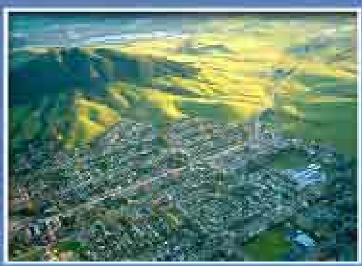
San Luis Obispo County
Master Water Report

Volume III of III

MAY 2012



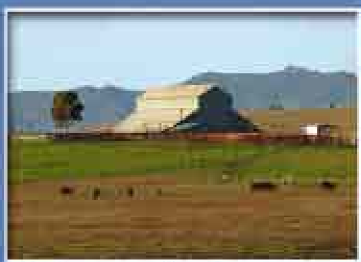


Photo taken by Glenn Bishop for the US-LT Resource Conservation District

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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San Luis Obispo County Flood Control and Water Conservation District

SAN LUIS OBISPO COUNTY MASTER WATER REPORT

May 2012

Expires on 3/31/13	**Expires on 6/30/12**	**Expires on 12/31/13**

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San Luis Obispo County Flood Control and Water Conservation District

SAN LUIS OBISPO COUNTY MASTER WATER REPORT

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PART III: WATER RESOURCE PLANNING

5.1 RELATIONSHIP OF MASTER WATER REPORT TO EXISTING DOCUMENTS

This chapter describes the relationship between the Master Water Report and the different State, County, and local agency water related documents, programs, or policies that guide water resource management decisions. In addition, this chapter also suggests coordination efforts that should occur in future updates to the Master Water Report that would promote consistency between the documents listed below.

5.1.1 California Water Plan

5.1.1.1 Description

The California Water Plan (CWP) provides a framework for water managers, legislators, other decision makers, and the public to consider options and make decisions regarding California's water future. The CWP, which is updated every five years, presents basic data and information on California's water resources including water supply evaluations and assessments of agricultural, urban, and environmental water uses to quantify the gap between water supplies and uses. The CWP also identifies and evaluates existing and proposed statewide demand management and water supply augmentation programs and projects to address the State's water needs.

The State's goal for the CWP is to meet Water Code requirements (Sections 10004 through 10013), receive broad support among those participating in California's water planning, and be a useful document for the public, water planners throughout the state, legislators and other decision-makers.

5.1.1.2 Relationship to Master Water Report (MWR)

This Master Water Report (MWR) utilized the California Water Plan for definitions of and information on water management strategies to consider in the County. To some extent, the MWR utilized the CWP's methodology of developing a range of future demands rather than one predicted demand value.

5.1.1.3 Timing

The CWP is on a schedule to release a 2013 update in March 2014, four years after the release of the 2009 Update. Since the requirement is to complete the updates every five years, the timing for a subsequent update is unclear. This MWR will assume the State follows this pattern for release every 4 years as a conservative approach.

5.1.1.4 Issues Related to Coordination

The CWP provides an opportunity for using consistent methodologies to develop water supply and demand estimates. However, it is important to evaluate the appropriateness of utilizing methodologies in the CWP locally. Items to consider include the data available versus the data needed, willingness and resources of individual agencies and groups that manage their water resources, resources of the District and County for future MWR updates, and various local issues that often are not accounted for adequately in State-wide templates.

5.1.1.5 Recommendations for Coordination

- Determine the appropriateness of utilizing CWP methodologies in future MWR updates
- Consider the timing of CWP updates in developing a schedule for updating the MWR

5.1.2 Integrated Regional Water Management Plan

5.1.2.1 Description

In November of 2002, Proposition 50 was passed by California voters, approving Chapter 8 (Water Code 79560 to 79565) and the Integrated Regional Water Management (IRWM) Program. To participate and be eligible for water resources planning and project grant funding, water agencies were asked to form a region when their jurisdictional boundaries overlap the same or connected watersheds and/or groundwater basins, and involve appropriate stakeholders to integrate water supply, water quality, ecosystem, and flood control issues into their water resources planning and projects. Associated grant program guidelines require the development and adoption of an IRWM Plan for the region prior to applying for grant funding.

The District, in cooperation with the Water Resources Advisory Committee (WRAC), has developed an IRWM Plan for the region defined as the County boundary. The San Luis Obispo County Region's IRWM Plan integrates all of the programs, plans and projects lead by entities within the region into water supply, water quality, ecosystem preservation and restoration, groundwater monitoring and management, and flood management programs. Depending on grant program funding criteria, projects within the IRWM Plan can be submitted by the District via the grant application process to the appropriate State agency for consideration. Additional State grant programs that utilize the IRWM Program include components of Propositions 84 and 1E.

5.1.2.2 Relationship to MWR

State guidelines require certain information be included in IRWM Plans, including a description of the region, water supply and demand information, and water resources projects and programs. The MWR is incorporated into appropriate sections of the IRWM Plan in accordance with the guidelines. The IRWM Plan also contains goals and objectives for water resources management that are utilized in the MWR for evaluating strategies to address water supply and demand discrepancies,

5.1.2.3 Timing

There is no set requirement for updating IRWM Plans. However, release of new guidelines for new grant opportunities and grant requirements can drive and/or set timelines. For example, the San Luis Obispo County Region's 2007 IRWM Plan will be updated in 2011-2012. This will be done in order to either meet current guidelines prior to the next round of grant funding, or to comply with a potential grant opportunity for 2011 that requires update of an IRWM Plan to current guidelines within 2 years of executing a grant agreement.

5.1.2.4 Issues related to coordination

Since the District is currently the lead agency in developing both the IRWM Plan and MWR in coordination with the WRAC, the main issue with coordination is limited to availability of District resources to manage both documents.

5.1.2.5 Recommendations for coordination

Via the WRAC, consider modifying the governance structure for IRWM Plan development and implementation to diversify resources for IRWM Plan development and implementation, to ensure it is a stakeholder-driven effort and to free up District resources for implementation of MWR recommendations. Incorporate climate change considerations included in future IRWM Plans into future drafts of the MWR.

5.1.3 County General Plan

California law requires every city and county in the state to prepare and adopt a comprehensive long-range General Plan for the physical development of the jurisdiction (California Government Code §65300). Each General Plan must include seven mandatory elements: land use, circulation, housing, conservation, open space, safety, and noise. General Plans may include other optional elements as desired. Any discussions of water in the General Plan must also be prepared in coordination with water suppliers (3,000 connections or more) and include any information on water supply and demand prepared pursuant to §65352.5 (CA Government Code). The following section discusses the components of the County's General Plan that are relevant to the MWR.

5.1.3.1 Conservation and Open Space Element

5.1.3.1.1 *Description*

San Luis Obispo County has an abundance of natural resources and open space features that are fundamental to our quality of life. These features include majestic natural landmarks, outstanding scenic vistas, important wildlife habitats, diverse natural communities, unique historic and cultural resources, vibrant lakes and creek corridors, dynamic coastal and marine environments, clean air, and bountiful soils. However, the County's special character is vulnerable to development pressure that can incrementally degrade biodiversity and threaten ecologic, historic, scenic, and other natural resources.

The Conservation and Open Space Element (COSE) is a tool to protect and preserve these unique community resources. Conservation is the planned management, preservation, and wise utilization of natural resources and landscapes to ensure their availability when needed. Conservation means using efficient technologies and changing wasteful habits. Conserving, renewing, and restoring natural resources will assure their greatest ecologic, economic, or social benefit over time. This is necessary in order to enjoy scenic beauty and recreation, eliminate or minimize premature and unnecessary conversion of open space to urban uses, maintain public health and safety, and support a vital economy.

The state requires conservation elements to address water issues with regard to the conservation, development, and utilization of this resource. The COSE contains goals, policies, and policy implementation strategies to this effect for the unincorporated areas of the County.

5.1.3.1.2 *Relationship to MWR*

This MWR was developed with consideration of COSE policies, goals and implementation strategies to project supply and demand and to evaluate and recommend strategies to address discrepancies in supply and demand projections. It is anticipated that implementation of recommendations in the MWR will accomplish certain water resources policy implementation strategies in the COSE and vice versa.

5.1.3.1.3 *Timing*

The County's COSE was updated in 2010. There is no set schedule for COSE updates; however, individual policy implementation strategies are anticipated to be initiated over time.

5.1.3.1.4 *Issues related to Coordination*

Since the COSE and this MWR were developed utilizing IRWM Plan goals and objectives, the two efforts are well aligned.

5.1.3.1.5 *Recommendations for Coordination*

Coordinate between County Departments as appropriate and in conjunction with the WRAC on the implementation of MWR recommendations and COSE policy implementation strategies related to water resources.

5.1.3.2 <u>Land Use and Circulation Element</u>

5.1.3.2.1 *Description*

The Land Use and Circulation Element (LUCE) of the General Plan contains policies that govern the way land is used and the way people move around in the unincorporated areas of San Luis Obispo County. The LUCE update (currently underway) is a consolidation and revision of the current LUCE for the rural areas of the county. The update will focus on planning at a regional level in order to protect agriculture and other important resources, and planning for expected growth through the year 2035, including economic development and a wider range of housing opportunities.

The LUCE will confront challenges within San Luis Obispo County such as long-term water resources, increased cost of infrastructure, effects of increasing rural development, and rural growth and the effects on agriculture, as well as traffic volumes and congestion. Addressing these issues will help to assure a sustainable and growing economy.

Objectives of the LUCE include, but are not limited to:

- Consolidating 15 planning areas into fewer areas (using watersheds and groundwater basins as boundaries),
- Implementing the County's strategic growth policies and state legislation (Senate Bill 375) by shifting inappropriate rural growth potential away from rural areas and protecting agricultural and natural resources,
- Planning for growth based on sustainable resources,
- Engaging in a high level of collaboration with communities, mutual water companies, community services districts, and cities.

5.1.3.2.2 *Relationship to MWR*

Both the LUCE and the MWR contain land-use based water demand projections for the unincorporated rural and agricultural areas of the County and coordinate with appropriate water providers for water resources planning information within urban and village reserve lines. One of the major themes for the LUCE update is planning so that future growth is in keeping with resources such as water supply so that both are sustainable. The MWR also seeks to understand the effect of allowable land use on water resources.

5.1.3.2.3 *Timing*

An update to the LUCE started in January 2010 and is anticipated to be completed in August of 2012.

5.1.3.2.4 *Issues related to Coordination*

The main issues are related to timing and planning area designations. Since the LUCE is being updated after the majority of the analysis in this MWR had been completed, water demand estimates will likely be different. While both were based on allowable land uses according to the current General Plan, the analysis for the LUCE update will be even more refined and on a parcel-specific basis. In selecting planning area designations, the MWR was free to utilize watersheds and groundwater basins, with consideration of local/sub-regional water resources-related jurisdictions, while the LUCE will likely use the Coastal Zone boundary in the formation of its planning area designations in order to address different land use requirements in the Coastal Zone versus the inland areas. Other than the Coastal Zone boundary, however, the planning area designations for the MWR and the LUCE are anticipated to be very consistent.

5.1.3.2.5 *Recommendations for Coordination*

- Utilize the land use analyses conducted for the LUCE in future MWR updates which will aid in demonstrating the effect on water resource demands between allowable land uses in the current General Plan versus land uses that are recommended based on implementation of strategic growth principles. Understanding this difference will aid the County, and potentially others, in determining effective land use based strategies to sustain water resources,
- Maintain a GIS-based system for updates to both efforts in the future.

5.1.3.3 <u>County Resource Management System</u>

5.1.3.3.1 *Description*

The Resource Management System (RMS) component of the General Plan focuses on collecting data in order to avoid and correct resource deficiencies with regard to six essential resources: water supply, water systems, wastewater treatment systems, schools, roads, and air quality. This information historically has been compiled in an Annual Resource Summary Report (ASR) that guides decisions about balancing development with the resources necessary to sustain such development. It focuses on collecting data, identifying resource problems, and recommending solutions. The RMS contains “triggers” to implement certain actions such as conservation or supplemental water development measures to avoid or correct resource deficiencies. These triggers are designated as Levels of Severity I, II, and III, and are tied to time frames to implement improvements or to enhance declining resources.

When an ASR identifies a level of severity for an area, the Board typically directs staff to prepare a Resource Capacity Study (RCS) for that area. The RCS is to provide a more detailed analysis and determination of the level of severity prior to certifying the level of severity and taking action to address the deficiency. An RCS draws from existing studies and information to confirm the level of severity determination and recommends actions for the Board to take within its authority to address the resource issue.

5.1.3.3.2 *Relationship to MWR*

There is an opportunity for MWR updates to utilize data collected on an annual basis by the RMS to document and analyze current and historical trends of supply and demand, compare actual water demands to the predicted range of future demands, and assist water resource management efforts. The RMS and RCSs can monitor the implementation of MWR recommendations to track and provide updates on water resource management strategies that are being implemented throughout the County. Recommendations for improved monitoring throughout the County were adopted by the Board in 2009 that when implemented, will benefit both the RMS and MWR updates by providing better data to assess water supply and demand.

5.1.3.3.3 *Timing*

The ASRs for the RMS are based on the water year, July 1st to June 30th, and are generally reviewed and approved by the Board early the following calendar year. RCSs are developed upon direction by the Board.

5.1.3.3.4 *Issues Related to Coordination*

Historically, the RMS has collected and reported on actual pumping and delivery data from water providers throughout the County that are willing to provide the information on an annual basis. This may not be reflective of the demand factors water providers, and consequently the MWR, utilize for planning purposes to assess the amount of supply needed to meet demand. For example, a common methodology for determining the water demand for planning is a ten-year running average, to account for fluctuations in demand year to year. Efforts are underway to refine the approach to presenting data in the ASRs for the RMS with regard to this issue.

Rural and agricultural demand data are lacking in a majority of the County, making it challenging for both the RMS and the MWR to assess whether a certain water resource is being used at or beyond its capacity. While implementation of the recommendations from the 2009 RMS ASR, along with other voluntary efforts to provide data, will go a long way, data collected over a longer time frame is most useful for planning purposes.

The MWR covers the whole County while the RMS is generally limited to population centers. Therefore, the annual mechanism for data collection is also limited to population centers. The County should consider expanding the RMS to include all areas of the County,

5.1.3.3.5 *Recommendations for Coordination*

- Continue to consider the RMS's contribution to other efforts like the MWR and others listed in this chapter in refining the approach to periodic reports and Level of Severity definitions.
- Refine data collection efforts with consideration of ultimately utilizing the data to assess resource capacity and conditions.

5.1.3.4 Agricultural Element

5.1.3.4.1 *Description*

The Agriculture Element focuses on wisely managing and protecting agricultural land-use resources in San Luis Obispo County. The mission of the Agriculture Element is to identify those areas of the county with productive farms, ranches and soils, and establish goals, policies and implementation measures that will enable their long-term stability and productivity. Key policies that relate to water resources are included below:

AG Policy 10: Water Conservation.

a. Encourage water conservation through feasible and appropriate "best management practices." Emphasize efficient water application techniques; the use of properly designed irrigation systems; and the control of runoff from croplands, rangelands, and agricultural roads.

b. Encourage the U.C. Cooperative Extension to continue its public information and research program describing water conservation techniques that may be appropriate for agricultural practices in this county. Encourage landowners to participate in programs that conserve water.

AG Policy 11: Agricultural Water Supplies.

a. Maintain water resources for production agriculture, both in quality and quantity, so as to prevent the loss of agriculture due to competition for water with urban and suburban development.

b. Do not approve proposed general plan amendments or rezonings that result in increased residential density or urban expansion if the subsequent development would adversely affect: (1) water supplies and quality, or (2) groundwater recharge capability needed for agricultural use.

c. Do not approve facilities to move groundwater from areas of overdraft to any other area, as determined by the Resource Management System in the Land Use Element.

Other Related Policies

Several other policies speak to land use preferences and environmental protection that, when implemented, help to protect water resources and/or preserve water resources for agricultural uses,

5.1.3.4.2 *Relationship to MWR*

Recommendations in the MWR are consistent with the policies in the Agriculture Element with respect to promotion of conservation and best management practices, understanding the condition of County water resources and optimizing use of surface water supplies for urban areas and/or to relieve pressure on groundwater basins as a source of supply.

5.1.3.4.3 *Timing*

The Agriculture Element is not anticipated to be updated in the foreseeable future.

5.1.3.4.4 *Issues Related to Coordination*

Given the prevalence of agricultural operations in the County, and that they are largely independently owned and operated, evaluating agricultural water demand on a land use basis and applying the various land use policies within the General Plan could result in a range of water demand forecasts. The wide variety of crop production systems and irrigation amounts contribute to the range of demand forecasts. Conversely, defunding of the Williamson Act could result in major efforts to develop land currently in agriculture—with unanticipated impacts on water resources.

5.1.3.4.5 *Recommendations for Coordination*

- Ensure agricultural processing facilities are included in agricultural demand calculations as appropriate and in accordance with the Agriculture Element.
- Consider the effect of land use policies when evaluating future demand scenarios.
- Track how implementation of MWR recommendations also implements Agriculture Element policies.

5.1.4 Sub-Regional/Area Water Resources Planning Documents

5.1.4.1 Description

Water suppliers that provide water directly, or treated water indirectly, to 3,000 connections or more, or in an amount of 3,000 AFY or more, are required to submit Urban Water Management Plans (UWMPs) to the State every five years (years ending in 00 or 05). For urban water purveyors, the UWMP is possibly the most critical and current source of information for updating the Master Water Report. These UWMPs document:

- Water supply source descriptions
- Historical water demands and demand projections
- Implementation of demand management measures
- Water shortage contingency plans
- Other water resources management strategies

Other water suppliers may from time to time develop water system master plans that contain similar information, but focus primarily on water distribution infrastructure and not water supply.

On a sub-regional basis, there are groundwater basin management groups that have been formed, as a result of court proceedings or voluntarily, that conduct and report on groundwater basin supply, demands, conditions, and management efforts.

On a regional basis, the San Luis Obispo Council of Governments (SLOCOG) has produced Community 2050, a Blueprint for Tomorrow's Growth, which is a collaborative planning effort that utilizes scenario planning to study long-range regional growth. Together, public officials and community participants compared different growth scenarios using performance indicators such as traffic congestion, farmland conversion, housing production and economic benefit. Information derived from Community 2050 was presented in a regional vision to aid local jurisdictions in making improved investment decisions. Community 2050 includes water management principles and implementation strategies utilizing the region's 2007 IRWM Plan.

5.1.4.2 Relationship to MWR

These local, sub-regional and regional documents provide important supply and demand information and guidance on water management strategy evaluations for this MWR. Future updates to the water demand and supply sections of the MWR will be based primarily on these documents.

5.1.4.3 Timing

UWMPs are generally due to the State in years ending in 0 and 5. As a result of new legislation and changes to the Water Code, the deadline was extended to July 1, 2011, for 2010 UWMPs. Since UWMPs are prepared on a set schedule, updates to the MWR could be coordinated with the completion of these reports. Water System Master Reports are developed as needed by individual water suppliers. Reports from groundwater basin management groups are generally produced annually, with special studies released as needed. The draft Community 2050 document was released in December of 2008.

5.1.4.4 Issues related to coordination

Since there are so many individual water suppliers/management groups in the County, with various approaches to water resources planning, time-tables for completing or updating their documents, and levels of resources to participate in the development of the MWR, obtaining a consistent "snapshot" of supply and demand analyses can be a significant and challenging effort. Also, many of the water purveyors do not meet the water supply or service connection threshold for preparing an UWMP.

5.1.4.5 Recommendations for Coordination

- Develop a consolidated, coordinated mechanism for gathering County-wide water supply and demand information to avoid redundancy and ensure consistency.
- Consider the timing of release of local and sub-regional documents in developing a schedule for updating the MWR.
- Consider the analyses conducted to develop Community 2050 when updating the land use-based water demand analysis in the MWR.

5.2 RECOMMENDATIONS FOR FUTURE MASTER WATER REPORT UPDATES

One option is to update the MWR on a five year cycle, following the completion of UWMPs. Most water purveyors completed their 2010 UWMPs in June 2011. Unfortunately, this MWR update was initiated prior to the start of the 2010 UWMP cycle. The next cycle of UWMPs will be prepared in 2015 and the MWR could be updated in 2016 to have the most current urban water demand and supply information,

Other documents like the California Water Plan, the County General Plan, and IRWM Plan are not as predictable with their scheduled updates, so linking future MWR updates to these documents would not promote a consistent assessment of County-wide demands and supply,

Since UWMPs are updated in years ending in 0 or 5, the MWR could be updated in years ending in 1 or 6 (i.e. 2016, 2021, 2026, 2031…).

5.2.1 Areas of Improvement and Data Limitations

Certain areas discussed in this MWR update lacked sufficient data or the data was antiquated and did not reflect current conditions. Below is a brief list of areas where increased investigation or collection of current data would be useful in the long term planning needs of the County and future MWR updates,

- The description of hydrologic conditions of several groundwater basins are over 50 years old and should be updated.
- Future updates should gather groundwater supply information for undefined groundwater basins or fractured rock formations. Sufficient water supply appears to exist to support rural and commercial agricultural operations outside of defined basins and a better understanding of these supplies is needed,
- The agricultural demand assessment relied on the County Agriculture Commissioner's GIS pesticide database. The pesticide use permits provide the most accurate information available regarding the location of planned commercial agricultural production during the year, but in some instances may not be entirely accurate. Occasionally sites which obtain permits are not planted for a variety of reasons, and many vegetable crop sites may be planted with more than one crop rotation during a year (Isensee, 2009). More detailed investigation should be invested to assess the demands from these irrigated pastures that are not reported to the Agriculture Commissioner. The District could also consider completing a separate study that focused entirely on the County's agricultural demands and developing accurate irrigation rates by water planning area.

- The rural water demand assessment will need to be revised to match the County Planning Department's update on rural development and subdivision potential in unincorporated areas of the County,
- The current approach for evaluating the County's demands by water planning area should be refined to investigate the demand versus supply on a groundwater basin or watershed basis. The water planning areas could be maintained, but the understanding between demand and source of supply would be improved if the investigation looked more closely than the water planning area level.
- Environmental water demand planning-level assessments such as this one do not take the complexity of natural systems into consideration. Site- and project-specific instream flow requirements need to be completed to be able to determine a water balance that accounted for environmental water demand on a water planning area basis in future Master Water Reports. This would allow the environmental water demand to be quantified and represented on a sub-watershed or creek basis. The first steps in this effort are establishing appropriate data collection sites, identifying opportunities for coordination with appropriate entities on the effort and prioritizing locations to study first.

APPENDIX A - TM NO. 1, DESCRIPTION OF AVAILABLE DATE, PREPARED BY WALLACE GROUP IN ASSOCIATION WITH CAROLLO ENGINEERS, FUGRO WEST INC., AND CLEATH-HARRIS GEOLOGISTS

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

TECHNICAL MEMORANDUM NO. 1

AVAILABLE DATA DESCRIPTION

DRAFT
April 2011

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SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

AVAILABLE DATA DESCRIPTION

TECHNICAL MEMORANDUM NO. 1

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DESCRIPTION OF AVAILABLE DATA

This Chapter provides an overview of the data available with respect to water resources in San Luis Obispo County (County). In addition to this memorandum, excerpts from the County's Data Enhancement Plan, which describes the County's water resources data collection network, are provided in Chapter 3 of the Master Water Plan (MWP). Included in this technical memorandum are brief descriptions and an overview of information related to available data for the following:

- Groundwater
- Stream Flow
- Precipitation
- Reservoirs
- Water Quality (import and surface waters, groundwater)

1.0 GROUNDWATER

There are many different types of data related to groundwater and hydrogeology. Information categories may include aquifer descriptions, hydraulic parameters, geologic cross-sections, base of permeable sediments maps, water levels and water level contour maps, groundwater in storage, hydrologic budgets, safe yield estimates, water demand, and water quality. Some of the data changes over time, requiring periodic monitoring. The MWP process updates groundwater information using the most recent available data in the public domain. The County has also implemented a Data Enhancement Plan, which will utilize the information from this MWP Update to populate a comprehensive database that includes groundwater data.

The tables below provide a reference guide to groundwater information for the various groundwater basins in the County. Many of the references contain historical information that is not used for this MWP update; however, they are of value to understanding a basin's hydrogeology and groundwater resources. The State Department of Water Resources also maintains an inventory of groundwater basins, with descriptive information that is updated periodically. Most local basins are identified with a DWR basin number, which is included in the data reference tables. Refer to Chapter 3 and Appendix B of the Master Water Plan for a detailed description of groundwater resources in the County.

Table 1.1 Groundwater Reference Table 1
Description of Available Data
San Luis Obispo County Flood Control and Water Conservation District

Sub-Region	Basin / Area	DWR Groundwater Basin reference number	Groundwater References[a]	Water Quality References[a]
North Coast	San Carpoforo Valley	3-33	1, 2, 3	1, 2, 3, 4
	Arroyo de la Cruz Valley	3-34	1, 2, 3	1, 2, 3, 4
	Pico Valley		102, 144	
	San Simeon Valley	3-35	1, 2, 3, 101, 105, 106, 107, 142, 143	1, 2, 3, 4, 101, 104, 105, 106, 107, 142, 143
	Santa Rosa Valley	3-36	1, 2, 3, 101, 103, 105, 106, 107	1, 2, 3, 4, 101, 104, 105, 106, 107
Inland West	Atascadero Subbasin	3-4.06	1, 3, 110, 111, 112, 113, 114, 116, 117, 118, 119, 120, 121, 122	108, 109, 110, 111, 112, 116, 117, 120, 121
	Paso Robles Basin	3-4.06	1, 3, 111, 112, 113, 114, 115, 123, 124, 125, 76, 127, 128, 129, 130, 131, 132, 139, 140	1, 3, 111, 112, 115, 123, 124, 125, 126, 129, 130, 131, 132, 133, 134, 136, 139, 140
	Santa Margarita Valley	3-4.06	1, 3, 137, 138, 141, 145	1, 3, 135, 137, 138, 141
Inland Central	Paso Robles Basin	3-4.06	1, 3, 111, 112, 113, 114, 115	1, 3, 111, 112, 115
	Rinconada Valley	3-43	1, 3	
Inland East	Paso Robles Basin	3-4.06	1, 3, 111, 112, 113, 114, 115, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 139, 140	1, 3, 111, 112, 115, 123, 124, 125, 126, 129, 130, 131, 132, 133, 134, 136, 139, 140
	Carrizo Plain	3-19	1, 3	1
	Cholame Valley	3-5	1, 3	
	Pozo Valley	3-44	1, 3	1, 3
	Rafael Valley	3-46	1, 3	
	Big Spring Area	3-47	1, 3	

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Table 1.2 Groundwater Reference Table 2
Description of Available Data
San Luis Obispo County Flood Control and Water Conservation District

Sub-Region	Basin/Area	DWR reference number	Groundwater References	Water Quality References
North Coast	Villa Valley	3-37	1, 2, 3, 28, 37	1, 2, 3, 4
	Cayucos Valley	3-38	1, 2, 3, 5, 6, 37, 61	1, 2, 3, 4, 5
	Old Valley	3-39	1, 2, 3, 36, 37, 61	1, 2, 3, 4, 36, 66
	Toro Valley	3-40	1, 2, 3, 5, 37	1, 2, 3, 4, 5
	Morro Valley	3-41	3, 7, 8, 9, 28, 36, 37	4, 7, 8, 9, 11, 36
	Chorro Valley	3-42	3, 7, 8, 10, 28, 37	4, 7, 8, 10, 11, 29, 30
	Los Osos Valley	3-8	3, 12, 13, 14, 15, 19, 28, 36, 37, 52, 70, 71, 72	4, 16, 17, 18, 20, 21, 29, 36, 70
South Coast - North	San Luis Obispo Valley	3-9	3, 22, 28, 32, 33, 36, 37, 68	4, 22, 23, 29, 30, 32, 33, 36, 68
	Edna Valley	3-9	3, 25, 28, 37, 46	4, 24, 29
South Coast - South	Pismo Valley	3-12	3, 26, 34, 45, 46	4, 29
	Arroyo Grande Creek Valley	3-12	3, 26, 28, 37, 42, 43, 45	4, 29, 30
	Northern Cities	3-12	3, 26, 28, 31, 37, 41, 42, 43, 45, 48, 57	4, 29, 48, 57, 62, 63
	Nipomo Mesa	3-12	3, 26, 27, 28, 37, 38, 40, 44, 45, 48, 52, 57, 73, 74	4, 29, 30, 39, 44, 48, 57, 67, 74
	Santa Maria Valley	3-12	3, 26, 28, 36, 37, 45, 47, 49, 50, 51, 54, 56, 57, 60, 73	4, 29, 30, 36, 49, 54, 56, 57, 60
	Huasna Valley	3-45	3, 37	4
	Cuyama Valley	3-13	3, 37, 51, 58, 59	4, 29, 30, 36, 58

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2.0 STREAM FLOW

Refer to Chapter 3 and Appendix D of the Master Water Plan for a description of available stream flow data.

3.0 PRECIPITATION DATA SOURCES

Precipitation data is important to reference to understand how various micro-climates throughout the County or region impact local water demands. SLOCountyWater.org has a hyperlinked map of nearly 100 precipitation gages throughout the County with data associated with each gage. There are three types of gages, ALERT, Field Download, and Volunteer, each with its own level of data detail as described below:

- ALERT Gages: These automated gages provide real-time rainfall data. Historic data is not available from the website.
- Field Download Gages: Provide daily rainfall totals for the entire period of record. Short duration intensities are also shown for each water year.
- Volunteer Gages: Provide daily rainfall totals for the period of record and include a summary of monthly rainfall totals for the period of record. Some gages have continuous measurements from over 50 years of record.

The County Hydrology Report provides detailed descriptions and data for precipitation gages listed on the SLOCountyWater.org website.

The County Flood Control and Water Conservation District published an isohyetal map of the County showing average annual precipitation based on a 42-year period from 1956 to 1998. The map (Figure 1 below) is part of the County's Department of Public Works Public Improvement Standards.

The California Data Exchange Center (CDEC) (http://cdec.water.ca.gov/precip_maps/cc_1212precip.html) shows a map of 12 precipitation gages throughout the County with data associated with each gage. Some gages have over 100 years of record. Some data are monthly, but most are hourly.

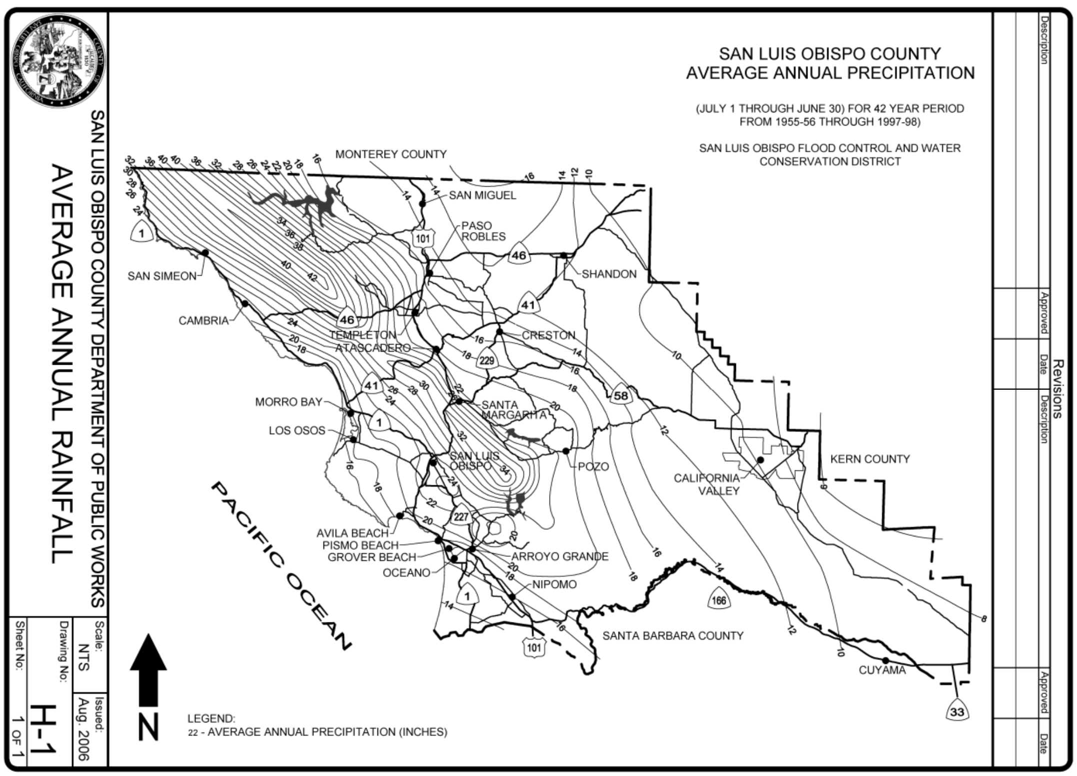
The California Irrigation Management Information System (CIMIS) (http://wwwcimis.water.ca.gov/cimis/welcome.jsp) weather stations collect weather data on a minute-by-minute basis, calculate hourly and daily values and store them in the data loggers. A computer at the Department of Water Resources (DWR) headquarters in Sacramento calls every station starting at midnight Pacific Standard Time (PST) and retrieves each day's data. Registered users may obtain not only rainfall, but many other weather data from this site, including evapotranspiration, temperature, wind speed, humidity, etc. There are four CIMIS weather stations in the County, with two in San Luis Obispo, one in Atascadero and one in Nipomo.

The National Weather Service (http://www.cnrfc.noaa.gov/rainfall_data.php) collects and reports data from approximately 28 rainfall gages in the County. Users can create custom maps showing daily rainfall totals for each County gage for any day back to November 2005. Data from earlier periods are available in other formats.

National Oceanic and Atmospheric Administration (NOAA) rainfall maps (NOAA Atlas 2) are available at http://www.nws.noaa.gov/oh/hdsc/noaaatlas2.htm. These maps provide precipitation depths for 2, 5, 10, 25, 50, and 100-year storms for both 6-hour and 24-hour intervals. The underlying data for these maps is being updated and a new atlas will be released later this year (2009).

More information on precipitation data is available in Chapter 3 of the MWP.

Figure 1 County-wide Isohyetal Map of Average Rainfall



4.0 RESERVOIR DATA SOURCES

This section describes the available data sources for County-wide water supply reservoirs, and information on storage, elevations, and water allocations. Details of water allocations and contractual arrangements with purveyors, is discussed in Chapter 3 and Appendix C of the MWP.

4.1 Data Sources

SLOCountyWater.org has a hyperlinked map of six county reservoirs with some data associated with each reservoir:

- Lopez Lake: Daily storage and release data from 2000 to present and from 1968 to 1998 in tabular form. Monthly data from 1968 to 1998. Also gives general information on capacity (49,388 AF) and maximum water elevation (523 feet)

- Nacimiento Lake: Current Daily data for the past week, including storage, releases, and rainfall. Also gives general information on capacity (377,900 AF) and maximum water elevation (800 feet)

- Santa Margarita Lake (Salinas Reservoir): Daily storage and release data from 1970 to present in tabular or graphical plots. Monthly data from 1942 to 1971 and 1984 to 2002. Also gives general information on capacity (23,843 AF) and maximum water elevation (1300.74 feet)

- Whale Rock: Daily storage data from 2005 to 2007 to present in tabular format. Also gives general information on capacity (40,662 AF) and maximum water elevation (216 feet)

- Twitchell Reservoir: Though located in SLO County, it is operated by SB Co FCD as a flood control structure and is not used directly for water supply (though releases are metered to maximize groundwater recharge in the Santa Maria River, which recharges the Santa Maria Groundwater Basin, used by numerous purveyors in the south county).

CDEC (http://cdec.water.ca.gov/staInfo.html) has historical information for Nacimiento Lake, Santa Margarita, and Whale Rock (Lopez Lake is not included).

- Nacimiento Lake: Monthly storage data from 1958 to present in CSV format or graphical plots. Also gives general information on capacity (377,900 AF), monthly averages, crest elevation (825')

- Santa Margarita Lake: Monthly storage data from 1956 to present in CSV format or graphical plots. Also gives general information on capacity (23,000 AF), monthly averages, crest elevation (1,325')

- Whale Rock: Monthly storage data from 1961 to present in CSV format or graphical plots. Also gives general information on capacity (40,700 AF), monthly averages, crest elevation (233')

The City of San Luis Obispo Utilities Department' website (http://www.slocity.org/utilities/sources.asp) describes the present and future water supply sources for the City of San Luis Obispo, including Whale Rock Reservoir and Santa Margarita Lake. The City's 2005 UWMP also describes the two reservoirs in detail, including operation, safe yield, siltation issues, and Salinas Reservoir expansion plans (currently on hold).

Zone 3's 2005 Urban Water Management Plan (2005 UWMP) provides data and other information for Lopez Reservoir and the various entities that use it as a water source. Size, safe yield, allocations and other information is included.

The County Hydrology Report provides descriptions and data for all County reservoirs, including Chorro Creek Reservoir, used by the California Men's Colony. The data table on page 110 of this report provides a concise source of information for each reservoir.

5.0 WATER QUALITY

This subsection describes the available water quality information and data, relative to County-wide groundwater basins, and water quality data available from water purveyors.

5.1 Sources of Data

The sources of data available are briefly described in this subsection. Available Consumer Confidence Reports CCR were referenced for each of the water purveyors. Appendix C of the MWP includes a water quality summary table organized by water purveyor.

6.0 UNIMPAIRED RUNOFF

Refer to Chapter 3 and Appendix D of the Master Water Plan for a description of available unimpaired runoff data.

7.0 LAND USE

Refer to Chapter 3 and Appendix D of the Master Water Plan for a description of available land use data.

8.0 AGRICULTURE

Refer to Chapter 3 and Appendix D of the Master Water Plan for a description of available agriculture data.

APPENDIX B - TM NO. 2, WATER SUPPLY INVENTORY AND ASSESSMENT – DESCRIPTION OF WATER RESOURCES, PREPARED BY WALLACE GROUP IN ASSOCIATION WITH FUGRO WEST INC., AND CLEATH-HARRIS GEOLOGISTS

TECHNICAL MEMORANDUM NO. 2

Date: March 29, 2010 (Updated 1.21.11)

To: JOSE GUTIERREZ, CAROLLO ENGINEERS

From: STEVE TANAKA, WALLACE GROUP

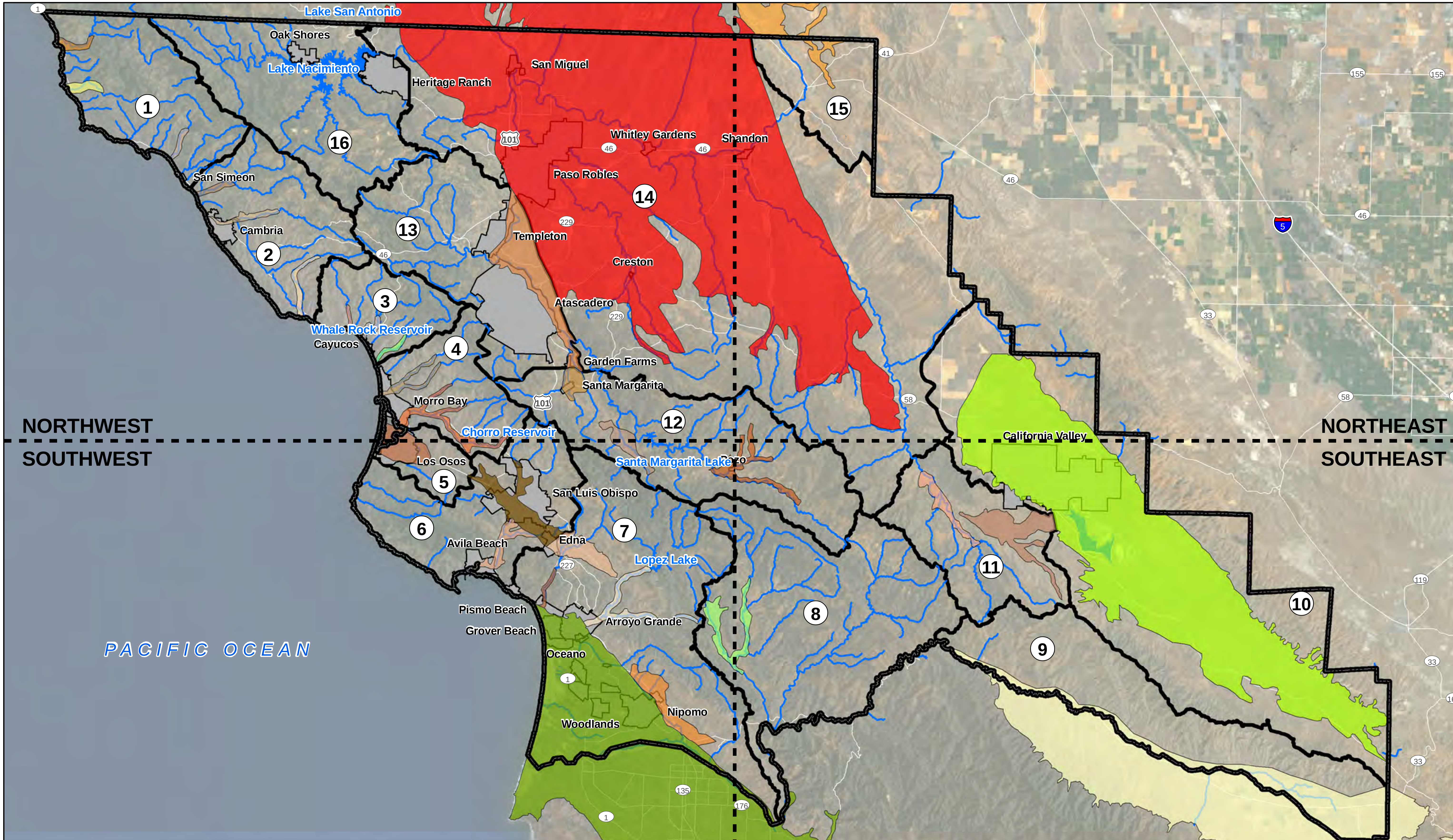
Subject: TASK C.3 WATER SUPPLY INVENTORY AND ASSESSMENT – DESCRIPTION OF WATER RESOURCES

In conjunction with Fugro West, Inc. and Cleath-Harris Geologists, we are submitting this technical memorandum No. 2 (TM) for Task C.3, Description of Water Resources. This TM focuses on groundwater resources throughout the County. A detailed list of groundwater reference documents, formatted as an Appendix, is to be included in the Master Water Plan. Water system production and consumption and other water resources including recycled water and desalination, is addressed in TM No. 3, Task C.3.

Groundwater basins are described in the following sections. The descriptions are arranged by Sub-region and Water Planning Area, as shown in Table 2.1 Refer to Figure 2.1 for a map depicting the groundwater basins in the region, and to Figures 2.2, 2.3, 2.4 and 2.5, respectively, showing four corresponding "quadrant" figures for basins in the northwest, northeast, southwest, and southeast areas of the County.

Table 2.1 – Groundwater Basins by Sub-Region

Sub-Region	WPA	Basin Name	Subbasin/Area
North Coast	1	San Carpoforo Valley	
		Arroyo de la Cruz Valley	
		Pico Creek Valley	
	2	San Simeon Valley	
		Santa Rosa Valley	
		Villa Valley	
	3	Cayucos Valley	
		Old Valley	
		Toro Valley	
	4	Morro Valley	
		Chorro Valley	
	5	Los Osos Valley	
South Coast	6	San Luis Obispo Valley	San Luis Valley Subbasin
			Avila Valley Subbasin
	7		Edna Valley Subbasin
		Santa Maria Valley	Pismo Creek Valley Subbasin
			Arroyo Grande Valley Subbasin
			Nipomo Valley Subbasin
			Northern Cities Management Area
			Nipomo Mesa Management Area
			Santa Maria Valley Management Area
	8	Huasna Valley	
	9	Cuyama Valley	
Inland	10	Carrizo Plain	
	11	Rafael Valley	
		Big Spring Area	
	12	Santa Margarita Valley	
		Rinconada Valley	
		Pozo Valley	
	13	Paso Robles	Atascadero Subbasin
	14		Paso Robles (main basin area)
	15	Cholame Valley	
	16	(none)	Nacimiento



San Luis Obispo County Flood Control and Water Conservation District

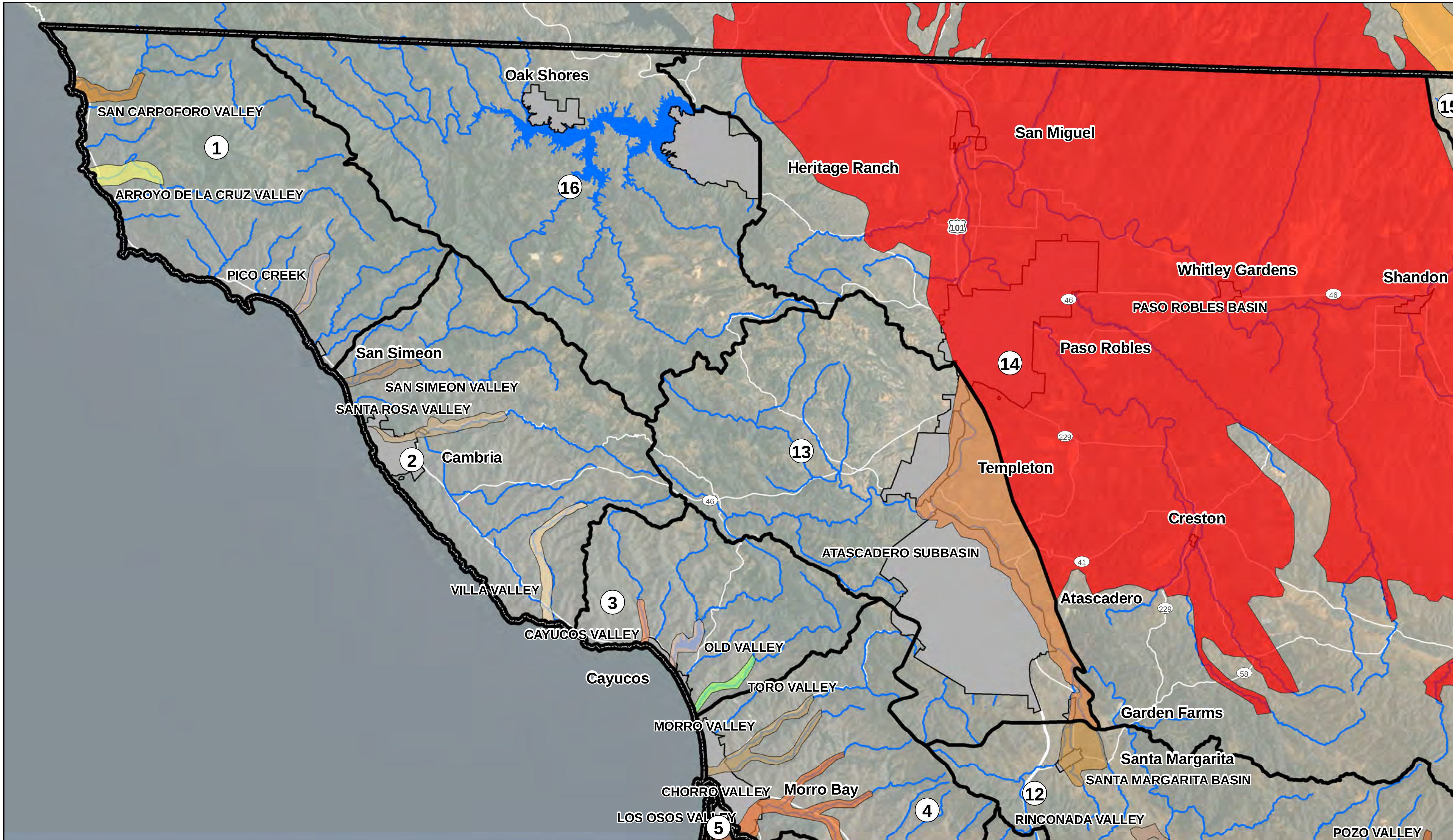
MASTER WATER PLAN

GROUNDWATER BASIN MAP

FIGURE 2.1

Legend

- County Boundary
- Water Planning Area
- Water Body
- URL/VRL Boundary
- Major Rivers/Streams



San Luis Obispo County Flood Control
and Water Conservation District

N

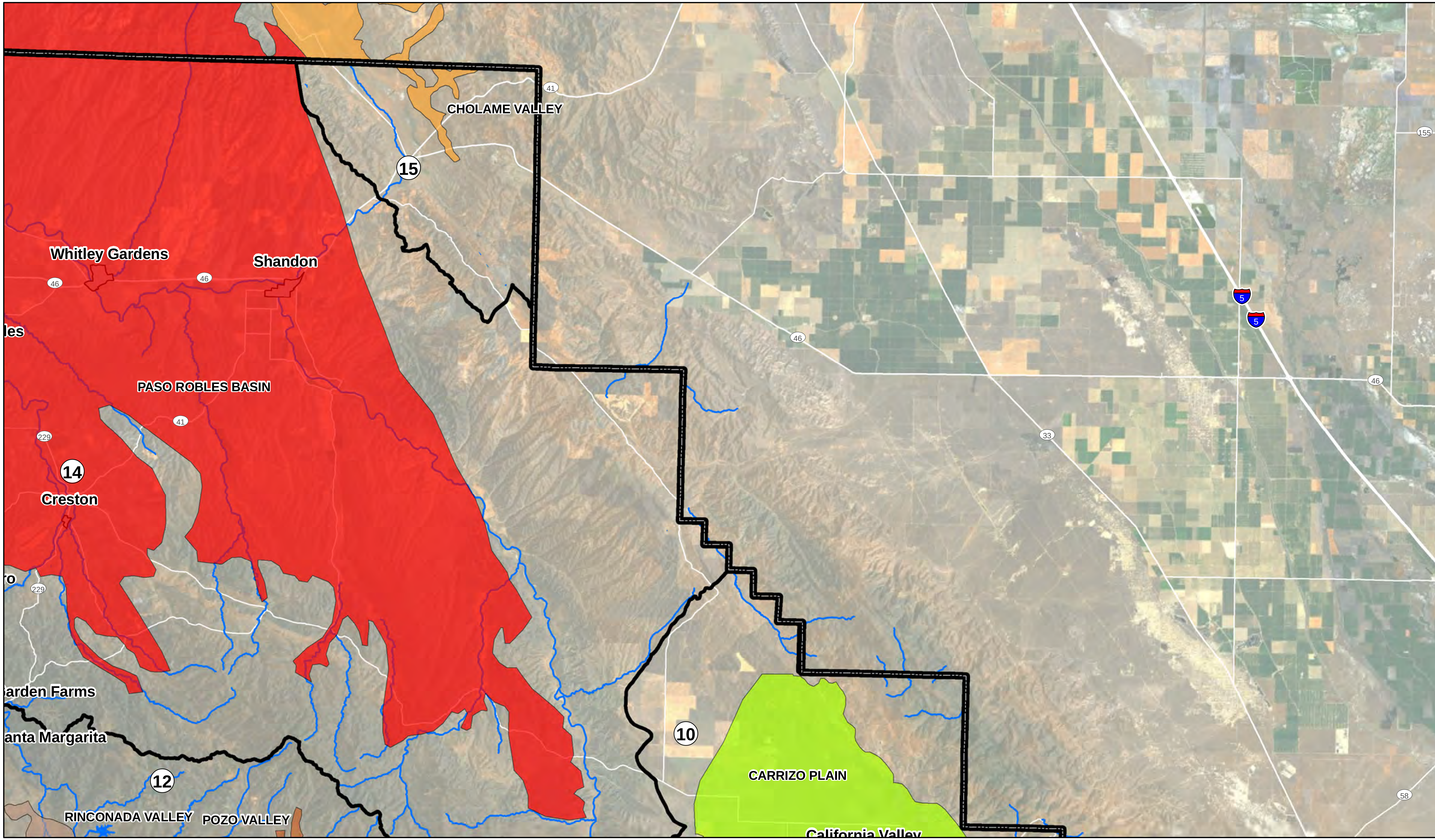
MASTER WATER PLAN

GROUNDWATER BASIN MAP NW

FIGURE 2.2

Legend

County Boundary
URL/VRL Boundary
Water Planning Area
Water Body
Major Rivers/Streams
Management Areas



San Luis Obispo County Flood Control and Water Conservation District

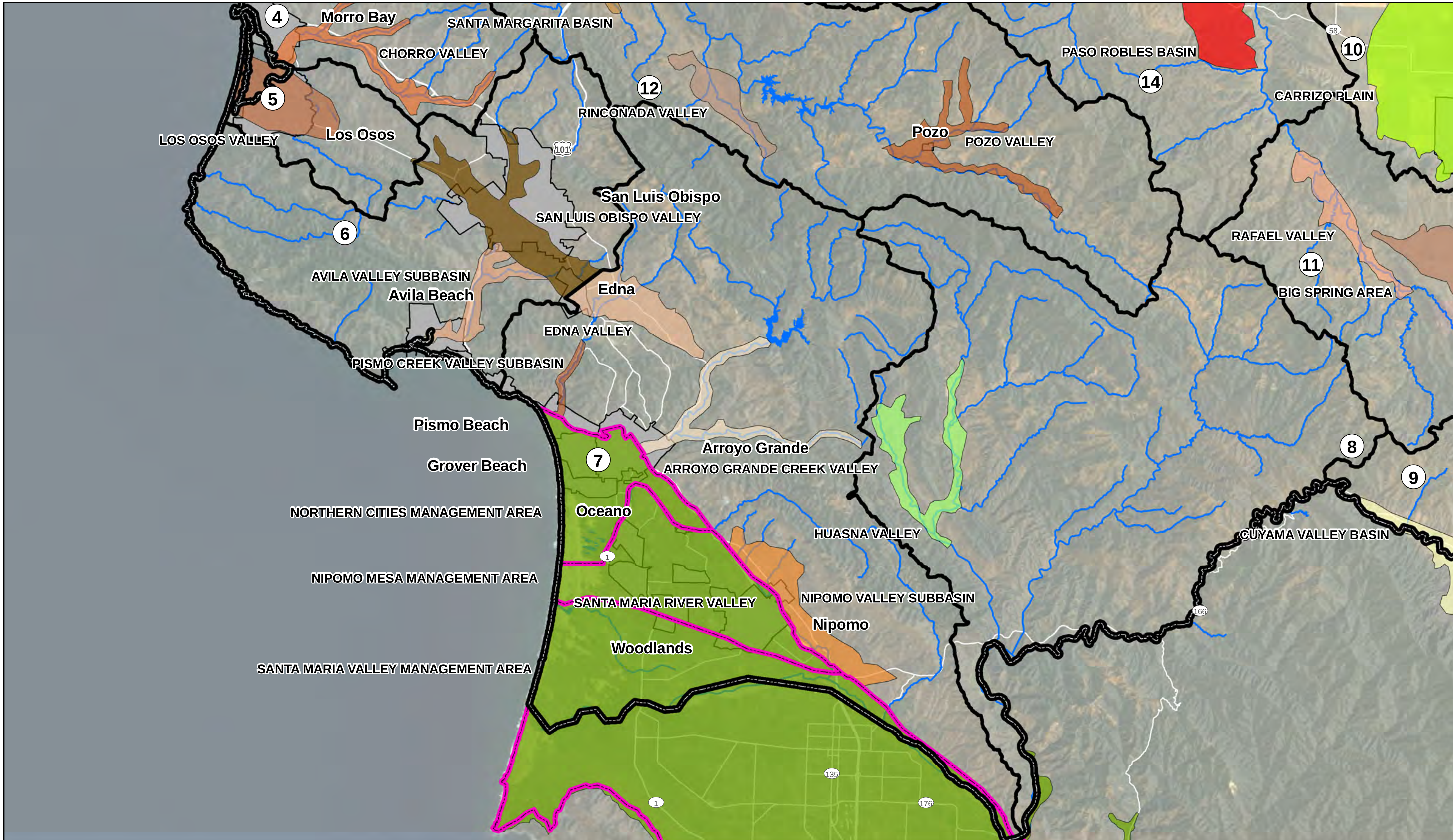
MASTER WATER PLAN

GROUNDWATER BASIN MAP NE

FIGURE 2.3

Legend

County Boundary
Water Planning Area
Major Rivers/Streams
URL/VRL Boundary
Water Body



San Luis Obispo County Flood Control and Water Conservation District

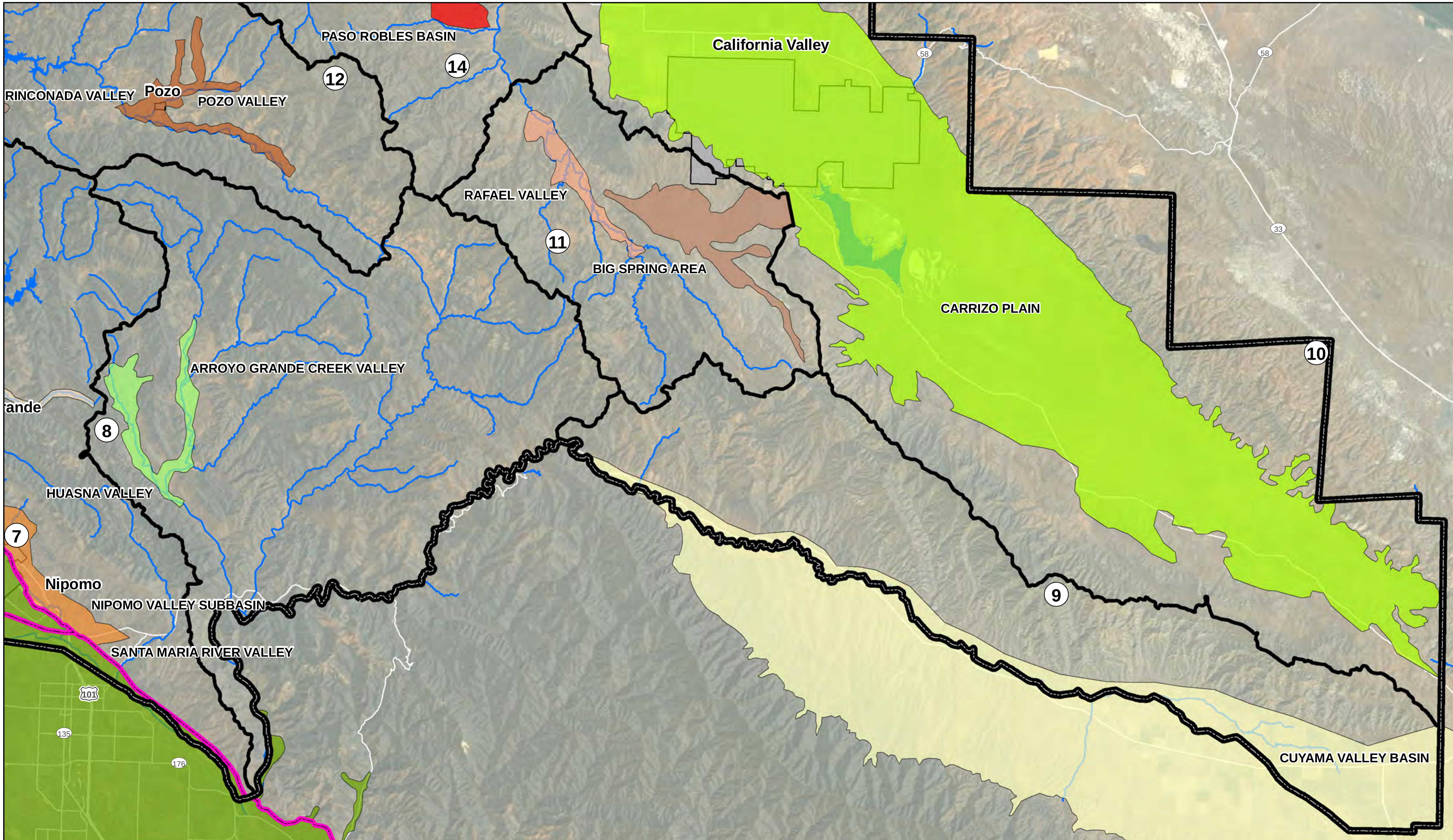
MASTER WATER PLAN

GROUNDWATER BASIN MAP SW

Legend

County Boundary
Water Planning Area
Major Rivers/Streams
URL/VRL Boundary
Water Body
Management Areas

FIGURE 2.4



San Luis Obispo County Flood Control and Water Conservation District

N

MASTER WATER PLAN

GROUNDWATER BASIN MAP SE

FIGURE 2.5

Legend

- County Boundary
- Water Planning Area
- Major Rivers/Streams
- URL/VRL Boundary
- Water Body
- Management Areas

NORTH COAST SUB-REGION

The North Coast sub-region is comprised of five Water Planning Areas (WPA's), including San Simeon (WPA 1), Cambria (WPA 2), Cayucos (WPA 3), Morro Bay (WPA 4), and Los Osos (WPA 5). A brief description of the basins within each WPA is provided below, with details on groundwater supply aquifers, groundwater users, basin yield, water quality, and water availability.

San Simeon Water Planning Area (WPA) 1

Groundwater basin descriptions in WPA 1 include San Carpoforo Valley, Arroyo de la Cruz Valley, and Pico Creek Valley.

San Carpoforo Valley Basin

The San Carpoforo Valley Groundwater Basin is located in the WPA 1 of the North Coast sub-region (Figure 2.2) and is identified in California's Groundwater Bulletin 118 as Groundwater Basin Number 3-33 (DWR, 2003). The basin underlies the San Carpoforo Valley and is 200 acres (0.3 square miles) in size. It is bounded to the west by the Pacific Ocean and on all other sides by impermeable rocks of the Jurassic to Cretaceous age Franciscan Group. The valley is drained by San Carpoforo Creek. Average annual precipitation in the basin ranges from 21 to 25 inches. Recharge to the basin comes primarily from seepage of surface flows in San Carpoforo Creek and deep percolation of precipitation.

Published hydrogeologic information for this basin is compiled from older reports and may not be representative of current conditions. If the District requires more current or detailed information for this basin, new studies would be necessary. Information currently compiled by County departments (such as well logs for private wells or water quality for shared well systems) would be useful to these studies. Additional information may be available from the DWR and private sources.

Supply Aquifers. According to Bulletin 118, groundwater is found in Holocene and late Pleistocene age alluvium (DWR, 2003). Recharge to the basin is predominantly percolation of stream flow and to a lesser extent percolation of precipitation and irrigation return flows. The groundwater storage capacity was estimated as 1,800 AF. There are no current estimates of actual groundwater in storage volumes. The volume of groundwater in storage likely fluctuates widely in response to seasonal variations in rainfall and pumping extractions.

Water Users. There are no municipal or public water purveyors in the basin. All pumping in the basin is for agricultural purposes and by overlying users.

Basin Yield. No estimates of basin yield exist.

Water Quality. No information is available describing water quality in the basin.

Water Availability. The primary constraints on water availability in the basin include physical limitations and potential water quality issues. Groundwater levels in the basin are likely highest during the wet season, steadily decline from these levels during the dry season, and recover again to higher levels during the next wet season. During drought periods, flows in San

Carpoforo Creek are likely insufficient to adequately recharge the channel alluvium and groundwater levels could subsequently be lowered significantly due to pumping. Significant lowering of basin groundwater levels at or below sea level near the coast could lead to seawater intrusion and degradation of water quality. Additional constraints that would limit water availability in the basin are unknown.

Arroyo de la Cruz Valley Basin

The Arroyo De La Cruz Valley Groundwater Basin is located in the WPA 1 of the North Coast sub-region (Figure 2.2) and is identified in California's Groundwater Bulletin 118 as Groundwater Basin Number 3-34 (DWR, 2003). The basin is 750 acres (1.2 square miles) in size and is bounded by the Pacific Ocean to the west and on all other sides by impermeable rocks of Jurassic to Cretaceous age Franciscan Group. The basin underlies a valley that is drained by Arroyo De La Cruz. Annual precipitation in the basin ranges from 20 to 24 inches. Recharge to the basin comes primarily from seepage of surface flows in Arroyo de la Cruz, deep percolation of precipitation, and agricultural irrigation return flows.

Published hydrogeologic information for this basin is compiled from older reports and may not be representative of current conditions. If the District requires more current or detailed information, new studies would be necessary. Information currently compiled by County departments (such as well logs for private wells or water quality for shared well systems) would be useful to these studies. Additional information may be available from the DWR and private sources.

Supply Aquifers. According to Bulletin 118, the main water-bearing unit in the basin is Holocene to late Pleistocene age alluvium (DWR, 2003). The alluvial deposits consist of sand, gravel, and clay and are up to 130 feet thick. Groundwater is largely unconfined, with water level elevations above sea level. The specific yield of the basin is estimated as 18 percent. Recharge in the basin is predominantly from percolation of stream flow and to a lesser extent from percolation of precipitation and irrigation return flows. Groundwater movement is generally westward. The groundwater storage capacity is estimated as 6,600 AF; however the actual amount in groundwater storage is unknown. The volume of groundwater in storage likely fluctuates widely in response to seasonal variations in rainfall and pumping extractions.

Water Users. There are no municipal or public water purveyors in the basin. All pumping in the basin is for agricultural purposes and by overlying users.

Basin Yield**.** The safe yield of the basin was estimated to be 1,244 AFY (Enivcom, 1982).

Water Quality. Groundwater samples taken from 4 wells from 1957 to 1985 show total dissolved solids concentration ranging from 211 to 381 mg/l.

Water Availability. The primary constraints on water availability in the basin include physical limitations and potential water quality issues. Groundwater levels in the basin are likely highest during the wet season, steadily decline from these levels during the dry season, and recover again to higher levels during the next wet season. During drought periods, flows in Arroyo De La Cruz are likely insufficient to adequately recharge the channel alluvium and groundwater levels could subsequently be lowered significantly due to pumping. Significant lowering of basin groundwater levels at or below sea level near the coast could lead to seawater intrusion and degradation of water quality. Additional constraints that would limit water availability in the basin are unknown.

Pico Creek Valley Basin

The Pico Creek Groundwater Basin is located in WPA 1 of the North Coast sub-region (Figure 2.2). Although studied elsewhere, the basin is not formally defined as a basin under California's Groundwater Bulletin 118 program. The basin is 62.5 acres (about one-tenth of a square mile) in size and underlies Pico Creek Valley (Cleath, 1986). The basin is bounded by the Pacific Ocean to the west and extends inland about 7,000 feet under the stream channel and floodplain of the Pico Creek. From the Pacific Ocean to about 1,200 feet inland, the basin is undeveloped. The Hearst Ranch is located from 1,200 feet inland to about 4,000 feet inland. Recharge to the basin comes primarily from seepage of surface flows in Pico Creek and deep percolation of precipitation.

Supply Aquifers. The main water-bearing unit in the basin is the Pico Creek alluvium (Cleath, 1986). The alluvium generally consists of sands, gravels, silt, and clay with a maximum thickness of about 60 feet, thinning in the northern, southern, and upstream directions in the valley. The alluvium between the ocean and Hearst Ranch is divided into a shallow and a deep aquifer, where the two aquifers are separated by a clay zone that acts as an aquitard. Above and below the clay zone are sand and gravel sediments. The saturated thickness of the shallow aquifer varies during the year and can be further divided into two layers: a layer above sea level and a layer below sea level. The saturated thickness of the layer above sea level varies in thickness from zero to 6 feet when the creek is flowing. The layer below sea level is continuously saturated and varies in thickness from 1 to 21 feet in the west to east direction. The deep aquifer below the clay zone is also continuously saturated and has a uniform thickness of about 19 feet (Cleath, 1986).

The clay zone is not present upstream of the Hearst Ranch and the alluvium eastward from there forms a single aquifer. The saturated thickness of the alluvium east of the Hearst Ranch is known to vary seasonally.

In general, the average specific yield of the alluvial sediments is about 17 percent. Recharge in the basin is predominantly from percolation of stream flow in the Pico Creek and to a lesser extent from percolation of precipitation. Historically, the creek flows during the winter months and does not flow during the summer months.

The basin contains groundwater stored both above sea level and below sea level. The available groundwater in storage above sea level is about 40 AF (Cleath, 1986). Much of the groundwater in storage below sea level has experienced sea water intrusion and is of lesser water quality. The available groundwater in storage below sea level is less than 50 AF.

Water Users. Water users in the basin include the San Simeon Community Services District and Hearst Ranch.

Basin Yield. The basin yield was initially estimated to be 120 AFY (Cleath, 1986).

Water Quality. Contamination of water supply wells due to seawater intrusion is a major water quality concern in the basin (Cleath, 1986). Lowering of groundwater levels below sea level in the basin during the summer months when creek flows are absent and pumping is active can result in the landward migration of the sea water/fresh groundwater interface. Although seawater intrusion has increased salinity levels in groundwater pumped from local water supply wells, it has not degraded water quality to the point that the water is non-potable. The 2008 Consumer Confidence Report for two San Simeon CSD wells reported that measured concentrations of all analyzed contaminants were below their respective Maximum Contaminant Level (MCL) or Regulatory Action Level (AL) values. In particular, the measured total dissolved solids concentration was 380 mg/l.

Water Availability. The primary constraints on water availability in the basin include physical limitations and potential water quality issues. Currently the water supply of San Simeon CSD is at a certified Level III severity rating (resource capacity has been met or exceeded) due to unreliability of the groundwater supply to meet existing demands (SLO County, 2008). As a result, a moratorium on development has been in place since 1991.

Since at least the mid-1980s, sea water intrusion has occurred within the Pico Creek Groundwater Basin (Cleath, 1986). The location of the sea water/fresh groundwater interface is a function of annual climate and groundwater pumping in the basin. Although the actual basin yield will vary annually depending on local precipitation and stream flow in the creek, extractions during an average water year should be maintained less than the estimated average-year basin yield of 120 AFY. Restricting groundwater extractions to no greater than the basin yield is intended to help mitigate against the occurrence of seawater intrusion into the basin and subsequent degradation of groundwater quality.

Cambria WPA 2

Groundwater basin descriptions in WPA 2 include San Simeon Valley, Santa Rosa Valley, Villa Valley.

San Simeon Valley Basin

The San Simeon Valley Groundwater Basin is located in the WPA 2 of the North Coast sub-region (Figure 2.2) and is identified in California's Groundwater Bulletin 118 as Groundwater Basin Number 3-35 (DWR, 2003). The basin underlies San Simeon Valley and is 620 acres (1 square mile) in size. It is bounded to the west by the Pacific Ocean, to the east by the Santa Lucia Range, and elsewhere by impermeable Franciscan Group rocks. The basin is drained by San Simeon Creek. Precipitation varies across the valley from 20 inches along the coast to about 26 inches at the eastern end of the valley floor to more than 40 inches at the headwaters of San Simeon Creek. Recharge to the basin comes primarily from seepage of surface flows in San Simeon and Van Gordon creeks, deep percolation of precipitation, and agricultural irrigation return flows.

Supply Aquifers. According to Bulletin 118, groundwater is found in Holocene age alluvial deposits underlying San Simeon Creek (DWR, 2003). The alluvial deposits consist of unconsolidated gravel, sand, clay, and silt. The alluvium varies in thickness from about 100 feet beneath the center of the valley to more than 120 feet at the coast (Yates and Van Konyenburg, 1998). Groundwater in the alluvium is unconfined and generally flows westward. The alluvium has an estimated specific yield of 18 percent and is recharged predominantly by percolation of stream flow and to a lesser extent from deep percolation of precipitation and irrigation return flows (DWR, 1958). The groundwater storage capacity is estimated as 4,000 AF; however the actual amount in groundwater storage is unknown (DWR, 2003). The volume of groundwater in storage likely fluctuates widely in response to seasonal variations in rainfall and pumping extractions.

Water Users. Water users in the basin include the Cambria Community Services District and overlying users.

Basin Yield**.** The safe yield of the basin was estimated to be 1,040 AFY (Cambria County Water District, 1976).

Water Quality. Groundwater samples from 31 wells collected from 1955 to 1994 show total dissolved solids (TDS) concentration ranging from 46 to 2,210 mg/l (DWR, 2003). Samples from three public supply wells show a TDS concentration range of 400 to 420 mg/l with an average concentration of 413 mg/l. Manganese concentrations in the downstream regions of the basin have exceeded the MCL, with a range of 0.002 to 1.6 mg/l (Yates and Van Konyenburg, 1998). The 2007 Consumer Confidence Report for Cambria CSD reported that measured concentrations of all analyzed contaminants were below their respective Maximum Contaminant Level (MCL) or Regulatory Action Level (AL) values. In particular, the measured total dissolved solids concentration was 440 mg/l.

Water Availability. The primary constraints on water availability in the basin include physical limitations and potential water quality issues. The State Water Resources Control Board (SWRCB) allows a maximum extraction of 1,230 AFY in the San Simeon Valley Groundwater Basin and a maximum dry season extraction of 370 AF (Cambria CSD WMP, 2008). Although the actual dates will vary each year depending on creek flows and rainfall occurrence, the dry season generally spans from May through October. Groundwater levels in the basin are generally highest during the wet season, steadily decline from these levels during the dry season, and recover again to higher levels during the next wet season. During drought periods, flows in San Simeon Creek can be insufficient to adequately recharge the channel alluvium and groundwater levels could subsequently be lowered significantly. Significant lowering of basin groundwater levels at or below sea level near the coast could lead to seawater intrusion and degradation of water quality, however as a practical matter, the operating practices by the Cambria CSD of their water supply wells prevents significant lowering of water levels and maintains groundwater quality. Therefore, as a practical matter, the start of the dry season and the groundwater levels at that time limit the actual amount of groundwater that can be extracted during the dry season.

Currently the water supply of Cambria CSD is at a Level III severity rating (resource capacity has been met or exceeded) due to unreliability of the groundwater supply to meet existing demands (Cambria CSD WMP, 2008).

Santa Rosa Valley Basin

The Santa Rosa Valley Groundwater Basin is located in WPA 2 of the North Coast sub-region (Figure 2.2) and is identified in California's Groundwater Bulletin 118 as Groundwater Basin Number 3-36 (DWR, 2003). The basin underlies the Santa Rosa Valley and is 4,480 acres (7 square miles) in size. It is bounded to the west by the Pacific Ocean and on all other sides by impermeable rocks of the Jurassic to Cretaceous age Franciscan group. The valley is drained by Green Valley, Perry, and Santa Rosa creeks. Average annual precipitation in the basin ranges from 20 inches along the coast to 26 inches along the eastern end of the valley to 40 inches at the creek headwaters (Yates and Van Konyenburg, 1998). Recharge to the basin comes primarily from seepage of surface flows in Santa Rosa Creek and tributaries, deep percolation of precipitation, and residential/agricultural return flows.

Supply Aquifers. According to Bulletin 118, the main water-bearing unit in the basin is unconfined alluvium (DWR, 2003). The alluvium is composed of unconsolidated sand, clay, silt, and gravel of predominantly fluvial origin, and ranges in total thickness from 100 feet near the middle of the valley to 120 feet along the coast. Estimated specific yield of the alluvium is 17 percent. The groundwater storage capacity of the basin has been estimated as 24,700 AF (DWR, 1975). The volume of groundwater in storage likely fluctuates widely in response to seasonal variations in rainfall and pumping extractions. The actual amount of groundwater in storage is unknown. Basin recharge occurs as percolation of stream flow, percolation of precipitation, and irrigation return flows.

Water Users. Water users in the basin include the Cambria Community Services District (CSD) and overlying users.

Basin Yield. The safe yield of the basin has been estimated to be 2,260 AFY (Cambria County Water District, 1976).

Water Quality. Groundwater sampled from one public supply well had a total dissolved solids concentration of 680 mg/l. Increases in measured groundwater chloride concentration suggest the possibility of seawater intrusion into the basin (DWR, 1975). From 1955 to 1975, measured chloride concentration increased from 80 mg/l to 933 mg/l (DWR, 1975), where background chloride concentration typically range from 30 to 270 mg/l (Yates and Van Konyenburg, 1998).

The Cambria CSD Urban Water Management Plan (UWMP) (Cambria CSD, 2005) noted the existence of an MtBE plume moving towards its Santa Rosa well field. The UWMP also noted that although the plume was still present at the time the UWMP was prepared, the district was taking action to remove the MtBE from the groundwater through a remediation program.

Water Availability. The primary constraints on water availability in the basin include physical limitations and potential water quality issues. The State Water Resources Control Board (SWRCB) allows a maximum extraction of 518 AFY in the Santa Rosa Valley Groundwater Basin and a maximum dry season extraction of 260 AF (Cambria CSD WMP, 2008). The California Coastal Commission Coastal Development Permit defines the Santa Rosa Creek dry period as July 1 to November 20, and restricts pumping during this period to 260 AF. In general, groundwater levels in the basin are typically highest during the wet season, steadily decline from these levels during the dry season, and recover again to higher levels during the next wet season. During drought periods, flows in Santa Rosa Creek can be insufficient to adequately recharge the channel alluvium and groundwater levels could subsequently be lowered significantly. Significant lowering of basin groundwater levels at or below sea level near the coast could lead to seawater intrusion and degradation of water quality.

Currently the water supply of Cambria CSD is at a Level III severity rating (resource capacity has been met or exceeded) due to unreliability of the groundwater supply to meet existing demands (Cambria CSD WMP, 2008).

Villa Valley Basin

The Villa Valley groundwater basin is part of the WPA 2 in the North Coast sub-region (Figure 2.2) and encompasses approximately 980 acres (1.5 square miles). The basin is bounded by the Pacific Ocean on the west and elsewhere by relatively impermeable rocks of the Jurassic to Cretaceous age Franciscan Formation. Villa Valley has been designated by the DWR as Basin 3-37 and is entirely within unincorporated San Luis Obispo County (DWR, 2003). Recharge to the basin comes primarily from seepage of surface flows in Villa Creek, deep percolation of precipitation, and residential/agricultural return flows.

Published hydrogeologic information for this basin is compiled from older reports and may not be representative of current conditions. If the District requires more current or detailed information for the Villa Valley basin, new studies would be necessary. Information currently compiled by County departments (such as well logs for private wells or water quality for shared well systems) would be useful to these studies. Additional information may be available from the DWR and private sources.

Supply Aquifers. The aquifer consists of alluvial deposits drained by Villa Creek. These deposits are up to approximately 50 feet thick.

Water Users. There are no municipal or public water purveyors in the basin. All pumping in the basin is for agricultural and residential purposes by overlying users.

Basin Yield. The projected safe seasonal yield of Villa Valley groundwater basin was historically estimated at 1,000 AFY (DWR, 1958). There has been no subsequent basin study to confirm or update this estimate.

Water Quality. Seawater intrusion has been reported historically in the lower portion of the basin (DWR, 1975). Upstream of sea water influence, the general mineral character of groundwater is calcium-magnesium bicarbonate to calcium-magnesium sulfate-bicarbonate, with an average TDS of 500 mg/l in samples collected from three wells between 1965 and 1970 (STORET Legacy Database).

Water Availability. Constraints on water availability in the Villa Valley basin include both physical limitations and water quality issues. Shallow alluvial deposits are typically more susceptible to drought impacts than deeper formation aquifers, having less groundwater in storage and consequently less capacity for resource utilization and banking. For the upper Villa Valley, water level and well capacity declines during drought would limit the availability of the resource, while in the lower valley area sea water intrusion would be the primary constraint.

Cayucos WPA 3

Groundwater basin descriptions in WPA 3 include Cayucos Valley, Old Valley, and Toro Valley.

Cayucos Valley Basin

The Cayucos Valley groundwater basin is part of the WPA 3 in the North Coast sub-region (Figure 2.2) and encompasses approximately 580 acres (0.9 square miles). The basin is bounded to the west by the Pacific Ocean and elsewhere by the generally non-water bearing Cretaceous-Jurassic rock units of the Franciscan Formation (Cleath, T. S., 1988). Cayucos Valley has been designated by the DWR as Basin 3-38 and is entirely within unincorporated San Luis Obispo County. Annual rainfall averages 16-18 inches (DWR, 2003). Recharge to the basin comes primarily from seepage of surface flows in Cayucos Creek, deep percolation of precipitation, and residential/agricultural return flows.

Some of the published hydrogeologic information for the Cayucos Valley groundwater basin is over 20 years old and may not be representative of current conditions. If the District requires more current or detailed information for this basin, new studies would be necessary. Information currently compiled by County departments (such as well logs for private wells or water quality for shared well systems) would be useful to these studies. Additional information may be available from the DWR and private sources.

Water Users. Basin groundwater users include a small public water system (mobile home park) and overlying residential and agricultural users. The Morro Rock Mutual Water Company and Paso Robles Beach Water Association service areas overlie a portion of the basin, however, these purveyors do not pump from the Cayucos Valley basin.

Supply Aquifers. The water supply aquifer is within the alluvial deposits of Cayucos Creek, which are comprised of gravel, sand, silt and clay. These alluvial deposits extend up to an estimated 80 feet thick, and are at least 68 feet thick at a distance of one mile inland from the coast (Cleath, T. S., 1988).

Basin Supply. The projected safe seasonal yield of the Cayucos Valley groundwater basin was historically estimated at 600 AFY (DWR, 1958). There has been no subsequent basin-wide study to confirm or update this estimate. Estimated production from the basin was 350 AFY in 1987 (Cleath, T. S., 1988).

Water Quality. There is evidence of sea water intrusion in the basin extending to the mobile home park wells and ranch wells immediately upstream of Highway 1. The general mineral character of groundwater upstream of the sea water influence is magnesium-bicarbonate, with a TDS concentration of close to 500 mg/l (Cleath, T. S., 1988).

Water Availability. Constraints on water availability in the Cayucos Valley basin include both physical limitations and water quality issues. Shallow alluvial deposits are typically more susceptible to drought impacts than deeper formation aquifers, having less groundwater in storage and consequently less capacity for resource utilization and banking. For the upper Cayucos Valley, water level and well capacity declines during drought would limit the availability of the resource, while in the lower valley area sea water intrusion would be the primary constraint.

Old Valley Basin

The Old Valley groundwater basin is part of the WPA 3 in the North Coast sub-region (Figure 2.2) and encompasses approximately 750 acres (1.2 square miles). The basin is bounded by the Pacific Ocean on the south and by relatively impermeable rocks of the Jurassic to Cretaceous age Franciscan Formation on all other sides. Old Valley, which includes Whale Rock reservoir, has been designated by the DWR as Basin 3-39 and is entirely within unincorporated San Luis Obispo County. Annual rainfall averages 16-18 inches (DWR, 2003).

Basin recharge upstream of the reservoir comes primarily from deep percolation of precipitation and seepage from surface flows in Cottontail Creek and Old Creek. Below the dam, recharge includes dam underflow and seepage from reservoir releases.

Water Users. Basin groundwater users downstream of Whale Rock reservoir include members of the Cayucos Area Water Organization (CAWO; Morro Rock Mutual Water Company, Paso Robles Beach Water Association, and County Service Area 10A), the Cayucos Cemetery District, and two landowners. The combined groundwater and Whale Rock reservoir surface water allocation for CAWO in Old Valley is 600 AFY, distributed as follows: PRBWA at 222 AFY; MRM at 170 AFY; CSA 10A at 190 AFY (plus 25 AFY of San Luis Obispo's entitlement via exchange for Lake Nacimiento water), and the Cemetery District at 18 AFY (CSA 10A, 2003). For the downstream landowners, it is 64 AFY. Upstream of the reservoir are residential and agricultural overlying users. Whale Rock reservoir water users, including the City of San Luis Obispo, Cal Poly and the California Men's Colony, are discussed in Technical Memorandum 3.

Supply Aquifers. The water supply aquifer is within the alluvial deposits of Old Creek and upstream tributary valleys, which are comprised of sands, gravels and clays. These alluvial deposits extend up to an estimated 72 feet thick (Cleath & Associates, 1993, 1995).

Basin Supply. Production from wells in the lower Old Valley groundwater basin (below the reservoir) ranged from 389 to 603 AFY, with an average of 505 AFY between 1981 and 1992. The lower basin was estimated to have a yield capable of providing the entire 600 AFY CAWO allocation, although releases from the reservoir were necessary to preclude sea water intrusion (Cleath & Associates 1993, 1995). With direct deliveries of CAWO downstream entitlement to a water treatment plant beginning in 1997, re-evaluation of the yield in this part of the Basin has not been a high priority.

Water Quality. The general mineral character of groundwater below the reservoir is calcium-magnesium bicarbonate, with an average TDS of 440 mg/l in 2008 (CSA 10/10A, 2008).

Water Availability. Constraints on water availability in the Old Valley basin include physical limitations, water rights, and environmental considerations. Shallow alluvial deposits upstream of the reservoir are susceptible to drought impacts, having limited groundwater in storage. For the area below the reservoir, dam underflow may provide a source of recharge. Water agreements limit the amount of groundwater available to the members of CAWO and downstream landowners in Old Valley, however, and the riparian habitat supports pond turtles and steelhead trout (on a periodic basis).

Toro Valley Basin

The Toro Valley groundwater basin is part of the WPA 3 in the North Coast sub-region (Figure 2.2) and encompasses approximately 510 acres (0.8 square miles). The basin is bounded to the west by the Pacific Ocean and elsewhere by generally non-water bearing rock units of the Cretaceous-Jurassic age Franciscan Formation, although springs issue from tertiary age formations on the northern rim of the watershed. Toro Valley has been designated by the DWR as Basin 3-40 and is entirely within unincorporated San Luis Obispo County (Cleath, T. S., 1988; DWR, 2003). Recharge to the basin comes primarily from seepage of surface flows in Toro Creek, deep percolation of precipitation, and residential/agricultural return flows.

Some of the published hydrogeologic information for the Cayucos Valley groundwater basin is over 20 years old and may not be representative of current conditions. If the District requires more current or detailed information for this basin, new studies would be necessary. Information currently compiled by County departments (such as well logs for private wells or water quality for shared well systems) would be useful to these studies. Additional information may be available from the DWR and private sources.

Water Users. Basin water users include Chevron (with agricultural tenants), and overlying residential and agricultural users.

Supply Aquifers. The water supply aquifer is within the alluvial deposits drained by Toro Creek, which are comprised of gravel, sand, silt and clay. These alluvial deposits extend up to an estimated 80 feet thick, and average approximately 50 feet thick in the lower portion of the basin (McClelland Engineers, 1988).

Basin Supply. The projected safe seasonal yield of the Toro Valley groundwater basin was historically estimated at 500 AFY (DWR, 1958). Estimates of hydrologic budget items for 1987 conditions included 591 AFY of percolation of precipitation and 532 AFY of basin groundwater production. Basin studies estimated that up to 1,260 acre-feet of additional water (beyond existing uses) would be available annually, on average, from induced stream flow seepage if new wells were constructed. However, the studies also indicated that during drought this additional supply could be significantly less than the average annual value (McClelland Engineers, 1988). Given the shallow nature of alluvial deposits and limited groundwater in storage, the safe yield estimate for this Master Water Plan Update is limited to the documented historical production that has not resulted in water supply problems, which to date has been up to 532 AFY.

Water Quality. Water quality data for a well approximately 0.7 miles inland of the coast between 1954 and 1987 indicates mild sea water intrusion at this location in the basin, with chloride concentrations up to 129 mg/l. The general mineral character of groundwater is generally magnesium-bicarbonate, with a TDS concentration typically between 400 mg/l and 700 mg/l (STORET Legacy Database and DWR, 2003). In the lower basin area near Highway 1, petroleum hydrocarbon contamination associated with the Chevron marine terminal has been detected in groundwater and remedial activities are ongoing (GeoTracker Database).

Water Availability. Constraints on water availability in the Toro Valley basin include both physical limitations and water quality issues. Shallow alluvial deposits are typically more susceptible to drought impacts than deeper formation aquifers, having less groundwater in storage and consequently less capacity for resource utilization and banking. For the upper Toro Valley, water level and well capacity declines during drought would limit the availability of the resource, while in the lower valley area sea water intrusion and petroleum hydrocarbon contamination would be the primary constraint. Toro Valley may be capable of providing significant additional yield through induced stream flow seepage, although drought impacts are not known.

Morro Bay WPA 4

Groundwater basin descriptions in WPA 4 include the Morro Valley and Chorro Valley.

Morro Valley Basin

The Morro Valley groundwater basin is part of the WPA 4 in the North Coast sub-region (Figure 2.2) and encompasses approximately 1,200 acres (1.9 square miles). The basin is bounded to the west by the Pacific Ocean and Morro Bay estuary, and elsewhere by contact with impermeable rock units of the Cretaceous-Jurassic age Franciscan Formation. Morro Valley is designated by the DWR as Basin 3-41. Most of the basin area is within unincorporated San Luis Obispo County, with the City of Morro Bay overlying the basin area southwest of the narrows near Highway 1 (DWR, 2003). Recharge to the basin comes primarily from seepage of surface flows in Morro Creek and Little Morro Creek, deep percolation of precipitation, and residential/agricultural return flows.

Supply Aquifers. The water supply aquifers are predominantly within the Holocene alluvial deposits drained by Morro Creek, which are comprised of gravel, sand, silt and clay. Unconsolidated saturated deposits near the coast include Holocene beach/dune sands and lagoonal fine grained sediments. The alluvial deposits are typically up to 80 feet thick (Cleath & Associates, 2007).

Water Users. Basin groundwater users include the City of Morro Bay, Morro Bay power plant, a cement plant, a small public water system (mobile home park), and residential and agricultural overlying users. The City of Morro Bay pumps sea water and Morro Creek underflow from the basin, the latter with a permitted allocation of 581 AFY from the State Water Resources Control Board.

Basin Yield. The existing perennial yield of the Morro Valley groundwater basin is estimated at 1,500 AFY. Groundwater modeling performed to evaluate the impacts of sea water well operation on the basin indicated that concurrent operation of the City of Morro Bay's sea water and fresh water supply wells could interfere during drought conditions such that the fresh water wells would be subject to sea water intrusion (Cleath & Associates, 1993a; 1993b).

Water Quality. The general mineral character of groundwater is typically magnesium-calcium bicarbonate, except near the coast, where sea water intrusion has occurred. Sea water intrusion and nitrates are the predominant concerns for water quality in the Morro Valley basin. In the mid-1980's TDS concentrations in groundwater downstream of the narrows near Highway 1 began to exceed 1,000 mg/l seasonally due to sea water intrusion. More recently, basin TDS concentrations (measured in 2007) were typically between 400 and 800 mg/l and increasing toward the coast, except for an area beneath agricultural fields in the lower valley where TDS concentrations reached 1000 mg/l, and nitrate concentrations reached 220 mg/l as nitrate (Cleath & Associates 1993a; 2007).

Water Availability. Primary constraints on water availability in the Morro Valley basin include physical limitations, water quality issues, and water rights. Shallow alluvial deposits are typically more susceptible to drought impacts than deeper formation aquifers, having less groundwater in storage and consequently less capacity for resource utilization and banking. For the upper Morro Valley, water level and well capacity declines during drought would limit the availability of the resource, while in the lower valley area sea water intrusion would be the primary constraint. Elevated nitrates are a constraint for drinking water availability at the City of Morro Bay well field, where production is also limited by appropriative water right permits from the State Water Resources Control Board.

Chorro Valley Basin

The Chorro Valley groundwater basin is part of WPA 4 in the North Coast sub-region (Figures 2.2 and 2.4) and encompasses approximately 3,200 acres (5 square miles), although the effective extent of saturated basin deposits covers an estimated 1,900 acres (3 square miles). The basin is bounded to the west by the Morro Bay estuary and elsewhere by contact with impermeable rock units of Tertiary dacite and Cretaceous-Jurassic age Franciscan Formation (Cleath-Harris Geologists, 2009). Chorro Valley is designated by the DWR as Basin 3-42. Most of the basin area is within unincorporated San Luis Obispo County, with the City of Morro Bay overlying the basin area near the Morro Bay estuary. Recharge to the basin comes primarily from seepage of surface flows in Chorro Creek and tributaries (including wastewater treatment plant discharges and releases from Chorro Reservoir), deep percolation of precipitation, and residential/agricultural return flows.

