Revised June 13, 2022

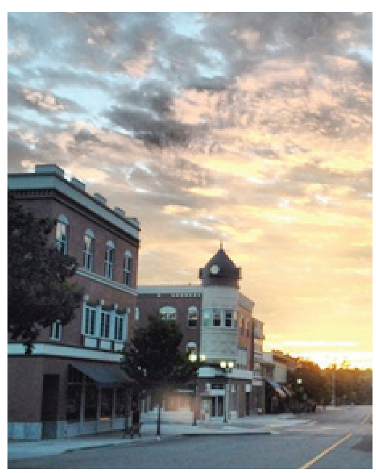
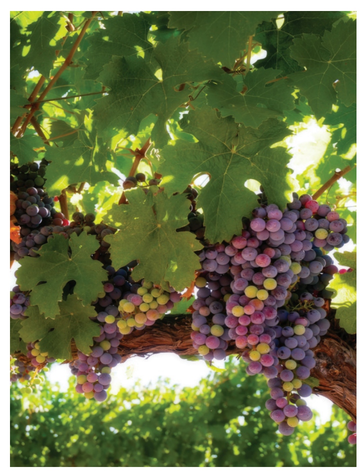
Paso Robles Subbasin

GROUNDWATER SUSTAINABILITY PLAN

Paso Robles Subbasin Groundwater Sustainability Agencies

County of San Luis Obispo
Shandon San Juan Water District
City of Paso Robles
San Miguel Community Services District



Revised June 13, 2022

Paso Robles Subbasin Groundwater Sustainability Plan

Prepared for:

Paso Robles Subbasin Cooperative Committee and the Groundwater Sustainability Agencies

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ABBREVIATIONS AND ACRONYMS

$/AF	dollar per acre-foot
$/AF-benefit	dollar per acre-foot of basin benefit
Act (or SGMA)	Sustainable Groundwater Management Act
AF	acre-feet
AFY	acre-feet per year
AMWC	Atascadero Mutual Water Company
Basin Plan	Water Quality Control Plan for the Central Coast Basin
BPs	Best Water Use Practices
BMPs	Best Management Practices
C&E	Communications and Engagement
CASGEM	California Statewide Groundwater Elevation Monitoring
CCR	California Code of Regulations
CCRWQCB	Central Coast Regional Water Quality Control Board
CGPS	Continuous GPS
CIMIS	California Irrigation Management Information System
City	City of Paso Robles
Cooperative Committee	Paso Basin Cooperative Committee
County	San Luis Obispo County
CSA16	Community Service Area 16
CSD	Community Services District
CWWCP	Countywide Water Conservation Program
DAIv2	Data Archive Interface
DDW	Division of Drinking Water
DMS	Paso Robles Subbasin Data Management System
DWR	Department of Water Resources
EPA	Environmental Protection Agency
ET (or ETo)	evapotranspiration
EVI	Enhanced Vegetation Index
ft/day	feet per day
ft^2/day	square feet per day
ft msl	feet above mean sea level
GAMA	Groundwater Ambient Monitoring and Assessment
GDE	Groundwater-Dependent Ecosystem
GMP	Groundwater Management Plan
gpd/ft	gallons per day per foot
gpm	gallons per minute
GSA	Groundwater Sustainability Agency
GSI	GSI Water Solutions, Inc.
GSP (or the Plan)	Groundwater Sustainability Plan

GSSI	Geoscience Support Services, Inc.
hp	horsepower
ILRP	Irrigated Lands Regulatory Program
InSAR	Interferometric Synthetic Aperture Radar
IRWMP	Integrated Regional Water Management Program
JPA	Joint Powers Authority
LID	Low Impact Development
LOS	Level of Severity
LUCE	Land Use and Circulation Element
MCL	Maximum Contaminant Limit (or Maximum Contaminant Levels)
MO	measurable objectives
MOA	Memorandum of Agreement
mg/L	milligram per liter
msl	mean sea level
MT	minimum thresholds
MWR	Master Water Report
NCCAG	Natural Communities Commonly Associated with Groundwater
NDMC	National Drought Mitigation Center
NHD	National Hydrology Dataset
NRCS	USGS National Resources Conservation Service
NWIS	National Water Information System
NWP	Nacimiento Water Project
O&M	operations and maintenance
OSWCR	DWR Online System for Well Completion Reports
pCi/L	picocuries per liter
PLSS	Public Land Survey System
PWIS	CA Water Boards Public Water Information System
RMS	Resource Management System or representative monitoring sites
RSR	Resource Summary Reports
RCS	Resource Capacity Studies
RW	recycled water
SAGBI	Soil Agricultural Groundwater Banking Index
SB	Senate Bill
SEP	Supplemental Environmental Project
SGMA (or Act)	Sustainable Groundwater Management Act
SGMA Regulations	CCR Subchapter 2. Groundwater Sustainability Plans
SLO County	San Luis Obispo County
SLOFCWCD	San Luis Obispo County Flood Control and Water Conservation District
SMC	Sustainable Management Criteria
SMCL	Secondary Maximum Contaminant Limit

SMCSD	San Miguel Community Services District
SNMP	Salt and Nutrient Management Plan
SPI	Standardized Precipitation Index
SSURGO	Soil Survey Geographic Database
Subbasin	Paso Robles Area Subbasin of the Salinas Valley Groundwater Basin
SWP	State Water Project
SWRCB	State Water Resources Control Board
SWRP	San Luis Obispo Stormwater Resource Plan
TDS	total dissolved solids
TMDLs	Total Maximum Daily Load
UNAVCO	University NAVSTAR Consortium
USACE	United States Army Corps of Engineers
USGS	United States Geologic Survey
USDA	United States Department of Agriculture
UWMP	Urban Water Management Plan
Water Board	State Water Resources Control Board
WPA	Water Planning Areas
WRAC	Water Resources Advisory Committee
WY	Water Year

REGULATIONS CHECKLIST FOR GSP SUBMITTAL

GSP Regulations Section	Requirement	Description	Section Number, or other location as indicated in the GSP
Article 3. Technical and Reporting Standards			
352.2	Monitoring Protocols	Monitoring protocols adopted by the GSA for data collection and management	7.8
		Monitoring protocols that are designed to detect changes in groundwater levels, groundwater quality, inelastic surface subsidence for basins for which subsidence has been identified as a potential problem, and flow and quality of surface water that directly affect groundwater levels or quality or are caused by groundwater extraction in the basin	Chapter 7, including Appendix F
Article 5. Plan Contents, Subarticle 1. Administrative Information			
354.4	General Information	Executive Summary	Executive Summary
		List of references and technical studies	References Cited
354.6	Agency Information	GSA mailing address	2.1
		Organization and management structure	2.2
		Contact information of Plan Manager	2.4
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		Estimate of implementation costs	10.2, Table 10-1
354.8(a)	Map(s)	Area covered by GSP	3.1 (Figure 3-1)
		Adjudicated areas, other agencies within the basin, and areas covered by an Alternative	Not applicable
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		Existing land use designations	Figure 3-4
		Density of wells per square mile	Figures 3-7, 3-8, 3-9
354.8(b)	Description of the Plan Area	Summary of jurisdictional areas and other features	3.2, 3.3
354.8(c) 354.8(d) 354.8(e)	Water Resource Monitoring and Management Programs	Description of water resources monitoring and management programs	3.6, 3.7, 3.8
		Description of how the monitoring networks of those plans will be incorporated into the GSP	3.9.1
		Description of how those plans may limit operational flexibility in the basin	3.9.2
		Description of conjunctive use programs	3.9.3, not applicable
354.8(f)	Land Use Elements or Topic Categories of Applicable General Plans	Summary of general plans and other land use plans	3.10
		Description of how implementation of the GSP may change water demands or affect achievement of sustainability and how the GSP addresses those effects	3.10.4
		Description of how implementation of the GSP may affect the water supply assumptions of relevant land use plans	10.3, 10.4
		Summary of the process for permitting new or replacement wells in the basin	2.3.1.2 and 3.8.6

		Information regarding the implementation of land use plans outside the basin that could affect the ability of the Agency to achieve sustainable groundwater management	3.10.4
354.8(g)	Additional GSP Contents (optional items)	Description of Actions related to: Control of saline water intrusion	Not applicable
		Wellhead protection	Not applicable
		Migration of contaminated groundwater	5.6.3
		Well abandonment and well destruction program	Not applicable
		Replenishment of groundwater extractions	Not applicable
		Conjunctive use and underground storage	3.9.3
		Well construction policies	2.3.1.2 and 3.8.6
		Addressing groundwater contamination cleanup, recharge, diversions to storage, conservation, water recycling, conveyance, and extraction projects	Not applicable
		Efficient water management practices	9.3.2
		Relationships with State and federal regulatory agencies	3.3.1, 3.3.3
		Review of land use plans and efforts to coordinate with land use planning agencies to assess activities that potentially create risks to groundwater quality or quantity	3.10
		Impacts on groundwater dependent ecosystems	4.7.2, 5.5, 8.9, Appendix C
354.10	Notice and Communication	Description of beneficial uses and users	Appendix G, including Section G.3
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		GSP comments and responses	Appendix M
		Decision-making process	Appendix G, including Section G.4
		Public engagement	Appendix G
		Encouraging active involvement	Appendix G, including Sections G.7, 8, 9 and Appendices H, I, and J
		Informing the public on GSP implementation progress	Appendix G, including Section G. 7
Article 5. Plan Contents, Subarticle 2. Basin Setting			
354.14	Hydrogeologic Conceptual Model	Description of the Hydrogeologic Conceptual Model	Chapter 4, inclusive
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		Map(s) of physical characteristics: topographic information, surficial geology, soil characteristics, surface water bodies, source and point of delivery for imported water supplies	Figures 4-1, 4-2, 4-3, 4-4, 4-19, 3-5
354.14(c)(4)	Map of Recharge Areas	Map delineating existing recharge areas that substantially contribute to the replenishment of the basin, potential recharge areas, and discharge areas	Figures 4-16, 4-17
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		Quantification of overdraft	Chapter 6
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		Minimum thresholds and measurable objectives for each management area	8.10.2
		Level of monitoring and analysis	8.10.3
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		Description of management areas	8.10
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354.26	Undesirable Results	Description of undesirable results	8.4.5, 8.5.4, 8.7.4, 8.8.4, 8.9.7
		Cause of groundwater conditions that would lead to undesirable results	8.4.5.2, 8.5.4.2, 8.7.4.2, 8.8.4.2, , 8.9.7
		Criteria used to define undesirable results for each sustainability indicator	8.4.6.1, 8.5.4.1, 8.7.4.1, 8.8.4.1, , 8.9.7
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354.28	Minimum Thresholds	Description of each minimum threshold and how they were established for each sustainability indicator	8.4.4, 8.5.2, 8.7.2, 8.8.2, 8.9.2
		Relationship for each sustainability indicator	8.4.4.5, 8.5.2.2, 8.7.2.4, 8.8.2.2, 8.9.4
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		How each minimum threshold will be quantitatively measured	8.4.4.9, 8.5.2.6, 8.7.2.8, 8.8.2.6, 8.9.2
354.30	Measurable Objectives	Description of establishment of the measurable objectives for each sustainability indicator	8.4.3, 8.5.3, 8.7.3, 8.8.3, 8.9.3
		Description of how a reasonable margin of safety was established for each measurable objective	8.4.3, 8.5.3, 8.7.3, 8.8.3, 8.9.3

		Description of a reasonable path to achieve and maintain the sustainability goal, including a description of interim milestones	8.4.3, 8.5.3.2, 8.7.3.4, 8.8.3.2, 8.9.3
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		Description of how the monitoring network provides adequate coverage of Sustainability Indicators	Chapter 7, including 7.2. through 7.6
		Density of monitoring sites and frequency of measurements required to demonstrate short-term, seasonal, and long-term trends	Chapter 7, including 7.2. through 7.6
		Scientific rational (or reason) for site selection	Chapter 7, including 7.2. through 7.6
		Consistency with data and reporting standards	Chapter 7, including 7.2. through 7.6
		Corresponding sustainability indicator, minimum threshold, measurable objective, and interim milestone	Chapter 7, including 7.2. through 7.6; Chapter 8 Tables 8-1 through 8-10
		Location and type of each monitoring site within the basin displayed on a map, and reported in tabular format, including information regarding the monitoring site type, frequency of measurement, and the purposes for which the monitoring site is being used Description of technical standards, data collection methods, and other procedures or protocols to ensure comparable data and methodologies	Chapter 7, including 7.2. through 7.6
354.36	Representative Monitoring	Description of representative sites	7.7
		Demonstration of adequacy of using groundwater elevations as proxy for other sustainability indicators	8.5.2
		Adequate evidence demonstrating site reflects general conditions in the area	7.7
354.38	Assessment and Improvement of Monitoring Network	Review and evaluation of the monitoring network	Chapter 10
		Identification and description of data gaps	Chapter 7, including 7.2.1, 7.3.1, 7.4.1, 7.5.1, 7.6.1
		Description of steps to fill data gaps	Chapter 10
		Description of monitoring frequency and density of sites	Chapter 7, including 7.2. through 7.6

Article 5. Plan Contents, Subarticle 5. Projects and Management Actions			
354.44	Projects and Management Actions	Description of projects and management actions that will help achieve the basin's sustainability goal	Chapter 9
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		Circumstances for implementation	
		Public noticing	
		Permitting and regulatory process	
		Time-table for initiation and completion, and the accrual of expected benefits	
		Expected benefits and how they will be evaluated	
		How the project or management action will be accomplished. If the projects or management actions rely on water from outside the jurisdiction of the Agency, an explanation of the source and reliability of that water shall be included.	
		Legal authority required	
		Estimated costs and plans to meet those costs	
		Management of groundwater extractions and recharge	
354.44(b)(2)		Overdraft mitigation projects and management actions	
Article 8. Interagency Agreements			
357.4	Coordination Agreements - Shall be submitted to the Department together with the GSPs for the basin and, if approved, shall become part of the GSP for each participating Agency.	Coordination Agreements shall describe the following: A point of contact	Not applicable
		Responsibilities of each Agency	
		Procedures for the timely exchange of information between Agencies	
		Procedures for resolving conflicts between Agencies	
		How the Agencies have used the same data and methodologies to coordinate GSPs	
		How the GSPs implemented together satisfy the requirements of SGMA	
		Process for submitting all Plans, Plan amendments, supporting information, all monitoring data and other pertinent information, along with annual reports and periodic evaluations	
		A coordinated data management system for the basin	
		Coordination agreements shall identify adjudicated areas within the basin, and any local agencies that have adopted an Alternative that has been accepted by the Department	

DEFINITIONS

California Water Code

Sec. 10721

Unless the context otherwise requires, the following definitions govern the construction of this part:

(a) Adjudication action means an action filed in the superior or federal district court to determine the rights to extract groundwater from a basin or store water within a basin, including, but not limited to, actions to quiet title respecting rights to extract or store groundwater or an action brought to impose a physical solution on a basin.

(b) Basin means a groundwater basin or subbasin identified and defined in Bulletin 118 or as modified pursuant to Chapter 3 (commencing with Section 10722).

(c) Bulletin 118 means the department's report entitled California's Groundwater: Bulletin 118 updated in 2003, as it may be subsequently updated or revised in accordance with Section 12924.

(d) Coordination agreement means a legal agreement adopted between two or more groundwater sustainability agencies that provides the basis for coordinating multiple agencies or groundwater sustainability plans within a basin pursuant to this part.

(e) De minimis extractor means a person who extracts, for domestic purposes, two acre-feet or less per year.

(f) Governing body means the legislative body of a groundwater sustainability agency.

(g) Groundwater means water beneath the surface of the earth within the zone below the water table in which the soil is completely saturated with water, but does not include water that flows in known and definite channels.

(h) Groundwater extraction facility means a device or method for extracting groundwater from within a basin.

(i) Groundwater recharge or recharge means the augmentation of groundwater, by natural or artificial means.

(j) Groundwater sustainability agency means one or more local agencies that implement the provisions of this part. For purposes of imposing fees pursuant to Chapter 8 (commencing with Section 10730) or taking action to enforce a groundwater sustainability plan, groundwater sustainability agency also means each local agency comprising the groundwater sustainability agency if the plan authorizes separate agency action.

(k) Groundwater sustainability plan or plan means a plan of a groundwater sustainability agency proposed or adopted pursuant to this part.

(l) Groundwater sustainability program means a coordinated and ongoing activity undertaken to benefit a basin, pursuant to a groundwater sustainability plan.

(m) In-lieu use means the use of surface water by persons that could otherwise extract groundwater in order to leave groundwater in the basin.

(n) Local agency means a local public agency that has water supply, water management, or land use responsibilities within a groundwater basin.

(o) Operator means a person operating a groundwater extraction facility. The owner of a groundwater extraction facility shall be conclusively presumed to be the operator unless a satisfactory showing is made to the governing body of the groundwater sustainability agency that the groundwater extraction facility actually is operated by some other person.

(p) Owner means a person owning a groundwater extraction facility or an interest in a groundwater extraction facility other than a lien to secure the payment of a debt or other obligation.

(q) Personal information has the same meaning as defined in Section 1798.3 of the Civil Code.

(r) Planning and implementation horizon means a 50-year time period over which a groundwater sustainability agency determines that plans and measures will be implemented in a basin to ensure that the basin is operated within its sustainable yield.

(s) Public water system has the same meaning as defined in Section 116275 of the Health and Safety Code.

(t) Recharge area means the area that supplies water to an aquifer in a groundwater basin.

(u) Sustainability goal means the existence and implementation of one or more groundwater sustainability plans that achieve sustainable groundwater management by identifying and causing the implementation of measures targeted to ensure that the applicable basin is operated within its sustainable yield.

(v) Sustainable groundwater management means the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results.

(w) Sustainable yield means the maximum quantity of water, calculated over a base period representative of long-term conditions in the basin and including any temporary surplus that can be withdrawn annually from a groundwater supply without causing an undesirable result.

(x) Undesirable result means one or more of the following effects caused by groundwater conditions occurring throughout the basin:

(1) Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon. Overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and groundwater recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods.

(2) Significant and unreasonable reduction of groundwater storage.

(3) Significant and unreasonable seawater intrusion.

(4) Significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies.

(5) Significant and unreasonable land subsidence that substantially interferes with surface land uses.

(6) Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water.

(y) Water budget means an accounting of the total groundwater and surface water entering and leaving a basin including the changes in the amount of water stored.

(z) Watermaster means a watermaster appointed by a court or pursuant to other law.

(aa) Water year means the period from October 1 through the following September 30, inclusive.

(ab) Wellhead protection area means the surface and subsurface area surrounding a water well or well field that supplies a public water system through which contaminants are reasonably likely to migrate toward the water well or well field.

Official California Code of Regulations

Title 23. Waters
Division 2. Department of Water Resources
Chapter 1.5. Groundwater Management
Subchapter 2. Groundwater Sustainability Plans
Article 2. Definitions
23 CCR § 351
§ 351. Definitions.

The definitions in the Sustainable Groundwater Management Act, Bulletin 118, and Subchapter 1 of this Chapter, shall apply to these regulations. In the event of conflicting definitions, the definitions in the Act govern the meanings in this Subchapter. In addition, the following terms used in this Subchapter have the following meanings:

(a) "Agency" refers to a groundwater sustainability agency as defined in the Act.

(b) "Agricultural water management plan" refers to a plan adopted pursuant to the Agricultural Water Management Planning Act as described in Part 2.8 of Division 6 of the Water Code, commencing with Section 10800 et seq.

(c) "Alternative" refers to an alternative to a Plan described in Water Code Section 10733.6.

(d) "Annual report" refers to the report required by Water Code Section 10728.

(e) "Baseline" or "baseline conditions" refer to historic information used to project future conditions for hydrology, water demand, and availability of surface water and to evaluate potential sustainable management practices of a basin.

(f) "Basin" means a groundwater basin or subbasin identified and defined in Bulletin 118 or as modified pursuant to Water Code 10722 et seq.

(g) "Basin setting" refers to the information about the physical setting, characteristics, and current conditions of the basin as described by the Agency in the hydrogeologic conceptual model, the groundwater conditions, and the water budget, pursuant to Subarticle 2 of Article 5.

(h) “Best available science” refers to the use of sufficient and credible information and data, specific to the decision being made and the time frame available for making that decision, that is consistent with scientific and engineering professional standards of practice.

(i) “Best management practice” refers to a practice, or combination of practices, that are designed to achieve sustainable groundwater management and have been determined to be technologically and economically effective, practicable, and based on best available science.

(j) “Board” refers to the State Water Resources Control Board.

(k) “CASGEM” refers to the California Statewide Groundwater Elevation Monitoring Program developed by the Department pursuant to Water Code Section 10920 et seq., or as amended.

(l) “Data gap” refers to a lack of information that significantly affects the understanding of the basin setting or evaluation of the efficacy of Plan implementation, and could limit the ability to assess whether a basin is being sustainably managed.

(m) “Groundwater dependent ecosystem” refers to ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface.

(n) “Groundwater flow” refers to the volume and direction of groundwater movement into, out of, or throughout a basin.

(o) “Interconnected surface water” refers to surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted.

(p) “Interested parties” refers to persons and entities on the list of interested persons established by the Agency pursuant to Water Code Section 10723.4.

(q) “Interim milestone” refers to a target value representing measurable groundwater conditions, in increments of five years, set by an Agency as part of a Plan.

(r) “Management area” refers to an area within a basin for which the Plan may identify different minimum thresholds, measurable objectives, monitoring, or projects and management actions based on differences in water use sector, water source type, geology, aquifer characteristics, or other factors.

(s) “Measurable objectives” refer to specific, quantifiable goals for the maintenance or improvement of specified groundwater conditions that have been included in an adopted Plan to achieve the sustainability goal for the basin.

(t) “Minimum threshold” refers to a numeric value for each sustainability indicator used to define undesirable results.

(u) “NAD83” refers to the North American Datum of 1983 computed by the National Geodetic Survey, or as modified.

(v) “NAVD88” refers to the North American Vertical Datum of 1988 computed by the National Geodetic Survey, or as modified.

(w) “Plain language” means language that the intended audience can readily understand and use because that language is concise, well-organized, uses simple vocabulary, avoids excessive acronyms and technical language, and follows other best practices of plain language writing.

(x) “Plan” refers to a groundwater sustainability plan as defined in the Act.

(y) “Plan implementation” refers to an Agency's exercise of the powers and authorities described in the Act, which commences after an Agency adopts and submits a Plan or Alternative to the Department and begins exercising such powers and authorities.

(z) “Plan manager” is an employee or authorized representative of an Agency, or Agencies, appointed through a coordination agreement or other agreement, who has been delegated management authority for submitting the Plan and serving as the point of contact between the Agency and the Department.

(aa) “Principal aquifers” refer to aquifers or aquifer systems that store, transmit, and yield significant or economic quantities of groundwater to wells, springs, or surface water systems.

(ab) “Reference point” refers to a permanent, stationary and readily identifiable mark or point on a well, such as the top of casing, from which groundwater level measurements are taken, or other monitoring site.

(ac) “Representative monitoring” refers to a monitoring site within a broader network of sites that typifies one or more conditions within the basin or an area of the basin.

(ad) “Seasonal high” refers to the highest annual static groundwater elevation that is typically measured in the Spring and associated with stable aquifer conditions following a period of lowest annual groundwater demand.

(ae) “Seasonal low” refers to the lowest annual static groundwater elevation that is typically measured in the Summer or Fall, and associated with a period of stable aquifer conditions following a period of highest annual groundwater demand.

(af) “Seawater intrusion” refers to the advancement of seawater into a groundwater supply that results in degradation of water quality in the basin, and includes seawater from any source.

(ag) “Statutory deadline” refers to the date by which an Agency must be managing a basin pursuant to an adopted Plan, as described in Water Code Sections 10720.7 or 10722.4.

(ah) “Sustainability indicator” refers to any of the effects caused by groundwater conditions occurring throughout the basin that, when significant and unreasonable, cause undesirable results, as described in Water Code Section 10721(x).

(ai) “Uncertainty” refers to a lack of understanding of the basin setting that significantly affects an Agency's ability to develop sustainable management criteria and appropriate projects and management actions in a Plan, or to evaluate the efficacy of Plan implementation, and therefore may limit the ability to assess whether a basin is being sustainably managed.

(aj) “Urban water management plan” refers to a plan adopted pursuant to the Urban Water Management Planning Act as described in Part 2.6 of Division 6 of the Water Code, commencing with Section 10610 et seq.

(ak) “Water source type” represents the source from which water is derived to meet the applied beneficial uses, including groundwater, recycled water, reused water, and surface water sources identified as Central Valley Project, the State Water Project, the Colorado River Project, local supplies, and local imported supplies.

(al) “Water use sector” refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation.

(am) “Water year” refers to the period from October 1 through the following September 30, inclusive, as defined in the Act.

(an) “Water year type” refers to the classification provided by the Department to assess the amount of annual precipitation in a basin.

ES EXECUTIVE SUMMARY

This Groundwater Sustainability Plan (GSP) fulfills the requirements of the Sustainable Groundwater Management Act (SGMA) for the Paso Robles Subbasin of the Salinas Valley Basin. The sustainability goal of this GSP is to sustainably manage the groundwater resources of the Paso Robles Subbasin for long-term community, financial, and environmental benefit of Subbasin users. This GSP outlines the approach to achieve a sustainable groundwater resource free of undesirable results within 20 years, while maintaining the unique cultural, community, and business aspects of the Subbasin. In adopting this GSP, it is the express goal of the GSAs to balance the needs of all groundwater users in the Subbasin, within the sustainable limits of the Subbasin's resources. The GSP describes the Paso Robles Subbasin, develops quantifiable management objectives that consider the interests of the Subbasin's beneficial groundwater uses and users, and identifies management actions and conceptual projects that will allow the Subbasin to achieve sustainability by 2040. This GSP covers the entire Paso Robles Subbasin. The Paso Robles Subbasin GSP has been jointly developed by four Groundwater Sustainability Agencies (GSAs):

- City of Paso Robles GSA
- Paso Basin - County of San Luis Obispo GSA
- San Miguel Community Services District (CSD) GSA
- Shandon - San Juan GSA

Submitted to the California Department of Water Resources (DWR) in January 2021, the first version of this GSP was reviewed by DWR in January 2022 and determined to be incomplete (DWR, 2022). Corrective actions were provided by DWR for two identified deficiencies; these corrective actions are incorporated into this June 13, 2022 GSP for resubmittal to DWR.

ES-1 Plan Area

The Paso Robles Subbasin lies completely within San Luis Obispo County. The Subbasin is bounded by two groundwater basins and two subbasins, as shown on Figure ES-1. The Subbasin includes the incorporated City of Paso Robles. The Subbasin additionally includes the unincorporated census-designated places of Shandon, San Miguel, Creston, Cholame, and Whitley Gardens.

The Subbasin is drained by the Salinas River. Primary tributaries to the Salinas River include the Estrella River, Huer Huero Creek, and San Juan Creek. Highway 101 is the most significant north-south highway in the Subbasin, with Highways 41 and 46 running east-west across the Subbasin.

The Subbasin currently has two water source types: groundwater and imported surface water. Until 2015, all water demands in the Subbasin were met with groundwater. Water demands in the Basin are organized into the six water use sectors identified in the SGMA Regulations. Agriculture is the largest water use sector as measured by water use. Native vegetation is the largest water use sector as measured by land area.

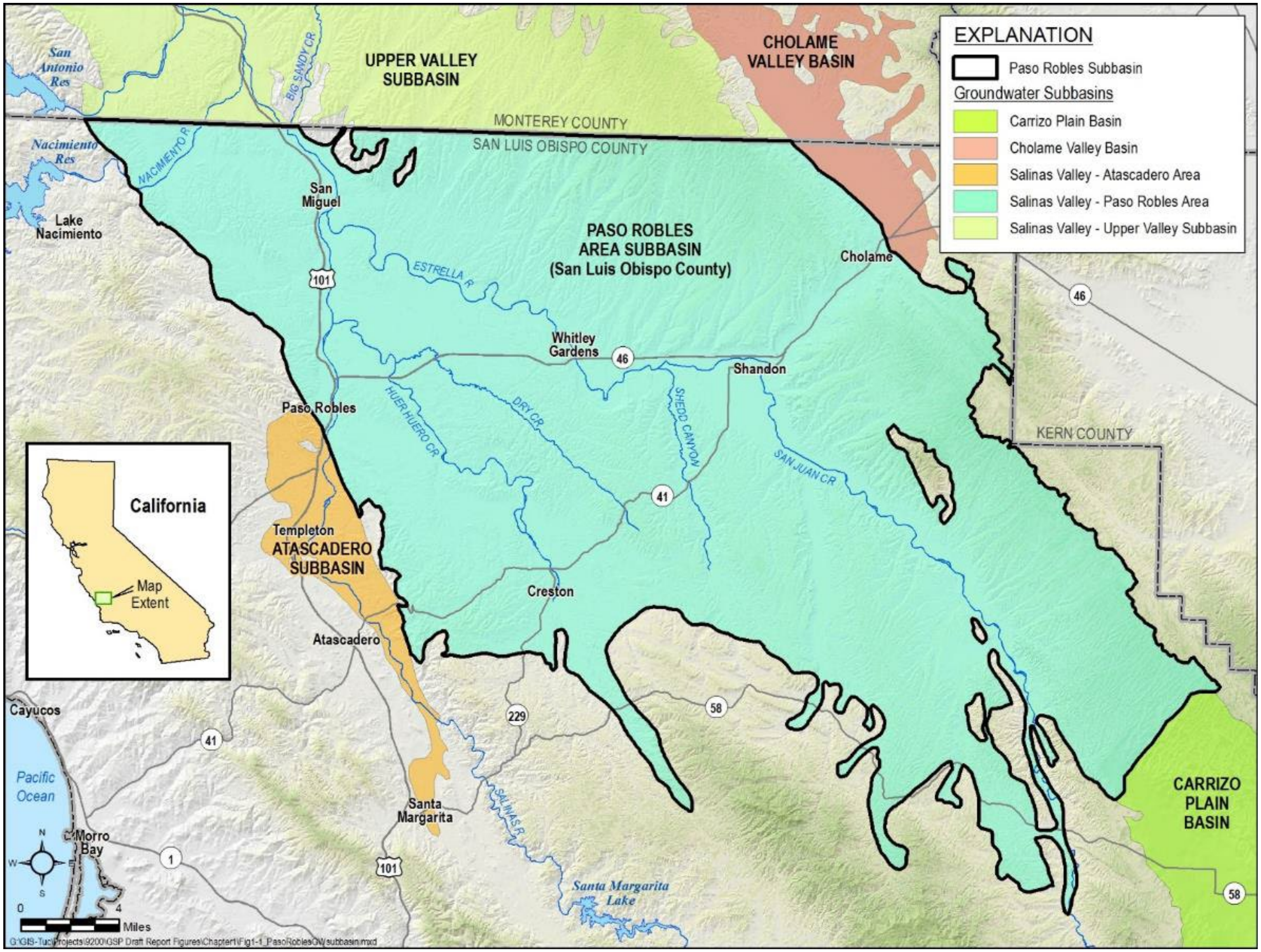


Figure ES-1: Paso Robles Subbasin Location

ES-2 Stakeholder Outreach

A stakeholder outreach and engagement strategy was developed to consider the concerns and ideas of a broad cross-section of stakeholders in the Subbasin. The stakeholder outreach strategy is detailed in Chapter 11 – Notice and Communication and Appendix F – Communications and Engagement (C&E) Plan.

Outreach and communication throughout GSP development included regular presentations at Cooperative Committee meetings, meetings with community groups, meetings with individual stakeholders, and community meetings. Comments from stakeholders were collected with a computerized system, and each GSA reviewed and considered the comments from their stakeholders. As of November 2019, over 190 comments were received and reviewed by the GSAs.

ES-3 Subbasin Geology and Hydrogeology

Two mapped geologic formations constitute the primary water bearing formations in the Subbasin: the Quaternary Alluvium bordering streams and rivers, and the Plio-Pleistocene Paso Robles Formation. The Alluvium is typically no more than 100 feet thick and comprises coarse sand and gravel with some fine-grained deposits. The Alluvium is generally coarser than the Paso Robles Formation, with higher permeability. Well production capacities often exceed 1,000 gallons per minute (gpm) from the Alluvium. The Paso Robles Formation constitutes most of the Subbasin, with depths up to 3,000 feet thick in some places. This formation comprises relatively thin, often discontinuous sand and gravel layers interbedded with thicker layers of silt and clay. The formation is typically unconsolidated and generally poorly sorted. The sand and gravel beds in the Paso Robles Formation have lower permeability compared to the overlying Alluvium. These two geologic formations constitute the two principal aquifers in the Subbasin. Underlying and surrounding the Subbasin are various geologic formations including Tertiary-age or older consolidated sedimentary beds, Cretaceous-age metamorphic rocks, and granitic rock.

ES-4 Existing Groundwater Conditions

Groundwater elevations in some portions of the Subbasin have been declining for many years, while groundwater elevations in other areas of the Subbasin have remained relatively stable.

ES- 4.1 Groundwater Flow Conditions

Groundwater elevations in the Alluvial Aquifer range from an elevation of approximately 1,400 feet above mean sea level (NAVD88) in the southeastern portion of the Subbasin to an elevation of approximately 600 feet above mean sea level near San Miguel. Groundwater flow generally follows the alignment of the creeks and rivers. The average horizontal hydraulic gradient in the Alluvial Aquifer is about 0.004 ft/ft from the southeastern portion of the Subbasin to San Miguel.

Groundwater elevations in the Paso Robles Formation Aquifer range from about 1,300 feet above mean sea level in the southeast portion of the Subbasin to about 550 feet above mean sea level near the City of Paso Robles and the town of San Miguel. Groundwater flow direction is generally to the northwest and west over most of the Subbasin, except in the area north of Paso Robles where groundwater flow is to the northeast. Groundwater flow in the western portion of the Paso Robles Formation Aquifer converges towards pumping depressions. Groundwater gradients range from approximately 0.003 ft/ft in the southeast portion of the Subbasin to approximately 0.01 ft/ft in the areas both southeast of Paso Robles and northwest of Whitley Gardens.

ES- 4.2 Groundwater Storage

Groundwater model results for a simulation period 1981 through 2011 indicate that approximately 369,000 AF were lost from storage in the Paso Robles Formation Aquifer.

ES- 4.3 Subsidence

Three years of recent Interferometric Synthetic Aperture Radar (InSAR) data provided by the California Department of Water Resources (DWR) suggests that there was only a minor amount of historical subsidence in small areas of the Subbasin over this period. Pumping induced subsidence is not a major concern for the Subbasin. Under this GSP, the GSAs will monitor subsidence annually using DWR's InSAR data.

ES- 4.4 Groundwater Recharge and Discharge Areas

Multiple methodologies have been used to identify areas of potential groundwater discharge including springs and seeps, groundwater discharge to surface water bodies, and ET by phreatophytes.

ES- 4.5 Groundwater Quality

Groundwater quality in the Subbasin is generally suitable for both municipal and agricultural uses. The most common drinking water quality standard exceedance in the Subbasin is Total Dissolved Solids (TDS). The second most common drinking water quality standard exceedance in the Subbasin is nitrate. No mapped groundwater contamination plumes from point sources exist in the Subbasin. Some historical groundwater samples from the Subbasin suggest slight to moderate restriction on irrigation use due to sodium or chloride toxicity.

ES-5 Water Budgets

Water budgets for the Paso Robles Subbasin were estimated using an integrated set of three models including a watershed model, a soil balance model, and a groundwater model. Water budgets were developed for historical, current, and future conditions. The future conditions modeled included climate change based on the approach developed by DWR. Both surface water and groundwater budgets were developed for all three time periods.

Historical and current groundwater budgets indicate a persistent groundwater storage decline in the Subbasin in the Paso Robles Formation Aquifer. Similarly, the future groundwater budget suggests continued groundwater storage decline if current water use practices continue. Historical, current, and projected sustainable yields were estimated based on the difference between current pumping practices and calculated groundwater storage deficits. While these calculated sustainable yields are a reasonable estimate of the long-term pumping that can be maintained without producing undesirable results, the definitive sustainable yield can only be determined once data show undesirable results have not occurred. Table ES-1 presents the general components of the three groundwater budgets, along with estimates of the historical, current, and projected sustainable yield.

The sustainable yield for the current water budget period is substantially lower than the historical and future water budgets. The reason for this lower value is because the current water budget corresponds to a drought period. In contrast, the historical water budget corresponds to a long period of representative hydrology and the future water budget was projected using an estimate of reasonable future hydrology based on historical conditions. Because the current water budget corresponds to drought conditions, it is not indicative of average long-term sustainable yield and it should not be used for sustainability planning.

Table ES-1: Historical, Current, and Future Groundwater Budget Components (in acre-feet per year)

Groundwater Inflow Component	Historical	Current	Future
Streamflow Percolation	26,900	2,700	28,800
Agricultural Irrigation Return Flow	17,800	13,100	14,500
Deep Percolation of Direct Precipitation	12,000	1,400	12,600
Subsurface Inflow into Subbasin	10,100	4,900	8,300
Wastewater Pond Percolation	3,400	4,700	3,500
Urban Irrigation Return Flow	1,200	2,100	1,800
Total	71,400	28,900	69,500
Groundwater Outflow Component	**Historical**	**Current**	**Future**
Total Groundwater Pumping	72,400	85,800	74,800
Discharge to Streams and Rivers from Alluvial Aquifer	7,300	4,300	4,600
Groundwater Flow Out of Subbasin	2,600	2,500	2,100
Riparian Evapotranspiration	1,700	1,700	1,700
Total	84,000	94,300	83,200
Sustainable Yield Estimate	**Historical**	**Current**	**Future**
	59,800	20,400	61,100

ES-6 Monitoring Networks

Achieving sustainability will be demonstrated in the data collected from monitoring networks over the GSP implementation horizon. Monitoring networks are developed for the five applicable sustainability indicators in the Subbasin. Seawater intrusion is not applicable in this Subbasin.

All monitoring networks presented in the GSP are based on existing monitoring sites. The monitoring networks are limited to locations with data that are publicly available and not collected under confidentiality agreements. It will be necessary after GSP adoption to expand the existing monitoring networks sites to fully demonstrate sustainability, refine the hydrogeologic conceptual model, and improve the GSP model. The monitoring networks are designed to accomplish the following:

- Demonstrate progress toward achieving measurable objectives described in the GSP
- Identify impacts to the beneficial uses and users of groundwater
- Monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds
- Quantify annual changes in water budget components

As of 2019 there are currently 23 wells in the groundwater elevation monitoring network, 22 wells in the Paso Robles Formation Aquifer and one new well owned by the City of Paso Robles in the Alluvial Aquifer. An additional nine potential future monitoring wells that have publicly available data were also identified, but the aquifer in which they are screened is unknown. These nine wells will be added to the monitoring network after the well completion information has been verified and they have been assigned to the appropriate aquifer. The locations of the groundwater elevation monitoring wells are shown on Figure ES-2.

This GSP adopts groundwater elevations as a proxy for estimating change in groundwater storage. The groundwater elevation monitoring wells shown on Figure ES-2, will also be used to monitor change in groundwater storage.

This GSP identifies existing groundwater elevation monitoring wells for monitoring of interconnected surface water with recommendations for additional sites. In addition, new stream gages have been installed since the beginning of the GSP development process.

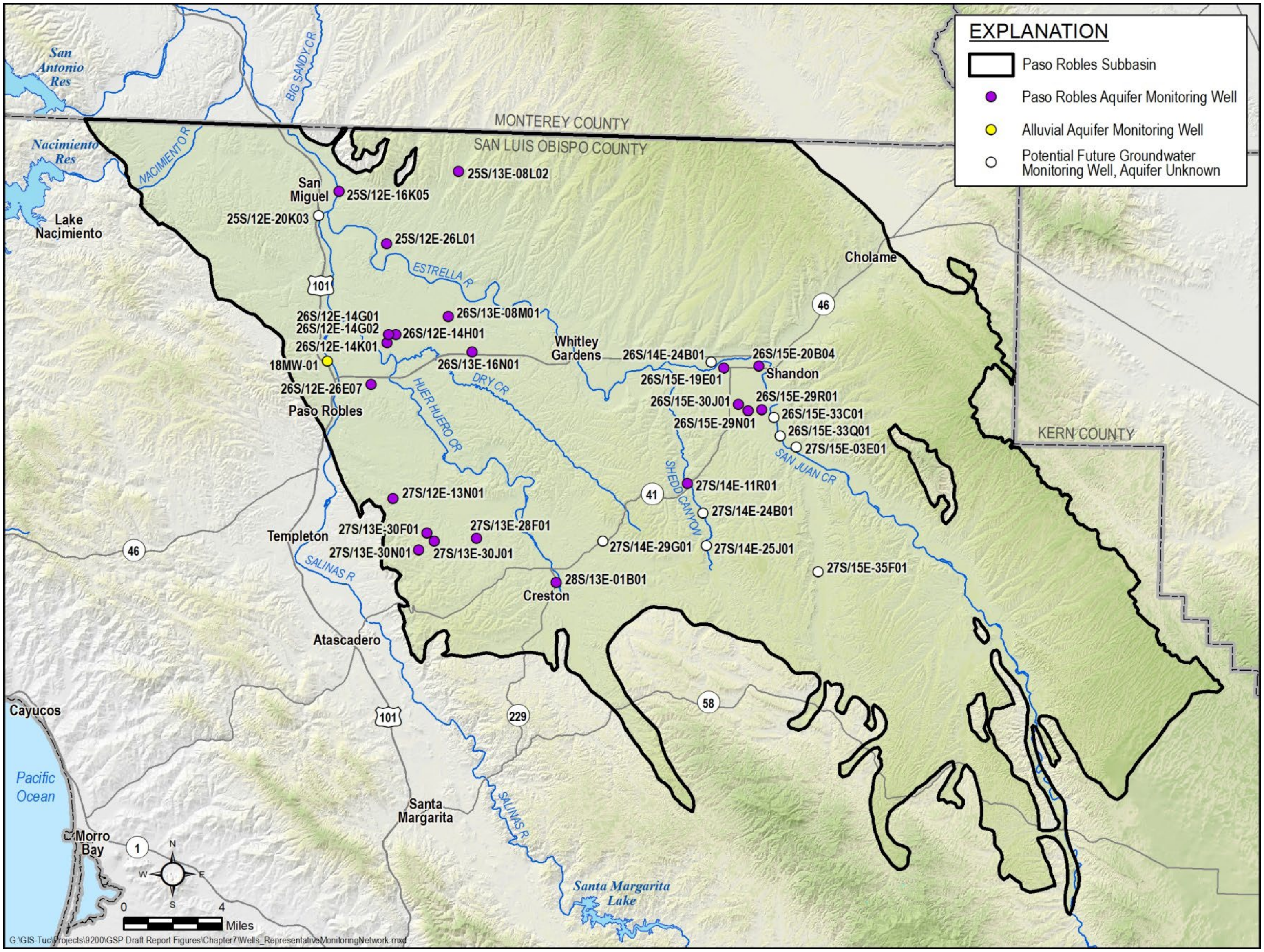


Figure ES-2: Groundwater Elevation Monitoring Well Locations

Degradation of groundwater quality is measured using existing wells. In particular, this GSP leverages groundwater quality data reported to the State Division of Drinking Water and groundwater quality data gathered as part of the State's Irrigated Lands Regulatory Program (ILRP). These two data sources provide a geographically extensive and complete network of wells to monitor groundwater quality in the Subbasin.

Land subsidence is monitored in the Subbasin with InSAR data provided by DWR. These data cover the years 2015 to 2018, and are adequate to identify areas of recent subsidence. One or more GSA may opt to contract with USGS or others with expertise in subsidence to gather any additional datasets and evaluate the cause(s) of any identified subsidence. The GSAs will continue to annually assess subsidence using the DWR provided InSAR data.

ES-7 Sustainable Management Criteria

Sustainable Management Criteria are the metrics by which sustainability is measured. Sustainable management criteria, including significant and unreasonable conditions, minimum thresholds, measurable objectives, and undesirable results, are established for the five applicable sustainability indicators in the Subbasin. Seawater intrusion is not applicable to this Subbasin.

Sustainable management criteria were developed with considerable public input and review, including:

- Holding a series of public outreach meetings.
- Surveying the public and gathering input on minimum thresholds and measurable objectives.
- Analyzing survey results to assess preferences and trends relevant to Sustainable Management Criteria.
- Combining survey results, outreach efforts, and hydrogeologic data to set initial conceptual minimum thresholds and measurable objectives.
- Conducting public meetings to present initial Sustainable Management Criteria and solicit additional public input.
- Reviewing public input on preliminary Sustainable Management Criteria with the GSAs.
- Modifying criteria based on public input and GSA recommendations.

The groundwater elevation measurable objective for each representative monitoring site in the monitoring network was set to the well's average 2017 groundwater elevation. The groundwater elevation minimum thresholds for each monitoring well were set to an elevation

30 feet below the measurable objective. Analysis of historical groundwater elevation data suggested that 30 feet allows for reasonable operational flexibility that accounts for seasonal and anticipated climatic variations on groundwater elevation. Undesirable results of additional groundwater declines are described with reference to domestic wells and sustainability criteria are explained with evaluation of the effects of the criteria on beneficial uses and users of groundwater, including domestic wells.

Both the minimum threshold and measurable objectives for change in storage are set to no long-term change in storage in the Subbasin. After the subbasin achieves sustainability, there will be no ongoing loss of groundwater in storage.

This GSP sets minimum thresholds for the degradation of groundwater quality as a number of supply wells. Some supply wells already exceed groundwater quality standards. This GSP is not designed to remediate these existing exceedances. Therefore, the minimum thresholds and measurable objectives allow all existing exceedances, plus exceedances in an additional 10% of the monitoring wells. This allows for some flexibility in managing groundwater quality, while not allowing substantial degradation of groundwater quality.

Both the minimum threshold and measurable objectives for subsidence are set to no long-term decline in ground surface elevation in the Subbasin.

Potential undesirable effects of depletion of interconnected surface water are described in terms of reduction in Salinas River outflow to Salinas Valley, passage opportunity for steelhead trout, and extent, density, and health of riparian habitat. Specific minimum thresholds and measurable objectives are presented including measured extent of vegetation for isolated wetlands not located near major stream channels. Groundwater levels are used as a reasonable proxy for the rate of flow depletion along three identified defined reaches of the Salinas River, Estrella River, and San Juan Creek. The sustainability criteria based on groundwater levels are defined with recognition that additional monitoring wells are needed.

ES-8 Projects and Actions to Attain Sustainability

Achieving sustainability in the Subbasin will rely on management actions that reduce groundwater pumping. Both basin-wide and area specific management actions will be undertaken. Basin-wide management actions include monitoring and outreach, promoting best management practices for water use, promoting stormwater capture and recharge, and promoting voluntary fallowing of irrigated land.

Area specific management actions involve mandatory limitations on pumping in certain areas. The GSAs will establish a regulatory program to identify and enforce required pumping limitation as necessary to arrest persistent groundwater elevation declines in specific areas. The amount of mandatory pumping limitations is uncertain and will depend on the effectiveness and timeliness of voluntary actions by pumpers to limit pumping as well as the extent of the specific areas identified for mandatory limitations.

Developing and adopting the regulations for mandatory pumping limitations will require substantial negotiations between the GSAs, public hearings, and environmental review (CEQA). Regulations adopted by individual GSAs related to pumping limitations would need to be substantially identical to assure a consistent methodology for identifying those areas across the Subbasin. After GSP adoption, developing the regulatory program will require the following steps:

1. Establishing a methodology for determining baseline pumping in specific areas considering:
    a. Groundwater elevation trends in areas of decline and estimated yield in that area
    b. Land uses and corresponding irrigation requirements
2. Establishing a methodology to determine whose use must be limited and by how much considering, though not limited to, water rights and evaluation of anticipated benefits from projects bringing in supplemental water or other relevant actions individual pumpers take.
3. A timeline for limitations on pumping ("ramp down") in specific areas as required to avoid undesirable results
4. Approving a formal regulation to enact the program

Projects that supplement the Subbasin's water supply may be implemented by willing entities to offset pumping and lessen the degree to which the management actions would be needed. For example, stormwater capture and percolation efforts will be important for enabling the replenishments of the Subbasin on a long-term basis by water that is naturally available.

ES-9 Plan Implementation

Implementation of the GSP requires robust administrative and financial structures, with adequate staff and funding to ensure compliance with SGMA. The GSP calls for GSAs to routinely provide information to the public about GSP implementation and progress towards sustainability and the need to use groundwater efficiently. GSAs will likely hire consultant(s) or hire staff to implement the GSP.

A conceptual planning-level cost of about $7,800,000 will cover planned activities during the first five years of implementation. This equates to an estimated cost of $1,560,000 per year. This cost estimate reflects routine administrative operations, public outreach, and the basin wide and area specific management actions. This estimate assumes a centralized approach to implementation and staffing, it does not include CEQA, legal staff costs, individual GSA staff costs or responding to DWR comments, nor does it include costs associated with any projects undertaken by willing entities. The GSP will be implemented under the terms of the existing MOA between the four GSAs until DWR approves the GSP and a new or renewed cooperative agreement is established. Consistent with the current MOA, an annual operating budget will be established that is considered for approval by each GSA.

1 INTRODUCTION TO PASO ROBLES SUBBASIN GROUNDWATER SUSTAINABILITY PLAN

1.1 Purpose of the Groundwater Sustainability Plan

In 2014, the State of California enacted the Sustainable Groundwater Management Act (SGMA). This law requires groundwater basins in California that are designated as medium or high priority be managed sustainably. Satisfying the requirements of SGMA generally requires four basic activities:

1. Forming one or multiple Groundwater Sustainability Agency(s) (GSAs) to fully cover a basin;
2. Developing one or multiple Groundwater Sustainability Plan(s) (GSPs) that fully cover the basin;
3. Implementing the GSP and managing to achieve quantifiable objectives; and
4. Regular reporting to the California Department of Water Resources (DWR).

This document fulfills the GSP requirement for the Paso Robles Area Subbasin of the Salinas Valley Groundwater Basin (Paso Robles Subbasin or Subbasin). This GSP describes the Paso Robles Subbasin, develops quantifiable management objectives that account for the interests of the Subbasin's beneficial groundwater uses and users, and identifies a group of projects and management actions that will allow the Subbasin to achieve sustainability within 20 years of plan adoption.

The GSP was developed specifically to comply with SGMA's statutory and regulatory requirements. As such, the GSP uses the terminology set forth in these requirements (see e.g. Water Code Section 10721 and 23 CCR Section 351) which is oftentimes different from the terminology utilized in other contexts (e.g. past reports or studies, past analyses, judicial rules or findings). The definitions from the relevant statutes and regulations are attached to this report for reference.

This GSP is a planning document. The numbers in this GSP are not meant to be the basis for final determinations of individual water rights or safe yield. This GSP also does not define water rights and none of the numbers in the GSP should be considered definitive for water rights determination purposes.

1.2 Description of Paso Robles Subbasin

The Paso Robles Subbasin is identified by DWR in Bulletin 118 as Subbasin No. 3-004.06 (DWR, 2016a). The Subbasin is part of the greater Salinas Valley Basin in the Central Coastal region of California. The Subbasin as defined in this GSP encompasses an area of approximately 436,240 acres, or 681 square miles and is entirely within San Luis Obispo County. The Subbasin boundaries delineate the groundwater basin; the watershed includes the area that drains the surface water to the Subbasin, and encompasses a much larger area.

The Subbasin as originally defined by DWR (2003) was in both Monterey and San Luis Obispo Counties. On February 11, 2019, DWR released the Final 2018 Basin Boundary Modifications approving two revisions to the Subbasin boundary. One revision made the northern boundary of the Paso Basin coincident with the Monterey and San Luis Obispo County line, placing the Paso Basin entirely within San Luis Obispo County and making formal coordination with Salinas Valley Basin GSA optional. The other revision removed the basin area underlying Heritage Ranch Community Services District GSA, making them no longer subject to SGMA or required to develop a GSP. A basin boundary modification was approved by DWR that moved the northern boundary of the Paso Robles Area Subbasin to the Monterey/San Luis Obispo county line. A subsequent basin boundary adjustment was approved by DWR in 2019 to remove the land covered by Heritage Ranch Community Services District from the Subbasin. Heritage Ranch Community Services District was originally an active GSA in the Subbasin. The Plan has been modified to take out Heritage Ranch Community Services District and the land it overlies after the boundary adjustment was approved. The final basin boundary is shown on Figure 1-1.

The Subbasin is bounded by two groundwater basins and two subbasins, as shown on Figure 1-1.

- The Atascadero Area Subbasin (3-004-11) is located southwest of the Paso Robles Subbasin. The boundary with the Subbasin is the Rinconada Fault zone which is a leaky barrier to groundwater flow.
- The Upper Valley Aquifer Subbasin of the Salinas Valley Groundwater Basin is located north of the Paso Robles Subbasin. Its aquifers are in hydraulic continuity with those in the Subbasin.
- The Cholame Valley (3-005) groundwater basin is located east of the Paso Robles Subbasin. Its western boundary is the San Andreas Fault that is a barrier to groundwater flow.
- The Carrizo Plain (3-019) groundwater basin is located southeast of the Paso Robles Subbasin. The Carrizo Plain boundary with the Subbasin is a topographic high with sediments in hydraulic continuity with the Basin.

The Atascadero, Carrizo Plain and Cholame Valley groundwater basins are designated as very low priority and therefore not required to submit GSPs. Although not required to develop a GSP, the Atascadero Area Subbasin is planning to prepare and adopt a GSP. The Paso Robles

Subbasin and Salinas Valley Upper Valley Aquifer Subbasin are subject to SGMA and are required to develop GSPs.

The Subbasin includes the incorporated City of Paso Robles. The Subbasin additionally includes the unincorporated census-designated places of Cholame, Creston, San Miguel, Shandon, and Whitley Gardens (Figure 1-1).

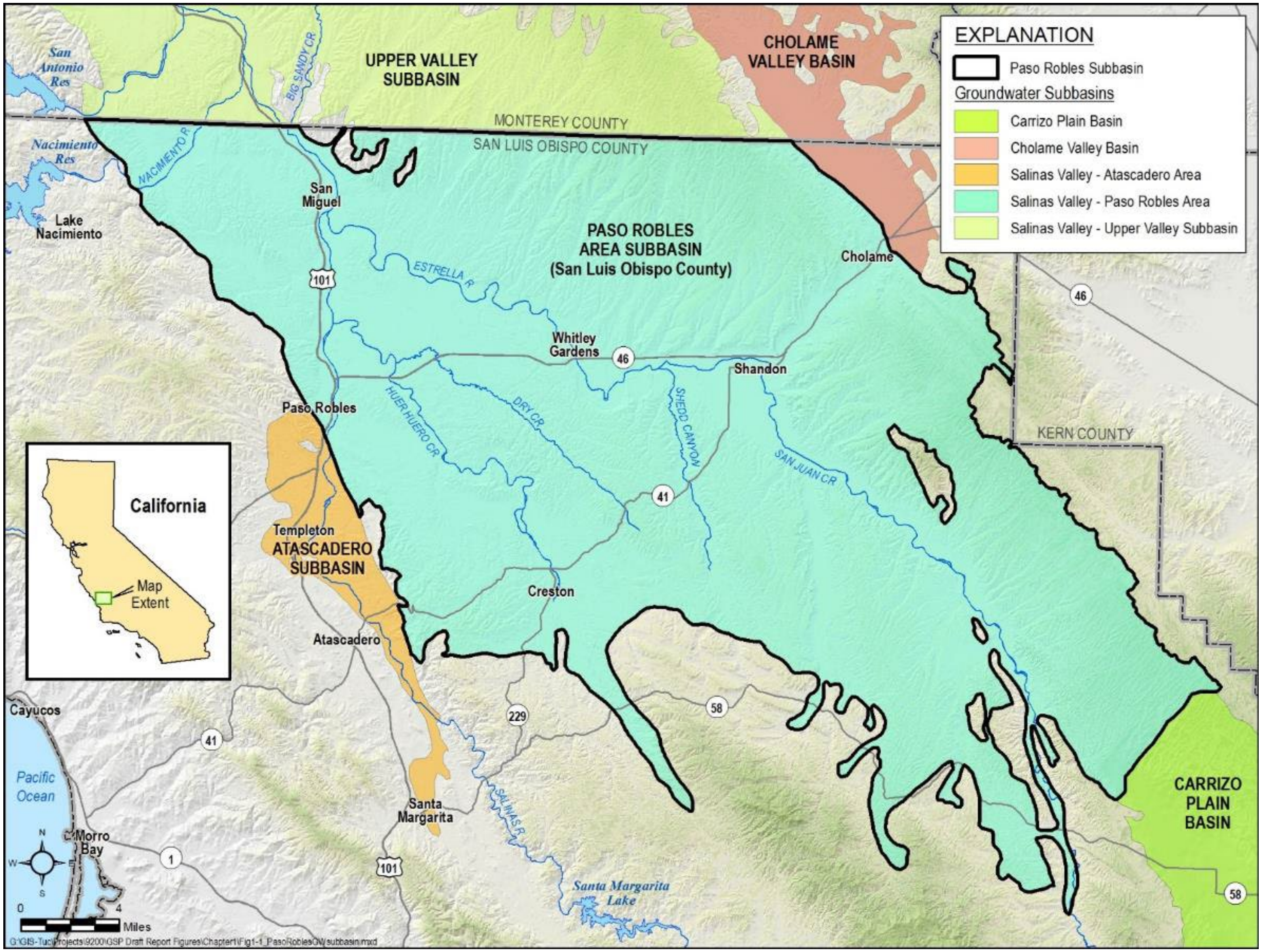


Figure 1-1. Paso Robles Subbasin and Surrounding Subbasins

2 AGENCIES' INFORMATION

The Paso Robles Subbasin GSP has been jointly developed by four GSAs:

- City of Paso Robles
- Paso Basin - County of San Luis Obispo GSA
- San Miguel Community Services District (CSD)
- Shandon - San Juan GSA

2.1 Agencies' Names and Mailing Addresses

The following contact information is provided for each GSA pursuant to California Water Code § 10723.8.

City of Paso Robles GSA
1000 Spring Street
City of Paso Robles, CA 93635

Paso Basin - County of San Luis Obispo GSA
C/O County of San Luis Obispo Department of Public Works - Water Resources
County Government Center, Room 206
San Luis Obispo, CA 93408

San Miguel Community Services District GSA
P.O. Box 180
San Miguel, CA 93451

Shandon - San Juan GSA
P.O. Box 150
Shandon, CA 93461

2.2 Agencies' Organization and Management Structure

The organization and management structures of each of the four subbasin GSAs are described below. Each of the GSAs appoints a representative to a Cooperative Committee that is further described in Section 2.3.2. The Cooperative Committee coordinates activities among all the GSAs during the GSP development phase.

2.2.1 City of Paso Robles GSA

The City of Paso Robles is an incorporated city that operates under a Council-Manager general law form of government. The City Council consists of five members elected at-large, on a non-partisan basis. Council members serve four-year overlapping terms. The mayor is directly elected and serves a two-year term. Decisions on all GSA-related matters require an affirmative vote of a majority of the five-member City Council. One member from the City Council sits on the Cooperative Committee that coordinates activities among all GSAs in accordance with the Memorandum of Agreement (MOA) further described in section 2.3.1.5 and included in Appendix A. The City of Paso Robles GSA's activities are staffed through the City's Department of Public Works.

2.2.2 Paso Basin - County of San Luis Obispo GSA

The County of San Luis Obispo is governed by a five-member Board of Supervisors. Board members are elected to staggered four-year terms. Decisions on all GSA-related matters require an affirmative vote of a majority of the Board. One member from the Board of Supervisors sits on the Cooperative Committee that coordinates activities among all GSAs in accordance with the MOA further described in section 2.3.1.5 and included in Appendix A. The Paso Basin - County of San Luis Obispo GSA's activities are staffed through the County's Department of Public Works.

2.2.3 San Miguel Community Services District GSA

San Miguel CSD is governed by a five-member Board of Directors. Directors are elected to four-year terms. Decisions on all GSA-related matters require an affirmative vote of a majority of the five Board of Directors members. One member from the San Miguel CSD Board of Directors sits on the Cooperative Committee that coordinates activities among all in accordance with the MOA further described in section 2.3.1.5 and included in Appendix A. The San Miguel CSD GSA's activities are staffed by the CSD's staff engineer.

2.2.4 Shandon - San Juan GSA

The Shandon-San Juan Water District is governed by a five-member Board of Directors elected to staggered four year terms. The District elected to serve as the exclusive GSA for the portion of the Subbasin situated within the boundaries of the District, and therefore also functions as the Shandon-San Juan GSA. Decisions on all GSA-related matter require an affirmative vote of a majority of the five-member Board of Directors. One member from the Shandon - San Juan GSA Board of Directors sits on the Cooperative Committee that coordinates activities among all in accordance with the Memorandum of Agreement (MOA) further described in section 2.3.1.5 and included in Appendix A. The Shandon - San Juan GSA's activities are staffed by members of the Water District or their representatives and by contracted professional engineers.

2.3 Authority of Agencies

Each of the GSAs developing this coordinated GSP is formed in accordance with the requirements of California Water Code § 10723 *et seq*. The resolutions of formation for all GSAs are included in Appendix A. The specific authorities for forming a GSA and implementing the GSP for each of the agencies that formed GSAs are listed below.

2.3.1 Individual GSAs

2.3.1.1 City of Paso Robles GSA

The City of Paso Robles is incorporated under the laws of the State of California. The City provides water supply and land use planning services to its residents. The City is therefore a local agency under California Water Code § 10721 with the authority to establish itself as a GSA. Upon establishing itself as a GSA, the City obtains all the rights and authorities provided to GSAs under California Water Code § 10725 *et seq.* subject to the terms and conditions set forth therein. In addition, the City retains its ability to manage groundwater pursuant to its police powers and well permitting authority.

2.3.1.2 Paso Basin - County of San Luis Obispo GSA

The County of San Luis Obispo has land use authority over the unincorporated areas of the County, including areas overlying the Paso Robles Subbasin. The County of San Luis Obispo is therefore a local agency under California Water Code § 10721 with the authority to establish itself as a GSA. Upon establishing itself as a GSA, the County obtains all the rights and authorities provided to GSAs under California Water Code § 10725 *et seq*. subject to the terms and conditions set forth therein. In addition, the County retains its ability to manage groundwater and the construction of wells pursuant to its police powers.

2.3.1.3 San Miguel Community Services District GSA

San Miguel CSD is a local public agency of the State of California, organized and operating under the Community Services District Law, Government Code § 6100 *et seq*. San Miguel CSD provides water and sewer services to its residents. San Miguel CSD is therefore a local agency under California Water Code § 10721 with the authority to establish itself as a GSA. Upon establishing itself as a GSA, San Miguel CSD obtains all the rights and authorities provided to GSAs under California Water Code § 10725 *et seq*. subject to the terms and conditions set forth therein.

2.3.1.4 Shandon - San Juan GSA

The Shandon - San Juan Water District was formed in accordance with California's Water District Law, California Water Code § 34000 *et seq*. In accordance with California's Water District Law, the Shandon - San Juan Water District obtains the water supply and management authorities included in California Water Code § 35300 *et seq*., with the exception of the ability to export groundwater beyond the boundaries of the Paso Robles subbasin. The Shandon - San Juan Water District is therefore a local agency under California Water Code § 10721 with the authority to establish itself as a GSA. Upon establishing itself as a GSA, the District obtains all the rights and authorities provided to GSAs under California Water Code § 10725 *et seq*. subject to the terms and conditions set forth therein.

2.3.1.5 Memorandum of Agreement for GSP Development

The five GSAs overlying the original Subbasin entered into a Memorandum of Agreement (MOA) in September 2017. Heritage Ranch CSD was an original party to the MOA. With the basin boundary modification approval by DWR in 2019, Heritage Ranch is no longer part of the Subbasin. A copy of the MOA is included in Appendix A.

The purpose of the MOA is to establish a committee to develop a single GSP for the entire Paso Robles Subbasin. The single GSP developed under this MOA will be considered for adoption by each individual GSA and subsequently submitted to DWR for approval. Per §12.2 of the MOA, the MOA shall automatically terminate upon DWR's approval of the adopted GSP. The GSAs may decide to enter into a new agreement to coordinate GSP implementation at that time.

The MOA establishes the Paso Basin Cooperative Committee (Cooperative Committee) consisting of one member and one alternate from each of the GSAs. The Cooperative Committee conducts activities related to GSP development and SGMA implementation. The full list of activities the Cooperative Committee is authorized to undertake is included in the MOA in Appendix A; highlights include:

- Developing a GSP that achieves the goals and objectives outlined in SGMA;
- Reviewing and participating in the selection of consultants related to Cooperative Committee efforts;
- Developing annual budgets and additional funding needs;
- Developing a stakeholder participation plan; and

The MOA sets forth each GSAs' weighted voting percentages and the votes needed to implement certain actions or make certain recommendations to the individual GSAs. In particular, the MOA states that the Cooperative Committee must unanimously vote to recommend that the GSAs adopt the final GSP, though the MOA provides that each GSA may adopt the GSP for its jurisdiction without the Cooperative Committee's recommendation. Any vote to recommend changes to the MOA requires unanimous approval by the Cooperative Committee Members.

2.3.2 Memorandum of Agreement for GSP Implementation

Pursuant to Section 1 of the MOA, the GSAs intend to use the current MOA as a basis for continued cooperation in the management of the Subbasin during the period between adoption of the GSP by each GSA and approval of the GSP by DWR.

2.3.3 Coordination Agreements

The single GSP developed by the GSAs completely covers the entire Paso Robles Subbasin. Therefore, no coordination agreements with other GSAs are necessary.

2.3.4 Legal Authority to Implement SGMA Throughout the Plan Area

Figure 2-1 shows the extent of the GSP plan area, along with the jurisdictional boundary of each of the exclusive GSAs cooperating on this GSP. This figure shows that the entire plan area is covered by the exclusive GSAs, and no portion of the Subbasin is covered by a non-exclusive GSA. Therefore, the combination of the GSAs provides the legal authority to implement this GSP throughout the entire plan area. No authority is needed from any other GSA to implement this plan.

2.4 Contact Information for Plan Manager

The County of San Luis Obispo Director of Groundwater Sustainability, Blaine T. Reely, PhD, P.E., has been designated as the Plan Manager. The Plan Manager can be reached at 805-781-4206 or breely@co.slo.ca.us

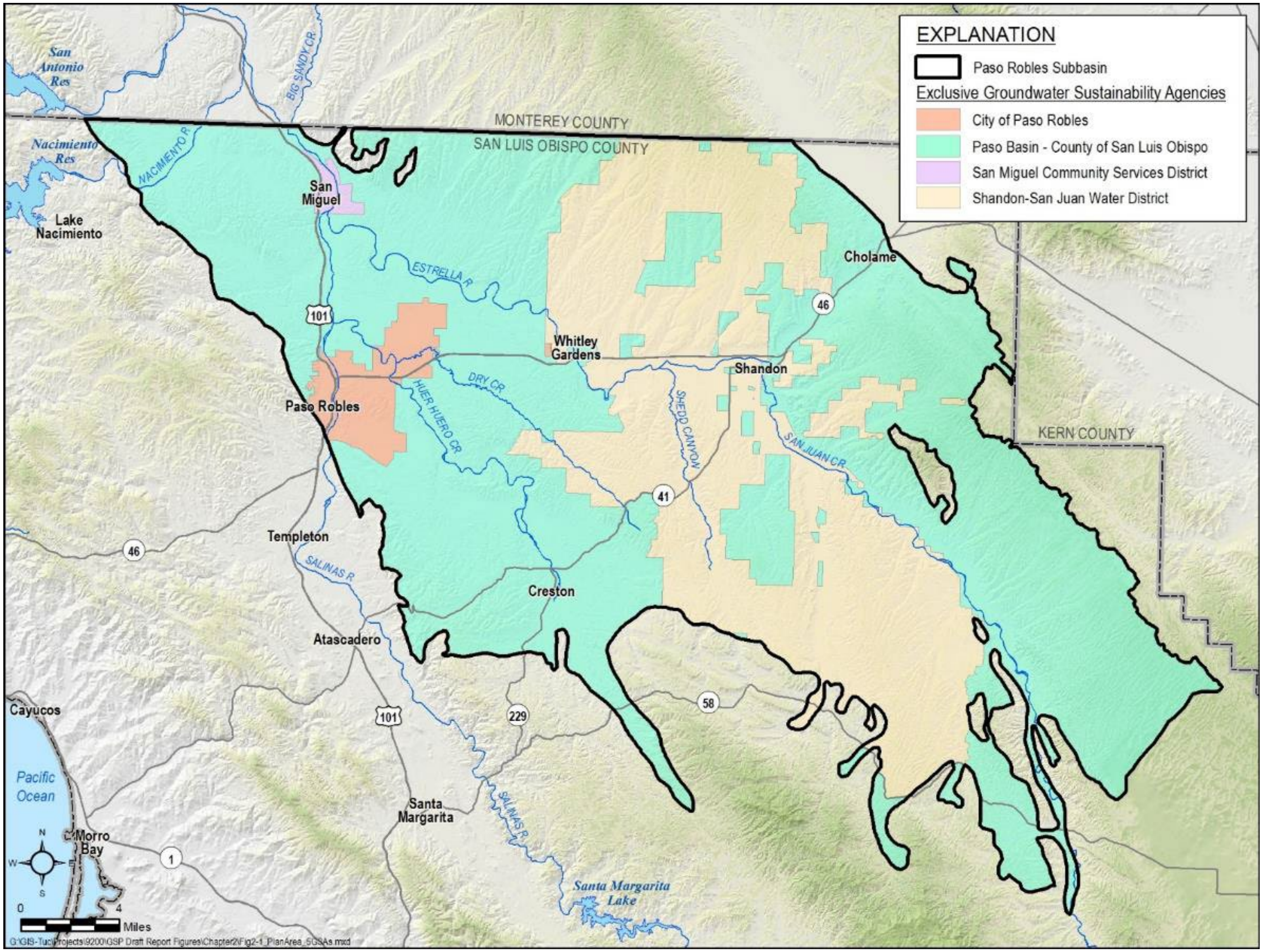


Figure 2-1. Extent of GSP Plan Area and Exclusive Groundwater Sustainability Agencies

3 DESCRIPTION OF PLAN AREA

3.1 Paso Robles Subbasin Introduction

This GSP covers the entire Paso Robles Subbasin. The Subbasin lies in the northern portion of San Luis Obispo County. The majority of the Subbasin comprises gentle flatlands near the Salinas River Valley, ranging in elevation from approximately 445 to 2,387 feet above mean sea level. The Subbasin is drained by the Salinas River. Tributaries to the Salinas River include the Estrella River, Huer Huero Creek, and San Juan Creek. Communities in the Subbasin are the City of Paso Robles and the communities of San Miguel, Creston, and Shandon. Highway 101 is the most significant north-south highway in the Subbasin, with Highways 41 and 46 running east-west across the Subbasin. Figure 3-1 shows the extent of the plan area as well as the significant water bodies, communities, and highways.

3.2 Adjudicated Areas, Other GSAs, and Alternative Plans

As of the date that this GSP was completed and submitted to DWR for evaluation: (1) No part of the Subbasin nor any surrounding subbasin is identified in SGMA (Water Code § 10720.8) as an adjudicated area and no part of the Subbasin nor any surrounding subbasin has been the subject of a comprehensive common law groundwater adjudication or comprehensive adjudication as described in Code of Civil Procedure Section 830 *et seq.*; (2) No other GSAs exist within the Subbasin; and (3) No alternative plans have been submitted for any part of the Subbasin, nor for any surrounding subbasin. Consequently, no map is included in the GSP for adjudicated areas, other GSAs or alternative plans.

3.3 Other Jurisdictional Areas

In addition to the GSAs, there are several federal, state, and local agencies that have some degree of water management authority in the Subbasin. Each agency or organization is discussed below. A map of the jurisdictional extent of the Federal and State agencies within the Subbasin is shown on Figure 3-2. The source of this information is the DWR SGMA data viewer, available on the DWR SGMA website. A map showing the jurisdictional extent of city and local jurisdictions within the Subbasin is shown on Figure 3-3, though boundaries are unknown, and therefore not included in the map, for other entities with water management/supply responsibilities (mutual water companies, small water systems, etc.).

3.3.1 Federal Jurisdictions

Federal agencies with land holdings in the Subbasin include the National Forest Service and the Bureau of Land Management. A portion of the Los Padres National Forest covers a small area near the southern boundary of the Subbasin. The Bureau of Land Management owns two small parcels in the Red Hills area that partially overlie the Subbasin.

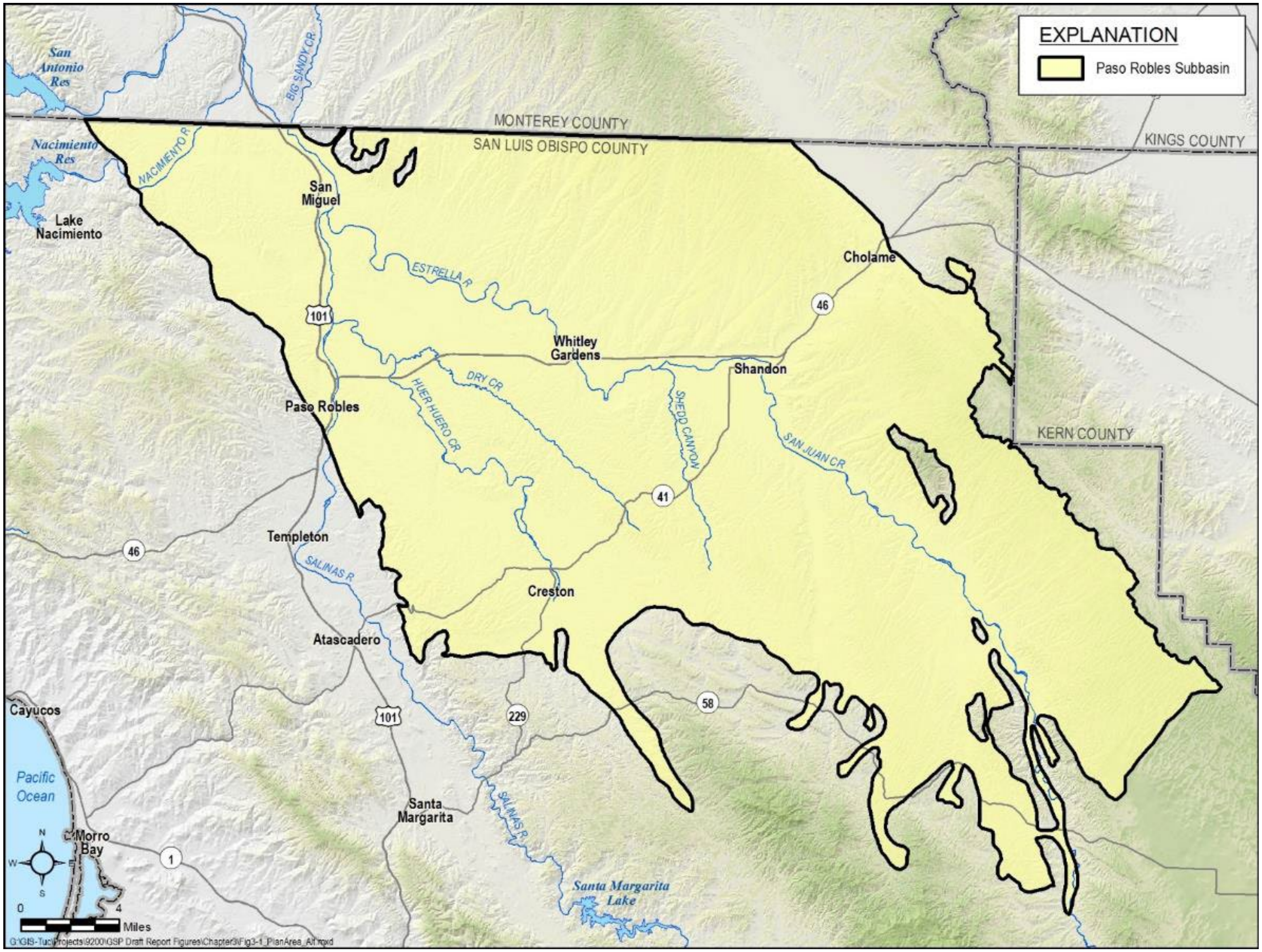


Figure 3-1. Area Covered by GSP

3.3.2 Tribal Jurisdiction

The Paso Basin is located in an area historically occupied by two Native American groups, the Obispeño Chumash and Salinan. The Chumash occupied the coast between San Luis Obispo and northwestern Los Angeles County, inland to the San Joaquin Valley. They were divided into two broad groups, of which the Obispeño were the northern group. The Salinan were northern neighbors of the Chumash, and although the presence of a firm boundary between the Chumash and the Salinan is uncertain, ethnographic accounts have placed Salinan territories in the northern portion of the County. Neither tribal group has recognized tribal lands in the Paso Basin.

3.3.3 State Jurisdictions

State agencies in the Subbasin include the California National Guard and the California Department of Fish and Wildlife. The California National Guard occupies Camp Roberts at the north end of the Subbasin. The California Department of Fish and Wildlife oversees an area along the Salinas River near Camp Roberts. The Department of Fish and Wildlife additionally has three conservation easements that partially overlie the eastern boundary of the Subbasin.

3.3.4 County Jurisdiction

The County of San Luis Obispo and the associated San Luis Obispo County Flood Control and Water Conservation District (SLOFCWCD) have jurisdiction over the entire Subbasin. Land owned or managed by the County in the Subbasin includes a conservation easement south of the City of Paso Robles operated by the Land Conservancy of San Luis Obispo County; CW Clark Park in Shandon; and Wolf Property Natural Area in San Miguel.

3.3.5 City and Local Jurisdictions

The City of Paso Robles lies on the west side of the Subbasin. The City has water management authority over its incorporated area and manages a number of parks and recreational sites. One community service district exists in the Subbasin: the San Miguel CSD. Two primarily agricultural water districts exist in the Subbasin: the Shandon - San Juan Water District and the Estrella-El Pomar-Creston Water District.

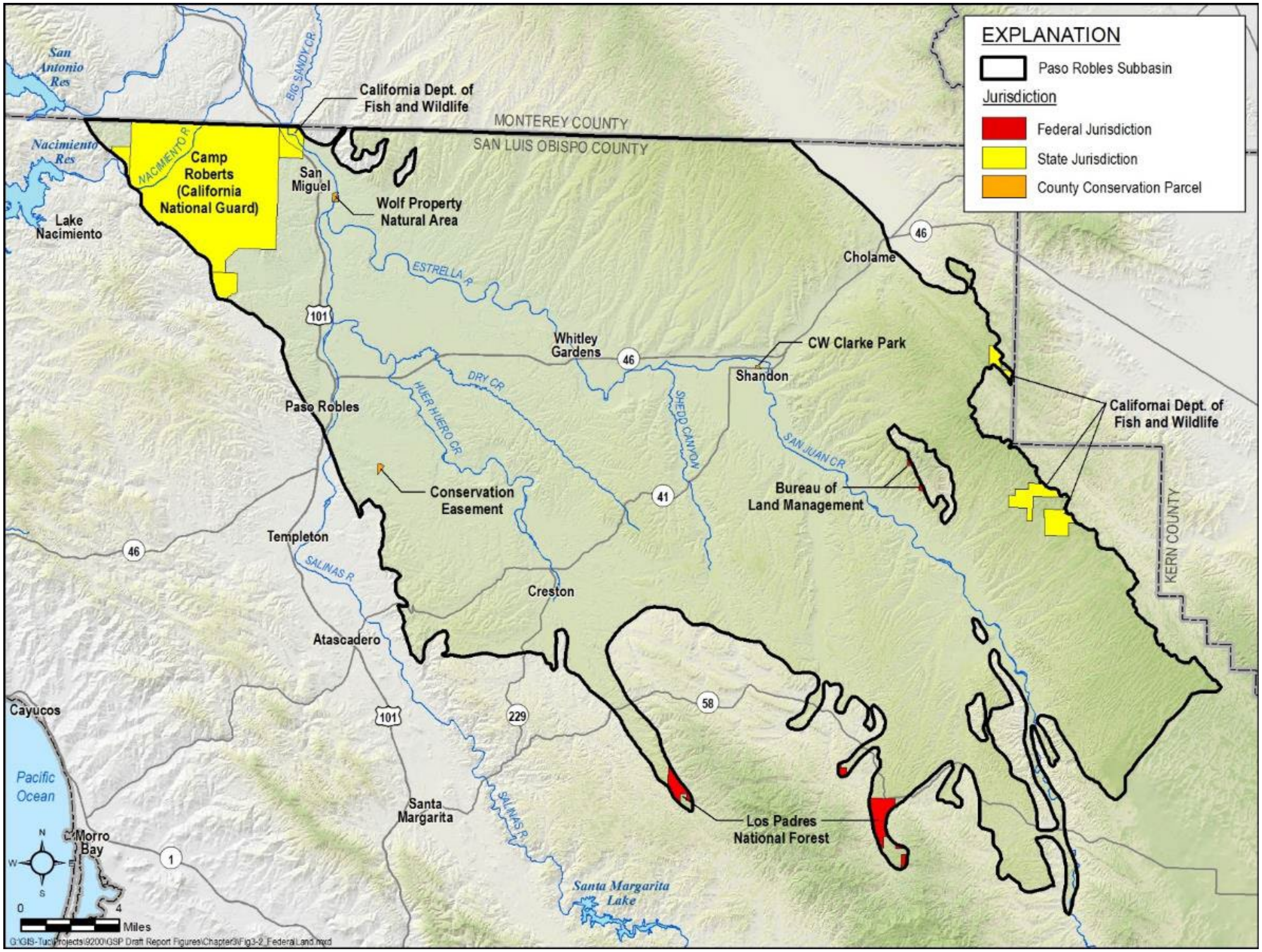


Figure 3-2. Map of Federal Jurisdictional Areas, State Jurisdictional Areas and County Conservation Parcels

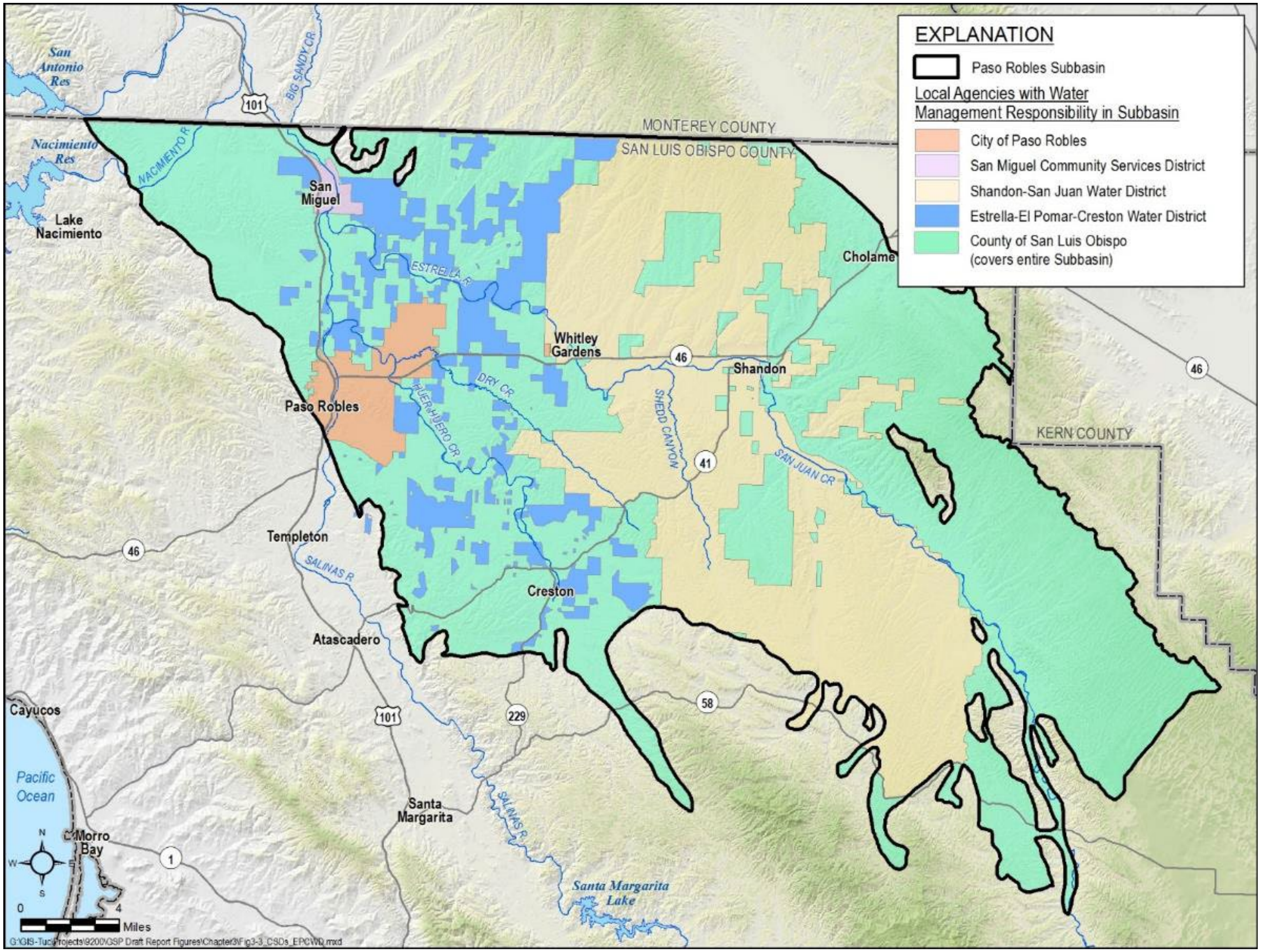


Figure 3-3. Map of City, CSD, and Water District Jurisdictional Areas

3.4 Land Use

Land use planning authority in the Subbasin is the responsibility of the City of Paso Robles (within its boundary) and of the County of San Luis Obispo (within all other areas of the Subbasin). Current land use in the Subbasin is shown on Figure 3-4 and is summarized by group in Table 3-1. The urban land use category is provided by DWR based on data compiled by Land IQ from 2014 (LandIQ, 2017). The agricultural land use categories and acreage is provided by the County of San Luis Obispo's Agricultural Commissioner's Offices (SLO County ACO) (2016). The balance of the 436,240 acres in the GSP Plan Area is classified as native vegetation and could include dry farmed land.

Table 3-1. Land Use Summary

Land Use Category	Acres
Citrus	397
Deciduous	471
Alfalfa	1,590
Nursery	63
Pasture	667
Vegetable	1,691
Vineyard	35,349
Native vegetation	387,435
Urban	8,577
Total	**436,240**

Sources: Department of Water Resources and County of San Luis Obispo's Agricultural Commissioner Offices

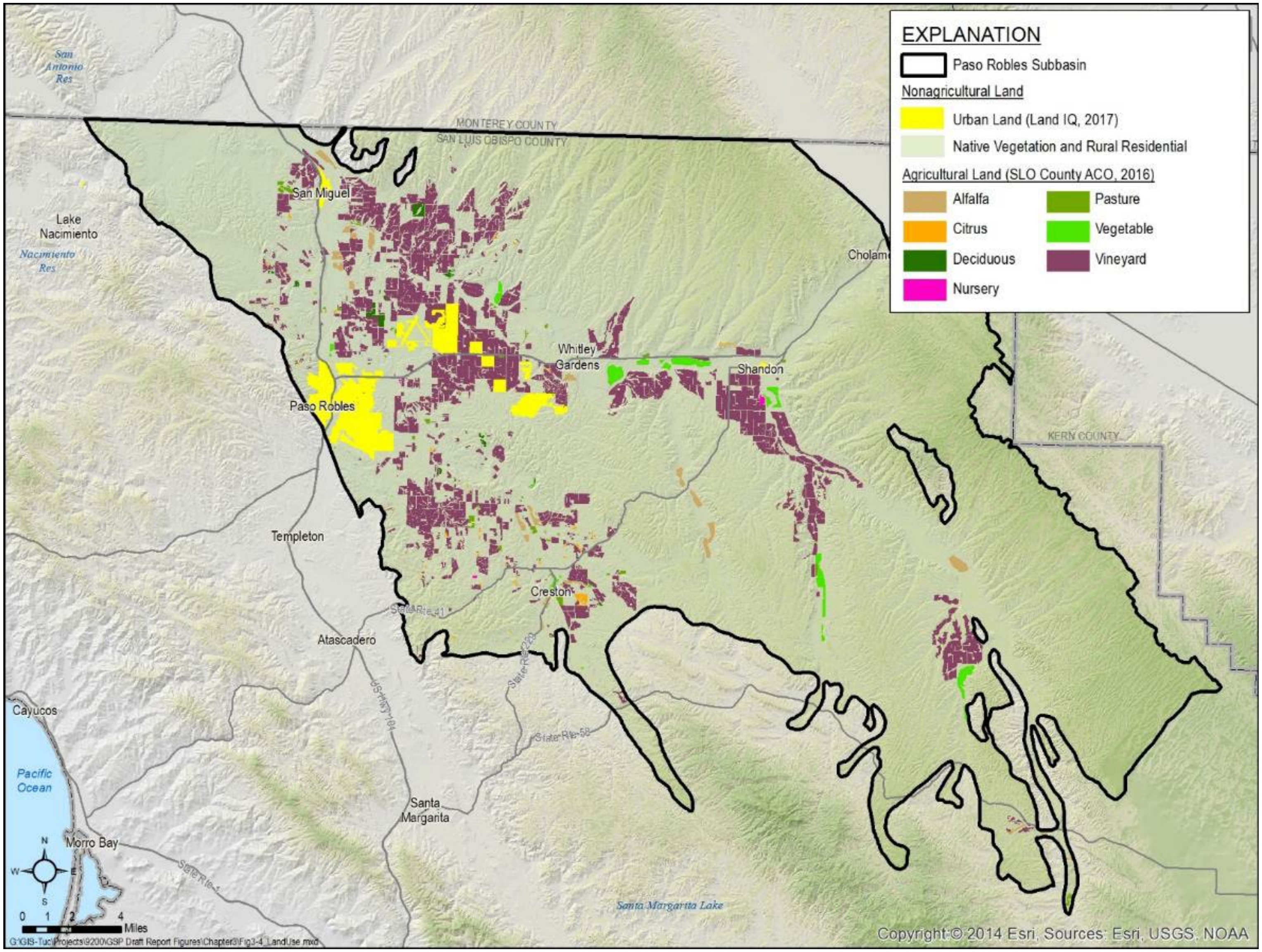


Figure 3-4. Existing Land Use Designations

3.4.1 Water Source Types

The Subbasin has three water source types: groundwater, surface water, and recycled water. Until 2015, all water demands in the Subbasin were met with groundwater. Figure 3-5 shows the communities, defined as cities and census-designated places that depend on groundwater as the source of water.

The City of Paso Robles began using Nacimiento Project Water in 2015. (Todd Groundwater, 2016). The City has a contractual entitlement to 6,488 acre-feet per year (AFY). Community Service Area 16 (CSA16), surrounding the community of Shandon, has a State Water Project (SWP) contract entitlement to 100 AFY from the Coastal Branch of the SWP. In 2017, CSA16 took delivery of 99 AF of water, which was the first delivery of SWP water. The locations of the pipelines supplying these water sources are shown on Figure 3-5, along with the land areas supplied by these surface water sources.

Historically, recycled water has not been used as a source of water in the Subbasin. The City of Paso Robles, San Miguel CSD, and Camp Roberts operate wastewater treatment plants. The City of Paso Robles is currently upgrading its water treatment system and plans to use its treated wastewater for irrigation and other non-potable uses. San Miguel CSD is also investigating non-potable use of wastewater. Currently, there is no land using wastewater as a water source type.

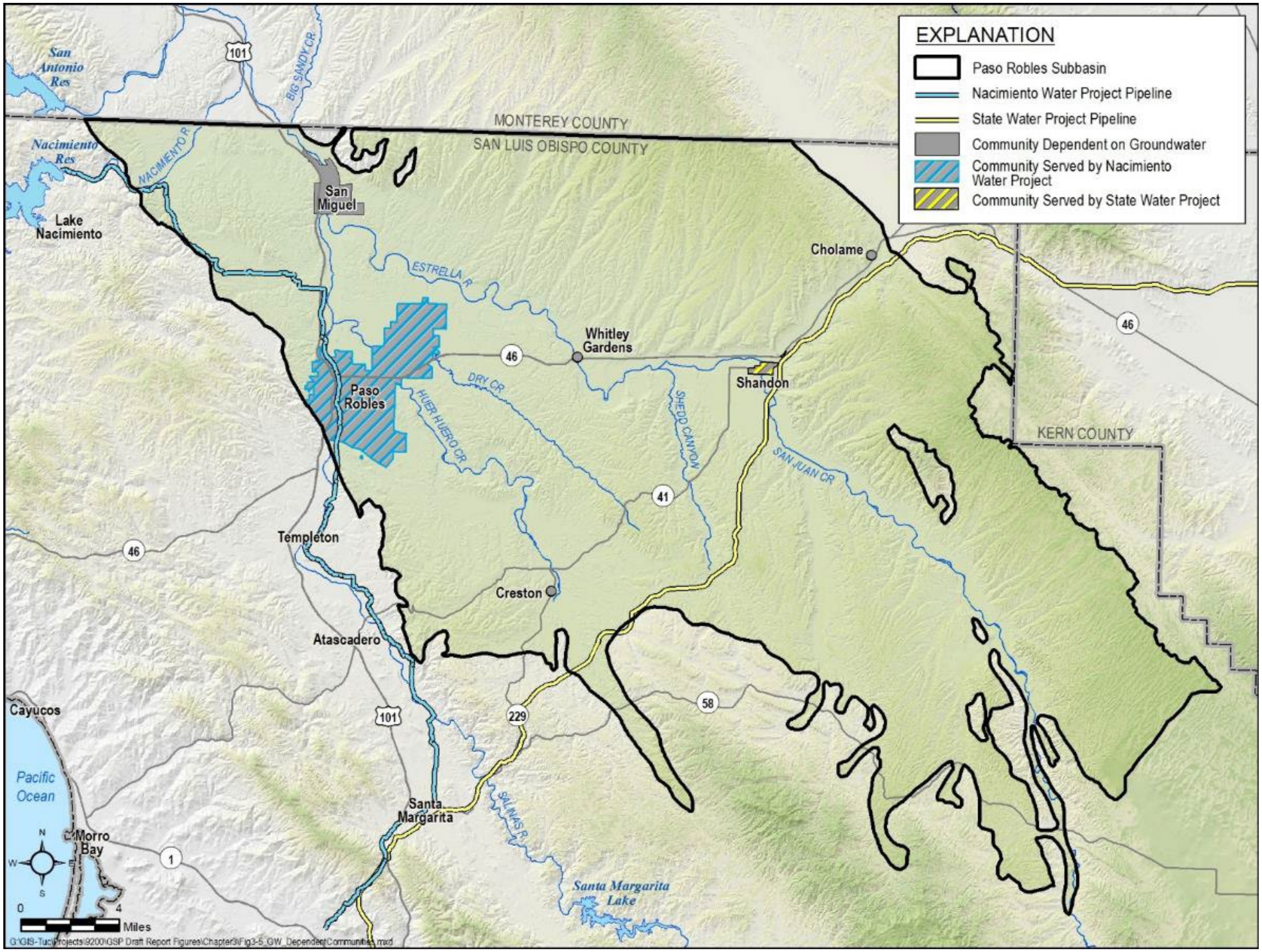


Figure 3-5. Communities Dependent on Groundwater and With Access to Surface Water

3.4.2 Water Use Sectors

Water demands in the Basin are organized into the six water use sectors identified in the SGMA Regulations. The urban, agricultural, and native vegetation areas are the same as the land use categories that were defined in Figure 3-4 and Table 3-1. These are:

- **Urban**. Urban water use is assigned to non-agricultural water uses in the cities and census-designated places. Domestic use outside of census-designated places is not considered urban use.
- **Industrial**. There is limited industrial water use in the Subbasin. DWR does not have any records of wells in the subbasin that are categorized solely for industrial use. Industrial use within the City is lumped into the urban water use sector and, since most industrial use outside of the City is associated with agriculture, it is lumped into the agricultural water use sector.
- **Agricultural**. This is the largest water use sector in the Subbasin by water use.
- **Managed wetlands**. There are no managed wetlands in the Subbasin.
- **Managed recharge**. There is no managed recharge in the Subbasin. Recycled water discharge to ponds is included in the urban water use sector
- **Native vegetation.** This is the largest water use sector in the Subbasin by land area. This sector, required by the SGMA Regulations, includes rural residential areas. Native vegetation is the term used in the SGMA Regulations for all other unmanaged and non-irrigated land use sectors.

Figure 3-6 shows the distribution of the water use sectors in the Subbasin.

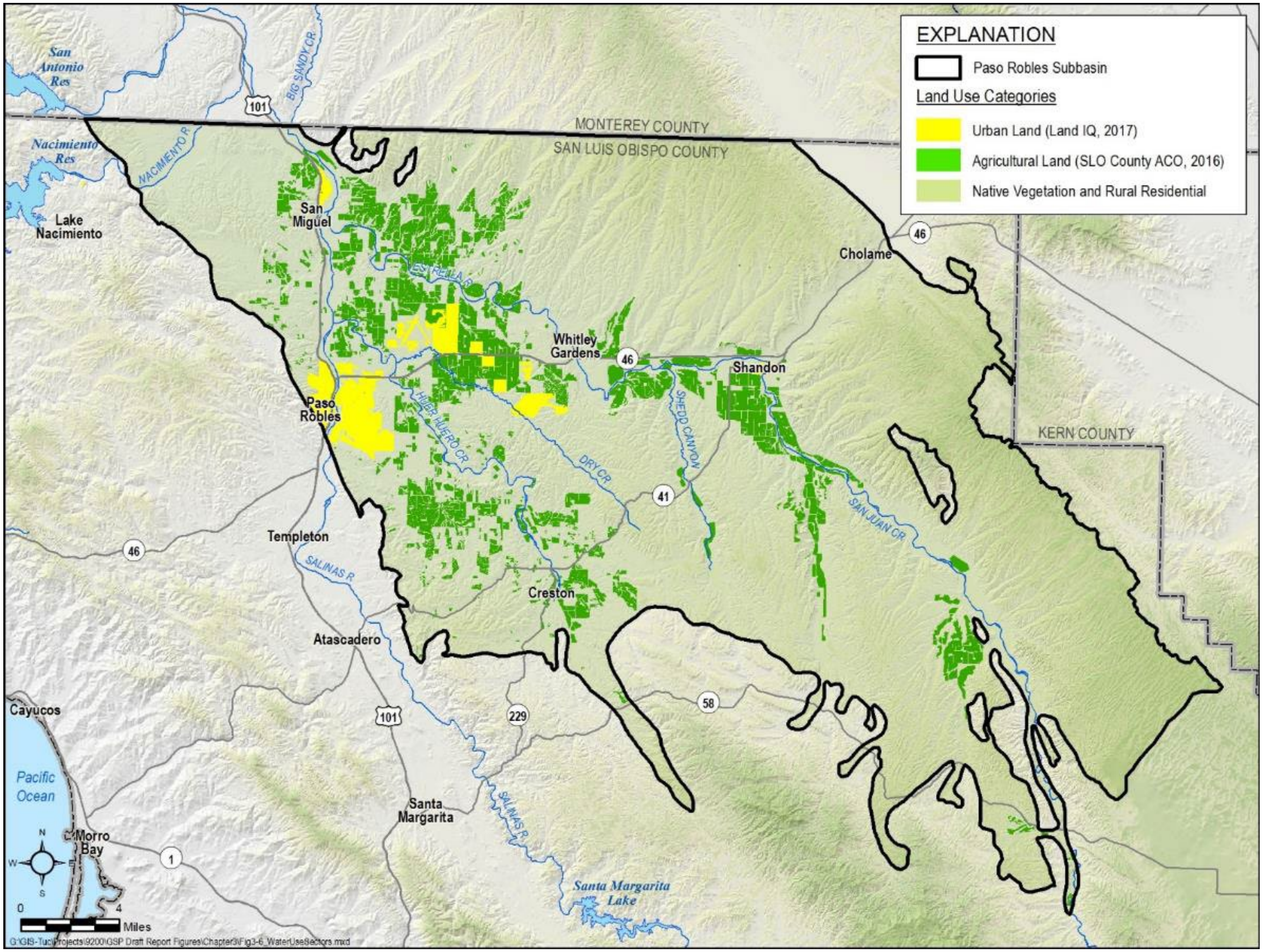


Figure 3-6. Water Use Sectors

3.5 Existing Well Types, Numbers, and Density

The total number of existing and active wells is not known. Well types, well depth, and well distribution data were downloaded from DWR's well completion report map application (DWR, 2018). DWR provided this information specifically for developing GSPs. DWR categorizes wells in this mapping application as either domestic, production, or public supply. These categories are based on the well use information submitted with the well logs to DWR. The majority of the wells categorized on well logs as production wells are used for agriculture. Most of the wells in the Subbasin are used for domestic purposes.

Figure 3-7 through Figure 3-9 show the density of these DWR wells in the Subbasin by their types of use. These DWR data used to develop these maps are not the same set of well data from other sources listed below. DWR data were used to develop maps of well densities because they are organized for easy mapping of well density per square mile. These maps should be considered representative of well distributions, but not definitive.

In addition to DWR datasets, described above, other well information is available from other public databases. Many wells in these databases may have been destroyed or abandoned. Some wells are located in more than one database. Additionally, it is possible that some wells exist in multiple sources listed below due to multiple well naming conventions. The number of wells in each database is listed below. These numbers are updated as of June 12, 2019 and contain duplicates (i.e. each well was included in the count for every source the well was found):

- Online System for Well Completion Reports (OSWCR): 5,854 wells
- SGMA Data Viewer: 20 wells
- SLO County Public Data: 41wells
- SLO County Confidential Data: 193 wells
- SLO County Public Health Department Data Request: 207 wells
- City of Paso Robles: 1 well
- CASGEM: 9 wells

Finally, the County of SLO Public Health Department has a well inventory database of wells permitted between 1965 and the present. The database is based on the best available historical data compiled from the Environmental Health Services well construction permit application process. Of the 5,164 wells documented in the subbasin, most are domestic wells, and approximately 600 are irrigation wells (County of SLO Public Health Department, June 2019).

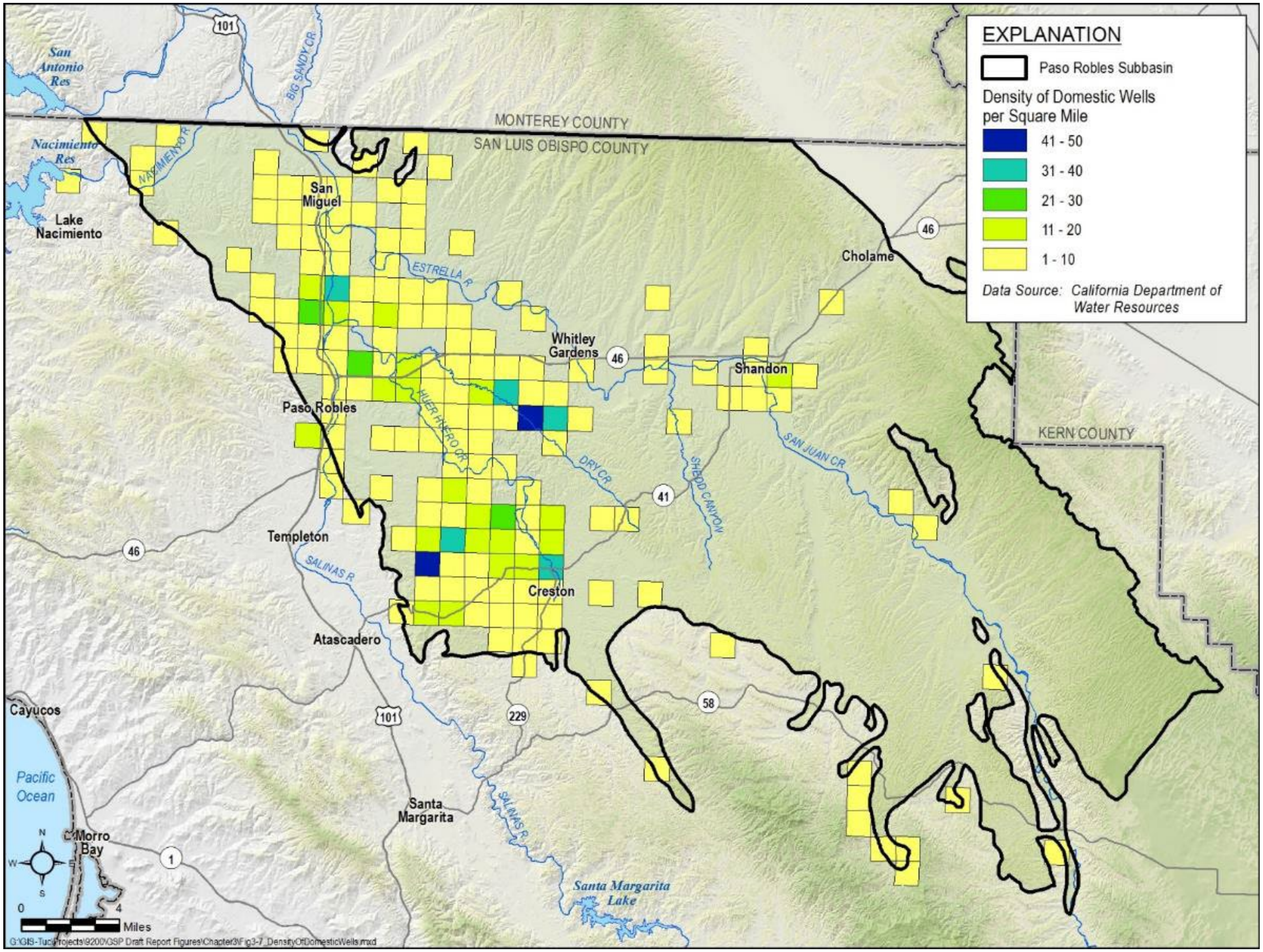


Figure 3-7. Density of Domestic Wells per Square Mile

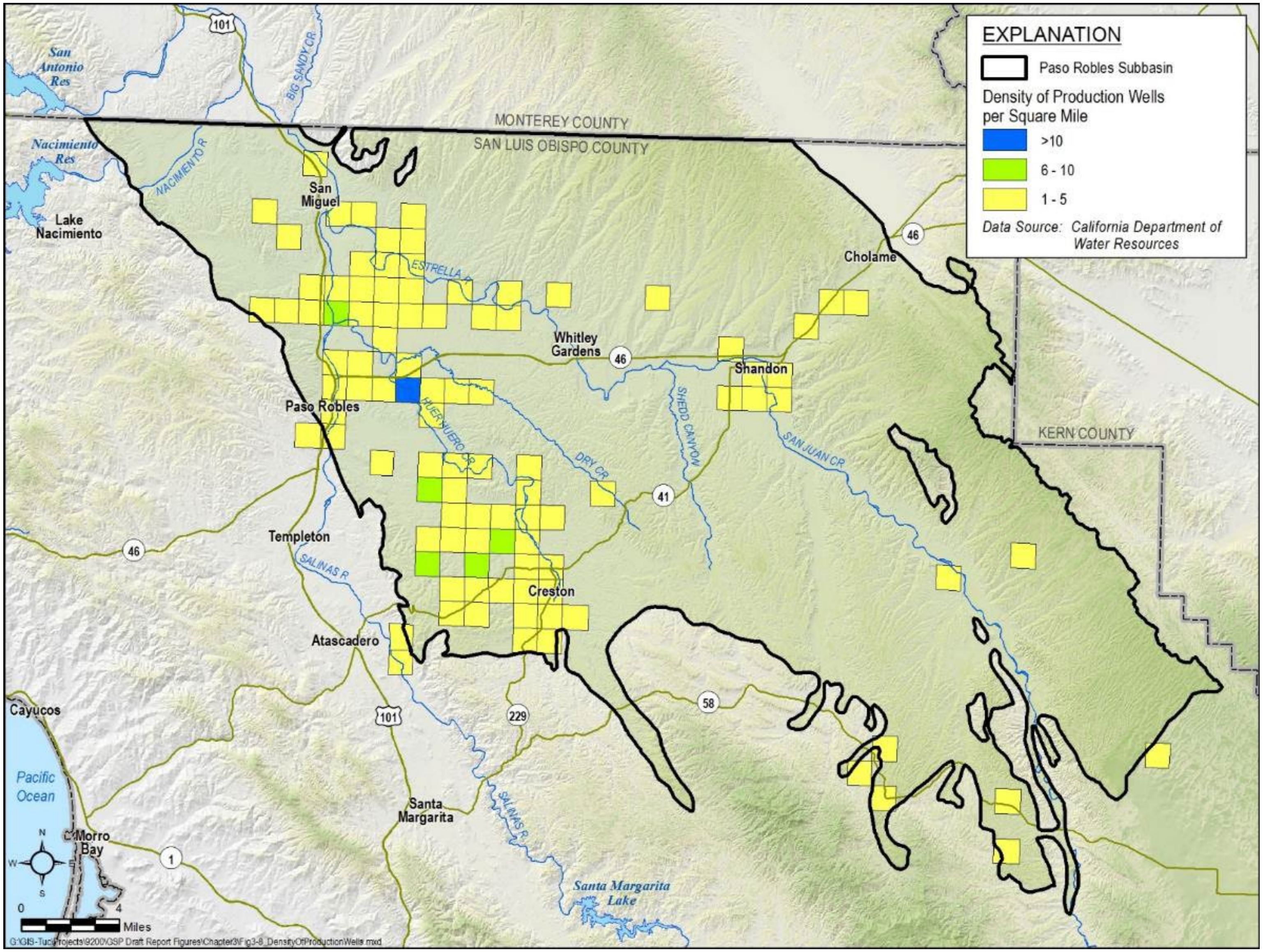


Figure 3-8. Density of Production Wells per Square Mile

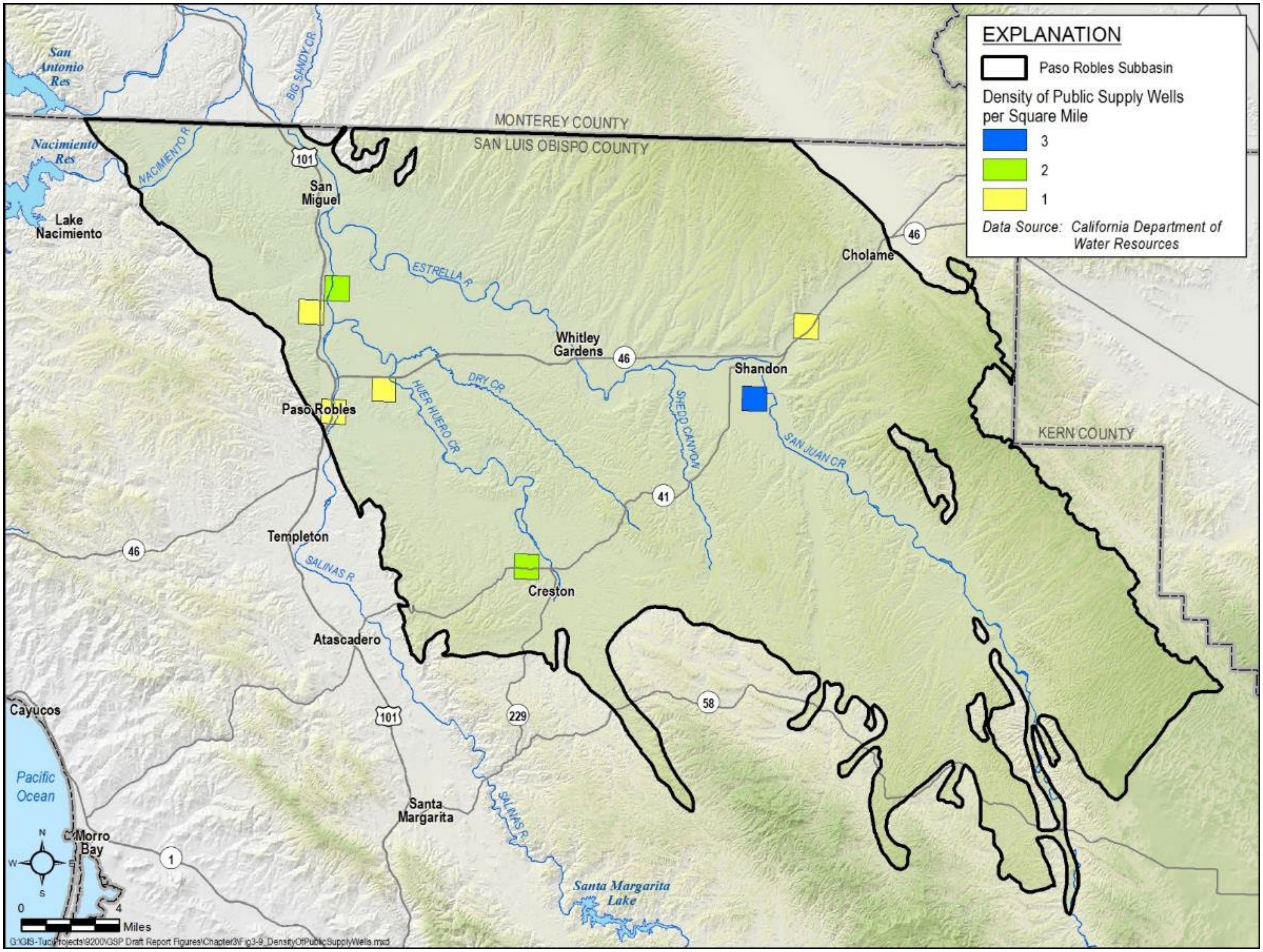


Figure 3-9. Density of Public Water Supply Wells per Square Mile

3.6 Existing Monitoring Programs

3.6.1 Groundwater Level Monitoring

The SLOFCWCD has been monitoring groundwater levels county-wide on a semi-annual basis for more than 50 years to support general planning and for engineering purposes. Groundwater level measurements are taken once in the spring and once in the fall. The monitoring takes place from a voluntary network of wells. The voluntary monitoring network has changed over time as access to wells has been lost or new wells have been added to the network.

The U.S. Geological Survey (USGS) monitors groundwater levels at two monitoring wells in the Basin. The two wells in the Paso Robles Subbasin only have one measurement, collected in November 2017. The frequency for monitoring is given as "periodic" so the frequency is unknown at this time.

Routine monitoring of groundwater levels is conducted in the Subbasin by County Staff through the SLOFCWCD program. Figure 3-10 shows the locations of monitoring wells in the SLOFCWCD's database that are designated as public and the locations of monitoring wells reported to the state's California Statewide Groundwater Elevation Monitoring (CASGEM) system. The monitoring network also includes a number of other wells in the Plan Area that are not shown on this map as the data was gathered under confidentiality agreements between monitoring network participants and SLOFCWCD. Additional evaluation of the current monitoring program was conducted for the GSP to establish a representative monitoring network of wells with public data that will be used during plan implementation to track groundwater elevations and ensure that minimum thresholds, described in Chapter 8, Sustainable Management Criteria, have not been exceeded.

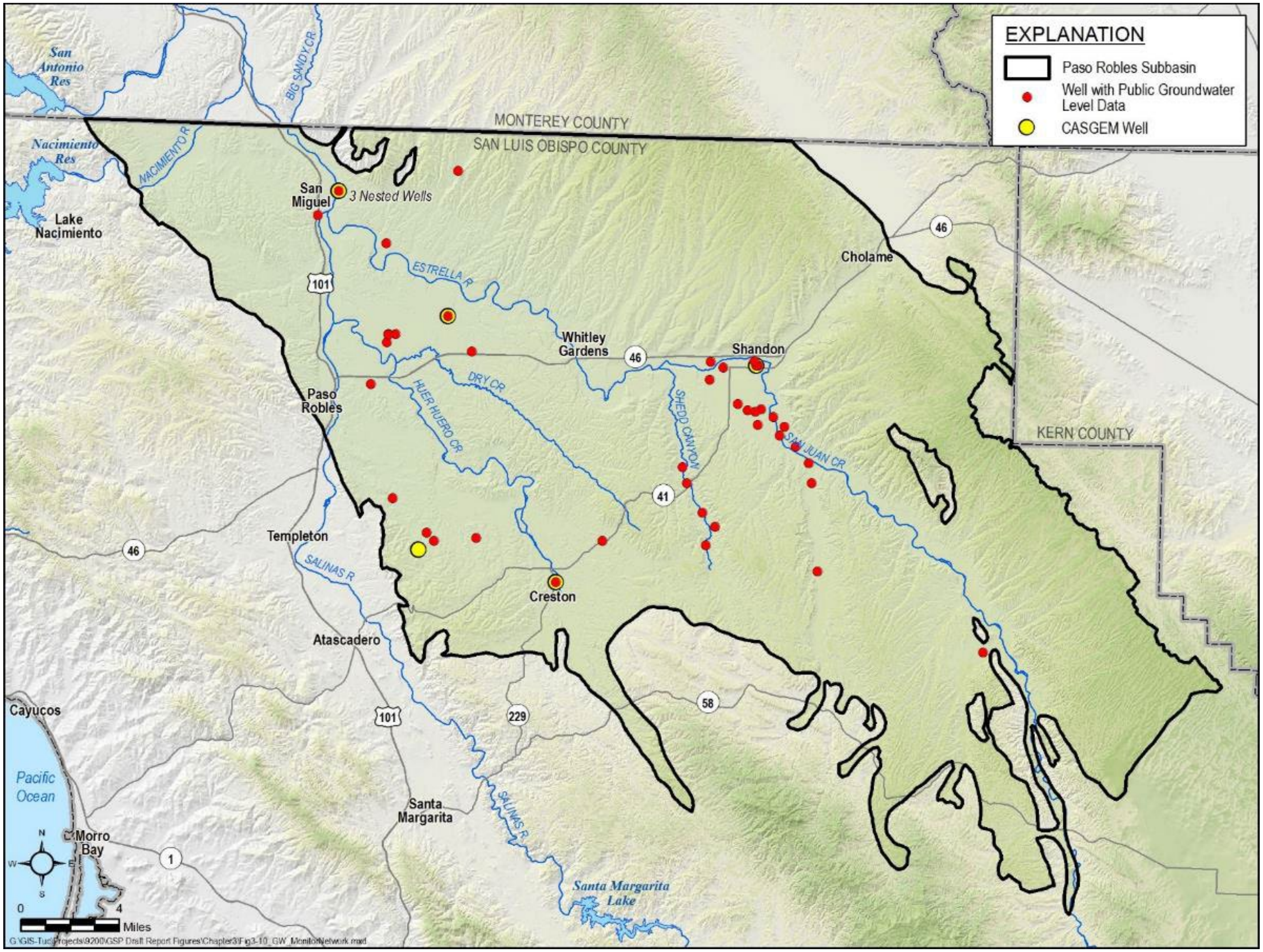


Figure 3-10. Wells with Publicly Available Groundwater Level Data

3.6.2 Groundwater Quality Monitoring

Groundwater quality is monitored under several different programs and by different agencies including:

- Municipal and community water purveyors must collect water quality samples on a routine basis for compliance monitoring and reporting to the California Division of Drinking Water.
- The USGS collects water quality data on a routine basis under the Groundwater Ambient Monitoring and Assessment (GAMA) program. These data are stored in the State's GAMA/Geotracker system.
- The State Water Resources Control Board's 2009 Recycled Water Policy required the development of Salt Nutrient Management Plans for groundwater basins in California. This plan was developed in 2015 for the Paso Robles Subbasin (RMC, 2015).
- There are multiple sites that are monitoring groundwater quality as part of investigation or compliance monitoring programs through the Central Coast Regional Water Quality Control Board.

Figure 3-11 shows the location of wells in the State's GAMA Geotracker database. The USGS monitors groundwater quality at two monitoring wells in the Subbasin. Only one sample has been collected (in 2017) from each of the wells. The monitoring frequency is unknown.

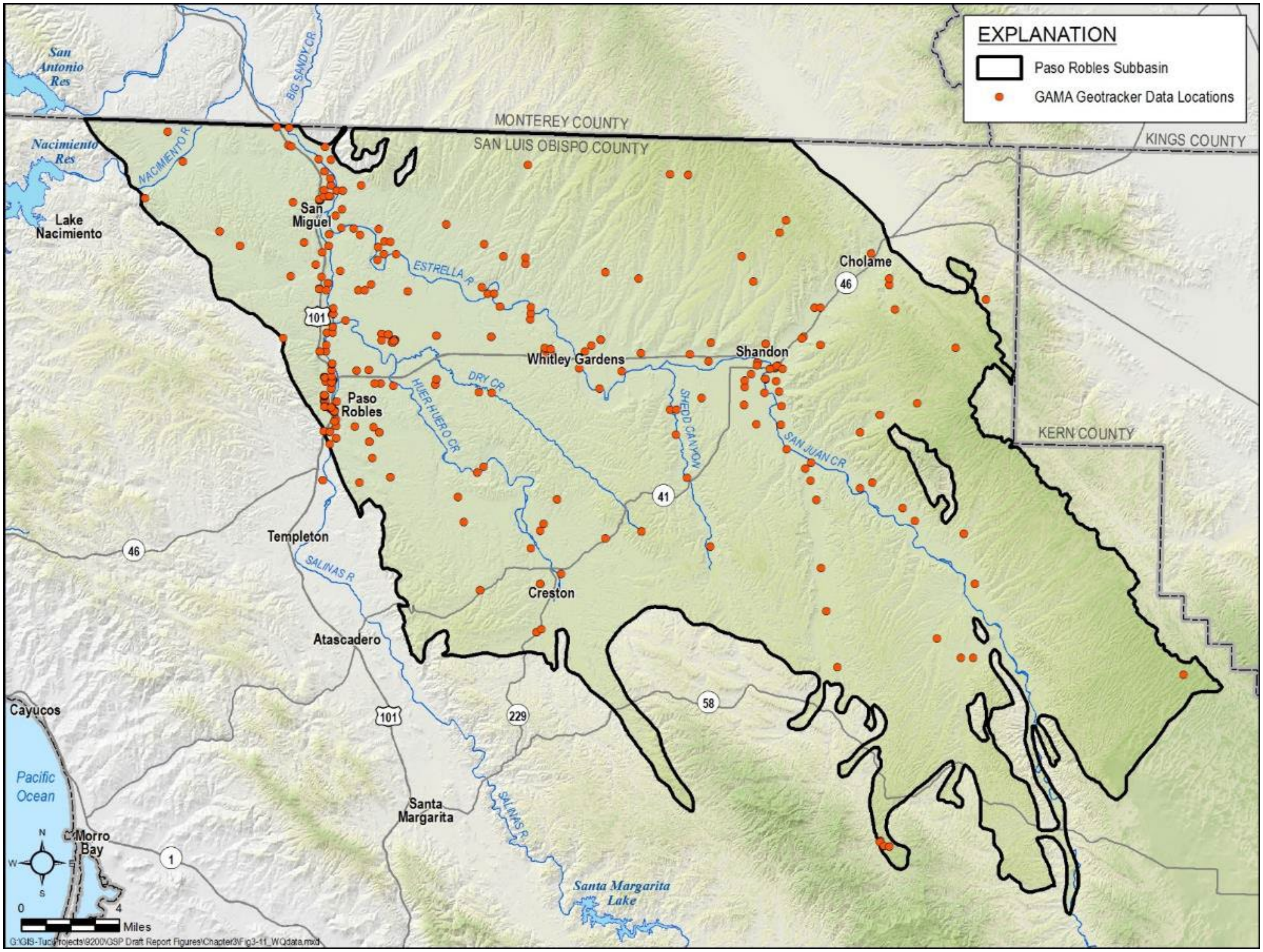


Figure 3-11. Groundwater Quality Monitoring Well Locations

3.6.3 Surface Water Monitoring

Stream gauges have historically been maintained and monitored by the USGS and the SLOFCWCD. Data are stored electronically in National Water Information System (NWIS) files and are retrievable from the USGS Water Resources Internet site.

The SLOFCWCD also stores electronic stream gauge data. There are various SLOFCWCD stream gauges surrounding the Subbasin, but no SLOFCWCD stream gauges lie within the Subbasin. Of the USGS stream gauges with historical data, only three gauges are currently active in the Subbasin:

- Salinas River above the City of Paso Robles,
- Estrella River near Estrella,
- Nacimiento River below the Nacimiento Dam near Bradley

A fourth stream gauge, the Salinas River gauge, lies at the base of Santa Margarita dam upstream of the Subbasin. This gauge is important for this GSP because it provides estimates of the streamflow released towards the Subbasin. Figure 3-12 shows the locations of the three active stream gauges in the Subbasin and the one SLOFCWCD gauge upstream of the Subbasin. These three stream gauges in the study area report daily average stream flows.

3.6.4 Climate Monitoring

Climate data are measured at seven stations located in the Subbasin. Data from these seven stations were obtained from the SLOFCWCD. The locations of the stations are shown on Figure 3-13. A discussion of climate will be provided in another chapter of the GSP (Chapter 6 – Water Budgets).

Figure 3-13 displays the long-term precipitation record at the Paso Robles station.

The Paso Robles precipitation station measures daily temperatures in addition to rainfall.
The California Irrigation Management Information System (CIMIS) station number 163 in Atascadero measures a number of climatic factors that allow a calculation of daily reference evapotranspiration (ETo) for the area. Table 3-2 provides a summary of average monthly rainfall, temperature, and reference ETo for the Basin.

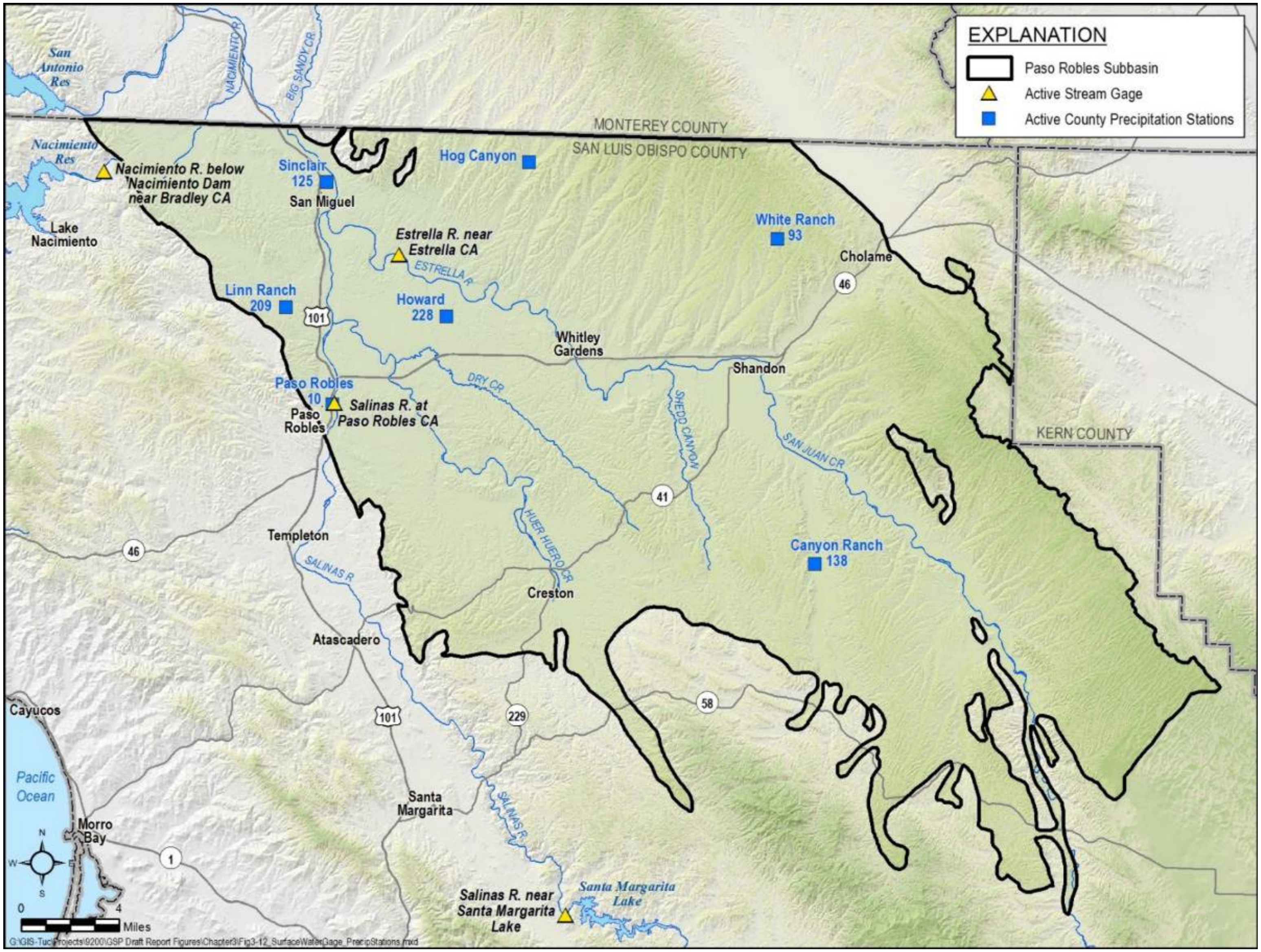


Figure 3-12. Surface Water Gauging and Precipitation Stations

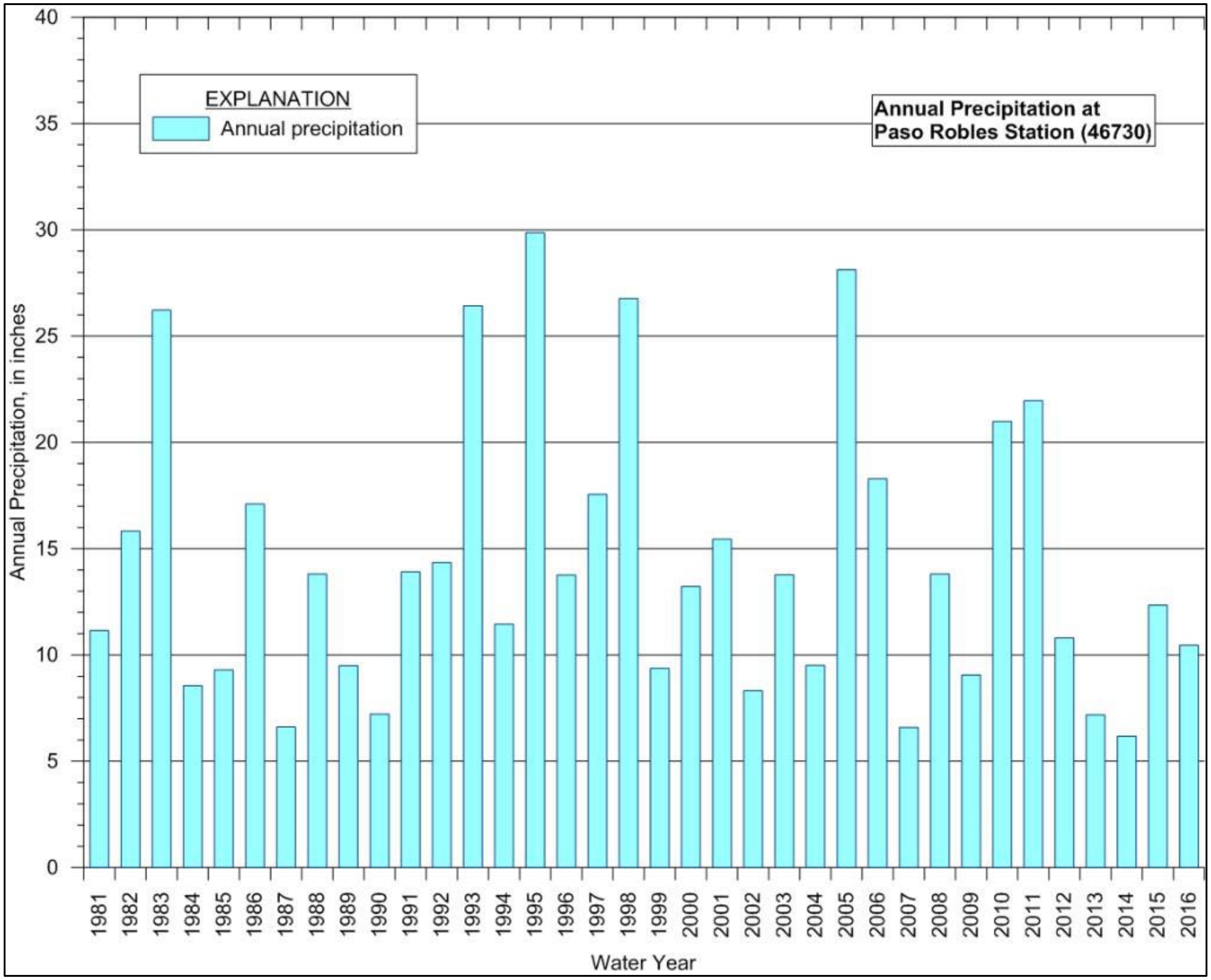


Figure 3-13. Annual Precipitation at the Paso Robles Station

Table 3-2. Average Monthly Climate Summary

Month	Average Rainfall (inches)[a]	Average ET_o (inches)[b]	Average Daily Temperature (F°)[c]
January	3.4	1.7	46.7
February	3.1	2.1	49.6
March	2.6	3.6	54.0
April	0.8	4.7	57.4
May	0.4	6.5	61.5
June	0.0	7.5	68.6
July	0.1	8.0	70.8
August	0.0	7.2	70.5
September	0.2	5.6	68.4
October	0.9	3.7	60.9
November	1.0	2.3	51.2
December	2.4	1.4	45.2
Monthly Average	1.2	4.5	-
Average Calendar Year [d]	15.0	54.5	58.7

[a] Average of monthly precipitation at Paso Robles Station 046730 for Jan 1989-Dec 2017 (NOAA NCDC).

[b] ETo = Average of monthly evapotranspiration at Paso Robles Station PR-1 for Jan 1989 through Dec 2017. PR-1 is operated by Western Weather Group. Data prior to Jan 2010 was compiled by Geoscience Support Services, Inc.

[c] Average daily temperature at Paso Robles Station (PR-1) for Jan 2010 through Dec 2017.

[d] Average Calendar Year is not the sum of monthly averages, but rather a historical annual average over the period of record.

3.6.4.1 Incorporating Existing Monitoring Programs into the GSP

The SLOFCWCD, the City of Paso Robles, and the City of San Miguel's monitoring programs provide a foundation of groundwater level data to develop the GSP. Chapter 7 of this GSP describes the long-term GSP Monitoring Program, including its relationship to the existing SLOFCWCD program.

The current water quality monitoring program for the production wells will be incorporated into this GSP to demonstrate that groundwater quality undesirable results do not occur based on data from a representative number of production wells. The existing stream gauges will also be incorporated into this GSP monitoring plan.

3.6.4.2 Limits to Operational Flexibility

The existing monitoring programs are not anticipated to limit the operational flexibility of this GSP.

3.7 Existing Management Plans

There are multiple groundwater and water management plans that cover the Subbasin. These plans are described in the following subsections, along with brief descriptions of how they relate to the management of current water supply, projected water supplies, and land use.

3.7.1 Groundwater Management Plan (2011)

The City of Paso Robles, having authority to manage the groundwater resources within their city limits, and SLOFCWCD, having authority to prepare a groundwater management plan within the unincorporated portions of the Paso Basin within San Luis Obispo County, developed a Groundwater Management Plan (GMP) (GEI, 2011) that is compliant with AB3030 and SB1938 legislation. The plan covered both the Atascadero and Paso Robles Subbasins but excluded the area between the San Juan and San Andreas Faults.

The GMP included a list of 73 groundwater management activities that could be implemented in the Subbasin. The groundwater management activities were grouped into various categories including stakeholder involvement, monitoring and data collection, resource protection, sustainability, and water management. The plan included an implementation schedule and a requirement for periodic updates.

3.7.2 San Luis Obispo County Master Water Report (2017)

The Master Water Report (MWR) (Carollo, 2017) is a compilation of the current and future water resource management activities being undertaken by various entities within San Luis Obispo County and is organized by Water Planning Areas (WPA). The MWR explores how these activities interrelate, analyzes current and future supplies and demands, identifies future water management strategies and ways to optimize existing strategies, and documents the role of the MWR in supporting other water resource planning efforts. The MWR evaluates and compares the available water supplies to the water demands for the different water planning areas. This was accomplished by reviewing or developing the following:

- Current water supplies and demands based on available information
- Forecast water demands and water supplies available in the future under current land use policies and designations
- Criteria under which there is a shortfall when looking at supplies versus demands

- Criteria for analyzing potential water resource management strategies, projects, programs, or policies
- Potential water resource management strategies, projects, programs, or policies to resolve potential supply deficiencies.

3.7.3 San Luis Obispo County Region Integrated Regional Water Management Plan (2014)

The San Luis Obispo County Integrated Regional Water Management Plan (IRWMP) was initially developed and adopted by the SLOFCWCD in 2005 (GEI Consultants, 2005), and has been updated several times. The 2014 IRWMP (San Luis Obispo County, 2014) included goals and objectives that provide the basis for decision-making and are used to evaluate project benefits. The goals and objectives reflect input from interested stakeholders on the region's major water resources issues.

The SLOFCWCD, in cooperation with the SLOFCWCD's Water Resources Advisory Committee (WRAC), prepared the IRWMP to align the region's water resources management planning efforts with the State's planning efforts. The IRWMP is used to support the Region's water resource management planning and submittal of grant applications to fund these efforts. The IRWMP integrated 19 different water management strategies that have or will have a role in protecting the region's water supply reliability, water quality, ecosystems, groundwater, and flood management objectives. The integration of these strategies resulted in a list of action items (projects, programs, and studies) needed to implement the IRWMP. The IRWMP is currently being updated, with a DWR submittal target date of October 2019.

3.7.4 Salt and Nutrient Management Plan for the Paso Robles Groundwater Basin (2015)

The City of Paso Robles, along with the City of Atascadero, San Miguel CSD, Templeton CSD, Heritage Ranch CSD, County of San Luis Obispo, and Camp Roberts, prepared a Salt and Nutrient Management Plan (SNMP) for the Subbasin in accordance with the State's 2009 Recycled Water Policy (RMC, 2015).

In the SNMP, baseline groundwater quality conditions were established as a framework under which salt and nutrient issues can be managed, and to streamline the permitting process of new recycled water projects while meeting water quality objectives and protecting beneficial uses. The SNMP will eventually be used by the Central Coast Regional Water Quality Control Board (CCRWQCB) to aid in the management of basin groundwater quality.

3.7.5 City of Paso Robles Urban Water Management Plan (2016)

The Urban Water Management Plan (UWMP) (Todd Groundwater, 2016) describes the City's current and future water demands, identifies current water supply sources, and assesses supply reliability for the City. The UWMP describes the City's reliance on groundwater and its support for efforts to mitigate or avoid conditions of overdraft by developing additional sources. The UWMP provides a forecast of future growth, water demand and water sources for the City through 2035. These sources include water conservation, surface water from Lake Nacimiento, and the use of recycled water for irrigation. The UWMP identifies beneficial impacts to groundwater quality through the use of these sources.

3.8 Existing Groundwater Regulatory Programs

There are several water-related regulatory programs in the Subbasin.

3.8.1 Salinas River Live Stream Agreement (SWRCB, 1972)

In 1972, the State Water Resources Control Board (SWRCB) issued a decision regarding the storage of water at Salinas Reservoir in order to protect vested downstream rights. The decision presumed that downstream rights would be met if a visible surface flow (i.e., a "live" stream) existed in the Salinas River between the Salinas Reservoir and the confluence with the Nacimiento River. If there was no live stream, then total daily inflow to the Salinas Reservoir was to be released to pass downstream.

The Live Stream Agreement was first implemented in 1972 using flow at the stream gauge on the Salinas River near the City of Paso Robles as an indicator of "live" stream conditions. In 1976, a set of six observation points was established to determine "visible surface flow". A seventh observation point, located immediately upstream of the Graves Creek confluence, was added in 1978. It is this seventh point that has always been the first point to go dry, triggering the live stream release period.

3.8.2 Groundwater Export Ordinance (2015)

In 2015, the County of San Luis Obispo passed an Exportation of Groundwater ordinance that requires a permit for the export of groundwater out of a groundwater basin or out of the County. An export permit is only approved if the Department of Public Works Director or his/her designee finds that moving the water would not have any adverse impacts to groundwater resources, such as causing aquifer levels to drop, disrupting the flow of neighboring wells or resulting in seawater intrusion. Export permits are only valid for one year.

3.8.3 County of San Luis Obispo Water Demand Offset Ordinance (2015)

In October 2015, the Board of Supervisors adopted the Ordinance and Resolution 2015-288. The Ordinance limited new or expanded irrigated agriculture in areas within the Subbasin except by offset of existing irrigated agriculture either on the same property or on a different property in the Subbasin. The Ordinance also identified areas of severe decline in groundwater elevation and properties overlying these areas would be further restricted from planting new or expanded irrigated agriculture except for those converting irrigated agriculture on the same property into a different crop type. Resolution 2015-288 established the Countywide Water Conservation Program (CWWCP). The CWWCP helps to substantially reduce increases in groundwater extraction in areas that have been certified Level of Severity (LOS) III.

In June 2019, the Board of Supervisors directed the County of San Luis Obispo Department of Planning and Building to develop recommendations for extending the Ordinance such that there is no gap between the expiration of the Ordinance and any pumping restrictions or controls that may be implemented as part of this GSP. The Department of Planning and Building is developing a two-phase extension. It is anticipated that the first phase will be presented to the Board of Supervisors in November, 2019, and will include a time extension as well as additions to the Ordinance that do not trigger significant review under CEQA. The second phase will likely be presented to the Board of Supervisors sometime in 2020, and will include Ordinance additions that may trigger more significant CEQA review.

3.8.4 Agricultural Order (RWQCB, 2017)

In 2017 the CCRWQCB issued Agricultural Order No. R3-2017-0002, a Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands (Agricultural Order). The permit requires that growers implement practices to reduce nitrate leaching into groundwater and improve surface receiving water quality. Specific requirements for individual growers are structured into three tiers based on the relative risk their operations pose to water quality.

Growers must enroll, pay fees, and meet various monitoring and reporting requirements according to the tier to which they are assigned. All growers are required to implement groundwater monitoring, either individually or as part of a cooperative regional monitoring program. Growers electing to implement individual monitoring (i.e., not participating in the regional monitoring program implemented by the Central Coast Groundwater Coalition or CCGC) are required to test all on-farm domestic wells and the primary irrigation supply well for nitrate or nitrate plus nitrite, and general minerals, including, but not limited to, total dissolved solids (TDS), sodium, chloride and sulfate.

3.8.5 Water Quality Control Plan for the Central Coast Basins (SWRCB, 2017)

The Water Quality Control Plan for the Central Coastal Basin (Basin Plan) was most recently updated in September 2017. The objective of the Basin Plan is to outline how the quality of the surface water and groundwater in the Central Coast Region should be managed to provide the highest water quality reasonably possible.

The Basin Plan lists beneficial users, describes the water quality which must be maintained to allow those uses, provides an implementation plan, details SWRCB and CCRWQCB plans and policies to protect water quality and a statewide surveillance and monitoring program as well as regional surveillance and monitoring programs.

Present and potential future beneficial uses for inland waters in the Basin are: surface water and groundwater as municipal supply (water for community, military or individual water supplies); agricultural; groundwater recharge; recreational water contact and non-contact; sport fishing; warm fresh water habitat; wildlife habitat; rare, threatened or endangered species; and, spawning, reproduction, and/or early development of fish.

Water Quality Objectives for both groundwater (drinking water and irrigation) and surface water are provided in the Basin Plan.

Total Maximum Daily Load (TMDLs) requirements have been developed for Fecal Indicator Bacteria and Alternative Implementation Program for the Cholame Creek Watershed and Lower San Antonio River Subwatershed in San Luis Obispo and Monterey Counties. A TMDL for boron in the Estrella River Subwatershed, San Luis Obispo and Monterey Counties has also been developed. A TDML for to the Upper Salinas River has not been developed.

The Basin Plan identified actions to be implemented in the Basin, including:

- Dischargers along the Salinas River should remain as separate treatment facilities with land disposal to evaporation/percolation systems and land application (irrigation) systems where possible. Disposal should be managed to provide maximum nitrogen reduction (e.g., through crop irrigation or wet and dry cycle percolation).
- The City of Paso Robles owns and operates a nominal 5 mgd secondary wastewater treatment plant. Treated wastewater is discharged to the Salinas River channel. Beneficial use of reclaimed water should be investigated and implemented, if feasible.
- The City of Paso Robles also owns and operates the wastewater facility serving the California Youth Authority and Paso Robles Airport. Wastewater from the California Youth Authority is currently treated at the City of Paso Robles' WWTP. This wastewater is part of the Recycled Water project that is currently in construction.

3.8.6 Requirements for New Wells

In October, 2017, Governor Brown signed Senate Bill (SB) 252 which became effective on January 1, 2018. SB 252 requires well permitting authorities to request certain information, such as depth of the proposed well, identification of existing wells on the property, the planned category of water use and the estimated cumulative extraction volume before January 1, 2020, from a well permit applicant to construct a new well within a critically overdrafted basin and to post the information provided. The law is subject to certain exceptions, such as the applicant would be a *de minimis* extractor, the proposed well is a replacement well that would not result in an increase in extraction, or the proposed well is located within an area subject to a GSP. The requirements set forth in SB 252 become inoperative on January 30, 2020.

3.8.7 Title 22 Drinking Water Program (SWRCB)

The SWRCB Division of Drinking Water (DDW) regulates public water systems in the State to ensure the delivery of safe drinking water to the public. A public water system is defined as a system for the provision of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out of the year. Private domestic wells, wells associated with drinking water systems with less than 15 residential service connections, industrial and irrigation wells are not regulated by the DDW. County of SLO Environmental Health has primacy and regulates smaller community systems less than 200 connections.

The SWRCB-DDW enforces the monitoring requirements established in Title 22 of the California Code of Regulations (CCR) for public water system wells, and all the data collected must be reported to the DDW. Title 22 also designates the regulatory limits (known as maximum contaminant levels [MCLs]) for various waterborne contaminants, including volatile organic compounds, non-volatile synthetic organic compounds, inorganic chemicals, radionuclides, disinfection byproducts, general physical constituents, and other parameters.

3.9 Monitoring and Management Programs with GSP

3.9.1 Incorporation into GSP

Information in these plans have been incorporated into this GSP and used during the preparation of Sustainability Goals, when setting Minimum Thresholds and Measurable Objectives, and were considered during development of Projects and Management Actions. This GSP specifically incorporates the following plans and programs, described above:

- The Salt and Nutrient Management Plan for the Paso Robles Groundwater Basin is incorporated into the existing conditions and the Sustainable Management Criteria.

- The County of San Luis Obispo Water Demand Offset Ordinance is acknowledged as an important tool for controlling new land uses dependent on groundwater until groundwater management controls can be finalized as part of GSP implementation.
- The Salinas River Live Stream Agreement requirements are incorporated into the Sustainable Management Criteria and sustainability projects as a restriction on the Salinas Dam operations and impacts to the Salinas River.
- The Groundwater Export Ordinance is incorporated as a limitation on groundwater use in the Projects and Management Actions.
- Agricultural Order (CCRWQCB, 2017) is incorporated into the monitoring plan and Sustainable Management Criteria as monitoring locations for agricultural water quality.

3.9.2 Limits to Operational Flexibility

Some of the existing management plans and ordinances will limit operational flexibility. These limits to operational flexibility have already been incorporated into the sustainability projects and programs included in this GSP. Examples of limits on operational flexibility include:

- The Groundwater Export Ordinance prevents export of water out of the Subbasin. This is likely not a significant limitation because exporting water out of the Subbasin hinders sustainability.

- The Basin Plan and the Title 22 Drinking Water Program restrict the quality of water that can be recharged into the Subbasin.

3.9.3 Conjunctive Use Programs

There are no active conjunctive use programs currently operating within the Subbasin.

3.10 Land Use Plans

The County of San Luis Obispo, the City of Paso Robles and Camp Roberts have land use authority. The GSAs do not have land use authority by virtue of being GSAs. Land use is an important factor in water management as described below. The following sections provide a general description of these land use plans and how implementation may affect groundwater. Per statute, when there is a substantial amendment to a city or county's general plan, the planning agency must review and consider the GSP.

3.10.1 City of Paso Robles General Plan (2011)

The City of Paso Robles General Plan is the fundamental land use policy document of the City of Paso Robles. The City's General Plan was developed to address several areas within the City's

Planning Area; which includes areas defined as City Limits, the Sphere of Influence, and the Planning Impact Area. The City's General Plan defines the framework by which the City's physical and economic resources are to be managed and used in the future. This City General Plan has a planning horizon of 2025.

Present City policy recommends that residential growth be managed toward a target population of 44,000 in 2025. Most growth is anticipated to occur within the existing City limits where services and public facilities are available. Additional growth is likely to occur in the urban area east of the Salinas River, but minor annexations to the City would be necessary in order to fully develop at the densities recommended in the City's General Plan.

3.10.2 San Luis Obispo County General Plan (2014)

The County of San Luis Obispo General Plan contains three pertinent elements that are related to land use and water supply. Pertinent sections include:

- Land Use Element
- Agricultural Element
- Inland Area Plans Element

The County General Plan also contains programs which are specific, non-mandatory actions or policies recommended by the Land Use and Circulation Element (LUCE) to achieve community or area wide objectives. Implementing each LUCE program is the responsibility of the County or other public agency that is identified in the program. Because programs are recommended actions rather than mandatory requirements, implementation of any program by the County should be based on consideration of community needs and substantial community support for the program and its related cost.

The LUCE, adopted in 2014, consolidates and reorganizes the former Adelaida, El Pomar-Estrella, Las Pilitas, Nacimiento, and Salinas River planning areas, and the northern portions of the Los Padres and Shandon-Carrizo planning areas, into a single watershed-based planning area called the North County planning area. The Planning Area does not conform to the Subbasin boundaries but does provide a general representation of the land use in the area.

Article 9 and Article 10 of the LUCE incorporates a number of community plans that were developed for the communities in the Subbasin. These include the Creston Village Plan, the North County Villages Plan, the San Miguel Community Plan, and the Shandon Community Plan.

The County General Plan identifies land use types and acres within the North County planning area. The data from the 2014 update are summarized on Table 3-3.

Table 3-3. Land Use Acreage

Land Use Category	Adelaida	El Pomar-Estrella	Las Pilitas	Los Padres North	Nacimiento	Salinas River	Shandon[2]	Total
Agriculture	152,715	104,762	21,270	11,613	36,049	52,954	348,569	**727,932**
Rural Lands	26,711	14,613	3,528	21,133	31,334	7,945	3,941	**109,205**
Recreation	277	0	460	0	2,725	664	0	**4,126**
Open Space	1,352	0	3,520	74,943	9,954	13,630	1,421	**104,820**
Residential Rural	77	11,816	625	0	2,363	5,530	170	**20,581**
Residential Suburban	0	363	0	0	0	82	0	**445**
Residential Single Family	0	0	0	0	0	22	0	**22**
Residential Multi-Family	0	0	0	0	0	0	0	**0**
Commercial Retail	0	0	8	0	0	5	3	**16**
Commercial Service	0	0	0	0	0	87	3	**90**
Industrial	0	0	0	0	0	20	0	**20**
Public Facilities	26,146	2	0	0	0	86	0	**26,234**
Dalidio Ranch	0	0	0	0	0	0	0	**0**
Total	**207,278**	**131,556**	**29,411**	**107,689**	**82,425**	**81,025**	**354,107**	**993,491**

[1]Acreage quantities are current as of the last major update to each of the former North County area plans (refer to Table 1-1).
[2]Northern half of the former Shandon-Carrizo planning area.

Projected growth in the planning subareas in the Subbasin as defined in the County General Plan includes:

- The City of Paso Robles population in 1995 was estimated to be 21,539, or 15.9 percent above the population of 18,138 in 1990, increasing at an average annual growth rate of 3.1 percent.
- Population in the Adelaida sub-area has been steadily increasing, but slower than the county as a whole. This pattern will likely continue, declining slightly as the countywide growth rate also declines.
- The Las Pilitas sub-area's present population is estimated to be 1,101. Since the sub- area contains no urban areas, a large population increase is not expected. Population growth in the Las Pilitas sub-area has been slightly less than 2 percent per year and is expected to slowly decline as the countywide growth rate also declines.

The SLO County Planning Department estimated potential water demands from rural residential areas in the County. They assumed that a reasonable ultimate build-out equates to development of 75 percent of all possible parcels currently zoned for rural residential areas. This would result in a rural residential demand of just over 37,000 AFY. This estimate includes small community water systems. If ultimate build-out occurred by 2025, the annual growth rate would be an unrealistic 12.8 percent. In order to determine the demand in 2025, a growth rate of 2.3 percent per year was assumed. As a result, the County estimated rural residential pumping in 2025 will be 16,504 AF, which is 44 percent of ultimate build-out.

An overarching assumption in this plan is that any future increases in groundwater use within the Subbasin will be offset by equal reductions in groundwater use in other parts of the Subbasin, or in other words, groundwater neutral through implementation of the GSP.

In addition, in 1990, the County created the Resource Management System (RMS) with the purpose of establishing a process whereby development could be sustained through planned resource management. The RMS focuses on collecting data, identifying issues and recommending solutions with respect to a number of resources, including water and sewage disposal. As part of the RMS, the County Planning and Building Department produces Biannual Resource Summary Reports (RSRs) and, under certain circumstances, Resource Capacity Studies (RCSs). When a resource deficiency becomes apparent, efforts are made to determine how the resource capacity might be expanded, where conservation measures could be introduced to extend the availability of the unused capacity, or where development should be limited or redirected to areas with remaining resource capacity.

The RMS uses resource-related data and analyses to classify resource deficiencies using three alert levels known as levels of severity (LOS). The criteria for each LOS in the context of water supply are as follows:

- LOS I is reached when water demand projected over 20 years equals or exceeds the estimated dependable supply.
- LOS II occurs when water demand projected over 15-20 years (or other lead time determined by an RCS) equals or exceeds the estimated dependable supply.
- LOS III is reached when water demand projected over 15 years (or other lead time determined by an RCS) equals or exceeds the estimated dependable supply or the time required to correct the problem is longer than the time available before the dependable supply is reached.

In 2007, the County Board of Supervisors directed staff to prepare an RCS for the water supply in the Paso Basin. The RCS addresses the state of the Paso Basin based on work already completed, which included:

- Paso Robles Groundwater Basin Study (Fugro, 2002)

- Paso Robles Groundwater Basin Study Phase II - Numerical Model Development, Calibration, and Application (Fugro, 2005)
- Evaluation of Paso Robles Groundwater Basin Pumping- Water Year 2006 (Todd, 2009)
- Paso Robles Groundwater Basin Water Balance Review and Update (Fugro, 2010)

These studies have calculated the water use by major water use sectors (agriculture, rural land uses, small commercial uses, municipal systems, and small community systems). These studies show that outflows exceed inflows on an average annual basis.

In February 2011, the County Board of Supervisors adopted the RCS, which recommended an LOS III for the Paso Basin and an LOS I for the Atascadero Basin. The RCS also recommended actions to include:

- Water conservation measures that will lead to more efficient water use.
- Land use controls that will reduce conflicts over the limited groundwater resource.

The RCS recognized various decision-making constraints that complicated potential actions by the County at that time, such as the limited regulatory role over water use throughout the entire basin. However, SGMA "…declares that it is vital that there be close coordination and consultation between California's water supply or management agencies and California's land use approval agencies to ensure that proper water supply and management planning occurs to accommodate projects that will result in increased demands on water supplies or impact water resource management." (Government Code 653525). Therefore it will be important to coordinate the County's land use authority with the planning and actions necessary to achieve the sustainability goals identified in local GSPs.

3.10.3 Camp Roberts Joint Land Use Study

Located north of the City of Paso Robles and spanning nearly 43,000 acres, Camp Roberts is one of the state's three main training bases for the California National Guard and trains more than 15,000 guardsmen in a typical year. Most of the base is in San Luis Obispo County, within the Subbasin, with the remainder in Monterey County. The Camp Roberts Joint Land Use Study was developed to improve communication between the installation and local communities about land use regulation and conservation decisions as well as natural resource management issues (Matrix Design Group, 2013).

The plan acknowledges groundwater supply planning must be coordinated to ensure viable water resources: "Groundwater supply is of great concern for San Luis Obispo and Monterey Counties. The increases in well drilling for development—residential, commercial, and agriculture—causes more concern in maintaining adequate levels of the Paso Robles Groundwater Basin.

Camp Roberts is a minimal user of the Basin, but development must be strategically planned to avoid unnecessary draws on the Basin."

The plan outlines the following monitoring activities related to water:

- Monitor surface water quality on Camp Roberts and throughout the watershed. Focus studies on the relationship between surface water and groundwater resources. Camp Roberts should allow collection of water samples on Camp Roberts by other agencies, if needed.

- Coordinate with local, regional and state water supply providers and permitting agencies to ensure continued availability of adequate potable water supplies. Identify primary users and anticipated needs through a future time period. Develop plans to sustain and manage water resources more efficiently and update plans regularly.

3.10.4 Land Use Plans Outside of Basin

The stakeholders submitting this GSP have not included information regarding the implementation of land use plans outside the Subbasin, as these adjacent subbasins are also required to implement SGMA and their GSPs will require them to achieve sustainable groundwater management.

4 HYDROGEOLOGIC CONCEPTUAL MODEL

This chapter describes the hydrogeologic conceptual model of the Paso Robles Subbasin, including the Subbasin boundaries, geologic formations and structures, and principal aquifer units. The chapter also summarizes general Subbasin water quality, the interaction between groundwater and surface water, and generalized groundwater recharge and discharge areas. This chapter draws upon previously published studies, primarily hydrogeologic and geologic investigations by Fugro Consultants Inc. completed for SLOFCWCD in 2002 and 2005. Subsequent groundwater model updates (GSSI 2014 and 2016), relied upon the original geologic interpretations (Fugro, 2002 and 2005), with the exception of the basin boundaries that are defined in accordance with Bulletin 118 (DWR 2003 and 2016a). The Hydrogeologic Conceptual Model presented in this chapter is a summary of aspects of the Subbasin hydrogeology that influence groundwater sustainability based on available information. The basin understanding will be adapted as hydrogeology is better understood in the future. Detailed information can be found in the original reports (Fugro, 2002 and 2005). This chapter, along with Chapter 3 – Description of Plan Area, sets the framework for subsequent chapters on groundwater conditions and water budgets.

4.1 Subbasin Topography and Boundaries

The Subbasin is a structural northwest-trending trough filled with sediments that have been folded and faulted by regional tectonics. The top of the Subbasin is the ground surface. The elevation of the Subbasin ranges from approximately 2,000 feet above mean sea level (msl) at the southeastern corner to approximately 600 feet above msl in the northwest where the Salinas River exits the Subbasin.

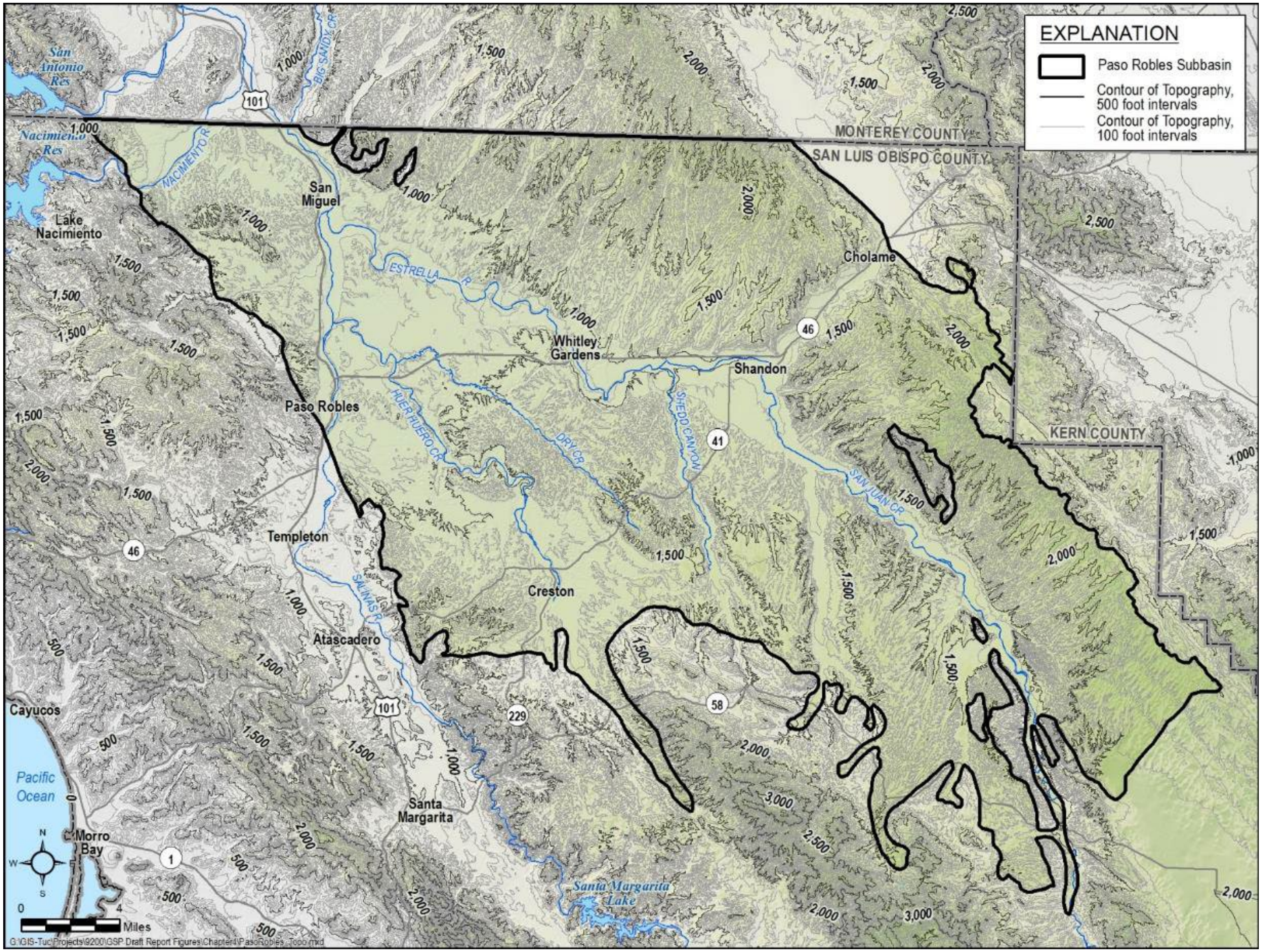


Figure 4-1. Paso Robles Subbasin Topography

Figure 4-1 shows the topography of the Subbasin using 100-foot contour intervals. The Subbasin is bounded by sediments with low permeability, sediments with poor groundwater quality, rock, and structural faults. In some areas the sediments of the Subbasin are continuous with adjacent subbasins.

The bottom of the Subbasin is generally defined as the base of the Paso Robles Formation, an irregular surface formed as the result of folding, faulting, and erosion (Fugro, 2002). The Subbasin bottom is not considered an absolute barrier to flow because some of the geologic units underlying the Paso Robles Formation produce sufficient quantities of water, but the water is generally of poor quality and therefore, is not considered part of the Subbasin. Figure 4-2 shows the lateral boundaries of the Subbasin and the approximate depth to the bottom of Paso Robles Formation in areas where it is saturated.

The Subbasin lateral boundaries are as follows:

- The western boundary of the Subbasin is defined by the contact between the sediments in the Subbasin and the sediments of the Santa Lucia Range. An additional section of the western boundary is defined by the San Marcos-Rinconada fault system which separates the Paso Robles Subbasin from the Atascadero Subbasin.
- The northern boundary of the Subbasin is defined by the county line between San Luis Obispo County and Monterey County. This boundary is not defined by a physical barrier to groundwater flow; water-bearing sediments are continuous with the Salinas Valley Upper Valley Subbasin in Monterey County.
- The eastern boundary of the Subbasin is defined by the contact between the sediments in the Subbasin and the sediments of the Temblor Range. The San Andreas Fault generally forms the northeastern Subbasin boundary, although the basin boundary was identified in the groundwater model as further west, in the area of the White Canyon/Red Hills/San Juan faults (Fugro, 2002).
- The southern boundary of the Subbasin is defined by the contact between the sediments in the Subbasin and the sediments of the La Panza Range. To the southeast, a watershed divide separates the Subbasin from the adjacent Carrizo Plain Basin; sedimentary layers are likely continuous across this divide.

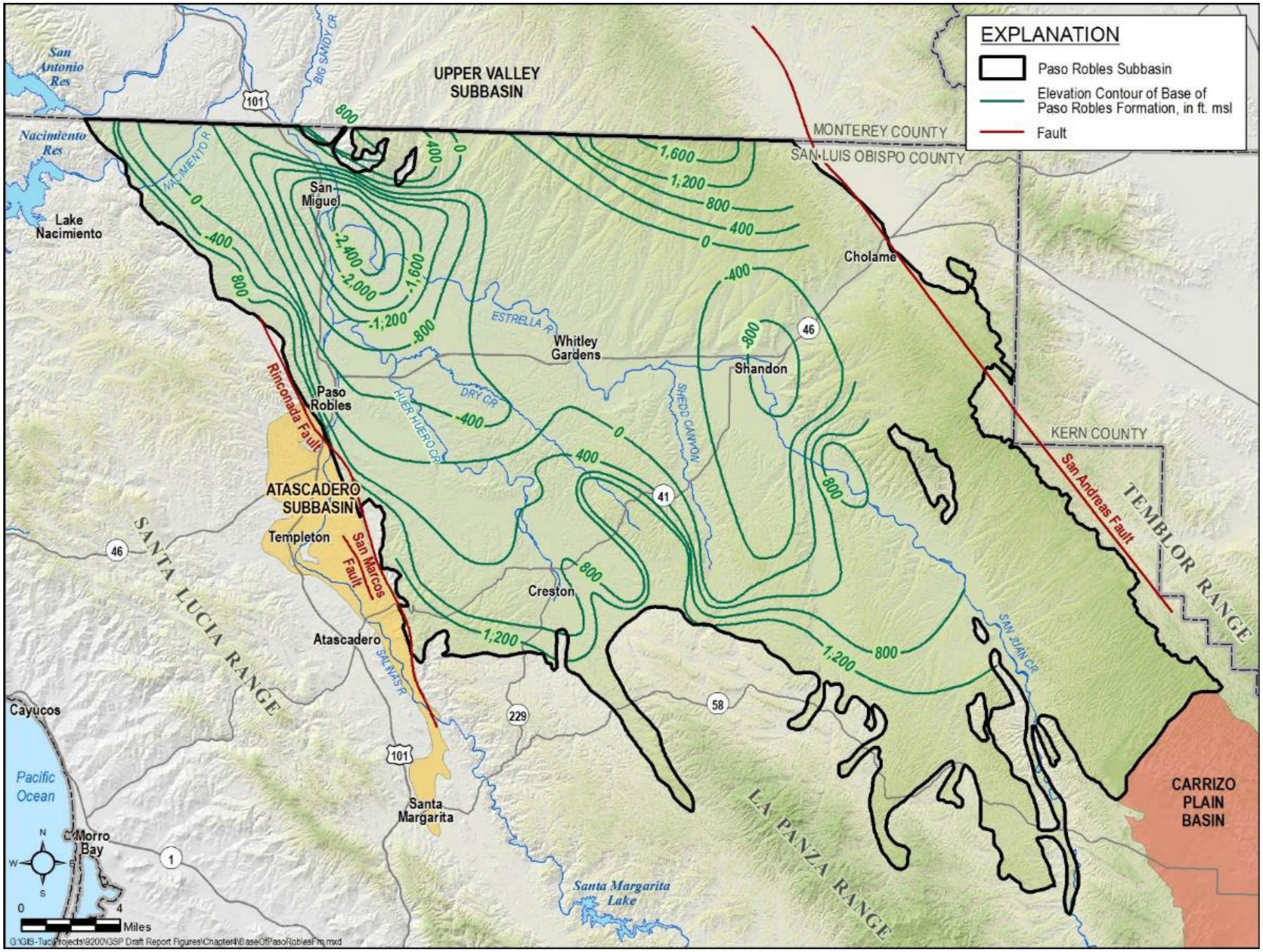


Figure 4-2. Base of Subbasin as Defined by the Base of the Paso Robles Formation

4.2 Soils Infiltration Potential

Saturated hydraulic conductivity of surficial soils is a good indicator of the soil's infiltration potential. Soil data from the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Soil Survey Geographic Database (SSURGO) (USDA NRCS, 2018) is shown by the four hydrologic groups on Figure 4-3. The soil hydrologic group is an assessment of soil infiltration rates that is determined by the water transmitting properties of the soil, which includes hydraulic conductivity and percentage of clays in the soil, relative to sands and gravels. The hydrologic soil group is "determined by the water transmitting soil layer with the lowest saturated hydraulic conductivity and depth to any layer that is more or less water impermeable or depth to a water table" (USDA NRCS, 2007).The groups are defined based on characteristics within 100 centimeters (40 inches) of the surface as:

- Group A – High Infiltration Rate: water is transmitted freely through the soil; soils typically less than 10 percent clay and more than 90 percent sand or gravel
- Group B – Moderate Infiltration Rate: water transmission through the soil is unimpeded; soils typically have between 10 and 20 percent clay and 50 to 90 percent sand
- Group C – Slow Infiltration Rate: water transmission through the soil is somewhat restricted; soils typically have between 20 and 40 percent clay and less than 50 percent sand
- Group D – Very Slow Infiltration Rate: water movement through the soil is restricted or very restricted; soil typically have greater than 40 percent clay, less than 50 percent sand

The hydrologic group of the soil generally correlates with the hydraulic conductivity of underlying geologic units, with lower soil hydraulic conductivity zones correlating to areas underlain by clayey portions of the Paso Robles Formation. The higher soil hydraulic conductivity zones correspond to areas underlain by alluvium or areas of coarser sediments within the Paso Robles Formation.

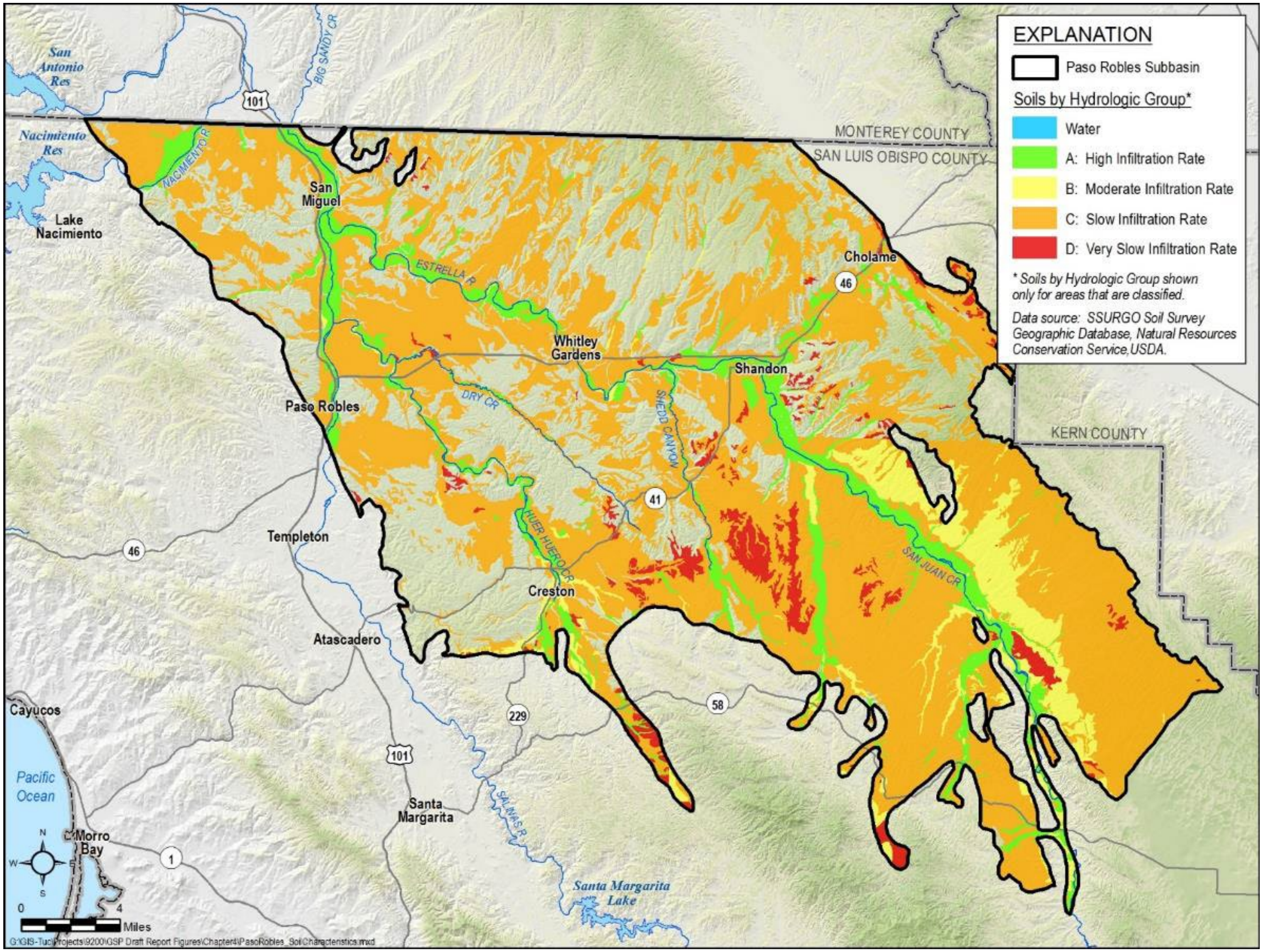


Figure 4-3. Paso Robles Subbasin Soil Characteristics

4.3 Regional Geology

This section provides a description of the geologic formations in the Subbasin. These descriptions are summarized from previously published reports by Fugro (2002 and 2005). Figure 4-4 shows the surficial geology and geologic structures of the Subbasin (County of SLO, 2007). Figure 4-5 provides the location of the geologic cross-sections shown on Figure 4-6 through Figure 4-10. The selected geologic cross-sections illustrate the relationship of the geologic formations that constitute the Subbasin and the geologic formations that underlie and surround the Subbasin based on lithologic data from wells. The cross-sections are from different reports so the format differs but the geologic units are consistent. Likewise, the cross sections were created from base maps that are not included in this report but the general geologic units and structures are the same as represented in Figure 4-4. Figure 4-6 through Figure 4-8 are from Fugro (2002). Figure 4-9 and Figure 4-10 are from Fugro (2005), which also label the various layers from the groundwater model that was developed at this time. The groundwater model was subsequently updated (GSSI, 2016) and is presented in Chapter 6.

4.3.1 Regional Geologic Structures

The base of the Subbasin is locally divided by two semi-parallel bedrock ridges: the San Miguel Dome and the Creston Anticlinorium (Figure 4-4). These two bedrock ridges are often not exposed at the ground surface, but are apparent in the east – west subsurface cross-sections, which show subsurface expression of the bedrock. Cross sections Figure 4-6 and Figure 4-8 show these areas where bedrock (generally consisting of the Pancho Rico Formation, the Santa Margarita Formation, or the Monterey Formation) is shallow or exposed at the surface. The shallow bedrock ridge does not appear to be present between San Miguel and Creston (Figure 4-7).

The deepest portion of the Subbasin is west of the San Miguel Dome and north of Paso Robles, with over 3,000 feet of sediments (Fugro, 2005). This deep trough extends through the Paso Robles area and shallows progressively to the south. As shown on Figure 4-6, the sediments are generally relatively thin on the order of a few hundred feet in the Creston area. East of the San Miguel Dome and near the community of Shandon the Paso Robles Formation is over 2,000 feet thick.

The faults within and along the borders of the Subbasin boundaries are shown on Figure 4-6 and are based on the basin boundaries defined by the State's Bulletin 118 – 2003 Update (DWR, 2003). The predominant fault near the western side of the Subbasin is the San Marcos-Rinconada fault system. The predominant fault near the eastern side of the Subbasin is the San Andreas Fault. Within the Subbasin and sub-parallel to the San Andreas Fault are the Red Hill, San Juan, and White Canyon faults, but it is unknown to what degree these faults are barriers to groundwater flow. These faults could create compartments in the sediments and limit the ability of groundwater to move within the Subbasin. The Paso Robles Formation is either not present or not saturated east of the San Juan fault system; there is very little well data in this portion of the Subbasin.

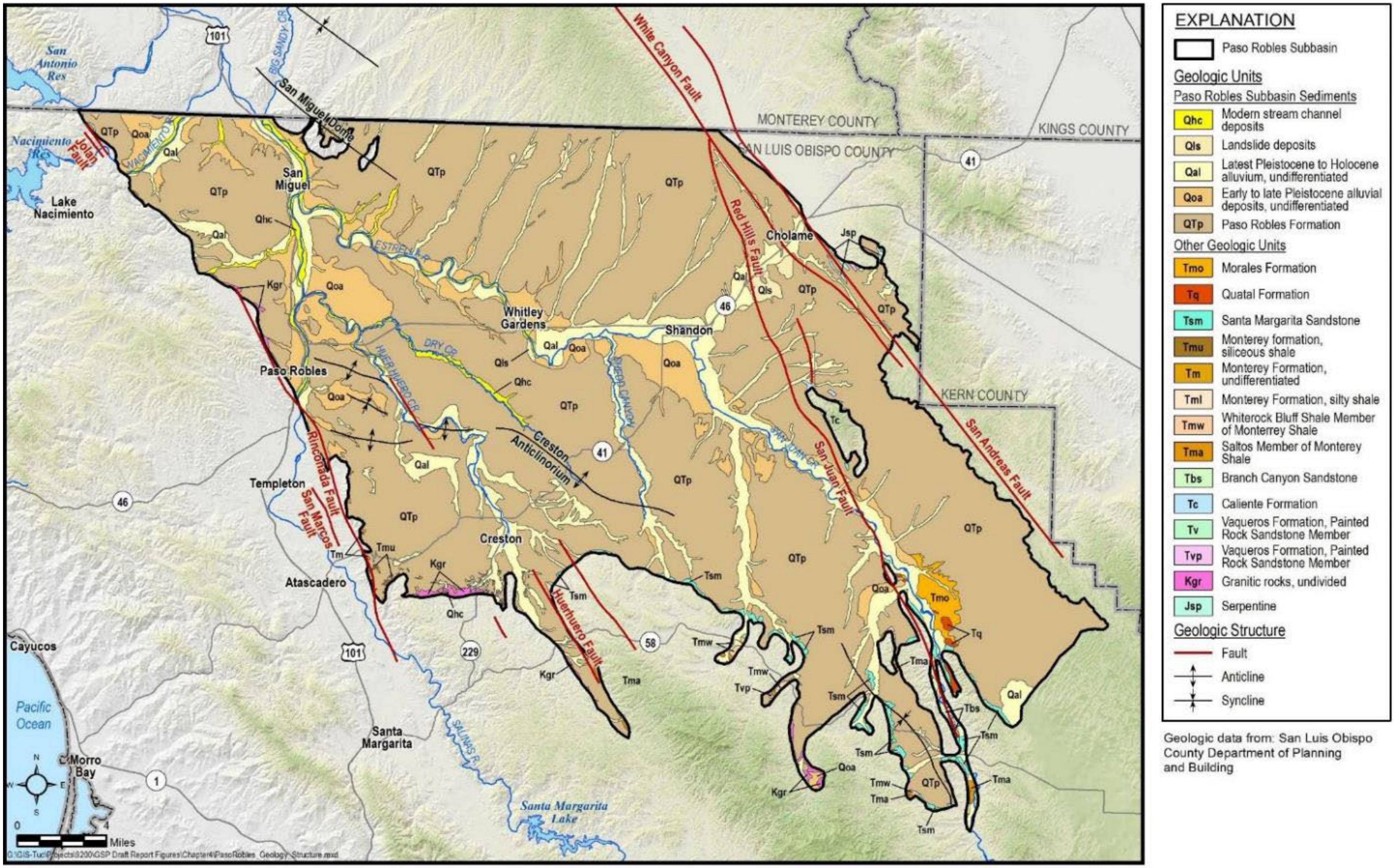


Figure 4-4. Surficial Geology and Geologic Structures

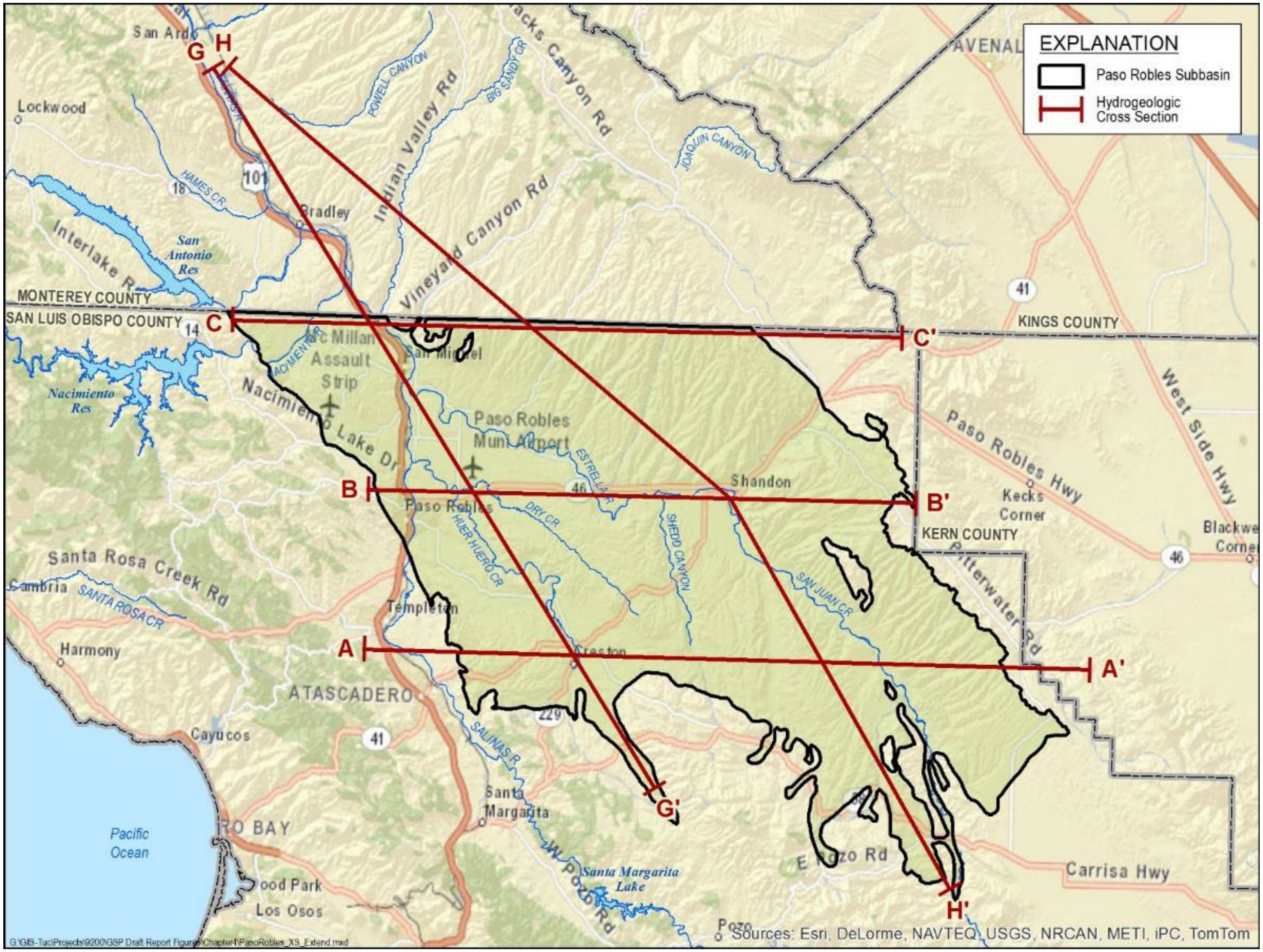
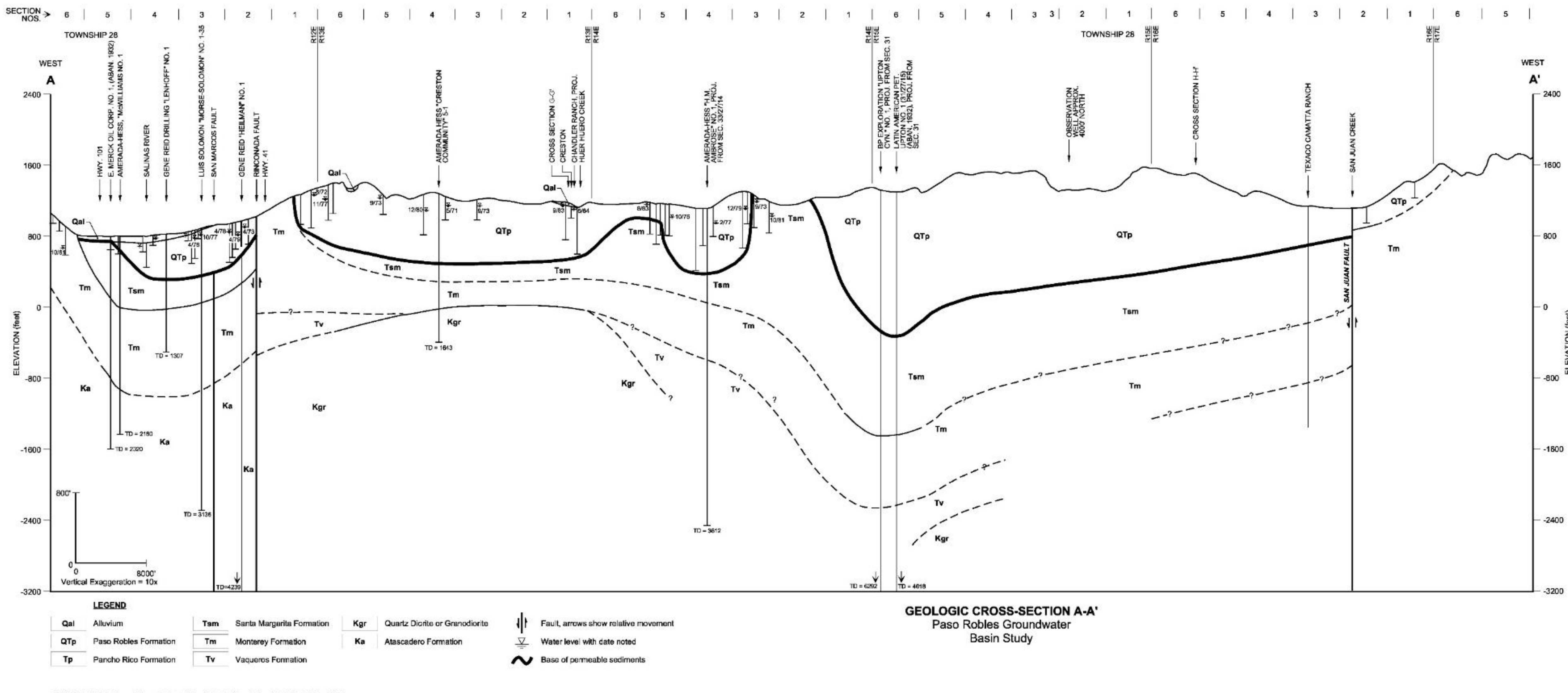
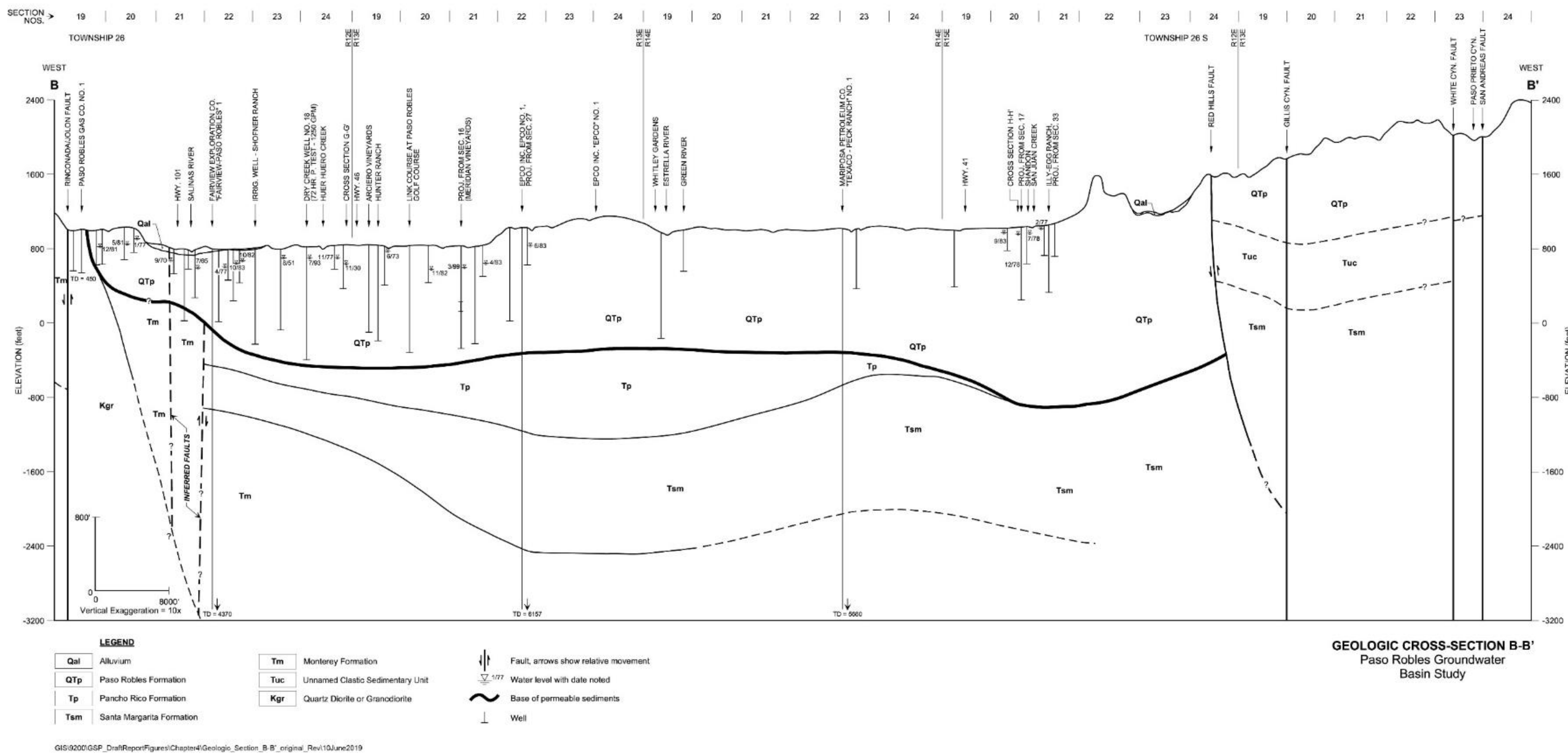


Figure 4-5. Cross Sections Locations



Source: Modified from Fugro (2002)

Figure 4-6. Geologic Section A-A'



Source: Modified from Fugro (2002)

Figure 4-7. Geologic Section B-B’

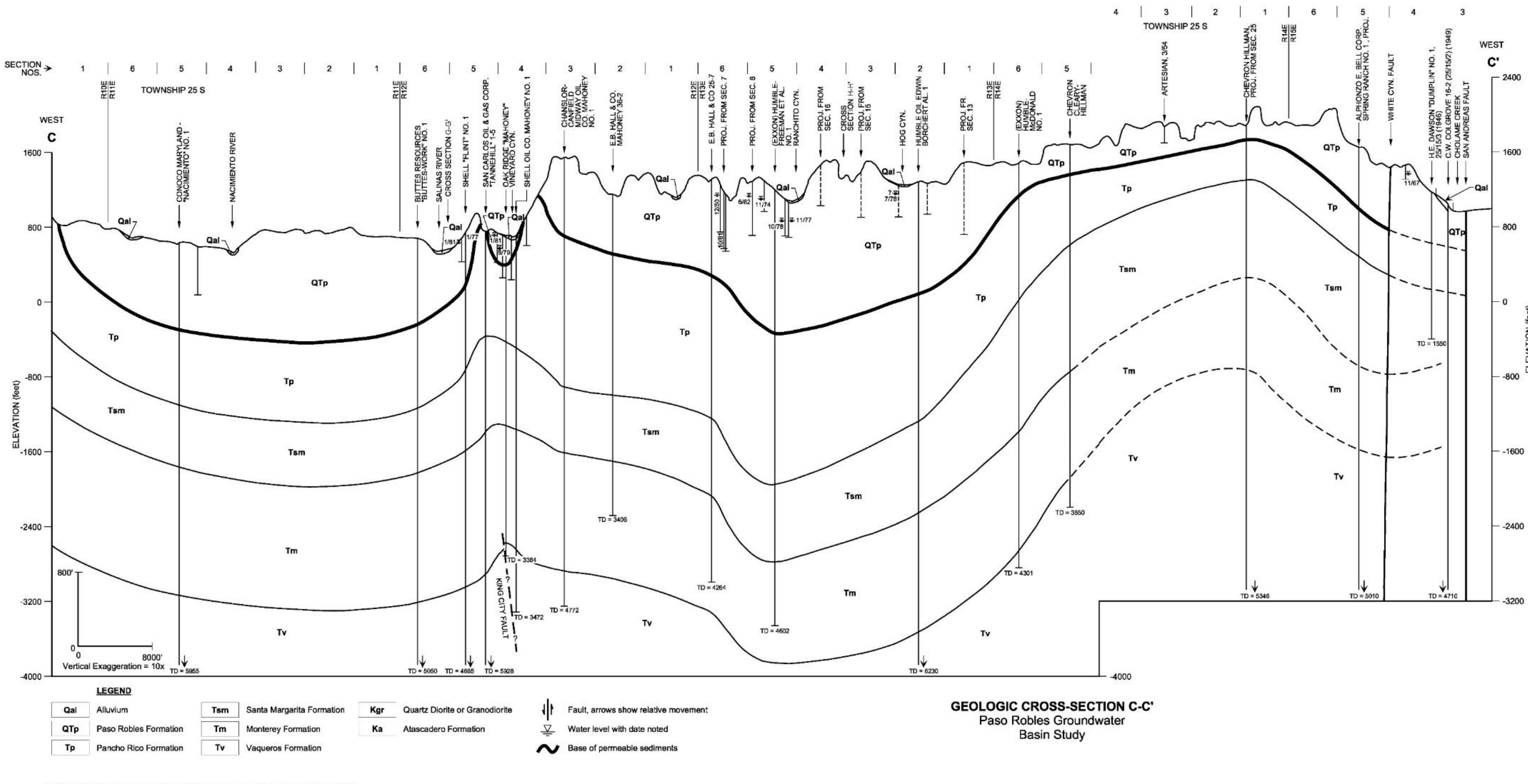


Figure 4-8. Geologic Section C-C'

Source: Modified from Fugro (2002)

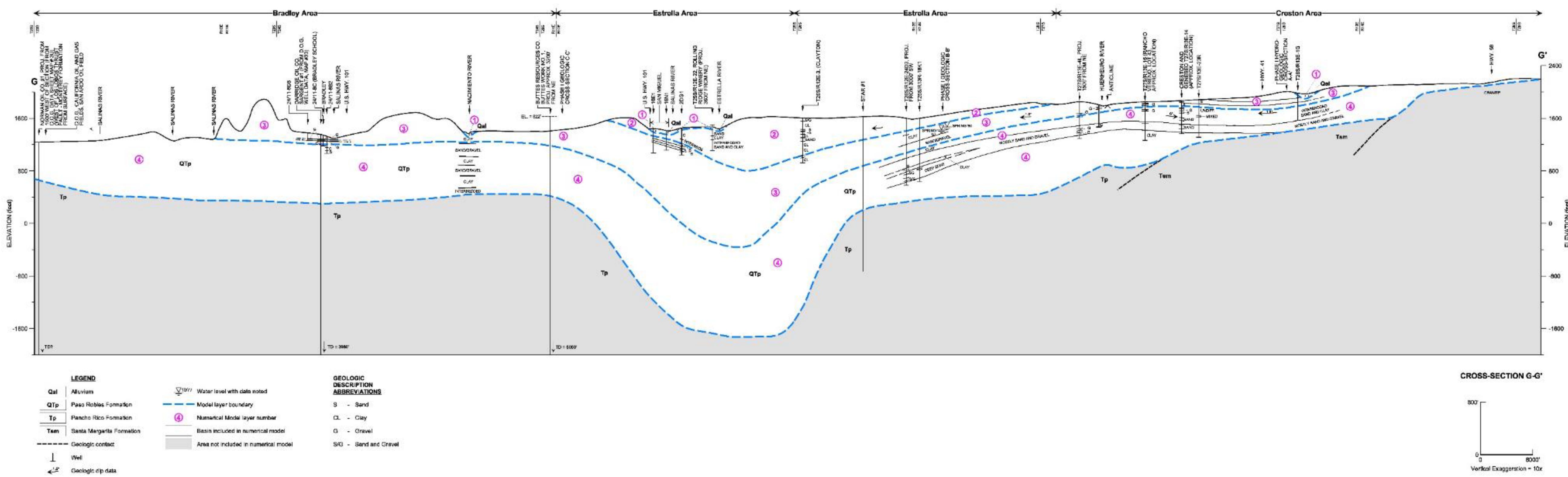


Figure 4-9. Geologic Section G-G'

Source: Modified from Fugro (2005)

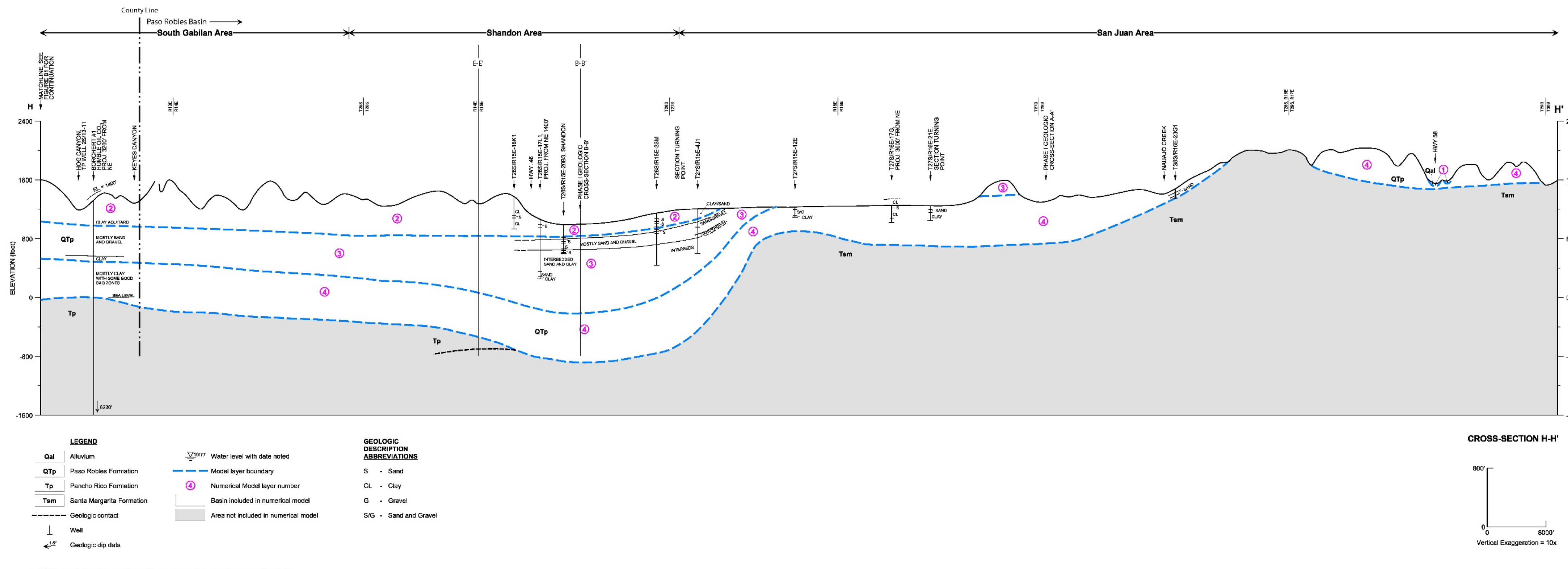


Figure 4-10. Geologic Section H-H'

Source: Modified from Fugro (2005)

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4.3.2 Geologic Formations Within the Subbasin

The main criteria used by previous authors for defining which geologic formations constitute the groundwater basin are:

1. The formation must have sufficient permeability and storage potential for the movement and storage of groundwater such that wells can reliably produce more than 50 gallons per minute (gpm), and

2. The groundwater produced from the geologic formation must be of generally acceptable quality (Fugro, 2002) based on the classification by DWR (1979) of groundwater with a conductivity of 3,000 micromhos/centimeter or less as fresh water.

The only two geologic formations that reliably meet these two criteria are the Quaternary-age alluvial deposits and the Tertiary-age Paso Robles Formation. Therefore, these are the only two formations that constitute the Subbasin. A general discussion of these two formations is presented below.

4.3.2.1 Alluvium

Alluvium occurs beneath the flood plains of the rivers and streams within the Subbasin. Figure 4-4 shows the location of the alluvial deposits, labeled as Quaternary alluvium, identified as Qal. These deposits are typically no more than 100 feet thick and comprise coarse sand and gravel with some fine-grained deposits. The alluvium is generally coarser than the Paso Robles Formation, with higher permeability that results in well production capability that often exceeds 1,000 gpm.

4.3.2.2 Paso Robles Formation

The largest volume of sediments in the Subbasin is in the Paso Robles Formation. This formation has sedimentary layers up to 3,000 feet thick in the northern part of the Estrella area and up to 2,000 feet near Shandon. Figure 4-4 shows the location of the Paso Robles Formation deposits, identified as QTp. Throughout most of the Subbasin the Paso Robles Formation sediments have a thickness of 700 to 1,200 feet.

The Paso Robles Formation is derived from erosion of nearby mountain ranges. Sediment size decreases from the east and the west, becoming finer towards the center of the Subbasin, indicating sediment source areas are both to the east and west. The Paso Robles Formation is a Plio-Pleistocene, predominantly non-marine geologic unit comprising relatively thin, often discontinuous sand and gravel layers interbedded with thicker layers of silt and clay. The formation was deposited in alluvial fan, flood plain, and lake depositional environments. The formation is typically unconsolidated and generally poorly sorted. The sand and gravel beds in the Paso Robles Formation have a high percentage of eroded Monterey shale and have lower permeability compared to the overlying alluvial unit. The formation also contains minor amounts of gypsum and woody coal.

Poor quality groundwater with elevated concentrations of iron, manganese, and in some cases hydrogen sulfide odor has been observed within deeper portions of the Paso Robles Formation in some areas. There is no published evidence of elevated arsenic. The 2002 Fugro report says, "No fluoride, arsenic, selenium, or uranium radioactivity exceeded the MCL in the samples reviewed from public water purveyor wells" and "Dissolved arsenic concentrations are present in most areas of the basin, typically at levels below 10 µg/l."

4.3.3 Geologic Formations Surrounding the Subbasin

Underlying and surrounding the Subbasin are older geologic formations that either typically have low well yields or have poor quality water. In general, the geologic units underlying the Subbasin include:

1. Tertiary-age or older consolidated sedimentary beds;
2. Cretaceous-age metamorphic rocks; and
3. Granitic rock.

Figure 4-11 shows the location of oil and gas exploration wells drilled in the Subbasin. These oil and gas wells help identify the depth and extent of the geologic formations that surround and underlie the Subbasin.

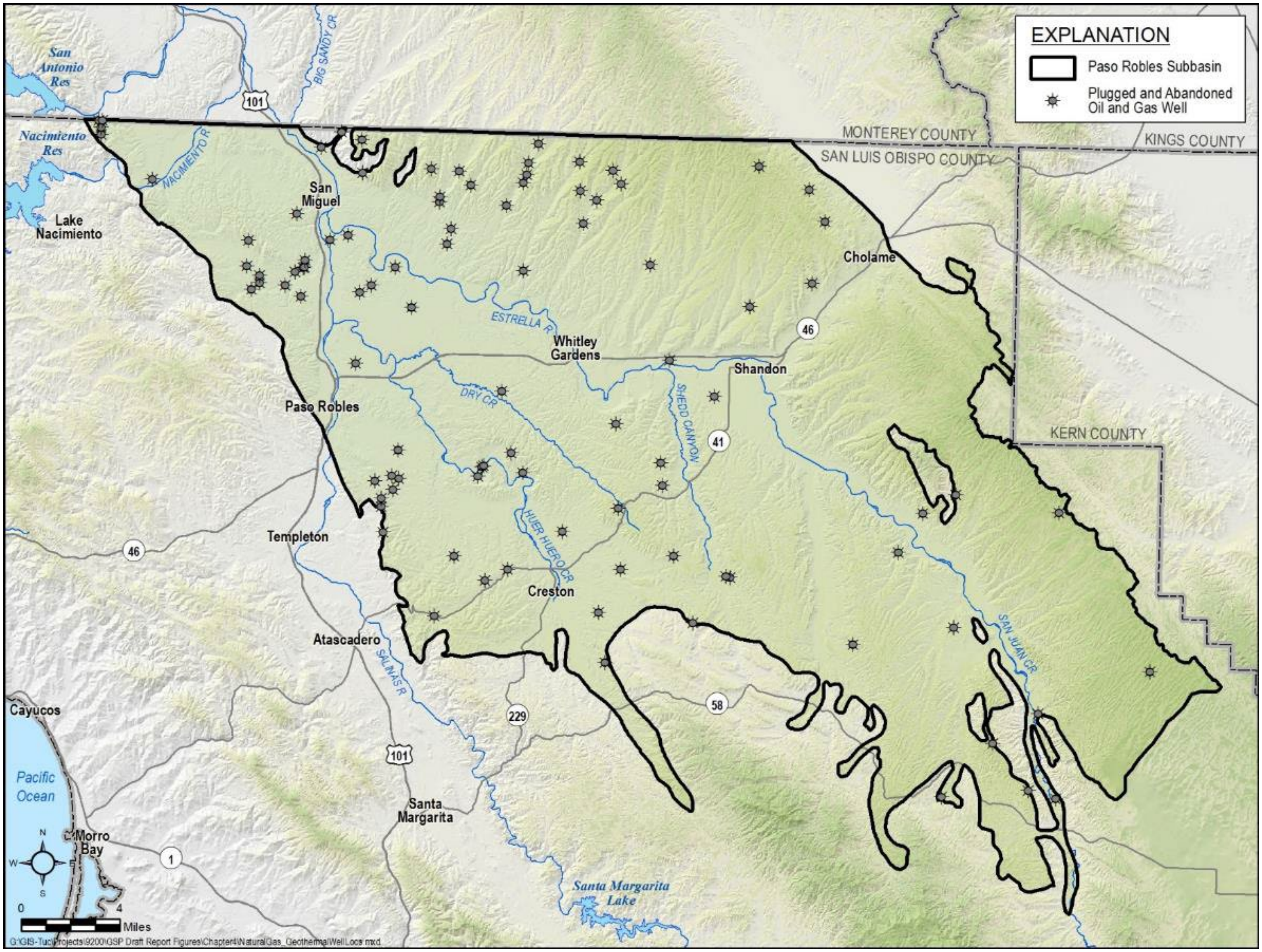


Figure 4-11. Natural Gas Exploration Well Locations and Geothermal Wells

4.3.3.1 Pancho Rico Formation

The Pancho Rico Formation (Tp) is a Pliocene-age marine deposit found mostly in the northern portion of the study area. In places it appears to be time-correlative to the Paso Robles Formation, and may be in lateral contact as a facies change. The unit predominantly consists of fine-grained sediments up to 1,400 feet thick that yield low quantities of water.

4.3.3.2 Santa Margarita Formation

The Santa Margarita Formation (Tsm) is an upper Miocene-age marine deposit, consisting of a white, fine-grained sandstone and siltstone with a thickness of up to 1,400 feet. The unit is found beneath most of the Subbasin. The Santa Margarita Formation is relatively permeable, but is not considered part of the Subbasin because the water quality is usually very poor. The geothermal waters contained in the Santa Margarita Formation in this area are often highly mineralized and characterized by elevated boron concentrations that restrict agricultural uses.

4.3.3.3 Monterey Formation

The Miocene-age Monterey Formation (Tm) consists of interbedded argillaceous and siliceous shale, sandstone, siltstone, and diatomite. The unit is as great as 2,000 feet thick in the study area, and is often highly deformed. Wells in the Monterey Formation are generally of too low yield to consider the Monterey Formation part of the Subbasin; although isolated areas in the Monterey Formation can yield more than 50 gpm. Additionally, groundwater produced from the Monterey Formation often has high concentrations of hydrogen sulfide, total organic carbon, manganese, and iron.

4.3.3.4 Vaqueros Formation

The marine Oligocene-age Vaqueros Formation (Tv) is a highly cemented fossiliferous sandstone that reaches a thickness up to 200 feet. Springs in the Vaqueros Formation with flows up to 25 gpm are common in canyons on the western and southern sides of the study area. Most water wells tapping this formation produce less than 20 gpm. Generally, the quality of water in this unit is good, though hard due to the calcareous cement within the rock.

4.3.3.5 Metamorphic and Granitic Rocks

The southern and western edges of the Subbasin are bordered by Cretaceous-age metamorphic and granitic rock. The metamorphic rock units include the Franciscan, Toro, and Atascadero Formations. The Franciscan consists of discontinuous outcrops of shale, chert, metavolcanics, graywacke, and blue schist, with or without serpentinite. The Toro Formation (Kt) is a highly consolidated claystone and shale that does not typically yield significant water to wells. The

Atascadero Formation (Ka) is highly consolidated, but does have some sandstone beds that yield limited amounts of water to wells.

The granitic rock unit (Kgr) lies east of the Rinconada fault system, south of Creston, east of Atascadero, and in the area northwest of Paso Robles. The granitic rocks are often capped by a layer of granular decomposed granite that may be weathered to clay. This decomposed granite may be up to 80 feet in thick and may contain limited amounts of groundwater.

4.4 Principal Aquifers and Aquitards

Water-bearing sand and gravel beds that may be laterally and vertically discontinuous are generally grouped together into zones that are referred to as aquifers. The aquifers can be vertically separated by fine-grained zones that can impede movement of groundwater between aquifers. Two aquifers exist in the Subbasin:

- A relatively continuous aquifer comprising alluvial sediments that underlie streams;
- An interbedded and discontinuous aquifer comprising sand and gravel lenses in the Paso Robles Formation.

Figure 4-4 shows the location of geologic sections that were used to depict the aquifers in the subsurface. Figure 4-12 through Figure 4-15 show the aquifers that are interpreted from the geologic logs, geophysical logs, groundwater levels, and water quality (Fugro, 2002 and 2005). Water-bearing zones are interpreted to be discontinuous lenses of sand and gravel and shown as tapering off on the cross sections. Because these cross sections are adopted from a study that supported a groundwater model, the cross sections include labels identifying the various layers from the groundwater model. The groundwater model was subsequently updated (GSSI, 2016) and is presented in Chapter 6. For the GSP several additional well logs were added to the sections to refine the extent of the aquifers. These logs have been labeled with the state well inventory number (e.g. E0188061). Appendix B contains the well logs used to update the sections that have publicly available data.

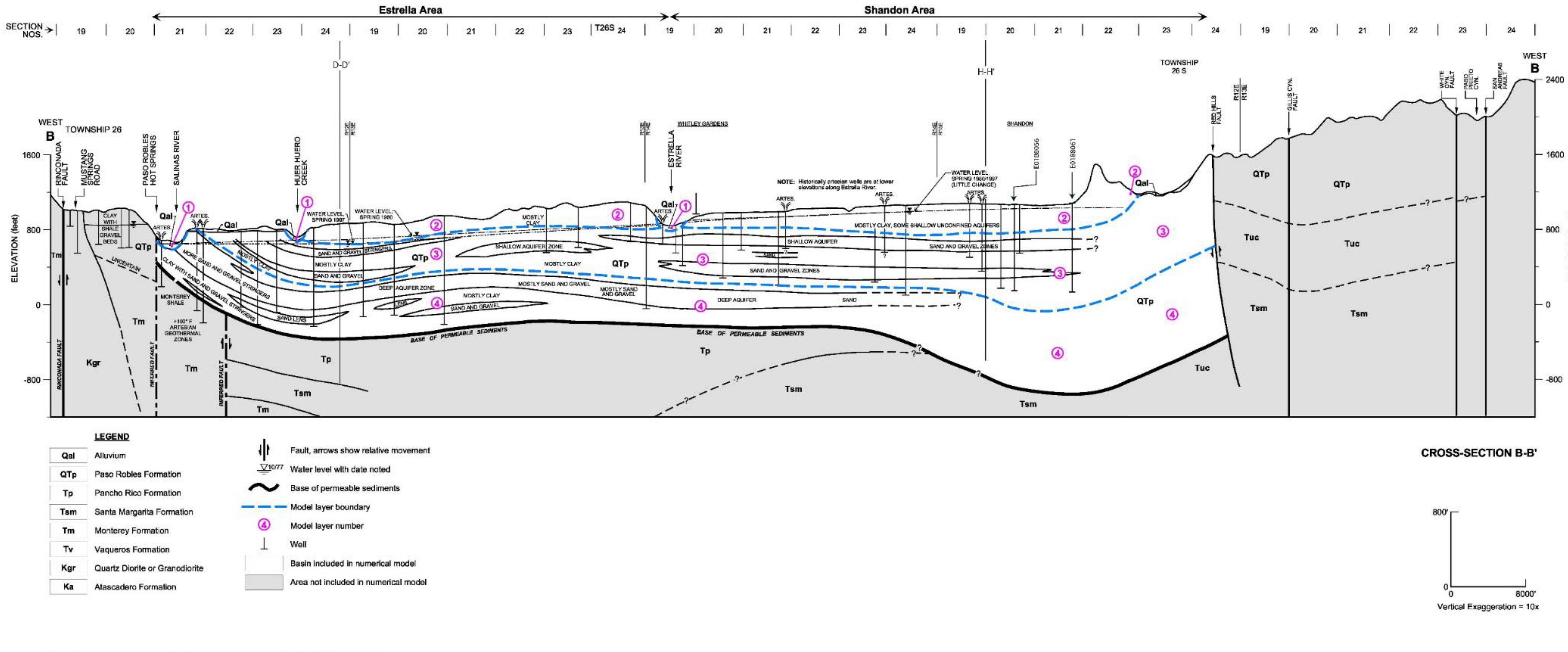


Figure 4-12. Aquifers - Geologic Section B-B'

Source: Modified from Fugro (2005)

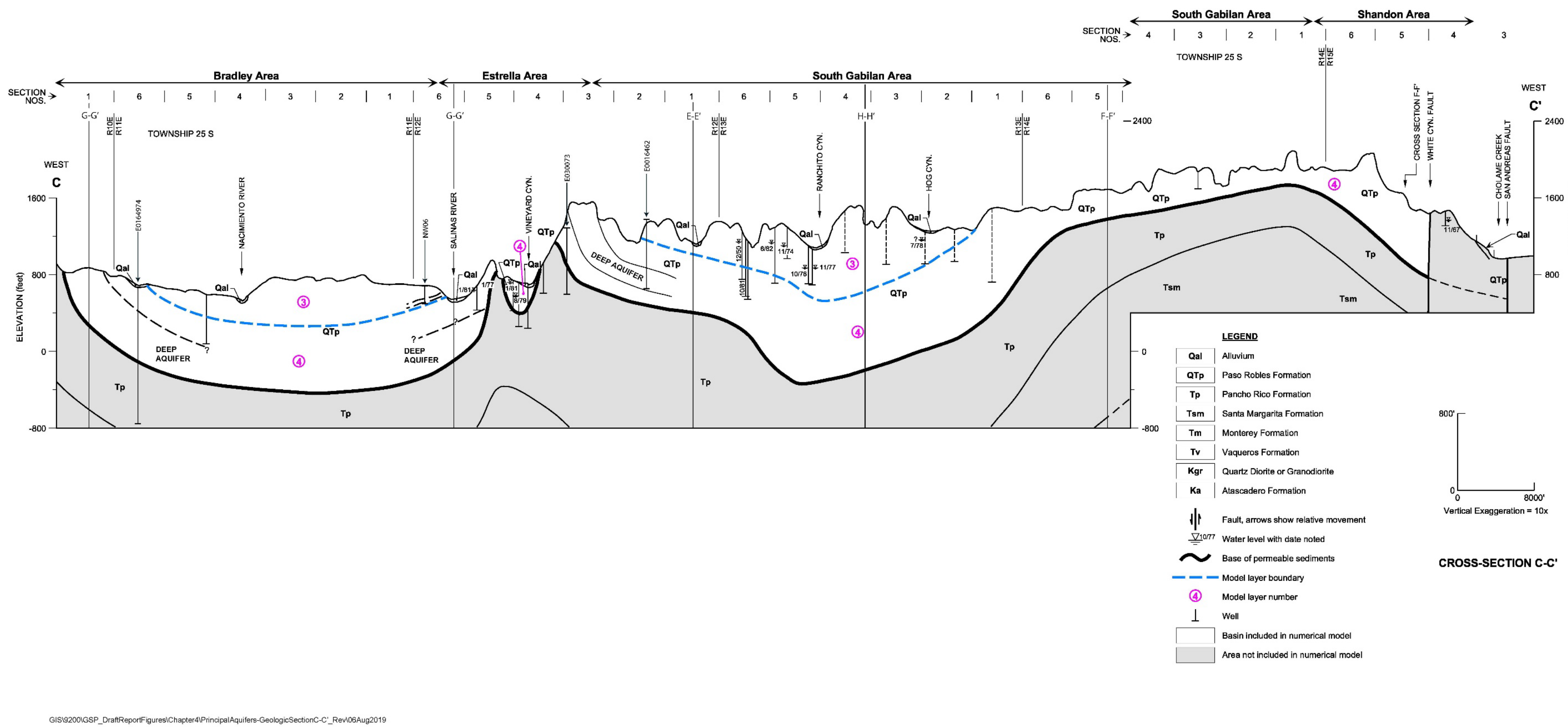


Figure 4-13. Aquifers - Geologic Section C-C'

Source: Modified from Fugro (2005)

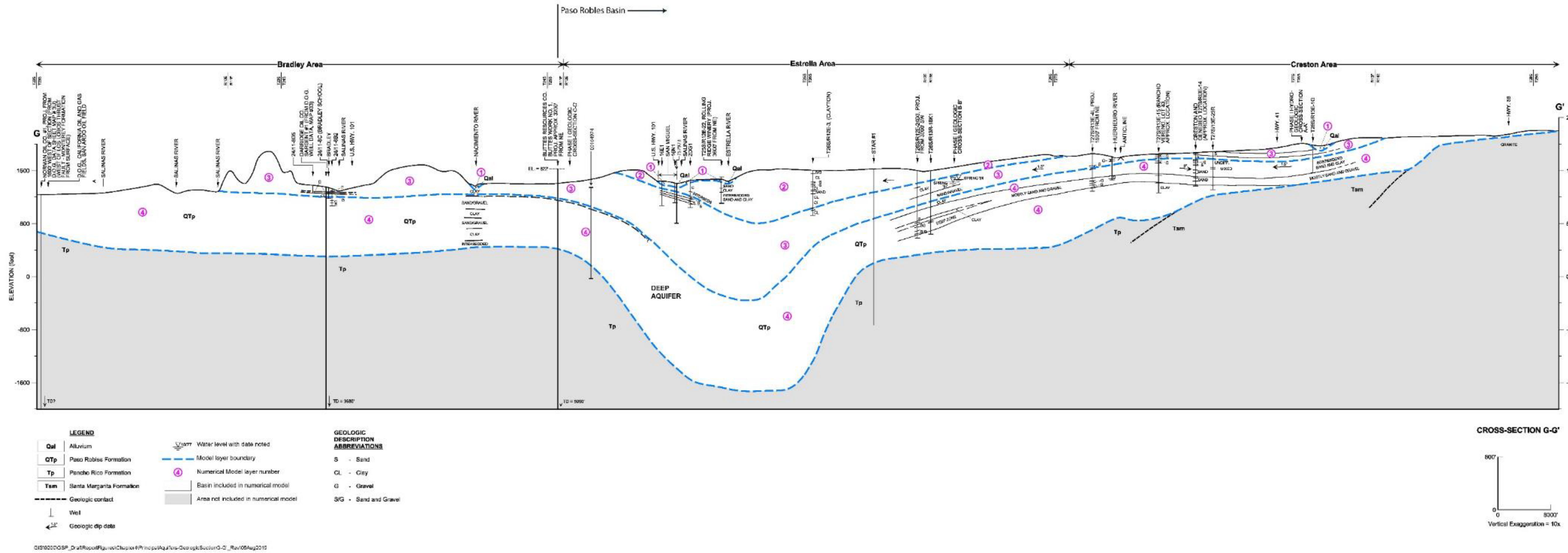


Figure 4-14. Aquifers - Geologic Section G-G'

Source: Modified from Fugro (2005)

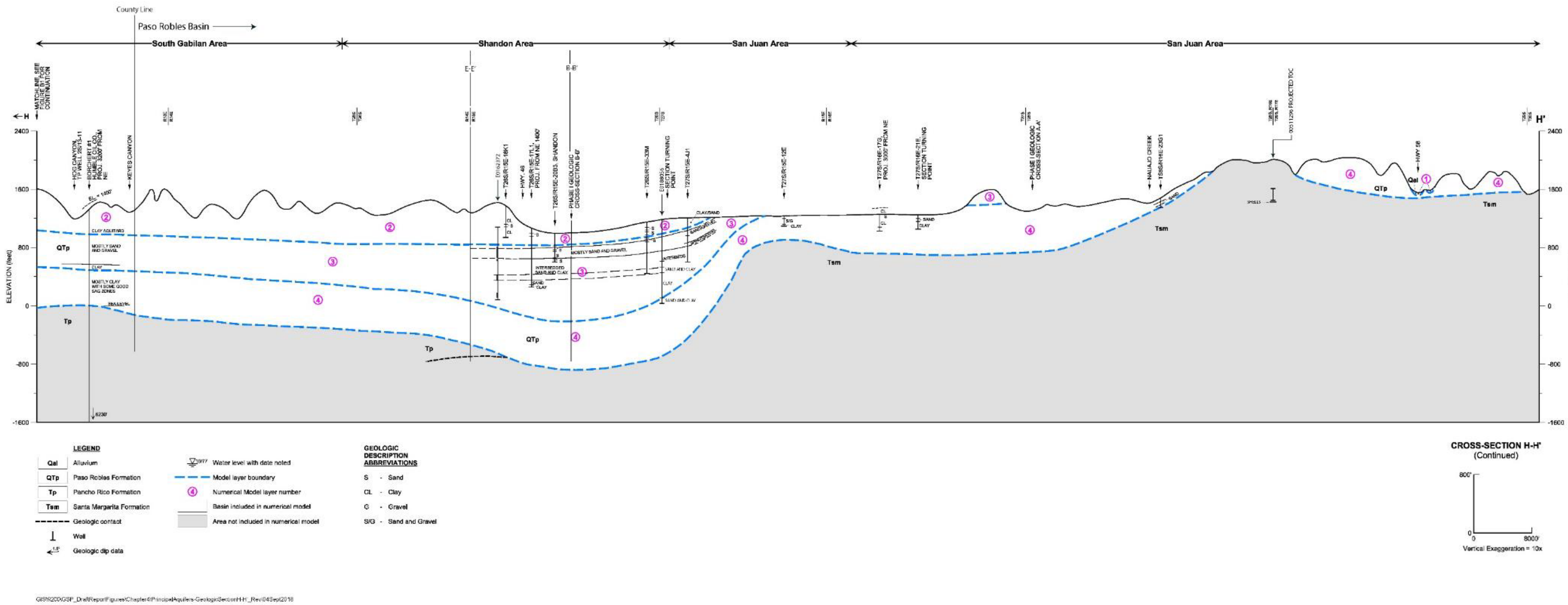


Figure 4-15. Aquifers - Geologic Section H-H'

Source: Modified from Fugro (2005)

4.4.1 Alluvial Aquifer

The unconfined Alluvial Aquifer is generally composed of saturated coarse-grained sediments and occurs along Huer Huero Creek, the Salinas River, and the Estrella River; the extent of this aquifer is shown on Figure 4-4. The alluvial aquifer varies in thickness, but is generally about 100 feet thick. The Alluvial Aquifer is highly permeable. Wells screened in the alluvial aquifer can yield up to a 1,000 gpm (Fugro, 2005).

4.4.2 Paso Robles Formation Aquifer

Geologic information reported in Fugro (2002) suggests that the sand and gravel zones that constitute the Paso Robles Formation Aquifer are generally thin, discontinuous, and are usually separated vertically by relatively thick zones of silts and clays. Figure 4-4 shows the extent of the Paso Robles Formation in the Subbasin. In general, the sand and gravel zones occur throughout the Paso Robles Formation, although they may be locally discontinuous or absent in some areas. As shown on Figure 4-14, near Creston the shallow sand and gravel zones are shown as disconnected from western parts of the Paso Robles aquifer, although data is limited in this region.

4.4.3 Aquifer Properties

Data reported in Fugro (2002) were reviewed to estimate representative aquifer hydraulic properties. Most aquifer tests have been conducted in the Estrella and Creston areas. Estimated aquifer properties are summarized in Table 4-1, which includes the following characteristics (Driscoll, 1986):

- Hydraulic conductivity: the rate of flow of water in gallons per day through a cross section of one square foot under a unit hydraulic gradient.
- Specific capacity: the rate of discharge of a water well per unit of drawdown, commonly expressed in volume of water at a reference temperature.
- Storativity: the volume of water an aquifer releases from or takes into storage per unit surface area of the aquifer per unit change in head.
- Transmissivity: the rate at which water is transmitted through a unit width of an aquifer under a unit hydraulic gradient.

Table 4-1. Paso Robles Subbasin Aquifer Hydrogeologic Properties

Well Location	Test Duration (hours)	Flow (gpm)	Well Depth (feet)	Perforated Interval (ft)	Transmissivity (gpd/ft)	Specific Capacity (gpm/ft)	Hydraulic Conductivity (ft/day)
Alluvial Aquifer							
28S/13E-36	24	367	70	40	186,300	68	620
Paso Robles Formation Aquifer							
27S/12E-09	72	300	450	170	8,800	4.9	6.9
26S/12E-22	12	220	430	100	900	1.2	1.2
25S/11E-24	12	150	350	90	800	0.62	1.2
27S/12E-18	8	140	225	35	4,100	3	15.7
26S/12E-20	48	115	400	50	7,600	10	20
26S/12E-36	24	400	660	280	8,800	5.1	4.2
26S/12E-35	18	690	830	370	7,900	4.9	2.9
27S/14E-18	24	600	740	220	6,100	5.5	3.7
26S/13E-16	24	200	820	350	3,100	2.63	1.2
26S/12E-25	24	500	730	340	5,700	3.6	2.2
25S/13E-30	24	600	720	260	6,900	79	3.5
26S/13E-7	24	600	825	380	3,200	3	1.1
26S/13E-7	24	600	990	610	5,000	4.2	1.1
24S/11E-34	24	850	612	100	2,805	4.5	3.8

Source: Fugro, 2002

Based on limited aquifer property data available for the Alluvial Aquifer, the transmissivity may be in the range of 150,000 to 200,000 gallons per day per foot (gpd/ft); or between 20,000 and 27,000 square feet per day (ft^2/day). Hydraulic conductivity of the Alluvial Aquifer may be over 500 feet per day (ft/d) based on estimated transmissivity and the thickness of the well's perforated interval.

The estimated transmissivity of the Paso Robles Formation Aquifer ranges between 800 gpd/ft and about 9,000 gpd/ft; or between 100 and 1,200 ft^2/day. The geometric mean of the Paso Robles Formation transmissivity values is about 4,200 gpd/ft, or 560 ft^2/day.

The estimated hydraulic conductivity of the Paso Robles Formation Aquifer ranges from about 1 ft/d to about 20 ft/d. The geometric mean of the tabulated hydraulic conductivity values for the Paso Robles Formation Aquifer is 5 ft/d.

Limited data exist to assess the confined storage properties, such as storativity, of the Paso Robles Formation aquifer (Fugro, 2002). Table 4-2 summarizes reported estimates of specific yield for unconfined portions of the aquifers. Average specific yield was estimated by analyzing 10 to 20 of the deepest well completion logs for each area. Each interval was assigned a specific yield by comparison of the formation description with published estimates based on extensive field and laboratory investigations conducted in southern coastal basins by the DWR and modified for the Paso Robles Formation (DWR, 1958). The assigned specific yield was then weighted according to the thickness of each bed and averaged over the entire depth of the well (Fugro, 2002). Results of this analysis suggested that a representative average value for specific yield for the Paso Robles Formation in the Subbasin was 0.09. This specific yield may be low. Average specific yields for unconsolidated sand and gravel sedimentary aquifers are commonly between 0.1 and 0.3 (Driscoll, 1986).

Table 4-2. Paso Robles Subbasin Specific Yield Estimates

Area	Number of Wells Used to Calculate	Average Estimated Specific Yield
Creston Area	47	0.09
Estrella	20	Not provided
San Juan	5	0.10
Shandon	20	0.08
North and South Gabilan	20	0.09
Basin Wide Average		0.09

Estimates of vertical hydraulic conductivity for each of the aquifers were not in reports from previous studies for the Subbasin. Estimates of vertical hydraulic conductivity incorporated into the basin-wide groundwater model are discussed in Appendix E.

4.4.4 Confining Beds and Geologic Structures

There is limited information regarding the continuity of stratigraphic features in the Subbasin that restrict groundwater flow within the Subbasin. Conceptually, the presence of laterally continuous zones of fine-grained strata within the Paso Robles Formation can restrict vertical movement of groundwater. These fine-grained zones are generally shown on the sections on Figure 4-12 through Figure 4-15. These figures show that the fine-grained strata are likely more continuous than the sand and gravel layers. These fine-grained zones act as confining beds, and are the cause of the artesian wells that were historically reported in the Subbasin. Fine-grained layers that limit vertical movement of groundwater appear to be more prevalent in the Estrella and Creston areas than in the eastern portion of the Shandon area. This may indicate that infiltration and recharge is more limited in the central part of the basin than it is to the east in the Shandon area.

There is some anecdotal evidence that subsurface geologic structures such as folds and faults may affect groundwater flow in the Subbasin, particularly in the Whitley Gardens area between Estrella and Shandon. Additional investigations would be needed to characterize the effect of structures on groundwater flow.

4.5 Primary Users of Groundwater

The primary groundwater users in the Subbasin include municipal, agricultural, rural residential, small community water systems, small commercial entities and environmental users (such as GDEs). Municipal, domestic, and agricultural demands in the Subbasin currently rely almost entirely on groundwater. Some municipal demands are partially met through imported surface water as presented previously in Chapter 3. The municipal sector pumps primarily from the Paso Robles Aquifer in the Subbasin. The agriculture sector uses groundwater from the Alluvial Aquifer and the Paso Robles Aquifer.

4.6 General Water Quality

This section presents a general discussion of the natural groundwater quality in the Subbasin, focusing on general minerals. The general water quality of the Subbasin described in this section is a summary of results in the Fugro 2002 report. A more complete discussion of the distribution and concentrations of specific constituents is presented in Chapter 5.

Groundwater in the Subbasin is generally suitable for drinking and agricultural uses. The two main water types as defined by water chemistry in the Subbasin are calcium bicarbonate and sodium bicarbonate. Calcium-bicarbonate type is the most prominent and is found in the Creston and San Juan areas. Sodium-bicarbonate is the second most dominant water type and is found in the Estrella and Shandon areas. Minor areas of sodium-chloride type water can be found in the eastern portion of the Subbasin and near Cholame Valley. In the northwest portion of the Subbasin, magnesium bicarbonate waters are found in the San Miguel area and a mixed water type is seen in the Bradley area. Summary tables of general groundwater quality are provided in Chapter 5.

4.7 Groundwater Recharge and Discharge Areas

Areas of significant, natural, areal recharge and discharge within the Paso Robles Subbasin are discussed below. Quantitative information about natural and anthropogenic recharge and discharge is provided in Chapter 6.

4.7.1 Groundwater Recharge Areas Inside the Subbasin

In general, natural areal recharge occurs via the following processes:

1. Distributed areal infiltration of precipitation, and
2. Infiltration of surface water from streams and creeks.

Appendix B includes a table of annual precipitation data for the Paso Robles weather station (USC00046730) for the water years from 1894 to 2019. Figure 4-16 is a map that ranks soil suitability to accommodate groundwater recharge based on five major factors that affect recharge potential, including: deep percolation, root zone residence time, topography, chemical limitations, and soil surface condition. The map[1] was developed by the California Soil Resource Lab at UC Davis and the University of California Agricultural and Natural Resources Department.

Areas with excellent recharge properties are shown in green. Areas with poor recharge properties are shown in red. Not all land is classified, but this map provides good guidance on where natural recharge likely occurs. Natural recharge is discussed in more detail in Chapter 6.

[1] Figure 4-16 shows the Soil Agricultural Groundwater Banking Index (SAGBI) map for the Paso Robles Subbasin. While the UC Davis database title SAGBI includes the term "banking", its use in this section is strictly as a dataset for evaluating recharge potential in the basin.

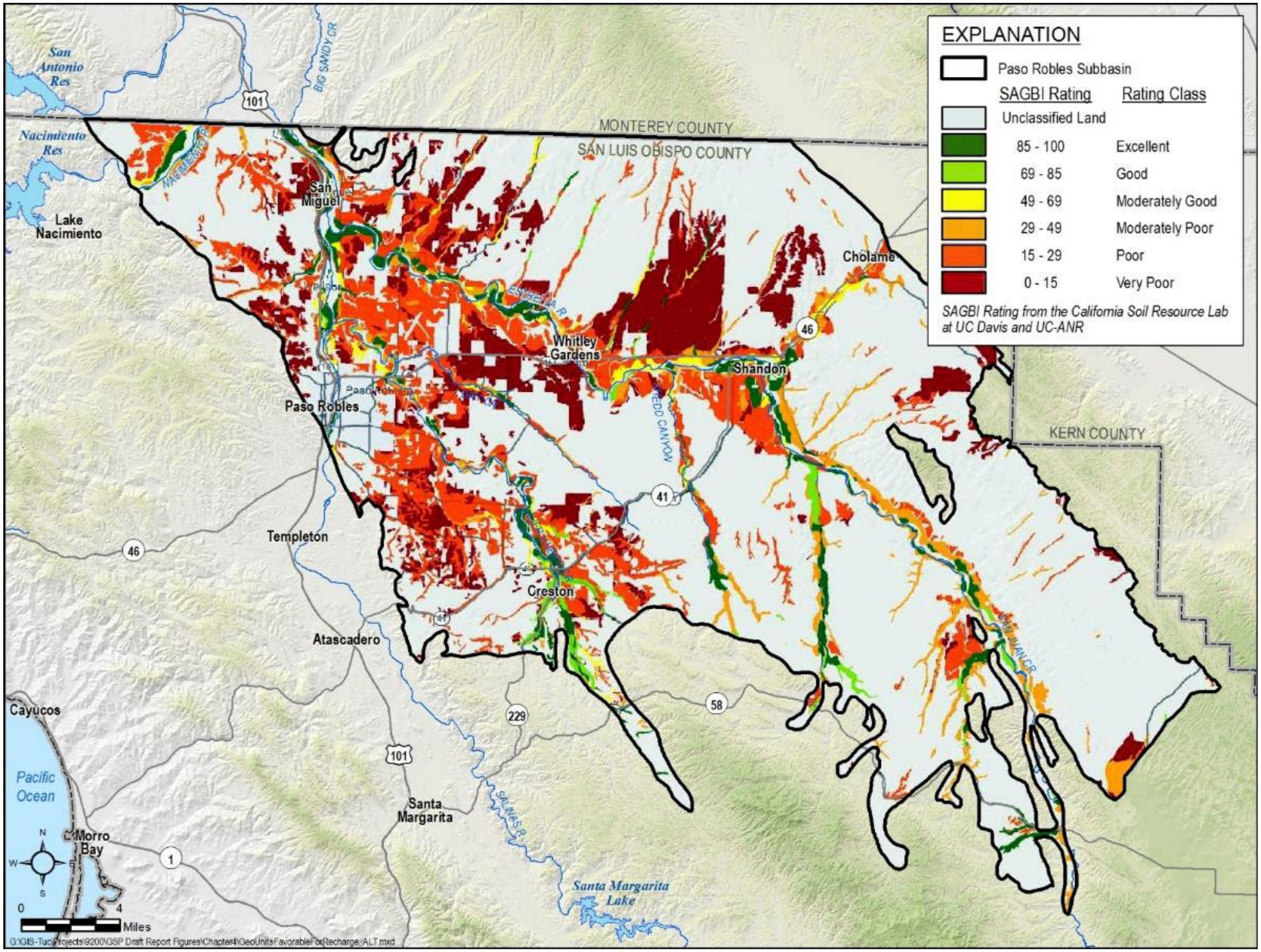


Figure 4-16. Potential Recharge Areas

4.7.2 Groundwater Discharge Areas Inside the Subbasin

Areas that have been identified in previous studies as potential historic natural groundwater discharge areas within the Plan area are shown on Figure 4-17 and include springs and seeps, groundwater discharge to surface water bodies, and ET by phreatophytes. Phreatophytes are plants with roots that tap into groundwater. The springs and seeps shown in the figure are a subset of the locations identified in the National Hydrology Dataset (NHD). Each of the NHD locations was examined on recent high-resolution (Google Earth©) aerial photographs to assess whether topography, soil color and vegetation at the site were consistent with the presence of groundwater discharge. In many cases they were not, and those locations were removed from the spring and seep data set (Appendix C). Off-channel springs and seeps are almost all located in the foothills of the Santa Lucia and Temblor mountain ranges. Based on their elevations high above the main part of the Subbasin, the springs and seeps may represent discharge of groundwater from perched strata feeding the Paso Robles Formation Aquifer that is forced to the surface locally by subsurface stratigraphy or faults. No efforts were made to ground truth or physically verify the presence of these features and there is no evidence that pumping from the Paso Robles Formation Aquifer is affecting the springs and seeps.

Groundwater discharge to streams – primarily, the Salinas River and Estrella River – has not been mapped to date. Instead, areas of potential groundwater discharge to streams were tentatively identified using the conceptual groundwater flow model. Highlighted purple areas along streams on Figure 4-17 represent stream cells in the model where simulated average groundwater discharge to the stream reach is at least 10 AFY. In contrast to mapped springs and seeps, which are derived from groundwater in the Paso Robles Formation Aquifer, groundwater discharge to streams is derived from the Alluvial Aquifer. No efforts were made to ground truth or physically verify the presence of these features and there is no evidence that pumping from the Paso Robles Formation Aquifer is affecting the Salinas River.

Phreatophytic vegetation along stream channels also functions as a discharge point for groundwater by removing water directly from the water table. The locations of this type of riparian vegetation are described in Section 5.5.

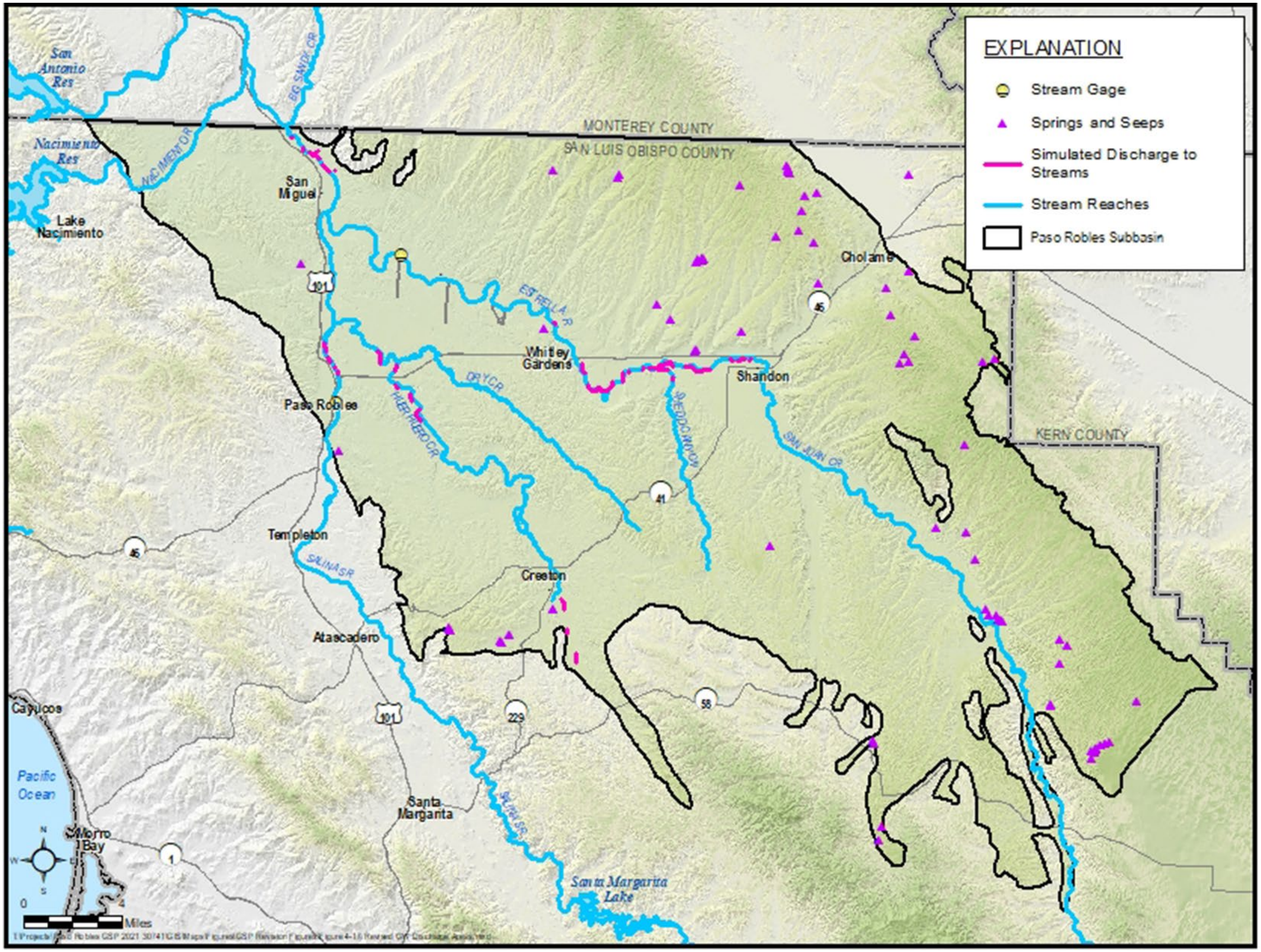


Figure 4-17. Potential Groundwater Discharge Areas

4.8 Surface Water Bodies

Figure 4-19 shows the rivers in the Subbasin that are considered significant to the management of groundwater in the Subbasin. Significant streams that are mostly perennial in the Subbasin include the Nacimiento River, Salinas River, the Estrella River, Huer Huero Creek, San Juan Creek, Dry Creek, and Shedd Canyon. Shell Creek is not included in this list since it is classified as either intermittent or ephemeral with no perennial stretches. These rivers and creeks lose water to the shallow aquifers during most of the year. There are no natural lakes in the Subbasin.

There are no reservoirs within the Subbasin; however, there are two reservoirs in the watershed. The Salinas Dam south of the Subbasin on the Salinas River forms Santa Margarita Lake. The Salinas Dam was constructed in the early 1940s as an emergency measure to provide adequate water supplies for Camp San Luis Obispo. The United States Army Corps of Engineers (USACE) now has jurisdiction over the dam and reservoir facilities. The City of San Luis Obispo has an agreement with USACE to divert the entire yield of Salinas Reservoir (Santa Margarita Lake) for water supply. Nacimiento Reservoir lies just outside of the Subbasin to the northwest. The reservoir discharges to the Nacimiento River, which crosses the northwest corner of the Subbasin.

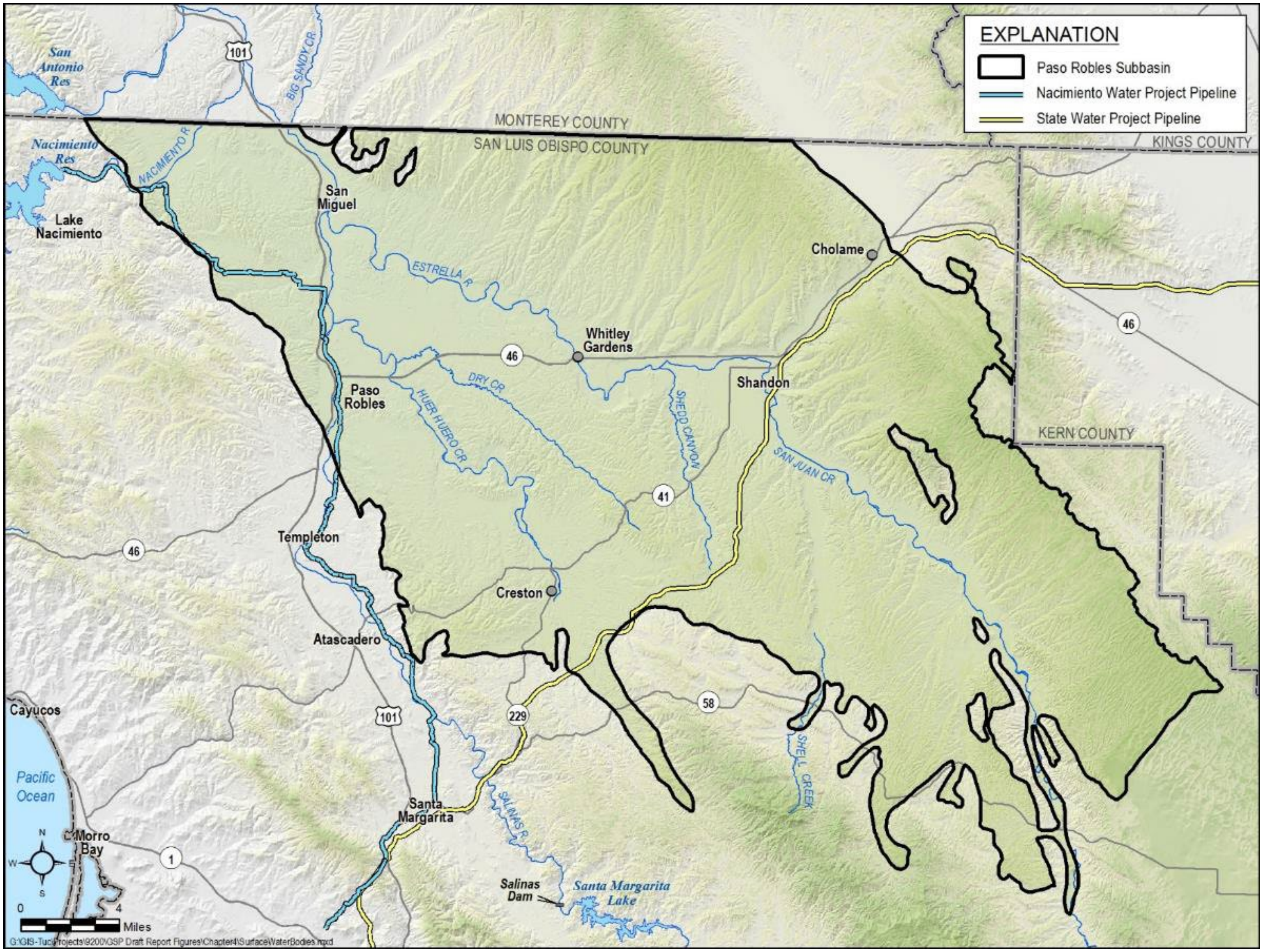


Figure 4-18. Surface Water Bodies

4.9 Data Gaps in the Hydrogeologic Conceptual Model

All hydrologic conceptual models contain a certain amount of uncertainty, and can be improved with additional data and analysis. The hydrogeologic conceptual model of the Paso Robles Subbasin could be improved with certain additional data and analyses. Several data gaps are identified below.

4.9.1 Aquifer Continuity

Aquifer continuity has a significant impact on how projects and management actions in one part of the Subbasin may influence sustainability in other parts of the Subbasin. As noted earlier, the Paso Robles aquifer comprises many discontinuous sand and gravel beds. However, Figure 4-12 shows a previous interpretation of a deep sand and gravel zone that is relatively continuous across the Subbasin. The continuity of this zone may prove to be important in how effective various projects and programs may promote sustainability. The extent and continuity of the Paso Robles Aquifer should be confirmed through existing or new well logs or other methods such as aerial geophysics. This is particularly important in the areas around Shandon and San Juan. Chapter 10 addresses the implementation plan for addressing data gaps.

4.9.2 Fault Influence on Groundwater Flow

Southeast of Paso Robles is an interbasin fault. It is unknown whether this fault and others are barriers to groundwater flow. If these interbasin faults are barriers to groundwater flow, they could compartmentalize the Subbasin and have a significant impact on where projects must be located in order to achieve sustainability. It may be possible to get a better understanding of the influence of these faults by performing aquifer tests and geophysical surveys in the vicinity of these faults.

4.9.3 Vertical Groundwater Gradients

There are limited data that demonstrate vertical hydraulic gradients across the basin. Data from a single set of nested wells are presented in Chapter 5; the data are inconclusive to establish a consistent upward or downward vertical gradient. More data about vertical gradients are included in Chapter 5. Demonstrating vertical gradients could be important to assess vertical flows between the Alluvium and the Paso Robles Aquifer as well as vertical flows within the Paso Robles Aquifer.

4.9.4 Specific Yield Estimates

The current estimates of specific yield of the various sedimentary layers composing the Paso Robles Aquifer are based on very limited data. This is a data gap that when filled, will improve the ability of the Model to reflect Basin conditions and interactions.

5 GROUNDWATER CONDITIONS

This chapter describes the current and historical groundwater conditions in the Alluvial Aquifer and the Paso Robles Formation Aquifer in the Paso Robles Subbasin. In accordance with the SGMA emergency regulations §354.16, current conditions are any conditions occurring after January 1, 2015. By implication, historical conditions are any conditions occurring prior to January 1, 2015. The chapter focuses on information required by the GSP regulations and information that is important for developing an effective plan to achieve sustainability. The organization of Chapter 5 aligns with the five sustainability indicators applicable to the Subbasin. As required by the regulations, these are:

1. Chronic lowering of groundwater elevations
2. Changes in groundwater storage
3. Subsidence
4. Depletion of interconnected surface waters
5. Groundwater quality

The sixth sustainability indicator, seawater intrusion, is not applicable to the Paso Robles Subbasin.

5.1 Groundwater Elevations

The following assessment of groundwater elevation conditions is largely based on data from the SLOFCWCD's groundwater monitoring program. Groundwater levels are measured by the SLOFCWCD through a network of public and private wells in the Subbasin. Additional groundwater elevation data for wells were obtained from other available data sources, including the CASGEM database, USGS, and other regulatory compliance programs. Locations of the wells (about 50 to 55 depending on year) used for the groundwater elevation assessment are shown on Figure 5-1. Data from some of the wells on this figure was collected subject to confidentiality agreements between the SLOFCWCD and well owners. Consistent with the terms of such agreements, the well owner information and specific locations for these wells is not published in this GSP. The set of wells shown on Figure 5-1 were selected from a larger set of monitoring wells in the SLOFCWCD database if there was sufficient information to assign the well to either the Alluvial Aquifer or Paso Robles Formation Aquifer. Additionally, in order to create maps showing historical water level changes over an approximately 20-year period, the wells were chosen if there was data from the years 1997 and 2017.

Groundwater elevation data were deemed representative of static conditions based on a check of consistency with nearby wells. Additional information on the monitoring network is provided in Chapter 7 – Monitoring Networks. In accordance with the SGMA Regulations, the following information is presented based on available data, in subsequent subsections for both aquifers in the Subbasin:

- Groundwater elevation contour maps for the seasonal high and low periods for 1997 and 2017
- A map depicting the change in groundwater elevation between 1997 and 2017
- Hydrographs for wells with publicly available data
- Assessments of horizontal and vertical groundwater gradients

5.1.1 Alluvial Aquifer

Groundwater elevation data for the Alluvial Aquifer are limited. The locations of the Alluvial Aquifer monitoring wells with available groundwater elevation data are shown on Figure 5-1. Some Alluvial Aquifer wells are all in the Alluvium as mapped in Figure 4-4, although some are not adjacent to mapped, named streams.

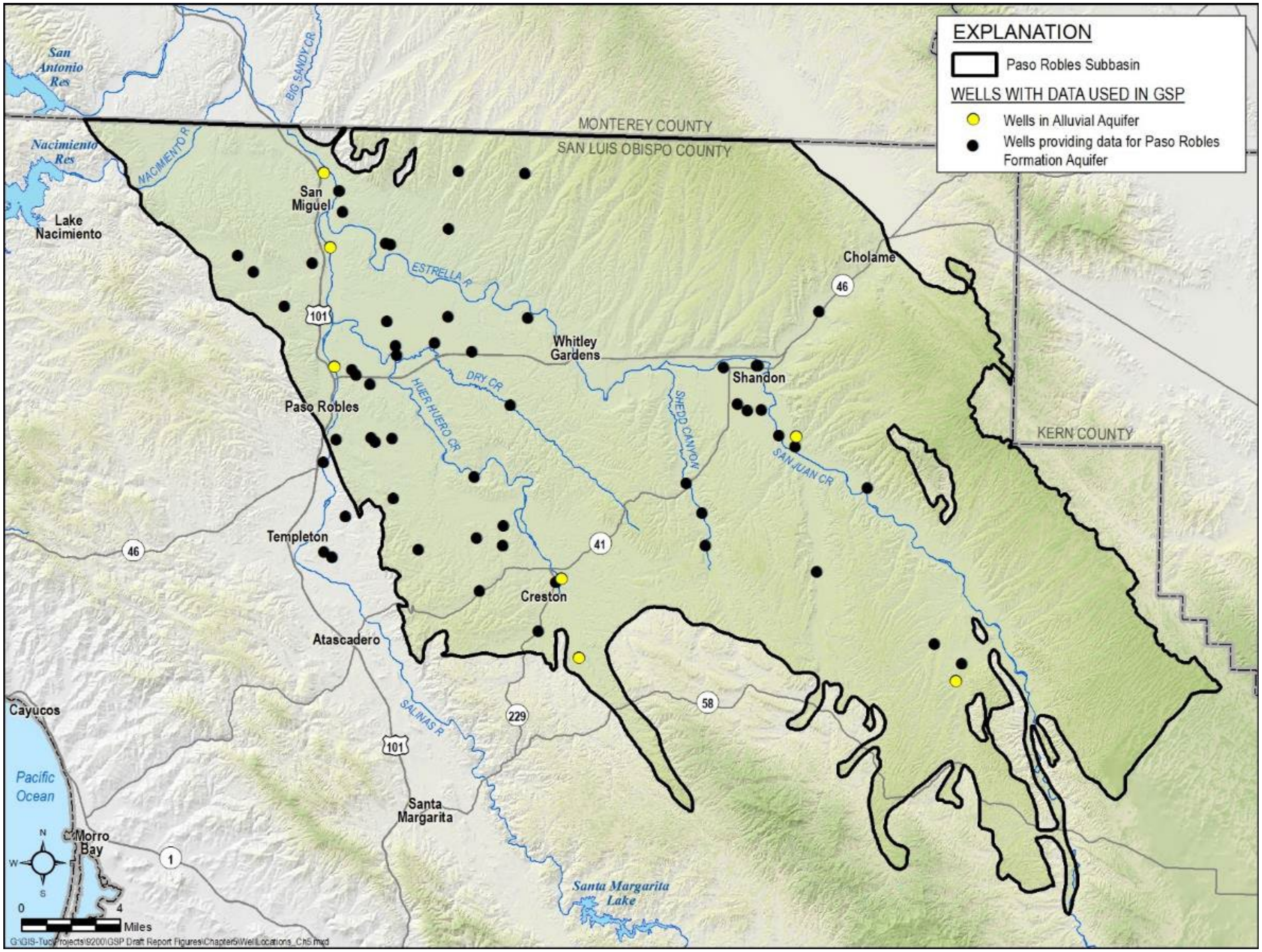


Figure 5-1. Location of Wells Used for Groundwater Elevation Assessments

5.1.1.1 Alluvial Aquifer Groundwater Elevation Contours and Horizontal Groundwater Gradients

Groundwater elevation data for the Alluvial Aquifer are too limited to prepare representative contour maps of the seasonal high and seasonal low groundwater elevations, or to prepare maps of historical groundwater elevations. Figure 5-2 shows current groundwater elevation contours for the Alluvial Aquifer. The contours were developed using 2017 data when available and the most recent data prior to 2017. Contours are only depicted on the map in areas near the wells that are shown on Figure 5-1.

Groundwater elevations range from approximately 1,400 feet above mean sea level (ft msl) in the southeastern portion of the Subbasin to approximately 600 ft msl near San Miguel. Groundwater flow direction is inferred as being from high to low elevations in a direction perpendicular to groundwater elevation contours. Groundwater flow direction in the Alluvial Aquifer generally follows the alignment of the creeks and rivers. Overall, groundwater in the Alluvial Aquifer flows from southeast to northwest across the Subbasin. Groundwater elevation data in the Alluvial Aquifer are too sparse to estimate local horizontal groundwater gradients. On a basin-wide scale, the average horizontal hydraulic gradient in the alluvium is about 0.004 ft/ft from the southeastern portion of the Subbasin to San Miguel.

5.1.1.2 Alluvial Aquifer Hydrographs

Groundwater level data for all of the Alluvial Aquifer wells shown on Figure 5-1 were collected under confidentiality agreements. Therefore, hydrographs for the Alluvial Aquifer are not included in this GSP. The lack of publicly available groundwater level data for the Alluvial Aquifer is a significant data gap. The approach for filling data gaps is presented in Chapter 10.

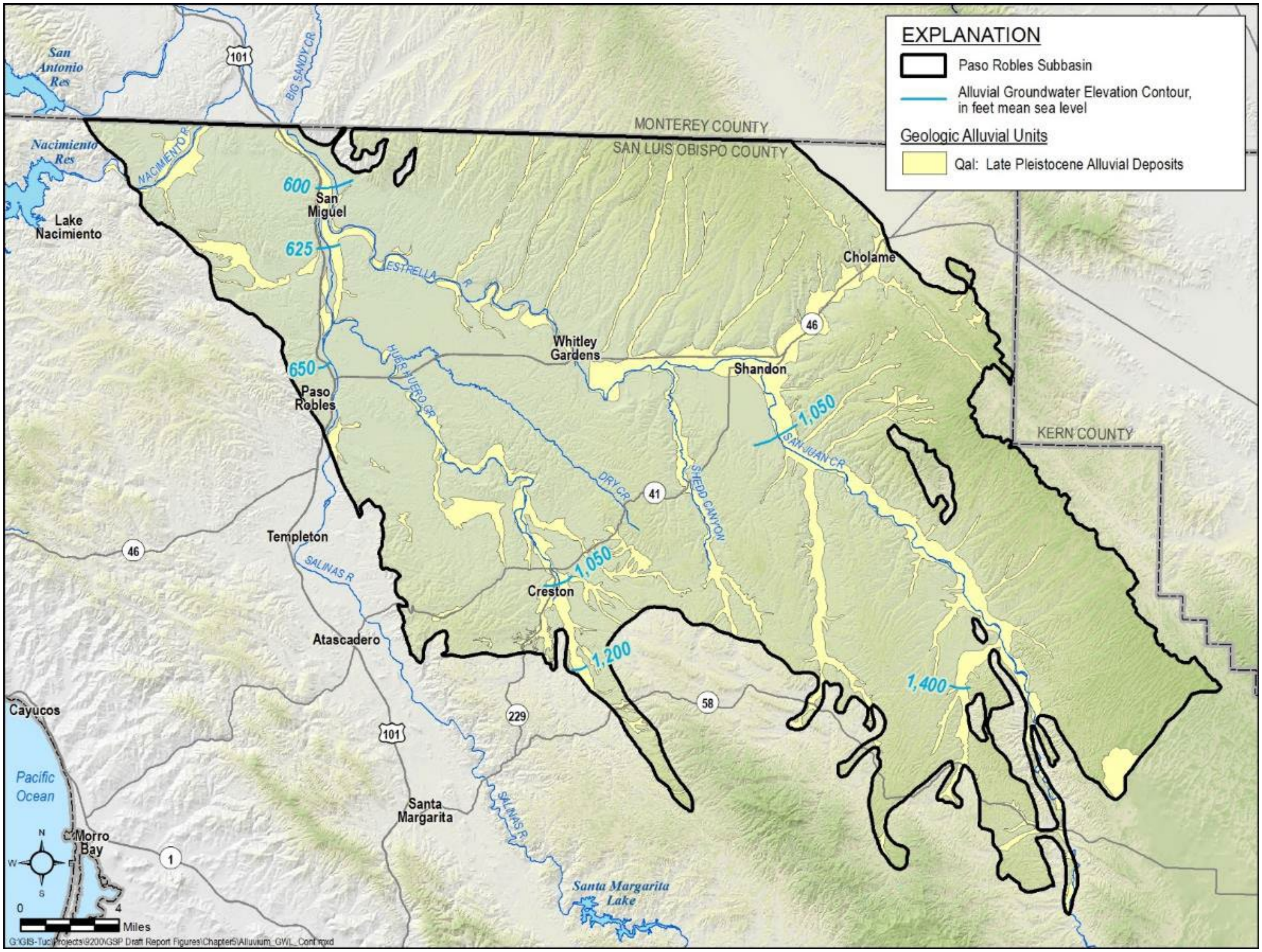


Figure 5-2. Groundwater Elevation Contours for the Alluvial Aquifer

5.1.2 Paso Robles Formation Aquifer

The locations of the Paso Robles Formation Aquifer monitoring wells used to assess the hydrogeologic conditions of the Paso Robles Formation Aquifer are shown on Figure 5-1. Groundwater occurs in the Paso Robles Formation Aquifer under unconfined, semi-confined, and confined conditions.

5.1.2.1 Paso Robles Aquifer Groundwater Elevation Contours and Horizontal Groundwater Gradients

Groundwater elevation data for 1997 and 2017, respectively, for the Paso Robles Formation Aquifer were contoured to assess current spatial variations, groundwater flow directions, and horizontal groundwater gradients. Contour maps were prepared for the seasonal high groundwater levels, which is typically in the spring, and the seasonal low groundwater levels, which is typically in the fall. In general, the spring groundwater data are for April and the fall groundwater data are for October. Data from public and private wells were used for contouring; information identifying the owner or detailed location of private wells is not shown on the maps. The contours are based on groundwater elevations measured at the well locations shown on Figure 5-1. Contour maps were generated using a computer-based contouring program and checked for representativeness by a qualified hydrogeologist. Groundwater elevation data deemed unrepresentative of static conditions or obviously erroneous were not used for contouring. Similar to groundwater elevation contour maps prepared for previous studies, close inspection of the maps indicates localized areas where interpolated groundwater elevations are above land surface. This typically occurs near streams and incised drainages where land surface tends to be locally lower than surrounding areas. While it is hydrologically possible that groundwater elevations in the Paso Robles Formation Aquifer are above land surface in some local areas, this is more likely an artifact of the computer contouring of sparse groundwater elevation data.

Figure 5-3 and Figure 5-4 show contours of historical groundwater elevations in the Paso Robles Formation Aquifer for spring 1997 and fall 1997, respectively. Overall, groundwater conditions in the Subbasin in the spring and fall of 1997 are similar, but groundwater elevations are generally lower in the fall than spring. Groundwater elevations ranged from about 1,300 ft msl in the southeast portion of the Subbasin to about 550 ft msl near the City of Paso Robles and the town of San Miguel (Figure 5-3 and Figure 5-4). Groundwater flow direction is inferred as being from high to low elevations in a direction perpendicular to groundwater elevation contours. Groundwater flow direction is generally to the northwest and west over most of the Subbasin, except in the area north of Paso Robles where groundwater flow is to the northeast. In general, groundwater flow in the western portion of the Subbasin tends to converge toward areas of low groundwater elevations.

Groundwater gradients range from approximately 0.003 ft/ft in the southeast portion of the Subbasin to approximately 0.01 ft/ft in the areas both southeast of Paso Robles and northwest of Whitley Gardens. The steepest groundwater gradients in the Subbasin are on the margins of the pumping depression in the vicinity of the city of Paso Robles and community of San Miguel.

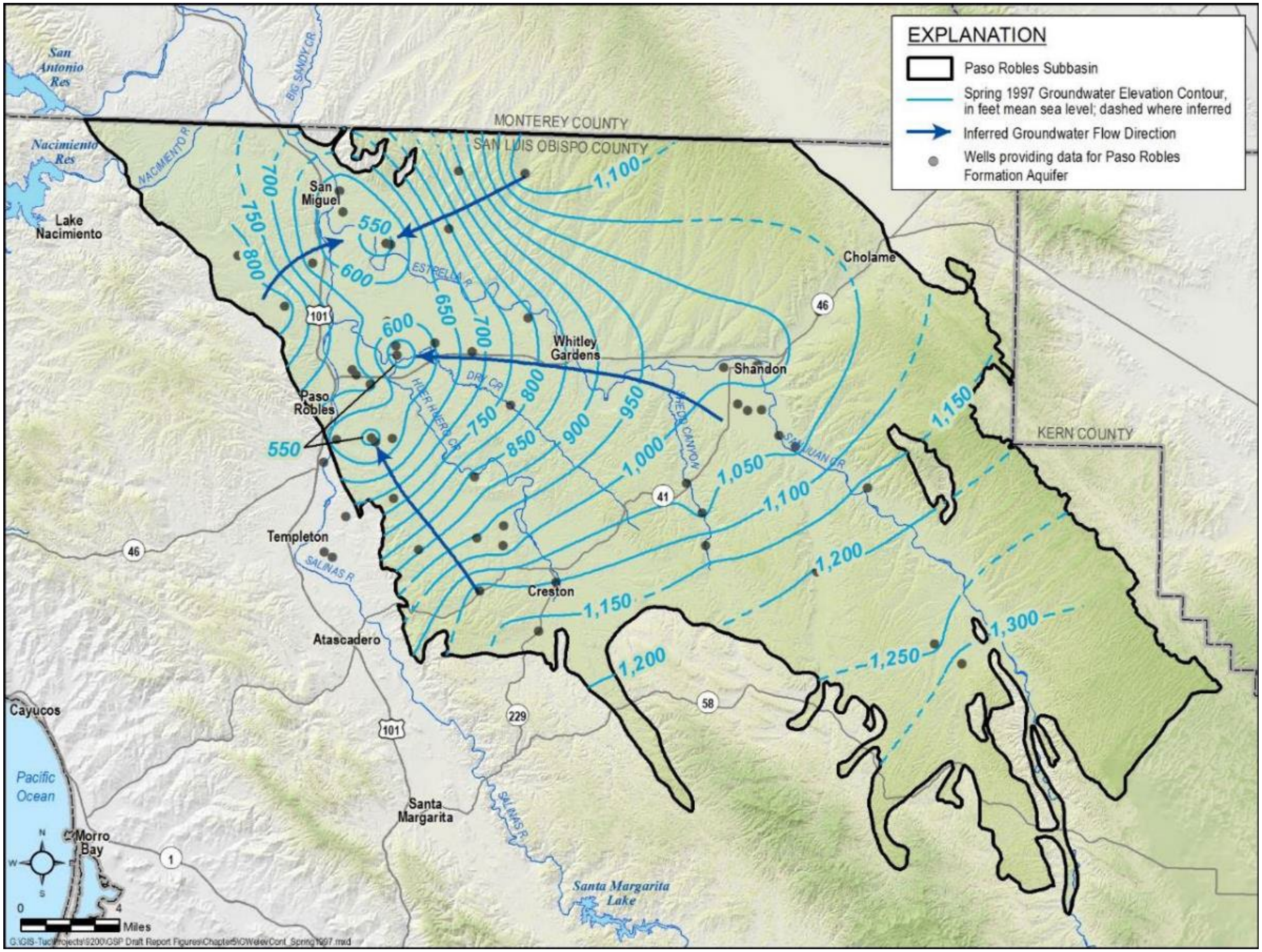


Figure 5-3. Paso Robles Formation Aquifer Spring 1997 Groundwater Elevation Contours

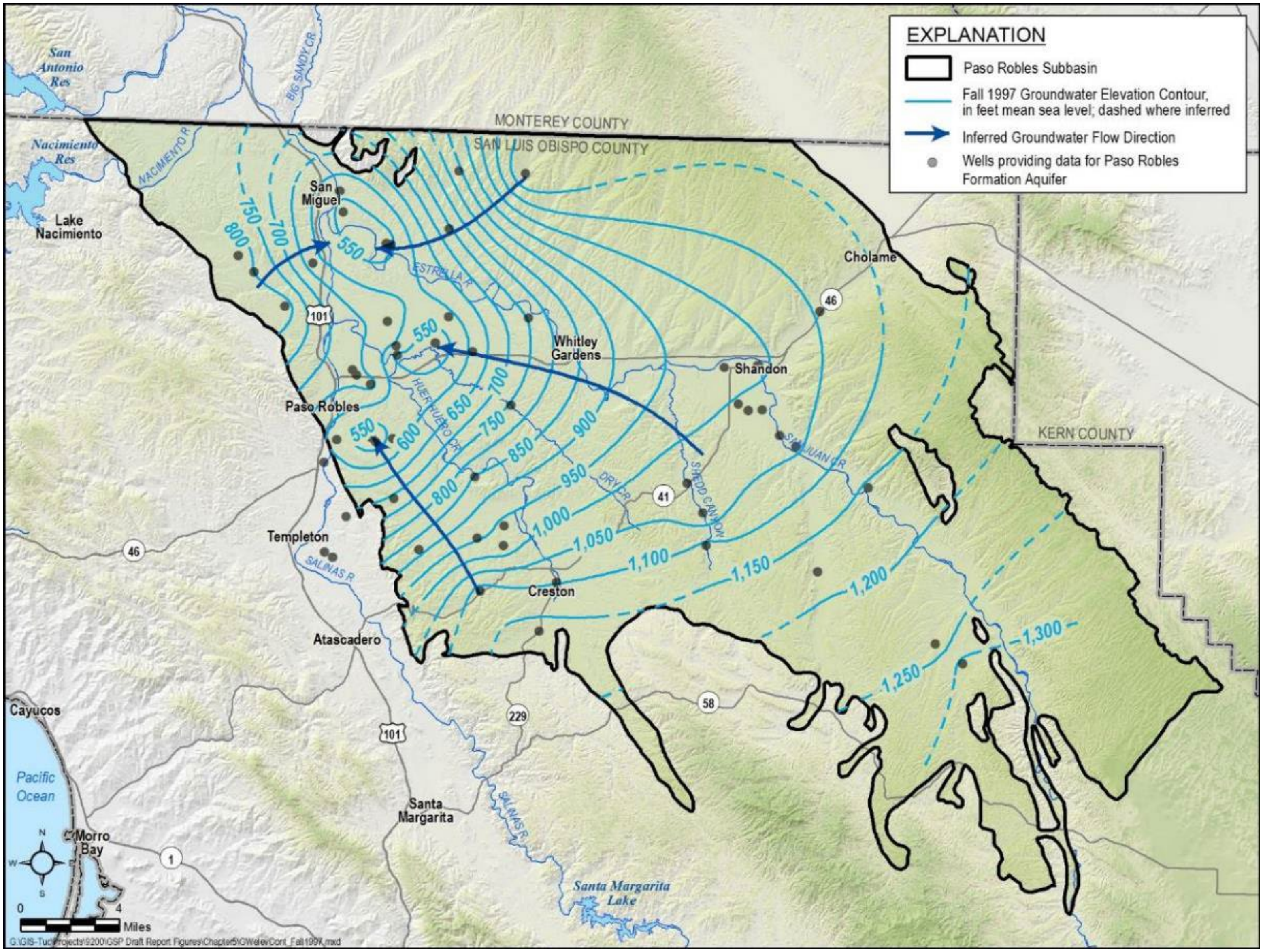


Figure 5-4. Paso Robles Formation Aquifer Fall 1997 Groundwater Elevation Contours

Figure 5-5 and Figure 5-6 show contours of current groundwater elevations in the Paso Robles Formation Aquifer for spring 2017 and fall 2017, respectively. Overall, groundwater conditions in the Subbasin in the spring and fall of 2017 were similar. Close inspection of the contour maps indicates that groundwater elevations are generally lower in the fall than spring. Groundwater elevations in 2017 are also lower than groundwater elevations in 1997. Groundwater elevations in 2017 ranged from about 1,250 ft msl in the southeast portion of the Subbasin to about 500 ft msl east of the City of Paso Robles (Figure 5-5 and Figure 5-6). Groundwater flow direction is inferred as being from high to low elevations in a direction perpendicular to groundwater elevation contours. Groundwater flow direction is generally to the northwest and west over most of the Subbasin, except in the area north of the City of Paso Robles where groundwater flow is to the northeast. In general, groundwater flow in the western portion of the Subbasin tends to converge toward areas of low groundwater elevations. These areas of low groundwater elevation are caused by pumping in the area between the City of Paso Robles and the communities of San Miguel and Whitley Gardens. Horizontal groundwater gradients range from approximately 0.002 foot/foot in the southeast portion of the Subbasin to approximately 0.02 foot/foot in the area southeast of Paso Robles. The steepest horizontal groundwater gradients in the Subbasin in 2017 are on the margins of the pumping depression east of Paso Robles and southeast of the community of San Miguel.

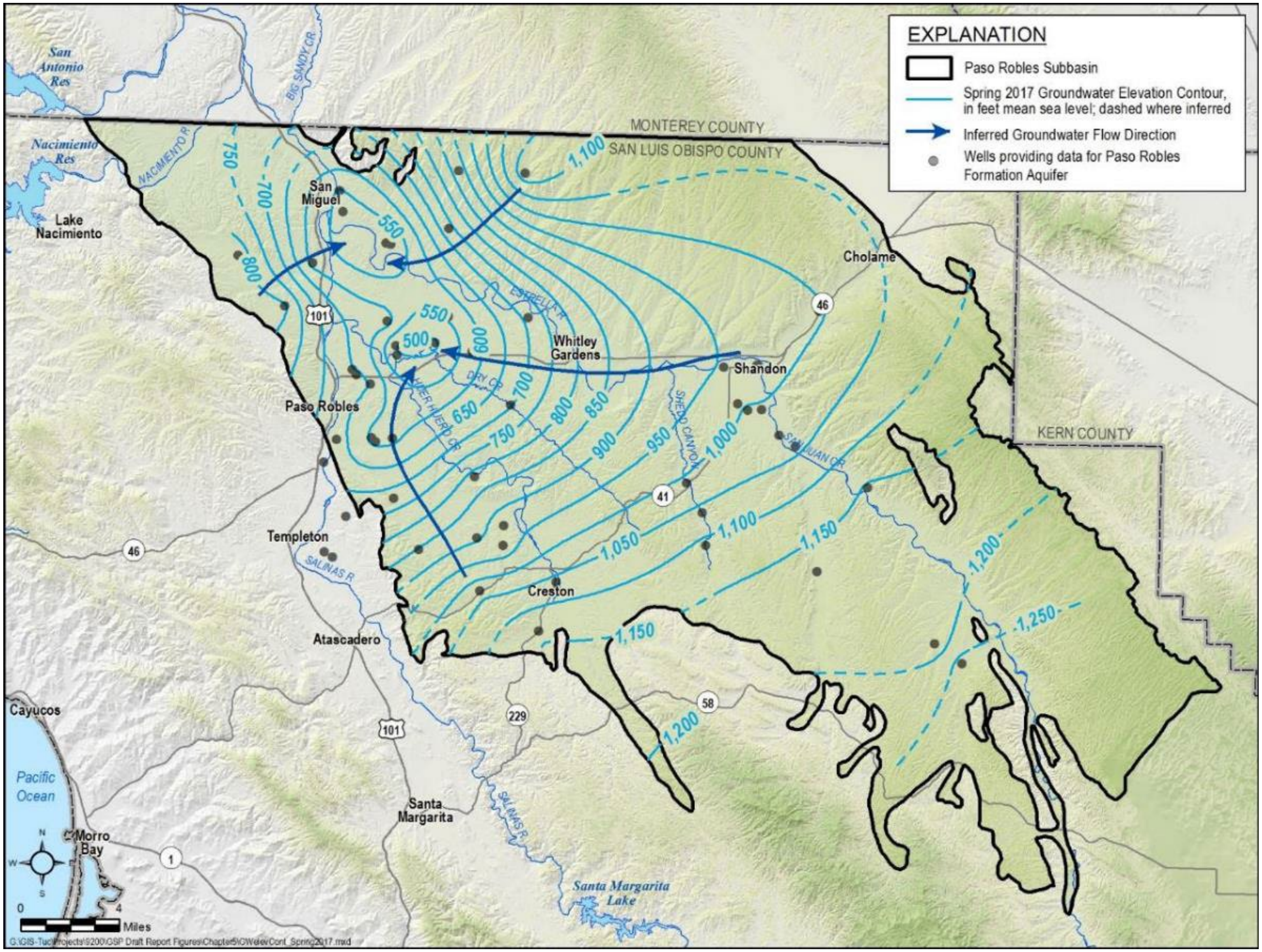


Figure 5-5. Paso Robles Formation Aquifer Spring 2017 Groundwater Elevation Contours

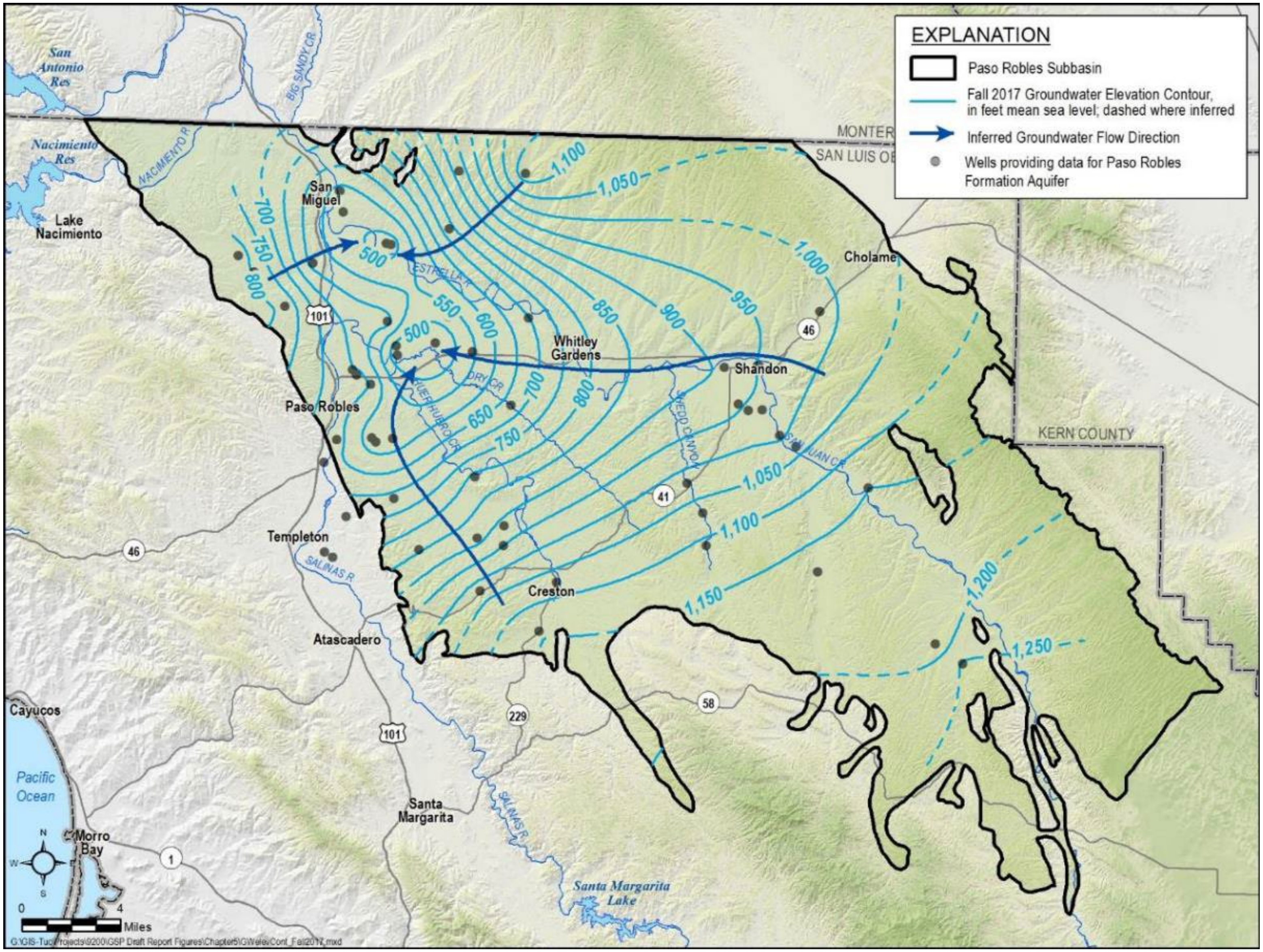


Figure 5-6. Paso Robles Formation Aquifer Fall 2017 Groundwater Elevation Contours

Figure 5-7 depicts the change in spring groundwater elevations in the Paso Robles Formation Aquifer between 1997 and 2017. Figure 5-8 depicts the change in fall groundwater elevations in the Paso Robles Formation Aquifer between and 1997 and 2017. Groundwater elevations are lower in 2017 than 1997 throughout most of the Subbasin. In general, the pattern of groundwater level decline in the spring and fall are similar, with a more pronounced area of decline extending toward Shandon in the fall. More than 80 feet of decline is observed in places during this period. Areas of largest decline are east of Paso Robles, near Creston, and in the southeastern portion of the basin. Limited data suggest an area of higher groundwater elevations exists in the vicinity of Paso Robles in 2017 compared to 1997. The increase may be related to reductions in groundwater pumping and proximity to the Salinas River. Monitoring data obtained during plan implementation will be used to further evaluate these areas.

The groundwater level contours and groundwater level change maps in this GSP are based on a reasonable and thorough analysis of the currently available data. As discussed in Chapter 8, the monitoring network should be expanded to more completely assess Subbasin conditions and demonstrate compliance with the sustainability goal for the Subbasin. Expanding the monitoring network and acquiring more groundwater elevation data will allow the GSAs to refine and modify this GSP in the future based on a more complete understanding of Subbasin conditions.

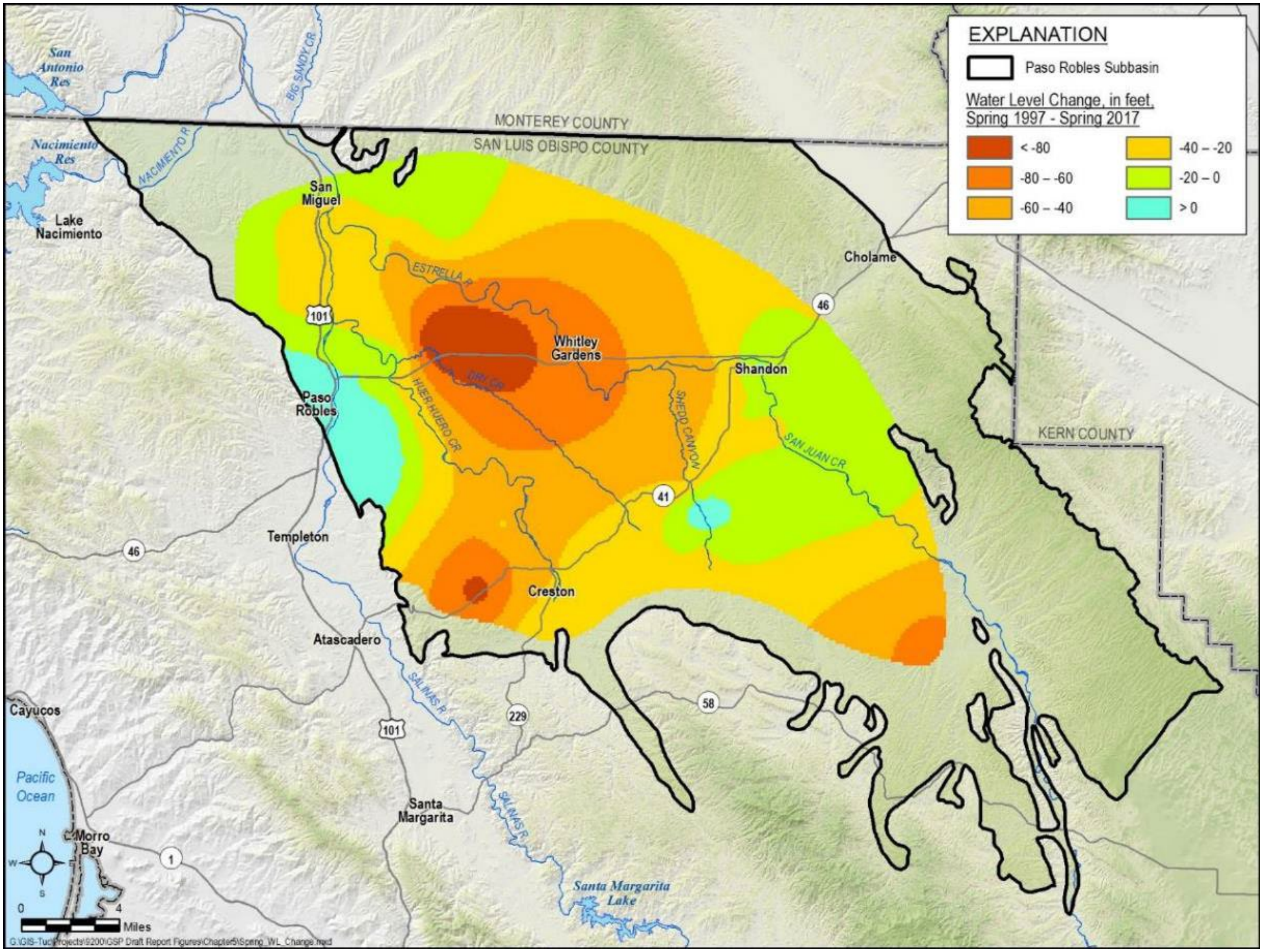


Figure 5-7. Paso Robles Formation Aquifer Change in Groundwater Elevation – Spring 1997 to Spring 2017

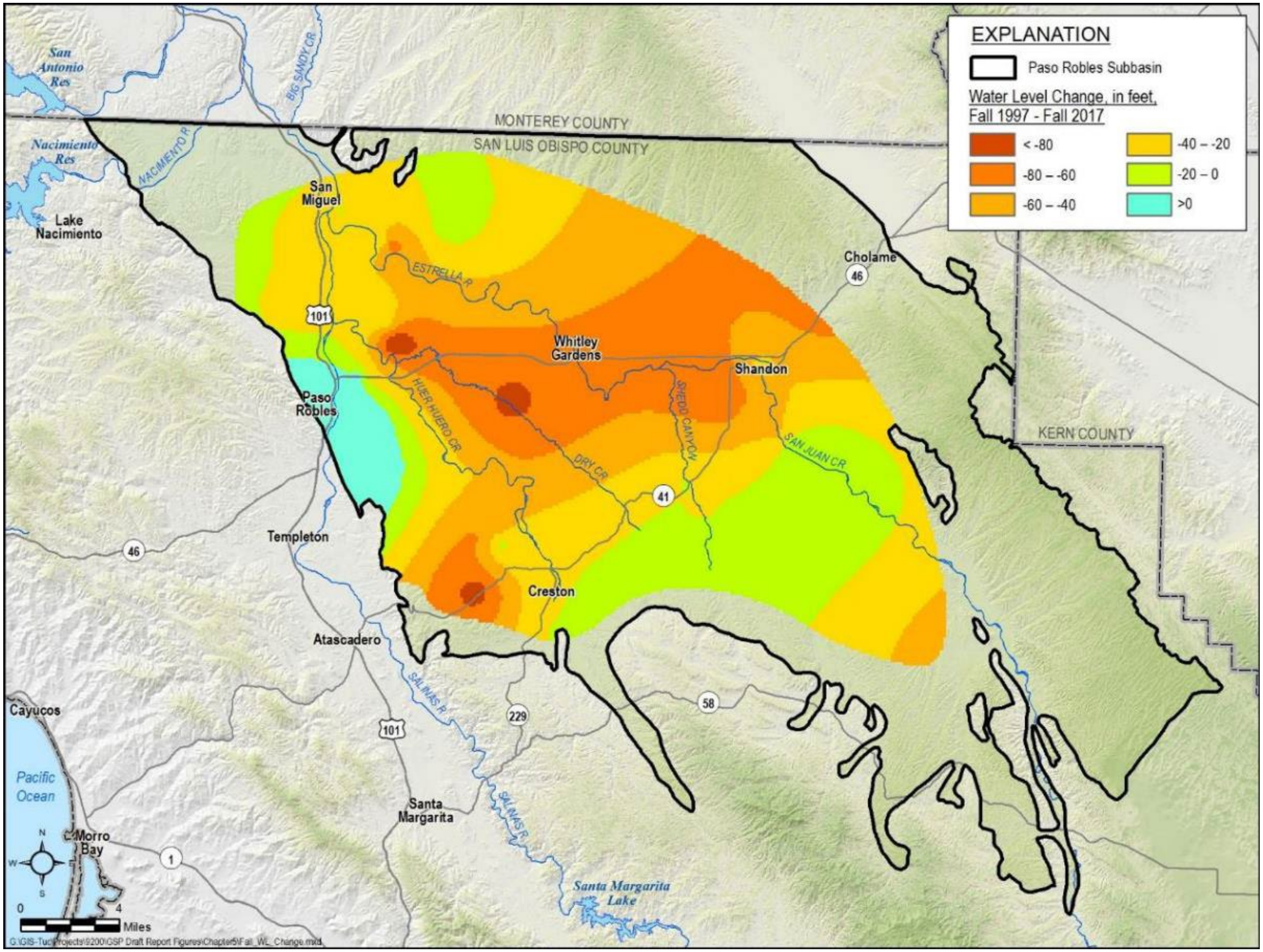


Figure 5-8. Paso Robles Formation Aquifer Change in Groundwater Elevation – Fall 1997 to Fall 2017

5.1.2.2 Paso Robles Formation Aquifer Hydrographs

Appendix D includes hydrographs for wells in the Paso Robles Formation Aquifer that have publicly available data. Only 22 of the monitoring wells have groundwater elevation data that were not collected under confidentiality agreements and sufficient information to confirm that the wells are screened in the Paso Robles Formation Aquifer. The lack of publicly available groundwater level data for the Paso Robles Formation Aquifer is a significant data gap. Long-term groundwater elevation declines are evident on some of the hydrographs shown in Appendix D. The magnitude of measured declines over the period of record is generally more than 50 feet at well 25S/12E-26L01, 26S/15E-20B02, and 27S/13E-28F01. Varying hydrogeology and pumping patterns in these locations leads to variable hydrographs for each of these wells.

The hydrographs show periods of climatic variations grouped by the following designations: wet, dry, or average/alternating wet and dry. Precipitation data were reviewed and analyzed to determine the occurrence and duration of wet and dry periods for the Paso Robles Subbasin. Precipitation from the Paso Robles weather station (NOAA station 46730) was used for this analysis because it is representative of conditions in the Subbasin and has the longest period of record of any station in the Subbasin. Figure 5-9 shows total annual precipitation by water year recorded at the Paso Robles station. Mean annual precipitation over the period 1925 to 2017 is 14.6 inches.

Wet and dry periods were determined based on a calculation and review of the Standardized Precipitation Index (SPI), which quantifies deviations from normal precipitation. The SPI was calculated at 1-, 2-, and 5-year time scales using the SPI Generator Tool developed by the National Drought Mitigation Center (NDMC, 2018). The 5-year, or 60-month SPI was selected as representative of multi-year meteorological fluctuations in the basin based on review of the data and computed SPI time series. For a given water year, the 60-month SPI quantifies the wetness or dryness of the preceding 60 months relative to the overall period of record. The annual time-series of the 60-month SPI was reviewed and generalized to determine wet and dry periods from 1930 to 2017 (Figure 5-9). A third category, “average/alternating”, is included for years during which the preceding 60-month period does not show a strong and persistent deviation from normal precipitation.

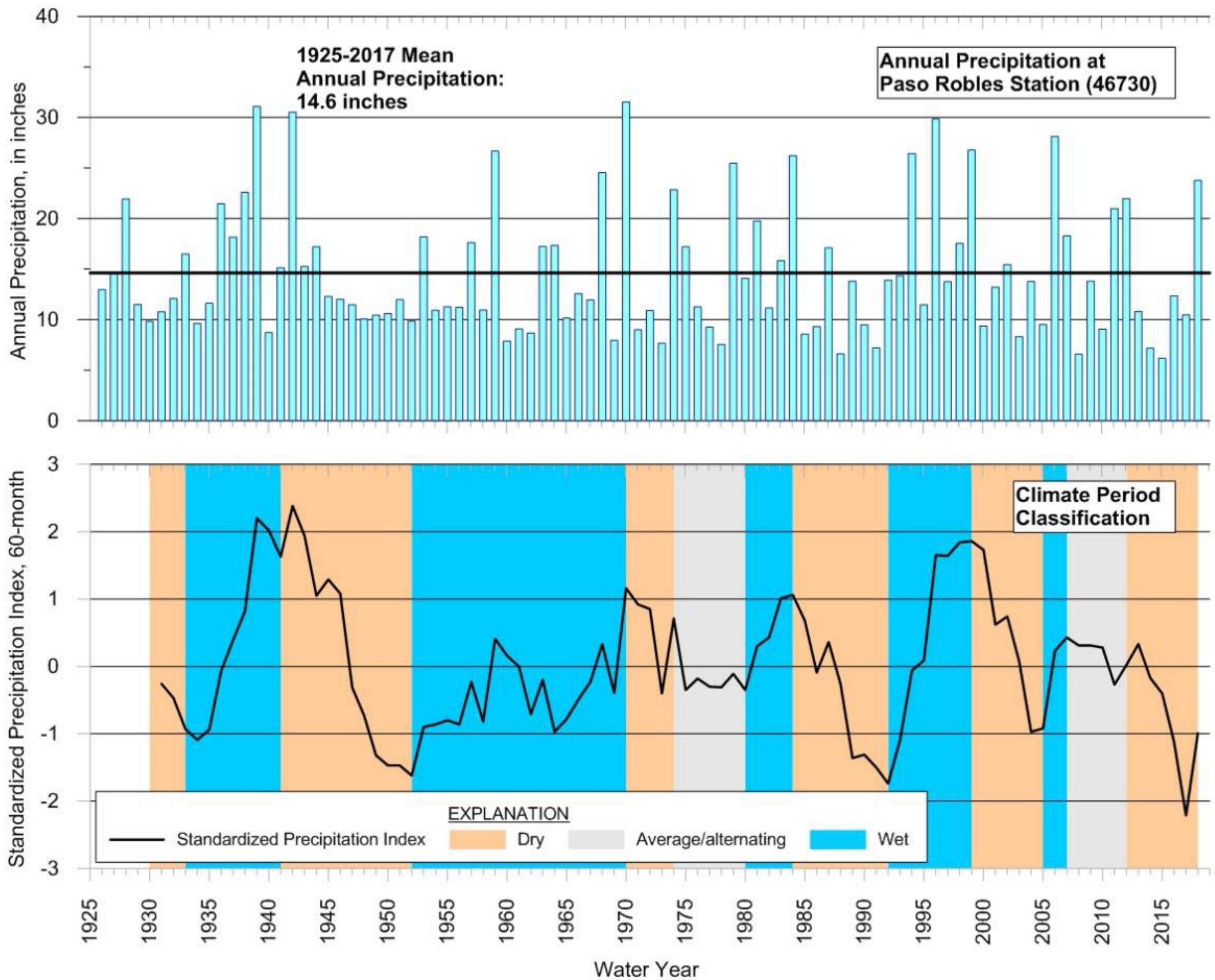


Figure 5-9. Climatic Periods in the Paso Robles Subbasin

5.1.3 Vertical Groundwater Gradients

SGMA regulations require assessment of vertical gradients to evaluate the vertical direction of groundwater movement between and within aquifers. Limited data exist to assess vertical groundwater gradients. Previous hydrologic studies of the Subbasin indicate that groundwater elevations are generally higher in the Alluvial Aquifer than the underlying Paso Robles Formation Aquifer, resulting in groundwater flow from the Alluvial Aquifer to the underlying Paso Robles Formation Aquifer (Fugro, 2005). The *Paso Robles Groundwater Basin Study, Phase II* (Fugro, 2005) stated that there is an assumed upward vertical groundwater gradient within the Paso Robles Formation near the northern portion of the Subbasin, although data were not provided to verify this assumption.

Vertical groundwater gradients can be estimated from nested or clustered wells. Wells 25S/12E-16K04, K05, and K06 are nested and provide groundwater elevation data from different depths in the Paso Robles Formation Aquifer near San Miguel. These wells are adjacent to a water supply well and therefore the vertical groundwater gradients may reflect local pumping conditions rather than broad, regional conditions. Hydrographs for these wells are shown on Figure 5-10. Groundwater levels in the shallowest well are shown with a green line, groundwater levels in the middle depth well are shown with a yellow line, and groundwater levels in the deepest well are shown with a red line. Prior to 2002, groundwater levels in the deepest well (red line) were generally higher than the groundwater levels in the middle and shallow wells, indicating an upward vertical groundwater gradient. A consistent vertical groundwater gradient is not apparent between the shallow and middle wells prior to 2002; groundwater elevations in the shallow and middle depth wells fluctuate around each other. After 2012, groundwater elevations in the deepest well were usually similar to or below the groundwater elevations in the shallow and middle depth wells; indicating a change to a downward vertical groundwater gradient.

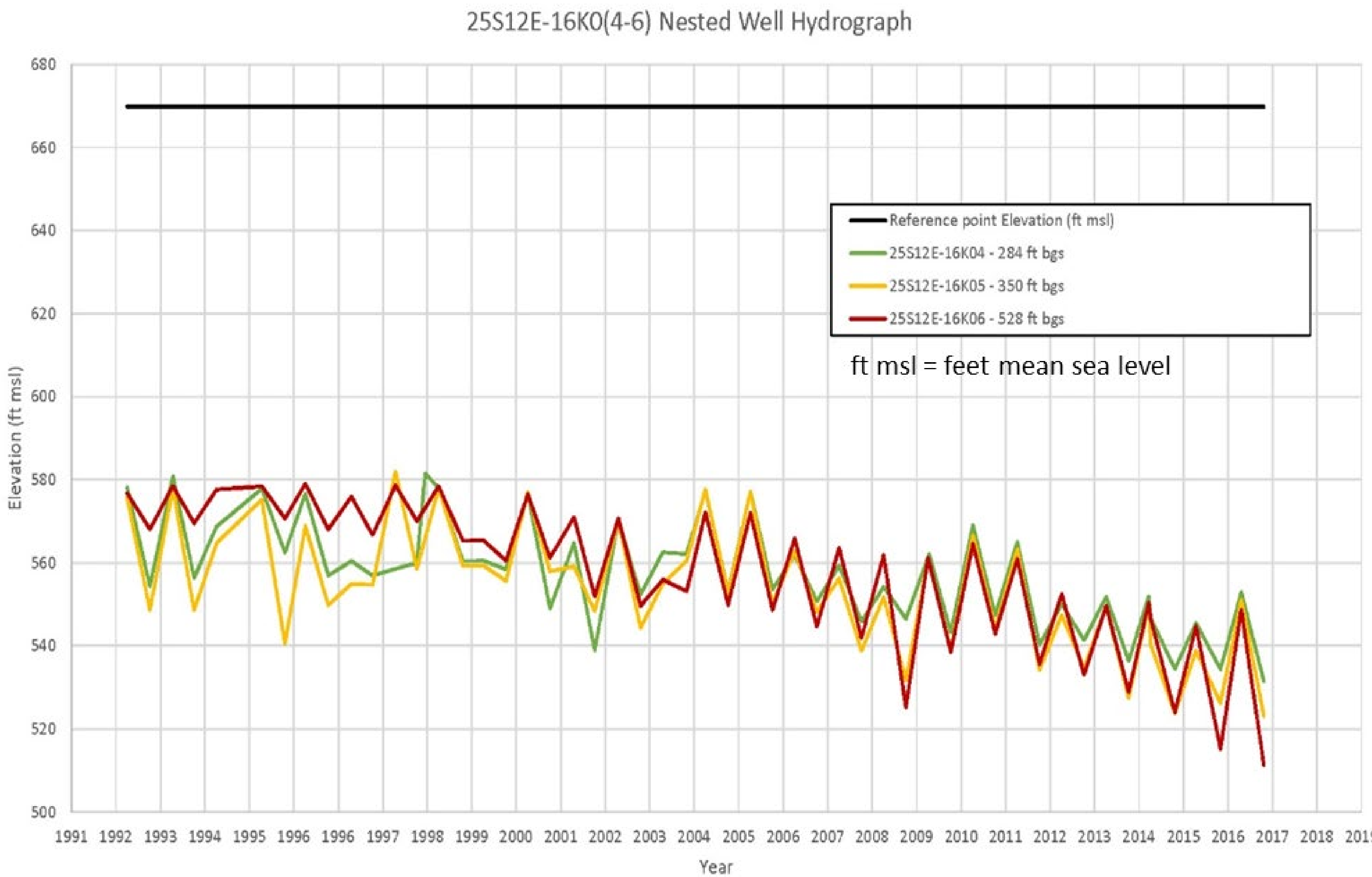


Figure 5-10. Vertical Groundwater Gradients near San Miguel

5.2 Change in Groundwater in Storage

This section summarizes changes in the amount of groundwater stored in the Subbasin. Changes in the amount of groundwater stored in the Subbasin were estimated for water years 1981 through 2016 using the updated Paso Robles Subbasin groundwater model. Chapter 6 provides additional information about the groundwater model.

5.2.1 Alluvial Aquifer

Figure 5-11 shows the cumulative change in the amount of groundwater stored in the Alluvial Aquifer for water years 1981 through 2016. The cumulative change is calculated as change since 1981. The period from 1981 through 2011 is considered representative of long-term hydrologic conditions prior to the drought period of 2012 through 2016. In accordance with SGMA Regulations § 354.16 (b), the graph also shows the estimated annual groundwater pumping derived from the updated groundwater model and wet, dry, and average/alternating climatic periods based on the analysis presented in Section 5.1.2.2. The cumulative change in storage is generally a function of both annual pumping and annual climatic conditions.

Over the period 1981 through 2011, the model indicates that approximately 20,000 acre-feet (AF) of storage change occurred in the Alluvial Aquifer. During the drought period 2012 through 2016, the model suggests a loss of groundwater in storage in the Alluvial Aquifer of about 50,000 AF. The loss of groundwater from storage during the drought represents an extreme condition which is not indicative of long-term storage trends in the Alluvial Aquifer.

As indicated on Figure 5-11, a decrease in the amount of groundwater stored in the Alluvial Aquifer generally occurs during dry periods and an increase in the amount of groundwater stored in the Alluvial Aquifer generally occurs during wet periods. During the period 1981 through 2011, estimated groundwater pumping from the Alluvial Aquifer decreased from about 6,000 AFY to about 2,000 AFY as indicated by the black bars on Figure 5-11. This suggests that the loss in groundwater in storage is not due to increased pumping, but is more likely a result of lack of recharge during low precipitation years.

The projections of groundwater storage loss in the Alluvial Aquifer were made using the groundwater model. Representation of groundwater conditions in the model for the Alluvial Aquifer is based on a relatively sparse groundwater level dataset. Available data suggest that groundwater levels in the Alluvial Aquifer over model period have been generally stable. This suggests that the amount of groundwater in storage has also been relatively stable. Additional groundwater elevation data will be obtained after GSP adoption to improve the understanding of groundwater conditions in the Alluvial Aquifer, update and recalibrate the groundwater model, and further evaluate groundwater storage conditions in the Alluvial Aquifer.

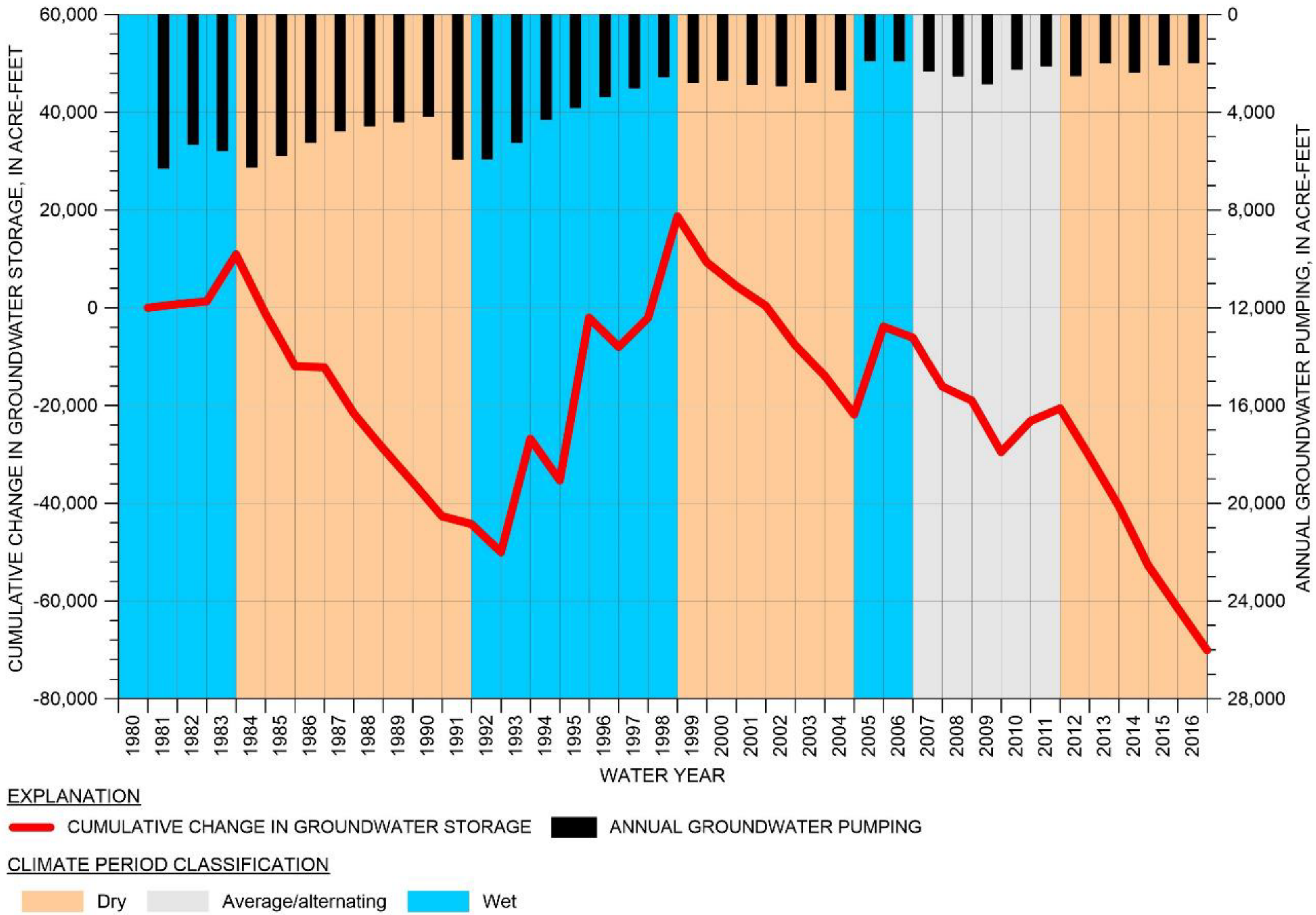


Figure 5-11. Estimated Cumulative Change of Groundwater in Storage in the Alluvial Aquifer

5.2.2 Paso Robles Formation Aquifer

Figure 5-12 shows the cumulative change of groundwater in storage in the Paso Robles Formation Aquifer for water years 1981 through 2016. In accordance with SGMA Regulations § 354.16 (b), the graph also shows the annual groundwater pumping and water year type. The climatic variation shown on Figure 5-12 is the same climatic variation developed on Figure 5-9. The cumulative change in storage is generally a function of both annual pumping and annual climatic conditions. Over the period 1981 through 2011, approximately 369,000 AF were removed from storage in the Paso Robles Formation Aquifer. Over the period 1981 through 2016, approximately 646,000 AF were removed from storage in the Paso Robles Formation Aquifer. Depletion of groundwater in storage generally occurs during dry periods and increases in groundwater in storage generally occur during wet periods, as indicated on Figure 5-12. Groundwater pumping decreased during the period from 1981 to 1999 and generally increased from 1999 to 2016. The loss in groundwater in storage in the Paso Robles Formation Aquifer appears to be from a combination of increased pumping since 1999 and a number of dry years with limited recharge.