Supply Aquifers. The water supply aquifers are within the Holocene alluvial deposits drained by Chorro Creek, which are comprised of gravel, sand, silt and clay. These alluvial deposits are 50-70 feet thick downstream of Canet Road, and include a permeable basal sand and gravel bed up to 30 feet thick, overlain by finer-grained flood plain deposits of sand, silt, and clay with some shallow gravelly lenses (Cleath-Harris Geologists, 2009).

Water Users. Basin groundwater users include the City of Morro Bay, San Luis Obispo County, California State Parks, California State Polytechnic University, California National Guard, California Men's Colony, and residential and agricultural overlying users. The City of Morro Bay pumps Chorro Creek underflow from the basin and has a permitted allocation of 1,142.5 AFY through the State Water Resources Control Board.

Basin Yield. The safe yield of the Chorro Valley basin was last reviewed by Cleath & Associates in 1993. Although no yield value was listed at that time, a 1992 groundwater production estimate of 2,210 AFY can be obtained from Table 4 of the 1993 report, along with a conclusion (page 16) that the basin was not in overdraft. Therefore, in accordance with methodology used historically by the Department of Water Resources for other coastal basins in San Luis Obispo County, the perennial yield of the Chorro Valley basin is estimated for planning purposes at 2,210 AFY (Cleath & Associates, 1993a; DWR, 1958).

Water Quality. The general mineral character of groundwater is typically magnesium bicarbonate to magnesium-calcium bicarbonate, except near the bay where sea water intrusion can occur seasonally, or in wells influence by wastewater treatment plant discharges into Chorro Creek. Nitrate concentrations are a concern for water quality in the lower portion of Chorro Valley basin. Sea water intrusion has been documented historically and is a potential future concern in the Chorro Flats area, should pumping patterns change significantly. Recent basin TDS concentrations (measured in 2008) were typically between 500 and 700 mg/l (DWR, 1975; Cleath-Harris Geologists, 2009).

Water Availability. Constraints on groundwater availability in the Chorro Valley basin include physical limitations, water quality issues, environmental demand, and water rights. Shallow alluvial deposits are typically more susceptible to drought impacts than deeper formation aquifers, having less groundwater in storage and consequently less capacity for resource utilization and banking. In the Chorro Valley upstream of the Chorro Creek discharge point for the California Men's Colony wastewater treatment plant, water level and well capacity declines during drought would limit the availability of the resource. The wastewater plant discharges enter the basin as imported water sources, and therefore provide additional available water for basin wells and environmental demand below the discharge point. In the lower valley area, sea water intrusion would be a primary constraint during drought. The Elevated nitrates are a constraint for drinking water availability at the City of Morro Bay well field where production is also limited by appropriative water right permits from the State Water Resources Control Board. These permits for underflow production by the City of Morro Bay have also been conditioned to require minimum surface flows in Chorro Creek for Steelhead habitat protection.

Los Osos WPA 5

Los Osos Valley is the only groundwater basin in WPA 5.

Los Osos Valley Basin

The Los Osos Valley groundwater basin is part of WPA 5 in the North Coast sub region (Figure 2.4) and encompasses approximately 10 square miles, of which 3.3 square miles underlie the Morro Bay estuary and sand split, and 6.7 square miles underlie the communities of Los Osos, Baywood Park, and the Los Osos Creek valley. The basin is effectively bounded to the west by the Pacific Ocean, and elsewhere by relatively impermeable rocks of the Tertiary age Pismo Formation, Tertiary dacite and the Cretaceous-Jurassic age Franciscan Formation. The southern basin boundary also parallels the main strand of the Los Osos fault. Los Osos Valley is designated by the DWR as Basin 3-8 (DWR, 2003; Cleath & Associates, 2005). The basin is entirely within unincorporated San Luis Obispo County. Freshwater recharge to the basin comes primarily from seepage of surface flows in Los Osos Creek, deep percolation of precipitation, and residential/agricultural return flows. Sea water intrusion is also a significant component of basin inflow under current conditions.

Supply Aquifers. Unconsolidated sediments forming the basin include Holocene alluvial deposits in the creek valley and dune sands between the creek valley and the coast, the Plio-Pleistocene age Paso Robles Formation, and the Pliocene age Careaga Formation. The basin is generally characterized as having five (5) zones. The upper aquifer (Zone C) reaches 200 feet thick along a synclinal axis which trends northwest to southeast through the middle of the basin, rising to the southeast. The lower aquifer (Zones D and E) is up to several hundred feet thick adjacent to the main strand of the Los Osos fault. There is also a perched aquifer less than 50 feet thick in the dune sands west of the Los Osos Creek valley (Zone B), and a shallow alluvial aquifer typically 70 feet thick in the creek valley (Zone A). The lower aquifer extends beneath the alluvial aquifer in the creek valley (Yates and Wiese, 1988; Cleath & Associates, 2005, ISJ Working Group, 2010).

Water Users. Basin groundwater users in the Los Osos Valley basin include Golden State Water Company, S&T Mutual, the Los Osos Community Services District, and overlying private well users. The three local water purveyors, along with the County of San Luis Obispo, are currently preparing a Basin Management Plan (BMP) under a court-approved Interlocutory Stipulated Judgment (ISJ Working Group).

Basin Yield. Estimates of the safe yield of the groundwater basin have been developed for the current condition, with existing septic systems in place, and assuming no new water development. The safe yield estimate of the basin under current conditions is 3,200 AFY (ISJ Working Group, 2010). Through the development of a BMP, it is the goal, among others, of the ISJ Working Group, to "provide for a continuously updated hydrologic assessment of the Basin, its water resources and safe yield."

Water Quality. Upper aquifer general mineral character is typically sodium-magnesium chloride-bicarbonate. TDS concentrations are generally between 200 mg/l and 400 mg/l. Nitrate is the primary constituent of concern in the upper aquifer, with concentrations in excess of the State drinking water standard of 45 mg/l as nitrate in shallow monitoring wells throughout the urban area (Cleath & Associates, 2005, 2006a, 2006b).

Lower aquifer general mineral character ranges from magnesium-calcium bicarbonate near Los Osos Creek to sodium chloride where impacted by sea water intrusion on the west side of the basin. TDS concentrations also vary significantly by location, and have been reported at up to 950 mg/l in west side supply wells, although average values in the urban area are closer to 500 mg/l. Sea water intrusion is the main concern for lower aquifer water quality (Cleath & Associates, 2005; GSWC, 2009).

Water Availability. The primary constraint on water availability in the Los Osos groundwater basin is deteriorating water quality due to sea water intrusion and nitrate contamination. The County of San Luis Obispo has certified that the basin is currently at a Level III severity rating (resource capacity has been met or exceeded) due to sea water intrusion. Through the development of the BMP, the ISJ Working Group will be evaluating and identifying the management strategies to implement, in coordination with the County's wastewater project, in order to improve conditions in the Basin.

SOUTH COAST SUB-REGION

The South Coast sub-region is comprised of four Water Planning Areas, including San Luis Obispo/Avila (WPA 6), South Coast (WPA 7), Huasna Valley (WPA 8), and Cuyama Valley (WPA 9). A brief description of the basins within each WPA is provided below, with details on groundwater supply aquifers, groundwater users, basin yield, water quality, and water availability.

San Luis Obispo/Avila WPA 6

The San Luis Obispo Valley groundwater basin is the only DWR-designated basin in WPA 6 of the South Coast sub-region (Figure 2.4). A rise in bedrock south of the San Luis Obispo Airport has created two separate subsurface drainage systems, which were designated as the San Luis Valley and Edna Valley subbasins in a draft 1997 DWR study. The extension of the San Luis Obispo Creek alluvial deposits between the Los Osos Valley Fault and the Pacific Ocean has been added herein as the Avila Valley Subbasin. The San Luis Valley and Avila Valley subbasins of the San Luis Obispo Valley groundwater basin are in WPA 6, while the Edna Valley subbasin is in WPA 7.

San Luis Obsipo Valley Basin

The San Luis Obispo Valley groundwater basin is part of WPA 6 and WPA 7 in the South Coast sub-region and encompasses approximately 13,800 acres (21.6 square miles), including the newly defined Avila Valley subbasin (Figure 2.4). The two larger subbasins underlie the San Luis and Edna Valleys and are bounded on the northeast by the Santa Lucia Range and on the southwest by the San Luis Range and the Los Osos and Edna faults. The San Luis Valley (WPA 6) and Edna Valley (WPA 7) subbasins comprise Basin 3-9 as defined by the DWR (DWR, 1997; 2003). Bedrock underlying the two larger subbasins is comprised of non-water bearing Cretaceous-Jurassic age Franciscan Formation. Tertiary age sedimentary and volcanic rocks rim the northeastern watershed and the Coastal Hills and are the source of spring flows into the basin. The Edna subbasin (approximately 4,700 acres) is entirely within unincorporated San Luis Obispo County, while the San Luis Valley subbasin (approximately 8,000 acres) includes both unincorporated County and the City of San Luis Obispo.

The Avila Valley subbasin (WPA 6) encompasses approximately 1,100 acres along the San Luis Obispo Creek floodplain between the Los Osos Valley fault and the Pacific Ocean, a distance of close to 7 miles. The subbasin is bounded and underlain by Mio-Pliocene rocks forming the western end of the Pismo Syncline and is entirely within unincorporated San Luis Obispo County. If the District requires more current or detailed information for this basin, specific studies would be necessary. In preparation for any future studies, the District or other agency could begin collecting available information (such as well logs, pump information, or water quality data) from private and public sources to facilitate future work.

San Luis Valley Subbasin

Supply Aquifer. The San Luis Valley subbasin is generally shallower than the Edna Valley subbasin. Water supply aquifers are mostly within the Holocene alluvial deposits and underlying Plio-Pleistocene Paso Robles Formation, with a few productive wells tapping Tertiary marine sands near Highway 101 and Los Osos Valley Road. The younger alluvial deposits are comprised mostly of clay and clayey/silty sands with permeable sand and gravel strata that are typically a few feet thick. These alluvial deposits are up to 60 feet deep and directly overlie bedrock in the western and northern areas of the basin. The Paso Robles Formation deposits, which are difficult to distinguish locally from the younger alluvium, extend the base of permeable sediments to depths of up to 150-200 feet below ground surface along the basin's southwest boundary. Permeable marine sands with seashells are logged between depths of 155 and 172 feet at a well on Calle Joaquin (Boyle, 1991; DWR 1997). Recharge to the basin comes primarily from seepage of surface flows in San Luis Obispo Creek and tributaries (including discharges from the City of San Luis Obispo Water Reclamation Facility), deep percolation of precipitation, and residential/agricultural return flows.

Water Users. Subbasin groundwater users include the City of San Luis Obispo, California State Polytechnic University, San Luis Coastal Unified School District, Chevron, close to two dozen small public water systems serving various commercial, industrial, and residential properties, agricultural growers, and private residences.

Subbasin Yield. The safe yield of the entire San Luis Valley groundwater basin was determined in a 1991 study based on elements of recharge and discharge, and in a 1997 study using elements of recharge and discharge, the length of the drought periods and the recovery time following them, and an assessment of the behavior of the basin. The 1991 study reported a value of sustained yield of the entire basin under existing conditions at 5,900 AFY. The 1997 DWR study reported a long-term dependable yield value for the San Luis Valley subbasin at 2,000-2,500 AFY, and a long-term dependable yield value for the Edna Valley subbasin at 4,000-4,500 AFY. DWR's 1997 study remains in draft form, but is the only yield estimate that separates the two main basin areas. Therefore, the lower values from the 1997 study, which total 6,000 AFY and closely match the 1991 study value, are selected for County planning purposes. In summary, the safe yield of the groundwater basin is estimated at 6,000 AFY, of which 2,000 AFY is assigned to the San Luis Valley subbasin, and 4,000 AFY to the Edna Valley portion (Boyle, 1991; DWR 1997).

Water Quality. The general mineral character of groundwater in the San Luis Valley subbasin is typically magnesium bicarbonate, becoming magnesium chloride-bicarbonate near Santa Fe Road and the San Luis Obispo County airport. TDS concentrations ranged from 320-630 mg/l (480 mg/l average) in six basin wells tested in 1988. Water quality problems vary by location within the basin, with nitrates, salinity, hardness, and perchloroethylene (PCE) historically being the constituents of greatest concern. PCE contamination was a major issue for two wells used by the City of San Luis Obispo during the period from 1987-91. Two high-capacity wells were also shut down in the 1990's due to elevated nitrate concentrations. Hardness and TDS/chloride are more of a concern in the airport area (Cleath, T. S., 1987, 1988; Boyle, 1991).

Water Availability. The primary constraints on water availability in the San Luis Valley subbasin include physical limitations, water quality issues, and environmental demand. The shallow alluvial deposits are typically more susceptible to drought impacts than deeper formation aquifers, having less groundwater in storage and consequently less capacity for resource utilization and banking. Another physical limitation is the potential for subsidence in some areas due to the dewatering and compaction of clays. Elevated nitrates are a constraint for drinking water availability at some of the City of San Luis Obispo wells. Steelhead habitat protection in San Luis Obispo Creek would also be a potential constraint on groundwater availability. Wastewater discharges from the City of San Luis Obispo Water Reclamation Facility enter San Luis Obispo Creek near the Los Osos Valley Road overpass. Most of this water originates as imported water and provides additional recharge to wells downstream and to the riparian habitat.

Avila Valley Subbasin

Supply Aquifer. Downstream of the Los Osos Valley fault, the San Luis Valley groundwater basin follows the alluvial deposits of San Luis Obispo Creek and tributaries to the ocean at Avila Beach. These alluvial deposits are typically less than 60 feet deep and are comprised of river gravel and sand beds overlain by floodplain silts and sands.

Underlying the alluvial deposits are Franciscan Formation rock and, downstream of the confluence of Davenport Creek, sedimentary and volcanic beds of Tertiary age. Within these older sedimentary and volcanic beds underlying the main groundwater bearing alluvial deposits, groundwater occurs in sandstones, shales and volcanic rocks. Wells in the alluvium produce as much as several hundred gallons per minute. Wells in the underlying older sedimentary and volcanic beds may produce more than 100 gallons per minute. Some of these deep wells produce warm water in the vicinity of Sycamore Mineral Springs and San Luis Bay Estates. Where these bedrock units occur downstream of the weir and along the coast, brackish or sea water may be encountered.

Water Users. Avila Valley MWC and San Miguelito MWC produce water from the Avila Valley Basin as do the agricultural and private water wells of overlying users in the valley.

Basin Yield. No basin yield numbers have been published.

Water Quality. The alluvium extends out to the ocean but the fresh water portion of the alluvium is upstream of the Marre weir at San Luis Bay Estates. Prior to installation of this weir in the early 1970's, seawater intrusion had occurred as far up the valley as the confluence with See Canyon Creek. Since the installation of the weir and with the supplemental flow from the City of San Luis Obispo wastewater treatment plant, there has not been any seawater intrusion documented upstream of the weir. General mineral character in the alluvial groundwater upstream of the Marre weir is sodium-magnesium bicarbonate, with TDS concentrations averaging close to 700 mg/l in the late 1970's (J.M. Montgomery, 1982).

Water Availability. The primary constraints on water availability in the Avila Valley basin are physical limitations and environmental demand. Shallow alluvial deposits are typically more susceptible to drought impacts than deeper formation aquifers, having less groundwater in storage and consequently less capacity for resource utilization and banking. Releases from the City of San Luis Obispo Water Reclamation Facility into San Luis Obispo Creek significantly offset storage losses during drought, but are also intended to support steelhead habitat. Below the Marre Weir, sea water intrusion is the primary constraint to water availability.

South Coast WPA 7

Groundwater basin descriptions in WPA 7 include the Edna Valley subbasin of the San Luis Obispo Valley groundwater basin, along with with three subbasins and three management areas of the Santa Maria Valley groundwater basin. Pismo Creek Valley, Arroyo Grande Valley, and Nipomo Valley are DWR-defined subbasins of the Santa Maria Valley groundwater basin (DWR, 2002). The Northern Cities, Nipomo Mesa, and Santa Maria Valley Management Areas are court-defined areas within the adjudicated boundary of the Santa Maria Valley Groundwater Basin (Figure 2.4).

Edna Valley Subbasin

The Edna Valley subbasin is part of WPA 7, rather than WPA 6, because surface and subsurface flow drains into the Santa Maria Valley groundwater basin (Figure 2.4).

Supply Aquifer. Aquifers within the Edna Valley subbasin include Holocene alluvial deposits the Plio-Pleistocene Paso Robles Formation and underlying Tertiary marine sands and shell beds. These basin materials are collectively thicker than basin strata in the San Luis Valley portion, reaching depths of over 300 feet (Boyle, 1991; DWR 1997). Recharge to the basin comes primarily from seepage of surface flows (Davenport Creek, West Corral de Piedra Creek, East Corral de Piedra Creek, and Cañada Verde), deep percolation of precipitation, and residential/agricultural return flows.

Water Users. Subbasin groundwater users include Golden State Water Company, San Luis Country Club (golf course), a few small public water systems, agricultural growers, and private residences.

Subbasin Yield. The estimated safe yield of the subbasin is 4,000 AFY (DWR, 1997; see San Luis Valley subbasin for additional details).

Water Quality. The general mineral character of groundwater in the Edna Valley subbasin is magnesium-calcium bicarbonate with a TDS range of 630-780 mg/l (average 690 mg/l), based on public water company testing during 2008. This is consistent with surface water samples collected in 2007 from tributaries to Pismo Creek in the Edna Valley, where the water was magnesium-calcium bicarbonate with 500-800 mg/ TDS (Balance Hydrologics, 2008; GSWC, 2009).

Water Availability. The primary constraints on water availability in the Edna Valley portion of the basin are physical limitations and environmental demand. Lowering groundwater levels due to production in the basin may impact base flows to Pismo Creek, which support steelhead habitat.

Santa Maria Valley Basin

The Santa Maria Valley groundwater basin is part of WPA 7 in the South Coast sub-region (Figure 2.4). There are two boundaries currently in use for the Santa Maria Valley groundwater basin, one defined by the California DWR, and one defined by the Superior Court of California. The court-defined boundary was developed by a technical committee for use in basin adjudication. This Master Water Plan divides the basin into the court-defined management areas but also includes sections on three alluvial valleys (Pismo Creek Valley, Arroyo Grande Valley, and Nipomo Valley) within the DWR-defined basin that are outside of the adjudicated area. These three alluvial valleys are referred to herein as subbasins as defined by a 2002 DWR study of the area.

The Santa Maria Valley groundwater basin (DWR boundary, including subbasins) encompasses approximately 184,000 acres (288 square miles), of which approximately 61,220 acres (95.7 square miles) are part of the South Coast sub-region within San Luis Obispo County (Figure 2.4). This groundwater basin underlies the Santa Maria Valley in the coastal portion of northern Santa Barbara and southern San Luis Obispo Counties. The basin also underlies Nipomo and Tri-Cities Mesas, Arroyo Grande Plain, with subbasins in the Nipomo, Arroyo Grande and Pismo Creek Valleys. The basin is bounded on the north by the San Luis and Santa Lucia Ranges, on the east by the San Rafael Mountains, on the south by the Solomon Hills and the San Antonio Creek Valley Groundwater Basin, on the southwest by the Casmalia Hills, and on the west by the Pacific Ocean. In addition, three subbasins have been identified in San Luis Obispo County that are separated from the main basin by the Wilmar Avenue fault. These are the Pismo Creek Valley (1,220 acres), Arroyo Grande Valley (3,860 acres), and Nipomo Valley (6,230 acres) subbasins. The Santa Maria Valley is designated by the DWR as Basin 3-9 (DWR 2002, 2003).

The Santa Maria Valley groundwater basin has been adjudicated. In 2005, the Superior Court of California entered a Stipulated Judgment for a basin-wide groundwater litigation case that defined three basin management areas encompassing approximately 256 square miles. These management areas are the Northern Cities Management Area, the Nipomo Mesa Management Area, and the Santa Maria Management Area, which are used herein for planning by the County of San Luis Obispo. The Stipulated Judgment was adopted, with a declaratory judgment and physical solution adjudged and decreed in the Judgment after Trial, dated January 25, 2008. The three DWR subbasins included herein as separate basin components are outside of the adjudicated area.

The San Luis Obispo County portion of the Santa Maria Valley Management Area and the Nipomo Mesa Management Area are in unincorporated County. The Northern Cities Management Area includes unincorporated County areas and the Cities of Pismo Beach, Arroyo Grande and Grover Beach. The City of Arroyo Grande also overlies a portion of the Arroyo Grande subbasin, and the City of Pismo Beach overlies a portion of the Pismo Creek Valley subbasin. Main basin management areas and subbasins are shown in Figure 2.4.

Pismo Creek Valley Subbasin

The Pismo Creek Valley subbasin is part of the Santa Maria Valley groundwater basin as defined by the DWR, but outside of the adjudicated basin area.

Supply Aquifers. Water supply aquifers are within Holocene alluvial deposits in Price Canyon, which is drained by Pismo Creek and its tributaries. The alluvium varies between 200 and 1,500 feet wide and is up to 60-70 feet thick, composed of basal sand and gravel locally interbedded with clay layers (Cleath, 1986; DWR, 2002; Fugro, 2009). Recharge to the subbasin comes primarily from seepage from Pismo Creek and tributaries, from deep percolation of precipitation, and subsurface inflow from the Edna Valley subbasin.

Water Users. Subbasin groundwater users include residential and agricultural overlying users. Plains Exploration & Production Company (Oil Field) groundwater supply wells are not located in the subbasin.

Subbasin Yield. The yield of the alluvial basin in the Spanish Spring ranch area has been estimated at 200 AFY, although this is before any consideration for environmental habitat demand (Fugro, 2009). Additional yield would be available from wells tapping the alluvium downstream of Spanish Springs Ranch, below the confluence of Las Cuevitas Creek, which drains the Indian Knob area. There is no estimate of the basin-wide yield.

Water Quality. Results of six groundwater samples collected from subbasin wells in 1999 indicate magnesium bicarbonate and magnesium sulfate-bicarbonate are the dominant water types, with a median TDS of 620 mg/l. One well exceeded the State drinking water standards for TDS and sulfate, and most of the wells also had iron and/or manganese concentrations above the drinking water standards (Fugro, 2009).

Water Availability. The primary constraints on water availability in the Pismo Creek Valley subbasin are physical limitations and environmental demand. The shallow alluvial deposits are typically more susceptible to drought impacts than deeper formation aquifers, having less groundwater in storage and consequently less capacity for resource utilization and banking. Steelhead habitat protection in Pismo Creek and tributaries would also be a potential constraint on groundwater availability.

Arroyo Grande Valley Subbasin

The Arroyo Grande Valley subbasin is part of the Santa Maria Valley groundwater basin as defined by the DWR, but outside of the adjudicated basin area.

Supply Aquifers. Water supply aquifers are within Holocene alluvial deposits in Arroyo Grande Valley, which is drained by Arroyo Grande Creek. The alluvial deposits reach approximately 100 feet thick (DWR, 2002). Recharge to the subbasin comes primarily from seepage from Arroyo Grande Creek (including Lopez Reservoir releases) and tributaries, deep percolation of precipitation, and residential/agricultural return flows.

Water Users. Subbasin groundwater users include small public water systems (residential, commercial, and County park), and agricultural and residential overlying users.

Subbasin Yield. There is no estimated safe yield or existing developed yield value reported for this subbasin. Groundwater levels in the Arroyo Grande Creek alluvium downstream of Lopez Dam are controlled by releases from Lopez reservoir, and have been fairly stable since 1969 (DWR, 2002).

Water Quality. Historical groundwater quality in the Arroyo Grande Valley Subbasin, based on samples collected in the 1980's, shows a progressive deterioration in a downstream direction. The general mineral character of groundwater in the valley was calcium-magnesium bicarbonate upstream of the Tar Springs Creek confluence and calcium-magnesium sulfate downstream of the confluence. The downstream section overlies a zone of multiple faults that may contribute highly mineralized water, along with irrigation water returns. With one exception, TDS, sulfate, and chloride concentrations in groundwater samples from wells in the upstream section met drinking water standards and the water was classified as suitable for agricultural irrigation. In the downstream section, TDS from wells typically exceeded 1,500 mg/l (the short term maximum drinking water standard), with sulfate concentrations exceeding the 500 mg/l upper limit for drinking water. The water was also classified as marginal to unsuitable for agricultural irrigation (DWR, 2002).

Water Availability. The primary constraints on water availability in the Arroyo Grande Valley subbasin are water quality issues, environmental demand, and water rights. Although shallow alluvial deposits are typically more susceptible to drought impacts than deeper formation aquifers, releases from Lopez Reservoir provide greater dry period recharge than would otherwise exist. Groundwater quality in the lower subbasin is marginal to poor, and steelhead habitat is present in Arroyo Grande Creek. The legal framework for Lopez Reservoir releases, downstream monitoring, and surface water allocations could also limit groundwater availability.

Nipomo Valley Subbasin

The Nipomo Valley subbasin is part of the Santa Maria Valley groundwater basin as defined by the DWR, but outside of the adjudicated basin area.

Supply Aquifers. Subbasin water supply aquifers are limited to the older alluvium, which covers the floor of the valley up to approximately 90 feet thick, thinning to negligible thickness toward the eastern edges of the subbasin. This older alluvium continues to supply some wells, although bedrock formations underlying the alluvium have, over time, become a more important source of groundwater supply (DWR, 2002). Recharge to the subbasin comes primarily from seepage from Nipomo Creek, from deep percolation of precipitation, and residential/agricultural return flows.

The fractured rock reservoirs that lie beneath the alluvial deposits are within the Monterey Formation and the Obispo Formation. These formations cover a much larger area than the subbasin limits, although the aquifer zones, which are defined by fracture permeability, are typically associated with particular strata and may be structurally complex.

Water Users. Subbasin groundwater users include residential and agricultural overlying users. The Nipomo Community Services District operated wells within the boundaries of the subbasin, but these wells tap the deeper fractured rock reservoirs.

Subbasin Yield. There is no existing estimate for the perennial yield of this subbasin.

Water Quality. Water quality is variable across the subbasin, and the available data set does not distinguish between older alluvial wells and fractured rock wells, although most of the water represented is from the fractured rock reservoirs. TDS concentrations in groundwater samples collected from in 22 wells between 1962 and 2000 ranged from 750 mg/l to 1,300 mg/l; sulfate concentrations between 200 and 340 mg/l; chloride concentrations between 64 and 130 mg/l; and nitrate concentrations from non-detected to 3.4 mg/l. Groundwater is classified as suitable to marginal under water quality guideline for irrigated agriculture (DWR, 2002).

Water Availability. The primary constraints on water availability in the Nipomo Valley subbasin are physical limitations and water quality. The shallow alluvial deposits are typically more susceptible to drought impacts than deeper formation aquifers, having less groundwater in storage and consequently less capacity for resource utilization and banking. In the Nipomo Valley they also overlie and recharge fractured rock aquifers, and would experience declines in water levels and production during dry periods. Water availability in the fractures rock reservoirs can be highly variable, depending on the local structure, available storage capacity, and access to source of recharge. Water quality results indicate that State drinking water standards are exceeded at some wells.

Northern Cities Management Area

The Northern Cities Management Area is part of the Santa Maria Valley groundwater basin adjudicated area.

Supply Aquifers. Water supply aquifers are within alluvial deposits, the Paso Robles Formation, the Careaga Formation and the Pismo Formation. The alluvium is tapped by wells in the Arroyo Grande Plain, where it reaches a maximum thickness of 130 feet. Pleistocene and older deposits are uplifted to the north across the Oceano and Santa Maria River faults. The Paso Robles Formation ranges from approximately 150-500 feet thick across the management area. The Careaga Formation is up to 300 feet thick south of the Santa Maria River fault, and absent north of the fault, where the Pismo Formation underlies the Paso Formation, reaching thicknesses of close to 600 feet along the coast (DWR 2002; Todd, 2007). Recharge to the management area comes primarily from seepage from Arroyo Grande Creek (including releases from Lopez Reservoir), from deep percolation of precipitation (includes storm water infiltration basins), subsurface inflow from the Nipomo Mesa with underflow from Pismo Creek, Meadow Creek, Arroyo Grande Creek, and Los Berros Creek alluvium, and residential/agricultural return flows.

Water Users. Basin groundwater users in the Northern Cities Management Area include City of Pismo Beach, City of Arroyo Grande, City of Grover Beach, Oceano Community Services District, small public water systems (including Halcyon Water System), Lucia Mar Unified School District, and residential and agricultural overlying users.

Area Yield. The safe yield of the DWR's Tri-Cities Mesa – Arroyo Grande Plain Hydrologic Subarea, reported as dependable yield, and was estimated between 4,000 AFY and 5,600 AFY prior to the formal establishment of the Northern Cities Management Area (DWR, 2002). A 2007 Water Balance Study for the management area estimated total average annual recharge at 8,535 AFY, and an average annual groundwater production of 5,569 AFY between 1986 and 2004 without detectable sea water intrusion, supporting the DWR's 5,600 AFY safe yield value estimate (Todd, 2007). The 2002 Groundwater Management Agreement (the "gentlemen's agreement") between the Northern Cities (with Oceano CSD) allocates an assumed safe yield of 9,500 AFY between basin users in this area, including 5,300 AFY for applied irrigation, 200 AFY for basin outflow, and 4,000 AFY for the urban allotment as follows:

- City of Arroyo Grande: 1,202 AFY
- City of Grover Beach: 1,198 AFY
- City of Pismo Beach: 700 AFY
- Oceano Community Services District: 900 AFY

The 9,500 AFY yield value was reportedly based on the 1979 DWR groundwater study for the Arroyo Grande area, although this value originated as the maximum estimated safe seasonal yield for the Arroyo Grande Subunit in the 1958 DWR report. The 2008 Annual Report for the Northern Cities Management Area acknowledges the historical 9,500 AFY yield value, but indicates that the allocation for basin outflow of 200 AFY is unreasonably low, and that the current subsurface outflow of 2,700-3,000 AFY has helped prevent seawater intrusion (Todd, 2009). Since subsurface basin outflow should not be included in a safe yield estimate, a range of 5,600-6,800 AFY represents the current best estimate for the perennial yield of the Northern Cities Management Area. According to the California Superior Court Judgment after Trial (2008) the Northern Cities have a right to produce 7,300 acre-feet from the basin.

Water Quality. Groundwater in the Tri-Cities Mesa portion of the Northern Cities Management Area (north of the Arroyo Grande Plain) is typically calcium bicarbonate-sulfate in general mineral character, based on data from 1992-2000, with a median TDS value of 650 mg/l. Six of 35 wells tested exceeded the State drinking water standard for nitrate, which has been a concern in the area. In the Arroyo Grande Plain, historical data between 1950 and 1987 indicate that the chemical character was typically either calcium magnesium sulfate or calcium-magnesium sulfate-bicarbonate. Approximately three-quarters of the wells sampled on the

Arroyo Grande Plain had TDS values between 500-1,500 mg/l, with half the wells reporting sulfate concentrations greater than 250 mg/l (DWR, 2002).

Water Availability. Water availability in the Northern Cities Management Area is primarily constrained by water quality issues and water rights. Basin sediments in the management area extend offshore along several miles of coastline, where sea water intrusion is the greatest potential threat to the supply. Low coastal groundwater levels indicated a potential for seawater intrusion that was locally manifested in sentry wells 32S/13E N02 and N03 in 2009 after 3 dry years, with levels and water quality improving after an average rainfall year in 2010. The major purveyors have agreed to share the water resources through a cooperative agreement that also sets aside water for agricultural use and for basin outflow, although the amount allocated for basin outflow has been deemed unreasonably low (Todd, 2007).

Nipomo Mesa Management Area

The Nipomo Mesa Management Area is part of the Santa Maria Valley groundwater basin adjudicated area.

Supply Aquifers. Water supply aquifers are within Holocene and Pleistocene dune sands, the Pliocene-Pleistocene Paso Robles Formation, and the Pliocene Careaga Formation (NMMA, 2008). DWR basin descriptions also include the Pliocene Pismo Formation (DWR, 2002). Dune sands forming the Nipomo Mesa reach a maximum thickness of close to 300 feet, although most of the sand is unsaturated. The Paso Robles Formation in this area is up to 600 feet thick south of the northwest-southeast trending Oceano fault, but has been uplifted and eroded to approximately 200 feet thick north of the fault. Further north beneath the Nipomo Mesa, the Paso Robles Formation is also uplifted across the Santa Maria River fault, becoming 100-150 feet thick north of the fault. Careaga Formation sands, which are approximately 200-300 feet thick beneath the Nipomo Mesa, are also uplifted to the north across the Oceano fault, and are completely missing north of the Santa Maria River fault. Pismo Formation sands are interpreted to underlie the Paso Robles Formation north of the Santa Maria River fault (DWR, 2002).

A third fault that affects geologic structure and the movement of groundwater in the Northern Cities Management Area and may be present in the NMMA area is the Wilmar Avenue fault. This fault may extend south of Arroyo Grande along the front of the San Luis Range and the northeast margin of NMMA to the northern part of Santa Maria Valley, where it may truncate against the Santa Maria River fault. Along this segment, the fault is inferred by the alignment of subtle geomorphic and geologic features, including a straight segment of Nipomo Creek (NMMA Technical Group, 2009 *after* DWR, 2002).

The NMMA has defined a Shallow Aquifer and a Deep Aquifer. The Shallow Aquifer within the NMMA is considered to be an unconfined aquifer. There may also be perched aquifers above local clay beds (perched aquifers are unconfined aquifers where the aquifer material below the clay bed is unsaturated). Unconfined aquifers intercept downward percolating water. Where the Deep Aquifer is present beneath a confining layer, then the Deep Aquifer is considered to be confined (NMMA Technical Group, 2009). Recharge to the management area comes primarily from deep percolation of precipitation, subsurface inflow from the Santa Maria Valley, and residential/agricultural return flows.

Water Users. Basin groundwater users in the Nipomo Mesa Management Area include Golden State Water Company, Rural Water Company, Woodlands, Conoco Phillips, Nipomo Community Services District, Lucia Mar Unified School District, small public water systems (serving residential, industrial and nursery/greenhouse operations), and commercial, agricultural and residential overlying users.

Area Yield. The safe yield of the DWR's Nipomo Mesa Hydrologic Subarea, reported as dependable yield, was estimated between 4,800 AFY and 6,000 AFY prior to the formal establishment of the Nipomo Mesa Management Area (DWR, 2002). The first Annual Report for the Nipomo Mesa Management Area does not list safe yield, but estimates total recharge at 7,300 AFY, being the sum of 5,700 AFY deep percolation of precipitation and 1,600 AFY subsurface inflow (NMMA Technical Group, 2009).

Water Quality. Water quality varies in general mineral character across the Nipomo Mesa. North of Black Lake Canyon, sodium is the dominant cation in many wells, and chloride or bicarbonate the dominant anion. South of the canyon, calcium sulfate and calcium-sodium bicarbonate is more common. The median TDS in 35 wells sampled between 1990 and 2000 was approximately 500 mg/l. Nitrate has been detected in excess of the drinking water standard in relatively few wells (DWR, 2002; NMMA Technical Group, 2009).

According to the database maintained by DPH, production wells used for public drinking and industrial use in the NMMA met drinking water quality standards in 2008. One of the ConocoPhillips production wells had a reported value of 1000 mg/l Total Dissolved Solids (TDS), the highest reported to the Department of Public Health within the NMMA; the well is used for industrial processing (NMMA Technical Group, 2009).

Water Availability. The primary constraints on water availability in the Nipomo Mesa Management Area would be physical limitations to the east, water quality on the west, and water rights. The base of permeable sediments rises toward the eastern boundary of the area, reducing groundwater in storage and increasing the susceptibility of wells to drought impacts and associated water level declines. To the west, where deeper sediments allow for greater storage fluctuations, sea water intrusion would limit the available fresh water.

The Nipomo Mesa area is currently in a certified Level of Severity III for water supply (resource capacity has been met or exceeded), as defined by San Luis Obispo County. The County's Level of Severity III led to the preparation of a water conservation ordinance (SLO County Code, Title 8 Chapter 8.92, effective September 25, 2008).

The NMMA Technical Group has established a groundwater monitoring plan that uses coastal and inland key wells to assess the condition of the basin. The 2008 Annual Report indicates that a potentially severe water shortage condition exists. This condition calls for voluntary actions under a response plan, with recommendations to draft a Well Management Plan and a conceptual plan to identify specific actions to be taken (NMMA Technical Group, 2009).

Santa Maria Valley Management Area

The Santa Maria Valley Management Area is part of the Santa Maria Valley groundwater basin adjudicated area.

Supply Aquifers. Water supply aquifers are within Holocene alluvial deposits, the Plio-Pleistocene Paso Robles Formation, and the Pliocene Careaga Formation. The younger alluvial deposits are comprised of poorly bedded, poorly sorted to sorted sand, gravel, silt, and clay, with cobbles and boulders. These alluvial deposits are up to 230 feet thick beneath the Santa Maria River. The Paso Robles Formation deposits were deposited under a variety of conditions, ranging from fluvial and estuarine-lagoonal in inland areas to nearshore marine at the coast, and consequently exhibit a wide range of lithologic character and texture. The formation typically includes unconsolidated to poorly consolidated mixtures of shale gravel, sand, silt and clay, reaching up to 700 feet thick at the southern County border along the Santa Maria River. The Careaga Formation is a late Pliocene, shallow-water marine deposit comprised mostly of sand that also reaches a thickness of close to 700 feet beneath the Santa Maria Plain (DWR, 2002). Recharge to the management area comes primarily from seepage of surface flows in the Santa Maria River (including releases from Twitchell reservoir), deep percolation of precipitation, and residential/agricultural return flows.

Water Users. Basin groundwater users in the San Luis Obispo County portion of the Santa Maria Valley Management Area consist primarily of agricultural overlying users, with some residential overlying users and a small public water system.

Area Yield. The Santa Maria Valley, most of which is in Santa Barbara County, provided 124,000 AFY of average annual production to wells over a perennial yield study period without sea water intrusion or a decline in groundwater levels and storage (Luhdorff & Scalmanini, 2000). The 2008 Annual Report for the Management Area estimated 125,100 acre-feet of groundwater production in the basin for 2008, with no indications of severe water shortage (Luhdorff & Scalmanini, 2009). Safe Yield in the San Luis Obispo County portion of the Santa Maria Valley, reported as dependable yield, was estimated between 11,100 AFY and 13,000 AFY prior to the formal establishment of the Santa Maria Valley Management Area (DWR, 2002).

Water Quality. Most of the groundwater in the San Luis Obispo County portion of the Santa Maria Valley Management Area may be characterized as a calcium-magnesium sulfate type. Sulfate and TDS are the primary constituents of concern. TDS concentrations collected in four area wells between 1992 and 1998 ranged from approximately 750 mg/l to 1,300 mg/l, with a median of 1,200 mg/l, which exceeds the State drinking water standard upper limit of 1,000 mg/l. All the sulfate concentrations exceeded the recommended drinking water standard of 250 mg/l and some exceeded the upper limit of 500 mg/l. TDS was up to 800 mg/l greater in the Holocene alluvial aquifer, as compared to the underlying Paso Robles Formation aquifers. Nitrates are also a concern in several areas of the valley, although the majority of groundwater sample results in the San Luis Obispo County portion of the valley are below drinking water standards. (DWR, 2002).

Water Availability. The primary constraint on water availability in the San Luis Obispo County portion of the San Maria Valley Management Area would be water quality and water rights. A natural outflow of fresh water must be maintained, both in the deeper aquifer zones where sea water pressures are greatest, and in the shallow alluvial zones where irrigation returns are concentrated. The operation of Twitchell reservoir and the Superior Court Stipulated Judgment and Judgment after Trial affect groundwater availability.

Huasna Valley WPA 8

Huasna Valley is the only groundwater basin in WPA 8.

Huasna Valley Basin

The Huasna Valley groundwater basin is part of the South Coast sub-region (Figure 2.4) and encompasses approximately 4,700 acres (7.3 square miles). The basin is bounded by Miocene age marine rock and underlies valleys drained by two branches of Huasna Creek which flow to Twitchell reservoir. Huasna Valley has been designated as Basin 3-45 and is entirely within unincorporated San Luis Obispo County (DWR, 2003). Recharge to the subbasin comes primarily from seepage from Huasna River and tributaries, deep percolation of precipitation, residential/agricultural return flows, and from Twitchell reservoir seepage when the reservoir fills the lower valley.

There is limited hydrogeologic information published for this basin. If the District requires more current or detailed information for this basin, new studies would be necessary. Information currently compiled by County departments (such as well logs for private wells or water quality for shared well systems) would be useful to these studies. Additional information may be available from the DWR and private sources.

Supply Aquifers. The basin aquifer consists of Quaternary alluvial deposits drained by Huasna Creek and Huasna River (DWR, 2003). Local groundwater development, however, is primarily within underlying sandstone beds, but also within fractured siliceous or calcareous shales. The sandstone units are located within the Phoenix and Saucelito members of the Santa Margarita Formation (Oasis Associates, 2009).

Water Users. Basin water users are residential and agricultural overlying users.

Basin Yield. There is no existing estimate of basin safe yield or hydrologic budget items.

Water Quality. No historical water quality data for the alluvial basin has been published in public documents or is available through the STORET Legacy Database.

Water Availability. Constraints on water availability in the Huasna Valley basin include both physical limitations and water quality issues. Shallow alluvial deposits are typically more susceptible to drought impacts than deeper formation aquifers, having less groundwater in storage and consequently less capacity for resource utilization and banking. In the Huasna Valley they also overlie and recharge sandstone aquifers, and would experience declines in water levels and production during dry periods, except where recharged from surface waters in Twitchell reservoir. Water availability in the sandstone and fractured reservoirs can be highly variable, depending on the local structure, available storage capacity, and access to source of recharge.

Cuyama Valley WPA 9

Cuyama Valley is the only groundwater basin in WPA 9.

Cuyama Valley Basin

The Cuyama Valley groundwater basin is part of the South Coast sub-region (Figure 2.5) and encompasses approximately 147,200 acres (230 square miles), of which approximately 32,600 acres (51 square miles) are within San Luis Obispo County. The basin underlies the valley drained by the Cuyama River and is bounded on the north by the Caliente range and on the Southwest by the Sierra Madre Mountains. Cuyama Valley has been designated as Basin 3-13 and includes portions within unincorporated San Luis Obispo County, Santa Barbara County, Kern County, and Ventura County (DWR, 2003). Recharge to the basin comes primarily from seepage from Cuyama River, deep percolation of precipitation, and residential/agricultural return flows.

<u>Supply Aquifers</u>. The aquifer consists of Holocene alluvial deposits and older terrestrial deposits. In the western part of the basin, the alluvium consists of thick beds of sand and gravel alternating with beds of clay. In the south central part of the basin, alluvium is predominantly comprised of sand and silt with some beds of gravel and clay. In the eastern part of the basin, alluvium consists of coarse gravel and sand. Except in the western part of the basin, the alluvium is not the principal water-bearing formation. The thickness of the alluvium is inferred to be from 150 to 250 feet (DWR 2003 after Upson and Worts 1951). Pleistocene age terrace deposits found in the valley are relatively thin and mainly above the zone of saturation. Underlying older terrestrial deposits, which include the Pliocene age Cuyama or Morales formation and a fanglomerate, are the main water-bearing units in the basin. These deposits consist of large and extensive bodies of poorly consolidated clay, silt, and gravel (DWR 2003 *after* Upson and Worts 1951).

<u>Water Users.</u> Basin groundwater users in the San Luis Obispo portion of the basin include oil field operators and residential/agricultural overlying users.

<u>Basin Yield</u>. Perennial yield for the entire basin has been estimated between 9,000 and 13,000 AFY (Upson and Worts, 1951). The long-term potential recharge of the basin was estimated between 12,000-16,000 AFY, with an average of 13,000 AFY year (Singer and Swarzenski, 1970). A safe yield of 10,667 AFY gross (8,000 AFY net consumptive use) was estimated in 1992 (Baca et al., 1992). The most recent compilation of hydrologic budget information presents a groundwater budget in which total groundwater pumpage is 40,592 AFY, resulting in a deficit of 30,532 AFY (Anderson et al, 2009). This hydrologic budget compilation indicates a perennial yield on the order of 10,000 AFY, which is within the range of prior work. There is no separate yield estimate for the San Luis Obispo County portion of the basin.

<u>Water Quality</u>. The general mineral character of groundwater in the Cuyama Basin is predominantly calcium-sulfate and magnesium-sulfate. Water quality generally deteriorates towards the west end of the basin, where the sediments thin. There is also poor quality water towards the northeast end of the basin at extreme depth, which may be connate from rocks of marine origin. Although groundwater in the Cuyama Valley is only of fair chemical quality, it has been used successfully to irrigate most crops. Presumably this has been possible because the sodium content of most of the water is relatively low and the soils are quite permeable (County of Santa Barbara 2005 Groundwater Report; Upson and Worts, 1951; Singer and Swarzenski, 1970).

Analyses of water from three public supply wells show an average TDS content of 858 mg/L and a range from 755 to 1,000 mg/L. USGS analyses show TDS content as high as 1,750 mg/L. Because of constant cycling and evaporation of irrigation water in the basin, water quality has been deteriorating (DWR 2003; SBCWA 1996; SBCWA 2001). Groundwater near the Caliente Range has high salinity, which has been attributed to seepage out of the basement marine rocks. Nitrate content reached 400 mg/L in some shallow wells (DWR 2003; County of Santa Barbara Planning and Development Department, 1994).

<u>Water Availability</u>. Constraints on water availability in the Cuyama Valley basin are primarily physical limitations. The maximum potential yield that can be achieved through lowering water levels to increase natural stream flow seepage and reduce subsurface outflow have been reached (production has exceeded this value). The County of San Luis Obispo Planning Department has determined that the basin is currently at a Level III severity rating (resource capacity has been met or exceeded) due to historical groundwater level declines and resulting groundwater storage losses.

In 1980, the Cuyama groundwater basin was identified by the California Department of Water Resources as one of the eleven basins in "critical condition of overdraft. Although the groundwater basin is experiencing serious hydrologic impacts due to unsustainable groundwater pumping practices, a groundwater management plan for the basin does not exist. Since the Cuyama groundwater basin lies within four counties future efforts for a county groundwater management plan will likely be difficult (Andersen et al., 2009).

INLAND SUB-REGION

The Inland sub-region is comprised of seven Water Planning Areas (WPA's), including Carrizo Plain (WPA 10), Rafael/Big Spring (WPA 11), Santa Margarita (WPA 12), Atascadero/Templeton (WPA 13), Salinas/Estrella (WPA 14), Cholame (WPA 15) and Nacimiento (WPA 16). A brief description of the basins within each WPA is provided below, with details on groundwater supply aquifers, groundwater users, basin yield, water quality, and water availability.

Carrizo Plain WPA 10

Carrizo Plain is the only groundwater basin in WPA 10.

Carrizo Plain

The Carrizo Plain Groundwater Basin is located in the Inland sub-region (Figures 2.3 and 2.5) and is identified in California's Groundwater Bulletin 118 as Groundwater Basin Number 3-19 (DWR, 2003). The basin is 173,000 acres (270 square miles) in size and is situated between the Temblor Range to the east and the Caliente Range and San Juan Hills to the west. The basin has internal drainage to Soda Lake. The basin is also transected by the San Andreas fault. Annual precipitation in the basin ranges from 7 to 9 inches.

Published hydrogeologic information for this basin is compiled from older reports old and may not be representative of current conditions. If the District requires more current or detailed information for this basin, new studies would be necessary. Information currently compiled by County departments (such as well logs for private wells or water quality for shared well systems) would be useful to these studies. Additional information may be available from the DWR and private sources.

Supply Aquifers. Groundwater in the basin is found in alluvium, the Paso Robles Formation, and the Morales Formation (DWR, 2003). The upper alluvium is of Pleistocene to Holocene age and consists of unconsolidated to loosely consolidated sands, gravels, and silts with a few beds of compacted clays. The Paso Robles Formation is of Pleistocene age and consists of poorly-sorted, mostly loosely consolidated gravels, sands, and silts. These deposits are more than 3,000 feet thick in the eastern portion of the basin along the San Andreas Fault Zone and decrease in thickness to the west. The Upper Pliocene Morales Formation consists of sands, gravels, and silts, which are generally more stratified and compacted than in the overlying Paso Robles Formation. Recharge to the basin is predominantly from percolation of stream flow and infiltration of precipitation. The groundwater storage capacity is estimated to be 400,000 AF, however the actual amount in groundwater storage is unknown.

Water Users. There is one small public water system serving the local school (part of the Atascadero Unified School District). All other pumping in the basin is for agricultural and residential purposes by overlying users. There are two proposed solar farms, as discussed in TM3 of this Master Water Plan (Topaz Solar Farm 550-MW; Sun Power-California Valley Solar Ranch 250-MW).

Basin Yield.

DWR Safe Yield: 600 AFY (based on demand in 1954)
Kemnitzer Safe Yield: 59,000 AFY (based on 1967 inflow/outflow analysis)

Taking into consideration the methodologies used in previous studies, historical groundwater levels, and water quality, the EIR estimates that a more reasonable safe yield to base planning decisions on is 8,000 – 11,000 AFY (SunPower - California Valley Solar Ranch Environmental Impact Report (EIR), Topaz Solar Farm (First Solar/Optisolar) Draft Environmental Impact Report, 2010).

Water Quality. Groundwater samples from 79 wells collected from 1957 to 1985 show total dissolved solids concentration ranging from 161 to 94,750 mg/l (DWR, 2003). Groundwater in the lower alluvium and upper Paso Robles Formation that both underlie Soda Lake are highly mineralized. Groundwater deeper in the confined Paso Robles Formation is of higher quality. Groundwater in the Morales Formation is likely to be brackish.

Water Availability. Constraints on water availability in the basin include physical limitations and water quality issues. The small basin yield of the Carrizo Plain Groundwater Basin relative to its large size and the naturally high levels of total dissolved solids in areas (e.g., Soda Lake) suggest that water availability in the region is limited. Other than water quality issues associated with the internal drainage structure of the basin, other constraints are not well defined.

Rafael Valley/Big Spring WPA 11

WPA 11 includes the Rafael Valley groundwater basin and the Big Spring Area groundwater basin.

Rafael Valley Basin

The Rafael Valley Groundwater Basin is located in the Inland sub-region of San Luis Obispo County (Figure 2.5) and is identified in California's Groundwater Bulletin 118 as Groundwater Basin Number 3-46 (DWR, 2003). The basin underlies the Rafael Valley and is 2,990 acres (4.7 square miles) in size. It is bounded by Cretaceous and Miocene age marine rocks and transected by the Chimeneas fault. The Rafael Valley is drained by the Rafael and San Juan creeks. Annual precipitation in the basin ranges from 8 to 10 inches per year.

Published hydrogeologic information for this basin is very limited. If the District requires more current or detailed information for this basin, new studies would be necessary. Information currently compiled by County departments (such as well logs for private wells or water quality for shared well systems) would be useful to these studies. Additional information may be available from the DWR and private sources.

Supply Aquifers. According to Bulletin 118, the main water-bearing unit in the basin is Quaternary age alluvium (DWR, 2003). Although the Chimeneas fault is noted to transect the basin, it is unknown whether it restricts or otherwise influences groundwater flow there.

Water Users. There are no municipal or public water purveyors in the basin. All pumping in the basin is for agricultural purposes and by overlying users.

Basin Yield. No information is available describing basin yield.

Water Quality. No information is available describing water quality in the basin.

Water Availability. Constraints on water availability in the Rafael Valley basin are primarily based on physical limitations. Shallow alluvial deposits are typically limited by available storage capacity and are therefore susceptible to drought impacts. In the Rafael Valley, the alluvial aquifer also overlies and recharges the underlying consolidated rock formations. Water availability in the consolidated rock reservoirs is highly variable, depending on the local structure, available storage capacity, and access to source of recharge.

Big Spring Area Basin

The Big Spring Area Groundwater Basin is located in the Inland sub-region of San Luis Obispo County (Figure 2.5) and is identified in California's Groundwater Bulletin 118 as Groundwater Basin Number 3-47 (DWR, 2003). The basin is 7,320 acres (11.4 square miles) in size and is bounded by Miocene age marine rocks. The basin underlies a valley that is drained by a tributary to San Juan Creek. Annual precipitation in the basin ranges from 8 to 10 inches.

Published hydrogeologic information for this basin is very limited. If the District requires more current or detailed information for this basin, new studies would be necessary. Information currently compiled by County departments (such as well logs for private wells or water quality for shared well systems) would be useful to these studies. Additional information may be available from the DWR and private sources.

Supply Aquifers. According to Bulletin 118, the main water-bearing unit in the basin is Quaternary age alluvium (DWR, 2003). No additional information is available describing the basin hydrogeology.

Water Users. There are no municipal or public water purveyors in the basin. All pumping in the basin is for agricultural purposes and by overlying users.

Basin Yield. No information is available describing basin yield.

Water Quality. No information is available describing water quality in the basin.

Water Availability. Constraints on water availability in the Big Spring basin are primarily based on physical limitations. Shallow alluvial deposits are typically limited by available storage capacity and are therefore susceptible to drought impacts. In the Big Spring area, the alluvial aquifer also overlies and recharges the underlying consolidated rock formations. Water availability in the consolidated rock reservoirs is highly variable, depending on the local structure, available storage capacity, and access to source of recharge.

Santa Margarita WPA 12

WPA 12 includes the Santa Margarita Valley, Rinconada Valley, and Pozo Valley groundwater basins.

Santa Margarita Valley Basin

The Santa Margarita Valley Groundwater Basin is located in the Inland sub-region (Figure 2.2). The basin area includes the unincorporated town of Santa Margarita and surrounding rural residences and agricultural fields. The total drainage area associated with the basin consists of four watersheds that collectively drain in the northerly direction into the Salinas River. The major creeks associated with the four watersheds are the Santa Margarita Creek, the Yerba Buena Creek, Trout Creek, and Rinconada Creek.

The boundaries of the Santa Margarita Valley Groundwater Basin have never been fully investigated in a hydrogeologic study. However, based on studies by Hart (1976), Todd (2004), and Hopkins (2006), the basin is generally bounded to the north by the southern boundary of the Atascadero Groundwater Subbasin, to the west by the northwest trending Nacimiento Fault Zone, to the east by the northwest trending Rinconada Fault Zone, and to the south by the distal region of the Rinconada Creek Watershed.

The basin primarily contains four geologic units which, from youngest to oldest, are: 1) the Younger Alluvium, 2) Older Alluvium, 3) Paso Robles Formation, and 4) Santa Margarita Formation. Average annual rainfall in the area is between 25 to 30 inches (Todd, 2004).

Supply Aquifers. The basin is primarily defined by the shallow Younger Alluvium and Older Alluvium and the deeper Paso Robles and Santa Margarita formations. The Younger Alluvium and Older Alluvium deposits occur along the active stream channels and along the eastern basin boundary adjacent the Rinconada Fault Zone. In particular, alluvial deposits associated with the Santa Margarita Creek extend from the ground surface to a depth of about 50 feet. Relative to the deeper Paso Robles and Santa Margarita Formations, the younger and older alluvium have high hydraulic conductivities.

The Paso Robles Formation consists of unconsolidated to moderately well consolidated sand and gravel deposits that range in thickness up to 300 to 400 feet. The Paso Robles

Formation is found at depths in the range of 400 to 500 feet below ground surface and may consist of non-marine conglomerate. The Santa Margarita Formation is typically a poorly stratified sandy, marine sequence that conformably overlies the Monterey Formation which likely defines the effective base of fresh water in the basin area. The Santa Margarita Formation contains thick beds of fine- to coarse-grained arkosic sandstone that is locally calcareous. The thickness of the Santa Margarita Formation likely ranges up to 1,000 feet. In general, the Santa Margarita sandstone forms a poor to moderate aquifer for groundwater production. The Paso Robles and Santa Margarita formations tapped by wells for water supply purposes in the basin are typically located in the Yerba Buena Creek area.

Water Users. Water users in the Santa Margarita area include the unincorporated town of Santa Margarita and overlying users. Water service for the town of Santa Margarita is provided by County Service Area 23 (CSA 23). CSA 23 is governed by the County of San Luis Obispo and is operated/managed by the Department of Public Works. Overlying users include rural residences and agricultural users.

Basin Yield. Based on an evaluation of available data used for the Santa Margarita Ranch Environmental Impact Analysis study, Hopkins (2006) indicated that the average annual yield of the basin in the vicinity of the proposed Ranch development may be in the range of 400 to 600 AFY. Todd (2004) reported that earlier evaluations estimated groundwater storage for the Santa Margarita Creek alluvial aquifer between the Salinas River and the headwaters of the Santa Margarita and Yerba Buena creeks to be about 410 AF.

Water Quality. The total dissolved solids (TDS) concentration in wells constructed in the alluvial deposits and in the Santa Margarita Formation were reported to be 400 mg/l and 490 mg/l, respectively (Todd, 2004).

Based on a review of available water quality data by Todd (2004), all shallow and deep wells sampled for nitrate have measured concentrations below the maximum contaminant level (MCL) of 45 mg/l.

Total coliform, fecal coliform, and Escherichia coli data were reviewed by Todd (2004) and found to be suggestive, although not conclusive, of small impacts on both shallow and deep aquifer wells from local wastewater disposal systems.

Water Availability. The primary constraint on water availability in the basin concerns physical limitations. Although the alluvial aquifer is considered to be highly productive, it is shallow in vertical extent (i.e., 50 feet thick) and therefore highly susceptible to seasonal fluctuations in groundwater levels of about 15 to 20 feet. During dry water years or extended droughts, well yields may be significantly reduced due to low groundwater levels (Todd, 2004). Recharge in the shallow alluvial deposits for a particular year is dependent on the annual climate conditions and the associated creek streamflows and precipitation runoff generated in the four watersheds.

Wells developed in the Santa Margarita Formation generally do not have sufficient yields to reliably replace the wells in the alluvial aquifer which serve as the primary source of water for the town of Santa Margarita. Hydrographs of deep wells indicate that groundwater levels have been trending downward there at least over the last decade (Hopkins, 2006).

Rinconada Valley Basin

The Rinconada Valley Groundwater Basin is located in the Inland sub-region (Figure 2.4) and is identified in California's Groundwater Bulletin 118 as Groundwater Basin Number 3-43 (DWR, 2003). The basin underlies the Rinconada Valley and is 2,580 acres (4 square miles) in size. It is bounded by Miocene age marine rocks and Mesozoic Franciscan Group rocks, and lies along the Nacimiento and Rinconada fault zones. The valley is drained by Rinconada Creek, which is tributary to the Salinas River. Annual precipitation in the basin ranges from 20 to 24 inches.

There is very limited information available for this basin. If the District requires more current or detailed information for this basin, new studies would be necessary. Information currently compiled by County departments (such as well logs for private wells or water quality for shared well systems) would be useful to these studies. Additional information may be available from the DWR and private sources.

Supply Aquifers. According to Bulletin 118, the main water-bearing unit in the basin is Quaternary age alluvium (DWR, 2003). Although the Nacimiento and Rinconada faults are noted to transect the basin, it is unknown whether they restrict or otherwise influence groundwater flow there.

Water Users. There are no municipal or public water purveyors in the basin. All pumping in the basin is for agricultural purposes and by overlying users.

Basin Yield. No information is available describing basin yield.

Water Quality. No information is available describing water quality in the basin.

Water Availability. Constraints on water availability in the Rinconada Valley basin are primarily based on physical limitations. Shallow alluvial deposits are typically limited by available storage capacity and are therefore susceptible to drought impacts. In the Rinconada Valley, the alluvial aquifer also overlies and recharges the underlying marine consolidated rock formations and older Franciscan and granitic units. Water availability in the consolidated rock reservoirs is generally limited and highly variable, depending on the local structure, available storage capacity, and access to source of recharge.

Pozo Valley Basin

The Pozo Valley Groundwater Basin is located in the Inland sub-region (Figure 2.4) and is identified in California's Groundwater Bulletin 118 as Groundwater Basin Number 3-44 (DWR, 2003). The basin is 6,840 acres (10.7 square miles) in size and is bounded on all sides by low permeability rocks of Cretaceous and Miocene age. The basin is drained by Pozo Creek and the Salinas River, both of which flow into Santa Margarita Lake. Annual precipitation in the basin ranges from 19 to 23 inches.

Published hydrogeologic information for this basin is compiled from older reports and may not be representative of current conditions. If the District requires more current or detailed information for this basin, new studies would be necessary. Information currently compiled by County departments (such as well logs for private wells or water quality for shared well systems) would be useful to these studies. Additional information may be available from the DWR and private sources.

Supply Aquifers. According to Bulletin 118, the main water-bearing unit in the basin is Holocene age alluvium (DWR, 2003). The alluvium is composed of sand, gravel, and clay and is up to 30 feet thick. The estimated specific yield of the alluvium is 15 percent. The groundwater storage capacity of the basin is estimated to be 2,000 AF, although the actual amount of groundwater in storage is unknown. Basin recharge occurs as percolation of stream flow, percolation of precipitation, and irrigation return flows.

Water Users. There are some small public water systems in the basin. All other pumping is for residential and agricultural purposes by overlying users.

Basin Yield. The safe available storage in the basin has been reported to be 1,000 AFY (DWR, 1958).

Water Quality. According to Bulletin 118, groundwater samples from 5 wells in the basin taken from 1951 to 1988 indicate TDS concentrations ranging from 287 to 676 mg/l (DWR, 2003).

Water Availability. Constraints on water availability in the Pozo Valley basin are primarily based on physical limitations. Shallow alluvial deposits are typically limited by available storage capacity and are therefore susceptible to drought impacts. In the Pozo Valley, the alluvial aquifer also overlies and recharges the underlying consolidated marine rock formations and granitic rock units. Water availability in the consolidated rock reservoirs is generally limited and highly variable, depending on the local structure, available storage capacity, and access to source of recharge.

Atascadero/Templeton WPA 13

WPA 13 includes the Atascadero subbasin of the Paso Robles groundwater basin (see WPA 14 for Paso Robles groundwater basin description). WPA 13 also includes consolidated rock aquifers that are not a part of, or described by, the Paso Robles groundwater basin. No information on the yield and water quality of these formations is available.

Atascadero Groundwater Subbasin

The Atascadero Groundwater Subbasin is located in the Inland sub-region (Figure 2.2) and is a subbasin within the Paso Robles Groundwater Basin. The northern boundary of the subbasin is approximately the southern end of the City of Paso Robles and the southern subbasin boundary is located just south of the community of Garden Farms. The western boundary of the subbasin is the western boundary of the Paso Robles Groundwater Basin and the eastern boundary of the subbasin is the Rinconada fault. Because the fault displaces the Paso Robles Formation, the hydraulic connection between the aquifer across the Rinconada fault is sufficiently restricted to warrant the classification of this area as a distinct subbasin (i.e., the Atascadero Groundwater Subbasin). Therefore, the Atascadero subbasin of the Paso Robles Groundwater Basin is defined as that portion of the basin west of the Rinconada fault.

The Atascadero subbasin includes the City of Atascadero and the communities of Templeton and Garden Farms. The Salinas River is the major hydrologic feature in the subbasin. Outflow (primarily surface flow and Salinas River underflow) occurs in the northern direction from the subbasin into the Estrella subarea of the Paso Robles Groundwater Basin.

Supply Aquifers. Pumping test data from wells in the subbasin suggest the presence of three aquifer groups with distinctly different hydraulic characteristics: 1) Holocene age alluvium along the floodplain of the Salinas River, 2) Paso Robles Formation deposits directly underlying the Salinas River alluvium, and 3) Paso Robles Formation deposits along the east side of the subbasin that are not directly connected to the younger alluvium.

The Salinas River alluvium is an unconfined aquifer that consists almost entirely of sand and gravel, with a high hydraulic conductivity. The thickness of the alluvium ranges widely, with an estimated maximum thickness of 100 feet. Shallow wells up to 100 feet deep are located in the immediate vicinity of the Salinas River along its entire reach, typically tapping the younger alluvium and/or shallow Paso Robles Formation aquifer zones.

In the City of Atascadero area, the Paso Robles Formation underlies the younger alluvium along the Salinas River floodplain. Wells in the Paso Robles Formation in hydraulic communication with the overlying younger alluvium tend to have higher hydraulic conductivity values than wells that penetrate the portions of the Paso Robles Formation not in contact with the alluvium.

Paso Robles Formation deposits east of the Salinas River comprise the largest portion of the subbasin. Lithology descriptions from driller's logs include sand and gravel with interbedded clays. The upper 300 feet of sediments in this area is characterized by thin (5 feet to 15 feet thick) interbedded brown or yellow clays with sand and "shale gravel." The beds tend to be thicker below 300 feet, with an increasing proportion of sand and gravel. The deepest part of the formation is the area between Templeton and the Rinconada fault. In general, deep wells reach several hundred feet deep and tap the Paso Robles Formation, although a few of the deeper wells also tap the upper portion of the upper Miocene-age Santa Margarita Formation.

The main source of recharge in the alluvium is the Salinas River. Recharge to the Paso Robles Formation occurs from the overlying Salinas River alluvium as well as from overlying channel deposits of the Santa Margarita, Atascadero, Graves, and Paso Robles creeks.

Water Users. Water users in the basin include municipalities, communities, rural domestic residences, and agricultural users. The major water purveyors are the Atascadero Mutual Water Company (Atascadero MWC), Templeton Community Services District (Templeton CSD), and Garden Farms Mutual Water Company (Garden Farms MWC).

Basin Yield. The perennial yield of the subbasin was estimated to be 16,400 AFY (Fugro, 2002).

Water Quality. Evaluation of water quality in the subbasin is based on historical data from 1970 to 1997 collected and reviewed by Fugro (2002). The general mineral character of recharge from Salinas River water is typically calcium and magnesium bicarbonate. Santa Margarita Creek water is magnesium-calcium-bicarbonate and Atascadero and Paso Robles creek water is calcium-bicarbonate. Total dissolved solids concentrations measured in wells along the Salinas River alluvium range from 317 to 857 mg/l. Total dissolved solids concentrations measured in wells in the Paso Robles Formation range from 389 to 975 mg/l (Fugro, 2002). Water quality data from 11 wells and one spring in the subbasin showed that no concentrations of contaminants exceed their respective MCL values (Fugro, 2002). The 2008 Water Quality Report for both Templeton CSD and Atascadero MWC found that none of the regulated and secondary substances that were tested for in water samples exceeded their MCL values.

Water Availability. Primary constraints on water availability in the subbasin include water rights and physical limitations. The rights to surface water flows in the Salinas River and associated pumping from the alluvium have been fully appropriated by the State Water Resources Control Board (State Board) and no future plans exist to increase these demands beyond the current allocations. Full appropriation implies that no additional rights to the Salinas River flows are being issued by the State Board at this time nor is any additional pumping for existing rights being granted. Therefore, the Salinas River does not represent a future source of water supply that can be developed beyond its present appropriation.

In terms of physical limitations, Todd (2009) estimated the gross groundwater pumping in the subbasin during 2006 to be 15,545 AF which is 95 percent of the subbasin perennial yield of 16,400 AFY. Ongoing studies that are expected to be completed in early 2010 may revise the estimated outflow from the subbasin, based on a recalculation of the subbasin water balance including return flows as well as new assumptions related to rural domestic water demands.

Salinas/Estrella WPA 14

WPA 14 includes the Paso Robles groundwater basin (except for the Atascadero subbasin portion, which is in WPA 13).

Paso Robles Basin

The Paso Robles Groundwater Basin is part of the Inland sub-region (Figures 2.2 and 2.3). According to California's Groundwater Bulletin 118, the entire Paso Robles Groundwater Basin is located within the greater Salinas Valley Groundwater Basin and is identified as Groundwater Basin Number 3-4.06. The entire Paso Robles Groundwater Basin is located in both Monterey and San Luis Obispo counties and is 505,000 acres (790 square miles) in size. 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. In Monterey County, the basin is bounded to the north by the Upper Valley Aquifer Subbasin. In San Luis Obispo County, the basin is bordered on the east by the Temblor Range, on the south by the La Panza Range, and on the west by the Santa Lucia Range.

In general, the basin is drained by the Salinas River, Estrella Creek, San Juan Creek, Huer Huero Creek, and numerous other smaller channels that are tributary to these major rivers and creeks.

Supply aquifers. Groundwater in the basin is found in Holocene age alluvium and in the Pleistocene age Paso Robles Formation. Holocene age alluvium is formed by alluvial deposition. These alluvial deposits consist of unconsolidated, fine- to coarse-grained sand with pebbles and boulders. In general, these deposits are mostly unconfined, range in depth from 30 to 130 feet below ground surface, and are characterized by relatively high permeability. Most of the alluvium associated with the various rivers and creeks in the basin provide limited supplies of extractable groundwater. The Salinas River, however, is a significant source of groundwater to several municipalities located adjacent to and along its reach as well as a number of overlying users with appropriative or riparian rights. Groundwater in the alluvium is a principal source of recharge to the underlying Paso Robles Formation.

The Paso Robles Formation is the most significant source of groundwater in the basin. It consists of unconsolidated, poorly-sorted sand, silt, gravel, and clay. Recharge to the basin derives from stream percolation of the alluvium underflow, infiltration of precipitation, and deep percolation of applied irrigation and wastewater discharge. Groundwater in the basin generally flows in the northwest direction. The groundwater storage capacity of the basin was estimated at 30,400,000 AF (Fugro West, 2002), although a portion of the storage capacity of the basin is not available to San Luis Obispo County users. Roughly one-third of the areal extent of the Paso Robles groundwater basin extend into Monterey County.

Water Users. Water users in the basin include municipalities, communities, rural domestic residences, and agricultural users. The major municipal water purveyors include the Atascadero Mutual Water Company, City of Paso Robles, Templeton Community Services District, CSA 16-1 (Shandon), and San Miguel Community Services District.

The San Luis Obispo County Environmental Health Department also identified 36 small commercial and community water systems that extract groundwater from the basin, including Garden Farms Mutual Water Company and Green River Mutual Water Company. Overlying users include rural domestic residences and agricultural farms.

Basin Yield. The perennial yield of the Paso Robles Groundwater Basin (including the Atascadero Groundwater Subbasin) is estimated to be 97,700 AFY (Fugro, 2002).

Water Quality. Overall, a review of available data by Fugro (2002) found that the quality of groundwater in the basin is generally good. Five potential water quality issues, however, were identified in the basin (excluding the Atascadero Groundwater Subbasin):

1. Increasing chlorides in the deep, historically artesian aquifer northeast of Creston;
2. Increasing total dissolved solids (TDS) and chlorides near San Miguel;
3. Increasing nitrates in the Paso Robles Formation in the area north of Highway 46, between the Salinas River and the Huer Huero Creek;
4. Increasing nitrates in the Paso Robles Formation in the area south of San Miguel; and
5. Increasing TDS and chlorides in deeper aquifers near the confluence of the Salinas and Nacimiento rivers

The 2009 Consumer Confidence Report for the City of Paso Robles reported no violations of MCL values for regulated substances and secondary substances in groundwater pumped by its distribution system. The 2007 Consumer Confidence Report for the San Miguel CSD reported a measured arsenic concentration of 11 ug/l (MCL for arsenic is 10 ug/l) and a measured barium concentration of 71.5 ug/l (MCL for barium is 2 ug/l). The 2008 Water Quality Report for CSA 16-1 found that none of the regulated and secondary substances that were tested for in water samples exceeded their MCL values.

Water Availability. Primary constraints on water availability in the basin include water rights, water quality, and physical limitations. The rights to surface water flows in the Salinas

River and associated pumping from the alluvium have been fully appropriated by the State Water Resources Control Board (State Board) and no future plans exist to increase these demands beyond the current allocations. Full appropriation implies that no additional rights to the Salinas River flows are being issued by the State Board at this time nor is any additional pumping for existing rights being granted. Therefore, the Salinas River does not represent a future source of water supply that can be developed beyond its present appropriation. In terms of physical limitations, Todd (2009) estimated the total groundwater pumping in the basin during 2006 to be 88,154 AF which is 90 percent of the basin perennial yield of 97,700 AFY.

Portions of the Paso Robles Groundwater Basin have experienced significant water level declines over the past 15 to 20 years (Fugro 2002, Fugro 2005, Todd 2007, Todd 2009). The causes of the water level declines include a range of groundwater uses in close proximity, including agricultural irrigation, municipal supply wells, golf course irrigation, and a relatively dense aggregation of rural ("ranchette") users. The County Board of Supervisors has certified a Level of Severity III for the main Basin and a Level of Severity I for the Atascadero Subbasin based on findings in the Resource Capacity Study and an updated pumping analysis for the basin. As a result of the certification, certain land use and monitoring actions will be implemented by the County.

Cholame Valley WPA 15

Cholame Valley is the only groundwater basin in WPA 15.

Cholame Valley Basin

The Cholame Valley Groundwater Basin is located in the Inland sub-region (Figure 2.3) and is identified in California's Groundwater Bulletin 118 as Groundwater Basin Number 3-5 (DWR, 2003). The basin is located in both Monterey and San Luis Obispo counties and is 39,800 acres (62 square miles) in size. The basin is comprised of Quaternary alluvium and is bounded to the southwest by the Plio-Pleistocene nonmarine Paso Robles formation and by Quaternary nonmarine terrace deposits to the northeast. The valley is drained by Cholame Creek and its tributary southeastward and westward into the Salinas River. Annual precipitation in the basin ranges from 11 to 17 inches.

Published hydrogeologic information for this basin is limited. If the District requires more current or detailed information for this basin, new studies would be necessary. Information currently compiled by County departments (such as well logs for private wells or water quality for shared well systems) would be useful to these studies. Additional information may be available from the DWR and private sources.

Supply Aquifers. According to Bulletin 118, available well completion reports indicate that the basin consists of both alluvial deposits and consolidated rock (DWR, 2003). Depths of the wells ranged from 100 to 665 feet. Most wells were located on the fringe of the basin in the upper canyon areas and are used primarily for domestic water supply. Groundwater flow direction is down valley to the southeast.

Water Users. There are some small public water systems in the San Luis Obispo County portion of the basin. All other pumping is for residential and agricultural purposes by overlying users.

Basin Yield. No information is available describing basin yield.

Water Quality. Very limited groundwater quality information has been published or described. Water quality data from non-specific sites indicate generally high concentrations of total dissolved solids, chlorides, sulfates, and boron (Chipping, et al, 1993).

Water Availability. Constraints on water availability in the Cholame Valley basin include physical limitations and water quality.

Nacimiento WPA 16

There are no significant groundwater basins in WPA 16. Public water systems such as Heritage Ranch, Water World Resorts, and the Nacimiento Water Company draw water from wells that rely on Nacimiento reservoir surface water or surface water releases. These water systems are discussed in Technical Memorandum 3.

OTHER GROUNDWATER SUPPLY SOURCES

The groundwater basins described above comprise most of the groundwater supply sources in San Luis Obispo County. There are other areas, however, where groundwater wells tap fractured rock aquifers or other non-basin sources. Water resources in some of these areas have been studied on a multiple-parcel basis for specific planning issues or for small public water systems, but in most cases hydrogeologic data is only generated when a new well is drilled or a property is sold. Generally, available information is limited to specific wells; formation-wide data related to aquifer yield, water quality, or water availability is not available.

A general classification of groundwater sources could begin with the age of geologic materials. All the groundwater basins in the county contain unconsolidated Quaternary-age deposits, and some include late Tertiary (Pliocene) deposits. Outside of the basins, the most productive local groundwater supply sources are from Tertiary-age deposits, such as the Santa Margarita Formation, Pismo Formation, Monterey Formation, and Obispo Formation. Older rocks, such as the Cretaceous sedimentary beds, Franciscan Formation, and La Panza granitics have very limited potential for water.

Within each formation there may be productive rock units. For example, in the Franciscan Formation, wells tapping fractured metavolcanics near active faults can supply over 100 gallons per minute to wells, even though most of the formation is relatively dry.

The following table lists some of the more developed areas of the county that are outside of groundwater basins, and the typical groundwater source to wells. If the District requires more detailed information, focused studies would be necessary. Information currently compiled by County departments (such as well logs, pump tests, or water quality for small public water systems in rural areas) would be useful to these studies. Additional information may be available from the DWR and private sources.

Table 2.2 – Other Groundwater Supply Sources

Sub-Region	Area	Common Geologic Formation	Production Zone
North Coast	Santa Rosa Creek Road	Monterey Fm. / Obispo Fm.	Siliceous shale/vitrified tuff
North Coast	Villa/Cayucos/Old/Willow/ Toro Creek Roads	Franciscan Fm. / Vaqueros Fm.	Metavocanics/ fractured sandstone
Inland	Nacimiento / San Antonio Lakes	Cretaceous sedimentary beds	Fractured sandstone
Inland	Adelaide	Monterey Formation	Calcareous siltstone, siliceous shale
Inland	Park Hill	La Panza Granitics	Quartz dikes
Inland	Templeton Hills	Monterey Formation	Fractured shale
South Coast	San Luis Hills/Oak Park	Pismo Formation	Sandstones
South Coast	Nipomo Valley/Los Berros/Tematte Ridge	Obispo Formation/ Monterey Fm.	Vitrified tuff/siliceous shale

APPENDIX C – TM NO. 3, WATER SUPPLY INVENTORY AND ASSESSMENT – WATER SUPPLY, DEMAND, AND WATER QUALITY

TECHNICAL MEMORANDUM NO. 3

Date: March 29, 2010 (Updated 1/21/11)

To: JOSE GUTIERREZ, CAROLLO ENGINEERS

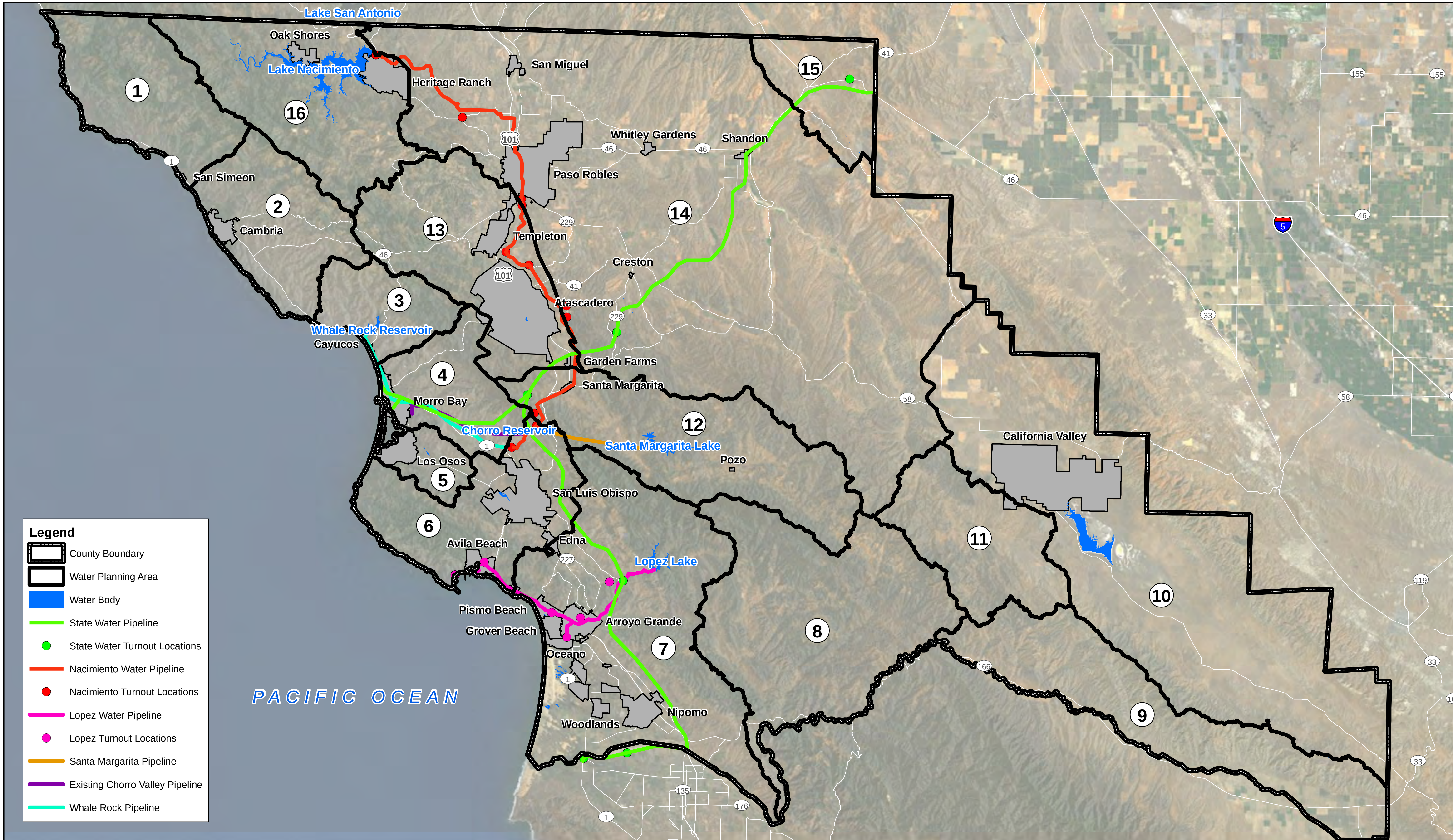
From: STEVE TANAKA, WALLACE GROUP

Subject: TASK C.3 WATER SUPPLY INVENTORY AND ASSESSMENT – WATER SUPPLY, DEMAND AND WATER QUALITY

In conjunction with Fugro West, Inc. and Cleath-Harris Geologists, we are submitting this technical memorandum No. 3 (TM) for Task C.3, Water Supply Inventory and Assessment. This TM focuses on water purveyor water supply, demand and water quality throughout the County. This TM includes a general overview of water supply resources, and more detailed descriptions of water supply for each purveyor (in each corresponding section). This TM also describes the various agreements/contracts of each purveyor with respect to water allocations, and cooperative agreements between multiple parties for overall management of shared water resources. Finally, this TM No. 3 includes an overview of water qualities of the various purveyors throughout the County.

SURFACE WATER RESOURCES

Water is drawn from a number of surface sources, both inside and outside of the County. This section describes the reservoirs in and out of the County that are used as water supply sources within the County. It also includes a brief description of the State Water Project. Allocations and key user agreements are described for each water source. Figure 3.1 shows the location of the conveyance systems for these sources.



San Luis Obispo County Flood Control and Water Conservation District

FIGURE 3.1

MASTER WATER PLAN

WATER CONVEYANCE MAP

STATE WATER PROJECT

The California Department of Water Resources (DWR) owns and operates the State Water Project (SWP). It is the largest state-built water and power project in the United States. The SWP first started delivering water to Californians in the 1960s and in 1963 the San Luis Obispo County Flood Control and Water Conservation District (District) contracted with DWR for 25,000 acre feet per year (AFY) of State Water. The SWP began delivering water to the Central Coast in 1997 upon completion of the Coastal Branch conveyance and treatment facilities, serving Santa Barbara and San Luis Obispo counties.

The treatment facility for State Water delivered through the Coastal Branch, known as the Polonio Pass Water Treatment Plant (PPWTP), is owned, operated and maintained by the Central Coast Water Authority (CCWA) for users in San Luis Obispo and Santa Barbara Counties. The Coastal Branch conveyance system is owned by DWR, which also operates and maintains the raw water portion of the system. The portion of the aqueduct that conveys treated water is operated and maintained by CCWA. Agreements between CCWA, Santa Barbara County Flood Control and Water Conservation District, District and DWR are in place to establish these roles and relationships.

In San Luis Obispo County, decisions were made in the early 1990's by local municipalities and water purveyors that led to Water Service Amount (WSA) requests for portions of the District's allocation of State Water. After extensive policy discussions regarding the use of State Water, the District entered into Water Supply Agreements with the agencies identified in Table 3.1. Master Water Treatment and Coastal Branch construction agreements with CCWA were also approved for treatment of 4,830 AFY of State Water, the cumulative total of WSA requests.

The SWP is considered a supplementary source of water supply as hydrologic variability, maintenance schedules, and repair requirements can cause reduced deliveries or complete shut down of the delivery system. Since delivery to the Central Coast began, the SWP has provided between 50 and 100 percent of the contracted allocations, but drought coupled with pumping restrictions in consideration of endangered species habitat lowered that amount to 35 percent in 2008 and 40 percent in 2009. To receive a greater portion of State Water, up to their full WSAs, during these shortages, most agencies have entered into "Drought Buffer Water Agreements" with the District for use of an additional portion of the District's SWP allocation, as shown in Table 3.1. For example, when the SWP can only deliver 50% of contracted allocations, an agency with a 100 AFY WSA and a 100 AFY drought buffer allocation can still receive its 100 AFY WSA – 50% of their 100 AFY WSA plus 50% of their 100 AFY drought buffer allocation equals 100 AFY.

Table 3.1 also illustrates that the District has 15,273 AFY of unsubscribed SWP allocation (District allocation (25,000 AFY) minus Total Reserved (9,727 AFY) equals 15,273 AFY), commonly referred to as the "excess allocation." Hydraulics, treatment plant capacity, and contractual terms and conditions limit how the excess allocation can be used. The following is a list of options for use of this excess allocation that will be evaluated in the MWP:

- Direct delivery after contract-revision negotiation for use of any additional capacity available in the Coastal Branch treatment and conveyance facilities;
- As additional drought buffer water;
- Via permanent, multi-year or single year transfer or exchange; and/or
- After groundwater or surface storage.

Table 3.1: District State Water Project Contractors

Contractor	WSA	Buffer	Total Reserved	6% Allocation Year (1977) (1)	66-69% Allocation Year (1)	100% Allocation Year (1)	WPA
Chorro Valley Turnout							
Morro Bay, City of	1,313	2,290	3,603	216	1,313	1,313	4
California Mens Colony	400	400	800	48	400	400	4
County Operations Center	425	425	850	51	425	425	4
Cuesta College	200	200	400	24	200	200	4
Subtotal	**2,338**	**3,315**	**5,653**	**339**	**2,338**	**2,338**	
Lopez Turnout							
Pismo Beach, City of	1,240	1,240	2,480	149	1,240	1,240	7
Oceano CSD	750	0	750	45	495	750	7
San Miguelito MWC	275	275	550	33	275	275	6
Avila Beach CSD	100	0	100	6	66	100	6
Avila Valley MWC	20	60	80	5	20	20	6
San Luis Coastal USD	7	7	14	1	7	7	6
Subtotal	**2,392**	**1,582**	**3,974**	**238**	**2,103**	**2,392**	
Shandon	100	0	100	6	66	100	14
Subtotal	**100**	**0**	**100**	**6**	**66**	**100**	
Total	**4,830**	**4,897**	**9,727**	**584**	**4,507**	**4,830**	

Notes:
1. Minimum, average, and maximum allocations established in the State Water Project Delivery Reliability Report 2007 (August 2008), page 51, Table 6.13.
This study used 66% for the average allocation year.

<u>SWP Reliability</u>
Future SWP deliveries to the District and SWP subcontractors within the County will be affected by many factors, including Delta pumping restrictions and climate change. Estimating the delivery reliability of the SWP depends on many issues, including possible future regulatory standards in the Delta, population growth, water conservation and recycled efforts, and water transfers. The California Department of Water Resources (DWR) published the State Water Project Delivery Reliability Report 2007 (August 2008). The report estimates future (2027) SWP delivery reliability and incorporates the 2007 federal court ruling for Delta pumping and potential impacts of future climate change. When compared to previous reliability reports, total annual deliveries for 2027 show decreases in deliveries in most years if no actions are taken to address the factors causing the decrease in availability. It is important to recognize that actions to re-establish reliability are being evaluated by DWR, State Water Contractors, and other State and Federal agencies. Future actions may include new environmental efforts as well as infrastructure improvements envisioned when the SWP was originally scoped in the 1960s.

Table 6.13 from the 2007 DWR reliability report contains the average, maximum, and minimum estimates of SWP Table A deliveries from the Delta under future conditions. Table 6.13 shows that average SWP delivery amounts may decrease from 8 to 11 percent of maximum SWP Table A amounts as compared to average SWP delivery amount estimates from previous reliability studies. In the 2005 DWR reliability report, delivery amounts were projected to be

77% of maximum SWP Table A amounts on average. The 2007 DWR reliability report projects delivery amounts to be 66 – 69% of maximum SWP Table A amounts on average. The decrease in deliveries is primarily due to flow targets related to Delta smelt, which reduces the amount of Delta water available for export by the SWP and the assumed hydrologic changes associated with climate change.

Table 3.1 not only lists the WSA, drought buffer, and total reserve allocations for the District, but it also provides the average, maximum single year and minimum single year allocations based on the range of deliveries presented in Table 6.13 from the 2007 reliability report. The minimum, average, and maximum deliveries were 6, 66, and 100 percent of the maximum SWP Table A allocations, respectively. For long term planning, it is assumed that SWP contractors will receive 66 percent of the maximum allocation in a given year. The allocations presented in Table 3.1 include the drought buffer (if applicable).

NACIMIENTO WATER PROJECT

The Nacimiento Dam was constructed in 1957 by Monterey County Flood Control and Water Conservation District (now known as the Monterey County Water Resources Agency (MCWRA)). The dam and reservoir continue to be operated by MCWRA. The lake has a capacity of 377,900 acre feet and a surface area of 5,727 acres. Water is collected from a 365.1 square mile watershed that is comprised of grazing lands and rugged wilderness.

In 1959, the District secured the rights to 17,500 AFY from Lake Nacimiento, with 1,750 AFY reserved for lakeside users and the Heritage Ranch Community Services District (CSD). After a long series of studies and negotiations, the Nacimiento Water Project (NWP) was initiated. The NWP is the single largest project that the District has ever undertaken. The total project cost, including design, construction, construction management, environmental permitting, and right-of-way, is approximately $176 million. Water deliveries are slated to begin in 2010. The project will deliver raw lake water from Lake Nacimiento to communities within San Luis Obispo County. Participating entities and their contracted water amounts are listed in Table 3.2.

Table 3.2: NWP Participants

Participants	Allocation (AFY)
City of Paso Robles	4000
Templeton CSD	250
City of San Luis Obispo	3380
Atascadero MWC	2000
CSA 10 A (via exchange)*	25
TOTAL	9655

*See Whale Rock Reservoir Operating Agreements

Though the participants have contracted for 9,655 AFY, the northern portions of the pipeline and appurtenances have been designed for the maximum allowable withdrawal amount of 15,750 AFY. Decreasing percentages of excess capacity are also designed into the southern reaches of the project. It is expected that additional allocations will be purchased in the future by existing participants or other entities. The mechanism by which the participation requests of other entities are considered varies depending on whether or not the entity was a part of the Environmental Impact Report (EIR). If the entity was a part of the EIR, it can proceed directly to the District Board of Supervisors for consideration. If it was not a part of the original EIR, it must consult with the Nacimiento Project Commission and obtain written support from existing participants that represent at least 55% of existing subscription amounts before proceeding to the District Board of Supervisors for consideration.

WHALE ROCK RESERVOIR

Whale Rock Reservoir is located on Old Creek Road approximately one half mile east of the community of Cayucos. The project was planned, designed, and constructed under the supervision of the State Department of Water Resources. Construction took place between October 1958 and April 1961. The reservoir is jointly owned by the City of San Luis Obispo, the California Men's Colony, and Cal Poly. These three agencies, with the addition of a representative from the Department of Water Resources, form the Whale Rock Commission which is responsible for operational policy and administration of the reservoir and related facilities. Day-to-day operation is provided by the City of San Luis Obispo.

Whale Rock reservoir is formed by an earthen dam and was able to store an estimated 40,662 acre-feet of water at the time of construction. The calculation of the yield available is coordinated with Salinas Reservoir using a safe annual yield computer model. The model also evaluates the effect of siltation. The Whale Rock Commission has budgeted for a siltation study to be undertaken in the near future.

Operating Agreements

Several agreements establish policy for the operation of the Whale Rock system and actions of the member agencies. A brief description of the existing agreements follows:

A) Agreement for the construction and operation of the Whale Rock Project, 1957, set forth the project's capital cost distribution to the member agencies.

B) A supplemental operating agreement, 1960, established the Whale Rock Commission and apportioned the operating costs.

C) Downstream water rights agreement (the original 1958 agreement was amended in April 1996) defining water entitlements for adjacent and downstream water users. The Cayucos Area Water Organization (CAWO) affected by this agreement consists of three public water purveyors and the cemetery, all in the Cayucos area. In addition to the agencies, water entitlements were identified for two separate downstream land owners. Entitlements are as follows (units of AFY):

Cayucos Area Water Organization (CAWO)[1]	
Paso Robles Beach Water Association	222
Morro Rock Mutual Water Company	170
County Service Area 10A	190
Cayucos-Morro Bay Cemetery District	18
Mainini Ranch	50
Ogle	14
Total Downstream Entitlement	664

The agencies generally receive their entitlements via pipeline from the reservoir, while the land owners' entitlement is released from the reservoir.

D) A decision and order by the Fish and Game Commission of the State of California, October 24, 1964, required the Whale Rock Commission to stock the reservoir with

[1] The referenced agreement establishes the amount of 600 AFY to CAWO. The allocations to the CAWO members are part of an internal agreement amongst the members.

17,500 rainbow trout (between six and eight inches long) each year. Subsequent DFG decisions have prohibited restocking with rainbow trout.

E) Superior Court decision #36101, 1977, required the Whale Rock Commission to allow public entry to the reservoir for fishing. In 1981, construction was completed on access trails and sanitary facilities at the reservoir, and public fishing began at the lake.

F) An agreement for water allocation and operational policy between the agencies forming the Whale Rock Commission. The agreement established the accounting procedures to allow each agency to carry over excess or deficit water each year.

G) An agreement between the Whale Rock Commission and the California Men's Colony, 1990, to establish maintenance and operation criteria for the Chorro Booster pumps. The Chorro Booster pumps were installed by the Commission on the California Men's Colony turnout from the Whale Rock line to reduce system pressures required to provide full flow to the California Men's Colony water treatment plant. Pump and pump station maintenance, per the agreement, are the responsibility of the California Men's Colony.

H) An agreement between the Whale Rock Commission and the County of San Luis Obispo for connection to the Whale Rock pipeline, 1995, allowed a pipeline connection to deliver water to the Dairy Creek Golf Course. Typically, the golf course uses recycled water from the California Men's Colony. Water from Whale Rock Reservoir can be delivered when recycled water is not available under the terms of the agreement.

I) A consent to common use agreement, 1996, between the Whale Rock Commission and the County of San Luis Obispo. The agreement allowed the installation of the State Water pipeline at seven locations within the existing Whale Rock pipeline easement.

J) A mutual aid agreement between the Whale Rock Commission and the City of Morro Bay, 2000, relative to water resources in the event of an emergency.

K) An exchange agreement, 2005, between CSA 10A and the City of San Luis Obispo allowing the delivery of up to 90 AFY of the City's Whale Rock water allocation to CSA 10A in exchange for CSA 10A's purchase of an equivalent amount of Nacimiento Water for delivery to the City. The anticipated need for CSA 10A is 25 AFY at build-out.

The following table below summarizes the current capacity rights for the joint right-holders (downstream water rights are accounted for separately).

Table 3.3: Whale Rock Reservoir Allocations

Water Users	%	AF
City of San Luis Obispo:	55.05	22,383
Cal Poly	33.71	13,707
CMC	11.24	4,570
TOTAL	100	40,660

Each rights-holder manages reservoir withdrawals individually from their available water storage allocation. The Whale Rock Commission tracks withdrawals and reports available volume on a monthly basis.

LOPEZ LAKE/RESERVOIR

The San Luis Obispo County Flood Control and Water Conservation District completed the Lopez Dam in 1968 to provide a reliable water supply for agricultural and municipal needs as well as flood protection for coastal communities. Lopez reservoir has a capacity of 49,388 AF.

The lake covers 950 acres and has 22 miles of oak covered shoreline. Allocations for Lopez water are based on a percentage of the safe yield of the reservoir, 8,730 AFY. Of that amount, 4,530 AFY are for pipeline deliveries and 4,200 AFY are reserved for downstream releases. The dam, terminal reservoir, treatment and conveyance facilities are a part of Flood Control Zone 3.

The agencies that contract for Lopez water in Zone 3 include the communities of Oceano, Grover Beach, Pismo Beach, Arroyo Grande, and County Service Area (CSA) 12 (including the Avila Beach area). Their allocations are shown in the table below.

Table 3.4: Lopez Lake Allocations

Water Users	AFY
City of Pismo Beach	896
Oceano CSD	303
City of Grover Beach	800
City of Arroyo Grande	2290
CSA 12	241
TOTAL	4530

There are two developments that could change both the amount of water available to contractors and the safe yield. The Arroyo Grande Habitat Conservation Plan, which is currently being developed, will likely require additional downstream releases. An interim downstream release schedule has reduced the amount of water available to municipalities. Changes in operation of the dam are being considered for reducing spills and optimizing future deliveries. Additionally, the City of Pismo Beach, on behalf of the Zone 3 agencies, has taken the lead on conducting a study to consider the feasibility of modifying the dam to augment capacity of the reservoir.

SANTA MARGARITA LAKE/SALINAS RESERVOIR

The Salinas Dam was built in 1941 by the War Department to supply water to Camp San Luis Obispo and, secondarily, to meet the water needs of the City of San Luis Obispo. The Salinas Reservoir (Santa Margarita Lake) captures water from a 112 square mile watershed and can currently store up to 23,843 acre-feet. In 1947, the Salinas Dam and delivery system was transferred from the regular Army to the U.S. Army Corps of Engineers. Shortly thereafter, the San Luis Obispo County Flood Control and Water Conservation District began operating this water supply for the City under a lease from the U.S. Army Corps of Engineers. Water from the reservoir is pumped through the Cuesta Tunnel (a one mile long tunnel through the mountains of the Cuesta Ridge) and then flows by gravity to the City's Water Treatment Plant on Stenner Creek Road. Transfer of dam ownership to the District from the U.S Army Corps of Engineers is under consideration.

The original design of the dam included spillway gates that would have increased capacity to an estimated 45,000 AF, and an increase in safe annual yield of 1,650 AFY. Though these gates were not installed due to safety concerns, more recent studies have shown that gates could be installed in conjunction with structural improvements to the dam. With its participation in the Nacimiento Water Project, the City has concluded that plans for expansion of the Salinas Reservoir should be put on hold. There is a possibility that this expansion right might be eliminated from the City's Water Rights Permit when it is renewed or licensed after December 2010.

The City withdrawals are coordinated with Whale Rock Reservoir using a safe annual yield computer model. The City's combined safe yield of the two reservoirs was 6950 AFY in 2009. The model also evaluates the effect of siltation.

CHORRO RESERVOIR

(Information for this section was taken from an interview with John Kellerman, the Plant Manager at the California Men's Colony and from the 2003 Chorro Valley Study).

The Chorro Reservoir is located approximately ¾ of a mile northeast of the California Men's Colony (CMC) in the upper Chorro watershed. The Chorro Reservoir is part of the Chorro Valley Water System operated by CMC. The system provides storage, treatment and distribution to four major users:

- The California Men's Colony (CMC)
- Camp San Luis Obispo/California National Guard (CSLO)
- San Luis Obispo County Operational/Education Centers (SLOCo)
- Cuesta Community College (Cuesta)

The reservoir and treatment plant were constructed by the US Army Corps of Engineers to provide water to Camp San Luis Obispo at the beginning of World War II. The net storage capacity of the Chorro Reservoir has decreased since it was constructed due to sedimentation, and was estimated to be 105 acre-feet, based on a study prepared by DWR in 1989. More recent studies indicate that the capacity is currently closer to 90 acre-feet. Safe annual yield is considered to be 140 AFY, as the watershed provides much more than what can be stored in the reservoir, even in drought years. It is worth noting that water demand at the Camp, both during the war and subsequently, has been met almost exclusively through surface flows to the reservoir from the Chorro watershed and from groundwater wells on the Camp property. Although the Salinas Reservoir waterline was extended from the Cuesta Water Tunnel to the Chorro Reservoir as part of the original improvements in World War II, the pipeline has only been used to convey water from the Salinas Reservoir to the Camp twice since construction.

CSLO has priority rights to water from Chorro Reservoir, with entitlement to 140 AFY. CMC has right to any excess. The Mainini Ranch has an agreement with CSLO for a delivery of up to 25 AFY, but has only used an average of 5 to 7 AFY over the past decade. For further discussion on agreements related to the Chorro Reservoir, see the description of the Chorro Valley Water System.

TWITCHELL RESERVOIR

Twitchell Dam is on the Cuyama River about 6 miles upstream from its junction with the Sisquoc River. Though the dam is located in Santa Barbara County and operated by the Santa Maria Valley Water Conservation District (SMVWCD), the reservoir straddles the county line and some agricultural land within San Luis Obispo County is irrigated from the Santa Maria Groundwater Basin replenished by the reservoir. The multiple-purpose Twitchell Reservoir has a total capacity of 224,300 acre-feet. It stores floodwaters of the Cuyama River, which are released as needed to recharge the ground-water basin and to prevent salt water intrusion. The reservoir supplies on average 32,000 AFY of recharge to the Santa Maria Groundwater Basin, though this value fluctuates significantly relative to annual precipitation. Because the reservoir is managed for flood control and groundwater recharge, the reservoir is empty much of the time. A majority of the groundwater flows towards the ocean, though a small gradient flows seasonally to the Nipomo Mesa.

OTHER WATER SUPPLY SOURCES

Other water supply sources in the County include seawater/brackish water desalination, recycled water (from municipal wastewater treatment plants), water conservation, and decentralized water supply opportunities.

Desalination

In the County, there is only one operating desalination facility, that being the City of Morro Bay's desalination plant. In the past the City has used the salt water reverse osmosis (SWRO) treatment plant to treat water from saltwater wells and to remove nitrates from fresh water wells. Recently the City completed the installation of two 450 gallons per minute (gpm) brackish water reverse osmosis (BWRO) treatment trains. The addition of these treatment processes will enable the City to treat both fresh water and salt water wells simultaneously, and will also reduce the energy usage of the facility as well. The SWRO trains are designed to produce approximately 645 AFY of potable water from sea water. The BWRO system is capable of treating the entire 581 AF of Morro Basin groundwater that the City can extract by permit.

Other Desalination Projects. The Cambria CSD has been striving to develop a seawater desalination plant to meet existing and future water demands. This plant, if implemented, is expected to produce up to 602 AFY. This plant will operate during the summer season to augment supply during the summer and high demand period (from summer tourism). A recycled water system is also planned, with an estimated 180 AFY made available for unrestricted irrigation use.

Three agencies, the City of Arroyo Grande, the City of Grover Beach, and the Oceano Community Services District (Agencies), participated in the evaluation of a potential drought-proof water supply, seawater desalination, to supplement their existing potable water sources. Currently, all three Agencies receive water from various sources, including: the California State Water Project, Lopez Lake Reservoir, and groundwater from the Arroyo Grande Plain/Tri-Cities Mesa Groundwater Basin. Recent projections of water supply shortfalls in the region motivated the Agencies to conduct a more detailed study of desalination as a supplemental water supply. The study focused on utilizing the existing South San Luis Obispo County Sanitation District’s (SSLOCSD) wastewater treatment plant site to take advantage of utilizing the existing ocean outfall, while having the plant located near the ocean seawater source. The feasibility study, completed in 2008, was based on a 2,300 AFY seawater desalination facility. Some of the major points of interest and concern of this study include:

- Some 20 or more beach wells may be needed to provide enough seawater to produce the 2,300 AFY potable water.
- Permitting and environmental issues could be complex, and implementation could take 8 years or longer.
- Initial capital cost could be in the range of $35 million, and customer rates could be impacted by 18% to over 100% to fund the project, and would cost in the neighborhood of $2,300 per AF or more, on a 20-year life cycle basis.

Water Recycling

There are several purveyors and agencies that recycle municipal wastewater in the County. Details of each purveyor or sanitary agency's recycled water program is discussed in detail in the corresponding sections later in this chapter. Recycled water qualities range from secondary quality (as defined by Title 22 CCR) to the highest level of treatment, tertiary 2.2 quality for unrestricted use. The most established water recycling program in the County is that of the City of San Luis Obispo. The City currently delivers 135 AFY to nearby golf courses, schools and commercial establishments, with expectations of augmenting up to 1,000 AFY of potable water with recycled water for irrigation. The City also must maintain discharge to San Luis Obispo Creek, and this flow amounts to approximately 1,800 AFY. Other water recycling projects in the County include:

- Nipomo CSD (Blacklake WWTP, Southland WWTP)
- California Men's Colony (Dairy Creek Golf Course)
- Templeton CSD (Meadowbrook WWTP/recharge Salinas River underflow)
- City of Atascadero WRF (Chalk Mountain Golf Course)
- Rural Water Company (Cypress Ridge Golf Course)
- Woodlands MWC (Monarch Dunes Golf Course)

<u>Water Recycling Studies and Potential Future Recycling Projects</u>. Numerous agencies have undertaken recycled water feasibility studies, to determine the viability of developing recycled water projects. Such agencies include, but may not be limited to:

- San Simeon CSD
- Cambria CSD
- City of Morro Bay/Cayucos Joint WWTP
- City of Paso Robles
- South San Luis Obispo County Sanitation District (SSLOCSD) WWTP
- City of Pismo Beach
- Avila Beach CSD/Port San Luis
- Los Osos CSD

<u>SSLOCSD Recycled Water Feasibility Study Update</u>. In 2001, the SSLOCSD conducted a recycled water feasibility study, with the assistance of State SRF grant funds. The South San Luis Obispo County Sanitation District (SSLOCSD) provides wastewater services to the Cities of Arroyo Grande and Grover Beach, the community of Oceano, and a small amount of unincorporated County territory.

Presently the SSLOCSD facility has a wastewater treatment capacity of 5.0 MGD (5,600 AFY). The treatment facility currently processes 2.8 MGD (3,136 AF/YR) of wastewater from the service area. Additionally, the City of Pismo Beach shares the use of the effluent outfall line discharging approximately 1.2 MGD in addition to the District's flow. The City of Pismo Beach wastewater plant has a permitted capacity of 1.75 mgd.

The updated study, completed in 2008, included "traditional" alternatives to irrigate turf and landscaping with secondary (where allowed) and tertiary effluent. Brief summaries of these additional alternatives are as indicated in the following paragraphs. A summary of costs is presented in Table 2.2 (taken from the Recycled Water Feasibility Study Report in its entirety).

- Stream flow augmentation. Tertiary recycled water would be piped to just below Lopez Dam, and discharged to Arroyo Grande Creek, thus “freeing up” possibly 4,200 AFY water that must otherwise be released from Lopez Dam for environmental stream flow. Due to projected high chloride levels, the alternative would likely require reverse osmosis treatment or other means of reducing overall TDS and chloride levels.
- Agricultural Irrigation There are approximately 3,000 acres of agricultural land in production, with in 3 miles of the SSLOCSD WWTP. Upgrading the plant to produce tertiary 2.2 effluent, and using the recycled water for crop irrigation could utilize most if not all of the effluent produced at the WWTP. Such a project, similar to any large-scale recycling project, requires a significant amount of planning, public education and outreach in order to be successful.
- Groundwater Recharge/Indirect Potable Reuse. The study evaluated possible well sites that could be used to re-inject highly treated recycled water in the groundwater basin, in compliance with CDPH groundwater regulations. Such water, after adequate residence time, and meeting the total organic carbon requirements, could be withdrawn from the aquifer thus increasing the well production currently limited in the Five Cities area.

Table 2.2 – Summary of Costs, SSLOCSD Recycled Water Alternatives

Alternative	Capital Cost, $[b]	Cost, $/AFY[c]
1-1. Turf Irrigation in SSLOCSD service area south of Hwy 101	$16,00,000	$11,600
1-2. Turf Irrigation, SSLOCSD and expanding north of Hwy 101	$19,000,000	$12,000
2. Direct Crop Agricultural Irrigation	$23,000,000	$1,200 to 1,400[d]
3-1. Stream Augmentation/Tertiary Effluent	$15,000,000	$4,200
3-2. Stream Augmentation/MF-RO Process Water	$30,000,000	$1,500 to $,700[d]
4. Indirect Potable Reuse	$38,000,000	$1,700 to 2,000[d]

[a] Costs do not include seasonal storage (where required), user on-site modifications, and other incidental costs to User
[b] Year 2008 dollars, rounded to nearest $1 million.
[c]Annualized costs/life cycle cost basis, 20 year life, 5% inflation.
[d]Low range based on possible Title XVI grant funding at 25%.

It should also be noted that this Report included discussions on opportunities for funding such recycled water projects. Funding opportunities included:

- Title XVI (Water Reclamation and Reuse) Program, can fund overall up to 25% of total project costs.
- State Revolving Fund Program/Water Recycling Funding Program.

- It was noted that other opportunities existed at the time of the report, for possible economic stimulus finding. Opportunities for such funding, however, are slim given that projects were to be “shovel ready”, and many agencies are competing for funding.
- In January 2010, the cities of Arroyo Grande and Pismo Beach initiated a joint study of recycled water feasibility to focus on alternatives to deliver secondary effluent to the Arroyo Grande Cemetery and the Caltrans Highway 101 median. This study is expected to be complete in April 2010.

Water Conservation

Water conservation programs are being implemented throughout the County. Most purveyors established water conservation programs during a prolonged drought in the early 90s. In the current drought, purveyors have been aggressively promoting conservation measures to their customers. Many have made mandatory conservation requirements part of the building code and others have provided incentives for voluntary conservation. Certain conservation measures are required as part of the State’s Urban Water Management Plan (UWMP) program. Two voluntary organizations assist members to implement these and other conservation measures. The conservation element of the UWMP and the programs of the two agencies are described below.

Urban Water Management Plans: California’s Urban Water Management Planning Act requires that every urban water supplier that provides water to 3,000 or more customers, or that provides over 3,000 acre-feet of water annually, should prepare and implement a plan (UWMP) to ensure the appropriate level of reliability in its water service sufficient to meet the needs of its various categories of customers during normal, dry, and multiple dry years. The Act requires that an UWMP contain a discussion of a water purveyor’s water Demand Management Measures (DMMs), including a description of each DMM currently being implemented or scheduled for implementation, the schedule of implementation for all DMMs, and the methods, if any, the supplier will use to evaluate the effectiveness of DMMs. The Urban Water Management Planning Act identifies 14 specific DMMs:

1. Water conservation coordinator;
2. Water Survey Programs for single-family residential and multi-family residential customers;
3. Residential plumbing retrofit;
4. System water audits, leak detection, and repair;
5. Metering with commodity rates for all new connections and retrofit of existing connections;
6. Large landscape conservation programs and incentives;
7. High-efficiency washing machine rebate programs;
8. Public information programs;
9. School education programs;
10. Conservation programs for commercial, industrial, and institutional accounts;
11. Wholesale agency programs;
12. Conservation pricing;
13. Water waste prohibition; and
14. Residential ultra-low flush toilet replacement programs.

The UWMP must discuss each of these potential DMMs and any other measures the supplier is implementing or has scheduled for implementation through a five-year period. The entire UWMP is to be updated every five years. If a particular DMM is not scheduled for implementation by the water supplier, the UWMP must include a cost-benefit evaluation that takes into consideration the economic, environmental, social, health, customer impact, and technological factors.

In addition to DMMs, the UWMP must also include a Water Shortage Contingency Plan, containing information on actions to be undertaken in response to water supply shortages of varying severity. These actions generally begin with voluntary conservation measures during periods of moderate shortage or high demand and progress to increasingly stringent mandatory restrictions on water use during severe shortages. Most purveyors have put some level of these Contingency Plans into place during the current drought.

Partners in Water Conservation: Partners in Water Conservation (PIWC) is a group of San Luis Obispo County water purveyors working together to provide the community with valuable information and educational opportunities on how to use water more efficiently, both indoors and outdoors. Members include:

City of Arroyo Grande
City of Grover Beach
City of Morro Bay
City of Paso Robles
City of Pismo Beach
City of San Luis Obispo
County of San Luis Obispo
Atascadero Mutual Water Company
Cambria Community Services District
Los Osos Community Services District
Nipomo Community Services District
Templeton Community Services District

The partnership has sponsored a number of programs and publications to promote conservation in the communities they serve. Some of their efforts include:

- Features of a Sustainable Landscape (brochure)
- Water Conserving Plants for Northern San Luis Obispo County (directory)
- Water Wise Landscape Workshops held annually in the summer
- Regular meetings of the membership to coordinate activities and to share lessons learned.

In addition to joint activities, each of the members has water conservation programs in their service areas which are described in the discussion for each purveyor.

California Urban Water Conservation Council: The California Urban Water Conservation Council (CUWCC) was created to increase efficient water use statewide through partnerships among urban water agencies, public interest organizations, and private entities. The Council's goal is to integrate urban water conservation Best Management Practices (BMPs) into the planning and management of California's water resources. Members pledge to develop and implement 14 comprehensive conservation BMPs. These are identical to the 14 DMMs required by the UWMP Act. CUWCC offers an extensive array of resources to assist members in the their conservation goals, including model municipal codes, sample surveys, conservation publications, descriptions of lessons learned from other members, and variety of technical resources to assist water suppliers in planning, estimating costs, and determining impact of BMP implementation.

SLO County members include:

- City of Pismo Beach
- City of San Luis Obispo
- Central Coast Water Authority
- Golden State Water Company
- Atascadero Mutual Water Company
- Cambria Community Services District
- Nipomo Community Services District
- Templeton Community Services District

Decentralized Supply Opportunities

Considering that the majority of potable water supply at the household level is consumed for non-potable uses such as toilet flushing and outdoor irrigation, there are opportunities for homeowners and businesses to develop their own non-potable water sources on a small scale basis. Along those lines, two "green" technologies that have been given significant attention recently are graywater recycling and stormwater reuse/rainwater harvesting.

Typical graywater systems harvest wastewater from households or buildings that has not come into contact with toilet or kitchen sink waste. The harvested water is then filtered for distribution in underground irrigation systems. More elaborate systems can be designed to use graywater for toilet flushing, though plumbing codes make this option more complex. The San Luis Obispo Coalition of Appropriate Technology (SLO-COAT) as recently published a homeowner's guide to the design and construction of relatively simple graywater systems that can be used for outdoor irrigation. The state is also revising plumbing codes to make graywater systems easier to install.

Promotion of stormwater reuse has been adopted the SWRCB as part of the latest strategic plan, nad is part of the State's recently adopted Water recycling Policy. Stormwater reuse is considered a locally available, sustainable supply, consistent with implementation of the California Global Warming Solutions Act of 2006, and other State and regional efforts.

Rainwater harvesting is a form of stormwater reuse, usually practiced on a small scale by homeowners. Rainwater harvesting is the process of intercepting stormwater runoff from a surface (e.g. roof, parking area, land surface), and putting it to beneficial use. Intercepted stormwater can be collected, slowed down, and retained or routed through the site landscape using cisterns, microbasins, swales and other water harvesting structures. Water harvesting reduces dependence on dwindling groundwater reserves and expensive imported water. Capturing and using stormwater runoff also reduces site discharge and erosion, and the potential transport of stormwater pollutants.

Stormwater reuse can be promoted in a variety of ways. For example, the city of Tucson, Arizona became the first municipality in the country to require developers of commercial properties to harvest rainwater for landscaping. The new measure – approved by a unanimous vote by the City Council – requires that new developments meet 50% of their landscaping water requirements by capturing rainwater. The new rule goes into effect June 1, 2010.

Consumer education is also a common approach to promoting stormwater capture and reuse. The City of Tucson has published its Water Harvesting Guidance Manual and the Texas Water Development Board has published the Texas Manual on Rainwater Harvesting. At the local level, SLO-COAT is planning to release a homeowner's guide to Low Impact Development which will emphasize simple techniques for stormwater capture and reuse at the household level.

The Atascadero Mutual Water Company has instituted a rebate program aimed at reducing landscape irrigation. One of the conservation measures supported by the program is the installation of rainwater harvesting systems at the household level, providing a rebate of up to $250 for storage tanks or cisterns designed to capture rainfall for use during dry periods.

Cambria CSD requires that residences built on properties larger than 8,000 sq ft. must have non-potable water collection cisterns for irrigation watering. 22 cisterns have been installed to date.

Given the large quantity of usable water that flows into household drains or runs off rooftops in the County, consideration should be given to further promoting stormwater reuse and graywater recycling as supplemental sources of water supply for landscape irrigation and other domestic uses.

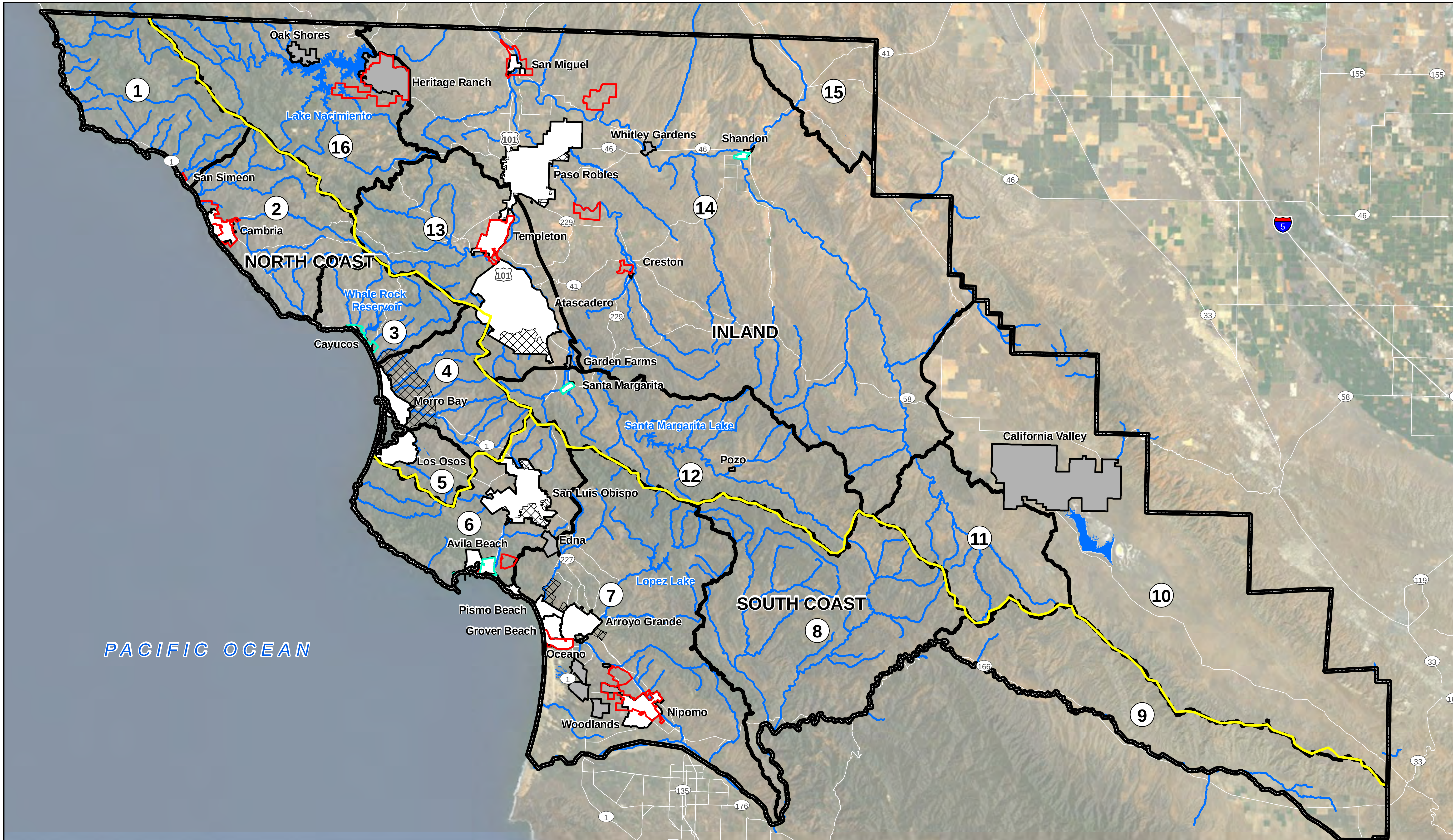
WATER PURVEYORS OF SAN LUIS OBISPO COUNTY

This section describes the existing and future water supplies and demands for the larger water purveyors throughout the County. Supply and demand for consumers served by smaller water purveyors are included in the discussion and analysis of overlying users. Figure 3.2 depicts an overview of the County, major cities and agencies germane to this master water plan, water regions and sub-regions.

NORTH COAST SUBREGION

This section describes water supply, water demand, and water quality for Water Planning Areas 1 to 4:

- San Simeon WPA 1: San Simeon CSD
- Cambria WPA 2: Cambria CSD
- Cayucos WPA 3: Cayucos Area Water Organization (Morro Rock Mutual Water Company, Paso Robles Beach Water Association, CSA 10A)
- Morro Bay WPA 4: City of Morro Bay and Chorro Valley Water System (California Men's Colony, Cuesta College, Camp San Luis Obispo, County Operations Center/Office of Education)
- Los Osos WPA 5: Community of Los Osos and vicinity (Golden State Water Company, Los Osos CSD, S&T Mutual Water Company).



San Luis Obispo County Flood Control and Water Conservation District

MASTER WATER PLAN

PROJECT BASEMAP

FIGURE 3.2

Legend

County Boundary	Urban Reserve Line	CSD
SOI	Water Body	County Sub-Region
Village Reserve Line	CSA	Major Rivers/Streams

San Simeon WPA 1

San Simeon Community Services District

Source: *November 2007 Water System Master Plan and Wastewater Collection System Evaluation; Discussion with Water Committee August 2010.*

The San Simeon Community Services District (San Simeon CSD) supplies its customers with domestic water service, wastewater service, and fire protection, among other services.

Land Use and Service Population. San Simeon is located on the central coast of San Luis Obispo County, along Highway 1 north of Cambria. The San Simeon CSD serves an area of approximately 100 acres, which includes approximately 320 residential dwelling units and over twice that number of hotel/motel units. Though the permanent residential population is estimated at 247, the tourist population can outnumber locals and varies with the season.

Existing (2006) Population: 247 permanent residents and 22.72 acres commercial/retail.

Build-out Population: 740 permanent residents and 42.54 acres commercial/retail.

The build-out population is the upper range from the San Simeon Community Plan which assumes 530 dwelling units and 1.4 persons per DU.

Water Demand. Water demand is summarized as follows:

- 2007 Average Day Demand (ADD): 108 AFY (0.096 MGD)
- 2007 Gross Per Capita Demand: 388 gpcd
- 2007 Residential Per Capita Demand: 72 gpcd
- Maximum Month Demand: 2.0 times ADD
- Future ADD (2025): 224 AFY (0.200 MGD.) based on land use water duty factors
- Future ADD (Build-out): 250 AFY

The relatively high gross per capita demand is due to the small resident population compared to the size of the overall population (tourists and residents) that depends on San Simeon CSD water. The commercial/retail sector constitutes over 70% of the annual demand. Build-out water demand is based on 3,426 gpd/acre for the non-residential sector and 72 gpcd consumption for residents.

Water Supply - Existing. The San Simeon CSD depends on groundwater from the Pico Creek underflow. Though the SWRCB permits extraction of up to 140 AFY, groundwater studies indicate a safe yield of only 120 AFY, with 16 AFY used at Hearst Ranch. This leaves the San Simeon CSD with a safe yield of 104 AFY.

Water Supply – Future: The Master Plan does not suggest future water supply alternatives, although historically San Simeon CSD has been water-short numerous times during dryer years. As a result of the limitations and unreliability of the supply, a moratorium on development has been in place since 1991. The San Simeon CSD plans to move forward with upgrading its wastewater treatment facility to ultimately be able to use the effluent as recycled water. Desalination, either jointly with Cambria or separately, or coordination with the Hearst

Ranch on a groundwater source of supply to meet build-out needs are options under consideration.

Water Conservation: The San Simeon CSD has adopted an ordinance establishing a 3-stage conservation plan based on water supply conditions. The community has also gone through a retrofit program and the hotels and restaurants continuously have water conservation measures in place.

Water Quality. Contamination of water supply wells due to seawater intrusion is a major water quality concern in the basin (Cleath, 1986). Lowering of groundwater levels below sea level in the basin during the summer months when creek flows are absent and pumping is active can result in the landward migration of the sea water/fresh groundwater interface. The landward flow of seawater into the estuary during winter high tides is also a contributing factor. Although seawater intrusion has increased salinity levels in groundwater pumped from local water supply wells, it has not degraded water quality to the point that the water is non-potable. The 2008 Consumer Confidence Report for two San Simeon CSD wells reported that measured concentrations of all analyzed contaminants were below their respective Maximum Contaminant Level (MCL) or Regulatory Action Level (AL) values.

Cambria WPA 2

Cambria Community Services District

Source: *2005 Cambria CSD Urban Water Management Plan, 2008 Water Master Plan EIR, Discussion with Engineering Manager August 2010*

Cambria is an unincorporated community located in the coastal region of central California, in the northwestern portion of San Luis Obispo County. Cambria is located along Highway 1, approximately 35 miles north of San Luis Obispo. The Cambria Community Services District (Cambria CSD) is an independent special district that provides water, wastewater, fire and other community services to its customers.

Land Use and Service Population. Cambria's URL encompasses approximately 2,351 gross acres, with a net acreage of approximately 1,790 acres, not counting the land in the road rights of way and beach areas along the ocean. Cambria primarily consists of residential uses with combinations of commercial and public institutional uses along Main Street. The surrounding outlying areas are devoted to agricultural uses, primarily grazing, which contribute to the unique setting of Cambria.

Existing (2007) Population: 6,284 (based on 3,786 dwelling units and 2.21 persons/DU)

Build-out Population: Ranges between 8,257 and 13,547 depending on assumptions; current direction in Cambria is to plan for 7,719 (based on 4,650 dwelling units and 1.66 persons/DU).

Water Demand. Water demand is summarized as follows:

- 2003 Average Day Demand (ADD): 815 AFY (0.73 MGD)
- 2003 Per Capita Demand: 90 gpcd (residential)

- Build-out ADD[2]: 1,514 AFY (1.35 MGD) at 175 gpcd (gross)

Water Supply - Existing. To meet water demand, the Cambria CSD operates wells that draw from local groundwater aquifers along the San Simeon and Santa Rosa Creeks. Cambria CSD's water rights are subject to the regulatory authority of the State Water Resources Control Board (SWRCB), and to a certain extent, conditions imposed under development permits issued by the California Coastal Commission (CCC). The current water rights diversion permits from the SWRCB allow Cambria CSD to pump a maximum of 1,118 acre-feet (AF) of water during the wet season, and 630 AF of water during the dry season[3], from both the San Simeon and Santa Rosa Basins. However, the current CCC Development Permit limits the total annual diversion from both creeks to no more than 1,230 AF of water. Additionally, the dry season date, duration, and beginning groundwater levels, limit the actual availability of groundwater from both basins. Currently the water supply of Cambria CSD is at a Level III severity rating (resource capacity has been met or exceeded) due to unreliability of the groundwater supply to meet existing demands.

Water Supply – Future: To meet the additional needs towards build-out and to increase water supply reliability, the Cambria CSD plans to construct a Seawater Desalination Plant to produce up to 602 AFY. This plant would operate during the dry season to augment supply during that period of high demand. A decentralized recycled water program is also planned, with an estimated 180 AFY made available for unrestricted irrigation use.

Water Conservation: Historically, the Cambria CSD has used conservation as a means to extend its existing supplies. Since 1988, a plumbing retrofit program has required the installation of water efficient fixtures upon resale or remodel of a home. The program was expanded in 1990 to require water efficient fixtures for new construction and for existing buildings that require a new connection permit. Since that time, the Cambria CSD has initiated a number of other conservation measures, including rebate programs and plumbing requirements that have resulted in an estimated savings of 18.9 AFY. Cambria CSD is a member of the California Urban Water Conservation Council (CUWCC) and Partners in Water Conservation.

Water Quality. In 1999, the Cambria CSD learned of an MTBE contamination plume that was spreading towards its Santa Rosa well field. As a result, its existing Santa Rosa well field was shut down and an emergency well and treatment plant were constructed further upstream. The new treatment plant provides filtering, disinfection, as well as the removal of iron and manganese. The adjustments made in well locations and the additional treatment provided for Santa Rosa Creek well have resulted in delivery of water to customers that meet both primary and secondary drinking water standards.

Cayucos WPA 3

Cayucos Area Water Organization

Source: *2007 Water Management Plan Update and 2003 CSA 10A Water System Master Plan*

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[2] The Water Master Plan presents several build-out scenarios with a range of annual demand projections from as low as 1,009 AFY to as high as 2,714 AFY. The above figure reflects a planning target for Scenario 4, a 50% quality of life increase in demand allowance and a 1.66 people/unit occupancy rate (Table 2.7, Assessment of Long-Term Water Supply Alternatives).
[3] The dry season begins on May 1 for the Santa Rosa basin and is tied to creek flows in the San Simeon basin. The dry season ends on October 31 for both basins.

The Cayucos Area Water Organization (CAWO) is made up of three member utilities and a cemetery district, the Morro Rock Mutual Water Company (Morro Rock MWC), the Paso Robles Beach Water Association (PRBWA), County Service Area 10A (CSA 10A) and Cayucos Cemetery District (CCD). CSA 10 operates a surface water treatment plant which delivers filtered and chlorinated water to the CAWO members. The three utility purveyors supply their customers with domestic water service, landscape irrigation and fire protection, among other services. The CCD uses the water for irrigation purposes.

Land Use and Service Population. Cayucos is a small oceanfront community with a mixture of vacation homes and full-time residences. A commercial sector serves both the residential and tourist population.

Water Demand. Water demand is summarized as follows:

- 2007 Average Day Demand (ADD): 432 AFY
- 2007 Per Capita Demand: 87 gpcd
- Build-out ADD: 641 AFY

Water Supply - Existing. CAWO members receive water from Whale Rock Reservoir with a maximum total annual entitlement of 600 AFY, allocated to each member as follows:

- Morro Rock MWC: 170 AFY
- PRBWA: 222 AFY
- CSA 10A: 190 AFY
- CCD: 18 AFY

Several wells are also available to CAWO members. The wells are primarily used as emergency back-up sources. Most of the wells extract water from an aquifer that is replenished by recharge from Old Creek and Whale Rock Reservoir. Water drawn from these wells is also limited by the 600 AFY entitlement from the Whale Rock Reservoir. One Morro Rock MWC well draws from Little Cayucos Creek Valley and is not subject to this limitation.

Water Supply – Future: CSA 10A has procured an additional entitlement of 25 AFY through the Nacimiento Water Supply Project. This water will be taken from the Whale Rock Reservoir in an exchange agreement with the City of San Luis Obispo. The agreement allows for up to 90 AFY to be exchanged, which may be a way to address any future needs of the CAWO.

Water Quality. Aluminum has occasionally been found in delivered water at levels that exceed the secondary MCL of 200 ppb. The high aluminum levels are due to residue from the water treatment process. Better control of the treatment process has resulted in lower levels of aluminum in recent water quality tests. Manganese has been found in raw water from the CAWO well at levels that exceed the secondary MCL of 50 ppb. As this well contributes less than 1% of the total supply, manganese is not detectable in delivered water.

Morro Bay WPA 4

City of Morro Bay

Source: *City of Morro Bay 2005 UWMP and 2007 Morro Bay Nitrate Study*

The City of Morro Bay provides water service to over 5,500 connections, including over 10,000 residents, businesses, industrial facilities, and public facilities.

Land Use and Service Population. The City of Morro Bay is located along the central coast of California in San Luis Obispo County. Its coastal location attracts a large number of tourists during the summer and on weekends. The motels, hotels, restaurants, State Parks, and other facilities serving the tourist population add a significant water demand to the local population living primarily in single-family residences.

Existing Population. The population estimate in 2005 was 10,270 according to the Urban Water Management Plan.

Build-out Population. The Urban Water Management Plan uses a build-out population of 12,900, estimated to be achieved in 2028.

Water Demand. Water demand is summarized as follows:

- 2005 Average Day Demand (ADD): 1,620 AFY (1.45 MGD)
- 2005 Per Capita Demand: 141 gpcd, based on “dry year” demand
- Maximum Month Demand: 1.27 times ADD
- Future ADD: 2,040 AFY (1.82 MGD.)

Water Supply - Existing. The City has multiple sources of potable water. Two groundwater basins, the Chorro and the Morro, were used exclusively prior to the City’s connection to the State Water Project. The City also operates a desalination plant and has mutual aid agreements with the California Men’s Colony and the Whale Rock Commission for emergency supply.

The groundwater basins have encountered several water quality issues, including seawater intrusion, MTBE contamination, and excessive nitrates, forcing the City to reduce extraction from groundwater sources. In addition, the SWRCB permitted allocation allows withdrawals from the Chorro Basin only when surface flows exceed 1.4 cfs. Nevertheless, strategic management of these sources should allow the City to reliably extract 581 AFY from the Morro Basin and 566 AFY from the Chorro wells, for a total of 1,147 AFY, even in dry years.

The City contracts with the District for 1,313 AFY of State Water. The City also has a Drought Buffer Water Agreement with the District for 2,290 AFY that will allow the City to receive its full 1,313 AFY allocation when the SWP can deliver at least 36.5% of contracted allocations (see SWP discussion). The City has been noted as being potentially interested in an additional 750 AFY of State Water and 1,500 AFY of Drought Buffer, should it become available (Additional/New Allocation Requests – Planning Purposes Only, 10/22/09).

The SWP shuts down for annual maintenance activities each fall/winter during which the City has used its alternative supplies. In 2008, the SWP shutdown took place when groundwater quality issues were limiting the City’s use of well water. The shortfall was made up for through an agreement with the California Men’s Colony to provide the City with water during that period.

The desalination plant was constructed in 1993 as a secondary supply during a drought. It has been used intermittently since that time, but raw water quality problems have limited its use.

Water Supply – Future: Plans to modernize the desalination plant should restore capacity to 645 AFY. Future needs could be met by doubling plant capacity.

The jointly operated Morro Bay - Cayucos Sanitary District Wastewater Treatment Plant is slated for a major upgrade in 2014. Production of tertiary effluent will be provided, and thus will provide increased opportunity for future water recycling to augment water supplies.

Water Conservation. Since the early 1990s, the City has implemented a rigorous water conservation program to promote more efficient use of existing water resources. Elements of the conservation program include:

- Progressively tiered water rate structure
- Creation of a developer funded low-flow toilet retrofit program
- Adoption of multi-level drought response program with increasing limits on irrigation and non-essential uses of potable water
- Promotion of many of the Water Conservation BMPs to be pursued by all contractors of the State Water Project, including an ongoing rebate program for homeowner installation of water-efficient appliances.

The program has had a significant impact, reducing average per capita water demand from 154 to about 129 gpcd (141 gpcd in dry years) or 8 to 16%. As noted in the City's 2005 sewer collection system Master Plan Update, flows in 2005 were lower than in 1986, even with a 10% increase in population.

The City is a member of Partners in Water Conservation

Water Quality. As mentioned above, groundwater quality issues are an ongoing concern, but the City's ability to obtain water from multiple sources and to blend them as needed to meet State Drinking Water Standards has lessened the concerns that water quality issues could hamper the City from meeting future water demands.

Chorro Valley Water System (California Men's Colony, Camp San Luis Obispo, Cuesta College, County Operations Center/Office of Education)

Source: *2003 Chorro Water Study and personal communication with CMC Plant Manager*

The California Men's Colony (CMC) is a state prison located on Highway 1 west of San Luis Obispo. The CMC operates its own water supply, treatment and distribution system for inmates and staff. CMC also wheels water to Camp San Luis Obispo (a National Guard campus), Cuesta College, County Operations Center (includes Fleet Services, Water Quality Lab, Juvenile Detention Center, County Jail, Office of Emergency Services), and County Office of Education. This system is also known as the Chorro Valley Water System.

Service Population. The CMC water system serves an inmate and staff population of 8,456. No expansion of this service population is planned, though a reduction in staff and inmate population is currently being considered by the legislature. Other population summaries include:

- Cuesta College. The College can service up to 6,500 students; however, on any given day, it is estimated that student/faculty population is around 1,500.

- Camp San Luis Obispo: Total population/employees on Base was not available.

Water Demand Summaries. The following summarizes demands for California Men's Colony, Camp San Luis Obispo, Cuesta College and County Operations Center/Office of Education (SLO Co). Other minor water demands for the fire station, Achievement House and Foster Ranch (6.22 AFY in total) are excluded from the individual summaries below, but are included in the overall summary.

California Men's Colony:

- 2008 Average Day Demand (ADD): 1,135 AFY (1.0 mgd)
- 2008 Per Capita Demand: 120 gpcd (based on current population)
- Maximum Month Demand: 100.3 AF (1.05 mgd)
- Future ADD (2025): Estimated to remain constant at 1,135 AFY

Camp San Luis Obispo:

- 2008 Average Day Demand (ADD): 138 AFY (0.12 mgd)
- 2008 Per Capita Demand: not known
- Maximum Month Demand: 21.8 AF (0.23 mgd)
- Future ADD (2025): Estimated to remain constant at 138 AFY
- NOTE: In review of 2009 water use demands through June 2009, Camp SLO water demands were approximately 30% lower than the same interval for 2008.

Cuesta College:

- 2008 Average Day Demand (ADD): 125 AFY (0.11 mgd)
- 2008 Per Capita Demand: ~75 gpcd (based on average attendance of 1,500 students)
- Maximum Month Demand: 19.2 AF (0.20 mgd)
- Future ADD (2025): Estimated to remain constant at 125 AFY (However Cuesta has been noted as being interested in an additional 10 AFY of State Water should it become available (Additional/New Allocation Requests – Planning Purposes Only, 10/22/09))

SLO Co:

- 2008 Average Day Demand (ADD): 94.3 AFY (0.084 mgd)
- 2008 Per Capita Demand: Unknown
- Maximum Month Demand: 9.21 AF (0.097 mgd)
- Future ADD (2025): Estimated to remain constant at 94.3 AFY

Overall Summary:

- 2008 Average Day Demand (ADD): 1,499 AFY (1.34 mgd)
- 2008 Per Capita Demand: Not applicable
- Maximum Month Demand: 128.5 AF (1.35 mgd)
- Future ADD (2025): Estimated to remain constant at 1,499 AFY

Water Supply - Existing. CMC operates a 3.0 MGD water treatment facility at the Chorro Reservoir, and delivers water to Camp SLO, Cuesta College, and SLO Co. CMC, Camp SLO, Cuesta College, and SLO Co receive water from three sources (and a fourth source for emergencies), as follows:

- Chorro Reservoir: located approximately ¾ of a mile northeast of the CMC in the upper Chorro watershed. The reservoir and treatment plant were constructed by the US Army Corps of Engineers to provide water to Camp San Luis Obispo at the beginning of World War II. The net storage capacity of the Chorro Reservoir has decreased since it was constructed due to sedimentation, and is currently about 90 acre-feet, according to recent studies. Camp SLO holds the first 140 AFY entitlement to this surface water; during surplus water years, any excess to the 140 AFY is used by CMC. Flow must be maintained in Chorro Creek downstream of the reservoir for riparian habitat enhancement.
- Whale Rock Reservoir: CMC is one of three owners (Cal Poly and City of SLO are others) holding a partial entitlement to Whale Rock Reservoir. CMC owns an 11.24% share of the reservoir's capacity which allows them to withdraw approximately 420 AFY. Raw lake water is pumped from Whale Rock Reservoir in Cayucos via a 30-inch diameter steel water main to the three owners. CMC's turnout delivers water to the CMC water treatment plant for treatment, prior to delivery.
- State Water. CMC contracts with the District for 400 AFY of State Water. CMC also has a Drought Buffer Water Agreement with the District for 400 AFY that will allow CMC to receive its 400 AFY allocation when the SWP can deliver at least 50% of contracted allocations (see SWP discussion). Cuesta College contracts with the District for 200 AFY of State Water and 200 AFY of Drought Buffer; however, CMC receives 60 AFY of this 200 AFY allocation per agreement for wheeling the water to Cuesta College. SLO Co has a 425 AFY allocation of State Water and a 425 AFY allocation of Drought Buffer; SLO Co never fully utilizes this allocation, so CMC utilizes all of the excess State Water allocation per agreement.
- Groundwater wells. CMC is in the process of rehabilitating one on-site well known as the Honor Farm Well (County Well No. 1). Once rehabilitated, this well water source will be allocated to Camp SLO; however, the water quality is such that it will be conveyed to the CMC water treatment plant, treated, and wheeled back to Camp SLO for use.
- The Salinas Reservoir waterline was extended from the Cuesta Water Tunnel to the Chorro Reservoir as part of the original improvements in World War II. The pipeline has only been used to convey water from the Salinas Reservoir to the Camp twice since construction.

Summary of Agreements. The following summarizes the pertinent water related agreements between the various agencies:

- CMC/Cuesta College. CMC and Cuesta College entered into Agreement on June 19, 2000, for water supply and wastewater treatment services. The term of this Contract is indefinite. As indicated above, Cuesta College has a 200 AFY SWP allocation; however, CMC at this time utilizes 60 AFY of this allocation. Cuesta's allocation includes 200 AFY drought buffer. Furthermore, in the event State Water is not available, CMC is obligated to supply Cuesta with "replacement" water in an amount equal to Cuesta's allocation of 200 AFY (not including the 60 AFY currently being utilized by CMC).
- CMC/Camp SLO: CMC agrees to process water at no cost to Camp SLO. Camp SLO has first rights to water from County Well No.1. In exchange, Camp SLO provides 25 AFY of Chorro Reservoir entitlement to CMC and CMC has free use of Camp SLO hospital and firing range.
- CMC/SLO Co: SLO Co provides up to 275 AFY from SLO Co's 425 AFY of State Water in exchange for wheeling the remaining 150 AFY. If SLO Co provides less than 275 AF, SLO Co will reimburse CMC for a pro rata share of potable water wheeling and capital

improvement costs to the WWTP. If CMC uses more than 275 AFY from SLO Co, CMC will reimburse SLO Co for variable costs of and excess State Water used. SLO Co will fund any needed improvements to CMC operated facilities if CMC wheels more than 150 AFY. CMC is responsible for measuring deliveries. SLO Co will reimburse CMC for wastewater treatment based on 80% of potable water used or metered Wastewater if meters are installed. Maximum CMC obligation for wastewater treatment is 240 AFY. Agreement is subject to conditions of State Water Supply Agreement. .

- SLO Co/State (CMC and Camp SLO): Allows State to test, develop and pump from SLO Co Well #1. Requires Camp SLO to execute two easements for SLO Co effluent lines. Requires State to develop well before 6/30/10. State to provide SLO Co 25 AFY after well is developed. State and SLO Co share pumped water equally after State uses first 150 AFY. Water provided to SLO Co by CMC to be Whale Rock Water. State may terminate agreement if well production is below 100 AFY or well water quality cannot be used. SLO Co may terminate agreement if State uses water for new non-government purposes.

Water Recycling. The CMC wastewater treatment facility, located southwest of the Cuesta College Campus, treats wastewater from CMC, Camp SLO, Cuesta College, and SLO Co. Currently, the WWTP provides up to 275 AFY of tertiary treated effluent to the Dairy Creek Golf Course, owned and operated by the County of San Luis Obispo. Recylced water is also used to provide a minimum flow of 0.75 cfs in Chorro Creek for riparian habitat enhancement.

Water Supply -Future. The California Department of Corrections/CMC is considering participation in the Nacimiento Water Project. CMC has contacted the District requesting from 200 AFY to 400 AFY of Nacimiento Water for future supply reliability and minor demand increases. Such allocation is available; however, it is uncertain at this time if they will participate due to costs and other factors. CMC has also expressed interest in any State Water that may become available (Additional/New Allocation Requests – Planning Purposes Only, 10/22/09).

Water Quality. CMC delivers excellent quality drinking water to its customers, from the three surface water supplies (Whale Rock, State Water, and Chorro Reservoir). Water consistently meets all primary drinking water standards, and levels of nitrates are very low (<2.3 mg/L). Total dissolved solids ranged from 357 to 440 mg/L, with an average of 389 mg/L.

Los Osos WPA 5

Community of Los Osos (Los Osos Community Services District, Golden State Water Company, and S&T Mutual Water Company)

Source: *2002 Los Osos CSD Water Master Plan, GSWC files, 2009 CHG groundwater studies, Sea Water Intrusion in the Los Osos Groundwater Basin (presentation to RWQCB), and the ISJ Working Group's May 4, 2010 Los Osos Groundwater Basin Update*

The community of Los Osos lies within the unincorporated coastal area of San Luis Obispo County, just south of the City of Morro Bay. Los Osos is bordered on the northwest by the Morro Bay Estuary (an estuary of national importance) and Morro Bay State Park; to the east by Los Osos Creek and its riparian corridor; and to the south and southwest by the Irish Hills and Montana de Oro State Park. The Los Osos Valley lies to the east of the community.

The community of Los Osos has been subject to a building moratorium since 1988, which has resulted in only limited development in the community since that time. Upon completion of the wastewater project by the County, the moratorium may be lifted (subject to other resource issues such as water supply and habitat conservation) so that development can once again proceed under normal circumstances.

The following three water purveyors serve the community of Los Osos:

- Los Osos Community Services District (Los Osos CSD)
- S & T Mutual Water Company (S&T MWC)
- Golden State Water Company (GSWC)

Land Use and Service Population. Los Osos is an unincorporated community located in San Luis Obispo County, California. Los Osos consists of a mix of residential, commercial, agriculture, and recreational areas. Table 3.5 below, taken from various sources shows existing and future populations/connections in the service areas.

Table 3.5. Population Estimates and Connection Data for Urban Water Purveyors (2002 Los Osos CSD WMP, 2009 RMS and GSWC files)

Purveyor Name	Existing (2008) Population	Build-out Population
Los Osos CSD Water Service Area	8,500	9,324
S&T Mutual Water Co.	525	535
	Existing (2006) Connections	**Build-out Connections**
GSWC Service Area	2,648	4,381

Build-out projections for the GSWC service area have been revised in its updated Master Plan prepared in 2007. The revised plan projects that once the building moratorium is lifted, the number of water service connections will increase from 2,648 in 2006 to 4,381 by 2030.

Water Demand. Water demand is summarized in Table 3.6. Existing production is based on average production by purveyor from 2004 to 2008. The 2002 Los Osos CSD Master Plan projections for build-out demand were based on 130 gpcd for Los Osos CSD and 250 gpcd for the S&T MWC service area. Existing demand has averaged 100 and 160 gpcd respectively over the past five years. Based on these lower rates of demand and assuming continued implementation of water conservation practices, the build-out demands are expected to be lower than those presented in the 2002 Los Osos CSD Master Plan. GSWC Master Plan build-out demand projections are based on 4,381 connections at 0.398 AFY/connection.

Table 3.6. Existing Production and Build-Out Water Demand

Water Purveyor	Ex. Production (2004-08)		Build-Out Demand	
	(mgd)	(AFY)	(mgd)	(AFY)
Los Osos CSD	0.85	951	0.93	1,044
S&T MWC	0.084	94	0.086	96
GSWC	0.89	998	1.54	1,730
Total	**1.82**	**2043**	**2.56**	**2,870**

Water Supply - Existing. The sole source of water for the Community of Los Osos has been its groundwater basin. The Los Osos Valley ground water basin under existing conditions, with existing septic systems in place, and assuming no new water development, is estimated to have a yield of 3,200 AFY. This source is shared by the three water purveyors and the many overlying users in the valley. After subtracting 1,100 AFY in agricultural irrigation, private domestic use and golf course irrigation, the purveyors have available for their use an estimated 2,100 AFY of sustainable safe yield.

Water Supply – Future. Through the development of a Basin Management Plan, it is the goal, among others, of the ISJ Working Group, to "provide for a continuously updated hydrologic assessment of the Basin, its water resources and safe yield." The ISJ Working Group will be evaluating and identifying the management strategies to implement, in coordination with the County's wastewater project, in order to improve conditions in the Basin. Strategies under consideration include additional conservation, well relocation, use of shallow wells, nitrate removal, brackish water desalination, rainwater harvesting and graywater systems.

Water Conservation. The County Planning Department has implemented an indoor retrofit-upon-sale program as an action identified as a result of the Board certifying a Level of Severity III for the Basin. A mandatory fixture replacement program, which is a part of the wastewater treatment facility project, will replace all toilets and urinals in the wastewater service area (also known as the "Prohibition Zone") with low-flow devices, which is estimated to ultimately reduce overall water consumption by 20 to 25% with similar savings in wastewater flows. The objective of wastewater project's required water conservation program is to reduce indoor water use to 50 gallons per capita day within the wastewater service area.

GSWC promotes conservation by providing free water conservation kits to all customers. Their outreach program is highlighted by an educational series explaining the "Five Golden Rules" for water conservation, a series of video vignettes that explain simple ways that consumers can conserve water at home. GSWC also has a full-time Water Use Efficiency Manager and is a member of the California Urban Water Conservation Council (CUWCC).

Los Osos CSD is a member of Partners in Water Conservation.

Water Quality. Over the past three decades, Los Osos groundwater has been the focus of a number of studies. The main water quality concerns in the basin are nitrate and sea water intrusion. Excessive levels of nitrate in upper levels of the groundwater system have been attributed to the high density of individual septic systems. The RWQCB placed a development moratorium on the community until a centralized wastewater treatment plant could be built. As these individual systems are replaced with a centralized wastewater treatment system, it is expected that nitrate levels in groundwater will decrease over the next few decades. In the meantime, purveyors have reduced pumping from the upper (contaminated) aquifer and have drawn increasing amounts from lower aquifers to deliver water suitable for drinking. Seawater intrusion, however, continues to be a growing concern, with the average horizontal rate of intrusion between 2005 and 2010, based on the 250 mg/l isochlor, being 700 feet per year.

SOUTH COAST SUBREGION

This section describes water supply, water demand, and water quality for Water Planning Areas 6 to 9:

- San Luis Obispo/Avila WPA 6: City of San Luis Obispo (includes County Airport), Cal Poly SLO, CSA 12 (includes Port San Luis), Avila Beach Community Services District, and Avila Valley (Avila Valley MWC and San Miguelito MWC).
- South Coast WPA 7: Golden State Water Company (Edna Valley), Northern Cities Management Area (City of Pismo Beach, City of Arroyo Grande, City of Grover Beach, and Oceano Community Services District),, Nipomo Mesa Management Area (Golden State Water Company - Nipomo, Nipomo CSD, , Rural Water Company, Woodlands MWC, and Conoco Phillips)
- Huasna Valley WPA 8
- Cuyama Valley WPA 9: Cuyama CSD

San Luis Obispo/Avila WPA 6

City of San Luis Obispo (including County Airport)

Source: *2005 City of SLO UWMP, 2009 Water Resources Status Report and 2010 General Plan Update, Chapter 8*

The City of San Luis Obispo is located in a coastal valley approximately 10 miles inland from the Pacific Ocean. The local Mediterranean climate provides for mild and dry summers and cool winters, with an annual average of about 23 inches of precipitation. Historically, the City has been the sole water purveyor within the City limits. This allowed the City to maintain uniformity of water service and distribution standards, and to be consistent in developing and implementing water policy. The City also serves the County Regional Airport and Cal Poly. Since Cal Poly has its own allocation of water from the Whale Rock Reservoir and has water resources that do not pass through the City treatment plant, the University is discussed separately.

Land Use and Service Population. The City has a 1% residential growth cap which assists in projecting future annual water needs. The current General Plan estimates that the build-out population for the City will be approximately 57,200 people.

Existing (2010) Population: 44,948

Build-out Population: 57,200

Water Demand. Water demand is summarized as follows:

- 2008 Average Day Demand (ADD): 6,375 AFY (5.69 MGD)
- 2000-09 Running Average Per Capita Demand: 123.2 gpcd
- Build-out Demand used for planning: 123.2 gpcd
- Build-out ADD: 7,894 AFY (7.05 MGD)

Cal Poly demand figures are not included in the above.

Water Supply - Existing. The City of San Luis Obispo currently receives water from four sources, Salinas Reservoir (Santa Margarita Lake), Whale Rock Reservoir, local groundwater, and recycled water from the Water Reclamation Facility. The City has depended on imported supplies from Salinas Reservoir, located near the community of Santa Margarita, since 1944 and Whale Rock Reservoir, located near the community of Cayucos, since 1961. With the onset of the drought in 1986, resulting in decreasing surface water supplies, the City activated its groundwater sources in 1989. The City currently uses a small amount of groundwater (~2% of total) for potable purposes, but does not count groundwater yield in its water supply portfolio. Even though the estimated safe yield of the basin is 2,000 AFY, nitrate and PCE contamination and drought make groundwater a less than reliable source.

The Whale Rock Reservoir provides water to the City of San Luis Obispo, California Polytechnic State University, and the California Men's Colony as well as the town of Cayucos. The City staff work closely with staff from the other entities relative to water planning issues.

The safe yield from the Salinas and Whale Rock reservoirs was 6940 AFY in 2010, but diminishes approximately 10 AFY due to siltation.

Recycled Water Program. The City of San Luis Obispo's Water Reclamation Facility (WRF) currently receives approximately 4.5 mgd (5,040 AFY) wastewater flows. The WRF provides tertiary treated effluent to an extensive recycled water distribution system that delivers recycled water to a number of customers in the southern area of the City, including Damon Garcia Sports Park, Laguna Golf Course, Laguna Middle School, Laguna Lake Park, and commercial centers such as Irish Hills Plaza. Currently, recycled water irrigation demand is 130 AFY, and the City anticipates customer demands to expand by 10 AFY to an anticipated maximum of 1,000 AFY. The City must also maintain stream flow to San Luis Obispo Creek, at a minimum average daily flow of 2.5 cfs (1.6 mgd, or 1,800 AFY). Effluent total dissolved solids (TDS) quality of the recycled water is approximately 900 mg/L.

Water Supply – Future: Future water sources include:

- The Nacimiento Water Project, scheduled to go online in 2010, will supply up to 3,380 AFY to the City of SLO.
- The City's Water Reuse Project will deliver up to 1,000 AFY of recycled water for irrigation and other approved uses. The tertiary recycled water produced by the City of San Luis Obispo is suitable for most uses other than swimming and drinking.

The City accounts for its water supplies by designating a portion of what is available for primary supply, reliability reserve and secondary supply, primary being the average supply needed to meet build-out needs; reliability reserve being a 20% buffer for future unforeseen or unpredictable long-term impacts to the City's available water resources such as loss of yield from an existing water supply source and impacts due to climate change; and secondary being the additional amount needed to supplement the primary and reliability supply to meet needs during short-term water supply shortages or peak demands.

Water Conservation: In June 1985, the City Council adopted the Annual Water Operational Plan policy which established a procedure to monitor the City's water supply situation on an annual basis. An integral component of the policy was the establishment of a water demand management or conservation program aimed at instituting corrective measures ahead of any projected water supply deficit to maintain a dependable supply during critically dry periods. Water demand management has played an ever increasing role in the overall water supply development and management strategies since 1985. In 1990, the City adopted a multi-source water policy in an attempt to solve both short term water shortages and meet the City's long term water needs. The importance of the implemented water efficiency programs has become even more apparent because of the difficulty in developing new water supply projects. Water conservation is now being viewed more as a water supply alternative.

The goal of the City's water conservation program is to make efficient use of its water resources to protect both short- and long-term water supply reliability by implementing water-efficiency programs which are consistent with accepted best management practices and comply with any State-mandated water use reductions, and mandatory water conservation measures when the City's water supplies are projected to last three years or less.

The City is a member of Partners in Water Conservation and the CUWCC.

Water Quality. Surface water from both reservoirs is considered to be of high quality. Groundwater quality has been generally good, but PCE contamination and occasional spikes in the nitrate content of well water has caused the City to provide additional treatment for individual wells or to take certain wells out of production.

Cal Poly San Luis Obispo

Source: *2007 Cal Poly Master Plan and EIR*

Cal Poly is located to the north of the City of San Luis Obispo. The university receives water from the City water system. Though it does not treat its own water, available supply is governed by entitlements from surface water sources.

Land Use and Service Population. Cal Poly occupies 1,321 acres with a campus core of 155 acres. The university also owns ranches and other outlying properties comprising an additional 8,357 acres. Water demand includes extensive agricultural and landscape irrigation requirements. The supply and demand discussion below applies to the 1,321-acre campus area.

2008 Population

- Students: 19,471
- Faculty 1,293
- Staff: 1,752
- Total: 22,516

Build-out Population
Approx Total : 23,100

Water Demand. Water demand is summarized as follows:

- 2008 Average Day Demand (ADD): 1,040 AFY (0.93 MGD)
- The existing demand is based on actual consumption figures
- Build-out ADD: 1,557 AFY (1.39 MGD). This figure is from the Master Plan which uses 1999-2000 consumption rates as a worst-case water demand scenario. Conservation practices over the past decade and into the future will likely reduce build-out demand.

Water Supply - Existing. Cal Poly derives its water from groundwater sources and through surface water entitlements. For general use, the University owns entitlement to 33.7% of the storage capacity in Whale Rock Reservoir or approximately 13,707 acre-feet when the reservoir is full.

Cal Poly's portion of the safe yield from the reservoir is calculated as 1,384 AFY, but diminishes approximately 2 AFY due to siltation. However, their allotment is based on volume and not on a flow rate, so Cal Poly is not bound by this limit. The safe yield from groundwater is undocumented, but no decline in groundwater reserves have been noticed.

The City treats and delivers approximately 600 AFY to Cal Poly. The remainder is untreated water primarily used for agriculture and landscape irrigation, drawn directly from the Whale Rock raw water pipeline or from agricultural wells.

Water Supply – Future. Future demands for domestic needs will be met by increasing the proportion of Whale Rock water treated by the City. Agricultural needs could be met in various ways, including increasing irrigation efficiency, withdrawing land from cultivation, using more groundwater, and other management practices.

Water Quality. Surface water from Whale Rock is considered to be of high quality. Groundwater quality has been generally good, though increases in nitrate levels have been measured in groundwater flowing through the aquifer as it passes under the Cal Poly campus.

Avila Beach Community Services District

Source: *2006 Draft Water Master Plan*

The Avila Beach Community Services District (Avila Beach CSD) supplies its customers with domestic water service, wastewater service and fire protection, among other services.

Land Use and Service Population. Avila Beach is an unincorporated community located in San Luis Obispo County, California. Avila Beach consists of a mix of residential, commercial, agriculture, and recreational areas. The table below, taken from the draft 2006 Avila Beach CSD Water Master Plan, shows existing and future populations of the service areas.

Table 3.7. Population Summary

Description	Existing Population (1998)[2]	Existing Population (2006)	Build-out Population[3]
Residential Total	395	240	672[1]

Notes:
1. Based on an occupancy rate of 2.0 for residential developments (Table 2-2).
2. This existing population decreased since the UNOCAL cleanup of Avila Beach began in late 1998 and ended mid 2000.
3. The actual year is difficult to predict but based on the rate of development it is anticipated in about ten years.

Water Demand. Water demand is summarized as follows:

- 2006 Average Day Demand (ADD): 51 AFY (0.0455 MGD)
- 2006 Per Capita Demand: 190 gpcd
- Updated 2008 ADD: (provide if available)
- Maximum Day Demand: 2.0 times ADD
- Future ADD: 150 AFY (0.133 MGD.)

Water Supply. The water supply for the Avila Beach CSD is contracted through County Service Area 12 (CSA 12), and consists of both Lopez Reservoir and State Water allocations. Table 3.8 (Table 4-1 from the draft 2006 WMP) provides a summary of water supply allocations for Avila Beach CSD.

Table 3.8. Summary of Water Supply Allocations for Avila Beach CSD

Allocation, AFY			Supply Need, AFY		
				Future	
Lopez Lake Reservoir	State Water	Total	Existing	Excluding Tank Farm	Including Tank Farm
68[1]	100[1]	168	51[2]	150	170[2]

Notes:
1. District information
2. Future demand + Projected Tank Farm Development

Water Quality. Water quality for both Lopez Lake and State Water treated sources meets both primary and secondary standards for drinking water, though regular monitoring of the treatment process is necessary to make appropriate adjustments to account for seasonal changes in the quality of Lopez Lake water.

Avila Valley Mutual Water Company

Source: *2008 Avila Valley MWC Consumer Confidence Report and personal communication with Avila Valley MWC Director Jerry Hartzell*

Avila Valley Mutual Water Company (Avila Valley MWC) serves a small cluster of homes in the Avila Valley area. The service area is fully built out.

Existing and Build-out Population: 65 (28 connections)

Water Demand. Water demand is summarized as follows:

- 2008 Average Day Demand (ADD): 32 AFY (28,000 gpd)
- Build-out ADD: 32 AFY (28,000 gpd)

Water Supply. Avila Valley MWC receives its water supply from surface sources. The Avila Valley MWC contracts with the District for a 20 AFY allocation of State Water and 60 AFY of Drought Buffer which is wheeled through Zone 3 facilities. An additional 12 AFY allocation of Lopez Lake water procured from CSA 12 brings the total supply to 32 AFY. Two wells are also owned by the Avila Valley MWC for emergency backup purposes, but because quality is less than desirable, they are not used on a regular basis.

Avila Valley MWC has been noted as being interested in an additional 20 to 40 AFY of State Water should it become available (Additional/New Allocation Requests – Planning Purposes Only, 10/22/09).

Water Quality: The quality of Avila Valley MWC water is similar to others using water from Lopez Lake. Raw well water is of poor quality and would only be treated and used as an emergency backup in case of disruption of the surface supply.

San Miguelito Mutual Water Company

Source: *2008 San Miguelito MWC Consumer Confidence Report and personal communication with Director Rick Koon*

San Miguelito Mutual Water Company (San Miguelito MWC) serves the San Luis Bay Estates area in the community of Avila Beach.

2008 Population Served: 1385 (620 connections)
Build-out Population: Estimated at 2100 (930 connections)

Water Demand. Water demand is summarized as follows:

- 2008 Average Day Demand (ADD): 263 AFY (0.24 MGD)
- Build-out ADD: 393 AFY (0.35 MGD.) (based on 70/30 supply goal discussed below)

Water Supply. San Miguelito MWC receives its water supply from both surface and groundwater sources. The San Miguelito MWC contracts with the District for a 275 AFY allocation of State Water and 275 AFY of Drought Buffer which is wheeled through Zone 3 facilities. Additional water is pumped from three local wells which draw water from the aquifer fed by San Luis Obispo Creek.

The San Miguelito MWC's goal is to provide consumers with a 70/30 blend of surface/well water, but problems with the well system have limited its contribution to 10 to 20% in recent years.

With a fully functioning water supply system, the San Miguelito MWC has adequate supply to meet both existing and future water requirements. San Miguelito MWC has been noted as being interested in an additional 10 AFY of State Water should it become available (Additional/New Allocation Requests – Planning Purposes Only, 10/22/09).

Water Quality. Quality of San Miguelito MWC water is similar to others using water from Lopez Lake. Raw well water is treated for iron and manganese removal and mixed with Lopez Lake water prior to delivery.

County Service Area 12 (including Port San Luis)

Source: *2005 Zone 3 UWMP*

County Service Area 12 (CSA 12) provides 61 AFY of Lopez Reservoir water to customers in the rural area east of Avila Beach and transfers up to 100 AFY of Lopez Reservoir water through its piping system to Port San Luis. The Port currently uses only 35% (35 AFY) of that allocation. In addition, CSA 12 transfers water through its piping system to Avila Beach CSD, Avila Valley MWC, and San Miguelito MWC (discussed separately).

Water supplies for CSA 12 also include 7 AFY from the State Water Project allocated to the San Luis Coastal Unified School District. Entities within CSA 12 have been noted as being interested in an additional 30 AFY of State Water should it become available (Additional/New Allocation Requests – Planning Purposes Only, 10/22/09).

South Coast WPA 7

Golden State Water Company (Edna Valley)

Source: *GSWC files*

Golden State Water Company (GSWC) supplies its Edna Valley customers with domestic water service.

Land Use and Service Population. Golden State's Edna Road service area is an unincorporated area located in San Luis Obispo County, California along Highway 227 to the south of the City of San Luis Obispo, not far from the County Airport. The Edna Road area is comprised of residential and agriculture areas and dominated by the San Luis Obispo Country Club, which includes an 18-hole golf course.

Water Demand. Existing demand has been calculated by multiplying the 9 year average demand per connection by the number of active service connections. This results in an existing demand of 410 AFY for year 2007.

- 2007 Average Day Demand (ADD): 410 AFY (0.366 MGD)
- 2007 and Build-out Per Connection Demand: 0.683 AFY/connection
- Build-out ADD: (Year 2030): 482 AFY based on 712 connections and an annual growth rate of 0.71%

Water Supply. The GSWC Edna Road service area draws water from three wells, each with 500 gpm pumping capacity. The wells tap the Edna Valley groundwater basin.

Water Quality. The Edna Road System groundwater sources currently comply with all primary and secondary MCLs; however, treatment is required. Lewis Lane Wells No.3 and No.4 are treated for high iron and manganese by oxidation and subsequent filtration, as well as partial treatment for intermittently high selenium by ion exchange (IX). Nitrate and arsenic are also present in all three wells, but average less than one half the MCL, and are removed along with selenium in the IX unit.

Northern Cities Management Area (NCMA)

City of Pismo Beach

Source: *2004 City of Pismo Beach Water Master Plan, 2005 City of Pismo Beach UWMP, 2008 and 2009 NCMA Annual Reports*

The City of Pismo Beach supplies its customers with domestic water service and fire protection.

Land Use and Service Population. The City of Pismo Beach is located in the southern portion of San Luis Obispo County, extending along the Pacific Ocean shoreline some seven miles. The dominant economic activity in Pismo Beach is tourism, and as a result the population of the City can more than double during summer holidays.

2004 Conditions: Population: 8,551

Build-out Conditions: Population: 11,122

Water Demand. Water demand is summarized as follows:

- 2008 Average Day Demand (ADD): 2,208 AFY (1.97 MGD)
- 2009 ADD: 2,039 AFY (1.82 MGD)
- 2004 residential demand: 161 gpcd
- Build-out ADD: 2,977 AFY (2.66 MGD.) at 0.68 AFY/acre (includes land within the SOI)

Water Supply- Existing. The City receives water from three water sources: local groundwater, Lopez Reservoir and the State Water Project. These sources are described below:

- 700 AFY local groundwater is extracted from the Arroyo Grande Plain, which is part of the Santa Maria Groundwater Basin. Extraction rights are shared by agreement with the City of Arroyo Grande, the City of Grover Beach, and the Oceano Community Services District. As party to the Santa Maria Groundwater Basin litigation, extraction rights may be decreased at a future date.
- 896 AFY from the Zone 3 Lopez Project is provided as a contractual supply to the City of Pismo Beach. Environmental protection issues may call for increased releases to Lopez Creek, thereby reducing the allotment available for Pismo Beach and other cities.
- 1,240 AFY comes from the SWP via contract with the District and delivery through Zone 3 facilities. 140 AFY of this contracted amount has been allocated for Pismo Ranch. The City also has a 1,240 AFY Drought Buffer allocation.

Water Supply – Future. Future water supply possibilities include the use of the Pismo Ranch allocation, tertiary treatment/reuse of wastewater, desalination, and extraction and treatment of groundwater from local basins. The City, in coordination with the NCMA, is also investigating the feasibility of increasing the safe yield of Lopez Reservoir. At this point, the use of the Pismo Ranch allocation has been deemed to be a cost-effective alternative. The City is in the process of initiating a supplemental recycled water study as a joint project with the City of Arroyo Grande. The City has been noted as being interested in an additional 500 AFY of State Water and 1500 AFY of Drought Buffer should it become available (Additional/New Allocation Requests – Planning Purposes Only, 10/22/09).

Water Quality. For the City of Pismo Beach, the most significant water quality issue is the formation of disinfection-by-products (DBP) in the treatment process, specifically trihalomethanes (THMs). THMs are a group of compounds formed during disinfection by the reaction of chlorine with naturally occurring organics. While the City has consistently met the current 80 micrograms-per-liter limits, there have been occasional instances in which the standard has been exceeded due to the high organic content of Lopez Reservoir water during certain times of the year. The new regulations require increased chlorine contact times, which will cause the THM levels to exceed the regulations.

Also of concern are nitrate levels in storage tanks. Due to the use of ammonia and chlorine to form chloramines, it is possible for nitrification to occur in the tanks where there is not adequate turnover. The City staff continually monitors the distribution system and storage detention times to assure adequate turnover. This ensures good quality water

Groundwater is typically calcium bicarbonate-sulfate in character, based on data from 1992-2000, with a median TDS value of 765 mg/l. Nitrates are low for the two wells used by the City. Well No.5 exceeded Primary Drinking Water Standards for uranium in the most recent CCR, but through appropriate mixing with water from other sources, the City has been able to deliver water that meets drinking water standards over the past decade.

City of Arroyo Grande

Source: *2005 City of Arroyo Grande UWMP and 2008 and 2009 NCMA Annual Report*

The City of Arroyo Grande supplies its customers with domestic water service and fire protection.

Land Use and Service Population. The City of Arroyo Grande is located in the southern portion of San Luis Obispo County along the banks of the Arroyo Grande Creek. Land use is primarily residential and agriculture with a small commercial sector. There are no agricultural or industrial water service connections.

2005 Conditions: Service Population: 16,637

Build-out Conditions (2025): Population: 20,224

Water Demand. Water demand is summarized as follows:

- 2005 Average Day Demand (ADD): 3,415 AFY (3.05 MGD)
- 2008 ADD: 3,531 AFY (3.15 MGD)
- 2009 ADD: 3,315 AFY (2.96 MGD)
- 2005 gross demand: 183 gpcd
- Build-out ADD: 4,150 AFY (3.71 MGD.)

Water Supply - Existing. The City has agreements in place to draw up to 3,794 AFY from four water sources: two groundwater basins, Lopez Reservoir and through Oceano CSD. These sources are described below:

- 1,314 AFY is the City's share of groundwater extracted from the Arroyo Grande Plain, which is part of the Santa Maria Groundwater Basin. Extraction rights are shared by agreement with the City of Pismo Beach, the City of Grover Beach, and the Oceano Community Services District. This includes a 112 AFY allocation from an Agricultural Land Conversion Credit. As party to the Santa Maria Groundwater Basin litigation, extraction rights may be decreased at a future date.
- 90 AFY groundwater is extracted from the Pismo Formation which is outside of the NCMA and not subject to management agreements.
- 2,290 AFY from the Zone 3 Lopez Project is provided as a contractual supply to the City of Arroyo Grande. Environmental protection issues may call for increased releases to Lopez Creek, thereby reducing the allotment available for Arroyo Grande and other cities.
- 100 AFY from Oceano Community Services District (Oceano CSD). The City of Arroyo Grande and Oceano CSD have entered into an interim water supply agreement, for delivery of up to 100 AFY of Oceano CSD water to the City. The City is currently using between 90% and 95% of their current supply allocation, and therefore is in need of temporary provisions to meet water supply needs. Oceano CSD will deliver up to 100 AFY of groundwater and/or State Water, at Oceano CSD's discretion. This temporary agreement ends in 2014.

Water Supply – Future. Future water supply possibilities include desalination, recycled water and State Water. Arroyo Grande has been noted as being interested in 200 to 400 AFY of State Water should it become available (Additional/New Allocation Requests – Planning Purposes Only, 10/22/09). Extension of the Nacimiento pipeline project was considered; however, the project was not deemed financially viable.

Water Quality. Lopez Lake water has seasonal quality fluctuations that must be addressed by adjusting treatment methods.

Groundwater quality varies by depth and source, with some of the shallower wells drawing water with high nitrate levels. Water extracted from the Pismo Formation receives iron/manganese treatment prior to delivery. Through appropriate mixing the City has been able to deliver water that meets drinking water standards.

City of Grover Beach

Source: *2005 City of Grover Beach UWMP, 2008 and 2009 NCMA Annual Reports, Draft 2010 Water Master Plan*

The City of Grover Beach supplies its customers with domestic water service and fire protection.

Land Use and Service Population. The City of Grover Beach has a Mediterranean coastal climate with mild and dry summers, cool winters and an annual average of 16 inches of precipitation. During the summer months, fog helps reduce irrigation requirements by decreasing evapotranspiration. Grover Beach is primarily a residential community, with a small commercial/industrial sector. Approximately 80% of the water consumers are residents. No agricultural consumers are served by the City water system, though landscape irrigation consumes approximately 90 AFY.

2009 Population: 13,254.

Build-out Population: Future build-out population, based on zoning and land use designations within the City boundary, is estimated at 15,000. It is expected to reach this level by 2030.

Water Demand. Water demand is summarized as follows:

- 2005 Average Day Demand (ADD): 2036 AFY (1.88 MGD)
- 2008 ADD: 2030 AFY
- 2009 ADD: 1940 AFY
- 2009 Per Capita Demand: 131 gpcd
- 17-year Average Per Capita Demand: 138 gpcd
- Future ADD at Build-out: 1,892 - 2,500 AFY (1.69 - 2.23 MGD) (20% level of conservation for the lower end of the range)

Water Supply. The City of Grover Beach receives water from Lopez Lake and also uses groundwater from four municipal wells and one irrigation pump. The description of these sources follows:

- 800 AFY Lopez Lake:
  The Zone 3 Lopez Project provides a contractual supply of up to 800 AFY to the City of Grover Beach, which is currently part of the safe yield of Lopez Lake. Environmental protection issues may call for increased releases to Lopez Creek, thereby reducing the allotment available for Grover Beach and other cities.
- 1,407 AFY Groundwater:
  Three shallow wells draw water from the Paso Robles formation and a fourth well draws water from the deeper Careaga formation. Extraction rights are shared by agreement with the City of Arroyo Grande, the City of Pismo Beach, and the Oceano Community Services District. The City of Grover Beach is currently entitled to 1,407 AFY from this source per the agreement. This includes a 207 AFY allocation from an Agricultural Land Conversion Credit. As party to the Santa Maria Groundwater Basin litigation, extraction rights may be decreased for both of these allocations at a future date.
- 225 AFY Non-potable Groundwater
  The 225 AFY pumped from irrigation wells is used on the State Parks Department golf course and a large park within the City.

The City had a temporary transfer agreement with the Oceano CSD that allowed the City to purchase up to 100 AFY, but this agreement has expired.

Water Supply – Future: Potential future water supply sources under consideration include desalination, State Water and recycled wastewater. Extension of the Nacimiento pipeline project was considered; however, the project was not deemed financially viable.

Water Quality: Lopez Lake water has seasonal quality fluctuations that must be addressed by adjusting treatment methods. The ground water from the Paso Robles formation meets all state and federal standards except for nitrate concentration. The City of Grover Beach completed construction of an ion exchange water treatment plant designed to remove nitrates from the shallow well water in 1989. This allows the City to use its shallow well water to produce water straight into the water mains after it passes through the treatment plant and a chlorination station.

Oceano Community Services District

Source: *2009 Oceano Community Services District Draft Water Master Plan Update and 2008 and 2009 NCMA Annual Reports*

Formed in November 1980, the Oceano Community Services District (Oceano CSD) took over several responsibilities of the County and now provides water, street lighting, sewage collection, garbage collection, fire protection and basic life support services, and parks and recreation services. The County still maintains responsibility for roads, drainage, land use planning, and general services. The service area has not changed since 1980 and encompasses approximately 1,150 acres with elevations ranging from sea level to 110 ft.

Land Use and Service Area Population. The Oceano CSD service area is located immediately to the south of Grover Beach and Arroyo Grande with the Pacific Ocean to the West in the County of San Luis Obispo. Oceano CSD includes over 450 acres of land zoned residential, 59 acres commercial, 40 acres industrial, 94 acres agricultural, and 99 acres zoned public facility.

Existing Population: Existing population (as of July 2009) within the Oceano CSD service area was based on evaluation of water and sewer connections, prior master plans (Garing & Taylor, 2004), and County data. Current population is estimated at 8,137.

Build-out Population: Future build-out population, based on zoning and land use designations within the CSD boundary, is estimated at 12,855.

Water Demand. Water demand is summarized as follows:

- 2008 Average Day Demand (ADD): 934 AFY (0.83 MGD)
- 2009 ADD: 885 AFY (0.79 MGD)
- 2008 Per Capita Demand: 97 gpcd
- Future ADD at Build-out: 1,419 AFY (1.27 MGD)
- Maximum Month Demand: 1.7 times ADD

Water Supply. The Oceano CSD utilizes water from three sources, including groundwater, the State Water Project and Lopez Lake water. A breakdown of the Oceano CSD's allocations is as follows:

- 900 AFY groundwater allocation, limited to this amount by agreement with the City of Arroyo Grande, the City of Pismo Beach, and the City of Grover Beach. As party to the Santa Maria Groundwater Basin litigation, extraction rights may be decreased at a future date.
- 303 AFY allocation from Lopez Lake, subject to possible reduction if habitat requirements dictate.
- 750 AFY from the State Water Project, but subject to limitations (see SWP

discussion).
- 1,953 AFY Total

Based on an evaluation of water supply reliability, based on 66% availability of State Water due to drought and/or environmental restrictions, the reliable State water supply is estimated at 495 AFY, for a total water supply for Oceano of 1,698 AFY. Participation in the District's drought buffer program for State Water would improve water supply reliability for the Oceano CSD.

The City of Arroyo Grande and Oceano CSD have entered into an interim water supply agreement, for delivery of up to 100 AFY of Oceano CSD water to the City. As indicated in the discussion on Arroyo Grande, the City is currently using between 90% and 95% of their current supply allocation, and therefore is in need of temporary provisions to meet water supply needs. Oceano CSD will deliver up to 100 AFY of groundwater and/or State Water, at Oceano CSD's discretion. This temporary agreement ends in 2014.

Water Quality. In reviewing the CCR for 2008, the Oceano CSD continues to meet all Federal and State Drinking Water Standards. Selenium levels continue to be high, from two of their existing wells (Wells 4 and 5); however, with blending of the various other water sources, the drinking water standard continues to be met.

The selenium concentrations in Wells 4 and 5 have appeared to increase since the 2004 G&T WMP Report. However, interestingly, the recent results also show a fairly clear trend of diminishing selenium concentrations over the past year. It is uncertain what may be the reason for the decline this past year; possibly the current drought conditions may have some effect on the selenium concentrations in the groundwater. Regardless, the concentrations of selenium remain above the MCL of 50 ug/L, and must continue to be monitored and blended with other water supplies to achieve the MCL requirements.

Nipomo Mesa Management Area (NMMA)

Golden State Water Company (Nipomo Area)

Source: *GSWC files, 2005 Santa Maria Groundwater Litigation Stipulation and 2008 and 2009 NMMA Annual Report*

The Golden State Water Company (GSWC) provides water service to approximately 1,475 households on the south side of Nipomo.

Land Use and Service Population. GSWC serves a rural population that is undergoing development and is expected to grow at a projected rate of 1.42 percent over the next two decades until build out (2030).

Water Demand. Water demand has been calculated based on historical use data. Existing and future water service areas and demands are summarized as follows:

Current Conditions
- 2007 Water service connections: 1,495
- 2007 9-year Average Water Consumption: 0.94 AFY/connection
- 2007 Average Day Demand (ADD): 1,405 AFY (1.25 MGD)

- 2008 ADD: 1,380 AFY (per 2008 NMMA Annual Report)
- 2009 ADD: 1,290 AFY (per 2008 NMMA Annual Report)

Build-out Conditions (2030)

- Water service connections: 2,068
- Average Water Consumption: 0.94 AFY/connection
- Average Day Demand (ADD): 1,944 AFY (1.74 MGD)

Water Supply. GSWC presently uses groundwater for 100% of supply requirements. Groundwater is pumped from the larger Santa Maria Valley Groundwater Basin (SMVGB) using five active wells. Total capacity of this system exceeds current 1,405 AFY requirements; however, litigation involving use of the SMGWB, which began in 1997, has resulted in stipulations and judgments in 2005 and 2008. As party to the Santa Maria Groundwater Basin litigation, extraction rights may be affected at a future date. In addition, the stipulated judgment has required GSWC to join with Nipomo CSD to develop alternative sources to import a minimum of 2,500 AFY. Once the supplemental water system is in place, GSWC will be required to purchase 8.33% (208.25 AFY) of that supply.

Water Quality. Water quality is formally monitored as part of the requirements of the NMMA stipulation. Wells are monitored regularly and reported publicly. The 2009 NMMA report has concluded that there is no evidence of seawater intrusion into the the NMMA portion of the groundwater basin. Localized areas of the NMMA have reported nitrate concentrations as high as 90 percent of the Maximum Contaminant Level and rising nitrate concentrations in groundwater. Three of the GSWC wells are currently being treated for iron and manganese.

Nipomo Community Services District

Source: *2007 Nipomo CSD Water and Sewer Master Plan Update, 2008 and 2009 NMMA Annual Reports, and 2009 Nipomo CSD Waterline Intertie Project Narrative Report, 2010 Public Review Draft Urban Water Management Plan (UWMP)*

The town of Nipomo is an unincorporated area located in southern San Luis Obispo County, the first community on Highway 101 entering the county from the south. The Nipomo Community Services District (Nipomo CSD) provides water service and wastewater services to approximately 12,000 residents. The Nipomo CSD is part of the Nipomo Mesa Management Area (NMMA) for management of groundwater resources.

Land Use and Service Population. The Nipomo CSD serves a rural area that is undergoing development. Development is expected to continue to expand in the future, more than doubling water demands at build-out.

Water Demand. Water demand has been calculated based on land-use categories and water duty factors. Existing and future water service areas and demands are summarized as follows:

Current Conditions

- Water Service Connections (2010): 4,128
- Baseline Gross Water Use: 244.8 gallons per capita per day (gpcd) (10 year average 1997-2006)
- 2009 Water Use: 222.7 gpcd

- 2006 Average Day Demand (ADD): 3,000 AFY (2.67 MGD)
- 2008 ADD: 2,700 AFY (per 2008 NMMA Annual Report)
- 2009 ADD: 2,560 AFY (per 2009 NMMA Annual Report)
- 2010 ADD: 2,698 AFY (per 2010 Draft UWMP)

Build-out Conditions (2030)

- Water Service Connections: 5,323
- Future Water Use: 195.8 gpcd
- Average Day Demand (ADD): 2,984 AFY (2.66 MGD) based on conservation goals

Water Supply. Nipomo CSD presently uses groundwater for 100% of supply requirements. Groundwater is pumped from the larger Santa Maria Valley Groundwater Basin (SMVGB) using eight active and one standby wells. Total capacity of this system exceeds current 3000 AFY requirements; however, litigation involving use of the SMVGB, which began in 1997, has resulted in stipulations and judgments in 2005 and 2008. As party to the Santa Maria Groundwater Basin litigation, extraction rights may be affected at a future date. The stipulation has also required the Nipomo CSD to develop alternative sources to import a minimum of 2,500 AFY.

Water Supply – Future: The Nipomo CSD has investigated multiple sources of supplemental water and, as a result, signed an agreement with the City of Santa Maria (City) to pursue a Waterline Intertie Project. The January 5, 2010 Wholesale Water Supply Agreement established the basis for purchase and delivery of water from the City to the Nipomo CSD. The project EIR has been certified. The Nipomo Waterline Intertie Project is going through its final design and financing stages. If constructed, it will be capable of delivering up to 3,000 AFY and could be completed in two and a half years. Three other water purveyors, Woodlands MWC, Golden State WC, and Rural Water Company will share in the costs project and will together receive one-third of the mandated minimum water delivery (833 of 2,500 AFY). The additional 500 AFY capacity has been reserved for use by the Nipomo CSD. Additional water via the City (if possible), desalination and recycled water are also being considered as a long term alternative source.

Water Quality. Water quality is formally monitored as part of the requirements of the NMMA stipulation. Wells are monitored regularly and reported publicly. The 2009 NMMA report has concluded that there is no evidence of seawater intrusion into the NMMA portion of the groundwater basin. Localized areas of the NMMA have reported nitrate concentrations as high as 90 percent of the Maximum Contaminant Level and rising nitrate concentrations in groundwater. There is a concern that nitrate levels are increasing in wells near the Southland WWTF. Though studies have not tied this increase to current effluent disposal practices, the WWTF is investigating alternative effluent disposal methods that will enhance groundwater recharge without increasing nitrate levels.