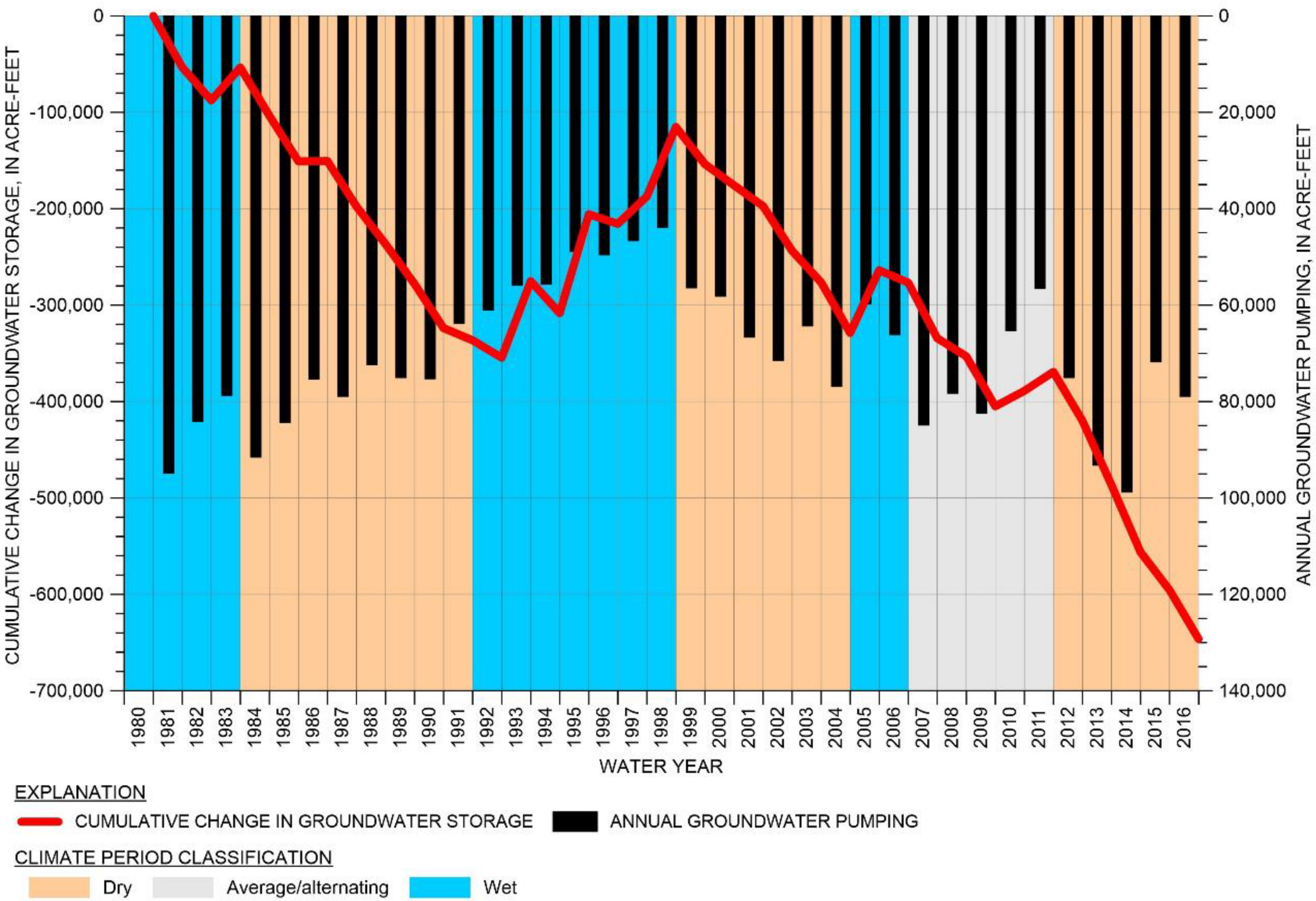


Figure 5-12. Estimated Cumulative Change of Groundwater in Storage in the Paso Robles Formation Aquifer

5.3 Seawater Intrusion

Seawater intrusion is not an applicable sustainability indicator for the Subbasin. The Subbasin is not adjacent to the Pacific Ocean, a bay, or inlet.

5.4 Subsidence

Land subsidence is the lowering of the land surface. While several human-induced and natural causes of subsidence exist, the only process applicable to the GSP is subsidence due to lowered groundwater elevations caused by groundwater pumping.

Historical subsidence can be estimated using Interferometric Synthetic Aperture Radar (InSAR) data provided by DWR. InSAR measures ground elevation using microwave satellite imagery data. DWR provides maps of the Subbasin depicting the difference in InSAR measured ground surface elevation for any two months between June 2015 and June 2018.

The InSAR data provided by DWR is subject to measurement error. DWR has stated that, on a statewide level, the total vertical displacement measurements between June 2015 and June 2018 is subject to two error sources (Brezing, personal communication):

1. The error between InSAR data and continuous GPS data is 16 mm (0.052 feet) with a 95% confidence level
2. The measurement accuracy when converting from the raw InSAR data to the maps provided by DWR is 0.048 feet with 95% confidence level.

Simply adding the errors 1 and 2 results in a combined potential error of 0.1 foot (or 1.2 inches). While this is not a robust statistical analysis, it does provide an estimate of the potential error in the InSAR maps provided by DWR. A land surface change of less than 0.1 feet is therefore within the noise of the data, and is equivalent to no subsidence in this GSP.

Figure 5-13 shows the InSAR measured subsidence in the Subbasin. The green area on Figure 5-13 is the area with measured ground surface rise or drop of less than 0.1 feet. This is within the measurement error and therefore is an area of no subsidence. The yellow area on Figure 5-13 is the area with measured ground surface drop of between 0.1 feet and 0.125 feet. This is slightly outside the measurement area, and may indicate subsidence of up to 0.025 feet over three years, or approximately 0.1 inches per year. This is a minor rate of subsidence and is relatively insignificant and not a major concern for the Subbasin. However, ongoing subsidence over many years could add up to a more significant ground surface drop and the GSAs will continue to monitor annual subsidence.

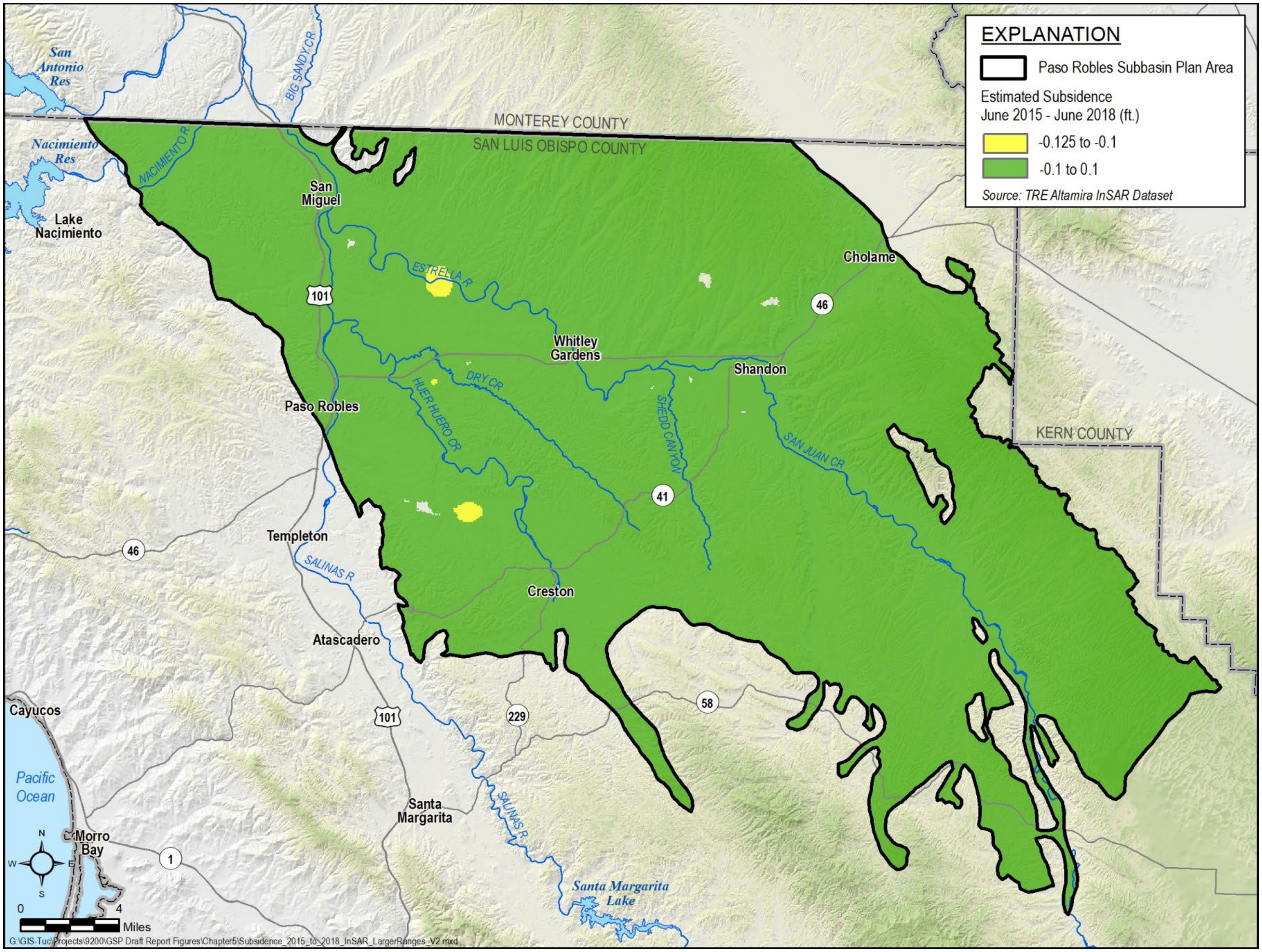


Figure 5-13. Subsidence 2015 to 2018 from InSAR Data

5.5 Interconnected Surface Water

SGMA regulations define interconnected surface water as "surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted" (§351 (o)). SGMA requires that GSPs evaluate "impacts on groundwater dependent ecosystems." (Water Code §10727.4(l)). Groundwater dependent ecosystems (GDEs) are defined in the GSP regulations as "ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface" (CCR § 351 (mm)). GDEs can be divided into two groups: plants and animals that depend on surface flow in streams (for example, fish, invertebrates, amphibians) and plants and animals that depend on a shallow water table accessible by plant roots (phreatophytic riparian vegetation and bird or other animal species that inhabit riparian vegetation). In this GSP, GDEs are discussed in the general category of interconnected surface water even though organisms in the second group strictly speaking rely only on a shallow water table, not surface flow in a stream.

Interconnection with stream flow occurs when the water table is near the stream bed elevation, and interconnection with riparian vegetation occurs when the water table is within the root zone, which generally extends to about 25 feet below the ground surface. These two elevation thresholds have different frequencies and durations of occurrence. Along some stream reaches, the water table might reach the stream bed elevation only when there is surface inflow and associated percolation. This connection might be present only during storm runoff events or seasonally in winter. In contrast, the water table may remain within the root zone for months even while water levels are seasonally declining. If the reach is in an area of regional groundwater discharge, the water table can be in the root zone most or all of the time. Thus, the duration of interconnection of groundwater with the riparian root zone is much greater than the duration of interconnection with surface flow in the stream.

In the Paso Robles Subbasin, major streams all overlie alluvial deposits, and interconnection is with alluvial groundwater. The alluvial deposits are relatively thin, and in some parts of the Basin there are extensive clay layers between the alluvium and the deeper aquifers of the Paso Robles Formation, where most pumping occurs. Accordingly, potential effects of pumping on interconnected surface water are evaluated in two steps: the effects of Paso Robles Formation pumping on alluvial groundwater levels, and the effects of alluvial groundwater levels on vegetation and stream flow. Pumping from the Alluvial Aquifer in the Basin is rare and generally occurs to meet domestic and limited livestock water demands. Large scale irrigation pumping from the Alluvial Aquifer does not typically occur in the Basin.

A generalized conceptual model of interconnection between surface water and groundwater in the Paso Robles Subbasin was articulated in SWRCB Decision 1585, issued in 1982 (SWRCB, 1982). The decision regarded a group of applications for surface diversions from tributaries to the Salinas River between Salinas Dam and the Nacimiento River. By that date, the SWRCB had already determined that groundwater in alluvial deposits along the Salinas River was classified as underflow subject to the rules of surface water appropriation. The Decision described hydrogeologic conditions and recharge processes in the Paso Robles Groundwater Basin, stating that there are "silty clays of low permeability existing within the upper portion of the Paso Robles Formation beneath and adjacent to the Salinas River alluvium… [that] appear to be sufficiently thick and extensive to act as a barrier separating underflow in the river alluvium from groundwater that occurs in the underlying older water-bearing formations." The clays were noted to extend eastward to about the community of Estrella along the Estrella River and the community of Creston along Huer Huero Creek. Upstream of the clays, some percolation from the Estrella River and Huer Huero Creek may directly recharge the Paso Robles Formation.

This hydrogeological conceptual model suggests that groundwater pumping—the preponderance of which is from the Paso Robles Formation—could potentially lower alluvial groundwater levels and deplete stream flows upstream of the clay layers but have only a negligible effect on alluvial water levels and stream flows overlying the clay layers. An additional geographic variation in regional hydrology is that the western part of the watershed surrounding the Subbasin is much wetter than the eastern part. Average annual precipitation over the Coast Ranges along the western side of the watershed is about four times greater than precipitation along the eastern edge of the watershed. As a result, surface runoff into the Salinas River is substantially greater than surface runoff into the Estrella River. The combined effect of greater surface inflow and confining layers beneath the alluvium is to enable the Salinas River to maintain relatively steady groundwater levels in the Alluvial Aquifer that support the establishment and growth of riparian vegetation. Except during major droughts, river recharge has been able to outpace leakage across the confining layers, even after water levels in deep wells have declined. In contrast, some stream reaches in the eastern half of the Subbasin do not appear to be buffered from the effects of pumping. Over several decades, pumping has lowered groundwater levels in localized areas within the Paso Robles Formation Aquifer, which may have potentially depleted stream flow in the past and may have decreased the extent and health of riparian vegetation. Throughout the majority of the Basin, these conditions occurred prior to 2015, and subsequent pumping has not exacerbated the depletion of stream flow. SGMA does not require that GDEs be restored to any condition that occurred prior to 2015.

The identification of interconnected stream reaches was based on a joint evaluation of multiple data sets related to interconnected surface water and GDEs, including precipitation, stream flow, groundwater levels, stream bed elevation, vegetation maps, aerial photographs of vegetation, satellite mapping of vegetation health, and results of groundwater modeling. A preponderance of evidence approach was used in delineating interconnected stream reaches, including subjective assessment of whether the frequency and duration of shallow water table conditions were sufficient to classify a reach as mostly or sometimes interconnected.

Many of the data used in the analysis pre-date 2015, which was the start of the SGMA management period. SGMA does not require that GDEs be restored to any condition that occurred prior to 2015. However, long-term data sets provide greater opportunity for differentiating the separate effects of variables that are often correlated. For example, precipitation, stream flow and groundwater levels are all potential sources of water for riparian vegetation, and all three are low during droughts. The extensive use of pre-2015 data in the analysis does not mean that this GSP intends to restore any conditions to a pre-2015 level.

Evaluation of the multiple data sets is summarized in subsections 5.5.1 through 5.5.4. Subsection 5.5.5 presents the delineated interconnected stream reaches while Subsection 5.5.6 addresses groundwater dependent animals. The technical studies addressing interconnected surface water and GDEs are all provided in Appendix C.

5.5.1 Groundwater Levels

Historical measurements of groundwater levels in wells can be used to identify where and to what extent Alluvial Aquifer water levels are different from Paso Robles Formation Aquifer water levels. The approach used to identify Alluvial Aquifer wells for this interconnected surface water analysis is not the same as the well-log based approach used for the groundwater elevation analysis in Section 5.1.1. The water-level database compiled for the GSP was screened to select wells with long periods of record located near streams. Thirty-one wells met these criteria. For the interconnected surface water analysis, the wells were classified as Alluvial Aquifer or Paso Robles Formation Aquifer based on the historical water level patterns. In Alluvial Aquifer wells, water levels remain relatively steady year after year at an elevation close to that of the nearby stream, and seasonal fluctuations are small. In wells completed in the Paso Robles Formation Aquifer, water levels exhibit seasonal fluctuations, have multiple-year trends in some areas of the Basin and are commonly substantially lower (rarely higher) than the nearby stream. Figure 5-14 shows sample hydrographs illustrating the two characteristic patterns.

Three of the five wells with an alluvial water table pattern are along the Salinas River, which is consistent with the conceptual model for interconnected surface water with the associated Alluvial Aquifer. One is near the Estrella River near the town of Estrella (Jardine Road), which the conceptual model suggests is still within the region of extensive clay layers beneath the alluvium. The final well is next to San Juan Creek about 7 miles upstream of Shandon. Its hydrograph is not as strongly alluvial, but the water levels are close to the creek bed elevation and fairly steady. In these locations, there is no evidence of alluvial water level declines as a consequence of pumping from the Paso Robles Formation Aquifer.

Two new pairs of monitoring wells installed in 2021 provided additional confirmation of the conceptual model (Cleath-Harris Geologists, 2021). One shallow-deep pair is next to the Salinas River at the 13th Street bridge. Water levels in both wells were within 3 feet of the riverbed elevation, indicating interconnection with surface water with the Alluvial Aquifer and a local absence of drawdown in the Paso Robles Formation Aquifer. The other pair was next to the Estrella River at Airport Road. These wells were constructed in 2021 as part of a Supplemental Environmental Project (SEP) which was implemented by the City of Paso Robles. This site is within the region where extensive shallow clay layers are thought to be present, and the water levels appear to confirm this. The shallower well was screened down to 40 feet below the ground surface and had a depth to water of 29.5 feet. The top of the screen in the second well was 160 feet deeper and its water level was 158 feet lower. This represents a vertical water-level gradient close to unity, which means the shallow aquifer is perched above the clay layers and there is an unsaturated zone between the shallow and deep aquifers.

It is recommended that pairs of shallow and deep monitoring wells be installed along the Estrella River upstream of Estrella and along San Juan Creek to provide a better understanding of the relationship between the Alluvial Aquifer and the underlying Paso Robles Formation Aquifer in these areas. Installation of additional monitoring wells is described in the monitoring discussion in Section 7.6.

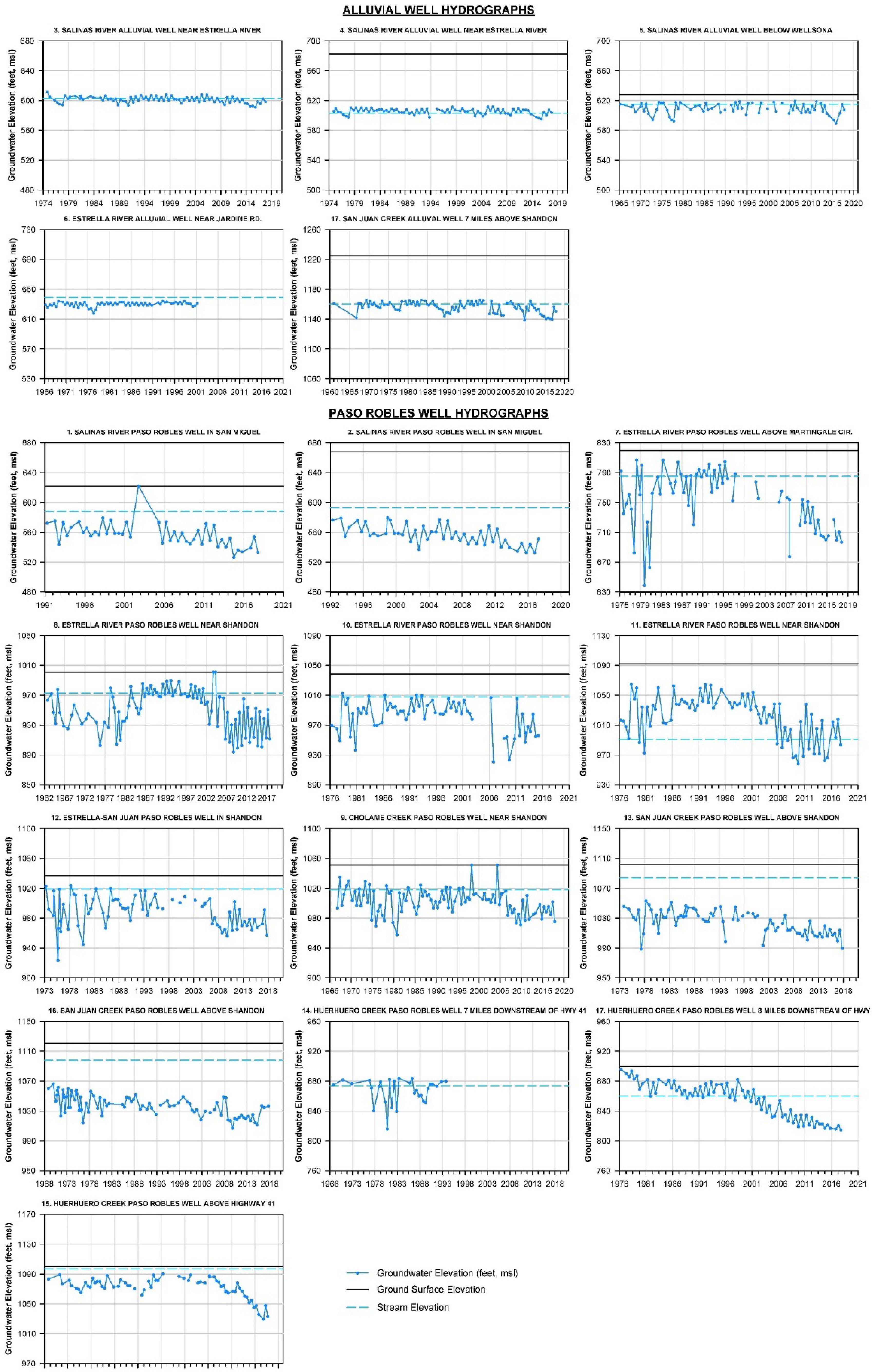
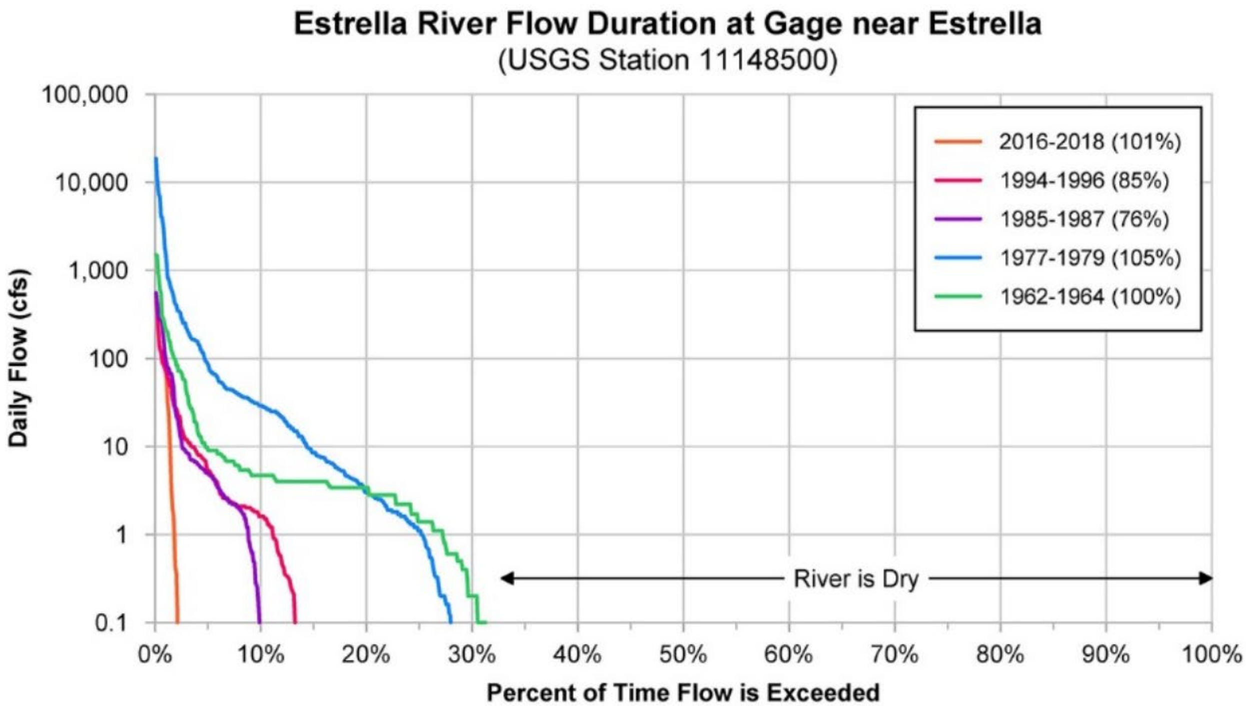


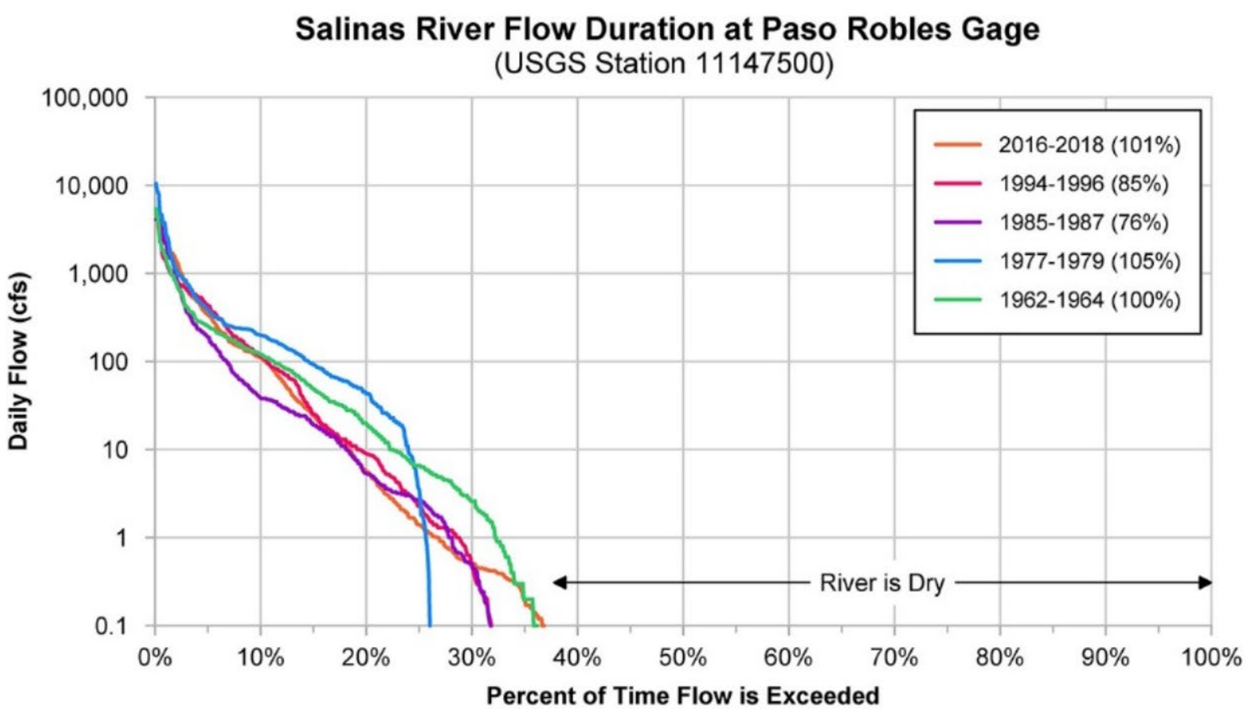
Figure 5-14. Alluvial and Paso Robles Well Hydrographs

5.5.2 Stream Flow

Differences between the low-flow regimes in the Salinas and Estrella Rivers are generally consistent with the hydrologic conceptual model and provide some evidence of flow depletion historically due to pumping along the Estrella River, although the flow record indicates that flow in the Estrella River are infrequent and typically only occur in response to seasonal wet weather conditions. Based on a review of the available stream flow records, any depletion of surface flow within the Estrella River occurred prior to 2015, and subsequent pumping has not resulted in the depletion of stream flow. SGMA does not require that GDEs be restored to any condition that occurred prior to 2015. The Salinas River gage is at Paso Robles, at the upstream edge of the Subbasin. Flows at that location do not reflect percolation or pumping effects within the Subbasin. The Estrella River gage is at Airport Road, downstream of the reaches potentially impacted by pumping. The gage was out of service from 1997-2015, but low-flow data for 2016-2018 was compared with data for 1955-1996.

Figure 5-15 shows flow-duration curves for both rivers for four three-year time intervals, roughly a decade apart from the 1960s to 2010s. Each curve displays all daily flows during a three-year period sorted from largest to smallest. The horizontal X axis shows the percentage of time each flow magnitude is exceeded. For perennial streams, the curves would extend across the entire width of the graph because flow exceeds zero 100 percent of the time. For seasonally intermittent streams, the curve bends down and crosses the X axis indicating the percentage of time flow is greater than zero. By plotting the vertical Y axis on a logarithmic scale, changes in low flows are visually expanded. If stream flow depletion is occurring, the effect is to curtail the duration of low flows (bend the curve downward) and shift the X axis intercept to the left.





Note: Percentages in legend indicate precipitation at Paso Robles as percent of 1910-2021 average

Figure 5-15. Flow-Duration Curves for Estrella and Salinas Rivers

As documented in Figure 5-15, low flows in the Estrella River have become progressively shorter in duration over the past five decades, indicated by the curves shifting progressively to the left. In contrast, the curves for the Salinas River have remained in a cluster, with no trend to the right or left. These curves suggest that flows upstream of the Estrella gage may have historically been interconnected with groundwater and subject to depletion by groundwater pumping and lowered groundwater levels. Based on a review of the available stream flow records, any depletion of surface flow within the Estrella River occurred prior to 2015, and subsequent pumping has not resulted in the depletion of stream flow. SGMA does not require that GDEs be restored to any condition that occurred prior to 2015.

Low flows and/or damp channel sediments visible in historical aerial photographs provide additional evidence of interconnection between surface water and groundwater. Along the Salinas River, flows as low as 5-8 cfs at the Paso Robles gage produced continuous surface flow all the way to the Nacimiento River, indicating negligible percolation due to a high water table. At other times, flow became discontinuous even when flow at the gage was considerably higher, probably indicating refilling of the Alluvial Aquifer after a period without surface flow.

Air photos indicate a potential for variable interconnection along the Estrella River upstream of the gage. Open water or ribbons of very damp soil along the channel were commonly present at various locations from about 4 miles upstream of Whitley Gardens to about 0.5 mile downstream of Whitley Gardens and along about a 1-mile reach near Martingale Circle (about 5 channel miles downstream of Whitley Gardens) prior to 2012. This reach is referred to in this analysis as the “middle reach” of the Estrella River. Since 2012, those apparent gaining conditions along the middle reach have not been visible in dry season air photos, possibly due to the 2012-2016 drought or to long-term declines in groundwater levels. No efforts were made to ground truth or physically verify the presence of these features. Although there is no evidence that pumping from the Paso Robles Formation Aquifer is affecting Salinas River flows, it is recommended that additional investigations be undertaken to further characterize this area.

5.5.3 Riparian Vegetation

Vegetation patterns along streams can also be used to map potential interconnection of surface water and groundwater because growth is more vigorous where plant roots can reach the water table. There are limitations to this approach, however. First, some plant species are facultative phreatophytes, which means they will establish and grow with or without continuous access to the water table. A second limitation is that riparian vegetation in shallow water table areas is subject to mechanical removal by flood scour In spite of these limitations, broad patches of dense riparian vegetation stand out in aerial photographs and provide an indication of where the water table is shallow and interconnected with the root zone and possibly also the stream channel.

A source of vegetation mapping often used for preparing GSPs is the Natural Communities Commonly Associated with Groundwater (NCCAG) mapping provided in georeferenced digital formats on DWR's SGMA Data Portal. The NCCAG maps of potential riparian and wetland vegetation are statewide compilations of numerous local vegetation mapping studies, mostly from the early 2000s. However, a detailed comparison of vegetation and wetland polygons in the NCCAG maps with aerial photographs revealed that the accuracy of the NCCAG vegetation delineations is poor in the Subbasin (Appendix C).

For the purposes of the interconnected surface water analysis for this GSP, a new map of riparian and wetland vegetation was created by digitally outlining areas of visibly dense riparian trees or shrubs more than about 50 feet wide along river and creek channels based on May 2017 aerial photography. The photography represents non-drought conditions in a year close to the start of the SGMA management era (January 2015). For isolated wetlands, mapped polygons in the NCCAG data set were compared with the 2017 aerial photographs and retained as groundwater dependent wetlands if they exhibited open water or bright green herbaceous vegetation in the dry season and were natural features (as opposed to constructed stock ponds).

The resulting map of groundwater-dependent vegetation is shown in Figure 5-16. In-channel riparian and wetland vegetation is mapped as polygons accurately delineating the perimeter of the vegetation patch. Isolated wetlands are shown using symbols because many of them would otherwise be too small to see on a basin-scale map. The vegetation distribution is generally consistent with the conceptual model for interconnected surface water. Dense riparian vegetation is most abundant along the Salinas River, which has relatively large and persistent surface flows as well as consistently shallow depth to groundwater in the adjacent Alluvial Aquifer. These conditions also result in a relatively high abundance of in-channel wetlands. Riparian vegetation along the Estrella River is generally sparser but is more abundant along the middle reach than the upper and lower reaches. Patches of sparse and dense riparian vegetation and even potential wetlands are present along San Juan Creek at locations more than about 10 miles upstream of Shandon. No efforts were made to ground truth or physically verify the presence of these features and there is no evidence that pumping from the Paso Robles Formation Aquifer is affecting these areas.

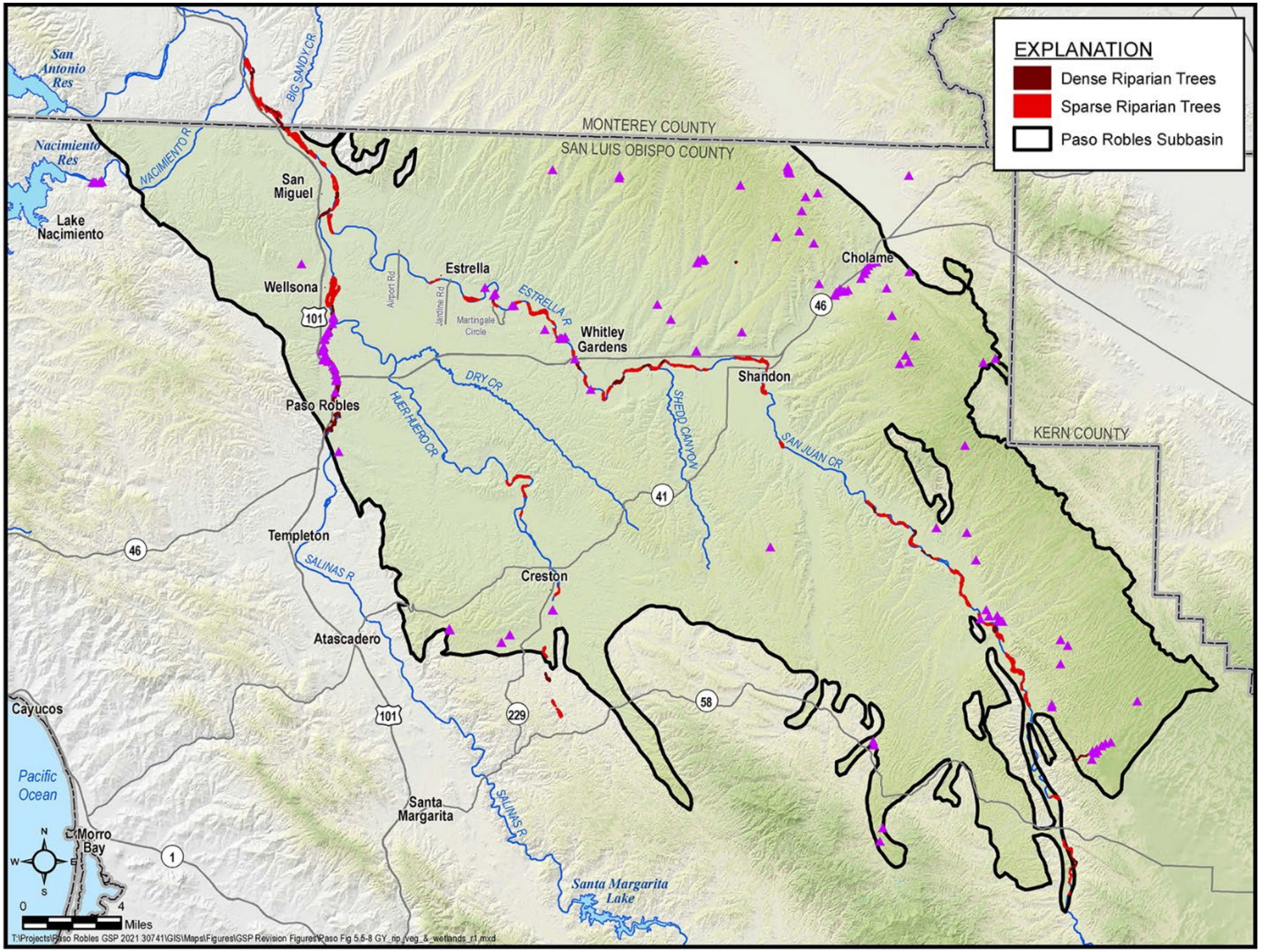


Figure 5-16. Groundwater Dependent Vegetation in Paso Robles Subbasin

Riparian vegetation conditions in 2018 was compared with conditions in 1994 along the entire lengths of the Salinas River, Estrella River, Huer Huero Creek and San Juan Creek using aerial photographs. Both of those dates were 2-4 years after the end of a major drought, and the droughts were of similar intensity and duration. In other words, precipitation and stream flow conditions during the years immediately preceding the two photographs were similar, but groundwater levels were different. Between those two periods, there were cumulative water-level declines in Paso Robles Formation Aquifer wells of 25-70 feet in the eastern part of the Subbasin. Water levels in Alluvial Aquifer wells along the Salinas River remained stable until 2011, declined 12-18 feet during 2012-2016 and then recovered (see Figure 5-14). The density and extent of patches of riparian vegetation along the waterways in 2018 was visually classified as “more”, “the same” or “less” than in 1994.

The results of the vegetation comparison are shown in Figure 5-17. Where there were differences along the Salinas River, they were all decreases in vegetation coverage. Review of additional photographs between 1994 and 2018 indicated that the decrease in vegetation occurred almost entirely during 2013-2017. This suggests that the relatively small and temporary declines in alluvial water levels during 2012-2016 were large enough to adversely impact vegetation. Along the Estrella River, vegetation coverage mostly declined near Shandon and along the downstream end toward the Salinas River, and the declines occurred over a longer period. Along the middle reach, however, vegetation coverage unexpectedly increased in a number of locations. This is the same river segment where gaining flow could be seen in aerial photographs up until 2012, indicating a near-surface water table. Although that river segment is thought to be east of the extensive near-surface clay layers in the Paso Robles Formation Aquifer, some aspect of hydrogeology and recharge appears to be sustaining a high water table in spite of large water-level declines in deeper wells in that region. No efforts were made to ground truth or physically verify the river geology in this area and additional investigations would be required to further characterize this area.

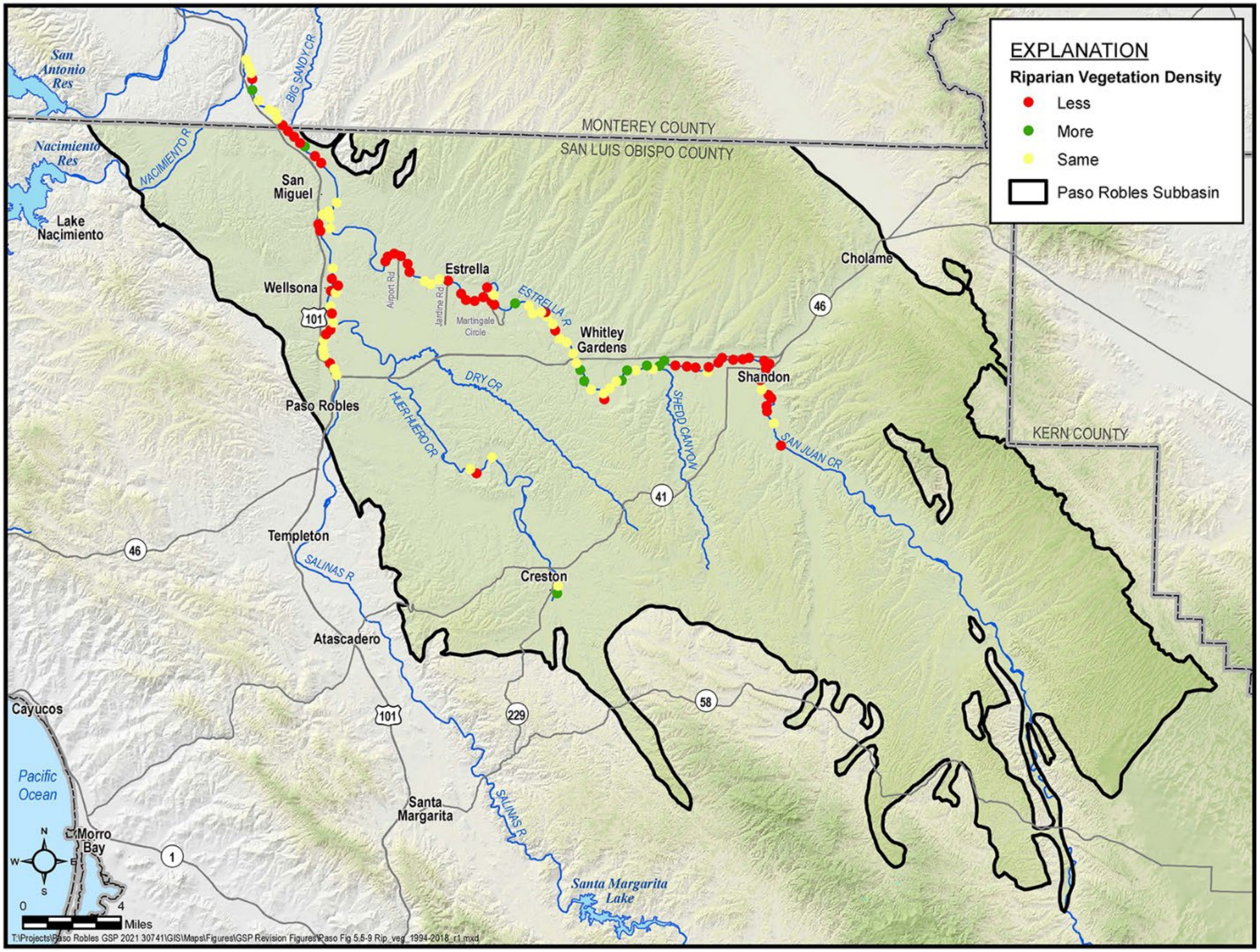


Figure 5-17. Density of Riparian Vegetation, Paso Robles Subbasin

Additional vegetation data were evaluated for indications of changes related to groundwater levels (Appendix C). Briefly, high-resolution aerial photographs for 2013 and 2017 were inspected to identify four limited locations where riparian trees appear to have died during the recent drought. These locations generally occur where Paso Robles Formation Aquifer groundwater levels had been declining for a few decades or where Alluvial Aquifer groundwater levels declined by over 10 feet for a few years between 2013 and 2017.

An Enhanced Vegetation Index (EVI) trend analysis was performed for the sparse and dense riparian vegetation areas presented on Figure 5-16 for the purpose of identifying and evaluating trends in riparian vegetation health as an indicator of potential long-term trends in surface water-groundwater interactions within stream reaches. EVI data provide an indicator of healthy, well-watered vegetation. It is calculated from the proportions of visible and near-infrared sunlight reflected by vegetation. EVI values typically range from zero to over 0.7. Healthy, or well-watered, vegetation absorbs most of the visible light that hits it and reflects a large portion of near-infrared light, resulting in a high EVI value. Unhealthy, dry, or dormant vegetation reflects more visible light and less near-infrared light, leading to a lower EVI value.

The EVI analysis was processed in Climate Engine (Huntington et al., 2017) using Landsat data from January 2009 through present. This analysis period is considered representative of recent hydrologic conditions as it begins and ends with similar hydrologic conditions and includes dry, wet, and average periods. The results of this study indicate that riparian vegetation health has generally remained stable over the analysis period suggesting that Alluvial Aquifer groundwater levels have remained a reliable water source within the rooting zone depth of the established riparian communities. Observed cyclical patterns of increasing and decreasing riparian vegetation health correlate strongly with water year type indicating that water levels in the Alluvial Aquifer operate independently from the long-term declining water levels induced by groundwater pumping in the underlying Paso Robles Formation Aquifer (Appendix C).

5.5.4 Simulated Groundwater-Surface Water Interconnection

Results of groundwater modeling provide additional clues regarding the location and timing of interconnected surface water. Stream cells where annual groundwater discharge into the stream averaged 10 AFY or more were shown on Figure 4-17. Those locations included the Salinas River above Huer Huero Creek and along a 3-mile reach below San Miguel. They also included the middle reach of the Estrella River. Those locations are consistent with the water level and vegetation data presented above. However, the model also had gaining stream reaches along Huer Huero Creek and parts of the upper reach of the Estrella River (from Shandon down to Shedd Canyon), where historical vegetation does not indicate the presence of shallow groundwater. This might indicate a bias in modeling results toward slightly high

Alluvial Aquifer groundwater levels along those rivers. Conversely, the model did not simulate gaining flow where the San Juan Fault crosses San Juan Creek, where a perennial spring is located in the channel.

The locations of simulated gaining and losing reaches were also compared for 1998 and 2016, representing years with relatively high and low groundwater levels, respectively. The locations of simulated gaining reaches in 1998 closely matched the locations of simulated groundwater inflow shown in Figure 4-17. As expected, the lengths of the gaining reaches were much shorter in 2016 but still included part of the middle reach of the Estrella River near Whitley Gardens, where a dense patch of riparian vegetation is present.

5.5.5 Delineation of Interconnected Surface Water

Stream reaches where groundwater may potentially be interconnected with surface flow or the riparian vegetation root zone are shown in Figure 5-18. The delineation is based on an interpretation of the data and analyses described in the preceding sections. This involved some subjective assessments such as differentiating "dense" from "sparse" riparian vegetation or estimating how frequent and persistent interconnection may be designated "interconnected". Along stream channels, two categories of interconnection were assigned: interconnection with surface water and interconnection with riparian vegetation. The former requires higher water levels and typically occurs less frequently or for shorter periods of time. The latter includes areas where the water table is less than about 25 feet below the stream bed most of the time. Empirically, this is the root zone depth associated with the presence of dense riparian vegetation. These considerations are discussed by stream reach below. No efforts were made to ground truth or physically verify the presence of actual interconnection and there is no evidence that pumping from the Paso Robles is currently affecting these areas.

The entire length of the Salinas River from Paso Robles to the confluence with the Nacimiento River was classified as interconnected with surface water and shallow groundwater in the Alluvial Aquifer. The presence of very stable water levels close to the riverbed elevation in all Alluvial Aquifer wells along that reach supports this designation, as does the presence of sparse to dense riparian vegetation along most of the reach. Even small inflows to the upper end of the reach commonly extend along the entire length of the reach, which also indicates that the water table is at or near the riverbed elevation along the entire length of the reach.

The Estrella River below Estrella (near Jardine Road) was classified as not interconnected. This classification reflects the very small amount of riparian vegetation along the entire reach throughout the analysis period (1989-2021). Although shallow clay layers are thought to be present in this area and the new shallow monitoring well at Airport Road confirms the presence of a water table 30 feet below the ground surface, this depth to water appears to be too great for vegetation to readily establish given the low frequency and duration of surface flow in the river.

The middle reach of the Estrella River, from Jardine Road up to Shedd Canyon contains alternating segments that appear to be not connected or are potentially connected to the vegetation root zone. These segments were classified primarily on the density of riparian vegetation. The only confirmation of groundwater levels is at a single well near the downstream end of the middle reach, where the depth to water was consistently about 10 feet below the riverbed. Emergent flow appeared to be present in some dry-season aerial photographs along a segment below Shedd Canyon, about 2.5 to 4 miles upstream of Highway 46. Open water or wet channel sediments appear to be present in some aerial photos in winter or spring but not during the dry season since about 2012. Thus, that segment was not classified as interconnected with surface water as of the start of the SGMA management period (2015).

The Estrella River from Shedd Canyon up to Shandon and the lowermost 10 miles of San Juan Creek were classified as not interconnected. Although sparse riparian vegetation is present in places, the depth to groundwater in Paso Robles Formation Aquifer wells has been declining for decades and now exceeds the rooting depth of riparian vegetation. The vegetation that remains probably consists of facultative phreatophytes or is vestigial mature vegetation that has managed to survive declining water levels. In any case, recruitment of new phreatophytic riparian vegetation is very unlikely under current conditions. Many of the data used in the analysis pre-date 2015, which was the start of the SGMA management period. SGMA does not require that GDEs be restored to any condition that occurred prior to 2015.

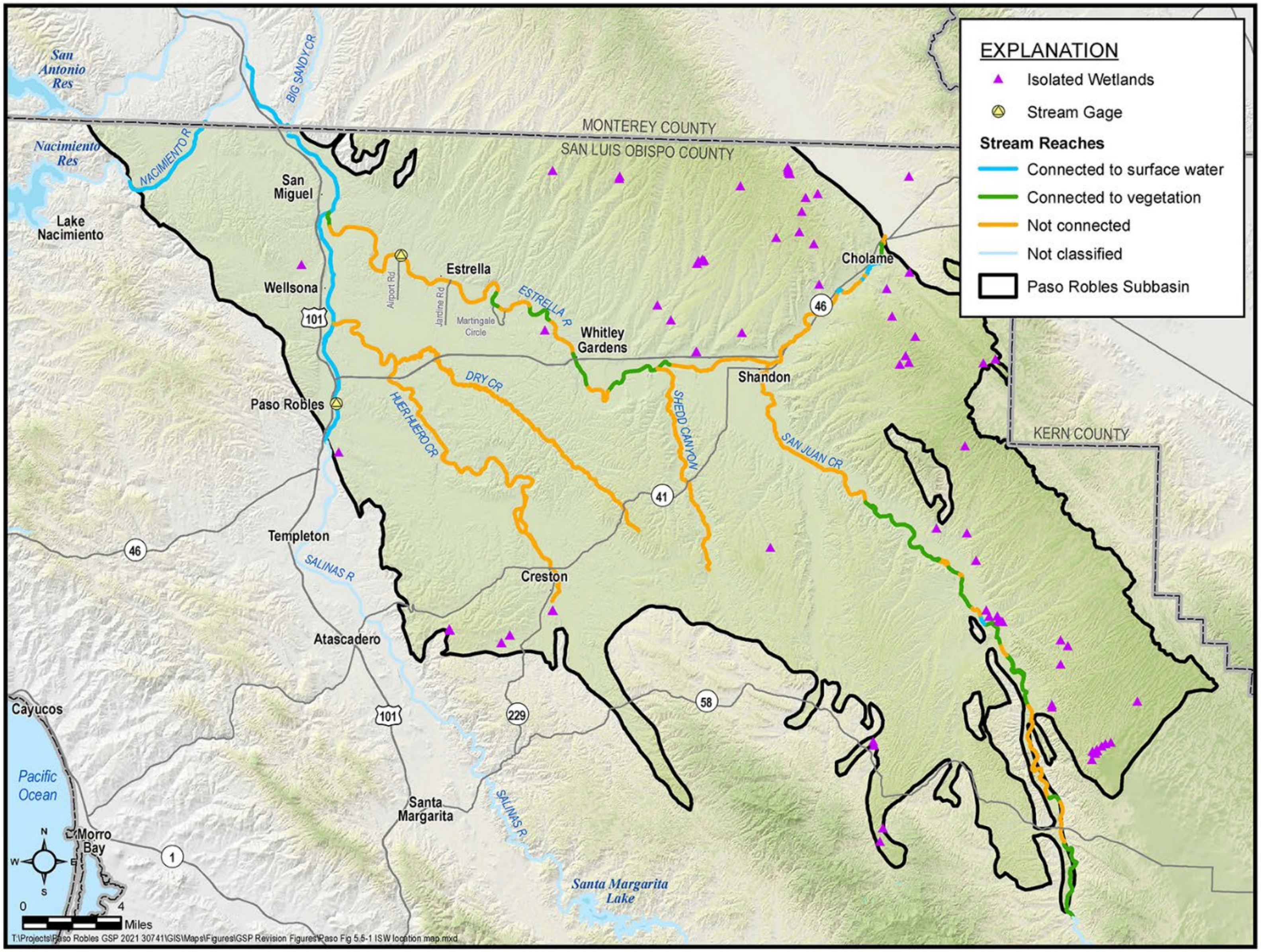


Figure 5-18. Locations of Interconnection Between Groundwater and Surface Water

Much of San Juan Creek more than 10 miles upstream of Shandon appears to be potentially interconnected to riparian vegetation based on the presence of sparse or dense vegetation along most of the reach. One short reach where the San Juan Fault crosses the creek was classified as interconnected to surface water because it usually has emerging groundwater along a low-flow channel bordered by wetland vegetation. The one well with water-level data along this reach has water levels that are usually within 10 feet of the creek bed elevation.

The lowermost 5 miles of Cholame Creek were delineated as not connected based on the absence of significant riparian vegetation and water levels in the sole monitoring well that average about 30 feet below the ground surface. Farther up the creek, however, is a reach several miles long that has open water or wetland vegetation in most historical aerial photographs. Shallow groundwater along that reach could be caused by faults that pass through the area (see Figure 4-4). For unknown reasons, the shallow water table and surface flow conditions have not caused the establishment of dense riparian vegetation.

Riparian vegetation is generally absent along Huer Huero Creek, Dry Creek and Shedd Canyon and is typically sparse where it is present. The depth to water in wells in those parts of the Subbasin is uniformly too deep to support riparian vegetation. Accordingly, those waterways were all classified as not connected to groundwater.

The reach of the Nacimiento River that traverses the northwest corner of the Subbasin was classified as interconnected to surface water because reservoir releases during the dry season are more than sufficient to sustain a high water table adjacent to the river. That reach is far from major pumping centers in the Paso Robles Subbasin and hence unlikely to be significantly depleted by pumping.

Isolated, off-channel wetlands shown on the interconnected surface water map (Figure 5-14) are the subset of the NCCAG wetlands where distinctly green vegetation was visible in dry season aerial photographs and the feature appeared to be a natural depression, not a constructed stockpond. These areas are far from major pumping centers in the Paso Robles Subbasin and are not subject to depletion by pumping.

5.5.6 Groundwater Dependent Animals

Many fish and wildlife species use aquatic and riparian habitats that are supported by groundwater. For the purpose of this GSP, beneficial use for habitat is limited to native species present in the Subbasin as of 2015, when SGMA took effect. The focus was on species that are state or federally listed as threatened, endangered or of special concern. This implicitly assumes that non-listed species will probably also be sustained if hydrologic conditions are suitable for sustaining the rarer species.

The reference document entitled Methodology for Identifying Groundwater Dependent Ecosystems documents a review of several sources of habitat information. Those sources often disagreed regarding which species are present within the Paso Robles Subbasin. For GSP purposes, it was concluded that animals that depend on riparian vegetation will probably be in good condition if the vegetation is in good condition. The one listed aquatic species seasonally present in streams that cross the Subbasin is southern steelhead which migrates up and down the Salinas River in winter and spring. Analysis in the above-mentioned reference document shows that groundwater pumping does not materially impact passage opportunity for steelhead because passage is only possible during relatively high flows and pumping from the Paso Robles Formation Aquifer has little effect on Salinas River flows because of clay layers beneath the alluvium along the Salinas River.

5.6 Groundwater Quality Distribution and Trends

Although groundwater quality is not a primary focus of SGMA, actions or projects undertaken by GSAs to achieve sustainability cannot degrade water quality to the extent that they would cause undesirable results. Therefore, the groundwater quality distribution and trends discussed in this section do not identify conditions that must be addressed by the GSP, but rather identify conditions that should not be exacerbated by this GSP.

Groundwater quality samples have been collected and analyzed throughout the Subbasin for various studies and programs. Water quality samples have been collected on a regular basis for compliance with regulatory programs. Additionally, a broad survey of groundwater quality sampling was conducted for the *Paso Robles Groundwater Basin Study, Phase I* (Fugro, 2002), and most recently by the USGS in 2018. Historical groundwater quality data were compiled for use in the SNMP (RMC, 2015).

This GSP focuses only on constituents that might be impacted by groundwater management activities. The constituents of concern are chosen because:

1. The constituent has either a drinking water standard or a known effect on crops
2. Concentrations have been observed above either the drinking water standard or the level that affects crops.

5.6.1 Groundwater Quality Suitability for Drinking Water

Groundwater in the basin is generally suitable for drinking water purposes. The *Paso Robles Groundwater Basin Study, Phase I* (Fugro 2002) reviewed water quality data from public supply wells to identify exceedances of drinking water standards. The drinking water standards Maximum Contaminant Levels (MCLs) and Secondary MCLs (SMCLs) are established by Federal and State agencies. MCLs are legally enforceable standards, while SMCLs are guidelines established for nonhazardous aesthetic considerations such as taste, odor, and color. The most common water quality standard exceedance in the Subbasin was exceedance of the SMCL for TDS, which exceeded the standard in 14 samples from the 74 samples. Nitrate also exceeded the MCL in four samples. One exceedance of mercury was found in the San Miguel area in a 1990 sample. There have been no recorded exceedances of mercury in any samples collected since that date.

5.6.2 Groundwater Quality Suitability for Agricultural Irrigation

Groundwater in the basin is generally suitable for agricultural purposes. Fugro (2002) evaluated the agricultural suitability of groundwater using three metrics:

1. Salinity as indicated by electrical conductivity
2. Soil structure as indicated by sodium absorption ratio and electrical conductivity
3. Presence of toxic salts as indicated by concentrations of sodium, chloride, and boron

Of the 74 samples evaluated 37 had no restrictions on irrigation use (Fugro, 2002) based on these criteria. This does not mean that half of the groundwater in the basin is unsuitable for irrigation; only that half of the samples had some constituent that may restrict unlimited irrigation use. Most cases of slight to moderate restriction on irrigation use were due to sodium or chloride toxicity. Severe restrictions for 13 samples were generally the result of high sodium, chloride, or boron toxicity.

5.6.3 Distribution and Concentrations of Point Sources of Groundwater Constituents

As noted in the SNMP (RMC, 2015), groundwater constituents of concern derive from point sources such as spill or leaks as well as diffuse sources, including:

- Irrigation water (e.g., potable water, groundwater, and future recycled water);
- Agricultural inputs (e.g., fertilizer and amendments);
- Septic system recharge;
- Infrastructure (e.g., percolation from treated wastewater ponds, leaking pipes); and
- Rainfall infiltration, mountain front recharge, and natural stream losses.

Potential point sources of groundwater quality degradation were identified using the State Water Resources Control Board (SWRCB) Geotracker website. Waste Discharge permits were also reviewed from on-line regional SWRCB websites. Table 5-1 summarizes information from these websites. Figure 5-19 shows the location of potential groundwater contaminant point sources. Based on available information there are no mapped groundwater contamination plumes at these sites, although investigations are ongoing.

Table 5-1. Potential Point Sources of Groundwater Contamination

Site Name	Site Type	Constituents of Concern (COCs)	Status
Former Chevron 9-0750	LUST Cleanup Site	petroleum hydrocarbons	remedial action plan submitted Q2 2018
Kirkpatrick Property (Unocal Portion)	Cleanup Program Site	crude oil	impacted soil; health risk assessment prepared in 2016
Lucy Brown Road Pipeline Site (Former ConocoPhillips Site #3469)	Cleanup Program Site	crude oil, diesel, gasoline	Initial groundwater monitoring data no significant impacts to groundwater.
Estrella Airfield (Paso Robles Municipal Airport)	Military Cleanup Site	unknown	unknown
Camp Roberts Solid Waste Site	Land Disposal Site	metals, cyanide, sulfide, herbicides, volatile organic compounds (VOCs), pesticides, PCBs, phthalate esters, phenols, semi-VOCs	TDS, nitrate and manganese detected in wells at concentrations above regulatory standards.
Camp Roberts South and Closed Landfill	Land Disposal Site	VOCs, chloride, sulfate, nitrate, sodium, manganese, TDS, total organic carbon	carbon tetrachloride detected at concentrations exceeding MCL.
Paso Robles Solid Waste Site	Land Disposal Site	chloride, total alkalinity, manganese, nitrate, sodium, sulfate, temperature, TDS, VOCs, Pesticides, PCBs, organophosphorus compounds, herbicides, semi-VOCs	COCs not detected in groundwater; sulfate and barium locally elevated; no remedial activities.

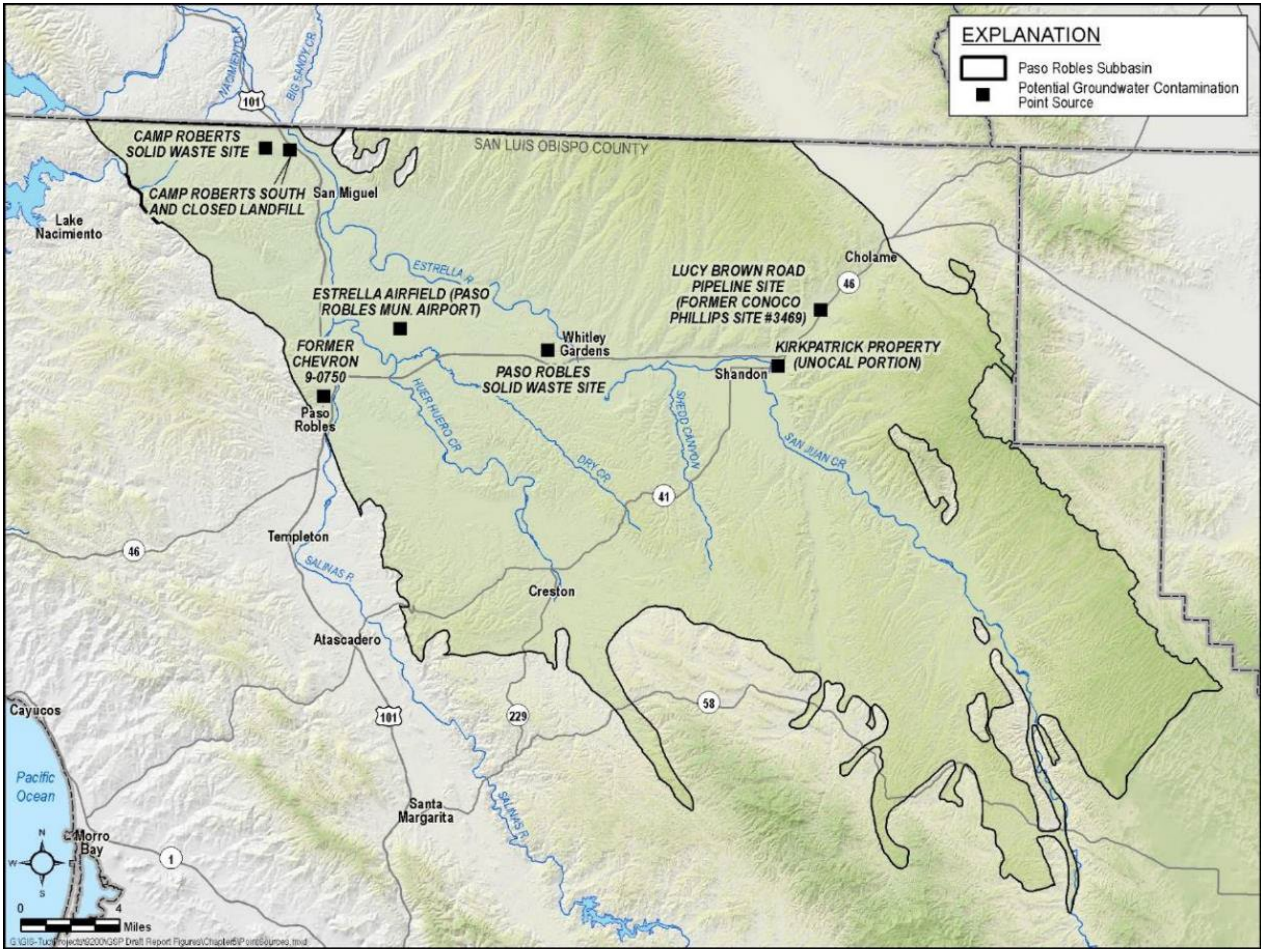


Figure 5-19. Location of Potential Point Sources of Groundwater Contaminants

5.6.4 Distribution and Concentrations of Diffuse or Natural Groundwater Constituents

Fugro (2002) identified a number of constituents of concern that are broadly distributed throughout the Subbasin. The SNMP (RMC, 2015) provides additional data on the distribution of certain constituents. The data from these previous reports are presented in terms of the informal subareas that have been used in previous studies to refer to various regions within the Subbasin. These seven subareas are not part of this GSP; RMC, 2015 shows the approximate location of these areas.

5.6.4.1 Total Dissolved Solids

TDS is a constituent of concern in groundwater because it has been detected at concentrations greater than its SMCL of 500 milligrams per liter (mg/L). Table 5-2 shows the range and average TDS concentrations by subarea as reported in the SNMP (RMC, 2015). This table shows the average TDS concentrations are greater than the SMCL of 500 mg/L in parts of the Subbasin. This table includes data for portions of the Bradley, North Gabilan, and South Gabilan subareas that are outside the Subbasin.

Table 5-2. TDS Concentration Ranges and Averages

Hydrogeologic Subarea	TDS Concentration Range (mg/L)	Average TDS Concentration (mg/L)
Estrella	350 – 1,560	552
Shandon	270 – 3,160	563
Creston	190 – 1,620	388
San Juan	160 – 2,170	425
Bradley	400 – 1,280	751
North Gabilan	370 – 1,320	856
South Gabilan	370 – 1,320	451

Source: RMC, 2015

The distribution and trends of TDS in the Subbasin are shown on Figure 5-20. This figure is from the SNMP (RMC, 2015) and includes portions of the Subbasin north of the Monterey County line which are outside the Subbasin. The study area for the SNMP also did not extend to the southeastern edge of the Subbasin. TDS distribution shown on this figure is not differentiated by aquifer or well depth. Sustainability projects and management actions implemented as part of this GSP are not anticipated to directly cause TDS concentrations in groundwater in a well that would otherwise remain below the SMCL to increase above the SMCL.

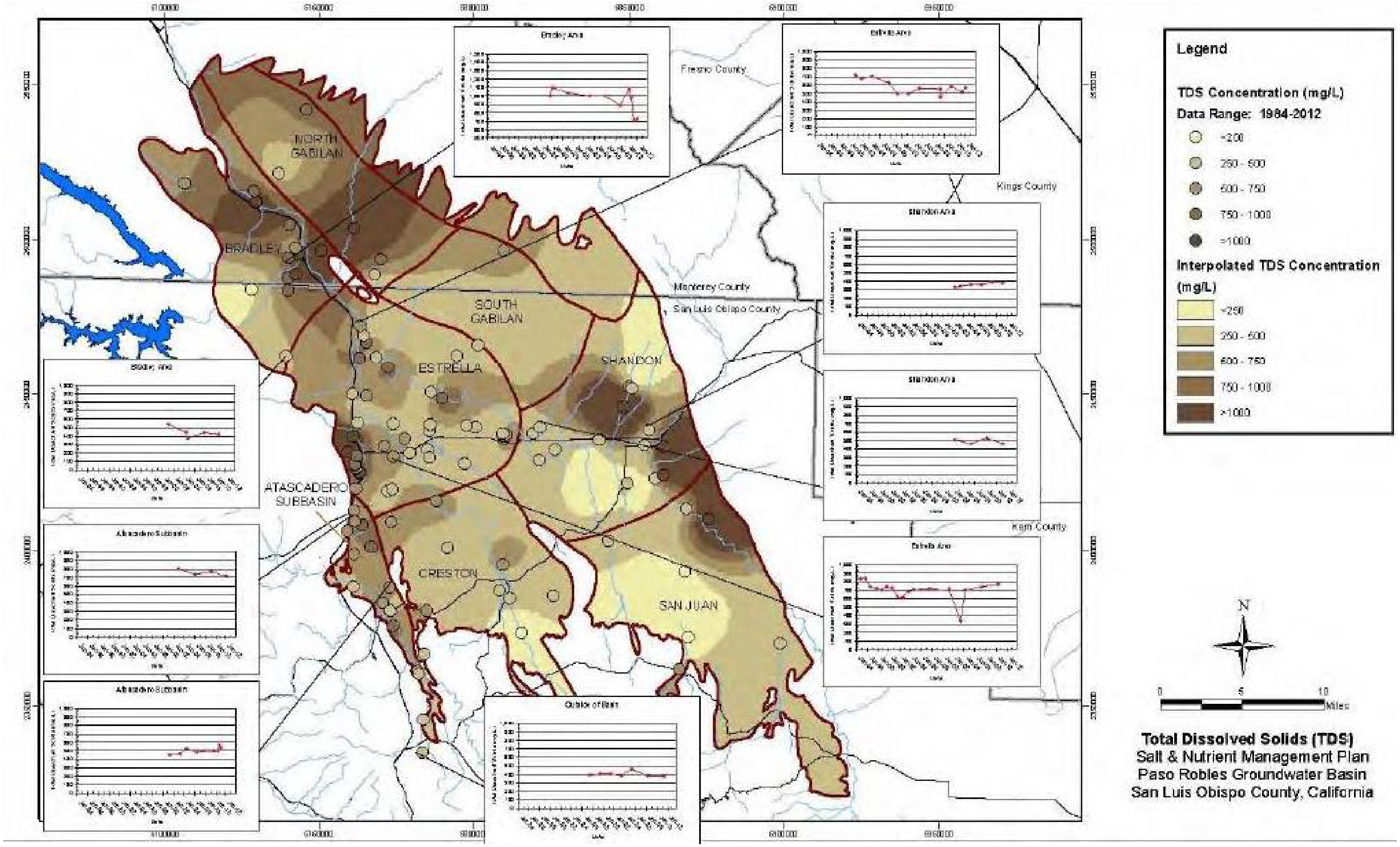


Figure 5-20. TDS Regional Distribution and Trends

Source: RMC, 2015

5.6.4.2 Chloride

Chloride is a constituent of concern in groundwater because it has been detected at concentrations greater than its SMCL of 250 mg/L. Elevated chloride concentrations in groundwater can damage crops and affect plant growth. Fugro (2002) reported that slight to moderate restrictions on irrigating trees and vines may occur when chloride concentrations exceed 100 mg/L. Severe restrictions on irrigating trees and vines may occur when chloride concentrations exceed 350 mg/L.

Table 5-3**,** which was compiled based on various tables and related information in the SNMP (RMC, 2015), shows the range and average chloride concentrations by subarea. This table indicates that average chloride concentrations are less than the SMCL of 250 mg/L throughout Subbasin. This table includes data for areas of the Bradley, North Gabilan, and South Gabilan subareas that are outside the Subbasin.

Table 5-3. Chloride Concentration Ranges and Averages

Hydrogeologic Subarea	Chloride Concentration Range (mg/L)	Average Chloride Concentration (mg/L)
Estrella	32 - 572	94
Shandon	31 - 550	80
Creston	25 - 508	69
San Juan	13 - 699	64
Bradley	40 - 400	84
North Gabilan	35 - 209	113
South Gabilan	35 - 209	37

Source: RMC, 2015

The distribution and trends of chloride in the Subbasin are shown on Figure 5-21. This figure is from the SNMP (RMC, 2015) and includes portions of the Subbasin north of the Monterey County line which are outside the Subbasin. Chloride distribution shown on this figure is not differentiated by aquifer or well depth. Sustainability projects and management actions implemented as part of this GSP are not anticipated to directly cause chloride concentrations in groundwater in a well that would otherwise remain below the SMCL to increase above the SMCL.

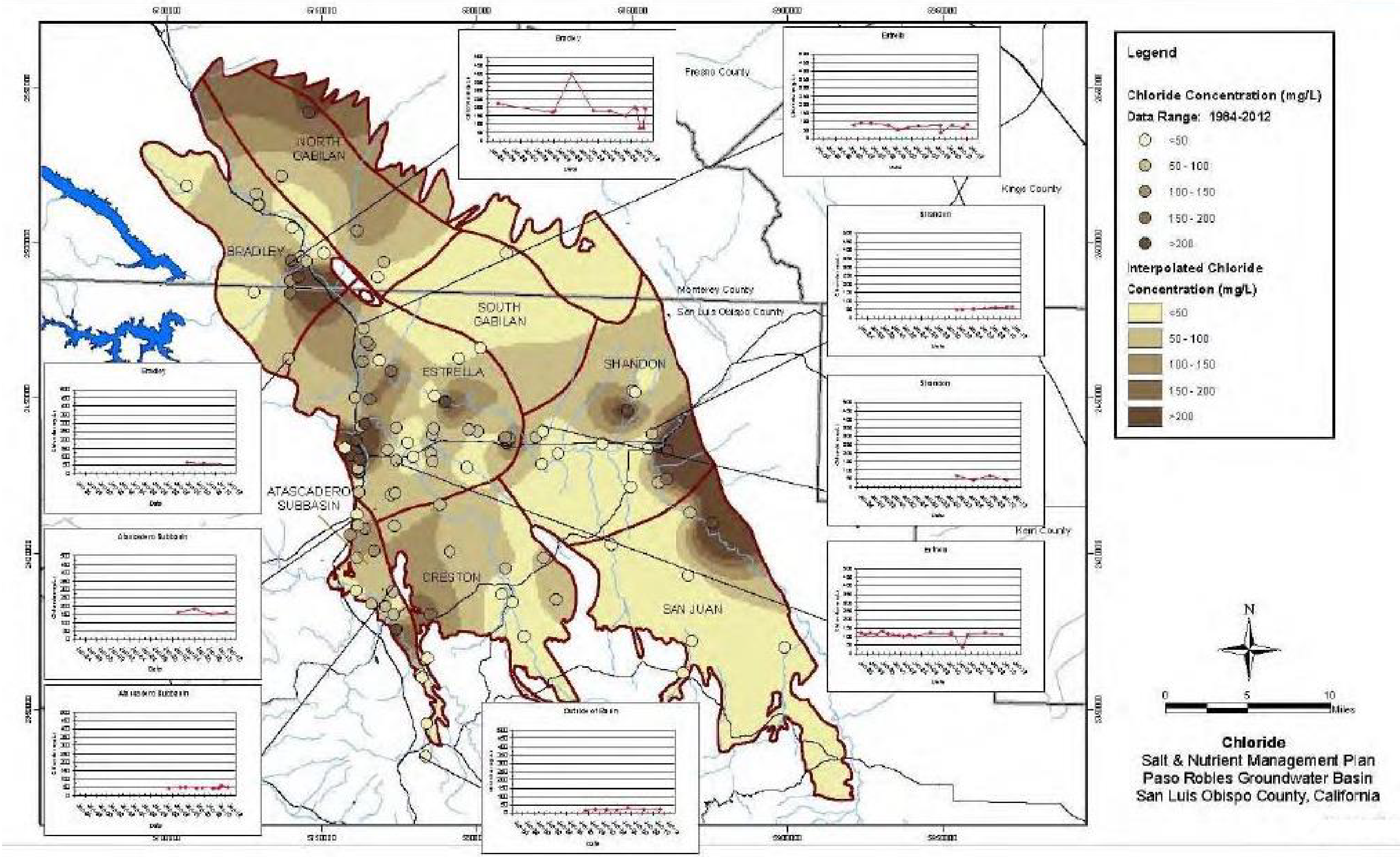


Figure 5-21. Chloride Regional Distribution and Trends

Source: RMC, 2015

5.6.4.3 Sulfate

Sulfate is a constituent of concern in groundwater because it has been observed at concentrations above its SMCL of 250 mg/L. Table 5-4 shows the range and average sulfate concentrations by subarea as reported in the SNMP (RMC, 2015). This table shows the average sulfate concentrations are greater than the SMCL of 250 mg/L in many areas of the Subbasin. This table includes data for areas of the Bradley, North Gabilan, and South Gabilan subareas that are outside the Subbasin.

Table 5-4. Sulfate Concentration Ranges and Averages

Hydrogeologic Subarea	Sulfate Concentration Range (mg/L)	Average Sulfate Concentration (mg/L)
Estrella	11 - 375	129
Shandon	14 – 2,010	360
Creston	7 - 353	67
San Juan	24 - 722	248
Bradley	30 - 704	296
North Gabilan	9 - 648	194
South Gabilan	9 - 648	194

Source: RMC, 2015

Maps of sulfate distribution in the Subbasin were not found in previous studies. Sustainability projects and management actions implemented as part of this GSP are not anticipated to directly cause sulfate concentrations in groundwater in a well that would otherwise remain below the SMCL to increase above the SMCL.

5.6.4.4 Nitrate

Nitrate is a constituent of concern in groundwater because concentrations have been detected greater than its MCL of 10 mg/L (measured as nitrogen). Nitrate concentrations in excess of the MCLs can result in health impacts.

Table 5-5 shows the range and average nitrate concentrations by subarea as reported in the SNMP (RMC, 2015). This table shows the average nitrate concentrations are less than the MCL of 10 mg/L throughout Subbasin. The range of measured nitrate concentrations however exceeds the MCL of 10 mg/L in every subarea. This table includes data for areas of the Bradley, North Gabilan, and South Gabilan subareas that are outside the Subbasin.

Table 5-5. Nitrate Concentration Ranges and Averages

Hydrogeologic Subarea	Nitrate Concentration Range (mg/L)	Average Nitrate Concentration (mg/L)
Estrella	0 – 16.2	2.5
Shandon	1.2 – 12.1	4.6
Creston	0.8 – 9.2	3.2
San Juan	0.1 – 5.8	2.8
Bradley	0.0 – 5.8	2.7
North Gabilan	5.0 – 9.8	8.4
South Gabilan	15.8	6.3

Source: RMC, 2015; the range of nitrate concentration in the South Gabilan subarea is uncertain

The distribution and trends of nitrate in the Subbasin are shown on Figure 5-22. This figure is from the SNMP (RMC, 2015) and includes portions of the Subbasin north of the Monterey County line which are outside the Subbasin. This nitrate distribution shown on this figure is not differentiated by aquifer or well depth. Sustainability projects and management actions implemented as part of this GSP are not anticipated to directly cause nitrate concentrations in groundwater in a well that would otherwise remain below the SMCL to increase above the SMCL.

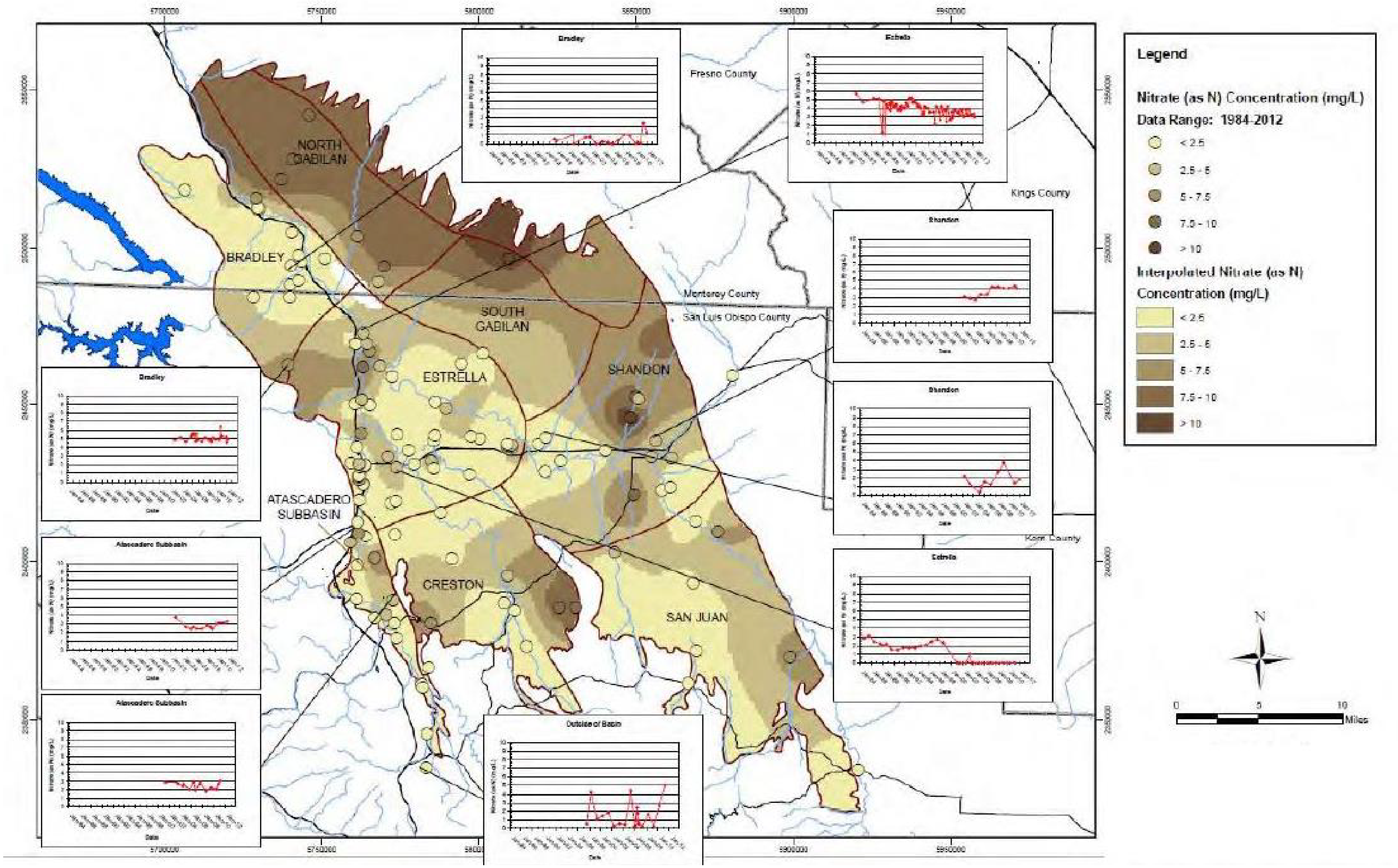


Figure 5-22. Nitrate Regional Distribution and Trends

Source: RMC, 2015

5.6.4.5 Boron

Boron is an unregulated constituent and therefore does not have a regulatory standard. However, boron is a constituent of concern because elevated boron concentrations in water can damage crops and affect plant growth. Fugro (2002) reported that severe restrictions on irrigating trees and vines may occur when boron concentrations exceed 0.5 mg/L.

Table 5-6 shows the range and average boron concentrations by subarea as reported in the SNMP (RMC, 2015). Average boron concentration exceeds the severe irrigation restriction level of 0.5 mg/L in the Estrella, Shandon, and San Juan subareas. The table includes data for areas of the Bradley, North Gabilan, and South Gabilan subareas that are outside the Subbasin.

Table 5-6. Boron Concentration Ranges and Averages

Hydrogeologic Subarea	Boron Concentration Range (mg/L)	Average Boron Concentration (mg/L)
Estrella	0.13 – 5.66	1.8
Shandon	0.08 – 2.97	0.81
Creston	0.06 – 0.31	0.14
San Juan	0.08 – 2.29	0.74
Bradley	0.12 – 0.18	0.15
North Gabilan	0.11 – 0.44	0.24
South Gabilan	0.11 – 0.44	0.24

Source: RMC, 2015

No maps exist of boron distribution in the Subbasin. Sustainability projects and management actions implemented as part of this GSP are not anticipated to directly cause boron concentrations in groundwater in a well that would otherwise remain below the SMCL to increase above the SMCL.

5.6.4.6 Gross Alpha Radiation

Gross alpha radiation is a constituent of concern because it has been detected at concentrations greater than the MCL of 15 picocuries per liter (pCi/L). Fugro (2002) reports that gross alpha radioactivity is present in most areas of the basin. Gross alpha particle count activity in groundwater exceeded the MCL for drinking water in the Estrella and Bradley areas. Gross alpha data included in Fugro's 2002 report are summarized in Table 5-7.

Table 5-7. Gross Alpha Concentration Ranges and Averages

Hydrogeologic Subarea	Gross Alpha Maximum Concentration (pCi/L)	Gross Alpha Average Concentration (pCi/L)
Estrella	31	20
Shandon	3	3
Bradley	23	2

Source: Fugro, 2002

No maps exist of the gross alpha distribution in the Subbasin. Sustainability projects and management actions implemented as part of this GSP are not anticipated to directly cause gross alpha radiation concentrations in groundwater in a well that would otherwise remain below the SMCL to increase above the SMCL.

5.6.5 Groundwater Quality Surrounding the Paso Robles Subbasin

Poor quality groundwater has been documented in wells that screen sediments and rocks below the Paso Formation as well as sediments and rocks surrounding the Subbasin. Based on limited observations, there is a concern that this poor quality groundwater may be drawn into wells in the Subbasin and degrade the groundwater quality if groundwater levels are allowed to fall too low. Groundwater levels must be maintained at elevations that prevent migration of poor quality groundwater from beneath or around the Subbasin.

6 WATER BUDGETS

This chapter summarizes the estimated water budgets for the Paso Robles Subbasin, including information required by the SGMA Regulations and information that is important for developing an effective plan to achieve sustainability. In accordance with the SGMA Regulations §354.18, the GSP should include a water budget for the basin that provides an accounting and assessment of the total annual volume of surface water and groundwater entering and leaving the basin, including historical, current, and projected water budget conditions, and the change in the volume of water stored. Water budgets should be reported in graphical and tabular formats, where applicable.

6.1 Overview of Water Budget Development

This chapter is subdivided into three sections: (1) historical water budgets, (2) current water budgets, and (3) future water budgets. Within each section, a surface water budget and groundwater budget are presented. Water budgets were developed using computer models of the Subbasin hydrogeologic conditions. Before presenting the water budgets, a brief overview of the models is presented. Appendix E provides additional information about the models and compares previously reported water budgets to water budgets developed for the GSP.

The water budgets reported herein are for the Subbasin defined in Section 1.2 and depicted on Figure 1-1. Prior to this GSP, water budgets reported for the Paso Robles groundwater Subbasin were often for a larger area that included area within Monterey County and the Atascadero Subbasin. Because the Subbasin boundary was redefined by DWR in 2019, the area within Monterey County and the Atascadero Subbasin are no longer part of the Subbasin and therefore are not considered in water budgets reported in the GSP. The revised Subbasin area results in water budget inflow components, outflow components, and estimates of sustainable yield that are different from previously reported water budgets.

Sustainable yield is defined in SGMA as "the maximum quantity of water, calculated over a base period representative of long-term conditions in the basin and including any temporary surplus that can be withdrawn annually from a groundwater supply without causing an undesirable result." Actual sustainable yield will be determined once data show undesirable results have not occurred. Thus, the sustainable yield estimate will be revised in the future as new data become available from monitoring data that evaluate the presence or absence of undesirable results.

In accordance with Section 354.18 of the SGMA Regulations, one integrated groundwater budget was developed for the combined inflows and outflows for the two principal aquifers - Alluvial Aquifer and Paso Robles Formation Aquifer – for each water budget period. Groundwater is pumped from both aquifers for beneficial use. Available groundwater elevation data suggest that most of the historic reduction in groundwater storage has occurred in the Paso Robles Formation Aquifer. Due to limitations in available groundwater elevation data for the

Alluvial Aquifer, water budgets for this aquifer are uncertain. Monitoring of hydrologic conditions in both aquifers will be conducted in the future to ensure that aquifer-specific Sustainable Management Criteria are being achieved and undesirable results are being avoided.

Figure 6-1 presents a general schematic diagram of the hydrologic cycle. The water budgets include the components of the hydrologic cycle.

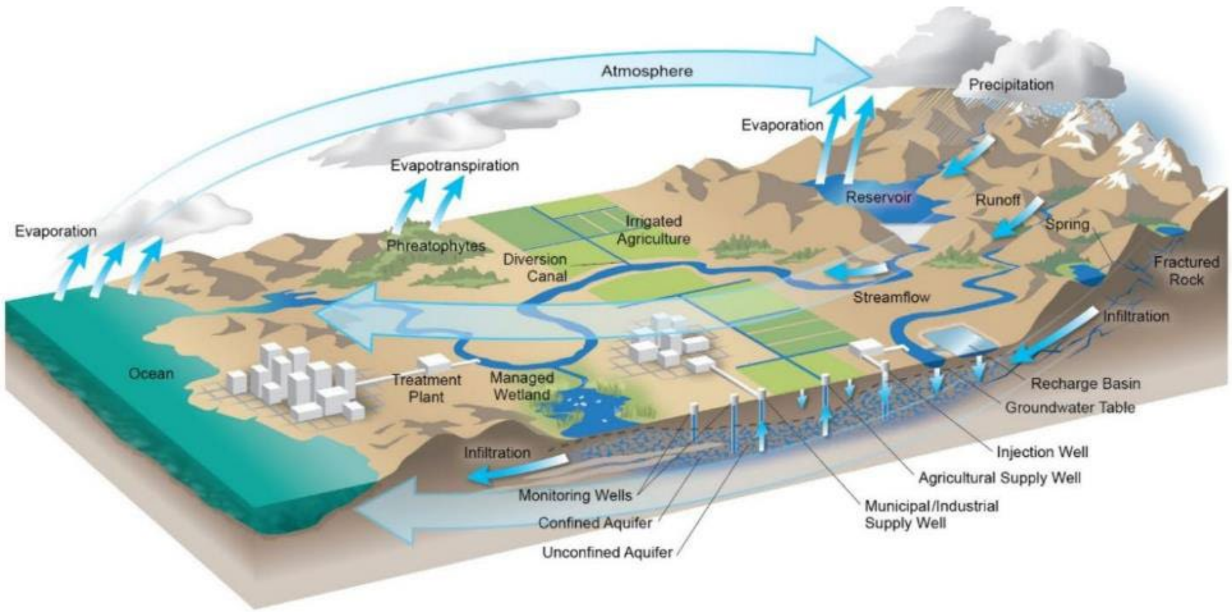


Figure 6-1. Hydrologic Cycle

A few components of the water budget can be measured, like streamflow at a gaging station or groundwater pumping from a metered well. Other components of the water budget are estimated, like recharge from precipitation or unmetered groundwater pumping. The water budget is an inventory of surface water and groundwater inflows (supplies) and outflows (demands) from the Subbasin, including:

Surface Water Inflows:

- Runoff of precipitation and reservoir releases into streams and rivers that enter the Subbasin from the surrounding watershed and that occurs inside the Subbasin
- Groundwater discharge to streams and rivers Surface Water Outflows:
- River flows exiting the Subbasin
- Percolation of streamflow to the groundwater system
- Evaporation (negligible compared to other surface water outflows)

Groundwater Inflows:

- Recharge from precipitation
- Subsurface inflow (including percolation of irrigation return flow, precipitation, and streamflow outside the Subbasin)
- Irrigation return flow (water not consumed by crops)
- Percolation of surface water from streams
- Infiltration of treated wastewater from disposal ponds

Groundwater Outflows:

- Evapotranspiration
- Groundwater pumping
- Discharge to streams and rivers
- Subsurface outflow to the next downgradient groundwater basin

The difference between inflows and outflows is equal to the change in storage.

6.2 Water Budget Data Sources and Basin Model

Water budgets for the Paso Robles Subbasin were estimated using an integrated system of three hydrologic models (collectively designated herein as the "basin model"), including:

1. A watershed model
2. A soil water balance model
3. A groundwater flow model

The groundwater model was originally developed by Fugro (2005). The watershed and soil water balance models were developed and integrated with an updated version of the groundwater model by Geoscience Support Services, Inc. (GSSI) (GSSI, 2014 and 2016). These models were developed for San Luis Obispo Flood Control and Water Conservation District (SLOFCWCD). The original models are documented in the following reports:

- Final Report, Paso Robles Groundwater Basin Study Phase II, Numerical Model Development, Calibration, and Application: Fugro, February 2005
- Paso Robles Groundwater Basin Model Update: Geoscience Support Services, Inc., December 2014

- Refinement of the Paso Robles Groundwater Basin Model and Results of Supplemental Water Supply Options Predictive Analysis: Geoscience Support Services, Inc., December 2016

The 2016 version of the basin model was updated for the GSP. The update included incorporating hydrologic data for the period 2012 through 2016 into the models. Appendix E includes a brief summary of the model update process, including:

- A summary of data sources used for the update (Table E-1)
- A summary of modifications made to the basin model to address computational refinements, data processing issues, and conceptual application of the model codes
- A comparison of the water budgets from the updated model and the original 2016 GSSI model.

The updated versions of the basin models are referred to herein collectively as the "GSP model".

Numerous sources of raw data were used to update the basin models for the GSP. Examples of raw data include reported pumping rates from the City of Paso Robles, precipitation data obtained from weather stations in the Subbasin, and crop acreage from the office of the San Luis Obispo County Agricultural Commissioner, among many others. Data sources are listed in Table E-1. Raw data were compiled, processed, and used to develop model input files. Model results were used to develop estimates of the individual inflow and outflow components of the surface water and groundwater budgets. Thus, all of the estimated flow components herein were extracted from the GSP model.

6.2.1 Model Assumptions and Uncertainty

The GSP model is based on available hydrogeologic and land use data from the past several decades, previous studies of Subbasin hydrogeologic conditions, and earlier versions of the basin models. The GSP model gives insight into how the complex hydrologic processes are operating in the Subbasin. During previous studies, available data and a peer-review process were used to calibrate the basin model to Subbasin hydrogeologic conditions. Results of the previous calibration process demonstrated that the model-simulated groundwater and surface water flow conditions were similar to observed conditions. The GSP model was not recalibrated. However, after updating it for the GSP, calibration of the model was reviewed and found to be similar to the previous model. Therefore, the GSP model was considered appropriate for the GSP.

Projections made with the GSP model have uncertainty due to limitations in available data and limitations from assumptions made to develop the models. Model uncertainty has been considered when developing and using the reported GSP water budgets for developing sustainability management actions and projects (Chapter 9).

During early implementation of the GSP, additional data will be collected to refine Subbasin understanding. These new data will be used to recalibrate the GSP model after the GSP is adopted. New hydrologic data and the calibrated model will be used to adaptively implement sustainability management actions, and possibly projects, to ensure that progress toward the sustainability goal is being achieved.

6.3 Historical Water Budget

The SGMA Regulations require that the historical surface water and groundwater budget be based on at least the most recent 10 years of data. For the Paso Robles Subbasin GSP, the period 1981 to 2011 was selected as the time period for the historical water budget (referred to as the historical base period) because it is long enough to capture typical climate variations, it corresponds to the period simulated in the basin model, and it ends at about the time the recent drought period began. Estimates of the surface water and groundwater inflows and outflows, and changes in storage for the historical base period are provided below.

6.3.1 Historical Surface Water Budget

The SGMA Regulations (§354.18) require development of a surface water budget for the GSP. The surface water budget quantifies important sources of surface water and evaluates their historical and future reliability. The water budget Best Management Practice (BMP) document states that surface water sources should be identified as one of the following (DWR, 2016c):

- Central Valley Project
- State Water Project
- Colorado River Project
- Local imported supplies
- Local supplies

The Paso Robles Subbasin relies on two of these surface water source types: local imported supplies and local supplies.

6.3.1.1 Historical Local Imported Supplies

During the historical base period, local imported water supplies were not used in the Subbasin. Use of local imported supplies began in 2014; information about these supplies is presented in Section 6.4 – Current Water Budget.

6.3.1.2 Historical Local Supplies

Local surface water supplies include surface water flows that enter the Subbasin from precipitation runoff within the watershed, Salinas River inflow to the Subbasin (including releases from the Salinas Reservoir), Nacimiento River inflow to the Subbasin (including releases from Nacimiento Reservoir), and discharge of groundwater to streams from the Alluvial Aquifer. Table 6-1 summarizes the annual average, minimum, and maximum values for these inflows.

Table 6-1. Estimated Historical (1981-2011) Annual Surface Water Inflows to Subbasin

Surface Water Inflow Component	Average	Minimum	Maximum
Nacimiento River Inflow to Subbasin	214,400	5,500	734,100
Precipitation Runoff within Watershed	96,900	400	606,900
Salinas River Inflow to Subbasin	41,800	1,600	179,900
Groundwater Discharge to Rivers and Streams from Alluvial Aquifer	7,300	4,300	11,800
Total	360,400		

Note: All values in AF

The estimated annual average total inflow from these sources over the historical base period is about 360,400 AF. The largest component of this average inflow is releases and flow in the Nacimiento River. While average inflows are large from the Nacimiento River, nearly all of this inflow leaves the Subbasin as surface water outflow because the length of the Nacimiento River within the Subbasin is short. The large difference between the minimum and maximum inflows reflects the difference between dry and wet years in the Subbasin.

6.3.1.3 Historical Surface Water Outflows

The estimated annual average total surface water outflow leaving the Subbasin as flow in the Salinas River, flow in the Nacimiento River, and percolation into the groundwater system over the historical base period is summarized in Table 6-2.

Table 6-2. Estimated Historical (1981-2011) Annual Surface Water Outflows from Subbasin

Surface Water Outflow Component	Average	Minimum	Maximum
Salinas River Outflow from Subbasin	119,100	5,300	646,300
Nacimiento River Outflow from Subbasin	214,400	5,500	734,000
Percolation of Surface Water to Groundwater	26,900	2,000	126,000
Total	360,400		

Note: All values in AF

The estimated annual average total outflow from these sources over the historical base period is about 360,400 AF. Of this 360,400 AFY, approximately 26,900 AFY of the outflow is percolation from streams into the groundwater system. Of this 26,900 AFY of percolation, 7,300 AFY returns to streamflow as groundwater discharge.

6.3.1.4 Historical Surface Water Budget

Figure 6-2 summarizes the historical water budget for the Subbasin.

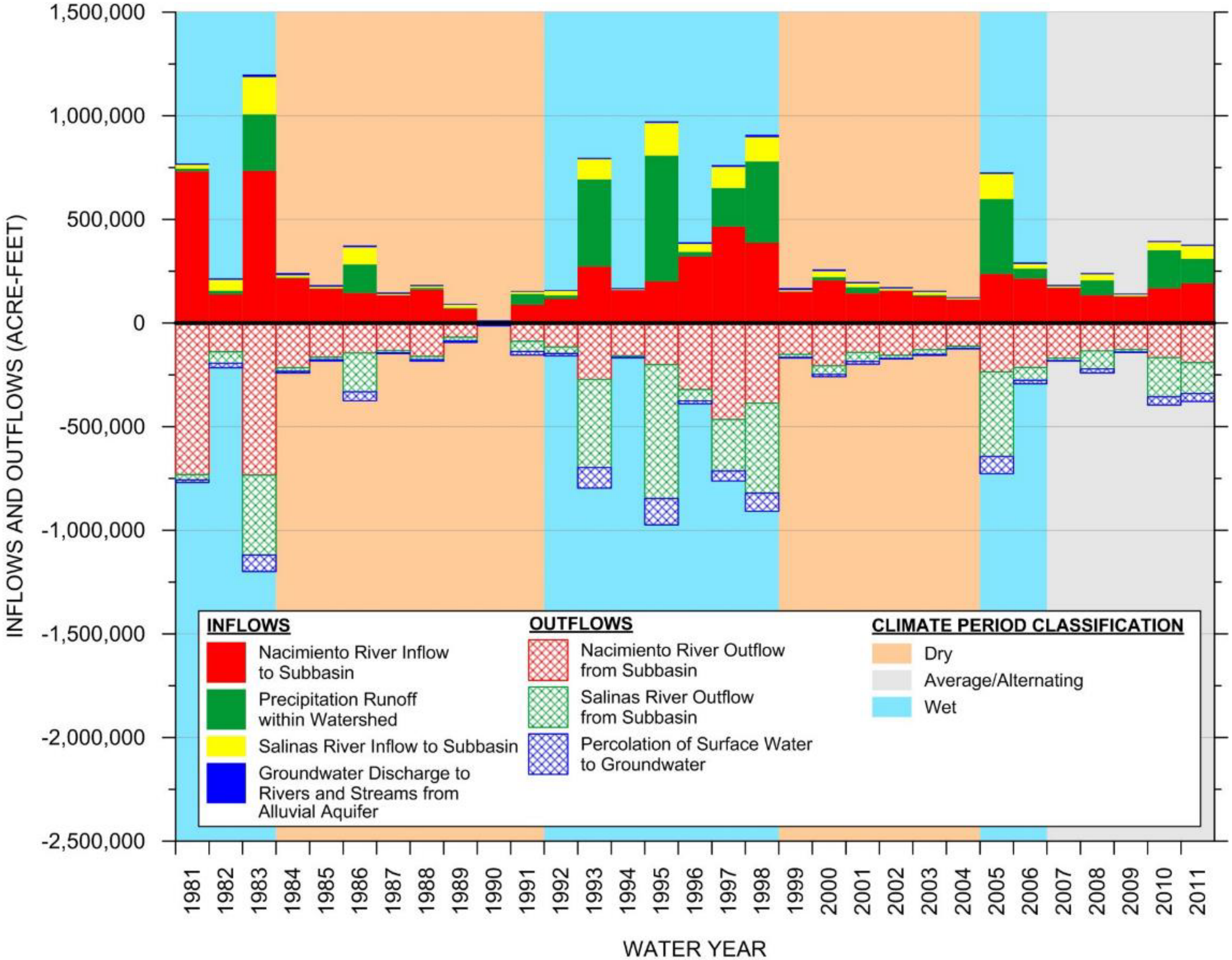


Figure 6-2. Historical (1981-2011) Surface Water Inflows and Outflows

Figure 6-2 shows the strong correlation between precipitation and streamflow in the Subbasin. In wet periods, shown with a blue background, surface water inflows and outflows are large. In contrast, in dry periods, shown with an orange background, surface water inflows and outflows are small. As shown on the graph, several years during the historical base period had total surface water inflows greater than 500,000 AFY. Assuming diversion permits could be obtained, future high flow years may provide opportunities to capture and use excess storm water as a new water supply in the Subbasin. This concept is discussed in more detail in Chapter 9 – Projects and Management Actions.

6.3.2 Historical Groundwater Budget

Groundwater supplied most of the water used in the Subbasin over the historical base period. The historical groundwater budget includes a summary of the estimated groundwater inflows, groundwater outflows, and change in groundwater in storage.

6.3.2.1 Historical Groundwater Inflows

Groundwater inflow components include streamflow percolation, agricultural irrigation return flow, deep percolation of direct precipitation, subsurface inflow into the Subbasin, wastewater pond percolation, and urban irrigation return flow. Estimated annual groundwater inflows for the historical base period are summarized in Table 6-3. Values reported in the table were estimated or derived from the GSP model using data sources reported in Table E-1 in Appendix E.

Table 6-3. Estimated Historical (1981-2011) Annual Groundwater Inflows to Subbasin

Groundwater Inflow Component [1]	Average	Minimum	Maximum
Streamflow Percolation	26,900	2,000	126,000
Agricultural Irrigation Return Flow	17,800	10,700	29,100
Deep Percolation of Direct Precipitation	12,000	300	45,400
Subsurface Inflow into Subbasin	10,100	4,900	14,300
Wastewater Pond Percolation	3,400	2,400	4,400
Urban Irrigation Return Flow	1,200	300	2,200
Total	71,400		

Note: All values in AF

(1) Percolation from septic systems is not directly accounted for because it is subtracted from the total estimated rural-domestic pumping to simulate a net rural-domestic pumping amount.

For the historical base period, estimated total average groundwater inflow ranged from 25,700 AFY to 201,700 AFY, with an average inflow of 71,400 AFY. The largest groundwater inflow component is streamflow percolation, which accounts for approximately 38% of the total annual average inflow. Streamflow percolation, agricultural irrigation return flow, and deep percolation of direct precipitation account for approximately 79% of the estimated total annual average inflow to the Subbasin. The large difference between the minimum and maximum inflows from streamflow percolation and direct precipitation reflect the variations in precipitation over the historical base period.

6.3.2.2 Historical Groundwater Outflows

Groundwater outflow components include total groundwater pumping from all water use sectors, groundwater discharge to streams and rivers from the Alluvial Aquifer, subsurface flow out of the Subbasin, and riparian evapotranspiration. Estimated annual groundwater outflows for the historical base period are summarized in Table 6-4.

Table 6-4. Estimated Historical (1981-2011) Annual Groundwater Outflow from Subbasin

Groundwater Outflow Component	Average	Minimum	Maximum
Total Groundwater Pumping	72,400	48,200	102,900
Groundwater Discharge to Streams and Rivers from Alluvial Aquifer	7,300	4,300	11,800
Subsurface Flow Out of Subbasin	2,600	2,300	3,000
Riparian Evapotranspiration	1,700	1,700	1,700
Total	84,000		

Note: All values in AF

The largest groundwater outflow component from the Subbasin is groundwater pumping. Estimated annual groundwater pumping by water use sector for the historical base period is summarized in Table 6-5.

Table 6-5. Estimated Historical (1981-2011) Annual Groundwater Pumping by Water Use Sector from Subbasin

Water Use Sector	Average	Minimum	Maximum
Agricultural	65,300	40,600	95,800
Municipal	3,200	1,700	6,000
Rural-Domestic [1]	2,500	1,700	3,400
Small Commercial	1,400	1,200	1,700
Total	72,400		

Notes: All values in AF

(1) Assumed to be net amount of pumping based on an analysis conducted by GSSI (2016). Net pumping was computed as total pumping amount minus septic return flow.

Agricultural pumping was the largest component of total groundwater pumping, accounting for about 90% of total pumping over the historical base period. Municipal, rural-domestic, and small commercial pumping account for 4%, 4%, and 2%, respectively, of total average annual pumping over the historical base period.

6.3.2.3 Historical Groundwater Budget and Changes in Groundwater Storage

Groundwater inflows and outflows for the historical base period are summarized on Figure 6-3. This graph shows groundwater inflow and outflow components for every year of the historical period. Inflow components are graphed above the zero line and outflow components are graphed below the zero line. Groundwater outflow by pumping (green bars) includes pumping from all water use sectors (Table 6-5).

Figure 6-4 shows annual and cumulative change in groundwater storage during the historical base period. Annual increases in groundwater storage are graphed above the zero line and annual decreases in groundwater storage are graphed below the zero line. The red line shows the cumulative change in groundwater storage over the historical base period.

The GSP uses the best available information to quantify the water budget for the Subbasin while recognizing the limitations inherent from existing data gaps. The water budget identifies and tracks changing inflows and outflows to the Subbasin and therefore is an important tool for local water resources management. The GSP contains a plan to gather more and better data in the future, which will be used to further refine the water budget. The GSP is designed to adapt to an increasing data set and expanding understanding of Subbasin conditions and water budget.

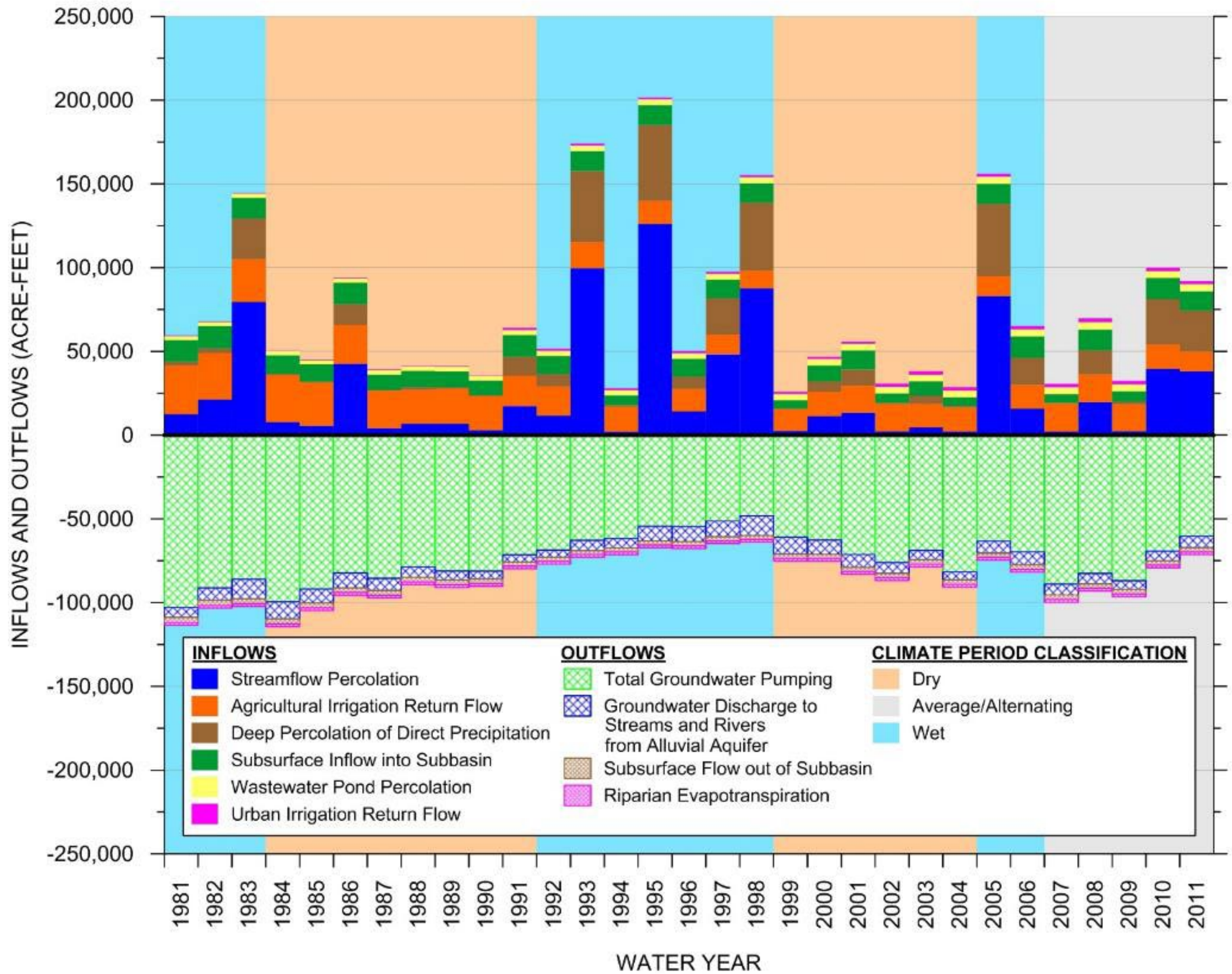


Figure 6-3. Historical (1981-2011) Groundwater Inflows and Outflows

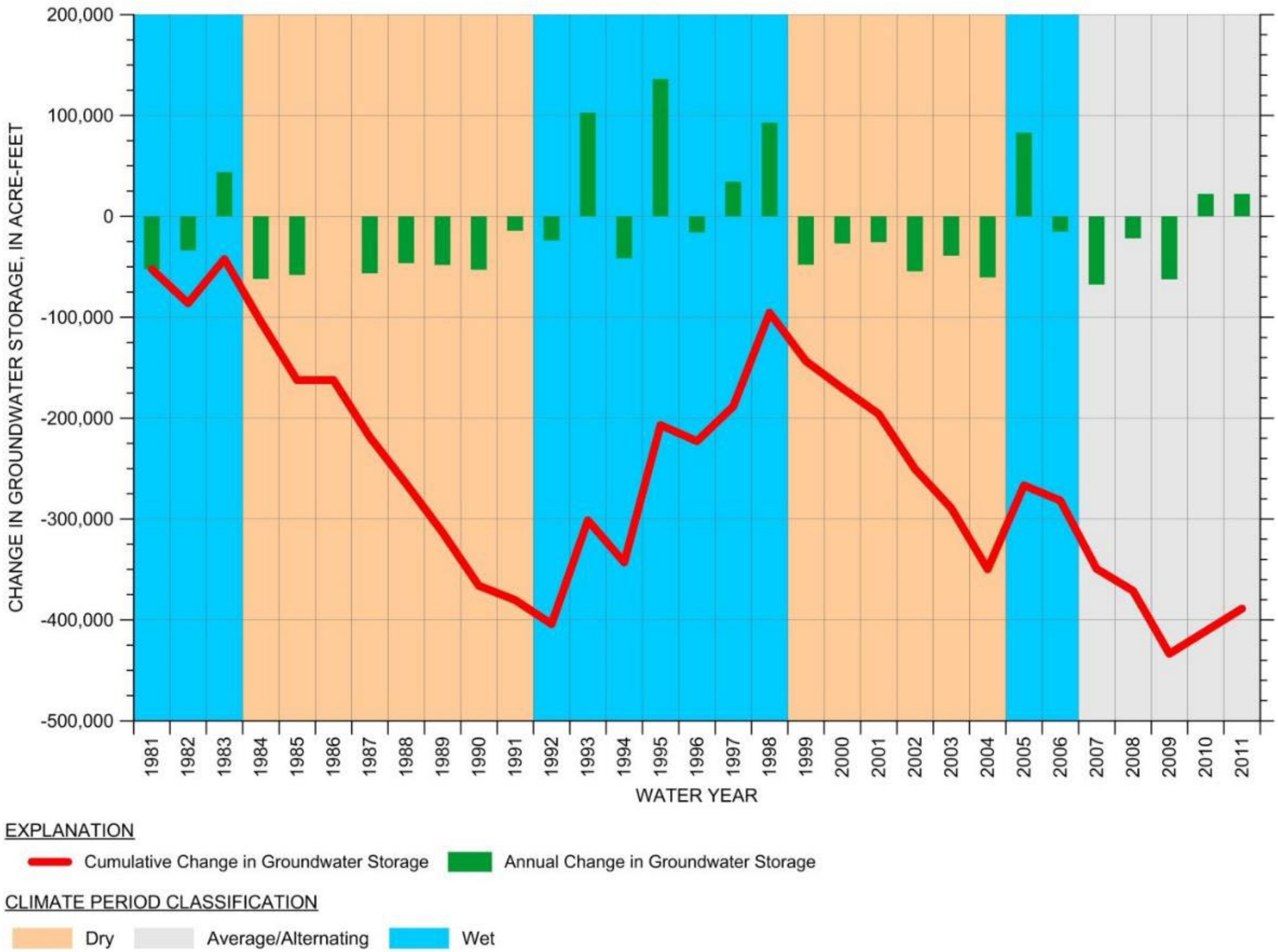


Figure 6-4. Historical (1981-2011) Annual and Cumulative Change in Groundwater Storage

The historical groundwater budget is strongly influenced by the amount of precipitation. During the historical base period, dry conditions prevailed from 1984 through 1991 and 1999 through 2004, as depicted by the orange areas on Figure 6-3 and Figure 6-4. During these dry periods, the amount of recharge and streamflow percolation was relatively low and the amount of pumping was relatively high. The net result was a loss of groundwater from storage. In contrast, wet conditions prevailed in the early 1980s, 1992 through 1998, and 2005 and 2006, as shown by blue areas on Figure 6-3 and Figure 6-4. During these wet periods, the amount of recharge and streamflow percolation was relatively high and the amount of pumping was relatively low. The net result was a gain of groundwater in storage. The period from 2007 through 2011 had generally alternating years of average precipitation. During this period, the amount of recharge and streamflow percolation was average and the amount of groundwater pumping was relatively high. The net result was a loss of groundwater from storage.

The historical groundwater budget is also influenced by the amount of groundwater pumping. Over the historical base period, the total amount of groundwater pumping showed two distinct trends (Figure 6-3). From the early 1980s through the late 1990s, groundwater pumping declined from about 100,000 AFY to about 50,000 AFY. In general, this decline in groundwater pumping corresponded to a period when irrigation of alfalfa and pasture acreage declined and irrigated vineyard acreage increased (Fugro, 2002). The transition from alfalfa and pasture to vineyard resulted in a net decrease in groundwater pumping because the irrigation demand of vineyards is less than alfalfa and pasture. This decrease in pumping contributed to the increase in groundwater in storage during the 1990s. After the late 1990s, groundwater pumping increased to about 100,000 AFY in 2007, largely due to continued expansion of irrigated vineyard acreage. The increase in groundwater pumping during this period contributed to the reductions in groundwater in storage that occurred after the late 1990s.

Over the 31 year historical base period, a net loss of groundwater storage of about 390,000 AF occurred. The annual average groundwater storage loss was approximately 12,600 AF. The average groundwater storage loss of 12,600 AFY is about 18% of the average total groundwater inflow of 71,400 AFY (Table 6-3) and about 15% of the average total groundwater outflow of 84,000 AFY (Table 6-4).

6.3.2.4 Historical Water Balance of the Subbasin

The computed long-term depletion of groundwater in storage indicates that total groundwater outflow exceeded the total inflow in the Subbasin from 1981 through 2011; this depletion is consistent with observed groundwater elevation declines (for example, see groundwater elevation change maps and hydrographs in Chapter 5). As summarized in Table 6-5, total groundwater pumping averaged approximately 72,400 AFY during the historical base period.

Section 354.18(b)(7) of the SGMA Regulations requires a quantification of sustainable yield for the Subbasin for the historical base period. Sustainable yield is the maximum quantity of groundwater, calculated over a base period representative of long-term conditions in the Subbasin and including any temporary surplus that can be withdrawn annually from a groundwater supply without causing an undesirable result. The historical sustainable yield was estimated by subtracting the estimate of average groundwater storage deficit of 12,600 AFY from the estimate of total average amount of groundwater pumping of 72,400 AFY for the historical base period. This results in a historical sustainable yield of about 59,800 AFY. This estimated value reflects historical climate, hydrologic and water resource conditions and provides insight into the amount of groundwater pumping that could be sustained in the Subbasin to maintain a balance between groundwater inflows and outflows and avoid undesirable results. However, it differs from estimates of future sustainable yield, which will be developed for representative average future climate and hydrologic conditions and will be used to plan management actions and projects needed to avoid undesirable results under SGMA.

6.4 Current Water Budget

The SGMA Regulations require that the current surface water and groundwater budget be based on the most recent hydrology, water supply, water demand, and land use information. For the Paso Robles Subbasin GSP, the period 2012 to 2016 was selected as the time period for the current water budget. The current water budget period corresponds to a drought period when the average annual precipitation averaged about 62% of the historical average annual precipitation and the average streamflow percolation was 10% of the historical average percolation. As a result, the current water budget period represents a more extreme condition in the Subbasin and is not appropriate for sustainability planning in the Subbasin. Estimates of the surface water and groundwater inflow and outflow, and changes in storage for the current water budget period are provided below.

6.4.1 Current Surface Water Budget

The current surface water budget quantifies important sources of surface water. Similar to the historical surface water budget, the current surface water budget includes two surface water source types: local imported supplies and local supplies.

6.4.1.1 Current Local Imported Supplies

As reported in the City of Paso Robles' 2016 Urban Water Management Plan, the most significant source of imported surface water in the Paso Robles Subbasin is the City's entitlement for Nacimiento water through a SLOFCWCD contract (Todd Groundwater, 2016). The total Nacimiento entitlement is about 6,500 AFY. Use of the Nacimiento water by the City began in 2014. Recently the Subbasin has begun to receive relatively small deliveries of up to 100 AFY of State Water Project water to Shandon CSA 16 for residential use. Currently, the City can treat up to about 2,700 AFY of Nacimiento water and deliver it for potable use (Todd Groundwater, 2016). Approximately another 270 AFY of Nacimiento water can be discharged to the Salinas River and recovered by a dedicated recovery well. In times of drought, Nacimiento water can be discharged to the Salinas River to improve reliability of the City's river recovery wells.

Only a small portion of the total water demand in the Subbasin during the current water budget period was met by the City's entitlement of imported surface water from Nacimiento Reservoir. According to records provided by the City, the amounts of Nacimiento water used in 2014, 2015, and 2016 were 227, 622, and 799 AF, respectively. The limited use is not an indication of the reliability of Nacimiento water, but rather a choice by the City regarding how to operate its water supply portfolio. Nacimiento water is expected to be a stable water supply given the favorable contractual priority of SLOFCWCD for the reservoir supply (Todd Groundwater, 2016).

Given the limited amount of imported Nacimiento water used compared to the amount of other local surface water supplies, the Nacimiento water supply is not aggregated into the surface water budget discussed below.

6.4.1.2 Current Local Supplies

Local surface water supplies include surface water flows that enter the Subbasin from precipitation runoff within the watershed, Salinas River inflow to the Subbasin (including releases from the Salinas Reservoir), Nacimiento River inflow to the Subbasin (including releases from Nacimiento Reservoir), and discharge of groundwater to streams from the Alluvial Aquifer. Table 6-6 summarizes the annual average, minimum, and maximum values for these inflows.

Table 6-6. Estimated Current (2012-2016) Annual Surface Water Inflows to Subbasin

Surface Water Inflow Component	Average	Minimum	Maximum
Precipitation Runoff	2,900	1,300	7,500
Salinas Reservoir Releases to Salinas River	6,600	5,200	8,500
Nacimiento Reservoir Releases	73,200	29,400	163,600
Groundwater Discharge to Rivers and Streams	4,300	3,000	6,100
Total	87,000		

Note: All values in AF

The estimated average total inflow from both precipitation runoff and reservoir releases over the current water budget period was approximately 87,000 AFY, or 25% of the 360,400 AFY over the historical base period. Approximately 84% of the local surface water supply was from Nacimiento Reservoir releases, most of which flows out of the Subbasin as surface flow. As a result, Nacimiento River flows do not result in appreciable amounts of surface water percolation to groundwater. If Nacimiento releases are not considered in the surface water inflows, surface water inflows during the current water budget period were less than 10% of the surface water inflows for the historical base period. The substantial reduction in surface water inflows reflects the drought conditions that prevailed during the current water budget period.

6.4.1.3 Current Surface Water Outflows

The estimated annual average, minimum, and maximum surface water outflow leaving the Subbasin as flow in the Salinas River, flow in the Nacimiento River, and percolation into the groundwater system over the current base period is summarized in Table 6-7.

Table 6-7. Estimated Current (2012-2016) Annual Surface Water Outflows from Subbasin

Surface Water Outflow Component	Average	Minimum	Maximum
Salinas River Flow	11,100	8,500	14,100
Nacimiento River Flow	73,200	29,400	163,300
Percolation of Surface Water to Groundwater	2,700	2,100	4,100
Total	87,000		

Note: All values in AF

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Reductions in surface water outflow for the current water budget period were similar to those reported above for the surface water inflows.

6.4.1.4 Current Surface Water Budget

Figure 6-5 summarizes the current surface water budget for the Subbasin. Figure 6-5 is on the same scale as Figure 6-2 and shows the effects of the drought conditions that prevailed during the period 2012 through 2016. During this period, precipitation was well below average, which resulted in very little surface water flow.

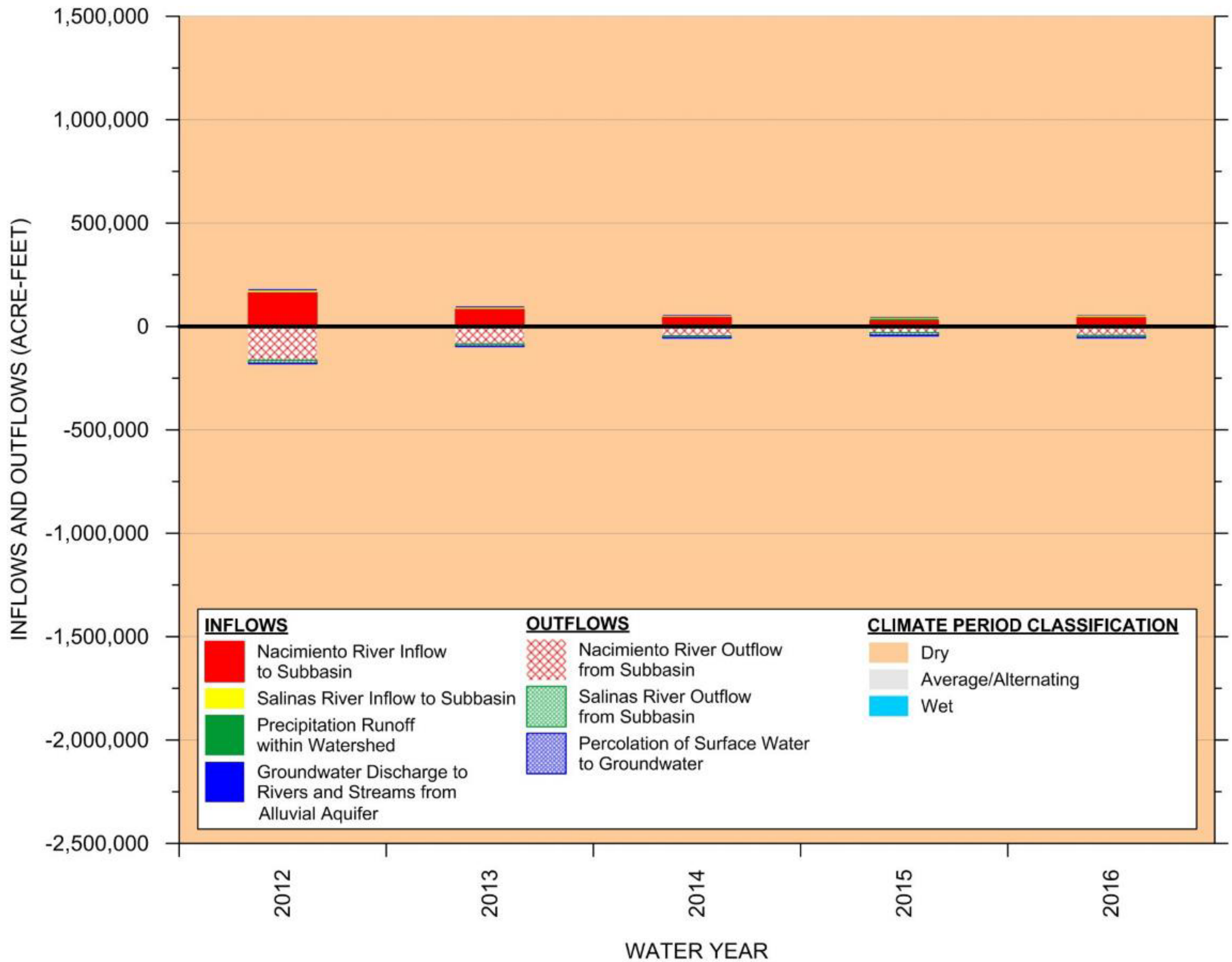


Figure 6-5. Current (2012 – 2016) Surface Water Inflows and Outflows

6.4.2 Current Groundwater Budget

Groundwater supplied most of the water used in the basin during the current water budget period. The current water budget includes a summary of the estimated groundwater inflows, groundwater outflows, and change in groundwater in storage.

6.4.2.1 Current Groundwater Inflows

Groundwater inflow components include streamflow percolation, agricultural irrigation return flows, deep percolation of direct precipitation, subsurface inflow into the Subbasin, wastewater pond percolation, and urban irrigation return flow. Estimated annual groundwater inflows for the current water budget period are summarized in Table 6-8.

Table 6-8. Estimated Current (2012-2016) Annual Groundwater Inflows to Subbasin

Groundwater Inflow Component [1]	Average	Minimum	Maximum
Streamflow Percolation	2,700	2,100	4,100
Agricultural Irrigation Return Flow	13,100	12,400	13,800
Deep Percolation of Direct Precipitation	1,400	500	3,800
Subsurface Inflow into Subbasin	4,900	4,400	6,000
Wastewater Pond Percolation	4,700	4,600	4,900
Urban Irrigation Return Flow	2,100	2,000	2,200
Total	28,900		

Note: All values in AF

(1) – Percolation from septic systems is not directly accounted for because it is subtracted from the total estimated rural-domestic pumping to simulate a net rural-domestic pumping amount.

For the current water budget period, estimated total average groundwater inflow ranged from 27,500 AFY to 33,100 AFY, with an average inflow of 28,900 AFY. Notable observations from the summary of groundwater inflows for the current water budget period included:

- Average total inflow during the current water budget period was about 40% of the historical base period.
- Unlike the historical base period, when the largest inflow component was streamflow percolation, the largest groundwater inflow component for the current water budget is agricultural irrigation return flow, which accounts for approximately 45% of the total average inflow.

- The relatively small difference between the minimum and maximum inflows reflects the drought condition that prevailed during the current water budget period, when precipitation and runoff were continuously low.
- Total annual average streamflow percolation in the current water budget period was approximately 10% of the streamflow percolation in the historical base period. This reflects the very low streamflows during the drought. The low streamflows had a significant impact on the groundwater basin because streamflow percolation was the most significant source of groundwater recharge during the historical period.
- Total annual average recharge from direct precipitation for the current water budget period was about 12% of the recharge from direct precipitation for the historical base period.

6.4.2.2 Current Groundwater Outflows

Groundwater outflow components include total groundwater pumping from all water use sectors, groundwater discharges to streams and rivers from the Alluvial Aquifer, subsurface flow out of the Subbasin, and riparian evapotranspiration. Estimated annual groundwater outflows for the current water budget period are summarized in Table 6-9.

Table 6-9. Estimated Current (2012-2016) Annual Groundwater Outflow from Subbasin

Groundwater Outflow Component	Average	Minimum	Maximum
Total Groundwater Pumping	85,800	73,900	101,200
Discharge to Streams and Rivers from Alluvial Aquifer	4,300	3,000	6,100
Subsurface Flow Out of Subbasin	2,500	2,300	2,600
Riparian Evapotranspiration	1,700	1,700	1,700
Total	94,300		

Note: All values in AF

For the current water budget period, estimated total average groundwater outflows ranged from 81,200 AFY to 109,300 AFY, with an average annual outflow of 94,300 AF. Notable observations from a comparison of the historical (Table 6-4) and current groundwater outflows include:

- Total annual average groundwater pumping was about 19% higher during the current water budget period.

- Groundwater discharge from the Alluvial Aquifer to streams was about 40% lower during the current water budget period, reflecting lower precipitation and lower groundwater levels.

The largest groundwater outflow component from the Subbasin in the current water budget period is pumping. Estimated annual groundwater pumping by water use sector for the current water budget period is summarized in Table 6-10.

Table 6-10. Estimated Current (2012-2016) Annual Groundwater Pumping by Water Use Sector

Water Use Sector	Average	Minimum	Maximum
Agricultural	77,000	65,600	92,300
Municipal	3,800	3,200	4,300
Rural-Domestic [1]	3,500	3,400	3,600
Small Commercial	1,500	1,500	1,500
Total	85,800		

Note: All values in AF

(1) Assumed to be net amount of pumping based on an analysis conducted by GSSI (2016). Net pumping was computed as total pumping amount minus septic return flow.

For the current water budget period, estimated total average groundwater pumping ranged from 73,900 AFY to 101,200 AFY, with an average pumping of 85,800 AFY. Agricultural pumping was the largest component of total groundwater pumping and accounts for about 90% of total pumping during the current water budget period. Municipal, rural-domestic, and small commercial pumping account for 4%, 4%, and 2%, respectively, of total average pumping during the current water budget period.

Notable observations from a comparison of the historical (Table 6-5) and current total annual average groundwater pumping include:

- Total annual average agricultural groundwater pumping was about 18% higher during the current water budget period when compared to the historical period (increase of 11,700 AFY)
- Total annual average rural-domestic groundwater pumping was about 40% higher during the current water budget period when compared to the historical period (increase of 1,000 AFY)

6.4.2.3 Current Groundwater Budget and Change in Groundwater Storage

Groundwater inflows and outflows for the current base period are summarized on Figure 6-6. This graph shows inflow and outflow components for every year of the current water budget period. Inflow components are graphed above the zero line and outflow components are graphed below the zero line. Groundwater outflow by pumping (green bars) includes pumping from all water use sectors (Table 6-10).

Figure 6-7 shows annual and cumulative change in groundwater storage during the current water budget period. Annual decreases in groundwater storage are graphed below the zero line. The red line shows the cumulative change in groundwater storage over the historical base period.

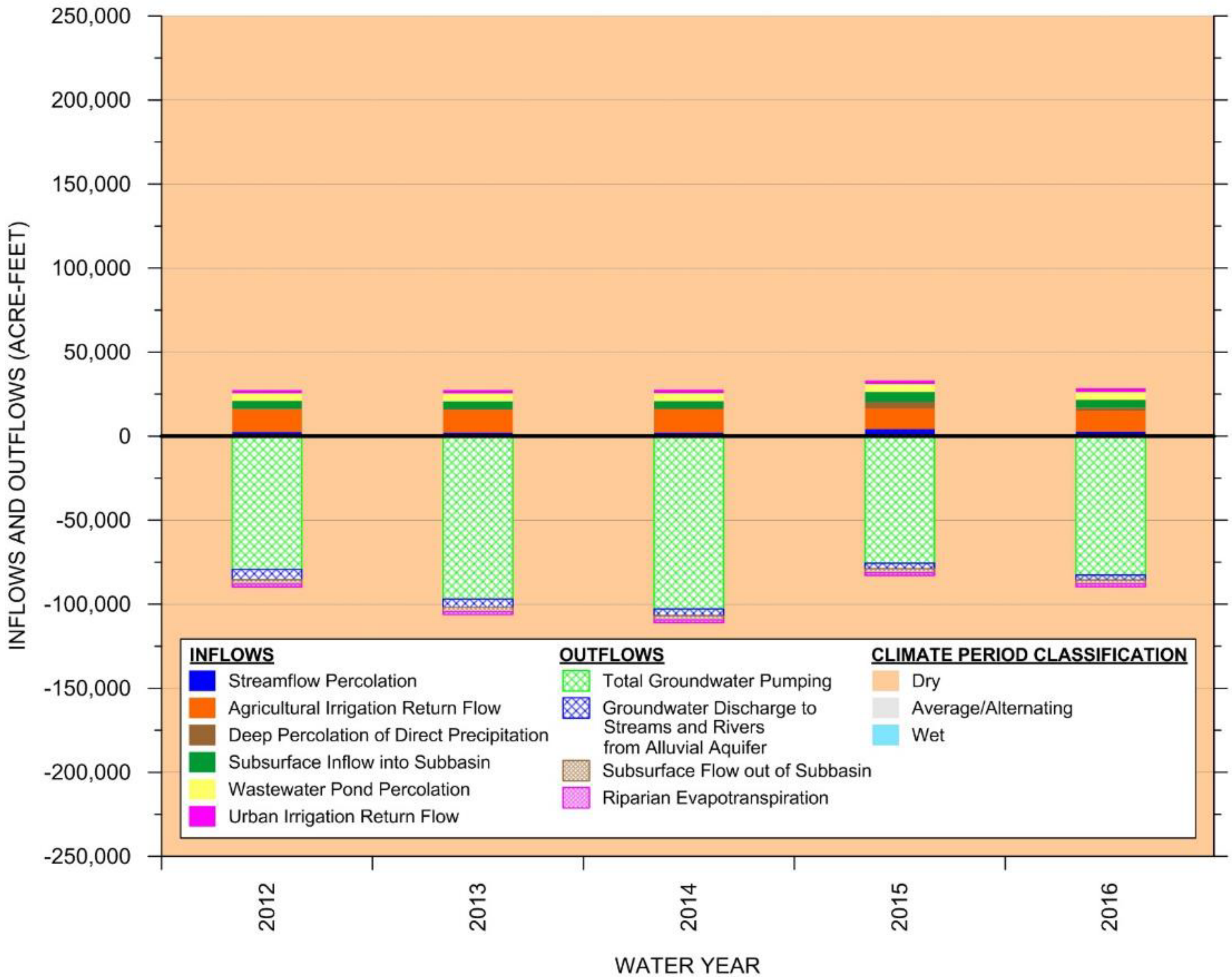


Figure 6-6. Current (2012-2016) Groundwater Inflows and Outflows

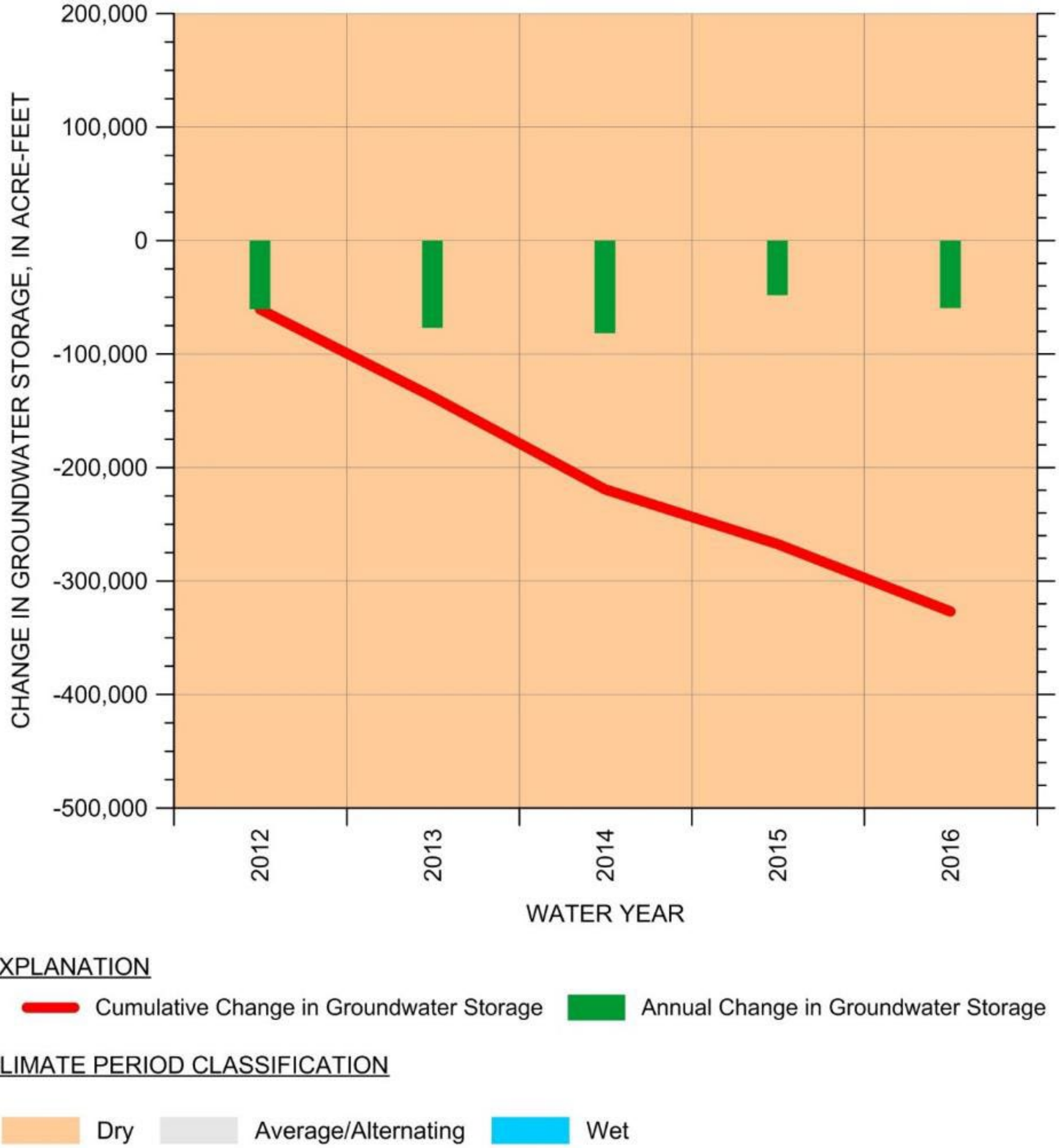


Figure 6-7. Current (2012-2016) Annual and Cumulative Change in Groundwater Storage

The current groundwater budget is strongly influenced by the drought; total groundwater pumping shows no trend over the five years that might be related to any continuing land use change. During the current water budget period, the amounts of recharge and streamflow percolation were very low and the average amount of pumping was slightly greater than the historical water budget period. Over the five-year current water budget period, an estimated net loss of groundwater in storage of about 327,000 AF occurred (Figure 6-7). The annual average groundwater storage loss, or the difference between outflow and inflow to the Subbasin, was approximately 65,400 AF.

6.4.2.4 Current Water Balance

The substantial short-term depletion of groundwater in storage indicates that total groundwater outflows exceeded the total inflows over the current water budget period. As summarized in Table 6-9, total groundwater pumping averaged approximately 85,800 AFY during the current period. A quantification of the current sustainable yield for the Subbasin is be estimated by subtracting the average groundwater storage deficit (65,400 AFY) from the total average amount of groundwater pumping (85,800 AFY) to yield about 20,400 AFY. Due to the drought conditions, the current water budget period is not appropriate for long-term sustainability planning.

6.5 Future Water Budget

SGMA Regulations require the development of a future surface water and groundwater budget to estimate future baseline conditions of supply, demand, and aquifer response to GSP implementation. The future water budget provides a baseline against which management actions will be evaluated over the GSP implementation period from 2020 to 2040. Future water budgets were developed using the GSP model.

In accordance with Section 354.18 (c)(3)(A) of the SGMA Regulations, the future water budget should be based on 50 years of historical precipitation, evapotranspiration, and streamflow information. The GSP model includes only 31 years of historical precipitation, evapotranspiration, and streamflow data. Therefore, the future water budget is based on 31 years of historical data rather than 50 years of historical data. It is believed that this time period is representative and is the best available information for groundwater sustainability planning purposes.

6.5.1 Assumptions Used in Future Water Budget Development

Assumptions about future groundwater supplies and demands are described in the following subsections. An overarching assumption is that any future increases in groundwater use within the Subbasin will be offset by equal reductions in groundwater use in other parts of the Subbasin, or in other words, groundwater neutral through implementation of the GSP.

Future water budgets were developed using the GSP model. During the update process for the GSP model, all model components (e.g., groundwater pumping) of the entire original 2016 GSSI model area were updated, including components with Monterey County and the Atascadero Subbasin. However, information provided for the future water budget only pertains to the GSP Subbasin (Figure 1-1), thus do not include areas within Monterey County or the Atascadero Subbasin.

6.5.1.1 Future Non-Agricultural Water Demand Assumptions

Future non-agricultural water demands were estimated for the City of Paso Robles (City) and San Miguel Community Services District (SMCSD) based on the following available planning documents:

- Paso Robles 2015 Urban Water Management Plan (UWMP) (Todd Groundwater, 2016)
- San Miguel Community Services District Water & Wastewater Master Plan Update (Monsoon Consultants, 2017)

Projections of the City's groundwater demand were obtained from the City's UWMP. A portion of the City's future groundwater demand will be offset by imported Nacimiento water. The projected water demand for SMCSD was assumed to be satisfied solely by groundwater. Projections for non-agricultural water demand for entities other than those listed above, such as residential wells and smaller commercial water users, were not available. Water demand for these users was assumed to remain constant into the future to be consistent with the overarching assumption that future growth will be groundwater neutral through the implementation of this GSP.

Total non-agricultural groundwater demand in the Subbasin is projected to increase from about 8,500 AFY in 2020 to about 8,700 AFY in 2040.

6.5.1.2 Future Wastewater Discharge Assumptions

Discharge of treated wastewater to the Salinas River provides a source of recharge to the Alluvial Aquifer. Rates of future wastewater discharge were estimated as a percentage of total water demand. Wastewater discharge as a percentage of water demand was calculated separately for each water provider. Projected annual wastewater discharge for San Miguel CSD is about 200 AFY, and projected annual wastewater discharge for the City of Paso Robles increases from about 2,900 AFY in 2020 to about 3,600 AFY by 2040. If the future wastewater discharge amounts differ from the estimated values cited above the GSP model and future water budgets will be adjusted during implementation to account for these changes.

6.5.1.3 Future Crop Acreage and Irrigation Efficiency Assumptions

In accordance with Section 354.18 (c)(3)(B) of the SGMA Regulations, the most recently available land use (in this case, crop acreage) and crop coefficient information should be used as the baseline condition for estimating future water demand. For the GSP, the 2016 crop acreage data obtained from the office of the San Luis Obispo County Agricultural Commissioner were used. These crop acreage data were the most recently available. To account for irrigation efficiency in the future water budget, the reported crop coefficient information from GSSI (GSSI, 2016) was used.

Projections for agricultural water demand are not available. Agricultural water demand was assumed to remain constant into the future to be consistent with the overarching assumption that future growth will be groundwater neutral through the implementation of this GSP.

6.5.1.4 Future Climate Assumptions

The SGMA Regulations require incorporating future climate estimates into the future water budget. To meet this requirement, DWR developed an approach for incorporating reasonably expected, spatially gridded changes to monthly precipitation and reference ETo (DWR, 2018b). The approach for addressing future climate change developed by DWR was used in the future water budget modeling for the Subbasin. The changes are presented as separate monthly change factors for both precipitation and ETo, and are intended to be applied to historical time series within the climatological base period through 2011. Specifically, precipitation and ETo change factors were applied to historical climate data for the period 1981 to 2011 for modeling the future water budget.

DWR provides several sets of change factors representing potential climate conditions in 2030 and 2070. DWR recommends using the 2030 change factors to evaluate conditions over the GSP implementation period (DWR, 2018b). Consistent with DWR recommendations, datasets of monthly 2030 change factors for the Paso Robles area were applied to precipitation and ETo data from the historical base period to develop monthly time series of precipitation and ETo, which were then used to simulate future hydrology conditions.

6.5.2 Modifications to Modeling Platform to Simulate Future Conditions

The existing modeling platform was modified to simulate future conditions, and the results of these simulations are used to develop the future water budget.

6.5.2.1 Modification to Soil Water Balance Model

The soil water balance model operates on a daily time scale and tracks daily variations in soil water storage for different agricultural areas in the Paso Robles Subbasin. For consistency with the monthly climate change factors provided by DWR, the daily model was used to develop monthly soil water balance calculations. These calculations compute irrigation demand as the residual crop evapotranspiration demand unsatisfied by effective precipitation.

These calculations use monthly precipitation and ETo, rescaled by the monthly climate change factors provided by DWR, and the same monthly crop coefficients used in the historical water budget analysis. Empirical relationships were developed to account for soil moisture carryover from the winter into the spring based on results from the daily soil water balance model.

Monthly applied irrigation water was determined over the future base period from computed monthly crop demand and the crop-specific irrigation efficiencies. Agricultural irrigation return flow is then computed as the difference between the applied irrigation water and the crop demand. Results were then averaged to provide average monthly rates of applied irrigation water and irrigation return flow that would be expected under future climate conditions.

6.5.2.2 Modifications to the Watershed Model

The watershed model operates on a daily time scale and simulates streamflow and infiltration of direct precipitation. The watershed model was modified to account for climate change by rescaling daily precipitation and ETo with the monthly climate change factors provided by DWR. The watershed model was then re-run using the modified precipitation and ETo values.

Results from the modified historical base period simulation were then averaged to provide average monthly rates of infiltration of direct precipitation and streamflow under future climate conditions.

6.5.2.3 Modifications to the Groundwater Model

The groundwater model operates at a semi-annual time scale, with stress periods representing six-month periods. The groundwater model was extended and modified to simulate the period 2020 to 2040. Starting groundwater levels for the future simulation were set to groundwater levels at the end of Water Year (WY) 2016, extracted from the updated groundwater model.

Future groundwater recharge components were computed using the modified soil water balance model and watershed model, as described above. Future streamflow generated both inside and outside the Subbasin was computed using the modified watershed model.

Future agricultural groundwater pumping was computed based on the modified soil water balance model. Future non-agricultural groundwater pumping was determined based on water demand assumptions described in Section 6.4.1.1.

Future groundwater recharge, streamflow, and agricultural pumping are specified in the groundwater model as repeating average time-series, based on average monthly calculation of applied irrigation water, excess irrigation water, recharge of direct precipitation, and streamflow.

This approach was adopted to simplify the future water budget and allow reporting of average future conditions accounting for climate change. Future non-agricultural pumping and wastewater return flows are the only inputs to the groundwater model that exhibit a long-term trend over the implementation period.

6.5.3 Projected Future Water Budget

Future surface water and groundwater budgets were projected.

6.5.3.1 Future Surface Water Budget

The future surface water budget includes average inflows from local imported supplies, average inflows from local supplies, average stream outflows, and average stream percolation to groundwater. Average future local imported supplies are estimated to be approximately 1,400 AFY. Table 6-11 summarizes the average local supply components of projected surface water budget.

Table 6-11. Projected Future Annual Average Surface Water Budget

Surface Water Budget Component	Flow Amount
Inflows	
Nacimiento River Inflow to Subbasin	214,300
Precipitation Runoff within Watershed	84,800
Salinas River Inflow to Subbasin	39,300
Groundwater Discharge to Rivers and Streams	4,600
Total	343,000
Outflows	
Nacimiento River Outflow from Subbasin	214,300
Salinas River Outflow from Subbasin	99,900
Percolation of Surface Water to Groundwater	28,800
Total	343,000

Note: All values in AF

6.5.3.2 Future Groundwater Budget

Projected groundwater budget components are computed using the modified groundwater flow model to simulate average conditions over the implementation period.

Table 6-12 summarizes projected annual groundwater inflows. In contrast to the historical groundwater budget which accounted for month-to-month variability, the projected groundwater budget is based on average monthly inflows. Therefore, variability in simulated groundwater budget components is minor, and minimum and maximum values are not included in Table 6-12.

Table 6-12. Projected Future Annual Groundwater Inflow to Subbasin

Groundwater Inflow Component	Average
Streamflow Percolation	28,800
Agricultural Irrigation Return Flow	14,500
Deep Percolation of Direct Precipitation	12,600
Subsurface Inflow into Subbasin	8,300
Wastewater Pond Leakage	3,500
Urban Irrigation Return Flow	1,800
Total	69,500

Note: All values in AF

The total average annual groundwater inflow is 1,900 AF less during the future period than during the historical base period. Annual agricultural irrigation return flow is the inflow component with the most significant reduction – about 3,300 AF – between the historical base period and future water budget period. Reduction in agricultural irrigation return flow is due partly to changes in historical cropping patterns and partly to improvements in vineyard irrigation efficiency.

Table 6-13 summarizes projected annual groundwater outflows.

Table 6-13. Projected Future Annual Groundwater Outflow from Subbasin

Groundwater Outflow Component	Average
Total Groundwater Pumping	74,800
Discharge to Streams and Rivers from Alluvial Aquifer	4,600
Groundwater Flow Out of Subbasin	2,100
Riparian Evapotranspiration	1,700
Total	83,200

Note: All values in AF

The total average annual groundwater outflow is estimated to be 800 AF less during the future period than during the historical base period. Future total annual groundwater pumping is projected to increase by about 2,400 AF compared to the historical base period. Concurrently, total annual discharge to streams and rivers and total annual groundwater outflow from the Subbasin are projected to decrease by about 2,700 AF and 500 AF, respectively.

6.5.3.3 Future Sustainable Yield

The projected future groundwater budget shows a long-term imbalance between inflows and outflows, with projected groundwater inflows of about 69,500 AFY and projected groundwater outflows of about 83,200 AFY. The projected future imbalance indicates an average annual decrease in groundwater in storage of 13,700 AFY. A calculated annual volume for the projected future sustainable yield of the Subbasin was estimated by subtracting the average groundwater storage deficit of 13,700 AFY from the total projected future average amount of groundwater pumping of 74,800 AFY. In this case, the future sustainable yield for the Subbasin period is estimated to be approximately 61,100 AFY. The estimated future sustainable yield is similar to the estimated sustainable yield for the historic base period. This similarity indicates that potential future changes in climate are not projected to have a substantial impact on the amount of groundwater that can be sustainably used compared to historical conditions. The calculated sustainable yield of the Subbasin is a reasonable estimate of the long-term pumping that can be maintained without producing undesirable results. Sustainable yield looks to the presence or absence of undesirable results, not strictly inflows and outflows. The definitive sustainable yield can only be determined once undesirable results have been described and data show undesirable results have not occurred. The sustainable yield estimate will be revised in the future as new data become available from monitoring data that evaluate the presence or absence of undesirable results.

7 MONITORING NETWORKS

This chapter describes the monitoring networks that exist and improvements to the monitoring networks that will be developed in the Subbasin as part of GSP implementation. This chapter is prepared in accordance with the SGMA regulations §354.32 and §354.34 and includes monitoring objectives, monitoring protocols, and data reporting requirements.

The monitoring networks presented in this chapter are based on existing monitoring sites. It will be necessary to expand the existing monitoring networks and identify or install more monitoring sites to fully demonstrate sustainability, refine the hydrogeologic conceptual model, and improve the GSP model. Monitoring networks are described for each of the five applicable sustainability indicators, and data gaps are identified for every monitoring network. These data gaps will be addressed during GSP implementation. Addressing these data gaps and developing more extensive and complete monitoring networks will improve the GSAs' ability to track progress and demonstrate sustainability.

7.1 Monitoring Objectives

The SGMA regulations require monitoring networks be developed to promote the collection of data of sufficient quality, frequency, and spatial distribution to characterize groundwater and related surface water conditions in the Subbasin and to evaluate changing conditions that occur through implementation of the GSP. The monitoring network should accomplish the following:

- Demonstrate progress toward achieving measurable objectives described in the GSP.
- Monitor impacts to the beneficial uses and users of groundwater.
- Monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds.
- Quantify annual changes in water budget components.
- The minimum thresholds and measurable objectives monitored by the networks are described in Chapter 8 - Sustainable Management Criteria.

7.1.1 Monitoring Networks

Monitoring networks are developed for each of the five sustainability indicators that are relevant to the Subbasin:

- Chronic lowering of groundwater levels
- Reduction in groundwater storage

- Degraded water quality
- Land subsidence
- Depletion of interconnected surface water

The Subbasin is isolated from the Pacific Ocean and is not threatened by seawater intrusion; therefore, this GSP does not provide monitoring for the seawater intrusion sustainability indicator.

The SGMA regulations allow the GSP to use existing monitoring sites for the monitoring network. Wells used for monitoring, however, are limited by restrictions in §352.4(c) of the SGMA regulations which requires the GSAs to provide various data for any wells used as monitoring wells, including but not limited to: CASGEM well identification number, well location, ground surface elevation, well depth, and perforated intervals. Wells for which these data were not available, or could not be easily inferred, could not be used in the current groundwater monitoring network.

The approach for establishing the monitoring network for this Subbasin is to leverage existing monitoring programs and incorporate additional monitoring locations that have been made available by cooperating entities. The monitoring networks are limited to locations with data that are publicly available and not collected under confidentiality agreements; the availability of well data and restrictions of existing confidentiality agreements results in a monitoring network with relatively few wells. This chapter identifies data gaps in each monitoring network and proposes locations for filling those data gaps.

7.1.2 Management Areas

The SGMA regulations require that if management areas are established, the quantity and density of monitoring sites in those areas shall be sufficient to evaluate conditions of the Subbasin setting and sustainable management criteria specific to that area. At this time, management areas have not been defined for the Subbasin. If management areas are developed in the future, the monitoring networks will be reevaluated to ensure that there is sufficient monitoring to evaluate conditions in each management area.

7.2 Groundwater Level Monitoring Network

The minimum thresholds and measurable objectives for the chronic lowering of groundwater levels sustainability indicator are evaluated by monitoring groundwater levels. The SGMA regulations require a network of monitoring wells sufficient to demonstrate groundwater occurrence, flow directions, and hydraulic gradients between principal aquifers and surface water features.

Existing well records and existing groundwater monitoring programs in the Subbasin are described in Chapters 3 and 5, respectively. Groundwater well construction data and water level data were obtained from the following public sources:

- San Luis Obispo County Flood Control and Water Conservation District (SLOFCWCD)
- USGS National Water Information System (NWIS)
- DWR Online System for Well Completion Reports (OSWCR)
- DWR SGMA Data Viewer
- DWR California Statewide Groundwater Elevation Monitoring (CASGEM)
- City of Paso Robles and San Miguel CSD for public drinking water supply wells

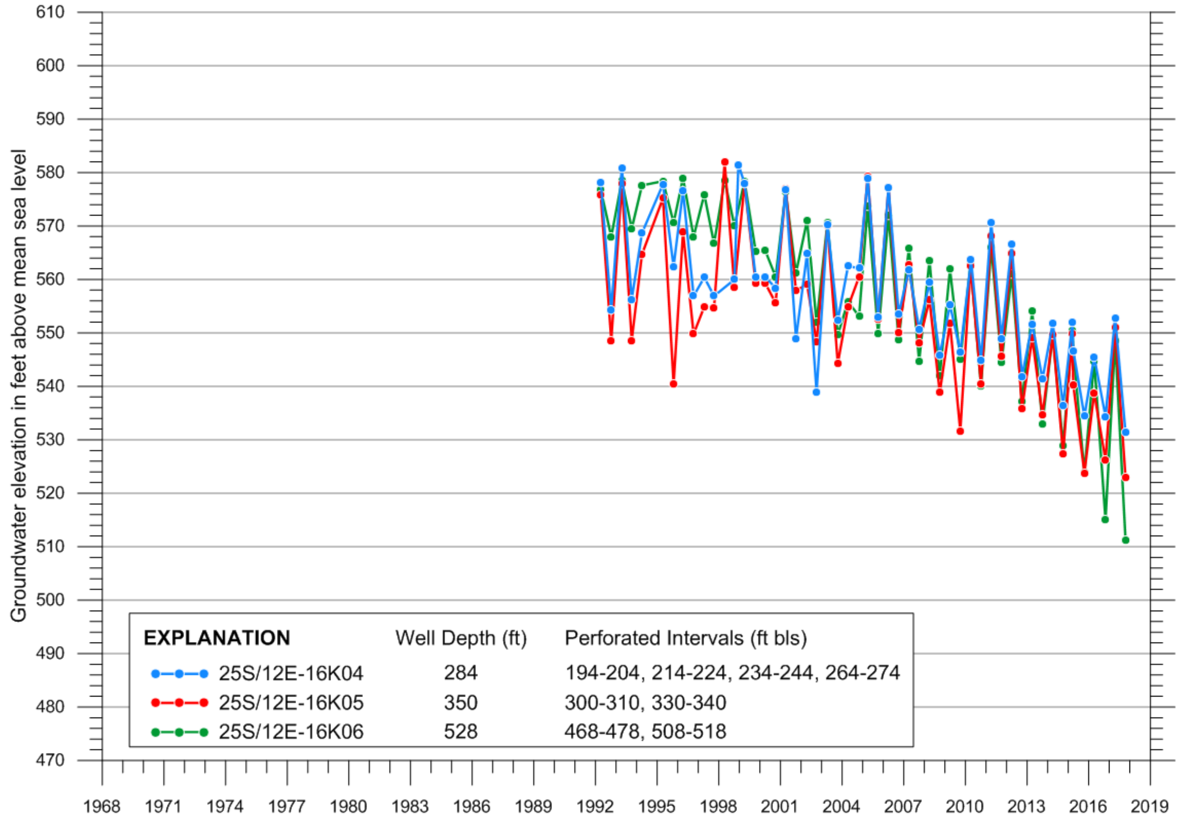
These data sources resulted in a dataset of thousands of wells. The dataset was analyzed using the following steps to assess whether individual wells could be included in the initial GSP groundwater level monitoring network:

1. **Include Only Currently Measured Wells**. To reduce the possibility of selecting a well that has not been monitored in many years or that may no longer be accessible, wells were excluded that did not have at least one groundwater level measurement from 2012 or later. All the groundwater level monitoring data available for the Subbasin that met this criterion were provided by SLOFCWCD or the USGS NWIS, which have monitored groundwater levels in approximately 130 wells since 2012.

2. **Remove Confidential Wells**. Most of the data from wells in the SLOFCWCD groundwater level monitoring network are subject to confidentiality agreements. Because monitoring data collected as part of this GSP will be publicly available, data from the wells subject to confidentiality agreements cannot be published and therefore these wells are currently excluded from the GSP monitoring network.

3. **Include Additional Wells Provided by GSAs**. The GSAs provided an additional set of wells after securing permission from well owners to be included in the monitoring network. Only wells that had measurements at least as recent at 2012, were included.

Within the group of wells that met the criteria listed above, there are two well clusters: each consisting of three wells in the same location. The wells in these two clusters are all screened in the Paso Robles Formation Aquifer at various depths. A comparison of hydrographs for each cluster indicates that water levels have been generally similar in the three wells in each cluster, as shown on Figure 7-1. Only one well was selected from each cluster for inclusion in the monitoring network because it is representative of all the wells in that cluster. The two wells selected for monitoring are wells 26S/15E-20B04 and 25S/12E-16K05.



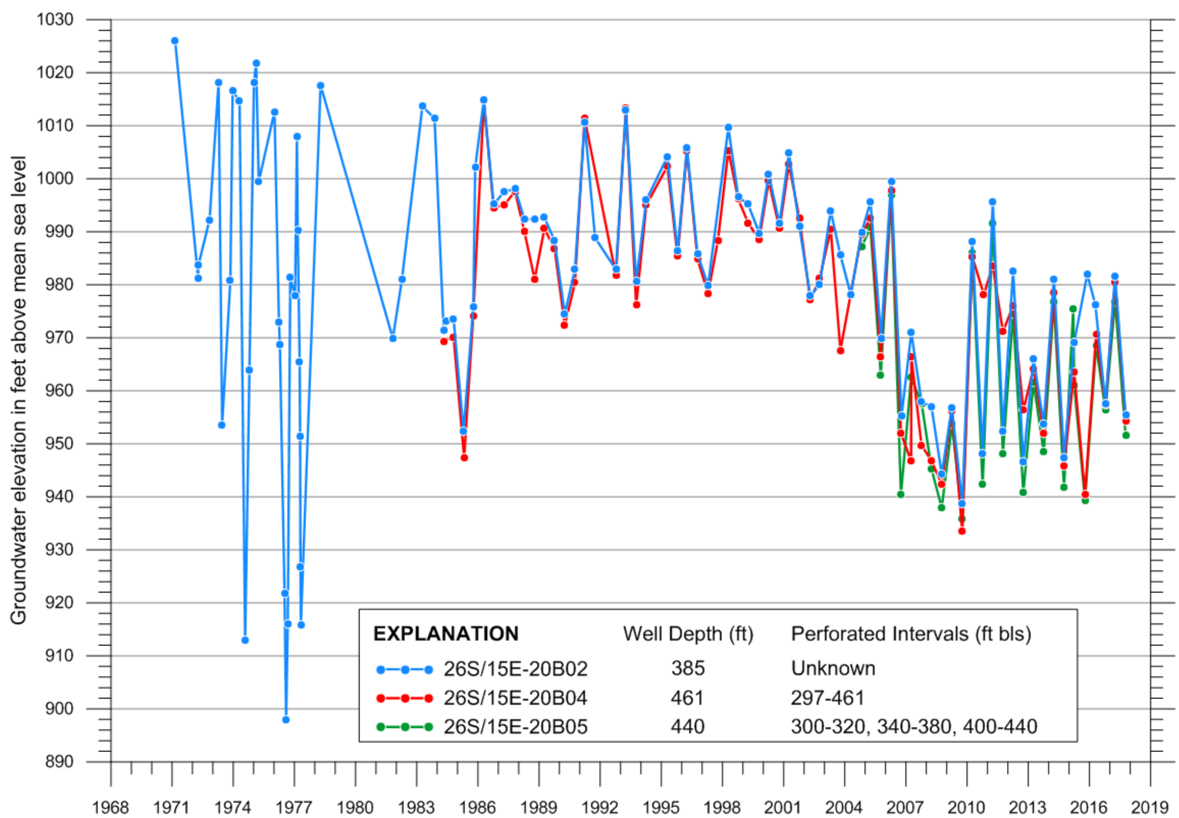


Figure 7-1. Hydrographs of Wells in Well Clusters

There are two principal aquifers in the Subbasin, as described in Chapter 4 – Hydrogeologic Conceptual Model. The Alluvial Aquifer occurs along stream channels and is generally up to about 100 feet thick. The Paso Robles Formation Aquifer occurs in thin discontinuous sand and gravel zones throughout the Subbasin. The wells in the proposed monitoring network are assigned to an aquifer according to these guidelines:

- The well location is compared to the surface geology map, Figure 4-4.
- If the well is located where the Paso Robles Formation is mapped at land surface on the surface geology map, then it is assumed to be monitoring the Paso Robles Formation Aquifer.
- If the well is located in the mapped extent of alluvium, and the screened interval or total well depth is less than 100 feet, then it was assumed to be monitoring the Alluvial Aquifer. If the top of the perforated interval is greater than 100 feet below land surface, then the well was assumed to be monitoring the Paso Robles Formation Aquifer.

The depths of several wells are unknown. Although well completion reports are available online via the State's OSWCR system, the well completion report numbers are unknown for these wells and therefore it is impossible to identify the associated well completion reports. Wells in which depth to water is greater than 100 feet below land surface on average are assumed to be monitoring the Paso Robles Formation Aquifer. Wells with depth to water less than 100 feet below land surface may be monitoring the alluvial aquifer, but their aquifer designations are unknown pending confirmation of screened interval and/or total depth. Wells for which an aquifer could not be assigned are considered potential future monitoring wells, and they will be included in the monitoring system when and if the well completion information and aquifer can be verified during GSP implementation. Likewise, there are also wells within the Alluvial Aquifer that could be included in the monitoring network when and if the data on depth and screened interval are obtained and confidentiality restrictions are lifted.

The wells in the water level monitoring network are listed in Table 7-1 and shown on Figure 7-2. As of 2019 there are 23 wells in the network, 22 wells monitor the Paso Robles Formation Aquifer and one well owned by the City of Paso Robles monitors the Alluvial Aquifer. Any of these wells that are missing well completion information will be assessed during GSP implementation to obtain well depth and/or screened interval. There are nine potential future monitoring wells listed on Table 7-2.

All 22 wells monitoring the Paso Robles Formation Aquifer are part of the SLOFCWCD monitoring network. These wells either are not subject to confidentiality agreements or the well data are located in a public database hosted by DWR and therefore are publicly available. The monitoring frequency indicates that water levels are presumably measured twice a year, in accordance with the SLOFCWCD protocol of measuring depths to water in April and October of each year. The most recent available measurement was 2016 or 2017 in all wells.

Table 7-1. Groundwater Level Monitoring Well Network

Well ID (alt ID)	Well Depth (feet)	Screen Interval(s) (feet bls)	Reference Point Elevation (feet AMSL)	First Year of Data	Last Year of Data	Years Measured (years)	Number of Measurements	Aquifer
18MW-0191[1]	50	10-50	672 (LSE)	2018	2018	<1	1	Qa
25S/12E-16K05 (PASO-0345)	350	300-310, 330-340	669.8	1992	2017	25	52	PR
25S/12E-26L01 (PASO-0205)	400	200-400	719.72	1970	2017	47	103	PR
25S/13E-08L02 (PASO-0195)	270	110-270	1,033.81	2012	2017	5	11	PR
26S/12E-14G01 (PASO-0048)	740	---	789.3	1969	2017	48	117	PR
26S/12E-14G02 (PASO-0017)	840	640-840	787	1993	2012	19	27	PR
26S/12E-14H01 (PASO-0184)	1230	180-?	790	1969	2016	47	45	PR
26S/12E-14K01 (PASO-0238)	1100	---	786	1979	2017	38	80	PR
26S/12E-26E07 (PASO-0124)	400	---	835	1958	2017	59	128	PR
26S/13E-08M01 (PASO-0164)	400	260-400	827.92	2013	2017	4	11	PR
26S/13E-16N01 (PASO-0282)	400	200-400	890.17	2012	2017	5	11	PR
26S/15E-19E01 (PASO-0073)	512	223-512	1,020	1987	2017	30	52	PR
26S/15E-20B04 (PASO-0401)	461	297-461	1,036.36	1984	2017	33	66	PR
26S/15E-29N01 (PASO-0226)	350	---	1,135	1958	2017	59	122	PR
26S/15E-29R01 (PASO-0406)	600	180-600	1,109.5	2012	2017	5	9	PR
26S/15E-30J01 (PASO-0393)	605	195-605	1,123.3	1970	2017	47	80	PR
27S/12E-13N01 (PASO-0223)	295	195-295	972.42	2012	2017	5	11	PR
27S/13E-28F01 (PASO-0243)	212	118-212	1,072	1969	2017	48	104	PR
27S/13E-30F01 (PASO-0355)	310	200-310	1,043.2	2012	2017	5	8	PR
27S/13E-30J01 (PASO-0423)	685	225-685	1,095	2012	2015	3	6	PR
27S/13E-30N01 (PASO-0086)	355	215-235, 275-355	1,086.73	2012	2016	4	6	PR
27S/14E-11R01 (PASO-0392)	630	180-630	1,160.5	1974	2017	43	69	PR
28S/13E-01B01 (PASO-0066)	254	154-254	1,099.93	2012	2016	4	9	PR

NOTES: New alluvial monitoring well information provided by City of Paso Robles; well not included in County database.

"—" = unknown; AMSL – above mean sea level; PR Paso Robles Formation Aquifer; Qa Alluvial Aquifer

Table 7-2. Potential Future Groundwater Monitoring Well, Aquifer Unknown

Well ID (alt ID)	Well Depth (feet)	Screen Interval(s) (feet bls)	Reference Point Elevation (feet AMSL)	First Year of Data	Last Year of Data	Years Measured (years)	Number of Measurements	Aquifer
25S/12E-20K03 (PASO-0304)	---	---	625	1974	2017	43	82	---
26S/14E-24B01 (PASO-0302)	---	---	1001	1962	2017	55	93	---
26S/15E-33C01 (PASO-0314)	---	---	1095	1973	2017	44	75	---
26S/15E-33Q01 (PASO-0381)	---	---	1102	1973	2017	44	78	---
27S/15E-03E01 (PASO-0277)	---	---	1120.8	1968	2017	49	104	---
27S/14E-24B01 (PASO-0391)	---	---	1180.5	1973	2017	44	69	---
27S/14E-25J01 (PASO-0074)	---	---	1,225.5	1972	2017	45	67	--
27S/14E-29G01 (PASO-0041)	---	---	1201.5	1974	2017	43	73	---
27S/15E-35F01 (PASO-0053)	---	---	1230	1965	2017	52	78	---

NOTES: "—" = unknown

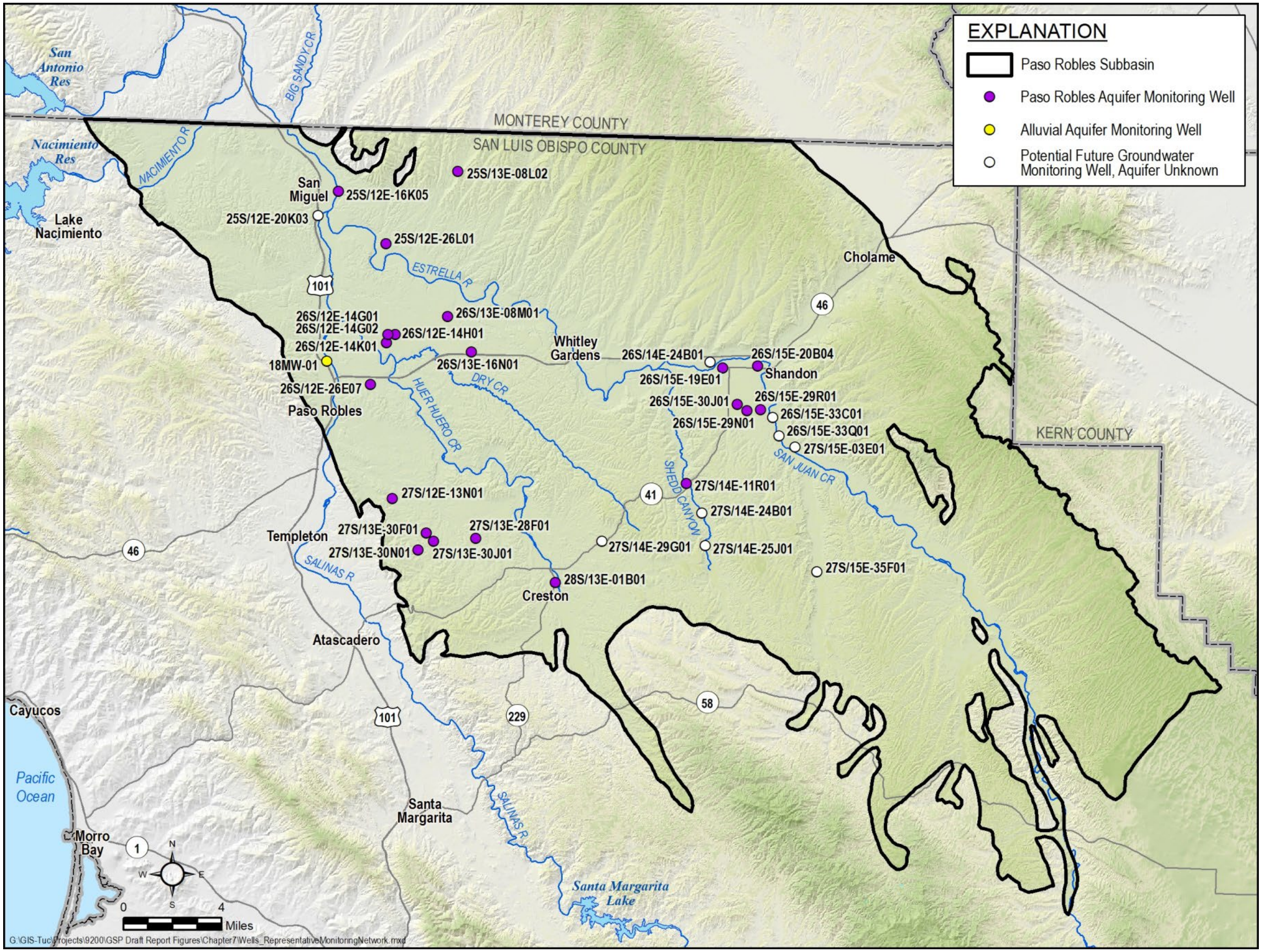


Figure 7-2. Groundwater Level Monitoring Well Network in Paso Robles Formation Aquifer

7.2.1 Groundwater Level Monitoring Network Data Gaps

The GSAs identified data gaps using guidelines in the SGMA regulations and BMPs published by DWR on monitoring networks (DWR, 2016b). Table 7-3 summarizes the suggested attributes of a groundwater level monitoring network from the BMPs in comparison to the current network, and identifies data gaps.

The SGMA regulations require a sufficient density of monitoring wells to characterize the groundwater table or potentiometric surface for each principal aquifer. Professional judgement is also used to determine an adequate level of monitoring density in areas of active groundwater pumping.

While there is no definitive rule on well density, the BMP cites a range of 0.2 to 10 wells per 100 square miles, with a median of 5 wells per 100 square miles from various cited studies. The CASGEM monitoring plan includes 10 to 20 wells per 100 square miles (SLOFCWCD, 2014). The Subbasin is 684 square miles, which equates to 34 wells at a median density of 5 wells per 100 square miles. The monitoring network of 22 wells in the Paso Robles Formation Aquifer is within the recommended range cited in the BMP (1 to 68 wells), but the number of monitoring wells may be considered low given the size and complexity of the Subbasin. The single monitoring well in the Alluvial Aquifer is insufficient. This is a data gap that will be addressed during plan implementation.

A program to increase monitoring frequency will be developed to determine seasonal high and low groundwater elevations and also monitor groundwater response to recharge and other activities. One method to increase monitoring frequency is to install continuous dataloggers in existing and new monitoring wells.

Groundwater level data must be sufficient to identify changes in groundwater flow directions and gradients. Groundwater contour maps are presented in Chapter 5 for both aquifers. These maps were prepared using available monitoring data, including data collected from wells subject to confidentiality agreements. To comply with the confidentiality agreements, the data and well locations are not included on the maps. The 23 wells in the proposed Paso Robles Formation Aquifer monitoring network are insufficient to develop representative and sufficiently detailed groundwater contour maps. The lack of publicly available data for both aquifers is identified as a data gap that will be addressed early in GSP implementation.

A recent study by GSI Water Solutions, Inc. (GSI) came to similar conclusions about data gaps in the Paso Robles Formation (GSI, 2018). The data gap areas developed by GSI are shown on Figure 7-3. These are areas where existing wells that can serve as monitoring wells should be identified, or new monitoring wells should be installed in the Paso Robles Formation Aquifer. Figure 7-3 also shows locations of data gaps and potential new well locations for the Alluvial Aquifer.

The data gap areas on Figure 7-3 will be addressed in the future by either identifying an existing well in the area that meets the criteria for a valid monitoring well, or drilling a new well in the area. There are approximately 90 confidential wells in the Subbasin that have been monitored since 2012 that could be used to fill some of these data gaps if the well owners agree to sign amended confidentiality agreements. SLOFCWCD will attempt to secure such amended agreements in areas where data gaps have been identified. The GSI data gap report identifies and targets specific confidential wells for consideration as new monitoring wells in a publicly accessible monitoring system. If an existing well cannot be identified to fill a data gap, it will be necessary to drill a new monitoring well for that data gap area.

Table 7-3. Summary of Best Management Practices, Groundwater Level Monitoring Well Network, and Data Gaps

Best Management Practice (DWR, 2016b)	Current Monitoring Network	Data Gap
Groundwater level data will be collected from each principal aquifer in the basin.	23 wells total. 22 wells are completed in the Paso Robles Formation Aquifer; one well is completed in the Alluvial Aquifer.	Additional wells are needed; well depth, screen interval, well log, and aquifer designation are unknown for candidate monitoring wells; renegotiate to release confidentiality from confidential wells with water level measurement more recent than 2000 in database
Groundwater level data must be sufficient to produce seasonal maps of groundwater elevations throughout the basin that clearly identify changes in groundwater flow direction and gradient (Spatial Density).	Confidential data from 43 wells and non-confidential data from 9 wells were used to create seasonal groundwater elevation maps for the Paso Robles Formation Aquifer (Chapter 5); Confidential data from 7 wells and data from 1 non-confidential well were used to create an annual groundwater elevation map for the Alluvial Aquifer (Chapter 5).	Some data used to prepare groundwater elevation maps in the GSP are confidential; in the future, only publicly available data will be used to develop contour maps. Additional wells are needed to develop representative contour maps.
Groundwater levels will be collected during the middle of October and March for comparative reporting purposes, although more frequent monitoring may be required (Frequency).	The 22 wells in the existing monitoring network that are screened in the Paso Robles Formation have been monitored twice a year, in spring (April) and fall (October), since at least 2012.	Seasonal monitoring is the protocol for SLOFCWCD (Appendix F); more frequent monitoring may be needed to identify actual seasonal high and low groundwater elevations and further characterize groundwater level fluctuations; instrumentation like transducers or other technology may be used in future to monitor groundwater elevations.
Data must be sufficient for mapping groundwater depressions, recharge areas, and along margins of basins where groundwater flow is known to enter or leave a basin.	Current network of 23 wells is insufficient for mapping all of these areas.	Additional monitoring wells are required in groundwater depressions, near recharge features such as rivers and streams, and along Subbasin margins; possibly install instrumentation like transducers or other technology in future monitoring wells.
Well density must be adequate to determine changes in storage.	Current network of 23 wells is insufficient for determining changes in groundwater storage.	Additional monitoring wells are required to adequately cover the Subbasin and determine changes in groundwater storage.
Data must be able to demonstrate the interconnectivity between shallow groundwater and surface water bodies, where appropriate.	One well in the existing monitoring network is confirmed to be completed in the Alluvial Aquifer. There is at least one additional well that may be completed in the Alluvial Aquifer if construction data were known.	Additional wells will be needed in the Alluvial Aquifer near reaches of interconnected surface water to characterize interconnectivity.
Data must be able to map the effects of management actions, i.e., managed aquifer recharge.	Current network of 23 wells is inadequate for mapping the effects of management actions.	Additional monitoring wells are required to map the effectiveness of management actions. This monitoring will be addressed as projects are implemented
Data must be able to demonstrate conditions near basin boundaries; agencies may consider coordinating monitoring efforts with adjacent basins to provide consistent data across basin boundaries. Agencies may consider characterization and continued impacts of internal hydraulic boundary conditions, such as faults, disconformities, or other internal boundary types.	Several wells in the existing monitoring network are used to monitor conditions on the southwestern boundary of the Subbasin.	Additional wells are likely necessary along the northern boundary with the Upper Valley Subbasin of the Salinas Valley. Additional wells may be necessary to map the structure and effect of internal faults.
Data must be able to characterize conditions and monitor adverse impacts to beneficial uses and users identified within the basin.	The current monitoring network characterizes only a portion of the Subbasin and the potential impacts.	Network will be expanded in accordance with the data gaps identified above.

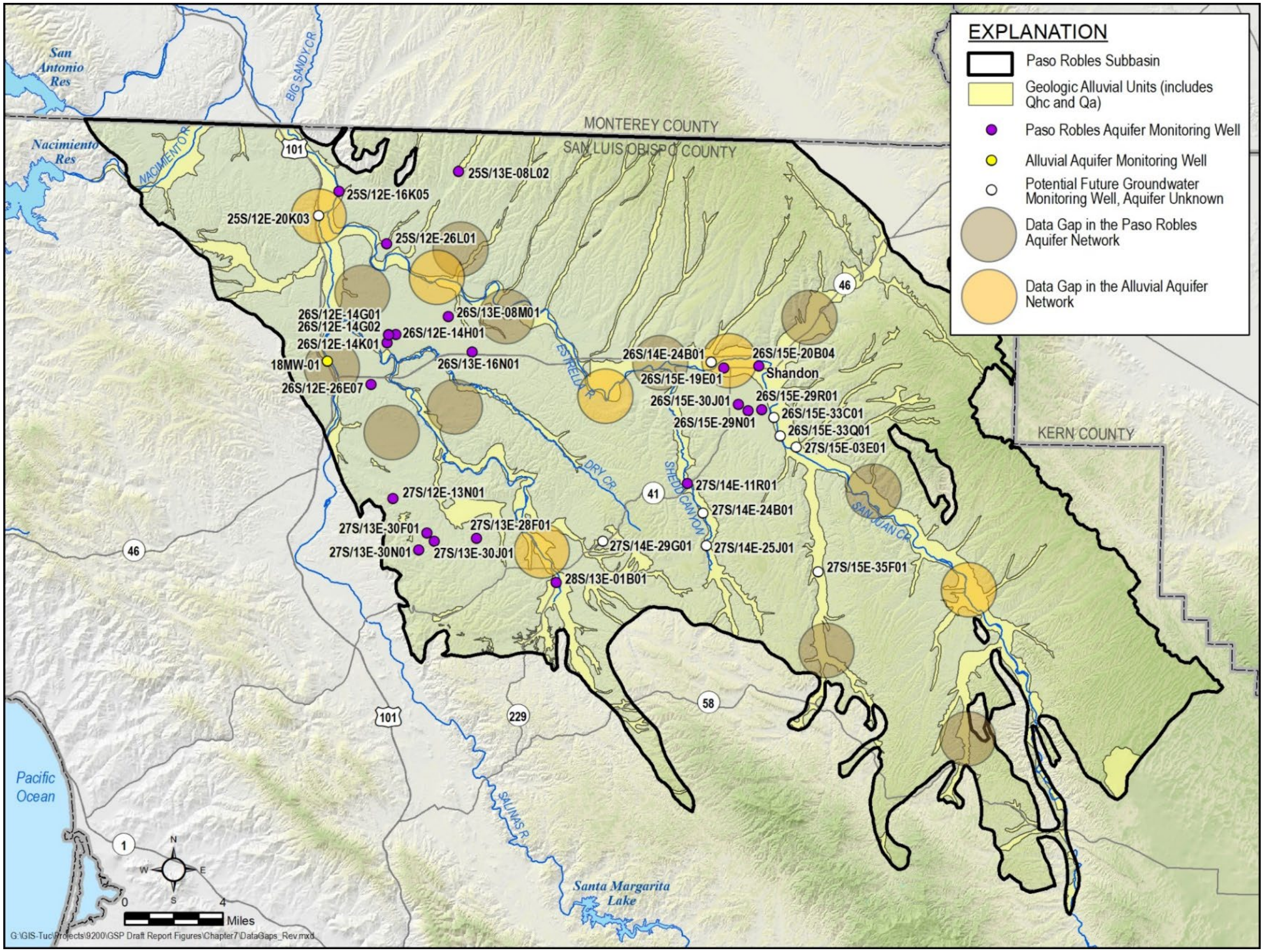


Figure 7-3. Data Gaps in the Groundwater Level Monitoring Well Network

7.2.2 Groundwater Level Monitoring Protocols

The groundwater level monitoring protocols established by SLOFCWCD are adopted by this GSP for manual groundwater level monitoring. The monitoring protocols are included in Appendix F.

There are various automated groundwater level monitoring devices in operation across the Subbasin and the GSP implementation phase will incorporate automated logging of groundwater elevations. Automated water level monitoring is already used in a number of private wells in the basin; these data may be used to supplement the current water level monitoring network in the future. As automated groundwater level monitoring systems are added to the monitoring network, appropriate protocols for each automated system will be incorporated into this GSP.

Automated groundwater level monitoring systems have the advantage of supplying more frequent groundwater levels with no increase in monitoring costs. The groundwater level monitoring BMP recommends more frequent monitoring in certain areas, including shallow, unconfined aquifers, in areas of rapid recharge, in areas of greater withdrawal rates, and in areas of more variable climatic conditions. More frequent monitoring may also be required in specific places where sustainability indicators are a concern or to track impacts of specific management actions and projects. The need for more frequent monitoring will be evaluated, and a program to increase monitoring frequency will be developed during the GSP implementation phase.

7.3 Groundwater Storage Monitoring Network

This GSP adopts groundwater levels as a proxy for assessing change in groundwater storage, as described in Chapter 8, Sustainable Management Criteria. To support the proxy, the relationship between change in groundwater levels and the change in the amount of groundwater in storage will be developed after GSP adoption and when additional data are available to develop the relationship. Groundwater level monitoring locations that are adequate for collecting the groundwater level data are identified in Section 7.2. Therefore, the network of wells providing groundwater level data for the reduction in groundwater storage sustainability indicator is the same wells shown on Table 7-1.

7.3.1 Groundwater Storage Monitoring Data Gaps

Data gaps in the groundwater storage monitoring network are similar to the data gaps identified for the groundwater level monitoring network discussed in Section 7.2.1. Because change in groundwater storage is predominantly influenced by changes in shallow water table elevations, more shallow wells than those discussed in Section 7.2.1 may be necessary. Additional water table wells may be needed throughout the Paso Robles Formation Aquifer.

The number of additional water table wells will not be known until there is an assessment of how many existing wells are screened at or near the existing water table in the Paso Robles Formation Aquifer. This is a data gap that will be addressed during GSP implementation.

7.3.2 Groundwater Storage Monitoring Protocols

The groundwater storage monitoring network is identical to the groundwater level monitoring network. Therefore, the protocols used for gathering water level data to assess changes in groundwater storage are identical to the protocols used for the chronic lowering of groundwater levels sustainability indicator. Protocols for the manual collection of groundwater levels are included in Appendix F. As automated groundwater level collection devices are added to the monitoring network, protocols will be developed for each of these automated systems and incorporated into the GSP.

7.4 Water Quality Monitoring Network

The sustainability indicator for degraded water quality is evaluated by monitoring groundwater quality at a network of existing supply wells. The SGMA regulations require sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators to address known water quality issues.

As described in Chapter 5, there are no known contaminant plumes in the Subbasin, therefore the monitoring network is monitoring only non-point source constituents of concern and naturally occurring water quality impacts.

Existing groundwater quality monitoring programs in the Subbasin are described in Chapter 3 and groundwater quality distribution and trends are described in Chapter 5. Constituents of concern were identified in Chapter 5 based on comparison to drinking water standards and levels that could impact crop production. As described in Chapter 8, separate minimum thresholds are set for agricultural constituents of concern and public supply well constituents of concern. Therefore, although there is a single groundwater quality monitoring network, different wells in the network will be assessed for different constituents. Constituents of concern for drinking water will be assessed at public water supply wells. Constituents of concern for crop health will be assessed at agricultural supply wells.

The public water supply wells included in the monitoring network were identified by reviewing data from the State Water Resources Control Board (SWRCB) Division of Drinking Water. Wells were selected that were sampled for at least one of the constituents of concern during 2015 or more recently. These wells are listed in Table 7-4 and shown on Figure 7-4. For the 41 public supply wells in the groundwater quality monitoring network, an assumed aquifer designation was assigned based on surficial geologic maps (Figure 4-4) and well depths when available. There are 31 wells that are in the Paso Robles Formation Aquifer, seven wells in the Alluvial Aquifer, and three wells where the aquifer could not be estimated. Verifying the aquifer for these three wells is a data gap that will be addressed during plan implementation.

The agricultural supply wells included in the monitoring network were identified by reviewing data from the Irrigated Lands Regulatory Program (ILRP) that are stored in the SWRCB's Geotracker/GAMA database. Wells were selected that had detections of at least one of the agricultural constituents of concern reported from 2015 or more recently (GAMA, 2015). There are 28 ILRP properties with agricultural supply wells in the groundwater quality monitoring network. Since multiple wells of unknown depth are associated with a given IRLP ID, the aquifer monitored by these wells is unknown. These wells are listed in Table 7-4 and shown on Figure 7-4. If an IRLP property has multiple wells, the location of the well is shown at the average of these coordinates.

Table 7-4. Groundwater Quality Monitoring Well Network

Well ID	Type of Well	Well Depth[1] (feet)	Screen Interval (feet bls)	First Measurement Date	Last Measurement Date	Measurement Period (years)	Measurement Count	Assumed Aquifer
W0604000207-001	PWS	440	340-440	2002	2018	16	63	PR
W0604000210-001	PWS	117	87-117	2002	2015	13	9	---
W0604000512-001	PWS	60	30-60	2002	2015	13	13	AA
W0604000554-001	PWS	355	155-355	2002	2016	14	16	PR
W0604000554-003	PWS	237	174-237	2002	2016	14	16	PR
W0604000620-001	PWS	354	120-354	2001	2018	17	36	PR
W0604000620-002	PWS	510	310-510	2002	2018	16	41	PR
W0604000693-002	PWS	40	---	2005	2017	12	9	AA
W0604000708-001	PWS	80	80-80	2002	2018	16	10	AA
W0604000781-001	PWS	792	412-792	2002	2018	16	21	PR
W0604000781-011	PWS	670	380-670	2002	2018	16	21	PR
W0604000788-001	PWS	450	235-450	2002	2018	16	15	PR
W0604000788-005	PWS	920	400-920	2003	2018	15	14	PR
W0604000789-001	PWS	245	125-245	2002	2018	16	17	PR
W0604000790-001	PWS	175	126-175	2002	2018	16	62	---
W0604000803-001	PWS	420	100-420	2004	2018	14	10	PR
W0604000803-002	PWS	420	200-420	2004	2018	14	10	PR
W0604010007-003	PWS	400	200-400	1984	2016	32	36	PR
W0604010007-004	PWS	500	---	1984	2018	34	82	PR
W0604010007-006	PWS	344	---	1987	2018	31	34	PR
W0604010007-007	PWS	80	20-80	1984	2017	33	23	AA
W0604010007-008	PWS	80	20-80	1984	2018	34	24	AA

Well ID	Type of Well	Well Depth[1] (feet)	Screen Interval (feet bls)	First Measurement Date	Last Measurement Date	Measurement Period (years)	Measurement Count	Assumed Aquifer
W0604010007-009	PWS	---	---	1990	2018	28	8	---
W0604010007-010	PWS	600	260-600	1990	2017	27	17	PR
W0604010007-012	PWS	425	---	1984	2018	34	35	PR
W0604010007-013	PWS	317	---	1984	2018	34	34	PR
W0604010007-017	PWS	675	---	1993	2018	25	26	PR
W0604010007-018	PWS	535	---	1993	2016	23	23	PR
W0604010007-019	PWS	220	---	1995	2017	22	25	PR
W0604010007-020	PWS	610	---	1996	2017	21	22	PR
W0604010007-021	PWS	100	---	1998	2018	20	22	AA
W0604010007-038	PWS	1060	300-1060	2003	2018	15	18	PR
W0604010010-004	PWS	300	85-300	1984	2018	34	118	PR
W0604010010-005	PWS	360	162-360	1991	2018	27	105	PR
W0604010010-009	PWS	380	350-380	2007	2018	11	250	PR
W0604010028-002	PWS	342	297-342	1991	2018	27	46	PR
W0604010028-004	PWS	400	300-400	2002	2018	16	31	PR
W0604010831-001	PWS	840	640-840	1989	2016	27	24	PR
W0604010831-002	PWS	446	401-446	1989	2016	27	23	PR
W0604010831-003	PWS	475	410-475	1989	2016	27	24	PR
W0604010900-002	PWS	50	---	1999	2018	19	18	AA
AGL020000646	ILRP	660	---	2012	2017	5	---	---
AGL020000801	ILRP	---	---	2013	2017	4	---	---
AGL020001525	ILRP	---	---	2014	2017	3	---	---
AGL020001534	ILRP	---	---	2013	2017	4	---	---

Well ID	Type of Well	Well Depth[1] (feet)	Screen Interval (feet bls)	First Measurement Date	Last Measurement Date	Measurement Period (years)	Measurement Count	Assumed Aquifer
AGL020001605	ILRP	---	---	2015	2017	2	---	---
AGL020001689	ILRP	---	---	2014	2017	3	---	---
AGL020001800	ILRP	---	---	2015	2015	<1	---	---
AGL020003900	ILRP	---	---	2015	2015	<1	---	---
AGL020004014	ILRP	---	---	2014	2017	3	---	---
AGL020005173	ILRP	---	---	2015	2017	2	---	---
AGL020005268	ILRP	---	---	2015	2015	<1	---	---
AGL020007128	ILRP	---	---	2014	2017	3	---	---
AGL020007471	ILRP	---	---	2015	2015	<1	---	---
AGL020007593	ILRP	---	---	2015	2018	3	---	---
AGL020007721	ILRP	---	---	2017	2017	<1	---	---
AGL020007807	ILRP	---	---	2012	2017	5	---	---
AGL020007815	ILRP	---	---	2012	2017	5	---	---
AGL020007848	ILRP	---	---	2015	2015	<1	---	---
AGL020007872	ILRP	---	---	2015	2018	3	---	---
AGL020009803	ILRP	---	---	2014	2018	4	---	---
AGL020010282	ILRP	---	---	2012	2015	3	---	---
AGL020013814	ILRP	---	---	2015	2018	3	---	---
AGL020015242	ILRP	---	---	2015	2018	3	---	---
AGL020015302	ILRP	---	---	2013	2017	4	---	---
AGL020016382	ILRP	---	---	2015	2018	3	---	---
AGL020024742	ILRP	---	---	2016	2017	1	---	---
AGL020025402	ILRP	---	---	2015	2017	2	---	---

Well ID	Type of Well	Well Depth[1] (feet)	Screen Interval (feet bls)	First Measurement Date	Last Measurement Date	Measurement Period (years)	Measurement Count	Assumed Aquifer
AGL020028348	ILRP	---	---	2017	2017	<1	---	---

Notes

--- = Unknown

(1) = total well depth is assumed to be equivalent to bottom of perforated interval

AA = Alluvial Aquifer; PR = Paso Robles Formation Aquifer

PWS = Public water supply

ILRP = Irrigated Lands Regulatory Program

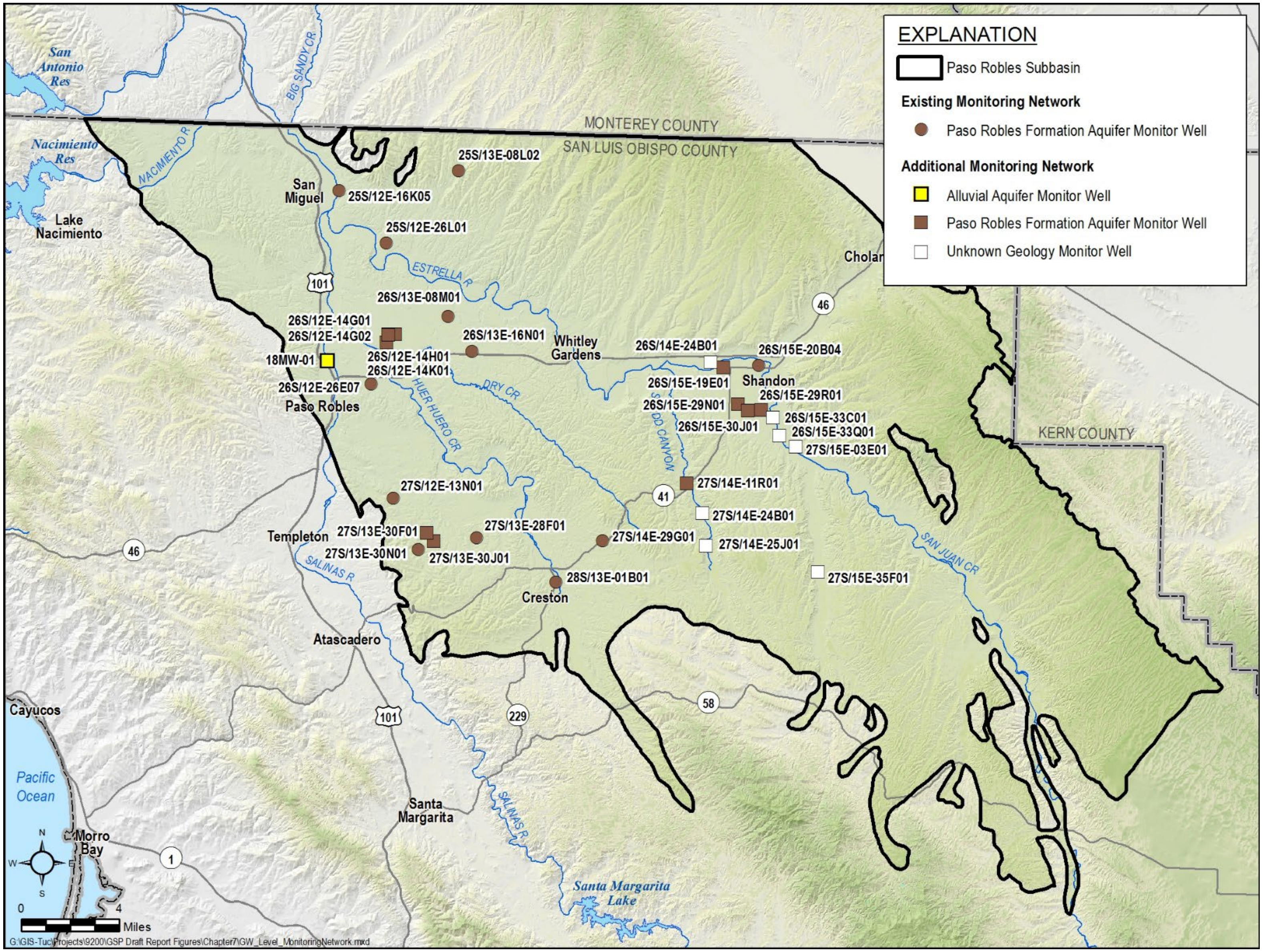


Figure 7-4. Groundwater Quality Monitoring Well Network

7.4.1 Groundwater Quality Monitoring Data Gaps

Because the groundwater quality monitoring network is based on existing supply wells, there are no spatial data gaps in the network. Table 7-5 summarizes the recommendations for groundwater quality monitoring from the BMPs, the current network, and data gaps. There is adequate spatial coverage in the network to assess impacts to beneficial uses and users. The primary data gap is that well construction info for many wells in the monitoring network is unknown. This is a data gap that will be addressed during GSP implementation.

7.4.2 Groundwater Quality Monitoring Protocols

Water quality samples are currently being collected according to SWRCB and ILRP requirements. ILRP data are currently collected under Central Coast RWQCB Ag Order 3.0. ILRP samples are collected under the Tier 1, Tier 2, or Tier 3 monitoring and reporting programs. Copies of these monitoring and reporting programs are included in Appendix F, and incorporated herein as monitoring protocols. These protocols will continue to be followed during GSP implementation for the groundwater quality monitoring.

Table 7-5. Summary of Groundwater Quality Monitoring, Best Management Practices, and Data Gaps

Best Management Practice (DWR, 2016b)	Current Network	Data Gap
Monitor groundwater quality data from each principal aquifer in the basin that is currently, or may be in the future, impacted by degraded water quality. • The spatial distribution must be adequate to map or supplement mapping of known contaminants. • Monitoring should occur based upon professional opinion, but generally correlate to the seasonal high and low groundwater level, or more frequent as appropriate.	There are 41 municipal wells and 28 IRLP wells within the plan area that have been regularly sampled since at least 2015 for groundwater quality.	None; the current monitoring network contains adequate spatial distribution to map water quality in the basin.
Collect groundwater quality data from each principal aquifer in the basin that is currently, or may be in the future, impacted by degraded water quality. • Agencies should use existing water quality monitoring data to the greatest degree possible. For example, these could include ILRP, GAMA, existing RWQCB monitoring and remediation programs, and drinking water source assessment programs.	Public databases provide adequate water quality information for degraded water quality.	Well depth and construction info for some wells in the monitoring network is unknown; however, there seems to be adequate coverage in both principal aquifers
Define the three-dimensional extent of any existing degraded water quality impact.	There are a large number of wells that are actively sampled.	Depth or construction information will need to be obtained to determine the vertical extent of contaminants
Data should be sufficient for mapping movement of degraded water quality.	There are a large number of wells that are actively sampled.	None
Data should be sufficient to assess groundwater quality impacts to beneficial uses and users.	Water quality monitoring program assesses impacts to both agricultural and municipal users.	None
Data should be adequate to evaluate whether management activities are contributing to water quality degradation.	There are a large number of wells that are actively sampled.	Projects and actions are being developed. Water quality network will be evaluated and augmented if necessary.

7.5 Land Subsidence Monitoring Network

The sustainability indicator for land subsidence is evaluated by monitoring land subsidence using InSAR data. As described in Chapter 5, land subsidence is monitored in the Subbasin by measuring ground elevation using microwave satellite imagery. This data is currently provided by DWR, covers the most recent three years of subsidence data (2015 - 2018), and is adequate to identify areas of recent subsidence. One or more GSA may opt to contract with USGS or others with expertise in subsidence to gather any additional datasets and evaluate the cause(s) of any identified subsidence. The GSAs will continue to annually assess subsidence using the DWR provided InSAR data.

7.5.1 Land Subsidence Monitoring Data Gaps

Available data indicate that there is currently no long-term subsidence occurring in the Subbasin that affects infrastructure. There are no data gaps identified with the subsidence network at this time.

7.5.2 Land Subsidence Monitoring Protocols

The BMP notes that no standard procedures exist for collecting subsidence data. The GSAs will continue to monitor data annually as part of GSP implementation. If additional relevant datasets become available, they will be evaluated and incorporated into the monitoring program. If the annual monitoring indicates subsidence is occurring at a rate greater than the minimum thresholds, then additional investigation and monitoring may be warranted. In particular, the GSAs will implement a study to assess if the observed subsidence can be correlated to groundwater elevations, and whether a reasonable causality can be established. The GSAs will also consider subsidence surveys published by the USGS in assessing land subsidence across the Subbasin if they become available.

7.6 Interconnected Surface Water Monitoring Network

Data presented in Section 5.5 indicate potential groundwater connection to surface water or to the riparian vegetation root zone at least some of the time along certain sections of the Salinas River, along the middle reach of the Estrella River (from Shedd Canyon to Martingale Circle) and along San Juan Creek upstream of Spring Creek. The potential connection along the Salinas River is between the surface water system and the adjacent Alluvial Aquifer. There is no evidence that the Salinas River surface water flows are connected to the underlying Paso Robles Formation Aquifer. The potential connection between the surface water system along the middle reach of the Estrella River (from Shedd Canyon to Martingale Circle) and along San Juan Creek upstream of Spring Creek, and the underlying Paso Robles Formation Aquifer is unknown but sufficient evidence exists that there could potentially be a connection, and therefore further investigation in these areas is recommended.

Seven existing wells already are monitored for water levels within 2,000 feet of those stream reaches and these have water-level patterns consistent with expected shallow water table conditions. Two of these are shown as blue squares in Figure 7-5. The locations of the others are not shown due to confidentiality restrictions, but they include three wells along the Salinas River between Wellsona and the Estrella River, one well next to the Estrella River near Jardine Road and one well next to San Juan Creek about 7 miles above Shandon. The City of Paso Robles' Supplemental Environmental Project (SEP) identified ten sites where multi-depth monitoring wells and stream gages would be useful for better characterizing interconnection of surface water and groundwater (Cleath-Harris Geologists, 2021). Those sites are shown as orange circles numbered 1 through 10 on the figure. Sites 1 and 9 have existing stream gages, and shallow and intermediate depth monitoring wells were installed nearby in spring 2021.

7.6.1 Interconnected Surface Water Monitoring Data Gaps

The existing shallow monitoring wells do not adequately cover the three stream reaches where interconnection of groundwater with surface water and/or the riparian vegetation root zone appears to occur some or most of the time. The presence of shallow clay layers and degree of separation between Alluvial Aquifer groundwater levels and Paso Robles Formation Aquifer pumping and water levels is poorly known in the eastern part of the Subbasin. Recommended locations for additional wells to verify and monitor interconnection are listed in Table 7-6 and shown in Figure 7-5 as green squares labeled A through H. Shallow and deep monitoring wells are needed at some of the locations to confirm any differences between Alluvial Aquifer and Paso Robles Formation Aquifer water levels. These locations are suggestions that would need to be refined based on practical considerations such as land ownership and adequate road access.

New stream gages have already been installed since the beginning of the GSP development process. This includes SEP sites 2, 4 and 10 on the Salinas River, Huer Huero Creek and Estrella River (see Figure 7-5) and a new gage installed by DWR on Cholame Creek at SEP site 8. Of the remaining SEP sites, a gage at site 7 would be the most useful.

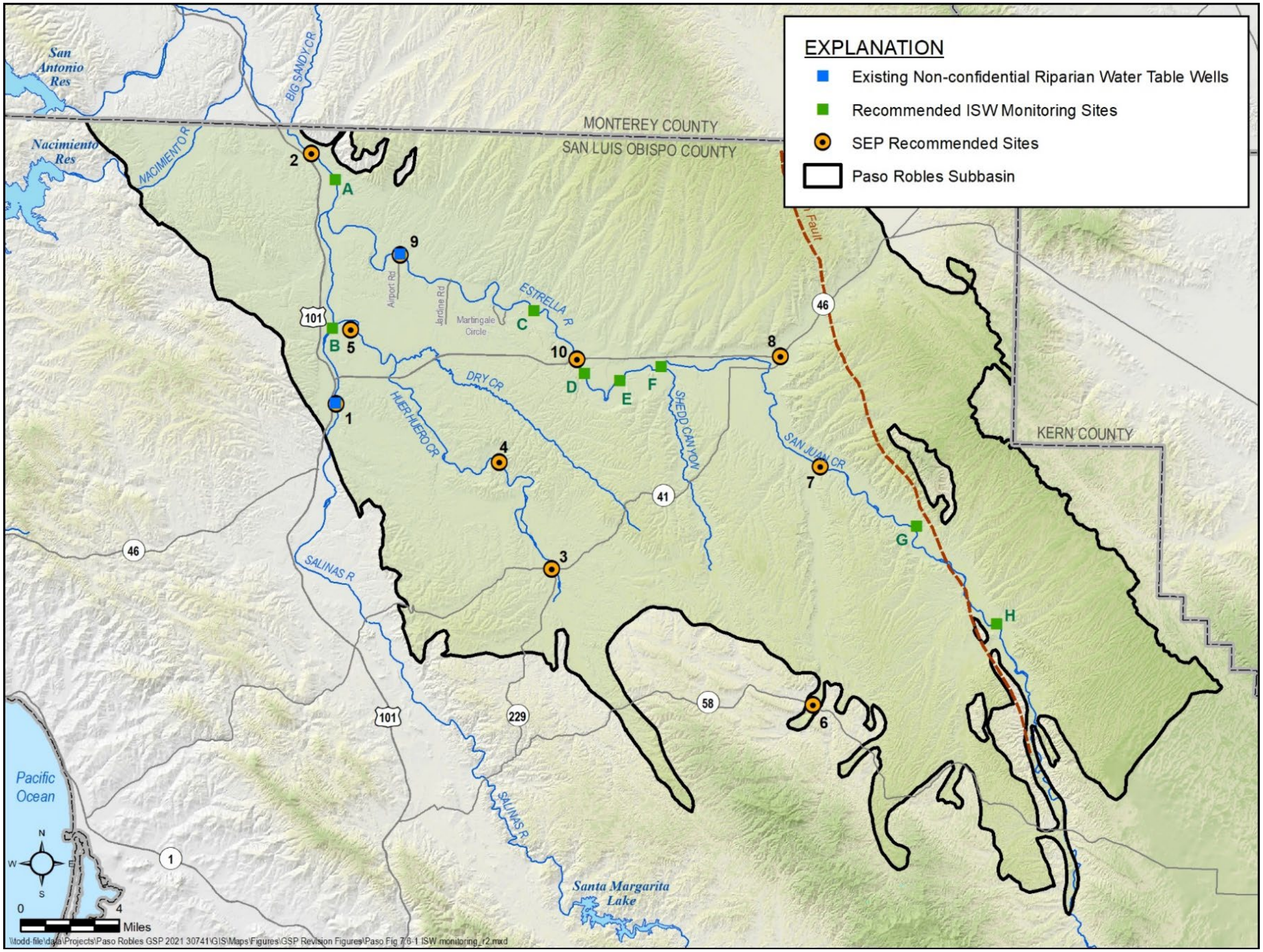


Figure 7-5. Interconnected Surface Water Monitoring Well Network

Table 7-6. Recommended Well Locations for Monitoring Interconnected Surface Water and GDEs

Map Label	Description
A	Salinas River in San Miguel, near existing Paso Robles Formation Aquifer monitoring well clusters. This site could replace or be shifted to SEP site 2. Only a shallow well is needed.
B	Salinas River near Wellsona. This fills a long reach with no data and is a location where surface flow is likely to become discontinuous before other reaches. Only a shallow well is needed.
C	Estrella River above Martingale Circle. This site is near an existing monitoring well near the river that shows a Paso Robles Formation Aquifer water-level pattern. Only a shallow well is needed.
D	Estrella River at Whitley Gardens. The suggested site is at the River Grove Drive bridge at the upstream edge of town. This site could replace or be shifted to SEP site 10. This site needs shallow and deep wells to confirm whether the alluvial water table is somewhat independent of underlying Paso Robles Formation Aquifer water levels.
E	Estrella River 3.3 channel miles upstream of Highway 46 (Whitley Gardens). There are no nearby existing wells to confirm the apparent presence of shallow water table conditions. This site needs shallow and deep wells to confirm whether the alluvial water table is somewhat independent of underlying Paso Robles Formation Aquifer water levels.
F	Estrella River near Shedd Canyon confluence. There are no nearby existing wells to confirm the apparent presence of shallow water table conditions. This site needs shallow and deep wells to confirm whether the alluvial water table is somewhat independent of underlying Paso Robles Formation Aquifer water levels.
G	San Juan Creek between existing monitoring well and San Juan Fault preferably near riparian vegetation. A shallow well is needed at this location to supplement the single existing well along this reach of San Juan Creek, which is reportedly 225 feet deep but has relatively stable water levels close to the creek bed elevation, like an Alluvial Aquifer well.
H	At this location, the San Juan Fault forces groundwater into the channel of San Juan Creek, creating a spring and a short reach of flowing water bordered by wetland vegetation. In lieu of a well, the length of the flowing reach and wetland area could be monitored to detect decreases in the flow of groundwater across the fault.

7.6.2 Interconnected Surface Water Monitoring Protocols

Stream gauging is currently being conducted by the USGS according to the protocol outlined in the BMP. Water level monitoring will be conducted in accordance the protocols described in the water level monitoring network section of this chapter.

7.7 Representative Monitoring Sites

Representative monitoring sites (RMS) are defined in the SGMA regulations as a subset of monitoring sites that are representative of conditions in the Subbasin. All of the monitoring sites in this chapter are considered RMS.

7.8 Data Management System and Data Reporting

The SGMA regulations provide broad requirements on data management, stating that a GSP must adhere to the following guidelines for a DMS:

- Article 3, Section 352.6: Each Agency shall develop and maintain a data management system that is capable of storing and reporting information relevant to the development or implementation of the GSP and monitoring of the Subbasin.
- Article 5, Section 354.40: Monitoring data shall be stored in the data management system developed pursuant to Section 352.6. A copy of the monitoring data shall be included in the Annual Report and submitted electronically on forms provided by the Department.

The Paso Robles Subbasin Data Management System (DMS) will be used for the organization, review, and uploading of data to implement the GSP. All data stored in the DMS have a unique identifier and a quality control check was performed on the data.

The Paso Robles Subbasin DMS was developed in Microsoft Access and contains the following main tables:

- **Well_Info** - General information about a well, including identifiers used by various agencies.
- **Site_Info** - Site information about a well, recharge site, or diversion; including location, elevation, and address information
- **Well_Constr** - Well construction information including depth, diameter, etc.
- **Well_Constr_Screen**- Supplements **Well_Constr** with well screen information. One well can have multiple screens.

- **Well_Geologic_Aquifer** - Information about the aquifer parameters of the well such as pumping test information, confinement, and transmissivity.
- **Well_Geologic_Lithology** - Lithologic information at a well site. Each well may have multiple lithologies at different depths.
- **Water_Level** - Water level measurements for wells
- **Well_Pumping** - Pumping measurements for wells, annual or monthly
- **SW_Recharge** - Recharge measurements for a recharge site, annual or monthly
- **SW_Diversion** - Diversion volume measurements for a diversion site, annual or monthly
- **Water_Quality** - Water quality data for wells or other type of site

Data sources used to populate the Paso Robles DMS are listed on Table 7-7. Categories marked with an X indicate datasets that are publicly accessible.

Table 7-7. Data Sources Used to Populate DMS

Data Sets	Data Category							
	Well and site info	Well construction	Aquifer properties and lithology (data to be added)	Water level	Pumping (data to be added)	Recharge (data to be added)	Diversion (data to be added)	Water quality
DWR (CASGEM)	X	X		X				
San Luis Obispo County	X	X		X				
Geotracker GAMA	X							X

Data were compiled and reviewed to comply with data quality objectives. The review included the following checks:

- Identifying outliers that may have been introduced during the original data entry process by others.
- Removing or flagging questionable data being uploaded in the DMS. This applies to historic water level data, water quality data, and water level over time.

The data were loaded into the database and checked for errors and missing data. Error tables were developed to identify water level and/or well construction data that were missing. For water level data, another data quality check was completed by plotting well hydrographs to identify and remove anomalous data points.

In the future, well log information will be entered for selected wells and other information will be added as needed to satisfy the requirements of the SGMA regulations. It is anticipated that the DMS will be migrated to a web-based DMS currently being planned and developed by the County of San Luis Obispo.

8 SUSTAINABLE MANAGEMENT CRITERIA

This chapter defines the conditions that constitute sustainable groundwater management, discusses the process by which the four GSAs in the Subbasin will characterize undesirable results, and establishes minimum thresholds and measurable objectives for each sustainability indicator.

This is the fundamental chapter that defines sustainability in the Subbasin, and it addresses significant regulatory requirements. The measurable objectives, minimum thresholds, and undesirable results presented in this chapter define the future sustainable conditions in the Subbasin and commit the GSAs to actions that will achieve these future conditions.

Defining Sustainable Management Criteria requires significant analysis and scrutiny. This chapter presents the data and methods used to develop Sustainable Management Criteria and demonstrate how they influence beneficial uses and users. The Sustainable Management Criteria presented in this chapter are based on currently available data and application of the best available science. As noted in this GSP, data gaps exist in the hydrogeologic conceptual model. Uncertainty caused by these data gaps was considered when developing the Sustainability Management Criteria. Due to uncertainty in the hydrogeologic conceptual model, these Sustainable Management Criteria are considered initial criteria and will be reevaluated and potentially modified in the future as new data become available.

The Sustainable Management Criteria are grouped by sustainability indicator. The following sustainability indicators are applicable in the Subbasin:

- Chronic lowering of groundwater elevations levels
- Reduction in groundwater storage
- Degraded water quality
- Land subsidence
- Depletion of interconnected surface water

The sixth Sustainable Management Criteria, sea water intrusion, is not applicable in the Subbasin.

To retain an organized approach, this chapter follows the same structure for each sustainability indicator. The description of each Sustainable Management Criterion contains all the information required by Section 354.22 *et. seq* of the SGMA regulations and outlined in the Sustainable Management Criteria BMP (DWR, 2017), including:

- How locally defined significant and unreasonable conditions were developed

- How minimum thresholds were developed, including:
  - The information and methodology used to develop minimum thresholds (§354.28 (b)(1))
  - The relationship between minimum thresholds and the relationship of these minimum thresholds to other sustainability indicators (§354.28 (b)(2))
  - The effect of minimum thresholds on neighboring basins (§354.28 (b)(3))
  - The effect of minimum thresholds on beneficial uses and users (§354.28 (b)(4))
  - How minimum thresholds relate to relevant Federal, State, or local standards (§354.28 (b)(5))
  - The method for quantitatively measuring minimum thresholds (§354.28 (b)(6))
- How measurable objectives were developed, including:
  - The methodology for setting measurable objectives (§354.30)
  - Interim milestones (§354.30 (a), §354.30 (e), §354.34 (g)(3))
- How undesirable results were developed, including:
  - The criteria defining when and where the effects of the groundwater conditions cause undesirable results based on a quantitative description of the combination of minimum threshold exceedances (§354.26 (b)(2))
  - The potential causes of undesirable results (§354.26 (b)(1))
  - The effects of these undesirable results on the beneficial users and uses (§354.26 (b)(3))
- As noted above, the SGMA regulations address minimum thresholds before measurable objectives. This order was used for all applicable sustainability indicators except Chronic Lowering of Groundwater Levels. For this sustainability indicator, measurable objectives are presented first, followed by the minimum thresholds – the order in which they were developed.

8.1 Definitions

The SGMA legislation and SGMA regulations contain a number of new terms relevant to the Sustainable Management Criteria. These terms are defined below using the definitions included in the SGMA regulations (§ 351, Article 2). Where appropriate additional explanatory text is added in italics. This explanatory text is not part of the official definitions of these terms. To the extent possible, plain language, including limited use of overly technical terms and acronyms, was used so that a broad audience will understand the development process and implications of the Sustainable Management Criteria.

- **Interconnected surface water** refers to surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water.
- Interconnected surface waters are parts of streams, lakes, or wetlands where the groundwater table is at or near the ground surface and there is water in the lakes, streams, or wetlands.
- **Interim milestone** refers to a target value representing measurable groundwater conditions, in increments of five years, set by an Agency as part of a Plan.
- Interim milestones are targets such as groundwater elevations that will be achieved every five years to demonstrate progress towards sustainability.
- **Management area** refers to an area within a basin for which the Plan may identify different minimum thresholds, measurable objectives, monitoring, or projects and management actions based on differences in water use sector, water source type, geology, aquifer characteristics, or other factors.
- **Measurable objectives** refer to specific, quantifiable goals for the maintenance or improvement of specified groundwater conditions that have been included in an adopted Plan to achieve the sustainability goal for the basin.
- Measurable objectives are goals that the GSP is designed to achieve.
- **Minimum thresholds** refer to numeric values for each sustainability indicator used to define undesirable results.
- Minimum thresholds are established at representative monitoring sites. Minimum thresholds are indicators of where an unreasonable condition might occur. For example, a particular groundwater elevation might be a minimum threshold if lower groundwater elevations would result in a significant and unreasonable reduction in groundwater storage.
- **Representative monitoring** refers to a monitoring site within a broader network of sites that typifies one or more conditions within the basin or an area of the basin.
- **Sustainability indicator** refers to any of the effects caused by groundwater conditions occurring throughout the basin that, when significant and unreasonable, cause undesirable results, as described in Water Code Section 10721(x).
- The five sustainability indicators relevant to the Subbasin are listed in the introductory section of Chapter 8.

- **Uncertainty** refers to a lack of understanding of the basin setting that significantly affects an Agency's ability to develop sustainable management criteria and appropriate projects and management actions in a Plan, or to evaluate the efficacy of Plan implementation, and therefore may limit the ability to assess whether a basin is being sustainably managed.
- **Undesirable Result** Section 10721 of the Sustainable Groundwater Management Act states that
- Undesirable result means one or more of the following effects caused by groundwater conditions occurring throughout the basin:

  (1) *Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon. Overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and groundwater recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods.*

  (2) *Significant and unreasonable reduction of groundwater storage.*

  (3) *Significant and unreasonable seawater intrusion.*

  (4) *Significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies.*

  (5) *Significant and unreasonable land subsidence that substantially interferes with surface land uses.*

  (6) *Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water.*

- Section § 354.26 of the SGMA regulations states that "The criteria used to define when and where the effects of the groundwater conditions cause undesirable results …shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin."

8.2 Sustainability Goal

Per Section §354.24 of the SGMA regulations, the sustainability goal for the Subbasin has three parts:

- A description of the sustainability goal;

- A discussion of the measures that will be implemented to ensure the Subbasin will be operated within sustainable yield, and;
- An explanation of how the sustainability goal is likely to be achieved.

The goal of this GSP is to sustainably manage the groundwater resources of the Paso Robles Subbasin for long-term community, financial, and environmental benefit of Subbasin users. This GSP outlines the approach to achieve a sustainable groundwater resource free of undesirable results within 20 years, while maintaining the unique cultural, community, and business aspects of the Subbasin. In adopting this GSP, it is the express goal of the GSAs to balance the needs of all groundwater users in the Subbasin, within the sustainable limits of the Subbasin's resources.

A number of management actions and conceptual projects are included in this GSP. Some combination of these management actions and conceptual projects will be implemented to ensure the Subbasin is operated within its sustainable yield and achieves sustainability. These management actions and conceptual projects include:

Management Actions

- Monitoring, reporting and outreach
- Promoting Best Water Use Practices
- Promoting stormwater capture
- Promoting voluntary fallowing of agricultural land
- Mandatory pumping limitations in specific areas
- Conceptual Projects
- City Recycled Water Delivery
- San Miguel CSD Recycled Water Delivery
- Nacimiento Water Project (NWP) Delivery at Salinas and Estrella River Confluence
- NWP Delivery North of City of Paso Robles
- NWP Delivery East of City of Paso Robles
- Expansion of Salinas Dam

The management actions and conceptual projects are designed to achieve sustainability within 20 years by one or more of the following means:

- Educating stakeholders and prompting changes in behavior to improve chances of achieving sustainability.

- Increasing awareness of groundwater pumping impacts to promote voluntary reductions in groundwater use through improved water use practices or fallowing crop land.
- Increasing basin recharge by capturing excess stormwater under approved permits.
- Developing new renewable water supplies for use in the Subbasin to offset groundwater pumping

8.3 General Process for Establishing Sustainable Management Criteria

The Sustainable Management Criteria presented in this chapter were developed using information from public input, received in public surveys, public meetings, comment forms; hydrogeologic analysis; and meetings with GSA staff and Cooperative Committee members. The process built on the Paso Robles Basin's long history of interested parties - including rural residents, farmers, local cities, and the County - holding public meetings to work on protecting the groundwater resource.

The general process for establishing Sustainable Management Criteria included:

- Holding a series of public outreach meetings that outlined the GSP development process and introduced stakeholders to Sustainable Management Criteria.
- Surveying the public and gathering input on minimum thresholds and measurable objectives. The survey questions were designed to get public input on all five sustainability indicators applicable to the Subbasin. A summary of the survey results is included in Appendix G.
- Analyzing survey results to assess preferences and trends relevant to Sustainable Management Criteria. Survey results and public comments from outreach meetings were analyzed to assess if different areas in the Subbasin had different preferences for minimum thresholds and measurable objectives.
- Combining survey results, outreach efforts, and hydrogeologic data to set initial conceptual minimum thresholds and measurable objectives.
- Conducting public meetings to present initial conceptual minimum thresholds and measurable objectives and receive additional public input. Three meetings on Sustainable Management Criteria were held in the Subbasin.
- Reviewing public input on preliminary Sustainable Management Criteria with GSAs.
- Addressing corrective actions provided by DWR with additional analyses relative to lowering of groundwater levels, identification of interconnected surface water, and establishment of sustainability criteria.

8.4 Chronic Lowering of Groundwater Levels Sustainable Management Criteria

This section is organized to first present the general concepts of the sustainable management criteria as developed in 2019. Responsive to the DWR Corrective Actions, this is supplemented by additional description of the undesirable results and additional explanation of the sustainability criteria with evaluation of the effects of the criteria on beneficial uses and users of groundwater.

8.4.1 Information and Methodology Used to Establish Measurable Objectives and Minimum Thresholds

The information used for establishing the chronic lowering of groundwater levels measurable objectives and minimum thresholds includes:

- Information about the public definition of significant and unreasonable conditions and preferred current and future groundwater elevations, gathered from the Sustainable Management Criteria survey and public outreach meetings.
- Historical groundwater elevation data from wells monitored by the County of San Luis Obispo
- Depths and locations from existing well records
- Maps of current and historical groundwater elevation data
- Results of modeling of various scenarios of future groundwater level conditions

Information and methods used to initially establish sustainable management criteria were supplemented using:

- The identified deficiencies and Corrective Actions defined by DWR in its June 3, 2021 letter reviewing the Paso Robles Area Subbasin – 2020 Groundwater Sustainability Plan (DWR, June 2021) and the January 21, 2022 “Incomplete” Determination of the 2020 Paso Robles Area Subbasin Groundwater Sustainability Plan (DWR, January 2022)
- Evaluation of existing well records with information on construction and locations (as of 2021) relative to the Representative Monitoring Site (RMS) wells
- Evaluation of the effects of the sustainability criteria on beneficial uses and users of groundwater, especially existing domestic well records

8.4.2 Locally Defined Significant and Unreasonable Conditions

This section provides the descriptions, definitions, and evaluation that are the basis for establishing sustainability criteria in the next section.

- Description of significant and unreasonable conditions
- Potential causes of significant and unreasonable conditions
- Definition of significant and unreasonable conditions

8.4.2.1 Description of Significant and Unreasonable Conditions

As groundwater levels decline in a well, a sequence of increasingly severe conditions will occur. These include an increase in pumping costs and a decrease in pump output (in gallons per minute). With further declines, the pump may break suction, which means that the water level in the well has dropped to the level of the pump intake. This can be remedied by lowering the pump inside the well, which can cost thousands of dollars. Chronically declining water levels will eventually drop below the top of the well screen. This exposes the screen to air, which can produce two adverse effects. In the first, water entering the well at the top of the screen will cascade down the inside of the well, entraining air; this air entrainment can result in cavitation damage to pump. The other potential adverse effect is accelerated corrosion of the well screen. Corrosion can reduce the efficiency and capacity of a well and eventually creates a risk of well screen collapse, which would likely render the well unusable. If water level declines significantly reduce the length of saturated well screen, water might not be able to flow into the well at the desired rate regardless of the capacity or depth setting of the pump. This might occur more frequently where the thickness of basin fill materials is relatively thin. While describing a progression of potential adverse effects, at some point the well no longer fulfills its water supply purpose and is deemed to have "gone dry." For the purposes of this discussion, a well going dry means that the entire well (to the reported total depth of the well) is unsaturated.

For purposes of setting the Measurable Objective and Minimum Threshold, significant and unreasonable conditions are defined in terms of an increased percentage of wells going dry. The rationale is based on four general assumptions summarized below, with more explanation in the following sections:

1. Accurate information on the location, elevation, use, status, and construction of most local supply wells is not readily available for detailed evaluation of the range of adverse effects. Analysis was initiated with the simple concept of the entire well depth as "going dry" and then applied to the set of existing wells that have available information on location and construction.

2. Responsibility for wells in a SGMA managed groundwater basin is shared between GSAs that manage groundwater levels to protect against significant and unreasonable conditions and well owners who have responsibility for their respective wells.

3. During the recent drought, many wells within the Subbasin were reported to have gone dry. The California Department of Water Resources (DWR) *Household Water Supply Shortage Reporting System* (DWR, April 2022) lists a total of 141 private household wells (i.e., domestic wells) that went dry as of the end of 2017, as shown on Figure 8-1.

4. Wells that went dry prior to 2017 are assumed to have either been replaced by deeper wells or an alternative water supply source. 2017 is used as the end of this analysis period to be consistent with the water level measurable objectives defined below.

8.4.2.2 Potential Causes of Significant and Unreasonable Conditions

With respect to chronic groundwater level declines, the primary cause of significant and unreasonable conditions is a water budget imbalance with pumping in excess of recharge. At any given time and place, this could involve multiple factors including local hydrogeologic conditions, cumulative pumping, reduced natural recharge due to drought, or reduction of surface water supplies used in lieu of groundwater and associated reduction in groundwater recharge from return flows.

The groundwater level declines in turn cause adverse conditions (i.e., loss of yield) that not only vary across the Subbasin and through time, but also differ in magnitude from well to well depending on its location, construction, operation, and conditions. Accurate information on the location, elevation, status, and construction of most local supply wells is not readily available and therefore, detailed evaluation of the range of adverse effects is not possible.

Moreover, the significant and unreasonable conditions of a well losing yield, experiencing damage, or "going dry" represent a complex interplay of causes and shared responsibility. Some of the potential causes are within the responsibility of the GSAs. Most notably, a GSA is responsible for groundwater basin management without causing significant and unreasonable conditions such as chronic groundwater level declines. SGMA also requires that a GSA address significant and unreasonable effects caused by groundwater conditions *throughout the basin.* This indicates that a GSA is not solely responsible for local or well-specific problems and furthermore that responsibility is shared with a well owner. A reasonable expectation exists that a well owner would construct, maintain, and operate the well to provide its expected yield over the well's life span, including droughts, and with some anticipation that neighbors also might construct wells (consistent with land use and well permitting policies).

8.4.2.3 Definition of Significant and Unreasonable Conditions

As context, the Sustainability Goal for the Paso Robles Subbasin is to sustainably manage groundwater resources for the long-term community, financial, and environmental benefit of users while maintaining the unique cultural, community, and business aspects of the Subbasin. Significant and unreasonable groundwater levels were initially defined in 2019 as those that:

- Impact the ability of existing domestic wells of average depth to produce adequate water for domestic purposes.
- Cause significant financial burden to those who rely on the groundwater basin
- Interfere with other SGMA sustainability indicators.

These have been modified. First, the limitation of existing domestic wells to those of average depth has been modified to conceptually include all existing well records, with a focus on domestic well records. This focus recognizes the importance of domestic wells as a source of potable supply (often the sole source to one or more households) and assumes that these are more likely to be shallow and thus susceptible to undesirable results from groundwater level declines. Data limitations in identifying domestic wells and evaluating impacts are acknowledged throughout this section. Second, financial burdens are not evaluated as a groundwater sustainability issue but are more appropriately addressed as part of the analysis of projects and management actions and implementation plan. Third, the effects on other SGMA sustainability indicators are addressed in Section 8.4.5.5.

For purposes of this supplementary analysis in response to DWR Corrective Actions and to support the sustainability criteria in this GSP, significant and unreasonable groundwater levels are defined as follows.

1. A significant number of wells throughout the Subbasin going dry with the following considerations:
    - As noted above, "going dry" means that the entire well length (to the bottom of the well) is unsaturated.
    - It is acknowledged that groundwater level declines involve a continuum of potential impacts that are specific to a well.
    - These include effects not noticed by the well owner and those that are noticed and reasonably handled by the well owner.
    - This significance criteria relates to dry wells that did not already go dry prior to 2017.

- The GSAs define a significant number of wells throughout the Subbasin as ten percent of all wells, as represented by wells with known location and construction information.

2. Chronic groundwater level declines that interfere with other SGMA sustainability indicators.

In that light, the definition of significant and unreasonable conditions would be the chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply equivalent to more than ten percent of wells going dry. This is defined by groundwater conditions occurring throughout the Subbasin. Additional temporal and spatial components defining undesirable results are presented in Section 8.4.6.

8.4.3 Measurable Objectives

The measurable objectives for chronic lowering of groundwater levels represent target groundwater elevations that are established to achieve the sustainability goal by at least 2040. Measurable objectives are groundwater levels established at each RMS. Measurable objective groundwater levels are higher than minimum threshold groundwater levels. Measurable objectives provide operational flexibility above minimum threshold levels to ensure that the Subbasin can be managed sustainably over a reasonable range of climate and hydrologic variability. Measurable objectives may change after GSP adoption as new information and hydrologic data become available.

8.4.3.1 Methodology for Setting Measurable Objectives

Initial measurable objectives were established based on historical groundwater level data along with input and preferences on future groundwater levels from domestic groundwater users, agricultural interests, environmental interests, and other Subbasin stakeholders. The input and preferences were used to formulate a range of conceptual measurable objective scenarios. These scenarios were evaluated using the GSP model to project the effect on future Subbasin operation and to select measurable objectives for the GSP.

8.4.3.2 Paso Robles Formation Aquifer Measurable Objectives

Initial measurable objectives for each groundwater level RMS in the Paso Robles Formation Aquifer were set at the approximate 2017 average groundwater levels. The measurable objectives are depicted on hydrographs in Appendix H.

8.4.3.3 Alluvial Aquifer Measurable Objectives

Only one RMS could be established for the Alluvial Aquifer. This RMS is associated with a new monitoring well (well name 18MW-0191) installed by the City of Paso Robles in June

2018. A measurable objective was not established for this RMS because it does not have sufficient historical groundwater level data. Additional measurable objectives will be established for the Alluvial Aquifer early after GSP adoption when the RMS network is expanded by either locating new candidate monitoring wells, modifying confidentiality agreements at known wells so that groundwater level data can be used, or by installing new monitoring wells.

8.4.4 Minimum Thresholds

Section §354.28(c)(1) of the SGMA regulations states that *"The minimum threshold for chronic lowering of groundwater levels shall be the groundwater elevation indicating a depletion of supply at a given location that may lead to undesirable results."*

The Sustainable Management Criteria survey (Appendix G) provided general information on stakeholders' preferences for future groundwater levels. Initial minimum thresholds were developed based on the survey and public outreach results, hydrogeologic information including contours of 2017 groundwater levels and evaluation of historical groundwater level variability at the RMS, and information about well construction.

Average 2017 non-pumping groundwater levels have been selected as measurable objectives, and minimum thresholds are set below those levels. As stated in the Executive Summary section ES-7, a groundwater elevation minimum threshold for each monitoring well was set to an elevation 30 feet below the measurable objective. Analysis of historical groundwater elevation data suggested that 30 feet allows for reasonable operational flexibility that accounts for seasonal and anticipated climatic variations on groundwater elevation. Specific conditions such as well depths at each RMS were considered when establishing the groundwater level for the initial minimum threshold. Protecting a sustainable groundwater supply for existing wells was a guiding consideration. Minimum thresholds were selected to allow sufficient time for the GSAs to develop a broader and publicly accessible dataset that will give clear guidance to establish a reasonable justification for any potential management actions that would be triggered by exceedances of minimum thresholds.

As noted above, only one RMS could be established for the Alluvial Aquifer. This RMS is associated with a new monitoring well (well name 18MW-0191) installed by the City of Paso Robles in June 2018. A measurable objective was not established for this well; therefore, a minimum threshold is not established. A minimum threshold will be established after additional groundwater level data are available for the well. Additional minimum thresholds will be established for the Alluvial Aquifer early after GSP adoption when an expanded RMS network is developed.

8.4.4.1 Evaluation of Effect on Existing Wells of Sustainability Criteria

This section focuses on the sustainability criteria for the Paso Robles Formation Aquifer. As noted in Sections 8.4.3.3 and 8.4.4, only one well was identified in 2019 to represent the Alluvial Aquifer and no sustainability criteria were defined. This 2021 evaluation includes:

- identification of existing well records with construction information relative to RMS wells
- presentation of measurable objectives at RMS and analysis of effects on existing well records
- presentation of minimum thresholds at RMS and analysis of effects on existing well records

8.4.4.1.1 Evaluation of Existing Wells with Construction Information

Figure 8-2 shows the locations of the Representative Monitoring Site (RMS) wells along with locations of existing supply well records in their vicinity. Each of the existing well records (shown on the map as a colored dot) has an assigned location and documented construction details from available sources.

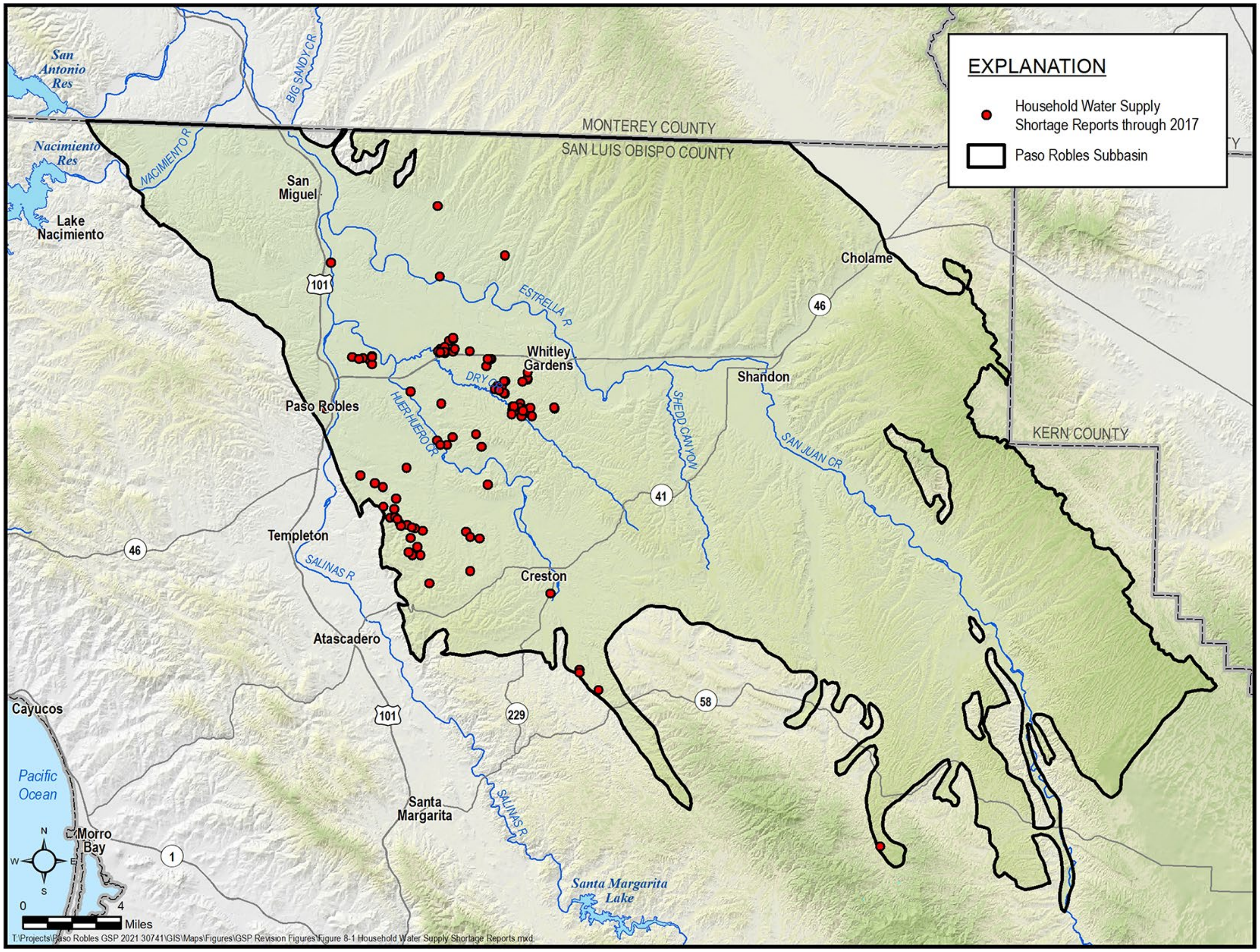


Figure 8-1. Household Water Supply Shortage Reports through 2017

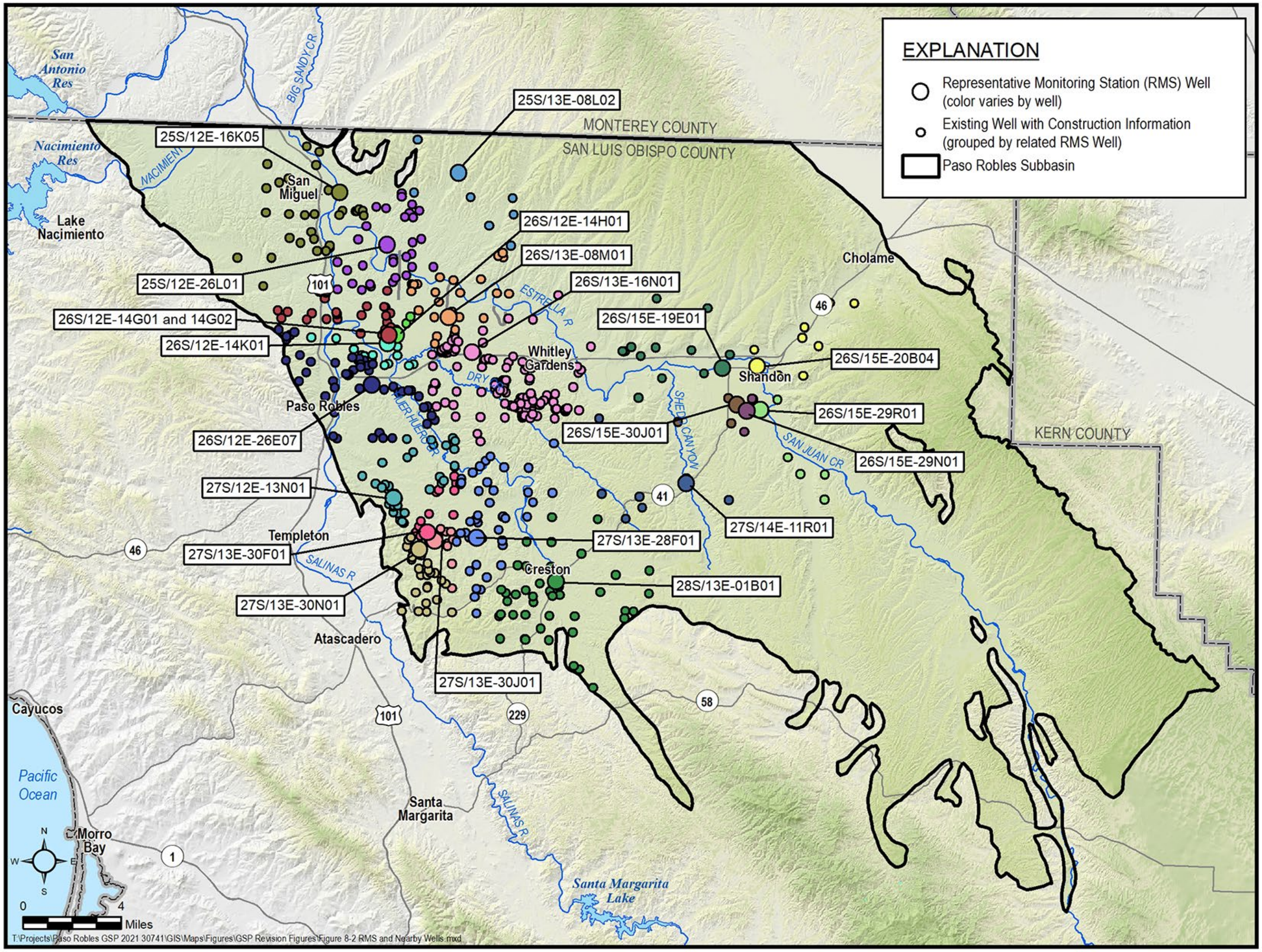


Figure 8-2. Representative Monitoring System (RMS) Wells and Existing Wells with Construction Information

Well locations and total depth information for existing wells in the Subbasin have been collected from three sources:

1. Records digitized as part of the Paso Robles Subbasin Data Management System (DMS)
2. Information from model development (GSSI 2016)
3. Records from DWR's Online System of Well Completion Reports (OSWCR, DWR October 2021)

A total of 1,593 wells with total depth information was identified within these three datasets: 71 from the DMS, 193 from model development, and 1,329 from OSWCR. While these datasets include significant well location and construction information, they also have limitations. Specifically:

- These datasets are solely records of well construction. None of the three indicate which wells have been replaced or destroyed, which still exist, or which are actively used for water supply.
- None of these records include information on pumping equipment, so assessment of the effects of water level changes on pumping costs is not possible.
- Very few of these records include complete screen interval information, and total well depth is the most commonly available information relating to well construction. Accordingly, assessment of water levels in comparison to saturated screen length is not possible, but comparison to total well depth is.
- The wells in these datasets represent a long history of well construction and groundwater conditions in the Subbasin. Older wells were typically shallower, corresponding to higher water levels and the drilling technology and practices at the time. Older wells have not been removed from these datasets, even though old shallow wells are likely no longer viable.
- While OSWCR includes the most wells by far, accurate locations for most of the wells in the OSWCR dataset are unknown. Only 4.5 percent of the OSWCR sourced wells with total depth information in the Subbasin are located by address. The remaining wells from this data source have been given Public Land Survey System (PLSS) section centers as their location. This location inaccuracy limits how these data can be used:

- Groundwater surface elevation from subbasin-wide contours or numerical model simulations interpolated at the mapped locations will be incorrect because the elevations would be different at the actual well location(s).

- The hydrogeologic conditions and aquifer in which these wells are completed cannot be accurately assessed because the conditions may be different at the actual well location(s).

- Assessment of the impacts of historical or future groundwater conditions on these wells is limited by the inaccurate locations and should be assumed to be representative in the aggregate and not on an individual-well basis.

The data from these three sources were combined into a single geographically-enabled dataset for evaluation in comparison to water levels in the RMS wells. These existing well recorded locations were mapped and the RMS well closest to each existing well record was identified. The existing well records were then grouped according to the nearest RMS well.

For each of the 22 groupings of wells around the RMS wells, the total depth of the wells was then compiled for comparison to depth to groundwater measurement in the respective RMS well. This allows the enumeration of how many wells theoretically would have been gone dry in historical and future periods.

Table 8-1 presents summary information for the 1,593 existing well records grouped by the nearest RMS well. As shown in Table 8-1, there is variability in the number and depths of existing wells nearest each RMS well. The number of nearby wells ranges from zero for RMS Well 26S/12E-14G02 (PASO-0017) to 310 for RMS Well 26S/13E-16N01 (PASO-0282). The shallowest well in this dataset is only 6 feet deep (nearest to RMS Well 26S/12E-26E07 (PASO-0124), while the deepest is 1,250 feet deep (nearest RMS Well 26S/13E-08M01 (PASO-0164). While there is a great deal of variability in the total depth of existing well records, the important observations from Table 8-1 are that:

1. The average depth of existing well records is over 400 feet, as shown by the weighted average at the bottom of the last column in the table.

2. The depth of the shallowest wells in the Subbasin varies widely with geography, as shown by the wide range of shallowest well total depths. However, the average depth of the shallowest wells in the Subbasin is only 76 feet, as indicated by the weighted average for the column showing the total depth of the shallowest wells.

These two statistics show that while most well records are for relatively deep wells, there have historically been shallow wells located in the Subbasin.

Table 8-1. RMS Wells and Nearby Existing Wells

RMS Well ID (alt ID)	Number of Nearby Wells	Total Depth of Shallowest Nearby Existing Well (feet)	Total Depth of Deepest Nearby Existing Well (feet)	Average Nearby Well Total Depth (feet)
25S/12E-16K05 (PASO-0345)	40	39	800	431
25S/12E-26L01 (PASO-0205)	92	70	890	377
25S/13E-08L02 (PASO-0195)	8	270	1,180	644
26S/12E-14G01 (PASO-0048)	99	30	870	362
26S/12E-14G02 (PASO-0017)	0	---	---	---
26S/12E-14H01 (PASO-0184)	11	100	1,090	585
26S/12E-14K01 (PASO-0238)	53	32	1,075	379
26S/12E-26E07 (PASO-0124)	174	6	1,004	347
26S/13E-08M01 (PASO-0164)	49	97	1,250	623
26S/13E-16N01 (PASO-0282)	310	120	1,220	610
26S/15E-19E01 (PASO-0073)	16	55	1,060	591
26S/15E-20B04 (PASO-0401)	36	39	475	304
26S/15E-29N01 (PASO-0226)	2	400	640	520
26S/15E-29R01 (PASO-0406)	23	210	867	419
26S/15E-30J01 (PASO-0393)	7	290	800	565
27S/12E-13N01 (PASO-0223)	62	92	980	442
27S/13E-28F01 (PASO-0243)	188	55	800	379
27S/13E-30F01 (PASO-0355)	55	104	810	398
27S/13E-30J01 (PASO-0423)	51	65	740	413
27S/13E-30N01 (PASO-0086)	111	100	660	348
27S/14E-11R01 (PASO-0392)	8	500	940	689
28S/13E-01B01 (PASO-0066)	198	62	750	381
Minimum:	**0**	**6**	**475**	**304**
Maximum:	**310**	**500**	**1,250**	**689**
Range:	**310**	**494**	**775**	**385**
Total / Weighted Average:	**1,593**	**76**	**927**	**437**

8.4.4.2 Effect of Paso Robles Formation Aquifer Measurable Objectives

Measurable objectives for groundwater level RMS wells in the Paso Robles Formation Aquifer are summarized in Table 8-2. Initial measurable objectives were set at the approximate 2017 average groundwater levels.

Assessment of the measurable objectives for the Paso Robles Formation Aquifer involved evaluation of the number of existing recorded wells that would have gone dry in 2017 when the measurable objective last occurred. The total depths of existing wells (with construction information) near the RMS wells were reviewed to identify which wells would have gone dry in average 2017 conditions, as represented by the nearest RMS well. The number and percentage of wells near each RMS well that would have gone dry are indicated on Table 8-2. As shown, a total of 225 wells within the available well information dataset would have gone dry in average 2017 groundwater level conditions, equivalent to 14.1 percent of the wells with construction information. This is more than the 141 wells that were reported to have gone dry in the *Household Water Supply Shortage Reporting System* (DWR, April 2022). This likely reflects three characteristics or limitations of the available information. First, the dataset includes well construction records for very old wells that have either been destroyed or are no longer in use and thus would not be reported to DWR. Second, not all of the existing wells for which construction information is available are household water supply sources, and thus this analysis likely includes wells for other purposes (e.g., irrigation). Finally, not all wells that went dry may have been reported to DWR; some well owners may not be aware of the reporting systems and some may have reported the conditions later.

Table 8-2. Chronic Lowering of Groundwater Levels Measurable Objectives for Paso Robles Formation Aquifer

RMS Well ID (alt ID)	Measurable Objective (feet NAVD88)	Number of Nearby Wells Dry at Measurable Objective	Percent of Nearby Wells Dry at Measurable Objective
25S/12E-16K05 (PASO-0345)	521	3	7.5%
25S/12E-26L01 (PASO-0205)	490	35	38.0%
25S/13E-08L02 (PASO-0195)	916	0	0.0%
26S/12E-14G01 (PASO-0048)	495	32	32.3%
26S/12E-14G02 (PASO-0017)	498	0	---
26S/12E-14H01 (PASO-0184)	505	2	18.2%
26S/12E-14K01 (PASO-0238)	483	17	32.1%
26S/12E-26E07 (PASO-0124)	648	38	21.8%
26S/13E-08M01 (PASO-0164)	613	4	8.2%
26S/13E-16N01 (PASO-0282)	588	4	1.3%
26S/15E-19E01 (PASO-0073)	929	1	6.3%
26S/15E-20B04 (PASO-0401)	967	1	2.8%
26S/15E-29N01 (PASO-0226)	993	0	0.0%
26S/15E-29R01 (PASO-0406)	986	0	0.0%
26S/15E-30J01 (PASO-0393)	959	0	0.0%
27S/12E-13N01 (PASO-0223)	716	10	16.1%
27S/13E-28F01 (PASO-0243)	894	19	10.1%
27S/13E-30F01 (PASO-0355)	766	16	29.1%
27S/13E-30J01 (PASO-0423)	806	12	23.5%
27S/13E-30N01 (PASO-0086)	810	31	27.9%
27S/14E-11R01 (PASO-0392)	1,028	0	0.0%
28S/13E-01B01 (PASO-0066)	1,040	0	0.0%
	Total:	225	14.1%

8.4.4.3 Effect of Paso Robles Formation Aquifer Minimum Thresholds

Minimum thresholds for groundwater level RMS wells in the Paso Robles Formation Aquifer are summarized on Table 8-3. Hydrographs for RMS wells with minimum thresholds are included in Appendix H. These minimum thresholds were selected to avoid the locally defined significant and unreasonable conditions.

As with the measurable objectives, the number of existing wells that would go dry at the minimum threshold was assessed. In this case, the assessment only included well records that would not have gone dry at the measurable objective. It is assumed that wells that would have gone dry in average 2017 groundwater conditions were either no longer active or were replaced with a deeper well or alternative water supply source. The number and percentage of additional wells near each RMS well that would go dry at the minimum threshold are indicated on Table 8-3. A total of 62 additional wells, or 3.9 percent within the available well information dataset, would go dry at the minimum threshold.

As a qualitative comparison, the number of wells that were reported to have gone dry in the Household Water Supply Shortage Reporting System indicates that 95 wells have been reported to have gone dry between the end of 2017 and the start of 2022. Some of these well issues have been resolved by lowering the pump or deepening the well. Some of these wells may also have gone dry prior to the end of 2017, but the conditions may not have been reported until later. The total number of wells reported to have gone dry through the start of 2022 (236) is very similar to the number of existing wells with construction information predicted to go dry in average 2017 conditions (225). Therefore, the available data indicate that the minimum thresholds are protective of undesirable results as they relate to shallow domestic wells, defined as 10 percent of wells going dry after 2017.

Table 8-3: Chronic Lowering of Groundwater Levels Minimum Thresholds for Paso Robles Formation Aquifer

RMS Well ID (alt ID)	Minimum Threshold (feet NAVD88)	Number of Nearby Wells Dry at Minimum Threshold Not Dry at Measurable Objective	Percent of Nearby Wells Dry at Minimum Threshold Not Dry at Measurable Objective
25S/12E-16K05 (PASO-0345)	491	2	5.0%
25S/12E-26L01 (PASO-0205)	460	7	7.6%
25S/13E-08L02 (PASO-0195)	886	0	0.0%
26S/12E-14G01 (PASO-0048)	465	11	11.1%
26S/12E-14G02 (PASO-0017)	468	0	---
26S/12E-14H01 (PASO-0184)	475	0	0.0%
26S/12E-14K01 (PASO-0238)	453	3	5.7%
26S/12E-26E07 (PASO-0124)	618	4	2.3%
26S/13E-08M01 (PASO-0164)	583	0	0.0%
26S/13E-16N01 (PASO-0282)	558	1	0.3%
26S/15E-19E01 (PASO-0073)	899	0	0.0%
26S/15E-20B04 (PASO-0401)	937	0	0.0%
26S/15E-29N01 (PASO-0226)	963	0	0.0%
26S/15E-29R01 (PASO-0406)	956	0	0.0%
26S/15E-30J01 (PASO-0393)	929	0	0.0%
27S/12E-13N01 (PASO-0223)	686	3	4.8%
27S/13E-28F01 (PASO-0243)	864	4	2.1%
27S/13E-30F01 (PASO-0355)	736	4	7.3%
27S/13E-30J01 (PASO-0423)	776	4	7.8%
27S/13E-30N01 (PASO-0086)	780	15	13.5%
27S/14E-11R01 (PASO-0392)	998	0	0.0%
28S/13E-01B01 (PASO-0066)	1,010	4	2.0%
	Total:	62	3.9%

8.4.4.4 Minimum Thresholds Impact on Domestic Wells

The potential impacts of the minimum thresholds on domestic wells are included in the assessment presented above, while acknowledging that the available well information datasets do not necessarily differentiate which wells are domestic. The analysis indicates that no more than 3.9 percent of all wells in the Subbasin are susceptible to going dry in the event that the minimum threshold is reached in all RMS wells simultaneously. The methodologies used for the analysis, and methodologies used for forecasting occurrences of wells going dry, will be further refined during GSP implementation. As not all wells used in the analysis are for domestic supply, this indicates that a smaller number of domestic wells are susceptible to going dry at the minimum threshold.

8.4.4.5 Relationship between Individual Minimum Thresholds and Relationship to Other Sustainability Indicators

Section 354.28 of the SGMA regulations requires that the description of all minimum thresholds include a discussion about the relationship between the minimum thresholds for each sustainability indicator. In the SMC BMP (DWR, 2017), DWR has clarified this requirement. First, the GSP must describe the relationship between each sustainability indicator's minimum threshold; in other words, describe why or how a water level minimum threshold set at a particular RMS is similar to or different to water level thresholds in nearby RMS. Second, the GSP must describe the relationship between the selected minimum threshold and minimum thresholds for other sustainability indicators; in other words, describe how a water level minimum threshold would not trigger an undesirable result for land subsidence, for example.

Groundwater elevation minimum thresholds are derived from the measurable objectives, which are average 2017 groundwater elevations. Because the measurable objectives represent a historical and realistic groundwater elevation map, the minimum thresholds derived from these objectives (i.e., 30 feet lower) likely do not conflict with each other.

Groundwater elevation minimum thresholds can influence other sustainability indicators.

- **Change in groundwater storage**. Changes in groundwater elevations reflect changes in the amount of groundwater in storage. Pumping at or less than the sustainable yield will maintain or raise average groundwater elevations in the Subbasin. The groundwater elevation minimum thresholds are set to maintain a constant elevation over an extended period of time, consistent with the practice of pumping at or less than the sustainable yield. Therefore, the groundwater elevation minimum thresholds will not result in long term significant or unreasonable change in groundwater storage.
- **Seawater intrusion**. This sustainability indicator is not applicable to this Subbasin.

- **Degraded water quality**. Protecting groundwater quality is critically important to all who depend upon the groundwater resource, particularly for drinking water and agricultural uses. Maintaining groundwater levels protects against degradation of water quality or exceeding regulatory limits for constituents of concern in supply wells due to actions proposed in the GSP. Water quality could be affected through two processes:

    1. Low groundwater elevations in an area could cause deeper, poor-quality groundwater to flow upward into existing supply wells. Groundwater elevation minimum thresholds are set below current levels, meaning upward flow of deep, poor-quality groundwater could occur in the future. Should groundwater quality degrade due to lower groundwater elevations, the groundwater elevation minimum thresholds will be raised to avoid this degradation.
    2. Changes in groundwater elevation due to actions implemented to achieve sustainability could change groundwater gradients, which could cause poor quality groundwater to flow towards supply wells that would not have otherwise been impacted. These groundwater gradients, however, are only dependent on differences between groundwater elevations, not on the groundwater elevations themselves. Therefore, the minimum threshold groundwater elevations do not directly lead to a significant and unreasonable degradation of groundwater quality in production wells.

- **Subsidence**. A significant and unreasonable condition for subsidence is permanent pumping induced subsidence that substantially interferes with surface land use. Subsidence is caused by dewatering and compaction of clay-rich sediments in response to lowering groundwater levels. Very small amounts of land surface elevation fluctuations have been reported across the Basin. The groundwater elevation minimum thresholds are set below existing groundwater elevations, which could induce additional subsidence that has not already started. Should new subsidence be observed due to lower groundwater elevations, the groundwater elevation minimum thresholds will be raised to avoid this subsidence.
- **Depletion of interconnected surface water**. The set of monitoring wells used to evaluate interconnected surface water includes some overlap with the set of RMS wells used for the groundwater level minimum threshold. Depending on the local relationship between Alluvial Aquifer water levels and Paso Robles Formation Aquifer water levels, the minimum threshold for interconnected surface water could be more constraining than the minimum threshold for groundwater elevations. The interconnected surface water minimum threshold (no more than 10 feet below the spring 2017 water level) is higher than the groundwater elevation minimum threshold (30 feet below the average 2017 water level), but the former applies only to Alluvial

Aquifer wells. At locations along stream segments with riparian vegetation where the difference between Alluvial Aquifer and Paso Robles Formation Aquifer water levels is less than 20 feet, the interconnected surface water minimum threshold would likely constrain water levels. The only locations where existing data indicates a potential connection between the surface water system and the underlying Paso Robles Formation Aquifer include the middle reach of the Estrella River (from Shedd Canyon to Martingale Circle) and along San Juan Creek upstream of Spring Creek. At these locations the connection between surface waters and the underlying Paso Robles Formation Aquifer is unknown but sufficient evidence exists that there could potentially be a connection, and therefore further investigation in these areas is recommended.

8.4.4.6 Effect of Minimum Thresholds on Neighboring Basins

One neighboring groundwater basin is required to develop a GSP: the Upper Valley Subbasin of the Salinas Valley Basin. Additionally, the adjoining Atascadero Subbasin is currently developing a GSP under SGMA. The anticipated effect of the groundwater elevation minimum thresholds on each of the two subbasins is addressed below.

Upper Valley Subbasin of the Salinas Valley Basin. The Upper Valley Subbasin is required to develop a GSP by 2022. The Upper Valley Subbasin is hydrogeologically downgradient of the Paso Robles Subbasin: groundwater generally flows from the Paso Robles Subbasin into the Upper Valley Subbasin. Lower groundwater levels in the Paso Robles Subbasin as a result of GSP actions could reduce the amount of groundwater flowing into the Upper Valley Subbasin, affecting that Subbasin's ability to achieve sustainability. The groundwater elevation minimum thresholds are set at constant levels that are below current elevations; therefore, they could reduce groundwater flow into the adjacent Upper Valley Subbasin. If reduced groundwater flow is observed that impacts sustainability in the Upper Valley Subbasin of the Salinas Valley Basin, then minimum thresholds would be adjusted to avoid this impact.

The Paso Robles Subbasin GSAs have developed a cooperative working relationship with the Salinas Valley Basin GSA who will be developing the GSP for the Upper Valley Subbasin. The two GSAs will monitor and work together to ensure that minimum thresholds do not significantly affect each Subbasin's ability to achieve sustainability.

Atascadero Subbasin. The Paso Robles Subbasin is hydrogeologically separated from the Atascadero Subbasin by the Rinconada Fault. The fault acts as a barrier to groundwater flow in the Paso Robles Formation Aquifer as presented in Chapter 4. While minimum thresholds are set at levels below current groundwater levels, these lower levels are not expected to impact sustainability in the Atascadero Subbasin due to the limited groundwater flow between the two Subbasins. The Paso Robles Subbasin GSAs have a cooperative working relationship with the Agencies managing the Atascadero Subbasin and will continue to work together to ensure that minimum thresholds do not significantly affect each Subbasin's ability to achieve sustainability.

8.4.4.7 Effects on Beneficial Users and Land Uses

The groundwater elevation minimum thresholds may have several effects on beneficial users and land uses in the Subbasin.

Agricultural land uses and users. The groundwater elevation minimum thresholds limit lowering of groundwater levels in the Subbasin. In the absence of other mitigating measures this has the effect of potentially limiting the amount of groundwater pumping in the Subbasin. Limiting the amount of groundwater pumping will limit the amount and type of crops that can be grown in the Subbasin, which could result in a proportional reduction in the economic viability of some properties. The groundwater elevation minimum thresholds could therefore limit expansion of the Subbasin's agricultural economy. This could have various effects on beneficial users and land uses:

- There will be an economic impact to employees and suppliers of production products and materials. Many parts of the local economy rely on a vibrant agricultural industry, and they too will be hurt proportional to the losses imparted to agricultural businesses.
- Growth of city, county and state tax rolls could be slowed or reduced due to the limitations imposed on agricultural growth.

Urban land uses and users. The groundwater elevation minimum thresholds effectively limit the amount of groundwater pumping in the Subbasin. This may limit urban growth or result in urban areas obtaining alternative sources of water. This may result in higher water costs for municipal water users.

Domestic land uses and users. The groundwater elevation minimum thresholds protect most domestic wells. Therefore, the minimum thresholds will likely have an overall beneficial effect on existing domestic land uses by protecting the ability to pump from domestic wells. However, limited water in some of the shallowest domestic wells may require owners to drill deeper wells. Additionally, the groundwater elevation minimum thresholds may limit the increase of non-*de minimis* groundwater use in order to limit future declines in groundwater levels caused by more non *de minimis* domestic pumping. Policies allowing offsets of existing use to allow new construction or bringing in new sources of water can mitigate against this effect.

Ecological land uses and users. Historical reductions in the extent and density of riparian vegetation in certain stretches of rivers and creeks may have been associated with declines in groundwater levels. The additional 30 feet of water-level decline allowed by the water-level minimum threshold could cause further reduction in riparian vegetation in areas where the Alluvial Aquifer is hydraulically connected with the Paso Robles Formation Aquifer. Groundwater elevation minimum thresholds effectively protect the groundwater resource including those existing ecological habitats that rely upon it because they are set to avoid long term declines in groundwater levels in a short amount of time. The sustainability criteria for interconnected surface water (see Section 8.8) include minimum thresholds defined as groundwater levels that are in some locations higher than the groundwater elevation minimum thresholds.

8.4.4.8 Relevant Federal, State, or Local Standards

No Federal, State, or local standards exist for chronic lowering of groundwater elevations.

8.4.4.9 Method for Quantitative Measurement of Minimum Thresholds

Groundwater elevation minimum thresholds will be directly measured from existing or new monitoring wells. The groundwater level monitoring will be conducted in accordance with the monitoring plan outlined in Chapter 7. Furthermore, the groundwater level monitoring will meet the requirements of the technical and reporting standards included in the SGMA regulations.

As noted in Chapter 7, the current groundwater monitoring network in the Paso Robles Formation Aquifer currently only includes 24 wells. For the Alluvial Aquifer, only one RMS was established. The GSAs will expand the monitoring network in both aquifers during GSP implementation.

8.4.5 Interim Milestones

Initial interim milestones were developed for the 24 RMS established for the Paso Robles Formation Aquifer based on the results of modeling conducted to evaluate management actions and select measurable objectives (Chapter 9). Because measurable objectives have not been established at RMS for the Alluvial Aquifer, interim milestones cannot be developed. Interim milestones will be developed in the future (after GSP adoption) when the RMS network is expanded in the Alluvial Aquifer.

Conceptually, the following actions and groundwater conditions are expected to occur during implementation.

- Monitoring of Subbasin conditions using an expanded monitoring network and continuous monitoring devices will provide additional information to refine interim milestones

- Pumping cutbacks in some areas of the Subbasin will begin about five years after adoption of the GSP. During this five-year period, current groundwater levels trends would continue to be tracked by the RMS.

- After about 5 years, groundwater levels will begin trending toward measurable objectives as a result of management actions and possibly pumping cutbacks in some area of the Subbasin.

Table 8-4 summarizes the interim milestones for the RMS in the Paso Robles Formation Aquifer.

Table 8-4: Chronic Lowering of Groundwater Levels Interim Milestones for Paso Robles Formation Aquifer

Well ID (alt ID)	Interim Milestones (feet NAVD88)		
	2025	2030	2035
25S/12E-16K05 (PASO-0345)	521	521	520
25S/12E-26L01 (PASO-0205)	499	496	492
25S/13E-08L02 (PASO-0195)	911	905	901
26S/12E-14G01 (PASO-0048)	526	532	534
26S/12E-14G02 (PASO-0017)	523	531	533
26S/12E-14H01 (PASO-0184)	513	521	524
26S/12E-14K01 (PASO-0238)	527	533	535
26S/12E-26E07 (PASO-0124)	644	644	645
26S/13E-08M01 (PASO-0164)	620	619	617
26S/13E-16N01 (PASO-0282)	595	594	593
26S/15E-19E01 (PASO-0073)	935	937	938
26S/15E-20B04 (PASO-0401)	972	976	978
26S/15E-29N01 (PASO-0226)	1,009	1,012	1,014
26S/15E-29R01 (PASO-0406)	997	1,001	1,003
26S/15E-30J01 (PASO-0393)	972	976	978
27S/12E-13N01 (PASO-0223)	711	710	709
27S/13E-28F01 (PASO-0243)	896	899	900
27S/13E-30F01 (PASO-0355)	770	768	765
27S/13E-30J01 (PASO-0423)	817	815	812
27S/13E-30N01 (PASO-0086)	804	799	794
27S/14E-11R01 (PASO-0392)	1,029	1,030	1,030
28S/13E-01B01 (PASO-0066)	1,052	1,055	1,055

Interim milestones may be revised during implementation as new data and understanding of the hydrogeologic conditions in the Subbasin become available.

8.4.6 Undesirable Results

8.4.6.1 Criteria for Defining Undesirable Results

The chronic lowering of groundwater elevation undesirable result is a quantitative combination of groundwater elevation minimum threshold exceedances. For chronic lowering of groundwater elevations, an exceedance is defined by the annual average (e.g., spring and fall) water level below the well's defined minimum threshold. For the Paso Robles Subbasin, the groundwater elevation undesirable result is:

Over the course of two years, no more than two exceedances for the groundwater elevation minimum thresholds within a 5-mile radius or within a defined area of the Basin for any single aquifer. A single monitoring well in exceedance for two consecutive years also represents an undesirable result for the area of the Basin represented by the monitoring well. Geographically isolated exceedances will require investigation to determine if local or Basin wide actions are required in response.

This compound definition of undesirable results provides flexibility in defining sustainability. Increasing the number of allowed minimum threshold exceedances provides more flexibility but may lead to significant and unreasonable conditions for a number of beneficial users. Reducing the number of allowed minimum threshold exceedances ensures strict adherence to minimum thresholds but reduces flexibility due to unanticipated hydrogeologic conditions. The undesirable result was set to balance the interests of beneficial users with the practical aspects of groundwater management under uncertainty.

Use of this definition of undesirable results in combination with the minimum threshold for groundwater elevation will avoid the significant and unreasonable conditions discussed above. Specifically, it will be impossible to cause a significant percentage of the wells in the Subbasin to go dry because the undesirable result includes geographic and temporal components that prevent the entire Subbasin from reaching the minimum thresholds in the RMS wells simultaneously.

As the monitoring system is expanded, the number of exceedances allowed may be adjusted. One additional exceedance will be allowed for approximately every seven new monitoring wells. This was considered a reasonable number of exceedances given the hydrogeologic uncertainty of the Subbasin. Close monitoring of groundwater data over the following years will allow actual numbers to be refined based on observable data. Management of the Subbasin will adapt to specific conditions and to a growing understanding of basin conditions and processes to adopt appropriate responses. When additional data and a better understanding of hydrogeologic conditions are available in the future, the GSAs may adjust measurable objectives and minimum thresholds and adaptively manage sustainability actions to avoid undesirable results.

8.4.6.2 Potential Causes of Undesirable Results

Conditions that may lead to an undesirable result include the following:

- Localized pumping clusters. Even if regional pumping is maintained within the sustainable yield, clusters of high-capacity wells may cause excessive localized drawdowns that lead to undesirable results in specific areas.
- Expansion of *de-minimis* pumping. Individual *de-minimis* pumpers, individually, do not have a significant impact on Subbasin-wide groundwater elevations. However, many
de-minimis pumpers are often clustered in specific residential areas. Pumping by these *de-minimis* users is not currently regulated under this GSP. Adding additional domestic *de-minimis* pumpers in specific areas may result in excessive localized drawdowns and undesirable results.
- Extensive drought and climate change. Minimum thresholds were established based on historical groundwater elevations and reasonable estimates of future groundwater elevations. Extensive droughts may lead to excessively low groundwater elevations and undesirable results.

8.4.6.3 Effects on Beneficial Users and Land Uses

The primary detrimental effect on beneficial users from allowing multiple exceedances occurs if more than one exceedance occurs in a small geographic area. Exceedances of the minimum thresholds for groundwater elevation are reasonable as long as the exceedances are spread out across the Subbasin. If the exceedances are clustered in a small area, it will indicate that significant and unreasonable effects are being born by a localized group of landowners.

8.5 Reduction in Groundwater Storage Sustainable Management Criteria

8.5.1 Locally Defined Significant and Unreasonable Conditions

Locally defined significant and unreasonable conditions were assessed based on the Sustainable Management Criteria survey, public meetings, available data, and discussions with GSA staff. Significant and unreasonable changes in groundwater storage in the Subbasin are those that:

- Lead to long-term reduction in groundwater storage
- Interfere with other sustainability indicators

Responses to the Sustainable Management Criteria survey and public input suggest that most areas of the basin would like to see more groundwater in storage to help with droughts, and some areas of the basin would like to see significantly more groundwater in storage. Public input on which concessions would be acceptable to increase the amount of groundwater in storage revealed two highly ranked concessions:

1. New pumping be offset with new recharge or reduced pumping
2. Pumping be reduced in dry years

However, the concession that agricultural pumping be reduced in all years ranked relatively low. This suggests that, while stakeholders would prefer more groundwater in storage, they also would not prefer to reduce existing agricultural pumping during average years. Stakeholders also prefer that groundwater storage be increased by retaining wet year flows for local recharge and/or importing water.

8.5.2 Minimum Thresholds

Section §354.28(c)(2) of the SGMA regulations states that "*The minimum threshold for reduction of groundwater storage shall be a total volume of groundwater that can be withdrawn from the basin without causing conditions that may lead to undesirable results. Minimum thresholds for reduction of groundwater storage shall be supported by the sustainable yield of the basin, calculated based on historical trends, water year type, and projected water use in the basin.*"

The reduction of groundwater in storage minimum threshold is established for the Subbasin as a whole, not for individual aquifers. Therefore, one minimum threshold for groundwater in storage is established for the entire Subbasin, but any reduction in storage that would cause an undesirable result in only a limited portion of the Subbasin shall be addressed in that area or areas where declining well levels indicate management actions or projects will be effective.

In accordance with the SGMA regulation cited above, the minimum threshold metric is a volume of pumping per year, or an annual pumping rate. Conceptually, the sustainable yield is the total volume of groundwater that can be pumped annually from the Subbasin without leading to undesirable results. As discussed in Chapter 6, absent the addition of supplemental water, the future estimated long-term sustainable yield of the Subbasin under reasonable climate change assumptions is 61,100 AFY. This estimated sustainable yield will change in the future as additional data become available.

This GSP adopts changes in groundwater level as a proxy for the change in groundwater storage metric. As allowed in §354.36(b)(1) of the SGMA regulations, an average of the semiannual groundwater elevation data at the RMSs will be reported annually as a proxy to track changes in the amount of groundwater in storage. A quantitative relationship between water level changes and volumetric changes in storage will be developed after the RMS network is expanded, new hydrogeologic data are developed, and the model is updated and recalibrated.

Based on well-established hydrogeologic principles, stable groundwater elevations maintained above the minimum threshold will limit depletion of groundwater from storage. Therefore, using groundwater elevations as a proxy, the minimum threshold is that the groundwater surface elevation averaged across all the wells in the groundwater level monitoring network will remain stable above the minimum threshold for chronic lowering of groundwater levels.

Exceedances of this minimum threshold, if limited to specific areas of the Basin, shall be addressed by management actions or projects developed where they affect those areas of exceedance. Multiple exceedances appearing across the Basin will require proportional Subbasin-wide responses.

8.5.2.1 Information Used and Methodology for Establishing Reduction in Storage Minimum Thresholds

The monitoring network and protocols used to measure groundwater elevations at the RMS are presented in Chapter 7, Monitoring Networks. These data will be used to monitor groundwater elevations and assess changes in groundwater storage.

8.5.2.2 Relationship between Individual Minimum Thresholds and Relationship to Other Sustainability Indicators

The minimum threshold for reduction in groundwater storage is a single value of average groundwater elevation over the entire Subbasin. Therefore, the concept of potential conflict between minimum thresholds at different locations in the Subbasin is not applicable.

The reduction in groundwater storage minimum threshold could influence other sustainability indicators. The reduction in groundwater storage minimum threshold was selected to avoid undesirable results for other sustainability indicators, as outlined below.

- **Chronic lowering of groundwater levels**. Because groundwater elevations will be used as a proxy for estimating groundwater pumping and changes in groundwater storage, the reduction in groundwater storage would not cause undesirable results for this sustainability indicator.
- **Seawater intrusion**. This sustainability indicator is not applicable to this Subbasin.
- **Degraded water quality**. The minimum threshold proxy of stable groundwater levels will not directly lead to a degradation of groundwater quality.

- **Subsidence**. Because future average groundwater levels will be stable, they will not induce any additional subsidence.
- **Depletion of interconnected surface waters**. The alluvial aquifer and the Paso Robles Formation both store groundwater. The minimum threshold for groundwater elevations involves water levels in the Paso Robles Formation, while the minimum threshold for interconnected surface water involves water levels in the alluvial aquifer. Both minimum thresholds limit minimum groundwater elevations to a finite depth below the 2017 elevations and thereby prevent long-term depletion in groundwater storage.

8.5.2.3 Effect of Minimum Thresholds on Neighboring Basins

The anticipated effect of the groundwater storage minimum thresholds on each of the two neighboring subbasins is addressed below.

Upper Valley Subbasin of the Salinas Valley Basin. Removing groundwater from storage in the Paso Robles Subbasin would reduce flow into the Upper Valley Subbasin, potentially affecting the ability of that Subbasin to achieve sustainability. The reduction in storage minimum threshold is set to prevent long-term reduction in storage and therefore maintain flow into the Upper Valley Subbasin. This minimum threshold will not prevent the Upper Valley Subbasin from achieving sustainability.

Atascadero Subbasin. The Paso Robles Subbasin is hydrogeologically separated from the Atascadero Subbasin by the Rinconada Fault. The fault acts as a partial barrier to groundwater flow as presented in Chapter 4. Removing groundwater from storage in the Paso Robles Subbasin could induce additional groundwater flow from the Atascadero Subbasin into the Paso Robles Subbasin, affecting the ability to achieve sustainability in the Atascadero Subbasin. The reduction in storage minimum threshold is set to prevent long term reduction in storage and will be monitored using groundwater elevation proxies, therefore will not induce lowering of groundwater elevations that could cause additional groundwater flows from the Atascadero Subbasin. The minimum threshold will therefore not prevent the Atascadero Subbasin from achieving sustainability.

8.5.2.4 Effect on Beneficial Uses and Users

The reduction in groundwater storage minimum threshold of maintaining stable average groundwater elevations will potentially require a reduction in the amount of groundwater pumping in the Subbasin. Reducing pumping may impact the beneficial uses and users of groundwater in the Subbasin.

Agricultural land uses and users. Reducing the amount of groundwater pumping may limit or reduce non-*de minimis* production in the Subbasin by reducing the amount of available water. Owners of agricultural lands that are currently not irrigated may be particularly impacted because the additional groundwater pumping needed to irrigate these lands could increase the Subbasin pumping beyond the sustainable yield, violating the minimum threshold.

Urban land uses and users. Reducing the amount of groundwater pumping may increase the cost of water for municipal users in the Subbasin because municipalities may need to find other, more expensive water sources.

Domestic land uses and users. Existing domestic groundwater users may generally benefit from this minimum threshold. Many domestic groundwater users are *de-minimis* users whose pumping may not be restricted by the projects and management actions adopted in this GSP. By restricting the amount of groundwater that is pumped from the Subbasin, the *de-minimis* users would be protected from overdraft that could impact their ability to pump groundwater.

Ecological land uses and users. Groundwater dependent ecosystems would generally benefit from this minimum threshold. Maintaining groundwater levels close to current levels maintains groundwater supplies similar to present levels which will continue to support groundwater dependent ecosystems.

8.5.2.5 Relation to State, Federal, or Local Standards

No federal, state, or local standards exist for reductions in groundwater storage.

8.5.2.6 Methods for Quantitative Measurement of Minimum Threshold

The quantitative metric for assessing compliance with the reduction in groundwater storage minimum threshold is monitoring groundwater elevations. The approach for quantitatively evaluating compliance with the minimum threshold for reduction in groundwater storage will be based on evaluating groundwater elevations annually. All groundwater elevations collected from the groundwater level monitoring network will be analyzed and averaged.

8.5.3 Measurable Objectives

The change in storage sustainability indicator uses groundwater levels as a proxy, using the same minimum thresholds and measurable objectives to protect against significant and unreasonable reduction in groundwater storage as it does protecting against chronic lowering of groundwater levels. The measurable objective, using the groundwater level proxy, is stable average groundwater levels.

8.5.3.1 Method for Setting Measurable Objectives

As discussed in Section 8.5.1, input from stakeholders suggested that they would prefer more groundwater in storage. However, stakeholders also suggested that they would prefer not to attain this increase in groundwater storage by reducing existing pumping during years with average climate conditions. Instead, they prefer to increase groundwater storage through increasing local recharge or importing water for recharge. Therefore, the conservative approach of simply maintaining stable groundwater levels was adopted for the measurable objective.

8.5.3.2 Interim Milestones

Interim milestones for groundwater storage are the same as those established for chronic lowering of groundwater elevations. Achieving the groundwater elevation interim milestones will also eliminate long term reductions in groundwater in storage.

8.5.4 Undesirable Results

8.5.4.1 Criteria for Defining Undesirable Results

The reduction in groundwater storage undesirable result is a quantitative combination of reduction in groundwater storage minimum threshold exceedances. There is only one reduction in groundwater storage minimum threshold. Therefore, no minimum threshold exceedances are allowed to occur and the reduction in groundwater storage undesirable result is:

During average hydrogeologic conditions, and as a long-term average over all hydrogeologic conditions, there shall be no persistent exceedances of the groundwater level proxy minimum threshold for change in groundwater storage.

8.5.4.2 Potential Causes of Undesirable Results

Conditions that may lead to an undesirable result for the reduction in groundwater storage sustainability indicator include the following:

- **Expansion of non-*de minimis* pumping.** Additional non-*de minimis* pumping may result in continued decline in groundwater elevations and exceedance of the proxy minimum threshold.
- **Expansion of *de minimis* pumping**. Pumping by *de minimis* users is not regulated under this GSP. Adding domestic *de minimis* pumpers in the Subbasin may result in lower groundwater elevations, and an exceedance of the proxy minimum threshold.

- **Extensive, unanticipated drought**. Minimum thresholds are established based on reasonable anticipated future climatic conditions. Extensive, unanticipated droughts may lead to excessively low groundwater recharge and unanticipated high pumping rates that could cause lower groundwater elevations and an exceedance of the proxy minimum threshold.

8.5.4.3 Effects on Beneficial Users and Land Use

The practical effect of this GSP for protecting against the reduction in groundwater storage undesirable result is that it encourages no net change in groundwater elevations and storage during average hydrologic conditions and over the long-term. Therefore, during average hydrologic conditions and over the long-term, beneficial uses and users will have access to the same amount of groundwater in storage that currently exists, and the beneficial users and uses of groundwater are protected from undesirable results. Pumping at the long-term sustainable yield during dry years would likely temporarily lower groundwater elevations and reduce the amount of groundwater in storage. Such short-term impacts, due to drought, are anticipated in SGMA and management actions should contain sufficient flexibility to accommodate them by ensuring they are offset by increases in groundwater levels or storage during normal or wet periods. Prolonged reductions in the amount of groundwater in storage could lead to undesirable results affecting beneficial users and uses of groundwater. In particular, groundwater pumpers that rely on water from shallow wells may be temporarily impacted by temporary reductions in the amount of groundwater in storage drops and lower water levels in their wells.

8.6 Seawater Intrusion Sustainable Management Criteria

The seawater intrusion sustainability indicator is not applicable to this Subbasin.

8.7 Degraded Water Quality Sustainable Management Criteria

8.7.1 Locally Defined Significant and Unreasonable Conditions

Locally defined significant and unreasonable conditions were assessed based on federal and state mandated drinking water and groundwater quality regulations, the Sustainable Management Criteria survey, public meetings, and discussions with GSA staff. Significant and unreasonable changes in groundwater quality in the Subbasin are increases in a chemical constituent that either:

- Result in groundwater concentrations in a public supply well above an established primary or secondary MCL, or
- Lead to reduced crop production.

8.7.2 Minimum Thresholds

Section §354.28(c)(2)of the SGMA regulations states that "*The minimum threshold shall be based on the number of supply wells, a volume of water, or a location of an isocontour that exceeds concentrations of constituents determined by the Agency to be of concern for the basin*."

As stated above, the SGMA regulations allow three options for setting degraded water quality minimum thresholds. In the Subbasin, degraded water quality minimum thresholds are based on a number of supply wells that exceed concentrations of constituents determined to be of concern for the Subbasin. The purpose of the minimum thresholds for constituents of concern with a primary or secondary MCL is to avoid furthering the migration of these constituents towards municipal or other drinking water wells. Therefore, the definition of supply wells for constituents of concern that have a primary or secondary MCL are public supply wells.

The purpose of the minimum thresholds for constituents of concern that may reduce crop productivity is to avoid furthering the migration of these constituents towards agricultural supply wells. Therefore, the definition of supply wells for constituents of concern that may lead to reduced crop production are agricultural supply wells.

As noted in Section 354.28 (c)(4) of the SGMA regulations, minimum thresholds are based on a degradation of groundwater quality, not an improvement of groundwater quality. Therefore, this GSP was developed to avoid taking actions that may inadvertently move groundwater constituents that have already been identified in the Subbasin in such a way that they have a significant and unreasonable impact that would not otherwise occur. Constituents of concern must meet two criteria:

1. They must have an established level of concern such as a primary or secondary MCL or a concentration that reduces crop production
2. They must have previously been found in the Subbasin at levels above the level of concern

Based on the review of groundwater quality in Chapter 5, different constituents of concern exist for both agricultural wells and public supply wells. The constituents of concern for agricultural wells are:

- Chloride
- Boron

The constituents of concern for public supply wells are:

- Total Dissolved Solids

- Chloride
- Sulfate
- Nitrate
- Gross Alpha Radiation

As noted in Section 5.6.3, based on available information there are no mapped groundwater contamination plumes in the Subbasin. Therefore, only potential impacts of diffuse or naturally occurring constituents listed above are addressed in this GSP.

The bases for establishing minimum thresholds for each constituent of concern in the Paso Robles Formation Aquifer and Alluvial Aquifer are listed in Table 8-5. This table does not identify the number of supply wells that will exceed the level of concern, but rather identifies how many additional wells will be allowed to exceed the level of concern. Wells that already exceed this limit are not counted against the minimum thresholds. In the table, minimum thresholds are generally set to the number of existing exceedances plus 10%. When the additional 10% reflects less than one exceedance, one additional exceedance is allowed. For example, if there are currently three exceedances of a constituent in an aquifer, the minimum threshold is set to

$$Exceedences = 3\ x\ 1.1 = 3.3\ where\ 1.1\ represents\ 110\%$$

$$Rounded\ Up\ To\ 4$$

The UC Cooperative Extension Guidelines state "Unlike most annual crops, tree and vine crops are generally susceptible to boron and chloride toxicity. Tolerances vary among species and rootstocks. Tolerant varieties and rootstocks restrict the uptake and accumulation of boron and chloride in leaf tissue. Boron concentrations in the irrigation water exceeding 0.5 to 0.75 mg/L can reduce plant growth and yield. Climatic effects are also important. In the cool moist coastal climates, irrigation waters with boron concentrations exceeding 1 mg/L are used successfully on tree and vine crops. Chloride moves readily with the soil water and is taken up by the roots. It is then transported to the stems and leaves. Sensitive berries and avocado rootstocks can tolerate only up to 120 ppm of chloride, while grapes can tolerate up to 700 ppm or more."

Current sample size is small (more wells will be added in the future), but known conditions in the Subbasin include these constituents. To reduce crop production to a significant and unreasonable extent would require levels of boron to exceed 0.75 mg/L in 10% more wells of total wells sampled and chloride to exceed 350 mg/L in 10% more wells of total wells sampled.

Table 8-5. Groundwater Quality Minimum Thresholds Bases

Constituent of Concern	Minimum Threshold Based on Number of Production Wells
Agricultural Wells in Monitoring Program	
Chloride	Fewer than 10% of additional agricultural production wells that are in the GSP monitoring program shall exceed 350 milligrams per liter (mg/L).
Boron	Fewer than 10% of additional agricultural production wells that are in the GSP monitoring program shall exceed 0.5 mg/L.
Municipal Wells in Monitoring Program	
Total Dissolved Solids	Fewer than 10% of additional municipal or domestic production wells that are in the GSP monitoring program shall exceed the TDS secondary MCL of 500 mg/L.
Chloride	Fewer than 10% of additional municipal or domestic production wells that are in the GSP monitoring program shall exceed the chloride secondary MCL of 250 mg/L.
Sulfate	Fewer than 10% of additional municipal or domestic production wells that are in the GSP monitoring program shall exceed the sulfate secondary MCL of 250 mg/L.
Nitrate	Fewer than 10% of additional municipal or domestic production wells that are in the GSP monitoring program shall exceed the nitrate MCL of 45 mg/L, measured as nitrate.
Gross Alpha Radiation	Fewer than 10% of additional municipal or domestic production wells that are in the GSP monitoring program shall exceed the gross alpha radiation MCL of 15 pCi/L.

8.7.2.1 Paso Robles Formation Aquifer

The minimum thresholds for degraded water quality in the Paso Robles Formation Aquifer are based on the goal of fewer than 10% of additional exceedances can occur in the future. However, some exceedances already exist in Paso Robles Formation Aquifer wells, and these exceedances will likely continue into the future. The minimum threshold for the number of allowed exceedances is therefore equal to the current number of exceedances plus 10%. In cases where incorporating the increase of 10% results in a fraction of a well less than one, one additional well exceedance was allowed. Based on the number of agricultural and municipal supply wells in the existing water quality monitoring network that is described in Chapter 7, the number of existing exceedances plus the 10% (or a minimum of one well) for each constituent is shown in Table 8-6. The exceedance numbers in this table are the minimum thresholds. This table additionally includes the percentage of existing wells that exceed the minimum thresholds for each constituent. The percentage defines the upper bound of wells that can exceed the minimum thresholds as additional wells are added to the monitoring program. Existing State, Federal, Public Health or Municipal regulations supersede this. Wells in exceedance of those Regulations will have to comply if they occur. AG Order 4.0 for Central Coast Region is under review and this GSP will comply with its findings.

Table 8-6. Minimum Thresholds for Degraded Groundwater Quality in Paso Robles Formation Aquifer Supply Wells Under the Current Monitoring Network [1]

Constituent of Concern	Number of Existing Supply Wells in Monitoring Network	Minimum Threshold Based on Existing Monitoring Network	Percentage of Wells with Exceedances
Agricultural Wells			
Chloride	28	4	14%
Boron	28	10	36%
Municipal Wells			
Total Dissolved Solids	34	12	35%
Chloride	34	2	6%
Sulfate	34	2	6%
Nitrate	34	2	6%
Gross Alpha Radiation	32	0	0%

1 – Data for this table were obtained from the following website: geotracker.waterboards.ca.gov/gama/gamamap/public/

8.7.2.2 Alluvial Aquifer

The minimum thresholds for degraded water quality in the Alluvial Aquifer are similarly based on the goal of fewer than 10% of additional exceedances shown in Table 8-5. Following the same process as the Paso Robles Formation Aquifer, the minimum thresholds for degraded water quality in the Alluvial Aquifer are shown in Table 8-7. All agricultural supply wells are assumed to pump from the Paso Robles Formation Aquifer, and therefore there are no agricultural well minimum thresholds set in the Alluvial Aquifer. As with the Paso Robles Formation Aquifer, as additional wells are added to the monitoring program, the percentage of wells exceeding the minimum threshold will not increase.

Table 8-7. Minimum Thresholds for Degraded Groundwater Quality in Alluvial Aquifer Supply Wells Under the Current Monitoring Network [1]

Constituent of Concern	Number of Existing Supply Wells in Monitoring Network	Minimum Threshold Based on Existing Monitoring Network	Percentage of Wells with Exceedances
Public Supply Wells			
Total Dissolved Solids	8	5	63%
Chloride	8	3	38%
Sulfate	8	3	38%
Nitrate	9	0	0%
Gross Alpha Radiation	7	0	0%

1 – Data for this table were obtained from the following website: geotracker.waterboards.ca.gov/gama/gamamap/public/

8.7.2.3 Information Used and Methodology for Establishing Water Quality Minimum Thresholds

The information used for establishing the degraded groundwater quality minimum thresholds included:

- Historical groundwater quality data from production wells in the Subbasin
- Federal and state drinking water quality standards
- Feedback about significant and unreasonable conditions from GSA staff members and the public

The historical groundwater quality data used to establish groundwater quality minimum thresholds are presented in Chapter 5.

Based on the review of historical and current groundwater quality data, federal and state drinking water standards, and irrigation water quality needs, GSAs agreed that these standards are appropriate to define degraded groundwater quality minimum thresholds.

8.7.2.4 Relationship between Individual Minimum Thresholds and Relationship to Other Sustainability Indicators

The groundwater quality minimum thresholds were set for each of six constituents that are currently found in the Subbasin above water quality standards or irrigation guidance levels. These minimum thresholds were derived from existing data measured at individual wells. There are no conflicts between the existing groundwater quality data; and therefore, the minimum thresholds represent a reasonable and realistic distribution of groundwater quality.

Because the underlying groundwater quality distribution is reasonable and realistic, there is no conflict that prevents the Subbasin from simultaneously achieving all six minimum thresholds.

Because SGMA regulations do not require projects or actions to improve groundwater quality, there will be no direct actions under the GSP associated with the groundwater quality minimum thresholds. Therefore, there are no actions that directly influence other sustainability indicators. However, preventing migration of poor groundwater quality may limit activities needed to achieve minimum thresholds for other sustainability indicators.

- **Change in groundwater levels**. Groundwater quality minimum thresholds could influence groundwater level minimum thresholds by limiting the types of water that can be used for recharge to raise groundwater levels. Water used for recharge cannot exceed any of the groundwater quality minimum thresholds.
- **Change in groundwater storage**. Nothing in the groundwater quality minimum thresholds promotes pumping in excess of the sustainable yield. Therefore, the groundwater quality minimum thresholds will not result in an exceedance of the groundwater storage minimum threshold.
- **Seawater intrusion**. This sustainability indicator is not applicable to this Subbasin
- **Subsidence**. Nothing in the groundwater quality minimum thresholds promotes a condition that will lead to additional subsidence and therefore, the groundwater quality minimum thresholds will not result in a significant or unreasonable level of subsidence.
- **Depletion of interconnected surface waters**. Nothing in the groundwater quality minimum thresholds promotes additional pumping or lower groundwater elevations in areas where interconnected surface waters may exist. Therefore, the groundwater quality minimum thresholds will not result in a significant or unreasonable depletion of interconnected surface waters.

8.7.2.5 Effect of Minimum Thresholds on Neighboring Basins

The anticipated effect of the degraded groundwater quality minimum thresholds on each of the two neighboring subbasins is addressed below.

Upper Valley Subbasin of the Salinas Valley Basin. The Upper Valley Subbasin is hydrogeologically down gradient of the Paso Robles Subbasin, thus groundwater generally flows from the Paso Robles Subbasin into the Upper Valley Subbasin. Poor groundwater quality in the Paso Robles Subbasin could flow into the Upper Valley Subbasin, affecting the ability to achieve sustainability in that Subbasin. The degraded groundwater quality minimum threshold is set to prevent unreasonable movement of poor-quality groundwater that could impact overall beneficial uses of groundwater. Therefore, it is unlikely that the groundwater quality minimum thresholds established for the Paso Robles Subbasin will prevent the Upper Valley Subbasin from achieving sustainability.

Atascadero Subbasin. Groundwater generally flows from the Atascadero Subbasin into the Paso Robles Subbasin. Therefore, poor quality groundwater in the Paso Robles Subbasin is not expected flow into the Atascadero Subbasin in the future, thus the Paso Robles Subbasin groundwater quality minimum thresholds will not likely prevent the Atascadero Subbasin from achieving sustainability.

8.7.2.6 Effect on Beneficial Uses and Users

Agricultural land uses and users. The degraded groundwater quality minimum thresholds generally benefit the agricultural water users in the Subbasin. For example, limiting the number of additional agricultural supply wells that could exceed constituent of concern concentrations that could reduce crop production ensures that a supply of usable groundwater will exist for beneficial agricultural use.

Urban land uses and users. The degraded groundwater quality minimum thresholds generally benefit the urban water users in the Subbasin. Limiting the number of additional wells where constituents of concern could exceed primary or secondary MCLs ensures an adequate supply of groundwater for municipal use.

Domestic land uses and users. The degraded groundwater quality minimum thresholds generally benefit the domestic water users in the Subbasin.

Ecological land uses and users. Although the groundwater quality minimum thresholds do not directly benefit ecological uses, it can be inferred that the degraded groundwater quality minimum thresholds generally benefit the ecological water uses in the Subbasin. Preventing constituents of concern from migrating will prevent unwanted contaminants from impacting ecological groundwater supply.

8.7.2.7 Relation to State, Federal, or Local Standards

The degraded groundwater quality minimum thresholds specifically incorporate federal and state drinking water standards.

8.7.2.8 Method for Quantitative Measurement of Minimum Thresholds

Degraded groundwater quality minimum thresholds will be directly measured from existing or new municipal or agricultural supply wells. Groundwater quality will initially be measured using existing monitoring programs.

- Exceedances of primary or secondary MCLs will be monitored by reviewing annual water quality reports submitted to the California Division of Drinking water by municipalities and small water systems.
- Exceedances of crop production minimum thresholds will be monitored as part of the ILRP as presented in Chapter 7.

8.7.3 Measurable Objectives

Groundwater quality should not be degraded due to actions taken under this GSP and, therefore, the measurable objectives were set to the number of exceedances present in 2017.

8.7.3.1 Paso Robles Formation Aquifer

Based on the existing monitoring network, the measurable objectives for degraded groundwater quality in the Paso Robles Formation Aquifer are shown in Table 8-8.

Table 8-8. Measurable Objectives for Degraded Groundwater Quality in Paso Robles Formation Aquifer Supply Wells Under the Current Monitoring Network

Constituent of Concern	Number of Existing Supply Wells in Monitoring Network	Measurable Objective Based on Existing Monitoring Network	Percentage of Wells with Exceedances
Agricultural Wells			
Chloride	28	3	14%
Boron	28	9	36%
Municipal Wells			
Total Dissolved Solids	34	10	35%
Chloride	34	1	6%
Sulfate	34	1	6%
Nitrate	34	1	6%
Gross Alpha Radiation	32	0	0%

8.7.3.2 Alluvial Aquifer

Based on the existing monitoring network, the measurable objectives for degraded groundwater quality in the Paso Robles Formation Aquifer are shown in Table 8-9.

Table 8-9. Measurable Objectives for Degraded Groundwater Quality in Alluvial Aquifer Supply Wells Under the Current Monitoring Network

Constituent of Concern	Number of Existing Supply Wells in Monitoring Network	Measurable Objective Based on Existing Monitoring Network	Percentage of Wells with Exceedances
Public Supply Wells			
Total Dissolved Solids	8	4	63%
Chloride	8	2	38%
Sulfate	8	2	38%
Nitrate	9	0	0%
Gross Alpha Radiation	7	0	0%

8.7.3.3 Method for Setting Measurable Objectives

Because improving groundwater quality is not a goal under SGMA, and protecting it is important to the beneficial users and uses of the resource, the measurable objectives were set to the number of exceedances present in 2017 (as identified in Tables 8-7 and 8-8).

8.7.3.4 Interim Milestones

Interim milestones show how the GSAs anticipate moving from current conditions to meeting the measurable objectives. For water quality, measurable objectives are set at the current number of water quality exceedances. Interim milestones are set for each five-year interval following GSP adoption.

The interim milestones for degraded groundwater quality were set at the measurable objectives for 5, 10 and 15 years after GSP adoption. The interim milestones for the constituents in the Paso Robles Formation Aquifer are shown in Table 8-10.

Table 8-10. Interim Milestone Groundwater Quality Exceedances in Paso Robles Formation Aquifer Supply Wells Under the Current Monitoring Network

Constituent of Concern	Five Year Number of Groundwater Quality Exceedances	Ten Year Number of Groundwater Quality Exceedances	Fifteen Year Number of Groundwater Quality Exceedances
Agricultural Supply Wells			
Chloride	3	3	3
Boron	9	9	9

Public supply wells			
Total Dissolved Solids	10	10	10
Chloride	1	1	1
Sulfate	1	1	1
Nitrate	1	1	1
Gross Alpha Radiation	0	0	0

The interim milestones for the constituents in the Alluvial Aquifer are shown in Table 8-11.

Table 8-11. Interim Milestone Groundwater Quality Exceedances in Alluvial Aquifer Supply Wells Under the Current Monitoring Network

Constituent of Concern	5-Year Number of Groundwater Quality Exceedances	10-Year Number of Groundwater Quality Exceedances	15-Year Number of Groundwater Quality Exceedances
Public supply wells			
Total Dissolved Solids	4	4	4
Chloride	2	2	2
Sulfate	2	2	2
Nitrate	0	0	0
Gross Alpha Radiation	0	0	0

8.7.4 Undesirable Results

8.7.4.1 Criteria for Defining Undesirable Results

By SGMA regulations, the degraded groundwater quality undesirable result is a quantitative combination of groundwater quality minimum threshold exceedances. For the Subbasin, groundwater quality degradation is unacceptable only as a direct result of actions taken as part of GSP implementation. Therefore, the degraded groundwater quality undesirable result is:

On average during any one year, no groundwater quality minimum threshold shall be exceeded in any aquifer as a direct result of projects or management actions taken as part of GSP implementation.

8.7.4.2 Potential Causes of Undesirable Results

Conditions that may lead to an undesirable result include the following:

- **Required Changes to Subbasin Pumping**. If the location and rates of groundwater pumping change as a result of projects implemented under the GSP, these changes could cause movement of one of the constituents of concern towards a supply well at concentrations that exceed relevant water quality standards.
- **Groundwater Recharge**. Active recharge with imported water or captured runoff could cause movement of one of the constituents of concern towards a supply well in concentrations that exceed relevant water quality standards.
- **Recharge of Poor-Quality Water**. Recharging the Subbasin with water that exceeds a primary or secondary MCL or concentration that reduces crop production could lead to an undesirable result.

8.7.4.3 Effects on Beneficial Users and Land Use

The practical effect of the degraded groundwater quality undesirable result is that it deters any significant changes to groundwater quality. Therefore, the undesirable result will not impact the use of groundwater and will not have a negative effect on the beneficial users and uses of groundwater.

8.8 Land Subsidence Sustainable Management Criteria

8.8.1 Locally Defined Significant and Unreasonable Conditions

Locally defined significant and unreasonable conditions for land subsidence were assessed based on public meetings and discussions with GSA staff. Significant and unreasonable rates of land subsidence in the Subbasin are those that lead to a permanent subsidence of land surface elevations that impact infrastructure. For clarity, this Sustainable Management Criterion adopts two related concepts:

- **Land Subsidence** is a gradual settling of the land surface caused by, among other processes, compaction of subsurface materials due to lowering of groundwater elevations from groundwater pumping. Land subsidence from dewatering subsurface clay layers can be an inelastic process, and the potential decline in land surface could be permanent.
- **Land Surface Fluctuation** is the periodic or annual measurement of the ground surface elevation. Land surface may rise or fall in any one year. Declining land surface fluctuation may or may not indicate long-term permanent subsidence.

Currently, InSAR data provided by DWR shows that meaningful land subsidence did not occur during the period between June 2015 and June 2018 in the Paso Robles Subbasin.

8.8.2 Minimum Thresholds

Section 354.28(c)(5) of the SGMA regulations states that "*The minimum threshold for land subsidence shall be the rate and extent of subsidence that substantially interferes with surface land uses and may lead to undesirable results.*"

Based on an analysis of potential errors in the InSAR data, as discussed in the following section, the subsidence minimum threshold is:

The InSAR measured subsidence between June of one year and June of the subsequent year shall be no more than 0.1 foot in any single year and a cumulative 0.5 foot in any five-year period, resulting in no long-term permanent subsidence.

8.8.2.1 Information Used and Methodology for Establishing Subsidence Minimum Thresholds

Minimum thresholds were established to protect groundwater supply, land uses and property interests from substantial subsidence that may lead to undesirable results. Changes in surface elevation are measured using InSAR data available from DWR. The general minimum threshold is the absence of long-term land subsidence due to pumping in the Subbasin. The InSAR data provided by DWR, however, are subject to measurement error. DWR has stated that, on a statewide level, for the total vertical displacement measurements between June 2015 and June 2018, the errors are as follows (Benjamin Brezing, personal communication):

1. The error between InSAR data and continuous GPS data is 16 mm (0.052 feet) with a 95% confidence level

2. The measurement accuracy when converting from the raw InSAR data to the maps provided by DWR is 0.048 feet with 95% confidence level.

By simply adding errors 1 and 2, we arrive at a combined error of 0.1 foot. While this is not a robust statistical analysis, it does provide an estimate of the potential error in the InSAR maps provided by DWR. A land surface change of less than 0.1 feet is therefore within the noise of the data, and is equivalent to no subsidence in this GSP.