Rural Water Company

Source: *2008 and 2009 NMMA Annual Reports and 2005 Santa Maria Groundwater Litigation Stipulation*

Rural Water Company (RWC) provides water to consumers on the north side of the Nipomo Mesa, including Cypress Ridge, a planned development consisting of approximately 380 homes and a gold course.

Land Use and Service Population. RWC serves a residential community that includes both densely spaced homes and numerous large lot rural residences. It also provides non-potable water to the Cypress Ridge Golf Course to supplement irrigation from recycled wastewater. The golf course is irrigated partially by effluent from the Cypress Ridge Wastewater Treatment Facility (Cypress Ridge WWTF), which in turn uses some of the golf course water features as finishing ponds in the waste treatment process.

Water Demand. Water demand has been calculated based on historical use data. Existing and future water service areas and demands are summarized as follows:

Current Conditions
- Population served: 1850
- 2008 ADD: 900 AFY (per 2008 NMMA Annual Report)
- 2009 ADD: 880 AFY (per 2009 NMMA Annual Report)

Build-out Conditions (2030)
- Water service connections: xxx
- Average Water Consumption: xx AFY/connection
- Average Day Demand (ADD): xxx

Water Supply. RWC presently uses groundwater for 100% of potable water supply requirements. Groundwater is pumped from the larger Santa Maria Valley Groundwater Basin (SMVGB) using several active wells. However, litigation involving use of the SMGVB, which began in 1997, has resulted in stipulations and judgments in 2005 and 2008. As party to the Santa Maria Groundwater Basin litigation, extraction rights may be affected at a future date. The stipulation has required RWC to join with Nipomo CSD to develop alternative sources to import a minimum of 2,500 AFY. Once the supplemental water system is in place, RWC will be required to purchase 8.33% (208.25 AFY) of that supply.

The Cypress Ridge WWTF currently produces approximately 50 AFY of irrigation quality effluent which is used on the golf course.

Water Quality. Water quality is formally monitored as part of the requirements of the NMMA stipulation. Wells are monitored regularly and reported publicly. The 2009 NMMA report has concluded that there is no evidence of seawater intrusion into the the NMMA portion of the groundwater basin. Localized areas of the NMMA have reported nitrate concentrations as high as 90 percent of the Maximum Contaminant Level and rising nitrate concentrations in groundwater.

Woodlands Mutual Water Company

Source: *2004 Water Master Plan, 2005 Santa Maria Groundwater Litigation Stipulation and 2008 and 2009 NMMA Annual Reports*

The Woodlands is a relatively new housing and commercial development located on the Nipomo Mesa in southern San Luis Obispo County. It is a planned community to be built out in four phases over time, with economic conditions influencing the date of completion. The Woodlands Mutual Water Company (Woodlands MWC) was organized to provide water to customers within the Woodlands Development. The Woodlands MWC currently supplies its customers with domestic water service, fire protection, wastewater collection, and wastewater reclamation.

Land Use and Service Population. The Woodlands has a tentative map allowing for 1,320 residential units, plus additional commercial facilities. Currently, there are 685 residential lots that have been recorded in final maps. Commercial facilities for the golf course are also constructed at this time. Other facilities that may be constructed in the future include commercial facilities at the business park, a hotel, and a possible school. The planned development also currently has an 18-hole golf course and a smaller 12-hole executive course. The on-site wastewater treatment plant provides the golf courses with recycled water for irrigation; however, it is also supplemented with groundwater. Another 18-hole golf course is also planned for the future, which will be irrigated with groundwater.

Water Demand. Existing and future water service areas and demands are summarized as follows:

Current Conditions

- 2009 ADD: 810 AFY (per 2009 NMMA Annual Report)

Build-out Conditions (2030)

- Average Day Demand (ADD): 1,600 AFY

The Woodlands Development is progressing with its phased development of homes and other planned facilities. Of the 1,320 future dwelling units, 685 parcels have been recorded and are ready for construction. As of September 2009, there are 323 active residential or commercial water service connections. In 2008, Woodlands MWC delivered 402 AFY to customers for commercial, residential, and common area irrigation use. This does not include raw water that was pumped for golf course purposes.

Based on the 2004 Water Master Plan, it is estimated that at build-out, Woodlands MWC will use approximately 872 AFY for all uses except golf course irrigation. When all golf courses are complete, they will require an additional 687.5 AFY. The table below provides a summary of the estimated water usage (excluding golf course irrigation) by land use.

Table 3.9. Summary of Estimated Water usage for The Woodlands

User	Units	Type of Unit	Demand, gpm	Total Usage, gpm (afy)
Residential Single Family	1,220	D.U.	0.3	366.00 (590.4)
Residential Multi-Family	100	D.U.	0.137	13.70 (22.1)
Village: Mixed Use	10.46	acres	1.3	13.60 (21.9)
Resort: Hotel	500	rooms	0.093	46.50 (75.0)
Resort: Mixed Use	23.67	acres	1.3	30.77 (49.6)
Business Park	20.29	acres	1	20.29 (32.7)
Golf Clubhouse	2	facilities	3.97	7.94 (12.8)
School	600	students	0.019	11.40 (18.4)
Maintenance/WWTP	1	lump	4.53	4.53 (7.3)
Parks	16.64	acre	1.55	25.79 (41.6)
Total				**540.48 (871.8)**

Water Supply. Currently, the Woodlands MWC relies on groundwater as the sole source of water. The Woodlands MWC owns and operates four wells, three of which produce potable water and the fourth serves irrigation needs. Groundwater is pumped from the Nipomo Mesa Management Area (NMMA) of the Santa Maria Groundwater Basin, an aquifer that has been the subject of ongoing litigation since 1997. As a party to the Santa Maria Groundwater Basin litigation, extraction rights may be affected at a future date. A 2005 Settlement Stipulation requires that NMMA water purveyors import a minimum of 2,500 acre-feet of supplemental water to the NMMA each year.

Woodlands MWC is cooperating with other water purveyors to meet the requirements of the Stipulation. The Nipomo Community Services District (Nipomo CSD) is serving as lead agency to develop the Waterline Intertie Project (WIP) that will connect the City of Santa Maria water system to the Nipomo CSD system, providing 2,500 AFY to the NMMA and an additional 500 AFY to Nipomo CSD. Woodlands MWC has agreed to purchase a portion of the NMMA supplemental water (determined according to the percentage of completion of the project and rising to a total of 417 AFY at such time as its service area is fully developed). Woodlands MWC has also agreed to pay a portion of the operating costs, capital costs and replacement costs of the project based on the amount of water purchased by Woodlands MWC relative to the total amount purchased from the City of Santa Maria. Woodlands MWC also has the right to exercise an option for an additional 300 AFY from the WIP at a future date.

24 AFY of recycled water was used in 2008 to partially irrigate the golf course. As more residential units are completed, increased quantities of wastewater will be available for recycling. The build-out flow of the WWTP is 774 AFY. Well water will continue to be required during periods in which the recycled water available is less than the golf course demand.

Water Quality. Water quality is formally monitored as part of the Woodlands MWC's participation in the NMMA Technical Group, and also as a requirement of the Department of Public Health. Wells are monitored regularly and reported publicly. . The 2009 NMMA report has concluded that there is no evidence of seawater intrusion into the the NMMA portion of the groundwater basin. Localized areas of the NMMA have reported nitrate concentrations as high as 90 percent of the Maximum Contaminant Level and rising nitrate concentrations in groundwater. The most recent Consumer Confidence Report indicated that Woodlands MWC supplied water that met both primary and secondary drinking water standards. One of the wells exceeds the standards for iron, but mixing with water from other wells produces water that meets the iron standard.

Conoco Phillips

Source: *2008 and 2009 NMMA Annual Reports and 2005 Santa Maria Groundwater Litigation Stipulation*

Conoco Phillips uses water for industrial operations at its refinery on the Nipomo Mesa.

Water Demand. Water demand has decreased in recent years due to infrastructure changes resulting in more water-efficient operations. Planned expansion will increase water demand, but demand will remain less than historical peak pumping rates.

Current Conditions

- 2008 Average Day Demand (ADD): 1,100 AFY (0.98 MGD)
- 2009 ADD: 1,200 AFY (1.07 MGD)

Build-out Conditions

- Average Day Demand (ADD): 1,400 AFY (1.25 MGD)

Water Supply. Conoco Phillips uses groundwater for 100% of supply requirements. Though it is a party to the Santa Maria Groundwater stipulation, it is not required to participate in the development of supplemental water. It has rights to reasonable and beneficial use of groundwater without limitation, except in the event of a Severe Water Shortage, as defined in the stipulation.

Water Quality. Water quality is formally monitored as part of the requirements of the NMMA stipulation. Wells are monitored regularly and reported publicly. The 2009 NMMA report has concluded that there is no evidence of seawater intrusion into the the NMMA portion of the groundwater basin. Localized areas of the NMMA have reported nitrate concentrations as high as 90 percent of the Maximum Contaminant Level and rising nitrate concentrations in groundwater. One of the Conoco Phillips wells reported a high (1000 mg/l) TDS value. The well is used for industrial processing.

Huasna Valley WPA 8

The Huasna Valley WPA has no large water purveyors. Water usage in this WPA is analyzed as overlying use.

Cuyama Valley WPA 9:

Cuyama Community Services District

Source: *2005 Grand Jury Report and SB County 2008 Water Production Survey*

The Cuyama Community Services District (Cuyama CSD) provides water to consumers in and around the community of New Cuyama in Santa Barbara County. Because the Cuyama CSD draws from an aquifer that extends into San Luis Obispo County, a brief discussion of this water purveyor is included.

Land Use and Service Population: The community of New Cuyama was established as a company town by Atlantic-Richfield to provide housing and services for its workers. The water supply system is now owned and operated by the Cuyama CSD, serving approximately 820 residents. There are 217 single family, 15 commercial, and 22 landscape connections.

Water Demand. Water demand is summarized as follows:

- 2008 Average Day Demand (ADD): 172 AFY (0.15 MGD)
- 2008 Per Capita Demand: 112 gpcd residential, 187.4 gpcd gross
- Future ADD at Build-out: unknown

Water Supply. Cuyama CSD draws all of its supply from wells which tap the Cuyama Valley groundwater basin. The basin as a whole is in a critical stage of overdraft. Efforts to sustainably manage the basin are hampered because the basin underlies four counties.

Water Quality: Because of constant cycling and evaporation of irrigation water in the basin, water quality has been deteriorating. Nitrate concentrations in some shallow wells in the area have exceeded 400 mg/l. Water from one of the principle wells contains arsenic at relatively high levels, often approaching the current arsenic MCL of 50 ppb. A treatment system has been installed to reduce levels of arsenic prior to distribution.

INLAND SUBREGION

This section describes water supply, water demand, and water quality for Water Planning Areas 10 to 16:

- Carrizo Plain WPA 10
- Rafael/Big Spring WPA 11
- Santa Margarita WPA 12: Santa Margarita Ranch and CSA 23 (Santa Margarita)
- Atascadero/Templeton WPA 13: Garden Farms CWD, Templeton CSD and Atascadero Mutual Water Company
- Salinas/Estrella WPA 14: San Miguel CSD, Camp Roberts, City of Paso Robles, and CSA 16 (Shandon)
- Cholame WPA 15
- Nacimiento WPA 16: Oak Shores (Nacimiento Water Company) and Heritage Ranch CSD

Carrizo Plain WPA 10

The Carrizo Plain WPA has no large water purveyors. Water usage in this WPA is analyzed as overlying use. Due to the age of previous water studies for this area, potential demands and groundwater characterization from water studies completed for two proposed solar power projects are included in this discussion. The modeling completed for these two projects analyzes a significant portion of the Carrizo groundwater basin.

Source: John Kessler, California Energy Commission (excerpts from Carrizo Energy Solar Farm); John Larson, URS Corporation (SunPower Project); Tim Cleath, Cleath-Harris Geologist, Inc. (SunPower Project); SunPower - California Valley Solar Ranch Environmental Impact Report (EIR), Topaz Solar Farm (First Solar) Draft Environmental Impact Report.

These two large solar farms are referred to as the Topaz Solar Farm, and the SunPower-California Valley Solar Ranch. These proposed projects are 550 and 250 megawatt solar power plants, respectively. Both projects propose to use photovoltaic technology, which will consume less water than steam-producing plants.

<u>Water Demand</u>. Water demand is summarized as follows:

Topaz Solar Farm (per DEIR):

- Project Construction Average Day Demand (ADD): 199 - 273 AFY for two years (0.18 – 0.24 MGD); 48 – 69 AFY for the third year (0.04 – 0.06 MGD)
- Ongoing Project Operation: 4.5 AFY (0.004 MGD)

Sun Power-California Valley Solar Ranch (per EIR):

- Project Construction Average Day Demand (ADD): 40.84 AFY for three years (0.04 MGD)
- Ongoing Project Operation: up to 9.3 AFY (0.008 MGD)

During operation of the facilities, (long-term) water demand would be required for washing solar panels if needed, potable water for employees, service water for general site uses including irrigation, and fire protection.

<u>Water Supply</u>.

DWR Safe Yield: 600 AFY (based on demand in 1954)
Kemnitzer Safe Yield: 59,000 AFY (based on 1967 inflow/outflow analysis)

Taking into consideration the methodologies used in previous studies, current and historical groundwater levels, and water quality, the solar project EIRs' water analyses conclude that a more reasonable safe yield to base planning decisions on ranges between 8,000 – 11,000 AFY.

<u>Water Quality:</u> Groundwater quality has a wide range of qualities, as noted in the groundwater resources discussion for the Carrizo Plain. Additionally, according to the Sun Power EIR, the results of groundwater quality testing conducted on samples for the proposed Sun Power solar project well indicate TDS content of 4,940 mg/L at the proposed project site. The EIR concludes that the groundwater quality, with treatment (reverse osmosis is proposed), is useable for the proposed project, particularly considering historic land uses of the area and understanding of aquifer characteristics. Similarly, according to the Topaz Farm EIR, the results

of groundwater quality testing conducted on samples for the proposed Topaz Farm solar project well indicate water from the lower aquifer is not suitable for drinking water without treatment and primarily exceed the drinking water standard for nitrate.

Rafael/Big Spring WPA 11

The Rafael/Big Spring WPA has no large water purveyors. Water usage in this WPA is analyzed as overlying use.

Santa Margarita WPA 12

Santa Margarita Ranch

Source: *Santa Margarita Ranch Agricultural Residential Cluster Subdivision Project and Future Development Program EIR*

The Santa Margarita Ranch (Ranch) encompasses approximately 14,000 acres and is located immediately east of U.S. Highway 101, and surrounds the community of Santa Margarita, between the cities of San Luis Obispo and Atascadero.

Land Use and Service Population. The land currently functions as ranch and vineyard with minimal residential water use. Approximately 96% of the water is used by vineyards and other farm operations. An Agricultural Residential Cluster Subdivision (ARCS) is proposed, including 3,778 acres near the middle of the Ranch, southeast of the community of Santa Margarita. A Future Development Program (FDP) is planned in various locations throughout the balance of the property. The proposed ARCS includes 111 large-lot residential units and agricultural reserves. The FDP covers a variety of development types, including 402 residences, a golf course, guest ranch, wineries, and other commercial and recreational facilities.

Water Demand. The existing Ranch water use is estimated at 1,621 AFY based on land use water factors. Planned expansion of orchards and vineyards will increase water use to 4,263 AFY. The EIR states that the ARCS would increase water demand by 161 AFY. Implementation of the FDP would add an additional 1,466 AFY of demand. Based on these values, the total build-out demand is 5,890 AFY.

Water Supply - Existing. Existing Santa Margarita Ranch water demands are supplied entirely by groundwater. The Ranch property is currently served by approximately 27 wells, located primarily along the east side of the Ranch, west of West Pozo Road. Individual well yields typically range between 200 and 400 gallons per minute (gpm) with some wells capable of rates of up to 1,000 gpm.

Environmental water requirements may limit the use of groundwater to meet the needs of expanded agricultural production and eventual residential development. Trout and Rinconada creeks, which are upper tributaries of the Salinas River, are important spawning habitat for steelhead, a federally declared endangered species. The National Marine Fisheries Service (NMFS) has previously received complaints that the creeks have allegedly been dewatered as a result of vineyard development on Ranch property.

Water Supply – Future: Supplemental water supply options for Santa Margarita Ranch are State Water and Nacimiento water.

Water Quality. TDS concentrations in wells in the area are relatively high. Nitrates have measured concentrations below the maximum contaminant level (MCL) of 45 mg/l. Total coliform, fecal coliform, and Escherichia coli data have been found to be suggestive, although not conclusive, of small impacts on both shallow and deep aquifer wells from local wastewater disposal systems.

County Service Area 23

Source: *2003 CSA 23 Water Master Plan, several County staff memos, County Public Works-compiled consumption data and Planning Department land use projections*

County Service Area 23 (CSA 23) consists of the community of Santa Margarita, an unincorporated community in north-central San Luis Obispo County. Santa Margarita has a population of approximately 1,400 and covers an area of approximately 265 acres. CSA 23 supplies the community with water via groundwater wells located in the center and south-eastern corner of the community. The community is completely reliant on groundwater for its supply. Fire service is included in the system.

Land Use and Service Population. In 2009, the CSA served a total of 525 connections, predominantly residential. Future build-out is estimated to be 619 connections.

Water Demand. Water demand is summarized as follows:

- Average Day Demand (ADD) (2005 – 2009): 164 AFY (0.146 MGD)
- Water Duty Factor (2005 – 2009): 265 gpd/residential meter, 305 gpd/commercial meter
- Build-out ADD (2035): 192 AFY (0.171 MGD.)

Water Supply - Existing. CSA 23 receives its water supply from two wells; Well No.3 and No.4. Well No.3 is a deep, fractured-rock well and Well No.4 is a relatively shallow well that pumps from the alluvial deposits of Santa Margarita Creek. Two other wells, No.1 and No.2, are near No.4, but are not built to current health standards, and can only be used in an emergency with a boil water order.

During periods of low seasonal rainfall, water level in the shallow well typically drops, triggering various voluntary conservation methods. Although the community is better than 85% built out according to the current general plan, there is concern that existing groundwater supplies may not be adequate to supply additional residents and that they are inadequate during periods of less then normal rainfall. There is also the concern that the reliance on essentially a single supply source (groundwater) may be placing the community in a tenuous public health and safety position.

Water Supply – Future: The 2003 Master Plan recommended securing an additional 100 AFY of reliable supply. Based on community input, concerns over cost and need, CSA 23 is currently investigating several options to secure an additional source of water to be used only during a drought or other emergency. These include State Water, Lake Nacimiento water or additional groundwater wells. Any one of these sources could potentially supply water demand at build-out given the community's support.

Water Quality. CSA 23 has been able to deliver water that meets State Drinking Water Standards, but consumer feedback indicates that the well water that serves the community is hard, stains fixtures and creates challenges in the laundry room. However, a consumer survey in 2004 indicated that less than 30% of the respondents would support procurement of additional water sources to improve the aesthetic quality of the delivered supply.

Atascadero/Templeton WPA 13

Garden Farms Community Water District

Source: *Garden Farms CWD Well logs and 2007 CCR*

The Garden Farms Community Water District (Garden Farms CWD) provides water to consumers in and around the unincorporated community of Garden Farms, located along the old El Camino Real between Santa Margarita and Atascadero. Garden Farms is a small residential community of 240 residents with 113 water service connections. Besides two small commercial establishments, all connections are residential.

Water Demand: Demand has fluctuated between 48 and 93 AFY over the past four years. The service area is fully built out.

Water Supply: Garden Farms CWD draws all of its supply from three wells (though the third well is rarely used) which tap the Atascadero Groundwater Subbasin. The basin is not adjudicated. Water levels have dropped several feet in the past year, likely due to the ongoing drought in the region.

Water Quality: Groundwater quality is typical for the subbasin, with no contaminants exceeding the primary drinking water standards. High levels of manganese (70 ppb reported in 2007) have been detected, but do not currently exceed the secondary drinking water standard of 50 ppb.

Templeton Community Services District

Source: *2005 Templeton CSD Water System Master Plan Update, 2010 Paso Robles Groundwater Basin Water Balance Review and Update*

The Templeton Community Services District (Templeton CSD) supplies its customers with domestic water service, wastewater service, and fire protection, among other services.

Land Use and Service Area Population. Templeton is an unincorporated community located in San Luis Obispo County, California along Highway 101 between the City of Paso Robles and City of Atascadero. Templeton consists of a mix of residential, commercial, agriculture, and recreational areas. The Templeton area has a number of homes on larger lots, and thus exhibits a relatively large per capita water demand as a result. Population projections described below are quoted from the November 2005 Water System Master Plan Update Report. It should be noted that the population projections are based on only those areas served by, and within, the Templeton CSD service area boundary. Thus, there will likely be discrepancies between these projections and those provided by the County or 2000 Census data.

Existing Population: Existing population (as of November 2005) within the Urban Reserve Line (URL) was based on the residential water connections plus the difference in the URL and the Templeton CSD boundary and the additional residences within the Templeton CSD that use personal on-site wells, resulting in a 2005 service area population of 6,417 persons.

Build-out Population: Based on the 2005 estimated population of 6,417 persons determined by the Templeton CSD's water service connections, plus 2,180 persons from the commercial mixed-use component, and an additional 900 persons from the residential component, the Templeton CSD's estimated build-out population (within its existing service area boundary) is 9,497 persons.

Water Demand. Water demand is summarized as follows:

- 2005 Average Day Demand (ADD): 1,682 AFY (1.50 MGD)
- 2005 Per Capita Demand: 234 gpcd
- Maximum Month Demand: 1.6 times ADD
- Build-out ADD: 2,260 AFY (2.02 MGD.)
- Build-out ADD (2025): 2,239 AFY (1,989 AFY Groundwater and 250 AFY Nacimiento Water)

Water Supply- Exisiting. The Templeton CSD depends on water from eleven wells that extract water from two groundwater sources: the Paso Robles Formation and the Salinas River Underflow. Nine of the eleven wells that extract water from the Paso Robles Formation are extracting from the Atascadero Groundwater Subbasin.

The Templeton CSD currently is permitted to extract 500 AFY from the Salinas River Underflow between October 1 and April 1. There are two wells that tap this aquifer, though only one, the Smith Well, is in service. The Templeton CSD may request from CDPH an extended permit to continue to pump from the river wells through May 15 if sufficient water is available and flowing during that time.

An additional source of water for the Templeton CSD comes from their re-use program with disposal of treated wastewater effluent from the Meadowbrook WWTP percolation ponds. This program allows the Templeton CSD to percolate treated effluent into the groundwater basin/Salinas River underflow and subsequently extract the same amount of water 28 months later. According to the 2005 Water Master Plan, wastewater flow to the Meadowbrook WWTP at that time was 148,000 gpd (165 AFY) with 30 AF being used to irrigate an alfalfa field. Therefore the Templeton CSD at that time had been withdrawing approximately an additional 135 AFY from the Salinas River allocation. Additional water extracted from the remaining two wells on the Salinas River accounted for approximately 649 AFY in 2005.

According to the 2005 Water Master Plan, the Templeton CSD's summer demand at that time was approximately 1,165 AFY. Because the Templeton CSD's available allocations during the summer are 1,710 AF, Templeton CSD was considered to have adequate supply to meet the current 2005 summer demand. Winter 2004/2005 demand for the Templeton CSD was estimated at 715 AF; however winter supply allocation only added up to 566 AF plus minimal water from the Paso Robles GB. Therefore, during the winter months the Templeton CSD was limited on water allocations.

Table 3.10 (Table 4-3 from the 2005 Water Master Plan) summarizes the existing water supply and allocations for Templeton CSD.

Table 3.10. Summary of Existing Water Supplies for Templeton CSD

		Summer Allocation 4/1 – 9/30	Winter Allocation 10/1 – 3/31	Total Allocation
Paso Robles Formation		--	--	1,700/1,550 AFY[1, 2] Safe Yield
Salinas River				
	Templeton CSD Allocation	--	500 AFY	500 AFY
	Riparian Rights	No increase to water supply	No increase to water supply	No increase to water supply
	Greer Riparian Rights	0.26 cfs 94 AF	--	94 AFY
	Re-Use Program	66 AF[3]	66 AF[3]	132 AFY
Total Allocation from all sources				2276 AFY

[1] 1,700 is the Safe Yield for all users of the Templeton Sub-Unit. Private well owners utilize approximately 150 AFY, leaving 1,550 AFY for Templeton CSD

[2] The Templeton CSD can extract water from the Paso Robles Formation any time during the year, however, the Templeton CSD extracts the majority of the water during the summer months when the main river water allocation is not available. The Paso Robles Formation is only used during the winter to help meet peak demands that the Smith Well is unable to meet.

[3] Allocation based on the existing wastewater demand minus the irrigated effluent minus 2 percent water loss.

<u>Water Supply – Future</u>: Future water supply for the Templeton CSD will likely come from the Nacimiento Water Project (NWP), which is currently under construction. The Templeton CSD is under contract to receive 250 AFY from the NWP. Templeton CSD plans to receive raw water from the NWP and percolate this water into the Salinas River underflow, in a similar manner that they percolate effluent from the Meadowbrook WWTP percolation ponds (Selby Pond site). This 250 AFY of percolated NWP water will then be extracted from the Templeton CSD's downstream potable water well field. In addition, the Templeton CSD may be making future provisions to divert additional wastewater flows to the Meadowbrook WWTP (which currently flow to the City of Paso Robles WWTP) in order to recycle additional treated effluent from the Salinas River underflow, increasing available water for extraction by as much as 458 AFY. These future water supply provisions are referenced in the 2005 Water Master Plan, and are included as recommendations for future water supply. In addition, the 2005 Water Master Plan recommended that Templeton CSD consider additional water supply wells (such as the McCoy well) to further enhance their ability to meet summer demand conditions. It is believed that this well has in fact been completed in recent years.

Table 3.11 summarizes future water supply sources for Templeton CSD.

Table 3.11. Future Water Supply Sources for Templeton CSD

Future Water Source	Allocation (AFY)
Nacimiento Water Supply	250
Re-Use Program (Existing Distribution System)	115
Re-Use Program (Future Diversion of WW Flows)	343
McCoy Well	--
Total	708

Water Quality. Based on the 2005 Water Master Plan, and review of current CCRs, the Templeton CSD's water supply to its customers meets all water quality standards. In general, the river wells have lower total dissolved solid levels than the Atascadero Groundwater Basin; however, all of the wells are below the upper limits of the drinking water standard of 1,000 mg/L. The Templeton CSD's overall aggregate TDS quality to its customers, as reported in the 2004 CCR, was 653 mg/L. This is based on how the Templeton CSD distributes and blends the various water supplies to its customers.

Atascadero Mutual Water Company

Source: *2005 Atascadero MWC UMWP and Draft 2009 Master Water Plan*

The Atascadero Mutual Water Company (Atascadero MWC) of San Luis Obispo County is a corporation organized under the laws of California for the purpose of providing water service to property owners, known as the shareholders, within a geographical service area. Atascadero MWC supplies its customers with domestic water service and fire protection.

Land Use and Service Population. The City of Atascadero is a community located in San Luis Obispo County, California along Highway 101 between the City of Paso Robles and City of San Luis Obispo. The City was originally subdivided as a colony in 1914 when the colony boundary was established. Atascadero MWC was established around this time and still retains its original form. The entire water system is the property of Atascadero MWC and is mutually owned by owners of the colony lots. Atascadero was incorporated as a City in 1979. The City of Atascadero now consists of a mix of residential, commercial, agriculture, and recreational areas. Atascadero MWC's service boundary operates within the colony boundary. Within this colony boundary are the Atascadero city limits and some of the unincorporated areas of the community such as the Eagle Ranch Property, the West San Marcos Development, and the area south of Santa Rosa Road known as the Random Oaks area.

Eagle Ranch, a large proposed development on the southwest side of the City, is only partially within Atascadero MWC's service area boundary. Atascadero MWC will serve the existing portion of the development within its boundary and another small portion proposed for inclusion. Adequate water supply for all of Eagle Ranch has yet to be confirmed.

Existing Population: In 2008, the Atascadero MWC served a population of 30,595 with 10,505 service connections.

Build-out Population: The Atascadero MWC projects a 2030 population of 37,436.

Water Demand. Water demand is summarized as follows:

- 2008 Average Day Demand (ADD): 6,565 AFY (5.86 MGD)
- 2008 Per Capita Demand: 192 gpcd

According to Atascadero MWC records and demand forecasts, average annual per capita demand has fluctuated in the range of 188 to 213 over the past decade, with lower water use possibly linked to mandatory conservation measures. It is anticipated that water conservation programs will cause lower per capita demands to become the rule rather than the exception. A per capita demand of 199 gpcd is used to estimate a future peak demand of 7,600 AFY in 2019 with a population of 34,016. Thereafter, conservation measures are predicted to more than compensate for population growth, resulting in a build-out demand of 7,511 AFY in 2030 for a population of 37,436.

- Peak Future ADD: 7,600 AFY (6.79 MGD) based on a population of 34,016 in 2019

Water Supply - Existing**.** The Atascadero MWC's water source is the groundwater found in the Atascadero sub-basin of the Paso Robles Groundwater Basin (PRGB) and underflow of the Salinas River. Water is pumped from 17 active wells with two additional wells on standby status. The PRGB is not currently adjudicated. Atascadero MWC derives approximately 42% of its supply from the PRGB with the remainder coming from the Salinas River underflow. Atascadero MWC has rights to 3,372 AFY from the Salinas River underflow. As the Salinas River underflow is more sensitive to rainfall, during dry years the proportionate withdrawal from the deeper PRGB has increased.

The current water supply system is under stress due to the ongoing drought. During the spring of 2009, the Atascadero MWC issued a stage 2 water shortage condition alert when reserve production capacity fell to less than 10% of the maximum day demand. Stage 2 mandatory conservation measures include a ban on daytime landscape watering, required alternate irrigation schedules, and a prohibition of irrigation runoff.

Water Supply - Future. The Atascadero MWC is a major partner of the Nacimiento Water Project, having contracted for a 2,000 AFY allotment of this future supply. The water will be used to recharge the groundwater table in the vicinity of the deep wells which pump from the Atascadero sub-basin. The water can then be treated in the same manner as the existing source of supply. The Atascadero MWC is also exploring the expansion of its current well fields.

Water Conservation: Atascadero MWC continues to aggressively promote water conservation, as it has since 1993. Atascadero MWC's program has reduced per capita indoor water use and the use of potable water for landscape irrigation. Atascadero MWC provides educational resources on its website, in its offices, and in periodic brochures included with water bills. Atascadero MWC made a further commitment to conservation in 1997, signing an MOU with the California Urban Conservation Council and continues to implement and meet the goals of Best Management Practices for Water Conservation including

- Conservation Rate Structure (i.e. Tier Water Rates)
- Turf conversion rebates
- Lawn aeration rebates

- Sprinkler nozzle replacement rebates
- Irrigation controller rain sensor rebates
- Weather based irrigation controller and soil moisture sensor rebates
- Rainwater harvesting system rebates
- High efficiency clothes washing machine rebates
- High efficiency toilet rebates
- School education programs
- Free seminars on water conserving landscape design and plant selection
- Free landscape/home water surveys
- Annual Water-Conserving Landscape awards

Atascadero MWC is a member of the California Urban Water Conservation Council, Groundwater Guardian Program, Alliance for Water Efficiency, Water Education Foundation, and SLO County Partners in Water Conservation.

Water Quality. Atascadero MWC's water supply to its customers meets all primary and secondary water quality standards.

Salinas/Estrella WPA 14

San Miguel Community Services District

Source: *2002 San Miguel CSD Water Master Plan*

The San Miguel CSD supplies its customers with domestic water service and fire protection, among other services.

Land Use and Service Population. The unincorporated Community of San Miguel is one of 6 urban areas within the County of San Luis Obispo Salinas River Planning Area Plan. According to the 2002 Water Master Plan, the current population within the San Miguel CSD boundary was approximately 1,500 and is expected to increase to 3,742 at build-out (2040) within the existing CSD boundary.

The San Miguel CSD Service Area covers approximately 1,530 acres. The land use zones are Residential Single Family (RSF), Residential Multi-Family (RMF), Residential Suburban (RS), Office/Professional (OP), Commercial Service (CS), Commercial Retail (CR), Recreation (REC), Public Facility (PF), Agriculture (AG), Residential Rural (RR), and Industrial (IND).

Water Demand. Water demand is summarized as follows:

- 2001 Average Day Demand (ADD): 235 AFY (0.21 MGD)
- 2001 Per Capita Demand: 139 gpcd.
- Future ADD at Build-out: 582 AFY (0.52 MGD)
- Maximum Month Demand: 1.5 times ADD

Water Supply. The water supply for the San Miguel CSD is obtained solely from groundwater pumping of the Paso Robles Formation. There are three wells within the CSD; the two primary wells (Well No. 3 and Well No. 4) are located in the Main Zone. Well No. 5, a smaller well is located in the San Lawrence Terrace (SLT) Zone. The SLT well historically exhibited high nitrate levels and has since been removed from service. However, in 2007, the District replaced Well 5 with a new well in the same location, but installed deeper (approximately 800 feet). After water quality testing confirmed this well met all potable water standards, it was placed in service, but since has experienced occasional high nitrate concentrations and possibly high arsenic concentrations. This new well is temporarily out of service while District further evaluates this well. The two active wells in the main zone combined, historically produced an average of 247 AFY (average for 1999 and 2000), as summarized in Table 3.12 (Table 4 from the 2002 Water Master Plan). The wells have a combined well pumping capacity of 1000 gpm; 600 gpm at Well No. 4 and 400 gpm at Well No. 3.

Table 3.12. Summary of Well Capacity and Production

Well	Capacity[1], gpm	Historical Production[2], AFY	Maximum Production[3], AFY
Well No. 3	400	110	323
Well No. 4	600	137	484
Total	**1000**	**247**	**807**

Notes: 1. Well capacity refers to the maximum pumping rating of the well
2. Historical Production is the average amount of water the wells produced in 1999 and 2000
3. Maximum production is the amount of water the wells could produce if run 12 hours per day 365 days per year

Water Quality. The presence of gross alpha emitters approaching the MCL in the San Miguel water supply is of growing concern. The presence of gross alpha emitters is from naturally occurring decay of Uranium-238 and Thorium-232. The two main zone wells operated by the San Miguel CSD have shown increasing levels of gross alpha particles through the years, although the average is currently below the proposed MCL. Several of these samples indicate gross alpha levels in exceedence of the proposed MCL of 15 pCi/L. Well No. 4 gross alpha levels have an average of about 12 pCi/L as of October 2000; however, there are 5 recorded instances when the proposed MCL was exceeded in the previous 5 years. The uranium levels at Well No. 4 are below the proposed MCL and show a decreasing trend, with an average of about 10 mg/L. Well No. 3 gross alpha levels have an average of about 15 pCi/L as of October 2000; however, the proposed MCL was exceeded 7 times in the previous 8 years. Uranium levels at Well No. 3 show an increasing trend, with an average of about 12 mg/L. All of the uranium results have remained below the proposed MCL of 20 mg/L.

As indicated earlier, the new well on the San Lawrence Terrace, drilled to a depth of approximately 800 feet (screened from approximately 300 feet to 800 feet elevation), has exhibited occasional high nitrate levels and possibly high arsenic levels. Information is very preliminary at this time, and it is unclear if this well will be able to produce potable water without any wellhead treatment.

Camp Roberts

Source: *San Miguel CSD/Camp Roberts Water System Consolidation Study, 2002*

Camp Roberts is operated by the California Army National Guard, and covers approximately 42,784 acres. Camp Roberts, located north of the community of San Miguel, is situated in both San Luis Obispo and Monterey Counties.

Land Use and Service Population. When fully mobilized the base supports 8,500 people. In the event of a nuclear disaster at Diablo Canyon Nuclear Power Plant, Camp Roberts is an evacuation and staging area for about 23,000 residents within San Luis Obispo County. No growth is expected for Camp Roberts; however, based on the above discussion, water demand and temporary service population can vary widely. Base population can be a combination of on-base personnel and civilian personnel that do not live on Base.

Water Demand. For Camp Roberts, the existing ADD was determined to be 0.17 mgd, based on a review of water production records for the year 2001. Current 2008/2009 water demand was not readily available at the time of this memorandum; however, updated information will be provided if available.

- 2001 Average Day Demand (ADD): 190 AFY (0.17 MGD)
- 2001 Per Capita Demand: Unknown
- Future ADD at Build-out: 190 AFY (0.17 MGD)
- Maximum Month Demand: 1.4 times ADD

Water Supply. Camp Roberts water supply is from groundwater pumping, with three active wells. Combined well capacity is 947 AFY (based on pumping 12 hours per day, 365 days per yeaer). Pumping rates range from 225 to 500 gpm per well.

Water Quality. TDS and arsenic levels in the groundwater are marginal. According to 2001 reports, Base water supply TDS is 900 mg/L. Also, the arsenic levels in 2001 were noted to be 9.6 ug/L, just below the MCL of 10 ug/L.

City of Paso Robles

Source: *2005 City of Paso Robles UWMP and correspondence from Christopher Alakel*

The City of Paso Robles is located in northern San Luis Obispo County (North County), on the eastern, inland side of the Santa Lucia Mountains. Paso Robles is situated on the upper Salinas River, which flows north toward Monterey County. Incorporated in 1889, the City of El Paso de Robles (Paso Robles) now encompasses a total area of 11,985 acres on both sides of the Salinas River. Other communities in the vicinity of Paso Robles include Templeton, the City of Atascadero, Santa Margarita, and San Miguel. The City also is situated on the western margin of the Paso Robles Groundwater Basin, which is the water-bearing portion of the upper Salinas River drainage area.

Land Use and Service Population. The first major commercial activity in the North County was cattle grazing, followed by development of almond groves and most recently, extensive planting of vineyards. In addition to its agricultural base, Paso Robles also has a long history as a resort, based primarily on development of the local hot springs. Paso Robles remains the major service center for ranching and agriculture in the North County, particularly areas to the east along Highway 46. The City proper is a mix of residential, commercial and industrial land uses, with significant areas devoted to parks and open space. Paso Robles, with a 2005 population of 27,361, is a growing community that could attain a population of 44,000 at build-out.

Existing (2005) Connections are summarized as follows:

- Single Family Residential: 8,100
- Multi-Family Residential: 1,600
- Commercial: 632
- Industrial 63
- Parks, Landscape, etc. 325
- TOTAL 10,720

Build-out Connections are summarized as follows:

- Single Family Residential: 13,400
- Multi-Family Residential: 9,300
- Commercial: 2,146
- Industrial 214
- Parks, Landscape, etc. 500
- TOTAL 25,560

Water Demand. Current demand is based on actual consumption while build-out is based on water duty factors summarized as follows:

- 2007 Average Day Demand (ADD): 8,126 AFY (7.26 MGD)
- 2005 gross water use: 220 gpcd
- 2005 Water Duty Factors:
  - Single family residential: 0.5 AFY (446 gpd/meter)
  - Multi-family residential: 0.4 AFY (357 gpd/meter)
  - Commercial/industrial: 1.5 AFY (1338 gpd/meter)
  - Irrigation/other 2.6 AFY (2319 gpd/meter)

- Build-out ADD (2025): 13,500 AFY (12.05 MGD)

Water Supply. The City of Paso Robles has historically relied upon local water supplies from the Salinas River underflow and from the Paso Robles Formation (PRF) for its municipal water supply.

Salinas River underflow refers to shallow subterranean flows in direct connection with the Salinas River. This underflow is subject to appropriative water rights and permitting by the State Water Resources Control Board (SWRCB). An approved SWRCB application allows the City to extract up to eight cfs (3,590 gpm) with a maximum extraction of 4,600 AFY (January 1 to December 31).

The deeper PRF currently contributes 2,856 AFY to City supply. The City plans to maintain this extraction rate in the future.

The City participates in the Paso Robles Groundwater Basin Agreement with San Luis Obispo County Flood Control and Water Conservation District (District), CSA 16 – Shandon, San Miguel CSD and approximately 20 landowners, who have organized as the Paso Robles

Imperiled Overlying Rights (PRIOR) group. Key elements of the Agreement are a clear acknowledgement that the PRGWB is not in overdraft now, and that the parties will not take court action to establish any priority of groundwater rights over another party as long as the Agreement is in effect. In addition, the parties agree to participate in a meaningful way in groundwater management activities, and to develop a plan for monitoring groundwater conditions in the PRGWB.

Water Supply – Future: To assure its water supply into the future, the City will purchase water from the Nacimiento Water Project, which is projected to deliver 4,000 AFY of raw water. The City is progressing with its plans for a water treatment plant; the City's Capital Improvement Program includes design of the water treatment plant beginning in 2007, construction starting in 2009, and startup of the plant in 2010 to coincide with first availability of Nacimiento water. The City will have the option of increasing its allotment of Nacimiento water to 8,000 as demand increases.

Another supply alternative being pursued by the City is the use of recycled wastewater. The City owns its own wastewater treatment plant which currently provides secondary treatment. Several alternatives have been studied to upgrade treatment to the tertiary level, and it is assumed that one of these alternatives will eventually be pursued. 5,000 AFY of wastewater could ultimately be treated, but 944 AFY would only be needed to meet build-out demand. This margin of safety serves as a backup source in case of limitations on any of the other sources of supply.

Water Conservation: The City has implemented a number of permanent mandatory water conservation measures that are in force throughout the water service area. They include mandatory recycling or recirculation of water for car washes, cooling systems, and decorative fountains and several other practices designed to curb water waste.

The City has targeted landscape irrigation as the water use practice with the highest potential for water conservation. Educational resources are available on the City website, in City offices, and in periodic brochures included with water bills. The City also sponsors a school education program that includes water conservation as a key component.

The City is a member of Partners in Water Conservation.

Water Quality. In general, City water quality is good, but has relatively high TDS and hardness. In response to the hardness, many residents use home water softeners. However, use of water softeners results in addition of salts to the City's wastewater, which is treated and discharged to the groundwater basin and/or Salinas River. This is one factor in locally increasing TDS and chloride in groundwater. This situation may be improved in the future with the introduction of Lake Nacimiento water into the City's potable water supply. Lake Nacimiento water is lower in hardness and TDS than groundwater, and reduces the need for water softeners.

With regard to regional groundwater quality, the Estrella subarea of the Paso Robles Groundwater Basin, which includes most of the City, is characterized locally by increasing TDS, chloride and nitrate concentrations. These adverse water quality trends are unlikely to affect City water supply in the near future, given that groundwater currently provided by the City meets all drinking water standards and the increases in TDS, chloride and nitrate are localized. Nonetheless, salt loading to the groundwater basin is an important long-term concern. Recognizing that City wastewater disposal is one source of salt loading, the City has made the reduction of salt loading one of their water resource goals. Major means to reduce salt in City wastewater include planned use of high-quality Lake Nacimiento supply, reduced use of home water softeners, strategic use of wells with lower salt concentrations, and implementation of an industrial waste discharge ordinance.

County Service Area 16 (Shandon)

Source: *2004 CSA 16 Water Master Plan, plus written updates provided by Jay Johnson, County of San Luis Obispo.*

County Service Area No.16 (CSA 16) was formed in 1972 to furnish potable water to customers in the Shandon area. Narrative and data are based on the 2004 Water System Master Plan.

Land Use and Service Population. CSA 16 provides water service to 284 residential customers, 11 public authorities, and one business. The Urban Reserve Line encompasses areas outside of the existing service boundary, so the future size and composition of the customer base will likely change. Within the existing community of Shandon, build-out service is expected to reach up to 547 service connections. However, the Shandon Community Plan is being updated that could result in a total of 2,200 residential connections and over 50 commercial and public authority service connections. The projected population is approximately 8,125. The Community Plan Update is expected to be completed by the end of calendar year, 2010.

Water Demand. Water demand is summarized as follows:

- 2004 Average Day Demand (ADD): 147 AFY (0.131 MGD)
- Build-out ADD : 271 AFY (0.242 MGD) (excludes pending Community Plan Update; Build-out of the Community Plan would result in an ADD of 1,100 AFY (1.0 MGD)

Water Supply. The current source of supply for the community of Shandon is groundwater from the Paso Robles Basin. Two wells provide all the current needs of the community and the groundwater supply is deemed sufficient to meet water needs at build-out in the current service area. Additional well(s) and storage will be needed to meet peak demand requirements for build-out.

CSA 16 has no supplemental water source, but does have an allocation of 100 AFY from the State Water Project. Because of the high cost to develop this supply and the lack of need at the time, in 1995, the Board of Supervisors approved offering their 100 AFY allocation for sale to other entities in the County. Since that time, only 15 AF of the 100 AFY has been secured via a transfer option agreement. This agreement expired in 2009 without the transfer taken.

Water Quality. The water in Shandon meets all Federal and State drinking water requirements and overall can be considered very good water. However, Shandon's water is considered to be hard, with an average concentration of 190 parts per million. Non-salt generating systems are recommended for individuals who want to use a water softener.

Cholame WPA 15

The Cholame WPA has no large water purveyors. Water usage in this WPA is analyzed as overlying use.

Nacimiento WPA 16:

Oak Shores (Nacimiento Water Company)

The community of Oak Shores, on the banks of Nacimiento Lake, is served by the Nacimiento Water Company (NWC), a public utility with offices in Bradley. NWC currently serves a population of 275 residents with water drawn from the lake which is then treated prior to distribution.

Plans to develop an additional 345 lots as part of Oak Shores Estates are currently on hold.

The water supply allocation for Oak Shores is part of the 1,750 AFY reserved for SLO County residents in the Lake Nacimiento area.

Heritage Ranch Community Services District

Source: *2008 Heritage Ranch Water Master Plan with updates*

The Heritage Ranch Community Services District (Heritage Ranch CSD) was formed in 1990 to oversee water and sewer services for the Heritage Ranch community. It supplies its customers with domestic water service and fire protection, among other services.

Land Use and Service Area Population. Heritage Ranch is an unincorporated community located in San Luis Obispo County, California on the east side of Lake Nacimiento, approximately 15 miles northwest of the City of Paso Robles. Land use at Heritage Ranch consists mostly of residential, recreational, and open space areas with some commercial and public facility areas including a small commercial parcel, fire station, public school, recreational complex, marina, campground, wilderness park, ballpark, church, equestrian center, and storage area for boats and trailers. A community that was originally started as a remote vacation destination with the vast majority of the residents only part-time has now become a bedroom community to neighboring cities with the vast majority of the residents full-time.

Existing Population: As of September 2010, the Heritage Ranch CSD services approximately 1,778 water customers. Based on a density of 2.0 persons per household, this equates to an existing population of approximately 3,556 persons.

Build-out Population: The Adopted Specific Plan for the Heritage Ranch CSD, prepared in 1972 and revised in 1980, limited the total number of developable units to 4,000. In 2004, the maximum number of developable units was revised a second time to its current maximum value of 2,900 units. Residential units within the Heritage Ranch CSD consist of a combination of several housing tracts, custom homes, condominiums, mobile homes, and recreational trailers. Based on the average household size of 2.0 persons per household, it is anticipated that the Heritage Ranch CSD's total build-out population will reach 5,800 persons.

Water Demand. Water demand is summarized as follows:

- 2007 Average Day Demand (ADD): 618.5 AFY (0.552 MGD)
- 2007 Per Capita Demand: 158 gpcd
- 2010 Average Day Demand (ADD): 553 AFY (0.493 MGD)
- 2010 Per Capita Demand: 139 gpcd
- Future ADD: 903 AFY (0.81 MGD)

Water Supply - Existing: The Heritage Ranch CSD only has one water supply source, the Gallery Well, which is fed via three horizontal wells located in the Nacimiento River bed just downstream of the Nacimiento Dam. Typically, the Nacimiento River is fed year-round by the release of water through the upper and/or lower outlet works in the dam at Lake Nacimiento. The release of the water is monitored and controlled by Monterey County Water Resources Agency until the water level of the Lake drops below 687 feet, at which time San Luis Obispo County may obtain control over the lake releases. The water is primarily released to sustain habitat in the river, provide water to farmers in the Salinas Valley, and halt salt water intrusion into the Salinas Valley, in addition to providing a water supply source to the Heritage Ranch CSD. If no water is released from the lake, which has rarely occurred in the past 50 years, the Heritage Ranch CSD will not have a water supply. Even though the water level of Lake Nacimiento has never dropped below the dam outlet, it has come close. The last time this occurred was in October of 1989 where the lake level diminished to within 2 feet above the lower outlet works.

The 1,100 AFY of allocation of Nacimiento Reservoir water designated for use in Heritage Ranch's service area is part of the 1,750 AFY reserved for SLO County residents in the Lake Nacimiento area. It is sufficient to provide water for build-out demand, but the configuration of the delivery system leaves the Heritage Ranch CSD vulnerable to a cut off of its water supply in an extreme drought.

Water Supply - Future: Alternative sources are under consideration, including taking water directly from the lake and connecting to the Nacimiento Pipeline. A possible tie-in with Camp Roberts was explored, but is now considered as not being a feasible option due to the reluctance of Camp Roberts to consider any emergency water supply options.

Water Conservation: Water demands over the last 3 years have decreased due to an increase in water rates and implementation of water conservation programs such as for toilet retrofits and turf conversion.

Water Quality. While the Heritage Ranch CSD's water supply to its customers has historically met all primary water quality standards, it currently exceeds the limits for Disinfection Byproducts (DBP). The treatment plant has been ineffective in removing sufficient natural organic matter to prevent the formation of DBP. The District Board hired a water treatment process engineering consultant and received a report with recommendations on new treatment equipment to better control DBP in September 2010. New equipment/processes include addition of treatment chemicals (Potassium Permanganate and Powdered Activated Carbon) and a new sedimentation basin to prevent the formation of DBP. This equipment/process will also prevent iron and manganese formation in the distribution system. The District applied for $400,000 in State funding to complete these improvements. The project should be bid out, constructed and operational in 2011.

COUNTY-WIDE WATER QUALITY

Water quality varies greatly from agency to agency, within groundwater basins and sub-basins, from each imported or reservoir water supply. Although they vary greatly, they are all required to meet the same primary and secondary drinking water standards established by the California Department of Public Health. As part of the overall review of water quality throughout the County, Table 3.13 summarizes mineral quality (TDS), nitrates, and hardness as it relates to their ability to meet state drinking water standards. The table includes specific remarks relative to individual water quality issues with each purveyor.

Table 3.13 – Summary of County-Wide Water Quality

Sub-Region	WPA	Water Users/ Generators/Sources	Water Quality			Water Supply[a]	Remarks
			TDS, mg/L	Nitrates, mg/L	Hardness, mg/L		
North Coast	San Simeon WPA 1	San Simeon CSD	380	6.9	300	GW	Recharge from Little Pico Creek
North Coast	San Simeon WPA 1	Overlying Users					
North Coast	Cambria WPA 2	Cambria CSD	440	1.8	328	GW	
North Coast	Cambria WPA 2	Overlying Users					
North Coast	Cayucos WPA 3	Morro Rock Mutual	See CSA 10A below			SW[b]	
North Coast	Cayucos WPA 3	Paso Robles Beach	See CSA 10A below			SW[b]	
North Coast	Cayucos WPA 3	CSA 10A	370	ND	260	SW[b]	0.34% provided by CAWO well in 2008. Contribution to water quality considered negligible
North Coast	Cayucos WPA 3	Overlying Users					
North Coast	Morro Bay WPA 4	City of Morro Bay	357	2.3	120	ST, DS	Brackish water desalination on standby. 85% of City's water supply provided by State Water in 2008.
North Coast	Morro Bay WPA 4	City of Morro Bay	598	37.3	522	GW	GW well nitrate levels exceed MCL. 15% of City's water supply provided by well water in 2008.
North Coast	Morro Bay WPA 4	CMC	389	2.3	280	SW[f]	CMC supplies water to County Ops/Office of Education, Cuesta College, and Camp SLO.
North Coast	Morro Bay WPA 4	County (Ops, Golf Course, Schools)	See CMC above			SW[f]	Dairy Creek Golf Course irrigated with tertiary recycled water from CMC WWTP
North Coast	Morro Bay WPA 4	Cuesta College	See CMC above			SW[f]	
North Coast	Morro Bay WPA 4	Camp SLO	See CMC above			SW[g]	
North Coast	Morro Bay WPA 4	Overlying Users					

Sub-Region	WPA	Water Users/ Generators/Sources	Water Quality			Water Supply[a]	Remarks
			TDS, mg/L	Nitrates, mg/L	Hardness, mg/L		
North Coast (cont.)	Los Osos WPA 5	Golden State Water	450	15	197	GW	Potential seawater intrusion impacts to lower .aquifer; upper aquifer nitrate contamination due to septic tanks, see discussion on Interlocutory Stipulated Judgment (ISJ)
		S&T Mutual				GW	
		Los Osos CSD	511	7.8	227	GW	
		Overlying Uses					
South Coast	San Luis Obispo/ Avila WPA 6	City of San Luis Obispo	380	4.8	No Data	SW[c,d], GW	Extensive tertiary recycled program serving area golf courses, schools and parks can provide up to 1,000 AFY for irrigation. Minimum 1.16mgd daily discharge provided for preservation of environmental habitat in San Luis Obispo Creek. Less than 2% of potable water supply provided by local wells.
		County Airport				SW[c,d], GW	Served by City of San Luis Obispo.
		Cal Poly				SW[c,d], GW	Whale Rock allocation treated by City WTP, and served to Campus.
		San Miguelito MWC				GW, ST	
		CSA 12				ST, SW[e]	
		Avila Valley MWC				ST, SW[e]	
		Port San Luis	See Avila Beach CSD below			ST	
		Avila Beach CSD	357	2.3	120	ST	
		Overlying Users					
	South Coast WPA 7	City of Pismo Beach	450	ND	330	SW[e]	
			357	2.3	120	ST	
			430	ND	290	Delivered	
			710, 820	5.3, ND	50, 450	GW	Well #5, #23 respectively

Sub-Region	WPA	Water Users/ Generators/Sources	Water Quality			Water Supply[a]	Remarks
			TDS, mg/L	Nitrates, mg/L	Hardness, mg/L		
South Coast (cont.)	South Coast WPA 7	City of Arroyo Grande	460	ND	360	SW[e]	Agency is considering seawater desalination or recycled water program to augment future water supply.
			273	ND	101	ST	
			553	23.4	366	GW	
		Oceano CSD	366	ND	230	SW[e], ST	Groundwater selenium levels are high in two wells; blending is used to ensure compliance with MCL.
			680	9	510	GW	
		City of Grover Beach	430	No Data	290	SW[e], ST	Agency is considering seawater desalination or recycled water program to augment future water supply.
			428	11.2	260	GW	
		Halcyon				GW	
		SLO County Dept. of Public Works Lopez Project 2008 Water Quality Report	450	No Data	330	SW	
			430	No Data	290	Combined SW + ST	
		Overlying Users	650	17	490	GW	1995-2000 median values for 25 wells. Nitrate MCL exceeded in 6 of the wells.
		Edna Road/Golden State Water Co.	690	8.8	430	GW	
		PXP				GW	
		Pismo Valley Overlying Users	620	ND	356	GW	1999 median values for 6 wells. TDS MCL exceeded in one of the wells.
		AG Valley Overlying Users	600	4.2	430	GW	1981-87 median values for 5 wells. Nitrate MCL exceeded in 1 well and TDS MCL exceeded in one other well.
South	South Coast WPA 7 (cont.)	SLO Co portion of Santa Maria Valley Overlying Users	1200	3	480	GW	1992-1998 median values of 4 wells in SLO County portion of Santa Maria Valley (2 wells have 11 separate piezometers). TDS MDL exceeded at 3 of the wells. Hardness data from

Sub-Region	WPA	Water Users/ Generators/Sources	Water Quality			Water Supply[a]	Remarks
			TDS, mg/L	Nitrates, mg/L	Hardness, mg/L		
Coast (cont.)							most recent available test (1980s).
	South Coast WPA 7 (cont.)	Nipomo CSD	581	7.6	310	GW	Currently in design of inter-tie pipeline to convey potable water from City of Santa Maria to Nipomo CSD.
		Golden State Water Co.	451	16	213	GW	
		Rural Water Company				GW	
		Woodlands	393	10.5	303	GW	Three GW wells on-site provide supply.
		Conoco Phillips				GW	
		Overlying Users	500	10	220	GW	1990-2000 median values for 35 wells.
	Huasna WPA 8	Overlying Users					Private well data not published for public use.
	Cuyama WPA 9	Cuyama CSD				GW	
		Overlying Users					Private well data not published for public use.
Inland	Carrizo Plain WPA 10	Overlying Users					
	Rafael/ Big Spring WPA 11	Overlying Users					
	Santa Margarita WPA 12	Santa Margarita Ranch				GW	Not in use; allocated for future residential development
		CSA 23	360, 390	ND, 7.5	160, 290	GW	Well #3, #4 respectively
	Atascadero/ Templeton WPA 13	Garden Farms					
		Atascadero Mutual Water Company	665	6.9	346	GW, SW[b]	Nacimiento water will be percolated into the local groundwater and extracted for use, starting 2010.
Inland (cont.)	Atascadero/ Templeton WPA 13	Templeton CSD	755	9.7	455	GW, SW[b]	Percolated wastewater effluent from Meadowbrook WWTP to underflow of Salinas River is “reclaimed” by downstream potable water supply wells. Nacimiento water will be

Sub-Region	WPA	Water Users/ Generators/Sources	Water Quality TDS, mg/L	Nitrates, mg/L	Hardness, mg/L	Water Supply[a]	Remarks
	(cont.)						percolated into the local groundwater and extracted for use, starting 2010.
			530-930	ND-42	150-610	Paso GW Basin	Data from 2005 Master Plan (2003/04 CCR).
			490-510	3-5	330-368	Salinas River Underflow	
		Overlying Users					
	Salinas/Estrella WPA 14	City of Paso Robles	518	6.5	253 (14.8 grains/gal)	GW, SW[b]	The City expects to incorporate Nacimiento water into its water supply beginning Year 2010.
		San Miguel CSD	580	4.3	280	GW	Both main Zone wells have concerns with rising levels of Radionuclides. San Lawrence Terrace well (east of Salinas River) may have possible high nitrate and arsenic levels.
		CSA 16	405	16	90	GW	
		Camp Roberts					
		Overlying Users					
	Cholame WPA 15	Overlying Users					
	Nacimiento WPA 16	Oak Shores					
		Heritage Ranch CSD	180	0.9	140	SW	Water taken from Nacimiento River 3000 ft downstream of the lake
		Overlying Users					

[a]ST=State Water; GW=Groundwater; SW=surface/lake water; DS=brackish or seawater desalination; NA=not applicable; ND=non-detected
[b]Whale Rock reservoir
[c]Future water supply will include Nacimiento Water Project water
[d]Surface water supply includes Whale Rock and Santa Margarita reservoirs
[e]Surface water supply includes Lopez/Zone 3 water
[f]Surface water supply includes Whale Rock Reservoir, State Water and Chorro Reservoir
[g]Surface water supply allocation is from Chorro Reservoir only; however, combined surface waters delivered include Whale Rock, State Water and Chorro Reservoir.

APPENDIX D – MEMORANDUM, SAN LUIS OBISPO COUNTY WATER DEMAND ANALYSIS METHODOLOGY AND RESULTS, ESA, JANUARY 11, 2010

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DRAFT memorandum

date	January 11, 2010
to	Courtney Howard, San Luis Obispo County; Water Resources Advisory Committee (WRAC)
from	Annika Fain, ESA; Eric Zigas, ESA
subject	San Luis Obispo County Water Demand Analysis Methodology and Results

Background

San Luis Obispo County (County) has experienced multiple droughts, degradation of groundwater, and limited water supplies. The San Luis Obispo County Flood Control and Water Conservation District (District), with the assistance of the Carollo consulting team (team includes ESA, Wallace Group, Fugro, and Cleath), is preparing an updated County Master Water Plan (MWP). The previous version of the MWP was completed in 1998 (County, 1998). Since then, there have been many changes in the water resources in the County, including the completion of local and regional water management plans, formation of the Integrated Regional Water Management Plan (IRWMP), new water sources, new water users, and new water regulations.

The updated MWP incorporates these changes and provides all entities in the County with information and tools to help effectively and efficiently manage water resources to protect ecosystems, public health and safety, and agriculture. The County, with the assistance of consultants, has compiled and calculated the water supply and water demand. This document presents the methodology and results summary for the water demand analysis. For the water demand analysis, ESA utilized data and information provided by the WRAC and other stakeholders. The description of water resources management, urban water demand, and water supply inventory is presented in an Appendix to the updated MWP.

Total Water Demand

Definition

The total County water demand is divided into three categories: urban, rural, and agricultural. Total demand is defined as the sum of urban, agricultural, and rural demand. Environmental water demand refers to the amount of water needed in an aquatic ecosystem, or released into it, to sustain aquatic habitat. Environmental water demand is not included in the total demand because it needs to be compared to the entire amount of water in the watershed, rather than only the groundwater and surface water available to County users.

Method

The total water demand was calculated for existing and future conditions throughout the County. For calculating the existing water demand ESA utilized the most recent available data. Details about what data were used for the analysis are described in the urban, agricultural, rural, and environmental sections of this document. For future water demand ESA provided projected demand for the foreseeable future. ESA created a geodatabase, which includes all categories of water demand for existing and future conditions, as well as the total water demand, for each of the water planning areas (WPAs). The water demand has been compiled into spreadsheets that are generated by ArcGIS® layers. This allows the County to readily update any of the parameters related to water demand to conduct additional analyses. ESA utilized input from the WRAC, regional, sub-regional, and other stakeholders related to the total water demand methodology. Water purveyors throughout the County were contacted about existing and future conservation. Specific conservation factors were applied to the future urban water demand projections for urban areas where these factors were available.

Assumptions

Calculating the existing total water demand and projecting the future total water demand requires a number of assumptions, as well as review and analysis of existing data for each of the categories. Two general assumptions are outlined below while assumptions specific to each of the individual water demand categories are discussed within the individual category sections:

- Existing demands represent average annual use, in acre-feet per year (AFY). The demand can vary widely on smaller timescales, such as a daily or monthly demand.

- Future water demand is shown as a range whenever possible. For urban areas, the minimum projected future water demand accounts for conservation and the maximum projected future water demand represents a maximum buildout scenario as defined by water management plans and purveyors. The projected demand is not associated with a particular year because the year of maximum buildout is unknown and varies between water planning areas. For agricultural demand, the range represents the difference between using low and high end values for existing and future effective rain and irrigation efficiencies. For rural demand, the future range represents the difference between different development and conservation scenarios.

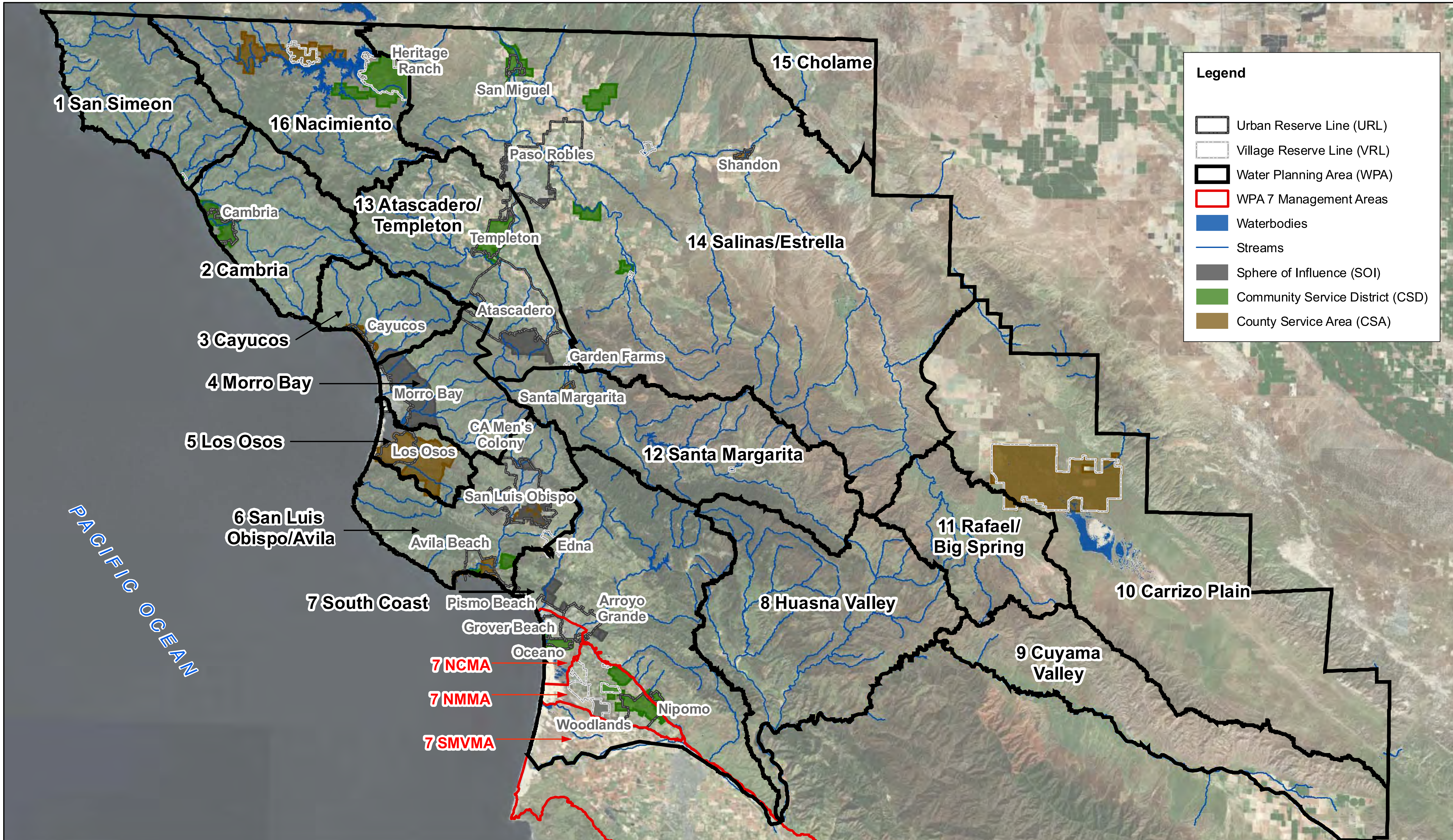
Total Demand by WPA

Table 1 summarizes the total water demand, including urban, agricultural, and rural water demand, as well as the environmental demand, developed for each of the 16 WPA's, **Figure 1** includes all 16 WPA's and the three management areas within WPA 7.

Urban Water Demand

Definition

Urban water demand refers to residential, commercial, industrial, parks, institutional, and golf course water demand within many of the unincorporated communities and incorporated cities in the County. For purposes of the MWP, the urban water demand includes all unincorporated communities and incorporated cities in the County where water purveyors have provided water demand information.



San Luis Obispo County Flood Control and Water Conservation District

MASTER WATER PLAN

San Luis Obispo County

Figure 1 Water Planning Areas in San Luis Obispo County

TABLE 1
EXISTING AND PROJECTED FUTURE WATER DEMAND FOR ALL WATER PLANNING AREAS[a]

WPA	WPA Name/ Category	Existing Demand (AFY)	Projected Demand (AFY)		
1	**San Simeon**				
Demand Category	Urban	108	213	-	224
	Agricultural	70	10	-	60
	Rural	20	50	-	50
	Total	**198**	**273**	**-**	**334**
	Environmental	72,980	72,980		
2	**Cambria**				
Demand Category	Urban	815	987	-	1,009
	Agricultural	640	740	-	1,490
	Rural	100	190	-	220
	Total	**1,555**	**1,917**	**-**	**2,719**
	Environmental	51,460	51,460		
3	**Cayucos**				
Demand Category	Urban	432	609	-	641
	Agricultural	520	430	-	800
	Rural	80	130	-	140
	Total	**1,032**	**1,169**	**-**	**1,581**
	Environmental	26,160	26,160		
4	**Morro Bay**				
Demand Category	Urban	3,112	3,460	-	3,532
	Agricultural	2,060	1,690	-	2,440
	Rural	120	190	-	220
	Total	**5,292**	**5,340**	**-**	**6,192**
	Environmental	27,880	27,880		
5	**Los Osos**				
Demand Category	Urban	2,043	2,727	-	2,870
	Agricultural	3,290	2,750	-	3,770
	Rural	20	20	-	20
	Total	**5,353**	**5,497**	**-**	**6,660**
	Environmental	7,040	7,040		
6	**SLO/Avila**				
Demand Category	Urban	7,871	10,787	-	11,355
	Agricultural	3,610	2,810	-	4,120
	Rural	450	610	-	660
	Total	**11,931**	**14,207**	**-**	**16,135**
	Environmental	33,030	33,030		
7	**South Coast**				
	Urban	410	458	-	482
	Agricultural	19,920	16,610	-	23,830
	Rural	1,480	1,990	-	2,160
Demand Category	NCMA[b]	11,326	13,142		13,854
	NMMA[b]	12,600	17,984		17,984
	SMVMA[b]	25,540	25,540		25,540
	Total	**71,276**	**75,724**	**-**	**83,850**
	Environmental	32,960	32,960		
8	**Huasna Valley**			-	
	Urban	0	0	-	0
Demand Category	Agricultural	1,550	2,060	-	2,820
	Rural	90	360	-	450
	Total	**1,640**	**2,420**	**-**	**3,270**
	Environmental	25,020	25,020		
9	**Cuyama Valley**				
	Urban	0	0	-	0
Demand Category	Agricultural	28,870	25,240	-	32,410
	Rural	10	80	-	100
	Total	**28,880**	**25,320**	**-**	**32,510**
	Environmental	Undetermined	Undetermined		
10	**Carrizo Plain**				
	Urban	0	0	-	0
Demand Category	Agricultural	800	680	-	890
	Rural [c]	210	9,610	-	12,740
	Total	**1,010**	**10,290**	**-**	**13,630**
	Environmental	Undetermined	Undetermined		

TABLE 1 (Continued)
EXISTING AND PROJECTED FUTURE WATER DEMAND FOR ALL WATER PLANNING AREAS

WPA	WPA Name/ Category	Existing Demand (AFY)	Projected Demand (AFY)		
11	**Rafael/Big Spring**				
Demand Category	Urban	0	0	-	0
	Agricultural	0	0	-	0
	Rural	0	470	-	620
	Total	**0**	**470**	**-**	**620**
	Environmental	Undetermined	Undetermined		
12	**Santa Margarita**				
Demand Category	Urban	1,819	5,881	-	6,190
	Agricultural	1,770	1,720	-	2,680
	Rural	240	450	-	520
	Total	**3,829**	**8,051**	**-**	**9,390**
	Environmental	32,850	32,850		
13	**Atascadero/Templeton**			-	
Demand Category	Urban	8,538	9,359	-	9,852
	Agricultural	10,620	9,740	-	14,600
	Rural	1,480	1,810	-	1,930
	Total	**20,638**	**20,909**	**-**	**26,382**
	Environmental	41,010	41,010		
14	**Salinas/Estrella**				
Demand Category	Urban	8,126	11,634	-	14,543
	Agricultural	67,610	60,740	-	86,820
	Rural	3,590	5,570	-	6,230
	Total	**79,326**	**77,944**	**-**	**107,593**
	Environmental	Undetermined	Undetermined		
15	**Cholame Valley**				
Demand Category	Urban	0	0	-	0
	Agricultural	80	60	-	80
	Rural	10	150	-	190
	Total	**90**	**210**	**-**	**270**
	Environmental	Undetermined	Undetermined		
16	**Nacimiento**				
Demand Category	Urban	619	987	-	1,039
	Agricultural	3,860	4,740	-	7,120
	Rural	280	730	-	880
	Total	**4,759**	**6,457**	**-**	**9,039**
	Environmental	108,390	108,390		

NOTES:

a Urban demand: Low projected demand includes conservation factor of 0 to 20 percent, based on conversations with Partners in Water Conservation. Agricultural demand: Affected by a wide range of conditions, including lack of data, weather conditions, changes in commodities and differences in irrigation practices. Future projections may not reflect the actual future water use or need, because of constant changes in farming practices. Projected agricultural demand may be significantly higher if more land is converted from dry to wet farming. Rural demand: Minimum projected rural demand reflects a 75 percent buildout scenario.

b Demand for WPA 7 management areas is from 2008 reports from NCMA (Todd Engineers, 2009), NMMA (NMMA, 2009), and SMVMA (Luhdorff and Scalmanini, 2009). SMVMA is approximated based on the proportion within San Luis Obispo County

c Carrizo Plain rural demand projections are based on existing zoning, which includes the potential for extensive California Valley development. The actual development may be much lower than 75 percent due to limited groundwater and other factors

Sources

Primary sources of data include the water system master plans (WSMP) and urban water management plans (UWMP) prepared by water purveyors, incorporated cities, and unincorporated communities. All of the urban areas have adopted a WSMP or UWMP during the last 10 years. Additionally, the County's *2008 Resource Management System Annual Resource Summary Report* provides existing projected water demand and population for these areas (County, 2008).

Method/Assumptions: Existing Use and Future Water Demand

Existing water use calculations and future water demand projections from WSMP's and UWMP's were used. UWMP's are available for all incorporated cities and include existing and future water demand. WSMP's are available for all of the unincorporated communities within Urban Reserve Lines (URLs) and some of the incorporated communities within the Village Reserve Lines (VRLs), and include existing and future water demand. The urban areas, which include all areas where water usage has been reported, are serviced by cities, Community Services Districts (CSD), County Service Areas (CSA), or other water purveyors. The Carollo consulting team, reviewed the UWMP's and WSMP's prepared by these water purveyors and provided a summary of the available existing and future urban water demand and supply presented in these documents.

The WSMP's and UWMP's describe existing use and future demand in various units such as gpcd (gallons per capita per day), AFY, or average day demand. For purposes of this analysis, the annual urban water demand is presented in AFY. The urban water demand for individual areas in the County are associated with an ArcGIS® layer that includes the existing and future urban demand. The range of future demand represents different development and conservation scenarios.

Urban Water Demand by WPA

Table 2 summarizes the urban water demand for WPAs. WPAs 8, 9, 10, 11, and 15 do not have urban demand because there are no large population centers in these WPAs. The urban water demand is discussed in detail in an Appendix to the MWP.

TABLE 2
URBAN WATER DEMAND BY WATER PLANNING AREA (WPA) [a]

WPA #	WPA Name	Existing (AFY)	Minimum Future (AFY)	Maximum Future (AFY)
1	San Simeon	108	213	224
2	Cambria	815	987	1,009
3	Cayucos	432	609	641
4	Morro Bay	3,112	3,460	3,532
5	Los Osos	2,043	2,727	2,870
6	San Luis Obispo/Avila	7,871	10,787	11,355
7	South Coast	410	458	482
	NCMA	8,702	10,518	11,232
	NMMA	6,600	11,984	11,984
12	Santa Margarita	1,819	5,881	6,190
13	Atascadero/Templeton	8,538	9,359	9,852
14	Salinas/Estrella	8,126	11,634	14,543
16	Nacimiento	619	987	1,039
Total		**49,195**	**69,604**	**74,953**

a WPAs 8,9, 10, 11, and 15, as well as SMVMA in WPA 7, do not have any urban water demand

North Coast Sub-Region

The North Coast Sub-Region includes WPA 1 through 6. The urban demand for WPA 1, San Simeon, includes the San Simeon CSD existing demand of 108 AFY and projected future demand of 213 to 224 AFY. The lower projected future water demand is based on an additional 5 percent reduction due to conservation. The urban demand for WPA 2 , Cambria, includes the Cambria CSD existing water demand of 815 AFY and projected future demand of 987 to 1,009 AFY. Cambria has achieved significant conservation and projects. In the future they could have an additional 2 percent reduction. The urban demand for WPA 3 includes the Cayucos Area Water Organization existing water demand of 432 AFY and projected future demand of 609 to 641 AFY. The lower projected future water demand is based on an additional 5 percent reduction due to conservation. The urban demand for WPA 4, Morro Bay, includes the Chorro Valley Water System and City of Morro Bay. The Chorro Valley Water System includes the California Men's Colony, Camp San Luis Obispo, and Cuesta College. The existing urban demand is 3,112 and the project future demand ranges from 3,460 to 3,532. The lower projected future water demand is based on an additional 2 percent reduction due to conservation. The existing urban demand in WPA 5, Los Osos, is 2,043 AFY and future projected demand ranges from 2,727 to 2,870 AFY. The lower projected future water demand is based on an additional 5 percent reduction due to conservation. The existing urban water demand for WPA 6, San Luis Obispo/Avila, is 7,871 AFY and future water demand ranges from 10,787 to 11,335. The lower projected future water demand is based on an additional 5 percent reduction due to conservation.

South Coast Sub-Region

The South Coast Sub-Region includes WPA 7 through 9. There is no urban water demand in WPA 8 and 9. WPA 7 includes the Northern Cities Management Area (NCMA), Nipomo Mesa Management Area (NMMA), and the northern portion of the Santa Maria Valley Management Area (SMVMA), as well as other outlying areas. The total urban existing demand for the entire water planning area is 15,712 AFY and future project demand ranges from 22,960 to 23,698 AFY. The lower projected future water demand is based on an overall 3 percent reduction due to conservation. The conservation includes 6 percent additional conservation for the NCMA, no additional conservation for the NMMA, and 5 percent additional conservation for the urban areas outside of the management areas within WPA 7. SMVMA within San Luis Obispo County does not include any urban water demand.

Inland Sub-Region

The inland sub-region includes WPA 10 through 16. WPAs 10, 11, and 15 have urban demand. The existing urban water demand for Santa Margarita Water Planning Area, WPA 12, is 1,819 AFY and future ranges from 5,881 to 6,190 AFY. The lower projected future water demand is based on an additional 5 percent reduction due to conservation. The existing urban water demand for WPA 13, Atascadero/Templeton, is 8,538 AFY and projected future demand ranges from 9,359 to 9,852 AFY. The lower projected future water demand is based on an additional 5 percent reduction due to conservation. The existing urban water demand for WPA 14, Salinas/Estrella, is 8,126 AFY and projected future ranges from 11,634 to 14,543. The lower projected future water demand is based on an additional 20 percent reduction due to conservation. The existing urban water demand for WPA 16, Nacimiento, is approximately 619 AFY and projected future ranges from approximately 987 to 1,039 AFY. The lower projected future water demand is based on an additional 5 percent reduction due to conservation.

Agricultural Water Demand

Definitions

Agricultural water demand refers to the annual applied water in all agricultural areas in the County. The following definitions are related to agricultural water demand:

- *Annual crop-specific applied water*: The annual crop-specific applied water represents the quantity of applied irrigation water per year (AF/Ac/Yr). For San Luis Obispo County, the crop-specific applied water is primarily a function of crop evapotranspiration (Etc), effective rainfall (ER), leaching requirement (LR), irrigation efficiency (IE), and frost protection (FP).

- *Eto*: The reference evapotranspiration (Eto) represents the approximate theoretical water use of a well watered, cool-seasoned grass, 4 – 6 inches tall, under full cover. This varies with changing weather conditions throughout the County. The Eto is generally reported in inches/month or inches/year.

- *Kc*: The crop coefficient (Kc) refers to a dimensionless number, specific to a particular crop, which is related to the Eto of grass (1.0). Kc is used to estimate plant water use for a particular plant in a particular region.

- *Etc*: The crop evapotranspiration (Etc) is estimated by multiplying Eto and Kc. Etc is the quantity (depth) of water transpired by plants, retained in plant tissue, and evaporated from adjacent soil surfaces during a specific time. The Etc is generally reported in inches/month or inches/year.

- *ER*: The effective rainfall (ER) is the amount of rain used by crops and is influenced by a variety of factors including frequency, intensity, and total amount of rainfall; percentage of ground cover, rate of evapotranspiration, and rooting depth of the crop; and soil water holding capacity, infiltration rate, and moisture at the time of rainfall. The ER is generally reported in inches/month or inches/year.

- *FP*: Frost protection (FP) refers to the amount of water used to protect plants from frost. The FP is based on the approximate number of nights per year, hours per night, and applied water flow rate for crops which are prone to damage. For this analysis, the crop-specific FP is reported in acre-foot per acre per year. ESA contacted UC Farm Advisors to establish the FP.

- *LR*: Leaching requirement (LR) refers to the amount of extra irrigation water necessary to remove salts from the soils. For this analysis, the LR is reported in percent of irrigated water. ESA contacted UC Farm Advisors to establish the LR.

- *IE*: Irrigation efficiency (IE) represents the percentage of irrigation water beneficially used vs. total irrigation water applied. ESA contacted a CRCD Irrigation Specialist to establish the IE.

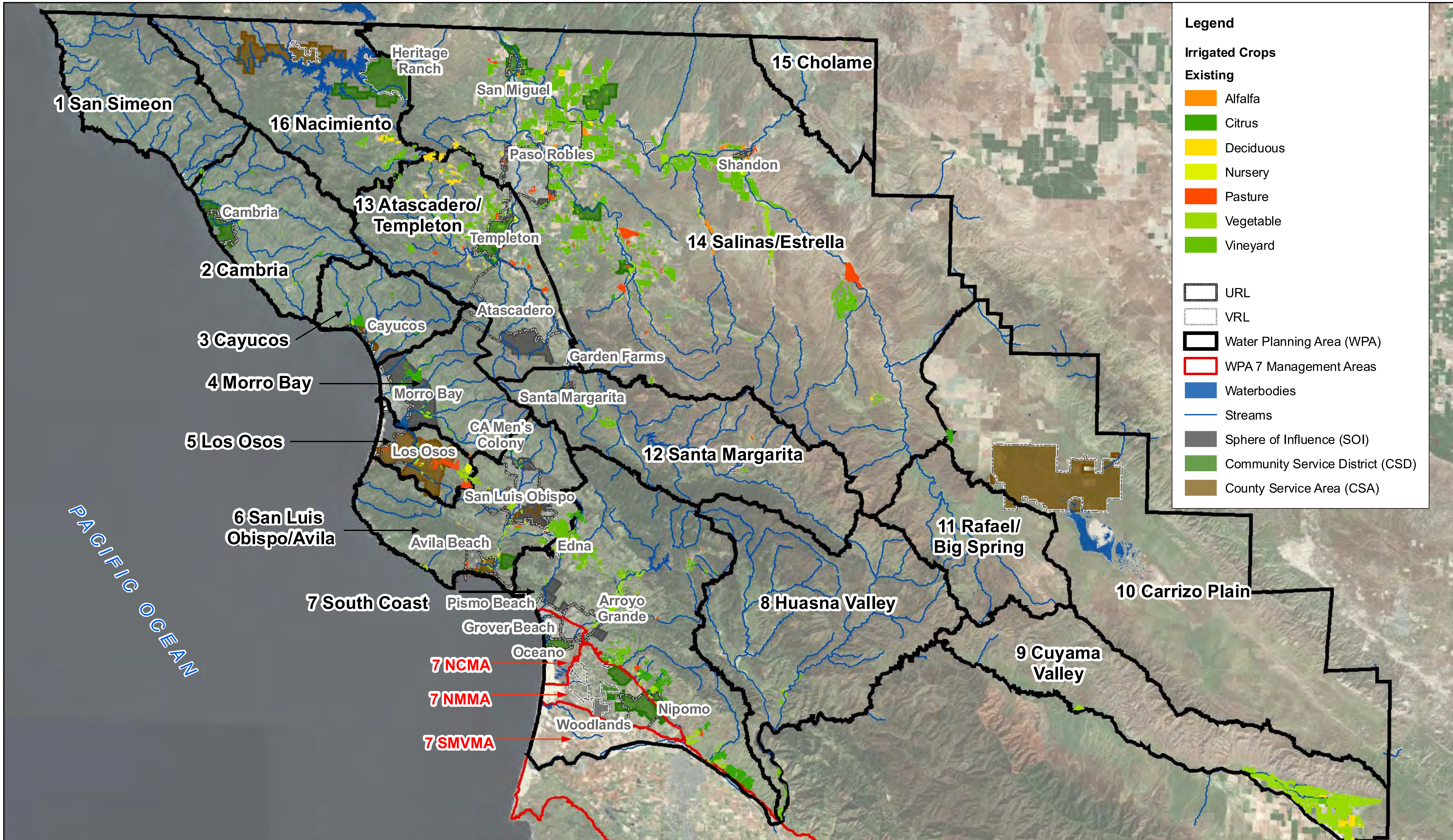
Sources

The Agriculture/Crop ArcGIS® layer for the County from August 2008 was used to determine existing agricultural acreage for each crop group. This layer is updated yearly with information from the pesticide use records obtained by the San Luis Obispo Department of Agriculture. The Agricultural Commissioner, Mike Isensee, has stated that the pesticide use records are forecasts and are approximately 80 percent accurate (Isensee, 2009a). The number of crop rotations varies and is not identified in the Agriculture/Crop ArcGIS® layer. The majority of irrigated vegetables are rotated numerous times throughout the year. Many of the coastal areas with available water may have 2, 3, or 4 crops planted in a particular year (Isensee, 2009c).

The California Irrigation Management Information System (CIMIS) and University of California Cooperative Extension Leaflets 21426 to 21428 data were used as reference evapotranspiration (ETo) and crop coefficients (Kc) for areas where data were available (CIMIS, 2009; Snyder et al., 1987, 1989a, 1989b). The rainfall data utilized is from SLO County gages, SLO County Hydrology Report (County, 2005), and County Flood Control and Water Conservation District maps (County, 2009). ESA contacted two UC Farm Advisors (Mark Battany and Mark Gaskell) in San Luis Obispo County and obtained information on frost protection and leaching requirements. Irrigation efficiency information was obtained from a Cachuma Resource Conservation District (CRCD) Irrigation Specialist (Kevin Peterson), as well as from Ms. Kris O'Connor, the Central Coast Vineyard Team (CCVT) Executive Director. Additionally, ESA used DWR estimates of the quantity of water applied to a specific crop per unit area (DWR, 2009a).

Method/Assumptions: Existing Agricultural Demand

The agricultural crop ArcGIS® layer includes approximately 200 classifications of commodities. This included approximately 86,000 acres of rangeland and 42,000 acres of uncultivated agriculture. For purposes of this analysis, the irrigated commodities were categorized into seven groups (**Table 3**). Avocados and citrus are included in the same crop group to be consistent with DWR crop groups (DWR, 2001) and annual agricultural water use monitoring by Gene Melschau, a Nipomo farmer (Melschau, 2009). Although the groups are based on commodities that may have similar water requirements, the actual water usage will vary based on individual commodities, soil type, and number of rotations on individual parcels. Almonds are not included in the commodity (deciduous) list because they require a small amount of irrigation water (Isensee, 2009b). **Figure 2** includes the location of all irrigated crops identified in the County ArcGIS® layer from August 2008.



San Luis Obispo County Flood Control and Water Conservation District

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Figure 2 Existing Crops in San Luis Obispo County

San Luis Obispo County

The existing acreage of irrigated crops, as reported by growers, is shown in **Table 4**. The acreage changes on a monthly or annual basis and can be readily updated in ArcGIS® and annual applied water can be recalculated.

TABLE 3
CROP GROUP AND COMMODITIES USED FOR THE AGRICULTURAL DEMAND ANALYSIS

Crop Group	Primary Commodities
Alfalfa	Alfalfa
Nursery	Christmas trees, miscellaneous nursery plants, flowers
Pasture	miscellaneous grasses, mixed pasture, sod/turf, sudangrass
Citrus	avocados, grapefruits, lemons, oranges, olives, kiwis, pomegranates
Deciduous	apples, apricots, berries, peaches, nectarines, plums, figs, pistachios, persimmons, pears, quince, strawberries
Vegetables	artichokes, beans, miscellaneous vegetables, mushrooms, onions, peas, peppers, tomatoes
Vineyard	wine grapes, table grapes

TABLE 4
EXISTING IRRIGATED CROP ACREAGE DETERMINED IN GIS[a]

WPA #	WPA Name	Alfalfa (ac)	Citrus (ac)	Deciduous (ac)	Nursery (ac)	Pasture (ac)	Vegetable (ac)	Vineyard (ac)	Total (ac)
1	San Simeon		19					64	83
2	Cambria		343	26	2		188	45	603
3	Cayucos		345				107	5	456
4	Morro Bay		672		0	35	497	76	1,281
5	Los Osos			4	104	505	903	1	1,515
6	San Luis Obispo/Avila		219	182	40	209	881	538	2,070
7[b]	South Coast		4,018	24	208	530	3,231	3,198	11,210
8	Huasna Valley		19	5			160	472	656
9	Cuyama Valley			642			9,083	211	9,936
10	Carrizo Plain		250						250
12	Santa Margarita	15		7		55		974	1,051
13	Atascadero/Templeton		32	712	80	589	17	3,434	4,864
14	Salinas/Estrella	800	319	655	76	1,446	2,098	27,424	32,818
15	Cholame Valley		26						26
16	Nacimiento		45	780		10		974	1,809
	Total	**815**	**6,307**	**3,037**	**510**	**3,377**	**17,166**	**37,416**	**68,629**

[a] Acreages were determined by aggregating County Crops ArcGIS® (2008) data, which is based on the pesticide use records, and crops identified in the County Land Use ArcGIS® (2009) data. These values are aggregated in a database file exported from ArcGIS® and summarized in a pivot table. The County Crops ArcGIS® data does not include any irrigated crop acreage in WPA 11.

[b] The agricultural acreage determined in GIS for WPA 7 only includes areas outside of the NCMA, NMMA, and SMVMA. The amount of irrigated acreage for these management areas is approximately 1,600 acres for NCMA (Todd Engineers, 2009), 2,600 acres for NMMA (NMMA, 2009), and 10,500 acres for SMVMA (Luhdorff and Scalmanini, 2009). 99.9 percent of strawberries in the County are located in these three areas.

ESA calculated the crop-specific applied water for these crop groups by utilizing information on crop evapotranspiration, contribution from rain or shallow water table, leaching requirements, irrigation efficiency, and frost protection. The following equation was used to calculate the annual crop-specific applied water (AF/Ac/Yr) for each of the water planning areas:

$$\text{Annual Crop - Specific Applied Water (AF/Ac/Yr)} = \frac{\text{ETc} - \text{ER}}{(1 - \text{LR}) \text{ x IE}} + \text{FP}$$

This formula was modified from a general formula for irrigation water requirements, which was established in 1997 (Burt, 1997). A detailed discussion and summary tables of each of the parameters in the above equation is presented in **Appendix A**. The annual crop-specific applied water is multiplied by crop acreage to determine an agricultural water demand for each crop group (AFY).

Reference Crop Evapotranspiration (Eto). Crop evapotranspiration for four CIMIS weather stations in San Luis Obispo County and in Kern County (to the east) was used (CIMIS, 2009). The CIMIS stations in San Luis Obispo County include two in San Luis Obispo, one in Atascadero, and one in Nipomo. Additional Eto monthly averages were obtained from the Reference Eto zone maps (DWR, 1999), University of California Bulletin 1922 (University of California, 1987), and University of California Cooperative Extension Leaflet 21426 (Snyder et al., 1987).

Crop coefficient (Kc). The crops in San Luis Obispo County were assigned crop coefficients based on the crop type and location. These crops include alfalfa, nursery, irrigated pasture, citrus, deciduous, vegetable, and vineyard. ESA has developed spreadsheets and ArcGIS® linkage so these numbers can be easily updated with new crop coefficients and crop evapotranspiration.

Crop Evapotranspiration (Etc). Crop evapotranspiration was calculated by multiplying the Eto by the Kc for each agricultural crop group and WPA.

Effective Rainfall (ER). The effective rainfall was calculated for each area by utilizing historical monthly precipitation in San Luis Obispo County and effective precipitation based on crop group.