Additionally, the InSAR data provided by DWR reflects both elastic and inelastic subsidence. While it is difficult to compensate for elastic subsidence, visual inspection of monthly changes in ground elevations suggest that elastic subsidence is largely seasonal. Figure 8-3 shows the ground level changes at a randomly selected point in the area where InSAR data are available. This figure demonstrates the general seasonality of the elastic subsidence. To minimize the influence of elastic subsidence on our assessment of long-term, permanent subsidence, changes in ground level will be measured annually from June of one year to June of the following year.

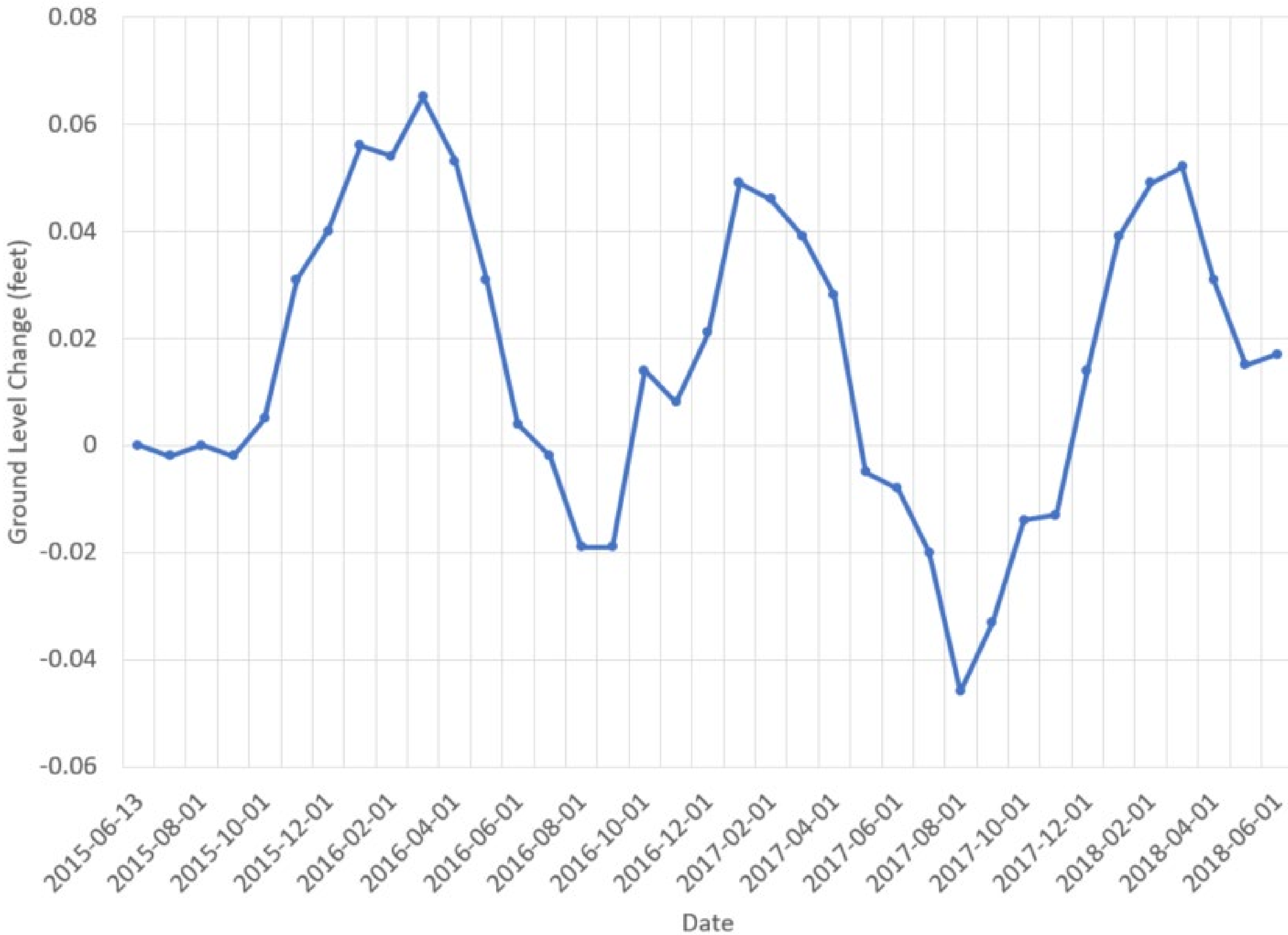


Figure 8-3: Example Seasonal Ground Surface Change

8.8.2.2 Relationship between Individual Minimum Thresholds and Relationship to Other Sustainability Indicators

Subsidence minimum thresholds have little or no impact on other minimum thresholds, as described below.

- **Chronic lowering of groundwater elevations**. Subsidence minimum thresholds will not result in significant or unreasonable groundwater elevations.
- **Change in groundwater storage**. The subsidence minimum thresholds will not change the amount of pumping, and will not result in a significant or unreasonable change in groundwater storage.
- **Seawater intrusion**. This sustainability indicator is not applicable in the Paso Robles Subbasin.
- **Degraded water quality**. The subsidence minimum thresholds will not change the groundwater flow directions or rates, and therefore and will not result in a significant or unreasonable change in groundwater quality.
- **Depletion of interconnected surface waters**. The ground level subsidence minimum thresholds will not change the amount or location of pumping and will not result in a significant or unreasonable depletion of interconnected surface waters.

8.8.2.3 Effect of Minimum Thresholds on Neighboring Basins

The anticipated effect of the subsidence minimum thresholds on each of the two neighboring subbasins is addressed below.

- **Upper Valley Subbasin of the Salinas Valley Basin**. The ground surface subsidence minimum thresholds are set to prevent any long-term subsidence that could harm infrastructure. Therefore, the subsidence minimum thresholds will not prevent the Upper Valley Subbasin from achieving sustainability.
- **Atascadero Subbasin**. The subsidence minimum thresholds are set to prevent any long-term subsidence that could harm infrastructure. Therefore, the subsidence minimum thresholds will not prevent the Atascadero Subbasin from achieving sustainability.

8.8.2.4 Effects on Beneficial Uses and Users

The subsidence minimum thresholds are set to prevent subsidence that could harm infrastructure. Available data indicate that there is currently no subsidence occurring in the Subbasin that affects infrastructure, and reductions in pumping are already required by the reduction in groundwater storage sustainability indicator. Therefore, the subsidence minimum thresholds do not require any additional reductions in pumping and there is no negative impact on any beneficial user.

8.8.2.5 Relation to State, Federal, or Local Standards

There are no federal, state, or local regulations related to subsidence.

8.8.2.6 Method for Quantitative Measurement of Minimum Threshold

Minimum thresholds will be assessed using DWR supplied InSAR data.

8.8.3 Measurable Objectives

The measurable objectives for subsidence represent target subsidence rates in the Subbasin. Long-term ground surface elevation data do not suggest the occurrence of permanent subsidence in the Subbasin. Therefore, the measurable objective for subsidence is maintenance of current ground surface elevations.

8.8.3.1 Method for Setting Measurable Objectives

The measurable objectives are set based on maintaining current conditions and changes are measured by DWR-supplied InSAR data.

8.8.3.2 Interim Milestones

Interim milestones show how the GSAs anticipate moving from current conditions to meeting the measurable objectives. Interim milestones are set for each five-year interval following GSP adoption.

Subsidence measurable objectives are set at current conditions of no long-term subsidence. Therefore, there is no change between current conditions and sustainable conditions. Therefore, the interim milestones are identical to the minimum thresholds and measurable objectives.

8.8.4 Undesirable Results

8.8.4.1 Criteria for Defining Undesirable Results

By regulation, the ground surface subsidence undesirable result is a quantitative combination of subsidence minimum threshold exceedances. For the Subbasin, no long-term subsidence that impacts infrastructure is acceptable. Therefore, the ground surface subsided undesirable result is:

Pumping induced subsidence of greater than 0.1 foot in any single year and a cumulative 0.5 foot in any five-year period could, if left unchecked, substantially interfere with surface land use.

Should potential subsidence be observed, the GSAs will first assess whether the subsidence may be due to elastic processes. If the subsidence is not elastic, the GSAs will undertake a program to correlate the observed subsidence with measured groundwater levels.

8.8.4.2 Potential Causes of Undesirable Results

Conditions that may lead to an undesirable result include a shift in pumping locations, which could lead to a substantial decline in groundwater levels. Shifting a significant amount of pumping and causing groundwater levels to fall in an area that is susceptible to subsidence could trigger subsidence in excess of the minimum thresholds.

8.8.4.3 Effects on Beneficial Users and Land Use

Staying above the minimum threshold will avoid the subsidence undesirable result and protect the beneficial uses and users from impacts to infrastructure and interference with surface land uses.

8.9 Depletion of Interconnected Surface Water SMC

8.9.1 Locally Defined Significant and Unreasonable Conditions

The two manifestations of depletion of interconnected surface water are reduced surface flow in streams and a lowering of the water table next to streams. The potential effects of depletion on beneficial uses of surface water and groundwater in the Subbasin are:

- Reduction in Salinas River outflow that decreases groundwater recharge in the Salinas Valley,
- Reduction in the extent, density, and health of riparian vegetation and animal species that use riparian habitat, and
- Reduction in passage opportunity for steelhead trout.

Each of these issues was considered in setting sustainable management criteria for interconnected surface water. In the case of habitat uses, the basis for the SMCs relies on the quantitative evaluation of groundwater effects on habitat presented in GSP Section 5.5.

8.9.2 Minimum Thresholds

The minimum threshold for interconnected surface water is a decline in the alluvial water table elevation as measured at Alluvial Aquifer RMS wells in the spring measurement round along the Salinas River, middle reach of the Estrella River (from Shedd Canyon to Martingale Circle) or San Juan Creek upstream of Spring Creek that is 1) likely caused by groundwater pumping in the Paso Robles Formation Aquifer, 2) is more than 10 feet below the spring 2017 elevation, 3) persists for more than two consecutive years, and 4) occurs along more than 15 percent of the length of any of the three stream reaches. It is noted that the potential connection along the Salinas River is between the surface water system and the adjacent alluvial deposits. There is no evidence that the Salinas River surface water flows are connected to the underlying Paso Robles Formation Aquifer. The potential connection between the surface water system along the middle reach of the Estrella River (from Shedd Canyon to Martingale Circle) and along San Juan Creek upstream of Spring Creek, and the underlying Paso Robles Formation Aquifer is unknown but sufficient evidence exists that there could potentially be a connection, and therefore further investigation in these areas is recommended.

SGMA regulations specify that the minimum threshold for interconnected surface water shall be defined as “the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results” (Regulations §354.28(c)(6)). However, the regulations also allow the use of groundwater elevations as a reasonable proxy for the rate of flow depletion if such approach is “supported by adequate evidence” (Regulations §354.28(d)). In the Paso Robles Subbasin, depth to water is a reasonable proxy because the resource most likely to be impacted is phreatophytic riparian vegetation, which is sensitive to depth to water but not to the rate of percolation. Also, analysis of potentially impacted beneficial uses that do depend on the rate of stream flow—downstream water users and steelhead trout migration—indicates that the likely magnitude of impact is negligibly small. Finally, from a practical standpoint, induced percolation from streams is difficult to measure, particularly if it is a small percentage of total flow and varies substantially from reach to reach along a stream.

There presently are too few Alluvial Aquifer monitoring wells along the middle reach of the Estrella River and the upper reach of San Juan Creek to evaluate the minimum threshold. For the first five years of GSP implementation, the minimum threshold will be evaluated only for the Salinas River reach. New monitoring wells will be installed along the Estrella River and San Juan Creek during that period (see Section 7.6.1), allowing the minimum threshold to be applied to those reaches in subsequent implementation periods.

8.9.3 Measurable Objectives

Measurable objectives are specific, quantifiable goals for the maintenance or improvement of groundwater conditions. They represent a desirable condition with respect to interconnected surface water. With respect to riparian vegetation, the measurable objective is a five-year moving average of spring groundwater elevations in Alluvial Aquifer wells along the Salinas

River, the middle reach of the Estrella River (from Shedd Canyon to Martingale Circle) and San Juan Creek upstream of Spring Creek that are no more than 5 feet below the spring 2017 groundwater elevations. This objective is expected to maintain the extent and density of riparian vegetation at the 2017 level. It would also maintain Salinas River outflow and steelhead passage opportunity at existing levels, at least as far as they are affected by depletion from groundwater pumping.

There presently are too few Alluvial Aquifer monitoring wells along the middle reach of the Estrella River and the upper reach of San Juan Creek to evaluate the measurable objective. For the first five years of GSP implementation, the measurable objective will be evaluated only for the Salinas River reach. New monitoring wells will be installed along the Estrella River and San Juan Creek during that period (see Section 7.6.1), allowing the measurable objective to be applied to those reaches in subsequent implementation periods.

8.9.4 Relationship of Minimum Threshold to Other Sustainability Indicators

8.9.4.1 Groundwater Elevations

The measurable objective and minimum threshold for interconnected surface water involve groundwater elevations in the Alluvial Aquifer. They do not conflict with the SMCs for Alluvial Aquifer groundwater elevations because those are not yet quantified (see Sections 8.4.3.3 and 8.4.4.2). The interconnected surface water SMCs could potentially be more restrictive than the SMCs for Paso Robles Formation Aquifer groundwater elevations if the latter would allow large declines in water table elevations along protected reaches of riparian vegetation. Specifically, the Paso Robles Formation Aquifer minimum threshold allows for 30 feet of additional water-level decline below the 2017 groundwater elevation.

8.9.4.2 Groundwater Storage

Groundwater storage is inherently connected to groundwater levels. Based on the logic presented above for groundwater elevation SMCs, the interconnected surface water SMCs could potentially constrain temporary or sustained reductions in groundwater storage in some locations that would otherwise be allowed by the groundwater storage minimum threshold, which is defined as groundwater elevations averaged over the entire Subbasin that are above the groundwater elevation minimum threshold (see Section 8.5.2).

8.9.4.3 Subsidence

Subsidence is not related to Alluvial Aquifer water levels because the Alluvial Aquifer is too thin and coarse-grained to experience significant compaction of clay layers due to 10 feet of water-level decline. Subsidence is a function of Paso Robles Formation Aquifer water levels, which are not directly involved in the interconnected surface water SMCs. To the extent that the interconnected surface water SMCs constrain the permissible amount of decline in Paso Robles Formation Aquifer water-levels, they decrease the risk of subsidence.

8.9.4.4 Water Quality

The interconnected surface water SMCs would not affect groundwater gradients and recharge rates, and they would not introduce contaminants or cause changes in aquifer geochemistry. Thus, they would not affect the water quality SMCs.

8.9.5 Effect of SMCs on Neighboring Basins

The mechanism by which the interconnected surface water SMCs could affect the Upper Valley Subbasin in the Salinas Valley (adjacent to and downstream of the Paso Robles Subbasin) would be by decreased groundwater recharge resulting from decreased flow in the Salinas River. However, that effect would be negligibly small (see Section 8.9.7.1 under "Undesirable Results" below).

The interconnected surface water SMCs would not affect groundwater in the Atascadero Subbasin because any changes in Salinas River flow would not propagate upstream to that Subbasin. By maintaining GDEs in the Paso Robles Subbasin in good condition, the SMCs would support the regional maintenance of GDEs, especially animals that move up and down the river and riparian corridors.

8.9.6 Relationship of SMCs to Federal, State and Local Regulations

The only federal, state or local regulation that directly applies to stream flow gains and losses is the "live stream" requirement imposed by the State Water Resources Control Board in the water rights permit for operating Salinas Dam upstream of the Subbasin. However, that requirement reflects a concern that changes in surface flow might impact groundwater availability, not the opposite, which is the concern here.

The state and federal endangered species acts protect animal species listed as threatened or endangered against "take", which is to capture, harm, wound or kill the animal. Harm includes significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. The listed animals that appear to actually be present in the Subbasin and potentially vulnerable to depletion of interconnected surface water are steelhead trout and California red-legged frog. The SMCs for interconnected surface water are designed to sustain populations of GDE animals, including these listed species, at 2017 levels. This would avoid take.

8.9.7 Undesirable Results

Undesirable results are adverse effects on beneficial users and uses of water that reach a magnitude considered significant and unreasonable. This section defines undesirable results for surface water users, riparian vegetation and fish passage. Generally, undesirable results are defined in terms of the percent of all interconnected surface water reaches that exceed the minimum threshold.

8.9.7.1 Surface Water Users

Decreased groundwater discharge to the Salinas River would be significant and unreasonable if it prevented groundwater users in the Salinas Valley—where groundwater is primarily recharged by Salinas River percolation—from continuing their existing, economically viable agricultural or urban uses of land. This is not expected to occur because of the combined effects of the groundwater storage and interconnected surface water SMCs. A decrease in groundwater storage would be associated with lower groundwater elevations and decreased groundwater discharge to the Salinas River. The groundwater storage SMC allows for a reduction in storage to an amount associated with Paso Robles Formation Aquifer groundwater elevations 30 feet below 2017 groundwater elevations but does not allow further declines beyond that. Annual water budgets for 1981-2011 produced by the groundwater model show that groundwater discharge to the Salinas River is dominated by contributing flows from the alluvial deposits and clearly correlated with year type (it increases in wet years) but is not obviously correlated with changes in pumping and storage from the Paso Robles Formation Aquifer (see Figure 6-3), which are strongly correlated with each other (Figure 5-12). Average annual groundwater discharge to streams (7,400 AFY) equals about 1.5 percent of annual groundwater pumping downstream in the Salinas Valley. If pumping in the Paso Robles Subbasin were to change, its effect on groundwater discharge to the Salinas River would likely be small, and hence much less than 1.5 percent of downstream water use. This is because the connection along the Salinas River is between the surface water system and the adjacent alluvial deposits. There is no evidence that the Salinas River surface water flows are connected to the underlying Paso Robles Formation Aquifers. Furthermore, to achieve the groundwater level management objective it will be necessary to balance the Subbasin water budget, which means that groundwater pumping will not cause increased depletion of stream flow in the future. As stated in Section 6.5.1 "An overarching assumption is that any future increases in groundwater use within the Subbasin will be offset by equal reductions in groundwater use in other parts of the Subbasin, or in other words, groundwater use will remain neutral through implementation of the GSP." In any event, the interconnected surface water minimum threshold would tend to restrict rather than increase the amount of future storage depletion and thus be more protective of Salinas River outflow and downstream users.

8.9.7.2 Groundwater Dependent Vegetation

The qualitative undesirable result for riparian vegetation is mortality. The minimum threshold definition for interconnected surface water specifies a quantitative depth and duration of low water table conditions that are considered likely to cause riparian tree stress and potential mortality, based on observed limited mortality patterns during 2013 to 2017[1].

An exceedance of the minimum threshold at a single location would not necessarily be undesirable if riparian vegetation in other parts of the Subbasin remained in good condition. Regional ecological function would continue, and the locally impacted area would likely recover when the water table rises back to more normal elevations above the minimum threshold. However, widespread exceedance of the minimum threshold could impair regional ecological function and retard the recovery process. Accordingly, an undesirable result is when water levels along more than 15 percent of the length of any of the three stream reaches with abundant riparian vegetation exceed the minimum threshold (defined in Section 8.9.3) as a result of groundwater pumping in the Paso Robles Formation Aquifer. The three reaches are the Salinas River from Paso Robles to the Subbasin boundary below San Miguel, the middle reach of the Estrella River (Shedd Canyon to Martingale Circle), and San Juan Creek upstream of Spring Creek.

8.9.7.3 Groundwater Dependent Animals

Animals that depend on riparian vegetation are assumed to suffer population declines if the extent of riparian vegetation decreases and thus are implicitly covered by the SMCs and undesirable results for vegetation. The undesirable result for steelhead trout—which uses surface flow in the Salinas River for migration—is a long-term decrease in population as a result of flow depletion caused by groundwater pumping. As explained in section 5.5.10, groundwater pumping has little effect on passage opportunity. Because the SMCs for groundwater levels and storage preclude ongoing future increases in pumping or decreases in groundwater levels, undesirable results with respect to steelhead passage are not expected to occur.

8.10 Management Areas

Management areas have not been established in the Subbasin. For planning purposes, the concepts for future management areas are provided below.

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[1] Results of a riparian vegetation EVI trend analysis indicate that riparian vegetation health has generally remained stable over the long term from January 2009 through present (see Section 5.5.3).

8.10.1 Future Management Area Concept

Management areas may be developed in the future based on the existence of a geologic and geographic divide in the Subbasin. The Subbasin is dominated by two main watersheds and many smaller watersheds that drain into and recharge the Subbasin. The western portion of the Subbasin is fed by the Salinas watershed, including the Huer Huero watershed. The eastern portion of the Subbasin is fed by the Estrella River watershed, including Cholame Creek and San Juan Creek watersheds. These two watersheds have different geologic and climatic conditions. Both watersheds drain to the confluence of the Estrella and Salinas Rivers near San Miguel in the northern end of the Subbasin. A distinct geologic ridge divides the Huer Huero portion of the Salinas River watershed from the Shed Canyon portion of the Estrella River watershed. This uplifted ridge bisects the Subbasin and the Estrella River cuts through this ridge near Whitley Gardens. The Subbasin may be divided into western and eastern management areas along the uplifted ridge in the future.

The nature of this divide and the underlying geology within the Subbasin needs to be better understood before the GSAs can delineate and justify any management area. The GSAs will initiate and support electromagnetic resonance surveys to help delineate local geology. Reports from well owners throughout the Subbasin suggest that some areas of the Subbasin are distinctly isolated from neighboring areas. Analysis of static groundwater levels from as many wells as possible will help to define areas where groundwater conditions appear to be hydrologically connected and areas where these conditions seem to be hydrologically isolated. This will help form the basis of defining the management area. This effort will also assist in defining where future monitoring wells should be located. The GSAs in the proposed management areas may undertake distinct management approaches which would be appropriately designed to protect the local groundwater resource without adversely impacting other areas of the Subbasin or neighboring Subbasins.

Each area of the Subbasin will be managed in conjunction with all other areas using the same set of undesirable results and minimum thresholds, tied to specific RMSs as described in this chapter. The Subbasin wide monitoring networks will be used to assure compliance with the GSP. Using management areas to assure long-term sustainability protects all beneficial uses and users in all parts of the Subbasin.

8.10.2 Minimum Thresholds and Measurable Objectives

The minimum thresholds that will be established in potential management areas will use the same process and criteria described above in this chapter. The minimum thresholds and measurable objectives will be developed to ensure groundwater levels remain above historical water levels in each management area, and to maintain historical groundwater flow conditions to downstream portions of the Subbasin and other downstream basins. By managing groundwater sustainably in each management area, the groundwater resource remains available for beneficial uses and users. Groundwater quality will not be degraded due to poor quality water moving into productive aquifers.

8.10.3 Monitoring

Because of the large size and distinctly separate drainages of the watersheds draining into each of management area, there is a need for a robust network of monitoring wells that provide data representative of specific portions of each management area. Initially, existing wells with known depths and known perforated intervals will be selected and used. Where needed, dedicated new monitoring wells may be added to improve the monitoring network.

8.10.4 How Management Areas Will Avoid Undesirable Results

The undesirable results described in the sections above are applicable in any management area that may be established in the future. As long as minimum thresholds are avoided and measurable objectives continue to be met within each management area, beneficial uses and users of the groundwater resource will be assured of continued access to a sustainable groundwater resource. The projects and management actions in each management area will be proportional to the need to avoid undesirable results.

8.10.5 Management

The establishment and implementation of Management Areas would follow the agreement among the four GSAs (see GSP Chapter 12).

9 MANAGEMENT ACTIONS AND PROJECTS

9.1 Introduction

The GSAs agree herein to work together in protecting the groundwater resource and in complying with SGMA, and further agree that this GSP makes no determination of water rights. GSP management actions undertaken to achieve sustainability under SGMA shall not result in or be construed as a forfeiture of or limitation on groundwater rights under common law.

This chapter describes the management actions that will be developed and implemented in the Subbasin to attain sustainability in accordance with §354.42 and §354.44 of the SGMA regulations. Management actions described herein are non-structural programs or policies that are intended to reduce or optimize local groundwater use. Consistent with SGMA regulations §354.44, this chapter also describes projects in process and conceptual projects involving new or improved infrastructure to make new water supplies available to the Subbasin that may be implemented by willing project participants to offset pumping and lessen the degree to which the management actions would be needed. The concept projects referenced are based on previous publicly vetted feasibility studies[2]. The need for management actions (and projects if implemented) is based on the following Subbasin conditions that were described in previous chapters.

- Groundwater levels are declining in many parts of the Subbasin, indicating that the amount of groundwater pumping is more than the natural recharge (Chapter 5)
- Water budgets (Chapter 6) indicate that amount of groundwater in storage will continue to decline in the future at an estimated rate of nearly 14,000 acre-feet per year (AFY), which assumes no net increase in pumping demand on the basin. If there is a net increase in demand due to e.g., the development of currently undeveloped properties in a way that requires the use of additional groundwater, the deficit would be greater.

To stop persistent declines in groundwater levels, achieve the sustainability goal before 2040, and avoid undesirable results as required by SMGA regulations, reducing groundwater pumping will be needed. Reductions in pumping will be required in amounts and locations which will prevent groundwater level declines that would result in undesirable results. A reduction in groundwater pumping will occur as a result of management actions, except where a new water supply becomes available and is used in lieu of pumping groundwater.

[2] Paso Robles Groundwater Basin Supplemental Supply Options Feasibility Study, January 2017

SGMA regulations §354.44 require that each management action and conceptual project described in the GSP include a discussion about:

- Relevant measurable objectives it would address
- The expected benefits of the action
- The circumstances under which management actions or projects will be implemented
- How the public will be noticed
- Relevant regulatory and permitting considerations
- Implementation schedules
- Legal authority required to take the actions
- Estimated costs

The groundwater management actions are intended to stabilize groundwater elevations, avoid undesirable results, and address all other sustainability indicators described in Chapter 8. Management actions to directly reduce groundwater pumping will be implemented where necessary. If groundwater levels are stabilized and/or sustained, many of the associated undesirable results described in Chapter 8 will be avoided.

The management actions (and projects if implemented) identified in this GSP will achieve groundwater sustainability by avoiding Subbasin-specific undesirable results.

***De Minimis* Groundwater Users**

While the number of *de minimis* groundwater users in the basin is significant, they are not currently regulated under this GSP. Growth of *de minimis* groundwater extractors could warrant regulated use in this GSP in the future. Growth will be monitored and reevaluated periodically.

9.2 Implementation Approach and Criteria for Management Actions

Using authorities outlined in Sections 10725 to 10726.9 of the California Water Code, the GSAs would ensure the maximum degree of local control and flexibility consistent with this GSP to commence management actions. Because the amount of groundwater pumping in the Subbasin is more than the estimated sustainable yield of about 61,000 AFY (see Chapter 6 and Appendix E)[3] and groundwater levels are persistently declining in certain areas, the GSAs

[3] Chapter 6 and Appendix E describe the process used to estimate sustainable yield. Sustainable yield is estimated based on the groundwater budget. The updated GSP model was used to develop the water budget and sustainable yield. Appendix E provides information on why the estimate of sustainable yield in the GSP differs from previous estimates.

will begin to implement management actions as early as possible after GSP adoption. The effect of the management actions will be reviewed annually, and additional management actions will be implemented as necessary to avoid undesirable results. Management actions fall into two categories, basin-wide and area specific, as described in more detail in the subsequent sections. Appendix L describes other programs that individual GSAs, pumpers and/or other entities may choose to fund and implement if they have the authority to do so.

In general, basin-wide management actions will apply to all Subbasin areas and reflect basic GSP implementation requirements such as monitoring, reporting and outreach, including necessary studies and early planning work, monitoring and filling data gaps with additional monitoring sites, annual reports and GSP updates, and promoting voluntary limitations in groundwater pumping aimed at both keeping groundwater levels stable and avoiding undesirable results.

Area specific management actions will also be implemented in areas experiencing persistent declines after the development of an appropriate regulation. Because developing and adopting the regulation will require substantial negotiations between the GSAs, public hearings, environmental review (CEQA) and legal risks that need to be addressed, efforts to define and gain approvals for the scope and detail associated with a regulation for area specific management actions will begin soon after GSP adoption. There is a strong need for adequate information to justify area specific management actions and considering that information will be a critical part of initial GSP implementation. Regulations adopted by GSAs related to identifying the specific areas for pumping limitations would need to be substantially identical to assure a consistent methodology for identifying those areas across the Subbasin. Individual pumpers in those areas will then need to choose how to comply with the necessary pumping limitations in those areas.

Figure 9-1 shows a flowchart of the conceptual GSP implementation approach. Public meetings and hearings will be held during the process of determining when and where in the Subbasin management actions are needed. A proportional and equitable approach to funding implementation of the GSP and any optional actions will be developed in accordance with all State laws and applicable public process requirements. During these meetings and hearings, input from the public, interested stakeholders, and groundwater pumpers will be considered and incorporated into the decision-making process.

At a time in the future when the effects of management actions have stabilized groundwater levels, the GSAs will reassess the need for continuing these actions. At a minimum, the reassessment process would be done as part of the 5-year review and report to the regulatory agencies.

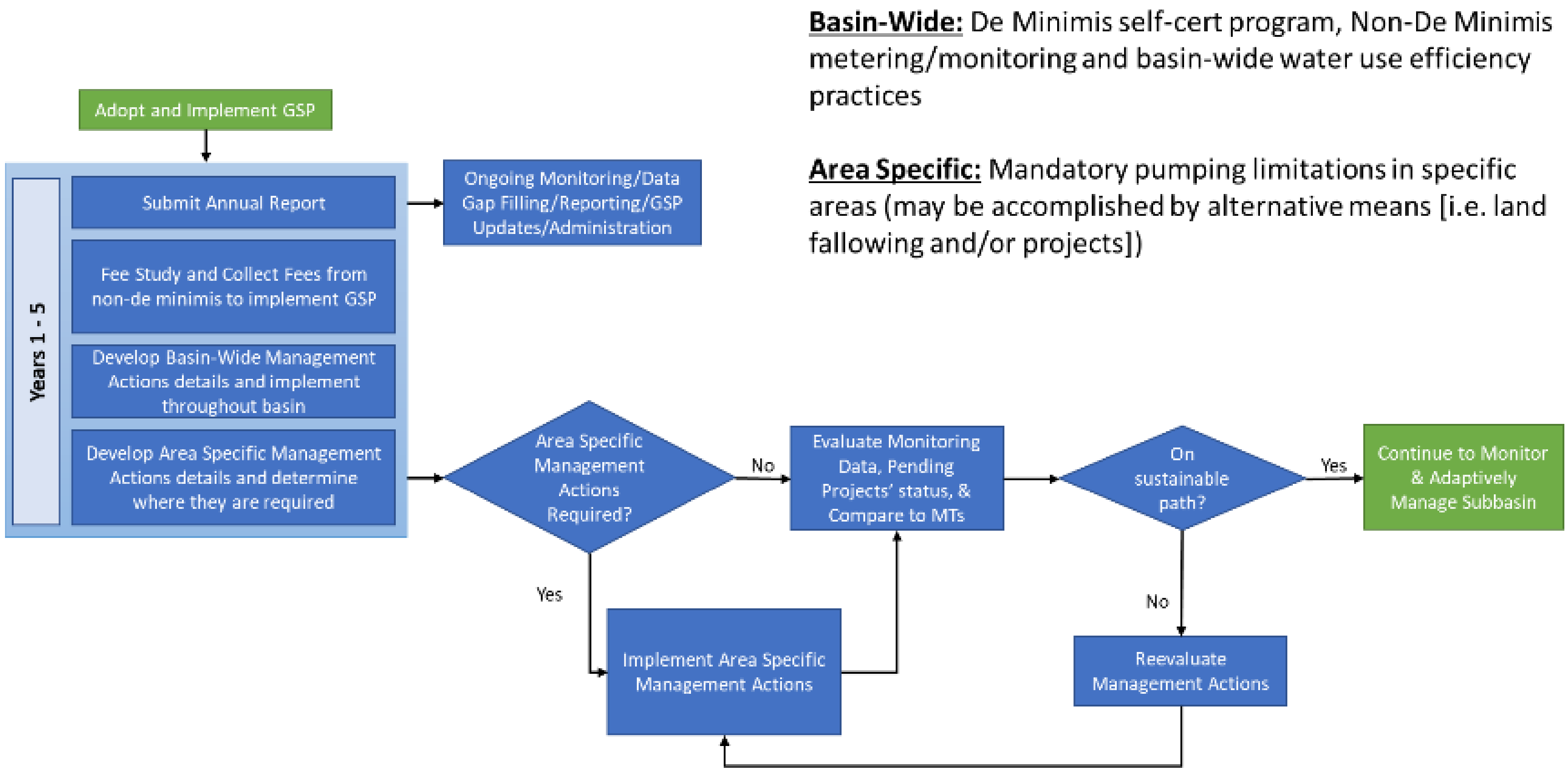


Figure 9-1: Conceptual Implementation Approach for Management Actions and Projects

9.3 Basin-Wide Management Actions

The following subsections outline the various basin-wide management actions. Basin-wide management actions will be implemented using input from stakeholders and in a data-driven process.

Basin-wide management actions include:

- Monitoring, reporting and outreach
- Promoting best water use practices
- Promoting stormwater capture
- Promoting voluntary fallowing of irrigated crop land

Sections required by SGMA regulations §354.44 follow the description of each management action below. Grant funding has been procured though the SGMA Round 1 Implementation Grant for implementation of the management actions listed above. Each management action was scored and ranked using a set of scoring criteria. The scores of individual management actions, as well as management action descriptions and justifications are included as a table in Appendix O.

9.3.1 Monitoring, Reporting and Outreach

Monitoring, reporting and outreach reflects the core functions that the GSAs need to provide to comply with SGMA regulations. The GSAs will direct the monitoring programs outlined in Chapter 7 to track Subbasin conditions related to the five applicable sustainability indicators. Data from the monitoring programs will be routinely evaluated to ensure progress is being made toward sustainability or to identify whether undesirable results are occurring. Data will be maintained in the Data Management System (DMS). Data from the monitoring program will be used by the GSAs to guide decisions on management actions and to prepare annual reports to Subbasin stakeholders and DWR and by individual entities to guide decisions on projects. SGMA regulations require that the reports comply with DWR forms and submittal requirements that will be published by DWR, and that all transmittals are signed by an authorized party. Data will be organized and available to the public to document Subbasin conditions relative to Sustainability Management Criteria (Chapter 8).

9.3.1.1 *De Minimis* Self Certification

A system for *de minimis* basin extractors to self-certify that they extract, for domestic purposes, two acre-feet or less per year will be developed in order to differentiate extractors for the purposes of implementing the GSP.

9.3.1.2 Non-*De* Minimis Metering and Reporting Program

This GSP calls for a program that will require all non-*de minimis* extractors to report extractions annually and use a water-measuring method satisfactory to the GSAs in accordance with Water Code Section 10725.8. It is anticipated that the GSAs will develop and adopt a regulation to implement this program, which is expected to include a system for reporting and accounting for land fallowing, stormwater capture projects, or other activities that individual pumpers implement. The information collected will be used to account for pumping that would have otherwise occurred, for analyzing projected Subbasin conditions and completing annual reports and five-year GSP assessment reports.

9.3.1.3 Annual Reports (SGMA Regulation §356.2)

Annual reports will be submitted to DWR starting on April 1, 2020. The purpose of the report is to provide monitoring and total groundwater use data to DWR, compare monitoring data to the sustainable management criteria, to report on management actions and projects implemented to achieve sustainability, and to promote best water use practices, stormwater capture and voluntary irrigated land fallowing. Annual reports will be available to Subbasin stakeholders.

9.3.1.4 5-Year GSP Updates and Amendments (SGMA Regulation §356.2)

In accordance with SGMA regulatory requirements (§356.4), five-year GSP assessment reports will be provided to DWR starting in 2025. The GSAs shall evaluate the GSP at least every five years to assess whether it is achieving the sustainability goal in the Subbasin. The assessment will include a description of significant new information that has been made available since GSP adoption or amendment and whether the new information or understanding warrants changes to any aspect of the plan.

Although not required by SGMA regulations, the GSAs anticipate that an amendment to the GSP will be prepared within the first five years to integrate new information. Updates may include incorporating additional monitoring data, updating the sustainable management criteria, documenting any projects that are being implemented and facilitating adaptive management of management actions.

9.3.1.5 Data Gaps

SGMA regulations require identification of data gaps and a plan for filling them (§ 354.38). Monitoring data will be collected and reported for each of the five sustainability indicators that are relevant to the Subbasin: chronic lowering of groundwater levels, reduction in groundwater storage, degraded water quality, land subsidence, and depletion of interconnected surface water. As noted in Chapter 7, the approach for establishing the monitoring networks was to leverage existing monitoring programs and, where data gaps existed, incorporate additional monitoring locations that have been made available by cooperating entities or that have been established by the GSAs. Appendix L identifies the plan for addressing data gaps in each monitoring network and the computer model of the Subbasin.

9.3.1.6 Relevant Measurable Objectives

Monitoring, Reporting, and Outreach would help achieve measurable objectives by keeping basin users informed about Subbasin conditions and the need to avoid undesirable results.

9.3.1.7 Expected Benefits and Evaluation of Benefits

The primary benefit from Monitoring, Reporting and Outreach is increasing hydrogeologic understanding of basin conditions and how management affects those conditions. Outreach, public education and associated changes in behavior improve the chances of achieving sustainability. Because it is unknown how much behavior will change as a result of Monitoring, Reporting and Outreach, it is difficult to quantify the expected benefits at this time.

Reductions in groundwater pumping will be measured directly through the metering and reporting program and recorded in the Data Management System (DMS). Changes in groundwater elevation will be measured with the groundwater level monitoring program. Subsidence will be measured using InSAR data. Changes in groundwater storage will be estimated using changes in groundwater levels (via proxy). Information about the monitoring programs is provided in Chapter 7. Isolating the effect of Monitoring, Reporting and Outreach on groundwater levels will be challenging because they are only one of several management actions that may be implemented concurrently in the Subbasin.

9.3.1.8 Circumstances for Implementation

Monitoring, Reporting and Outreach will begin upon adoption of the GSP. No other triggers are necessary or required.

9.3.1.9 Public Noticing

Public meetings will be held to inform the groundwater pumpers and other stakeholders about Subbasin conditions and the need for behavior changes. Groundwater pumpers and interested stakeholders will have the opportunity at these meetings to provide input and comments on how the Monitoring, Reporting and Outreach are being implemented in the Subbasin. Information on Monitoring, Reporting and Outreach will also be provided through annual GSP reports and links to relevant information on GSA websites.

9.3.1.10 Permitting and Regulatory Process

It is anticipated that the GSAs will adopt a regulation governing the metering and reporting program.

9.3.1.11 Implementation Schedule

Monitoring, Reporting and Outreach efforts will begin upon GSP adoption.

9.3.1.12 Legal Authority

The legal authority to conduct Monitoring, Reporting and Outreach is included in SGMA. For example, Water Code § 10725.8 authorizes GSAs to require through their GSPs that the use of every groundwater extraction facility (except those operated by *de minimis* extractors) be measured.

9.3.1.13 Estimated Cost

The total estimated cost for Monitoring, Reporting, and Outreach is $1,150,000.

9.3.2 Promoting Best Water Use Practices

This GSP calls for the GSAs to encourage pumpers to implement the most effective water use efficiency methods applicable, often referred to as Best Management Practices (BMPs). It is anticipated that industry leaders would facilitate workshops or other programs designed to communicate what the latest best water use practices are for their industry. Effective BMPs could result in:

- Efficient irrigation practices.
- A better accounting of annual precipitation and its contribution to soil moisture in all irrigation decisions and delay commencing irrigation until soil moisture levels require replenishment.
- Optimization of irrigation needs for frost control if sprinklers are used.
- More optimal irrigation practices by monitoring crop water use with soil and plant monitoring devices and tie monitoring data to evapotranspiration (ET) estimates.
- Conversion from high water demand crops to lower water demand crops.

Many growers already use BMPs, but improvements can be made. A goal of promoting BMPs is to broaden their use to more growers in the Subbasin. *De minimis* groundwater users will be encouraged to use BMPs as well. Promoting BMPs will include broad outreach to groundwater pumpers in the Subbasin to emphasize the importance of utilizing BMPs and understanding their positive benefits for mitigating declining groundwater levels and forestalling mandated limitations in groundwater extraction on their property.

9.3.2.1 Relevant Measurable Objectives

BMPs would help achieve the groundwater elevation, groundwater storage, and land subsidence measurable objectives.

9.3.2.2 Expected Benefits and Evaluation of Benefits

The primary benefit from initiating BMPs is mitigating the decline, or raising, groundwater elevations. An ancillary benefit from stable or rising groundwater levels may include avoiding pumping induced subsidence. Because it is unknown how much pumping will be reduced from promoting BMPs, it is difficult to quantify the expected benefits at this time.

Reductions in groundwater pumping will be measured directly through the metering and reporting program and recorded in the Data Management System (DMS). Changes in groundwater elevation will be measured with the groundwater level monitoring program. Subsidence will be measured with the InSAR network. Changes in groundwater storage will be estimated using the groundwater level proxy. Information about the monitoring programs is provided in Chapter 7. Isolating the effect of BMPs on groundwater levels will be challenging because they are only one of several management actions that may be implemented concurrently in the Subbasin.

9.3.2.3 Circumstances for Implementation

BMPs and related outreach will be promoted soon after adoption of the GSP. No other triggers are necessary or required.

9.3.2.4 Public Noticing

Public meetings will be held to inform the groundwater pumpers and other stakeholders about Subbasin conditions and the need for BMPs. Groundwater pumpers and interested stakeholders will have the opportunity at these meetings to provide input and comments on how the BMPs are being implemented in the Subbasin. The BMPs will also be promoted through annual GSP reports and links to relevant information on GSA websites.

9.3.2.5 Permitting and Regulatory Process

No permitting or regulatory process is needed for promoting BMPs.

9.3.2.6 Implementation Schedule

The GSAs envision that BMPs will be promoted within a year of GSP adoption.

9.3.2.7 Legal Authority

No legal authority is needed to promote BMPs.

9.3.2.8 Estimated Cost

The estimated cost for promoting BMPs and understanding the extent to which they are being implemented in the Subbasin is included in the cost of the metering and reporting program and developing annual reports.

9.3.3 Promote Stormwater Capture

Stormwater and dry weather runoff capture projects, including Low Impact Development (LID) standards for new or retrofitted construction, will be promoted as priority projects to be implemented as described in the San Luis Obispo County Stormwater Resource Plan (SWRP). The SWRP outlines an implementation strategy to ensure valuable, high-priority projects with multiple benefits. While the benefits are not easily quantified, the State is very supportive of such efforts. Stormwater capture projects in several areas of the Basin, including reaches of the Huer Huero, San Juan and Estrella drainages are likely to be pursued.

This management action covers two types of stormwater capture activities. The first stormwater capture activity involves retaining and recharging onsite runoff. Examples of this type of activity include LID and on-farm recharge of local runoff. The second stormwater capture activity involves recharge of unallocated storm flows. These actions require temporary diversions of storm flows from streams, and transport of those flows to recharge locations. State programs and grants (e.g., FLOOD-MAR, Proposition 68) and local entities (e.g., Resource Conservation Districts) can be utilized as resources to move forward on stormwater capture and percolation efforts.

9.3.3.1 Relevant Measurable Objectives

Stormwater capture would benefit the groundwater elevation, groundwater storage, and land subsidence measurable objectives.

9.3.3.2 Expected Benefits and Evaluation of Benefits

The primary benefit from promoting stormwater capture is to mitigate the decline of, or possibly raise, groundwater elevations through additional recharge. An ancillary benefit from stable or rising groundwater elevations may include avoiding pumping induced subsidence. Because the amount of recharge that could be accomplished from the program is unknown at this time, it is difficult to quantify the expected benefits.

Changes in groundwater elevation will be measured with the groundwater level monitoring program. Subsidence will be measured with the InSAR network. Changes in groundwater storage will be estimated using the groundwater level proxy. Information about the monitoring programs is provided in Chapter 7. Isolating the effect of the stormwater capture on groundwater levels will be challenging because it will be only one of several management actions that may be implemented concurrently in the Subbasin.

9.3.3.3 Circumstances for Implementation

Stormwater capture will be promoted as soon as possible after adoption of the GSP.

9.3.3.4 Public Noticing

Public meetings will be held to inform the groundwater pumpers and other stakeholders about Subbasin conditions and the need for stormwater capture. Groundwater pumpers and interested stakeholders will have the opportunity at these meetings to provide input and comments on how stormwater capture projects are being implemented in the Subbasin. Stormwater capture will also be promoted through annual GSP reports and links to relevant information on GSA websites.

9.3.3.5 Permitting and Regulatory Process

Recharge of stormwater by retaining and recharging onsite runoff does not require permits. Recharge of unallocated storm flows is currently subject to the SWRCB's existing temporary permit for groundwater recharge program. The SWRCB is currently developing five-year permits for capturing high flow events. Recharge of unallocated storm flows will be subject to the terms of these five-year permits if and when they are enacted. Stormwater capture may also be subject to CEQA permitting. A regulation will need to be adopted by the GSAs to account for projects that recharge unallocated storm flows as a part of the metering and reporting program. Regulations are subject to CEQA.

9.3.3.6 Implementation Schedule

The GSAs envision that stormwater capture will be promoted within two years of GSP adoption.

9.3.3.7 Legal Authority

Other than acquiring required permits and the right to divert stormwater, there are no other legal authorities required to implement stormwater capture.

9.3.3.8 Estimated Cost

The estimated cost for promoting stormwater capture and understanding the extent to which it is being implemented in the Subbasin is included in the cost of the metering and reporting program and developing annual reports.

9.3.4 Promote Voluntary Fallowing of Agricultural Land

This GSP calls for the GSAs to promote voluntary fallowing of crop land to reduce overall groundwater demand. For example, the GSAs could develop a Subbasin-wide accounting system that tracks landowners who decide to voluntarily fallow their land and cease groundwater pumping or otherwise refrain from using groundwater. If given the opportunity to create a “place holder” for their ability to pump under regulations adopted by the GSAs, some property owners currently irrigating crops or that might want to irrigate in the future may choose to forego the expense of farming and extracting water if those rights can be accounted for and protected. A regulation would need to be adopted by the GSAs for the metering and reporting program, and the program could include provisions related to land fallowing.

9.3.4.1 Relevant Measurable Objectives

The voluntary fallowing of irrigated land would benefit the groundwater elevation, groundwater storage, and land subsidence measurable objectives.

9.3.4.2 Expected Benefits and Evaluation of Benefits

The primary benefit of voluntary fallowing would be mitigating the decline of groundwater elevations by reducing pumping. An ancillary benefit from stable or rising groundwater elevations may include avoiding pumping induced subsidence. Because it is unknown how many landowners will willingly fallow their land, it is difficult to quantify the expected benefits at this time.

Reductions in groundwater pumping will be measured directly through the metering and reporting program and recorded in the DMS. Changes in groundwater elevation will be measured with the groundwater level monitoring program. Subsidence will be measured with the InSAR network. Changes in groundwater storage will be estimated using the groundwater level proxy. Information about the monitoring programs is provided in Chapter 7. Isolating the effect of voluntary fallowing on sustainability metrics will be challenging because it will be only one of several management actions that may be implemented concurrently in the Subbasin.

9.3.4.3 Circumstances for Implementation

The GSAs envision that voluntary fallowing of land will be promoted as soon as possible after GSP adoption.

9.3.4.4 Public Noticing

Public meetings will be held to inform the groundwater pumpers and other stakeholders about Subbasin conditions and the need for voluntary fallowing. Landowners, groundwater pumpers and interested stakeholders will have the opportunity at these meetings to provide input and comments on how voluntary fallowing is being implemented in the Subbasin. Voluntary fallowing will also be promoted through annual GSP reports and links to relevant information on GSA websites.

9.3.4.5 Permitting and Regulatory Process

Regulations are subject to CEQA.

9.3.4.6 Implementation Schedule

The GSAs envision that voluntary fallowing will be promoted within two years of GSP adoption.

9.3.4.7 Legal Authority

California Water Code §10726.2(c) provides GSAs the authorities to provide for a program of voluntary land fallowing.

9.3.4.8 Estimated Cost

The estimated cost for promoting and accounting for land fallowing is included in the cost of the metering and reporting program and developing annual reports.

9.4 Area Specific Management Actions

Implementation of area specific management actions may be necessary to address areas of persistent groundwater level decline (Figure 9-1). Through a regulatory program, GSAs will conduct extensive data analysis to delineate where pumping needs to be limited to stabilize levels. With this information, affected pumpers will need to decide how to achieve these limitations. This may include land fallowing/retirement or paying for projects and/or programs that can be effectively implemented proportional to the recognized volume of groundwater necessary to avoid undesirable results in each area of the Subbasin. Sections required by SGMA regulations §354.44 follow the description of each management action below.

9.4.1 Mandatory pumping limitations in specific areas

The GSAs will establish a regulatory program to identify and enforce required pumping limitation as necessary to arrest persistent groundwater level declines in specific areas. The amount of mandatory pumping limitations is uncertain and will depend on the effectiveness and timeliness of voluntary actions by pumpers and the success of other measures outlined in the GSP. The water budget presented in Chapter 6 suggests that an estimated shortfall of 13,700 AFY will need to be addressed by a combination of increased water supply, conservation and reduction in pumping in order to achieve sustainability. After GSP adoption, developing the program would likely require the following steps:

5. Establishing a methodology for determining baseline pumping in specific areas considering:
    a. Groundwater level trends in areas of decline and estimated available volume of water in those areas
    b. Land uses and corresponding irrigation requirements
6. Establishing a methodology to determine whose use must be limited and by how much considering, though not limited to, water rights and evaluation of anticipated benefits from projects bringing in supplemental water or other relevant actions individual pumpers take.
7. A timeline for limitations on pumping (“ramp down”) in specific areas as required to avoid undesirable results
8. Approving a formal regulation to enact the program

Determination of baseline pumping in specific areas will need to be established and guidance developed by DWR in response to legislative directives for consistent implementation of the Water Conservation Act of 2009, as is used in Urban Water Management Plans, may be helpful. Baseline pumping would be ramped down to meet water use targets in specific areas until it is projected that groundwater levels will stabilize. Analyses will be updated periodically as new data are developed. The ramp down schedule would be developed during program development; the rate of ramp down would depend on when the program starts, and projections of how long lower pumping rates are required in specific areas in order to avoid undesirable results. The specific ramp down amounts and timing would be reassessed periodically by the GSAs as needed to achieve sustainability. These adjustments would occur when additional data and analyses are available.

9.4.1.1 Relevant Measurable Objectives

Mandatory limitations to groundwater pumping in specific areas would benefit the groundwater elevation, groundwater storage, and land subsidence measurable objectives in those areas.

9.4.1.2 Expected Benefits and Evaluation of Benefits

The primary benefit from the mandatory pumping limitations is mitigating the decline of groundwater levels through reduced total pumping. An ancillary benefit from stable or increasing groundwater elevations may include avoiding pumping induced subsidence. The program is designed to ramp down total pumping to the sustainable yield; therefore, the quantifiable goal is to maintain pumping within the sustainable yield.

Limitations on groundwater pumping will be measured directly through the metering and reporting program and recorded in the DMS. Changes in groundwater elevation are an important metric for the mandatory pumping limitation program and will be measured with the groundwater level monitoring program. Subsidence will be measured using InSAR data. Changes in groundwater storage will be estimated using the groundwater level proxy. Information about the monitoring programs is provided in Chapter 7. Isolating the effect of the mandatory pumping limitation program on sustainability metrics will be challenging because it will be only one of several management actions that may be implemented concurrently in the Subbasin. However, as the pumping ramp down is initiated, the correlation between reduced pumping and higher groundwater levels may become more apparent.

9.4.1.3 Circumstances for Implementation

Because there are areas where groundwater levels are persistently declining and undesirable results could occur, the mandatory pumping limitation program will be implemented after the GSAs adopt the regulation governing the program.

9.4.1.4 Public Noticing

Public meetings will be held to inform groundwater pumpers and other stakeholders that the mandatory pumping limitation program is being developed. The mandatory pumping limitation program will be developed in an open and transparent process. Landowners, groundwater pumpers and other stakeholders will have the opportunity at these meetings to provide input and comments on the process and the program elements.

9.4.1.5 Permitting and Regulatory Process

The mandatory pumping limitation program is subject to CEQA. The mandatory pumping limitation program would be developed in accordance with all applicable groundwater laws and respect all groundwater rights.

9.4.1.6 Implementation Schedule

Developing the mandatory pumping limitation program and adopting the regulation would likely take up to five years. Once the regulation is adopted, the program will be implemented.

9.4.1.7 Legal Authority

California Water Code §10726.4 (a)(2) provides GSAs the authorities to control groundwater extractions by regulating, limiting, or suspending extractions from individual groundwater wells or extractions from groundwater wells in the aggregate.

9.4.1.8 Estimated Cost

The cost to develop and implement the mandatory pumping limitation program is estimated to be $350,000. This does not include the cost of the CEQA permitting or any ongoing program oversight.

9.5 Projects

Projects involve new or improved infrastructure to make new water supplies available to the Subbasin. Best Management Practices and developing projects that will enhance supply will mitigate groundwater level decline. Several potential projects are described in this GSP that may be implemented by willing entities to offset pumping and lessen the degree to which the management actions would be needed. The implementation of projects depends on willing participants and/or successful funding votes.

There are six potential sources of water for projects:

1. Tertiary treated wastewater supplied and sold by City of Paso Robles and the San Miguel CSD to private groundwater extractors to use in lieu of groundwater. This water is commonly referred to as recycled water (RW).
2. State Water Project (SWP) water
3. Nacimiento Water Project (NWP) water
4. Salinas Dam/Santa Margarita Reservoir water
5. Local recycled water
6. Flood flows/stormwater from local rivers and streams

These six water sources are described in more detail in Appendix I. Of these six sources, only RW, SWP, NWP, and Salinas Dam currently have sufficiently reliable volumes of unused water to justify the expense of new infrastructure to be used on a regular basis for supplementing water supplies in the Subbasin. Since there are uncertainties associated with securing agreements to utilize SWP and related infrastructure, descriptions of concept projects associated with the use of this water supply are included in Appendix L. Capturing flood flows/stormwater from streams in permitted projects will be pursued. Specific elements of these projects will be developed in the near future. Use of the Salinas Dam to capture flood flows/stormwater is presently the only conceptual project included in the GSP. In summary, the initial focus of new supply is on developing RW, NWP, and Salinas Dam projects in the Subbasin. Grant funding has been procured though the SGMA Round 1 Implementation Grant for implementation of the projects listed above. Each project was scored and ranked using a set of scoring criteria. The scores of individual projects, as well as project descriptions and justifications are included as a table in Appendix O.

9.5.1 General Project Provisions

Many of the priority projects listed below are subject to similar requirements. These general provisions that are applicable to all projects include certain permitting and regulatory requirements, public notice requirements, and the legal authority to initiate and complete the projects. This section assumes the development of projects are led by one or more GSAs in order to complete the sections below that are required by SGMA regulations §354.44.

9.5.1.1 Summary of Permitting and Regulatory Processes

Although the provisions of this GSP do not require projects to be subject to a particular set of requirements, projects envisioned in the GSP may require an environmental review process via CEQA and may require an Environmental Impact Report, a Negative Declaration, or a Mitigated Negative Declaration.

There will be a number of local, county and state permits, right of ways, and easements required depending on pipeline alignments, stream crossings, and project type.

Projects must adhere to the Salt/Nutrient Management Plan for the Paso Robles Groundwater Basin (RMC 2015).

9.5.1.2 Public Noticing

All projects are subject to the public noticing requirements per CEQA.

9.5.1.3 Legal Authority Required for Projects and Basis for That Authority within the Agency

California Water Code §10726.2 provides GSAs the authority to purchase, among other things, land, water rights, and privileges. Additionally, an assessment of the legal rights to acquire and use various water sources is included in Appendix I.

9.5.2 Conceptual Projects

Six conceptual projects are included in this GSP and have been identified after many public meetings and studies over the last decade and currently ongoing. All six projects will not necessarily be implemented, but they represent six reasonable projects that could help achieve sustainability throughout the Subbasin. Conceptual projects were developed for different regions in the Subbasin to address localized declines in groundwater elevations. Projects were sized based on the locations of available supplies and pumping demands in different areas of the Subbasin. Actual projects will be highly dependent on the ability of the GSAs and/or individual entities to negotiate with water suppliers and purchase the surface waters described in Appendix I. Four other conceptual projects that are not being developed currently are included in Appendix L for future consideration.

Table 9-1. Conceptual Projects

Project Name	Water Supply	Project Type	Approximate Location	Average Volume (AFY)
City Recycled Water Delivery	RW	Direct Delivery	Near City of Paso Robles	2,200
San Miguel Recycled Water Delivery	RW	Direct Delivery	Near San Miguel	200 [a]
NWP Delivery at Salinas and Estrella River Confluence	NWP	Direct Delivery	Near the confluence of the Salinas and Estrella Rivers	2,800
NWP Delivery North of City of Paso Robles	NWP	Direct Delivery	North of Huer Huero Creek, due west of the airport	1,000
NWP Delivery East of City of Paso Robles	NWP	Direct Delivery	East of the City of Paso Robles	2,000
Expansion of Salinas Dam	Salinas River	River Recharge	Along the Salinas River	1,000

Notes: (a) Average volume amounts may be updated in final GSA based on more recent information
(b) Approximate locations are assumed to establish the benefit calculations required by SGMA

Short descriptions of each concept project are included below, along with a map showing general project locations. Sections required by SGMA regulations §354.44 follow the description of each project. Generalized costs are also included for planning purposes. Components of these projects including facility locations, pipeline routes, recharge mechanisms, and other details may change in future analyses. Therefore, each of the projects listed below should be treated as a generalized project that represents a number of potential detailed projects.

9.5.2.1 Assumptions Used in Developing Projects

Assumptions that were used to develop projects and cost estimates are provided in Appendix J. Assumptions and issues for each project need to be carefully reviewed and revised during the pre-design phase of each project. Project designs, and therefore costs, could change considerably as more information is gathered.

The cost estimates included below are class 5, order of magnitude estimates. These estimates were made with little to no detailed engineering data. The expected accuracy range for such an estimate is within +50 percent or –30 percent. The cost estimates are based on the engineering assessment of current conditions at the project location. They reflect a professional opinion of costs at this time and are subject to change as project designs mature.

Capital costs include major infrastructure including pipelines, pump stations, customer connections, turnouts and storage tanks. Capital costs also include 30% contingency for plumbing appurtenances, 15% increase for general conditions, 15% for contractor overhead and profit, and 8% for sales tax. Engineering, legal, administrative, and project contingencies was assumed as 30% of the total construction cost and included within the capital cost. Land acquisition at $30,000/acre was also included within capital costs.

Annual operations and maintenance (O&M) fees include the costs to operate and maintain new project infrastructure. O&M costs also include any pumping costs associated with new infrastructure. O&M costs do not include O&M or pumping costs associated with existing infrastructure, such as existing NWP O&M costs because these are assumed to be part of water purchase costs. Water purchase costs were assumed to include repayment of loans for existing infrastructure; however, these purchase costs will need to be negotiated. The terms of such a negotiation could vary widely.

Capital costs were annualized over thirty years and added with annual O&M costs and water purchase costs to determine an annualized dollar per acre-foot ($/AF) cost for each project. This $/AF value might not always represent the $/AF of basin benefit ($/AF-benefit).

9.5.2.2 Preferred Project 1: City Recycled Water Delivery

This project will use up to 2,200 AFY of disinfected tertiary effluent for in-lieu recharge in the central portion of the basin near and inside the City of Paso Robles. Water that is not used for recycled water purposes will be discharged to Huer Huero Creek with the potential for additional recharge benefits. The general layout of this project and relevant monitoring wells are shown on Figure 9-2. Infrastructure includes upgraded wastewater treatment plant and pump station, 5.8 miles of pipeline, a storage tank, numerous turnouts, and a discharge to Huer Huero Creek. Additionally, a conceptual pipeline to the north of the main line will deliver recycled water to a larger geographical area. The cost to upgrade the wastewater treatment plant is also not included in the cost estimate, since the upgrades were required per the NPDES permit regardless of use for recycled water. Since this project is already in the predesign phase, the predesign project cost estimate is provided for this GSP.

9.5.2.2.1 Relevant Measurable Objectives

The measurable objectives benefiting from this groundwater project include:

- Groundwater elevation measurable objectives in the central portion of the Subbasin
- The groundwater storage measurable objective
- Land subsidence measurable objectives in the central portion of the Subbasin

9.5.2.2.2 Expected Benefits and Evaluation of Benefits

The primary benefit from the Paso Robles RW project is higher groundwater elevations in the Central portion of the Subbasin due to in-lieu recharge from the direct use of the RW and recharge through Huer Huero Creek. Ancillary benefits of shallower groundwater elevations may include an increase in groundwater storage, improved groundwater quality from recharge of high-quality water, and avoiding pumping induced subsidence. The GSP model was used to quantify the expected benefit from this project. Figure 9-3 shows the expected groundwater level benefit predicted by the GSP model after 10 years of project operation. Figure 9-3 expresses the benefit as feet of groundwater. The groundwater level benefit shown on Figure 9-3 is a measure of how much higher groundwater elevations are expected to be with the project rather than without the project.

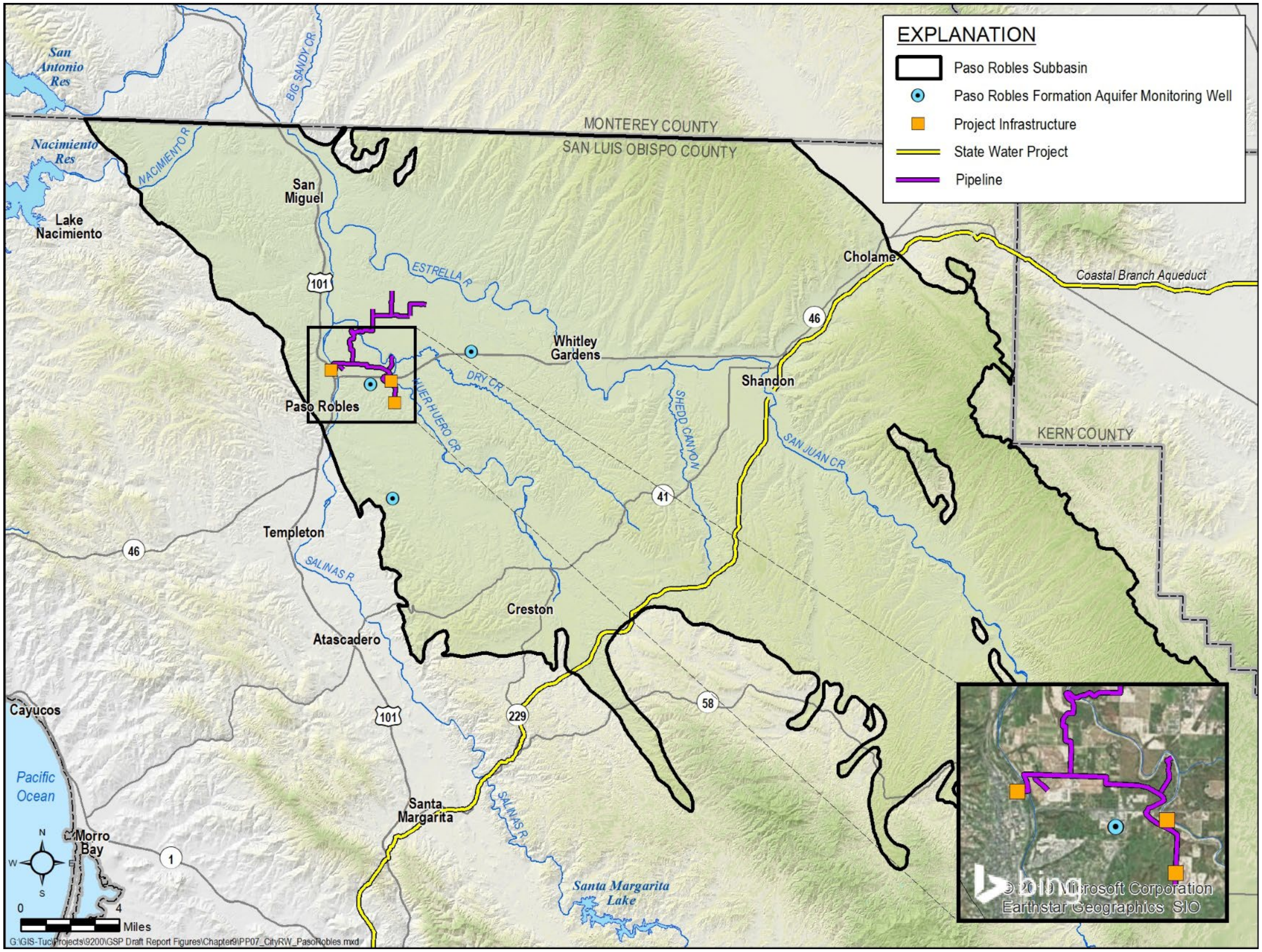


Figure 9-2. Paso Robles RW Project Layout

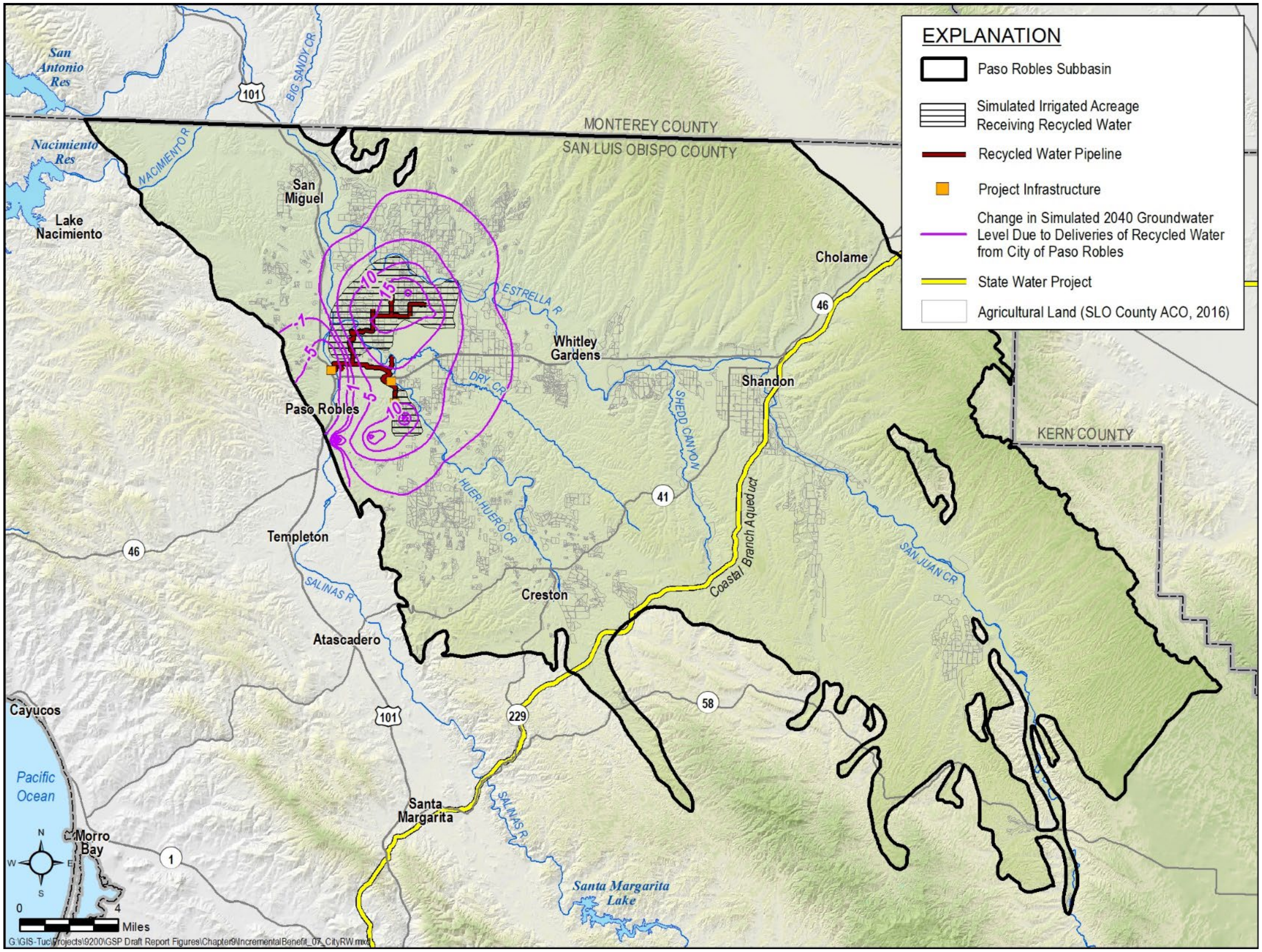


Figure 9-3. Groundwater Level Benefit of Paso Robles RW Project in Central Subbasin

Changes in groundwater elevation will be measured with the groundwater level monitoring program detailed in Chapter 7. Subsidence will be measured with the InSAR network detailed in Chapter 7. A direct correlation between the Paso Robles RW project and changes in groundwater levels may not be possible because this is only one among many management actions and projects that might be implemented in the Subbasin.

9.5.2.2.3 Circumstances for Implementation

This project is already being implemented by the City of Paso Robles. The monitoring wells 26S/12E-26E07, 26S/13E-16N01, and 27S/12E-13N01 will likely be positively impacted by this project.

9.5.2.2.4 Implementation Schedule

The project is underway. The phase design is expected to be complete by 2019 and construction complete by 2021. The implementation schedule is presented on Figure 9-4.

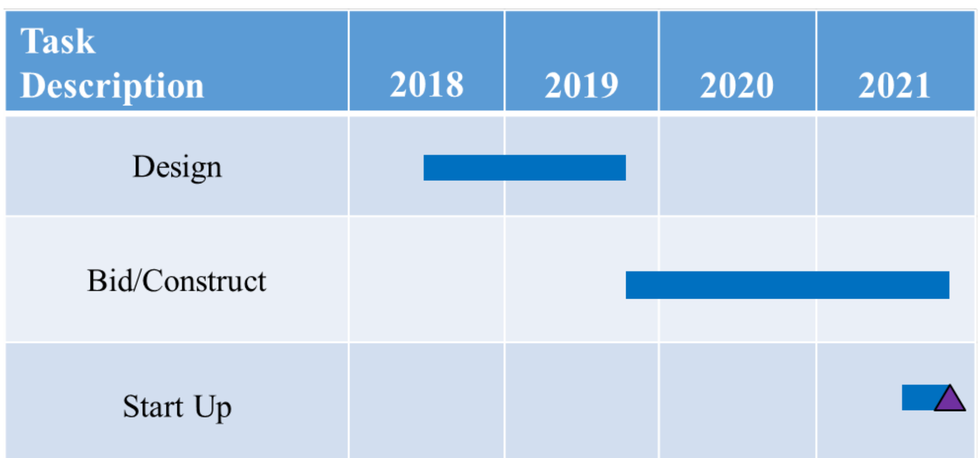


Figure 9-4. Implementation Schedule for Paso Robles RW in Central Subbasin

9.5.2.2.5 Estimated Cost

The estimated total project cost for this project is $22M. The cost and financing for the project is being determined by the City of Paso Robles. Annual O&M costs are not provided in this GSP. The cost ($/AF) of this water will be set by the City of Paso Robles and is not included in this GSP.

9.5.2.3 Preferred Project 2: San Miguel CSD Recycled Water Delivery

The San Miguel RW project is currently in the planning and preliminary design phases; therefore, the project concepts presented herein are preliminary.

This project is a planned project that involves the upgrade of San Miguel Community Services District (CSD) wastewater treatment plant to meet California Code of Regulations (CCR) Title 22 criteria for disinfected secondary recycled water for irrigation use by vineyards. Potential customers include a group of agricultural customers on the east side of the Salinas River, and a group of agricultural customers northwest of the wastewater treatment plant. The project might include the utilization of process discharge from a nearby processing facility for additional water recycling. The project could provide between 200 and 450 AFY of additional water supplies. The general layout of this project and relevant monitoring wells are shown on Figure 9-5. The infrastructure shown here includes a treatment plant upgrade, a recycled water pumping station and pipeline infrastructure to provide for delivering water to customers. The actual project size and infrastructure will be determined based on project feasibility and negotiations with suppliers and customers. For more information on technical assumptions and cost assumptions, refer to Appendix J.

9.5.2.3.1 Relevant Measurable Objectives

The measurable objectives benefiting from this groundwater project include:

- Groundwater elevation measurable objectives in the northern portion of the Subbasin
- The groundwater storage measurable objective
- Land subsidence measurable objectives in the northern portion of the Subbasin

9.5.2.3.2 Expected Benefits and Evaluation of Benefits

The primary benefit from RW use for irrigation is higher groundwater elevations in the northern portion of the Subbasin due to in-lieu recharge from the direct use of the RW. Ancillary benefits may include an increase in groundwater storage and avoiding pumping induced subsidence. The GSP model was used to quantify the expected benefit from this project. Figure 9-6 shows the expected groundwater level benefit predicted by the GSP model after 10 years of project operation. Figure 9-6 expresses the benefit as feet of groundwater. The groundwater level benefit shown on Figure 9-6 is a measure of how much higher groundwater elevations are expected to be with the project rather than without the project.

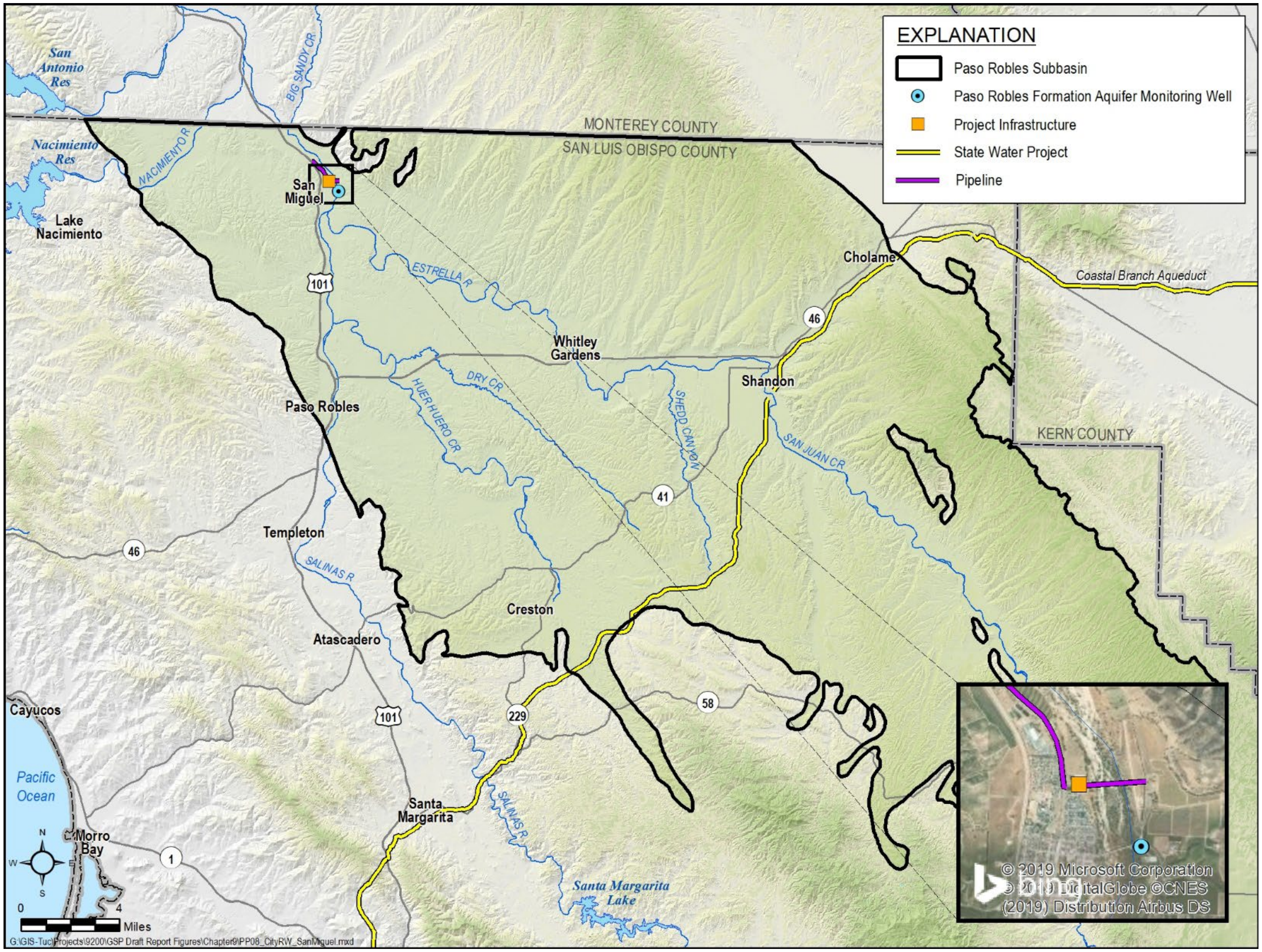


Figure 9-5. Conceptual San Miguel CSD RW Project Layout

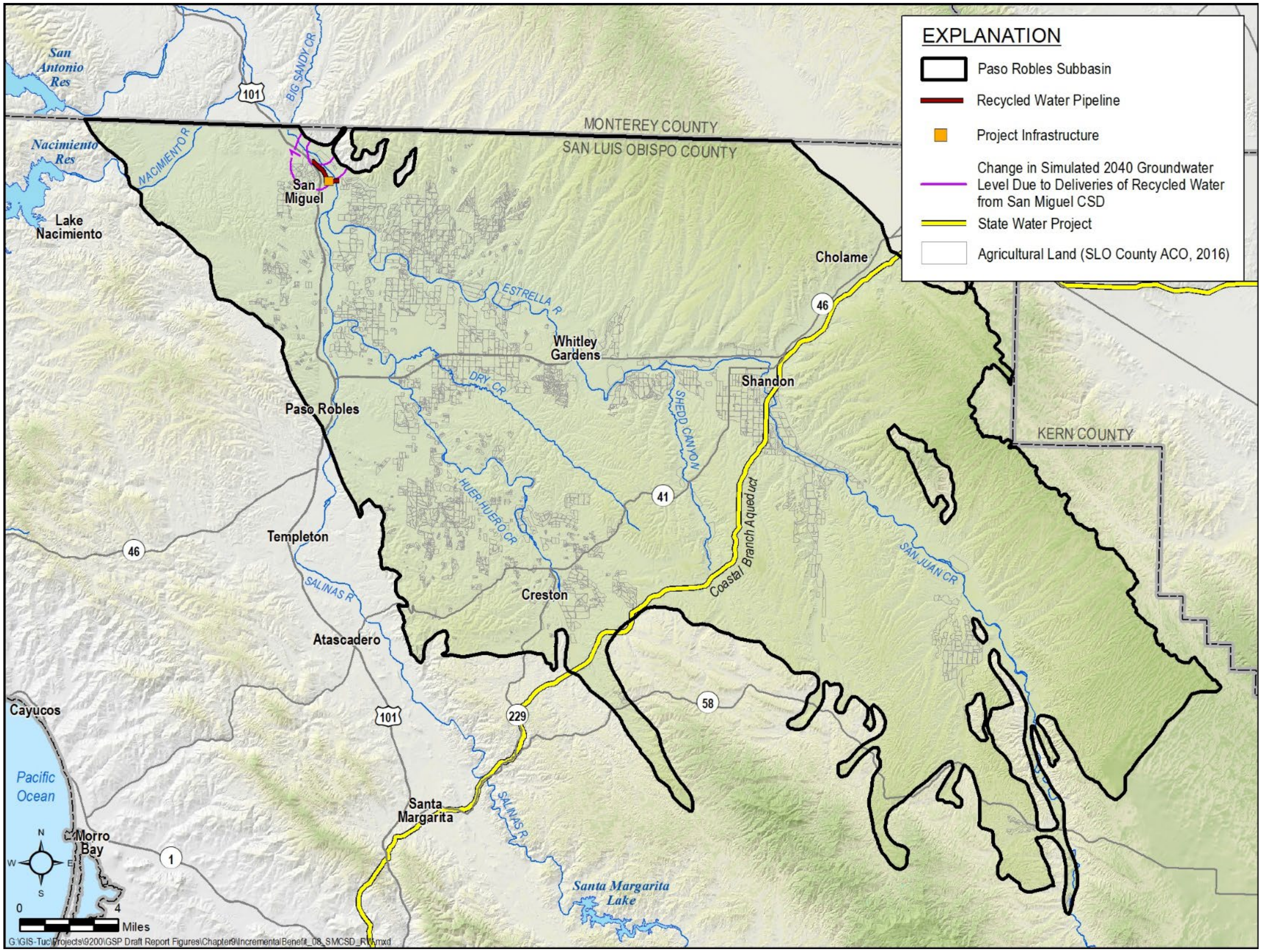


Figure 9-6. Groundwater Level Benefit of San Miguel CSD RW Project

Changes in groundwater elevation will be measured with the groundwater level monitoring program detailed in Chapter 7. Subsidence will be measured with the InSAR network detailed in Chapter 7. A direct correlation between the San Miguel CSD RW Project and changes in groundwater levels may not be possible because this is only one among many management actions and projects that might be implemented in the Subbasin.

9.5.2.3.3 Circumstances for Implementation

Willing parties will plan, design and raise funds to initiate projects. San Miguel CSD Staff has completed the planning phase and is currently in the design development phase of the project. The initial phase of the San Miguel CSD RW Project is currently planned for completion in mid-2021 with subsequent phases to be initiated if, after five years, groundwater levels in the northern portion of the monitoring network continue to decline at unsustainable rates. In particular, continued unsustainable groundwater level declines in monitoring well 25S/12E-16K05 will trigger implementation of this project. Additional triggers will be added as the monitoring well network expands.

This project is a planned project being undertaken by San Miguel CSD and may be implemented regardless of the triggered implementation framework presented herein.

9.5.2.3.4 Implementation Schedule

The implementation schedule is presented on Figure 9-7. The project will take 4 to 6 years to implement. The actual project start date is to be determined on an as-needed basis or by San Miguel CSD.

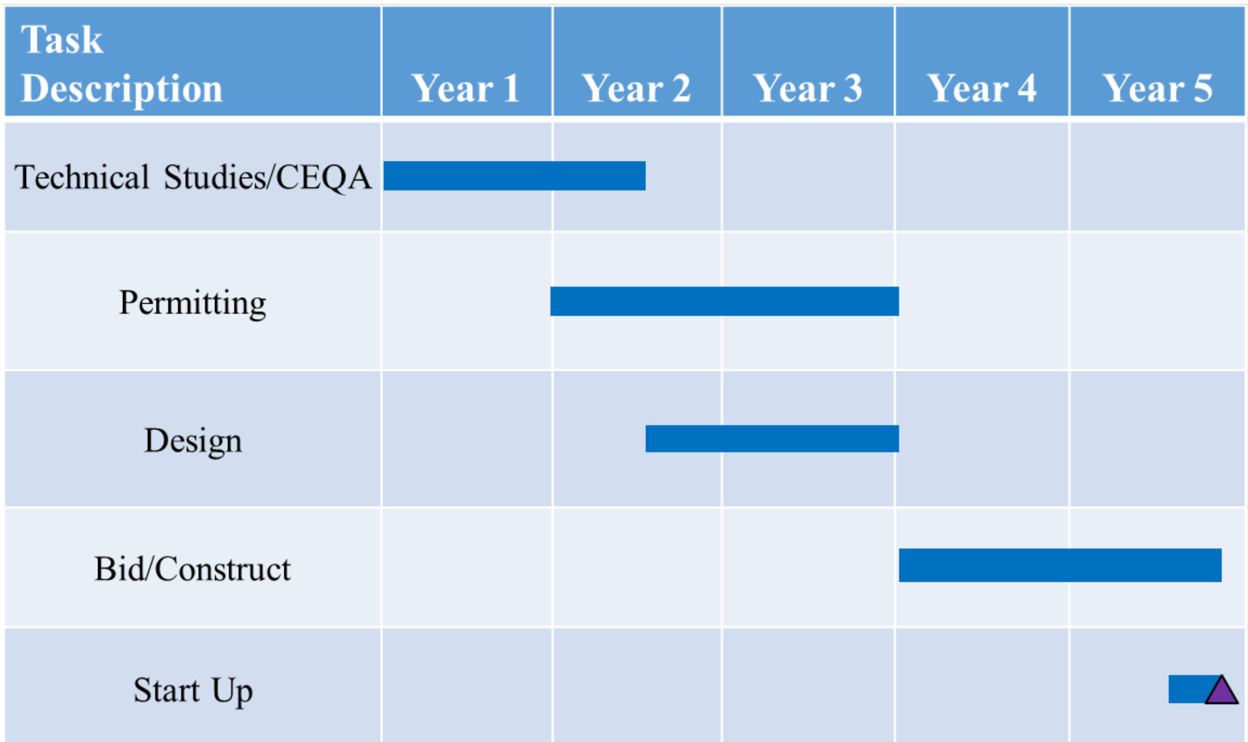


Figure 9-7. Implementation Schedule for San Miguel RW

9.5.2.3.5 Estimated Cost

This project is currently in the planning phases, and the San Miguel RW project presented herein might not accurately reflect the most current design concept. The cost of the potential project that is described herein was estimated for the purposes of the GSP. The estimated total project cost for this project is $15M, not including wastewater treatment plant upgrades. Cost can be covered by the bonding capacity developed through the groundwater conservation program. Annual O&M costs are estimated at $340,000. O&M costs would be covered by the overproduction surcharges. Based on a 30-year loan at a 5% interest rate, the cost of water for this project would be approximately $2,900/AF. Additional details regarding how costs were developed are included in Appendix J.

9.5.2.4 Preferred Project 3: NWP Delivery at Salinas and Estrella River Confluence

This conceptual project directly delivers up to 3,500 AFY of NWP water to agricultural water users near the confluence of the Salinas and Estrella Rivers, and an area north of the Estrella River. On average, this project will provide 2,800 AFY of water for use in lieu of groundwater pumping in the region. Before implementing this project, additional outreach and meetings with property owners and interested stakeholders will be conducted to inform them about the project details and acquire necessary approvals.

The general layout of this project and relevant monitoring wells are shown on Figure 9-8. Infrastructure includes a new NWP turnout, 13 miles of pipeline, a 700 horsepower (hp) pump station, and two river crossings: one crossing of the Salinas River and one crossing of the Estrella River. For more information on technical assumptions and cost assumptions, refer to Appendix J.

9.5.2.4.1 Relevant Measurable Objectives

The measurable objectives benefiting from this project include:

- Groundwater elevation measurable objectives in the central portion of the Subbasin
- The groundwater storage measurable objective
- Land subsidence measurable objectives in the central portion of the Subbasin

9.5.2.4.2 Expected Benefits and Evaluation of Benefits

The primary benefit from in-lieu recharge using NWP water is higher groundwater elevations in the central portion of the Subbasin. Ancillary benefits of shallower groundwater elevations may include an increase in groundwater storage and avoiding pumping induced subsidence. The GSP model was used to quantify the expected benefit from this project. Figure 9-9 shows the expected groundwater level benefit predicted by the GSP model after 10 years of project operation. Figure 9-9 expresses the benefit as feet of groundwater. The groundwater level benefit shown on Figure 9-9 is a measure of how much higher groundwater elevations are expected to be with the project rather than without the project.

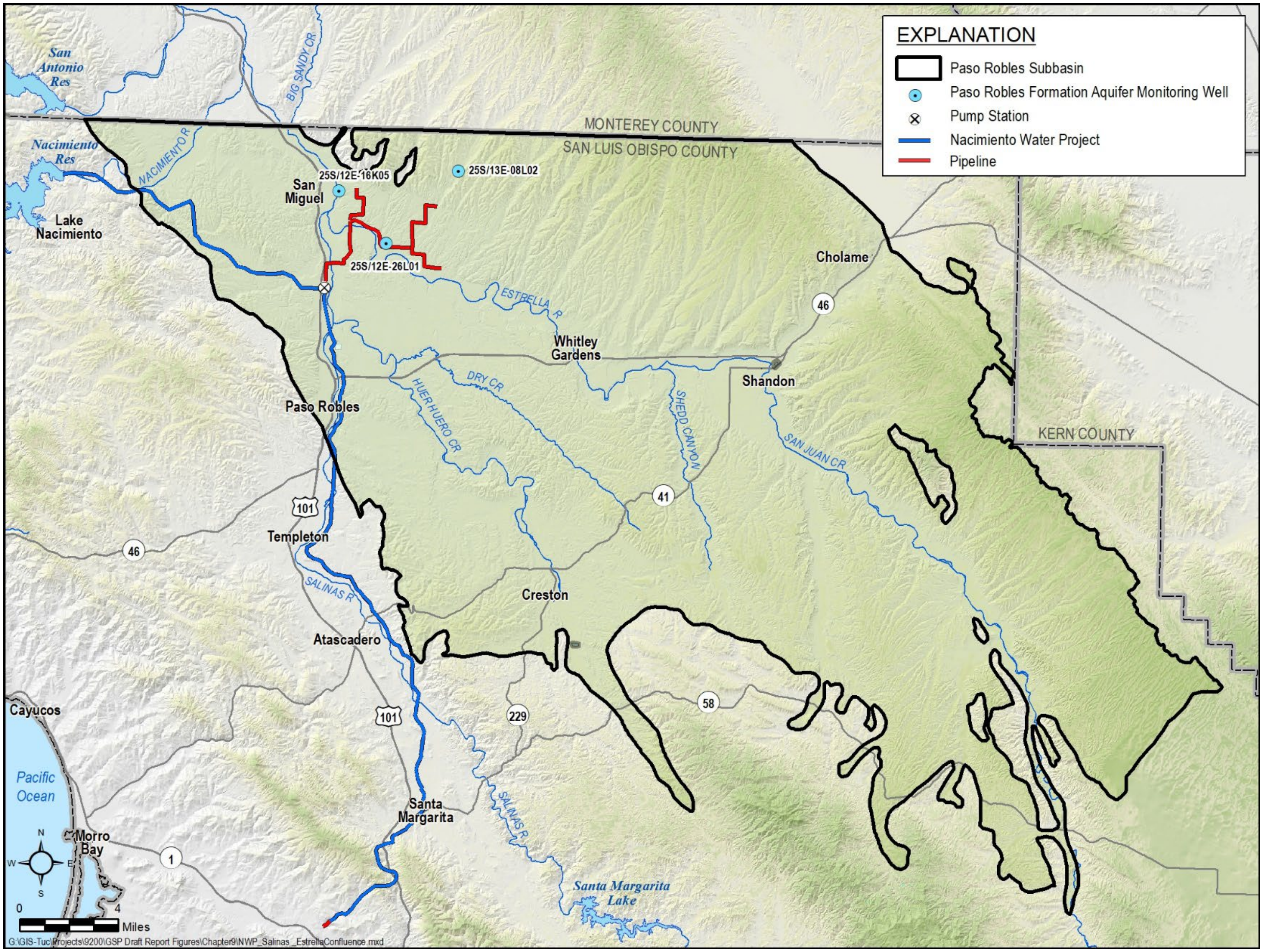


Figure 9-8. Conceptual NWP Delivery at Salinas and Estrella River Confluence Project Layout

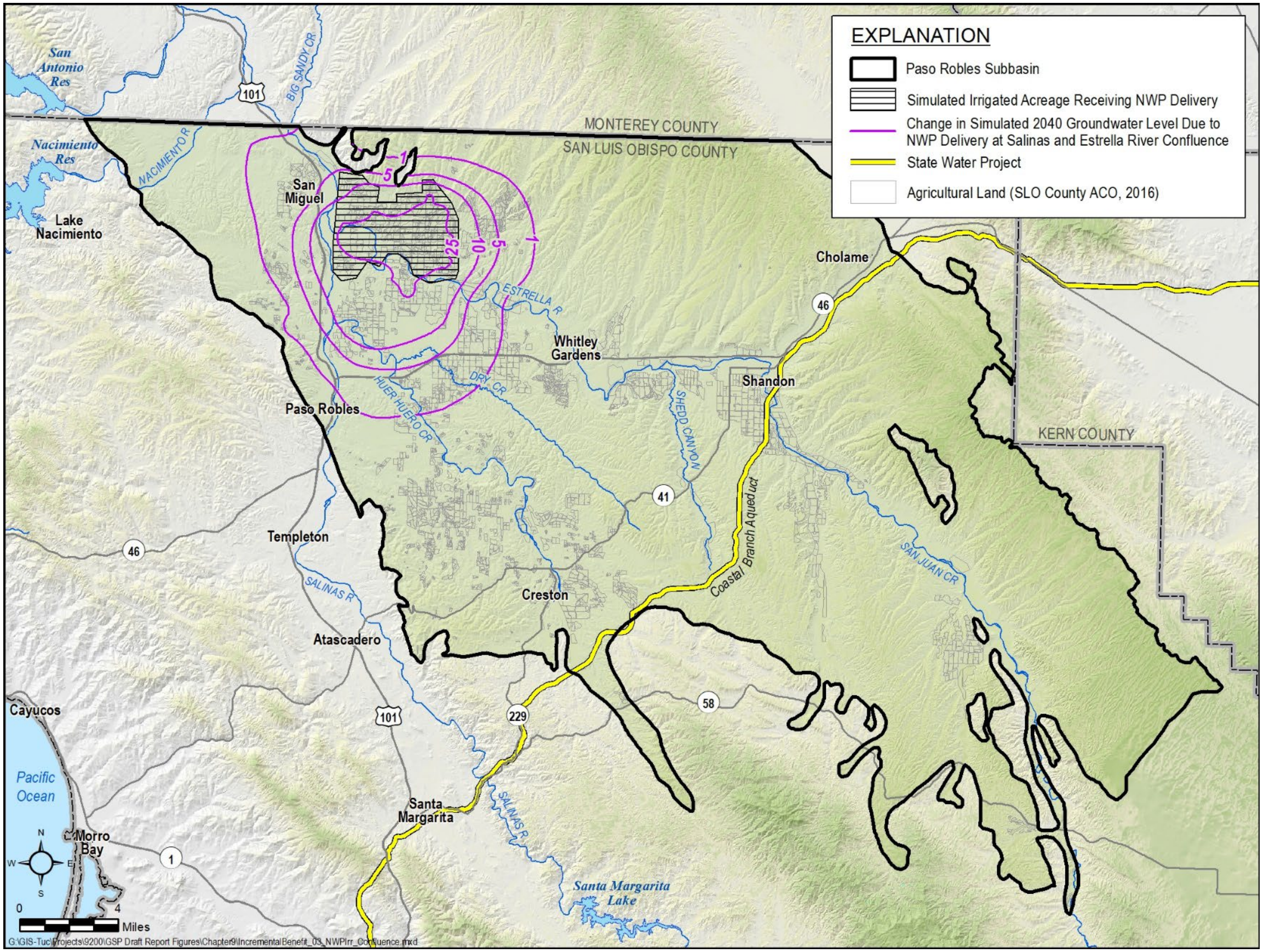


Figure 9-9. Groundwater Level Benefit of NWP Delivery at Salinas and Estrella River Confluence

Changes in groundwater elevation will be measured with the groundwater level monitoring program detailed in Chapter 7. Subsidence will be measured with InSAR data as detailed in Chapter 7. A direct correlation between in-lieu recharge and changes in groundwater levels may not be possible because this is only one among many management actions and projects that may be implemented in the Subbasin.

9.5.2.4.3 Circumstances for Implementation

All projects are implemented based on need, cost benefit studies and willing participants. The project to deliver water for in-lieu recharge near the Salinas and Estrella confluence will be initiated if, after five years, groundwater levels in the northern portion of the monitoring network continue to decline at unsustainable rates and willing participants agree to participate in the project. In particular, continued unsustainable groundwater level declines in monitoring wells 25S/12E-16K05, 25S/12E-26L01, and 25S/13E-08L02 will trigger implementation of this project. Additional triggers will be added as the monitoring well network expands.

9.5.2.4.4 Implementation Schedule

The implementation schedule is presented on Figure 9-10. The project will take 4 to 6 years to implement depending on the time required to negotiate procurement of NWP water. Conceptually, project implementation would occur in years 6 through 12 after GSP adoption.

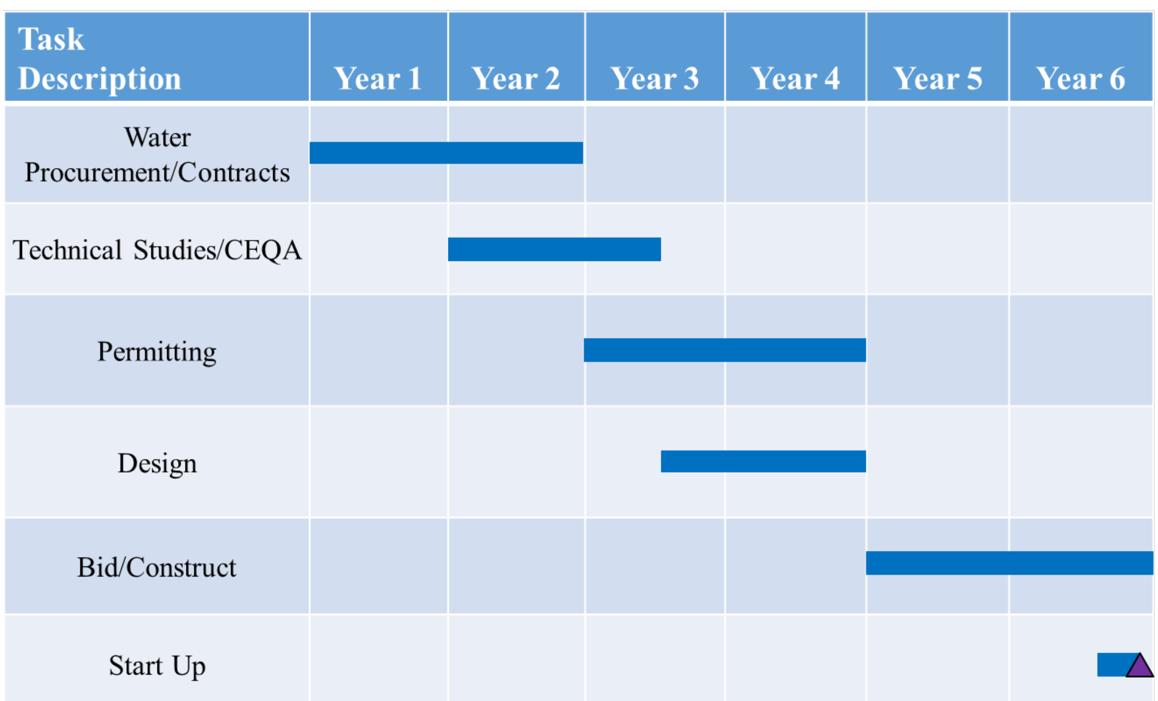


Figure 9-10. Implementation Schedule for NWP Delivery at Salinas and Estrella River Confluence

9.5.2.4.5 Estimated Cost

The estimated total project cost for this project is $50M. Annual O&M costs are estimated at $740,000. The average annual cost of NWP purchased water is estimated at $2.4M based on an average year delivery of 2,800 AFY. However, the unit price would need to be negotiated, and the actual amount of water available will vary year to year thereby affecting the actual annual purchase cost. O&M and water purchase costs would be covered by the overproduction surcharges. Based on a 30-year loan at a 5% interest rate, the cost of water for this project would be approximately $3,200/AF. Additional details regarding how costs were developed are included in Appendix J.

9.5.2.5 Preferred Project 4: NWP Delivery North of City of Paso Robles

This project provides up to 1,250 AFY of NWP water for direct delivery to agricultural water users north of the Paso Robles airport. On average, this project will provide 1,000 AFY of water for use in lieu of groundwater pumping in the region.

The general layout of this project and relevant monitoring wells are shown on Figure 9-11. Infrastructure includes a new NWP turnout, 5.6 miles of pipeline, a 130 hp pump station, and one river crossing for the Salinas River. For more information on technical assumptions and cost assumptions, refer to Appendix J.

9.5.2.5.1 Relevant Measurable Objectives

The measurable objectives benefiting from this project include:

- Groundwater elevation measurable objectives in the central portion of the Subbasin
- The groundwater storage measurable objective
- Land subsidence measurable objectives in the central portion of the Subbasin

9.5.2.5.2 Expected Benefits and Evaluation of Benefits

The primary benefit from in-lieu recharge using NWP water is higher groundwater elevations in the central portion of the Subbasin. Ancillary benefits of shallower groundwater elevations may include an increase in groundwater storage and avoiding pumping induced subsidence. The GSP model was used to quantify the expected benefit from this project. Figure 9-12 shows the expected groundwater level benefit predicted by the GSP model after 10 years of project operation. Figure 9-12 expresses the benefit as feet of groundwater. The groundwater level benefit shown on Figure 9-12 is a measure of how much higher groundwater elevations are expected to be with the project rather than without the project.

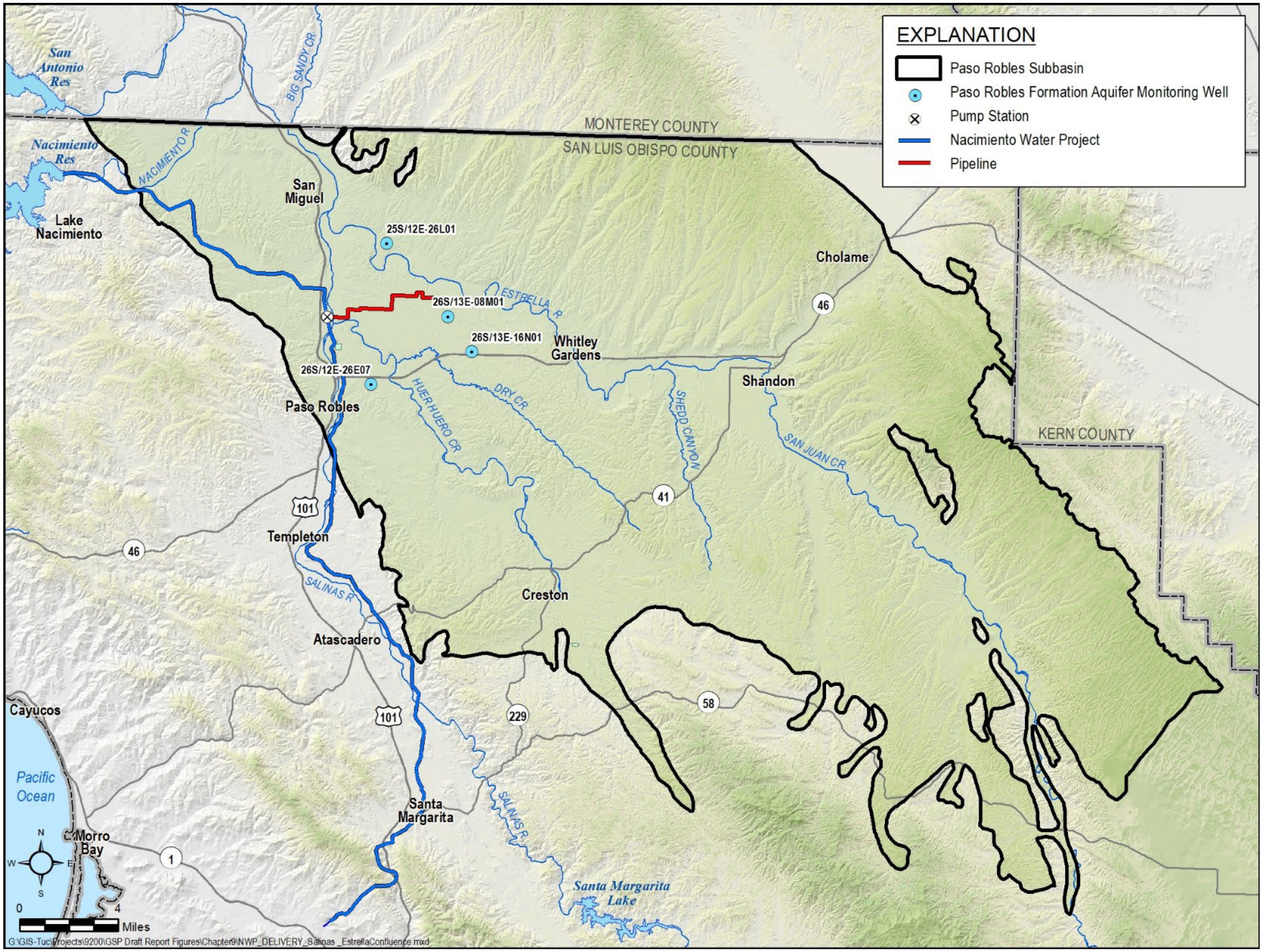


Figure 9-11. Conceptual NWP Delivery North of City of Paso Robles Project Layout

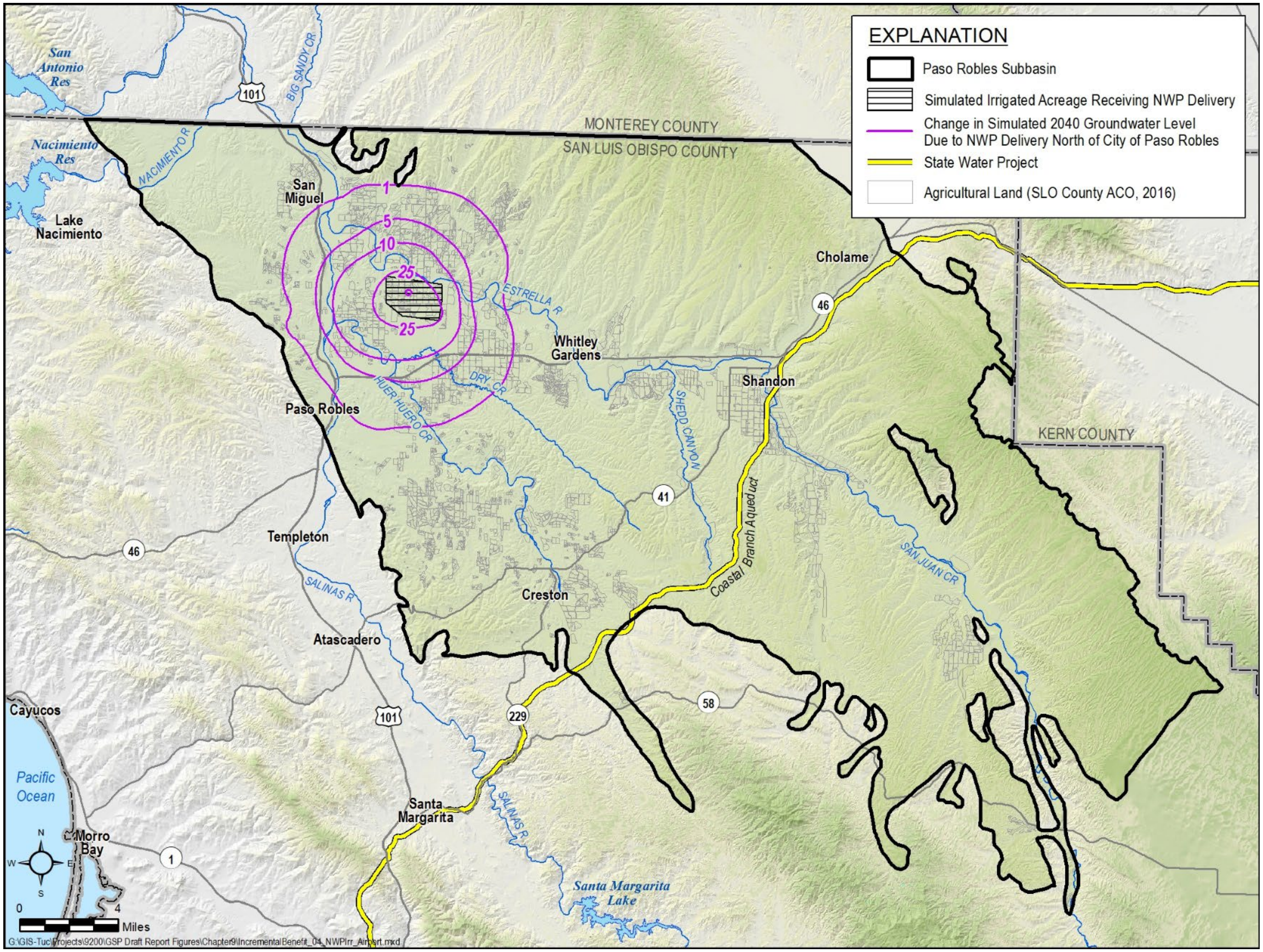


Figure 9-12. Groundwater Level Benefit from NWP Delivery North of City of Paso Robles

Changes in groundwater elevation will be measured with the groundwater level monitoring program detailed in Chapter 7. Subsidence will be measured with the InSAR network detailed in Chapter 7. A direct correlation between in-lieu recharge and changes in groundwater levels may not be possible because this is only one among many management actions and projects that may be implemented in the Subbasin.

9.5.2.5.3 Circumstances for Implementation

All projects are implemented based on need, cost benefit studies and willing participants. The project to deliver water for in-lieu recharge north of the airport will be initiated if, after five years, groundwater levels in the northern portion of the monitoring network continue to decline at unsustainable rates. In particular, continued unsustainable groundwater level declines in monitoring wells 26S/13E-08M01, 26S/13E-16N01, 25S/12E-26L01, and 26S/12E-26E07 will trigger implementation of this project. Additional triggers will be added as the monitoring well network expands.

9.5.2.5.4 Implementation Schedule

The implementation schedule is presented on Figure 9-13. The project will take 4 to 6 years to implement depending on the time required to negotiate procurement of NWP water. Conceptually, project implementation would occur in years 6 through 12 after GSP adoption.

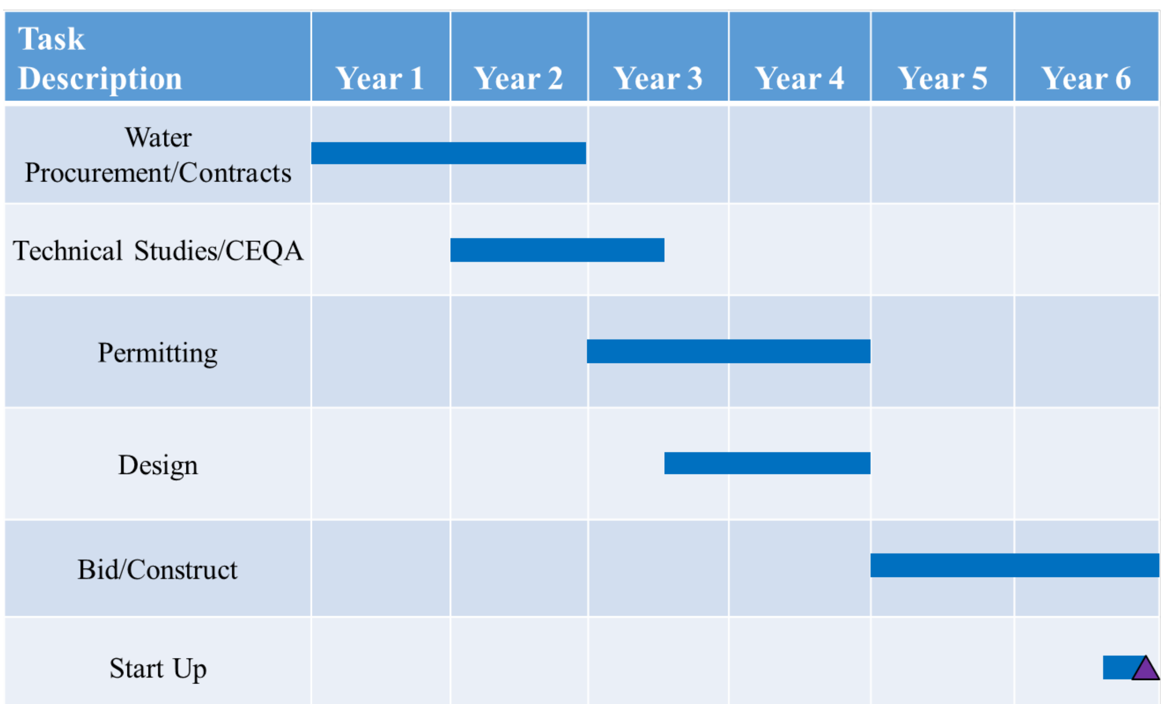


Figure 9-13. Implementation Schedule for NWP Delivery North of City of Paso Robles

9.5.2.5.5 *ESTIMATED COST*

The estimated total project cost for this project is $22M. Annual O&M costs are estimated at $150,000. The average annual cost of NWP purchased water is estimated at $1.2M based on an average year delivery of 1,000 AFY. However, the unit price would need to be negotiated, and the actual amount of water available will vary year to year thereby affecting the actual annual purchase cost. O&M and water purchase costs would be covered by the overproduction surcharges. Based on a 30-year loan at a 5% interest rate, the cost of water for this project would be approximately $2,800/AF. Additional details regarding how costs were developed are included in Appendix J.

9.5.2.6 Preferred Project 5: NWP Delivery East of City of Paso Robles

This project provides up to 2,500 AFY of NWP water to for direct delivery to agricultural water users east of the City of Paso Robles. On average, this project will provide 2,000 AFY of water for use in lieu of groundwater pumping in the region.

The general layout of this project and relevant monitoring wells are shown on Figure 9-14. Infrastructure includes a new NWP turnout, 5.6 miles of pipeline, a 130 hp pump station, and two river crossings one crossing of the Estrella River and one crossing of a tributary to the Estrella River. For more information on technical assumptions and cost assumptions, refer to Appendix J.

9.5.2.6.1 *RELEVANT MEASURABLE OBJECTIVES*

The measurable objectives benefiting from this project include:

- Groundwater elevation measurable objectives in the central portion of the Subbasin
- The groundwater storage measurable objective
- Land subsidence measurable objectives in the central portion of the Subbasin

9.5.2.6.2 *EXPECTED BENEFITS AND EVALUATION OF BENEFITS*

The primary benefit from in-lieu recharge using NWP water is higher groundwater elevations in the central portion of the Subbasin. Ancillary benefits of shallower groundwater elevations may include an increase in groundwater storage and avoiding pumping induced subsidence. The GSP model was used to quantify the expected benefit from this project. Figure 9-15 shows the expected groundwater level benefit predicted by the GSP model after 10 years of project operation. Figure 9-15 expresses the benefit as feet of groundwater. The groundwater level benefit shown on Figure 9-15 is a measure of how much higher groundwater elevations are expected to be with the project rather than without the project.

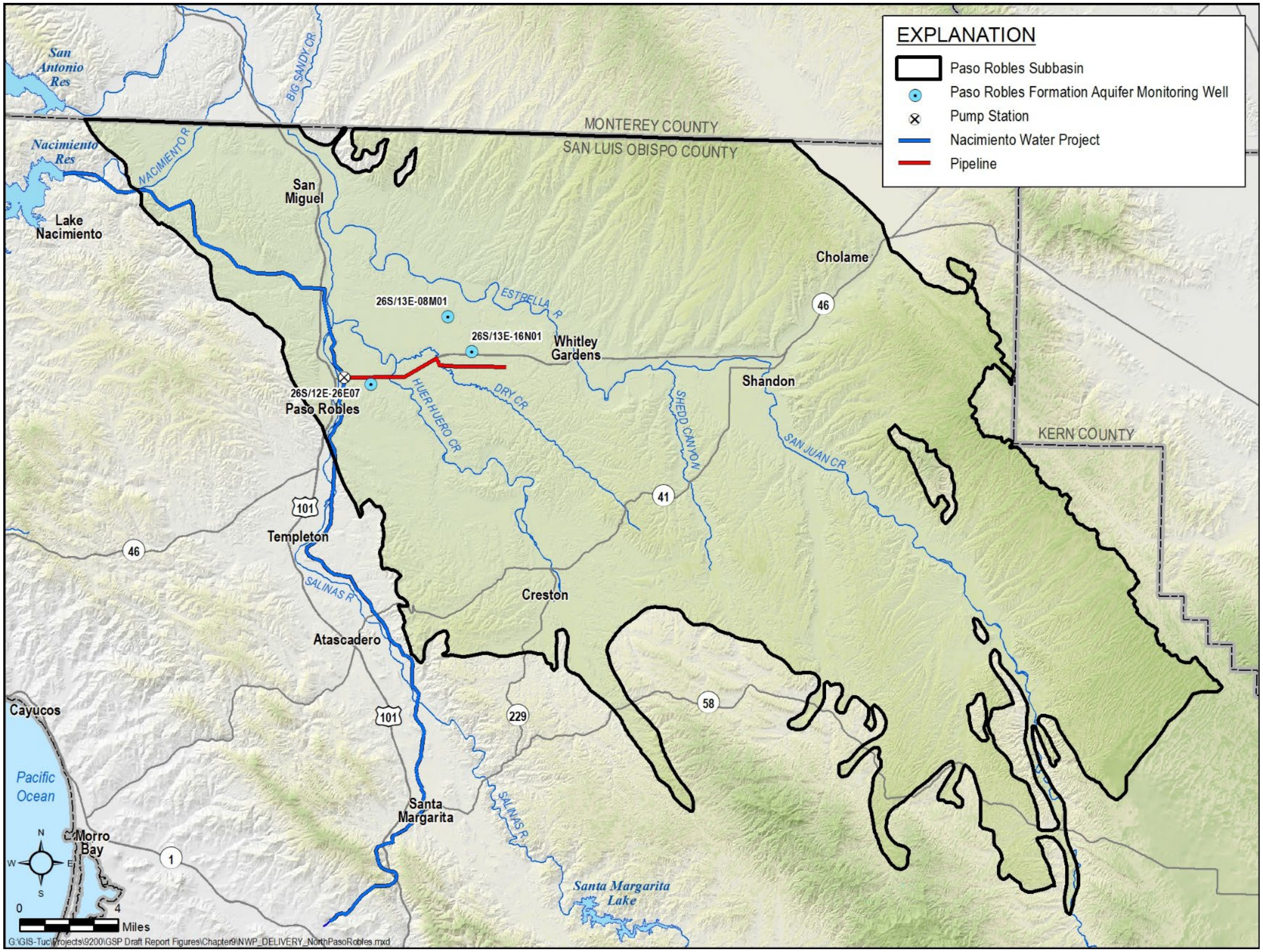


Figure 9-14. Conceptual NWP Delivery East of City of Paso Robles Project Layout

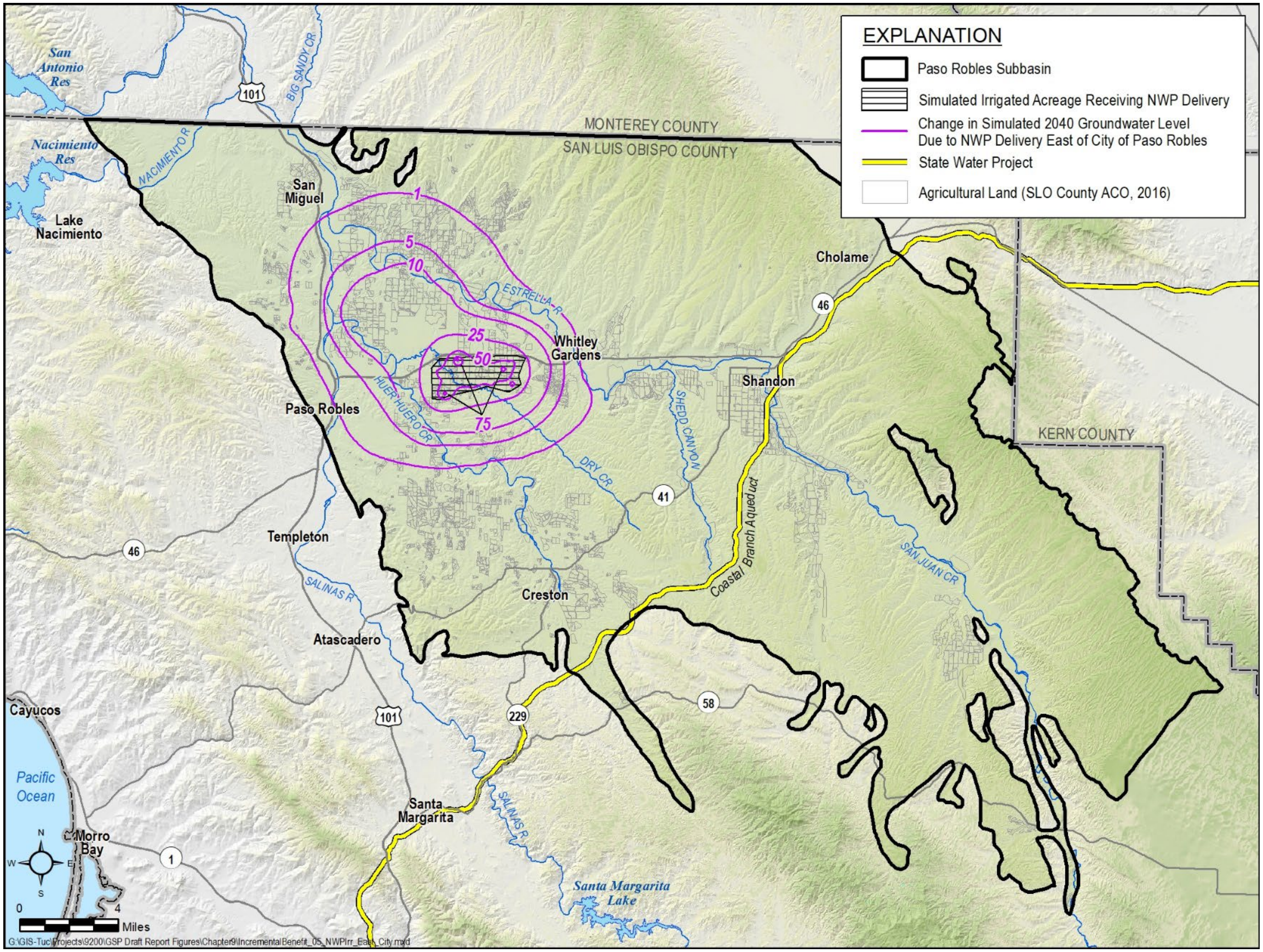


Figure 9-15. Groundwater Level Benefit from NWP Delivery East of City of Paso Robles

Changes in groundwater elevation will be measured with the groundwater level monitoring program detailed in Chapter 7. Subsidence will be measured with the InSAR network detailed in Chapter 7. A direct correlation between in-lieu recharge and changes in groundwater levels may not be possible because this is only one among many management actions and projects that may be implemented in the Subbasin.

9.5.2.6.3 Circumstances for Implementation

All projects are implemented based on need, cost benefit studies and willing participants. The project to deliver water for in-lieu recharge east of the City of Paso Robles will be initiated if, after five years, groundwater levels in the central portion of the monitoring network continue to decline at unsustainable rates. In particular, continued unsustainable groundwater level declines in monitoring wells 26S/13E-16N01, 26S/13E-08M01 and 26S/12E-26E07 will trigger implementation of this project. Additional triggers will be added as the monitoring well network expands.

9.5.2.6.4 Implementation Schedule

The implementation schedule is presented on Figure 9-16. The project will take 4 to 6 years to implement depending on the time required to negotiate procurement of NWP water. Conceptually, project implementation would occur in years 6 through 12 after GSP adoption.

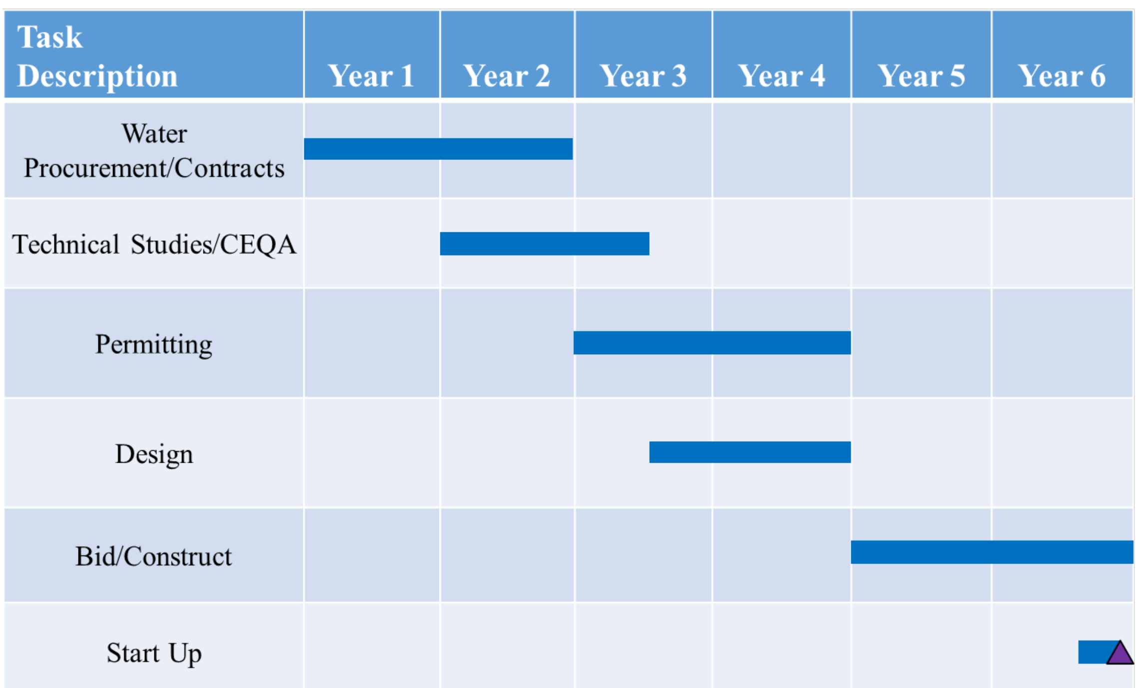


Figure 9-16. Implementation Schedule for NWP Delivery East of City of Paso Robles

9.5.2.6.5 Estimated Cost

The estimated total project cost for this project is $32M. Annual O&M costs are estimated at $380,000. The average annual cost of NWP purchased water is estimated at $2.4M based on an average year delivery of 2,000 AFY. However, the unit price would need to be negotiated, and the actual amount of water available will vary year to year thereby affecting the actual annual purchase cost. O&M and water purchase costs would be covered by the overproduction surcharges. Based on a 30-year loan at a 5% interest rate, the cost of water for this project would be approximately $2,400/AF. Additional details regarding how costs were developed are included in Appendix J.

9.5.2.7 Preferred Project 6: Expansion of Salinas Dam

SLOCFCWCD operates the Salinas Dam to provide water to the City of San Luis Obispo. The storage capacity of the lake is 23,843 AF; however, the City has existing water rights of 45,000 AF of storage. It is anticipated that funding would be sought to help the cost of retrofitting the dam and expanding the storage capacity by installing gates along the spillway in order to retain flood flow/stormwater for beneficial use. A risk assessment for the Dam is scheduled for the summer of 2019.

There may be opportunities to use the water from the expanded reservoir storage to benefit the Subbasin. One possibility would be to schedule summer releases from the storage to the Salinas River, which would benefit the Subbasin by recharging the basin through the Salinas River. Another way this project might indirectly benefit the Subbasin is if the City of San Luis Obispo were to use more of their Salinas River water allocation, thereby freeing up the NWP water for purchase by the GSAs.

9.5.2.7.1 Relevant Measurable Objectives

The measurable objectives benefiting from this project include:

- Groundwater elevation measurable objectives in the central portion of the Subbasin
- The groundwater storage measurable objective
- Land subsidence measurable objectives in the central portion of the Subbasin

9.5.2.7.2 Expected Benefits and Evaluation of Benefits

The primary benefit from releasing additional water to the Salinas River during the summer is higher groundwater elevations along the Salinas River. Ancillary benefits of shallower groundwater elevations may include an increase in groundwater storage and avoiding pumping induced subsidence. The GSP model was used to quantify the expected benefit from this project. Figure 9-17 shows the expected groundwater level benefit predicted by the GSP model after 10 years of project operation. Figure 9-17 expresses the benefit as feet of groundwater. The groundwater level benefit shown on Figure 9-17 is a measure of how much higher groundwater elevations are expected to be with the project rather than without the project.

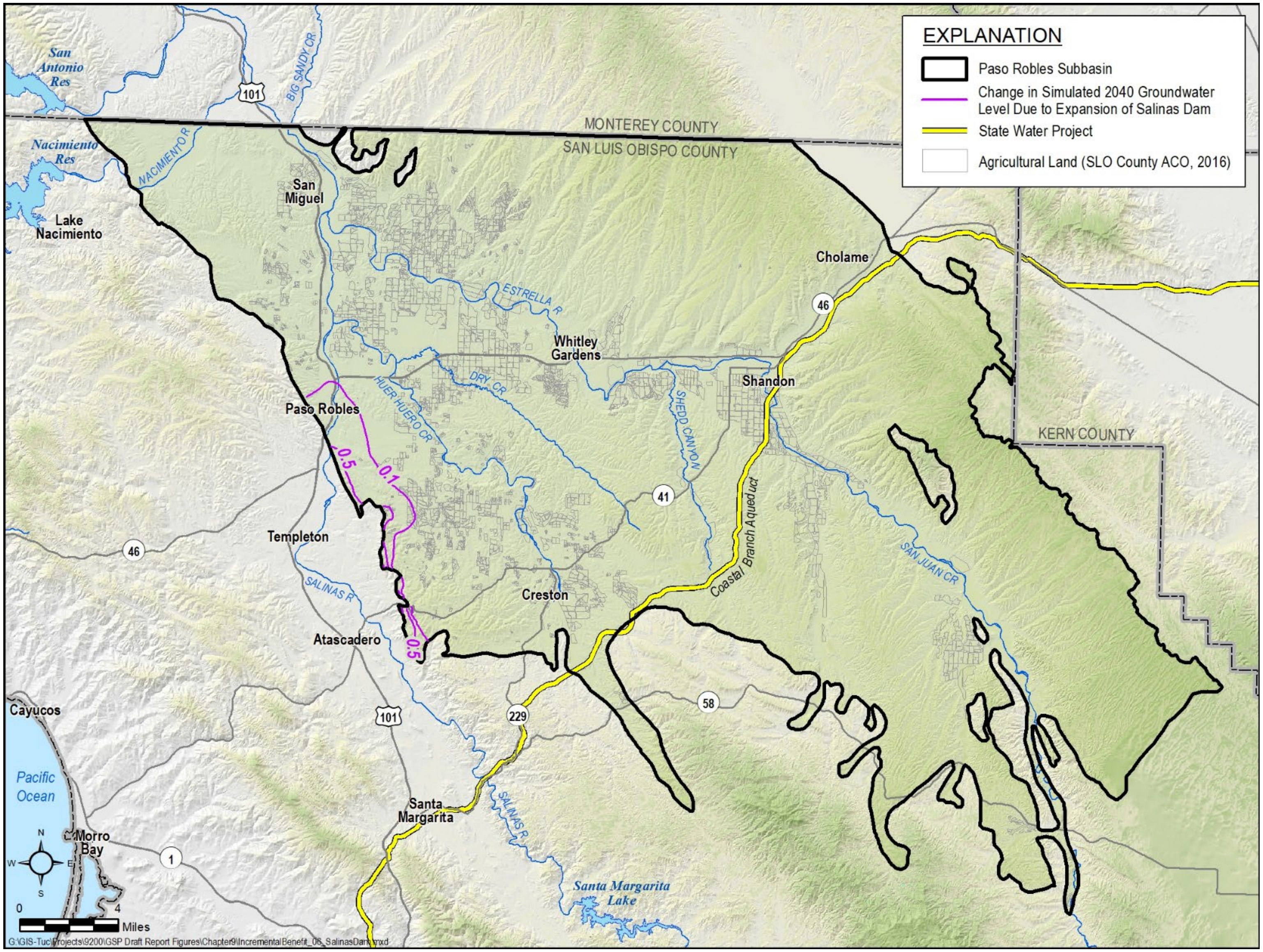


Figure 9-17. Groundwater Level Benefit from Salinas River Summer Releases

9.5.2.7.3 Circumstances for Implementation

All projects are implemented based on need, cost benefit studies and willing participants. The project to release Salinas River water during the summer will be initiated if, after two years, groundwater levels near the Salinas River continue to decline at unsustainable rates. In particular, continued unsustainable groundwater level declines in monitoring wells 25S/12E-16K05, 26S/13E-16N01, 27S/12E-13N01 and 27S/13E-30N01 will trigger implementation of this project. Additional triggers will be added as the monitoring well network expands.

9.5.2.7.4 Implementation Schedule

The implementation schedule is presented on Figure 9-18. The project will take 4 to 5 years to implement. Conceptually, project implementation would occur in years 3 through 8 after GSP adoption.

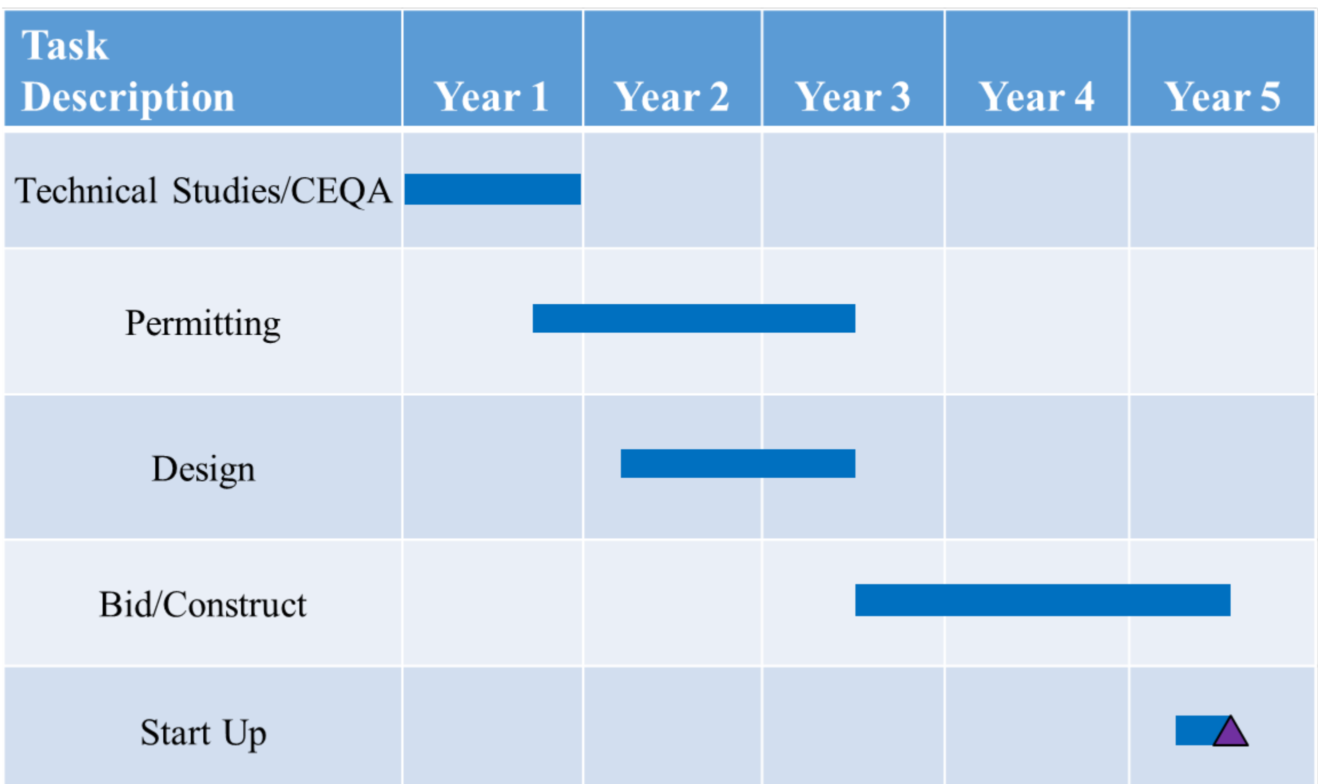


Figure 9-18. Implementation Schedule for Expansion of Salinas Dam

9.5.2.7.5 Estimated Cost

The cost to increase the storage capacity behind the Salinas Dam has been estimated at between $30M and $50M. O&M costs have not been estimated at this time. Some of these costs may be available from federal sources. No additional capital cost would be required to release water to the Salinas River for recharge during the summer months.

9.6 Other Groundwater Management Activities

Although not specifically funded or managed as part of implementing this GSP, a number of associated groundwater management activities will be promoted and encouraged by the GSAs as part of general good groundwater management practices.

9.6.1 Continue Urban and Rural Residential Conservation

Existing water conservation measures should be continued, and new water conservation measures promoted for residential users. Conservation measures may include the use of low flow toilet fixtures, or laundry-to-landscape greywater reuse systems. Conservation projects can reduce demand for groundwater pumping, thereby acting as in-lieu recharge.

9.6.2 Watershed Protection and Management

Watershed restoration and management can reduce stormwater runoff and improving stormwater recharge into the groundwater basin. While not easily quantified and therefore not included as projects in this document, watershed management activities may be worthwhile and benefit the basin.

9.6.3 Retain and Enforce the Existing Water Export Ordinance

This GSP recommends that San Luis Obispo County's existing groundwater export ordinance should be enforced and retained. With limited exception, the ordinance requires a permit for the movement of groundwater across the county or Subbasin line. To obtain a permit, the movement of groundwater cannot negatively impact a nearby overlying groundwater user, result in seawater intrusion, or result in a cone of depression greater than the landowner's property line. This ordinance will continue to protect the county's water supplies.

9.7 Demonstrated Ability to Attain Sustainability

To demonstrate the ability to attain sustainability, a groundwater management scenario that included both projects and management actions was modeled. The scenario included all of the conceptual projects listed in Section 9.5.3. In addition to the conceptual projects, pumping was reduced to bring groundwater elevations to the measurable objectives before 2040 and maintain the same groundwater elevations through 2070.

The GSP model was adapted to simulate the scenario described above over the GSP implementation period from 2020 through 2040. The ability to achieve sustainability was quantified by comparing 2040 simulated groundwater levels under each of the two scenarios against the Measurable Objective surface – as described in Chapter 8 – for both the Paso Robles formation aquifer and the Alluvial aquifer.

Individual hydrographs comparing the predicted groundwater elevations to the measurable objectives at each representative monitoring site are included in Appendix K.

9.8 Management of Groundwater Extractions and Recharge and Mitigation of Overdraft

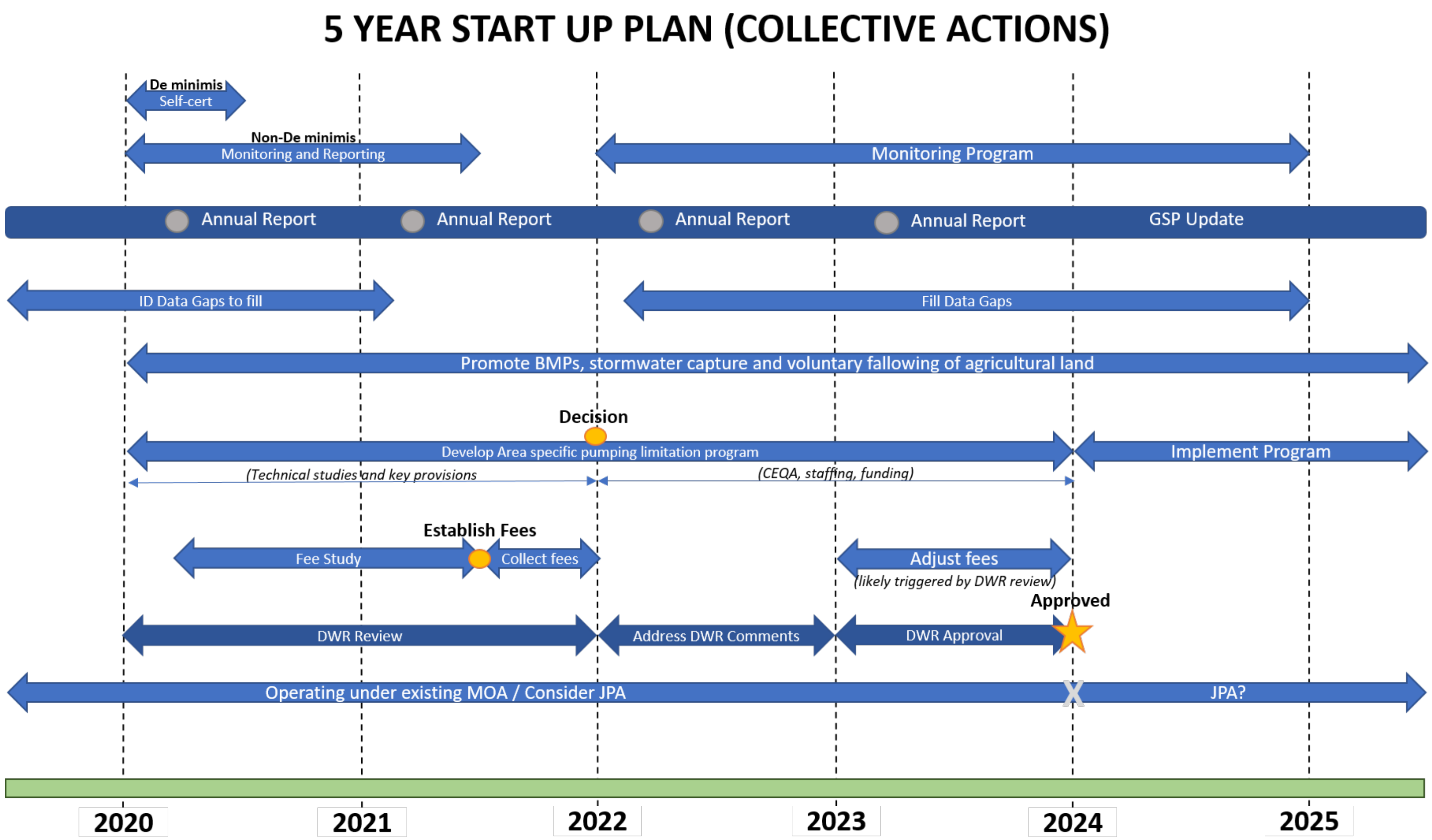
This GSP is specifically designed to mitigate the decline in groundwater storage and persistent groundwater level declines in certain areas with a combined program of management actions designed to promote voluntary reductions in pumping and provide authority for mandatory pumping limitations where necessary. Individual GSAs are also proceeding on projects designed to use recycled water, any available Nacimiento Project water and flood flow/stormwater in the Salinas River to use in lieu of pumping groundwater and/or to supplement groundwater supplies.

10 GROUNDWATER SUSTAINABILITY PLAN IMPLEMENTATION

This chapter is intended to serve as a conceptual roadmap for efforts to start implementing the GSP over the first five years and discusses implementation effects in accordance with SGMA regulations sections 354.8(f)(2) and (3). A general schedule showing the major tasks and estimated timeline is provided in Figure 10-1. Specific regulations guiding the content of this chapter were not developed by DWR.

The implementation plan provided in this chapter is based on current understanding of Subbasin conditions and anticipated administrative considerations that affect the management actions described in Chapter 9. Understanding of Subbasin conditions and administrative considerations will evolve over time based on future refinement of the hydrogeologic setting, groundwater flow conditions, and input from Subbasin stakeholders.

Implementation of the GSP requires robust administrative and financing structures, with adequate staff and funding to ensure compliance with SGMA. The GSP calls for GSAs to routinely provide information to the public about GSP implementation and progress towards sustainability and the need to use groundwater efficiently. The GSP calls for a website to be maintained as a communication tool for posting data, reports and meeting information. The website may also include forms for on-line reporting of information needed by the GSAs (e.g., annual pumping amounts) and an interactive mapping function for viewing Subbasin features and monitoring information.



JPA: Joint Powers Authority

Figure 10-1. General Schedule of 5-Year Start-Up Plan

10.1 Administrative Approach

GSAs will likely hire consultant(s) or hire staff to implement the GSP. If consultants are hired, it is anticipated that qualified professionals will be identified and hired through a competitive selection process. It is also anticipated that the lead GSA for a particular task will keep the other GSAs informed via periodic updates to the Cooperative Committee and the public. As needed, the GSAs would likely coordinate on the specific studies and analyses necessary to improve understanding of Subbasin conditions. The GSAs would likely then use new information on Subbasin conditions and projects to identify, evaluate, and/or improve management actions to achieve sustainability. This GSP calls for actions considered by the GSAs to be vetted through a public outreach process whereby groundwater pumpers and other stakeholders will have opportunities to provide input to the decision-making process.

10.2 Funding GSP Implementation

As summarized in Table 10-1, a conceptual planning-level cost of about $7,800,000 was estimated for planned activities during the first five years of implementation, or an estimated cost of $1,560,000 per year. This cost estimate reflects routine administrative operations, monitoring, public outreach, and the basin wide and area specific management actions outlined in Chapter 9. This estimate assumes a centralized approach to implementation and staffing, it does not include CEQA, legal staff costs, individual GSA staff costs or responding to DWR comments, nor does it include costs associated with any projects undertaken by willing entities.

The GSP calls for implementation to be covered under the terms of the existing MOA (see Chapter 12) among the four GSAs until DWR approves the GSP and a new or renewed GSA cooperative agreement is established. Consistent with current practice under the MOA, it is anticipated that an annual operating budget will be established that is considered for approval by each GSA. This budget information and management action details would be used to conduct a fee study for purposes of developing a groundwater pumping fee to cover the costs of implementing the regulatory program described in the GSP including, but not limited to, costs related to monitoring and reporting, hydrogeologic studies, pumping reduction enforcement where necessary, and public outreach.

The GSAs plan to conduct focused public outreach and hold meetings to educate and solicit input on the proposed fee structure and plan to begin developing the fee structure as soon as administratively feasible after GSP adoption. Establishing a funding structure is estimated to cost $250,000.

California Water Code Sections 10730 and 10730.2 provide GSAs with the authority to impose certain fees, including fees on groundwater pumping. Any imposition of fees, taxes or other charges would need to follow the applicable protocols outlined in the above sections and all applicable Constitutional requirements based on the nature of the fee. Such protocols would likely include public outreach, notification of all property owners, and at least one public hearing where the opinions and concerns of all parties are heard and considered before the GSAs make a determination to proceed with a fee or other charge. It is assumed that any fee structure adopted by the individual GSAs would be adopted by resolution or ordinance and would be identical in all material respects, i.e. with respect to levels and classes of uses. As part of or in conjunction with the feasibility study and in order to reduce the risk of a legal challenge, the GSAs plan to obtain the legal advice necessary to ensure that the proposed fee is consistent with all applicable legal requirements and rights.

With respect to those pumpers that are not anticipated to be subject to the fee, the GSAs plan to develop a program pursuant to which such pumpers will be required to self-certify that they only pump for domestic purposes and use less than 2 AFY.

Table 10-1. Estimated Planning-Level Costs for First Five Years of Implementation[1]

GSP Implementation Activity	Description	Estimated Costs	Cost Unit	Anticipated Timeframe	Estimated Costs During Startup (2020-2025)
Administration and Finance					
Administration development	Update agreements; hire staff (GSP manager and staff); update website; conduct public outreach and meeting protocols	$ 100,000	lump sum	Quarters 1-2, 2020	$ 100,000
Ongoing GSP implementation administration	Routine operating costs (salaries, office space, equipment, etc.)	$ 500,000	annual	Starting in 2020	$ 2,500,000
Fee study for GSP implementation	Study to develop and justify funding mechanism for GSP implementation	$ 250,000	lump Sum	Quarter 2, 2020 through Quarter 2, 2021	$ 250,000
Basin-wide Management Actions					
Monitoring, reporting & outreach					
De minimis self certification	Evaluate existing programs; develop new program for GSP	$ 30,000	lump sum	Quarters 1-2, 2020	$ 30,000
Non-de minimis metering & reporting program	Develop new metering and reporting program, land fallowing/project accounting	$ 100,000	lump sum	Quarters 1-2, 2020	$ 100,000
Annual reports	Collect and analyze groundwater level data; apply groundwater lelvel - storage proxy, evaluate water quality data, download and evaluate land subsidence data; update data management system (DMS); maintain monitoring network infrastructure; prepare and submit annual report to DWR	$ 250,000	annual	Starting in 2020	$ 1,250,000
Data gaps					
Supplemental hydrogeologic study	Refine hydrologeologic conceptual model; address data gaps	$ 300,000	lump sum	2020 to 2024	$ 300,000
Monitoring networks - groundwater levels					
Verify network	Verify proposed network	$ 30,000	lump sum	Quarters 1-2, 2020	$ 30,000
Expand network - add existing wells	Identify/inspect wells, video-logging, access agreements	$ 100,000	lump sum	Quarters 1-2, 2020	$ 100,000
Expand network - drill new wells	Add new wells in key data gap areas	$ 100,000	per well	Quarters 1-2, 2020	$ 500,000
Monitoring networks - groundwater storage					
Develop groundwater level - storage proxy	Quantiative relationship between changes in groundwater level, changes in storage, and amount of groundwater pumping	$ 50,000	lump sum	Quarters 3-4, 2020	$ 50,000
Monitoring networks - water quality					
Verify network	Verify proposed network	$ 20,000	lump sum	2020 to 2024	$ 20,000
Monitoring networks - land subsidence					
Verify network	Verify proposed network	$ 20,000	lump sum	2020 to 2024	$ 20,000
Monitoring networks - interconnected surface water					
Conduct surface water/groundwater investigation	Focused surface and groundwater investigations in areas of ptentailly interconnectivity; conduct monitoring; cost depends on avaailabiltiy of existing wells and number of new wells needed; cost assumes 5 new wells needed	$ 400,000	lump sum	2020 to 2024	$ 400,000
5-year GSP updates & amendments					
GSP assessment and reporting	Prepare report/amend GSP	$ 300,000	lump sum	2023 to 2024	$ 300,000
Groundwater modeling	Refine, update, and recalibrate groundwater model	$ 250,000	lump sum	2023	$ 250,000
Promoting					
Best water use practices	Costs included in monitoring, reporting and outreach for ongoing GSP implementation				
Stormwater capture					
Voluntary fallowing of agricultural land					
Area Specific Management Actions					
Mandatory pumping limitations in specific areas					
Baseline pumping determination	Develop structure; public outreach; meetings; legal fees	$ 350,000	lump sum	2020 to 2022	$ 350,000
Pumping limitations determination					
Timeline established for pumping limitations					
Pumping limitations regulations approval process					
Regulation implementation	Oversight and enforcement	$ 250,000	annual	Starting in 2020	$ 1,250,000
				Total Estimated Costs during Startup (2020-2025)	**$ 7,800,000**
				Average Annual Estimated Costs during Startup (2020-2025)	**$ 1,560,000**

[1] This estimate assumes a centralized approach to implementation and staffing, it does not include CEQA, legal staff costs, individual GSA staff costs or responding to DWR comments, nor does it include costs associated with any projects undertaken by willing entities.

10.3 Plan Implementation Effects on Existing Land Use

Given that implementation of the GSP will likely result in the adoption of regulations limiting or suspending extractions pursuant to the authority granted by SGMA, implementation of the GSP is likely to have an impact on land uses. However, all such regulations will need to be consistent with the applicable statutory constraints, including those described in Water Code Section 10726.4(a)(2) which provides that such regulations shall be consistent with the applicable elements of the city or county general plan, unless there is insufficient sustainable yield in the basin to serve a land use designated in the city or county general plan and Water Code Section 10726.8(f) which states that nothing contained in SGMA or in a GSP shall be interpreted as superseding the land use authority of cities and counties.

10.4 Plan Implementation Effects on Water Supply

Plan implementation will not significantly alter the existing water supply of the Subbasin. If entities opt to develop optional water supply projects as outlined in Chapter 9, the Subbasin's water supply could increase.

10.5 Plan Implementation Effects on Local and Regional Economy

Plan implementation will potentially limit economic growth due to pumping reductions outlined in Chapter 9. Pumping reductions could limit or reduce agricultural output, thereby reducing regional income.

11 NOTICE AND COMMUNICATION

This chapter and the Communications and Engagement (C&E) Plan in Appendix M describe the notification and communication with interested parties and stakeholders in the Subbasin regarding the GSP. The information presented is prepared in accordance with the SGMA Regulations §354.10 to provide a description of beneficial uses, a list of public meetings, and comments and a summary of responses. It also contains a communication section with an explanation of the decision-making process, identification of opportunities for public engagement, a description of outreach to diverse populations, and the method for keeping the public updated about the plan and related activities. These requirements are met by the Communications and Engagement (C&E) Plan that is included in Appendix M. Public comments received and provided by the GSAs are listed in Appendix N. Table 11-1 lists the specific regulatory and statutory requirements for notice and communication and refers to sections of the C&E Plan.

The plan was written early in the process of GSP development as a stand-alone document to guide notice and communication throughout GSP development. The C&E Plan was presented to and accepted as "receive and file" by the Cooperative Committee on July 25, 2018. Table 11-2 lists public meetings that were held after July 2018.

Table 11-1. Requirements of Statutes and Regulations Pertaining to Notice and Communications

Legislative / Regulatory Requirement	Legislative / Regulatory Section Reference	C&E Plan Section
Publish public notices and conduct public meetings when establishing a GSA, adopting or amending a GSP, or imposing or increasing a fee.	SGMA Sections 10723(b), 10728.4, and 10730(b)(1).	**7.0**
Maintain a list of, and communicate directly with, interested parties.	SGMA Sections 10723.4, 10730(b)(2), and 10723.8(a)	**4.0**
Consider the interests of all beneficial uses and users of groundwater.	SGMA Section 10723.2	**4.0**
Provide a written statement describing how interested parties may participate in plan [GSP] development and implementation, as well as a list of interested parties, at the time of GSA formation.	SGMA Sections 10723.8(a) and 10727.8(a)	**4.0**
Encourage active involvement of diverse social, cultural, and economic elements of the population within the groundwater basin.	SGMA Section 10727.8(a)	**7.0**
Understand that any federally recognized Indian Tribe may voluntarily agree to participate in the planning, financing, and management of groundwater basins – refer to DWR's Engagement with Tribal Governments Guidance Document for Tribal recommended communication procedures.	SGMA 10720.3(c)	**7.0**
Description of beneficial uses and users of groundwater in the basin	GSP Regulations §354.10	**3.0**
List of public meetings at which the Plan [GSP] was discussed or considered	GSP Regulations §354.10	**Table 11-2**
Comments regarding the Plan [GSP] received by the Agency and a summary of responses	GSP Regulations §354.10	**N/A at time of publication**
A communication section that includes the following:	GSP Regulations §354.10	
Explanation of the Agency's decision-making process	GSP Regulations §354.10	**4.0**
Identification of opportunities for public engagement and discussion of how public input and response will be used	GSP Regulations §354.10	**7.0**
Description of how the Agency encourages active involvement of diverse social, cultural, and economic elements of the population within the basin	GSP Regulations §354.10	**7.0**
The method the Agency will follow to inform the public about progress implementing the Plan [GSP], including the status of projects and actions	**GSP Regulations §354.10**	**7.0**

Table 11-2. Public Meetings at which the GSP Was Discussed

Type of Meeting	Location	Date
City of Paso Robles		
GSA Formation Public Hearing	Paso Robles City Hall	**Jan 17, 2017**
Todd Groundwater Contract for Pre-GSP Planning	Paso Robles City Hall	**April 4, 2017**
GSA/GSP Funding	Paso Robles City Hall	**June 6, 2017**
Paso Basin MOA	Paso Robles City Hall	**Aug 15, 2017**
Paso Basin MOA Appointments	Paso Robles City Hall	**Sept 7, 2017**
Paso Basin Prop 1 Grant Application	Paso Robles City Hall	**Oct 17, 2017**
GSA Notice of Intent to Prepare GSP	Paso Robles City Hall	**Jan 6, 2018**
GSP Contract Award to HydroMetrics	Paso Robles City Hall	**March 20, 2018**
GSA Review of GSP Draft Chapters 1-4 and 11	Paso Robles City Hall	**Oct 16, 2018**
GSA Review of GSP Draft Chapters 5-8	Paso Robles City Hall	**April 16, 2019**
GSA Review of GSP Draft Chapters 9-12	Paso Robles City Hall	**June 18, 2019**
GSA Increase to GSP Budget	Paso Robles City Hall	**Aug 6, 2019**
Adoption of GSP Public Hearing	Paso Robles City Hall	**Dec 17, 2019**
Adoption of Revised GSP Public Hearing	Paso Robles City Hall and Zoom	**Jun 21, 2022**
County of San Luis Obispo		
County Board of Supervisors	County Government Center	**May 16, 2017**
County Board of Supervisors	County Government Center	**Aug 22, 2017**
County Board of Supervisors	County Government Center	**Feb 6, 2018**
County Board of Supervisors	County Government Center	**March 6, 2018**
County Board of Supervisors	County Government Center	**June 19, 2018**
County Board of Supervisors	County Government Center	**Oct 2, 2018**
County Board of Supervisors	County Government Center	**Dec 4, 2018**
County Board of Supervisors	County Government Center	**Feb 26, 2019**
County Board of Supervisors	County Government Center	**April 9, 2019**
County Board of Supervisors	County Government Center	**June 18, 2019**
County Board of Supervisors	County Government Center	**Aug 20, 2019**
County Board of Supervisors	County Government Center	**Oct 22, 2019**
County Board of Supervisors	County Government Center	**Nov 5, 2019**
County Board of Supervisors	County Government Center	**Nov 19, 2019**
County Board of Supervisors	County Government Center	**Dec 17, 2019**
County Board of Supervisors	County Government Center and Zoom	**Jul 20, 2022**
Paso Robles Subbasin Cooperative Committee		
Cooperative Committee Meeting	EOC Main Conference Room	**Oct 18, 2017**
Cooperative Committee Meeting	Courtyard by Marriott	**Oct 25, 2017**
Cooperative Committee Meeting	EOC Main Conference Room	**Dec 6, 2017**
Cooperative Committee Meeting	Hampton Inn & Suites	**Feb 14, 2018**
Cooperative Committee Meeting	Paso Robles City Hall	**March 7, 2018**
Cooperative Committee Meeting	Paso Robles City Hall	**April 25, 2018**
Cooperative Committee Meeting	Paso Robles City Hall	**July 25, 2018**
Cooperative Committee Special Meeting	Paso Robles City Hall	**Sept 12, 2018**

Type of Meeting	Location	Date
Paso Robles Subbasin Cooperative Committee (continued)		
Public Workshop: Sustainable Management Criteria	Kermit King Elementary School	**Oct 4, 2018**
Public Workshop: Sustainable Management Criteria	Creston Elementary School	**Oct 8, 2018**
Cooperative Committee Regular Meeting	Paso Robles City Hall	**Oct 17, 2018**
Cooperative Committee Special Meeting	Paso Robles City Hall	**March 6, 2019**
Cooperative Committee Regular Meeting	Paso Robles City Hall	**April 24, 2019**
Cooperative Committee Special Meeting	Paso Robles City Hall	**May 22, 2019**
Cooperative Committee Regular Meeting	Paso Robles City Hall	**July 24, 2019**
Cooperative Committee Special Meeting	Paso Robles City Hall	**Aug 21, 2019**
Cooperative Committee Regular Meeting	Paso Robles City Hall	**Oct 23, 2019**
Cooperative Committee Special Meeting	Paso Robles City Hall	**Nov 20, 2019**
Cooperative Committee Special Meeting	Zoom	**Sep 23, 2020**
Cooperative Committee Special Meeting	Zoom	**Nov 18, 2020**
Cooperative Committee Special Meeting	Zoom	**Jan 27, 2021**
Cooperative Committee Special Meeting	Zoom	**Mar 17, 2021**
Cooperative Committee Special Meeting	Zoom	**Apr 28, 2021**
Cooperative Committee Special Meeting	Zoom	**Jul 21, 2021**
Cooperative Committee Special Meeting	Zoom	**Jul 27, 2021**
Cooperative Committee Special Meeting	Zoom	**Oct 27, 2021**
Cooperative Committee Special Meeting	Zoom	**Jan 26, 2022**
Cooperative Committee Special Meeting	Zoom	**Mar 4, 2022**
Cooperative Committee Special Meeting	Paso Robles City Hall and Zoom	**Mar 17, 2022**
Cooperative Committee Special Meeting	Paso Robles City Hall and Zoom	**Apr 27, 2022**
San Miguel Community Services District		
2018 GSP Meeting	SMCS District office	**June 28, 2018**
2018 GSP Meeting	SMCS District office	**Aug 23, 2018**
2018 GSP Meeting	SMCS District office	**Sept 27, 2018**
2018 GSP Meeting	SMCS District office	**Oct 25, 2018**
2019 GSP Meeting	SMCS District office	**Jan 24, 2019**
2019 GSP Meeting	SMCS District office	**March 28, 2019**
2019 GSP Meeting	SMCS District office	**April 25, 2019**
2019 GSP Meeting	SMCS District office	**May 21, 2019**
2019 GSP Meeting	SMCS District office	**July 25, 2019**
2019 GSP Meeting	SMCS District office	**Aug 22, 2019**
2019 GSP Meeting	SMCS District office	**Sept 26, 2019**
2019 GSP Meeting	SMCS District office	**Oct 24, 2019**
2019 GSP Meeting	SMCS District office	**Nov 21, 2019**
2019 GSP Meeting	SMCS District office	**Dec 19, 2019**
Revised GSP Adoption Hearing	SMCS District office	**Jun 23, 2022**
Shandon-San Juan Water District		
SSJWD Board Meeting	Shandon High School Library	**Aug 15, 2017**
SSJWD Board Meeting	Shandon High School Library	**Sept 19, 2017**

Type of Meeting	Location	Date
Shandon-San Juan Water District (continued)		
Shandon Advisory Groundwater Update	Shandon Park	**Oct 4, 2017**
SSJWD Board Meeting	Shandon High School Library	**Oct 17, 2017**
SSJWD Board Meeting	Shandon High School Library	**Nov 15, 2017**
Shandon Advisory Groundwater Update	Shandon Park	**Feb 7, 2018**
SSJ GSA GSP Board meeting	Shandon High School Library	**Feb 20, 2018**
Shandon Advisory Groundwater Update	Shandon Park	**March 7, 2018**
SSJ GSA GSP Board meeting	Shandon High School Library	**March 27, 2018**
SSJ GSA GSP Board meeting	Shandon High School Library	**May 15, 2018**
SSJ GSA GSP Board meeting	Shandon High School Library	**June 19, 2018**
SSJ GSA GSP Board meeting	Shandon High School Library	**July 17, 2018**
Shandon Advisory Groundwater Update	Shandon Park	**Aug 1, 2018**
SSJ GSA GSP Board meeting	Shandon High School Library	**Aug 21, 2018**
Shandon Advisory Groundwater Update	Shandon Park	**Sept 5, 2018**
SSJ GSA GSP Special Board meeting	Windfall Farms Creston	**Sept 18, 2018**
Shandon Advisory Groundwater Update	Shandon Park	**Oct 3, 2018**
SSJ GSA GSP Board meeting	Shandon High School Library	**Oct 16, 2018**
Shandon Advisory Groundwater Update	Shandon Park	**Nov 7, 2018**
SSJ GSA GSP Board meeting	Shandon High School Library	**Nov 14, 2018**
SSJ GSA GSP Board meeting	Shandon High School Library	**Dec 11, 2018**
SSJ GSA GSP Board meeting	Shandon High School Library	**Jan 15, 2019**
SSJ GSA GSP Board meeting	Shandon High School Library	**Feb 19, 2019**
SSJ GSA GSP Special Board meeting	J Lohr Wine Center Paso Robles	**March 19, 2019**
SSJ GSA GSP Special Board meeting	J Lohr Wine Center Paso Robles	**April 9, 2019**
Shandon Advisory Groundwater Update	Shandon Park	**May 1, 2019**
SSJ GSA GSP Special Board meeting	J Lohr Wine Center Paso Robles	**May 7, 2019**
SSJ GSA GSP Board meeting	Shandon High School Library	**June 18, 2019**
SSJ GSA GSP Special Board meeting	Paso Robles Wine Services Paso Robles	**July 8, 2019**
SSJ GSA GSP Board meeting	Paso Robles Wine Services Paso Robles	**Aug 27, 2019**
SSJ GSA GSP Special Board meeting	Sunny Slope Lodge Shandon	**Sept 5, 2019**
SSJ GSA GSP Board meeting	Sunny Slope Lodge Shandon	**Sept 17, 2019**
SSJ GSA GSP Board meeting	Sunny Slope Lodge Shandon	**Oct 15, 2019**
SSJ GSA GSP Board meeting	Sunny Slope Lodge Shandon	**Nov 21, 2019**
SSJ GSA GSP Adoption Hearing	Sunny Slope Lodge Shandon	**Jun 22, 2022**

12 MEMORANDUM OF AGREEMENT

The GSAs will operate under the existing MOA until DWR approves the GSP. The existing MOA is included in Appendix A. During DWR's review process, the GSAs will consider developing a refined governance structure to implement the GSP. The governance structure would be established in a new agreement between the GSAs. The agreement would outline details and responsibilities for GSP administration among the participating entities and may include provisions to establish a new governing body to oversee GSP implementation.

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Revised June 2022

Paso Robles Subbasin

GROUNDWATER SUSTAINABILITY PLAN

APPENDICES

Paso Robles Subbasin Groundwater Sustainability Agencies

County of San Luis Obispo
Shandon San Juan Water District
City of Paso Robles
San Miguel Community Services District

Revised June 13, 2022

Paso Robles Subbasin Groundwater Sustainability Plan APPENDICES

Prepared for:

Paso Robles Subbasin Cooperative Committee and the Groundwater Sustainability Agencies

LIST OF APPENDICES

Appendix A

Groundwater Sustainability Agency Resolutions and Memorandum of Agreement

BEFORE THE BOARD OF SUPERVISORS

of the

COUNTY OF SAN LUIS OBISPO

Tuesday, May 16, 2017

PRESENT: Supervisors Bruce S. Gibson, Adam Hill, Lynn Compton, Debbie Arnold, and Chairperson John Peschong

ABSENT: None

RESOLUTION NO. 2017-134

RESOLUTION FORMING THE PASO BASIN – COUNTY OF SAN LUIS OBISPO GROUNDWATER SUSTAINABILITY AGENCY AND FINDING THAT THE PROJECT IS EXEMPT FROM SECTION 21000 *ET SEQ.* OF THE CALIFORNIA PUBLIC RESOURCES CODE (CEQA)

The following Resolution is hereby offered and read:

WHEREAS, in 2014, the California Legislature adopted, and the Governor signed into law, three bills (SB 1168, AB 1739, and SB 1319) collectively referred to as the Sustainable Groundwater Management Act (SGMA) (Water Code §§ 10720 *et seq.*), that became effective on January 1, 2015, and that have been subsequently amended; and

WHEREAS, the intent of SGMA, as set forth in Water Code section 10720.1, is to provide for the sustainable management of groundwater basins at a local level by providing local groundwater agencies with the authority, and technical and financial assistance necessary, to sustainably manage groundwater; and

WHEREAS, SGMA requires the formation of a groundwater sustainability agency (GSA) or agencies for all basins designated by the California Department of Water Resources (DWR) as high or medium priority on or before June 30, 2017; and

WHEREAS, SGMA further requires the adoption of a groundwater sustainability plan (GSP) for all basins designated by DWR as high or medium priority and subject to critical conditions of overdraft on or before January 31, 2020; and

WHEREAS, the Paso Robles Area Groundwater Subbasin (Basin No. 3-004.06) (Basin) has been designated by DWR as a high priority basin subject to critical conditions of overdraft; and

WHEREAS, the County of San Luis Obispo is a "local agency" within the Basin as defined in Water Code Section 10721(n) and thus is eligible to form a GSA in the Basin; and

WHEREAS, the Salinas Valley Basin Groundwater Sustainability Agency, City of El Paso de Robles, San Miguel Community Services District, Heritage Ranch Community Services District, and Shandon-San Juan Water District are also local agencies within the Basin, and it is anticipated that they will each become the GSA for their respective service areas within the Basin; and

WHEREAS, on April 6, 2017, the San Luis Obispo Local Agency Formation Commission (LAFCO) conditionally approved the formation of the Estrella-El Pomar-Creston Water District (EPCWD) for the purpose of serving as (or part of) a GSA and which could be formed as early as Fall 2017; and

WHEREAS, although it is anticipated that the EPCWD will desire to become the GSA for its service area consistent with LAFCO's conditional approval, this decision cannot be made or effectuated until the EPCWD is formed, the Board of Directors are seated and the Board of Directors holds the necessary public hearing; and

WHEREAS, the County of San Luis Obispo's SGMA Strategy specifically acknowledges the possibility that a new eligible local agency may be formed shortly after the June 30, 2017 deadline and permits the County of San Luis Obispo to include the potential future service area of the EPCWD in its initial boundary submittal to DWR and then permits them through future action by the Board of Supervisors to subsequently withdraw from serving as the GSA within said area; and

WHEREAS, the County of San Luis Obispo desires to form a GSA to cover all areas within the Basin within the County of San Luis Obispo that will not otherwise be covered by a GSA as of the June 30, 2017 deadline; and

WHEREAS, the County of San Luis Obispo published a notice of public hearing consistent with the requirements contained within Water Code Section 10723(b); and

WHEREAS, the Board of Supervisors conducted such a public hearing on May 16, 2017; and

WHEREAS, the County of San Luis Obispo is committed to the sustainable management of groundwater within the Paso Basin and intends to coordinate with the other GSAs and affected parties, and to consider the interests of all beneficial users and uses of groundwater within the Paso Basin through a memorandum of agreement with the other GSAs.

NOW, THEREFORE, BE IT RESOLVED AND ORDERED by the Board of Supervisors of the County of San Luis Obispo, State of California, that:

Section 1: The foregoing recitals are true and correct and are incorporated herein by reference.

Section 2: The County of San Luis Obispo hereby decides to become the GSA for, and undertake sustainable groundwater management within, the portions of the Basin within the County of San Luis Obispo, with the exception of the portions of the Basin located within the boundaries of the City of El Paso de Robles, the San Miguel Community Services District, the Heritage Ranch Community Services District, and the Shandon-San Juan Water District ("GSA Boundary"). A map of the GSA Boundary is attached hereto as Exhibit A and incorporated herein.

Section 3: The Director of Public Works of the County of San Luis Obispo, or designee, is hereby authorized and directed to submit notice of adoption of this Resolution in addition to all other information required by SGMA, including but not limited to, all information required by Water Code Section 10723.8, to DWR, and to support the development and maintenance of an interested persons list as described in Water Code Section 10723.4 and a list of interested parties as described in Water Code Section 10723.8(a)(4).

Section 4: The Director of Public Works of the County of San Luis Obispo, or designee, is hereby authorized to take such other and further actions as may be necessary to effectuate the purposes of this Resolution.

Section 5: The Board of Supervisors finds that the adoption of this Resolution is exempt from the requirements of the California Environmental Quality Act (Public Resources Code §§ 21000 et seq.) (CEQA) pursuant to Section 15061(b)(3) of the CEQA Guidelines.

Section 6: The Environmental Coordinator of the County of San Luis Obispo is hereby directed to file a Notice of Exemption in accordance with the provisions of CEQA.

Upon motion of Supervisor Arnold, seconded by Chairperson Peschong, and on the following roll call vote, to wit:

AYES: Supervisors Arnold, Chairperson Peschong, Gibson, Hill and Compton

NOES: None

ABSENT: None

ABSTAINING: None

the foregoing resolution is hereby adopted on the 16th day of May, 2017.

John Peschong
Chairperson of the Board of Supervisors

ATTEST:

TOMMY GONG
Clerk of the Board of Supervisors

By: Annette Ramirez
Deputy Clerk

[SEAL]

APPROVED AS TO FORM AND LEGAL EFFECT:

RITA L. NEAL
County Counsel

By: /s/ Erica Stuckey
Deputy County Counsel

Dated: May 4, 2017

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STATE OF CALIFORNIA,)
) **ss.**
COUNTY OF SAN LUIS OBISPO)

I, Tommy Gong, County Clerk and ex-officio Clerk of the Board of Supervisors, in and for the County of San Luis Obispo, State of California, do hereby certify the foregoing to be a full, true and correct copy of an order made by the Board of Supervisors, as the same appears spread upon their minute book.

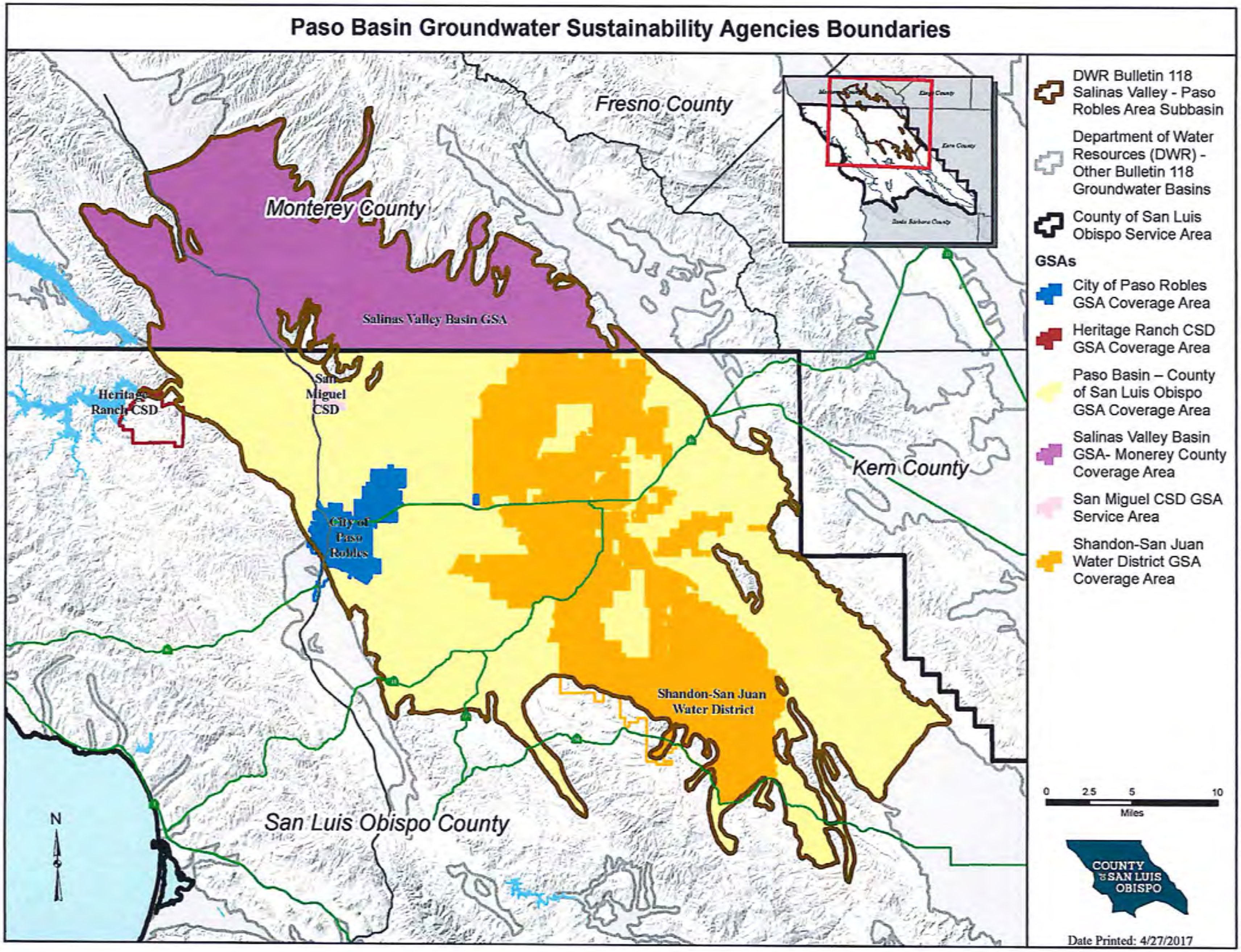
WITNESS my hand and the seal of said Board of Supervisors, affixed this 16th day of May, 2017.

Tommy Gong
County Clerk and Ex-Officio Clerk
of the Board of Supervisors

(SEAL)

By: [signature]
Deputy Clerk

EXHIBIT A


Paso Basin Groundwater Sustainability Agencies Boundaries
Fresno County
Monterey County
Salinas Valley Basin GSA
San Miguel CSD
Heritage Ranch CSD
City of Paso Robles
Kern County
Shandon-San Juan Water District
San Luis Obispo County
N
DWR Bulletin 118 Salinas Valley - Paso Robles Area Subbasin
Department of Water Resources (DWR) - Other Bulletin 118 Groundwater Basins
County of San Luis Obispo Service Area
GSAs
City of Paso Robles GSA Coverage Area
Heritage Ranch CSD GSA Coverage Area
Paso Basin – County of San Luis Obispo GSA Coverage Area
Salinas Valley Basin GSA- Monerey County Coverage Area
San Miguel CSD GSA Service Area
Shandon-San Juan Water District GSA Coverage Area
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Miles
COUNTY of SAN LUIS OBISPO
Date Printed: 4/27/2017

CITY OF EL PASO DE ROBLES

"The Pass of the Oaks"

January 26, 2017

Sent via U.S. Postal Service & Electronic Mail to MarkNordberg@water.ca.gov

Mr. Mark Nordberg, GSA Project Manager
Senior Engineering Geologist
Department of Water Resources
901 P Street, Room 213A
P.O. Box 942836
Sacramento, CA 94236
Mark.Nordberg@water.ca.gov

Subject: Notice of Election to Become a Groundwater Sustainability Agency for a Portion of the Paso Robles Sub-Basin of the Salinas Basin

Dear Mr. Nordberg:

Pursuant to California Water Code Section 10723.8, the City of Paso Robles (City), a political subdivision of the State of California, gives notice to the California Department of Water Resources (DWR) of the City's decision to become a Groundwater Sustainability Agency (GSA) and to undertake sustainable groundwater management in the Paso Robles Sub-Basin (DWR Basin No. 3-4.06) (Basin) in accordance with the Sustainable Groundwater Management Act (SGMA). The GSA will be known as the Paso Robles City GSA. The City overlies the Basin and the proposed service area of the GSA lies entirely within the City's jurisdictional boundaries.

In accordance with section 10723(b) of the Water Code and section 6066 of the Government Code, a notice of public hearing was published in a newspaper of general circulation in the City of Paso Robles and San Luis Obispo County regarding the City's intent to consider forming a GSA. Copies of the proof of publication and published notices are included as Enclosure 1.

On January 17, 2017, the Paso Robles City Council (Council) held a public hearing regarding its decision to form a GSA in accordance with California Water Code Section 10723(b). No written comments were received before the public hearing and no negative comments or objections were made during the hearing.

After holding the public hearing, the Council approved Resolution 17-009 (Enclosure 2), electing to become a GSA over the portion of the Basin within the jurisdiction of the City, as further depicted in Exhibit A to the Resolution and in shape files included herein as Enclosure 3. No new bylaws, ordinances, or authorities for the governance of the GSA have been adopted by the City at this time.

The City is coordinating with other local agencies that overlie the Basin and intends to work cooperatively with these agencies to jointly manage groundwater in the Basin.

The Council has authorized the City's Public Works Director, Dick McKinley, to negotiate inter-agency agreements with local public agencies overlying the Basin, as necessary, for the purposes of implementing a cooperative and coordinated governance structure to sustainably manage the Basin.

To date, the San Miguel Community Services District has provided notice to DWR of its intent to form a GSA over the Basin, but not over the area proposed for the City GSA. To the City's knowledge, no other entities within the City's proposed GSA service area have provided notice to DWR to become a GSA.

Pursuant to California Water Code Section 10723.2, the City will consider the interests of all beneficial uses and users of groundwater, as well as those responsible for implementing a Groundwater Sustainability Plan (GSP). An initial list of stakeholders and interested parties is described below:

a. Holders of overlying groundwater rights – the majority of individuals and entities exercising groundwater rights within that portion of the Basin located within the jurisdiction of the City have a County well permit, or a City permit, and compliance with the County or City ordinances. Those entities include agricultural users, domestic users, other overlying users, and public or private landowners. The list of those private parties pumping groundwater within the City of Paso Robles City limits is included as Enclosure 4.
b. Municipal well operators – the City.
c. Public water systems – the City.
d. Local land use planning agencies – the City.
e. Environmental users of groundwater - None
f. Surface water users, if there is a hydrologic connection between surface and groundwater basins - None
g. California Native American tribes – None.
h. Disadvantaged communities, including but not limited to, those served by private domestic wells or small community water systems or ratepayers and domestic well owners - None.
i. Entities listed in Section 10927 that are monitoring and reporting groundwater elevations in all or part of a groundwater basin managed by the GSA – the City of Paso Robles files, contributes, and/or maintain California Statewide Groundwater Elevation Monitoring (CASGEM) monitoring data with the DWR through San Luis Obispo County.
j. It is anticipated that other entities may form a GSA over part of the Paso Robles sub-basin, including San Luis Obispo County, San Miguel CSD, a future Shandon-San Juan Water District (which is in the LAFCO process), a future Estrella-El Pomar-Creston Water District (which is in the LAFCO process), and several different groups in Monterey County.

The City intends to engage in an open, collaborative and inclusive process to work cooperatively with stakeholders to develop and implement a GSP or multiple GSPs for the Basin and will maintain a list of interested parties to be included in the formation of the GSP(s). An initial list of those interested parties is included in Enclosure 5. The City intends to work with San Luis Obispo County, San Miguel CSD, and the two Water Districts which are currently being formed to work with several interested parties, holding regular meetings, and considering comments, to prepare a GSP that would serve all of the GSAs in San Luis Obispo County overlying the Paso Robles sub-basin, and would be fully coordinated with the GSPs prepared in Monterey County.

The following information is included in this notice and transmittal pursuant to California Water Code Section 10723.8 (a):

1. Notice of Public Hearing pursuant to Government Code Section 6066
2. City Resolution No. 17-009 (with Exhibit A – Paso Robles Sub-basin Maps)
3. City of Paso Robles Boundary shape files

If you have any questions, or require additional information, please contact the City Public Works Director, Dick McKinley, at (805) 237-3861 or via email at dmckinley@prcity.com.

Sincerely,

Thomas Frutchey
City Manager

Enclosures: No. 1: Notice of Public Hearing pursuant to Government Code Section 6066
No. 2: City of Paso Robles Resolution No. 17-009 (with Exhibit A – Paso Robles Sub-basin Maps)
No. 3: City of Paso Robles Boundary shape files (electronic files only)
No. 4: List of private parties who pump from the groundwater basin within the City limits of the City of Paso Robles
No. 5: List of interested parties who would be advised and encouraged to participate in the process of preparing the GSP.

C: Mike McKenzie, DWR - South Central Region
Senior Engineering Geologist
3374 East Shields Avenue
Fresno, CA 93726
Charles.McKenzie@water.ca.gov

Dick McKinley, City Public Works Director
Wade Horton, County of San Luis Obispo Public Works Director
Warren Frace, City Community Development Director
Christopher Alakel, City Water Resource Manager

Append a list of interested parties who receive a copy of this notice (See Enclosure 5)

ENCLOSURE NO. 1

NOTICE OF PUBLIC HEARING

NOTICE OF PASO ROBLES CITY COUNCIL

PUBLIC HEARING

DATE OF MEETING: **TUESDAY, JANUARY 17, 2017**

TIME OF MEETING: **6:30 PM**

PLACE OF MEETING: **COUNCIL CHAMBER, 1ST FLOOR, CITY HALL, 1000 SPRING STREET, PASO ROBLES, CALIFORNIA, 93446**

PROJECT NAME: **RESOLUTION REQUEST AUTHORIZING THE CITY OF EL PASO DE ROBLES TO BECOME A GROUNDWATER SUSTAINABILITY AGENCY OVER THE PASO ROBLES SUB-BASIN UNDER THE CITY LIMITS OF THE CITY OF EL PASO DE ROBLES**

APPLICANT: **CITY OF EL PASO DE ROBLES**

FOR ADDITIONAL INFORMATION PLEASE CONTACT CITY PUBLIC WORKS DIRECTOR: Dick McKinley at (805) 237-3861 or at: dmckinley@prcity.com

PLEASE ACCEPT THIS AS A NOTICE TO INFORM YOU, as a property owner, tenant or interested citizen, that the City Council of the City of El Paso de Robles, California will conduct a public hearing, as part of a scheduled City Council meeting, on the following project:

Notice is hereby given that the City Council of the City of El Paso de Robles will consider authorizing the City to become a Groundwater Sustainability Agency (GSA) over that portion of the Paso Robles Sub-basin that lies under the City limits of the City of El Paso de Robles, per California Water Code Sections 10723 to 10727. In 2014, the California Legislature and the Governor passed into law the Sustainable Groundwater Management Act (SGMA), which provides a new framework for best management of resources in California. Implementation of SGMA is achieved through formation of GSAs and through preparation and implementation of Groundwater Sustainability Plans (GSPs). The City has a groundwater basin that is governed by SGMA legislation, the Paso Robles Sub-basin of the Salinas Basin. This groundwater sub-basin is designated by the State as a high priority basin and must comply with SGMA requirements.

Once the GSA is formed, the City will then be required to develop and implement a GSP that provides a roadmap for managing the basin on a sustainable basis. The City believes it is essential for the City to be a GSA. SGMA provides GSAs with access to various powers and authorities to ensure sustainable management. Becoming a GSA will confirm the City's role as the local groundwater management agency, ensure access to SGMA authorities, and preserve access to grant funding or other opportunities that may be limited to GSAs.

The decision of the City Council is final.

COMMUNICATIONS

This item may begin at any time after the time specified. Any interested person may address the City Council to express support or opposition to this issue. Time allotted to each speaker is determined by the Chair and, in general, is limited to three (3) minutes.

Those unable to attend the hearing may write a letter to the Mayor and City Council, Attention: City Clerk, City Hall, 1000 Spring Street, Paso Robles, CA 93446, OR, you can reach us by email at cityclerk@prcity.com OR FAX at (805) 237-4032. All communications will be forwarded to the Mayor and City Council.

If you wish to challenge the Council's actions on the above proceedings in court, you may be limited to raising only those issues you or someone else raised at the public hearing described in this notice, or in written correspondence to the City Council at or prior to the public hearing. All correspondence should be delivered to the City Clerk (at the above address) to be included in the record of the proceedings, at or prior to the time of the public hearing. Correspondence must be received no later than 5:00 pm on January 17, 2017.

This material is available in alternative formats upon request. To order information in an alternative format, or to arrange for a sign language or oral interpreter for the meeting, please call the City Clerk's office at least 5 working days prior to the meeting at (805) 237-3960 (voice) or visit the City of Paso Robles website at www.prcity.com.

Dick McKinley
Public Works Director
1/3/2017

THE Newspaper of the Central Coast
TRIBUNE

3825 South Higuera • Post Office Box 112 • San Luis Obispo, California 93406-0112 • (805) 781-7800

In The Superior Court of The State of California
In and for the County of San Luis Obispo
AFFIDAVIT OF PUBLICATION

AD # 2855235
CITY OF PASO ROBLES
PUBLIC WORKS

STATE OF CALIFORNIA
ss.
County of San Luis Obispo

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen and not interested in the above entitled matter; I am now, and at all times embraced in the publication herein mentioned was, the principal clerk of the printers and publishers of THE TRIBUNE, a newspaper of general Circulation, printed and published daily at the City of San Luis Obispo in the above named county and state; that notice at which the annexed clippings is a true copy, was published in the above-named newspaper and not in any supplement thereof – on the following dates to wit; JANUARY 3, 10, 2017 that said newspaper was duly and regularly ascertained and established a newspaper of general circulation by Decree entered in the Superior Court of San Luis Obispo County, State of California, on June 9, 1952, Case #19139 under the Government Code of the State of California.

I certify (or declare) under the penalty of perjury that the foregoing is true and correct.

(Signature of Principal Clerk)
DATED: JANUARY 10, 2017
AD COST: $750.20

NOTICE OF PASO ROBLES CITY COUNCIL PUBLIC HEARING

DATE OF MEETING: TUESDAY, JANUARY 17, 2017

TIME OF MEETING: 6:30 PM

PLACE OF MEETING: COUNCIL CHAMBER, 1ST FLOOR, CITY HALL, 1000 SPRING STREET, PASO ROBLES, CALIFORNIA, 93446

PROJECT NAME: RESOLUTION REQUEST AUTHORIZING THE CITY OF EL PASO DE ROBLES TO BECOME A GROUNDWATER SUSTAINABILITY AGENCY OVER THE PASO ROBLES SUB-BASIN UNDER THE CITY LIMITS OF THE CITY OF EL PASO DE ROBLES

APPLICANT: CITY OF EL PASO DE ROBLES

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Dick McKinley
Public Works Director
1/3/2017
Jan. 3, 10, 2017 2855235

http://www.prcity.com/press/index.asp

City of Paso Robles: Press R... ×

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PASO ROBLES

SITE SEARCH

DEPARTMENTS CITY COUNCIL ADVISORY BODIES PLANNING COMMISSION

Address
City of Paso Robles
1000 Spring Street
Paso Robles, CA 93446
Map
Phone
(805) 227-PASO
(7276)
FAX
(805) 237-6565
Hours
Mon-Fri 8am to 5pm
E-mail
info@prcity.com

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CITY GOVERNMENT

PRESS RELEASES & PUBLIC NOTICES

City Manager's Task Force on Medical Marijuana - Meeting Reminder
Posted: January 23, 2017

Public Notice: City Council Workshop - Review of Draft Short-Term Rental Ordinance
Posted: January 19, 2017

Free Tax Assistance at the Library
Posted: January 13, 2017

Sierra Backpacking Adventure Presentation at the Library
Posted: January 13, 2017

Paso Robles to Honor Martin Luther King Jr.
Posted: January 10, 2017

Residential Structure Fire - 3126 Spring Street #3
Posted: January 9, 2017

Notice of Public Hearing: Resolution Request Authorizing the City of Paso Robles to become a Groundwater Sustainability Agency Over the Paso Robles Sub-Basin Under the City Limits of the City of Paso Robles
Posted: January 3, 2017

Attempted Bank Robbery
Posted: January 3, 2017

Residential Structure Fire - 14th Street
Posted: January 3, 2017

Volunteers Wanted: Housing Authority Board of Commissioners
Posted: December 27, 2016

Volunteers Wanted: Planning Commission
Posted: December 27, 2016

Residential Structure Fire
Posted: December 23, 2016

Mayor Martin and Supervisor-Elect Peschong Confer
Posted: December 19, 2016

Seeking Musical Performers for 2017 Summer Concert Series
Posted: December 15, 2016

HOT TOPICS

Level 2 Watering Restrictions are In Effect!

Water ... Use it Wisely

Local Hazard Mitigation Plan (2016)

Supplemental Sales Tax Information
and Road Repair Plans

Adopted Ordinances

- **1038 N.S.** ***2016 CA Building Code***
- **1037 N.S.** ***Airport Commission***
- **1036 N.S.** ***Marijuana Regulation***

City Council/ Advisory Committees: Find An Agenda

List of City Officials

Public Records Requests

Senate Bill 272 (Enterprise System Catalog)

City Projects
Capital OUT TO BID
Request for Proposals

Municipal Code Online Database

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ENCLOSURE NO. 2

CITY OF PASO ROBLES RESOLUTION NO. 17-009

RESOLUTION NO. 17-009

RESOLUTION OF THE CITY COUNCIL OF THE CITY OF EL PASO DE ROBLES AUTHORIZING THE CITY TO BECOME A GROUNDWATER SUSTAINABILITY AGENCY FOR THE PASO ROBLES SUB-BASIN OF THE SALINAS BASIN FOR THE AREA THAT LIES BENEATH AND WITHIN THE JURISDICTIONAL BOUNDARIES OF THE CITY OF EL PASO DE ROBLES

WHEREAS, in 2014 the California Legislature and the Governor passed into law the Sustainable Groundwater Management Act (SGMA) for local management of groundwater resources in California through the formation of Groundwater Sustainability Agencies (GSAs) and through preparation and implementation of Groundwater Sustainability Plans (GSPs); and

WHEREAS, the City overlies a portion of the Paso Robles Sub-basin of the Salinas Groundwater Basin, which is subject to SGMA, and thus one or more GSAs must be formed for the Sub-basin by June 30, 2017, or the Sub-basin may be subject to regulation by the State Water Resources Control Board; and

WHEREAS, the City is a "local agency" as that term is defined by SGMA, and as such is authorized to form a GSA to manage groundwater resources in the Sub-basin and within the City's jurisdictional boundaries in accordance with SGMA and other applicable laws and authorities; and

WHEREAS, the City desires to form a GSA to manage groundwater resources in the Sub-basin beneath and within the City's jurisdictional boundaries (and excluding that portion of the City's boundaries that overlie the Atascadero Sub-basin as designated by the Department of Water Resources); and

WHEREAS, the City intends that its GSA will work cooperatively with the other GSAs that have formed or will be formed in the Paso Robles Sub-basin to prepare one or more GSPs by January 2020, so that groundwater resources in the Sub-basin will be properly managed and sustainable in accordance with the provisions of SGMA; and

WHEREAS, it is essential that the City form this GSA because SGMA grants GSAs substantial additional powers and authorities to ensure sustainable groundwater management. Acting as the GSA within the City's jurisdictional boundaries will, among other things, confirm the City's role as the local groundwater management agency, ensure access to SGMA authorities, and preserve access to grant funding and other opportunities that may be available to GSAs; and

WHEREAS, pursuant to the requirements of SGMA, the City held a public hearing on this date after publication of notice pursuant to California Government Code section 6066 to consider adoption of this Resolution.

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF EL PASO DE ROBLES DOES HEREBY RESOLVE AS FOLLOWS:

Section 1. All of the above recitals are true and correct and incorporated herein by reference.

Section 2. The Mayor is authorized to sign a resolution for the City of El Paso de Robles to become a Groundwater Sustainability Agency in accordance with the Sustainable Groundwater Management Act over the portion of the Paso Robles Sub-basin which lies under and within the jurisdictional boundaries of the City of Paso Robles (and excluding that portion of the City's boundaries that overlie the Atascadero Sub-basin as designated by the Department of Water Resources).

Section 3. The City Manager is authorized and directed to submit a notice of this Resolution along with all other required information to the California Department of Water Resources in accordance with the Sustainable Groundwater Management Act.

Section 4. The City Groundwater Sustainability Agency shall consider the interests of all beneficial uses and users of groundwater within the jurisdictional boundaries of the City and will develop an outreach program for all such stakeholders.

Section 5. The City Groundwater Sustainability Agency shall establish and maintain a list of persons interested in receiving notices regarding the City's involvement in the preparation of one or more Groundwater Sustainability Plans in the Paso Robles Sub-basin, where any person may request in writing to be placed on the City's list of interested persons.

APPROVED this 17TH day of January, 2017, by the following vote:

AYES: Gregory, Hamon, Strong, Reed, Martin
NOES:
ABSENT:
ABSTAIN:

Steven W. Martin, Mayor

ATTEST:

Kristen L. Buxkemper, Deputy City Clerk

I hereby certify that the foregoing is a full, true and correct copy of Resolution 17-009 Authorizing the City to become a Groundwater Sustainability Agency for the PR Sub-Basin. on file in the Office of the City Clerk.
In witness hereof, my hand and official seal:

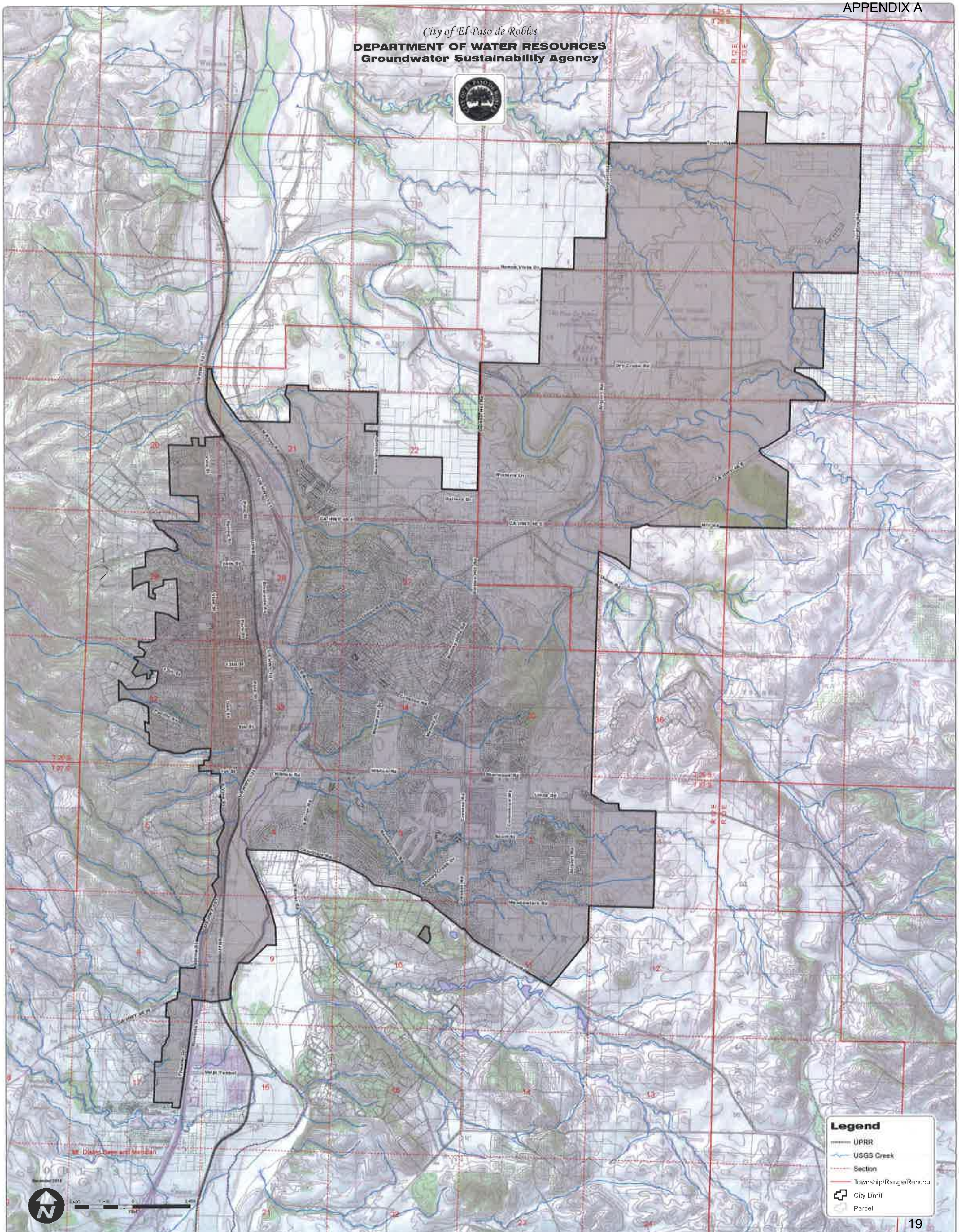
1/23/17
Date

Deputy City Clerk

82481.00000\29454130.2

ENCLOSURE NO. 3

CITY OF PASO ROBLES BOUNDARY MAP
(SHAPE FILES ARE ELECTRONIC ONLY)


City of El Paso de Robles
DEPARTMENT OF WATER RESOURCES
Groundwater Sustainability Agency
Legend
UPRR
USGS Creek
Section
Township/Range/Rancho
City Limit
Parcel

ENCLOSURE NO. 4

LIST OF PRIVATE PARTIES

APN_1	Owner	Assessee	Address1	City	State	Zip
008022001	SALMANZADEH FAMILY TRUST	SALMANZADEH JULIE TRE ETAL	3700 SPRING ST	PASO ROBLES	CA	93446
009461049	R & H GOLF LP A CA LP	R & H GOLF LP A CA LP	1460 SPANISH CAMP RD	PASO ROBLES	CA	93446
009751022	PEREZ EDDIE F & ELAYNE L	PEREZ EDDIE F & ELAYNE L	2464 CRESTON RD	PASO ROBLES	CA	93446
009795001	OLSEN INVESTMENTS LLC	OLSEN INVESTMENTS LLC	3161 LINNE RD	PASO ROBLES	CA	93446
009795002	OLSEN INVESTMENTS LLC A CA LLC	OLSEN INVESTMENTS LLC A CA LLC	3161 LINNE RD	PASO ROBLES	CA	93446
009795005	GOULART LOIS D REVOCABLE LIVING TRUST	GOULART LOIS D TRE	255 HANSON RD	PASO ROBLES	CA	93446
009796004	CONDICT WINFIELD S FAMILY TRUST	CONDICT WAYNE A TRE ETAL	1 CHATTANOOGA ST	IRVINE	CA	92620
009796006	CONDICT PRESTON F	VANKLEY F & J ETAL	1556 SENTIMENTAL LN	OUR TOWN	CA	93446
009796009	CONDICT GREGORY R	CONDICT GREGORY R HEIRS OF ETAL	PO BOX 3889	PASO ROBLES	CA	93447
009796010	CONDICT RANDALL C	TOSCH AJ & M ETAL	560 AAROE DR	OUR TOWN	CA	93446
009796017	CONDICT KEVIN C	BUETTNER LILLIAN M TRE ETAL	9416 CUMMINGS RD	DURHAM	CA	95938
009796018	CONDICT WAYNE A	CONDICT WAYNE A	1557 SENTIMENTAL LN	OUR TOWN	CA	93446
009796020	CONDICT WINFIELD S FAMILY TRUST	CONDICT WAYNE A TRE ETAL	1 CHATTANOOGA ST	IRVINE	CA	92620
009821002	ESTRADA SILAS & TERESA TRUST	ESTRADA SILAS TRE ETAL	220 S VINE ST	PASO ROBLES	CA	93446
009821007	COOK JOHN & KATHLEEN LIVING TRUST	COOK JOHN H TRE ETAL	1466 LA CIMA RD	SANTA BARBARA	CA	93101
009851012	CGLPT ENTERPRISES GEN PTP	CGLPT ENTERPRISES GEN PTP	4490 BUENA VISTA DR	PASO ROBLES	CA	93446
009863006	GAVIN TODD	GAVIN TODD	2550 CATTLEMAN WAY	PASO ROBLES	CA	93446
009863007	HARROD PASO LP A CA LP	HARROD PASO LP	PO BOX 3200	SALINAS	CA	93912
009863009	HARROD PASO LP A CA LP	HARROD PASO LP	PO BOX 3200	SALINAS	CA	93912
025011026	WOODRUM CHAD	WOODRUM CHAD & MELISSA	805 RED CLOUD RD	PASO ROBLES	CA	93446
025011027	WEBER MICHAEL E	WEBER MICHAEL E	1640 LYLE LN	PASO ROBLES	CA	93446
025011028	COLLINS JULIA	COLLINS JULIA & RODNEY	1690 LYLE LN	PASO ROBLES	CA	93446
025011029	DREA MELISSA L	DREA MELISSA L	17 GILBERT HILL	BERMUDA	FR	99999
025011031	GONZALES CRISTINA S	SIMOES MATILDE L ETAL	1575 LYLE LN	PASO ROBLES	CA	93446
025011032	CRUME ALFRED G	CRUME ALFRED G & MARY R	1555 LYLE LN	PASO ROBLES	CA	93446
025362001	WHITE BRUCE	WHITE BRUCE	PO BOX 539	PASO ROBLES	CA	93447
025362004	BLAKE DANIEL A & JANICE A LIVING TRUST	BLAKE DANIEL A TRE ETAL	4374 UNION RD	PASO ROBLES	CA	93446
025362009	GRAF TRUST	GRAF FRANCES A TRE	2902 ARDMORE RD	PASO ROBLES	CA	93446
025362011	GOLDSTEIN FAMILY LLC A CA LLC	GOLDSTEIN FAMILY LLC	1355 HIGHWAY 46 WEST	PASO ROBLES	CA	93446
025362012	VIEIRA RICHARD A & KATHLEEN M 2009 REVOCABLE TRUST	VIEIRA KATHLEEN M TRE ETAL	2910 ARDMORE RD	PASO ROBLES	CA	93446
025362013	HONZEL CHARLES R	HONZEL CHARLES R & PL	PO BOX 1332	PASO ROBLES	CA	93446
025362036	EHRKE JAMES T	EHRKE JAMES T	9926 SAGE HILL WY	ESCONDIDO	CA	92026
025371017	RAK FRANK R JR REVOCABLE LIVING TRUST	RAK FRANK R JR TRE	PO BOX 3212	PASO ROBLES	CA	93447
025371021	HAYLEY JULIET E	HAYLEY MICHAEL S & JULIET E	3189 E HWY 46	PASO ROBLES	CA	93446
025371024	OBRIEN DAVID P	OBRIEN DAVID P & LIESL A	2785 CLARK VALLEY RD	LOS OSOS	CA	93402
025381008	WILCOX RANCH LP A CA LP	WILCOX RANCH LP	67225 SARGENTS RD	SAN ARDO	CA	93450
025390004	GREGORY CHARLES S & DAWN P 2009 REVOCABLE TRUST	GREGORY CHARLES S TRE ETAL	PO BOX 4068	PASO ROBLES	CA	93447
025390009	RIVER OAKS II LLC A DE LLC	RIVER OAKS II LLC	PO BOX 4280	PASO ROBLES	CA	93447
025410005	BAER DEREK A	BAER DEREK A & SONJIA M	1711 EXPERIMENTAL STATON RD	PASO ROBLES	CA	93446
025410007	MOE MARILYN R 2009 REVOCABLE TRUST	MOE MARILYN R TRE	1631 EXPERIMENTAL STATION	PASO ROBLES	CA	93446
025410008	DOBROTH ERIC	DOBROTH ERIC & SARA	1700 EXPERIMENTAL STATION RD	PASO ROBLES	CA	93446
025410009	CVT TRUST (TR 1)	TSUI CHERYL V TRE ETAL	1520 EXPERIMENTAL STATION RD	PASO ROBLES	CA	93446
025410010	LAPOINTE PAUL & JOYCE LIVING TRUST	LAPOINTE PAUL E TRE ETAL	1412 EXPERIMENTAL STATION RD	PASO ROBLES	CA	93446
025411004	SIMPSON ANDREA	SIMPSON ANDREA	2935 WATSON CT E	CONCORD	CA	94518
025411013	HARDWICK TRUST OF 1999	HARDWICK THOMAS K TRE ETAL	908 WALNUT DR	PASO ROBLES	CA	93446
025422013	JOHNSTON PETER F & JOCELYN W FAMILY TRUST	JOHNSTON PETER F TRE ETAL	1815 EXPERIMENTAL STATION RD	PASO ROBLES	CA	93446
025434006	DIAMOND STERLING & JUDY REVOCABLE TRUST	DIAMOND STERLING N TRE ETAL	5920 BUENA VISTA DR	PASO ROBLES	CA	93446
025434007	BUTTERFIELD JACOB B	BUTTERFIELD JACOB B & LAURIE A	200 CRESTMONT	SLO	CA	93401
025435008	PASO ROBLES HORSE PARK A CA LLC	PASO ROBLES HORSE PARK A CA LLC	2279 WILLOW CREEK RD	PASO ROBLES	CA	93446
025435010	SMITH GARY D	SMITH GARY D ETAL	8105 SAN DIEGO RD	ATASCADERO	CA	93422
025436013	PASO ROBLES CITY OF	CITY OF PASO ROBLES (955)	1000 SPRING ST	PASO ROBLES	CA	93446
025436015	BOATMAN GARY P	HOFFMAN GWYNN H TRE ETAL	1511 PARK ST	PASO ROBLES	CA	93446
025436018	WILSON RUSSELL R INTER VIVOS TRUST	WILSON RUSSELL R TRE	3580 AIRPORT RD	PASO ROBLES	CA	93446
025436019	DIDONNA ANTHONY & MAXINE TRUST	DIDONNA ANTHONY R TRE ETAL	3490 AIRPORT RD	PASO ROBLES	CA	93446
025436029	HANDLEY JERRY L	HANDLEY JERRY L & KATHERINE A	PO BOX 1011	PASO ROBLES	CA	93447
025436039	EBERLE WINERY LTD A LTD PTP	EBERLE WINERY LTD	PO BOX 2459	PASO ROBLES	CA	93447
025441001	PR11 LLC A CA LTD LIABILITY COMPANY	PR11 LLC A CA LTD LIABILITY COMPANY	2021 THE ALAMEDA #145	SAN JOSE	CA	95126
025441002	PR11 LLC A CA LTD LIABILITY COMPANY	PR11 LLC A CA LTD LIABILITY COMPANY	2021 THE ALAMEDA #145	SAN JOSE	CA	95126
025441004	RUTZ FAMILY INC A CA CORP	RUTZ FAMILY INC	PO BOX 2030	PASO ROBLES	CA	93447
025442003	PASO ROBLES VINEYARDS INC A CALIFORNIA CORPORATION	PASO ROBLES VINEYARDS INC A CA COR	PO BOX 2030	PASO ROBLES	CA	93447
025442005	GEARHART KELLY V	MILLER JAMES H JR ETAL	PO BOX 4725	PASO ROBLES	CA	93447
025442006	PASO ROBLES VINEYARD INC A CALIF CORP	PASO ROBLES VINEYARD INC A CAL COR	PO BOX 2030	PASO ROBLES	CA	93447
025442007	PASO ROBLES VINEYARDS INC A CALIFORNIA CORPORATION	PASO ROBLES VINEYARDS INC A CA COR	PO BOX 2030	PASO ROBLES	CA	93447
025442008	PASO ROBLES VINEYARDS INC A CALIFORNIA CORPORATION	PASO ROBLES VINEYARDS INC A CA COR	PO BOX 2030	PASO ROBLES	CA	93447
025442009	PASO ROBLES VINEYARDS INC A CALIFORNIA CORPORATION	PASO ROBLES VINEYARDS INC A CA COR	PO BOX 2030	PASO ROBLES	CA	93447
025442010	BALDWIN MARIETTE	BALDWIN MARIETTE	PO BOX 182	PASO ROBLES	CA	93447
025442011	PASO ROBLES VINEYARDS INC A CALIFORNIA CORPORATION	PASO ROBLES VINEYARDS INC A CA COR	PO BOX 2030	PASO ROBLES	CA	93447
025442012	PASO ROBLES VINEYARDS INC A CALIFORNIA CORPORATION	PASO ROBLES VINEYARDS INC A CA COR	PO BOX 2030	PASO ROBLES	CA	93447
025442013	PASO ROBLES VINEYARDS INC A CALIFORNIA CORPORATION	PASO ROBLES VINEYARDS INC A CA COR	PO BOX 2030	PASO ROBLES	CA	93447
025442014	PASO ROBLES VINEYARDS INC A CALIFORNIA CORPORATION	PASO ROBLES VINEYARDS INC A CA COR	PO BOX 2030	PASO ROBLES	CA	93447
025442015	PASO ROBLES VINEYARDS INC A CALIFORNIA CORPORATION	PASO ROBLES VINEYARDS INC A CA COR	PO BOX 2030	PASO ROBLES	CA	93447
025442017	PASO ROBLES VINEYARDS INC A CALIFORNIA CORPORATION	PASO ROBLES VINEYARDS INC A CA COR	PO BOX 2030	PASO ROBLES	CA	93447
025442018	PASO ROBLES VINEYARDS INC A CALIFORNIA CORPORATION	PASO ROBLES VINEYARDS INC A CA COR	PO BOX 2030	PASO ROBLES	CA	93447
025442020	GEARHART KELLY V	MILLER JAMES H JR ETAL	PO BOX 4725	PASO ROBLES	CA	93447
025442021	VINO VISTA LLC A CA LLC	VINO VISTA LLC	PO BOX 510	PASO ROBLES	CA	93447
025442022	VINA VISTA LLC A CA LLC	VINO VISTA LLC	PO BOX 510	PASO ROBLES	CA	93447
025442023	VINO VISTA LLC A CA LLC	VINO VISTA LLC	PO BOX 510	PASO ROBLES	CA	93447
025443002	VINO VISTA LLC A CA LLC	VINO VISTA LLC	PO BOX 510	PASO ROBLES	CA	93447
025443013	VINO VISTA LLC A CA LLC	VINO VISTA LLC	PO BOX 510	PASO ROBLES	CA	93447
025443015	VINO VISTA LLC A CA LLC	VINO VISTA LLC	PO BOX 510	PASO ROBLES	CA	93447
025443016	VINO VISTA LLC A CA LLC	VINO VISTA LLC	PO BOX 510	PASO ROBLES	CA	93447
025443017	VINO VISTA LLC A CA LLC	VINO VISTA LLC	PO BOX 510	PASO ROBLES	CA	93447
025443018	VINO VISTA LLC A CA LLC	VINO VISTA LLC	PO BOX 510	PASO ROBLES	CA	93447
025443019	VINO VISTA LLC A CA LLC	VINO VISTA LLC	PO BOX 510	PASO ROBLES	CA	93447
025444001	VINO VISTA LLC A CA LLC	VINO VISTA LLC	PO BOX 510	PASO ROBLES	CA	93447
025444004	VINO VISTA LLC A CA LLC	VINO VISTA LLC	PO BOX 510	PASO ROBLES	CA	93447
025444006	VINO VISTA LLC A CA LLC	VINO VISTA LLC	PO BOX 510	PASO ROBLES	CA	93447
025444008	VINO VISTA LLC A CA LLC	VINO VISTA LLC	PO BOX 510	PASO ROBLES	CA	93447
025444009	VINO VISTA LLC A CA LLC	VINO VISTA LLC	PO BOX 510	PASO ROBLES	CA	93447
025444010	VINO VISTA LLC A CA LLC	VINO VISTA LLC	PO BOX 510	PASO ROBLES	CA	93447
025444011	VINO VISTA LLC A CA LLC	VINO VISTA LLC	PO BOX 510	PASO ROBLES	CA	93447
025444012	VINO VISTA LLC A CA LLC	VINO VISTA LLC	PO BOX 510	PASO ROBLES	CA	93447
025444013	VINO VISTA LLC A CA LLC	VINO VISTA LLC	PO BOX 510	PASO ROBLES	CA	93447
025444014	VINO VISTA LLC A CA LLC	VINO VISTA LLC	PO BOX 510	PASO ROBLES	CA	93447

ENCLOSURE NO. 5

LIST OF INTERESTED PARTIES

City of Paso Robles GSA

Interested Parties List

John Neil	AMWC	jneil@amwc.us
Willy Cunha	Shandon-San Juan Water District	wcunha@sunviewvineyards.com
Nick DeBar	City of Atascadero	ndebar@atascadero.org
Tom Moss	Monterey County	mosst@co.monterey.ca.us
Rob Johnson	Monterey County Water Resources Agency	johnsonr@co.monterey.ca.us
Steve Sinton	Shandon-San Juan Water District	sjsinton@earthlink.net
Patricia Wilmore	Paso Robles Wine Country Alliance	pwilmore@pasowine.com
Darrell Gentry	San Miguel CSD	darrell.gentry@sanmiguelcsd.org
Paul Clark	SLO County Farm Bureau	paul@paulclarklaw.com
Jeff Briltz	Templeton CSD	jbriltz@templetoncsd.org
Dana Merrill	Estrella-El Pomar-Creston Water District	info@mesavineyard.com
Jerry Reaugh	Estrella-El Pomar-Creston Water District	jerry@reaughj.com
Sue Harvey	Environmental - North County Watch	susan@ifsusan.com
Randy Diffenbaugh	Rancho Salinas Mutual Benefit Water Company	rdiff@yahoo.com
Sue Luft	Rural Residential	luftsue@gmail.com
Larry Werner	Engineering	lwerner@northcoastengineering.com
Courtney Howard	SLO County	choward@co.slo.ca.us
Carolyn Berg	SLO County	cberg@co.slo.ca.us
Angela Ruberto	SLO County	aruberto@co.slo.ca.us
John Wallace	Engineering	johnw@wallacegroup.us
John Dornellas	Heritage Ranch CSD	john@heritageranchcsd.org
John Hollenbeck	Engineering	johnhollenbeckpe@gmail.com
Steve Baker	Rural Residential	sbaker1440@gmail.com
Mladen Bandov	SLO County	mbandov@co.slo.ca.us
Kari Wagner	Engineering	kariw@wallacegroup.us
Rachelle Rickard	City of Atascadero	rrickard@atascadero.org
Iris Priestaf	Engineering	IPriestaf@toddgroundwater.com
Kevin Peck	Shandon-San Juan Water District	kp538349@gmail.com
Susan Hayes	Farm Supply	shayes@farmsupplycompany.com
Craig Thomas	Spanish Lakes Mutual Water Company	cncthomas@charter.net
Jim Hagen	Spanish Lakes Mutual Water Company	jdhagen44@hotmail.com
Mark Gabler	Walnut Hills Mutual Water Company	mark.gabler@att.net
Dan Lloyd	Santa Ysabel Ranch Mutual Water Company	danrlloyd@yahoo.com
Karen Capadona	Green River Mutual Water Company	kncapadona@gmail.com
Greg Powell	Mustang Springs Mutual Water Company	greg@make-it.com
Susan Howard	Shandon CSA 16	susan@shilohtax.com

SHANDON-SAN JUAN WATER DISTRICT

RESOLUTION 17-003
RESOLUTION FORMING THE SHANDON-SAN JUAN GROUNDWATER SUSTAINABILITY AGENCY

The following Resolution is hereby offered and read:

WHEREAS, in 2014, the California Legislature adopted, and the Governor signed into law, three bills (SB 1168, AB 1739, and SB 1319) collectively referred to as the Sustainable Groundwater Management Act (SGMA) (Water Code §§ 10720 *et seq.*), that became effective on January 1, 2015, and that have been subsequently amended; and

WHEREAS, the intent of SGMA, as set forth in Water Code section 10720.1, is to provide for the sustainable management of groundwater basins at a local level by providing local groundwater agencies with the authority, and technical and financial assistance necessary, to sustainably manage groundwater; and

WHEREAS, SGMA requires the formation of a groundwater sustainability agency (GSA) or agencies for all basins designated by the California Department of Water Resources (DWR) as high or medium priority on or before June 30, 2017; and

WHEREAS, SGMA further requires the adoption of a groundwater sustainability plan (GSP) for all basins designated by DWR as high or medium priority and subject to critical conditions of overdraft on or before January 31, 2020; and

WHEREAS, the Paso Robles Area Groundwater Subbasin (Basin No. 3-004.06) (Basin) has been designated by DWR as a high priority basin subject to critical conditions of overdraft; and

WHEREAS, the Shandon-San Juan Water District is a “local agency” within the Basin as defined in Water Code Section 10721(n) and thus is eligible to form a GSA in the Basin; and

WHEREAS, the Salinas Valley Basin Groundwater Sustainability Agency, City of El Paso de Robles, San Miguel Community Services District, Heritage Ranch Community Services District, and the County of San Luis Obispo are also local agencies within the Basin, and it is anticipated that they will each become the GSA for their respective service areas within the Basin; and

WHEREAS, adoption of a GSA is exempt from the requirements of the California Environmental Quality Act (Public Resources Code §§ 21000 et seq.) (CEQA) pursuant to Section 15061(b)(3) of the CEQA Guidelines; and

WHEREAS, on April 6, 2017, the San Luis Obispo Local Agency Formation Commission (LAFCO) conditionally approved the formation of the Estrella-El Pomar-Creston Water District (EPCWD) for the purpose of serving as (or part of) a GSA for its portion of the Basin and which could be formed as early as Fall 2017; and

WHEREAS, the Shandon-San Juan Water District desires to form a GSA to cover all areas within the boundaries of the Shandon-San Juan Water District as of the June 30, 2017 deadline; and

WHEREAS, the Shandon-San Juan Water District has published a notice of public hearing consistent with the requirements contained within Water Code Section 10723(b); and

WHEREAS, the Shandon-San Juan Water District conducted such a public hearing on June 8, 2017; and

WHEREAS, the Shandon-San Juan Water District is committed to the sustainable management of groundwater within the Paso Basin in the manner required by SGMA and intends to coordinate with the other GSAs and affected parties, and to consider the interests of all beneficial users and uses of groundwater within the Paso Basin through a memorandum of agreement with the other GSAs.

NOW, THEREFORE, BE IT RESOLVED AND ORDERED by the Board of the Shandon-San Juan Water District, that:

Section 1: The foregoing recitals are true and correct and are incorporated herein by reference.

Section 2: The Shandon-San Juan Water District hereby decides to become the GSA for, and undertake sustainable groundwater management within the boundaries of the Shandon-San Juan Water District, and A map of the GSA Boundary is attached hereto as Exhibit A and incorporated herein.

Section 3: The President of the Board of the Shandon-San Juan Water District, or designee, is hereby authorized and directed to submit notice of adoption of this Resolution in addition to all other information required by SGMA, including but not limited to, all information required by Water Code Section 10723.8, to DWR, and to support the development and maintenance of an interested persons list as described in Water Code Section 10723.4 and a list of interested parties as described in Water Code Section 10723.8(a)(4).

Section 4: The President of the Board of the Shandon-San Juan Water District, or designee, is hereby authorized to take such other and further actions as may be necessary to effectuate the purposes of this Resolution.

Upon motion of Director Turrentine, seconded by Director Sinton,

and on the following roll call vote, to wit:

AYES: 5

NOES: 0

ABSENT: 0

ABSTAINING: 0

the foregoing resolution is hereby adopted on the 8th day of June, 2017.

Willy Cunha,
President of the Board of Directors

ATTEST:

Stephanie Bertoux,
Secretary of the Board of Directors

Dated: June 8, 2017

NOTICE OF EXEMPTION

SHANDON-SAN JUAN WATER DISTRICT
365 TRUESDALE RD. • PO BOX 150 • SHANDON • CALIFORNIA 93461 • (805) 239-0555

Forming Shandon-San Juan Ground Sustainability Agency

Project Location (Specific address):
Paso Robles Groundwater Base
Project Location (County):
San Luis Obispo

Project Applicant & Phone No.:
Shandon-San Juan Water District (805) 239-0555
Applicant Address (specific):
365 Truesdale RD. PO Box 150
Shandon, CA 93461

Description of Nature, Purpose and Beneficiaries of Project

Form a Groundwater Sustainability Agency (GSA) for the District portion of the Paso Robles Groundwater Basin. To cooperate with the other Basin GSA's to write a single Groundwater Sustainability Plan (GSP).

Name of Public Agency Approving Project: Shandon-San Juan Water District

Exempt Status:

Statutory Exemption {Sec. 15262 }

Reasons why project is exempt: The activity is statutorily exempt from CEQA because it is a planning study that collects inventories groundwater data and studies & uses that data to create a GSP. The GSP will include water budgets, strategies, and potential actions projects and programs. Future implementation of any identified actions, projects or programs would be subject to CEQA review.

Willy Cunha President Board of Director
Shandon- San Juan Water District (805) 239-0555

Lead Agency Contact Person **Telephone**

Signature [signature] Date 06/08/17

Name (Print) Willy Cunha Title President of the Board of Directors

Board of Directors

President
John Green

Vice President
Larry Reuck

Members
Travis Dawes
Anthony Kalvans
Gib Buckman

General Manager
Darrell W. Gentry

Fire Chief
Rob Roberson

Mission Statement

Committed to serving the community with effectiveness, efficiency, and care to support the economic and social quality of life in San Miguel

Proudly serving San Miguel:

Fire Protection

Street Lighting

Water

Wastewater

Solid Waste

P.O. Box 180
1150 Mission Street
San Miguel, CA 93451

Tel. 805-467-3388
Fax 805-467-9212

www.sanmiguelcsd.org

November 22, 2016

Mark Nordberg, GSA Project Manager
Sustainable Groundwater Management Program
California Department of Water Resources
901 P Street, Room 213A
P.O. Box 942836
Sacramento, CA 94236

Re: San Miguel Community Services District Notice of Intent to become a Groundwater Sustainability Agency for Portions of the Paso Robles Groundwater Basin

Dear Mr. Nordberg:

Pursuant to California Water Code section 10723.8 of the Sustainable Groundwater Management Act of 2014 ("SGMA"), the San Miguel Community Services District ("SMCSD") hereby provides this notice of its decision to become a Groundwater Sustainability Agency ("GSA") for those portions of the Paso Robles Groundwater Sub-basin ("PR Basin"), Department of Water Resources ("DWR"), Bulletin 118, Sub-basin No. 3-04.06 within SMCSD's service area and sphere of influence. SMCSD's service area and sphere of influence overlie a portion of the PR Basin as depicted in Exhibit 1.

As mandated under SGMA, DWR has identified the PR Basin as a high priority basin. Accordingly, the PR Basin must be managed sustainably by one or more GSAs in accordance with the timelines established in SGMA. SMCSD is a local public agency of the State of California organized and operating under the Community Services District Law ("CSD Law"), Government Code §61000 *et seq*. Per Government Code §61100(a) & (b) of the CSD Law, SMCSD has activated powers to "supply water for any beneficial uses, in the same manner as a municipal water district, formed pursuant to the Municipal Water District Law of 1911, Division 20 (commencing with Section 71000) of the Water Code" and to "collect, treat, or dispose of sewage, wastewater, recycled water, and storm water" within its service area in "the same manner as a sanitary district, formed pursuant to the Sanitary District Act of 1923, Division 6 (commencing with Section 6400) of the Health and Safety Code." Pursuant to Government Code §61100(a) & (b), SMCSD exercises water supply and management responsibilities throughout its service area.

SMCSD's water management responsibilities in the PR Basin include operation and maintenance of a wastewater treatment plant, management and infiltration of treated wastewater into the PR Basin via SMCSD owned infiltration ponds, and supplying customers with water for beneficial use by pumping groundwater from the PR Basin. Becoming a GSA will support SMCSD's existing efforts to eliminate overdraft in the SMCSD's portion of the PR Basin while protecting water quality and ensuring future water supply sustainability in the San Miguel area (in cooperation with the County of San Luis Obispo and other water supply agencies in the PR Basin).

In accordance with Section 10723(b) of the Water Code, and Section 6066 of the Government Code, SMCSD published a notice of public hearing regarding SMCSD' s potential decision to become a GSA. The notice of public hearing was published in a newspaper of general circulation in northern San Luis Obispo County, the Paso Robles Press and San Luis Obispo Tribune, thereby notifying interested parties and the public of SMCSD's intent to consider becoming a GSA in portions of the PR Basin.

The notice and proof of publication is enclosed herewith as Exhibit 2. On October 27, 2016, the SMCSD Board of Directors, at a properly noticed special board meeting, held a public hearing to consider whether SMCSD should file a notice of intent to become a GSA for a portion of the PR Basin. No written comments were received prior to the public hearing, and the SMCSD heard and considered the verbal comments of the members of the public who provided comments at the October 27, 2016 public hearing.

Following closure of the public hearing, SMCSD's Board of Directors adopted Resolution No. 2016-34, enclosed herewith as Exhibit 3, wherein SMCSD's governing body determined to become a GSA for all of those portions of the PR Basin within SMCSD's service area and sphere of influence. SMCSD is not proposing any new bylaws, ordinances, or other new authorities associated with this GSA formation, but it will continue to work collaboratively with the County of San Luis Obispo and other water supply agencies, as well as other neighboring local agencies, to ensure all of the groundwater in the PR Basin is managed in accordance with the requirements of SGMA.

To the best of SMCSD's knowledge, other entities considering formation of a GSA near SMCSD's service area and sphere of influence in the PR Basin may include:

- County of San Luis Obispo
- City of Paso Robles
- City of Atascadero
- Templeton Community Services District, and
- Atascadero Mutual Water District.

The SMCSD Board of Directors in Resolution No. 2016-34 authorized the Board President and District General Manager and District General Counsel to negotiate MOUs, or other appropriate agreement(s), with other public agencies and/or entities that utilize or manage water in the PR Basin, as may be necessary for the purpose of implementing a cooperative, coordinated governance structure for the management of the PR Basin.

SMCSD has begun discussions with the agencies listed above, stakeholders, and interested parties overlying portions of the PR Basin near SMCSD's service area and sphere of influence, and is working cooperatively with these parties to establish basin-wide coordination and governance for groundwater management (while reducing, to the maximum extent practical, duplication of effort, overlap of jurisdiction, and inter-agency conflict).

As required by Water Code Section 10723.8(a)(4), SMCSD established and is maintaining a list of interested parties that will continue to be amended as necessary during the GSA formation and Groundwater Sustainability Plan ("GSP") development process. As required by SGMA, SMCSD will consider all classes of beneficial uses and users of groundwater within the PR Basin, as well as the interests of those entities responsible for developing GSPs.

An initial list of interested parties is enclosed herewith as Exhibit 4. The interested persons list will be used by SMCSD to ensure that, pursuant to California Water Code Section 10723.2, SMCSD considers the interests of all beneficial uses and users of groundwater in the PR Basin, as well as those responsible for implementing a GSP or GSPs in the PR Basin. SMCSD will update the interested parties list as new information becomes available and negotiations with other public agencies progress.

It is my understanding, based on opinion of SMCSD's legal counsel, that all applicable and required information listed in Water Code §10723.8(a) has been provided to DWR in this correspondence and supporting exhibits. SMCSD's GSA formation notification to DWR complies with all of the requirements of SGMA (as amended). However, to the extent that DWR requires additional information to complete the GSA formation notification process, SMCSD will promptly provide such information.

If you have any questions, or require further information, please contact Darrell Gentry, SMCSD General Manager at (805) 467-3388.

Sincerely,

Darrell Gentry

Darrell Gentry,
District General Manager
San Miguel Community Services District

Attachments: Exhibits 1-4

EXHIBIT 1

(PR BASIN AREA MAP/ESTRELLA SUB-BASIN MAP)

San Miguel Community Services District
Service Area & Sphere of Influence
Recommendation

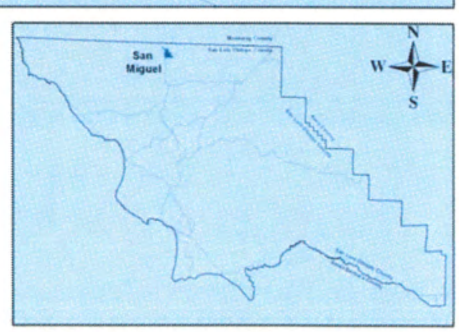
Legend

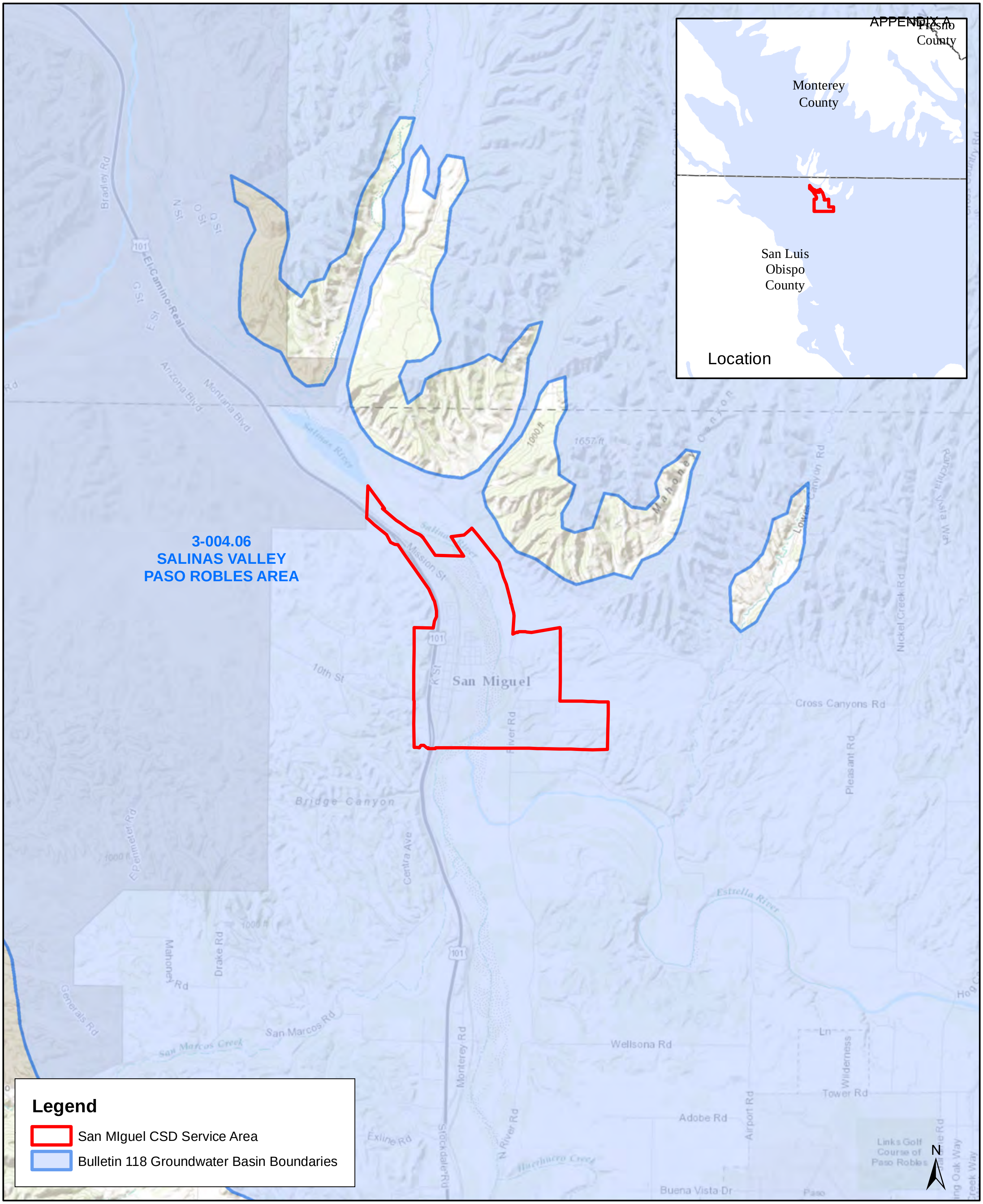
Major Roads

Service Area

Sphere of Influence
(Same as Service Area)

Prepared By SLOLAFCO
Name: San Miguel_SOI Bndy
Date: 7/1/2013





San Miguel Community Services District
GSA Submittal

0 0.5 1 2 Miles

For a map of all the GSA's submitted, see: http://www.water.ca.gov/groundwater/sgm/gsa_map.cfm

Date: 12/16/2016

EXHIBIT 2

(NOTICE OF PUBLIC HEARING

PROOF OF PUBLICATION)

SAN MIGUEL COMMUNITY SERVICES DISTRICT

NOTICE OF PUBLIC HEARING

NOTICE IS HEREBY GIVEN THAT THE San Miguel Community Services District Board of Directors will hold a public hearing on:

Thursday, October 27, 2016, 7:00 P.M., 1150 Mission Street to consider the following:

1. Adopting **Resolution No 2016-33**, To Form a Groundwater Sustainability Agency (GSA) pursuant to California Water Code section 10723.8 of the Sustainable Groundwater Management Act of 2014 for all properties within the District water service and sphere of influence boundaries.

Description:

2. To consider approving the enacting resolution to form and establish a GSA for purpose of managing water resources within the jurisdictional and sphere of influence boundaries of the San Miguel Community Services District that establishes the following objectives:

> A consistent and minimum reliable water supply is essential to the public health, safety and welfare of the people and community of San Miguel, and
>
> Will enact rules, regulations and standards for water reuse, recycling, conservation, and
>
> Work collaboratively with others to eliminate or reduce overdraft conditions that may exist in the SMCSD's portion of the PR Basin, while protecting water quality and ensuring future water supply sustainability in the San Miguel area (in cooperation with the County of San Luis Obispo and other water supply agencies in the PR Basin), and to assure that the San Miguel Area portion of the Basin is managed in accordance with the requirements of SGMA

The GSA will be comprised of the SMCSD Board of Directors who may enact voluntary and mandatory measures to achieve these specified objectives.

Proposed Environmental Determination:

Categorical Exemption, Class 7, Regulatory Action Taken to Protect Natural Resource.

A copy of the Categorical Exemption form is available at District office and available upon request or at the District website. District contact information is: www.sanmiguelcsd.org or phone – (805) 467-3388.

Interested persons are invited to be present at the public hearing and will be given an opportunity to speak in favor or in opposition to the above-proposed ordinance. Written comments are also acceptable, if submitted or delivered to the District office prior to the public hearing.

Information regarding the proposed ordinance is on file at the District office or may be found on the District's website, www.sanmiguelcsd.org.

BY ORDER OF THE SAN MIGUEL COMMUNITY SERVICES DISTRICT BOARD OF DIRECTORS.

DARRELL W. GENTRY, GENERAL MANAGER AND SECRETARY TO THE BOARD

Date: September 28, 2016

Published Once on Friday, October 7, 2016

and Once on Friday, October 14, 2016

ROBLES CA 93446
If Corporation or LLC-Print State of Incorporation/Organization

I declare that all information in this statement is true and correct. (A registrant who declares as true information which he or she knows is false is guilty of a crime.)

/S/DEBRA LINDBERG

This statement was filed with the County Clerk of San Luis Obispo County on 09/21/2016

TRANSACTING BUSINESS DATE: NOT APPLICABLE

CERTIFICATION

I hereby certify that this copy is a correct copy of

THE TOTAL AMOUNT DUE. Trustor(s): JAMES M. DIMAURO AND NINA M. DIMAURO Recorded: 11/4/2005 as Instrument No. 2005093503 of Official Records in the office of the Recorder of SAN LUIS OBISPO County, California; Date of Sale: 10/31/2016 at 11:00AM Place of Sale: In the breezeway adjacent to the County General Services Building located at 1087 Santa Rosa Street San Luis Obispo, California 93401 Amount of unpaid balance and other charges: $117,345.15 The purported property address is: 2290 HERITAGE LOOP RD, PASO ROBLES, CA 93446 Assessor's Parcel No.: 012-190-029

NOTICE TO POTENTIAL

any incorrectness of the property address or other common designation, if any, shown herein. If no street address or other common designation is shown, directions to the location of the property may be obtained by sending a written request to the beneficiary within 10 days of the date of first publication of this Notice of Sale. If the sale is set aside for any reason, including if the Trustee is unable to convey title, the Purchaser at the sale shall be entitled only to a return o f the monies paid to the Trustee. This shall be the Purchaser's sole and exclusive remedy. The purchaser shall have no further recourse against the Trustor, the Trustee, the Beneficiary, the Beneficiary's Agent,

SAN MIGUEL COMMUNITY SERVICES DISTRICT
NOTICE OF PUBLIC HEARING

NOTICE IS HEREBY GIVEN THAT THE San Miguel Community Services District Board of Directors will hold a public hearing on:
Thursday, October 27, 2016, 7:00 P.M., 1150 Mission Street to consider the following:
1. Adopting Resolution No 2016-33, To Form a Groundwater Sustainability Agency (GSA) pursuant to California Water Code section 10723.8 of the Sustainable Groundwater Management Act of 2014 for all properties within the District water service and sphere of influence boundaries.
Description:
2. To consider approving the enacting resolution to form and establish a GSA for purpose of managing water resources within the jurisdictional and sphere of influence boundaries of the San Miguel Community Services District that establishes the following objectives:
A consistent and minimum reliable water supply is essential to the public health, safety and welfare of the people and community of San Miguel, and
Will enact rules, regulations and standards for water reuse, recycling, conservation, and
Work collaboratively with others to eliminate or reduce overdraft conditions that may exist in the SMCSD's portion of the PR Basin, while protecting water quality and ensuring future water supply sustainability in the San Miguel area (in cooperation with the County of San Luis Obispo and other water supply agencies in the PR Basin), and to assure that the San Miguel Area portion of the Basin is managed in accordance with the requirements of SGMA

The GSA will be comprised of the SMCSD Board of Directors who may enact voluntary and mandatory measures to achieve these specified objectives.
Proposed Environmental Determination:
Categorical Exemption, Class 7, Regulatory Action Taken to Protect Natural Resource.
A copy of the Categorical Exemption form is available at District office and available upon request or at the District website. District contact information is: www.sanmiguelcsd.org or phone – (805) 467-3388.
Interested persons are invited to be present at the public hearing and will be given an opportunity to speak in favor or in opposition to the above-proposed ordinance. Written comments are also acceptable, if submitted or delivered to the District office prior to the public hearing.
Information regarding the proposed ordinance is on file at the District office or may be found on the District's website, www.sanmiguelcsd.org.
BY ORDER OF THE SAN MIGUEL COMMUNITY SERVICES DISTRICT BOARD OF DIRECTORS.
DARRELL W. GENTRY, GENERAL MANAGER AND SECRETARY TO THE BOARD
Date: September 28, 2016 Published Once on Friday, October 7, 2016 and Once on Friday, October 14, 2016

TOMMY GONG,
County Clerk
By ABAUTISTA, Deputy

New Fictitious Business Name Statement, Expires 09/20/2021

PUB: 9-30, 10-7, 10-14, 10-21-2016 LEGAL #5451

NOTICE OF TRUSTEE'S SALE

T.S. No.: 2016-CA006964 Loan No.: XXXXX Order No.: 5822494 APN: 048-071-020,018,014,012, 010, 048-071-008,004, & 085-171-008

YOU ARE IN DEFAULT UNDER A DEED OF TRUST DATED 9/13/2007. UNLESS YOU TAKE ACTION TO PROTECT YOUR PROPERTY, IT MAY BE SOLD AT A PUBLIC SALE. IF YOU NEED AN EXPLANATION OF THE NATURE OF THE PROCEEDING AGAINST YOU, YOU SHOULD CONTACT A LAWYER.
A public auction sale to the highest bidder for cash, cashier's check drawn on a state or national bank, a check drawn by a state or federal credit union, or a check drawn by a state or federal savings and loan association, or savings association, or savings bank specified in section 5102 of the Financial Code and authorized to do business in this state. Sale will be held by the duly appointed trustee as shown below, of all right, title, and interest conveyed to and now held by the trustee in the hereinafter described property under and pursuant to a Deed of Trust described below. The sale will be made, but without covenant or warranty, expressed or implied, regarding title, possession, or encumbrances, to pay the remaining principal sum of the note(s) secured by the Deed of Trust, with interest and late charges thereon, as provided in the note(s), advances, under the terms of the Deed of Trust, interest thereon, fees, charges and expenses of the Trustee for the total amount (at the time of the initial publication of the Notice of Sale) reasonably estimated to be set forth below. The amount may be greater on the day of sale.

BENEFICIARY MAY ELECT TO BID LESS THAN THE TOTAL

APPENDIX A

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NOTICE TO PRO
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EXHIBIT 3

(DISTRICT ADOPTING RESOLUTION)

ORIGINAL

RESOLUTION NO. 2016- 34

RESOLUTION OF THE BOARD OF DIRECTORS OF SAN MIGUEL COMMUNITY SERVICES DISTRICT TO BECOME A GROUNDWATER SUSTAINABILITY AGENCY FOR A PORTION OF THE PASO ROBLES GROUNDWATER BASIN WITHIN THE BOUNDARIES AND SPHERE OF INFLUENCE FOR SAN MIGUEL COMMUNITY SERVICES DISTRICT

WHEREAS in September 2014, the Sustainable Groundwater Management Act SGMA was signed into law with an effective date of January 1, 2015 and codified at California Water Code Section 10720 et seq., and

WHEREAS the legislative intent of SGMA is to among other goals: provide sustainable management of alluvial groundwater basins and sub-basins AS defined by the California Department of Water Resources (DWR); to enhance local management of groundwater; to establish minimum standards for sustainable groundwater management and to provide specified local agencies authority and the technical and financial assistance necessary to sustainably manage groundwater, and

WHEREAS the Water Code, Section 10723a authorizes a local agency with water supply water management or local land use responsibilities or a combination of local agencies with such responsibilities overlying a groundwater basin to decide to become a Groundwater Sustainability Agency GSA under SGMA, and

WHEREAS San Miguel Community Services District (SMCSD) is a local agency with water management responsibilities exercised per Government Code 61100 b within SMCSD's service area including management and infiltration of treated wastewater throughout the SMCSD service area, and

WHEREAS sustainable groundwater management of high priority basins as designated by DWR is required by SGMA, and

WHEREAS the service area of SMCSD overlies portions of the Estrella sub-basin of a portion of the Paso Robles Groundwater Basin DWR Bulletin 118 Basin No. 9-7 hereinafter the SLR Basin which is designated by DWR as a high priority basin, and

WHEREAS California Water Code Section 10723.8 requires that a local agency deciding to serve as a GSA notify DWR within 30 days of the local agency's decision to become a GSA authorized to undertake sustainable groundwater management within a basin and

WHEREAS California Water Code Section 10723.8 mandates that 90 days following the posting by DWR of the local agency's decision to become a GSA that entity shall be presumed to be the exclusive GSA for the designated area within the basin the agency is managing as described in the notice provided that no other GSA formation notice covering the same area has been submitted to DWR, and

ORIGINAL

WHEREAS SMCSD intends to pursue a memorandum of understanding or other Agreement(s) with one or more local agencies in the PR Basin that will achieve the common purpose of creating a governance structure for the entire PR Basin that ensures all of the PR Basin is sustainably managed in a transparent and effective manner under one or more groundwater sustainability plans GSPs, and

WHEREAS in accordance with Section 10723b of the California Water Code and Section 6066 of the California Government Code, a notice of public hearing was published in a general circulation newspaper in San Luis Obispo County regarding SMCSDs intent to consider becoming a GSA for a portion of the PR Basin, and

WHEREAS becoming a GSA supports the SMCSD's ongoing efforts to maintain and replenish the PR Basin, while working to eliminate over-drafting and ensure water supply sustainability within its service area boundaries in cooperation with the state recognized GSA's located within the Paso Robles Basin.

NOW THEREFORE THE SMCSD BOARD OF DIRECTORS HEREBY FINDS DETERMINES RESOLVES AND ORDERS AS FOLLOWS:

Section 1. The above recitals and each of them are true and correct.

Section 2. The SMCSD Board of Directors hereby decides and determines that SMCSD shall become the GSA for all of those portions of the PR Basin underlying or within the jurisdictional boundaries/sphere of influence of SMCSD.

Section 3. SMCSD Staff is directed to submit to DWR within thirty 30 days of the approval of this Resolution all documentation and information required by Water Code Section 10723.8 to support SMCSD's formation of a GSA.

Section 4. The Board President of SMCSD is authorized to execute memorandum(s) of understanding that memorializes the synergistic manner in which SMCSD maintains and/or replenishes its portion of the PR Basin with treated wastewater and otherwise cooperates in the management of the PR Basin in accordance with developed groundwater model(s) and groundwater management plan(s) that protects basin water quality in the Estrella portion of the PR Basin, while ensuring groundwater levels do not drop below specified levels.

Section 5. Board President and District General Manager are further authorized to pursue and negotiate with other local agencies and interested parties in the Estrella portion of the PR Basin such other agreements associated with SGMA compliance as may be deemed prudent by the Board President and/or General Manager. Such agreements-which shall generally be for the purpose of developing and implementing a cooperative and coordinated governance structure for future management of groundwater in some or the entire PR Basin-shall be submitted by the President to the SMCSD Board for consideration and possible approval.

Section 6. The approval of this Resolution and the actions described herein are exempt from the requirements of the California Environmental Quality Act CEQA since:

1) they are not a project for purposes of CEQA Guidelines 14 Cal. Code Regs. 15378 b5 because the approval will not result in direct or indirect physical changes in the environment, and

2) it can be seen with certainty that there is no possibility that the approval in question may have a significant effect on the environment. CEQA Guidelines 14 Cal. Code Regs. 15061b3. Staff is directed to file and post within five 5 business days a Notice of Exemption associated with this approval with the Clerk of the Board of Supervisors of San Luis Obispo County.

Section 7. The Secretary to the Board does hereby certifies the adoption of this resolution.

PASSED APPROVED AND ADOPTED this 27th day of October 2016 by the following Vote:

AYES BUCKMAN, DAWES, GREEN, KALVANS, REUCK

NOES

ABSENT

John Green, Board President
San Miguel Community Services District

ATTEST:

Darrell W. Gentry

Darrell W. Gentry, General Manager and
Secretary to the Board of Directors

APPROVED AS TO FORM:

Doug White, District General Counsel

EXHIBIT 4

(LIST OF INTERESTED PARTIES)

4-H Clubs- Paso Robles
807 Sycamore canyon
Paso Robles, CA 93446

4-H Clubs- San Luis Obispo
2156 Sierra Way #C
San Luis Obispo, CA 93422

Agricultural Liaison Advisory Board (ALAB)

Almira Water Association
P.O. Box 752
Paso Robles, CA 93447

Arciero Winery
5011 CA-46
Paso Robles, CA 93446

Atascadero Mutual Water Company
5005 El Camino Real
Atascadero, CA 93422

Atascadero State Hospital
10333 El Camino Real
Atascadero, CA 93422

Cal Trans Shandon Rest Stop
1120 N Street MS 49 Ca-46
Sacramento, CA 95814

Camp Roberts
billeting office, bldg 6037
Camp Roberts, CA 93451

Central Coast Salmon Enhancement
229 Stanley Ave.
Arroyo Grande, CA 93420

Central Coast Vineyard Team
5915 El Camino Real
Atascadero, CA 93422

Central Coast Wine Grape Growers Association

Chumash Casino Resort
3400 E. Hwy 246
Santa Ynez, CA 93460

City of Atascadero
6500 Palma Ave.
Atascadero, CA 93422

City of Atascadero
6500 Palma Ave.
Atascadero, CA 93422

City of Paso Robles
1000 Spring Street
Paso Robles, CA 93446

City of Paso Robles
1000 Spring Street
Paso Robles, CA 93446

County of Monterey
168 West Alisal Street 3rd fl
Salinas, CA 93901

County of Monterey
140 Church St
Salinas, CA 93901

County of San Luis Obispo
1055 Monterey Street
San Luis Obispo, CA 93408

County of San Luis Obispo Planning Department & Planning Commission
976 Osos Street #200
San Luis Obispo, CA 93408

Courtside Cellars
1425 Mission Street
San Miguel, CA 93451

Creston Country Store
6330 Webster Rd.
Creston, CA 93432

Creston Elementary School
5105 O'donovan Rd.
Creston, CA 93432

Department of Water Resources
1416 9th Street
Sacramento, CA 95814

El Paso De Robles Youth Correction Facility
4545 Airport Road
Paso Robles, CA 93446

Garden Farms Community Water District
17005 Walnut Ave.
Atascadero, CA 93422

Green River Mutual Water Company
5 Grace Dr.
Paso Robles, CA 93446

Grower-Shipper Association
512 Pajaro Street
Salinas, CA 93901

Heritage Ranch CSD
4870 Heritage Road
Paso Robles, CA 93446

Heritage Ranch CSD
4870 Heritage Road
Paso Robles, CA 93446

Huerhuero Ranch
9620 Huer Huero Road
Creston, CA 93432

Hunter Ranch Golf Course
4041 CA-46
?aso Robles, CA 93446

Independent Grape Growers of Paso Robles
P.O. Box 599
Paso Robles, CA 93447

Jack Ranch Cafe
19215 CA-46
Shandon, CA 93461

Land Conservancy of San Luis Obispo
1137 Pacific Street #A
San Luis Obispo, CA 93401

Las Posas Tablas Resource Conservation District
65 S. Main Street #107
Templeton, CA 93465

Loading Chute
6350 Webster Road
Creston, CA 93432

Local Chapter California Certified Organic Farms
P.O. Box 838
Paso Robles, CA 93447

Longbranch Saloon
6258 Webster Road
Creston, CA 93432

Los Robles Mobile Estates
3165 Theatre Dr.
Paso Robles, CA 93446

Meridian Vineyard
7000 Hwy 46
Paso Robles, CA 93446

Monterey County Parks Department
168 West Alisal Street 2rd fl
Salinas, CA 93901

Monterey County Water Resources Agency
893 Blanco Circle
Salinas, CA 93901

Mustang Springs Mutual Water Company
1606 Spring Street
Paso Robles, CA 93446

Native American Heritage Commission
915 Capital Mall #364
Sacramento, CA 95814

North County Farmers Market Association
P.O. Box 1783
Paso Robles, CA 93447

Paso Robles Chamber of Commerce
1225 Park Street
Paso Robles, CA 93446

Paso Robles RV Ranch
398 Exline Road
Paso Robles, CA 93446

Paso Robles Truck Plaza (San Paso)
81 Wellsona Rd.
Paso Robles, CA 93446

Paso Robles Vintners and Growers Association
30 10th Street
Paso Robles, CA 93446

Paso Robles Wine Country Alliance
1446 Spring Street #103
Paso Robles, CA 93446

Pete Johnston GM
2485 Theater Drive
Paso Robles, CA 93446

Pleasant Valley Elementary
025 Ranchita Canyon Road
San Miguel , CA 93451

Rancho Salinas Mutual Benefit Water Company
3563 Empleo Street
San Luis Obispo, CA 93408

Regional Water Quality Control Board
320 West Fourth St #200
Los Angeles, CA 90013

Salinan Nation Cultural Association
P.O. Box 56
Lockwood, CA 93932

San Luis Obispo Council of Government (SLO COG)
919 Palm Street #T
San Luis Obispo, CA 93401

San Luis Obispo County Flood Control
& Water Conservation
)76 Osos Street #206
San Luis Obispo, CA 93408

San Miguel Advisory Council
P.O. Box 822
San Miguel , CA 93451

San Miguel Catholic Church—
Monterey Diocese
P.O. Box 69
San Miguel , CA 93451

San Miguel Cemetery District
'.O. Box 237
San Miguel, CA 93451

San Miguel Chamber of Commerce
P.O. Box 385
San Miguel, CA 93451

San Miguel CSD
P.O. Box 180
San Miguel, CA 93451

San Miguel School District
.601 L Street
ian Miguel, CA 93451

Santa Ynez Band of Mission Indians
P.O. Box 517
Santa Ynez, CA 93460

Santa Ysabel Ranch Mutual Water
Company
P.O. Box 1988
Atascadero, CA 93422

SATCOM- Camp Roberts
illeting office, bldg 6037
:amp Roberts, CA 93451

SLO County Cattlemen
P.O. Box 302
Paso Robles, CA 93447

SLO County Cattlewomen
9765 Carrisa Hwy
Santa Margarita, CA 93453

SLO County Farm Supply
450 Ramada Dr.
aso Robles, CA 93446

SLO County Visitors & Conference
Bureau
1334 Marsh Street
San Luis Obispo, CA 93401

SLO Farm Bureau
4875 Morabito Place
San Luis Obispo, CA 93401

Spanish Lakes Mutual Water Company
330 Morro Road
.tascadero, CA 93422

Templeton CSD
420 Crocker St.
Templeton, CA 93465

Templeton CSD
420 Crocker St.
Templeton, CA 93465

'he Nature Conservancy
9 Pacific St
Monterey, CA 93940

The Nature Conservancy
895 Napa Ave
Morro Bay, CA 93442

U.S. Fish & Wildlife
1849 C Street NW
Washington, DC 20240

JC Cooperative Extension
49 San Benito Street #115
ollister, CA 95023

Upper Salinas-Las Tablas Resource
Conservation District
65 S. Main St. #107
Templeton , CA 93465

USDA Conservation Service
21001 Elliot Road
Lockeford, CA 95237

JSDA Farm Service Agency
30 Campus Drive
andford, CA 93230

Walnut Hills Mutual Water Company
245 Nutwood Circle
Paso Robles, CA 93446

MEMORANDUM OF AGREEMENT REGARDING PREPARATION OF A GROUNDWATER SUSTAINABILITY PLAN FOR THE PASO ROBLES GROUNDWATER BASIN

This Memorandum of Agreement regarding Preparation of a Groundwater Sustainability Plan for the Paso Robles Groundwater Basin ("MOA") is entered into by and between the City of El Paso de Robles ("City"), the San Miguel Community Services District ("SMCSD"), the Heritage Ranch Community Services District ("HRCSD"), the County of San Luis Obispo ("County") and the Shandon-San Juan Water District ("SSJWD") (each referred to individually as a "Party" and collectively as the "Parties") for purposes of preparing a groundwater sustainability plan for the Paso Robles Area Subbasin.

Recitals

WHEREAS, on September 16, 2014, Governor Jerry Brown signed into law Senate Bills 1168 and 1319 and Assembly Bill 1739, known collectively as the Sustainable Groundwater Management Act (Water Code §§ 10720 *et seq.*) ("SGMA"), which became effective on January 1, 2015 and which have been and may continue to be amended from time to time; and

WHEREAS, SGMA requires the establishment of a groundwater sustainability agency ("GSA") or agencies for all basins designated as medium or high priority by the California Department of Water Resources ("DWR") on or before June 30, 2017; and

WHEREAS, SGMA further requires the adoption of a groundwater sustainability plan ("GSP") or coordinated GSPs for all basins designated by DWR as high or medium priority and subject to critical conditions of overdraft on or before January 31, 2020; and

WHEREAS, DWR has designated the Paso Robles Area Subbasin (Basin No. 3-004.06) ("Basin") as a high priority basin subject to critical conditions of overdraft; and

WHEREAS, each of the Parties has decided to become the GSA within its respective service area overlying the Basin and has informed DWR of its decision and intent to undertake sustainable groundwater management therein; and

WHEREAS, each of the Parties desires to collectively develop and implement a single GSP to sustainably manage the portions of the Basin underlying their combined service areas (*i.e.* all portions of the Basin located within the County of San Luis Obispo); and

WHEREAS, the Parties share the common goal of cost effective, sustainable groundwater management that considers the interests and concerns of all beneficial uses and users of groundwater within the Basin; and

WHEREAS, on April 6, 2017, the San Luis Obispo Local Agency Formation Commission conditionally approved the formation of the Estrella-El Pomar-Creston Water District ("EPCWD"), subject to, among other things, a successful vote on the formation pursuant to Water Code Section 34500, for purposes of serving as a GSA within its service area; and

WHEREAS, the EPCWD, if formed, will not be formed until after the June 30, 2017 deadline, and the County included the potential service area of the EPCWD within the Paso Basin – County of San Luis Obispo Groundwater Sustainability Agency that the County formed on May 16, 2017 by Resolution 2017-134; and

WHEREAS, the Parties acknowledge the cooperative efforts of the working group, including representatives of each Party and the applicant and several petitioners desiring to form the EPCWD, that commenced meeting in August 2016 and that culminated in this MOA; and

WHEREAS, this MOA provides for the future addition of EPCWD as a Party to this MOA provided that certain conditions are satisfied, including, but not limited to, a successful vote on the formation of the EPCWD pursuant to Water Code Section 34500 and the County Board of Supervisors decides to withdraw from serving as the GSA for the EPCWD service area; and

WHEREAS, the active involvement and cooperation of all users of groundwater within the Basin is highly valued by the Parties and their continued willing cooperation in SGMA implementation is deemed critical for successful sustainable management of the Basin.

NOW, THEREFORE, it is mutually understood and agreed as follows:

Section 1
Purpose

The purpose of this MOA is to establish a committee to develop a single GSP that will be considered for adoption by each individual Party and subsequently submitted to DWR for approval. This MOA may also serve as the basis for continued cooperation among the Parties in the management of the Basin during the period between adoption of the GSP by each Party and approval of the GSP by DWR. As more specifically set forth in Section 12.2 below, this MOA shall automatically terminate upon DWR's approval of the GSP for the Basin.

Section 2
Term

This MOA shall become effective on the date that the last of the five (5) Parties signs ("Effective Date") and shall remain in effect until terminated in accordance with Section 9.2 or Section 12.2 below.

Section 3
EPCWD

If and only if the EPCWD is formed and its Board of Directors decides to become the GSA within its service area and the County Board of Supervisors decides to withdraw from serving as the GSA within said area, the EPCWD may become a Party to this Agreement by signing the Addition of Party to Memorandum of Agreement regarding Preparation of a Groundwater Sustainability Plan for the Paso Robles Groundwater Basin in the form attached hereto as Exhibit A ("Addition") provided that the County Board of Supervisors has accepted the Addition as part of its decision to withdraw.

Section 4
Paso Basin Cooperative Committee

4.1 The Parties hereby establish the Paso Basin Cooperative Committee ("Cooperative Committee") which shall be composed of a member and alternate member from each of the five (5) Parties.

4.2 The governing body of each Party shall promptly appoint a member and alternate member to the Cooperative Committee. Each Cooperative Committee member and alternate member shall serve at the pleasure of the appointing Party, and may be removed from the Cooperative Committee by the appointing Party at any time. Each Cooperative Committee member's compensation, if any, for his or her service on the Cooperative Committee shall be the responsibility of the appointing Party.

4.3 If and only if the EPCWD becomes a Party to this MOA in accordance with Section 3 of this MOA, the Cooperative Committee shall also include a member and alternate member from the EPCWD appointed by the EPCWD.

4.4 The Cooperative Committee shall conduct activities related to GSP development and SGMA implementation at the pleasure and under the guidance of the Parties, including, but not limited to:

A. Development of a GSP that achieves the goals and objectives outlined in SGMA;

B. Review and participation in the selection of consultants related to Cooperative Committee efforts, as more specifically set forth in Section 6 below;

C. Development of recommended annual budgets and additional funding needs for consideration and approval of the Parties and development of a record of expenditures, in accordance with and subject to Section 5 below. Consistent with Section 7 below, it is expected that each of the Parties will contribute in-kind staff support; therefore, recommended annual budgets shall generally not include the staff or overhead costs of any Party associated with participation in this MOA;

D. Development of a plan that describes the anticipated tasks to be performed under this MOA and a schedule for performing said tasks;

E. Implementation of the actions and/or policies undertaken pursuant to this MOA and resolution of any issues related to these actions and/or policies;

F. Development of measures that may be implemented in the event insufficient or unsatisfactory progress is being made in development of the GSP;

G. Development of a stakeholder participation plan that includes public outreach and education programs and workshops as appropriate and that involves the interested stakeholders in developing and implementing the GSP (*e.g.* workshops at key milestones); if determined necessary by the Cooperative Committee and supported by the Parties, the Cooperative Committee may lead implementation of the stakeholder participation plan or other stakeholder engagement activities;

H. Establishment from time to time of one or more standing or *ad hoc* committees to assist in carrying out the purposes and objectives of the Cooperative Committee as may be necessary;

I. Recommendation that each individual Party adopt the GSP developed under this MOA;

J. Resolution of differences among the Parties;

K. Coordination with neighboring GSAs in the Salinas Valley Groundwater Basin and with neighboring GSPs as may be required and/or to ensure no adverse effects.

4.5 The Cooperative Committee shall meet at least quarterly to carry out the activities described above. The Cooperative Committee shall prepare and maintain minutes of its meetings, and all meetings of the Cooperative Committee shall be conducted in accordance with the Ralph M. Brown Act (Government Code §§ 54950 *et seq.*). A majority of the members of the Cooperative Committee shall constitute a quorum for purposes of transacting business, except that less than a quorum may vote to adjourn the meeting. Attendance at all Cooperative Committee meetings may be augmented to include Parties' staff or consultants to ensure that the appropriate expertise is available.

4.6 Subject to Section 4.7 below, on all matters considered by the Cooperative Committee, the vote of each member shall be weighted in accordance with the following percentages:

City Member	15%
SMCSD Member	3%
HRCSD Member	1%

SSJWD Member	20%
County Member	61%

4.7 If and only if the EPCWD becomes a Party to this MOA in accordance with Section 3 of this MOA, the voting percentages set forth in Section 4.6 shall be modified as follows:

City Member	15%
SMCSD Member	3%
HRCSD Member	1%
SSJWD Member	20%
County Member	32%
EPCWD Member	29%

4.8 Any action or recommendation considered by the Cooperative Committee shall require the affirmative vote of 67 percent based on the percentages set forth in Section 4.6 or 4.7 above, as applicable. Notwithstanding the foregoing, the following shall require the affirmative vote of 100 percent based on the percentages set forth in Section 4.6 or 4.7 above, as applicable: (A) a recommendation that each of the Parties adopt the GSP or adopt any amendment thereto prepared in response to comments from DWR and (B) a recommendation that the Parties amend this MOA. For purposes of determining whether the requisite voting threshold has been met, the voting percentage of each member must be included in the calculation with the following limited exception: in the event that a member recuses himself or herself (A) said member's voting percentage shall be allocated *pro rata* to the other members for purposes of determining whether the 67 percent threshold has been met and (B) said members' affirmative vote shall not be required to reach the 100 percent threshold (i.e. all members who have not recused themselves must vote in the affirmative). Without limiting the foregoing, an absence by any member(s) shall not result in any *pro rata* distribution for purposes of determining whether the 67 percent threshold has been met or result in elimination of the requirement that said member vote in the affirmative for purposes of determining whether the 100 percent threshold has been met.

4.9 The creation of the Cooperative Committee shall not be construed as a delegation of any powers or authorities, and all powers and authorities of each individual Party shall reside with that Party.

Section 5
Funding

5.1 The Fiscal Year of the Cooperative Committee shall be July 1 through June 30.

5.2 For Fiscal Years 2017 – 2018, 2018 – 2019 and 2019 – 2020, the Cooperative Committee shall develop a recommended budget for consideration by each Party. Subject to each Party's approval of the budget for the relevant Fiscal Year, each Party shall be responsible for funding a portion of said budgeted costs in accordance with the percentages set forth in Section 4.6 or Section 4.7 above, as applicable. Neither the Cooperative Committee nor any Party on behalf of the Cooperative Committee shall make any financial expenditures or incur any financial obligations or liabilities pursuant to this MOA for Fiscal Years 2017 – 2018, 2018 – 2019 or 2019 – 2020 prior to approval of the budget for the relevant Fiscal Year by each Party.

5.3 For Fiscal Year 2020 – 2021 and following, the Cooperative Committee shall develop a recommended budget and recommended contribution percentages for consideration by each Party. Subject to each Party's approval of the budget and its contribution percentage, each Party shall be responsible for funding a portion of said budgeted costs in accordance with the percentages approved by each Party. Neither the Cooperative Committee nor any Party on behalf of the Cooperative Committee shall make any financial expenditures or incur any financial obligations or liabilities pursuant to this MOA for Fiscal Year 2020 – 2021 and following prior to approval of the budget and contribution percentages for the relevant Fiscal Year by each Party.

5.4 It is anticipated that the vast majority of budgeted costs will involve costs for consultant services. Consequently, most contributions shall be paid to the City in the manner described in Section 6.6 below. For budgeted costs that do not involve consultant services (if any), the Cooperative Committee shall determine the manner in which such contributions shall be paid consistent with Section 5.2 and Section 5.3 above.

5.5 The Cooperative Committee shall make recommendations related to any additional non-budgeted funding needs, but shall have no authority to require any Party to contribute funds over and above those included in the budgets approved by each Party.

5.6 On an annual basis, the Cooperative Committee and/or contracting agent shall provide the Parties with a record of expenditures from the previous Fiscal Year related to this MOA.

Section 6
Engagement of Consultants

6.1 It is anticipated that the Cooperative Committee will desire to retain the services of one or more consultants in conducting the activities identified in Section 4.4 above, including, but not necessarily limited to, its development of the GSP.

6.2 The City agrees to act as the contracting agent on behalf of the Cooperative Committee and shall follow its own procurement policies in the engagement of such consultant(s) subject to Section 6.3 below.

6.3 The City agrees that the Parties and the Cooperative Committee shall be included in the selection of any consultant retained by the City on behalf of the Cooperative Committee.

More specifically, staff representatives from each of the Parties shall be given an opportunity to review and approve all requests for proposals prior to their release and to participate in the various stages of the selection process, including, but not limited to, review of proposals and participation on interview panels. In addition, the City shall not issue a notice to proceed to any selected consultant until the Cooperative Committee has confirmed the consultant and related contract.

6.4 The Cooperative Committee may request that the City terminate a consultant contract entered into on behalf of the Cooperative Committee subject to and in accordance with the terms specified in the contract.

6.5 All consultant contracts entered into by the City on behalf of the Cooperative Committee shall include the following: (A) a provision that the consultant shall not commence work until a notice to proceed is issued and acknowledgement that a notice to proceed will not be issued until the Cooperative Committee confirms the consultant and contract; (B) a provision requiring that the consultant name each Party, its employees, officers and agents as an additional insured; and (C) an expected spend plan estimating the amount of the not to exceed contract amount that the consultant expects to invoice the City each month.

6.6 Upon receipt of each invoice from a consultant retained on behalf of the Cooperative Committee, the City shall calculate each Party's payment obligation based on the percentages set forth in Section 4.6 or Section 4.7, as applicable, or on the percentages approved by each Party as set forth in Section 5.3, depending on the Fiscal Year. The City shall submit an invoice to each Party showing the foregoing calculation, and each Party shall remit payment to the City within thirty (30) days.

Section 7
Roles and Responsibilities of the Parties

In addition to performance of the roles and responsibilities set forth above related to, among other things, appointment of members and alternate members to the Cooperative Committee, consideration of annual budgets and cost contributions and participation in the selection of consultants, the Parties shall:

A. Work to jointly to meet the objectives of this MOA through, among other things, coordination of all activities related to fulfillment of said objectives;

B. Internally or jointly designate a staff person(s) to provide expertise and existing information in a timely manner and to participate in the development of the GSP and/or related technical studies and/or other materials or actions being considered by the Cooperative Committee;

C. Upon recommendation of the Cooperative Committee, consider adoption of the GSP and, as defined in the GSP once approved, implement the GSP within its respective GSA service area. Notwithstanding the foregoing, nothing contained in this MOA shall be construed as obligating any Party to adopt the GSP developed under this MOA, or as preventing any Party from adopting the GSP developed under this MOA in the event that the Cooperative Committee fails to recommend approval or another Party (or Parties) elects not to adopt the GSP developed under this MOA;

D. Bring any dispute over any of the activities discussed in this MOA to the Cooperative Committee in order to provide the Cooperative Committee with an opportunity to resolve the dispute.

Section 8
Interagency Communication and Providing Proper Notice

8.1 In order to provide for consistent and effective communication among the Parties, each Party agrees to designate a representative as its central point of contact on all matters relating to this MOA and the GSP. Additional representatives from the community or staff may be appointed to serve as points of contact on specific actions or issues.

8.2 All notices, statements or payments related to implementing the objectives of this MOA shall be deemed to have been duly given if given in writing and delivered electronically, personally or mailed by first-class, registered, or certified mail to the Parties at the addresses set forth in Exhibit B. Notwithstanding any other provision of this MOA, the Parties may update Exhibit B from time to time without formally amending this MOA.

Section 9
Withdrawal and Termination

9.1 Any Party may unilaterally withdraw from this MOA without causing or requiring termination of this MOA. Withdrawal shall become effective upon thirty (30) days written notice to the remaining Parties' designated addresses as listed in Exhibit B. Nothing contained in this Section 9 shall be construed as prohibiting a Party that has withdrawn from this MOA from developing its own GSP for its service area within the Basin. A Party that has withdrawn from this MOA shall remain obligated to pay its percentage cost share of expenses and obligations as outlined in the current budget incurred, accrued or encumbered up to the date the Party provided notice of withdrawal, including, but not limited to, its cost share obligation under any existing consultant contract for which the City has issued a notice to proceed. If a Party withdraws, the Cooperative Committee shall reassess the contributions of each remaining Party to fund the current budget and determine if the Cooperative Committee needs to request the contribution of additional funding from the governing board of each Party.

9.2 This MOA may be terminated upon unanimous written consent of all current Parties.

Section 10
Amendments

This MOA may be amended only by unanimous written consent of all current Parties. Approval from a Party is valid only after that Party's governing body approves the amendment at a public meeting. Neither individual Cooperative Committee members nor individual members of the Parties' governing boards have the authority, express or implied, to amend, modify, waive or in any way alter this MOA or the terms and conditions hereof.

Section 11
Indemnification

No Party, nor any officer or employee of a Party, shall be responsible for any damage or liability occurring by reason of anything done or omitted to be done by another Party under or in connection with this MOA. The Parties further agree, pursuant to Government Code Section 895.4, that each Party shall fully indemnify and hold harmless each other Party and its agents, officers, employees and contractors from and against all claims, damages, losses, judgments, liabilities, expenses and other costs, including litigation costs and attorney fees, arising out of, resulting from, or in connection with any work delegated to or action taken or omitted to be taken by such Party under this MOA.

Section 12
Miscellaneous

12.1 Execution in Counterparts. This MOA may be executed in counterparts.

12.2 Automatic Termination of MOA. This MOA shall automatically terminate upon DWR's approval of the adopted GSP. Depending on the content of the GSP, the Parties may decide to enter into a new agreement to coordinate GSP implementation.

12.3 Choice of Law. This MOA is made in the State of California, under the Constitution and laws of said State and is to be so construed.

12.4 Severability. If any provision of this MOA is determined to be invalid or unenforceable, the remaining provisions shall remain in force and unaffected to the fullest extent permitted by law and regulation.

12.5 Entire Agreement. This MOA constitutes the sole, entire, integrated and exclusive agreement between the Parties regarding the contents herein. Any other contracts, agreements, terms, understandings, promises, representations not expressly set forth or referenced in this writing are null and void and of no force and effect.

12.6 Construction and Interpretation. The Parties agree and acknowledge that this MOA has been developed through negotiation, and that each Party has had a full and fair

opportunity to revise the terms of this MOA. Consequently, the normal rule of construction that any ambiguities are to be resolved against the drafting party shall not apply in construing or interpreting this MOA.

IN WITNESS WHEREOF, the Parties have executed this MOA on the dates shown below.

CITY OF EL PASO DE ROBLES

By: ______________________
Tom Frutchey

Its: City Manager

Date: ______________________

APPROVED AS TO FORM AND LEGAL EFFECT:

By: ______________________

Its: ______________________

Date: ______________________

SHANDON SAN JUAN WATER DISTRICT

By: ______________________
Willy Cunha

Its: President, Board of Directors

Date: ______________________

APPROVED AS TO FORM AND LEGAL EFFECT:

By: ______________________

Its: ______________________

Date: ______________________

COUNTY OF SAN LUIS OBISPO

By: ______________________
John Peschong

Its: Chair, Board of Supervisors

Date: 8/22/2017

APPROVED AS TO FORM AND LEGAL EFFECT:

By: ______________________

Its: deputy county counsel

Date: Aug 29, 2017

HERITAGE RANCH COMMUNITY SERVICES DISTRICT

By: ______________________
Scott Duffield

Its: General Manager

Date: ______________________

APPROVED AS TO FORM AND LEGAL EFFECT:

By: ______________________

Its: ______________________

Date: ______________________

ATTEST:

Tommy Gong, County Clerk-Recorder and
Ex-Officio Clerk of the Board of Supervisors

By, ______________________
Deputy Clerk

opportunity to revise the terms of this MOA. Consequently, the normal rule of construction that any ambiguities are to be resolved against the drafting party shall not apply in construing or interpreting this MOA.

IN WITNESS WHEREOF, the Parties have executed this MOA on the dates shown below.

CITY OF EL PASO DE ROBLES

By: Thomas Frutchey
Tom Frutchey

Its: City Manager

Date: 9-20-17

APPROVED AS TO FORM AND LEGAL EFFECT:

By: Iris P. Yang

Its: City Attorney

Date: 9/20/17

SHANDON SAN JUAN WATER DISTRICT

By: ______________________
Willy Cunha

Its: President, Board of Directors

Date: ______________________

APPROVED AS TO FORM AND LEGAL EFFECT:

By: ______________________

Its: ______________________

Date: ______________________

COUNTY OF SAN LUIS OBISPO

By: ______________________
John Peschong

Its: Chair, Board of Supervisors

Date: ______________________

APPROVED AS TO FORM AND LEGAL EFFECT:

By: ______________________

Its: ______________________

Date: ______________________

HERITAGE RANCH COMMUNITY SERVICES DISTRICT

By: ______________________
Scott Duffield

Its: General Manager

Date: ______________________

APPROVED AS TO FORM AND LEGAL EFFECT:

By: ______________________

Its: ______________________

Date: ______________________

opportunity to revise the terms of this MOA. Consequently, the normal rule of construction that any ambiguities are to be resolved against the drafting party shall not apply in construing or interpreting this MOA.

IN WITNESS WHEREOF, the Parties have executed this MOA on the dates shown below.

CITY OF EL PASO DE ROBLES

By: ______________________
Tom Frutchey

Its: City Manager

Date: ______________________

APPROVED AS TO FORM AND LEGAL EFFECT:

By: ______________________

Its: ______________________

Date: ______________________

COUNTY OF SAN LUIS OBISPO

By: ______________________
John Peschong

Its: Chair, Board of Supervisors

Date: ______________________

APPROVED AS TO FORM AND LEGAL EFFECT:

By: ______________________

Its: ______________________

Date: ______________________

SHANDON SAN JUAN WATER DISTRICT

By: ______________________
Willy Cunha

Its: President, Board of Directors

Date: 7-26-2017

APPROVED AS TO FORM AND LEGAL EFFECT:

By: ______________________ of Young Wooldridge, LLP

Its: District Counsel

Date: 7/26/17

HERITAGE RANCH COMMUNITY SERVICES DISTRICT

By: ______________________
Scott Duffield

Its: General Manager

Date: ______________________

APPROVED AS TO FORM AND LEGAL EFFECT:

By: ______________________

Its: ______________________

Date: ______________________

opportunity to revise the terms of this MOA. Consequently, the normal rule of construction that any ambiguities are to be resolved against the drafting party shall not apply in construing or interpreting this MOA.

IN WITNESS WHEREOF, the Parties have executed this MOA on the dates shown below.

CITY OF EL PASO DE ROBLES

By: ______________________
Tom Frutchey

Its: City Manager

Date: ______________________

APPROVED AS TO FORM AND LEGAL EFFECT:

By: ______________________

Its: ______________________

Date: ______________________

SHANDON SAN JUAN WATER DISTRICT

By: ______________________
Willy Cunha

Its: President, Board of Directors

Date: ______________________

APPROVED AS TO FORM AND LEGAL EFFECT:

By: ______________________

Its: ______________________

Date: ______________________

COUNTY OF SAN LUIS OBISPO

By: ______________________
John Peschong

Its: Chair, Board of Supervisors

Date: ______________________

APPROVED AS TO FORM AND LEGAL EFFECT:

By: ______________________

Its: ______________________

Date: ______________________

HERITAGE RANCH COMMUNITY SERVICES DISTRICT

By: Scott Duffield
Scott Duffield

Its: General Manager

Date: 07/31/2017

APPROVED AS TO FORM AND LEGAL EFFECT:

By: ______________________

Its: District Counsel

Date: 7/26/17

SAN MIGUEL COMMUNITY
SERVICES DISTRICT

By: ______________________
Rob Roberson

Its: Interim General Manager

Date: 8/29/2017

APPROVED AS TO FORM AND
LEGAL EFFECT:

By: ______________________

Its: Douglas White

Date: 9/6/17

EXHIBIT A

Addition of Party to Memorandum of Agreement regarding Preparation of a Groundwater Sustainability Plan for the Paso Robles Groundwater Basin

WHEREAS, certain local agencies that each decided to become the groundwater sustainability agency within their respective service areas overlying the Paso Robles Area Subbasin (Basin No. 3-004.06) have entered into an agreement entitled "Memorandum of Agreement regarding Preparation of a Groundwater Sustainability Plan for the Paso Robles Groundwater Basin" ("Agreement"); and

WHEREAS, the Estrella-El Pomar-Creston Water District ("EPCWD") could not be an original signatory to the Agreement, because it had not yet been formed; and

WHEREAS, Section 3 of the Agreement sets forth the process by which the EPCWD can become a party to the Agreement provided that certain conditions are met; and

WHEREAS, the EPCWD has received and reviewed a copy of the Agreement; and

WHEREAS, on ___________, the EPCWD Board of Directors held a public hearing and by Resolution _________decided to become the groundwater sustainability agency within its service area and a signatory to the Agreement; and

WHEREAS, on ___________, the County of San Luis Obispo Board of Supervisors held a public hearing and by Resolution _________decided to withdraw from serving as the groundwater sustainability agency within the EPCWD's service area and to accept the signature below.

NOW, THEREFORE, acknowledging that the recitals above are correct and are part of this agreement, the EPCWD, upon acceptance by signature below by the County of San Luis Obispo Board of Supervisors, shall become a party to the Agreement effective immediately. The EPCWD shall bear the benefits and enjoy the burdens of the Agreement as though the EPCWD had originally executed said Agreement as it now exists or may be amended in the future, and for so long as the Agreement remains in effect or for so long as the EPCWD is a party to the Agreement.

ACCEPTED AND APPROVED BY THE ESTRELLA-EL POMAR-CRESTON WATER DISTRICT BOARD OF DIRECTORS:

By: ______________________ Date: ______________________

Its: ______________________

APPROVED AS TO FORM AND LEGAL EFFECT:

By: ______________________ Date: ______________________

Its: ______________________

Address for purposes of Exhibit B to the Agreement:

Estrella-El Pomar-Creston Water District

____

____

Attention: ____________

ACCEPTED AND APPROVED BY THE COUNTY OF SAN LUIS OBISPO BOARD OF SUPERVISORS IN ACCORDANCE WITH THE AGREEMENT:

By: ______________________ Date: ______________________

Its: ______________________

APPROVED AS TO FORM AND LEGAL EFFECT:

By: ______________________ Date: ______________________

Its: ______________________

EXHIBIT B
PARTY ADDRESS LIST

County of San Luis Obispo
976 Osos Street, Room 206
San Luis Obispo, CA 93408
Attention: Wade Horton, Public Works Director

City of El Paso de Robles
1000 Spring Street
Paso Robles, CA 93451
Attention: Dick McKinley, Public Works Director

San Miguel Community Services District
1150 Mission Street
San Miguel, CA 93451
Attention: Rob Roberson, Interim General Manager

Heritage Ranch Community Services District
4870 Heritage Road
Paso Robles, CA 93446
Attention: Scott Duffield, General Manager

Shandon San Juan Water District
365 Truesdale Road PO Box 150
Shandon, CA 93461
Attention: Willy Cunha, President, Board of Directors

Appendix B

Additional Well Logs Used to Supplement Cross Sections and Precipitation Data

'The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0188056

Page 1 of 2

Owner's Well Number SVW3

Date Work Began 07/24/2013 Date Work Ended 7/26/2013

Local Permit Agency San Luis Obispo County Environmental Health Services

Permit Number 2013-116 Permit Date 7/3/13

DWR Use Only – Do Not Fill In

State Well Number/Site Number

Latitude N Longitude W

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Direct Rotary Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
0	30	Conductor
0	600	Brown Clay Streaks w/Sand, Course and Fine
600	645	Cemented Course Sands w/Brown Clay
645	750	Course Sand w/Brown Clay
750	940	Brown Clay w/Course Sand
940	1,090	Fine Sand w/Brown Clay

Total Depth of Boring 1090 Feet

Total Depth of Completed Well 790 Feet

Well Owner

Well Location

Address 3385 Truesdale Road

City Shandon County San Luis Obispo

Latitude 35 Deg 36 Min 1776 Sec. N Longitude 120 Deg 22 Min 1767 Sec. W

Datum Dec. Lat. 35.60477 Dec. Long. 120.37158

APN Book Page Parcel

Township 27S Range 15E Section 4 M

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

SEE

ATTACHED MAP

West East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well
○ Modification/Repair
○ Deepen
○ Other
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

⦿ Water Supply
☐ Domestic ☐ Public
☑ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
○ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other

Water Level and Yield of Completed Well

Depth to first water 194 (Feet below surface)

Depth to Static Water Level 194 (Feet) Date Measured 09/25/2013

Estimated Yield * 3,000 (GPM) Test Type Step-Drawndown

Test Length 6.8 (Hours) Total Drawdown 243 (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	30	36	Conductor	Low Carbon Steel	1/4	30		
0	330	26	Blank	Mild Steel	5/16	16.5		
330	640	26	Screen	HSLA Ful Flo	5/16	16.5	Louver	0.080
640	655	26	Blank	HSLA	5/16	16.5		
655	665	26	Screen	HSLA Ful Flo	5/16	16.5	Louver	0.080
665	680	26	Blank	HSLA	5/16	16.5		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	60	Cement	6 Sack Slurry
60	800	Filter Pack	80-1/4x10, 20-8x16
800	1,090	Fill	Cuttings

Attachments

☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Tyson R. Davis, Pacific Coast Well Drilling, Inc.
Person, Firm or Corporation

P.O. Box 184 (Address) Templeton (City) CA (State) 93465 (Zip)

Signed [signature] C-57 Licensed Water Well Contractor

10/25/2013 Date Signed 927400 C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

RECEIVED

NOV 19 2013

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File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0188056

Page 2 of 2

Owner's Well Number SVW3

Date Work Began 07/24/2013 Date Work Ended 7/26/2013

Local Permit Agency San Luis Obispo County Environmental Health Services

Permit Number 2013-116 Permit Date 7/3/13

DWR Use Only – Do Not Fill In

State Well Number/Site Number

Latitude N Longitude W

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Direct Rotary Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)

Total Depth of Boring 1090 Feet

Total Depth of Completed Well 790 Feet

Well Owner

Well Location

Address 3385 Truesdale Road

City Shandon County San Luis Obispo

Latitude 35 Deg. 36 Min. 1776 Sec. N Longitude 120 Deg. 22 Min. 1767 Sec. W

Datum Dec. Lat. 35.60477 Dec. Long. 120.37158

APN Book Page Parcel

Township 27S Range 15E Section 4

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

West East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well
○ Modification/Repair
○ Deepen
○ Other
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

⦿ Water Supply
☐ Domestic ☐ Public
☑ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
○ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other

Water Level and Yield of Completed Well

Depth to first water (Feet below surface)

Depth to Static Water Level (Feet) Date Measured

Estimated Yield * (GPM) Test Type

Test Length (Hours) Total Drawdown (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
680	700	26	Screen	HSLA Ful Flo	5/16	16.5	Louver	0.080
700	730	26	Blank	HSLA	5/16	16.5		
730	750	26	Screen	HSLA Ful Flo	5/16	16.5	Louver	0.080
750	790	26	Blank	Mild Steel	5/16	16.5		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description

Attachments

☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Tyson R. Davis, Pacific Coast Well Drilling, Inc.
Person, Firm or Corporation

P.O. Box 184 (Address) Templeton (City) CA (State) 93465 (Zip)

Signed [signature] C-57 Licensed Water Well Contractor

1025/2013 Date Signed

927400 C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

e0188056

WELL PERMIT PLOT PLAN

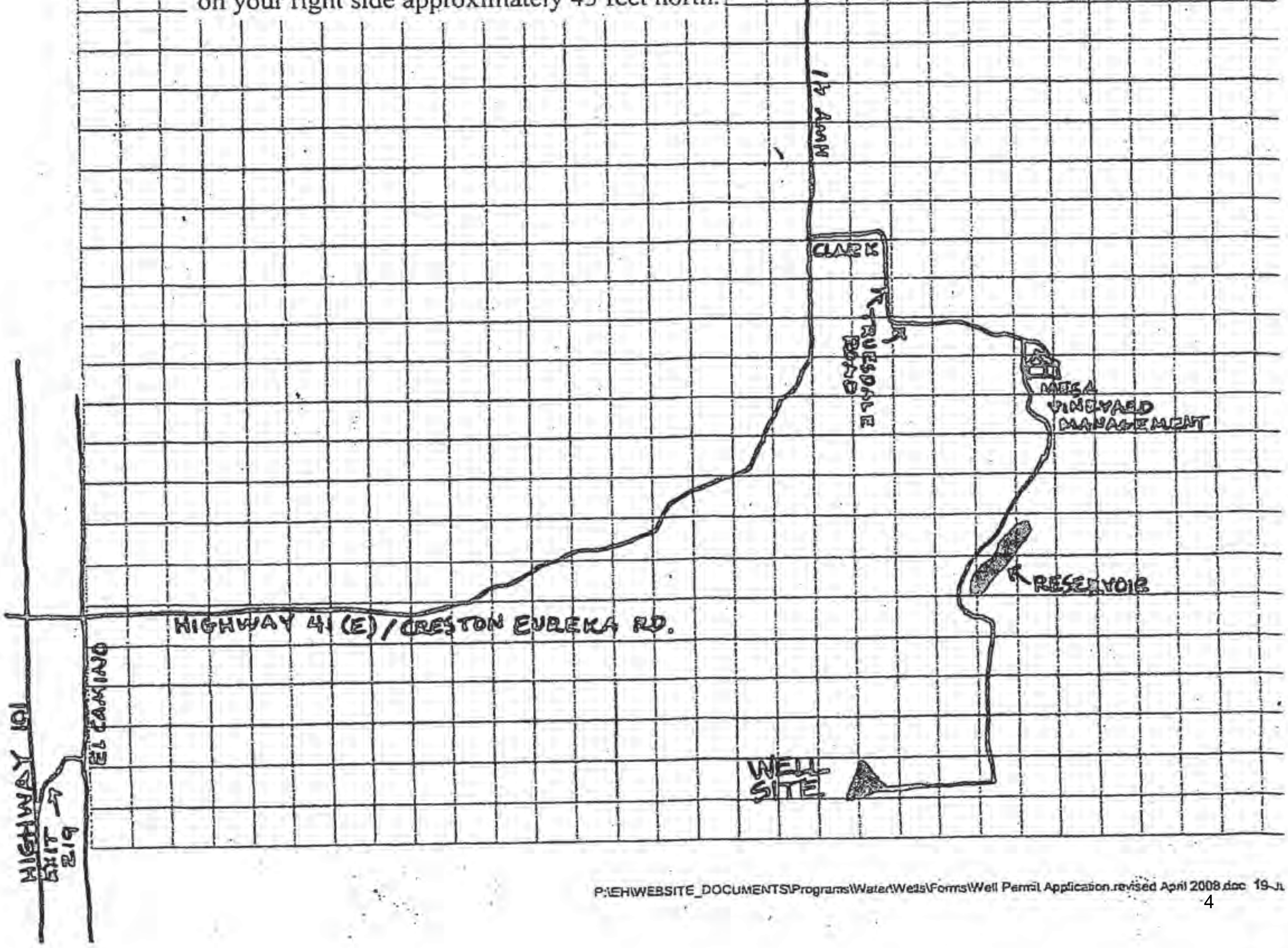
SAN LUIS OBISPO COUNTY ENVIRONMENTAL HEALTH SERVICES
2156 Sierra Way
San Luis Obispo, California 93401
Telephone: 805-781-5544

SCALE: ¼ inch = 25 feet

INDICATE BELOW THE **EXACT LOCATION** OF PROPOSED WELL WITH RESPECT TO THE FOLLOWING ITEMS: PROPERTY LINES, WATER BODIES OR WATER COURSES, DRAINAGE PATTERN, ROADS, EXISTING WELLS, SEWERS AND PRIVATE SEWAGE DISPOSAL SYSTEMS, ANIMAL ENCLOSURES AND ANY OTHER CONCENTRATED SOURCES OF POLLUTION. **INCLUDE DIMENSIONS.** ALL PROPOSED WELL SITES SHALL BE DESIGNATED WITH A FLAGGED SURVEYOR'S STAKE LABELED "WELL SITE." DRILLING SHALL NOT COMMENCE UNTI THIS APPLICATION IS APPROVED.

Assessor's Parcel Number-

Take Highway 101 (N) and take Exit #219 toward Morro Road/Highway 41. Turn left onto El Camino Real at the stop light. Drive to the next stop light, approximately 500 feet. Turn right onto CA-41/Creston Eureka Road and drive for approximately 18 miles. Turn right onto Clark Road and drive for approximately 1/2 mile. Turn right onto Truesdale Road and drive for approximately 1 mile. Truesdale turns to the left. Continue on Truesdale for approximately another 1 mile. 3385 Truesdale Road is on your right. There will be a sign that says "Mesa Vineyard Management" Turn right and drive approximately 400 feet. Turn right before building and drive approximately 100 feet. Turn left along side the building and drive approximately 250 feet. Turn right and drive approximately 1/4 mile. There will be a reservoir on your left. Drive along side of the reservoir and round to the left. Turn right and drive along side vineyards (to your right) for approximately 1/4 mile. Turn right and drive approximately 1/4 mile. Well site will be on your right side approximately 45 feet north.



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File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0188061

Page 1 of 2

Owner's Well Number SJW4

Date Work Began 07/31/2013 Date Work Ended 8/2/2013

Local Permit Agency San Luis Obispo County Environmental Health Department

Permit Number 2013-117 Permit Date 7/3/13

DWR Use Only – Do Not Fill In

State Well Number/Site Number

Latitude N Longitude W

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify ____

Drilling Method Direct Rotary Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
0	30	Conductor
0	465	Fine Brown Sand w/Streaks of Brown Clay
465	502	Gravel (Rough Drilling)
502	745	Course Sand w/Streaks of Brown Clay
745	815	Small Gravel (Rough Drilling)
815	975	Fine Sand
975	1,050	Course Sand w/Less Brown Clay

Total Depth of Boring 1050 Feet

Total Depth of Completed Well 1040 Feet

Well Owner

Well Location

Address 2575 San Juan Road

City Shandon County San Luis Obispo

Latitude 35 Deg. 37 Min. 4814 Sec. N Longitude 120 Deg. 22 Min. 257 Sec. W

Datum ____ Dec. Lat. 35.62997 Dec. Long. 120.36792

APN Book ____ Page ____ Parcel ____

Township 26S Range 15E Section 33 C

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

SEE ATTACHED MAP

West East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well
○ Modification/Repair
○ Deepen
○ Other ____
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

⦿ Water Supply
☐ Domestic ☐ Public
☑ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
○ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other ____

Water Level and Yield of Completed Well

Depth to first water 140 (Feet below surface)

Depth to Static Water Level 140 (Feet) Date Measured 08/02/2013

Estimated Yield * 1,000 (GPM) Test Type Air Lift

Test Length 6.0 (Hours) Total Drawdown ____ (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	30	36	Conductor	Low Carbon Steel	1/4	30		
0	200	26	Blank	Mild Steel	5/16	16.5		
200	410	26	Screen	HSLA	5/16	16.5	Louver	0.070
410	470	26	Blank	Mild Steel	5/16	16.5		
470	500	26	Screen	HSLA	5/16	16.5	Louver	0.070
500	590	26	Blank	Mild Steel	5/16	16.5		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	60	Cement	6 Sack Slurry
60	850	Filter Pack	80-1/4*10&20-8*16
850	1,050	Fill	Cuttings

Attachments

☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☐ Other ____

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Tyson R. Davis, Pacific Coast Well Drilling, Inc.
Person, Firm or Corporation

P.O. Box 184 (Address) Templeton (City) CA (State) 93465 (Zip)

Signed [signature] C-57 Licensed Water Well Contractor

Date Signed 11.1.13

C-57 License Number 927400

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

RECEIVED

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File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0188061

Page 2 of 2

Owner's Well Number SJW4

Date Work Began 07/31/2013 Date Work Ended 8/2/2013

Local Permit Agency San Luis Obispo County Environmental Health Department

Permit Number 2013-117 Permit Date 7/3/13

DWR Use Only – Do Not Fill In

State Well Number/Site Number

N Latitude W Longitude

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Direct Rotary Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
0	30	Conductor
0	465	Fine Brown Sand w/Streaks of Brown Clay
465	502	Gravel (Rough Drilling)
502	745	Course Sand w/Streaks of Brown Clay
745	815	Small Gravel (Rough Drilling)
815	975	Fine Sand
975	1,050	Course Sand w/Less Brown Clay

Total Depth of Boring 1050 Feet

Total Depth of Completed Well 1040 Feet

Well Owner

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Address 2575 San Juan Road

City Shandon County San Luis Obispo

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Datum Dec. Lat. 35.62997 Dec. Long. 120.36792

APN Book Page Parcel

Township 26S Range 15E Section 33

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

West East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well
○ Modification/Repair
○ Deepen
○ Other
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

⦿ Water Supply
☐ Domestic ☐ Public
☑ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
○ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other

Water Level and Yield of Completed Well

Depth to first water (Feet below surface)

Depth to Static Water Level (Feet) Date Measured

Estimated Yield * (GPM) Test Type

Test Length (Hours) Total Drawdown (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
590	630	26	Screen	HSLA	5/16	16.5	Louver	0.070
630	700	26	Blank	Mild Steel	5/16	16.5		
700	730	26	Screen	HSLA	5/16	16.5	Louver	0.070
730	750	26	Blank	Mild Steel	5/16	16.5		
750	810	26	Screen	HSLA	5/16	16.5	Louver	0.070
810	840	26	Blank	Mild Steel	5/16	16.5		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description

Attachments

☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

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Person, Firm or Corporation

P.O. Box 184 (Address) Templeton (City) CA (State) 93465 (Zip)

Signed [signature] C-57 Licensed Water Well Contractor

Date Signed 11-1-13

C-57 License Number 927400

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

e0188061

WELL PERMIT PLOT PLAN

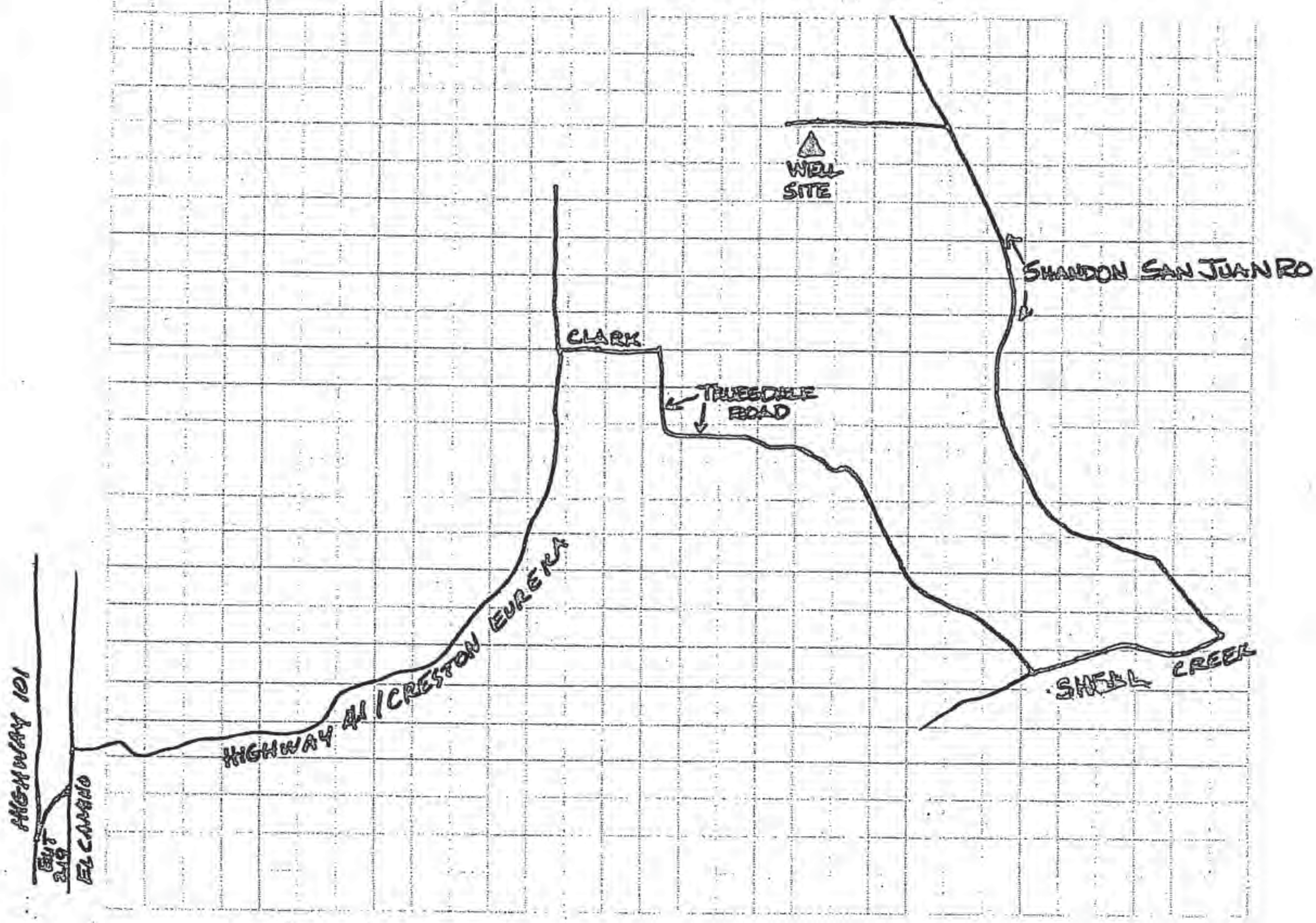
SAN LUIS OBISPO COUNTY ENVIRONMENTAL HEALTH SERVICES
2156 Sierra Way
San Luis Obispo, California 93401
Telephone: 805-781-5544

SCALE: ¼ inch = 25 feet

INDICATE BELOW THE **EXACT LOCATION** OF PROPOSED WELL WITH RESPECT TO THE FOLLOWING ITEMS: PROPERTY LINES, WATER BODIES OR WATER COURSES, DRAINAGE PATTERN, ROADS, EXISTING WELLS, SEWERS AND PRIVATE SEWAGE DISPOSAL SYSTEMS, ANIMAL ENCLOSURES AND ANY OTHER CONCENTRATED SOURCES OF POLLUTION. **INCLUDE DIMENSIONS.** ALL PROPOSED WELL SITES SHALL BE DESIGNATED WITH A FLAGGED SURVEYOR'S STAKE LABELED "WELL SITE." DRILLING SHALL NOT COMMENCE UNTIL THIS APPLICATION IS APPROVED.

Assessor's Parcel Number-

Take Highway 101 (N) and take Exit #219 toward Morro Road/Highway 41. Turn left onto El Camino Real at the stop light. Drive to the next stop light, approximately 500 feet. Turn right onto CA-41/Creston Eureka Road and drive for approximately 18 miles. Turn right onto Clark Road and drive for approximately 1/2 mile. Turn right onto Truesdale Road and drive for approximately 4 miles. Turn left on Shell Creek Road and drive for approximately 3/4 mile. Turn left onto Shandon San Juan Road and drive for approximately 2.9 miles and turn left onto dirt road. Drive a little over 1/4 mile and the Well Site is on your left approximately 50-55 feet.



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Page 1 of 2

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0162372

DWR Use Only – Do Not Fill In

State Well Number/Site Number

Latitude N Longitude W

APN/TRS/Other

Owner's Well Number Continental Vineyards

Date Work Began 08/01/2012 Date Work Ended 8/10/2012

Local Permit Agency County of San Luis Obispo Public Health

Permit Number 2012-149 Permit Date 7/30/12

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify ____

Drilling Method Reverse Circulation Rotary Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
0	40	Clay
40	55	Gravel
55	65	Clay
65	150	Gravel
150	160	Clay
160	165	Gravel
165	180	Clay
180	200	Gravel
200	230	Clay
230	280	Gravel
280	318	Clay
318	320	Sand
320	336	Clay
336	340	Gravel
340	355	Clay
355	360	Gravel
360	370	Clay
370	390	Gravel
390	400	Clay
400	435	Gravel
435	480	Clay
480	530	Gravel
530	560	Clay
560	605	Gravel
605	620	Clay
620	635	Gravel
635	650	Clay
650	730	Clay
730	810	Clay
810	830	Gravel

Total Depth of Boring 1,110 Feet

Total Depth of Completed Well 1,100 Feet

Well Owner

Well Location

Address 11000 Hwy. 46E

City Paso Robles County San Luis Obispo

Latitude 35 Deg. 67 Min. 95 Sec. N Longitude 120 Deg. 48 Min. 19 Sec. W

Datum ____ Decimal Lat. ____ Decimal Long. ____

APN Book ____ Page ____ Parcel 019.121.013 ✓

Township 26S Range 14E Section 8

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North / West / East / South

SEE ATTACHED

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well

○ Modification/Repair

○ Deepen

○ Other ____

○ Destroy

Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

⦿ Water Supply

☐ Domestic ☐ Public

☑ Irrigation ☐ Industrial

○ Cathodic Protection

○ Dewatering

○ Heat Exchange

○ Injection

○ Monitoring

○ Remediation

○ Sparging

○ Test Well

○ Vapor Extraction

○ Other ____

Water Level and Yield of Completed Well

Depth to first water 205 (Feet below surface)

Depth to Static Water Level 205 (Feet) Date Measured 09/04/2012

Estimated Yield * 1,900 (GPM) Test Type Constant Rate

Test Length 12.0 (Hours) Total Drawdown 89 (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size If Any (Inches)
0	320	24	Blank	Low Carbon Steel	.250	14		
320	560	24	Screen	Low Carbon Steel	.250	14	Louver	0.080
560	600	24	Blank	Low Carbon Steel	.250	14		
600	650	24	Screen	Low Carbon Steel	.250	14	Louver	0.080
650	720	24	Blank	Low Carbon Steel	.250	14		
720	760	24	Screen	Low Carbon Steel	.250	14	Louver	0.080

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	50	Cement	6 Sac Slurry
50	1,110	Filter Pack	1/4 * 10

Attachments

☐ Geologic Log

☐ Well Construction Diagram

☐ Geophysical Log(s)

☐ Soil/Water Chemical Analyses

☐ Other ____

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Pacific Coast Well Drilling, Inc.
Person, Firm or Corporation

P.O. Box 184 (Address) Templeton (City) CA (State) 93465 (Zip)

Signed [signature] C-57 Licensed Water Well Contractor Date Signed 8-25-12 C-57 License Number 927400

DWR 188 REV. 1/2006

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IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

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State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0162372

Page 2 of 2

Owner's Well Number Continental Vineyards

Date Work Began 08/01/2012 Date Work Ended 8/10/2012

Local Permit Agency County of San Luis Obispo Public Health

Permit Number 2012-149 Permit Date 7/30/12

DWR Use Only – Do Not Fill In

State Well Number/Site Number

Latitude N Longitude W

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Reverse Circulation Rotary Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
830	860	Clay
860	920	Gravel
920	990	Clay
990	1,030	Gravel
1030	1,040	Clay
1040	1,080	Gravel
1080	1,110	Clay

Total Depth of Boring 1,110 Feet

Total Depth of Completed Well 1,100 Feet

Well Owner

Well Location

Address 11000 Hwy. 46E

City Paso Robles County San Luis Obispo

Latitude 35 Deg. 67 Min. 95 Sec. N Longitude 120 Deg. 48 Min. 19 Sec. W

Datum Decimal Lat. Decimal Long.