Frost Protection (FP). The sprinkler frost protection water requirement was estimated for grapes (throughout the County), strawberries (WPA 7 and 8), and blueberries (WPA 2, 7, and 14). For vineyards, the frost threat occurs from March to April in San Luis Obispo County. For strawberries in San Luis Obispo County, primarily in WPA 7, the frost threat occurs from January to March. Sprinkler frost protection requires a large amount of water, which may be higher than a typical groundwater well can produce (Battany, 2009). Therefore, growers that use sprinkler frost protection will generally have large reservoirs on site or nearby. The frost protection in the County is approximately 0.50 AF/Ac/Yr for vineyards throughout the County (San Luis Obispo County, 1998), because many of the vineyards do not use frost protection ESA has used a value of 0.25 AF/Ac/Yr. The frost protection value used for strawberries and blueberries, classified as deciduous, is 0.4 AF/Ac/Yr (County, 1998). The vast majority of strawberries (99.9 percent) are located in WPA 7 management areas (i.e. NCMA, NMMA, and SMVMA).

Leaching Requirements (LR). Leaching requirements, the amount of over watering necessary to remove salts from the soil, were assumed to be satisfied by rainfall in the coastal areas. ESA assumed that the leaching requirements for inland areas varied from 5 percent to 16 percent for existing conditions and 7 percent to 18 percent for future conditions (Fugro and Cleath, 2002). Mark Gaskell, UC Farm Advisor, stated that strawberries may have a leaching requirement of 10 to 20 percent (Gaskell, 2009). Therefore, ESA used a leaching requirement of 11 percent for existing demand and 13 percent for future demand in WPA 7. Future leaching requirements may be greater, based on a build-up of salts in the soil due to deficient winter rains (Battany, 2008; Gaskell, 2009).

Irrigation Efficiency (IE). Irrigation efficiencies were calculated by utilizing irrigation distribution uniformity and losses provided by the San Luis Obispo County/Santa Barbara County Cachuma Resource Conservation District (CRCD), San Luis Obispo County Coastal Resources Conservation District, vineyard owners, and recent studies. Additionally, ESA incorporated input from a CRCD Irrigation Specialist on existing and future irrigation efficiencies (Peterson, 2009a, 2009b).

Method/Assumptions: Future Agricultural Demand

Similar methods and equations were used to calculate the future irrigation water requirements. The calculation of future agricultural demand is different from existing use due to changes in cropping patterns, weather patterns, and irrigation methods. Over the past 20 years, irrigation efficiencies have improved substantially. Although predicting future agricultural demand is very difficult, according to the Agricultural Commissioner and a CRCD Irrigation Specialist, irrigation efficiencies are likely to continue to improve due to site specific monitoring of soil water availability and crop needs, planting of root stock that is more drought tolerate, or modification of irrigation techniques based upon ongoing research (Isensee, 2009c; Peterson, 2009b) Growers may also face economic pressure due to increased electricity costs if groundwater levels decline, or may have economic incentives for the development of higher water efficiencies (Isensee, 2009c). Therefore, ESA assumed higher irrigation efficiencies for projected future agricultural demand than in existing demand calculations. More details about how the irrigation efficiencies were determined are included in Appendix A.

Based on recent trends in agriculture, much of the additional projected future irrigated land could be converted to vineyards. For purposes of this analysis, ESA assumed that the 6,000 acres of hay and oats identified in the 2008 ArcGIS® crop layer would be converted to vineyards. The County has approximately 70,000 acres of farmland enrolled in the Federal Conservation Reserve Program (CRP) (USDA, 2009). Many of the existing CRP contracts will expire in the next 10 years. If there is sufficient water available, much of this farmland could enter into irrigated production (Isensee, 2009c). ESA has estimated future irrigated crop acreage by adding existing irrigated crop acreage plus inactive irrigated crop acreage and approximately 6,000 acres of future vineyards (converted from existing oat and hay acreage). The total future irrigated crop acreage, including WPA 7 management areas, was 95,038 acres compared to existing crop acreage of 83,329 acres. This analysis does not account for annual rotation from fallow to cultivated land. Projected future irrigated acreage is presented in **Table 5**.

Agricultural Water Demand by WPA

Table 6 includes a summary of the range of existing annual applied water (AFY) by WPA. The range is based on different rainfall and irrigation efficiencies. **Table 7** includes a summary of the projected future annual applied water (AFY) by WPA. All agricultural water demands have been rounded to the 10's.

San Simeon Water Planning Area (WPA 1)

The existing annual applied water for WPA 1 is approximately 70 AFY. The existing crops in this area include citrus and vineyards. The projected future annual applied water for WPA 1 ranges from approximately 10 to 60 AFY. The projected future agricultural demand is less than existing, due to increased irrigation efficiencies and no additional crops in this area.

TABLE 5
PROJECTED FUTURE IRRIGATED CROP ACREAGE DETERMINED IN GIS[a]

WPA #	WPA Name	Alfalfa (ac)	Citrus (ac)	Deciduous (ac)	Nursery (ac)	Pasture (ac)	Vegetable (ac)	Vineyard (ac)	Total (ac)
1	San Simeon		19					64	83
2	Cambria		409	28	2		395	457	1,291
3	Cayucos		477				108	13	598
4	Morro Bay		722		0	35	527	96	1,380
5	Los Osos		21	4	104	505	995	1	1,628
6	San Luis Obispo/Avila		224	182	40	209	920	542	2,117
7[b]	South Coast		4,048	44	209	703	3,378	3,740	12,122
8	Huasna Valley		19	5	4	97	160	670	954
9	Cuyama Valley			642			9,501	211	10,354
10	Carrizo Plain		251	1			3		255
12	Santa Margarita	15	4	9		95		1,284	1,406
13	Atascadero/Templeton		54	778	80	814	47	4,774	6,547
14	Salinas/Estrella	800	381	879	78	1,886	2,121	32,086	38,232
15	Cholame Valley		26						26
16	Nacimiento		48	846		10		2,441	3,345
	Total	**815**	**6,703**	**3,418**	**517**	**4,352**	**18,154**	**46,380**	**80,338**

[a] The agricultural acreages were determined by aggregating County Crops ArcGIS® (2008) data, which is based on the pesticide use records, and crops identified in the County Land Use ArcGIS® (2009) data. These crop acreages are aggregated in a database file exported from ArcGIS® and inputted into spreadsheets. The County Crops ArcGIS® data does not include any irrigated crop acreage in WPA 11.

[b] The agricultural acreage determined in GIS for WPA 7 only includes areas outside of the NCMA, NMMA, and SMVMA. The amount of irrigated acreage for these management areas is approximately 1,600 acres for NCMA (Todd Engineers, 2009), 2,600 acres for NMMA (NMMA, 2009), and 10,500 acres for SMVMA (Luhdorff and Scalmanini, 2009). 99.9 percent of strawberries in the County are located in these three areas.

TABLE 6
EXISTING AGRICULTURAL WATER DEMAND BY WPA (AFY)[a]

Water Planning Area		low demand (AFY)	medium demand (AFY)	high demand (AFY)
1	San Simeon	40	70	90
2	Cambria	440	640	850
3	Cayucos	370	520	670
4	Morro Bay	1,670	2,060	2,440
5	Los Osos	2,750	3,290	3,830
6	San Luis Obispo/Avila	2,900	3,610	4,320
7[b]	South Coast	16,250	19,920	23,580
8	Huasna Valley	1,300	1,550	1,800
9	Cuyama Valley	25,110	28,870	32,630
10	Carrizo Plain	690	800	910
12	Santa Margarita	1,390	1,770	2,160
13	Atascadero/Templeton	8,570	10,620	12,670
14	Salinas/Estrella	55,480	67,610	79,730
15	Cholame Valley	70	80	90
16	Nacimiento	3,120	3,860	4,610
	Total	**120,150**	**145,270**	**170,380**

[a] All agricultural demand values have been rounded to the 10's. The County Crops ArcGIS® data does not include any irrigated crop acreage in WPA 11.

[b] The agricultural demand for WPA 7 in this table only includes areas outside of the NCMA, NMMA, and SMVMA.

TABLE 7
PROJECTED FUTURE AGRICULTURAL WATER DEMAND BY WPA (AFY)[a]

Water Planning Area		low demand (AFY)	medium demand (AFY)	high demand (AFY)
1	San Simeon	10	40	60
2	Cambria	740	1,110	1,490
3	Cayucos	430	620	800
4	Morro Bay	1,690	2,070	2,440
5	Los Osos	2,750	3,260	3,770
6	San Luis Obispo/Avila	2,810	3,470	4,120
7[b]	South Coast	16,610	20,220	23,830
8	Huasna Valley	2,060	2,440	2,820
9	Cuyama Valley	25,240	28,820	32,410
10	Carrizo Plain	680	780	890
12	Santa Margarita	1,720	2,200	2,680
13	Atascadero/Templeton	9,740	12,170	14,600
14	Salinas/Estrella	60,740	73,780	86,820
15	Cholame Valley	60	70	80
16	Nacimiento	4,740	5,930	7,120
	Total	**130,020**	**156,980**	**183,930**

[a] All projected future agricultural demand values have been rounded to the 10's. The County Crops ArcGIS® data does not include any irrigated crop acreage in WPA 11.
[b] The agricultural water demand for WPA 7 only includes areas outside of the NCMA, NMMA, and SMVMA.

Cambria Water Planning Area (WPA 2)

The existing annual applied water for WPA 2 is approximately 640 AFY. The existing crops in this area include citrus, deciduous, vegetable, and vineyards. The projected future annual applied water for WPA 2 ranges from approximately 740 to 1,490 AFY. The projected future agricultural demand is higher than existing due to increases in acreage of all of the existing crop groups, especially vegetables and vineyards.

Cayucos Water Planning Area (WPA 3)

The existing annual applied water for WPA 3 is approximately 520 AFY. The existing crops in this area include citrus, vegetables, and vineyards. The projected future annual applied water for WPA 3 ranges from approximately 430 to 800 AFY. The projected future agricultural demand is higher than existing due to increases in acreage of citrus, vegetables, and vineyards.

Morro Bay Water Planning Area (WPA 4)

The existing annual applied water for WPA 4 is approximately 2,060 AFY. The existing crops in this area include citrus, irrigated pasture, vegetable, and vineyards. The projected future annual applied water for WPA 4 ranges from approximately 1,690 to 2,440 AFY. The projected future agricultural demand is higher than existing due to increases in acreage of citrus, vegetables, and vineyards.

Los Osos Water Planning Area (WPA 5)

The existing annual applied water for WPA 5 is approximately 3,290 AFY. The existing crops in this area include deciduous, nursery, pasture, vegetable, and vineyards. The projected future annual applied water for WPA 5 ranges from approximately 2,750 to 3,770 AFY. The projected future agricultural demand is less than existing, due to increased irrigation efficiencies.

San Luis Obispo/Avila Water Planning Area (WPA 6)

The existing annual applied water for WPA 6 is approximately 3,610 AFY. The existing crops in this area include deciduous, nursery, pasture, vegetable, and vineyards. The projected future annual applied water for WPA 6 ranges from approximately 2,810 to 4,120 AFY. The projected future agricultural demand is less than existing, due to increased irrigation efficiencies.

South Coast Water Planning Area (WPA 7)

Outlying Areas

The existing annual applied water in the tables above includes the demand for the areas in WPA 7 that are located outside of the NMMA, NCMA, and SMVMA boundaries. The existing annual applied water for this part of WPA 7 is approximately 19,920 AFY. The projected future demand ranges from 16,610 to 23,830 AFY.

Northern Cities Management Area (NCMA)

In 2008, the irrigated crops consisted of approximately 4 acres of nursery crops and approximately 1,596 acres of crops such as broccoli, onions, and strawberries. The total existing annual applied water for irrigated crops in the NCMA, part of WPA 7, is approximately 2,590 AFY (Todd Engineers, 2009). The future agricultural water demand in NCMA is not expected to change significantly from existing water usage (Todd Engineers, 2009).

Nipomo Mesa Management Area (NMMA)

In 2008, the irrigated crops in NMMA consisted of 3 acres deciduous, 3 acres pasture, 424 acres vegetable, 264 acres of avocado and lemon, 1,176 acres of strawberries, and 261 acres of nurseries (NMMA, 2009). The total existing annual applied water for irrigated crops in NMMA is approximately 4,300 AFY (NMMA, 2009). The future agricultural water demand in NMMA is not expected to change significantly from existing water usage.

Santa Maria Valley Management Area (SMVMA)

In 2008, the crops within the San Luis Obispo portion of SMVMA consisted of approximately 9,649 acres of vegetables, 798 acres of strawberries, and 63 acres of nurseries. The crop acreage was calculated from the San Luis Obispo County Crops ArcGIS layer. The 2008 SMVMA Annual Report established annual applied crop water duties for these crop groups of 2.50, 1.55, and 2.1 AF/Ac/Yr, respectively (Luhdorff and Scalmanini, 2009). Based on the applied water duties established in the SMVMA 2008 Annual Report and the acreage determined by the County Crops ArcGIS layer, the existing agricultural water demand would be approximately 25,540 AFY. The future agricultural water demand in SMVMA is not expected to change significantly from existing water usage.

Huasna Valley Water Planning Area (WPA 8)

The existing annual applied water for WPA 8 is approximately 1,550 AFY. The existing crops in this area include citrus, deciduous, vegetables, and vineyards. The projected future annual applied water for WPA 8 ranges from approximately 2,060 to 2,820 AFY. The projected future agricultural demand is higher than existing due to increases in acreage of nursery, pasture, and vineyards.

Cuyama Valley Water Planning Area (WPA 9)

The existing annual applied water for WPA 9 is approximately 28,870 AFY. The existing crops in this area include deciduous, vegetables, and vineyards. The projected future annual applied water for WPA 9 ranges from approximately 25,320 to 32,410 AFY. The projected future agricultural demand is less than existing, due to increased irrigation efficiencies.

Carrizo Plain Water Planning Area (WPA 10)

The existing annual applied water for WPA 10 is approximately 800 AFY. The existing crops in this area are primarily citrus crops. The projected future annual applied water for WPA 10 ranges from approximately 680 to 890 AFY. The projected future agricultural demand is less than existing, due to increased irrigation efficiencies.

Santa Margarita Water Planning Area (WPA 12)

The existing annual applied water for WPA 12 is approximately 1,770 AFY. The existing crops in this area include alfalfa, deciduous, pasture, and vineyards. The projected future annual applied water for WPA 12 ranges from approximately 1,720 to 2,680 AFY. The projected future agricultural demand is higher than existing due to increases in acreage of citrus, deciduous, pasture, and vineyards.

Atascadero/Templeton Water Planning Area (WPA 13)

The existing annual applied water for WPA 13 is approximately 10,620 AFY. The existing crops in this area include citrus, deciduous, nursery, pasture, vegetable, and vineyards. The projected future annual applied water for WPA 13 ranges from approximately 9,740 to 14,600 AFY. The projected future agricultural demand is higher than existing due to increases in acreage of all existing crop groups.

Salinas/Estrella Water Planning Area (WPA 14)

The existing annual applied water for WPA 14 is approximately 67,610 AFY. The existing crops in this area include commodities from all crop groups. The projected future annual applied water for WPA 14 ranges from approximately 60,740 to 86,820 AFY. The projected future agricultural demand is higher than existing due to increases in acreage of citrus, deciduous, pasture, vegetables, and vineyards.

Cholame Water Planning Area (WPA 15)

The existing annual applied water for WPA 15 is approximately 80 AFY. The existing crops in this area are primarily citrus crops. The projected future annual applied water for WPA 15 ranges from approximately 60 to 80 AFY. The projected future agricultural demand is approximately equal to the existing agricultural demand in this planning area.

Nacimiento Water Planning Area (WPA 16)

The existing annual applied water for WPA 16 is approximately 3,860 AFY. The existing crops in this area are citrus, deciduous, pasture, and vineyards. The projected future annual applied water for WPA 16 ranges from approximately 4,740 to 7,120 AFY. The projected future agricultural demand is higher than existing due to increases in acreage of citrus, deciduous, and vineyards.

Rural Water Demand

Definitions

Rural water demand refers to water demand in unincorporated areas of the County that are not considered agricultural or urban.

Sources

The County ArcGIS® land use data, including vacant and developed properties and potential subdivisions and units, in the unincorporated areas of the County were used to calculate a rural water demand. Additional sources include information from purveyors, water management plans, and the County's *2008 Resource Management System Annual Summary Report*.

Method/Assumptions: Existing and Future Rural Demand

A water duty factor was applied to the number of dwelling units (DU) of unincorporated areas that are outside of the urban and agricultural areas. The water duty factor associated with rural demand is an estimated average annual volume of water used by a particular rural user and is represented as AFY/DU.

Due to different climates and types of water usage, the water duty factors can vary widely between region and time of year. The water duty factor varies with the number of persons in each DU, the amount of landscaping, and the climate. Coastal areas require less water than inland areas due to greater evapotranspiration in the inland areas and more precipitation in the coastal areas. The water duty factor for each area was determined by utilizing water usage data available through San Luis Obispo County, adjacent counties, and water purveyors. ESA calculated a range for existing and future rural demand in each region based on the amount of development and conservation.

ESA utilized the County Land Use ArcGIS® layer, which includes land use and potential DU per acre for all unincorporated areas of the County. The methods that the County used to prepare the land use data are described in **Appendix B**. A detailed discussion of how ESA utilized the County Land Use ArcGIS® database is included in **Appendix C**. For the rural demand analysis, ESA excluded all areas in the County that were accounted for with urban or agricultural water demand. Existing and projected future nurseries and vineyards present in the Land Use ArcGIS® layer were merged into the agriculture ArcGIS® layer and included in the agricultural demand analysis.

ESA calculated a rural water demand for each area by multiplying the number of dwelling units by a water duty factor. For future rural water demand, the potential residential demand was reduced by 25 percent to account for physical and environmental constraints on development. The 25 percent is based on a future County development of 75 percent of vacant land that is designated by the County as having development potential. In the future, this could be refined for specific planning areas. The County is developing a Countywide Rural Plan that will analyze different rural buildout scenarios. The rural demand for individual areas in the County was associated with a ArcGIS® layer, which includes the number of dwelling units, water duty factor, and calculated rural water demand for all unincorporated areas in the County that are not considered agricultural or urban. ESA utilized input from the WRAC, regional, sub-regional, and other stakeholders to develop the rural water demand methodology.

Rural Water Demand by WPA

Appendix C provides a detailed discussion of the method ESA used to calculate the existing and projected future rural water demand. **Table 8** summarizes an estimate of the existing rural demand and an estimate of the projected future rural demand for all WPAs. The number of existing dwelling units (DU) was multiplied by 0.8 AFY/DU for coastal WPAs (WPA 1-7) and 1.0 AFY/DU for inlands WPA (WPA 8-16) to estimate the existing rural residential water demand for this WPA. Rural residential water demand represents approximately 99.6 percent of the total rural demand. The number of existing rural industrial/commercial parcels, which are not served by existing water purveyors, was multiplied by a factor of 1.5 AFY/DU for all planning areas and for both existing and future industrial/commercial rural water demand. Rural industrial/commercial demand makes up approximately 0.4 percent of total rural water demand. The number of projected future DU was multiplied by 0.6 AFY/DU for coastal WPAs and 0.8 AFY/DU for inland WPAs to determine the projected future rural water demand for this WPA. **Figure 3** shows a summary of residential, commercial/industrial, and vacant parcels throughout San Luis Obispo County. According to existing County land use designations, much of the vacant rural land could be developed in the future if water and other resources were available.

TABLE 8
EXISTING AND FUTURE RURAL WATER DEMAND

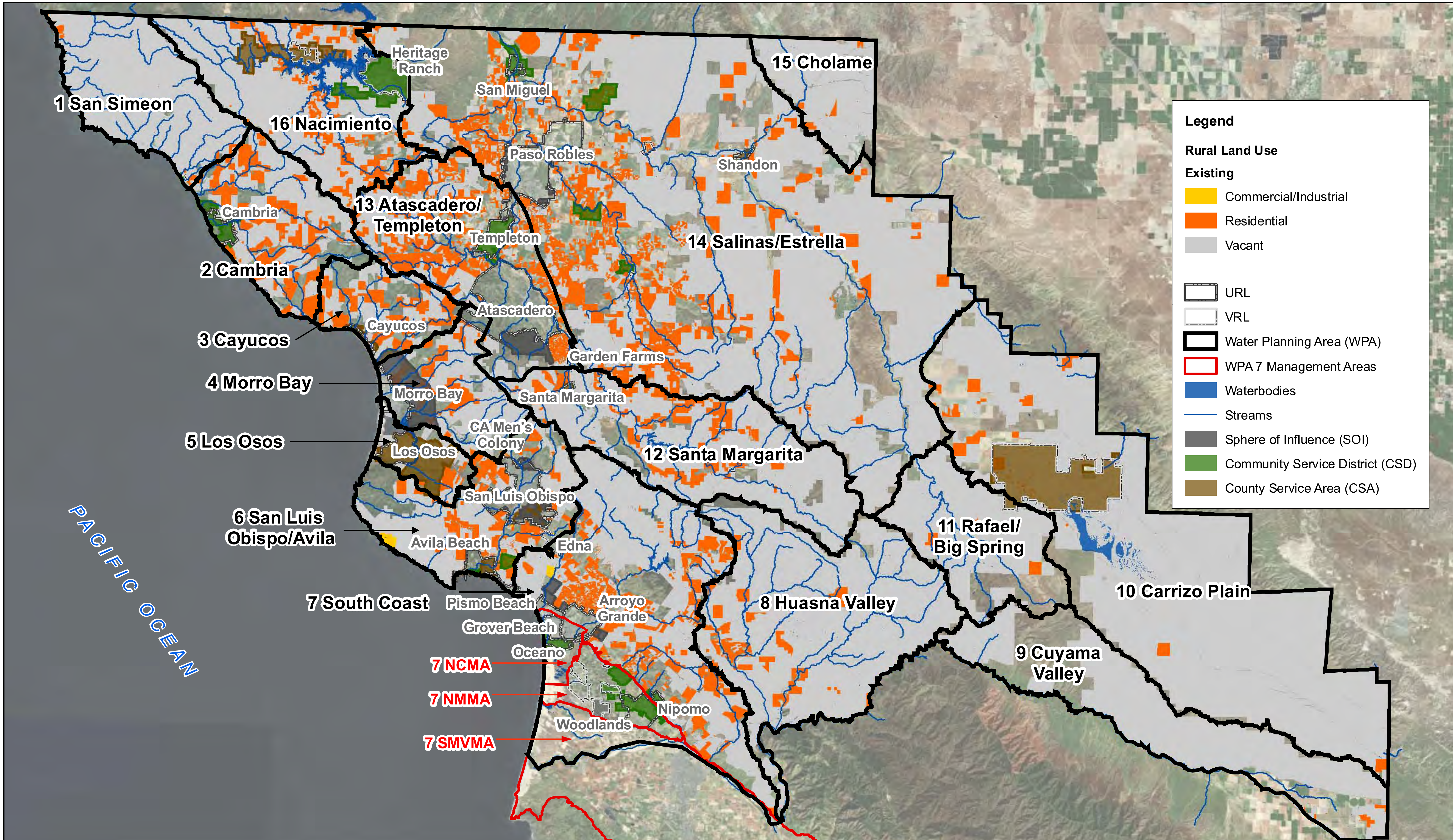
	Water Planning Area	Average Existing Rural Demand (AFY)[a]	Minimum Future Rural Demand (AFY)[b,c]	Maximum Future Rural Demand (AFY)[b]
1	San Simeon	20	50	50
2	Cambria	100	190	220
3	Cayucos	80	130	140
4	Morro Bay	120	190	220
5	Los Osos	20	20	20
6	San Luis Obispo/Avila	450	610	660
7[d]	South Coast	1,480	1,990	2,160
8	Huasna Valley	90	360	450
9	Cuyama Valley	10	80	100
10	Carrizo Plain	210	9,610	12,740
11	Rafael/Big Spring	0	470	620
12	Santa Margarita	240	450	520
13	Atascadero/Templeton	1,480	1,810	1,930
14	Salinas/Estrella	3,590	5,570	6,230
15	Cholame Valley	10	150	190
16	Nacimiento	280	730	880
	Total	**8,180**	**22,410**	**27,130**

[a] Water usage factor used for all existing rural residential units in WPA 1-7 is 0.8 AFY/DU and WPA 8-16 is 1.0 AFY/DU, for commercial/industrial areas was 1.5 AFY/DU.

[b] Water usage factor used for all future residential units in WPA 1-7 is 0.6 AFY/DU and WPA 8-16 is 0.8 AFY/DU, for commercial/industrial areas was 1.5 AFY/DU.

[c] Minimum demand represents 75 percent of potential development

[d] The rural demand for WPA 7 only includes areas outside of the NCMA, NMMA, and SMVMA.



San Luis Obispo County Flood Control and Water Conservation District

MASTER WATER PLAN

San Luis Obispo County

Figure 3 Rural Land Use in San Luis Obispo County

North Coast Sub-Region

The existing rural demand for San Simeon Water Planning Area, WPA 1, is approximately 20 AFY and future is approximately 50 AFY. The existing rural demand for Cambria Water Planning Area, WPA 2, is approximately 100 AFY and future is approximately 190 to 220 AFY. The existing rural demand for Cayucos Water Planning Area, WPA 3, is approximately 80 AFY and future range is from approximately 130 to 140 AFY. The existing rural demand for Morro Bay Water Planning Area, WPA 4, is approximately 120 AFY and projected future range is from 200 to 220 AFY. The existing rural demand for Los Osos Water Planning Area, WPA 5, is 20 AFY and projected future demand is approximately the same. The majority of WPA 5 is composed of agricultural and urban areas, so there are only a small number of parcels in WPA 5 where there could be additional rural development. The existing rural demand for San Luis Obispo/Avila Water Planning Area, WPA 6, is 450 AFY and projected future range is 610 to 660 AFY. The majority of existing rural parcels identified in the WPAs within the North Coast Sub-Region are classified as developed rural lands. The majority of vacant parcels in these WPAs that could be converted to rural residential in the future are vacant parcels with rural land use designations.

South Coast Water Planning Area (WPA 7)

Outlying Areas

The existing annual rural water demand in the tables above includes the demand for the areas in WPA 7 that are located outside of the NMMA, NCMA, and SMVMA boundaries. The existing demand for outlying areas in WPA 7 is 1,480 AFY and the projected demand for outlying areas in WPA 7 is 1,990 to 2,160 AFY. The majority of existing rural parcels identified in WPA 7 are classified as developed rural residential, rural suburban, or rural lands. The majority of vacant parcels in WPA 7 that could be converted to rural residential in the future are vacant parcels with rural land use designations

Northern Cities Management Area (NCMA)

In 2008, the NCMA had a rural demand of approximately 36 AFY (Todd Engineers, 2009). The NCMA has minimal rural land that could be developed. In the future, the rural water demand in this area is expected to be similar to the existing demand. Most of the increase in demand in NCMA is projected to be from urban users. The existing rural water demand will be estimated and reported annually in an NCMA report.

Nipomo Mesa Management Area (NMMA)

In 2008, the NMMA had a rural demand of approximately 1,700 AFY (NMMA, 2009). The rural water demand consisted of primarily rural residential and suburban parcels. The rural water demand in the future is expected to be similar to the existing demand. Most of the increase in water demand in NMMA is projected to be from urban users. The rural water demand will be estimated and reported annually in an NMMA report.

Santa Maria Valley Management Area (SMVMA)

The water demand in the San Luis Obispo section of SMVMA is primarily classified as agricultural demand (Luhdorff and Scalmanini, 2009). Based on the County Land Use GIS, the existing rural water demand in SMVMA is approximately 37 AFY and future demand is approximately 110 AFY. Both existing and future rural demand is less than 0.5 percent of the total demand for the SMVMA within San Luis Obispo County.

Huasna Valley Water Planning Area (WPA 8)

For the Huasna Valley Water Planning Area, the existing annual rural water demand is 90 AFY and the range of projected future demand is 360 to 450 AFY. The majority of existing rural parcels identified in WPA 8 are classified as developed rural lands. The majority of vacant parcels in WPA 8 that could be converted to rural residential in the future are vacant parcels with rural land use designations.

Cuyama Valley Water Planning Area (WPA 9)

The existing annual rural water demand is 10 AFY and the range of projected future demand is 80 to 100 AFY. The majority of existing rural parcels identified in WPA 9 are classified as developed rural lands. The majority of vacant parcels in WPA 9 that could be converted to rural residential in the future are vacant parcels with rural land use designations

Inland Sub-Region

The estimated rural demand for the Carrizo Plain, WPA 10, is 210 AFY and future demand ranges from 9,610 to 12,740 AFY. The majority of existing rural parcels identified in WPA 10 are classified as developed rural lands. According to existing zoning, it is possible that Carrizo Plain could have extensive residential development. However, it is unlikely that the number of residential units that are zoned as potential residential will be developed due to limited water availability and other factors.

There is no existing rural demand for WPA 11, Rafael/Big Spring, but in the future, if water is available and development occurs, there could be from approximately 470 to 620 AFY. The existing rural demand for WPA 12 is approximately 240 AFY and future demand ranges from approximately 450 to 520 AFY. The existing rural demand for WPA 13, Atascadero/Templeton, is approximately 1,480 AFY and future demand ranges from 1,810 to 1,930 AFY. The existing rural demand for WPA 14, Salinas/Estrella, is approximately 3,590 AFY and future demand ranges from 5,570 to 6,230 AFY. The existing rural demand for WPA 15, Cholame, is approximately 10 AFY and future demand ranges from 150 to 190 AFY. The existing rural demand for WPA 16 is approximately 280 AFY and future demand ranges from 730 to 880 AFY. The majority of existing rural parcels identified in the Inland Sub-Region are classified as developed rural lands. The majority of vacant parcels in these WPAs that could be converted to rural residential in the future are vacant parcels with rural land use designations

Environmental Water Demand

Definitions

Environmental water demand refers to the amount of water needed in an aquatic ecosystem, or released into it, to sustain aquatic habitat and ecosystem processes.

Sources

There are six active USGS streamflow gages and 68 inactive USGS streamflow gages in San Luis Obispo County (USGS, 2009). Information on location, site details, drainage, and available data was obtained for all United States Geological Survey (USGS) sites and imported into ArcGIS®. ESA obtained similar information from Sylas Cranor in the San Luis Obispo Water Resources Department for all 16 active gages and inactive gages and imported available information into ArcGIS®.

Method/Assumptions: Environmental Demand

A detailed discussion of the methods for determining the environmental demand is included in **Appendix D**. ESA quantified environmental water demands for areas where data were available and unimpaired runoff data could be obtained, calculated, or estimated. ESA utilized USGS and County existing stream gage data and obtained the critical stream flow data. Unimpaired runoff estimates were calculated by developing regional, multiple regression relationships that predict runoff at an ungaged, or partially gaged, location as a function of runoff at a gaged location. Once the estimated unimpaired runoff has been established, ESA used the median annual discharge methodology to calculate an environmental water demand (Hatfield and Bruce, 2000). ESA selected this method for the environmental demand analysis based on target species, data availability, input from the WRAC and other stakeholders, as well as time and budget constraints.

The DWR has identified over 1,000 water rights applications and permits for San Luis Obispo County (DWR, 2009b). For purposes of this analysis, ESA presents the unimpaired mean annual discharge and environmental water demand without including an analysis of the 1,000 diversion rights in the County. However, ESA includes some of the established instream flow requirements. In order to obtain a better understanding of how much surface water is available for aquatic life, the County would need to identify and quantify all diversion rights and instream flow requirements in the watershed.

Environmental Water Demand by WPA

A detailed discussion of the results of the environmental demand analysis is included in Appendix D. The mean annual discharge and environmental water demand estimates are shown in **Table 9**.

San Simeon Water Planning Area (WPA 1)

The total unimpaired mean annual discharge in WPA 1 is approximately 104,490 AFY and environmental water demand is approximately 72,980 AFY. WPA 1 was divided into eight sub-watersheds and the unimpaired mean annual discharge and environmental water demand was calculated for each of these areas. Some of the creeks included in these sub-watersheds include San Carpoforo, Honda Arroyo, Arroyo de la Cruz, Arroyo de la Laguna, Arroyo del Osos, Arroyo del Corral, Arroyo Laguna, and Pico Creek.

TABLE 9
MEAN ANNUAL DISCHARGE AND ENVIRONMENTAL WATER DEMAND ESTIMATES

WPA #[a]	WPA Name	Estimated Unimpaired Mean Annual Discharge (AFY)	Environmental Water Demand (AFY)
1	San Simeon	104,490	72,980
2	Cambria	87,050	51,460
3	Cayucos	33,340	26,160
4	Morro Bay	43,430	27,880
5	Los Osos	8,200	7,040
6	SLO/Avila	45,820	33,030
7	South Coast	49,100	32,960
8	Huasna Valley	34,220	25,020
12	Santa Margarita	46,630	32,850
13	Atascadero/Templeton	74,090	41,010
16	Nacimiento	251,120[b]	108,390[b]

[a] The eastern portion of the County (i.e., WPAs 9, 10, 11, 14, and 15) was ultimately excluded from the environmental water demand analysis due to the lack of data and regional physiographic differences.

[b] Estimates for WPA16 environmental water demand include the watershed area for the Nacimiento River Index-station (162 square miles); though the Index-station is within WPA 16, most of the watershed area is not.

Cambria Water Planning Area (WPA 2)

The total unimpaired mean annual discharge in WPA 2 is approximately 87,050 AFY and environmental water demand is approximately 51,460 AFY. WPA 2 was divided into three sub-watersheds and the unimpaired mean annual discharge and environmental water demand was calculated for each of these areas. Creeks in these sub-watersheds include San Simeon, Santa Rosa, and Villa Creek.

Cayucos Water Planning Area (WPA 3)

For WPA 3, the total unimpaired mean annual discharge is approximately 33,340 AFY and environmental water demand is approximately 26,160 AFY. WPA 3 was divided into three sub-watersheds and the unimpaired mean annual discharge and environmental water demand was calculated for each of these areas. Creeks in these sub-watersheds include Cayucos and Toro Creek.

Morro Bay Water Planning Area (WPA 4)

The unimpaired mean annual discharge for WPA 4 is approximately 43,430 AFY and environmental water demand is approximately 27,880 AFY. WPA 4 was divided into two sub-watersheds and the unimpaired mean annual discharge and environmental water demand was calculated for these sub-watersheds. Creeks in these sub-watersheds include Morro and Chorro Creek.

Los Osos Water Planning Area (WPA 5)

The unimpaired mean annual discharge for WPA 5 is approximately 8,200 AFY and environmental water demand is approximately 7,040 AFY. The analysis for WPA 5 analyzed the area as one watershed that includes Los Osos Creek and an area of approximately 23 square miles.

San Luis Obispo/Avila Water Planning Area (WPA 6)

The unimpaired mean annual discharge for WPA 6 is approximately 45,820 AFY and environmental water demand is approximately 33,030 AFY. WPA 6 was divided into four sub-watersheds and the unimpaired mean annual discharge and environmental water demand was calculated for these sub-watersheds. The largest creek in these sub-watersheds is San Luis Obispo Creek. San Luis Obispo Creek has an instream flow requirement of a minimum daily average of discharge 2.5 cubic feet per second (cfs), which is equivalent to approximately 1,810 AFY (NOAA, 2005).

South Coast Water Planning Area (WPA 7)

The unimpaired mean annual discharge for WPA 7, inclusive of the water management areas, is approximately 49,100 AFY and environmental water demand of 32,960 AFY. WPA 7 was divided into five sub-watersheds and the unimpaired mean annual discharge and environmental water demand was calculated for these sub-watersheds. Creeks in these sub-watersheds include Pismo and Arroyo Grande Creek. The Arroyo Grande Creek below Lopez Dam has instream flow requirements that vary from less than 3 cfs to 20 cfs (2,170 AFY to 14,480) based on time of year and amount of water in the reservoir (Stetson Engineers, 2004)

Huasna Valley Water Planning Area (WPA 8)

The unimpaired mean annual discharge for WPA 8 inclusive of the water management areas is approximately 34,220 AFY and environmental water demand of 25,020 AFY. WPA 8 was divided into three sub-watersheds and the unimpaired mean annual discharge and environmental water demand was calculated for these sub-watersheds. Some of the creeks in these sub-watersheds included Huasna River and Alamo Creek.

Santa Margarita Water Planning Area (WPA 12)

The unimpaired mean annual discharge for WPA 12 inclusive of the water management areas is approximately 46,630 AFY and environmental water demand of 32,850 AFY. WPA 12 was divided into three sub-watersheds and the unimpaired mean annual discharge and environmental water demand was calculated for these sub-watersheds. The Salinas River is the major river in these sub-watersheds.

Atascadero/Templeton Water Planning Area (WPA 13)

The unimpaired mean annual discharge for WPA 13 inclusive of the water management areas is approximately 74,090 AFY and environmental water demand of 41,010 AFY. WPA 13 was divided into two sub-watersheds and the unimpaired mean annual discharge and environmental water demand was calculated for these sub-watersheds. The major water bodies in these sub-watersheds include the Salinas River and Paso Robles Creek.

Nacimiento Water Planning Area (WPA 16)

The unimpaired mean annual discharge for WPA 16 inclusive of the water management areas is approximately 251,124 AFY and environmental water demand of 108,390 AFY. WPA 16 was divided into three sub-watersheds and the unimpaired mean annual discharge and environmental water demand was calculated for these sub-watersheds. The major river in these sub-watersheds is the Nacimiento River.

Appendices

Appendix A, San Luis Obispo County Water Demand Analysis Annual Applied Water Variables, technical memorandum, ESA, prepared December 2009.

Appendix B, San Luis Obispo County ArcGIS® LU Methodology Report, San Luis Obispo County, 2009.

Appendix C, San Luis Obispo County Rural Land Use

Appendix D, SLO County MWP, Environmental Water Demand Estimates, technical memorandum, ESA, November 24, 2009.

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DRAFT memorandum

date January 7, 2010

to Courtney Howard, San Luis Obispo County; Water Resources Advisory Committee (WRAC)

from Annika Fain, ESA; Eric Zigas, ESA

subject San Luis Obispo County Annual Crop-Specific Applied Water Variables (Appendix A)

Agricultural Demand

ESA calculated the crop-specific applied water for these crop groups by utilizing information on crop evapotranspiration, effective rainfall, leaching requirements, irrigation efficiency, and frost protection. The following equation was used to calculate the annual crop-specific applied water (AF/Ac/Yr) for each of the water planning areas:

$$\text{Annual Crop - Specific Applied Water (AF/Ac/Yr)} = \frac{\text{ETc} - \text{ER}}{(1 - \text{LR}) \text{ x IE}} + \text{FP}$$

This formula was modified from a general formula for irrigation water requirements, which was established in 1997 (Burt, 1997). A detailed discussion and summary tables of each of the parameters in the above equation is presented below. **Table A1** presents a range of values for the existing annual crop-specific applied water (AF/Ac/Yr) for all crop groups and water planning area. **Table A2** presents a range of values for the projected future crop-specific applied water (AF/Ac/Yr) for all crop groups and water planning area. The annual crop-specific applied water is multiplied by crop acreage to determine an agricultural water demand (AFY). **Table A3** presents a range of values for the agricultural water demand for all crop groups and water planning area. **Table A4** presents a range of values for the agricultural water demand for all crop groups and water planning area.

Reference Crop Evapotranspiration (Eto). Crop evapotranspiration for CIMIS weather stations in San Luis Obispo County and in Kern County (to the east) was used. The CIMIS stations in San Luis Obispo County include two in San Luis Obispo, one in Atascadero, and one in Nipomo. Additionally, Blackwells Corner, in Kern County was used to estimate Eto in Eastern San Luis Obispo County. The water planning areas were grouped according to the reference crop evapotranspiration climate groups (**Table A5**). Due to substantial variability within WPA 7, ESA used an average crop evapotranspiration of Arroyo Grande and Nipomo for this area. A summary of the estimated reference crop evapotranspiration used for the analysis is shown in **Table A6**.

Crop coefficients (Kc). The crops in San Luis Obispo County were assigned crop coefficients based on the crop type and location. These crops include alfalfa, nursery, irrigated pasture, citrus, deciduous, vegetable, and vineyard. The spreadsheet and ArcGIS® model is set-up so these numbers can be easily updated with new crop coefficients and crop evapotranspiration. The crop coefficients for this analysis are summarized in **Table A7**.

TABLE A1
EXISTING CROP-SPECIFIC APPLIED WATER (AF/AC/YR) BY CROP GROP AND WATER PLANNING AREA

WPA #	WPA Name	Alfalfa (AF/Ac/Yr)			Citrus (AF/Ac/Yr)			Deciduous (AF/Ac/Yr)			Nursery (AF/Ac/Yr)			Pasture (AF/Ac/Yr)			Vegetable (AF/Ac/Yr)[a]			Vineyard (AF/Ac/Yr)		
		Low	High	Med	Low	High	Med	Low	High	Med	Low	High	Med	Low	High	Med	Low	High	Med	Low	High	Med
1	San Simeon	1.4	2.5	2.0	0.5	1.2	0.9	1.3	2.2	1.8	0.6	1.5	1.1	1.6	2.7	2.1	1.2	1.4	1.3	0.5	1.0	0.8
2	Cambria	1.4	2.5	2.0	0.5	1.2	0.9	0.9	1.8	1.4	0.6	1.5	1.1	1.6	2.7	2.1	1.0	1.4	1.2	0.0	0.6	0.4
3	Cayucos	1.6	2.7	2.2	0.6	1.4	1.0	1.1	1.9	1.5	0.7	1.6	1.2	1.7	2.9	2.3	1.0	1.4	1.2	0.1	0.7	0.5
4	Morro Bay	2.2	3.3	2.7	1.1	1.8	1.5	1.6	2.4	2.0	1.2	2.0	1.6	2.3	3.4	2.9	1.2	1.7	1.4	0.5	1.0	0.8
5	Los Osos	2.2	3.3	2.7	1.1	1.8	1.5	1.6	2.4	2.0	1.2	2.0	1.6	2.3	3.4	2.9	1.2	1.7	1.4	0.5	1.0	0.8
6	San Luis Obispo/Avila	2.3	3.5	2.9	1.1	1.9	1.5	1.7	2.6	2.1	1.2	2.1	1.7	2.5	3.7	3.1	1.4	1.8	1.6	0.5	1.1	0.8
7	South Coast	2.7	3.9	3.3	1.5	2.2	1.8	2.7	3.7	3.2	1.6	2.4	2.0	2.9	4.1	3.5	1.5	1.9	1.7	0.7	1.3	1.0
8	Huasna Valley	4.8	6.4	5.6	2.5	3.4	3.0	4.2	5.4	4.8	2.6	3.7	3.1	4.8	6.5	5.7	2.0	2.6	2.3	1.8	2.6	2.2
9	Cuyama Valley	4.8	6.4	5.6	2.5	3.4	3.0	3.8	5.0	4.4	2.6	3.7	3.1	4.8	6.5	5.7	2.0	2.6	2.3	1.8	2.6	2.2
10	Carrizo Plain	5.1	6.7	5.9	2.8	3.6	3.2	4.1	5.3	4.7	2.9	3.9	3.4	5.2	6.8	6.0	2.1	2.7	2.4	2.0	2.7	2.4
11	Rafael/Big Spring	4.8	6.4	5.6	2.5	3.4	3.0	3.8	5.0	4.4	2.6	3.7	3.1	4.8	6.5	5.7	2.0	2.6	2.3	1.8	2.6	2.2
12	Santa Margarita	3.2	4.5	3.9	1.4	2.2	1.8	2.5	3.5	3.0	1.5	2.4	2.0	4.8	6.5	5.7	1.4	1.9	1.6	1.1	1.8	1.4
13	Atascadero/Templeton	3.2	4.5	3.9	1.4	2.2	1.8	2.5	3.5	3.0	1.5	2.4	2.0	4.8	6.5	5.7	1.4	1.9	1.6	1.1	1.8	1.4
14	Salinas/Estrella	3.8	5.2	4.5	1.9	2.7	2.3	3.4	4.5	4.0	2.0	2.9	2.5	5.2	6.8	6.0	1.6	2.2	1.9	1.4	2.1	1.7
15	Cholame Valley	4.9	6.5	5.7	2.5	3.3	2.9	3.9	5.1	4.5	2.6	3.6	3.1	4.8	6.5	5.7	1.9	2.4	2.1	2.0	2.7	2.3
16	Nacimiento	3.2	4.5	3.9	1.4	2.2	1.8	2.5	3.5	3.0	1.5	2.4	2.0	3.3	4.6	3.9	1.4	1.9	1.6	1.1	1.8	1.4

[a] Accounts for multi-cropping (assumes 3 vegetable crops planted per acre per year for WPA 1-7; assumes 2 vegetable crops planted per acre per year for WPA 8-16)

TABLE A2
PROJECT FUTURE CROP-SPECIFIC APPLIED WATER (AF/AC/YR) BY CROP GROP AND WATER PLANNING AREA

WPA #	WPA Name	Alfalfa (AF/Ac/Yr)			Citrus (AF/Ac/Yr)			Deciduous (AF/Ac/Yr)			Nursery (AF/Ac/Yr)			Pasture (AF/Ac/Yr)			Vegetable (AF/Ac/Yr)[a]			Vineyard (AF/Ac/Yr)		
		Low	High	Med	Low	High	Med	Low	Low	High	Med	Low	High	Med	Low	Low	High	Med	Low	High	Med	Low
1	San Simeon	1.3	2.4	1.8	0.5	1.2	0.8	1.3	2.1	1.7	0.6	1.4	1.0	1.5	2.5	2.0	0.9	1.3	1.1	0.0	0.6	0.3
2	Cambria	1.3	2.4	1.8	0.5	1.2	0.8	0.9	1.7	1.3	0.6	1.4	1.0	1.5	2.5	2.0	0.9	1.3	1.1	0.0	0.6	0.3
3	Cayucos	1.5	2.5	2.0	0.6	1.3	0.9	1.0	1.8	1.4	0.7	1.5	1.1	1.6	2.6	2.1	1.0	1.3	1.2	0.2	0.7	0.4
4	Morro Bay	2.1	3.0	2.5	1.1	1.7	1.4	1.5	2.2	1.9	1.1	1.9	1.5	2.2	3.2	2.7	1.2	1.5	1.4	0.5	1.0	0.7
5	Los Osos	2.1	3.0	2.5	1.1	1.7	1.4	1.5	2.2	1.9	1.1	1.9	1.5	2.2	3.2	2.7	1.2	1.5	1.4	0.5	1.0	0.7
6	San Luis Obispo/Avila	2.2	3.2	2.7	1.0	1.7	1.4	1.6	2.4	2.0	1.1	2.0	1.5	2.3	3.4	2.9	1.3	1.7	1.5	0.5	1.0	0.7
7	South Coast	2.6	3.6	3.1	1.4	2.1	1.7	2.6	3.5	3.1	1.5	2.3	1.9	2.7	3.8	3.3	1.4	1.8	1.6	0.7	1.2	0.9
8	Huasna Valley	4.6	6.1	5.3	2.4	3.3	2.8	4.1	5.2	4.6	2.5	3.5	3.0	4.6	6.1	5.4	1.9	2.5	2.2	1.7	2.5	2.1
9	Cuyama Valley	4.6	6.1	5.3	2.4	3.3	2.8	3.7	4.8	4.2	2.5	3.5	3.0	4.6	6.1	5.4	1.9	2.5	2.2	1.7	2.5	2.1
10	Carrizo Plain	4.9	6.3	5.6	2.7	3.5	3.1	4.0	5.0	4.5	2.7	3.7	3.2	4.9	6.4	5.7	2.1	2.6	2.3	2.0	2.6	2.3
11	Rafael/Big Spring	4.6	6.1	5.3	2.4	3.3	2.8	3.7	4.8	4.2	2.5	3.5	3.0	4.6	6.1	5.4	1.9	2.5	2.2	1.7	2.5	2.1
12	Santa Margarita	3.1	4.3	3.7	1.4	2.1	1.7	2.4	3.4	2.9	1.5	2.3	1.9	3.1	4.3	3.7	1.3	1.8	1.6	1.1	1.7	1.4
13	Atascadero/Templeton	3.1	4.3	3.7	1.4	2.1	1.7	2.4	3.4	2.9	1.5	2.3	1.9	3.1	4.3	3.7	1.3	1.8	1.6	1.1	1.7	1.4
14	Salinas/Estrella	3.7	4.9	4.3	1.8	2.6	2.2	3.3	4.3	3.8	1.9	2.8	2.3	3.7	5.0	4.3	1.6	2.1	1.8	1.4	2.0	1.7
15	Cholame Valley	4.7	6.1	5.4	2.4	3.2	2.8	3.8	4.9	4.4	2.5	3.4	2.9	4.8	6.2	5.5	1.8	2.3	2.0	1.9	2.6	2.2
16	Nacimiento	3.1	4.3	3.7	1.4	2.1	1.7	2.4	3.4	2.9	1.5	2.3	1.9	3.1	4.3	3.7	1.3	1.8	1.6	1.1	1.7	1.4

[a] Accounts for multi-cropping (assumes 3 vegetable crops planted per acre per year for WPA 1-7; assumes 2 vegetable crops planted per acre per year for WPA 8-16)

TABLE A3
EXISTING AGRICULTURAL WATER DEMAND (AFY) BY CROP GROP AND WATER PLANNING AREA

WPA #	WPA Name	Alfalfa (AFY)			Citrus (AFY)			Deciduous (AFY)			Nursery (AFY)			Pasture (AFY)			Vegetable (AFY)[a]			Vineyard (AFY)		
		Low	High	Med	Low	High	Med	Low	High	Med	Low	High	Med	Low	High	Med	Low	High	Med	Low	High	Med
1	San Simeon	0	0	0	9	24	17	0	0	0	0	0	0	0	0	0	0	0	0	33	65	49
2	Cambria	0	0	0	165	424	295	24	47	36	1	2	2	0	0	0	248	343	295	3	30	17
3	Cayucos	0	0	0	220	471	345	0	0	0	0	0	0	0	0	0	146	198	172	1	4	2
4	Morro Bay	0	0	0	753	1,206	979	0	0	0	0	0	0	82	120	101	796	1,038	917	43	81	62
5	Los Osos	0	0	0	0	0	0	6	8	7	125	209	167	1,176	1,725	1,451	1,444	1,883	1,664	1	1	1
6	San Luis Obispo/Avila	0	0	0	241	408	324	304	466	385	48	85	67	515	773	644	1,512	1,991	1,752	279	594	436
7[b]	South Coast	0	0	0	5,892	8,886	7,389	68	89	78	324	510	417	1,539	2,190	1,864	5,974	7,718	6,846	2,458	4,192	3,325
8	Huasna Valley	0	0	0	48	65	56	18	23	20	0	0	0	0	0	0	392	508	450	845	1,206	1,026
9	Cuyama Valley	0	0	0	0	0	0	2,448	3,236	2,842	0	0	0	0	0	0	22,287	28,861	25,574	377	538	457
10	Carrizo Plain	0	0	0	693	911	802	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	Rafael/Big Spring	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	Santa Margarita	48	68	58	0	0	0	18	25	21	0	0	0	266	358	312	0	0	0	1,055	1,709	1,382
13	Atascadero/Templeton	0	0	0	46	70	58	1,799	2,516	2,158	123	194	159	2,851	3,827	3,339	28	38	33	3,718	6,026	4,872
14	Salinas/Estrella	3,053	4,182	3,617	607	859	733	1,981	2,672	2,327	151	223	187	7,447	9,770	8,609	4,160	5,463	4,812	38,080	56,562	47,321
15	Cholame Valley	0	0	0	65	87	76	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	Nacimiento	0	0	0	65	99	82	1,970	2,755	2,362	0	0	0	33	46	39	0	0	0	1,054	1,709	1,381
Total		**3,101**	**4,250**	**3,676**	**8,804**	**13,509**	**11,157**	**8,636**	**11,837**	**10,237**	**773**	**1,224**	**998**	**13,908**	**18,808**	**16,358**	**36,988**	**48,043**	**42,515**	**47,946**	**72,716**	**60,331**

[a] Accounts for multi-cropping (assumes 3 vegetable crops planted per acre per year for WPA 1-7; assumes 2 vegetable crops planted per acre per year for WPA 8-16)
[b] The agricultural demand for WPA 7 in this table only includes areas outside of the NCMA, NMMA, and SMVMA.

TABLE A4
PROJECT FUTURE AGRICULTURAL WATER DEMAND (AFY) BY CROP GROP AND WATER PLANNING AREA

WPA #	WPA Name	Alfalfa (AFY)			Citrus (AFY)			Deciduous (AFY)			Nursery (AFY)			Pasture (AFY)			Vegetable (AFY)[a]			Vineyard (AFY)		
		Low	High	Med	Low	High	Med	Low	High	Med	Low	High	Med	Low	High	Med	Low	High	Med	Low	High	Med
1	San Simeon	0	0	0	9	22	16	0	0	0	0	0	0	0	0	0	0	0	0	5	42	23
2	Cambria	0	0	0	185	472	329	25	47	36	1	2	1	0	0	0	493	672	582	35	298	166
3	Cayucos	0	0	0	288	608	448	0	0	0	0	0	0	0	0	0	139	187	163	3	10	6
4	Morro Bay	0	0	0	764	1,208	986	0	0	0	0	0	0	76	110	93	797	1,027	912	52	96	74
5	Los Osos	0	0	0	22	35	29	5	8	7	117	193	155	1,103	1,592	1,347	1,502	1,937	1,720	1	1	1
6	San Luis Obispo/Avila	0	0	0	233	390	311	287	435	361	45	78	62	483	713	598	1,490	1,939	1,715	272	567	420
7[b]	South Coast	0	0	0	5,606	8,355	6,981	121	155	138	304	471	388	1,914	2,681	2,297	5,899	7,531	6,715	2,767	4,638	3,703
8	Huasna Valley	0	0	0	46	62	54	17	22	20	9	13	11	448	592	520	379	485	432	1,166	1,644	1,405
9	Cuyama Valley	0	0	0	0	0	0	2,366	3,090	2,728	0	0	0	0	0	0	22,506	28,802	25,654	366	516	441
10	Carrizo Plain	0	0	0	672	872	772	4	5	5	0	0	0	0	0	0	7	9	8	0	0	0
11	Rafael/Big Spring	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	Santa Margarita	46	64	55	5	8	7	21	29	25	0	0	0	296	410	353	0	0	0	1,356	2,169	1,762
13	Atascadero/Templeton	0	0	0	75	113	94	1,898	2,624	2,261	118	183	151	2,539	3,515	3,027	74	99	87	5,040	8,062	6,551
14	Salinas/Estrella	2,925	3,946	3,436	700	978	839	2,569	3,423	2,996	150	217	183	6,969	9,366	8,167	4,060	5,270	4,665	43,365	63,625	53,495
15	Cholame Valley	0	0	0	63	83	73	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	Nacimiento	0	0	0	66	99	83	2,064	2,853	2,459	0	0	0	31	43	37	0	0	0	2,577	4,122	3,350
Total		**2,972**	**4,011**	**3,491**	**8,733**	**13,306**	**11,020**	**9,376**	**12,690**	**11,033**	**744**	**1,158**	**951**	**13,858**	**19,024**	**16,441**	**37,346**	**47,957**	**42,652**	**57,005**	**85,790**	**71,397**

[a] Accounts for multi-cropping (assumes 3 vegetable crops planted per acre per year for WPA 1-7; assumes 2 vegetable crops planted per acre per year for WPA 8-16)
[b] The agricultural demand for WPA 7 in this table only includes areas outside of the NCMA, NMMA, and SMVMA.

TABLE A5
CLIMATE GROUP FOR CROP EVAPOTRANSPIRATION BY WPA

WPA#	WPA	Assigned Climate Group
1	San Simeon	San Simeon
2	Cambria	San Simeon
3	Cayucos	San Simeon
4	Morro Bay	Morro Bay
5	Los Osos	Morro Bay
6	San Luis Obispo/Avila	San Luis Obispo
7	South Coast	Arroyo Grande/Nipomo
8	Huasna Valley	Cuyama
9	Cuyama Valley	Cuyama
10	Carrizo Plain	Cuyama
11	Rafael/Big Spring	Cuyama
12	Santa Margarita	Atascadero
13	Atascadero/Templeton	Atascadero
14	Salinas/Estrella	Paso Robles
15	Cholame Valley	Blackwells Corner
16	Nacimiento	Atascadero

[a] Climate Groups were determined by looking at available Eto by WPA

TABLE A6
REFERENCE CROP EVAPOTRANSPIRATION (inches/month)[a]

Month	Arroyo Grande	Blackwells Corner	Morro Bay	Paso Robles	San Luis Obispo	San Simeon	Nipomo	Atascadero	Cuyama
January	2.0	1.4	2.0	1.6	2.0	2.0	2.2	1.2	2.1
February	2.2	2.1	2.2	2.0	2.2	2.0	2.5	1.5	2.4
March	3.2	3.8	3.1	3.2	3.2	2.9	3.8	2.8	3.8
April	3.8	5.4	3.5	4.3	4.1	3.5	5.1	3.9	5.4
May	4.3	7	4.3	5.5	4.9	4.2	5.7	4.5	6.9
June	4.7	7.8	4.5	6.3	5.3	4.4	6.2	6	7.9
July	4.3	8.5	4.6	7.3	4.6	4.6	6.4	6.7	8.5
August	4.6	7.7	4.6	6.7	5.5	4.3	6.1	6.2	7.7
September	3.6	5.8	3.8	5.1	4.4	3.5	4.9	5	5.9
October	3.2	3.9	3.5	3.7	3.5	3.1	4.1	3.2	4.5
November	2.4	1.9	2.1	2.1	2.4	2.0	2.9	1.7	2.6
December	1.7	1.2	1.7	1.4	1.7	1.7	2.3	1	2
Total (in/yr)	40.0	56.5	39.9	49.2	43.8	38.2	52.2	43.7	59.7

[a] The ETo values in this table were derived from: CIMIS, 2009; DWR, 1999; University of California, 1987; Snyder et al., 1987

TABLE A7
CROP COEFFICIENTS FOR EACH CROP GROUP

Month	Alfalfa	Citrus	Deciduous	Nursery	Pasture	Vegetables	Vineyard
January	0.00	0.56	0.00	0.50	0.00	0.00	0.00
February	0.00	0.56	0.00	0.50	0.00	0.00	0.00
March	0.90	0.56	0.60	0.50	1.00	0.00	0.00
April	0.90	0.56	0.70	0.50	1.00	0.00	0.00
May	0.90	0.56	0.80	0.50	1.00	0.00	0.60
June	0.90	0.56	0.90	0.50	1.00	0.00	0.70
July	1.00	0.56	1.00	0.50	1.00	0.00	0.60
August	1.00	0.56	1.00	0.50	1.00	1.00	0.50
September	1.10	0.56	0.90	0.50	1.00	1.00	0.30
October	1.00	0.56	0.80	0.50	1.00	1.00	0.10
November	0.00	0.56	0.00	0.50	0.00	1.00	0.00
December	0.00	0.56	0.00	0.50	0.00	1.00	0.00

[a] Adapted from DWR 113-3 (DWR, 1974), UC Leaflet 21427 (Snyder et al., 1989a), UC Leaflet 21428 (Snyder et al., 1989b)

Crop Evapotranspiration (Etc). Crop evapotranspiration was calculated by multiplying the reference evapotranspiration and for each agricultural crop and area. Annual Crop evapotranspiration (AF/Ac/Yr) for each crop group and WPA is summarized in **Table A8**.

TABLE A8
ANNUAL CROP EVAPOTRANSPIRATION [a] (AF/Ac/Yr)
FOR EACH CROP GROUP AND WPA

WPA #	WPA Name	Alfalfa	Citrus	Deciduous	Nursery	Pasture	Vegetable	Vineyard
1	San Simeon	2.4	1.8	2.2	1.6	2.5	1.2	1.0
2	Cambria	2.4	1.8	2.2	1.6	2.5	1.2	1.0
3	Cayucos	2.4	1.8	2.2	1.6	2.5	1.2	1.0
4	Morro Bay	2.6	1.9	2.3	1.7	2.7	1.3	1.0
5	Los Osos	2.6	1.9	2.3	1.7	2.7	1.3	1.0
6	San Luis Obipso/Avila	2.8	2.0	2.5	1.8	3.0	1.5	1.2
7	South Coast	3.0	2.2	2.6	1.9	3.1	1.5	1.2
8	Huasna Valley	4.1	2.8	3.7	2.5	4.2	1.9	1.7
9	Cuyama Valley	4.1	2.8	3.7	2.5	4.2	1.9	1.7
10	Carrizo Plain	4.1	2.8	3.7	2.5	4.2	1.9	1.7
11	Rafael/Big Spring	4.1	2.8	3.7	2.5	4.2	1.9	1.7
12	Santa Margarita	3.1	2.0	2.8	1.8	3.2	1.4	1.3
13	Atascadero/Templeton	3.1	2.0	2.8	1.8	3.2	1.4	1.3
14	Salinas/Estrella	3.4	2.3	3.0	2.1	3.5	1.6	1.4
15	Cholame Valley	4.0	2.6	3.6	2.4	4.2	1.7	1.7
16	Nacimiento	3.1	2.0	2.8	1.8	3.2	1.4	1.3

[a] Crop evapotranspiration is equal to the product of crop coefficients and reference crop evapotranspiration

Effective Rainfall (ER). The effective rainfall was calculated for each area by utilizing historical annual precipitation in San Luis Obispo County and effective precipitation based on crop type and water planning area.

The historical yearly precipitation gages that were used for the water demand analysis are listed in **Table A9**. The rainfall from each of these gages was assigned to a particular water planning area. Due to substantial variability

TABLE A9
SAN LUIS OBISPO COUNTY RAINFALL STATIONS USED FOR ANALYSIS

Rainfall Station	Average (Inches/Yr)	County Gage #	Record
Santa Rosa Creek	27.5	169	1964-2003
Cayucos Creek	24.8	173.1	1965-2003
Baywood Park/Camp SLO	18.2	177/224	1967-2003
CalPoly	22.2	1	1870-2003
Lopez Dam	19.6	178.1	1968-2003
Nipomo	16.6	38	1921-2003
Santa Maria Valley	15.3	23	1910-2003
Paso Robles	15.2	10	1887-2003
AMWC	17.4	34	1916-2003
Santa Margarita	24.3	9a	1972-2003
Carrizo Plain	10.9	151.2	1966-2003
White Ranch	12.3	93	1931-2008
Oceano CSA #13	16.1	157.1	1959-2006

SOURCE: San Luis Obispo County, 2005 & 2009 http://www.slocountywater.org/site/Water%20Resources/Data/maps/data.htm

within WPA 7, ESA used an average precipitation of Nipomo and Lopez Dam gages for this area. **Table A10** lists the range of effective rainfall percentage for each crop group.

TABLE A10
EFFECTIVE RAINFALL PERCENTAGE FOR EACH CROP GROUP[a]

Range	Alfalfa	Citrus	Deciduous	Nursery	Pasture	Vegetable[b]	Vineyard
Low	40%	40%	40%	30%	40%	15%	30%
High	60%	60%	60%	50%	60%	25%	50%

[a] Effective rainfall general ranges from 29% to 59% (Burt et al., 2002)
[b] Accounts for multi-cropping by reducing vegetable effective rainfall in half.

Frost Protection (FP). The sprinkler frost protection water requirement was estimated for grapes (throughout the County), as well as strawberries and blueberries (WPA 1, 7, 8, and 14). For vineyards, the frost threat occurs from March to April in San Luis Obispo County. For strawberries and blueberries in San Luis Obispo County, primarily in WPA 7 and 14, respectively the frost threat occurs from January to March. Sprinkler frost protection requires a large amount of water, which may be higher than a typical groundwater well can produce (Battany, 2009). Therefore, growers that use sprinkler frost protection will generally have large reservoirs on site or nearby. The frost protection values ESA used were 0.25 AF/Ac/Yr for vineyards throughout the County and 0.4 AF/Ac/Yr for strawberries and blueberries in WPA 1, 7, 8, and 14. This was based on information provided by the

UC Farm Advisors and input from the WRAC and other agricultural stakeholders. Details on how the numbers were determined for vineyards and strawberry frost protection are shown below.

Grapes

Sprinkler frost protection on vineyards will only occur where growers have access to a large reservoir onsite or nearby (Battany, 2009). Overhead sprinklers may operate from 4-6 hours per evening for 10-12 nights per year (San Luis Obispo County, 1998). System flow rates generally range from 40 to 50 gallons per minute per acre (gpm/Ac), 0.09 inches per hour (in/hr) and 0.11 in/hr, respectively. **Table A11** shows an example of yearly applied water for frost protection on a vineyard depending on minutes of runtime and a system flow rate of 50 gpm/Ac. To determine the percentage of acreage that uses sprinkler frost protection would require a detailed look at all vineyards on aerial photography and/or discussions with all vineyard owners. The amount of frost protection on vineyards varies from year to year and farm to farm. For purposes of this analysis, ESA has assumed that approximately 50% of the vineyards use frost protection. Therefore, ESA used 0.25 AF/Ac/Yr for frost protection on grapes throughout the County.

TABLE A11
RANGE OF ANNUAL APPLIED WATER FOR FROST PROTECTION ON A TYPICAL VINEYARD (AF/AC/YR)

Hours per night	Nights per year	Annual Applied Water (AF/Ac/Yr)
4	10	0.34
	11	0.38
	12	0.41
5	10	0.43
	11	0.47
	12	0.52
6	10	0.52
	11	0.57
	12	0.62

SOURCE: San Luis Obispo County, 1998

Strawberries and Blueberries

The amount of frost protection on strawberries varies from year to year and farm to farm. Sprinklers typically operate for 6 to 10 hours a night for 8-12 nights per year (San Luis Obispo County, 1998). System flow rates for frost protection of strawberries are approximately 45 gpm/Ac (0.10 in/hr). **Table A12** shows an example of yearly applied water for frost protection on strawberries depending on minutes of runtime and a system flow rate of 45 gpm/Ac. For purposes of the agricultural water demand analysis, strawberries and blueberries are grouped in the deciduous group. To account for the frost protection of strawberries and blueberries on some of the crops, 0.4 AF/Ac/Yr was added to the deciduous crop in WPA 1, 7, 8, and 14.

TABLE A12
RANGE OF ANNUAL APPLIED WATER FOR FROST PROTECTION ON STRAWBERRIES (AF/AC/YR)

Hours per night	Nights per year	Annual Applied Water (AF/Ac/Yr)
6	8	0.48
	10	0.60
	12	0.72
8	8	0.64
	10	0.80
	12	0.96
10	8	0.80
	10	1.00
	12	1.20

SOURCE: San Luis Obispo County, 1998

Leaching Requirements (LR). Leaching requirements, amount of over watering necessary to remove salts from the soil, were assumed to be satisfied by rainfall in the majority of the coastal areas (WPA 1 to WPA 6). Leaching requirements for the Paso Robles Basin were presented by Fugro and Cleath (2002). ESA used these estimates, approximately 5 percent to 16 percent, to identify existing LR for inland areas. **Table A12** includes the leaching requirement percentage used for crop groups located in inland WPAs (WPA 8-16). Mark Gaskell, UC Farm Advisor, stated that strawberries may have a leaching requirement of 10 to 20 percent (Gaskell, 2009). Therefore, ESA used a leaching requirement of 11 percent for existing demand in WPA 7. The future leaching requirements may be greater based on a build-up of salts in the soil (Battany, 2008; Gaskell, 2009). Therefore, the future leaching requirements were assumed to be 1 to 2 percent higher than existing leaching requirements.

TABLE A12
LEACHING REQUIREMENTS FOR INLAND AREAS IN SAN LUIS OBISPO COUNTY

	Leaching Requirements (%)	
Crop Group	Existing	Future
Alfalfa	8%	10%
Nursery	5%	7%
Pasture	8%	10%
Citrus	5%	7%
Deciduous	11%	13%
Vegetable	8%	10%
Vineyard	16%	18%

SOURCE: Existing leaching requirements were adapted from Fugro and Cleath, 2002 (Table 13)

Irrigation Efficiencies (IE). Irrigation efficiencies were calculated by utilizing distribution uniformity and losses provided by the San Luis Obispo County/Santa Barbara County Cachuma Resource Conservation District

(CRCD), San Luis Obispo County Coastal Resources Conservation District, vineyard owners, and recent studies. Additionally, ESA incorporated input from the WRAC and other agricultural stakeholders.

Higher irrigation efficiencies depend primarily on improving system distribution uniformity, decreasing surface losses, and reducing scheduling errors. Irrigation efficiencies are difficult to measure and are often estimated according to the system type, special practices, and distribution uniformities. Micro irrigation systems include micro-sprinklers, drip emitters, and drip tape. Micro systems tend to have higher irrigation efficiencies than sprinkler systems (**Table A13**). Regardless, there is a range between potential and actual performances of irrigation systems.

TABLE A13
ESTIMATED IRRIGATION EFFICIENCY RANGES BASED ON SYSTEM TYPE

	Estimated Irrigation Efficiency (IE) (%)		
Irrigation System Type	**Maximum Potential IE (includes excellent design and excellent management)**	**Average IE (includes excellent design and average management)**	**Low IE (includes average design and below average management)**
Sprinkler	80-85	75	50-60
Micro	90-95	85	60-70

SOURCE: Peterson, 2009a

Local farm advisors were contacted regarding the types of irrigation systems on crop groups. **Table A14** summarizes the type of irrigation systems used on specific crops. In 1998 MWP, the majority of vegetables were irrigated with surface systems. Over the last 10 years, surface irrigation systems have been converted to micro and sprinkler irrigation systems (Peterson, 2009a).

TABLE A14
ESTIMATES OF CURRENT IRRIGATION SYSTEM TYPES BY CROP GROUP

	Percentage of Acreage with Irrigation System Type (%)		
Crop Group	**Surface**	**Sprinkler**	**Micro**
Alfalfa	0	100	0
Citrus (permanent)	0	20	80
Deciduous (permanent)	0	20	80
Nursery	0	50	50
Pasture	0	100	0
Permanent	0	20	80
Vegetable	0	40	60
Vineyard	0	0	100

[a] Acreage was placed in a particular category according to the system they use most of the season.

SOURCE: Peterson, 2009b

Although measuring irrigation efficiency is difficult, a system's distribution uniformity can be quantified and measured in the field. The relationship between distribution uniformity and irrigation efficiency can be expressed as follows:

Irrigation Efficiency=Distribution Uniformity x (1-Losses)

The CRCD conducts irrigation evaluations with the Mobile Irrigation Lab. The CRCD has completed more than 325 evaluations related to irrigation efficiencies throughout San Luis Obispo and Santa Barbara Counties. The irrigation specialists provided estimates presented in Table A9 and Table A10, as well as information on distribution uniformity. Recent evaluations have shown that the distribution uniformity is approximately 75%, which is 5% higher than in 1998 (Peterson, 2009a). This change is primarily due to the change from surface to micro and sprinkler systems.

The sprinkler systems are associated with distribution uniformities of approximately 75% and micro systems are associated with distribution uniformities of 85%. For the purposes of estimating applied water, irrigation efficiencies were assigned to crop group according to the primary irrigation system type. **Table A15** includes existing irrigation efficiencies for crop groups**.** Irrigation efficiencies are likely to continue to improve in the future, due to improvements in equipment, economic pressure (increased electricity costs if groundwater levels decline), or have economic incentives (Isensee, 2009). **Table A16** includes projected future irrigation efficiencies for crop groups.

TABLE A15
EXISTING IRRIGATION EFFICIENCIES FOR CROP GROUPS

	Existing Irrigation Efficiency Range (%)	
Crop Group	**Low**	**High**
Alfalfa	60%	75%
Nursery	60%	75%
Pasture	60%	75%
Citrus & Deciduous	70%	85%
Vegetable	70%	85%
Vineyard	70%	85%

SOURCE: Peterson, 2009a and 2009b

TABLE A16
FUTURE PROJECTED IRRIGATION EFFICIENCIES FOR CROP GROUPS

	Projected Future Irrigation Efficiency Range (%)	
Crop Group	**Low**	**High**
Alfalfa	65%	80%
Nursery	65%	80%
Pasture	65%	80%
Citrus & Deciduous	75%	90%
Vegetable	75%	90%
Vineyard	75%	90%

SOURCE: Peterson, 2009a and 2009b

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Master Water Plan Project
Part 1: Methodology for Determining Vacant and Developed Properties

Intro - The assessor's GIS parcel database consists of 122895 individual APNs. Each APN record is populated with information indicating ownership, an abbreviated legal description (LEGAL), land value (LAND), improvement value (IMPS), home owner's exemption (HOX), land use codes* (PRIM_LUC, LUC_1, LUC_2, LUC_3), etc. A "Status" field was added to the GIS parcel database to designate whether a property is either developed or vacant or within city limits.

Step 1: Select all parcels that are within city limits and designate status as "City" (total APNs = 56594).

Step 2: Select (from the remaining parcels - 66301) all parcels that have a home owner's exemption and designate status as "Developed LUCode – HOX Res" (total APNs = 20879).

Step 3: Select parcels (from the remaining parcels - 45422) that have an improvement value of less than $1000 and designate status as "Vacant <= 1000 IMP" (total APNs = 25519).

Step 4: From the parcels selected above (Vacant <= 1000 IMP) all parcels with a PRIM_LUC indicating: common area, church, government, greenhouse, public trns facility, school, sludge site, utility, winery (121, 580, 636, 637, 802, 810, 820, 850 – 861 or legal field indicates "road") were selected and viewed using aerial photography to determine status. Note: Properties with the PRIM_LUC's indicated above have improvements often not assessed because of tax status. Additional review was required in order to determine whether or not properties were developed or vacant and status designated as "Vacant <= 1000 IMP" or "Developed <= 1000 IMP " and land use code type where applicable or "Military Base" or "Road" or "Lake" (total APNs = 2282).

Step 5: Select parcels (from the remaining parcels - 19903) that have land use codes indicating development types consistent with residential, commercial, industrial, manufacturing, motel, office, retail, etc. (i.e., 110 – 415, 421, 422, 423, 424, 425, 427, 428, 435, 440, 509, 511, 512, 515, 520, 522, 536) and that also have improvement values greater than 20,000. Designate status as "Developed LUCode" and land use code type where applicable (total APNs = 16425).

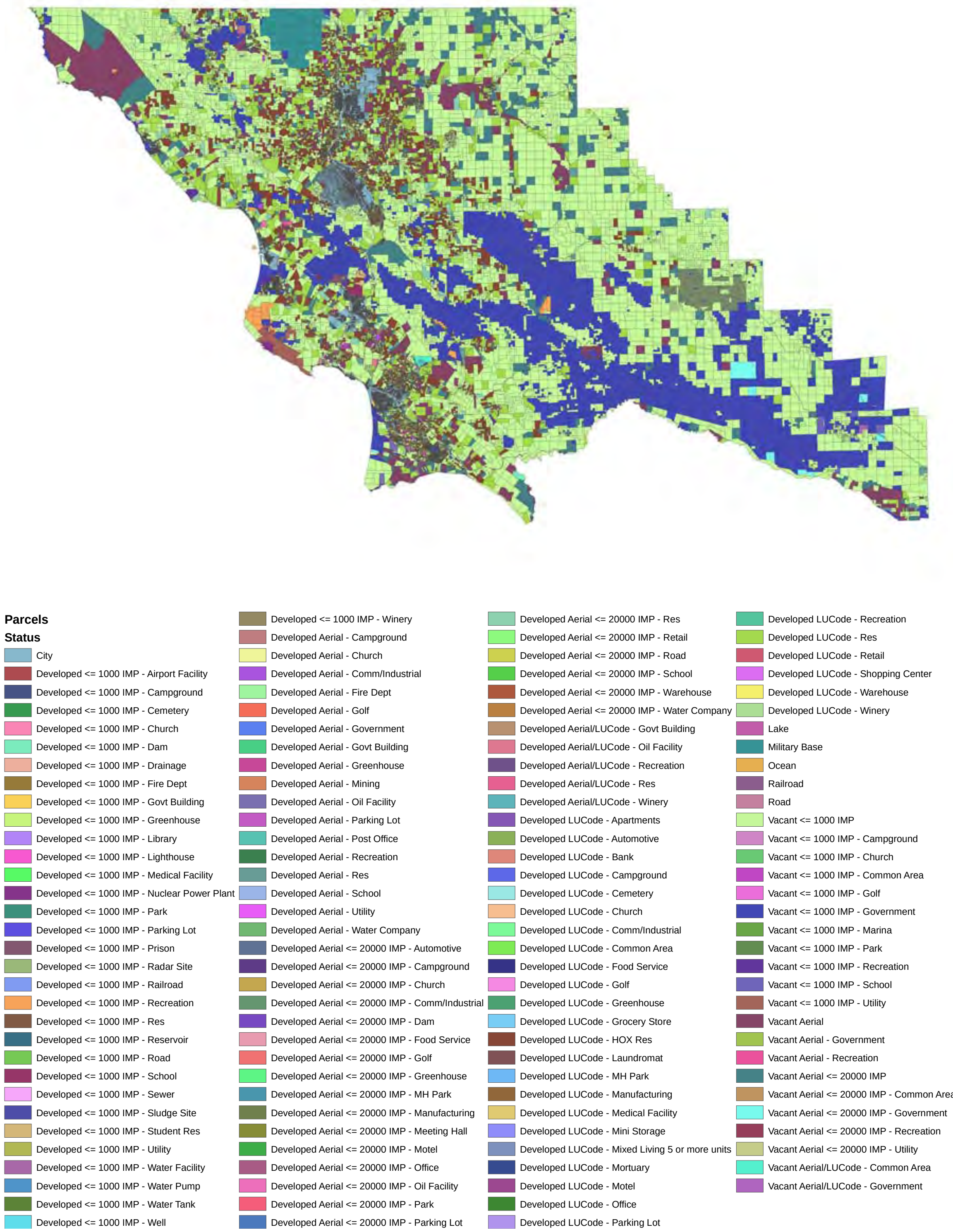
Step 6: Select parcels (from the remaining parcels 3475) that have an improvement value of more than $1000 and less than $20,000 and designate as "Vacant Aerial <= 20000 IMP" or "Developed Aerial <= 20000 IMP" and land use code type where applicable (total APNs = 1965).

Step 7: The remaining parcels (1513) have an improvement value ranging from 20228 – 7903723 and the PRIM_LUC indicates use other than residential. All parcels zoned as RMF, RSF, RS, RR and RL were viewed using aerial photography and determined to be either "Vacant Aerial" or "Developed Aerial" and land use code type where applicable (total APNs = 536).

Step 8: The remaining 977 parcels were sorted by land use category. All parcels zoned AG were viewed using aerial photography and designated status as “Vacant Aerial” or “Developed Aerial” and land use code type where applicable (total APNs = 890).

Step 9: The remaining 87 parcels, which have a zoning other than Residential or Agriculture and have an improvement value greater than $20,000 were viewed individually and status designated as “Vacant Aerial” or “Developed Aerial” and land use code type where applicable.

> * The assessor land use codes have been found to contain inconsistencies, errors and omissions. While it is impractical to view each parcel individually to verify which are developed or vacant, many parcels were viewed individually using the aerial photography to determine status.


Parcels
Status
City
Developed <= 1000 IMP - Airport Facility
Developed <= 1000 IMP - Campground
Developed <= 1000 IMP - Cemetery
Developed <= 1000 IMP - Church
Developed <= 1000 IMP - Dam
Developed <= 1000 IMP - Drainage
Developed <= 1000 IMP - Fire Dept
Developed <= 1000 IMP - Govt Building
Developed <= 1000 IMP - Greenhouse
Developed <= 1000 IMP - Library
Developed <= 1000 IMP - Lighthouse
Developed <= 1000 IMP - Medical Facility
Developed <= 1000 IMP - Nuclear Power Plant
Developed <= 1000 IMP - Park
Developed <= 1000 IMP - Parking Lot
Developed <= 1000 IMP - Prison
Developed <= 1000 IMP - Radar Site
Developed <= 1000 IMP - Railroad
Developed <= 1000 IMP - Recreation
Developed <= 1000 IMP - Res
Developed <= 1000 IMP - Reservoir
Developed <= 1000 IMP - Road
Developed <= 1000 IMP - School
Developed <= 1000 IMP - Sewer
Developed <= 1000 IMP - Sludge Site
Developed <= 1000 IMP - Student Res
Developed <= 1000 IMP - Utility
Developed <= 1000 IMP - Water Facility
Developed <= 1000 IMP - Water Pump
Developed <= 1000 IMP - Water Tank
Developed <= 1000 IMP - Well
Developed <= 1000 IMP - Winery
Developed Aerial - Campground
Developed Aerial - Church
Developed Aerial - Comm/Industrial
Developed Aerial - Fire Dept
Developed Aerial - Golf
Developed Aerial - Government
Developed Aerial - Govt Building
Developed Aerial - Greenhouse
Developed Aerial - Mining
Developed Aerial - Oil Facility
Developed Aerial - Parking Lot
Developed Aerial - Post Office
Developed Aerial - Recreation
Developed Aerial - Res
Developed Aerial - School
Developed Aerial - Utility
Developed Aerial - Water Company
Developed Aerial <= 20000 IMP - Automotive
Developed Aerial <= 20000 IMP - Campground
Developed Aerial <= 20000 IMP - Church
Developed Aerial <= 20000 IMP - Comm/Industrial
Developed Aerial <= 20000 IMP - Dam
Developed Aerial <= 20000 IMP - Food Service
Developed Aerial <= 20000 IMP - Golf
Developed Aerial <= 20000 IMP - Greenhouse
Developed Aerial <= 20000 IMP - MH Park
Developed Aerial <= 20000 IMP - Manufacturing
Developed Aerial <= 20000 IMP - Meeting Hall
Developed Aerial <= 20000 IMP - Motel
Developed Aerial <= 20000 IMP - Office
Developed Aerial <= 20000 IMP - Oil Facility
Developed Aerial <= 20000 IMP - Park
Developed Aerial <= 20000 IMP - Parking Lot
Developed Aerial <= 20000 IMP - Res
Developed Aerial <= 20000 IMP - Retail
Developed Aerial <= 20000 IMP - Road
Developed Aerial <= 20000 IMP - School
Developed Aerial <= 20000 IMP - Warehouse
Developed Aerial <= 20000 IMP - Water Company
Developed Aerial/LUCode - Govt Building
Developed Aerial/LUCode - Oil Facility
Developed Aerial/LUCode - Recreation
Developed Aerial/LUCode - Res
Developed Aerial/LUCode - Winery
Developed LUCode - Apartments
Developed LUCode - Automotive
Developed LUCode - Bank
Developed LUCode - Campground
Developed LUCode - Cemetery
Developed LUCode - Church
Developed LUCode - Comm/Industrial
Developed LUCode - Common Area
Developed LUCode - Food Service
Developed LUCode - Golf
Developed LUCode - Greenhouse
Developed LUCode - Grocery Store
Developed LUCode - HOX Res
Developed LUCode - Laundromat
Developed LUCode - MH Park
Developed LUCode - Manufacturing
Developed LUCode - Medical Facility
Developed LUCode - Mini Storage
Developed LUCode - Mixed Living 5 or more units
Developed LUCode - Mortuary
Developed LUCode - Motel
Developed LUCode - Office
Developed LUCode - Parking Lot
Developed LUCode - Recreation
Developed LUCode - Res
Developed LUCode - Retail
Developed LUCode - Shopping Center
Developed LUCode - Warehouse
Developed LUCode - Winery
Lake
Military Base
Ocean
Railroad
Road
Vacant <= 1000 IMP
Vacant <= 1000 IMP - Campground
Vacant <= 1000 IMP - Church
Vacant <= 1000 IMP - Common Area
Vacant <= 1000 IMP - Golf
Vacant <= 1000 IMP - Government
Vacant <= 1000 IMP - Marina
Vacant <= 1000 IMP - Park
Vacant <= 1000 IMP - Recreation
Vacant <= 1000 IMP - School
Vacant <= 1000 IMP - Utility
Vacant Aerial
Vacant Aerial - Government
Vacant Aerial - Recreation
Vacant Aerial <= 20000 IMP
Vacant Aerial <= 20000 IMP - Common Area
Vacant Aerial <= 20000 IMP - Government
Vacant Aerial <= 20000 IMP - Recreation
Vacant Aerial <= 20000 IMP - Utility
Vacant Aerial/LUCode - Common Area
Vacant Aerial/LUCode - Government

Part 2: Determination of Development Potential – Subdivision and Units.

Urban and Village Area Additional Development Potential Assumptions for County Master Water Plan

Vacant Land

To determine additional development potential on vacant parcels, use the following densities and intensities, except as shown below for particular communities. **Additional residential development potential should be multiplied by 0.9** to account for environmental and physical constraints and the likelihood that not all parcels will be developed to full potential.

RR:	5-acre parcel size; assign 1 dwelling unit per parcel
RS:	1-acre parcel size; assign one dwelling unit per parcel
RSF:	5 units per acre
RMF:	20 units/acre (only on parcels > or = to 6,000 ft.^{2}; otherwise, 1 unit)
O/P,CR:	Floor area (ft.^{2}) = .2625 x total parcel area (ft.^{2}) (.2625 = .35 FAR x .75)
CS:	Floor area (ft.^{2}) =.1875 x total parcel area (ft.^{2}) (.1875 = (.25 FAR x .75)
IND:	Floor area (ft.^{2}) =.15 x total parcel area (ft.^{2}) (.15 = .20 FAR x .75)

***Exceptions**:*
Note: RMF densities apply only on parcels > or = to 6,000 ft.^{2}; otherwise, 1 unit

Cayucos:	RMF:	10 units per acre (planning area standard)
Cambria:	RMF:	15 units per acre
Santa Margarita:	RMF:	15 units per acre (due to septic)
Templeton:	RSF:	4 units per acre (due to 7,500 ft.^{2} min. parcel size)
Oceano:	RMF:	15 units per acre (planning area standard)
Nipomo:	RMF:	15 units per acre (some planning area standards reduce density)
Whitley Gardens:	RS:	2.5-acre minimum parcel size (planning area standard)

Shandon: SP- 6 Use draft plan buildout as follows:

RS:	88
RSF:	1,334
RMF:	426
AG:	25
Mixed-use:	284 residential, 332,000 ft.^{2} commercial
CS/Res.:	52 residential, 84,000 ft.^{2} commercial

CR: 10 residential, 241,500 ft.^{2} commercial
CS: 1 residential, 730,000 ft.^{2} commercial

Los Ranchos/
Edna Village: SP- 2 Use total buildout of 690 units as follows:
REC: 258
RR: 45
RS: 200
RSF: 187

Black Lake: SP-1 REC: 606

Woodlands: SP- 5 Residential development potential = 1,320 units as follows:

REC: 1,240 single-family, 60 multi-family, 500-unit hotel/resort + commercial on 28 acres
CR: 20 multi-family
CR: 140,000 ft.^{2}
CS: 350,000 ft.^{2}

Heritage Ranch: SP- 3 total development potential per planning area standards (2,900, including RV sites)

Oak Shores: SP- 4 additional potential per planning area standards (1,786 including RV spaces)

Rural Area Build-Out Assumptions for the Master Water Plan[1]

Planning Area	**Category**								
	AG	**RL**	**RR**	**RS[2]**	**CS[4]/ IND[4]**	**CR[5]**	**REC**	**PF[3]**	**OS[3]**
Adelaida	160	80[10]	5	N/A	N/A	N/A	No dev.	-----	-----
El Pomar-Estrella	160	80	5	2.5	N/A	N/A	No dev.	-----	-----
Huasna-Lopez	160	80	N/A	N/A	N/A	N/A	No dev.	-----	-----
Los Padres	160	160	N/A	N/A	N/A	N/A	N/A	-----	-----
Las Pilitas	160	80	10	N/A	N/A	2.5	20	-----	-----
Nacimiento	160	80	10	N/A	N/A	2.5	20	-----	-----
Salinas River	80	80	5	2.5	2.5 (CS)	2.5	No dev.	-----	-----
San Luis Bay	80	80	5	2.5	N/A	N/A	No dev.	-----	-----
San Luis Obispo	80	160	10	2.5	N/A	N/A	No dev.	-----	-----
Shandon-Carrizo	160	160	5[6]	N/A	N/A	N/A	N/A	-----	-----
South County	80	80[7]	5[8]	2.5	2.5 (CS) 10 (IND)	2.5	66 res. units[9]	-----	-----
North Coast	160	80	N/A	N/A	N/A	2.5	No dev.	-----	-----
Estero	160	160[10]	5	5	N/A	N/A	No dev.[11]	-----	-----
San Luis Bay	20 res.	80	N/A	N/A				-----	-----

(coastal)	units[12]								
South County (coastal)	80	No dev.	N/A	N/A	No dev. (IND)	N/A	No dev.	-----	-----

1. Numbers are assumed average minimum parcel sizes for new land divisions, unless otherwise indicated. Residential buildout potential is determined as follows:
   a. Determine the numbers of potential parcels using the minimum parcel sizes in the table, but use actual buildout numbers from the table where indicated
   b. Assign one dwelling unit per existing and potential parcel
   c. For purposes of the Master Water Plan, determine existing numbers of dwelling units by planning area, and then subtract that from the total number of dwelling units from b. above to yield additional residential development potential by planning area
   e. Multiply the additional residential development potential by 0.9 to account for environmental and physical constraints and the likelihood that not all parcels will be developed to full potential.
   f. Add the additional residential development potential from e. above to the number of existing residential units in the planning area to yield total residential buildout for the planning area.
2. Assume that ordinance changes will discourage community water systems in rural areas per COSE; some rural areas have planning area standards for 2.5-acre minimum parcel sizes
3. Assumes no additional development potential in these categories
4. Where parcel sizes are specified, determine development potential (ft.^{2} of floor area) as follows:
   a. Determine total number of existing and potential parcels
   b. For each existing and potential parcel, development potential (ft.^{2} of floor area) = parcel area x 0.18 floor area ratio
   c. Multiply the square footage from b. above by .75 to yield total commercial or industrial buildout. This accounts for environmental and physical constraints, possible existing residential development in Commercial and Industrial categories, and the likelihood that not all such parcels will be developed to their full potential (Commercial and Industrial categories are typically not built out to their zoning capacities).
5. Where parcel sizes are specified, determine development potential (ft.^{2} of floor area) as follows:
   a. Determine total number of existing and potential parcels
   b. For each existing and potential parcel, development potential (ft.^{2} of floor area) = parcel area x 0.20 floor area ratio
   c. Multiply the square footage from b. above by .75 to yield total commercial buildout; this accounts for environmental and physical constraints, possible existing residential development in Commercial and Industrial categories, and the likelihood that not all such parcels will be developed to their full potential (Commercial categories are typically not built out to their zoning capacities).
6. This area is adjacent to the Shandon URL and is to be included in an expanded URL per the draft Shandon Community Plan; if the buildout for this area is included in the buildout for the Shandon urban area, then do not assign buildout for this area
7. Replace residential buildout for Southland Area adjacent to Nipomo (RL on west side of 101; AG, RS and REC on east side of 101) with buildout for industrial park per planning area standard; use .25 FAR and do not adjust further, as the site is vacant, has minimal constraints, should be included in the Nipomo Urban Reserve Line, and should develop with full urban services. [APNs: 092-152-039 (RL); 092-153-048,032; 090-171-036,008,018,007)

8. Replace residential buildout for Canada Ranch adjacent to Nipomo with buildout for industrial park/retail/residential per planning area standard. This area should be included in the Nipomo Urban Reserve Line and develop with full urban services (APN: 091-301-041).
9. Assign 50 dwelling units in the REC category per Bartleson Ranch planning area standard (APNs: 047-311-008; 075-102-004,003) and 16 units in the REC category per Willow/ Via Concha planning area standard (APNs: 091-181-053,052)
10. No development potential on existing lots in the Morro Strand and Morro Rock View subdivisions
11. No further residential development in the REC category along Hwy. 41 occupied by the mobilehome and RV park and adjacent area (see limitation on use standard)
12. Total residential development potential in Cienega Valley assumes one dwelling per existing parcel--no additional subdivision potential; no residential development along Diablo coast

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DRAFT memorandum

date December 17, 2009

to Courtney Howard, San Luis Obispo County; Water Resources Advisory Committee (WRAC)

from Annika Fain, ESA

subject San Luis Obispo County Rural Water Demand Analysis (Appendix C)

Rural Water Demand

A water duty factor was applied to the number of dwelling units of unincorporated areas outside of land designated as rural or agricultural. The County Land Use ArcGIS® database was used to determine where rural residential land use exists and how many dwelling units (DU) exist. Also, the database was used to determine where the future development may occur and how many DU could be built. The rural water demand analysis in combination with the urban and agricultural demand analysis, confirmed that the existing rural water demand is less than 5 percent of the total water demand (including urban, agricultural, and rural) (ESA, 2009-Table 1) . The analysis confirmed that even if 75 percent or more of the available rural residential land is developed, then the countywide rural water demand would be less than 10 percent of the total water demand (ESA, 2009-Table 1). Prior to the County providing the County Land Use ArcGIS® to ESA, a number of steps were completed to update the countywide database. These are explained in detail in Appendix B (San Luis Obispo County, 2009). We followed a series of seven steps for this analysis.

County Land Use Analysis

The main steps ESA followed after receiving the County Land Use ArcGIS® layer are as follows:

Step 1: Created a rural land use ArcGIS® layer from existing County Land Use ArcGIS® layer.

- Opened the County Land Use file that includes approximately 120,000 parcels.
- Calculated existing acreage for all parcels (Calc_Acrge).
- Subtracted out all parcels that were located in areas where an urban demand has been defined by excluding areas within the URL, VRL, CSD, and CSA boundaries, as well as areas where agricultural demand has been calculated.
- Calculated new acreage for parcels that were partially in an urban or agricultural defined area (New_Acrge).
- Calculated the ratio of new acreage to existing ratio (Acge_Ratio).

- For those parcels where the ratio of new acreage over existing acreage was greater than 50%, an indicator was set to "1" (Acge_Ind). These were used in the rural demand calculations.
- For the parcels where the ratio of new acreage over existing acreage was less than or equal to 50% than the demand was calculated as an urban or agricultural parcel.
- Rural land use was analyzed for the remaining parcels (approximately 30,000 parcels)

Step 2: Grouped the remaining land use categories for further analysis. Many of these categories only had a few parcels associated with them after the urban and agriculture areas had been excluded.

- The "Residential" category included developed residential and other parcels that may have rural water demand associated with them. This makes up approximately 99% of the developed parcels.
  - The following four "Status" categories made up approximately 99% of the developed land use parcels: Developed Aerial – Res, Developed Aerial <= 20000 IMP – Res, Developed LUCode - HOX Res, and Developed LUCode – Res.
  - The other categories that are included in residential made up less than 1% of the total developed land use parcels: Developed Aerial – School, Developed Aerial <= 20000 IMP – Campground, Developed Aerial <= 20000 IMP - MH Park, Developed Aerial/LUCode - Govt Building, Developed LUCode – Apartments, Developed LUCode – Campground, Developed LUCode - Food Service, Developed LUCode - Medical Facility, Developed LUCode - MH Park, Developed LUCode - Mixed Living 5 or more units, Developed LUCode – Motel, Developed <= 1000 IMP – School, and Developed LUCode - Office
- The "Commercial/Industrial" category included developed commercial/industrial parcels that may have rural water demand associated with them. The total number of parcels in this category makes up less than 1% of the developed parcels. The following "Status" designations made up the commercial/industrial category.
  - Status = 'Developed <= 1000 IMP - Nuclear Power Plant' OR "Status" = 'Developed Aerial - Comm/Industrial' OR "Status" = 'Developed Aerial - Mining' OR "Status" = 'Developed Aerial - Oil Facility' OR "Status" = 'Developed Aerial <= 20000 IMP - Comm/Industrial' OR "Status" = 'Developed Aerial <= 20000 IMP - Manufacturing' OR "Status" = 'Developed Aerial <= 20000 IMP - Oil Facility' OR "Status" = 'Developed LUCode - Comm/Industrial' OR "Status" = 'Developed LUCode - Manufacturing'
- The "Other" category included areas where there was little or no rural water demand associated with the parcels. This category makes up less than 1% of the developed parcels remaining after subtracting agricultural and urban areas. The following "Status" designations were included in the category:
  - "Status" = 'Developed <= 1000 IMP - Cemetery' OR "Status" = 'Developed <= 1000 IMP - Dam' OR "Status" = 'Developed <= 1000 IMP - Lighthouse' OR "Status" = 'Developed <= 1000 IMP - Radar Site' OR "Status" = 'Developed <= 1000 IMP - Railroad' OR "Status" = 'Developed <= 1000 IMP - Recreation' OR "Status" = 'Developed <= 1000 IMP - Reservoir' OR "Status" = 'Developed <= 1000 IMP - Road' OR "Status" = 'Developed <= 1000 IMP - Sewer' OR "Status" = 'Developed <= 1000 IMP - Sludge Site' OR "Status" = 'Developed <= 1000 IMP - Utility' OR "Status" = 'Developed <= 1000 IMP - Water Facility' OR "Status" = 'Developed <= 1000 IMP - Water Pump' OR "Status" = 'Developed <= 1000 IMP - Water Tank' OR "Status" = 'Developed <= 1000 IMP - Well' OR "Status" = 'Developed Aerial - Recreation' OR "Status" = 'Developed

Aerial <= 20000 IMP - Dam' OR "Status" = 'Developed Aerial/LUCode - Recreation' OR "Status" = 'Developed LUCode - Automotive' OR "Status" = 'Developed LUCode - Church' OR "Status" = 'Developed LUCode - Grocery Store' OR "Status" = 'Developed LUCode - Mini Storage' OR "Status" = 'Developed LUCode - Recreation' OR "Status" = 'Developed LUCode - Warehouse' OR "Status" = 'Lake' OR "Status" = 'Railroad' OR "Status" = 'Road'

- The "Vacant" category included the followed Status designations established by the County. The majority of vacant parcels were classified by the County as 'Vacant <= 1000 IMP' and designated as parcels that could be developed. A summary of the vacant categories are as follows:

  - Residential Vacant: Status = 'Vacant <= 1000 IMP' OR "Status" = 'Vacant <= 1000 IMP - Campground' OR "Status" = 'Vacant <= 1000 IMP - School' OR "Status" = 'Vacant Aerial' OR "Status" = 'Vacant Aerial - Government' OR "Status" = 'Vacant Aerial <= 20000 IMP' OR "Status" = 'Vacant Aerial <= 20000 IMP - Government' OR "Status" = 'Vacant Aerial/LUCode - Government' OR "Status" = 'Vacant <= 1000 IMP - Government'

  - Other Vacant: Status = 'Vacant <= 1000 IMP - Common Area' OR "Status" = 'Vacant <= 1000 IMP - Marina' OR "Status" = 'Vacant <= 1000 IMP - Recreation' OR "Status" = 'Vacant Aerial <= 20000 IMP - Common Area' OR "Status" = 'Vacant Aerial/LUCode - Common Area'

Step 3: Divided the parcels by WPAs and assigned parcels. Some parcels were located in multiple WPAs.

- Recalculate acreages (Acge_Ind) for each parcel, including divided parcels.
- For those parcels where the ratio of new acreage over existing acreage was greater than 50%, an indicator was set to "1" (Acge_Ind).
- The divided parcels were assigned to the WPA where the majority of the parcel was located.

Step 4: Assigned a number of dwelling units for each residential and commercial/industrial category. The "Specific_P" and "Units" were defined by the County based on planning designations:

- For all existing developed parcels we assigned the following number of dwelling units (Exist_DU)

  - All "developed" = 1 (DU)
  - All "vacant" = 0 (DU)
  - Other = 0 (DU)

- For all future developed parcels we assigned the following number of dwelling units (Future_DU)

  - For "Specific_P" = FAR (Floor Area Ratio) & "Specific_P"= Note7-FAR, then Future_DU = 1 (DU). Since FAR numbers of units are not defined by a parcel, we have assumed that each FAR parcel will have 1 DU associated. This may result in an underestimate of future FAR units, but the total number of FAR units

  - All other "Specific_P":

    - For "Units" > 0, then Future_DU="Units" [e.g. 2, 3]
    - For "Units" = 0 AND "Exist_DU=0, then Future_DU=0

        - For “Units” = 0 AND “Exist_DU=1, then Future_DU=1

Step 5: Assigned a water duty factor (AF/DU) for each of the designated categories:

- Existing water duty factors were assigned (Ex_AF_DU):
    - Residential-Existing
        - 0.8 AFY/DU for planning area 1-7
        - 1.0 AFY/DU for planning area 8-16
    - Commercial Industrial
        - 1.5 AFY/DU for all planning areas
- Future water duty factors were assigned (Fut_AF_DU):
    - Residential-Future
        - 0.6 AFY/DU for planning area 1-7
        - 0.8 AFY/DU for planning area 8-16
    - Commercial Industrial
        - 1.5 AFY/DU for all planning areas

Step 6: Calculated the rural water demand for each WPA:

- Existing rural demand (Exist _AFY)
    - Multiply Exist_DU and Ex_AF_DU
- Future rural demand (Future _AFY)
    - Multiply Future_DU and Fut_AF_DU

Step 7: Summarized the rural water demand for each WPA:

- Created summary pivot tables from rural land use ArcGIS® layer
- Linked the pivot table to the rural demand summary excel file, as well as the total demand excel file.

References

Environmental Science Associates (ESA), San Luis Obispo County Water Demand Analysis Methodology and Results, December 2009.

San Luis Obispo County, San Luis Obispo County ArcGIS® Land Use Methodology Report, San Luis Obispo County, 2009.

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DRAFT memorandum

date December 17, 2009

to Jose Gutierrez, Carollo; Lou Carella, Carollo

from Justin Gragg, ESA; Annika Fain, ESA

subject SLO County MWP, Environmental Water Demand Estimates (Appendix D)

Purpose and Scope

San Luis Obispo County (County) has experienced multiple droughts, degradation of groundwater, and is faced with increasingly limited water supplies. The County is preparing an updated County Master Water Plan (MWP). The previous version of the MWP was completed in 1998. Since then, there have been many changes to the water resources within the County, including the completion of local and regional water management plans, formation of the Integrated Regional Water Management Plan (IRWMP), new water sources, new water users, and new water regulations. The updated MWP will incorporate these changes and provide all entities in the County with information to help effectively and efficiently manage water resources to protect ecosystems, public health and safety, and agriculture.

The updated MWP will include water supply and demand estimates for the entire County for existing and future conditions. Water demand estimates will be divided into the following categories: Agricultural, Urban, Rural, and Environmental. The following presents the approach, methodology, and results of the Environmental Water Demand (EWD) analysis for the County Watershed Planning Areas (WPAs) (as applicable).

Approach

For the purposes of the MWP, the term "Environmental Water Demand" is herein defined as the amount of water needed in an aquatic ecosystem, or released into it, to sustain aquatic habitat and ecosystem processes. Of course, natural riverine ecosystems are highly complex and often very dynamic, being controlled by a number of physical processes, containing a variety of distinct habitat types, and supporting a wide variety of aquatic species. Thus, it is often necessary to identify a target species, or group of species, whose habitat requirements are well-enough defined to allow for the development of a reasonable estimation of the amount of water needed to support these species. Furthermore, the target species, or group of species, should be widely recognized as an indicator species (i.e., a species whose habitat requirements are sensitive enough to allow for successful identification of environmental problems, yet broad enough to adequately represent a wide array of aquatic species). For the purposes of the EWD analysis, the federally threatened south-central California coast steelhead (*Oncorhynchus mykiss*) was used as the primary indicator species. Although numerous other listed and non-listed native aquatic species occur throughout the County, a large proportion of these species typically thrive in water bodies known to support steelhead. Furthermore, the threatened status of steelhead requires careful consideration of potential impacts to the species from future projects, including water development projects.

EWD is most commonly described and quantified in terms of instream flow requirements (i.e., the amount of water that must remain in the creek or river to support the various life stages of the target or indicator species). Numerous methodologies have been developed over recent decades for the purposes of quantifying instream flow requirements for steelhead and other salmonid species. These range from very simplistic estimations, such as the "Montana Method" (Tennant, 1976), to very site-specific and data-intensive assessments, such as the widely applied Instream Flow Incremental Methodology (IFIM) and its component Physical Habitat Simulation Model (PHABSIM), developed in the 1970's by the U.S. Fish and Wildlife Service (USFWS). The advantages and disadvantages of the various methodologies have been discussed extensively in the scientific literature and technical publications. We evaluated the relative merits and shortcomings of a number of available methodologies to determine the most appropriate approach to use for estimating EWD. Based on a number of selection criteria, including regional applicability, scientific support and justification, scale of the assessment (i.e., county-wide), and the feasibility and efficiency of the overall approach, we chose to apply a peer-reviewed methodology developed by Hatfield and Bruce (2000), *Predicting Salmonid Habitat-Flow Relationships for Streams from Western North America*.

The Hatfield and Bruce (2000) methodology is based on the authors' review of over 1,500 habitat-flow relationship curves developed during 127 site-specific PHABSIM studies from throughout the western United States. The authors developed predictions regarding the flow requirements for salmonids in this region and tested whether habitat-flow relationships for salmonids were related to watershed characteristics and geographic location. Their research found that mean annual discharge (MAD) was the best predictor for optimum flow, and that improvements in the predictive power of the regression model was sometimes possible with the addition of longitude and latitude coordinates (Hatfield and Bruce, 2000). As is the case in many regression-derived predictive models, a number of statistical uncertainties are inherent in this approach, and the authors provide a thorough discussion of the applicability of their methodology, including explicit cautions that site-specific follow-up assessments would be warranted in many situations. However, the largely planning-level focus of the Hatfield and Bruce (2000) approach appears to lend itself particularly well to the development of EWD estimates on a regional scale, recognizing that more detailed assessment will likely be required in support of future site-specific water development projects.

Implementation

During PHABSIM assessments, optimum flow ranges are typically developed for different life stages of the target species. Since their methodology is based on a review of numerous PHABSIM studies, Hatfield and Bruce (2000) also present optimum flow relationship equations for four distinct life stages of steelhead (i.e., fry, juvenile, adult, and spawning). Distinguishing between the flow needs of different life stages provides fisheries managers with the tools necessary to maximize suitable flow conditions according to life stage. However, this approach presents a minor difficulty for a broad-scale EWD assessment. For example, one life stage of steelhead, juveniles, is present year-round, and all four life stages may be present simultaneously during the spring. This raises the question of which optimal flow is in fact "optimal" at any given time of the year. In other words, which life stage equation should be used to determine yearly EWD? We elected to use two representative life stages in the assessment of EWD. If flow conditions are suitable for the adult life stage during the winter and early spring, then spawning can occur even though the physical spawning capacity of the water course in question may not be maximized. Similarly, if summer and fall flow conditions are suitable for juvenile steelhead, then the slower, shallower channel margin habitat preferred by fry is typically also present. Therefore, we chose to use Hatfield and Bruce's (2000) adult equation to determine EWD during the adult/spawning season of December through April, and the juvenile equation to determine EWD during the May through November rearing period.

As discussed, we have selected steelhead as our target/indicator species, and have selected the adult and juvenile flow prediction equations to represent EWD on an annual basis. However, the County contains numerous minor, seasonal drainages, as well as larger watersheds (particularly within the eastern half of the County), that do not support steelhead and are unlikely to have supported the species historically. Although fish use of seasonal drainages is limited, these streams nevertheless serve an important ecological function for a number of other aquatic species, including amphibians, reptiles, and invertebrates. Moreover, many of these streams ultimately flow into larger drainages that do support fisheries resources, including steelhead. The same can be said for some of the larger watersheds not known to support (presently or historically) steelhead. A consistent, comparable, and broadly-applicable methodology for assessing EWD in relation to another species or habitat characteristic, for areas where steelhead may not have existed historically, was not available. However, it would not be reasonable to exclude such areas from the EWD estimate, which has a broad ecological connotation, based solely on whether or not steelhead are currently or were historically present. Further, relatively simple adjustments can be made to the values derived from the Hatfield and Bruce (2000) methodology to better account for the seasonality of flow within particular watersheds of WPAs. Therefore, it is assumed that, in general, the Hatfield and Bruce (2000) approach leads to a reasonable estimate of EWD (i.e., the amount of water required for optimum ecological function), regardless of whether or not the watershed of interest has historically supported steelhead.

Methods

The Hatfield and Bruce (2000) methodology requires MAD estimates for each watershed of interest. In order to reflect an accurate estimate of EWD, the MAD discharge should represent unimpaired (or natural) flow conditions and should be reflective of a relatively long time period (i.e., longer than 30 years). Mean daily flow values from stream gaging stations representative of long-term, unimpaired flow conditions were used to derive MAD estimates within the different WPAs. The overall methodology for the calculation and extrapolation of unimpaired MAD estimates generally follows the approaches presented by Ries and Friesz (2000) and Mann et al. (2004).

Selection of Index and Study Stations

Following the approach presented by Mann et al. (2004), candidate Index and Study-stations were identified from a list of existing and historic stream gaging locations within the County and adjacent counties. An Index-station is defined as a stream gage that is representative of long-term, unimpaired flows conditions (i.e., the mean daily flow record does not need to be adjusted or extended); a Study-station is defined as a stream gage that has a period of record shorter than desired but is representative of unimpaired flow conditions. As such, the record of mean daily flow values for the Study-station could be extended, or adjusted, to a period concurrent with that of an Index-station if a reliable and reasonable relationship exists. Thus, the differences between records would be due to differences in climatic or drainage basin characteristics and not to the fact that different periods of time are being represented. Most of the stations used in the analysis were those of the U.S. Geological Survey (USGS) and the remainder were installed or taken-over by the San Luis Obispo County Flood Control and Water Conservation District (District).

Index-stations were selected based upon having a period of record longer than 30 years, being representative of unimpaired flow conditions, and not exhibiting any long-term trends in the mean daily flow data. To determine whether or not flow conditions could reasonably be considered unimpaired, the USGS Annual Water Data Report (WDR) was consulted for each gage location of interest for the last, or most recent, year of operation. If the USGS WDR indicated that there was no upstream regulation or diversion, the gage location was considered to be representative of unimpaired flow conditions. If the USGS WDR indicated that there was no upstream regulation but there were small diversions (e.g., small domestic diversion, stock ponds, etc.), or if the gage was one managed by the District (e.g., information equivalent to that found in the USGS WDR was not available), then the face-value amount of the upstream water rights (i.e., diversions) was determined through searching the State Water Resources Control Board's (SWRCB) Water Right Information Management System (WRIMS) (SWRCB, 2009). If the total face-value of the upstream permitted or licensed (or otherwise recognized by the SWRCB) diversions was less than one percent of the MAD of the gage of interest, then that location was considered to be representative of unimpaired flow conditions. Otherwise, the gage location was eliminated from further consideration in the analysis.[1]

Study-stations were selected based upon having a common (i.e., with the eventual study period) period of record longer than 8 years and being representative of unimpaired flow conditions. Determination of whether or not the Study-station mean daily flow record could reasonably be considered representative of unimpaired flow conditions followed the same methodology as described above for the Index-stations.

In order to adjust Study-station flows using the long-term Index-station records, tests for trends in the Index-station flow data were carried out. Improper regression or correlation can result if trends are evident in the long-term record for the region or for individual Index-stations (e.g., if trends are evident in the long-term Index-station records, then using these stations to adjust and extend short-term records may lead to substantially more error in the estimates). Trend tests involved first plotting mean annual flow versus year for each potential Index-station for qualitative detection of trends in the data. Kendall τ correlation tests (at the 0.05 significance level; Helsel and Hirsch, 2002) were then run on each Index-station's mean annual flows to quantitatively determine if any long-term trends were evident. No regional or individual station long-term trends were detected.

Based upon the criteria described above, two Index-stations were selected from the study area (i.e., the County and areas immediately adjacent): Lopez Creek near Arroyo Grande (Index-station 1; USGS 11141280) and the Nacimiento River below Sapaque Creek near Bryson (Index-station 2; USGS 11148900) (**Table D1; Figure D1**). The study period (i.e., the period for which the existing, average annual EWD estimates were made), based upon the Index-stations' common period of record, was selected as water year (WY) 1972-2008.[2] These two stations are at opposite extremes with respect to the overall flow regime (**Figure D2**): Lopez Creek is a relatively small, perennial stream and the Nacimiento River is a relatively large and ephemeral stream. Six Study-stations were ultimately selected from the study area: the Sisquoc River near Sisquoc (Study-station 1; USGS 11138500), Arroyo Grande above Phoenix Creek near Arroyo Grande (Study-station 2; USGS 11141150), Los Berros Creek near Nipomo (Study-station 3; USGS 11141600), Arroyo de la Cruz near San Simeon (Study-station 4; USGS 11142500), the Salinas River near Pozo (Study-station 5; USGS 11143500), and Salsipuedes Creek near Pozo (Study-station 6; USGS 11144200) (**Table D1; Figure D1**). For each Index and Study-station, information

[1] If there were many (i.e., more than 10) water rights upstream of a given station location, then that station was eliminated based solely upon the number of recorded water rights and, due to scope and budget limitations, the face-value of the water rights was not determined; nor was it determined whether or not the time period of the water right was concurrent with that of the station location of interest.

[2] A water year (WY) begins on October 1 of the previous year and ends on September 30 of the designated WY. For example, WY 2004 comprises the period of October 1, 2003 through September 30, 2004.

related to the USGS WDR and/or water rights is presented in **Attachment 1**. The results of the Kendall τ correlation tests on the mean annual flow values for Index-stations 1 and 2 are presented in **Attachment 2**.

TABLE D1
INDEX AND STUDY STATIONS

Station	Site Name	Site ID/no.	Drainage Area (sq. miles)	Flow Regime	Period of Record (Water Years)
Index Station 1 (Ind1)	Lopez Creek	USGS 11141280	20.9	Perennial	1968-2008
Index Station 2 (Ind2)	Nacimiento River	USGS 11148900	162.0	Ephemeral	1972-2008
Study Station 1 (Std1)	Sisquoc River	USGS 11138500	281.0	Perennial	1944-1999
Study Station 2 (Std2)	Arroyo Grande	USGS 11141150	13.5	Perennial	1968-1992
Study Station 3 (Std3)	Los Berros Creek	USGS 11141600	15.0	Perennial	1969-1978[a]
Study Station 4 (Std4)	Arroyo de la Cruz	USGS 11142500	41.2	Ephemeral	1951-1979
Study Station 5 (Std5)	Salinas River	USGS 11143500	70.3	Perennial	1943-1983
Study Station 6 (Std6)	Salsipuedes Creek	USGS 11144200	5.9	Ephemeral	1970-1983

[a] Based on data from the USGS for these water years

Regression Analysis and Mean Annual Discharge

Regression analysis was used to extend the mean daily flow record of each Study-station to cover the entire study period, WY 1972-2008. Study-station-Index-station pairings were based primarily on proximity of the stations to one another. In cases where the regression relationship was not strong or clear, both Index-stations were used in order to determine which one, if any, provided the most reliable relationship with respect to mean daily flow values.

Similar to the approach described by Ries and Friesz (2000), the relationship between Index-station and Study-station mean daily flow values were evaluated over a concurrent period (i.e., the period of overlap in the mean daily flow record of each station). First, the log-transformed (base 10), concurrent mean daily flow values at a Study-station were plotted versus the log-transformed mean daily flow values at the selected Index-station. A mathematical (i.e., ordinary least squares) correlation method was used when the subsequent relationship appeared linear, and a graphical method was used when the relationship illustrated curvature or otherwise appeared non-linear. Both methods assume that the relation between the mean daily flow at the Study-station and the Index-station remains constant with time (this is why trend testing of the Index-stations is important), and thus the relation between the concurrent period mean daily flows can be used to estimate flow statistics that represent long-term conditions. Once a reliable mathematical or graphical relationship was established, the statistic of interest (e.g., long-term MAD) for the Index-stations was used to compute the statistic of interest for each Study-station.

For the mathematical correlation between the log-transformed data, the regression coefficient of determination (R^2) for Index-station daily mean flows versus Study-station daily mean flows was required to be greater than 0.8 for concurrent flow data. The Index-station MAD (or statistic of interest) was then log-transformed, entered into the ordinary-least-squares regression equation, and the equation was subsequently solved for the Study-station value (e.g., MAD for WY 1972-2008).

For the graphical correlation, the method was applied by plotting the original (non-log) values of concurrent mean daily flows on log-log paper and drawing a smooth curve through the plotted points that appears to best fit the data (Ries and Friesz, 2000). Next, the MAD (or statistic of interest) for the Index-station was entered into the curve of relation and the corresponding value for the Study-station was read from the graph. In this approach, the relationship between the two stations was most important for the range of flows near the MAD value for the Index-station. As such, if the relationship was not strong below this range (i.e., at the low end of the relation, as is often the case with log-log plots), the Study-station was not necessarily automatically discarded. Further, if an ordinary-least-squares regression line appeared to best describe the relationship of the data (i.e., if the ordinary-least-squares regression line was essentially the same as that which was drawn in by hand), then the subsequent regression equation was used to predict the MAD (or statistic of interest) value for the Study-station. If a reliable relationship (mathematical or graphical) did not exist the Study-station was discarded from further analysis. The Index-station-Study-station relations used in this analysis are included in **Attachment 3**.

Weighted Mean Annual Discharge

If the period of record for a Study-station comprised one-half or more of the study period, then a weighted MAD was calculated. In this case, the MAD was calculated from the Study-station mean daily flow values over the period of record, and the MAD for the remainder of the study period was calculated using the regression relation. The final MAD was calculated as a weighted average of the two values. For two Study-stations, the Sisquoc River (Study-station 1) and Arroyo Grande (Study-station 2), a weighted MAD was calculated (**Attachment 4**).

Extrapolation of Mean Annual Discharge Values

Once the unimpaired MAD estimates were calculated for the Index- and Study-stations, these values were then used to estimate the MAD for other watersheds and WPAs through extrapolation. To do this, the WPAs were further subdivided into individual sub-watershed areas (**Figure D3**). The delineation of sub-watersheds within the WPAs was done using ArcGIS® and was based upon the watershed delineation data provided by the District (San Luis Obispo County, 2000). The area (in square miles) and coordinates (longitude and latitude of the watershed mid-point) of each sub-watershed were also calculated within ArcGIS®. Sub-watershed areas were generally delineated (and aggregated) for the point at which the particular river or stream exited the WPA. As a result, the sub-watersheds draining east (to the Salinas River valley) are generally much larger than the coastal sub-watersheds. In some cases these larger sub-watershed areas were further sub-divided based upon a particular feature (e.g., lake or reservoir) or a particularly large tributary (e.g., Paso Robles Creek). It is important to note (as explained in more detail below, *Assumptions and Sources of Uncertainty*) that the unit optimal flow values derived from Hatfield and Bruce (2000), and ultimately the EWD estimates, are in part dependent upon the size of the drainage area (i.e., larger drainage areas have smaller unit optimal flow values, and vice versa).

Once the sub-watershed areas were delineated, the unit MAD (cubic feet per second [cfs] per square mile) was calculated for each of the Index- and Study-stations. The unit MAD values were then applied to each of the sub-watersheds in order to derive a MAD estimate for the entire sub-watershed based on its area. The extrapolation of Index- and Study-station unit MAD values to other sub-watershed areas was done qualitatively based upon proximity as well as similarities in mean annual rainfall (PRISM, 2007) and overall topography. In some cases, more than one unit MAD value was used for a given sub-watershed, in which case the unit MAD value ultimately used represented an average. Unit MAD values for the Index- and Study-stations, as well as for each of the sub-watersheds (including a list of which Index- and Study-station unit MAD values were used in the derivation of the unit MAD for each of the sub-watersheds), are listed in the tables comprising **Attachment 5**.

The eastern portion of the County (i.e., WPAs 9, 10, 11, 14, and 15) was ultimately excluded from the EWD analysis due to the lack of data and regional physiographic differences. No unimpaired flow data were available for WPAs 9, 10, 11, 14, and 15. All of the available unimpaired flow data were for stations in the western portion of the County. Substantial differences in mean annual rainfall, topography, and geology precluded a reliable extrapolation of the Index- and Study-station unit MAD values to these eastern areas of the County.

Environmental Water Demand

Once the MAD was calculated for each sub-watershed, the equations presented by Hatfield and Bruce (2000) were used to derive the EWD estimate (as described above). An EWD flow value was calculated for the period December through April (i.e., adult demand) and for the period May through November (i.e., juvenile demand). The following are the relevant equations as presented by Hatfield and Bruce (2000):

$$\log_e(optimum\_juvenile\_flow) = -8.482 + 0.593 \cdot \log_e(MAD) + 2.555 \cdot \log_e(latitude)$$
$$\log_e(optimum\_adult\_flow) = 1.105 + 0.737 \cdot \log_e(MAD)$$

Where optimum flow and MAD are in cfs and latitude is in decimal degrees.

For each period the flow value was converted to a total volume (i.e., acre-feet) based upon the average number of days within the period, and the two volumes were then summed to derive a total annual EWD estimate for each sub-watershed. For the juvenile period (May through November) an additional adjustment was made to better account for the generally ephemeral nature of the study area (i.e., assuming that all days in the May through November period would normally have flow under natural, or unimpaired, conditions is not reflective of the regional hydrologic regime). At the scale of the sub-watersheds used in this analysis (i.e., relatively large), most (if not all) of the coastal watersheds, as well as the larger watersheds to the east, are naturally ephemeral. Those reaches that are perennial tend to be in the small, headwater-type watersheds (though there are exceptions within the study area, such as the Sisquoc River – though the Sisquoc River is not within the County). Based upon the mean daily flow data for the Nacimiento River Index-station, which indicate that the river is dry approximately 30 percent of the time, a regional adjustment was made to the annual EWD estimates: it was assumed that all of the sub-watersheds were dry for 30 percent of the time (i.e., for approximately 110 days). The optimum flow values and EWD estimates for each sub-watershed and WPA are presented in the tables of Attachment 5; the annual EWD estimates for each WPA are also summarized below in **Table D2**.

TABLE D2
MEAN ANNUAL DISCHARGE AND ENVIRONMENTAL WATER DEMAND ESTIMATES

WPA (#)[a]	WPA Name	Estimated Unimpaired Mean Annual Discharge (MAD) (AFY)	Environmental Water Demand (EWD) (AFY)
1	San Simeon	104,491	72,975
2	Cambria	87,049	51,463
3	Cayucos	33,340	26,162
4	Morro Bay	43,433	27,878
5	Los Osos	8,199	7,045
6	SLO/Avila	45,816	33,034
7	South Coast	49,103	32,956
8	Huasna Valley	34,217	25,019
12	Santa Margarita	46,633	32,850
13	Atascadero/Templeton	74,088	41,006
16	Nacimiento	251,124[b]	108,390 [b]

[a] The eastern portion of the County (i.e., WPAs 9, 10, 11, 14, and 15) was ultimately excluded from the EWD analysis due to the lack of data and regional physiographic differences. No unimpaired flow data were available for WPAs 9, 10, 11, 14, and 15.

[b] Estimates include the watershed area for the Nacimiento River Index-station (162 square miles); though the Index-station is within WPA 16, most of the watershed area is not.

Assumptions and Sources of Uncertainty

The following list summarizes some key assumptions and sources of uncertainty for the presented estimates of EWD:

- The EWD estimates presented here are based upon the habitat requirements of steelhead (*Oncorhynchus mykiss*), and this approach and methodology therefore assumes that the steelhead is an appropriate target species for the study area;

- For the Nacimiento River Index-station and most of the Study-stations, the coefficient of variation (CV)[3] for the mean daily flows was beyond the range (i.e., higher than) reported by Hatfield and Bruce (2000) for their study sites. This reflects the fact that the flow regime in our study area (i.e., the County and surrounding areas) is generally more ephemeral and variable than that of the collective region analyzed by Hatfield and Bruce (2000) Therefore, extrapolation using the MAD at these stations may lead to overestimates of the optimal flow value (and, subsequently, the EWD) for the sub-watershed areas. This is because the MAD value at these stations is disproportionately influenced by large flows and these watersheds are predominantly ephemeral;

- A few of the sub-watershed areas had estimated MAD values below the range reported by Hatfield and Bruce (2000) for their study sites (i.e., below 4.1 cfs). The reliability of the Hatfield and Bruce (2000) methodology in this low range of MAD values is unclear and has not been tested. In fact, the optimal flow values calculated for the very small sub-watershed areas in our study area (i.e., those with estimated MAD values less than approximately 10 cfs) were often greater than the estimated MAD values, in which case the annual EWD was assumed to equal the MAD.

- The prediction intervals for the Hatfield and Bruce (2000) equations are relatively large, primarily reflecting statistical uncertainty and other sources of error;

- Regional variation in rainfall is not quantitatively accounted for in extrapolating the mean annual discharge estimates for the Index and Study-stations to other areas;

- As stated in the scope of work, the estimates of EWD presented here do not include “geomorphic” flows. In other words, in calculating an annual EWD for a given watershed, consideration was not given to the particular range of flows typically responsible for the maintenance of channel form and, ultimately, function over time;

- The unit EWD (i.e., demand per unit area, such as acre-feet per square mile) is, in part, dependent upon the drainage area to the point of interest, and the relationship between unit EWD and drainage area is generally not linear. In some cases the unit EWD is inversely related to drainage area (i.e., the EWD volume per unit area *increases* as drainage area *decreases*). As a result, dividing large watershed areas (e.g., WPA 12 or 13) into smaller sub-watersheds, and subsequently summing the EWD estimates from the smaller sub-watersheds, would likely lead to a higher total EWD estimate for the overall watershed area of interest. It is assumed that the delineation of sub-watersheds employed here is reasonable for the purpose of estimating EWD.

- Planning-level assessments such as this one do not take the complexity of natural systems into consideration. While our results provide a reasonable and scientifically supported estimation of Environmental Water Demand for the purposes of water planning, site- and project-specific instream flow requirements should be completed for all future water development projects.

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[3] The coefficient of variation (CV) is a statistical measure of variability and is calculated as the standard deviation divided by the mean.

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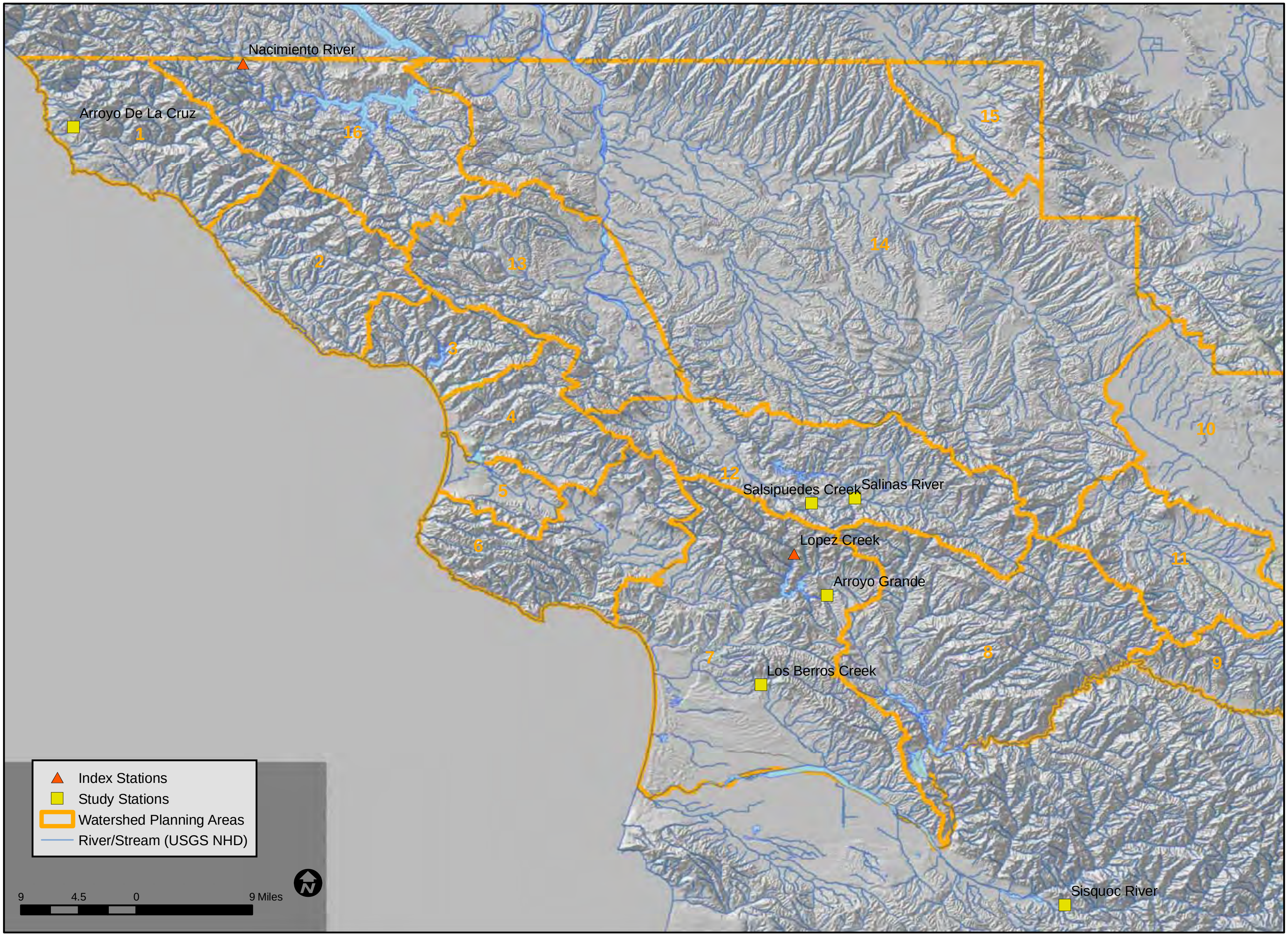

SOURCE: USGS, 2009; ESA, 2009; USEPA, 2005; San Obispo County, 2000 & 2009

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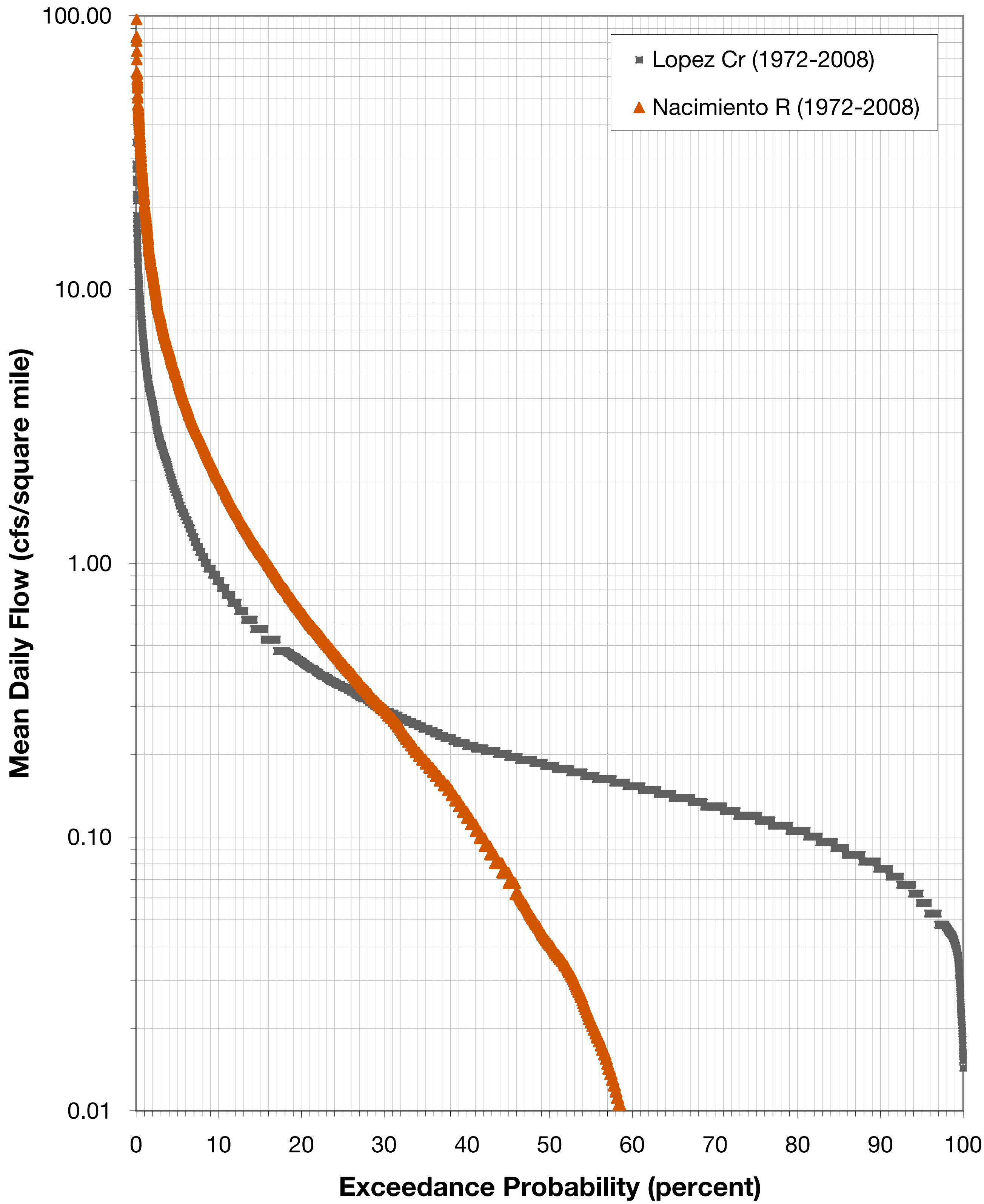
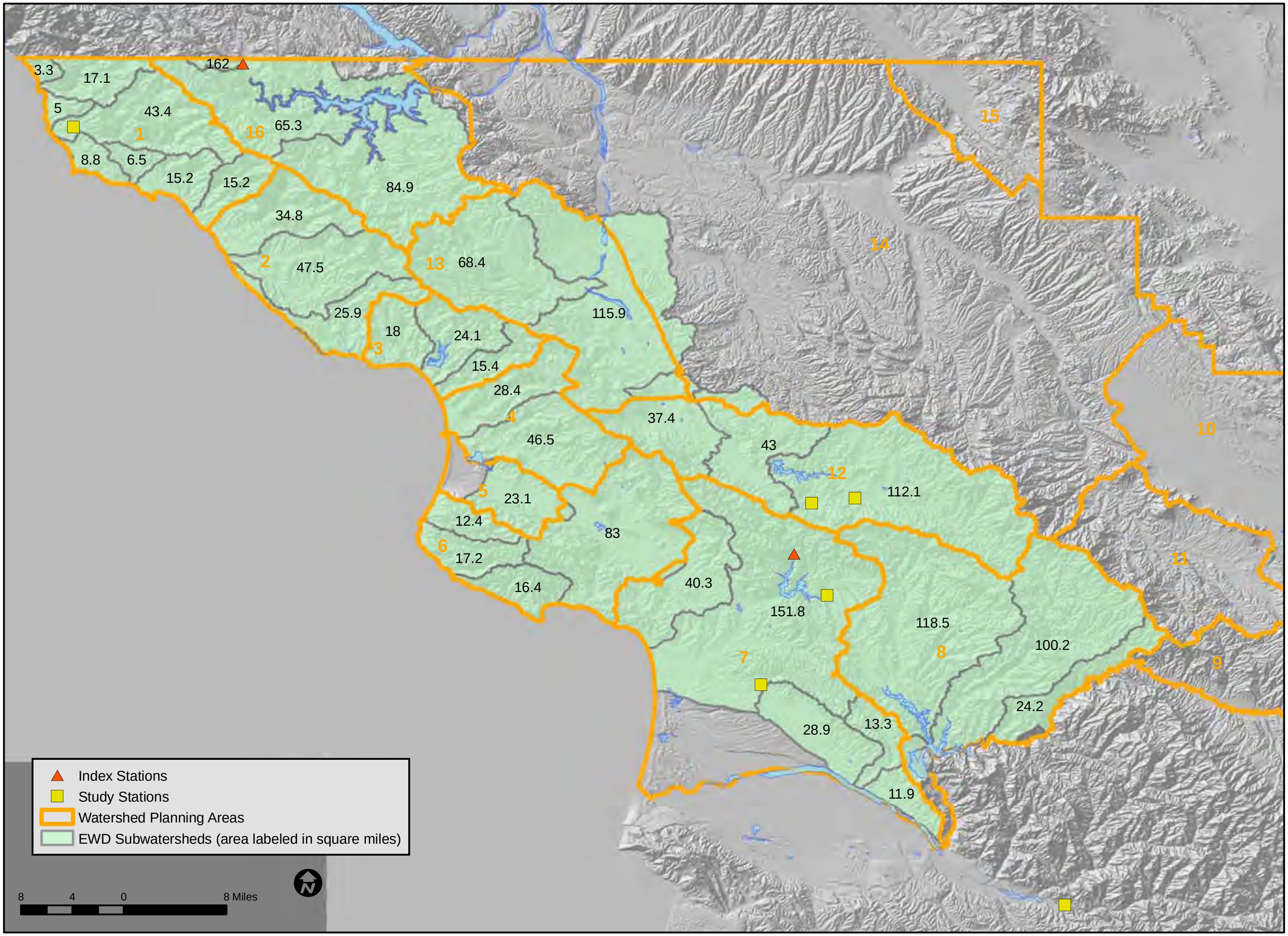
Figure D1
Index and Study Stream Gage Stations



SOURCE: USGS, 2009; ESA, 2009

Figure D2
Mean Daily Flow at Index Station Stream Gages



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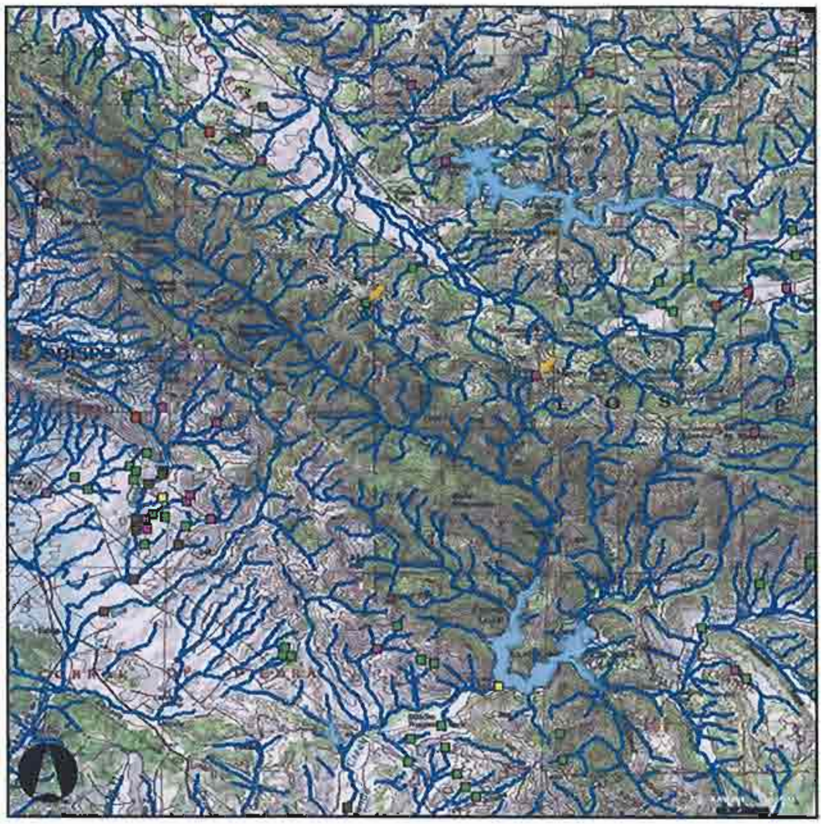
SOURCE: USGS, 2009; ESA, 2009; San Obispo County, 2000 & 2009

Figure D3

Subwatersheds Used for Environmental Water Demand Analysis

Attachment 1

USGS Water Data Reports and SWRCB Water Rights Information



water rights upstream of
USGS 11141280
Lopez Cr

Points of Diversion (1)

Points of Diversion (1)

Points of Diversion
- Adjudicated
- Cancelled
- Certified
- Claimed
- Claimed - Local Oversight
- Inactive
- Licensed

Points of Diversion (continued)
- Pending
- Permitted
- Registered
- Revoked
- State Filing
- Temporary

Lakes (1:24K)

Rivers (1:24K)

NGS USA Topographic Maps

Select POD Results

Points of Diversion (1)

POD_ID	APPL_ID	POD_NUM	APPL_POD	TOWNSHIP_NUMBER	TOWNSHIP_DIRECTION	RANGE_NUMBER	RANGE_DIRECTION	SECTION_NUMBER	SECTION_CLASSIFIER	QUARTER	QUARTER
894	A021268	01	A021268_01	30	S	14	E	28		SE	SE

Select POD Results

Points of Diversion (1)

POD_ID	APPL_ID	POD_NUM	APPL_POD	TOWNSHIP_NUMBER	TOWNSHIP_DIRECTION	RANGE_NUMBER	RANGE_DIRECTION	SECTION_NUMBER	SECTION_CLASSIFIER	QUARTER	QUARTER
22513	C005030	01	C005030_01	30	S	13	E	24		NW	NW

SWRCB	Division of Water Rights - e-WRIMS	10/14/2009
	1) Select Columns A, B, and C)	
	2) Format / Column / Autofit Selection	
	3) Left Justify Column Text	
Application		
	Application ID	A021268
	Appliation Rec'd Date	
	Application Acceptance Date	5/1/1963
	Notice Date	
	Protest	
	Number of Protests	0
	Agent Name	
	Agent Entity Type	
	Primary Owner	U S LOS PADRES NATL FOREST
	Primary Owner Entity Type	Federal Government
	Water Right Type	Appropriative
	Face Value Amount	1.1
	Face Value Units	Acre-feet per Year
	Appl Fee Amount	10
	Appl Fee Amt Recd	10
	Max DD Appl	1000
	Max DD Units	Gallons per Day
	Max DD Ann	0
	Max Storage	0
	Max Use Ann	1.1
	Year First Use	0
	Billing Determination	Not Determined
	Power Discount %	0
	FERC #	
	FERC Facility	
	Initial 401 Certification Start	
	Initial 401 Certification End	
	Renewed 401 Certification Start	
	Renewed 401 Certification End	
	Kilowatts Face Plate	0
Parties		
	Name Type	Primary Owner
	Effective From Date	9/15/1994
	Effective To Date	
	Salutation	
	Entity Type	Federal Government
	Last Name	U S LOS PADRES NATL FOREST
	Middle Name	
	First Name	
	Mailing Street Number	
	Mailing Street Name	6755 HOLLISTER AVE STE 150
	Mailing Address Line2	
	Mailing City	GOLETA
	Mailing State	CA
	Mailing Zip	93117
	Mailing Country	USA
	Mailing Foreign Code	
	Billing Street Number	
	Billing Street Name	6755 HOLLISTER AVE STE 150
	Billing Address Line2	
	Billing City	GOLETA
	Billing State	CA
	Billing Zip	93117

	Billing Country	USA
	Billing Foreign Code	
	Phone	8059686640
Status		
	Current Status	Licensed
Uses		
	Use Code	Domestic
	Use Status (New)	Migrated from old WRIMS data
	Use Population	0
	Use Net Acreage	0
	Use Gross Acreage	0
	Use Direct Diversion Annual Amount (AFA)	0
	Use Direct Diversion Rate (New)	0
	Use Direct Diversion Rate Units	
	Use Storage Amount (New) (AFA)	0
Use Seasons		
	Direct Div Season Begin Date	1-Jan
	Direct Div Season End Date	31-Dec
	Season Direct Div Rate (New)	0
	Season Direct Div Rate Units	
	Season Direct Div Annual Amount (New) (AFA)	0
	Direct Div Season Status (New)	Migrated from old WRIMS data
	Storage Season Begin Date	
	Storage Season End Date	
	Season Storage Amount (AFA)	0
	Collection Season Status (New)	Migrated from old WRIMS data
Uses		
	Use Code	Fire Protection
	Use Status (New)	Migrated from old WRIMS data
	Use Population	0
	Use Net Acreage	0
	Use Gross Acreage	0
	Use Direct Diversion Annual Amount (AFA)	0
	Use Direct Diversion Rate (New)	0
	Use Direct Diversion Rate Units	
	Use Storage Amount (New) (AFA)	0
Use Seasons		
	Direct Div Season Begin Date	1-Jan
	Direct Div Season End Date	31-Dec
	Season Direct Div Rate (New)	0
	Season Direct Div Rate Units	
	Season Direct Div Annual Amount (New) (AFA)	0
	Direct Div Season Status (New)	Migrated from old WRIMS data
	Storage Season Begin Date	
	Storage Season End Date	
	Season Storage Amount (AFA)	0
	Collection Season Status (New)	Migrated from old WRIMS data
Uses		
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	Use Status (New)	Migrated from old WRIMS data
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	Use Net Acreage	0
	Use Gross Acreage	0
	Use Direct Diversion Annual Amount (AFA)	0
	Use Direct Diversion Rate (New)	0

	Use Direct Diversion Rate Units	
	Use Storage Amount (New) (AFA)	0
Use Seasons		
	Direct Div Season Begin Date	1-Jan
	Direct Div Season End Date	31-Dec
	Season Direct Div Rate (New)	0
	Season Direct Div Rate Units	
	Season Direct Div Annual Amount (New) (AFA)	0
	Direct Div Season Status (New)	Migrated from old WRIMS data
	Storage Season Begin Date	
	Storage Season End Date	
	Season Storage Amount (AFA)	0
	Collection Season Status (New)	Migrated from old WRIMS data
Uses		
	Use Code	Fish and Wildlife Protection and/or Enhancement
	Use Status (New)	Migrated from old WRIMS data
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	Use Net Acreage	0
	Use Gross Acreage	0
	Use Direct Diversion Annual Amount (AFA)	0
	Use Direct Diversion Rate (New)	0
	Use Direct Diversion Rate Units	
	Use Storage Amount (New) (AFA)	0
Use Seasons		
	Direct Div Season Begin Date	1-Jan
	Direct Div Season End Date	31-Dec
	Season Direct Div Rate (New)	0
	Season Direct Div Rate Units	
	Season Direct Div Annual Amount (New) (AFA)	0
	Direct Div Season Status (New)	Migrated from old WRIMS data
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	Storage Season End Date	
	Season Storage Amount (AFA)	0
	Collection Season Status (New)	Migrated from old WRIMS data
POD		
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	POD Unit	Gallons per Day
	POD Status	Active
	Direct Div Amount	1000
	Direct Div Ac Ft	0
	Amount Storage	0
	POD Max Dd	1000
	Source Max Dd Unit	Gallons per Day
	POD Max Storage	0
	Source Max Storage Unit	Gallons per Day
	Diversion Code	Diversion point
	Diversion Type	Direct Diversion
	Storage Type	Diversion point
POD GIS Maintained Data		
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	Object ID	177519
	Pod Number	1
	Has Opod	N
	Appl Pod	A021268_01
	podId	894

	County	San Luis Obispo
	Parcel Number	
	Sp Zone	5
	North Coord	2295832
	East Coord	5822486
	Quarter Quarter	SE
	Quarter	SE
	Section Classifier	
	Section Number	28
	Township Number	30
	Township Direction	S
	Range Number	14
	Range Direction	E
	Meridian	21
	Location Method	DD_NE
	Source Name	LITTLE FALLS SPRING
	TribDesc	
	Watershed	ESTERO BAY
	Quad Map Name	SANTA MARGARITA LAKE
Permit		
	Permit ID	14230
	Water Right Description	Migrated data from old WRIMS system.
	Issue Date	1/3/1964
	Construction Completed by	
	Planned Project Completion Date	12/1/1966
License		
	License ID	8823
	Issue Date	1/3/1969
	Licensee Reporting Cycle	
	First Licensee Report Year	
License Terms		
	Term ID	
	Version Number	1
	Term Short Description	
	DWR Specific Clauses	

SWRCB	Division of Water Rights - e-WRIMS	10/14/2009
	1) Select Columns A, B, and C)	
	2) Format / Column / Autofit Selection	
	3) Left Justify Column Text	
Application		
	Application ID	C005030
	Appliation Rec'd Date	12/31/1997
	Application Acceptance Date	12/31/1997
	Notice Date	
	Protest	
	Number of Protests	0
	Agent Name	
	Agent Entity Type	
	Primary Owner	L CARL GRIEB
	Primary Owner Entity Type	Individual
	Water Right Type	Stockpond
	Face Value Amount	1
	Face Value Units	Acre-feet per Year
	Appl Fee Amount	10
	Appl Fee Amt Recd	10
	Max DD Appl	0
	Max DD Units	Gallons per Day
	Max DD Ann	0
	Max Storage	1
	Max Use Ann	1
	Year First Use	1969
	Billing Determination	Not Determined
	Power Discount %	0
	FERC #	
	FERC Facility	
	Initial 401 Certification Start	
	Initial 401 Certification End	
	Renewed 401 Certification Start	
	Renewed 401 Certification End	
	Kilowatts Face Plate	0
Parties		
	Name Type	Primary Owner
	Effective From Date	1/5/1999
	Effective To Date	
	Salutation	
	Entity Type	Individual
	Last Name	GRIEB
	Middle Name	CARL
	First Name	L
Parties		
	Name Type	Non-Primary Owner
	Effective From Date	1/5/1999
	Effective To Date	

	Salutation	
	Entity Type	Individual
	Last Name	GRIEB
	Middle Name	L
	First Name	BARBARA
Status		
	Current Status	Certified
Uses		
	Use Code	Stockwatering
	Use Status (New)	Migrated from old WRIMS data
	Use Population	120
	Use Net Acreage	0
	Use Gross Acreage	0
	Use Direct Diversion Annual Amount (AFA)	0
	Use Direct Diversion Rate (New)	0
	Use Direct Diversion Rate Units	
	Use Storage Amount (New) (AFA)	1
Use Seasons		
	Direct Div Season Begin Date	
	Direct Div Season End Date	
	Season Direct Div Rate (New)	0
	Season Direct Div Rate Units	
	Season Direct Div Annual Amount (New) (AFA)	0
	Direct Div Season Status (New)	Migrated from old WRIMS data
	Storage Season Begin Date	1-Jan
	Storage Season End Date	31-Dec
	Season Storage Amount (AFA)	1
	Collection Season Status (New)	Migrated from old WRIMS data
POD		
	POD Number	1
	POD Unit	Gallons per Day
	POD Status	Active
	Direct Div Amount	0
	Direct Div Ac Ft	0
	Amount Storage	1
	POD Max Dd	0
	Source Max Dd Unit	Gallons per Day
	POD Max Storage	1
	Source Max Storage Unit	Gallons per Day
	Diversion Code	Diversion point
	Diversion Type	Storage
	Storage Type	Diversion point
POD GIS Maintained Data		
	Appl ID	C005030
	Object ID	177563

Pod Number	1
Has Opod	Y
Appl Pod	C005030_01
podId	22513
County	San Luis Obispo
Parcel Number	
Sp Zone	5
North Coord	2303733
East Coord	5808086
Quarter Quarter	NW
Quarter	NW
Section Classifier	
Section Number	24
Township Number	30
Township Direction	S
Range Number	13
Range Direction	E
Meridian	21
Location Method	DD_NE
Source Name	UNST
TribDesc	
Watershed	ESTERO BAY
Quad Map Name	ARROYO GRANDE

Permit

Permit ID	
Water Right Description	
Issue Date	
Construction Completed by	
Planned Project Completion Date	

License

License ID	5030
Issue Date	7/24/2000
Licensee Reporting Cycle	
First Licensee Report Year	

SWRCB	Division of Water Rights - e-WRIMS	10/14/2009
	1) Select Columns A, B, and C)	
	2) Format / Column / Autofit Selection	
	3) Left Justify Column Text	
Application		
	Application ID	C002567
	Appliation Rec'd Date	
	Application Acceptance Date	1/3/1978
	Notice Date	
	Protest	
	Number of Protests	0
	Agent Name	LESTER B MANKINS
	Agent Entity Type	Individual
	Primary Owner	ANDREW W MCREYNOLDS
	Primary Owner Entity Type	Individual
	Water Right Type	Stockpond
	Face Value Amount	0
	Face Value Units	Acre-feet per Year
	Appl Fee Amount	10
	Appl Fee Amt Recd	10
	Max DD Appl	0
	Max DD Units	Gallons per Day
	Max DD Ann	0
	Max Storage	0.1
	Max Use Ann	0
	Year First Use	1968
	Billing Determination	Not Determined
	Power Discount %	0
	FERC #	
	FERC Facility	
	Initial 401 Certification Start	
	Initial 401 Certification End	
	Renewed 401 Certification Start	
	Renewed 401 Certification End	
	Kilowatts Face Plate	0
Parties		
	Name Type	Agent
	Effective From Date	9/15/1994
	Effective To Date	
	Salutation	
	Entity Type	Individual
	Last Name	MANKINS
	Middle Name	B
	First Name	LESTER
Parties		
	Name Type	Primary Owner
	Effective From Date	9/15/1994
	Effective To Date	

	Salutation	
	Entity Type	Individual
	Last Name	MCREYNOLDS
	Middle Name	W
	First Name	ANDREW
Parties		
	Name Type	Non-Primary Owner
	Effective From Date	9/15/1994
	Effective To Date	
	Salutation	
	Entity Type	Individual
	Last Name	MCREYNOLDS
	Middle Name	M
	First Name	CHRISTA
Parties		
	Name Type	Agent
	Effective From Date	9/15/1994
	Effective To Date	
	Salutation	
	Entity Type	Individual
	Last Name	MANKINS
	Middle Name	B
	First Name	LESTER
Status		
	Current Status	Certified
Uses		
	Use Code	Stockwatering
	Use Status (New)	Migrated from old WRIMS data
	Use Population	0
	Use Net Acreage	0
	Use Gross Acreage	0
	Use Direct Diversion Annual Amount (AFA)	0
	Use Direct Diversion Rate (New)	0
	Use Direct Diversion Rate Units	
	Use Storage Amount (New) (AFA)	0.1
Use Seasons		
	Direct Div Season Begin Date	
	Direct Div Season End Date	
	Season Direct Div Rate (New)	0
	Season Direct Div Rate Units	
	Season Direct Div Annual Amount (New) (AFA)	0
	Direct Div Season Status (New)	Migrated from old WRIMS data
	Storage Season Begin Date	1-Nov
	Storage Season End Date	1-May

	Season Storage Amount (AFA)	0.1
	Collection Season Status (New)	Migrated from old WRIMS data
POD		
	POD Number	1
	POD Unit	Gallons per Day
	POD Status	Active
	Direct Div Amount	0
	Direct Div Ac Ft	0
	Amount Storage	0.1
	POD Max Dd	0
	Source Max Dd Unit	Gallons per Day
	POD Max Storage	0
	Source Max Storage Unit	Gallons per Day
	Diversion Code	Diversion point
	Diversion Type	Direct Diversion
	Storage Type	Diversion point
POD GIS Maintained Data		
	Appl ID	C002567
	Object ID	177366
	Pod Number	1
	Has Opod	N
	Appl Pod	C002567_01
	podId	32416
	County	San Luis Obispo
	Parcel Number	
	Sp Zone	5
	North Coord	2262231
	East Coord	5845386
	Quarter Quarter	SW
	Quarter	NW
	Section Classifier	
	Section Number	32
	Township Number	31
	Township Direction	S
	Range Number	15
	Range Direction	E
	Meridian	21
	Location Method	DD_NE
	Source Name	UNST
	TribDesc	
	Watershed	ESTERO BAY
	Quad Map Name	TAR SPRING RIDGE
Permit		
	Permit ID	
	Water Right Description	
	Issue Date	
	Construction Completed by	
	Planned Project Completion Date	

License

License ID	2567
Issue Date	5/18/1979
Licensee Reporting Cycle	
First Licensee Report Year	

SWRCB	Division of Water Rights - e-WRIMS	10/14/2009
	1) Select Columns A, B, and C)	
	2) Format / Column / Autofit Selection	
	3) Left Justify Column Text	
Application		
	Application ID	C002568
	Appliation Rec'd Date	
	Application Acceptance Date	1/3/1978
	Notice Date	
	Protest	
	Number of Protests	0
	Agent Name	LESTER B MANKINS
	Agent Entity Type	Individual
	Primary Owner	ANDREW W MCREYNOLDS
	Primary Owner Entity Type	Individual
	Water Right Type	Stockpond
	Face Value Amount	0
	Face Value Units	Acre-feet per Year
	Appl Fee Amount	10
	Appl Fee Amt Recd	10
	Max DD Appl	0
	Max DD Units	Gallons per Day
	Max DD Ann	0
	Max Storage	0.7
	Max Use Ann	0
	Year First Use	1965
	Billing Determination	Not Determined
	Power Discount %	0
	FERC #	
	FERC Facility	
	Initial 401 Certification Start	
	Initial 401 Certification End	
	Renewed 401 Certification Start	
	Renewed 401 Certification End	
	Kilowatts Face Plate	0
Parties		
	Name Type	Primary Owner
	Effective From Date	9/15/1994
	Effective To Date	
	Salutation	
	Entity Type	Individual
	Last Name	MCREYNOLDS
	Middle Name	W
	First Name	ANDREW
Parties		
	Name Type	Agent
	Effective From Date	9/15/1994
	Effective To Date	

	Salutation	
	Entity Type	Individual
	Last Name	MANKINS
	Middle Name	B
	First Name	LESTER
Parties		
	Name Type	Non-Primary Owner
	Effective From Date	9/15/1994
	Effective To Date	
	Salutation	
	Entity Type	Individual
	Last Name	MCREYNOLDS
	Middle Name	M
	First Name	CHRISTA
Parties		
	Name Type	Agent
	Effective From Date	9/15/1994
	Effective To Date	
	Salutation	
	Entity Type	Individual
	Last Name	MANKINS
	Middle Name	B
	First Name	LESTER
Status		
	Current Status	Certified
Uses		
	Use Code	Stockwatering
	Use Status (New)	Migrated from old WRIMS data
	Use Population	0
	Use Net Acreage	0
	Use Gross Acreage	0
	Use Direct Diversion Annual Amount (AFA)	0
	Use Direct Diversion Rate (New)	0
	Use Direct Diversion Rate Units	
	Use Storage Amount (New) (AFA)	0.7
Use Seasons		
	Direct Div Season Begin Date	
	Direct Div Season End Date	
	Season Direct Div Rate (New)	0
	Season Direct Div Rate Units	
	Season Direct Div Annual Amount (New) (AFA)	0
	Direct Div Season Status (New)	Migrated from old WRIMS data
	Storage Season Begin Date	1-Nov
	Storage Season End Date	1-May

	Season Storage Amount (AFA)	0.7
	Collection Season Status (New)	Migrated from old WRIMS data
POD		
	POD Number	1
	POD Unit	Gallons per Day
	POD Status	Active
	Direct Div Amount	0
	Direct Div Ac Ft	0
	Amount Storage	0.7
	POD Max Dd	0
	Source Max Dd Unit	Gallons per Day
	POD Max Storage	0
	Source Max Storage Unit	Gallons per Day
	Diversion Code	Diversion point
	Diversion Type	Direct Diversion
	Storage Type	Diversion point
POD GIS Maintained Data		
	Appl ID	C002568
	Object ID	177377
	Pod Number	1
	Has Opod	N
	Appl Pod	C002568_01
	podId	19077
	County	San Luis Obispo
	Parcel Number	
	Sp Zone	5
	North Coord	2263931
	East Coord	5839486
	Quarter Quarter	NW
	Quarter	NW
	Section Classifier	
	Section Number	31
	Township Number	31
	Township Direction	S
	Range Number	15
	Range Direction	E
	Meridian	21
	Location Method	DD_NE
	Source Name	UNST
	TribDesc	
	Watershed	ESTERO BAY
	Quad Map Name	TAR SPRING RIDGE
Permit		
	Permit ID	
	Water Right Description	
	Issue Date	
	Construction Completed by	
	Planned Project Completion Date	

License

License ID	2568
Issue Date	5/18/1979
Licensee Reporting Cycle	
First Licensee Report Year	

SWRCB	Division of Water Rights - e-WRIMS	10/14/2009
	1) Select Columns A, B, and C)	
	2) Format / Column / Autofit Selection	
	3) Left Justify Column Text	
Application		
	Application ID	C002569
	Appliation Rec'd Date	
	Application Acceptance Date	1/3/1978
	Notice Date	
	Protest	
	Number of Protests	0
	Agent Name	LESTER B MANKINS
	Agent Entity Type	Individual
	Primary Owner	ANDREW W MCREYNOLDS
	Primary Owner Entity Type	Individual
	Water Right Type	Stockpond
	Face Value Amount	0
	Face Value Units	Acre-feet per Year
	Appl Fee Amount	10
	Appl Fee Amt Recd	10
	Max DD Appl	0
	Max DD Units	Gallons per Day
	Max DD Ann	0
	Max Storage	0.1
	Max Use Ann	0
	Year First Use	1962
	Billing Determination	Not Determined
	Power Discount %	0
	FERC #	
	FERC Facility	
	Initial 401 Certification Start	
	Initial 401 Certification End	
	Renewed 401 Certification Start	
	Renewed 401 Certification End	
	Kilowatts Face Plate	0
Parties		
	Name Type	Agent
	Effective From Date	9/15/1994
	Effective To Date	
	Salutation	
	Entity Type	Individual
	Last Name	MANKINS
	Middle Name	B
	First Name	LESTER
Parties		
	Name Type	Non-Primary Owner
	Effective From Date	9/15/1994
	Effective To Date	

	Salutation	
	Entity Type	Individual
	Last Name	MCREYNOLDS
	Middle Name	M
	First Name	CHRISTA
Parties		
	Name Type	Primary Owner
	Effective From Date	9/15/1994
	Effective To Date	
	Salutation	
	Entity Type	Individual
	Last Name	MCREYNOLDS
	Middle Name	W
	First Name	ANDREW
Parties		
	Name Type	Agent
	Effective From Date	9/15/1994
	Effective To Date	
	Salutation	
	Entity Type	Individual
	Last Name	MANKINS
	Middle Name	B
	First Name	LESTER
Status		
	Current Status	Certified
Uses		
	Use Code	Stockwatering
	Use Status (New)	Migrated from old WRIMS data
	Use Population	0
	Use Net Acreage	0
	Use Gross Acreage	0
	Use Direct Diversion Annual Amount (AFA)	0
	Use Direct Diversion Rate (New)	0
	Use Direct Diversion Rate Units	
	Use Storage Amount (New) (AFA)	0.1
Use Seasons		
	Direct Div Season Begin Date	
	Direct Div Season End Date	
	Season Direct Div Rate (New)	0
	Season Direct Div Rate Units	
	Season Direct Div Annual Amount (New) (AFA)	0
	Direct Div Season Status (New)	Migrated from old WRIMS data
	Storage Season Begin Date	1-Nov
	Storage Season End Date	1-May

	Season Storage Amount (AFA)	0.1
	Collection Season Status (New)	Migrated from old WRIMS data
POD		
	POD Number	1
	POD Unit	Gallons per Day
	POD Status	Active
	Direct Div Amount	0
	Direct Div Ac Ft	0
	Amount Storage	0.1
	POD Max Dd	0
	Source Max Dd Unit	Gallons per Day
	POD Max Storage	0
	Source Max Storage Unit	Gallons per Day
	Diversion Code	Diversion point
	Diversion Type	Direct Diversion
	Storage Type	Diversion point
POD GIS Maintained Data		
	Appl ID	C002569
	Object ID	177426
	Pod Number	1
	Has Opod	N
	Appl Pod	C002569_01
	podId	26526
	County	San Luis Obispo
	Parcel Number	
	Sp Zone	5
	North Coord	2273732
	East Coord	5840986
	Quarter Quarter	SE
	Quarter	NW
	Section Classifier	
	Section Number	19
	Township Number	31
	Township Direction	S
	Range Number	15
	Range Direction	E
	Meridian	21
	Location Method	DD_NE
	Source Name	UNST
	TribDesc	
	Watershed	ESTERO BAY
	Quad Map Name	TAR SPRING RIDGE
Permit		
	Permit ID	
	Water Right Description	
	Issue Date	
	Construction Completed by	
	Planned Project Completion Date	

License

License ID	2569
Issue Date	5/18/1979
Licensee Reporting Cycle	
First Licensee Report Year	

SWRCB	Division of Water Rights - e-WRIMS	10/14/2009
	1) Select Columns A, B, and C)	
	2) Format / Column / Autofit Selection	
	3) Left Justify Column Text	
Application		
	Application ID	C002570
	Appliation Rec'd Date	
	Application Acceptance Date	1/3/1978
	Notice Date	
	Protest	
	Number of Protests	0
	Agent Name	LESTER B MANKINS
	Agent Entity Type	Individual
	Primary Owner	ANDREW W MCREYNOLDS
	Primary Owner Entity Type	Individual
	Water Right Type	Stockpond
	Face Value Amount	0
	Face Value Units	Acre-feet per Year
	Appl Fee Amount	10
	Appl Fee Amt Recd	10
	Max DD Appl	0
	Max DD Units	Gallons per Day
	Max DD Ann	0
	Max Storage	0.2
	Max Use Ann	0
	Year First Use	1962
	Billing Determination	Not Determined
	Power Discount %	0
	FERC #	
	FERC Facility	
	Initial 401 Certification Start	
	Initial 401 Certification End	
	Renewed 401 Certification Start	
	Renewed 401 Certification End	
	Kilowatts Face Plate	0
Parties		
	Name Type	Primary Owner
	Effective From Date	9/15/1994
	Effective To Date	
	Salutation	
	Entity Type	Individual
	Last Name	MCREYNOLDS
	Middle Name	W
	First Name	ANDREW
Parties		
	Name Type	Agent
	Effective From Date	9/15/1994
	Effective To Date	

	Salutation	
	Entity Type	Individual
	Last Name	MANKINS
	Middle Name	B
	First Name	LESTER
Parties		
	Name Type	Agent
	Effective From Date	9/15/1994
	Effective To Date	
	Salutation	
	Entity Type	Individual
	Last Name	MANKINS
	Middle Name	B
	First Name	LESTER
Parties		
	Name Type	Non-Primary Owner
	Effective From Date	9/15/1994
	Effective To Date	
	Salutation	
	Entity Type	Individual
	Last Name	MCREYNOLDS
	Middle Name	M
	First Name	CHRISTA
Status		
	Current Status	Certified
Uses		
	Use Code	Stockwatering
	Use Status (New)	Migrated from old WRIMS data
	Use Population	0
	Use Net Acreage	0
	Use Gross Acreage	0
	Use Direct Diversion Annual Amount (AFA)	0
	Use Direct Diversion Rate (New)	0
	Use Direct Diversion Rate Units	
	Use Storage Amount (New) (AFA)	0.2
Use Seasons		
	Direct Div Season Begin Date	
	Direct Div Season End Date	
	Season Direct Div Rate (New)	0
	Season Direct Div Rate Units	
	Season Direct Div Annual Amount (New) (AFA)	0
	Direct Div Season Status (New)	Migrated from old WRIMS data
	Storage Season Begin Date	1-Nov
	Storage Season End Date	1-May

	Season Storage Amount (AFA)	0.2
	Collection Season Status (New)	Migrated from old WRIMS data
POD		
	POD Number	1
	POD Unit	Gallons per Day
	POD Status	Active
	Direct Div Amount	0
	Direct Div Ac Ft	0
	Amount Storage	0.2
	POD Max Dd	0
	Source Max Dd Unit	Gallons per Day
	POD Max Storage	0
	Source Max Storage Unit	Gallons per Day
	Diversion Code	Diversion point
	Diversion Type	Direct Diversion
	Storage Type	Diversion point
POD GIS Maintained Data		
	Appl ID	C002570
	Object ID	177445
	Pod Number	1
	Has Opod	N
	Appl Pod	C002570_01
	podId	13496
	County	San Luis Obispo
	Parcel Number	
	Sp Zone	5
	North Coord	2275931
	East Coord	5845386
	Quarter Quarter	SW
	Quarter	SW
	Section Classifier	
	Section Number	17
	Township Number	31
	Township Direction	S
	Range Number	15
	Range Direction	E
	Meridian	21
	Location Method	DD_NE
	Source Name	UNST
	TribDesc	
	Watershed	ESTERO BAY
	Quad Map Name	TAR SPRING RIDGE
Permit		
	Permit ID	
	Water Right Description	
	Issue Date	
	Construction Completed by	
	Planned Project Completion Date	

License

License ID	2570
Issue Date	5/18/1979
Licensee Reporting Cycle	
First Licensee Report Year	

SWRCB	Division of Water Rights - e-WRIMS	10/14/2009
	1) Select Columns A, B, and C)	
	2) Format / Column / Autofit Selection	
	3) Left Justify Column Text	
Application		
	Application ID	C002571
	Appliation Rec'd Date	
	Application Acceptance Date	1/3/1978
	Notice Date	
	Protest	
	Number of Protests	0
	Agent Name	LESTER B MANKINS
	Agent Entity Type	Individual
	Primary Owner	ANDREW W MCREYNOLDS
	Primary Owner Entity Type	Individual
	Water Right Type	Stockpond
	Face Value Amount	0
	Face Value Units	Acre-feet per Year
	Appl Fee Amount	10
	Appl Fee Amt Recd	10
	Max DD Appl	0
	Max DD Units	Gallons per Day
	Max DD Ann	0
	Max Storage	0.2
	Max Use Ann	0
	Year First Use	1962
	Billing Determination	Not Determined
	Power Discount %	0
	FERC #	
	FERC Facility	
	Initial 401 Certification Start	
	Initial 401 Certification End	
	Renewed 401 Certification Start	
	Renewed 401 Certification End	
	Kilowatts Face Plate	0
Parties		
	Name Type	Agent
	Effective From Date	9/15/1994
	Effective To Date	
	Salutation	
	Entity Type	Individual
	Last Name	MANKINS
	Middle Name	B
	First Name	LESTER
Parties		
	Name Type	Non-Primary Owner
	Effective From Date	9/15/1994
	Effective To Date	

	Salutation	
	Entity Type	Individual
	Last Name	MCREYNOLDS
	Middle Name	M
	First Name	CHRISTA
Parties		
	Name Type	Agent
	Effective From Date	9/15/1994
	Effective To Date	
	Salutation	
	Entity Type	Individual
	Last Name	MANKINS
	Middle Name	B
	First Name	LESTER
Parties		
	Name Type	Primary Owner
	Effective From Date	9/15/1994
	Effective To Date	
	Salutation	
	Entity Type	Individual
	Last Name	MCREYNOLDS
	Middle Name	W
	First Name	ANDREW
Status		
	Current Status	Certified
Uses		
	Use Code	Stockwatering
	Use Status (New)	Migrated from old WRIMS data
	Use Population	0
	Use Net Acreage	0
	Use Gross Acreage	0
	Use Direct Diversion Annual Amount (AFA)	0
	Use Direct Diversion Rate (New)	0
	Use Direct Diversion Rate Units	
	Use Storage Amount (New) (AFA)	0.2
Use Seasons		
	Direct Div Season Begin Date	
	Direct Div Season End Date	
	Season Direct Div Rate (New)	0
	Season Direct Div Rate Units	
	Season Direct Div Annual Amount (New) (AFA)	0
	Direct Div Season Status (New)	Migrated from old WRIMS data
	Storage Season Begin Date	1-Nov
	Storage Season End Date	1-May

	Season Storage Amount (AFA)	0.2
	Collection Season Status (New)	Migrated from old WRIMS data
POD		
	POD Number	1
	POD Unit	Gallons per Day
	POD Status	Active
	Direct Div Amount	0
	Direct Div Ac Ft	0
	Amount Storage	0.2
	POD Max Dd	0
	Source Max Dd Unit	Gallons per Day
	POD Max Storage	0
	Source Max Storage Unit	Gallons per Day
	Diversion Code	Diversion point
	Diversion Type	Direct Diversion
	Storage Type	Diversion point
POD GIS Maintained Data		
	Appl ID	C002571
	Object ID	177451
	Pod Number	1
	Has Opod	N
	Appl Pod	C002571_01
	podId	32417
	County	San Luis Obispo
	Parcel Number	
	Sp Zone	5
	North Coord	2276431
	East Coord	5845686
	Quarter Quarter	SW
	Quarter	SW
	Section Classifier	
	Section Number	17
	Township Number	31
	Township Direction	S
	Range Number	15
	Range Direction	E
	Meridian	21
	Location Method	DD_NE
	Source Name	UNST
	TribDesc	
	Watershed	ESTERO BAY
	Quad Map Name	TAR SPRING RIDGE
Permit		
	Permit ID	
	Water Right Description	
	Issue Date	
	Construction Completed by	
	Planned Project Completion Date	

License

License ID	2571
Issue Date	5/18/1979
Licensee Reporting Cycle	
First Licensee Report Year	

SWRCB	Division of Water Rights - e-WRIMS	10/14/2009
	1) Select Columns A, B, and C)	
	2) Format / Column / Autofit Selection	
	3) Left Justify Column Text	
Application		
	Application ID	C002572
	Appliation Rec'd Date	
	Application Acceptance Date	1/3/1978
	Notice Date	
	Protest	
	Number of Protests	0
	Agent Name	LESTER B MANKINS
	Agent Entity Type	Individual
	Primary Owner	CHRISTA M MCREYNOLDS
	Primary Owner Entity Type	Individual
	Water Right Type	Stockpond
	Face Value Amount	0
	Face Value Units	Acre-feet per Year
	Appl Fee Amount	10
	Appl Fee Amt Recd	10
	Max DD Appl	0
	Max DD Units	Gallons per Day
	Max DD Ann	0
	Max Storage	0.1
	Max Use Ann	0
	Year First Use	1962
	Billing Determination	Not Determined
	Power Discount %	0
	FERC #	
	FERC Facility	
	Initial 401 Certification Start	
	Initial 401 Certification End	
	Renewed 401 Certification Start	
	Renewed 401 Certification End	
	Kilowatts Face Plate	0
Parties		
	Name Type	Primary Owner
	Effective From Date	9/15/1994
	Effective To Date	
	Salutation	
	Entity Type	Individual
	Last Name	MCREYNOLDS
	Middle Name	M
	First Name	CHRISTA
Parties		
	Name Type	Agent
	Effective From Date	9/15/1994
	Effective To Date	

	Salutation	
	Entity Type	Individual
	Last Name	MANKINS
	Middle Name	B
	First Name	LESTER
Parties		
	Name Type	Agent
	Effective From Date	9/15/1994
	Effective To Date	
	Salutation	
	Entity Type	Individual
	Last Name	MANKINS
	Middle Name	B
	First Name	LESTER
Parties		
	Name Type	Non-Primary Owner
	Effective From Date	9/15/1994
	Effective To Date	
	Salutation	
	Entity Type	Individual
	Last Name	MCREYNOLDS
	Middle Name	W
	First Name	ANDREW
Status		
	Current Status	Certified
Uses		
	Use Code	Stockwatering
	Use Status (New)	Migrated from old WRIMS data
	Use Population	0
	Use Net Acreage	0
	Use Gross Acreage	0
	Use Direct Diversion Annual Amount (AFA)	0
	Use Direct Diversion Rate (New)	0
	Use Direct Diversion Rate Units	
	Use Storage Amount (New) (AFA)	0.1
Use Seasons		
	Direct Div Season Begin Date	
	Direct Div Season End Date	
	Season Direct Div Rate (New)	0
	Season Direct Div Rate Units	
	Season Direct Div Annual Amount (New) (AFA)	0
	Direct Div Season Status (New)	Migrated from old WRIMS data
	Storage Season Begin Date	1-Nov
	Storage Season End Date	1-May

	Season Storage Amount (AFA)	0.1
	Collection Season Status (New)	Migrated from old WRIMS data
POD		
	POD Number	1
	POD Unit	Gallons per Day
	POD Status	Active
	Direct Div Amount	0
	Direct Div Ac Ft	0
	Amount Storage	0.1
	POD Max Dd	0
	Source Max Dd Unit	Gallons per Day
	POD Max Storage	0
	Source Max Storage Unit	Gallons per Day
	Diversion Code	Diversion point
	Diversion Type	Direct Diversion
	Storage Type	Diversion point
POD GIS Maintained Data		
	Appl ID	C002572
	Object ID	177442
	Pod Number	1
	Has Opod	N
	Appl Pod	C002572_01
	podId	13497
	County	San Luis Obispo
	Parcel Number	
	Sp Zone	5
	North Coord	2275531
	East Coord	5845386
	Quarter Quarter	SW
	Quarter	SW
	Section Classifier	
	Section Number	17
	Township Number	31
	Township Direction	S
	Range Number	15
	Range Direction	E
	Meridian	21
	Location Method	DD_NE
	Source Name	UNST
	TribDesc	
	Watershed	ESTERO BAY
	Quad Map Name	TAR SPRING RIDGE
Permit		
	Permit ID	
	Water Right Description	
	Issue Date	
	Construction Completed by	
	Planned Project Completion Date	

License

License ID	2572
Issue Date	5/18/1979
Licensee Reporting Cycle	
First Licensee Report Year	

SWRCB	Division of Water Rights - e-WRIMS	10/14/2009
	1) Select Columns A, B, and C)	
	2) Format / Column / Autofit Selection	
	3) Left Justify Column Text	
Application		
	Application ID	C002573
	Appliation Rec'd Date	
	Application Acceptance Date	1/3/1978
	Notice Date	
	Protest	
	Number of Protests	0
	Agent Name	LESTER B MANKINS
	Agent Entity Type	Individual
	Primary Owner	ANDREW W MCREYNOLDS
	Primary Owner Entity Type	Individual
	Water Right Type	Stockpond
	Face Value Amount	0
	Face Value Units	Acre-feet per Year
	Appl Fee Amount	10
	Appl Fee Amt Recd	10
	Max DD Appl	0
	Max DD Units	Gallons per Day
	Max DD Ann	0
	Max Storage	0.4
	Max Use Ann	0
	Year First Use	1962
	Billing Determination	Not Determined
	Power Discount %	0
	FERC #	
	FERC Facility	
	Initial 401 Certification Start	
	Initial 401 Certification End	
	Renewed 401 Certification Start	
	Renewed 401 Certification End	
	Kilowatts Face Plate	0
Parties		
	Name Type	Agent
	Effective From Date	9/15/1994
	Effective To Date	
	Salutation	
	Entity Type	Individual
	Last Name	MANKINS
	Middle Name	B
	First Name	LESTER
Parties		
	Name Type	Non-Primary Owner
	Effective From Date	9/15/1994
	Effective To Date	

	Salutation	
	Entity Type	Individual
	Last Name	MCREYNOLDS
	Middle Name	M
	First Name	CHRISTA
Parties		
	Name Type	Agent
	Effective From Date	9/15/1994
	Effective To Date	
	Salutation	
	Entity Type	Individual
	Last Name	MANKINS
	Middle Name	B
	First Name	LESTER
Parties		
	Name Type	Primary Owner
	Effective From Date	9/15/1994
	Effective To Date	
	Salutation	
	Entity Type	Individual
	Last Name	MCREYNOLDS
	Middle Name	W
	First Name	ANDREW
Status		
	Current Status	Certified
Uses		
	Use Code	Stockwatering
	Use Status (New)	Migrated from old WRIMS data
	Use Population	0
	Use Net Acreage	0
	Use Gross Acreage	0
	Use Direct Diversion Annual Amount (AFA)	0
	Use Direct Diversion Rate (New)	0
	Use Direct Diversion Rate Units	
	Use Storage Amount (New) (AFA)	0.4
Use Seasons		
	Direct Div Season Begin Date	
	Direct Div Season End Date	
	Season Direct Div Rate (New)	0
	Season Direct Div Rate Units	
	Season Direct Div Annual Amount (New) (AFA)	0
	Direct Div Season Status (New)	Migrated from old WRIMS data
	Storage Season Begin Date	1-Nov
	Storage Season End Date	1-May

	Season Storage Amount (AFA)	0.4
	Collection Season Status (New)	Migrated from old WRIMS data
POD		
	POD Number	1
	POD Unit	Gallons per Day
	POD Status	Active
	Direct Div Amount	0
	Direct Div Ac Ft	0
	Amount Storage	0.4
	POD Max Dd	0
	Source Max Dd Unit	Gallons per Day
	POD Max Storage	0
	Source Max Storage Unit	Gallons per Day
	Diversion Code	Diversion point
	Diversion Type	Direct Diversion
	Storage Type	Diversion point
POD GIS Maintained Data		
	Appl ID	C002573
	Object ID	177420
	Pod Number	1
	Has Opod	N
	Appl Pod	C002573_01
	podId	3761
	County	San Luis Obispo
	Parcel Number	
	Sp Zone	5
	North Coord	2271331
	East Coord	5849686
	Quarter Quarter	SE
	Quarter	SE
	Section Classifier	
	Section Number	20
	Township Number	31
	Township Direction	S
	Range Number	15
	Range Direction	E
	Meridian	21
	Location Method	DD_NE
	Source Name	UNST
	TribDesc	
	Watershed	ESTERO BAY
	Quad Map Name	TAR SPRING RIDGE
Permit		
	Permit ID	
	Water Right Description	
	Issue Date	
	Construction Completed by	
	Planned Project Completion Date	

License

License ID	2573
Issue Date	5/18/1979
Licensee Reporting Cycle	
First Licensee Report Year	

SWRCB	Division of Water Rights - e-WRIMS	10/14/2009
	1) Select Columns A, B, and C)	
	2) Format / Column / Autofit Selection	
	3) Left Justify Column Text	
Application		
	Application ID	C002574
	Appliation Rec'd Date	
	Application Acceptance Date	1/3/1978
	Notice Date	
	Protest	
	Number of Protests	0
	Agent Name	LESTER B MANKINS
	Agent Entity Type	Individual
	Primary Owner	ANDREW W MCREYNOLDS
	Primary Owner Entity Type	Individual
	Water Right Type	Stockpond
	Face Value Amount	0
	Face Value Units	Acre-feet per Year
	Appl Fee Amount	10
	Appl Fee Amt Recd	10
	Max DD Appl	0
	Max DD Units	Gallons per Day
	Max DD Ann	0
	Max Storage	0.9
	Max Use Ann	0
	Year First Use	1965
	Billing Determination	Not Determined
	Power Discount %	0
	FERC #	
	FERC Facility	
	Initial 401 Certification Start	
	Initial 401 Certification End	
	Renewed 401 Certification Start	
	Renewed 401 Certification End	
	Kilowatts Face Plate	0
Parties		
	Name Type	Primary Owner
	Effective From Date	9/15/1994
	Effective To Date	
	Salutation	
	Entity Type	Individual
	Last Name	MCREYNOLDS
	Middle Name	W
	First Name	ANDREW
Parties		
	Name Type	Non-Primary Owner
	Effective From Date	9/15/1994
	Effective To Date	

	Salutation	
	Entity Type	Individual
	Last Name	MCREYNOLDS
	Middle Name	M
	First Name	CHRISTA
Parties		
	Name Type	Agent
	Effective From Date	9/15/1994
	Effective To Date	
	Salutation	
	Entity Type	Individual
	Last Name	MANKINS
	Middle Name	B
	First Name	LESTER
Parties		
	Name Type	Agent
	Effective From Date	9/15/1994
	Effective To Date	
	Salutation	
	Entity Type	Individual
	Last Name	MANKINS
	Middle Name	B
	First Name	LESTER
Status		
	Current Status	Certified
Uses		
	Use Code	Stockwatering
	Use Status (New)	Migrated from old WRIMS data
	Use Population	0
	Use Net Acreage	0
	Use Gross Acreage	0
	Use Direct Diversion Annual Amount (AFA)	0
	Use Direct Diversion Rate (New)	0
	Use Direct Diversion Rate Units	
	Use Storage Amount (New) (AFA)	0.9
Use Seasons		
	Direct Div Season Begin Date	
	Direct Div Season End Date	
	Season Direct Div Rate (New)	0
	Season Direct Div Rate Units	
	Season Direct Div Annual Amount (New) (AFA)	0
	Direct Div Season Status (New)	Migrated from old WRIMS data
	Storage Season Begin Date	1-Nov
	Storage Season End Date	1-May