APN Book Page Parcel 019.121.013

Township 26S Range 14E Section 8

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

West East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well
○ Modification/Repair
○ Deepen
○ Other
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

⦿ Water Supply
☐ Domestic ☐ Public
☑ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
○ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other

Water Level and Yield of Completed Well

Depth to first water (Feet below surface)

Depth to Static Water Level (Feet) Date Measured

Estimated Yield * (GPM) Test Type

Test Length (Hours) Total Drawdown (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
760	800	24	Blank	Low Carbon Steel	.250	14		
800	1,080	24	Screen	Low Carbon Steel	.250	14	Louver	0.080
1,080	1,100	24	Blank	Low Carbon Steel	.250	14		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description

Attachments

☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Pacific Coast Well Drilling, Inc.
Person, Firm or Corporation

P.O. Box 184 Templeton CA 93465
Address City State Zip

Signed [signature] 8-25-12 927400
C-57 Licensed Water Well Contractor Date Signed C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

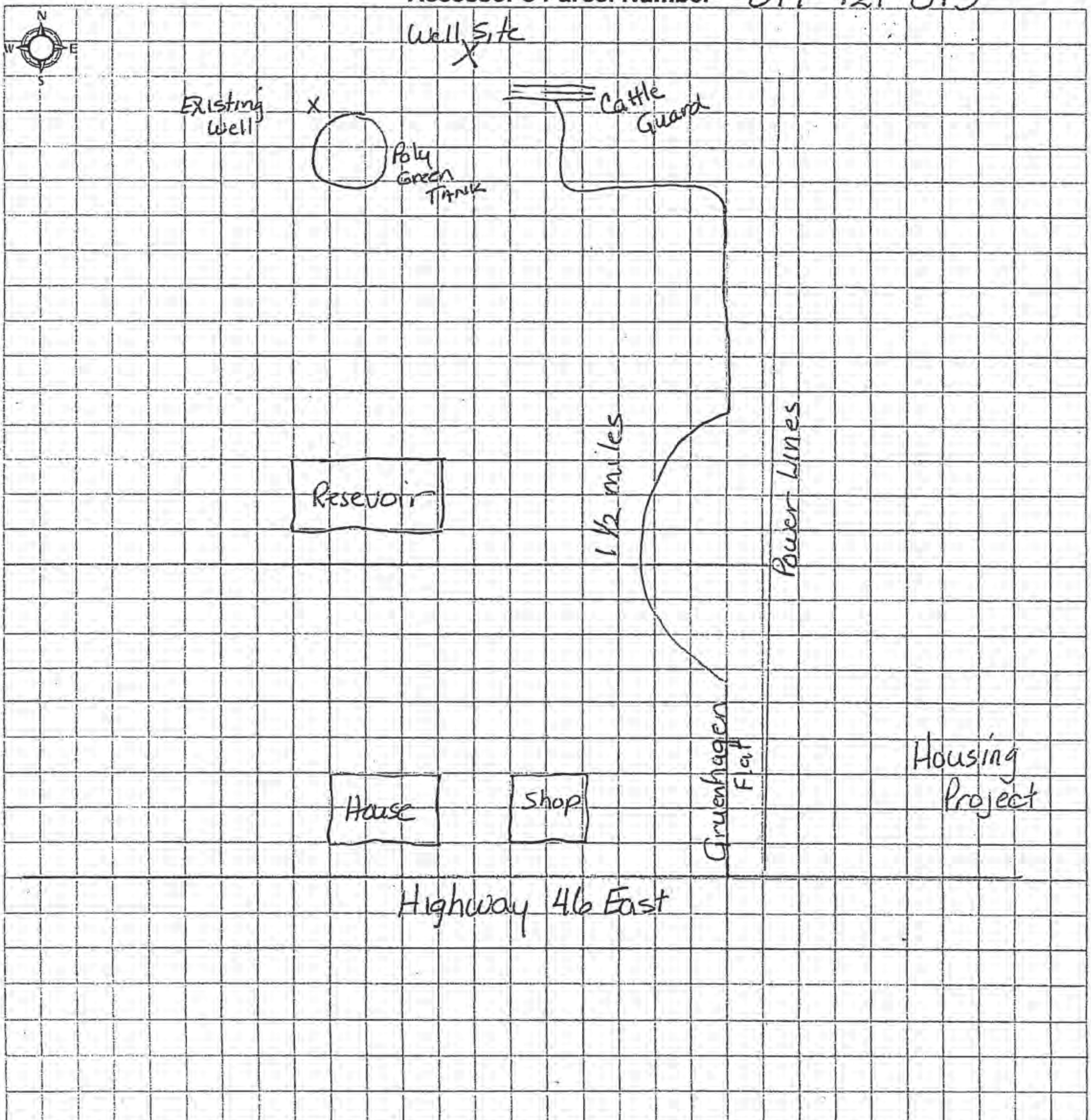
WELL PERMIT PLOT PLAN

SAN LUIS OBISPO COUNTY ENVIRONMENTAL HEALTH SERVICES
2156 Sierra Way
San Luis Obispo, California 93401
Telephone: 805-781-5544

SCALE: ¼" = 25"   Indeck Paso Robles, LLC

INDICATE BELOW THE **EXACT LOCATION** OF PROPOSED WELL WITH RESPECT TO THE FOLLOWING ITEMS: PROPERTY LINES, WATER BODIES OR WATER COURSES, DRAINAGE PATTERN, ROADS, EXISTING WELLS, SEWERS AND PRIVATE SEWAGE DISPOSAL SYSTEMS, ANIMAL ENCLOSURES AND ANY OTHER CONCENTRATED SOURCES OF POLLUTION. **INCLUDE DIMENSIONS.** ALL PROPOSED WELL SITES SHALL BE DESIGNATED WITH A FLAGGED SURVEYOR'S STAKE LABELED "WELL SITE." DRILLING SHALL NOT COMMENCE UNTIL THIS APPLICATION IS APPROVED.

Assessor's Parcel Number- 019-121-013



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Page 1 of 4

Owner's Well Number John Hancock Well #1

Date Work Began 11/01/2012 Date Work Ended 2/26/2013

Local Permit Agency San Luis Obispo County Environmental Health Services

Permit Number 2012-229 Permit Date 10/15/12

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0164974

DWR Use Only – Do Not Fill In

State Well Number/Site Number

Latitude N Longitude W

APN/TRS/Other

Geologic Log

Orientation ◉ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Reverse Circulation Rotary Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
0	40	Conductor
40	80	Clay
80	90	Gravel
90	100	Clay
100	110	Clay
110	120	Gravel
120	150	Course Sand
150	165	Gravel w/Clay
165	205	Gravel
205	210	Clay
210	220	Gravel
220	230	Gravel
230	240	Gravel
240	250	Clay
250	260	Clay
260	270	Clay
270	290	Clay
290	300	Clay
300	310	Clay
310	320	Gravel
320	330	Gravel
330	340	Clay
340	350	Clay
350	360	Clay
360	370	Clay
370	380	Gravel
380	390	Gravel
390	400	Clay
400	410	Clay
410	420	Clay

Total Depth of Boring 1393 Feet

Total Depth of Completed Well 870 Feet

Well Owner

Well Location

Address Exit 241, San Miquel

City San Miquel County San Luis Obispo

Latitude 35 Deg. 76 Min. 464 Sec. N Longitude 120 Deg. 72 Min. 51 Sec. W

Datum Decimal Lat. Decimal Long.

APN Book Page Parcel 027,011,036

Township Range Section

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

West East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

◉ New Well
○ Modification/Repair
○ Deepen
○ Other
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

◉ Water Supply
☐ Domestic ☐ Public
☑ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
○ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other

Water Level and Yield of Completed Well

Depth to first water (Feet below surface)

Depth to Static Water Level (Feet) Date Measured

Estimated Yield * (GPM) Test Type

Test Length (Hours) Total Drawdown (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	40	36	Conductor	Mild Steel	5/16	30		
0	195	24	Blank	Mild Steel	5/16	14.5		
195	210	24	Screen	Mild Steel	5/16	14.5	Louver	0.070
210	220	24	Blank	Mild Steel	5/16	14.5		
220	270	24	Screen	Copper Bearing	5/16	14.5	Louver	0.070
270	290	24	Blank	Copper Bearing	5/16	14.5		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	50	Cement	6 Sak
50	1,388	Filter Pack	75% SRI #6
			25% SRI #8

Attachments

☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Pacific Coast Well Drilling, Inc.
Person, Firm or Corporation

P.O. Box 184 (Address) Templeton (City) CA (State) 93465-0184 (Zip)

Signed [signature] C-57 Licensed Water Well Contractor 1/17/13 Date Signed 927400 C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

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State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0164974

Page 2 of 4

Owner's Well Number John Hancock Well #1

Date Work Began 11/01/2012 Date Work Ended 2/26/2013

Local Permit Agency San Luis Obispo County Environmental Health Services

Permit Number 2012-229 Permit Date 10/15/12

DWR Use Only – Do Not Fill In

State Well Number/Site Number

Latitude N Longitude W

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify ______

Drilling Method Reverse Circulation Rotary Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
420	430	Clay
430	440	Clay
440	450	Clay
450	460	Clay
460	470	Clay
470	480	Clay
480	490	Clay
490	500	Clay
500	510	Clay
510	520	Gravel/Clay
520	530	Clay
530	540	Clay
540	550	Slurry/Clay
550	560	Clay
560	570	Clay
570	575	Gravel
575	580	Clay
580	625	Gravel
625	660	Course Sand
660	755	Clay w/Sand
755	805	Rough Drilling
805	910	Sand/Gravel, Brown, Sandy Clay
910	930	Sand/Gravel, Brown, Sandy Clay
930	940	Clay
940	950	Clay/Sandy
950	960	Clay/Sandy
960	970	Clay/Sandy
970	980	Clay/Sandy
980	990	Gravel
990	1,000	Gravel

Total Depth of Boring 1393 Feet

Total Depth of Completed Well 870 Feet

Well Owner

Well Location

Address Exit 241, San Miquel

City San Miguel County San Luis Obispo

Latitude 35 Deg. 76 Min. 464 Sec. N Longitude 120 Deg. 72 Min. 51 Sec. W

Datum ______ Decimal Lat. ______ Decimal Long. ______

APN Book ______ Page ______ Parcel 027,011,036

Township ______ Range ______ Section ______

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

West

East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well
○ Modification/Repair
○ Deepen
○ Other ______
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

⦿ Water Supply
☐ Domestic ☐ Public
☑ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
○ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other ______

Water Level and Yield of Completed Well

Depth to first water ______ (Feet below surface)

Depth to Static Water Level ______ (Feet) Date Measured ______

Estimated Yield * ______ (GPM) Test Type ______

Test Length ______ (Hours) Total Drawdown ______ (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
290	350	24	Screen	Copper Bearing	5/16	14.5	Louver	0.070
350	370	24	Blank	Copper Bearing	5/16	14.5		
370	410	24	Screen	Copper Bearing	5/16	14.5	Louver	0.070
410	450	24	Blank	Copper Bearing	5/16	14.5		
450	530	24	Screen	Copper Bearing	5/16	14.5	Louver	0.070
530	580	24	Blank	Copper Bearing	5/16	14.5		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description

Attachments

☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☐ Other ______

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Pacific Coast Well Drilling, Inc.
Person, Firm or Corporation

P.O. Box 184 (Address) Templeton (City) CA (State) 93465-0184 (Zip)

Signed [signature] C-57 Licensed Water Well Contractor

1/17/13 Date Signed

927400 C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

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Page 3 of 4

Owner's Well Number John Hancock Well #1

Date Work Began 11/01/2012 Date Work Ended 2/26/2013

Local Permit Agency San Luis Obispo County Environmental Health Services

Permit Number 2012-229 Permit Date 10/15/12

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0164974

DWR Use Only – Do Not Fill In

State Well Number/Site Number

Latitude N Longitude W

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify ______

Drilling Method Reverse Circulation Rotary Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
1,000	1,010	Sandy Clay
1,010	1,020	Sandy Clay
1020	1,030	Gravel
1030	1,040	Sandy Clay
1040	1,050	Clay
1050	1,060	Sandy Clay
1060	1,070	Sandy Clay
1070	1,080	Sandy Clay
1080	1,090	Gravel
1090	1,100	Gravel
1100	1,110	Gravel
1110	1,120	Sandy Clay
1120	1,130	Sandy Clay
1130	1,140	Sandy Clay
1140	1,150	Sandy Clay
1150	1,160	Clay
1160	1,170	Clay
1170	1,180	Clay
1180	1,190	Sandy Clay
1190	1,200	Clay Brown
1200	1,220	Small Gravel, Sandy Clay
1220	1,240	Brown Clay
1240	1,255	Rough Drilling Gravel
1255	1,295	Brown Clay
1295	1,305	Gravel
1305	1,335	Clay
1335	1,356	Course Sand
1356	1,363	Gravel/Course Sand
1363	1,366	Clay
1366	1,368	Gravel/Course Sand

Total Depth of Boring 1393 Feet

Total Depth of Completed Well 870 Feet

Well Owner

Well Location

Address Exit 241, San Miguel

City San Miguel County San Luis Obispo

Latitude 35 Deg. 76 Min. 464 Sec. N Longitude 120 Deg. 72 Min. 51 Sec. W

Datum ______ Decimal Lat. ______ Decimal Long. ______

APN Book ______ Page ______ Parcel 027 011 036

Township ______ Range ______ Section ______

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

West East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well

○ Modification/Repair

○ Deepen

○ Other ______

○ Destroy

Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

⦿ Water Supply

☐ Domestic ☐ Public

☑ Irrigation ☐ Industrial

○ Cathodic Protection

○ Dewatering

○ Heat Exchange

○ Injection

○ Monitoring

○ Remediation

○ Sparging

○ Test Well

○ Vapor Extraction

○ Other ______

Water Level and Yield of Completed Well

Depth to first water ______ (Feet below surface)

Depth to Static Water Level ______ (Feet) Date Measured ______

Estimated Yield * ______ (GPM) Test Type ______

Test Length ______ (Hours) Total Drawdown ______ (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
580	600	24	Screen	Copper Bearing	5/16	14.5	Louver	0.070
600	660	24	Blank	Copper Bearing	5/16	14.5		
660	700	24	Screen	Copper Bearing	5/16	14.5	Louver	0.070
700	740	24	Blank	Copper Bearing	5/16	14.5		
740	790	24	Screen	Copper Bearing	5/16	14.5	Louver	0.070
790	810	24	Blank	Copper Bearing	5/16	14.5		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description

Attachments

☐ Geologic Log

☐ Well Construction Diagram

☐ Geophysical Log(s)

☐ Soil/Water Chemical Analyses

☐ Other ______

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Pacific Coast Well Drilling, Inc.
Person, Firm or Corporation

P.O. Box 184 Templeton CA 93465-0184
Address City State Zip

Signed [signature] 1/17/13 927400
C-57 Licensed Water Well Contractor Date Signed C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

RECEIVED

OCT 29 2013

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File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0164974

DWR Use Only – Do Not Fill In

State Well Number/Site Number

N Latitude | W Longitude

APN/TRS/Other

Page 4 of 4

Owner's Well Number John Hancock Well #1

Date Work Began 11/01/2012 Date Work Ended 2/26/2013

Local Permit Agency San Luis Obispo County Environmental Health Services

Permit Number 2012-229 Permit Date 10/15/12

Geologic Log

Orientation ◉ Vertical ○ Horizontal ○ Angle Specify ____

Drilling Method Reverse Circulation Rotary Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
1,368	1,375	Clay
1,375	1,385	Rough Drilling Sand
1385	1,393	Clay/Silt

Total Depth of Boring 1393 Feet

Total Depth of Completed Well 870 Feet

Well Owner

Well Location

Address Exit 241, San Miguel

City San Miguel County San Luis Obispo

Latitude 35 Deg. 76 Min. 464 Sec. N Longitude 120 Deg. 72 Min. 51 Sec. W

Datum ____ Decimal Lat. ____ Decimal Long. ____

APN Book ____ Page ____ Parcel 027,011,036

Township ____ Range ____ Section ____

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

West East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

◉ New Well
○ Modification/Repair
○ Deepen
○ Other ____
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

◉ Water Supply
☐ Domestic ☐ Public
☑ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
○ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other ____

Water Level and Yield of Completed Well

Depth to first water ____ (Feet below surface)

Depth to Static Water Level ____ (Feet) Date Measured ____

Estimated Yield * ____ (GPM) Test Type ____

Test Length ____ (Hours) Total Drawdown ____ (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
810	830	24	Screen	Copper Bearing	5/16	14.5	Louver	0.070
830	870	24	Blank	Copper Bearing	5/16	14.5		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description

Attachments

☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☐ Other ____

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Pacific Coast Well Drilling, Inc.
Person, Firm or Corporation

P.O. Box 184 (Address) Templeton (City) CA (State) 93465-0184 (Zip)

Signed [signature] C-57 Licensed Water Well Contractor 1/17/13 Date Signed 927400 C-57 License Number

DWR 188 REV. 1/2006

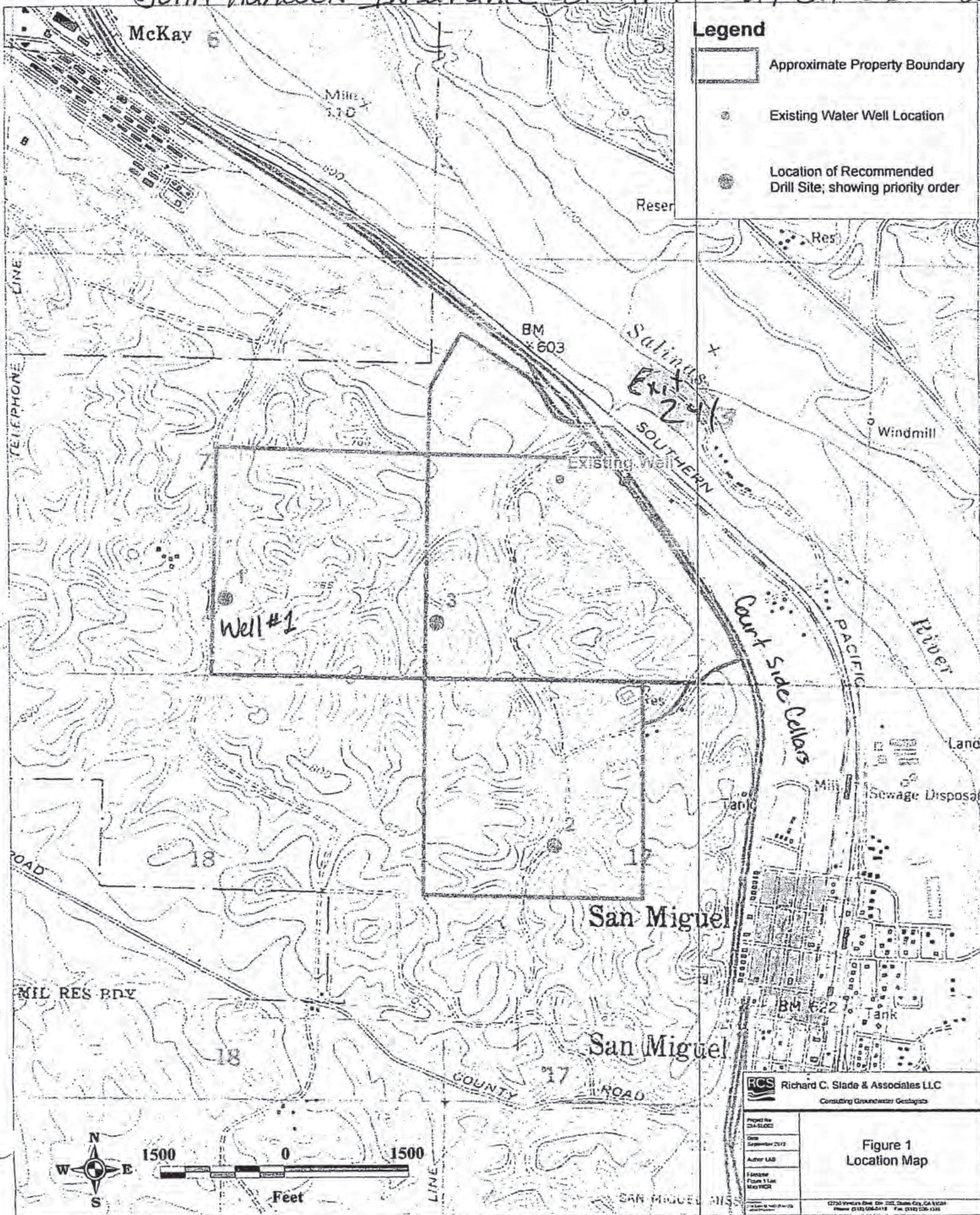
IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

RECEIVED

OCT 29 2013

e0164974
APPENDIX B

John Hancock Insurance Co. APN: 027-011-036 Well#1



ORIGINAL
File with DWR

Page 1 of 1

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. e016462

DWR USE ONLY — DO NOT FILL IN
24S/13E+36
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

Owner's Well No.
Date Work Began 9-16-04, Ended 9-22-04
Local Permit Agency Monterey County Health Dept
Permit No. 04-07838 Permit Date 7-26-04

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD Rotary FLUID Bentonite

DEPTH FROM SURFACE Ft. to Ft.		DESCRIPTION *Describe material, grain size, color, etc.*
0	2	Top soil
2	5	Brown clay
5	7	Sand & gravel
7	65	Lite green clay
65	75	Sand & gravel
75	140	Lite brown clay
140	150	Shale gravel
150	160	Brown clay
160	175	Coarse sand & gravel
175	180	Brown clay
180	250	Brown clay with gravel
250	260	Sand & gravel
260	280	Brown clay
280	295	Shale gravel
295	400	Brown clay
400	425	Shale gravel
425	430	Brown clay
430	465	Shale gravel-layers brown clay
465	520	Brown clay
520	535	Shale gravel
535	560	Lite blue clay
560	585	Shale gravel
585	620	Lite blue clay
620	690	Shale gravel some lite brown shale
690	700	Blue clay

NOTE: ANY PERSON REMOVING THE CAP FROM THIS WELL OTHER THAN MILLER DRILLING CO OR AUTHORIZED CONTRACTOR APPROVED BY US WILL VOID ALL STRUCTURAL WARRANTIES.

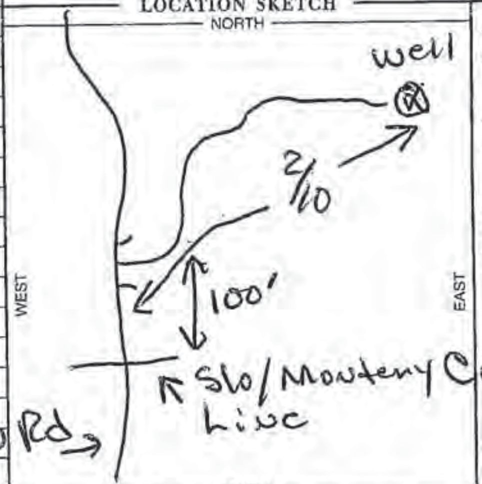
TOTAL DEPTH OF BORING 700 (Feet)
TOTAL DEPTH OF COMPLETED WELL 695 (Feet)

WELL OWNER

WELL LOCATION

Address 77509 Hog Cyn
City San Miguel
County Monterey County
APN Book 424 Page 151 Parcel 027
Township 24S Range 13E Section 36
Latitude 35 47 30.9 NORTH (DEG. MIN. SEC.) Longitude 120 32 18.1 WEST (DEG. MIN. SEC.)

LOCATION SKETCH



Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. ***PLEASE BE ACCURATE & COMPLETE.***

ACTIVITY (✓)

X NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (✓)

WATER SUPPLY
X Domestic ___ Public
___ Irrigation ___ Industrial
MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 520 (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 410 (Ft.) & DATE MEASURED 9-22-04
ESTIMATED YIELD * 14@500 75@680 (GPM) & TEST TYPE Blow test
TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)
* *May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	520	9 7/8	X				F480 PVC	5	.265	
520	540	9 7/8		X			F480 PVC	5	.265	.040 P
540	560	9 7/8	X				F480 PVC	5	.265	
560	600	9 7/8		X			F480 PVC	5	.265	.040 P
600	620	9 7/8	X				F480 PVC	5	.265	
620	695	9 7/8		X			F480 PVC	5	.265	.040 P

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	61	X			
61	695				Bye

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Miller Drilling Company (PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

ADDRESS 301 North Main Street Templeton (CITY) Calif. (STATE) 93465 (ZIP)

Signed [signature] WELL DRILLER/AUTHORIZED REPRESENTATIVE 9-23-04 (DATE SIGNED) 324634 AA (C-57 LICENSE NUMBER)

DWR 188 REV. 11-97 IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL
File with DWR

Page 1 of 1

Owner's Well No. ____

Date Work Began 09-29-05, Ended 10-5-05

Local Permit Agency Monterey County Health Dept

Permit No. 05-10531 Permit Date 7-05

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. e030073

DWR USE ONLY — DO NOT FILL IN

24S/13E-33
STATE WELL NO./STATION NO.

LATITUDE | LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DRILLING METHOD Rotary FLUID Bentonite

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	5	Top soil
5	30	Sand & gravel
30	60	Brown clay
60	90	Sand & gravel
90	110	Brown clay
110	115	Sand & gravel
115	160	Brown clay
160	220	Sand & gravel
220	330	Brown clay with gravel cemented
330	350	Sand & gravel
350	360	Brown clay with gravel
360	390	Sand & gravel
390	470	Brown clay with gravel, tight
470	485	Shale gravel
485	500	Brown clay with gravel, tight
500	510	Shale gravel
510	650	Brown claywith gravel, tight
650	680	Blue clay

NOTE:
ANY PERSON REMOVING THE CAP FROM THIS WELL OTHER THAN MILLER DRILLING CO OR AUTHORIZED CONTRACTOR APPROVED BY US WILL VOID ALL STRUCTURAL WARRANTIES.

TOTAL DEPTH OF BORING 680 (Feet)

TOTAL DEPTH OF COMPLETED WELL 650 (Feet)

WELL LOCATION

Address Ranchita Cyn LOT 2 Tract 3A South 1/2

City San Miguel

County Monterey

APN Book 424 Page 405 Parcel 058

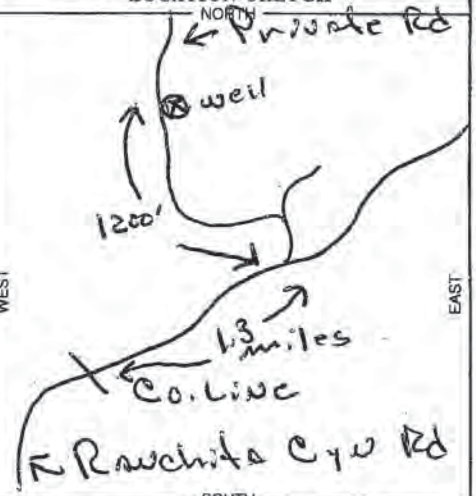
Township 24S Range 13E Section 33

Latitude 35 48.126 NORTH (DEG. MIN. SEC.) Longitude 120 34.064 WEST (DEG. MIN. SEC.)

LOCATION SKETCH

NORTH

WEST



EAST

SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL

MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (✓)

WATER SUPPLY
X Domestic ___ Public
___ Irrigation ___ Industrial

MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 470 (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL 332 (Ft.) & DATE MEASURED 10-5-05

ESTIMATED YIELD 20@440 (GPM) & TEST TYPE Blow test

TEST LENGTH 75@640 (Hrs.) TOTAL DRAWDOWN ___ (Ft.)

** May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	470	9 7/8	X				F480 PVC	5	.265	
470	550	9 7/8		X			F480 PVC	5	.265	.040 P
550	570	9 7/8	X				F480 PVC	5	.265	
570	590	9 7/8		X			F480 PVC	5	.265	.040 P
590	610	9 7/8	X				F480 PVC	5	.265	
610	650	9 7/8		X			F480 PVC	5	.265	.040 P

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	60	X			
60	650				Lapis3 mix

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Miller Drilling Company
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

ADDRESS 301 North Main Street CITY Templeton STATE Calif. ZIP 93465

Signed [signature] WELL DRILLER/AUTHORIZED REPRESENTATIVE

DATE SIGNED 10-19-05 C-57 LICENSE NUMBER 324634 AA

DWR 188 REV. 11-97

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

Paso Robles Historical Precipitation by Water Year

Water Year	Annual Precipitation (inches)[a]	Water Year	Annual Precipitation (inches)	Water Year	Annual Precipitation (inches)
1894	4.95	1937	22.57	1979	14.09
1895	15.3	1938	31.1	1980	19.73
1896	14.31	1939	8.72	1981	11.14
1897	15.5	1940	15.14	1982	15.62
1898	4.77	1941	30.5	1983	26.21
1899	11.3	1942	15.28	1984	8.54
1900	11.66	1943	16.91	1985	9.29
1901	22.84	1944	12.3	1986	17.1
1902	11.15	1945	12	1987	7.48
1903	11.24	1946	11.46	1988	13.81
1904	0.44	1947	10.05	1989	9.47
1906	8.48	1948	10.43	1990	7.22
1907	22	1949	10.61	1991	13.9
1908	15.31	1950	11.97	1992	14.35
1909	---	1951	9.82	1993	26.43
1910	15.78	1952	18.15	1994	11.45
1911	26.05	1953	10.9	1995	29.86
1912	12.37	1954	11.27	1996	13.76
1913	9.17	1955	11.19	1997	17.55
1914	18.88	1956	17.28	1998	26.77
1915	24.96	1957	10.94	1999	9.37
1916	21.02	1958	26.49	2000	13.21
1917	17.53	1959	7.87	2001	15.43
1918	14.82	1960	9.07	2002	8.32
1919	11.55	1961	8.66	2003	13.76
1920	13.06	1962	17.23	2004	9.51
1921	14.14	1963	17.06	2005	33.21
1922	21.37	1964	10.14	2006	15.55
1923	15.74	1965	12.56	2007	6.59
1924	6.11	1966	11.94	2008	13.8
1925	12.95	1967	24.55	2009	9.06
1926	14.56	1968	7.95	2010	20.99
1927	21.91	1969	31.5	2011	21.97
1928	11.5	1970	8.97	2012	10.8
1929	9.83	1971	10.9	2013	7.18
1930	10.99	1972	7.65	2014	6.16
1931	12.23	1973	22.83	2015	12.35
1932	16.5	1974	17.22	2016	10.46
1933	9.62	1975	11.24	2017	23.77
1934	11.62	1976	9.26	2018	10.62
1935	21.45	1977	7.55	2019	20.56
1936	18.16	1978	24.89		

Notes:

[a] Annual precipitation calculated as sum of daily values as reported by National Oceanic Atmospheric Administration Climate Data Online for Paso Robles Station (USC00046730)

--- = incomplete or inaccurate data

Source: https://www.ncdc.noaa.gov/cdo-web/, downloaded 10/29/19

Appendix C

Methodology for Identifying Potential Groundwater Dependent Ecosystems

TODD GROUNDWATER

January 31, 2022

MEMORANDUM

To: Blaine Reely, San Luis Obispo County and
Christopher Alakel, City of Paso Robles

From: Gus Yates, PG, CHG and Iris Priestaf, PhD

Re: Interconnected Surface Water Assessment, Paso Robles Basin GSP

The Sustainable Groundwater Management Act (SGMA) regulations define interconnected surface water as “surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted” (§351 (o)). SGMA requires that GSPs evaluate “impacts on groundwater dependent ecosystems.” (Water Code §10727.4(l)). Groundwater dependent ecosystems (GDEs) are defined in the GSP regulations as “ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface” (CCR § 351 (mm)). GDEs can be divided into two groups: plants and animals that depend on surface flow in streams (for example, fish, invertebrates, amphibians) and plants and animals that depend on a shallow water table accessible by plant roots (phreatophytic riparian vegetation and bird or other animal species that inhabit riparian vegetation). In this GSP, GDEs are discussed in the general category of interconnected surface water even though organisms in the second group strictly speaking rely only on a shallow water table, not surface flow in a stream.

This GSP addresses both types of interconnection between groundwater and surface water: interconnection with open surface water (streams, springs or lakes) and interconnection with the root zone of riparian vegetation. These two categories involve different groundwater elevation thresholds and often have different frequencies and durations of occurrence. Along seasonally intermitted streams—which includes all stream reaches crossing the Subbasin—large surface inflow events can quickly raise the alluvial water table up to near the level of the water in the stream. At that point, surface water and groundwater are hydraulically interconnected, and there may be short gaining and losing segments along the overall stream reach. When surface inflow dries up, regional groundwater discharge may continue to sustain flow for a longer period. The maximum water table depth at which the roots of phreatophytic riparian vegetation can access groundwater is perhaps 30 feet below the ground surface based on the observed locations of dense riparian vegetation. After the water table falls below the stream bed elevation during the dry season, it will remain within the 0 to 30 foot depth range for an extended period, in some locations perennially. Thus, the duration of interconnection of groundwater with the riparian root zone is much greater than the duration of interconnection with surface flow in the stream.

Locations of interconnection between groundwater and surface water are shown in Figure 1. The identification of interconnected stream reaches was based on a joint evaluation of stream flows, groundwater levels and riparian vegetation. For GSP purposes, it is further necessary to separate the effect of groundwater levels from the effects of other hydrologic variables that are typically correlated over time, such as precipitation and surface runoff. The following data sets were analyzed to quantify the relationships among variables:

- Annual precipitation and cumulative departure of annual precipitation at Paso Robles
- Gaged stream flows in the Salinas and Estrella Rivers
- Historical aerial photographs from 1989-2021
- Groundwater levels in shallow alluvial wells and deeper (Paso Robles Formation) wells
- Changes in the extent and density of riparian and wetland vegetation
- The water status of vegetation based on spectral analysis of satellite images during 1987-2020

Each of these data sets is described below. Taken together, the data sets were remarkably consistent with a hydrogeologic conceptual model of the Subbasin described in a SWRCB decision in 1982. That conceptual model and its extension to interconnected surface water is presented first to provide a framework for considering the individual data sets.

Many of the data used in the analysis pre-date 2015, which was the start of the SGMA management period. SGMA does not require that GDEs be restored to any condition that occurred prior to 2015. However, long-term data sets provide greater opportunity for differentiating the separate effects of variables that are often correlated. For example, precipitation, stream flow and groundwater levels are all potential sources of water for riparian vegetation, and all three are low during droughts. The extensive use of pre-2015 data in the analysis does not mean that this GSP intends to restore any conditions to a pre-2015 level.

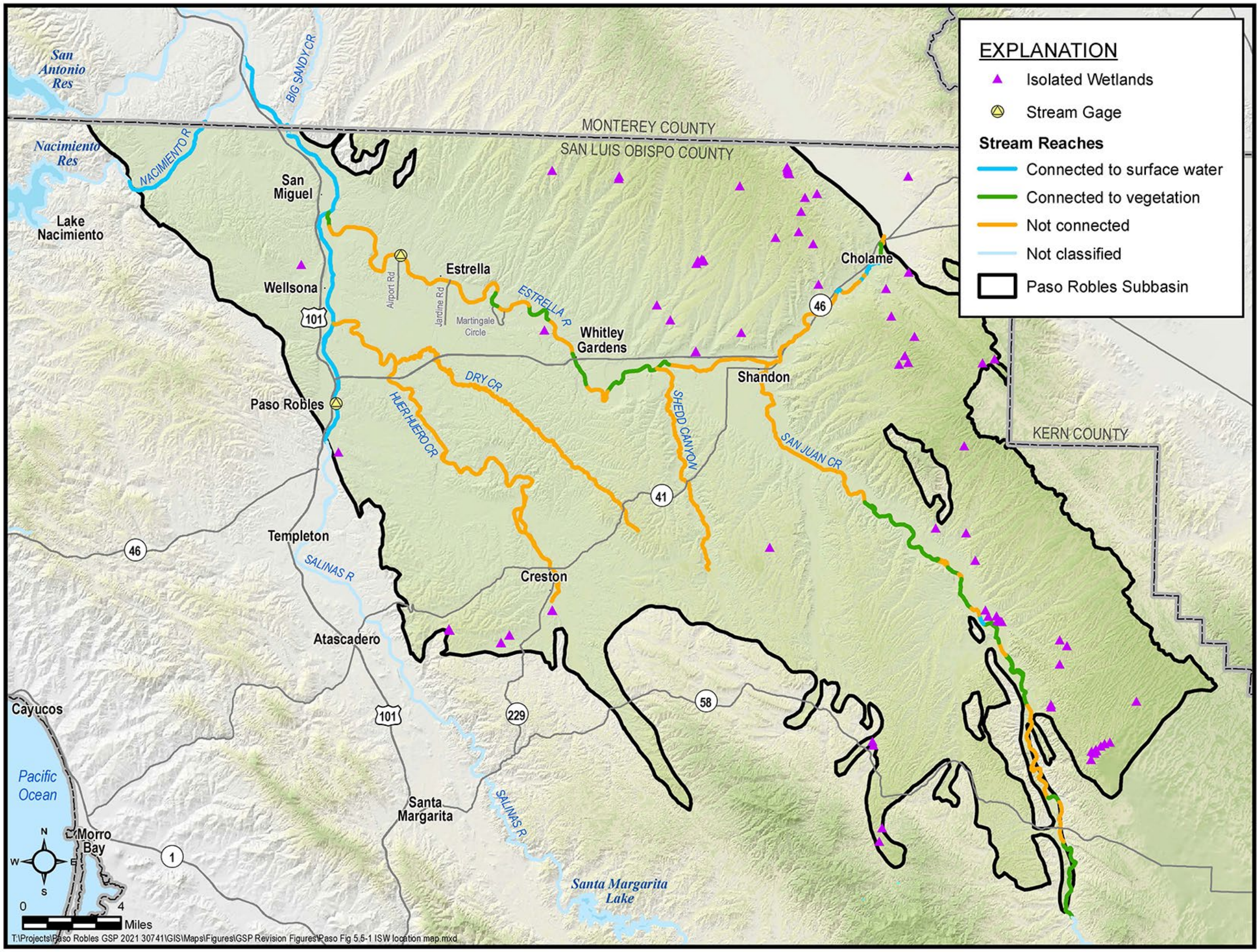


Figure 1. Locations of Interconnection Between Groundwater and Surface Water

1. CONCEPTUAL MODEL OF INTERCONNECTED SURFACE WATER

In 1982, the SWRCB issued Decision 1585 regarding a group of applications for surface diversions from tributaries to the Salinas River between Salinas Dam and the Nacimiento River (SWRCB, 1982). By that date, the SWRCB had already determined that groundwater in alluvial deposits along the Salinas River was classified as underflow subject to the rules of surface water appropriation. The Decision described hydrogeologic conditions and recharge processes in the Paso Robles Groundwater Basin, stating that there are “silty clays of low permeability existing within the upper portion of the Paso Robles Formation beneath and adjacent to the Salinas River alluvium… [that] appear to be sufficiently thick and extensive to act as a barrier separating underflow in the river alluvium from groundwater that occurs in the underlying older water-bearing formations.” The clays were said to extend eastward to about the community of Estrella along the Estrella River and the community of Creston along Huerhuero Creek. Upstream of the clays, percolation from the Estrella River and Huerhuero Creek directly recharges the Paso Robles Formation.

This hydrogeological conceptual model suggests that groundwater pumping—the preponderance of which is from the Paso Robles Formation—would tend to deplete stream flows upstream of the clay layers but have only a small effect on stream flows overlying the clay layers. An additional geographic variation in regional hydrology is that the western part of the watershed surrounding the Subbasin is much wetter than the eastern part. Average annual precipitation over the Coast Ranges along the western side of the watershed is about four times greater than precipitation along the eastern edge of the watershed. As a result, surface runoff into the Salinas River is substantially greater than surface runoff into the Estrella River. The combined effect of greater surface inflow and confining layers beneath the alluvium is to enable the Salinas River to maintain high, steady groundwater levels that support the establishment and growth of riparian vegetation. Except during major droughts, river recharge has been able to outpace leakage across the confining layers, even after water levels in deep wells declined by many tens of feet. In contrast, many stream reaches in the eastern half of the Subbasin do not appear to be buffered from the effects of pumping. Over several decades, pumping has lowered groundwater levels in the Paso Robles Formation, depleted stream flow and may have caused the observed decrease in the extent and health of riparian vegetation.

2. PRECIPITATION

The history of annual precipitation at Paso Robles is useful for interpreting other data sets. It identifies individual dry and wet years as well as droughts and sequences of wet years and allows changes in groundwater levels and vegetation to be related to general hydrologic conditions. For example, comparing vegetation at the end of one drought with vegetation at the end of a later drought controls for drought effects and allows the effects of long-term water-level declines to be assessed.

Figure 2 shows annual precipitation at Paso Robles during water years 1910-2021. The blue bars show annual precipitation, and the orange line shows the cumulative departure of annual precipitation. The cumulative departure line goes down in years that are drier than average and up in years that are wetter than average. Thus, droughts appear as long, large declining segments of the cumulative departure line. Two droughts used in the present analysis were 1987-1990 and 2012-2016. They were similar in intensity (63-64 percent of long-term average precipitation), but the more recent drought was one year longer.

3. STREAM FLOW

Stream flow gages with useful historical records are “Salinas River at Paso Robles” (USGS station 11147500), with a period of record of water years 1940-2021, and “Estrella River near Estrella” (USGS station 11148500), with a period of record of water years 195696 and 2016-2018. The Salinas River gage is near the upstream end of the reach crossing the Subbasin. Flows at that location do not reflect pumping depletion within the basin, but they can be used to evaluate flow duration and the amount of flow required to create continuous throughflow to the Nacimiento River confluence. Aerial photographs from nineteen dates between 1989 and 2021 were examined to determine whether throughflow was present, which was on five dates. However, the amount of flow at the gage associated with throughflow is inconsistent and might have been affected by flows over the weeks and months preceding the respective photograph. Live flow was present with gaged flows as small as 5-8 cubic feet per second (cfs), when flow had been continuous but slowly receding for weeks beforehand. Conversely, discontinuous flow was present with gaged flows as high as 73 cfs. The location where flow first becomes discontinuous was not obvious from the aerial photographs. Commonly, the entire reach from about Wellsona to the Nacimiento River was dry, damp or flowing.

Along the Estrella River, open water or at least ribbons of very damp soil along the channel were commonly present at various locations from about 4 miles upstream of Whitley Gardens to about 0.5 mile downstream of Whitley Gardens and along about a 1-mile reach near Martingale Circle (about 5 channel miles downstream of Whitley Gardens) prior to 2012. Since then, those possible gaining reaches have not been visible in dry season air photos.

Figure 3 shows annual discharge and cumulative departure of annual discharge in the Salinas River at the Paso Robles gage. The patterns of annual discharge and cumulative departure are similar to those for precipitation, which confirms that river flows derive primarily from rainfall runoff.

Flows in the Estrella River are much smaller than those in the Salinas River due primarily to the smaller amount of annual rainfall. For example, average annual discharge in the Salinas River during water years 1972-1994 (74,925 acre-feet per year) was close to the long-term average and was 4.6 times greater than annual discharge in the Estrella River for the same time period.

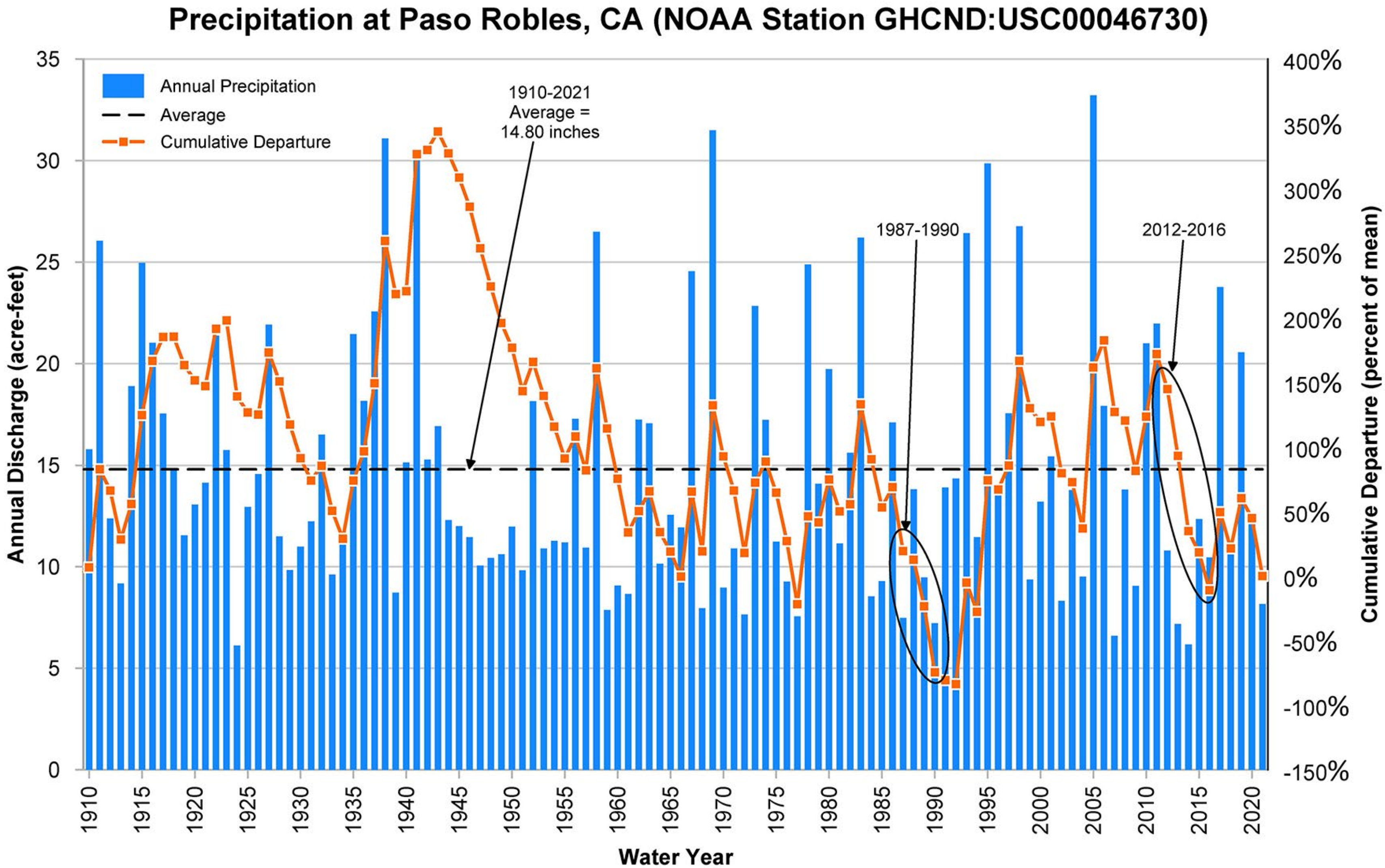


Figure 2. Annual Precipitation at Paso Robles, Water Years 1910 to 2021

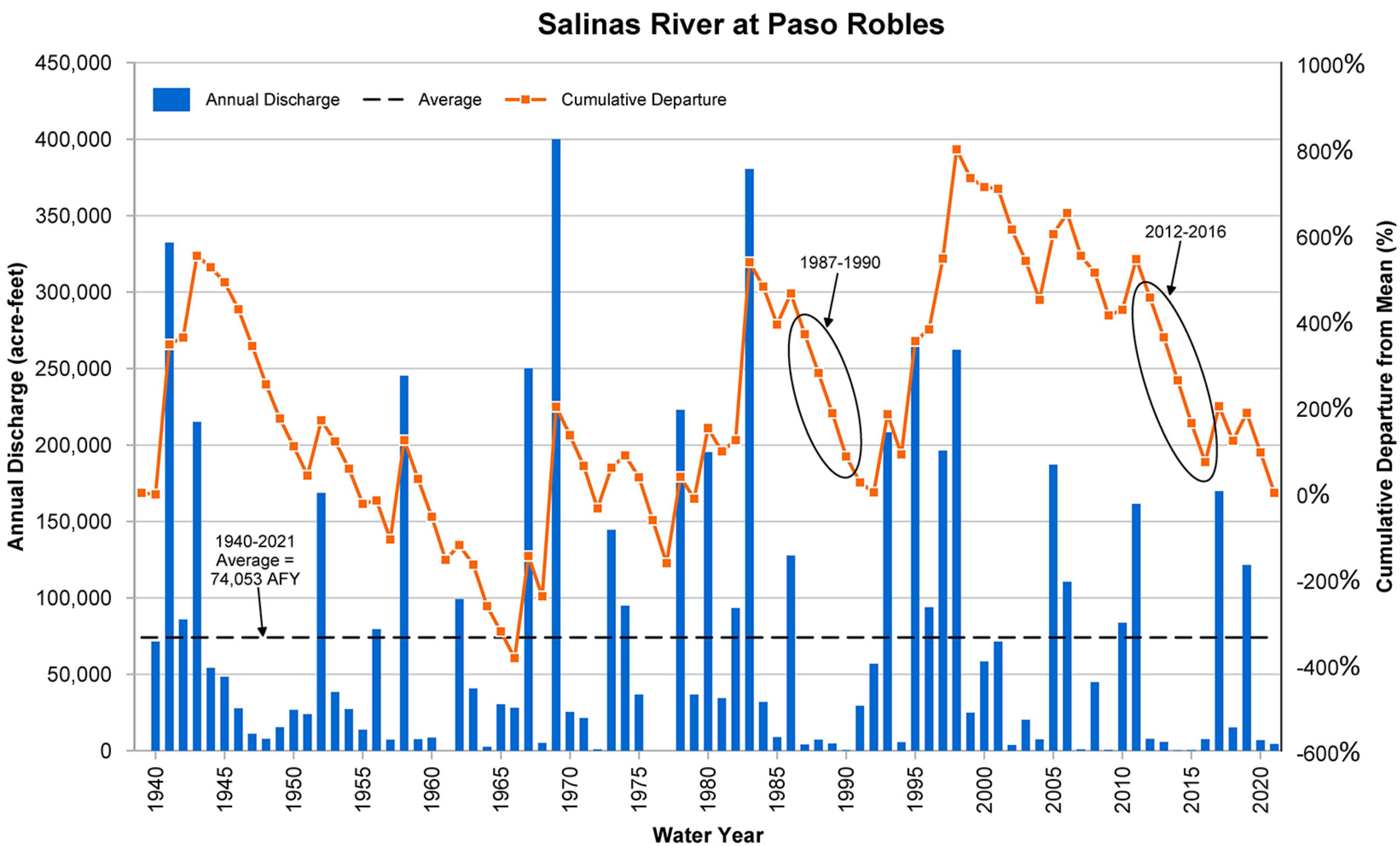


Figure 3. Annual Discharge and Cumulative Departure of Annual Discharge, Salinas River at Paso Robles Gage

Estrella River flows at the “near Estrella” gage (see Figure 1) have also been depleted by groundwater pumping and declining groundwater levels, whereas the Salinas River flows have not. Figure 4 shows flow-duration curves for both rivers for four three-year time intervals, roughly a decade apart from the 1960s to 2010s. Each curve displays all daily flows during a three-year period sorted from largest to smallest. The horizontal X axis shows the percentage of time each flow magnitude is exceeded. For perennial streams, the curves would extend across the entire width of the graph because flow exceeds zero 100 percent of the time. For seasonally intermittent streams, the curve bends down and crosses the X axis indicating the percentage of time flow is greater than zero. By plotting the vertical Y axis on a logarithmic scale, changes in low flows are visually expanded. If groundwater pumping is depleting stream flow, the effect is to curtail the duration of low flows (bend the curve downward) and shift the X axis intercept to the left.

As documented in Figure 4, in the Estrella River, low flows have become increasingly depleted by groundwater pumping over the past five decades, causing the curves to shift progressively to the left. In contrast, the curves for the Salinas River have remained in a cluster, with no trend to the right or left. The Estrella River gage is near the eastern edge of the shallow clay layers in the Paso Robles Formation. These curves confirm that flows upstream of the gage were historically interconnected with groundwater and subject to depletion by groundwater pumping and lowered groundwater levels.

Prior to 2012, there were several locations along the Estrella River where subsurface hydrogeologic conditions appeared to push the water table closer to the land surface, resulting in flow or visible dampness along the low-flow channel when nearby reaches were dry. This most commonly occurred 3-4.5 miles above Highway 46, 0-1 miles above Highway 46 (at Whitley Gardens), and 3.8-5 miles downstream of Highway 46 near Martingale Circle. Neither flow nor dampness has been visible during the dry season at these locations since 2012.

4. GROUNDWATER LEVELS

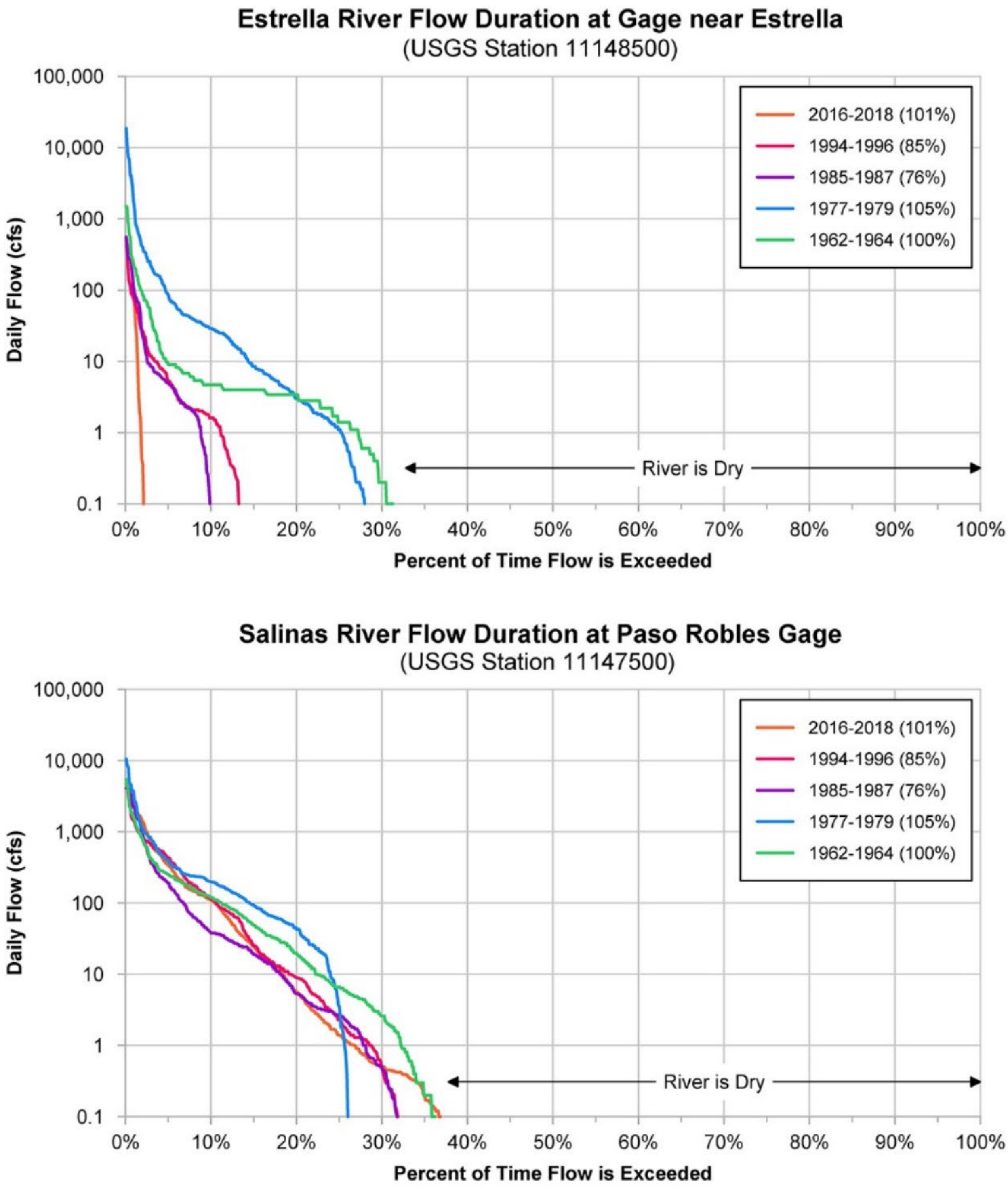
Relating groundwater levels to interconnected surface water requires that the depth of the well screen be known because wells screened at different depths can have different water levels. Only the true water table at the uppermost zone of saturation is relevant to interconnection with surface water or tree roots. In alluvial basins like the Paso Robles Subbasin the true water table is typically higher than the water level in deeper aquifer units tapped by water supply wells because confining layers within the basin fill materials slow the rates at which pumping from deep aquifers affect water levels in shallow ones. For example, a very large difference between shallow and deep water levels was found near the Airport Road bridge over the Estrella River (see Figure 1), where two monitoring wells were installed in 2021. The shallower well was screened down to 40 feet below the ground surface and had a depth to water of 29.5 feet (Cleath-Harris Geologists, 2021). The top of the screen in the second well was 160 feet deeper and its water level was 158 feet lower.

This represents a vertical water-level gradient close to unity, which means the shallow aquifer is perched and there is an unsaturated zone between the shallow and deep aquifers.

Most attempts to group water level data by well depth have been hampered by lack of depth or screened interval information for the wells (see for example GSP Sections 4.4 and 4.4.4). Groundwater levels have been monitored in about 3,600 wells in the Subbasin by SLOFCWCD, but construction information is available for only 244 of them. Only one well was usable as an RMS for alluvial aquifer groundwater levels.

A different approach was used for this analysis of interconnected surface water. Monitored wells with relatively long periods of record and located within about 2,000 feet of a surface waterway were selected from the water level database. Of these 31 wells, most were along the Salinas and Estrella Rivers, with a few along San Juan Creek, Huerhuero Creek and Shedd Canyon. The hydrographs for these wells were classified as alluvial or Paso Robles based on the water level patterns. In alluvial wells, water levels were close to the adjacent stream bed elevation, had small seasonal fluctuations and were stable from year to year except during droughts, when larger water-level declines occurred. Figure 5 shows examples of alluvial well hydrographs. The figure also shows examples of hydrographs characteristic of Paso Robles Formation wells. In those hydrographs, seasonal fluctuations are larger, water levels in winter are more irregular and not necessarily close to the elevation of the nearby stream, and steady long-term water-level declines commenced sometime between the 1970s and 2000s. Almost all of the hydrographs fit clearly into one or the other of these two patterns.

All of the wells along the Salinas River fit the alluvial well hydrograph pattern except for two multi-depth monitoring well clusters in San Miguel that appeared to be completed in the Paso Robles Formation. The only well along the Estrella River with the alluvial well signature is the one farthest downstream, within the region characterized by shallow clay layers that separate alluvial groundwater levels from deeper Paso Robles groundwater levels. All of the wells farther upstream along the Estrella River exhibit the Paso Robles well pattern. One well next to San Juan Creek has a hydrograph closer to an alluvial pattern than a Paso Robles pattern. This well is upstream of most agricultural pumping. It might be completed in the Paso Robles Formation but has not yet experienced long-term water-level declines due to pumping. The geographic distribution of all of the hydrographs fits the conceptual model for interconnected surface water: where extensive shallow clay layers are present in the Paso Robles Formation, alluvial groundwater levels have remained relatively stable and at an elevation close to that of the adjacent stream bed. The aforementioned new multi-depth monitoring well site on the Estrella River at Airport Road likewise fits the pattern.



Note: Percentages in legend indicate precipitation at Paso Robles as percent of 1910-2021 average

Figure 4. Flow-Duration Curves for Estrella and Salinas Rivers

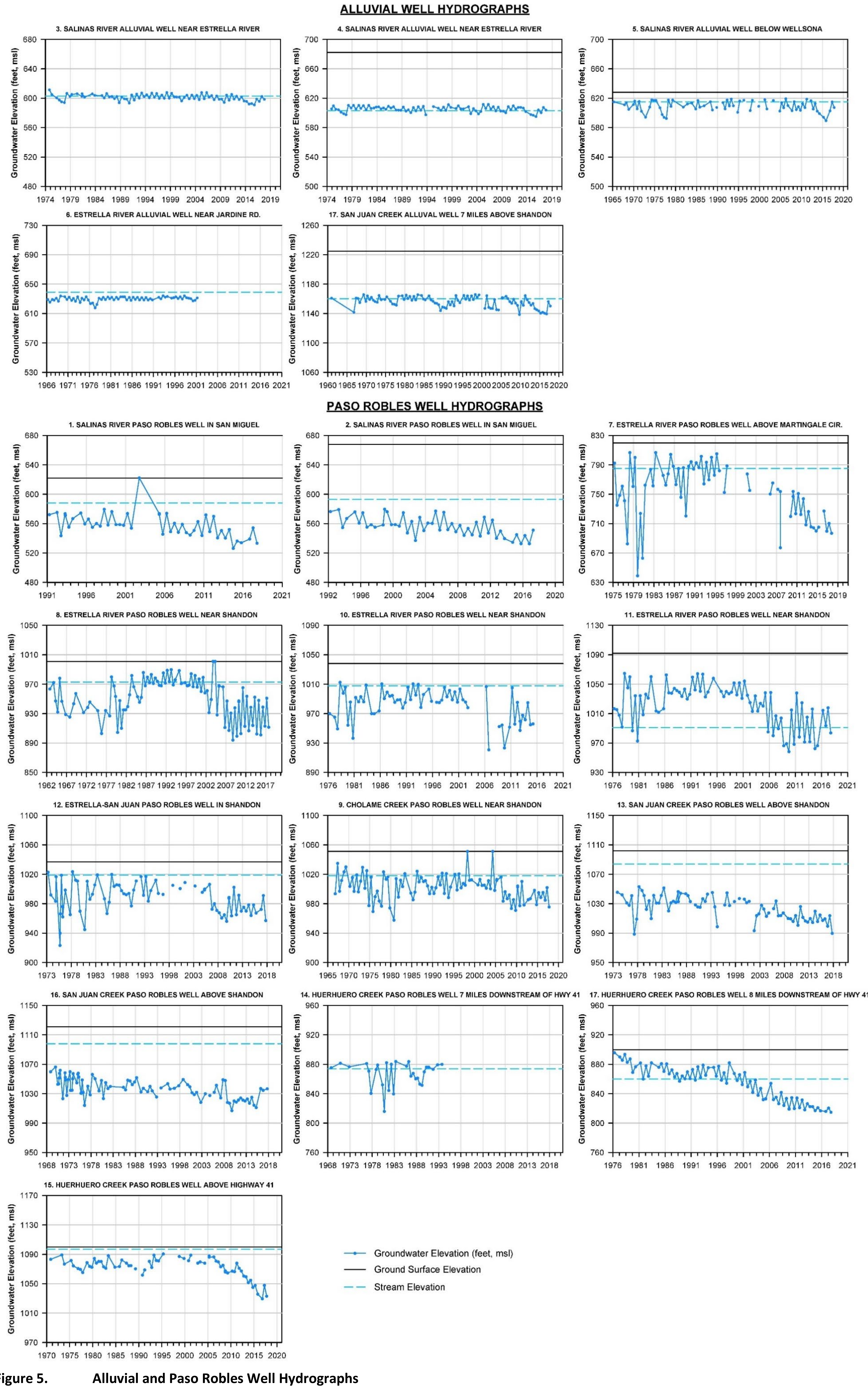


Figure 5. Alluvial and Paso Robles Well Hydrographs

5. RIPARIAN VEGETATION

Vegetation patterns along streams can also be used to map potential interconnection of surface water and groundwater because growth is more vigorous where plant roots can reach the water table. There are limitations to this approach, however. First, some plant species are facultative phreatophytes, which means they will establish and grow with or without access to the water table. A second limitation is that riparian vegetation in shallow water table areas is subject to mechanical removal by flood scour or by clearing for agricultural land use. A third limitation is that a narrow band of vegetation can survive along a stream channel even where the water table is deep if surface flows periodically replenish soil moisture in the stream bank. In spite of these limitations, broad patches of dense riparian vegetation stand out in aerial photographs and provide an indication of where the water table is shallow and interconnected with the root zone and possibly also the stream channel.

Two sources of vegetation mapping were used in the analysis: maps of Natural Communities Commonly Associated with Groundwater (NCCAG) and historical aerial photographs. The NCCAG maps of potential riparian and wetland vegetation are statewide compilations of numerous local vegetation mapping studies, mostly from the early 2000s. The NCCAG maps are provided in georeferenced digital formats on DWR's SGMA Data Portal. Historical aerial photographs taken on nineteen dates between 1989 and 2021 can be viewed on Google Earth©. Some of the older photography was low-resolution, so the Google Earth data were supplemented with high-resolution photography for 1994 obtained from Netronline (www.historicaerials.com).

A comparison of the NCCAG maps with aerial photographs revealed that the accuracy of the NCCAG vegetation delineations is poor in the Subbasin. This is illustrated in Figure 6, which shows NCCAG vegetation polygons overlain on aerial photographs at four locations along the Salinas and Estrella Rivers. The riparian vegetation polygons clearly miss many areas of vegetation that is denser and more likely phreatophytic than the vegetation in the polygons or simply cover areas with little vegetation at all. The wetland polygons along the river channels were mapped in greater detail but do not consistently correspond to a particular type of vegetation visible in the photograph. In particular, wetlands within the river channels are commonly present as long, narrow ribbons along the low-flow channel. Slight shifting in the low-flow channel location or small errors in georeferencing the data can place the mapped polygon over the incorrect type of vegetation.

The NCCAG wetland map also includes numerous off-channel vegetation patches mapped as springs or seeps. Mapping accuracy for these features was also uneven, as shown in Figure 7.

For the purposes of the interconnected surface water analysis for this GSP, a new map of riparian and wetland vegetation was created by digitally outlining areas of visibly dense riparian trees or shrubs more than about 50 feet wide along river and creek channels based on May 2017 aerial photography. The photography represents dry-season conditions in a year close to the start of the SGMA management era (January 2015). In-channel wetlands are indicated where bright green herbaceous vegetation was visible, generally in narrow strips along low-flow channels. This type of wetland vegetation comes and goes between seasons and years. The mapping is intended to show areas where it can often be found.

For isolated wetlands, all of the mapped features in the NCCAG data set were reviewed and classified as groundwater dependent wetlands if they exhibited open water or bright green herbaceous vegetation in the dry season. Many of the features in the data set do not appear to be wetlands at all, are artificial water features such as stock ponds or are seasonal wetlands. Seasonal wetlands—including vernal pools—are transient features that derive water from ponding of rainfall runoff in localized depressions. In some instances, near-surface groundwater perched on the same shallow clay layer that holds the surface runoff might contribute subsurface flow to the seasonal wetland for a few weeks or months (Williamson and others, 2005). That shallow groundwater is perched above an unsaturated zone and not connected to regional groundwater. Where regional groundwater intersects the land surface, it generally does so perennially or nearly so. Hence, it supports wetland vegetation that is green year-round.

The resulting map of groundwater-dependent vegetation is shown in Figure 8. In-channel riparian and wetland vegetation is mapped as polygons accurately delineating the perimeter of the vegetation patch. Isolated wetlands are shown using symbols because many of them would otherwise be too small to see on a basin-scale map. The vegetation distribution is generally consistent with the conceptual model for interconnected surface water. Dense riparian vegetation is most abundant along the Salinas River, which has relatively large and persistent surface flows as well as consistently shallow depth to groundwater. These conditions also result in a relatively high abundance of in-channel wetlands. Riparian vegetation along the Estrella River is sparser and has become more so in recent decades, as described below. Patches of sparse and dense riparian vegetation and even wetlands are present along San Juan Creek at locations more than about 10 miles upstream of Shandon.

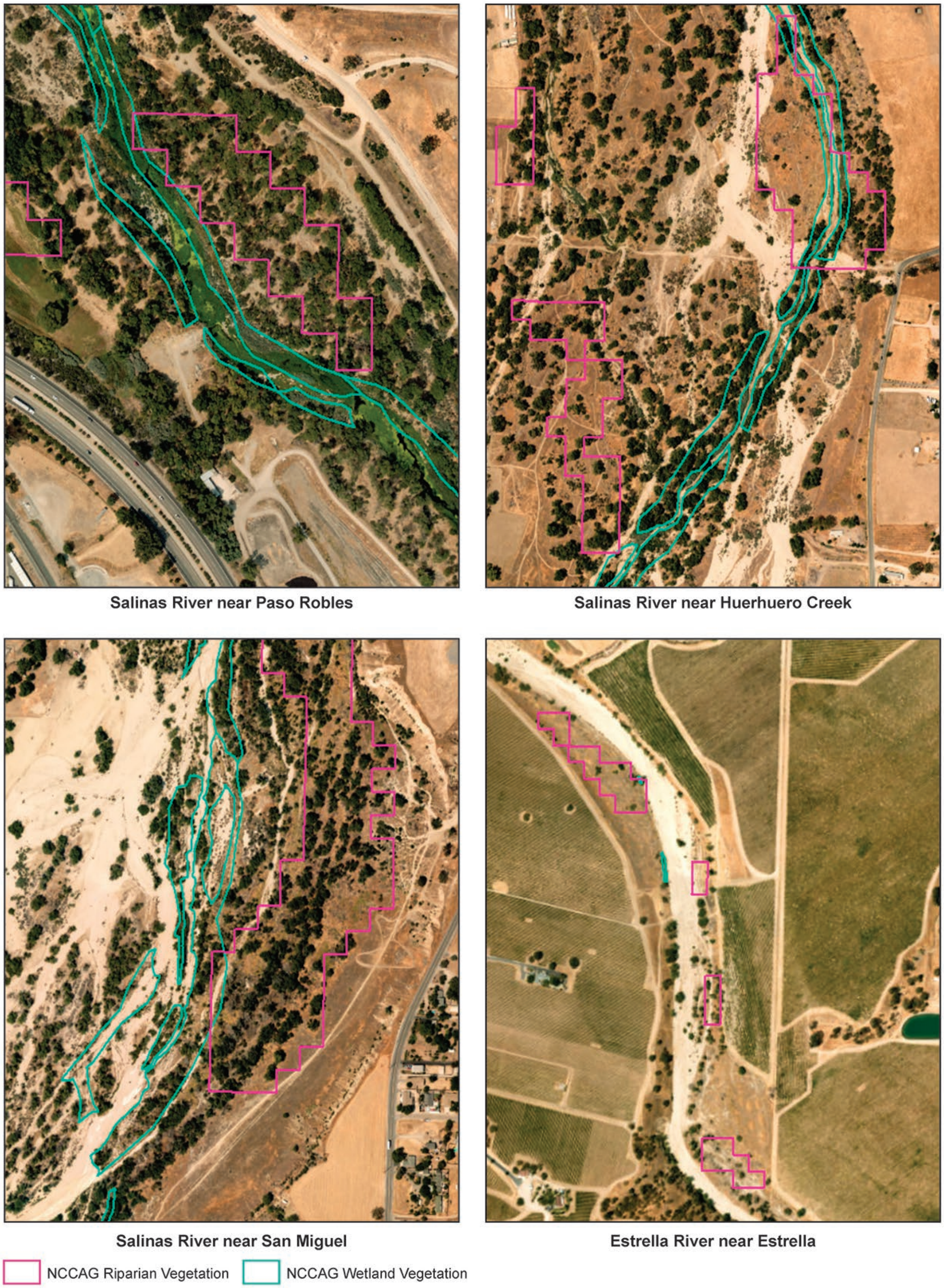


Figure 6. NCCAG Vegetation Polygon Accuracy Along the Salinas and Estrella Rivers

Figure 7. **NCCAG Wetland Map Accuracy within Paso Robles Subbasin**

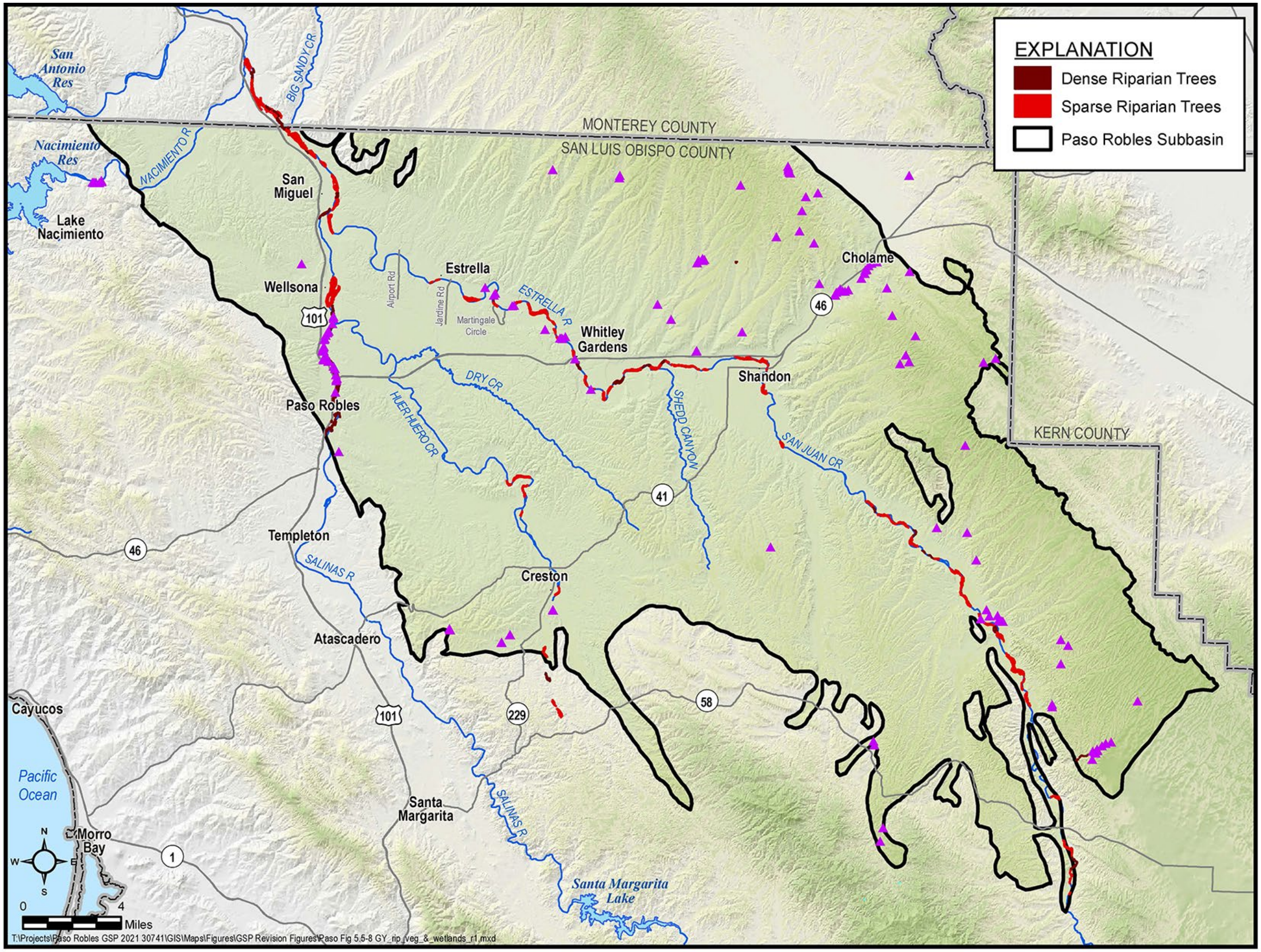


Figure 8. Groundwater-Dependent Vegetation in Paso Robles Subbasin

6. CHANGES IN RIPARIAN VEGETATION OVER TIME

Changes in the location, extent and density of riparian tree and shrub canopy over time provide important clues regarding the variables affecting vegetation GDEs. For example, unusually low stream flow and water levels occurred along the Salinas River only during the 2012-2016 drought, whereas stream flow and groundwater levels along the upper half of the Estrella River and lower reach of San Juan Creek have been gradually declining for decades. Thus, if vegetation impacts can be observed in aerial photographs or satellite imagery, then the timing of the impacts is informative. Three types of temporal vegetation analysis were completed: comparisons of vegetation in 1949, 1978, 1994, 2003 and 2018, mapping of riparian tree mortality during the 2012-2016 drought, and mapping of changes in satellite-based measurements of vegetation moisture status over time.

6.1 Comparison of Riparian Vegetation in 1949-2018

In 2004, the Upper Salinas-Las Tablas Resource Conservation District measured changes in the extent and density of riparian vegetation at several locations along Subbasin streams by comparing aerial photographs from 1949, 1978 and 2003 (US-LTRCD, 2004). Along two Salinas River sample reaches near Atascadero and Paso Robles, the percent cover of in-channel riparian vegetation decreased from 84-95 percent in 1949 to 10-23 percent in 2003. Similar tabulations at thirteen additional locations along the Salinas and Estrella Rivers and Huerhuero Creek found that overall about two-thirds of the riparian vegetation that existed along those waterways in 1949 had disappeared by 2003. The report listed nine possible causes of the decrease in riparian vegetation but did not include any analysis to quantify which were the most significant.

Looking back at those data, some conclusions regarding causality can be inferred. The reductions in riparian vegetation along the Estrella River and Huerhuero Creek could not have been the result of upstream dam operation, which was a potential cause of reductions along the Salinas River (Salinas Dam was completed in 1942). It is possible that riparian vegetation was exceptionally abundant in 1949 because it was a few years after 1936-1943, which was the largest sequence of wet years in the 1910-2021 period of record for precipitation (see Figure 2). Long-term declines in groundwater levels could not have explained the decrease in vegetation along the Salinas River, where alluvial water levels have remained stable and shallow since at least the early 1970s. Elsewhere in the Subbasin, chronic declines in groundwater levels mostly started in the 1980s or 1990s, although they started earlier in a few cases. Water-level declines since 1980 could not have caused vegetation declines during 1949-1978.

A similar analysis was completed for this GSP, comparing riparian vegetation conditions in 2018 with conditions in 1994 along the entire lengths of the Salinas River, Estrella River, Huerhuero Creek and San Juan Creek using aerial photographs. Each of those dates were soon after the end of a major drought. As discussed in section 5.5.2, the 1987-1990 drought and the 2012-2016 drought were similar in intensity (low precipitation), but the more recent drought lasted a year longer. In other words, precipitation and stream flow conditions during the years immediately preceding the two photographs were similar, but groundwater levels were different. Between those two periods, there were cumulative water-level declines in the Paso Formation wells of 25-70 feet in the eastern part of the Subbasin. Water levels along the Salinas River remained stable until 2011, declined 12-18 feet during 2012-2016 and then recovered (see Figure 5). The density and extent of patches of riparian vegetation along the waterways in 2018 was visually classified as “more”, “the same” or “less” than in 1994.

The results of the vegetation comparison are shown in Figure 9. Where there were differences along the Salinas River, they were all decreases in vegetation coverage. This suggests that the relatively small and temporary water level declines during 2012-2016 were large enough to adversely impact vegetation. Along the Estrella River, vegetation coverage mostly declined near Shandon and along the downstream end toward the Salinas River. Along the middle reach, however, vegetation coverage unexpectedly increased in a number of locations. This is the same river segment where gaining flow could be seen in aerial photographs up until 2012, indicating a near-surface water table. Although that river segment is thought to be east of the extensive near-surface clay layers in the Paso Robles Formation, some aspect of hydrogeology and recharge appears to be sustaining a high water table in spite of large water-level declines in deeper wells in that region.

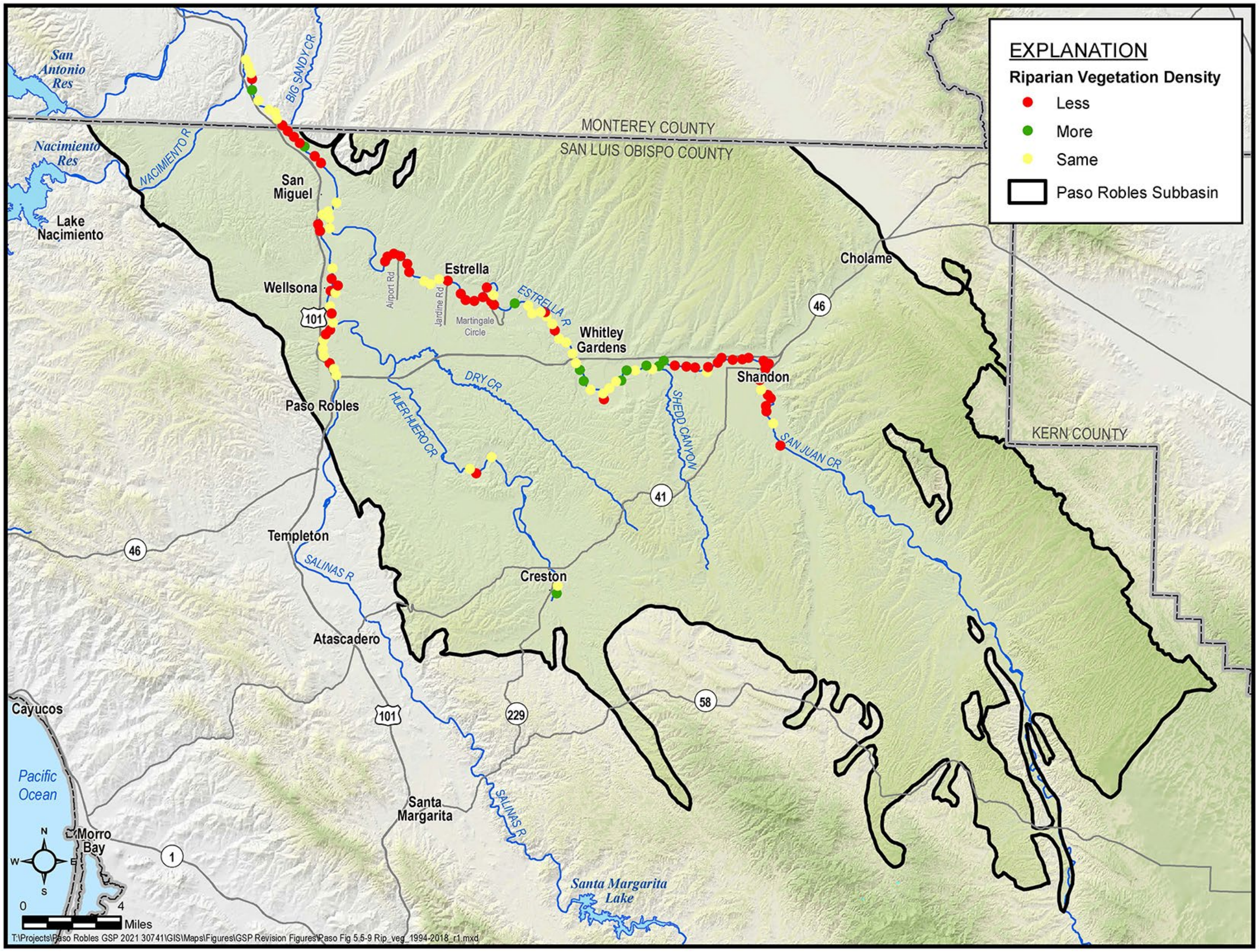


Figure 9. Density of Riparian Vegetation, Paso Robles Subbasin

6.2 Riparian Tree Mortality during 2013-2017

The resolution of recent historical aerial photographs on Google Earth© is sufficiently high that the death of individual trees or groups of trees can be readily detected by comparing photographs before and after the mortality event. The 2012-2016 drought caused noticeable riparian tree mortality in a number of locations. Aerial photographs bracketing the drought (2013 and 2017) were systematically compared to map locations of significant tree mortality. Pairs of photographs illustrating tree mortality are shown in Figure 10, and a map showing the locations and percent canopy reduction where mortality was observed is shown in Figure 11.

Mortality occurred along the Salinas and Estrella Rivers. The number of locations and extent of mortality was less for the Salinas River. Along the Salinas River, groundwater levels declined 12-18 feet during the drought as a result of insufficient surface flow to maintain the normal high water table. This indicates that for trees accustomed to shallow depths to water (less than 20 feet), water-level declines of 12-18 feet can be fatal. The situation along the Estrella River is more complex. Tree mortality was concentrated during the 2012-2016 period even though Paso Robles Formation groundwater levels had been declining for years before the drought. Like the presence of emergent flow and relatively dense riparian vegetation along the middle segment of the Estrella River prior to 2012, the delayed mortality of trees along the river might indicate the presence of a water table normally shallower than the water levels in nearby Paso Robles Formation wells.

6.3 Trends in Moisture Status using NDVI and NDMI

The health and vigor of riparian vegetation cannot be reliably detected in aerial photographs. However, spectral analysis of light reflected from the vegetation does provide that information and can be obtained from Landsat satellite imagery. Two commonly used metrics of vegetation health and vigor are the normalized difference vegetation index (NDVI) and normalized difference moisture index (NDMI), both of which involve ratios of selected visible and infrared wavelengths. NDVI relates to the greenness of vegetation and NDMI relates to transpiration. The Nature Conservancy compiled these two metrics from historical satellite imagery for riparian vegetation throughout California and incorporated it into the GDE Pulse on-line mapping tool (The Nature Conservancy, 2019b). Values are only calculated for NCCAG mapped wetland and riparian vegetation polygons. For each polygon, the tool displays time series plots of annual summertime NDVI and NDMI during 198719. Figure 12 shows examples of NDVI and NDMI time series for two vegetation polygons and illustrates the GDE Pulse tool that calculates trends for user-selected periods. In general, NDVI and NDMI tend to rise and fall together, as they both represent measures of water-related vegetation health.

Salinas River below Wellsona

Estrella River 1.3 Miles Upstream of Jardine Road

Estrella River 1.5 Miles Downstream of Highway 41

Estrella River at Shandon

Figure 10. Riparian Vegetation Mortality between 2013 and 2017

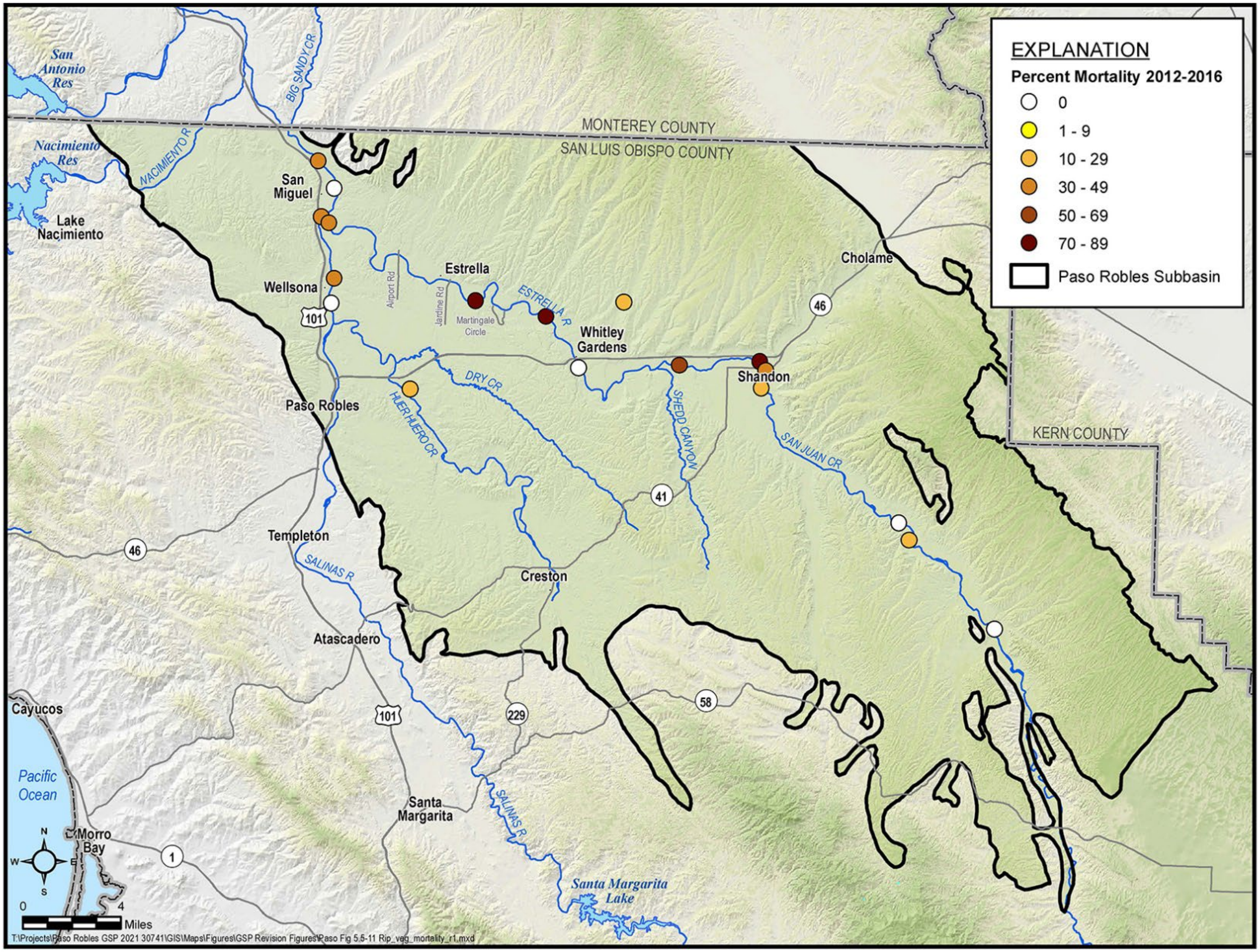
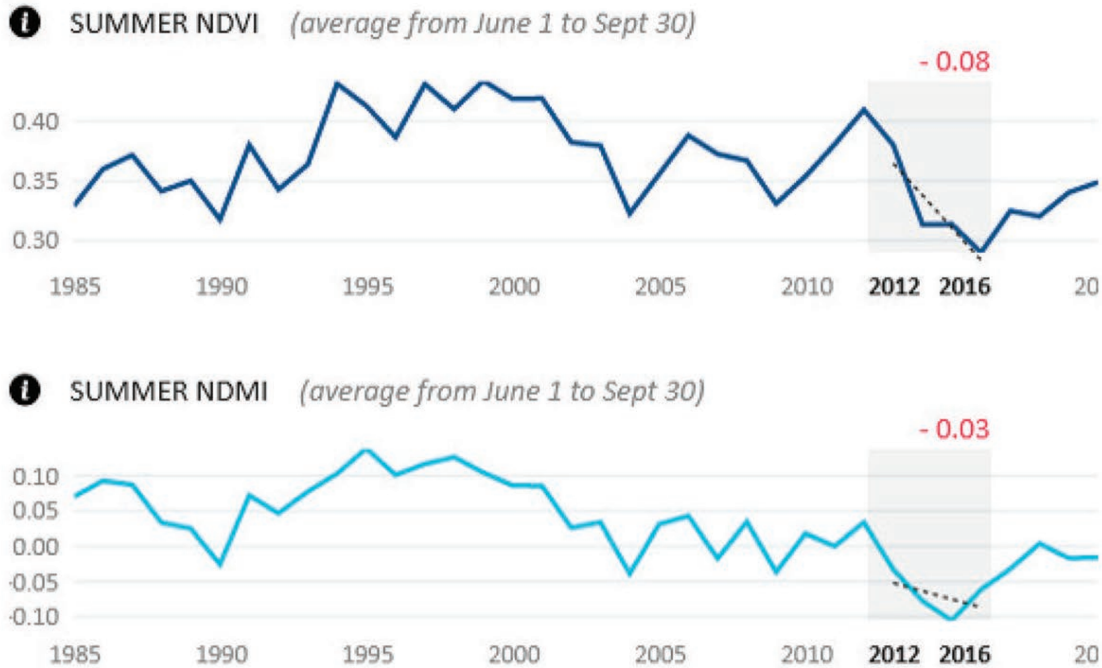
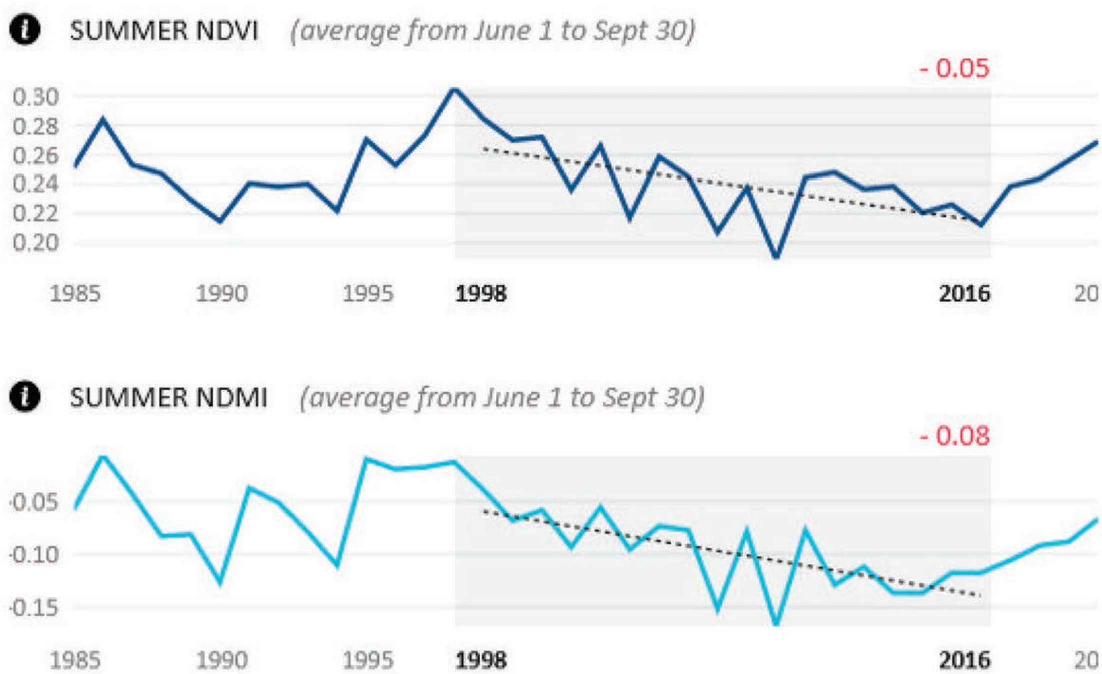


Figure 11. **Riparian Canopy Reduction between 2013 and 2017**



A. Valley Foothill Riparian Polygon on Salinas River near Huerhuero Creek



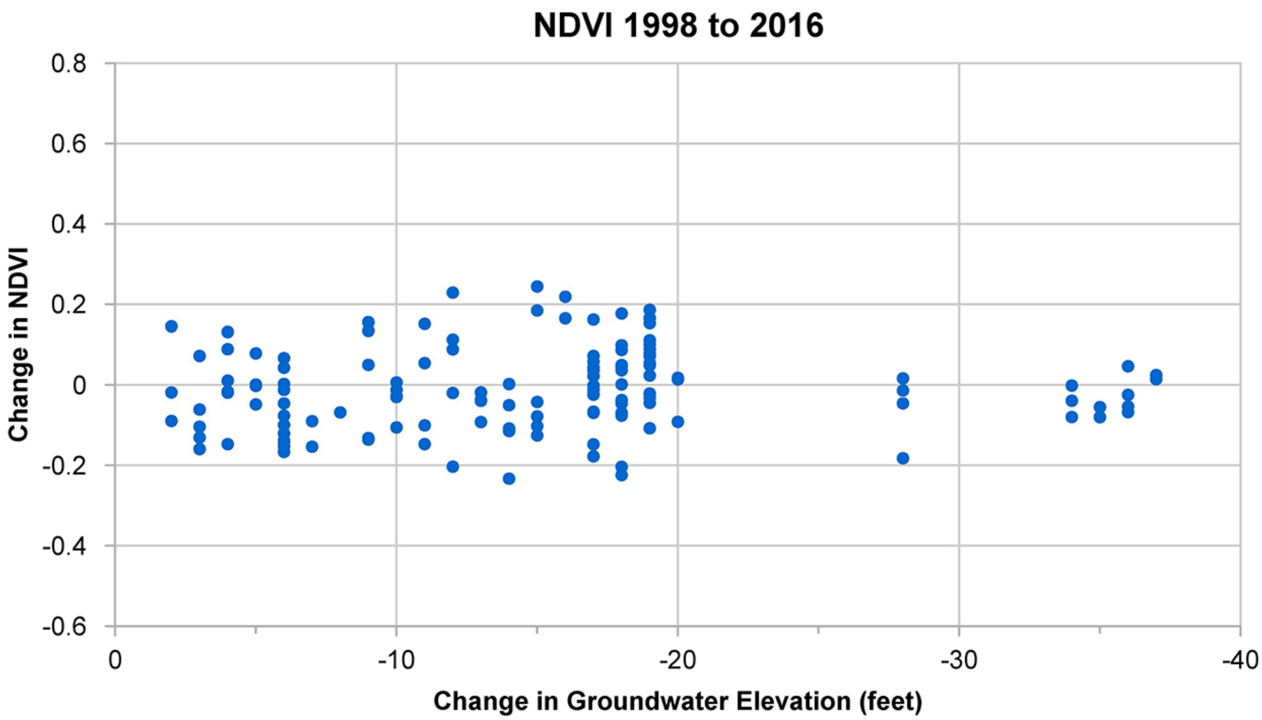
B. Valley Foothill Riparian Polygon on Estrella River near Shandon

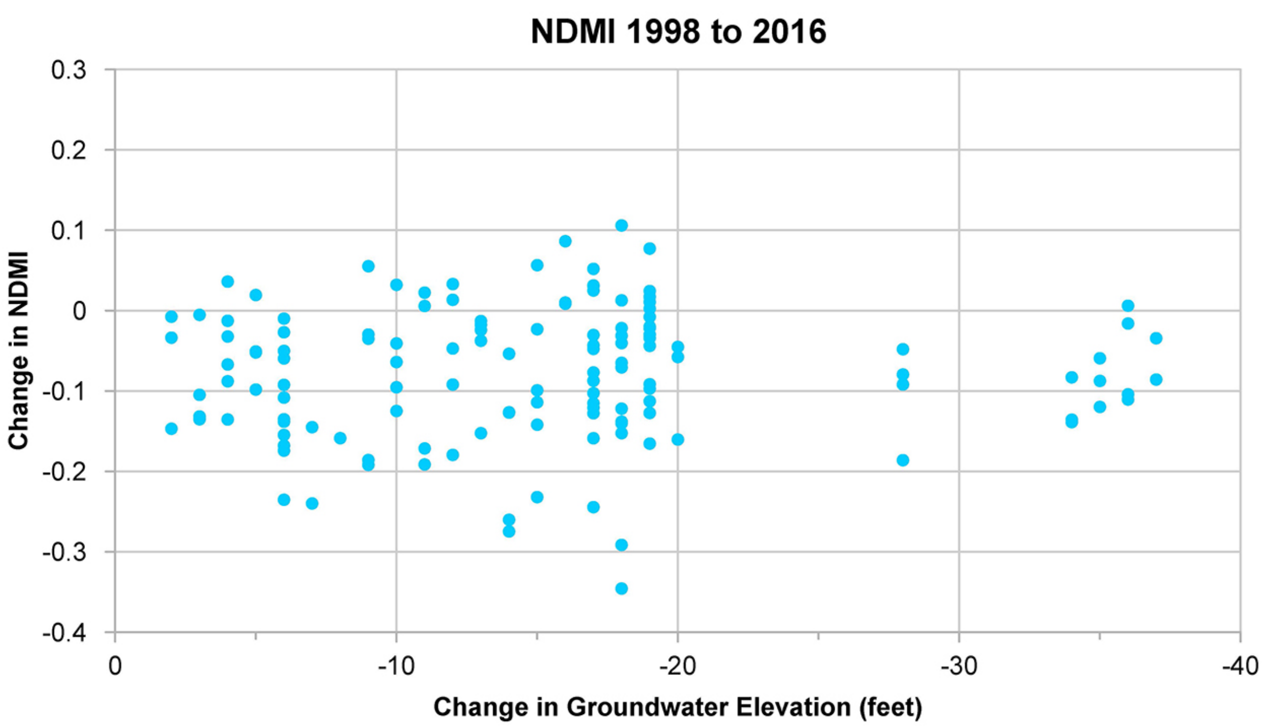
Figure 12. NDVI and NDMI Time Series, Two Vegetated Areas

The NDVI and NDMI data were tested for consistency with changes in precipitation, water levels, vegetation extent and vegetation mortality. The first test consisted of tabulating the NDVI and NDMI trends during 2012-2016 and 2016-2020 for all riparian vegetation polygons along the Salinas and Estrella Rivers. The expectation was that trends would be declining during 2012-2016 due to drought conditions and rising during 2016-2020 due to the return to more normal hydrologic conditions. Along the Salinas River between Paso Robles and Camp Roberts, 95 percent of the polygons had declining NDVI trends during 2012-2016 (72 percent for NDMI). During 2016-2020, 86 percent of the polygons had increasing trends (82 percent for NDMI). So that reach of the Salinas River exhibited the expected pattern. Below Camp Roberts, NDVI and NDMI results were inconsistent during 2012-2016 (75 percent decreased in NDVI; 82 percent increased in NDMI). Results in this reach were also mixed during 2016-2020 (only about half of the polygons experienced an increasing trend in NDVI or NDMI).

Results for the Estrella River were generally counterintuitive. Downstream of Martingale Circle, NDVI and NDMI both increased in 92 percent of polygons during 2012-2016, and 69-75 percent continued increasing during 2016-2020. From Martingale Circle up nearly to Shedd Canyon Road, 62-92 percent of polygons decreased in NDVI or NDMI during 2012-2016, and 71-77 percent increased during 2016-2020 (the expected pattern). From Shedd Canyon Road up to Shandon, NDVI and NDMI conflicted during 2012-2016 (92 percent decreased in NDVI while 85 percent increased in NDMI). However, both metrics tended to increase during 2016-2020.

A second analysis compared changes in NDVI and NDMI with changes in groundwater levels. A common pattern in NDVI and NDMI plots for riparian vegetation polygons was a declining trend from around 1998 to around 2016. The net change in each of those metrics for each riparian polygon was compared with the net change in groundwater elevation at that location. Historical groundwater elevations for those two dates at each polygon were obtained from simulated groundwater levels in layer 1 of the regional groundwater flow model. Layer 1 represents the alluvial deposits along rivers and creeks in the Subbasin. If vegetation is groundwater-dependent, one would expect a decline in groundwater levels to be correlated with a decline in NDVI and NDMI. However, the scatterplots of change in NDVI and NDMI versus change in groundwater level exhibited no correlation. The plots are shown in Figure 13. A possible explanation for the lack of correlation is inaccuracies in the vegetation mapping, which were described in Section 5.5.5. Riparian and wetland vegetation patches along river channels tend to be long and narrow. A small lateral offset in registering the satellite data with the vegetation mapping could result in selecting satellite image pixels for land cover adjacent to the intended vegetation type. Alternatively, the distribution of vegetation patches in the year that polygons were mapped might not have been the same as the distribution in 1998 or 2016. Finally, simulated groundwater levels might not be highly accurate, but errors would tend to appear as a bias affecting a broad region equally or affecting 1998 or 2016 uniformly. That type of bias would still allow NDVI and NDMI patterns to appear, rather than the random results seen in the data plots.





Source: each data point represents one NCCAG riparian vegetation polygon from GDE Pulse map: https://gde.codefornature.org/#/map

Figure 13. NDVI and NDMI Versus Change in Groundwater Level

In any case, the apparent lack of correlation between groundwater levels and NDVI or NDMI is not interpreted here as proving that vegetation is not dependent on groundwater. Rather, it just demonstrates that this particular data set is not particularly helpful for quantifying that relationship.

7. SIMULATED GROUNDWATER-SURFACE WATER INTERCONNECTION

The regional groundwater flow model used to develop water budgets for this GSP is another source of information regarding interconnected surface water. The simulated basin-wide groundwater budgets for 1981-2011 (Tables 6-3 and 6-4) included stream percolation averaging 26,900 AFY (38 percent of total inflows), and groundwater discharge to streams averaging 7,300 AFY (9 percent of total outflows). Stream reaches that lose water to percolation are not necessarily interconnected with groundwater. They can be perched high above the water table. In contrast, reaches where groundwater discharges into streams are by definition interconnected. Thus, simulated discharge to streams amounting to 9 percent of total basin outflow indicates that substantial reaches of one or more streams in the Subbasin are interconnected with groundwater.

Simulated gains and losses in stream flow for every stream reach and stress period in the model were extracted from the results for the historical calibration simulation. The gaining and losing stream reaches in September 1998 (high groundwater levels) and September 2016 (low groundwater levels) were then plotted on the maps shown in Figures 14 and 15. Along the Salinas River in 1998, most of the reaches from Paso Robles to Wellsona and from San Miguel to the Nacimiento River were gaining. In 2016, there were gaining reaches in both of those general locations, but considerably shortened at both the upstream and downstream ends.

Along lower San Juan Creek and the Estrella River, flow was absent or losing to a point downstream of Shandon in 1998 and 2016. In 1998, predominantly gaining conditions were present from above Shedd Canyon almost to Estrella, with one lengthy losing reach upstream of Martingale Circle. The gaining reaches retracted substantially but did not disappear entirely in 2016. They were still present upstream of Highway 46 at Whitley Gardens and near the Shedd Canyon confluence.

The accuracy of these particular model results is uncertain because few stream flow and alluvial water level measurements are available for model calibration. It is noteworthy, however, that the reaches simulated as gaining by the model correspond closely to reaches where riparian vegetation is relatively dense and/or gaining flow or damp soils could be seen in aerial photographs. Also, the difference in length of the gaining reaches between 1998 and 2016 is reasonably consistent with differences that would be expected based on the stream flow, water level and vegetation data.

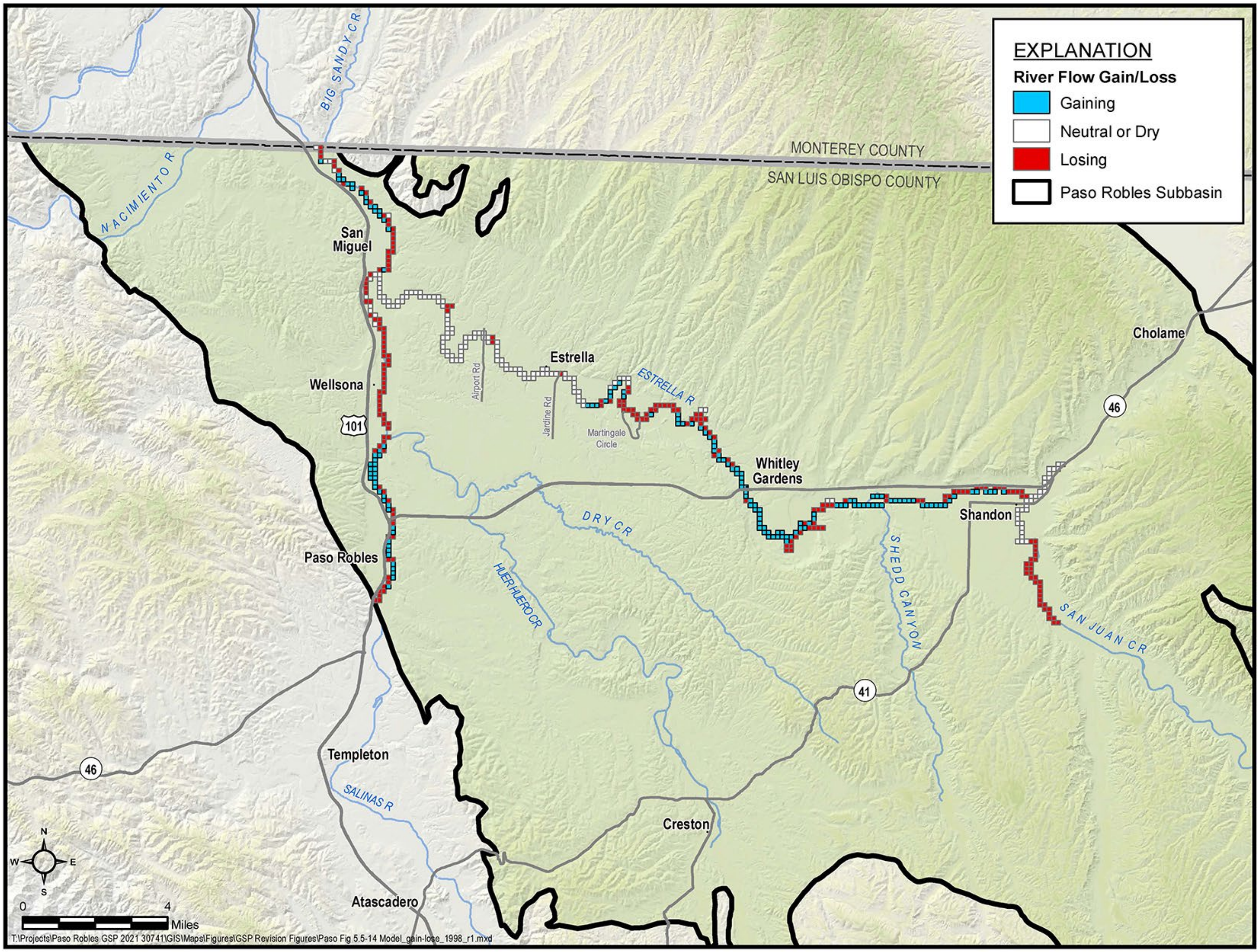


Figure 14. Gaining and Losing Stream Reaches, September 1998 (high groundwater levels)

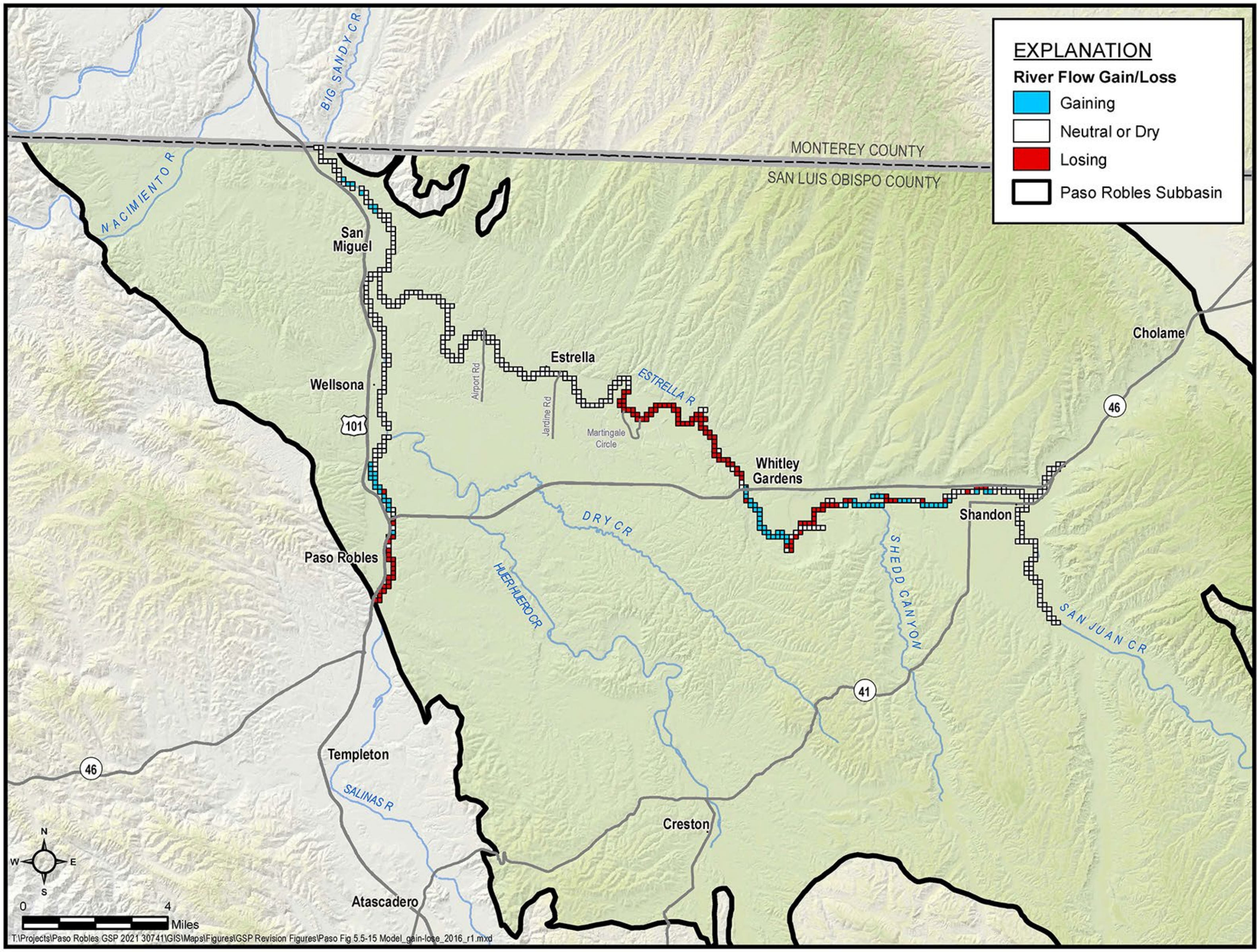


Figure 15. Gaining and Losing Stream Reaches, September 2016 (low groundwater levels)

8. NON-CONFORMING DATA

Some of the data reviewed for this section do not appear to fit the conceptual model for interconnected surface water and are worth mentioning. They include the following:

- The lower part of the Estrella River, from Estrella to the confluence with the Salinas River reportedly overlies shallow clay layers in the Paso Robles Formation and should have shallow alluvial water levels similar to those along nearby reaches of the Salinas River. The new shallow monitoring well at Airport Road confirmed the presence of a water table only 30 feet below the ground surface. On the basis of groundwater conditions, one would expect dense riparian vegetation to be present along this reach of the Estrella River, but vegetation has been absent or sparse continuously since at least the early 1990s. One possible explanation is that surface flows are too infrequent and brief to support recruitment of new phreatophytic vegetation. That is, a depth to water of 30 feet might be shallow enough to sustain mature vegetation with deep roots, but sustained surface flows and a shallower water table—at least in wet years—is probably necessary for new seedlings to become established. The magnitude and duration of surface flows have steadily decreased over the past four decades, so the probability of successful recruitment has become increasingly slim.
- Dense riparian vegetation and even emergence of groundwater at various points along the middle segment of the Estrella River (roughly from Shedd Canyon Road to Martingale Circle) appears inconsistent with regionally declining groundwater levels. That reach is reportedly upstream of the shallow clay layers in the western part of the Subbasin. Thus, pumping from wells in the Paso Robles Formation would be expected to lower the water table and deplete surface flows. It appears that some aspect of subsurface hydrogeology sustains a relatively high and steady alluvial water table along this reach. One possible mechanism is that shallow clay layers extend farther up the Estrella River than previously thought. Another possible explanation is that recharge and groundwater flowing south from the uplands on the north side of the river provide inflow to shallow aquifer horizons that helps buffer their water levels against drawdown caused by deeper pumping. An example of high Paso Robles water levels on the north side of the river is shown in hydrograph 11 of Figure 5. Water levels in that well were historically 40-50 feet above the riverbed elevation before starting to decline around 2000. A third possible explanation could be the presence of a fault or a northward extension of the Creston Anticlinorium creating a barrier to westward groundwater flow. In any case, there appears to be some combination of subsurface hydrogeology and recharge processes that has helped sustain riparian vegetation to at least a limited extent along the middle reach of the Estrella River.
- There was considerable local variability in the observed changes in riparian vegetation extent and density from 1994 to 2018, especially along the Estrella River. Changes in groundwater levels would likely be more uniform over broader areas. One possible explanation for the local variability in vegetation is the limitations of air photo interpretation for that purpose. Tree and shrub species cannot be accurately identified in the photographs. Some species are facultative phreatophytes, meaning they can become established and grow with or without access to the water table. Coast live oak is an example. Changes in non-phreatophytic vegetation could obscure changes in phreatophytic vegetation.

9. DELINEATION OF INTERCONNECTED SURFACE WATER

The delineation of interconnected surface water (Figure 1) reflects a preponderance of evidence based on the data and analyses described in the preceding sections. This involved some subjective assessments such as differentiating "dense" from "sparse" riparian vegetation or estimating how frequent and persistent interconnection must be to be designated "interconnected". Along stream channels, two categories of interconnection were assigned: interconnection with surface water and interconnection with riparian vegetation. The former requires higher water levels and typically occurs less frequently or for shorter periods of time. The latter includes areas where the water table is less than about 25 feet below the stream bed most of the time. Empirically, this is the root zone depth associated with the present of dense riparian vegetation. These considerations are discussed by stream reach below.

The entire length of the Salinas River from Paso Robles to the confluence with the Nacimiento River was classified as interconnected with surface water. The presence of very stable water levels close to the river bed elevation in all alluvial wells along that reach supports this designation, as does the presence of sparse to dense riparian vegetation along most of the reach. Even small inflows to the upper end of the reach commonly extend along the entire length of the reach, which also indicates that the water table is at or near the riverbed elevation along the entire length of the reach.

The Estrella River below Estrella (near Jardine Road) was classified as not interconnected. This classification reflects the very small amount of riparian vegetation along the entire reach throughout the analysis period (1989-2021). Although shallow clay layers are thought to be present in this area and the new shallow monitoring well at Airport Road confirms the presence of a water table 30 feet below the ground surface, this depth to water appears to be too great for vegetation to readily establish given the low frequency and duration of surface flow in the river.

The middle reach of the Estrella River, from Jardine Road up to Shedd Canyon contains alternating segments that are not connected or are connected to the vegetation root zone. These segments were classified primarily on the density of riparian vegetation. The only confirmation of groundwater levels is at a single well near the downstream end of the middle reach, where the depth to water was consistently about 10 feet below the riverbed. Emergent flow was present in some dry-season aerial photographs along a segment below Shedd Canyon, about 2.5 to 4 miles upstream of Highway 46. Open water or wet channel sediments can still be seen in some air photos in winter or spring but not during the dry season since about 2012. Thus, that segment was not classified as interconnected with surface water as of the start of the SGMA management period (2015).

The Estrella River from Shedd Canyon up to Shandon and lowermost 10 miles of San Juan Creek were classified as not interconnected. Although sparse riparian vegetation is present in places, the depth to groundwater in wells has been declining for decades and now exceeds the rooting depth of riparian vegetation. The vegetation that remains probably consists of facultative phreatophytes or is vestigial mature vegetation that has managed to survive declining water levels. In any case, recruitment of new phreatophytic riparian vegetation is very unlikely under current conditions.

Much of San Juan Creek more than 10 miles upstream of Shandon appears to be interconnected to riparian vegetation based on the presence of sparse or dense vegetation along most of the reach. One short reach was classified as interconnected to surface water because it usually has emerging groundwater along a low-flow channel bordered by wetland vegetation. The one well with water-level data along this reach has water levels that are usually within 10 feet of the creek bed elevation.

The lowermost 5 miles of Cholame Creek were delineated as not connected based on the absence of significant riparian vegetation and water levels in the sole monitoring well that average about 30 feet below the ground surface. Farther up the creek, however, is a reach several miles long that has open water or wetland vegetation in most historical aerial photographs. Shallow groundwater along that reach could be caused by faults that pass through the area (see Figure 4-4) or by fine-grained geologic layers intersecting the land surface and impeding lateral groundwater flow. For unknown reasons, the shallow water table and surface flow conditions have not caused the establishment of dense woody riparian vegetation.

Riparian vegetation is rare along Huerhuero Creek, Dry Creek and Shedd Canyon and is typically sparse where it is present. The depth to water in wells in that part of the Subbasin is uniformly too large to support riparian vegetation. Accordingly, those waterways were all classified as not connected to groundwater.

The reach of the Nacimiento River that traverses the northwest corner of the Subbasin was classified as interconnected to surface water because reservoir releases during the dry season are more than sufficient to sustain a high water table adjacent to the river. That reach is far from major pumping centers in the Paso Robles Subbasin and hence unlikely to be significantly depleted by pumping.

Isolated, off-channel wetlands shown on the interconnected surface water map (Figure 1) are the subset of the NCCAG wetlands where distinctly green vegetation was visible in dry season aerial photographs and the feature appeared to be a natural depression, not a constructed stockpond.

10. GROUNDWATER DEPENDENT ANIMALS

Many fish and wildlife species use aquatic and riparian habitats that are supported by groundwater. For the purpose of this GSP, beneficial use for habitat is limited to native species present in the Subbasin as of 2015, when SGMA took effect. The focus was on species that are state or federally listed as threatened, endangered or of special concern. This implicitly assumes that non-listed species will probably also be sustained if hydrologic conditions are suitable for sustaining the rarer species. The life history needs of listed bird, mammal, reptile, amphibian, and insect species were reviewed to estimate whether they have groundwater requirements beyond those needed to sustain the riparian habitat in which they live. A separate analysis was made for fish, which have flow requirements considerably different from the requirements to sustain vegetation.

References that were used to inventory and evaluate groundwater dependent animal species included the Upper Salinas River Watershed Plan (US-LTRCD, 2004), the California Department of Fish and Wildlife's (CDFW) BIOS on-line habitat map tool (https://apps.wildlife.ca.gov/bios/), critical habitat area maps for listed species prepared by the U.S. Fish and Wildlife Service (USFWS) also available on-line (https://fws.maps.arcgis.com/home/webmap/viewer.html?webmap=9d8de5e265ad4fe09893cf75b8dbfb77), several reports on steelhead trout (NMFS, 2007; Woodard, 2012; Stillwater Sciences, 2020), and interviews with Upper Salinas-Las Tablas Resource Conservation District (US-LTRCD) and National Marine Fisheries Service (NMFS) staff (Bell, 2021; Stevens and Rogers, 2021).

10.1 Invertebrates, Amphibians, Reptiles, Mammals and Birds

USFWS delineates critical habitat areas for federally listed species, and the three critical habitat areas overlapping the Subbasin are for vernal pool fairy shrimp, California red-legged frog (CRLF) and California tiger salamander. Their critical habitat areas are shown in Figure 16. A large area in the central part of the Subbasin is mapped as critical habitat for vernal pool fairy shrimp. Vernal pools are not considered GDEs in this GSP. They form for a few weeks to a few months in spring where rainfall runoff collects in depressions underlain by clay soils that allow ponding to persist. In some cases, vernal pools can receive inflow from shallow, perched aquifers covering a limited upslope area (Williamson and others, 2005). However, that supply is also seasonal and is perched over an unsaturated zone separating it from the regional groundwater system that is the focus of the GSP. Groundwater pumping from the regional aquifer does not impact vernal pools or adjacent perched aquifers. The critical habitat area for California tiger salamander overlaps a tiny part of the far eastern edge of the subbasin. Tiger salamanders are a primarily upland species, but they lay eggs in vernal pools. Thus, they are not considered a groundwater dependent species.

The mapped critical habitat area for CRLF also overlies a small part of the eastern edge of the Subbasin. That area is a hilly region far from significant amounts of groundwater pumping, which mostly occurs in agricultural areas. Thus, the handful of springs that might be used by frogs in that region are very unlikely to be depleted by groundwater pumping. The potential for suitable CRLF habitat in the Subbasin exceeds the mapped critical habitat area. The Upper Salinas River Watershed Plan (Plan) noted that the frogs are present along the Salinas River near Paso Robles and in Atascadero Creek. The surface flow requirements for CRLF are shallow, slow-moving water with emergent vegetation, with flow persisting at least to mid-summer to provide enough time for the tadpoles to metamorphose. These flow conditions could plausibly be met along the Salinas River—especially close to Paso Robles—and possibly some locations along San Juan Creek. Thus, groundwater pumping that depletes base flow and in-channel wetland habitat probably decreases CRLF habitat.

The Plan asserts that a number of other species dependent on riparian habitat are present in the upper Salinas River watershed, but in some cases the BIOS database does not show the Subbasin as being within the range of that species or possessing suitable habitat. These include Arroyo toad and Swainson's hawk. Western pond turtle is a listed species that has been found in the canyon reach of the Salinas River below Salinas Dam. However, it requires channel and flow conditions not present in stream reaches overlying the Subbasin. The turtle needs deep, slow-moving perennial pools with boulders or large woody debris. The wide, gravelly channels with intermittent flow in the Subbasin area would not be suitable for Western pond turtle. The Plan also mentions Least Bell's vireo, but the Subbasin does not contain critical habitat for that species, and expanses of dense willows preferred by the bird are generally not present in the Subbasin.

10.2 Fish

The Plan states that four native fish species are present in the upper Salinas River watershed: Sacramento sucker, hitch, three spine stickleback and southern steelhead. All of these require clear, cold, perennial flow for spawning and rearing, and those conditions are present only in the upper reaches of the Salinas River and its tributaries. Those locations are far from groundwater pumping intense enough to materially affect flow. Unlike the other three species, southern steelhead is anadromous and does migrate seasonally up and down stream reaches that cross the Subbasin.

Steelhead require a minimum amount of flow to swim along a stream channel. This minimum passage flow is defined by the minimum required width and depth of flow at the shallowest point along the channel reach, which is called the “critical riffle”. At the critical riffle, the water must be at least 0.7 foot deep for adult steelhead up-migration and cover at least 25 percent of the channel width. For out-migrating smolts, the minimum depth is 0.3 foot (Woodard, 2012). The only stream channel in the Subbasin used for migration by steelhead is the Salinas River, which the fish traverse to reach spawning areas in tributaries farther upstream: Graves, Santa Rita, Atascadero and Santa Margarita Creeks, which enter the river in the Atascadero Subbasin (Stillwater Sciences, 2020). No study has been done to identify the critical riffle along the Subbasin reach of the Salinas River or to estimate the passage flow associated with it (Stevens and Rogers, 2021; Bell, 2021). A reasonable estimate would be the minimum passage flow at Bradley (9 miles downstream of the Subbasin), which the National Marine Fisheries Service estimated at 300-380 cfs in the biological opinion prepared for the Salinas River Water Project (NMFS 2007). Sections of the Salinas River channel between Paso Robles and the Nacimiento River confluence are at least as wide and gravelly as the channel at Bradley.

The lowest flows along the Subbasin reach of the Salinas River are largely protected by the “live stream” requirement in the water rights permit for Salinas Dam. That requirement was first imposed in 1952 and allows Salinas River flow to be diverted to storage behind Salinas Dam (in Santa Margarita Lake) only when there is continuous flow in the Salinas River from the dam to the confluence with the Nacimiento River (SWRCB, 1982). The purpose of this condition on the water right permit was to ensure that the needs of downstream users with prior rights were being met, including groundwater users pumping from the underflow of the river. It was assumed that as long as continuous flow was present, the river was replenishing the underflow at a rate sufficient to meet those needs. The live stream requirement is implemented by visually inspecting Salinas River flow at nine bridge crossings between Salinas Dam and the Nacimiento River. When one or more locations has zero flow, live stream conditions are not met and diversions to storage must cease. At that point, all inflows to Santa Margarita Lake are passed through Salinas Dam to the downstream reach of the river. San Luis Obispo County staff conduct the “live stream” observations, and records since 2011 show that flow at the Paso Robles gage on the day live stream conditions ended was on average 5.5 cfs. This means a very small flow at Paso Robles was able to maintain continuous flow all the way across the Subbasin. This confirms the ISW conceptual model assertion that Salinas River inflows are generally able to sustain high water table elevations in the alluvium along the river, such that percolation losses are small at the time flow recession in spring eventually becomes discontinuous.

The live stream requirement is reasonably protective of groundwater users and riparian vegetation, but not necessarily of fish passage. If there were 300 cfs of inflow to Santa Margarita Lake during the steelhead migration season, only a few cfs would need to be released to sustain live flow to the Nacimiento River. Thus, the diversion to storage would eliminate the passage opportunity unless tributary inflows below the dam were sufficient to provide it.

Groundwater pumping would not plausibly decrease the duration of steelhead passage flows along the Subbasin reach of the Salinas River. This is because the shallow clay layers beneath the river alluvium greatly diminish the ability of deeper wells (in the Paso Robles Formation) from lowering alluvial groundwater levels and depleting river flow. This is borne out by the alluvial well hydrographs, which show steady water table elevations near the river bed elevation in all years and seasons except when large droughts substantially diminish Salinas River inflows to the Subbasin reach.

Even without the clay layers, groundwater pumping would not likely diminish passage opportunity to a significant degree because the high flows required for passage tend to recede quickly anyway. Suppose, for example, that 10,000 AFY of the 26,900 AFY of stream recharge simulated in the groundwater model were from the Salinas River and all of the percolation resulted from pumping-induced percolation, it would be equivalent to 13.8 cfs of flow depletion. That depletion would only affect passage opportunity when flow is between the minimum passage flow and 13.8 cfs greater than that flow. If flows were higher than that range, passage would still be possible even with the depletion. If flows were lower, passage would not have been possible anyway. Assuming a minimum passage flow of 300 cfs, which is the low end of the estimated range at Bradley, the depletion would only affect passage opportunity when flow is 300-313.8 cfs. Thirty-six flow event recession rates during 1970-2019 were evaluated, and the average time during which flow was in that range averaged 8 hours (minimum = 1 hour; maximum = 34 hours). These results are illustrated in Figure 17. A flow event duration of two days would probably be needed for steelhead to traverse the reach from the Nacimiento River to Paso Robles, based on the 5-day estimate for swimming upstream from Monterey Bay to Bradley (NMFS, 2007). Almost all flow events with flows greater than 300 cfs were above 300 cfs for at least two days. This simplified passage analysis did not account for downstream flow conditions such as releases from Nacimiento and San Antonio Reservoirs to meet the NMFS flow prescription for steelhead, or concurrent Arroyo Seco flows or whether the beach barrier between the Salinas River lagoon and Monterey Bay is open or closed. Those factors would likely decrease the height of the blue bars somewhat. Nevertheless, even under this unrealistically worst-case scenario, the impact of flow depletion on steelhead passage opportunity would usually be a few hours. Although this would be detrimental, it would not likely result in a significant decrease in long-term reproductive success.

To summarize the analysis of GDE animals, it appears that sustainability criteria that would be protective of riparian vegetation and wetlands would be protective of the animal species that use those habitats. Any impact of groundwater pumping on steelhead passage opportunity appears to be negligibly small.

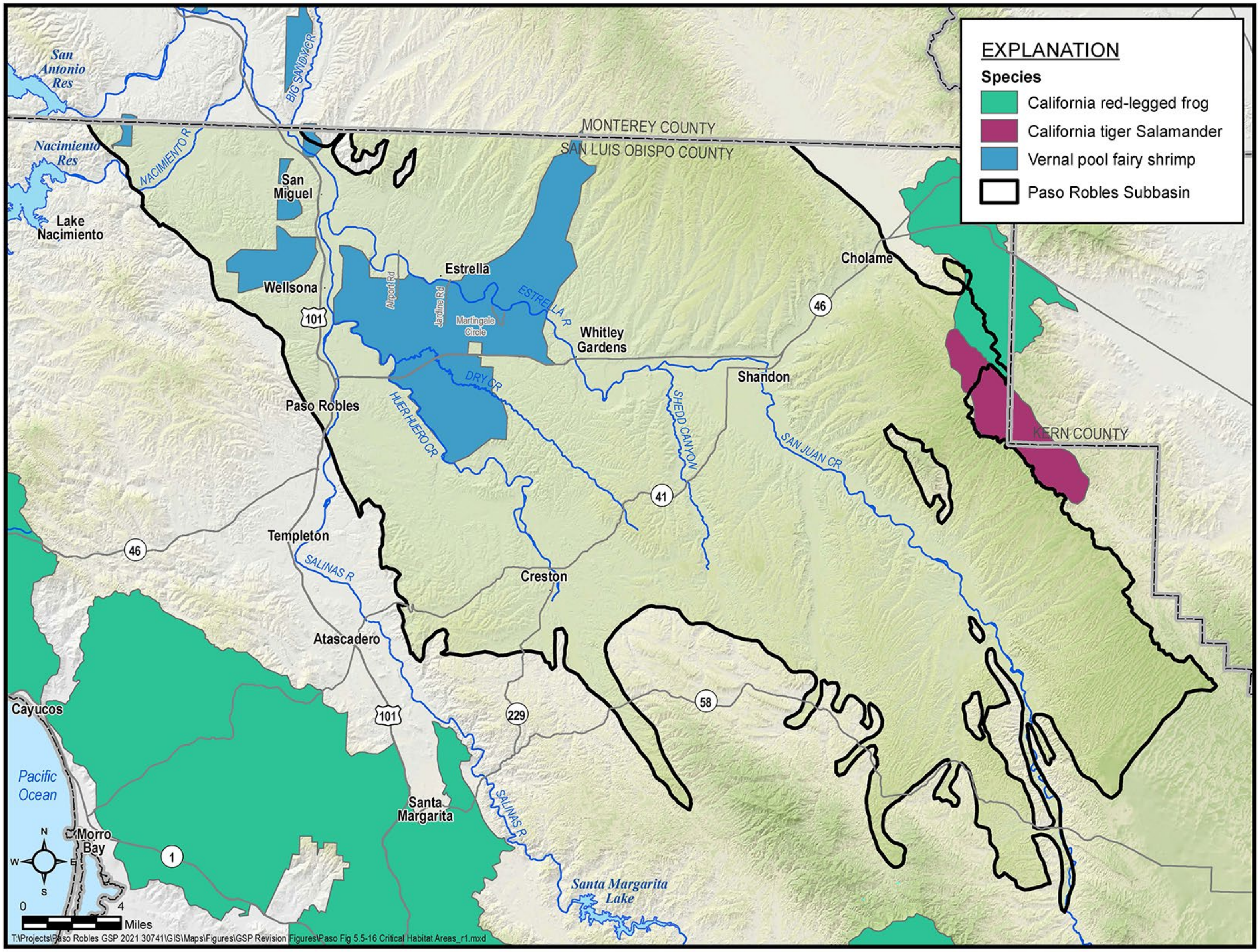


Figure 16. Critical Habitat Areas

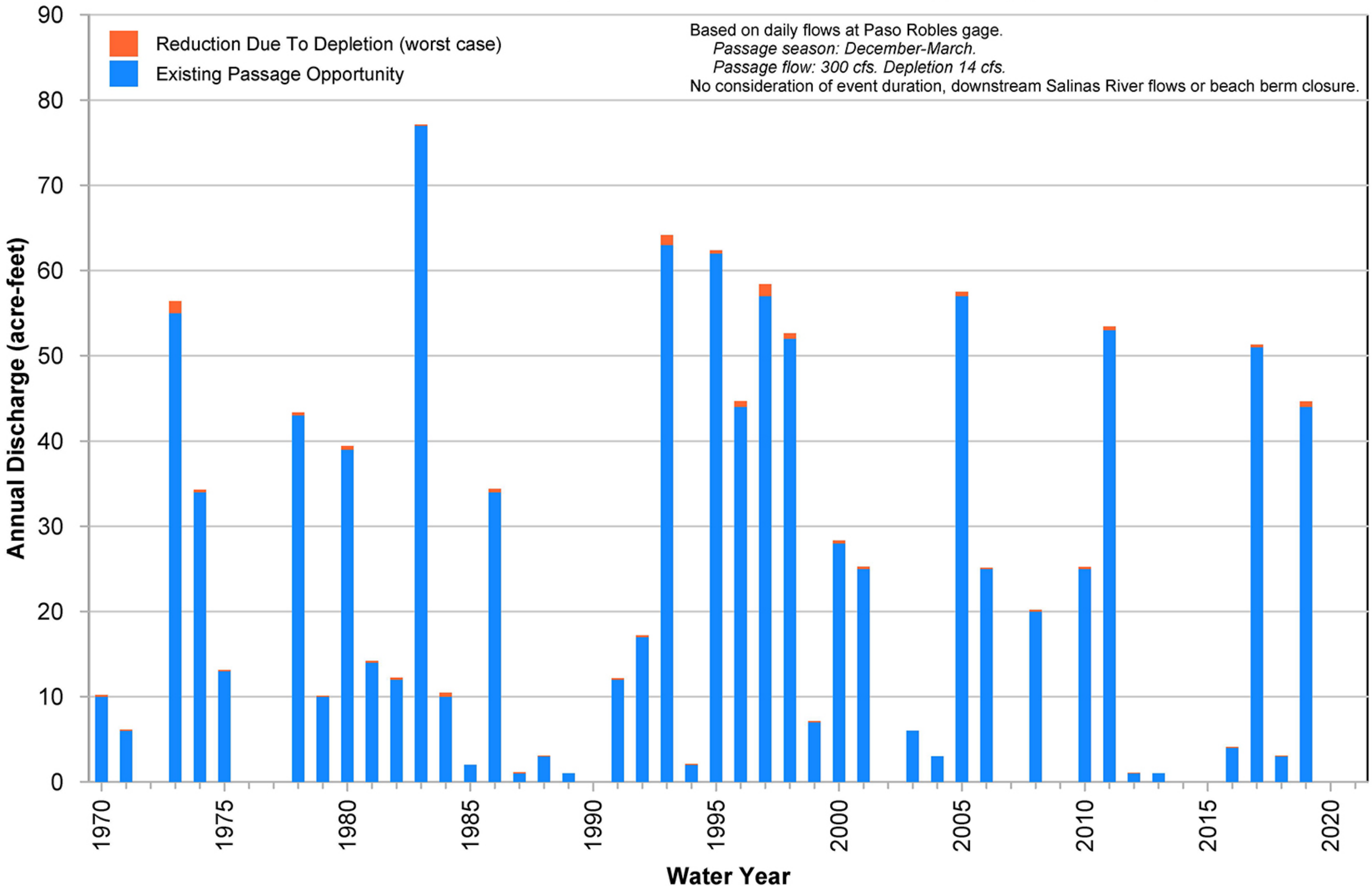


Figure 17. **Simplified Steelhead Passage Opportunity, Salinas River**

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Water Solutions, Inc.

TECHNICAL MEMORANDUM

Paso Robles Basin Riparian Health Trend Analysis as an Indicator of SW-GW Interaction

To: Blaine Reely, Groundwater Sustainability Director, County of San Luis Obispo

From: Nate Page, GSI Water Solutions, Inc.

Dave O'Rourke, GSI Water Solutions, Inc.

Attachments: Attachment A: Enhanced Vegetation Index Trend Analyses – Riparian Areas, Paso Robles Basin

Date: April 22, 2022

1. Introduction

GSI Water Solutions (GSI) was retained by the County of San Luis Obispo Groundwater Sustainability Director to perform an Enhanced Vegetation Index (EVI) trend analysis of riparian vegetation communities within the Paso Robles Groundwater Basin (Basin). The purpose of this analysis is to identify and evaluate trends in riparian vegetation health as an indicator of potential long-term trends in surface water-groundwater interactions.

2. Methods

An Enhanced Vegetation Index (EVI) analysis was completed for riparian vegetation areas in the Basin using Landsat data processed in Climate Engine[1]. EVI data provides an indicator of healthy, well-watered vegetation. It is calculated from the proportions of visible and near-infrared sunlight reflected by vegetation. EVI values typically range from zero to over 0.7. Healthy, or well-watered, vegetation absorbs most of the visible light that hits it and reflects a large portion of near-infrared light, resulting in a high EVI value. Unhealthy, dry, or dormant vegetation reflects more visible light and less near-infrared light, leading to a lower EVI value.

The EVI analysis was constrained to areas identified by Todd Groundwater (Todd) as 'sparse' and 'dense' riparian areas[2]. The sparse and dense riparian areas were each split up into subareas and each subarea was analyzed separately. The locations of each subarea are presented on Figure 1 and listed in Table 1.

[1] Climate Engine (Huntington et al., 2017) is an online tool for cloud computing of climate and remote sensing data powered by Google Earth Engine (Gorelick et al., 2017) (https://app.climateengine.org/climateEngine)
[2] As presented in Figure 5-16 of the draft revisions to Paso Robles Basin GSP Section 5.5 Interconnected Surface Water.

Table 1. EVI Analysis Subareas

Sparse Riparian	Dense Riparian
Salinas River	Salinas River
Estrella River upstream of Whitley Gardens	Estrella River upstream of Whitley Gardens
Estrella River downstream of Whitley Gardens	Estrella River downstream of Whitley Gardens
San Juan Creek	San Juan Creek
Creston (Huer Huero Creek)	

The EVI analyses for each riparian subarea were processed in Climate Engine using Landsat data from January 2009 through present. This analysis period is considered representative of recent hydrologic conditions as it begins and ends with similar hydrologic conditions and includes dry, wet, and average periods. Importantly, this analysis period captures the severe drought years of 2013 and 2014 and includes the period since the January 2015 Sustainable Groundwater Management Act (SGMA) date of compliance. EVI results are based on daily statistical mean EVI values calculated over the analysis area for each day the satellites were overhead (approximately once every 8 days).

3. Results and Discussion

Key Findings:

- EVI values typically vary seasonally with observed annual minimums and maximums correlating strongly with water year type (i.e., wet, dry, normal),
- 'Dense' riparian areas; each EVI trend analysis shows a slightly increasing trend in EVI values over the analysis period,
- 'Sparse' riparian areas; all but one EVI trend analysis show a slightly increasing trend in EVI values over the analysis period,
    - The one exception, 'sparse' Creston area, shows essentially a flat/stable trend over the analysis period
- These stable to slightly increasing EVI trends indicate stable to slightly increasing riparian vegetation health within the identified riparian areas over the long-term.

The results of each EVI trend analysis are presented graphically in Attachment A. The graphs include total monthly precipitation recorded at the Paso Robles station (NOAA 46730) to facilitate comparison between EVI and water year type. In general, winters with higher precipitation totals correlate with higher EVI values during the following dry season. Conversely, winters with lower precipitation totals, including the exceptionally dry winters of 2013 and 2014, are generally followed by below normal dry season EVI values.

Without exception, riparian vegetation health, as indicated by EVI, recovers to 2009-2010 levels in the years following 2014. Even in the flat trend 'sparse' Creston analysis area, EVI values appear to recover to 2010 levels by 2019. These patterns show that while riparian vegetation health may decline during drought it fully recovers during subsequent wet/normal water years. The results of this study indicate that riparian vegetation health has remained stable over the analysis period and may in fact be slightly increasing throughout the majority of the 'sparse' and 'dense' riparian areas in the Basin. This stability of riparian vegetation health suggests that alluvial groundwater levels have remained consistently within the rooting zone depth of the established riparian vegetation in the analysis areas. These results also suggest that water levels in the alluvial aquifer supporting these established riparian communities have not been affected by long-term declining water levels induced by groundwater pumping in the underlying Paso Robles Formation Aquifer.

4. Conclusions

GSI performed an EVI trend analysis of riparian vegetation communities within the Basin for the purpose of identifying and evaluating trends in riparian vegetation health as an indicator of potential long-term trends in surface water-groundwater interactions within reaches of the adjacent streams. The results of this study indicate that riparian vegetation health has generally remained stable to slightly increasing over the analysis period suggesting that alluvial groundwater levels have remained consistently within the rooting zone depth of the established riparian communities. The patterns of increasing and decreasing riparian vegetation health typically vary seasonally with annual minimums and maximums correlating strongly with water year type. These observations indicate that water levels in the alluvial aquifer are independent from the long-term declining water levels induced by groundwater pumping in the underlying Paso Robles Formation Aquifer. This suggests the presence of a clay layer at the base of the alluvial aquifer supporting these riparian communities. Based on the results of this study there does not seem to be any long-term trend in surface water-alluvial aquifer groundwater interactions within the Basin. Further investigations are required to evaluate any potential surface water-groundwater interactions with the Paso Robles Formation Aquifer.

FIGURES

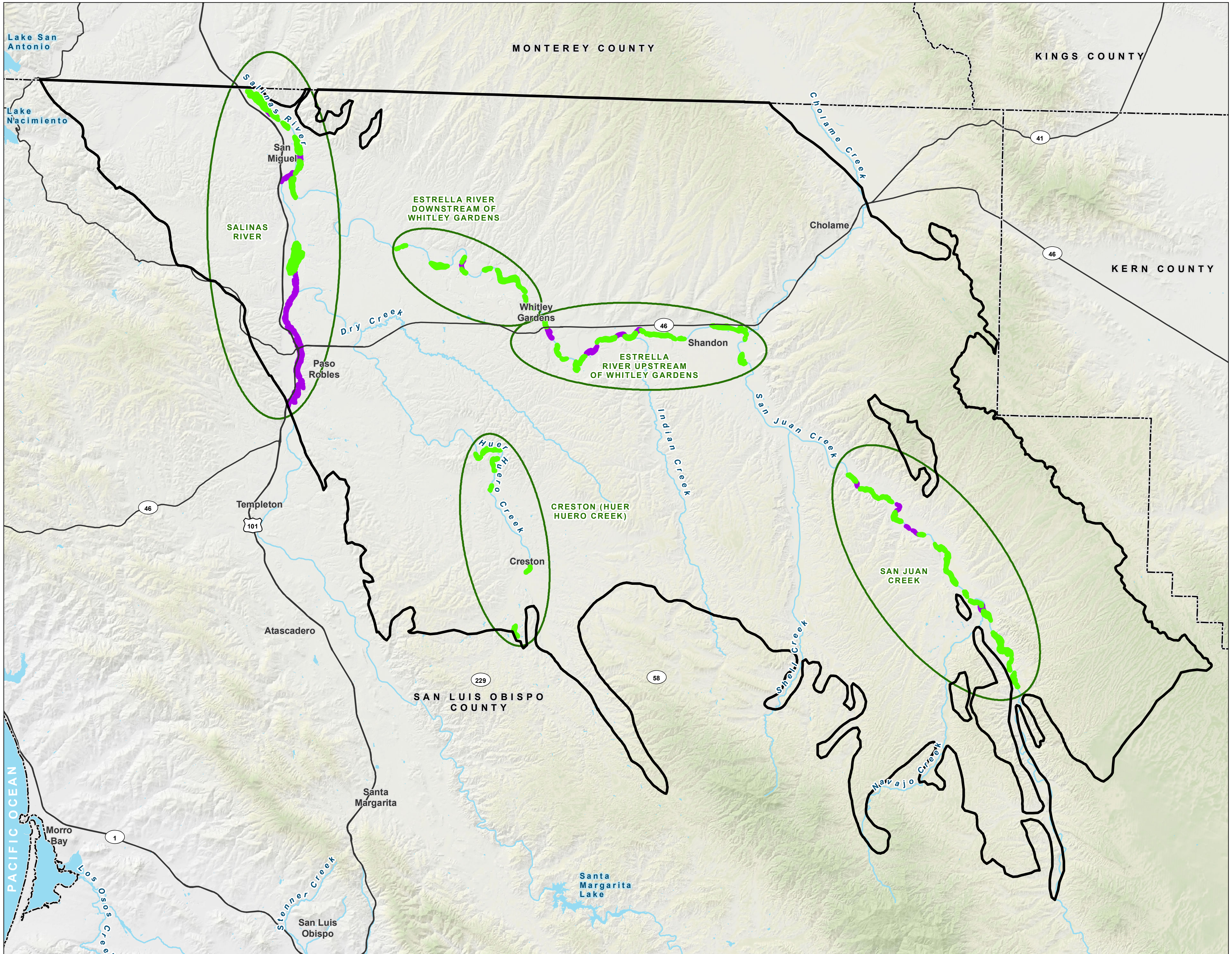


FIGURE 1

Riparian EVI Analysis Subareas

Paso Robles Basin
Riparian Health Trend Analysis
as an Indicator of
SW-GW Interaction

LEGEND

- Sparse Riparian Area
- Dense Riparian Area
- Riparian Subarea

All Other Features

- Paso Robles Subbasin
- County Boundary
- Major Road

N

0 10,000 20,000 30,000
Feet

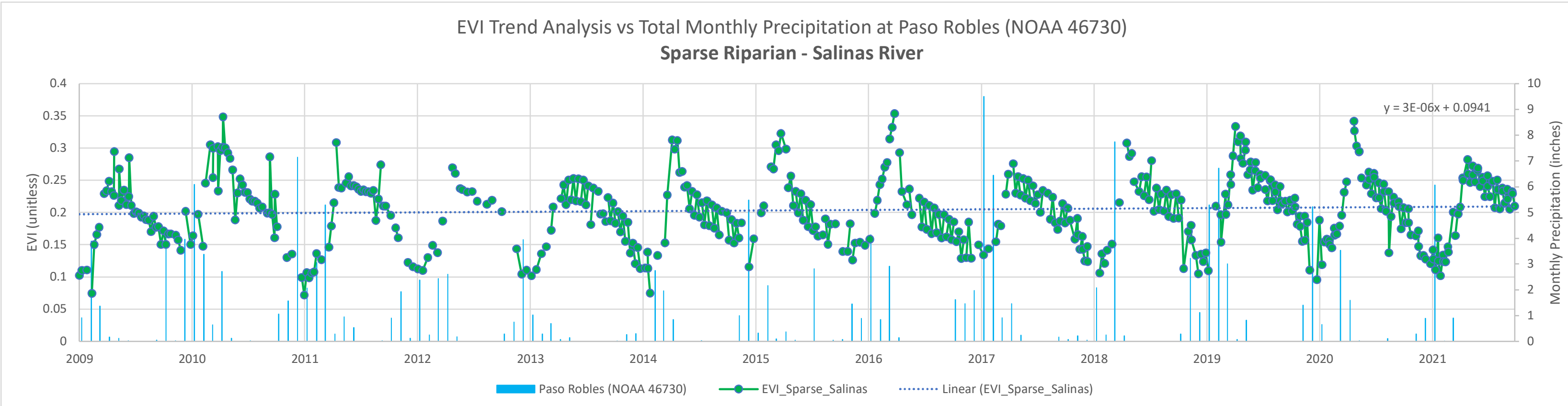
Date: April 25, 2022
Data Sources: CA DWR, SLO Co., City of Paso Robles, USGS

Water Solutions, Inc.

ATTACHMENT A

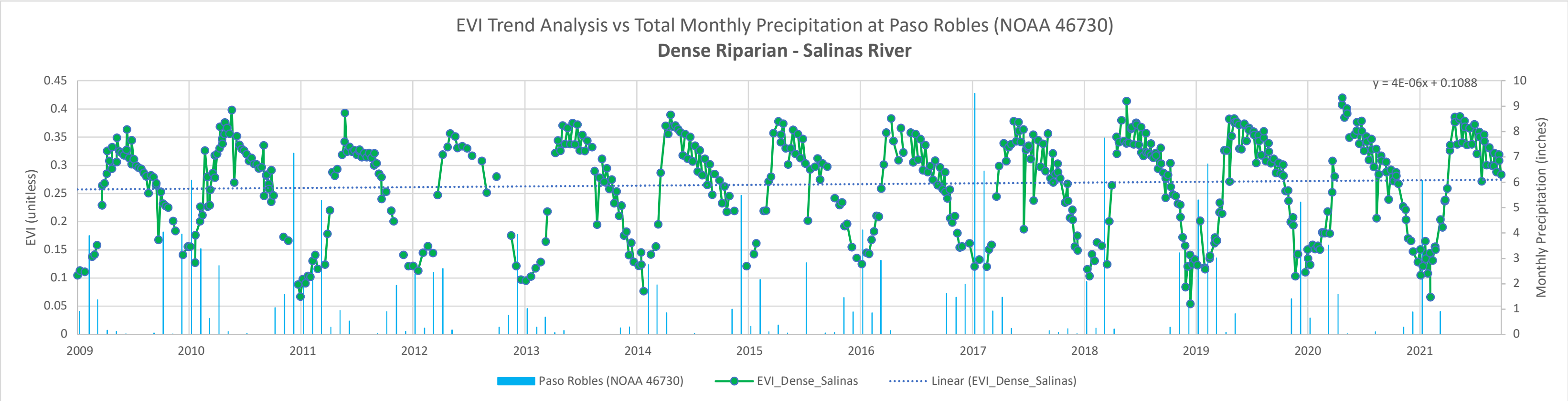
Enhanced Vegetation Index Trend Analyses

Riparian Areas - Paso Robles Basin

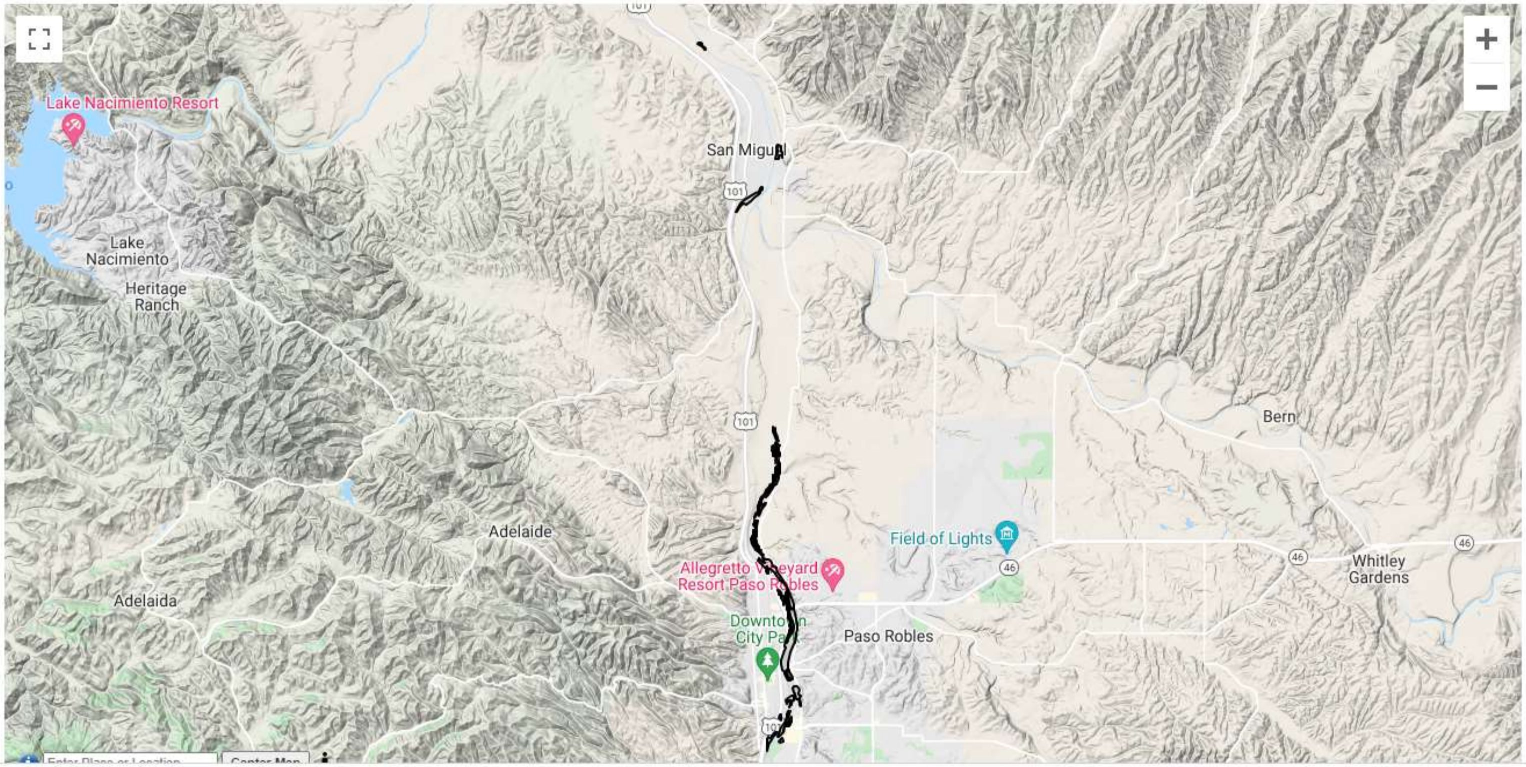


EVI Trend Analysis vs Total Monthly Precipitation at Paso Robles (NOAA 46730)
Sparse Riparian - Salinas River
EVI (unitless)
Monthly Precipitation (inches)
y = 3E-06x + 0.0941
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
Paso Robles (NOAA 46730)
EVI_Sparse_Salinas
Linear (EVI_Sparse_Salinas)

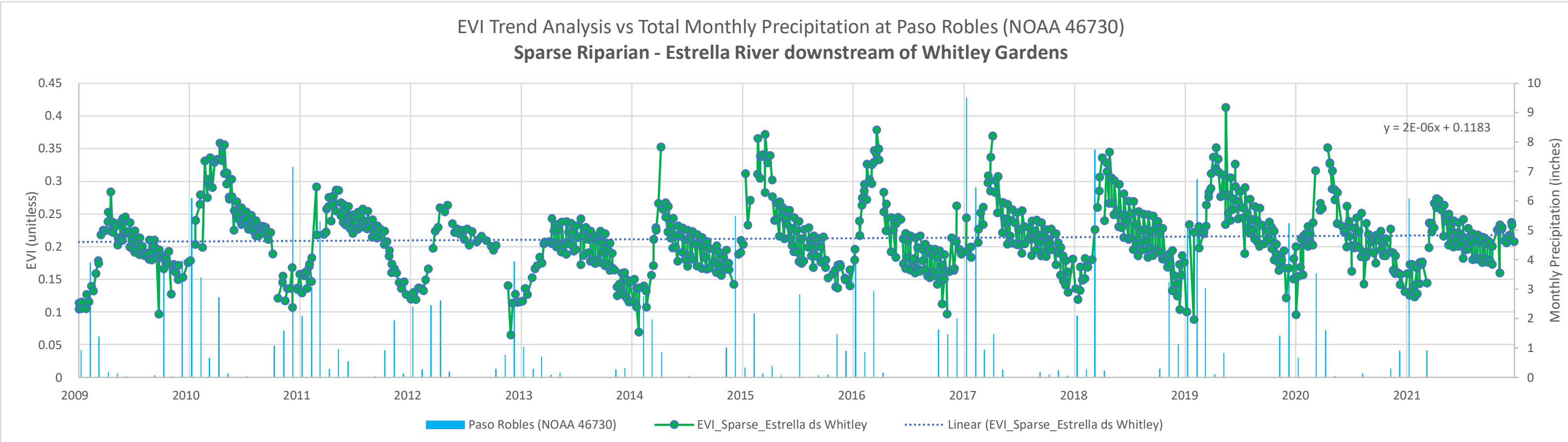
Nacimiento
Work Family Guest Ranch
Lake Nacimiento Resort
San Miguel
Lake Nacimiento
Heritage Ranch
Bern
Adelaide
Field of Lights
Whitley

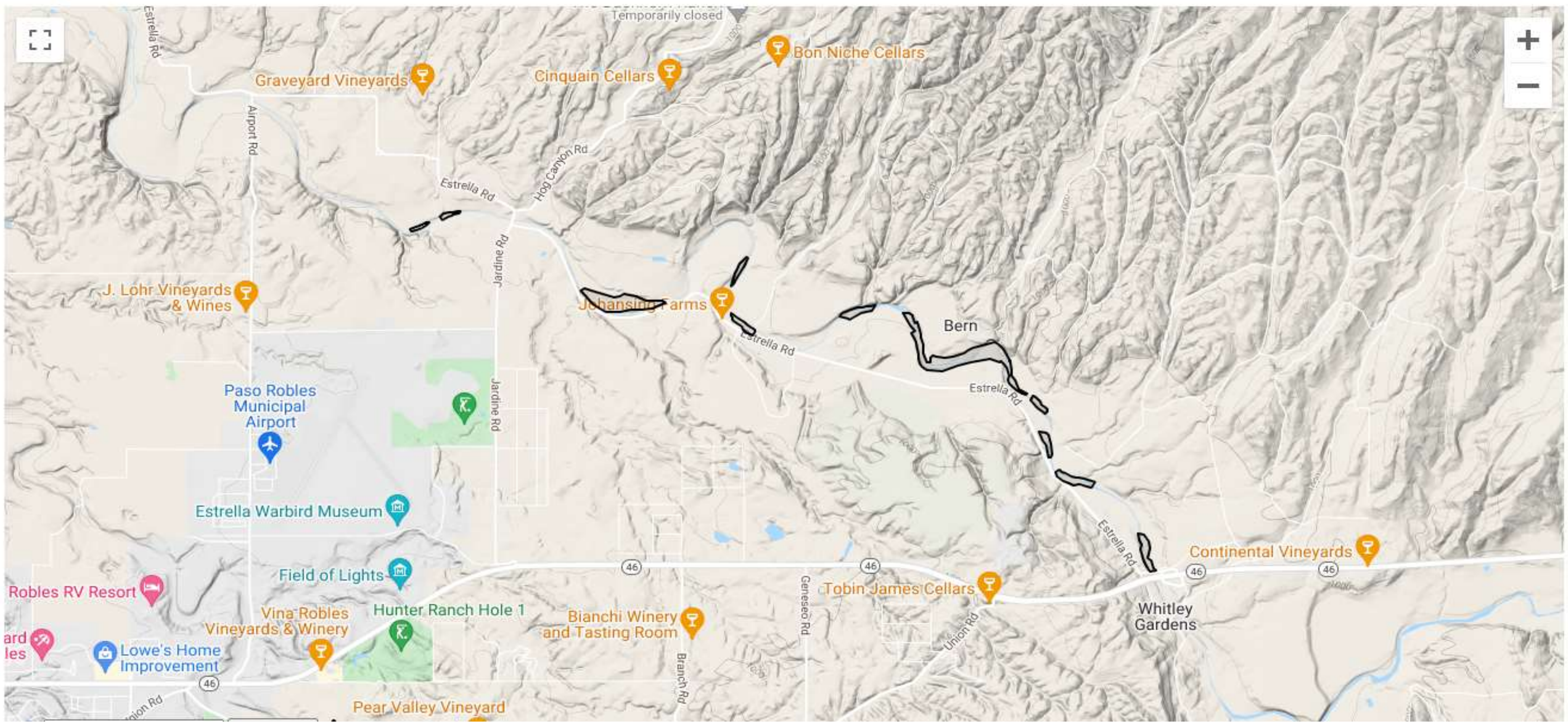


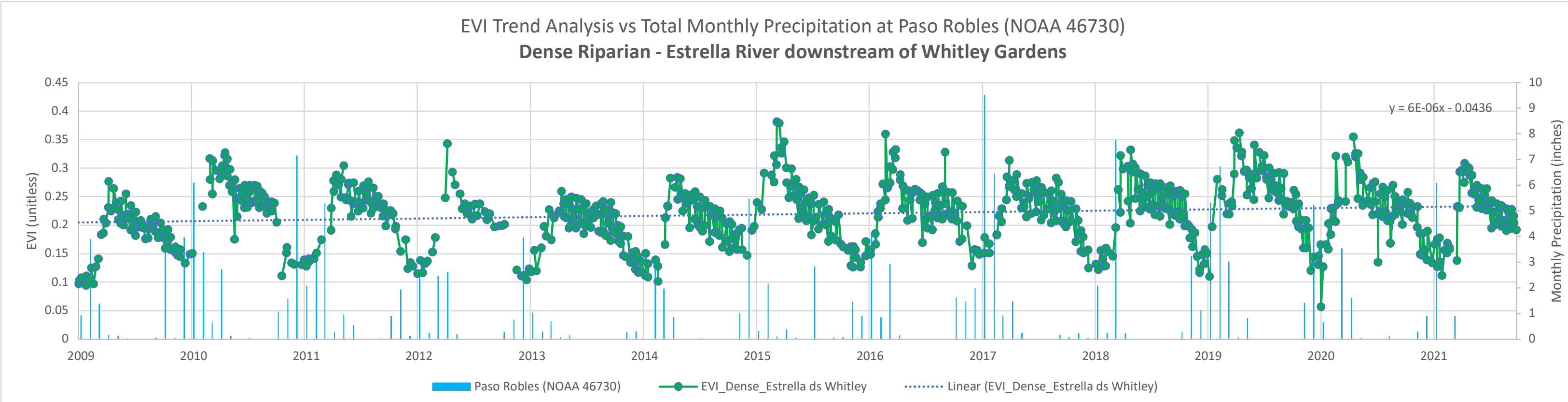
EVI Trend Analysis vs Total Monthly Precipitation at Paso Robles (NOAA 46730)
Dense Riparian - Salinas River
y = 4E-06x + 0.1088
EVI (unitless)
Monthly Precipitation (inches)
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
10
9
8
7
6
5
4
3
2
1
0
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
Paso Robles (NOAA 46730)
EVI_Dense_Salinas
Linear (EVI_Dense_Salinas)



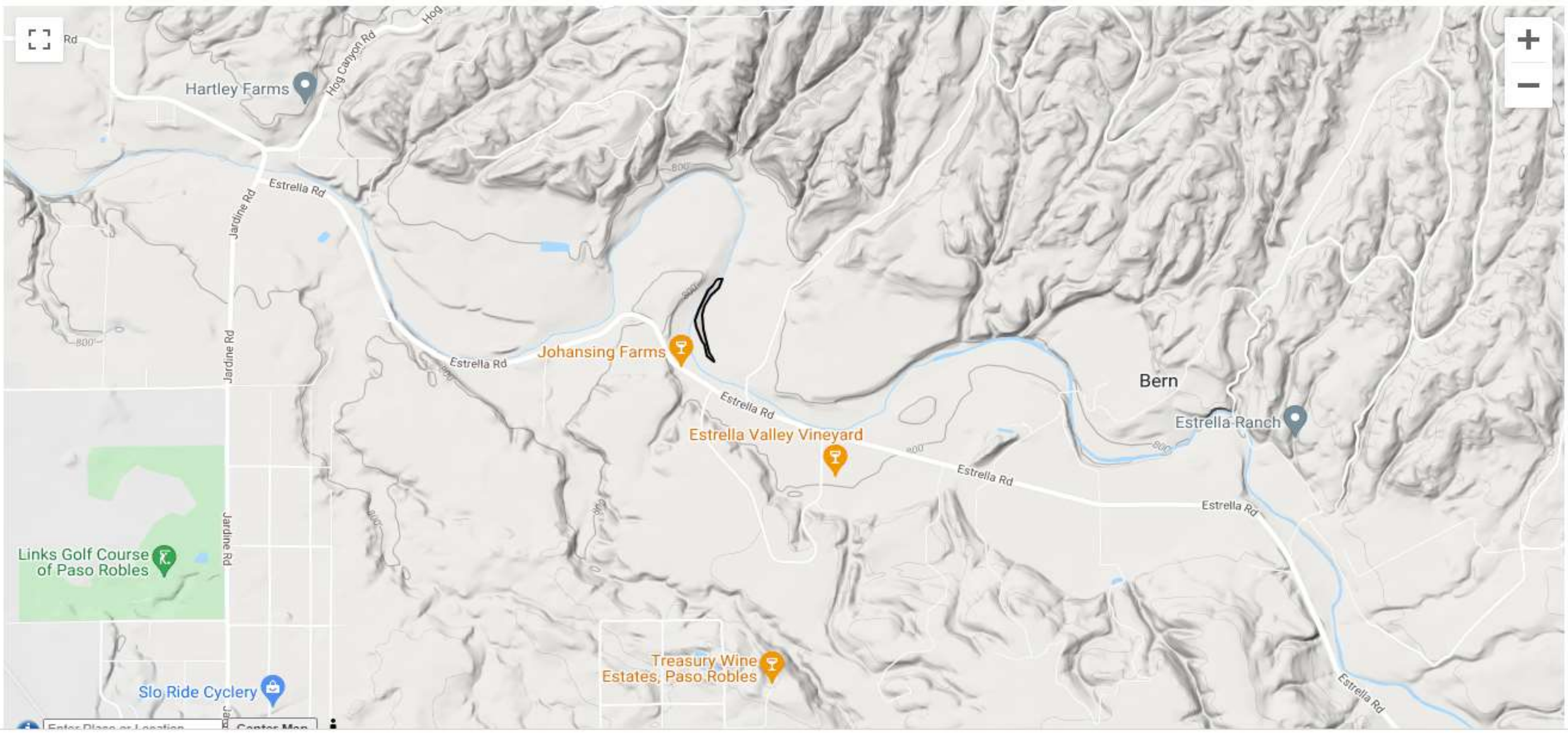
Lake Nacimiento Resort
Lake Nacimiento
Heritage Ranch
San Miguel
101
Bern
Adelaide
Adelaida
Field of Lights
46
Allegretto Vineyard Resort Paso Robles
Downtown City Park
Paso Robles
Whitley Gardens


EVI Trend Analysis vs Total Monthly Precipitation at Paso Robles (NOAA 46730)
Sparse Riparian - Estrella River downstream of Whitley Gardens
EVI (unitless)
Monthly Precipitation (inches)
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
10
9
8
7
6
5
4
3
2
1
0
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
y = 2E-06x + 0.1183
Paso Robles (NOAA 46730)
EVI_Sparse_Estrella ds Whitley
Linear (EVI_Sparse_Estrella ds Whitley)

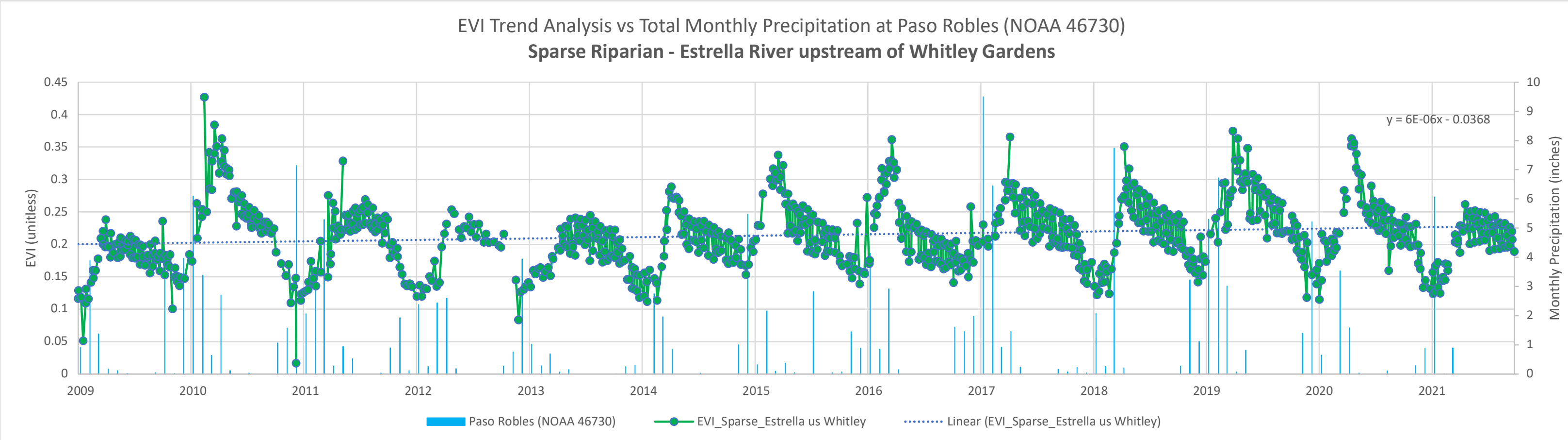

Temporarily closed
Bon Niche Cellars
Graveyard Vineyards
Cinquain Cellars
Estrella Rd
Airport Rd
Hog Canyon Rd
Jardine Rd
J. Lohr Vineyards & Wines
Johansing Farms
Bern
Estrella Rd
Paso Robles Municipal Airport
Estrella Warbird Museum
Field of Lights
Robles RV Resort
Vina Robles Vineyards & Winery
Hunter Ranch Hole 1
Bianchi Winery and Tasting Room
Tobin James Cellars
Continental Vineyards
Whitley Gardens
Lowe's Home Improvement
Pear Valley Vineyard
Geneseo Rd
Union Rd
Branch Rd
46

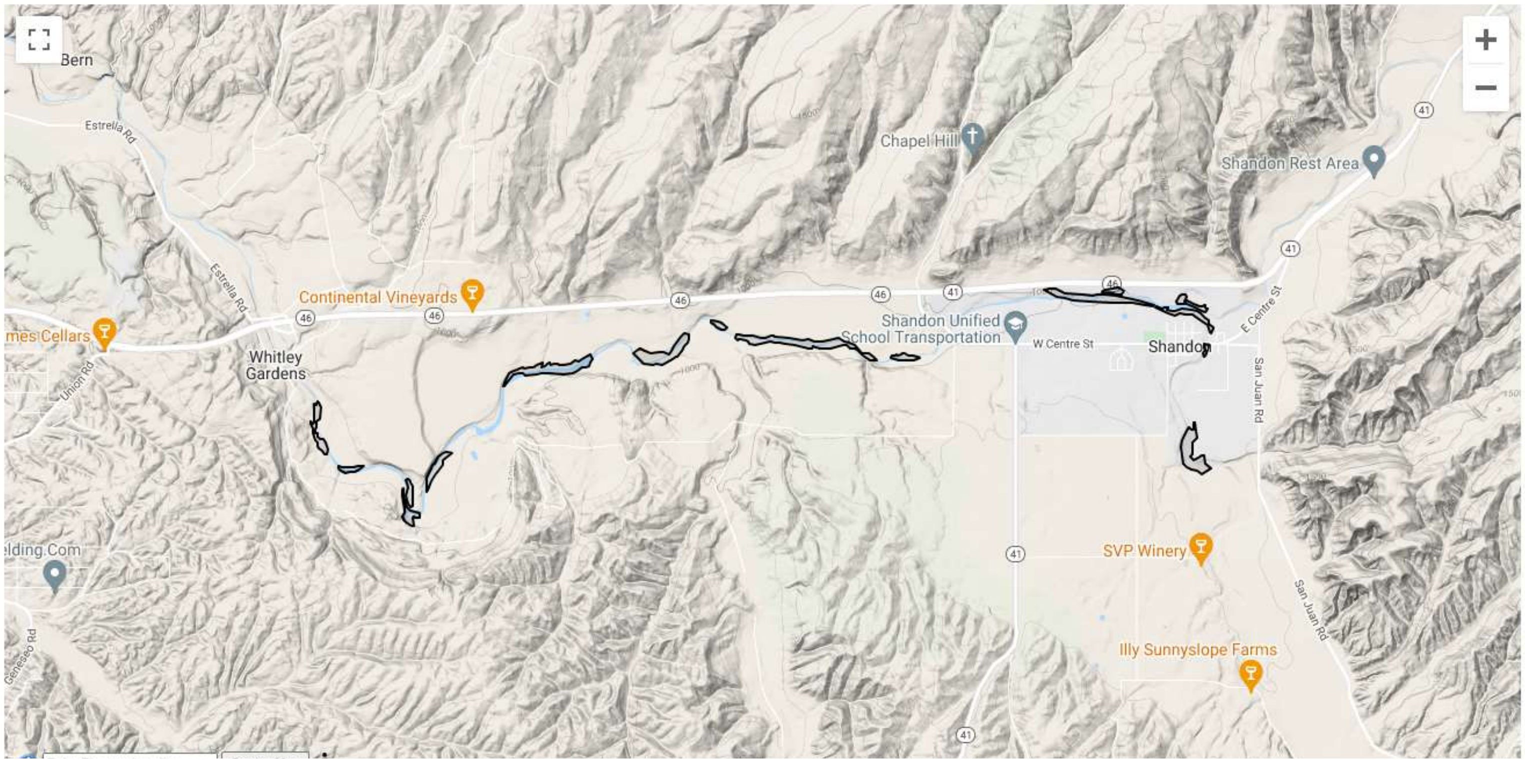


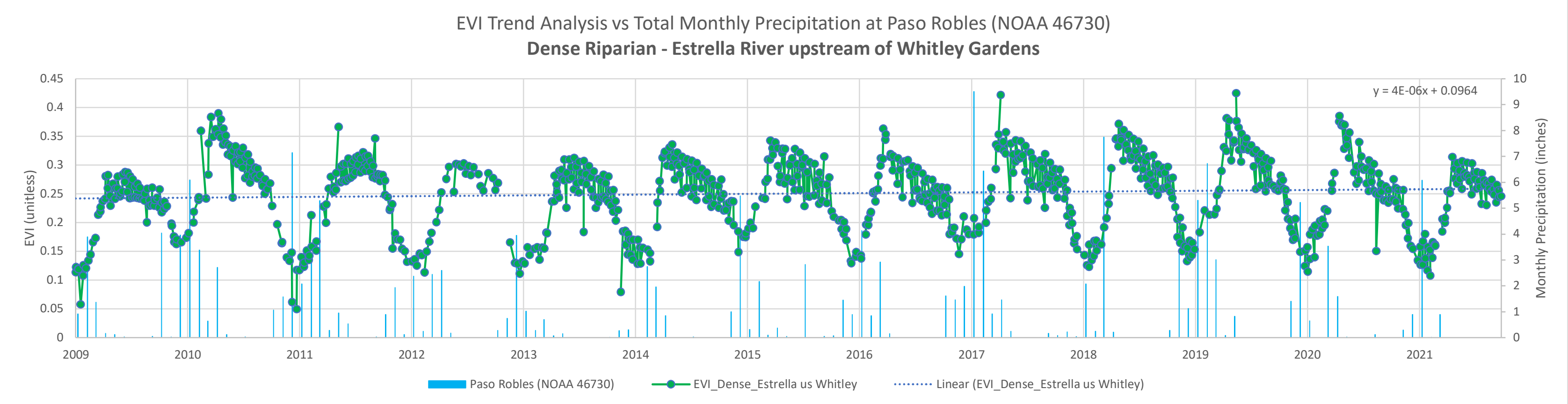
EVI Trend Analysis vs Total Monthly Precipitation at Paso Robles (NOAA 46730)
Dense Riparian - Estrella River downstream of Whitley Gardens
EVI (unitless)
Monthly Precipitation (inches)
y = 6E-06x - 0.0436
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
10
9
8
7
6
5
4
3
2
1
0
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
Paso Robles (NOAA 46730)
EVI_Dense_Estrella ds Whitley
Linear (EVI_Dense_Estrella ds Whitley)



Hartley Farms
Hog Canyon Rd
Estrella Rd
Jardine Rd
Johansing Farms
Estrella Valley Vineyard
Bern
Estrella Ranch
Links Golf Course of Paso Robles
Slo Ride Cyclery
Treasury Wine Estates, Paso Robles


EVI Trend Analysis vs Total Monthly Precipitation at Paso Robles (NOAA 46730)
Sparse Riparian - Estrella River upstream of Whitley Gardens
EVI (unitless)
Monthly Precipitation (inches)
y = 6E-06x - 0.0368
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
10
9
8
7
6
5
4
3
2
1
0
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
Paso Robles (NOAA 46730)
EVI_Sparse_Estrella us Whitley
Linear (EVI_Sparse_Estrella us Whitley)

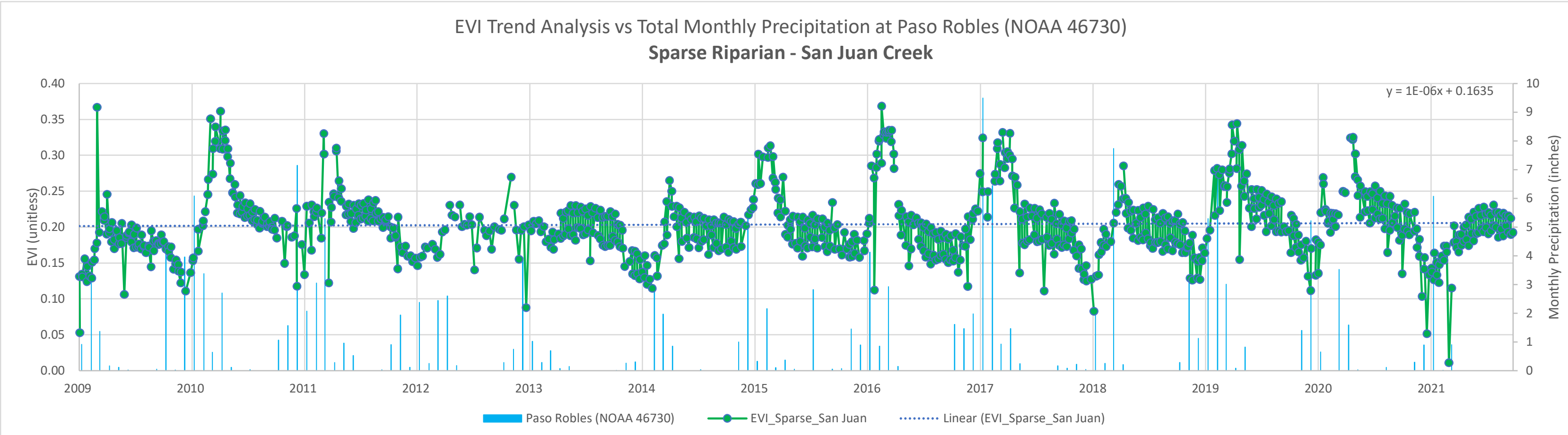

Bern
Estrella Rd
Chapel Hill
Shandon Rest Area
Continental Vineyards
mes Cellars
Whitley
Gardens
Shandon Unified
School Transportation
W Centre St
Shandon
E Centre St
San Juan Rd
SVP Winery
Illy Sunnyslope Farms
lding.Com
Union Rd
Estrella Rd
46
41



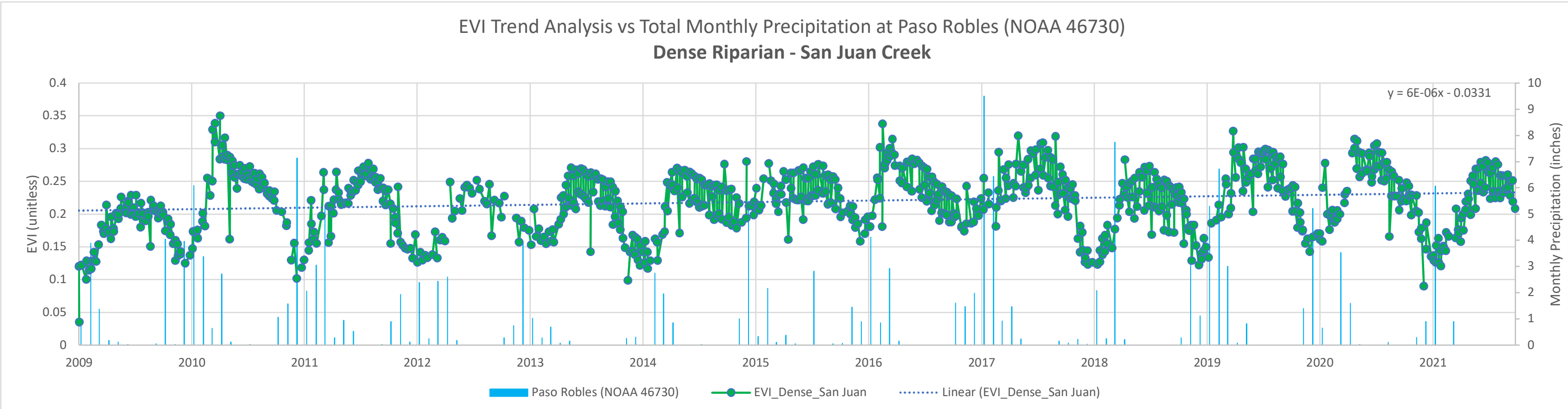
EVI Trend Analysis vs Total Monthly Precipitation at Paso Robles (NOAA 46730)
Dense Riparian - Estrella River upstream of Whitley Gardens
y = 4E-06x + 0.0964
EVI (unitless)
Monthly Precipitation (inches)
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
10
9
8
7
6
5
4
3
2
1
0
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
Paso Robles (NOAA 46730)
EVI_Dense_Estrella us Whitley
Linear (EVI_Dense_Estrella us Whitley)

Estrella Rd
Haley Land & Livestock
Green River Mutual Water
Continental Vineyards
Clevenger Cattle
Whitley Gardens
Bootjack Ranch
46

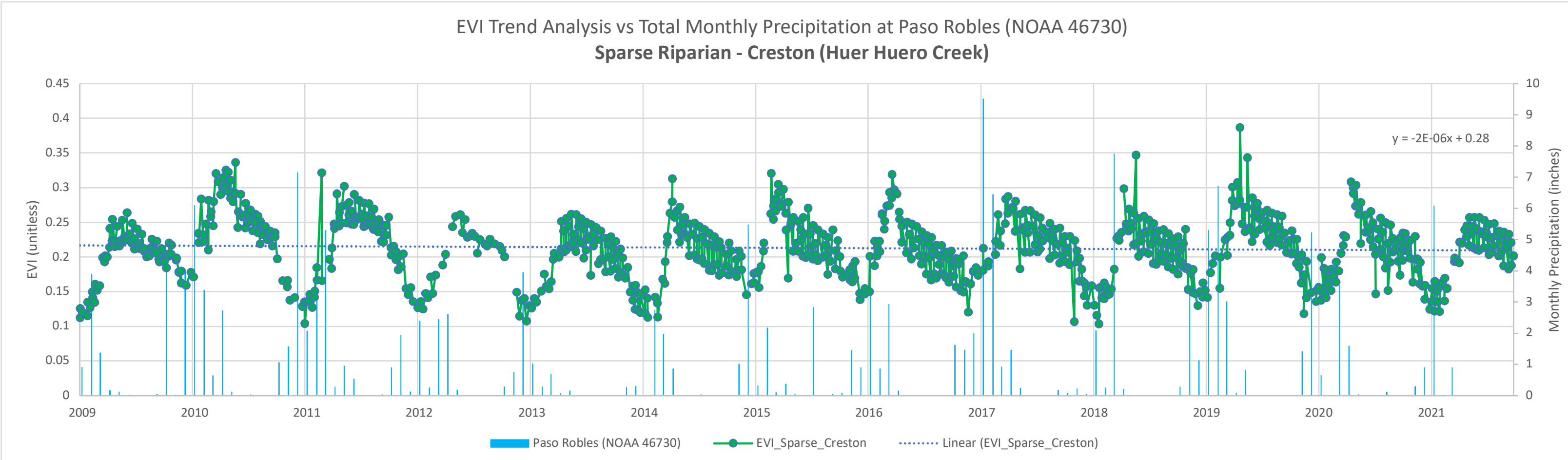
ip

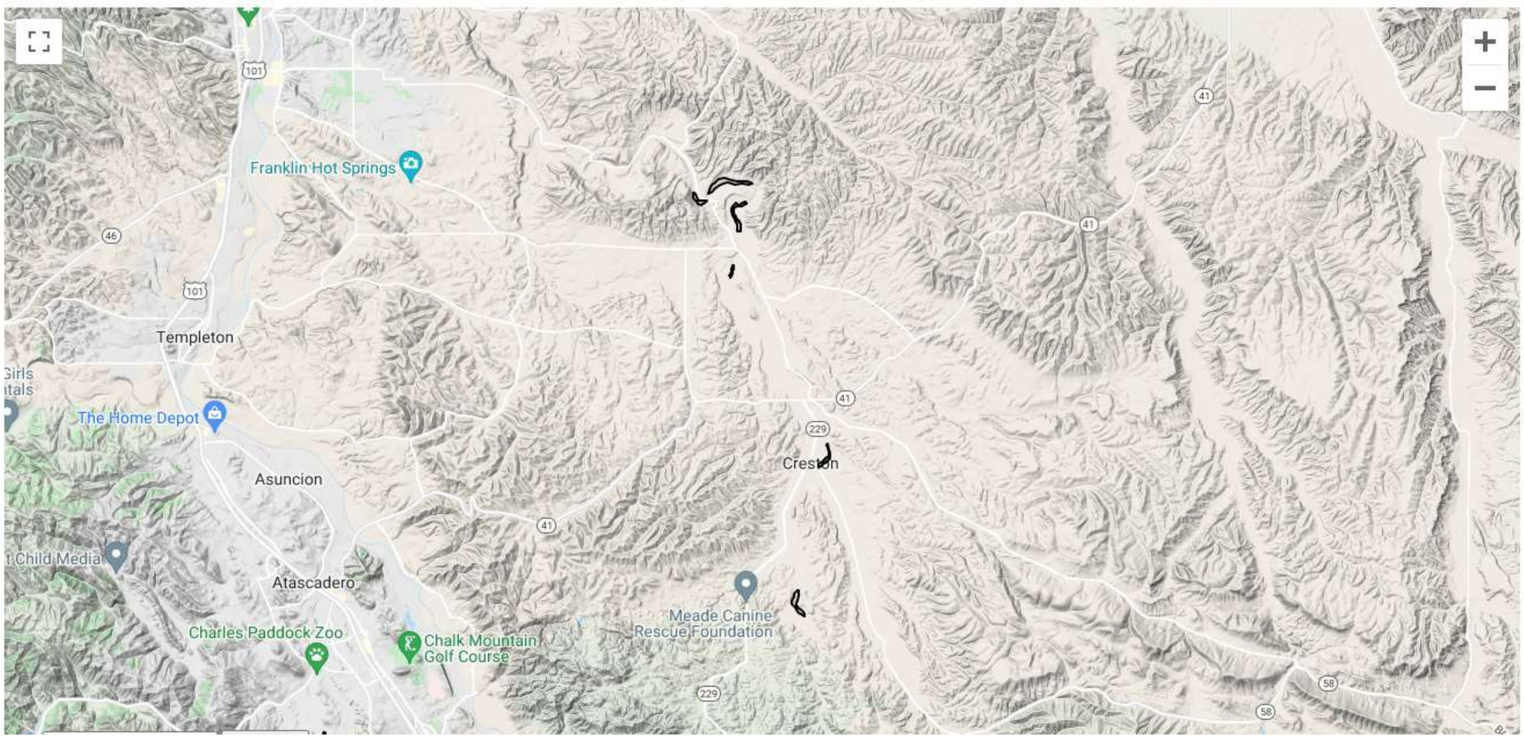

EVI Trend Analysis vs Total Monthly Precipitation at Paso Robles (NOAA 46730)
Sparse Riparian - San Juan Creek
y = 1E-06x + 0.1635
EVI (unitless)
Monthly Precipitation (inches)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.40
0
1
2
3
4
5
6
7
8
9
10
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
Paso Robles (NOAA 46730)
EVI_Sparse_San Juan
Linear (EVI_Sparse_San Juan)


41
41
58
58
Blue Star Memorial


EVI Trend Analysis vs Total Monthly Precipitation at Paso Robles (NOAA 46730)
Dense Riparian - San Juan Creek
y = 6E-06x - 0.0331
EVI (unitless)
Monthly Precipitation (inches)
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
10
9
8
7
6
5
4
3
2
1
0
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
Paso Robles (NOAA 46730)
EVI_Dense_San Juan
Linear (EVI_Dense_San Juan)


Shell Creek Rd
ell Creek Vineyards
Shell Creek Rd


EVI Trend Analysis vs Total Monthly Precipitation at Paso Robles (NOAA 46730)
Sparse Riparian - Creston (Huer Huero Creek)
EVI (unitless)
Monthly Precipitation (inches)
y = -2E-06x + 0.28
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0
1
2
3
4
5
6
7
8
9
10
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
Paso Robles (NOAA 46730)
EVI_Sparse_Creston
Linear (EVI_Sparse_Creston)


Franklin Hot Springs
Templeton
The Home Depot
Asuncion
Atascadero
Charles Paddock Zoo
Chalk Mountain Golf Course
Meade Canine Rescue Foundation
Creston
101
46
41
229
58

INTRODUCTION

Groundwater dependent ecosystems (GDEs) within the Paso Robles Subbasin are identified in accordance with §354.16(g) of the Groundwater Sustainability Plan regulations. The procedure for identifying GDEs follows guidance developed by

The Nature Conservancy (TNC) and detailed in the *Groundwater Dependent Ecosystems under the Sustainable Groundwater Management Act: Guidance for Preparing Groundwater Sustainability Plans* report (Rohde et al., 2018). This process differentiates between indicators of Groundwater Dependent Ecosystems (iGDEs), potential Groundwater Dependent Ecosystems, and true Groundwater Dependent Ecosystems.

- iGDEs were developed by The Nature Conservancy in partnership with the California Department of Fish and Wildlife (DFW) and DWR using the best available statewide data. The iGDEs are identified using locations of springs and seeps, wetlands, and vegetation known to use groundwater. The Nature Conservancy also uses the term “Natural Communities Commonly Associated with Groundwater” to refer to these iGDEs.

- Potential GDE are iGDEs that, through mapping analyses, may be connected to shallow groundwater and therefore be supported by shallow groundwater.

- True GDEs are potential GDE’s that have been field verified to establish that they are supported by groundwater. The methodology described herein does not identify true GDEs.

The procedure consists of the following steps:

- Review geospatial data from TNC that showing indicators of groundwater dependent ecosystems (iGDEs) within the Subbasin

- Assess the connection to groundwater for indicators of groundwater dependent ecosystems

- Identify potential GDEs. Potential GDEs are iGDEs that might be connected to groundwater. Potential GDEs should be field verified before they are established as true GDEs.

Geospatial data showing iGDEs were downloaded from TNC’s website for Natural Communities Commonly Associated with Groundwater

(NCCAG; https://gis.water.ca.gov/app/NCDatasetViewer). The iGDEs present in the Paso Robles Subbasin include potential GDEs identified as Wetlands or GDE Vegetation. All iGDEs in the Subbasin, as identified by TNC, are shown on Figure C-1.

Datasets used to assess the potential connection of the iGDEs to groundwater include the San Luis Obispo (SLO) County surface geologic map (County of San Luis Obispo, 2007), measured groundwater levels in the San Luis Obispo County groundwater monitoring network, geospatial data included in the National Hydrographic Dataset (NHD) provided by the U.S. Geological Survey showing the location of mapped springs and seeps, and the updated numerical groundwater flow model of the Paso Robles Subbasin.

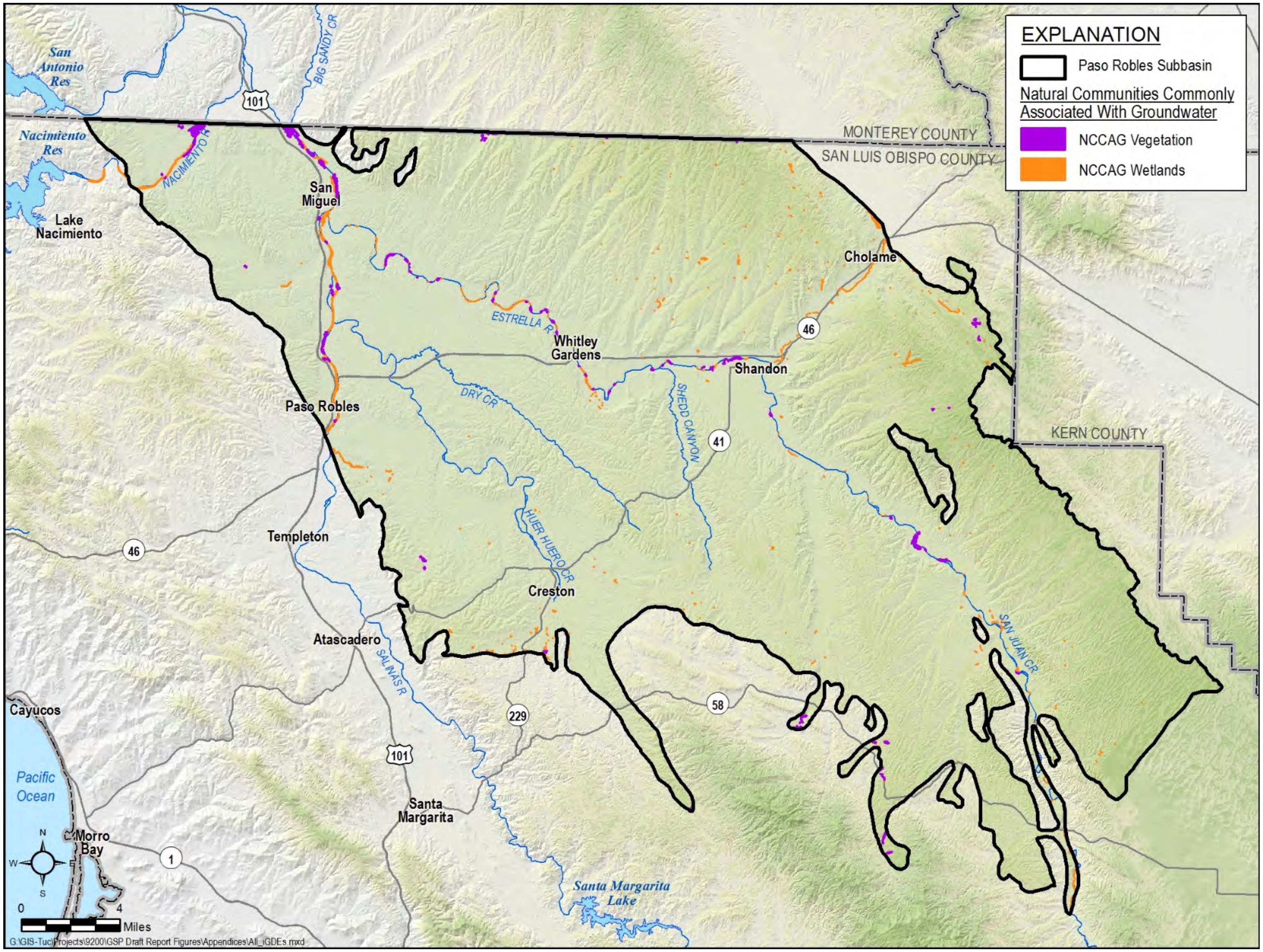


Figure C-1: Areas with Indicators of Groundwater Dependent Ecosystems (iGDEs) (*from TNC*)

CRITERIA FOR CONNECTION TO GROUNDWATER

The iGDEs identified by TNC data can only be potential GDEs if they are connected to a groundwater source that supports the vegetation or wetlands. Potential iGDEs that are supported by streamflows, soil moisture, or shallow perched aquifers, rather than by a regional groundwater aquifer, are not considered GDEs for this report. The report by Rohde et al. (2018) provides a general list of questions, or criteria, applicable to all iGDEs for assessing connection to groundwater. These general questions are:

- Is the iGDE underlain by a shallow unconfined or perched aquifer that has been delineated as being part of a Bulletin 118 principal aquifer in the Subbasin?
- Is the depth to groundwater under the iGDE less than 30 feet?
- Is the iGDE located in an area known to discharge groundwater (e.g. springs/seeps)?

The datasets described above are used to assess the potential connection of iGDEs to groundwater based on the three criteria listed above. To be considered a potential GDE, the iGDEs must satisfy at least one of the three criteria described above; or the landforms around the iGDE must suggest the area could support potential GDEs. Following the suggestions in Rhode (2018), example landforms that could support potential GDEs might be mapped springs, seeps, or a break in the slope of the ground. In the absence of more formal field reconnaissance, the results of this screening level analysis only identify potential GDEs in the Subbasin. Additional field verification is necessary to definitively determine the true GDEs in the Paso Robles Subbasin.

Question 1: Is the iGDE underlain by a shallow unconfined or perched aquifer that has been delineated as being part of a Bulletin 118 principal aquifer in the Subbasin?

Bulletin 118 (DWR, 2003) identifies two primary water-bearing formations in the Subbasin: Quaternary alluvium (Qa) and the Plio-Pleistocene-age Paso Robles formation (QTp). The Qa's thickness ranges from 30 to 130 feet and is highly permeable relative to the QTp. Groundwater in the Qa occurs under unconfined, or water-table conditions. The Qa extent shown on Figure C-2 was determined based on the surficial geologic map of San Luis Obispo County (San Luis Obispo County, 2007). This analysis assumes that all iGDEs that overlie the Quaternary alluvial unit are connected to shallow groundwater Qa sediments, and are therefore classified as potential GDEs as recommended by Rohde and others (2018). The Qa's extent and coincident potential GDEs are shown on Figure C-2. Most iGDEs within the Subbasin fall within the Qa extent.

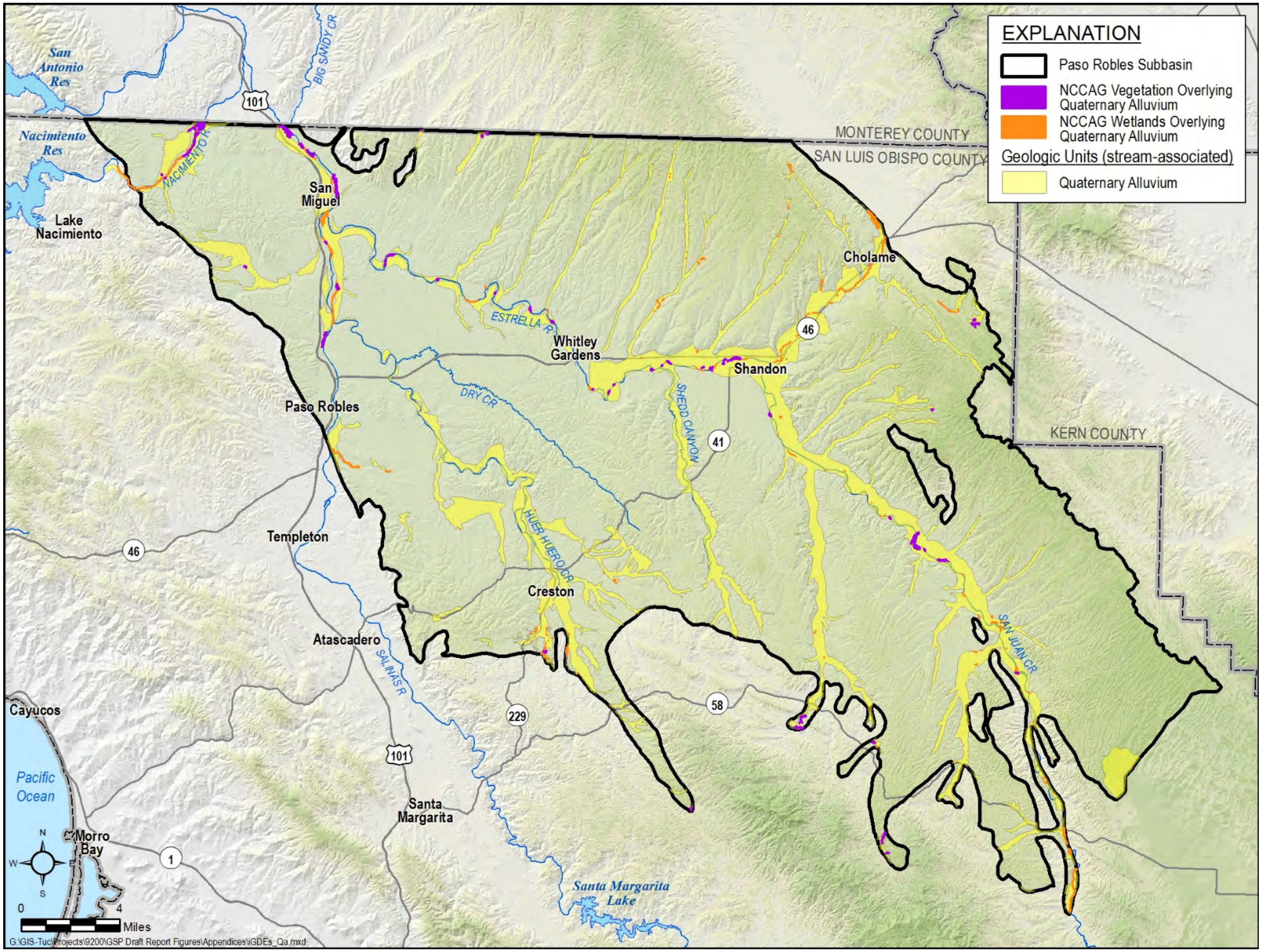


Figure C-2: iGDEs Associated with the Shallow, Unconfined Quaternary Alluvial (Qa) Aquifer

This criterion clearly has the potential to overestimate the number of potential GDEs in the Subbasin. The subjective assessment of what constitutes a shallow unconfined aquifer may result in identifying potential GDEs in areas that do not have the underlying groundwater to support the GDE. This emphasizes the need for field verification of the potential GDEs identified in this GSP.

Question 2: Is depth to groundwater under the iGDE less than 30 feet?

Depth to water is routinely measured by San Luis Obispo County staff within a network of monitoring wells. Figure C-3 shows the locations of San Luis Obispo County monitoring wells completed in the Qa. This analysis uses spring 2017 depth to water data where available. A representative value for spring depth to water was used based on review of historical groundwater levels to establish depth to water for wells at which spring 2017 data were unavailable. Wells where depth to water is less than 30 feet are shown in blue on Figure C-3. Wells where depth to water is greater than 30 feet are shown in yellow. Results from the groundwater model were used to supplement the measured groundwater level data. The simulated spring 2016 groundwater elevations were analyzed to further identify areas where depth to water is less than 30 feet. Based on the measured groundwater level data and model results, iGDEs overlying areas where estimated depth to groundwater is less than 30 feet are shown on Figure C-3.

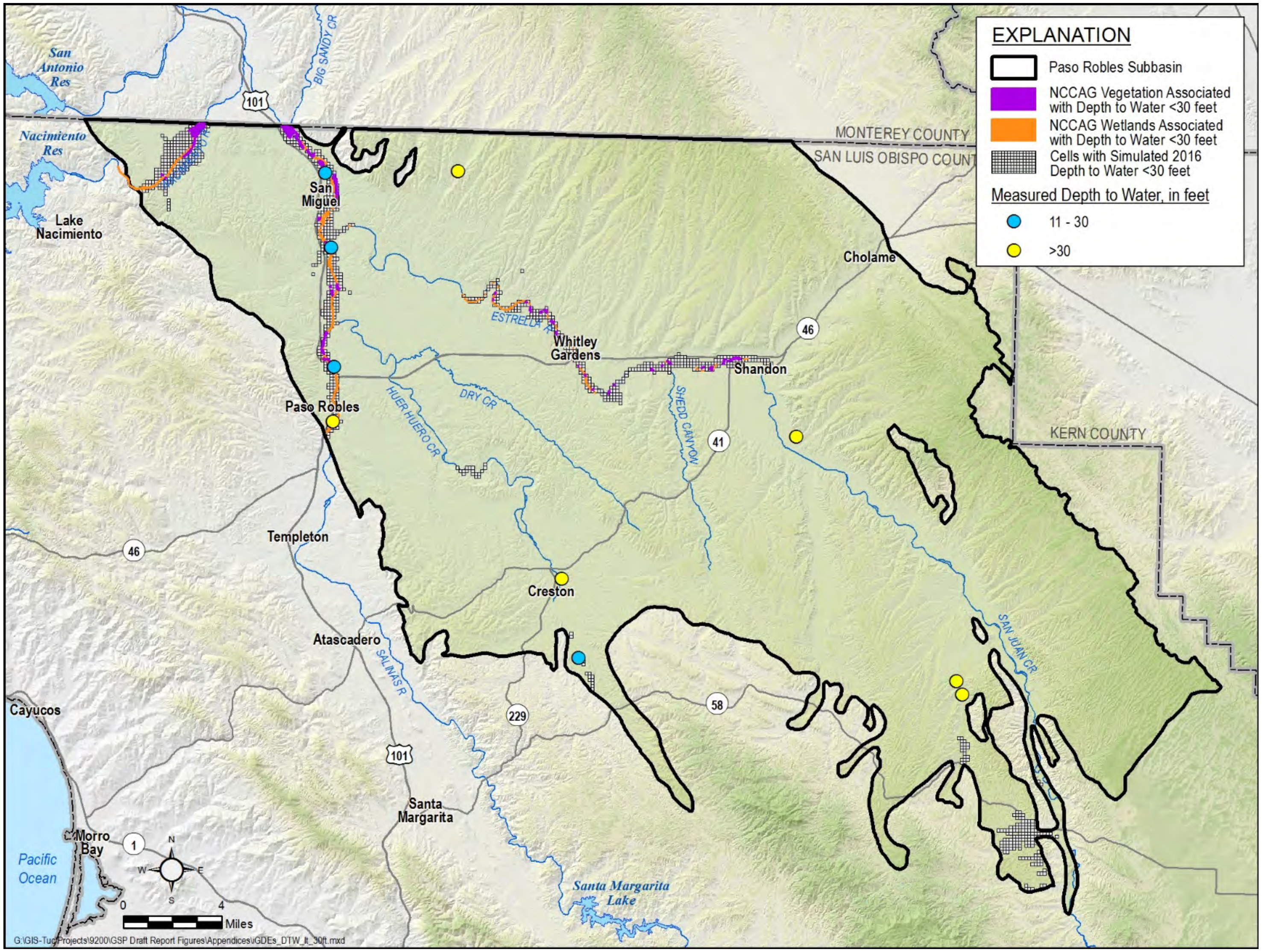


Figure C-3: Qa monitoring wells, Model Cells with Depth to Water Less than 30 Feet, and Potential GDEs based on Depth to Groundwater Less than 30 Feet

Is the iGDE located in an area known to discharge groundwater (e.g., springs/seeps)?

Springs and seeps in the Subbasin identified in National Hydrography Dataset (NHD) tend to be located in the foothills of the Santa Lucia and Temblor mountain ranges, which bound the Subbasin to the west and east, respectively.

Figure C-4 shows the location of NHD seeps and springs. iGDEs within 0.5 miles of a seep/spring point are classified as potential GDEs.

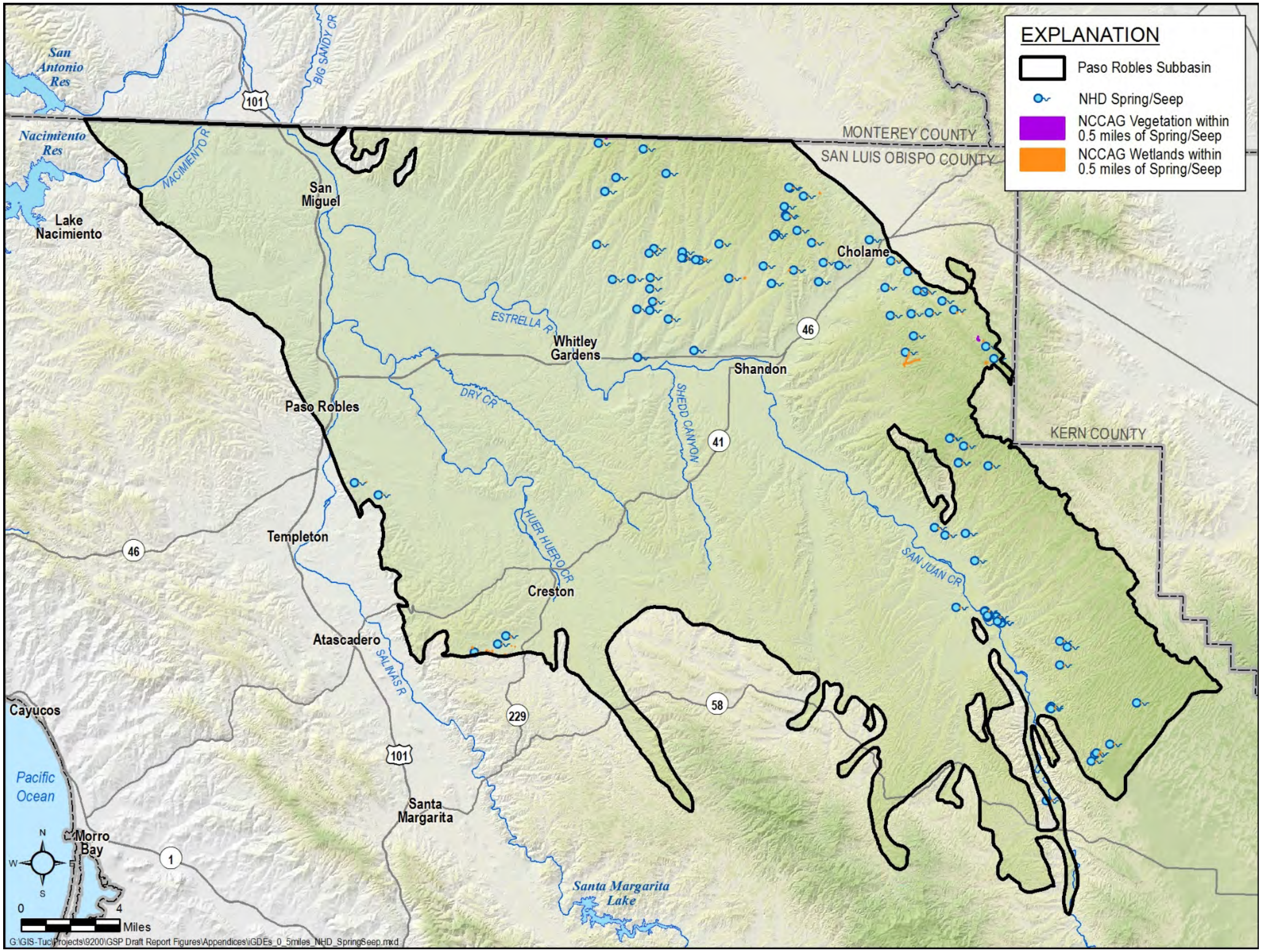


Figure C-4: NHD Springs and Seeps and iGDEs Within 0.5 Miles of a Spring or Seep

FINAL DELINEATION OF POTENTIAL GROUNDWATER DEPENDENT ECOSYSTEMS

After evaluating the three criteria listed above for connection to groundwater, additional iGDEs were identified that should be classified as potential GDEs based on landforms that suggest potential GDEs, effectively loosening the criteria for association with either the shallow alluvial aquifer or springs and seeps. The purpose for this task was to ensure that the extent of potential GDEs would err on the side of estimating maximum GDE extent. Specifically:

1. iGDEs within 0.5 miles of the mapped Qa outcrop are assumed to be hydraulically connected to the shallow alluvial aquifer. Furthermore, iGDEs that appear to be physically connected with other identified potential GDEs in the Qa were manually identified and added to the extent of potential GDEs. Figure C-5 shows all potential GDEs resulting from this analysis.
2. Remaining iGDEs were evaluated to determine their relationship to areas where seeps and springs might occur. These include areas near mapped clusters of seeps and springs such as the northeast mountainous region of the Subbasin shown on Figure C-6; or areas with breaks in the slope of the land surface that may cause “groundwater to emerge or vegetation to congregate on the surface” (Rohde and others, 2018). Figure C-6 shows all potential GDEs associated with known springs or seeps or located in areas that potentially host springs or seeps.

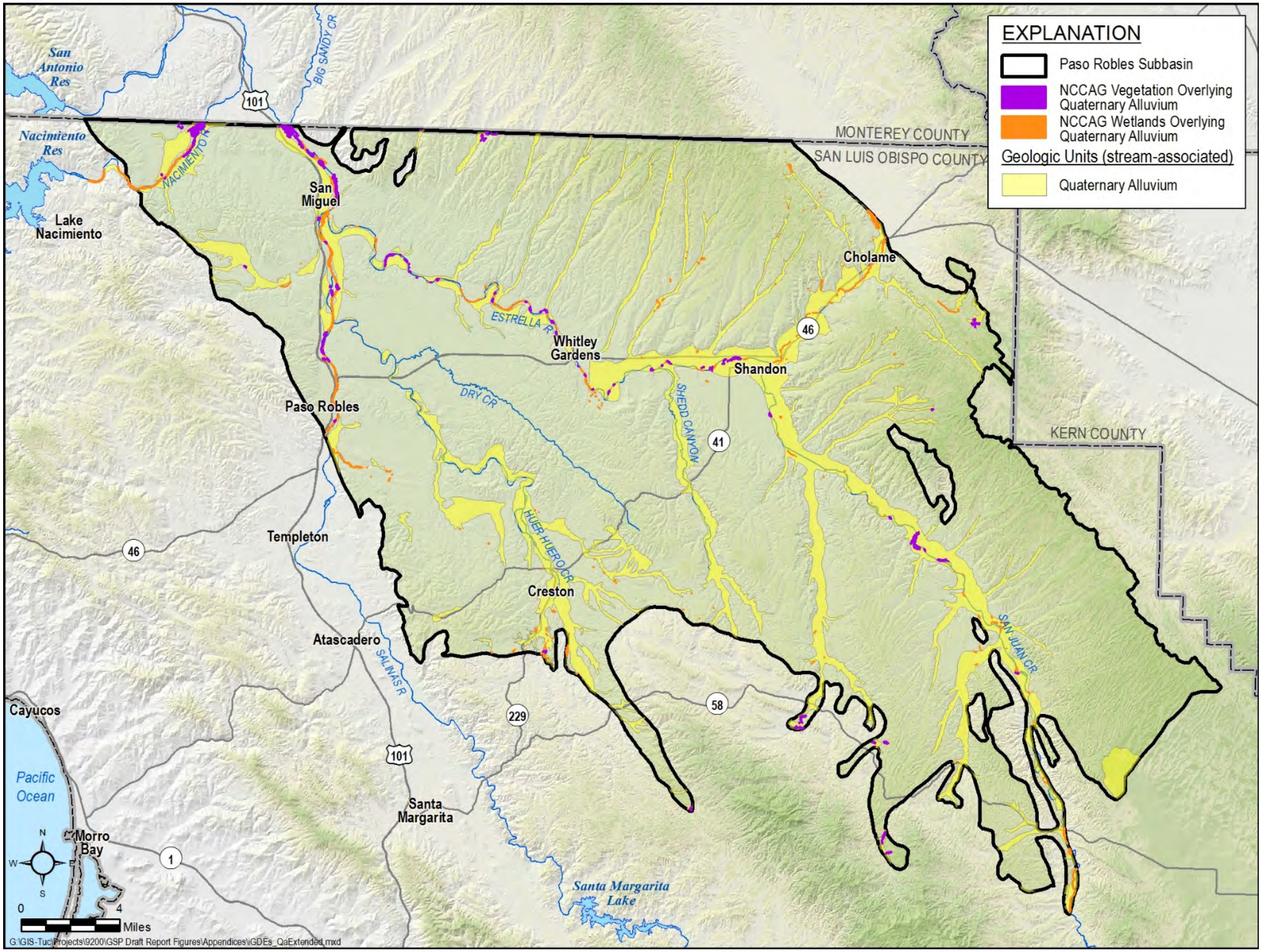


Figure C-5: iGDEs Associated with Quaternary Alluvium (Overlying, Within 0.5 miles, or Manually Selected)

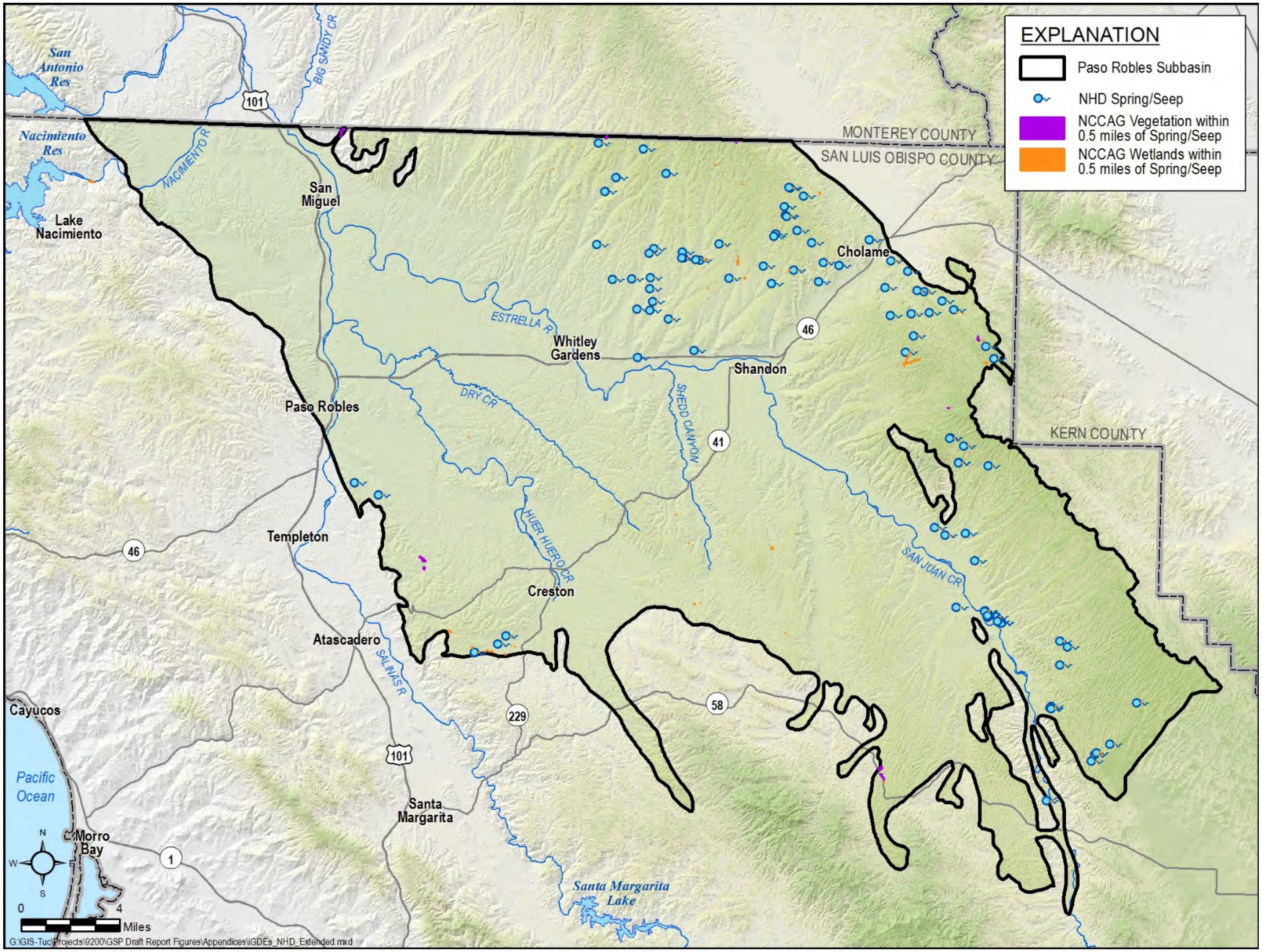


Figure C-6: iGDEs Associated with Springs or Seeps or Located in an Area with Potential Springs or Seeps

Measured groundwater levels within SLO County do not suggest additional areas where groundwater is close enough to the surface to be a significant source for natural communities. The report by Rhode et al. (2018) lists additional spatial data that could be considered for identifying GDS including Critical Habitat for Threatened and Endangered Species, California Protected Areas, and Areas of Conservation Emphasis. None of these datasets show additional potential GDEs in the Subbasin. No additional potential GDEs were identified based on a review of local water and environmental management reports.

The final set of potential GDEs in the Subbasin are shown in Figure C-7. Field verification is necessary to assess whether these potential GDEs are true GDEs.

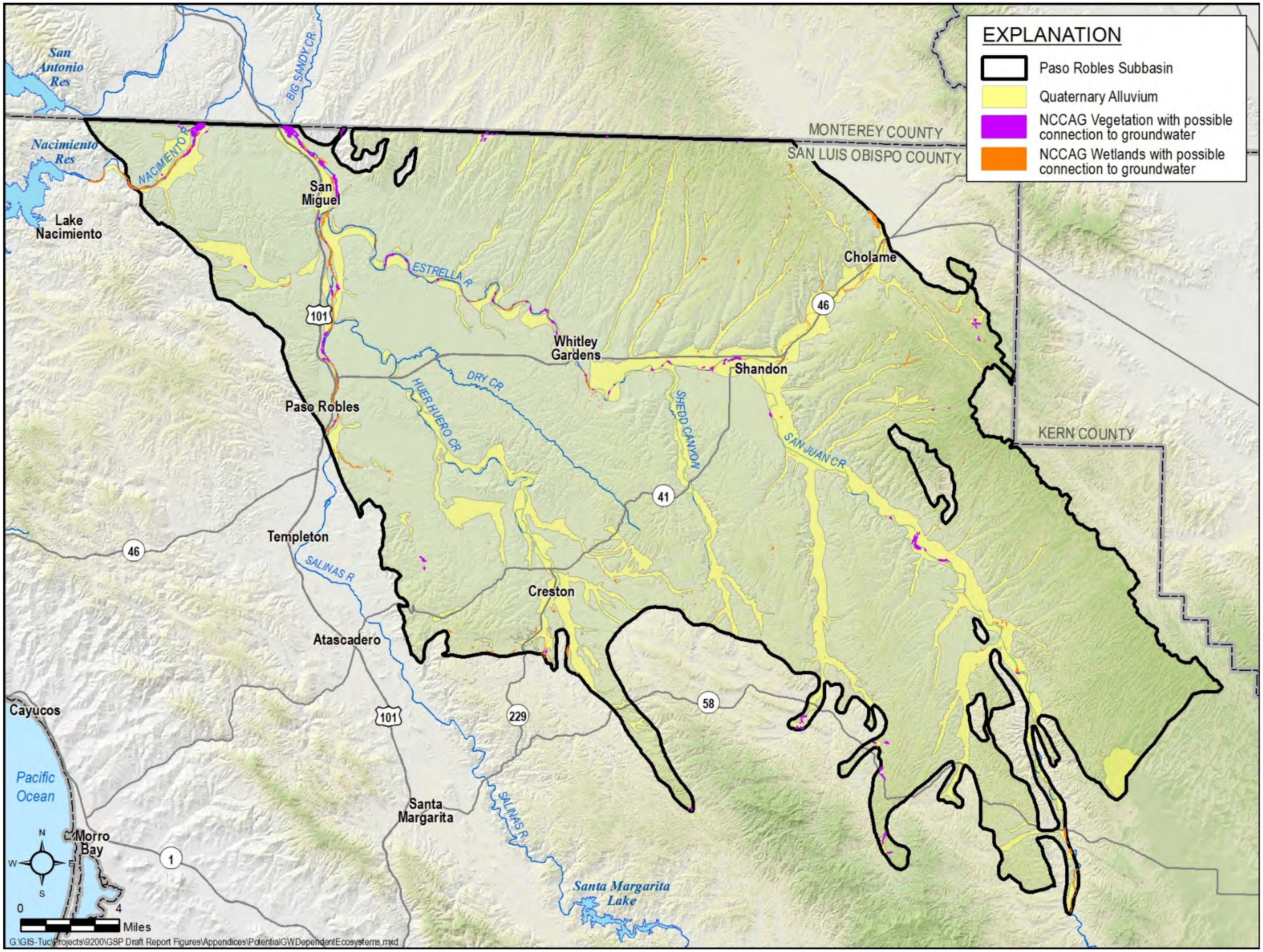


Figure C-7: Extent of Potential GDEs

REFERENCES

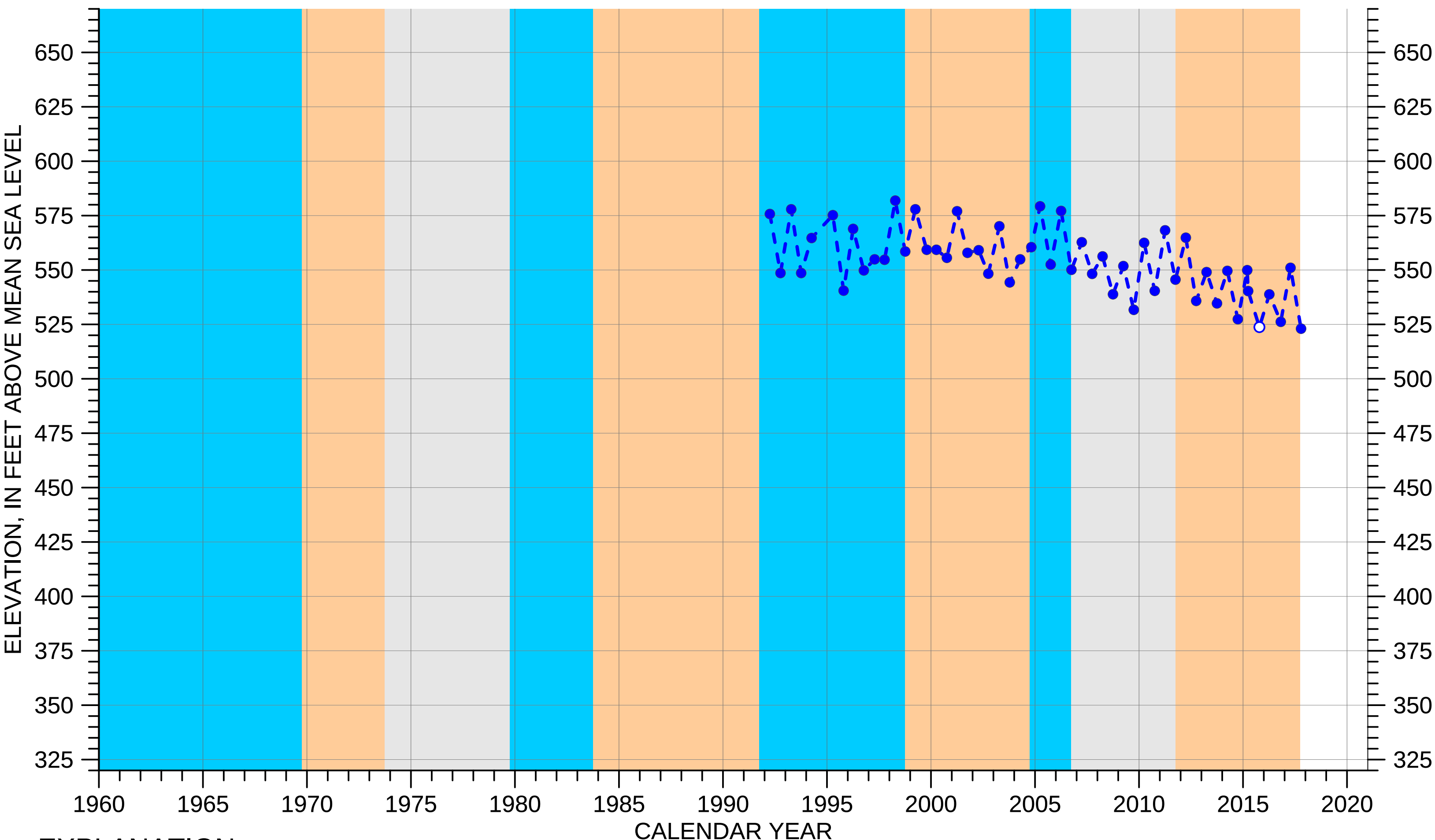
Rohde, M. M., S. Matsumoto, J. Howard, S. Liu, L. Riege, and E.J. Remson, 2018, Groundwater Dependent Ecosystems under the Sustainable Groundwater Management Act: Guidance for Preparing Groundwater Sustainability Plans: The Nature Conservancy, San Francisco, California.

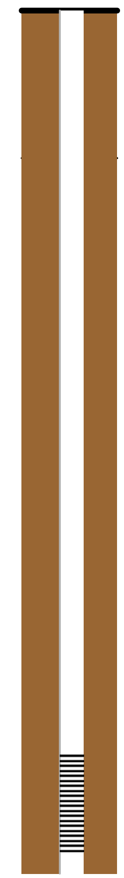
California Department of Water Resources (DWR), 2003, Bulletin 118 Basin Descriptions: Salinas Valley Groundwater Basin, Paso Robles Area Subbasin, accessed at https://water.ca.gov/Programs/Groundwater-Management/ Bulletin-118

County of San Luis Obispo, Planning and Building Department, 2007, Surface geology map, accessed at https://lib.calpoly.edu/gis/browse.jsp?by=e&e=2

Appendix D

Hydrographs





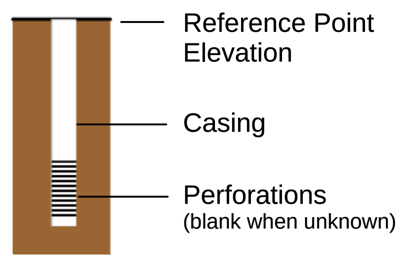
EXPLANATION

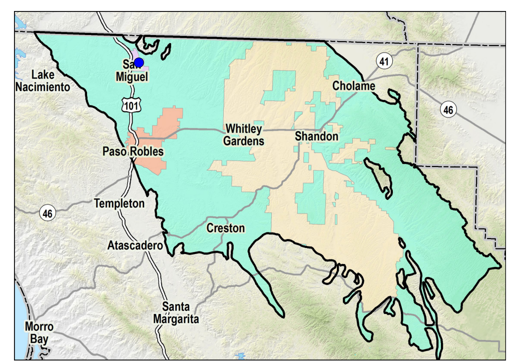
GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET



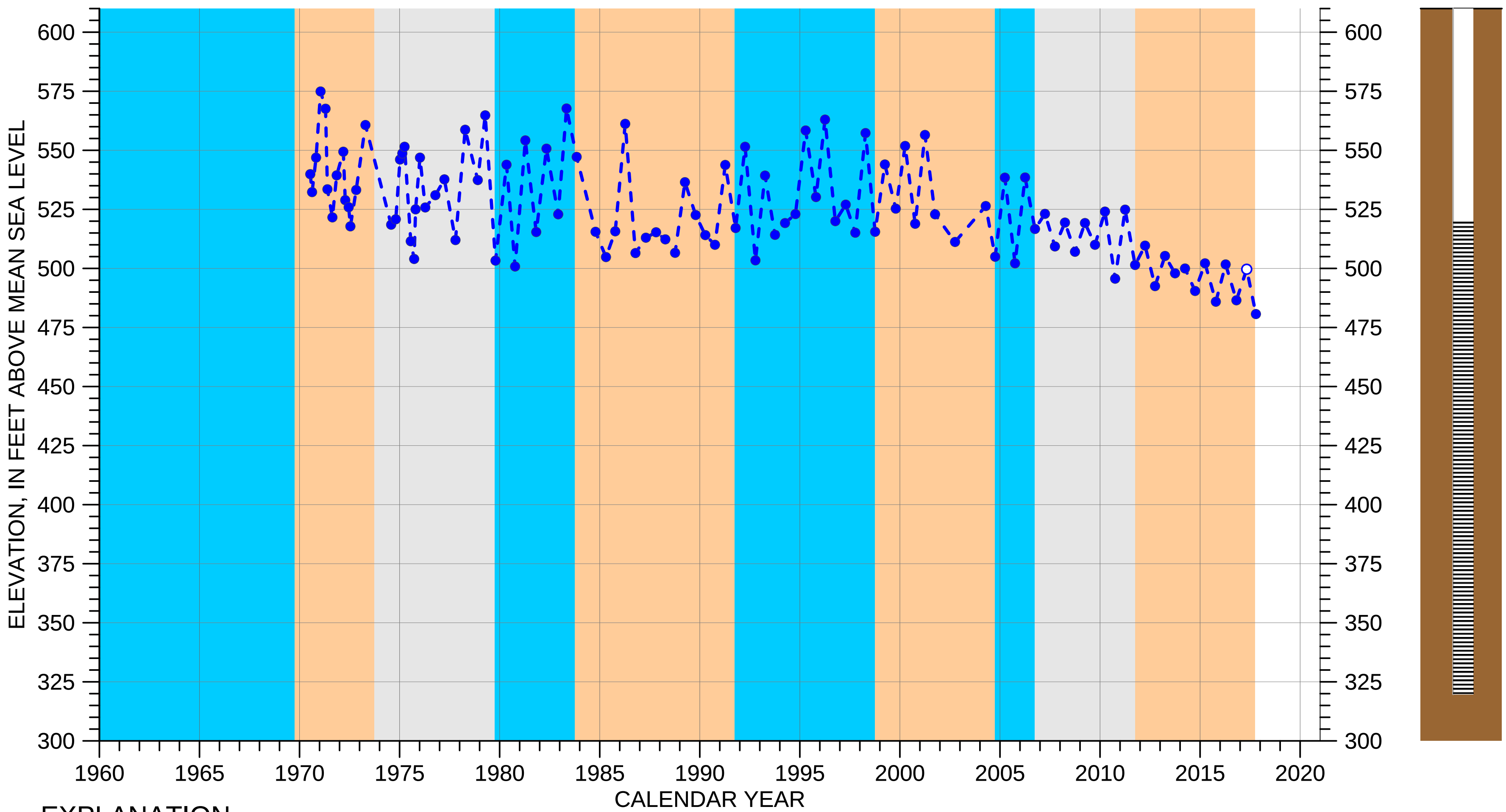


Well Depth: 350 feet
Screened Interval: 300-310, 330-340 feet below ground surface
Reference Point Elevation: 669.8 feet above mean sea level

* Measurement reported as not static

MEASURED WATER LEVELS FOR 25S/12E-16K05

S:\projects\9200_Paso Robles GSP\GSP\Ch 9-10 Coordination Effort\Ch 9\Appendices\AppendixJ_SimulatedHydrographs\grf\Observed_only_noSMC\Fig01_25S_12E-16K05.grf



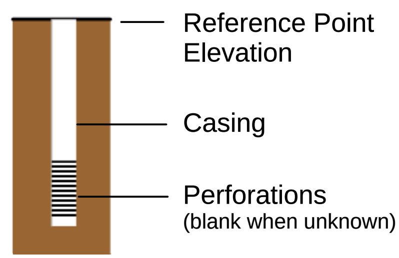
EXPLANATION

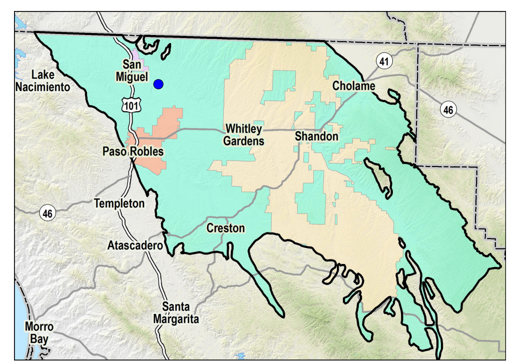
GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET





Well Depth: 400 feet
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Reference Point Elevation: 719.7 feet above mean sea level

* Measurement reported as not static

MEASURED WATER LEVELS FOR 25S/12E-26L01

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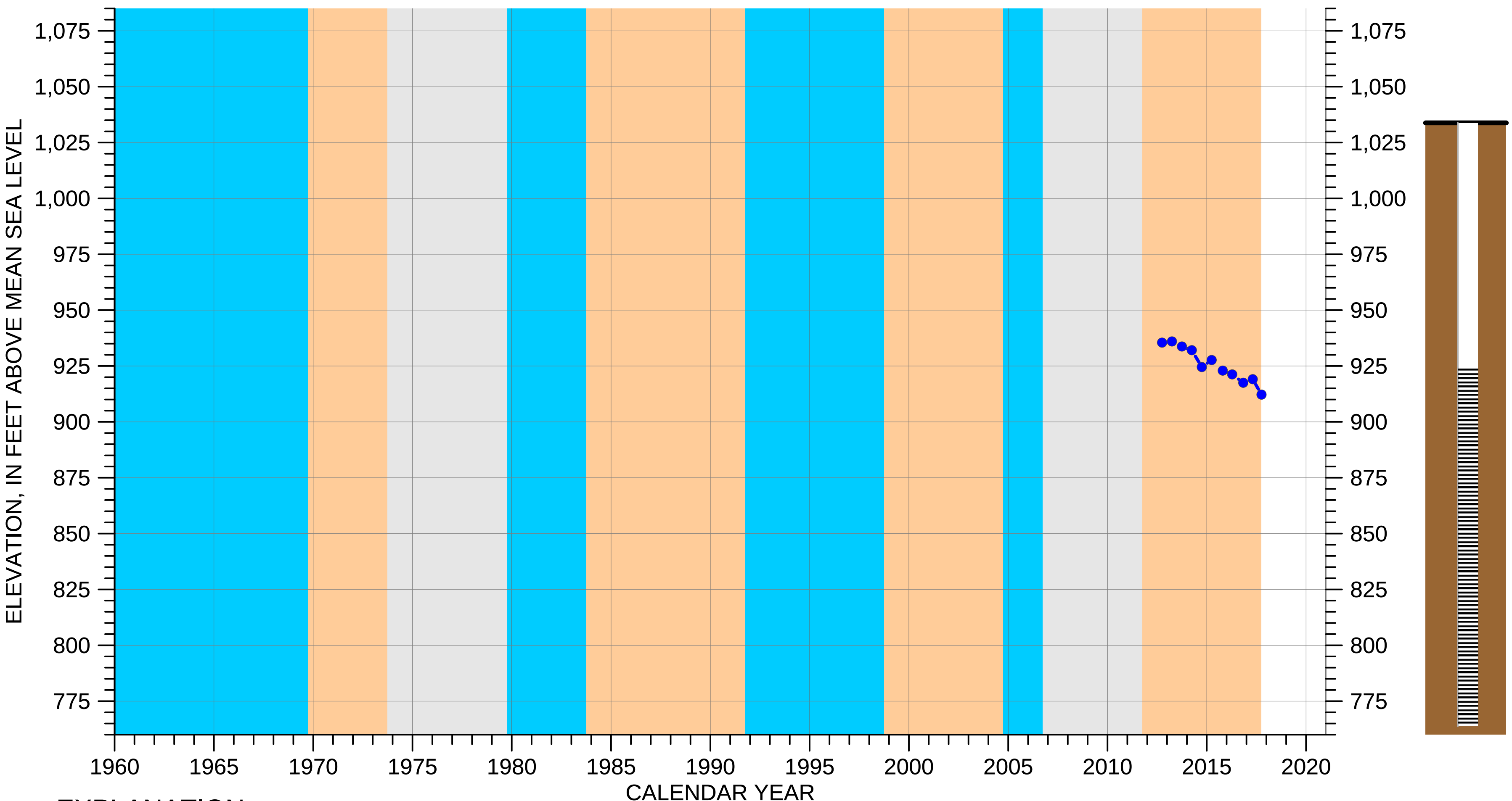


EXPLANATION

GROUNDWATER ELEVATION

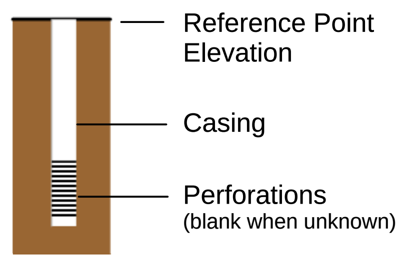
MEASUREMENT NOT VERIFIED*

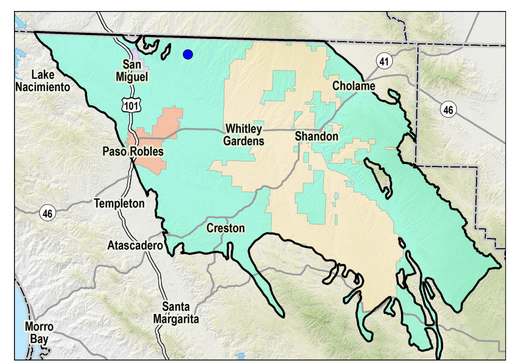
CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Well Depth: 270 feet
Screened Interval: 110-270 feet below ground surface
Reference Point Elevation: 1033.8 feet above mean sea level

* Measurement reported as not static





MEASURED WATER LEVELS FOR 25S/13E-08L02

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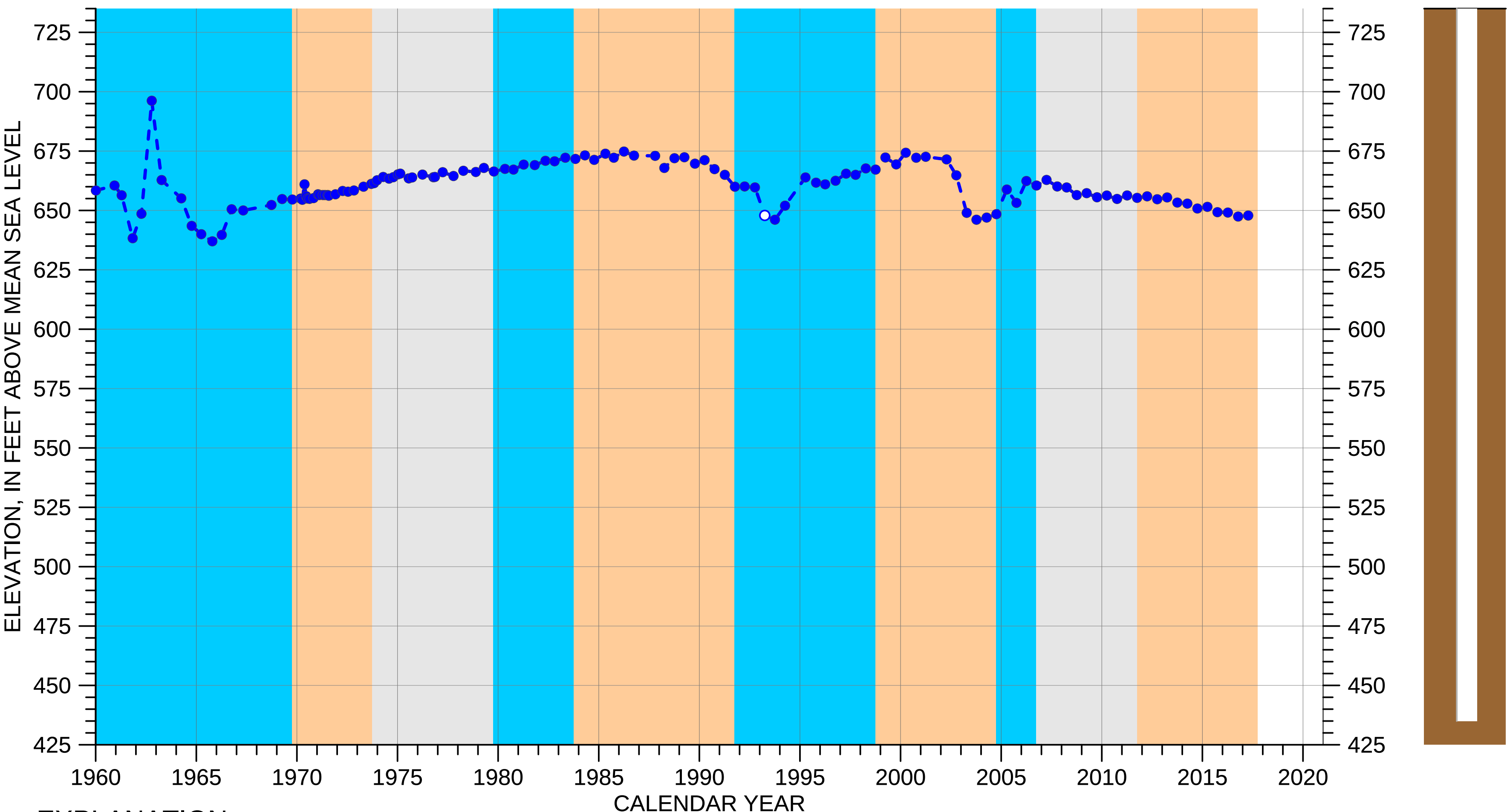


EXPLANATION

GROUNDWATER ELEVATION

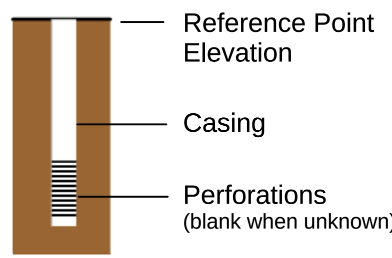
MEASUREMENT NOT VERIFIED*

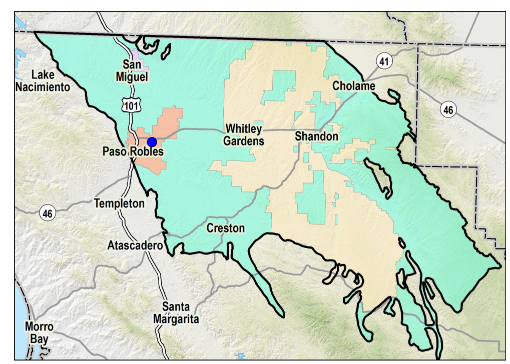
CLIMATE PERIOD CLASSIFICATION

DRY   AVERAGE/ALTERNATING   WET

Well Depth: 400 feet
Screened Interval: unknown
Reference Point Elevation: 835 feet above mean sea level

* Measurement reported as not static





MEASURED WATER LEVELS FOR 26S/12E-26E07

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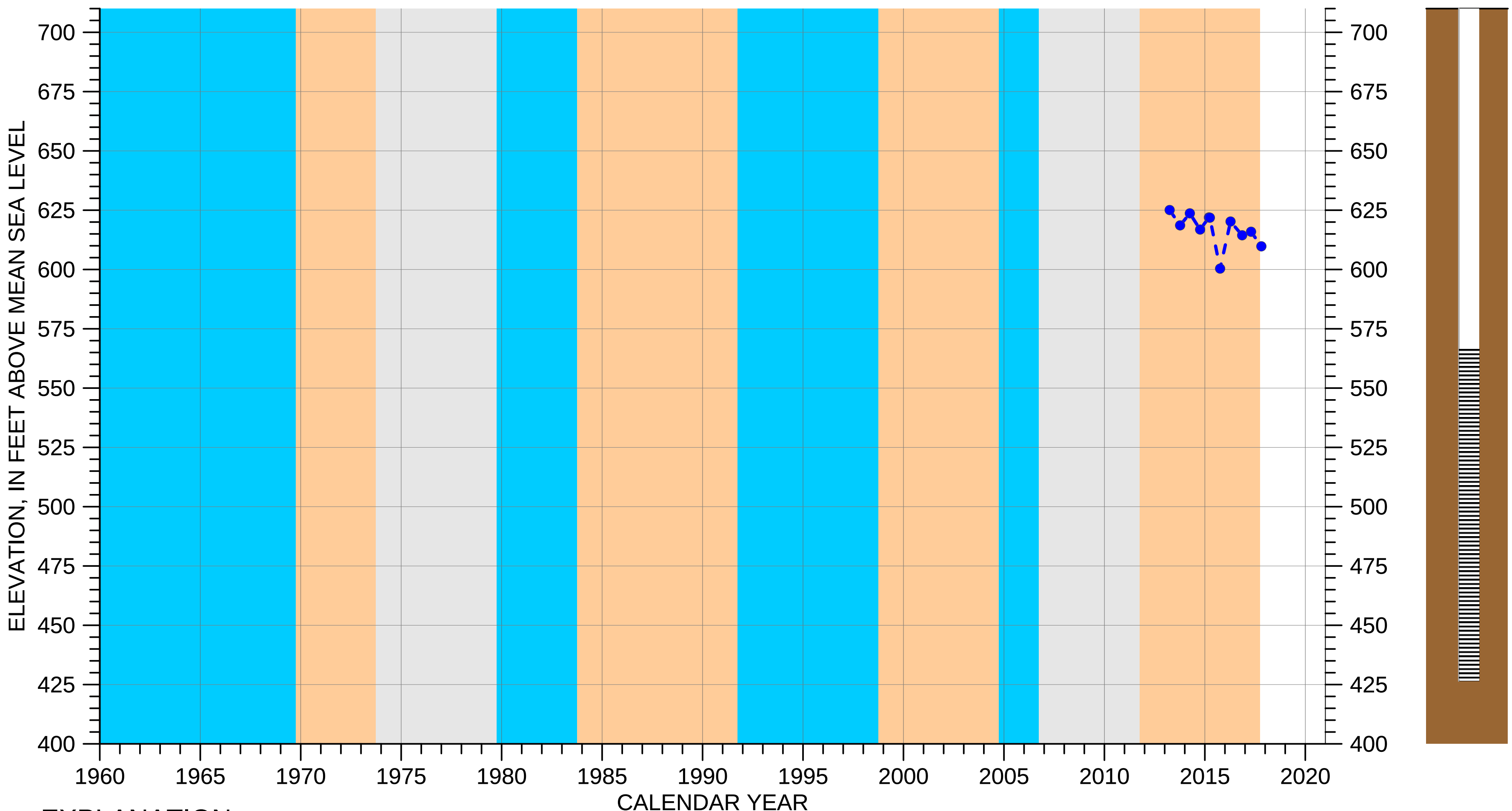


EXPLANATION

GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

CLIMATE PERIOD CLASSIFICATION

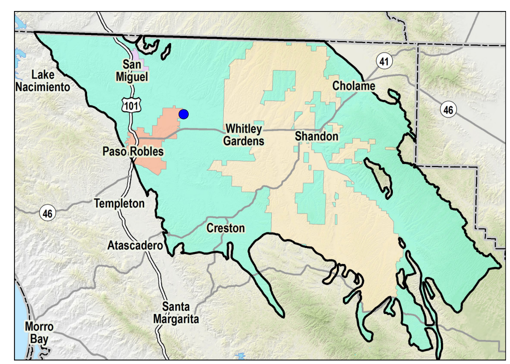
DRY

AVERAGE/ALTERNATING

WET

Well Depth: 400 feet
Screened Interval: 260-400 feet below ground surface
Reference Point Elevation: 827.9 feet above mean sea level

* Measurement reported as not static



MEASURED WATER LEVELS FOR 26S/13E-08M01

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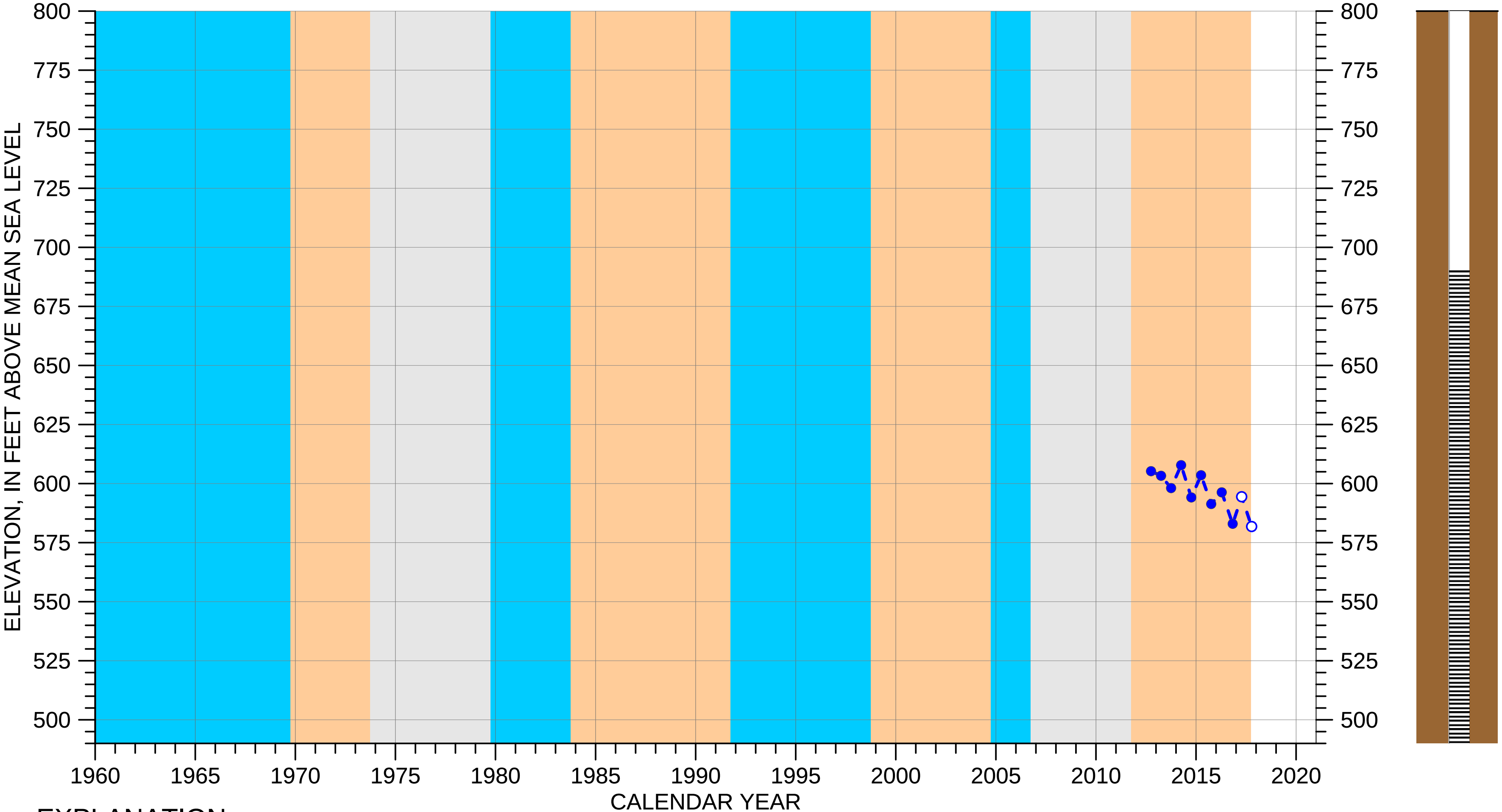


EXPLANATION

GROUNDWATER ELEVATION

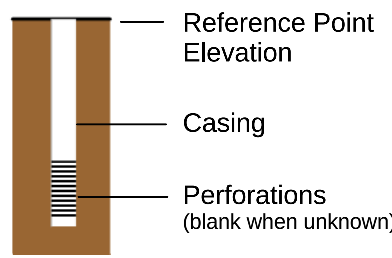
MEASUREMENT NOT VERIFIED*

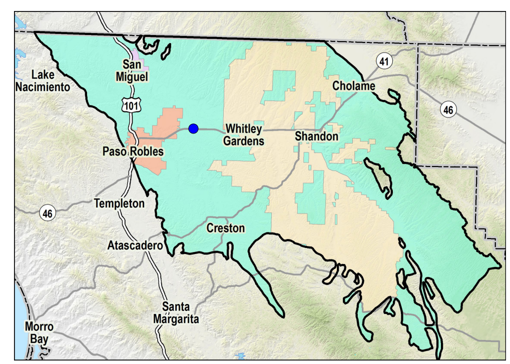
CLIMATE PERIOD CLASSIFICATION

DRY   AVERAGE/ALTERNATING   WET

Well Depth: 400 feet
Screened Interval: 200-400 feet below ground surface
Reference Point Elevation: 890.2 feet above mean sea level

* Measurement reported as not static





MEASURED WATER LEVELS FOR 26S/13E-16N01

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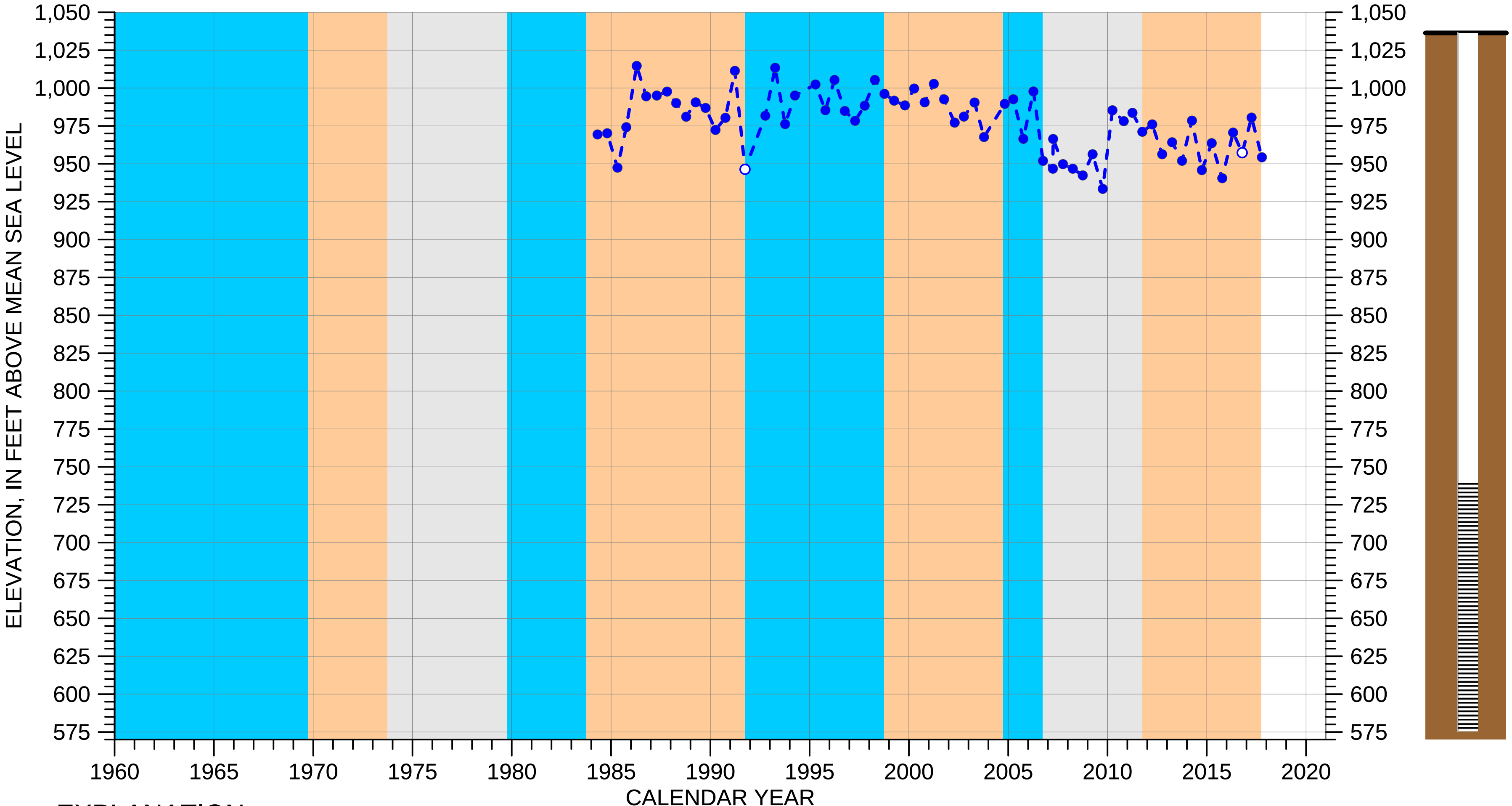


EXPLANATION

GROUNDWATER ELEVATION

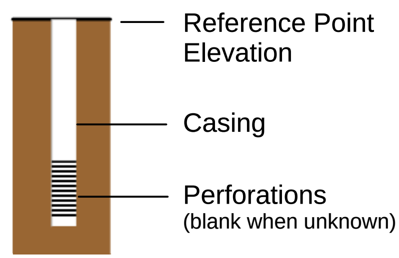
MEASUREMENT NOT VERIFIED*

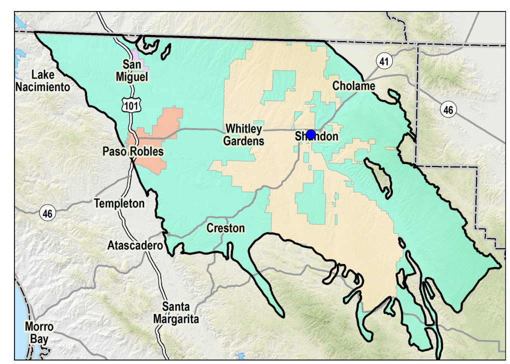
CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Well Depth: 461 feet
Screened Interval: 297-461 feet below ground surface
Reference Point Elevation: 1036.36 feet above mean sea level

* Measurement reported as not static





MEASURED WATER LEVELS FOR 26S/15E-20B04

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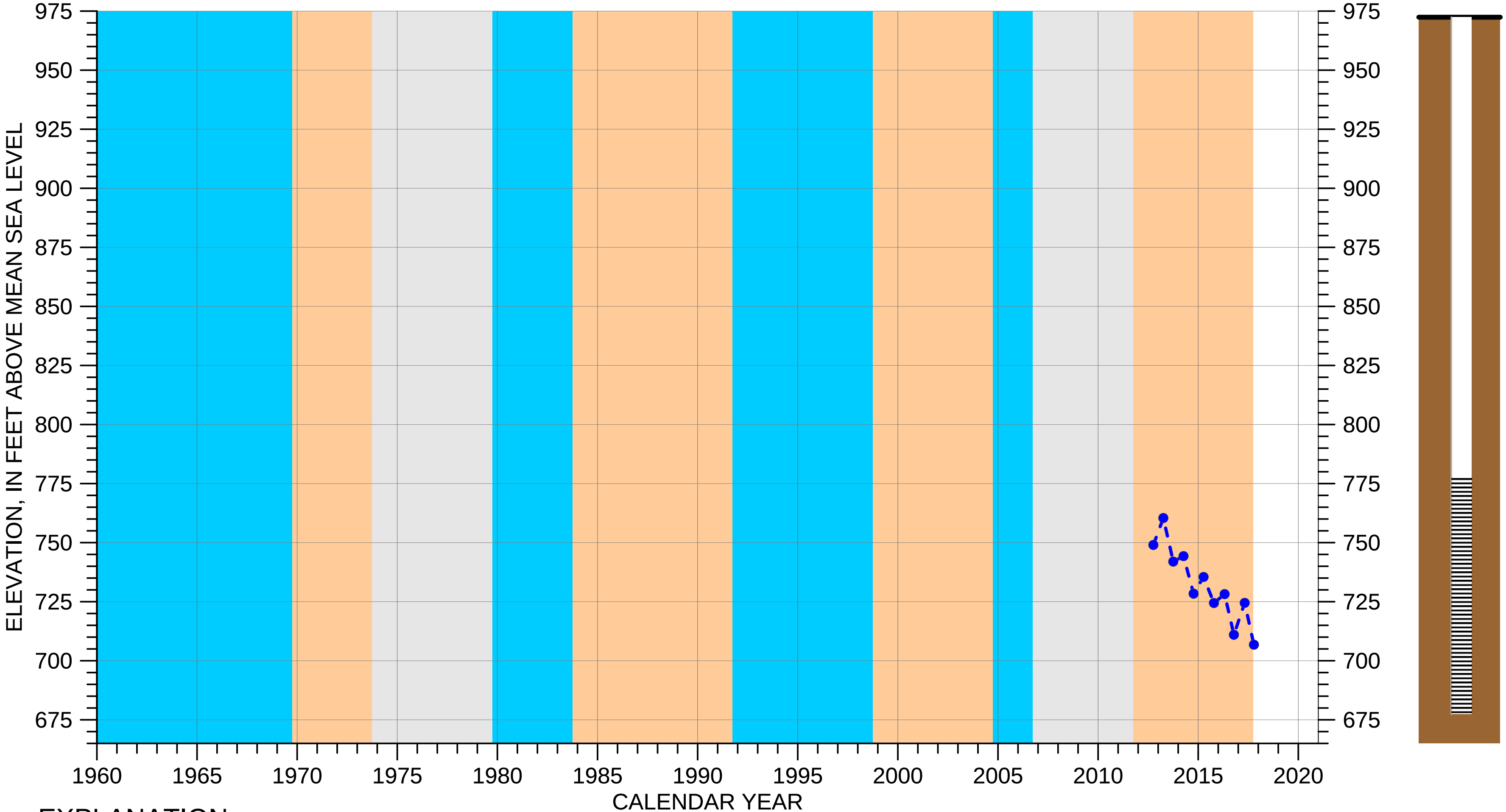


EXPLANATION

GROUNDWATER ELEVATION

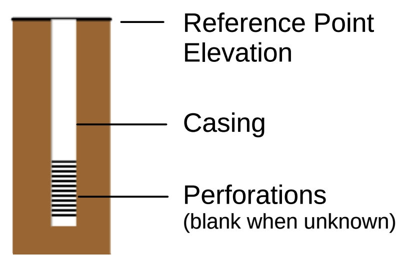
MEASUREMENT NOT VERIFIED*

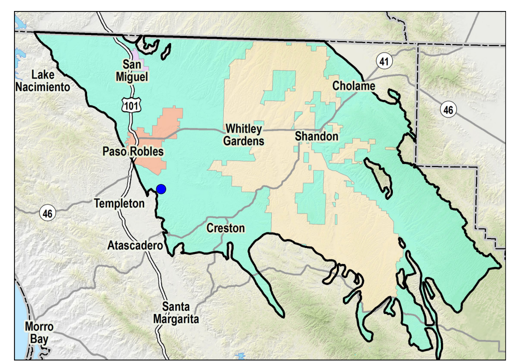
CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Well Depth: 295 feet
Screened Interval: 195-295 feet below ground surface
Reference Point Elevation: 972.4 feet above mean sea level

* Measurement reported as not static





MEASURED WATER LEVELS FOR 27S/12E-13N01

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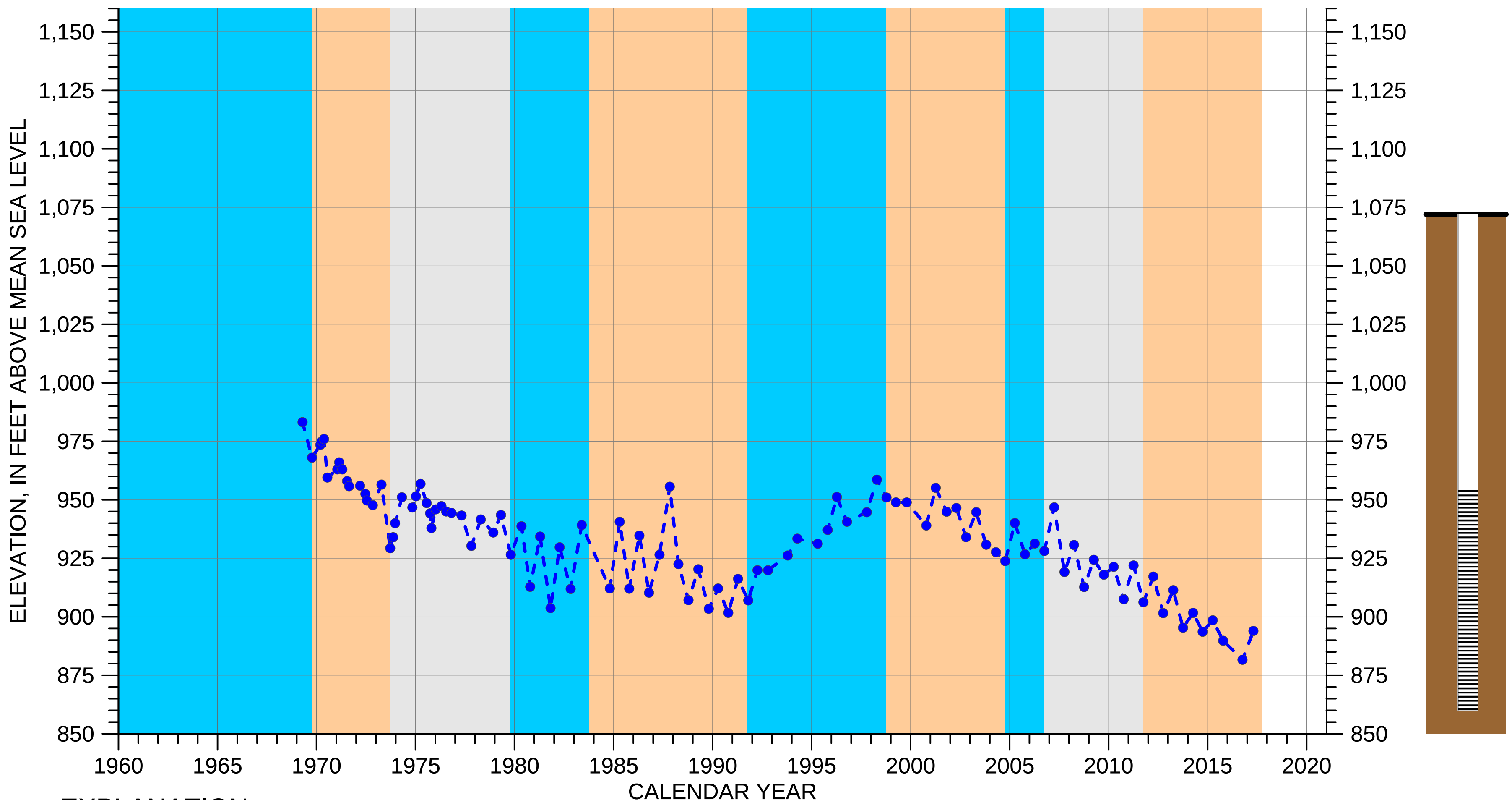


EXPLANATION

GROUNDWATER ELEVATION

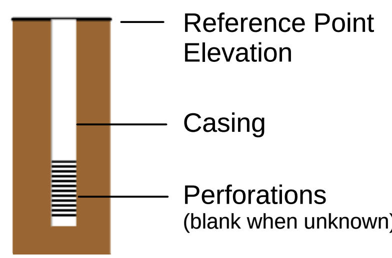
MEASUREMENT NOT VERIFIED*

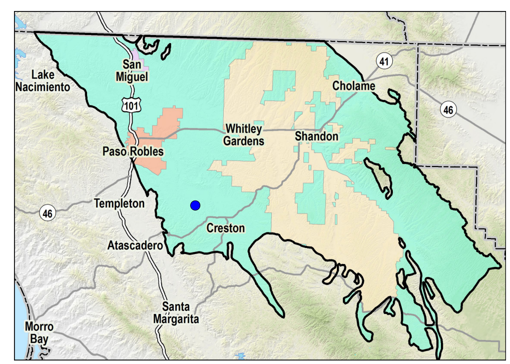
CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Well Depth: 212 feet
Screened Interval: 118-212 feet below ground surface
Reference Point Elevation: 1072 feet above mean sea level

* Measurement reported as not static





MEASURED WATER LEVELS FOR 27S/13E-28F01

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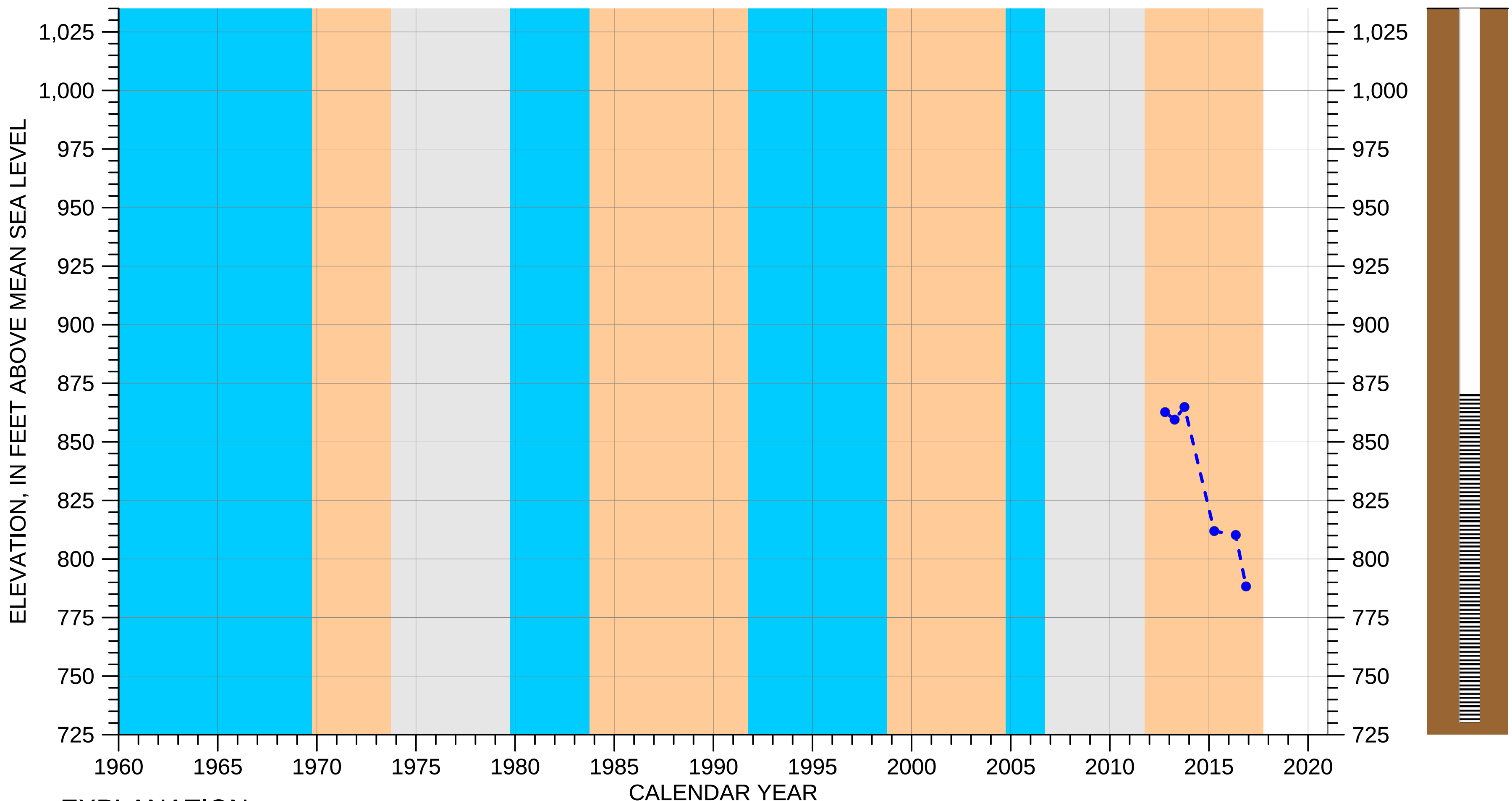


EXPLANATION

GROUNDWATER ELEVATION

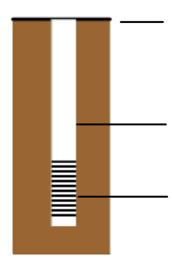
MEASUREMENT NOT VERIFIED*

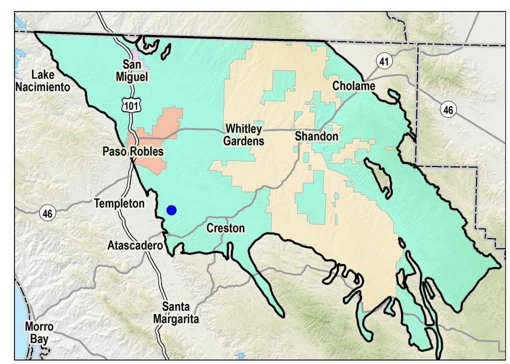
CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Well Depth: 355 feet
Screened Interval: 215-235, 275-355 feet below ground surface
Reference Point Elevation: 1086.7 feet above mean sea level

* Measurement reported as not static





MEASURED WATER LEVELS FOR 27S/13E-30N01

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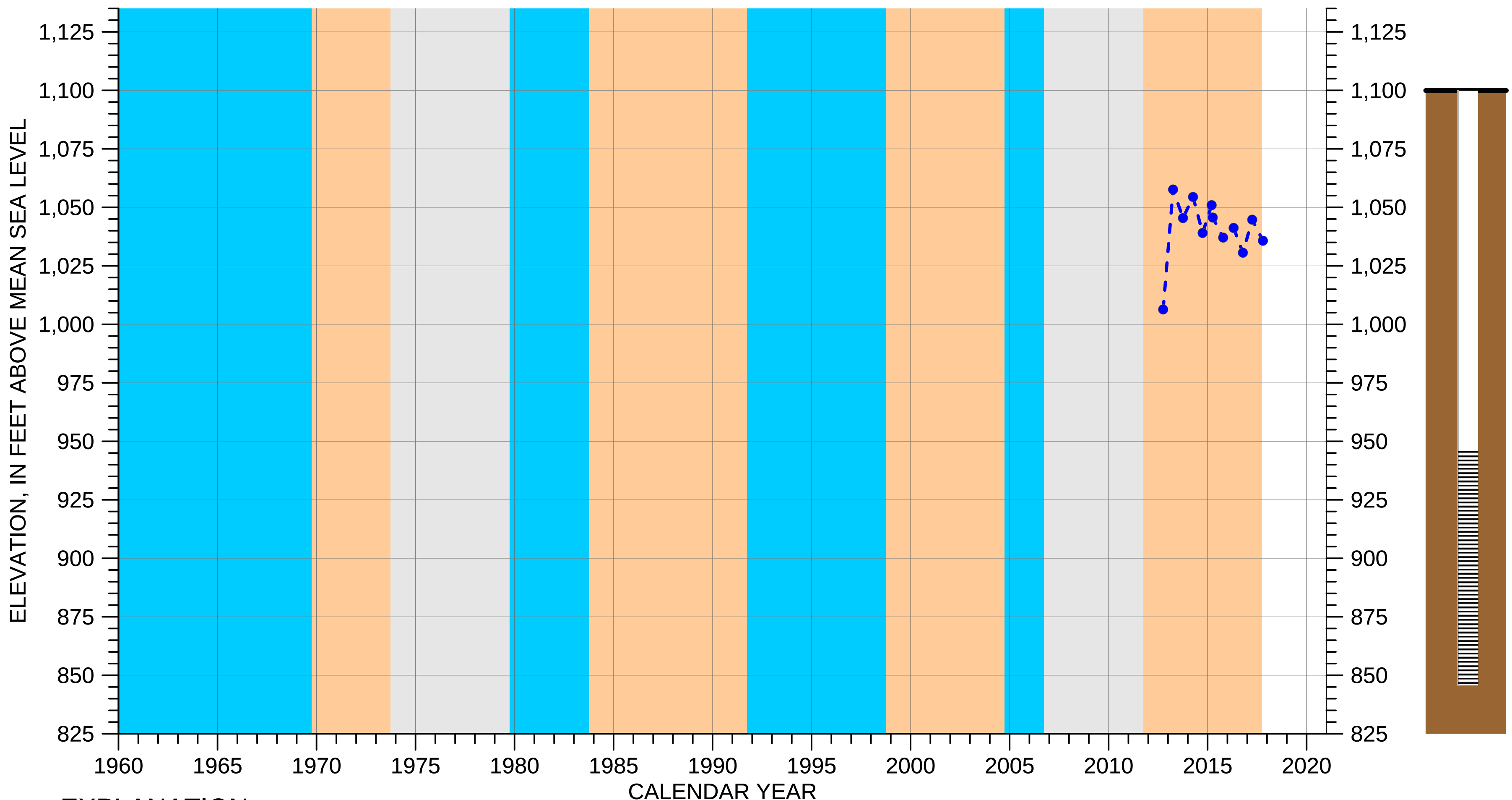


EXPLANATION

GROUNDWATER ELEVATION

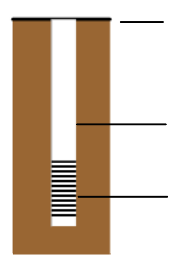
MEASUREMENT NOT VERIFIED*

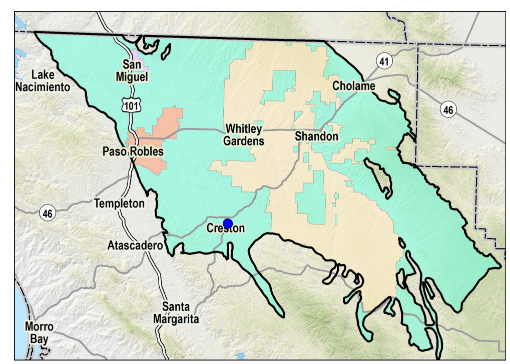
CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Well Depth: 254 feet
Screened Interval: 154-254 feet below ground surface
Reference Point Elevation: 1099.9 feet above mean sea level

* Measurement reported as not static





MEASURED WATER LEVELS FOR 28S/13E-01B01

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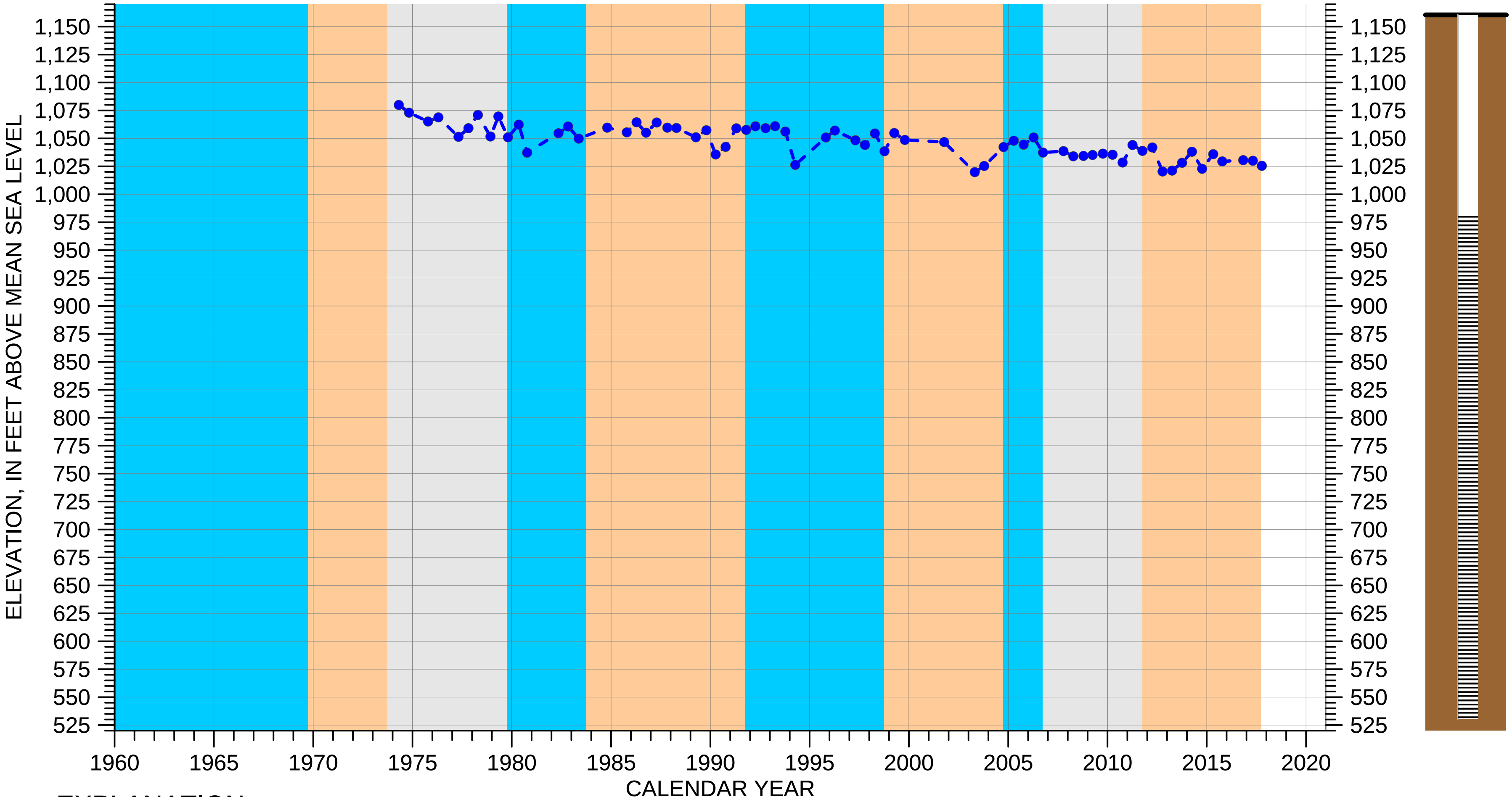


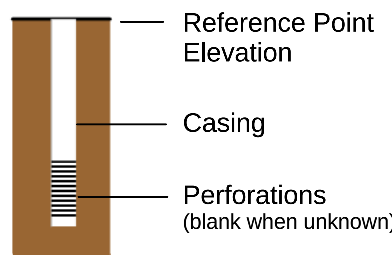
EXPLANATION

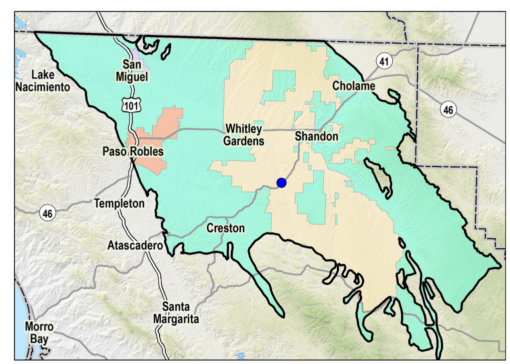
GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET



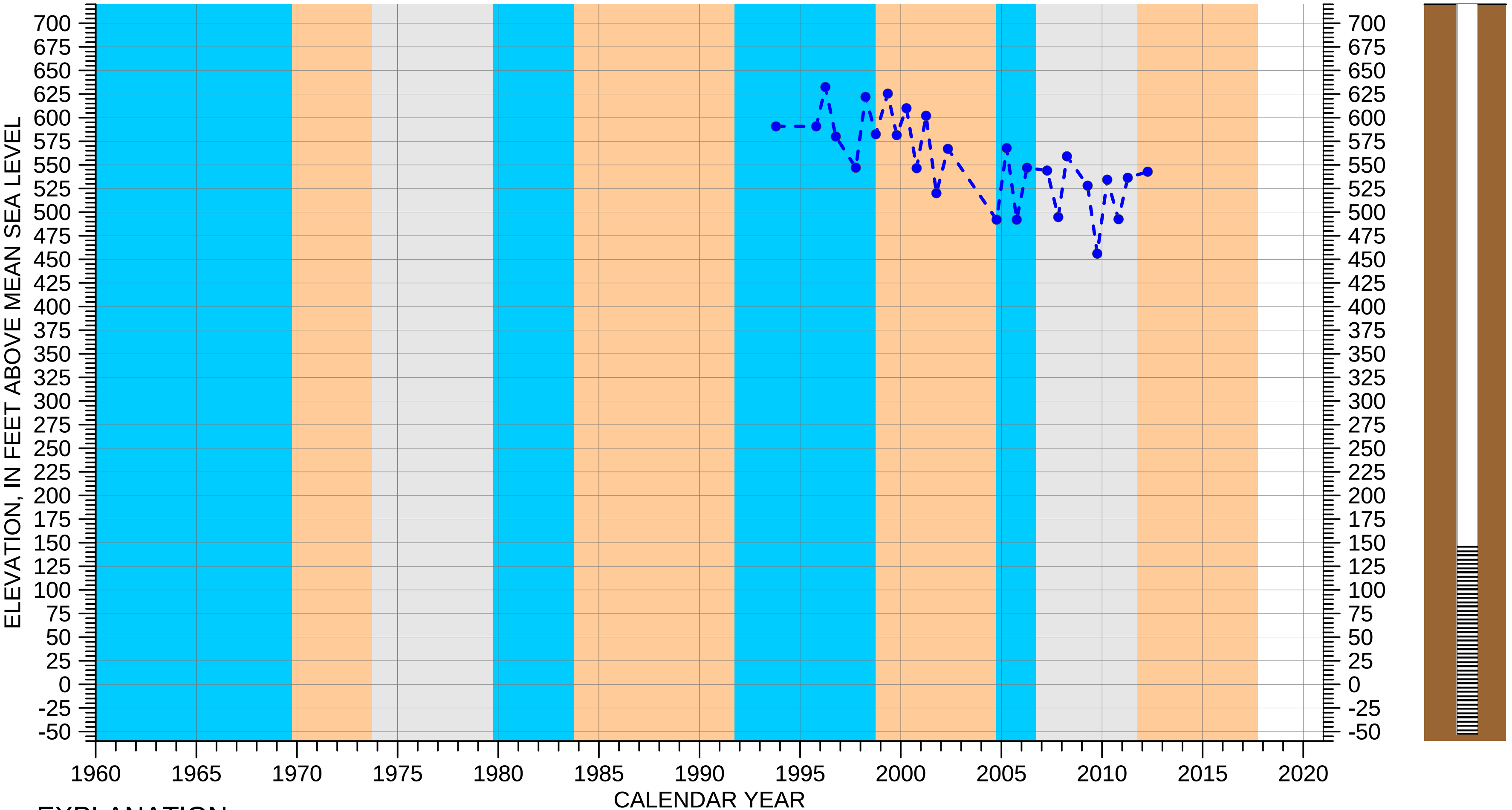


Well Depth: 630
Screened Interval: 180-630 feet below ground surface
Reference Point Elevation: 1160.5 feet above mean sea level

* Measurement reported as not static

MEASURED WATER LEVELS FOR 27S/14E-11R01

S:\projects\9200_Paso Robles GSP\GSP\Ch 9-10 Coordination Effort\Ch 9\Appendices\AppendixJ_SimulatedHydrographs\grf\Observed_only_noSMC\Fig12_27S_14E-11R01.grf



EXPLANATION

GROUNDWATER ELEVATION

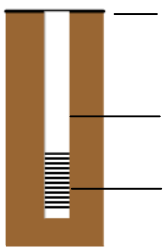
MEASUREMENT NOT VERIFIED*

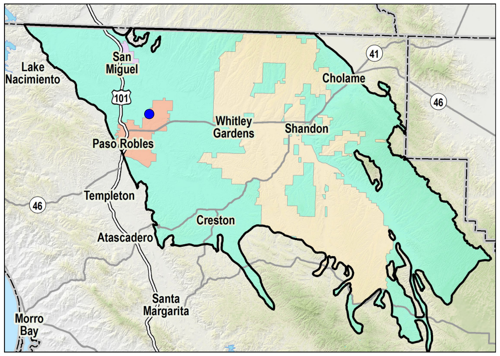
CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Well Depth: 840
Screened Interval: 640- ~840 feet below ground surface
Reference Point Elevation: 787 feet above mean sea level

* Measurement reported as not static





MEASURED WATER LEVELS FOR 26S/12E-14G02

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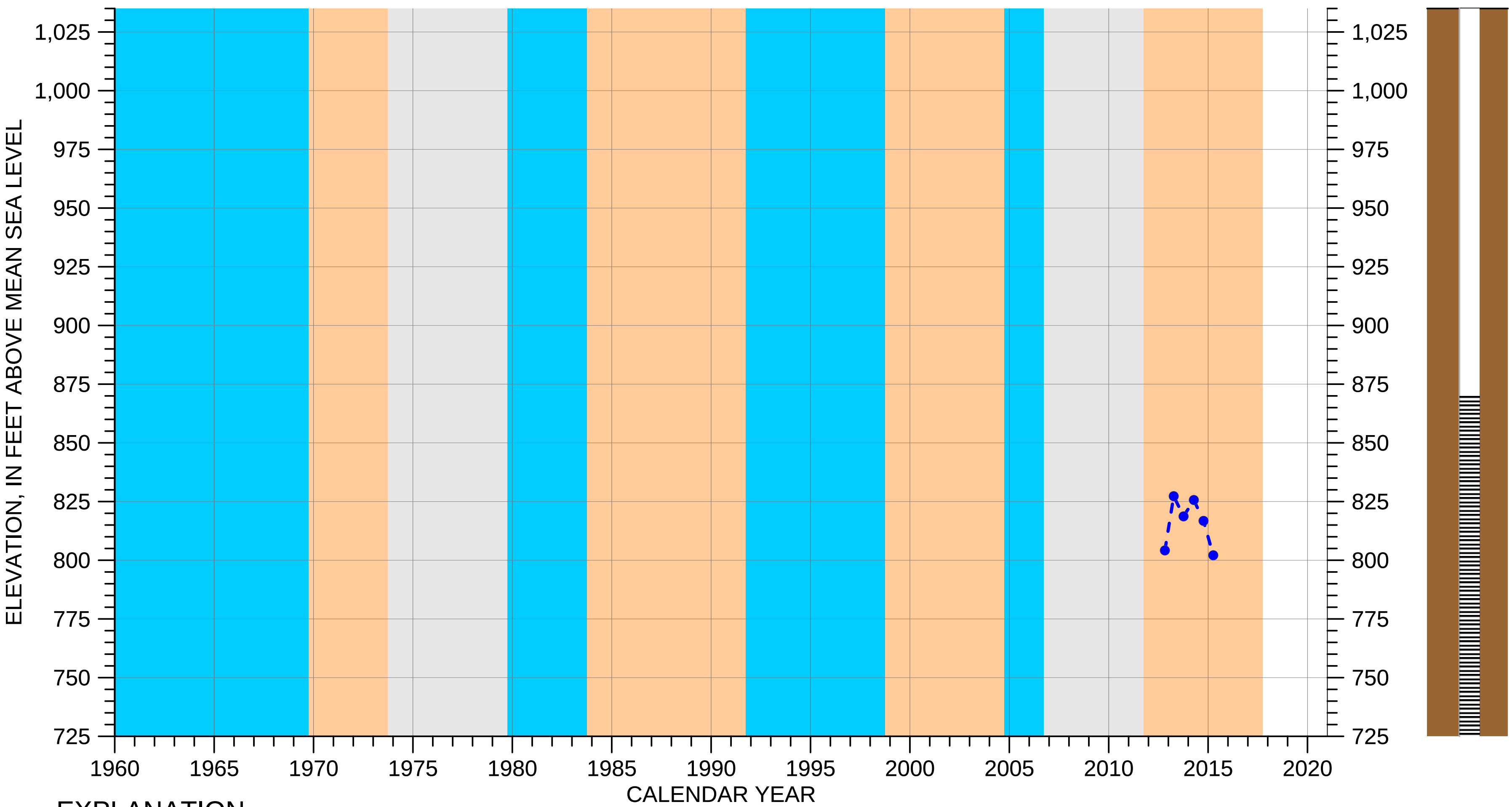


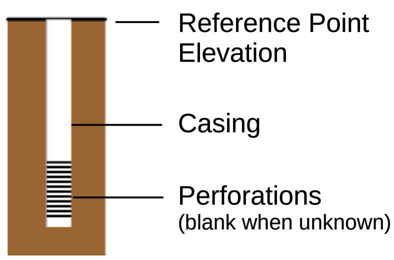
EXPLANATION

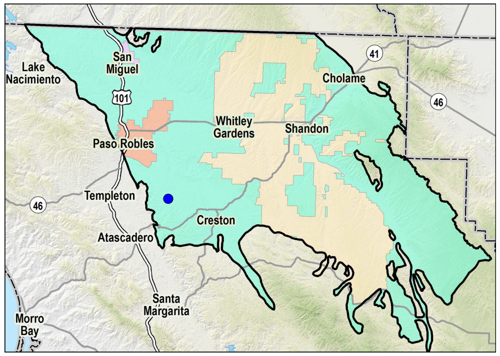
GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET



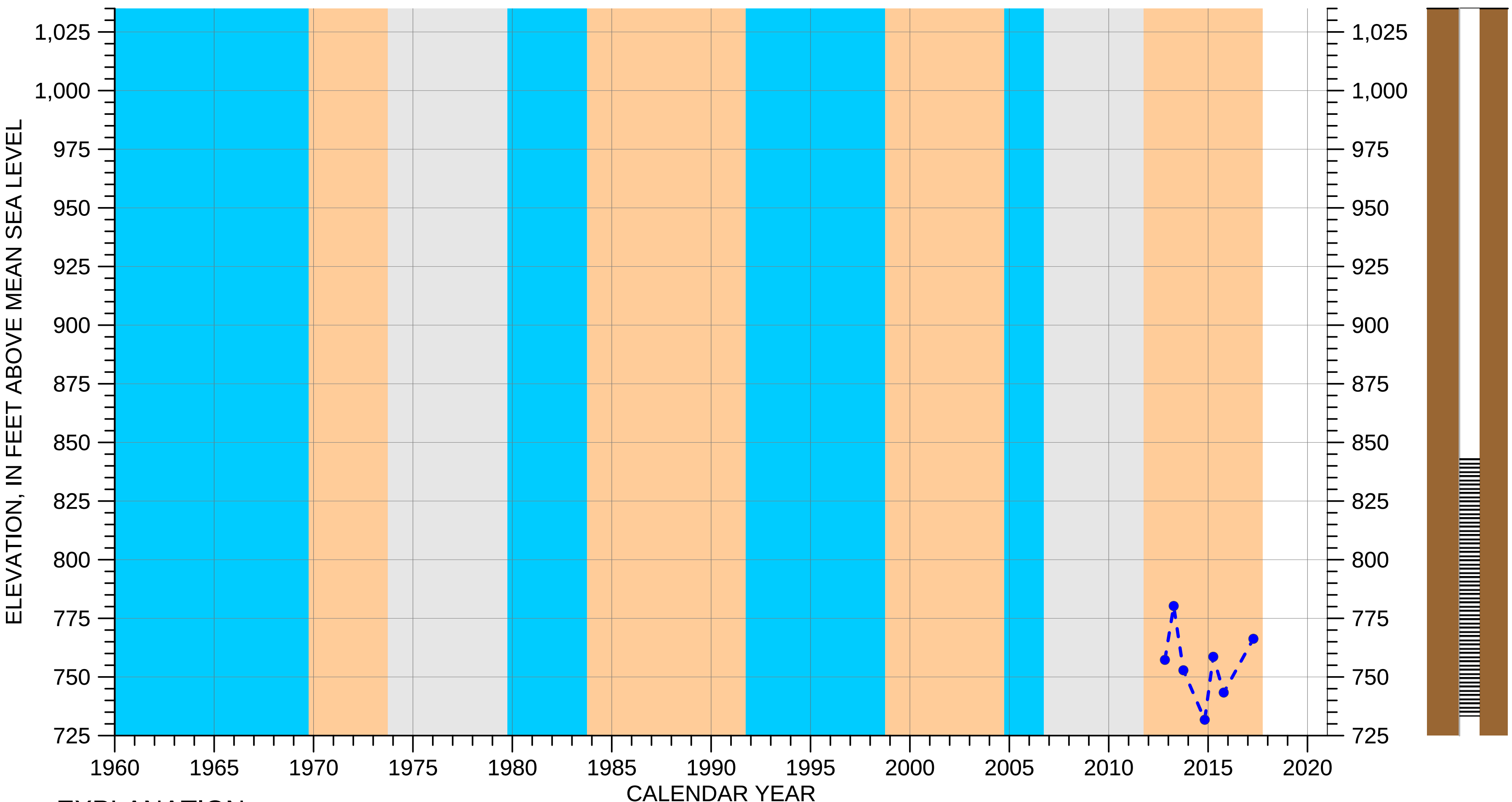


Well Depth: 685
Screened Interval: 225-685 feet below ground surface
Reference Point Elevation: 1095 feet above mean sea level

* Measurement reported as not static

MEASURED WATER LEVELS FOR 27S/13E-30J01

S:\projects\9200_Paso Robles GSP\GSP\Ch 9-10 Coordination Effort\Ch 9\Appendices\AppendixJ_SimulatedHydrographs\grf\Observed_only_noSMC\Fig13_27S_13E-30J01.grf



EXPLANATION

GROUNDWATER ELEVATION

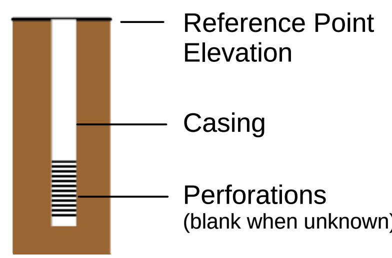
MEASUREMENT NOT VERIFIED*

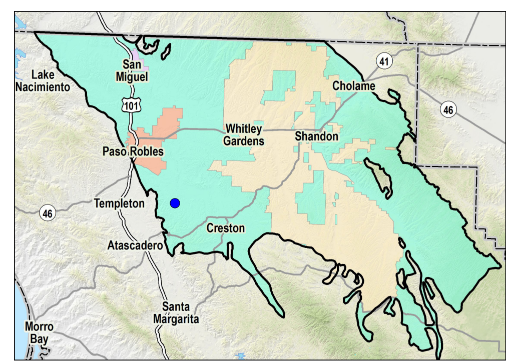
CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Well Depth: 310
Screened Interval: 200-310 feet below ground surface
Reference Point Elevation: 1043.2 feet above mean sea level

* Measurement reported as not static





MEASURED WATER LEVELS FOR 27S/13E-30F01

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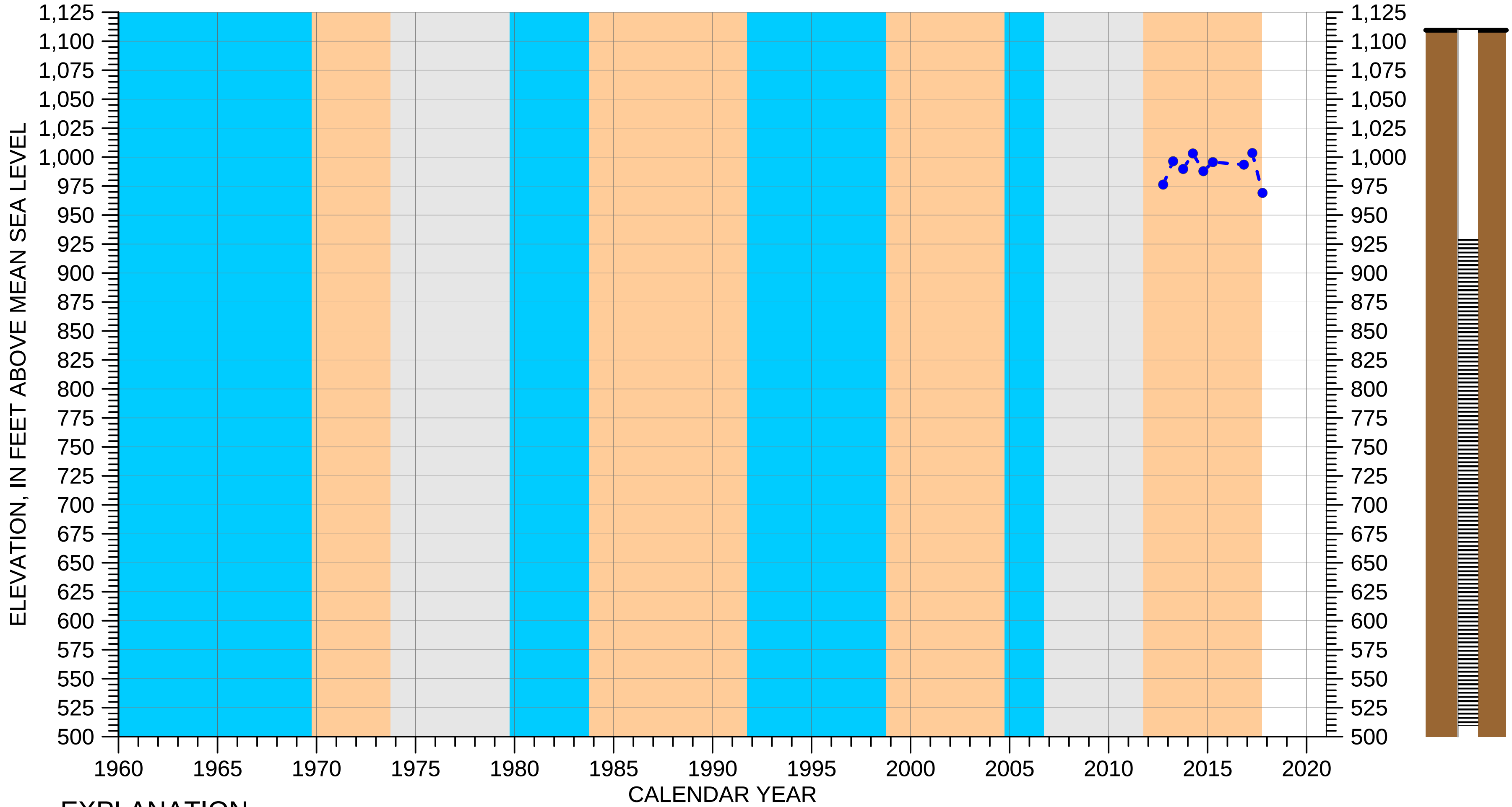


EXPLANATION

GROUNDWATER ELEVATION

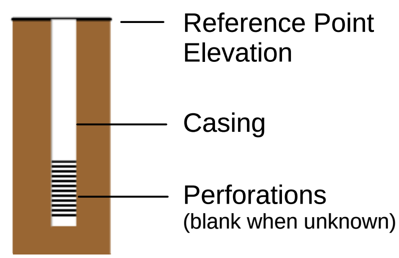
MEASUREMENT NOT VERIFIED*

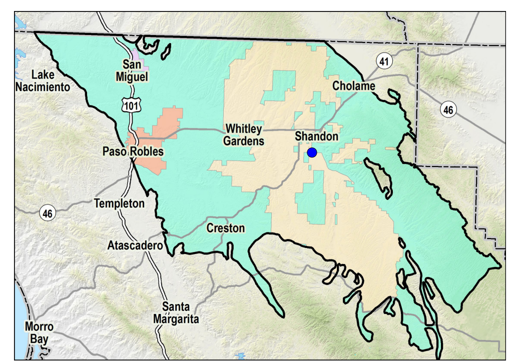
CLIMATE PERIOD CLASSIFICATION

DRY | AVERAGE/ALTERNATING | WET

Well Depth: 600
Screened Interval: 180-600 feet below ground surface
Reference Point Elevation: 1109.5 feet above mean sea level

* Measurement reported as not static





MEASURED WATER LEVELS FOR 26S/15E-29R01

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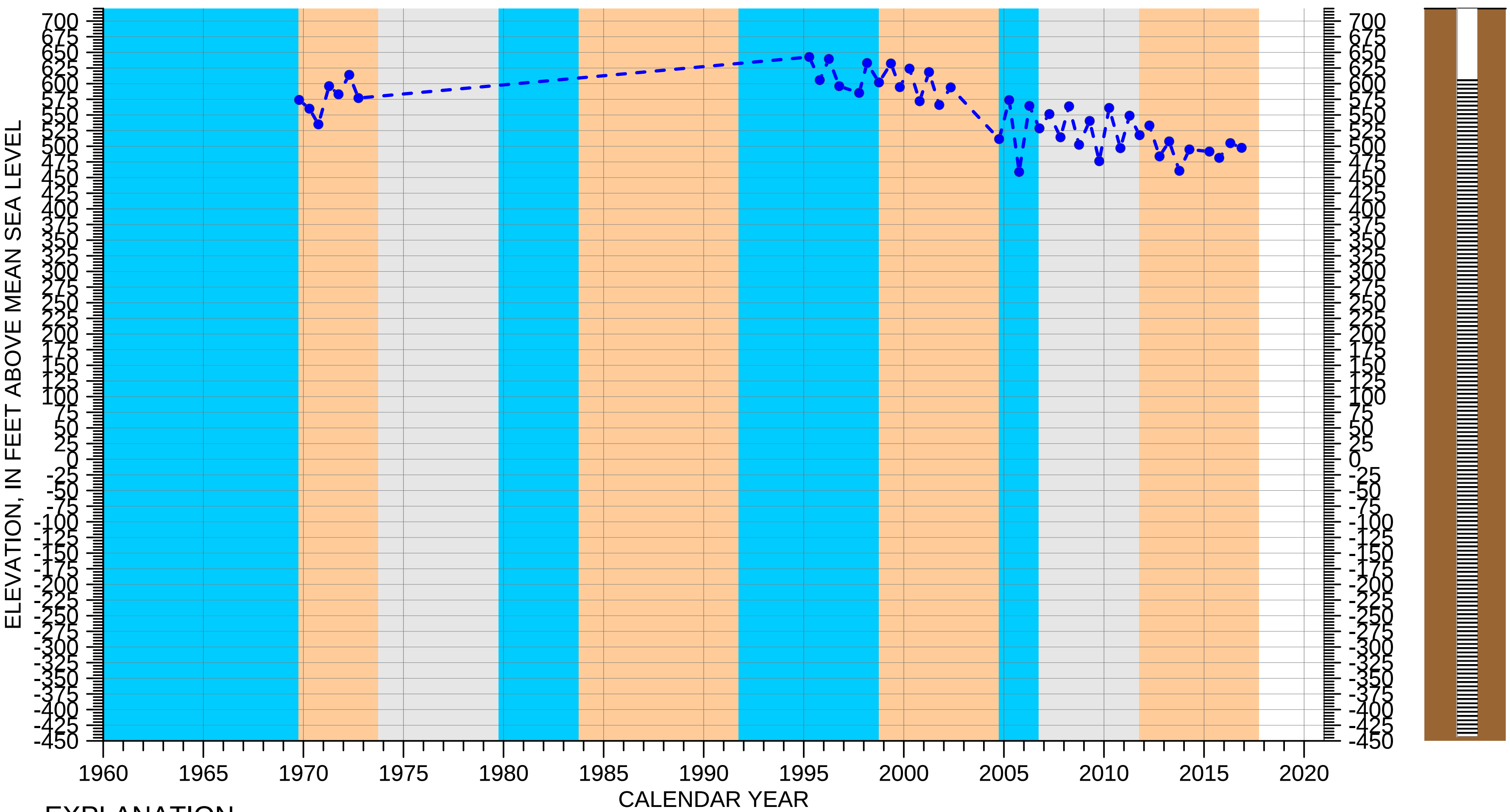


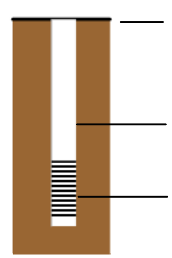
EXPLANATION

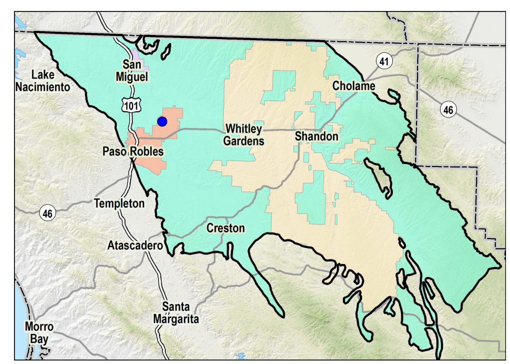
GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET



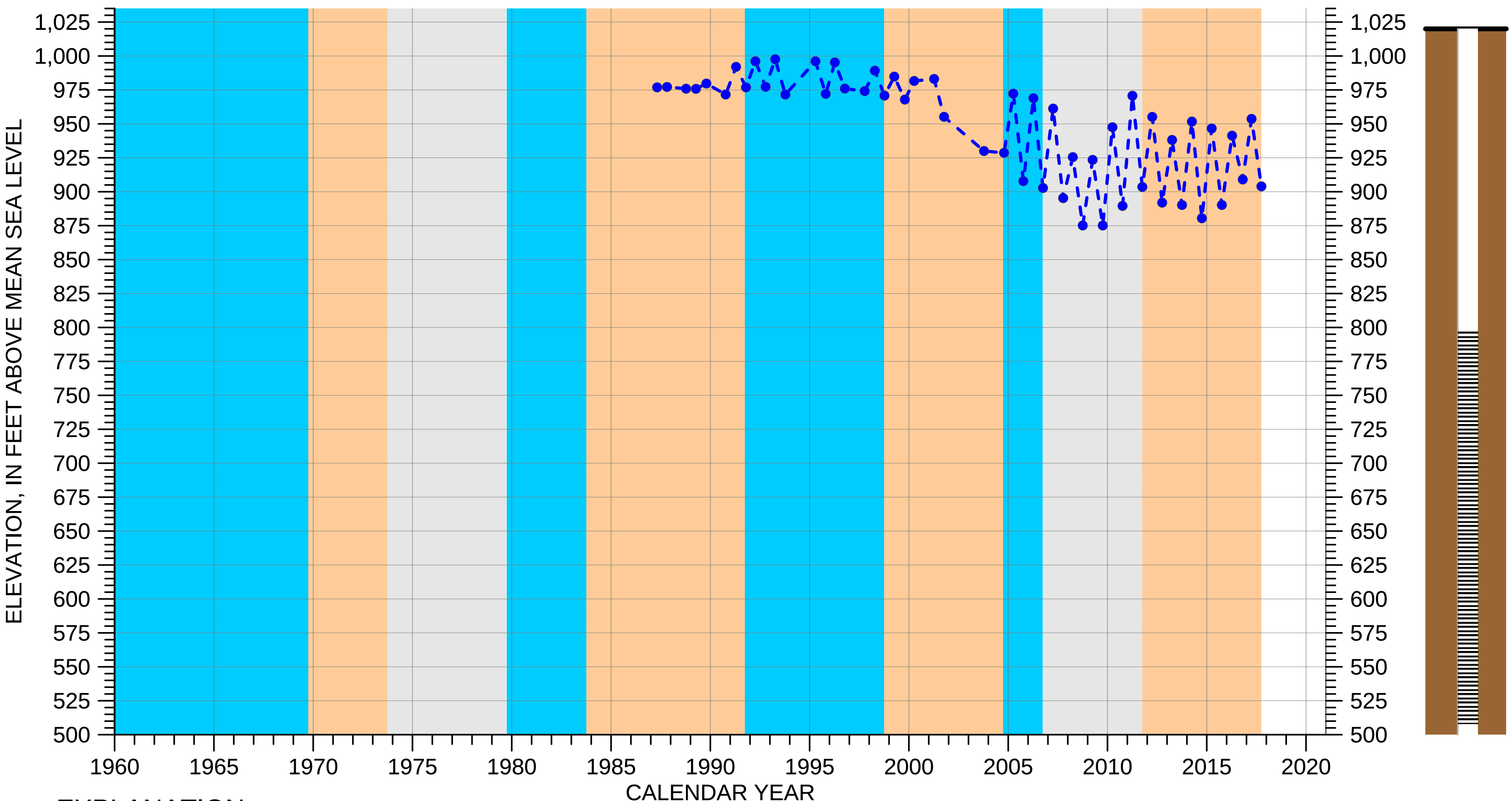


Well Depth: 1230
Screened Interval: 180-~1230 feet below ground surface
Reference Point Elevation: 790 feet above mean sea level

* Measurement reported as not static

MEASURED WATER LEVELS FOR 26S/12E-14H01

S:\projects\9200_Paso Robles GSP\GSP\Ch 9-10 Coordination Effort\Ch 9\Appendices\AppendixJ_SimulatedHydrographs\grf\Observed_only_noSMC\Fig16_26S_12E-14H01.grf



EXPLANATION

GROUNDWATER ELEVATION

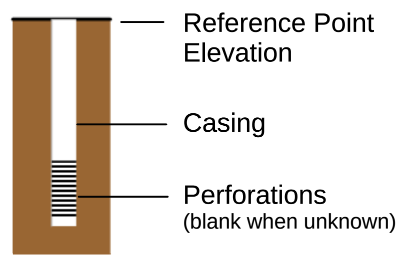
MEASUREMENT NOT VERIFIED*

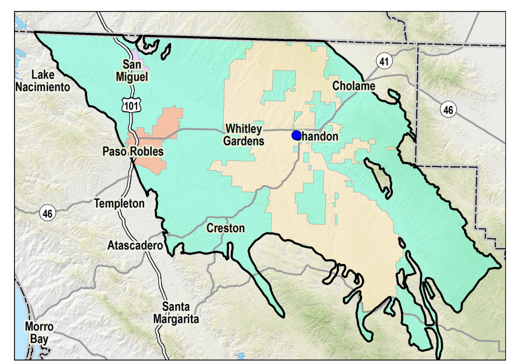
CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Well Depth: 512
Screened Interval: 223-512 feet below ground surface
Reference Point Elevation: 1020 feet above mean sea level

* Measurement reported as not static





MEASURED WATER LEVELS FOR 26S/15E-19E01

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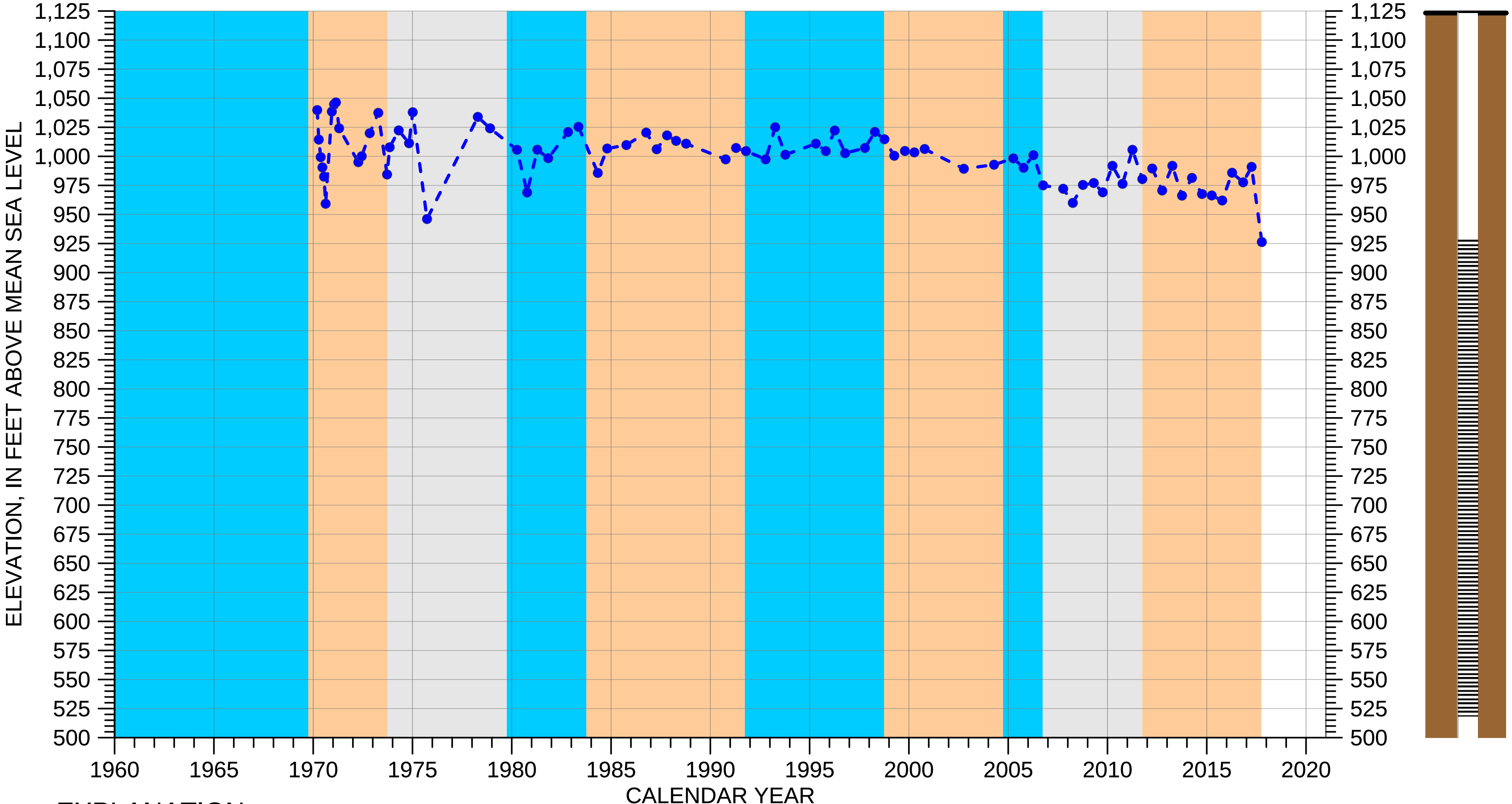


EXPLANATION

GROUNDWATER ELEVATION

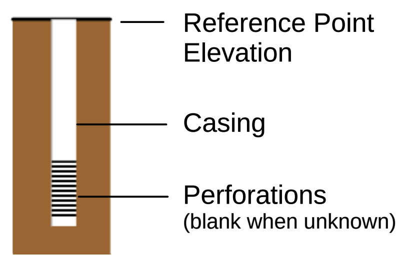
MEASUREMENT NOT VERIFIED*

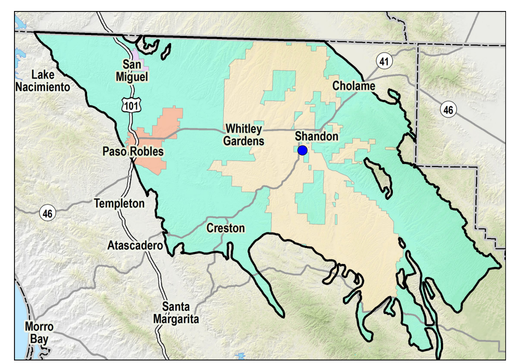
CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Well Depth: 605
Screened Interval: 195-605 feet below ground surface
Reference Point Elevation: 1123.3 feet above mean sea level

* Measurement reported as not static





MEASURED WATER LEVELS FOR 26S/15E-30J01

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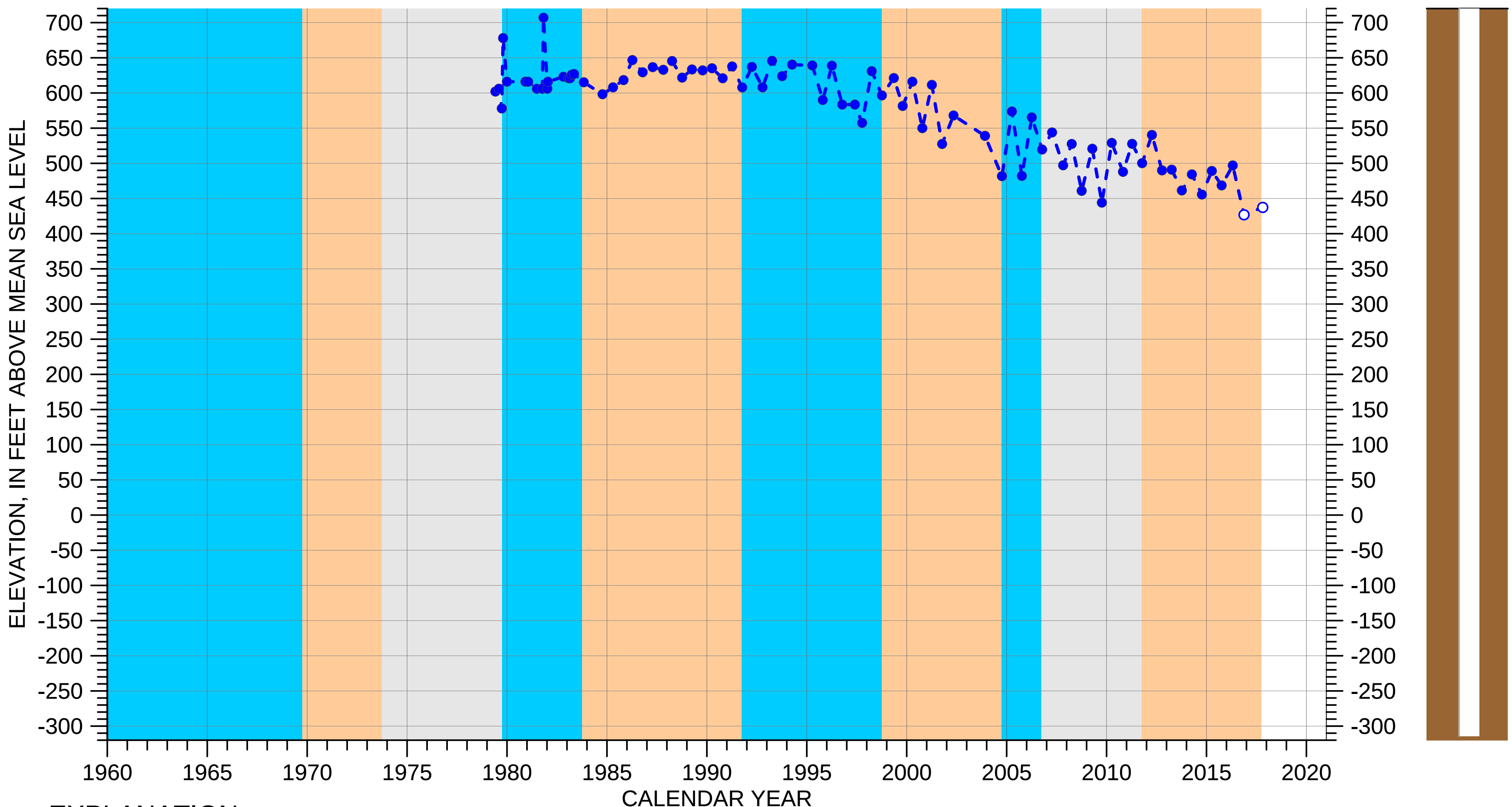


EXPLANATION

GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

CLIMATE PERIOD CLASSIFICATION

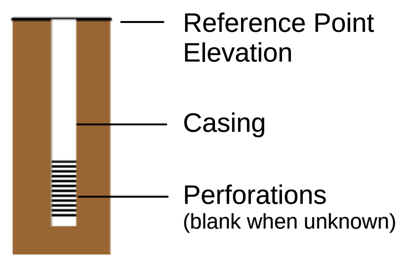
DRY

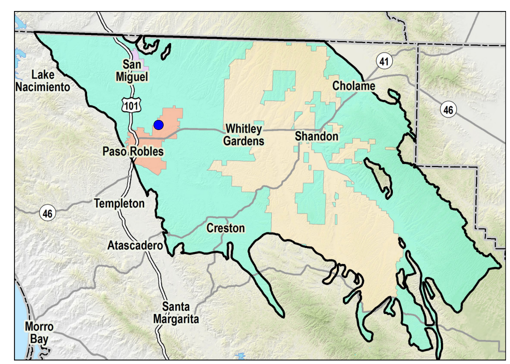
AVERAGE/ALTERNATING

WET

Well Depth: 1100
Screened Interval: unknown
Reference Point Elevation: 786 feet above mean sea level

* Measurement reported as not static





MEASURED WATER LEVELS FOR 26S/12E-14K01

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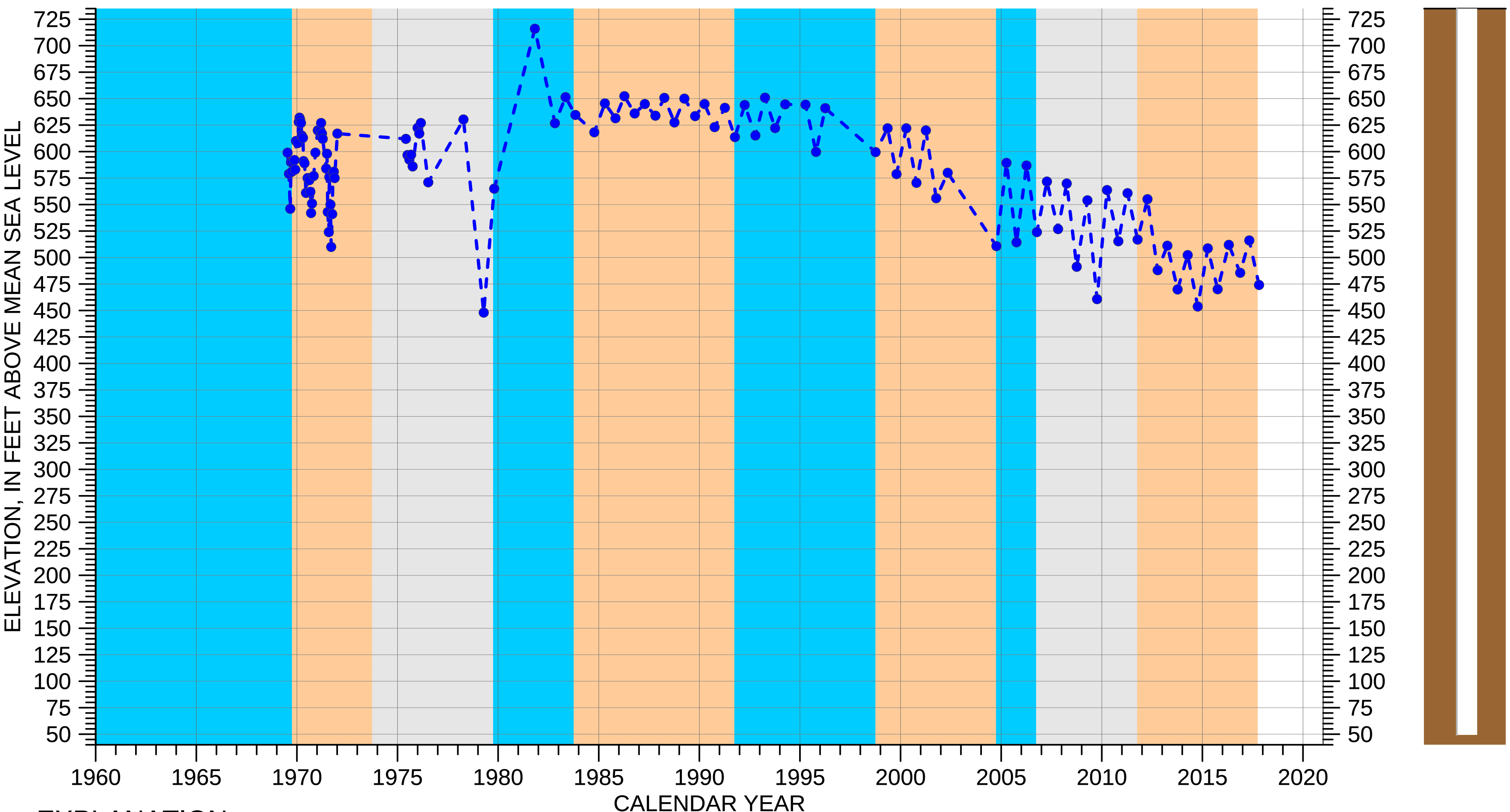


EXPLANATION

GROUNDWATER ELEVATION

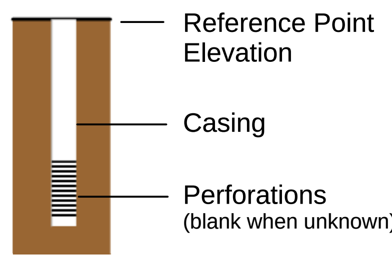
MEASUREMENT NOT VERIFIED*

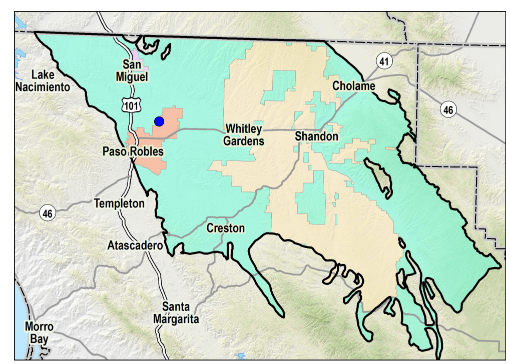
CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Well Depth: 740
Screened Interval: unknown
Reference Point Elevation: 789.3 feet above mean sea level

* Measurement reported as not static





MEASURED WATER LEVELS FOR 26S/12E-14G01

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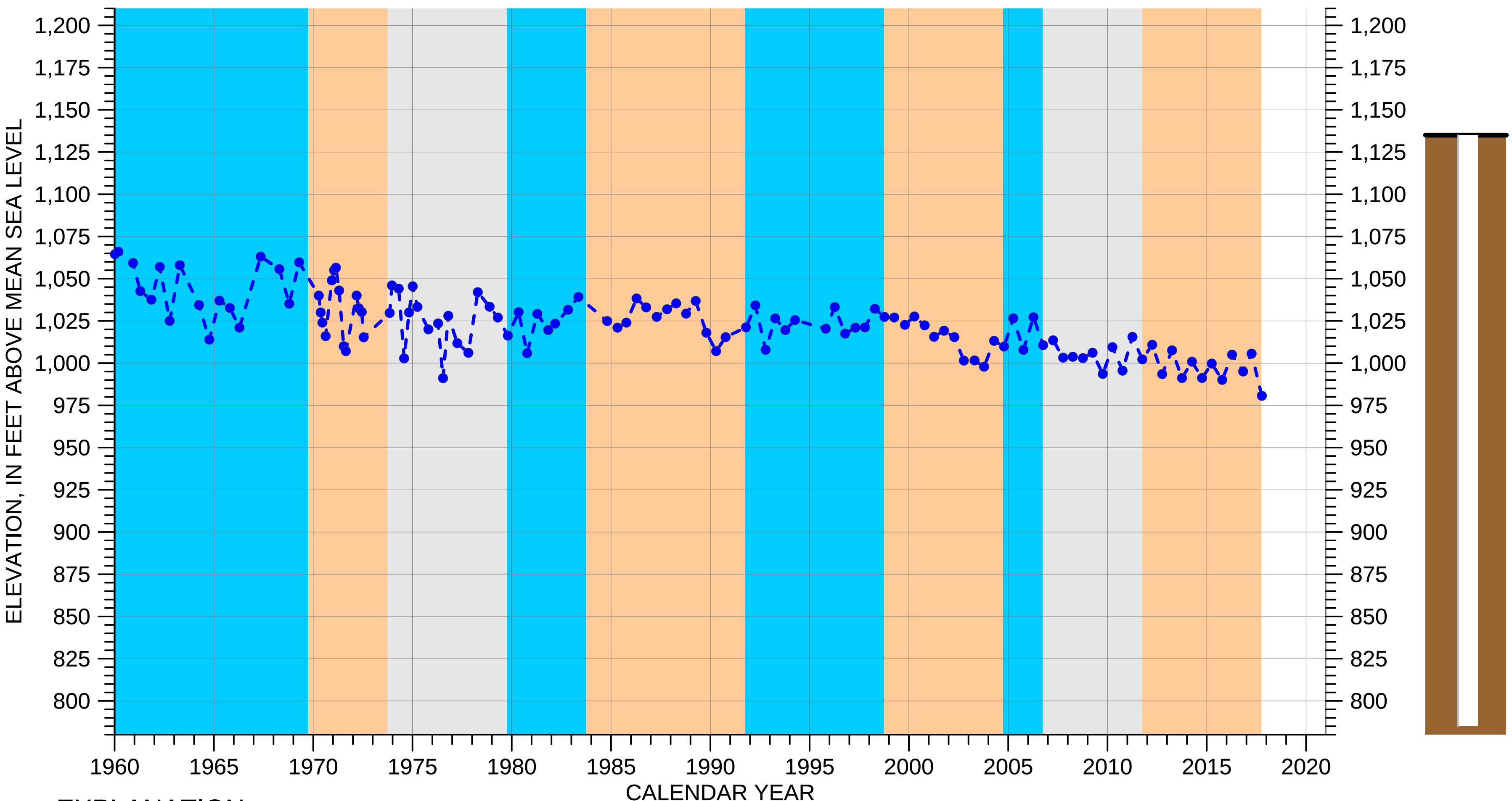


EXPLANATION

GROUNDWATER ELEVATION

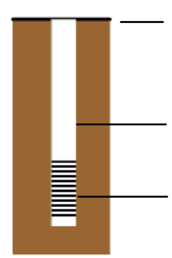
MEASUREMENT NOT VERIFIED*

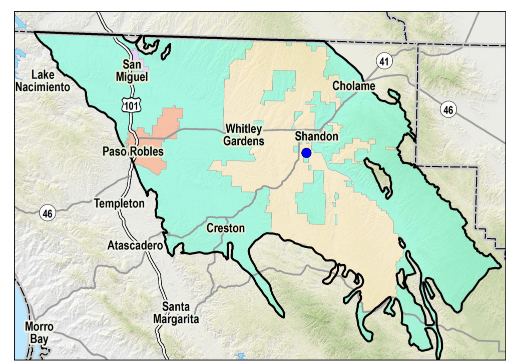
CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Well Depth: 350
Screened Interval: unknown
Reference Point Elevation: 1135 feet above mean sea level

* Measurement reported as not static





MEASURED WATER LEVELS FOR 26S/15E-29N01

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Appendix E

Summary of Model Update and Modifications

Appendix E. Summary of Model Update and Modifications

LIST OF FIGURES

LIST OF TABLES

E1 INTRODUCTION

This appendix briefly summarizes modeling work done for the GSP. A hydrologic modeling platform was developed for the Paso Robles Subbasin during the period from 2005 through 2016. This modeling platform was adapted for the GSP. Modeling work conducted for the GSP included the following activities:

- Updating the platform with recent hydrologic information
- Modifying certain components of the platform to address computational issues identified during the update process
- Adapting the water budgeting process to be consistent with the new boundary of the Paso Robles Subbasin[1]. Figure E-1 of the GSP shows the new Subbasin Boundary (in green); the GSP only applies to the new Subbasin area, thus, water budgets reported in the GSP do not include areas within the former Subbasin boundary that lie north of the San Luis Obispo County Line and do not include the Atascadero Subbasin. Therefore, groundwater budgets reported in the GSP are not directly comparable to previously reported groundwater budgets.

[1] The Subbasin boundary was formally modified by the California Department of Water Resources on February 11, 2019. Information on the modified boundary can be found at https://water.ca.gov/Programs/Groundwater-Management/Basin-Boundary-Modifications.

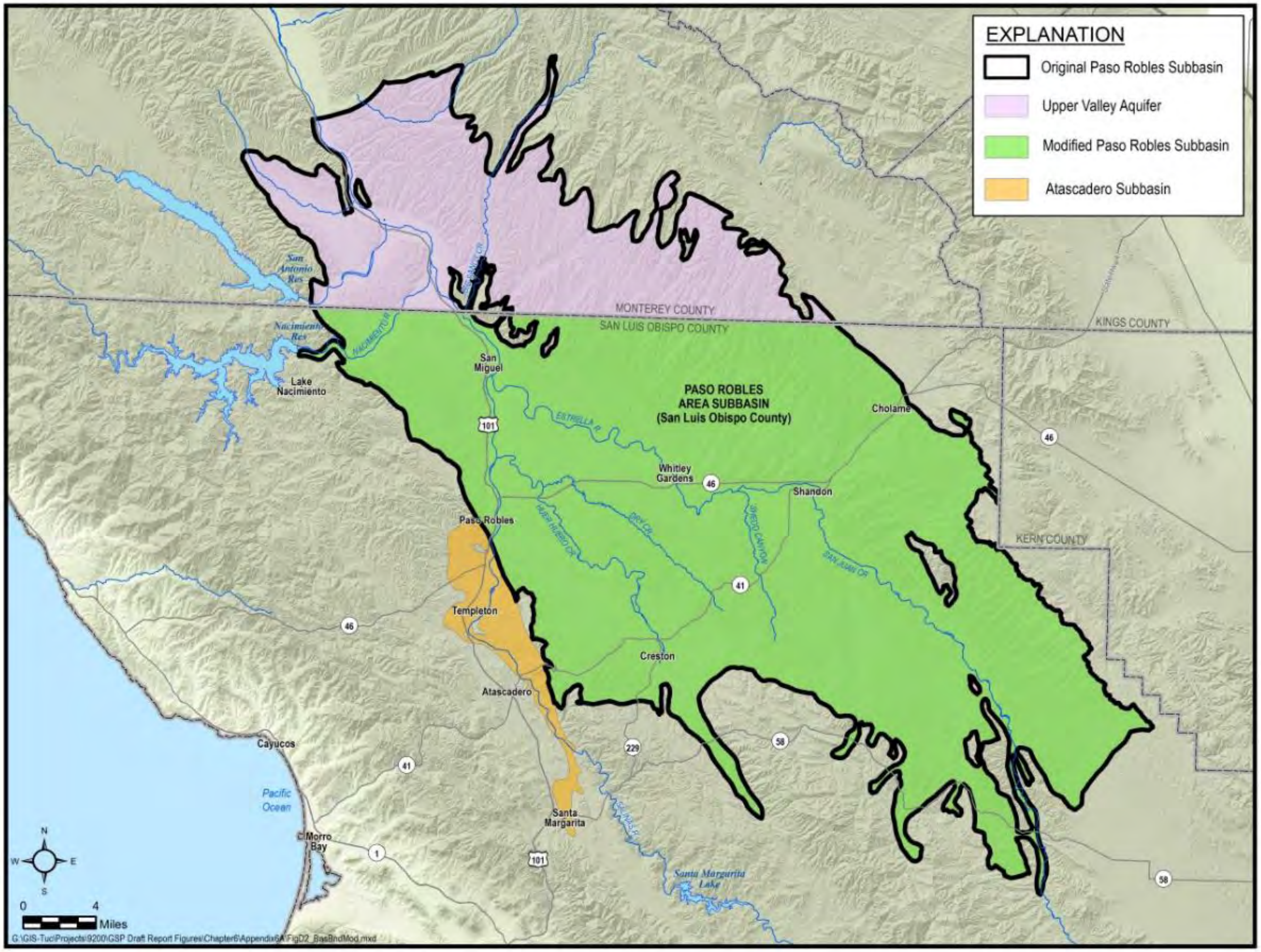


Figure E-1. Map Showing Paso Robles Subbasin Boundary

This appendix summarizes the model update process and effects of changes to the modeling platform and the change in Subbasin boundary on computed groundwater budgets, and presents a comparison between previously reported groundwater budgets and the computed groundwater budget for the GSP.

The appendix is subdivided into the following sections.

- Description of GSP Model
- Model Update
- Model Modifications
- Comparison of Groundwater Budgets

The hydrologic modeling platform includes a numerical groundwater flow model and two additional models that are used to compute groundwater model input data for streamflow, recharge, and groundwater pumping [Geoscience Support Services, Inc. (GSSI), 2014 and 2016]. The two additional models consist of a Soil Water Balance (SWB) spreadsheet model and a surface water model. The interrelationship between the groundwater model, SWB model, and surface water model are shown on Figure E-2. Hereafter in this appendix, the original hydrologic modeling platform developed by GSSI is referred to as "the GSSI model."

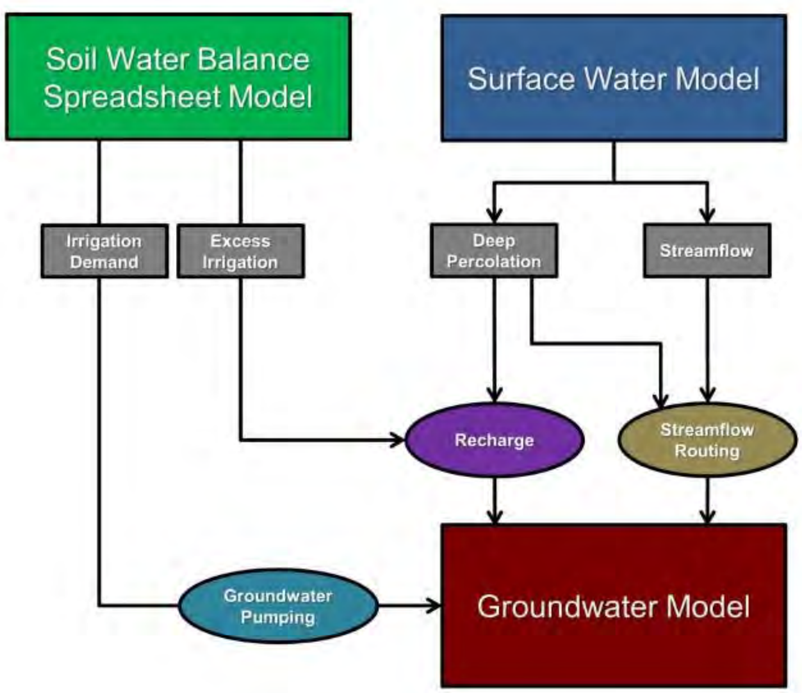


Figure E-2. Schematic for Modeling Platform

The GSSI model was updated for the GSP. The model update process included compiling hydrologic data and preparing model input files to extend the simulation time period from 2012 through 2016. Model modifications included changes to model structure, input/output processing routines, and model assumptions. Modifications were made to address issues that had a potentially significant impact on the computed water budget and groundwater storage deficit. These modifications were made to develop an updated estimate of the groundwater storage deficit that must be addressed during implementation of the GSP.

As was planned from the outset of GSP development, and to meet critical deadlines, the GSP model was not recalibrated. In lieu of recalibration, a focused comparison of model-projected and observed groundwater elevations at wells and stream flows at selected stream gages was conducted. Results of this comparison indicated that the calibration of the GSP model was similar to the GSSI model, thus, the model was considered appropriate for use on the GSP. The GSP model will be recalibrated in the future when additional hydrogeologic data are available.

E1.1 Overview of Differences in Computed Sustainable Yield

Previous and current estimates of sustainable yield of the Subbasin were computed using the modeling platform. Both the model modifications and the change in Subbasin boundary influence the computed sustainable yield. Over the historical base period from 1981 through 2011, the computed sustainable yield from the 2016 GSSI model is about 89,700 acre-feet per year (AFY). This estimate of sustainable yield pertains to the original Subbasin boundary and the Atascadero Subbasin. By comparison, the computed sustainable yield for the modified Subbasin boundary from the updated GSP model is about 59,800 AFY. The difference between these two values is nearly 30,000 AFY. About 80% of this difference is due to changes in the Subbasin boundary. The remaining difference is the result of modifications made to the model components.

E2 DESCRIPTION OF GSP MODEL

E2.1 Soil Water Balance Spreadsheet Model

The SWB model uses rainfall, evapotranspiration, soil, and crop data to estimate groundwater irrigation demand for crops in the Subbasin. Irrigated crops in the Paso Robles Subbasin are assigned to seven crop categories (Carollo and others, 2012), including alfalfa, nursery, pasture, citrus, deciduous, vegetables, and vineyard. For the GSP model, geospatial crop datasets compiled by the Agricultural Commissioner's Office of San Luis Obispo County were intersected with different climate zones and soil types in both the Paso Robles Subbasin and surrounding watershed. For each of the seven crop categories, existing discrete SWB models were extended in time for each unique intersection of crop acreage, climate zone, and soil type to cover the current period (2012-2016).

The underlying structure and data requirements are identical for all of the SWB spreadsheet models, except vineyards. All of the SWB models operate on a daily time step, and require daily precipitation and reference evapotranspiration rates as input. SWB models developed for vineyards also require daily minimum temperature data to estimate frost prevention groundwater pumping during March and April.

The SWB model computes daily irrigation demand rates in inches. Groundwater pumping to satisfy the irrigation demand is higher than the actual crop demand due to excess irrigation losses, which depend on assumed irrigation efficiency. The study documented by GSSI (2014) defined irrigation efficiency for each of the seven crop categories, and those efficiency values were also used in this study. The difference between groundwater pumping and crop irrigation demand is assumed to percolate past the base of the root zone, ultimately becoming groundwater recharge. This recharge is referred to as irrigation return flow in Chapter 6.

E2.2 Surface Water Model

A surface water model was developed by GSSI (2014) for the watershed contributing to the Paso Robles Subbasin. The surface water model was developed using the Hydrologic Simulation Program – Fortran (HSPF) code. The model simulates land surface processes and surface water flow at the subwatershed scale (Bicknell and others, 2001). The surface water model simulates daily time steps, and requires daily precipitation, reference evapotranspiration, and reservoir releases as input. Historical watershed simulations developed by GSSI (2014) used land use data for 1985, 1997, and 2011 in the surface water model. The 2011 land use data were used to update the GSP model.

The surface water model simulates deep percolation of precipitation past the base of the root zone and streamflow leaving the outlet of each subwatershed. The amount of deep percolation of precipitation computed by the surface water model was included in the recharge assigned to the groundwater model, and simulated streamflow at the subwatershed outlet was used to compute surface flow rates for stream segments simulated in the groundwater model.

E2.3 Groundwater Model

The groundwater flow model for the Paso Robles Subbasin uses the MODFLOW-2005 code (GSSI, 2014 and 2016). The extent and structure of the GSSI model are based on an earlier version of the groundwater flow model developed by Fugro (2005). Groundwater inflows simulated in the model include areal recharge, subsurface inflow at the model boundaries, and streambed percolation. Areal recharge includes both recharge from precipitation and irrigation return flow. Groundwater outflows simulated in the model include subsurface flow out of the Subbasin, groundwater pumping, and riparian evapotranspiration.

Areal recharge and subsurface inflow are computed based on excess irrigation from the SWB model and deep percolation of precipitation from the surface water model. Streambed percolation depends on both simulated water table elevation and simulated streamflow, which in turn is based on simulated streamflow from the surface water model. Agricultural groundwater pumping is specified based on irrigation demand computed in the SWB model.

E3 MODEL UPDATE

SGMA regulations require estimation of surface water and groundwater budgets for both a historical base period and current period. For the Subbasin, the historical base period covers Water Years (WY) 1981 through 2011 and the current period covers WY 2012 through 2016. The existing model covers only the historical base period (GSSI, 2014; GSSI, 2016). To comply with SGMA regulations for developing a current water budget, it was necessary to update the 2016 version of the GSSI model to include hydrologic data from 2012 through 2016.

Each of the three components of the modeling platform was updated to include the current period. Table E-1 lists datasets used for the model update, along with the source for each dataset.

Table E-1. Data Sources for Model Update

Dataset	Responsible Agency or Entity	Type of Data	Data Source
Meteorological Data			
Paso Robles Station (46730); Santa Margarita Booster Station (47933)	NOAA[1]	Daily precipitation	https://www.ncdc.noaa.gov/cdo-web/datatools/findstation
San Miguel Wolf Ranch (47867)	NOAA[1]	Daily precipitation	ftp://ftp.ncdc.noaa.gov/pub/data/hpd/auto/v2/beta/
Oak Shores WWTP (201)	San Luis Obispo County	Daily precipitation	Electronic transmittal from SLO County
Paso Robles	WWG[2]	Daily reference evapotranspiration	Electronic transmittal
Atascadero (163)	CIMIS[3]	Daily reference evapotranspiration	https://cimis.water.ca.gov/WSNReportCriteria.aspx
Hydrologic Data			
Nacimiento Reservoir	Monterey County Water Resources Agency	Daily reservoir releases	http://www.co.monterey.ca.us/government/government-links/water-resources-agency/projects-facilities/historical-data#wra
San Antonio Reservoir	Monterey County Water Resources Agency	Daily reservoir releases	http://www.co.monterey.ca.us/government/government-links/water-resources-agency/projects-facilities/historical-data#wra
Salinas Dam	San Luis Obispo County	Daily reservoir releases	https://wr.slocountywater.org/site.php?site_id=25&site=2d50a617-2e23-4efc-a9be-e3a2c4a7100b
Water Use Data			
San Miguel CSD	San Miguel CSD	Monthly groundwater pumping	Excel file (Paso_Water_Use_Tables_v7.xlsx) received from GEI Consultants on 14 June 2018; data provided to GEI by San Miguel CSD
City of Paso Robles	City of Paso Robles	Monthly groundwater pumping	Excel file (Paso_Water_Use_Tables_v7.xlsx) received from GEI Consultants on 14 June 2018; data provided to GEI by City

			of Paso Robles
Templeton CSD	Templeton CSD	Annual groundwater pumping	Water Supply Buffer Update, January 31, 2018
Atascadero MWC	Atascadero MWC	Annual groundwater pumping	Atascadero MWC Urban Water Management Plan
Small commercial pumping	N/A	Annual groundwater pumping	For pumping that started before 2010, projected based on historic use in 2016 model (linear regression trend). For water use that began in 2010; assume 1% annual increase through 2016.
Domestic pumping	N/A	Annual groundwater pumping	Projected based on historic use in 2016 model (linear regression trend).
Agricultural pumping	N/A	Annual groundwater pumping	Pumping based on groundwater demand from soil water-balance spreadsheets
Wastewater Recharge			
Wastewater recharge (all utilities)	N/A	Annual recharge to groundwater from wastewater	Projected based on rates in 2016 model (linear regression trend).
Crop Data			
San Luis Obispo County, 2013-2016	San Luis Obispo County	Geospatial data attributed with acreage and crop group	Electronic transmittal from SLO County
State of California, 2014	CA DWR[4]	Geospatial data attributed with acreage and crop group	https://gis.water.ca.gov/app/CADWRLandUseViewer/

(1) National Oceanic and Atmospheric Administration

(2) Western Weather Group

(3) California Irrigation Management Information System

(4) California Department of Water Resources

E4 MODEL MODIFICATIONS

E4.1 Modifications to Model Components

Groundwater budgets for the Subbasin were derived from the groundwater flow model, which depends on the SWB models and surface water model for key input data. During the model update process for the GSP model, several modifications were made to the individual models to improve two computational aspects of the model.

E4.1.1 Modifications to Agricultural Irrigation Routing

In the model input files developed by GSSI and provided to the GSAs by the County of San Luis Obispo, irrigation return flow was routed to the surface water model. This irrigation return flow was treated as an external lateral surface inflow to the land surface. The surface water model combines this water with all direct precipitation that was not intercepted by the crop canopy. Some of the water accumulating at the land surface becomes streamflow. The remaining water enters the soil root zone. In the GSSI model, excess irrigation return flow water accumulating in the upper and lower soil root zones was subject to evapotranspiration. However, excess irrigation return flow represents water that has moved past the root zone, and should not be subject to evapotranspiration. Thus, irrigation return flow was inadvertently subjected to soil evaporation twice. The net effect of double-counting soil evaporation was to underestimate the quantity of water that ended up as deep percolation to groundwater.

The models were modified so that irrigation return flow calculated in the SWB models was routed to groundwater recharge in the groundwater flow model instead of routed to the surface water model. As a result, areal recharge specified in the GSP model is greater than areal recharge specified in the GSSI model.

E4.1.2 Modifications to Streamflow Routing Outside the Paso Robles Subbasin

In the GSSI model, subsurface inflow was computed as the sum of irrigation return flow, deep percolation of direct precipitation, and streambed percolation occurring outside the Subbasin boundaries. Streambed percolation was computed by HSPF as an outflow from each stream reach. The streambed percolation was computed using reference information from the HSPF Best Management Practices toolkit developed by the U.S. Environmental Protection Agency (GSSI, 2014).

Modifications were made to the process described above to ensure consistency in the simulated water balance. In HSPF, stream outflows and streambed percolation are routed to the next downstream stream reach. Consequently, when a stream enters the margin of the Paso Robles

Subbasin, HSPF routes all of the streamflow and streambed percolation into the stream network within the Subbasin. However, in the GSSI model, the streambed percolation water was also being added to the groundwater model as subsurface inflow. This means percolating water through streambeds in the watershed outside of the Subbasin was being double counted: as both stream inflow and subsurface inflow.

To avoid double counting the inflow, M&A modified the groundwater model input files so that subsurface inflow no longer included HSPF model-computed streambed percolation outside the Paso Robles, Atascadero, and Upper Valley Subbasins. The primary effect of this change was a reduction in subsurface inflow into the groundwater model. A secondary effect of this change was a reduction in inflow to streams inside the Subbasin boundary due to excess subsurface inflow.

Reduction in stream inflows as a result of modifications described above is due to an input processing procedure developed by GSSI (2016). Specifically, the 2016 version of the GSSI model included an empirical procedure for re-assigning computed subsurface inflow above a threshold value as surface water inflow to streams inside the Subbasin boundaries. The GSP model uses the same procedure; however, streambed percolation is no longer double counted, thus computed subsurface inflow in excess of the threshold is lower in the GSP model than compared to the GSSI (2016) model.

E4.1.3 Summary of Effects of Model Modifications

The net effect of correcting excess agricultural irrigation routing was to increase areal recharge within the Paso Robles Subbasin. The net effect of removing streambed percolation computed by the surface water model from subsurface inflow to the groundwater model was to reduce both subsurface inflow and surface water inflow to streams in the groundwater flow model. The combined effect of these two modifications was to reduce the amount of water recharging the groundwater system in the Subbasin.

E4.2 Change in Subbasin Boundary

The boundary of the Paso Robles Subbasin changed between completion of the 2016 GSSI model and the GSP model update.

In 2018, the California Department of Water Resources (DWR) redefined the Paso Robles Subbasin boundary in response to two basin boundary modification requests. As a result of this modification, the Atascadero Subbasin, and all land north of the Monterey County line are no longer included in the Paso Robles Subbasin (Figure E-1). The modified Subbasin area (in green) is addressed in the GSP. Groundwater budgets for the GSP are reported for the smaller Subbasin area. Previous groundwater budgets using the 2016 GSSI model were reported for the entire original Paso Robles Groundwater Subbasin, including the Atascadero Subbasin (GSSI, 2016).

Therefore, the GSP groundwater budgets are not directly comparable to the previous groundwater budgets.

E5 COMPARISON OF GROUNDWATER BUDGETS

Differences between previously published groundwater budgets and the groundwater budget published in the GSP are caused by:

- Modifications made to the modeling platform components
- Changes in the Subbasin boundary

These changes have a direct effect on the computed water budget, long-term groundwater storage deficit and sustainable yield in the Subbasin.

The effect of modifying the modeling platform on groundwater storage deficit and sustainable yield can be quantified by comparing the computed water budgets from 2016 GSSI and GSP models for the same Subbasin boundary. The effect of changing the Subbasin boundary on groundwater storage deficit and sustainable yield can be quantified by comparing the computed groundwater budget of the original Paso Robles Subbasin boundary to the groundwater budget of the modified Paso Robles Subbasin boundary using either the 2016 GSSI or GSP model.

E5.1 Effect of Model Modifications on Water Budgets

This section summarizes changes in water budget components, groundwater storage deficit, and sustainable yield that result from modifications made to the individual models of the modeling platform. Table E-2 compares annual average groundwater pumping rates by water use sector for the historical base period (1981 to 2011) specified for the original Paso Robles Subbasin boundary in the GSSI (2016) and GSP models.

Table E-2. Simulated Groundwater Pumping

	Original Subbasin Boundary	
Water Use Sector	GSSI (2016)	GSP model
Agricultural	75,900	75,800
Municipal	12,000	12,000
Rural-Domestic	2,800	2,800
Small Commercial	2,200	2,200
Total	92,900	92,800

Note: All values in AFY

Annual average groundwater pumping rates are nearly identical between the two models. The small increase of 100 AFY in annual average agricultural pumping in the GSP model is the result of minor modifications made to the model data processing spreadsheets.

Table E-3 compares simulated annual average inflow and outflow components of the groundwater budget for the original Paso Robles Subbasin boundary for the historical base period for the GSSI (2016) and GSP models.

Table E-3. Comparison of Annual Average Inflow and Outflow Components

	Original Subbasin Boundary	
	GSSI (2016)	GSP model
Inflow		
Streamflow Percolation	53,000	39,500
Total Recharge[1]	50,500	51,600
Treated Wastewater Leakage	5,600	5,600
Total Inflow	109,100	96,700
Outflow		
Groundwater Pumping	92,900	92,800
Discharge to Streams and Rivers	14,300	13,200
Riparian Evapotranspiration	3,500	3,500
Subsurface Outflow [2]	1,600	1,600
Total Outflow	112,300	111,100

Notes: All values in AFY

(1) Includes areal recharge and subsurface inflow from the surrounding watershed

(2) Includes subsurface outflow in the Salinas Alluvium and Paso Robles Formation at the northern boundary of the original Paso Robles Subbasin

Total inflow in the GSP model is about 12,400 AFY lower than the GSSI (2016) model for the original Subbasin boundary. The reduction in total inflow reflects the net change in inflow caused by a reduction of 13,500 AFY in streambed percolation and an increase of 1,100 AFY in total recharge. The changes in streamflow and recharge are described in Section D-E4.1.

Table E-4 compares the computed annual average groundwater storage deficit and sustainable yield from the GSSI (2016) and GSP models, for the original Subbasin boundary and historical base period of 1981 through 2011.

Table E-4. Annual Average Groundwater Storage Deficit and Sustainable Yield

	Original Subbasin Boundary	
	GSSI (2016)	GSP model
Storage Deficit	3,200	14,400
Sustainable Yield	89,700	78,400

Note: All values in AFY

The computed annual average storage deficit for the original Subbasin boundary for the GSP model is about 11,200 AFY greater than the GSSI (2016) model. The increase in the computed storage deficit is due almost entirely to the reduction in total groundwater inflows, as shown in Table E-3. The reduction in total inflow is the result of the reduction in streamflow that resulted from modifying the model components. Consequently, the annual average sustainable yield of the original Subbasin boundary estimated using the GSP model is about 11,300 AFY lower than that computed by the GSSI model.

E5.2 Effect of Changes in Subbasin Boundary on Water Budgets

This section summarizes changes in water budget components, groundwater storage deficit, and sustainable yield that result from the change in Subbasin boundary. The 2016 GSSI model was used for this evaluation because it does not included the effect of modifications made to the model components discussed in Section D-E5.1. Table E-5 compares annual average groundwater pumping rates by water use sector specified for both the original and modified Subbasin boundaries, for the historical base period, and for the 2016 GSSI model.

Table E-5. Simulated Groundwater Pumping

	GSSI (2016) model	
Water Use Sector	Original Subbasin Boundary	Modified Subbasin Boundary
Agricultural	75,900	65,400
Municipal	12,000	3,100
Rural-Domestic	2,800	2,500
Small Commercial	2,200	1,400
Total	92,900	72,400

Note: All values in AFY

Simulated annual average total pumping rate is about 20,500 AFY lower for the modified Subbasin boundary compared to the original Subbasin boundary. The total amount of groundwater pumping is lower because pumping in the Atascadero Subbasin and the portion of the original Paso Robles Subbasin located in Monterey County is no longer accounted for in the modified Subbasin. Thus, the reduction in pumping is equivalent to the amount of groundwater pumping in the Atascadero Subbasin and in the portion of the original Paso Robles Subbasin located in Monterey County.

Table E-6 compares simulated annual average inflow and outflow components of the groundwater budget for the original and modified Subbasin boundaries, the historical base period, and the 2016 GSSI model.

Table E-6. Comparison of Simulated Inflow and Outflow

	GSSI (2016) model	
	Original Subbasin Boundary	Modified Subbasin Boundary
Inflow		
Streamflow Percolation	53,000	36,700
Total Recharge	50,500	34,000
Wastewater Pond Leakage	5,600	3,400
Subsurface Inflow [1]	0	3,600
Total Inflow	109,100	77,700
Outflow		
Groundwater Pumping	92,900	72,400
Discharge to Streams and Rivers	14,300	8,100
Riparian Evapotranspiration	3,500	1,700
Subsurface Outflow [2]	1,600	2,500
Total Outflow	112,300	84,700

Note: All values in AFY

(1) Subsurface inflow from the Atascadero Subbasin

(2) Subsurface outflow from the Paso Robles Subbasin to the Upper Valley Subbasin.

E5.2.1 Differences in Simulated Inflows

Total simulated annual average groundwater inflow is about 31,400 AFY lower for the modified Subbasin than the original Subbasin. The reduction reflects the net change in streamflow percolation, recharge, wastewater pond leakage, and subsurface inflow, as described further below.

- Simulated annual average streamflow percolation for the modified Subbasin boundary is about 16,300 AFY lower compared to the original Subbasin boundary. The lower streamflow percolation is due to reductions in the number and length of stream channels present within the modified Subbasin boundary compared to the original Subbasin boundary.
- Simulated annual average recharge for the modified Subbasin boundary is about 16,500 AFY lower compared to the original Subbasin boundary. The lower recharge is due to:
    - Smaller area within the modified Subbasin, resulting in less areal recharge from direct precipitation
    - Smaller area of irrigated fields within the modified Subbasin, resulting in less recharge from irrigation return flow

  - Reduced length of contact between Subbasin and surrounding watershed, resulting in less subsurface inflow

- Simulated annual average wastewater pond leakage for the modified Subbasin boundary is about 2,200 AFY lower compared to the original Subbasin boundary. Wastewater pond leakage is lower because it does not include wastewater pond leakage within the Atascadero Subbasin.
- Simulated annual average subsurface inflow for the modified Subbasin boundary is about 3,600 AFY higher compared to the original Subbasin boundary. Subsurface inflow to the modified Subbasin includes groundwater flow from the Atascadero Subbasin into the Paso Robles Subbasin. When modeling the original Subbasin boundary, which includes both the Atascadero Subbasin and Paso Robles Subbasin, the flow between the Subbasins was an internal flow within the model and not an inflow crossing the boundary of the model.

E5.2.2 Differences in Simulated Outflows

Total simulated annual average outflow for the modified Subbasin boundary is about 27,600 AFY lower compared to the original Subbasin boundary. The reduction in total simulated outflow is due to changes in simulated discharge to rivers and streams, riparian evapotranspiration, and subsurface outflow, as described further below.

- Simulated annual average total groundwater pumping for the modified Subbasin is about 20,500 AFY lower than that of original Subbasin. The amount of groundwater pumping is lower because the modified Subbasin boundary does not include pumping from the Atascadero Subbasin or the portion of the original Paso Robles Subbasin in Monterey County.
- Simulated annual average discharge to streams and rivers for the modified Subbasin boundary is about 6,200 AFY lower compared to the original Subbasin boundary. The lower discharge to rivers and streams is due to exclusion of channel segments that receive groundwater discharge in the Atascadero Subbasin and portion of the original Paso Robles Subbasin in Monterey County.
- Simulated annual average riparian evapotranspiration for the modified Subbasin boundary is about 1,800 AFY lower compared to the original Subbasin boundary. The amount of riparian evapotranspiration is lower because the number and length of stream channels along which riparian vegetation are lower in the modified Subbasin compared to the original Subbasin.
- Simulated annual average subsurface outflow for the modified Subbasin boundary is about 900 AFY higher compared to the original Subbasin boundary. Similar to subsurface inflow, the higher subsurface outflow occurs because this flow crosses a

boundary (the Monterey County line) when modeling the modified Subbasin boundary, whereas, this flow is internally accounted for when modeling the original Subbasin boundary.

E5.2.3 Differences in Simulated Sustainable Yield

Table E-7 compares the computed average annual groundwater storage deficit and sustainable yield for the original and modified Subbasin boundaries, the historical base period, and using the 2016 GSSI model.

Table E-7. Average Annual Groundwater Storage Deficit and Sustainable Yield

	2016 GSSI Model	
	Original Subbasin	Modified Subbasin
Storage Deficit	3,200	7,000
Sustainable Yield	89,700	65,400

Note: All values in AFY

The computed annual average storage deficit from the 2016 GSSI model is about 3,200 AFY for the original Subbasin. Groundwater storage deficits similar to this value have been commonly reported in the Paso Robles Subbasin in the past. For the modified Subbasin, the computed annual average storage deficit from the 2016 GSSI model is about 7,000 AFY. Therefore, the computed annual average groundwater storage deficit for the modified Subbasin is about 3,800 AFY higher compared to the original Subbasin. The increase in computed annual average groundwater storage deficit is the result of differences in the magnitude of reductions in total inflow and total outflow.

Figure E-3 shows a map of computed sustainable yields from the 2016 GSSI model. The area of the original Paso Robles Subbasin outside of the modified Subbasin (green area) has been divided into the Atascadero Subbasin and the Upper Valley Aquifer Subbasin for illustration purposes. The sustainable yield of the Upper Valley Aquifer, Paso Robles, and Atascadero Subbasins shown on Figure E-3 sum to the sustainable yield of the original Subbasin as listed in Table E-7.

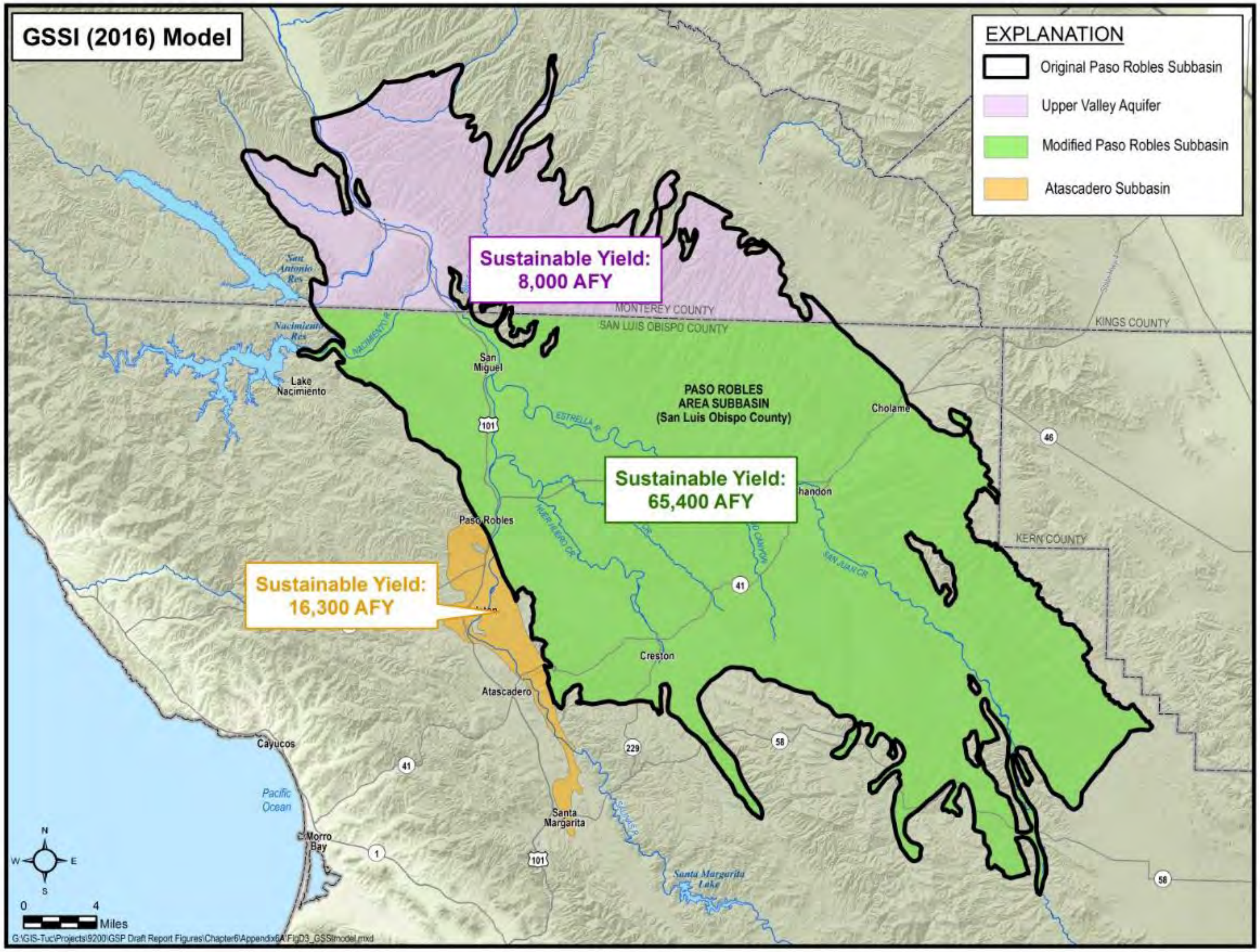


Figure E-3. Sustainable Yield Computed by GSSI (2016) Model

E5.3 Combined Effect of Model Modifications and Changes in Subbasin Boundary on Water Budgets

This section summarizes changes in water budget components, groundwater storage deficit, and sustainable yield that result from both modifications made to model components and the change the Subbasin boundary. For this evaluation, the GSP model was used because it includes both types of changes. Table E-8 compares annual average groundwater pumping rates by water use sector specified for both the original and modified Subbasin boundaries, for the historical base period, using the GSP model.

Table E-8. Simulated Groundwater Pumping for GSP Model

	GSP Model	
Water Use Sector	Original Subbasin	Modified Subbasin
Agricultural	75,800	65,400
Municipal	12,000	3,100
Rural-Domestic	2,800	2,500
Small Commercial	2,200	1,400
Total	92,800	72,400

Note: All values in AFY

Table E-9 compares simulated annual average inflow and outflow components of the groundwater budget for the original and modified Subbasin boundaries, for the historical base period, using the GSP model.

Table E-9. Comparison of Simulated Inflow and Outflow for GSP Model

	GSP model	
	Original Subbasin	Modified Subbasin
Inflow		
Streamflow Percolation	39,500	26,900
Total Recharge	51,600	38,000
Wastewater Pond Leakage	5,600	3,400
Subsurface Inflow[1]	--	3,100 [1]
Total Inflow	96,700	71,400
Outflow		
Groundwater Pumping	92,800	72,400
Discharge to Streams and Rivers	13,200	7,300
Riparian Evapotranspiration	3,500	1,700
Subsurface Outflow	1,600 [2]	2,600 [3]
Total Outflow	111,100	84,000

Note: All values in AFY

(1) Subsurface inflow from the Atascadero Subbasin

(2) Includes subsurface outflow in the Salinas Alluvium and Paso Robles Formation at the northern boundary of the original Paso Robles Subbasin

(3) Subsurface outflow from the Paso Robles Subbasin to the Upper Valley Subbasin.

E5.3.1 Differences in Simulated Inflows

Total simulated annual average groundwater inflow is about 25,300 AFY lower for the modified Subbasin than the original Subbasin. The reduction reflects the net change in streamflow percolation, recharge, wastewater pond leakage, and subsurface inflow, as described further below.

- Simulated annual average streamflow percolation for the modified Subbasin boundary is about 12,600 AFY lower compared to the original Subbasin boundary. The lower streamflow percolation is due to reductions in the number and length of stream channels present within the modified Subbasin boundary compared to the same for original Subbasin boundary.
- Simulated annual average recharge for the modified Subbasin boundary is about 13,600 AFY lower compared to the original Subbasin boundary. The lower recharge is due to:
    - Smaller area within the modified Subbasin, resulting in less recharge from direct precipitation
    - Smaller area of irrigated fields in the modified Subbasin, resulting in less recharge from irrigation return flow
    - Reduced length of contact between Subbasin and surrounding watershed, resulting in less subsurface inflow
- Simulated annual average wastewater pond leakage for the modified Subbasin boundary is about 2,200 AFY lower compared to the original Subbasin boundary. The amount of wastewater pond leakage is lower because the modified Subbasin does not include wastewater pond leakage within the Atascadero Subbasin.
- Simulated annual average subsurface inflow for the modified Subbasin boundary about 3,100 AFY higher compared to the original Subbasin boundary. Subsurface inflow to the modified Subbasin includes groundwater flow from the Atascadero Subbasin into the Paso Robles Subbasin. When modeling the original Subbasin boundary, which includes both the Atascadero Subbasin and Paso Robles Subbasin, the flow between the Subbasins is an internal flow within the model and not an inflow crossing the boundary of the modified Subbasin.

E5.3.2 Differences in Simulated Outflows

Total simulated annual average outflow for the modified Subbasin boundary is about 27,100 AFY lower compared to the original Subbasin boundary. The reduction in total simulated outflow is due to changes in simulated discharge to rivers and streams, riparian evapotranspiration, and subsurface outflow, as described further below.

- Simulated annual average total groundwater pumping for the modified Subbasin is reduced by about 20,400 AFY compared to the original Subbasin. The amount of groundwater pumping is lower because the modified Subbasin does not include pumping from the Atascadero Subbasin or the portion of the original Paso Robles Subbasin in Monterey County.
- Simulated annual average discharge to streams and rivers for the modified Subbasin boundary is about 5,900 AFY compared to the original Subbasin boundary. The amount of discharge to rivers and streams is lower because the modified Subbasin does not include channel segments that receive groundwater discharge in the Atascadero Subbasin and portion of the original Paso Robles Subbasin in Monterey County.
- Simulated annual average riparian evapotranspiration for the modified Subbasin boundary is about 1,800 AFY lower compared to the original Subbasin boundary. The amount of riparian evapotranspiration is lower because the modified Subbasin has fewer stream channels and shorter stream channel lengths along which riparian vegetation is present than the original Subbasin.
- Simulated annual average subsurface outflow for the modified Subbasin boundary is about 1,000 AFY higher compared to the original Subbasin boundary. Similar to subsurface inflow, the higher subsurface outflow occurs because this flow crosses a boundary (the Monterey County line) when modeling the modified Subbasin, whereas, this flow is internally accounted for when modeling the original Subbasin.

E5.3.3 Differences in Computed Sustainable Yield

Table E-10 compares the computed average annual groundwater storage deficit and sustainable yield for the original and modified Subbasin boundaries, the historical base period, and for the GSP model.

Table E-10. Average Annual Groundwater Storage Deficit and Sustainable Yield

	GSP Model	
	Original Subbasin	Modified Subbasin
Storage Deficit	14,400	12,600
Sustainable Yield	78,400	59,800

Note: All values in AFY

The computed annual average storage deficit from the GSP model is about 14,400 AFY for the original Subbasin boundary. For the modified Subbasin, the computed annual average storage deficit from the GSP model is about 12,600 AFY. Therefore, the computed annual average groundwater storage deficit for the modified Subbasin boundary is about 1,800 AFY lower compared to the original Subbasin boundary. The decrease in computed annual average groundwater storage deficit is the result of differences in the magnitude of reductions in total inflow and total outflow.

Figure E-4 shows a map of computed sustainable yields from the GSP model. The area of the original Paso Robles Subbasin outside of the modified Subbasin (green area) has been divided into the Atascadero Subbasin and the Upper Valley Aquifer Subbasin for illustration purposes. The sustainable yield of the Upper Valley Aquifer, Paso Robles, and Atascadero Subbasins shown on Figure E-4 sum to the sustainable yield of the original Subbasin as listed in Table E-10.

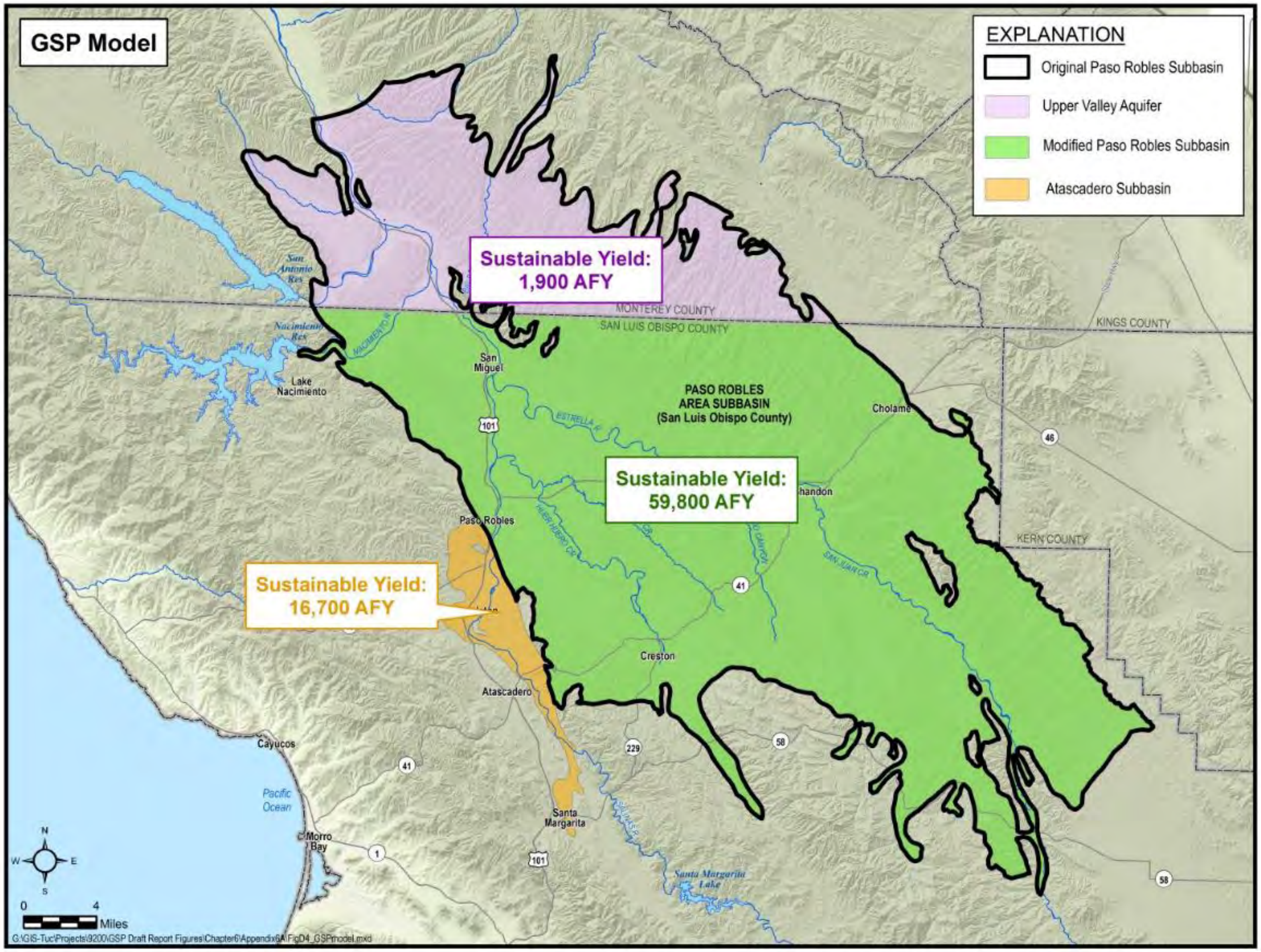


Figure E-4. Sustainable Yield as Computed by GSP Model

E6 CONCLUSIONS

Both the model modifications and the change in Subbasin boundary influence the computed sustainable yield. Over the historical base period, the computed sustainable yield for the original Subbasin boundary from the 2016 GSSI model is about 89,700 AFY. By comparison, the computed sustainable yield for the modified Subbasin boundary from the updated GSP model is about 59,800 AFY. The difference between these two values is nearly 30,000 AFY. Most of this difference is due to changes in the Subbasin boundary. The computed sustainable yield from 2016 GSSI model for the modified Subbasin boundary is 65,400 AFY; a reduction of about 24,300 AFY from the sustainable yield of the original Subbasin. The change in Subbasin boundary accounts for about 80% of the reduction in reported sustainable yields. The remaining difference is the result of modifications made to the model components.

Appendix F

Monitoring Protocols

County of San Luis Obispo Procedures for Measuring Depth to Water in Groundwater Wells

The following procedures must be followed when conducting depth to water measurements for the County of San Luis Obispo and the San Luis Obispo County Flood Control and Water Conservation District's groundwater monitoring program. These procedures are adapted from the USGS publication "Groundwater Technical Procedures of the U.S. Geological Survey" compiled by William L. Cunningham and Charles W. Schalk in 2011 and "Best Management Practices for the Sustainable Management of Groundwater – Monitoring Protocols, Standards and Sites" published by the California Department of Water Resources in December 2016.

Key Terms

1. RP (Reference Point): Total distance from the measuring point (typically the top of casing) to the surface of the water
2. WS: Length of wetted chalk on steel tape.
3. FT ABOVE: Distance from measuring point reference to land surface.
4. DIST to WATER: The distance from the measuring point to the water surface. RP – WS – FT ABOVE = DIST to Water.
5. OBS INIT: In the well book, note the initials of the person performing the measuring in this column. Determined by the login user on the iPad.
6. REMARKS or COMMENTS: Note any special remarks regarding the measurement of each well, including, any significant factors potentially affecting the well level, pumping or temporary blocked access, changes in RP, etc.
7. PUMPING: Fill the pumping column according to the Pumping Key Legend
    a. D = Dry
    b. E = Estimated
    c. F = Flowing
    d. N = Nearby pumping
    e. R = Recently pumped
    f. S = See well book
    g. T = Temporarily no access

Preparation

1. Groundwater elevation data, which will form the basis of basin-wide water table and piezometric maps, should approximate conditions at a discrete period in time. Therefore, all groundwater levels in a basin should be collected within as short a time as possible, preferably within a **1 to 2-week period**.
2. Check well log books for notifications about **one week** before you begin performing the bi-annual well measuring.
    a. Go through all the well data log books to check which wells have a special note of notifying owner. Make sure you contact the owners in accordance with the instructions.
    b. This information is also listed by well data book here: G:\WR\Tech Unit\x Groundwater\Well Information Resources\Well Books\Well Number Lists.
3. Verify the description of the well using the field iPad GIS program.

   a. You must ensure that you are measuring the correct well by comparing it to the iPad GIS and well book as well as any other description of the well.
   b. There should be a picture of every well in each of the data books and iPad database.

Reference Point

1. Verify the Reference Point (RP) by using the field iPad GIS program.
   a. Depth to groundwater must be measured relative to an established RP on the well casing. The RP can be identified with a permanent marker, paint spot, or a notch in the lip of the well casing. By convention in open casing monitoring wells, the RP is located on the north side of the well casing.
   b. In the well book and in the well database, there are pictures and descriptions of the RP to be used for each well. Always ask questions if you are uncertain about the location of the RP.
2. Make sure the measured RP is equal to the one listed on the first well card for each well. Note if there is a difference.
3. If no RP is apparent, measure the depth to groundwater from the north side of the top of the well casing, and note it in the comments.
4. If an access becomes blocked or a RP changes for any reason, this must be noted in the Comments, the new RP elevation must be surveyed, and the new value of RP feet above or below ground surface must be measured and recorded. New photographs to identify the new RP must also be taken and put into the iPad well database. All measurements are to be made in US Survey feet.

Measurement

1. After locating the RP, remove any cap, lid, or plug that covers the monitoring access point, listening for pressure release. If a release is observed, wait and allow the water level to equilibrate. Note in the Comments that a pressure release was observed and whether the pressure was causing air to flow out of or into the casing.
2. Never measure a well while it is pumping. Instead, record a P in the Pumping column and include any relevant notes in the Comments. If possible, visit the well later in the day or on a different day to obtain a static water level measurement.
3. If the well is rebounding or drawing down, record the appropriate code in the Pumping Key. Make a note of the distance that the water moved (up or down) and the time between measurements in the Comments. If possible, visit the well later in the day or on a different day to try and obtain a static water level measurement.
4. **Depth to groundwater must be measured to an accuracy of 0.01 feet.**
   a. This is true when using both the steel tape and the electronic sounding tape. The steel tape should be used in wells that have a history of oil on the surface of the water.
   b. Also use the steel tape if there are obstructions or tight spaces in the casing in which the electronic sounding tape could get stuck. Otherwise, use the electronic sounding tape.

   c. Repeat measurement after 15 minutes to verify that the static levels are not rebounding. Repeat until measurements are consistent. Typically, this should not be repeated over 3 times. But this process is left to the discretion of the technician. If consistency is not achieve, add note in the Comments.
5. See **Appendix A** for measurement and recording procedures using the steel tape.
6. See **Appendix B** for measurement and recording procedures using the sounder and electronic sounding tape.
7. Complete the well card and electronic water level measurement field form in accordance with the recording procedures.
   a. Assess the area around the well to determine any significant factors potentially affecting the well level and note any factors that may influence the depth to water readings, such as weather, nearby irrigation, flooding, tidal influence, and well condition.
   b. If there is a questionable measurement or the measurement could not be obtained, note it in the in the Pumping column and in the Comments.

Special Cases

1. If you find a well that has not been monitored during the past three monitoring periods and this information has been documented in the Comments (e.g. could not find, no access to old RP, well removed, etc.), make a special note and mark this well page in the book. Inform the Technical Unit Supervisor, so that the well can be removed from the well books.
2. If you are unable to measure a well, due to pumping or temporary blocked access for example, note the reason in the Comments.
3. In some wells, a layer of oil may float on the water surface.
   a. If the oil layer is a foot or less thick, use the steel tape. See **Appendix A** for the procedure for using the steel tape. Read the steel tape at the top of the oil mark and use this value for the water-level measurement instead of the wetted chalk mark. The measurement will differ slightly from the water level that would be measured were the oil not present. If there is oil in the well, it must be noted in the Comments and an E for estimated must be entered in the Pumping column of the electronic water level measurement field form.
   b. If several feet of oil are present in the well, or if it is necessary to know the thickness of the oil layer, a commercially available water-detector paste can be used that will detect the presence of water in the oil. The paste is applied to the lower end of the tape and will show the top of the oil as a wet line, and the top of the water will show as a distinct color change. Because oil density is about three-quarters that of water, the water level can be estimated by adding the thickness of the oil layer times its density to the oil- water interface elevation.

Decontamination

1. Do not decontaminate the tape between measurements at the same well. Only decontaminate the tape after completing the well measurement and before moving on to the next well.
2. To decontaminate the electronic sounding tape or steel tape, use a bleach water solution of 50 mg/liter (0.005 percent) to avoid any cross-contamination between wells.

3. If there is oil on the tape, use a non-toxic degreaser and remove all traces of oil before you use the bleach solution.

Appendix A: Procedure for Steel Tape

Materials and Instruments

1. A steel tape graduated in feet, tenths, and hundredths of feet
2. Blue carpenters' chalk
3. Well book
4. Pencil and eraser
5. iPad and electronic water level measurement field form
6. Wrenches with adjustable jaws and other tools to remove well cap

Data Accuracy and Limitations

1. A graduated steel tape is commonly accurate to 0.01 feet.
2. The water level should be within 500 feet of the land surface for steel tapes.
3. If the well casing is not plumb, the depth to water will have to be corrected.
4. When measuring deep water levels, tape expansion and stretch is an additional consideration.

Instructions

1. Chalk the lower 20 to 40 feet of the tape by pulling the tape across a piece of blue carpenter's chalk. The wetted chalk mark will identify that part of the tape that was submerged.
2. Lower the weight and tape into the well until the lower end of the tape is submerged below the water. The weight and tape should be lowered into the water slowly to prevent splashing. Continue to lower the end of the tape into the well until the next graduation (a whole-foot mark) is opposite the measuring RP, record this number in the RP column of the electronic water level measurement field form. The length of tape needed to reach the water surface can be estimated from previous water-level measurements. Otherwise, the length of tape needed to reach the water surface will have to be found by trial and error.
3. Rapidly bring the tape to the surface before the wetted chalk mark dries and becomes difficult to read.

Recording

1. Record the number of the wetted chalk mark in the WS column of the well book card.
2. Subtract the wetted chalk mark number (WS) from to the measuring RP. Record this number in the FT ABOVE column of the well book card.

3. Apply the RP correction to get the depth to water below (or above) the land-surface. If the RP is above land surface, the distance between the RP and land surface datum is subtracted from the depth to water from the RP to obtain the depth to water below land surface. If the RP is below land surface precede the RP correction value with a minus (-) sign and subtract the distance between the RP and land surface datum from the depth to water from the RP to obtain the depth to water below land surface. Record this number in the DIST TO WATER column of the well book card.
4. Record initials of the in the OBS. INT. column.
5. Once you have calculated and recorded the measurement in the well book, open the WELLS app on the iPad. Select the well you are measuring by clicking the blue “i” symbol. This should bring up all previous information on that specific well. If you wish to add a picture of the well to the information, select the camera icon next to “Add Data.”
6. Click “Add Data” and select “Tape” for “Tool Used.” Input your measurement into the “Tape Reading” section of the electronic water level measurement field form. Click “Update.” You have successfully measured the well level.

Maintenance

1. Maintain the tape in good working condition by periodically physically checking the tape for rust, breaks, kinks, and possible stretch due to the suspended weight of the tape and the tape weight.
2. Our steel tapes are sent to USGS for calibration every two years.

Appendix B: Procedure for Electronic Sounding Tape

Materials and Instruments

1. Sounder and electric sounding tape
2. iPad and electronic water level measurement field form
3. Wrenches with adjustable jaws and other tools to remove well cap

Data Accuracy and Limitations

1. Oil, ice, or other debris may interfere with the water level measurement
2. Corrections to the measurements are necessary if the well casing is angled, and when measuring deep water levels because of tape expansion and stretch

Instructions

1. When using the sounder to measure depth to groundwater, it is generally good practice to use the least sensitive setting. Using a more sensitive setting will sometimes give false positives due to a wet or leaking casing. If you suspect that the casing has a hole, mention it in the Comments column on the electronic water level measurement field form. Do your best to ascertain the approximate depth of the hole relative to the reference point.
2. Approach the well with the sounder in hand. Then, place the sounder level on the ground or another surface near the opening of the well. Turn on the sounder device by turning the dial with “SENSITIVITY” written in bold letters above it to the least sensitive setting possible. Press the lest button located on the same side as the knob. If you successfully turned on the sounder, a ringing noise will be clearly produced, and the red light above the test button will remain solid until you let go of the button. If there is no sound, start over.
3. Once the sounder is on, pull out the silver end of the tape and prepare to lower it into the well. Loosen the wheel knob on the other side of the sounder, opposite of both the test button and the “SENSITIVITY” knob. Once this knob is loosened, place the silver end of the tape into the entrance of the well. If the silver end does not begin to descend on its own, you may need to feed it into the entrance until there is enough weight for it to draw down by itself.
4. **Do not let go of the sounder.** If the well opening is big enough, the sounder may fall in. At that point, it will be lost. This equipment is expensive, and there are only so many in the County’s possession. If the sounder becomes stuck, report its location to the Technical Unit Supervisor.

5. As you feed the silver end of the tape into the well or as it draws down under its own weight, belay the tape with your hand so that the tape is not damaged by the entrance of the well. Keep the descent as smooth as possible and avoid letting the silver end descend too quickly. If the well happens to be dry and the silver end hits the ground too hard, it may damage the equipment.
6. Once the same ringing noise from the test button sounds, pull the tape back until the noise is no longer heard. Then, slowly let the silver end descend again without belaying the line with your hand, as this may lead to an inaccurate measurement. Once you hear the ringing noise again, place your index finger at the point that the tape enters the well. Turn the tape over, and read the tape for the depth to groundwater measurement.
7. **You may now turn off the sounder; the ringing that it produces will be quite loud.**

Recording

1. When reading the tape, **ensure you record the full measurement.** Often, the depth to groundwater will not be an exact number (e.g. 100.00 ft). Numbers between 1 and 9 are tenths (0.10s) of a foot. Therefore, if your finger is on a number between 1 and 9, you must backtrack on the tape until you reach the next whole number. For example, if the number was six and the next whole number was 145, the full measurement would be 145.6 ft.
2. Once you have double-checked the measurement, open the WELLS app on the iPad. Select the well you are measuring by clicking the blue “i” symbol. This should bring up all previous information on that specific well. If you wish to add a picture of the well to the information, select the camera icon next to “Add Data.”
3. Click “Add Data” and select the “Sounder” for “Tool Used.”
4. The reference elevation should already be calculated. If the reference elevation is missing, determine your current altitude. (This can be done by searching “what is my altitude” on Google.)
5. For “Tape Reading (RP),” input your measurement in both the left and right field.
6. Continue to “Feet Above.” “Feet Above” is the height of the well entrance from the ground. This simple measurement can be determined using a measuring tape or a ruler. If the measurement is already in the form, do not change it.
7. Once you have inputted all the information, click “Update.” You have successfully measured the well level.

Calibration:

Our sounders are sent to USGS for calibration every two years.

Flowmeter Calibration Test Report

Well Owner:	Well Operator:
Owner Address:	Operator Address:
City, State, Zip:	City, State, Zip:
Owner Telephone:	Operator Telephone:
Contact Person:	Contact Person:
State Well Number:	Owner's Well Number:
Well or Site Address:	Thomas Guide - Page & Section:
Meter Manufacturer:	Is This Meter New from Manufacturer? YES NO
Meter Serial Number:	Discharge Pipe Size (inches):
Manufacturer Date:	Tap Size & Type:
Meter Size (inches):	Meter Bypass Piping: YES NO Other
Meter Units: AF CF Gal MI/h Other	Is This A Bypass Meter?: YES NO
Meter Multiplier	Underground Vault: YES NO Other
Meter Type:	Pump Motor/Engine (horsepower):

Meter Use: Agricultural Domestic Municipal Industrial

Calibration or Repair Test Results

	Meter End	Meter Start	Volume Pumped	Run Time	Flow rate	Accuracy (%)
Test 1						
Test 2						
Test 3						

Remarks

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION

MONITORING AND REPORTING PROGRAM
ORDER NO. R3-2017-0002-01

TIER 1

DISCHARGERS ENROLLED UNDER CONDITIONAL WAIVER OF WASTE DISCHARGE REQUIREMENTS FOR DISCHARGES FROM IRRIGATED LANDS

This Monitoring and Reporting Program Order No. R3-2017-0002-01 (MRP) is issued pursuant to California Water Code (Water Code) sections 13267 and 13269, which authorize the California Regional Water Quality Control Board, Central Coast Region (hereafter Central Coast Water Board) to require preparation and submittal of technical and monitoring reports. Water Code section 13269 requires a waiver of waste discharge requirements to include as a condition the performance of monitoring and the public availability of monitoring results. *Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands*, Order No. R3-2017-0002 (Order) includes criteria and requirements for three tiers. This MRP sets forth monitoring and reporting requirements for **Tier 1 Dischargers** enrolled under the Order. A summary of the requirements is shown below.

SUMMARY OF MONITORING AND REPORTING REQUIREMENTS FOR TIER 1:

Part 1: Surface Receiving Water Monitoring and Reporting *(cooperative or individual)*
Part 2: Groundwater Monitoring and Reporting *(cooperative or individual)*

Pursuant to Water Code section 13269(a)(2), monitoring requirements must be designed to support the development and implementation of the waiver program, including, but not limited to, verifying the adequacy and effectiveness of the waiver's conditions. The monitoring and reports required by this MRP are to evaluate effects of discharges of waste from irrigated agricultural operations and individual farms/ranches on waters of the state and to determine compliance with the Order.

MONITORING AND REPORTING BASED ON TIERS

The Order and MRP include criteria and requirements for three tiers, based upon those characteristics of individual farms/ranches at the operation that present the highest level of waste discharge or greatest risk to water quality. Dischargers must meet conditions of the Order and MRP for the appropriate tier that applies to their land and/or the individual farm/ranch. Within a tier, Dischargers comply with requirements based on the specific level of discharge and threat to water quality from individual farms/ranches. The lowest tier, Tier 1, applies to dischargers who discharge the lowest level of waste (amount or concentration) or pose the lowest potential to cause or contribute to an exceedance of water quality standards in waters of the State or of the United States. The highest tier, Tier 3, applies to dischargers who discharge the highest level of waste or pose the greatest potential to cause or contribute to an exceedance of water quality standards in waters of the State or of the United States. Tier 2 applies to dischargers whose discharge has a moderate threat to water quality. Water quality is defined in terms of regional, state, or federal numeric or narrative water quality standards. Per the Order, Dischargers may submit a request to the Executive Officer to approve transfer to a lower tier. If the Executive Officer approves a transfer to a lower tier, any interested person may request that the Central Coast Water Board conduct a review of the Executive Officer's determination.

PART 1. SURFACE RECEIVING WATER MONITORING AND REPORTING REQUIREMENTS

The surface receiving water monitoring and reporting requirements described herein are generally a continuation of the surface receiving water monitoring and reporting requirements of Monitoring and Reporting Program Order No. 2012-0011-01, as revised August 22, 2016, with the intent of uninterrupted regular monitoring and reporting during the transition from Order No. R3-2012-0011-01 to Order No. R3-2017-0002-01.

Monitoring and reporting requirements for surface receiving water identified in Part 1.A. and Part 1.B. apply to Tier 1 Dischargers. Surface receiving water refers to water flowing in creeks and other surface waters of the State. Surface receiving water monitoring may be conducted through a cooperative monitoring program on behalf of Dischargers, or Dischargers may choose to conduct surface receiving water monitoring and reporting individually. Key monitoring and reporting requirements for surface receiving water are shown in Tables 1 and 2.

A. Surface Receiving Water Quality Monitoring

1. Dischargers must elect a surface receiving water monitoring option (cooperative monitoring program or individual receiving water monitoring) to comply with surface receiving water quality monitoring requirements, and identify the option selected on the Notice of Intent (NOI).

2. Dischargers are encouraged to choose participation in a cooperative monitoring program (e.g., the existing Cooperative Monitoring Program or a similar program) to comply with receiving water quality monitoring requirements. Dischargers not participating in a cooperative monitoring program must conduct surface receiving water quality monitoring individually that achieves the same purpose.

3. Dischargers (individually or as part of a cooperative monitoring program) must conduct surface receiving water quality monitoring to a) assess the impacts of their waste discharges from irrigated lands to receiving water, b) assess the status of receiving water quality and beneficial use protection in impaired waterbodies dominated by irrigated agricultural activity, c) evaluate status, short term patterns and long term trends (five to ten years or more) in receiving water quality, d) evaluate water quality impacts resulting from agricultural discharges (including but not limited to tile drain discharges), e) evaluate stormwater quality, f) evaluate condition of existing perennial, intermittent, or ephemeral streams or riparian or wetland area habitat, including degradation resulting from erosion or agricultural discharges of waste, and g) assist in the identification of specific sources of water quality problems.

<u>Surface Receiving Water Quality Sampling and Analysis Plan</u>

4. **By March 1, 2018, or as directed by the Executive Officer**, Dischargers (individually or as part of a cooperative monitoring program) must submit a surface receiving water quality Sampling and Analysis Plan (SAAP) and Quality Assurance Project Plan (QAPP); this requirement is satisfied if an approved SAAP and QAPP addressing all surface receiving water quality monitoring requirements described in this Order has been submitted pursuant to Order No. R3-2012-0011 and associated Monitoring and Reporting Programs. Dischargers (or a third party cooperative monitoring program) must develop the Sampling and Analysis Plan to describe how the proposed monitoring will achieve the objectives of the MRP and evaluate compliance with the Order. The Sampling and Analysis Plan may propose alternative monitoring site locations, adjusted monitoring parameters, and other changes as necessary to assess the impacts of waste discharges from irrigated lands to receiving water. The Executive Officer must approve the Sampling and Analysis Plan and QAPP.

5. The Sampling and Analysis Plan must include the following minimum required components:
    a. Monitoring strategy to achieve objectives of the Order and MRP;
    b. Map of monitoring sites with GIS coordinates;
    c. Identification of known water quality impairments and impaired waterbodies per the 2010 Clean Water Act 303(d) List of Impaired Waterbodies (List of Impaired Waterbodies);
    d. Identification of beneficial uses and applicable water quality standards;
    e. Identification of applicable Total Maximum Daily Loads;
    f. Monitoring parameters;
    g. Monitoring schedule, including description and frequencies of monitoring events;

h. Description of data analysis methods;

6. The QAPP must include receiving water and site-specific information, project organization and responsibilities, and quality assurance components of the MRP. The QAPP must also include the laboratory and field requirements to be used for analyses and data evaluation. The QAPP must contain adequate detail for project and Water Board staff to identify and assess the technical and quality objectives, measurement and data acquisition methods, and limitations of the data generated under the surface receiving water quality monitoring. All sampling and laboratory methodologies and QAPP content must be consistent with U.S. EPA methods, State Water Board's Surface Water Ambient Monitoring Program (SWAMP) protocols and the Central Coast Water Board's Central Coast Ambient Monitoring Program (CCAMP). Following U.S. EPA guidelines[1] and SWAMP templates[2], the receiving water quality monitoring QAPP must include the following minimum required components:
    a. Project Management. This component addresses basic project management, including the project history and objectives, roles and responsibilities of the participants, and other aspects.
    b. Data Generation and Acquisition. This component addresses all aspects of project design and implementation. Implementation of these elements ensures that appropriate methods for sampling, measurement and analysis, data collection or generation, data handling, and quality control activities are employed and are properly documented. Quality control requirements are applicable to all the constituents sampled as part of the MRP, as described in the appropriate method.
    c. Assessment and Oversight. This component addresses the activities for assessing the effectiveness of the implementation of the project and associated QA and QC activities. The purpose of the assessment is to provide project oversight that will ensure that the QA Project Plan is implemented as prescribed.
    d. Data Validation and Usability. This component addresses the quality assurance activities that occur after the data collection, laboratory analysis and data generation phase of the project is completed. Implementation of these elements ensures that the data conform to the specified criteria, thus achieving the MRP objectives.

[1] USEPA. 2001 (2006) USEPA Requirements for Quality Assurance Project Plans (QA/R-5) Office of Environmental Information, Washington, D.C. USEPA QA/R-5
[2] http://waterboards.ca.gov/water_issues/programs/swamp/tools.shtml#qa

7. The Central Coast Water Board may conduct an audit of contracted laboratories at any time in order to evaluate compliance with the QAPP.

8. The Sampling and Analysis Plan and QAPP, and any proposed revisions are subject to approval by the Executive Officer. The Executive Officer may also revise the Sampling and Analysis Plan, including adding, removing, or changing monitoring site locations, changing monitoring parameters, and other changes as necessary to assess the impacts of waste discharges from irrigated lands to receiving water.

Surface Receiving Water Quality Monitoring Sites

9. The Sampling and Analysis Plan must, at a minimum, include monitoring sites to evaluate waterbodies identified in Table 1, unless otherwise approved by the Executive Officer. The Sampling and Analysis Plan must include sites to evaluate receiving water quality impacts most directly resulting from areas of agricultural discharge (including areas receiving tile drain discharges). Site selection must take into consideration the existence of any long term monitoring sites included in related monitoring programs (e.g. CCAMP and the existing CMP). Sites may be added or modified, subject to prior approval by the Executive Officer, to better assess the pollutant loading from individual sources or the impacts to receiving waters caused by individual discharges. Any modifications must consider sampling consistency for purposes of trend evaluation.

Surface Receiving Water Quality Monitoring Parameters

10. The Sampling and Analysis Plan must, at a minimum, include the following types of monitoring and evaluation parameters listed below and identified in Table 2:

    a. Flow Monitoring;
    b. Water Quality (physical parameters, metals, nutrients, pesticides);
    c. Toxicity (water and sediment);
    d. Assessment of Benthic Invertebrates.

11. All analyses must be conducted at a laboratory certified for such analyses by the State Department of Public Health (CDPH) or at laboratories approved by the Executive Officer. Unless otherwise noted, all sampling, sample preservation, and analyses must be performed in accordance with the latest edition of *Test Methods for Evaluating Solid Waste*, SW-846, U.S. EPA, and analyzed as specified herein by the above analytical methods and reporting limits indicated. Certified laboratories can be found at the web link: http://www.cdph.ca.gov/certlic/labs/Documents/ELAPLablist.xls

12. Water quality and flow monitoring is used to assess the sources, concentrations, and loads of waste discharges from individual farms/ranches and groups of Dischargers to surface waters, to evaluate impacts to water quality and beneficial uses, and to evaluate the short term patterns and long term trends in receiving water quality. Monitoring data must be compared to existing numeric and narrative water quality objectives.

13. Toxicity testing is to evaluate water quality relative to the narrative toxicity objective. Water column toxicity analyses must be conducted on 100% (undiluted) sample. At sites where persistent unresolved toxicity is found, the Executive Officer may require concurrent toxicity and chemical analyses and a Toxicity Identification Evaluation (TIE) to identify the individual discharges causing the toxicity.

Surface Receiving Water Quality Monitoring Frequency and Schedule

14. The Sampling and Analysis Plan must include a schedule for sampling. Timing, duration, and frequency of monitoring must be based on the land use, complexity, hydrology, and size of the waterbody. Table 2 includes minimum monitoring frequency and parameter lists. Agricultural parameters that are less common may be monitored less frequently. Modifications to the receiving water quality monitoring parameters, frequency, and schedule may be submitted for Executive Officer consideration and approval. At a minimum, the Sampling and Analysis Plan schedule must consist of monthly monitoring of common agricultural parameters in major agricultural areas, including two major storm events during the wet season (October 1 – April 30).

15. Storm event monitoring must be conducted within 18 hours of storm events, preferably including the first flush run-off event that results in significant increase in stream flow. For purposes of this MRP, a storm event is defined as precipitation producing onsite runoff (surface water flow) capable of creating significant ponding, erosion or other water quality problem. A significant storm event will generally result in greater than 1-inch of rain within a 24-hour period.

16. Dischargers (individually or as part of a cooperative monitoring program) must perform receiving water quality monitoring per the Sampling and Analysis Plan and QAPP approved by the Executive Officer.

B. Surface Receiving Water Quality Reporting

Surface Receiving Water Quality Data Submittal

1. Dischargers (individually or as part of a cooperative monitoring program) must submit water quality monitoring data to the Central Coast Water Board electronically, in a format specified by the Executive Officer and compatible with SWAMP/CCAMP electronic submittal guidelines, each January 1, April 1, July 1, and October 1.

<u>Surface Receiving Water Quality Monitoring Annual Report</u>

2. **By July 1, 2017,** and every July 1 annually thereafter, Dischargers (individually or as part of a cooperative monitoring program) must submit an Annual Report, electronically, in a format specified by the Executive Officer including the following minimum elements:
    a. Signed Transmittal Letter;
    b. Title Page;
    c. Table of Contents;
    d. Executive Summary;
    e. Summary of Exceedance Reports submitted during the reporting period;
    f. Monitoring objectives and design;
    g. Monitoring site descriptions and rainfall records for the time period covered;
    h. Location of monitoring sites and map(s);
    i. Tabulated results of all analyses arranged in tabular form so that the required information is readily discernible;
    j. Summary of water quality data for any sites monitored as part of related monitoring programs, and used to evaluate receiving water as described in the Sampling and Analysis Plan.
    k. Discussion of data to clearly illustrate compliance with the Order and water quality standards;
    l. Discussion of short term patterns and long term trends in receiving water quality and beneficial use protection;
    m. Evaluation of pesticide and toxicity analyses results, and recommendation of candidate sites for Toxicity Identification Evaluations (TIEs);
    n. Identification of the location of any agricultural discharges observed discharging directly to surface receiving water;
    o. Laboratory data submitted electronically in a SWAMP/CCAMP comparable format;
    p. Sampling and analytical methods used;
    q. Copy of chain-of-custody forms;
    r. Field data sheets, signed laboratory reports, laboratory raw data;
    s. Associated laboratory and field quality control samples results;
    t. Summary of Quality Assurance Evaluation results;

u. Specify the method used to obtain flow at each monitoring site during each monitoring event;
v. Electronic or hard copies of photos obtained from all monitoring sites, clearly labeled with site ID and date;
w. Conclusions.

PART 2. GROUNDWATER MONITORING AND REPORTING REQUIREMENTS

Groundwater monitoring may be conducted through a cooperative monitoring and reporting program on behalf of growers, or Dischargers may choose to conduct groundwater monitoring and reporting individually. Qualifying cooperative groundwater monitoring and reporting programs must implement the groundwater monitoring and reporting requirements described in this Order, unless otherwise approved by the Executive Officer. An interested person may seek review by the Central Coast Water Board of the Executive Officer's approval or denial of a cooperative groundwater monitoring and reporting program.

Key monitoring and reporting requirements for groundwater are shown in Table 3.

A. Groundwater Monitoring

1. Dischargers must sample private domestic wells and the primary irrigation well on their farm/ranch to evaluate groundwater conditions in agricultural areas, identify areas at greatest risk for nitrogen loading and exceedance of drinking water standards, and identify priority areas for follow up actions.

2. Dischargers must sample at least one groundwater well for each farm/ranch on their operation, including groundwater wells that are located within the property boundary of the enrolled county assessor parcel numbers (APNs). For farms/ranches with multiple groundwater wells, Dischargers must sample all domestic wells and the primary irrigation well. For the purposes of this MRP, a "domestic well" is any well that is used or may be used for domestic use purposes, including any groundwater well that is connected to a residence, workshop, or place of business that may be used for human consumption, cooking, or sanitary purposes. Groundwater monitoring parameters must include well screen interval depths (if available), general chemical parameters, and general cations and anions listed in Table 3.

3. Dischargers must conduct two rounds of monitoring of required groundwater wells during calendar year 2017; one sample collected during spring (**March - June)** and one sample collected during fall **(September - December)**.

4. Groundwater samples must be collected by a qualified third party (e.g., consultant, technician, person conducting cooperative monitoring) using proper sampling methods, chain-of-custody, and quality assurance/quality

control protocols. Groundwater samples must be collected at or near the well head before the pressure tank and prior to any well head treatment. In cases where this is not possible, the water sample must be collected from a sampling point as close to the pressure tank as possible, or from a cold-water spigot located before any filters or water treatment systems.

5. Laboratory analyses for groundwater samples must be conducted by a State certified laboratory according to U.S. EPA approved methods; unless otherwise noted, all monitoring, sample preservation, and analyses must be performed in accordance with the latest edition of *Test Methods for Evaluating Solid Waste*, SW-846, United States Environmental Protection Agency, and analyzed as specified herein by the above analytical methods and reporting limits indicated. Certified laboratories can be found at the web link below: http://www.waterboards.ca.gov/centralcoast/water_issues/programs/ag_waivers/docs/resources4growers/2016_04_11_labs.pdf

6. If a discharger determines that water in any domestic well exceeds 10 mg/L of nitrate as N, the discharger or third party must provide notice to the Central Coast Water Board within 24 hours of learning of the exceedance. For domestic wells on a Discharger's farm/ranch that exceed 10 mg/L nitrate as N, the Discharger must provide written notification to the users within 10 days of learning of the exceedance and provide written confirmation of the notification to the Central Coast Water Board.

   The drinking water notification must include the statement that the water poses a human health risk due to elevated nitrate concentration, and include a warning against the use of the water for drinking or cooking. In addition, Dischargers must also provide prompt written notification to any new well users (e.g. tenants and employees with access to the affected well), whenever there is a change in occupancy.

   For all other domestic wells not on a Discharger's farm/ranch but that may be impacted by nitrate, the Central Coast Water Board will notify the users promptly.

   The drinking water notification and confirmation letters required by this Order are available to the public.

B. Groundwater Reporting

1. **Within 60 days of sample collection,** Dischargers must coordinate with the laboratory to submit the following groundwater monitoring results and information, electronically, using the Water Board's GeoTracker electronic deliverable format (EDF):
   a. GeoTracker Ranch Global Identification Number

b. Field point name (Well Name)
c. Field Point Class (Well Type)
d. Latitude
e. Longitude
f. Sample collection date
g. Analytical results
h. Well construction information (e.g., total depth, screened intervals, depth to water), as available

2. Dischargers must submit groundwater well information required in the electronic Notice of Intent (eNOI) for each farm/ranch and update the eNOI to reflect changes in the farm/ranch information within 30 days of the change. Groundwater well information reported on the eNOI includes, but is not limited to:

a. Number of groundwater wells present at each farm/ranch
b. Identification of any groundwater wells abandoned or destroyed (including method destroyed) in compliance with the Order
c. Use for fertigation or chemigation
d. Presence of back flow prevention devices
e. Number of groundwater wells used for agricultural purposes
f. Number of groundwater wells used for or may be used for domestic use purposes (domestic wells).

PART 3. GENERAL MONITORING AND REPORTING REQUIREMENTS

A. Submittal of Technical Reports

1. Dischargers must submit reports in a format specified by the Executive Officer. A transmittal letter must accompany each report, containing the following penalty of perjury statement signed by the Discharger or the Discharger's authorized agent:

   "In compliance with Water Code §*13267, I certify under penalty of perjury that this document and all attachments were prepared by me, or under my direction or supervision following a system designed to assure that qualified personnel properly gather and evaluate the information submitted. To the best of my knowledge and belief, this document and all attachments are true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment".*

2. If the Discharger asserts that all or a portion of a report submitted pursuant to this Order is subject to an exemption from public disclosure (e.g. trade secrets or secret processes), the Discharger must provide an explanation of how those portions of the reports are exempt from public disclosure. The

Discharger must clearly indicate on the cover of the report (typically an electronic submittal) that the Discharger asserts that all or a portion of the report is exempt from public disclosure, submit a complete report with those portions that are asserted to be exempt in redacted form, submit separately (in a separate electronic file) unredacted pages (to be maintained separately by staff). The Central Coast Water Board staff will determine whether any such report or portion of a report qualifies for an exemption from public disclosure. If the Central Coast Water Board staff disagrees with the asserted exemption from public disclosure, the Central Coast Water Board staff will notify the Discharger prior to making such report or portions of such report available for public inspection.

B. Central Coast Water Board Authority

1. Monitoring reports are required pursuant to section 13267 of the California Water Code. Pursuant to section 13268 of the Water Code, a violation of a request made pursuant to section 13267 may subject you to civil liability of up to $1000 per day.

2. The Water Board needs the required information to determine compliance with Order No.R3-2017-0002. The evidence supporting these requirements is included in the findings of Order No.R3-2017-0002.

John M. Robertson
Executive Officer

March 8, 2017
Date

Table 1. Major Waterbodies in Agricultural Areas[1]

Hydrologic SubArea	Waterbody Name	Hydrologic SubArea	Waterbody Name
30510	Pajaro River	30920	Quail Creek
30510	Salsipuedes Creek	30920	Salinas Reclamation Canal
30510	Watsonville Slough	31022	Chorro Creek
30510	Watsonville Creek[2]	31023	Los Osos Creek
30510	Beach Road Ditch[2]	31023	Warden Creek
30530	Carnadero Creek	31024	San Luis Obispo Creek
30530	Furlong Creek[2]	31024	Prefumo Creek
30530	Llagas Creek	31031	Arroyo Grande Creek
30530	Miller's Canal	31031	Los Berros Creek
30530	San Juan Creek	31210	Bradley Canyon Creek
30530	Tesquisquita Slough	31210	Bradley Channel
30600	Moro Cojo Slough	31210	Green Valley Creek
30910	Alisal Slough	31210	Main Street Canal
30910	Blanco Drain	31210	Orcutt Solomon Creek
30910	Old Salinas River	31210	Oso Flaco Creek
30910	Salinas River (below Gonzales Rd.)	31210	Little Oso Flaco Creek
30920	Salinas River (above Gonzales Rd. and below Nacimiento R.)	31210	Santa Maria River
30910	Santa Rita Creek[2]	31310	San Antonio Creek[2]
30910	Tembladero Slough	31410	Santa Ynez River
30920	Alisal Creek	31531	Bell Creek
30920	Chualar Creek	31531	Glenn Annie Creek
30920	Espinosa Slough	31531	Los Carneros Creek[2]
30920	Gabilan Creek	31534	Arroyo Paredon Creek
30920	Natividad Creek	31534	Franklin Creek

[1] At a minimum, monitoring sites must be included for these waterbodies in agricultural areas, unless otherwise approved by the Executive Officer. Monitoring sites may be proposed for addition or modification to better assess the impacts of waste discharges from irrigated lands to surface water. Dischargers choosing to comply with surface receiving water quality monitoring, individually (not part of a cooperative monitoring program) must only monitor sites for waterbodies receiving the discharge.

[2] These creeks are included because they are newly listed waterbodies on the 2010 303(d) list of Impaired Waters that are associated with areas of agricultural discharge.

Table 2. Surface Receiving Water Quality Monitoring Parameters

Parameters and Tests	RL[3]	Monitoring Frequency[1]
Photo Monitoring		
Upstream and downstream photographs at monitoring location		With every monitoring event
WATER COLUMN SAMPLING		
Physical Parameters and General Chemistry		
Flow (field measure) (CFS) following SWAMP field SOP[9]	.25	Monthly, including 2 stormwater events
pH (field measure)	0.1	"
Electrical Conductivity (field measure) (µS/cm)	2.5	"
Dissolved Oxygen (field measure) (mg/L)	0.1	"
Temperature (field measure) (^{o}C)	0.1	"
Turbidity (NTU)	0.5	"
Total Dissolved Solids (mg/L)	10	"
Total Suspended Solids (mg/L)	0.5	"
Nutrients		
Total Nitrogen (mg/L)	0.5	Monthly, including 2 stormwater events
Nitrate + Nitrite (as N) (mg/L)	0.1	"
Total Ammonia (mg/L)	0.1	"
Unionized Ammonia (calculated value, mg/L))		"
Total Phosphorus (as P) (mg/L)	0.02	
Soluble Orthophosphate (mg/L)	0.01	"
Water column chlorophyll a (µg/L)	1.0	"
Algae cover, Floating Mats, % coverage	-	"
Algae cover, Attached, % coverage	-	"
Water Column Toxicity Test		
Algae - *Selenastrum capricornutum (*96-hour chronic; Method1003.0 in EPA/821/R-02/013)	-	4 times each year, twice in dry season, twice in wet season
Water Flea – *Ceriodaphnia dubia* (7-day chronic; Method 1002.0 in EPA/821/R-02/013)	-	"
Midge - *Chironomus spp.* (96-hour acute; Alternate test species in EPA 821-R-02-012)	-	"

Parameters and Tests	RL[3]	Monitoring Frequency[1]
Toxicity Identification Evaluation (TIE)	-	As directed by Executive Officer
Pesticides[2] /Herbicides (µg/L)		
Organophosphate Pesticides		
Azinphos-methyl	0.02	2 times in both 2017 and 2018, once in dry season and once in wet season of each year, concurrent with water toxicity monitoring
Chlorpyrifos	0.005	”
Diazinon	0.005	”
Dichlorvos	0.01	”
Dimethoate	0.01	”
Dimeton-s	0.005	”
Disulfoton (Disyton)	0.005	”
Malathion	0.005	”
Methamidophos	0.02	”
Methidathion	0.02	“
Parathion-methyl	0.02	“
Phorate	0.01	“
Phosmet	0.02	“
Neonicotinoids		
Thiamethoxam	.002	“
Imidacloprid	.002	“
Thiacloprid	.002	“
Dinotefuran	.006	“
Acetamiprid	.01	“
Clothianidin	.02	“
Herbicides		
Atrazine	0.05	“
Cyanazine	0.20	“
Diuron	0.05	“
Glyphosate	2.0	“
Linuron	0.1	“
Paraquat	0.20	“
Simazine	0.05	“
Trifluralin	0.05	“
Metals (µg/L)		
Arsenic (total) [5,7]	0.3	2 times in both 2017 and 2018, once in dry season and once in wet season of each year, concurrent with water toxicity monitoring
Boron (total) [6,7]	10	“
Cadmium (total & dissolved) [4.5,7]	0.01	“

Parameters and Tests	RL[3]	Monitoring Frequency[1]
Copper (total and dissolved) [4,7]	0.01	"
Lead (total and dissolved) [4,7]	0.01	"
Nickel (total and dissolved) [4,7]	0.02	"
Molybdenum (total) [7]	1	"
Selenium (total)[7]	0.30	"
Zinc (total and dissolved) [4.5,7]	0.10	"
Other (µg/L)		
Total Phenolic Compounds[8]	5	2 times in 2017, once in spring (April-May) and once in fall (August-September)
Hardness (mg/L as CaCO3)	1	"
Total Organic Carbon (ug/L)	0.6	"
SEDIMENT SAMPLING		
Sediment Toxicity - *Hyalella azteca* 10-day static renewal (EPA, 2000)		2 times each year, once in spring (April-May) and once in fall (August-September)
Pyrethroid Pesticides in Sediment (µg/kg)		
Gamma-cyhalothrin	2	2 times in both 2017 and 2018, once in spring (April-May) and once in fall (August-September) of each year, concurrent with sediment toxicity sampling
Lambda-cyhalothrin	2	"
Bifenthrin	2	"
Beta-cyfluthrin	2	"
Cyfluthrin	2	"
Esfenvalerate	2	"
Permethrin	2	"
Cypermethrin	2	"
Danitol	2	"
Fenvalerate	2	"
Fluvalinate	2	"
Other Monitoring in Sediment		
Chlorpyrifos (µg/kg)	2	"
Total Organic Carbon	0.01%	"
		"
Sediment Grain Size Analysis	1%	"

[1]Monitoring frequency may be used as a guide for developing alternative Sampling and Analysis Plans implemented by individual growers.
[2]Pesticide list may be modified based on specific pesticide use in Central Coast Region. Analytes on this list must be reported, at a minimum.
[3] Reporting Limit, taken from SWAMP where applicable.
[4] Holmgren, Meyer, Cheney and Daniels. 1993. Cadmium, Lead, Zinc, Copper and Nickel in Agricultural Soils of the United States. J. of Environ. Quality 22:335-348.

[5]Sax and Lewis, ed. 1987. Hawley's Condensed Chemical Dictionary. 11th ed. New York: Van Nostrand Reinhold Co., 1987. Zinc arsenate is an insecticide.
[6]Http://www.coastalagro.com/products/labels/9%25BORON.pdf; Boron is applied directly or as a component of fertilizers as a plant nutrient.
[7]Madramootoo, Johnston, Willardson, eds. 1997. Management of Agricultural Drainage Water Quality. International Commission on Irrigation and Drainage. U.N. FAO. SBN 92-6-104058.3.
[8]http://cat.inist.fr/?aModele=afficheN&cpsidt=14074525; Phenols are breakdown products of herbicides and pesticides. Phenols can be directly toxic and cause endocrine disruption.
[9]See SWAMP field measures SOP, p. 17
mg/L – milligrams per liter; ug/L – micrograms per liter; ug/kg – micrograms per kilogram;
NTU – Nephelometric Turbidity Units; CFS – cubic feet per second.

Table 3. Groundwater Sampling Parameters

Parameter	RL	Analytical Method[3]	Units
pH	0.1	Field or Laboratory Measurement EPA General Methods	pH Units
Specific Conductance	2.5		µS/cm
Total Dissolved Solids	10		mg/L
Total Alkalinity as $CaCO_3$		EPA Method 310.1 or 310.2	
Calcium	0.05	General Cations[1] EPA 200.7, 200.8, 200.9	
Magnesium	0.02		
Sodium	0.1		
Potassium	0.1		
Sulfate (SO4)	1.0	General Anions EPA Method 300 or EPA Method 353.2	
Chloride	0.1		
Nitrate + Nitrite (as N)[2] or Nitrate as N	0.1		

[1]General chemistry parameters (major cations and anions) represent geochemistry of water bearing zone and assist in evaluating quality assurance/quality control of groundwater monitoring and laboratory analysis.
[2]The MRP allows analysis of "nitrate plus nitrite" to represent nitrate concentrations (as N). The "nitrate plus nitrite" analysis allows for extended laboratory holding times and relieves the Discharger of meeting the short holding time required for nitrate.
[3]Dischargers may use alternative analytical methods approved by EPA.
RL – Reporting Limit; µS/cm – micro siemens per centimeter

Table 4. Tier 1 - Time Schedule for Key Monitoring and Reporting Requirements (MRPs)

REQUIREMENT	TIME SCHEDULE[1]
Submit Sampling And Analysis Plan and Quality Assurance Project Plan (SAAP/QAPP) for Surface Receiving Water Quality Monitoring *(individually or through cooperative monitoring program)*	By March 1, 2018, or as directed by the Executive Officer; satisfied if an approved SAAP/QAPP has been submitted pursuant to Order No. R3-2012-0011 and associated MRPs
Initiate surface receiving water quality monitoring *(individually or through cooperative monitoring program)*	Per an approved SAAP and QAPP
Submit surface receiving water quality monitoring data *(individually or through cooperative monitoring program)*	Each January 1, April 1, July 1, and October 1

Submit surface receiving water quality Annual Monitoring Report *(individually or through cooperative monitoring program)*	By July 1 2017; annually thereafter by July 1
Initiate monitoring of groundwater wells	First sample from March-June 2017, second sample from September-December 2017
Submit groundwater monitoring results	Within 60 days of the sample collection

[1] Dates are relative to adoption of this Order, unless otherwise specified.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION

MONITORING AND REPORTING PROGRAM
ORDER NO. R3-2017-0002-02

TIER 2

DISCHARGERS ENROLLED UNDER
THE CONDITIONAL WAIVER OF WASTE DISCHARGE REQUIREMENTS FOR DISCHARGES FROM IRRIGATED LANDS

This Monitoring and Reporting Program Order No. R3-2017-0002-02 (MRP) is issued pursuant to California Water Code (Water Code) sections 13267 and 13269, which authorize the California Regional Water Quality Control Board, Central Coast Region (hereafter Central Coast Water Board) to require preparation and submittal of technical and monitoring reports. Water Code section 13269 requires a waiver of waste discharge requirements to include as a condition the performance of monitoring and the public availability of monitoring results. *Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands*, Order No. R3-2017-0002 (Order) includes criteria and requirements for three tiers. This MRP sets forth monitoring and reporting requirements for **Tier 2 Dischargers** enrolled under the Order. A summary of the requirements is shown below.

SUMMARY OF MONITORING AND REPORTING REQUIREMENTS FOR TIER 2:

Part 1: Surface Receiving Water Monitoring and Reporting *(cooperative or individual)*
Part 2: Groundwater Monitoring and Reporting *(cooperative or individual)*
Total Nitrogen Applied Reporting *(required for subset of Tier 2 Dischargers if farm/ranch growing any crop with high nitrate loading risk to groundwater);*
Part 3: Annual Compliance Form

Pursuant to Water Code section 13269(a)(2), monitoring requirements must be designed to support the development and implementation of the waiver program, including, but not limited to, verifying the adequacy and effectiveness of the waiver's conditions. The monitoring and reports required by this MRP are to evaluate effects of discharges of waste from irrigated agricultural operations and individual farms/ranches on waters of the state and to determine compliance with the Order.

MONITORING AND REPORTING BASED ON TIERS

The Order and MRP include criteria and requirements for three tiers, based upon those characteristics of the individual farms/ranches at the operation that present the highest level of waste discharge or greatest risk to water quality. Dischargers must meet conditions of the Order and MRP for the appropriate tier that applies to their land and/or the individual farm/ranch. Within a tier, Dischargers comply with requirements based on the specific level of discharge and threat to water quality from individual farms/ranches. The lowest tier, Tier 1, applies to dischargers who discharge the lowest level of waste (amount or concentration) or pose the lowest potential to cause or contribute to an exceedance of water quality standards in waters of the State or of the United States. The highest tier, Tier 3, applies to dischargers who discharge the highest level of waste or pose the greatest potential to cause or contribute to an exceedance of water quality standards in waters of the State or of the United States. Tier 2 applies to dischargers whose discharge has a moderate threat to water quality. Water quality is defined in terms of regional, state, or federal numeric or narrative water quality standards. Per the Order, Dischargers may submit a request to the Executive Officer to approve transfer to a lower tier. If the Executive Officer approves a transfer to a lower tier, any interested person may request that the Central Coast Water Board conduct a review of the Executive Officer's determination.

PART 1. SURFACE RECEIVING WATER MONITORING AND REPORTING REQUIREMENTS

The surface receiving water monitoring and reporting requirements described herein are generally a continuation of the surface receiving water monitoring and reporting requirements of Monitoring and Reporting Program Order No. 2012-0011-02, as revised August 22, 2016, with the intent of uninterrupted regular monitoring and reporting during the transition from Order No. R3-2012-0011-02 to Order No. R3-2017-0002-02.

Monitoring and reporting requirements for surface receiving water identified in Part 1.A. and Part 1.B. apply to Tier 2 Dischargers. Surface receiving water refers to water flowing in creeks and other surface waters of the State. Surface receiving water monitoring may be conducted through a cooperative monitoring program on behalf of Dischargers, or Dischargers may choose to conduct surface receiving water monitoring and reporting individually. Key monitoring and reporting requirements for surface receiving water are shown in Tables 1 and 2. Time schedules are shown in Table4.

A. Surface Receiving Water Quality Monitoring

1. Dischargers must elect a surface receiving water monitoring option (cooperative monitoring program or individual receiving water monitoring) to comply with surface receiving water quality monitoring requirements, and identify the option selected on the Notice of Intent (NOI).

2. Dischargers are encouraged to choose participation in a cooperative monitoring program (e.g., the existing Cooperative Monitoring Program or a similar program) to comply with receiving water quality monitoring requirements. Dischargers not participating in a cooperative monitoring program must conduct surface receiving water quality monitoring individually that achieves the same purpose.

3. Dischargers (individually or as part of a cooperative monitoring program) must conduct surface receiving water quality monitoring to a) assess the impacts of their waste discharges from irrigated lands to receiving water, b) assess the status of receiving water quality and beneficial use protection in impaired waterbodies dominated by irrigated agricultural activity, c) evaluate status, short term patterns and long term trends (five to ten years or more) in receiving water quality, d) evaluate water quality impacts resulting from agricultural discharges (including but not limited to tile drain discharges), e) evaluate stormwater quality, f) evaluate condition of existing perennial, intermittent, or ephemeral streams or riparian or wetland area habitat, including degradation resulting from erosion or agricultural discharges of waste, and g) assist in the identification of specific sources of water quality problems.

Surface Receiving Water Quality Sampling and Analysis Plan

4. **By March 1, 2018, or as directed by the Executive Officer**, Dischargers (individually or as part of a cooperative monitoring program) must submit a surface receiving water quality Sampling and Analysis Plan (SAAP) and Quality Assurance Project Plan (QAPP); this requirement is satisfied if an approved SAAP and QAPP addressing all surface receiving water quality monitoring requirements described in this Order has been submitted pursuant to Order No.R3-2012-0011 and associated Monitoring and Reporting Programs. Dischargers (or a third party cooperative monitoring program) must develop the Sampling and Analysis Plan to describe how the proposed monitoring will achieve the objectives of the MRP and evaluate compliance with the Order. The Sampling and Analysis Plan may propose alternative monitoring site locations, adjusted monitoring parameters, and other changes as necessary to assess the impacts of waste discharges from irrigated lands to receiving water. The Executive Officer must approve the Sampling and Analysis Plan and QAPP.

5. The Sampling and Analysis Plan must include the following minimum required components:
    a. Monitoring strategy to achieve objectives of the Order and MRP;
    b. Map of monitoring sites with GIS coordinates;

c. Identification of known water quality impairments and impaired waterbodies per the 2010 Clean Water Act 303(d) List of Impaired Waterbodies (List of Impaired Waterbodies);
d. Identification of beneficial uses and applicable water quality standards;
e. Identification of applicable Total Maximum Daily Loads;
f. Monitoring parameters;
g. Monitoring schedule, including description and frequencies of monitoring events;
h. Description of data analysis methods;

6. The QAPP must include receiving water and site-specific information, project organization and responsibilities, and quality assurance components of the MRP. The QAPP must also include the laboratory and field requirements to be used for analyses and data evaluation. The QAPP must contain adequate detail for project and Water Board staff to identify and assess the technical and quality objectives, measurement and data acquisition methods, and limitations of the data generated under the surface receiving water quality monitoring. All sampling and laboratory methodologies and QAPP content must be consistent with U.S. EPA methods, State Water Board's Surface Water Ambient Monitoring Program (SWAMP) protocols and the Central Coast Water Board's Central Coast Ambient Monitoring Program (CCAMP). Following U.S. EPA guidelines[1] and SWAMP templates[2], the receiving water quality monitoring QAPP must include the following minimum required components:
   a. Project Management. This component addresses basic project management, including the project history and objectives, roles and responsibilities of the participants, and other aspects.
   b. Data Generation and Acquisition. This component addresses all aspects of project design and implementation. Implementation of these elements ensures that appropriate methods for sampling, measurement and analysis, data collection or generation, data handling, and quality control activities are employed and are properly documented. Quality control requirements are applicable to all the constituents sampled as part of the MRP, as described in the appropriate method.
   c. Assessment and Oversight. This component addresses the activities for assessing the effectiveness of the implementation of the project and associated QA and QC activities. The purpose of the assessment is to provide project oversight that

[1] USEPA 2001 (2006) USEPA requirements for Quality Assurance Project Plans (QA/R-5) Office of Environmental Information, Washington, D.C. USEPA QA/R-5
[2] http://waterboards.ca.gov/water_issues/programs/swamp/tools.shtml#qa

will ensure that the QA Project Plan is implemented as prescribed.

d. Data Validation and Usability. This component addresses the quality assurance activities that occur after the data collection, laboratory analysis and data generation phase of the project is completed. Implementation of these elements ensures that the data conform to the specified criteria, thus achieving the MRP objectives.

7. The Central Coast Water Board may conduct an audit of contracted laboratories at any time in order to evaluate compliance with the QAPP.

8. The Sampling and Analysis Plan and QAPP, and any proposed revisions are subject to approval by the Executive Officer. The Executive Officer may also revise the Sampling and Analysis Plan, including adding, removing, or changing monitoring site locations, changing monitoring parameters, and other changes as necessary to assess the impacts of waste discharges from irrigated lands to receiving water.

<u>Surface Receiving Water Quality Monitoring Sites</u>

9. The Sampling and Analysis Plan must, at a minimum, include monitoring sites to evaluate waterbodies identified in Table 1, unless otherwise approved by the Executive Officer. The Sampling and Analysis Plan must include sites to evaluate receiving water quality impacts most directly resulting from areas of agricultural discharge (including areas receiving tile drain discharges). Site selection must take into consideration the existence of any long term monitoring sites included in related monitoring programs (e.g. CCAMP and the existing CMP). Sites may be added or modified, subject to prior approval by the Executive Officer, to better assess the pollutant loading from individual sources or the impacts to receiving waters caused by individual discharges. Any modifications must consider sampling consistency for purposes of trend evaluation.

<u>Surface Receiving Water Quality Monitoring Parameters</u>

10. The Sampling and Analysis Plan must, at a minimum, include the following types of monitoring and evaluation parameters listed below and identified in Table 2:

    a. Flow Monitoring;
    b. Water Quality (physical parameters, metals, nutrients, pesticides);
    c. Toxicity (water and sediment);
    d. Assessment of Benthic Invertebrates.

11. All analyses must be conducted at a laboratory certified for such analyses by the State Department of Public Health (CDPH) or at laboratories approved by the Executive Officer. Unless otherwise noted, all sampling, sample preservation, and analyses must be performed in accordance with the latest edition of *Test Methods for Evaluating Solid Waste*, SW-846, U.S. EPA, and analyzed as specified herein by the above analytical methods and reporting limits indicated. Certified laboratories can be found at the web link: http://www.cdph.ca.gov/certlic/labs/Documents/ELAPLablist.xls

12. Water quality and flow monitoring is used to assess the sources, concentrations, and loads of waste discharges from individual farms/ranches and groups of Dischargers to surface waters, to evaluate impacts to water quality and beneficial uses, and to evaluate the short term patterns and long term trends in receiving water quality. Monitoring data must be compared to existing numeric and narrative water quality objectives.

13. Toxicity testing is to evaluate water quality relative to the narrative toxicity objective. Water column toxicity analyses must be conducted on 100% (undiluted) sample. At sites where persistent unresolved toxicity is found, the Executive Officer may require concurrent toxicity and chemical analyses and a Toxicity Identification Evaluation (TIE) to identify the individual discharges causing the toxicity.

Surface Receiving Water Quality Monitoring Frequency and Schedule

14. The Sampling and Analysis Plan must include a schedule for sampling. Timing, duration, and frequency of monitoring must be based on the land use, complexity, hydrology, and size of the waterbody. Table 2 includes minimum monitoring frequency and parameter lists. Agricultural parameters that are less common may be monitored less frequently. Modifications to the receiving water quality monitoring parameters, frequency, and schedule may be submitted for Executive Officer consideration and approval. At a minimum, the Sampling and Analysis Plan schedule must consist of monthly monitoring of common agricultural parameters in major agricultural areas, including two major storm events during the wet season (October 1 – April 30).

15. Storm event monitoring must be conducted within 18 hours of storm events, preferably including the first flush run-off event that results in significant increase in stream flow. For purposes of this MRP, a storm event is defined as precipitation producing onsite runoff (surface water flow) capable of creating significant ponding, erosion or other water quality problem. A

significant storm event will generally result in greater than 1-inch of rain within a 24-hour period.

16. Dischargers (individually or as part of a cooperative monitoring program) must perform receiving water quality monitoring per the Sampling and Analysis Plan and QAPP approved by the Executive Officer.

B. Surface Receiving Water Quality Reporting

Surface Receiving Water Quality Data Submittal

1. Dischargers (individually or as part of a cooperative monitoring program) must submit water quality monitoring data to the Central Coast Water Board electronically, in a format specified by the Executive Officer and compatible with SWAMP/CCAMP electronic submittal guidelines, each January 1, April 1, July 1, and October 1.

Surface Receiving Water Quality Monitoring Annual Report

2. **By July 1, 2017,** and every July 1 annually thereafter, Dischargers (individually or as part of a cooperative monitoring program) must submit an Annual Report, electronically, in a format specified by the Executive Officer including the following minimum elements:
   a. Signed Transmittal Letter;
   b. Title Page;
   c. Table of Contents;
   d. Executive Summary;
   e. Summary of Exceedance Reports submitted during the reporting period;
   f. Monitoring objectives and design;
   g. Monitoring site descriptions and rainfall records for the time period covered;
   h. Location of monitoring sites and map(s);
   i. Tabulated results of all analyses arranged in tabular form so that the required information is readily discernible;
   j. Summary of water quality data for any sites monitored as part of related monitoring programs, and used to evaluate receiving water as described in the Sampling and Analysis Plan.
   k. Discussion of data to clearly illustrate compliance with the Order and water quality standards;
   l. Discussion of short term patterns and long term trends in receiving water quality and beneficial use protection;
   m. Evaluation of pesticide and toxicity analyses results, and recommendation of candidate sites for Toxicity Identification Evaluations (TIEs);

n. Identification of the location of any agricultural discharges observed discharging directly to surface receiving water;
o. Laboratory data submitted electronically in a SWAMP/CCAMP comparable format;
p. Sampling and analytical methods used;
q. Copy of chain-of-custody forms;
r. Field data sheets, signed laboratory reports, laboratory raw data;
s. Associated laboratory and field quality control samples results;
t. Summary of Quality Assurance Evaluation results;
u. Specify the method used to obtain flow at each monitoring site during each monitoring event;
v. Electronic or hard copies of photos obtained from all monitoring sites, clearly labeled with site ID and date;
w. Conclusions.

PART 2. GROUNDWATER MONITORING AND REPORTING REQUIREMENTS

Groundwater monitoring may be conducted through a cooperative monitoring and reporting program on behalf of growers, or Dischargers may choose to conduct groundwater monitoring and reporting individually. Qualifying cooperative groundwater monitoring and reporting programs must implement the groundwater monitoring and reporting requirements described in this Order, unless otherwise approved by the Executive Officer. An interested person may seek review by the Central Coast Water Board of the Executive Officer's approval or denial of a cooperative groundwater monitoring and reporting program.

Key monitoring and reporting requirements for groundwater are shown in Table 3.

A. Groundwater Monitoring

1. Dischargers must sample private domestic wells and the primary irrigation well on their farm/ranch to evaluate groundwater conditions in agricultural areas, identify areas at greatest risk for nitrogen loading and exceedance of drinking water standards, and identify priority areas for follow up actions.

2. Dischargers must sample at least one groundwater well for each farm/ranch on their operation, including groundwater wells that are located within the property boundary of the enrolled county assessor parcel numbers (APNs). For farms/ranches with multiple groundwater wells, Dischargers must sample all domestic wells and the primary irrigation well. For the purposes of this MRP, a "domestic well" is any well that is used or may be used for domestic use purposes, including any groundwater well that is connected to a residence, workshop, or place of business that may be used for human consumption, cooking, or sanitary purposes. Groundwater monitoring

parameters must include well screen interval depths (if available), general chemical parameters, and general cations and anions listed in Table 3.

3. Dischargers must conduct two rounds of monitoring of required groundwater wells during calendar year 2017; one sample collected during spring (**March - June)** and one sample collected during fall **(September - December)**.

4. Groundwater samples must be collected by a qualified third party (e.g., consultant, technician, person conducting cooperative monitoring) using proper sampling methods, chain-of-custody, and quality assurance/quality control protocols. Groundwater samples must be collected at or near the well head before the pressure tank and prior to any well head treatment. In cases where this is not possible, the water sample must be collected from a sampling point as close to the pressure tank as possible, or from a cold-water spigot located before any filters or water treatment systems.

5. Laboratory analyses for groundwater samples must be conducted by a State certified laboratory according to U.S. EPA approved methods; unless otherwise noted, all monitoring, sample preservation, and analyses must be performed in accordance with the latest edition of *Test Methods for Evaluating Solid Waste*, SW-846, United States Environmental Protection Agency, and analyzed as specified herein by the above analytical methods and reporting limits indicated. Certified laboratories can be found at the web link below: http://www.waterboards.ca.gov/centralcoast/water_issues/programs/ag_waivers/docs/resources4growers/2016_04_11_labs.pdf

6. If a discharger determines that water in any domestic well exceeds 10 mg/L of nitrate as N, the discharger or third party must provide notice to the Central Coast Water Board within 24 hours of learning of the exceedance. For domestic wells on a Discharger's farm/ranch, that exceed 10 mg/L of nitrate as N, the Discharger must provide written notification to the users within 10 days of learning of the exceedance and provide written confirmation of the notification to the Central Coast Water Board.

   The drinking water notification must include the statement that the water poses a human health risk due to elevated nitrate concentration, and include a warning against the use of the water for drinking or cooking. In addition, Dischargers must also provide prompt written notification to any new well users (e.g. tenants and employees with access to the affected well), whenever there is a change in occupancy.

   For all other domestic wells not on a Discharger's farm/ranch but that may be impacted by nitrate, the Central Coast Water Board will notify the users promptly.

The drinking water notification and confirmation letters required by this Order are available to the public.

B. Groundwater Reporting

1. **Within 60 days of sample collection,** Dischargers must coordinate with the laboratory to submit the following groundwater monitoring results and information, electronically, using the Water Board's GeoTracker electronic deliverable format (EDF):
    a. GeoTracker Ranch Global Identification Number
    b. Field point name (Well Name)
    c. Field Point Class (Well Type)
    d. Latitude
    e. Longitude
    f. Sample collection date
    g. Analytical results
    h. Well construction information (e.g., total depth, screened intervals, depth to water), as available

2. Dischargers must submit groundwater well information required in the electronic Notice of Intent (eNOI) for each farm/ranch and update the eNOI to reflect changes in the farm/ranch information within 30 days of the change. Groundwater well information reported on the eNOI includes, but is not limited to:
    a. Number of groundwater wells present at each farm/ranch
    b. Identification of any groundwater wells abandoned or destroyed (including method destroyed) in compliance with the Order
    c. Use for fertigation or chemigation
    d. Presence of back flow prevention devices
    e. Number of groundwater wells used for agricultural purposes
    f. Number of groundwater wells used for or may be used for domestic use purposes (domestic wells).

C. Total Nitrogen Applied Reporting

1. By March 1, 2018, and by March 1 annually thereafter, Tier 2 Dischargers growing any crop with a high potential to discharge nitrogen to groundwater must record and report total nitrogen applied for each specific crop that was irrigated and grown for commercial purposes on that farm/ranch during the preceding calendar year (January through December).

   Crops with a high potential to discharge nitrogen to groundwater are: beet, broccoli, cabbage, cauliflower, celery, Chinese cabbage (napa), collard, endive, kale, leek, lettuce (leaf and head), mustard, onion (dry and green), spinach, strawberry, pepper (fruiting), and parsley.

Total nitrogen applied must be reported on the Total Nitrogen Applied Report form as described in the Total Nitrogen Applied Report form instructions.

Total nitrogen applied includes any product containing any form or concentration of nitrogen including, but not limited to, organic and inorganic fertilizers, slow release products, compost, compost teas, manure, and extracts.

2. The Total Nitrogen Applied Report form includes the following information:
   a. General ranch information such as GeoTracker file numbers, name, location, acres.
   b. Nitrogen concentration of irrigation water
   c. Nitrogen applied in pounds per acre with irrigation water
   d. Nitrogen present in the soil
   e. Nitrogen applied with compost and amendments
   f. Specific crops grown
   g. Nitrogen applied in pounds per acre with fertilizers and other materials to each specific crop grown
   h. Crop acres of each specific crop grown
   i. Whether each specific crop was grown organically or conventionally
   j. Basis for the nitrogen applied
   k. Explanation and comments section
   l. Certification statement with penalty of perjury declaration
   m. Additional information regarding whether each specific crop was grown in a nursery, greenhouse, hydroponically, in containers, and similar variables.

PART 3. ANNUAL COMPLIANCE FORM

Tier 2 Dischargers must submit annual compliance information, electronically, on the Annual Compliance Form. The purpose of the electronic Annual Compliance Form is to provide information to the Central Coast Water Board to assist in the evaluation of threat to water quality from individual agricultural discharges of waste and measure progress towards water quality improvement and verify compliance with the Order and MRP. Time schedules are shown in Table 4.

A. Annual Compliance Form

1. **By March 1, 2018, and updated annually thereafter by March 1**, Tier 2 Dischargers must submit an Annual Compliance Form electronically, in a

format specified by the Executive Officer. The electronic Annual Compliance Form includes, but is not limited to the following minimum requirements[1]:

a. Question regarding consistency between the Annual Compliance Form and the electronic Notice of Intent (eNOI);
b. Information regarding type and characteristics of discharge (e.g., number of discharge points, estimated flow/volume, number of tailwater days);
c. Identification of any direct agricultural discharges to a stream, lake, estuary, bay, or ocean;
d. Identification of specific farm water quality management practices completed, in progress, and planned to address water quality impacts caused by discharges of waste including irrigation management, pesticide management, nutrient management, salinity management, stormwater management, and sediment and erosion control to achieve compliance with this Order; and identification of specific methods used, and described in the Farm Plan consistent with Order Provision 44.g., for the purposes of assessing the effectiveness of management practices implemented and the outcomes of such assessments;
e. Proprietary information question and justification;
f. Authorization and certification statement and declaration of penalty of perjury.

PART 5. GENERAL MONITORING AND REPORTING REQUIREMENTS

A. Submittal of Technical Reports

1. Dischargers must submit reports in a format specified by the Executive Officer. A transmittal letter must accompany each report, containing the following penalty of perjury statement signed by the Discharger or the Discharger's authorized agent:

   "In compliance with Water Code §*13267, I certify under penalty of perjury that this document and all attachments were prepared by me, or under my direction or supervision following a system designed to assure that qualified personnel properly gather and evaluate the information submitted. To the best of my knowledge and belief, this document and all attachments are true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment".*

[1] Items reported in the Annual Compliance Form are due by March 1, 2018, and annually thereafter, unless otherwise specified.

2. If the Discharger asserts that all or a portion of a report submitted pursuant to this Order is subject to an exemption from public disclosure (e.g. trade secrets or secret processes), the Discharger must provide an explanation of how those portions of the reports are exempt from public disclosure. The Discharger must clearly indicate on the cover of the report (typically an electronic submittal) that the Discharger asserts that all or a portion of the report is exempt from public disclosure, submit a complete report with those portions that are asserted to be exempt in redacted form, submit separately (in a separate electronic file) unredacted pages (to be maintained separately by staff). The Central Coast Water Board staff will determine whether any such report or portion of a report qualifies for an exemption from public disclosure. If the Central Coast Water Board staff disagrees with the asserted exemption from public disclosure, the Central Coast Water Board staff will notify the Discharger prior to making such report or portions of such report available for public inspection.

B. Central Coast Water Board Authority

1. Monitoring reports are required pursuant to section 13267 of the California Water Code. Pursuant to section 13268 of the Water Code, a violation of a request made pursuant to section 13267 may subject you to civil liability of up to $1000 per day.

2. The Water Board needs the required information to determine compliance with Order No. R3-2017-0002. The evidence supporting these requirements is included in the findings of Order No. R3-2017-0002.

John M. Robertson
Executive Officer

March 8, 2017
Date

Table 1. Major Waterbodies in Agricultural Areas[1]

Hydrologic SubArea	Waterbody Name	Hydrologic SubArea	Waterbody Name
30510	Pajaro River	30920	Quail Creek
30510	Salsipuedes Creek	30920	Salinas Reclamation Canal
30510	Watsonville Slough	31022	Chorro Creek
30510	Watsonville Creek[2]	31023	Los Osos Creek
30510	Beach Road Ditch[2]	31023	Warden Creek
30530	Carnadero Creek	31024	San Luis Obispo Creek
30530	Furlong Creek[2]	31024	Prefumo Creek
30530	Llagas Creek	31031	Arroyo Grande Creek
30530	Miller's Canal	31031	Los Berros Creek
30530	San Juan Creek	31210	Bradley Canyon Creek
30530	Tesquisquita Slough	31210	Bradley Channel
30600	Moro Cojo Slough	31210	Green Valley Creek
30910	Alisal Slough	31210	Main Street Canal
30910	Blanco Drain	31210	Orcutt Solomon Creek
30910	Old Salinas River	31210	Oso Flaco Creek
30910	Salinas River (below Gonzales Rd.)	31210	Little Oso Flaco Creek
30920	Salinas River above Gonzales Rd. and below Nacimiento R.)	31210	Santa Maria River
30910	Santa Rita Creek[2]	31310	San Antonio Creek[2]
30910	Tembladero Slough	31410	Santa Ynez River
30920	Alisal Creek	31531	Bell Creek
30920	Chualar Creek	31531	Glenn Annie Creek
30920	Espinosa Slough	31531	Los Carneros Creek[2]
30920	Gabilan Creek	31534	Arroyo Paredon Creek
30920	Natividad Creek	31534	Franklin Creek

[1] At a minimum, monitoring sites must be included for these waterbodies in agricultural areas, unless otherwise approved by the Executive Officer. Monitoring sites may be proposed for addition or modification to better assess the impacts of waste discharges from irrigated lands to surface water. Dischargers choosing to comply with surface receiving water quality monitoring, individually (not part of a cooperative monitoring program) must only monitor sites for waterbodies receiving the discharge.
[2] These creeks are included because they are newly listed waterbodies on the 2010 303(d) list of Impaired Waters that are associated with areas of agricultural discharge.

Table 2. Surface Receiving Water Quality Monitoring Parameters

Parameters and Tests	RL[3]	Monitoring Frequency[1]
Photo Monitoring		
Upstream and downstream photographs at monitoring location		With every monitoring event
WATER COLUMN SAMPLING **Physical Parameters and General Chemistry**		
Flow (field measure) (CFS) following SWAMP field SOP[9]	.25	Monthly, including 2 stormwater events
pH (field measure)	0.1	"
Electrical Conductivity (field measure) (µS/cm)	2.5	"
Dissolved Oxygen (field measure) (mg/L)	0.1	"
Temperature (field measure) (^{o}C)	0.1	"
Turbidity (NTU)	0.5	"
Total Dissolved Solids (mg/L)	10	"
Total Suspended Solids (mg/L)	0.5	"
Nutrients		
Total Nitrogen (mg/L)	0.5	Monthly, including 2 stormwater events
Nitrate + Nitrite (as N) (mg/L)	0.1	"
Total Ammonia (mg/L)	0.1	"
Unionized Ammonia (calculated value, mg/L))		"
Total Phosphorus (as P) (mg/L)	0.02	
Soluble Orthophosphate (mg/L)	0.01	"
Water column chlorophyll a (µg/L)	1.0	"
Algae cover, Floating Mats, % coverage	-	"
Algae cover, Attached, % coverage	-	"
Water Column Toxicity Test		
Algae - *Selenastrum capricornutum (*96-hour chronic; Method1003.0 in EPA/821/R-02/013)	-	4 times each year, twice in dry season, twice in wet season
Water Flea – *Ceriodaphnia dubia* (7-day chronic; Method 1002.0 in EPA/821/R-02/013)	-	"
Midge - *Chironomus spp.* (96-hour acute; Alternate test species in EPA 821-R-02-012)	-	"

Parameters and Tests	RL[3]	Monitoring Frequency[1]
Toxicity Identification Evaluation (TIE)	-	As directed by Executive Officer
Pesticides[2] /Herbicides (µg/L)		
Organophosphate Pesticides		
Azinphos-methyl	0.02	2 times in both 2017 and 2018, once in dry season and once in wet season of each year, concurrent with water toxicity monitoring
Chlorpyrifos	0.005	”
Diazinon	0.005	”
Dichlorvos	0.01	”
Dimethoate	0.01	”
Dimeton-s	0.005	”
Disulfoton (Disyton)	0.005	”
Malathion	0.005	”
Methamidophos	0.02	”
Methidathion	0.02	“
Parathion-methyl	0.02	“
Phorate	0.01	“
Phosmet	0.02	“
Neonicotinoids		
Thiamethoxam	.002	“
Imidacloprid	.002	“
Thiacloprid	.002	“
Dinotefuran	.006	“
Acetamiprid	.01	“
Clothianidin	.02	
Herbicides		
Atrazine	0.05	“
Cyanazine	0.20	“
Diuron	0.05	“
Glyphosate	2.0	“
Linuron	0.1	“
Paraquat	0.20	“
Simazine	0.05	“
Trifluralin	0.05	“
Metals (µg/L)		
Arsenic (total) [5,7]	0.3	2 times in both 2017 and 2018, once in dry season and once in wet season of each year, concurrent with water toxicity monitoring
Boron (total) [6,7]	10	“

Parameters and Tests	RL[3]	Monitoring Frequency[1]
Cadmium (total & dissolved) [4.5,7]	0.01	"
Copper (total and dissolved) [4,7]	0.01	"
Lead (total and dissolved) [4,7]	0.01	"
Nickel (total and dissolved) [4,7]	0.02	"
Molybdenum (total) [7]	1	"
Selenium (total)[7]	0.30	"
Zinc (total and dissolved) [4.5,7]	0.10	"
Other (µg/L)		
Total Phenolic Compounds[8]	5	2 times in 2017, once in spring (April-May) and once in fall (August-September)
Hardness (mg/L as CaCO3)	1	"
Total Organic Carbon (ug/L)	0.6	"
SEDIMENT SAMPLING		
Sediment Toxicity - *Hyalella azteca* 10-day static renewal (EPA, 2000)		2 times each year, once in spring (April-May) and once in fall (August-September)
Pyrethroid Pesticides in Sediment (µg/kg)		
Gamma-cyhalothrin	2	2 times in both 2017 and 2018, once in spring (April-May) and once in fall (August-September) of each year, concurrent with sediment toxicity sampling
Lambda-cyhalothrin	2	"
Bifenthrin	2	"
Beta-cyfluthrin	2	"
Cyfluthrin	2	"
Esfenvalerate	2	"
Permethrin	2	"
Cypermethrin	2	"
Danitol	2	"
Fenvalerate	2	"
Fluvalinate	2	"
Other Monitoring in Sediment		
Chlorpyrifos (µg/kg)	2	"
Total Organic Carbon	0.01%	"
		"
Sediment Grain Size Analysis	1%	"

[1]Monitoring is ongoing through all five years of the Order, unless otherwise specified. Monitoring frequency may be used as a guide for developing alternative Sampling and Analysis Plan.
[2]Pesticide list may be modified based on specific pesticide use in Central Coast Region. Analytes on this list must be reported, at a minimum.

[3] Reporting Limit, taken from SWAMP where applicable.
[4] Holmgren, Meyer, Cheney and Daniels. 1993. Cadmium, Lead, Zinc, Copper and Nickel in Agricultural Soils of the United States. J. of Environ. Quality 22:335-348.
[5]Sax and Lewis, ed. 1987. Hawley's Condensed Chemical Dictionary. 11th ed. New York: Van Nostrand Reinhold Co., 1987. Zinc arsenate is an insecticide.
[6]Http://www.coastalagro.com/products/labels/9%25BORON.pdf; Boron is applied directly or as a component of fertilizers as a plant nutrient.
[7]Madramootoo, Johnston, Willardson, eds. 1997. Management of Agricultural Drainage Water Quality. International Commission on Irrigation and Drainage. U.N. FAO. SBN 92-6-104058.3.
[8]http://cat.inist.fr/?aModele=afficheN&cpsidt=14074525; Phenols are breakdown products of herbicides and pesticides. Phenols can be directly toxic and cause endocrine disruption.
[9]See SWAMP field measures SOP, p. 17
mg/L – milligrams per liter; ug/L – micrograms per liter; ug/kg – micrograms per kilogram;
NTU – Nephelometric Turbidity Units; CFS – cubic feet per second;

Table 3. Groundwater Monitoring Parameters

Parameter	RL	Analytical Method[3]	Units
pH	0.1	Field or Laboratory Measurement EPA General Methods	pH Units
Specific Conductance	2.5		µS/cm
Total Dissolved Solids	10		mg/L
Total Alkalinity as CaCO3	1	EPA Method 310.1 or 310.2	
Calcium	0.05	General Cations[1] EPA 200.7, 200.8, 200.9	
Magnesium	0.02		
Sodium	0.1		
Potassium	0.1		
Sulfate (SO4)	1.0	General Anions EPA Method 300 or EPA Method 353.2	
Chloride	0.1		
Nitrate + Nitrite (as N)[2] or Nitrate as N	0.1		

[1]General chemistry parameters (major cations and anions) represent geochemistry of water bearing zone and assist in evaluating quality assurance/quality control of groundwater sampling and laboratory analysis.
[2]The MRP allows analysis of "nitrate plus nitrite" to represent nitrate concentrations (as N). The "nitrate plus nitrite" analysis allows for extended laboratory holding times and relieves the Discharger of meeting the short holding time required for nitrate.
[3]Dischargers may use alternative analytical methods approved by EPA.
RL – Reporting Limit; µS/cm – micro siemens per centimeter

Table4. Tier 2 - Time Schedule for Key Monitoring and Reporting Requirements (MRPs)

REQUIREMENT	TIME SCHEDULE[1]
Submit Sampling And Analysis Plan and Quality Assurance Project Plan (SAAP/QAPP) for Surface Receiving Water Quality Monitoring (*individually or through cooperative monitoring program*)	By March 1, 2018, or as directed by the Executive Officer; satisfied if an approved SAAP/QAPP has been submitted pursuant to Order No. R3-2012-0011 and associated MRPs
Initiate surface receiving water quality monitoring (*individually or through cooperative monitoring program*)	Per an approved SAAP and QAPP
Submit surface receiving water quality monitoring data (*individually or through cooperative monitoring program*)	Each January 1, April 1, July 1, and October 1
Submit surface receiving water quality Annual Monitoring Report *(individually or through cooperative monitoring program*)	By July 12017: annually thereafter by July 1
Initiate monitoring of groundwater wells	First sample from March-June 2017, second sample from September-December 2017
Submit electronic Annual Compliance Form	March 1, 2018 and every March 1 annually thereafter
Submit groundwater monitoring results	Within 60 days of the sample collection
Tier 2 Dischargers with farms/ranches growing high risk crops: Report total nitrogen applied on the Total Nitrogen Applied form	March 1, 2018 and every March 1annually thereafter

[1] Dates are relative to adoption of this Order or enrollment date for Dischargers enrolled after the adoption of this Order, unless otherwise specified.

California Regional Water Quality Control Board
Central Coast Region

Monitoring and Reporting Program
Order No. R3-2017-0002-03

TIER 3

Dischargers Enrolled Under
Conditional Waiver of Waste Discharge Requirements For
Discharges from Irrigated Lands

This Monitoring and Reporting Program Order No. R3-2017-0002-03 (MRP) is issued pursuant to California Water Code (Water Code) sections 13267 and 13269, which authorize the California Regional Water Quality Control Board, Central Coast Region (hereafter Central Coast Water Board) to require preparation and submittal of technical and monitoring reports. Water Code section 13269 requires a waiver of waste discharge requirements to include as a condition, the performance of monitoring and the public availability of monitoring results. *Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands,* Order No. R3-2017-0002 (Order), includes criteria and requirements for three tiers. This MRP sets forth monitoring and reporting requirements for **Tier 3 Dischargers** enrolled under the Order. A summary of the requirements is shown below.

SUMMARY OF MONITORING AND REPORTING REQUIREMENTS FOR TIER 3:

Part 1: Surface Receiving Water Monitoring and Reporting *(cooperative or individual)*
Part 2: Groundwater Monitoring and Reporting *(cooperative or individual)*
Total Nitrogen Applied Reporting *(required for subset of Tier 3 Dischargers if farm/ranch growing any crop with high nitrate loading risk to groundwater);*
Part 3: Annual Compliance Form
Part 5: Individual Surface Water Discharge Monitoring and Reporting
Part 6: Irrigation and Nutrient Management Plan *(required for subset of Tier 3 Dischargers if farm/ranch has High Nitrate Loading Risk)*
Part 7: Water Quality Buffer Plan *(required for subset of Tier 3 Dischargers if farm/ranch contains or is adjacent to a waterbody impaired for temperature, turbidity or sediment)*

Pursuant to Water Code section 13269(a)(2), monitoring requirements must be designed to support the development and implementation of the waiver program, including, but not limited to, verifying the adequacy and effectiveness of the waiver's conditions. The monitoring and reports required by this MRP are to evaluate effects of discharges of waste from irrigated agricultural operations and individual farms/ranches on waters of the state and to determine compliance with the Order.

MONITORING AND REPORTING BASED ON TIERS

The Order and MRP includes criteria and requirements for three tiers, based upon those characteristics of the individual farms/ranches at the operation that present the highest level of waste discharge or greatest risk to water quality. Dischargers must meet conditions of the Order and MRP for the appropriate tier that applies to their land and/or the individual farm/ranch. Within a tier, Dischargers comply with requirements based on the specific level of discharge and threat to water quality from individual farms/ranches. The lowest tier, Tier 1, applies to dischargers who discharge the lowest level of waste (amount or concentration) or pose the lowest potential to cause or contribute to an exceedance of water quality standards in waters of the State or of the United States. The highest tier, Tier 3, applies to dischargers who discharge the highest level of waste or pose the greatest potential to cause or contribute to an exceedance of water quality standards in waters of the State or of the United States. Tier 2 applies to dischargers whose discharge has a moderate threat to water quality. Water quality is defined in terms of regional, state, or federal numeric or narrative water quality standards. Per the Order, Dischargers may submit a request to the Executive Officer to approve transfer to a lower tier. If the Executive Officer approves a transfer to a lower tier, any interested person may request that the Central Coast Water Board conduct a review of the Executive Officer's determination.

PART 1. SURFACE RECEIVING WATER MONITORING AND REPORTING REQUIREMENTS

The surface receiving water monitoring and reporting requirements described herein are generally a continuation of the surface receiving water monitoring and reporting requirements of Monitoring and Reporting Program Order No. 2012-0011-03, as revised August 22, 2016, with the intent of uninterrupted regular monitoring and reporting during the transition from Order No. R3-2012-0011-03 to Order No. R3-2017-0002-03.

Monitoring and reporting requirements for surface receiving water identified in Part 1.A. and Part 1.B. apply to Tier 3 Dischargers. Surface receiving water refers to water flowing in creeks and other surface waters of the State. Surface receiving water monitoring may be conducted through a cooperative monitoring program on behalf of Dischargers, or Dischargers may choose to conduct surface receiving water monitoring and reporting individually. Key monitoring and reporting requirements for surface receiving water are shown in Tables 1 and 2. Time schedules are shown in Table 5.

A. Surface Receiving Water Quality Monitoring

1. Dischargers must elect a surface receiving water monitoring option (cooperative monitoring program or individual receiving water monitoring) to comply with surface receiving water quality monitoring requirements, and identify the option selected on the Notice of Intent (NOI).

2. Dischargers are encouraged to choose participation in a cooperative monitoring program (e.g., the existing Cooperative Monitoring Program or a similar program) to comply with receiving water quality monitoring requirements. Dischargers not participating in a cooperative monitoring program must conduct surface receiving water quality monitoring individually that achieves the same purpose.

3. Dischargers (individually or as part of a cooperative monitoring program) must conduct surface receiving water quality monitoring to a) assess the impacts of their waste discharges from irrigated lands to receiving water, b) assess the status of receiving water quality and beneficial use protection in impaired waterbodies dominated by irrigated agricultural activity, c) evaluate status, short term patterns and long term trends (five to ten years or more) in receiving water quality, d) evaluate water quality impacts resulting from agricultural discharges (including but not limited to tile drain discharges), e) evaluate stormwater quality, f) evaluate condition of existing perennial, intermittent, or ephemeral streams or riparian or wetland area habitat, including degradation resulting from erosion or agricultural discharges of waste, and g) assist in the identification of specific sources of water quality problems.

<u>Surface Receiving Water Quality Sampling and Analysis Plan</u>

4. **By March 1, 2018, or as directed by the Executive Officer**, Dischargers (individually or as part of a cooperative monitoring program) must submit a surface receiving water quality Sampling and Analysis Plan (SAAP) and Quality Assurance Project Plan (QAPP); this requirement is satisfied if an approved SAAP and QAPP addressing all surface receiving water quality monitoring requirements described in this Order has been submitted pursuant to Order No.R3-2012-0011 and associated Monitoring and Reporting Programs. Dischargers (or a third party cooperative monitoring program) must develop the Sampling and Analysis Plan to describe how the proposed monitoring will achieve the objectives of the MRP and evaluate compliance with the Order. The Sampling and Analysis Plan may propose alternative monitoring site locations, adjusted monitoring parameters, and other changes as necessary to assess the impacts of waste discharges from irrigated lands to receiving water. The Executive Officer must approve the Sampling and Analysis Plan and QAPP.

5. The Sampling and Analysis Plan must include the following minimum required components:
    a. Monitoring strategy to achieve objectives of the Order and MRP;
    b. Map of monitoring sites with GIS coordinates;

c. Identification of known water quality impairments and impaired waterbodies per the 2010 Clean Water Act 303(d) List of Impaired Waterbodies (List of Impaired Waterbodies);
d. Identification of beneficial uses and applicable water quality standards;
e. Identification of applicable Total Maximum Daily Loads;
f. Monitoring parameters;
g. Monitoring schedule, including description and frequencies of monitoring events;
h. Description of data analysis methods;

6. The QAPP must include receiving water and site-specific information, project organization and responsibilities, and quality assurance components of the MRP. The QAPP must also include the laboratory and field requirements to be used for analyses and data evaluation. The QAPP must contain adequate detail for project and Water Board staff to identify and assess the technical and quality objectives, measurement and data acquisition methods, and limitations of the data generated under the surface receiving water quality monitoring. All sampling and laboratory methodologies and QAPP content must be consistent with U.S. EPA methods, State Water Board's Surface Water Ambient Monitoring Program (SWAMP) protocols and the Central Coast Water Board's Central Coast Ambient Monitoring Program (CCAMP). Following U.S. EPA guidelines[1] and SWAMP templates[2], the receiving water quality monitoring QAPP must include the following minimum required components:
   a. Project Management. This component addresses basic project management, including the project history and objectives, roles and responsibilities of the participants, and other aspects.
   b. Data Generation and Acquisition. This component addresses all aspects of project design and implementation. Implementation of these elements ensures that appropriate methods for sampling, measurement and analysis, data collection or generation, data handling, and quality control activities are employed and are properly documented. Quality control requirements are applicable to all the constituents sampled as part of the MRP, as described in the appropriate method.
   c. Assessment and Oversight. This component addresses the activities for assessing the effectiveness of the implementation of the project and associated QA and QC activities. The purpose of the assessment is to provide project oversight that

[1] USEPA. 2001 (2006) USEPA Requirements for Quality Assurance Project Plans (QA/R-5) Office of Environmental Information, Washington, D.C. USEPA QA/R-5
[2] http://waterboards.ca.gov/water_issues/programs/swamp/tools.shtml#qa

will ensure that the QA Project Plan is implemented as prescribed.

d. Data Validation and Usability. This component addresses the quality assurance activities that occur after the data collection, laboratory analysis and data generation phase of the project is completed. Implementation of these elements ensures that the data conform to the specified criteria, thus achieving the MRP objectives.

7. The Central Coast Water Board may conduct an audit of contracted laboratories at any time in order to evaluate compliance with the QAPP.

8. The Sampling and Analysis Plan and QAPP, and any proposed revisions are subject to approval by the Executive Officer. The Executive Officer may also revise the Sampling and Analysis Plan, including adding, removing, or changing monitoring site locations, changing monitoring parameters, and other changes as necessary to assess the impacts of waste discharges from irrigated lands to receiving water.

<u>Surface Receiving Water Quality Monitoring Sites</u>

9. The Sampling and Analysis Plan must, at a minimum, include monitoring sites to evaluate waterbodies identified in Table 1, unless otherwise approved by the Executive Officer. The Sampling and Analysis Plan must include sites to evaluate receiving water quality impacts most directly resulting from areas of agricultural discharge (including areas receiving tile drain discharges). Site selection must take into consideration the existence of any long term monitoring sites included in related monitoring programs (e.g. CCAMP and the existing CMP). Sites may be added or modified, subject to prior approval by the Executive Officer, to better assess the pollutant loading from individual sources or the impacts to receiving waters caused by individual discharges. Any modifications must consider sampling consistency for purposes of trend evaluation.

<u>Surface Receiving Water Quality Monitoring Parameters</u>

10. The Sampling and Analysis Plan must, at a minimum, include the following types of monitoring and evaluation parameters listed below and identified in Table 2:

    a. Flow Monitoring;
    b. Water Quality (physical parameters, metals, nutrients, pesticides);
    c. Toxicity (water and sediment);
    d. Assessment of Benthic Invertebrates.

11. All analyses must be conducted at a laboratory certified for such analyses by the State Department of Public Health (CDPH) or at laboratories approved by the Executive Officer. Unless otherwise noted, all sampling, sample preservation, and analyses must be performed in accordance with the latest edition of *Test Methods for Evaluating Solid Waste*, SW-846, U.S. EPA, and analyzed as specified herein by the above analytical methods and reporting limits indicated. Certified laboratories can be found at the web link: http://www.cdph.ca.gov/certlic/labs/Documents/ELAPLablist.xls

12. Water quality and flow monitoring is used to assess the sources, concentrations, and loads of waste discharges from individual farms/ranches and groups of Dischargers to surface waters, to evaluate impacts to water quality and beneficial uses, and to evaluate the short term patterns and long term trends in receiving water quality. Monitoring data must be compared to existing numeric and narrative water quality objectives.

13. Toxicity testing is to evaluate water quality relative to the narrative toxicity objective. Water column toxicity analyses must be conducted on 100% (undiluted) sample. At sites where persistent unresolved toxicity is found, the Executive Officer may require concurrent toxicity and chemical analyses and a Toxicity Identification Evaluation (TIE) to identify the individual discharges causing the toxicity.

Surface Receiving Water Quality Monitoring Frequency and Schedule

14. The Sampling and Analysis Plan must include a schedule for sampling. Timing, duration, and frequency of monitoring must be based on the land use, complexity, hydrology, and size of the waterbody. Table 2 includes minimum monitoring frequency and parameter lists. Agricultural parameters that are less common may be monitored less frequently. Modifications to the receiving water quality monitoring parameters, frequency, and schedule may be submitted for Executive Officer consideration and approval. At a minimum, the Sampling and Analysis Plan schedule must consist of monthly monitoring of common agricultural parameters in major agricultural areas, including two major storm events during the wet season (October 1 – April 30).

15. Storm event monitoring must be conducted within 18 hours of storm events, preferably including the first flush run-off event that results in significant increase in stream flow. For purposes of this MRP, a storm event is defined as precipitation producing onsite runoff (surface water flow) capable of creating significant ponding, erosion or other water quality problem. A

significant storm event will generally result in greater than 1-inch of rain within a 24-hour period.

16. Dischargers (individually or as part of a cooperative monitoring program) must perform receiving water quality monitoring per the Sampling and Analysis Plan and QAPP approved by the Executive Officer.

B. Surface Receiving Water Quality Reporting

<u>Surface Receiving Water Quality Data Submittal</u>

1. Dischargers (individually or as part of a cooperative monitoring program) must submit water quality monitoring data to the Central Coast Water Board electronically, in a format specified by the Executive Officer and compatible with SWAMP/CCAMP electronic submittal guidelines, each January 1, April 1, July 1, and October 1.

<u>Surface Receiving Water Quality Monitoring Annual Report</u>

2. **By July 1, 2017,** and every July 1 annually thereafter, Dischargers (individually or as part of a cooperative monitoring program) must submit an Annual Report, electronically, in a format specified by the Executive Officer including the following minimum elements:

   a. Signed Transmittal Letter;
   b. Title Page;
   c. Table of Contents;
   d. Executive Summary;
   e. Summary of Exceedance Reports submitted during the reporting period;
   f. Monitoring objectives and design;
   g. Monitoring site descriptions and rainfall records for the time period covered;
   h. Location of monitoring sites and map(s);
   i. Tabulated results of all analyses arranged in tabular form so that the required information is readily discernible;
   j. Summary of water quality data for any sites monitored as part of related monitoring programs, and used to evaluate receiving water as described in the Sampling and Analysis Plan.
   k. Discussion of data to clearly illustrate compliance with the Order and water quality standards;
   l. Discussion of short term patterns and long term trends in receiving water quality and beneficial use protection;

m. Evaluation of pesticide and toxicity analyses results, and recommendation of candidate sites for Toxicity Identification Evaluations (TIEs);
n. Identification of the location of any agricultural discharges observed discharging directly to surface receiving water;
o. Laboratory data submitted electronically in a SWAMP/CCAMP comparable format;
p. Sampling and analytical methods used;
q. Copy of chain-of-custody forms;
r. Field data sheets, signed laboratory reports, laboratory raw data;
s. Associated laboratory and field quality control samples results;
t. Summary of Quality Assurance Evaluation results;
u. Specify the method used to obtain flow at each monitoring site during each monitoring event;
v. Electronic or hard copies of photos obtained from all monitoring sites, clearly labeled with site ID and date;
w. Conclusions.

PART 2. GROUNDWATER MONITORING AND REPORTING REQUIREMENTS

Groundwater monitoring may be conducted through a cooperative monitoring and reporting program on behalf of growers, or Dischargers may choose to conduct groundwater monitoring and reporting individually. Qualifying cooperative groundwater monitoring and reporting programs must implement the groundwater monitoring and reporting requirements described in this Order, unless otherwise approved by the Executive Officer. An interested person may seek review by the Central Coast Water Board of the Executive Officer's approval or denial of a cooperative groundwater monitoring and reporting program.

Key monitoring and reporting requirements for groundwater are shown in Table 3.

A. Groundwater Monitoring

1. Dischargers must sample private domestic wells and the primary irrigation well on their farm/ranch to evaluate groundwater conditions in agricultural areas, identify areas at greatest risk for nitrogen loading and exceedance of drinking water standards, and identify priority areas for follow up actions.

2. Dischargers must sample at least one groundwater well for each farm/ranch on their operation, including groundwater wells that are located within the property boundary of the enrolled county assessor parcel numbers (APNs). For farms/ranches with multiple groundwater wells, Dischargers must sample all domestic wells and the primary irrigation well. For the purposes of this MRP, a "domestic well" is any well that is used or may be used for domestic

use purposes, including any groundwater well that is connected to a residence, workshop, or place of business that may be used for human consumption, cooking, or sanitary purposes. Groundwater monitoring parameters must include well screen interval depths (if available), general chemical parameters, and general cations and anions listed in Table 3.

3. Dischargers must conduct two rounds of monitoring of required groundwater wells during calendar year 2017; one sample collected during spring (**March - June)** and one sample collected during fall **(September - December)**.

4. Groundwater samples must be collected by a qualified third party (e.g., consultant, technician, person conducting cooperative monitoring) using proper sampling methods, chain-of-custody, and quality assurance/quality control protocols. Groundwater samples must be collected at or near the well head before the pressure tank and prior to any well head treatment. In cases where this is not possible, the water sample must be collected from a sampling point as close to the pressure tank as possible, or from a cold-water spigot located before any filters or water treatment systems.

5. Laboratory analyses for groundwater samples must be conducted by a State certified laboratory according to U.S. EPA approved methods; unless otherwise noted, all monitoring, sample preservation, and analyses must be performed in accordance with the latest edition of *Test Methods for Evaluating Solid Waste*, SW-846, United States Environmental Protection Agency, and analyzed as specified herein by the above analytical methods and reporting limits indicated. Certified laboratories can be found at the web link below: http://www.waterboards.ca.gov/centralcoast/water_issues/programs/ag_waivers/docs/resources4growers/2016_04_11_labs.pdf

6. If a discharger determines that water in any domestic well exceeds 10 mg/L of nitrate as N, the discharger or third party must provide notice to the Central Coast Water Board within 24 hours of learning of the exceedance. For domestic wells on a Discharger's farm/ranch that exceed 10 mg/L nitrate as N, the Discharger must provide written notification to the users within 10 days of learning of the exceedance and provide written confirmation of the notification to the Central Coast Water Board.

   The drinking water notification must include the statement that the water poses a human health risk due to elevated nitrate concentration, and include a warning against the use of the water for drinking or cooking. In addition, Dischargers must also provide prompt written notification to any new well users (e.g. tenants and employees with access to the affected well), whenever there is a change in occupancy.

For all other domestic wells not on a Discharger's property, the Central Coast Water Board will notify the users promptly.

The drinking water notification and confirmation letters required by this Order are available to the public.

B. Groundwater Reporting

1. **Within 60 days of sample collection,** Dischargers must coordinate with the laboratory to submit the following groundwater monitoring results and information, electronically, using the Water Board's GeoTracker electronic deliverable format (EDF):
    a. GeoTracker Ranch Global Identification Number
    b. Field point name (Well Name)
    c. Field Point Class (Well Type)
    d. Latitude
    e. Longitude
    f. Sample collection date
    g. Analytical results
    h. Well construction information (e.g., total depth, screened intervals, depth to water), as available

2. Dischargers must submit groundwater well information required in the electronic Notice of Intent (eNOI) for each farm/ranch and update the eNOI to reflect changes in the farm/ranch information within 30 days of the change. Groundwater well information reported on the eNOI includes, but is not limited to:
    a. Number of groundwater wells present at each farm/ranch
    b. Identification of any groundwater wells abandoned or destroyed (including method destroyed) in compliance with the Order
    c. Use for fertigation or chemigation
    d. Presence of back flow prevention devices
    e. Number of groundwater wells used for agricultural purposes
    f. Number of groundwater wells used for or may be used for domestic use purposes (domestic wells)

C. Total Nitrogen Applied Reporting

1. By March 1, 2018, and by March 1 annually thereafter, Tier 3 Dischargers growing any crop with a high potential to discharge nitrogen to groundwater must record and report total nitrogen applied for each specific crop that was irrigated and grown for commercial purposes on that farm/ranch during the preceding calendar year (January through December).

   Crops with a high potential to discharge nitrogen to groundwater are: beet, broccoli, cabbage, cauliflower, celery, Chinese cabbage (napa), collard, endive, kale, leek, lettuce (leaf and head), mustard, onion (dry and green), spinach, strawberry, pepper (fruiting), and parsley.

Total nitrogen applied must be reported on the Total Nitrogen Applied Report form as described in the Total Nitrogen Applied Report form instructions.

Total nitrogen applied includes any product containing any form or concentration of nitrogen including, but not limited to, organic and inorganic fertilizers, slow release products, compost, compost teas, manure, and extracts.

2. The Total Nitrogen Applied Report form includes the following information:
    a. General ranch information such as GeoTracker file numbers, name, location, acres.
    b. Nitrogen concentration of irrigation water
    c. Nitrogen applied in pounds per acre with irrigation water
    d. Nitrogen present in the soil
    e. Nitrogen applied with compost and amendments
    f. Specific crops grown
    g. Nitrogen applied in pounds per acre with fertilizers and other materials to each specific crop grown
    h. Crop acres of each specific crop grown
    i. Whether each specific crop was grown organically or conventionally
    j. Basis for the nitrogen applied
    k. Explanation and comments section
    l. Certification statement with penalty of perjury declaration
    m. Additional information regarding whether each specific crop was grown in a nursery, greenhouse, hydroponically, in containers, and similar variables.

PART 3. ANNUAL COMPLIANCE FORM

Tier 3 Dischargers must submit annual compliance information, electronically, on the Annual Compliance Form. The purpose of the electronic Annual Compliance Form is to provide information to the Central Coast Water Board to assist in the evaluation of threat to water quality from individual agricultural discharges of waste and measure progress towards water quality improvement and verify compliance with the Order and MRP. Time schedules are shown in Table 5.

A. Annual Compliance Form

1. **By March 1, 2018, and updated annually thereafter by March 1**, Tier 3 Dischargers must submit an Annual Compliance Form electronically, in a format specified by the Executive Officer. The electronic Annual Compliance Form includes, but is not limited to the following minimum requirements[1]:
    a. Question regarding consistency between the Annual Compliance Form and the electronic Notice of Intent (eNOI);
    b. Information regarding type and characteristics of discharge (e.g., number of discharge points, estimated flow/volume, number of tailwater days);
    c. Identification of any direct agricultural discharges to a stream, lake, estuary, bay, or ocean;
    d. Identification of specific farm water quality management practices completed, in progress, and planned to address water quality impacts caused by discharges of waste including irrigation management, pesticide management, nutrient management, salinity management, stormwater management, and sediment and erosion control to achieve compliance with this Order; and identification of specific methods used, and described in the Farm Plan consistent with Order Provision 44.g., for the purposes of assessing the effectiveness of management practices implemented and the outcomes of such assessments:
    e. Proprietary information question and justification;
    f. Authorization and certification statement and declaration of penalty of perjury.

PART 5. INDIVIDUAL SURFACE WATER DISCHARGE MONITORING AND REPORTING REQUIREMENTS

Monitoring and reporting requirements for individual surface water discharge identified in Part 5.A. and Part 5.B. apply to Tier 3 Dischargers with irrigation water or stormwater discharges to surface water from an outfall. Outfalls are locations where irrigation water and stormwater exit a farm/ranch, or otherwise leave the control of the discharger, after being conveyed by pipes, ditches, constructed swales, tile drains, containment structures, or other discrete structures or features that transport the water. Discharges that have commingled with discharges from another farm/ranch are considered to have left the control of the discharger. Key monitoring and reporting requirements for individual surface water discharge are shown in Tables 4A and 4B. Time schedules are shown in Table 5.

[1] Items reported in the Annual Compliance Form are due by March 1 2018, and annually thereafter, unless otherwise specified.

A. Individual Surface Water Discharge Monitoring

1. Tier 3 Dischargers must conduct individual surface water discharge monitoring to a) evaluate the quality of individual waste discharges, including concentration and load of waste (in kilograms per day) for appropriate parameters, b) evaluate effects of waste discharge on water quality and beneficial uses, and c) evaluate progress towards compliance with water quality improvement milestones in the Order.

Individual Sampling and Analysis Plan

2. **By March 1, 2018, or as directed by the Executive Officer**, Tier 3 Dischargers must submit an individual surface water discharge Sampling and Analysis Plan (SAAP) and QAPP to monitor individual discharges of irrigation water and stormwater that leaves their farm/ranch from an outfall. The Sampling and Analysis Plan and QAPP must be submitted to the Executive Officer; this requirement is satisfied if an approved SAAP and QAPP addressing all individual surface water discharge monitoring requirements described in this Order has been submitted pursuant to Order No.R3-2012-0011 and associated Monitoring and Reporting Programs.

3. The Sampling and Analysis Plan must include the following minimum required components to monitor irrigation water and stormwater discharges:
    a. Number and location of outfalls (identified with latitude and longitude or on a scaled map);
    b. Number and location of monitoring points;
    c. Description of typical irrigation runoff patterns;
    d. Map of discharge and monitoring points;
    e. Sample collection methods;
    f. Monitoring parameters;
    g. Monitoring schedule and frequency of monitoring events;

4. The QAPP must include appropriate methods for sampling, measurement and analysis, data collection or generation, data handling, quality control activities, and documentation.

5. The Sampling and Analysis Plan and QAPP, and any proposed revisions are subject to approval by the Executive Officer. The Executive Officer may require modifications to the Sampling and Analysis Plan or Tier 3 Dischargers may propose Sampling and Analysis Plan modifications for Executive Officer approval, when modifications are justified to accomplish the objectives of the MRP.

Individual Surface Water Discharge Monitoring Points

6. Tier 3 Dischargers must select monitoring points to characterize at least 80% of the estimated maximum irrigation run-off discharge volume from each farm/ranch based on that farm's/ranch's typical discharge patterns[1], including tailwater discharges and discharges from tile drains. Sample must be taken when irrigation activity is causing maximal run-off. Load estimates will be generated by multiplying flow volume of discharge by concentration of contaminants. Tier 3 Dischargers must include at least one monitoring point from each farm/ranch which drains areas where chlorpyrifos or diazinon are applied, and monitoring of runoff or tailwater must be conducted within one week of chemical application. If discharge is not routinely present, Discharger may characterize typical run-off patterns in the Annual Report. See Table 4A for additional details.

7. Tier 3 Dischargers must also monitor storage ponds and other terminal surface water containment structures that collect irrigation and stormwater runoff, unless the structure is (1) part of a tail-water return system where a major portion of the water in such structure is reapplied as irrigation water, or (2) the structure is primarily a sedimentation pond by design with a short hydraulic residence time (96 hours or less) and a discharge to surface water when functioning. If multiple ponds are present, sampling must cover at least those structures that would account for 80% of the maximum storage volume of the containment features. See Table 4B for additional details. Where water is reapplied as irrigation water. Dischargers shall document reuse in the Farm Plan.

Individual Surface Water Discharge Monitoring Parameters, Frequency, and Schedule

8. Tier 3 Dischargers must conduct monitoring for parameters, laboratory analytical methods, frequency and schedule described in Tables 4A and 4B. Dischargers may utilize in-field water testing instruments/equipment as a substitute for laboratory analytical methods if the method is approved by U.S. EPA, meets reporting limits (RL) and practical quantitation limits (PQL) specifications in the MRP, and appropriate sampling methodology and quality assurance checks can be applied to ensure that QAPP standards are met to ensure accuracy of the test.

[1] The requirement to select monitoring points to characterize at least 80% of the estimated maximum irrigation run-off based on typical discharge patterns is for the purposes of attempting to collect samples that represent a majority of the volume of irrigation run-off discharged; however the Board recognizes that predetermining these locations is not always possible and that sampling results may vary. The MRP does not specify the number or location of monitoring points to provide maximum flexibility for growers to determine how many sites necessary and exact locations are given the anticipated site-specific conditions.

9. Tier 3 Dischargers must initiate individual surface water discharge monitoring per an approved Sampling and Analysis Plan and QAPP, unless otherwise directed by the Executive Officer.

B. Individual Surface Water Discharge Reporting

Individual Surface Water Discharge Monitoring Data Submittal

By March 1, 2018, and annually thereafter by March 1, Tier 3 Dischargers must submit individual surface water discharge monitoring data and information to the Central Coast Water Board electronically, in a pdf format, containing at least the following items, or as otherwise approved by the Executive Officer:

a. Electronic laboratory data
- All reports of results must contain Ranch name and Global ID, site name(s), project contact, and date.
- Electronic laboratory data reports of chemical results shall include analytical results, as well as associated quality assurance data including method detection limits, reporting limits, matrix spikes, matrix spike duplicates, laboratory blanks, and other quality assurance results required by the analysis method.
- Electronic laboratory data reports of toxicity results shall include summary results comparable to those required in a CEDEN file delivery, including test and control results. For each test result, the mean, associated control performance, calculated percent of control, statistical test results and determination of toxicity, must be included. Test results must specify the control ID used to calculate statistical outcomes.
- Field data results, including temperature, pH, conductivity, turbidity and flow measurements, any field duplicates or blanks, and field observations.
- Calculations of un-ionized ammonia concentrations
- Calculations of total flow and pollutant loading (for nitrate, pesticides if sampled, total ammonia, and turbidity) (include formulas);

b. Narrative description of typical irrigation runoff patterns;
c. Location of sampling sites and map(s);
d. Sampling and analytical methods used;
e. Specify the method used to obtain flow at each monitoring site during each monitoring event;
f. Photos obtained from all monitoring sites, clearly labeled with location and date;
g. Sample chain-of-custody forms do not need to be submitted but must be made available to Central Coast Water Board staff, upon request.

PART 6. IRRIGATION AND NUTRIENT MANAGEMENT PLAN

Monitoring and reporting requirements related to the Irrigation and Nutrient Management Plan (INMP) identified in Part 6.A., and 6.B, apply to Tier 3 Dischargers identified by the Executive Officer that are newly enrolled in Order No. R3-2017-0002, and Tier 3 Dischargers that were subject to Irrigation and Nutrient Management Plan Requirements in Order R3-2012-0011 per MRP Order No. R3-2012-0011-03 Time schedules are shown in Table 5.

A. Irrigation and Nutrient Management Plan Monitoring

1. Tier 3 Dischargers required in Order No. R3-2012-0011 to develop and initiate implementation of an Irrigation and Nutrient Management Plan (INMP) certified by a Professional Soil Scientist, Professional Agronomist, or Crop Advisor certified by the American Society of Agronomy, or similarly qualified professional, are required to update (as necessary) and implement their INMP throughout the term of this Order.

2. The Executive Officer will assess whether an INMP is required for new Tier 3 Dischargers that enroll in Order No. R3-2017-0002 during the term of the Order. The Executive Officer will use the criteria established in Order No. R3-2012-0011 to make this assessment. If a Tier 3 Discharger is required to develop an INMP, the Tier 3 discharger must develop and initiate implementation of an Irrigation and Nutrient Management Plan (INMP) certified by a Professional Soil Scientist, Professional Agronomist, or Crop Advisor certified by the American Society of Agronomy, or similarly qualified professional, **within 18 months** of the Executive Officer's assessment of the INMP requirement.
3. The purpose of the INMP is to budget and manage the nutrients applied to each farm/ranch considering all sources of nutrients, crop requirements, soil types, climate, and local conditions in order to minimize nitrate loading to surface water and groundwater in compliance with this Order. The professional certification of the INMP must indicate that the relevant expert has reviewed all necessary documentation and testing results, evaluated total nitrogen applied relative to typical crop nitrogen uptake and nitrogen removed at harvest, with consideration to potential nitrate loading to groundwater, and conducted field verification to ensure accuracy of reporting.
4. Tier 3 Dischargers required to develop and initiate implementation an (INMP) must include the following elements in the INMP. The INMP is not submitted to the Central Coast Water Board, with the exception of the INMP Effectiveness Report:
    a. Proof of INMP certification;
    b. Map locating each farm/ranch;
    c. Identification of crop nitrogen uptake values for use in nutrient balance calculations;

d. Record keeping annually by either Method 1 or Method 2:

e. To meet the requirement to record total nitrogen in the soil,dischargers may take a nitrogen soil sample (e.g. laboratory analysis or nitrate quick test) or use an alternative method to evaluate nitrogen content in soil, prior to planting or seeding the field or prior to the time of pre-sidedressing, or at an alternative time when it is most effective to determine nitrogen present in the soil that is available for the next crop and to minimize nitrate leaching to groundwater. The amount of nitrogen remaining in the soil must be accounted for as a source of nitrogen when budgeting, and the soil sample or alternative method results must be maintained in the INMP.
f. Identification of irrigation and nutrient management practices in progress (identify start date), completed (identify completion date), and planned (identify anticipated start date) to reduce nitrate loading to groundwater to achieve compliance with this Order.
g. Description of methods Discharger will use to verify overall effectiveness of the INMP.

5. Tier 3 Dischargers must evaluate the effectiveness of the INMP. Irrigation and Nutrient Management Plan effectiveness monitoring must evaluate reduction in new nitrogen[1] loading potential based on minimized fertilizer use and improved irrigation and nutrient management practices in order to minimize new nitrogen loading to surface water and groundwater. Evaluation methods used may include, but are not limited to analysis of groundwater well monitoring data or soil sample data, or analysis of trends in new nitrogen application data.

B. Irrigation and Nutrient Management Plan Reporting

1. **By March 1, 2019**, Tier 3 Dischargers required to develop and initiate implementation of an INMP must submit an INMP Effectiveness Report to evaluate reductions in nitrate loading to surface water and groundwater based on the implementation of irrigation and nutrient management practices in a format specified by the Executive Officer. Dischargers in the same groundwater basin or subbasin may choose to comply with this requirement as a group by submitting a single report that evaluates the overall effectiveness of the broad scale implementation of irrigation and nutrient management practices identified in individual INMPs to protect groundwater. Group efforts must use data from each farm/ranch (e.g., data from individual groundwater wells, soil samples, or nitrogen application). The INMP

[1] New nitrogen is nitrogen from fertilizers, amendments, and other nitrogen sources applied other than nitrogen present in groundwater.

Effectiveness Report must include a description of the methodology used to evaluate and verify effectiveness of the INMP.

PART 7. WATER QUALITY BUFFER PLAN

Monitoring and reporting requirements related to the Water Quality Buffer Plan identified in Part 7.A. and Part 7.B. apply to Tier 3 Dischargers that have farms/ranches *that contain or are adjacent to waterbody identified on the List of Impaired Waterbodies as impaired for temperature, turbidity, or sediment).* Time schedules are shown in Table 5.

A. **Water Quality Buffer Plan**

1. **By 18 months following enrollment in Order No. R3-2017-0002 of a Tier 3 farm/ranch**, Tier 3 Dischargers adjacent to or containing a waterbody identified on the List of Impaired Waterbodies as impaired for temperature, turbidity or sediment must submit a Water Quality Buffer Plan (WQBP) to the Executive Officer that protects the listed waterbody and its associated perennial and intermittent tributaries. The purpose of the Water Quality Buffer Plan is to prevent waste discharge, comply with water quality standards (e.g., temperature, turbidity, sediment), and protect beneficial uses in compliance with this Order and the following Basin Plan requirement:

   Basin Plan (Chapter 5, p. V-13, Section V.G.4 – Erosion and Sedimentation, *"A filter strip of appropriate width, and consisting of undisturbed soil and riparian vegetation or its equivalent, must be maintained, wherever possible, between significant land disturbance activities and watercourses, lakes, bays, estuaries, marshes, and other water bodies. For construction activities, minimum width of the filter strip must be thirty feet, wherever possible…."*

2. The Water Quality Buffer Plan must include the following or the functional equivalent, to address discharges of waste and associated water quality impairments:

   a. A minimum 30 foot buffer (as measured horizontally from the top of bank on either side of the waterway, or from the high water mark of a lake and mean high tide of an estuary);
   b. Any necessary increases in buffer width to adequately prevent the discharge of waste that may cause or contribute to any excursion above or outside the acceptable range for any Regional, State, or Federal numeric or narrative water quality standard (e.g., temperature, turbidity);

c. Any buffer less than 30 feet must provide equivalent water quality protection and be justified based on an analysis of site-specific conditions and be approved by the Executive Officer;
d. Identification of any alternatives implemented to comply with this requirement, that are functionally equivalent to described buffer;
e. Schedule for implementation;
f. Maintenance provisions to ensure water quality protection;
g. Annual photo monitoring;

2. The WQPB must be submitted using the Water Quality Buffer Plan form, or, if an alternative to the WQBP is submitted, in a format approved by the Executive Officer.

3. **By March 1, 2019**, Tier 3 Dischargers that submitted a WQBP pursuant to Order No. R3-2012-0011 or Order No. R3-2017-0002, are required to update (as necessary) and implement their WQBP, and annually submit a WQBP Status Report of their WQBP implementation using the Water Quality Buffer Plan form, or, if an alternative to the WQBP was submitted, an Alternative to WQBP Status Report, electronically, in a format approved by the Executive Officer.

PART 8. GENERAL MONITORING AND REPORTING REQUIREMENTS

A. Submittal of Technical Reports

1. Dischargers must submit reports in a format specified by the Executive Officer (reports will be submitted electronically, unless otherwise specified by the Executive Officer). A transmittal letter must accompany each report, containing the following penalty of perjury statement signed by the Discharger or the Discharger's authorized agent:

   "In compliance with Water Code §*13267, I certify under penalty of perjury that this document and all attachments were prepared by me, or under my direction or supervision following a system designed to assure that qualified personnel properly gather and evaluate the information submitted. To the best of my knowledge and belief, this document and all attachments are true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment".*

2. If the Discharger asserts that all or a portion of a report submitted pursuant to this Order is subject to an exemption from public disclosure (e.g. trade secrets or secret processes), the Discharger must provide an explanation of how those portions of the reports are exempt from public disclosure. The

Discharger must clearly indicate on the cover of the report (typically an electronic submittal) that the Discharger asserts that all or a portion of the report is exempt from public disclosure, submit a complete report with those portions that are asserted to be exempt in redacted form, submit separately (in a separate electronic file) unredacted pages (to be maintained separately by staff). The Central Coast Water Board staff will determine whether any such report or portion of a report qualifies for an exemption from public disclosure. If the Central Coast Water Board staff disagrees with the asserted exemption from public disclosure, the Central Coast Water Board staff will notify the Discharger prior to making such report or portions of such report available for public inspection.

B. Central Coast Water Board Authority

1. Monitoring reports are required pursuant to section 13267 of the California Water Code. Pursuant to section 13268 of the Water Code, a violation of a request made pursuant to section 13267 may subject you to civil liability of up to $1000 per day.

2. The Water Board needs the required information to determine compliance with Order No.R3-2017-0002. The evidence supporting these requirements is included in the findings of Order No.R3-2017-0002.

____

John M. Robertson
Executive Officer

____

Date

Table 1. Major Waterbodies in Agricultural Areas[1]

Hydrologic SubArea	Waterbody Name	Hydrologic SubArea	Waterbody Name
30510	Pajaro River	30920	Quail Creek
30510	Salsipuedes Creek	30920	Salinas Reclamation Canal
30510	Watsonville Slough	31022	Chorro Creek
30510	Watsonville Creek[2]	31023	Los Osos Creek
30510	Beach Road Ditch[2]	31023	Warden Creek
30530	Carnadero Creek	31024	San Luis Obispo Creek
30530	Furlong Creek[2]	31024	Prefumo Creek
30530	Llagas Creek	31031	Arroyo Grande Creek
30530	Miller's Canal	31031	Los Berros Creek
30530	San Juan Creek	31210	Bradley Canyon Creek
30530	Tesquisquita Slough	31210	Bradley Channel
30600	Moro Cojo Slough	31210	Green Valley Creek
30910	Alisal Slough	31210	Main Street Canal
30910	Blanco Drain	31210	Orcutt Solomon Creek
30910	Old Salinas River	31210	Oso Flaco Creek
30910	Salinas River (below Gonzales Rd.)	31210	Little Oso Flaco Creek
30920	Salinas River (above Gonzales Rd. and below Nacimiento R.)	31210	Santa Maria River
30910	Santa Rita Creek[2]	31310	San Antonio Creek[2]
30910	Tembladero Slough	31410	Santa Ynez River
30920	Alisal Creek	31531	Bell Creek
30920	Chualar Creek	31531	Glenn Annie Creek
30920	Espinosa Slough	31531	Los Carneros Creek[2]
30920	Gabilan Creek	31534	Arroyo Paredon Creek
30920	Natividad Creek	31534	Franklin Creek

[1] At a minimum, monitoring sites must be included for these waterbodies in agricultural areas, unless otherwise approved by the Executive Officer. Monitoring sites may be proposed for addition or modification to better assess the impacts of waste discharges from irrigated lands to surface water. Dischargers choosing to comply with surface receiving water quality monitoring, individually (not part of a cooperative monitoring program) must only monitor sites for waterbodies receiving the discharge.

[2] These creeks are included because they are newly listed waterbodies on the 2010 303(d) list of Impaired Waters that are associated with areas of agricultural discharge.

Table 2. Surface Receiving Water Quality Monitoring Parameters

Parameters and Tests	RL[3]	Monitoring Frequency[1]
Photo Monitoring		
Upstream and downstream photographs at monitoring location		With every monitoring event
WATER COLUMN SAMPLING		
Physical Parameters and General Chemistry		
Flow (field measure) (CFS) following SWAMP field SOP[9]	.25	Monthly, including 2 stormwater events
pH (field measure)	0.1	”
Electrical Conductivity (field measure) (µS/cm)	2.5	”
Dissolved Oxygen (field measure) (mg/L)	0.1	”
Temperature (field measure) (^{o}C)	0.1	”
Turbidity (NTU)	0.5	”
Total Dissolved Solids (mg/L)	10	”
Total Suspended Solids (mg/L)	0.5	”
Nutrients		
Total Nitrogen (mg/L)	0.5	Monthly, including 2 stormwater events
Nitrate + Nitrite (as N) (mg/L)	0.1	”
Total Ammonia (mg/L)	0.1	”
Unionized Ammonia (calculated value, mg/L))		”
Total Phosphorus (as P) (mg/L)	0.02	
Soluble Orthophosphate (mg/L)	0.01	”
Water column chlorophyll a (µg/L)	1.0	“
Algae cover, Floating Mats, % coverage	-	“
Algae cover, Attached, % coverage	-	“
Water Column Toxicity Test		
Algae - *Selenastrum capricornutum (*96-hour chronic; Method1003.0 in EPA/821/R-02/013)	-	4 times each year, twice in dry season, twice in wet season
Water Flea – *Ceriodaphnia dubia* (7-day chronic; Method 1002.0 in EPA/821/R-02/013)	-	”
Midge - *Chironomus spp.* (96-hour acute; Alternate test species in EPA 821-R-02-012)	-	“

Parameters and Tests	RL[3]	Monitoring Frequency[1]
Toxicity Identification Evaluation (TIE)	-	As directed by Executive Officer
Pesticides[2] /Herbicides (μg/L)		
Organophosphate Pesticides		
Azinphos-methyl	0.02	2 times in both 2017 and 2018, once in dry season and once in wet season of each year, concurrent with water toxicity monitoring
Chlorpyrifos	0.005	”
Diazinon	0.005	”
Dichlorvos	0.01	”
Dimethoate	0.01	”
Dimeton-s	0.005	”
Disulfoton (Disyton)	0.005	”
Malathion	0.005	”
Methamidophos	0.02	”
Methidathion	0.02	“
Parathion-methyl	0.02	“
Phorate	0.01	“
Phosmet	0.02	“
Neonicotinoids		
Thiamethoxam	.002	“
Imidacloprid	.002	“
Thiacloprid	.002	“
Dinotefuran	.006	“
Acetamiprid	.01	“
Clothianidin	.02	
Herbicides		
Atrazine	0.05	“
Cyanazine	0.20	“
Diuron	0.05	“
Glyphosate	2.0	“
Linuron	0.1	“
Paraquat	0.20	“
Simazine	0.05	“
Trifluralin	0.05	“
Metals (μg/L)		
Arsenic (total) [5,7]	0.3	2 times in both 2017 and 2018, once in dry season and once in wet season of each year, concurrent with water toxicity monitoring
Boron (total) [6,7]	10	“
Cadmium (total & dissolved) [4.5,7]	0.01	“

Parameters and Tests	RL[3]	Monitoring Frequency[1]
Copper (total and dissolved) [4,7]	0.01	"
Lead (total and dissolved) [4,7]	0.01	"
Nickel (total and dissolved) [4,7]	0.02	"
Molybdenum (total) [7]	1	"
Selenium (total)[7]	0.30	"
Zinc (total and dissolved) [4.5,7]	0.10	"
Other (µg/L)		
Total Phenolic Compounds[8]	5	2 times in 2017, once in spring (April-May) and once in fall (August-September)
Hardness (mg/L as CaCO3)	1	"
Total Organic Carbon (ug/L)	0.6	"
SEDIMENT SAMPLING		
Sediment Toxicity - *Hyalella azteca* 10-day static renewal (EPA, 2000)		2 times each year, once in spring (April-May) and once in fall (August-September)
Pyrethroid Pesticides in Sediment (µg/kg)		
Gamma-cyhalothrin	2	2 times in both 2017 and 2018, once in spring (April-May) and once in fall (August-September) of each year, concurrent with sediment toxicity sampling
Lambda-cyhalothrin	2	"
Bifenthrin	2	"
Beta-cyfluthrin	2	"
Cyfluthrin	2	"
Esfenvalerate	2	"
Permethrin	2	"
Cypermethrin	2	"
Danitol	2	"
Fenvalerate	2	"
Fluvalinate	2	"
Other Monitoring in Sediment		
Chlorpyrifos (µg/kg)	2	"
Total Organic Carbon	0.01%	"
		"
Sediment Grain Size Analysis	1%	"

[1]Monitoring is ongoing through all five years of the Order, unless otherwise specified. Monitoring frequency may be used as a guide for developing alternative Sampling and Analysis Plan.
[2]Pesticide list may be modified based on specific pesticide use in Central Coast Region. Analytes on this list must be reported, at a minimum.
[3] Reporting Limit, taken from SWAMP where applicable.

[4] Holmgren, Meyer, Cheney and Daniels. 1993. Cadmium, Lead, Zinc, Copper and Nickel in Agricultural Soils of the United States. J. of Environ. Quality 22:335-348.
[5]Sax and Lewis, ed. 1987. Hawley's Condensed Chemical Dictionary. 11th ed. New York: Van Nostrand Reinhold Co., 1987. Zinc arsenate is an insecticide.
[6]Http://www.coastalagro.com/products/labels/9%25BORON.pdf; Boron is applied directly or as a component of fertilizers as a plant nutrient.
[7]Madramootoo, Johnston, Willardson, eds. 1997. Management of Agricultural Drainage Water Quality. International Commission on Irrigation and Drainage. U.N. FAO. SBN 92-6-104058.3.
[8]http://cat.inist.fr/?aModele=afficheN&cpsidt=14074525; Phenols are breakdown products of herbicides and pesticides. Phenols can be directly toxic and cause endocrine disruption.
[9]See SWAMP field measures SOP, p. 17
mg/L – milligrams per liter; ug/L – micrograms per liter; ug/kg – micrograms per kilogram;
NTU – Nephelometric Turbidity Units; CFS – cubic feet per second;

Table 3. Groundwater Monitoring Parameters

Parameter	RL	Analytical Method[3]	Units
pH	0.1	Field or Laboratory Measurement EPA General Methods	pH Units
Specific Conductance	2.5		µS/cm
Total Dissolved Solids	10		mg/L
Total Alkalinity as $CaCO_3$	1	EPA Method 310.1 or 310.2	
Calcium	0.05	General Cations[1] EPA 200.7, 200.8, 200.9	
Magnesium	0.02		
Sodium	0.1		
Potassium	0.1		
Sulfate (SO_4)	1.0	General Anions EPA Method 300 or EPA Method 353.2	
Chloride	0.1		
Nitrate + Nitrite (as N)[2] *or* Nitrate as N	0.1		

[1]General chemistry parameters (major cations and anions) represent geochemistry of water bearing zone and assist in evaluating quality assurance/quality control of groundwater monitoring and laboratory analysis.
[2]The MRP allows analysis of "nitrate plus nitrite" to represent nitrate concentrations (as N). The "nitrate plus nitrite" analysis allows for extended laboratory holding times and relieves the Discharger of meeting the short holding time required for nitrate.
[3]Dischargers may use alternative analytical methods approved by EPA.
RL – Reporting Limit; µS/cm – micro siemens per centimeter

Table 4A. Individual Discharge Monitoring for Tailwater, Tile drain, and Stormwater Discharges

Parameter	Analytical Method[1]	Maximum PQL	Units	Min Monitoring Frequency
Discharge Flow or Volume	Field Measure	---	CFS	(a) (d)
Approximate Duration of Flow	Calculation	---	hours/month	
Temperature (water)	Field Measure	0.1	°Celsius	
pH	Field Measure	0.1	pH units	

Electrical Conductivity	Field Measure	100	µS/cm	
Turbidity	SM 2130B, EPA 180.1	1	NTUs	
Nitrate + Nitrite (as N)	EPA 300.1, EPA 353.2	0.1	mg/L	
Ammonia	SM 4500 NH3, EPA 350.3	0.1	mg/L	
Chlorpyrifos[2]	EPA 8141A, EPA 614	0.02	ug/L	(b) (c) (d)
Diazinon[2]				
Ceriodaphnia Toxicity (96-hr acute)	EPA-821-R-02-012	NA	% Survival	
Hyalella Toxicity in Water (96-hr acute)	EPA-821-R-02-012	NA	% Survival	

[1] In-field water testing instruments/equipment as a substitute for laboratory analysis if the method is approved by EPA, meets RL/PQL specifications in the MRP, and appropriate sampling methodology and quality assurance checks can be applied to ensure that QAPP standards are met to ensure accuracy of the test.
[2]If chlorpyrifos or diazinon is used at the farm/ranch, otherwise does not apply. The Executive Officer may require monitoring of other pesticides based on results of downstream receiving water monitoring.
(a) Two times per year during primary irrigation season for farms/ranches less than or equal to 500 acres, and four times per year during primary irrigation season for farms/ranches greater than 500 acres. Executive Officer may reduce sampling frequency based on water quality improvements.
(b) Once per year during primary irrigation season for farms/ranches less than or equal to 500 acres, and two times per year during primary irrigation season for farms/ranches greater than 500 acres.
(c) Sample must be collected within one week of chemical application, if chemical is applied on farm/ranch;
(d) Once per year during wet season (October – March) for farms/ranches less than or equal to 500 acres, and two times per year during wet season for farms/ranches greater than 500 acres, within 18 hours of major storm events;
CFS – Cubic feet per second; NTU – Nephelometric turbidity unit; PQL – Practical Quantitation Limit;
NA – Not applicable

Table 4B. Individual Discharge Monitoring for Tailwater Ponds and other Surface Containment Features

Parameter	Analytical Method[1]	Maximum PQL	Units	Minimum Monitoring Frequency
Volume of Pond	Field Measure	1	Gallons	(a) (d)
Nitrate + Nitrite (as N)	EPA 300.1, EPA 353.2	50	mg/L	

[1] In-field water testing instruments/equipment as a substitute for laboratory analysis if the method is approved by EPA, meets RL/PQL specifications in the MRP, and appropriate sampling methodology and quality assurance checks can be applied to ensure that QAPP standards are met to ensure accuracy of the test.
(a) Four times per year during primary irrigation season; Executive Officer may reduce monitoring frequency based on water quality improvements.
(d) Two times per year during wet season (October – March, within 18 hours of major storm events)

Table 5. Tier 3 - Time Schedule for Key Monitoring and Reporting Requirements (MRPs)

REQUIREMENT	TIME SCHEDULE[1]
Submit Sampling And Analysis Plan and Quality Assurance Project Plan (SAAP/QAPP) for Surface Receiving Water Quality Monitoring (*individually or*	By March 1, 2018, or as directed by the Executive Officer; satisfied if an approved SAAP/QAPP has been submitted pursuant

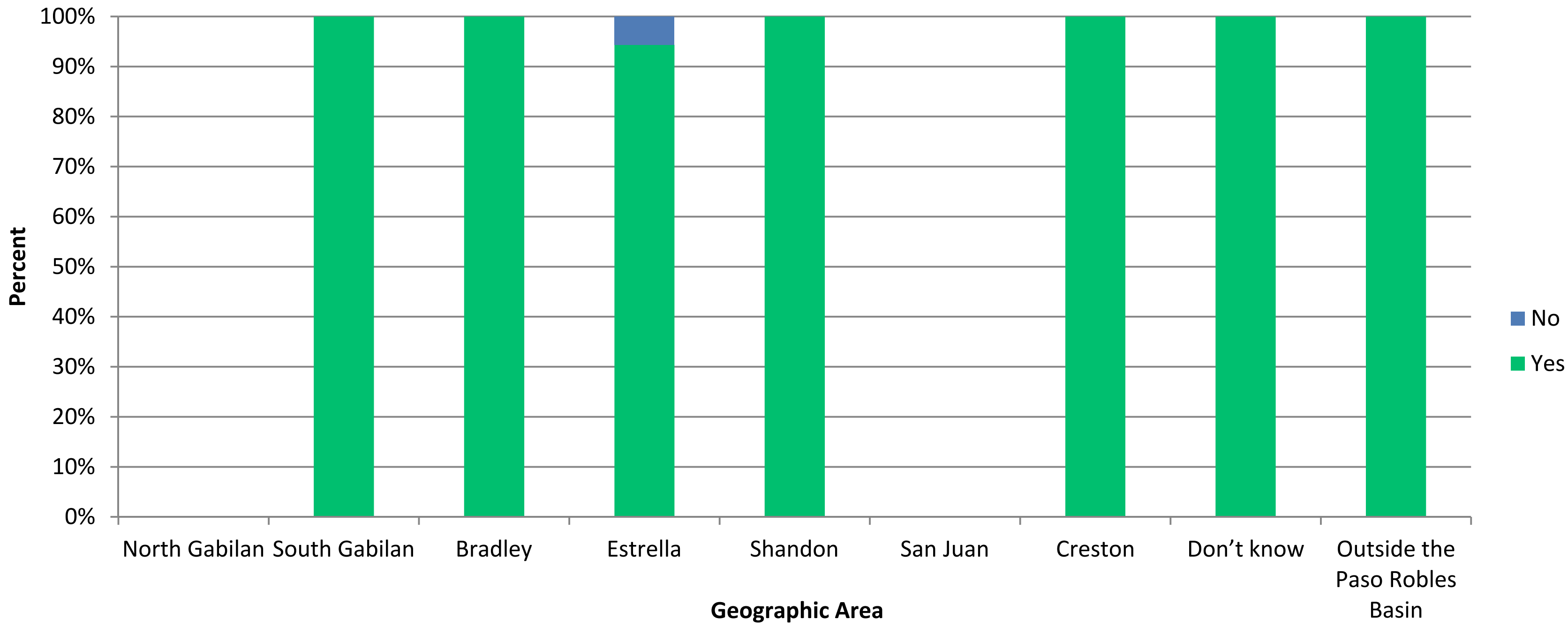
through cooperative monitoring program)	to Order No. R3-2012-0011 and associated MRPs
Initiate surface receiving water quality monitoring (*individually or through cooperative monitoring program*)	Per an approved SAAP and QAPP
Submit surface receiving water quality monitoring data (*individually or through cooperative monitoring program*)	Each January 1, April 1, July 1, and October 1
Submit surface receiving water quality Annual Monitoring Report (*individually or through cooperative monitoring program*)	By July 1 2017; annually thereafter by July 1
Initiate monitoring of groundwater wells	First sample from March-June 2017, second sample from September-December 2017
Submit individual surface water discharge SAAP and QAPP	By March 1, 2018 or as directed by the Executive Officer; waived if an approved SAAP and QAPP has been submitted and being implemented pursuant to Order No. R3-2012-0011.
Initiate individual surface water discharge monitoring	As described in an approved SAAP and QAPP
Submit individual surface water discharge monitoring data	March 1, 2018, and every March 1 annually thereafter
Submit electronic Annual Compliance Form	March 1, 2018 and every March 1 annually thereafter
Submit groundwater monitoring results	Within 60 days of the sample collection
Submit Water Quality Buffer Plan or alternative	Within 18 months of enrolling new Tier 3 farm/ranch in Order
Submit Status Report on Water Quality Buffer Plan or alternative	March 1, 2019
Tier 3 Dischargers with farms/ranches growing high risk crops:	
Report total nitrogen applied on the Total Nitrogen Applied form	March 1, 2018 and every March 1 annually thereafter
Submit INMP Effectiveness Report	March 1, 2019

[1] Dates are relative to adoption of this Order, unless otherwise specified.

Appendix G

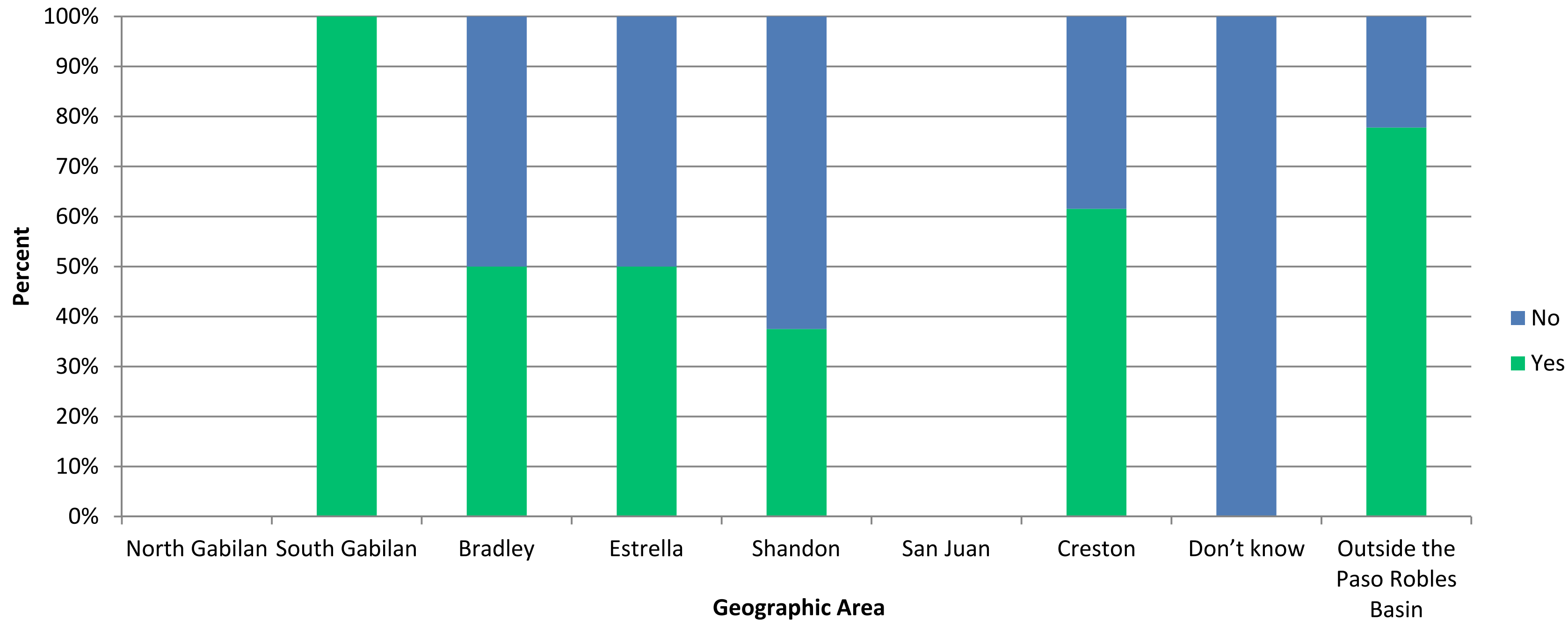
Sustainable Management Criteria Survey Results

Have you heard about the Sustainable Groundwater Management Act (SGMA) Groundwater Sustainability Plan (GSP) process?



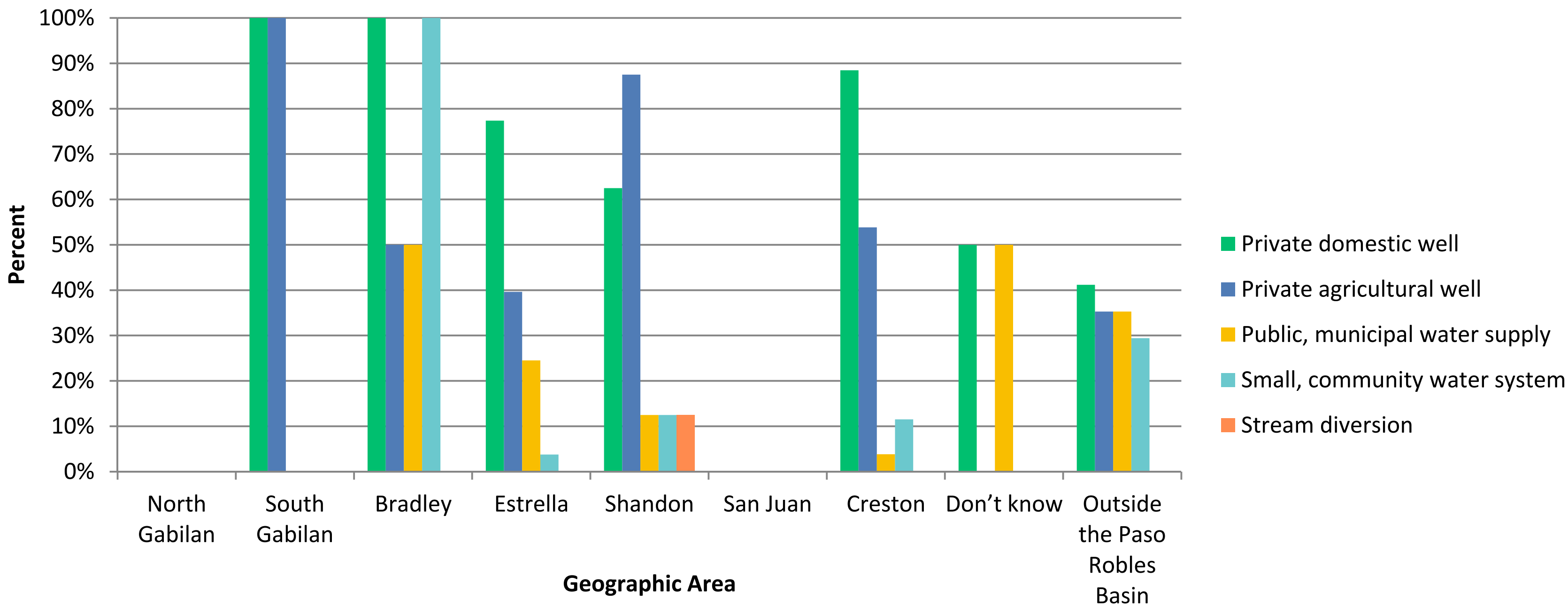
Geographic Area	Yes		No		Total	
	Percent	Count	Percent	Count	Percent	Count
North Gabilan	0%	0	0%	0	0%	0
South Gabilan	100%	1	0%	0	1%	1
Bradley	100%	2	0%	0	2%	2
Estrella	94%	50	6%	3	48%	53
Shandon	100%	8	0%	0	7%	8
San Juan	0%	0	0%	0	0%	0
Creston	100%	26	0%	0	23%	26
Don't know	100%	2	0%	0	2%	2
Outside the Paso Robles Basin	100%	19	0%	0	17%	19
Total	97%	108	3%	3	100%	111
					Answered	111
					Skipped	0

Have you been involved in other water supply public processes in the past?



Geographic Area	Yes		No		Total	
	Percent	Count	Percent	Count	Percent	Count
North Gabilan	0%	0	0%	0	0%	0
South Gabilan	100%	1	0%	0	1%	1
Bradley	50%	1	50%	1	2%	2
Estrella	50%	26	50%	26	48%	52
Shandon	38%	3	63%	5	7%	8
San Juan	0%	0	0%	0	0%	0
Creston	62%	16	38%	10	24%	26
Don't know	0%	0	100%	2	2%	2
Outside the Paso Robles Basin	78%	14	22%	4	17%	18
Total	56%	61	44%	48	100%	109
					Answered	109
					Skipped	2

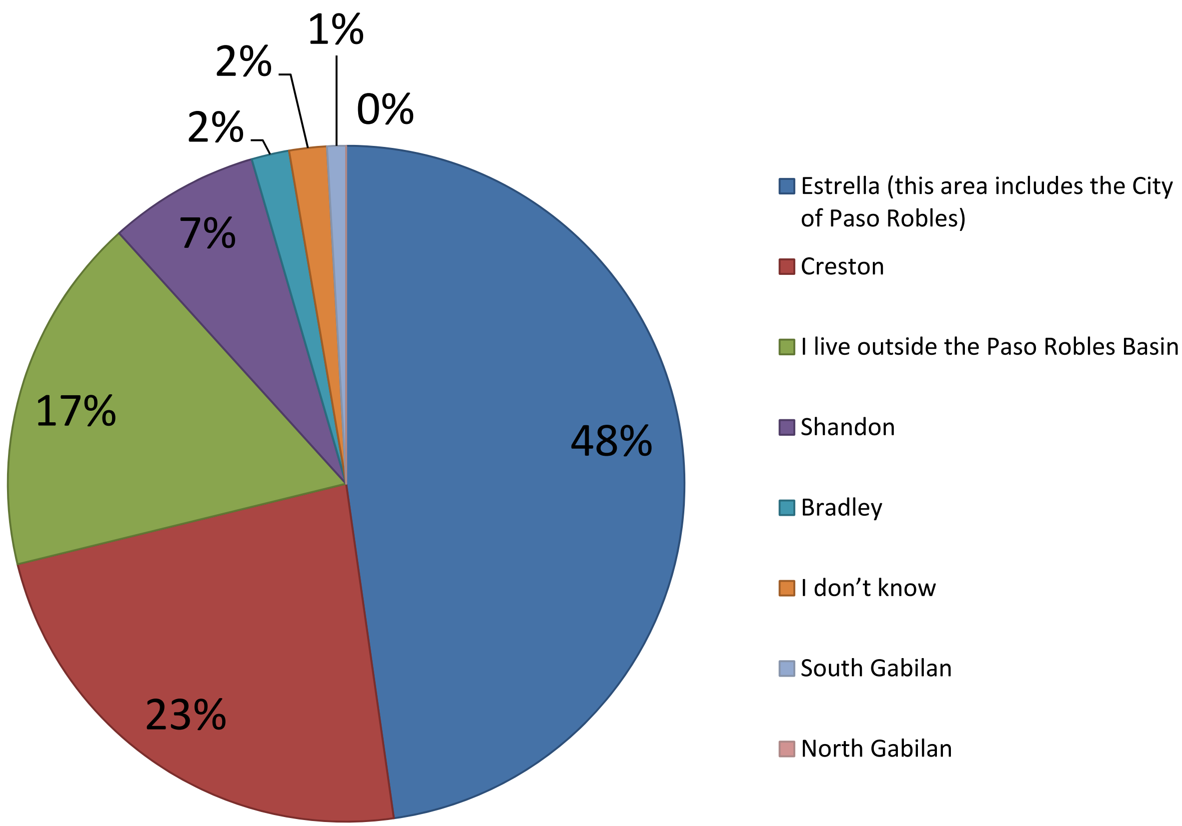
Which water sources do you use? (select all that apply)



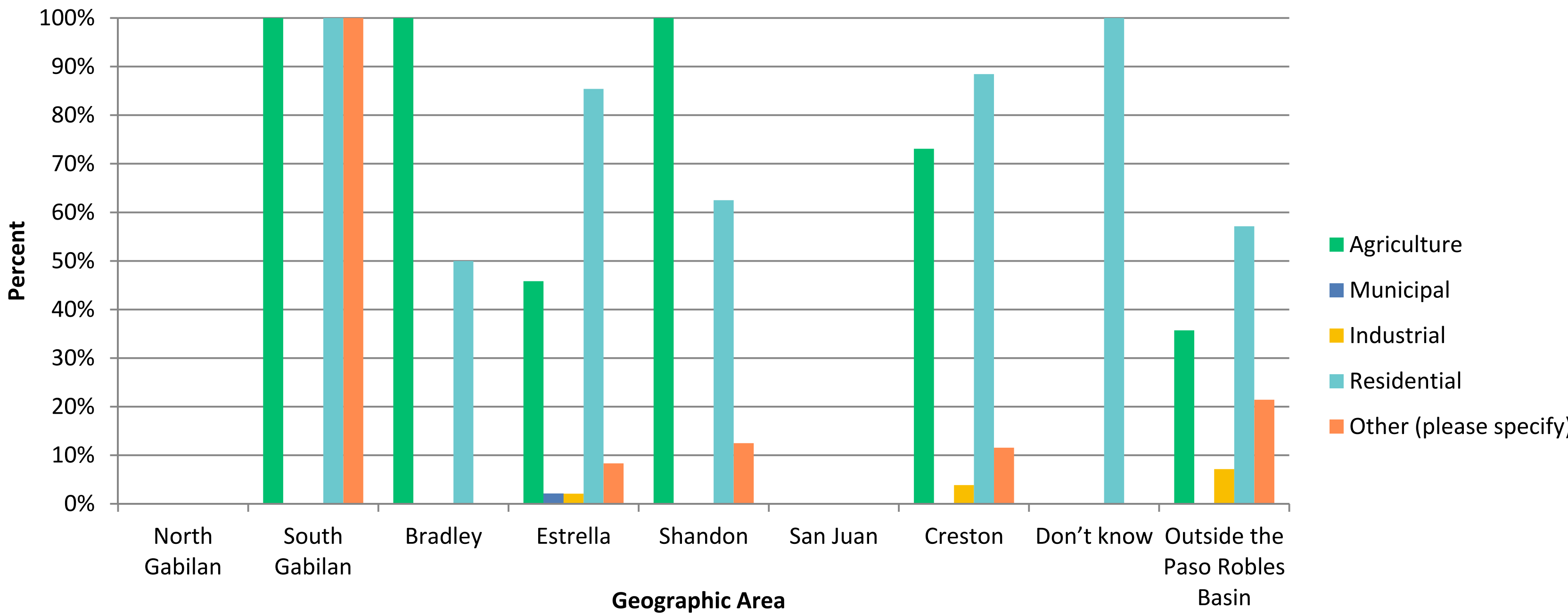
Geographic Area	Private domestic well		Private agricultural well		Public, municipal water supply		Small, community water system		Stream diversion		Total	
	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count
North Gabilan	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0
South Gabilan	100%	1	100%	1	0%	0	0%	0	0%	0	1%	1
Bradley	100%	2	50%	1	50%	1	100%	2	0%	0	2%	2
Estrella	77%	41	40%	21	25%	13	4%	2	0%	0	49%	53
Shandon	63%	5	88%	7	13%	1	13%	1	13%	1	7%	8
San Juan	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0
Creston	88%	23	54%	14	4%	1	12%	3	0%	0	24%	26
Don't know	50%	1	0%	0	50%	1	0%	0	0%	0	2%	2
Outside the Paso Robles Basin	41%	7	35%	6	35%	6	29%	5	0%	0	16%	17
Total	73%	80	46%	50	21%	23	12%	13	1%	1	100%	109
											Answered	109
											Skipped	2

Which geographic area do you live in?

Geographic Area	Percent	Count
North Gabilan	0%	0
South Gabilan	1%	1
Bradley	2%	2
Estrella (this area includes the City of Paso Robles)	48%	53
Shandon	7%	8
San Juan	0%	0
Creston	23%	26
I don't know	2%	2
I live outside the Paso Robles Basin	17%	19
Total	100%	111



If you pump groundwater, what do you use it for? (check all that apply)



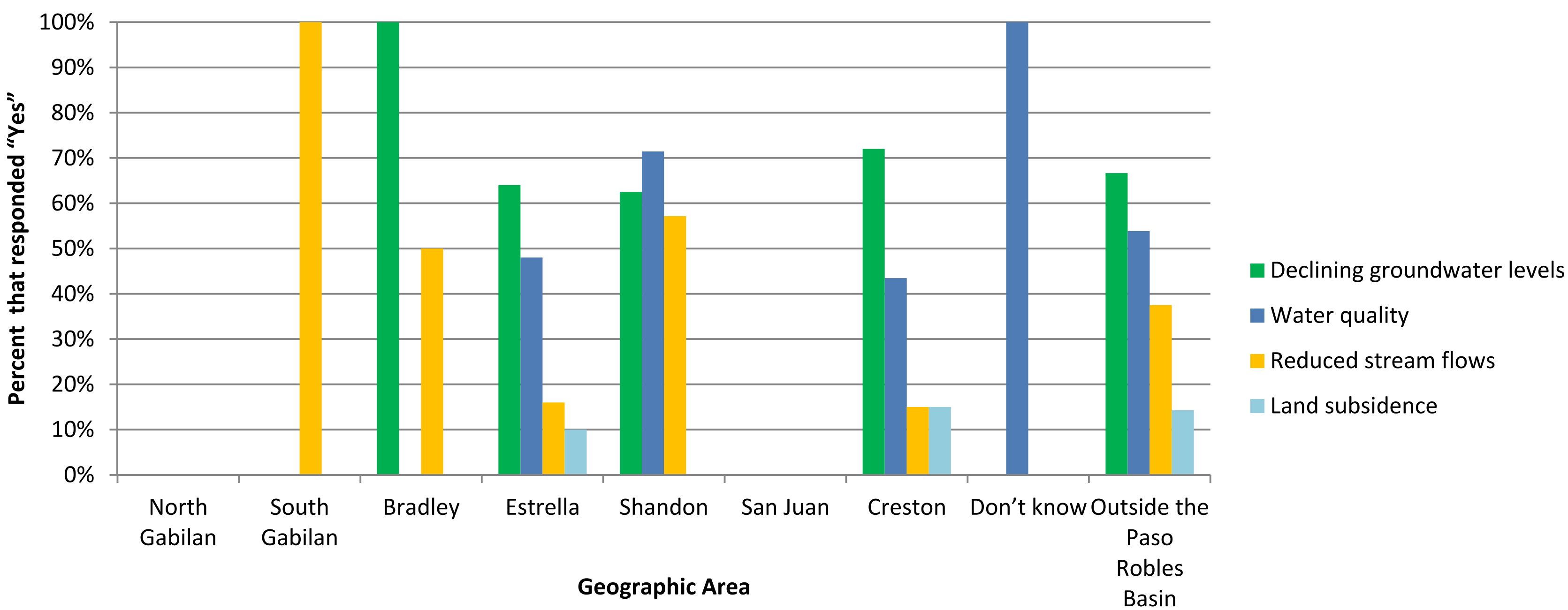
Geographic Area	Agriculture		Municipal		Industrial		Residential		Other (please specify)		Total	
	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count
North Gabilan	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0
South Gabilan	100%	1	0%	0	0%	0	100%	1	100%	1	1%	1
Bradley	100%	2	0%	0	0%	0	50%	1	0%	0	2%	2
Estrella	46%	22	2%	1	2%	1	85%	41	8%	4	48%	48
Shandon	100%	8	0%	0	0%	0	63%	5	13%	1	8%	8
San Juan	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0
Creston	73%	19	0%	0	4%	1	88%	23	12%	3	26%	26
Don't know	0%	0	0%	0	0%	0	100%	1	0%	0	1%	1
Outside the Paso Robles Basin	36%	5	0%	0	7%	1	57%	8	21%	3	14%	14
Total	57%	57	1%	1	3%	3	80%	80	12%	12	100%	100
											Answered	100
											Skipped	11

Please rank the following potential negative impacts to groundwater based on your level of concern, with 1 representing the impact of greatest concern.

Impact	Rank:	1		2		3		4		Total		Weighted Score
Declining groundwater levels	North Gabilan	0%	0	0%	0	0%	0	0%	0	0%	0	0.0
	South Gabilan	0%	0	0%	0	0%	0	0%	0	0%	0	0.0
	Bradley	0%	0	100%	1	0%	0	0%	0	1%	1	2.0
	Estrella	76%	35	17%	8	7%	3	0%	0	42%	46	1.3
	Shandon	83%	5	0%	0	17%	1	0%	0	5%	6	1.3
	San Juan	0%	0	0%	0	0%	0	0%	0	0%	0	0.0
	Creston	83%	20	8%	2	4%	1	4%	1	22%	24	1.3
	Don’t know	100%	2	0%	0	0%	0	0%	0	2%	2	1.0
	Outside the Paso Robles Basin	79%	15	16%	3	5%	1	0%	0	17%	19	1.3
	Total	70%	77	13%	14	5%	6	1%	1	100%	110	1.2
Water Quality	North Gabilan	0%	0	0%	0	0%	0	0%	0	0%	0	0.0
	South Gabilan	0%	0	100%	1	0%	0	0%	0	1%	1	2.0
	Bradley	100%	1	0%	0	0%	0	0%	0	1%	1	1.0
	Estrella	17%	8	55%	26	26%	12	2%	1	43%	47	2.1
	Shandon	33%	2	50%	3	17%	1	0%	0	5%	6	1.8
	San Juan	0%	0	0%	0	0%	0	0%	0	0%	0	0.0
	Creston	9%	2	74%	17	17%	4	0%	0	21%	23	2.1
	Don’t know	0%	0	100%	1	0%	0	0%	0	1%	1	2.0
	Outside the Paso Robles Basin	6%	1	72%	13	22%	4	0%	0	16%	18	2.2
	Total	13%	14	55%	61	19%	21	1%	1	100%	110	1.8
Reduced stream flows	North Gabilan	0%	0	0%	0	0%	0	0%	0	0%	0	0.0
	South Gabilan	100%	1	0%	0	0%	0	0%	0	1%	1	1.0
	Bradley	50%	1	0%	0	50%	1	0%	0	2%	2	2.0
	Estrella	2%	1	11%	5	52%	24	35%	16	42%	46	3.2
	Shandon	20%	1	60%	3	0%	0	20%	1	5%	5	2.2
	San Juan	0%	0	0%	0	0%	0	0%	0	0%	0	0.0
	Creston	5%	1	0%	0	75%	15	20%	4	18%	20	3.1
	Don’t know	0%	0	50%	1	50%	1	0%	0	2%	2	2.5
	Outside the Paso Robles Basin	6%	1	6%	1	61%	11	28%	5	16%	18	3.1
	Total	5%	6	9%	10	47%	52	24%	26	100%	110	2.6
Land subsidence	North Gabilan	0%	0	0%	0	0%	0	0%	0	0%	0	0.0
	South Gabilan	0%	0	0%	0	0%	0	100%	1	1%	1	4.0
	Bradley	0%	0	0%	0	50%	1	50%	1	2%	2	3.5
	Estrella	15%	7	13%	6	19%	9	54%	26	44%	48	3.1
	Shandon	0%	0	0%	0	40%	2	60%	3	5%	5	3.6
	San Juan	0%	0	0%	0	0%	0	0%	0	0%	0	0.0
	Creston	0%	0	14%	3	10%	2	76%	16	19%	21	3.6
	Don’t know	0%	0	0%	0	0%	0	100%	1	1%	1	4.0
	Outside the Paso Robles Basin	11%	2	6%	1	11%	2	72%	13	16%	18	3.4
	Total	8%	9	9%	10	15%	16	55%	61	100%	110	2.9

Have you been negatively impacted by the following?

Figure and table below show results for those who responded "Yes"



	Declining groundwater levels		Water quality		Reduced stream flows		Land subsidence	
Geographic Area	Percent	Count	Percent	Count	Percent	Count	Percent	Count
North Gabilan	0%	0	0%	0	0%	0	0%	0
South Gabilan	0%	0	0%	0	100%	1	0%	0
Bradley	100%	2	0%	0	50%	1	0%	0
Estrella	64%	32	48%	24	16%	8	10%	5
Shandon	63%	5	71%	5	57%	4	0%	0
San Juan	0%	0	0%	0	0%	0	0%	0
Creston	72%	18	43%	10	15%	3	15%	3
Don't know	0%	0	100%	1	0%	0	0%	0
Outside the Paso Robles Basin	67%	10	54%	7	38%	6	14%	2
Total	62%	67	44%	47	21%	23	9%	10

Have you been negatively impacted by the following?

Responses from Creston				
Declining groundwater levels	Water quality	Reduced stream flows	Land subsidence-	Negative impacts:
No	No	No	No	
No	No	No		
Yes	Yes	No	No	
No	Yes	No	Yes	WATER LINES BREAKING
Yes	Yes	No	No	
Yes	No	No	No	
No	No	No	No	
No	No			
Yes	No			
Yes				Well ran dry.
Yes	No	No	Yes	
Yes				Had to stop watering my garden and. Lost apple and apricot trees. Could no longer have a food garden.
Yes	Yes	No	No	
Yes	Yes	Yes	No	
No	No	No	No	Not sure... How are individuals supposed to know the water quality characteristics?
Yes	No	No	No	Drill new deeper wells
Yes	Yes		No	We have given up our lawns and our vegetable garden and limited our baths/showers and wear clothes longer before washing.
No	No	No	No	
Yes	No	No	No	
Yes	No	No	No	Moderate decline in static water level. In close proximity to Windfall Farms who pumps constantly. Also in proximity to a newly planted very large vineyard with new pumping. The risk of adverse impact on our groundwater is very high.
				No ,none of the above
Yes	Yes	No	No	
Yes	Yes	No	No	Greatly reduced groundwater level and poor water quality in new well.
Yes	No	No	No	Dramatic decrease in aquifer level and need to drop pump in 2015
Yes	Yes	Yes	No	obvious increase in hardness of water; trees in creek dying; well levels not returning during average rain year.
Yes	Yes	Yes	Yes	

Have you been negatively impacted by the following?

Responses from Estrella				
Declining groundwater levels	Water quality	Reduced stream flows	Land subsidence-	Negative impacts:
Yes	Yes	Yes	No	
Yes	Yes	Yes	No	
Yes	Yes	No	No	2 dry wells
No	Yes	No	No	
No	No	No	No	
Yes	No	No	No	
No	Yes	No	No	Salt build-up in soil
Yes	Yes	No	No	
No	No	No	No	
Yes	Yes	Yes	Yes	well water level is very close to pump, have to have a new well drilled
Yes	Yes	No	No	
Yes	Yes	No	Yes	
No	No	No	No	
Yes	Yes	Yes	No	Each citizen within the basin is impacted by these whether aware or not. As these impacts increase the economic burden will increase, the communal burden will increase i.e. loss of natural beauty and shared public spaces, decisions of who gets water who does not. Increased public strife and division.
No	No	No	No	
Yes	No	No	No	
Yes	Yes	No	No	Had to lower the pumps Have to treat our water to combat water quality
Yes	Yes	No	Yes	Water quality has decreased with the concentration of salts in our wells.
No	No	No	No	
No	No	No	No	
No	No	No	No	
Yes	Yes	No	No	
No	Yes	No	No	Increased salinity
Yes	Yes	No	No	
No	Yes	No	No	
Yes	No	No	No	No measurements on water quality, but water table has dropped significantly since late 1990's

Have you been negatively impacted by the following?

Responses from Estrella Continued				
Declining groundwater levels	Water quality	Reduced stream flows	Land subsidence-	Negative impacts:
	No	No	No	Well static level has dropped 50’
No	Yes	No	No	increased salts, boron, etc.
No	Yes	No	No	
No	No	No	No	The city's attempt to take over right to my well water
Yes	Yes	No	No	Forced to install a second, larger holding tank and drop our well pump. When we purchased the home, the water tasted great and we had no problem with excess calcium build-up. Now it does not taste the same and we have excessive mineral build-up.
Yes	No	No	No	Cost per ac-ft increased due to declining levels.
Yes	No	No	No	
No	No	No	No	
Yes	No	No	Yes	
Yes	No	No	No	
No	No	No	No	
Yes	No	Yes	No	Quickly declining static water level in our well. Recharge rate reduced. Pumping volume reduced.
Yes	No	Yes	No	the water level in our well has dropped 50+ feet in the last four years
No	No	No	No	
Yes	Yes	Yes	No	The level of arsenic in our groundwater caused us to have to obtain a grant to correct the problem.
Yes	Yes		No	Higher energy costs, lowering in water quality and quantity
Yes	No	No	No	
Yes	Yes	No	No	My job and livelihood depends upon wine grape production and having a balanced and sustainable management of the groundwater basin for ALL should be achievable.
				Need more info.
Yes	Yes	No	No	
Yes	No	No	No	
Yes	No	No	Yes	Paid $35,000 for a new well 2 months ago!!!
Yes	No	Yes	No	I had to drill a much deeper well.
Yes	No	No	No	Static water level of our well has dropped 35' since 2011
No	No	No	No	
Yes	Yes			My 350 foot well went dry. Had to drill a new one

Have you been negatively impacted by the following?

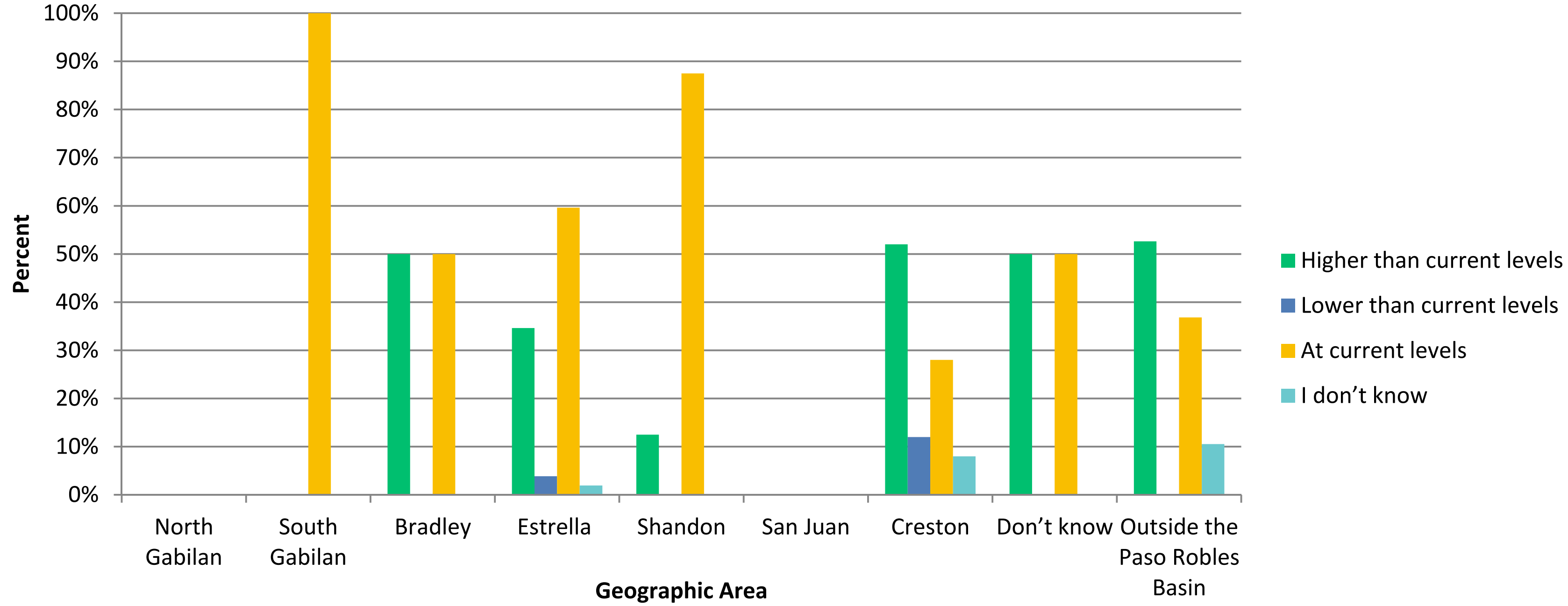
Responses from Outside the Paso Robles Basin

Declining groundwater levels	Water quality	Reduced stream flows	Land subsidence-	Negative impacts:
Yes		Yes	Yes	Fisheries, aquatic life,quality of life
Yes	Yes	Yes	No	Irrigation limitations.
Yes	No	Yes	No	
Yes	Yes	No	No	
No	No	No	No	
No	No	No	No	
Yes	No	No	No	
No	Yes	No	No	blowing dust in the wind
No	Yes	No	No	
		Yes		
		Yes		Reduced Steelhead spawning and rearing habitat. Riparian vegetation decline.
Yes				Wellntel's clients in the Paso basin are negatively impacted by declining groundwater levels.
Yes	No	No	No	
No	No	No	No	
Yes	Yes	Yes	Yes	
Yes	Yes	No	No	In Shandon over the last 90 years GW levels have declined and water quality has been reduced to a degree in some wells.
Yes	Yes	No	No	
Yes		Yes	Yes	Fisheries, aquatic life,quality of life
Yes	Yes	Yes	No	Irrigation limitations.
Yes	No	Yes	No	
Yes	Yes	No	No	
No	No	No	No	
No	No	No	No	
Yes	No	No	No	

Have you been negatively impacted by the following?

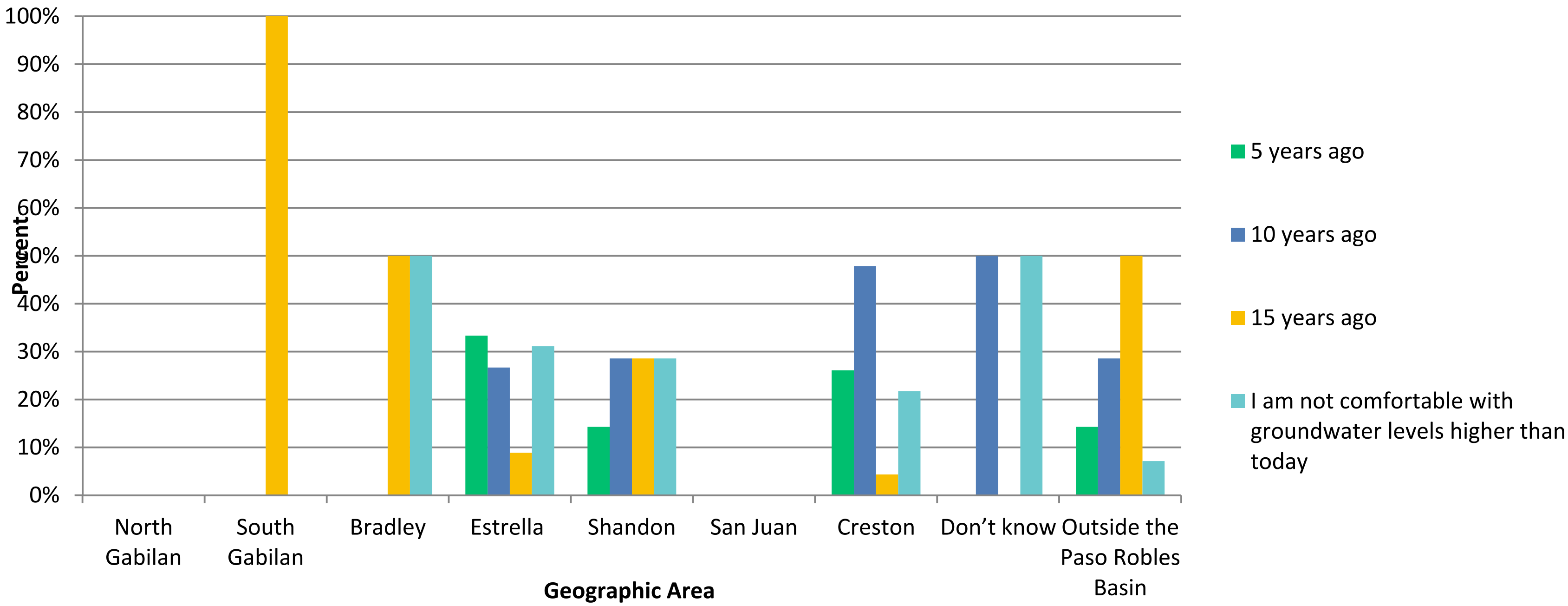
Declining groundwater levels	Water quality	Reduced stream flows	Land subsidence-	Negative impacts:
Responses from Bradley				
Yes	No	No	No	
Yes	No	Yes	No	Nacimiento recreation uses impaired by Monterey County dam releases. Limited water availability overall increases water usage in some agri-businesses. State water law creates contentiousness in water access.
Responses from Don't Know				
No	Yes	No	No	
				Not yet, many friends have lost their wells
Responses from South Gabilan				
No	No	Yes	No	Due to lack of rainfall, stream reduction results in less water penetrating the upper hardpan and replenishing the substrata and ground water.
Responses from Shandon				
No	Yes	No	No	
Yes	No	No	No	
Yes	Yes	No	No	Cost of water and lack of quality
Yes				Lost a well adjacent to vineyard property
Yes	Yes	Yes	No	Cost of pumping from groundwater levels and brackish water quality
No	Yes	Yes	No	
Yes	No	Yes	No	loss of grazing forage, loss of wildlife habitat, increased business expense/cost
No	Yes	Yes	No	

Raising groundwater levels requires developing new water supplies or reducing pumping; both of which have a financial cost. Lowering groundwater levels will allow increased pumping, but may dry out shallower (domestic) wells or streams. 20 years from now, would you be most satisfied with groundwater levels in your part of the basin that are stable at:



Geographic Area	Higher than current levels		Lower than current levels		At current levels		I don't know		Total	
	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count
North Gabilan	0%	0	0%	0	0%	0	0%	0	0%	0
South Gabilan	0%	0	0%	0	100%	1	0%	0	1%	1
Bradley	50%	1	0%	0	50%	1	0%	0	2%	2
Estrella	35%	18	4%	2	60%	31	2%	1	48%	52
Shandon	13%	1	0%	0	88%	7	0%	0	7%	8
San Juan	0%	0	0%	0	0%	0	0%	0	0%	0
Creston	52%	13	12%	3	28%	7	8%	2	23%	25
Don't know	50%	1	0%	0	50%	1	0%	0	2%	2
Outside the Paso Robles Basin	53%	10	0%	0	37%	7	11%	2	17%	19
Total	40%	44	5%	5	50%	55	5%	5	100%	109
									Answered	109
									Skipped	2

If the basin is maintained higher than current levels, additional water must be imported or pumping must be reduced. Knowing that higher groundwater levels will result in higher costs, please complete the following statement. I am comfortable with groundwater levels that would stabilize at levels seen: (select one)

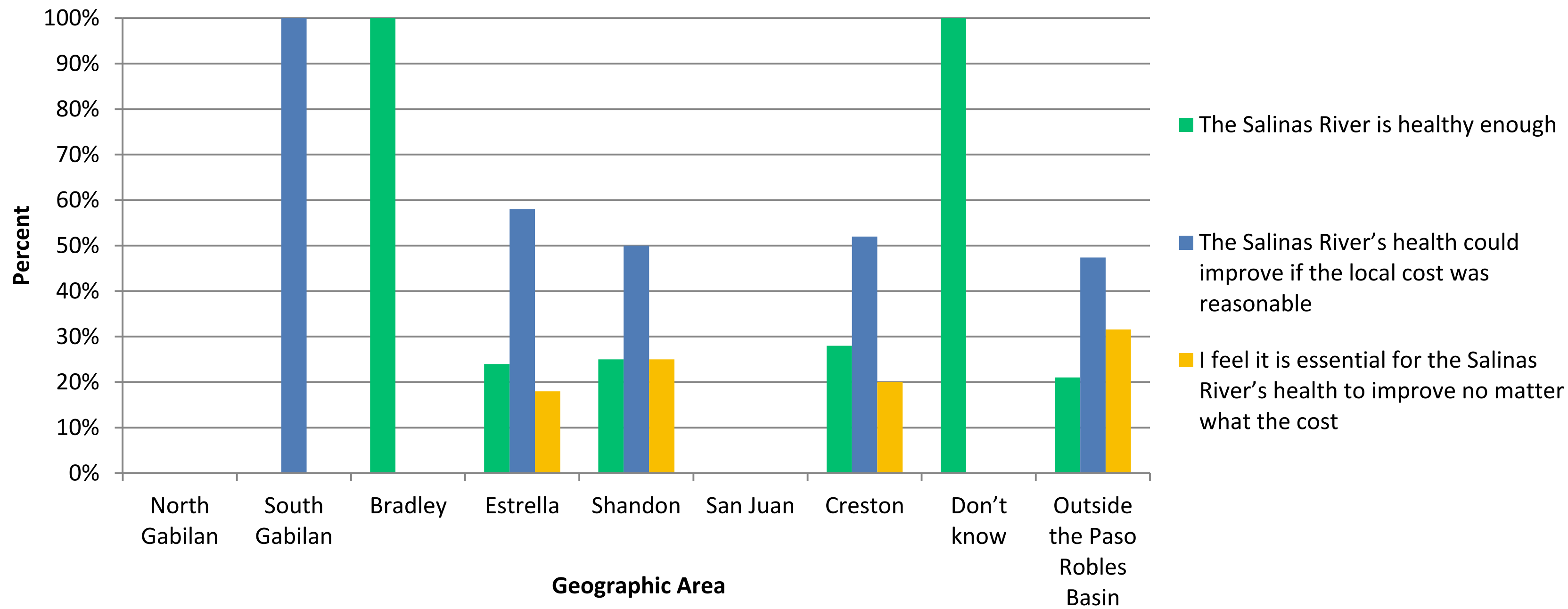


Geographic Area	5 years ago		10 years ago		15 years ago		I am not comfortable with groundwater levels higher than today		Total	
	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count
North Gabilan	0%	0	0%	0	0%	0	0%	0	0%	0
South Gabilan	0%	0	0%	0	100%	1	0%	0	1%	1
Bradley	0%	0	0%	0	50%	1	50%	1	2%	2
Estrella	33%	15	27%	12	9%	4	31%	14	48%	45
Shandon	14%	1	29%	2	29%	2	29%	2	7%	7
San Juan	0%	0	0%	0	0%	0	0%	0	0%	0
Creston	26%	6	48%	11	4%	1	22%	5	24%	23
Don’t know	0%	0	50%	1	0%	0	50%	1	2%	2
Outside the Paso Robles Basin	14%	2	29%	4	50%	7	7%	1	15%	14
Total	26%	24	32%	30	17%	16	26%	24	100%	94
Other (please specify)									20%	19
									Answered	94
									Skipped	17

If the basin is maintained at lower than current levels, domestic wells or local streams may dry out. How much lower, approximately, could groundwater levels drop before they are too low? If you do not believe levels should drop, leave the slider at zero.

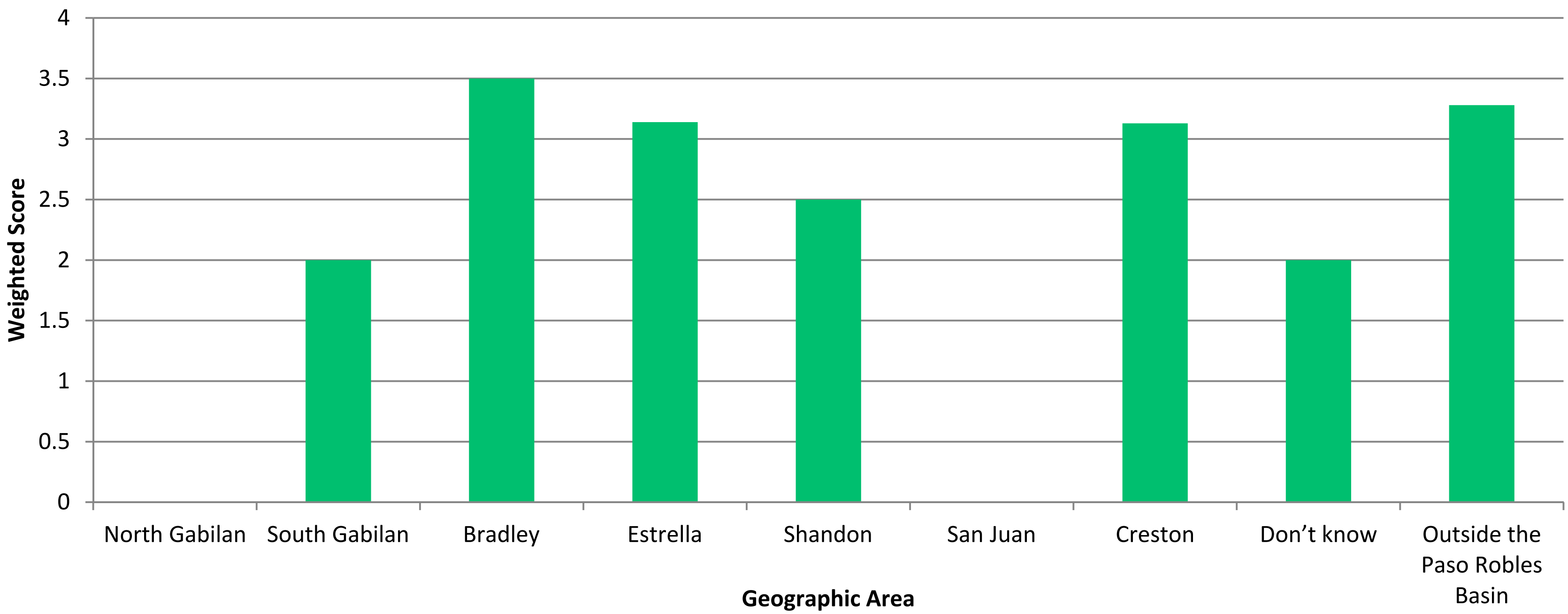
Responses from Creston	Responses from Estrella	Responses from Don't know	Responses from Outside the Paso Robles Basin	Responses from Shandon	Responses from South Gabilan
102	100	13	1	3	0
0	0		100	0	
200	100		150	0	
0	15		50	0	
75	0		0	110	
0	100		0		
45	0		0		
0	401		0		
114	50		0		
0	251		0		
0	0		2		
0	1		49		
0	0				
	0				
	1				
	250				
	208				
	0				
	301				
	0				
	0				
	400				
	40				
	500				
	23				
	275				
	0				
	0				
	0				
	0				
	34				
	201				

Which statement best describes your opinion of the health (in terms of stream flow and water quality) of the Salinas River in the Paso Robles Basin?



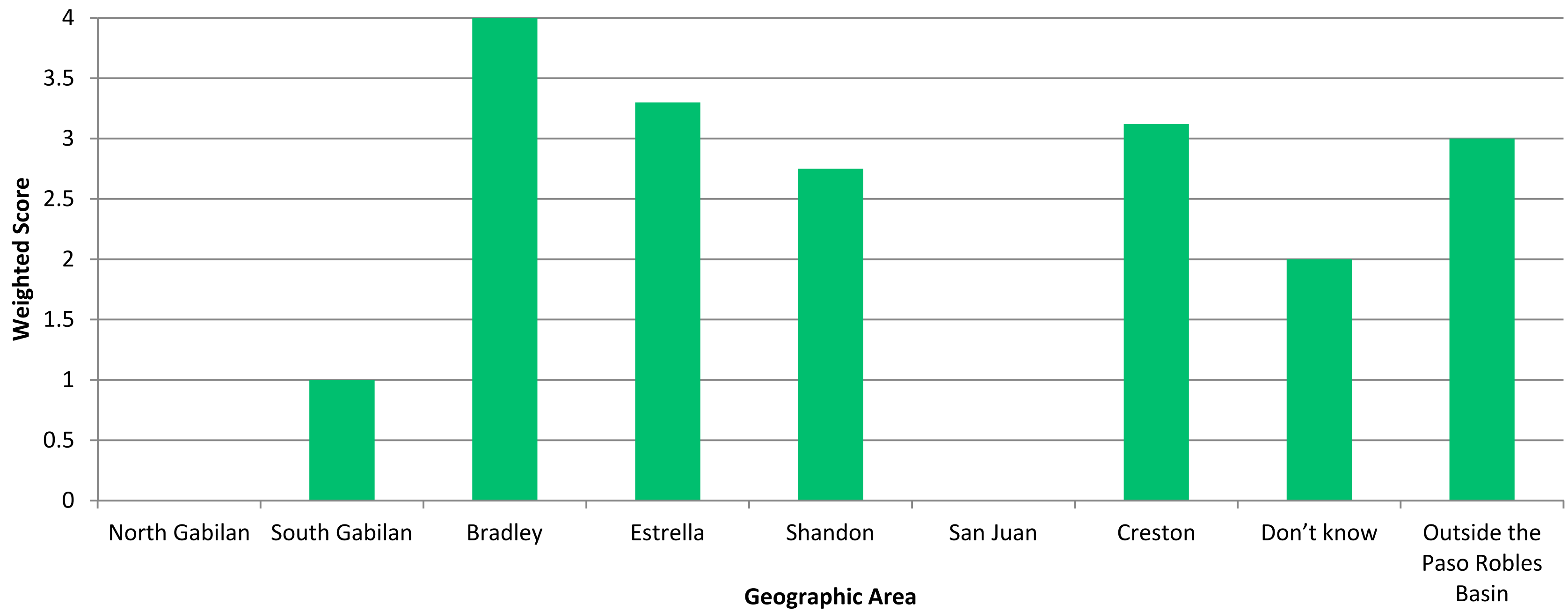
Geographic Area	The Salinas River is healthy enough		The Salinas River's health could improve if the local cost was reasonable		I feel it is essential for the Salinas River's health to improve no matter what the cost		Total	
	Percent	Count	Percent	Count	Percent	Count	Percent	Count
North Gabilan	0%	0	0%	0	0%	0	0%	0
South Gabilan	0%	0	100%	1	0%	0	1%	1
Bradley	100%	2	0%	0	0%	0	2%	2
Estrella	24%	12	58%	29	18%	9	47%	50
Shandon	25%	2	50%	4	25%	2	8%	8
San Juan	0%	0	0%	0	0%	0	0%	0
Creston	28%	7	52%	13	20%	5	24%	25
Don't know	100%	1	0%	0	0%	0	1%	1
Outside the Paso Robles Basin	21%	4	47%	9	32%	6	18%	19
Total	26%	28	53%	56	21%	22	100%	106
							Answered	106
							Skipped	5

Do you feel that the health of Salinas River in the Paso Robles Basin is negatively impacted by the following? Please indicate on a scale of 1 (least impact) to 5 (most impact): Limited releases from Santa Margarita Lake (Salinas Reservoir)



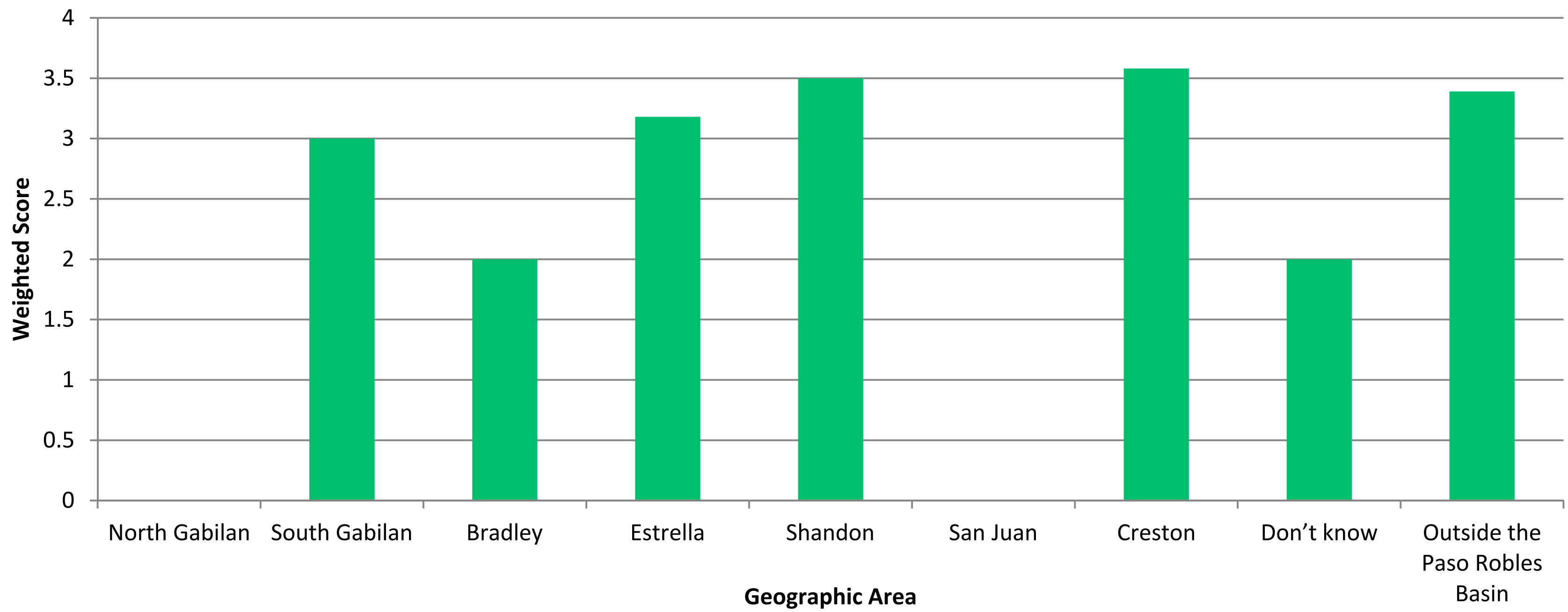
Geographic Area	Least impact 1		2		Moderate impact 3		4		Most impact 5		Total		Weighted Average
North Gabilan	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
South Gabilan	0%	0	100%	1	0%	0	0%	0	0%	0	1%	1	2
Bradley	0%	0	0%	0	50%	1	50%	1	0%	0	2%	2	3.5
Estrella	14%	7	20%	10	22%	11	22%	11	20%	10	46%	49	3.14
Shandon	38%	3	13%	1	25%	2	13%	1	13%	1	8%	8	2.5
San Juan	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
Creston	13%	3	17%	4	38%	9	13%	3	21%	5	23%	24	3.13
Don't know	0%	0	100%	1	0%	0	0%	0	0%	0	1%	1	2
Outside the Paso Robles Basin	22%	4	11%	2	11%	2	28%	5	28%	5	17%	18	3.28
Total	16%	17	18%	19	24%	25	20%	21	20%	21	100%	106	3.01
												Answered	106
												Skipped	5

Do you feel that the health of Salinas River in the Paso Robles Basin is negatively impacted by the following? Please indicate on a scale of 1 (least impact) to 5 (most impact): People directly diverting water from the Salinas River in and upstream of the Paso Robles Basin



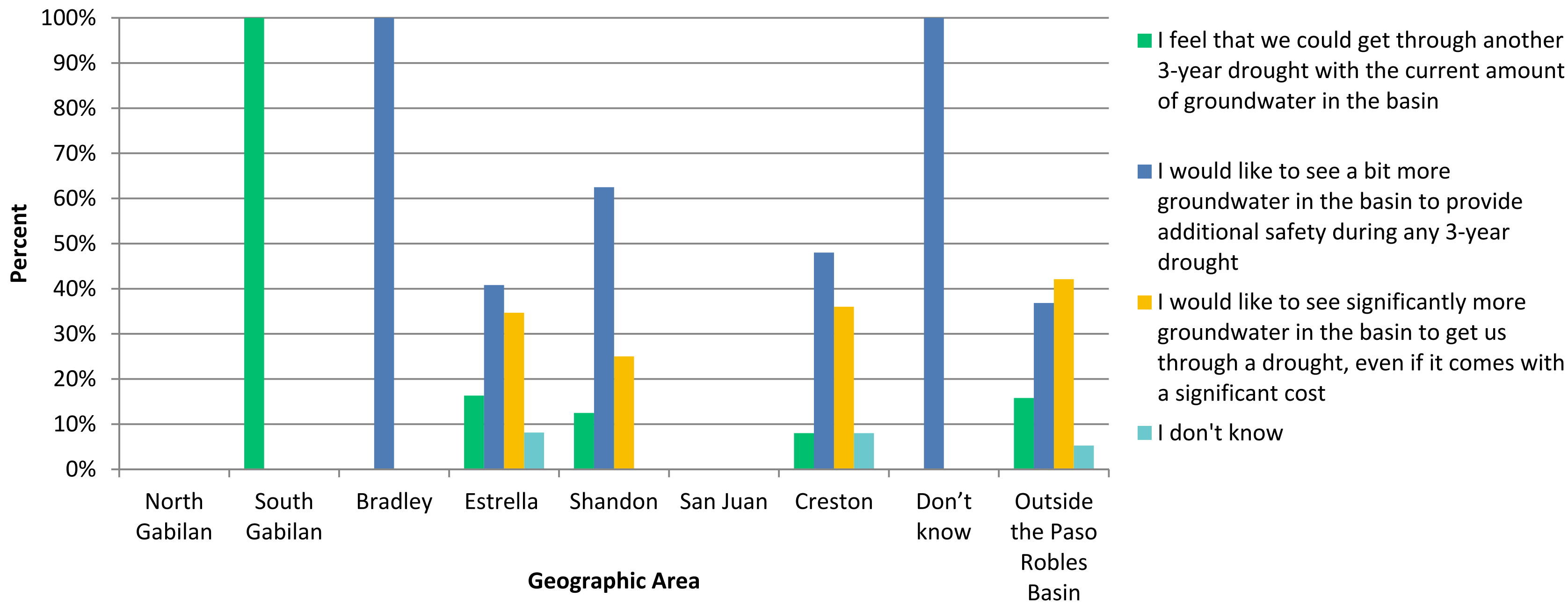
Geographic Area	Least impact 1		2		Moderate impact 3		4		Most impact 5		Total		Weighted Average
North Gabilan	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
South Gabilan	100%	1	0%	0	0%	0	0%	0	0%	0	1%	1	1
Bradley	0%	0	0%	0	50%	1	0%	0	50%	1	2%	2	4
Estrella	10%	5	12%	6	34%	17	26%	13	18%	9	47%	50	3.3
Shandon	13%	1	38%	3	25%	2	13%	1	13%	1	8%	8	2.75
San Juan	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
Creston	20%	5	12%	3	28%	7	16%	4	24%	6	24%	25	3.12
Don’t know	0%	0	100%	1	0%	0	0%	0	0%	0	1%	1	2
Outside the Paso Robles Basin	28%	5	0%	0	33%	6	22%	4	17%	3	17%	18	3
Total	16%	17	12%	13	31%	33	21%	22	19%	20	100%	106	3.11
												Answered	106
												Skipped	5

Do you feel that the health of Salinas River in the Paso Robles Basin is negatively impacted by the following? Please indicate on a scale of 1 (least impact) to 5 (most impact): Groundwater wells pulling water from, or preventing water from getting to, the Salinas River

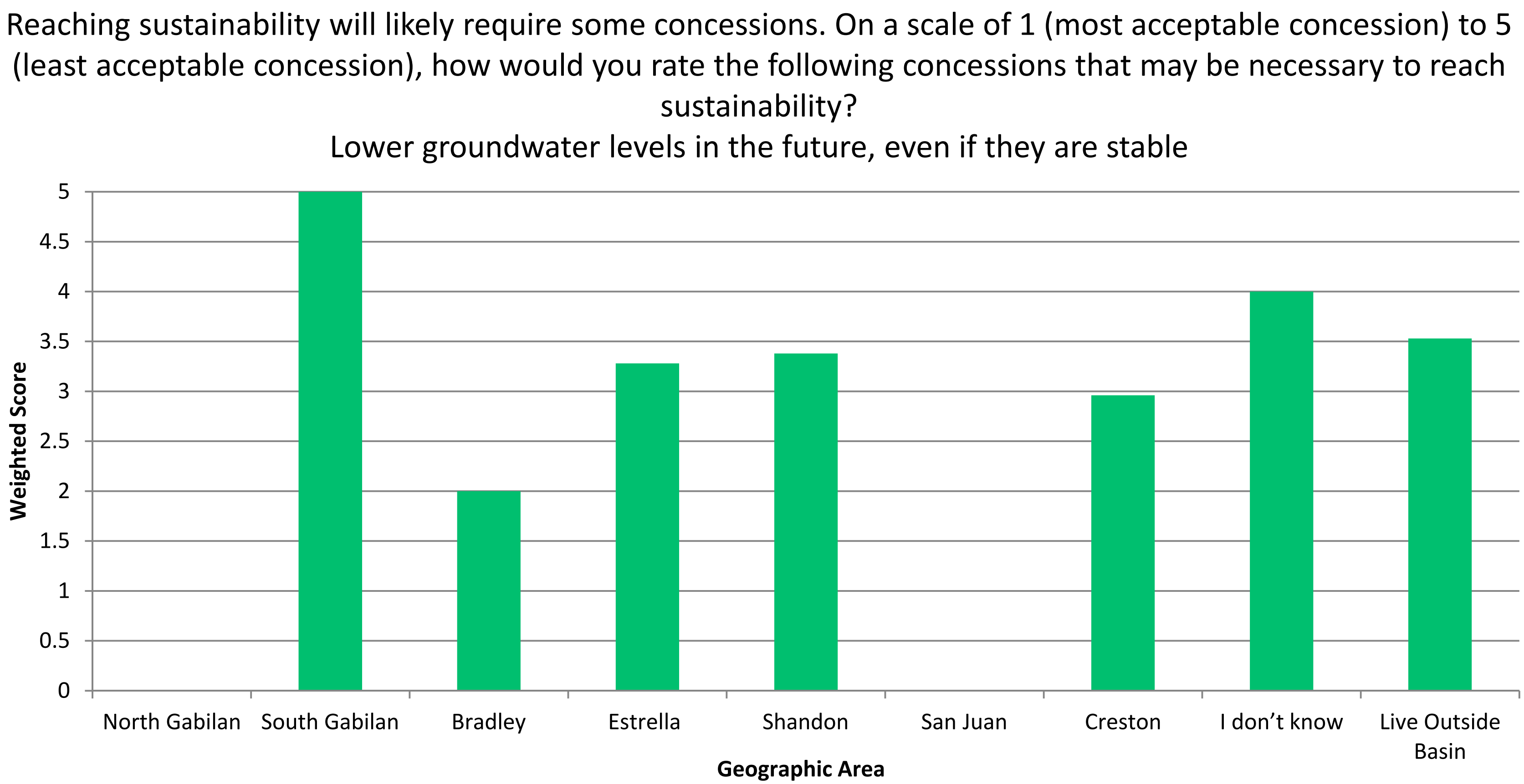


Geographic Area	Least impact 1		2		Moderate impact 3		4		Most impact 5		Total		Weighted Average
North Gabilan	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
South Gabilan	0%	0	0%	0	100%	1	0%	0	0%	0	1%	1	3
Bradley	50%	1	0%	0	50%	1	0%	0	0%	0	2%	2	2
Estrella	18%	9	10%	5	30%	15	20%	10	22%	11	47%	50	3.18
Shandon	13%	1	13%	1	25%	2	13%	1	38%	3	8%	8	3.5
San Juan	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
Creston	12%	3	12%	3	27%	7	8%	2	42%	11	25%	26	3.58
Don't know	0%	0	100%	1	0%	0	0%	0	0%	0	1%	1	2
Outside the Paso Robles Basin	17%	3	6%	1	28%	5	22%	4	28%	5	17%	18	3.39
Total	16%	17	10%	11	29%	31	16%	17	28%	30	100%	106	3.30
												Answered	106
												Skipped	5

Which statement best describes your opinion about the amount of groundwater stored in the Paso Robles Basin?



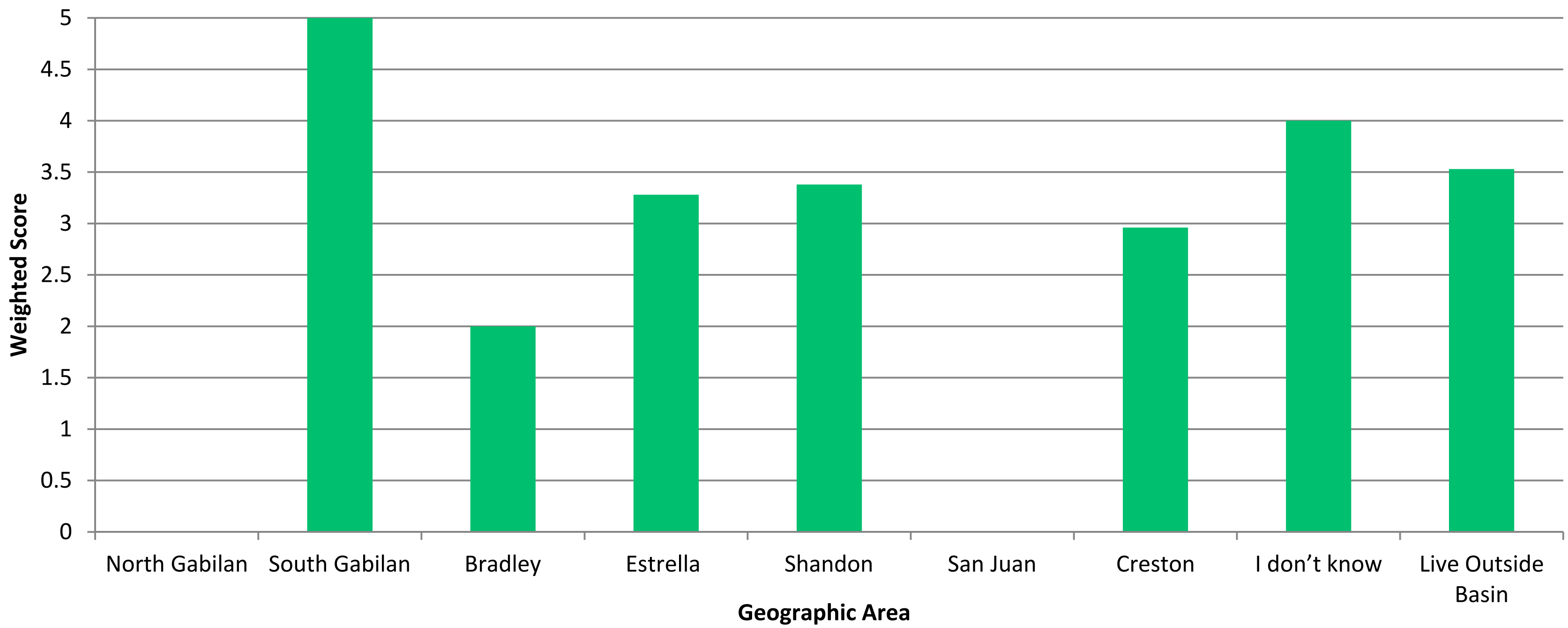
Geographic Area	I feel that we could get through another 3-year drought with the current amount of groundwater in the basin		I would like to see a bit more groundwater in the basin to provide additional safety during any 3-year drought		I would like to see significantly more groundwater in the basin to get us through a drought, even if it comes with a significant cost		I don't know		Total	
	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count
North Gabilan	0%	0	0%	0	0%	0	0%	0	0%	0
South Gabilan	100%	1	0%	0	0%	0	0%	0	1%	1
Bradley	0%	0	100%	2	0%	0	0%	0	2%	2
Estrella	16%	8	41%	20	35%	17	8%	4	47%	49
Shandon	13%	1	63%	5	25%	2	0%	0	8%	8
San Juan	0%	0	0%	0	0%	0	0%	0	0%	0
Creston	8%	2	48%	12	36%	9	8%	2	24%	25
Don't know	0%	0	100%	1	0%	0	0%	0	1%	1
Outside the Paso Robles Basin	16%	3	37%	7	42%	8	5%	1	18%	19
Total	14%	15	45%	47	34%	36	7%	7	100%	105
									Answered	105
									Skipped	6



Geographic Area	most acceptable				moderately acceptable				least acceptable				
	1		2		3		4		5		Total		Weighted Score
North Gabilan	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
South Gabilan	0%	0	0%	0	0%	0	0%	0	100%	1	1%	1	5
Bradley	50%	1	0%	0	50%	1	0%	0	0%	0	2%	2	2
Estrella	19%	9	11%	5	23%	11	17%	8	30%	14	47%	47	3.28
Shandon	0%	0	0%	0	75%	6	13%	1	13%	1	8%	8	3.38
San Juan	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
Creston	17%	4	26%	6	22%	5	13%	3	22%	5	23%	23	2.96
I don't know	0%	0	0%	0	0%	0	100%	1	0%	0	1%	1	4
Live Outside Basin	11%	2	11%	2	37%	7	0%	0	42%	8	19%	19	3.53
Total	16%	16	13%	13	30%	30	13%	13	29%	29	100%	101	
												Answered	101
												Skipped	10

Reaching sustainability will likely require some concessions. On a scale of 1 (most acceptable concession) to 5 (least acceptable concession), how would you rate the following concessions that may be necessary to reach sustainability?

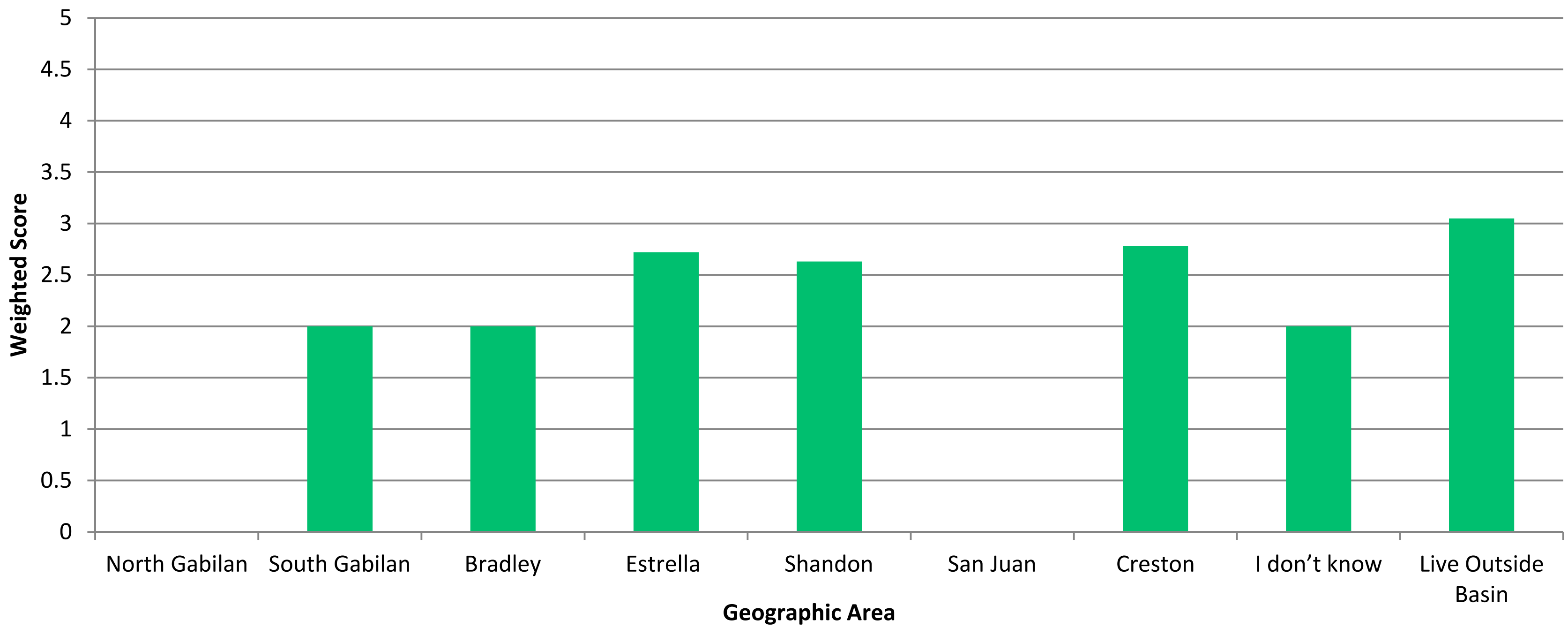
Restrictions on pumping in dry years when groundwater levels might be low



Geographic Area	most acceptable				moderately acceptable				least acceptable				
	1		2		3		4		5		Total		Weighted Score
North Gabilan	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
South Gabilan	0%	0	0%	0	0%	0	0%	0	100%	1	1%	1	5
Bradley	50%	1	0%	0	50%	1	0%	0	0%	0	2%	2	2
Estrella	19%	9	11%	5	23%	11	17%	8	30%	14	47%	47	3.28
Shandon	0%	0	0%	0	75%	6	13%	1	13%	1	8%	8	3.38
San Juan	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
Creston	17%	4	26%	6	22%	5	13%	3	22%	5	23%	23	2.96
I don't know	0%	0	0%	0	0%	0	100%	1	0%	0	1%	1	4
Live Outside Basin	11%	2	11%	2	37%	7	0%	0	42%	8	19%	19	3.53
Total	16%	16	13%	13	30%	30	13%	13	29%	29	100%	101	
												Answered	**101**
												Skipped	**10**

Reaching sustainability will likely require some concessions. On a scale of 1 (most acceptable concession) to 5 (least acceptable concession), how would you rate the following concessions that may be necessary to reach sustainability?

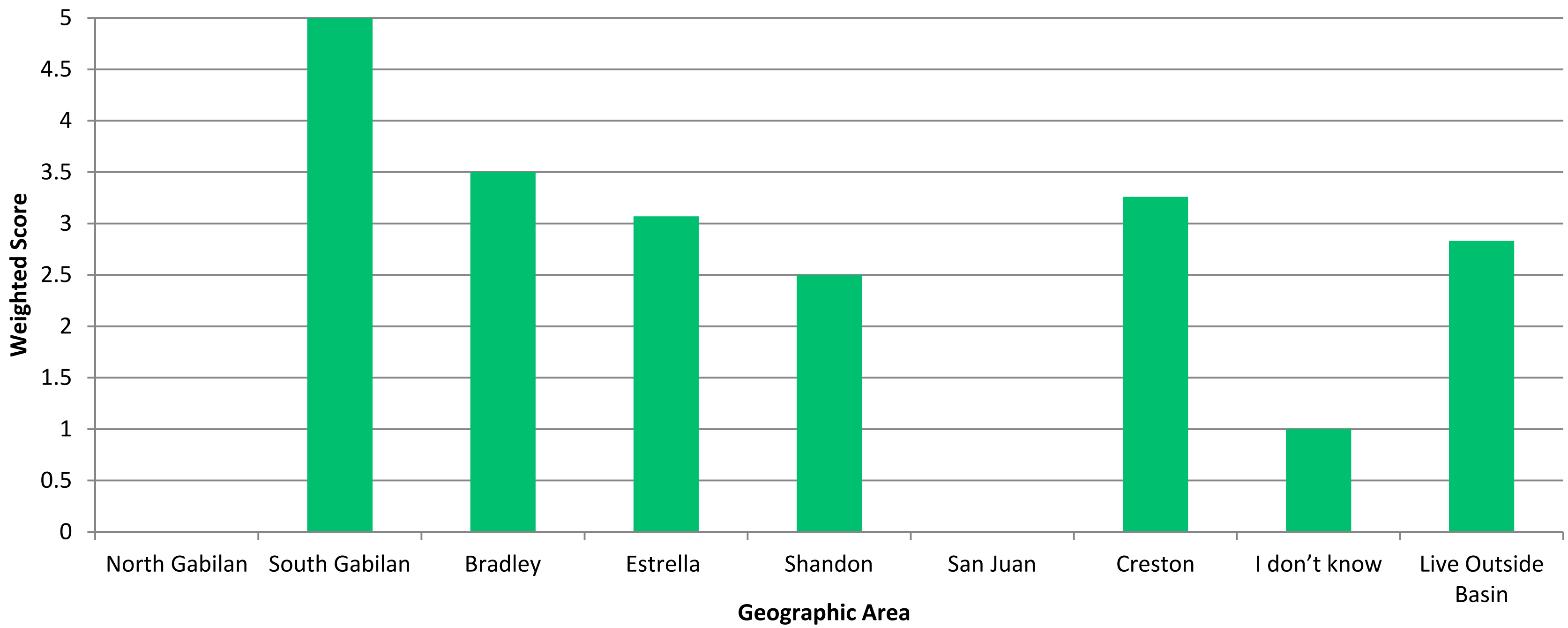
Less flow in the Salinas River



Geographic Area	most acceptable				moderately acceptable				least acceptable				
	1		2		3		4		5		Total		Weighted Score
North Gabilan	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
South Gabilan	0%	0	100%	1	0%	0	0%	0	0%	0	1%	1	2
Bradley	50%	1	0%	0	50%	1	0%	0	0%	0	2%	2	2
Estrella	20%	9	22%	10	41%	19	2%	1	15%	7	46%	46	2.72
Shandon	25%	2	25%	2	25%	2	13%	1	13%	1	8%	8	2.63
San Juan	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
Creston	22%	5	17%	4	35%	8	13%	3	13%	3	23%	23	2.78
I don't know	0%	0	100%	1	0%	0	0%	0	0%	0	1%	1	2
Live Outside Basin	21%	4	11%	2	26%	5	26%	5	16%	3	19%	19	3.05
Total	21%	21	20%	20	35%	35	10%	10	14%	14	100%	101	
											Answered		**101**
											Skipped		**10**

Reaching sustainability will likely require some concessions. On a scale of 1 (most acceptable concession) to 5 (least acceptable concession), how would you rate the following concessions that may be necessary to reach sustainability?

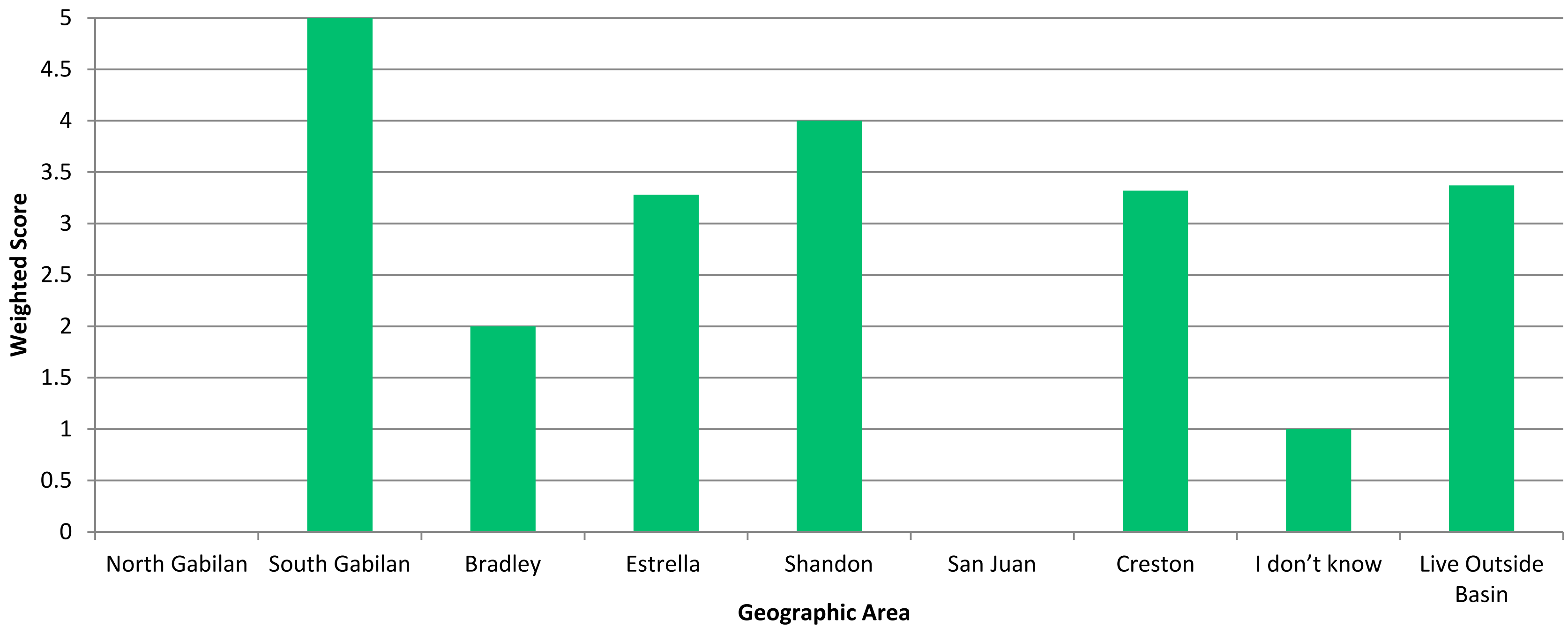
A requirement to reduce pumping to maintain creek flows



Geographic Area	most acceptable				moderately acceptable				least acceptable				
	1		2		3		4		5		Total		Weighted Score
North Gabilan	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
South Gabilan	0%	0	0%	0	0%	0	0%	0	100%	1	1%	1	5
Bradley	0%	0	0%	0	50%	1	50%	1	0%	0	2%	2	3.5
Estrella	11%	5	22%	10	31%	14	20%	9	16%	7	45%	45	3.07
Shandon	38%	3	13%	1	25%	2	13%	1	13%	1	8%	8	2.5
San Juan	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
Creston	17%	4	13%	3	26%	6	13%	3	30%	7	23%	23	3.26
I don't know	100%	1	0%	0	0%	0	0%	0	0%	0	1%	1	1
Live Outside Basin	28%	5	6%	1	28%	5	33%	6	6%	1	18%	18	2.83
Total	18%	18	15%	15	28%	28	20%	20	17%	17	100%	101	
												Answered	**101**
												Skipped	**10**

Reaching sustainability will likely require some concessions. On a scale of 1 (most acceptable concession) to 5 (least acceptable concession), how would you rate the following concessions that may be necessary to reach sustainability?

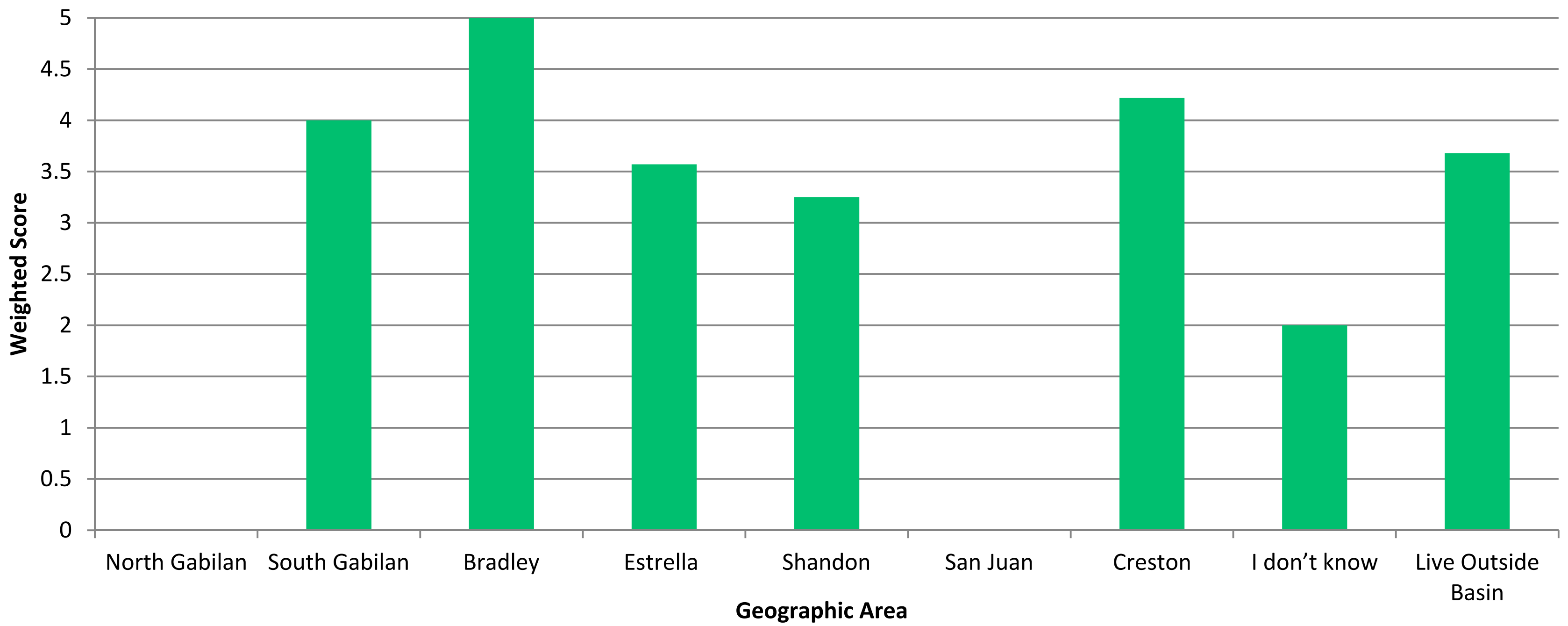
A requirement to reduce agricultural pumping in all years



Geographic Area	most acceptable				moderately acceptable				least acceptable				
	1		2		3		4		5		Total		Weighted Score
North Gabilan	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
South Gabilan	0%	0	0%	0	0%	0	0%	0	100%	1	1%	1	5
Bradley	0%	0	100%	2	0%	0	0%	0	0%	0	2%	2	2
Estrella	19%	9	17%	8	17%	8	11%	5	36%	17	47%	47	3.28
Shandon	13%	1	0%	0	25%	2	0%	0	63%	5	8%	8	4
San Juan	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
Creston	23%	5	14%	3	9%	2	18%	4	36%	8	22%	22	3.32
I don't know	100%	1	0%	0	0%	0	0%	0	0%	0	1%	1	1
Live Outside Basin	16%	3	11%	2	21%	4	26%	5	26%	5	19%	19	3.37
Total	19%	19	15%	15	16%	16	14%	14	36%	36	100%	101	
												Answered	101
												Skipped	10

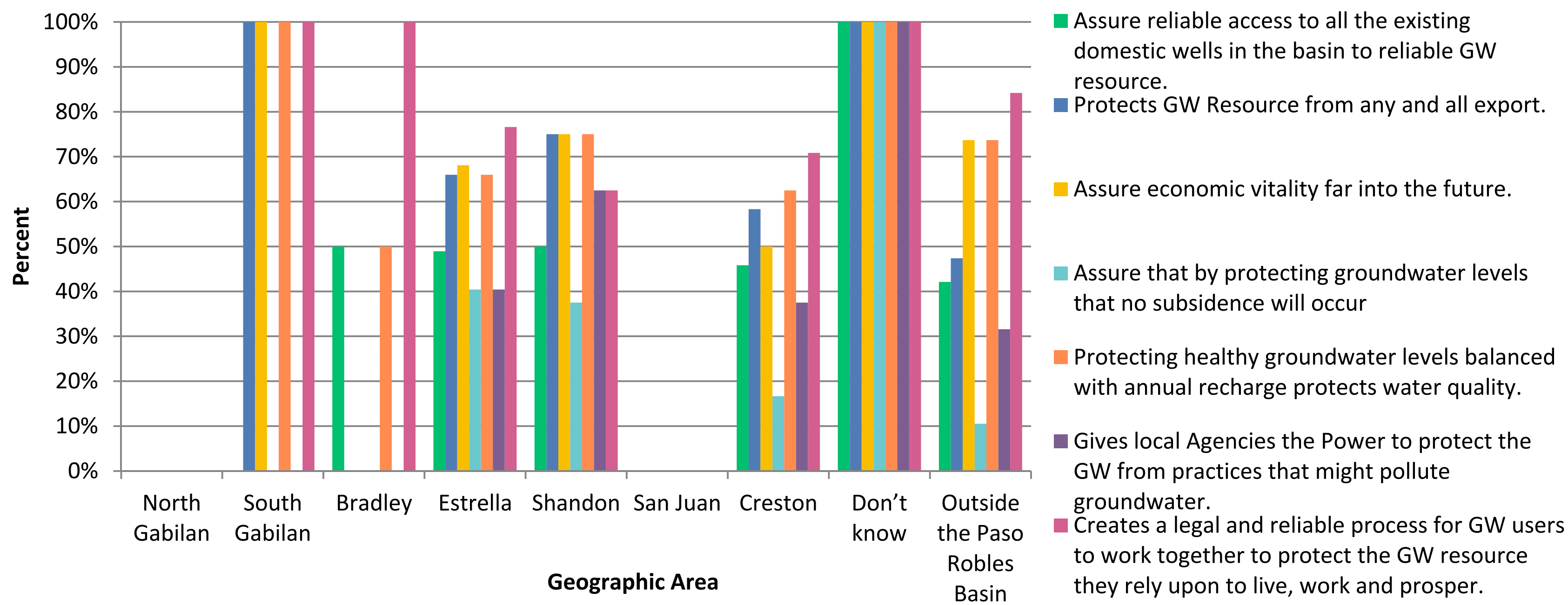
Reaching sustainability will likely require some concessions. On a scale of 1 (most acceptable concession) to 5 (least acceptable concession), how would you rate the following concessions that may be necessary to reach sustainability?

Shallow domestic wells going dry and needing to be deepened



Geographic Area	most acceptable				moderately acceptable				least acceptable				
	1		2		3		4		5		Total		Weighted Score
North Gabilan	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
South Gabilan	0%	0	0%	0	0%	0	100%	1	0%	0	1%	1	4
Bradley	0%	0	0%	0	0%	0	0%	0	100%	2	2%	2	5
Estrella	15%	7	15%	7	13%	6	13%	6	45%	21	47%	47	3.57
Shandon	13%	1	0%	0	50%	4	25%	2	13%	1	8%	8	3.25
San Juan	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
Creston	0%	0	4%	1	17%	4	30%	7	48%	11	23%	23	4.22
I don't know	0%	0	100%	1	0%	0	0%	0	0%	0	1%	1	2
Live Outside Basin	5%	1	16%	3	21%	4	21%	4	37%	7	19%	19	3.68
Total	9%	9	12%	12	18%	18	20%	20	42%	42	100%	101	
												Answered	**101**
												Skipped	**10**

From your perspective, check the boxes that apply to the biggest opportunities as a result of the SGMA process



Geographic Area	Assure reliable access to all the existing domestic wells in the basin to reliable GW resource.		Protects GW Resource from any and all export.		Assure economic vitality far into the future.		Assure that by protecting groundwater levels that no subsidence will occur		Protecting healthy groundwater levels balanced with annual recharge protects water quality.		Gives local Agencies the Power to protect the GW from practices that might pollute groundwater.		Creates a legal and reliable process for GW users to work together to protect the GW resource they rely upon to live, work and prosper.		Total	
	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count
North Gabilan	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0
South Gabilan	0%	0	100%	1	100%	1	0%	0	100%	1	0%	0	100%	1	1%	1
Bradley	50%	1	0%	0	0%	0	0%	0	50%	1	0%	0	100%	2	2%	2
Estrella	49%	23	66%	31	68%	32	40%	19	66%	31	40%	19	77%	36	46%	47
Shandon	50%	4	75%	6	75%	6	38%	3	75%	6	63%	5	63%	5	8%	8
San Juan	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0
Creston	46%	11	58%	14	50%	12	17%	4	63%	15	38%	9	71%	17	24%	24
Don't know	100%	1	100%	1	100%	1	100%	1	100%	1	100%	1	100%	1	1%	1
Outside the Paso Robles Basin	42%	8	47%	9	74%	14	11%	2	74%	14	32%	6	84%	16	19%	19
Total	47%	48	61%	62	65%	66	28%	29	68%	69	39%	40	76%	78	100%	102
															Answered	102
															Skipped	9

What would be a successful outcome of the SGMA process from your perspective?

Responses from Estrella
Balancing the water usage in urban areas vs ag.
Sustainable groundwater levels
Protect groundwater supplies with an equitable approach for all users. Do not increase city use at the expense of agricultural use.
Maintain groundwater levels. Enforcement of over pumping. No selling groundwater.
Stability
Stable political situation which allows additional planting of irrigated crops
Maintain GW levels and quality at greater or at least current levels
Stop or reduce residential development including hotels which are major water users.
A successful outcome would be to further stabilize water levels and then come up with a plan to recharge the water basin.
We have too much government involved in our daily lives. Eliminate all of the SGMA governmental entities.
A better understanding of groundwater, its biggest users, biggest threats, and best practices that can help reduce use.
Respect for and preservation of private landowner water rights.
Raise current groundwater elevations
Completely measure the basin in all areas and develop accurate sustainable yields that are measurable
Creates a plan for stabilizing and perhaps improving future water availability and quality. Controls over pumping by some parties that are abusing groundwater pumping.
Slow growth in Paso Robles city limits.
All vested parties unite in reaching viable solutions for the betterment of all. Local control.
Develop and implement a plan that is acceptable to stakeholders while fulfilling the requirements of the SGMA process.
An allocation per acre, equal for all land owners that in total brings the usage down to a sustainable level. Owners that didn't plan to use their could lease, sell or contribute to raising the water table and help mitigate low rainfall
Land use regulations to monitor / regulate future growth of AG. Also need to monitor all development to ensure there is sufficient water resources. Water resources must be managed. Growth must be planned. Wells will need monitoring along with a reliable means of determining the water level of the basin.
Increased scientific research on the basin and the development of an integrated plan to reach sustainability using that research as a foundation.
The wake up call to City Council that we cannot keep adding 1000s of homes.

What would be a successful outcome of the SGMA process from your perspective?

Responses from Estrella Continued
Stabilize basin from decline without destroying agriculture.
The end of waiting for my well to run dry
A plan that stabilizes ground water sources which assures property values
Not to have to listen to that Graywall guy any more.
Stable well water levels
Collect data that clearly defines the status of the parts of the basin and then work to create a fair distribution of pumping capability so that NO WELL goes dry.
maintain ground water levels at current state in non impacted areas and increase the levels in severely impacted areas
Reaching SGMA's defined purpose: achieve sustained water supplies
enough groundwater to sustain growth in the area
{Better} educating our community so there is a clear, uniform understanding and coalition effort moving forward.
less residential & commercial development, mainly less residential density of development. The quality of life offered here is being squandered I feel by a hurry up attitude toward development. Paso Robles will only become more attractive in the future with a slower approach to development of high density projects. The land is the finite resource, once it's developed, nothing else can be done with it for long periods of time. Don't be in such a rush to sell the golden goose. Thank you for this survey opportunity.
A stable and reliable GW.
maintaining ground water levels about 100 feet higher than they are today.
One where limitations are placed on the amount of water that can be drawn from the aquifer and more specifically the larger agricultural operations. Also to implement practices of water consumption by the general public and practice water conservation at all times.
That those who have superior rights to groundwater maintain that entitlement, and the appropriators be the first to be required to conserve or find alternate sources of water, especially the city of Paso
No export and metered wells with allocations. Bring the basin back to health and sustainable levels for 100 years to come.

What would be a successful outcome of the SGMA process from your perspective?

Responses from Creston
Through additional data, prove that there is not a justification for rationing water.
Pumping reductions which are applied fairly (based on crop water duty factors vs. historic pumping) to ensure that groundwater levels return to and stay at January 1, 2015 levels on average (allowing for lower levels in dry years only if groundwater levels on average stay at Jan. 1, 2015 levels).
to keep large investors from selling our water.
Win Win deal for everyone. Increase storage supplies and keep the basin in balance.
We already conserve and use as little as we can get by with. Getting everyone to do the same would be most helpfuk
A fair, science based plan, with exponentially more monitoring, and rewards for the most efficient water management practices.
- addressing the elephant in the room of disproportionate water usage by grape growers - recognition of residential water users as de minimis users
Stabilize water level at or near present level without major heartache to residents.
One with facts to back up the actions and one that accounts for future growth.
-To most heavily scrutinize new development, whether housing or agriculture, rather than limit the current community. -To offer quality monitoring on a county-wide level to ensure the safety of private domestic well users. -
Stable water levels and plan for the future which could include more irrigated land if owners willing to pay imported water cost
Pumping limits on heavy ag users, and a means of monitoring their usage. Significant fines for violations - high enough to make it economically unfeasible to exceed the limits set.
Maintaining levels and quality of this precious resource for the years to come.
A county wide "slow growth" ordinance
For decades our area was dry farmed and the population was modest. We now have major irrigated farming and excessive development, residential, commercial, wineries, and breweries - all major uses of groundwater. We need to get realistic on how our groundwater is used.
Follow the law ,overlyers first all others get in line use their other water sources end of story
Restoration of the Basin to its condition before the recent (last 10 years) explosion of development and pumping.
Groundwater levels returned to January 2015 levels and maintained at those levels into the future. Each sub-area meets the levels for their area.
A stable, healthy aquifer, able to withstand drought years, all parties sharing in the burden.
maintaining water levels at the BMP levels set around the basin.
Balance and sensible approach

What would be a successful outcome of the SGMA process from your perspective?

Responses from Outside the Paso Robles Basin
Stop subdividing ag land by abolishing certificates of compliance. No more production of grapes. Encourage dry-land farming. Raise ground water levers to historic averages.
Maintain or improve existing pumping levels with no pumping restrictions.
It's very important that we have a reasoned and scientific assessment of the health of the Basin so that we can consider projects to will enhance the Basin's yield. Very little will be achieved if we try to fix the Basin by how people feel. Good science will have to drive this process. Opinions matter little. Only good science and data will allow for just and equitable solutions.
sustainability no adjudication
sustainability at current levels
SLO County (Paso Basin area especially) becomes a more resilient economy (more sustainable and profitable agriculture) and health of the Salinas is increased as much as possible in conjunction with the US-LTRCD and other stakeholders. To collaborate to make difficult decisions, but ensure that agricultural users are not harmed economically or can benefit in some way if these difficult decisions do affect them (e.g. investigate how agriculture can be a force of long-term ecological good through innovative conservation tools or incentives and skillful communication thereof).
Stabilize groundwater levels and create a workable plan for agriculture and domestic use
Protect ground water by limiting new growth in the Paso Robles area.
Restoration and protection of the irreplaceable natural resources of the Salinas River for present and future generations.
Ample monitoring programs(using Wellntel) that engage groundwater users in a shared understanding of groundwater dynamics - ensuring adequate water for everyone.
Sustainable yields to support agriculture at it's current level and with room to grow.
Appropriate and legally-defensible flows for fish.
A practical GSP that all the parties can successfully implement to protect the GW resource sustainably into the future.
Local management of the resource. Improved local understanding and collaboration of people to understand how this GW source we have CAN be shared and used without harm to one another.
No domestic wells be effected. stop the wine industry growth no marijuana growers

What would be a successful outcome of the SGMA process from your perspective?