	Season Storage Amount (AFA)	0.9
	Collection Season Status (New)	Migrated from old WRIMS data
POD		
	POD Number	1
	POD Unit	Gallons per Day
	POD Status	Active
	Direct Div Amount	0
	Direct Div Ac Ft	0
	Amount Storage	0.9
	POD Max Dd	0
	Source Max Dd Unit	Gallons per Day
	POD Max Storage	0
	Source Max Storage Unit	Gallons per Day
	Diversion Code	Diversion point
	Diversion Type	Direct Diversion
	Storage Type	Diversion point
POD GIS Maintained Data		
	Appl ID	C002574
	Object ID	177408
	Pod Number	1
	Has Opod	N
	Appl Pod	C002574_01
	podId	7769
	County	San Luis Obispo
	Parcel Number	
	Sp Zone	5
	North Coord	2269232
	East Coord	5835886
	Quarter Quarter	NE
	Quarter	NW
	Section Classifier	P
	Section Number	25
	Township Number	31
	Township Direction	S
	Range Number	14
	Range Direction	E
	Meridian	21
	Location Method	DD_NE
	Source Name	ARROYO GRANDE CREEK
	TribDesc	
	Watershed	ESTERO BAY
	Quad Map Name	TAR SPRING RIDGE
Permit		
	Permit ID	
	Water Right Description	
	Issue Date	
	Construction Completed by	
	Planned Project Completion Date	

License

License ID	2574
Issue Date	5/18/1979
Licensee Reporting Cycle	
First Licensee Report Year	

SWRCB	Division of Water Rights - e-WRIMS	10/14/2009
	1) Select Columns A, B, and C)	
	2) Format / Column / Autofit Selection	
	3) Left Justify Column Text	
Application		
	Application ID	C002682
	Appliation Rec'd Date	
	Application Acceptance Date	1/5/1978
	Notice Date	
	Protest	
	Number of Protests	0
	Agent Name	
	Agent Entity Type	
	Primary Owner	BOB LANGSTON
	Primary Owner Entity Type	Individual
	Water Right Type	Stockpond
	Face Value Amount	0
	Face Value Units	Acre-feet per Year
	Appl Fee Amount	10
	Appl Fee Amt Recd	10
	Max DD Appl	0
	Max DD Units	Gallons per Day
	Max DD Ann	0
	Max Storage	0.1
	Max Use Ann	0
	Year First Use	1962
	Billing Determination	Not Determined
	Power Discount %	0
	FERC #	
	FERC Facility	
	Initial 401 Certification Start	
	Initial 401 Certification End	
	Renewed 401 Certification Start	
	Renewed 401 Certification End	
	Kilowatts Face Plate	0
Parties		
	Name Type	Non-Primary Owner
	Effective From Date	9/15/1994
	Effective To Date	
	Salutation	
	Entity Type	Individual
	Last Name	LANGSTON
	Middle Name	
	First Name	MOLLY
Parties		
	Name Type	Primary Owner
	Effective From Date	9/15/1994
	Effective To Date	

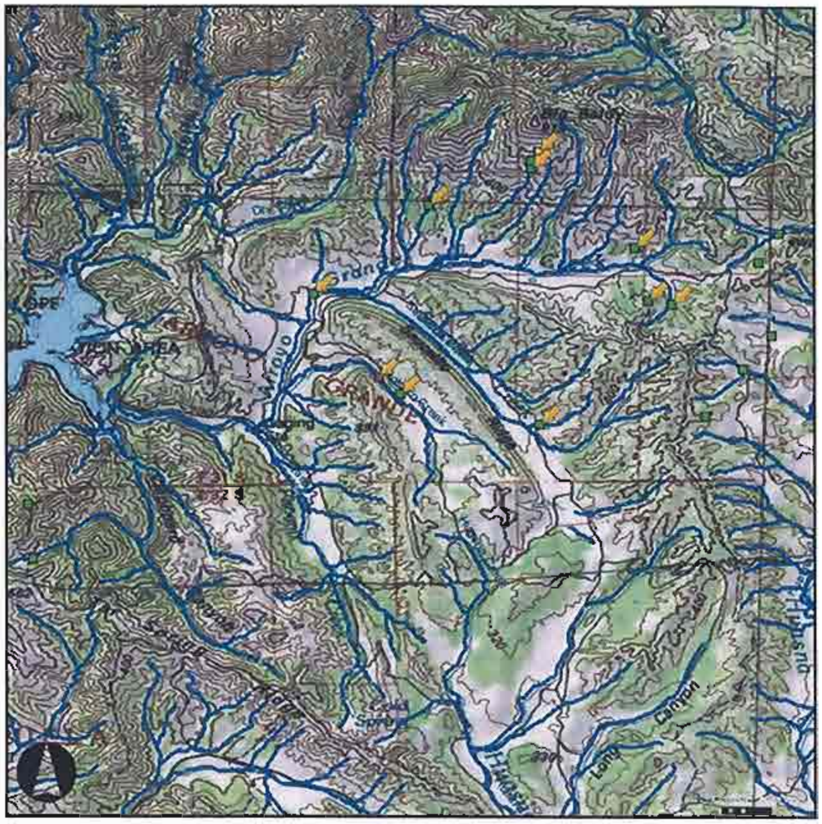
	Salutation	
	Entity Type	Individual
	Last Name	LANGSTON
	Middle Name	
	First Name	BOB
Status		
	Current Status	Certified
Uses		
	Use Code	Stockwatering
	Use Status (New)	Migrated from old WRIMS data
	Use Population	0
	Use Net Acreage	0
	Use Gross Acreage	0
	Use Direct Diversion Annual Amount (AFA)	0
	Use Direct Diversion Rate (New)	0
	Use Direct Diversion Rate Units	
	Use Storage Amount (New) (AFA)	0.1
Use Seasons		
	Direct Div Season Begin Date	
	Direct Div Season End Date	
	Season Direct Div Rate (New)	0
	Season Direct Div Rate Units	
	Season Direct Div Annual Amount (New) (AFA)	0
	Direct Div Season Status (New)	Migrated from old WRIMS data
	Storage Season Begin Date	1-Nov
	Storage Season End Date	1-May
	Season Storage Amount (AFA)	0.1
	Collection Season Status (New)	Migrated from old WRIMS data
POD		
	POD Number	1
	POD Unit	Gallons per Day
	POD Status	Active
	Direct Div Amount	0
	Direct Div Ac Ft	0
	Amount Storage	0.1
	POD Max Dd	0
	Source Max Dd Unit	Gallons per Day
	POD Max Storage	0
	Source Max Storage Unit	Gallons per Day
	Diversion Code	Diversion point
	Diversion Type	Direct Diversion
	Storage Type	Diversion point
POD GIS Maintained Data		
	Appl ID	C002682
	Object ID	177405

	Pod Number	1
	Has Opod	N
	Appl Pod	C002682_01
	podId	15254
	County	San Luis Obispo
	Parcel Number	
	Sp Zone	5
	North Coord	2268331
	East Coord	5851186
	Quarter Quarter	SE
	Quarter	NW
	Section Classifier	
	Section Number	28
	Township Number	31
	Township Direction	S
	Range Number	15
	Range Direction	E
	Meridian	21
	Location Method	DD_NE
	Source Name	UNST
	TribDesc	
	Watershed	ESTERO BAY
	Quad Map Name	TAR SPRING RIDGE
Permit		
	Permit ID	
	Water Right Description	
	Issue Date	
	Construction Completed by	
	Planned Project Completion Date	
License		
	License ID	2682
	Issue Date	5/14/1980
	Licensee Reporting Cycle	
	First Licensee Report Year	

SWRCB	Division of Water Rights - e-WRIMS	10/14/2009
	1) Select Columns A, B, and C)	
	2) Format / Column / Autofit Selection	
	3) Left Justify Column Text	
Application		
	Application ID	C002683
	Appliation Rec'd Date	
	Application Acceptance Date	1/5/1978
	Notice Date	
	Protest	
	Number of Protests	0
	Agent Name	
	Agent Entity Type	
	Primary Owner	BOB LANGSTON
	Primary Owner Entity Type	Individual
	Water Right Type	Stockpond
	Face Value Amount	0
	Face Value Units	Acre-feet per Year
	Appl Fee Amount	10
	Appl Fee Amt Recd	10
	Max DD Appl	0
	Max DD Units	Gallons per Day
	Max DD Ann	0
	Max Storage	0.1
	Max Use Ann	0
	Year First Use	1954
	Billing Determination	Not Determined
	Power Discount %	0
	FERC #	
	FERC Facility	
	Initial 401 Certification Start	
	Initial 401 Certification End	
	Renewed 401 Certification Start	
	Renewed 401 Certification End	
	Kilowatts Face Plate	0
Parties		
	Name Type	Primary Owner
	Effective From Date	9/15/1994
	Effective To Date	
	Salutation	
	Entity Type	Individual
	Last Name	LANGSTON
	Middle Name	
	First Name	BOB
Parties		
	Name Type	Non-Primary Owner
	Effective From Date	9/15/1994
	Effective To Date	

	Salutation	
	Entity Type	Individual
	Last Name	LANGSTON
	Middle Name	
	First Name	MOLLY
Status		
	Current Status	Certified
Uses		
	Use Code	Stockwatering
	Use Status (New)	Migrated from old WRIMS data
	Use Population	0
	Use Net Acreage	0
	Use Gross Acreage	0
	Use Direct Diversion Annual Amount (AFA)	0
	Use Direct Diversion Rate (New)	0
	Use Direct Diversion Rate Units	
	Use Storage Amount (New) (AFA)	0.1
Use Seasons		
	Direct Div Season Begin Date	
	Direct Div Season End Date	
	Season Direct Div Rate (New)	0
	Season Direct Div Rate Units	
	Season Direct Div Annual Amount (New) (AFA)	0
	Direct Div Season Status (New)	Migrated from old WRIMS data
	Storage Season Begin Date	1-Nov
	Storage Season End Date	1-May
	Season Storage Amount (AFA)	0.1
	Collection Season Status (New)	Migrated from old WRIMS data
POD		
	POD Number	1
	POD Unit	Gallons per Day
	POD Status	Active
	Direct Div Amount	0
	Direct Div Ac Ft	0
	Amount Storage	0.1
	POD Max Dd	0
	Source Max Dd Unit	Gallons per Day
	POD Max Storage	0
	Source Max Storage Unit	Gallons per Day
	Diversion Code	Diversion point
	Diversion Type	Direct Diversion
	Storage Type	Diversion point
POD GIS Maintained Data		
	Appl ID	C002683
	Object ID	177407

	Pod Number	1
	Has Opod	N
	Appl Pod	C002683_01
	podId	19086
	County	San Luis Obispo
	Parcel Number	
	Sp Zone	5
	North Coord	2268531
	East Coord	5850186
	Quarter Quarter	SW
	Quarter	NW
	Section Classifier	
	Section Number	28
	Township Number	31
	Township Direction	S
	Range Number	15
	Range Direction	E
	Meridian	21
	Location Method	DD_NE
	Source Name	UNST
	TribDesc	
	Watershed	ESTERO BAY
	Quad Map Name	TAR SPRING RIDGE
Permit		
	Permit ID	
	Water Right Description	
	Issue Date	
	Construction Completed by	
	Planned Project Completion Date	
License		
	License ID	2683
	Issue Date	5/14/1980
	Licensee Reporting Cycle	
	First Licensee Report Year	



water rights upstream of
USGS 11141150
Arroyo Grande AB Phoenix Cr

Points of Diversion (11)

Points of Diversion
- Adjudicated
- Cancelled
- Certified
- Claimed
- Claimed - Local Oversight
- Inactive
- Licensed
- Pending

Points of Diversion (continued)
- Permitted
- Registered
- Revoked
- State Filing
- Temporary

Lakes (1:24K)

Rivers (1:24K)

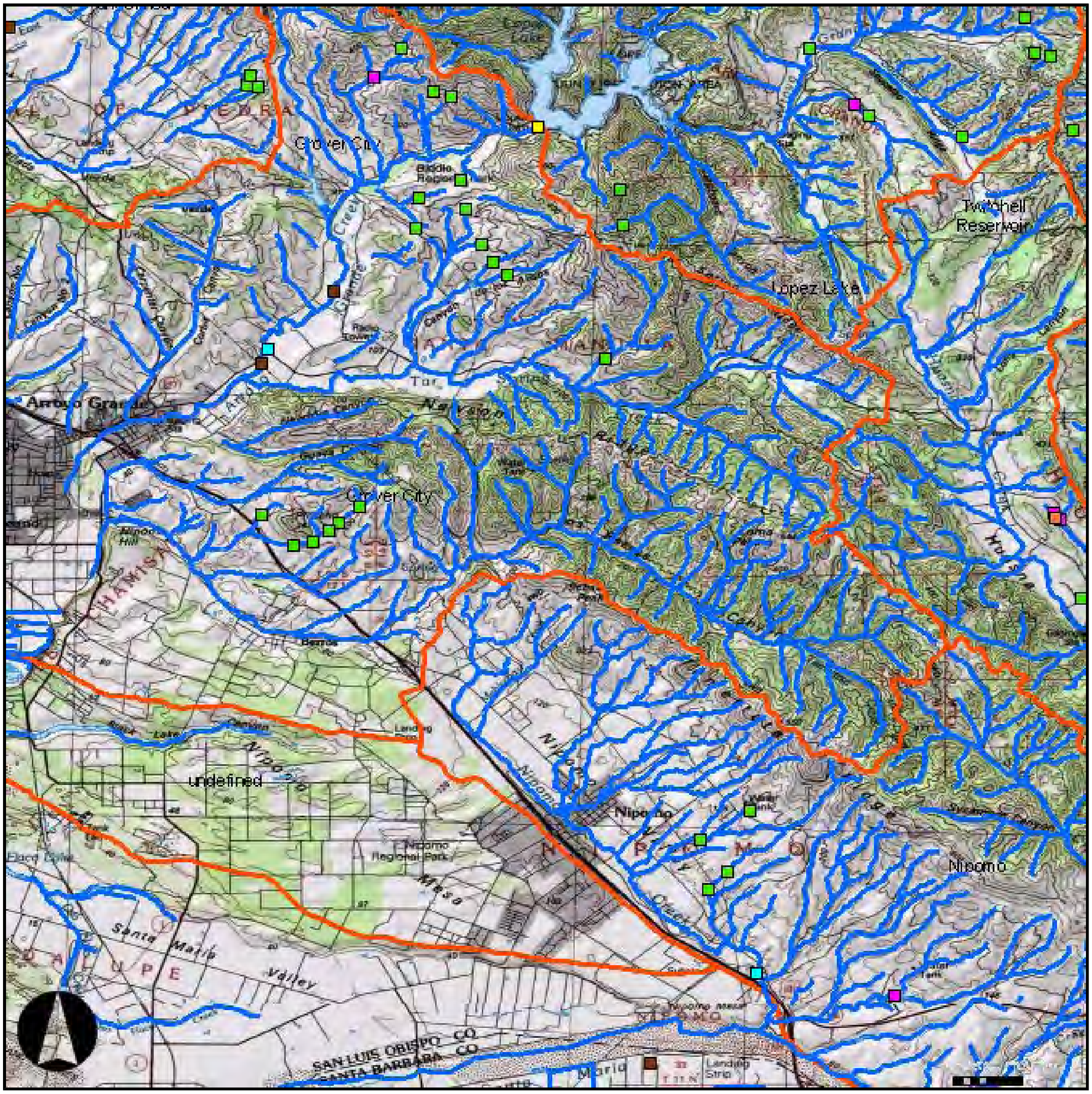
NGS USA Topographic Maps

Select POD Results

Points of Diversion (11)

POD_ID	APPL_ID	POD_NUM	APPL_POD	TOWNSHIP_NUMBER	TOWNSHIP_DIRECTION	RANGE_NUMBER	RANGE_DIRECTION	SECTION_NUMBER	SECTION_CLASSIFIER	QUARTER	QUARTER
32623	A025698	01	A025698_01	31	S	14	E	25	P	SE	SE
32416	C002567	01	C002567_01	31	S	15	E	32		NW	SW
19077	C002568	01	C002568_01	31	S	15	E	31		NW	NW
26526	C002569	01	C002569_01	31	S	15	E	19		NW	SE
13496	C002570	01	C002570_01	31	S	15	E	17		SW	SW
32417	C002571	01	C002571_01	31	S	15	E	17		SW	SW
13497	C002572	01	C002572_01	31	S	15	E	17		SW	SW
3761	C002573	01	C002573_01	31	S	15	E	20		SE	SE
7769	C002574	01	C002574_01	31	S	14	E	25	P	NW	NE

15254	C002682	01	C002682_01	31	S	15	E	28		NW	SE
19086	C002683	01	C002683_01	31	S	15	E	28		NW	SW



Points of Diversion
- Adjudicated
- Cancelled
- Certified
- Claimed
- Claimed - Local Oversight
- Inactive
- Licensed
- Pending
- Permitted
- Registered

Points of Diversion (continued)
- Revoked
- State Filing
- Temporary

Lakes (1:24K)

Rivers (1:24K)

Super Planning Watersheds

NGS USA Topographic Maps

water rights upstream of
USGS 11141600/SLO 05
Los Berros Cr
(no identified upstream rights)

SWRCB	Division of Water Rights - e-WRIMS	10/14/2009
	1) Select Columns A, B, and C)	
	2) Format / Column / Autofit Selection	
	3) Left Justify Column Text	
Application		
	Application ID	A019108
	Appliation Rec'd Date	
	Application Acceptance Date	11/24/1959
	Notice Date	
	Protest	
	Number of Protests	0
	Agent Name	
	Agent Entity Type	
	Primary Owner	STATE WATER RESOURCES CONTROL BOARD
	Primary Owner Entity Type	Government (State/Municipal)
	Water Right Type	Appropriative
	Face Value Amount	0
	Face Value Units	Acre-feet per Year
	Appl Fee Amount	0
	Appl Fee Amt Recd	0
	Max DD Appl	0
	Max DD Units	Gallons per Day
	Max DD Ann	0
	Max Storage	80000
	Max Use Ann	0
	Year First Use	0
	Billing Determination	Not Determined
	Power Discount %	0
	FERC #	
	FERC Facility	
	Initial 401 Certification Start	
	Initial 401 Certification End	
	Renewed 401 Certification Start	
	Renewed 401 Certification End	
	Kilowatts Face Plate	0
Parties		
	Name Type	Primary Owner
	Effective From Date	9/15/1994
	Effective To Date	
	Salutation	
	Entity Type	Government (State/Municipal)
	Last Name	STATE WATER RESOURCES CONTROL BOARD
	Middle Name	
	First Name	
	Mailing Street Number	
	Mailing Street Name	PO BOX 2000
	Mailing Address Line2	
	Mailing City	SACRAMENTO
	Mailing State	CA
	Mailing Zip	95812
	Mailing Country	USA
	Mailing Foreign Code	
	Billing Street Number	
	Billing Street Name	PO BOX 2000
	Billing Address Line2	
	Billing City	SACRAMENTO
	Billing State	CA
	Billing Zip	95812
	Billing Country	USA
	Billing Foreign Code	

	Phone	
Status		
	Current Status	State Filing
Uses		
	Use Code	Irrigation
	Use Status (New)	Migrated from old WRIMS data
	Use Population	0
	Use Net Acreage	70940
	Use Gross Acreage	0
	Use Direct Diversion Annual Amount (AFA)	0
	Use Direct Diversion Rate (New)	0
	Use Direct Diversion Rate Units	
	Use Storage Amount (New) (AFA)	0
Use Seasons		
	Direct Div Season Begin Date	
	Direct Div Season End Date	
	Season Direct Div Rate (New)	0
	Season Direct Div Rate Units	
	Season Direct Div Annual Amount (New) (AFA)	0
	Direct Div Season Status (New)	Migrated from old WRIMS data
	Storage Season Begin Date	
	Storage Season End Date	
	Season Storage Amount (AFA)	0
	Collection Season Status (New)	Migrated from old WRIMS data
Uses		
	Use Code	Municipal
	Use Status (New)	Migrated from old WRIMS data
	Use Population	0
	Use Net Acreage	0
	Use Gross Acreage	0
	Use Direct Diversion Annual Amount (AFA)	0
	Use Direct Diversion Rate (New)	0
	Use Direct Diversion Rate Units	
	Use Storage Amount (New) (AFA)	0
Uses		
	Use Code	Recreational
	Use Status (New)	Migrated from old WRIMS data
	Use Population	0
	Use Net Acreage	0
	Use Gross Acreage	0
	Use Direct Diversion Annual Amount (AFA)	0
	Use Direct Diversion Rate (New)	0
	Use Direct Diversion Rate Units	
	Use Storage Amount (New) (AFA)	0
Uses		
	Use Code	Domestic
	Use Status (New)	Migrated from old WRIMS data
	Use Population	0
	Use Net Acreage	0
	Use Gross Acreage	0
	Use Direct Diversion Annual Amount (AFA)	0
	Use Direct Diversion Rate (New)	0
	Use Direct Diversion Rate Units	
	Use Storage Amount (New) (AFA)	0
Uses		
	Use Code	Industrial

	Use Status (New)	Migrated from old WRIMS data
	Use Population	0
	Use Net Acreage	0
	Use Gross Acreage	0
	Use Direct Diversion Annual Amount (AFA)	0
	Use Direct Diversion Rate (New)	0
	Use Direct Diversion Rate Units	
	Use Storage Amount (New) (AFA)	0
Uses		
	Use Code	Stockwatering
	Use Status (New)	Migrated from old WRIMS data
	Use Population	0
	Use Net Acreage	0
	Use Gross Acreage	0
	Use Direct Diversion Annual Amount (AFA)	0
	Use Direct Diversion Rate (New)	0
	Use Direct Diversion Rate Units	
	Use Storage Amount (New) (AFA)	0
POD		
	POD Number	1
	POD Unit	Gallons per Day
	POD Status	Active
	Direct Div Amount	0
	Direct Div Ac Ft	0
	Amount Storage	80000
	POD Max Dd	0
	Source Max Dd Unit	Gallons per Day
	POD Max Storage	80000
	Source Max Storage Unit	Gallons per Day
	Diversion Code	Diversion point
	Diversion Type	Direct Diversion
	Storage Type	Diversion point
POD GIS Maintained Data		
	Appl ID	A019108
	Object ID	179182
	Pod Number	1
	Has Opod	N
	Appl Pod	A019108_01
	podId	34643
	County	San Luis Obispo
	Parcel Number	
	Sp Zone	5
	North Coord	2463437
	East Coord	5586781
	Quarter Quarter	NE
	Quarter	NE
	Section Classifier	
	Section Number	35
	Township Number	25
	Township Direction	S
	Range Number	6
	Range Direction	E
	Meridian	21
	Location Method	DD_NE
	Source Name	ARROYO DE LA CRUZ
	TribDesc	
	Watershed	ESTERO BAY
	Quad Map Name	PIEDRAS BLANCAS

Permit

Permit ID
Water Right Description
Issue Date
Construction Completed by
Planned Project Completion Date

SWRCB	Division of Water Rights - e-WRIMS 1) Select Columns A, B, and C) 2) Format / Column / Autofit Selection 3) Left Justify Column Text		10/14/2009
Application			
	Application ID	A020026A	
	Appliation Rec'd Date		3/9/1961
	Application Acceptance Date		3/9/1961
	Notice Date		
	Protest		
	Number of Protests		0
	Agent Name	MARTIN CEPKAUSKAS	
	Agent Entity Type	Individual	
	Primary Owner	HEARST HOLDINGS INC	
	Primary Owner Entity Type	Government (State/Municipal)	
	Water Right Type	Appropriative	
	Face Value Amount		70
	Face Value Units	Acre-feet per Year	
	Appl Fee Amount		0
	Appl Fee Amt Recd		0
	Max DD Appl		0.27
	Max DD Units	Cubic Feet per Second	
	Max DD Ann		70
	Max Storage		0
	Max Use Ann		70
	Year First Use		0
	Billing Determination	Not Determined	
	Power Discount %		0
	FERC #		
	FERC Facility		
	Initial 401 Certification Start		
	Initial 401 Certification End		
	Renewed 401 Certification Start		
	Renewed 401 Certification End		
	Kilowatts Face Plate		0
Parties			
	Name Type	Agent	
	Effective From Date		12/13/2001
	Effective To Date		
	Salutation		
	Entity Type	Individual	
	Last Name	CEPKAUSKAS	
	Middle Name		
	First Name	MARTIN	
Parties			
	Name Type	Primary Owner	
	Effective From Date		6/26/1997
	Effective To Date		
	Salutation		
	Entity Type	Government (State/Municipal)	
	Last Name	HEARST HOLDINGS INC	
	Middle Name		

	First Name	
	Mailing Street Number	
	Mailing Street Name	5 THIRD ST STE 200
	Mailing Address Line2	
	Mailing City	SAN FRANCISCO
	Mailing State	CA
	Mailing Zip	94103
	Mailing Country	USA
	Mailing Foreign Code	
	Billing Street Number	
	Billing Street Name	5 3RD ST STE 200
	Billing Address Line2	
	Billing City	SAN FRANCISCO
	Billing State	CA
	Billing Zip	94103
	Billing Country	USA
	Billing Foreign Code	
	Phone	4157778196
Status		
	Current Status	Licensed
Uses		
	Use Code	Irrigation
	Use Status (New)	Migrated from old WRIMS data
	Use Population	0
	Use Net Acreage	27
	Use Gross Acreage	0
	Use Direct Diversion Annual Amount (AFA)	70
	Use Direct Diversion Rate (New)	0
	Use Direct Diversion Rate Units	
	Use Storage Amount (New) (AFA)	0
Use Seasons		
	Direct Div Season Begin Date	1-Apr
	Direct Div Season End Date	31-Oct
	Season Direct Div Rate (New)	0
	Season Direct Div Rate Units	
	Season Direct Div Annual Amount (New) (AFA)	0
	Direct Div Season Status (New)	Migrated from old WRIMS data
	Storage Season Begin Date	
	Storage Season End Date	
	Season Storage Amount (AFA)	0
	Collection Season Status (New)	Migrated from old WRIMS data
Uses		
	Use Code	Domestic
	Use Status (New)	Migrated from old WRIMS data
	Use Population	0
	Use Net Acreage	0
	Use Gross Acreage	0
	Use Direct Diversion Annual Amount (AFA)	70
	Use Direct Diversion Rate (New)	0
	Use Direct Diversion Rate Units	
	Use Storage Amount (New) (AFA)	0
Use Seasons		

	Direct Div Season Begin Date		1-Jan
	Direct Div Season End Date		31-Dec
	Season Direct Div Rate (New)		0
	Season Direct Div Rate Units		
	Season Direct Div Annual Amount (New) (AFA)		0
	Direct Div Season Status (New)	Migrated from old WRIMS data	
	Storage Season Begin Date		
	Storage Season End Date		
	Season Storage Amount (AFA)		0
	Collection Season Status (New)	Migrated from old WRIMS data	
Uses			
	Use Code	Stockwatering	
	Use Status (New)	Migrated from old WRIMS data	
	Use Population		0
	Use Net Acreage		0
	Use Gross Acreage		0
	Use Direct Diversion Annual Amount (AFA)		70
	Use Direct Diversion Rate (New)		0
	Use Direct Diversion Rate Units		
	Use Storage Amount (New) (AFA)		0
Use Seasons			
	Direct Div Season Begin Date		1-Jan
	Direct Div Season End Date		31-Dec
	Season Direct Div Rate (New)		0
	Season Direct Div Rate Units		
	Season Direct Div Annual Amount (New) (AFA)		0
	Direct Div Season Status (New)	Migrated from old WRIMS data	
	Storage Season Begin Date		
	Storage Season End Date		
	Season Storage Amount (AFA)		0
	Collection Season Status (New)	Migrated from old WRIMS data	
Uses			
	Use Code	Irrigation	
	Use Status (New)	Migrated from old WRIMS data	
	Use Population		0
	Use Net Acreage		0
	Use Gross Acreage		0
	Use Direct Diversion Annual Amount (AFA)		0
	Use Direct Diversion Rate (New)		0
	Use Direct Diversion Rate Units		
	Use Storage Amount (New) (AFA)		0
POD			
	POD Number		1
	POD Unit	Cubic Feet per Second	
	POD Status	Active	
	Direct Div Amount		0.27
	Direct Div Ac Ft		70
	Amount Storage		0
	POD Max Dd		0.27
	Source Max Dd Unit	Cubic Feet per Second	
	POD Max Storage		0
	Source Max Storage Unit	Cubic Feet per Second	
	Diversion Code	Diversion point	

	Diversion Type	Storage
	Storage Type	Diversion point

POD GIS Maintained Data

POD

	POD Number	1
	POD Unit	Cubic Feet per Second
	POD Status	Active
	Direct Div Amount	0.27
	Direct Div Ac Ft	70
	Amount Storage	0
	POD Max Dd	0.27
	Source Max Dd Unit	Cubic Feet per Second
	POD Max Storage	0
	Source Max Storage Unit	Cubic Feet per Second
	Diversion Code	Diversion point
	Diversion Type	Storage
	Storage Type	Diversion point

POD GIS Maintained Data

Permit

	Permit ID	14902
	Water Right Description	Migrated data from old WRIMS system.
	Issue Date	10/28/1965
	Construction Completed by	
	Planned Project Completion Date	

License

	License ID	010924A
	Issue Date	6/26/1997
	Licensee Reporting Cycle	
	First Licensee Report Year	

License Terms

	Term ID	5
	Version Number	1
	Term Short Description	
	DWR Specific Clauses	

SWRCB	Division of Water Rights - e-WRIMS	10/14/2009
	1) Select Columns A, B, and C)	
	2) Format / Column / Autofit Selection	
	3) Left Justify Column Text	
Application		
	Application ID	A020026B
	Appliation Rec'd Date	3/9/1961
	Application Acceptance Date	3/9/1961
	Notice Date	
	Protest	
	Number of Protests	0
	Agent Name	
	Agent Entity Type	
	Primary Owner	CALIF DEPT OF PARKS & RECREATION
	Primary Owner Entity Type	Government (State/Municipal)
	Water Right Type	Appropriative
	Face Value Amount	60
	Face Value Units	Acre-feet per Year
	Appl Fee Amount	0
	Appl Fee Amt Recd	0
	Max DD Appl	0.14
	Max DD Units	Cubic Feet per Second
	Max DD Ann	60
	Max Storage	0
	Max Use Ann	60
	Year First Use	0
	Billing Determination	Not Determined
	Power Discount %	0
	FERC #	
	FERC Facility	
	Initial 401 Certification Start	
	Initial 401 Certification End	
	Renewed 401 Certification Start	
	Renewed 401 Certification End	
	Kilowatts Face Plate	0
Parties		
	Name Type	Primary Owner
	Effective From Date	6/26/1997
	Effective To Date	
	Salutation	
	Entity Type	Government (State/Municipal)
	Last Name	CALIF DEPT OF PARKS & RECREATION
	Middle Name	
	First Name	
	Mailing Street Number	
	Mailing Street Name	PO BOX 942896
	Mailing Address Line2	
	Mailing City	SACRAMENTO
	Mailing State	CA
	Mailing Zip	94296
	Mailing Country	USA
	Mailing Foreign Code	
	Billing Street Number	
	Billing Street Name	PO BOX 942896
	Billing Address Line2	
	Billing City	SACRAMENTO

	Billing State	CA
	Billing Zip	94296
	Billing Country	USA
	Billing Foreign Code	
	Phone	
Status		
	Current Status	Licensed
Uses		
	Use Code	Irrigation
	Use Status (New)	Migrated from old WRIMS data
	Use Population	0
	Use Net Acreage	19
	Use Gross Acreage	0
	Use Direct Diversion Annual Amount (AFA)	55.2
	Use Direct Diversion Rate (New)	0
	Use Direct Diversion Rate Units	
	Use Storage Amount (New) (AFA)	0
Use Seasons		
	Direct Div Season Begin Date	1-Apr
	Direct Div Season End Date	31-Dec
	Season Direct Div Rate (New)	0
	Season Direct Div Rate Units	
	Season Direct Div Annual Amount (New) (AFA)	0
	Direct Div Season Status (New)	Migrated from old WRIMS data
	Storage Season Begin Date	
	Storage Season End Date	
	Season Storage Amount (AFA)	0
	Collection Season Status (New)	Migrated from old WRIMS data
Uses		
	Use Code	Domestic
	Use Status (New)	Migrated from old WRIMS data
	Use Population	0
	Use Net Acreage	0
	Use Gross Acreage	0
	Use Direct Diversion Annual Amount (AFA)	7.2
	Use Direct Diversion Rate (New)	0
	Use Direct Diversion Rate Units	
	Use Storage Amount (New) (AFA)	0
Use Seasons		
	Direct Div Season Begin Date	1-Jan
	Direct Div Season End Date	31-Dec
	Season Direct Div Rate (New)	0
	Season Direct Div Rate Units	
	Season Direct Div Annual Amount (New) (AFA)	0
	Direct Div Season Status (New)	Migrated from old WRIMS data
	Storage Season Begin Date	
	Storage Season End Date	
	Season Storage Amount (AFA)	0
	Collection Season Status (New)	Migrated from old WRIMS data
Uses		
	Use Code	Irrigation
	Use Status (New)	Migrated from old WRIMS data
	Use Population	0

Use Net Acreage	0
Use Gross Acreage	0
Use Direct Diversion Annual Amount (AFA)	0
Use Direct Diversion Rate (New)	0
Use Direct Diversion Rate Units	
Use Storage Amount (New) (AFA)	0

POD

POD Number	1
POD Unit	Cubic Feet per Second
POD Status	Active
Direct Div Amount	0.14
Direct Div Ac Ft	60
Amount Storage	0
POD Max Dd	0.14
Source Max Dd Unit	Cubic Feet per Second
POD Max Storage	0
Source Max Storage Unit	Cubic Feet per Second
Diversion Code	Diversion point
Diversion Type	Storage
Storage Type	Diversion point

POD GIS Maintained Data

Appl ID	A020026B
Object ID	179063
Pod Number	1
Has Opod	N
Appl Pod	A020026B_01
podId	11447
County	San Luis Obispo
Parcel Number	
Sp Zone	5
North Coord	2451536
East Coord	5641183
Quarter Quarter	SE
Quarter	NE
Section Classifier	
Section Number	10
Township Number	26
Township Direction	S
Range Number	8
Range Direction	E
Meridian	21
Location Method	DD_NE
Source Name	UNSP (AKA PHELAN SPRING)
TribDesc	
Watershed	ESTERO BAY
Quad Map Name	PEBBLESTONE SHUT-IN

POD

POD Number	1
POD Unit	Cubic Feet per Second
POD Status	Active
Direct Div Amount	0.14
Direct Div Ac Ft	60
Amount Storage	0
POD Max Dd	0.14
Source Max Dd Unit	Cubic Feet per Second

	POD Max Storage	0
	Source Max Storage Unit	Cubic Feet per Second
	Diversion Code	Diversion point
	Diversion Type	Storage
	Storage Type	Diversion point
POD GIS Maintained Data		
	Appl ID	A020026B
	Object ID	179109
	Pod Number	1
	Has Opod	Y
	Appl Pod	A020026B_01
	podId	40134
	County	San Luis Obispo
	Parcel Number	
	Sp Zone	5
	North Coord	2454336
	East Coord	5639783
	Quarter Quarter	SW
	Quarter	SW
	Section Classifier	
	Section Number	4
	Township Number	26
	Township Direction	S
	Range Number	8
	Range Direction	E
	Meridian	21
	Location Method	DD_NE
	Source Name	UNSP (AKA CHISHOLM SPRING)
	TribDesc	
	Watershed	ESTERO BAY
	Quad Map Name	PEBBLESTONE SHUT-IN
Permit		
	Permit ID	14902
	Water Right Description	Migrated data from old WRIMS system.
	Issue Date	10/28/1965
	Construction Completed by	
	Planned Project Completion Date	
License		
	License ID	010924B
	Issue Date	6/26/1997
	Licensee Reporting Cycle	
	First Licensee Report Year	
License Terms		
	Term ID	5
	Version Number	1
	Term Short Description	
	DWR Specific Clauses	

SWRCB	Division of Water Rights - e-WRIMS 1) Select Columns A, B, and C) 2) Format / Column / Autofit Selection 3) Left Justify Column Text	10/14/2009
Application		
	Application ID	A025881
	Appliation Rec'd Date	
	Application Acceptance Date	12/6/1978
	Notice Date	
	Protest	
	Number of Protests	0
	Agent Name	MARTIN CEPKAUSKAS
	Agent Entity Type	Individual
	Primary Owner	HEARST HOLDINGS INC
	Primary Owner Entity Type	Government (State/Municipal)
	Water Right Type	Appropriative
	Face Value Amount	1607
	Face Value Units	Acre-feet per Year
	Appl Fee Amount	24
	Appl Fee Amt Recd	24
	Max DD Appl	5.06
	Max DD Units	Cubic Feet per Second
	Max DD Ann	1607
	Max Storage	0
	Max Use Ann	1607
	Year First Use	0
	Billing Determination	Not Determined
	Power Discount %	0
	FERC #	
	FERC Facility	
	Initial 401 Certification Start	
	Initial 401 Certification End	
	Renewed 401 Certification Start	
	Renewed 401 Certification End	
	Kilowatts Face Plate	0
Parties		
	Name Type	Agent
	Effective From Date	12/13/2001
	Effective To Date	
	Salutation	
	Entity Type	Individual
	Last Name	CEPKAUSKAS
	Middle Name	
	First Name	MARTIN
Parties		
	Name Type	Primary Owner
	Effective From Date	9/15/1994
	Effective To Date	
	Salutation	
	Entity Type	Government (State/Municipal)
	Last Name	HEARST HOLDINGS INC
	Middle Name	
	First Name	
	Mailing Street Number	
	Mailing Street Name	5 THIRD ST STE 200
	Mailing Address Line2	
	Mailing City	SAN FRANCISCO
	Mailing State	CA
	Mailing Zip	94103
	Mailing Country	USA
	Mailing Foreign Code	
	Billing Street Number	
	Billing Street Name	5 3RD ST STE 200
	Billing Address Line2	
	Billing City	SAN FRANCISCO
	Billing State	CA
	Billing Zip	94103
	Billing Country	USA
	Billing Foreign Code	
	Phone	4157778196
Parties		
	Name Type	Agent
	Effective From Date	9/15/1994
	Effective To Date	12/12/2001
	Salutation	
	Entity Type	Individual
	Last Name	BATTAGLIA
	Middle Name	M
	First Name	PHILLIP
Status		
	Current Status	Permitted
Uses		
	Use Code	Irrigation
	Use Status (New)	Migrated from old WRIMS data
	Use Population	0
	Use Net Acreage	300
	Use Gross Acreage	0
	Use Direct Diversion Annual Amount (AFA)	1607
	Use Direct Diversion Rate (New)	0
	Use Direct Diversion Rate Units	
	Use Storage Amount (New) (AFA)	0
Use Seasons		
	Direct Div Season Begin Date	1-Jan

Direct Div Season End Date	31-Dec
Season Direct Div Rate (New)	0
Season Direct Div Rate Units	
Season Direct Div Annual Amount (New) (AFA)	0
Direct Div Season Status (New)	Migrated from old WRIMS data
Storage Season Begin Date	
Storage Season End Date	
Season Storage Amount (AFA)	0
Collection Season Status (New)	Migrated from old WRIMS data

Uses

Use Code	Municipal
Use Status (New)	Migrated from old WRIMS data
Use Population	0
Use Net Acreage	0
Use Gross Acreage	0
Use Direct Diversion Annual Amount (AFA)	1607
Use Direct Diversion Rate (New)	0
Use Direct Diversion Rate Units	
Use Storage Amount (New) (AFA)	0

Use Seasons

Direct Div Season Begin Date	1-Jan
Direct Div Season End Date	31-Dec
Season Direct Div Rate (New)	0
Season Direct Div Rate Units	
Season Direct Div Annual Amount (New) (AFA)	0
Direct Div Season Status (New)	Migrated from old WRIMS data
Storage Season Begin Date	
Storage Season End Date	
Season Storage Amount (AFA)	0
Collection Season Status (New)	Migrated from old WRIMS data

POD

POD Number	1
POD Unit	Cubic Feet per Second
POD Status	Active
Direct Div Amount	5.06
Direct Div Ac Ft	1607
Amount Storage	0
POD Max Dd	5.06
Source Max Dd Unit	Cubic Feet per Second
POD Max Storage	0
Source Max Storage Unit	Cubic Feet per Second
Diversion Code	Diversion point
Diversion Type	Storage
Storage Type	Diversion point

POD GIS Maintained Data

Appl ID	A025881
Object ID	179178
Pod Number	1
Has Opod	N
Appl Pod	A025881_01
podId	9745
County	San Luis Obispo
Parcel Number	
Sp Zone	5
North Coord	2462937
East Coord	5589681
Quarter Quarter	SW
Quarter	NE
Section Classifier	P
Section Number	36
Township Number	25
Township Direction	S
Range Number	6
Range Direction	E
Meridian	21
Location Method	DD_NE
Source Name	ARROYO DE LA CRUZ UNDERFLOW
TribDesc	
Watershed	ESTERO BAY
Quad Map Name	PIEDRAS BLANCAS

Permit

Permit ID	19247
Water Right Description	Migrated data from old WRIMS system.
Issue Date	5/29/1984
Construction Completed by	
Planned Project Completion Date	12/31/1906

Permit Terms

Term ID	140500
Version Number	1
Term Short Description	Monitoring Plans
DWR Specific Clauses	

Permit Terms

Term ID	999
Version Number	1
Term Short Description	
DWR Specific Clauses	

Permit Terms

Term ID	60999
Version Number	1
Term Short Description	
DWR Specific Clauses	

Permit Terms

Term ID	29

	Version Number	1
	Term Short Description	Permit Term 29 - Water Management/Water Conservation, Irrigation System Evaluation (Note - Not carried over into license)
	DWR Specific Clauses	
Permit Terms		
	Term ID	400500
	Version Number	1
	Term Short Description	Invasive Species
	DWR Specific Clauses	
Permit Terms		
	Term ID	290101
	Version Number	1
	Term Short Description	
	DWR Specific Clauses	
Permit Terms		
	Term ID	600
	Version Number	1
	Term Short Description	
	DWR Specific Clauses	

SWRCB	Division of Water Rights - e-WRIMS	10/14/2009
	1) Select Columns A, B, and C)	
	2) Format / Column / Autofit Selection	
	3) Left Justify Column Text	
Application		
	Application ID	A027126
	Appliation Rec'd Date	
	Application Acceptance Date	11/25/1981
	Notice Date	
	Protest	
	Number of Protests	0
	Agent Name	MARTIN CEPKAUSKAS
	Agent Entity Type	Individual
	Primary Owner	HEARST HOLDINGS INC
	Primary Owner Entity Type	Government (State/Municipal)
	Water Right Type	Appropriative
	Face Value Amount	72
	Face Value Units	Acre-feet per Year
	Appl Fee Amount	10
	Appl Fee Amt Recd	10
	Max DD Appl	0
	Max DD Units	Gallons per Day
	Max DD Ann	0
	Max Storage	72
	Max Use Ann	72
	Year First Use	0
	Billing Determination	Not Determined
	Power Discount %	0
	FERC #	
	FERC Facility	
	Initial 401 Certification Start	
	Initial 401 Certification End	
	Renewed 401 Certification Start	
	Renewed 401 Certification End	
	Kilowatts Face Plate	0
Parties		
	Name Type	Agent
	Effective From Date	9/15/1994
	Effective To Date	3/29/1995
	Salutation	
	Entity Type	Individual
	Last Name	BATTAGLIA
	Middle Name	M
	First Name	PHILLIP
Parties		
	Name Type	Agent
	Effective From Date	12/13/2001
	Effective To Date	
	Salutation	
	Entity Type	Individual
	Last Name	CEPKAUSKAS
	Middle Name	
	First Name	MARTIN
Parties		
	Name Type	Primary Owner
	Effective From Date	9/15/1994
	Effective To Date	
	Salutation	
	Entity Type	Government (State/Municipal)
	Last Name	HEARST HOLDINGS INC
	Middle Name	

	First Name	
	Mailing Street Number	
	Mailing Street Name	5 THIRD ST STE 200
	Mailing Address Line2	
	Mailing City	SAN FRANCISCO
	Mailing State	CA
	Mailing Zip	94103
	Mailing Country	USA
	Mailing Foreign Code	
	Billing Street Number	
	Billing Street Name	5 3RD ST STE 200
	Billing Address Line2	
	Billing City	SAN FRANCISCO
	Billing State	CA
	Billing Zip	94103
	Billing Country	USA
	Billing Foreign Code	
	Phone	4157778196
Parties		
	Name Type	Agent
	Effective From Date	3/30/1995
	Effective To Date	12/12/2001
	Salutation	
	Entity Type	Individual
	Last Name	COOKE
	Middle Name	J
	First Name	A
Status		
	Current Status	Permitted
Uses		
	Use Code	Stockwatering
	Use Status (New)	Migrated from old WRIMS data
	Use Population	0
	Use Net Acreage	0
	Use Gross Acreage	0
	Use Direct Diversion Annual Amount (AFA)	0
	Use Direct Diversion Rate (New)	0
	Use Direct Diversion Rate Units	
	Use Storage Amount (New) (AFA)	72
Use Seasons		
	Direct Div Season Begin Date	
	Direct Div Season End Date	
	Season Direct Div Rate (New)	0
	Season Direct Div Rate Units	
	Season Direct Div Annual Amount (New) (AFA)	0
	Direct Div Season Status (New)	Migrated from old WRIMS data
	Storage Season Begin Date	1-Nov
	Storage Season End Date	31-Mar
	Season Storage Amount (AFA)	72
	Collection Season Status (New)	Migrated from old WRIMS data
Uses		
	Use Code	Domestic
	Use Status (New)	Migrated from old WRIMS data
	Use Population	0
	Use Net Acreage	0
	Use Gross Acreage	0
	Use Direct Diversion Annual Amount (AFA)	0
	Use Direct Diversion Rate (New)	0
	Use Direct Diversion Rate Units	
	Use Storage Amount (New) (AFA)	72
Use Seasons		

	Direct Div Season Begin Date	
	Direct Div Season End Date	
	Season Direct Div Rate (New)	0
	Season Direct Div Rate Units	
	Season Direct Div Annual Amount (New) (AFA)	0
	Direct Div Season Status (New)	Migrated from old WRIMS data
	Storage Season Begin Date	1-Nov
	Storage Season End Date	31-Mar
	Season Storage Amount (AFA)	72
	Collection Season Status (New)	Migrated from old WRIMS data
Uses		
	Use Code	Irrigation
	Use Status (New)	Migrated from old WRIMS data
	Use Population	0
	Use Net Acreage	35
	Use Gross Acreage	0
	Use Direct Diversion Annual Amount (AFA)	0
	Use Direct Diversion Rate (New)	0
	Use Direct Diversion Rate Units	
	Use Storage Amount (New) (AFA)	72
Use Seasons		
	Direct Div Season Begin Date	
	Direct Div Season End Date	
	Season Direct Div Rate (New)	0
	Season Direct Div Rate Units	
	Season Direct Div Annual Amount (New) (AFA)	0
	Direct Div Season Status (New)	Migrated from old WRIMS data
	Storage Season Begin Date	1-Nov
	Storage Season End Date	31-Mar
	Season Storage Amount (AFA)	72
	Collection Season Status (New)	Migrated from old WRIMS data
POD		
	POD Number	1
	POD Unit	Gallons per Day
	POD Status	Active
	Direct Div Amount	0
	Direct Div Ac Ft	0
	Amount Storage	72
	POD Max Dd	0
	Source Max Dd Unit	Gallons per Day
	POD Max Storage	72
	Source Max Storage Unit	Gallons per Day
	Diversion Code	Diversion point
	Diversion Type	Storage
	Storage Type	Diversion point
POD GIS Maintained Data		
	Appl ID	A027126
	Object ID	179062
	Pod Number	1
	Has Opod	N
	Appl Pod	A027126_01
	podId	4164
	County	San Luis Obispo
	Parcel Number	
	Sp Zone	5
	North Coord	2451536
	East Coord	5641183
	Quarter Quarter	SE
	Quarter	NW
	Section Classifier	P
	Section Number	10
	Township Number	26
	Township Direction	S

	Range Number	8
	Range Direction	E
	Meridian	21
	Location Method	DD_NE
	Source Name	UNSP (AKA PHELAN SPRING)
	TribDesc	
	Watershed	ESTERO BAY
	Quad Map Name	PEBBLESTONE SHUT-IN

POD

	POD Number	1
	POD Unit	Gallons per Day
	POD Status	Active
	Direct Div Amount	0
	Direct Div Ac Ft	0
	Amount Storage	72
	POD Max Dd	0
	Source Max Dd Unit	Gallons per Day
	POD Max Storage	72
	Source Max Storage Unit	Gallons per Day
	Diversion Code	Diversion point
	Diversion Type	Storage
	Storage Type	Diversion point

POD GIS Maintained Data

	Appl ID	A027126
	Object ID	179106
	Pod Number	1
	Has Opod	Y
	Appl Pod	A027126_01
	podId	39440
	County	San Luis Obispo
	Parcel Number	
	Sp Zone	5
	North Coord	2454336
	East Coord	5639573
	Quarter Quarter	SW
	Quarter	SW
	Section Classifier	P
	Section Number	4
	Township Number	26
	Township Direction	S
	Range Number	8
	Range Direction	E
	Meridian	21
	Location Method	DD_NE
	Source Name	UNSP (AKA CHISOLM SPRING)
	TribDesc	
	Watershed	ESTERO BAY
	Quad Map Name	PEBBLESTONE SHUT-IN

Permit

	Permit ID	20775
	Water Right Description	Migrated data from old WRIMS system.
	Issue Date	2/23/1995
	Construction Completed by	
	Planned Project Completion Date	

Permit Terms

	Term ID	22	
	Version Number	1	
	Term Short Description	Term 22	Right of Access

DWR Specific Clauses

Permit Terms

Term ID	000005J
Version Number	1
Term Short Description	
DWR Specific Clauses	

SWRCB	Division of Water Rights - e-WRIMS	10/14/2009
	1) Select Columns A, B, and C)	
	2) Format / Column / Autofit Selection	
	3) Left Justify Column Text	
Application		
	Application ID	A027212
	Appliation Rec'd Date	
	Application Acceptance Date	2/17/1982
	Notice Date	
	Protest	
	Number of Protests	0
	Agent Name	MARTIN CEPKAUSKAS
	Agent Entity Type	Individual
	Primary Owner	HEARST HOLDINGS INC
	Primary Owner Entity Type	Government (State/Municipal)
	Water Right Type	Appropriative
	Face Value Amount	65
	Face Value Units	Acre-feet per Year
	Appl Fee Amount	10
	Appl Fee Amt Recd	10
	Max DD Appl	0.41
	Max DD Units	Cubic Feet per Second
	Max DD Ann	65
	Max Storage	0
	Max Use Ann	65
	Year First Use	0
	Billing Determination	Not Determined
	Power Discount %	0
	FERC #	
	FERC Facility	
	Initial 401 Certification Start	
	Initial 401 Certification End	
	Renewed 401 Certification Start	
	Renewed 401 Certification End	
	Kilowatts Face Plate	0
Parties		
	Name Type	Primary Owner
	Effective From Date	9/15/1994
	Effective To Date	
	Salutation	
	Entity Type	Government (State/Municipal)
	Last Name	HEARST HOLDINGS INC
	Middle Name	
	First Name	
	Mailing Street Number	
	Mailing Street Name	5 THIRD ST STE 200
	Mailing Address Line2	
	Mailing City	SAN FRANCISCO
	Mailing State	CA
	Mailing Zip	94103
	Mailing Country	USA
	Mailing Foreign Code	
	Billing Street Number	
	Billing Street Name	5 3RD ST STE 200

	Billing Address Line2	
	Billing City	SAN FRANCISCO
	Billing State	CA
	Billing Zip	94103
	Billing Country	USA
	Billing Foreign Code	
	Phone	4157778196
Parties		
	Name Type	Agent
	Effective From Date	9/15/1994
	Effective To Date	12/12/2001
	Salutation	
	Entity Type	Individual
	Last Name	BATTAGLIA
	Middle Name	M
	First Name	PHILLIP
Parties		
	Name Type	Agent
	Effective From Date	12/13/2001
	Effective To Date	
	Salutation	
	Entity Type	Individual
	Last Name	CEPKAUSKAS
	Middle Name	
	First Name	MARTIN
Status		
	Current Status	Permitted
Uses		
	Use Code	Irrigation
	Use Status (New)	Migrated from old WRIMS data
	Use Population	0
	Use Net Acreage	46
	Use Gross Acreage	0
	Use Direct Diversion Annual Amount (AFA)	65
	Use Direct Diversion Rate (New)	0
	Use Direct Diversion Rate Units	
	Use Storage Amount (New) (AFA)	0
Use Seasons		
	Direct Div Season Begin Date	1-Dec
	Direct Div Season End Date	30-Apr
	Season Direct Div Rate (New)	0
	Season Direct Div Rate Units	
	Season Direct Div Annual Amount (New) (AFA)	0
	Direct Div Season Status (New)	Migrated from old WRIMS data
	Storage Season Begin Date	
	Storage Season End Date	
	Season Storage Amount (AFA)	0
	Collection Season Status (New)	Migrated from old WRIMS data
Uses		

	Use Code	Domestic
	Use Status (New)	Migrated from old WRIMS data
	Use Population	0
	Use Net Acreage	0
	Use Gross Acreage	0
	Use Direct Diversion Annual Amount (AFA)	65
	Use Direct Diversion Rate (New)	0
	Use Direct Diversion Rate Units	
	Use Storage Amount (New) (AFA)	0
Use Seasons		
	Direct Div Season Begin Date	1-Dec
	Direct Div Season End Date	30-Apr
	Season Direct Div Rate (New)	0
	Season Direct Div Rate Units	
	Season Direct Div Annual Amount (New) (AFA)	0
	Direct Div Season Status (New)	Migrated from old WRIMS data
	Storage Season Begin Date	
	Storage Season End Date	
	Season Storage Amount (AFA)	0
	Collection Season Status (New)	Migrated from old WRIMS data
Uses		
	Use Code	Stockwatering
	Use Status (New)	Migrated from old WRIMS data
	Use Population	0
	Use Net Acreage	0
	Use Gross Acreage	0
	Use Direct Diversion Annual Amount (AFA)	65
	Use Direct Diversion Rate (New)	0
	Use Direct Diversion Rate Units	
	Use Storage Amount (New) (AFA)	0
Use Seasons		
	Direct Div Season Begin Date	1-Dec
	Direct Div Season End Date	30-Apr
	Season Direct Div Rate (New)	0
	Season Direct Div Rate Units	
	Season Direct Div Annual Amount (New) (AFA)	0
	Direct Div Season Status (New)	Migrated from old WRIMS data
	Storage Season Begin Date	
	Storage Season End Date	
	Season Storage Amount (AFA)	0
	Collection Season Status (New)	Migrated from old WRIMS data
POD		
	POD Number	1
	POD Unit	Cubic Feet per Second
	POD Status	Active
	Direct Div Amount	0.41
	Direct Div Ac Ft	0
	Amount Storage	0
	POD Max Dd	0.41
	Source Max Dd Unit	Cubic Feet per Second
	POD Max Storage	0
	Source Max Storage Unit	Cubic Feet per Second
	Diversion Code	Diversion point

Diversion Type	Storage
Storage Type	Diversion point

POD GIS Maintained Data

Appl ID	A027212
Object ID	179108
Pod Number	1
Has Opod	Y
Appl Pod	A027212_01
podId	6678
County	San Luis Obispo
Parcel Number	
Sp Zone	5
North Coord	2454336
East Coord	5639783
Quarter Quarter	SW
Quarter	SW
Section Classifier	
Section Number	4
Township Number	26
Township Direction	S
Range Number	8
Range Direction	E
Meridian	21
Location Method	DD_NE
Source Name	UNSP (AKA CHISOLM SPRING)
TribDesc	
Watershed	ESTERO BAY
Quad Map Name	PEBBLESTONE SHUT-IN

POD

POD Number	1
POD Unit	Cubic Feet per Second
POD Status	Active
Direct Div Amount	0.41
Direct Div Ac Ft	0
Amount Storage	0
POD Max Dd	0.41
Source Max Dd Unit	Cubic Feet per Second
POD Max Storage	0
Source Max Storage Unit	Cubic Feet per Second
Diversion Code	Diversion point
Diversion Type	Storage
Storage Type	Diversion point

POD GIS Maintained Data

Appl ID	A027212
Object ID	179065
Pod Number	1
Has Opod	N
Appl Pod	A027212_01
podId	38644
County	San Luis Obispo
Parcel Number	
Sp Zone	5

	North Coord	2451536
	East Coord	5641183
	Quarter Quarter	SE
	Quarter	NW
	Section Classifier	
	Section Number	10
	Township Number	26
	Township Direction	S
	Range Number	8
	Range Direction	E
	Meridian	21
	Location Method	DD_NE
	Source Name	UNSP (AKA PHELAN SPRING)
	TribDesc	
	Watershed	ESTERO BAY
	Quad Map Name	PEBBLESTONE SHUT-IN
Permit		
	Permit ID	20906
	Water Right Description	Migrated data from old WRIMS system.
	Issue Date	3/18/1997
	Construction Completed by	
	Planned Project Completion Date	
Permit Terms		
	Term ID	5
	Version Number	1
	Term Short Description	
	DWR Specific Clauses	

SWRCB	Division of Water Rights - e-WRIMS	10/14/2009
	1) Select Columns A, B, and C)	
	2) Format / Column / Autofit Selection	
	3) Left Justify Column Text	
Application		
	Application ID	A029851
	Appliation Rec'd Date	
	Application Acceptance Date	11/1/1990
	Notice Date	
	Protest	
	Number of Protests	0
	Agent Name	
	Agent Entity Type	
	Primary Owner	CALIF DEPT OF PARKS & RECREATION
	Primary Owner Entity Type	Government (State/Municipal)
	Water Right Type	Appropriative
	Face Value Amount	2.8
	Face Value Units	Acre-feet per Year
	Appl Fee Amount	100
	Appl Fee Amt Recd	100
	Max DD Appl	0
	Max DD Units	Gallons per Day
	Max DD Ann	0
	Max Storage	2.8
	Max Use Ann	2.8
	Year First Use	0
	Billing Determination	Not Determined
	Power Discount %	0
	FERC #	
	FERC Facility	
	Initial 401 Certification Start	
	Initial 401 Certification End	
	Renewed 401 Certification Start	
	Renewed 401 Certification End	
	Kilowatts Face Plate	0
Parties		
	Name Type	Primary Owner
	Effective From Date	9/15/1994
	Effective To Date	
	Salutation	
	Entity Type	Government (State/Municipal)
	Last Name	CALIF DEPT OF PARKS & RECREATION
	Middle Name	
	First Name	
	Mailing Street Number	
	Mailing Street Name	PO BOX 942896
	Mailing Address Line2	
	Mailing City	SACRAMENTO
	Mailing State	CA
	Mailing Zip	94296
	Mailing Country	USA
	Mailing Foreign Code	
	Billing Street Number	
	Billing Street Name	PO BOX 942896
	Billing Address Line2	
	Billing City	SACRAMENTO

	Billing State	CA
	Billing Zip	94296
	Billing Country	USA
	Billing Foreign Code	
	Phone	9163221948
Status		
	Current Status	Permitted
Uses		
	Use Code	Domestic
	Use Status (New)	Migrated from old WRIMS data
	Use Population	6000
	Use Net Acreage	0
	Use Gross Acreage	0
	Use Direct Diversion Annual Amount (AFA)	0
	Use Direct Diversion Rate (New)	0
	Use Direct Diversion Rate Units	
	Use Storage Amount (New) (AFA)	2.8
Use Seasons		
	Direct Div Season Begin Date	
	Direct Div Season End Date	
	Season Direct Div Rate (New)	0
	Season Direct Div Rate Units	
	Season Direct Div Annual Amount (New) (AFA)	0
	Direct Div Season Status (New)	Migrated from old WRIMS data
	Storage Season Begin Date	1-Nov
	Storage Season End Date	31-Mar
	Season Storage Amount (AFA)	2.8
	Collection Season Status (New)	Migrated from old WRIMS data
POD		
	POD Number	1
	POD Unit	Gallons per Day
	POD Status	Active
	Direct Div Amount	0
	Direct Div Ac Ft	0
	Amount Storage	2.8
	POD Max Dd	0
	Source Max Dd Unit	Gallons per Day
	POD Max Storage	2.8
	Source Max Storage Unit	Gallons per Day
	Diversion Code	Diversion point
	Diversion Type	Storage
	Storage Type	Diversion point
POD GIS Maintained Data		
	Appl ID	A029851
	Object ID	179110
	Pod Number	1
	Has Opod	Y
	Appl Pod	A029851_01
	podId	933
	County	San Luis Obispo
	Parcel Number	
	Sp Zone	5
	North Coord	2454386

East Coord	5639758
Quarter Quarter	SW
Quarter	SW
Section Classifier	
Section Number	4
Township Number	26
Township Direction	S
Range Number	8
Range Direction	E
Meridian	21
Location Method	DD_NE
Source Name	UNSP
TribDesc	
Watershed	ESTERO BAY
Quad Map Name	PEBBLESTONE SHUT-IN

POD

POD Number	1
POD Unit	Gallons per Day
POD Status	Active
Direct Div Amount	0
Direct Div Ac Ft	0
Amount Storage	0
POD Max Dd	0
Source Max Dd Unit	Gallons per Day
POD Max Storage	2.8
Source Max Storage Unit	Gallons per Day
Diversion Code	Diversion point
Diversion Type	Storage
Storage Type	Diversion point

POD GIS Maintained Data

Appl ID	A029851
Object ID	179060
Pod Number	1
Has Opod	N
Appl Pod	A029851_01
podId	29525
County	San Luis Obispo
Parcel Number	
Sp Zone	5
North Coord	2451486
East Coord	5640983
Quarter Quarter	SE
Quarter	NW
Section Classifier	
Section Number	10
Township Number	26
Township Direction	S
Range Number	8
Range Direction	E
Meridian	21
Location Method	DD_NE
Source Name	UNSP
TribDesc	
Watershed	ESTERO BAY
Quad Map Name	PEBBLESTONE SHUT-IN

Permit

Permit ID	20924
Water Right Description	Migrated data from old WRIMS system.
Issue Date	6/19/1997
Construction Completed by	
Planned Project Completion Date	12/31/2002

SWRCB	Division of Water Rights - e-WRIMS	10/14/2009
	1) Select Columns A, B, and C)	
	2) Format / Column / Autofit Selection	
	3) Left Justify Column Text	
Application		
	Application ID	C000612
	Appliation Rec'd Date	
	Application Acceptance Date	12/30/1976
	Notice Date	
	Protest	
	Number of Protests	0
	Agent Name	
	Agent Entity Type	
	Primary Owner	WALTER M WARREN
	Primary Owner Entity Type	Individual
	Water Right Type	Stockpond
	Face Value Amount	0
	Face Value Units	Acre-feet per Year
	Appl Fee Amount	10
	Appl Fee Amt Recd	10
	Max DD Appl	0
	Max DD Units	Gallons per Day
	Max DD Ann	0
	Max Storage	2.5
	Max Use Ann	0
	Year First Use	1958
	Billing Determination	Not Determined
	Power Discount %	0
	FERC #	
	FERC Facility	
	Initial 401 Certification Start	
	Initial 401 Certification End	
	Renewed 401 Certification Start	
	Renewed 401 Certification End	
	Kilowatts Face Plate	0
Parties		
	Name Type	Primary Owner
	Effective From Date	9/15/1994
	Effective To Date	
	Salutation	
	Entity Type	Individual
	Last Name	WARREN
	Middle Name	M
	First Name	WALTER
Status		
	Current Status	Certified
Uses		

	Use Code	Stockwatering
	Use Status (New)	Migrated from old WRIMS data
	Use Population	0
	Use Net Acreage	0
	Use Gross Acreage	0
	Use Direct Diversion Annual Amount (AFA)	0
	Use Direct Diversion Rate (New)	0
	Use Direct Diversion Rate Units	
	Use Storage Amount (New) (AFA)	2.5
Use Seasons		
	Direct Div Season Begin Date	
	Direct Div Season End Date	
	Season Direct Div Rate (New)	0
	Season Direct Div Rate Units	
	Season Direct Div Annual Amount (New) (AFA)	0
	Direct Div Season Status (New)	Migrated from old WRIMS data
	Storage Season Begin Date	1-Nov
	Storage Season End Date	1-May
	Season Storage Amount (AFA)	2.5
	Collection Season Status (New)	Migrated from old WRIMS data
POD		
	POD Number	1
	POD Unit	Gallons per Day
	POD Status	Active
	Direct Div Amount	0
	Direct Div Ac Ft	0
	Amount Storage	2.5
	POD Max Dd	0
	Source Max Dd Unit	Gallons per Day
	POD Max Storage	0
	Source Max Storage Unit	Gallons per Day
	Diversion Code	Diversion point
	Diversion Type	Direct Diversion
	Storage Type	Diversion point
POD GIS Maintained Data		
	Appl ID	C000612
	Object ID	179058
	Pod Number	1
	Has Opod	Y
	Appl Pod	C000612_01
	podId	2016
	County	San Luis Obispo
	Parcel Number	
	Sp Zone	5
	North Coord	2451486
	East Coord	5640983
	Quarter Quarter	NW
	Quarter	NW

	Section Classifier	
	Section Number	10
	Township Number	26
	Township Direction	S
	Range Number	8
	Range Direction	E
	Meridian	21
	Location Method	DD_NE
	Source Name	UNST
	TribDesc	
	Watershed	ESTERO BAY
	Quad Map Name	PEBBLESTONE SHUT-IN
Permit		
	Permit ID	
	Water Right Description	
	Issue Date	
	Construction Completed by	
	Planned Project Completion Date	
License		
	License ID	612
	Issue Date	4/14/1978
	Licensee Reporting Cycle	
	First Licensee Report Year	

SWRCB	Division of Water Rights - e-WRIMS	10/14/2009
	1) Select Columns A, B, and C)	
	2) Format / Column / Autofit Selection	
	3) Left Justify Column Text	
Application		
	Application ID	C000613
	Appliation Rec'd Date	
	Application Acceptance Date	12/30/1976
	Notice Date	
	Protest	
	Number of Protests	0
	Agent Name	
	Agent Entity Type	
	Primary Owner	WALTER M WARREN
	Primary Owner Entity Type	Individual
	Water Right Type	Stockpond
	Face Value Amount	0
	Face Value Units	Acre-feet per Year
	Appl Fee Amount	10
	Appl Fee Amt Recd	10
	Max DD Appl	0
	Max DD Units	Gallons per Day
	Max DD Ann	0
	Max Storage	1
	Max Use Ann	0
	Year First Use	1950
	Billing Determination	Not Determined
	Power Discount %	0
	FERC #	
	FERC Facility	
	Initial 401 Certification Start	
	Initial 401 Certification End	
	Renewed 401 Certification Start	
	Renewed 401 Certification End	
	Kilowatts Face Plate	0
Parties		
	Name Type	Primary Owner
	Effective From Date	9/15/1994
	Effective To Date	
	Salutation	
	Entity Type	Individual
	Last Name	WARREN
	Middle Name	M
	First Name	WALTER
Status		
	Current Status	Certified
Uses		

Use Code	Stockwatering
Use Status (New)	Migrated from old WRIMS data
Use Population	0
Use Net Acreage	0
Use Gross Acreage	0
Use Direct Diversion Annual Amount (AFA)	0
Use Direct Diversion Rate (New)	0
Use Direct Diversion Rate Units	
Use Storage Amount (New) (AFA)	1

Use Seasons

Direct Div Season Begin Date	
Direct Div Season End Date	
Season Direct Div Rate (New)	0
Season Direct Div Rate Units	
Season Direct Div Annual Amount (New) (AFA)	0
Direct Div Season Status (New)	Migrated from old WRIMS data
Storage Season Begin Date	1-Nov
Storage Season End Date	1-May
Season Storage Amount (AFA)	1
Collection Season Status (New)	Migrated from old WRIMS data

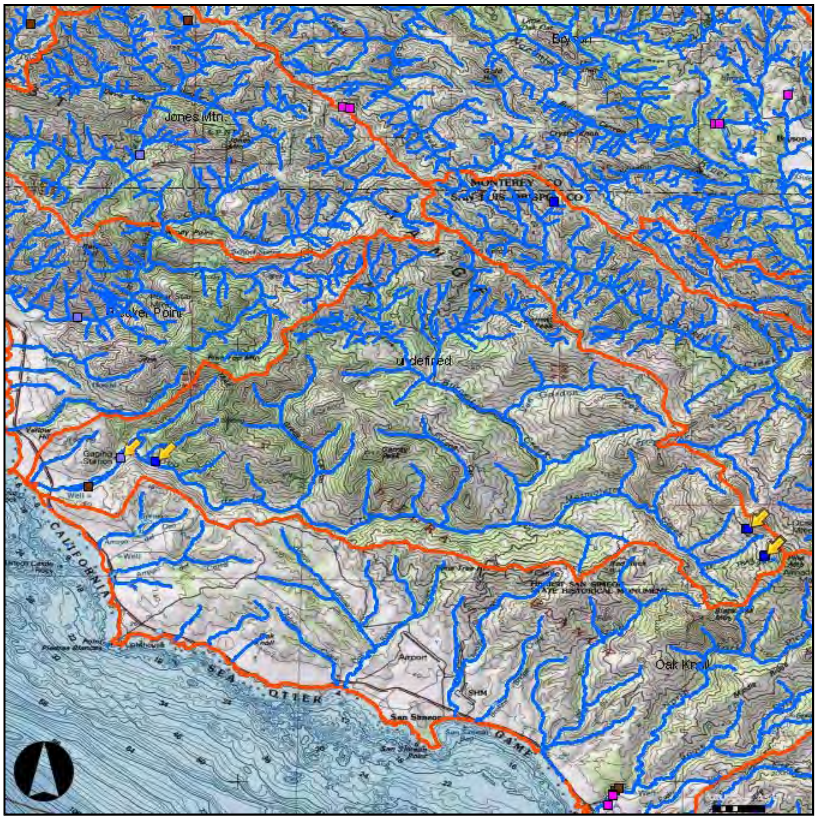
POD

POD Number	1
POD Unit	Gallons per Day
POD Status	Active
Direct Div Amount	0
Direct Div Ac Ft	0
Amount Storage	1
POD Max Dd	0
Source Max Dd Unit	Gallons per Day
POD Max Storage	0
Source Max Storage Unit	Gallons per Day
Diversion Code	Diversion point
Diversion Type	Direct Diversion
Storage Type	Diversion point

POD GIS Maintained Data

Appl ID	C000613
Object ID	179059
Pod Number	1
Has Opod	Y
Appl Pod	C000613_01
podId	13524
County	San Luis Obispo
Parcel Number	
Sp Zone	5
North Coord	2451486
East Coord	5640983
Quarter Quarter	NW
Quarter	SE

	Section Classifier	
	Section Number	10
	Township Number	26
	Township Direction	S
	Range Number	8
	Range Direction	E
	Meridian	21
	Location Method	DD_NE
	Source Name	UNST
	TribDesc	
	Watershed	ESTERO BAY
	Quad Map Name	PEBBLESTONE SHUT-IN
Permit		
	Permit ID	
	Water Right Description	
	Issue Date	
	Construction Completed by	
	Planned Project Completion Date	
License		
	License ID	613
	Issue Date	4/14/1978
	Licensee Reporting Cycle	
	First Licensee Report Year	



water rights upstream of
USGS 11142500
Arroyo De La Cruz NR San Simeon

Points of Diversion (12)

Points of Diversion (2)

Points of Diversion
- Adjudicated
- Cancelled
- Certified
- Claimed
- Claimed - Local Oversight
- Inactive
- Licensed
- Pending

Points of Diversion (continued)
- Permitted
- Registered
- Revoked
- State Filing
- Temporary

Lakes (1:24K)

Rivers (1:24K)

Super Planning Watersheds

NGS USA Topographic Maps

Select POD Results

Points of Diversion (2)

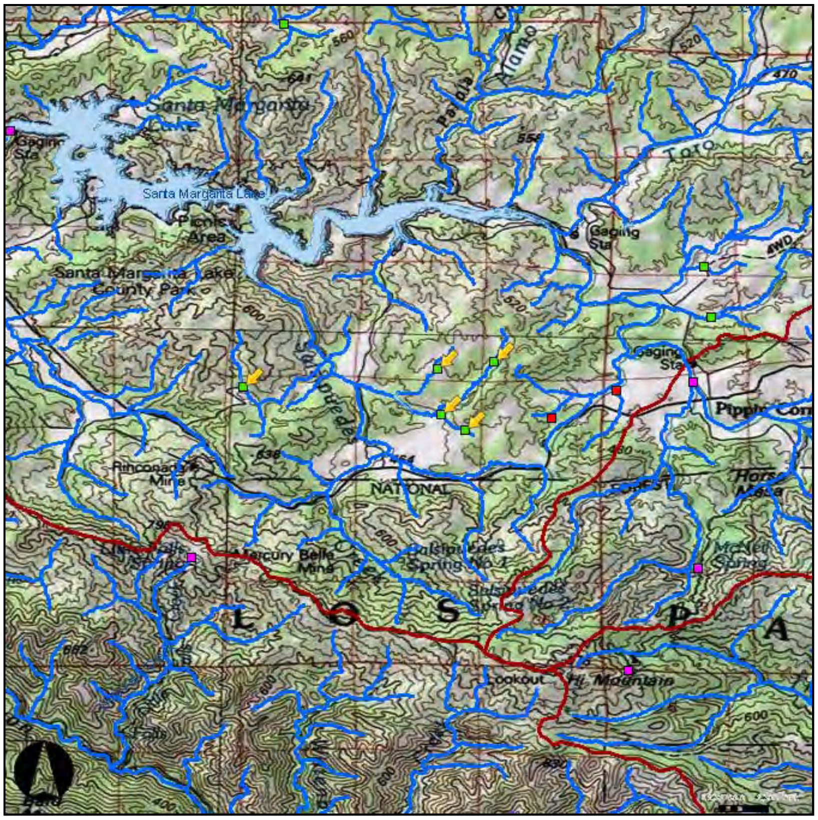
POD_ID	APPL_ID	POD_NUM	APPL_POD	TOWNSHIP_NUMBER	TOWNSHIP_DIRECTION	RANGE_NUMBER	RANGE_DIRECTION	SECTION_NUMBER	SECTION_CLASSIFIER	QUARTER	QUARTER
34643	A019108	01	A019108_01	25	S	6	E	35		NE	NE
9745	A025881	01	A025881_01	25	S	6	E	36	P	NE	SW

Select POD Results

Points of Diversion (12)

POD_ID	APPL_ID	POD_NUM	APPL_POD	TOWNSHIP_NUMBER	TOWNSHIP_DIRECTION	RANGE_NUMBER	RANGE_DIRECTION	SECTION_NUMBER	SECTION_CLASSIFIER	QUARTER	QUARTE
7099	A020026	01	A020026_01	26	S	8	E	10		NW	SE
3121	A020026	01	A020026_01	26	S	8	E	4		SW	SW
40134	A020026B	01	A020026B_01	26	S	8	E	4		SW	SW
11447	A020026B	01	A020026B_01	26	S	8	E	10		NE	SE
4164	A027126	01	A027126_01	26	S	8	E	10	P	NW	SE

39440	A027126	01	A027126_01	26	S	8	E	4	P	SW	SW
38644	A027212	01	A027212_01	26	S	8	E	10		NW	SE
6678	A027212	01	A027212_01	26	S	8	E	4		SW	SW
933	A029851	01	A029851_01	26	S	8	E	4		SW	SW
29525	A029851	01	A029851_01	26	S	8	E	10		NW	SE
2016	C000612	01	C000612_01	26	S	8	E	10		NW	NW
13524	C000613	01	C000613_01	26	S	8	E	10		SE	NW



Points of Diversion (1)

Points of Diversion (4)

Points of Diversion
- Adjudicated
- Cancelled
- Certified
- Claimed
- Claimed - Local Oversight
- Inactive
- Licensed
- Pending

Points of Diversion (continued)
- Permitted
- Registered
- Revoked
- State Filing
- Temporary

Lakes (1:24K)

Rivers (1:24K)

Super Planning Watersheds

NGS USA Topographic Maps

Select POD Results

Points of Diversion (4)

POD_ID	APPL_ID	POD_NUM	APPL_POD	TOWNSHIP_NUMBER	TOWNSHIP_DIRECTION	RANGE_NUMBER	RANGE_DIRECTION	SECTION_NUMBER	SECTION_CLASSIFIER	QUARTER	QUARTER
45387	C004801	01	C004801_01	30	S	14	E	23		NE	SW
39550	C004802	01	C004802_01	30	S	14	E	14		SE	SW
22131	C004803	01	C004803_01	30	S	14	E	13		SW	SW
39551	C005409	01	C005409_01	30	S	14	E	23		SE	NE

Select POD Results

Points of Diversion (1)

POD_ID	APPL_ID	POD_NUM	APPL_POD	TOWNSHIP_NUMBER	TOWNSHIP_DIRECTION	RANGE_NUMBER	RANGE_DIRECTION	SECTION_NUMBER	SECTION_CLASSIFIER	QUARTER	QUARTER
32606	C003486	01	C003486_01	30	S	14	E	22		NW	NW

Water Resources Data for California

Water Year 1977

Volume 1. Colorado River Basin, Southern Great Basin from Mexican Border to Mono Lake Basin, and Pacific Slope Basins from Tijuana River to Santa Maria River

U.S. GEOLOGICAL SURVEY WATER-DATA REPORT CA-77-1

Prepared in cooperation with the California Department of Water Resources and with other agencies

11137400 ALAMO CREEK NEAR NIPOMO, CA

LOCATION.--Lat 35°02'55", long 120°18'05", in Huasna Grant, San Luis Obispo County, on right bank 3.2 mi (5.1 km) upstream from mouth, and 10 mi (16 km) east of Nipomo.

DRAINAGE AREA.--83.3 mi^2 (215.7 km^2).

PERIOD OF RECORD.--March 1959 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 650 ft (198 m), from topographic map. Prior to Oct. 1, 1966, at datum 2.00 ft (0.610 m) higher.

REMARKS.--No flow since Mar. 22, 1975. No regulation or diversion above station.

AVERAGE DISCHARGE.--18 years, 7.14 ft^3/s (0.202 m^3/s), 5,170 acre-ft/yr (6.37 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,020 ft^3/s (255 m^3/s) Jan. 25, 1969, gage height, 10.51 ft (3.203 m), from rating curve extended above 3,100 ft^3/s (87.8 m^3/s) on basis of slope-area measurement at gage height 10.30 ft (3.139 m); no flow for all or part of each year.

EXTREMES FOR CURRENT YEAR.--No flow during year.

Water Resources Data for California

Volume 2. Pacific Slope Basins from Arroyo Grande to Oregon State Line except Central Valley

U.S. GEOLOGICAL SURVEY WATER-DATA REPORT CA-78-2

WATER YEAR 1978

Prepared in cooperation with the California Department of Water Resources ~~and with~~ other agencies

11141600 LOS BERROS CREEK NEAR NIPOMO, CA

LOCATION.--Lat 35°05'17", long 120°30'32", in Nipomo Grant (on boundary), San Luis Obispo County, Hydrologic Unit 18060006, on left bank at upstream side of bridge, 0.8 mi (1.3 km) downstream from Adobe Creek, and 3.7 mi (6.0 km) northwest of Nipomo.

DRAINAGE AREA.--15.0 mi^2 (38.8 km^2).

PERIOD OF RECORD.--August 1968 to September 1978 (discontinued).

GAGE.--Water-stage recorder and broad-crested weir. Altitude of gage is 312 ft (95 m), from topographic map.

REMARKS.--Records good except those for period of no gage-height record, Apr. 10 to May 16, which are fair. No regulation or diversion above station.

AVERAGE DISCHARGE.--10 years, 2.20 ft^3/s (0.062 m^3/s), 1,590 acre-ft/yr (1.96 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 599 ft^3/s (17.0 m^3/s) Jan. 25, 1969, gage height, 5.43 ft (1.655 m), from rating curve extended above 230 ft^3/s (6.51 m^3/s) on basis of slope-area measurement of maximum flow; no flow Oct. 6 to Dec. 26, 1977.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 20 ft^3/s (0.6 m^3/s), revised, and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Jan. 16	1345	259	7.33	3.67	1.119	Mar. 4	1115	*402	11.4	4.41	1.344
Feb. 10	0715	368	10.4	4.23	1.289	Mar. 11	1245	31	.88	2.04	.622
Feb. 13	1130	159	4.50	3.11	.948	Apr. 17	0430	46	1.30	2.20	.671

Minimum daily discharge, no flow Oct. 6 to Dec. 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.01		0	.15	1.3	6.0	6.2	4.7	1.9	.84	.46	.46
2	.01		0	.15	1.2	6.4	6.0	4.4	2.0	.85	.46	.64
3	.01		0	.16	1.1	11	5.5	4.0	1.8	.78	.45	.56
4	.01		0	.16	.99	197	5.4	3.4	1.7	.84	.39	.50
5	.01		0	.31	1.3	70	4.3	3.2	1.7	.71	.38	.52
6	0		0	2.6	1.6	37	6.3	3.3	1.7	.72	.36	.42
7	0		0	1.7	8.3	22	7.6	3.4	1.6	.74	.36	.41
8	0		0	1.3	25	17	7.0	3.6	1.6	.77	.36	.39
9	0		0	2.3	145	15	6.1	3.3	1.6	.90	.34	.36
10	0		0	5.0	231	13	5.1	3.2	1.4	.89	.31	.37
11	0		0	3.7	65	12	6.2	3.1	1.3	.77	.31	.37
12	0		0	2.7	46	10	5.1	3.1	1.3	.74	.33	.36
13	0		0	2.1	75	8.8	4.7	3.0	1.3	.71	.28	.36
14	0		0	6.9	49	8.3	4.1	2.8	1.3	.55	.39	.36
15	0		0	30	29	7.7	9.6	2.6	1.4	.68	.41	.37
16	0		0	76	18	7.2	17	2.4	1.4	.77	.41	.30
17	0		0	57	13	6.6	13	2.3	1.2	.74	.41	.34
18	0		0	18	9.9	6.5	9.4	2.3	1.1	.74	.41	.30
19	0		0	18	8.6	6.3	7.5	2.3	1.1	.73	.49	.38
20	0		0	16	7.4	6.8	6.2	2.2	1.1	.66	.56	.39
21	0		0	8.8	6.8	6.2	5.8	2.2	1.2	.64	.48	.44
22	0		0	6.0	6.2	7.2	5.6	2.2	1.1	.59	.41	.36
23	0		0	3.3	5.7	7.8	5.2	2.2	1.1	.55	.44	.29
24	0		0	1.9	5.3	6.9	5.8	2.3	1.0	.56	.40	.27
25	0		0	2.8	5.2	6.3	9.2	2.2	.96	.52	.41	.26
26	0		0	2.3	5.1	5.4	6.6	2.1	1.0	.48	.33	.22
27	0		1.0	2.0	5.2	5.0	6.0	2.0	1.1	.45	.40	.22
28	0		1.1	1.8	6.3	4.6	5.4	1.9	1.2	.48	.50	.26
29	0		.21	1.7	---	4.7	5.0	1.8	1.3	.46	.51	.24
30	0		.16	1.5	---	5.4	4.8	1.8	1.1	.46	.49	.24
31	0	---	.15	1.4	---	7.1	---	1.9	---	.46	.49	---
TOTAL	.05	0	2.62	277.73	783.49	541.2	201.7	85.2	40.56	20.78	12.73	10.96
MEAN	.002	0	.085	8.96	28.0	17.5	6.72	2.75	1.35	.67	.41	.37
MAX	.01	0	1.1	76	231	197	17	4.7	2.0	.90	.56	.64
MIN	0	0	0	.15	.99	4.6	4.1	1.8	.96	.45	.28	.22
AC-FT	.10	0	5.2	551	1550	1070	400	169	80	41	25	22

CAL YR 1977 TOTAL 73.84 MEAN .20 MAX 1.1 MIN 0 AC-FT 146
WTR YR 1978 TOTAL 1977.02 MEAN 5.42 MAX 231 MIN 0 AC-FT 3920

11142080 MORRO CREEK AT MORRO BAY, CA

LOCATION.--Lat 35°22'42", long 120°51'12", in Moro Y Cayucos Grant, San Luis Obispo County, Hydrologic Unit 18060006, on left bank at upstream side of frontage road bridge in town of Morro Bay, and 700 ft (213 m) downstream from Little Morro Creek.

DRAINAGE AREA.--24.0 mi² (62.2 km²).

PERIOD OF RECORD.--October 1970 to September 1978 (discontinued).

GAGE.--Water-stage recorder. Concrete control since Nov. 7, 1971. Altitude of gage is 20 ft (6.1 m), from topographic map.

REMARKS.--Records good including those for period of no gage-height record, July 25 to Sept. 30. No regulation; small diversion above station for individual use.

AVERAGE DISCHARGE.--8 years, 8.87 ft³/s (0.251 m³/s), 6,430 acre-ft/yr (7.93 hm³/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,960 ft³/s (55.5 m³/s) Jan. 18, 1973, gage height, 10.38 ft (3.164 m), from rating curve extended above 440 ft³/s (12.5 m³/s) on basis of slope-area measurement of maximum flow; no flow for long periods in most years.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 60 ft³/s (1.7 m³/s) and maximum (*) from rating curve extended as explained above:

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Dec. 27	1615	407	11.5	5.11	1.558	Feb. 10	0330	858	24.3	6.85	2.088
Jan. 5	2400	166	4.70	4.01	1.222	Feb. 12	1730	*1120	31.7	7.75	2.362
Jan. 9	1030	360	10.2	4.90	1.494	Mar. 4	0815	813	23.0	6.69	2.039
Jan. 16	1400	780	22.1	6.57	2.003	Apr. 15	1600	336	9.52	4.78	1.457

Minimum daily discharge, no flow many days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1			0	11	9.8	33	22	20	8.2	4.5	2.6	1.1
2			0	12	9.4	45	20	19	7.8	3.9	2.7	1.1
3			0	11	8.5	92	20	18	7.3	3.7	2.6	1.1
4			0	8.6	7.9	411	29	18	7.4	3.8	2.6	1.3
5			0	22	13	199	22	17	7.0	3.8	2.6	2.1
6			0	65	15	119	28	16	6.9	3.6	2.5	1.8
7			0	30	114	88	30	15	6.8	3.5	2.4	1.6
8			0	21	167	69	26	15	6.8	3.7	2.4	1.4
9			0	98	486	73	25	15	6.2	3.6	2.5	1.3
10			0	89	451	56	24	14	5.5	3.5	2.4	1.4
11			0	42	165	53	23	14	5.7	3.6	2.2	1.4
12			0	29	337	42	22	13	5.3	3.4	2.1	1.4
13			0	21	295	36	22	13	4.9	3.1	2.1	1.3
14			0	99	153	34	21	12	4.7	3.0	2.0	1.4
15			0	177	103	32	86	12	4.7	3.0	2.0	1.5
16			0	266	83	31	73	12	4.7	2.9	1.9	1.6
17			0	148	65	29	43	11	4.7	2.9	1.9	1.5
18			0	71	52	28	36	11	4.3	2.9	1.8	1.4
19			0	61	44	27	33	10	4.7	2.8	1.7	1.3
20			0	52	39	26	30	10	4.9	2.9	1.7	1.2
21			0	41	35	25	28	10	5.0	2.9	1.7	1.1
22			0	33	34	34	26	10	4.7	2.8	1.7	.90
23			.91	28	32	25	24	9.8	4.5	2.8	1.7	.78
24			0	24	30	24	23	9.8	4.2	2.8	1.6	.74
25			0	21	28	23	32	9.5	4.1	2.7	1.5	.75
26			.01	18	27	23	35	9.0	4.3	2.7	1.4	.76
27			122	17	26	22	24	8.7	4.4	2.7	1.3	.78
28			161	15	35	22	22	8.0	4.1	2.6	1.3	.79
29			37	14	---	22	21	7.8	4.0	2.5	1.2	.78
30			23	13	---	23	20	7.8	4.1	2.5	1.2	.75
31		---	16	11	---	26	---	7.9	---	2.5	1.1	---
TOTAL	0	0	359.92	1568.6	2864.6	1792	890	383.3	161.9	97.6	60.4	36.33
MEAN	0	0	11.6	50.6	102	57.8	29.7	12.4	5.40	3.15	1.95	1.21
MAX	0	0	161	266	486	411	86	20	8.2	4.5	2.7	2.1
MIN	0	0	0	8.6	7.9	22	20	7.8	4.0	2.5	1.1	.74
AC-FT	0	0	714	3110	5680	3550	1770	760	321	194	120	72

CAL YR 1977 TOTAL 394.77 MEAN 1.08 MAX 161 MIN 0 AC-FT 783
WTR YR 1978 TOTAL 8214.65 MEAN 22.5 MAX 486 MIN 0 AC-FT 16290

11142100 TORO CREEK NEAR MORRO BAY, CA

LOCATION.--Lat 35°25'31", long 120°51'33", in Moro Y Cayucos Grant, San Luis Obispo County, Hydrologic Unit 18060006, on left bank at downstream side of county road bridge, 0.3 mi (0.5 km) downstream from small right-bank tributary, and 2.3 mi (3.7 km) north of town of Morro Bay.

DRAINAGE AREA.--14.0 mi² (36.3 km²).

PERIOD OF RECORD.--October 1970 to September 1978 (discontinued).

GAGE.--Water-stage recorder. Concrete control since Aug. 2, 1972. Altitude of gage is 40 ft (12 m), from topographic map.

REMARKS.--Records good except those for period of no gage-height record, Apr. 16 to May 17, which are fair. No regulation; small diversion above station for individual use.