Responses from Bradley
GW resource is not overdeveloped. GW policies recognize the standing of individuals, and does not cater
Responses from Don't Know
lower ag use of water (wine grapes) alfalfa
Responses from South Gabilan
Stay out of the separate water supply in the Ranchita Canyon area and to the North, which is Northerly
Responses from Shandon
Shandon becoming its own basin
Publicly monitor ground water levels. Publicly monitor all agricultural wells. Maintain or improve groundwater levels.
reliable water
Meeting the requirements of the law with least amount of capital spending
Sustainable water volume and quality.
Users paying a fair price for water and an end to the disharmony in the community
recognition of dry land farming and ranching groundwater needs, ability to receive credit for groundwater recharge practices
Groundwater levels that are stable within a few years at a level that allows continued domestic and agricultural uses. Levels may differ by location within the basin.

Please provide any other information, comments, or questions that you have regarding the SGMA process and development of Minimum Thresholds for the Paso Robles Basin.

Responses from Estrella
Their must be rules about a corp drilling a signifiant well right on your fence line and destroying your ag well.
Developers and others continue to blame vineyards for water use . Actually vineyards with effective drip irrigation use little water compared to hotels and residential expansion.
Get out of our lives!!!!!
I have been in the profession of civil engineering and water sustainability for over 25 years. I am currently a sustainable wine auditor in SLO County for CSWA. There are ways to reduce water consumption that actually saves money that should be mandated.
Need to agricultural pumpers providing technical details about current irrigation practices including scheduling, water saving technologies, cultural practices, etc.
Your all dancing around the issue, there is 2 to 3 times the sustainable usage, it has to come down! Farming techniques have to reduce evaporation or reduce acreage.
We need to be careful in examining the estimated water use as submitted by some engineering companies. One example was the engineer report for the EPC Water District. Way over estimated water use, methodology flawed. They simply averaged all AG uses at 3.5 AF for all planted acres. Since most irrigated acreage in the EPC District was vines, this over estimated. For vines they used 1.8 AF based on a 30 year irrigation use average. With the advances in irrigation, this number should be 1to 1.25AF.
My fear is that the Council will approve lowering the threshold just to make it easier to maintain while adding 1000s of new homes to the area.
I think serious thought needs to be given to some vehicle to discourage new major large vineyards from contributing to the decline of the ground water in the basin
Keep the process objective, based on good science with the least government control.
unsure

Please provide any other information, comments, or questions that you have regarding the SGMA process and development of Minimum Thresholds for the Paso Robles Basin.

Responses from Creston
How can the county be sure of water quality, and well productivity throughout the basin(s) and are there currently sufficiently trained individuals to carry out the potential increase of data gathering, sampling and related activities to serve the public?
Pumping data and groundwater levels for 2015 - not 2011 - must be used. Key wells must be chosen and used for verification. Pumping reductions must be calculated based on 2015 data. Any groundwater reductions in the short term must be addressed, instead of waiting until 5 year reviews.
Get the supervisors on board
again increase storage and balance the basin. Allow Huer Huero River to run and bring the basin back into balance.
With the city of Paso planning major housing developments and hotels. The cities usage is going up exponentially
More information on the great many variations of the PR Basin.
This there even a chance to hold the water level near current with recent spurt of ag growth and continued residential growth--without draconian measures? Is this whole process just an exercise?
Is the county currently staffed with the workforce of individuals with experience in well sampling, depth sounding, field assessment of wellhead sanitation, environmental/watershed and related activities that will be of increased importance to serve the local community? -If the county will not be measuring or monitoring these criteria, who will?
Acceptable drops likely will vary in the Basin, a single figure in feet is likely too simplistic
I appreciate the opportunity to participate in a survey like this. Thank you
Where are the results of the last survey from about a month ago?
The overdraft is a lie , the casgem # a lie tell the truth State provide the water you sold, build the dams we voted on
The first step is to require meters and reporting on all wells. The Basin will never be managed until we know accurately how much water is being extracted.
The El Pomar area should be addressed separately from the Creston sub-area. Data on key wells must be maintained to determine status of groundwater levels in relation to established minimum thresholds.
I am very disappointed by the lack of community spirit to solve this problem.
I have concerns that the GSPs will require too little, too late and the basin will be irreparably damaged. Plans will look good on paper but won't be effective. The larger ag interests will have taken maximum profit and move an.

Please provide any other information, comments, or questions that you have regarding the SGMA process and development of Minimum Thresholds for the Paso Robles Basin.

Responses from Outside the Paso Robles Basin
Minimum thresholds are the center piece of the GSP. This will require qualified hydrologists and hydrogeologists working together to analyze our basin and come up with alternatives and choices. Once the scientific data is analyzed and accepted by Basin users, then careful consideration must be made taking into account the social and economic impact of proposed changes to water usage in the Basin.
We are not sffected by basin levels so my answers may not be applicable.
Thank YOU! Appreciate the hard work you all are doing, and would love to see survey results or be informed about the tangible and intangible outcomes of it.
Minimum groudwater levels must be correlated with appropriate stream flow levels to protect all the Groundwater Dependent Ecosystems associated with the Salinas River, including the estuary.
The Paso GSA would benifit from using Wellntel based community groundwater monitoring networks. The network would fill data gaps, and engage stakeholders by providing them sustainability indicators for their own wells.
Nothing at this time and thank you for this survey!
Minimum thresholds in the Paso Basin need to be based on accurate rich publicly accessible GW data. Combining historical and new ongoing standing water level data sets with periodic quality testing.
I'm sure you are aware of this, but the Blue Ribbon Committee's work back in 2012 is a good source of information.
please do not bend to big money

Please provide any other information, comments, or questions that you have regarding the SGMA process and development of Minimum Thresholds for the Paso Robles Basin.

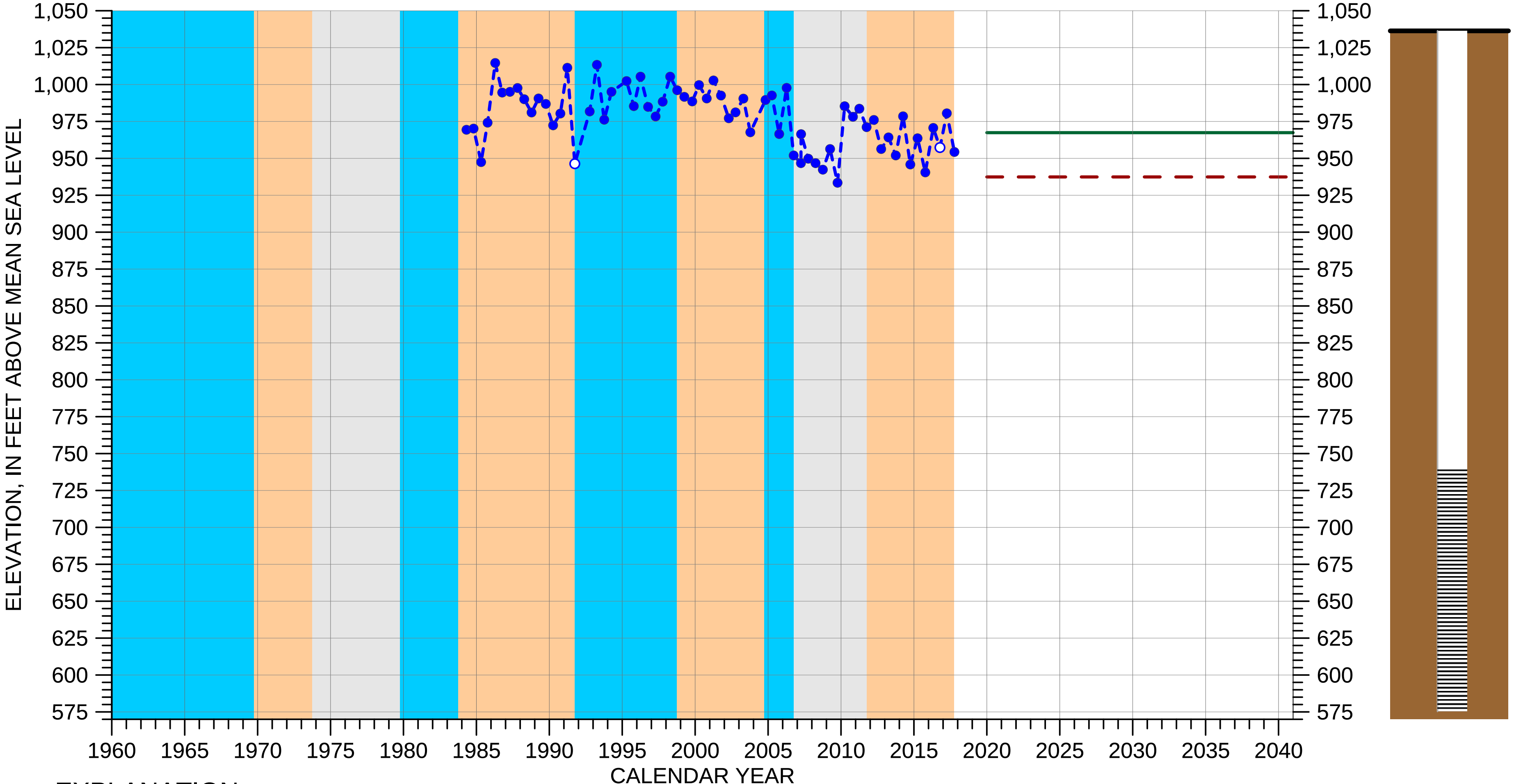
Responses from South Gabilan
For ranchers, farmers and others who wish to plant an irrigable agricultural product, give consideration towards them, even though they had not planted their lands before the explosive growth and heavy use of water for vineyards.

Responses from Don’t Know
the County needs to have more regs re usage. How many acres of grapes have been planted since theCounty's last "regulation“

Responses from Shandon
Make everything easy for the public to know.
N/A
Please address the ability to deepen or drill new wells for domestic use in the Shandon area.
a successful outcome should include a market based system whereby credits/debits can be traded (monetized) for appropriate recharge/use of groundwater in the basin

Appendix H

Paso Robles Formation Aquifer RMS Hydrographs and Well Data



EXPLANATION

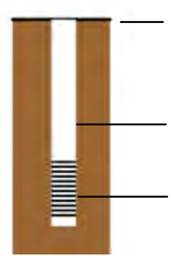
MEASURABLE OBJECTIVE
MINIMUM THRESHOLD
GROUNDWATER ELEVATION
MEASUREMENT NOT VERIFIED*

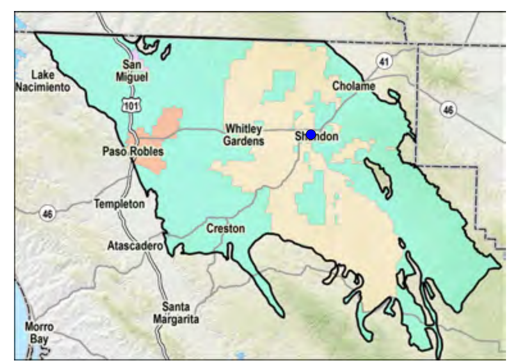
CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Well Depth: 461 feet
Screened Interval: 297-461 feet below ground surface
Reference Point Elevation: 1036.36 feet above mean sea level

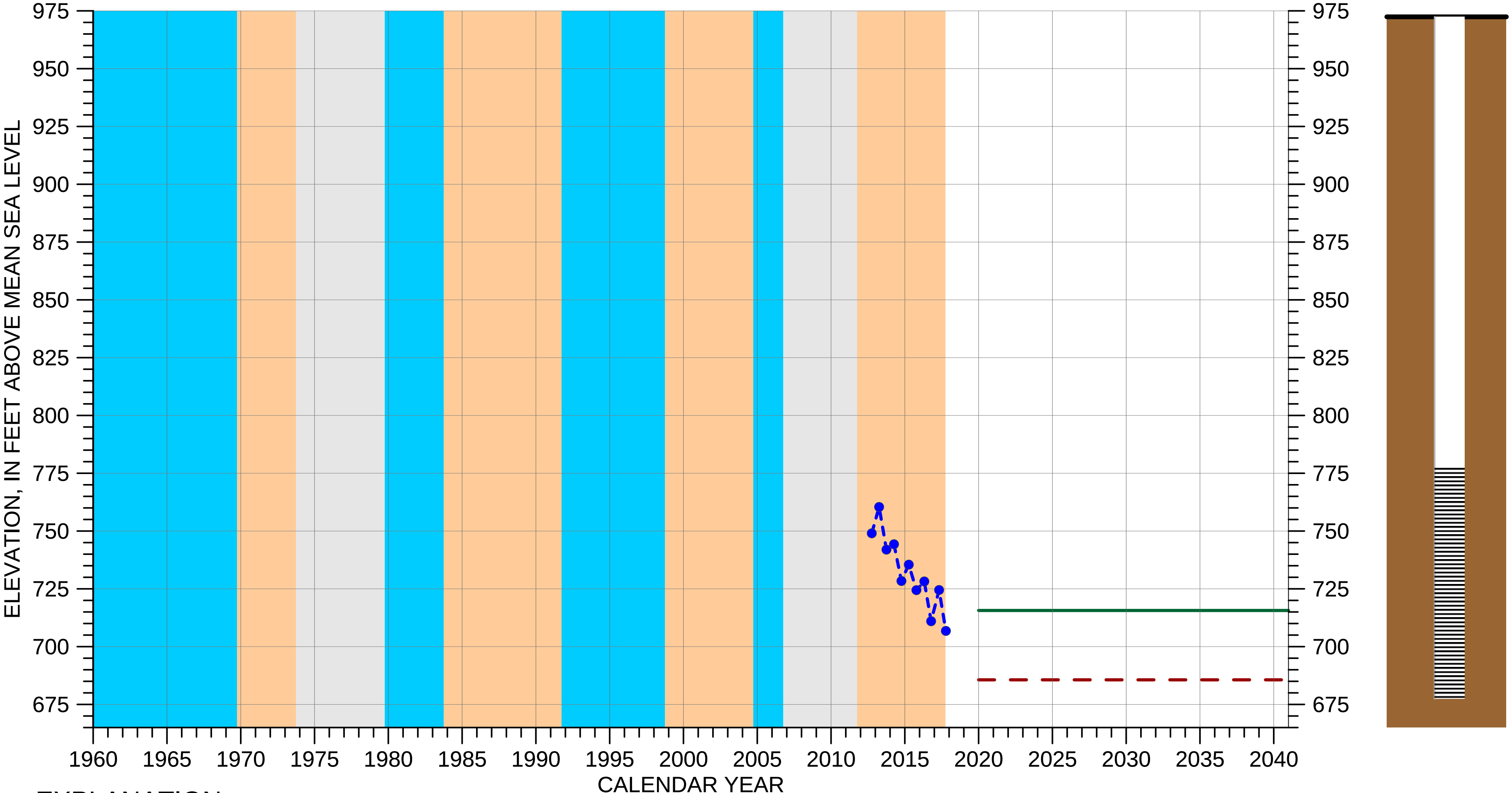
* Measurement reported as not static





MEASUREABLE OBJECTIVES AND MINIMUM THRESHOLDS FOR 26S/15E-20B04

S:\projects\9200_Paso Robles GSP\GSP\Ch 9-10 Coordination Effort\Ch 9\Appendices\AppendixJ_SimulatedHydrographs\grf\Observed_only\Fig07_26S_15E-20B04.grf



EXPLANATION

MEASURABLE OBJECTIVE

MINIMUM THRESHOLD

GROUNDWATER ELEVATION

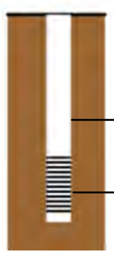
MEASUREMENT NOT VERIFIED*

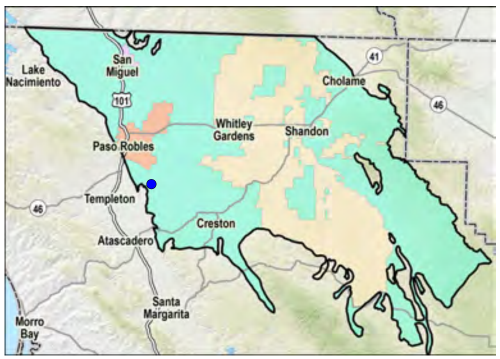
CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Well Depth: 295 feet
Screened Interval: 195-295 feet below ground surface
Reference Point Elevation: 972.4 feet above mean sea level

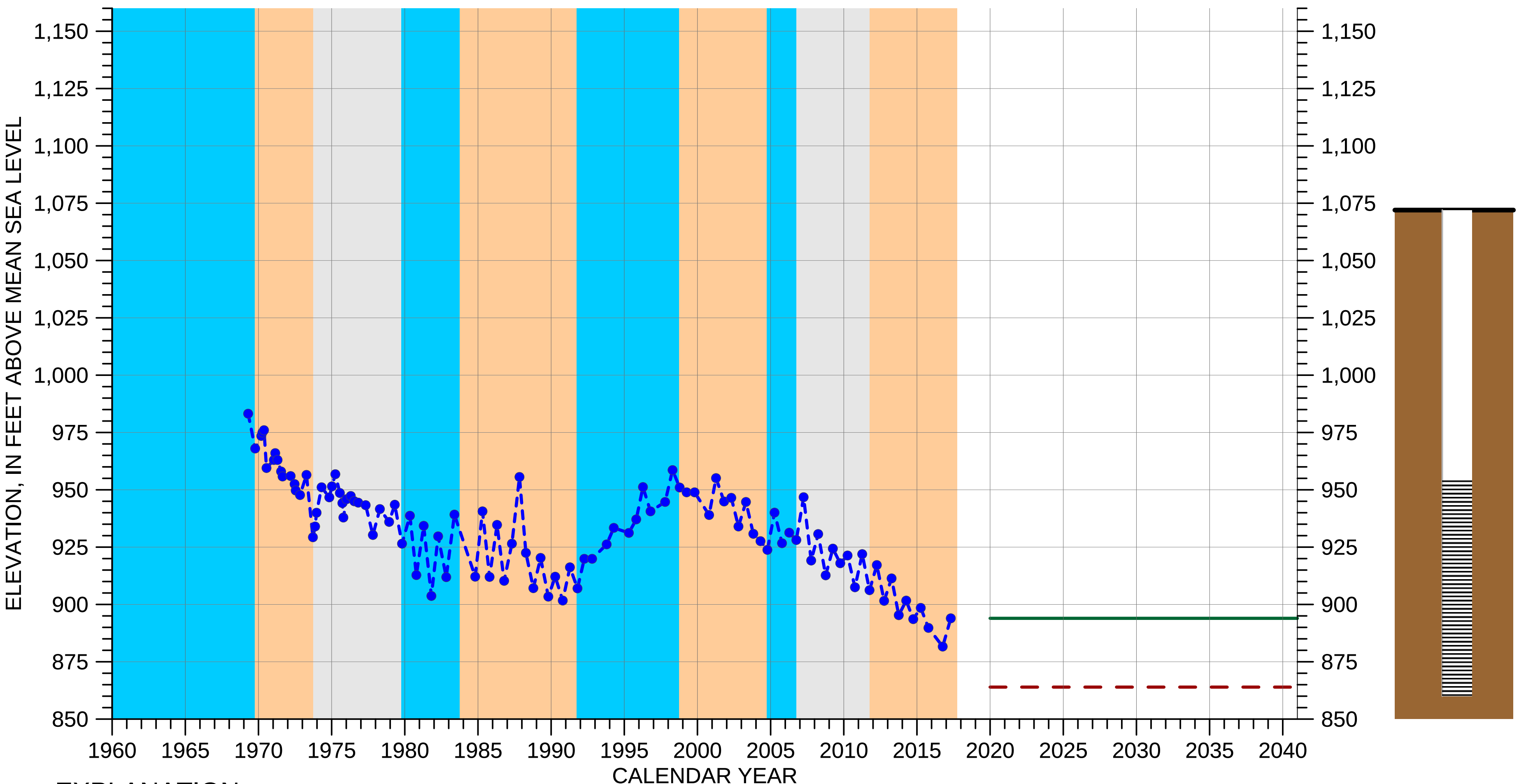
* Measurement reported as not static





MEASUREABLE OBJECTIVES AND MINIMUM THRESHOLDS FOR 27S/12E-13N01

S:\projects\9200_Paso Robles GSP\GSP\Ch 9-10 Coordination Effort\Ch 9\Appendices\AppendixJ_SimulatedHydrographs\grf\Observed_only\Fig08_27S_12E-13N01.grf



EXPLANATION

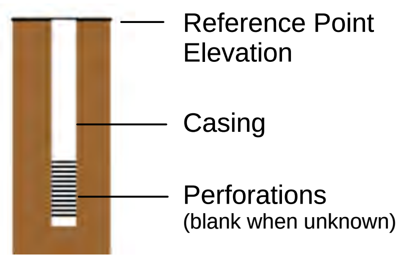
MEASURABLE OBJECTIVE
MINIMUM THRESHOLD
GROUNDWATER ELEVATION
MEASUREMENT NOT VERIFIED*

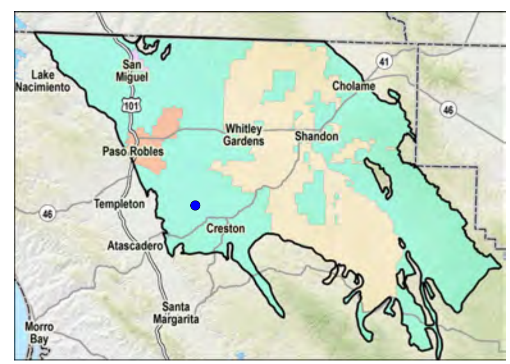
CLIMATE PERIOD CLASSIFICATION

DRY
AVERAGE/ALTERNATING
WET

Well Depth: 212 feet
Screened Interval: 118-212 feet below ground surface
Reference Point Elevation: 1072 feet above mean sea level

* Measurement reported as not static





MEASUREABLE OBJECTIVES AND MINIMUM THRESHOLDS FOR 27S/13E-28F01

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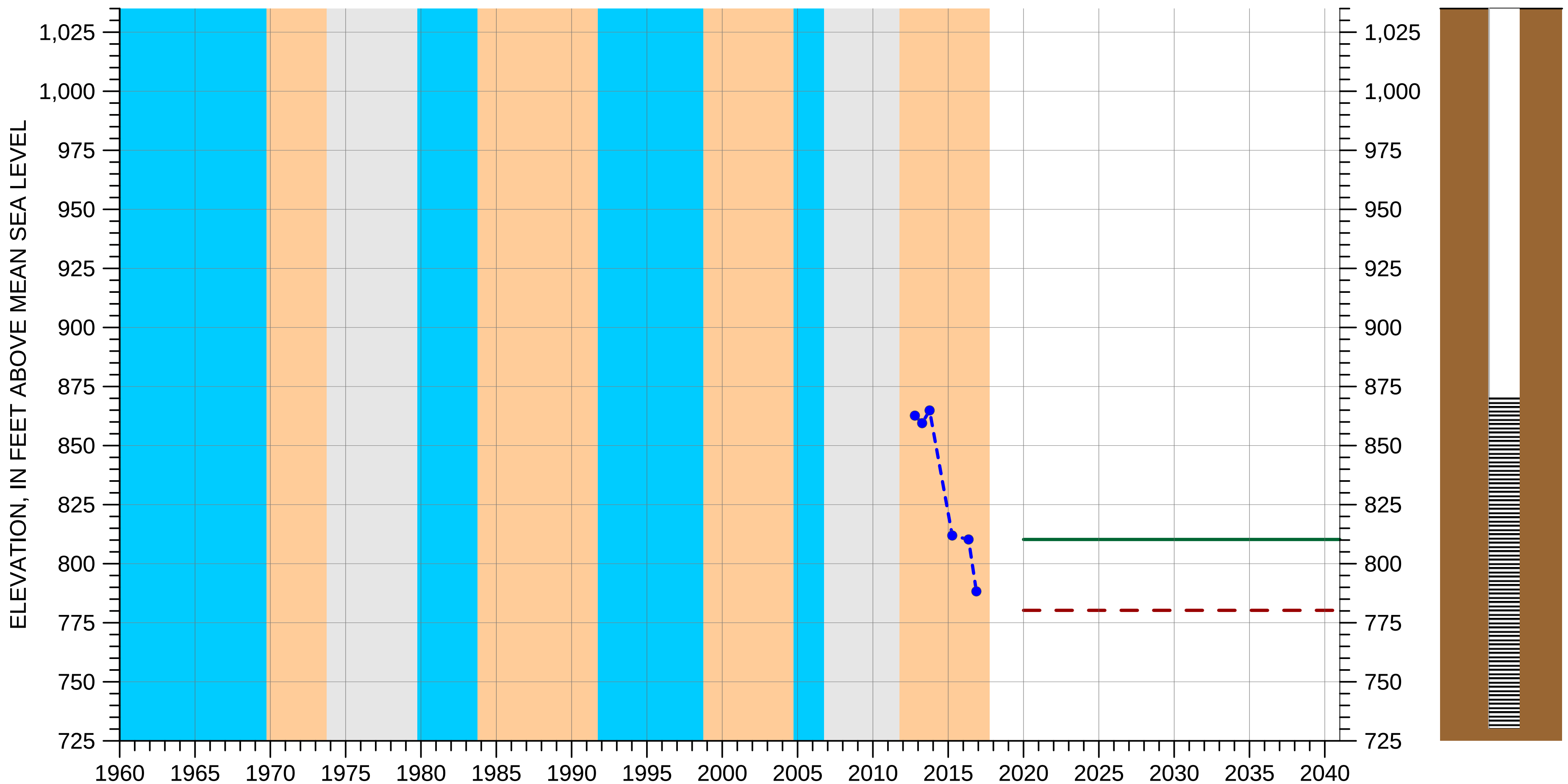


EXPLANATION

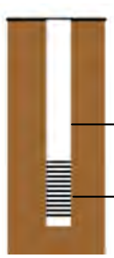
- MEASURABLE OBJECTIVE
- MINIMUM THRESHOLD
- GROUNDWATER ELEVATION
- MEASUREMENT NOT VERIFIED*

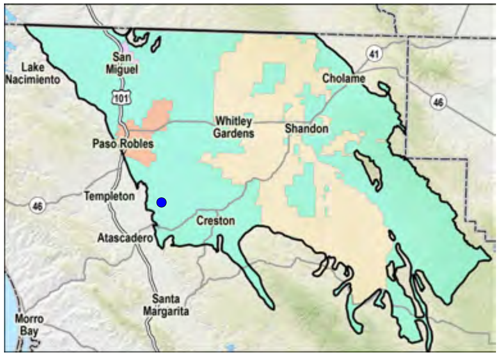
CLIMATE PERIOD CLASSIFICATION

DRY | AVERAGE/ALTERNATING | WET

Well Depth: 355 feet
Screened Interval: 215-235, 275-355 feet below ground surface
Reference Point Elevation: 1086.7 feet above mean sea level

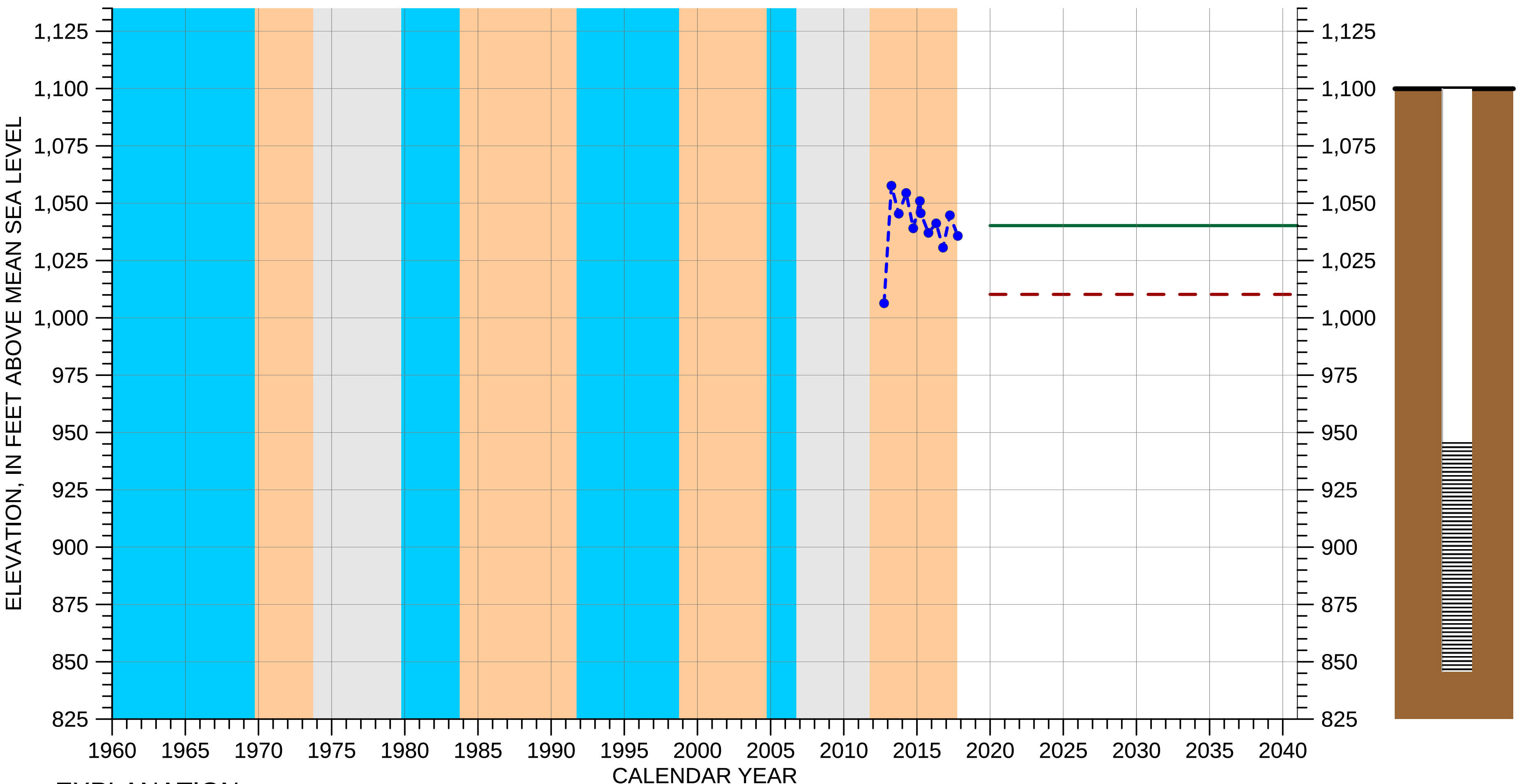
* Measurement reported as not static





MEASUREABLE OBJECTIVES AND MINIMUM THRESHOLDS FOR 27S/13E-30N01

S:\projects\9200_Paso Robles GSP\GSP\Ch 9-10 Coordination Effort\Ch 9\Appendices\AppendixJ_SimulatedHydrographs\grf\Observed_only\Fig10_27S_13E-30N01.grf



EXPLANATION

MEASURABLE OBJECTIVE

MINIMUM THRESHOLD

GROUNDWATER ELEVATION

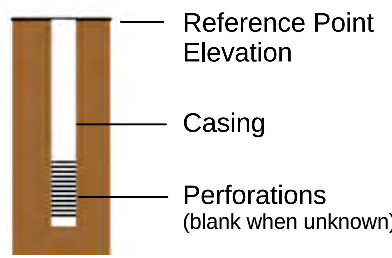
MEASUREMENT NOT VERIFIED*

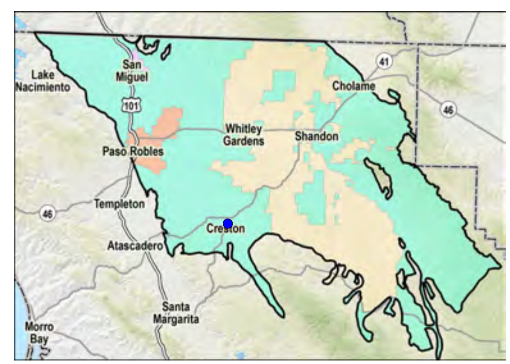
CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Well Depth: 254 feet
Screened Interval: 154-254 feet below ground surface
Reference Point Elevation: 1099.9 feet above mean sea level

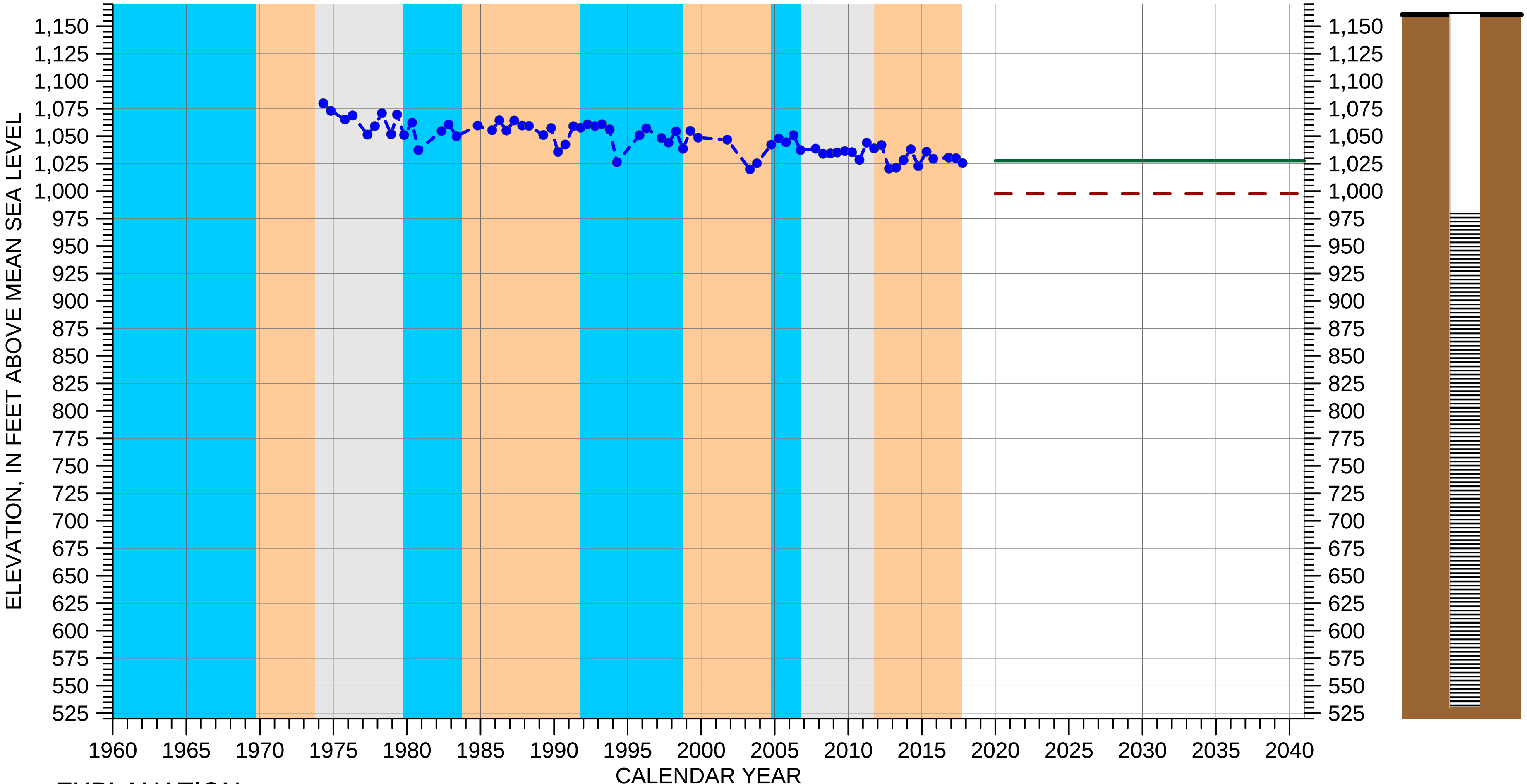
* Measurement reported as not static





MEASUREABLE OBJECTIVES AND MINIMUM THRESHOLDS FOR 28S/13E-01B01

S:\projects\9200_Paso Robles GSP\GSP\Ch 9-10 Coordination Effort\Ch 9\Appendices\AppendixJ_SimulatedHydrographs\grf\Observed_only\Fig11_28S_13E-01B01.grf



EXPLANATION

MEASURABLE OBJECTIVE

MINIMUM THRESHOLD

GROUNDWATER ELEVATION

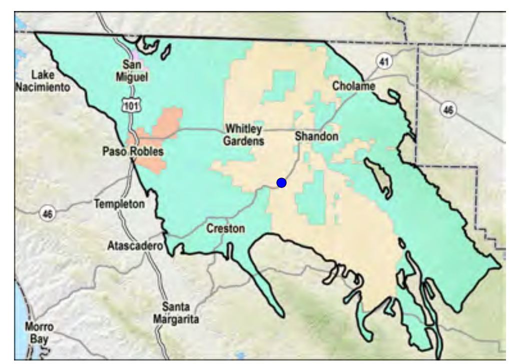
MEASUREMENT NOT VERIFIED*

CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

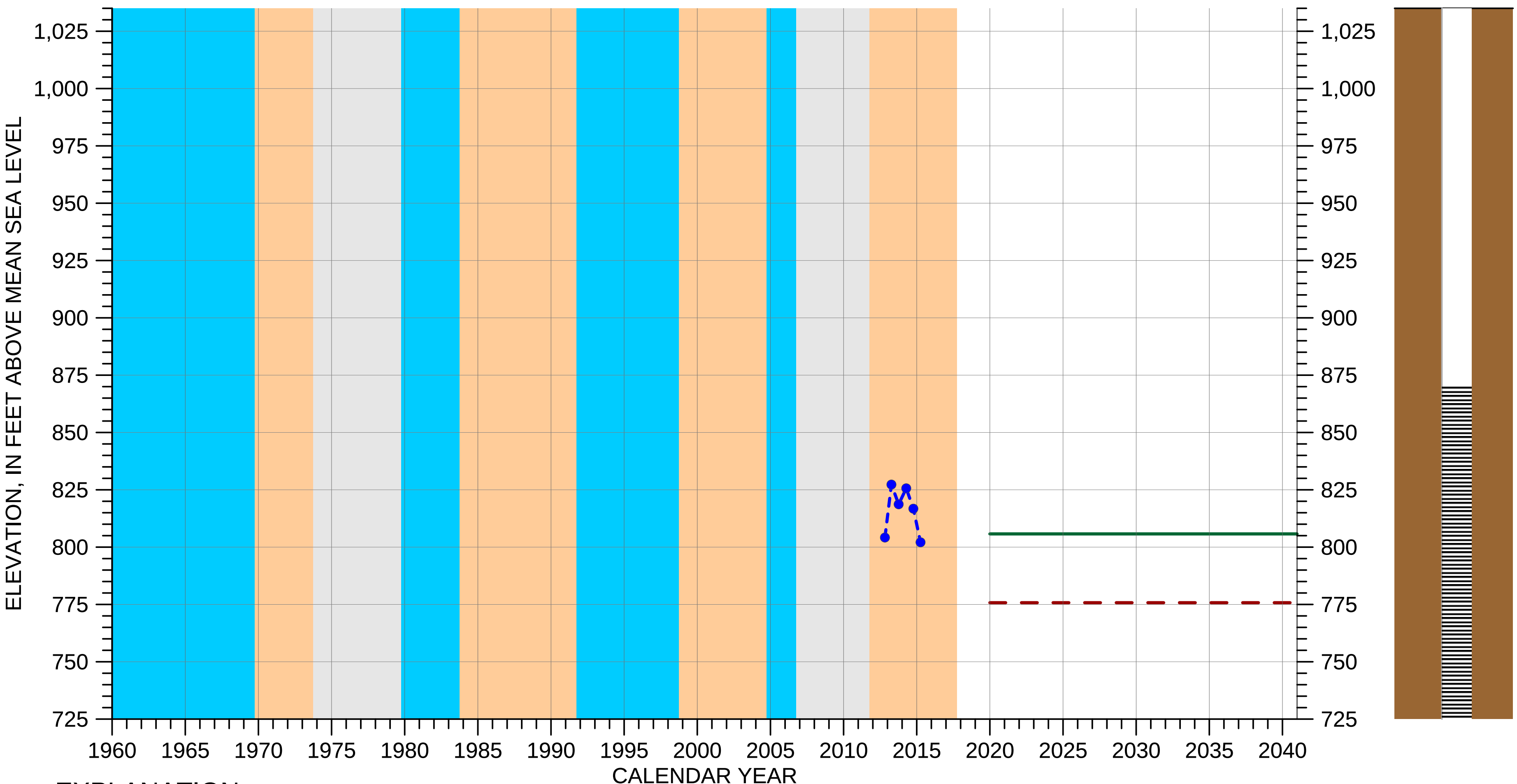
Well Depth: 630
Screened Interval: 180-630 feet below ground surface
Reference Point Elevation: 1160.5 feet above mean sea level

* Measurement reported as not static



MEASUREABLE OBJECTIVES AND MINIMUM THRESHOLDS FOR 27S/14E-11R01

S:\projects\9200_Paso Robles GSP\GSP\Ch 9-10 Coordination Effort\Ch 9\Appendices\AppendixJ_SimulatedHydrographs\grf\Observed_only\Fig12_27S_14E-11R01.grf



EXPLANATION

MEASURABLE OBJECTIVE

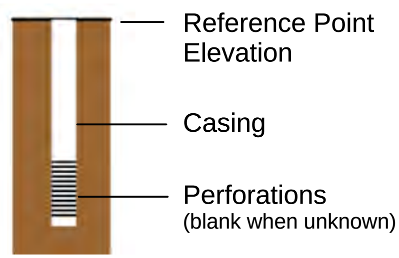
MINIMUM THRESHOLD

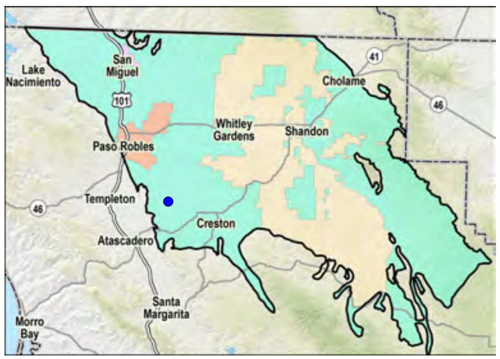
GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET



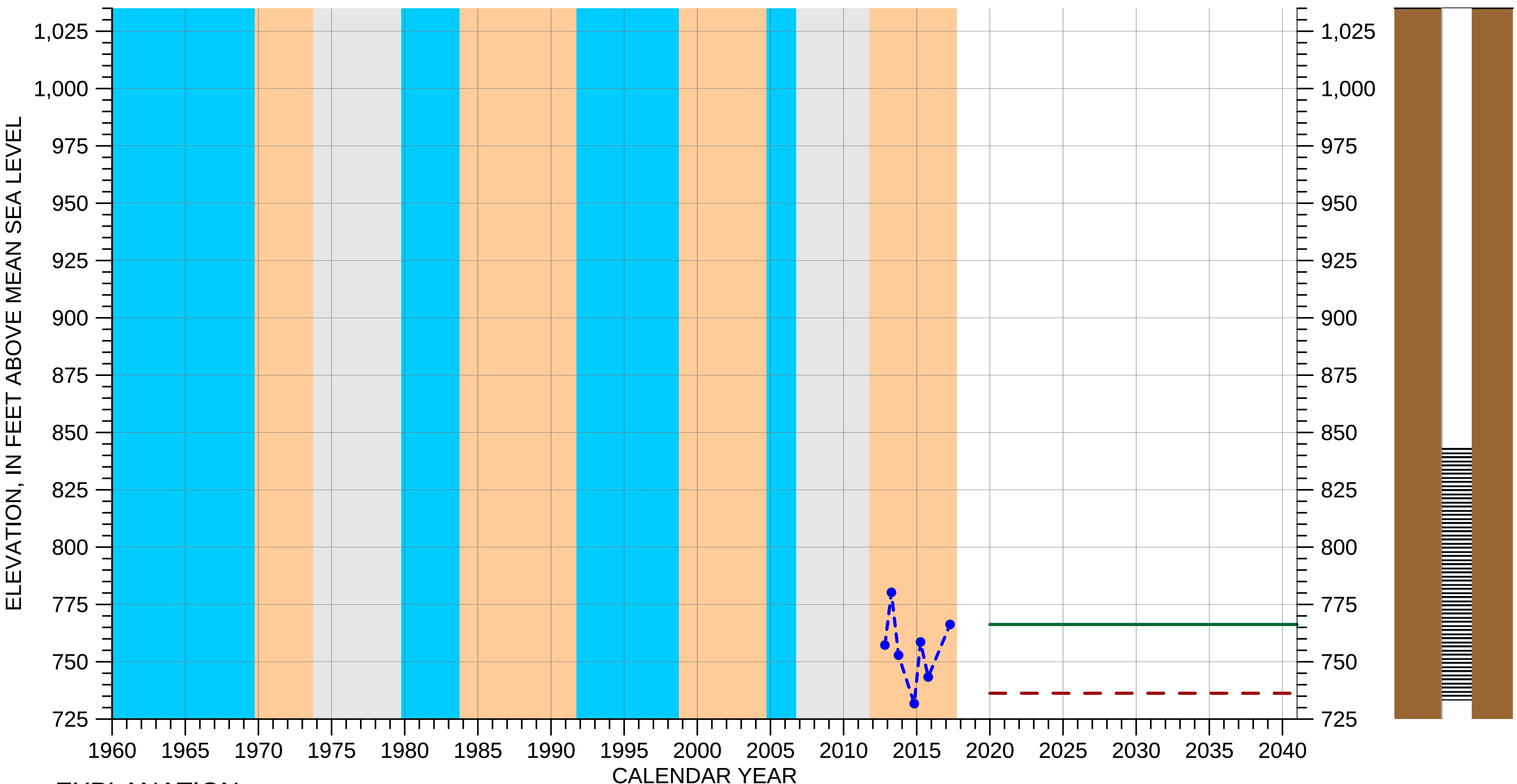


Well Depth: 685
Screened Interval: 225-685 feet below ground surface
Reference Point Elevation: 1095 feet above mean sea level

* Measurement reported as not static

MEASUREABLE OBJECTIVES AND MINIMUM THRESHOLDS FOR 27S/13E-30J01

S:\projects\9200_Paso Robles GSP\GSP\Ch 9-10 Coordination Effort\Ch 9\Appendices\AppendixJ_SimulatedHydrographs\grf\Observed_only\Fig13_27S_13E-30J01.grf



EXPLANATION

MEASURABLE OBJECTIVE

MINIMUM THRESHOLD

GROUNDWATER ELEVATION

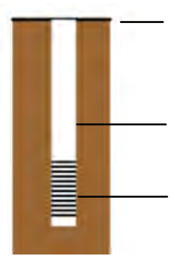
MEASUREMENT NOT VERIFIED*

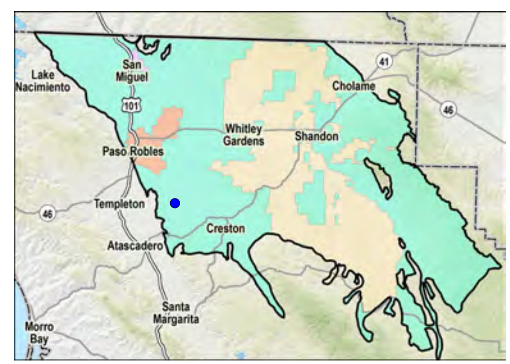
CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Well Depth: 310
Screened Interval: 200-310 feet below ground surface
Reference Point Elevation: 1043.2 feet above mean sea level

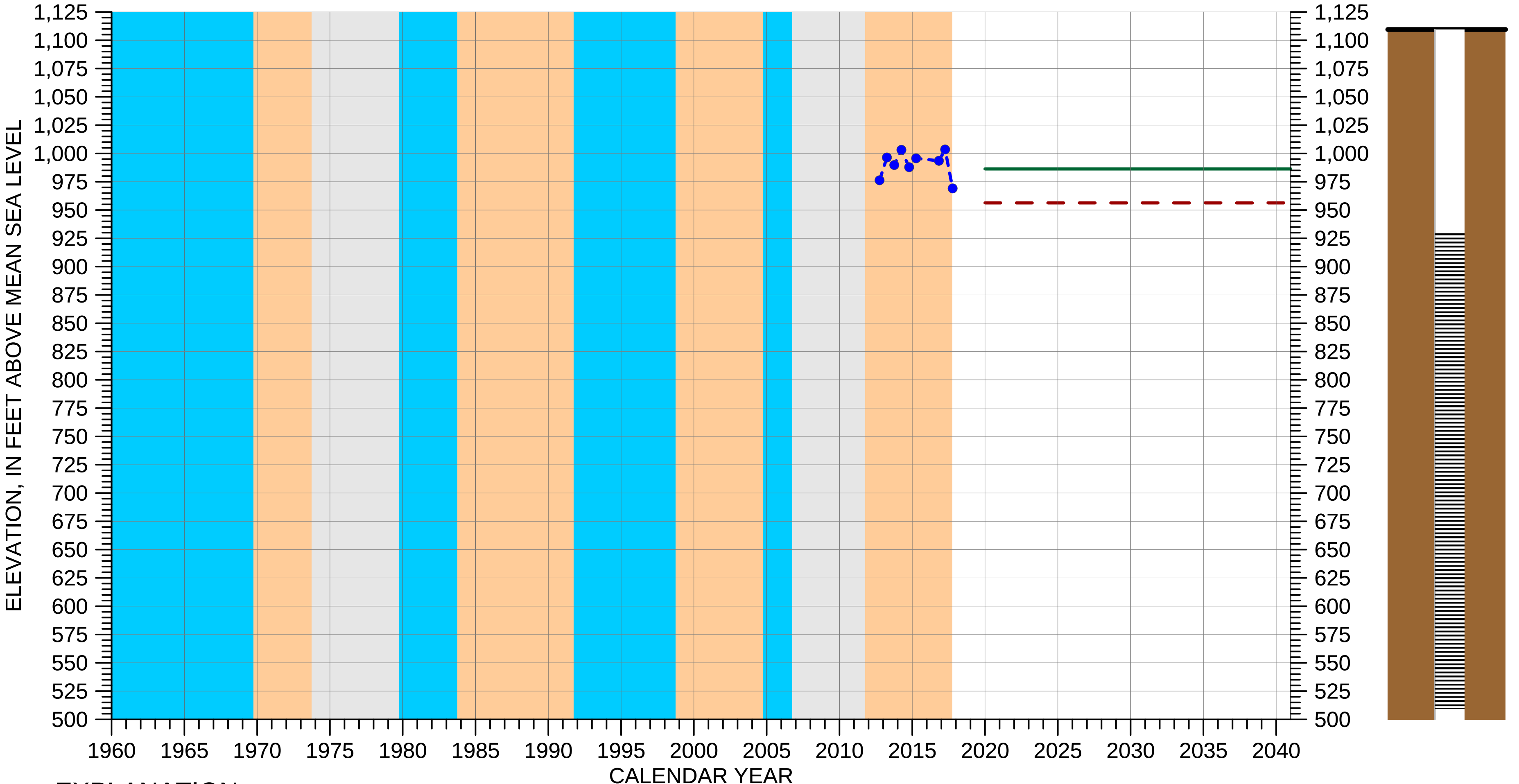
* Measurement reported as not static





MEASUREABLE OBJECTIVES AND MINIMUM THRESHOLDS FOR 27S/13E-30F01

S:\projects\9200_Paso Robles GSP\GSP\Ch 9-10 Coordination Effort\Ch 9\Appendices\AppendixJ_SimulatedHydrographs\grf\Observed_only\Fig14_27S_13E-30F01.grf



EXPLANATION

MEASURABLE OBJECTIVE

MINIMUM THRESHOLD

GROUNDWATER ELEVATION

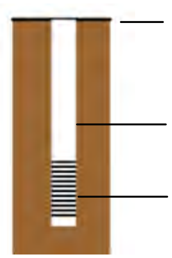
MEASUREMENT NOT VERIFIED*

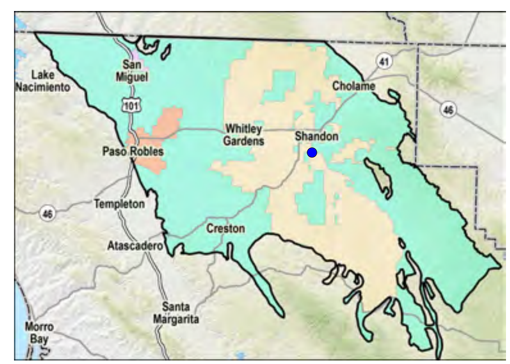
CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Well Depth: 600
Screened Interval: 180-600 feet below ground surface
Reference Point Elevation: 1109.5 feet above mean sea level

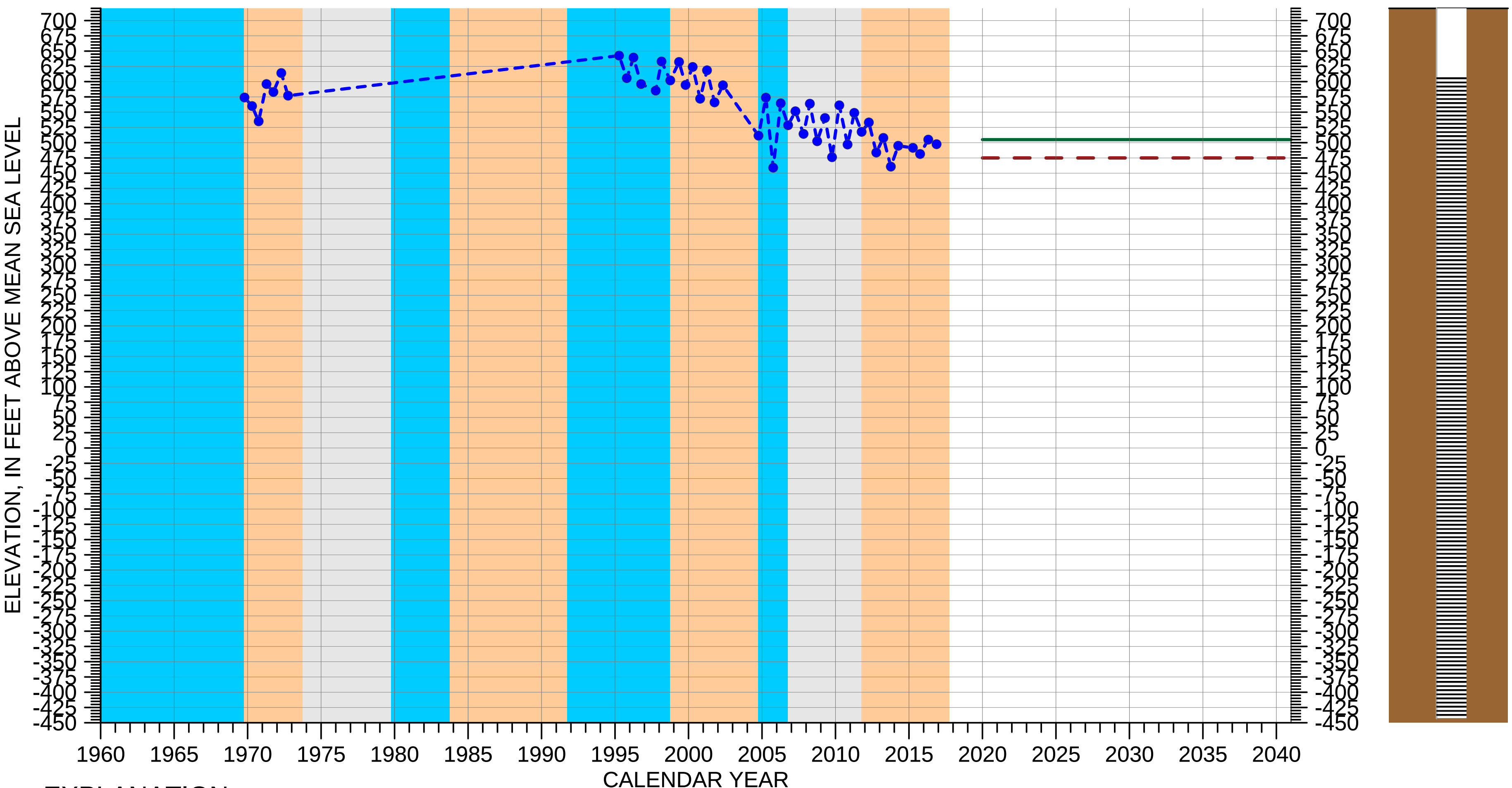
* Measurement reported as not static





MEASUREABLE OBJECTIVES AND MINIMUM THRESHOLDS FOR 26S/15E-29R01

S:\projects\9200_Paso Robles GSP\GSP\Ch 9-10 Coordination Effort\Ch 9\Appendices\AppendixJ_SimulatedHydrographs\grf\Observed_only\Fig15_26S_15E-29R01.grf



EXPLANATION

MEASURABLE OBJECTIVE

MINIMUM THRESHOLD

GROUNDWATER ELEVATION

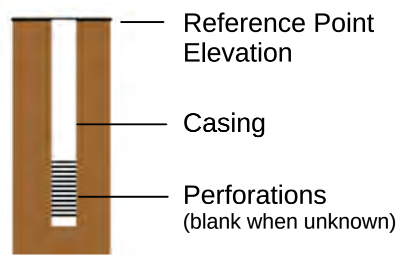
MEASUREMENT NOT VERIFIED*

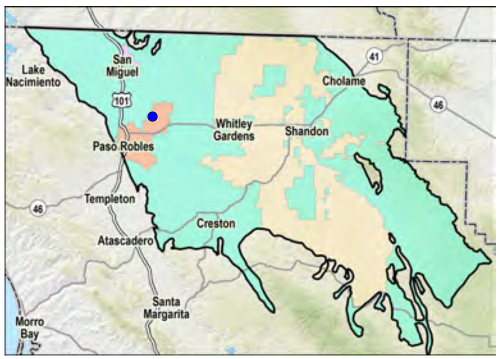
CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

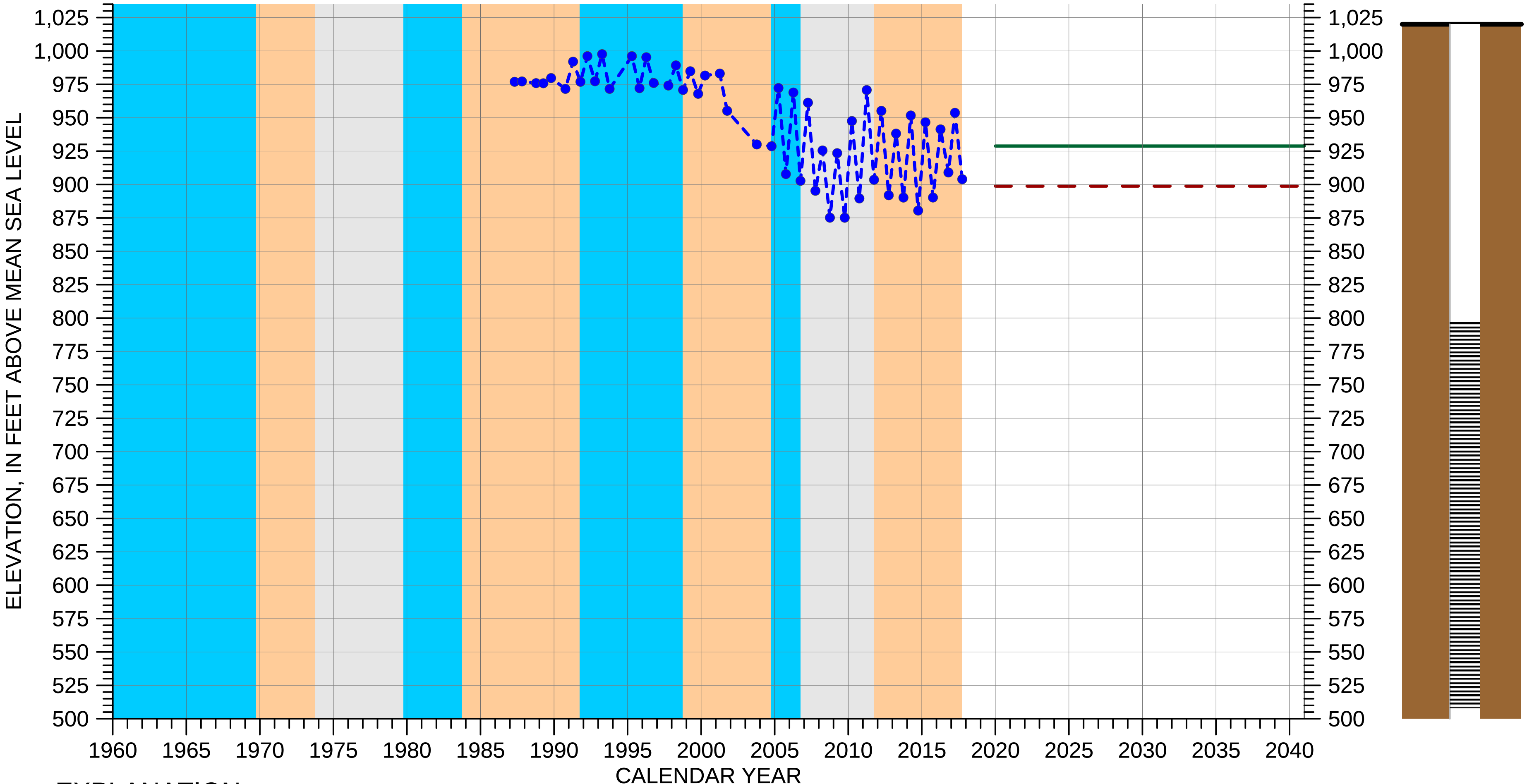
Well Depth: 1230
Screened Interval: 180-~1230 feet below ground surface
Reference Point Elevation: 790 feet above mean sea level

* Measurement reported as not static





MEASUREABLE OBJECTIVES AND MINIMUM THRESHOLDS FOR 26S/12E-14H01



EXPLANATION

MEASURABLE OBJECTIVE

MINIMUM THRESHOLD

GROUNDWATER ELEVATION

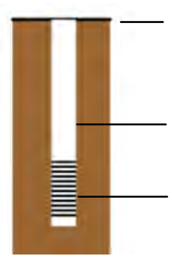
MEASUREMENT NOT VERIFIED*

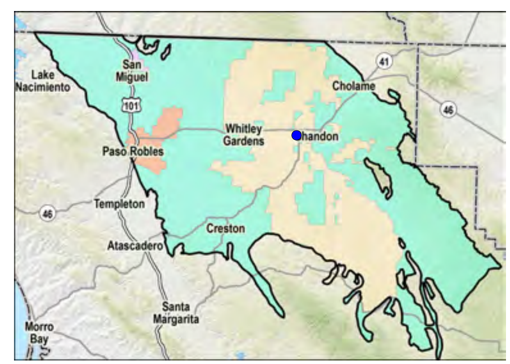
CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Well Depth: 512
Screened Interval: 223-512 feet below ground surface
Reference Point Elevation: 1020 feet above mean sea level

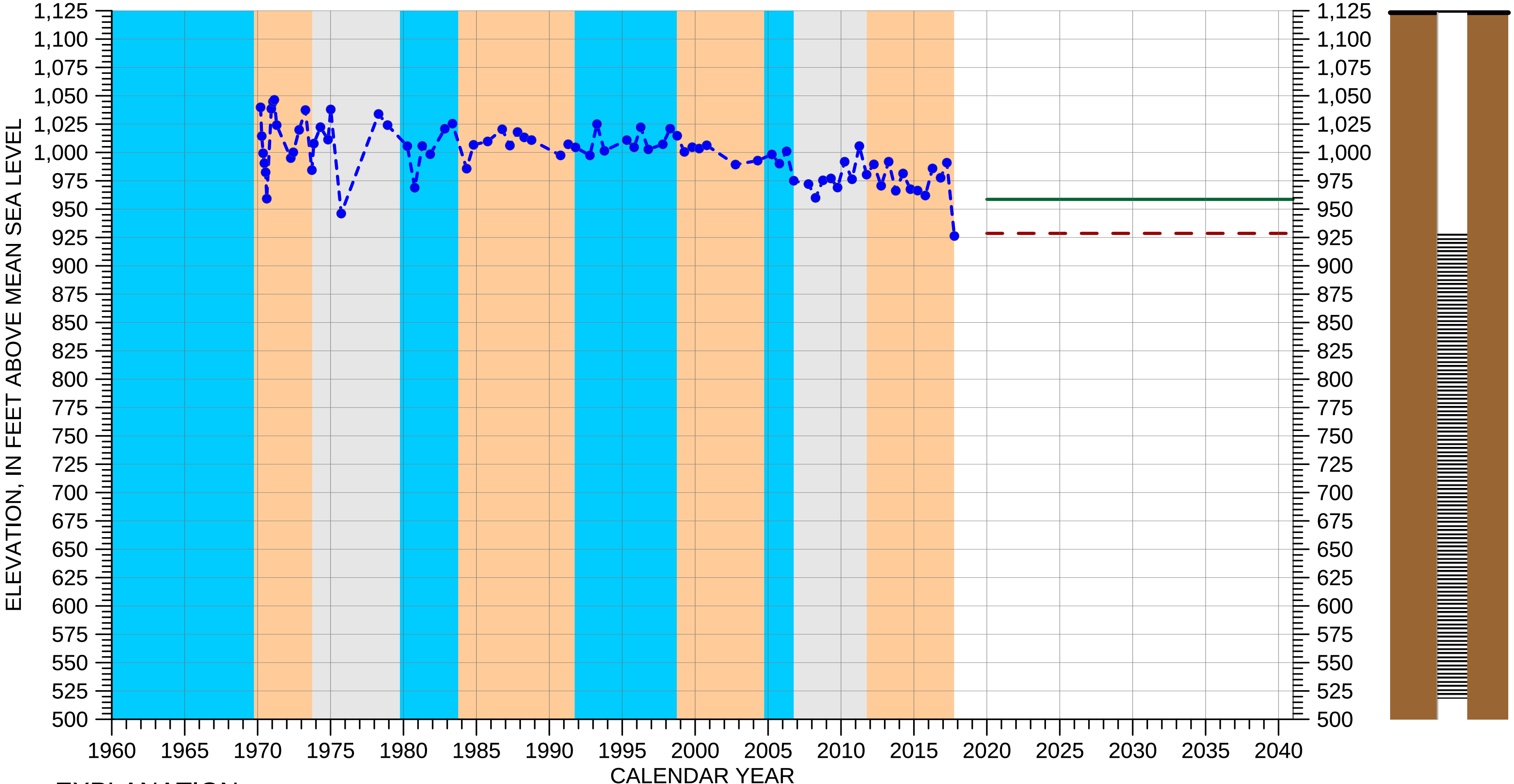
* Measurement reported as not static





MEASUREABLE OBJECTIVES AND MINIMUM THRESHOLDS FOR 26S/15E-19E01

S:\projects\9200_Paso Robles GSP\GSP\Ch 9-10 Coordination Effort\Ch 9\Appendices\AppendixJ_SimulatedHydrographs\grf\Observed_only\Fig17_26S_15E-19E01.grf



EXPLANATION

MEASURABLE OBJECTIVE

MINIMUM THRESHOLD

GROUNDWATER ELEVATION

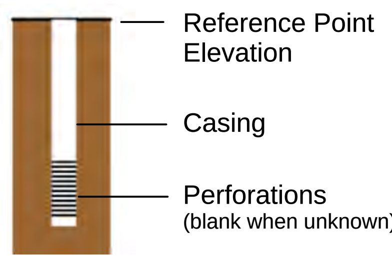
MEASUREMENT NOT VERIFIED*

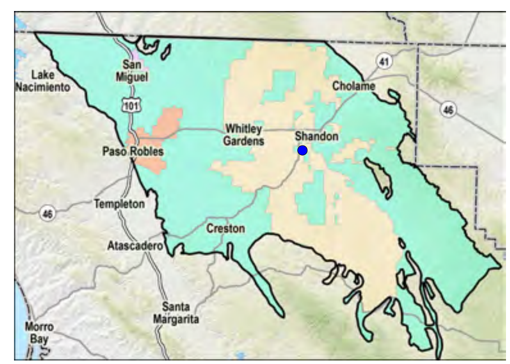
CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Well Depth: 605
Screened Interval: 195-605 feet below ground surface
Reference Point Elevation: 1123.3 feet above mean sea level

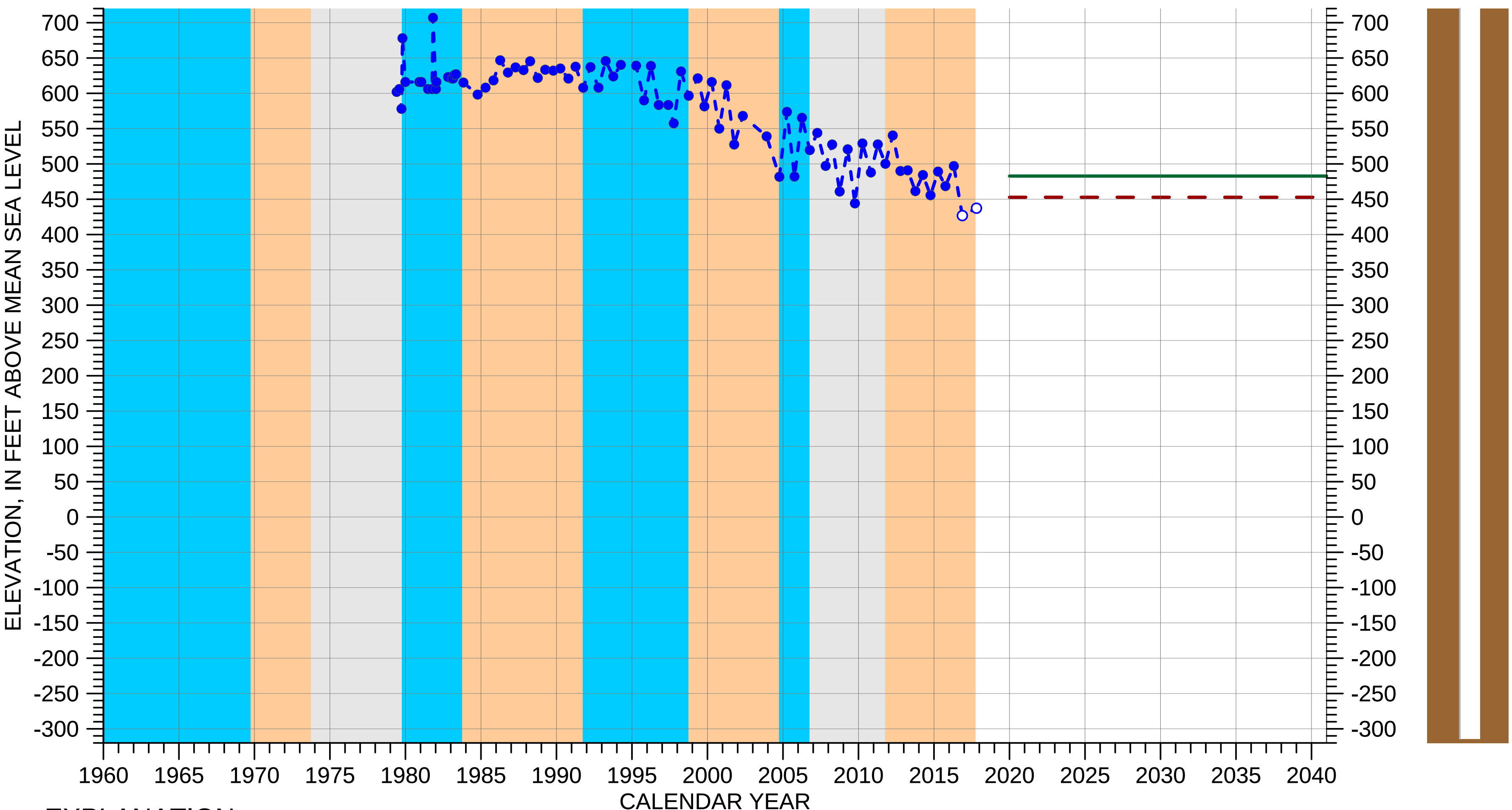
* Measurement reported as not static





MEASUREABLE OBJECTIVES AND MINIMUM THRESHOLDS FOR 26S/15E-30J01

S:\projects\9200_Paso Robles GSP\GSP\Ch 9-10 Coordination Effort\Ch 9\Appendices\AppendixJ_SimulatedHydrographs\grf\Observed_only\Fig18_26S_15E-30J01.grf



EXPLANATION

MEASURABLE OBJECTIVE

GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

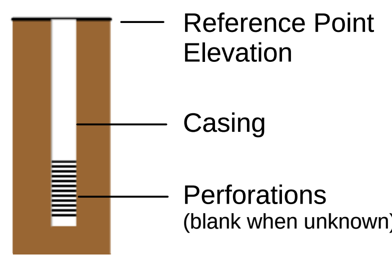
MINIMUM THRESHOLD

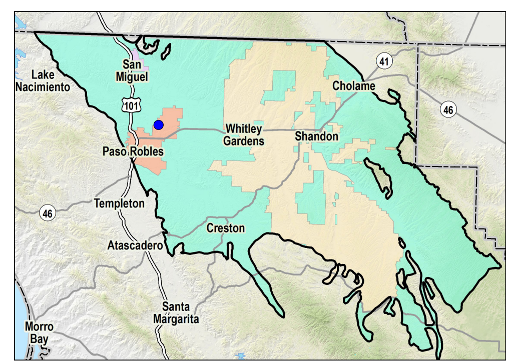
CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Well Depth: 1100
Screened Interval: unknown
Reference Point Elevation: 786 feet above mean sea level

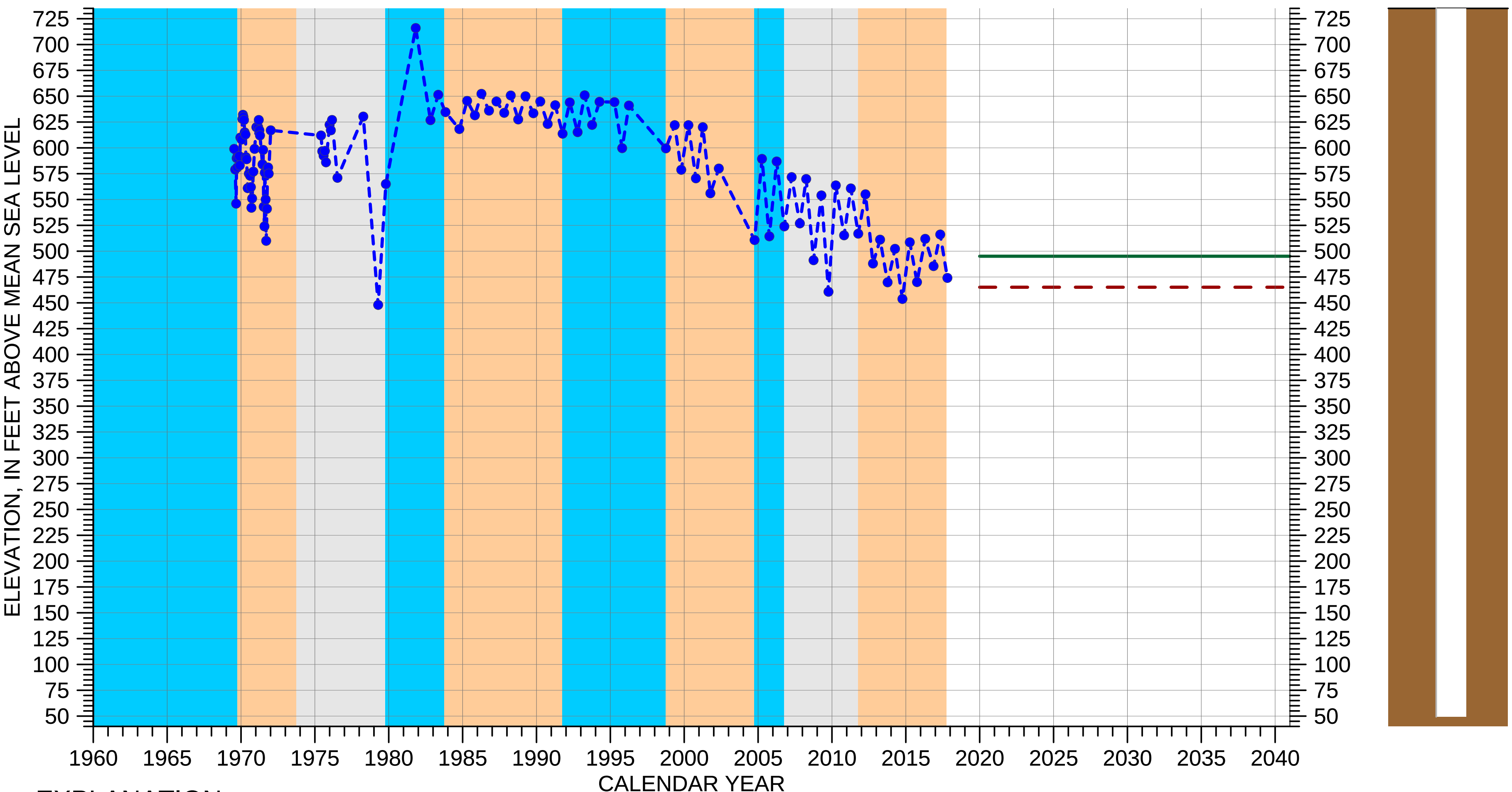
* Measurement reported as not static





MEASUREABLE OBJECTIVES AND MINIMUM THRESHOLDS FOR 26S/12E-14K01

S:\projects\9200_Paso Robles GSP\GSP\Ch 9-10 Coordination Effort\Ch 9\Appendices\AppendixJ_SimulatedHydrographs\grf\Observed_only\Fig19_26S_12E-14K01.grf



EXPLANATION

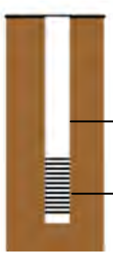
MEASURABLE OBJECTIVE
MINIMUM THRESHOLD
GROUNDWATER ELEVATION
MEASUREMENT NOT VERIFIED*

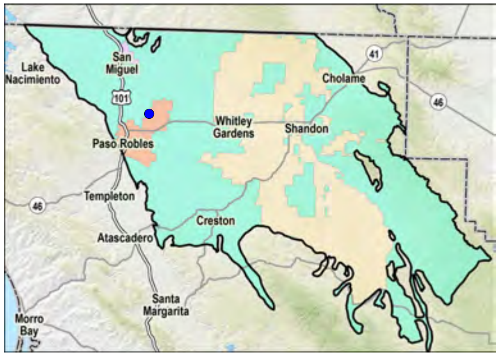
CLIMATE PERIOD CLASSIFICATION

DRY
AVERAGE/ALTERNATING
WET

Well Depth: 740
Screened Interval: unknown
Reference Point Elevation: 789.3 feet above mean sea level

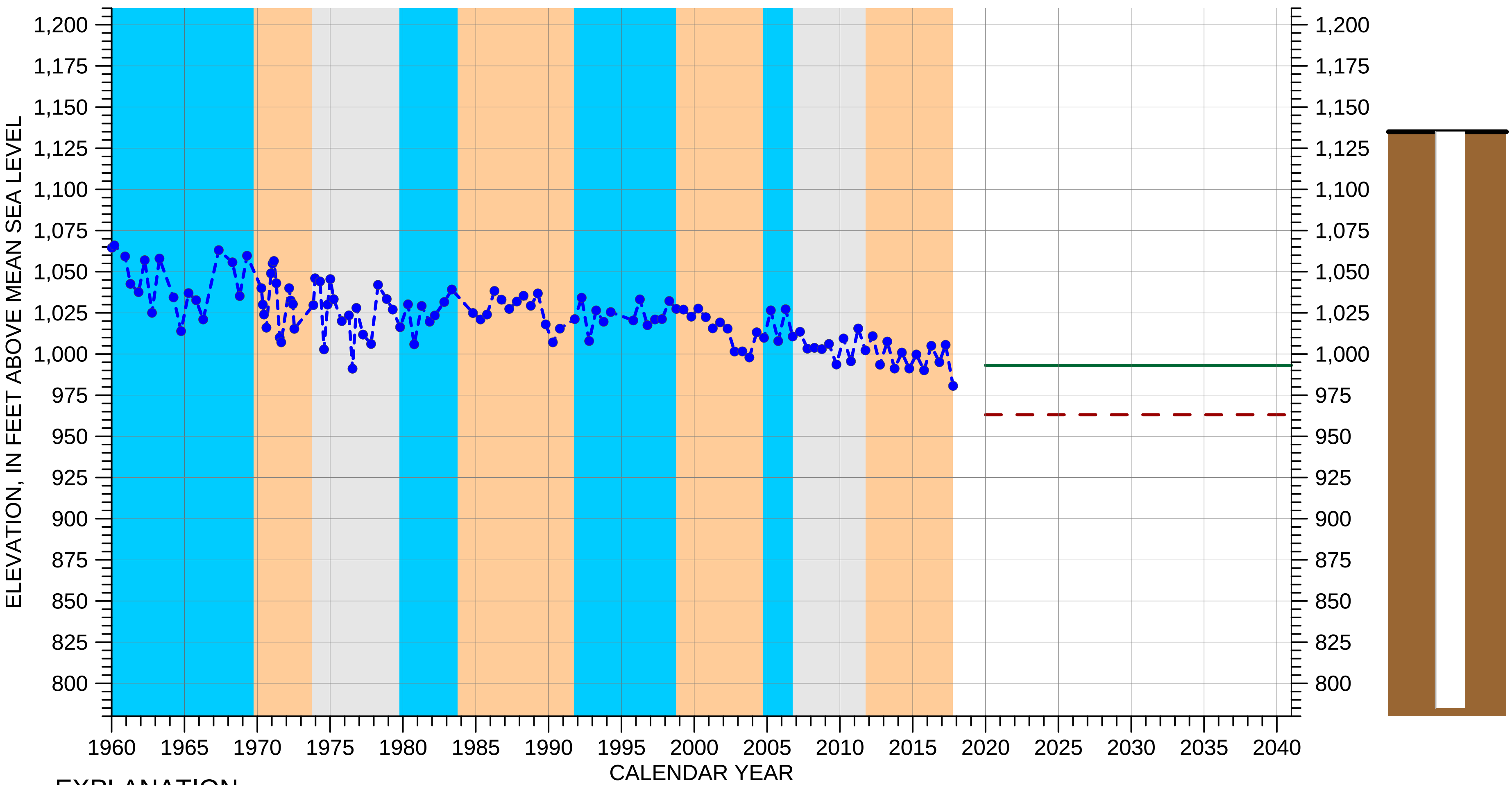
* Measurement reported as not static





MEASUREABLE OBJECTIVES AND MINIMUM THRESHOLDS FOR 26S/12E-14G01

S:\projects\9200_Paso Robles GSP\GSP\Ch 9-10 Coordination Effort\Ch 9\Appendices\AppendixJ_SimulatedHydrographs\grf\Observed_only\Fig20_26S_12E-14G01.grf



EXPLANATION

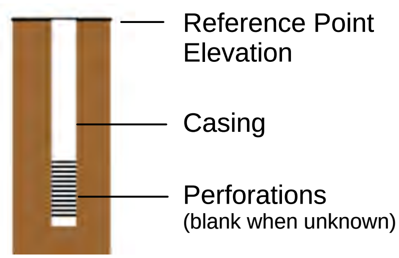
MEASURABLE OBJECTIVE
MINIMUM THRESHOLD
GROUNDWATER ELEVATION
MEASUREMENT NOT VERIFIED*

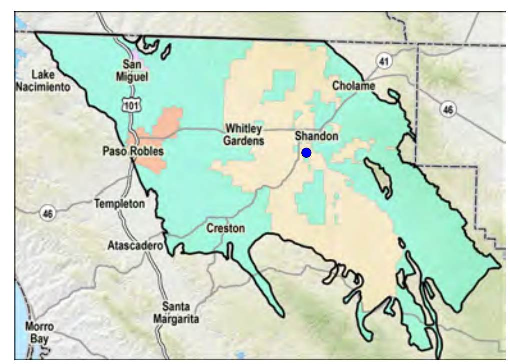
CLIMATE PERIOD CLASSIFICATION

DRY
AVERAGE/ALTERNATING
WET

Well Depth: 350
Screened Interval: unknown
Reference Point Elevation: 1135 feet above mean sea level

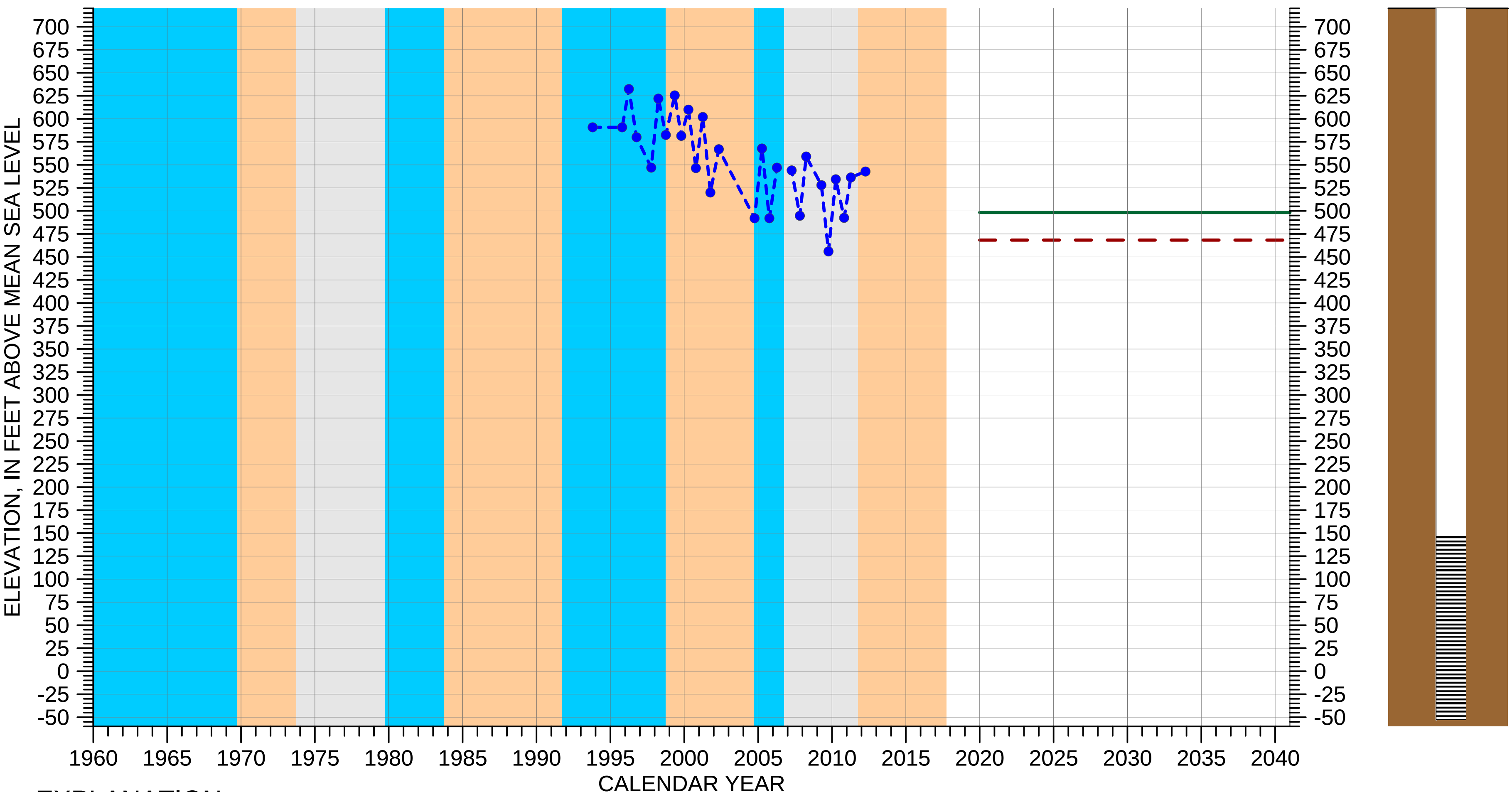
* Measurement reported as not static





MEASUREABLE OBJECTIVES AND MINIMUM THRESHOLDS FOR 26S/15E-29N01

S:\projects\9200_Paso Robles GSP\GSP\Ch 9-10 Coordination Effort\Ch 9\Appendices\AppendixJ_SimulatedHydrographs\grf\Observed_only\Fig21_26S_15E-29N01.grf



EXPLANATION

MEASURABLE OBJECTIVE

MINIMUM THRESHOLD

GROUNDWATER ELEVATION

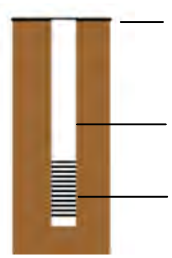
MEASUREMENT NOT VERIFIED*

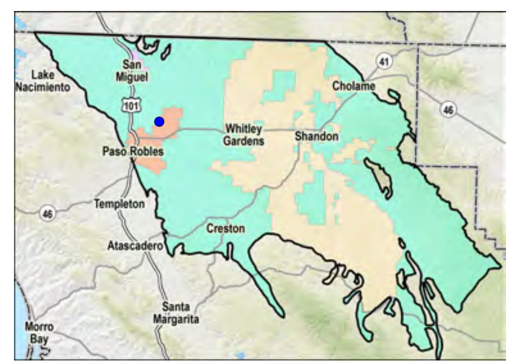
CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Well Depth: 840
Screened Interval: 640- ~840 feet below ground surface
Reference Point Elevation: 787 feet above mean sea level

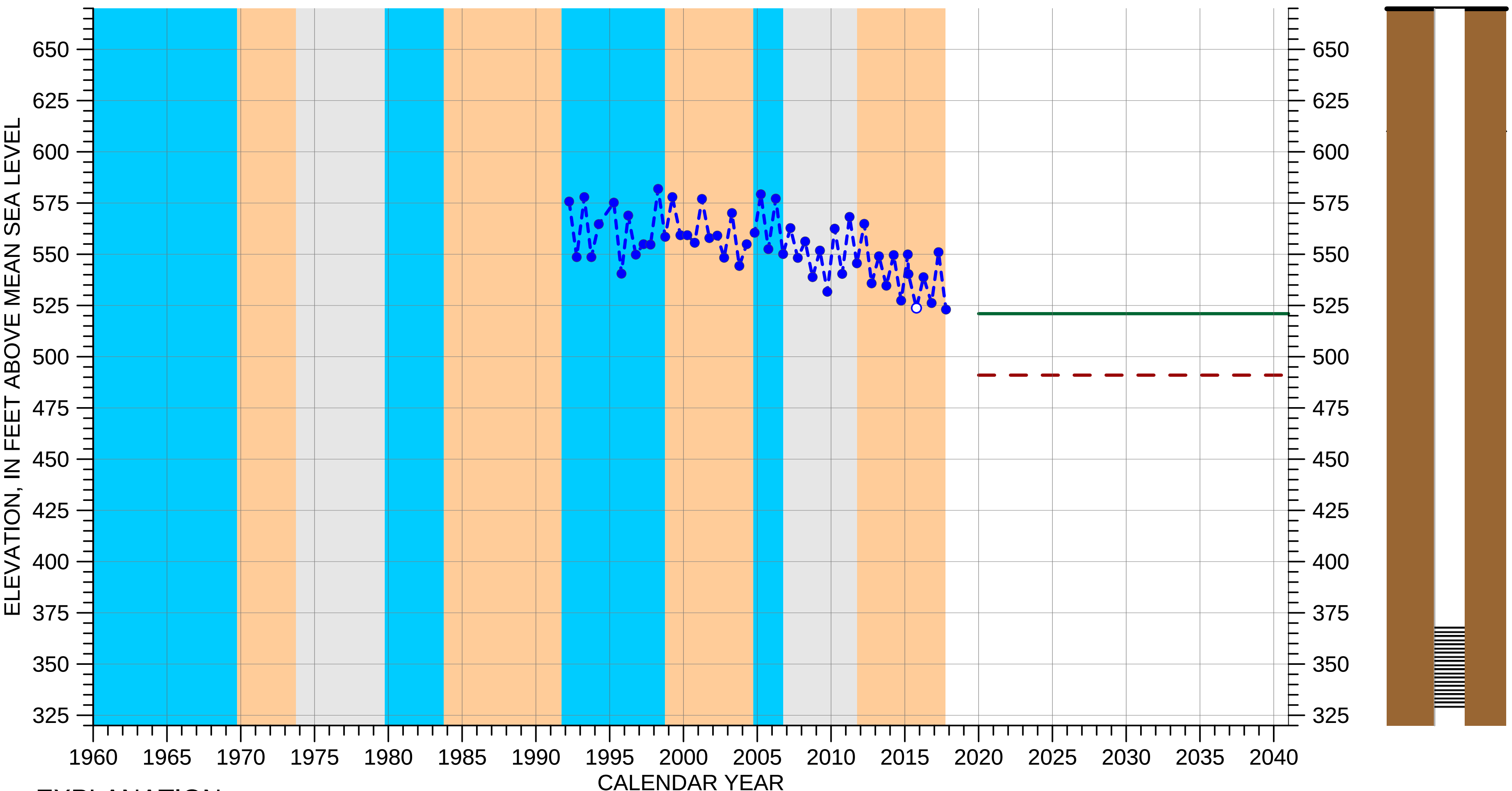
* Measurement reported as not static





MEASUREABLE OBJECTIVES AND MINIMUM THRESHOLDS FOR 26S/12E-14G02

S:\projects\9200_Paso Robles GSP\GSP\Ch 9-10 Coordination Effort\Ch 9\Appendices\AppendixJ_SimulatedHydrographs\grf\Observed_only\Fig22_26S_12E-14G02.grf



EXPLANATION

MEASURABLE OBJECTIVE

MINIMUM THRESHOLD

GROUNDWATER ELEVATION

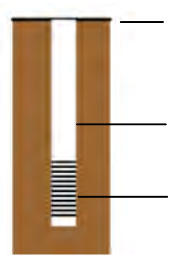
MEASUREMENT NOT VERIFIED*

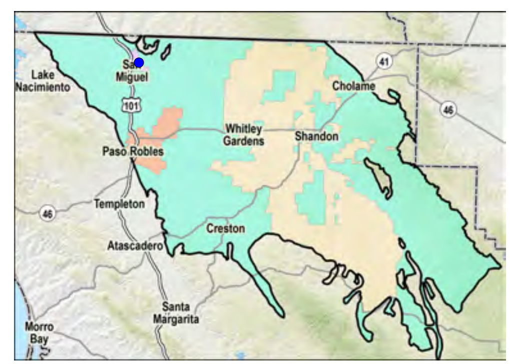
CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Well Depth: 350 feet
Screened Interval: 300-310, 330-340 feet below ground surface
Reference Point Elevation: 669.8 feet above mean sea level

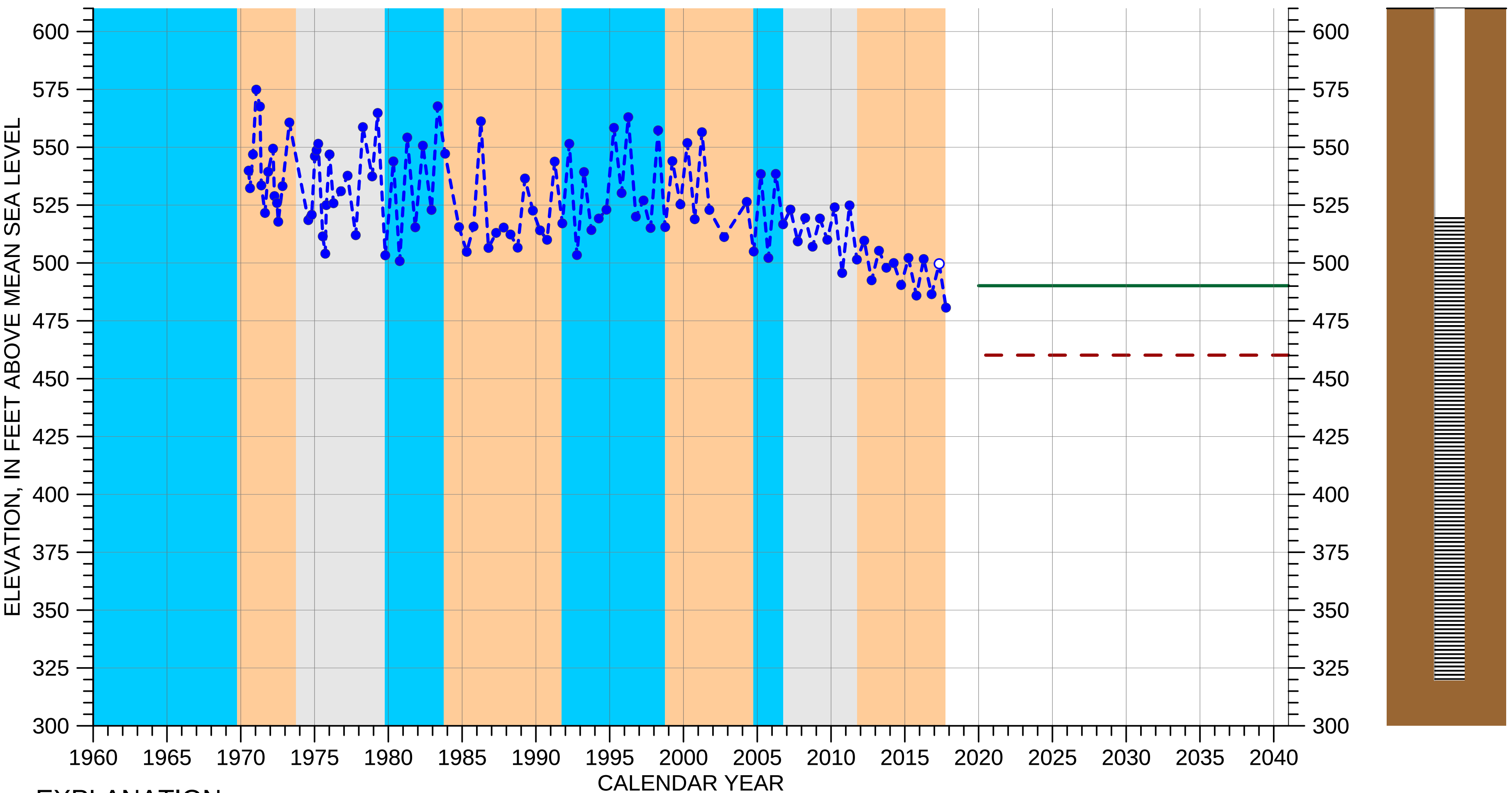
* Measurement reported as not static





MEASUREABLE OBJECTIVES AND MINIMUM THRESHOLDS FOR 25S/12E-16K05

S:\projects\9200_Paso Robles GSP\GSP\Ch 9-10 Coordination Effort\Ch 9\Appendices\AppendixJ_SimulatedHydrographs\grf\Observed_only\Fig01_25S_12E-16K05.grf



EXPLANATION

MEASURABLE OBJECTIVE

MINIMUM THRESHOLD

GROUNDWATER ELEVATION

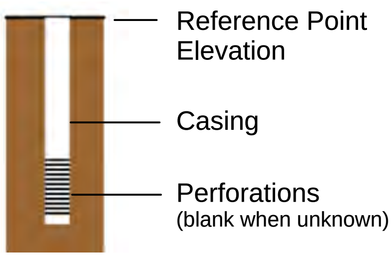
MEASUREMENT NOT VERIFIED*

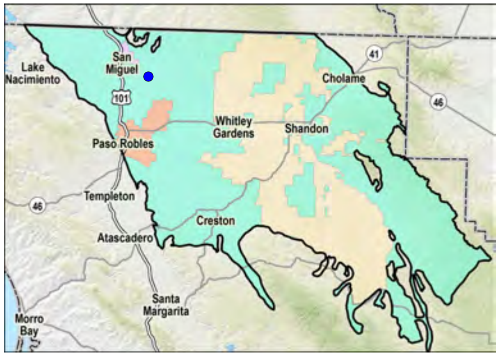
CLIMATE PERIOD CLASSIFICATION

DRY | AVERAGE/ALTERNATING | WET

Well Depth: 400 feet
Screened Interval: 200-400 feet below ground surface
Reference Point Elevation: 719.7 feet above mean sea level

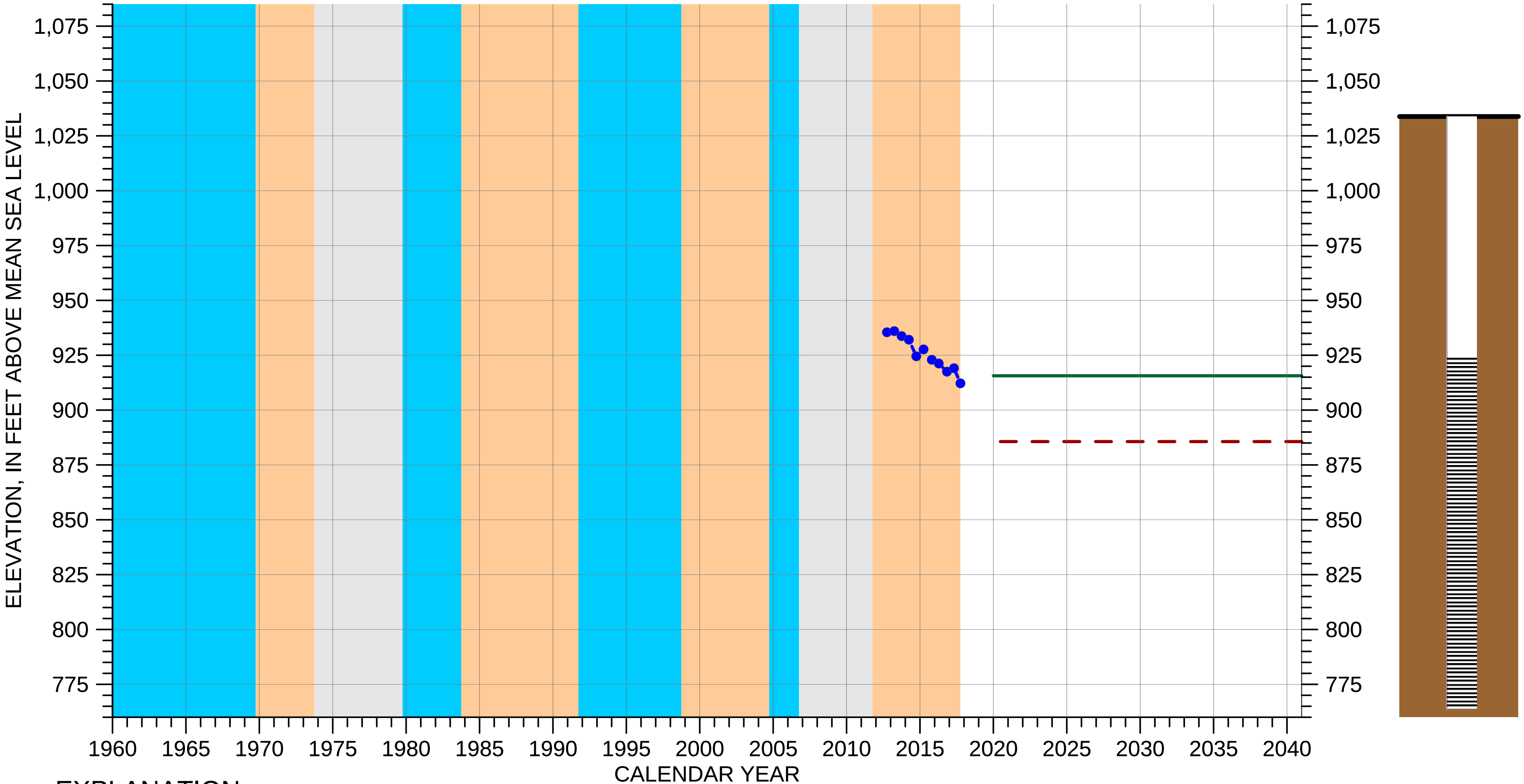
* Measurement reported as not static





MEASUREABLE OBJECTIVES AND MINIMUM THRESHOLDS FOR 25S/12E-26L01

S:\projects\9200_Paso Robles GSP\GSP\Ch 9-10 Coordination Effort\Ch 9\Appendices\AppendixJ_SimulatedHydrographs\grf\Observed_only\Fig02_25S_12E-26L01.grf



EXPLANATION

MEASURABLE OBJECTIVE

MINIMUM THRESHOLD

GROUNDWATER ELEVATION

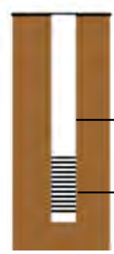
MEASUREMENT NOT VERIFIED*

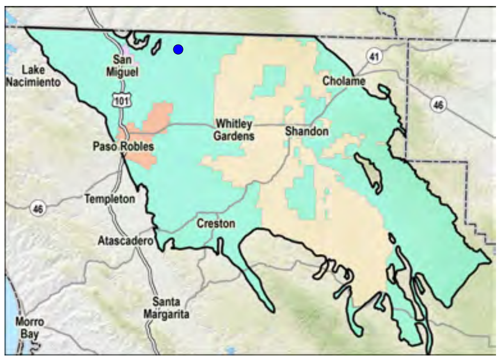
CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Well Depth: 270 feet
Screened Interval: 110-270 feet below ground surface
Reference Point Elevation: 1033.8 feet above mean sea level

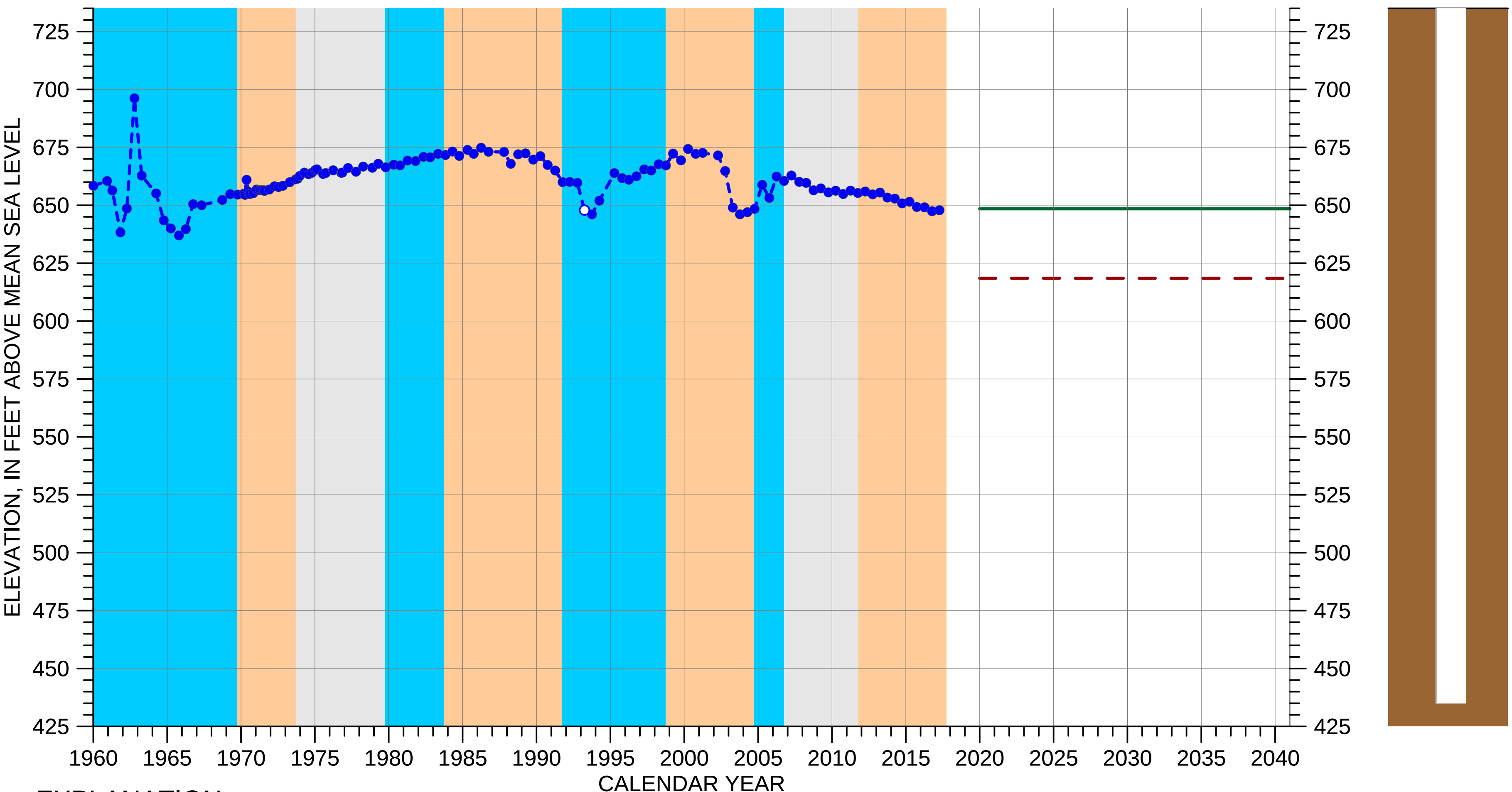
* Measurement reported as not static





MEASUREABLE OBJECTIVES AND MINIMUM THRESHOLDS FOR 25S/13E-08L02

S:\projects\9200_Paso Robles GSP\GSP\Ch 9-10 Coordination Effort\Ch 9\Appendices\AppendixJ_SimulatedHydrographs\grf\Observed_only\Fig03_25S_13E-08L02.grf



EXPLANATION

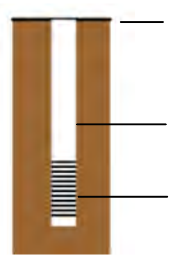
MEASURABLE OBJECTIVE
MINIMUM THRESHOLD
GROUNDWATER ELEVATION
MEASUREMENT NOT VERIFIED*

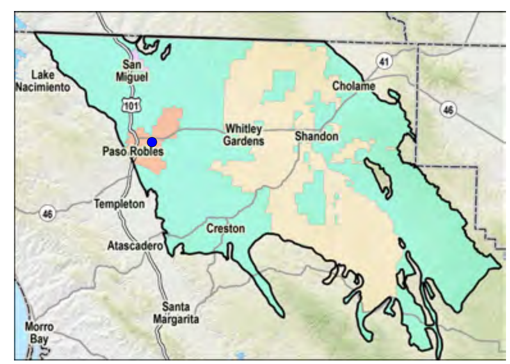
CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Well Depth: 400 feet
Screened Interval: unknown
Reference Point Elevation: 835 feet above mean sea level

* Measurement reported as not static





MEASUREABLE OBJECTIVES AND MINIMUM THRESHOLDS FOR 26S/12E-26E07

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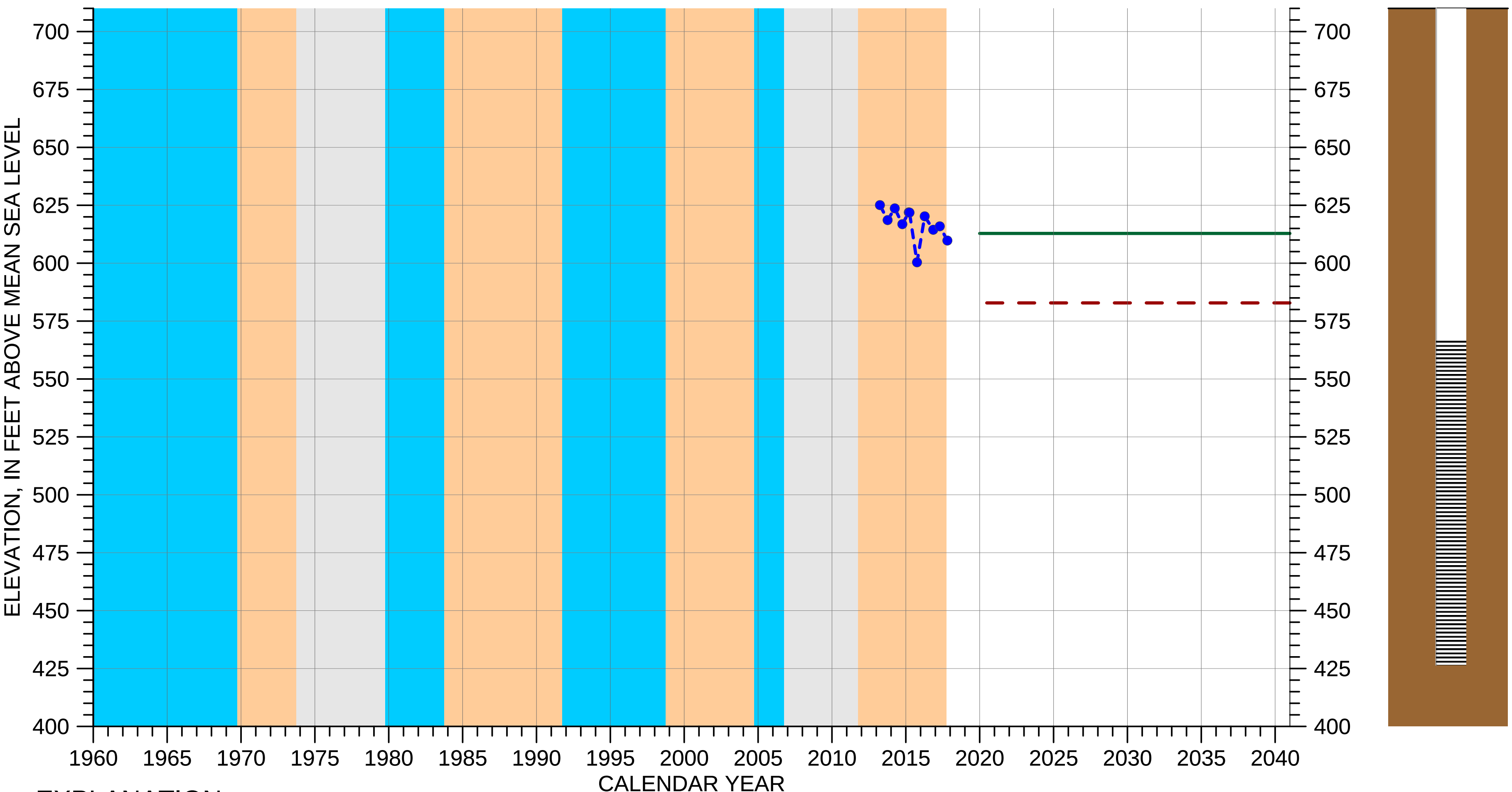


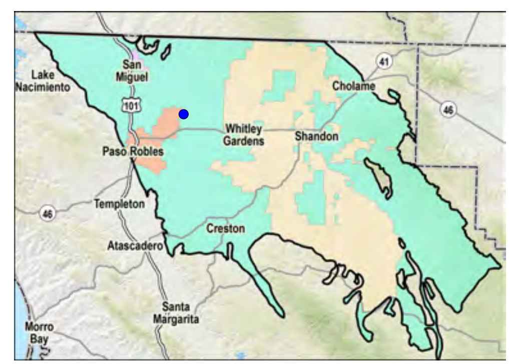
EXPLANATION

MEASURABLE OBJECTIVE

MINIMUM THRESHOLD

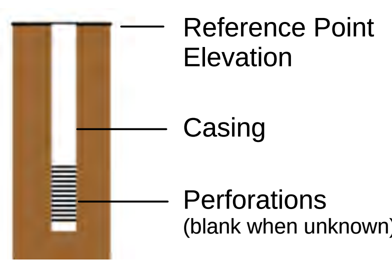
GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*



CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET



Well Depth: 400 feet
Screened Interval: 260-400 feet below ground surface
Reference Point Elevation: 827.9 feet above mean sea level

* Measurement reported as not static

MEASUREABLE OBJECTIVES AND MINIMUM THRESHOLDS FOR 26S/13E-08M01

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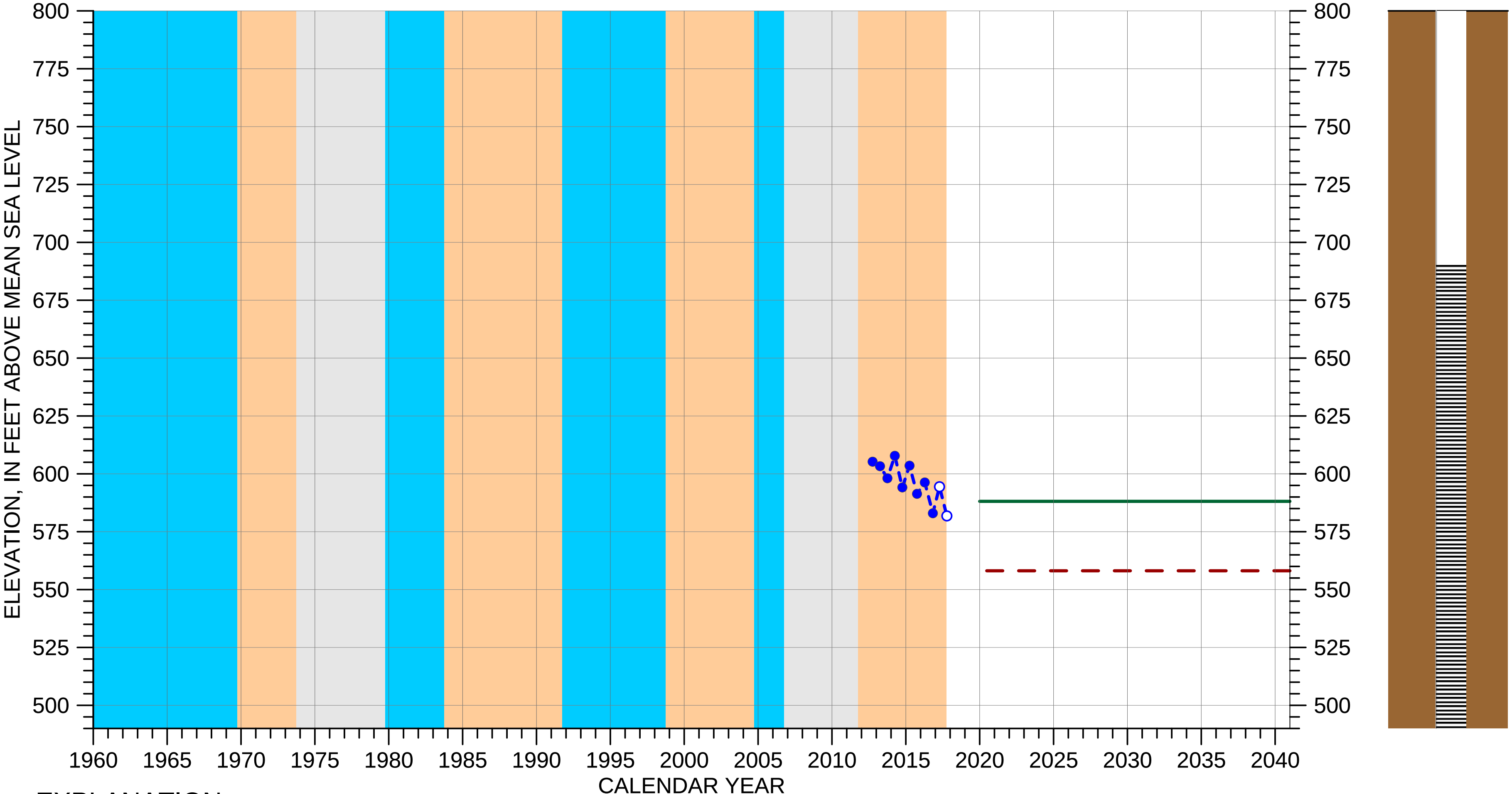


EXPLANATION

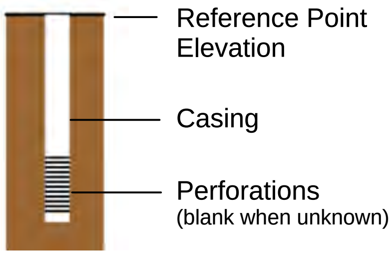
- MEASURABLE OBJECTIVE
- MINIMUM THRESHOLD
- GROUNDWATER ELEVATION
- MEASUREMENT NOT VERIFIED*

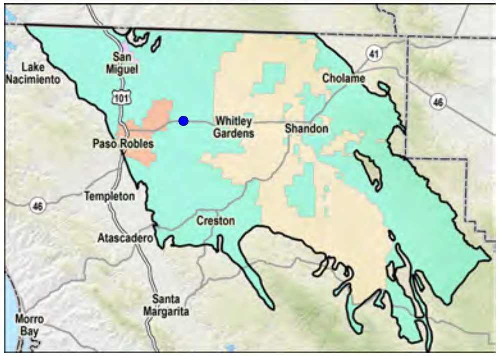
CLIMATE PERIOD CLASSIFICATION

DRY | AVERAGE/ALTERNATING | WET

Well Depth: 400 feet
Screened Interval: 200-400 feet below ground surface
Reference Point Elevation: 890.2 feet above mean sea level

* Measurement reported as not static





MEASUREABLE OBJECTIVES AND MINIMUM THRESHOLDS FOR 26S/13E-16N01

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Appendix I

Water Supplies

APPENDIX I – WATER SUPPLIES

1.1 Overview and Acquisition of Available Water Supplies

There are four types of surface waters available for use in the Paso Robles Subbasin for groundwater recharge or in-lieu use – State Water Project (SWP) water, Nacimiento Water Project (NWP) water, local recycled water, and flood flows from local rivers and streams. Below is a description of each supply, including a discussion of reliability and contracting issues.

1.1.1 State Water Project

The SWP is a water storage and delivery system of reservoirs, aqueducts, power plants, and pumping plants that extend from Northern to Southern California for over 600 miles. Its main purpose is to divert and store surplus water during wet periods and distribute it to 29 contractors in Northern California, the San Francisco Bay Area, the San Joaquin Valley, the Central Coast, and Southern California. The SWP is operated by the California Department of Water Resources (DWR).

The SWP's Coastal Branch passes through the southern portion of the Subbasin, through the Shandon and Creston regions. The Coastal Branch of this system extends from the California Aqueduct for 160 miles through the southern portion of Subbasin. Figure 1 shows the Coastal Branch and Polonio Pass Treatment Plant (PPWTP). Prior to treatment at PPWTP, water in the Coastal Branch is untreated. Water is treated at the PPWTP, and southeast of the PPWTP the water in the Coastal Branch pipeline is of potable water standards.

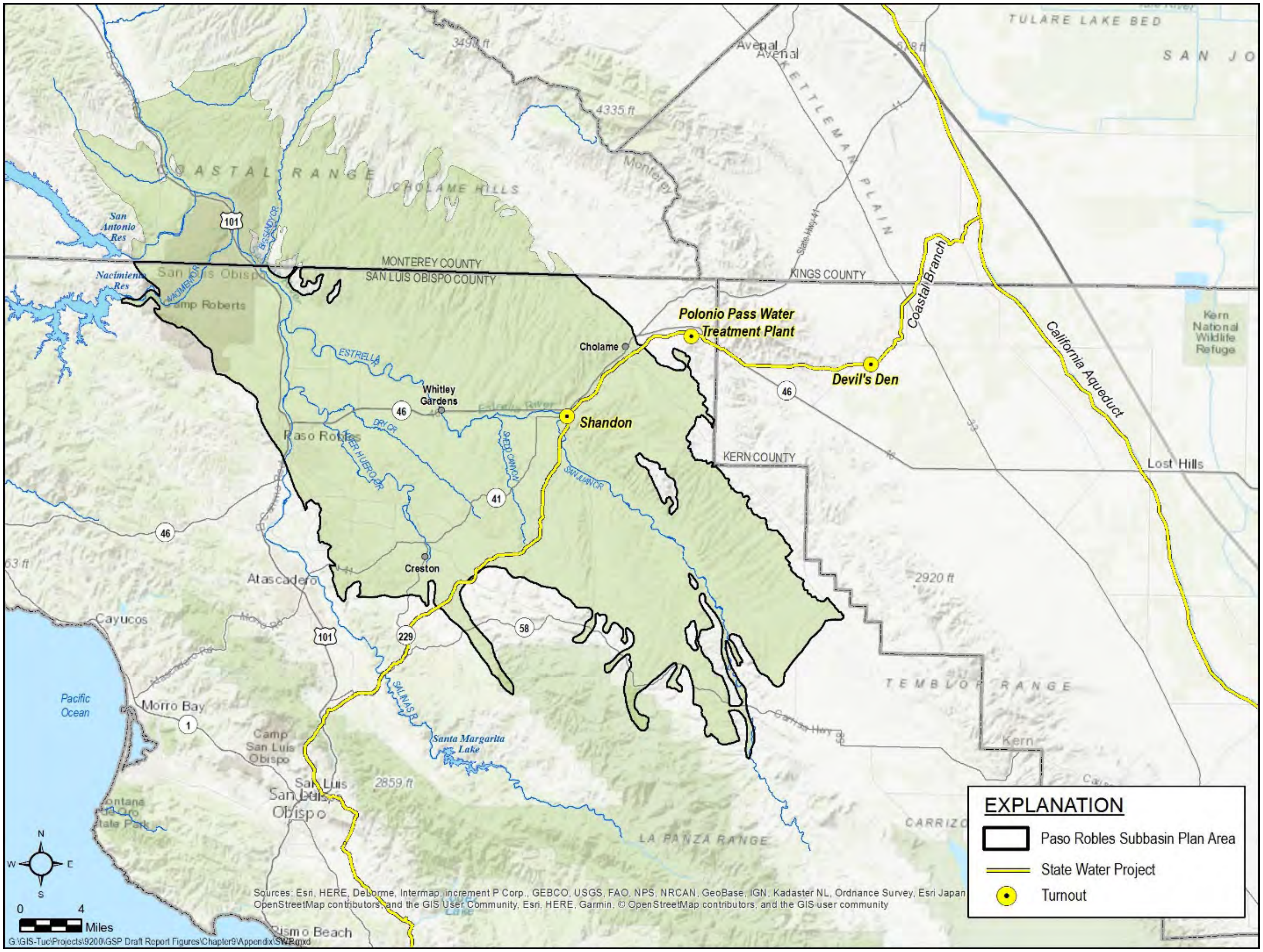


Figure 1: SWP Coastal Branch Infrastructure

The San Luis Obispo County Flood Control and Water Conservation District (SLOCFCWD) is one of DWR's 29 SWP contractors. DWR has contracts with both Santa Barbara County Flood Control and Water Conservation District (SBCFCWCD) and SLOCFCWD to deliver SWP water through the Coastal Branch. The Central Coast Water Authority (CCWA) owns, operates, and maintains the PPWTP and operates the portion of the Coastal Branch that is downstream of Polonio Pass.

SLOCFCWD currently has 25,000 AFY of Table A allocation contracted with DWR. Of this amount, 10,477 AFY is allocated to subcontractors through Water Supply Agreements. SLOCFCWD retains an excess allocation of 14,523 AFY; however, DWR estimates availability of SWP water to average around 58-62% of total allocations (DWR 2014, SWR 2015, DWR 2018). For SLOCFCWD's excess allocation of 14,523, 58-62% corresponds to between 8,400 and 9,000 AFY. For the purpose of the GSP, a value of 8,800 AFY has been assumed as the long-term average annual availability for SLOCFCWD's excess Table A allocation. The actual amount available for delivery by DWR would vary from year to year between zero and 14,523 AF.

1.1.1.1 Physical and Contractual Constraints

According to a study on the Coastal Branch (WSC 2011), enough hydraulic capacity exists to deliver water that exceeds SLOCFCWD's contracted capacity within the Coastal Branch pipeline; however, contractual capacity limits currently constrain the amount of excess allocation available to SLOCFCWD and would need to be renegotiated if SLOCFCWD were to take water at any location downstream of the PPWTP. In particular the Master Water Supply Agreement with DWR dictates:

- District's contractual capacity for Reach 1 is 7.17 cfs (5,191 AFY).
- District's contractual capacity for Reaches 2 through 4 is 7.17 cfs (5,191 AFY).

And the Master Water Treatment Agreement with CCWA dictates:

- District's contractual capacity in the PPWTP is 4,830 AFY

Additionally, existing District subcontractors can increase their SWP allocations. For example, the Oceano Community Services District recently contracted with SLOCFCWD for 750 AFY of additional drought buffer. These increases could limit the amount of excess allocation water available to the Subbasin.

Historical and anticipated future costs for existing subcontractors were analyzed in a supply options study by SLOCFCWD (Carollo, 2017). The analysis determined the range of costs for raw and treated water, shown in Table 1.

Table 1: SWP Estimated Costs Paid by Existing Subcontractors Based on Point of Delivery

Turnout Location	Water Quality	Estimated Unit Cost ($/AF)
SWP & Coastal Branch Intersection	Raw	$467
Devil's Den Pumping Station	Raw	$1,793
PPWTP	Treated	$2,292
Shandon Turnout	Treated	$2,503

The unit costs shown in 1 were estimated average values that were developed to account for a capacity buy-in that includes back payment of capacity allocation and anticipated payment for 20 years. The back payments and future payments were summed and divided over a 20-year payback period. These costs also factor in the SWP system's anticipated future reliability of an average annual delivery of 59% of the total allocation, meaning they are intended to represent costs for actual delivered water.

Raw water is available only east of the PPWTP. To secure the lower raw water cost, new infrastructure would need to be constructed to bring water from upstream of PPWTP to the Subbasin. A previous analysis showed that the annualized cost of the new infrastructure plus the cost of the raw water equated to a similar unit cost as that of treated water. The new infrastructure would also greatly increase the total capital cost of a project. The SWP projects analyzed for the purposes of the GSP assumed the use of treated water; however, the planning and predesign stages of a future SWP project could include an analysis of using treated vs. raw water.

SWP water can be procured by GSAs in two ways: negotiating with a current District or CCWA subcontractor, or negotiating with SLOCFCWD to receive an annual allocation as a new subcontractor.

Under the first method, the purchaser would hold a sub-agreement with an existing subcontractor (that has excess allocation) and not have a direct relationship with SLOCFCWD. The second method would come with an annual buy-in cost and a unit cost of water. It would also, however, increase the potential volume and certainty of supply. Given the amount of water being considered for projects in this GSP, it is likely that being a new subcontractor would be the only feasible route.

Contractual and legal information as it applies to the SWP is described in further detail in Attachment 1 to this appendix.

1.1.1.2 Nacimiento Water Project

The Nacimiento Water Project (NWP) consists of 45 miles of pipeline that conveys raw water from Lake Nacimiento in the northern portion of San Luis Obispo County to communities within San Luis Obispo County. Figure 2 shows an overview of the NWP.

Monterey County Water Resource Agency (MCWRA) manages and operates Lake Nacimiento. SLOCFCWD has an entitlement of 17,500 AFY through a Master Water Agreement with MCWRA negotiated in 1959. Of this amount, 1,750 AFY is permanently allocated to lakeside customers, and the rest is allocated to seven participants. Any surplus NWP water must be obtained through the existing participants. Table 2 shows the allocations of each of the seven participants. These allocations established in 2016 and fully allocated SLOVCWD's entitlement.

Table 2: Nacimiento Water Project Participants and Allocations

Agency	New Allocation
City of Paso Robles	6,488
Templeton Community Services District (CSD)	406
Atascadero Mutual Water Company (MWC)	3,244
City of San Luis Obispo	5,482
County Service Area 10A (CSA 10A)	40
Bella Vista Mobile Home Park	10
Santa Margarita Ranch Mutual Water Company	80
Total	15,750

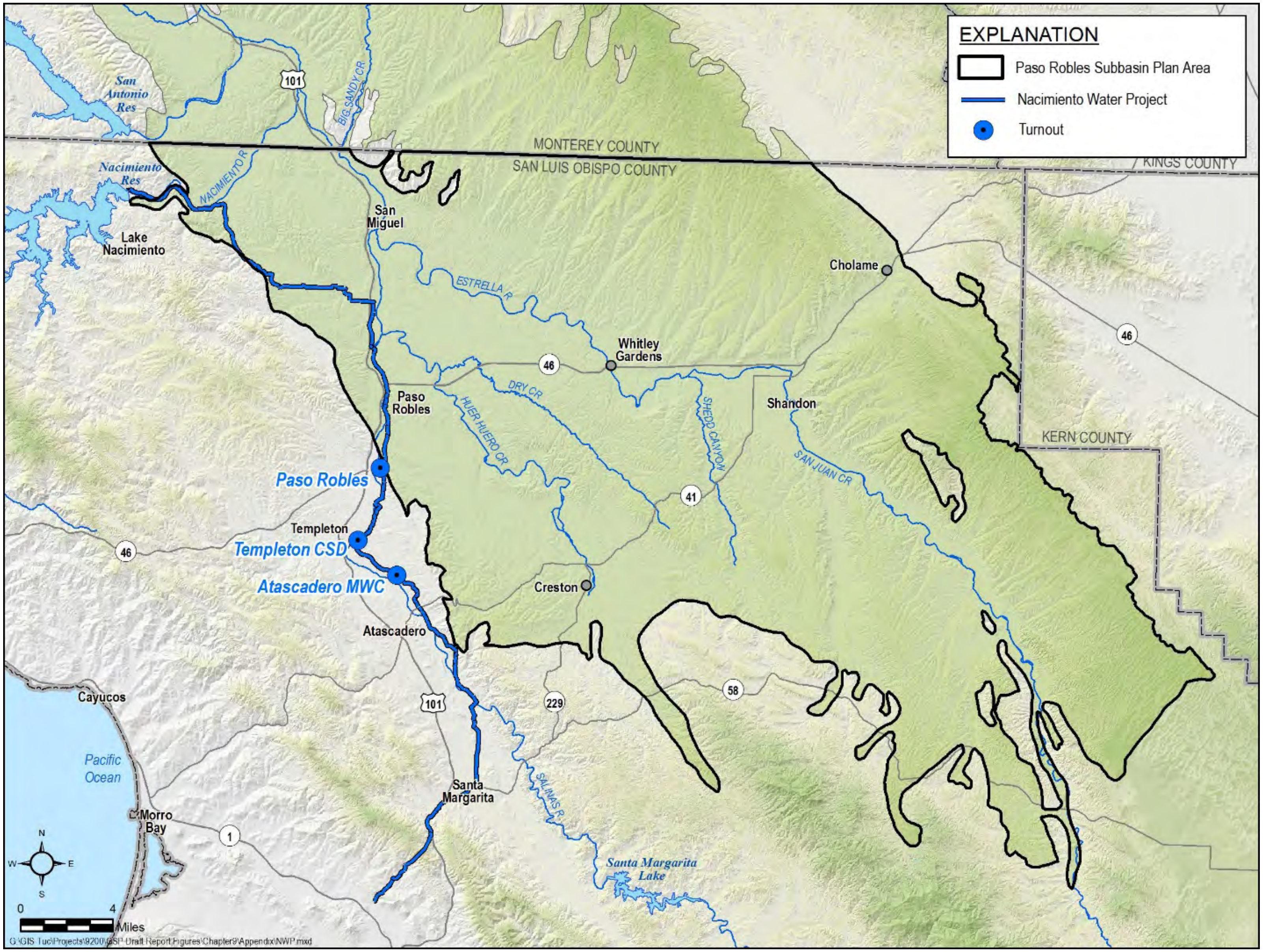


Figure 2: NWP Infrastructure

A previous study projected surplus NWP water based on participant's projected use (Carollo, 2017). The projected surplus is shown in Table 3. NWP is a very reliable supply, since SLOCFCWD's entitlement is for the lowest pool in the reservoir, and therefore is largely immune to level fluctuations. However, as seen in Table 3, NWP participants tend to use more during drought conditions, leaving less surplus water.

To determine how much NWP water might be available for purchase by the GSAs, the 2040 projected annual average surplus supply amounts were used. Dry years were assumed to occur one year out of every three years. A weighted average of the 2040 dry and wet year supplies was calculated as 5,800 AFY. While 5,800 AFY was assumed to be available to the Paso Robles GSAs, the actual amount would need to be negotiated with existing NWP project participants as there may be other entities interested in acquiring surplus NWP water.

Table 3: Nacimiento Water Project Projected Annual Surplus Supply

	Normal Year (AFY)	Dry Year (AFY)
2020	10,135	5,577
2030	8,473	4,045
2040	7,269	2,852

The NWP contract established the process for determining the cost per acre-foot of surplus water, which was applicable prior to full allocation of NWP water among the existing participants. According to the contract, the cost of surplus water to each NWP participant had two components:

1. Operations and maintenance costs per AF of surplus water for the prior year
2. Variable energy costs associated with delivering the surplus water.

For non-participants, a third component is added consisting of debt service costs for surplus water delivered for the current year. Table 4 shows the estimated costs for FY 2015/16, which was the last year when there was non-allocated NWP water available.

Table 4: Nacimiento Water Project Estimated Costs

Location	For Participants	For Non-Participants[2]
City of Paso Robles	$216/AF	$1,299/AF
Templeton CSD	$234/AF	$1,967/AF
Atascadero MWC	$235/AF	$1,554/AF

Under full allocation, the NWP contract requires selling surplus water at a cost the market can bear but not less than costs participants pay for the delivery of the same unit or units of water. At the time of this report, no surplus water sales have occurred after full allocation approval in April 2016. Thus, a range of purchase costs is possible.

The minimum cost of $250/AF is based on FY 2015/16 costs for participants, representing the cost to convey the water to a turnout. The maximum cost of $2,000/AF is assumed based on FY 2015/16 costs for non-participants, including the debt service cost. However, the actual cost must be negotiated between the purchaser and the NWP participants.

A non-participant may purchase NWP water from an NWP participant every year. However, the non-participant will not have permanent rights to the water unless a participant is willing to sell a portion of its NWP allotment. Thus, a multi-year purchase agreement from a non-participant is likely required to support capital investment in conveyance facilities.

1.1.1.3 Recycled Water

The Paso Subbasin contains two wastewater treatment plants (WWTPs): Paso Robles WWTP and San Miguel WWTP. Recycled water meeting high quality standards established by the State of California is available from these plants year-round. Most demand or recycled water is non-potable demand, such as irrigation. This demand is seasonal, with much greater demand in the summer.

Water quality is a potential issue for irrigation projects using recycled water. Because the water is high in salinity, only a portion of the total amount of water used for irrigation can be recycled water without damaging the crops. To mitigate this issue, recycled water projects in the Subbasin would either be blended with groundwater supplies or occasional flushing would be performed to prevent buildup of salts in the root zone.

The City of Paso Robles is in the process of planning and constructing a recycled water project which could provide up to 2,900-5,000 AFY of in-lieu and direct recharge by providing recycled water for use on golf courses, City parks, nearby vineyards, and recharge through discharge into Huer Huero Creek.

According to the Recycled Water Distribution System Final Design (Carollo, 2018), 1,320 AFY of recycled water will be available during Phase 1 of the project. Some of this water will be used for park irrigation and industrial use, offsetting the City of Paso Robles' potable water demand. Some of this water will be used to offset agricultural pumping. Excess water supply will be discharged to Huer Huero Creek as a recharge project. Phase 1 of the project is modeled in the modified baseline simulation of this GSP, beginning in 2025.

Phase 2 of the project is less well defined. Phase 2 is based on the assumption that as the City grows, the available wastewater for recycled water use will increase. In Phase 2, an assumed additional 902 AFY of recycled water will be available for use for both in-City and out of city demands. Excess tertiary treated water will be discharged to Huer Huero creek. Phase 2 of the project is modeled in the modified baseline simulation of this GSP beginning in 2040.

Phase 1 of the recycled water project planned by the City of Paso Robles is shown in Figure 3. Private pipelines that will use recycled water for agricultural purposes are not shown in Figure 3; however, the in-lieu recharge has been modeled as part of the modified baseline simulation.

The City of San Miguel is also planning to reuse some or all of its centrally-treated wastewater which could amount to up to 200+ AFY. This additional recycled water is also available for irrigation or other non-potable projects that could offset groundwater pumping.

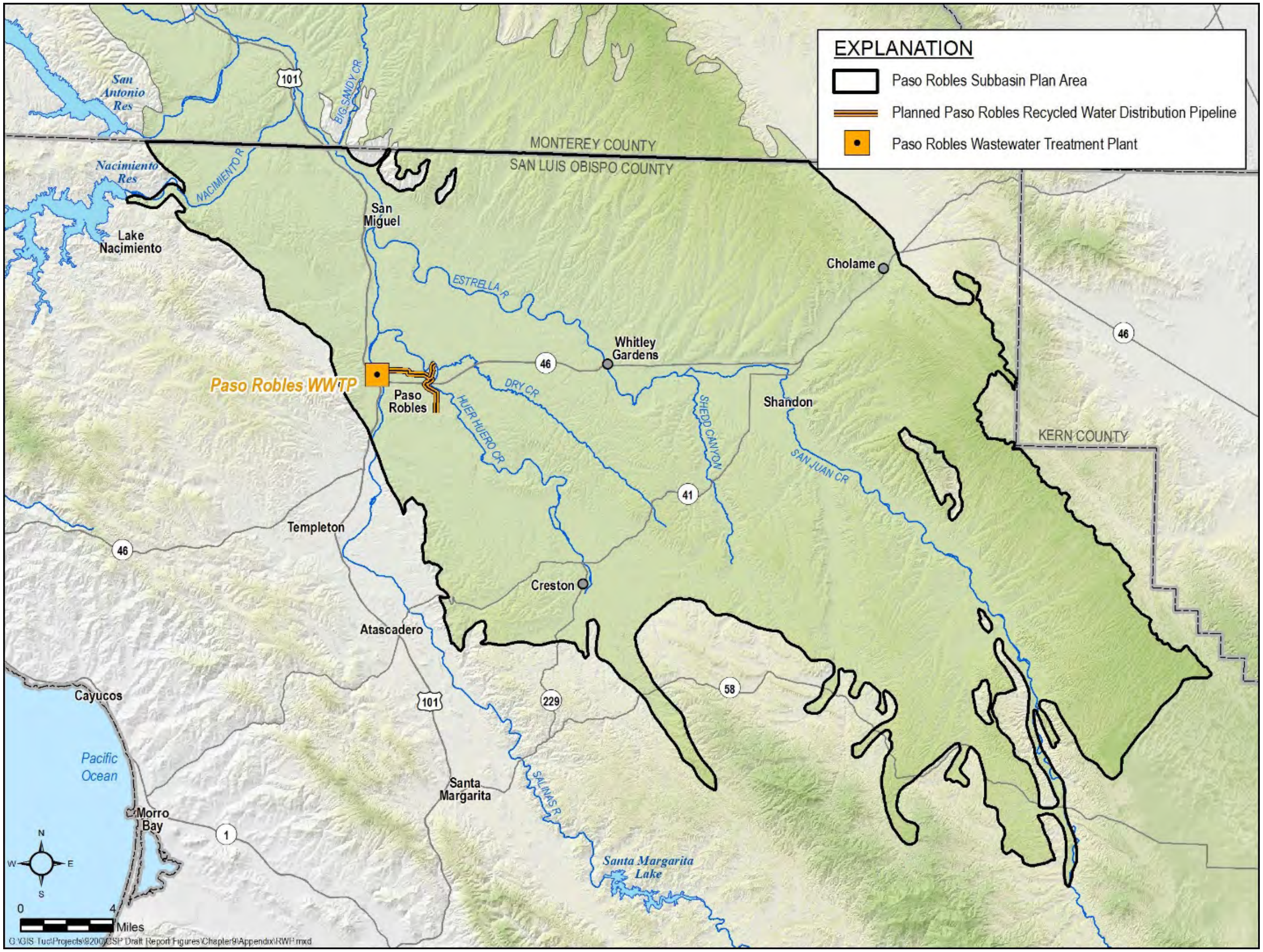


Figure 3: City of Paso Robles Planned Recycled Water Project

1.1.1.4 Surface Water

Three large perennial streams flow through the Paso Robles Basin – the Salinas River, the Estrella River, and Huer Huero Creek, as shown in Figure 4. There are two ways to acquire rights to use surface water from these streams – a standard surface water diversion permit or a temporary flood flow permit, both discussed below.

Acquiring a standard diversion permit is a lengthy and complicated process. A standard permit is likely to be very difficult to acquire, since any downstream user can protest a permit application. Furthermore, the Salinas River between Salinas Dam and the inlet of the Nacimiento is fully allocated throughout the year, except between January and May 1. The acquisition of a standard water diversion permit was not explored further.

DWR has circulated a proposed approach to streamline applicants that seek to divert water only during high flow events (SWRCB 2018). Under the proposed administrative approach, applicants could apply for a temporary permit to divert flows that exceed the 90th percentile daily flow up to 10 or 20% of the total flow between December 1 and March 31.

For example, the 90th percentile flood flow of the Salinas River for January 26th is 1,250 cfs; however, the 90th percentile flood flow for January 27th is 876 cfs. If the river were to flow at 1,000 cfs for both days, water could only be captured during January 27th but not during January 26th. What this means is that flood flows could only be captured infrequently and the large scale infrastucture required to capture these flows could sit idle many years at a time.

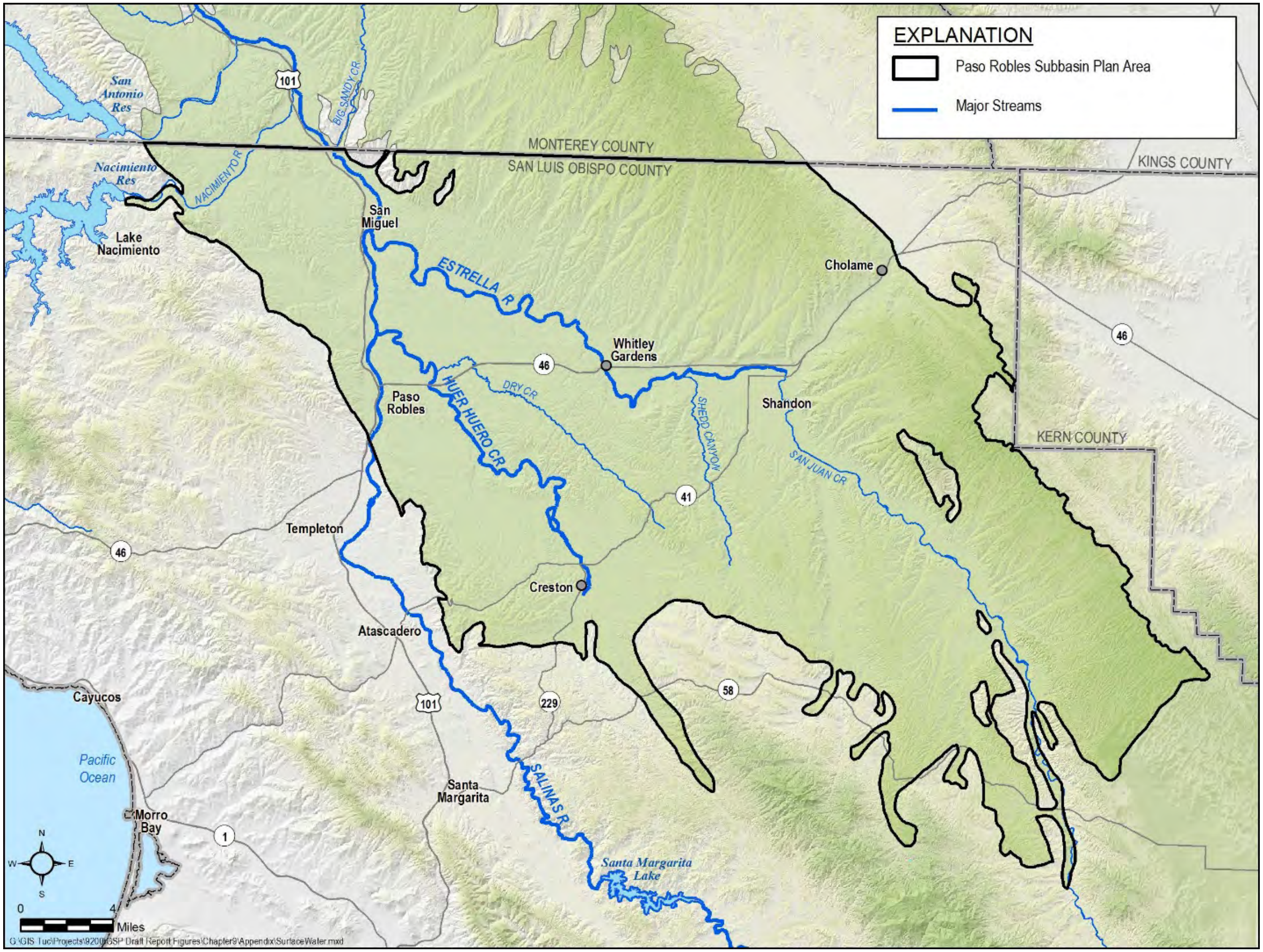


Figure 4: Major Streams in the Paso Robles Subbasin

REFERENCES

DWR 2014. The State Water Project Final Delivery Reliability Report 2013. December 2014.

DWR 2015. The State Water Project Final Delivery Capability Report 2015. July 2015.

DWR 2018. The State Water Project Capability Report and Studies 2017. March 30, 2018.

Carollo 2018. Recycled Water Distribution System Final Design. Technical Memorandum. Project confirmation. Final. December, 2018.

Carollo 2017. Paso Robles Groundwater Basin Supplemental Supply Options Feasibility Study. San Luis Obispo County Flood Control and Water Conservation District. January 2017.

SWRCB 2018. Streamlined Permitting Process for Diversions of High Flows to Underground Storage: Discussion Draft July 20, 2018. SWRCB Division of Water Rights. July 20, 2018.

WSC 2011. Capacity Assessment of the Coastal Branch, Chorro Valley & Lopez Pipelines. 2011.

WSC 2016. Paso Robles Groundwater Basin Supplemental Supply Options Study: Technical Memorandum No. 3. Potential Supply Options and Points of Delivery for State Water. San Luis Obispo County Flood Control and Water Conservation District. December 2016.

ATTACHMENT 1: MEMORANDUM REGARDING STATE WATER PROJECT EXCESS ALLOCATION

MEMORANDUM

To:	HydroMetrics – Paso Robles GSP
From:	OLP
Issue:	San Luis Obispo County Flood Control and Water Conservation District's State Water Project "Excess Allocation"
Date:	June 6, 2018
Client No.:	1902

San Luis Obispo County's State Water Project ("SWP") contract is between the San Luis Obispo Flood Control and Water Conservation District ("District") and the Department of Water Resources ("DWR"). (District SWP Water Supply Contract, at 1.) This Water Supply Contract gives the District the right to 25,000 acre-feet of SWP water each year. (District SWP Water Supply Contract, at 78.) The District then subcontracts its SWP allocation to ten subcontractors.

The SWP water is delivered to the District via the Coastal Branch of the California Aqueduct. Although the District is entitled to 25,000 acre-feet of SWP water each year, contractual provisions from agreements entered during the Coastal Branch's construction substantially limit the District's Coastal Branch conveyance capacity. Consequently, the District possesses an "Excess Allocation," which represents the difference between the District's annual allocation and the water reserved and delivered to its subcontractors. The following discussion begins with a primer on the District's involvement with the SWP. It then addresses the District's Excess Allocation and concludes by discussing factors influencing how much Excess Allocation water is currently available.

I. <u>State Water Project: Coastal Branch – Background.</u>

The SWP is a water storage and delivery system of reservoirs, aqueducts, power plants, and pumping plants extending for more than 600 miles from northern to southern California. ((SLO Technical Memorandum #3, at 3-6) ("Tech. Memo 3").) The California Aqueduct ("Aqueduct") is one of the key features of the SWP by conveying water from the Delta to central and southern California. (*Id.*) Of relevance here, the Coastal Branch of the SWP connects to the Aqueduct approximately 11 miles south of Kettleman City. (*Id.*) The Coastal Branch extends for approximately 160 miles through Kings, Kern, San Luis Obispo, and Santa Barbara Counties and terminates in Northern Santa Barbara County. (*Id.*)

DWR delivers SWP water through the Coastal Branch to two SWP contractors: (1) the District; and (2) the Santa Barbara County Flood Control and Water Conservation District ("SBCFCWCD"), via the Central Coast Water Authority ("CCWA"), a joint powers authority. Both the District and CCWA then subcontract out their SWP entitlements via "Water Supply Agreements" with individual subcontractors. (*Id.*)

The Coastal Branch was constructed in two phases – "Phase I" and "Phase II." (*Id.*) Phase I was completed in 1968 and includes 15 miles of aqueduct and two pumping stations (Las Perillas and Badger Hill). Although Phase I was completed in 1968, SWP water was not delivered to SBFCWCD or the District until Phase II was completed, because the facilities did not reach the District or SBFCWCD end users. (Department of Water Resources Bulletin 132-98, at xxviii.)

Phase II consists of 101 miles of pipeline and extends from the terminus of Phase I to Tank 5, located in Northern Santa Barbara County. (Tech. Memo 3, at 3-9.) Included within Phase II are three pumping stations (Devils Den, Bluestone, and Polonio Pass) as well as the Polonio Pass Water Treatment Plant ("PPWTP"). (*Id*.) After Phase II was completed in August 1997, SWP water was finally delivered to the District and SBCFCWCD. (*Id*.)

The ownership and operation of the Phase II facilities is divided amongst/between DWR, CCWA, and the District. DWR was responsible for the design and construction of all Phase II facilities. (CCWA Urban Water Management Plan 2010, at 3.) Following construction, DWR has retained ownership of Phase II facilities. (*Id*.) In addition, DWR maintains and operates the "raw water portion" of Phase II, which is located "upstream" of the PPWTP. (San Luis Obispo Regional Integrated Water Management Proposal, Attachment 13, at 1-2.)

However, CCWA and the District financed the costs for Phase II's design and construction and continue to finance the operation of Phase II. (*Id*.) CCWA operates the "treated portion" of Phase II, which runs from the PPWTP and encompasses all conveyance facilities from the PPWTP to the end of Phase II in Santa Barbara. (Central Coast Water Authority, 2017-18 Fiscal Budget, at 298.)

The District's delivery of water through Phase II facilities is controlled by the Master Water Treatment Agreement between the District and CCWA. This Agreement provides that CCWA is responsible for treating the District's SWP water at the PPWTP and conveying the treated water through Phase II facilities to District subcontractors. (Tech. Memo 3, at 3-11.) The District only funded its portion of Phase II, which would support the delivery of 4,830 acre-feet per year. Because of the District's decision to fund the Phase II only up to its existing demand, the Water Treatment Agreement limits the delivery of District water to 4,830 acre feet of PPWTP treated water through the Phase II conveyance facilities per year. (*Id*.; Master Water Treatment Agreement 1992 and 1995.)

II. **Quantifying the District's Excess Allocation**

The District's Excess Allocation represents the difference between its SWP entitlement of 25,000 acre-feet per year and the amount of water reserved by its subcontractors. (Tech Memo 3, at 3-10.) As noted above, subcontractor demand is 4,830 acre-feet per year. (*Id*., at 3-10 to 3-11.) This leaves 20,170 acre feet of excess allocation.

However, the SWP often is not able to deliver 100 percent of contract water to the SWP contractors. Because the SWP allocations are often reduced to below 100 percent delivery, the District also provides its subcontractors the opportunity acquire "drought buffer" deliveries. The purpose of the drought buffer is to maintain full water deliveries to District subcontractors even when SWP allocations are reduced.

The District provides up to 5,747 acre feet of drought buffer allocation per year, as shown in the chart below. The drought buffer works as follows: Envision a subcontractor with a contract for 100 acre-feet of water per year (Water Service Amount) and 100 acre-feet "drought buffer." In a year where SWP allocation are reduced to 50 percent of the contract amount, this subcontractor would still get 100 acre-feet of water because they would get 50 percent of their water service amount (50 acre-feet) and 50 percent of their drought buffer (50 acre-feet).

Subcontractor	Water Service Amount	Drought Buffer	Total Reserved
Chorro Valley Turnout		*~$1,100 per AF*	
City of Morro Bay	1,313	2,290	3,603
CA Men's Colony	400	400	800
County OP Center	425	425	850
Cuesta College	200	200	400
Lopez Turnout		*~$1,000 per AF*	
City of Pismo Beach	1,240	1,240	2,480
Oceano CSD	750	750	1500
San Miguelito MWC	275	275	550
Avila Beach CSD	100	100	200
Avila Valley MWC	20	60	80
San Luis Coastal USD	7	7	14
Shandon	100	0	100
TOTAL	**4,830**	**5,747**	**10,577**

As displayed above, the District's current subcontractors have purchased various quantities of drought buffer rights. In years where SWP allocations are reduced to greater than 50 percent, the District will need to demand almost the entire 10,577 acre feet to serve its subcontractors. This reduces the excess allocation of the District to 14,423 acre-feet per year. ((San Luis Obispo County Water Resources, Division of Public Works: State Water Project, available at: https://www.slocountywater.org/site/Major%20Projects/State%20Water%20Project/) (Accessed May 14, 2018).)

III. How Much of The District's Excess Allocation is Actually Available?

On paper, the District has 14,423 acre-feet in Excess Allocation. However, there are several factors that may make it difficult to access and put the Excess Allocation to beneficial use. Those factors are summarized below.

1. SWP Rarely Delivers 100 Percent of Contractor Allocation

Although the District is entitled to 25,000 acre-feet per year, the actual amount of water delivered to SWP contractors can vary substantially each year. For example, in 2006, the District received 100 percent of its annual allocation. (Tech. Memo 3, at 3-17.) Conversely, in 2014, the District received only 5 percent of its annual allocation. (*Id*.) Carollo Engineers developed a Technical Memorandum on behalf of the District addressing supplemental supply options in the Paso Robles basin.

The Technical Memorandum estimated that future long-term average annual allocation would likely be around 58 percent. (Tech. Memo 3, at 3-30.) In other words, for planning purposes, future SWP deliveries to the District will likely average around 58 percent of the District's 25,000 SWP contract entitlement. (*Id*.) Applying this figure to the District's current Excess Allocation, this means (all other constraints aside) the District could expect to have access to approximately 8,365 acre-feet of excess allocation per year in an average year – rather than 14,432 acre-feet. (14,432 acre-feet x .58 = 8,365.34).

2. <u>Capacity Constraints</u>

As discussed above, the District's Master Water Treatment Agreement limits the District's Phase II capacity to 4,830 acre-feet per year. Thus, even if the District could obtain excess allocation from the SWP, the current Agreement with CCWA limits capacity to 4,830 acre feet per year.

The Technical Memorandum concluded that there is "significant unused capacity" within the SWP Coastal Branch facilities that could be used to deliver additional District SWP water. (Tech. Memo 3, at 3-3.) If there is physical capacity available, it is possible the District and CCWA could negotiate an amendment to the Master Water Treatment Agreement to allow the District to access additional capacity in Phase II facilities. The Master Water Treatment agreement has been amended before (in 1995 to reflect the District's current 4,830 acre-feet limitation). However, that amendment occurred before Phase II was completed in 1997. While the Master Water Treatment has an amendment provision, it does not appear that the agreement has been amended since Phase II came online in August of 1997.

Other than amendment of the Master Water Treatment Agreement between the District and CCWA, there are capacity limitations for the Coastal Branch facilities reaches 1-6 included in the DWR contract for SWP water with SBCFCWCD. (Table B of the SWP/SBCFCWCD Contract.) To the extent these limitations control CCWA, they may restrict CCWA from allocating the District additional capacity in Phase II facilities.

The Master Water Treatment Agreement between CCWA and the District limits the District's capacity on the "treated" portion of Phase II. However, the Master Water Treatment Agreement does not limit the District's capacity to convey water through the "untreated portion" of Phase II (Reach 1) which consists of approximately 16.2 miles of pipeline and three pumping plants (Devils Den, Bluestone, and Polonio Pass). (Tech. Memo 3, at A-3 (Need to review Exhibit E of the Master Water Treatment Agreement to confirm this finding.).) Similarly, the Master Water Service Agreement does not limit District delivery of water through Phase I (completed in 1968). Therefore, if the conveyance capacity challenges above cannot be overcome, there may be an option to access the excess SWP allocation by building a new pipeline or other delivery conveyance structure that separately conveys the excess allocation prior to the "treated" portion of Phase II facilities.

3. Potential Rights of Existing Subcontractors

The District currently has 10 subcontractors. The subcontractors may have certain rights of first refusal on the District's Excess Allocation. Specifically, this right derives from the District's "Excess Entitlement Policy" and may be further included in each subcontractor's Local Water Supply Contract with the District.

In 2003, the District developed a series of Excess Entitlement policies. (Tech. Memo 3, at 3-10 to 3-11 (San Luis Obispo Board of Supervisors, *Policy on Excess State Water Supply*, January 2003).) In relevant part, these policies provide that prior to transferring the District's Excess Allocation for "any other use," subcontractors of the District's SWP water with capacity in Phase II must have the "first right" to utilize the Excess Allocation for "drought buffer" purposes. (San Luis Obispo Board of Supervisors, *Policy on Excess Water State Water Supply*, at 1.) The process by which subcontractors acquire excess allocation is unclear as are any potential limitations on acquisition of future drought buffer quantities from the District.

5. The District's Current Excess Allocation Activities

In recent years, the District has leveraged its Excess Allocation via DWR sanctioned water sales, stored the water for future use, and (potentially) engaged in an exchange program with CCWA. For example, in 2013 the District participated in a DWR sanctioned "Multiyear Water Pool" program whereby it sold 19,404 acre-feet of water to other SWP contractors. (DWR Bulletin 132-14, at 169.)

Additionally, the District has also stored portions of its Excess Allocation for use in the following year. An example of this is the SWP's "carryover water" program. This program permits SWP contractors to carryover a portion of its allocated water approved for delivery in the current year for delivery during the following year. (Tech. Memo 3, at 3-14.) In 2014, when the SWP delivered only 5 percent of contractors' entitlements, the District delivered 2,693 acre-feet of carryover water. (DWR Bulletin 132-15, at Table 9-8.)

In addition to water sales and carryover storage, in 2016, the District attempted to implement an "exchange program" with CCWA. In this program, the District proposed to exchange some of its "wet water" in storage for pipeline and treatment capacity above its current 4,830 acre-feet limitation. (SLO Department of Public Works, Report of J. Ogren, at 3 (December 13, 2016).) The proposed exchange was structured as a 2 for 1 program whereby for every two acre-feet of water the District provided to CCWA in excess of the District's annual 4,830 acre-feet limitation, CCWA would get to keep one acre-foot and CCWA would treat and then convey the other acre-foot to the District's subcontractors. (*Id*. (emphasis added).) It is unclear if this proposed program was implemented. However, the fact that the District proposed this program suggests the District is making efforts to utilize its Excess Allocation.

4. Acquisition of the District's Excess Allocation.

All other limitations aside, the GSA should consider if there were Excess Allocation available, how it would acquire this water from the District. This consideration should include (1) the relationship between the District and the County and whether the District would allow the County to use the Excess Allocation; (2) whether the GSA could become a District subcontractor; (3) whether any other entity could become a District subcontractor; (4) negotiations of which entities would pay for the Excess Allocation and/or increased capacity

IV. **Outstanding Questions**.

The following are outstanding questions at this time:

1. What is the extent of the the subcontractor right of first refusal to Excess Allocation? Is it limited to drought buffer rights? Or do subcontractors have right to refuse all excess allocation?

2. Is it possible to negotiate increased capacity in Phase II facilities with CCWA?

3. What are the estimated costs for conveyance facilities to divert water above the PPWTP and deliver to the GSA service area?

V. **Conclusion and Next Steps**.

The major limiting factors in accessing Excess Allocation include: (1) SWP delivery shortages; (2) limited capacity in Phase II facilities; and (3) the (potentially) superior rights of existing subcontractors.

***

Appendix J

Project Assumptions

APPENDIX J – PROJECT ASSUMPTIONS

This document provides an overview of the assumptions used to develop projects and costs in Chapter 9 of the Paso Robles GSP. Assumptions need to be checked and tested during the pre-design phase of each project. Project designs, and therefore costs, could change considerably as more information is gathered.

1.1 Year-to-Year Variability in Water Supply Amount

All water supplies being considered to supplement the Paso Subbasin are rainfall dependent and therefore vary year to year in the amount available for supply. To make use of the available long-term average annual average water supply, projects and infrastructure such as pipes and pump stations must be sized for the highest flows that could occur. The highest available flows, as well as the long-term expected averages for SWP and NWP are presented in Table 1.

Table 1: Long-term Average and High Flow Available

Supply	Long-term Average (AFY)	Highest Flow (AFY)
SWP	8,860	14,770
NWP	5,800	7,270

1.2 Seasonal Variability in Demand

Injection and recharge basin projects were sized to deliver flow steadily throughout the year with no seasonal variation. Direct delivery projects were sized to deliver water according to seasonal fluctuations in demand.

1.3 Daily Variability in Demand

No daily variation in demand was assumed for any projects. For irrigation projects, water for each day would be delivered over a 24-hour period, even though irrigation might typically occur over a 12-hour or less window. This would require farmers to have onsite storage and pumps. All onsite improvements for direct users are assumed to be developed by individual land owners.

1.3.1 Recycled Water Projects

The two recycled water Projects described in the GSP are planned projects being implemented by the City of Paso Robles and San Miguel CSD. The Paso Robles project is currently underway, with design expected to be complete by 2019 and construction to be complete by 2021. Pipeline alignments, costs, and delivery amounts were obtained from the project design 60% design information.

The San Miguel project is not as far along as that of Paso Robles. Some conceptual information is known; however, exact pipelines, customers, flows, and costs have not been determined yet. To obtain a cost for the purposes of the GSP, the project team came up with a potential design for a San Miguel RW project – one that sends half the flow to the eastern customers, and another half of the flow to western customers. The actual design is to be determined.

1.3.2 Recharge Basin Projects

All recharge basin projects were sized assuming an infiltration rate of 0.5’ per day. Recharge basins were assumed to receive water consistently throughout the year, with no seasonal variation in water delivery.

The locations of all three recharge basin projects were selected to be close enough to the supply pipelines such that a pump station would not be required to deliver water to the recharge site. If land close to supply lines cannot be procured, these projects might require a pump station, which would increase project cost.

1.3.3 Direct Delivery Projects

The three NWP direct delivery projects were selected and sized to offset pumping throughout the eastern central region of the Subbasin and even out projected water levels.

Seasonal variation of demand (by month) was assumed in each region to follow patterns based on 2015 agricultural pumping demand curves modeled in the GSP model. Assumed peaking factors by month are shown in Table 2.

Table 2: Agricultural Demand Peaking Factors, by Month

Month	Peaking Factor
January	0.00
February	0.00
March	0.7
April	2
May	1.6
June	2.5
July	2
August	1.1
September	1.2
October	0.7

Pipelines were sized to deliver supply commensurate with the amount of NWP water that would be available during a wet year (Table 1). Table 3 shows the amount of peak and average demand met by each project in the project region.

Table 3: Peak and Average Demand and Deliveries for Direct Delivery Projects

	North	Central[1]	Eastern
Peak Monthly Demand (gpm)	15,920	2,640	5,500
Max Pipeline Delivery (gpm)	2,960	1,260	2,480
Average annual demand (AFY)	10,415	1,725	3,600
Annual water delivered, wet year (AFY)	3,510	1,250	2,510

Notes:
1. Demands for this area are those remaining demand after accounting for recycled water deliveries (from the modified baseline model run).

Pipelines were sized to deliver demand at all hours of the day regardless of the time period required for irrigation. This assumption was made to reduce the pipeline diameter and pump station requirements; however, this assumption requires that farmers have daily on-site storage to collect water from the pipeline during times when they're not irrigating. The cost of on-site storage and other on-site improvements was not included in the cost estimates.

Water from the NWP might have water quality that is problematic for irrigation systems; the NWP pipeline carries untreated reservoir water that can be high in metals and contain algae that that could clog or foul drip irrigation or sprinkler heads. No treatment was assumed in the project costs; however, water quality would need to be analyzed and a small pilot study conducted to determine if any water quality adjustment would be required. Alternatively, different irrigation techniques or operational changes may need to be utilized with NWP water deliveries. This could be determined in a pilot study.

1.3.4 Local Recharge Projects

The perennial rivers that flow through the Paso Robles Basin can be engorged with flood water for several weeks at a time while remaining dry for most of the year. Historical water levels on the Estrella River, Huer Huero Creek, and the Salinas River were analyzed to determine the frequency, length, and volume of flow imparted by these flood events.

Legal issues were also considered to determine how much water could feasibly be extracted for a local recharge project. A standard surface water diversion permit would theoretically allow for more water to be extracted from a river; however, the process for obtaining a standard surface water permit is extremely lengthy and complicated. The Salinas River between Salinas Dam and the Nacimiento confluence is fully allocated except between Jan 1 – May 15; and, permit applications would be subject to protest from all existing upstream and downstream permit-holders.

DWR may introduce a streamlined surface water permit for GSAs to extract water during flood flows. The draft concept of the temporary permit is to allow the diversion of flood flows between December 1 and March 31. The diversions can only legally occur on days when the volume of flow in the river is greater than the 90th percentile flow for that particular day of the year. This concept is described in detail in Appendix I.

Though the volume of water available during floods is considerable, the infrastructure required to divert a large volume would also need to be sizeable. The volume of stormwater that could be captured from the Salinas River under the draft streamlined permit was computed for three different sized systems. Flood flows for the last 30 years (1989-2018) were used to simulate the diversions, which were set to occur only on days between January 1 and March 31 with flood flows higher than the 90th percentile flood flow. The results are shown in Table 4.

Table 4: Simulated Volume Diverted from the Salinas River under the Draft Streamlined Permit over a 30-Year Period for Different System Sizes

System Size (cfs)	Recharge basin size (acres)	Volume captured over the 30 year period (AF)	Average annual captured (AFY)
10	40	4,900	165
40	160	20,400	645
80	315	38,000	1,260

It is worth noting that, over the 30-year simulated period, the stormwater diversion infrastructure would have been activated for a total of 250 days (an average of 8 days per year). Costs are provided for the 10 cfs system. Water would be extracted via radial Ranney wells, which are built to draw water from the alluvium and do not require in-river infrastructure.

1.3.5 Salinas Dam Expansion

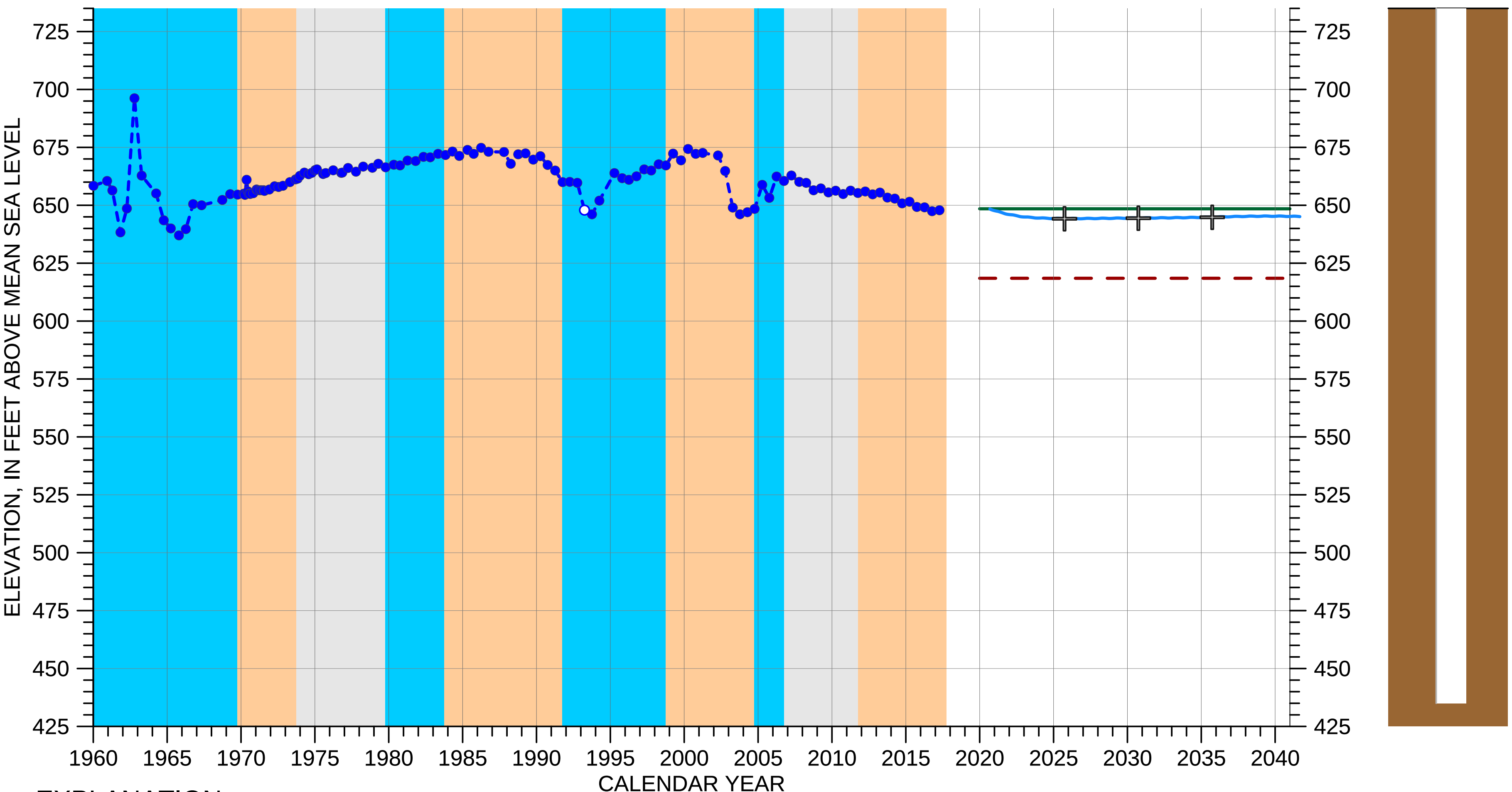
Information regarding the Salinas Dam expansion was obtained from SLOCFCWCD.

REFERENCES

SLOCFCWCD 2008. Paso Robles Groundwater Subbasin Water Banking Feasibility Study. Final Report. San Luis Obispo County Flood Control and Water Conservation District. April 2008.

Appendix K

Model Results that Demonstrate Sustainability



EXPLANATION

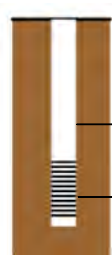
- MEASURABLE OBJECTIVE
- MINIMUM THRESHOLD
- GROUNDWATER ELEVATION
- MEASUREMENT NOT VERIFIED*
- PROJECTED WATER LEVEL
- INTERIM MILESTONE

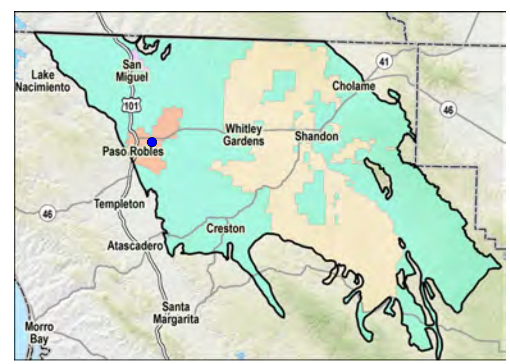
CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Well Depth: 400 feet
Screened Interval: unknown
Reference Point Elevation: 835 feet above mean sea level

* Measurement reported as not static





MEASUREABLE OBJECTIVES, MINIMUM THRESHOLDS, AND INTERIM MILESTONES FOR 26S/12E-26E07

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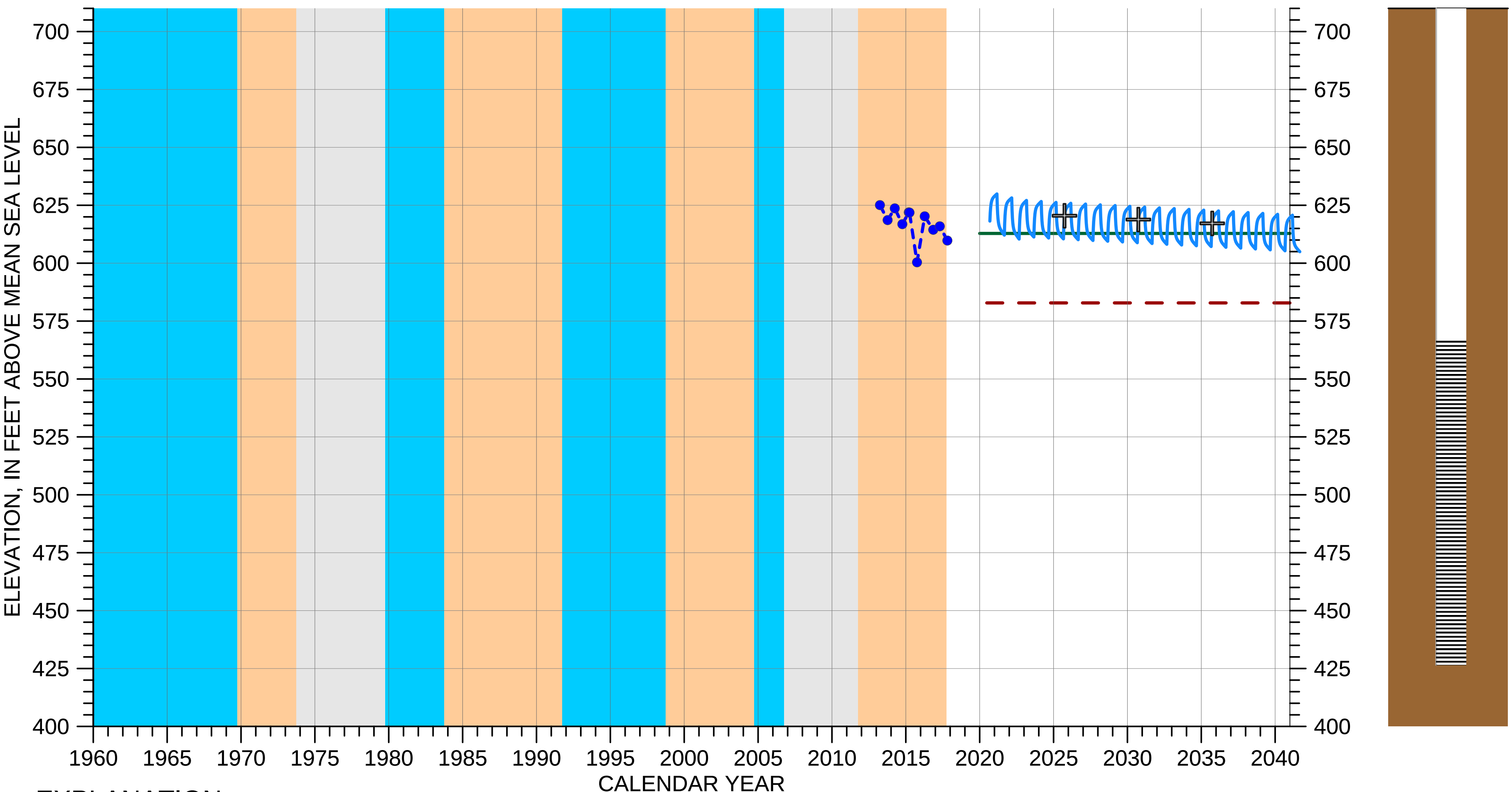

EXPLANATION

MEASURABLE OBJECTIVE

MINIMUM THRESHOLD

GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

PROJECTED WATER LEVEL

INTERIM MILESTONE

CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

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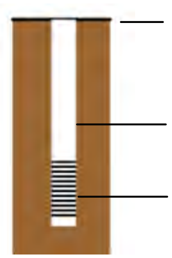
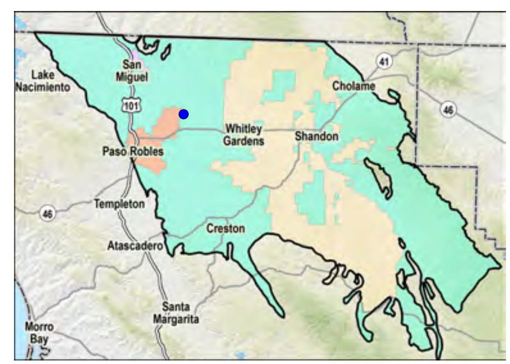
Screened Interval: 260-400 feet below ground surface
Reference Point Elevation: 827.9 feet above mean sea level

* Measurement reported as not static





MEASUREABLE OBJECTIVES, MINIMUM THRESHOLDS, AND INTERIM MILESTONES FOR 26S/13E-08M01

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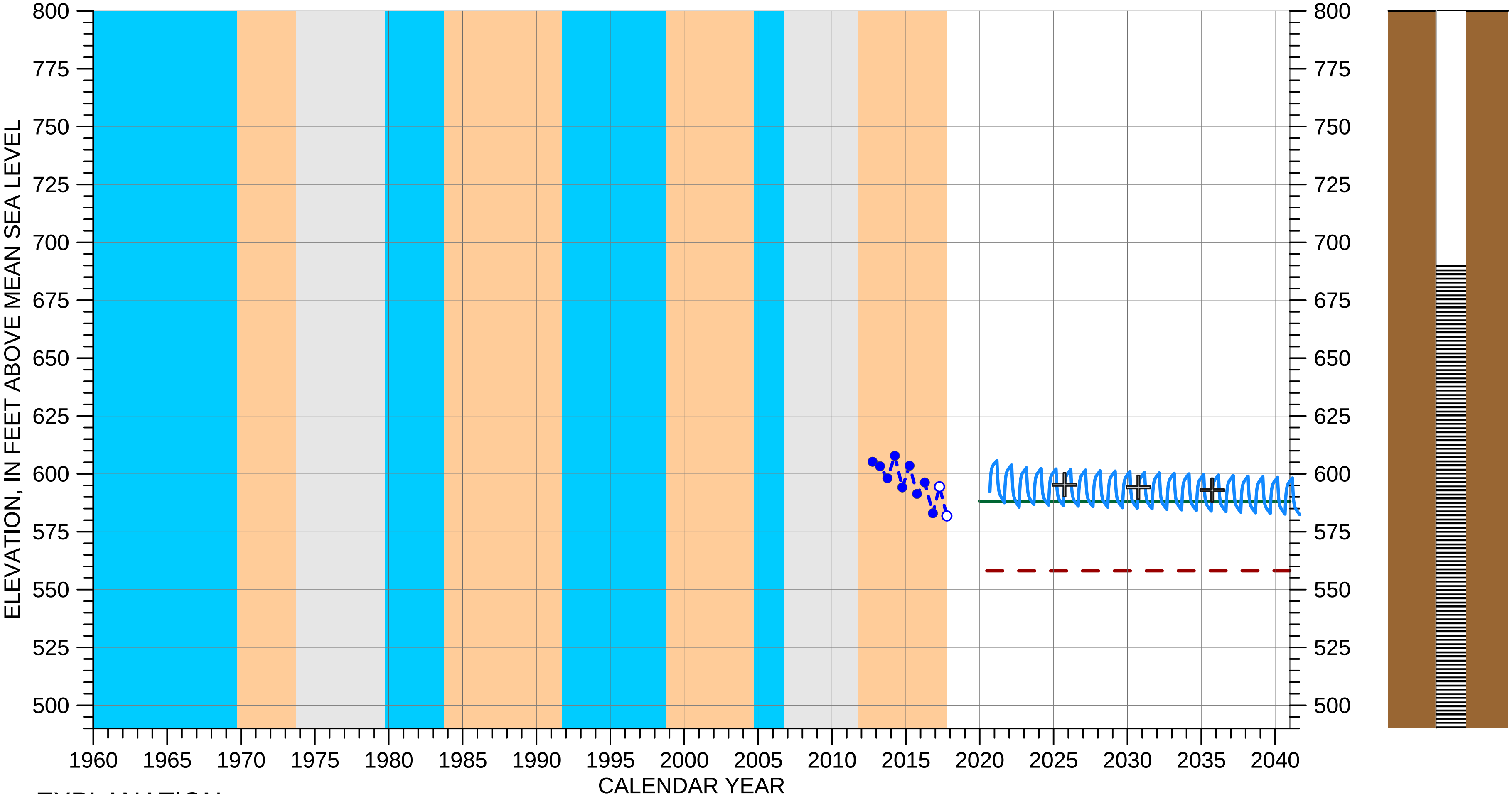

EXPLANATION

MEASURABLE OBJECTIVE
MINIMUM THRESHOLD
GROUNDWATER ELEVATION
MEASUREMENT NOT VERIFIED*
PROJECTED WATER LEVEL
INTERIM MILESTONE

CLIMATE PERIOD CLASSIFICATION

DRY
AVERAGE/ALTERNATING
WET

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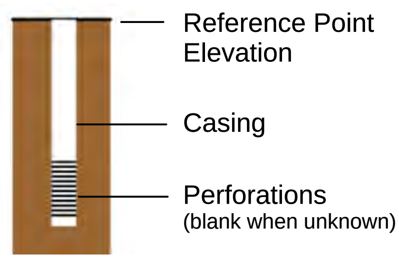
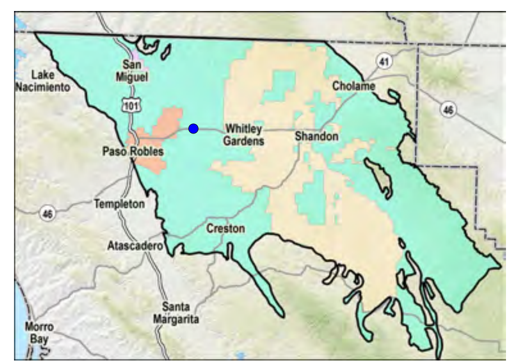
Screened Interval: 200-400 feet below ground surface
Reference Point Elevation: 890.2 feet above mean sea level

* Measurement reported as not static





MEASUREABLE OBJECTIVES, MINIMUM THRESHOLDS, AND INTERIM MILESTONES FOR 26S/13E-16N01

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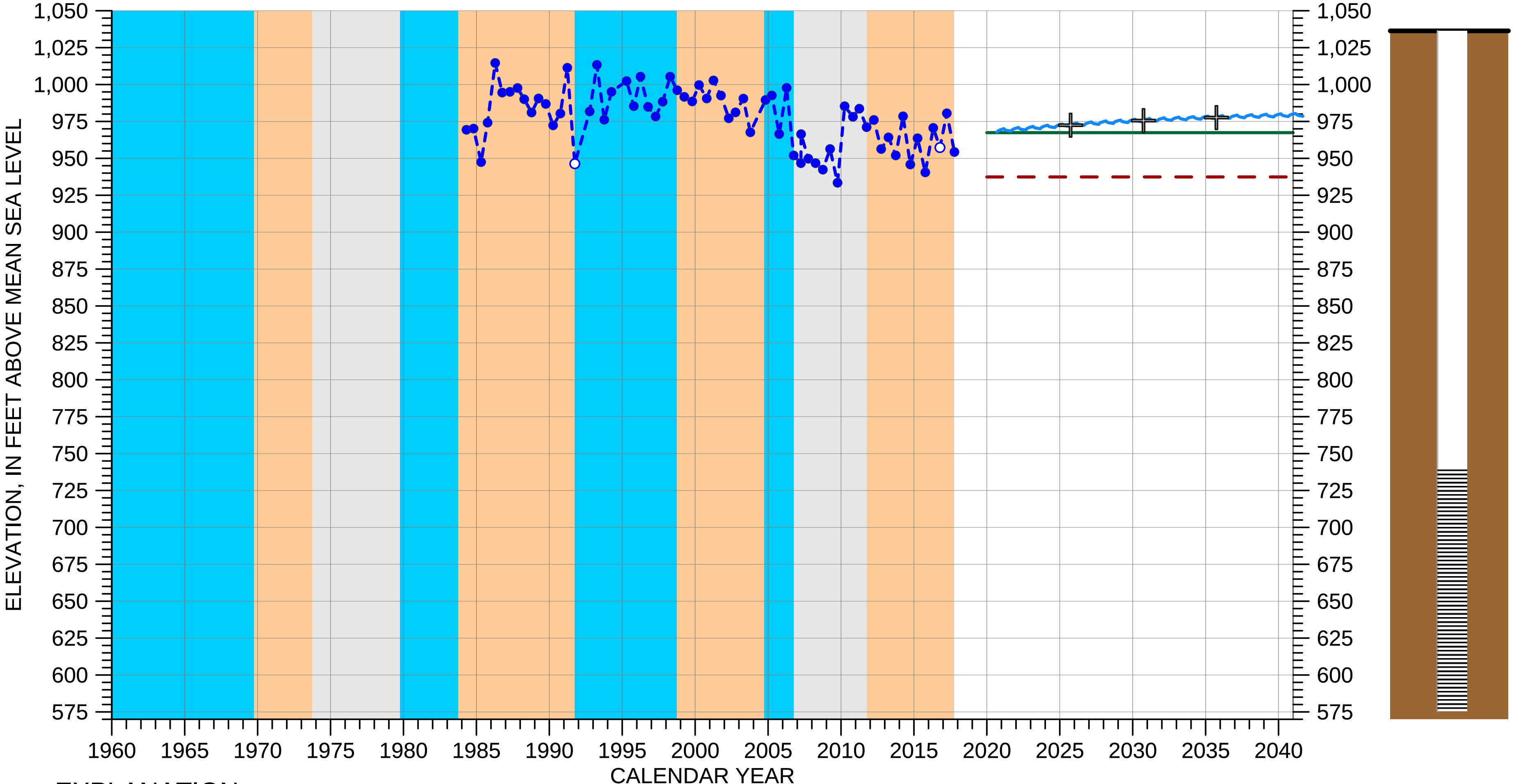


EXPLANATION

MEASURABLE OBJECTIVE

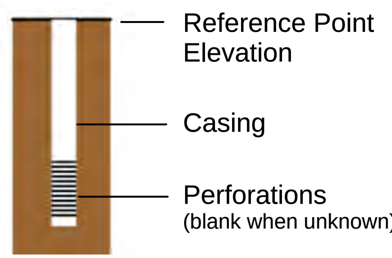
MINIMUM THRESHOLD

GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

PROJECTED WATER LEVEL

INTERIM MILESTONE



CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

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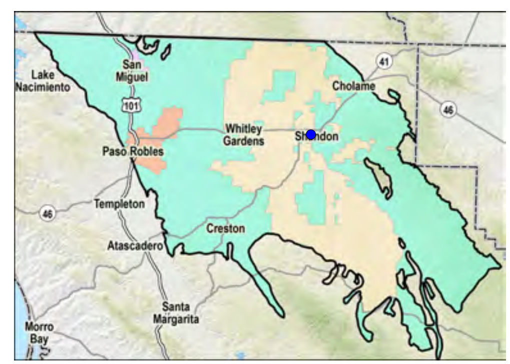
Reference Point Elevation: 1036.36 feet above mean sea level

* Measurement reported as not static



MEASUREABLE OBJECTIVES, MINIMUM THRESHOLDS, AND INTERIM MILESTONES FOR 26S/15E-20B04

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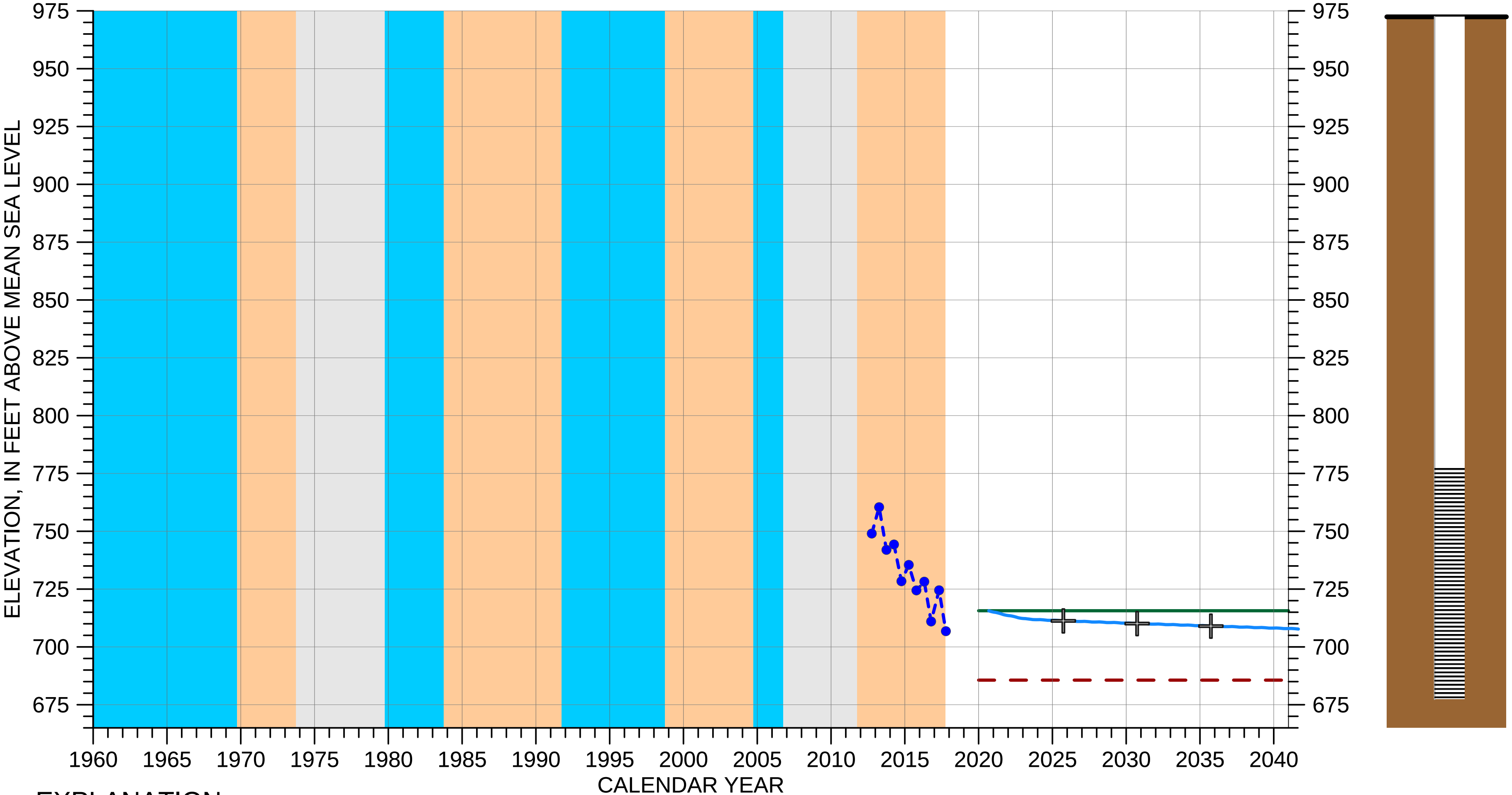
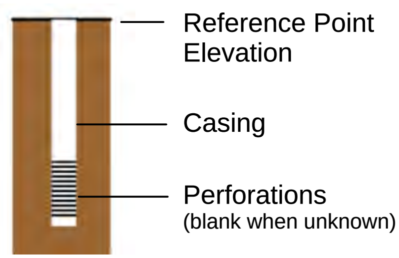


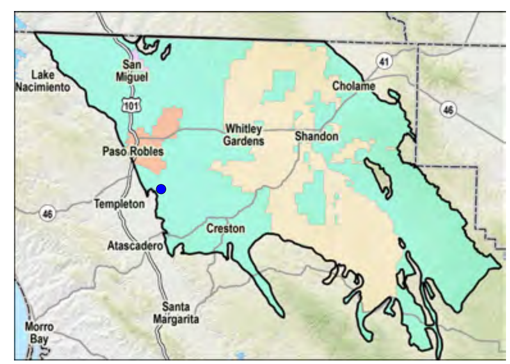
EXPLANATION

- MEASURABLE OBJECTIVE
- MINIMUM THRESHOLD
- GROUNDWATER ELEVATION
- MEASUREMENT NOT VERIFIED*
- PROJECTED WATER LEVEL
- INTERIM MILESTONE

CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET





Well Depth: 295 feet
Screened Interval: 195-295 feet below ground surface
Reference Point Elevation: 972.4 feet above mean sea level

* Measurement reported as not static

MEASUREABLE OBJECTIVES, MINIMUM THRESHOLDS, AND INTERIM MILESTONES FOR 27S/12E-13N01

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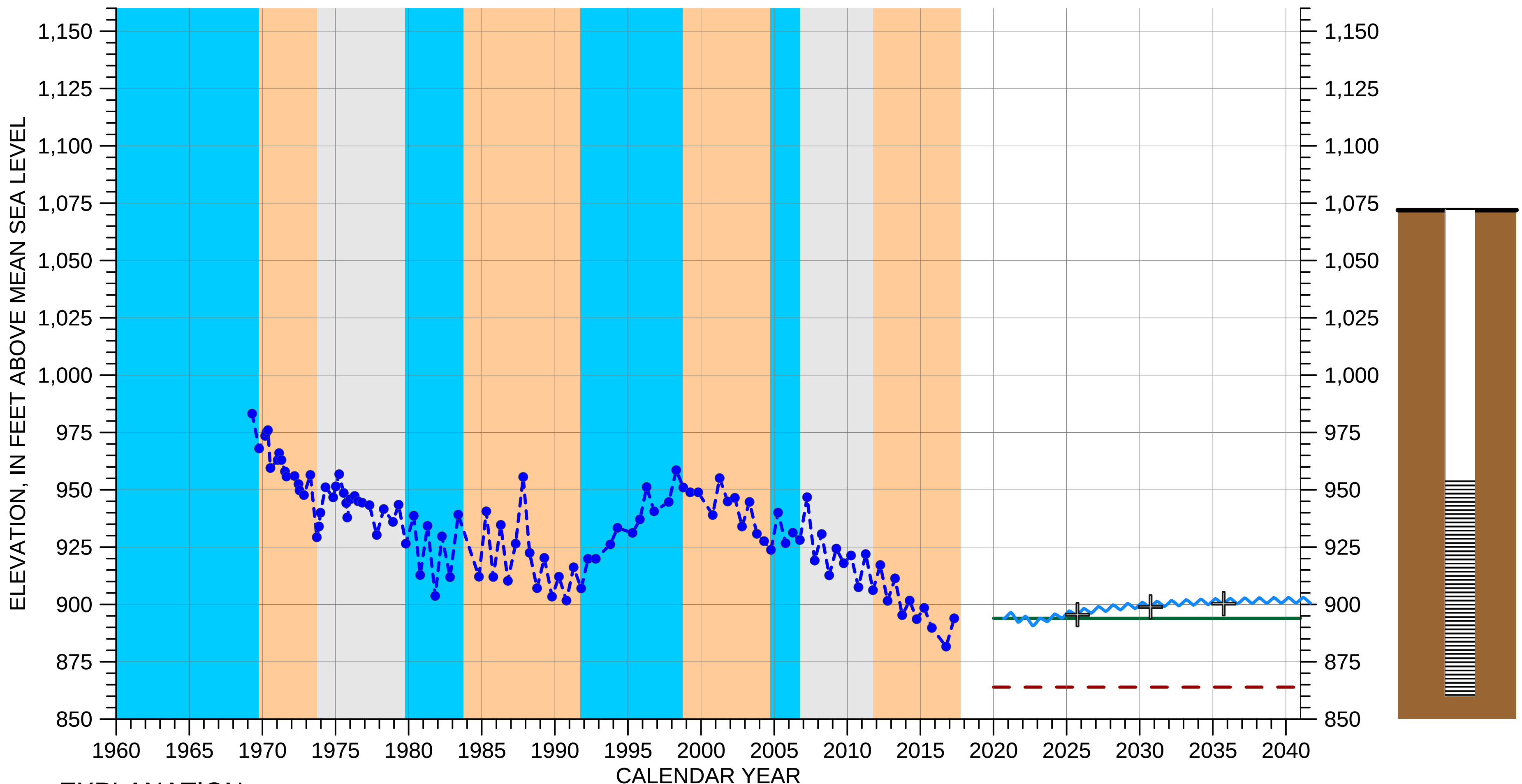


EXPLANATION

MEASURABLE OBJECTIVE

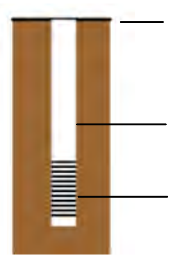
MINIMUM THRESHOLD

GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

PROJECTED WATER LEVEL

INTERIM MILESTONE

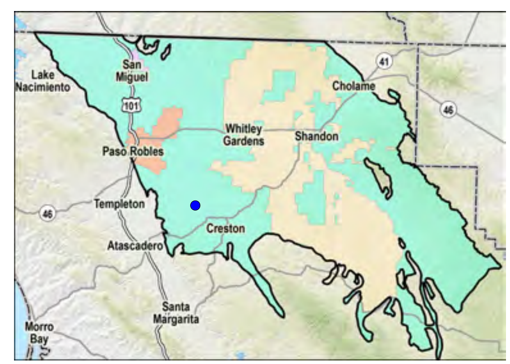


CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Well Depth: 212 feet
Screened Interval: 118-212 feet below ground surface
Reference Point Elevation: 1072 feet above mean sea level

* Measurement reported as not static



MEASUREABLE OBJECTIVES, MINIMUM THRESHOLDS, AND INTERIM MILESTONES FOR 27S/13E-28F01

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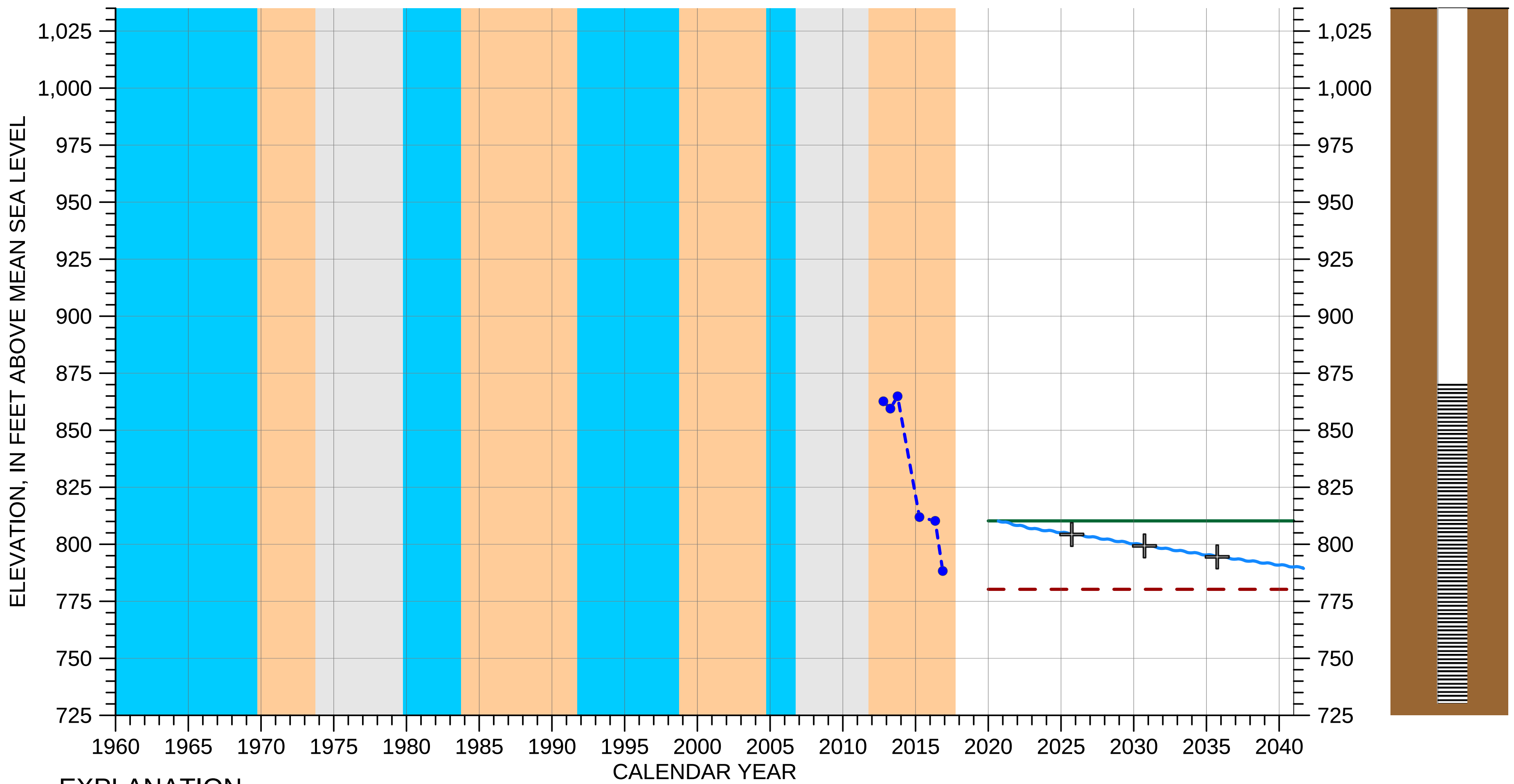

EXPLANATION

MEASURABLE OBJECTIVE
MINIMUM THRESHOLD
GROUNDWATER ELEVATION
MEASUREMENT NOT VERIFIED*
PROJECTED WATER LEVEL
INTERIM MILESTONE

CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Reference Point Elevation
Casing
Perforations (blank when unknown)

Well Depth: 355 feet
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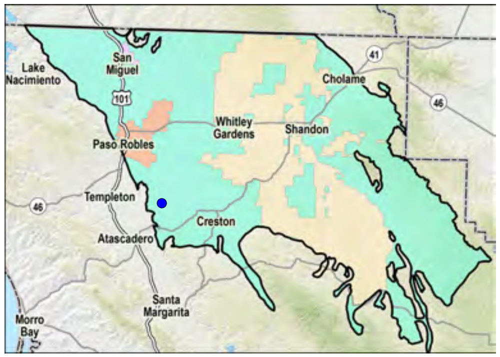
Reference Point Elevation: 1086.7 feet above mean sea level

* Measurement reported as not static



MEASUREABLE OBJECTIVES, MINIMUM THRESHOLDS, AND INTERIM MILESTONES FOR 27S/13E-30N01

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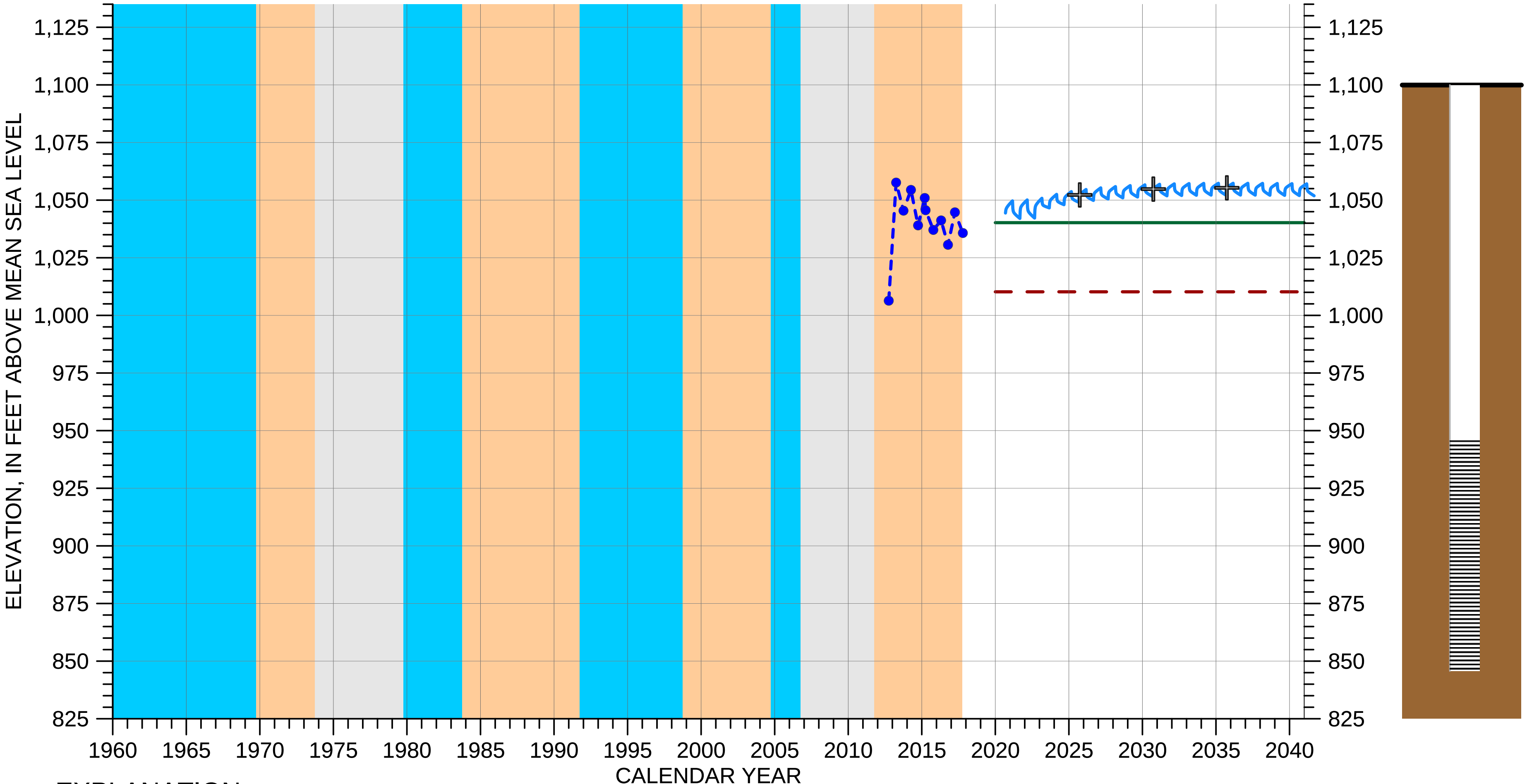


EXPLANATION

MEASURABLE OBJECTIVE

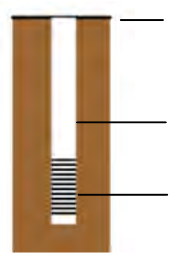
MINIMUM THRESHOLD

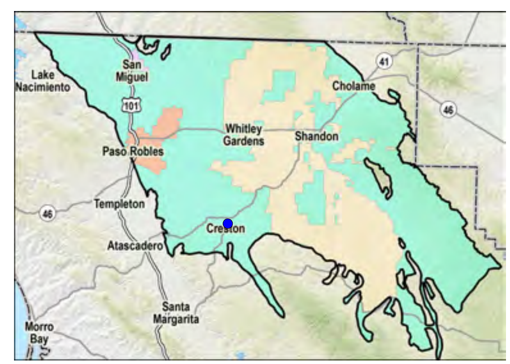
GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

PROJECTED WATER LEVEL

INTERIM MILESTONE





CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Well Depth: 254 feet
Screened Interval: 154-254 feet below ground surface
Reference Point Elevation: 1099.9 feet above mean sea level

* Measurement reported as not static

MEASUREABLE OBJECTIVES, MINIMUM THRESHOLDS, AND INTERIM MILESTONES FOR 28S/13E-01B01

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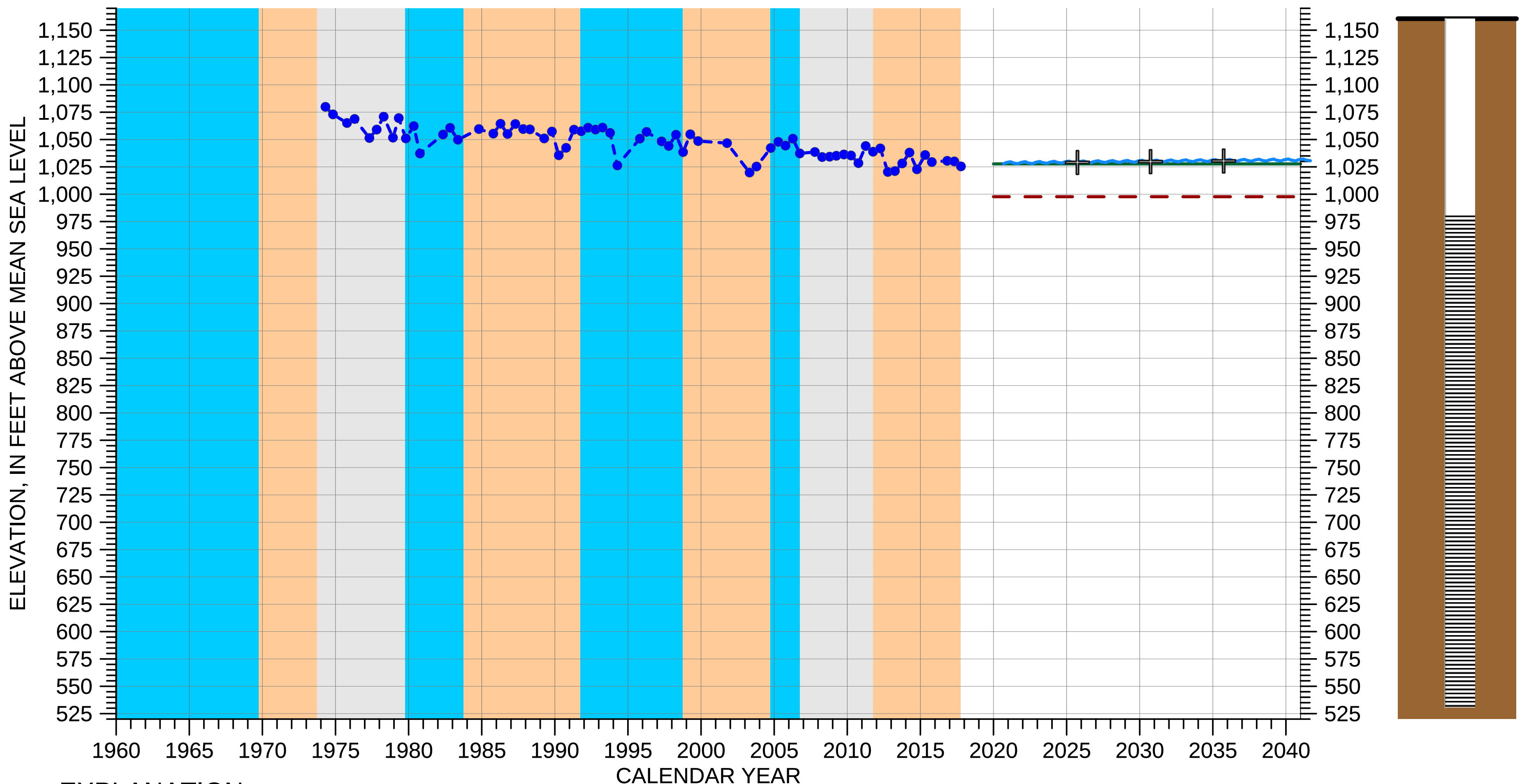

EXPLANATION

MEASURABLE OBJECTIVE

MINIMUM THRESHOLD

GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

PROJECTED WATER LEVEL

INTERIM MILESTONE

CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Well Depth: 630
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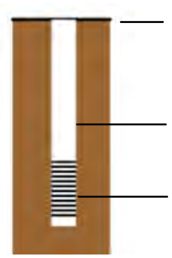
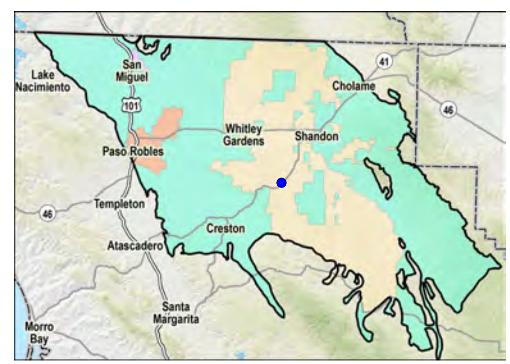
Reference Point Elevation: 1160.5 feet above mean sea level

* Measurement reported as not static





MEASUREABLE OBJECTIVES, MINIMUM THRESHOLDS, AND INTERIM MILESTONES FOR 27S/14E-11R01

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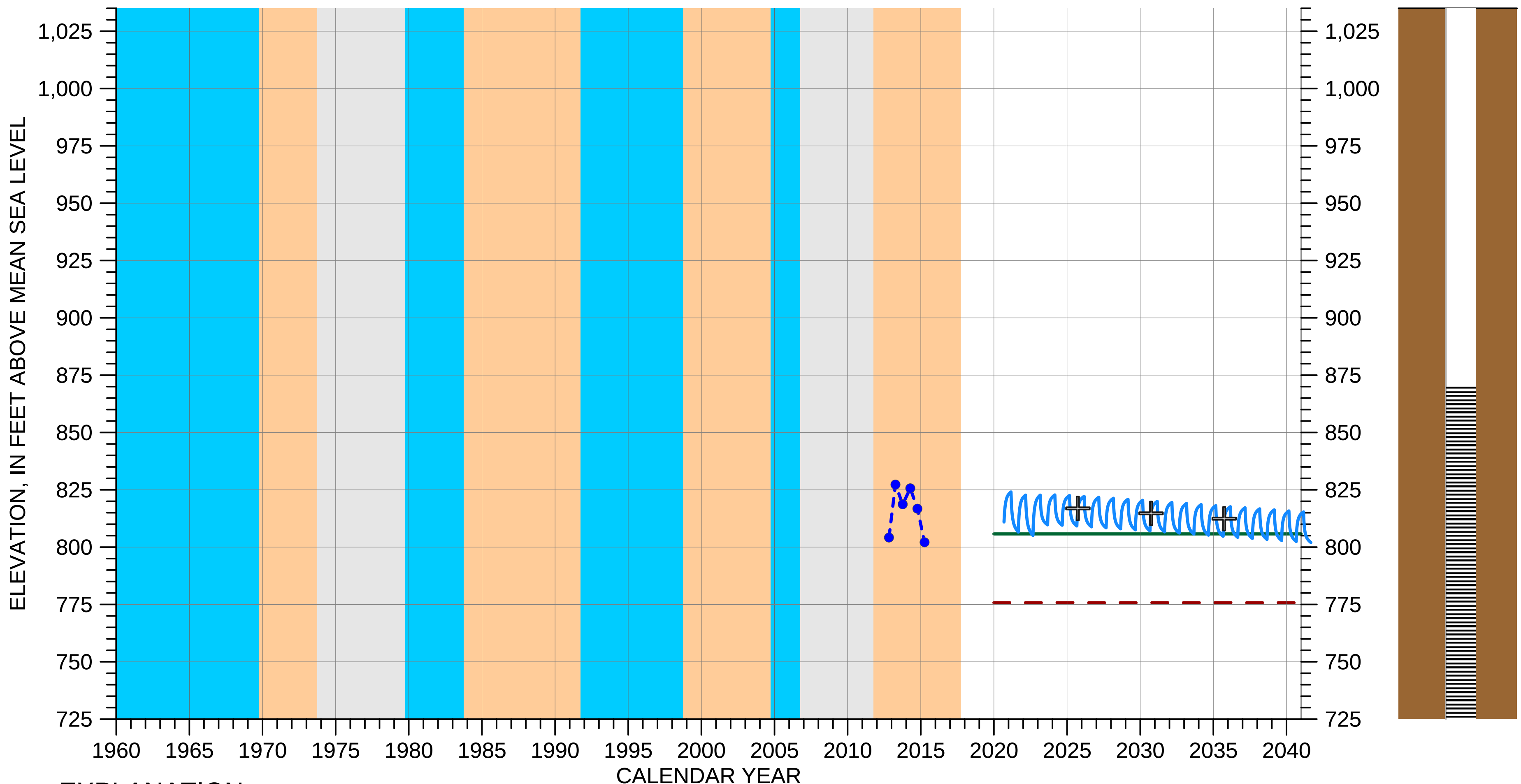
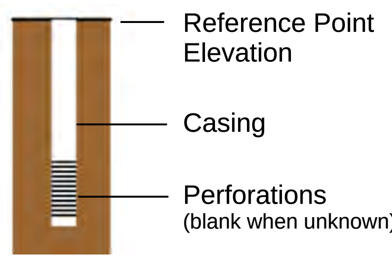


EXPLANATION

- MEASURABLE OBJECTIVE
- MINIMUM THRESHOLD
- GROUNDWATER ELEVATION
- MEASUREMENT NOT VERIFIED*
- PROJECTED WATER LEVEL
- INTERIM MILESTONE

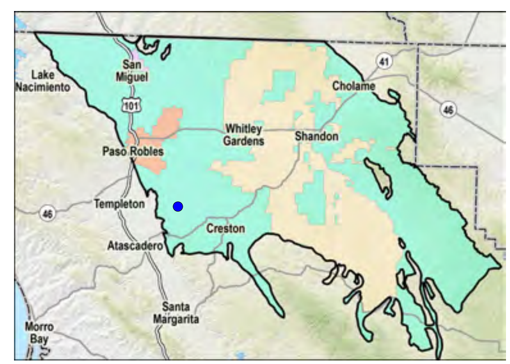


CLIMATE PERIOD CLASSIFICATION

DRY | AVERAGE/ALTERNATING | WET

Well Depth: 685
Screened Interval: 225-685 feet below ground surface
Reference Point Elevation: 1095 feet above mean sea level

* Measurement reported as not static



MEASUREABLE OBJECTIVES, MINIMUM THRESHOLDS, AND INTERIM MILESTONES FOR 27S/13E-30J01

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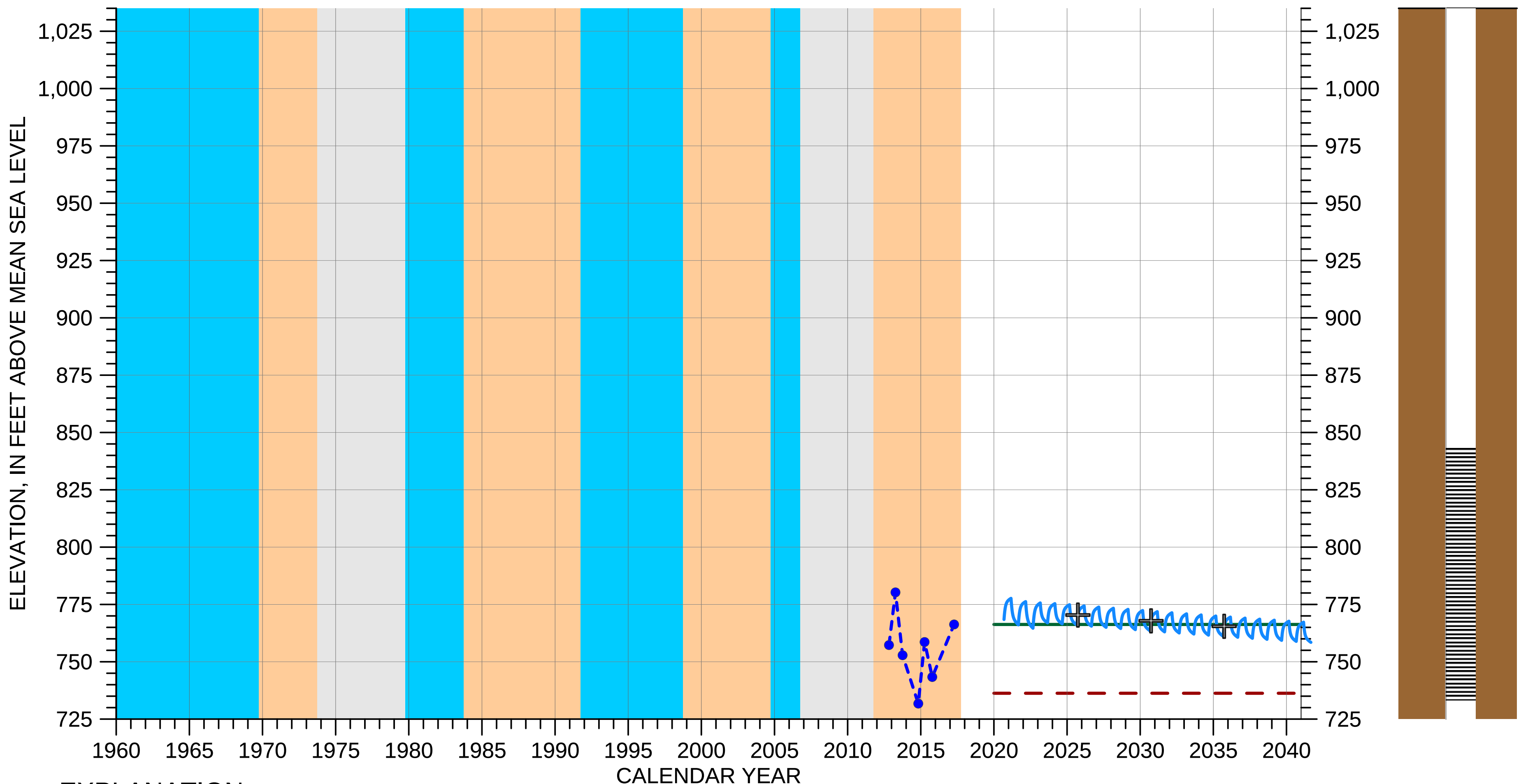


EXPLANATION

MEASURABLE OBJECTIVE

MINIMUM THRESHOLD

GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

PROJECTED WATER LEVEL

INTERIM MILESTONE

CLIMATE PERIOD CLASSIFICATION

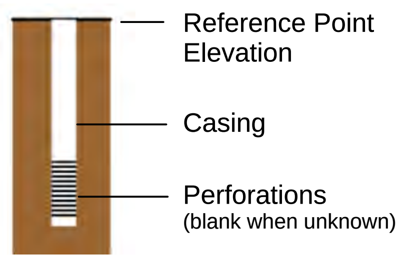
DRY

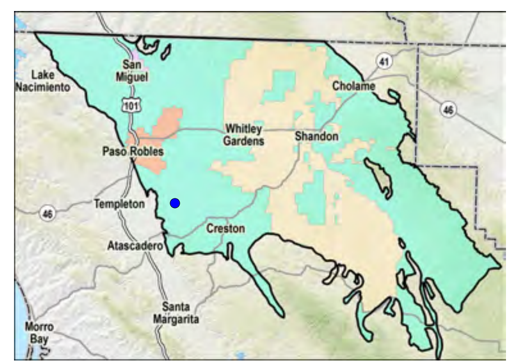
AVERAGE/ALTERNATING

WET

Well Depth: 310
Screened Interval: 200-310 feet below ground surface
Reference Point Elevation: 1043.2 feet above mean sea level

* Measurement reported as not static





MEASUREABLE OBJECTIVES, MINIMUM THRESHOLDS, AND INTERIM MILESTONES FOR 27S/13E-30F01

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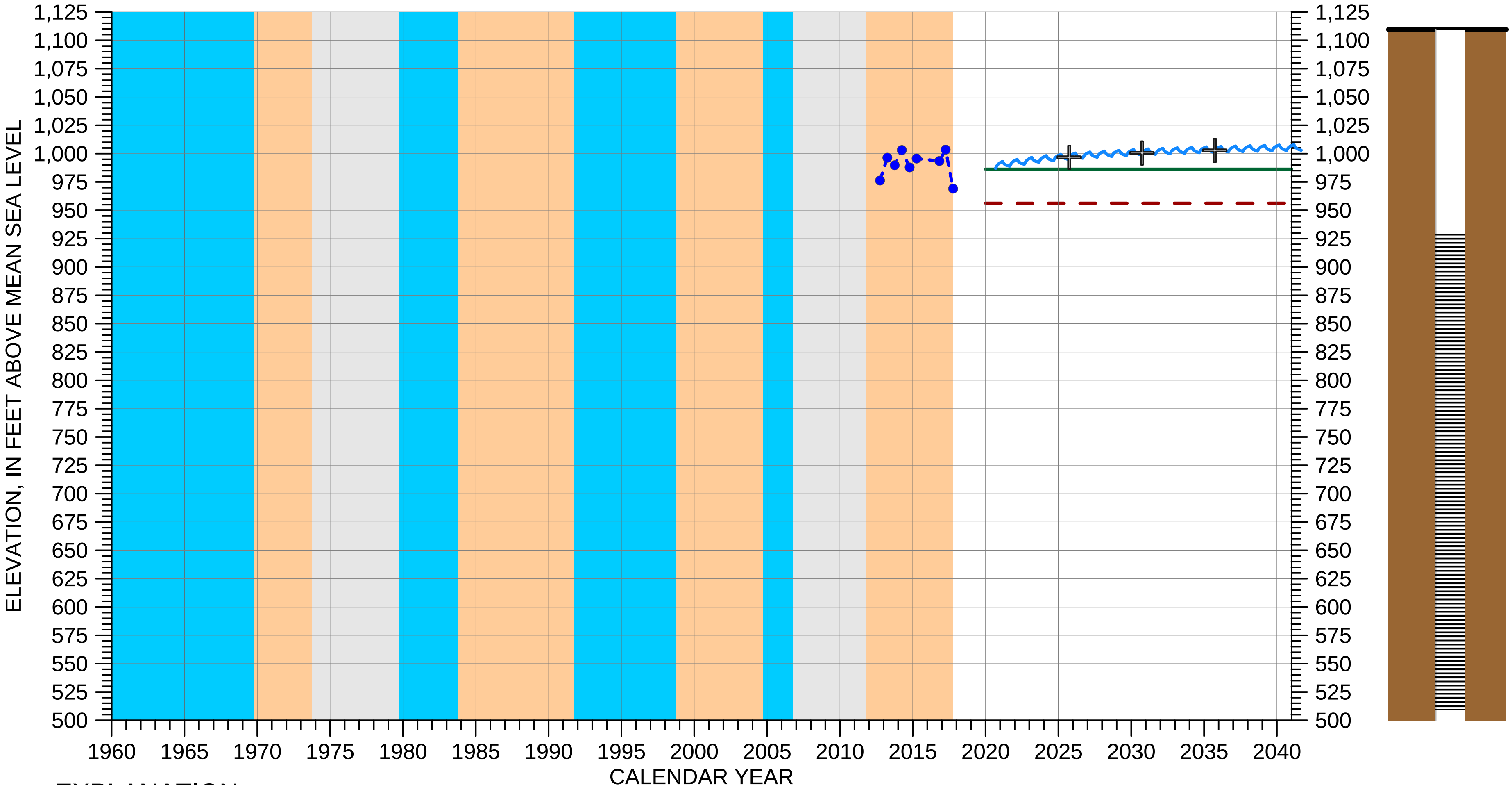
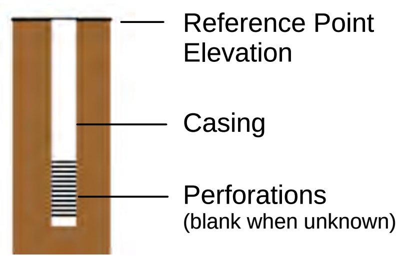


EXPLANATION

MEASURABLE OBJECTIVE
MINIMUM THRESHOLD
GROUNDWATER ELEVATION
MEASUREMENT NOT VERIFIED*
PROJECTED WATER LEVEL
INTERIM MILESTONE

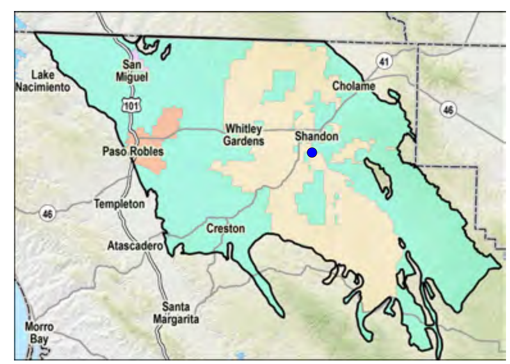


CLIMATE PERIOD CLASSIFICATION

DRY
AVERAGE/ALTERNATING
WET

Well Depth: 600
Screened Interval: 180-600 feet below ground surface
Reference Point Elevation: 1109.5 feet above mean sea level

* Measurement reported as not static



MEASUREABLE OBJECTIVES, MINIMUM THRESHOLDS, AND INTERIM MILESTONES FOR 26S/15E-29R01

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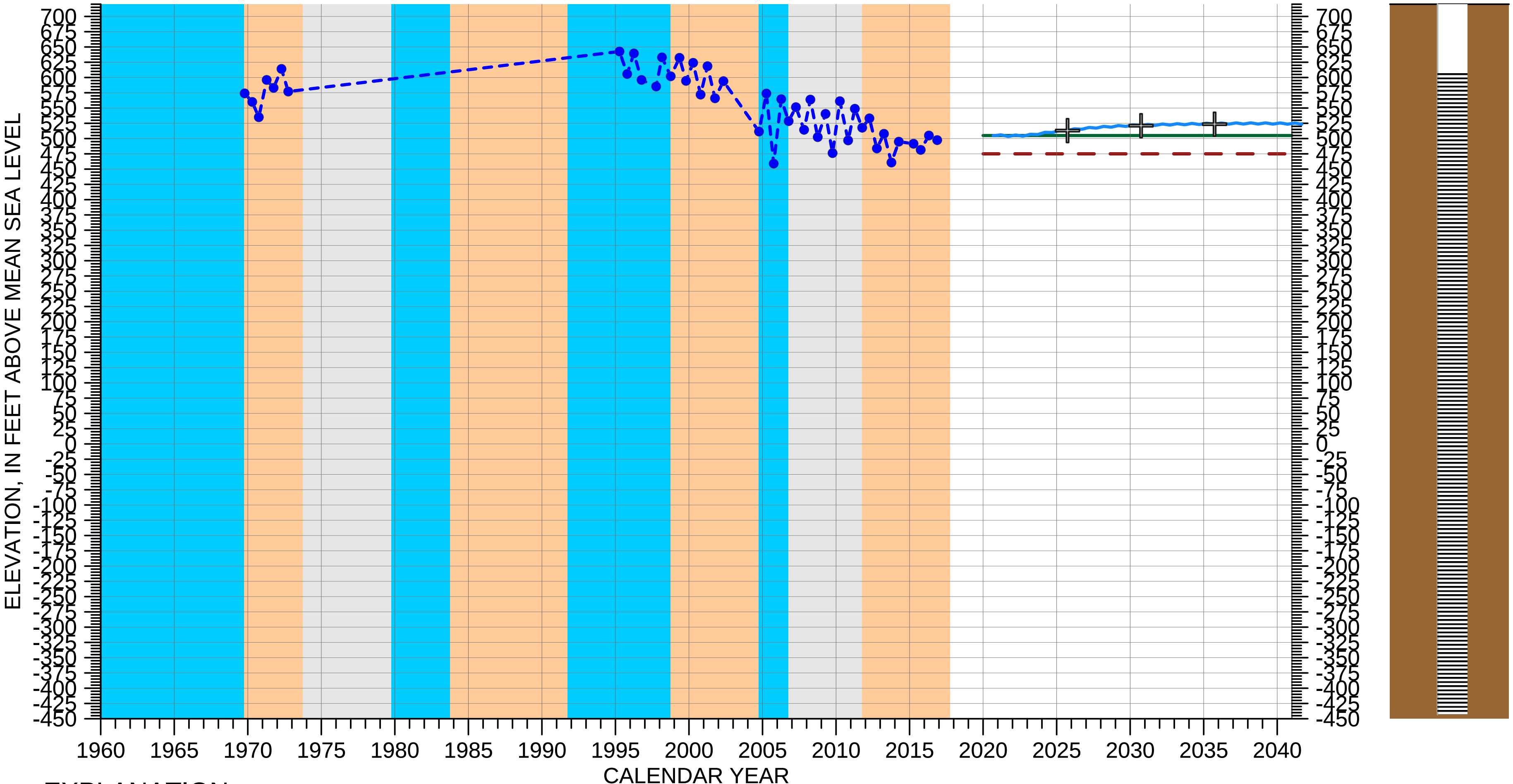


EXPLANATION

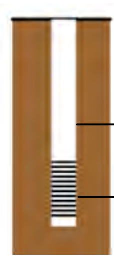
- MEASURABLE OBJECTIVE
- MINIMUM THRESHOLD
- GROUNDWATER ELEVATION
- MEASUREMENT NOT VERIFIED*
- PROJECTED WATER LEVEL
- INTERIM MILESTONE

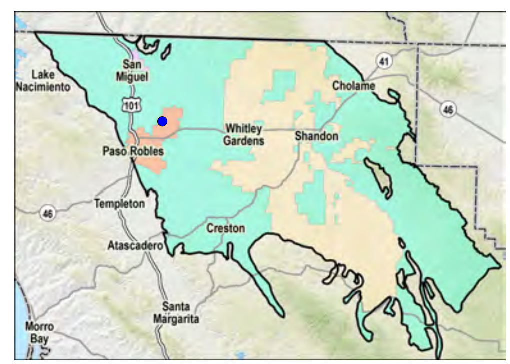
CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Well Depth: 1230
Screened Interval: 180-~1230 feet below ground surface
Reference Point Elevation: 790 feet above mean sea level

* Measurement reported as not static





MEASUREABLE OBJECTIVES, MINIMUM THRESHOLDS, AND INTERIM MILESTONES FOR 26S/12E-14H01

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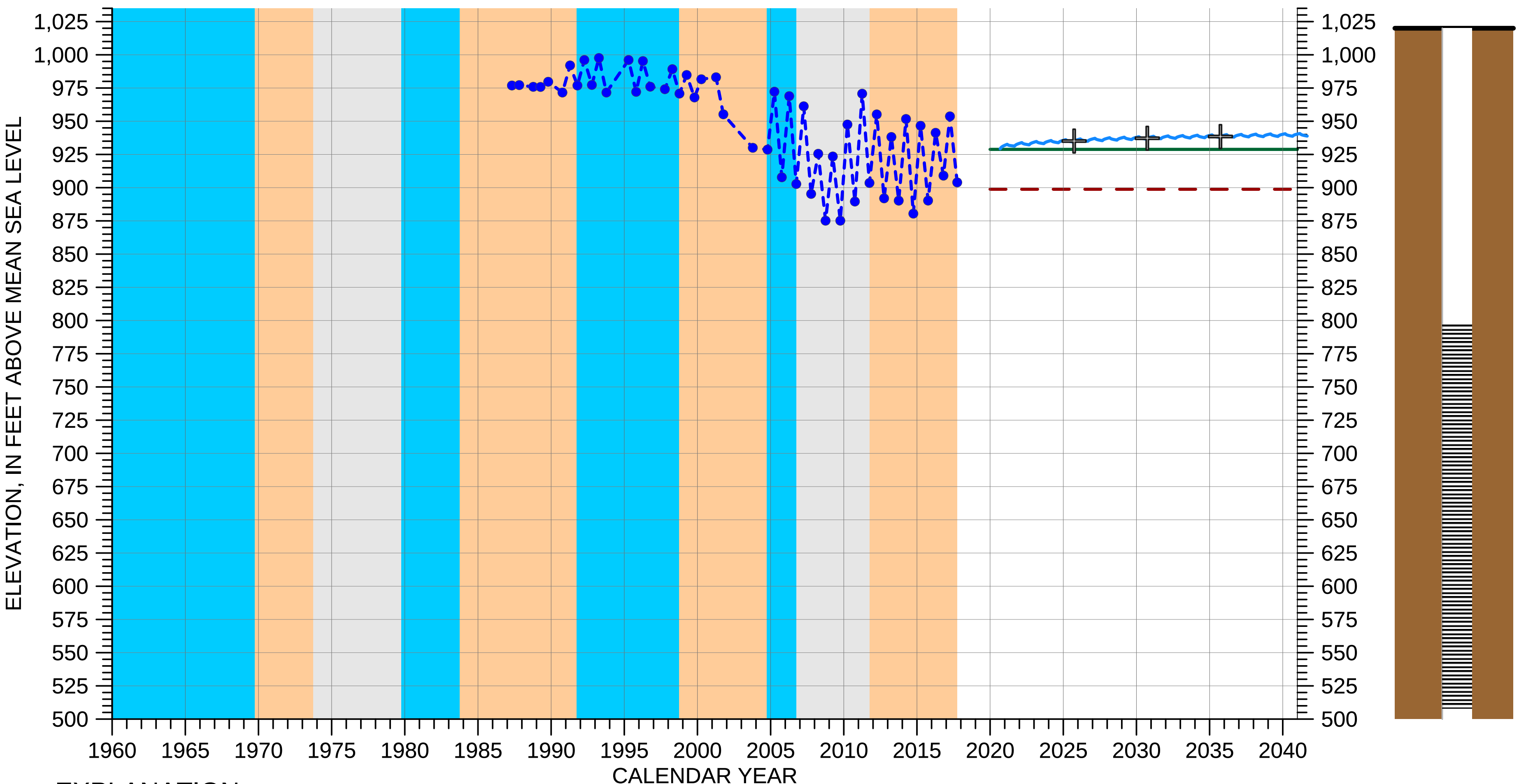


EXPLANATION

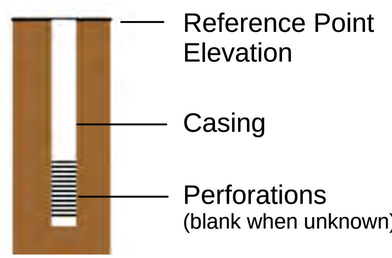
MEASURABLE OBJECTIVE
MINIMUM THRESHOLD
GROUNDWATER ELEVATION
MEASUREMENT NOT VERIFIED*
PROJECTED WATER LEVEL
INTERIM MILESTONE

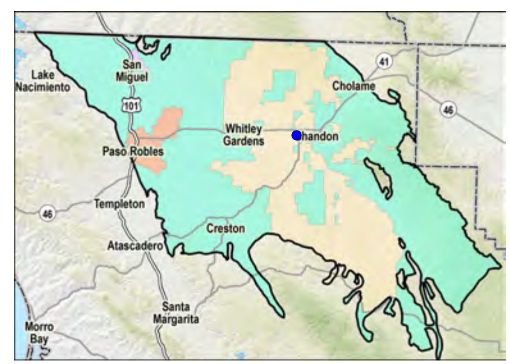
CLIMATE PERIOD CLASSIFICATION

DRY
AVERAGE/ALTERNATING
WET

Well Depth: 512
Screened Interval: 223-512 feet below ground surface
Reference Point Elevation: 1020 feet above mean sea level

* Measurement reported as not static





MEASUREABLE OBJECTIVES, MINIMUM THRESHOLDS, AND INTERIM MILESTONES FOR 26S/15E-19E01

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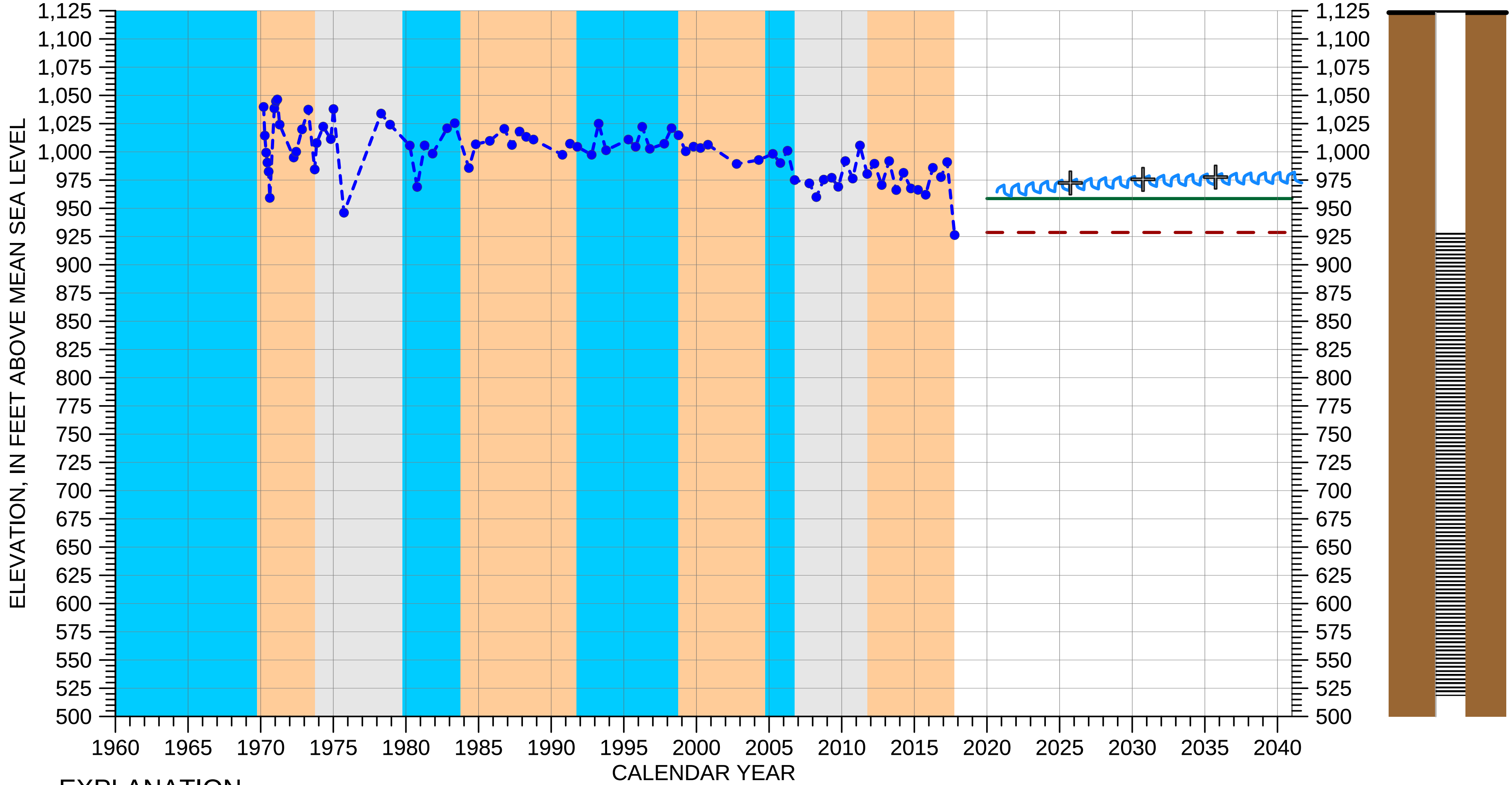


EXPLANATION

MEASURABLE OBJECTIVE

MINIMUM THRESHOLD

GROUNDWATER ELEVATION

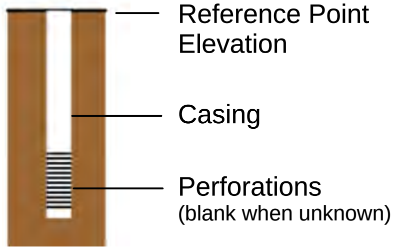
MEASUREMENT NOT VERIFIED*

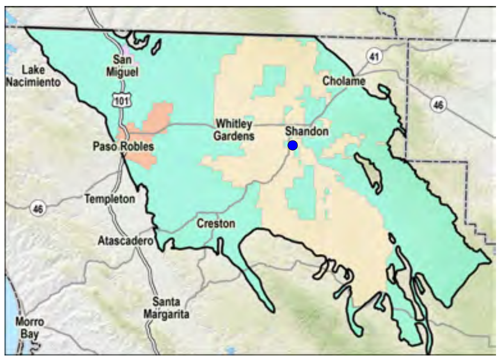
PROJECTED WATER LEVEL

INTERIM MILESTONE

CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET



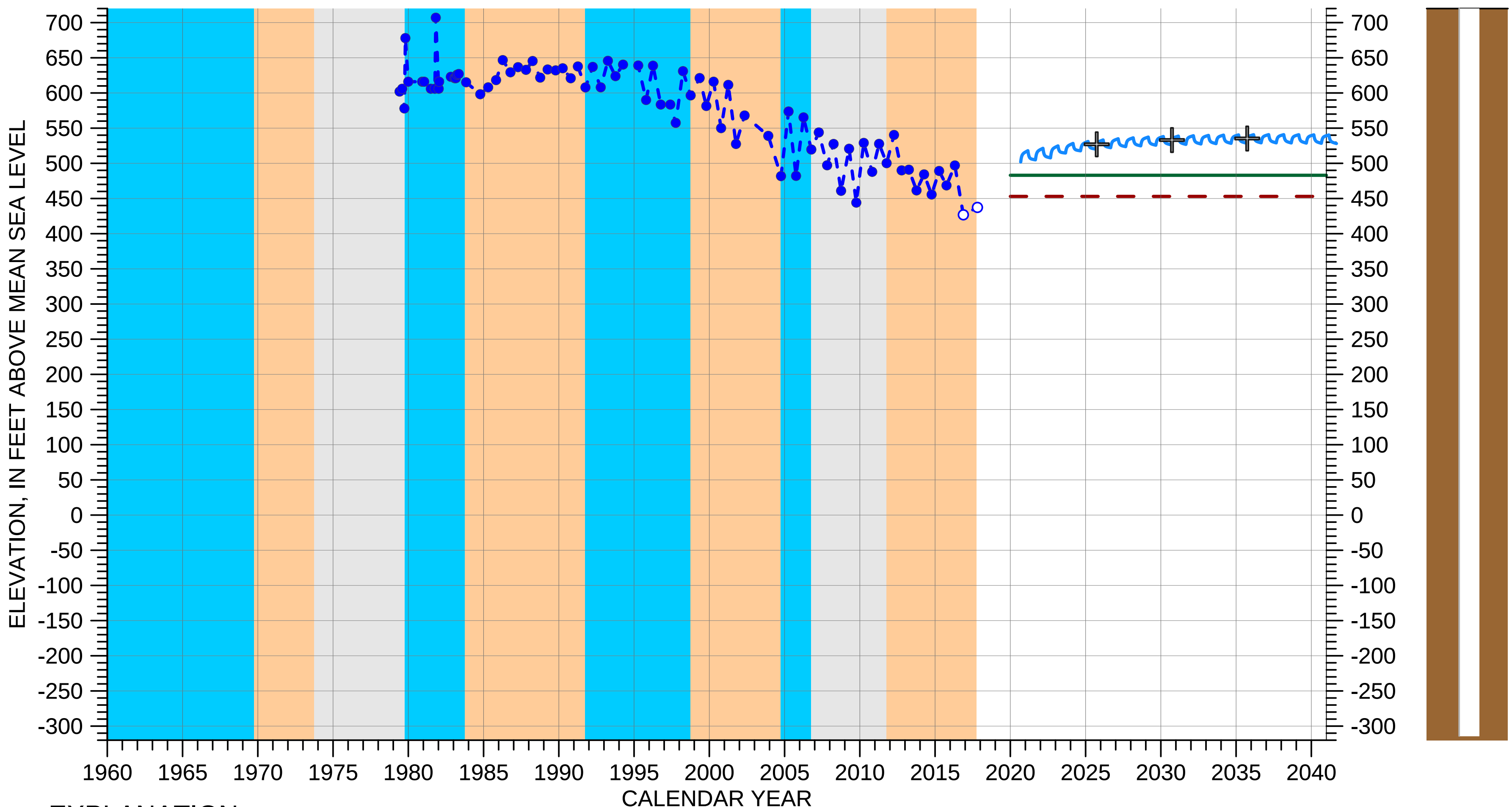


Well Depth: 605
Screened Interval: 195-605 feet below ground surface
Reference Point Elevation: 1123.3 feet above mean sea level

* Measurement reported as not static

MEASUREABLE OBJECTIVES, MINIMUM THRESHOLDS, AND INTERIM MILESTONES FOR 26S/15E-30J01

S:\projects\9200_Paso Robles GSP\GSP\Ch 9-10 Coordination Effort\Ch 9\Appendices\AppendixJ_SimulatedHydrographs\grf\ProjectedWL_2017MO_withIM\Fig18_26S_15E-30J01.grf



EXPLANATION

MEASURABLE OBJECTIVE

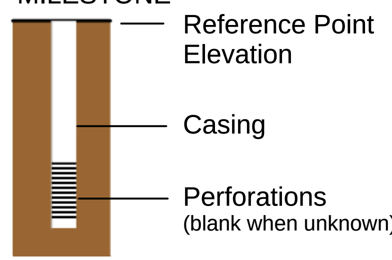
GROUNDWATER ELEVATION

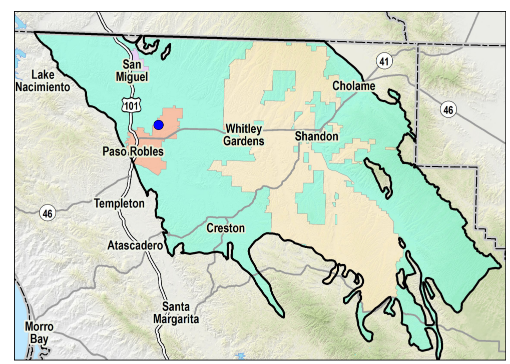
PROJECTED WATER LEVEL

MINIMUM THRESHOLD

MEASUREMENT NOT VERIFIED*

INTERIM MILESTONE





CLIMATE PERIOD CLASSIFICATION

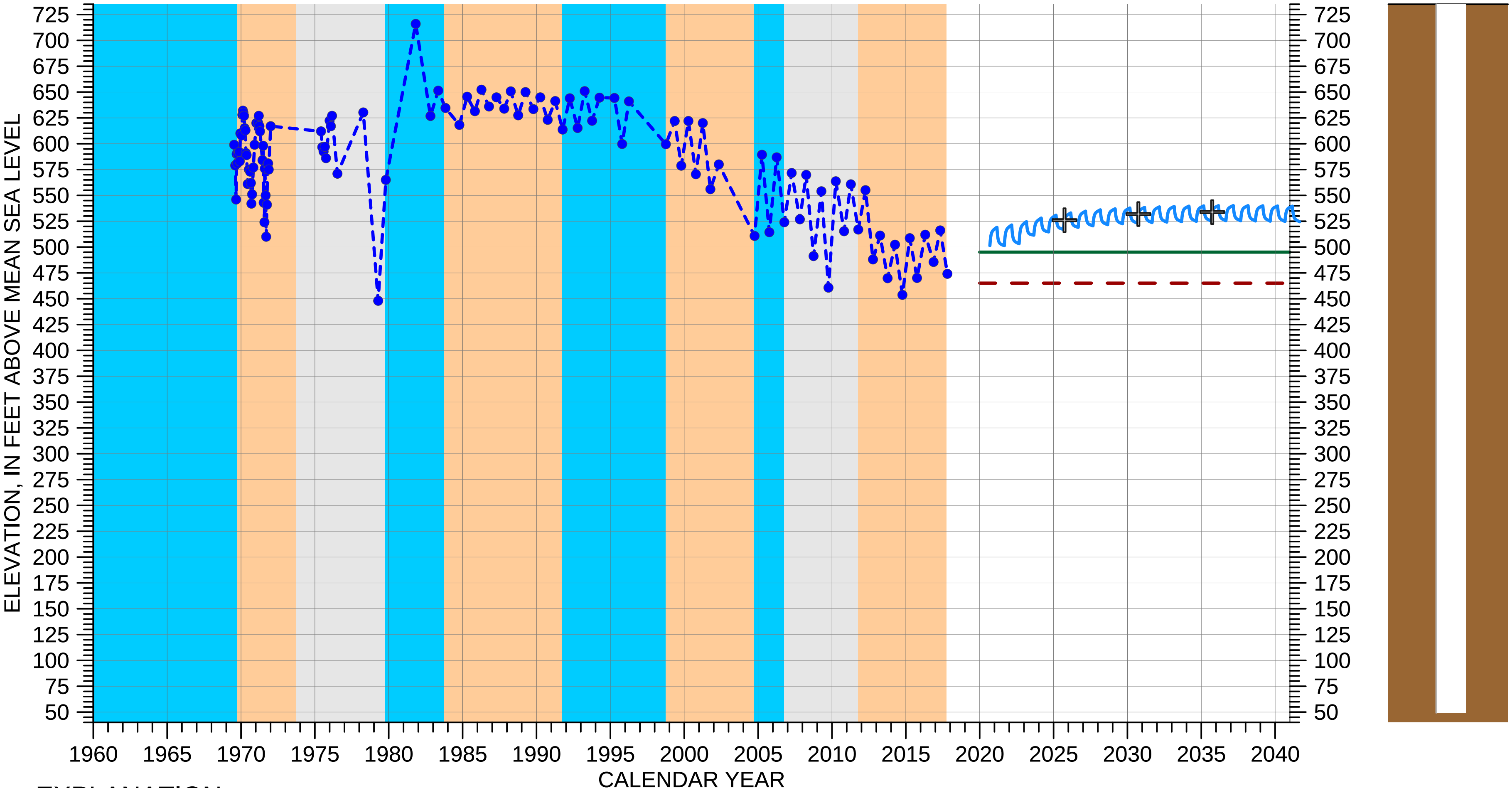
DRY AVERAGE/ALTERNATING WET

Well Depth: 1100
Screened Interval: unknown
Reference Point Elevation: 786 feet above mean sea level

* Measurement reported as not static

MEASUREABLE OBJECTIVES, MINIMUM THRESHOLDS, AND INTERIM MILESTONES FOR 26S/12E-14K01

S:\projects\9200_Paso Robles GSP\GSP\Ch 9-10 Coordination Effort\Ch 9\Appendices\AppendixJ_SimulatedHydrographs\grf\ProjectedWL_2017MO_withIM\Fig19_26S_12E-14K01.grf



EXPLANATION

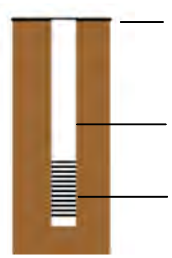
MEASURABLE OBJECTIVE
MINIMUM THRESHOLD
GROUNDWATER ELEVATION
MEASUREMENT NOT VERIFIED*
PROJECTED WATER LEVEL
INTERIM MILESTONE

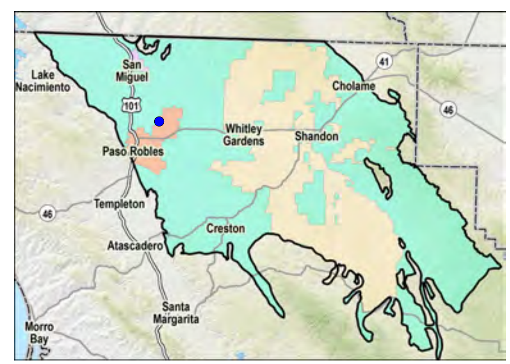
CLIMATE PERIOD CLASSIFICATION

DRY
AVERAGE/ALTERNATING
WET

Well Depth: 740
Screened Interval: unknown
Reference Point Elevation: 789.3 feet above mean sea level

* Measurement reported as not static





MEASUREABLE OBJECTIVES, MINIMUM THRESHOLDS, AND INTERIM MILESTONES FOR 26S/12E-14G01

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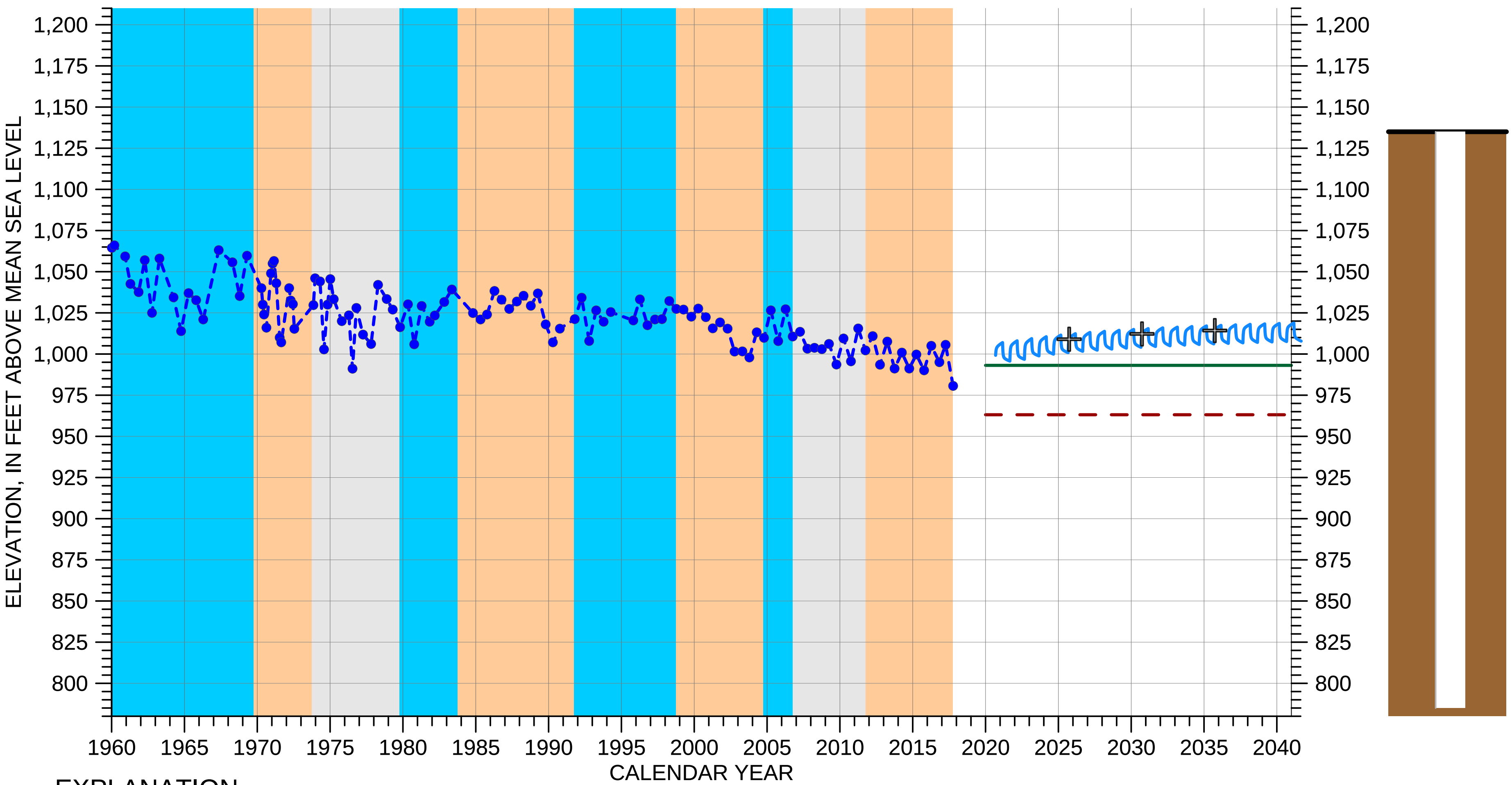


EXPLANATION

MEASURABLE OBJECTIVE

MINIMUM THRESHOLD

GROUNDWATER ELEVATION

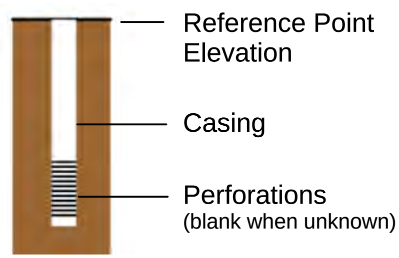
MEASUREMENT NOT VERIFIED*

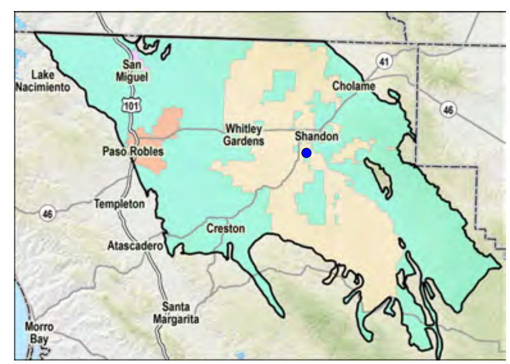
PROJECTED WATER LEVEL

INTERIM MILESTONE

CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET



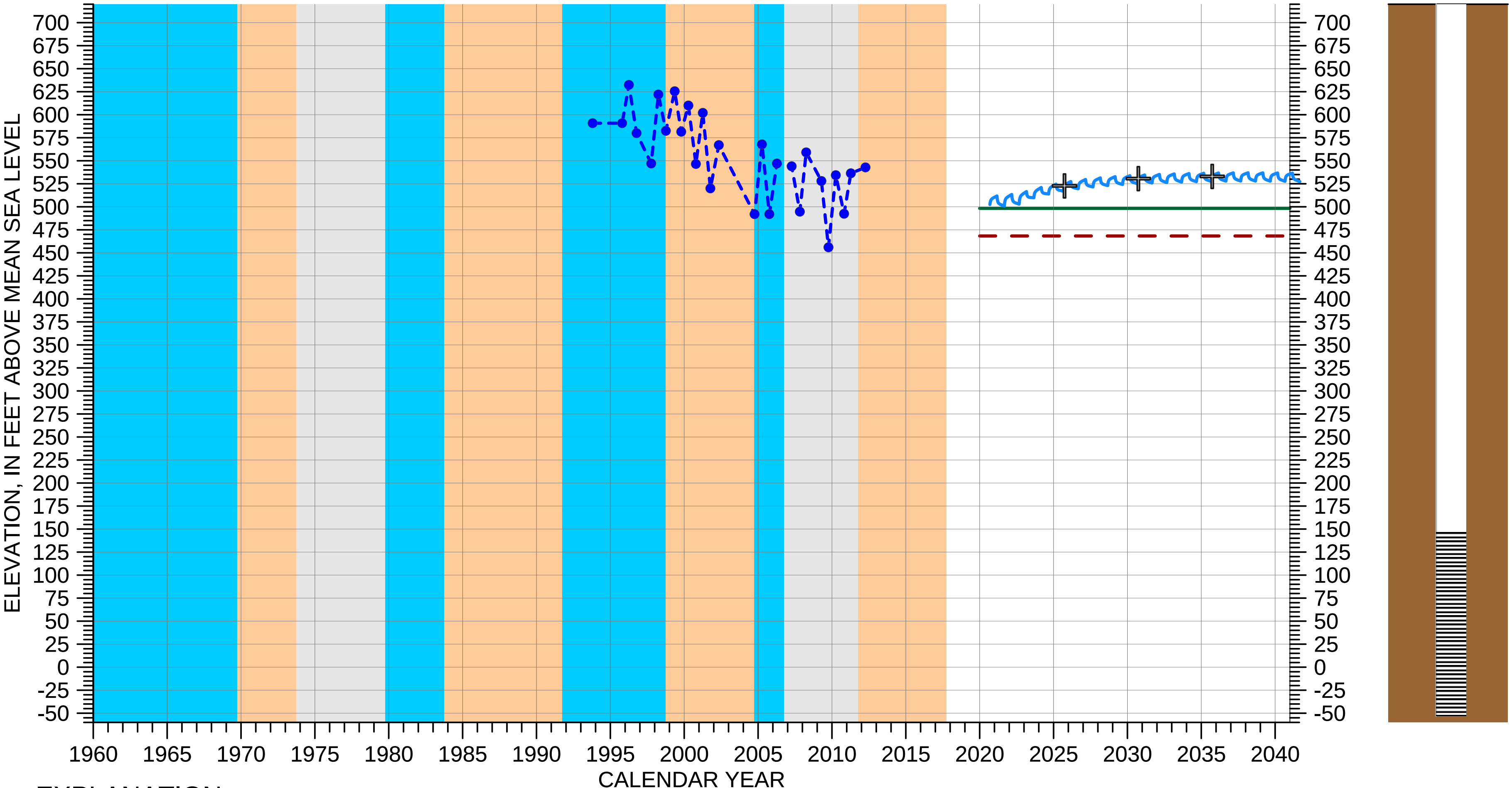


Well Depth: 350
Screened Interval: unknown
Reference Point Elevation: 1135 feet above mean sea level

* Measurement reported as not static

MEASUREABLE OBJECTIVES, MINIMUM THRESHOLDS, AND INTERIM MILESTONES FOR 26S/15E-29N01

S:\projects\9200_Paso Robles GSP\GSP\Ch 9-10 Coordination Effort\Ch 9\Appendices\AppendixJ_SimulatedHydrographs\grf\ProjectedWL_2017MO_withIM\Fig21_26S_15E-29N01.grf



EXPLANATION

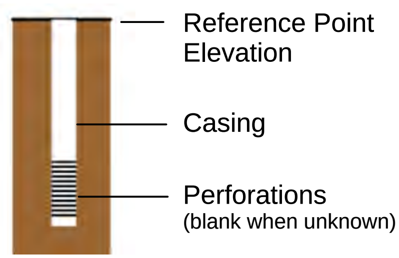
- MEASURABLE OBJECTIVE
- MINIMUM THRESHOLD
- GROUNDWATER ELEVATION
- MEASUREMENT NOT VERIFIED*
- PROJECTED WATER LEVEL
- INTERIM MILESTONE

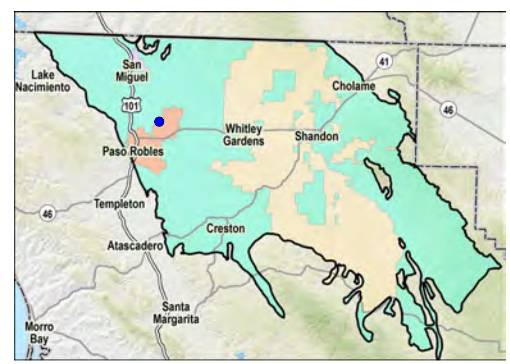
CLIMATE PERIOD CLASSIFICATION

DRY | AVERAGE/ALTERNATING | WET

Well Depth: 840
Screened Interval: 640- ~840 feet below ground surface
Reference Point Elevation: 787 feet above mean sea level

* Measurement reported as not static





MEASUREABLE OBJECTIVES, MINIMUM THRESHOLDS, AND INTERIM MILESTONES FOR 26S/12E-14G02

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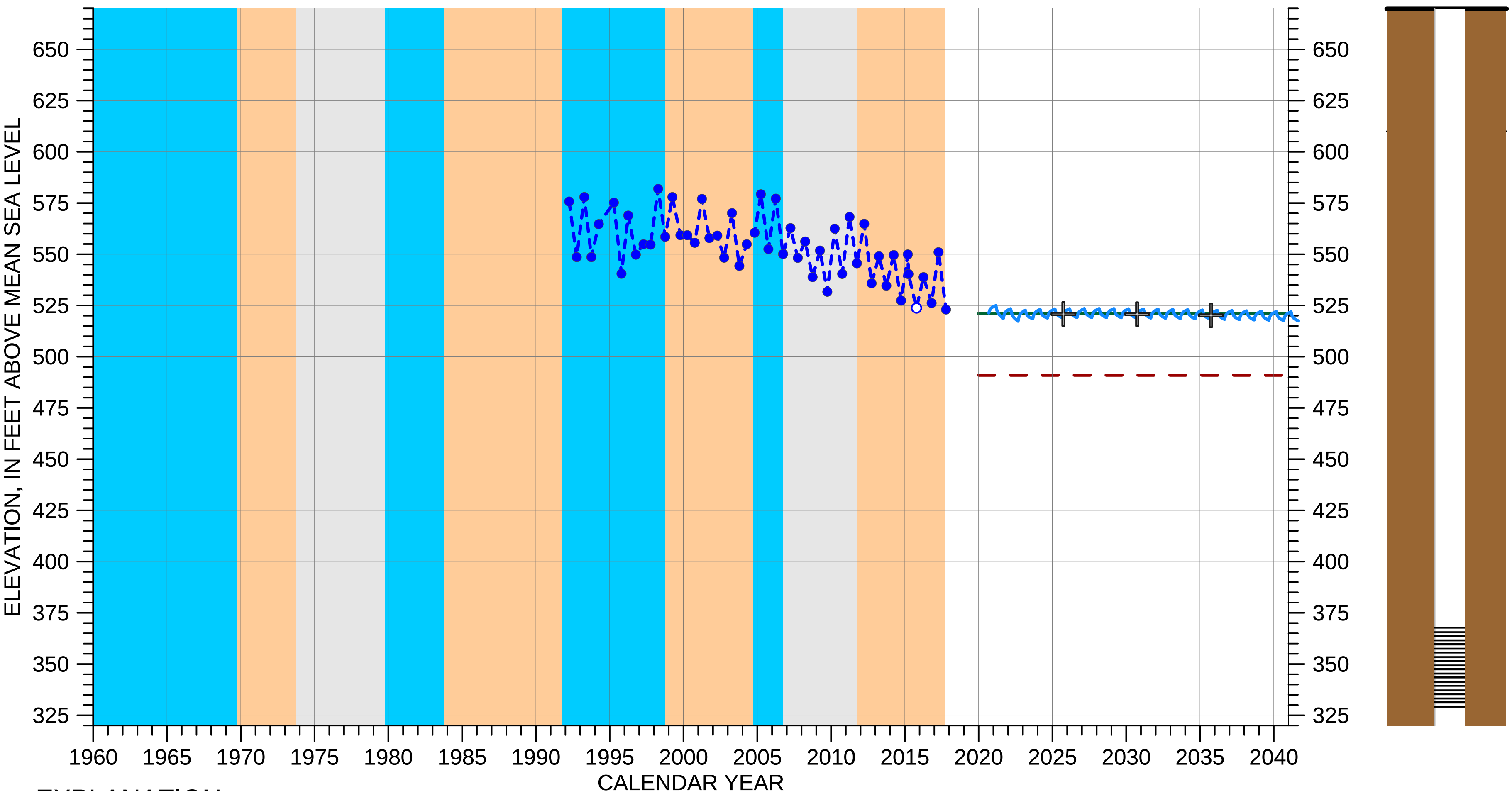


EXPLANATION

MEASURABLE OBJECTIVE

MINIMUM THRESHOLD

GROUNDWATER ELEVATION

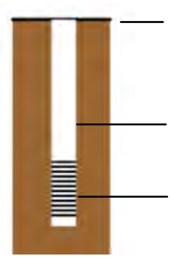
MEASUREMENT NOT VERIFIED*

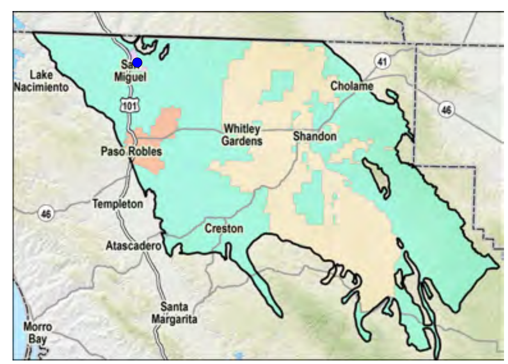
PROJECTED WATER LEVEL

INTERIM MILESTONE

CLIMATE PERIOD CLASSIFICATION

DRY | AVERAGE/ALTERNATING | WET





Well Depth: 350 feet
Screened Interval: 300-310, 330-340 feet below ground surface
Reference Point Elevation: 669.8 feet above mean sea level

* Measurement reported as not static

MEASUREABLE OBJECTIVES, MINIMUM THRESHOLDS, AND INTERIM MILESTONES FOR 25S/12E-16K05

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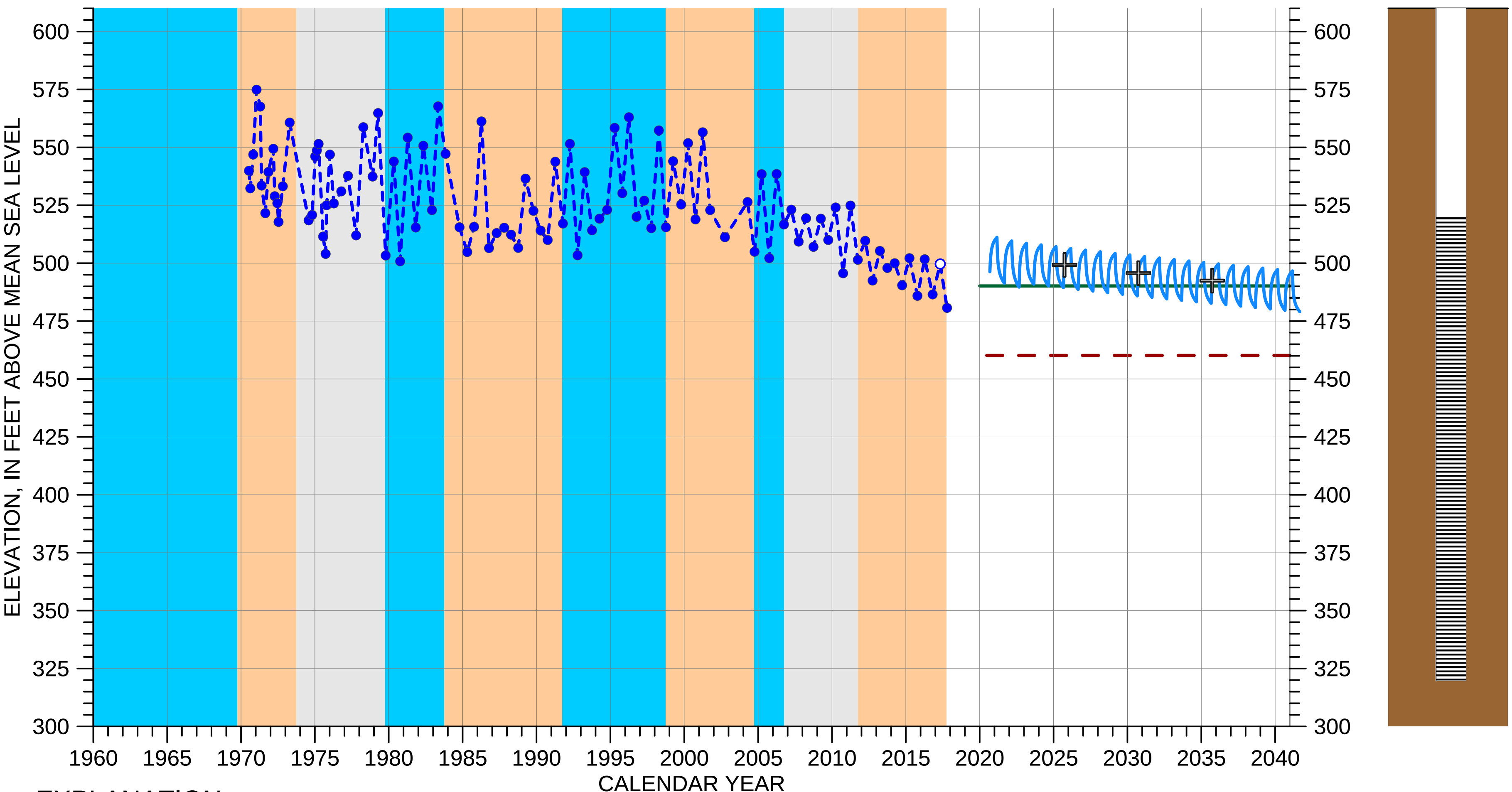


EXPLANATION

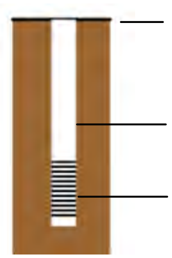
MEASURABLE OBJECTIVE
MINIMUM THRESHOLD
GROUNDWATER ELEVATION
MEASUREMENT NOT VERIFIED*
PROJECTED WATER LEVEL
INTERIM MILESTONE

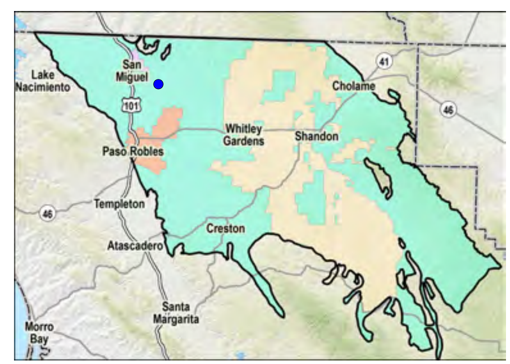
CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Well Depth: 400 feet
Screened Interval: 200-400 feet below ground surface
Reference Point Elevation: 719.7 feet above mean sea level

* Measurement reported as not static





MEASUREABLE OBJECTIVES, MINIMUM THRESHOLDS, AND INTERIM MILESTONES FOR 25S/12E-26L01

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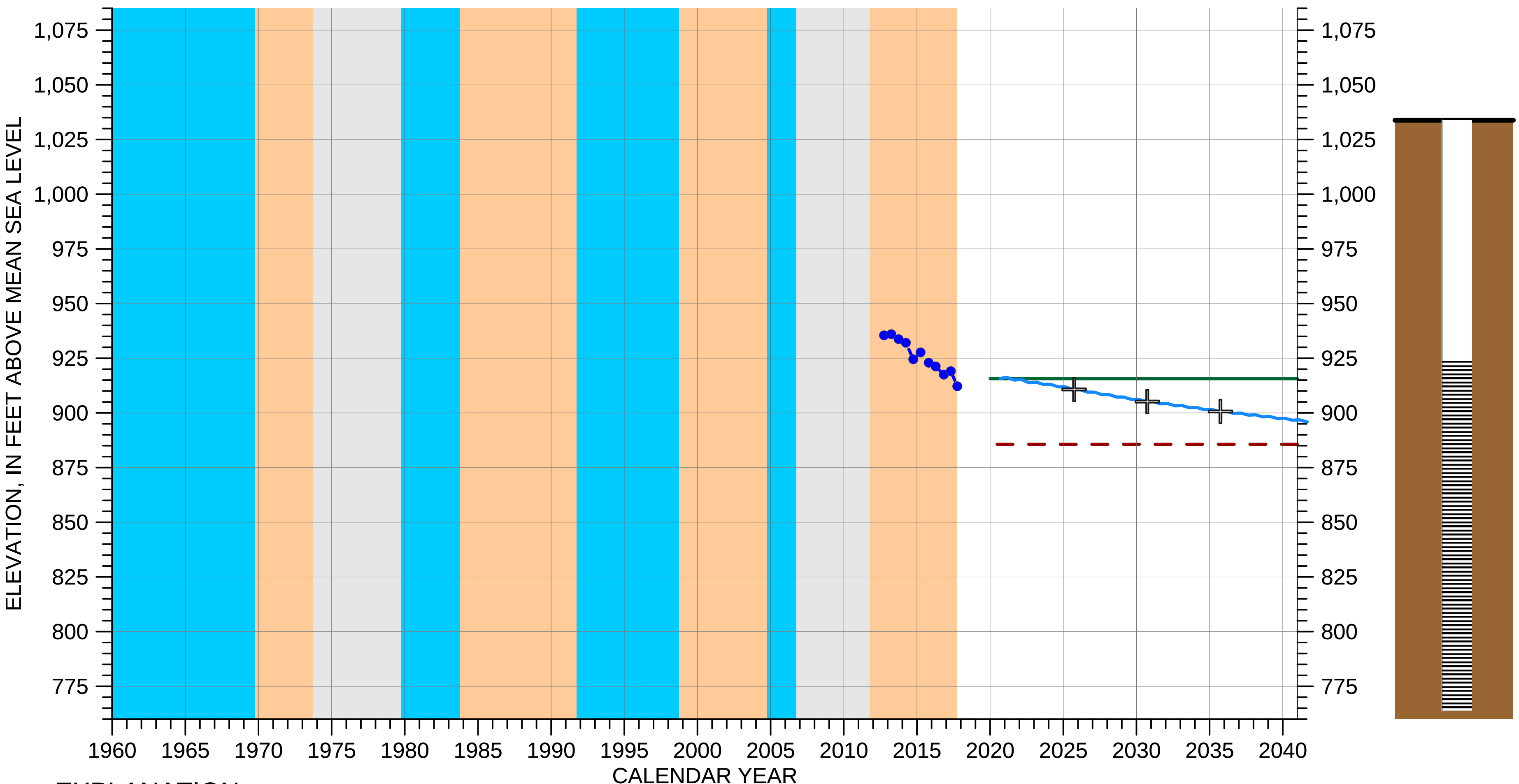


EXPLANATION

MEASURABLE OBJECTIVE

MINIMUM THRESHOLD

GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

PROJECTED WATER LEVEL

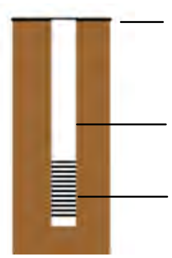
INTERIM MILESTONE

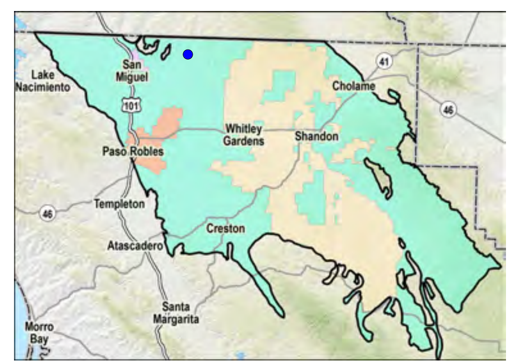
CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Well Depth: 270 feet
Screened Interval: 110-270 feet below ground surface
Reference Point Elevation: 1033.8 feet above mean sea level

* Measurement reported as not static





MEASUREABLE OBJECTIVES, MINIMUM THRESHOLDS, AND INTERIM MILESTONES FOR 25S/13E-08L02

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APPENDIX L. OTHER MANAGEMENT ACTION PROGRAM CONCEPTS, DATA GAP PLAN, AND OTHER PROJECT CONCEPTS

Programs that affected pumpers could fund to achieve necessary reductions and/or avoid undesirable results are described below.

L1.1 Well Interference Mitigation Program

GSAs have explicit authority to impose spacing requirements on new groundwater well construction to minimize well interference and impose reasonable operating regulations on existing groundwater wells to minimize well interference, including requiring extractors to operate on a rotation basis (Water Code 10726.4).

The net effect of implementing a program to mitigate well interference could be a reduction in groundwater pumping.

L1.1.1 Relevant Measurable Objectives

An interference mitigation program would benefit the groundwater elevation, groundwater storage, and land subsidence measurable objectives.

L1.1.2 Expected Benefits and Evaluation of Benefits

The primary benefit from the well interference program could be less pumping in the Subbasin. A connected secondary benefit will be mitigating the decline, or raising, groundwater elevations from reduced pumping. An ancillary benefit from stable or rising groundwater elevations may include avoiding pumping induced subsidence. Because the amount of pumping reduction from an interference mitigation program is unknown at this time, it is difficult to quantify the expected benefits.

Reductions in groundwater pumping would be measured directly through the metering and reporting program and recorded in the DMS. Changes in groundwater elevation would be measured with the groundwater level monitoring program. Subsidence would be measured with the CGPS station network. Changes in groundwater storage would be estimated using the groundwater level proxy. Information about the monitoring programs is provided in Chapter 7. Isolating the effect of the interference mitigation program on groundwater levels will be challenging because it will be only one of several management actions that may be implemented concurrently in the Subbasin.

L1.1.3 Circumstances for Implementation

The interference mitigation program would be initiated only after a GSA decides whether it will be implemented.

L1.1.4 Public Noticing

Public meetings would be held to inform the public that interference mitigation program is being considered and/or developed. The interference mitigation program would be developed in an open and transparent process. The public and interested stakeholders would have the opportunity at these meetings to provide input and comments on the process and the program elements.

L1.1.5 Permitting and Regulatory Process

The interference mitigation program may be subject to CEQA. Pumping rotation schedules and well spacing requirements may need to be implemented by establishing new ordinances.

L1.1.6 Implementation Schedule

The interference mitigation program would be developed and implemented when a GSA decides to initiate the process.

L1.1.7 Legal Authority

California Water Code §10726.4 provides GSAs the authorities to establish well spacing requirements and establish pumping rotation schedules.

L1.1.8 Estimated Cost

The cost to develop and implement the interference mitigation program is estimated to be up to $750,000 depending on the final components included. The estimated cost of the CEQA permitting process and the annual cost of data collection, data management, and program compliance are unknown at this time.

L1.2 Groundwater Conservation Program

A groundwater conservation program could be implemented to achieve the necessary limitations in groundwater pumping. This program could include elements that would facilitate compensating landowners for fallowing or retiring agricultural land, incentivize water use efficiency through a tiered pumping fee structure, and/or facilitate the development of projects. The program would need adequate monitoring and oversight to ensure there are no unintended consequences from implementing the program elements and projects. The GSA would likely conduct substantial public outreach and hold meetings to educate and solicit input on the groundwater conservation program and any proposed elements. This outreach program would be designed to ensure that the conservation program is equitable to all beneficial groundwater users and uses, and that it is consistent with groundwater laws and water rights.

Substantial negotiation among Subbasin groundwater users and public input would be needed to develop an equitable fee structure and the details of a groundwater conservation program. The groundwater conservation program would be developed with the intent of providing groundwater pumpers flexibility in how they manage water. Some groundwater pumpers may choose to reduce pumping, others may choose to coordinate through the groundwater conservation program with neighbors retiring land or paying for projects.

L1.2.1 Relevant Measurable Objectives

The groundwater management program would benefit the groundwater elevation, groundwater storage, and land subsidence measurable objectives.

L1.2.2 Expected Benefits and Evaluation of Benefits

The primary benefit from implementing a groundwater conservation program is reduced Subbasin pumping. A connected benefit of reduced pumping is mitigating the decline, or raising, groundwater elevations. An ancillary benefit from stable or increasing groundwater elevations may include avoiding pumping induced subsidence. The program is designed to ramp down pumping to the sustainable yield; therefore, the quantifiable benefit is to maintain pumping within the sustainable yield.

Reductions in groundwater pumping would be measured directly through the metering and reporting program and recorded in the DMS. Changes in groundwater elevation are an important metric for the groundwater conservation program and would be measured with the groundwater level monitoring program. Subsidence would be measured with the CGPS station network. Changes in groundwater storage would be estimated using the groundwater level proxy. Information about the monitoring programs is provided in Chapter 7. Isolating the effect of the groundwater conservation program on sustainability metrics will be challenging because it would be only one of several management actions that may be implemented concurrently in the Subbasin. However, as the program is initiated, the correlation between reduced pumping and higher groundwater levels may become more apparent.

L1.2.3 Circumstances for Implementation

The groundwater conservation program would be developed and implemented when a GSA decides to initiate the process.

L1.2.4 Public Noticing

Public meetings will be held to inform groundwater pumpers and other stakeholders that the groundwater conservation program is being developed. The groundwater conservation program would be developed in an open and transparent process. Groundwater pumpers and other stakeholders would have the opportunity at these meetings to provide input and comments on the process and the program elements.

L1.2.5 Permitting and Regulatory Process

A groundwater conservation program is subject to CEQA. A groundwater conservation program would be developed in accordance with all applicable groundwater laws and respect all groundwater rights. Depending on the funding approach agreed to for developing this management action, the fee structure and its justification developed as part of the groundwater conservation program would need to meet all California Constitutional requirements related to government funding mechanisms.

L1.2.6 Implementation Schedule

Developing and implementing a groundwater conservation program would likely take approximately two years, which includes time for conducting the required funding procedures.

L1.2.7 Legal Authority

California Water Code §10730 and §10730.2 provide GSAs the authorities to impose fees, including fees on groundwater pumping.

L1.2.8 Estimated Cost

The cost to develop and implement a groundwater conservation program is estimated to be $750,000. This does not include the cost of the CEQA permitting or any ongoing program oversight.

L2 DATA GAP PLAN

L2.1 Groundwater Level Monitoring Network and Supplemental Hydrogeologic Investigation

Monitoring groundwater levels in the Subbasin will be the most important monitoring activity during GSP implementation. Changes in groundwater levels will be the primary metric to document progress toward measurable objectives or avoiding undesirable results. Additional monitoring wells and more groundwater level data are needed to adequately characterize groundwater levels throughout the Subbasin for GSP implementation and meet State standards. Additionally, a better understanding of geologic conditions, and the impact of these conditions on groundwater flow in the Subbasin, is needed. These are key data gaps that will be addressed early during implementation. To address these data gaps, supplemental hydrogeologic investigations will be conducted by the GSAs during the first years of implementation after funding is available.

The overarching goal of the supplemental hydrogeologic investigations will be to sufficiently improve understanding of the hydrogeologic conceptual model of the Subbasin to support an equitable decision making process and adaptive management of the programs designed to achieve sustainability. The supplemental hydrogeologic investigations will be conducted in tandem with improving the groundwater level monitoring network. The investigation will rely on existing information first and conduct additional investigation to address targeted data gaps. To achieve the broad investigation goal, the following activities may be conducted as part of the supplemental hydrogeologic investigation.

- Compilation and evaluation of a broader dataset of existing groundwater levels
- Deployment of automated groundwater level monitoring devices in some monitoring wells
- Video logging of existing wells
- Initiation of monitoring in additional existing wells
- Drilling new dedicated monitoring wells
- Geophysical surveys to improve understanding of geologic conditions and structures
- Characterizing groundwater movement between Subbasin watersheds
- Pumping tests to estimate aquifer properties and characterize groundwater flow conditions in specific areas of the Subbasin

- Refinement and recalibration of the existing groundwater model or use of a new model when sufficient data become available
- Targeted groundwater quality sampling and incorporating groundwater data already collected under other regulatory programs

An additional data gap related to surface water and groundwater interconnectivity was also identified. A specific study to address this data gap is proposed in Section 9.3.1.5.6.

Results of the supplemental hydrogeologic investigation will be summarized in a report. Investigation results will support many important decisions made collectively by the GSAs or individually during implementation, including for example

- Developing a framework to evaluate and project groundwater level trends relative to minimum thresholds and undesirable results, and to establish triggers for initiation of public outreach and hearings on the need for and equitable implementation of sustainability programs and/or projects
- Adjusting sustainable yield
- Defining areas of the Subbasin in need of specific action and where management actions and or projects would be appropriate and beneficial.

New data gaps may be identified during the supplemental hydrogeologic study that would be addressed, if needed, in future investigations.

L2.2 Improve Monitoring Network

Specific data gaps were identified in Chapter 7, Monitoring Networks, related to the groundwater level monitoring network, including insufficient coverage of wells in the Paso Robles Formation Aquifer, and a lack of wells in the Alluvial Aquifer. The general plan for adding monitoring wells and Representative Monitoring Sites (RMSs) to the monitoring network will be to first incorporate existing wells. If an existing well cannot be identified or permission to use data from an existing well cannot be secured to fill a data gap, then a new monitoring well will be drilled. A system for registering monitoring wells for the GSP monitoring network will be developed. Additional information on the process for addressing data gaps and implementing groundwater level monitoring is provided below.

L2.2.1 Verify Current Network

The proposed RMS sites will be verified for inclusion in the monitoring network and data gaps will be confirmed. Before monitoring starts under the GSP, the GSAs will contact owners of all wells identified as RMS in the current network to negotiate a new access agreement that will allow routine monitoring and reporting of data from the well, and possibly provisions for compensating well owners for use of their well. RMS wells will be inspected to verify total depth and screened interval (video logging may be required) and ensure the static groundwater level can be measured in accordance with monitoring protocols. The aquifer designation will be verified or designated.

L2.2.2 Expand Network

Additional monitoring wells and RMSs are needed for the groundwater level monitoring network in order to meet State standards. Existing wells not currently in the network may be added or new wells may be drilled.

Existing Wells. Existing wells in data gap areas will be identified for possible incorporation into the monitoring network. There are approximately 90 confidential wells in the Subbasin that have been monitored by the SLOFCWCD since 2012 that could be used to fill data gaps if a new access agreement can be secured with the well owners to allow use of groundwater level data from the well. Additionally, the County of SLO is developing a database of wells that will be used for identifying additional monitoring wells. During GSP development, some well owners offered access to their wells for monitoring purposes; these wells will also be considered. All of these potential sources for adding existing wells to the network will be used. In addition, the GSAs will conduct routine public outreach to identify other willing well owners to participate in the monitoring network. All candidate existing wells for incorporation into the monitoring network will be inspected to ensure they are adequate for monitoring and to determine depth, perforated intervals, and aquifer designation. Access agreements will be secured with well owners to ensure that data can be reported from the wells.

New Wells. New wells will be drilled in data gap areas where existing wells do not exist or areas where access to existing wells could not be secured. The GSAs will obtain required permits and access agreements before drilling new wells. The GSAs will retain the services of licensed geologists or engineers and qualified drilling companies for drilling new wells. The GSAs will evaluate the availability of grant funds through DWR for new wells. Once drilled, the new wells will be tested as necessary and equipped for monitoring. All well construction information, including the aquifer that is being monitored, will be registered with the well.

L2.2.3 Begin Monitoring Program

Groundwater level monitoring under the GSP will begin in 2020. Monitoring will adhere to protocols outlined in Chapter 7, Monitoring Networks, or new protocols developed under the GSP. Annually, monitoring data will be analyzed and presented in the following ways:

- Check and verify data then upload data to the Data Management System

- Prepare seasonal water level contour maps of both aquifers and evaluate changes
- Compare data to sustainable management criteria at RMS
- Analyze impacts of projects and actions.

Data will be included in the annual report to DWR.

L2.2.4 Evaluate Monitoring Network

As part of annual reporting, the monitoring network and current RMSs will be evaluated to ensure that they are sufficient to meet monitoring objectives and track Subbasin groundwater levels relative to Sustainable Management Criteria. Results of this evaluation could lead to further expansion of the monitoring network or omission of monitoring wells deemed unnecessary for monitoring objectives.

Groundwater Storage Monitoring Network

The GSAs will monitor groundwater levels as a proxy for assessing change in groundwater storage. Therefore, the groundwater level monitoring network will also be used for monitoring the reduction in groundwater storage sustainability indicator. Data gaps in the groundwater storage monitoring network are similar to the data gaps identified for the groundwater level monitoring network. However, most of the change in groundwater storage occurs near the water table, so sufficient water table monitoring wells are needed, including in the Paso Robles Formation Aquifer where most of the groundwater pumping occurs.

The need for additional water table wells will assessed by evaluating existing wells that are screened at or near the existing water table in the Paso Robles Formation Aquifer. If additional wells are needed, the steps described in Section 10.3.1 for expanding the current network will be followed.

Water Quality Monitoring Network

Under the GSP, water quality monitoring will be conducted in existing public water supply wells and agricultural supply wells. Initially, the current RMSs identified in Chapter 7 will be verified for inclusion in the monitoring network. The current network of RMSs for water quality has adequate spatial coverage to assess impacts to beneficial uses and users from actions taken in response to implementing the GSP. The primary data gap for water quality monitoring is the lack of well construction information for many of the supply wells in the monitoring network. Additional wells may be necessary to monitor impacts of projects and actions on water quality.

2.2.4.1 Verify Current Network

Before monitoring begins, the owner, operational status, construction details, and aquifer designation of all supply wells incorporated into the current network will be verified or determined. New information on supply wells will be added to the Data Management System. Supply wells used for water quality monitoring will be registered under the GSP well registration program. During the verification process, if other public or agricultural supply wells are identified that are deemed to improve the network, they may be added to the network.

2.2.4.2 Begin Monitoring Program

Water quality monitoring under the GSP will begin in 2020. Monitoring will adhere to protocols outlined in Chapter 7, Monitoring Networks, or new protocols developed under the GSP. For the most part, water quality monitoring and data reporting are already conducted by individual well owners as part of other regulatory programs for both public water supply wells and agricultural irrigation wells, as described in Chapter 7. These reported monitoring data will be used for the GSP.

Annually, monitoring data will be compiled, analyzed, managed, and presented in the following ways:

- Downloaded from public databases
- Check and verify data then upload data to the Data Management System
- Prepare data summary tables and figures
- Compare data to Sustainable Management Criteria at RMS
- Analyze impacts of projects and actions

Monitoring results will be included in the annual report to DWR.

2.2.4.3 Evaluate Monitoring Network

As part of annual reporting, the monitoring network and current RMSs will be evaluated to ensure that they are sufficient to meet monitoring objectives and track Subbasin groundwater quality relative to Sustainable Management Criteria. Results of this evaluation could lead to further expansion of the monitoring network or omission of monitoring wells deemed unnecessary for monitoring objectives.

Land Subsidence Monitoring Network

Land subsidence monitoring will be conducted using existing CGPS sites as described in Chapter 7, Monitoring Networks. Data from the CGPS are managed by UNAVCO. Data obtained from

UNAVCO will be evaluated to verify they are adequate for determining whether subsidence is occurring and for inclusion in the monitoring network. Data gaps related to the land subsidence monitoring network were not identified in Chapter 7. If the existing CGPS sites are determined to be inadequate for use under the GSP, then new land surface elevation monitoring devices will be deployed and/or alternate monitoring methods will be considered.

2.2.4.4 Conduct Monitoring

Land subsidence monitoring under the GSP will begin in 2020. As a first step, protocols for obtaining, evaluating, and using land surface elevation data from the CGPS sites will be developed. Annually, land surface elevation data will be analyzed and presented in the following ways:

- Download data from public database(s), including the USGS California Water Science Center and DWR
- Check and verify data then upload data to the Data Management System.
- Prepare summary tables and figures
- Compare data to sustainable management criteria at RMS

Results will be included in the annual report to DWR.

2.2.4.5 Evaluate Monitoring Network

As part of annual reporting, the monitoring network and current RMSs will be evaluated to ensure that they are sufficient to meet monitoring objectives and track Subbasin land surface elevations relative to Sustainable Management Criteria. Results of this evaluation could lead to further expansion of the monitoring network or omission of monitoring sites deemed unnecessary or inadequate for monitoring objectives. For land subsidence, an effort to identify other relevant subsidence data or studies will be conducted biannually.

Evaluating Interconnected Surface Water

As discussed in Chapter 5, the consensus among local groundwater experts is that there is no interconnection between surface water and groundwater in the Subbasin. Therefore, sustainable management criteria and an associated monitoring network for interconnected surface water and groundwater were not developed for the GSP. However, the GSAs value riparian and all native vegetation and communities and recognize that if new data from streamflow, stream geometry and groundwater level data near streams show a surface water and groundwater interconnection that the GSP will be updated to include them. To that end, the GSAs will conduct periodic investigation of areas of potential interconnected surface water and groundwater in the Subbasin.

The GSAs will develop and conduct a hydrogeologic investigation to establish whether or not interconnected surface waters exist in the Subbasin. The overall goal of this investigation is to obtain sufficient stream flow, stream geometry and groundwater level data in areas of potential interconnection to quantitatively determine if and when surface and groundwater water are interconnected. More specifically, the investigation could include gathering the following data as resources allow.

Shallow Groundwater Levels. The first step will be to identify existing wells that monitor shallow groundwater levels adjacent to streams. These wells will most likely be screened in the Alluvial Aquifer. If existing wells are identified and deemed adequate based on an inspection, an agreement will be secured with the well owner to incorporate the well into the investigation and report data from the well. If existing wells cannot be identified or accessed, then GSA(s) may consider drilling new monitoring wells.

Streamflow Monitoring. Streamflow conditions will also be evaluated. Data gathering may include walking or drone surveys, historical photos, local observations, and automated camera and stream gages in key reaches. USGS stream gaging data will also be evaluated. It may be necessary to verify the accuracy of existing stream gages and install new or additional stream gaging equipment.

It is expected that streamflow and shallow groundwater monitoring will continue until sufficient data are obtained to improve understanding of the relationship between surface water and shallow groundwater. If stream flow surveys or data suggests interconnected surface water and groundwater exists in the Subbasin, the GSP will be updated include this information, including related Sustainable Management Criteria and an appropriate monitoring program.

Groundwater Model Updates

After sufficient new data from monitoring programs, the supplemental hydrogeologic investigation, and other sources have been evaluated, the GSAs will consider the value of refining, updating, and recalibrating the GSP model or replacing it with a new open source model. New data and refinements to the hydrogeologic conceptual model, and possibly the updated numerical model, would be used for the following analyses:

- Refining the aquifer parameters and model input values
- Updating the estimated sustainable yield of the Subbasin
- Evaluating benefits of alternative sustainability programs or projects

The USGS is developing a regional groundwater model for the entire Salinas Valley, including the Paso Robles Subbasin. The GSAs will work with the USGS to coordinate modeling efforts and leverage modeling efficiencies where available.

L3 OTHER PROJECT CONCEPTS

Four other conceptual projects are summarized in the table below for future consideration to help stabilize groundwater levels and avoid undesirable results.

Other Project Concept

Project Name	Water Supply	Amount (AFY)
Delivery to Southwestern Subbasin Area	SWP	2,200
Delivery to Eastern Subbasin Area	SWP	930
Delivery to North of City of Paso Robles	NWP	1,500
Flood Flow Capture and Delivery North of City of Paso Robles	Salinas River	164

Appendix M

Communication and Engagement Plan

COMMUNICATION & ENGAGEMENT PLAN

FOR THE PASO ROBLES SUBBASIN GROUNDWATER SUSTAINABILITY PLAN

JULY 2018

Paso Robles Subbasin Groundwater Sustainability Agencies

- *County of San Luis Obispo*
- *City of Paso Robles*
- *San Miguel Community Services District*
- *Heritage Ranch Community Services District*
- *Shandon San Juan Water District*




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1.0 INTRODUCTION

In 2015, the California state legislature approved a new groundwater management law known as the Sustainable Groundwater Management Act (SGMA). SGMA requires local agencies in medium- and high-priority groundwater basins, as designated by the California Department of Water Resources (DWR), to form Groundwater Sustainability Agencies (GSAs) and prepare Groundwater Sustainability Plans (GSPs). Because the Paso Robles Subbasin[1] (DWR Bulletin 118 Basin No. 3-4.06) has been designated as a high-priority basin subject to critical conditions of overdraft, the Paso Robles Subbasin GSP is due by January 31, 2020. Whereas, other medium- and high- priority basins not subject to critical conditions of overdraft are due January 31, 2022. During the GSP preparation process, GSP Regulations require public outreach and engagement with basin users, the public, and other stakeholders (collectively referred to in this document as Interested Parties).

The purpose of this Communication and Engagement Plan (C&E Plan) is to outline the process for Interested Parties' involvement in the development of a GSP for the Paso Robles Subbasin.

About Paso Robles Subbasin

The Paso Robles Subbasin lies in northern San Luis Obispo County and extends into southern Monterey County. The Subbasin is bounded by the Santa Lucia Range on the west, the La Panza Range on the south, and the Temblor and Diablo Ranges on the east. The **Figure 1** shows the Paso Robles Subbasin and the GSAs formed therein.

Basin Boundary Modifications

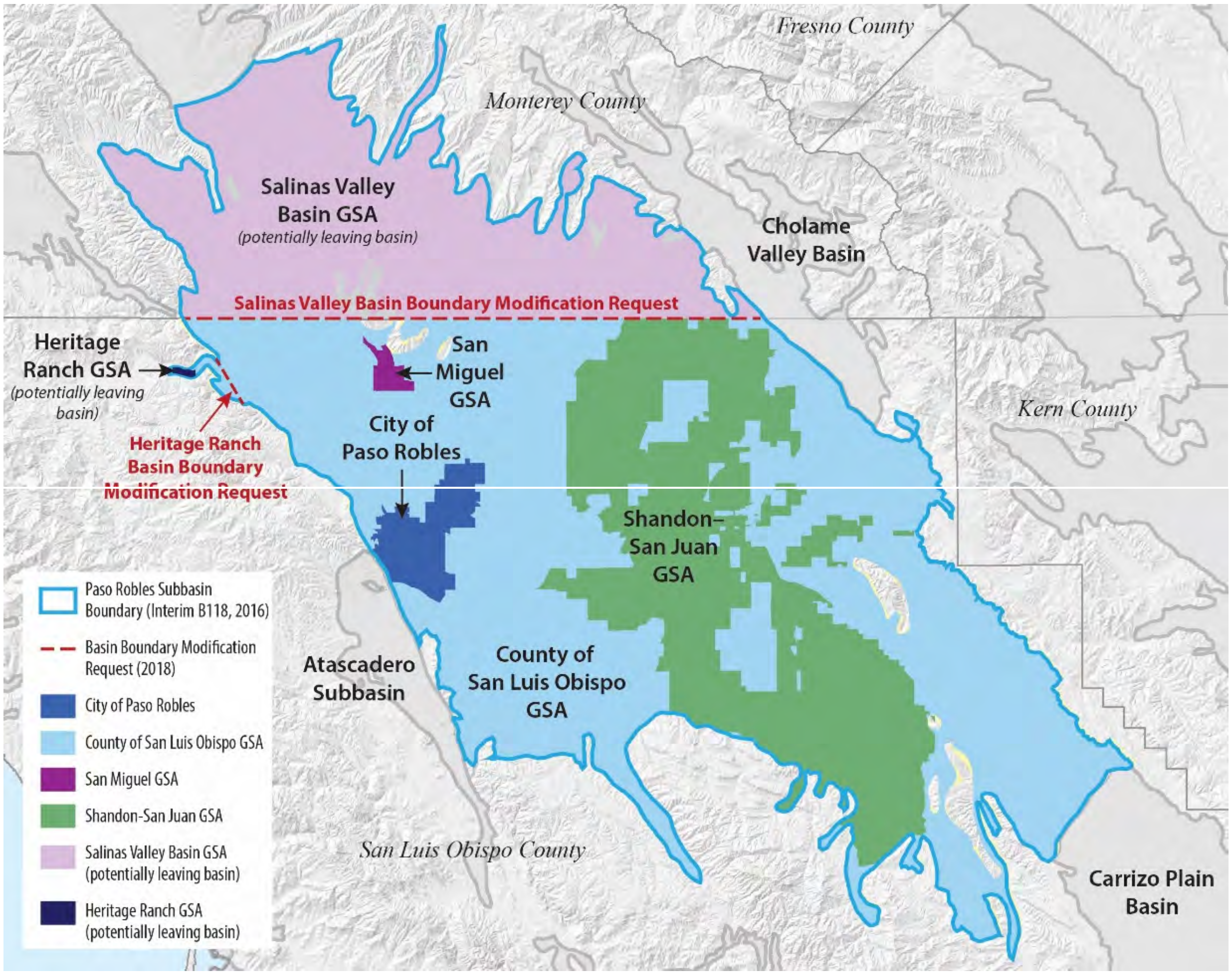
Two GSAs currently included in the Paso Robles Subbasin have filed initial notifications to DWR for a basin boundary modification which would cause them to leave the Paso Robles Subbasin.

- **Salinas Valley Basin GSA** (SVBGSA) submitted an initial notification on May 1, 2018 and a basin boundary modification request on July 5, 2018 to DWR regarding a jurisdictional internal boundary modification at the County line. If SVBGSA is granted the basin boundary modification, they will modify the border between the Upper Valley Aquifer and Paso Robles Subbasin to coincide with the Monterey/San Luis Obispo County line resulting in the Paso Subbasin lying wholly in San Luis Obispo County. The Paso Robles Subbasin GSAs support this request.
- **Heritage Ranch CSD GSA** submitted an initial notification on April 23, 2018 and a basin boundary modification request on June 27, 2018 to DWR regarding a scientific external boundary modification. If the request is granted, the Heritage Ranch CSD GSA area will be excluded from the Paso Robles Subbasin.

If either of these GSAs are granted a basin boundary modification, the Paso Robles Subbasin GSAs will continue to engage and coordinate with them as needed to achieve sustainable groundwater management.

[1] Formally, the Paso Robles Area Subbasin of the Salinas Valley Groundwater Subbasin

Figure 1. ***Paso Robles Subbasin and GSA Boundaries***



Formation of a Single GSP Memorandum of Agreement

In September 2017, through a Memorandum of Agreement (MOA), five GSAs that were formed under the DWR GSA process collectively agreed to develop one GSP for the portion of the Paso Robles Subbasin in San Luis Obispo County. As part of the MOA (Section 4.4(D)) they also decided to collectively develop a stakeholder participation plan that includes public outreach and involves Interested Parties in developing the GSP. These GSAs include:

- Paso Basin – County of San Luis Obispo GSA
- City of Paso Robles GSA
- San Miguel Community Services District GSA
- Shandon–San Juan GSA
- Heritage Ranch Community Services District GSA *(currently seeking basin boundary modification)*

The GSAs above will work together to develop the Paso Subbasin GSP. To streamline GSP development, each GSA provides a representative to serve on the Paso Subbasin Cooperative Committee ("Cooperative Committee"). Details about the Cooperative Committee are discussed in Section 4.0 GSAs' DECISION-MAKING PROCESS.

Our Promise

The Cooperative Committee, comprised of representatives of the five GSAs, *commit to developing a recommended GSP that will safeguard our local groundwater resources through sustainable management and to preserve this invaluable water supply source for future generations. We commit to work with Interested Parties to ensure that their concerns and inputs are considered in GSP development.*

C&E Plan as a Roadmap

This C&E Plan serves as a roadmap to meet the statutory requirements of SGMA and the GSP Regulations as outlined in **Appendix A** and, more importantly, serves to create common understanding and transparency among GSAs and Interested Parties throughout the GSP development process. The GSAs will follow this C&E Plan to engage with and gather input from various Interested Parties to support GSP development. GSP information, meeting schedules, and useful links can be found at the Paso Robles Groundwater Communication Portal (Paso GCP) at: www.pasogcp.com. Anyone may register as an Interested Party to be notified of upcoming events and activities regarding GSP development. For more information on the Paso GCP, refer to **Appendix B**.

2.0 GOALS AND OBJECTIVES

The goal of Paso Robles Subbasin communication and engagement efforts is to involve broad and diverse Interested Parties, including stakeholders, the public, and beneficial users, throughout the GSP development process to ensure Interested Parties' concerns, issues, and aspirations are consistently understood and considered in the GSAs' decision-making process.

Under the umbrella of meeting the statutory requirements of SGMA and the GSP Regulations, the objectives of the GSAs' engagement efforts are as follows:

- Educate Interested Parties about the importance of a GSP, what is and is not feasible, what must be accomplished, and how success will be measured
- Ensure Interested Parties and beneficial users of groundwater are given the opportunity to contribute meaningful input, which is then considered in the decision-making process
- Involve a diverse group of Interested Parties in the GSP process
- Make public participation easy and accessible

Interested Parties discuss potential options for groundwater management in the Paso Robles Subbasin at a public workshop held on May 14, 2018.

3.0 BENEFICIAL USES AND STAKEHOLDER GROUPS

Among the beneficial groundwater uses supported by the Paso Robles Subbasin are various irrigated and non-irrigated agricultural activities (including but not limited to grazing, vineyards, and orchards); rural domestic/residential wells; municipal and industrial supply; and aquatic ecosystems associated with rivers and streams, some of which provide habitat for threatened or endangered species.

Given its location, the Paso Robles Subbasin has diverse land uses including the following:

— Urban (i.e. City of el Paso de Robles)
— Community Services Districts (2)
— Urban Reserve area (e.g. Shandon)
— Village Reserve area (e.g. Creston)
— Rural Residential areas
— Agriculture
— Industrial areas
— Commercial areas
— Natural landscape

The Paso Robles Subbasin also covers a wide range of Interested Parties, including, but not limited to, the following:

— Land use authorities
— Private well users
— Urban users
— Native American Tribal interests
— Business interests
— Agriculture interests
— Public agencies
— Public water systems/ community water systems
— Environmental interests
— Disadvantaged Communities (DACs) – as identified in **Appendix C**
— General public

California Water Code (CWC) §10723.4 requires GSAs to establish and maintain a list of persons interested in receiving notices regarding plan preparation, meeting announcements, and availability of draft plans, maps, and other relevant documents. Any person may request, in writing, to be placed on the list of interested persons. Additionally, the GSAs developed the Paso Robles Groundwater Communication Portal (Paso GCP) where any person may sign up to be added to the list of Interested Parties. The Paso GCP is available at www.pasogcp.com. **Appendix D** includes an initial list of Interested Parties identified at the time of GSA formation. The updated Interested Parties list, with individual registrants, is stored in the Paso GCP, and will be available to DWR at the time of GSP submittal.

Diverse Outreach Practices

The Paso Robles Subbasin GSAs are committed to encouraging the active involvement of diverse social, cultural, and economic interests of the population within the groundwater basin. As such, outreach practices will be diverse as well, as outlined in Section 7.0.

4.0 GSAs' DECISION-MAKING PROCESS

The MOA, as introduced in Section 1.0, lays the framework for governance and decision-making. The MOA established the Cooperative Committee made up of representatives of the five GSAs to develop a single GSP that will be considered for adoption by each individual GSA. It is important to note that the MOA automatically terminates upon the State's approval of the GSP.

To provide for consistent and effective communication among the GSAs, each GSA agreed to designate one Cooperative Committee Member to conduct activities related to GSP development and SGMA implementation. **Table 1** lists the Primary and Alternate Members of the Cooperative Committee, as well as a point of contact for each GSA's staff. Each Cooperative Committee Member represents their respective GSA in the development of a recommended GSP that will be considered for adoption by each individual GSA and subsequently submitted to DWR for approval. GSA Staff works with the GSA Consultant on administrative matters to move the GSP process forward. A copy of the MOA and detailed Cooperative Committee responsibilities in the development of the GSP is available at https://slocountywater.org/site/Water%20Resources/SGMA/paso/pdf/FinalMOA_FullyExecuted.pdf

Table 1. Cooperative Committee Members and Weighted Vote for Decision-Making

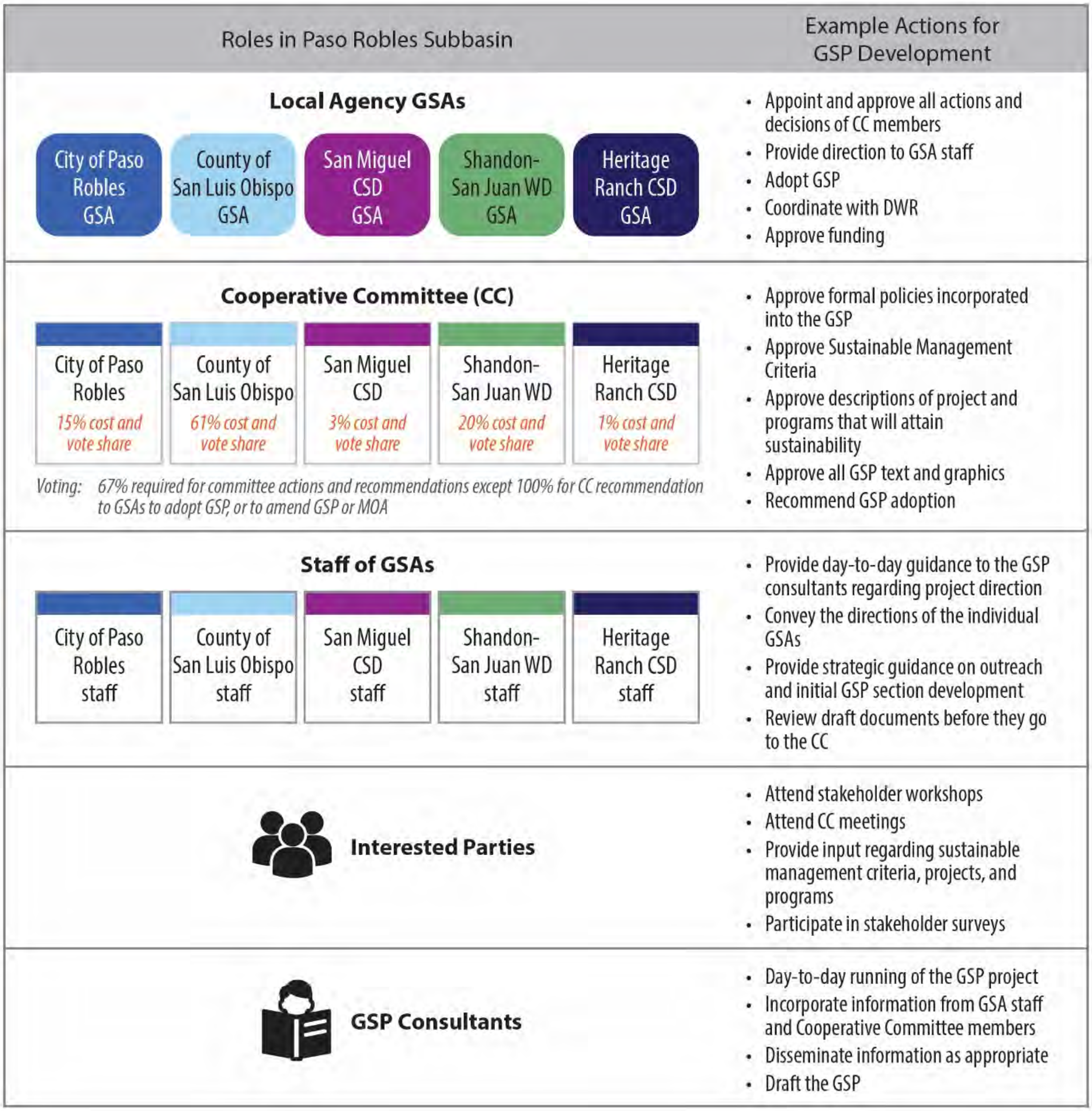
GSA (% Weighted Vote)	Cooperative Committee Member	Cooperative Committee Alternate	GSA's Staff Point of Contact
County of San Luis Obispo (61%)	John Peschong	Debbie Arnold	Angela Ruberto
City of Paso Robles (15%)	John Hamon	Steve Martin	Dick McKinley
Shandon-San Juan Water District (20%)	Willy Cunha	Matt Turrentine	Randy Diffenbaugh
San Miguel CSD (3%)	Joe Parent	Kelly Dodds	Blaine Reely
Heritage Ranch CSD (1%)	Reginald Coussineau	Scott Duffield	Scott Duffield

The Cooperative Committee will consider all beneficial uses and users of groundwater in the Subbasin as well as public input during the decision-making process. Each of the GSAs have weighted voting (see **Table 1**) on decision-making, with the exception of MOA amendments or termination and recommendation that the GSAs adopt the final GSP or any amendments thereto which require a unanimous vote. Portions of the MOA addressing voting are provided below.

> *MOA Section 4.8: Any action or recommendation considered by the Cooperative Committee shall require the affirmative vote of 67 percent based on the percentages set forth in Section 4.6 or 4.7 above (of the MOA), as applicable. Notwithstanding the foregoing, **the following shall require the affirmative vote of 100 percent** based on the percentages set forth in Section 4.6 or 4.7 above (of the MOA), as applicable: (A) a recommendation that each of the Parties adopt the GSP or adopt any amendment thereto prepared in response to comments from DWR and (B) a recommendation that the Parties amend this MOA.*
>
> *MOA Section 9.2: This MOA may be terminated upon unanimous written consent of all current Parties.*

A summary of the Paso Robles Subbasin roles and actions for GSP development is depicted in **Figure 2**.

Figure 2. ***Paso Robles Subbasin Roles and Example Actions for GSP Development***



The following are descriptions of how each GSA makes their individual GSA decisions and which forums are used to devise their decision-making. Once their decisions are made they report to the Cooperative Committee for discussion.

County of San Luis Obispo GSA

Governing body	**County of San Luis Obispo Board of Supervisors**
Meeting information	**Bi-Monthly, on average; San Luis Obispo County Government Center.** See the complete schedule online. If matters relating to GSP development will be discussed during a Board meeting, the topic will be shown on the meeting's agenda.

The Paso Basin – County of San Luis Obispo GSA's governing body is the **County of San Luis Obispo Board of Supervisors**. The County's SGMA Strategy supports 1) fair and equitable representation in GSAs decision-making processes that include participation by the County and/or an alternative, stakeholder-driven eligible entity, and 2) adequate consultation between any GSA efforts and related County authorities and/or planning/management efforts. The County supports participating in a GSA in a basin to represent one or more of the following key roles and/or authorities:

- Interest 1: Representation of County Service Area(s)
- Interest 2: Representation of otherwise unrepresented beneficial uses/users of groundwater (e.g., rural domestic, agricultural, environmental, etc. as defined by SGMA)
- Interest 3: Land use authority
- Interest 4: Well construction permitting authority
- Interest 5: Integration and alignment of the County's discrete management actions (e.g., groundwater export ordinance) to the GSA's basin-wide, comprehensive management actions

City of Paso Robles GSA

Governing body	**Paso Robles City Council**
Meeting information	**First and third Tuesday of each month, Paso Robles City Hall.** If matters relating to GSP development will be discussed during a City Council meeting, the topic will be shown on the meeting's agenda.

The City of Paso Robles' GSA covers properties in the City limits except that portion of the City that is west of the Rinconada fault and thus in the Atascadero Basin. The GSA's governing body is the **Paso Robles City Council**, acting as the Board of the GSA. The City Council meets on the first and third Tuesday of each month in the Council Chamber in City Hall, but only meets as the GSA Board when there is a specific action item for the GSA.

Shandon-San Juan Water District GSA

Governing body	**Shandon-San Juan Water District Board of Directors**
Meeting information	**Third Tuesday of each month, Shandon High School Library.** If matters relating to GSP development will be discussed during a Board meeting, the topic will be shown on the meeting's agenda.

The Shandon San Juan GSA is formed and governed by an “opt-in” California Water District lying in the northeastern portion of San Luis Obispo County. The GSA’s governing body is the **Board of Directors of the Shandon-San Juan Water District** (SSJWD), acting as the Board of the GSA. SSJWD meets on the third Tuesday of each month at the Shandon High School Library.

San Miguel CSD GSA

Governing body	**San Miguel Community Services District Board of Directors**
Meeting information	**Fourth Thursday of each month, San Miguel CSD District Office.** If matters relating to GSP development will be discussed during a Board meeting, the topic will be shown on the meeting’s agenda.

The San Miguel Community Services District GSA covers the properties within its District boundaries. The GSA’s governing body is the **San Miguel Community Services District Board of Directors**, acting as the Board of the GSA. The District Board of Directors meets on the fourth Thursday of each month at the District office which is located at 1150 Mission St. in San Miguel, CA 93451. The Board of Directors only meets as the GSA Board when there is a specific action item for the GSA on the agenda.

While an initial list of Interested parties was identified for the Paso Robles Subbasin at the time of GSA formation**,** additional Interested Parties specific to San Miguel CSD include the following:

- Disadvantaged communities, including but not limited to, those served by private domestic wells or small community water systems or ratepayers and domestic well owners – the Community of San Miguel, which lies within the District’s GSA, is designated as a Disadvantaged Community (DAC)
- Entities listed in Section 10927 that are monitoring and reporting groundwater elevations in all or part of a groundwater basin managed by the GSA – the San Miguel Community Services District files, contributes, and/or maintain California Statewide Groundwater Elevation Monitoring (CASGEM) monitoring data with the DWR through San Luis Obispo County.

Heritage Ranch CSD GSA

Governing body	**Heritage Ranch Community Services District Board of Directors**
Meeting information	**Third Thursday of each month, Heritage Ranch CSD District Office.** If matters relating to GSP development will be discussed during a Board meeting, the topic will be shown on the meeting’s agenda.

The Heritage Ranch Community Services District’s governing body is a **Board of Directors** of five members. Director terms are four years, with staggered elections of three seats and two seats. They meet at 4:00 p.m. on the third Thursday of every month, in the Board Room located at 4870 Heritage Road, Paso Robles CA, 93446.

The Heritage Ranch Board also has five Committees. The Committees may include two Board members and members of the public. The manager is the staff person assigned to all Committees. The Board President appoints membership to committees at the first regular meeting in December in even number years. Heritage Ranch Committee membership is for two years. The Board President may also appoint ad-hoc committees. In response to SGMA, an ad-hoc SGMA Committee was appointed. The current SGMA Committee is Director Cousineau and Director Barker.

Heritage Ranch Committee motions and recommendations shall be advisory to the Board and shall not commit the District [HRCSD] to any policy, act, or expenditure unless expressly delegated by Board action. Nor may any committee direct staff to perform specific duties unless duly authorized by the Board. The committee chair is authorized to schedule committee meetings as deemed necessary and all such meetings shall be in compliance with Open Meeting Law of California (Brown Act).

Additional Contributors to GSP Development

Interested Parties

Interested Parties can participate in public meetings and hearings, which are posted on the Paso GCP, and communicate with Cooperative Committee members to provide input, obtain information, and review and comment on GSP documents. An initial list of Interested Parties identified for the Paso Robles Subbasin at the time of GSA formation is provided in **Appendix D**. Anyone may register as an Interested Party via the Paso GCP at www.pasogcp.com. Once registered, Interested Parties will receive invitations to meetings and workshops related Paso Robles Subbasin GSP development. The Interested Party list is stored and maintained in the Paso GCP database.

GSP Consultants

A team of consultants will conduct technical studies and investigations, including groundwater modeling, and draft the GSP documents.

Consultant work will be overseen by the GSA staff, who will provide guidance and oversight regarding GSP development, prior to reviewing draft documents with the Cooperative Committee. The consulting firms assisting with GSP development for the Paso Robles Subbasin are listed below.

- Hydrometrics Water Resources, Inc. (lead consultant)
- Montgomery and Associates
- Carollo Engineers
- GEI Consultants, Inc.
- O'Laughlin & Paris, LLP
- Strategy Driver, Inc.
- WestWater Research, LLC

Staff of the GSAs

Staff of the GSAs provide day-to-day guidance to the GSP consultant regarding project direction. Staff of the GSAs review GSP documents before they are passed to the Cooperative Committee. Staff members make interim decisions on the approach and messaging involved in GSP development. Fundamental to this decision-making approach is that staff of each GSA regularly communicate with GSA Boards or Councils and respective Cooperative Committee Members.

Decision-Making Steps

The Paso Robles Subbasin GSP must be developed under a compressed schedule, as the final adopted GSP is due to DWR by January 31, 2020. To ensure the GSP is delivered on time, decision-making during chapter development as well as for final approval must follow a streamlined process. These processes are outlined in **Figure 3** and **Figure 4**, respectively.

Figure 3. ***GSP Chapter Development Process***

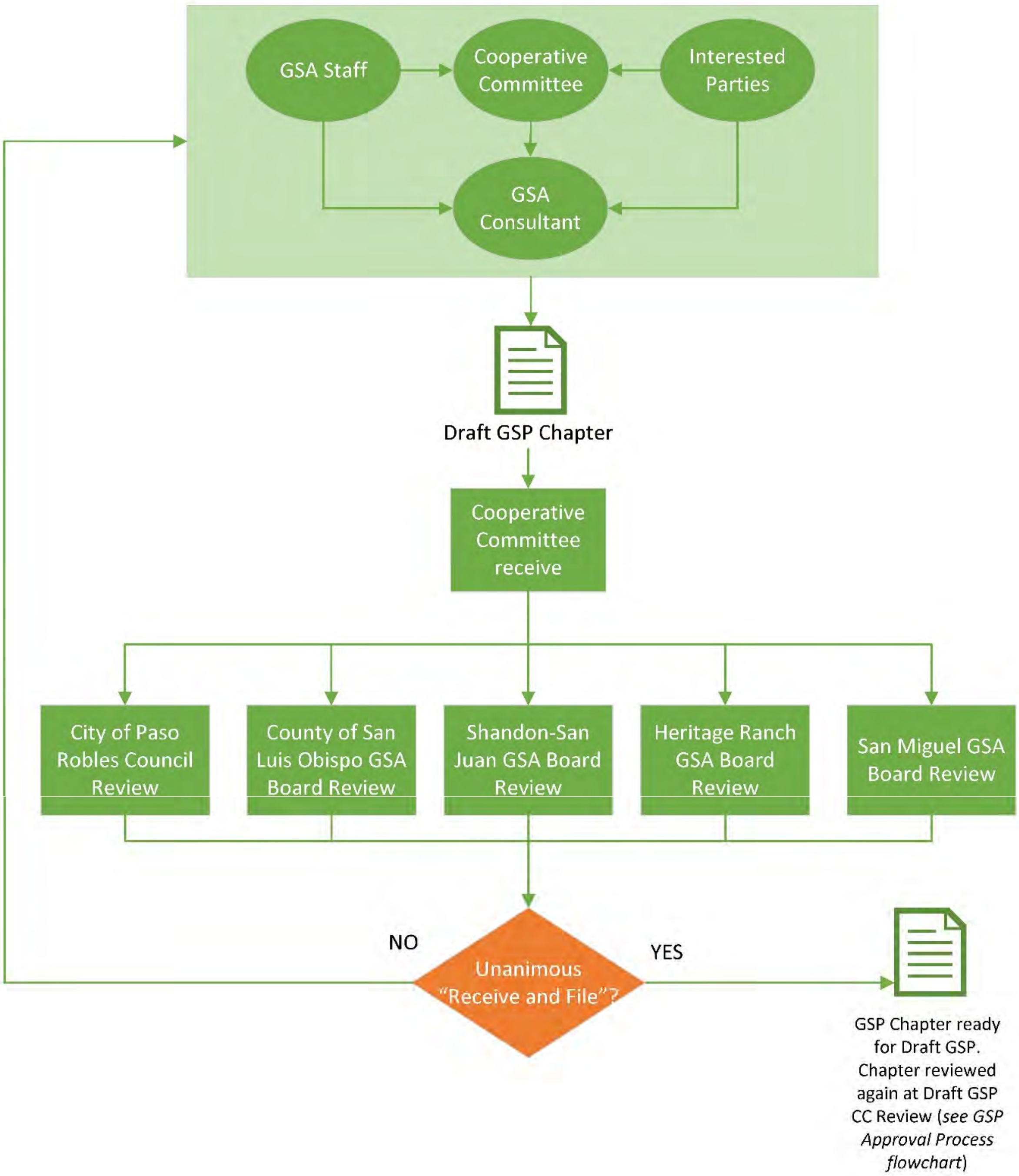
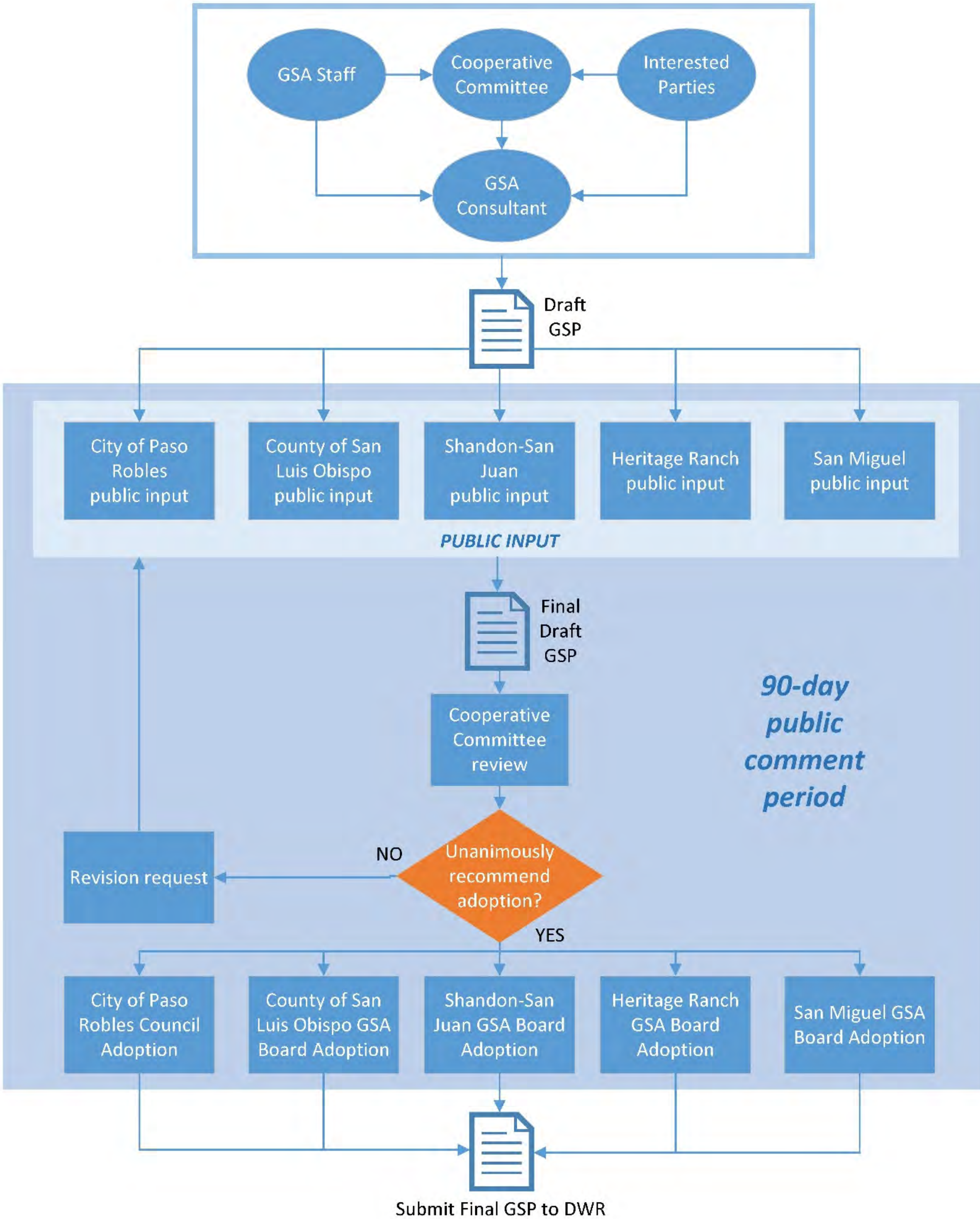


Figure 4. ***GSP Approval Process***



5.0 HOW CAN INTERESTED PARTIES AND PUBLIC GET INVOLVED?

The GSP process for the Paso Robles Subbasin includes both the development and implementation of a GSP. Interested Party participation is vital to the success of the GSP. A first step for Interested Parties to get involved is to sign up through the Paso GCP at www.pasogcp.com and review the content on the following websites:

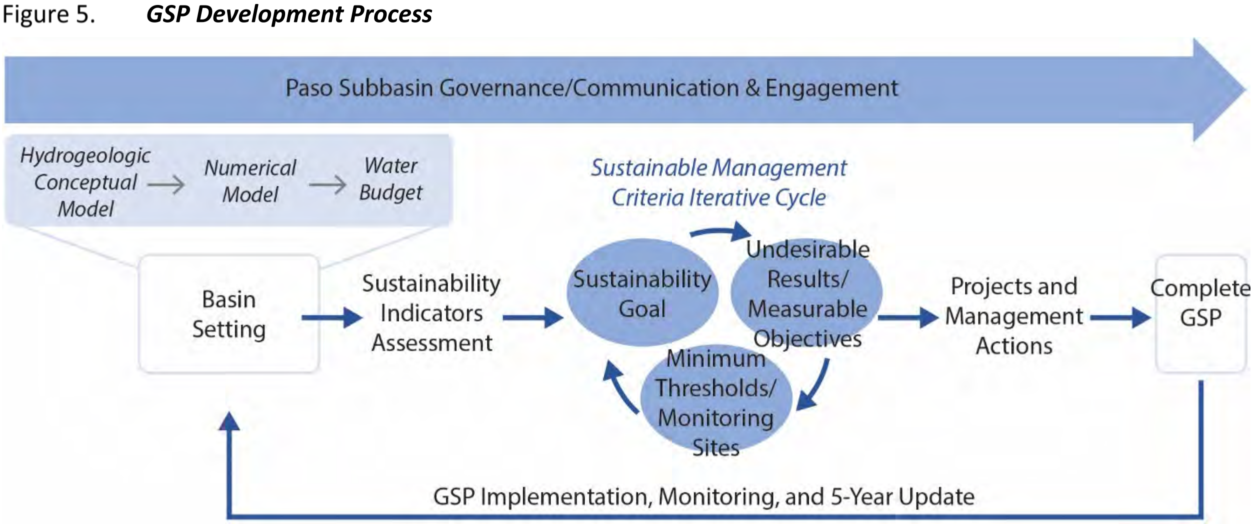
- Paso Robles Subbasin Groundwater Communication Portal (Paso GCP) – www.pasogcp.com
- GSA websites
  - County of San Luis Obispo – www.slocountywater.org
  - Shandon-San Juan Water District – www.ssjwd.org
  - Heritage Ranch CSD – www.heritageranchcsd.com
  - San Miguel CSD – www.sanmiguelcsd.org
  - City of Paso Robles – www.prcity.com
- DWR's SGMA Portal – https://sgma.water.ca.gov/portal/

Meetings of the Paso Subbasin Cooperative Committee are scheduled on a regular basis to provide information to the public and Interested Parties and provide opportunities to ask questions and make suggestions. These meetings are posted on the Paso GCP and announced via email. See **Section 7.0** to learn more ways the GSAs are engaging Interested Parties and inviting participation.

GSP Development Process

The GSP development process for the Paso Robles Subbasin shown in **Figure 5** outlines key tasks and their relationship to one another in developing the GSP. These main tasks roughly follow what will ultimately be the GSP's chapters. GSP development will also include: listing data gaps and how they will be filled during GSP implementation, conducting technical studies, defining the Subbasin's characteristics, accounting for current and planned groundwater uses, considering groundwater dependent ecosystems (GDEs), incorporating land use planning, and developing sustainable management criteria.

Figure 5. ***GSP Development Process***



Appendix E includes a preliminary schedule showing milestones and Interested Party engagement activities. As shown on the schedule, Cooperative Committee meetings will be held at regular intervals. Cooperative Committee meetings are open to the public. Focused workshops will be held as needed. In addition, technical staff will be available throughout the process to communicate and engage with Interested Parties. Interested Parties can be involved in GSP development by providing input throughout the process of completing these tasks. Periodic updates and materials will be posted on the Paso GCP and presented at Cooperative Committee meetings for Interested Parties review and comment.

Above, Interested Parties participate in an interactive workshop (May 14, 2018) about projects and actions.

6.0 DESIRED OUTCOMES

DWR's Stakeholder Communication and Engagement Guidance Document suggests answering a series of questions when setting desired outcomes for GSP Interested Party outreach. The questions and responses for the Paso Robles Subbasin are listed below.

What are we trying to accomplish?
We aim to make opportunities available for Interested Parties to provide input during development of the Paso Robles Subbasin GSP, and ensure the GSP considers input from Interested Parties.

How will we know if we are successful?
We will be successful when various Interested Parties have opportunities to provide their input, ask questions, receive up-to-date information, and comment on GSP development and draft documents.

What are the challenges or barriers?
One of the challenges is making a complete list of Interested Parties and being able to effectively communicate with them. We will make efforts to reach a broad set of Interested Parties and expand the list. We will use several forms of communication outreach such as: meetings, calendar updates with notification automatically sent to Interested Parties, radio and newspaper advertising, and email blasts. For a list of media contacted regarding Paso Subbasin GSP events, see **Appendix F**.

What are the opportunities for communication and engagement?
Available communication and engagement opportunities for Interested Parties include public workshops and hearings, communication through individual GSA webpages, registration as an Interested Party or contact through the Paso GCP, correspondence, phone calls, emails, and Cooperative Committee meetings.

What is the timeframe?
GSP development began in spring 2018 and will progress to adoption before January 31, 2020. During that period, Interested Party communication and engagement will be a continuous process, including the public review period for GSP approval. The Draft Paso Subbasin GSP will be available for 90 days of review during Fall 2019.

When will public input be relevant?
During GSP development, public input will be most relevant when the GSAs are framing the scope of studies, setting sustainable management criteria, developing management actions, identifying groundwater-dependent ecosystems (GDE), collecting existing and planned groundwater use information, and during public review of the draft GSP prior to DWR approval. Workshops and/or surveys will be held or conducted during GSP development for public input when it is most relevant.

How will public input be used?
GSP Regulations (Section 355.4) require that GSAs consider the interests of the beneficial uses and users of groundwater in the Subbasin. In addition, the GSAs as part of the GSP, will consider land use and property interests. Public input is essential in understanding and considering these interests and effects. During the GSP review and approval process, DWR will take public comments into account when determining whether interests within the Subbasin have been considered in the development and implementation of the GSP (Section 353.8).

7.0 COMMUNICATION + ENGAGEMENT TOOLS AND VENUES

Communication and engagement with Interested Parties may include Subbasin-wide outreach as well as engagement specifically within the individual GSA areas. Each GSA area may include a set of Interested Parties with specific interests. Each GSA will decide required levels of communication for its own GSA area and engage with Interested Parties in its GSA area as appropriate.

For Subbasin-wide interests and issues, the Cooperative Committee will communicate with Interested Parties. The Paso Robles Subbasin GSAs are committed to encouraging the active involvement of diverse social, cultural, and economic elements of the population within the groundwater basin. Therefore, outreach will be conducted through multiple and varied venues. Descriptions of these venues are presented below.

Paso GCP

Interested Parties are invited to register using the Paso GCP at www.pasogcp.com. Registrants will automatically be invited by email to activities regarding GSP development. Interested Parties may also view a calendar of events, register for upcoming events, and view materials from past events.

GSA Web Pages

Dedicated SGMA webpages for each GSA are listed below and also accessible at www.pasogcp.com. The webpages are designed to provide background information, maps, documents, status updates, useful links, contact information, and a means of communicating between the GSAs and the public.

- City of Paso Robles – www.prcity.com
- County of San Luis Obispo – www.slocountywater.org
- Heritage Ranch CSD – www.heritageranchcsd.com
- San Miguel CSD – www.sanmiguelcsd.org
- Shandon-San Juan Water District – www.ssjwd.org

Cooperative Committee Special Meetings

The Paso Robles Subbasin Cooperative Committee will host Special Meetings as-needed to cover time-sensitive GSP topics. For example, Special Meetings were hosted by the Cooperative Committee in Spring 2018 to launch the GSP process on the following topics:

- GSP Timeline, GSP requirements, and an introduction to Sustainable Management Criteria (April 23, 2018)
- Groundwater law and its connection to SGMA, State of the Subbasin (April 30, 2018)
- Projects and programs for groundwater management (May 14, 2018)
- Further information on the state of the Subbasin, and follow-up to the first three meetings (May 21, 2018)

Unless noticed as a Special Meeting, GSP-related discussions will take place during the regular meetings of the Cooperative Committee.

Cooperative Committee Regular Meetings

The Cooperative Committee meets regularly to carry out GSP activities. Regular Cooperative Committee meetings locations vary, but are typically held in the Paso Robles City Council Chambers. Meeting information, agendas, and other relevant documents are posted on the Paso GCP. The Cooperative Committee prepares and maintains minutes of its meetings, and all meetings of the Cooperative Committee are conducted in accordance with the Ralph M. Brown Act (Government Code §§ 54950 et seq.).

Public Surveys

Public surveys will be conducted when GSP development requires specific input from Interested Parties. Two public surveys were identified as of May 2018. The first was a C&E Survey, the results of which are discussed in **Appendix A** and many suggestions have been incorporated into this C&E Plan. The second survey centered around Sustainable Management Criteria/Minimum Thresholds and was conducted in Summer 2018.

Meeting feedback forms are available at public workshops to encourage Interested Party feedback on how the workshops are conducted. These feedback forms have been useful in helping the Cooperative Committee, GSA staff, and GSP consultants adapt to meet needs of Interested Parties along the way. For example, one meeting feedback form indicated that signage was needed at the meeting location to help find the correct building. Reusable directional signs were produced and displayed at the next meeting and will be available for future meetings. An example of the meeting feedback form is provided in **Appendix H**.

GSAs' Board of Directors/Supervisors/Council Meeting

Table 2 lists meetings of the governing bodies of the GSAs where interim updates regarding GSP development may be discussed as needed. See the linked websites below for the meeting agendas which may list SGMA as a topic. Stakeholders and members of the public may choose to comment at those meetings.

Table 2. GSA Regularly Scheduled Meetings

GSA / WEBSITE	DATE/TIME	LOCATION
County of San Luis Obispo www.slocounty.ca.gov/Departments/Board-of-Supervisors/Board-Meetings,-Agendas-and-Minutes.aspx	On average, twice per month	County Government Center Board of Supervisors Chambers 1055 Monterey Street San Luis Obispo, CA 93408
City of Paso Robles www.prcity.com	As-needed on the agenda of the City Council Meetings, held the first and third Tuesday of each month	Paso Robles City Hall Council Chambers 1000 Spring Street Paso Robles, CA 93446
Shandon-San Juan Water District www.ssjwd.org	As-needed on the agenda of the District Board Meetings, held on the third Tuesday of each month	Shandon High School 151 S. 1st Street Shandon, CA 93461

GSA / WEBSITE	DATE/TIME	LOCATION
Heritage Ranch CSD www.heritageranchcsd.com	As-needed on the agenda of the District Board Meetings, held on the third Thursday of each month	Heritage Ranch CSD District Office 4870 Heritage Road Paso Robles, CA 93446
San Miguel CSD www.sanmiguelcsd.org	As-needed on the agenda of the District Board Meetings, held on the fourth Thursday of each month	San Miguel CSD District Office 1150 Mission Street (Fire Station) San Miguel, CA 93451

eMail

Email blasts (emails to the entire list of Interested Parties) will be sent when there is significant information to communicate regarding GSP development. For example, email blasts are sent when Special Meetings of the Cooperative Committee are scheduled.

Individual emails will also be sent to invite known Interested Party groups to participate. For example, a letter was sent via email to local Native American Tribal governments inviting participation in the GSP process. A copy of the letter is included as **Appendix I**.

Postal Mail

Postal mail will be utilized to reach areas of the groundwater basin that may not otherwise be informed of GSP activities. For example, a postcard was mailed to Interested Parties in the San Miguel CSD GSA service area to announce the Special Meetings and launch of the Paso GCP, because the existing contact list for the San Miguel GSA included postal addresses, but not email addresses. The postcard invited these known Interested Parties in the San Miguel GSA to attend the Cooperative Committee Special Meetings and register their email address online with the Paso GCP. This postcard was also available at the Shandon-San Juan Water District Office for Interested Parties to pick up when they stopped by and was distributed to the rural communities of Jardine, Ground Squirrel Hollow, and Geneseo. The postcard is included with **Appendix J**.

Spanish Language Materials

The Cooperative Committee identified that there are potential Interested Parties who may be primarily Spanish-speaking. Because of this input, additional materials for communication about GSP development will be created in Spanish. Items identified initially for Spanish-language communications include the following:

- Postcard in Spanish to advertise Paso GCP (see **Appendix J**)
- Web page on Paso GCP written in Spanish
- Link on Paso GCP Spanish-language web page to request materials in Spanish

Adjacent Basin Meetings

Members of adjacent basins are welcome to participate in regularly scheduled Cooperative Committee meetings as well as special meetings. In addition, coordination between adjacent basins and individual GSAs will occur as needed. The names and GSP deadlines for basins adjacent are shown in **Table 3**.

Table 3. Basins Adjacent to the Paso Robles Subbasin

Basin	Basin Prioritization	GSP Due Date
Atascadero Subbasin	Draft 2018 DWR basin prioritization as Very Low (subject to change)	Pending final DWR basin prioritization
Lockwood Valley Basin	Very Low	N/A
Salinas Basin - Upper Valley Aquifer	Medium	January 31, 2022
Cholame Valley Basin	Very Low	N/A
Carrizo Plain Basin	Very Low	N/A

Public Hearings

Notices of public hearings are published in a variety of media, including radio and local newspapers, informing the public on meeting information, subject, and how to provide comments prior to decision making. Public hearings will also be noticed through the Paso GCP. At a minimum, a Public Hearing will be held when adopting or amending the GSP, or imposing or increasing a fee.

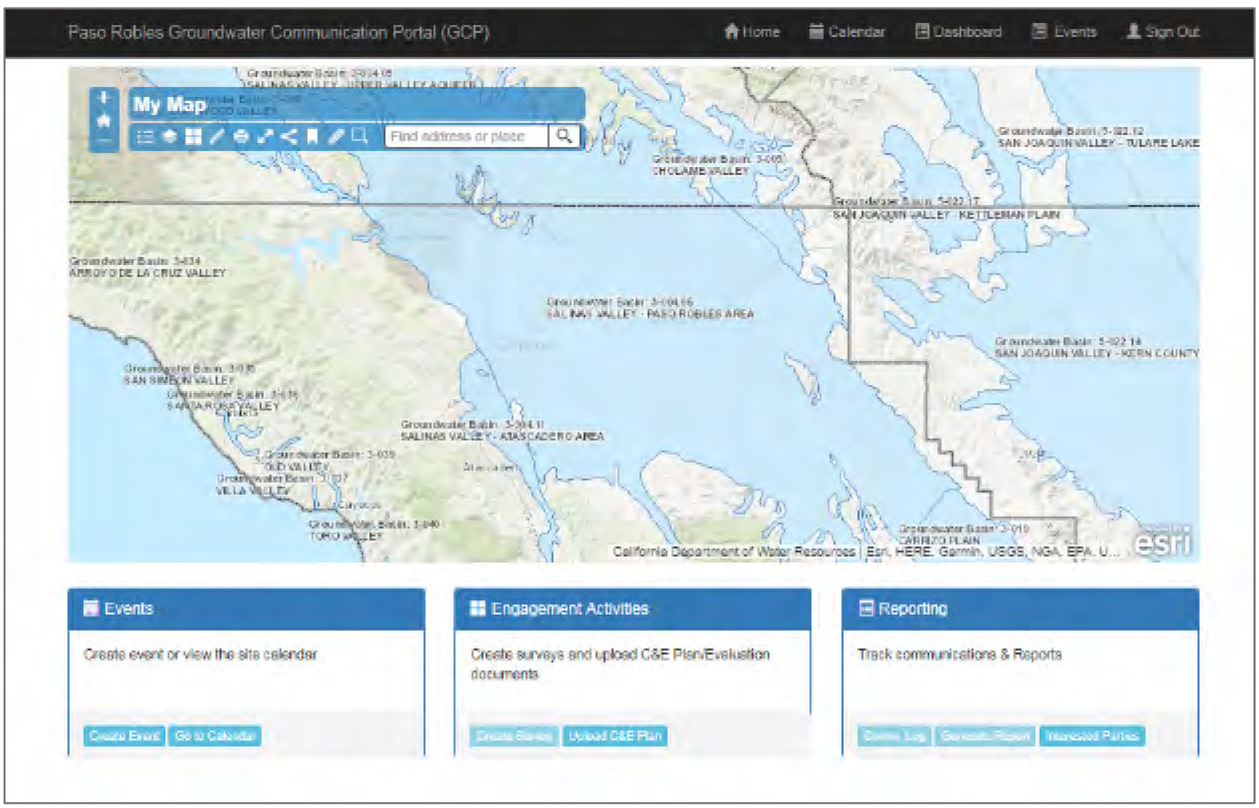
8.0 TRACK AND EVALUATE COMMUNICATIONS AND ENGAGEMENT

The Paso GCP (see **Appendix B**) tracks communications and engagement efforts for the Paso Robles Subbasin GSAs.

The Paso GCP serves as a repository for information about public meetings and interested parties. It tracks outreach efforts by the GSAs in its database; storing meeting attendance information, logging targeted outreach, and hosting the Interested Parties list.

Tool administrators can generate reports about meetings related to GSP planning. The reports include items such as attendance sheets, RSVPs, agendas, minutes, handouts, and presentations. Reports such as these will be included with the final Paso Robles Subbasin GSP as submitted to DWR.

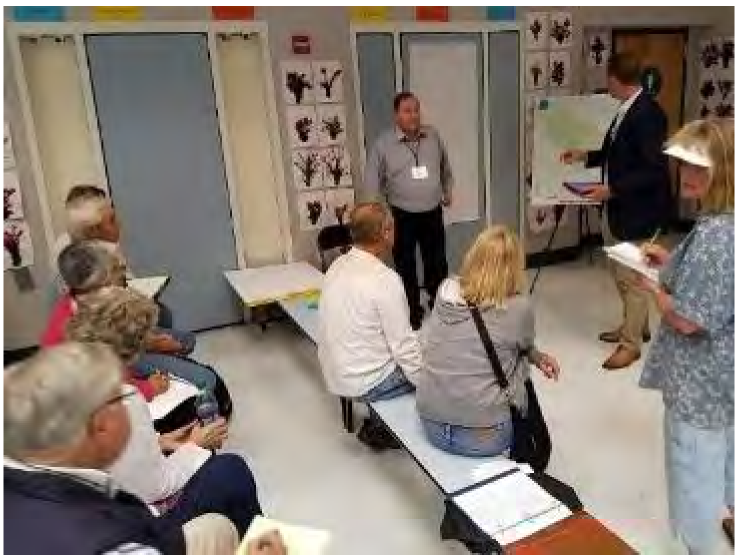
GSAs continually evaluate communications and engagement efforts as they are executed following this C&E Plan. This evaluation is conducted through the Cooperative Committee, GSA Staff, and GSP Consultant observations, as well as through feedback from Interested Parties via online surveys and meeting feedback forms. The Cooperative Committee, GSA Staff, and GSP Consultants will assess needs and update this C&E Plan as necessary.

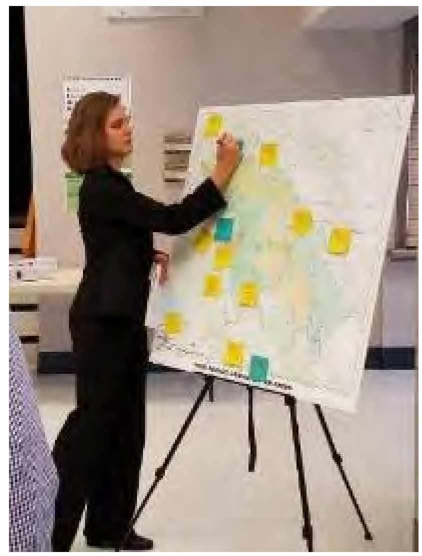


The Paso GCP is the primary tool for tracking communication and engagement in the Paso Robles Subbasin. Above is a view of the Administrator's dashboard, where site administrators can post events, upload documents, and generate reports regarding communication and engagement.

9.0 SUMMARY

Interested Parties' communication and outreach activities are essential in GSP development. Only through effective communication and outreach can Interested Parties' concerns, issues, and aspirations be consistently understood and considered in the GSAs' decision-making process. Moreover, the C&E Plan process will be ongoing, starting with GSP development and continuing through implementation of the approved GSP for the Paso Robles Subbasin. As in GSP development, periodic reviews and adjustments of the C&E Plan process may be necessary. The goal is to develop and implement a robust Interested Parties C&E Plan process so we may achieve sustainability and manage our valuable shared groundwater resource for future generations.





Interested Parties, GSA Staff Member Dick McKinley of City of Paso Robles GSA, and consultants Matthew Payne and Lydia Holmes at a public workshop in May 2018.

APPENDICES

Appendix A. Statutory Table

Legislative/Regulatory Requirement	Legislative/Regulatory Section Reference	C&E Plan Section
Publish public notices and conduct public meetings when establishing a GSA, adopting or amending a GSP, or imposing or increasing a fee.	SGMA Sections 10723(b), 10728.4, and 10730(b)(1).	7.0
Maintain a list of, and communicate directly with, interested parties.	SGMA Sections 10723.4, 10730(b)(2), and 10723.8(a)	4.0
Consider the interests of all beneficial uses and users of groundwater.	SGMA Section 10723.2	4.0
Provide a written statement describing how interested parties may participate in plan [GSP] development and implementation, as well as a list of interested parties, at the time of GSA formation.	SGMA Sections 10723.8(a) and 10727.8(a)	4.0
Encourage active involvement of diverse social, cultural, and economic elements of the population within the groundwater basin.	SGMA Section 10727.8(a)	7.0
Understand that any federally recognized Indian Tribe may voluntarily agree to participate in the planning, financing, and management of groundwater basins – refer to DWR's Engagement with Tribal Governments Guidance Document for Tribal recommended communication procedures.	SGMA 10720.3(c)	7.0
Description of beneficial uses and users of groundwater in the basin	GSP Regulations §354.10	3.0
List of public meetings at which the Plan [GSP] was discussed or considered	GSP Regulations §354.10	Appendix E
Comments regarding the Plan [GSP] received by the Agency and a summary of responses	GSP Regulations §354.10	N/A at time of publication
A communication section that includes the following (GSP Regulations §354.10):		
Explanation of the Agency's decision-making process	GSP Regulations §354.10	4.0
Identification of opportunities for public engagement and discussion of how public input and response will be used	GSP Regulations §354.10	7.0
Description of how the Agency encourages active involvement of diverse social, cultural, and economic elements of the population within the basin	GSP Regulations §354.10	7.0
The method the Agency will follow to inform the public about progress implementing the Plan [GSP], including the status of projects and actions	GSP Regulations §354.10	7.0

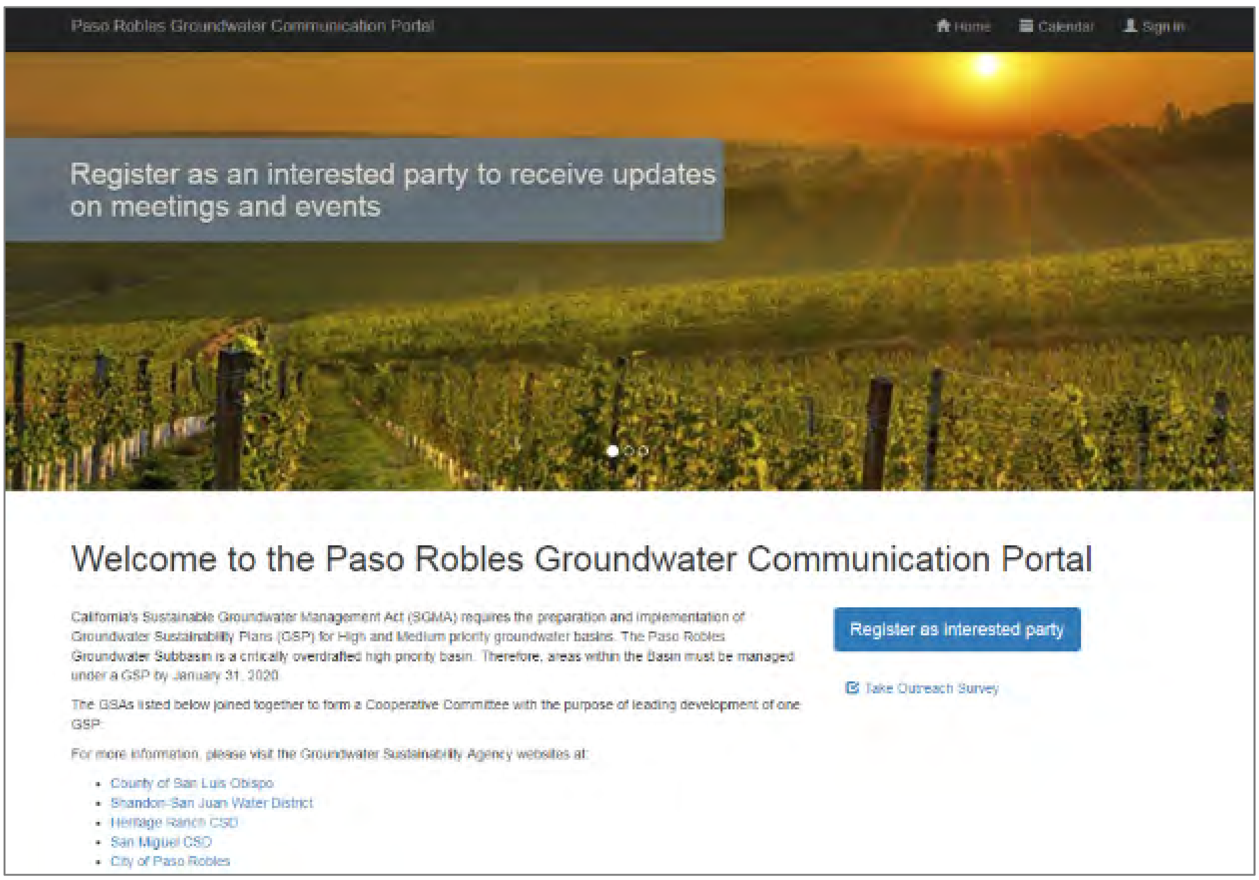
Appendix B. Paso Robles Subbasin Groundwater Communication Portal

The Paso Robles Subbasin Groundwater Communication Portal (Paso GCP) is a web-based outreach tool for Paso Subbasin GSAs to post events and automatically inform Interested Parties about GSP development. Interested Parties can visit the website and register their email address to stay informed about upcoming activities.

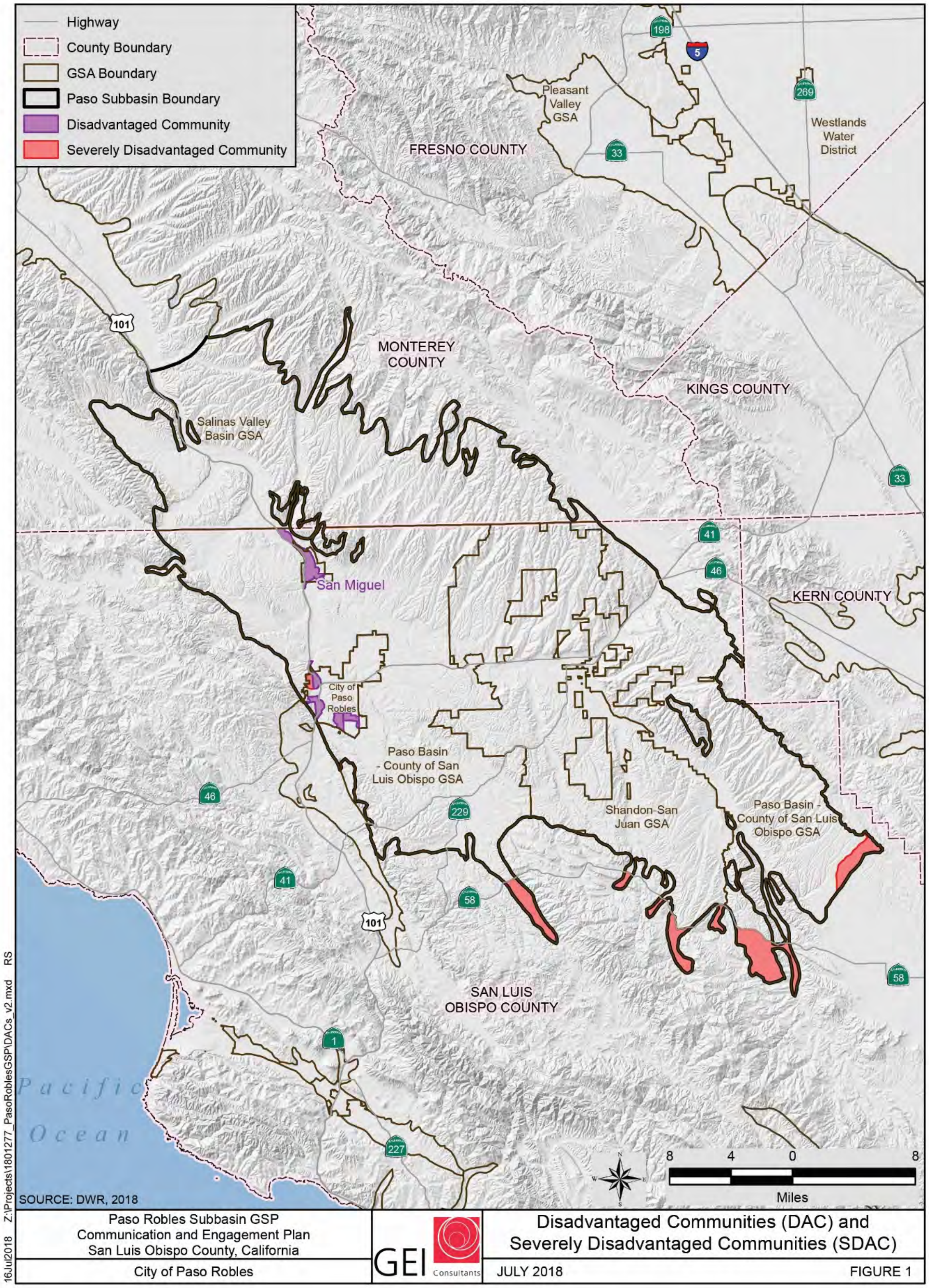
The Paso GCP serves as a repository for GSA information about Paso Robles Subbasin meetings, communications, and Interested Parties. It tracks outreach efforts by the GSAs; storing meeting attendance information, logging targeted outreach, and hosting the interested parties list.

Tool administrators can generate reports about GSP outreach activities. The reports include items such as attendance sheets, RSVPs, agendas, minutes, handouts, and presentations.

Paso GCP Home Page



Appendix C.Disadvantaged Communities in the Paso Robles Subbasin



Appendix D. Initial Interested Parties List

Pursuant to the California Water Code Section 10723.2, the Paso Robles Subbasin GSAs will consider the interest of all beneficial uses and users of groundwater when developing and implementing the Paso Robles Subbasin GSP.

The five Paso Robles Subbasin GSAs[2], party to the MOA, developed lists of Interested Parties and submitted those lists to DWR at the time of GSA formation. A compiled list of those submissions is provided below. This initial list, plus individuals who expressed interest in receiving updates about GSP development via the San Luis Obispo County website, were imported into the Paso GCP (presented in **Appendix B**) in May 2018. The Paso GCP automatically notifies the Interested Parties list via email when GSP-related events are scheduled in the Paso Robles Subbasin. The list continues to grow as additional Interested Parties self-register or are otherwise identified.

Agency

- Atascadero Basin GSA
- City of Paso Robles
- County of Monterey
- County of San Luis Obispo
- Creston School District
- Estrella-El Pomar-Creston Water District
- Heritage Ranch CSD
- Monterey County Parks Department
- Monterey County Water Resources Agency
- Paso Robles Unified School District
- Salinas Valley GSA
- San Luis Obispo County Flood Control & Water Conservation District
- San Miguel CSD
- San Miguel Joint Union School District
- Shandon San Juan Water District
- Shandon Unified School District
- Templeton CSD
- U.S. Department of Commerce – National Oceanic and Atmospheric Administration

Water Corporations Regulated by PUC or a Mutual Water Company

- Atascadero Mutual Water Company
- Green River Mutual Water Company
- Mustang Springs Mutual Water Company
- Rancho Salinas Mutual Benefit Water Company
- Santa Ysabel Ranch Mutual Water Company
- Spanish Lakes Mutual Water Company
- Walnut Hills Mutual Water Company

[2] City of Paso Robles GSA, County of San Luis Obispo GSA, Shandon-San Juan GSA, San Miguel GSA, and Heritage Ranch GSA

Agricultural users

- Agricultural landowners (individuals)_
- Agricultural Liaison Advisory Board (ALAB)
- Central Coast Vineyard Team
- Central Coast Wine Grape Growers Association
- Farm Bureau
- Grower-Shipper Association
- Independent Grape Growers of Paso Robles
- Local Chapter California Certified Organic Farms
- North County Farmers Market Association
- Paso Robles Vintners and Growers Association
- Paso Robles Wine Country Alliance
- SLO County Cattlemen
- SLO County Cattlewomen
- SLO County Farm Supply
- UC Cooperative Extension
- Upper Salinas-Las Tablas Resource Conservation District
- USDA Conservation Service
- USDA Farm Service Agency
- 4-H Clubs

Domestic well owners

- Individual rural residential/suburban landowners

Municipal well operators

- Covered in other categories

Public water systems (per EHS records)

- Almira Water Association
- Arciero Winery
- Cal Trans Shandon Rest Stop
- Camp Roberts
- Creston Country Store
- Creston Elementary School
- El Paso De Robles Youth Correction Facility
- Huerhuero Ranch
- Hunter Ranch Golf Course
- Jack Ranch Cafe
- Links at Lista Del Hombre
- Loading Chute
- Longbranch Saloon
- Los Robles Mobile Estates
- Meridian Vineyard
- North River Road
- Paso Robles RV Ranch
- Paso Robles Truck Plaza (San Paso)

- Pete Johnston GM
- Pleasant Valley Elementary
- SATCOM
- Shandon CSA

Local land use planning agencies

- City of Atascadero
- City of Paso Robles
- County of San Luis Obispo
- San Luis Obispo Council of Government (SLO COG)

Environmental users of groundwater

- Various agencies on this list address environmental concerns related to groundwater and the Paso Robles Subbasin GSAs will work with them to consider and protect such interests.

Surface water users (if hydrologic connection)

- Atascadero Community Services District (CSD)
- City of Paso Robles
- City of San Luis Obispo
- Heritage Ranch CSD
- Templeton CSD

Federal government

- Camp Roberts
- National Marine Fisheries Service
- U.S. Fish & Wildlife

California Native American tribes

- Chumash
- Salinan

Disadvantaged communities

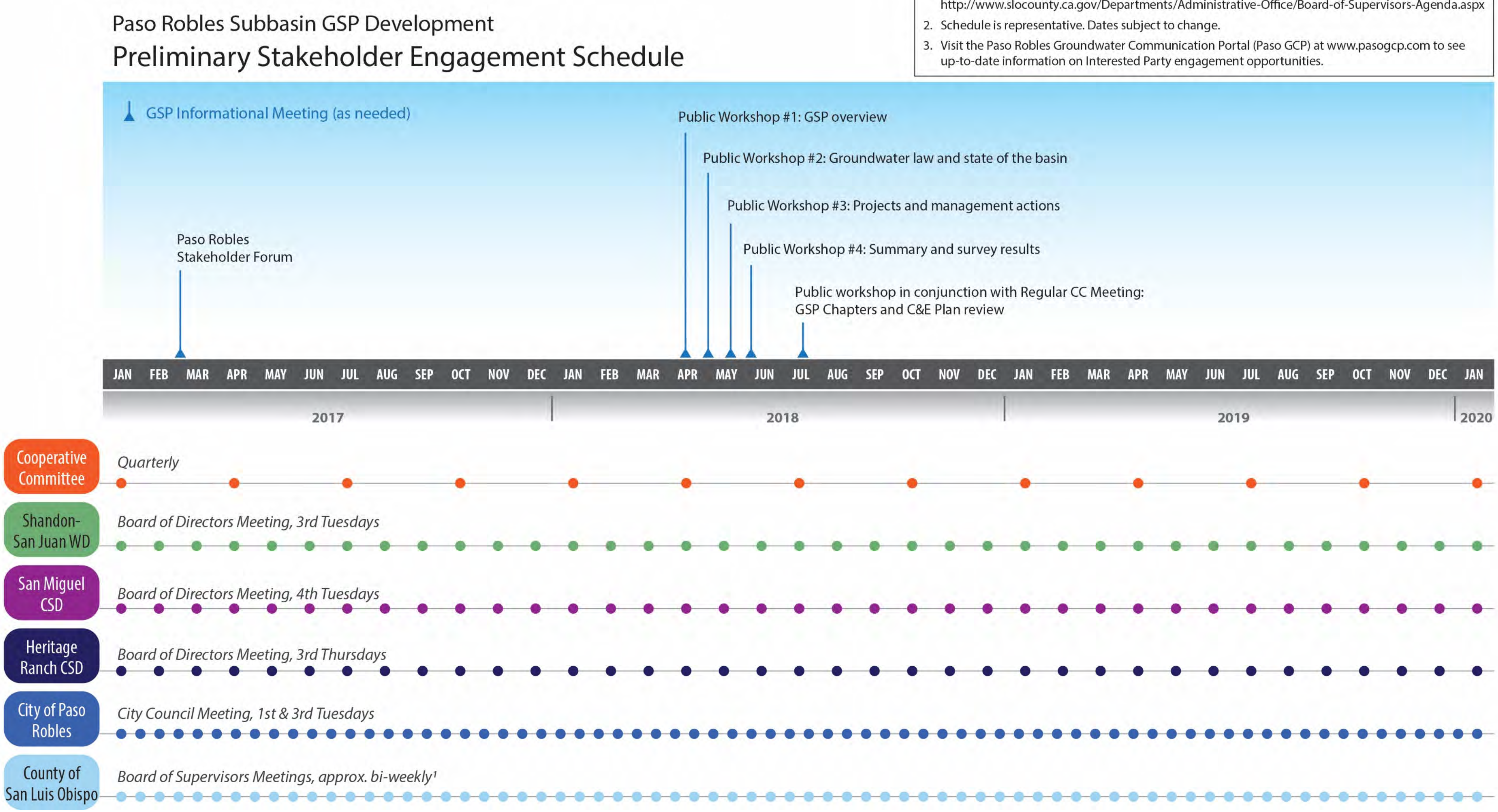
- There are disadvantaged communities in the Paso Robles Subbasin, particularly in the southern portion of the Subbasin, where there are severely disadvantaged communities.

Entities monitoring and reporting groundwater in the Subbasin

- Various of the agencies and water companies listed above collect and report groundwater data including at the County and State level (CASGEM).

Appendix E. Preliminary Engagement Schedule

NOTES
1. See San Luis Obispo County Board of Supervisors meeting schedule online at http://www.slocounty.ca.gov/Departments/Administrative-Office/Board-of-Supervisors-Agenda.aspx
2. Schedule is representative. Dates subject to change.
3. Visit the Paso Robles Groundwater Communication Portal (Paso GCP) at www.pasogcp.com to see up-to-date information on Interested Party engagement opportunities.



Appendix F. Media Contacts List

Press releases regarding GSP development public workshops are sent to the following contacts.

- Atascadero Mutual Water Company
- Atascadero News
- City of Atascadero
- City of Paso Robles
- County Administrator
- County Blade
- Cuestonian - Cuesta College
- KCBX
- KCOY-TV (NPG of California)
- KCPR
- KEYT KCOY KKFX
- KGUR
- KIDI FM/ KTAP
- KKJG/ KZOZ/ KKAL/KSTT/KVEC
- KPRL
- KPYG/ KWWV/ KXDZ/ KXTZ/ KYNS
- KSBW
- KSBY-TV
- KSMA/ KVEC/KJUG
- KTAS-TV, Telemundo
- KUHL-AM
- Los Osos Bay News; SLO City News; Coast News
- Monterey County Water Resources Agency
- Monterey Herald
- Mustang Daily
- New Times
- Paso Robles Chamber of Commerce
- Paso Robles Daily News
- Paso Robles Press
- Paso Robles Unified School District
- Pleasant Valley Joint Union School Dist.
- San Luis Obispo County Admin Analyst
- San Luis Obispo County Public Works
- San Miguel Community Services District
- San Miguel Joint School District
- SGMA/Calif Department of Water Resources & RWQCB
- Shandon Unified School District
- SLO County Board of Supervisors Secretary
- Soaring Eagle Press
- Templeton Chamber of Commerce
- Templeton Community Services District
- Templeton Unified School District
- The Tribune / County Digest

Appendix G. C&E Survey Results

From May 4 to May 18, 2018 a public survey was conducted to evaluate best methods for communication and engagement in the Paso Robles Subbasin. An invitation was sent to over 500 Interested Party contacts in the Paso GCP database. Over 100 Interested Parties responded and completed the survey. The results of the survey guided the formation of this C&E Plan and were presented at the May 21, 2018 Special Meeting of the Cooperative Committee. The presentation slides from that meeting are presented on the following pages.

How the Survey Results Were Used

The C&E Survey identified many methods in which the Interested Parties could receive information and provide input into the GSP process. As a result of the Survey, certain communication methods are emphasized in the C&E Plan, such as the development of the Paso Groundwater Communication Portal (Paso GCP) where Interested Parties can receive information in one consolidated location rather than seek information from all five individual GSA websites. Information posted to the Paso GCP includes meeting announcements, notes and materials provided at the meetings, FACT Sheets, frequently asked questions (FAQ), and important documents related to the SGMA GSP development process. In addition, the Paso GCP will provide input opportunities for Interested Parties to comment on the GSP process.

Many of the Interested Parties requests were accommodated through a meeting feedback form (see **Appendix H**) that was available at the four Informational Meetings held in Spring 2018. Subsequent actions as a result of the meeting feedback forms included:

- Providing clear signage to the meeting location
- Incorporating topics of interest expressed by Interested Parties to be discussed at the meetings
- Adding station-facilitated exercises where the Interested Parties could participate in smaller groups with the Cooperative Committee, GSA Staff, and Consultants on-hand for open dialog and interactive discussion for input.
- Developing specific outreach postcards for communities identified by Interested Parties, including both Disadvantaged Communities and Rural communities which may not have received electronic information.

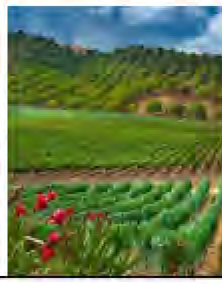
We are appreciative of all those Interested Parties that participated in the online C&E Survey and the meeting feedback forms to improve the Paso GSP outreach process to be most effective.

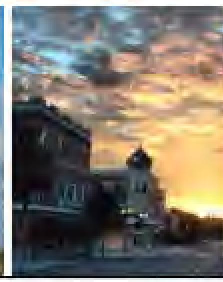
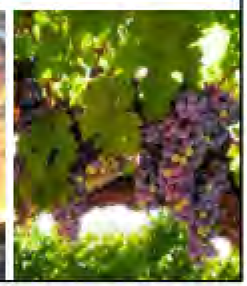
COMMUNICATION AND ENGAGEMENT SURVEY RESULTS

Paso Robles Basin

Paso Robles Basin GSAs
City of Paso Robles
County of San Luis Obispo
Heritage Ranch CSD
San Miguel CSD
Shandon-San Juan Water District

May 21, 2018



COMMUNICATION AND ENGAGEMENT SURVEY

103

Total Responses

- Date Opened: Friday, May 04, 2018
- Date Closed: Friday, May 18, 2018
- Complete Responses: 103

Q1: Have you participated in a public process before?

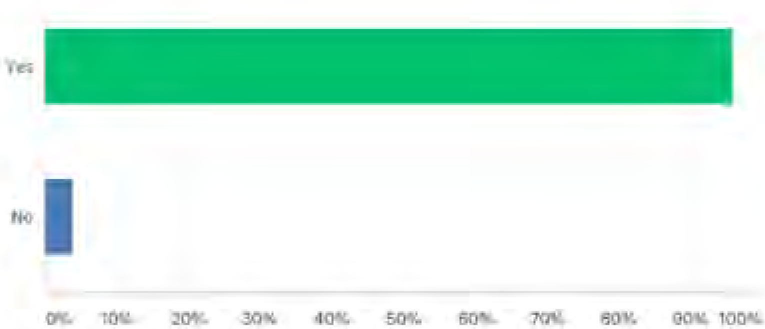
ANSWER CHOICES	RESPONSES	
Yes	75.25%	76
No	24.75%	25
TOTAL		101

Answered: 101
Skipped: 2

Q2: Have you heard about the SGMA GSP process?

ANSWER CHOICES	RESPONSES	
Yes	96.08%	98
No	3.92%	4
TOTAL		102

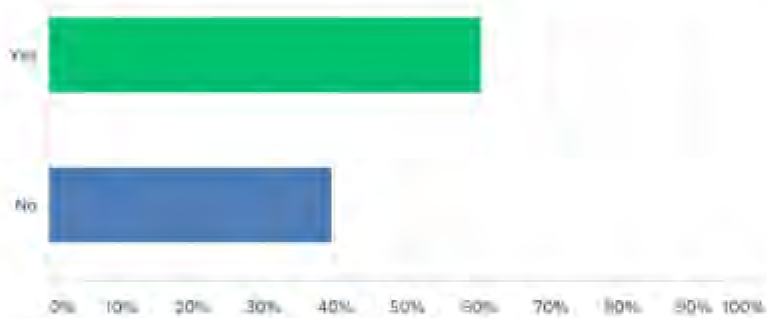
Answered: 102
Skipped: 1



Q3: Have you been involved in other water supply public processes in the past?

ANSWER CHOICES	RESPONSES	
Yes	60.40%	61
No	39.60%	40
TOTAL		101

Answered: 101
Skipped: 2



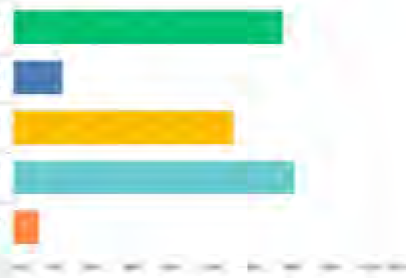
Q4: What is your level of interest in providing input on the planning and implementation of the SGMA GSP process?

	LEAST INTEREST ☆	☆☆	☆☆☆	☆☆☆☆	MOST INTEREST ☆☆☆☆☆	TOTAL	WEIGHTED AVERAGE
☆	1.96% 2	1.96% 2	13.73% 14	23.53% 24	58.82% 60	102	4.38

Answered: 102
Skipped: 1

Q5: How would you like to provide input on the SGMA GSP process? Choose all that apply.

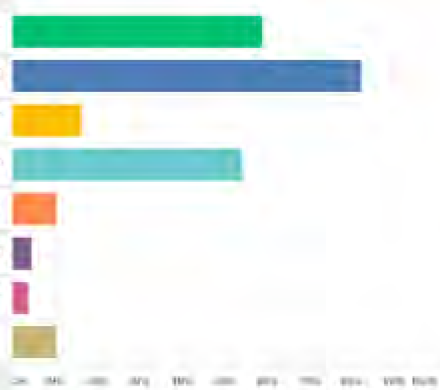
ANSWER CHOICES	RESPONSES	
Through a comment portal online	67.96%	70
Using social media	12.62%	13
During in-person meetings	55.34%	57
By reviewing draft project documents	70.87%	73
Other (please specify)	6.80%	7
Total Respondents: 103		



Answered: 103 Skipped: 0

Q6: How would you like to receive information about the GSP process? Choose all that apply.

ANSWER CHOICES	RESPONSES	
Website updates	59.22%	61
E-blasts/newsletters	82.52%	85
Flyers/community postings	16.50%	17
Meetings	54.37%	56
Social media: Facebook	10.68%	11
Social media: Nextdoor	4.85%	5
Social media: Twitter	3.88%	4
Other (please specify)	10.68%	11
Total Respondents: 103		

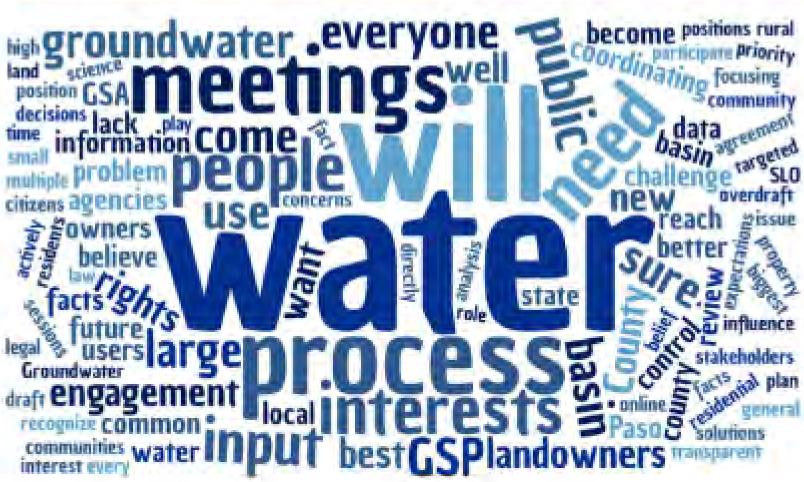


Answered: 103 Skipped: 0

Q7: What SGMA topics and information are of interest to you?

Answered: 96
Skipped: 7

Q8: What potential challenges do you anticipate regarding engagement? How can they be addressed?

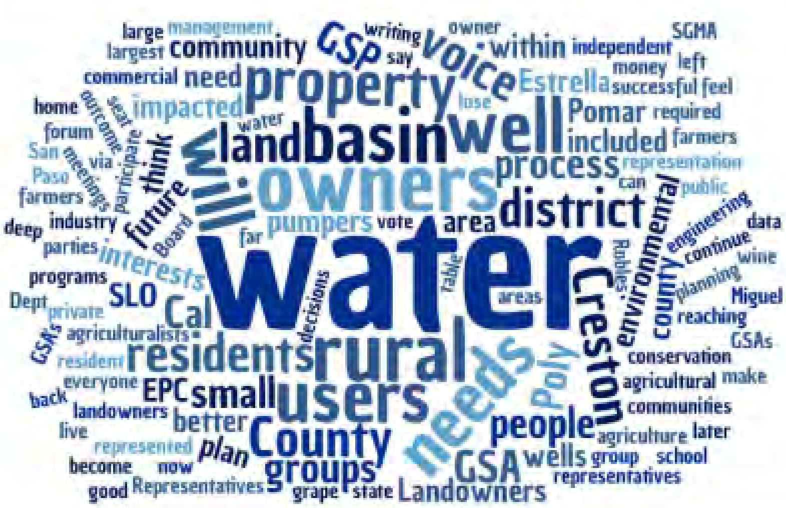


Answered: 91
Skipped: 12

Q9: What would be a successful outcome for the GSP from your perspective?

Answered: 97
Skipped: 6

Q10. Who else do you think needs to be involved in the planning and implementation of the SGMA GSP?



Answered: 81
Skipped: 22

Q11. Do you have any other suggestions for the GSAs on communication and engagement methods for the SGMA GSP process?

Answered: 73
Skipped: 30

Appendix H. Meeting Feedback Form

Paso Robles Basin Meeting Survey

Name: ______________________________

Contact: ______________________________

Date: ______________________________

Please provide feedback to improve out communication and engagement process.

Survey Questions		Agree	Disagree
1	Information provided was useful and understandable?		
2	Meeting noticing was timely, informative about location and meeting topic(s)?		
3	Opportunity was provided to comment/ask questions?		
4	Can we contact you regarding your survey to follow up?		
5	Other SGMA topics and information of interest to you include: a. ______ b. ______ c. ______ d. ______		
6	Other suggestions on communication and engagement that would be helpful for the SGMA process: ______ ______ ______ ______		

Example Meeting Feedback Form

Appendix I. Letter Distributed to Native American Tribal Governments

[Variable greeting]

We are writing to notify you that a Groundwater Sustainability Plan (GSP) for the Paso Robles Groundwater Basin is under development and we are inviting you to participate in the GSP process.

In 2015, the State legislature approved a new groundwater management law known as the Sustainable Groundwater Management Act (SGMA). SGMA required local agencies to form Groundwater Sustainability Agencies (GSAs) by June 30, 2017 and prepare a GSP. SGMA allows any federally recognized Indian tribe to voluntarily participate in the preparation or administration of a GSP. A federally recognized tribe's actions during participation will be based on the tribe's independent sovereign authority and not the authorities that SGMA provides to local agencies[1]. Regardless of whether a tribe opts to coordinate their groundwater management with SGMA implementation, SGMA requires GSAs to consider the interests of all beneficial uses and users of groundwater, including tribes[2]. For more information on Tribal Government Engagement with GSAs, please see the Discussion Questions[3] paper prepared by the California Department of Water Resources Sustainable Groundwater Management Program Tribal Advisory Group.

We invite you to participate in the Paso Robles Groundwater Basin GSP. If you wish to be included on the list of Interested Parties to receive further information on ways to meaningfully participate in processes related to GSP development in the Paso Robles Basin, please register at the following web address: www.pasogcp.com and feel free to contact our Public Outreach Facilitator, Ellen Cross, with any questions or comments by email at crosse@strategydriver.com or by phone at (510) 316-9657.

Thank you.

The Paso Robles Groundwater Basin Cooperative Committee

- *City of Paso Robles GSA*
- *County of San Luis Obispo GSA*
- *Shandon-San Juan GSA*
- *Heritage Ranch GSA*
- *San Miguel GSA*

[1] Water Code §10720.3(c)
(2) Water Code §10723.2
(3) http://www.water.ca.gov/-/media/DWR-Website/Web-Pages/About/Tribal/Files/Publications/Tribal-Engagement-with-GSA-Discussion-Questions.pdf

[1] Water Code §10720.3(c)
[2] Water Code §10723.2
[3] http://www.water.ca.gov/-/media/DWR-Website/Web-Pages/About/Tribal/Files/Publications/Tribal-Engagement-with-GSA-Discussion-Questions.pdf

Appendix J. Postcard Mailers

JOIN THE DISCUSSION

www.pasogcp.com

JOIN THE DISCUSSION

In accordance with the Sustainable Groundwater Management Act (SGMA), a Groundwater Sustainability Plan (GSP) is being developed for the Paso Robles Groundwater Basin.

The Paso Basin Cooperative Committee invites you to register as an Interested Party to be notified about events concerning GSP preparation and to provide your insights.

For more information and to register as an Interested Party, please visit the website below.

www.pasogcp.com

REGISTER TODAY!

Sent on behalf of the Paso Robles Basin Groundwater Sustainability Agencies:

County of San Luis Obispo GSA
City of Paso Robles GSA
San Miguel Community Services District GSA
Heritage Ranch Community Services District GSA
Shandon San Juan Water District GSA

HYDROMETRICS
PASO BASIN TEAM
1232 PARK STREET, SUITE 2B
PASO ROBLES, CA 93446

Postcard sent to announce the Paso GCP

JOIN THE DISCUSSION

Sustainable Groundwater Management in the
Paso Robles Groundwater Subbasin

JOIN THE DISCUSSION

In accordance with the Sustainable Groundwater Management Act (SGMA), the Paso Robles Groundwater Basin is in the process of preparing a Groundwater Sustainability Plan (GSP).

Interested Parties are encouraged to attend the following workshops to learn more:

Projects and Programs for Groundwater Management Workshop
Monday, May 14, 2018 at 5:30 PM

Summary of the Paso Basin GSP Process Workshop
Monday, May 21, 2018 at 5:30 PM

The workshops above will be held at:
Kermit King Elementary
700 Schoolhouse Cir. Paso Robles, CA 93446

For more information, contact the San Miguel CSD offices at (805) 467-3388 or visit **www.sanmiguelcsd.org**

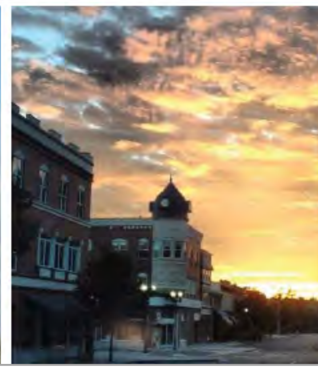
After May 15, for all *future* GSP information, register as an Interested Party at **www.pasogcp.com**.

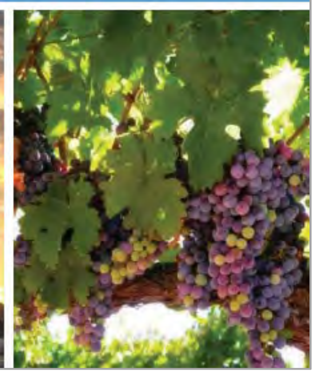
SAN MIGUEL C.S.D.
1150 MISSION ST.
SAN MIGUEL, CA 93451

Postcard sent to invite Interested Parties to attend public workshops

PARTICIPE EN LA DISCUSIÓN

www.pasogcp.com





PARTICIPE EN LA DISCUSIÓN

De acuerdo con la ley de Gestión Sustentable del Agua Subterránea (SGMA), se está desarrollando un Plan de Sustentabilidad de Agua Subterránea para la Cuenca de Paso de Robles (GSP).

El Comité Cooperativo de la Cuenca de Paso de Robles lo invita a registrase como una Parte Interesada para recibir notificaciones sobre eventos acerca de la preparación del GSP y para proporcionar sus ideas.

Para más información y para registrarse como una Parte Interesada, visite el sitio web a continuación.

www.pasogcp.com

¡REGÍSTRESE AHORA!

Enviado en nombre de las Agencias de Sustentabilidad de Agua Subterránea de la Cuenca de Paso de Robles:

GSA del Condado de San Luis Obispo
GSA de la Ciudad de Paso de Robles
GSA del Distrito de Servicios Comunitarios de San Miguel
GSA del Distrito de Servicios Comunitarios de Heritage Ranch
GSA del Distrito de Agua de Shandon-San Juan

HYDROMETRICS
PASO BASIN TEAM
1232 PARK STREET, SUITE 2B
PASO ROBLES, CA 93446

Spanish language postcard for Interested Parties

Appendix N

Public Comments

All comments received through the PasoGCP.com site were automatically recorded with the time and date of the comment as well as the name of the commenter and, if applicable based on the physical address provided, their GSA. The comments were forwarded to the GSAs and the commenter was notified that their comment had been received. The GSAs reviewed each comment received and incorporated the comment into the text as the GSA felt appropriate. Comments received by mail or other means were considered and incorporated in the same manner. The final GSP reflects the responses to comments incorporated by all four GSAs.

Public Comments received through 9/29/2019 to be considered while compiling the Draft GSP for the Paso Basin						
Name	**Chapter & Section**	**Comment**	**GSA**	**Comment Source**	**Date/Time**	**Attachment(s)**
Sheila Lyons	**Ch. 1 Introduction to Paso Robles Subbasin Groundwater Sustainability Plan** 1.2 Description of Paso Robles Subbasin	Please read on as this comment does apply to Chapter 1. Chapter 3, Figure 3-14 Indicates current Land Use Planning subareas. There needs to be an additional Figure indicating the PR Groundwater Basin Subareas such the one from Fugro, 2002 Basin Boundary showing subareas of the Basin. This can be found on the front page of the June 10, 2015 report "Achieving Sustainability in the PR Groundwater Basin. If not in this section, the Basin subarea map from Fugro needs to be included in the GSP somewhere....Chapter #1? This is important....land use planning areas are significantly different from basin planning areas. They have different characteristics and land use planning areas would be inappropriate for basin management. Creston participated early on in meetings for setting voluntary Basin Management Objectives and we are clear that the Creston Sub-Area has different management objectives from other parts of the basin due to our location (leading head of much of the recharge water going into the aquifer). We were much more aggressive and conservative about what course of action we think needs to be implemented to obtain basin sustainability. We believe the Creston Sub-area must be considered separate from the El Pomar-Estrella Land Use Planning Area because they are very different from one another and have very different management requirements.	County of San Luis Obispo GSA	pasogcp.com	9/22/2018 2:40:00 PM	
Laurie Gage, District Administrator	**Ch. 1 Introduction to Paso Robles Subbasin Groundwater Sustainability Plan**	The Board of Directors of the Estrella-El Pomar-Creston Water District has reviewed Chapter 1 and concluded that it has no comments on this chapter at this time. Individual Board directors may choose to personally comment on this chapter separately and independently from the Board as a whole.	City of Paso Robles GSA	pasogcp.com	10/11/2018 8:59:00 PM	
Verna Jigour	**Ch. 1 Introduction to Paso Robles Subbasin Groundwater Sustainability Plan** 1.2 Description of Paso Robles Subbasin	I advise expanding the text and figure 1.1 to include the watersheds/catchments feeding the pertinent subbasins. I realize that SGMA does not require planning outside the basins of concern but, especially in the case of the Paso Robles Subbasin, opportunities to augment groundwater recharge and storage will be left out of the equation if planning is confined solely to the basins. GSA stakeholders correctly identified potential watershed approaches at the third GSP informational meeting May 14, 2018, according to the documented results of the Projects and Management Actions Rotating Group Stations. Following are pertinent excerpts: Despite that Station 1 was titled In-Basin Supply Projects some of the documented suggestions do, in fact, consider the broader watershed context, as follows: "Ideas from the small groups related to in-Basin water supply projects: Slow down flows in Salinas River Optimize Salinas River recharge Incentive-based recharge Improve local stream recharge Recharge on floodplains (with environmental benefit) Forest management Recharge above the basin/higher up in basin Station 2 Out of Basin Supply Projects Ideas from the small groups related to out-of-Basin water supply projects: Watershed restoration projects "Management "Restore after fires/reseed with native vegetation Study Salinas Watershed at headwaters for potentialStation 4 Conservation Measures Ideas from the small groups related to conservation measures: Watershed management Forest management Promote healthy soils (pastures, root crops), carbon farming While this especially pertains to CHAPTER 9. Projects and Management Actions, Chapter 1 sets the stage for all subsequent chapters, does it not? If Chapter 1 considers solely the basins, projects and management actions relevant to the watersheds/ catchments will be left out. I consider it a mistaken artifact of reductionism that SGMA dictates apply solely to the (alluvial) groundwater basins [sinks], considering that those basins are actually fed by their respective watersheds/ catchments [source]. Alas, this reductionistic paradigm, one of several documented in the Alternate Paradigms section of my website, has dominated water resources thinking for most of the past century but that was not always the case. Excerpts from the Proceedings of a Conference of Governors in the White House, Washington, D.C., convened by President Theodore Roosevelt in 1908, shared in my third blog post, How Watersheds Relate to Groundwater, demonstrate that livestock managers of that era correctly recognized that the forests and vegetation serve the same purpose as artificial reservoirs, made by dams or otherwise. They were similarly attuned to the minimum flow a.k.a. baseflow as a measure of watershed health. I offer additional details and links in the file attachments to my comments, but suffice it to state here that the approach proposed on my Rainfall to Groundwater website, based on my doctoral dissertation, Watershed Restoration for Baseflow Augmentation [Jigour 2008 (2011)], abstract attached, is literally tailor-made for the Paso Robles Subbasin GSP Chapter 11. Projects and Management. The Paso Robles Subbasin is the poster child for the Rainfall to Groundwater Approach. I only hope the GSAs will avail themselves of this nearly singular opportunity to restore watershed/catchment functions for groundwater sustainability, including restoration of steelhead habitats among other ecological benefits.		pasogcp.com	10/15/2018 9:58:00 PM	Link: 20181015_Jigour
Laurie Gage, District Administrator	**Ch. 2 Agencies' Information**	The Board of Directors of the Estrella-El Pomar-Creston Water District has reviewed Chapter 2 and concluded that it has no comments on this chapter at this time. Individual Board directors may choose to personally comment on this chapter separately and independently from the Board as a whole.	City of Paso Robles GSA	pasogcp.com	10/11/2018 8:59:00 PM	
Verna Jigour	**Ch. 2 Agencies' Information** 2.1 Agencies' Names and Mailing Addresses	Change to include watersheds/ catchments feeding the subbasins as noted for Chapter 1.		pasogcp.com	10/15/2018 9:58:00 PM	Link: 20181015_Jigour
Sheila Lyons	**Ch. 3 Description of Plan Area** 3.4 Land Use	Section 3.4.2 and Figure 3-6, of the same name "Water Use Sectors" show the distribution of sectors but there is no table or text with the actual numbers by acres for each of these sectors, nor is there any estimate of their usage. Perhaps the second part (usage) of this will come in later chapters but the first (acreage) should be shown here.	County of San Luis Obispo GSA	pasogcp.com	9/22/2018 3:40:00 PM	
Sheila Lyons	**Ch. 3 Description of Plan Area** 3.4 Land Use	Table 3-1 Land Use Summary - data from DWR 2014 is obviously out of date. Much has changed since. The SLO Department of Agriculture surely has more recent data (see there annual reports). An update of current info should be done. We believe there are closer to 40,000 or more acres in vineyards today.	County of San Luis Obispo GSA	pasogcp.com	9/22/2018 2:40:00 PM	
Sheila Lyons	**Ch. 3 Description of Plan Area** 3.5 Existing Well Types, Numbers, and Density	Table 3-2 Types of Wells - data appears to be entirely too low. CAB members believe this number should be revisited with numbers acquired from our Public Works department rather than DWR data.. 99 productions wells is way too low. We know there are 200 wineries in North County, admittedly all are not over the PR Basin, but many are. Windfall Farms which is here is Creston has around 6 wells alone that are production wells.	County of San Luis Obispo GSA	pasogcp.com	9/22/2018 2:40:00 PM	
Sheila Lyons	**Ch. 3 Description of Plan Area** 3.6 Existing Monitoring Programs	Section 3.6.4 Climate MonitoringTable 3-4 Average Month Climate Summary Avg of 2010-2017 If this data is to be used for any calculations going forward the more important number would be the slope of the line for the average increase in monthly temperatures over time. Fixed numbers are not really useful for predicting future events. Or, at a minimum if this is a "for information only" section, the rate of temperature increases should be calculated and included as part of this section.	County of San Luis Obispo GSA	pasogcp.com	9/22/2018 2:40:00 PM	

Public Comments received through 9/29/2019
to be considered while compiling the Draft GSP for the Paso Basin

Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
Sheila Lyons	**Ch. 3 Description of Plan Area** 3.10 Land Use Plans	Figure 3-14 Indicates current Land Use Planning subareas. There needs to be an additional Figure indicating the PR Groundwater Basin Subareas such the one from Fugro, 2002 Basin Boundary showing subareas of the Basin. This can be found on the front page of the June 10, 2015 report "Achieving Sustainability in the PR Groundwater Basin. If not in this section, the Basin subarea map from Fugro needs to be included in the GSP somewhere....Chapter #1? This is important....land use planning areas are significantly different from basin planning areas. They have different characteristics and land use planning areas would be inappropriate for basin management. Creston participated early on in meetings for setting voluntary Basin Management Objectives and we are clear that the Creston Sub-Area has different management objectives from other parts of the basin due to our location (leading head of much of the recharge water going into the aquifer).We were much more aggressive and conservative about what course of action we think needs to be implemented to obtain basin sustainability. We believe the Creston Sub-area must be considered separate from the El Pomar-Estrella Land Use Planning Area because they are very different from one another and have very different management requirements.	County of San Luis Obispo GSA	pasogcp.com	9/22/2018 2:40:00 PM	
Sheila Lyons	**Ch. 3 Description of Plan Area** 3.5 Existing Well Types, Numbers, and Density	CAB recently submitted a comment regarding Table 3-2 Wells over the Basin stating that we didn't believe the numbers shown in this table. We have since located an Excel file provided to CAB from the SLO PW Dept in recent months showing that there are 3945 production wells over the PR Basin. This indicates that there are many many more wells than the Table 3-2 of the Chapter 3 draft of the GSP would suggest. See attached file.	County of San Luis Obispo GSA	pasogcp.com	9/30/2018 8:51:00 AM	Link: 20180930_Lyons
Dennis Loucks	**Ch. 3 Description of Plan Area** 3.4 Land Use	See attachment regarding Chapter 3.4 Land Use -- specifically Table 3-1, Land Use Summary.Notes:Comment uploaded by consultant via scanned hard copy. Because physical address is required to submit form, address for Dennis Loucks was found online posted in the SAN LUIS OBISPO LOCAL AGENCY FORMATION COMMISSION MEETING MINUTES FOR THURSDAY September 17, 2015. Therefore, address may be dated or incorrect. Because comment was uploaded by consultant, and the interested party's email address was not known to the consultant, the email address provided with this form belongs to uploading party.	County of San Luis Obispo GSA	pasogcp.com	9/30/2018 4:30:00 PM	Link: 20180725_Loucks
Laurie Gage, District Administrator	**Ch. 3 Description of Plan Area**	The Board of Directors of the Estrella-El Pomar-Creston Water District has reviewed Chapter 3 and concluded that it has no comments on this chapter at this time. Individual Board directors may choose to personally comment on this chapter separately and independently from the Board as a whole.	City of Paso Robles GSA	pasogcp.com	10/11/2018 8:59:00 PM	
Verna Jigour	**Ch. 3 Description of Plan Area** 3.1 Paso Robles Subbasin Introduction	This GSP covers the entire Paso Robles Subbasin.This GSP covers the entire watershed/ catchment area feeding the Paso Robles Subbasin.Figure 3-1: Area Covered by GSP:Change to include watershed/ catchment area.		pasogcp.com	10/15/2018 9:58:00 PM	Link: 20181015_Jigour
Verna Jigour	**Ch. 3 Description of Plan Area** 3.4 Land Use	3.4.2 WATER USE SECTORS Please correct the following patently incorrect statement: Native vegetation. This is the largest water use sector in the Subbasin by land area.This sector includes rural residential areas. Again, this largest water use sector is dominated by nonnative annual grasslands., as stated above. Figure 3-6: Water Use SectorsPlease correct the erroneous label stating Native Vegetation		pasogcp.com	10/15/2018 9:58:00 PM	Link: 20181015_Jigour
Verna Jigour	**Ch. 3 Description of Plan Area** 3.4 Land Use	The following statement is flat-out incorrect: The balance of the approximately 438,000 acres in the GSP Plan Area is largely native vegetation and could include dry farmed land. Surely the County of San Luis Obispo has its own Geographic Information System (GIS) it can use to test the veracity of the above claim. The GSP should not rely on erroneous information, even if it comes from DWR. My own past GIS work with landcover layers derived from the California Gap Analysis (explained in greater detail in my accompanying file attachment) showed me that a vast proportion of what I then referred to as upper Salinas River watershed is clothed with nonnative annual grasslands. While DWR may have referred to these lands as native vegetation they certainly not known for their discernment of vegetation types.The Land Use section should include at least a summary of historical and prehistorical (Native American) land use to fully establish the environmental setting of human cause changes in vegetative land cover. For example, the charcoal industry is known to have thrived later in SLO County than in many other regions of California. Historical removal of native oaks used in the charcoal should ideally be mapped to correlate historical changes to watershed land cover. The spatial locations of other documented impacts on native vegetation (and its watershed/ catchment functions), such as those mid- 20th Century state-sanctioned projects aimed at removing woody vegetation for rangeland improvement summarized in my blog post, Ball and Chain & Other Links, should be mapped. Historical impacts for which spatial documentation may not be forthcoming should at least be considered as part of the planning process.		pasogcp.com	10/15/2018 9:58:00 PM	Link: 20181015_Jigour
Sheila Lyons	**Ch. 3 Description of Plan Area** 3.1 Paso Robles Subbasin Introduction	CAB voted at our Oct 17th meeting to echo the sentiments of the public present at the Oct. 8, 2018 Workshop held in Creston, that Creston is unique and should not be lumped in with El Pomar, Estrella, or any other part of the PR Basin, but should be considered a sub-area unto itself. Our hydrology is different and our view on basin management is more conservative than other areas of the basin.	County of San Luis Obispo GSA	pasogcp.com	10/20/2018 9:27:00 AM	
Dick McKinley	**Ch. 4 Hydrogeologic Conceptual Model** 4.3 Regional Geology	Explain transmissivity. Is 400ft fast or slow?	City of Paso Robles GSA	pasogcp.com	10/5/2018 1:06:00 PM	
Dick McKinley	**Ch. 4 Hydrogeologic Conceptual Model** 4.7 Groundwater Recharge and Discharge Areas	We may need to date this page at a later date because it is an amended page.	City of Paso Robles GSA	pasogcp.com	10/5/2018 1:06:00 PM	
Dana Merrill	**Ch. 4 Hydrogeologic Conceptual Model** 4.9 Data Gaps in the Hydrogeologic Conceptual Model	In my opinion options for cutbacks that won't cause major reverse economic impacts across our presently robust local economy are very limited, I am most interested In Supply and Recharge options. The upper range of the PR (below the Alluvial) has experience the most decline. It is where the majority of domestic and smaller capacity agricultural wells are located, mostly drilled 20+ years ago. A major effort to recharge that zone would accomplish a great deal and should be an area of major focus immediately. What's needed to focus on this aspect? Vertical zone basin studies for one. There are a good many wells in this range and some could be converted to recharge wells since they don't pump water anymore. Figure a way to comply with regulations on recharge. If the upper range could be restored and regularly recharged it helps rural landowners, agriculture and really everyone.Let's get to meaningful work ASAP. Background efforts I realize are required in the process but the challenges are pretty obvious after decades of study and recent history of wells going dry.	County of San Luis Obispo GSA	pasogcp.com	11/12/2018 7:15:00 AM	
John Thompson	**Ch. 4 Hydrogeologic Conceptual Model** 4.9 Data Gaps in the Hydrogeologic Conceptual Model	Since well logs are readily available, it would seem a model could be made (realizing that someone has to gather the data and create the map and probably would not do it for free). I have noticed that well drillers do not always describe formations the same. But if you took a driller of 40 years who has drilled all over the basin and mapped using his/her logs you could have a GOOD map. You could go onsite with said driller and see what they call cemented gravel and everyone could be on the same page.		pasogcp.com	12/6/2018 1:00:00 PM	
John Thompson	**Ch. 4 Hydrogeologic Conceptual Model** 4.1 Subbasin Topography and Boundaries	Bottom of Page 4. "...very little well data in this portion of the subbasin." Is the lack of data something that is looking to be corrected? It would seem that a local well drilling company could be a huge source of data and information. I do not know the legalities of such things, just an idea.		pasogcp.com	12/6/2018 1:00:00 PM	
Patricia Wilmore	**Ch. 4 Hydrogeologic Conceptual Model** 4.5 Primary Users of Groundwater	Municipal use, when addressed in future chapters, should indicate, outline and encourage opportunities where in the City of Paso Robles can utilize other sources besides groundwater. This should be one of the highest priority means of balancing the basin.	County of San Luis Obispo GSA	pasogcp.com	12/9/2018 3:16:00 PM	

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Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
Patricia Wilmore	**Ch. 4 Hydrogeologic Conceptual Model** 4.7 Groundwater Recharge and Discharge Areas	Figure 4-16 provides an excellent basis for bringing additional water into the basin via recharge.	County of San Luis Obispo GSA	pasogcp.com	12/9/2018 3:16:00 PM	
Verna Jigour	**Ch. 4 Hydrogeologic Conceptual Model** 4.7 Groundwater Recharge and Discharge Areas	Re: the last sentence of 4.7.1: "this map provides good guidance on where natural recharge likely occurs" it actually offers only a partial picture considering solely recharge occurring from strictly vertical infiltration/percolation from surfaces directly above the identified recharge areas. It fails to consider *interflow* from natural infiltration/percolation on uplands draining to those apparently optimal areas. See the catchment model on my web page, Stream Networks vs Watersheds/ Catchments: https://rainfalltogroundwater.net/stream-networks-vs-catchments/		pasogcp.com	12/10/2018 5:48:00 PM	
Verna Jigour	**Ch. 4 Hydrogeologic Conceptual Model** 4.9 Data Gaps in the Hydrogeologic Conceptual Model	Another method for ascertaining aquifer continuity and/or fault influence on groundwater flow is isotope analysis, e.g., see the following: Zdon, A., M. L. Davisson, and A. H. Love. 2018. Understanding the source of water for selected springs within Mojave Trails National Monument, California. Environmental Forensics 19:99-111 https://doi.org/10.1080/15275922.2018.1448909		pasogcp.com	12/10/2018 5:48:00 PM	
Verna Jigour	**Ch. 4 Hydrogeologic Conceptual Model** 4.2 Soils Infiltration Potential	The first sentence, Saturated hydraulic conductivity of surficial soils is a good indicator of the soils infiltration potential may have been assumed true by many in the early 20th century, but by mid-century empirical observations began to show that woody plant roots and their decay products strongly influence both infiltration and percolation. Furthermore, soil structure mediated by especially woody plant roots, along with their soil ecosystems, also influences infiltration and percolation rates. Ecohydrology emerged around the turn of this current century/ millennium and it's past time to be integrating it into such public planning processes as this. Remember, infiltration and percolation begin in the unsaturated a.k.a vadose zone (not the saturated zone) and the properties of the vadose zone are highly influenced by the vegetation there. While inferences based on the purely physical property of saturated hydraulic conductivity offer some insight, they tell far from the whole story. Infiltration and percolation may be greatly enhanced by restoring native woody plants to historically degraded watersheds the case for most in this subbasin, as per my comments on earlier chapters. If this GSP overlooks that it will be overlooking important opportunities to enhance sustainability. For some pertinent insights, please see the following pages on my website: Plants in an Ecohydrology Context: https://rainfalltogroundwater.net/plants-in-an-ecohydrology-context/ and Surface-Groundwater Systems in a Holistic Water Cycle: https://rainfalltogroundwater.net/surface-groundwater-systems/		pasogcp.com	12/10/2018 5:48:00 PM	
Dennis Loucks, Fred Hoey & Greg Grewal	**Ch. 5 Groundwater Conditions** 5.4 Subsidence	(See attachments)		Other	10/17/2018	Link: 20181017_LouGreHoe Link: 20181017_USGS
Todd Beights	**Ch. 5 Groundwater Conditions** 5.2 Change in Groundwater Storage	A neighbor nearby has recently installed 30,000 gallons of water storage tanks with another 10,000 gallons of storage about to be installed. Our water wells are only a few hundred feet apart and they have to run their well around the clock to continually fill these storage tanks that are used for agricultural benefits. I am nervous that over drafting is occurring and potentially jeopardizing the future of our domestic well use. Is unlimited storage and well pumping a sound practice that you endorse or do you view it some other way that might warrant addressing the issue?		pasogcp.com	11/26/2018 3:00:00 PM	
Todd Beights	**Ch. 5 Groundwater Conditions** 5.2 Change in Groundwater Storage	A neighbor nearby has recently installed 30,000 gallons of water storage tanks with another 10,000 gallons of storage about to be installed. Our water wells are only a few hundred feet apart and they have to run their well around the clock to continually fill these storage tanks that are used for agricultural benefits. I am nervous that over drafting is occurring and potentially jeopardizing the future of our domestic well use. Is unlimited storage and well pumping a sound practice that you endorse or do you view it some other way that might warrant addressing the issue?		pasogcp.com	11/26/2018 3:00:00 PM	
Kevin Peck	**Ch. 5 Groundwater Conditions** 5.1 Groundwater Elevations	Paragraph 1 of 5.1.2.2 explains that there is a lack of publicly available ground water data. Has there been an effort during this GSP process, to contact basin landowners to access their wells for acquiring additional water levels data?	Shandon San Juan GSA	pasogcp.com	11/26/2018 3:59:00 PM	
Molly Scott	**Ch. 5 Groundwater Conditions** 5.2 Change in Groundwater Storage	Good morning, With mutual respect for the effort that has been put into writing these chapters, it would be my recommendation to ensure there is a glossary defining critical terms such as: Alluvial Aquifer, Groundwater Storage, Groundwater pumping, etc. Having a specific outlined definition for terms such as these would be beneficial for all parties and allow for greater consistency when discussing and ready future chapters. Thank you, Molly Scott, Grower Relations Manager JUSTIN Vineyards & Winery	County of San Luis Obispo GSA	pasogcp.com	12/6/2018 11:44:00 AM	
John Thompson	**Ch. 5 Groundwater Conditions** 5.2 Change in Groundwater Storage	From page 5-23, "This suggests that the loss in groundwater storage is not due to increased pumping, but is more likely a result of lock of recharge during low precipitation years." Figures 5-14 and 5-15 are supposed to visually describe this, but I think they do not help with comprehending the above statement. It seems obvious in figure 5-14 but is unclear in 5-15. I think the visual of the chart/graph can be better represented or the statement should be modified.		pasogcp.com	12/6/2018 1:28:00 PM	
John Thompson	**Ch. 5 Groundwater Conditions** 5.2 Change in Groundwater Storage	Is there such a thing as groundwater storage potential? Does this change? Is this where subsidence comes into play?		pasogcp.com	12/6/2018 1:28:00 PM	
John Thompson	**Ch. 5 Groundwater Conditions** 5.1 Groundwater Elevations	Some items that could use another paragraph to put more in layman's terms: Standardized precipitation Index Vertical Groundwater Gradients		pasogcp.com	12/6/2018 1:28:00 PM	
John Thompson	**Ch. 5 Groundwater Conditions** 5.1 Groundwater Elevations	The map of monitoring wells seem to be lacking some of the most critical areas such as Jardine, Ground Squirrel Hollow, and Independence Ranch. IDEA: Waive water offset fee/tax for continued monitoring allowance.		pasogcp.com	12/6/2018 1:00:00 PM	
John Thompson	**Ch. 5 Groundwater Conditions** 5.1 Groundwater Elevations	Is there a better map available to see where the monitoring wells are or does that violate certain rights?		pasogcp.com	12/6/2018 1:00:00 PM	
John Thompson	**Ch. 5 Groundwater Conditions** 5.1 Groundwater Elevations	Overlay figures 5-7 & 5-1 to really see where data is lacking and where it is really needed.		pasogcp.com	12/6/2018 1:00:00 PM	
John Thompson	**Ch. 5 Groundwater Conditions** 5.1 Groundwater Elevations	Regarding Hydrographs, I have noticed that everyone wants to think of water levels in terms of feet below ground surface instead of feet above sea level. I think both could be represented on the graph so all could see the correlation. For instance, feet above sea level could stay on the left hand vertical axis and the right hand vertical axis could be stated in feet below ground surface.		pasogcp.com	12/6/2018 1:00:00 PM	
John Thompson	**Ch. 5 Groundwater Conditions** 5.3 Seawater Intrusion	Regarding subsidence. On the surface it seems a trite item if we can stabilize groundwater levels. However, if it persists, are we harming how much water our aquifer can potentially hold? If so, maybe our minimal threshold should be geared more towards this type of data. Is there any plans to measure this? Is there a way to differentiate between natural and pumping causes?		pasogcp.com	12/6/2018 1:28:00 PM	
John Thompson	**Ch. 5 Groundwater Conditions** 5.6 Groundwater Quality Distribution and Trends	Last paragraph. Is there any examples of this happening? Is this a legitimate concern?		pasogcp.com	12/6/2018 1:28:00 PM	

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Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
John Thompson	**Ch. 5 Groundwater Conditions** 5.6 Groundwater Quality Distribution and Trends	Of your groundwater constituents, it is not clear why each of them is being considered as a constituent. For example, "elevated chloride concentrations in groundwater can damage crops and affect plant growth," is strait forward and I could see why you would measure it. However, TDS, sulfate, and gross alpha radiation are not adequately explained as to their usefulness as groundwater quality constituents. And gross alpha radiation is not adequately defined so that I would even know what it is.		pasogcp.com	12/6/2018 1:28:00 PM	
Patricia Wilmore	**Ch. 5 Groundwater Conditions** 5.2 Change in Groundwater Storage	5.21. Alluvial Aquifer Notes that Figure 5-14 "suggests that the loss in groundwater during low precipitation years is not due to increased pumping but is more likely a result of lack of recharge during low precipitation years" is a key point for future planning.	County of San Luis Obispo GSA	pasogcp.com	12/9/2018 3:16:00 PM	
Patricia Wilmore	**Ch. 5 Groundwater Conditions** 5.1 Groundwater Elevations	Significant data gaps are indicated due to lack of publicly available groundwater level data. How can this be remedied? Since confidentiality appears to be important, pursue getting additional agreements.	County of San Luis Obispo GSA	pasogcp.com	12/9/2018 3:16:00 PM	
John Onderdonk	**Ch. 5 Groundwater Conditions** 5.1 Groundwater Elevations	The last sentence of the first paragraph of Section 5.1.2.2 states: The lack of publicly available groundwater level data for the Paso Robles Formation Aquifer is a significant data gap. This data gap combined with uncertainty with regard to aquifer continuity within the Subbasin (Section 4.9) and continuity with neighboring Subbasins, particularly given the Northern boundary of the Subbasinis defined by the county line not by a physical barrier to groundwater flow (Section 4.1), highlights the limited understanding of aquifer attributes and current conditions. The GSP must establish a clear protocol for how this uncertaintywill be addressed. According to Section 5.1.2.1, the lack of data will be partially addressed through a recommended expansion of the Subbasin monitoring network which will be detailed in Chapter 8. It would be beneficial if the GSP explicitly states a timeline for this monitoring expansion and provided specific guidance on whether or not the additional monitoring and data collection will be done before or after the adoption of the GSP and how new monitoring data will be incorporated during GSP implementation. Specific procedures for how the GSP can be refined, modified and challenged as new data is presented should be clearly defined in advance. While the collection of additional data will improve the development and implementation of the GSP, uncertainly will still remain. Given that fact, the GSP should clearly define where the burden of proof for compliance/non-compliance lies (with the landowneror GSA). Additionally, clear procedures for demonstrating compliance in light of limited data and uncertainty should be defined.	County of San Luis Obispo GSA	pasogcp.com	12/10/2018 8:59:00 AM	
Timothy Cleath	**Ch. 5 Groundwater Conditions** 5.1 Groundwater Elevations	Fig 5-2: as shown should not be included in the alluvial aquifer map as these areas are typically on elevated terraces and are not saturated. Paso Robles Formation aquifer infers that there is only one aquifer. In fact, within the Paso Robles Formation there are many aquifers. Modify the title to say Aquifers. Fig 5-3, -4, -5 and -6 contours extend considerably beyond where well water level information occurs (Fig. 5-1) northeast of Whitley Gardens and east of the San Juan River. Either show the basis for these contours (on Figure 5-1) or remove or dash the contours in these areas on Fig 5-3. Showing the "inferred groundwater flow direction" can be misleading (the gradient of the interpreted contours may be due to various factors and is not always the direction of flow) and should be removed. Fig 5-6 and 5-7 similarly include areas where the contours have extended beyond the water level information. The depression west of Creston is based on one data point and may not be representative of other wells in this area (the basin is shallower in this area and may show significant variability in water levels from one well to another). This should be noted in the text. The water level rise along the western edge of the basin near Paso Robles is acknowledged to be a result of limited data and it is best to not try to guess why in the text (delete last sentence on para. 1 of page 5-13). 5.1.2.2 Identify where the 18 monitored wells are located. In light of the potential need for "key wells" as a basis for groundwater management, further discussions should be included regarding available publicly reviewable groundwater level hydrographs. With respect to the hydrographs, Fig 5-11 shows the water level at nearly the bottom of the well. This well, in the Creston area, would not be good for a future water level monitoring well. The well water level for the Shandon area shows stability during the recent dry period, while the other two hydrographs (Creston and Estrella subareas) show a 40- to 50-foot decline. Please consider including some comment on this in the text. 5.1.3 Historically an upward vertical gradient in the Estrella River valley near Shandon has been indicated by flowing wells in this area. As groundwater levels decline in the lower aquifers, the vertical gradient will change. Similarly, wells in the Creston area have flowed during wet periods.		pasogcp.com	12/10/2018 11:29:00 AM	
Verna Jigour	**Ch. 5 Groundwater Conditions** 5.2 Change in Groundwater Storage	5.2.1 ALLUVIAL AQUIFER, 3rd paragraph: Some text seems to be missing here: As indicated on _____ presumably Figure 5-14?		pasogcp.com	12/10/2018 5:48:00 PM	
Jerry Reaugh	**Ch. 5 Groundwater Conditions** 5.2 Change in Groundwater Storage	Comments Pertaining to Chapter 5 of the Paso Robles Subbasin Groundwater Sustainability Plan	County of San Luis Obispo GSA	pasogcp.com	12/10/2018 12:49:00 PM	
Jerry Reaugh	**Ch. 5 Groundwater Conditions** 5.2 Change in Groundwater Storage	This comment should be referred to the SLO County Paso Basin GSA. The EPC WD is in the County GSA but the way you do the addresses prevents this comment from being assigned to the proper GSA. Jerry Reaugh	County of San Luis Obispo GSA	pasogcp.com	12/10/2018 12:31:00 PM	
Herb Rowland	**Ch. 5 Groundwater Conditions** 5.2 Change in Groundwater Storage	In regards to Figures 5-14 and 5-15, how is the annual groundwater pumping determined? How was this measured historically and how will it be estimated going forward? If wells are not metered, and even the ones that are metered aren't being reported, how is that number established? It is a very crucial number to determine the water budget for the basin and will affect a large number of people and businesses if it is incorrect. There needs to be a high level of confidence and consensus in this number, throughout the basin, if the overall plan is to succeed. This number is too important to just make generalizations and the assumptions that whatever model you use takes, must be vetted under a very high level of scrutiny.	County of San Luis Obispo GSA	pasogcp.com	12/10/2018 11:50:00 AM	
Timothy Cleath	**Ch. 5 Groundwater Conditions** 5.2 Change in Groundwater Storage	For comparison purposes, use the same scales for the alluvial aquifer and Paso Robles Formation plots. The net change in storage in the alluvial aquifer is highly dependent on inflows from rainfall runoff, releases from reservoirs and wastewater discharges. This should be noted. The lack of alluvial aquifer water level data in the various stream valleys limits the verification of the modeled change in storage. This should be noted. fourth para p. 5-23: "As indicated on" ?? what? Total groundwater in alluvial aquifer storage should be stated to understand the impact of the "cumulative change in storage". This would also be appropriate for the Paso Robles Formation aquifers. page 5-25 first sentence: Fig 5-15 shows climate periods not precipitation data.		pasogcp.com	12/10/2018 11:29:00 AM	
Timothy Cleath	**Ch. 5 Groundwater Conditions** 5.4 Subsidence	Comment on whether subsidence is significant for groundwater management of this basin. What is the level at which it is significant? Has there been any impacts to date?		pasogcp.com	12/10/2018 11:29:00 AM	

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Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
Timothy Cleath	**Ch. 5 Groundwater Conditions** 5.5 Interconnected Surface Water	Why wouldn't groundwater elevations in the alluvial wells at or above the stream channel at any time suggest interconnectivity between the surface water and the groundwater? Paso Robles Formation wells would not necessarily indicate interconnectivity based on water levels. Water levels for model simulation time step durations are not be the best indicator of connectivity. Are the surface water areas and the alluvial aquifers not interconnected if they are not shown in red on Fig. 5-17? The depletion of interconnected surface water across the basin is much more complex than is depicted in this section. A discussion of the factors and their significance in different areas of the basin would be a good start toward a more thorough analysis of this interconnectivity.		pasogcp.com	12/10/2018 11:29:00 AM	
Verna Jigour	**Ch. 5 Groundwater Conditions** 5.6 Groundwater Quality Distribution and Trends	5.6.1 GROUNDWATER QUALITY SUITABILITY FOR DRINKING WATER, last sentence: Please explain the likely source for exceedance of mercury in 1990 and whether/why it may no longer be an issue (?)		pasogcp.com	12/10/2018 5:48:00 PM	
Timothy Cleath	**Ch. 5 Groundwater Conditions** 5.6 Groundwater Quality Distribution and Trends	Since the 2002 report, changes to MCLs and additional water quality data has occurred. Arsenic has been found at levels above the MCL. More information about boron is available in the western portion of the basin between San Miguel and Paso Robles. These should be discussed and possible recommendations made to further delineate areas/aquifers where these occur. The quality of wastewater discharges has changed but current discharges can be a significant source of salt to the groundwater recharge. This should be discussed and potential management measures to evaluate and reduce this source of salt contribution to the basin. TDS and Chloride concentrations are shown to be high on Figs 5-20 and -21 in the area near Paso Robles. Groundwater recharge is also high in this area. Sustainability projects and management actions could result in improvements to this condition. Average Boron Concentration as noted in table 5-6 is probably not correct for most of the Estrella subarea (high boron does occur in the underlying formations beneath the Paso Robles Formation and in the area west of Highway 101).		pasogcp.com	12/10/2018 11:29:00 AM	
Patricia Wilmore	**Ch. 6 Water Budgets** 6.5 Future Water Budget	General Comment: Future Water Budgets should use well data, gathered from more wells than 12 (as noted in Chapter 7) rather than a GSP model. The monitoring network, to produce valid information on which to base actions, should be at least 50 wells. 6.5.1. States that "a portion of the City's future groundwater demand will be offset by Nacimiento water." The beneficial use of Naci water is a key point of this entire GSP. There needs to be a more serious effort/plan to either have the City use more of the 6,500 AFY entitlement, either via a greater treatment capacity than it has now and/ or additional supplies into the Salinas to be recovered by recovery well(s) and/or a viable plan to deliver and sell the water to agriculture. In other words, the difference between what the city is entitled to and what it currently uses needs to be accounted and planned for in the GSP. The GSP should and the County should actively support and promote the Basin's access to Nacimiento water.	County of San Luis Obispo GSA	pasogcp.com	4/15/2019 10:42:00 AM	
TImothy Cleath	**Ch. 6 Water Budgets** 6.3 Historical Water Budget	Table 6-3 and ensuing tables: Wastewater pond "leakage" should be better referred to as "percolation". Leakage sounds like it is unintentional. Table 6-3 (and ensuing tables): Rather than not having the numbers add up and saying some difference relates to water year/calendar year values, it would be better to make some adjustments to the numbers and not have this discrepancy. 6.3.2.2Table 6-4: Shouldn't riparian ET have some variation (max/min), even if it is not much? Some of the hydrologic budget components have appreciable increases over the historic period. Therefore, a discussion of the trends would be useful in determining if the "average" values should be used to compare historic and recent uses. 6.3.2.3 Figure 6-4: 1986 does not have a value- I'd assume that is because it is "0" but perhaps some way of showing that on the graph would be good. 6.3.2.4 The report should identify a "balanced" hydrologic period during which sustainable yield should be determined in addition to using the full base period. This is important since the time interval for appreciable recharge (10-12 years) is longer than in many other basins.		pasogcp.com	4/15/2019 12:21:00 PM	
TImothy Cleath	**Ch. 6 Water Budgets** 6.4 Current Water Budget	6.4.1.1 Imported Nacimiento water should be aggregated into the surface water budget in light of the fact that this source will be increasingly used to the benefit of the basin. 6.4.1.2 Are the Salinas River releases based on flow at the Niblick bridge or are they releases from the dam? In light of the extractions between the dam and the down flow stream gage, value may be appreciably different. Tables 6-6 and 6-7 Groundwater discharge to the river is more than the percolation of surface water to groundwater during this drought period. It would seem to me that the opposite should be true. 6.4.1.4 Figure 6-5 should have the same vertical scale as Figure 6-4 6.4.2.3 Comparing historic average to current average would be better if it considered the trends of water use over the historic time period (particularly for rural domestic). Figure 6-7 could be better presented as a bar graph considering the limited number of datapoints and the fact that they represent the entire year.		pasogcp.com	4/15/2019 12:21:00 PM	
Sandi Matsumoto	**Ch. 6 Water Budgets** 6.4 Current Water Budget	Please clarify what assumptions and data were used to calculate Riparian Evapotranspiration. Why was evapotranspiration only calculated for riparian vegetation? In Chapter 3.4.2 ofthe Draft GSP, native vegetation was identified as the largest water use sectorin the subbasin by land area. Please estimate evapotranspiration for allnative vegetation in the subbasin for the water budget.		pasogcp.com	4/15/2019 1:20:00 PM	Link: 20190415_Matsumoto
Stephen Sinton	**Ch. 6 Water Budgets** 6.5 Future Water Budget	A groundwater basin which is at or beyond its safe yield is allocated according to water rights with the priority given to domestic and agricultural uses overlying the basin. Projections for the City's future groundwater demand must be limited to any prescriptive rights determined to be held by it, but may not be expanded. Therefore, under current water law, the City and SMCSD's future water demands are limited in the basin and will need to be satisfied by other sources. Because we don't know what a judge might do with regard to the City's and SMCSD's rights, this section should be removed.	Shandon San Juan GSA	pasogcp.com	4/15/2019 12:00:00 AM	
Verna Jigour	**Ch. 6 Water Budgets** 6.1 Overview of Water Budget Development	1st paragraph: This chapter includes one appendix Please state specifically which appendix here (presumably D?). Figure 6-1. Hydrologic Cycle:The labels for Infiltration are incorrect. The associated arrows in the diagram depict *Interflow*, rather than infiltration. *Infiltration* should be shown at watershed surfaces. *Percolation* follows infiltration through the vadose and saturated zones.		pasogcp.com	4/15/2019 9:48:00 PM	
Verna Jigour	**Ch. 6 Water Budgets** 6.3 Historical Water Budget	The largest groundwater inflow component is streamflow percolation, which accounts for approximately 38% of the total average inflow. Especially since surface-groundwater interflows operate in both directions, how were the figures for Streamflow Percolation derived? Perhaps this is revealed in one of the earlier models but it is not apparent in Chapter 6 nor in Appendix D. Does that high percentage of inflows attributed to streamflow percolation apply primarily on certain streams or is it consistent throughout the watershed? Given that the combined substrate area of all streams comprises a fraction of the area of watershed uplands, this predominance of Streamflow Percolation over Deep Percolation of Direct Precipitation and Subsurface Inflow contributions seems to suggest a fairly high rate of runoff. That supports the historical degradation of the watersheds Iv'e pointed to in previous comments.That is, the detention (infiltration and percolation) storage capacity of regional watersheds has become degraded through historical human impacts on land cover (vegetation) such that runoff became enhanced. This comment is intended to connect with my previous and current input that watershed restoration could serve some of the purpose intended by flood water capture.		pasogcp.com	4/15/2019 9:48:00 PM	

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Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
National Marine Fisheries Service - Rick Rogers	**Ch. 6 Water Budgets**	Section 6.2.1 (Model Assumptions and Uncertainty) stated: "Results of the previous calibration process demonstrated that the model-simulated groundwater and surface water flow conditions were similar to observed conditions. After updating for the GSP, the calibration of the GSP model was reviewed. Results of the review indicated that the GSP model was sufficiently calibrated for use in the GSP." Since the evaluation of interconnected surface water are based on the results of simulated streamflow and groundwater levels from the GSP model, we would like to obtain a detailed information about the results of the calibration process and the differences between observed and simulated streamflow and groundwater levels. In this way, we will have a better understanding of the uncertainty in the interconnected surface water results associated with the GSP model results.		email		
Patricia Wilmore	**Ch. 7 Monitoring Networks** 7.2 Groundwater Level Monitoring Network	12 wells in the monitoring network is woefully insufficient data on which to base decisions. Significant and dedicated outreach needs to be done to get this number up to about 50. The GSP should have a section detailing how this will be achieved. As for the percentage of monitoring wells that will trigger action, the current draft uses 15%; we recommend 25%.	County of San Luis Obispo GSA	pasogcp.com	4/15/2019 10:42:00 AM	
TImothy Cleath	**Ch. 7 Monitoring Networks** 7.2 Groundwater Level Monitoring Network	7.2 Available alluvial aquifer groundwater level monitoring data should be obtained for the wastewater discharge monitoring sites. This provides good information on alluvial aquifer groundwater levels- particularly for City of Paso Robles, San Miguel CSD and Camp Roberts. This information is publicly released and can be used without a confidentiality agreement. This information can also be used in evaluating surface water/groundwater flow conditions. The bmp criteria for monitoring well networks and the data gaps in Table 7-2 might be better connected with Figure 7-3 if specific data gap locations are related to specific bmp criteria (e.g., well data density for storage calculations, wells located to address alluvial aquifer/surface water interconnectivity, wells used to monitor groundwater recharge activities, wells to monitor conditions along the borders with other subbasins).The Camp Roberts wells tapping the Paso Robles Formation can serve to address some of the data gap issues on the northern boundary of the basin as discussed in the data gaps on Table 7-2. This information was used in defining the basin structure in the 2002 basin study. City of Paso Robles has formed a GSA and will need to provide groundwater level data for their GSP. This data should be considered as available. The City has wells in the alluvial deposits and the Paso Robles Formation that are monitored. Table 7-2 states that in the future "only publicly available data will be used to develop contour maps". This will severely limit the accuracy of the contour maps. Other basin management agencies have used data in-house to develop contour maps without releasing the specific well water level data. This section refers to "confidential" wells. It is important to use appropriate terminology. The wells themselves are not confidential.Â The water level data collected is considered "confidential" where no release has been given to share the data to the public. It may also be good to define the term "confidential".Table 7-2 The last item says that the "network will be expanded". Say the "network will need to be expanded"7.4 If not reviewed already, the 2015 CCGWC Groundwater Quality Characterization report should be reviewed to identify areas of known high nitrate concentrations and verify that groundwater quality monitoring is sufficient to address the impact of the sources of nitrate on the basin groundwater. Recent water quality investigations have noted arsenic concentrations exceeding the current MCL at quite a few wells in the basin. These were not identified in the 2002 basin study because there was a higher MCL at the time. Groundwater quality monitoring in the future should better define the extent of this natural constituent.7.5 While no documented subsidence has been found, the existing monitoring network for subsidence is insufficient to evaluate subsidence due to groundwater pumping in the basin. Three sites are along the northern border of the subbasin where little pumping is occurring and there are only two others in the remainder of the basin area: one south of Whitley Gardens and the other in Camatta Canyon. Only the Whitley Gardens site is in the main area of pumping. The long term monitoring of these locations should be verified as some subsidence monitoring is tied to research activities that do not have long term funding.7.6 As a professional hydrogeologist working in this area for 35 years, I am not part of the consensus that there is "no interconnection between surface water and groundwater in the Subbasin". Since the GSP is saying that further evaluation of interconnectivity will need to be performed, the monitoring program should be developed if further evaluation establishes interconnectivity. As I mentioned earlier on data collection, there are existing monitoring wells in the "datagap" areas that have been monitored for many years and whose data is publicly available.Streamflow data is typically less abundant but some may be available from the City of Paso Robles near the wastewater treatment plant. Inquiry with the City should be done to see if they have this information.		pasogcp.com	4/15/2019 12:21:00 PM	
Sandi Matsumoto	**Ch. 7 Monitoring Networks** 7.2 Groundwater Level Monitoring Network	Data must be able to characterize conditions and monitor adverse impacts to beneficial uses andusers identified within the basin. Aside from GDEs mapped in the basin (Figure 4-18), environmental surfacewater users have not been identified in the GSP thus far. SGMA requires that potential effects on GDEs andenvironmental surface water users be described when defining undesirableresults. In addition to identifying GDEs inthe basin, The Nature Conservancy recommends identifying beneficial users ofsurface water, which include environmental users. This is a critical step, asit is impossible to define significant and unreasonable adverse impacts without knowing what is being impacted, nor is possible to monitor ISWs in a way that can identify adverse impacts on beneficial uses ofsurface water[23 CCR, §354.34(c)(6)(D)]. For your convenience, we've provided a list of freshwater species within the boundary of the Paso Robles basin in Attachment C of our letter. Our hope is that this information will help your GSA better evaluate and monitor the impacts of groundwater management on environmental beneficial users ofsurface water. We recommend that after identifying whichfreshwater species exist in your basin, especially federal and state listed species, that you contact staff at the Department of Fish and Wildlife (DFW), United States Fish and Wildlife Service (USFWS) and/or National Marine Fisheries Services (NMFS) to obtain their input on thegroundwater and surface water needs of the organisms on the freshwater specieslist, and how best to monitor them. Because effects to plants and animalsare difficult and sometimes impossible to reverse, we recommend erring on theside of caution to preserve sufficient groundwater conditions to sustain GDEs and ISWs. Please identify appropriate biological indicators that can be used to monitor potential impacts to environmental beneficial users as a current data gap, and make plans to reconcile these in Chapter 10 (Plan Implementation).		pasogcp.com	4/15/2019 1:20:00 PM	Link: 20190415_Matsumoto
Sandi Matsumoto	**Ch. 7 Monitoring Networks** 7.6 Interconnected Surface Water Monitoring Network	The first sentence in this section is contradictory to the ISW mapping conducted in Chapter 5 do exist in the Paso Robles Subbasin (Figure 5-17). Depletions of surface water were also estimatedin Section 5.5.1, and the statement that there is no need for a monitoring network that quantifies surface water depletion from is false and goes against SGMA requirements. SGMA requires tha twhen monitoring depletions of interconnected surface water that spatial and temporal exchanges between surface water and groundwater are necessary to calculate depletions of surface water caused by groundwater extraction [23CCR §354.34(c)(6)] and that the monitoring network shall be designed to ensure adequate coverage of sustainability indicators [23CCR,§ 354.34(d)]. Where minimum thresholds for ISWs are to be quantified by the location, quantity, and timing of depletions of interconnected surface water [23 CCR, §354.28(c)(6)(A)]. Thus, there is a need for a monitoring network that quantifies surface water depletion from interconnected surface waters. In addition to the need for additional shallow monitoring wells in the Alluvial aquifer to map ISWs, there is also a need to enhancing monitoring of stream flow and vertical groundwater gradients by installing more stream gauges and clustered/nested wells near streams, rivers or wetlands. Ideally, co-locating stream gauges with clustered wells that can monitor groundwater levels in both the Alluvial and Paso Robles Formation aquifers would enhance understanding about where ISWs exist in the basin and whether pumping is causing depletions of surface water or impacts on beneficial users of surfacewater and groundwater.There is a need to integrate biological indicators that can monitor adverse impacts to beneficial uses of surface water and groundwater within ISWs.		pasogcp.com	4/15/2019 1:20:00 PM	Link: 20190415_Matsumoto

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Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
National Marine Fisheries Service - Rick Rogers	**Ch. 7 Monitoring Networks**	Section 7.6 (Interconnected Surface Water Monitoring Network) stated: "As discussed in Chapter 5, the consensus among local groundwater experts is that there is no interconnection between surface water and groundwater in the Subbasin. Therefore, there is no need for a monitoring network that quantifies surface water depletion from interconnected surface waters. However, there is a need to verify whether or not there are interconnected surface waters in the Subbasin. The assessment of whether or not there are interconnected surface waters will be evaluated by monitoring surface water and groundwater in areas where interconnected surface water conditions may exist." We have reviewed Chapter 5 and have not found any statement or references regarding the consensus among local groundwater experts (which are not identified) indicated in the previous paragraph. Chapter 5 stated: "Limited and ephemeral surface water flows in the Subbasin over the last 40 years make it difficult to study the interconnectivity of surface water and groundwater and to quantify the degree to which surface water depletion has occurred. The spatial extent of interconnected surface water was evaluated based on results from the basin-wide groundwater flow model of the Paso Robles Subbasin." Also, Chapter 6 (Section 6.2.1) stated: "During early implementation of the GSP, additional data will be collected to refine Subbasin understanding and recalibrate the GSP model. New hydrologic data and the recalibrated model will be used to adaptively implement sustainability management actions and projects to ensure that progress toward sustainability goals is being achieved." Therefore, the first statement in Section 7.6 (regarding non-interconnected surface waters) is not properly justified and should not be mentioned at this time. More definitive conclusions should be provided after the GSP model is refined and recalibrate.				
Andrew Christie	**Ch. 8 Sustainable Management Criteria** 8.9 Depletion of Interconnected Surface Water SMC	As set forth below, Chapter 8 claims that that the proposed minimum thresholds would not impact interconnected surface waters because, Chapter 8 claims, there are no interconnected surface waters. Depletion of interconnected surface waters. The assessment of local groundwater experts is that there are not interconnected surface waters in the Subbasin. Therefore, there are no current minimum thresholds or undesirable results that could be affected by the groundwater elevation minimum thresholds. Changes in groundwater elevations, however, could reconnect surface waters. If this occurs, minimum thresholds will be established for depletion of interconnected surface waters and the relationship between those new minimum thresholds and all other sustainability indicators will be reassessed. Chapter 5, however, shows that the basin does include areas of surface water connection. See Figure 5-17, at 5-29. Accordingly, Chapter 8 must analyze the relationship between the proposed minimum thresholds and surface water connections. Chapter 8 claims, Groundwater elevation minimum thresholds effectively protect the groundwater resource including those existing ecological habitats that rely upon it. As noted above, groundwater level minimum thresholds may limit both agricultural and rural residential growth. Ecological land uses and users may benefit by this reduction in agricultural and rural residential growth. The claim that the thresholds effectively protect ecological habitats, however, is not supported by any analysis of data. As such, Chapter 8 must be revised to include analysis of the relationship between the groundwater levels and ecological habitats and discuss whether and the extent to which the proposed minimum thresholds affect ecological habitats.		pasogcp.com	4/1/2019 3:46:00 PM	
Patricia Wilmore	**Ch. 8 Sustainable Management Criteria** 8.4 Chronic Lowering of Groundwater Levels Sustainable Management Criteria	8.3 relies on a survey (also referred to in other parts of the document) that represents a small sample and asks for opinions on matters for which there was no accompanying data on which to base an opinion. Therefore, its analysis and conclusions should not be used to set standards which by their nature require study and expertise, including knowledge of the consequences of each decision. 8.4.2. Minimum Thresholds. These need to be reset at a reasonable level that doesn't put us behind at the outset. They should protect the resource while also giving the GSA's time to collect and analyze data, allow for public input on specific actions under consideration and create specific funding mechanisms. 8.4.2.7. Effects on Beneficial Users and Land Uses. As noted, "many parts of the local economy rely on a vibrant agricultural industry and they too will be hurt proportional to the losses imparted to agricultural businesses." Indeed! The entire GSP needs a more thorough economic analysis of its proposals. Our most recent study, done by the UC Davis Agricultural Issues Center, indicated in 2016 a total of $1.65 Billion economic impact for the Paso AVA. Of that, in 2015 the year on which the study was based, property tax assessments to vineyards and wineries represented 28% of the total in SLO County and the sales tax revenue collected from those same entities was 10% of the SLO County total. It would be well worth it to factor in the proportional benefits to increasing supply with realistic projects based on clear defensible data. There are challenges ahead and concerned citizens, landowners and interested parties need to be part of the process to make it successful.	County of San Luis Obispo GSA	pasogcp.com	4/15/2019 10:42:00 AM	
Patricia Noel	**Ch. 8 Sustainable Management Criteria** 8.3 General Process for Establishing Sustainable Management Criteria	Please allow the enforcing agencies to have adequate time (at least five years) to start implementation and observe the results before more drastic measures are commenced.Water levels should be given adequate time to stabilize after the historic drought.Any undesirable results should be addressed locally, not throughout the basin. Bottom line: I support the Shandon-San Juan Water District's comments on the Basin Plan as posted on its website.	Shandon San Juan GSA	pasogcp.com	4/15/2019 12:53:00 PM	
Sandi Matsumoto	**Ch. 8 Sustainable Management Criteria** 8.3 General Process for Establishing Sustainable Management Criteria	Stakeholder involvement is crucial whenestablishing sustainable management criteria. The role of the GSA is to represent and balance the needs of all groundwater beneficial uses and users in the basin, which has been expressed in the Sustainability goal in Section 8.2. According to p.6, only rural residents, farmers, and local cities were surveyed to gather input on sustainable management criteria. Please specify what information or efforts have been used/made to protect the interests of environmental users and disadvantaged community members. SGMA requires that sustainable management criteria are consistent with other state, federal or local regulatory standards [23 CCR, §354.28(b)(5)]. Please describe what process was used to identify other regulatory standards that need consideration when establishing minimum thresholds for sustainability criteria.		pasogcp.com	4/15/2019 1:20:00 PM	Link: 20190415_Matsumoto

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Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
Sandi Matsumoto	**Ch. 8 Sustainable Management Criteria** 8.4 Chronic Lowering of Groundwater Levels Sustainable Management Criteria	[8.4.1] The definition of significant and unreasonable is a qualitative statement that is used to describe when undesirable results would occur in the basin, such that a minimum threshold can be quantified. Potential effects on all beneficial users of groundwater in the basin need to be taken into consideration. According to the California Constitution Article X, water resources in California must be put to beneficial use to the fullest extent of which they are capable. Please modify the local definition for significant and unreasonable (provided on p. 6), so that it also specifies potential effects on environmental beneficial users of groundwater in the basin, and addresses how water rights amongst beneficial users will be prioritized when establishing thresholds. [8.4.2.1] The use of 2017 groundwater elevations to establish minimum thresholds for the Paso Robles Formation Aquifer is inadequate, since the SGMA benchmark date is January 1, 2015. Also, no scientific rationale was explained for using 2007 groundwater elevation data to establish initial minimum thresholds for the Alluvial Aquifer. SGMA is based on the use of best available science, and selecting minimum thresholds solely on public opinion from a select group of stakeholders (e.g., domestic well users, irrigators, municipalities) in the basin, is not a scientifically-based approach nor does it consider potential effects on environmental beneficial users of groundwater. A better approach is to use 10-year baseline period of groundwater elevation data (2005-2015) to establish how groundwater conditions during that time period affect different water users across the basin. Please document the consideration of the following when establishing minimum thresholds for chronic lowering of groundwater levels:- Are groundwater elevations between 2005-2015 above the max screen depth for domestic, agriculture, municipal wells?- Are the proposed minimum thresholds preserving water rights? [Water Code ,§10720.5(b)]- Are the proposed minimum thresholds consistent with other state, federal or local regulatory standards? [23 CCR, §354.28(b)(5)]- Are there environmental beneficial groundwater users that need consideration, particularly those that are legally protected under the United States Endangered Species Act or California Endangered Species Act? (See Attachment C in the attached letter for a list of freshwater species located in the Paso Robles Subbasin).- Is the equity being applied across different beneficial user groups (e.g., domestic, agriculture, municipal, environmental) when establishing minimum thresholds? [8.4.2.1] Please provide a description for how the initial minimum threshold groundwater elevations for the Alluvial Aquifer (Figure 8-3) may impact environmental beneficial users of groundwater (e.g., GDEs) in the basin. When converting groundwater elevations to depth to groundwater contours, please use the USGS digital elevation model (see Attachment D in the letter). [8.4.2.1] Please make a back-up plan in the Monitoring network chapter on how the GSA will install shallow monitoring wells in the Alluvial Aquifer if confidentially agreements still prevent existing wells from being used as representative monitoring wells for the Chronic Lowering of Groundwater sustainability indicator. [8.4.2.5] Depletions of interconnected surface waters do exist in the Paso Robles Subbasin (Figure 5-17). Depletions of surface water were also estimated in Section 5.5.1, and the statement that there are no current minimum thresholds or undesirable results for interconnected surface water is inadequate and goes against SGMA requirements. Thus, there is a need to establish sustainable management criteria for interconnected surface waters in the basin. (See further comments in attached letter regarding Interconnected Surface Waters)..		pasogcp.com	4/15/2019 1:20:00 PM	Link: 20190415_Matsumoto
		[8.4.2.7] The description of how the groundwater elevation minimum thresholds affect ecological land uses and users (Section 8.4.2.7 p.17) is inadequate for the following reasons:- The draft GSP has failed to describe current and historical groundwater conditions with GDE areas. Thus, it is impossible to assess how the proposed minimum thresholds relate to historical groundwater conditions in the GDE and whether potential adverse effects could occur to the GDEs as a result of groundwater conditions. - Legally protected species located with GDEs have not been identified. Thus, it is impossible to evaluate whether federal, state, or local standards exist for groundwater elevations needed to protect these listed species (see Section 8.4.2.8). [8.4.3.1] Under SGMA, Measurable Objectives are to be established to achieve the sustainability goal of the basin within 20 years of Plan implementation [23 CCR ,§ 354.30 (a)]. Please modify the methodology for setting measurable objectives for groundwater levels (p.18-19) so that it helps attain the sustainability goal defined on p. 4 (Section 8.2): sustainably manage the groundwater resources of the Paso Robles Subbasin for long-term community, financial, and environmental benefit of residents and business in the Subbasin. This GSP outlines the approach to achieve a sustainable groundwater resource free of undesirable results within 20 years, while maintaining the unique cultural, community, and business aspects of the Subbasin. In adopting this GSP, it is the express goal of the GSAs to balance the needs of all groundwater users in the Subbasin, within the sustainable limits of the Subbasins resources. [8.4.4.1] Please elaborate how the 15% exceedance criteria balances the interests of environmental beneficial users in comparison with other groundwater users in the basin				
Sandi Matsumoto	**Ch. 8 Sustainable Management Criteria** 8.9 Depletion of Interconnected Surface Water SMC	According to Chapter 5, interconnected surface waters exist in the Paso Robles Subbasin (Figure 5-17). Depletions of surface water were also estimated in Section 5.5.1. While there is certainly data gaps and a need for additional shallow monitoring wells inthe Alluvial aquifer to map ISWs, there is also a need to enhancing monitoring of stream flow and vertical groundwater gradients by installing morestream. SGMA is based on best available science and adaptive management, thusthere should be an attempt to identify some minimum thresholds for ISWs, which are to be quantified by The location, quantity, and timing of depletions of interconnected surface water [23 CCR, §354.28(c)(6)(A)]. [8.9.2] There is a need to evaluate potential effects on beneficial uses of surface and groundwater. Please refer to Attachment C (in the attached letter) for a list of freshwater species in Paso Robles Subbasin that may be existwithin ISWs. We recommend that after identifying which freshwater species exist in your basin, especially federal and state listed species, that you contact staff at the Department of Fish and Wildlife (DFW), United States Fish and Wildlife Service (USFWS) and/or National Marine Fisheries Services (NMFS) to obtain their input on the groundwater and surface water needs of the organisms on the freshwater species list. Because effects to plants and animals are difficult and sometimes impossible to reverse, we recommend erring on the side of caution to preserve sufficient groundwater conditions to sustain GDEs and ISWs.		pasogcp.com	4/15/2019 1:20:00 PM	Link: 20190415_Matsumoto
Martha Noel	**Ch. 8 Sustainable Management Criteria** 8.3 General Process for Establishing Sustainable Management Criteria	I want the Basin Plan to provide for the following: 1. That the agencies that have to enforce the plan have adequate time (at least five years) to start implementation and observe the results before more drastic measures are commenced. 2. That water levels be given adequate time to stabilize after the historic drought. 3. That "undesirable results" not include shallow wells going dry. 4. That any undesirable results be addressed locally, not throughout the basin. I am in support the Shandon-San Juan Water District's comments on the Basin Plan as posted on its website.	Shandon San Juan GSA	pasogcp.com	4/15/2019 1:49:00 PM	
William Noel	**Ch. 8 Sustainable Management Criteria** 8.1 Definitions	Here are my requests about definitions. Thank you. Will 1. That water levels be given adequate time to stabilize after the historic drought. 3. That "undesirable results" not include shallow wells going dry. 4. That any undesirable results be addressed locally, not throughout the basin. I support the Shandon-San Juan Water District's comments on the Basin Plan as posted on its website. All my best. Will	Shandon “San Juan GSA	pasogcp.com	4/15/2019 2:12:00 PM	

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Julie Pruniski	**Ch. 8 Sustainable Management Criteria** 8.3 General Process for Establishing Sustainable Management Criteria	Overall, I support the Shandon-San Juan Water District's comments on the Basin Plan as posted on its website. Specifically, the Basin Plan should 1) provide the agencies that have to enforce the plan with adequate time (at least five years) to start implementation and observe the results before more drastic measures are commenced; 2) that water levels be given adequate time to stabilize after the historic drought; 3) that "undesirable results" not include shallow wells going dry, and 4) that any undesirable results be addressed locally, not throughout the basin.	Shandon San Juan GSA	pasogcp.com	4/15/2019 2:18:00 PM	
Laurie Gage	**Ch. 8 Sustainable Management Criteria** 8.1 Definitions	Multiple sections addressed in attached document	County of San Luis Obispo GSA	pasogcp.com	4/15/2019 4:51:00 PM	Link: 20190415_Gage
Timothy Cleath	**Ch. 8 Sustainable Management Criteria** 8.7 Degraded Water Quality Sustainable Management Criteria	8.7.2 Water Quality: Arsenic is a naturally occurring constituent that should be monitored. 8.7.2 Previous statement that there are no mapped plumes is repeated here. The treated wastewater effluent discharges introduce higher NO3 water to the groundwater. There is also a nitrate high concentration near Creston. These have been documented in the 2015 CCGWC report prepared for the irrigated lands program monitoring.		pasogcp.com	4/15/2019 4:53:00 PM	
Timothy Cleath	**Ch. 8 Sustainable Management Criteria** 8.9 Depletion of Interconnected Surface Water SMC	8.9.1 I believe there is some interconnectivity.8.9.4 Impacts can occur based on interconnectivity.		pasogcp.com	4/15/2019 4:53:00 PM	
Timothy Cleath	**Ch. 8 Sustainable Management Criteria** 8.10 Management Areas	Groundwater management for specific management areas within the Subbasin is highly recommended to address impacts more appropriately.		pasogcp.com	4/15/2019 4:53:00 PM	
Timothy Cleath	**Ch. 8 Sustainable Management Criteria** 8.4 Chronic Lowering of Groundwater Levels Sustainable Management Criteria	8.4.2.1 Water level in the alluvium is very sensitive to time of year. State specific time of year when water level data is to be used for threshold. The water level should be specific to the monitored well-simulated information is not accurate enough. 8.4.2.4 I question the accuracy of the water levels in OSWCR wells with the minimum thresholds because often these wells do not have accurate ground surface elevations. 8.4.2.5 Water Quality Degradation: It is possible (and likely) that some upflow may already be occurring from the poor quality water at depth in some locations due to low water levels. 8.4.2.5 Subsidence: It is not reasonable to establish a zero subsidence threshold because some subsidence is possible without causing an unacceptable impact. Subsidence is very site specific, so if subsidence is to be a criteria for management, the location of monitoring sites is critical and the amount of subsidence causing an unacceptable impact should be applied to that location based on impact to local structures.		pasogcp.com	4/15/2019 4:53:00 PM	
Stephen Sinton	**Ch. 8 Sustainable Management Criteria** 8.1 Definitions	Minimum thresholds as used are a problem because they put us in violation the moment they are adopted. GSA's need time to implement measures to arrest groundwater level declines and even after 5 years, may need additional leeway in setting minimum thresholds to allow time for the design, permitting and construction of water supply enhancement projects. Appropriate Minimum thresholds are at best a guess at this point. The historic excess pumping (as calculated by the Model) are very small amounts compared to the total amount of water in storage in the basin. I don't think that point is well described, but should be in order for interested and concerned citizens to understand the situation. I suspect that hydrographs that don't show the depth to the bottom of the groundwater formation give a false sense of urgency. We definitely need to stop the downward trend, but the real question is how much time do we have before we risk undesirable results.	Shandon San Juan GSA	pasogcp.com	4/15/2019 5:38:00 PM	
Stephen Sinton	**Ch. 8 Sustainable Management Criteria** 8.2 Sustainability Goal	Public surveys in the absence of facts about costs and other impacts have limited value and shouldn't be relied upon as the primary basis for setting standards. The outreach for this GSP was valuable, but reached a relatively small sample of the total basin groundwater users. The comments received are valuable, but scientific information should be the real basis for decisions made. I think the projects and management actions should be stated as options, not requirements. I think the Figure 8-2 map is wrong and troublesome and should be deleted. We might want to show measureable objectives, but I'm not even sure about the value of doing that.	Shandon San Juan GSA	pasogcp.com	4/15/2019 5:38:00 PM	
Stephen Sinton	**Ch. 8 Sustainable Management Criteria** 8.1 Definitions	It would help if the acronyms used were defined, either in the definitions sectionÂ or when they first appear in the text. I would think this would be a good practice at the beginning of each chapter.	Shandon San Juan GSA	pasogcp.com	4/15/2019 5:38:00 PM	
Stephen Sinton	**Ch. 8 Sustainable Management Criteria** 8.4 Chronic Lowering of Groundwater Levels Sustainable Management Criteria	8.4.2.6 Third paragraph refers to "two" GSAs, but there are four of us and one more in Monterey County. The language about minimum thresholds should be replaced with measureable objectives.Going back to minimum thresholds, I think they are essential for preventing undesirable results, but since we don't know where orÂ at what water levels that is going to occur, I think it's essential that the GSP be clear that minimum thresholds are an estimate and shouldn't be considered as fixed or absolute.	Shandon San Juan GSA	pasogcp.com	4/15/2019 5:38:00 PM	
Stephen Sinton	**Ch. 8 Sustainable Management Criteria** 8.5 Reduction in Groundwater Storage Sustainable Management Criteria	There are two itemized points under 8.5.1 and #2 says that pumping should be reduced in dry years is a highly ranked concession. The fact is that pumping should be reduced in wet years, when less "added" water from irrigation is required. In dry years farmers have to use more water to make up for the lack of rain. 8.5.2.4 I couldn't understand the opening sentence. Same with 8.5.4.3.	Shandon San Juan GSA	pasogcp.com	4/15/2019 5:38:00 PM	
Stephen Sinton	**Ch. 8 Sustainable Management Criteria** 8.7 Degraded Water Quality Sustainable Management Criteria	8.7.2.1 & .2 If a new monitoring well is added to the system and it has water quality that exceeds the established limits, does that constitute an exceedance?	Shandon San Juan GSA	pasogcp.com	4/15/2019 5:38:00 PM	
John Onderdonk	**Ch. 8 Sustainable Management Criteria** 8.4 Chronic Lowering of Groundwater Levels Sustainable Management Criteria	This theme is reiterated in Chapters 7 and 8. Given that uncertainty, it seems reasonable to expect that management thresholds be set conservatively. The proposed decision to base individual well minimum thresholdson single points in time (2007 or 2017) based on survey responses doesn't seem to reflect appropriately conservative decision making in the face ofuncertainty. A more prudent approach would be to set minimum thresholds more conservatively (lower elevation) than suggested in the GSP and adjust those minimum thresholds, to become more stringent (higher elevation) as additional data dictates. Perhaps an appropriate methodology for this would be to add trend lines to the hydrographs in Appendix G, extend that trend out five years and set theminimum threshold at that point. Another concern is the reliance on 12 wells to be representative of the entire Subbasin. Here again, choosing 15% (two wells) as the limit on minimum threshold exceedance in the chronic lowering of groundwater level is overly aggressive and presumptuous. A more reasoned decision would acknowledge the small sample size and increase the percentage appropriately. It seems a 33% (four wells) threshold would be significantly more representative of the entire Subbasin. Alternatively, the threshold could be set at a lower percentage, say 25% (three wells), if management action were triggered only in the event those wells were each in a geographically distinct area of the Subasin. Of course these numbers may not be nor are they based on rigorous mathematics, but they do allow for the early adoption of management criteria, collection of additional data to further inform decision making and time for regulated entities to participate and adapt to the GSP management actions. Importantly, this processof continued refinement and data informed regulation is consistent with the intention of SGMA and US environmental case law.	County of San Luis Obispo GSA	pasogcp.com	4/15/2019 8:50:00 PM	

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National Marine Fisheries Service - Rick Rogers	**Ch. 8 Sustainable Management Criteria**	Page 48 states "As described in Chapter 4, Hydrogeologic Conceptual Model and Chapter 5, Groundwater Conditions, the prevailing belief of local residents and experts in the Subbasin based on observation and some hydrologic data, is that interconnected surface water and groundwater does not currently exist in the Subbasin." This conclusion is not supported by Chapter 5, which clearly shows interconnected surface water in Figure 5-17. In fact, the process used in Chapter 5 to identify groundwater/surface water interconnection likely underestimates the extent and distribution of this connection – "If model simulated groundwater elevations in any aquifer were above the bottom of the stream or river for at least half of the time between 2010 and 2016, then the surface water was considered interconnected with the groundwater." First, no explanation is given as to why modeled groundwater elevations must be above the streambed elevation for "at least half of the time" for streamflow depletion to be realized. Without further explanation, this assumption is not scientifically appropriate or justified. Also, why was the time period of 2010-2016 (a historic drought) chosen as the period of analysis? Given the likely depressed groundwater elevation expected during a drought and the resultant underestimation of groundwater/surface water connectivity, using this time period is inappropriate. In Chapter 6 the draft GSP acknowledges as much, stating that using the period 2012-2016 for the current water budget "represents a more extreme condition in the basin and is not appropriate for sustainability planning in the Subbasin." Thus, the Paso GSP should begin developing a threshold and measureable objective for streamflow depletion at this time, in addition to planning for further data analysis in the future that will help refine those values.		pasogcp.com	4/15/2019 12:00:00 AM	
Daniel Sinton	**Ch. 8 Sustainable Management Criteria** 8.3 General Process for Establishing Sustainable Management Criteria	1. That the agencies that have to enforce the plan haveadequate time (at least five years) to start implementation and observe the results before more drastic measures are commenced.2. That water levels be given adequate time to stabilizeafter the historic drought. 3. That "undesirable results" not include shallow wells going dry. 4. That any undesirable results be addressed locally, notthroughout the basin. I support the Shandon-San Juan Water District's comments on the Basin Plan as posted on its website.	Shandon San Juan GSA	pasogcp.com	4/16/2019 7:18:00 AM	
Laurie Gage	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.4 Level 2 Management Actions	Section 9.4.2.3 references "Re-locating pumping allowances provides pumpers with flexibility and maintains consistency with San Luis Obispo County's current Agriculture Offset Program." I fully agree that there needs to be a program that allows transition from the current offset ordinance to something that provides equal or better protection in terms of total water use. But the fly in the ointment is that the ordinance must have an extension in order to remain in effect, or there will be a gap between the sunset date of the ordinance (upon adoption of the GSP by the last GSA), and the time that any GSP-defined replacement could take place. We have seen a rush to plant in the past when a gap opportunity presented itself and at that time, it was on the order of months, and not a few years. BUT MORE IMPORTANTLY, allowing the ordinance to sunset presents another more immediately critical issue: the deed restrictions in place on properties which provided the offset credit fall away as of the sunset date. Which means that if the current sunset date is not extended, then EVERY FALLOWED ACRE COULD IMMEDIATE COME BACK ON LINE FOR IRRIGATION. The total number of acre-feet used for agricultural irrigation offset credits (according to County GSA staff) is approximately 12,000 acre-feet. That is the amount that could feasibly come back on line into irrigation the day after the GSP is adopted. With a projected annual deficit of 13,000 acre-feet, we are looking at DOUBLING the deficit if those acre-feet are reclaimed for use upon the sunset date of the offset ordinance. As an even nastier side effect of not extending the ordinance and having fallowed acreage come back online, that acreage could be used AGAIN for a future offset credit under the relocation and transfer or pumping allowances program outlined in this section. At the very minimum, GSP staff should be aware of the potential 12,000 acre-feet that could come back online after the sunset date without extension of the offset ordinance, and to utilize that figure in all projections of annual use in calculations for the GSP. Please consider the extreme degree to which the choice not to extend the sunset date of the offset ordinance could potentially impact the annual deficit.	County of San Luis Obispo GSA	pasogcp.com	5/26/2019 1:24:00 PM	
Stephen Sinton	**Ch.9 Projects and Management Actions** (Revised May 2019) 9.4 Level 2 Management Actions	In 9.4.2, carryover pumping credits, recharge credits and transfer allowances must always be limited in location to the area within the basin that is impacted. One approach might be to have a general rule that transfers can only be used within a stated distance from a well, but allow a pumper to appeal that rule if the facts support allowing a more distant transfer. 9.4.2.1: I don't support stating that a GSA "will" or "would" do something. That isn't appropriate to the plan in my opinion. The plan should say "may" or "could". That shows up in the first sentence of 9.4.2.1 and the first & third sentences of the third paragraph. 9.4.2.3 I want to reiterate that moving pumping allowances must be limited first to the basin and second, to a location close to the sending source. 9.4.3: I have a HUGE problem with this section. While the proposal may be good for water conservation, it is a disaster for the land, our communities, open space, wildlife, water and air quality, sedimentation, percolation and a whole range of social and environmental issues. This is a policy matter that is regularly before the County and our cities, but converting agriculture to rural residential use - rural sprawl - damages everything noted above as well as our food supply. In addition, if we suppress agriculture, but foster residential growth, we will see our water use grow and our sustainability decline. This is a terrible idea.	Shandon San Juan GSA	pasogcp.com	6/19/2019 4:15:00 PM	
Stephen Sinton	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.2 Implementation Approach and Criteria for Management Actions and Projects	These comments are my own, as I have not had an opportunity to discuss them with the Board of the Shandon-San Juan Water District. One of the mechanisms that may help not only with the implementation of best management practices, but also with funding for projects is to look for ways to both incentivize pumpers and penalize them for failure to measure water use. If the basic fee for pumping an acre foot is X, then those who don't measure could be charged the assumed consumption rate for the crops grown plus 50% (or some other %). On the other hand, GSAs could seek grants to help pumpers pay for and install meters, provide training and even maintenance. 9.2 talks about GSAs implementing management practices as soon as possible, which is fine to a point, but my view is that we will need time to improve monitoring and reporting (and while that is going on, refine our evaluation of projects) before we know clearly what it is that must be done. So I don't support the the statement that management actions will be implemented before projects. Some projects may get started (planning, CEQA, engineering, budgeting) very quickly. Also, the above referenced statement doesn't make clear whether you project Level 1 or Level 2 management to precede project work. I have a similar reaction to the statement that Level 2 management will begin soon after GSP adoption. We need time to refine our assessment of the magnitude of the problem and vastly improve our monitoring so we can more accurately measure our progress, or even our lack of progress. We also need to understand where Level 2 actions will be effective and where they will not. To me, Level 2 addresses the situation after we know more.	Shandon San Juan GSA	pasogcp.com	6/19/2019 4:15:00 PM	

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Name	**Chapter & Section**	**Comment**	**GSA**	**Comment Source**	**Date/Time**	**Attachment(s)**
Stephen Sinton	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.5 Projects	I think the list of projects is very good, but I strongly disagree (and I believe the Shandon-San Juan Water District will too) that capturing flood flows is a "lower priority". In fact, I believe it may be the lowest hanging fruit and with willing landowners and some cooperation from regulatory authorities, could be implemented relatively soon. So whatever bias there is against capturing and percolating flood flows, it should not be in the GSP. This entire section, showing the expected costs of every new acre foot of water, shows that there really isn't any such thing as de minimis use. 9.5.1.2: Speaking with some confidence that I am not alone in this, the current assumption is that any project using direct recharge will NOT be initiated and or owned by the County GSA. The County has never supported agriculture in this way and the primary reason for the existence of two new water districts in the County is not to become GSAs, but to do projects because we farmers and ranchers have been repeatedly ignored when it comes to water projects. Those projects go to urban voters, not we who provide the food and jobs. 9.5.2.2: In the same line of thought, I believe the projects will not be led by the Cooperative Committee. The cities probably won't need these projects, so it won't be the Cooperative Committee that leads it. The Water Districts are more likely to assume leadership with projects, since that is what they were created to do. 9.5.3.5 There are several references to Figures that seem to be the wrong ones. 9.5.4: The name "Substitute Projects" implies less valuable concepts. Substitute for what? All projects are valuable when we need water - and should be preferred only based on price, water availability and feasibility. 9.5.4.2: Why does this project assume the use of treated water from the SWP? That makes no sense to me. One possible recharge project would be to divert the water just before the treatment facility, pipe it to the nearest available recharge point on Cholame Creek or the Estrella River and discharge for percolation. Treated water is more expensive and without apparent added value.	Shandon San Juan GSA	pasogcp.com	6/19/2019 4:15:00 PM	
Stephen Sinton	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.3 Level 1 Management Actions	In encouraging BMPs, we need to engage with entities that aren't currently part of this process, such as NRCS, RCDs and the UC Cooperative Extension. In 9.3.2 Well Interference Mitigation, I wish it were so, but doubt that alternating pumping days will save water. It may avoid well interference, but I expect that farmers would end up using the same amount of water during the growing season. 9.3.4: I support the voluntary fallowing program, but have always felt that we might have to pay for some fallowing. In fact, paying someone to fallow ground that is growing a high water use crop may be by the far the least expensive way to reach sustainability. GSAs will need to plan for buying irrigation rights. Having said that, it is critical that any purchase of irrigation rights not be transferable. They need to be retired. The same applies to the Conservation Program in 9.4.2.	Shandon San Juan GSA	pasogcp.com	6/19/2019 4:15:00 PM	
Lee Nesbit	**Ch. 9 Projects and Management Actions** (Revised May 2019)	(See attachment)	County of San Luis Obispo GSA	pasogcp.com	6/20/2019 4:04:00 PM	Link: 20190621_Nesbitt
James Anderson	**Ch. 9 Projects and Management Actions** (Revised May 2019)	Chapter 9 of the draft GSP provides that land is not under irrigation when the GSP is adopted may not be provided an initial pumping allowance if a Groundwater Conservation Program is established because the GSP assumes that there will be no increase in demand on the Subbasin. Chapter 9 goes on to provide that, if owners of such non-irrigated land wish to begin pumping in the future consistent with their overlying rights, they must either (i) acquire pumping allowance from willing sellers subject to GSA approval, (ii) but into a project that delivers surface water to the same area of the Subbasin, and/or (iii) pay surcharges associated with pumping above their pumping allowance. William & Doris Land & Energy Co., LLC is the owner of approximately 2,440 acres of open land in San Luis Obispo County identified as Assessor's Parcel Nos. 037-321-016 and 037-331-014. That land is flat and farmable, and we intend to farm it in the immediate future. Indeed, we have engaged a hydrologist to locate the best locations for new wells. However, while the property has been irrigated with groundwater in the past, there has been no recent irrigation of the property. It could therefore be considered "non-irrigated" for purposes of Chapter 9 of the Draft GSP. That would result in an inequitable and illegal impact on our land. As drafted, Chapter 9 fails to recognize our overlying groundwater rights or our right to pump groundwater in the future and instead imposes a penalty on us simply because we have not yet commenced our planned extractions. Effectively precluding the exercise of our overlying rights simply because they have not recently been exercised would amount to an unconstitutional taking of those rights that could result in an enormous reduction in our land value. Should that occur, we would have no alternative but to bring an action for inverse condemnation and other claims to recover that lost value. We want to avoid that outcome. We therefore urge you to recognize the rights of our property and similarly situated lands to pump groundwater regardless of whether those rights have been recently exercised, and to not adopt and GSP that interferes with those rights or discriminates between currently irrigated land and land that has not recently been irrigated.		pasogcp.com	6/26/2019 12:52:00 PM	
Estrella Dosrios	**Ch. 9 Projects and Management Actions** (Revised May 2019)	(See attachment)		email / pasogcp.com	6/27/2019 0:00	Link: 20190427_Dosrios
Patricia Wilmore	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.3 Level 1 Management Actions	9.3.2 in the first version of Chapter 9 was called Groundwater Management Program. This has now changed to Interference Mitigation Program which is not as clear as the original. This is an example of what we perceive to be unnecessary changes from the original draft, which the consultant and his team say it took 3 months to write, to a revised version prepared in just a few weeks. This change in process has made stakeholders uneasy and has left our constituents questioning the transparency of the process. We continue to support a reasonable plan which allows for a collaborative approach to prevent negative effects on the Basin in a way that benefits all users.	County of San Luis Obispo GSA	pasogcp.com	6/28/2019 8:36:00 AM	
Patricia Wilmore	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.2 Implementation Approach and Criteria for Management Actions and Projects	9.3.2.4. Public noticing. It is stated here that the Interference Mitigation Program (please change back to Groundwater Management Program) "will be developed in an open and transparent process...to include interested stakeholders." We have many members who farm over the Basin and they would like to have a session with the consultant and our County GSA representative. So far, meetings with specific outreach to agriculturists have not occurred and this is the most effected group of stakeholders. Is this up to us to arrange or could County staff do so?	County of San Luis Obispo GSA	pasogcp.com	6/28/2019 8:36:00 AM	

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Name	**Chapter & Section**	**Comment**	**GSA**	**Comment Source**	**Date/Time**	**Attachment(s)**
Patricia Wilmore	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.4 Level 2 Management Actions	It is critical that during the Level 1 phase, which we understand to be five years, we also explore projects to bring water to the Basin. Without this effort, the potential reductions outlined in Level 2 may be onerous to the point of destroying a very viable and significant part of our economy. Again, agriculturists need to be involved in getting a clear understanding of the effects of mandatory pumping reductions. A portion of the Groundwater pumping fees from Level 1 should be earmarked for working on new supplies and not just a time to figure out how the pumping reductions would work.	County of San Luis Obispo GSA	pasogcp.com	6/28/2019 8:36:00 AM	
Patricia Wilmore	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.5 Projects	9.5.3 changes the term "Priority Projects" to "Conceptual Projects." This change of terminology dilutes the very real need to be serious about bringing new supplies to the Basin. There seems to be a lack of understanding that most of our grower members are not "big guys." During the first five years of the plan, we need to expend time and money looking at the opportunities for additional water and prioritize the most doable.	County of San Luis Obispo GSA	pasogcp.com	6/28/2019 8:36:00 AM	
Patricia Wilmore	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.6 Other Groundwater Management Activities	9.6.1. When new supplies are identified and prioritized, rural residents should share in the cost since they will also share in the benefits.	County of San Luis Obispo GSA	pasogcp.com	6/28/2019 8:36:00 AM	
Patricia Wilmore	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.7 Demonstrated Ability to Attain Sustainability	Bottom line, for us, is that the plan is feasible and meets State requirements. Since we are a High Priority Basin, our plan will certainly be scrutinized. It is essential that the consultant and his team, hired as the experts, have a say in every step of the process. It is also important that specific groups of stakeholders are able to have input in a focused stakeholder meeting. Additionally, a more thorough study of the economic effects of the GSP needs to be done.	County of San Luis Obispo GSA	pasogcp.com	6/28/2019 8:36:00 AM	
Patricia Wilmore	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.8 Management of Groundwater Extractions and Recharge and Mitigation of Overdraft	Please note that although the PRWCA offices are in the City of Paso Robles, our constituents are primarily in the County.	County of San Luis Obispo GSA	pasogcp.com	6/28/2019 8:36:00 AM	
Jerry Lohr	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.5 Projects	I would like to submit the attached PDF file as my comments on Chapter 9. Regards, Jerry Lohr	County of San Luis Obispo GSA	pasogcp.com	6/28/2019 2:07:00 PM	Link: 20190628_Lohr
Craig Finster	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.1 Introduction	Please see attached comment.		pasogcp.com	6/29/2019 10:02:00 AM	Link: 20190629_Finster
Jerry Reaugh	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.2 Implementation Approach and Criteria for Management Actions and Projects	Thank you for this opportunity to submit these comments. Regards, Jerry Reaugh	County of San Luis Obispo GSA	pasogcp.com	6/30/2019 4:16:00 PM	Link: 20190630_Reaugh
Sandi Matsumoto	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.3 Level 1 Management Actions	This attachment summarizes our comments on Chapters 9-11 of the Paso Robles Subbasin Draft GSP. In this section, we refer to our previous comments, dated 15 April 2019, on Chapters 4-8 and Appendix B of the Draft GSP. Chapter 9 Management Actions and Projects [Checklist Items #50-51]: Since these conceptual projects are location-specific, please highlight the benefits of these conceptual projects on specific mapped GDEs and ISWs. For more case studies on how to incorporate environmental benefits into groundwater projects, please visit our website: https://groundwaterresourcehub.org/case-studies/recharge-case-studies/		pasogcp.com	7/1/2019 12:21:00 PM	Link: 20190701_Matsumoto
Sandi Matsumoto	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.4 Level 2 Management Actions	This attachment summarizes our comments on Chapters 9-11 of the Paso Robles Subbasin Draft GSP. In this section, we refer to our previous comments, dated 15 April 2019, on Chapters 4-8 and Appendix B of the Draft GSP. Chapter 9 Management Actions and Projects [ChecklistItems #50-51]: Since these conceptual projects are location-specific, please highlight the benefits of these conceptual projects on specific mapped GDEs and ISWs. For more case studies on how to incorporate environmental benefits into groundwater projects, please visit our website: https://groundwaterresourcehub.org/case-studies/recharge-case-studies/		pasogcp.com	7/1/2019 12:38:00 PM	Link: 20190701_Matsumoto
Sandi Matsumoto	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.5 Projects	This attachment summarizes our comments on Chapters 9-11 of the Paso Robles Subbasin Draft GSP. In this section, we refer to our previous comments, dated 15 April 2019, on Chapters 4-8 and Appendix B of the Draft GSP. Chapter 9 Management Actions and Projects [ChecklistItems #50-51]: Since these conceptual projects are location-specific, please highlight the benefits of these conceptual projects on specific mapped GDEs and ISWs. For more case studies on how to incorporate environmental benefits into groundwater projects, please visit our website: https://groundwaterresourcehub.org/case-studies/recharge-case-studies/		pasogcp.com	7/1/2019 12:40:00 PM	Link: 20190701_Matsumoto
Sandi Matsumoto	(Submitted with comments on Chapter 9-12)	Lands that are protected as open space reserves, habitat reserves, wildlife refuges, etc. or other lands protected inperpetuity and supported by groundwater or ISWs should be identified and acknowledged.		pasogcp.com	7/1/2019 12:43:00 PM	Link: 20190701_Matsumoto
Molly Saso	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.4 Level 2 Management Actions	HFS supports the development of carryover pumping allowances to provide flexibility in meeting hydrologic conditions. Â Maximum flexibility in the management and transfer of pumping allowances, subject to the avoidance of undesirable results as defined by SGMA, will provide opportunity to manage and address needs within the Basin.		pasogcp.com	7/1/2019 1:56:00 PM	
Molly Saso	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.4 Level 2 Management Actions	Implementation of pumping rampdown should be initiated only upon assessment of groundwater level trend and pumping data, and then limited to specific areas where the contribution of pumping reductions to Basin sustainability objectives can be quantified through modeling and other analysis.		pasogcp.com	7/1/2019 1:56:00 PM	
Molly Saso	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.4 Level 2 Management Actions	Fees developed within the proposed Tiered Pumping Fee structure must be developed based on legal principles of equity, economic impacts, cost of replenishment water, demand reduction and other quantifiable components.		pasogcp.com	7/1/2019 1:56:00 PM	

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Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
Molly Saso	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.4 Level 2 Management Actions	HFS supports continuation of the current Agriculture Offset Program. This Program is understood and provides a solid mechanism for establishing pumping allowances under the GSP, as well as conditions for use and transfer of those allowances.		pasogcp.com	7/1/2019 1:56:00 PM	
Molly Saso	**Ch.9 Projects and Management Actions** (Revised May 2019) 9.3 Level 1 Management Actions	The proposed implementation of Level 1 and Level 2 Management Actions is reasonable given the limited amount of data and understanding of Basin Conditions as discussed in the Chapter 6 draft. Additional monitoring data must be developed and is required to support Level 2 Actions. The GSP should consider financial and other incentives to promote and maximize the sustainability benefits of Level 1 Management Actions.		pasogcp.com	7/1/2019 1:56:00 PM	
Molly Saso	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.1 Introduction	The impact of de minimis groundwater users is defined as significant, yet the draft GSP proposes that they should not be regulated. SGMA defines a de minimis extractor as once who extracts, for domestic purposes, two acre-feet or less per year. [WC 10721(e)]. De minimis extractors are not exempt from the full provisions of SGMA, rather they are provided limited protections relative to metering and reporting and the imposition of regulatory fees. Careful consideration and evaluation should be given to the impact of de minimis extractors on the Paso Basin sustainability objectives and various financial and demand reduction alternatives that are available to mitigate those impacts.		pasogcp.com	7/1/2019 1:56:00 PM	
Molly Saso	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.7 Demonstrated Ability to Attain Sustainability	The ability to attain sustainability has been modeled using all of the conceptual projects and management actions set forth in Chapter 9 and pumping reductions to meet measurable objectives by 2040. Further analysis on the economic benefit and viability of these projects is needed to support inclusion in that modeling. It is highly probable that some projects will not meet basic economic targets, thus impacting the timing and amounts of future pumping reductions. The GSP should include a discussion of various alternatives and project/pumping mixes to show a range of possibilities that would result in sustainable groundwater management.		pasogcp.com	7/1/2019 1:56:00 PM	
Molly Saso	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.5 Projects	HFS appreciates the analysis of Project alternatives in Section 9.5. HFS supports strategic investment at the GSA and individual level to expand the Water Budget for the Basin by constructing economically viable projects.		pasogcp.com	7/1/2019 1:56:00 PM	
John Onderdonk	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.4 Level 2 Management Actions	While Chapter 9 does not mandate specific management actions and projects nor does it define all aspects of those management actions or projects, it will form the basis for future implementation. Because of that fact, Section 9.4 Level 2 Management Actions should either explicitly state that the order management actions are listed does not imply a prioritization of those actions or Section 9.4 should be reorganized to more accurately reflect implementation priority. It seems reasonable to assume that mandatory pumping reductions would be the last management action to be implemented after all other actions have failed to achieve desired results. A reasonable reorganization of Section 9.4 would be groundwater conservation program (9.4.2) followed by agricultural land and pumping allowance retirement (9.4.3) followed by mandatory pumping reductions (9.4.1).The discussion in Section 9.4.2.4 of how non-irrigated land will be treated should a Groundwater Conservation Program be implemented is concerning in that it suggests initial pumping allowance will be denied thereby unfairly penalizing non-irrigated landowners by curtailing their future rights to pump groundwater. This could create a perverse incentive for non-irrigated landowners to immediately installirrigation to maintain their future rights. The three options listed for ways non-irrigated landowners can acquire pumpingallowances are in effect the same: purchase those allowances at marke tvalue. These again could potentially create perverse incentives where by early actors are reward with lower market prices. Because section 9.4.2.4 will establish a basis for how non-irrigated landowners are treated under a Groundwater Conservation Plan, the section should explicitly state there may be other reasonable ways to fairly allocate initial pumping allowances and the list provided is meant to be illustrative not complete. For example, consideration should be given to an opt-in option for non-irrigated landowners to voluntarily opt-in to the groundwater conservation program to attain and secure initial pumping allowances. Alternatively, non-irrigated landowners could be given credit for positive contributions to the health of the groundwater basin (groundwater recharge, monitoring well installation, watershed and riparian protection/management, etc.) any of which could be used to satisfy future pumping allowance. The main point is that all the details of specific management actions should be thoroughly discussed at a point in time when those actions are warranted, and action planning is required. Chapter 9 must not curtail or preemptively define the scope or parameters of the future development of those actions.	County of San Luis Obispo GSA	pasogcp.com	7/1/2019 4:06:00 PM	
John Onderdonk	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.3 Level 1 Management Actions	Section 9.3.3 highlights the importance of on-farm recharge of local water as a beneficial action landowners could take to meet the goals of the GSP. A primary means for achieving groundwater recharge is through the construction and use of stock ponds and other surface impoundments. However,given SB 88 and portions of the California Water Code, there seems to be significant confusion among landowners with regards to their rights to construct and use stock ponds and surface impoundments. It would be beneficial if this section provided more guidance on stormwater capture best practices (surface impoundment and other methods) to help landowners balance local GSP goals with State regulations.	County of San Luis Obispo GSA	pasogcp.com	7/1/2019 4:06:00 PM	
Sheila Lyons	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.3 Level 1 Management Actions	There needs to be more emphasis on water conservation and living within our means. Suggesting that historical usage be a justification for future allowances is nonsensical. Here in Creston, we have seen many properties significantly over pumping (sprinklers when it is raining, overflow onto the roads, major pipe leaks, continuing to plant more and more lush landscaping around wineries, etc.) to establish their usage numbers. Whereas other folks, particularly those with shallow wells or wells slow to recharge have made significant efforts to conserve...allowing landscaping to die, etc. Those who have conserved in an attempt to protect us all are not all de minimus users. Many folks chose not to plant knowing full well where we were headed. They should not be penalized. The proposal set forth rewards those who have over-pumped by allocating to them larger claims to water up front. Any mandatory cut backs will not begin to have any immediate impact to them because they have built in a cushion. Meanwhile their over-pumping continues to harm their immediate neighbors. Also, they have set up high usage numbers which they can then decide to "sell off, move to other properties, or trade". There should be no selling off or trading. Crop duty factors must enter into the equation to restrict the folks who have been over-pumping throughout our rising crisis of a declining basin. Whereas, folks who have been conserving all along will feel the immediate effect IF mandatory cut backs are implemented. Additionally, no one with a parcel of land should be water starved. The obstacles for building a family home on a blank parcel are already tremendous. Property owners should not have to "buy" water for a de minimus use. Having to do so has a significant impact on property values. All existing legal parcels should have access to de minimus levels of water usage. For many people their blank parcel was an investment for their futures, either an eventual family home or a retirement property. They should not bear the financial burden of those who have continuously over-pumped the Basin.	County of San Luis Obispo GSA	pasogcp.com	7/2/2019 15:43	

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Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
Sandi Matsumoto	**Ch. 10 Plan Implementation** 10.2 Monitoring Networks	Section 10.2.5 Evaluating Interconnected Surface Water (p. 14-15) [Checklist Item #48]: sustainable management criteria and an associated monitoring network for interconnected surface water and groundwater do need to be developed in the GSP, as stated in our comments on Chapter 9 above, and depletion of ISWs should be monitored. The Draft GSP states that an initial hydrogeologic investigation will be conducted. Please provide sufficient detail for the investigation and monitoring program including stream gauges, screened intervals and aquifers of the shallow wells and frequency of monitoring, in order to describe monitoring of both the extent of ISWs and the quantity of surface water depletions from ISWs. As stated in TNCs previous comments in our previous letter on Chapter 7, the Nature Conservancy recommends identifying beneficial users of surface water, which include environmental users. This is a critical step, as it is impossible to define significant and unreasonable adverse impacts without knowing what is being impacted, nor is possible to monitor ISWs in a way that can identify adverse impacts on beneficial uses of surface water. For your convenience, we've provided a list of freshwater species within the boundary of the Paso Robles basin in Attachment C. Please identify appropriate biological indicators that can be used to monitor potential impacts to environmental beneficial users as a current data gap and explain how this data gap will be filled.		pasogcp.com	7/1/2019 12:41:00 PM	Link: 20190701_Matsumoto
Laurie Gage, District Administrator	**Ch. 11 Notice and Communications**	The Board of Directors of the Estrella-El Pomar-Creston Water District has reviewed Chapter 11 and concluded that it has no comments on this chapter at this time. Individual Board directors may choose to personally comment on this chapter separately and independently from the Board as a whole.	City of Paso Robles GSA	pasogcp.com	10/11/2018 8:59:00 PM	
Dan Penkauskas	**Ch. 11 Notice and Communications** 11.1 Communications and Engagement Plan	Hi All. We're in the Creston area and have a single domestic well for our drinking water. We vote for maintaining levels as they are today. Also, please sign us up to monitor our well. Thank you, Dan	County of San Luis Obispo GSA	pasogcp.com	10/12/2018 6:41:00 AM	
Sheila Lyons	**Ch. 11 Notice and Communications** 11.1 Communications and Engagement Plan	Anywhere in the GSP where there is a reference to interested parties, including the Appendix D of Chapter 11, all Citizen Advisory Groups over the Paso Basin should be listed. CAB is writing to ask specifically that we be added throughout, including Appendix D of this chapter.	County of San Luis Obispo GSA	pasogcp.com	10/20/2018 9:26:00 AM	
Joe Plummer	**Draft GSP** Executive Summary	We have significant concerns about the proposed document and how it was prepared. The document, as written, is vague with respect to impacts and timing of same on irrigated agriculture. This is not surprising, as the Water District representing irrigated agriculture was prohibited from direct participation in the preparation and drafting of the document. In place of direct participation in the process, our "elected officials" chose to insert themselves, having the "County" represent our interests. In fact, the "County" has never, to my knowledge, held any input sessions or requested any input, including from the PRWCA or IGGA (representatives of our industry) from our industry. As a result, the presented draft document does not adequately represent the interests of irrigated ag and, in fact, goes a long ways towards decimating our industry. I believe this document should not be finalized and submitted until a broad representation of the ag community have had an opportunity to provide, in an open forum, their input.	County of San Luis Obispo GSA	pasogcp.com	9/25/2019 2:10:00 PM	
Stuart Suplick	**Draft GSP** Executive Summary	***ES 4.4 Interconnected Surface Water and Groundwater*** There are no available data that establish whether or not the groundwater and surface water are connected through a continuous saturated zone in any aquifer. The potential for interconnected surface water and groundwater in the Subbasin will be assessed during GSP implementation. COMMENT: The GDE determination methods from Rohde et al., 2018 do not indicate these interconnections? Or only to too limited a capacity, e.g. alluvial aquifers? Apologies if I misunderstood/did not read in detail enough Appendix C in this regard.		pasogcp.com	9/24/2019 8:52:00 PM	
Donald Morris	**Draft GSP** Executive Summary	The objectives of the approach to achieving sustainability should state that all property water rights should be equally respected, regardless of the current usage. Allotment of the quotas should be done by acreage and the free market would allow leasing/sellilng of usage rights between those wishing to use higher amounts and those using below their quota. To do otherwise would be outright confiscation of deeded water rights without compensation and a public gift to other/adjacent properties. This could be phased in over a period of years(suggest 5 or less) in which at the end of the time those not using their quota could be leasing their quota or just adding to the amount not being pumped. This guidance/goal may be applicable to other sections in the documents provided for review.	County of San Luis Obispo GSA	pasogcp.com	9/26/2019 10:58:00 AM	
Carter Collins	**Draft GSP** Executive Summary	1. As a whole, the GSP is unclear as to what exactly the GSAs will tangibly do to ensure the elimination of the current overdraft in the Paso Robles Basin. This not only risks the health of the basin, but it increases the chances that the California Department of Water Resources will not approve the GSP. The GSP needs to clearly state what and how the GSAs will act. 2. A hallmark of SGMA is the call for including all stakeholders in the decision-making process. The County GSA, however, did not hold any outreach meetings with the Ag Community. Since the EPC WD represents 44% of the agriculture based pumped water, there should be more active involvement in developing the GSP. Successfully reducing the Ag pumping to benefit the groundwater basin will have to include the understanding and support of the Ag Community. 3. Groundwater pumping allocations, monitoring, and enforcement need to be clearly planned out. The implementation process will be doomed to failure if those who must sacrifice are not included in the decision to cutback pumping. Water use should be measured by meters to ensure accuracy. Violations must be enforced through both civil orders and penalties. 4. Most of the projects listed in the current GSP are purely conceptual. Moving forward, the GSP needs to explain how it will ensure and promote the construction of projects generating significant new useable water. 5. The risk of growth in de minimis groundwater users needs to be fully addressed. The GSP notes that the current number of de minimis users is significant and that their growth could warrant regulation in the future, but it does not say how it will ensure that the growth will not eat into the rights of other existing users. Perhaps a cap should be placed on the total number of de minimis users, requiring that any growth is acquired voluntarily from others.	County of San Luis Obispo GSA	pasogcp.com	9/26/2019 13:52	20190926_Collins

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Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
Anthony Riboli	**Draft GSP** Executive Summary	Please see attached letter.	County of San Luis Obispo GSA	pasogcp.com	9/26/2019 5:48:00 PM	Link: 20190926_Riboli
James Green	**Draft GSP** Executive Summary	Please see the attached letter.		pasogcp.com	9/27/2019 10:58:00 AM	Link: 20190927_Green
Hilary Graves	**Draft GSP** Executive Summary	My comments pertain to the entire GSP document and the process that agricultural overliers have endured to arrive at the current version available to the public. As an agriculturist, I have not felt well represented by the County of SLO as my GSA. In addition, the County has, in my opinion, failed to satisfy the SGMA requirement of outreach and education. The County as my GSA has not held a stakeholder meeting soliciting input from agriculture or sharing their vision for supporting our industry through the SGMA implementation process. Three minutes of one-directional public comment at the Board of Supervisors and/or the Paso Basin Cooperative Committee meetings is not sufficient to serve as outreach and education. This process is important enough to all overliers that it requires the opportunity for outreach and education in the form of back-and-forth dialogue with the option of asking questions and robust debate when warranted. One only has to read the comments from other commenters to see that the County has failed in its role as educator to overlying property owners. The confusion and misinformation being shared without correction is disappointing, to say the least. The County's lack of commitment in the GSP to a multi-faceted and truly sustainable approach to solutions, including options such as groundwater recharge, water conservation, increased surface storage, increased use of recycled water, capture and reuse of stormwater, and better implementation and integration of regional projects, further complicates our situation and highlights the County's lack of ambition and ability to think proactively about the health of our groundwater basin. For example, if the County is unable to receive and distribute our State Water Project allocation due to lack of forethought and planning, at least sell the water to other users and use the money to pay for projects that benefit our Basins in SLO County. Even that suggestion is met with a list of reasons why it cannot be done instead of a list of ways that we might be able to make it happen. Agriculture is not only the primary driver of the economy in SLO County, but an important part of our Countys heritage. Farmers in California are leaders in implementing some of the most efficient irrigation methods in the world. The broad consensus in our state, and in our county as well, is that our water management system is unprepared to meet the needs of agriculture, industry, the environment, and our growing population. I am committed to collaborating and contributing to a solution for the long term health of our basin. There is no easy fix and it is going to be expensive, but sustainability means that we must all work together to come up with solutions that support a stable economy, protect the environment, and provide for public health and safety.	County of San Luis Obispo GSA	pasogcp.com	9/28/2019 10:50:00 AM	
Ralph J. Herman Sr.	**Draft GSP - Volume 1** Chapter 1	In reviewing the material on the GSP Volume 1, I did not find any mention or any indication that there are double Faults running parallel, East and West, from approximately Hog Canyon, Westerly to apparently San Miguel. The Faults are therefore just South of the end of Ranchita Canyon. As a result, we believe that is the main reason that at least the area of Ranchita Canyon, North to and beyond the SLO County line, has generally maintained adequate ground water for the wells over the yeas, including the past dry seasons. Further, it has been more recently recognized by the Superior Court, that the single Fault separating the Paso Robles Basin from the Atascadero Basin, is a physical barrier between the two Basins. As a result of this legal determination, why has the Paso Robles Basin, annexed all lands to the North County Line into the Paso Robles Basin when there is a double Fault Block? In addition, the only brief mention of any Faults in the material that I could locate, was in Volume 1, 4.9.2 Fault Influence on Groundwater. In addition to the above, I have a suggestion for you. It would be easier reading the material presented when in Draft form, that the word DRAFT that appears on every page, be reduced from Black to maybe a light gray, or simply an outline of the letters so that the underlying material is not blocked out. Thank you.	County of San Luis Obispo GSA	pasogcp.com	9/28/2019 11:29:00 PM	
Sheila Lyons	**Draft GSP - Volume 1** Chapter 3	The math doesn't seem to bear out on page 3-34 top paragraph. If build out 75% of all RR parcels results in pumping of 37,000 AFY, then 100% would be 49,300 AFY. Final paragraph says that 16,504 AFY would be 44% of ultimate build out, but doing the math it only comes out to be 33%.	County of San Luis Obispo GSA	pasogcp.com	9/3/2019 11:10:00 AM	
Sue Harvey	**Draft GSP - Volume 1** Chapter 4	Re 4.9 Data Gaps in the Hydrogeological Conceptual Model: We are assuming that the underlying data supporting the inflow and outflows are accurately interpreted within the limitations of the data gaps that are laid out in the Plan. Once the GSP is adopted the first project to be undertaken must be in-fill of data for monitoring wells to collect the information necessary to plug the data gaps.		pasogcp.com	9/27/2019 2:52:00 PM	
Stuart Suplick	**Draft GSP - Volume 1** Chapter 4	Section 4.7.1 Groundwater Recharge Areas Inside the Subbasin "Figure 4-16 is a map that ranks soil suitability to accommodate groundwater recharge based on five major factors that affect recharge potential, including: deep percolation, root zone residence time, topography, chemical limitations, and soil surface condition. The map was developed by the California Soil Resource Lab at UC Davis and the University of California Agricultural and Natural Resources Department." COMMENT: Consider pairing with information provided in the Cal Poly Senior Project https://digitalcommons.calpoly.edu/nrmsp/57/ to identify areas where, especially during droughts, promoting beaver damming with beaver dam analogs or local resident educational efforts can help with at least alluvial aquifer recharge. Or where runoff or deliberately added water can create additional "reservoirs" or "recharge ponds" that are seasonal, relatively cheap, and (besides the need to monitor for/control invasives) provide a boon for birds and local endangered species.		pasogcp.com		
Sue Harvey	**Draft GSP - Volume 2** Chapter 8	The Plan relies on identifying exceedances of minimum thresholds (groundwater levels or water quality) for purposes of triggering pumping cutbacks. How will exceedances be addressed while an ordinance is being enacted? Violations of exceedances will be meaningless and cannot be remedied without an intermediate plan. Ground water levels will continue to decline.		pasogcp.com	9/27/2019 2:52:00 PM	

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Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
Sue Harvey	**Draft GSP - Volume 2** Chapter 9	The Plan estimates that it will take five years to enact a pumping reduction ordinance. Five years is too long to wait to start to reverse over-pumping. The Plan correctly emphasizes that pumping cutbacks are necessary as extensive over-pumping is already occurring.There must be some intermediate plan of action identified to mitigate current over-pumping during the period before an ordinance is adopted. As listed in 9.5, the Projects, while possible and of benefit, are too far distant to be viable management options for addressing the immediate problem of reversing depletion of the basin. Chapter 9 offers little realistic planning, cost, or engineering information. Projects 2, 3, 4, and 5 dangerously offers overproduction surcharges as a reliable funding mechanism for the projects. Over-pumping (overproduction) cant be managed through a system of surcharges because entities will merely treat this as a cost of doing business and make no effort to change their business model, while "overproduction surcharges will end up becoming a necessary component of the financial survival of the agency leveling the surcharge. Hence there will be little incentive on anyones part to come into compliance. The history of Fox Canyon Water District should provide ample caution in this regard. Chapter 9 should be relegated to the Appendix.		pasogcp.com	9/27/2019 2:52:00 PM	
Stuart Suplick	**Draft GSP - Volume 2** Chapter 9	Concerned that the Northern Chumash and Salinan tribes will not be encouraged sufficiently (or their relationship with the GSAs/County is not being prioritized or invested in) to collaborate in the process for promoting voluntary fallowing with farmers, environmental users, County government. Or other recharge/demand reduction methods. Section 3.3.2 Tribal Jurisdiction states "These two tribes do not have any recognized tribal land in the Subbasin" seeming to imply that they are a low-impact or low-priority stakeholder - but this does not account for the lands they occupied prior to any state- or federal-specific recognitions of governance. Appendix I also does not describe the degree to which tribes were notified and followed-up upon (unless I missed this elsewhere). Perhaps the members really aren't interested, but given that they managed this land historically/prehistorically, it seems an insult to not prioritize their incorporation or give them a bigger platform for sharing and integrating and respecting any traditional ecological knowledge they may have, on their terms as much as possible. I also have reservations about the lack of information at the moment on how the meetings and community consultations for voluntary fallowing/mandatory supply cuts will be directed or run to best encourage cooperation on what can become a highly political and emotion-filled topic very fast. At least some solid research should go into providing a lower-level picture of how these sessions could be run on a human-dimensions level. Especially if none of the GSA/GSP consultant staff come from a agricultural background. For instance, in terms of voluntary fallowing, thinking more holistically https://esajournals.onlinelibrary.wiley.com/doi/full/10.1002/ecs2.2367 could be key if combined with the recognition that a good number of farmers would not want to fallow their land for more than economic reasons - e.g. a rewarding sense of stewardship, for instance. In this sense, finding ways to accompany fallowing with restoration/riparian buffer expansion/environmental and traditional indigenous knowledge education of kids and the community could be one idea for farmers to maintain their sense of identity during seasons or the long-term when they fallow.		pasogcp.com	9/24/2019 8:52:00 PM	
Ruthie Redmond	Draft GSP **Volumes 1 & 2** **Executive Summary**	(See attached letter for specific comments on each section)		pasogcp.com	9/27/2019 12:27:00 PM	Link: 20190927_Redmond
Robert Woodland	**Draft GSP - Appendices**	Please see attachment	City of Paso Robles GSA	pasogcp.com	9/27/2019 2:10:00 PM	Link: 20190927_Woodland
Mackenna Buchholz	Additional Comments	(See attachment)		Other	5/3/2018	Link: 20180503_Buchholz
Greg Grewal	Additional Comments	(See attachment)		Other	5/14/2018	Link: 20180514_Grewal
Donald Morris	Additional Comments	(See attachment)		Other	5/21/2018	Link: 20180521_Morris
Sheila Lyons	Additional Comments	Please find enclosed below a letter and an attachment with input from the Creston Advisory Body representing the Creston Community and Rural Residents across the Basin. The vote of endorsement for the contents of this letter by the CAB member at last night's CAB meeting was unanimous. We hope you will find this information helpful when making decisions on Basin management. Thank you for your attention to our input. Sheila Lyons CAB Chairperson		Other	7/19/2018	Link: 20180719_Lyons
William Enholm	Additional Comments	(See attachment)		Other	7/25/2018	Link: 20180725_Elholm
Tommy & Kathy Carter	Additional Comments	(See attachment)		Other	7/26/2018	Link: 20180727_Carter
Dianne Jackson	Additional Comments	Supervisors Peschong & Arnold, and Chairperson Hamon, I am in complete agreement and support the comments CAB submitted to the Paso Basin Cooperative Committee. CAB has been working on this topic for over a decade and has tried to include the many comments that they have received from the public, over the years. The new groundwater sustainability plans require each basin to reverse groundwater overdraft. There is only one way to get that accomplished, stop over pumping. Hoping you will take into serious consideration every point that was addressed. Grace and Peace, Dianne Jackson		Other	7/26/2018	

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Name	**Chapter & Section**	**Comment**	**GSA**	**Comment Source**	**Date/Time**	**Attachment(s)**
Carol & Harold Rowland	Additional Comments	(See attachment)		Other	7/26/2018	Link: 20180726_Rowland
Sheila Lyons	Additional Comments	In reading the notes from various PR Basin Cooperative Committee meetings we don't see anywhere that the local Citizen's Advisory Councils are included for receiving notices or communications. Additionally in those lists we have seen all entities listed have specific addresses by which the organizations or agencies may be noticed, however, Rural Residents are simply called out as Rural Residents. It seems greatly amiss to us that Rural Residents who are the great majority of the people living over the Paso Basin and who will be impacted the very most are not being communicated with directly. At the very least all Citizen Advisory Councils over the Basin should be noticed. Please add the Creston Advisory Body (CAB) to your contact lists. All notices may be sent directly to our chairperson, Sheila Lyons, (removed)	County of San Luis Obispo GSA	pasogcp.com	9/22/2018 2:47:00 PM	
Leslie Jordan	Additional Comments	(See attachment)		Other	9/25/2018	Link: 20180925_Jordan
Melenie Ristow	Additional Comments	Hello, I'm on vacation & won't be able to attend the water meeting in Creston. I wanted you to know I'm extremely worried about what will happen to my residential water well for my home & 20 acres. I've lived on Huer Huero rd for 38+ yrs with a mix of drought, normal & wet years & so far never run out of water, but I'm a lucky one. We've always known water is life out here & we have chosen a variety of ways to be responsible & conserve our water to be able to live here. I too worry about my investment in my property & realize my investment will be compromised if my well runs dry. Not being a big or corporate water user I have very few alternatives or be financially able to truck water to my home. And thus count on my representatives to protect my water interests. I implore you to do just that. Please protect mine & the thousands of residential water user wells in our Creston area. Thank You, Melenie Ristow		Other	10/1/2018	
Sheila Lyons	Additional Comments	Hello Supervisor Arnold, I submitted the following Excel file, that CAB received from the Public Works Dept back in the spring, to the Paso Basin Groundwater Sustainability Cooperative Committee through the GCP Portal. You may recall that CAB questioned the table in Chapter 3 of the GSP (Table 3-2, page 22) because it didn't appear to be up to date. In fact Table 3-2 of Chapter 3 showed only about 1/3 of the total wells that the SLO PW Dept indicated as being in production over the PR Basin, as given to CAB earlier this year. Sheila Lyons CAB Chairperson (See attachment)		Other	10/2/2018	Link: 20181002_Lyons
Dick McKinley	Additional Comments	Figures 4.6-4.10 have print that is too small to read.	City of Paso Robles GSA	pasogcp.com	10/5/2018 1:06:00 PM	
Frederick Hoey	Additional Comments	These comments relate to Figure 3-14: North County Planning Subareas: I object to the El Pomar-Estrella-Sub Area as defined. Interestingly, this Sub Area is startlingly similar to the boundaries of the "area of influence" of the Estrella-El Pomar-Creston Water District as defined by SLO-LAFCO. I expect this harmony is deliberate. The Creston area is distinctly different from both the El Pomar and Estrella area; accordingly, actions that are appropriate and necessary for the El Pomar and Estrella areas will not be appropriate for Creston. For instance within the Estrella areas a significant "cone of depression" has been created by the egregious groundwater pumping by the City of Paso Robles, which has been compounded by the local concentrations of large vineyard operations. Many Creston landowners have long been concerned that Creston groundwater would ultimately be utilized to remedy the damage that has been done to the Estrella groundwater levels. By combining three geographic areas, each with their own unique issues, into a Planning Sub Area, the authors of Chapter 3 wrongly assumed that the citizens of Creston would not rise up in strong opposition to such blatant, potential piracy of our water resources to cover the sins of the City of Paso Robles through the exploitation of the Estrella area. I strongly urge that the Creston area be identified as a separate Planning Sub Area, a view shared by all of my Creston friends and connections.	County of San Luis Obispo GSA	pasogcp.com	10/6/2018 4:03:00 PM	
James Green	Additional Comments	Good afternoon, Micki: Please distribute the attached letter regarding County Groundwater Sustainability Agency (GSA) Meetings to the Supervisors, all districts. Thank you. Warm Regards, James Green Government Affairs Specialist		Other	10/8/2018	Link: 20181008_Green
Dennis Loucks	Additional Comments	Dear Mr Peschong, Attached are my comments pertaining to the GSP plan to date. Please refer them to your Cooperative Committee. (See attachment)		Other	10/8/2018	Link: 20181008_Loucks
Frederick Hoey	Additional Comments	(See attachment)		Other	10/12/2018	Link: 20181012_Hoey

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Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
Dennis Loucks	Additional Comments	(See attachment)		Other	10/15/2018	Link: 20181017_USGS
Stephen Sinton	Additional Comments	Figure 4-12 makes zones look simple and continuous when they are probably more complicated and multi-layered with impervious and semi-impervious layers scattered both vertically and horizontally. I believe our newest well on Shell Creek was 592' with almost continuous sandfrom surface to the bottom of the formation. It test pumped more like 1500 gpm, although we don't use it at thatlevel. The transmissivity information could be very significant. Is there a source for where this came from? Artesian wells existed within the boundaries of Shandon itself. Overall Much of the information available for this GSP is uncertain, but we will know a lot more as we begin implementation. The risk, therefore, is that facts will become immovable and immutable if we don't repeatedly state our uncertainties and the need forrefinement. The Plan needs to be clear that our understanding of the basin is likely to change over time, numbers will have to be changed, basin limits will undoubtedly be revised and many other aspects will be altered by new information. So we need to be unambiguous that each "fact" may potentially require updating and decisions and actions based on those facts may need to bealtered.	County of San Luis Obispo GSA	pasogcp.com	10/15/2018 8:01:00 AM	
Verna Jigour	Additional Comments	This is just to note my apologies if you received two copies of my comment addendum file. My comment on this web input function is that I could not tell how many files I had attached the screen only shows the most recent attachment. I intended/ attempted to attach two files 1. my comments addendum and 2. my doctoral dissertation abstract. If you did not receive both files, please advise me and I will provide them again. Thanks for the opportunity to comment! Verna Jigour, PhD Rainfall to Groundwater		pasogcp.com	10/15/2018 9:58:00 PM	Link: 20181015_Jigour
Dana Merrill	Additional Comments	RE Survey While the comments are interesting to read and seem to suggest in general experience with falling water levels and concern for more to follow, they have several shortcomings in my opinion. 1. Done in a vacuum as no mention of cost or who would pay renders them useless without follow up 2. Sample size is likely too small and cannot be verified as to authenticity 3. Time and cost hopefully was minimal as time is passing while the drought continues and meaningful measures and strategies are urgently needed for individuals and businesses to plan and budget for the future. 4. More critical work is needed, asking whether Utopia is desired is of minimal interest without quoting a cost Sorry but that's my feeling on the Survey. Maybe a well intentioned legislative mandate that it be included but we need to get on to the real issues and strategies. Every stakeholder, landowner, and even cities will feel the impact of severe pumping cutbacks in the Paso Basin as economic multipliers in reverse mean higher taxes, less jobs, tourism and lower property values. The Urgency Ordinace is an example of how land values plummet if water is restricted. Let's get going on solutions and figure out whether we can find a way to pay for them!	County of San Luis Obispo GSA	pasogcp.com	11/12/2018 7:56:00 AM	
John Thompson	Additional Comments	This probably seems tedious, but when reviewing the draft, the dark "DRAFT" across the page is distracting. Possibly lighten the text across the page or put "DRAFT" as a header.		pasogcp.com	12/6/2018 1:00:00 PM	
John Thompson	Additional Comments	In general, when a source is referred to in the text, it would be nice if it were properly cited. I do not know that we need a literature cited at the end of each section, but one online literature sited page would suffice. For instance, on page 5-38 the map is cited as RMC, 2015, but that resource is hard to find without a proper literature cited appendix or reference. Better yet, a website that could digitally link you to all cited works.		pasogcp.com	12/6/2018 1:00:00 PM	
Steve Sinton	Additional Comments	Can the chapter draw any conclusions as to what would happen to groundwater levels if we had a period of above normal rainfall years? 2. Can you further clarify the different aquifers? Most readers are familiar with the deep sulfur water and the aquifer above it, but Chapter 5 seems to further divide the upper aquifer in a way that isn't perfectly clear. 3. Figure 5-8 does not reflect the groundwater elevation conditions I experience on Shell Creek. Perhaps the extrapolation used in the figure covers too wide an area. 4. In 5.1.3 there is discussion of upward vertical groundwater flow. What is this based on and what does it mean to the management of the basin? 5. It may just be me, but I find Figures 5-15 and 5-16 very confusing. 5-15 makes it look like water use (the black lines coming down) is declining, but the text says the opposite. 6. Section 5.5 talks about gaining streams, but other than a few places where underflow is forced to the surface, I don't know of anything that is a gaining stream. The same applies to 5.5.1 where the chapter talks about groundwater discharge to surface water. I don't know of any place where it exists. The conclusion that the mean annual surface water depletion was about 8500 af/year seems impossible. If that statement (and Figure 5-18) is based solely on the model, that only makes the model seem less valid.	Shandon San Juan GSA	pasogcp.com	12/9/2018 9:55:00 PM	

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Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
Timothy Cleath	Additional Comments	Specific Edits: P. 7 Para 4: Delete sentences 5 and 6 (King City fault?). Fig 4-6: Geologic Map does not agree with portions of this cross section. P. 17 Delete last sentence of first paragraph: not necessary and not significant. P. 17 para 2: Identify arsenic as a constituent of concern. P. 19 para 1: Poor quality water in the Pancho Rico is not necessarily associated with the tar sands. We don't see tar sands in the Pancho Rico underlying the basin. P. 19 para : The Santa Margarita Formation varies inpermeability but is typically much lower than the Paso Robles Formation. That is the basis for not including it in the basin sediments. Where the geothermal water is present, groundwater quality is more brackish. P. 19 para 4: Vaqueros Formation groundwater is typically brackish. Fig 4-12 to 4-15: Reference map showing locations of cross sections. Aquifers shown in blue stop abruptly in some areas. Please explain why. P. 25 para 2: sentence 4: Not shown on Figure 14-4. Last sentence: Not clear what is meant by the "shallow aquifer.... may be an isolated aquifer area". Please explain. Table 4-1: Define Q/s. Note that the hydraulic conductivity is an average based on the full perforated interval and is not a specific aquifer hydraulic conductivity. P. 26 Para 2: Is the reference to the Paso Robles Formation and the shallow aquifer zone correct? This seems to be conflicting. P. 27 The specific yield for the Paso Robles Formation gravels is appropriate in light of the flatness and compaction of these gravel beds. P. 27 last para: Folds and faults do affect groundwater flow in the Subbasin. Consider particularly the Red Hills/San Juan faults and the folds near the Rinconada fault. P. 28 para 1: Municipal demands are significantly met by Nacimiento and State Water Project waters (Paso and Shandon) Fig 4-16: This map is incomplete and also not a good representation of where groundwater recharge can occur to the Paso Robles Formation. The alluvial areas are obvious. It may be best to exclude this figure and provide more discussions related to factors for recharge such as is discussed in the Huer Huero and Paso banking studies. P. 31 The areas identified as "discharge areas" just happen to be near where wastewater discharges occur and may not be areas of groundwater discharge. The areas of mapped springs and seeps are likely to be due to stratigraphic and structural conditions and not shallow and perched aquifer units. P. 34 Include the Nacimiento River and Shell Creek in the surface water features. Surface Water Bodies would seem to refer to lakes and ponds and not so much streams. It would be better to take out "bodies" from the title. P. 36 Recommendations should be for a geostatistical analysis of well completion reports and for general geophysics, not just aerial geophysics. Also, note that there is one nested well as is discussed in Chapter 5.		pasogcp.com	12/10/2018 9:36:00 AM	
Timothy Cleath	Additional Comments	General comments: Paso Robles Aquifer suggests there is only one aquifer-change to Aquifers. In light of the need to adjust the basin boundaries, there should be a discussion and illustration showing the 2002 basin boundary and the San Juan/Red Hills faults should be shown. The Base of the Permeable Sediments map from the 2002 Paso study is in need of a revision based on more recent information. The deep basin area near San Miguel is much shallower than was shown in that map. Soils infiltration rates in the table are not quantitative and the clay content and sand and gravel content do not add up. Explain why. Figure 14 has extensive areas where no soil infiltration information is available. Explain why.		pasogcp.com	12/10/2018 9:36:00 AM	
Green River Mutual Water Company	Additional Comments	(See attachment)		Other	1/2019	Link: 20190101_GRM
Dana Merrill	Additional Comments	My comments in brief are: 1. Better detailed data is needed before selecting specific projects by area. Shandon and Creston (depending on where Creston extends) seem to have stable water levels vs the Red Zone. So recharge or supplemental water needs to be likely worth the cost to areas in better shape. Or prove taking there does help the Red Zone. 2. Many small users is Jardine, Squirrel Hollow, etc may need regional systems which could be a few deep Wells or supplemental water. Domestic and AG May have different solutions. Antiquated subdivisions have special challenges that require solutions different than commercial Agriculture. Those are a failure of good Planning which didn't exist when the lots created. Government should now help resolve but wells and septic systems on 1 acre parcels not sound planning. Same as Los Osos faced only worse. 3. More spending on dedicated monitoring has been promised for years but never built. Do that first to be sure the solutions will work. 4. Prioritize getting the County Naci share, where the County Paso Basin was left out, into the Basin. Get the city Paso Robles to take its full allotment which would lessen the salt level of its effluent. More purple pipe water could then go to vineyards . Basin landowners could subsidize the lake water treatment plant expansion cost for the city. 5.there should be an alternative to take State water before treatment at Polonio Pass. Maybe pipe to Estrella River then pump out by Whitley Gardens. Save pipeline costs perhaps. More water at lower cost is available although more pipeline is needed. 6. Get representative monitoring well system going and build projects as results of monitoring dictates. Figure out where our projects should be concentrated.	County of San Luis Obispo GSA	Other	2/25/2019	

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Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
		7. Get Irrigated Land Ordinance renewed for 5 years for stability. Expiring is not going to be good in 2020. County has a system and while it's not perfect it's a start we have experience with. 8. An Economic Study needs to be included to know whether Ramp Down or Supplemental water is best. A Ramp Down is not possible as we have few annual irrigated crops, the economic multiplier factor in reverse will devastate the local economy based on the wine and tourist industry. Winegrapes use so little water we have no lower use crop alternatives. 9. Get the Paso Basin on a priority list for State Water, otherwise urban uses will grab it and its gone. Buy a base amount the add annual purchases on high rainfall years at lower prices for recharge. Continue to rely on wells but support groundwater levels with supplemental water. 10. Adopt a Monterey County mandatory reporting system based on meters for Ag Wells 5 inch or larger. Exempt true non commercial de minimous users. They should contribute a minimal fixed admin fee to the system. Commercial Ag pay based on usage to incentivize efficiency. Group by zones as Monterey does. 11. Get more sophisticated data. Water levels have dropped most in the Red Zone but the Basin is deepest there. So many Wells still produce well. If we were to simply concentrate on the Red Zone and have the whole basin pay, would that be logical or fair? Do we know? If not, find out before proposing projects that likely can't pass a 218 election for funding anyway. 12. Our first 5 years post GSP submission need a vast improvement in data. Measure changes is water levels across the basin so we all have confidence in the data. And know the Economic impacts on us all, farmers, retired folks, city residents. That should help with buy in. Other than the Purple Pipe city of Paso project and getting on the State Water reservation list we are not ready for projects or drastic Ramping Down. Those two projects might be all we need. I may have further comments but wanted to get these in. Thanks for the opportunity. Dana Merrill Paso Robles, CA				
Dana Merrill	Additional Comments	(See attachment)	County of San Luis Obispo GSA	Other	2/26/2019	Link: 20190225_DMerril1_Ch9
Bill Stansbury	Additional Comments	It is good to see a concrete plan taking place. I am a deminimis user. It appears I will not be financially impacted by the GSP. I do fear a large political backlash by land owners, particularly in the Creston area. They always seem to have their alternate version of the facts and refuse to believe there is an overdraft problem. I am 70 years old, survive on a pension and live alone. When my wife was alive, we had to drill a new well in 2006 after moving in in 1992. Our well was 250 feet. The water table was at 135 feet when we moved here in 1992. Our new well is 500 feet deep and the water is now at 320 feet. I cannot afford to drill to 1,000 feet and what guarantee is there that there is potable water at this depth in our area? As you can see the "little guy" is in a tough spot here. I wish you the best and I hope I live to see this plan come to fruition. Thanks, Bill Stansbury		Other	2/27/2019	
George Tracy	Additional Comments	Thanks for sending this. There are a few typos in some of the draft documents but I found them very interesting. The minimal users appear to be exempt from the GSA as the law allows. I hope this will be true in the future too. I assume the county is to be the overriding GSA for the purposes of implementation. I am curious on how the other water purveyors will react to that. Since there is not a written agreement for the implementation of the Paso Basin GSA how are you planning to get it implemented by all the GSA agencies. I have heard there will be an agreement but I have not seen one. As a county resident I have watched my well levels fall year after year. I measure the well every year since 2013 when I had to replace my pump at the level it had been installed in 1997. That level was 252 feet. The initial water level when installed was 150 feet.It has fallen every year. Last year it was at 307 below the ground some 200 feet above the replaced well pump. The plan does not mention what the county ordinance that limits planting will be once the plan has been implemented. Will a new ordinance be put in place to limit installation of new plantings again? Not all crops are listed in the SLO county ordinance. Specifically Hemp and Marijuana are missing, there may be others as well. Brewers are also not listed but several use groundwater for their source of water. Do you have a list of facilities that will be implicated as pumpers? I hope to attend the March 6 meeting but the notice does not indicate time or place. could you send that to me?		Other	2/27/2019	

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Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
Laurie Gage	Additional Comments	To the Paso Basin Cooperative Committee: I am writing in support of the letter to be considered by the Paso Basin Cooperative Committee as Item #8 in its March 6, 2019 meeting. As the holder of an onsite offset clearance, I have carefully reviewed the language of the termination clause in the deed restriction that was required of me by the clearance, and it would appear that without modification of the sunset date of the ordinance, it might be possible for me to begin irrigating the acreage that I fallowed in order to create the credit. I have no intention of pursuing reirrigating fallowed land, but it begs the question whether any owner of property fallowed to create an offset credit needed on that property or transferred/sold elsewhere, would feel the same reluctance to begin irrigating again. If the ordinance sunset date is not modified, I believe it might lead to having the clearance-fallowed land be irrigated again, completely negating any benefit of the one-to-one offset put in place to protect the basin. Add that to the increased water demand by having a gap between the sunset date and some future and, as of yet, unknown and undetermined program in the GSP, and the consequences could be long-lasting and very, very negative. Look to history and the 6-week gap in the ordinance process and what kind of advantage was taken back then. Thank you for your consideration and again, I urge your support of the letter in Item 8 of your March 6 agenda. Laurie Gage Full Sail Farm		Other	3/3/2019	
Sue Luft	Additional Comments	Paso Basin Cooperative Committee, I have reviewed the letter on page 59 of the agenda package for your March 6, 2019 meeting. I ask that your Committee approve this request that the SLO County Board of Supervisors modify the sunset date of the County's Water Conservation Ordinance related to the Paso Basin to when conservation provisions in the adopted Groundwater Sustainability Plan are implemented. Without modifying the sunset date of the County's Water Conservation Ordinance, there will be a gap which may result in increased water demand in the Paso Basin. This increased demand would increase the projected deficit in the basin and would impact the ability to comply with the Sustainable Groundwater Management Act. Thank you. Sue Luft Landowner, El Pomar area of Paso Basin		Other	3/3/2019	
Greg Grewal	Additional Comments	(See attachment)		Other	3/6/2019	Link: 20190306_Grewal
Douglas Brown	Project and Management Actions - Concepts	Appreciate your taking the time to speak with me yesterday. Here are the comments I last submitted on the website on Chapter 9 of the GSP which you indicate have not come through to you and others: I would request that the following alternatives be included as potential projects/management actions for study and implementation: 1.Reducing or eliminating exports of Salinas river water outside of the basin, particularly exports from Santa Margarita to the City of San Luis Obispo. These exports have negative environmental effects on the river as well as the groundwater basin and reduce recharge to the groundwater basin. The County, through the SLOCFCWCD, has significant obligations and control over these exports; 2.Require Shandon to participate in the SWP, as was envisioned in the early 1990's when a contract was executed for that purpose, prior to requiring other water users to participate in the SWP or other supplemental water projects. The County, through the SLOCFCWCD, was a significant, if not the lead, actor involved in such contract; 3.Require the urban agencies to use Nacimiento water for current water users rather than for new development prior to requiring other water users to participate in Nacimiento, SWP or other supplemental water projects. The County, through the SLOCFCWCD, has significant obligations and controls over the Nacimiento project and contracts with the urban agencies. While I understand that these proposals may not be popular options for various of the urban agencies, I do believe that failure to consider them would be inconsistent with the obligations that the GSAs have under state statutes. On the call you indicated that there had been no discussion of the environmental process for the GSP or projects or actions proposed to be undertaken. If true, I believe this is unfair to land owners and water users overlying the Paso Robles groundwater basin who deserve a clear explanation of this process and when they have a right to object. I reiterate my request to speak with the attorney in the county counsel office advising the County on environmental compliance with respect to the GSP. Douglas S. Brown		pasogcp.com	3/21/2019 5:12:00 PM	

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Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
Douglas Brown	Project and Management Actions - Concepts	Courtney, Thank you for your response. The public trust doctrine in California can operate to require additional releases above and beyond the permit conditions if necessary for instream or groundwater basin protection. I would respectfully request that the County (and the other GMAs) analyze this issue as an alternative. I have been told (but do not know) that Shandon does not take its full allocation of SWP water. I would respectfully suggest that the County and the other GMA's study of any SWP water alternative not include any project paid for by rural or agricultural users until Shandon takes its full allocation of SWP. I would respectfully suggest that the GMAs study urban use of Nacimiento water for existing users rather than new development. While I appreciate that other studies may have considered certain of these options, I would respectfully suggest that the GMAs need to re-review these options as part of their statutory duties under the groundwater management act. How much (or little) they can depend on the prior work will presumably depend of whether that prior work meets the standards applicable to the groundwater management act. Douglas S. Brown		pasogcp.com	3/21/2019 5:20:00 PM	
Sheila Lyons	Project and Management Actions - Concepts	Comments from both public and members at CAB Meetings - Administration, Accounting and Management - Ag pumping data collection states that one way would be for the Ag pumpers to report metered pumping to their GSA. How will this be verified? Management Actions - Although land use restrictions are mentioned there is no reference to working with the Planning and Building Dept. at the County to align new ordinances and policies to protect water resources. CAB has recently reviewed proposed ordinance changes for growing cannibis (not considered an ag crop) and for agricultural worker housing. Offsets are stated to be the source of water in one case...offsets do not make water and there aren't enough replacement toilets for the program to do any good. Ag operators agree that giving off-sets is not the answer for cannabis projects. No mention of water source in proposed Ag worker housing ordinance at all and the allowance for this type of housing is being expanded hugelyokay on lots down to 5 acres in size, 1 worker per 1 acre of grapes, expanded zoning allowance, etc. ALL new or modified County ordinances need to have conditions for where the water will come from in new plantings or development. Existing rural residents, most of which will be de minimis users with shallow wells, are still going to be impacted by allowing additional planting and development and no amount of money is going to compensate them for these infractions. Available Water Supplies - State Water Project - Although there is 14,500 AFY currently unused that number will drop in drought years when we would most need it due to increased demand from the subscriber. We would still have to pay for 14,500 AFY, not 8900 AFY to insure that we still get 8900 AFY. Or else, if we only contract for 8900 AFY we will get only 5160 AFY (58% of 8900). Who currently owns the Salinas Dam? What about down stream properties that were dependent on this run off water in the past - legal commitments? Options to Deliver New Water Supplies - Is there consideration that any new recharge basins be covered to prevent excess evaporation? Development of Project Alternatives for GSP - General Assumptions - For direct delivery projects, pipeline alignments were selected to deliver water to the largest users closest to the water source. Do these users pay the most for this benefit? They should. Direct Injection of		pasogcp.com	3/25/2019 5:03:00 PM	
Sheila Lyons	Project and Management Actions - Concepts	CAB felt that the discussion questions are rather vague and non-specific so hard to comment upon in some cases. Here are the comments we were able to obtain.		pasogcp.com	3/25/2019 5:03:00 PM	
Sheila Lyons	Project and Management Actions - Concepts	Introduction - Second point, #4 - and throughout...there appears to be a focus on Growers and how they are impacted. What will be the fall out for Rural Residents who have animals, orchards, etc. and use more than de minimis users?		pasogcp.com	3/25/2019 5:03:00 PM	
Andrew Rainey	Ch. 1003 Summary of Model Update and Modification 1003.5 Comparison of Groundwater Budgets	I do not see how a change in the lines on a map will defy gravity & the change in elevation from a higher point to lower point.if you say that a fault line will act to separate the water basins some how, maybe like a geological dam eventually the water will either come over the dam or fine a way to seep through the dam if the elevation goes from higher to lower.common logic would say that the water shed above the PR water basin has to effect the inflow into the PR water basin area.I do not see how you can not include the Atascadero water area into the PR water basin. they must be linked as the watershed is headed down hill.seems very strange to me to come to any other conclusion.	City of Paso Robles GSA	pasogcp.com	3/29/2019 9:32:00 AM	
Dana Merrill	Project and Management Actions - Concepts	My comments to this Chapter are: Page 4, paragraph 1. Exempting de minimous from water charges is fine but not necessarily from "assessments" as they are users who have a stake in the Basin health. Cumulatively they are a significant use of water. Page 6, Management Action, second paragraph "adversely affecting the local economy" is a significant point. The wine industry and resulting tourism boom has benefitted beyond the ag water users. Cutback will negatively impact the economy and a measurement of that impact should be carried out to help decide what cost of supplemental water or idling of irrigated farming really costs our community. Same paragraph: Water charging framework should prioritize water efficiency and higher water use crops should not be subsidized or favored because of historic use. Page 7: Paragraph 1, last sentence dealing with idled and to save water, should have added "...beneficial uses of the acquired land given its water use limitation." Page 8, Paragraph 2, Naci Water Project: The Naci Water Partners potentially could consider selling to a new partner: the Paso Robles Basin, whether the County entity or other. Perhaps there are willing sellers to carve out a base entitlement which could be augmented by shorter term purchases from other partners' shares. Page 9 "Important Considerations", line 2, what are "Potential water quality issues" associated with Naci lake water that would be limiting as a source?Page 10: General Assumptions: "Local groundwater deficits" require more precise determinations of boundaries, perhaps related to the same issue with "Zones" Page 10 SWP Assumptions: Need to determine definitively whether heavier pumping beyond the Red Zone impacts the Red Zone. And whether adding Supplemental Water to non Red Zone can improve Red Zone water levels. Same paragraph: Buying untreated SWP water farther east pre treatment would be cheaper and allow for more quantity to be acquired potentially. Cost of additional pipeline would have to be evaluated as part of viability review	County of San Luis Obispo GSA	pasogcp.com	3/29/2019 11:53:00 AM	

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Name	**Chapter & Section**	**Comment**	**GSA**	**Comment Source**	**Date/Time**	**Attachment(s)**
Dana Merrill	Project and Management Actions - Concepts	Topics of Discussion section 1. Equity bullet point page 1; define "heavy pumper"; is that volume based upon acreage or by crop (alfalfa vs winegrapes etc)? Projects should be paid via a combination of Capital Project funding and operational charges for recurring operating expenses. 2. Equity bullet #2: monitoring wells, negotiating water charges framework, video logging wells (determining Zone Boundaries), extraction system monitoring etc. could be funded at last initially by a per acre charge, probably on irrigated lands. 3. Bullets page 2: deminimus pumpers: Yes and No to complete exemption. Lower base fee of their own is logical. 4. Pumping allowances: Set a base fixed amount, likely between 1 ac ft/acre/year and 1.25 ac ft/acre/year regardless of irrigated crop grown. Use economics as a tool to encourage water to move to most efficient use within Ag uses. 5. Standarized uses should be Paso Basin oriented. Battany study a good source for one at least. 6. Ramp downs: 10 years to complete, start in 5 at soonest. Need to see what Supplemental water is required. A given hopefully is current County Ordinance regarding new irrigated land is renewed for 5 years or GSAs choose a new approach (don't let it expire and start land development and well drilling rush to put us farther behind). 7. Ramp downs need to be equal until Zone boundaries are established with research. 8. Don't cap carryover or users will make sure to pump to avoid losing 9. County fine to be State Water Contractor IF they will take action to get it going. If not, get different entity motivated to get this going asap to know if it is a viable option supported by those who will pay for it. County record so far is too little, too late on Supplemental sources to Basin in general. 10. State Water contractor could be paid with usage charges and property tax in combination. Many examples statewide to select from	County of San Luis Obispo GSA	pasogcp.com	3/29/2019 12:10:00 PM	
Dana Merrill	Project and Management Actions - Concepts	Re: changes in Pumping Allowance from Ag to M and I: most non Ag uses including Manufacturing and Industrial (M and I) which was mentioned and conversion to urban housing or ranchettes can attract a higher financial return on pumped water than Agriculture, Even tree crops, wine grapes and vegetables cannot compete with non Ag buyers of water whether groundwater or supplemental sources. Agriculture needs to be appreciated when it comes to pricing water. Ag is a key economic contributor today helping to drive the strong local economy. It is possible go the way of southern CA and other regions that can converted to non Ag uses. That could happen is Paso Robles if the combination of cutbacks and high price supplemental water makes it an obvious choice to convert to non Ag uses. Plus pressure from the state to build more housing. Those with high priced water to sell will profit in the near term but the agricultural character will change dramatically from the present. The allure of Paso Robles is not only the town but its setting, led by it becoming a world class wine destination. So be careful about moving Ag water to M and I or other uses, as mentioned as an possible strategy, as our very unique character could be lost.	County of San Luis Obispo GSA	pasogcp.com	3/30/2019 6:12:00 PM	
Dan Penkauskas	Additional Comments	I really like the job you've done - good research and analysis of the current state and several proposed solutions with their costs worked out. I particularly like the proposed cost of water for growers - a nominal cost for the first 12", but sharply (10x?) higher for drafts over that. Some growers have very deep pockets indeed, and only draconian rates after the first 12" will encourage them to comply.Thank you.	County of San Luis Obispo GSA	pasogcp.com	4/5/2019 12:29:00 PM	
Allen Duckworth	Ch. 9 Projects and Management Actions Fact Sheet and Discussion Points 9.2 Discussion Points	It appears that the priorities of the Draft Projects Summaries are in reverse order. Even in a bad year, the Paso Robles Basin and surrounding water shed, receives more than enough good clean rain water to meet our needs so it makes no sense to let that water run down the Salinas River to the Pacific Ocean then purchase water from the unreliable State Water Project that could potentially contaminate our pristine basin. Water from the State Water Project should never be at the top of the list as they have already allocated way more water than they will ever have so we could never count on that water being available when most needed. The pipeline projects are very expensive,should require an Environmental Impact Report and would best serve a limited group of property owners. Such projects would not meet the stated goal of providing equity between who benefits from projects and who pays for projects therefore should only be considered by the individual water districts whose members would be the primary benefactors ratherthan being part of the GSP. Taking advantage of natural recharge methods such as installing check dams in natural percolation areas to redirect more runoff water into the basin would be much more cost effective and benefit a larger portion of the basin. One project that should be at or near the top of the list is enlarging the Salinas Dam because that could restore the Salinas River to the required, year around surface flow which would greatly increase the basin recharge. This project would be financially advantageous because it would be eligible for Proposition 1 grants as well as Federal funds from the RAIL act which will be redirecting money from the failed highspeed rail project to California water storage projects. Let's get our priorities straight and concentrate on providing a sustainable water supply for all the residents rather than a water banking opportunity for a selectgroup of investors. This DRAFT plan looks just like the Assembly Bill 2453 that nearly 80% of the area voters have already rejected. Please listen to the will of the people!	County of San Luis Obispo GSA	pasogcp.com	4/13/2019 1:03:00 PM	
Sheila Lyons	Ch. 9 Projects and Management Actions Fact Sheet and Discussion Points 9.1 Fact Sheet	Has consideration been given to charging cannabis projects for their ability to irrigate from the PR Basin? The state is apparently already doing this. With all the cannabis projects coming into North County this should be considered. See link to state charges: https://www.waterboards.ca.gov/resources/fees/water_rights/docs/fy1819_finalfeeschedulesummary.pdf	County of San Luis Obispo GSA	pasogcp.com	4/11/2019 3:47:00 PM	
Verna Jigour	Ch. 9 Projects and Management Actions Fact Sheet and Discussion Points 9.1 Fact Sheet	"Local Rivers/Streams" Localized recharge of rainfall runoff before it enters a stream or river is also possible. Restoring detention storage functions on *vast areas of rangelands in the watershed* could capture excess stormwater flows more efficiently than engineered structures. Restored native woody and perennial plants, their root systems and associated soil ecosystems, would capture and route more precipitation directly to groundwater right where it falls circumventing the need to capture and divert flood flows to human-maintained basins. [See RainfalltoGroundwater for elaboration.] This is not a small source, as suggested in the second paragraph under Local Rivers/Streams. Applied to the entire watershed/catchment, this is an enormous potential source, as I've strived to point out in my comments on your process.		pasogcp.com	4/15/2019 9:48:00 PM	

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Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
Jerry Reaugh	Combined comments on Chapters 6, 7 & 8	The attached are my comments on Chapters 6,7,& 8. Regards, Jerry Reaugh	County of San Luis Obispo GSA	pasogcp.com	4/15/2019 11:52:00 AM	Link: 20190415_Reaugh
Sandi Matsumoto	Ch. 1001 Methodology for Identifying Potential Groundwater Dependent Ecosystem 1001.1000 N/A	Please specify what field verification methods (e.g., isotope analysis, enhanced shallow groundwater monitoring) will be used to definitively determine whether potential GDEs are true GDEs. It is highly advised that multiple depth to groundwater measurements are used to verify whether an iGDE (or NC dataset polygon) is connected to groundwater, so that fluctuations in the groundwater regime can be adequately represented. The analysis described on p.7 to create Figure B-3 only relies on Spring 2017 depth data, which is also after the Jan 1, 2015 SGMA benchmark date. Also, according to the shallow monitoring well data gaps described in Chapter 5 and 7, there is insufficient data to confidently remove data for NC polygons that are >5km away from a shallow well. See Attachment D of this letter for six best practices when using groundwater data to verify the NC dataset.The NC dataset needs to be ground truthed with aerial photography to screen for changes in land use that many not be reflected in the NC dataset (e.g., recent development, cultivated agricultural land, obvious human-made features). Grouping multiple GDE polygons into larger units by location (proximity to each other) and principal aquifer will simplify the process ofevaluating potential effects on GDE due to groundwater conditions under GSP Chapter 7: Sustainable Management Criteria. Groundwater conditions within GDEs should be briefly described within the portion of the Basin Setting Section where GDEs are being identified. Not all GDEs are created equal. Some GDEs may contain legally protected species or ecologically rich communities, whereas other GDEs may be highly degraded with little conservation value. Including a description of the types of species (protected status, native versus non-native), habitat, and environmental beneficial uses (Refer to Attachment C for a list of freshwater species found in the Paso Robles Subbasin and refer to Worksheet 2, p.74 of GDE Guidance Document) can be helpful in assigning an ecological value to the GDEs. Identifying an ecological value of each GDE can help prioritize limited resources when considering GDEs as well as prioritizing legally protected species or habitat that may need special consideration when setting sustainable management criteria. Decisions to remove, keep, or add polygons from the NC dataset into a basin GDE map should be based on best availablescience in a manner that promotes transparency and accountability with stakeholders. Any polygons that are removed, added, or kept should be inventoried in the submitted shapefile to DWR, and mapped in the plan. We recommend revising Figure 4-11, Appendix B, and including it in Chapter 5 to reflect this change.		pasogcp.com	4/15/2019 1:20:00 PM	
Gail Schoettler	Additional Comments	Steve Sinton has been critical to the development of the local groundwater plan for the Paso Robles Basin, which desperately needs such a plan. I have watched the groundwater level fall for decades and now, with all the vineyards in the area, the time is more important than ever to ensure that the Basin can sustain all the agricultural and domestic uses. Agencies involved need time to implement the plan and evaluate how it is working so they can make adjustments as necessary. Given the long drought in California, the plan should also ensure that water levels be given time to stabilize. It is imperative that existing wells not go dry, so please take this into account as well. If results are not good, localities need to be given the opportunity to fix the problems before the Basin takes charge.	Shandon San Juan GSA	pasogcp.com	4/15/2019 3:20:00 PM	
Greg Grewal	Additional Comments	See attachment on county rainfall data.		PBCC Meeting	4/24/2019	Link: 20190425_Grewal
Dick McKinley	City of Paso Robles GSA public hearing: Chapters 5-8	These are public comments from the City of Paso Robles GSA public hearing regarding Chapters 5-8. 1. Dale Gustin "Asked about the relationship of this draft GSP to the Steinbeck litigation. Noted that there has been a lot of rain in 2019, and if the GSP took that into account. The answer was given that the GSP was based on data prior to 2019 per DWR guidelines. 2. Gerry Stover "Asked about wastewater and was informed about the Recycled Water project currently underway, and the recent completion of the Tertiary Treatment portion of the Wastewater Treatment Plant.	City of Paso Robles GSA	Public Meeting; submitted via pasogcp.com	5/2/2019 9:07:00 AM	
William & Doris Land & Energy Co LLC	Additional Comments	Re: Sustainable Groundwater Management Act Ladies and Gentlemen: William & Doris Land & Energy Co., LLC is the owner of approximately 2,440 acres of open land in San Luis Obispo County identified as Assessor's Parcel Nos. 037-321-016 and 037-331-014. While that property has been irrigated with groundwater in the past, there has been no recent irrigation of the property. We have just become aware that the groundwater sustainability plan (the "GSP") being developed for the subbasin underlying our property under Sustainable Groundwater Management Act may deny our property the right to pump groundwater in the future because groundwater has not been applied to the property for a number of years. We write to express our strenuous opposition to any GSP that fails to recognize our overlying groundwater rights or our right to pump groundwater in the future. Precluding the exercise of our overlying rights simply because they have not recently been exercised would amount to an unconstitutional taking of those rights that could result in an enormous reduction in our land value. Should that occur, we would have no alternative but to bring an action for inverse condemnation and other claims to recover that lost value. We want to avoid that outcome. We therefore urge you to recognize the rights of our property and similarly situated lands to pump groundwater regardless of whether those rights have been recently exercised, and to not adopt any GSP that interferes with those rights or discriminates between currently irrigated land and land that has not recently been irrigated. Very Truly Yours, (signed) Manager		Letter to the County Board of Supervisors Office	5/8/2019	
Various Stakeholders	Additional Comments	Supervisor Peschong provides a summary of comments received from various stakeholders and community members.	County of San Luis Obispo GSA	PBCC Meeting	5/22/2019	Link: 20190522_Summary_of_Comments

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Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
Submitted by Dick McKinley; comments by Dale Gustin, Gary Dunnican, Cody Furguson, and Patty Smith	City of Paso Robles GSA public hearing - comments on Chapters 9-12	Public comments on Chapters 9-12 from the 6/18/2019 Paso Robles City Council/GSA Meeting (See attachment). To view the agenda for this meeting, please click **here**.	City of Paso Robles GSA	City Council/GSA Meeting, submitted via pasogcp.com	6/19/2019 2:18:00 PM	Link: 20190620_PRCityCouncil
County of San Luis Obispo Department of Public Works	Additional Comments	See attached handout on the Paso Basin Aerial Groundwater Mapping Pilot Study distributed during the August 21, 2019 Paso Basin Cooperative Committee Meeting.		PBCC Meeting	8/21/2019	Link: 20190821_PilotStudy
Steve Lohr Jerry Reaugh Jerry Lohr	Additional Comments	See attached presentation received during the public comment period of the August 21, 2019 Paso Basin Cooperative Committee Meeting.		PBCC Meeting	8/21/2019	Link: 20190821_LohrReaugh
Sheila Lyons	Additional Comments	Many things seem to be missing from this plan. How are water sheds going to be handled? What if someone just outside the basin boundary puts in a well and pumps all they want? What if a lot is 1/2 in the basin and 1/2 out of the basin? There doesn't seem to be any recommendation for making use of the County's land use authority for assisting in managing the Basin. The County should review all land use polices for impact on the basin. Implementation of new policies could help with management. Disallowing new ag ponds? Cannabis farms? Another management tool that should be considered is a computer app requiring irrigators to coordinate watering times to limit the impact of well draw down happening all at once. Salinas Valley has such a system...strawberry growers initiated this...in their case it was due to salt water intrusion issues...but it could be used to manage pumping here in Paso Basin to protect rural residential wells adjacent to large ag operations. The growers must log on and reserve times for irrigating. This would seem like a good growing practice as well.	County of San Luis Obispo GSA	pasogcp.com	9/3/2019 11:10:00 AM	
Jerry Lohr	Additional Comments	I would like to submit the project map for the BVB Blended Water Backbone System. Regards, Jerry Lohr	County of San Luis Obispo GSA	pasogcp.com	9/27/2019 11:34:00 AM	Link: 20190927_Lohr3
Jerry Lohr	Additional Comments	On September 9th, my son Steve Lohr and myself met with Supervisors Peschong and Arnold along with Wade Horton and Courtney Howard. We discussed some of our ideas about how to move the Paso Robles Groundwater Subbasin towards sustainability. I was asked at that meeting to prepare a 1-page summary letter. Attached is that letter which was submitted to the Supervisors and the County. I would like to submit that letter to the Cooperative Committee as well. I am attaching the letter. In a subsequent Comment, I will be sending a copy of the Blended Water Backbone Project Map. Regards, Jerry Lohr	County of San Luis Obispo GSA	pasogcp.com	9/27/2019 11:26:00 AM	Link: 20190927_Lohr2
Jerry Lohr	Additional Comments	Please find attached my Comment Letter to the Cooperative Committee. Regards, Jerome J. Lohr	County of San Luis Obispo GSA	pasogcp.com	9/27/2019 10:50:00 AM	Link: 20190927_Lohr
Jerry Reaugh	Additional Comments	I am pleased to submit the attached comment letter to the CC. Regards, Jerry Reaugh	County of San Luis Obispo GSA	pasogcp.com	9/27/2019	Link:20190927_Reaugh
Sheila Lyons	Additional Comments	Many things seem to be missing from this plan. How are water sheds going to be handled? What if someone just outside the basin boundary puts in a well and pumps all they want? What if a lot is 1/2 in the basin and 1/2 out of the basin? There doesn't seem to be any recommendation for making use of the County's land use authority for assisting in managing the Basin. The County should review all land use polices for impact on the basin. Implementation of new policies could help with management. Disallowing new ag ponds? Cannabis farms? Another management tool that should be considered is a computer app requiring irrigators to coordinate watering times to limit the impact of well draw down happening all at once. Salinas Valley has such a system...strawberry growers initiated this...in their case it was due to salt water intrusion issues...but it could be used to manage pumping here in Paso Basin to protect rural residential wells adjacent to large ag operations. The growers must log on and reserve times for irrigating. This would seem like a good growing practice as well.	County of San Luis Obispo GSA	pasogcp.com	8/23/2019 11:10:00 AM	

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Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
Steven Carter	Additional Comments	My family owns and operates a property that has been in irrigated agriculture since the late 1980's. The pumping water level in our well has not significantly dropped since we purchased the property in 2002. It seems evident however that there is a problem basin-wide with the over pumping of our groundwater. This was especially apparent during the recent drought years. I have attended many of the GSA meetings that have now culminated in the proposed GSP. I have been very disappointed in the lack of communication with the SLO County GSA which is supposed to represent my interest. While the individual County Supervisors have been available for one-on-one meetings, the GSA staff have had almost no outreach to the 'white-area' agricultural pumpers who represent more than 50% of the total water usage in the basin. Moreover, the County BOS went out of their way to prohibit the EPC Water District from acting as a GSA. This has essentially left the largest single group of Paso Robles basin water users, the very ones who will be impacted the most by the GSP, on the outside looking in. I believe that going forward, the basin should be managed as a single unit. If cutbacks in pumping are proposed as a method of bringing the basin into sustainability then they should be implemented basin wide. Any proposal that draws lines in the sand will only pit neighbor against neighbor and surely lead to wasteful litigation. As the GSP is being finalized and presumably adopted, for agriculturists life goes on. It is evident to me that I should plan on pumping less groundwater in the future and so have started transitioning my property from growing alfalfa to growing deciduous trees. This should result in a net savings of irrigation usage but at a considerable cost per acre. One of the costs by the way, was a fee paid to the SLO County Planning Department for permission to change irrigated crops. Still, with the proposed GSP, there are many unanswered questions and the following are a few that are of interest to me. What agency is going to monitor water usage and at what cost? Will credit be given to savings in water usage that are implemented before the GSP is adopted? Best management practices, BMP's, are mentioned but not specified. Will there be penalties for pumpers who don't follow BMP's? What is the fate of land owners who don't have historical water usage on their properties? What happens if there is a significant increase in de minimis groundwater users?	County of San Luis Obispo GSA	pasogcp.com	9/29/2019 4:46:00 PM	
Dana Merrill	Additional Comments	Comments on GSP and the formation process	County of San Luis Obispo GSA	pasogcp.com	9/24/2019 3:01:00 PM	Link: 20190924_Merrill
Richard Woodland	Additional Comments	My name is Richard Woodland. I am a native of Paso Robles and have been involved in irrigated farming in or near Paso Robles for approximately 45 years. This farming has included alfalfa farming, where the Woodland Plazas I & II are located today, to current vineyard operations in the north county. First, I would like to thank SLO Co and the other GSAs for their extensive time and effort they have put into the current draft Groundwater Sustainability Plan. I understand the complexity of the situation as I was involved with and a part of the Upper San Gabriel Valley Municipal Water District in So. Calif. for approximately 30 years. I also understand that there may not be a perfect solution for all involved. What I am concerned about are several issues that appear to not have been addressed and are somewhat in the "kick the can down the road" mode. I am concerned that there is virtually no agriculture related representation nor inclusion in the various GSP meetings nor involvement in the draft policies. I am concerned that growth doesn't appear to have been considered regarding de minimis users. I am concerned that there does not appear to be a method for monitoring or policing water use. I am concerned that nothing has been addressed regarding the significant difference between those who use best farming practices, who are already addressing minimal water usage versus those who do no use the latest technology. Should there be a blanket reduction in water use, those who have invested in and have upgraded to the most modern practices stand to be hurt the most. I am really troubled in that San Luis Obispo Co., which is still an agricultural county, has no agricultural voice. There really needs to be at least 1 voting representative from the agriculture community. Thank you once again to the County of SLO and other GSAs for your hard work and dedication in this matter. The GSP will definitely impact everyone in the region and therefore should be represented by all facets of the region. Respectfully, Richard Woodland	City of Paso Robles GSA	pasogcp.com	9/24/2019 10:35:00 AM	
Dana Merrill	Additional Comments	Comments on GSP (see attached letter)	County of San Luis Obispo GSA	pasogcp.com	9/26/2019 2:47:00 PM	Link: 20190926_Merrill
Joe Irick	Additional Comments	Please see attached letter.	County of San Luis Obispo GSA	pasogcp.com	9/26/2019 10:42:00 AM	Link: 20190926_Irick
Fred Hoey	Additional Comments	Supervisor Peschong, & Angela Ruberto: I am sending the attached document as requested. Fred Hoey	County of San Luis Obispo GSA	via email	9/27/2019 0:00	Link: 20190927_Hoey

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Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
Robin Chapman	Additional Comments	RE: Draft GSP Remarks on specific sections of Draft GSP: Definitions: ˜Best available science refers to the use of sufficient and credible information and data, specific to the decision being made ¦. that is consistent with scientific and engineering professional standards of practice. I hereby state unequivocally that Best Science Available was not implemented in determining the San Miguel Area of Severe Decline. The majority of the area thus designated is owned by the Galbraith family and the Galbraith Family Trust, and as a member of that family, I know that no information or data whatsoever was collected regarding well tests, historic water use and/or levels, nor any other information that would indicate decline. The Galbraith family has for years, and routinely continues, to test well levels, and test results show that standing water levels are identical today to those of 1969. I demand that the designation as an Area of Severe Decline be withdrawn unless and until sufficient and credible information and data proves otherwise. Section 3.4 SLO Co. Ag Commissioners office is not fully aware of crop production in the county. The following categories need to be added to Irrigated Crop list: 1) Rotation crops 2) Irrigated grain 3.4.2 I am baffled by the assertion that Most industrial use is associated with agriculture and is lumped into the ag water use sector. What? There are scores of manufacturers and industries in the Subbasin, including within and around the city of Paso Robles, that have nothing to do with agriculture. Examples are: *Firestone Brewing *JIT Companies *Custom Tube and Manufacturing Inc *Trelleborg * Hogue Tool and Machine Industrial use and manufacturing are different than, and should be listed separately from, Agriculture.	County of San Luis Obispo GSA	pasogcp.com	9/29/2019 2:55:00 PM	
Robin Chapman (continued)	Additional Comments	Section 3.6.2 States that USGS has only one (1) water sample and that sampling frequency is unknown. This source is too vague to be used when deciding policy. Section 3.6.4 ETo information rates have been gathered from Atascadero, a site which is not in the Paso Robles Subbasin, and therefore possibly irrelevant. Section 3.10.2 Quotes SLO County General Plan : ¦ as countywide growth declines¦ Is this a mistake? Humans show no trend toward stabilizing their population growth, and SLO County will likewise have its share of population increase. Should it read as the rate of growth declines? Section 7.1.4 Monitoring networks are limited to locations with data that are publicly available and not under confidentiality agreements. Actually, none of the well monitoring information has been available. In attempting to pinpoint the locations of the listed monitoring wells, my inquiries elicited from County staff the explanation that most, or all, of the privately owned wells had confidentiality agreements, and thus no information about them could be shared. It was no easier to obtain information about public wells. After an unusually helpful member of county staff showed me an aerial view of the wells that were used to create the San Miguel Area of Severe Decline, that person was warned by the division supervisor not to provide me with any more information. If well data, or any other information, is used to make public policy, the public has a right to that information. Section 7.1.2 ¦ quantity and density of monitoring sites ¦ shall be sufficient to evaluate conditions of the Subbasin setting ¦ The number of monitoring wells is way too small to characterize such a large area. Section 7.2 SLOFCWCD removed 130 wells from its monitoring program because of privacy agreements. So how many wells remain in the monitoring program? Where are they located?	County of San Luis Obispo GSA	pasogcp.com	9/29/2019 2:55:00 PM	

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Robin Chapman (continued)	Additional Comments	Section 7.2.1 Data gaps will be addressed during implementation ¦ When? How? By whom? How will it be guaranteed that data gathering and analysis is done by conscientious and informed personnel? One alluvial well is not enough ¦ If one well is not enough to represent alluvial aquifer(s), how can one be enough to monitor groundwater flow directions? How many more wells do you anticipate adding? When, and where? Section 7.2.2 Galbraith Family Farm should be monitored as an area of rapid recharge. Section 7.3 It is hard to judge from the scale of the illustration, but monitoring well 25S/12E-16K05 appears to be an alluvial aquifer well. Section 7.3.1 Data gap will be addressed by whom, when? How will it be guaranteed that data gathering and analysis is done by conscientious and informed personnel? Section 7.4.1 I dispute that there are no spatial data gaps in the network . The highest density of monitoring wells in any area of the Subbasin is three (3)! That leaves a lot of territory either underrepresented or not monitored at all. Section 7.6 More monitoring is needed than the one currently acceptable well. Section 8 The criteria defining .. is pretty vague.	County of San Luis Obispo GSA	pasogcp.com	9/29/2019 2:55:00 PM	
Robin Chapman (continued)	Additional Comments	Section 8.1 Management Area refers to an area within a basin for which the Plan may identify different minimum thresholds, measurable objectives, monitoring, or projects and management actions based on differences in water use sector, water source type, geology, aquifer characteristics, ¦ or other factors. I suggest that the SM Area of Severe Decline be re-evaluated under this clause. Section 8.1 Shouldnt this sectioned be numbered 8.2, and all following sections be amended accordingly? Section 8.1 Conceptual Projects NWP delivery at confluence of the Salinas and Estrella Rivers. My husbands family has owned this specific property for the past 54 years. These are the facts about this location: 1)NO ONE has approached the Galbraith Family about situating any project on their property. 2)Said property is in one of the highest recharge areas in the Subbasin, and has never had a shortage of water, and therefore no need, for supplemental water. This project was supposedly vetted through an outreach program. Nobody reached out to the landowner. Table 8.1 The shallowest well listed is at 490 feet. Galbraith Family Farm stands at, and has historically stood at, 157 feet. Does that sound like an area of severe decline? Section 8.3.4.4 States that should it determined that water quality is degraded, measures will be taken to avoid any undesirable effect. If water is found to be degraded, it is too late to AVOID. The correct term is mitigated. Ditto on the paragraphs mentioning subsidence and impacts on the Upper Valley Subbasin (8.3.4.5).	County of San Luis Obispo GSA	pasogcp.com	9/29/2019 2:55:00 PM	

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Robin Chapman (continued)	Additional Comments	Section 8.3.4.6 Domestic land uses and users ¦ limited water in some of the shallowest domestic wells may require owners to drill deeper wells. I strongly feel that property owners whose private wells are depleted through no fault of their own should not have to bear the financial burden of drilling a new well. Where it can be shown that irrigation of crops in areas that were previously dry-farmed, or never farmed at all, contributed to depletion of a pre-existing well, surrounding irrigators should either have to supply property owners with water or provide funds for a new well. Policies allowing offsets of existing use to allow new construction ¦. If we assume that the PR Subbasin is in decline (which is the foundation of this Plan, is it not?) then offsets will not reduce groundwater depletion. Offsets do nothing more than maintain the status quo, which equals a continuing cycle of overdraft. Limitations should be imposed on users of great quantities of groundwater before de minimus users are required to cut water use. Section 8.3.5.2 The first sentence doesnt make sense to me. Is it the intention to say a DEFINITION of an undesirable result ¦? The word unanticipated should be deleted after extensive and before drought. Anticipated drought wouldnt be a potential cause of undesirable results? Section 8.6.1 ¦ in groundwater concentrations well above an established ¦ I think well above needs clarification. Section 8.6.2 Shouldnt criteria for constituents of concern be numbered 1 and 2, not 3 and 4? Why must a constituent of concern have already been above a level of concern? Doesnt this omit constituents that were previously present, but have since risen to a level of concern? Likewise with newly detected or newly declared constituents. Unacceptable levels or constituents that are identified in future should be included in this list.	County of San Luis Obispo GSA	pasogcp.com	9/29/2019 2:55:00 PM	
Robin Chapman (continued)	Additional Comments	Why are already-contaminated wells exempt from the current thresholds? Section 8.6.4.2 Groundwater recharge: Shouldnt this read active recharge with imported or ¦? Section 8.7.1 The last sentence in Land Subsidence should read Land subsidence is an inelastic ¦ Section 8.7.2.1 The margin of error is equivalent to one-half of the subsidence allowance. That doesnt instill a lot of confidence. Section 8.7.4.2 Couldnt continued pumping also be a potential cause of undesirable results? Section 9.1 ¦ to make new water supplies available ¦ There are no new water supplies. There is only as much water as there is. Expecting to receive water from out of the area reflects a lack of knowledge of the consequences to habitats deprived of their natural amounts of precipitation, stream flow, storage, etc. Section 9.2 There is a strong need for adequate information to justify area specific management actions. See comments on Sect. 8.1. Section 9.3.1.5 SMGA regulations require identification of data gaps and a plan for filling them. I have previously stated and currently maintain that there are too few wells enlisted in the monitoring program. I have never received an explanation why only wells with pedigrees are allowed in the program. Isnt there valuable information that could be gathered from wells whose dates of drilling are unknown, whose depth and perforations are not recorded? What have these things to do with monitoring well levels? Section 9.3.1.9 - Can public noticing in this and all other chapters please be changed to public notification?	County of San Luis Obispo GSA	pasogcp.com	9/29/2019 2:55:00 PM	

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Robin Chapman (continued)	Additional Comments	Section 9.3.4 Voluntary fallowing I strongly support the creation of a Place Holder category for growers whom have had a hiatus in irrigation. It should be taken into account that the entire time such growers have suspended or reduced irrigation, they have been conserving groundwater. They should be rewarded, not punished. Historic land use and water rights should be duly considered. Section 9.4.1 Mandatory pumping limitations Rather than an across-the-board pumping reduction of 18%, I adamantly feel that groundwater extractors that planted thousands of acres of land that were previously never irrigated have exacerbated the groundwater situation and therefore should bear the brunt of any extraction decrease. It simply is not fair or right to strip growers with long-established irrigation rights of their means of livelihood. Therefore, perhaps a 20% decrease should be mandated for said properties, with re-evalution in two years. Section 9.5 Projects 1)Household and industrial waste dumps pollutants in the city waste water system that may make use of recycled water undesirable. 2)State water is completely allocated 3)Nacimiento water is completely allocated 4)The city of San Luis Obispo has the rights to more water than the dam currently holds. The city has already stated that it will not give up any of its current capacity to any other entity. The possibility of raising the level of the dam is, at best, remote. 5)Again, the pollutant issue 6)Diversions from any river, creek, stream, etc., requires DWR and CEQA approval Section 9.5.2.2 Pollutants, including salts and heavy metals, and their effects on targeted properties,must be assessed. How do landowners along Huer Huero Creek feel about this proposed discharge? Figure 9-2 Who owns the properties on which the proposed pipeline would pass? Are these owners compliant with this proposal?	County of San Luis Obispo GSA	pasogcp.com	9/29/2019 2:55:00 PM	
Robin Chapman (continued)	Additional Comments	How many growers would stand to benefit from this project? Who are they? Who would be required to pay for this pipeline and delivery system? Section 9.5.2.3 See comments under 9.5.2.2 Section 9.5.2.3.3 The information provided by only one monitoring well is entirely insufficient to base any action or project on. In particular, continued unsustainable groundwater level declines in monitoring well 25S/12E-16K05 will trigger implementation of this project. If it is known that a specific well is already pumping at an unsustainable rate, shut that well down. Dont put the onus on landowners and wells that have not demonstrated decline. It is completely unfair, unwarranted, and unprofessional to weight one location with ultimate decision-making status while all other data. If a data gap exists at such a location, then responsibility and diligence dictate that gaps be filled and analyzed before any action or project is considered. Funding for projects If pumping reductions are inadequate for achieving sustainability, funds raised by a water charge framework will be used to initiate projects throughout the Subbasin. Why should everyone have to pay into a fund that benefits only a few growers who most likely are the very extractors who hastened the current groundwater situation? This is welfare for the rich. Section 9.5.2.3.5 Costs can be covered by the bonding capacity¦ assumes that a public entity is willing to take on debt, and that voters are willing to approve that debt for the benefit of two or three water extractors. This is not holding unsustainable extractors accountable and is fobbing off their egregious water use on the community at large. Again, welfare for the rich at the expense of the entire populace.	County of San Luis Obispo GSA	pasogcp.com	9/29/2019 2:55:00 PM	

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Robin Chapman (continued)	Additional Comments	Section 9.5.2.4 Project 3 This project has not been discussed or approved by the landowner, and benefits only one grower. I reiterate: NWP water is completely allotted There are too few monitoring wells to initiate action or projects The burden of finance should be distributed among only the beneficiaries of any such action or project Section 9.5.2.4.3 There are only three (3) monitoring wells that would trigger an expensive project that would benefit only a few individuals. Who owns wells 25S/12E-16K05, 25S/12E-26L01, and 25S/13E-08L02? Why should they be important enough to trigger a publicly funded project? Again, there is no unallocated NWP water. Sections 9.5.2.5; 9.5.2.6.3; 9.5.2.7; 9.5.2.7.3 Refer to previous comments beginning with Section 9.1 Section 9.6.2 improving should be changed to improve. Section 9.6.3 Export of water or water credits should be allowed only to contiguous or near-contiguous sites. Figure 10-1 What is JPA? Section 10.2 In paragraph 2, ¦. implementation ¦ between the four ¦ should read among the four.	County of San Luis Obispo GSA	pasogcp.com	9/29/2019 2:55:00 PM	
Robin Chapman (continued)	Additional Comments	Summation 1) Initial groundwater pumping limitations should fall on properties on which the irrigated crops were planted on previously non-irrigated land. 2) There are too few monitoring wells throughout the Subbasin to be representative of groundwater levels in any given area. 3) De minimus wells that are negatively affected by nearby extraction for the purpose of irrigating previously dry-farmed or never farmed land should have those negative effects mitigated by the causative extractors. 4) There needs to be a minimum of ten wells per area for the purposes of monitoring groundwater levels, extraction limits, and the initiation of projects. If necessary, change the criteria for inclusion in the monitoring program. Projects that benefit only a few growers should not be at the expense of the entire Subbasin	County of San Luis Obispo GSA	pasogcp.com	9/29/2019 2:55:00 PM	
Randy Record	Additional Comments	Good morning, My family and I have owned a wine grape vineyard in San Miguel since 2007. I have been actively involved in attempting to address the groundwater overdraft in the region. I am very concerned with the proposed Groundwater Sustainability Plan (GSP), particularly with the exclusion of irrigated agriculture. It is imperative that the Estrella-El Pomar-Creston Water District (EPA WD) be allowed to provide meaningful input and a voting position within the GSP. It is inconceivable that irrigated ag will be required to curtail groundwater pumping without the opportunity to provide input in the process and decision making. Thank you for your consideration and action.	County of San Luis Obispo GSA	pasogcp.com	9/28/2019 11:07:00 AM	
Patricia Wilmore	Additional Comments	The comments below are submitted on behalf of the Paso Robles Wine Country Alliance (PRWCA). *Please note: Although our offices are in the City of Paso Robles, our comments are made primarily on behalf of our members in the County of San Luis Obispo's Groundwater Sustainability Agency (GSA). Our organization is a 501 c 6 non-profit trade association of some 500 members representing winery, grower, hospitality and related businesses in Paso Robles Wine Country. Many of these members conduct business, growing grapes, making wine and/or providing hospitality, over the Paso Robles Groundwater Basin. While we have provided comments along the way as the draft chapters have been made available, we would like now to provide general comments about the process and its outcome. These comments include some concerns that we hope will be addressed as soon as possible within the first five year implementation period. Looking Back: 1. The irrigated agricultural community, most of whom are our members and who are the largest users over the basin, were not given an opportunity for focused stakeholder input. At the initial Information Meeting, 4/23/18, our Government Affairs Coordinator, Patricia Wilmore, requested that this be addressed. In a subsequent Cooperative Committee Meeting, 7/25/18, the request was made again. The Chair suggested this should be discussed; however, the County's GSA representative dismissed the idea out of hand. No specific outreach to the Ag community, the primary users, was done thereafter despite requests. 2. The document lacks specifics about how decisions will be made in the future. It's not clear how and when the GSP implementation process will begin and who will run it. It has been suggested that the task will fall to County Public Works staff. Do they have sufficient bandwidth to do so?	County of San Luis Obispo GSA	pasogcp.com	9/28/2019 10:39:00 AM	

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		who will run it. It has been suggested that the task will fall to County Public Works staff. Do they have sufficient bandwidth to do so? 3. This lack of detail results in a high level of uncertainty for business planning purposes for our members and others. 4. Best Management Practices (BMPs) are mentioned with few specifics BMPs can be very effective in reducing groundwater pumping. Our stakeholders were (and are) willing provide details on this but were not consulted. 5. We continue to be concerned about the rewrite of Chapter 9, Projects and Management Actions. This section says little about meaningful projects that could be pursued and does not emphasize project-development work that is already taking place. It does not state how the GSAs will promote viable development projects moving forward. Looking Ahead: 1. Provide for the active involvement of the Agricultural Community in the implementation of the GSP. 2. Explain how the GSAs will pursue the construction of water projects that can generate significant and usable water. 3. Clearly define the process by which groundwater pumping allocations will be determined. In conclusion, we appreciate the work that has gone into the GSP thus far and acknowledge the challenges that lie ahead. Our members are willing to be an active part of this process and hope for meaningful inclusion as we move forward.				
Laurie Gage	Additional Comments	TO: The Paso Basin Cooperative Committee RE: Comments to be considered for the final draft of the PBCC As a landowner in the Paso Robles Groundwater Basin and having been involved with water issues in the Basin since 2013, I have been following the development of the SGMA-directed Groundwater Sustainability Plan with interest and some concerns. My Groundwater Sustainability Agency is the San Luis Obispo County Flood Control District and I have been disappointed by the degree to which my GSA has not developed a serious outreach program to all overliers to engage them in serious conversation about the Plan. Apart from some very sparsely noticed and attended early meetings, there has been no visible effort on the part of the County to let the people they represent in the process know about what is going on. I speak with many people on a daily basis who have NO idea that there is anything happening in the Basin at all, let alone be concerned about and have the opportunity to provide input. The County has put the Paso Basin Cooperative Committee meetings up as the resource for landowners to engage in the process, and that is well and good, as long as a landowner even knows about the Plan and the PBCC to begin with. But due to the lack of outreach by the GSA, many sit in ignorance yet will feel the effects of the Plan for years to come. Additionally, the Plan to date is fairly vague not in the concepts of sustainability, but in the details on how achieving sustainability will take place. The implementation of the Plan is the proverbial can getting kicked down the road, and the responsibility will fall to a consortium of the GSAs. If my GSAs actions, or lack thereof, to date are any example, then I fear that there will be more can kicking with no effort to obtain supplemental water through recycled and Nacimiento water, aquifer recharge or other projects. The only solution then that I expect to be offered by my GSA is that of cutbacks across the board and while I am not an irrigator, I fear what impacts across-the-board cutbacks may have on not just the agricultural irrigators, but all the collateral industries and services that intertwine with the agricultural industry: fuel providers, equipment operators, ag employment services, mechanics and so on, filtering on down to the impacts on the businesses and services that support those impacted in the first tier. Currently, the only GSA with an agricultural voice represents only a portion of the agricultural use in the Basin, yet irrigated agriculture accounts for something close to 90% of the pumping in the Basin. I would like to see a voice for irrigated agriculture included in the implementation group as an equal participant with the existing four GSA members. Without that input, irrigated agriculture may not have the opportunity to help formulate consistent policies and approaches to reaching sustainability that allow for reasonable constraints which then allow for business planning and protect the complex economic structure that currently benefits all in the Basin, while working towards the protection sustainability offers us all. I feel that my GSA has not fully represented my interests in developing the current Plan due to their lack of serious intent to reach ALL the landowners they represent and gather them in for their input. Our Basin is a complex combination of irrigated agriculture, dryland farming, ranching, and residential interests, and a few active and loud voices have steered our GSAs approach to the Plan and have had no compensating voice of the rest of the people in our GSAs area because our GSA has made a very scanty effort to include us all. Thank you. Laurie Gage	County of San Luis Obispo GSA	pasogcp.com	9/27/2019 3:30:00 PM	

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to be considered while compiling the Draft GSP for the Paso Basin

Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
Debra Dommen	Additional Comments	First, Id like to thank the San Luis Obispo Board of Supervisors for their efforts in drafting the Groundwater Sustainability Plan (GSP). We farm over 1,000 acres of vineyard in San Luis Obispo County and take our responsibility for water conservation seriously. Over the past year we have tracked a 15.8% improvement in water efficiency, and this is just one year. We acknowledge and support that it is the responsibility of all groundwater users in the basin to work together to eliminate the overdraft of water and establish long term sustainability. To that end, the GSP absolutely must involve the agricultural community in the implementation of the plan. This has not been accomplished to date. We recognize that groundwater pumping allocations will come, however it is imperative that the process by which these allocations are determined be clearly outlined in the GSP. As above, it is important that there be a meaningful dialog with the agricultural community and that we have input into the process of determining those allocations. It is essential that the GSP provide an effective monitoring and enforcement program. The draft GSP states that non-dinimis must use a water measuring method satisfactory to the GSAs but does not comment on enforcement. Metering need to be required to ensure accurate monitoring and violations must be enforced. Thank you for taking our comments into consideration and we look forward to being part of the dialog.	County of San Luis Obispo GSA	pasogcp.com	9/27/2019 15:30	
Joe Plummer	Additional Comments	I am concerned that the aquifer, itself, may be mis-represented by the well data and aquifer levels developed from same. For a number of years, I have asked that my irrigation well data from my well (drilled in 2006) be included in the model. County have regularly measured water levels since 2012 have seen very little decline in water table, even though this well sets in the area shown by model in the "-40 to -60 ft decline" zone.	County of San Luis Obispo GSA	pasogcp.com	9/25/2019 2:10:00 PM	

Appendix N

Public Comments
Attachments

All comments received through the PasoGCP.com site were automatically recorded with the time and date of the comment as well as the name of the commenter and, if applicable based on the physical address provided, their GSA. The comments were forwarded to the GSAs and the commenter was notified that their comment had been received. The GSAs reviewed each comment received and incorporated the comment into the text as the GSA felt appropriate. Comments received by mail or other means were considered and incorporated in the same manner. The final GSP reflects the responses to comments incorporated by all four GSAs.

Gregory T. Grewal
[redacted]

[redacted] Residence
Cellular

HAND DELIVERED

May 14, 2018

Mr. John Hamon, Chairperson, Paso Basin Cooperative Committee

Mr. Derek Williams, President, Hydro Metrics

Gentlemen:

I have found the last few meetings of the Paso Basin Cooperative Committee interesting and informative. Likewise the two public workshops have been informative. However, a common occurrence at all meetings has been that very few of the important questions or issues brought forward during public comment are answered or actually addressed by staff or consultants. I believe the lack of thoughtful responses undermines the trustworthiness of the process.

I am also of the opinion that the credibility of the GSP development process would be strengthened if Hydro Metrics staff would quickly endeavor to obtain copies of all of the studies and reports relating to the Paso Robles Groundwater basin completed or sanctioned by the County of San Luis Obispo or the City of Paso Robles since January 2000. Part of this document accumulation should include the Paso Robles Groundwater Basin Agreement of November 8, 2005, commonly known as the PRIOR Agreement.

Since 2013 I have been a member of the Paso Basin Committee and more recently of the Water Resources Advisory Committee (WRAC) representing rural residents. I have also attended many meetings or programs sponsored by the DWR. Accordingly, I am familiar with most of the documents I am encouraging you to compile. A review of these documents will shine light on the history of Paso Basin inter-agency water politics, which produced both successes and failures over the last many years.

Sincerely,

To: Donald Morris; [redacted]
Subject: RE: Comments for the Groundwater Basin Workshop

From: Donald Morris [redacted]
Sent: Monday, May 21, 2018 10:14 AM
To: [redacted]
Subject: Comments for the Groundwater Basin Workshop

Fellow owners in the Basin.

I'm disappointed that I haven't been able to attend the workshops and am not up on what has been decided/discussed. I would like to give an input on my experience and perceptions.
My well water table cycled nearly 20 feet every year but returned until the late 90's when it started progressively getting deeper, in concert with the large plantings of grapes. My Well was drilled in the late 40's and irrigated about 40 acres of alfalfa, but that was a hobby, not a business and was discontinued.
When we joined to form a water district, I was disappointed as to the approach for water usage, which appeared to me to be that the current large users would get a reduced portion and low level users would be forever locked out. Obviously, the investment in the property deserves consideration, but all our deeds have the same rights and I believe, after a transition, that all should be left on some semblance of the same rights, not a pure confiscation of deed rights. My general outline of a "fair and legal" process would be.

1: Determine the long term acceptable draw on the aquifer(I suspect that it is 1/2 or less of current usage)
2: Set a transition period to reduce the usage to #1 draws based on total acreage owned (5 years?)
3: Concurrent with #2 and possibly extending beyond #2 time period, transition from current users having full access to the decreasing draw to a system where each owner has acreage access to their portion and may use, save, or sell/lease their allotment to a pool of users or individually to a user.

This would acknowledge the different levels of investments, but transition to a system that leaves each deeded owner of water rights equal standing based on acreage. Those that choose to not irrigate, could still have land value by leasing their rights to users and the users could maintain some fraction of their plantings. The district should also be inventive to secure/create additional capture and creation of additional sources and sell based on cost. Without #3, the process is a pure confiscation of property rights by a quasi-government agency to the benefit of others without compensation and is a selective destruction of property values. Fairness requires a transition and equal rights at the end.

Donald H Morris

Creston Advisory Body

Chairperson: Sheila Lyons [redacted]

July 18, 2018

San Luis Obispo County Supervisor John Peschong jpeschong@co.slo.ca.us
San Luis Obispo County Supervisor Debbie Arnold darnold@co.slo.ca.us
Chairperson the Paso Basin Cooperative Committee, John Hamon JHamon@prcity.com

Dear Distinquished Representatives,

The Creston Advisory Body (CAB) represents the landowners of approximately 40,000 acres in District #5, the majority of which live over the Paso Robles Groundwater Basin (Basin), including many who chose not to join the Estrella/El Pomar/Creston Water District but fall well within the general land area that this district overlays. Consequently the management of the Basin is of great concern to those who live here and invariably we discuss “the water situation” at the majority of our monthly meetings. It is our understanding that the County serves as the GSA which represents us as Rural Residents as part of the Memorandum of Agreement (MOA) established to create a Groundwater Sustainability Plan (GSP) for the Basin. The County also represents thousands of other Rural Residents that do not live within the CAB Boundaries and do not have Community Advisory Councils who can take a stand and represent them in these matters. With these facts in evidence we wish to weigh in and express our views on how we believe the Basin should be managed to the benefit of all who live here. First and foremost, we believe that water is a “common resource” and this principle should be accepted as an undisputed fact.

We have summarized below the three top goals that have consistently been expressed during our meetings. We have also assembled the details behind each of these goals, along with additional concerns, in the attached document in order to communicate to you directly our rationale behind the goals recommended. Is is our hope that you will use these goals, along with our concerns and recommendations, as an important resource as you move forward making the momentous water management decisions that will impact our communities at large.

The three top goals for Basin management as recommended by CAB:

1. Declare the non-commercial Rural Residents over the Basin di minimis users exempting them from monitoring and fees for water management and future supplemental projects.
2. Insist upon aggressive conservation efforts by the majority of the Basin’s largest pumpers, including irrigated agriculture (Ag) and the City of Paso Robles, thereby minimizing the overall number of shallower well failures across the Basin. Those that can have the greatest impact need to be particularly conscientious and step up to make the most difference.
3. Use County authority to re-examine existing ordinances and policies as a mechanism for developing regulations that equitably apply to ALL residents and businesses over the Basin and work towards achieving Basin sustainability.

Clearly, any fair and sustainable water management program cannot be accomplished in the absence of thorough and thoughtful consideration, and fair resolution, of citizen’s concerns. We believe that our claim to the use of Basin water for domestic purposes is codified in Water Code Section 106 which provides as follows: “It is hereby declared to be the established policy of this State that the use of water for domestic purposes is the highest use of water and that the next highest use of water is for irrigation.” It is of utmost importance to the Rural Residents of our community that the final management solutions decided upon by your committee take into account the impact they will have on the quality of our lives, in some cases, our very existence.

Thank you for your attention to our concerns.

Sincerely,

Sheila Lyons, CAB Chairperson

CC: Derrik Williams, President HyroMetrics Water Resources, Inc. derrik@hydrometricswri.com

Summary of Concerns and Recommendations

by Rural Residents-at-large over the PR Basin

July 2018

Three Top Goals:

1. Declare the non-commercial Rural Residents over the Basin de minimis users exempting them from monitoring and fees for water management and future supplemental projects.
2. Insist upon aggressive conservation efforts by the majority of the Basin's largest pumpers, including irrigated agriculture (Ag) and the City of Paso Robles, thereby minimizing the overall number of shallower well failures across the Basin. Those that can have the greatest impact need to be particularly conscientious and step up to the make the most difference.
3. Use County authority to re-examine existing ordinances and policies as a mechanism for developing regulations that equitably apply to ALL residents and businesses over the Basin and work towards achieving Basin sustainability.

Goal #1: Declare the non-commercial Rural Residents over the Basin de minimis users exempting them from monitoring and fees for water management and future supplemental projects.

- Rural Residential users should be entitled to at least a de minimis per residence allowance for water usage. They already pay property taxes for management by Flood Control and Water Conservation District The State defines a de minimis allowance below which the user should not be burdened with additional interference of their water usage.
- It should be noted that the average Rural Residential parcel has animals, vegetable gardens, fruit trees and landscaping in addition to the residence itself. Many residents rely upon their small plots as subsistence for their families. Rural Residents have been estimated in County commissioned studies to use between 0.5 and 3.0 AF/year [1], [2] depending on parcel size and the number of residences on the parcel. Whereas, irrigated Ag parcels, such as those with vineyards, typically use 1.0 AF/acre/yr, or more in many cases. County commissioned studies show that Rural Residential has been estimated to only use somewhere in the neighborhood of 13% of the perennial yield, a level that has held consistent over time. This clearly demonstrates that Rural Residential uses have not pushed us into the current water crisis.
- Charges for additional AF over and above de minimis allowances should be on a graduated scale with less unit price for the first AF over the allowance and increased costs as consumption increases. This would encourage conservation efforts by all.
- Non-commercial Rural Residents are the most vulnerable of all entities over the Basin. Historically Rural Residential wells have been much shallower and smaller bores (~100- 400 ft deep, bores of typically 5-6 inches) than Ag wells (several hundred to > 1000 ft deep, bores of a minimum 8 inches).

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[1] Fugro West and Cleath and Associates. August 2002. Paso Robles Groundwater Basin Study (Phase I). Prepared for County of San Luis Obispo County Public Works Department.

[2] Fugro West, ETIC Engineers, and Cleath and Associates. February 2005. Paso Robles Groundwater Basin Study, Phase II, Numeri cal Model Development, Calibration, and Application. Prepared for County of San Luis Obispo County Public Works Department.

Many residential wells in Creston are as shallow as 100-200ft (reports from local residents). Some wells have already gone dry. There are several thousand Rural Residential wells over the Basin.

- We believe that our claim to the use of Basin water for domestic purposes is codified in California Water Code Section 106 which provides as follows: "It is hereby declared to be the established policy of this State that the use of water for domestic purposes is the highest use of water and that the next highest use of water is for irrigation." This principle has been upheld in the courts consistently. A local organization, North County Watch, brought this to the attention of The PR Groundwater Basin Blue Ribbon Committee back in 2013 (see the following attached letter).
- Rural Residents are all on septic systems and some 90% of the water they pump from the Basin goes right back into the Basin.
- The monitoring de minimis users would incur an excessive cost to the overall management program for the several thousand residential parcels whose uses are far smaller than irrigated Ag. Large water users should be the first to be monitored and charged for their usage.
- Rural Residents lack the significant financial resources in general (shallow pockets) to deal with the issue (no lobbyists, no public relations people, no board of director members who can attend endless meetings) versus the large Agri-businesses (deep pockets) with the incentive to pass costs on to other entities in order to increase their profits. Additional costs passed on to Rural Residents to solve a problem that irrigated agriculture has created would be an undue burden.
- The owners of vacant parcels should have the right to reasonable & beneficial use of their property, to build a residence if they so desire, even though they have no history of "prior use" water.
- An important consideration is the protection of property values of ALL residents who live over the Basin. In an effort to protect Rural Residential families' health and welfare, as well as property values, the definition of sustainability for Rural Residents must be to minimize the number of overall wells that will fail due to over-drafting and the consequent drop in the water table. Protection of the rights of Rural Residents to "reasonable and beneficial use" of water must be set as a priority equal to, or greater than, the priority set for protecting Agriculture.

Goal #2: Insist upon aggressive conservation efforts by the majority of the Basin's largest pumpers, including irrigated agriculture (Ag) and the City of Paso Robles, thereby minimizing the overall number of shallower well failures across the Basin. Those that can have the greatest impact need to be particularly conscientious and step up to the make the most difference.

- Irrigated agriculture has consistently and significantly increased in acreage over the Basin in the last 20 years. According to the Agricultural Commissioner's Crop Reports, the acreage in vineyards in the County, of which the majority is in the North County, has increased from around 5000 acres in 1999 to nearly 50,000 acres today.
- Irrigation water does not contribute significantly to the recharge of the Basin. It only accounts for 2% of the total recharge[3].
- The outdated concept of "prior use" as establishing, or justifying, a new future use must be reconsidered. Many agriculturalists have intentionally over irrigated in order to establish favorable usage numbers. Additionally, some have planted elaborate landscaping to enhance their properties. Prior usage numbers may have been inflated due to over irrigation in anticipation of future restrictions. Irrigated Ag pumps well over 80% of the perennial yield from the Basin annually,

[3] Hydrologic Budget Summary of the PR Groundwater Basin from Phase I Report Fugro and Cleath 2002.

as estimated in 2005[4], and planting has continued since then. In contrast, many rural residents, who have pumped much less water, but fearing that their wells would go dry, have implemented unilateral cut backs in their water usage, and in many cases let their landscaping die.

- Reasonable and fair controls and limits must be instituted on new permits for large commercial and agricultural developments. There is no reason why so many such projects (new wineries and other commercial developments, etc.), many with extensive landscaping plans, are allowed to proceed, when they are so openly damaging to the welfare and interests of other non-commercial landowners whose numbers so clearly are the majority. Additionally, this type of growth is contradictory to the goal of achieving Basin sustainability.
- A high percentage of the new irrigated acreage within the Basin **is** owned by corporations whose investors do not live here, and who are looking at short-term bottom line profits rather than long-term Basin sustainability. Up until recently some of these corporations have touted their water resources as marketable assets on their websites.
- Water "off sets" should be retired completely, given that the overall goals are Basin sustainability and future growth. Most certainly, offsets from water rich areas of the Basin should not be used over other parts of the Basin, particularly in areas with more severe issues.
- If crop duty factors are used for setting allowance (these would be preferential to prior usage) then the crop factors used need to be realistic, not the inflated values used to set up the Shandon San Juan Water District.
- There should be no "vested rights," beyond a fixed de minimis value, based on prior water usage. There should be no selling of "excess water" when conservation measures are implemented. There is no "excess water." Water is a "common interest" resource and the "excess" should remain in the Basin to prevent further well failures. Fox Canyon Groundwater Management Agency is a well-known example where farmers were allowed to sell off "excess water" much to the detriment of improving water resources for the district's customers.
- Restriction on using overhead sprinklers should be considered. For example: No watering mid-day (between noon and 6 pm) or when it is raining.
- Management of the Basin's groundwater should be paid for pro rata based on usage by the large water users. It was suggested that there should be a County ordinance calling for a proportional fee structure based on specific measurable factors, such as the size of the pump, the number of irrigated acres, and the number of Acre Feet of water pumped.
- The issue of why Paso Robles continues to pump so much groundwater contributing to the problem in Estrella needs to be addressed. Why is additional development getting approved prior to the completion of purification plants that would provide new water supplies? The City of Paso Robles has been behind the curve in constructing water treatment facilities to accommodate their full contractual rights to Lake Nacimiento water causing excessive dependence on groundwater.
- As stated in the PR Groundwater Basin Study, Phase II in 2005, "Because future agricultural trends are so problematic to forecast, slight mis-forecasts in agricultural demand predictions could have large implications relative to changes in groundwater storage and water levels. It is clear a relatively slight adjustment in "build-out" agricultural pumping could make the difference between potential basin overdraft or non-overdraft conditions.[5]"

[4] PR Groundwater Basin Study, Phase II, Fugro, Etic Engineering, and Cleath, 2005
[5] PR Groundwater Basin Study, Phase II, Fugro, Etic Engineering and Cleath, 2005

- "Current (2006) agricultural and commercial pumping have reached or exceeded the amounts estimated as build-out in the Phase II Report Model Scenario 2 while municipal and rural pumping are well below the build-out predictions. " "Given that agriculture accounts for two-thirds of pumping, regular updating of agricultural pumping (land use, cropping, and irrigation rate data) is essential to management of groundwater resources for long-term sustainability[6]."
- It is clear now, in 2018, that the attempt in 2011 to draft and follow voluntary BMO's (Basin Management Objectives) was unsuccessful in stopping the downward trend in water levels in the Basin. Although Rural Residents unilaterally adopted conservation measures in hopes of staving off the continuation of residential well failures, irrigated Ag acreage continued to grow and consume water from the Basin at accelerated rates. As a result, Rural Residential wells have continued to fail.
- Trying to calculate the number of years that we can continue the growth of irrigated Ag, with annual overdrafts, and still not pump the Basin dry is foolhardy. The consequential impact to the longevity of the Basin is unpredictable at best and unreasonable at the very least.

Goal #3: **Use County authority to re-examine existing ordinances and policies as a mechanism for developing regulations that equitably apply to ALL residents and businesses over the Basin and work towards achieving Basin sustainability.**

- Land use zoning needs to be reviewed and potentially revised to assist with water management.
- Why does the County continue to allow planting of more vineyards? Why are Ag ponds allowed at all? Wind machines are more effective and should be used for frost protection, not water. Should we allow ponds to be filled with groundwater? Restrictions on planting must be implemented. Drought tolerant rootstocks and improved irrigation practices need to be conditions required for any future vineyard planting, or replanting, to occur. The County should implement an allocation program, similar to the one that exists for allowing the construction of new residences, that limits the number of acres of irrigated crops that can be planted each year. Establish a fixed number of acres for irrigated crops, that can be planted, or a fixed number of AF that can be pumped, over the Basin, a number that would ensure Basin sustainability. Hold fast to that limit unless significant recharge of the Basin has occurred.
- A review of the County's Agricultural Element, and the provisions in Right to Farm Ordinance (Title 5, Chapter 5.16) of 2002, and how they are contradictory to the mandate by the State to establish Basin sustainability needs to occur. Agriculture is of great importance to San Luis Obispo County but the degree of deferential treatment should be commensurate and complementary to other equally important goals and mandates that the County is committed to achieving. Once again, the rights of Rural Residents to reasonable and beneficial use of water must be given equal priority.
- Permit applications for the drilling of new wells need to be scrutinized thoroughly before issuance, including an evaluation of the harm that could be done to neighboring properties. Deep wells in particular need to be assessed before permits are granted to avoid a future harmful event such as the Cotta well incident that recently occurred in Creston which cross-contaminated water strata. Deeply drilled wells risk cross contamination of multiple strata of our aquifer(s), can't be replenished in a timely manner and can therefore cause permanent damage.

Additional Comments and Recommendations that do not immediately fall within the above three goals, but would assist in achieving these goals:

[6] Evaluation of Paso Robles Groundwater Basin Pumping, Water Year 2006; Todd Engineering, May 2009

- There should be no exporting of water from the Basin.
- The Creston area is located in the southern most portion of the Paso Robles Groundwater Basin. The Paso basin groundwater aquifers generally run north from Creston[7]. The significant pumping by the City of Paso Robles downstream from Creston, has accelerated aquifer flows out of Creston and is also a contributing factor in the decline of Creston groundwater levels. Creston is the "fountainhead" of a significant portion of the groundwater ultimately contained within the Paso basin. Therefore, pragmatically Creston groundwater deserves to receive specific safeguarding, the benefits of which would accrue ultimately to the entire basin.
- There should be no water banking projects considered. In 2008 a SLO County groundwater study identified the greater Shandon area as having the ideal characteristics for water banking activities.[8] In water banking not all acquisitions of water involve the receipt of wet water. The receipt of "paper water," which is an IOU for water delivery in the future, involves a risk that the water delivery may not be made when the water is needed. Water banking can also involve the transfer of water between water districts for delivery to a third party. A benefit to a water district holding water IOUs can be the manipulation of data on the actual water under their control thereby allowing greater water usage. Big money interests want to control water banking activities within the Paso basin, not unlike the Kern Water Bank. The coastal branch pipeline of the State Water Project traverses Shandon on its way south through SLO County and recently, a "Turnout Valve" was installed on that pipeline in Shandon. With only modest modification this valve could be used as part of a water banking operation. Recognize that water banking is not an acceptable activity to alleviate Paso basin issues. Rather it is a scheme for exceedingly large money interests to control and profit from water.
- Recharge efforts are acceptable but only if the water is left in the Basin for normal usage. It should not be withdrawn for other purposes.
- No transferring water from areas with minimal issues to problem areas (e.g. Creston to Estrella) should be allowed.
- Recognize that the state water project is over committed (by seven fold according to some news reports) and has under delivered by less than, or equal to, half of contracted water during the last few years. The state water project water is not a reliable or satisfactory approach to augmenting Paso basin water. It is unlikely that a new contract for state water project water can be negotiated currently.
- To ensure of full compliance to any regulation set forth, inspections need to be conducted on all monitored landowners to determine their degree of compliance. Where violations are found, serious consequences should be instituted and enforced. Large water users need to pay the majority of the enforcement costs, in particular when violations occur and follow-up is required to ensure compliance.
- When Rural Residential properties lose value due to water issues costing thousands to remedy how will those owners be compensated for the loss of value? Will the property taxes be lowered? Ag gets breaks that Rural Residents do not and current practices are clearly discriminatory. Ag gets

[7] Paso Robles Groundwater Sub-basin Water Banking Feasibility Study, 2002.

[8] Paso Robles Groundwater Sub-basin Water Banking Feasibility Study, 2002. Water banking is: any transaction involving water, wet water movement, water contracts, paper water, and the storage of actual water.

crop insurance for failed crops due to drought. Ag gets property tax breaks through the Williamson Act. Ag gets low interest loans for new wells and other infrastructure projects. Also, tax write-offs for losses and depreciation costs of equipment& fences. Rural residents get no such benefits. Some Rural Residents whose wells failed, and who could not afford to drill a new well ($20,000-$30,000), have had to purchase additional storage tanks and resort to water deliveries…all expenses they could ill afford. Programs to assist Rural Residents need to be implemented to offset the burden some are sure to bear when their wells go dry, especially if the final basin management plan exacerbates the problem and wells continue to fail (e.g. Low interest loans, compensation for losses, no permit fees to drill new wells, reduced property taxes (maybe reduce overall property value, or improvements being taxed, by the cost of the new well), loans (like those for special districts) paid back over time). Ideally fines to violators who over pump could also be used to compensate those whose wells have gone dry, for the cost of drilling a new well. Once again, Rural residents did not cause the problem and should not bear the burden of fixing it.

- It should be noted that there is a reason that the majority (some 78% of the voters overall on AB2453) rejected the idea that we should have a water district managed by a few wealthy landowners as board members. No one believed that these members would have the Rural Residents best interests at heart.
- Finally, and one of the most frequently expressed concerns, is that the final basin management solutions will be driven by big money interests at the expense of the majority of the landowners over the Basin. Rural Resident landowners lack the resources to be represented by lobbyists, or public relations agents, but rather must rely on the efforts of unpaid volunteer community advisory representatives trying to protect their interests.

What will determine success? Has sustainability been achieved?

Successful management of the Basin should have measurable outcomes.

1. Keep the number of Rural Residential wells that have failed due to the drop in the water table to less than 10% of the total.
2. Water tables across the Basin have recovered to their 2014 levels (or previous years) and remained there for 5 years or more.
3. The downward slope of the graph showing overall Basin decline has become measurably more positive. For example, if the current downward slope is 4 ft/yr drop, then a recovery to 2ft/yr or better would be showing a positive improvement.

The majority of landowners on wells within the Basin are in unincorporated areas and most are de minimis water users. The GSP will be developed with the participation of competing interests, some powerful and some with limited influence. Nevertheless, four principles must guide the process, namely; 1) water is a common resource; 2) the quantity of Paso basin water is ultimately finite; 3) damage to the basin has been done and needs to be reversed; 4) the GSP must provide for the equitable use of water by all parties with water rights.

North County Watch
Looking Out Today For Tomorrow

MEMO TO: Paso Robles Groundwater Basin Blue Ribbon Committee

FROM: Susan Harvey, President
North County Watch

DATE: May 17, 2013

RE: Water Code Section 106

North County Watch is a 501 c3 non-profit Public Benefit corporation. We are an all-volunteer organization committed to sustainable development in and around north San Luis Obispo County.

We would like to addresses issues around a discussion at the BRC meeting on May 16th, regarding the accuracy of our *a priori* statement regarding the superior rights of rural residential users. Thank you for raising the issue and this opportunity to elucidate our position.

Water Code Section 106

Water Code Section 106 provides "It is hereby declared to be the established policy of this State that the use of water for domestic purposes is the highest use of water and that the next highest use is for irrigation."

Court Support for Section 106

California courts have consistently supported the policy codified in Section 106. In *City of Beaumont v. Beaumont Irrigation District* (1965)[i], the court held that Section 106 is a policy that governs administrative agencies' water allocation decisions, stating that application of "section 106 of the Water Code...is binding upon every California agency," including irrigation districts which were parties to the case.

Meridian v. San Francisco (1939)[ii] stated "It should be the first concern of the court in any case pending before it and of the department in the exercise of its powers under the act to recognize and protect the interests of those who have prior and paramount right to the use the waters and streams. The highest use in accordance with the law is for domestic purposes, and next highest use is for irrigation."

North County Watch P.O. Box 455 Templeton, CA 93465
501(c)(3) nonprofit corporation (77-0576955)

The California Supreme Court in *National Audubon Society v. Superior Court* (1983)[iii] stated "[a]lthough the primary function of [Water Code Sections 106 and 106.5], particularly section 106, is to establish priorities between competing appropriators, these enactments also declare principles of California water policy applicable to any allocation of water resources."

Central & West Water Basin Replenishment District v. So. California Water Co. (2003)[iv] held that court-supervised mass adjudications of water rights are subject to and governed by Section 106, and it therefore rejected a proposal for water banking by some of the adjudicated parties because the proposal did not comply with the policy in Section 106 of prioritizing domestic use.

<u>California Common Law Supports Section 106</u>

California Common Law codifies the longstanding principle that in allocating California's limited water supplies in time and places of scarcity, water needs for domestic purposes must take priority over water needs for commercial profit, including agriculture.

> *Alta Land & Water Co. v. Hancock* (1890)[v] "the rights…to the use of water for the supply of the natural wants of man and beast" must take precedence over "the rights…to use the water for purposes of irrigation."
>
> *Smith v. Carter* (1897)[vi] "both parties [to the water rights dispute] were entitled to have their natural wants supplied, that is, to use so much of water as was necessary for strictly domestic purposes and to furnish drink for man and beast, before any could be used for irrigation purposes" and that "[a]fter their natural wants were supplied each party was entitled to reasonable use of the remaining water for irrigation".
>
> *Drake v. Tucker* (1919)[vii] the trial court "properly decided that it would be an unreasonable use of the water under all the facts and circumstances for the plaintiff to use it for irrigation before the domestic uses of the defendant had been satisfied."
>
> *Cowell v. Armstrong* (1930)[viii] "Natural uses are those arising out of the necessities of life…such as household use, drinking, [and] watering domestic animals…[and] unquestionably the term 'domestic purposes' would extend to culinary purposes and the purposes of cleaning, washing, the feeding and supplying of an ordinary quantity of cattle, and so on."
>
> *Prather v. Hoberg* (1944)[ix] "Without question the authorities approve the use of water for domestic purposes as first entitled to preference. That use includes consumption for the sustenance of human beings, for household conveniences, and for the care for livestock."
>
> *Deetz v. Carter* (1965)[x] "[p]riority conferred on domestic users by Water Code section 106 is a statutory extension of a traditional preference accorded to 'natural' over 'artificial' uses."

North County Watch P.O. Box 455 Templeton, CA 93465
501(c)(3) nonprofit corporation (77-0576955)

Reasonable and Beneficial

In "The Reasonable Use Doctrine and Agricultural Water Use Efficiency: A Report to the State Water Resources Control Board and the Delta Stewardship Council" authored by Delta Watermaster Craig M. Wilson, Mr. Wilson lays the foundation for the "reasonable use" doctrine based on the California Constitution Section Article 10 Sec. 2, California Statutes Water Code §§100, 275, 1059, 1051, 1825, 10608, 10801, 85023, and several court cases.

Mr. Wilson, comments that the Reasonable Use Doctrine has been broadly implemented: "The State Water Board and the courts have used the doctrine to find unreasonable water uses in a variety of settings: ...7) The storage and diversion of water that jeopardize compliance with water quality standards, the public trust, and other in situ beneficial uses; 8) Excessive use of groundwater by overlying landowners in an overdrafted basin."

Rights of the Rural Residential Overliers to the Basin

Our purpose for raising the issue is to inform the committee of the primary right of domestic user and to reinforce the importance of the standing of the rural residential user. The court cases arose out of adjudicative situations and while some members of the committee and others might argue that enforcement of Section 106 is only the purview of the courts, that is, strictly speaking, that all overliers have equal rights, it is in the best interest of the rural residential overliers to make it clear that the courts have repeatedly recognized the superior right of water uses for residential purposes over irrigated agriculture.

The question in point during the meeting and clarified by Chair Werner was "What issues do we want to see addressed in the investigation of basin management districts?" It is our position that the rights of rural residential users must be secured within the structure of any management district before the district is formed. Thus far, we have not seen discussion or attention given to these rights that are codified in Section 106. We have been attending committee meetings for over 6 months, and it is not an exaggeration to say that focus has been primarily the needs of irrigated agriculture.

California Water District Not Equitable to Rural Residential Overliers

We are even more concerned about the rights of the rural residential overlier when there appears to be a well orchestrated push to form a California Water District. Water Code Section 35003[xi] [Water Code§§ 34000-35003 codify a California Water District] states that voting rights are based on one vote for each dollar of assessed valuation. North County Watch continues to raise the issue of the rights of the rural residential user because we have not heard anything that would give comfort to the thousands of rural residential users as to how their rights and concerns might be addressed in a California Water District.

Conclusion

North County Watch appreciates that this discussion of management districts is nascent and we fully support the efforts to establish a management structure. We clearly stated this position in

North County Watch P.O. Box 455 Templeton, CA 93465
501(c)(3) nonprofit corporation (77-0576955)

our letter of March 18, 2013 on the failure of the county to manage the basin. We would be remiss if we waited until a district is formed to see if it protects the rights of rural residential users. We all have the goal of avoiding adjudication. Thus, the time to remind the committee and others of the priority rights of the rural residential user, per Section 106, is now, so that we get some acknowledgement and protection of those rights. Furthermore, North County Watch believes that domestic use includes a level of reasonable use commensurate with social and cultural norms of our community.

CC: Mr. Paavo Ogren, Director of Public Works
Ms. Courtney Howard, P.E.,Water Resources Engineer
SLO County Board of Supervisors

---

[i] *City of Beaumont v. Beaumont Irrigation District* (1965), 63 Cal.2d 291, 381, 46 Cal.Rptr. 465, 469

[ii] *Meridian v. San Francisco* (1939), 13 Cal.2d424, 450, 90 P.2d 537, 550

[iii] *National Audubon Society v. Superior Court* (1983), 33 Cal3d 419, 448, n.30, 189 Cal.Rptr. 346,366 n.30

[iv] *Central & West Water Basin Replenishment District v. So. California Water Co.* (2003), 109 Cal.App.4th 891, 912-13, 135 Cal.Rptr.2d 486

[v] *Alta Land & Water Co. v. Hancock* (1890), 85 Cal.219, 230

[vi] *Smith v. Carter* (1897), 116 Cal. 587, 592

[vii] *Drake v. Tucker* (1919), 43 Cal.App 53, 58

[viii] *Cowell v. Armstrong* (1930), 210 Cal. 218, 225

[ix] *Prather v. Hoberg* (1944), 24 Cal.2d 549, 5562, 150 P.2d 405, 412

[x] *Deetz v. Carter* (1965), 232,Cal.App2d 851, 854-55, 43 Cal.Rptr. 321, 323

[xi] 35003. Each voter shall have one vote for each dollar's worth of land to which he or she holds title. The last equalized assessment book of the district is conclusive evidence of ownership and of the value of the land so owned except that in the event that an assessment for a district shall not have been made and levied for the year in which the election is held, the last assessment roll of each affected county shall be used in lieu of the assessment book of the district as evidence of ownership. However, the board may determine by resolution that the assessment book or assessment roll of each affected county shall be corrected to reflect, in the case of transfers of land, those persons who as of the 45th day prior to the election appear as owners on the records of the county. If an equalized assessment book of the district does not exist, then each voter shall be entitled to cast one vote for each acre owned by the voter within the district, provided that if the voter owns less than one acre then the voter shall be entitled to one vote and any fraction shall be rounded to the nearest full acre.

North County Watch P.O. Box 455 Templeton, CA 93465
501(c)(3) nonprofit corporation (77-0576955)

From: William Enholm
Sent: Wednesday, July 25, 2018 12:17 PM
To: John Peschong <jpeschong@co.slo.ca.us>; Debbie Arnold <darnold@co.slo.ca.us>; JHamon_prcity.com <JHamon@prcity.com>
Cc:
Subject: Re: CAB letter and attachment to Paso Basin Cooperative Committee

Distinguished Representatives,

I make my living financing vineyards and wineries. I love to see Paso regaining its “mojo” and growing. I also live in rural Creston and share the concerns so eloquently expressed in the CAB letter. Please help balance the water concerns of so many. I support the priorities as expressed by the CAB, in their letter dated 7/18/18.

Sincerely,

Bill Enholm

Sent from my iPhone

On Jul 25, 2018, at 10:32 AM,

Important water info

Begin forwarded message:

From: Sheila Lyons
Date: July 25, 2018 at 9:30:15 AM PDT
Subject: CAB letter and attachment to Paso Basin Cooperative Committee

Please find attached the letter from CAB to the Paso Basin Cooperative Committee and the attachment with the supporting information collected from the public and CAB members at meetings over the years.

The Paso Basin Cooperative Committee is responsible for generating the Groundwater Sustainability Plan (GSP) for the management of the Paso Groundwater Basin. This GSP is required by the State of CA to address the Paso Basin's decline. This committee is made up of five entities whose votes on the committee are weighted. As rural residents over the Paso Basin we are represented by the County through Supervisor John Peschong on this committee, with Supervisor Debbie Arnold as his alternate.

Paso Basin Cooperative Committee: 61% San Luis Obispo County, 15% City of Paso Robles, 20% Shandon/San Juan Water District, 3% San Miguel, 1% Heritage Ranch.

Sheila Lyons
CAB Chairperson

<CAB Cover Letter to Paso Basin CC.pdf>

<CAB Summary Goals July 2018 Paso Basin CC.pdf>

In review of the draft, sustainability plan one aspect of the plan that I found of interest was Chapter 3.4 Land Use.

Table 3-1 listed the land use categories, 10 in total, ranging from Citrus, deciduous fruits and nuts, Vineyard, Urban, Grain, Pasture etc.

The table listed the number of acres as of 2014 that were planted in the Paso Robles Basin. What was missing was the amount of water typically applied to these categories on a yearly basis.

In order to be able to manage water usage, a reliable means of determining how much water the basin is using needs to be determined. Since the draft did not include this data, I utilized the average acre-feet per year from Table 9 that was published in the Agricultural Water Offset Program of 2014.

Based on Table 3-1 in the Draft and Table 9, the total that I was able to estimate was just under 100,000 acre feet per year for the basin. No water allowance was given for idle or native vegetation. My urban estimate methodology is flawed in that it is based in acres and not residential units. Having said that, at .75 per acre the urban allowance was 16,649ac ft., so hopefully it is in the ballpark.

My estimate is that the 438,000 acres in the basin utilizes approx. 100,000 acre-feet per year.

It is vitally important that the methodology in estimating water use totals be well scrutinized. A case in point is when you examine the Engineer's report for the EPC Water District (2016), their methodology estimated that their water use for 41,000 acres would be 59,000 acre feet per year. Their estimates did not breakout the various land use categories as listed in Table 3-1, they just averaged all water use factors for seven Ag uses and came up with 3.5 acre feet per Irrigated acre in their district. This resulted in a grossly inflated figure.

So, as you can see Methodology is very important, 100,000 acre–feet for 438,000 acres verses 59,000 acre-feet for 41,000 acres.

My suggestion is the following:

1. Compare 2014 Land Use Summary to a current Land Use Summary, acres planted as well as estimated water use.
2. Add Cattle operations to Land Use Summary
3. Urban category needs more itemization; residential, industrial, hotel.

7/25/2018

3.4 LAND USE

Land use planning authority in the Subbasin is the responsibility of the County of San Luis Obispo and the City of Paso Robles. Land use information for the Subbasin was collected Department of Water Resources, the County of San Luis Obispo's Agricultural Commissioner Offices and from other County departments. Current land use in the Subbasin is shown on Figure 3-4 and is summarized by group in Table 3-1. All land use categories except native vegetation listed on Table 3-1 are the land use categories provided by DWR (2014). The balance of the approximately 438,000 acres in the GSP Plan Area is largely native vegetation and could include dry farmed land.

Table 3-1: Land Use Summary

Land Use Category	Acres		
Citrus and subtropical	304	2.3	699.–
Deciduous fruits and nuts	2,339	3.5	8,186 –
Grain and hay crops	266	4.5	1,197
Idle	10,096	Ø	
Pasture	3,254	4.8	15,619
Truck nursery and berry crops	955	2.5	2,387
Urban	22,199	.75	16,649
Vineyard	32,076	1.7	54,529
Young perennial	71	1.9	134
Native vegetation	366,440	Ø	
Total	**438,000**		99,400 ac ft/year total

Source: DWR, 2014

1) ② Land Use – 433,000 / 99,400 acft
what is it now four years later?
2) EPC 41,000 Ac – 59,360 a.c.ft –

3. Possible Sources of Offset Credits

Credits for the Ag Water Offset Program, within the PRGWB, may come from a combination of sources. As technology, information, practices, and irrigation efficiencies evolve and improve, other forms and sources of credits may become available to offset new water use in the PRGWB. Below is a list of potential sources of credits available from current documented practices.

- Fallowing of irrigated land resulting in less pumping;
- Crop conversion(s) to less water intensive crops as designated by the adopted program water use charts (e.g. alfalfa to olives, irrigated pasture to dryland range, water intense deciduous crops to less intensive deciduous, grain or vegetable crops, etc).

3.1 Water available from crop conversion

Calculating the amount of water that is made available by switching from a specific crop to one requiring less water can be done by using the annual crop-specific applied water calculated for each Crop Group within each WPA (SLO 2012). However, as noted above, the methodology used to derive the listed numbers is a standardized accepted approach. This information for the Salinas/Estrella WPA, using the medium value, is shown in Table 9.

Table 9. Existing Crop-Specific Applied Water by Crop Group

Crop Group	Applied Water (AF/Ac/Yr)
Alfalfa	4.5
Citrus	2.3
Deciduous	3.5
Strawberries	2.3[1]
Nursery	2.5
Pasture	4.8
Small Grain	1.2[1]
Vegetables	1.9
Vineyard	1.7

1. Information obtained from Current Cost and Return Studies, UCCE, UC Davis (Small grains 2013 data, Strawberries 2011 data), see section "Strawberries" and "Small Grains" in this report to understand how these crop requirement numbers were derived using the methodology of the Master Water Report

being directly represented in the SGMA process as non-irrigated lands do have overlying groundwater rights and, in the future may rely on groundwater to a greater degree than now. Also as outlined above in addressing the rotation of parcels, or portions of parcels, in and out of irrigation, a database will be maintained to modify assessments accordingly. So even though there may be irrigation facilities (pipes etc.) available to a parcel or portion of the parcel, if no irrigation is applied, then that acreage will be treated as non-irrigated.