AVERAGE DISCHARGE.--8 years, 5.74 ft³/s (0.163 m³/s), 4,160 acre-ft/yr (5.13 hm³/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,600 ft³/s (130 m³/s) Jan. 18, 1973, gage height, 9.65 ft (2.941 m), from rating curve extended above 140 ft³/s (3.96 m³/s) on basis of slope-area measurement of maximum flow; no flow at times in most years.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 40 ft³/s (1.1 m³/s) and maximum (*) from rating curve extended as explained above:

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Dec. 27	1530	264	7.48	2.87	.875
Jan. 5	2330	463	13.1	3.51	1.070
Jan. 9	1000	254	7.19	2.83	.863
Jan. 14	2115	752	21.3	4.26	1.298
Jan. 19	0230	182	5.15	2.53	.771
Feb. 8	1930	597	16.9	3.88	1.183
Feb. 12	1615	*801	22.7	4.37	1.332
Feb. 28	2200	142	4.02	2.35	.716
Mar. 4	0815	264	7.48	2.87	.875
Mar. 9	1400	100	2.83	2.13	.649
Mar. 22	0245	54	1.53	1.84	.561
Apr. 4	0515	87	2.46	2.05	.625
Apr. 15	1400	616	17.4	3.93	1.198

Minimum daily discharge, no flow many days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1			0	3.5	6.0	19	13	12	4.7	2.3	1.8	.79
2			0	5.1	5.6	36	12	12	4.5	2.1	1.8	.83
3			0	3.8	5.2	58	12	11	4.6	2.1	1.8	.84
4			0	3.4	5.0	163	25	11	4.7	2.1	1.8	1.2
5			0	19	6.2	110	16	11	4.7	2.2	1.7	1.5
6			0	65	5.9	76	25	10	4.7	2.3	1.7	1.2
7			0	22	67	60	25	9.4	4.0	2.3	1.6	1.1
8			0	13	124	51	21	9.1	3.8	2.4	1.7	.99
9			0	53	235	54	19	8.9	3.5	2.4	1.6	.95
10			0	56	189	43	19	8.7	3.3	2.3	1.4	1.0
11			0	30	93	39	18	8.5	3.4	2.3	1.4	1.0
12			0	18	165	35	17	7.9	3.2	2.4	1.4	.90
13			0	12	132	32	16	7.6	3.0	2.3	1.4	.87
14			0	70	79	29	15	7.3	3.0	2.3	1.3	.96
15			0	104	55	27	91	7.2	3.1	2.1	1.3	1.0
16			0	144	46	26	50	7.0	3.2	2.2	1.3	1.1
17			.65	87	36	24	35	6.5	3.3	2.2	1.2	1.1
18			.13	56	30	22	28	6.1	3.0	2.1	1.1	1.0
19			0	68	26	20	25	5.9	2.9	2.1	1.1	.90
20			0	41	25	19	21	5.7	2.9	2.1	1.1	.81
21			0	32	24	19	19	5.7	2.9	1.9	1.2	.75
22			0	28	20	28	18	5.7	2.9	1.7	1.2	.65
23			.49	22	18	20	17	5.7	2.9	1.7	1.1	.52
24			0	17	16	17	16	5.5	2.8	1.7	1.1	.50
25			0	14	15	16	22	5.3	2.7	1.7	1.0	.47
26			0	12	14	15	24	5.3	2.8	1.7	.98	.41
27			52	9.9	14	14	16	5.2	2.8	1.7	.89	.45
28			79	8.9	23	13	14	5.0	2.6	1.6	.78	.56
29			20	7.7	---	13	14	4.6	2.5	1.6	.81	.53
30			8.9	6.9	---	13	13	4.5	2.5	1.6	.77	.62
31		---	5.1	6.4	---	17	---	4.6	---	1.8	.73	---
TOTAL	0	0	166.27	1038.6	1479.9	1128	676	229.9	100.9	63.3	40.06	25.50
MEAN	0	0	5.36	33.5	52.9	36.4	22.5	7.42	3.36	2.04	1.29	.85
MAX	0	0	79	144	235	163	91	12	4.7	2.4	1.8	1.5
MIN	0	0	0	3.4	5.0	13	12	4.5	2.5	1.6	.73	.41
AC-FT	0	0	330	2060	2940	2240	1340	456	200	126	79	51

CAL YR 1977 TOTAL 189.52 MEAN .52 MAX 79 MIN 0 AC-FT 376
WTR YR 1978 TOTAL 4948.43 MEAN 13.6 MAX 235 MIN 0 AC-FT 9820

Water Resources Data for California

Volume 2. Pacific Slope Basins from Arroyo Grande to Oregon State Line except Central Valley

U.S. GEOLOGICAL SURVEY WATER-DATA REPORT CA-79-2

WATER YEAR 1979

Prepared in cooperation with the California Department of Water Resources and with other agencies

11142500 ARROYO DE LA CRUZ NEAR SAN SIMEON, CA

LOCATION.--Lat 35°43'02", long 121°17'02", in Piedra Blanca Grant, San Luis Obispo County, Hydrologic Unit 18060006, on right bank 1.7 mi (2.7 km) upstream from mouth, and 7 mi (11 km) northwest of San Simeon.

DRAINAGE AREA.--41.2 mi² (106.7 km²).

PERIOD OF RECORD.--October 1950 to September 1979 (discontinued).

REVISED RECORDS.--WSP 1245: 1951. WSP 1929: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 22 ft (6.7 m), from topographic map.

REMARKS.--Records good. No regulation or diversion above station.

AVERAGE DISCHARGE.--29 years, 54.4 ft³/s (1.541 m³/s), 39,410 acre-ft (48.6 hm³/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 35,200 ft³/s (997 m³/s) Dec. 6, 1966, gage height, 15.27 ft (4.654 m), from rating curve extended above 7,600 ft³/s (215 m³/s) on basis of slope-area measurements at gage heights 12.40 ft (3.780 m) and 15.27 ft (4.654 m); no flow for long periods in each year.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 2,500 ft³/s (71 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Jan. 15	0115	*7600	215	9.42	2.871
Feb. 20	1930	4130	117	7.68	2.341

Minimum daily discharge, no flow many days.

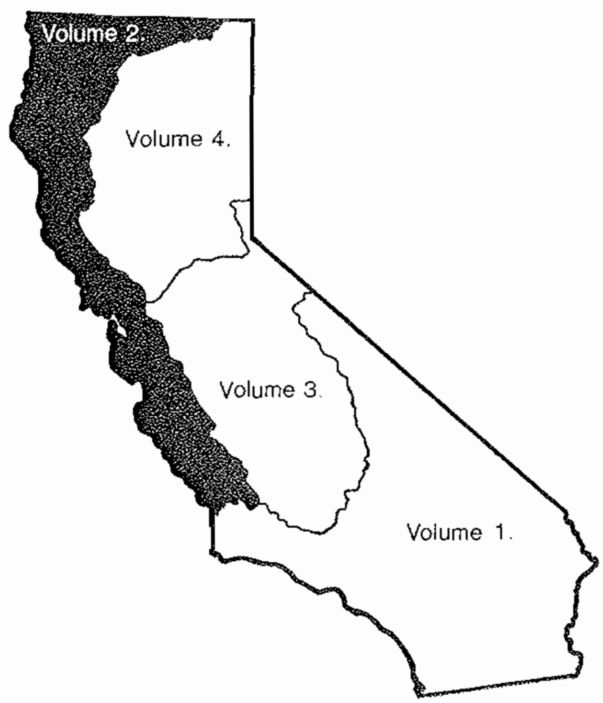
DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1		0	7.4	1.1	545	212	168	17	8.1	1.4		
2		0	6.0	.98	392	167	138	17	7.2	1.2		
3		0	4.3	.93	274	148	118	16	6.6	1.1		
4		0	3.5	.93	194	136	103	15	6.0	1.0		
5		0	3.0	.92	145	125	92	14	5.6	.90		
6		0	2.2	.84	108	116	82	14	5.2	.89		
7		0	1.6	.80	79	110	74	13	4.9	.86		
8		0	1.2	163	55	104	66	13	4.5	.84		
9		0	1.1	212	38	99	58	12	4.0	.80		
10		0	1.1	56	35	94	55	11	3.5	.78		
11		0	1.0	33	33	90	54	11	3.1	.76		
12		0	.93	47	32	87	51	10	2.9	.71		
13		0	.92	25	502	83	48	10	2.7	.63		
14		0	.80	398	797	79	45	10	2.6	.26		
15		0	.80	1950	334	81	42	10	2.8	.11		
16		0	.80	577	402	107	39	11	2.8	.04		
17		0	.85	125	265	210	37	11	2.7	.01		
18		0	.99	180	213	114	35	10	2.5	0		
19		0	16	125	189	99	32	11	2.4	0		
20		0	17	91	758	93	30	11	2.4	0		
21		793	11	66	851	86	28	11	2.4	0		
22		261	7.2	50	536	81	27	12	2.3	0		
23		112	4.8	44	482	77	27	12	2.2	0		
24		58	3.4	41	328	73	25	12	2.2	0		
25		36	2.7	38	264	69	24	12	2.2	0		
26		23	2.1	34	231	207	25	11	2.1	0		
27		17	1.7	30	199	1040	32	10	1.9	0		
28		13	1.6	27	180	966	23	9.5	1.6	0		
29		10	1.5	26	---	609	20	9.3	1.5	0		
30		8.3	1.3	45	---	321	18	9.3	1.4	0		
31		---	1.1	783	---	222	---	8.8	---	0		---
TOTAL	0	1331.3	109.89	5172.50	8461	6105	1616	363.9	102.3	12.29	0	0
MEAN	0	44.4	3.54	167	302	197	53.9	11.7	3.41	.40	0	0
MAX	0	793	17	1950	851	1040	168	17	8.1	1.4	0	0
MIN	0	0	.80	.80	32	69	18	8.8	1.4	0	0	0
AC-FT	0	2640	218	10260	16780	12110	3210	722	203	24	0	0

CAL YR 1978 TOTAL 36152.44 MEAN 99.0 MAX 3180 MIN 0 AC-FT 71710
WTR YR 1979 TOTAL 23274.18 MEAN 63.8 MAX 1950 MIN 0 AC-FT 46160

Water Resources Data California Water Year 1983

Volume 2. Pacific Slope Basins from Arroyo Grande to Oregon State Line except Central Valley



U.S. GEOLOGICAL SURVEY WATER-DATA REPORT CA-83-2
Prepared in cooperation with the California Department of Water Resources and with other agencies

11143500 SALINAS RIVER NEAR POZO, CA

LOCATION.--Lat 35°17'55", long 120°24'10", in NE 1/4 sec.19, T.30 S., R.15 E., San Luis Obispo County, Hydrologic Unit 18060005, on right bank at downstream side of county road bridge, 1.0 mi downstream from Pozo Creek, 1.6 mi west of Pozo, and 7.4 mi upstream from Salinas Dam.

DRAINAGE AREA.--70.3 mi^2.

PERIOD OF RECORD.--July 1942 to September 1983 (discontinued).

REVISED RECORDS.--WSP 1565: 1943(M). WSP 2129: 1952, 1953(P), 1954(M), 1958(M), 1960(M). WDR CA-74-1: 1973.

GAGE.--Water-stage recorder. Datum of gage is 1,347.78 ft National Geodetic Vertical Datum of 1929. Prior to May 13, 1969, water-stage recorder at site 0.4 mi downstream at same datum.

REMARKS.--Records poor. No regulation or diversion above station. Water is stored in Santa Margarita Lake below station.

AVERAGE DISCHARGE.--41 years, 19.5 ft^3/s, 14,130 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 18,600 ft^3/s Jan. 25, 1969, gage height, 13.90 ft in gage well, 15.5 ft site then in use, from floodmarks, from rating curve extended above 7,100 ft^3/s on basis of slope-area measurement of maximum flow; no flow at times.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 300 ft^3/s and maximum (*) from rating curve extended above 620 ft^3/s on basis of slope-area measurement of peak flow:

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Nov. 30	0815	2,770	16.84	Feb. 8	0200	1,790	15.34
Dec. 22	1800	*5,270	19.59	Feb. 12	0515	431	12.04
Jan. 24	0915	2,880	16.98	Mar. 1	0345	3,850	18.13
Jan. 27	0500	3,560	17.81				

Minimum daily, 0.93 ft^3/s Oct. 14.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.0	1.5	60	12	118	1570	50	141	7.6	5.0	3.1	2.3
2	.97	1.4	8.0	10	103	1140	46	108	7.0	4.9	3.0	2.3
3	.97	1.4	7.0	8.6	91	681	43	81	7.6	4.8	2.9	2.3
4	1.0	1.3	6.0	7.4	75	435	41	65	8.3	4.4	2.9	2.2
5	1.0	1.4	5.1	6.5	67	308	38	56	10	4.0	2.8	2.2
6	1.1	1.4	4.9	5.9	88	242	36	45	9.8	4.1	2.7	2.3
7	1.1	1.4	5.3	5.2	289	196	34	40	9.1	3.7	2.7	2.3
8	1.1	1.4	4.7	4.7	862	160	33	35	9.2	3.8	2.7	2.2
9	1.1	3.7	4.5	4.3	305	130	31	33	9.3	3.8	2.7	2.1
10	1.1	2.9	4.4	3.8	192	110	30	29	10	3.9	2.7	2.1
11	1.1	2.0	4.5	3.4	146	97	29	27	10	4.0	2.7	2.0
12	1.1	1.8	4.6	3.2	173	80	28	26	10	3.8	2.6	1.8
13	1.0	1.8	4.3	2.9	285	110	27	25	11	3.7	2.4	1.8
14	.93	1.8	4.4	2.7	160	87	24	24	12	3.6	2.5	1.5
15	.98	1.8	4.4	2.7	118	65	22	22	9.2	3.5	2.4	1.4
16	.95	1.8	4.4	2.7	99	110	21	21	4.0	3.5	2.3	1.3
17	1.0	1.8	4.1	2.5	84	135	20	19	5.0	3.5	2.3	1.3
18	1.0	3.5	4.1	10	77	220	68	18	5.8	3.4	2.7	1.2
19	.98	3.3	4.1	29	65	150	79	17	6.0	3.3	3.3	1.1
20	1.0	2.3	4.1	14	56	130	70	15	6.4	3.2	2.8	1.2
21	1.1	2.1	4.5	9.6	49	165	87	14	6.8	3.1	2.8	1.3
22	1.2	2.2	1570	897	44	130	58	12	6.7	3.1	2.7	1.4
23	1.2	2.2	445	594	40	150	51	11	6.6	3.2	2.7	1.4
24	1.3	2.1	101	1190	37	240	91	9.7	6.4	3.3	2.6	1.4
25	1.5	2.1	55	321	66	160	66	10	6.3	3.2	2.5	1.5
26	2.4	2.1	37	165	177	120	52	10	5.7	3.2	2.6	1.4
27	1.5	2.0	26	1860	805	90	42	9.8	5.4	3.1	2.4	1.4
28	1.3	2.0	22	541	502	82	48	9.8	5.3	3.0	2.4	1.4
29	1.2	7.7	22	476	---	70	57	9.7	5.1	3.1	2.3	1.6
30	1.8	718	18	218	---	60	157	9.3	5.0	3.1	2.6	1.8
31	1.7	---	15	147	---	53	---	8.7	---	3.0	2.4	---
TOTAL	36.68	782.2	2468.4	6560.1	5173	7476	1479	961.0	226.6	112.3	82.2	51.5
MEAN	1.18	26.1	79.6	212	185	241	49.3	31.0	7.55	3.62	2.65	1.72
MAX	2.4	718	1570	1860	862	1570	157	141	12	5.0	3.3	2.3
MIN	.93	1.3	4.1	2.5	37	53	20	8.7	4.0	3.0	2.3	1.1
AC-FT	73	1550	4900	13010	10260	14830	2930	1910	449	223	163	102

CAL YR 1982 TOTAL 12439.3 MEAN 34.2 MAX 1900 MIN .78 AC-FT 24670
WTR YR 1983 TOTAL 25408.98 MEAN 69.8 MAX 1860 MIN .93 AC-FT 50400

11144200 SALSIPUEDES CREEK NEAR POZO, CA

LOCATION.--Lat 35°17'34", long 120°27'07", in NW 1/4 SW 1/4 sec.23, T.30 S., R.14 E., San Luis Obispo County, Hydrologic Unit 18060005, on left bank 1.9 mi upstream from mouth, and 4.4 mi west of Pozo.

DRAINAGE AREA.--5.91 mi^2.

PERIOD OF RECORD.--October 1969 to September 1983 (discontinued).

REVISED RECORDS.--WDR CA-72-1: 1971(P).

GAGE.--Water-stage recorder and concrete control. Altitude of gage is 1,480 ft, from topographic map.

REMARKS.--Records fair except for period of faulty or no gage-height record, Feb. 19 to July 16, which is poor. No regulation or diversion above station.

AVERAGE DISCHARGE.--14 years, 2.64 ft^3/s, 1,920 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,450 ft^3/s Feb. 21, 1980, gage height, 6.12 ft, from rating curve extended above 67 ft^3/s on basis of slope-area measurements at gage heights 4.58 ft and 5.88 ft; no flow for long periods in each year.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 100 ft^3/s, and maximum (*) from rating curve extended as explained above:

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Nov. 30	Unknown	976	4.94	Jan. 26	2315	313	3.05
Dec. 22	1530	1,250	5.64	Feb. 7	2200	495	3.65
Jan. 24	0545	*1,260	5.66	Mar. 1	0045	1,130	5.34

Minimum, no flow for many days.

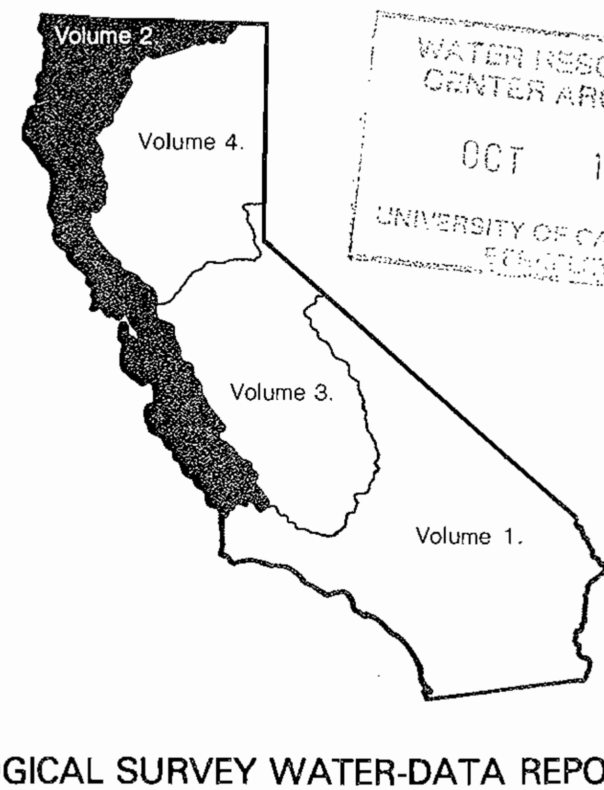
DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1		0	4.0	1.9	11	276	6.2	10	.63	.04	0	.01
2		0	2.0	1.7	14	150	5.5	8.0	.57	.03	0	.01
3		0	1.0	1.6	11	90	5.2	6.8	.52	.03	0	.01
4		0	.65	1.5	8.8	65	4.7	6.0	.48	.03	0	.01
5		0	.48	1.4	9.3	48	4.4	5.4	.43	.02	0	.01
6		0	.35	1.2	21	38	4.2	4.9	.39	.02	0	.01
7		0	.29	1.1	68	31	4.0	4.5	.37	.02	0	.01
8		0	.23	1.1	63	26	3.9	4.2	.33	.02	0	.02
9		.14	.20	1.0	25	23	3.7	3.8	.30	.02	0	.02
10		.03	.18	.92	16	17	3.6	3.5	.28	.01	0	.02
11		0	.17	.89	12	15	3.4	3.3	.25	.01	0	.01
12		0	.16	.89	50	12	3.3	3.1	.23	.01	0	.01
13		0	.16	.79	43	15	3.1	2.9	.21	.01	0	.01
14		0	.15	.79	26	12	2.9	2.8	.19	.01	0	0
15		0	.16	.79	22	9.3	2.8	2.7	.17	.01	0	0
16		0	.15	.79	19	17	2.6	2.5	.16	.01	0	0
17		0	.13	.73	18	18	2.4	2.3	.14	0	0	0
18		0	.13	5.1	20	30	18	2.2	.13	0	0	0
19		.54	.13	6.1	19	18	12	2.0	.12	0	0	0
20		.30	.11	2.4	17	19	13	1.8	.11	0	0	0
21		.12	.43	2.1	14	23	15	1.7	.10	0	0	0
22		.06	296	141	13	18	14	1.6	.09	0	0	0
23		.07	31	39	12	22	9.0	1.5	.08	0	.01	0
24		.05	11	134	13	33	12	1.4	.07	0	0	0
25		.05	6.5	27	25	25	9.0	1.2	.07	0	0	0
26		.05	4.6	38	20	18	6.3	1.1	.06	0	0	0
27		.05	3.6	107	75	12	5.4	1.0	.06	0	0	0
28		.06	3.0	32	70	10	7.5	.92	.05	0	0	0
29		1.0	2.7	26	---	8.0	6.5	.85	.05	0	0	0
30		28	2.5	16	---	7.4	14	.75	.04	0	0	0
31		---	2.2	13	---	6.5	---	.70	---	0	0	---
TOTAL	0	30.52	374.36	607.79	735.1	1112.2	207.6	95.42	6.68	0.30	0.01	0.16
MEAN	0	1.02	12.1	19.6	26.3	35.9	6.92	3.08	.22	.010	.000	.005
MAX	0	28	296	141	75	276	18	10	.63	.04	.01	.02
MIN	0	0	.11	.73	8.8	6.5	2.4	.70	.04	0	0	0
AC-FT	0	61	743	1210	1460	2210	412	189	13	.6	.02	.3

CAL YR 1982	TOTAL	1395.23	MEAN	3.82	MAX	296	MIN	0	AC-FT	2770
WTR YR 1983	TOTAL	3170.14	MEAN	8.69	MAX	296	MIN	0	AC-FT	6290

Water Resources Data California Water Year 1989

Volume 2. Pacific Slope Basins from Arroyo Grande to Oregon State Line except Central Valley



U.S. GEOLOGICAL SURVEY WATER-DATA REPORT CA-89-2
Prepared in cooperation with the California Department of Water Resources and with other agencies

11142300 SAN SIMEON CREEK NEAR CAMBRIA, CA

LOCATION.--Lat 35°35'59", long 121°06'47", in San Simeon Grant, San Luis Obispo County, Hydrologic Unit 18060006, on right bank, 0.7 mi upstream of Highway 1 bridge and 3.0 mi northwest of Cambria.

DRAINAGE AREA.--26.3 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1987 to July 1989 (discontinued).

GAGE.--Water-stage recorder and crest-stage gage. Datum of gage is 12.13 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Records fair. No regulation or diversion upstream from station.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,000 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Dec. 24	0930	*4,880	*15.05				

No flow for many days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	18	2.4	2.4	8.8	1.2	.00	.00	---	---
2	.00	.00	.00	11	2.1	48	7.8	1.1	.00	.00	---	---
3	.00	.00	.00	8.9	2.2	23	7.0	.89	.00	.00	---	---
4	.00	.00	.00	7.5	13	11	6.1	.37	.00	.00	---	---
5	.00	.00	.00	141	9.4	8.2	5.4	.18	.00	.00	---	---
6	.00	.00	.00	e43	5.5	7.2	4.7	.05	.00	.00	---	---
7	.00	.00	.00	24	4.4	6.7	4.1	.00	.00	.00	---	---
8	.00	.00	.00	17	4.5	6.0	3.7	.00	.00	.00	---	---
9	.00	.00	.00	14	36	5.4	3.1	.00	.00	.00	---	---
10	.00	.00	.00	12	17	5.1	3.1	.00	.00	.00	---	---
11	.00	.00	.00	10	11	11	3.0	.00	.00	.00	---	---
12	.00	.00	.00	8.2	8.9	9.4	2.8	.00	.00	---	---	---
13	.00	.00	.00	7.2	7.8	6.7	2.5	.00	.00	---	---	---
14	.00	.00	.00	6.8	6.7	6.0	2.6	.00	.00	---	---	---
15	.00	.00	.00	6.2	5.9	5.7	2.2	.00	.00	---	---	---
16	.00	.00	.00	5.7	5.5	11	2.1	.00	.00	---	---	---
17	.00	.00	.00	5.1	5.0	12	2.1	.00	.00	---	---	---
18	.00	.00	.00	4.7	4.8	8.3	2.3	.00	.00	---	---	---
19	.00	.00	.00	4.5	4.7	7.2	2.4	.00	.00	---	---	---
20	.00	.00	.00	4.0	4.3	6.6	2.3	.00	.00	---	---	---
21	.00	.00	.51	3.4	3.9	5.8	2.1	.00	.00	---	---	---
22	.00	.00	124	2.7	3.7	5.4	1.9	.00	.00	---	---	---
23	.00	.00	38	5.5	3.4	5.2	1.8	.00	.00	---	---	---
24	.00	.00	784	6.5	3.3	58	2.0	.00	.00	---	---	---
25	.00	.00	76	4.2	3.2	104	3.1	.00	.00	---	---	---
26	.00	.00	30	3.7	2.9	48	2.5	.00	.00	---	---	---
27	.00	.00	19	3.2	2.9	24	2.0	.00	.00	---	---	---
28	.00	.00	16	2.9	2.7	18	1.7	.00	.00	---	---	---
29	.00	.00	12	2.8	---	14	1.3	.00	.00	---	---	---
30	.00	.00	11	2.6	---	12	1.2	.00	.00	---	---	---
31	.00	---	26	2.5	---	10	---	.00	---	---	---	---
TOTAL	0.00	0.00	1136.51	398.8	187.1	511.3	97.7	3.79	0.00	---	---	---
MEAN	.00	.00	36.7	12.9	6.68	16.5	3.26	.12	.00	---	---	---
MAX	.00	.00	784	141	36	104	8.8	1.2	.00	---	---	---
MIN	.00	.00	.00	2.5	2.1	2.4	1.2	.00	.00	---	---	---
AC-FT	.0	.0	2250	791	371	1010	194	7.5	.0	---	---	---

CAL YR 1988 TOTAL 2591.50 MEAN 7.08 MAX 784 MIN .00 AC-FT 5140

e Estimated.

11142300 SAN SIMEON CREEK NEAR CAMBRIA, CA--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--
CHEMICAL DATA: Water year 1988 to February 1989 (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND	SPE-CIFIC CON-DUCT-ANCE (US/CM)	PH (STAND-ARD UNITS)	TEMPER-ATURE WATER (DEG C)	HARD-NESS TOTAL (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)
JAN									
31...	1210	2.7	519	--	12.0	--	--	--	--
FEB									
23...	1325	3.6	495	8.20	17.0	240	44	31	16

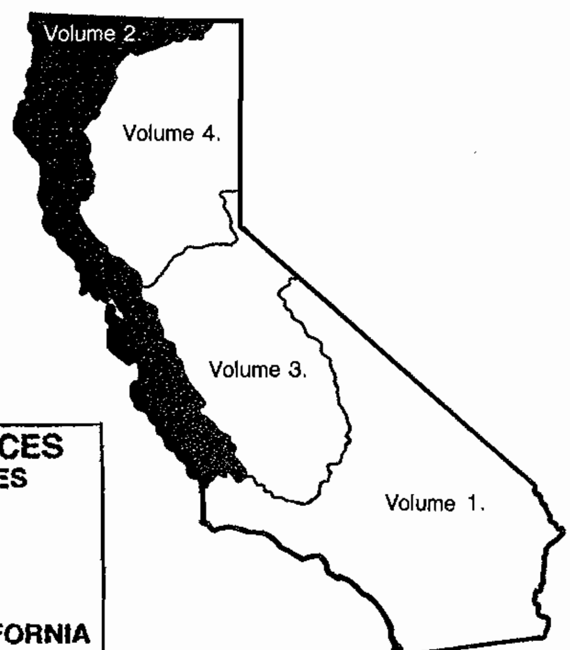
DATE	SODIUM PERCENT	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	BROMIDE DIS-SOLVED (MG/L AS BR)
JAN								
31...	--	--	--	--	--	--	--	--
FEB								
23...	13	0.5	1.1	216	44	13	0.10	<0.010

DATE	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	BORON, DIS-SOLVED (UG/L AS B)	IRON, DIS-SOLVED (UG/L AS FE)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)
JAN								
31...	--	--	--	--	--	--	--	--
FEB								
23...	14	292	294	<0.010	0.206	180	5	3

< Actual value is known to be less than the value shown.

Water Resources Data California Water Year 1992

Volume 2. Pacific Slope Basins from Arroyo Grande to Oregon State Line except Central Valley



U.S. GEOLOGICAL SURVEY WATER-DATA REPORT CA-92-2
Prepared in cooperation with the California Department of
Water Resources and with other agencies

ARROYO GRANDE BASIN

11141150 ARROYO GRANDE ABOVE PHOENIX CREEK, NEAR ARROYO GRANDE, CA

LOCATION.--Lat 35°11'19", long 120°26'03", in Arroyo Grande Grant, San Luis Obispo County, Hydrologic Unit 18060006, on right bank 0.4 mi upstream from county road bridge, 0.45 mi upstream from Phoenix Creek, and 9.2 mi northeast of Arroyo Grande.

DRAINAGE AREA.--13.4 mi^2.

PERIOD OF RECORD.--June 1967 to September 1992 (discontinued).
CHEMICAL DATA: Water year 1977.
WATER TEMPERATURE: Water years 1968-73.
SEDIMENT DATA: Water years 1967-73, June 1990.

REVISED RECORDS.--WDR CA-70-2: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 560 ft above National Geodetic Vertical Datum of 1929, from topographic map. Prior to May 24, 1984, at site 0.4 mi downstream at different datum.

REMARKS.--Records poor. No regulation or diversion upstream from station except for small stock ponds.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,270 ft^3/s, Jan. 25, 1969, gage height, 6.83 ft, in gage well, 6.57 ft from floodmarks, site and datum then in use, from rating curve extended above 350 ft^3/s on basis of slope-area measurement of peak flow; maximum gage height, 8.29 ft, Apr. 4, 1978, from floodmark, site and datum then in use; minimum daily discharge, 0.12 ft^3/s, Sept. 7, 1977.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 40 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Feb. 12	e0630	e*225	unknown	Feb. 15	e0445	e200	unknown

Minimum daily, 0.28 ft^3/s, Sept. 22.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e.30	e.45	e.62	e1.3	e.82	e1.6	e1.3	1.1	.84	.79	.49	.55
2	e.30	e.42	e.62	e.83	e.82	e1.6	e1.3	1.1	.79	.76	.53	.42
3	e.30	e.41	e.62	e.80	e.82	e1.5	e1.3	1.1	.80	.66	.48	.38
4	e.31	e.40	e.62	e.90	e.81	e1.5	e1.3	1.2	.87	.67	.50	.39
5	e.31	e.40	e.62	e10	e.81	e1.6	e1.3	1.3	.99	.58	.40	.41
6	e.31	e.40	e.62	e7.0	e.81	e4.0	e1.3	1.3	1.1	.44	.43	.43
7	e.31	e.40	e.64	e7.4	e.80	e3.5	e1.3	1.4	1.1	.40	.41	.33
8	e.31	e.40	e.70	e3.8	e.80	e2.6	e1.3	1.5	1.1	.44	.38	.33
9	e.32	e.41	e.69	e2.0	e.80	e2.0	e1.3	1.5	1.1	.45	.41	.33
10	e.32	e.70	e.67	e1.5	e17	e1.8	1.3	1.5	1.3	.47	.43	.39
11	e.32	e.67	e.66	e1.3	e28	e1.7	1.2	1.5	1.4	.53	.46	.37
12	e.32	e.60	e.66	e1.1	e56	e1.6	1.2	1.5	1.4	.64	.38	.39
13	e.32	e.53	e.66	e1.0	e45	e1.6	1.3	1.3	1.5	.70	.39	.41
14	e.33	e.50	e.66	e.97	e35	e1.5	1.4	1.3	1.6	.71	.42	.37
15	e.33	e.48	e.66	e.94	e60	e1.5	1.3	1.3	1.7	.73	.41	.38
16	e.33	e.46	e.66	e.94	e35	e1.5	1.3	1.2	1.0	.64	.41	.41
17	e.33	e.50	e.66	e.91	e18	e1.5	1.3	1.1	1.2	.62	.41	.39
18	e.33	e1.0	e.66	e.90	e9.0	e1.5	1.3	1.1	1.4	.63	.39	.39
19	e.34	e.96	e.66	e.88	e4.8	e1.4	1.5	1.1	1.5	.54	.42	.39
20	e.34	e.81	e.66	e.87	e3.3	e1.4	1.5	1.0	1.5	.55	.39	.38
21	e.34	e.73	e.66	e.86	e2.8	e1.4	1.6	1.0	1.4	.55	.40	.29
22	e.34	e.68	e.66	e.86	e2.5	e2.0	1.5	1.0	1.3	.51	.43	.28
23	e.35	e.67	e.66	e.86	e2.3	e1.9	1.5	1.0	1.2	.47	.44	.31
24	e.35	e.66	e.66	e.85	e2.1	e1.7	1.5	1.0	1.1	.52	.45	.33
25	e.35	e.65	e.66	e.85	e2.0	e1.6	1.4	1.0	.96	.52	.44	.38
26	e.80	e.64	e.66	e.84	e1.9	e1.5	1.4	.99	.95	.54	.42	.37
27	e.77	e.63	e.66	e.84	e1.8	e1.5	1.3	.94	.93	.58	.33	.40
28	e.64	e.63	e3.5	e.84	e1.7	e1.5	1.3	.90	.79	.49	.40	.42
29	e.57	e.63	e6.0	e.84	e1.7	e1.4	1.2	.93	.75	.54	.45	.42
30	e.51	e.62	e6.4	e.83	---	e1.4	1.2	.91	.83	.57	.51	.41
31	e.48	---	e2.5	e.83	---	e1.4	---	.86	---	.46	.51	---
TOTAL	11.88	17.44	36.04	54.64	337.19	54.2	40.2	35.93	34.40	17.70	13.32	11.45
MEAN	.38	.58	1.16	1.76	11.6	1.75	1.34	1.16	1.15	.57	.43	.38
MAX	.80	1.0	6.4	10	60	4.0	1.6	1.5	1.7	.79	.53	.55
MIN	.30	.40	.62	.80	.80	1.4	1.2	.86	.75	.40	.33	.28
AC-FT	24	35	71	108	669	108	80	71	68	35	26	23

e Estimated.

ARROYO GRANDE BASIN

11141150 ARROYO GRANDE ABOVE PHOENIX CREEK, NEAR ARROYO GRANDE, CA--Continued

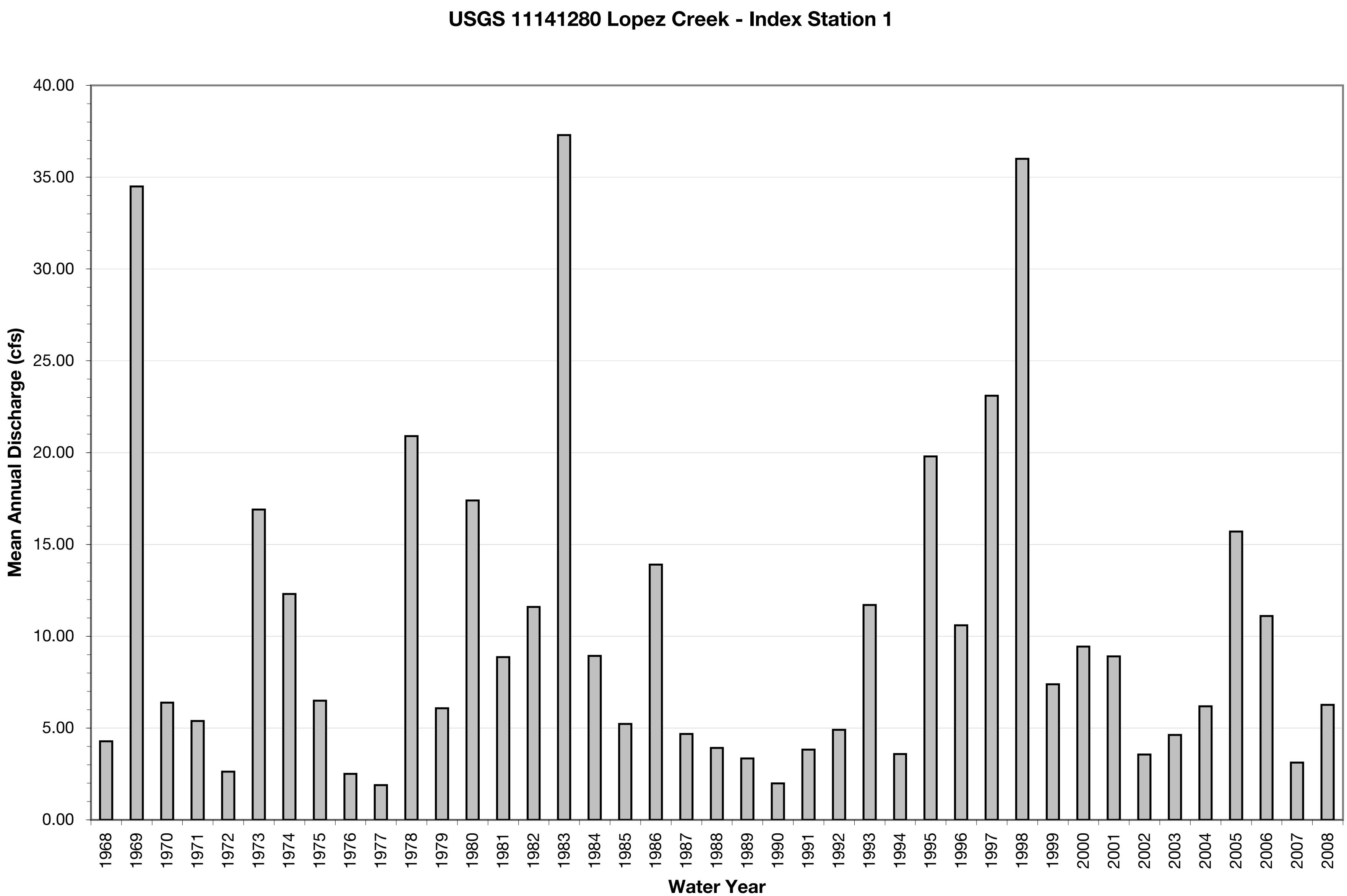
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1967 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	.96	1.39	1.90	4.93	7.42	6.67	3.36	1.84	1.47	1.07	.83	.76
MAX	1.95	4.75	6.75	47.8	42.3	32.2	16.0	5.90	4.23	2.84	2.07	1.50
(WY)	1984	1983	1983	1969	1969	1986	1982	1983	1983	1983	1983	1986
MIN	.32	.40	.41	.52	.66	.80	.57	.43	.28	.18	.20	.26
(WY)	1991	1991	1991	1991	1991	1990	1990	1990	1990	1990	1990	1990

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1967 - 1992	
ANNUAL TOTAL	288.75		664.39			
ANNUAL MEAN	.79		1.82		2.68	
HIGHEST ANNUAL MEAN					10.8	1969
LOWEST ANNUAL MEAN					.50	1990
HIGHEST DAILY MEAN	8.6	Mar 20	60	Feb 15	391	Jan 25 1969
LOWEST DAILY MEAN	.30	Sep 29	.28	Sep 22	.12	Sep 7 1977
ANNUAL SEVEN-DAY MINIMUM	.30	Sep 27	.31	Oct 1	.16	Aug 5 1990
INSTANTANEOUS PEAK FLOW			225	Feb 12	1270	Jan 25 1969
INSTANTANEOUS PEAK STAGE			.00	Feb 12	8.29	Apr 4 1978
ANNUAL RUNOFF (AC-FT)	573		1320		1940	
10 PERCENT EXCEEDS	.99		1.7		3.6	
50 PERCENT EXCEEDS	.62		.80		1.2	
90 PERCENT EXCEEDS	.34		.38		.43	

Attachment 2

Mean Annual Discharge and Kendall's Tau Correlation Tests (Lopez Creek and Nacimiento River)



11141280_LopezCr_maq.xls : CHT

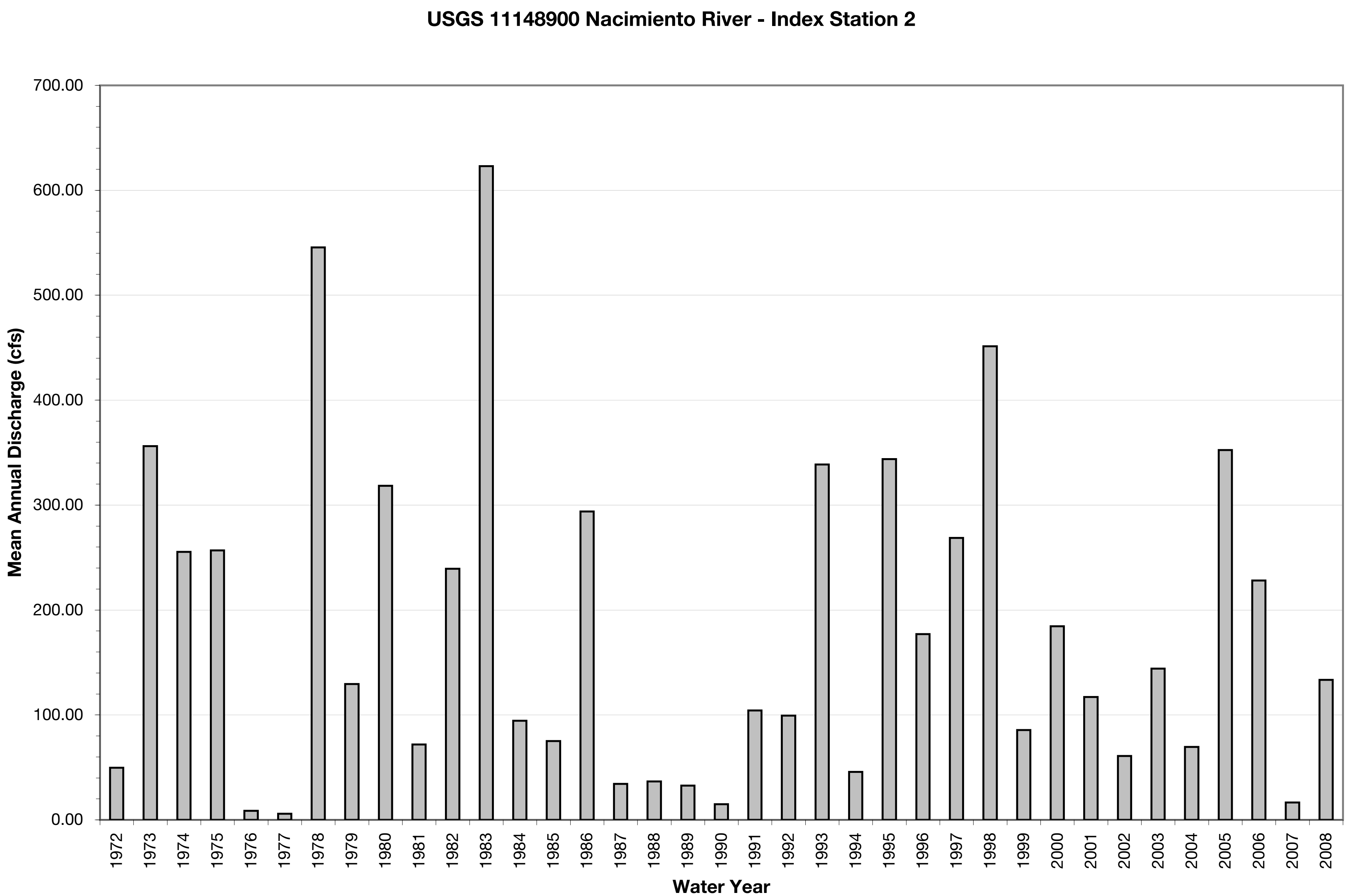
USGS 11141280 LOPEZ C NR ARROYO GRANDE CA

Agency	Gage No.	Water Year	Mean Annual Flow (cfs)
USGS	11141280	1968	4.28
USGS	11141280	1969	34.50
USGS	11141280	1970	6.38
USGS	11141280	1971	5.38
USGS	11141280	1972	2.63
USGS	11141280	1973	16.90
USGS	11141280	1974	12.30
USGS	11141280	1975	6.49
USGS	11141280	1976	2.50
USGS	11141280	1977	1.89
USGS	11141280	1978	20.90
USGS	11141280	1979	6.08
USGS	11141280	1980	17.40
USGS	11141280	1981	8.87
USGS	11141280	1982	11.60
USGS	11141280	1983	37.30
USGS	11141280	1984	8.93
USGS	11141280	1985	5.22
USGS	11141280	1986	13.90
USGS	11141280	1987	4.68
USGS	11141280	1988	3.92
USGS	11141280	1989	3.35
USGS	11141280	1990	1.99
USGS	11141280	1991	3.82
USGS	11141280	1992	4.90
USGS	11141280	1993	11.70
USGS	11141280	1994	3.59
USGS	11141280	1995	19.80
USGS	11141280	1996	10.60
USGS	11141280	1997	23.10
USGS	11141280	1998	36.00
USGS	11141280	1999	7.39
USGS	11141280	2000	9.44
USGS	11141280	2001	8.90
USGS	11141280	2002	3.56
USGS	11141280	2003	4.63
USGS	11141280	2004	6.18
USGS	11141280	2005	15.70
USGS	11141280	2006	11.10
USGS	11141280	2007	3.12
USGS	11141280	2008	6.26

Kendall Rank Correlation for Column 1, Column 2

Score	-14.000
Tau	-.017
Z-Value	-.157
P-Value	.8751
Tau corrected for ties	-.017
Tied Z-Value	-.157
Tied P-Value	.8751
# Ties, Column 1	0
# Ties, Column 2	0

9 cases were omitted due to missing values.



11148900_NacimientoR_maq.xls : CHT

USGS 11148900 NACIMIENTO R BL SAPAQUE C NR BRYSON CA

Agency	Gage No.	Water Year	Mean Annual Flow (cfs)
USGS	11148900	1972	49.60
USGS	11148900	1973	356.10
USGS	11148900	1974	255.40
USGS	11148900	1975	256.80
USGS	11148900	1976	8.62
USGS	11148900	1977	5.74
USGS	11148900	1978	545.70
USGS	11148900	1979	129.40
USGS	11148900	1980	318.30
USGS	11148900	1981	71.80
USGS	11148900	1982	239.30
USGS	11148900	1983	623.00
USGS	11148900	1984	94.50
USGS	11148900	1985	75.20
USGS	11148900	1986	293.90
USGS	11148900	1987	34.30
USGS	11148900	1988	36.60
USGS	11148900	1989	32.60
USGS	11148900	1990	14.90
USGS	11148900	1991	104.30
USGS	11148900	1992	99.30
USGS	11148900	1993	338.70
USGS	11148900	1994	45.70
USGS	11148900	1995	343.90
USGS	11148900	1996	177.00
USGS	11148900	1997	268.60
USGS	11148900	1998	451.30
USGS	11148900	1999	85.60
USGS	11148900	2000	184.40
USGS	11148900	2001	117.00
USGS	11148900	2002	60.90
USGS	11148900	2003	144.20
USGS	11148900	2004	69.40
USGS	11148900	2005	352.40
USGS	11148900	2006	228.10
USGS	11148900	2007	16.50
USGS	11148900	2008	133.50

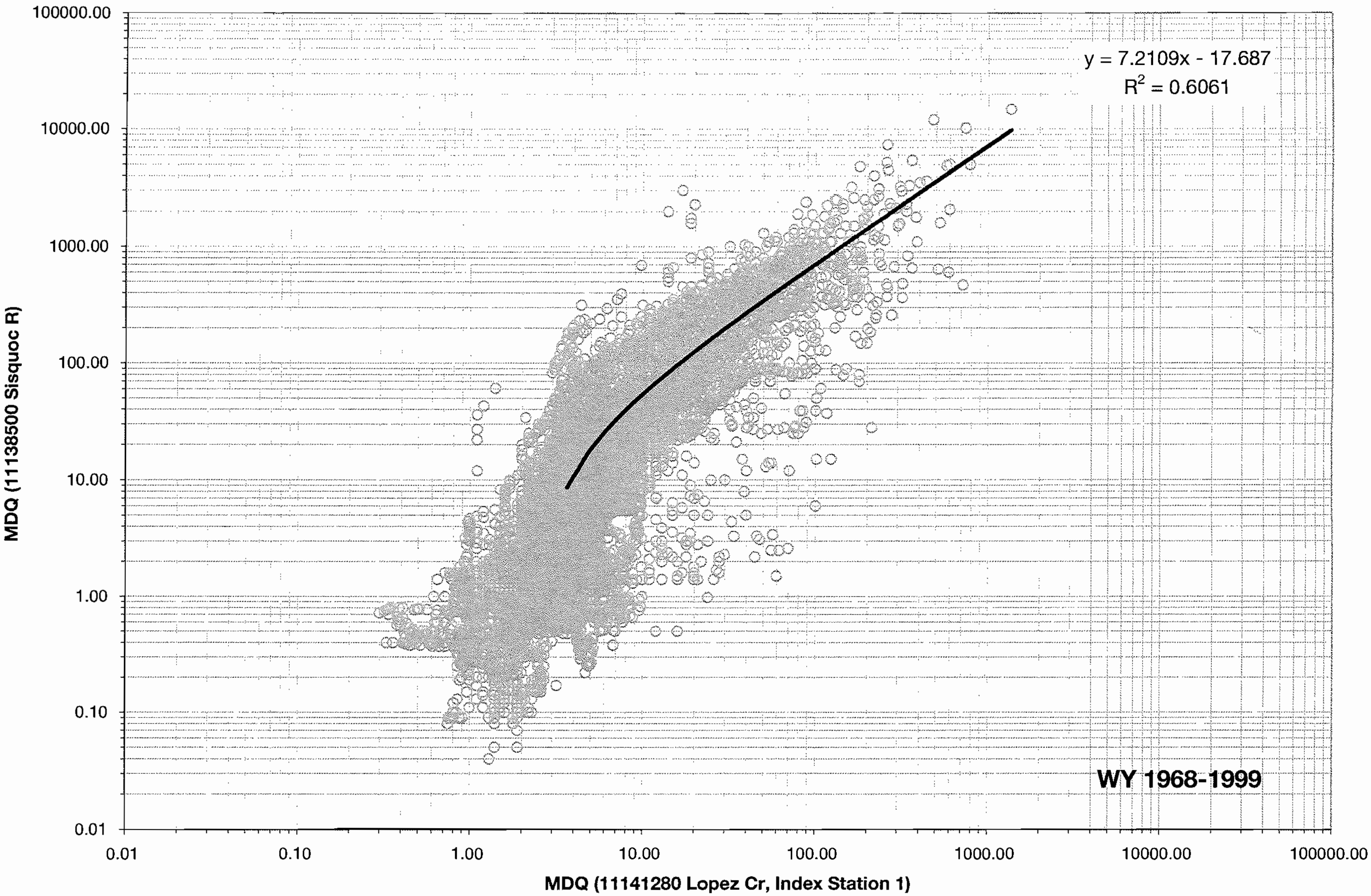
Kendall Rank Correlation for Column 1, Column 2

Score	-4.000
Tau	-.006
Z-Value	-.052
P-Value	.9583
Tau corrected for ties	-.006
Tied Z-Value	-.052
Tied P-Value	.9583
# Ties, Column 1	0
# Ties, Column 2	0

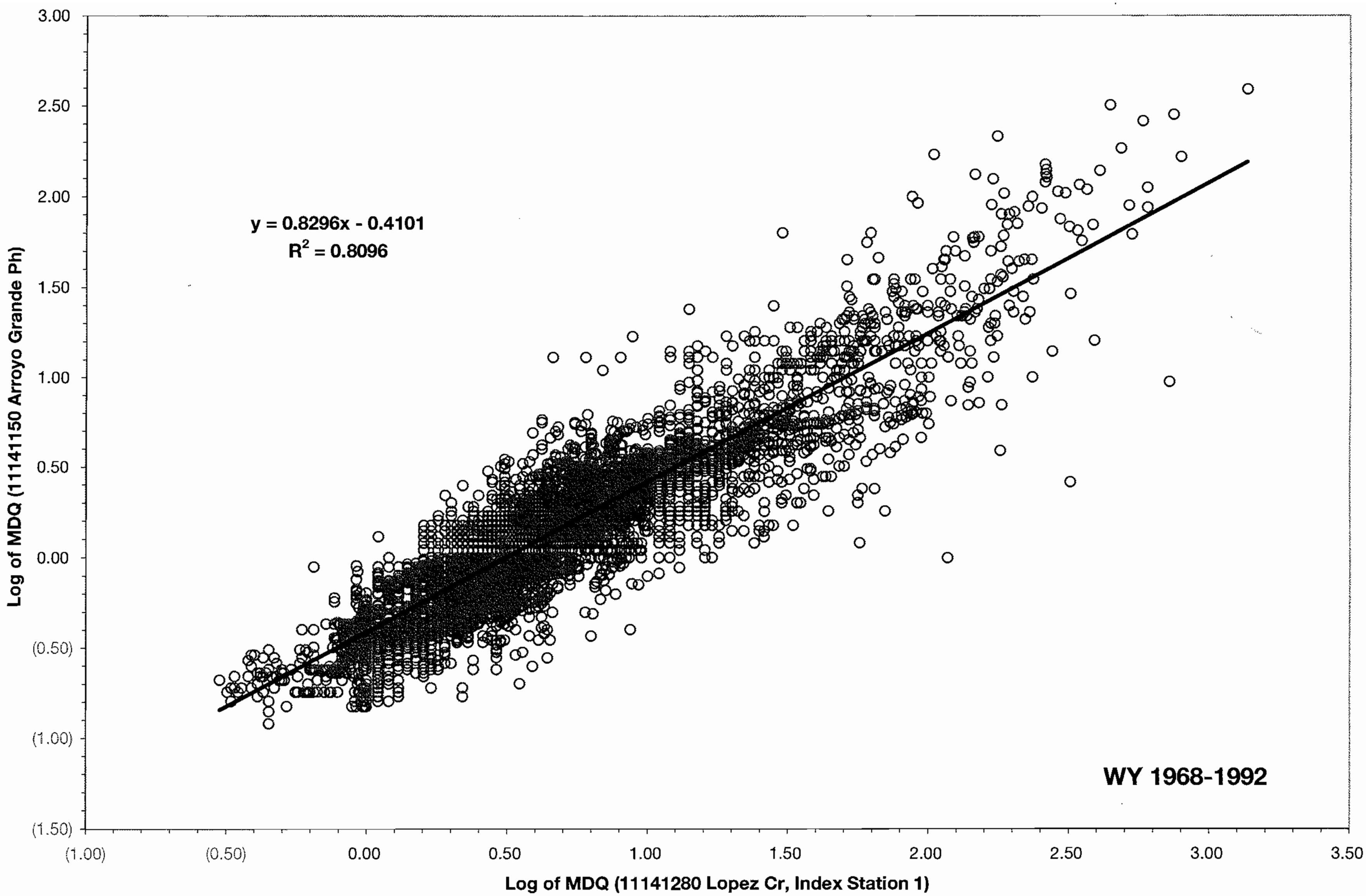
13 cases were omitted due to missing values.

Attachment 3

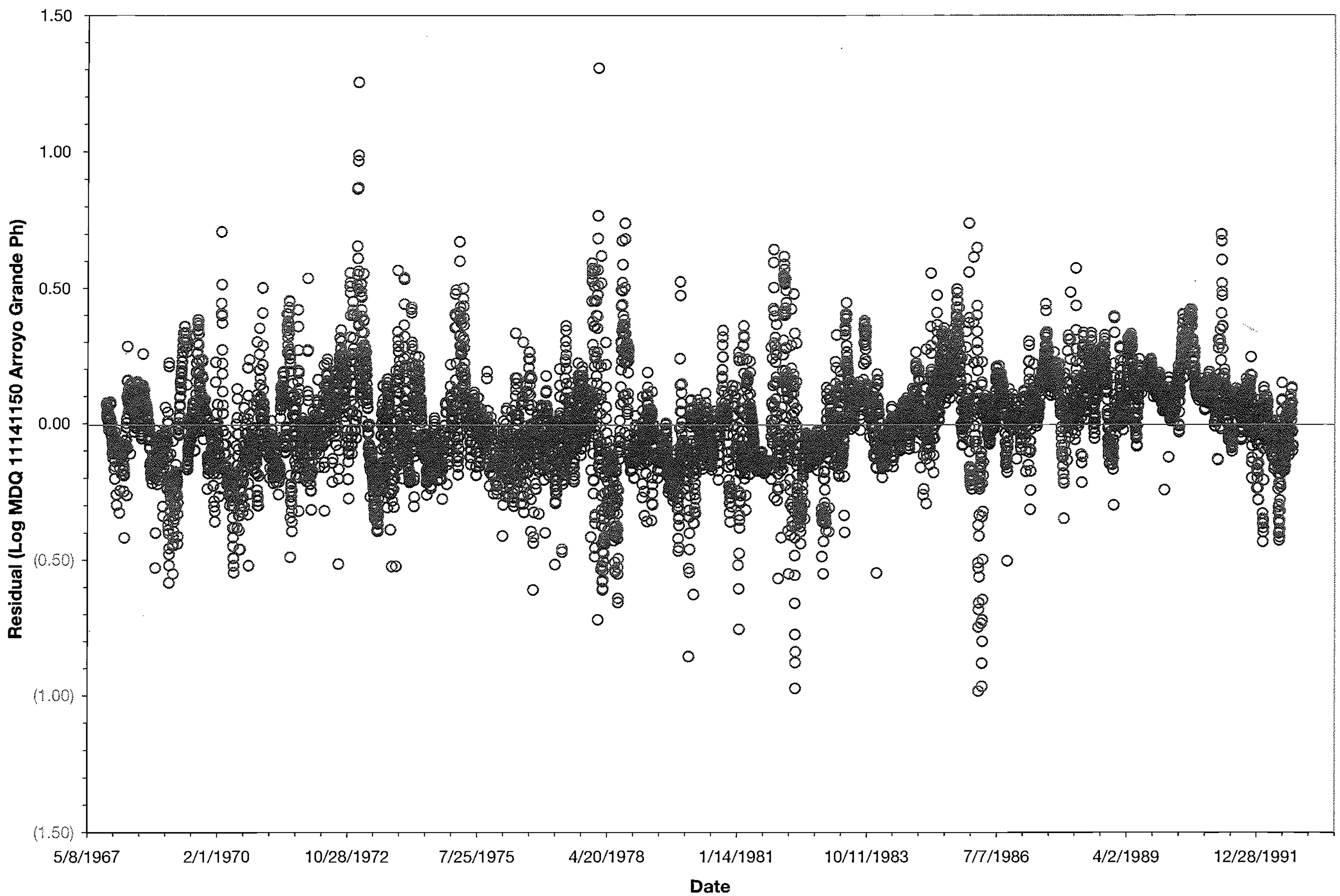
Index and Study Station Regression Analysis



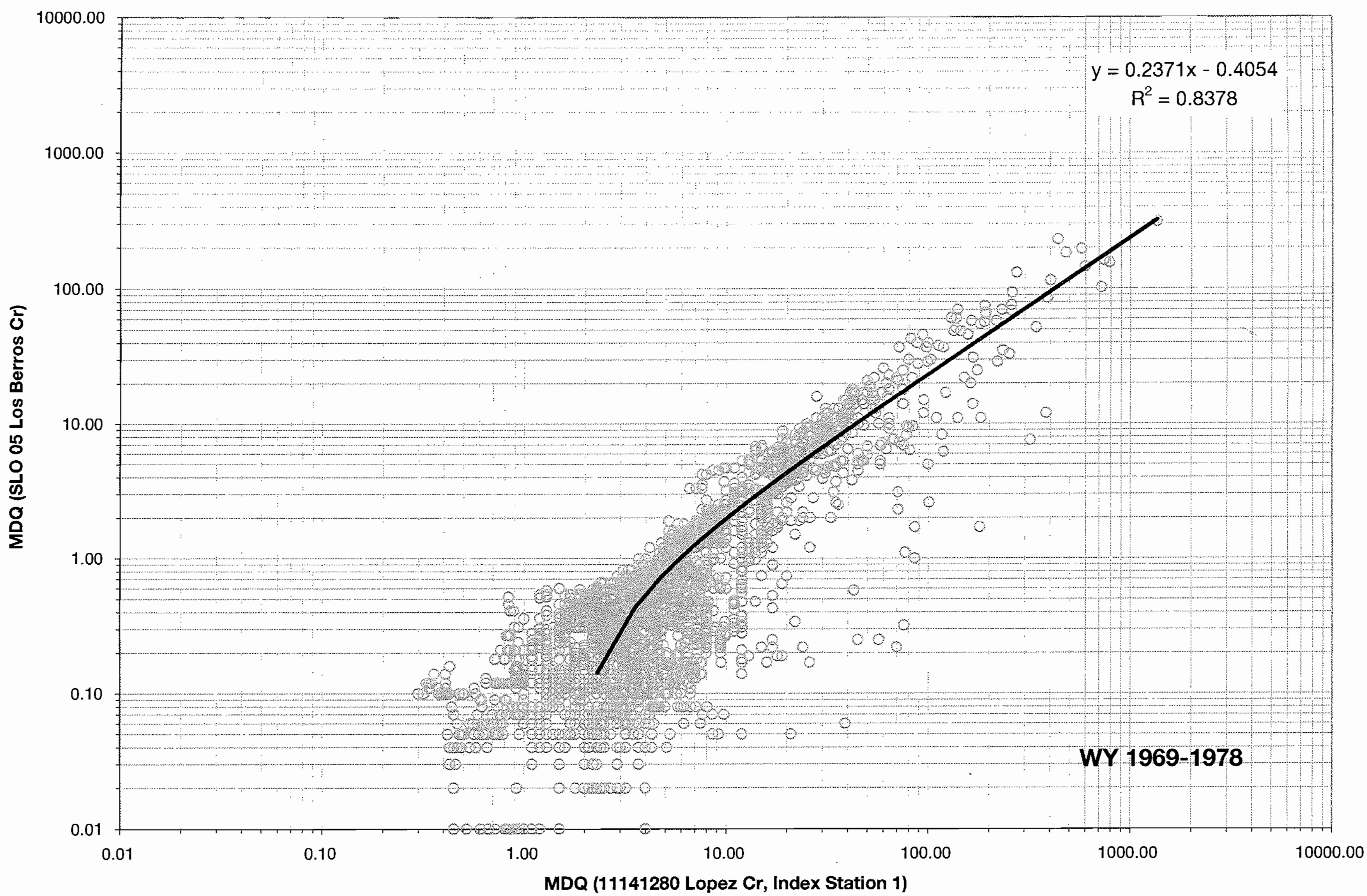
100000.00
10000.00
1000.00
100.00
10.00
1.00
0.10
0.01
MDQ (11138500 Sisquoc R)
y = 7.2109x - 17.687
R^2 = 0.6061
WY 1968-1999
0.01
0.10
1.00
10.00
100.00
1000.00
10000.00
100000.00
MDQ (11141280 Lopez Cr, Index Station 1)



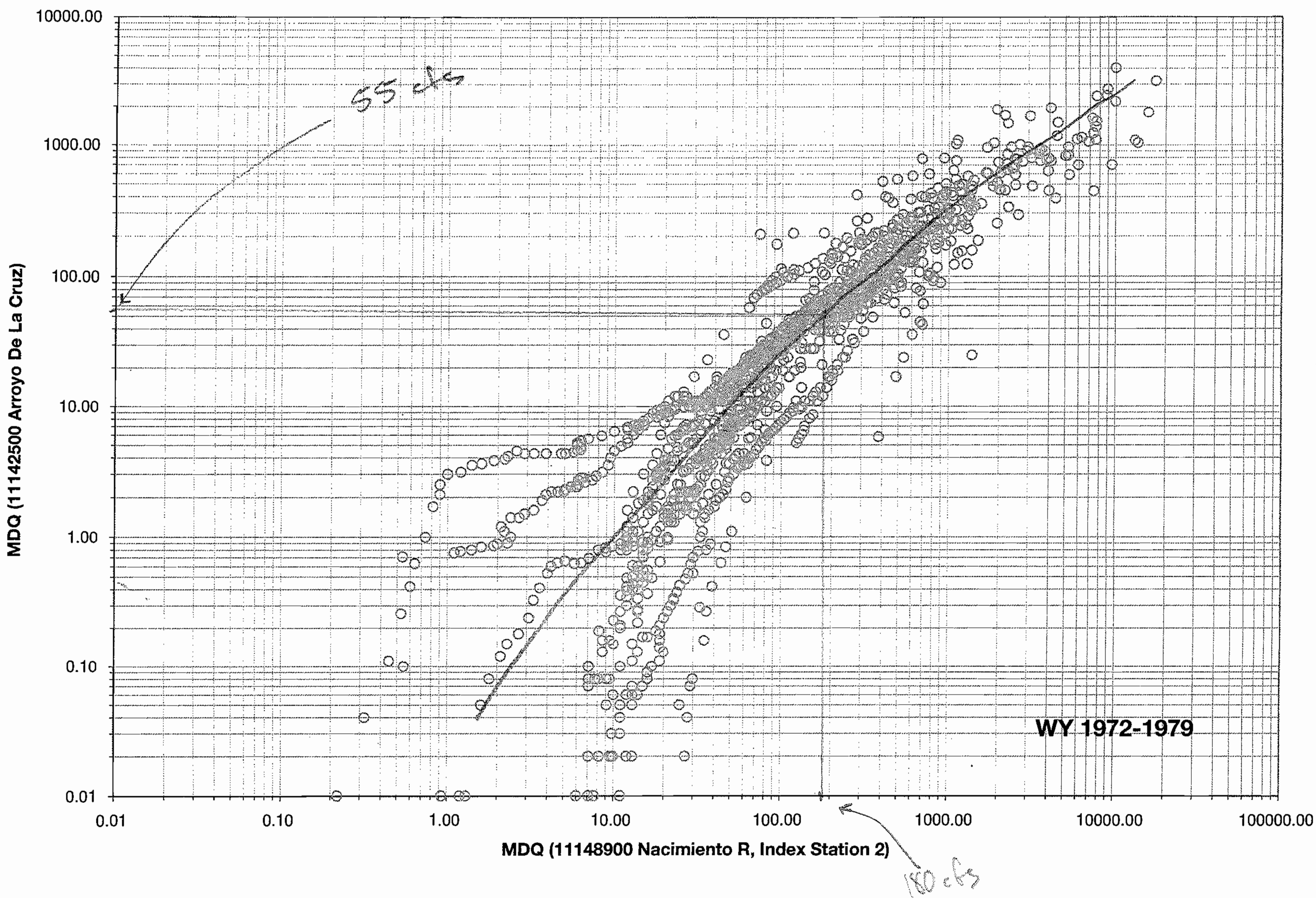
3.00
2.50
2.00
1.50
1.00
0.50
0.00
(0.50)
(1.00)
(1.50)
Log of MDQ (11141150 Arroyo Grande Ph)
y = 0.8296x - 0.4101
R2 = 0.8096
WY 1968-1992
(1.00)
(0.50)
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
Log of MDQ (11141280 Lopez Cr, Index Station 1)

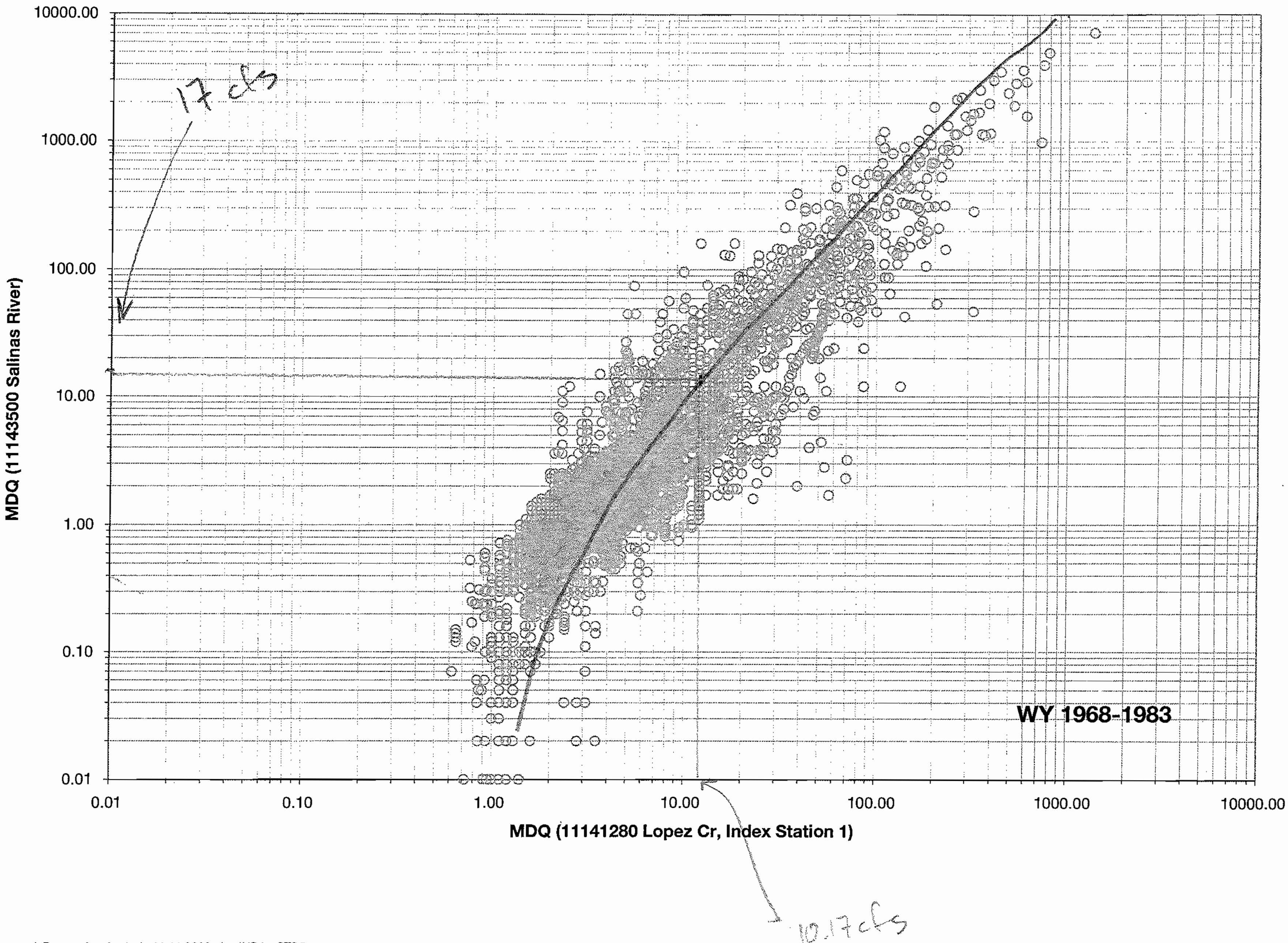


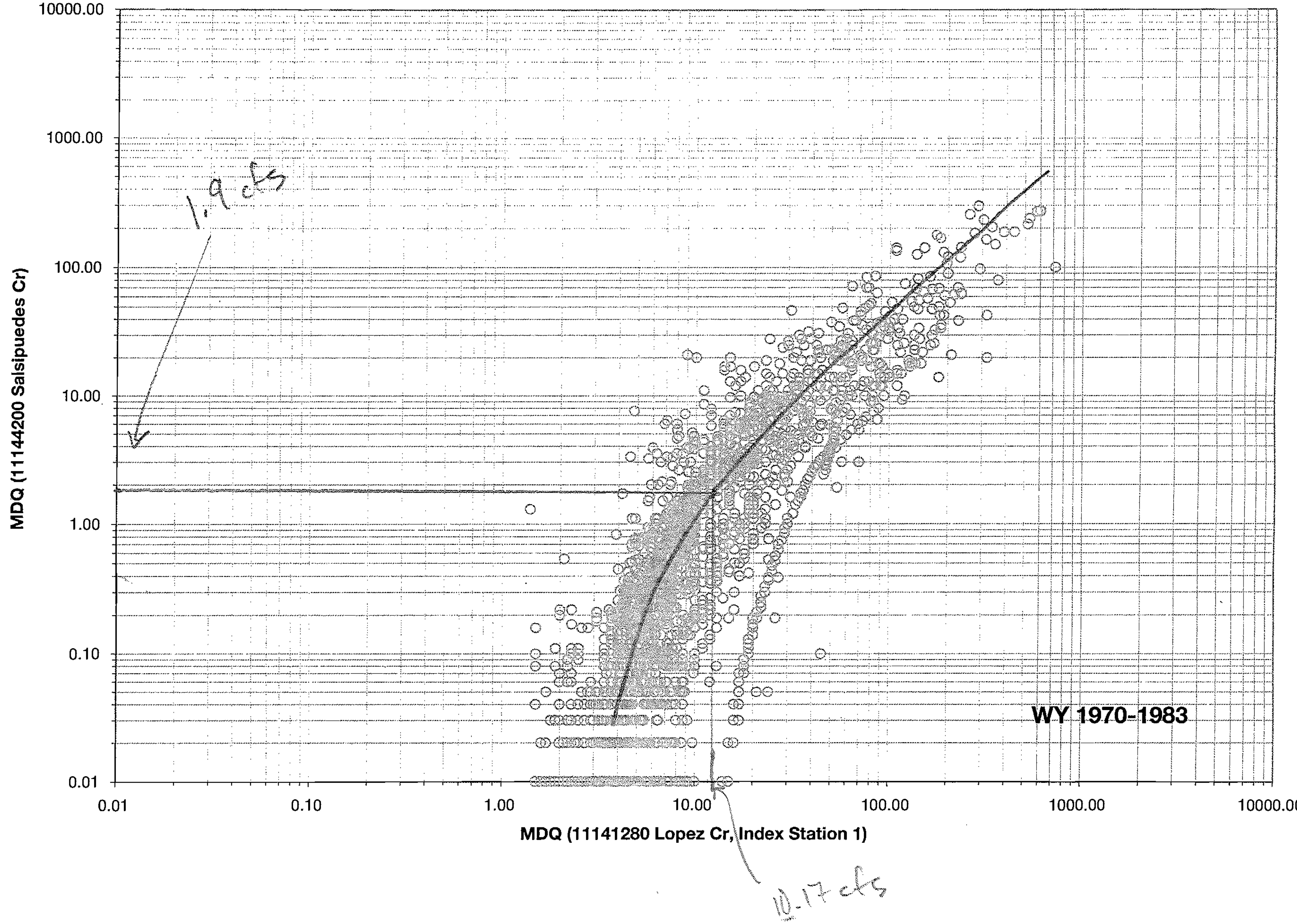
Residual (Log MDQ 11141150 Arroyo Grande Ph)
1.50
1.00
0.50
0.00
(0.50)
(1.00)
(1.50)
5/8/1967
2/1/1970
10/28/1972
7/25/1975
4/20/1978
1/14/1981
10/11/1983
7/7/1986
4/2/1989
12/28/1991
Date



MDQ (SLO 05 Los Berros Cr)
10000.00
1000.00
100.00
10.00
1.00
0.10
0.01
y = 0.2371x - 0.4054
R2 = 0.8378
WY 1969-1978
0.01
0.10
1.00
10.00
100.00
1000.00
10000.00
MDQ (11141280 Lopez Cr, Index Station 1)


MDQ (11142500 Arroyo De La Cruz)
10000.00
1000.00
100.00
10.00
1.00
0.10
0.01
0.01
0.10
1.00
10.00
100.00
1000.00
10000.00
100000.00
MDQ (11148900 Nacimiento R, Index Station 2)
WY 1972-1979
55 cfs
180 cfs


17 cfs
10000.00
1000.00
100.00
10.00
1.00
0.10
0.01
MDQ (11143500 Salinas River)
WY 1968-1983
0.01
0.10
1.00
10.00
100.00
1000.00
10000.00
MDQ (11141280 Lopez Cr, Index Station 1)
10.17 cfs


10000.00
1000.00
100.00
10.00
1.00
0.10
0.01
MDQ (11144200 Salsipuedes Cr)
0.01
0.10
1.00
10.00
100.00
1000.00
10000.00
MDQ (11141280 Lopez Cr, Index Station 1)
WY 1970-1983
1.9 cfs
10.17 cfs

Attachment 4

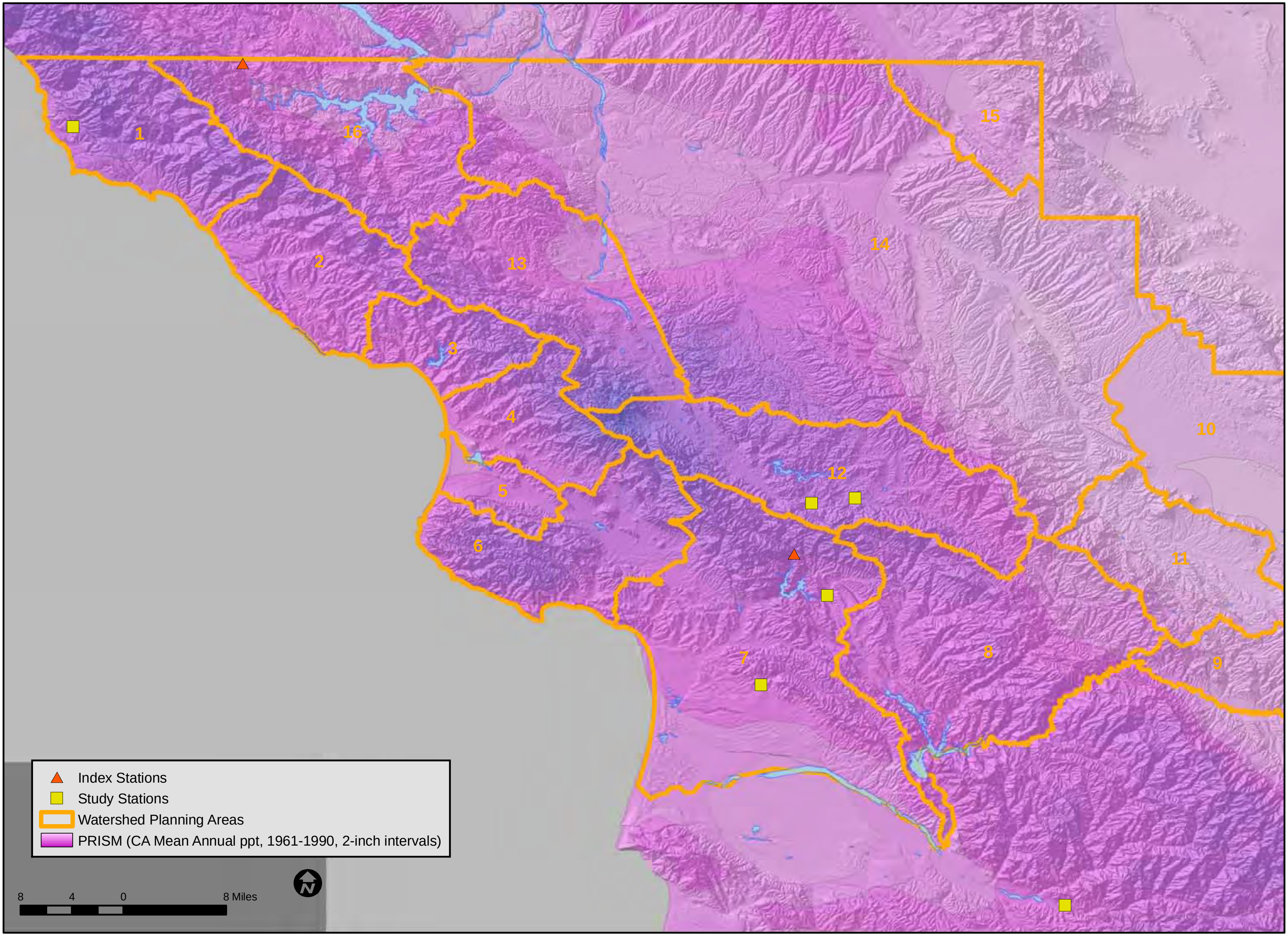
Weighted Mean Annual Discharge (Arroyo Grande and Sisquoc River)

Weighted Mean Annual Discharge (MAD) Calculation

	11141150 Arroyo Grande Ph				11138500 Sisquoc R			
	MAD (cfs)	water year range	years	count (days)	MAD (cfs)	water year range	years	count (days)
MAD (cfs):								
range1 (from gage data)	2.44	1972-1992	21	7670	56.93	1972-1999	28	10227
range2 (from regression)	2.91	1993-2008	16	5844	37.48	2000-2008	9	3287
Weighted MAD (1972-2008) (cfs)	**2.64**				**52.20**			

Attachment 5

Unit Mean Annual Discharge for Index and Study Stations


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
Index Stations
Study Stations
Watershed Planning Areas
PRISM (CA Mean Annual ppt, 1961-1990, 2-inch intervals)
8
4
0
8 Miles
N

Mean Annual Discharge - Index/Study Stations
(WY 1972-2008)

WPA #	7	16	S. of 8	7	7	1	12	12
WPA Name	South Coast	Nacimiento	Huasna Valley	South Coast	South Coast	San Simeon	Santa Margarita	Santa Margarita
Station Name	Lopez Creek	Nacimiento River	Sisquoc River	Arroyo Grande Ph	Los Berros Creek	Arroyo DeLa Cruz	Salinas River	Salsipuedes Creek
Station No.	11141280	11148900	11138500	11141150	11141600	11142500	11143500	11144200
Station ID	Index 1	Index 2	Study Sta 1	Study Sta 2	Study Sta 3	Study Sta 4	Study Sta 5	Study Sta 6
Latitude	35.235530	35.788579	34.839722	35.188586	35.088032	35.717190	35.298585	35.292752
DA (mi^2)	20.9	162.0	281.0	13.5	15.0	41.2	70.3	5.9
General Regime	Perennial	Ephemeral	Perennial	Perennial	Perennial [1]	Ephemeral	Perennial	Ephemeral
MAD (cfs)	10.17	180.02	52.20	2.64	2.01	55.00	17.00	1.90
Unit MAD (cfs/mi^2)	0.49	1.11	0.19	0.20	0.13	1.33	0.24	0.32
MAD (acre-feet)	7,370	130,453	37,827	1,913	1,457	39,856	12,319	1,377

Notes:
1 Based on water years 1969-1978 (i.e., the USGS data only)

EWD - SUMMARY
(WY 1972-2008)

WPA #	**1**							
WPA Name	**San Simeon**							
Station Name				Arroyo de la Cruz				Pico Cr
Station No.								
Station ID	11	12	13	14	15	16	17	18
Latitude	35.782313	35.772307	35.738701	35.724013	35.680381	35.680016	35.660101	35.650794
DA (mi^2)	3.3	17.1	5.0	43.4	8.8	6.5	15.2	15.2
Unit MAD derived from:	Ind2, Std4	Ind2, Std4	Ind2, Std4	Std4	Ind2, Std4	Ind2, Std4	Ind2, Std4	Ind2, Std4
Unit MAD (cfs/mi^2)	1.22	1.22	1.22	1.33	1.22	1.22	1.22	1.22
MAD (cfs)	3.98	20.83	6.09	57.71	10.70	7.88	18.51	18.51
MAD (acre-feet)	2,882	15,091	4,412	41,819	7,753	5,711	13,411	13,411
Adult Demand (Dec-Apr):								
(cfs)	8.35	28.29	11.43	59.97	17.32	13.83	25.94	25.94
(cfs/mi^2)	2.56	1.66	2.29	1.38	1.97	2.14	1.71	1.71
(acre-feet)	2,506	8,491	3,430	17,996	5,197	4,149	7,783	7,783
Juvenile Demand (May-Nov):								
(cfs)	4.38	11.68	5.62	21.31	7.82	6.52	10.81	10.80
(cfs/mi^2)	1.34	0.68	1.13	0.49	0.89	1.01	0.71	0.71
Annual 0 flow days (%)	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
(acre-feet)[1]	907	2,420	1,164	4,415	1,620	1,351	2,239	2,237
Annual EWD (acre-feet) [2]	**2,882**	**10,911**	**4,412**	**22,410**	**6,817**	**5,500**	**10,022**	**10,021**
Annual EWD (acre-feet/mi^2)	**884.1**	**639.2**	**884.1**	**516.5**	**777.3**	**851.4**	**660.7**	**660.6**
Unimpaired MAD for WPA (acre-ft)								**104,491**
Annual EWD for WPA (acre-ft)								**72,975**
EWD/MAD (%)								**69.8%**

Notes:
1 Excludes estimated no. of days with no flow
2 If the calculated EWD is greater than the calculated MAD, then EWD is assumed to be equal to the MAD.

EWD - SUMMARY
(WY 1972-2008)

WPA #	**2**			**3**		
WPA Name	**Cambria**			**Cayucos**		
Station Name	San Simeon Cr	Santa Rosa Cr	Villa Cr	Cayucos Cr		Toro Cr
Station No.						
Station ID	21	22	23	31	32	33
Latitude	35.617505	35.558596	35.507583	35.482575	35.481812	35.453110
DA (mi^2)	34.8	47.5	25.9	18.0	24.1	15.4
Unit MAD derived from:	Ind2	Ind2	Ind2	Ind1, Ind2	Ind1, Ind2	Ind1, Ind2
Unit MAD (cfs/mi^2)	1.11	1.11	1.11	0.80	0.80	0.80
MAD (cfs)	38.62	52.73	28.78	14.41	19.30	12.30
MAD (acre-feet)	27,984	38,207	20,857	10,441	13,983	8,916
Adult Demand (Dec-Apr):						
(cfs)	44.60	56.11	35.91	21.57	26.75	19.20
(cfs/mi^2)	1.28	1.18	1.39	1.20	1.11	1.25
(acre-feet)	13,384	16,837	10,777	6,472	8,026	5,761
Juvenile Demand (May-Nov):						
(cfs)	16.66	19.96	13.89	9.20	10.94	8.36
(cfs/mi^2)	0.48	0.42	0.54	0.51	0.45	0.54
Annual 0 flow days (%)	30.0	30.0	30.0	30.0	30.0	30.0
(acre-feet)[1]	3,452	4,135	2,877	1,905	2,266	1,732
Annual EWD (acre-feet) [2]	**16,836**	**20,972**	**13,655**	**8,377**	**10,292**	**7,492**
Annual EWD (acre-feet/mi^2)	**483.9**	**441.5**	**526.6**	**465.1**	**426.7**	**487.2**
Unimpaired MAD for WPA (acre-ft)			**87,049**			**33,340**
Annual EWD for WPA (acre-ft)			**51,463**			**26,162**
EWD/MAD (%)			**59.1%**			**78.5%**

Notes:
1 Excludes estimated no. of days with no flow
2 If the calculated EWD is greater than the calculated M

EWD - SUMMARY
(WY 1972-2008)

WPA #	**4**		**5**	**6**			
WPA Name	**Morro Bay**		**Los Osos**	**SLO/Avila**			
Station Name	Morro Cr	Chorro Cr	Los Osos Cr				SLO Cr
Station No.							
Station ID	41	42	51	61	62	63	64
Latitude	35.419954	35.360460	35.297121	35.272507	35.238282	35.198003	35.259129
DA (mi^2)	28.4	46.5	23.1	12.4	17.2	16.4	83.0
Unit MAD derived from:	Ind1, Ind2	Ind1, Ind2	Ind1	Ind1	Ind1	Ind1	Ind1
Unit MAD (cfs/mi^2)	0.80	0.80	0.49	0.49	0.49	0.49	0.49
MAD (cfs)	22.72	37.22	11.31	6.07	8.44	8.06	40.66
MAD (acre-feet)	16,464	26,969	8,199	4,396	6,118	5,838	29,465
Adult Demand (Dec-Apr):							
(cfs)	30.17	43.40	18.05	11.40	14.54	14.05	46.33
(cfs/mi^2)	1.06	0.93	0.78	0.92	0.84	0.85	0.56
(acre-feet)	9,053	13,024	5,416	3,421	4,365	4,216	13,902
Juvenile Demand (May-Nov):							
(cfs)	11.99	16.00	7.86	5.42	6.58	6.38	16.74
(cfs/mi^2)	0.42	0.34	0.34	0.44	0.38	0.39	0.20
Annual 0 flow days (%)	30.0	30.0	30.0	30.0	30.0	30.0	30.0
(acre-feet)[1]	2,485	3,316	1,629	1,124	1,364	1,322	3,469
Annual EWD (acre-feet) [2]	**11,538**	**16,340**	**7,045**	**4,396**	**5,728**	**5,539**	**17,371**
Annual EWD (acre-feet/mi^2)	**406.3**	**351.2**	**305.1**	**355.1**	**332.5**	**336.9**	**209.3**
Unimpaired MAD for WPA (acre-ft)		**43,433**	**8,199**				**45,816**
Annual EWD for WPA (acre-ft)		**27,878**	**7,045**				**33,034**
EWD/MAD (%)		**64.2%**	**85.9%**				**72.1%**

Notes:
1 Excludes estimated no. of days with no flow
2 If the calculated EWD is greater than the calculated M

EWD - SUMMARY
(WY 1972-2008)

WPA #	**7**					**8**		
WPA Name	**South Coast**					**Huasna Valley**		
Station Name	Pismo Cr	Arroyo Grande				Huasna R	Alamo Cr/Huasna R	
Station No.								
Station ID	71	72	73	74	75	81	82	83
Latitude	35.202812	35.170851	35.036416	35.029204	34.959284	35.157884	35.132654	35.087447
DA (mi^2)	40.3	151.8	28.9	13.3	11.9	118.5	100.2	24.2
Unit MAD derived from:	Ind1	Ind1, Std2, Std3	Std3	Std3	Std3	Std2, Std3, Std6	Std1, Std2, Std3	Std1, Std2, Std3
Unit MAD (cfs/mi^2)	0.49	0.27	0.13	0.13	0.13	0.22	0.17	0.17
MAD (cfs)	19.75	40.99	3.75	1.73	1.55	26.07	17.03	4.11
MAD (acre-feet)	14,310	29,701	2,719	1,252	1,122	18,892	12,344	2,981
<u>Adult Demand (Dec-Apr):</u>								
(cfs)	27.21	46.60	8.00	4.52	4.17	33.39	24.40	8.56
(cfs/mi^2)	0.68	0.31	0.28	0.34	0.35	0.28	0.24	0.35
(acre-feet)	8,164	13,984	2,401	1,356	1,250	10,019	7,322	2,569
<u>Juvenile Demand (May-Nov):</u>								
(cfs)	10.87	16.71	4.01	2.53	2.36	12.77	9.90	4.25
(cfs/mi^2)	0.27	0.11	0.14	0.19	0.20	0.11	0.10	0.18
Annual 0 flow days (%)	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
(acre-feet)[1]	2,251	3,463	831	524	489	2,646	2,052	881
Annual EWD (acre-feet) [2]	**10,415**	**17,447**	**2,719**	**1,252**	**1,122**	**12,665**	**9,373**	**2,981**
Annual EWD (acre-feet/mi^2)	**258.4**	**114.9**	**94.2**	**94.2**	**94.2**	**106.9**	**93.5**	**123.2**
Unimpaired MAD for WPA (acre-ft)					**49,103**			**34,217**
Annual EWD for WPA (acre-ft)					**32,956**			**25,019**
EWD/MAD (%)					**67.1%**			**73.1%**

Notes:
1 Excludes estimated no. of days with no flow
2 If the calculated EWD is greater than the calculated M

EWD - SUMMARY
(WY 1972-2008)

WPA #	**12**			**13**		**16**		
WPA Name	**Santa Margarita**			**Atascadero/Templeton**		**Nacimiento**		
Station Name	Salinas R ab	Salinas R bl		Salinas R	Paso Robles Cr	Nacimiento Gage	Nacimiento N	Nacimiento S
Station No.								
Station ID	121	122	123	131	132	161 (Ind2)	162	163
Latitude	35.305700	35.358765	35.381551	35.524672	35.564448	35.788579	35.748751	35.670447
DA (mi^2)	112.1	43.0	37.4	115.9	68.4	162.0	65.3	84.9
Unit MAD derived from:	Std5, Std6	Ind1, Std6	Ind1, Std6	Ind1, Std6	Ind1, Ind2	Ind2	Ind2	Ind2
Unit MAD (cfs/mi^2)	0.28	0.41	0.41	0.41	0.80	--	1.11	1.11
MAD (cfs)	31.39	17.63	15.33	47.52	54.72	180.02	72.48	94.24
MAD (acre-feet)	22,746	12,776	11,112	34,435	39,653	130,453	52,525	68,291
Adult Demand (Dec-Apr):								
(cfs)	38.28	25.03	22.58	51.97	57.66	138.70	70.94	86.08
(cfs/mi^2)	0.34	0.58	0.60	0.45	0.84	0.86	1.09	1.01
(acre-feet)	11,488	7,510	6,776	15,595	17,304	41,620	21,288	25,831
Juvenile Demand (May-Nov):								
(cfs)	14.41	10.27	9.47	18.72	20.41	42.03	24.44	28.39
(cfs/mi^2)	0.13	0.24	0.25	0.16	0.30	0.26	0.37	0.33
Annual 0 flow days (%)	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
(acre-feet)[1]	2,985	2,129	1,963	3,878	4,229	8,707	5,062	5,882
Annual EWD (acre-feet) [2]	**14,473**	**9,638**	**8,739**	**19,473**	**21,533**	**50,327**	**26,350**	**31,713**
Annual EWD (acre-feet/mi^2)	**129.1**	**224.1**	**233.7**	**168.0**	**314.8**	**310.7**	**403.5**	**373.5**
Unimpaired MAD for WPA (acre-ft)			**46,633**		**74,088**			**251,269**
Annual EWD for WPA (acre-ft)			**32,850**		**41,006**			**108,390**
EWD/MAD (%)			**70.4%**		**55.3%**			**43.1%**

Notes:
1 Excludes estimated no. of days with no flow
2 If the calculated EWD is greater than the calculated M