Residential

Residential development depends upon a potable, adequate water supply for household needs and therefore will receive an assessment. The PRGWB studies provided research to estimate the average water usage for rural homesteads.[3] However, because the District is focused on the agricultural operations/properties, it is not foreseen that the District will have the capability to serve small lot rural subdivisions

Commercial Operations

Commercial operations depend upon a potable supply for workers and customers alike, similar to residential uses associated with agricultural operations. However, the water usage for these land uses will need to be determined on a case by case basis. For initial funding purposes, commercial uses are proposed to be assessed as if they were a residential use. Wineries?

4.2 Water Use Factors

The following provides a discussion on the water use factors identified for each assessment class.

Irrigated Agriculture

The Estrella, El Pomar, Creston Water District is home to hundreds of acres of farmed land with a variety of crops. The water use for these crops varies and thus an average water use has been determined for Irrigated Agriculture. The water use for the crops that are typically farmed in the District are as follows:

Land Use Category	Ave. Water Use Factor (AF/acre/yr)
Alfalfa	4.8
Citrus	2.3
Deciduous	4.1
Nursery	2.4
Irrigated Pasture	5.0
Vegetables	3.9
Vineyards	1.8
Total	24.3
Average	3.5

*Source: applied water factors, SLO County, Paso Robles Groundwater Basin Model Update, 2014, Table 10[4]

The water usage of 1.0 AFY will be utilized as one benefit unit for the purposes of establishing an assessment spread.

Non-Irrigated Agriculture

[3] Ibid, PRGWB Model Update, December 19, 2014
[4] Ibid, PRGWG Model Update, December 19, 2014, Table 10

Depending on the terrain and carrying capacity of the land, non-irrigated agriculture can be dry farmed for hay, other non-irrigated crops, and for grazing. These uses are minimal and are best evaluated as a cattle grazing operation. These operations typically utilize between 0.03 and 0.003 AFY/ac and therefore are minimal users. However, the project proponents have provided an estimate of local non-irrigated water usage as a percentage of irrigated usage; ie. 1.69% of Irrigated Agriculture Usage. This results in 0.06 AFY/ac (1.69% x 3.5 AFY/ac = 0.06 AFY/ac) for a benefit unit to calculate an assessment to be applied to non-irrigated agriculture.

Residential

Residences nominally use 0.29 AFY indoor and 0.46 AFY outdoor for a total of 0.75 AFY per residence in rural hot areas of the county[5]. Therefore, it is assumed that a rural residence is equivalent to: (0.75 AFY/3.5AFY) or 21.4% of water usage for an acre of irrigated crop.

Commercial Operations

Commercial Operation uses will be evaluated as a resident if a small operation on a small lot. Larger commercial users will need to be evaluated on a case by case basis.

4.3 Voluntary Funding

The District will be formed on a voluntary basis. **All the voluntary members of the District will be asked to agree to a maximum funding assessment not to exceed $35.00/acre for irrigated agriculture. Non-irrigated agriculture parcels will be assessed at 1.69% of irrigated agriculture's cost, or $0.59/acre. Each residence or commercial operation will be assessed at $7.50 (maximum) for each unit (0.75AFY/3.5AFY = 21.4% of an irrigated acre assessment = 21.4% x $35 = $7.50).** However, as a basic minimum cost, **all ownerships,** whether made up of one parcel or many parcels will have a minimum assessment of **up to $50 per ownership,** depending on the overall administrative costs to service the GSA. These rates are within the same order of magnitude of the data developed above and are proportional to the special benefit received by each category of parcel based on water usage per parcel. It is noted that one parcel may be assessed for all three classes.

4.4 Benefit Units

A benefit unit is a method of calculating a property's proportional share of the assessment costs. **One benefit unit (BU) is equivalent to the use of 1.0 Acre-foot of water/year.** Table 2 identifies the total number of benefit units assigned to each Assessment Class utilizing the target acreages in each category petitioning at this time. These acreages will vary until District formation is approved.

Table 2-Assessment Class and Total Benefit Units

Assessment Class	Total Acreage or Units (estimated)		Water Use Factor AFY	Benefit Units (rounded)
Irrigated Agriculture	16,500	Acres	3.50	57,750
Non-irrigated Agriculture	24,300	Acres	0.06	1,460
Residential and Commercial Operations	200	Each	0.75	150
Total Benefit Units	41,000			**59,360**

[5] Ibid, PRGWB Model Update, December 19, 2014, Table 13 Rural Residential Water Demand, SLO County,

From: Carol Rowland [redacted]
Sent: Thursday, July 26, 2018 11:01 AM
To: John Peschong <jpeschong@co.slo.ca.us>; Debbie Arnold <darnold@co.slo.ca.us>; jJHamon@prcity.com
Cc: [redacted]
Subject: RE CAB letter of 7/18/18 to Paso Basin Cooperative Committee

Dear Distinguished Representatives of the Paso Basin Cooperative Committee,

I am writing to express my support for the CAB letter and the CAB Summary Goals of July 2018 included at the end of my letter.

I have read the attached CAB letter and the attachment carefully and am in total agreement with everything contained in them.

I have spoken and written to the County BOS on many occasions on this subject and will summarize briefly what my position has been.

We are an older retired couple living in the Creston area since 1975, not far from the Cotta Well property Every year for the last few years we have been afraid our well will go dry.

We have given up our vegetable gardens, our lawn, and have lost or pulled out many landscaping plants and areas. We have replaced some plants in limited areas with drought resistant plants. We are careful with our water use, taking fewer baths and showers, wearing clothes longer before washing, flushing toilets less frequently, etc.

We are living on a fixed income and cannot afford to drill a new well. We are still paying off a mortgage.

In May of 2013 when we started noticing our well was recovering very slowly every day, water delivery was a fixed amount and you had to pay for a full delivery regardless of how much you could accept. We installed another water storage tank so we could accept all the water we paid for if we had to have it delivered because our well had failed.

Our only asset is our property. We are concerned that our property value will drop as the water disappears. How can we sell our property at a reasonable price without a working well and as property values are devalued as a result of lack of water?

Thank you for considering the concerns of one of many thousands of rural residents depending on the Paso Robles Groundwater Basis for water.

Thank you for considering our concerns,

Carol and Harold Rowland
[redacted]

From: Tommy & Kathy Carter [redacted]
Sent: Thursday, July 26, 2018 9:04 PM
To: Debbie Arnold <darnold@co.slo.ca.us>
Subject: Re: paso basin cooperative committee

Dear Supervisor Arnold,

Thank you for standing with all the little people in this water conflict.

Tommy and Kathy Carter

On Thu, Jul 26, 2018 at 11:28 AM, Debbie Arnold <darnold@co.slo.ca.us> wrote:

> Thank you for sharing your comments.
>
> Sincerely,
>
> **Debbie Arnold**
>
> **Supervisor, District 5**
>
> (p) 805-781-4339
>
> (f) 805-781-1350
>
> darnold@co.slo.ca.us

COUNTY OF SAN LUIS OBISPO

BOARD OF SUPERVISORS

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From: Tommy & Kathy Carter [mailto[redacted]
Sent: Wednesday, July 25, 2018 7:55 PM
To: Debbie Arnold <darnold@co.slo.ca.us>
Subject: paso basin cooperative committee

We are fully in agreement with the goals of the Creston Advisory Body, and the explanations of these goals.

Tommy and Kathy Carter

[redacted]

CALIFORNIA WATER | **GROUNDWATER**

To: GSAs

We write to provide a starting point for addressing environmental beneficial users of surface water, as required under the Sustainable Groundwater Management Act (SGMA).

SGMA seeks to achieve sustainability, which is defined as the absence of several undesirable results, including "depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial users of surface water" (Water Code §10721).

The Nature Conservancy (TNC) is a science-based, nonprofit organization with a mission *to conserve the lands and waters on which all life depends*. Like humans, plants and animals often rely on groundwater for survival, which is why TNC helped develop, and is now helping to implement, SGMA. Earlier this year, we launched the Groundwater Resource Hub, which is an online resource intended to help make it easier and cheaper to address environmental requirements under SGMA.

As a first step in addressing when depletions might have an adverse impact, The Nature Conservancy recommends identifying the beneficial users of surface water, which include environmental users. This is a critical step, as it is impossible to define "significant and unreasonable adverse impacts" without knowing *what* is being impacted. To make this easy, we are providing this letter and the accompanying documents as the best available science on the freshwater species within the boundary of your groundwater sustainability agency (GSA). Our hope is that this information will help the GSA better evaluate the impacts of groundwater management on environmental beneficial users of surface water.

To help the GSA take this first step, we are providing the following references:

- **Freshwater Species List**. The excel file named for the GSA is a spreadsheet that includes a list of freshwater species found within the GSA's jurisdiction. The list includes fish, amphibians, reptiles, birds, plants, macroinvertebrates and mammals, and provides both the scientific (column C) and common (column D) names for each.

  The freshwater species list includes the conservation status for each species, indicating whether federal (column E) and/or state (column F) endangered species laws may apply to management of the species. The list also includes the sources of the data. Historical observations (pre-1980) and observations of extirpated species were excluded from the analysis.

To produce the freshwater species list, we used ArcGIS to select features within the California Freshwater Species Database version 2.0.9 within the GSA's boundary. This database contains information on ~4,000 vertebrates, macroinvertebrates and vascular plants that depend on fresh water for at least one stage of their life cycle. The spatial database contains locality observations and/or distribution information from ~400 data sources. The database is housed in the California Department of Fish and Wildlife's BIOS as well as on The Nature Conservancy's science website.

- **Field/Column definitions**. This table provides a definition for the column headings in the excel freshwater species list. The title of this file is "Field_Descriptions.xls".

- **Data Sources**. This document describes the data sources for each species in freshwater species list. The document, titled "Freshwater_Species_Data_Sources.xls", provides the name of each source, citation and a link to the data source, if available.

- **PLoSONE Publication**. As evidence that the California Freshwater Species Database is the best available science, we are attaching a peer-reviewed publication, which was the basis of the California Freshwater Species Database. The paper, which is attached as "FW_Paper_PLoSONE", appeared in PLoSONE, an online scientific journal. This paper describes the methods used to compile the freshwater species database, and patterns of species richness (the density and diversity of species), endemism (species found only in a particular region) and vulnerability of freshwater species in California. Also attached is the supplemental material published in PLoSONE (FW_Paper_PLOSONE_S1, FW_Paper_PLOSONE_S2, FW_Paper_PLOSONE_S3, and FW_Paper_PLOSONE_S4).

As next steps, we suggest three actions. First, please share these materials with your consultants and stakeholders, and use them as a starting point to identify environmental beneficial users of surface water. Second, contact staff at the Department of Fish and Wildlife (DFW), United States Fish and Wildlife Service (USFWS) and/or National Marine Fisheries Services (NMFS) to obtain their input on the groundwater and surface water needs of the organisms on the GSA's freshwater species list. Third, please visit the Groundwater Resource Hub at the end of the year, when we will be releasing a Freshwater Species Guidebook, which is under development by a collaboration of agencies and nonprofits, including TNC, CDFW, USFWS and NMFS. The Guidebook will provide a summary of information on each individual freshwater species, which should be useful in determining surface water needs and the habitat conditions needed to sustain these important resources.

Given all that must be accomplished to meet SGMA deadlines, The Nature Conservancy is working hard to provide resources to make addressing environmental beneficial users of groundwater and surface water as simple and inexpensive as possible. With this freshwater species list tailored to the GSA, as well as the Indicators of Groundwater Dependent Ecosystems Database (also known by the Department of Water Resources as the Natural Communities Dataset), we hope to make the first, critical step in managing groundwater resources, which includes identifying environmental users, an easy SGMA requirement to satisfy.

If you have any questions about these materials, please contact me or Jeanette Howard, [redacted]

Sincerely,

Sandi Matsumoto
Associate Director
California Water Program
[redacted]

PLOS | ONE

RESEARCH ARTICLE

Patterns of Freshwater Species Richness, Endemism, and Vulnerability in California

Jeanette K. Howard[1☯]*, Kirk R. Klausmeyer[1☯], Kurt A. Fesenmyer[2☯], Joseph Furnish[3], Thomas Gardali[4], Ted Grantham[5], Jacob V. E. Katz[5], Sarah Kupferberg[6], Patrick McIntyre[7], Peter B. Moyle[5], Peter R. Ode[8], Ryan Peek[5], Rebecca M. Quiñones[5], Andrew C. Rehn[7], Nick Santos[5], Steve Schoenig[7], Larry Serpa[1], Jackson D. Shedd[1], Joe Slusark[7], Joshua H. Viers[9], Amber Wright[10], Scott A. Morrison[1]

1 The Nature Conservancy, San Francisco, California, United States of America, **2** Trout Unlimited, Boise, Idaho, United States of America, **3** USDA Forest Service, Vallejo, California, United States of America, **4** Point Blue Conservation Science, Petaluma, California, United States of America, **5** Center for Watershed Sciences and Department of Wildlife Fish and Conservation Biology, University of California Davis, Davis, California, United States of America, **6** Integrative Biology, University of California, Berkeley, Berkeley, California, United States of America, **7** Biogeographic Data Branch, California Department of Fish and Wildlife, Sacramento, California, United States of America, **8** Aquatic Bioassessment Laboratory, California Department of Fish and Wildlife, Rancho Cordova, California, United States of America, **9** School of Engineering, University of California Merced, Merced, California, United States of America, **10** Department of Biology, University of Hawaii at Manoa, Honolulu, Hawaii, United States of America

☯ These authors contributed equally to this work.
* jeanette_howard@tnc.org

OPEN ACCESS

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Editor: Brian Gratwicke, Smithsonian's National Zoological Park, UNITED STATES

Received: February 7, 2015

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Published: July 6, 2015

Data Availability Statement: All data are available from The Nature Conservancy website: scienceforconservation.org. The data used in the study are third-party data. The data sources and third-party contacts are provided in S3 Table. We received permissions from all data providers to publicly use and release the data.

Funding: We thank The Nature Conservancy for supporting development of this database and this research, with additional support from the U. S. Bureau of Land Management. With the exception of the authors, the funders had no role in study design,

Abstract

The ranges and abundances of species that depend on freshwater habitats are declining worldwide. Efforts to counteract those trends are often hampered by a lack of information about species distribution and conservation status and are often strongly biased toward a few well-studied groups. We identified the 3,906 vascular plants, macroinvertebrates, and vertebrates native to California, USA, that depend on fresh water for at least one stage of their life history. We evaluated the conservation status for these taxa using existing governmental and non-governmental organization assessments (e.g., endangered species act, NatureServe), created a spatial database of locality observations or distribution information from ~400 data sources, and mapped patterns of richness, endemism, and vulnerability. Although nearly half of all taxa with conservation status (n = 1,939) are vulnerable to extinction, only 114 (6%) of those vulnerable taxa have a legal mandate for protection in the form of formal inclusion on a state or federal endangered species list. Endemic taxa are at greater risk than non-endemics, with 90% of the 927 endemic taxa vulnerable to extinction. Records with spatial data were available for a total of 2,276 species (61%). The patterns of species richness differ depending on the taxonomic group analyzed, but are similar across taxonomic level. No particular taxonomic group represents an umbrella for all species, but hotspots of high richness for listed species cover 40% of the hotspots for all other species and 58% of the hotspots for vulnerable freshwater species. By mapping freshwater species hotspots we show locations that represent the top priority for conservation action in the state. This study identifies opportunities to fill gaps in the evaluation of conservation status for freshwater taxa in California, to address the lack of occurrence information for nearly

data collection and analysis, decision to publish, or preparation of the manuscript.

Competing Interests: The authors have declared that no competing interests exist.

40% of freshwater taxa and nearly 40% of watersheds in the state, and to implement adequate protections for freshwater taxa where they are currently lacking.

Introduction

Freshwater habitats cover less than 1% of the earth's surface (about the size of the European Union) but support roughly 125,000 described species, or 10% of the described species on the planet [1]. Species dependent on freshwater habitats are in decline globally [2, 3]; between 10,000 and 20,000 freshwater species are thought to be extinct or imperiled by human activities [1, 3], with freshwater species at higher risk of extinction than their terrestrial counterparts [4]. In North America, extinction rates for freshwater species are four to five times greater than those for terrestrial species [5–7], and increasing human population and climate change are predicted to exacerbate extinctions in the future [7–10]. Estimates of known extinctions however, are likely gross underestimates because most groups of freshwater organisms are understudied [11]. The insular and fragmented nature of freshwater habitats, which often results in high levels of endemism, makes freshwater populations highly vulnerable to extirpation [1].

Although great strides are being made in the methods to adapt conservation planning principals and conservation strategies to the particularities of freshwater systems [12–13], conservation action is hampered by a lack of basic information about the definition and location of these species. The first stage of systematic conservation planning is compiling information about the location of threatened and rare species in a region [14], but for freshwater species, this information tends to be lacking, dispersed, or focused on limited taxonomic groups even in data rich areas.

Because data is lacking, conservation groups often focus on focal species or taxonomic groups that have better distribution data. Recent studies have attempted to systematically address broad-scale patterns of freshwater species distribution, and spatial congruence among taxonomic groups [4, 15]. These studies show that congruence between taxonomic groups at global and continental scales are low, suggesting that focusing on a single species or taxonomic group may not benefit all freshwater species[4, 15].

California (USA) encompasses an exceptionally diverse array of freshwater ecosystem types, from rivers flowing through temperate rainforests to desert springs where ancient aquifers come to the surface [16]. In addition, demands on California's freshwater resources to meet human needs are intensifying as its population grows, and climate change further strains an already over-allocated water supply system [17–18]. Water allocations are currently five times the state's mean annual runoff and, in many of the state's major river basins, rights to divert water lay claim to up to 1,000% of natural surface water supplies [19].

Recent studies have highlighted dramatic declines of California native fishes with 80% either extinct or threatened with extinction within 100 years [10, 20]. Yet, the composition, distribution, and status of the broader suite of freshwater taxa in the state are not well understood. To address this need, we assembled the first comprehensive database of spatial observations for freshwater vascular plants, macroinvertebrates, and vertebrates in California. Here, we use this new and now publicly available database [21] to evaluate the patterns of freshwater species richness, endemism, and vulnerability, identify hotspots of freshwater richness, and to evaluate the spatial congruence of species richness across taxonomic groups.

Fig 1. Study area. The extent of the study area in California and the major hydrologic regions it contains. Inset shows the location of California in North America. Shaded relief is from "The National Map" by the U.S. Geological Survey.

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Materials and Methods

Study Area

The spatial unit of analysis for this assessment was the smallest-size watershed (12-digit hydrologic unit code, or HUC12, watershed) available in the nested national dataset compiled by the US Department of Agriculture Natural Resource Conservation Service [22]. Our study area included those watersheds (n = 4,450) within the administrative boundary of the state of California, totaling 410,515 km^2 (Fig 1). For reporting results, we nested the HUC12 watersheds within 10 major hydrologic management regions defined by California's Department of Water Resources corresponding to the state's major drainage basins [23] (Fig 1)(S1 Table).

Taxa List

The taxonomic units of analysis for this assessment were drawn from an initial list of species and sub-species known to utilize freshwater habitats within California from NatureServe (http://natureserve.org) (n = 1,903)[24]. Because NatureServe collects and manages information for only a subset of species throughout the U.S., Canada, Latin America, and the Caribbean we assessed regional and specific taxonomic reviews and checklists to identify missing taxa (S2 Table). For example, we relied on the PISCES for all fish data because the software and database is comprehensive and quality-controlled [25–26].

Comprehensive taxonomic reviews are not available in California for non-vascular plants, such as benthic algae and mosses, planktonic microcrustacea, segmented worms, and water mites; consequently, these groups are excluded from our effort. The authors, selected for their taxonomic expertise in the state, compiled and reviewed lists of freshwater dependent species and subspecies that occur within California (S1 Table). The experts removed redundancies due to changes in taxonomy or nomenclature, and assembled a definitive list of freshwater taxa (S3 Table). Our final database augmented the freshwater taxa included in the NatureServe list by 105% (n = 2,003), for a total of 3,906 taxa (S3 Table). Species, subspecies, Evolutionary Significant Units, and Distinct Population Segments are hereafter referred to as "taxa" for convenience.

Criteria for categorizing taxa as "freshwater dependent" varied by taxonomic group (S1 File). For example, freshwater fishes were defined as those that spawn in freshwater habitats. Herpetofauna, were included if: 1) they rely on fresh water to complete one or more life stage (e.g., all anurans and many caudates); or, 2) forage within fresh water as obligates (e.g., western pond turtle, *Actinemys marmorata marmorata*) or non-obligates (e.g., western terrestrial garter snake, *Thamnophis elegans elegans*) at some stage of development; or, 3) they would not persist without freshwater microhabitats (e.g., Inyo mountain salamander, *Batrachoseps campi*); or, 4) they are found within splash zones of freshwater springs and creeks (e.g., Dunn's salamander, *Plethodon dunni*). Plant species were included if: 1) they occur exclusively in fresh water and have special adaptations for living submerged in water, or at the water's surface; or, 2) occur primarily in freshwater wetland habitats but are not strictly aquatic; or, 3) require freshwater inundation to complete their life-cycle, such as plants occurring in long-inundated portions of vernal pools (e.g., *Orcuttia californica*); or, 4) were identified in the Jepson Manual of Vascular Plants of California [27] as associated with wetland habitats such as marshes, lakes, vernal pools, fens, springs, and bogs, and dependent on wetland habitat; or, 5) were included as wetland obligates or as facultative wetland plants in the U.S. Army Corps of Engineers list of wetland plant species [28]. See S1 File for criteria used for birds, mammals, vascular plants and invertebrates. We limited our list to taxa native to California.

Taxa were classified as endemic if they are known to be restricted to California based on available data sources (S2 Table).

Conservation Status

We evaluated the conservation status for all taxa on our final list (S3 Table) by reviewing the scientific literature, NatureServe, state and federal Endangered Species Act lists, management agency designations, and taxonomic group reviews (S1 Table). We attempted to be as complete as possible, and use available conservation status sources for the taxonomic groups considered in this study. Table 1 provides sources and criteria for classifying taxon as listed, vulnerable or apparently secure. Note that taxa were not classified as "apparently secure" if they fell under any criteria listed under "vulnerable" in Table 1.

Spatial Data and Summaries

We collected spatial data related to the occurrence or distribution of the freshwater taxa included on our final list (S3 Table), and assembled a geographic database using Esri ArcGIS version 10.1 software. Due to taxonomic changes and differences among data sources, we were not always able to attribute spatial records at the subspecies level. As a result, all spatial data summaries and analyses are conducted at the species level. Data were collected from a variety of sources (S2 Table). The subsequent database includes available spatial data for each taxon categorized by observation type (Table 2), data format (i.e. point, line, and polygon), origin (i.e. native range vs. translocation), conservation status, and habitat usage (e.g. seasonal or migratory use).

Table 1. Sources and criteria used to rank taxa.

Source	Criteria for "listed ranking"	Criteria for "Vulnerable" ranking	Criteria for "Apparently Secure" ranking
ESA federal or state lists [29–30]	• Endangered OR	• Under Review in the Candidate or Petition Process OR	
	• Threatened	• Proposed Threatened OR	
		• Species of Special Concern OR	
		• Candidate OR	
		• Bird of Conservation Concern OR	
		• Special Concern OR	
		• Special	
NatureServe [24]		Ranked at either the global (G) or state (S) scales as:	Ranked at either the global (G) or state (S) scales as:
		• Vulnerable (NatureServe ranking of 3) OR	• Apparently Secure (NatureServe ranking of 4) OR
		• Imperiled (NatureServe ranking of 2) OR Critically imperiled (NatureServe ranking of 1)	• Secure" (NatureServe ranking of 5
Status assessment of California's native inland fishes [20]		• EN (endangered) OR	• NT (near-threatened) OR
		• VU (vulnerable)(following IUCN definitions)	• LC (least concern)
Conservation Status of Freshwater Gastropods of Canada and the United States [31]		• Endangered OR	Currently Stable (CS)
		• Threatened OR	
		• Vulnerable	
California Native Plant Society – Rare Plant Inventory [32]		• 1A (Plants Presumed Extirpated in California and Either Rare or Extinct Elsewhere) OR	
		• 1B (Plants Rare, Threatened, or Endangered in California and Elsewhere) OR	
		• 2A (Plants Presumed Extirpated in California, But Common Elsewhere) OR	
		• 2B (Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere	
Amphibian and Reptile Species of Special Concern (ARSSC) [33]		Appears on list	
California Department of Fish and Wildlife (CDFW) Species of Special Concern [34]		Appears on list	
USFWS Species of Concern [35]		Appears on list	
USFWS Birds of Conservation Concern [36]		Appears on list	
US Forest Service National Threatened, Endangered and Sensitive Species (TES) Program [37]		Appears on list	
US Bureau of Land Management Special Status Species [38]		Appears on list	

A taxon was classified as listed, vulnerable or apparently secure if one of the criteria conditions were met. For example, if a taxon is classified as endangered on the federal ESA list, we designated the taxon as "listed" in our database. Alternatively, if a taxon was classified as EN (endangered) in Moyle et al. 2011, we classified the taxon as "vulnerable" in our database.

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While this effort represents the most comprehensive compilation of freshwater species occurrence in the state, we acknowledge that data quality may vary among sources. With the exception of PISCES, which has been expert reviewed for data quality, other data sources have

Table 2. Classifications used to group spatial data records in the California Freshwater Species Database.

Spatial Data Classification Groups
Current observations (post-1980)
Observation with undefined date
Historical observation (pre-1980)
Extirpated
Modeled habitat/ generalized observation
Expert Opinion
Management area designations*
Range
Historical range
Unknown

* e.g., Critical Habitat designation by the U.S. Fish and Wildlife Service

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not undergone such review, and therefore may not accurately represent species ranges. For example, most invertebrate data come from bioassessment monitoring efforts which are known to under sample certain habitats such as non-perennial streams, large rivers, springs, high altitude streams, and wet meadows.

To examine and compare patterns of freshwater species richness, endemism, and vulnerability, we summed and mapped unique species by HUC12 watershed, and calculated the percentage of species that are endemic, vulnerable, and listed in each watershed. We also mapped richness by eight taxonomic groups (fish, herpteofauna, mollusks, birds, crustaceans, plants, mammals, insects and other invertebrates) by summing the number of species in each taxonomic group within the HUC12s. We identified hotspots as the top 5% richest watersheds [39].

We recognize that spatial data for freshwater species is often lacking, so we tested how each taxonomic group serves as a proxy for the full suite of freshwater species. First we calculated the pairwise Pearson's correlation coefficient of species richness counts in HUC12 watersheds by taxonomic group to evaluate the relationship between taxonomic groups. Next, we calculated the Pearson's correlation coefficient for each taxonomic group compared to all other freshwater species not in that taxonomic group. For example, we calculated the correlation coefficient for fish richness compared to all other freshwater species (excluding fish) by HUC12 watershed. In addition, we calculated the correlation of all listed species in each HUC12 compared to all other non-listed species.

We also tested whether geographical patterns of richness in one group act as a surrogate for those in other groups by comparing the overlap of hotspots for one group with corresponding hotspots for other groups [39]. Finally, we compared the hotspots for each group with vulnerable freshwater species to test how well each group acts as a surrogate for vulnerable freshwater biodiversity in most need of conservation action.

Results

Richness, Endemism, and Vulnerability

We identified 3,906 freshwater taxa in California (S3 Table) which included 336 subspecies, evolutionary significant units, or distinct population segments. Insects, arachnids,

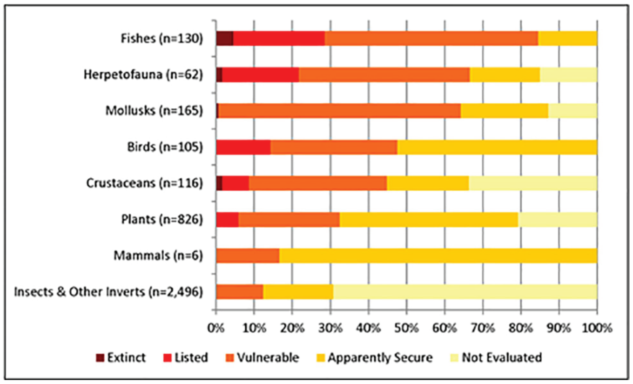

Fig 2. Taxonomic grouping and conservation status of freshwater taxa native to California. Percentage of freshwater species by taxonomic groups that are considered vulnerable (at risk of extinction) in California watersheds, "Insects and other invertebrates" includes the classes Arachnida, Branchiopoda, Insecta and Polychaeta.

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branchiopods, and polychaetes (referred to henceforth as "insects and other invertebrates") comprise over two-thirds (63%) of the freshwater taxa in the study, with 2,496 taxa (Fig 2). The next largest group is vascular plants (n = 826), followed by mollusks (n = 165), fish (n = 130), crustaceans (n = 116) birds (n = 105), herpetofauna (n = 62), and mammals (n = 6) (Table 3). Eleven freshwater taxa that were once found in the study area are now considered extinct, including one plant (*Potentilla multijuga*), two crustaceans (*Pacifastacus nigrescens* and *Syncaris pasadenae*), one mollusk (*Planorbella traski*), one frog (*Rana lithobates] yavapaiensis*), and six fishes (*Cyprinodon nevadensis calidae*, *Siphatales bicolor ssp. 11*, *Gila crassicauda*, *Pogonichthys ciscoides*, *Ptychocheilus lucius*, and *Salvelinus confluentus*). An additional 14 species considered possibly extinct include eight insects (*Farula davisi*, *Hygrotus artus*, *Mesocapnia bakeri*, *Paraleptophlebia californica*, *Paraleptophlebia clara*, *Paraleptophlebia rufivenosa*, *Parapsyche extensa*, *Rhyacophila amabilis*), two amphibians (*Rana pretiosa*, and *Incilius alvarius*), one mollusk (*Valvata virens*), two plants (*Plagiobothrys glaber* and *Potentilla uliginosa*), and one turtle (*Kinosternon sonoriense*).

To date, conservation status has been assessed for only 50% (N = 1,939) of the state's freshwater taxa (Table 3). Moreover, the conservation status of some taxonomic groups is

Table 3. Number of taxa included in each taxonomic group along with the number and percentage of species by conservation status.

Group	All	Extinct	Listed	Vulnerable (but not listed)	Apparently Secure	Not Evaluated
Insects and Other Inverts*	2,496	0	0	309 (12%)	460 (18%)	1,727 (70%)
Plants[1]	826	1 (0%)	47 (5%)	220 (27%)	387 (47%)	171 (21%)
Mollusks	165	1 (0.5%)	0	105 (63.5%)	38 (23%)	21 (13%)
Fishes	130	6 (5%)	31 (24%)	73 (56%)	20 (15%)	0
Crustaceans	116	2 (2%)	8 (7%)	42 (36%)	25 (21%)	39 (34%)
Birds	105	0	15 (14%)	35 (34%)	55 (52%)	0
Herpetofauna	62	1 (2%)	12 (19%)	29 (46%)	11 (18%)	9 (15%)
Mammals	6	0	0	1 (17%)	5 (83%)	0
Total	3,906	11 (0.3%)	113 (3%)	814 (21%)	1,001 (26%)	1,967 (50%)

* Includes Arachnida, Branchiopoda, Insecta and Polychaeta.

[1]All California plants are evaluated for rarity. Due to the lack of a 'secure' category in the CNPS ranking system, common taxa may not appear to have been evaluated.

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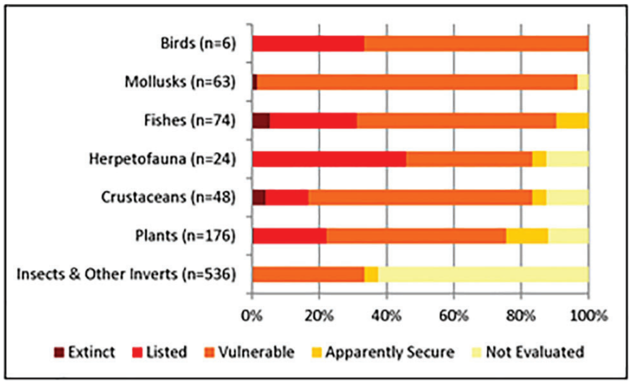

Fig 3. Taxonomic grouping and conservation rank of freshwater taxa endemic to study area. Percentage of freshwater endemic species by taxonomic groups that are considered vulnerable (at risk of extinction) in California watersheds. "Insects and other invertebrates" includes the classes Arachnida, Branchiopoda, Insecta and Polychaeta.

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disproportionally understudied. For example, the conservation status of all fish and bird taxa have been evaluated, but only 31% (n = 769) of insects and other invertebrates (Table 3). Of the freshwater taxa evaluated, 51.5% are considered secure (n = 1,001), 48% are ranked as vulnerable (n = 927), and 0.5% (n = 11) are now considered extinct. Although nearly half of the freshwater taxa were classified as vulnerable, only 113 (6%) are listed as endangered or threatened under the federal or state ESA.

Some taxonomic groups contain considerably more vulnerable taxa than others (Fig 2). For example, 104 of the 130 (80%) fishes, 66% of herpetofauna (n = 41) and 64% (n = 105) of mollusks are considered vulnerable. On the other hand, 83% of the mammals, 52% of the birds, and 47% of the plants are considered secure. However, as noted above, the comprehensiveness of data varies by taxonomic group such that the true level of imperilment could be much greater for taxonomic groups such as insects, other invertebrates and crustaceans where the majority of known taxa have not been evaluated for conservation state (Fig 2 and Table 3).

Nearly a quarter of the 3,906 native freshwater taxa found in California are endemic (n = 927), including 536 insects and other non-molluscan invertebrates, 176 plants, 74 fishes, 63 mollusks, 48 crustaceans, 24 herpetofauna, and 6 birds (Fig 3). Of the 560 endemic taxa that were evaluated for conservation status, nearly 90% (n = 498) are considered vulnerable (Fig 3). All 6 endemic birds are considered vulnerable, as are 98% of the endemic mollusk taxa. In addition, 85% of endemic fishes are considered vulnerable (Fig 3). Eight endemic taxa are considered extinct including four fishes (*Cyprinodon nevadensis calidae*, *Siphatales bicolor ssp. 11*, *Gila crassicauda*, and *Pogonichthys ciscoides*), two crustaceans (*Pacifastacus nigrescens* and *Syncaris pasadenae)*, one plant (*Potentilla multijuga*) and one mollusk (*Planorbella traski*). Only 76 (14%) of vulnerable endemic taxa are formally listed on state or federal endangered species lists.

Spatial Data and Summaries

To map spatial patterns of freshwater diversity in the state, we compiled spatial data from 408 different sources (S2 Table) and assembled a database with over 9,000 polygon, 23,000 line, and 3,484,000 point records. As noted in the above Methods, we compiled spatial data only at the species level. Therefore, although our final species list contains information on 3,906 taxa, we compiled spatial data for the 3,727 species in the database. It should be noted that although there are 336 subspecies, ESUs, or DPSs in the database, 179 species are comprised of at least two subspecies.

We obtained spatial data (see Table 2 for data types) for 2,276 (61%) of the 3,727 total freshwater species, including 588 (68%) of the 862 endemic species, 752 (90%) of the 838 vulnerable species, and all 94 species listed under state or federal Endangered Species Acts [29–30]. We were unable to find any spatially explicit data for 1,451 (39%) of the species.

Hydrologic regions with the greatest species richness include portions of the San Francisco Bay (average species richness by HUC12 = 111 species), South Coast (average species richness by HUC12 = 91) and Sacramento River (average species richness by HUC12 = 74) (Fig 4A). The average richness of vulnerable taxa per HUC12 by hydrologic regions was greatest in the San Francisco Bay (n = 31), South Coast and San Joaquin (n = 22), Sacramento (n = 21), and North Coast (n = 19). However, the regions with the highest percentage of vulnerable species per HUC12 are the South Lahontan, Tulare Lake, South Coast, Colorado, and Central Coast regions (Fig 4B). Listed species are found across the study area with at least one being as either currently or historically found in watersheds that cover 76% of the state (Fig 4C). However, in contrast to vulnerable species (Fig 4B), the proportion of listed species per HUC12 watershed is relatively low (Fig 4C).

The average richness of endemic taxa per HUC12 by hydrologic regions was greatest in the San Francisco Bay (n = 19), San Joaquin (n = 15), South Coast (n = 14), Sacramento (n = 12), and the Central Coast (n = 11) (Fig 5A). Regions with hydrological connections outside of California–North Coast, North and South Lahontan, and Colorado River–have a lower percentage of California endemic species (n = 7, 5, 3, 4 on average, respectively). More than half of the study area (61%) is comprised of HUC12 watersheds in which over 60% of the endemic species found in those watersheds are considered vulnerable (Fig 5B). As with all native freshwater species, the proportion of endemic species that are listed under state or federal ESA lists is considerably less than the proportion of those considered vulnerable in most HUC12 watersheds (Fig 5C).

Spatial patterns of richness vary by taxonomic group and appear to correspond with distribution of freshwater habitat (Fig 6). For example, fish richness is highest in major rivers in the state including the Sacramento and Klamath river watersheds located in the Sacramento and North Coast hydrologic regions (Fig 6A)(S1 Table). Herpetofauna richness is highest in

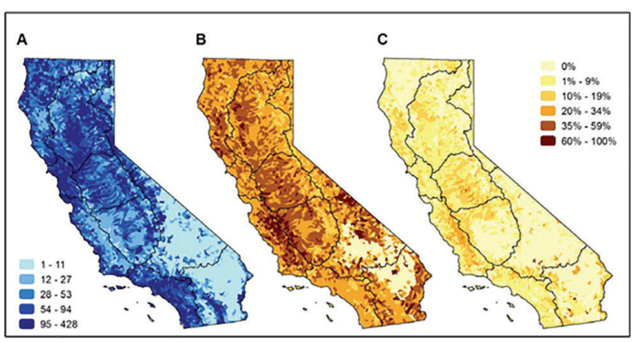

Fig 4. Patterns of richness and vulnerability of freshwater species native to California watersheds. Maps of (A) the number of native freshwater species in each HUC12 watershed (includes current, historic, range and modeled data). The range of species richness is shown in quintiles, therefore the darkest blue is the top 20% of species richness, the lightest blue the lowest 20%.; (B) percentage of species in each HUC12 watershed that are ranked as vulnerable; and (C) percentage of species in each HUC12 watershed that are listed as endangered or threatened under state or federal ESA lists. Maps in panels B and C share the legend on the right of the figure. The black lines on the maps represent the major hydrologic regions in the study area.

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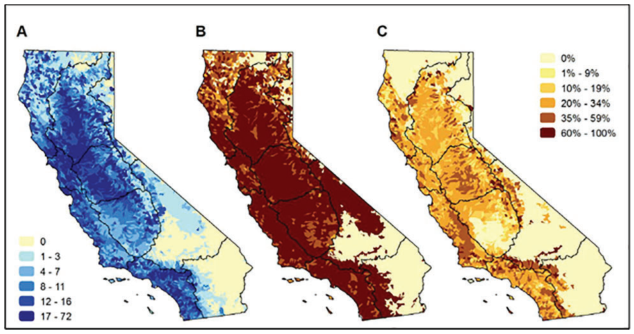

Fig 5. Patterns of richness and vulnerability of freshwater species endemic to California, watersheds. Maps of (A) the number of endemic freshwater species in each HUC12 watershed (includes current, historic, range and modeled data). The range of endemic species richness is shown in quintiles, therefore the darkest blue is the top 20% of species richness, the lightest blue the lowest 20%.; (; (B) percentage of endemic species considered vulnerable in each HUC12 watershed; and (C) percentage of endemic species in each HUC12 watershed that are listed as endangered or threatened under state or federal ESA lists. Maps in panels B and C share the legend on the right of the figure. The black lines on the maps represent the major hydrologic regions in the study area.

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mountain foothill and coastal areas (Fig 6B), with bird richness being highest in wetland, coastal, and compatible agriculture (e.g., flooded rice) regions of the state (Fig 6C). Richness of mollusks/crustaceans, insects and other invertebrates is concentrated in headwater, spring systems and more isolated pockets of habitat (Fig 6D and 6E). Plant richness appears distributed throughout the state with pockets of high richness even in desert regions which are underrepresented by other taxonomic groups (Fig 6F).

Geographies noted for high species richness are consistent regardless of observation type (Table 2). The San Francisco Bay, Sacramento River, and portions of the South Coast hydrologic regions are consistently identified as biodiversity hotpots whether observational, range, or modeled data are considered (Fig 7). Patterns of diversity for historical observations and

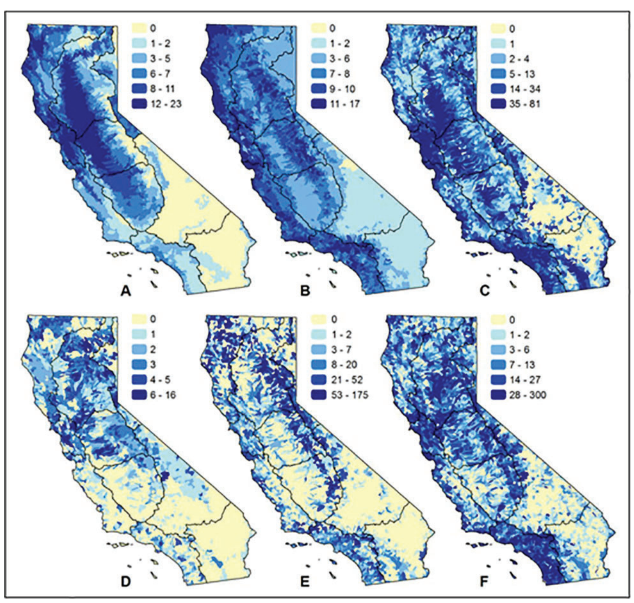

Fig 6. Patterns of freshwater species richness by taxonomic group. Maps show richness of: (A) fishes; (B) herpetofauna; (C) birds; (D) mollusks/crustaceans; (E) insects and other invertebrates; (F) plants.

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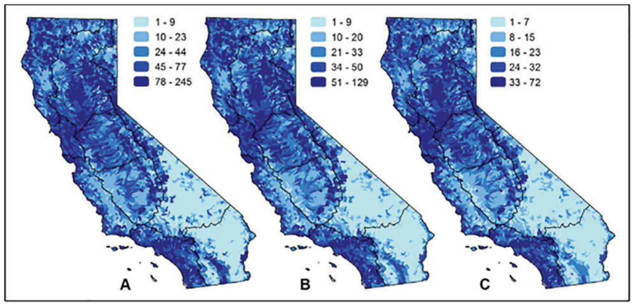

Fig 7. Patterns of richness by data type of California freshwater species. Maps show the number of native freshwater species when summarized by: (A) observational data recorded after 1980; (B) observational data recorded before 1980 or observations of extirpated populations; and (C) data that includes range maps, historical range maps, modeled habitat, professional judgment, critical habitat designations, and management area designations. Spatial data with an unknown observation date or unknown type are not included in any panel. The black lines on the maps represent the major hydrologic regions in the study area.

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extirpated populations appear similar to current observations (Fig 7A and 7B). Modeled and generalized data such as range maps completely cover the study area and provide perhaps the clearest pattern of diversity of freshwater taxa (Fig 7C); however, these patterns are only predictions of taxa presence. Nearly 40% of the study area does not contain a recent (post-1980) observation for any of the freshwater taxa considered in this study (Fig 7A).

The correlation coefficients of species richness at the HUC12 watershed scale between the various taxonomic groups are relatively low (Table 4), with the highest being between mollusks and mammals (0.52); fishes and mammals (0.52); and fishes and herps (0.51). The lowest correlations coefficients are between insects and other inverts and birds (0.03); crustaceans (0.06) and fishes (0.07).

We tested how the richness of various groups of species (taxonomic groups and listed species) serve as a proxy for the richness of all other freshwater species using correlation and hotspot overlap analysis. Listed species were the most correlated at the HUC12 watershed scale with the richness of all other freshwater species (0.63), followed by herpetofauna (0.51) and mollusks and plants (0.45) (Fig 8). Insects and other invertebrates had the lowest correlation to all other species (0.23). With the hotspot overlap analysis, we found again that listed species serve as the best proxy for all other species, with a 40% overlap in hotspots, followed by plants (29%), mollusks (27%) and crustaceans (25%) (Fig 9). We also compared hotspots for each group with hotspots of vulnerable freshwater species, since these are in the highest need of conservation action. Hotspots for listed species overlapped with 58% of the hotspots for vulnerable

Table 4. Correlation matrix of the richness within each HUC12 watershed summarized by taxonomic groups.

	Fishes	Crustaceans	Herps	Insects & Other Inverts	Mollusks	Plants	Birds	Mammals
Fishes	1.00	0.33	0.51	0.07	0.35	0.22	0.42	0.52
Crustaceans		1.00	0.09	0.06	0.14	0.20	0.26	0.11
Herps			1.00	0.32	0.32	0.34	0.32	0.32
Insects & Other Inverts				1.00	0.44	0.26	0.03	0.28
Mollusks					1.00	0.23	0.17	0.52
Plants						1.00	0.38	0.15
Birds							1.00	0.09
Mammals								1.00

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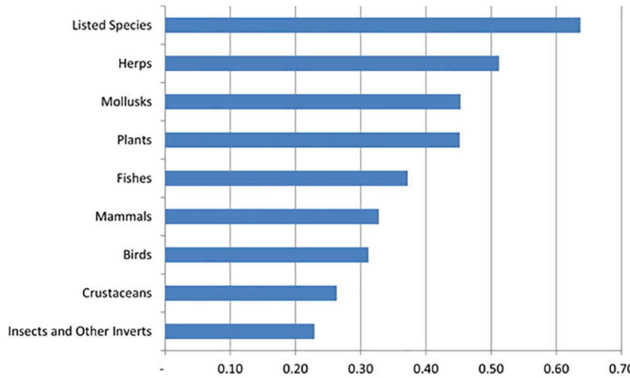

Fig 8. Relationship among taxonomic groups. Correlation of the richness within each HUC12 watershed for taxonomic groups of species when compared to all other freshwater species (excluding that group).

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freshwater species (excluding listed species). Mapping the hotspots shows that hotspots for listed species overlap with hotspots for all other species in the Sacramento River, San Francisco Bay, and South Coast hydrologic regions (Fig 10). However, hotspots congruence is lower in the North Coast and San Joaquin hydrologic regions.

Discussion

We compiled the most comprehensive database of freshwater species richness and distribution for the state of California to date. Using that database, we provide the first multi-taxa analysis of richness, endemism, and vulnerability for the majority of freshwater diversity in the state. Our study finds that the plight of freshwater species in California mirrors global trends [1–3]. We found that nearly half of freshwater taxa native to California are considered vulnerable to extinction, however only 6% of those taxa are currently listed under state or federal ESA. Even more disconcerting is that 90% of the freshwater taxa endemic to California—and so wholly reliant on conservation actions within the state—are vulnerable to extinction. However, only 14% of these endemic taxa are listed under state or federal ESAs (Fig 3). Therefore, legal listing does not appear to accurately reflect the state of vulnerability of freshwater taxa in the state.

We found that freshwater fishes, amphibians, reptiles, and mollusks are the most vulnerable taxonomic groups, a finding that is consistent with other studies [5, 10, 40–42]. However, this

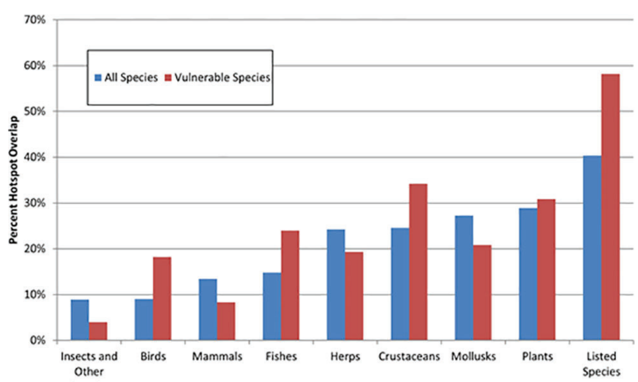

Fig 9. Overlap of hotspots. The relative performance of hotspots (top 5% of watersheds by richness) for taxonomic groups of species in matching hotspots for all (blue bars) and vulnerable (red bars) freshwater species. To avoid double counting, hotspots for all and vulnerable species were identified excluding the species in each subgroup for each comparison.

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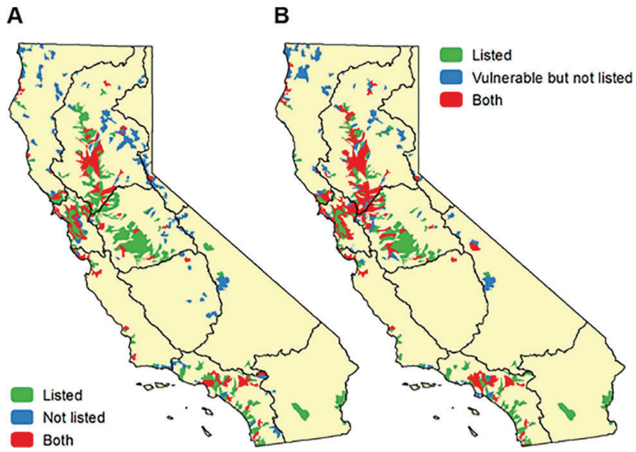

Fig 10. Location of hotspots. Comparison of the location of hotspot watersheds (top 5% by richness) for A) listed species with all non-listed species, and B) vulnerable but non-listed species.

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finding could be biased by the general lack of information about vulnerability of other taxonomic groups (Fig 3). These results provide evidence that some taxonomic groups are much better evaluated for conservation status than others (Table 3). For example, all fish and bird taxa have been evaluated as have most of the reptiles, amphibians, plants, and mollusks. In contrast, only 31% of the insects and other invertebrates have been evaluated for conservation status. Furthermore, we still lack spatially-explicit information for 1,448 freshwater species, including many known or suspected to be vulnerable to extinction. Evaluating the conservation status and locations of understudied freshwater species is priority for future research. Given that data acquisition is costly and time intensive, a recent study has shown that concentrating survey efforts on species with the highest uncertainty, such as rare species, provides an effective way to enhance the accuracy of conservation planning [43].

While there are some significant data gaps in our knowledge about the locations of many freshwater species, we were able to compile spatial data for 90% of the vulnerable species in the state, and all of the listed species. With this rich dataset, we were able to test how well a conservation focus on a particular subset of species would benefit other freshwater species. We found that a conservation focus on hotspots for a single taxonomic group such as fishes would provide poor overlap with hotspots for all other freshwater species. Our results are similar to a recent study on global patterns of freshwater species distribution [4]. Interestingly, we found that listed species do provide a reasonable proxy for other freshwater species, since hotspots for listed species cover 40% of the hotspots for non-listed species and 58% of the hotspots for non-listed vulnerable species (Figs 9 and 10). In our study area, focusing conservation action on the hotspots for listed species will likely benefit other freshwater species that need conservation action but have not yet been listed. If these patterns hold for other locations, this finding has implications for conservation strategies outside of our study area because there is generally more spatially explicit information about the distribution of listed species.

The publicly-available dataset [21] we have produced provides a means to place a wide range of freshwater management actions, including water rights administration and water use permitting within the larger context of freshwater-dependent species conservation. Furthermore, the dataset supports conservation planning initiatives by federal and state agencies and non-governmental organizations at the landscape scale, including efforts to delineate priority watershed networks which, if protected or restored, can most efficiently encompass freshwater biodiversity in the state for multiple species groups.

Conclusions

Human population growth, increasing demands for freshwater resources, and climate change are projected to exacerbate strains on freshwater resources and lead to further imperilment and extinction of freshwater taxa [1, 8–10, 44–45]. Fundamental to addressing this conservation challenge is information to elucidate what taxa are at risk and where best to focus efforts to improve conservation of freshwater species diversity. This study provides a foundation for freshwater conservation planning in California and highlights key hotspots of freshwater species which serve as priorities for conservation action. Yet, major gaps remain in our understanding of freshwater species distribution and status, as well as in the conservation protections afforded that diversity. Filling these knowledge gaps–e.g., with targeted surveys for understudied taxa, especially the listed, vulnerable, and endemic forms–is essential to inform current and future water management decisions. Addressing the gaps and inadequacies in conservation protections will be critical if we are to reverse the alarming declines of freshwater diversity seen in California as around the world.

Supporting Information

S1 File. Criteria used to define freshwater species by taxonomic group.
(DOCX)

S1 Table. Summary of stream characteristics for regions. Values from National Hydrography Dataset Plus, version 1 (EPA and USGS).
(DOCX)

S2 Table. List of sources for freshwater taxa included in our freshwater species list.
(DOCX)

S3 Table. List of sources that supplied spatial data for freshwater species occurrence.
(DOCX)

S4 Table. List of freshwater taxa included in study.
(DOCX)

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Author Contributions

Conceived and designed the experiments: JKH KRK KAF JF T. Gardali T. Grantham JVEK SK PM PBM PRO RP RMQ ACR NS SS LS JDS JS JHV AW SAM. Performed the experiments: JKH KRK KAF JF T. Gardali T. Grantham JVEK SK PM PBM PRO RP RMQ ACR NS SS LS JDS JS JHV AW SAM. Analyzed the data: JKH KRK KAF JF T. Gardali T. Grantham JVEK SK PM PBM PRO RP RMQ ACR NS SS LS JDS JS JHV AW SAM. Contributed reagents/materials/analysis tools: JKH KRK KAF JF T. Gardali T. Grantham JVEK SK PM PBM PRO RP RMQ ACR NS SS LS JDS JS JHV AW SAM. Wrote the paper: JKH KRK KAF JF T. Gardali T. Grantham JVEK SK PM PBM PRO RP RMQ ACR NS SS LS JDS JS JHV AW SAM.

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S1 File. Criteria used to define freshwater species

1. FISH

- Freshwater fishes are defined as those that spawn in freshwater. Catadromous species wouldn't qualify, however, we do not have any catadromous species in California. This also precludes several estuarine species commonly found in brackish water such as starry flounder, striped mullet and staghorn sculpin.

2. PLANTS

- Plant species that occur exclusively in freshwater and have special adaptations for living submerged in water, or at the water's surface. Includes free-floating aquatic plans and emergent wetland plants rooted beneath the water surface (e.g., *Nuphar polysepala*).
- Plant species that occur primarily in freshwater wetland habitats but are not strictly aquatic (e.g. *Typha angustifolia*).
- Plant species requiring freshwater inundation to complete their life-cycle, such as plants occurring in long-inundated portions of vernal pools (e.g., *Orcuttia californica*).
- Plant species associated with freshwater and aquatic habitats over much of their range or life-cycle as identified by expert botanists.
- Plant species identified in the Jepson Manual of Vascular Plants of California as associated with wetland habitats such as marshes, lakes, vernal pools, fens, springs, and bogs, and dependent on wetland habitat.
- Plant species identified as Wetland Obligates in the U.S. Army Corps of Engineers list of wetland plant species.
- Plant species identified as Facultative Wetland plants in the U.S. Army Corps of Engineers list of wetland plant species, and identified by expert botanists as dependent on freshwater wetland or aquatic habitats.

3. HERPETOFAUNA

- Species that exclusively rely on freshwater or freshwater-dependent vegetation communities in California in order to complete one or more stages of a reproductive cycle.
- Species that forage within freshwater, either as obligates (e.g., *Actinemys marmorata* and *Thamnophis gigas*), non-obligates (e.g., *T. elegans* and *T. ordinoides*), or as obligates and non-obligates depending on point of ontogeny (i.e., larval and adult amphibian of a single species).
- Relict species occurring within mesic microhabitats within xeric landscapes that would not persist in such regions without freshwater springs, such as *Batrachoseps campi* (a plethodontid salamander that exhibits direct development and does not have a larval stage).
- Species that do not require freshwater for foraging or any part of their reproductive cycle, but are typically found in California occurring within the splash zone of freshwater springs and creeks, such as *Plethodon dunni* (a plethodontid salamander with direct development).

4. BIRDS

A) Criteria for Inclusion

- Species that exclusively rely on freshwater or freshwater-dependent vegetation communities in California, including taxa strongly associated with riparian vegetation.
- Species that breed widely across western North America in freshwater habitats and migrate to California where a substantial portion, but not all, of their wintering habitat consists of freshwater habitats
- Species that use coastal waters during winter and migration but rely completely on freshwater for breeding in California (e.g, Harlequin Duck, American White Pelican, Western Grebe)
- Species that require freshwater inputs in to saline systems where reductions in freshwater inputs could result in complete habitat loss or substantial changes vegetation and habitat suitability (e.g., species that are only found at the Salton Sea , Saltmarsh Common Yellowthroat).
- Species that winter or breed in both freshwater and saline wetlands, but have large portions of their California population dependent on inland freshwater habitats, including flooded agriculture.

B) Criteria for Exclusion

- Species not dependent on the regular presence of freshwater or freshwater-dependent habitats.
- Species that no longer occur in or are not native to the region.
- Species were omitted if they are rare and do not contribute in a meaningful way to the avifauna of the region. – i.e., primarily lost "vagrants," even if the occur every year (e.g., Swamp Sparrow, American Redstart).

5. INVERTEBRATES

- Benthic macroinvertebrates (BMIs) are those included on the Southwest Association of Freshwater Invertebrate Taxonomists (SAFIT) Standard Taxonomic Effort (STE) list collected as part of freshwater bioassessment in the southwestern United States. The list contains BMI species known to occur in streams, lakes, or wetlands, including vernal pools, but special emphasis was placed on stream taxa since freshwater bioassessment is most frequently conducted in that habitat type. The list was compiled from published literature sources and from records in the State Water Board's bioassessment database, the latter being derived from surveys of thousands of stream sites throughout California.
- All species in the SAFIT list are benthic in one or more life stages and utilize freshwater habitats in one or more of the following critical life functions: feeding, mating, egg deposition/development, and larval development to maturity.
- The species list is more comprehensive for some taxonomic groups than others, reflecting the knowledge base and interests of the authors and other taxonomists at California's Aquatic Bioassessment Lab, availability and regional synoptic coverage of primary taxonomic literature, and likelihood of obtaining properly preserved specimens in typical benthic samples. For example, the list is comprehensive for most aquatic insect groups such as mayflies, stoneflies, dragonflies, caddisflies, beetles, the dipteran suborder Nematocera, etc. The dipteran suborder Brachycera is a notable exception, with most taxa being listed at genus level. The species lists also include surface-dwelling groups like Gerridae (water striders, order Hemiptera) and Gyrinidae (whirligig beetles, order Coleoptera), but exclude taxa associated with riparian zones,

shore-dwelling species, and plant tissue inhabitants in taxonomic groups such as Collembola, Staphylinidae, Heteroceridae, Chrysomelidae, Curculionidae, Saldidae, Isopoda and Amphipoda.

- The list is comprehensive for benthic crustaceans except Ostracoda. The list does not include planktonic microcrustacea (Copepoda and Cladocera). No attempt has been made to provide comprehensive species lists for freshwater Annelida (segmented worms) as preservation is typically poor in benthic samples, but generic lists are provided for leeches and polychaetes. Similarly, generic listings are included for Acari (water mites). An extensive taxonomic literature is available for these groups and could support compilation of species lists by appropriate experts in future versions. The list also excludes freshwater parasites such as Branchiura and mermithid Nematoda, the Branchiobdella, which are commensals on crayfish, and the Nematomorpha which are parasitic on terrestrial insects but are found in freshwater for part of their life cycle.
- Phylum Mollusca is variably treated: species lists are generally comprehensive for taxa that occur in larger streams and rivers, despite improper preservation that prevents species-level identifications in typical benthic samples that are collected for bioassessment purposes. Pebblesnails (Families Hydrobiidae and Lithoglyphidae) are a diverse group in springs of the southwestern US, but a species list has not been included.

S1 Table. Summary of stream characteristics for regions. Values from National Hydrography Dataset Plus, version 1 (EPA and USGS).

Region	Area (km^2)	Streams (km)	Ratio of perennial to intermittent stream km	Canals & pipelines (km)	Ave. stream slope (%)	Ave. mean annual flow (m^3/sec.)	Ave. annual temp. (°C)	Ave. annual total ppt (cm)	Hydrological connections outside CA	Major features
Central Coast	29,313	27,830	0.15	228	0.07	0.13	14.0	52	-	Salinas River
Colorado River	51,431	31,668	0.04	3,859	0.04	18.20	18.8	21	Colorado basin (WY, CO, UT, AZ, NM, NV)	Colorado River, Salton Sea
North Coast	50,662	34,915	2.14	796	0.18	8.42	11.5	145	Klamath basin (OR)	Klamath, Trinity, Mad, Russian rivers
North Lahontan	15,863	8,917	0.75	391	0.07	0.85	6.4	74	Drains to closed basins in NV	Lake Tahoe, terminal basins
Sacramento River	70,684	49,773	0.72	11,306	0.06	6.23	12.2	98	-	Sacramento and Pit rivers, springs
San Francisco Bay	11,718	7,984	0.58	1,531	0.04	1.61	14.7	66	-	San Francisco Bay, vernal pools
San Joaquin River	39,686	29,145	0.57	9,559	0.06	4.03	12.5	77	-	San Joaquin River
South Coast	28,295	22,400	0.10	1,694	0.07	0.08	14.9	51	-	Santa Clara River
South Lahontan	69,063	43,867	0.07	1,179	0.06	0.41	14.1	27	Drains to closed basins in NV	Owens River, isolated springs
Tulare Lake	43,592	25,412	0.30	9,591	0.09	1.41	12.2	50	-	Kern River

S3 Table. Sources used to compile spatial data occurrences.

Citation	*Weblink*
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S4 Table. List of taxa included in the database.

Scientific Name	**Common Name**	**Group**
Abedus breviceps		Insects & other
Abedus herberti		Insects & other
Abedus indentatus		Insects & other
Abedus ovatus		Insects & other
Abedus parkeri		Insects & other
Abedus vicinus		Insects & other
Ablabesmyia annulata		Insects & other
Ablabesmyia aspera		Insects & other
Ablabesmyia cinctipes		Insects & other
Ablabesmyia mallochi		Insects & other
Ablabesmyia monilis		Insects & other
Ablabesmyia peleensis		Insects & other
Acalyptonotus pacificus		Insects & other
Acanthomysis aspera		Crustaceans
Acanthomysis hwanhaiensis		Crustaceans
Acentrella insignificans	A Mayfly	Insects & other
Acentrella turbida	A Mayfly	Insects & other
Acerpenna pygmaea		Insects & other
Acilius abbreviatus		Insects & other
Acipenser medirostris ssp. 1	Southern green sturgeon	Fishes
Acipenser medirostris ssp. 2	Northern green sturgeon	Fishes
Acipenser transmontanus	White sturgeon	Fishes
Acneus beeri		Insects & other
Acneus burnelli		Insects & other
Acneus oregonensis		Insects & other
Acneus quadrimaculatus		Insects & other
Actinemys marmorata marmorata	Western Pond Turtle	Herps
Actinemys marmorata pallida	Southern Pacific Pond Turtle	Herps
Actitis macularius	Spotted Sandpiper	Birds
Aechmophorus clarkii	Clark's Grebe	Birds
Aechmophorus occidentalis	Western Grebe	Birds
Aedes aegypti		Insects & other
Aedes cinereus		Insects & other
Aedes vexans		Insects & other
Aeshna canadensis	Canada Darner	Insects & other
Aeshna interrupta interna		Insects & other
Aeshna juncea		Insects & other
Aeshna palmata	Paddle-tailed Darner	Insects & other

Aeshna persephone		Insects & other
Aeshna subarctica		Insects & other
Aeshna umbrosa occidentalis	Shadow Darner	Insects & other
Aeshna walkeri	Walker's Darner	Insects & other
Agabinus glabrellus		Insects & other
Agabinus sculpturellus		Insects & other
Agabus ancillus		Insects & other
Agabus anthracinus		Insects & other
Agabus apache		Insects & other
Agabus approximatus		Insects & other
Agabus austinii		Insects & other
Agabus austrodiscors		Insects & other
Agabus bjorkmanae		Insects & other
Agabus brevicollis		Insects & other
Agabus confertus		Insects & other
Agabus cordatus		Insects & other
Agabus discors		Insects & other
Agabus disintegratus		Insects & other
Agabus erichsoni		Insects & other
Agabus euryomus		Insects & other
Agabus griseipennis		Insects & other
Agabus hoppingi		Insects & other
Agabus hypomelas		Insects & other
Agabus ilybiiformis		Insects & other
Agabus jimzim		Insects & other
Agabus klamathensis		Insects & other
Agabus kootenai		Insects & other
Agabus lineelus		Insects & other
Agabus lugens		Insects & other
Agabus lutosus		Insects & other
Agabus minnesotensis		Insects & other
Agabus morosus		Insects & other
Agabus obliteratus nectris		Insects & other
Agabus obliteratus obliteratus		Insects & other
Agabus oblongulus		Insects & other
Agabus obsoletus		Insects & other
Agabus pandurus		Insects & other
Agabus perplexus		Insects & other
Agabus punctulatus		Insects & other
Agabus regularis		Insects & other
Agabus roguus		Insects & other
Agabus rumppi	Death Valley Agabus Diving Beetle	Insects & other

Agabus sasquatch		Insects & other
Agabus semivittatus		Insects & other
Agabus seriatus		Insects & other
Agabus smithi		Insects & other
Agabus strigulosus		Insects & other
Agabus tristis		Insects & other
Agabus vandykei		Insects & other
Agabus versimilis		Insects & other
Agabus walsinghami		Insects & other
Agapetus arcita	A Caddisfly	Insects & other
Agapetus bifidus		Insects & other
Agapetus boulderensis		Insects & other
Agapetus celatus	A Caddisfly	Insects & other
Agapetus denningi		Insects & other
Agapetus joannia	A Caddisfly	Insects & other
Agapetus malleatus	A Caddisfly	Insects & other
Agapetus marlo	A Caddisfly	Insects & other
Agapetus occidentis		Insects & other
Agapetus orosus	A Caddisfly	Insects & other
Agapetus taho	A Caddisfly	Insects & other
Agathon arizonica		Insects & other
Agathon aylmeri		Insects & other
Agathon comstocki		Insects & other
Agathon dismalea		Insects & other
Agathon doanei	A Net-winged Midge	Insects & other
Agathon elegantulus		Insects & other
Agathon markii		Insects & other
Agathon sequoiarum		Insects & other
Agelaius phoeniceus aciculatus	Kern Red-winged Blackbird	Birds
Agelaius tricolor	Tricolored Blackbird	Birds
Agraylea multipunctata		Insects & other
Agraylea saltesea	A Caddisfly	Insects & other
Agrostis oregonensis	Oregon Bentgrass	Plants
Agrypnia dextra		Insects & other
Agrypnia glacialis	A Caddisfly	Insects & other
Agrypnia improba		Insects & other
Agrypnia vestita		Insects & other
Aix sponsa	Wood Duck	Birds
Alienacanthomysis macropsis		Crustaceans
Alisma gramineum	Narrowleaf Water-plantain	Plants
Alisma triviale	Northern Water-plantain	Plants

Alisotrichia arizonica		Insects & other
Allium validum	Tall Swamp Onion	Plants
Allocosmoecus partitus	A Caddisfly	Insects & other
Allomyia acanthis		Insects & other
Allomyia cascadis		Insects & other
Allomyia cidoipes	A Caddisfly	Insects & other
Allomyia renoa		Insects & other
Alloperla chandleri	Mariposa Sallfly	Insects & other
Alloperla delicata	Delicate Sallfly	Insects & other
Alloperla elevata	A Stonefly	Insects & other
Alloperla fraterna	Cascades Sallfly	Insects & other
Alloperla thalia		Insects & other
Alnus rhombifolia	White Alder	Plants
Alnus rubra	Red Alder	Plants
Alnus viridis fruticosa	Siberian Alder	Plants
Alnus viridis sinuata	Sitka Alder	Plants
Alnus viridis virdis	Green Alder	Plants
Alopecurus aequalis aequalis	Short-awn Foxtail	Plants
Alopecurus aequalis sonomensis	Sonoma Shortawn Foxtail	Plants
Alopecurus carolinianus	Tufted Foxtail	Plants
Alopecurus geniculatus geniculatus	Meadow Foxtail	Plants
Alopecurus myosuroides	NA	Plants
Alopecurus pratensis	NA	Plants
Alopecurus saccatus	Pacific Foxtail	Plants
Alotanypus venustus		Insects & other
Ambrysus amargosus	Ash Meadows Naucorid	Insects & other
Ambrysus arizonus		Insects & other
Ambrysus californicus		Insects & other
Ambrysus circumcinctus		Insects & other
Ambrysus funebris	Nevares Spring Naucorid Bug	Insects & other
Ambrysus melanopterus		Insects & other
Ambrysus mormon		Insects & other
Ambrysus occidentalis		Insects & other
Ambrysus pulchellus		Insects & other
Ambrysus puncticollis		Insects & other
Ambrysus relictus		Insects & other
Ambrysus thermarum		Insects & other
Ambrysus woodburyi		Insects & other
Ambystoma californiense "Santa Barbara"	Santa Barbara Tiger Salamander	Herps
Ambystoma californiense	Sonoma Tiger Salamander	Herps

"Sonoma"		
Ambystoma californiense californiense	California Tiger Salamander	Herps
Ambystoma gracile	Northwestern Salamander	Herps
Ambystoma macrodactylum		Herps
Ambystoma macrodactylum croceum	Santa Cruz Long-toed Salamander	Herps
Ambystoma macrodactylum sigillatum	Southern Long-toed Salamander	Herps
Ameletus amador	A Mayfly	Insects & other
Ameletus andersoni	A Mayfly	Insects & other
Ameletus bellulus	A Mayfly	Insects & other
Ameletus celer	A Mayfly	Insects & other
Ameletus cooki	A Mayfly	Insects & other
Ameletus dissitus	A Mayfly	Insects & other
Ameletus doddsianus		Insects & other
Ameletus edmundsi	A Mayfly	Insects & other
Ameletus exquisitus		Insects & other
Ameletus falsus		Insects & other
Ameletus imbellis	A Mayfly	Insects & other
Ameletus majusculus	A Mayfly	Insects & other
Ameletus minimus	A Mayfly	Insects & other
Ameletus oregonensis		Insects & other
Ameletus pritchardi	A Mayfly	Insects & other
Ameletus quadratus		Insects & other
Ameletus shepherdi	A Mayfly	Insects & other
Ameletus similior	A Mayfly	Insects & other
Ameletus sparsatus	A Mayfly	Insects & other
Ameletus subnotatus	A Mayfly	Insects & other
Ameletus suffusus	A Mayfly	Insects & other
Ameletus tolae		Insects & other
Ameletus validus	A Mayfly	Insects & other
Ameletus vancouverensis	A Mayfly	Insects & other
Ameletus velox	A Mayfly	Insects & other
Ameletus vernalis	A Mayfly	Insects & other
Americorophium salmonis		Crustaceans
Americorophium spinicorne		Crustaceans
Americorophium stimpsoni		Crustaceans
Ametor latus		Insects & other
Ametor scabrosus		Insects & other
Ametropus ammophilus	A Mayfly	Insects & other
Amiocentrus aspilus	A Caddisfly	Insects & other

Ammannia coccinea	Scarlet Ammannia	Plants
Ammannia robusta	Grand Redstem	Plants
Amnicola limosa		Mollusks
Amphiagrion abbreviatum	Western Red Damsel	Insects & other
Amphicosmoecus canax	A Caddisfly	Insects & other
Amphinemura apache		Insects & other
Amphinemura mogollonica		Insects & other
Amphinemura venusta		Insects & other
Amphiscirpus nevadensis		Plants
Amphizoa insolens		Insects & other
Amphizoa lecontei		Insects & other
Amphizoa striata		Insects & other
Ampumixis dispar		Insects & other
Anabolia bimaculata		Insects & other
Anacaena limbata		Insects & other
Anacaena signaticollis		Insects & other
Anacroneuria wipukupa		Insects & other
Anagapetus aisha	A Caddisfly	Insects & other
Anagapetus bernea	A Caddisfly	Insects & other
Anagapetus chandleri	A Caddisfly	Insects & other
Anagapetus debilis		Insects & other
Anagapetus hoodi		Insects & other
Anas acuta	Northern Pintail	Birds
Anas americana	American Wigeon	Birds
Anas clypeata	Northern Shoveler	Birds
Anas crecca	Green-winged Teal	Birds
Anas cyanoptera	Cinnamon Teal	Birds
Anas discors	Blue-winged Teal	Birds
Anas platyrhynchos	Mallard	Birds
Anas strepera	Gadwall	Birds
Anax junius	Common Green Darner	Insects & other
Anax walsinghami	Giant Green Darner	Insects & other
Anaxyrus boreas boreas	Boreal Toad	Herps
Anaxyrus boreas halophilus	California Toad	Herps
Anaxyrus californicus	Arroyo Toad	Herps
Anaxyrus canorus	Yosemite Toad	Herps
Anaxyrus cognatus	Great Plains Toad	Herps
Anaxyrus exsul	Black Toad	Herps
Anaxyrus punctatus	Red-spotted Toad	Herps
Anaxyrus woodhousii woodhousii	Rocky Mountain Toad	Herps

Anchycteis velutina		Insects & other
Anemopsis californica	Yerba Mansa	Plants
Anodonta californiensis	California Floater	Mollusks
Anodonta dejecta	Woebegone Floater	Mollusks
Anodonta oregonensis	Oregon Floater	Mollusks
Anopheles franciscanus		Insects & other
Anopheles freeborni		Insects & other
Anopheles hermsi		Insects & other
Anopheles judithae		Insects & other
Anopheles occidentalis		Insects & other
Anopheles punctipennis		Insects & other
Anser albifrons	Greater White-fronted Goose	Birds
Anser albifrons elgasi	Tule White-fronted Goose	Birds
Anthopotamus verticis	Walker's Tusked Sprawler	Insects & other
Antocha monticola		Insects & other
Apanisagrion lais		Insects & other
Apatania arizona		Insects & other
Apatania chasica		Insects & other
Apatania sorex	A Caddisfly	Insects & other
Apatania tavala	Cascades Apatanian Caddisfly	Insects & other
Apedilum elachistum		Insects & other
Apedilum subcinctum		Insects & other
Aphodius alternatus		Insects & other
Apobaetis etowah	A Mayfly	Insects & other
Aponogeton distachyos	NA	Plants
Apsectrotanypus florens		Insects & other
Apteraliplus parvulus		Insects & other
Aquarius amplus arizonensis		Insects & other
Aquarius remigis		Insects & other
Aquilegia eximia	Van Houtte's Columbine	Plants
Aquilegia shockleyi	NA	Plants
Araeopidius monochus		Insects & other
Archilestes californica	California Spreadwing	Insects & other
Archilestes grandis	Great Spreadwing	Insects & other
Archoplites interruptus	Sacramento perch	Fishes
Arctitalitus sylvaticus		Crustaceans
Arctocorisa sutilis		Insects & other
Arctopsyche californica	A Caddisfly	Insects & other
Arctopsyche grandis	A Caddisfly	Insects & other
Ardea alba	Great Egret	Birds
Ardea herodias	Great Blue Heron	Birds

Arenaria paludicola	Marsh Sandwort	Plants
Argia agrioides	California Dancer	Insects & other
Argia alberta	Paiute Dancer	Insects & other
Argia emma	Emma's Dancer	Insects & other
Argia fumipennis		Insects & other
Argia hinei	Lavender Dancer	Insects & other
Argia immunda	Kiowa Dancer	Insects & other
Argia lacrimans		Insects & other
Argia lugens	Sooty Dancer	Insects & other
Argia moesta	Powdered Dancer	Insects & other
Argia munda		Insects & other
Argia nahuana	Aztec Dancer	Insects & other
Argia oenea		Insects & other
Argia pallens		Insects & other
Argia pima		Insects & other
Argia plana		Insects & other
Argia sabino		Insects & other
Argia sedula	Blue-ringed Dancer	Insects & other
Argia tarascana		Insects & other
Argia tezpi		Insects & other
Argia tonto		Insects & other
Argia translata		Insects & other
Argia vivida	Vivid Dancer	Insects & other
Artemia franciscana	San Francisco Brine Shrimp	Crustaceans
Artemia monica	Mono Lake Brine Shrimp	Crustaceans
Arundo donax	NA	Plants
Asarum lemmonii	Lemmon's Wild Ginger	Plants
Ascaphus truei	Coastal Tailed Frog	Herps
Asioplax edmundsi	A Mayfly	Insects & other
Assiminea californica		Mollusks
Assiminea infima	Badwater Snail	Mollusks
Asynarchus aldinus		Insects & other
Asynarchus cinnamoneus		Insects & other
Asynarchus montanus		Insects & other
Asynarchus pacificus		Insects & other
Atherix pachypus		Insects & other
Atopsyche sperryi		Insects & other
Atopsyche tripunctata		Insects & other
Atractelmis wawona	Wawona Riffle Beetle	Insects & other
Attenella attenuata		Insects & other
Attenella delantala	A Mayfly	Insects & other

Attenella margarita	A Mayfly	Insects & other
Attenella soquele	A Mayfly	Insects & other
Augyles mundulus		Insects & other
Axonopsis californica		Insects & other
Aythya affinis	Lesser Scaup	Birds
Aythya americana	Redhead	Birds
Aythya collaris	Ring-necked Duck	Birds
Aythya marila	Greater Scaup	Birds
Aythya valisineria	Canvasback	Birds
Azolla filiculoides	NA	Plants
Azolla microphylla	Mexican mosquito fern	Plants
Baccharis glutinosa	NA	Plants
Baccharis salicina		Plants
Bacopa eisenii	Gila River Water-hyssop	Plants
Bacopa monnieri	NA	Plants
Bacopa rotundifolia	NA	Plants
Baetis adonis	A Mayfly	Insects & other
Baetis alius	A Mayfly	Insects & other
Baetis bicaudatus	A Mayfly	Insects & other
Baetis diablus	A Mayfly	Insects & other
Baetis flavistriga	A Mayfly	Insects & other
Baetis magnus	A Mayfly	Insects & other
Baetis notos	A Mayfly	Insects & other
Baetis palisadi	A Mayfly	Insects & other
Baetis piscatoris	A Mayfly	Insects & other
Baetis tricaudatus	A Mayfly	Insects & other
Baetisca lacustris		Insects & other
Baetodes alleni		Insects & other
Baetodes arizonensis		Insects & other
Baetodes bibranchius		Insects & other
Baetodes edmundsi		Insects & other
Bandakia fragilis		Insects & other
Bandakia longipalpis		Insects & other
Bandakia oregonensis		Insects & other
Banksiola crotchi	A Caddisfly	Insects & other
Batis maritima	Saltwort	Plants
Batrachoseps campi	Inyo Mountains Salamander	Herps
Baumannella alameda	Alameda Springfly	Insects & other
Beckmannia syzigachne	American Sloughgrass	Plants
Belostoma bakeri		Insects & other
Belostoma confusum		Insects & other

Belostoma flumineum		Insects & other
Belostoma saratogae	Saratoga Springs Belostoman Bug	Insects & other
Belostoma subspinosum		Insects & other
Bergia texana	Texas Bergia	Plants
Berosus fraternus		Insects & other
Berosus hatchi		Insects & other
Berosus infuscatus		Insects & other
Berosus ingeminatus		Insects & other
Berosus maculosus		Insects & other
Berosus metalliceps		Insects & other
Berosus notapeltatus		Insects & other
Berosus oregonensis		Insects & other
Berosus punctatissimus		Insects & other
Berosus sayi		Insects & other
Berosus stylifera		Insects & other
Berula erecta	Wild Parsnip	Plants
Betula glandulosa	Resin Birch	Plants
Bibiocephala grandis		Insects & other
Bidens cernua	Nodding Beggarticks	Plants
Bidens laevis	Smooth Bur-marigold	Plants
Bidens tripartita	NA	Plants
Bidens vulgata	NA	Plants
Bilyjomyia algens		Insects & other
Biomphalaria havanensis	Ghost Rams-horn	Mollusks
Bisancora pastina	Antelope Sallfly	Insects & other
Bisancora rutriformis	Scooped Sallfly	Insects & other
Bistorta bistortoides		Plants
Bittacomorpha clavipes		Insects & other
Bittacomorpha occidentalis		Insects & other
Bittacomorphella ostenii		Insects & other
Bittacomorphella pacifica		Insects & other
Blennosperma bakeri	Baker's Blennosperma	Plants
Blephariceera jordani		Insects & other
Blephariceera kalmiopsis		Insects & other
Blephariceera micheneri	A Net-winged Midge	Insects & other
Blephariceera ostensackeni		Insects & other
Blephariceera zionensis		Insects & other
Boehmeria cylindrica	NA	Plants
Bolboschoenus fluviatilis		Plants
Bolboschoenus glaucus	NA	Plants
Bolboschoenus maritimus	NA	Plants

paludosus		
Bolboschoenus robustus		Plants
Bolshecapnia maculata	Spotted Snowfly	Insects & other
Boreoclus persimilis		Insects & other
Boreoclus sinuaticornis		Insects & other
Boreoheptagyia lurida		Insects & other
Botaurus lentiginosus	American Bittern	Birds
Bowmanasellus sequoiae	Sequoia cave isopod	Crustaceans
Brachycentrus americanus	A Caddisfly	Insects & other
Brachycentrus echo	A Caddisfly	Insects & other
Brachycentrus occidentalis		Insects & other
Brachymesia furcata	Red-tailed Pennant	Insects & other
Brachymesia gravida		Insects & other
Branchinecta campestris	Pocket Pouch Fairy Shrimp	Crustaceans
Branchinecta coloradensis	Colorado Fairy Shrimp	Crustaceans
Branchinecta conservatio	Conservancy Fairy Shrimp	Crustaceans
Branchinecta cornigera		Crustaceans
Branchinecta dissimilis	Dissimilar Fairy Shrimp	Crustaceans
Branchinecta gigas	Giant Fairy Shrimp	Crustaceans
Branchinecta hiberna	Winter Fairy Shrimp	Crustaceans
Branchinecta kaibabensis		Crustaceans
Branchinecta lindahli	Versatile Fairy Shrimp	Crustaceans
Branchinecta longiantenna	Longhorn Fairy Shrimp	Crustaceans
Branchinecta lynchi	Vernal Pool Fairy Shrimp	Crustaceans
Branchinecta mackini	Alkali Fairy Shrimp	Crustaceans
Branchinecta mesovallensis	Midvalley Fairy Shrimp	Crustaceans
Branchinecta oriena	A Fairy Shrimp	Crustaceans
Branchinecta packardi		Crustaceans
Branchinecta sandiegonensis	San Diego Fairy Shrimp	Crustaceans
Brasenia schreberi	Watershield	Plants
Brechmorhoga mendax	Pale-faced Clubskimmer	Insects & other
Brechmorhoga pertinax		Insects & other
Brillia flavifrons		Insects & other
Brillia laculata		Insects & other
Brillia parva		Insects & other
Brillia retifinis		Insects & other
Brodiaea nana		Plants
Brodiaea orcuttii	Orcutt's Brodiaea	Plants
Brodiaea pallida	Chinese Camp Brodiaea	Plants
Brundiniella eumorpha		Insects & other
Brychius hornii		Insects & other

Brychius pacificus		Insects & other
Bucephala albeola	Bufflehead	Birds
Bucephala clangula	Common Goldeneye	Birds
Buenoa arida		Insects & other
Buenoa arizonis		Insects & other
Buenoa hungerfordi		Insects & other
Buenoa margaritacea		Insects & other
Buenoa omani		Insects & other
Buenoa scimitra		Insects & other
Buenoa uhleri		Insects & other
Butorides virescens	Green Heron	Birds
Caecidotea sequoiae	An Isopod	Crustaceans
Caecidotea tomalensis	Tomales Isopod	Crustaceans
Caenis amica	A Mayfly	Insects & other
Caenis bajaensis	A Mayfly	Insects & other
Caenis latipennis	A Mayfly	Insects & other
Caenis punctata	A Mayfly	Insects & other
Caenis youngi	A Mayfly	Insects & other
Caladomyia pistra		Insects & other
Calamagrostis nutkaensis	Pacific Small-reedgrass	Plants
Calasellus californicus	An Isopod	Crustaceans
Calasellus longus	An Isopod	Crustaceans
Calidris alpina	Dunlin	Birds
Calidris mauri	Western Sandpiper	Birds
Calidris minutilla	Least Sandpiper	Birds
Calileuctra dobryi	Elsmere Needlefly	Insects & other
Calileuctra ephemera	Napa Needlefly	Insects & other
Calineuria californica	Western Stone	Insects & other
Callibaetis californicus	A Mayfly	Insects & other
Callibaetis ferrugineus	A Mayfly	Insects & other
Callibaetis fluctuans	A Mayfly	Insects & other
Callibaetis montanus		Insects & other
Callibaetis pallidus	A Mayfly	Insects & other
Callibaetis pictus	A Mayfly	Insects & other
Callicorixa audeni		Insects & other
Callicorixa scudderi		Insects & other
Callicorixa vulnerata		Insects & other
Calliperla luctuosa	Coast Stripetail	Insects & other
Callitriche fassettii	NA	Plants
Callitriche heterophylla bolanderi	Large Water-starwort	Plants

Callitriche heterophylla heterophylla	Northern Water-starwort	Plants
Callitriche longipedunculata	Longstock Water-starwort	Plants
Callitriche marginata	Winged Water-starwort	Plants
Callitriche palustris	Vernal Water-starwort	Plants
Callitriche trochlearis	Waste-water Water-starwort	Plants
Calochortus uniflorus	Shortstem Mariposa Lily	Plants
Calopteryx aequabilis	River Jewelwing	Insects & other
Caltha leptosepala	Slender-sepal Marsh-marigold	Plants
Caltha palustris	NA	Plants
Camelobaetidius kickapoo		Insects & other
Camelobaetidius maidu	Maidu Mayfly	Insects & other
Camelobaetidius mexicanus		Insects & other
Camelobaetidius musseri		Insects & other
Camelobaetidius warreni	A Mayfly	Insects & other
Campanula californica	Swamp Harebell	Plants
Capnia barberi	Plumas Snowfly	Insects & other
Capnia californica	California Snowfly	Insects & other
Capnia caryi		Insects & other
Capnia confusa		Insects & other
Capnia coyote	Coyote Snowfly	Insects & other
Capnia decepta		Insects & other
Capnia elongata	Caascades Snowfly	Insects & other
Capnia erecta		Insects & other
Capnia excavata	Saddleback Snowfly	Insects & other
Capnia fialai	Humboldt Snowfly	Insects & other
Capnia giulianii	Whitney Snowfly	Insects & other
Capnia glabra	Smooth Snowfly	Insects & other
Capnia gracilaria	Slender Snowfly	Insects & other
Capnia hitchcocki	Arroyo Snowfly	Insects & other
Capnia hornigi		Insects & other
Capnia inyo	Inyo Snowfly	Insects & other
Capnia jewetti		Insects & other
Capnia kersti		Insects & other
Capnia lacustra	Lake Snowfly	Insects & other
Capnia licina		Insects & other
Capnia lineata	Straight Snowfly	Insects & other
Capnia mariposa	Mariposa Snowfly	Insects & other
Capnia melia	Northwest Snowfly	Insects & other
Capnia mono	Mono Snowfly	Insects & other
Capnia nana		Insects & other

Capnia nedia		Insects & other
Capnia ophiona	Snakehead Snowfly	Insects & other
Capnia oregona		Insects & other
Capnia palomar	Palomar Snowfly	Insects & other
Capnia petila		Insects & other
Capnia pileata	Birdhead Snowfly	Insects & other
Capnia promota	Pacific Snowfly	Insects & other
Capnia quadrituberosa	Four-knobbed Snowfly	Insects & other
Capnia regilla	Royal Snowfly	Insects & other
Capnia saratoga	Saratoga Snowfly	Insects & other
Capnia scobina	Rasp Snowfly	Insects & other
Capnia sequoia	Sequoia Snowfly	Insects & other
Capnia sextuberculata		Insects & other
Capnia shasta		Insects & other
Capnia shepardi	Yuba Snowfly	Insects & other
Capnia spinulosa	San Gabriel Snowfly	Insects & other
Capnia teresa	Bernardino Snowfly	Insects & other
Capnia tumida	Swollen Snowfly	Insects & other
Capnia uintahi		Insects & other
Capnia umpqua	Umpqua Snowfly	Insects & other
Capnia utahensis	Utah Snowfly	Insects & other
Capnia valhalla	Viking Snowfly	Insects & other
Capnia ventura	Ventura Snowfly	Insects & other
Capnia willametta		Insects & other
Capnia yosemite	Yosemite Snowfly	Insects & other
Capnura anas		Insects & other
Capnura elevata		Insects & other
Capnura fibula		Insects & other
Capnura intermontana		Insects & other
Capnura venosa		Insects & other
Capnura wanica		Insects & other
Cardiocladius platypus		Insects & other
Carex alma	Sturdy Sedge	Plants
Carex amplifolia	Bigleaf Sedge	Plants
Carex aquatilis aquatilis	Water Sedge	Plants
Carex aquatilis dives	Sitka Sedge	Plants
Carex arcta	Northern Clustered Sedge	Plants
Carex atherodes	Awned Sedge	Plants
Carex aurea	Golden-fruit Sedge	Plants
Carex buxbaumii	Buxbaum's Sedge	Plants
Carex canescens canescens	Hoary Sedge	Plants

Carex comosa	Bristly Sedge	Plants
Carex cusickii	Cusick's Sedge	Plants
Carex densa	Dense Sedge	Plants
Carex diandra	Lesser Panicled Sedge	Plants
Carex disperma	Softleaf Sedge	Plants
Carex echinata echinata	Little Prickly Sedge	Plants
Carex echinata phyllomanica	Star Sedge	Plants
Carex exsiccata	Beaked Sedge	Plants
Carex feta	Green-sheath Sedge	Plants
Carex fissuricola	Cleft Sedge	Plants
Carex harfordii	Harford's Sedge	Plants
Carex hendersonii	Henderson's Sedge	Plants
Carex hirtissima	Fuzzy Sedge	Plants
Carex hystericina	Porcupine Sedge	Plants
Carex integra	Smooth-beak Sedge	Plants
Carex interior	Inland Sedge	Plants
Carex jonesii	Jones' Sedge	Plants
Carex klamathensis		Plants
Carex lasiocarpa	Slender Sedge	Plants
Carex lemmonii	Lemmon's Sedge	Plants
Carex lenticularis	Shore Sedge	Plants
Carex leporina		Plants
Carex leporinella	Sierra Hare Sedge	Plants
Carex leptalea	NA	Plants
Carex limosa	Mud Sedge	Plants
Carex livida	Livid Sedge	Plants
Carex longii	NA	Plants
Carex luzulina luzulina	Woodrush Sedge	Plants
Carex lyngbyei	Lyngbye's Sedge	Plants
Carex mertensii	Mertens' Sedge	Plants
Carex nebrascensis	Nebraska Sedge	Plants
Carex nervina	Sierra Sedge	Plants
Carex neurophora	Alpine-nerved Sedge	Plants
Carex nigricans	Black Alpine Sedge	Plants
Carex nudata	Torrent Sedge	Plants
Carex obnupta	Slough Sedge	Plants
Carex pellita	Woolly Sedge	Plants
Carex praeceptorum	Teacher's Sedge	Plants
Carex praticola	Northern Meadow Sedge	Plants
Carex saliniformis	Santa Cruz Sedge	Plants
Carex sartwelliana	Yosemite Sedge	Plants

Carex scabriuscula	Cascade Sedge	Plants
Carex schottii	Schott's Sedge	Plants
Carex scoparia scoparia	Broom Sedge	Plants
Carex scopulorum bracteosa	Holm's Rocky Mountain Sedge	Plants
Carex senta	Western Rough Sedge	Plants
Carex sheldonii	Sheldon's Sedge	Plants
Carex simulata	Copycat Sedge	Plants
Carex spectabilis	Northwestern Showy Sedge	Plants
Carex stipata stipata	Stalk-grain Sedge	Plants
Carex utriculata	Beaked Sedge	Plants
Carex vesicaria vesicaria	Inflated Sedge	Plants
Carex viridula viridula	Little Green Sedge	Plants
Carex vulpinoidea	NA	Plants
Cascadia nuttallii	NA	Plants
Cascadoperla trictura	Cascades Stripetail	Insects & other
Castilleja campestris succulenta	Fleshy Owl's-clover	Plants
Castilleja miniata elata	Siskiyou Indian-paintbrush	Plants
Castilleja miniata miniata	Greater Red Indian-paintbrush	Plants
Castilleja minor minor	Alkali Indian-paintbrush	Plants
Castilleja minor spiralis	Large-flower Annual Indian-paintbrush	Plants
Castor canadensis	American Beaver	Mammals
Catostomus fumeiventris	Owens sucker	Fishes
Catostomus latipinnis	Flannelmouth sucker	Fishes
Catostomus luxatus	Lost River sucker	Fishes
Catostomus microps	Modoc sucker	Fishes
Catostomus occidentalis humboldtianus	Humboldt sucker	Fishes
Catostomus occidentalis lacusanserinus	Goose Lake sucker	Fishes
Catostomus occidentalis mnioltiltus	Monterey sucker	Fishes
Catostomus occidentalis occidentalis	Sacramento sucker	Fishes
Catostomus platyrhynchus	Lahontan mountain sucker	Fishes
Catostomus rimiculus	Klamath smallscale sucker	Fishes
Catostomus santaanae	Santa Ana sucker	Fishes
Catostomus snyderi	Klamath largescale sucker	Fishes
Catostomus tahoensis	Tahoe sucker	Fishes
Caudatella columbiella		Insects & other
Caudatella edmundsi	A Mayfly	Insects & other
Caudatella heterocaudata	A Mayfly	Insects & other
Caudatella hystrix	A Mayfly	Insects & other

Caudatella jacobi	A Mayfly	Insects & other
Celina occidentalis		Insects & other
Cenocorixa andersoni		Insects & other
Cenocorixa blaisdelli		Insects & other
Cenocorixa kuiterti	A Water Boatman	Insects & other
Cenocorixa utahensis		Insects & other
Cenocorixa wileyae		Insects & other
Centroptilum album	A Mayfly	Insects & other
Centroptilum asperatum	A Mayfly	Insects & other
Centroptilum bifurcatum	A Mayfly	Insects & other
Centroptilum conturbatum	A Mayfly	Insects & other
Centroptilum elsa		Insects & other
Centroptilum oreophilum		Insects & other
Centroptilum selanderorum		Insects & other
Cephalanthus occidentalis	Common Buttonbush	Plants
Ceraclea annulicornis	A Caddisfly	Insects & other
Ceraclea latahensis	A Caddisfly	Insects & other
Ceraclea maculata	A Caddisfly	Insects & other
Ceraclea resurgens		Insects & other
Ceraclea tarsipunctata	A Caddisfly	Insects & other
Ceraclea vertreesi		Insects & other
Ceratophyllum demersum	Common Hornwort	Plants
Chaetarthria bicolor		Insects & other
Chaetarthria hespera		Insects & other
Chaetarthria leechi	Leech's Chaetarthrian Water Scavenger Beetle	Insects & other
Chaetarthria magna		Insects & other
Chaetarthria nigrella		Insects & other
Chaetarthria ochra		Insects & other
Chaetarthria pallida		Insects & other
Chaetarthria punctulata		Insects & other
Chaetarthria pusilla		Insects & other
Chaetarthria spinata		Insects & other
Chaetarthria truncata		Insects & other
Chaetocladius ligni		Insects & other
Chamaecyparis lawsoniana		Plants
Chasmatonotus hyalinus		Insects & other
Chasmatonotus maculipennis		Insects & other
Chasmatonotus univittatus		Insects & other
Chasmistes brevirostris	Shortnose sucker	Fishes
Chelomideopsis brunsoni		Insects & other

Chelomideopsis minuta		Insects & other
Chelomideopsis occidentalis		Insects & other
Chelomideopsis siskiyouensis		Insects & other
Chen caerulescens	Snow Goose	Birds
Chen rossii	Ross's Goose	Birds
Chernokrilus misnomus	Oregon Springfly	Insects & other
Chernovskiia orbicus		Insects & other
Cheumatopsyche analis		Insects & other
Cheumatopsyche arizonensis	A Caddisfly	Insects & other
Cheumatopsyche campyla	A Caddisfly	Insects & other
Cheumatopsyche enonis		Insects & other
Cheumatopsyche gelita		Insects & other
Cheumatopsyche lasia		Insects & other
Cheumatopsyche mickeli	A Caddisfly	Insects & other
Cheumatopsyche mollala	A Caddisfly	Insects & other
Cheumatopsyche pasella		Insects & other
Cheumatopsyche pinula		Insects & other
Cheumatopsyche wabasha		Insects & other
Chimarra adella		Insects & other
Chimarra angustipennis	A Caddisfly	Insects & other
Chimarra butleri	A Caddisfly	Insects & other
Chimarra elia	A Caddisfly	Insects & other
Chimarra lara		Insects & other
Chimarra primula		Insects & other
Chimarra ridleyi		Insects & other
Chimarra schiza		Insects & other
Chimarra siva		Insects & other
Chimarra texana		Insects & other
Chimarra utahensis	A Caddisfly	Insects & other
Chironomus anonymus		Insects & other
Chironomus anthracinus		Insects & other
Chironomus atrella		Insects & other
Chironomus calligraphus		Insects & other
Chironomus cucini		Insects & other
Chironomus decorus		Insects & other
Chironomus frommeri		Insects & other
Chironomus longipes		Insects & other
Chironomus maturus		Insects & other
Chironomus mendax		Insects & other
Chironomus plumosus		Insects & other
Chironomus riparius		Insects & other

Chironomus staegeri		Insects & other
Chironomus stigmaterus		Insects & other
Chironomus tuxis		Insects & other
Chironomus utahensis		Insects & other
Chironomus whitseli		Insects & other
Chlidonias niger	Black Tern	Birds
Chloropyron maritimum canescens		Plants
Chloropyron maritimum maritimum		Plants
Chloropyron maritimum palustre		Plants
Chloropyron molle hispidum		Plants
Chloropyron molle molle		Plants
Chloropyron palmatum	NA	Plants
Chloropyron tecopense		Plants
Choroterpes albiannulata	A Mayfly	Insects & other
Choroterpes inornata	A Mayfly	Insects & other
Choroterpes terratoma	A Mayfly	Insects & other
Chroicocephalus philadelphia	Bonaparte's Gull	Birds
Chrysosplenium glechomifolium	Pacific Golden-saxifrage	Plants
Chyrandra centralis	A Caddisfly	Insects & other
Cicendia quadrangularis	Oregon Microcala	Plants
Cicuta douglasii	Western Water-hemlock	Plants
Cicuta maculata angustifolia	Spotted Water-hemlock	Plants
Cicuta maculata bolanderi	Bolander's Water-hemlock	Plants
Cicuta maculata maculata	Spotted Water-hemlock	Plants
Cinclus mexicanus	American Dipper	Birds
Cinygma dimicki	A Mayfly	Insects & other
Cinygma integrum	A Mayfly	Insects & other
Cinygma lyriforme	A Mayfly	Insects & other
Cinygmula gartrelli	A Mayfly	Insects & other
Cinygmula mimus	A Mayfly	Insects & other
Cinygmula par	A Mayfly	Insects & other
Cinygmula ramaleyi	A Mayfly	Insects & other
Cinygmula reticulata	A Mayfly	Insects & other
Cinygmula tarda		Insects & other
Cinygmula tioga	A Mayfly	Insects & other
Cinygmula uniformis	A Mayfly	Insects & other
Cirsium crassicaule	Slough Thistle	Plants
Cirsium douglasii breweri		Plants

Cirsium douglasii douglasii	Douglas' Thistle	Plants
Cirsium fontinale campylon	Mt. Hamilton Thistle	Plants
Cirsium fontinale fontinale	Fountain Thistle	Plants
Cirsium fontinale obispoense	Chorro Creek Bog Thistle	Plants
Cirsium hydrophilum hydrophilum	Suisun Thistle	Plants
Cirsium hydrophilum vaseyi	Mt. Tamalpais Thistle	Plants
Cirsium scariosum loncholepis		Plants
Cirsium scariosum robustum		Plants
Cirsium scariosum scariosum	Drummond's Thistle	Plants
Cistothorus palustris clarkae	Clark's Marsh Wren	Birds
Cistothorus palustris palustris	Marsh Wren	Birds
Claassenia sabulosa	Shortwing Stone	Insects & other
Cladium californicum	California Sawgrass	Plants
Cladopelma amachaerum		Insects & other
Cladopelma edwardsi		Insects & other
Cladopelma forcipis		Insects & other
Cladopelma viridulum		Insects & other
Cladotanytarsus marki		Insects & other
Cladotanytarsus viridiventris		Insects & other
Cleptelmis addenda		Insects & other
Climacia californica		Insects & other
Clinopodium mimuloides	Monkey-flower Savory	Plants
Clinotanypus pinguis		Insects & other
Clistoronia formosa		Insects & other
Clistoronia maculata		Insects & other
Clistoronia magnifica	A Caddisfly	Insects & other
Cloeodes excogitatus	A Mayfly	Insects & other
Cloeodes macrolamellus		Insects & other
Cloeodes peninsulus		Insects & other
Clostoeca disjuncta	A Caddisfly	Insects & other
Clunio californiensis		Insects & other
Cnodocentron yavapai		Insects & other
Coccyzus americanus occidentalis	Western Yellow-billed Cuckoo	Birds
Coenagrion resolutum	Taiga Bluet	Insects & other
Colligyrus convexus	Canary Duskysnail	Mollusks
Colligyrus greggi		Mollusks
Colymbetes crotchi		Insects & other
Colymbetes densus		Insects & other
Colymbetes incognitus		Insects & other
Colymbetes strigatus		Insects & other

Comarum palustre	Marsh Cinquefoil	Plants
Conchapelopia mera		Insects & other
Conchapelopia pallens		Insects & other
Copelatus chevrolati		Insects & other
Copelatus glyphicus		Insects & other
Coptotomus longulus longulus		Insects & other
Coquillettidia peturbans		Insects & other
Cordulegaster diadema		Insects & other
Cordulegaster dorsalis	Pacific Spiketail	Insects & other
Cordulia shurtleffii	American Emerald	Insects & other
Corisella decolor		Insects & other
Corisella edulis		Insects & other
Corisella inscripta		Insects & other
Corisella tarsalis		Insects & other
Corydalus bidenticulatus		Insects & other
Corydalus texanus		Insects & other
Cosumnoperla hypocrena	Cosumnes Stripetail	Insects & other
Cosumnoperla sequoia	A Stonefly	Insects & other
Cottus aleuticus	Coastrange sculpin	Fishes
Cottus asper ssp. 1	Prickly sculpin	Fishes
Cottus asper ssp. 2	Clear Lake prickly sculpin	Fishes
Cottus asperrimus	Rough sculpin	Fishes
Cottus beldingi	Paiute sculpin	Fishes
Cottus gulosus	Riffle sculpin	Fishes
Cottus klamathensis klamathensis	Upper Klamath marbled sculpin	Fishes
Cottus klamathensis macrops	Bigeye marbled sculpin	Fishes
Cottus klamathensis polyporus	Lower Klamath marbled sculpin	Fishes
Cottus perplexus	Reticulate sculpin	Fishes
Cottus pitensis	Pit sculpin	Fishes
Cotula coronopifolia	NA	Plants
Coturnicops noveboracensis	Yellow Rail	Birds
Crangonyx richmondensis	Ellis Bog Crangonyctid	Crustaceans
Crassula aquatica	Water Pygmyweed	Plants
Crassula solieri	NA	Plants
Crenitis alticola		Insects & other
Crenitis dissimilis		Insects & other
Crenitis malkini		Insects & other
Crenitis morata		Insects & other
Crenitis palpalis		Insects & other
Crenitis paradigma		Insects & other

Crenitis rufiventris		Insects & other
Crenitis seriellus		Insects & other
Crenitis snoqualmie		Insects & other
Crenophylax sperryi		Insects & other
Cricotopus annulator		Insects & other
Cricotopus bicinctus		Insects & other
Cricotopus blinni		Insects & other
Cricotopus edurus		Insects & other
Cricotopus furtivus		Insects & other
Cricotopus fuscatus		Insects & other
Cricotopus globistylus		Insects & other
Cricotopus herrmanni		Insects & other
Cricotopus infuscatus		Insects & other
Cricotopus nostocicola		Insects & other
Cricotopus obscurifuscus		Insects & other
Cricotopus ornatus		Insects & other
Cricotopus parafuscatus		Insects & other
Cricotopus subfuscus		Insects & other
Cricotopus subletteorum		Insects & other
Cricotopus sylvestris		Insects & other
Cricotopus tremulus		Insects & other
Cricotopus trifascia		Insects & other
Crypsis vaginiflora	NA	Plants
Cryptochia califca	A Caddisfly	Insects & other
Cryptochia denningi	Denning's Cryptic Caddisfly	Insects & other
Cryptochia excella	Kings Canyon Cryptochian Caddisfly	Insects & other
Cryptochia neosa		Insects & other
Cryptochia pilosa		Insects & other
Cryptochia shasta	Confusion Caddisfly	Insects & other
Cryptochironomus curryi		Insects & other
Cryptochironomus digitatus		Insects & other
Cryptochironomus fulvus		Insects & other
Cryptochironomus ponderosus		Insects & other
Cryptochironomus psittacinus		Insects & other
Cryptotendipes ariel		Insects & other
Cryptotendipes darbyi		Insects & other
Culex anips		Insects & other
Culex apicalis		Insects & other
Culex arizonensis		Insects & other
Culex boharti		Insects & other
Culex coronator		Insects & other

Culex erythrothorax		Insects & other
Culex interrogator		Insects & other
Culex pipiens		Insects & other
Culex quinquefasciatus		Insects & other
Culex reevesi		Insects & other
Culex restuans		Insects & other
Culex salinarius		Insects & other
Culex stigmatosoma		Insects & other
Culex tarsalis		Insects & other
Culex territans		Insects & other
Culex thriambus		Insects & other
Culiseta impatiens		Insects & other
Culiseta incidens		Insects & other
Culiseta inornata		Insects & other
Culiseta minnesotae		Insects & other
Culiseta morsitans		Insects & other
Culiseta particeps		Insects & other
Culoptila cantha		Insects & other
Culoptila kimminsi		Insects & other
Culoptila moselyi		Insects & other
Culoptila thoracica		Insects & other
Cultus aestivalis		Insects & other
Cultus pilatus		Insects & other
Cultus tostonus	Toston Springfly	Insects & other
Curicta pronotata		Insects & other
Cybister ellipticus		Insects & other
Cybister explanatus		Insects & other
Cyclothyas siskiyouensis		Insects & other
Cygnus buccinator	Trumpeter Swan	Birds
Cygnus columbianus	Tundra Swan	Birds
Cylloepus abnormis		Insects & other
Cylloepus parkeri		Insects & other
Cymbiodyta arizonica		Insects & other
Cymbiodyta columbiana		Insects & other
Cymbiodyta dorsalis		Insects & other
Cymbiodyta fraterculus		Insects & other
Cymbiodyta howdeni		Insects & other
Cymbiodyta imbellis		Insects & other
Cymbiodyta leechi		Insects & other
Cymbiodyta minima		Insects & other
Cymbiodyta occidentalis		Insects & other

Cymbiodyta pacifica		Insects & other
Cymbiodyta pseudopacifica		Insects & other
Cymbiodyta puella		Insects & other
Cymbiodyta punctatostriata		Insects & other
Cymbiodyta seriata		Insects & other
Cyperus acuminatus	Short-point Flatsedge	Plants
Cyperus bipartitus	Shining Flatsedge	Plants
Cyperus erythrorhizos	Red-root Flatsedge	Plants
Cyperus flavescens	NA	Plants
Cyperus fuscus	NA	Plants
Cyperus involucratus	NA	Plants
Cyperus iria	NA	Plants
Cyperus squarrosus	Awned Cyperus	Plants
Cyphomella gibbera		Insects & other
Cyphon arcuatus		Insects & other
Cyphon brevicollis		Insects & other
Cyphon exiguus		Insects & other
Cyphon johni		Insects & other
Cyphon spinulosus		Insects & other
Cyphon variabilis		Insects & other
Cyprinodon macularius	Desert pupfish	Fishes
Cyprinodon nevadensis amargosae	Amargosa River pupfish	Fishes
Cyprinodon nevadensis calidae	Tecopa Pupfish	Fishes
Cyprinodon nevadensis nevadensis	Saratoga Springs pupfish	Fishes
Cyprinodon nevadensis shoshone	Shoshone pupfish	Fishes
Cyprinodon radiosus	Owens pupfish	Fishes
Cyprinodon salinus milleri	Cottonball Marsh pupfish	Fishes
Cyprinodon salinus salinus	Salt Creek pupfish	Fishes
Cypripedium californicum	California Lady's-slipper	Plants
Cypseloides niger	Black Swift	Birds
Cyzicus californicus	California Clam Shrimp	Crustaceans
Cyzicus elongatus	Elongate Clam Shrimp	Crustaceans
Cyzicus mexicanus	Mexican Clam Shrimp	Crustaceans
Cyzicus setosa	Bristletail Clam Shrimp	Crustaceans
Damasonium californicum		Plants
Darlingtonia californica	California Pitcherplant	Plants
Darmera peltata	Umbrella Plant	Plants
Datisca glomerata	Durango Root	Plants
Delphinium uliginosum	Swamp Larkspur	Plants

Deltamysis homquistae		Crustaceans
Demeijerea brachialis		Insects & other
Dendrocygna bicolor	Fulvous Whistling-Duck	Birds
Derotanypus aclines		Insects & other
Desmona bethula	Amphibious Caddisfly	Insects & other
Desmona mono	A Caddisfly	Insects & other
Desmopachria dispersa		Insects & other
Desmopachria latissima		Insects & other
Desmopachria mexicana		Insects & other
Desmopachria portmanni		Insects & other
Despaxia augusta	Smooth Needleflyl	Insects & other
Deuterophlebia coloradensis		Insects & other
Deuterophlebia inyoensis		Insects & other
Deuterophlebia nielsoni		Insects & other
Deuterophlebia personata		Insects & other
Deuterophlebia shasta	A Mountain Midge	Insects & other
Diamesa aberrata		Insects & other
Diamesa ancysta		Insects & other
Diamesa chorea		Insects & other
Diamesa davisi		Insects & other
Diamesa haydaki		Insects & other
Diamesa heteropus		Insects & other
Diamesa japonica		Insects & other
Diamesa sonorae		Insects & other
Diamesa spinacies		Insects & other
Dicamptodon ensatus	California Giant Salamander	Herps
Dicamptodon tenebrosus	Pacific Giant Salamander	Herps
Dicosmoecus atripes	A Caddisfly	Insects & other
Dicosmoecus gilvipes	A Caddisfly	Insects & other
Dicosmoecus pallicornis	A Caddisfly	Insects & other
Dicrotendipes adnilus		Insects & other
Dicrotendipes aethiops		Insects & other
Dicrotendipes californicus		Insects & other
Dicrotendipes crypticus		Insects & other
Dicrotendipes fumidus		Insects & other
Dicrotendipes milleri		Insects & other
Dicrotendipes modestus		Insects & other
Dicrotendipes nervosus		Insects & other
Dicrotendipes tritomus		Insects & other
Dineutus solitarius		Insects & other
Dineutus sublineatus		Insects & other

Diphetor hageni	Hagen's Small Minnow Mayfly	Insects & other
Diplectrona californica	California Diplectronan Caddisfly	Insects & other
Distichlis littoralis	NA	Plants
Diura knowltoni	Nearctic Springfly	Insects & other
Doddsia occidentalis	Western Willowfly	Insects & other
Doithrix barberi		Insects & other
Doithrix ensifer		Insects & other
Dolophilodes aequalis	A Caddisfly	Insects & other
Dolophilodes andora	A Caddisfly	Insects & other
Dolophilodes dorcus	A Caddisfly	Insects & other
Dolophilodes novusamericanus	A Caddisfly	Insects & other
Dolophilodes pallidipes	A Caddisfly	Insects & other
Doroneuria baumanni	Cascades Stone	Insects & other
Downingia bacigalupii	Bacigalup's Downingia	Plants
Downingia bella	Hoover's Downingia	Plants
Downingia bicornuta	NA	Plants
Downingia concolor	NA	Plants
Downingia cuspidata	Toothed Calicoflower	Plants
Downingia elegans	NA	Plants
Downingia insignis	Parti-color Downingia	Plants
Downingia laeta	Great Basin Downingia	Plants
Downingia montana	Sierra Downingia	Plants
Downingia ornatissima	NA	Plants
Downingia pulchella	Flat-face Downingia	Plants
Downingia pulcherrima		Plants
Downingia pusilla	Dwarf Downingia	Plants
Downingia willamettensis		Plants
Downingia yina	NA	Plants
Drosera anglica	English Sundew	Plants
Drosera rotundifolia	NA	Plants
Drunella coloradensis	A Mayfly	Insects & other
Drunella doddsii	A Mayfly	Insects & other
Drunella flavilinea	A Mayfly	Insects & other
Drunella grandis	A Mayfly	Insects & other
Drunella pelosa	A Mayfly	Insects & other
Drunella spinifera	A Mayfly	Insects & other
Drymocallis cuneifolia ewanii		Plants
Dryops arizonensis		Insects & other
Dubiraphia brunnescens	Brownish Dubiraphian Riffle Beetle	Insects & other
Dubiraphia giulianii	Giuliani's Dubiraphian Riffle Beetle	Insects & other
Dulichium arundinaceum	NA	Plants

Dumontia oregonensis	A Water Flea	Crustaceans
Dysmicohermes disjunctus		Insects & other
Dysmicohermes ingens		Insects & other
Dythemis fugax		Insects & other
Dythemis nigrescens		Insects & other
Dythemis velox		Insects & other
Dytiscus cordieri		Insects & other
Dytiscus dauricus		Insects & other
Dytiscus habilis		Insects & other
Dytiscus hatchi		Insects & other
Dytiscus hybridus		Insects & other
Dytiscus marginicollis		Insects & other
Ecclisocosmoecus scylla		Insects & other
Ecclisomyia bilera	King's Creek Ecclisomyian Caddisfly	Insects & other
Ecclisomyia conspersa	A Caddisfly	Insects & other
Ecclisomyia maculosa	A Caddisfly	Insects & other
Ecdyonurus criddlei	A Mayfly	Insects & other
Ecdyonurus simplicoides		Insects & other
Echinochloa oryzoides	NA	Plants
Echinodorus berteroi	Upright Burhead	Plants
Edmundsius agilis	A Mayfly	Insects & other
Egretta thula	Snowy Egret	Birds
Elatine brachysperma	Shortseed Waterwort	Plants
Elatine californica	California Waterwort	Plants
Elatine heterandra	Mosquito Waterwort	Plants
Elatine rubella	Southwestern Waterwort	Plants
Eleocharis acicularis acicularis	Least Spikerush	Plants
Eleocharis acicularis gracilescens	Least Spikerush	Plants
Eleocharis acicularis occidentalis		Plants
Eleocharis atropurpurea	Purple Spikerush	Plants
Eleocharis bella	Delicate Spikerush	Plants
Eleocharis bernardina		Plants
Eleocharis bolanderi	Bolander's Spikerush	Plants
Eleocharis coloradoensis		Plants
Eleocharis decumbens	Decumbent Spikerush	Plants
Eleocharis engelmannii detonsa		Plants
Eleocharis engelmannii engelmannii	Engelmann's Spikerush	Plants
Eleocharis flavescens flavescens	Pale Spikerush	Plants
Eleocharis geniculata	Capitate Spikerush	Plants

Eleocharis macrostachya	Creeping Spikerush	Plants
Eleocharis montevidensis	Sand Spikerush	Plants
Eleocharis obtusa	Blunt Spikerush	Plants
Eleocharis ovata		Plants
Eleocharis palustris	Creeping Spikerush	Plants
Eleocharis parishii	Parish's Spikerush	Plants
Eleocharis parvula	Small Spikerush	Plants
Eleocharis quadrangulata	NA	Plants
Eleocharis quinqueflora	Few-flower Spikerush	Plants
Eleocharis radicans	Rooted Spikerush	Plants
Eleocharis rostellata	Beaked Spikerush	Plants
Eleocharis suksdorfiana	NA	Plants
Eleocharis torticulmis	Twisted Spikerush	Plants
Elodea bifoliata	NA	Plants
Elodea canadensis	Broad Waterweed	Plants
Elodea nuttallii	Nuttall's Waterweed	Plants
Elodes angusta		Insects & other
Elodes apicalis		Insects & other
Elodes aquatica		Insects & other
Elodes emarginata		Insects & other
Elodes impressa		Insects & other
Elodes nunenmacheri		Insects & other
Empidonax traillii	Willow Flycatcher	Birds
Empidonax traillii adastus	A Willow Flycatcher	Birds
Empidonax traillii brewsteri	Willow Flycatcher	Birds
Empidonax traillii extimus	Southwestern Willow Flycatcher	Birds
Enallagma anna	River Bluet	Insects & other
Enallagma basidens	Double-striped Bluet	Insects & other
Enallagma boreale	Boreal Bluet	Insects & other
Enallagma carunculatum	Tule Bluet	Insects & other
Enallagma civile	Familiar Bluet	Insects & other
Enallagma clausum	Alkali Bluet	Insects & other
Enallagma cyathigerum		Insects & other
Enallagma praevarum	Arroyo Bluet	Insects & other
Enallagma semicirculare		Insects & other
Endochironomus nigricans		Insects & other
Endotribelos hesperium		Insects & other
Enochrus aridus		Insects & other
Enochrus californicus		Insects & other
Enochrus carinatus		Insects & other
Enochrus cristatus		Insects & other

Enochrus cuspidatus		Insects & other
Enochrus diffusus		Insects & other
Enochrus fimbriatus		Insects & other
Enochrus hamiltoni		Insects & other
Enochrus ochraceus		Insects & other
Enochrus piceus		Insects & other
Enochrus pygmaeus		Insects & other
Entosphenus folletti	Northern California brook lamprey	Fishes
Entosphenus similis	Klamath River lamprey	Fishes
Entosphenus tridentata ssp. 1	Pacific lamprey	Fishes
Entosphenus tridentata ssp. 2	Goose Lake lamprey	Fishes
Eobrachycentrus gelidae		Insects & other
Eocosmoecus frontalis		Insects & other
Eocyzicus digueti	Straightbacked Clam Shrimp	Crustaceans
Epeorus albertae	A Mayfly	Insects & other
Epeorus deceptivus	A Mayfly	Insects & other
Epeorus dulciana	A Mayfly	Insects & other
Epeorus grandis	A Mayfly	Insects & other
Epeorus hesperus	A Mayfly	Insects & other
Epeorus lagunitas	A Mayfly	Insects & other
Epeorus longimanus	A Mayfly	Insects & other
Epeorus margarita	A Mayfly	Insects & other
Epeorus permagnus		Insects & other
Ephemera simulans		Insects & other
Ephemerella alleni		Insects & other
Ephemerella aurivillii	A Mayfly	Insects & other
Ephemerella dorothea dorothea	A Mayfly	Insects & other
Ephemerella excrucians	A Mayfly	Insects & other
Ephemerella maculata	A Mayfly	Insects & other
Ephemerella tibialis	A Mayfly	Insects & other
Ephemerella velmae	A Mayfly	Insects & other
Ephemerella verruca		Insects & other
Ephoron album	A Mayfly	Insects & other
Epilobium campestre	NA	Plants
Epilobium cleistogamum	Cleistogamous Spike-primrose	Plants
Epilobium hallianum		Plants
Epilobium oreganum	Oregon Willowherb	Plants
Epilobium oregonense	Oregon Willow-herb	Plants
Epilobium palustre	Marsh Willowherb	Plants
Epipactis gigantea	Giant Helleborine	Plants
Epitheca canis	Beaverpond Baskettail	Insects & other

Epitheca spinigera	Spiny Baskettail	Insects & other
Equisetum palustre	NA	Plants
Eragrostis hypnoides	Teal Lovegrass	Plants
Erebaxonopsis nearctica		Insects & other
Eremopyrgus eganensis		Mollusks
Eretes sticticus		Insects & other
Eretmoptera browni		Insects & other
Erigeron coulteri	Coulter's Fleabane	Plants
Eriophorum crinigerum	Fringed Cotton-grass	Plants
Eriophorum gracile gracile	Slender Cotton-grass	Plants
Erpetogomphus compositus	White-belted Ringtail	Insects & other
Erpetogomphus crotalinus		Insects & other
Erpetogomphus designatus		Insects & other
Erpetogomphus lampropeltis lampropeltis	Serpent Ringtail	Insects & other
Eryngium alismifolium	Inland Coyote-thistle	Plants
Eryngium aristulatum aristulatum	California Eryngo	Plants
Eryngium aristulatum hooveri	Hoover's Coyote-thistle	Plants
Eryngium aristulatum parishii	San Diego Button Celery	Plants
Eryngium articulatum	Jointed Coyote-thistle	Plants
Eryngium castrense	Great Valley Eryngo	Plants
Eryngium constancei	Loch Lomond Button-celery	Plants
Eryngium jepsonii	NA	Plants
Eryngium mathiasiae	Mathias' Coyote-thistle	Plants
Eryngium pinnatisectum	Tuolumne Coyote-thistle	Plants
Eryngium racemosum	Delta Coyote-thistle	Plants
Eryngium spinosepalum	Spiny Sepaled Coyote-thistle	Plants
Eryngium vaseyi vallicola		Plants
Eryngium vaseyi vaseyi	Vasey's Coyote-thistle	Plants
Erythemis collocata	Western Pondhawk	Insects & other
Erythemis simplicicollis		Insects & other
Erythemis vesiculosa		Insects & other
Erythrodiplax basifusca		Insects & other
Erythrodiplax funerea		Insects & other
Eubranchipus bundyi	Knobbedlip Fairy Shrimp	Crustaceans
Eubranchipus oregonus	Oregon Fairy Shrimp	Crustaceans
Eubranchipus serratus	Ethologist Fairy Shrimp	Crustaceans
Eubrianax edwardsii		Insects & other
Eucapnopsis brevicauda	Shorttailed Snowfly	Insects & other
Eucorethra underwoodi		Insects & other
Eucyclogobius newberryi	Tidewater goby	Fishes

Eukiefferiella claripennis		Insects & other
Eukiefferiella coerulescens		Insects & other
Eukiefferiella cyanea		Insects & other
Eukiefferiella devonica		Insects & other
Eukiefferiella ilkleyensis		Insects & other
Eulimnadia diversa	Diversity Clam Shrimp	Crustaceans
Eulimnadia texana	Texan Clam Shrimp	Crustaceans
Eulimnichus analis		Insects & other
Eulimnichus californicus		Insects & other
Eulimnichus evanescens		Insects & other
Eulimnichus montanus		Insects & other
Eulimnichus perpolitus		Insects & other
Euphorbia hooveri	NA	Plants
Euryhapsis annuliventris		Insects & other
Euryhapsis illoba		Insects & other
Eurylophella lodi	A Mayfly	Insects & other
Eustoma exaltatum	NA	Plants
Euthamia occidentalis	Western Fragrant Goldenrod	Plants
Exopalaemon carinicauda		Crustaceans
Fallceon eatoni	A Mayfly	Insects & other
Fallceon quilleri	A Mayfly	Insects & other
Fallceon sonora	A Mayfly	Insects & other
Fallceon thermophilos	A Mayfly	Insects & other
Farula davisi	Green Springs Mountain Farulan Caddisfly	Insects & other
Farula geyseri	A Farulan Caddisfly	Insects & other
Farula honeyi	A Farulan Caddisfly	Insects & other
Farula jewetti		Insects & other
Farula malkini		Insects & other
Farula moweri	A Caddisfly	Insects & other
Farula petersoni	A Farulan Caddisfly	Insects & other
Farula praelonga	Long-tailed Caddisfly	Insects & other
Farula raineri		Insects & other
Farula reapiri		Insects & other
Farula wigginsi		Insects & other
Ferrissia fragilis	Fragile Ancylid	Mollusks
Ferrissia rivularis	Creeping Ancylid	Mollusks
Ferrissia walkeri	Cloche Ancylid	Mollusks
Ficopotamus enigmaticus		Insects & other
Fimbristylis autumnalis	NA	Plants
Fimbristylis thermalis	Hot Springs Fimbry	Plants
Floerkea proserpinacoides	False Mermaidweed	Plants

Fluminicola ahjumawi	Ahjumawi pebblesnail	Mollusks
Fluminicola anserinus	Goose Valley pebblesnail	Mollusks
Fluminicola caballensis	Horse Creek pebblesnail	Mollusks
Fluminicola erosus	Smokey Charley pebblesnail	Mollusks
Fluminicola favillaceus	Ash Valley pebblesnail	Mollusks
Fluminicola fremonti	Fremont pebblesnail	Mollusks
Fluminicola lunsfordensis	Lunsford pebblesnail	Mollusks
Fluminicola modoci	Modoc Pebblesnail	Mollusks
Fluminicola multifarius	Shasta pebblesnail	Mollusks
Fluminicola neritoides	Willow Creek pebblesnail	Mollusks
Fluminicola potemicus	Potem Creek pebblesnail	Mollusks
Fluminicola scopulinus	Castle Creek pebblesnail	Mollusks
Fluminicola seminalis	Nugget Pebblesnail	Mollusks
Fluminicola turbiniformis	Turban Pebblesnail	Mollusks
Fluminicola umbilicatus	Hat Creek pebblesnail	Mollusks
Fluminicola warnerensis	Warner pebblesnail	Mollusks
Frankenia palmeri	Palmer's Frankenia	Plants
Frisonia picticeps	Painted Springfly	Insects & other
Fulica americana	American Coot	Birds
Fundulus parvipinnis	California killifish	Fishes
Galba bulimoides	Prairie Fossaria	Mollusks
Galba cubensis	Carib Fossaria	Mollusks
Galba modicella	Rock Fossaria	Mollusks
Galba obrussa	Golden Fossaria	Mollusks
Galba perplexa	A Freshwater Snail	Mollusks
Galba sonomaensis	Sonoma Fossaria	Mollusks
Galba techella	A Freshwater Snail	Mollusks
Galium trifidum	Small Bedstraw	Plants
Gallinago delicata	Wilson's Snipe	Birds
Gallinula chloropus	Common Moorhen	Birds
Gammarus lacustris		Crustaceans
Gasterosteus aculeatus aculeatus	Coastal threespine stickleback	Fishes
Gasterosteus aculeatus microcephalus	Inland threespine stickleback	Fishes
Gasterosteus aculeatus ssp. 1	Shay Creek stickleback	Fishes
Gasterosteus aculeatus williamsoni	Unarmored threespine stickleback	Fishes
Gelastocoris oculatus		Insects & other
Gelastocoris rotundatus		Insects & other
Gelochelidon nilotica vanrossemi	Gull-billed Tern	Birds
Gentiana calycosa	Explorer's Gentian	Plants

Gentiana sceptrum	Pacific Gentian	Plants
Gentiana setigera	Elegant Gentian	Plants
Gentianella amarella acuta	Autumn Dwarf Gentian	Plants
Gentianopsis holopetala	Sierra Gentian	Plants
Gentianopsis simplex	One-flower Gentian	Plants
Georissus californicus		Insects & other
Georthocladius platystylus		Insects & other
Georthocladius wirthi		Insects & other
Geothelpusa dehaani		Crustaceans
Geothlypis trichas sinuosa	Saltmarsh Common Yellowthroat	Birds
Geothlypis trichas trichas	Common Yellowthroat	Birds
Gerris comatus		Insects & other
Gerris gillettei		Insects & other
Gerris incognitis		Insects & other
Gerris incurvatus		Insects & other
Gerris insperatus		Insects & other
Gigantodax adleri		Insects & other
Gila coerulea	Blue chub	Fishes
Gila crassicauda	Thicktail Chub	Fishes
Gila elegans	Bonytail	Fishes
Gila orcutti	Arroyo chub	Fishes
Glinus radiatus	NA	Plants
Glossosoma alascense	A Caddisfly	Insects & other
Glossosoma bruna	A Caddisfly	Insects & other
Glossosoma califica	A Caddisfly	Insects & other
Glossosoma excitum		Insects & other
Glossosoma mereca	A Caddisfly	Insects & other
Glossosoma montanum		Insects & other
Glossosoma oregonense	A Caddisfly	Insects & other
Glossosoma penitum	A Caddisfly	Insects & other
Glossosoma pternum	A Caddisfly	Insects & other
Glossosoma pyroxum		Insects & other
Glossosoma schuhi		Insects & other
Glossosoma sequoia	A Caddisfly	Insects & other
Glossosoma traviatum		Insects & other
Glossosoma velonum		Insects & other
Glossosoma ventrale		Insects & other
Glossosoma verdonum	A Caddisfly	Insects & other
Glossosoma wenatchee		Insects & other
Glyceria borealis	Small Floating Mannagrass	Plants
Glyceria elata	Tall Mannagrass	Plants

Glyceria fluitans	NA	Plants
Glyceria grandis	American Mannagrass	Plants
Glyceria leptostachya	Slim-head Mannagrass	Plants
Glyceria striata var. stricta	Fowl Mannagrass	Plants
Glyphopsyche irrorata	A Caddisfly	Insects & other
Glyptotendipes barbipes		Insects & other
Glyptotendipes lobiferus		Insects & other
Glyptotendipes paripes		Insects & other
Gnorimosphaeroma insulare	An Isopod	Crustaceans
Gnorimosphaeroma noblei	An Isopod	Crustaceans
Goeldichironomus amazonicus		Insects & other
Goeldichironomus holoprasinus		Insects & other
Goera archaon	A Caddisfly	Insects & other
Goeracea genota		Insects & other
Goeracea oregona	Sagehen Creek Goeracean Caddisfly	Insects & other
Gomphus kurilis	Pacific Clubtail	Insects & other
Gomphus lynnae		Insects & other
Gonidea angulata	Western Ridged Mussel	Mollusks
Grammotaulius betteni		Insects & other
Graphoderus liberus		Insects & other
Graphoderus occidentalis		Insects & other
Graphoderus perplexus		Insects & other
Graptocorixa abdominalis		Insects & other
Graptocorixa californica		Insects & other
Graptocorixa gerhardi		Insects & other
Graptocorixa serrulata		Insects & other
Graptocorixa uhleri		Insects & other
Graptocorixa uhleroidea	A Water Boatman	Insects & other
Gratiola ebracteata	Bractless Hedge-hyssop	Plants
Gratiola heterosepala	Boggs Lake Hedge-hyssop	Plants
Gratiola neglecta	Clammy Hedge-hyssop	Plants
Greneria humeralis		Insects & other
Grus canadensis	Sandhill Crane	Birds
Grus canadensis canadensis	Lesser Sandhill Crane	Birds
Grus canadensis tabida	Greater Sandhill Crane	Birds
Gumaga griseola	A Bushtailed Caddisfly	Insects & other
Gumaga nigricula	A Bushtailed Caddisfly	Insects & other
Gymnochthebius falli		Insects & other
Gymnochthebius fossatus		Insects & other
Gymnochthebius laevipennis		Insects & other
Gyraulus circumstriatus	Disc Gyro	Mollusks

Gyraulus crista	Star Gyro	Mollusks
Gyraulus deflectus		Mollusks
Gyraulus parvus	Ash Gyro	Mollusks
Gyraulus vermicularis	Pacific Coast Gyraulus	Mollusks
Gyretes sinuatus		Insects & other
Gyretes torosus		Insects & other
Gyrinus affinis		Insects & other
Gyrinus bifarius		Insects & other
Gyrinus confinis		Insects & other
Gyrinus consobrinus		Insects & other
Gyrinus latilimbus		Insects & other
Gyrinus maculiventris		Insects & other
Gyrinus parcus		Insects & other
Gyrinus picipes		Insects & other
Gyrinus pleuralis		Insects & other
Gyrinus plicifer		Insects & other
Gyrinus rugosus		Insects & other
Halesochila taylori		Insects & other
Haliaeetus leucocephalus	Bald Eagle	Birds
Haliaeetus leucocephalus pop. 4	Bald Eagle - Wintering Population	Birds
Haliplus concolor		Insects & other
Haliplus cylindricus		Insects & other
Haliplus distinctus		Insects & other
Haliplus dorsomaculatus		Insects & other
Haliplus eremicus		Insects & other
Haliplus gracilis		Insects & other
Haliplus leechi		Insects & other
Haliplus longulus		Insects & other
Haliplus mimeticus		Insects & other
Haliplus robertsi		Insects & other
Haliplus rugosus		Insects & other
Haliplus subguttatus		Insects & other
Haliplus tumidus		Insects & other
Halobates sericeus		Insects & other
Haploperla chilnualna	Yosemite Sallfly	Insects & other
Harnischia curtilamellata		Insects & other
Hastingsia alba	White Rushlily	Plants
Hayesomyia senata		Insects & other
Hebrus buenoi		Insects & other
Hebrus hubbardi		Insects & other
Hebrus longivillus		Insects & other

Hebrus major		Insects & other
Hebrus obscurus		Insects & other
Hebrus sobrinus		Insects & other
Helenium autumnale	Common Sneezeweed	Plants
Helenium bigelovii	Bigelow's Sneezeweed	Plants
Helenium bolanderi	Coast Sneezeweed	Plants
Helenium puberulum	Rosilla	Plants
Helichus columbianus		Insects & other
Helichus striatus		Insects & other
Helichus suturalis		Insects & other
Helichus triangularis		Insects & other
Helicopsyche borealis	A Caddisfly	Insects & other
Helicopsyche mexicana	A Caddisfly	Insects & other
Helicopsyche pietia		Insects & other
Helicopsyche sinuata	A Caddisfly	Insects & other
Helisoma anceps	Two-ridge Rams-horn	Mollusks
Helisoma minus	A Freshwater Snail	Mollusks
Helisoma newberryi newberryi	Great Basin Rams-horn	Mollusks
Helisoma subcrenatum		Mollusks
Helochares normatus		Insects & other
Helodon beardi		Insects & other
Helodon chaos		Insects & other
Helodon diadelphus		Insects & other
Helodon mccreadiei		Insects & other
Helodon newmani		Insects & other
Helodon onchyodactylus		Insects & other
Helodon protus		Insects & other
Helodon susanae		Insects & other
Helodon trochus		Insects & other
Helophorus alternatus		Insects & other
Helophorus auricollis		Insects & other
Helophorus californicus		Insects & other
Helophorus columbianus		Insects & other
Helophorus cuspifer		Insects & other
Helophorus eclectus		Insects & other
Helophorus fenderi		Insects & other
Helophorus fortis		Insects & other
Helophorus hatchi		Insects & other
Helophorus lacustris		Insects & other
Helophorus lecontei		Insects & other
Helophorus ledatus		Insects & other

Helophorus leechi		Insects & other
Helophorus linearis		Insects & other
Helophorus linearoides		Insects & other
Helophorus nitiduloides		Insects & other
Helophorus nitidulus		Insects & other
Helophorus oblongus		Insects & other
Helophorus oregonus		Insects & other
Helophorus orientalis		Insects & other
Helophorus parasplendidus		Insects & other
Helophorus robertsi		Insects & other
Helophorus schuhi		Insects & other
Helophorus tuberculatus		Insects & other
Hemiosus exilis		Insects & other
Heptagenia adaequata		Insects & other
Heptagenia elegantula	A Mayfly	Insects & other
Heptagenia solitaria	A Mayfly	Insects & other
Herthania compta		Insects & other
Herthania concinna		Insects & other
Hesperagrion heterodoxum		Insects & other
Hesperocorixa atopodonta		Insects & other
Hesperocorixa laevigata		Insects & other
Hesperocorixa vulgaris		Insects & other
Hesperoperla hoguei	Banded Stone	Insects & other
Hesperoperla pacifica	Golden Stone	Insects & other
Hesperophylax alaskensis	A Caddisfly	Insects & other
Hesperophylax consimilis		Insects & other
Hesperophylax designatus	A Caddisfly	Insects & other
Hesperophylax magnus	A Caddisfly	Insects & other
Hesperophylax minutus	A Caddisfly	Insects & other
Hesperophylax occidentalis	A Caddisfly	Insects & other
Hetaerina americana	American Rubyspot	Insects & other
Hetaerina vulnerata		Insects & other
Heteranthera limosa	NA	Plants
Heterelmis glabra		Insects & other
Heterelmis obesa		Insects & other
Heterelmis stephani		Insects & other
Heterlimnius corpulentus		Insects & other
Heterlimnius koebelei		Insects & other
Heterocerus brunneus		Insects & other
Heterocerus gemmatus		Insects & other
Heterocerus gnatho		Insects & other

Heterocerus mexicanus		Insects & other
Heterocerus mollinus		Insects & other
Heterocerus parrotus		Insects & other
Heterocerus sinuosus		Insects & other
Heterocerus tristis		Insects & other
Heterocerus unicus		Insects & other
Heterocloeon anoka		Insects & other
Heteroplectron californicum	A Caddisfly	Insects & other
Heterotrissocladius oliveri		Insects & other
Hexagenia limbata	A Mayfly	Insects & other
Hibiscus lasiocarpos occidentalis		Plants
Himalopsyche phryganea	A Caddisfly	Insects & other
Himantopus mexicanus	Black-necked Stilt	Birds
Hippuris vulgaris	Common Mare's-tail	Plants
Histrionicus histrionicus	Harlequin Duck	Birds
Holorusia hespera		Insects & other
Homoleptohyphes dimorphus	A Mayfly	Insects & other
Homoleptohyphes mirus		Insects & other
Homoleptohyphes quercus		Insects & other
Homophylax adriana		Insects & other
Homophylax andax		Insects & other
Homophylax flavipennis		Insects & other
Homophylax insulas	A Caddisfly	Insects & other
Homophylax nevadensis	A Caddisfly	Insects & other
Homophylax rentzi	A Caddisfly	Insects & other
Homoplectra alseae		Insects & other
Homoplectra luchia		Insects & other
Homoplectra nigripennis	A Caddisfly	Insects & other
Homoplectra norada	A Caddisfly	Insects & other
Homoplectra oaklandensis	A Caddisfly	Insects & other
Homoplectra schuhi	Schuh's Homoplectran Caddisfly	Insects & other
Homoplectra shasta	A Caddisfly	Insects & other
Homoplectra sierra	A Caddisfly	Insects & other
Homoplectra spora	A Caddisfly	Insects & other
Hosackia oblongifolia	NA	Plants
Howellia aquatilis	Water Howellia	Plants
Hyalella azteca	An Amphipod	Crustaceans
Hyalella muerta	An Amphipod	Crustaceans
Hyalella sandra	An Amphipod	Crustaceans
Hydaticus aruspex		Insects & other

Hydatophylax hesperus	A Caddisfly	Insects & other
Hydraena alternata		Insects & other
Hydraena arenicola		Insects & other
Hydraena arizonica		Insects & other
Hydraena bituberculata		Insects & other
Hydraena californica		Insects & other
Hydraena circulata		Insects & other
Hydraena leechi		Insects & other
Hydraena mignymixys		Insects & other
Hydraena nigra		Insects & other
Hydraena occidentalis		Insects & other
Hydraena pacifica		Insects & other
Hydraena petila		Insects & other
Hydraena sierra		Insects & other
Hydraena tuolumne		Insects & other
Hydraena vandykei		Insects & other
Hydraena yosemitensis		Insects & other
Hydrobaenus pilipes		Insects & other
Hydrobaenus saetheri		Insects & other
Hydrobius fuscipes		Insects & other
Hydrochara lineata		Insects & other
Hydrochara rickseckeri	Ricksecker's Water Scavenger Beetle	Insects & other
Hydrochus pseudosquamifer		Insects & other
Hydrochus squamifer		Insects & other
Hydrochus vagus		Insects & other
Hydrochus variolatus		Insects & other
Hydrocotyle ranunculoides	Floating Marsh-pennywort	Plants
Hydrocotyle umbellata	Many-flower Marsh-pennywort	Plants
Hydrocotyle verticillata verticillata	Whorled Marsh-pennywort	Plants
Hydrometra aemula		Insects & other
Hydrometra australis		Insects & other
Hydrometra lillianis		Insects & other
Hydrometra martini		Insects & other
Hydrophilus insularis		Insects & other
Hydrophilus triangularis		Insects & other
Hydroporus axillaris		Insects & other
Hydroporus carri		Insects & other
Hydroporus despectus		Insects & other
Hydroporus fortis		Insects & other
Hydroporus klamathensis		Insects & other

Hydroporus leechi	Leech's Skyline Diving Beetle	Insects & other
Hydroporus longiusculus		Insects & other
Hydroporus mannerheimi		Insects & other
Hydroporus notabilis		Insects & other
Hydroporus occidentalis		Insects & other
Hydroporus pervicinus	Wooly Hydroporus Diving Beetle	Insects & other
Hydroporus simplex	Simple Hydroporus Diving Beetle	Insects & other
Hydroporus sinuatipes		Insects & other
Hydroporus subpubescens		Insects & other
Hydroporus tademus		Insects & other
Hydroporus tenebrosus		Insects & other
Hydroporus transpunctatus		Insects & other
Hydroporus tristis		Insects & other
Hydroporus zackii		Insects & other
Hydropsyche alternans		Insects & other
Hydropsyche amblis	A Caddisfly	Insects & other
Hydropsyche andersoni		Insects & other
Hydropsyche auricolor		Insects & other
Hydropsyche californica	A Caddisfly	Insects & other
Hydropsyche centra		Insects & other
Hydropsyche cockerelli	A Caddisfly	Insects & other
Hydropsyche cora	A Caddisfly	Insects & other
Hydropsyche dorata		Insects & other
Hydropsyche intrica	A Caddisfly	Insects & other
Hydropsyche occidentalis	A Caddisfly	Insects & other
Hydropsyche oslari	A Caddisfly	Insects & other
Hydropsyche philo	A Caddisfly	Insects & other
Hydropsyche protis		Insects & other
Hydropsyche tana	A Caddisfly	Insects & other
Hydropsyche venada		Insects & other
Hydropsyche winema		Insects & other
Hydroptila ajax	A Caddisfly	Insects & other
Hydroptila arctia	A Caddisfly	Insects & other
Hydroptila argosa	A Caddisfly	Insects & other
Hydroptila consimilis		Insects & other
Hydroptila hamata	A Caddisfly	Insects & other
Hydroptila icona	A Caddisfly	Insects & other
Hydroptila lenora		Insects & other
Hydroptila modica		Insects & other
Hydroptila pecos		Insects & other
Hydroptila rono	A Caddisfly	Insects & other

Hydroptila xera	A Caddisfly	Insects & other
Hydroscapha natans		Insects & other
Hydrotrupes palpalis		Insects & other
Hydrovatus brevipes		Insects & other
Hydrovatus davidis		Insects & other
Hygrotus acaroides		Insects & other
Hygrotus artus	Mono Lake Hygrotus Diving Beetle	Insects & other
Hygrotus bruesi		Insects & other
Hygrotus collatus		Insects & other
Hygrotus curvipes	Curved-foot Hygrotus Diving Beetle	Insects & other
Hygrotus dissimilis		Insects & other
Hygrotus femoratus		Insects & other
Hygrotus fontinalis	Travertine Band-thigh Diving Beetle	Insects & other
Hygrotus fraternus		Insects & other
Hygrotus hydropicus		Insects & other
Hygrotus impressopunctatus		Insects & other
Hygrotus infuscatus		Insects & other
Hygrotus intermedius		Insects & other
Hygrotus lutescens		Insects & other
Hygrotus marklini		Insects & other
Hygrotus masculinus		Insects & other
Hygrotus nigrescens		Insects & other
Hygrotus nubilis		Insects & other
Hygrotus obscureplagiatus		Insects & other
Hygrotus patruelis		Insects & other
Hygrotus pedalis		Insects & other
Hygrotus sayi		Insects & other
Hygrotus semivittatus		Insects & other
Hygrotus sharpi		Insects & other
Hygrotus thermarum		Insects & other
Hygrotus tumidiventris		Insects & other
Hygrotus turbidus		Insects & other
Hygrotus unguicularis		Insects & other
Hygrotus wardii		Insects & other
Hyperacanthomysis longirostris		Crustaceans
Hypericum anagalloides	Tinker's-penny	Plants
Hypomesus pacificus	Delta smelt	Fishes
Hysterocarpus traskii lagunae	Clear Lake tule perch	Fishes
Hysterocarpus traskii pomo	Russian River tule perch	Fishes
Hysterocarpus traskii traskii	Sacramento tule perch	Fishes
Icteria virens	Yellow-breasted Chat	Birds

Iliamna rivularis		Plants
Ilybius angustior		Insects & other
Ilybius fraterculus		Insects & other
Ilybius quadrimaculatus		Insects & other
Incilius alvarius	Colorado River Toad	Herps
Ioscytus cobbeni		Insects & other
Ioscytus franciscanus		Insects & other
Ioscytus nasti		Insects & other
Ioscytus politus		Insects & other
Ioscytus tepidarius		Insects & other
Ipnobius robustus	Robust Tryonia	Mollusks
Iris missouriensis	Western Blue Iris	Plants
Ironodes arcticus		Insects & other
Ironodes californicus	A Mayfly	Insects & other
Ironodes lepidus	A Mayfly	Insects & other
Ironodes nitidus	A Mayfly	Insects & other
Ischnura barberi	Desert Forktail	Insects & other
Ischnura cervula	Pacific Forktail	Insects & other
Ischnura damula		Insects & other
Ischnura demorsa		Insects & other
Ischnura denticollis	Black-fronted Forktail	Insects & other
Ischnura erratica	Swift Forktail	Insects & other
Ischnura gemina	San Francisco Forktail	Insects & other
Ischnura hastata	Citrine Forktail	Insects & other
Ischnura perparva	Western Forktail	Insects & other
Ischnura ramburii		Insects & other
Isocapnia abbreviata	Shortlimb Snowfly	Insects & other
Isocapnia agassizi		Insects & other
Isocapnia eichlini	A Stonefly	Insects & other
Isocapnia grandis	Giant Snowfly	Insects & other
Isocapnia mogila	Irregular Snowfly	Insects & other
Isocapnia palousa		Insects & other
Isocapnia rickeri		Insects & other
Isocapnia spenceri	Chilliwack Snowfly	Insects & other
Isocapnia vedderensis		Insects & other
Isoetes bolanderi	NA	Plants
Isoetes echinospora	NA	Plants
Isoetes howellii	NA	Plants
Isoetes nuttallii	NA	Plants
Isoetes occidentalis	NA	Plants
Isoetes orcuttii	NA	Plants

Isogenoides colubrinus	Blackfoot Springfly	Insects & other
Isogenoides elongatus		Insects & other
Isogenoides zionensis		Insects & other
Isolepis cernua	Low Bulrush	Plants
Isolepis setacea	NA	Plants
Isonychia intermedia		Insects & other
Isonychia velma	A Mayfly	Insects & other
Isoperla acula	Fresno Stipetail	Insects & other
Isoperla adunca	Arroyo Stripetail	Insects & other
Isoperla baumanni	California Stripetail	Insects & other
Isoperla bifurcata	Forked Stripetail	Insects & other
Isoperla denningi	Angeles Stripetail	Insects & other
Isoperla fulva	Western Stripetail	Insects & other
Isoperla gravitans		Insects & other
Isoperla karuk	Klamath Stripetail	Insects & other
Isoperla laucki	Humboldt Stripetail	Insects & other
Isoperla marmorata	Red Stripetail	Insects & other
Isoperla miwok	Miwok Stripetail	Insects & other
Isoperla mormona	Mormon Stripetail	Insects & other
Isoperla muir		Insects & other
Isoperla phalerata		Insects & other
Isoperla pinta	Checkered Stripetail	Insects & other
Isoperla quinquepunctata	Fivespot Stripetail	Insects & other
Isoperla raineri		Insects & other
Isoperla roguensis	Rogue Stripetail	Insects & other
Isoperla sobria	Colorado Stripetail	Insects & other
Isoperla sordida	Notched Stripetail	Insects & other
Isoperla tilasqua		Insects & other
Ithytrichia clavata	A Caddisfly	Insects & other
Ithytrichia mexicana		Insects & other
Ixobrychus exilis hesperis	Western Least Bittern	Birds
Jaumea carnosa	Fleshy Jaumea	Plants
Juga acutifilosa	Topaz Juga	Mollusks
Juga chacei	Chace Juga	Mollusks
Juga nigrina	Black Juga	Mollusks
Juga occata	Scalloped Juga	Mollusks
Juga orickensis	Redwood Juga	Mollusks
Juncus acuminatus	Sharp-fruit Rush	Plants
Juncus acutus leopoldii	Spiny Rush	Plants
Juncus anthelatus	NA	Plants
Juncus articulatus articulatus		Plants

Juncus bolanderi	Bolander's Rush	Plants
Juncus bryoides	Moss Rush	Plants
Juncus chlorocephalus	Green-head Rush	Plants
Juncus diffusissimus	NA	Plants
Juncus digitatus	Finger Rush	Plants
Juncus dubius	Mariposa Rush	Plants
Juncus duranii	Duran's Rush	Plants
Juncus effusus austrocalifornicus		Plants
Juncus effusus effusus	NA	Plants
Juncus effusus pacificus		Plants
Juncus exiguus		Plants
Juncus falcatus falcatus	Sickle-leaf Rush	Plants
Juncus falcatus sitchensis		Plants
Juncus hemiendytus abjectus	Dwarf Rush	Plants
Juncus hemiendytus hemiendytus	Dwarf Rush	Plants
Juncus hesperius		Plants
Juncus leiospermus	NA	Plants
Juncus lescurii		Plants
Juncus luciensis	Santa Lucia Dwarf Rush	Plants
Juncus macrandrus	Long-anther Rush	Plants
Juncus macrophyllus	Longleaf Rush	Plants
Juncus marginatus	NA	Plants
Juncus mertensianus	Mertens' Rush	Plants
Juncus nevadensis inventus	Sierra Rush	Plants
Juncus nodosus	NA	Plants
Juncus phaeocephalus paniculatus	Brownhead Rush	Plants
Juncus phaeocephalus phaeocephalus	Brown-head Rush	Plants
Juncus planifolius	NA	Plants
Juncus regelii	Regel's Rush	Plants
Juncus rugulosus	Wrinkled Rush	Plants
Juncus saximontanus	Rocky Mountain Rush	Plants
Juncus supiniformis	Hairyleaf Rush	Plants
Juncus textilis	Basket Rush	Plants
Juncus uncialis	Inch-high Rush	Plants
Juncus usitatus	NA	Plants
Juncus xiphioides	Iris-leaf Rush	Plants
Kathroperla perdita	Longhead Sallfly	Insects & other
Kathroperla takhoma	Slenderhead Sallfly	Insects & other

Kiefferulus dux		Insects & other
Kiefferulus modocensis		Insects & other
Kinosternon sonoriense	Sonoran Mud Turtle	Herps
Kobresia myosuroides	Pacific Kobresia	Plants
Kogotus nonus	Smooth Springfly	Insects & other
Konikea expansipalpis		Insects & other
Krenopelopia narda		Insects & other
Kyhosia bolanderi		Plants
Labrundinia maculata		Insects & other
Labrundinia pilosella		Insects & other
Laccobius acutipenis		Insects & other
Laccobius agilis		Insects & other
Laccobius borealis		Insects & other
Laccobius bruesi		Insects & other
Laccobius californicus		Insects & other
Laccobius carri		Insects & other
Laccobius ellipticus		Insects & other
Laccobius hardyi		Insects & other
Laccobius insolitus		Insects & other
Laccobius leechi		Insects & other
Laccobius mexicanus		Insects & other
Laccobius nevadensis		Insects & other
Laccobius occidentalis		Insects & other
Laccobius oregonensis		Insects & other
Laccobius pacificus		Insects & other
Laccobius piceus		Insects & other
Laccobius tridentipenis		Insects & other
Laccobius truncatipenis		Insects & other
Laccophilus biguttatus		Insects & other
Laccophilus fasciatus terminalis		Insects & other
Laccophilus horni		Insects & other
Laccophilus maculosus		Insects & other
Laccophilus maculosus decipiens		Insects & other
Laccophilus maculosus shermani		Insects & other
Laccophilus mexicanus atristernalis		Insects & other
Laccophilus mexicanus mexicanus		Insects & other
Laccophilus oscillator		Insects & other
Laccophilus pictus		Insects & other

Laccophilus quadrilineatus quadrilineatus		Insects & other
Laccophilus salvini		Insects & other
Laccophilus sonorensis		Insects & other
Laccophilus vacaensis		Insects & other
Laccornis pacificus		Insects & other
Lachlania saskatchewanensis		Insects & other
Ladona julia	Chalk-fronted Corporal	Insects & other
Lampetra ayersi	River lamprey	Fishes
Lampetra hubbsi	Kern brook lamprey	Fishes
Lampetra lethophaga	Pit-Klamath brook lamprey	Fishes
Lampetra richardsoni	Western brook lamprey	Fishes
Landoltia punctata	NA	Plants
Lanx alta	Highcap Lanx	Mollusks
Lanx hannai		Mollusks
Lanx klamathensis	Scale Lanx	Mollusks
Lanx patelloides	Kneecap Lanx	Mollusks
Lanx subrotundatus		Mollusks
Lara avara		Insects & other
Lara gehringi		Insects & other
Larsia decolorata		Insects & other
Larsia lyra		Insects & other
Larsia marginella		Insects & other
Larsia planensis		Insects & other
Larsia sequoiaensis		Insects & other
Larus livens	Yellow-footed Gull	Birds
Lasthenia burkei	Burke's Goldfields	Plants
Lasthenia conjugens	Contra Costa Goldfields	Plants
Lasthenia ferrisiae	Ferris' Goldfields	Plants
Lasthenia fremontii	Fremont's Goldfields	Plants
Lasthenia glabrata coulteri	Coulter's Goldfields	Plants
Laterallus jamaicensis coturniculus	California Black Rail	Birds
Lathyrus jepsonii	NA	Plants
Lathyrus palustris	Vetchling Peavine	Plants
Lauterborniella agrayloides		Insects & other
Lavinia exilicauda chi	Clear Lake hitch	Fishes
Lavinia exilicauda exilicauda	Sacramento hitch	Fishes
Lavinia exilicauda harengeus	Monterey hitch	Fishes
Lavinia mitrulus	Northern (Pit) roach	Fishes
Lavinia parvipinnus	Gualala roach	Fishes
Lavinia symmetricus navarroensis	Navarro roach	Fishes

Lavinia symmetricus ssp. 1	Russian River roach	Fishes
Lavinia symmetricus ssp. 2	Red Hills roach	Fishes
Lavinia symmetricus ssp. 3	Clear Lake roach	Fishes
Lavinia symmetricus ssp. 4	Tomales roach	Fishes
Lavinia symmetricus subditus	Monterey roach	Fishes
Lavinia symmetricus symmetricus	Central California roach	Fishes
Lednia sierra	A Stonefly	Insects & other
Leersia oryzoides	Rice Cutgrass	Plants
Legenere limosa	False Venus'-looking-glass	Plants
Lemna aequinoctialis	Lesser Duckweed	Plants
Lemna gibba	Inflated Duckweed	Plants
Lemna minor	Lesser Duckweed	Plants
Lemna minuta	Least Duckweed	Plants
Lemna trisulca	Star Duckweed	Plants
Lemna turionifera	Turion Duckweed	Plants
Lemna valdiviana	Pale Duckweed	Plants
Lenarchus brevipennis		Insects & other
Lenarchus gravidus	A Caddisfly	Insects & other
Lenarchus rho		Insects & other
Lenarchus rillus	A Caddisfly	Insects & other
Lenarchus vastus	A Caddisfly	Insects & other
Lepania cascada		Insects & other
Lepidium jaredii jaredii	Jared's Pepper-grass	Plants
Lepidium oxycarpum	Sharp-pod Pepper-grass	Plants
Lepidostoma acarolum		Insects & other
Lepidostoma apache		Insects & other
Lepidostoma apornum		Insects & other
Lepidostoma astaneum	A Caddisfly	Insects & other
Lepidostoma bakeri		Insects & other
Lepidostoma baxea	A Caddisfly	Insects & other
Lepidostoma canthum	A Caddisfly	Insects & other
Lepidostoma cascadense	A Caddisfly	Insects & other
Lepidostoma castalianum	A Caddisfly	Insects & other
Lepidostoma cinereum	A Caddisfly	Insects & other
Lepidostoma ermanae	Cold Spring Caddisfly	Insects & other
Lepidostoma errigenum	A Caddisfly	Insects & other
Lepidostoma hoodi		Insects & other
Lepidostoma jewetti	A Caddisfly	Insects & other
Lepidostoma knulli		Insects & other
Lepidostoma lacinatum		Insects & other

Lepidostoma licolum	A Caddisfly	Insects & other
Lepidostoma lotor	A Caddisfly	Insects & other
Lepidostoma mexicanum		Insects & other
Lepidostoma ojanum	A Caddisfly	Insects & other
Lepidostoma ormeum		Insects & other
Lepidostoma pluviale	A Caddisfly	Insects & other
Lepidostoma podagrum	A Caddisfly	Insects & other
Lepidostoma quericinum		Insects & other
Lepidostoma rayneri	A Caddisfly	Insects & other
Lepidostoma recinum	A Caddisfly	Insects & other
Lepidostoma roafi	A Caddisfly	Insects & other
Lepidostoma stigma		Insects & other
Lepidostoma unicolor	A Caddisfly	Insects & other
Lepidostoma verodum	A Caddisfly	Insects & other
Lepidurus bilobatus		Crustaceans
Lepidurus cryptus	Cryptic Tadpole Shrimp	Crustaceans
Lepidurus lemmoni	Lynch Tadpole Shrimp	Crustaceans
Lepidurus packardi	Vernal Pool Tadpole Shrimp	Crustaceans
Leptestheria compleximanus	Spineynose Clam Shrimp	Crustaceans
Leptohyphes apache		Insects & other
Leptohyphes ferruginus		Insects & other
Leptohyphes lestes		Insects & other
Leptohyphes zalope		Insects & other
Leptophlebia cupida	A Mayfly	Insects & other
Leptophlebia pacifica	A Mayfly	Insects & other
Lestes alacer		Insects & other
Lestes congener	Spotted Spreadwing	Insects & other
Lestes disjunctus	Northern Spreadwing	Insects & other
Lestes dryas	Emerald Spreadwing	Insects & other
Lestes stultus	Black Spreadwing	Insects & other
Lestes unguiculatus	Lyre-tipped Spreadwing	Insects & other
Lethocerus americanus		Insects & other
Lethocerus angustipes		Insects & other
Lethocerus medius		Insects & other
Leucorrhinia glacialis	Crimson-ringed Whiteface	Insects & other
Leucorrhinia hudsonica	Hudsonian Whiteface	Insects & other
Leucorrhinia intacta	Dot-tailed Whiteface	Insects & other
Leucorrhinia proxima	Belted Whiteface	Insects & other
Leucothoe davisiae	Western Doghobble	Plants
Leucotrichia limpia		Insects & other
Leucotrichia pictipes	A Micro Caddisfly	Insects & other

Leucotrichia sarita		Insects & other
Leucrocuta jewetti		Insects & other
Lewisia cantelovii	Cantelow's Lewisia	Plants
Libellula comanche	Comanche Skimmer	Insects & other
Libellula composita	Bleached Skimmer	Insects & other
Libellula croceipennis	Neon Skimmer	Insects & other
Libellula forensis	Eight-spotted Skimmer	Insects & other
Libellula luctuosa	Widow Skimmer	Insects & other
Libellula nodisticta	Hoary Skimmer	Insects & other
Libellula pulchella	Twelve-spotted Skimmer	Insects & other
Libellula quadrimaculata	Four-spotted Skimmer	Insects & other
Libellula saturata	Flame Skimmer	Insects & other
Lichminus tenuicornis		Insects & other
Ligidium kofoidi	A Cave Obligate Isopod	Crustaceans
Lilaeopsis masonii	Mason's Lilaeopsis	Plants
Lilaeopsis occidentalis	Western Lilaeopsis	Plants
Lilium kelleyanum	Kelley's Lily	Plants
Lilium pardalinum pardalinum	Leopard Lily	Plants
Lilium pardalinum pitkinense	Pitkin Marsh Lily	Plants
Lilium pardalinum shastense	Leopard Lily	Plants
Lilium pardalinum vollmeri	Vollmer's Lily	Plants
Lilium pardalinum wigginsii	Wiggin's Lily	Plants
Lilium parryi	Lemon Lily	Plants
Lilium parvum	Small Tiger Lily	Plants
Limnanthes alba alba	White Meadowfoam	Plants
Limnanthes alba parishii	NA	Plants
Limnanthes alba versicolor	White Meadowfoam	Plants
Limnanthes bakeri	Baker's Meadowfoam	Plants
Limnanthes douglasii douglasii	Douglas' Meadowfoam	Plants
Limnanthes douglasii nivea	Douglas' Meadowfoam	Plants
Limnanthes douglasii rosea	Douglas' Meadowfoam	Plants
Limnanthes douglasii striata		Plants
Limnanthes douglasii sulphurea	Pt. Reyes Meadowfoam	Plants
Limnanthes floccosa bellingeriana	Bellinger's Meadowfoam	Plants
Limnanthes floccosa californica	Shippee Meadowfoam	Plants
Limnanthes floccosa floccosa	Woolly Meadowfoam	Plants
Limnanthes montana	Mountain Meadowfoam	Plants
Limnanthes vinculans	Sebastopol Meadowfoam	Plants
Limnebius alutaceous		Insects & other
Limnebius arenicolus		Insects & other

Limnebius leechi		Insects & other
Limnebius piceus		Insects & other
Limnebius sinuatus		Insects & other
Limnephilus abbreviatus		Insects & other
Limnephilus acnestus	A Caddisfly	Insects & other
Limnephilus acula	A Caddisfly	Insects & other
Limnephilus alconura	Klamath Limnephilan Caddisfly	Insects & other
Limnephilus apache		Insects & other
Limnephilus aretto	A Caddisfly	Insects & other
Limnephilus arizona		Insects & other
Limnephilus assimilis	A Caddisfly	Insects & other
Limnephilus atercus	Fort Dick Limnephilus Caddisfly	Insects & other
Limnephilus bucketti	A Caddisfly	Insects & other
Limnephilus canadensis		Insects & other
Limnephilus catula	A Caddisfly	Insects & other
Limnephilus coloradensis	A Caddisfly	Insects & other
Limnephilus concolor	A Caddisfly	Insects & other
Limnephilus diversus		Insects & other
Limnephilus ectus		Insects & other
Limnephilus elongatus		Insects & other
Limnephilus externus	A Caddisfly	Insects & other
Limnephilus fagus		Insects & other
Limnephilus frijole	A Caddisfly	Insects & other
Limnephilus granti		Insects & other
Limnephilus hyalinus		Insects & other
Limnephilus insularis		Insects & other
Limnephilus kalama		Insects & other
Limnephilus kennicotti		Insects & other
Limnephilus lithus		Insects & other
Limnephilus lopho		Insects & other
Limnephilus lunonus		Insects & other
Limnephilus moestus		Insects & other
Limnephilus morrisoni	A Caddisfly	Insects & other
Limnephilus neoacula		Insects & other
Limnephilus nogus	A Caddisfly	Insects & other
Limnephilus occidentalis	A Caddisfly	Insects & other
Limnephilus peltus	A Caddisfly	Insects & other
Limnephilus productus	A Caddisfly	Insects & other
Limnephilus rothi		Insects & other
Limnephilus santanus		Insects & other
Limnephilus secludens	A Caddisfly	Insects & other

Limnephilus sericeus		Insects & other
Limnephilus sierrata	A Caddisfly	Insects & other
Limnephilus silviae		Insects & other
Limnephilus sitchensis		Insects & other
Limnephilus spinatus	A Caddisfly	Insects & other
Limnephilus tulatus		Insects & other
Limnichites foraminosus		Insects & other
Limnichites nebulosus		Insects & other
Limnichites perforatus		Insects & other
Limnichoderus lutrochinus		Insects & other
Limnichoderus naviculatus		Insects & other
Limnobium spongia	NA	Plants
Limnochares anomala		Insects & other
Limnocoris moapensis		Insects & other
Limnodromus scolopaceus	Long-billed Dowitcher	Birds
Limnophyes asquamatus		Insects & other
Limnophyes doughmani		Insects & other
Limnophyes hamiltoni		Insects & other
Limnophyes natalensis		Insects & other
Limnophyes pilicistulus		Insects & other
Limnoporus notabilis		Insects & other
Limonium californicum	California Sea-lavender	Plants
Limosella acaulis	Southern Mudwort	Plants
Limosella aquatica	Northern Mudwort	Plants
Limosella australis	NA	Plants
Linderiella occidentalis	California Fairy Shrimp	Crustaceans
Linderiella santarosae	Santa Rosa Plateau Fairy Shrimp	Crustaceans
Lindernia dubia	Yellowseed False Pimpernel	Plants
Liodessus obscurellus		Insects & other
Liodessus saratogae		Insects & other
Lipocarpha micrantha	Dwarf Bulrush	Plants
Lithobates pipiens	Northern Leopard Frog	Herps
Lithobates yavapaiensis	Yavapai Leopard Frog	Herps
Lobelia cardinalis cardinalis	NA	Plants
Lobelia cardinalis pseudosplendens		Plants
Lobelia dunnii serrata	Dunn's Lobelia	Plants
Lontra canadensis canadensis	North American River Otter	Mammals
Lontra canadensis sonora	Southwestern River Otter	Mammals
Lophodytes cucullatus	Hooded Merganser	Birds
Ludwigia grandiflora	NA	Plants

Ludwigia hexapetala	NA	Plants
Ludwigia palustris	Marsh Seedbox	Plants
Ludwigia peploides montevidensis	NA	Plants
Ludwigia peploides peploides	NA	Plants
Ludwigia repens	Creeping Seedbox	Plants
Lupinus polyphyllus burkei		Plants
Lupinus polyphyllus pallidipes	Largeleaf Lupine	Plants
Lupinus polyphyllus polyphyllus	Bigleaf Lupine	Plants
Lutrochus arizonensis		Insects & other
Lycastoides alticola		Insects & other
Lycopodiella inundata	NA	Plants
Lycopus americanus	American Bugleweed	Plants
Lycopus uniflorus uniflorus	Northern Bugleweed	Plants
Lymnaea stagnalis	Swamp Lymnaea	Mollusks
Lynceus brachyurus	Holarctic Clam Shrimp	Crustaceans
Lynceus brevifrons		Crustaceans
Lysichiton americanus	Yellow Skunk-cabbage	Plants
Lysimachia thyrsiflora	Water Loosestrife	Plants
Lythrum californicum	California Loosestrife	Plants
Lythrum portula	NA	Plants
Maccaffertium terminatum	A Mayfly	Insects & other
Macrelmis moestus		Insects & other
Macrodiplax balteata	Marl Pennant	Insects & other
Macromia magnifica	Western River Cruiser	Insects & other
Macrothemis inacuta		Insects & other
Macrovelia hornii		Insects & other
Malenka bifurcata		Insects & other
Malenka biloba	Two-lobed Forestfly	Insects & other
Malenka californica	California Forestfly	Insects & other
Malenka coloradensis		Insects & other
Malenka cornuta	Horned Forestfly	Insects & other
Malenka depressa	Bluntlobe Forestfly	Insects & other
Malenka flexura		Insects & other
Malenka marionae	Sagehen Forestfly	Insects & other
Malenka murvoshi		Insects & other
Malenka perplexa		Insects & other
Malenka tina		Insects & other
Margaritifera falcata	Western Pearlshell	Mollusks
Marilia flexuosa	A Caddisfly	Insects & other
Marilia nobsca		Insects & other

Marsilea oligospora	NA	Plants
Marsilea vestita vestita	NA	Plants
Martarega mexicana		Insects & other
Maruina lanceolata		Insects & other
Matriella teresa	A Mayfly	Insects & other
Mayatrichia acuna		Insects & other
Mayatrichia ayama		Insects & other
Mayatrichia ponta		Insects & other
Megaceryle alcyon	Belted Kingfisher	Birds
Megaleuctra complicata		Insects & other
Megaleuctra kincaidi		Insects & other
Megaleuctra sierra	Sierra Needlefly	Insects & other
Megarcys signata		Insects & other
Megarcys subtruncata		Insects & other
Megarcys yosemite	Yosemite Springfly	Insects & other
Menetus opercularis	Button Sprite	Mollusks
Menyanthes trifoliata	Bog Buckbean	Plants
Mergus merganser	Common Merganser	Birds
Mergus serrator	Red-breasted Merganser	Birds
Meringodixa chalonensis		Insects & other
Meropelopia flavifrons		Insects & other
Merragata hebroides		Insects & other
Mesocapnia arizonensis		Insects & other
Mesocapnia autumna		Insects & other
Mesocapnia bakeri	Pomona Snowfly	Insects & other
Mesocapnia bulbosa	Bulbous Snowfly	Insects & other
Mesocapnia frisoni		Insects & other
Mesocapnia lapwae		Insects & other
Mesocapnia oenone		Insects & other
Mesocapnia porrecta	Stretched Snowfly	Insects & other
Mesocapnia projecta	Spined Snowfly	Insects & other
Mesocapnia werneri	Sabino Snowfly	Insects & other
Mesocapnia yoloensis	Yolo Snowfly	Insects & other
Mesovelia amoena		Insects & other
Mesovelia mulsanti		Insects & other
Metacnephia coloradensis		Insects & other
Metacnephia jeanae		Insects & other
Metacnephia villosa		Insects & other
Metrichia arizonensis		Insects & other
Metrichia nigritta		Insects & other
Metriocnemus edwardsi		Insects & other

Metriocnemus stevensi		Insects & other
Metriocnemus yaquina		Insects & other
Metrobates denticornis		Insects & other
Metrobates trux		Insects & other
Micracanthia fennica		Insects & other
Micracanthia humilis		Insects & other
Micracanthia quadrimaculata		Insects & other
Micracanthia schuhi		Insects & other
Micracanthia utahensis		Insects & other
Micranthes aprica		Plants
Micranthes marshallii	NA	Plants
Micranthes odontoloma		Plants
Micranthes oregana	NA	Plants
Micrasema arizonica		Insects & other
Micrasema bactro	A Caddisfly	Insects & other
Micrasema dimicki		Insects & other
Micrasema diteris	A Caddisfly	Insects & other
Micrasema onisca	A Caddisfly	Insects & other
Micrasema oregona		Insects & other
Microchironomus nigrovittatus		Insects & other
Microcylloepus formicoideus	Furnace Creek Riffle Beetle	Insects & other
Microcylloepus moapus		Insects & other
Microcylloepus similis		Insects & other
Microcylloepus thermarum		Insects & other
Micromenetus dilatatus	Bugle Sprite	Mollusks
Micropsectra nigripila		Insects & other
Micropsectra polita		Insects & other
Microtendipes caducus		Insects & other
Microtendipes pedellus		Insects & other
Microvelia beameri		Insects & other
Microvelia buenoi		Insects & other
Microvelia californiensis		Insects & other
Microvelia cerifera		Insects & other
Microvelia fasculifera		Insects & other
Microvelia gerhardi		Insects & other
Microvelia glabrosulcata		Insects & other
Microvelia hinei		Insects & other
Microvelia paludicola		Insects & other
Microvelia pulchella		Insects & other
Microvelia rasilis		Insects & other
Microvelia rufescens		Insects & other

Microvelia signata		Insects & other
Microvelia torquata		Insects & other
Mideopsis pumila		Insects & other
Mimulus alsinoides	Chickweed Monkeyflower	Plants
Mimulus angustatus	Narrowleaf Pansy Monkeyflower	Plants
Mimulus breviflorus	Short-flower Monkeyflower	Plants
Mimulus cardinalis	Scarlet Monkeyflower	Plants
Mimulus dentatus	Tooth-leaf Monkeyflower	Plants
Mimulus evanescens	Disappearing Monkeyflower	Plants
Mimulus glaucescens	Shield-bract Monkeyflower	Plants
Mimulus guttatus	Common Large Monkeyflower	Plants
Mimulus laciniatus	Cutleaf Monkeyflower	Plants
Mimulus latidens	Broad-tooth Monkeyflower	Plants
Mimulus lewisii	Lewis' Monkeyflower	Plants
Mimulus nudatus	Bare Monkeyflower	Plants
Mimulus parishii	Parish's Monkeyflower	Plants
Mimulus pilosus		Plants
Mimulus primuloides linearifolius	Primrose Monkeyflower	Plants
Mimulus primuloides primuloides	Primrose Monkeyflower	Plants
Mimulus pulchellus	Pansy Monkeyflower	Plants
Mimulus ringens	Square-stem Monkeyflower	Plants
Mimulus tilingii tilingii	Subalpine Monkeyflower	Plants
Mimulus tricolor	Tricolor Monkeyflower	Plants
Mitellastra caulescens		Plants
Momonia projecta		Insects & other
Monopelopia tenuicalcar		Insects & other
Montia chamissoi	Chamisso's Miner's-lettuce	Plants
Montia fontana fontana	Fountain Miner's-lettuce	Plants
Montia howellii	Howell's Miner's-lettuce	Plants
Moribaetis mimbresaurus		Insects & other
Morphocorixa lundbladi		Insects & other
Moselia infuscata	Hairy Needlefly	Insects & other
Moselyana comosa		Insects & other
Muhlenbergia utilis	Aparejo Grass	Plants
Musulium partumeium		Mollusks
Musulium secuirs		Mollusks
Mycteria americana	Wood Stork	Birds
Mylopharodon conocephalus	Hardhead	Fishes
Myosotis laxa	Small Forget-me-not	Plants
Myosotis scorpioides	NA	Plants

Myosurus apetalus	Bristly Mousetail	Plants
Myosurus minimus	NA	Plants
Myosurus sessilis	Sessile Mousetail	Plants
Myriophyllum aquaticum	NA	Plants
Myriophyllum hippuroides	Western Water-milfoil	Plants
Myriophyllum quitense	Andean Water-milfoil	Plants
Myriophyllum sibiricum	Common Water-milfoil	Plants
Myriophyllum verticillatum	Whorled Water-milfoil	Plants
Mysis diluviana		Crustaceans
Mystacides alafimbriatus	A Caddisfly	Insects & other
Mystacides interjecta		Insects & other
Mystacides sepulchralis	A Caddisfly	Insects & other
Najas flexilis	Slender Naiad	Plants
Najas gracillima	NA	Plants
Najas guadalupensis guadalupensis	Southern Naiad	Plants
Namamyia plutonis	A Caddisfly	Insects & other
Namanereis hawaiiensis		Insects & other
Nanocladius anderseni		Insects & other
Nanonemoura wahkeena		Insects & other
Narpus angustus		Insects & other
Narpus arizonicus		Insects & other
Narpus concolor		Insects & other
Narthecium californicum	California Bog Asphodel	Plants
Nasturtium gambelii	NA	Plants
Natarsia miripes		Insects & other
Navarretia cotulifolia	Cotula Navarretia	Plants
Navarretia fossalis	Spreading Navarretia	Plants
Navarretia heterandra	Tehama Navarretia	Plants
Navarretia intertexta	Needleleaf Navarretia	Plants
Navarretia leucocephala bakeri	Baker's Navarretia	Plants
Navarretia leucocephala leucocephala	White-flower Navarretia	Plants
Navarretia leucocephala minima	Least Navarretia	Plants
Navarretia leucocephala pauciflora	Few-flower Navarretia	Plants
Navarretia leucocephala plieantha	Many-flower Navarretia	Plants
Navarretia myersii deminuta	Small Pincushion Navarretia	Plants
Navarretia myersii myersii	Pincushion Navarretia	Plants
Navarretia prostrata	Prostrate Navarretia	Plants
Neanthes limnicola		Insects & other

Nectopsyche dorsalis	A Caddisfly	Insects & other
Nectopsyche gracilis	A Caddisfly	Insects & other
Nectopsyche lahontanensis	A Caddisfly	Insects & other
Nectopsyche minuta	A Caddisfly	Insects & other
Nectopsyche stigmatica		Insects & other
Nehalennia irene	Sedge Sprite	Insects & other
Nemotaulius hostilis		Insects & other
Nemoura spiniloba	Spiny Forestfly	Insects & other
Neochoroterpes kossi		Insects & other
Neochthebius vandykei		Insects & other
Neoclypeodytes amybethae		Insects & other
Neoclypeodytes cinctellus		Insects & other
Neoclypeodytes fryii		Insects & other
Neoclypeodytes haroldi		Insects & other
Neoclypeodytes leachi		Insects & other
Neoclypeodytes ornatellus		Insects & other
Neoclypeodytes pictodes		Insects & other
Neoclypeodytes plicipennis		Insects & other
Neoclypeodytes quadripustulatus		Insects & other
Neoclypeodytes roughleyi		Insects & other
Neocorixa snowi		Insects & other
Neohermes californicus		Insects & other
Neohermes filicornis		Insects & other
Neomideopsis siuslawensis		Insects & other
Neomysis kadiakensis	A Mysid Shrimp	Crustaceans
Neomysis mercedis		Crustaceans
Neophylax occidentis	A Caddisfly	Insects & other
Neophylax rickeri	A Caddisfly	Insects & other
Neophylax splendens	A Caddisfly	Insects & other
Neoplea striola		Insects & other
Neoporus arizonicus		Insects & other
Neoporus dimidiatus		Insects & other
Neoporus undulatus		Insects & other
Neostapfia colusana	Colusa Grass	Plants
Neothremma alicia	A Caddisfly	Insects & other
Neothremma andersoni		Insects & other
Neothremma didactyla		Insects & other
Neothremma genella	Golden-horned Caddisfly	Insects & other
Neothremma macronata	A Caddisfly	Insects & other
Neothremma siskiyou	Siskiyou Caddisfly	Insects & other

Neotrichia blinni		Insects & other
Neotrichia halia	A Caddisfly	Insects & other
Neotrichia okopa	A Caddisfly	Insects & other
Neotrichia olorino		Insects & other
Neotrichia osmena		Insects & other
Neotrichia sandyae		Insects & other
Neotrichia sonoroa		Insects & other
Neovison vison	American Mink	Mammals
Nereis succinea		Insects & other
Nerophilus californicus	A Caddisfly	Insects & other
Nerthra manni		Insects & other
Nerthra martini		Insects & other
Nerthra mexicana		Insects & other
Nilotanypus fimbriatus		Insects & other
Nilothauma babiyi		Insects & other
Nilothauma mirabile		Insects & other
Nitrophila mohavensis	Amargosa Niterwort	Plants
Nixe kennedyi	A Mayfly	Insects & other
Nothotrichia shasta		Insects & other
Notonecta hoffmani		Insects & other
Notonecta indica		Insects & other
Notonecta irrorata		Insects & other
Notonecta kirbyi		Insects & other
Notonecta lobata		Insects & other
Notonecta repanda		Insects & other
Notonecta shooteri		Insects & other
Notonecta spinosa		Insects & other
Notonecta undulata		Insects & other
Notonecta unifasciata		Insects & other
Numenius americanus	Long-billed Curlew	Birds
Numenius phaeopus	Whimbrel	Birds
Nuphar polysepala		Plants
Nycticorax nycticorax	Black-crowned Night-Heron	Birds
Nyctiophylax moestus		Insects & other
Nymphaea mexicana	NA	Plants
Ochlerotatus aboriginis		Insects & other
Ochlerotatus aloponotum		Insects & other
Ochlerotatus bicristatus		Insects & other
Ochlerotatus burgeri		Insects & other
Ochlerotatus campestris		Insects & other
Ochlerotatus cataphylla		Insects & other

Ochlerotatus clivis		Insects & other
Ochlerotatus communis		Insects & other
Ochlerotatus deserticola		Insects & other
Ochlerotatus dorsalis		Insects & other
Ochlerotatus epactius		Insects & other
Ochlerotatus excrucians		Insects & other
Ochlerotatus fitchii		Insects & other
Ochlerotatus flavescens		Insects & other
Ochlerotatus hendersoni		Insects & other
Ochlerotatus hexodontus		Insects & other
Ochlerotatus impiger		Insects & other
Ochlerotatus implicatus		Insects & other
Ochlerotatus increpitus		Insects & other
Ochlerotatus intrudens		Insects & other
Ochlerotatus melanimon		Insects & other
Ochlerotatus monticola		Insects & other
Ochlerotatus muelleri		Insects & other
Ochlerotatus nevadensis		Insects & other
Ochlerotatus nigromaculatus		Insects & other
Ochlerotatus niphadopsis		Insects & other
Ochlerotatus papago		Insects & other
Ochlerotatus provocans		Insects & other
Ochlerotatus pullatus		Insects & other
Ochlerotatus purpureipes		Insects & other
Ochlerotatus schizopinax		Insects & other
Ochlerotatus sierrensis		Insects & other
Ochlerotatus sollicitans		Insects & other
Ochlerotatus squamiger		Insects & other
Ochlerotatus sticticus		Insects & other
Ochlerotatus taeniorhynchus		Insects & other
Ochlerotatus tahoensis		Insects & other
Ochlerotatus thelcter		Insects & other
Ochlerotatus trivittatus		Insects & other
Ochlerotatus varipalpus		Insects & other
Ochlerotatus ventrovittus		Insects & other
Ochlerotatus washinoi		Insects & other
Ochrotrichia alexanderi	A Caddisfly	Insects & other
Ochrotrichia alsea	Alsea Ochrotrichian Micro Caddisfly	Insects & other
Ochrotrichia argentea		Insects & other
Ochrotrichia arizonica	A Caddisfly	Insects & other
Ochrotrichia buccata	A Caddisfly	Insects & other

Ochrotrichia burdicki	A Caddisfly	Insects & other
Ochrotrichia dactylophora		Insects & other
Ochrotrichia hadria	A Caddisfly	Insects & other
Ochrotrichia honeyi	A Caddisfly	Insects & other
Ochrotrichia ildria		Insects & other
Ochrotrichia logana	A Caddisfly	Insects & other
Ochrotrichia lometa	A Caddisfly	Insects & other
Ochrotrichia lucia	A Caddisfly	Insects & other
Ochrotrichia mono	A Caddisfly	Insects & other
Ochrotrichia nacora	A Caddisfly	Insects & other
Ochrotrichia okanoganensis		Insects & other
Ochrotrichia oregona		Insects & other
Ochrotrichia phenosa	Deschutes Ochrotrichian Micro Caddisfly	Insects & other
Ochrotrichia quadrispina	A Caddisfly	Insects & other
Ochrotrichia rothi		Insects & other
Ochrotrichia salaris	A Caddisfly	Insects & other
Ochrotrichia spinulata		Insects & other
Ochrotrichia stylata	A Caddisfly	Insects & other
Ochrotrichia tarsalis		Insects & other
Ochrotrichia tenuata	A Caddisfly	Insects & other
Ochrotrichia trapoiza	A Caddisfly	Insects & other
Ochrotrichia vertreesi	Vertrees's Ochrotrichian Micro Caddisfly	Insects & other
Ochterus barberi		Insects & other
Ochterus perbosci		Insects & other
Ochterus rotundus		Insects & other
Ochthebius apache		Insects & other
Ochthebius arenicolus		Insects & other
Ochthebius arizonicus		Insects & other
Ochthebius aztecus		Insects & other
Ochthebius biinicisus		Insects & other
Ochthebius bisinuatus		Insects & other
Ochthebius borealis		Insects & other
Ochthebius brevipennis		Insects & other
Ochthebius californicus		Insects & other
Ochthebius costipennis		Insects & other
Ochthebius crassalus	Wing-shoulder Minute Moss Beetle	Insects & other
Ochthebius crenatus		Insects & other
Ochthebius cribricollis		Insects & other
Ochthebius discretus		Insects & other
Ochthebius gruwelli		Insects & other
Ochthebius interruptus		Insects & other

Ochthebius lecontei		Insects & other
Ochthebius leechi		Insects & other
Ochthebius lineatus		Insects & other
Ochthebius madrensis		Insects & other
Ochthebius marinus		Insects & other
Ochthebius martini		Insects & other
Ochthebius mimicus		Insects & other
Ochthebius orbus		Insects & other
Ochthebius pacificus		Insects & other
Ochthebius puncticollis		Insects & other
Ochthebius recticulus	Wilbur Springs Minute Moss Beetle	Insects & other
Ochthebius rectus		Insects & other
Ochthebius rectusalus		Insects & other
Ochthebius richmondi		Insects & other
Ochthebius sculptoides		Insects & other
Ochthebius sculptus		Insects & other
Ochthebius sierrensis		Insects & other
Ochthebius similis		Insects & other
Ochthebius tubus		Insects & other
Ochthebius uniformis		Insects & other
Octogomphus specularis	Grappletail	Insects & other
Oecetis arizonica		Insects & other
Oecetis avara	A Caddisfly	Insects & other
Oecetis disjuncta	A Caddisfly	Insects & other
Oecetis inconspicua	A Caddisfly	Insects & other
Oecetis metlacensis		Insects & other
Oecetis ochracea	A Caddisfly	Insects & other
Oemopteryx leei	A Stonefly	Insects & other
Oemopteryx vanduzeea	Alpine Willowfly	Insects & other
Oenanthe sarmentosa	Water-parsley	Plants
Oenothera longissima	Long-stem Evening-primrose	Plants
Oligophlebodes minutus		Insects & other
Oligophlebodes mostbento		Insects & other
Oligophlebodes ruthae		Insects & other
Oligophlebodes sierra	A Caddisfly	Insects & other
Oligophlebodes sigma		Insects & other
Onconeura semifimbriata		Insects & other
Oncorhynchus clarki clarki	Coastal cutthroat trout	Fishes
Oncorhynchus clarki henshawi	Lahontan cutthroat trout	Fishes
Oncorhynchus clarki seleneris	Paiute cutthroat trout	Fishes
Oncorhynchus gorbuscha	Pink salmon	Fishes

Oncorhynchus keta	Chum salmon	Fishes
Oncorhynchus kisutch - CCC	Central Coast coho salmon	Fishes
Oncorhynchus kisutch - SONCC	Southern Oregon Northern California coast coho salmon	Fishes
Oncorhynchus mykiss - CCC winter	Central California coast winter steelhead	Fishes
Oncorhynchus mykiss - CV	Central Valley steelhead	Fishes
Oncorhynchus mykiss - KMP summer	Klamath Mountains Province summer steelhead	Fishes
Oncorhynchus mykiss - KMP winter	Klamath Mountains Province winter steelhead	Fishes
Oncorhynchus mykiss - NC summer	Northern California coast summer steelhead	Fishes
Oncorhynchus mykiss - NC winter	Northern California coast winter steelhead	Fishes
Oncorhynchus mykiss - SCCC	South Central California coast steelhead	Fishes
Oncorhynchus mykiss - Southern CA	Southern California steelhead	Fishes
Oncorhynchus mykiss aguabonita	California golden trout	Fishes
Oncorhynchus mykiss aquilarum	Eagle Lake rainbow trout	Fishes
Oncorhynchus mykiss gilberti	Kern River rainbow trout	Fishes
Oncorhynchus mykiss irideus	Coastal rainbow trout	Fishes
Oncorhynchus mykiss ssp. 1	Goose Lake redband trout	Fishes
Oncorhynchus mykiss stonei	McCloud River redband trout	Fishes
Oncorhynchus mykiss whitei	Little Kern golden trout	Fishes
Oncorhynchus tshawytscha - CCC fall	California Coast fall Chinook salmon	Fishes
Oncorhynchus tshawytscha - CV fall	Central Valley fall Chinook salmon	Fishes
Oncorhynchus tshawytscha - CV late fall	Central Valley late fall Chinook salmon	Fishes
Oncorhynchus tshawytscha - CV spring	Central Valley spring Chinook salmon	Fishes
Oncorhynchus tshawytscha - CV winter	Central Valley winter Chinook salmon	Fishes
Oncorhynchus tshawytscha - SONCC fall	Southern Oregon Northern California coast fall Chinook salmon	Fishes
Oncorhynchus tshawytscha - UKT fall	Upper Klamath-Trinity fall Chinook salmon	Fishes
Oncorhynchus tshawytscha - UKT spring	Upper Klamath-Trinity spring Chinook salmon	Fishes
Ondatra zibethicus	Common Muskrat	Mammals

Onocosmoecus sequoiae	A Caddisfly	Insects & other
Onocosmoecus unicolor	A Caddisfly	Insects & other
Ophiogomphus arizonicus		Insects & other
Ophiogomphus bison	Bison Snaketail	Insects & other
Ophiogomphus morrisoni	Great Basin Snaketail	Insects & other
Ophiogomphus occidentis	Sinuous Snaketail	Insects & other
Ophiogomphus severus	Pale Snaketail	Insects & other
Oplonaeschna armata		Insects & other
Optioservus canus	Pinnacles Optioservus Riffle Beetle	Insects & other
Optioservus divergens		Insects & other
Optioservus heteroclitus		Insects & other
Optioservus quadrimaculatus		Insects & other
Optioservus seriatus		Insects & other
Oravelia pege	Dry Creek Cliff Strider Bug	Insects & other
Orconectes neglectus neglectus		Crustaceans
Orcuttia californica	California Orcutt Grass	Plants
Orcuttia inaequalis	San Joaquin Valley Orcutt Grass	Plants
Orcuttia pilosa	Hairy Orcutt Grass	Plants
Orcuttia tenuis	Slender Orcutt Grass	Plants
Orcuttia viscida	Sacramento Orcutt Grass	Plants
Ordobrevia nubifera		Insects & other
Oregonasellus elliotti		Crustaceans
Oreodytes abbreviatus		Insects & other
Oreodytes angustior		Insects & other
Oreodytes congruus		Insects & other
Oreodytes crassulus		Insects & other
Oreodytes humboltensis		Insects & other
Oreodytes obesus cordillerensis		Insects & other
Oreodytes obesus obesus		Insects & other
Oreodytes picturatus		Insects & other
Oreodytes quadrimaculatus		Insects & other
Oreodytes rhyacophilus		Insects & other
Oreodytes scitulus bisulcatus		Insects & other
Oreodytes scitulus scitulus		Insects & other
Oreodytes sierrae		Insects & other
Oreodytes subrotundus		Insects & other
Oreoleptis torrenticola		Insects & other
Oreostemma alpigenum andersonii	Anderson's Tundra Aster	Plants
Oreostemma elatum	Plumas Mountaincrown	Plants
Oreostemma peirsonii	Peirson's Aster	Plants

Oreothlypis luciae	Lucy's Warbler	Birds
Orohermes crepusculus		Insects & other
Oroperla barbara	Gilltail Springfly	Insects & other
Orthemis discolor		Insects & other
Orthemis ferruginea	Roseate Skimmer	Insects & other
Orthilia secunda	One-side Wintergreen	Plants
Orthocladius appersoni		Insects & other
Orthocladius carlatus		Insects & other
Orthocladius dentifer		Insects & other
Orthocladius dorenus		Insects & other
Orthocladius dubitatus		Insects & other
Orthocladius frigidus		Insects & other
Orthocladius hellenthali		Insects & other
Orthocladius lignicola		Insects & other
Orthocladius luteipes		Insects & other
Orthocladius mallochi		Insects & other
Orthocladius obumbratus		Insects & other
Orthocladius oliveri		Insects & other
Orthocladius rivicola		Insects & other
Orthocladius rubicundus		Insects & other
Orthocladius subletti		Insects & other
Orthodon microlepidotus	Sacramento blackfish	Fishes
Orthopodomyia kummi		Insects & other
Orthopodomyia signifera		Insects & other
Osobenus yakimae	Yakima Springfly	Insects & other
Ostrocerca dimicki		Insects & other
Ostrocerca foersteri		Insects & other
Oxyethira aculea		Insects & other
Oxyethira aeola		Insects & other
Oxyethira arizona	A Caddisfly	Insects & other
Oxyethira dualis	A Caddisfly	Insects & other
Oxyethira pallida	A Caddisfly	Insects & other
Oxypolis occidentalis	Western Cowbane	Plants
Oxyura jamaicensis	Ruddy Duck	Birds
Pachydiplax longipennis	Blue Dasher	Insects & other
Pacifastacus connectens		Crustaceans
Pacifastacus fortis	Shasta Crayfish	Crustaceans
Pacifastacus gambelii	Pilose Crayfish	Crustaceans
Pacifastacus leniusculus klamathensis	Klamath Signal Crayfish	Crustaceans
Pacifastacus leniusculus leniusculus	Signal Crayfish	Crustaceans

Pacifastacus leniusculus trowbridgii	Columbia River Signal Crayfish	Crustaceans
Pacifastacus nigrescens	Sooty Crayfish	Crustaceans
Palaeagapetus guppyi		Insects & other
Palaeagapetus nearcticus	A Caddisfly	Insects & other
Palaemnema domina		Insects & other
Palaemon macrodactylus		Crustaceans
Palmacorixa buenoi		Insects & other
Paltothemis lineatipes	Red Rock Skimmer	Insects & other
Pandion haliaetus	Osprey	Birds
Panicum acuminatum acuminatum		Plants
Panicum acuminatum fasciculatum		Plants
Panicum acuminatum lindheimeri		Plants
Panicum acuminatum thermale		Plants
Panicum dichotomiflorum	NA	Plants
Pantala flavescens	Wandering Glider	Insects & other
Pantala hymenaea	Spot-winged Glider	Insects & other
Paracapnia baumanni	A Stonefly	Insects & other
Paracapnia boris	A Stonefly	Insects & other
Paracapnia disala	Dirty Snowfly	Insects & other
Paracapnia ensicala		Insects & other
Paracapnia humboldta	A Stonefly	Insects & other
Parachaetocladius imberbus		Insects & other
Parachironomus abortivus		Insects & other
Parachironomus chaetaolus		Insects & other
Parachironomus directus		Insects & other
Parachironomus frequens		Insects & other
Parachironomus hazelriggi		Insects & other
Parachironomus hirtalatus		Insects & other
Parachironomus tenuicaudatus		Insects & other
Paracladius conversus		Insects & other
Paracladopelma alphaeus		Insects & other
Paracloeodes minutus	A Small Minnow Mayfly	Insects & other
Paracoenia calida	Wilber Springs Shore Fly	Insects & other
Paracymus communis		Insects & other
Paracymus confusus		Insects & other
Paracymus elegans		Insects & other
Paracymus ellipsis		Insects & other
Paracymus restrictus		Insects & other

Paracymus subcupreus		Insects & other
Paracymus tarsalis		Insects & other
Parakiefferiella subaterrima		Insects & other
Paralauterborniella nigrohalteris		Insects & other
Paraleptophlebia altana	A Mayfly	Insects & other
Paraleptophlebia aquilina		Insects & other
Paraleptophlebia associata	A Mayfly	Insects & other
Paraleptophlebia bicornuta		Insects & other
Paraleptophlebia brunneipennis		Insects & other
Paraleptophlebia cachea	A Mayfly	Insects & other
Paraleptophlebia californica	A Mayfly	Insects & other
Paraleptophlebia clara	A Mayfly	Insects & other
Paraleptophlebia debilis	A Mayfly	Insects & other
Paraleptophlebia falcula		Insects & other
Paraleptophlebia gregalis	A Mayfly	Insects & other
Paraleptophlebia helena	A Mayfly	Insects & other
Paraleptophlebia heteronea	A Mayfly	Insects & other
Paraleptophlebia memorialis	A Mayfly	Insects & other
Paraleptophlebia packii	A Mayfly	Insects & other
Paraleptophlebia placeri	A Mayfly	Insects & other
Paraleptophlebia quisquilia	A Mayfly	Insects & other
Paraleptophlebia rufivenosa	A Mayfly	Insects & other
Paraleptophlebia sculleni		Insects & other
Paraleptophlebia temporalis	A Mayfly	Insects & other
Paraleptophlebia vaciva	A Mayfly	Insects & other
Paraleptophlebia zayante	A Mayfly	Insects & other
Paraleuctra divisa	California Needlefly	Insects & other
Paraleuctra forcipata	Bullshorn Needlefly	Insects & other
Paraleuctra occidentalis	Western Needlefly	Insects & other
Paraleuctra projecta		Insects & other
Paraleuctra vershina	Summit Needlefly	Insects & other
Paramerina fragilis		Insects & other
Paramerina smithae		Insects & other
Parametriocnemus lundbeckii		Insects & other
Paraperla frontalis	Hyporheic Sallfly	Insects & other
Paraperla wilsoni	Chilliwack Sallfly	Insects & other
Paraphaenocladius exagitans		Insects & other
Paraphaenocladius innasus		Insects & other
Parapholis strigosa	NA	Plants
Parapsyche almota	A Caddisfly	Insects & other
Parapsyche elsis	A Caddisfly	Insects & other

Parapsyche extensa	King's Creek Parapsyche Caddisfly	Insects & other
Parapsyche spinata	A Caddisfly	Insects & other
Parapsyche turbinata	A Caddisfly	Insects & other
Parasimulium crosskeyi		Insects & other
Parasimulium furcatum		Insects & other
Parasimulium species		Insects & other
Parasimulium stonei		Insects & other
Paratanytarsus grimmii		Insects & other
Paratendipes albimanus		Insects & other
Paratendipes basidens		Insects & other
Paratendipes fuscitibia		Insects & other
Paratendipes subaequalis		Insects & other
Paratendipes thermophilus		Insects & other
Paratrichocladius rufiventris		Insects & other
Parnassia cirrata cirrata	Fringed Grass-of-Parnassus	Plants
Parnassia cirrata intermedia		Plants
Parnassia fimbriata fimbriata	Fringed Grass-of-Parnassus	Plants
Parnassia palustris	Marsh Grass-of-Parnassus	Plants
Parnassia parviflora	Small-flower Grass-of-parnassus	Plants
Parochlus kiefferi		Insects & other
Parthina linea	A Caddisfly	Insects & other
Parthina vierra	A Caddisfly	Insects & other
Paspalum distichum	Joint Paspalum	Plants
Patapius spinosus		Insects & other
Pectiantia ovalis	NA	Plants
Pectiantia pentandra		Plants
Pedicularis attollens	NA	Plants
Pedicularis groenlandica	NA	Plants
Pedomoecus sierra	A Caddisfly	Insects & other
Pelecanus erythrorhynchos	American White Pelican	Birds
Pelocoris biimpressus		Insects & other
Peltodytes callosus		Insects & other
Peltodytes dispersus		Insects & other
Peltodytes mexicanus		Insects & other
Peltodytes simplex		Insects & other
Pentacora saratogae		Insects & other
Pentacora signoreti		Insects & other
Pentacora sphacelata		Insects & other
Pentaneura inconspicua		Insects & other
Pentaneura inyoensis		Insects & other
Perideridia bacigalupii	Bacigalupi's Perideridia	Plants

Perideridia bolanderi bolanderi	Bolander's Yampah	Plants
Perideridia bolanderi involucrata	Bolander's Yampah	Plants
Perideridia californica	California Yampah	Plants
Perideridia gairdneri borealis	Gairdner's Yampah	Plants
Perideridia gairdneri gairdneri	Gairdner's Yampah	Plants
Perideridia howellii	Howell's False Caraway	Plants
Perideridia kelloggii	Kellogg's Yampah	Plants
Perideridia lemmonii	Lemmon's Yampah	Plants
Perideridia leptocarpa	Narrow-seeded Yampah	Plants
Perideridia oregana	Oregon Yampah	Plants
Perideridia parishii latifolia	Parish's Yampah	Plants
Perideridia parishii parishii	Parish's Yampah	Plants
Perideridia pringlei	Pringle's Yampah	Plants
Perithemis domitia		Insects & other
Perithemis intensa	Mexican Amberwing	Insects & other
Perithemis tenera		Insects & other
Perlinodes aurea	Longgill Springfly	Insects & other
Perlomyia collaris	Black Needlefly	Insects & other
Perlomyia utahensis	Utah Needlefly	Insects & other
Persicaria amphibia		Plants
Persicaria hydropiper	NA	Plants
Persicaria hydropiperoides		Plants
Persicaria lapathifolia		Plants
Persicaria maculosa	NA	Plants
Persicaria orientalis	NA	Plants
Persicaria pensylvanica	NA	Plants
Persicaria punctata	NA	Plants
Persicaria wallichii	NA	Plants
Petrophila confusalis		Insects & other
Petrophila jaliscalis		Insects & other
Petrophila kearfottalis		Insects & other
Phacelia distans	NA	Plants
Phaenopsectra dyari		Insects & other
Phaenopsectra flavipes		Insects & other
Phaenopsectra mortensoni		Insects & other
Phaenopsectra pilicellata		Insects & other
Phaenopsectra profusa		Insects & other
Phalacrocorax auritus	Double-crested Cormorant	Birds
Phalacroseris bolanderi	NA	Plants
Phalaris arundinacea	Reed Canarygrass	Plants
Phalaropus tricolor	Wilson's Phalarope	Birds

Philarctus bergrothi		Insects & other
Philocasca demita		Insects & other
Philocasca oron		Insects & other
Philocasca rivularis	A Caddisfly	Insects & other
Philorus californica	A Net-winged Midge	Insects & other
Philorus jacinto	A Net-winged Midge	Insects & other
Philorus vanduzeei	A Net-winged Midge	Insects & other
Philorus yosemite	A Net-winged Midge	Insects & other
Phragmites australis australis	Common Reed	Plants
Phreatobrachypoda robusta		Insects & other
Phryganea cinerea	A Caddisfly	Insects & other
Phyla lanceolata	Fog-fruit	Plants
Phyla nodiflora	Common Frog-fruit	Plants
Phylloicus aeneus		Insects & other
Phylloicus mexicanus		Insects & other
Phyllospadix scouleri	Scouler's Surf-grass	Plants
Phyllospadix torreyi	Torrey's Surf-grass	Plants
Physa acuta	Pewter Physa	Mollusks
Physa gyrina	Tadpole Physa	Mollusks
Physella boucardi	Desert Physa	Mollusks
Physella cooperi	Olive Physa	Mollusks
Physella costata	Ornate Physa	Mollusks
Physella humerosa	Corkscrew Physa	Mollusks
Physella lordi	Twisted Physa	Mollusks
Physella osculans	Cayuse Physa	Mollusks
Physella propinqua	Rocky Mountain Physa	Mollusks
Physella traski	Sculpted Physa	Mollusks
Physella virgata	Protean Physa	Mollusks
Physella virginea	Sunset Physa	Mollusks
Physemus minutus		Insects & other
Pilularia americana	NA	Plants
Pinguicula macroceras	NA	Plants
Pipilo aberti	Abert's Towhee	Birds
Pipilo crissalis eremophilus	Inyo California Towhee	Birds
Piranga rubra	Summer Tanager	Birds
Pisidium casertanum		Mollusks
Pisidium compressum		Mollusks
Pisidium idahoense		Mollusks
Pisidium lilljeborgi		Mollusks
Pisidium nitidum		Mollusks
Pisidium subtruncatum		Mollusks

Pisidium ultramontanum	Montane Peaclam	Mollusks
Pisidium variabile		Mollusks
Pisidium walkeri		Mollusks
Plagiobothrys acanthocarpus	Adobe Popcorn-flower	Plants
Plagiobothrys austiniae	Austin's Popcorn-flower	Plants
Plagiobothrys chorisianus	NA	Plants
Plagiobothrys distantiflorus	California Popcorn-flower	Plants
Plagiobothrys glaber	Hairless Allocarya	Plants
Plagiobothrys greenei	Greene's Popcorn-flower	Plants
Plagiobothrys humistratus	Dwarf Popcorn-flower	Plants
Plagiobothrys leptocladus	Alkali Popcorn-flower	Plants
Plagiobothrys nitens		Plants
Plagiobothrys parishii	Parish's Popcorn-flower	Plants
Plagiobothrys reticulatus reticulatus		Plants
Plagiobothrys reticulatus rossianorum		Plants
Plagiobothrys tener	NA	Plants
Plagiobothrys undulatus	NA	Plants
Planorbella binneyi	Coarse Rams-horn	Mollusks
Planorbella occidentalis	Fine-lined Rams-horn	Mollusks
Planorbella subcrenata	Rough Rams-horn	Mollusks
Planorbella tenuis	Mexican Rams-horn	Mollusks
Planorbella traski	Keeled Rams-horn	Mollusks
Planorbella trivolvis	Marsh Rams-horn	Mollusks
Plantago elongata elongata	Slender Plantain	Plants
Platanthera dilatata leucostachys		Plants
Platanthera sparsiflora sparsiflora	Canyon Bog Orchid	Plants
Platanthera stricta	Slender Bog Orchid	Plants
Platanthera tescamnis	NA	Plants
Platanthera yosemitensis	Yosemite Bog-Orchid	Plants
Platanus racemosa	California Sycamore	Plants
Plathemis lydia	Common Whitetail	Insects & other
Plathemis subornata	Desert Whitetail	Insects & other
Platyhydracarus juliani		Insects & other
Platyhydracarus parvipalpis		Insects & other
Platyvelia beameri		Insects & other
Platyvelia brachialis		Insects & other
Platyvelia summersi		Insects & other
Plauditus punctiventris		Insects & other
Plegadis chihi	White-faced Ibis	Birds

Plethodon dunni	Dunn's Salamander	Herps
Pleuropogon californicus californicus		Plants
Pleuropogon californicus davyi		Plants
Pleuropogon hooverianus	North Coast False Semaphore Grass	Plants
Pleuropogon refractus	Nodding False Semaphore Grass	Plants
Pluchea odorata odorata	Scented Conyza	Plants
Pluchea sericea	Arrow-weed	Plants
Plumiperla diversa	Margined Sallfly	Insects & other
Plumiperla spinosa	Spiny Sallfly	Insects & other
Pluvialis squatarola	Black-bellied Plover	Birds
Podiceps nigricollis	Eared Grebe	Birds
Podilymbus podiceps	Pied-billed Grebe	Birds
Podmosta decepta		Insects & other
Podmosta delicatula	Delicate Forestfly	Insects & other
Podmosta obscura		Insects & other
Pogogyne abramsii	San Diego Mesamint	Plants
Pogogyne douglasii	NA	Plants
Pogogyne floribunda	Profuse-flowered Pogogyne	Plants
Pogogyne nudiuscula	Otay Mesamint	Plants
Pogogyne zizyphoroides		Plants
Pogonichthys ciscoides	Clear Lake Splittail	Fishes
Pogonichthys macrolepidotus	Sacramento splittail	Fishes
Polycentropus arizonensis		Insects & other
Polycentropus aztecus		Insects & other
Polycentropus cinereus		Insects & other
Polycentropus denningi		Insects & other
Polycentropus flavus	A Caddisfly	Insects & other
Polycentropus gertschi		Insects & other
Polycentropus halidus	A Caddisfly	Insects & other
Polycentropus variegatus	A Caddisfly	Insects & other
Polygonum marinense	Marin Knotweed	Plants
Polypedilum albicorne		Insects & other
Polypedilum albinodus		Insects & other
Polypedilum angustum		Insects & other
Polypedilum apicatum		Insects & other
Polypedilum artifer		Insects & other
Polypedilum aviceps		Insects & other
Polypedilum braseniae		Insects & other
Polypedilum californicum		Insects & other
Polypedilum cinctum		Insects & other

Polypedilum cultellatum		Insects & other
Polypedilum digitifer		Insects & other
Polypedilum halterale		Insects & other
Polypedilum illinoense		Insects & other
Polypedilum isocerus		Insects & other
Polypedilum labeculosum		Insects & other
Polypedilum laetum		Insects & other
Polypedilum obelos		Insects & other
Polypedilum ophioides		Insects & other
Polypedilum parvum		Insects & other
Polypedilum pedatum		Insects & other
Polypedilum pterospilus		Insects & other
Polypedilum scalaenum		Insects & other
Polypedilum sulaceps		Insects & other
Polypedilum trigonus		Insects & other
Polypedilum tritum		Insects & other
Polypedilum vibex		Insects & other
Polyplectropus charlesi		Insects & other
Pomacea bridgesii		Mollusks
Pomacea paludosa		Mollusks
Pomatiopsis binneyi	Robust Walker	Mollusks
Pomatiopsis californica	Pacific Walker	Mollusks
Pomatiopsis chacei	Marsh Walker	Mollusks
Pomoleuctra andersoni	Oregon Needlefly	Insects & other
Pomoleuctra purcellana		Insects & other
Populus trichocarpa	NA	Plants
Porterella carnosula	Western Porterella	Plants
Porzana carolina	Sora	Birds
Postelichus confluentus		Insects & other
Postelichus immsi		Insects & other
Postelichus productus		Insects & other
Potamogeton alpinus	Northern Pondweed	Plants
Potamogeton amplifolius	Largeleaf Pondweed	Plants
Potamogeton berchtoldii	NA	Plants
Potamogeton diversifolius	Water-thread Pondweed	Plants
Potamogeton epihydrus	Nuttall's Pondweed	Plants
Potamogeton foliosus fibrillosus	Fibrous Pondweed	Plants
Potamogeton foliosus foliosus	Leafy Pondweed	Plants
Potamogeton gramineus	Grassy Pondweed	Plants
Potamogeton illinoensis	Illinois Pondweed	Plants
Potamogeton natans	Floating Pondweed	Plants

Potamogeton nodosus	Longleaf Pondweed	Plants
Potamogeton praelongus	White-stem Pondweed	Plants
Potamogeton pusillus pusillus	Slender Pondweed	Plants
Potamogeton richardsonii	Richardson's Pondweed	Plants
Potamogeton robbinsii	Flatleaf Pondweed	Plants
Potamogeton zosteriformis	Flatstem Pondweed	Plants
Potentilla anserina anserina		Plants
Potentilla anserina pacifica		Plants
Potentilla multijuga	Ballona Cinquefoil	Plants
Potentilla newberryi	Newberry's Cinquefoil	Plants
Potentilla uliginosa	Cunningham Marsh cinquefoil	Plants
Primula jeffreyi		Plants
Primula pauciflora		Plants
Primula subalpina		Plants
Primula tetrandra	NA	Plants
Prionocera oregonica		Insects & other
Pristinicola hemphilli	Pristine Pyrg	Mollusks
Procladius barbatulus		Insects & other
Procladius bellus		Insects & other
Procladius culiciformis		Insects & other
Procladius denticulatus		Insects & other
Procladius freemani		Insects & other
Procladius sublettei		Insects & other
Procloeon pennulatum	A Mayfly	Insects & other
Procloeon rivulare	A Mayfly	Insects & other
Procloeon venosum	A Mayfly	Insects & other
Progomphus borealis	Gray Sanddragon	Insects & other
Promenetus exacuous	Sharp Sprite	Mollusks
Promenetus umbilicatellus	Umbilicate Sprite	Mollusks
Prosimulium caudatum		Insects & other
Prosimulium constrictistylum		Insects & other
Prosimulium davesi		Insects & other
Prosimulium dicentum		Insects & other
Prosimulium dicum		Insects & other
Prosimulium esselbaughi		Insects & other
Prosimulium exigens		Insects & other
Prosimulium flaviantennus		Insects & other
Prosimulium formosum		Insects & other
Prosimulium frohnei		Insects & other
Prosimulium fulvithorax		Insects & other
Prosimulium fulvum		Insects & other

Prosimulium idemai		Insects & other
Prosimulium imposter		Insects & other
Prosimulium longirostrum		Insects & other
Prosimulium minifulvum		Insects & other
Prosimulium rusticum		Insects & other
Prosimulium secretum		Insects & other
Prosimulium shewelli		Insects & other
Prosimulium travisi		Insects & other
Prosimulium uinta		Insects & other
Prosimulium unicum		Insects & other
Prosopium williamsoni	Mountain whitefish	Fishes
Prostoia besametsa	Bended Forestfly	Insects & other
Protanyderus margarita		Insects & other
Protanyderus vanduzeei		Insects & other
Protanyderus vipio		Insects & other
Protochauliodes aridus		Insects & other
Protochauliodes cascadius		Insects & other
Protochauliodes minimus		Insects & other
Protochauliodes montivagus		Insects & other
Protochauliodes simplus		Insects & other
Protochauliodes spenceri		Insects & other
Protoptila balmorhea		Insects & other
Protoptila coloma	A Caddisfly	Insects & other
Protoptila erotica		Insects & other
Psectrocladius barbimanus		Insects & other
Psectrocladius spinifer		Insects & other
Psectrocladius vernalis		Insects & other
Psectrotanypus dyari		Insects & other
Psephenus arizonensis		Insects & other
Psephenus falli		Insects & other
Psephenus minckleyi		Insects & other
Psephenus montanus		Insects & other
Psephenus murvoshi		Insects & other
Pseudacris cadaverina	California Treefrog	Herps
Pseudacris hypochondriaca	Baja California Treefrog	Herps
Pseudacris regilla	Northern Pacific Chorus Frog	Herps
Pseudacris sierra	Sierran Treefrog	Herps
Pseudiron centralis	White Sand-river Mayfly	Insects & other
Pseudochironomus richardsoni		Insects & other
Pseudocloeon apache		Insects & other
Pseudocloeon propinquum	A Mayfly	Insects & other

Pseudocorixa beameri		Insects & other
Pseudodiamesa branickii		Insects & other
Pseudoleon superbus		Insects & other
Pseudorthocladius dumicaudus		Insects & other
Pseudorthocladius uniserratus		Insects & other
Pseudosmittia forcipata		Insects & other
Pseudosmittia nanseni		Insects & other
Pseudostenophylax edwardsi	A Caddisfly	Insects & other
Psilocarphus brevissimus brevissimus	Dwarf Woolly-heads	Plants
Psilocarphus brevissimus multiflorus	Delta Woolly Marbles	Plants
Psilocarphus oregonus	Oregon Woolly-heads	Plants
Psilocarphus tenellus	NA	Plants
Psorophora columbiae		Insects & other
Psorophora discolor		Insects & other
Psorophora howardii		Insects & other
Psorophora signipennis		Insects & other
Psychoglypha alascensis		Insects & other
Psychoglypha avigo	A Caddisfly	Insects & other
Psychoglypha bella	A Caddisfly	Insects & other
Psychoglypha browni		Insects & other
Psychoglypha klamathi	A Caddisfly	Insects & other
Psychoglypha leechi	A Caddisfly	Insects & other
Psychoglypha mazamae	A Caddisfly	Insects & other
Psychoglypha ormiae	A Caddisfly	Insects & other
Psychoglypha prita		Insects & other
Psychoglypha schuhi		Insects & other
Psychoglypha subborealis	A Caddisfly	Insects & other
Psychomyia flavida	A Caddisfly	Insects & other
Psychomyia lumina	A Caddisfly	Insects & other
Psychomyia nomada		Insects & other
Pteronarcella badia		Insects & other
Pteronarcella regularis	Dwarf Salmonfly	Insects & other
Pteronarcys californica	Giant Salmonfly	Insects & other
Pteronarcys princeps	Ebony Salmonfly	Insects & other
Ptychocheilus grandis	Sacramento pikeminnow	Fishes
Ptychocheilus lucius	Colorado Pikeminnow	Fishes
Ptychoptera byersi		Insects & other
Ptychoptera lenis		Insects & other
Ptychoptera minor		Insects & other
Ptychoptera monoensis		Insects & other

Ptychoptera pendula		Insects & other
Ptychoptera sculleni		Insects & other
Ptychoptera townesi		Insects & other
Puccinellia howellii	Trinity Mountains Alkali Grass	Plants
Puccinellia nutkaensis	Alaska Alkaligrass	Plants
Puccinellia nuttalliana	Nuttall's Alkali Grass	Plants
Puccinellia parishii	Parish's Alkali Grass	Plants
Puccinellia pumila		Plants
Puccinellia simplex	Little Alkali Grass	Plants
Pyrgulopsis aardahli	Benton Valley Springsnail	Mollusks
Pyrgulopsis amargosae	Amargosa Springsnail	Mollusks
Pyrgulopsis archimedis	Archimedes Pyrg	Mollusks
Pyrgulopsis californiensis	Laguna Mountain Springsnail	Mollusks
Pyrgulopsis castaicensis	A Freshwater Snail	Mollusks
Pyrgulopsis cinerana	Ash Valley Pyrg	Mollusks
Pyrgulopsis diablensis	Diablo Range Pyrg	Mollusks
Pyrgulopsis eremica	Smoke Creek Pyrg	Mollusks
Pyrgulopsis falciglans	Likely Pyrg	Mollusks
Pyrgulopsis gibba	Surprise Valley Pyrg	Mollusks
Pyrgulopsis giuliani	Southern Sierra Nevada Springsnail	Mollusks
Pyrgulopsis greggi	Kern River Pyrg	Mollusks
Pyrgulopsis intermedia	Crooked Creek Springsnail	Mollusks
Pyrgulopsis lasseni	Willow Creek Pyrg	Mollusks
Pyrgulopsis licina		Mollusks
Pyrgulopsis longae	Long Valley Pyrg	Mollusks
Pyrgulopsis longinqua	Salton Sea Springsnail	Mollusks
Pyrgulopsis micrococcus	Oasis Valley Springsnail	Mollusks
Pyrgulopsis milleri	A Freshwater Snail	Mollusks
Pyrgulopsis owensensis	Owens Valley Springsnail	Mollusks
Pyrgulopsis perforata		Mollusks
Pyrgulopsis perturbata	Fish Slough Springsnail	Mollusks
Pyrgulopsis rupinicola	Sucker Springs Pyrg	Mollusks
Pyrgulopsis sanchezi		Mollusks
Pyrgulopsis stearnsiana	Yaqui Springsnail	Mollusks
Pyrgulopsis taylori	San Luis Obispo Pyrg	Mollusks
Pyrgulopsis turbatrix	Southeast Nevada Pyrg	Mollusks
Pyrgulopsis ventricosa	Clear Lake Pyrg	Mollusks
Pyrgulopsis wongi	Wong's Springsnail	Mollusks
Radotanypus submarginella		Insects & other
Rallus limicola	Virginia Rail	Birds
Rallus longirostris yumanensis	Yuma Clapper Rail	Birds

Ramellogammarus californicus		Crustaceans
Ramellogammarus campestris		Crustaceans
Ramellogammarus columbianus		Crustaceans
Ramellogammarus littoralis		Crustaceans
Ramellogammarus oregonensis		Crustaceans
Ramellogammarus ramellus		Crustaceans
Ramellogammarus similimanus		Crustaceans
Ramphocorixa rotundocephala		Insects & other
Rana aurora	Northern Red-legged Frog	Herps
Rana boylii	Foothill Yellow-legged Frog	Herps
Rana cascadae	Cascades Frog	Herps
Rana draytonii	California Red-legged Frog	Herps
Rana muscosa	Southern Mountain Yellow-legged Frog	Herps
Rana pretiosa	Oregon Spotted Frog	Herps
Rana sierrae	Sierra Nevada Yellow-legged Frog	Herps
Ranatra brevicollis	A Water Scorpion	Insects & other
Ranatra fusca		Insects & other
Ranatra montezuma		Insects & other
Ranatra quadridentata		Insects & other
Ranunculus alismifolius alismellus	Water-plantain Buttercup	Plants
Ranunculus alismifolius alismifolius	Water-plantain Buttercup	Plants
Ranunculus alismifolius hartwegii		Plants
Ranunculus alismifolius lemmonii		Plants
Ranunculus andersonii andersonii	Anderson's Buttercup	Plants
Ranunculus aquatilis aquatilis	White Water Buttercup	Plants
Ranunculus aquatilis diffusus		Plants
Ranunculus bonariensis	NA	Plants
Ranunculus flabellaris	Yellow Water-crowfoot	Plants
Ranunculus flammula flammula	Lesser Spearwort	Plants
Ranunculus flammula ovalis		Plants
Ranunculus hydrocharoides	NA	Plants
Ranunculus hystriculus		Plants
Ranunculus lobbii	Lobb's Water Buttercup	Plants
Ranunculus macounii	Macoun's Buttercup	Plants
Ranunculus populago	Mountain Buttercup	Plants
Ranunculus pusillus pusillus	Pursh's Buttercup	Plants
Ranunculus repens	NA	Plants

Ranunculus sardous	NA	Plants
Ranunculus sceleratus	NA	Plants
Recurvirostra americana	American Avocet	Birds
Remartinia luteipennis		Insects & other
Reomyia wartinbei		Insects & other
Rhagovelia becki		Insects & other
Rhagovelia choreutes		Insects & other
Rhagovelia distincta		Insects & other
Rhagovelia varipes		Insects & other
Rhamnus alnifolia	Alderleaf Buckthorn	Plants
Rhantus anisonychus		Insects & other
Rhantus atricolor		Insects & other
Rhantus binotatus		Insects & other
Rhantus consimilis		Insects & other
Rhantus gutticollis		Insects & other
Rhantus sericans		Insects & other
Rhantus wallisi		Insects & other
Rheotanytarsus hamatus		Insects & other
Rheumatobates hungerfordi		Insects & other
Rhinichthys osculus klamathensis	Klamath speckled dace	Fishes
Rhinichthys osculus nevadensis	Amargosa Canyon speckled dace	Fishes
Rhinichthys osculus robustus	Lahontan speckled dace	Fishes
Rhinichthys osculus ssp. 1	Sacramento speckled dace	Fishes
Rhinichthys osculus ssp. 2	Owens speckled dace	Fishes
Rhinichthys osculus ssp. 3	Long Valley speckled dace	Fishes
Rhinichthys osculus ssp. 4	Santa Ana speckled dace	Fishes
Rhionaeschna californica	California Darner	Insects & other
Rhionaeschna multicolor	Blue-eyed Darner	Insects & other
Rhionaeshna dugesi		Insects & other
Rhionaeshna psillus		Insects & other
Rhithrogena decora	A Mayfly	Insects & other
Rhithrogena flavianula	A Mayfly	Insects & other
Rhithrogena hageni	A Mayfly	Insects & other
Rhithrogena morrisoni	A Mayfly	Insects & other
Rhithrogena plana	A Mayfly	Insects & other
Rhithrogena robusta	A Mayfly	Insects & other
Rhithrogena undulata	A Mayfly	Insects & other
Rhithrogena virilis		Insects & other
Rhizelmis nigra		Insects & other
Rhododendron columbianum		Plants

Rhododendron occidentale occidentale	Western Azalea	Plants
Rhyacophila acuminata	A Caddisfly	Insects & other
Rhyacophila alberta		Insects & other
Rhyacophila amabilis	Castle Lake Rhyacophilan Caddisfly	Insects & other
Rhyacophila angelita	A Caddisfly	Insects & other
Rhyacophila arcella	A Caddisfly	Insects & other
Rhyacophila ardala	A Caddisfly	Insects & other
Rhyacophila arnaudi	A Caddisfly	Insects & other
Rhyacophila balosa	A Caddisfly	Insects & other
Rhyacophila basalis	A Caddisfly	Insects & other
Rhyacophila betteni	A Caddisfly	Insects & other
Rhyacophila bifila	A Caddisfly	Insects & other
Rhyacophila blarina		Insects & other
Rhyacophila californica	A Caddisfly	Insects & other
Rhyacophila cerita	A Caddisfly	Insects & other
Rhyacophila chandleri	A Caddisfly	Insects & other
Rhyacophila chilsia		Insects & other
Rhyacophila chordata	A Caddisfly	Insects & other
Rhyacophila colonus	Obrien Rhyacophilan Caddisfly	Insects & other
Rhyacophila coloradensis	A Caddisfly	Insects & other
Rhyacophila darbyi	A Caddisfly	Insects & other
Rhyacophila ebria		Insects & other
Rhyacophila ecosa	A Caddisfly	Insects & other
Rhyacophila fenderi	Fender's Rhyacophilan Caddisfly	Insects & other
Rhyacophila grandis	A Caddisfly	Insects & other
Rhyacophila haddocki		Insects & other
Rhyacophila harmstoni	A Caddisfly	Insects & other
Rhyacophila hyalinata	A Caddisfly	Insects & other
Rhyacophila inculta	A Caddisfly	Insects & other
Rhyacophila insularis	A Caddisfly	Insects & other
Rhyacophila iranda		Insects & other
Rhyacophila jenniferae	A Caddisfly	Insects & other
Rhyacophila jewetti	A Caddisfly	Insects & other
Rhyacophila karila	A Caddisfly	Insects & other
Rhyacophila kernada	A Caddisfly	Insects & other
Rhyacophila kincaidi		Insects & other
Rhyacophila leechi	A Caddisfly	Insects & other
Rhyacophila lineata	Castle Crags Rhyacophilan Caddisfly	Insects & other
Rhyacophila lurella	A Caddisfly	Insects & other
Rhyacophila malkini		Insects & other

Rhyacophila mosana	Bilobed Rhyacophilan Caddisfly	Insects & other
Rhyacophila narvae	A Caddisfly	Insects & other
Rhyacophila neograndis	A Caddisfly	Insects & other
Rhyacophila nevadensis	A Caddisfly	Insects & other
Rhyacophila norcuta	A Caddisfly	Insects & other
Rhyacophila oreta	A Caddisfly	Insects & other
Rhyacophila pellisa	A Caddisfly	Insects & other
Rhyacophila perda		Insects & other
Rhyacophila perplana		Insects & other
Rhyacophila pichaca		Insects & other
Rhyacophila rayneri	A Caddisfly	Insects & other
Rhyacophila reyesi	A Caddisfly	Insects & other
Rhyacophila rotunda	A Caddisfly	Insects & other
Rhyacophila sequoia	A Caddisfly	Insects & other
Rhyacophila sierra	A Caddisfly	Insects & other
Rhyacophila siskiyou	A Caddisfly	Insects & other
Rhyacophila spinata	Spiny Rhyacophilan Caddisfly	Insects & other
Rhyacophila starki	A Caddisfly	Insects & other
Rhyacophila tamalpaisi	A Caddisfly	Insects & other
Rhyacophila tehama	A Caddisfly	Insects & other
Rhyacophila tralala		Insects & other
Rhyacophila tucula	A Caddisfly	Insects & other
Rhyacophila unipunctata		Insects & other
Rhyacophila vaccua	A Caddisfly	Insects & other
Rhyacophila vaefes	A Caddisfly	Insects & other
Rhyacophila vagrita		Insects & other
Rhyacophila valuma	A Caddisfly	Insects & other
Rhyacophila vao	A Caddisfly	Insects & other
Rhyacophila vedra	A Caddisfly	Insects & other
Rhyacophila velora	A Caddisfly	Insects & other
Rhyacophila vemna		Insects & other
Rhyacophila verrula	A Caddisfly	Insects & other
Rhyacophila vetina		Insects & other
Rhyacophila viquaea		Insects & other
Rhyacophila visor		Insects & other
Rhyacophila vobara		Insects & other
Rhyacophila vocala	A Caddisfly	Insects & other
Rhyacophila vuzana	A Caddisfly	Insects & other
Rhyacophila willametta		Insects & other
Rhyacotriton variegatus	Southern Torrent Salamander	Herps
Rhynchospora alba	White Beakrush	Plants

Rhynchospora californica	California Beakrush	Plants
Rhynchospora capitellata	Brownish Beakrush	Plants
Rhynchospora globularis	NA	Plants
Richardsonius egregius	Lahontan redside	Fishes
Rickera sorpta	Palestripe Springfly	Insects & other
Riparia riparia	Bank Swallow	Birds
Robackia demeijeri		Insects & other
Rorippa columbiae	Columbia Yellowcress	Plants
Rorippa curvipes	Rocky Mountain Yellowcress	Plants
Rorippa curvisiliqua curvisiliqua	Curve-pod Yellowcress	Plants
Rorippa palustris palustris	Bog Yellowcress	Plants
Rorippa sphaerocarpa	Round-fruit Yellowcress	Plants
Rorippa subumbellata	Tahoe Yellowcress	Plants
Rotala ramosior	Toothcup	Plants
Rudbeckia klamathensis		Plants
Rumex britannica	NA	Plants
Rumex californicus		Plants
Rumex conglomeratus	NA	Plants
Rumex crassus		Plants
Rumex fueginus		Plants
Rumex kerneri	NA	Plants
Rumex lacustris		Plants
Rumex occidentalis		Plants
Rumex persicarioides		Plants
Rumex salicifolius salicifolius	Willow Dock	Plants
Rumex stenophyllus	NA	Plants
Rumex transitorius		Plants
Rumex triangulivalvis		Plants
Rumex utahensis		Plants
Rumex violascens	Violet Dock	Plants
Rupisalda dewsi		Insects & other
Rupisalda saxicola		Insects & other
Rupisalda teretis		Insects & other
Ruppia cirrhosa	Widgeon-grass	Plants
Ruppia maritima	Ditch-grass	Plants
Rynchops niger	Black Skimmer	Birds
Sagina saginoides	Arctic Pearlwort	Plants
Sagittaria cuneata	Wapatum Arrowhead	Plants
Sagittaria latifolia latifolia	Broadleaf Arrowhead	Plants
Sagittaria longiloba	Longbarb Arrowhead	Plants
Sagittaria montevidensis		Plants

calycina		
Sagittaria sanfordii	Sanford's Arrowhead	Plants
Salda buenoi		Insects & other
Salda littoralis		Insects & other
Salda lugubris		Insects & other
Salda obscura		Insects & other
Salda provancheri		Insects & other
Saldula andrei		Insects & other
Saldula balli		Insects & other
Saldula basingeri		Insects & other
Saldula comatula		Insects & other
Saldula dispersa		Insects & other
Saldula explanata		Insects & other
Saldula latticollis		Insects & other
Saldula lattini		Insects & other
Saldula luctuosa		Insects & other
Saldula nigrita		Insects & other
Saldula opacula		Insects & other
Saldula opiparia		Insects & other
Saldula orbiculata		Insects & other
Saldula pallipes		Insects & other
Saldula palustris		Insects & other
Saldula pexa		Insects & other
Saldula saltatoria		Insects & other
Saldula severini		Insects & other
Saldula sulcicollis		Insects & other
Saldula usingeri	Wilbur Springs Shorebug	Insects & other
Saldula villosa		Insects & other
Salicornia bigelovii	Dwarf Glasswort	Plants
Salicornia rubra	Western Glasswort	Plants
Salix babylonica	NA	Plants
Salix boothii	Booth's Willow	Plants
Salix breweri	Brewer's Willow	Plants
Salix delnortensis	Del Norte Willow	Plants
Salix drummondiana	Satiny Salix	Plants
Salix eastwoodiae	Eastwood's Willow	Plants
Salix exigua exigua	Narrowleaf Willow	Plants
Salix exigua hindsiana		Plants
Salix geyeriana	Geyer's Willow	Plants
Salix gooddingii	Goodding's Willow	Plants
Salix hookeriana	Hooker's Willow	Plants

Salix jepsonii	Jepson's Willow	Plants
Salix laevigata	Polished Willow	Plants
Salix lasiandra caudata		Plants
Salix lasiandra lasiandra		Plants
Salix lasiolepis lasiolepis	Arroyo Willow	Plants
Salix lemmonii	Lemmon's Willow	Plants
Salix lutea	Yellow Willow	Plants
Salix melanopsis	Dusky Willow	Plants
Salix planifolia	NA	Plants
Salix prolixa	Mackenzie's Willow	Plants
Salix purpurea	NA	Plants
Salix sitchensis	Sitka Willow	Plants
Salix tracyi		Plants
Salmasellus howarthi		Crustaceans
Salmoperla sylvanica	Bighead Springfly	Insects & other
Salvelinus confluentus	Bull Trout	Fishes
Salvinia minima	NA	Plants
Salvinia oblongifolia	NA	Plants
Samolus parviflorus	NA	Plants
Sanfilippodytes adelardi	A Predaceous Diving Beetle	Insects & other
Sanfilippodytes barbarae		Insects & other
Sanfilippodytes barbarensis		Insects & other
Sanfilippodytes belfragei		Insects & other
Sanfilippodytes bidessoides	A Predaceous Diving Beetle	Insects & other
Sanfilippodytes corvallis		Insects & other
Sanfilippodytes hardyi		Insects & other
Sanfilippodytes kingi		Insects & other
Sanfilippodytes latebrosus		Insects & other
Sanfilippodytes malkini		Insects & other
Sanfilippodytes palliatus		Insects & other
Sanfilippodytes rossi		Insects & other
Sanfilippodytes setifer	A Predaceous Diving Beetle	Insects & other
Sanfilippodytes terminalis		Insects & other
Sanfilippodytes veronicae		Insects & other
Sanfilippodytes vilis		Insects & other
Sanfilippodytes williami		Insects & other
Sarracenia purpurea	NA	Plants
Sasquaperla hoopa	A Stonefly	Insects & other
Scaphiopus couchii	Couch's Spadefoot	Herps
Scheuchzeria palustris	Pod Grass	Plants
Schoenoplectus acutus acutus	NA	Plants

Schoenoplectus acutus occidentalis	Hardstem Bulrush	Plants
Schoenoplectus americanus	Three-square Bulrush	Plants
Schoenoplectus californicus	California Bulrush	Plants
Schoenoplectus heterochaetus	Slender Bulrush	Plants
Schoenoplectus mucronatus	NA	Plants
Schoenoplectus pungens longispicatus	Three-square Bulrush	Plants
Schoenoplectus pungens pungens	NA	Plants
Schoenoplectus saximontanus	Rocky Mountain Bulrush	Plants
Schoenoplectus subterminalis	Water Bulrush	Plants
Schoenoplectus tabernaemontani	Softstem Bulrush	Plants
Schoenoplectus triqueter	NA	Plants
Schoenus nigricans	Blacksedge	Plants
Scirpus congdonii	Congdon's Bulrush	Plants
Scirpus cyperinus	NA	Plants
Scirpus diffusus	Umbrella Bulrush	Plants
Scirpus microcarpus	Small-fruit Bulrush	Plants
Scirpus pendulus	Pendulous Bulrush	Plants
Scirtes californicus		Insects & other
Scirtes orbiculatus		Insects & other
Scirtes plagiatus		Insects & other
Scutellaria galericulata	Hooded Skullcap	Plants
Sedella leiocarpa	Lake County Mock Stonecrop	Plants
Senecio hydrophiloides	Sweet Marsh Ragwort	Plants
Senecio hydrophilus	Great Swamp Ragwort	Plants
Senecio triangularis	Arrow-leaf Groundsel	Plants
Sequoia sempervirens		Plants
Sergentia albescens		Insects & other
Serratella levis	A Mayfly	Insects & other
Serratella micheneri	A Mayfly	Insects & other
Sesbania herbacea		Plants
Setophaga petechia	Yellow Warbler	Birds
Setophaga petechia brewsteri	A Yellow Warbler	Birds
Setophaga petechia sonorana	Sonoran Yellow Warbler	Birds
Setvena tibialis		Insects & other
Setvena wahkeena		Insects & other
Sialis arvalis		Insects & other
Sialis bilobata		Insects & other
Sialis californica		Insects & other

Sialis cornuta		Insects & other
Sialis hamata		Insects & other
Sialis nevadensis		Insects & other
Sialis occidens		Insects & other
Sialis rotunda		Insects & other
Sidalcea calycosa calycosa	Annual Checker-mallow	Plants
Sidalcea calycosa rhizomata	Point Reyes Checkerbloom	Plants
Sidalcea gigantea		Plants
Sidalcea hirsuta	Hairy Checker-mallow	Plants
Sidalcea neomexicana	Rocky Mountain Checker-mallow	Plants
Sidalcea oregana hydrophila	Water-loving Checker-mallow	Plants
Sidalcea oregana oregana	Oregon Checker-mallow	Plants
Sidalcea oregana valida	Kenwood Marsh Checker-mallow	Plants
Sidalcea pedata	Pedate Checker-mallow	Plants
Sidalcea ranunculacea	Marsh Checker-mallow	Plants
Sidalcea reptans	Creeping Checker-mallow	Plants
Sierraperla cora	Giant Roachfly	Insects & other
Sigara alternata		Insects & other
Sigara grossolineata		Insects & other
Sigara krafti		Insects & other
Sigara mckinstryi	A Water Boatman	Insects & other
Sigara nevadensis		Insects & other
Sigara omani		Insects & other
Sigara vallis	A Water Boatman	Insects & other
Sigara vandykei		Insects & other
Sigara washingtonensis		Insects & other
Simulium anduzei		Insects & other
Simulium apricarium		Insects & other
Simulium argus		Insects & other
Simulium balteatum		Insects & other
Simulium bivittatum		Insects & other
Simulium brevicercum		Insects & other
Simulium bricenoi		Insects & other
Simulium canadensis		Insects & other
Simulium canonicolum		Insects & other
Simulium carbunculum		Insects & other
Simulium chromatinum		Insects & other
Simulium chromocentrum		Insects & other
Simulium clarum		Insects & other
Simulium conicum		Insects & other
Simulium craigi		Insects & other

Simulium curiei		Insects & other
Simulium decorum		Insects & other
Simulium defoliarti		Insects & other
Simulium donovani		Insects & other
Simulium encisoi		Insects & other
Simulium exculatum		Insects & other
Simulium freemani		Insects & other
Simulium griseum		Insects & other
Simulium hechti		Insects & other
Simulium hippovorum		Insects & other
Simulium hunteri		Insects & other
Simulium infernale		Insects & other
Simulium iriartei		Insects & other
Simulium jacumbae		Insects & other
Simulium joculator		Insects & other
Simulium longithallum		Insects & other
Simulium meridionale		Insects & other
Simulium modicum		Insects & other
Simulium mysterium		Insects & other
Simulium nebulosum		Insects & other
Simulium negativum		Insects & other
Simulium notatum		Insects & other
Simulium paynei		Insects & other
Simulium petersoni		Insects & other
Simulium pilosum		Insects & other
Simulium piperi		Insects & other
Simulium pugetense		Insects & other
Simulium quadratum		Insects & other
Simulium rostratum		Insects & other
Simulium saxosum		Insects & other
Simulium silvestre		Insects & other
Simulium tescorum		Insects & other
Simulium tribulatum		Insects & other
Simulium twinni		Insects & other
Simulium vandalicum		Insects & other
Simulium venator		Insects & other
Simulium venustum		Insects & other
Simulium virgatum		Insects & other
Simulium vittatum		Insects & other
Simulium wyomingense		Insects & other
Simulium zephyrus		Insects & other

Sinapis alba	NA	Plants
Siphatales bicolor bicolor	Klamath tui chub	Fishes
Siphatales bicolor obesus	Lahontan stream tui chub	Fishes
Siphatales bicolor pectinifer	Lahontan lake tui chub	Fishes
Siphatales bicolor snyderi	Owens tui chub	Fishes
Siphatales bicolor ssp. 1	Eagle Lake tui chub	Fishes
Siphatales bicolor ssp. 11	High Rock Spring Tui Chub	Fishes
Siphatales mohavensis	Mojave tui chub	Fishes
Siphatales thalassinus ssp. 1	Pit River tui chub	Fishes
Siphatales thalassinus thalassinus	Goose Lake tui chub	Fishes
Siphatales thalassinus vaccaceps	Cow Head tui chub	Fishes
Siphlonurus columbianus	A Mayfly	Insects & other
Siphlonurus occidentalis	A Mayfly	Insects & other
Siphlonurus spectabilis	A Mayfly	Insects & other
Sisko oregona		Insects & other
Sisko sisko		Insects & other
Sisyra vicaria		Insects & other
Sisyrinchium californicum	Golden Blue-eyed-grass	Plants
Sisyrinchium elmeri	Elmer's Blue-eyed-grass	Plants
Sisyrinchium longipes	Timberland Blue-eyed-grass	Plants
Sium suave	Hemlock Water-parsnip	Plants
Skwala americana	American Springfly	Insects & other
Skwala curvata	Curved Springfly	Insects & other
Smicridea arizonensis	A Caddisfly	Insects & other
Smicridea dispar	A Caddisfly	Insects & other
Smicridea fasciatella	A Caddisfly	Insects & other
Smicridea signata		Insects & other
Solidago elongata		Plants
Solidago guiradonis	Guirado's Goldenrod	Plants
Solidago lepida salebrosa		Plants
Solidago spectabilis	Nevada Goldenrod	Plants
Soliperla campanula		Insects & other
Soliperla quadrispinula	Four-spined Roachfly	Insects & other
Soliperla sierra	Sierra Roachfly	Insects & other
Soliperla thyra	California Roachfly	Insects & other
Soliperla tillamook		Insects & other
Somatochlora albicincta	Ringed Emerald	Insects & other
Somatochlora minor		Insects & other
Somatochlora semicircularis	Mountain Emerald	Insects & other
Sorex palustris	American Water Shrew	Mammals

Soyedina interrupta		Insects & other
Soyedina nevadensis	Nevada Forestfly	Insects & other
Soyedina producta	Knobbed Forestfly	Insects & other
Sparganium angustifolium	Narrowleaf Bur-reed	Plants
Sparganium emersum		Plants
Sparganium eurycarpum eurycarpum		Plants
Sparganium eurycarpum greenei		Plants
Sparganium natans	Small Bur-reed	Plants
Spartina densiflora	NA	Plants
Spartina foliosa	California Cordgrass	Plants
Spartina gracilis	Alkali Cordgrass	Plants
Spea hammondii	Western Spadefoot	Herps
Spea intermontana	Great Basin Spadefoot	Herps
Sperchon stellata		Insects & other
Sphaerium occidentale		Mollusks
Sphaerium patella	Rocky Mountain Fingernailclam	Mollusks
Sphaerium striatum		Mollusks
Sphenosciadium capitellatum	Swamp Whiteheads	Plants
Spiranthes romanzoffiana	Hooded Ladies'-tresses	Plants
Spirinchus thaleichthys	Longfin smelt	Fishes
Spirodela polyrhiza	NA	Plants
Stachys ajugoides	Bugle Hedge-nettle	Plants
Stachys albens	White-stem Hedge-nettle	Plants
Stachys chamissonis chamissonis	Coast Hedge-nettle	Plants
Stachys pycnantha	Short-spike Hedge-nettle	Plants
Stachys rigida quercetorum		Plants
Stachys stricta	Sonoma Hedge-nettle	Plants
Stactobiella brustia		Insects & other
Stactobiella delira	A Caddisfly	Insects & other
Stactobiella palmata		Insects & other
Stagnicola caperata	Wrinkled Marshsnail	Mollusks
Stagnicola elodes	Marsh Pondsnail	Mollusks
Stagnicola gabbi	Striate Pondsnail	Mollusks
Stagnicola traski	Widelip Pondsnail	Mollusks
Stegopterna acra		Insects & other
Stegopterna permutata		Insects & other
Stegopterna xantha		Insects & other
Stellaria littoralis	Beach Starwort	Plants
Stemodia durantifolia	White-woolly Stemodia	Plants
Stenelmis calida calida	Devil's Hole Warm Spring Riffle Beetle	Insects & other

Stenelmis lariversi		Insects & other
Stenelmis moapa		Insects & other
Stenelmis occidentalis		Insects & other
Stenochironomus colei		Insects & other
Stenochironomus fuscipatellus		Insects & other
Stenochironomus hilaris		Insects & other
Stenochironomus totifuscus		Insects & other
Stenocolus scutellaris		Insects & other
Stenocypris archoplites	An Ostracod	Crustaceans
Stictochironomus naevus		Insects & other
Stictochironomus quagga		Insects & other
Stictotarsus aequinoctialis		Insects & other
Stictotarsus coelamboides		Insects & other
Stictotarsus corvinus		Insects & other
Stictotarsus decemsignatus		Insects & other
Stictotarsus deceptus		Insects & other
Stictotarsus dolerosus		Insects & other
Stictotarsus eximius		Insects & other
Stictotarsus expositus		Insects & other
Stictotarsus funereus		Insects & other
Stictotarsus griseostriatus		Insects & other
Stictotarsus panaminti		Insects & other
Stictotarsus roffi		Insects & other
Stictotarsus spectabilis		Insects & other
Stictotarsus striatellus		Insects & other
Streptocephalus dorothae	New Mexico Fairy Shrimp	Crustaceans
Streptocephalus mackini		Crustaceans
Streptocephalus sealii	Spinytail Fairy Shrimp	Crustaceans
Streptocephalus texanus	Greater Plains Fairy Shrimp	Crustaceans
Streptocephalus woottoni	Riverside Fairy Shrimp	Crustaceans
Streptopus amplexifolius americanus		Plants
Strix nebulosa	Great Gray Owl	Birds
Stuckenia filiformis alpina		Plants
Stuckenia pectinata		Plants
Stuckenia striata		Plants
Stygalbiella affinis		Insects & other
Stygalbiella arizonica		Insects & other
Stygobromus cherylae	Barr's Amphipod	Crustaceans
Stygobromus cowani	Cowan's Amphipod	Crustaceans
Stygobromus gallawayae	Gallaway's Amphipod	Crustaceans

Stygobromus gradyi	Grady's Cave Amphipod	Crustaceans
Stygobromus grahami	A Cave Obligate Amphipod	Crustaceans
Stygobromus harai	Hara's Cave Amphipod	Crustaceans
Stygobromus hyporheicus	Hypoheic Amphipod	Crustaceans
Stygobromus imperialis	Imperial Amphipod	Crustaceans
Stygobromus lacicolus	Lake Tahoe Amphipod	Crustaceans
Stygobromus mackenziei	Mackenzie's Cave Amphipod	Crustaceans
Stygobromus myersae	Myers' Amphipod	Crustaceans
Stygobromus mysticus	A Cave Obligate Amphipod	Crustaceans
Stygobromus rudolphi	Rudolph's Amphipod	Crustaceans
Stygobromus sheldoni	Sheldon Stygobromid	Crustaceans
Stygobromus sierrensis	A Cave Obligate Amphipod	Crustaceans
Stygobromus tahoensis	Lake Tahoe Stygobromid	Crustaceans
Stygobromus trinus	Trinity County Amphipod	Crustaceans
Stygobromus wengerorum	Wenger Cave Stygobromid	Crustaceans
Stygonyx courtneyi		Crustaceans
Stygoporus oregonensis		Insects & other
Stylurus intricatus	Brimstone Clubtail	Insects & other
Stylurus olivaceus	Olive Clubtail	Insects & other
Stylurus plagiatus	Russet-tipped Clubtail	Insects & other
Suaeda calceoliformis	American Sea-blite	Plants
Suaeda californica	California Sea-blite	Plants
Suaeda esteroa	Estuary Suaeda	Plants
Sublettea coffmani		Insects & other
Subularia aquatica americana	Water Awlwort	Plants
Suphisellus bicolor		Insects & other
Susulus venustus	Beautiful Springfly	Insects & other
Suwallia amoenacolens		Insects & other
Suwallia autumna		Insects & other
Suwallia dubia	Pale Sallfly	Insects & other
Suwallia lineosa		Insects & other
Suwallia pallidula	Yellow Sallfly	Insects & other
Suwallia shepardi	A Stonefly	Insects & other
Suwallia sierra	Sierra Sallfly	Insects & other
Suwallia starki		Insects & other
Suwallia sublimis	A Stonefly	Insects & other
Sweltsa adamantea		Insects & other
Sweltsa borealis	Boreal Sallfly	Insects & other
Sweltsa californica	Chico Sallfly	Insects & other
Sweltsa coloradensis	Colorado Sallfly	Insects & other
Sweltsa continua	Gabriel Sallfly	Insects & other

Sweltsa exquisita		Insects & other
Sweltsa fidelis	Mountain Sallfly	Insects & other
Sweltsa lamba		Insects & other
Sweltsa occidens		Insects & other
Sweltsa oregonensis		Insects & other
Sweltsa pacifica	Pacific Sallfly	Insects & other
Sweltsa pisteri	Coastal Sallfly	Insects & other
Sweltsa resima	California Sallfly	Insects & other
Sweltsa revelstoka		Insects & other
Sweltsa salix	A Stonefly	Insects & other
Sweltsa tamalpa	Tamalpais Sallfly	Insects & other
Sweltsa townesi	Sierra Sallfly	Insects & other
Sweltsa umbonata	Shasta Sallfly	Insects & other
Sweltsa yurok	A Stonefly	Insects & other
Symbiocladius equitans		Insects & other
Sympetrum corruptum	Variegated Meadowhawk	Insects & other
Sympetrum costiferum	Saffron-winged Meadowhawk	Insects & other
Sympetrum danae	Black Meadowhawk	Insects & other
Sympetrum illotum	Cardinal Meadowhawk	Insects & other
Sympetrum internum	Cherry-faced Meadowhawk	Insects & other
Sympetrum madidum	Red-veined Meadowhawk	Insects & other
Sympetrum obtrusum	White-faced Meadowhawk	Insects & other
Sympetrum occidentale		Insects & other
Sympetrum pallipes	Striped Meadowhawk	Insects & other
Sympetrum signiferum		Insects & other
Sympetrum vicinum	Autumn Meadowhawk	Insects & other
Symphyotrichum bracteolatum		Plants
Symphyotrichum frondosum	Alkali Aster	Plants
Symphyotrichum lanceolatum hesperium	Siskiyou Aster	Plants
Symphyotrichum lanceolatum lanceolatum	NA	Plants
Symphyotrichum lentum	Suisun Marsh Aster	Plants
Sympotthastia diastena		Insects & other
Syncaris pacifica	California Freshwater Shrimp	Crustaceans
Syncaris pasadenae	Pasadena Freshwater Shrimp	Crustaceans
Synendotendipes luski		Insects & other
Tachycineta bicolor	Tree Swallow	Birds
Taenionema californicum	California Willowfly	Insects & other
Taenionema grinnelli	Angeles Willowfly	Insects & other
Taenionema jacobii		Insects & other
Taenionema jeanae	A Stonefly	Insects & other

Taenionema jewetti		Insects & other
Taenionema kincaidi	Pale Willowfly	Insects & other
Taenionema oregonense		Insects & other
Taenionema pacificum	Pacific Willowfly	Insects & other
Taenionema pallidum	Common Willowfly	Insects & other
Taenionema raynorium	Yosemite Willowfly	Insects & other
Taenionema uinta		Insects & other
Taenionema umatilla		Insects & other
Taeniopteryx nivalis	Boreal Willowfly	Insects & other
Talitroides alluaudi		Crustaceans
Talitroides topitotum		Crustaceans
Tanypteryx hageni	Black Petaltail	Insects & other
Tanypus carinatus		Insects & other
Tanypus grodhausi		Insects & other
Tanypus imperialis		Insects & other
Tanypus neopunctipennis		Insects & other
Tanypus nubifer		Insects & other
Tanypus parastellatus		Insects & other
Tanypus punctipennis		Insects & other
Tanypus stellatus		Insects & other
Tanytarsus angulatus		Insects & other
Tanytarsus challeti		Insects & other
Tanytarsus dendyi		Insects & other
Tanytarsus hastatus		Insects & other
Tanytarsus limneticus		Insects & other
Tanytarsus mendax		Insects & other
Tanytarsus neoflavellus		Insects & other
Tanytarsus pelsuei		Insects & other
Taricha granulosa	Rough-skinned Newt	Herps
Taricha rivularis	Red-bellied Newt	Herps
Taricha sierrae	Sierra Newt	Herps
Taricha torosa	Coast Range Newt	Herps
Taxus brevifolia		Plants
Telebasis salva	Desert Firetail	Insects & other
Telmatogeton alaskensis		Insects & other
Telmatogeton japonicus		Insects & other
Telmatogeton macswaini		Insects & other
Telmatogeton spinosus		Insects & other
Telmatogeton trilobatus		Insects & other
Teloleuca bifasciata		Insects & other
Teloleuca pellucens		Insects & other

Tempisquitoneura merrillorum		Insects & other
Tethymyia aptena		Insects & other
Thalassosmittia clavicornis		Insects & other
Thalassosmittia marina		Insects & other
Thalassosmittia pacifica		Insects & other
Thalassotrechus barbarae		Insects & other
Thaleichthys pacificus	Eulachon	Fishes
Thamnocephalus mexicanus		Crustaceans
Thamnocephalus platyurus	Beavertail Fairy Shrimp	Crustaceans
Thamnophis atratus atratus	Santa Cruz Gartersnake	Herps
Thamnophis atratus hydrophilius	Oregon Gartersnake	Herps
Thamnophis atratus zaxanthus	Diablo Range Gartersnake	Herps
Thamnophis couchii	Sierra Gartersnake	Herps
Thamnophis elegans elegans	Mountain Gartersnake	Herps
Thamnophis elegans terrestris	Coast Gartersnake	Herps
Thamnophis elegans vagrans	Wandering Gartersnake	Herps
Thamnophis gigas	Giant Gartersnake	Herps
Thamnophis hammondii hammondii	Two-striped Gartersnake	Herps
Thamnophis hammondii ssp. 1	Santa Catalina Gartersnake	Herps
Thamnophis marcianus marcianus	Marcy's Checkered Gartersnake	Herps
Thamnophis ordinoides	Northwestern Gartersnake	Herps
Thamnophis sirtalis fitchi	Valley Gartersnake	Herps
Thamnophis sirtalis infernalis	California Red-sided Gartersnake	Herps
Thamnophis sirtalis sirtalis	Common Gartersnake	Herps
Thamnophis sirtalis ssp. 1	South Coast Gartersnake	Herps
Thamnophis sirtalis tetrataenia	San Francisco Gartersnake	Herps
Thelypteris puberula sonorensis	NA	Plants
Thermonectus intermedius		Insects & other
Thermonectus marmoratus		Insects & other
Thermonectus nigrofasciatus nigrofasciatus		Insects & other
Thermonectus sibleyi		Insects & other
Thienemannimyia barberi		Insects & other
Thienemannimyia fusciceps		Insects & other
Thienemannimyia norena		Insects & other
Thraulodes brunneus		Insects & other
Thraulodes gonzalesi		Insects & other
Thraulodes tenulineus		Insects & other
Throscinus crotchi		Insects & other
Timpanoga hecuba	A Mayfly	Insects & other

Tinodes belisus	A Caddisfly	Insects & other
Tinodes cascadius	A Caddisfly	Insects & other
Tinodes consuetus	A Caddisfly	Insects & other
Tinodes gabriella	A Caddisfly	Insects & other
Tinodes parvulus	A Caddisfly	Insects & other
Tinodes powelli	A Caddisfly	Insects & other
Tinodes provo	A Caddisfly	Insects & other
Tinodes schusteri	A Caddisfly	Insects & other
Tinodes sigodanus	A Caddisfly	Insects & other
Tinodes siskiyou	A Caddisfly	Insects & other
Tinodes twilus	A Caddisfly	Insects & other
Tinodes usillus	A Caddisfly	Insects & other
Tlalocomyia andersoni		Insects & other
Tlalocomyia osbornii		Insects & other
Tlalocomyia ramifera		Insects & other
Tlalocomyia stewarti		Insects & other
Torreyochloa pallida	NA	Plants
Toxicoscordion fontanum	NA	Plants
Toxicoscordion micranthum	NA	Plants
Toxicoscordion venenosum venenosum		Plants
Toxorhynchites moctezuma		Insects & other
Tramea calverti		Insects & other
Tramea lacerata	Black Saddlebags	Insects & other
Tramea onusta	Red Saddlebags	Insects & other
Traverella albertana		Insects & other
Trepobates becki		Insects & other
Trepobates pictus		Insects & other
Trepobates taylori		Insects & other
Trepobates trepidus		Insects & other
Triaenodes frontalis		Insects & other
Triaenodes injustus		Insects & other
Triaenodes reuteri		Insects & other
Triaenodes tardus	A Caddisfly	Insects & other
Tribelos jucundum		Insects & other
Tribelos subatrum		Insects & other
Tribelos subletteorum		Insects & other
Trichocorixa arizonensis		Insects & other
Trichocorixa calva		Insects & other
Trichocorixa reticulata		Insects & other
Trichocorixa uhleri		Insects & other

Trichocorixa verticalis		Insects & other
Tricoryhyphes condylus		Insects & other
Tricorythodes explicatus	A Mayfly	Insects & other
Tricorythodes fictus	A Mayfly	Insects & other
Triglochin maritima	Common Bog Arrow-grass	Plants
Triglochin palustris	Slender Bog Arrow-grass	Plants
Triglochin scilloides	NA	Plants
Triglochin striata	Three-ribbed Arrow-grass	Plants
Tringa melanoleuca	Greater Yellowlegs	Birds
Tringa semipalmata	Willet	Birds
Tringa solitaria	Solitary Sandpiper	Birds
Triops longicaudatus	Summer tadpole shrimps	Crustaceans
Triznaka pintada	Rough Sallfly	Insects & other
Triznaka sheldoni		Insects & other
Triznaka signata		Insects & other
Tropicus pusillus		Insects & other
Tropisternus californicus		Insects & other
Tropisternus columbianus		Insects & other
Tropisternus ellipticus		Insects & other
Tropisternus lateralis		Insects & other
Tropisternus orvus		Insects & other
Tropisternus salsamentus		Insects & other
Tropisternus sublaevis		Insects & other
Tryonia margae	Grapevine Springs Elongate Tryonia	Mollusks
Tryonia porrecta	Desert Tryonia	Mollusks
Tryonia rowlandsi	Grapevine Springs Squat Tryonia	Mollusks
Tryonia salina	Cottonball Marsh Tryonia	Mollusks
Tryonia variegata	Amargosa Tryonia	Mollusks
Tuctoria greenei	Green's Awnless Orcutt Grass	Plants
Tuctoria mucronata	Mucronate Orcutt Grass	Plants
Tvetenia vitracies		Insects & other
Twinnia hirticornis		Insects & other
Typha domingensis	Southern Cattail	Plants
Typha latifolia	Broadleaf Cattail	Plants
Uca crenulata		Crustaceans
Uranotaenia anhydor		Insects & other
Utacapnia columbiana	Columbian Snowfly	Insects & other
Utacapnia imbera		Insects & other
Utacapnia lemoniana		Insects & other
Utacapnia sierra	Sierra Snowfly	Insects & other
Utacapnia tahoensis	Tahoe Snnowflyl	Insects & other

Utaperla sopladora		Insects & other
Utaxatax californiensis		Insects & other
Utaxatax newelli		Insects & other
Utaxatax ovalis		Insects & other
Utricularia gibba	Humped Bladderwort	Plants
Utricularia intermedia	Flatleaf Bladderwort	Plants
Utricularia macrorhiza	Greater Bladderwort	Plants
Utricularia minor	Lesser Bladderwort	Plants
Utricularia ochroleuca	Northern Bladderwort	Plants
Utricularia subulata	NA	Plants
Uvarus amandus		Insects & other
Uvarus subtilis		Insects & other
Vaccinium macrocarpon	NA	Plants
Vaccinium uliginosum occidentale		Plants
Vaccupernius packeri		Insects & other
Valvata humeralis	Glossy Valvata	Mollusks
Valvata tricarinata		Mollusks
Valvata utahensis		Mollusks
Valvata virens	Emerald Valvata	Mollusks
Veratrum fimbriatum	Fringed False Hellebore	Plants
Verbena scabra	Sandpaper Vervain	Plants
Veronica americana	American Speedwell	Plants
Veronica anagallis-aquatica	NA	Plants
Veronica catenata	NA	Plants
Veronica peregrina	NA	Plants
Veronica scutellata	Marsh-speedwell	Plants
Vertigo ovata	Ovate Vertigo	Mollusks
Vespericola armiger	Santa Cruz Hesperian	Mollusks
Vespericola embertoni	Reeves Canyon Hesperian Snail	Mollusks
Vespericola eritrichius	Velvet Hesperian	Mollusks
Vespericola euthales	A Terrestrial Snail	Mollusks
Vespericola haplus	Butte Creek Hesperian	Mollusks
Vespericola karokorum	Karok Hesperian	Mollusks
Vespericola klamathicus	Klamath Hesperian	Mollusks
Vespericola marinensis	Marin Hesperian	Mollusks
Vespericola megasoma	Redwood Hesperian	Mollusks
Vespericola orius	El Dorado Hesperian	Mollusks
Vespericola pilosus	Brushfield Hesperian	Mollusks
Vespericola pinicola	Monterey Hesperian	Mollusks
Vespericola pressleyi	Big Bar Hesperian	Mollusks

Vespericola rhodophila	Azalea Hesperian Snail	Mollusks
Vespericola rothi	Ellery Creek Hesperian	Mollusks
Vespericola sasquatch	Sasquatch Hesperian Snail	Mollusks
Vespericola scotti	Benson Gulch Hesperian	Mollusks
Vespericola shasta	Shasta Hesperian	Mollusks
Vespericola sierranus	Siskiyou Hesperian	Mollusks
Viola langsdorffii	NA	Plants
Viola macloskeyi	NA	Plants
Vireo bellii	Bell's Vireo	Birds
Vireo bellii arizonae	Arizona Bell's Vireo	Birds
Vireo bellii pusillus	Least Bell's Vireo	Birds
Visoka cataractae	Cataract Forestfly	Insects & other
Vorticifex effusa effusa	Artemesian Rams-horn	Mollusks
Vorticifex solida	A Freshwater Snail	Mollusks
Wolffia arrhiza	NA	Plants
Wolffia borealis	Dotted Watermeal	Plants
Wolffia brasiliensis	Pointed Watermeal	Plants
Wolffia columbiana	Columbian Watermeal	Plants
Wolffia globosa	Asian Watermeal	Plants
Wolffiella lingulata	Tongue Bogmat	Plants
Wolffiella oblonga	Saber-shape Bogmat	Plants
Wormaldia anilla	A Caddisfly	Insects & other
Wormaldia arizonensis		Insects & other
Wormaldia birneyi	A Caddisfly	Insects & other
Wormaldia gabriella	A Caddisfly	Insects & other
Wormaldia gesugta	A Caddisfly	Insects & other
Wormaldia hamata	A Caddisfly	Insects & other
Wormaldia laona	A Caddisfly	Insects & other
Wormaldia occidea	A Caddisfly	Insects & other
Wormaldia pachita	A Caddisfly	Insects & other
Xanthocephalus xanthocephalus	Yellow-headed Blackbird	Birds
Xenelmis sandersoni		Insects & other
Xenochironomus xenolabis		Insects & other
Xenopelopia tincta		Insects & other
Xyrauchen texanus	Razorback sucker	Fishes
Yoraperla brevis	Least Roachfly	Insects & other
Yoraperla mariana		Insects & other
Yoraperla nigrisoma	Black Roachfly	Insects & other
Yoraperla siletz	Coastal Roachfly	Insects & other
Yphria californica	A Caddisfly	Insects & other
Zaitzevia parvula		Insects & other

Zaitzevia posthonia		Insects & other
Zannichellia palustris	Horned Pondweed	Plants
Zapada cinctipes	Common Forestfly	Insects & other
Zapada columbiana	Columbian Forestfly	Insects & other
Zapada cordillera	Cordilleran Forestfly	Insects & other
Zapada frigida	Frigid Forestfly	Insects & other
Zapada haysi	Intermountain Forestfly	Insects & other
Zapada oregonensis	Oregon Forestfly	Insects & other
Zavrelimyia sinuosa		Insects & other
Zavrelimyia thryptica		Insects & other
Zizania palustris interior	NA	Plants
Zizania palustris palustris	NA	Plants
Zoniagrion exclamationis	Exclamation Damsel	Insects & other
Zumatrichia notosa		Insects & other

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OBJECTID_1	Elements_GROUP_	Elements_ELM_SCINAM	Elements_ELM_COMNAM	Elements_Fed_list	Elements_State_list	Elements_Other_list	Elements_MgtAg_list	ObservationType_ObsTyp_Name	Format_Fmt_Name	HabitatUsage_HabU_Name	Source_Source_Name
1	Crustaceans	Branchinecta lynchi	Vernal Pool Fairy Shrimp	Threatened	Special	IUCN - Vulnerable		Critical habitat/ management area designations	Polygon	Undefined	USFWS Critical Habitat Designation
2	Crustaceans	Branchinecta lynchi	Vernal Pool Fairy Shrimp	Threatened	Special	IUCN - Vulnerable		Current observations (post 1980)	Polygon	Undefined	California Natural Diversity Database (4/2016)
3	Crustaceans	Branchinecta lynchi	Vernal Pool Fairy Shrimp	Threatened	Special	IUCN - Vulnerable		Range (current or unknown)	Polygon	Undefined	Range approx. from NatureServe Explorer descriptions
4	Herps	Actinemys marmorata marmorata	Western Pond Turtle		Special Concern	ARSSC	BLM, USFS	Current observations (post 1980)	Polygon	Undefined	California Natural Diversity Database (4/2016)
5	Herps	Actinemys marmorata marmorata	Western Pond Turtle		Special Concern	ARSSC	BLM, USFS	Modeled habitat/ generalized observation	Polygon	Undefined	California Wildlife Habitat Relationships
6	Herps	Ambystoma californiense californiense	California Tiger Salamander	Threatened	Threatened	ARSSC		Critical habitat/ management area designations	Polygon	Undefined	USFWS Critical Habitat Designation
7	Herps	Ambystoma californiense californiense	California Tiger Salamander	Threatened	Threatened	ARSSC		Current observations (post 1980)	Polygon	Undefined	California Natural Diversity Database (4/2016)
8	Herps	Ambystoma californiense californiense	California Tiger Salamander	Threatened	Threatened	ARSSC		Modeled habitat/ generalized observation	Polygon	Undefined	California Wildlife Habitat Relationships
9	Herps	Anaxyrus boreas boreas	Boreal Toad					Modeled habitat/ generalized observation	Polygon	Undefined	California Wildlife Habitat Relationships
10	Herps	Anaxyrus californicus	Arroyo Toad	Endangered	Special Concern	ARSSC		Modeled habitat/ generalized observation	Polygon	Undefined	California Wildlife Habitat Relationships
11	Herps	Pseudacris cadaverina	California Treefrog			ARSSC		Modeled habitat/ generalized observation	Polygon	Undefined	California Wildlife Habitat Relationships
12	Herps	Rana boylii	Foothill Yellow-legged Frog	Under Review in the Candidate or Petition Process	Special Concern	ARSSC	BLM, USFS	Modeled habitat/ generalized observation	Polygon	Undefined	California Wildlife Habitat Relationships
13	Herps	Rana draytonii	California Red-legged Frog	Threatened	Special Concern	ARSSC		Critical habitat/ management area designations	Polygon	Undefined	USFWS Critical Habitat Designation
14	Herps	Rana draytonii	California Red-legged Frog	Threatened	Special Concern	ARSSC		Modeled habitat/ generalized observation	Polygon	Undefined	California Wildlife Habitat Relationships
15	Herps	Spea hammondii	Western Spadefoot	Under Review in the Candidate or Petition Process	Special Concern	ARSSC	BLM	Current observations (post 1980)	Polygon	Undefined	California Natural Diversity Database (4/2016)
16	Herps	Spea hammondii	Western Spadefoot	Under Review in the Candidate or Petition Process	Special Concern	ARSSC	BLM	Modeled habitat/ generalized observation	Polygon	Undefined	California Wildlife Habitat Relationships
17	Herps	Taricha torosa	Coast Range Newt		Special Concern	ARSSC		Modeled habitat/ generalized observation	Polygon	Undefined	California Wildlife Habitat Relationships
18	Herps	Thamnophis hammondii hammondii	Two-striped Gartersnake		Special Concern	ARSSC	BLM, USFS	Modeled habitat/ generalized observation	Polygon	Undefined	California Wildlife Habitat Relationships
19	Herps	Thamnophis sirtalis sirtalis	Common Gartersnake					Modeled habitat/ generalized observation	Polygon	Undefined	California Wildlife Habitat Relationships
20	Plants	Navarretia prostrata	Prostrate Navarretia		Special	CRPR - 1B.1		Current observations (post 1980)	Polygon	Undefined	California Natural Diversity Database (4/2016)
21	Birds	Actitis macularius	Spotted Sandpiper					Current observations (post 1980)	Point	Undefined	SBMNH OS
22	Birds	Actitis macularius	Spotted Sandpiper					Unknown	Point	Undefined	MVZ MVZ Birds
23	Birds	Aechmophorus occidentalis	Western Grebe					Current observations (post 1980)	Point	Undefined	CLO EBIRD
24	Birds	Agelaius tricolor	Tricolored Blackbird	Bird of Conservation Concern	Special Concern	BSSC - First priority	BLM	Current observations (post 1980)	Point	Undefined	CLO EBIRD
25	Birds	Agelaius tricolor	Tricolored Blackbird	Bird of Conservation Concern	Special Concern	BSSC - First priority	BLM	Current observations (post 1980)	Point	Undefined	CLO EBIRD_CA
26	Birds	Agelaius tricolor	Tricolored Blackbird	Bird of Conservation Concern	Special Concern	BSSC - First priority	BLM	Unknown	Point	Undefined	Royal Ontario Museum: ROM Birds
27	Birds	Aix sponsa	Wood Duck					Current observations (post 1980)	Point	Undefined	CLO EBIRD
28	Birds	Aix sponsa	Wood Duck					Current observations (post 1980)	Point	Undefined	CLO EBIRD_CA
29	Birds	Anas americana	American Wigeon					Current observations (post 1980)	Point	Undefined	CLO EBIRD
30	Birds	Anas americana	American Wigeon					Current observations (post 1980)	Point	Undefined	CLO EBIRD_CA
31	Birds	Anas americana	American Wigeon					Current observations (post 1980)	Point	Undefined	CLO GBBC
32	Birds	Anas clypeata	Northern Shoveler					Current observations (post 1980)	Point	Undefined	CLO GBBC
33	Birds	Anas crecca	Green-winged Teal					Current observations (post 1980)	Point	Undefined	CLO EBIRD
34	Birds	Anas crecca	Green-winged Teal					Current observations (post 1980)	Point	Undefined	CLO EBIRD_CA
35	Birds	Anas cyanoptera	Cinnamon Teal					Current observations (post 1980)	Point	Undefined	CLO EBIRD
36	Birds	Anas cyanoptera	Cinnamon Teal					Current observations (post 1980)	Point	Undefined	CLO EBIRD_CA
37	Birds	Anas platyrhynchos	Mallard					Current observations (post 1980)	Point	Undefined	CLO EBIRD
38	Birds	Anas platyrhynchos	Mallard					Current observations (post 1980)	Point	Undefined	CLO EBIRD_CA
39	Birds	Anas platyrhynchos	Mallard					Current observations (post 1980)	Point	Undefined	CLO GBBC
40	Birds	Anas platyrhynchos	Mallard					Current observations (post 1980)	Point	Undefined	SBMNH AV
41	Birds	Anas platyrhynchos	Mallard					Current observations (post 1980)	Point	Undefined	SBMNH OS
42	Birds	Anas strepera	Gadwall					Current observations (post 1980)	Point	Undefined	CLO EBIRD
43	Birds	Anas strepera	Gadwall					Current observations (post 1980)	Point	Undefined	CLO EBIRD_CA
44	Birds	Anas strepera	Gadwall					Current observations (post 1980)	Point	Undefined	CLO GBBC
45	Birds	Ardea alba	Great Egret					Current observations (post 1980)	Point	Undefined	CLO EBIRD
46	Birds	Ardea alba	Great Egret					Current observations (post 1980)	Point	Undefined	CLO EBIRD_CA
47	Birds	Ardea alba	Great Egret					Current observations (post 1980)	Point	Undefined	CLO GBBC
48	Birds	Ardea herodias	Great Blue Heron					Current observations (post 1980)	Point	Undefined	California Avian Datacenter, Level 5 - Big Sur Ornithology Lab
49	Birds	Ardea herodias	Great Blue Heron					Current observations (post 1980)	Point	Undefined	CLO EBIRD
50	Birds	Ardea herodias	Great Blue Heron					Current observations (post 1980)	Point	Undefined	CLO GBBC
51	Birds	Aythya collaris	Ring-necked Duck					Current observations (post 1980)	Point	Undefined	CLO EBIRD
52	Birds	Aythya collaris	Ring-necked Duck					Current observations (post 1980)	Point	Undefined	CLO EBIRD_CA
53	Birds	Aythya collaris	Ring-necked Duck					Current observations (post 1980)	Point	Undefined	CLO GBBC
54	Birds	Bucephala albeola	Bufflehead					Current observations (post 1980)	Point	Undefined	CLO EBIRD
55	Birds	Bucephala albeola	Bufflehead					Current observations (post 1980)	Point	Undefined	CLO EBIRD_CA
56	Birds	Bucephala albeola	Bufflehead					Current observations (post 1980)	Point	Undefined	CLO GBBC
57	Birds	Bucephala clangula	Common Goldeneye					Current observations (post 1980)	Point	Undefined	SBMNH AV
58	Birds	Butorides virescens	Green Heron					Current observations (post 1980)	Point	Undefined	California Avian Datacenter, Level 5 - Big Sur Ornithology Lab
59	Birds	Butorides virescens	Green Heron					Current observations (post 1980)	Point	Undefined	CLO EBIRD_CA
60	Birds	Chen caerulescens	Snow Goose					Current observations (post 1980)	Point	Undefined	CLO EBIRD
61	Birds	Chen rossii	Ross's Goose					Current observations (post 1980)	Point	Undefined	CLO EBIRD_CA
62	Birds	Cistothorus palustris palustris	Marsh Wren					Current observations (post 1980)	Point	Undefined	CLO EBIRD
63	Birds	Cistothorus palustris palustris	Marsh Wren					Unknown	Point	Undefined	Royal Ontario Museum: ROM Birds
64	Birds	Egretta thula	Snowy Egret					Current observations (post 1980)	Point	Undefined	CLO EBIRD
65	Birds	Egretta thula	Snowy Egret					Current observations (post 1980)	Point	Undefined	CLO GBBC
66	Birds	Fulica americana	American Coot					Current observations (post 1980)	Point	Undefined	CLO EBIRD
67	Birds	Fulica americana	American Coot					Current observations (post 1980)	Point	Undefined	CLO EBIRD_CA
68	Birds	Fulica americana	American Coot					Current observations (post 1980)	Point	Undefined	CLO GBBC
69	Birds	Gallinago delicata	Wilson's Snipe					Current observations (post 1980)	Point	Undefined	CLO EBIRD_CA
70	Birds	Gallinago delicata	Wilson's Snipe					Current observations (post 1980)	Point	Undefined	CLO GBBC
71	Birds	Gallinula chloropus	Common Moorhen					Current observations (post 1980)	Point	Undefined	CLO GBBC
72	Birds	Geothlypis trichas trichas	Common Yellowthroat					Current observations (post 1980)	Point	Undefined	California Avian Datacenter, Level 5 - Big Sur Ornithology Lab
73	Birds	Haliaeetus leucocephalus	Bald Eagle	Bird of Conservation Concern	Endangered		USFS, BLM	Current observations (post 1980)	Point	Undefined	California Natural Diversity Database (4/2016)
74	Birds	Haliaeetus leucocephalus	Bald Eagle	Bird of Conservation Concern	Endangered		USFS, BLM	Current observations (post 1980)	Point	Undefined	CLO EBIRD
75	Birds	Haliaeetus leucocephalus	Bald Eagle	Bird of Conservation Concern	Endangered		USFS, BLM	Current observations (post 1980)	Point	Undefined	CLO EBIRD_CA
76	Birds	Haliaeetus leucocephalus	Bald Eagle	Bird of Conservation Concern	Endangered		USFS, BLM	Current observations (post 1980)	Point	Undefined	iNaturalist Observations
77	Birds	Lophodytes cucullatus	Hooded Merganser					Current observations (post 1980)	Point	Undefined	CLO EBIRD
78	Birds	Lophodytes cucullatus	Hooded Merganser					Current observations (post 1980)	Point	Undefined	CLO EBIRD_CA
79	Birds	Lophodytes cucullatus	Hooded Merganser					Current observations (post 1980)	Point	Undefined	CLO GBBC
80	Birds	Megaceryle alcyon	Belted Kingfisher					Current observations (post 1980)	Point	Undefined	California Avian Datacenter, Level 5 - Big Sur Ornithology Lab
81	Birds	Megaceryle alcyon	Belted Kingfisher					Current observations (post 1980)	Point	Undefined	CLO GBBC
82	Birds	Megaceryle alcyon	Belted Kingfisher					Current observations (post 1980)	Point	Undefined	SBMNH AV
83	Birds	Mergus merganser	Common Merganser					Current observations (post 1980)	Point	Undefined	California Avian Datacenter, Level 5 - Big Sur Ornithology Lab
84	Birds	Mergus merganser	Common Merganser					Current observations (post 1980)	Point	Undefined	CLO EBIRD
85	Birds	Nycticorax nycticorax	Black-crowned Night-Heron					Current observations (post 1980)	Point	Undefined	CLO EBIRD
86	Birds	Oxyura jamaicensis	Ruddy Duck					Current observations (post 1980)	Point	Undefined	CLO EBIRD
87	Birds	Oxyura jamaicensis	Ruddy Duck					Current observations (post 1980)	Point	Undefined	CLO EBIRD_CA
88	Birds	Phalacrocorax auritus	Double-crested Cormorant					Current observations (post 1980)	Point	Undefined	CLO EBIRD_CA
89	Birds	Phalacrocorax auritus	Double-crested Cormorant					Current observations (post 1980)	Point	Undefined	CLO GBBC
90	Birds	Podiceps nigricollis	Eared Grebe					Current observations (post 1980)	Point	Undefined	CLO EBIRD
91	Birds	Podilymbus podiceps	Pied-billed Grebe					Current observations (post 1980)	Point	Undefined	CLO EBIRD
92	Birds	Podilymbus podiceps	Pied-billed Grebe					Current observations (post 1980)	Point	Undefined	CLO EBIRD_CA
93	Birds	Porzana carolina	Sora					Current observations (post 1980)	Point	Undefined	CLO EBIRD_CA
94	Birds	Porzana carolina	Sora					Current observations (post 1980)	Point	Undefined	CLO GBBC
95	Birds	Porzana carolina	Sora					Unknown	Point	Undefined	Royal Ontario Museum: ROM Birds
96	Birds	Rallus limicola	Virginia Rail					Current observations (post 1980)	Point	Undefined	CLO EBIRD
97	Birds	Riparia riparia	Bank Swallow		Threatened			Current observations (post 1980)	Point	Undefined	California Natural Diversity Database (4/2016)
98	Birds	Setophaga petechia	Yellow Warbler			BSSC - Second priority		Current observations (post 1980)	Point	Undefined	California Avian Datacenter, Level 5 - Big Sur Ornithology Lab
99	Birds	Setophaga petechia	Yellow Warbler			BSSC - Second priority		Current observations (post 1980)	Point	Undefined	CLO EBIRD
100	Birds	Setophaga petechia	Yellow Warbler			BSSC - Second priority		Current observations (post 1980)	Point	Undefined	CLO EBIRD_CA
101	Birds	Tachycineta bicolor	Tree Swallow					Current observations (post 1980)	Point	Undefined	California Avian Datacenter, Level 5 - Big Sur Ornithology Lab
102	Birds	Tachycineta bicolor	Tree Swallow					Current observations (post 1980)	Point	Undefined	CLO EBIRD
103	Birds	Tachycineta bicolor	Tree Swallow					Current observations (post 1980)	Point	Undefined	CLO EBIRD_CA
104	Birds	Tachycineta bicolor	Tree Swallow					Current observations (post 1980)	Point	Undefined	CLO GBBC
105	Birds	Tringa melanoleuca	Greater Yellowlegs					Current observations (post 1980)	Point	Undefined	CLO EBIRD
106	Birds	Tringa melanoleuca	Greater Yellowlegs					Current observations (post 1980)	Point	Undefined	SBMNH AV
107	Birds	Tringa solitaria	Solitary Sandpiper					Current observations (post 1980)	Point	Undefined	CLO EBIRD_CA
108	Birds	Vireo bellii pusillus	Least Bell's Vireo	Endangered	Endangered		BLM	Current observations (post 1980)	Point	Undefined	California Natural Diversity Database (4/2016)
109	Birds	Xanthocephalus xanthocephalus	Yellow-headed Blackbird		Special Concern	BSSC - Third priority		Current observations (post 1980)	Point	Undefined	California Avian Datacenter, Level 5 - Big Sur Ornithology Lab
110	Birds	Xanthocephalus xanthocephalus	Yellow-headed Blackbird		Special Concern	BSSC - Third priority		Current observations (post 1980)	Point	Undefined	CLO EBIRD
111	Crustaceans	Branchinecta lynchi	Vernal Pool Fairy Shrimp	Threatened	Special	IUCN - Vulnerable		Current observations (post 1980)	Point	Undefined	California Natural Diversity Database (4/2016)
112	Crustaceans	Cyprididae fam.	Cyprididae fam.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
113	Crustaceans	Hyalella spp.	Hyalella spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
114	Crustaceans	Pacifastacus spp.	Pacifastacus spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
115	Herps	Actinemys marmorata marmorata	Western Pond Turtle		Special Concern	ARSSC	BLM, USFS	Current observations (post 1980)	Point	Undefined	LACM Herps
116	Herps	Actinemys marmorata marmorata	Western Pond Turtle		Special Concern	ARSSC	BLM, USFS	Unknown	Point	Undefined	California Natural Diversity Database (4/2016)
117	Herps	Anaxyrus boreas boreas	Boreal Toad					Current observations (post 1980)	Point	Undefined	iNaturalist Observations
118	Herps	Pseudacris hypochondriaca	Baja California Treefrog					Current observations (post 1980)	Point	Undefined	MHP MHP-H
119	Herps	Pseudacris regilla	Northern Pacific Chorus Frog					Current observations (post 1980)	Point	Undefined	CAS HERP
120	Herps	Pseudacris regilla	Northern Pacific Chorus Frog					Current observations (post 1980)	Point	Undefined	CCBER Herps
121	Herps	Pseudacris regilla	Northern Pacific Chorus Frog					Current observations (post 1980)	Point	Undefined	MHP MHP-H
122	Herps	Pseudacris regilla	Northern Pacific Chorus Frog					Current observations (post 1980)	Point	Undefined	SBMNH HE
123	Herps	Rana draytonii	California Red-legged Frog	Threatened	Special Concern	ARSSC		Current observations (post 1980)	Point	Undefined	California Natural Diversity Database (4/2016) - 'Sensitive'
124	Herps	Rana draytonii	California Red-legged Frog	Threatened	Special Concern	ARSSC		Current observations (post 1980)	Point	Undefined	SBMNH HE
125	Herps	Spea hammondii	Western Spadefoot	Under Review in the Candidate or Petition Process	Special Concern	ARSSC	BLM	Current observations (post 1980)	Point	Undefined	California Natural Diversity Database (4/2016)
126	Herps	Spea hammondii	Western Spadefoot	Under Review in the Candidate or Petition Process	Special Concern	ARSSC	BLM	Current observations (post 1980)	Point	Undefined	CAS HERP
127	Herps	Thamnophis sirtalis infernalis	California Red-sided Gartersnake			Not on any status lists		Current observations (post 1980)	Point	Undefined	CAS HERP
128	Herps	Thamnophis sirtalis sirtalis	Common Gartersnake					Current observations (post 1980)	Point	Undefined	CAS HERP
129	Insects & other inverts	Agabus spp.	Agabus spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
130	Insects & other inverts	Berosus spp.	Berosus spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
131	Insects & other inverts	Callibaetis spp.	Callibaetis spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
132	Insects & other inverts	Centroptilum spp.	Centroptilum spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
133	Insects & other inverts	Chironomidae fam.	Chironomidae fam.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
134	Insects & other inverts	Chironomus spp.	Chironomus spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
135	Insects & other inverts	Cladotanytarsus spp.	Cladotanytarsus spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
136	Insects & other inverts	Coenagrionidae fam.	Coenagrionidae fam.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
137	Insects & other inverts	Corisella spp.	Corisella spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
138	Insects & other inverts	Corixidae fam.	Corixidae fam.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
139	Insects & other inverts	Cricotopus spp.	Cricotopus spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
140	Insects & other inverts	Dicrotendipes spp.	Dicrotendipes spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
141	Insects & other inverts	Enochrus spp.	Enochrus spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
142	Insects & other inverts	Ephemerellidae fam.	Ephemerellidae fam.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
143	Insects & other inverts	Eukiefferiella spp.	Eukiefferiella spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
144	Insects & other inverts	Fallceon quilleri	A Mayfly					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
145	Insects & other inverts	Gyrinus spp.	Gyrinus spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
146	Insects & other inverts	Helicopsyche spp.	Helicopsyche spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
147	Insects & other inverts	Hydrophilidae fam.	Hydrophilidae fam.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
148	Insects & other inverts	Hydroporus spp.	Hydroporus spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
149	Insects & other inverts	Hydropsyche spp.	Hydropsyche spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
150	Insects & other inverts	Hydropsychidae fam.	Hydropsychidae fam.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
151	Insects & other inverts	Hydroptila spp.	Hydroptila spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
152	Insects & other inverts	Laccobius spp.	Laccobius spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
153	Insects & other inverts	Lepidostoma spp.	Lepidostoma spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
154	Insects & other inverts	Limnophyes spp.	Limnophyes spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
155	Insects & other inverts	Liodessus obscurellus				Not on any status lists		Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
156	Insects & other inverts	Microtendipes spp.	Microtendipes spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
157	Insects & other inverts	Optioservus spp.	Optioservus spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
158	Insects & other inverts	Paratanytarsus spp.	Paratanytarsus spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
159	Insects & other inverts	Peltodytes spp.	Peltodytes spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
160	Insects & other inverts	Phaenopsectra spp.	Phaenopsectra spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
161	Insects & other inverts	Procladius spp.	Procladius spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
162	Insects & other inverts	Rheotanytarsus spp.	Rheotanytarsus spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
163	Insects & other inverts	Sigara mckinstryi	A Water Boatman			Not on any status lists		Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
164	Insects & other inverts	Sigara spp.	Sigara spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
165	Insects & other inverts	Simulium spp.	Simulium spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
166	Insects & other inverts	Sperchon spp.	Sperchon spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
167	Insects & other inverts	Tanytarsus spp.	Tanytarsus spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
168	Insects & other inverts	Tricorythodes spp.	Tricorythodes spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
169	Mammals	Castor canadensis	American Beaver			Not on any status lists		Current observations (post 1980)	Point	Undefined	MVZ MVZ Mammals
170	Mollusks	Gyraulus spp.	Gyraulus spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
171	Mollusks	Lymnaea spp.	Lymnaea spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
172	Mollusks	Physa spp.	Physa spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
173	Mollusks	Pisidium spp.	Pisidium spp.					Current observations (post 1980)	Point	Undefined	SWAMP via CEDEN. Download 10 April 2014, Obs before 13 July 2012
174	Plants	Alnus rhombifolia	White Alder					Current observations (post 1980)	Point	Undefined	SBBG
175	Plants	Alnus rhombifolia	White Alder					Current observations (post 1980)	Point	Undefined	SBBG SBBG
176	Plants	Ammannia coccinea	Scarlet Ammannia					Current observations (post 1980)	Point	Undefined	UCR
177	Plants	Ammannia coccinea	Scarlet Ammannia					Current observations (post 1980)	Point	Undefined	UCR UCR
178	Plants	Anemopsis californica	Yerba Mansa					Unknown	Point	Undefined	UCJEPS UC
179	Plants	Azolla filiculoides	NA					Current observations (post 1980)	Point	Undefined	Calflora
180	Plants	Azolla filiculoides	NA					Current observations (post 1980)	Point	Undefined	SBBG
181	Plants	Azolla filiculoides	NA					Current observations (post 1980)	Point	Undefined	SBBG SBBG
182	Plants	Baccharis salicina				Not on any status lists		Current observations (post 1980)	Point	Undefined	SBBG SBBG
183	Plants	Bolboschoenus maritimus paludosus	NA			Not on any status lists		Current observations (post 1980)	Point	Undefined	CHSC
184	Plants	Bolboschoenus maritimus paludosus	NA			Not on any status lists		Current observations (post 1980)	Point	Undefined	CHSC CHSC
185	Plants	Callitriche heterophylla bolanderi	Large Water-starwort					Current observations (post 1980)	Point	Undefined	SBBG
186	Plants	Callitriche heterophylla bolanderi	Large Water-starwort					Current observations (post 1980)	Point	Undefined	SBBG SBBG

187	Plants	Callitriche heterophylla bolanderi	Large Water-starwort					Current observations (post 1980)	Point	Undefined	UCD
188	Plants	Callitriche heterophylla bolanderi	Large Water-starwort					Current observations (post 1980)	Point	Undefined	UCD UCD
189	Plants	Callitriche marginata	Winged Water-starwort					Current observations (post 1980)	Point	Undefined	Calflora
190	Plants	Callitriche marginata	Winged Water-starwort					Current observations (post 1980)	Point	Undefined	SBBG
191	Plants	Callitriche marginata	Winged Water-starwort					Current observations (post 1980)	Point	Undefined	SBBG SBBG
192	Plants	Crassula aquatica	Water Pygmyweed					Current observations (post 1980)	Point	Undefined	Calflora
193	Plants	Crassula aquatica	Water Pygmyweed					Current observations (post 1980)	Point	Undefined	SBBG
194	Plants	Crassula aquatica	Water Pygmyweed					Current observations (post 1980)	Point	Undefined	SBBG SBBG
195	Plants	Crassula aquatica	Water Pygmyweed					Current observations (post 1980)	Point	Undefined	UCD
196	Plants	Crassula aquatica	Water Pygmyweed					Current observations (post 1980)	Point	Undefined	UCD UCD
197	Plants	Crypsis vaginiflora	NA					Current observations (post 1980)	Point	Undefined	SBBG
198	Plants	Crypsis vaginiflora	NA					Current observations (post 1980)	Point	Undefined	SBBG SBBG
199	Plants	Cyperus erythrorhizos	Red-root Flatsedge					Current observations (post 1980)	Point	Undefined	SBBG
200	Plants	Cyperus erythrorhizos	Red-root Flatsedge					Current observations (post 1980)	Point	Undefined	SBBG SBBG
201	Plants	Cyperus erythrorhizos	Red-root Flatsedge					Current observations (post 1980)	Point	Undefined	UCR
202	Plants	Cyperus erythrorhizos	Red-root Flatsedge					Current observations (post 1980)	Point	Undefined	UCR UCR
203	Plants	Epilobium campestre	NA			Not on any status lists		Current observations (post 1980)	Point	Undefined	SBBG
204	Plants	Epilobium campestre	NA			Not on any status lists		Current observations (post 1980)	Point	Undefined	SBBG SBBG
205	Plants	Epilobium cleistogamum	Cleistogamous Spike-primrose					Current observations (post 1980)	Point	Undefined	UCD
206	Plants	Epilobium cleistogamum	Cleistogamous Spike-primrose					Current observations (post 1980)	Point	Undefined	UCD UCD
207	Plants	Eryngium vaseyi vaseyi	Vasey's Coyote-thistle			Not on any status lists		Current observations (post 1980)	Point	Undefined	UCD UCD
208	Plants	Euthamia occidentalis	Western Fragrant Goldenrod					Current observations (post 1980)	Point	Undefined	SBBG
209	Plants	Euthamia occidentalis	Western Fragrant Goldenrod					Current observations (post 1980)	Point	Undefined	SBBG SBBG
210	Plants	Euthamia occidentalis	Western Fragrant Goldenrod					Unknown	Point	Undefined	UCJEPS JEPS
211	Plants	Helenium puberulum	Rosilla					Current observations (post 1980)	Point	Undefined	SBBG
212	Plants	Helenium puberulum	Rosilla					Current observations (post 1980)	Point	Undefined	SBBG SBBG
213	Plants	Hydrocotyle verticillata verticillata	Whorled Marsh-pennywort					Current observations (post 1980)	Point	Undefined	SBBG SBBG
214	Plants	Juncus effusus effusus	NA					Current observations (post 1980)	Point	Undefined	SBBG
215	Plants	Juncus effusus effusus	NA					Current observations (post 1980)	Point	Undefined	SBBG SBBG
216	Plants	Juncus luciensis	Santa Lucia Dwarf Rush		Special	CRPR - 1B.2	USFS	Current observations (post 1980)	Point	Undefined	SBBG
217	Plants	Juncus luciensis	Santa Lucia Dwarf Rush		Special	CRPR - 1B.2	USFS	Current observations (post 1980)	Point	Undefined	SBBG SBBG
218	Plants	Juncus xiphioides	Iris-leaf Rush					Current observations (post 1980)	Point	Undefined	SBBG
219	Plants	Juncus xiphioides	Iris-leaf Rush					Current observations (post 1980)	Point	Undefined	SBBG SBBG
220	Plants	Limosella aquatica	Northern Mudwort					Current observations (post 1980)	Point	Undefined	UCD
221	Plants	Limosella aquatica	Northern Mudwort					Current observations (post 1980)	Point	Undefined	UCD UCD
222	Plants	Limosella aquatica	Northern Mudwort					Current observations (post 1980)	Point	Undefined	UCR
223	Plants	Limosella aquatica	Northern Mudwort					Current observations (post 1980)	Point	Undefined	UCR UCR
224	Plants	Marsilea vestita vestita	NA			Not on any status lists		Current observations (post 1980)	Point	Undefined	SBBG SBBG
225	Plants	Marsilea vestita vestita	NA			Not on any status lists		Current observations (post 1980)	Point	Undefined	UCR UCR
226	Plants	Mimulus guttatus	Common Large Monkeyflower					Unknown	Point	Undefined	UCJEPS UC
227	Plants	Mimulus latidens	Broad-tooth Monkeyflower					Current observations (post 1980)	Point	Undefined	Calflora
228	Plants	Mimulus latidens	Broad-tooth Monkeyflower					Current observations (post 1980)	Point	Undefined	SBBG
229	Plants	Mimulus pilosus				Not on any status lists		Current observations (post 1980)	Point	Undefined	UCR
230	Plants	Montia fontana fontana	Fountain Miner's-lettuce					Current observations (post 1980)	Point	Undefined	Calflora
231	Plants	Navarretia prostrata	Prostrate Navarretia		Special	CRPR - 1B.1		Current observations (post 1980)	Point	Undefined	Calflora
232	Plants	Navarretia prostrata	Prostrate Navarretia		Special	CRPR - 1B.1		Current observations (post 1980)	Point	Undefined	California Natural Diversity Database (4/2016)
233	Plants	Navarretia prostrata	Prostrate Navarretia		Special	CRPR - 1B.1		Current observations (post 1980)	Point	Undefined	SBBG
234	Plants	Navarretia prostrata	Prostrate Navarretia		Special	CRPR - 1B.1		Current observations (post 1980)	Point	Undefined	SBBG SBBG
235	Plants	Paspalum distichum	Joint Paspalum					Current observations (post 1980)	Point	Undefined	SBBG
236	Plants	Paspalum distichum	Joint Paspalum					Current observations (post 1980)	Point	Undefined	SBBG SBBG
237	Plants	Persicaria lapathifolia				Not on any status lists		Current observations (post 1980)	Point	Undefined	SBBG
238	Plants	Persicaria lapathifolia				Not on any status lists		Current observations (post 1980)	Point	Undefined	SBBG SBBG
239	Plants	Persicaria maculosa	NA			Not on any status lists		Current observations (post 1980)	Point	Undefined	SBBG
240	Plants	Persicaria maculosa	NA			Not on any status lists		Current observations (post 1980)	Point	Undefined	SBBG SBBG
241	Plants	Phacelia distans	NA					Current observations (post 1980)	Point	Undefined	Calflora
242	Plants	Phacelia distans	NA					Current observations (post 1980)	Point	Undefined	SBBG
243	Plants	Phacelia distans	NA					Current observations (post 1980)	Point	Undefined	SBBG SBBG
244	Plants	Pilularia americana	NA					Current observations (post 1980)	Point	Undefined	Calflora
245	Plants	Pilularia americana	NA					Current observations (post 1980)	Point	Undefined	SBBG
246	Plants	Pilularia americana	NA					Current observations (post 1980)	Point	Undefined	SBBG SBBG
247	Plants	Pilularia americana	NA					Current observations (post 1980)	Point	Undefined	UCD
248	Plants	Pilularia americana	NA					Current observations (post 1980)	Point	Undefined	UCD UCD
249	Plants	Plagiobothrys acanthocarpus	Adobe Popcorn-flower					Current observations (post 1980)	Point	Undefined	Calflora
250	Plants	Plagiobothrys acanthocarpus	Adobe Popcorn-flower					Current observations (post 1980)	Point	Undefined	SBBG
251	Plants	Plagiobothrys acanthocarpus	Adobe Popcorn-flower					Current observations (post 1980)	Point	Undefined	SBBG SBBG
252	Plants	Plagiobothrys acanthocarpus	Adobe Popcorn-flower					Current observations (post 1980)	Point	Undefined	UCD
253	Plants	Plagiobothrys acanthocarpus	Adobe Popcorn-flower					Current observations (post 1980)	Point	Undefined	UCD UCD
254	Plants	Platanus racemosa	California Sycamore					Current observations (post 1980)	Point	Undefined	SBBG
255	Plants	Platanus racemosa	California Sycamore					Current observations (post 1980)	Point	Undefined	SBBG SBBG
256	Plants	Psilocarphus brevissimus brevissimus	Dwarf Woolly-heads					Current observations (post 1980)	Point	Undefined	UCD UCD
257	Plants	Ranunculus aquatilis diffusus				Not on any status lists		Current observations (post 1980)	Point	Undefined	SBBG
258	Plants	Ranunculus aquatilis diffusus				Not on any status lists		Current observations (post 1980)	Point	Undefined	SBBG SBBG
259	Plants	Rorippa curvisiliqua curvisiliqua	Curve-pod Yellowcress					Current observations (post 1980)	Point	Undefined	SBBG SBBG
260	Plants	Rumex salicifolius salicifolius	Willow Dock					Current observations (post 1980)	Point	Undefined	SBBG SBBG
261	Plants	Salix exigua exigua	Narrowleaf Willow					Current observations (post 1980)	Point	Undefined	SBBG SBBG
262	Plants	Salix laevigata	Polished Willow					Current observations (post 1980)	Point	Undefined	SBBG
263	Plants	Salix laevigata	Polished Willow					Current observations (post 1980)	Point	Undefined	SBBG SBBG
264	Plants	Salix laevigata	Polished Willow					Unknown	Point	Undefined	UCJEPS UC
265	Plants	Salix lasiolepis lasiolepis	Arroyo Willow					Current observations (post 1980)	Point	Undefined	SBBG SBBG
266	Plants	Salix lasiolepis lasiolepis	Arroyo Willow					Unknown	Point	Undefined	UCJEPS UC
267	Plants	Schoenoplectus americanus	Three-square Bulrush					Current observations (post 1980)	Point	Undefined	CHSC
268	Plants	Schoenoplectus americanus	Three-square Bulrush					Current observations (post 1980)	Point	Undefined	CHSC CHSC
269	Plants	Schoenoplectus pungens pungens	NA					Current observations (post 1980)	Point	Undefined	CHSC CHSC
270	Plants	Schoenoplectus saximontanus	Rocky Mountain Bulrush					Current observations (post 1980)	Point	Undefined	UCR
271	Plants	Typha domingensis	Southern Cattail					Current observations (post 1980)	Point	Undefined	SBBG
272	Plants	Typha domingensis	Southern Cattail					Current observations (post 1980)	Point	Undefined	SBBG SBBG
273	Plants	Typha latifolia	Broadleaf Cattail					Current observations (post 1980)	Point	Undefined	SBBG
274	Plants	Typha latifolia	Broadleaf Cattail					Current observations (post 1980)	Point	Undefined	SBBG SBBG
275	Plants	Veronica anagallis-aquatica	NA					Current observations (post 1980)	Point	Undefined	JEPS
276	Plants	Veronica anagallis-aquatica	NA					Current observations (post 1980)	Point	Undefined	JEPS JEPS
277	Plants	Veronica anagallis-aquatica	NA					Current observations (post 1980)	Point	Undefined	RSA
278	Plants	Veronica anagallis-aquatica	NA					Current observations (post 1980)	Point	Undefined	RSA RSA
279	Plants	Veronica anagallis-aquatica	NA					Current observations (post 1980)	Point	Undefined	SBBG
280	Plants	Veronica anagallis-aquatica	NA					Current observations (post 1980)	Point	Undefined	SBBG SBBG
281	Plants	Veronica anagallis-aquatica	NA					Unknown	Point	Undefined	UCJEPS JEPS
282	Plants	Veronica catenata	NA			Not on any status lists		Current observations (post 1980)	Point	Undefined	JEPS
283	Plants	Veronica catenata	NA			Not on any status lists		Current observations (post 1980)	Point	Undefined	JEPS JEPS
284	Plants	Veronica catenata	NA			Not on any status lists		Current observations (post 1980)	Point	Undefined	OBI
285	Plants	Veronica catenata	NA			Not on any status lists		Current observations (post 1980)	Point	Undefined	OBI OBI
286	Plants	Veronica catenata	NA			Not on any status lists		Current observations (post 1980)	Point	Undefined	RSA
287	Plants	Veronica catenata	NA			Not on any status lists		Current observations (post 1980)	Point	Undefined	RSA RSA
288	Plants	Veronica catenata	NA			Not on any status lists		Current observations (post 1980)	Point	Undefined	SBBG
289	Plants	Veronica catenata	NA			Not on any status lists		Current observations (post 1980)	Point	Undefined	SBBG SBBG
290	Plants	Veronica catenata	NA			Not on any status lists		Unknown	Point	Undefined	UCJEPS JEPS
291	Fishes	Oncorhynchus mykiss - SCCC	South Central California coast steelhead	Threatened	Special Concern	Vulnerable - Moyle 2013		Critical habitat/ management area designations	Line	Undefined	NMFS Critical Habitat - Chinook and Steelhead
292	Fishes	Catostomus occidentalis mnioltiltus	Monterey sucker			Least Concern - Moyle 2013		Professional judgement	Polygon	Undefined	PISCES (Jan 8, 2014 download)
293	Fishes	Catostomus occidentalis occidentalis	Sacramento sucker			Least Concern - Moyle 2013		Professional judgement	Polygon	Undefined	PISCES (Jan 8, 2014 download)
294	Fishes	Cottus gulosus	Riffle sculpin		Special	Near-Threatened - Moyle 2013		Professional judgement	Polygon	Undefined	PISCES (Jan 8, 2014 download)
295	Fishes	Entosphenus tridentata ssp. 1	Pacific lamprey		Special	Near-Threatened - Moyle 2013	BLM, USFS	Professional judgement	Polygon	Undefined	PISCES (Jan 8, 2014 download)
296	Fishes	Lavinia exilicauda exilicauda	Sacramento hitch		Special	Near-Threatened - Moyle 2013		Modeled habitat/ generalized observation	Polygon	Undefined	PISCES (Jan 8, 2014 download)
297	Fishes	Lavinia exilicauda harengeus	Monterey hitch		Special	Vulnerable - Moyle 2013		Professional judgement	Polygon	Undefined	PISCES (Jan 8, 2014 download)
298	Fishes	Oncorhynchus mykiss - SCCC	South Central California coast steelhead	Threatened	Special Concern	Vulnerable - Moyle 2013		Professional judgement	Polygon	Undefined	PISCES (Jan 8, 2014 download)
299	Fishes	Oncorhynchus mykiss irideus	Coastal rainbow trout			Least Concern - Moyle 2013		Professional judgement	Polygon	Undefined	PISCES (Jan 8, 2014 download)
300	Fishes	Ptychocheilus grandis	Sacramento pikeminnow			Least Concern - Moyle 2013		Professional judgement	Polygon	Undefined	PISCES (Jan 8, 2014 download)

Attribute	Explanation
OBJECTID	Processing field - ignore
Elements_GROUP_	Taxonomic grouping (Mammal, Bird, Fishes, Herps, Mollusks, Crustaceans, Insects & other inverts, Plants)
Elements_ELM_SCINAM	Scientific name
Elements_ELM_COMNAM	Common name
Elements_Fed_list	Status on Federal Endangered Species List as of April 13, 2015
Elements_State_list	Status on California Endangered Species or Sensitive Species lists as of April 13, 2015
Elements_Other_list	Status on other sensitive species lists as of April 13, 2015
Elements_MgtAg_list	Status on land management agency (USFS, BLM) sensitive species lists as of April 13, 2015
ObservationType_ObsTyp_Name	Observation Type Name (e.g., observations, modeled habitat, range, critical habitat)
Format_Fmt_Name	Format Name (Point, Line, Polygon)
HabitatUsage_HabU_Name	Habitat Usage Name (e.g., spawning, migration, breeding, wintering)
Source_Source_Name	Short name for source of species occurrence information

OBJECTID	Source ID	Source Name	Citation	Weblink	Aggregator
1	144	PISCES (Jan 8, 2014 download)	Katz, J, P Moyle, R Peek, N Santos, A Bell, RQuiñones, and J Viers. PIS	http://pisces.ucdavis.edu/node	PISCES
3	64	NDOW Wildlife Action Plan 2012 revision	Nevada Department of Wildlife. 2012. Nevada Wildlife Action Plan. Ren	http://www.ndow.org/uploadedFiles/ndoworg/Content/Nevada Wildlife/Co	
5	65	Calflora	Calflora. 2008. The Calflora Database. Berkeley, CA. Available: http://wv	http://www.calflora.org	
9	67	Fairy Shrimps of CA's Puddles, Pools, and Playas	Eriksen, C. and D. Belk. 1999. Fairy Shrimps of California's Puddles, Po	n/a	
10	43	NV Natural Heritage Program	Nevada Natural Heritage Program. 2011. Biotics . Nevada Dept of Conservation and Natural Resources, Carson City, NV.		
23	51	BLM/USU National Aquatic Monitoring Center (aka The BugLa	Western Center for Monitoring & Assessment of Freshwater Ecosystems.	http://www.usu.edu/buglab/	Buglab
40	27	AZ Natural Heritage Program	Arizona Dept. of Game and Fish. 2011. Arizona Natural Heritage Prograi	http://www.azgfd.gov/w c/edits/species concern.shtml	
67	50	Oregon GAP Analysis Wildlife Models	Oregon Biodiversity Information Center. 2004. GAP Wildlife Models. Por	http://www.pdx.edu/pnwlamp/wildlife-models	
73	61	Hovingh surveys	Hovingh, P. 2012. Field surveys of Great Basin spring habitats. Direct re	n/a	
74	56	SFEI San Francisco Bay Benthic Data	San Francisco Estuary Institute. 2008. SFEI San Francisco Bay Benthic	http://www.sfei.org/	
77	68	Subterranean Institute database	Graening, G.O. et al. 2012. Unpublished data, database report. The Sub	http://www.subinstitute.org/	
89	66	Occurrences approx. from NatureServe Explorer descriptions	NatureServe. 2012. NatureServe Explorer: An online encyclopedia of life [\	http://www.natureserve.org/explorer	
90	63	Range approx. from NatureServe Explorer descriptions	NatureServe. 2012. NatureServe Explorer: An online encyclopedia of life [\	http://www.natureserve.org/explorer	
103	13	USFWS Critical Habitat Designation	US Fish and Wildlife Service. 2011. Final Critical Habitat. Fort Collins, C	http://crithab.fws.gov/crithab/	
104	44	SW Regional GAP Wildlife Habitat Relationship	Boykin, KG, et al. 2007. Predicted animal-habitat distributions and specie	http://swregap.nmsu.edu/	
105	40	NPS Klamath Network Herp surveys 2002	Bury, RB, LC Gangle III, and S Litrakis. 2002. Inventory for Amphibians a	http://irmafiles.nps.gov/reference/holding/472918	
106	41	Sierra NV Nat Forests Critical Aquatic Refuges	US Forest Service. 2006. Critical Aquatic Refuges in Sierra Nevada Nati	http://www.fs.usda.gov/detail/r5/landmanagement/gis/?cid=fsbdev3 0483	
123	3	Jeanette "Mussel Sites 2009 Final"	Howard, JK. 2010. Sensitive Freshwater Mussel Surveys in the Pacific S	n/a	
124	4	Jeanette "Forest Service Mussel Sites 062810v2"	Howard, JK. 2010. Sensitive Freshwater Mussel Surveys in the Pacific S	n/a	
125	5	Jeanette "Mussel Sites Final"	Howard, JK. 2010. Sensitive Freshwater Mussel Surveys in the Pacific S	n/a	
126	14	California Wildlife Habitat Relationships	California Department of Fish and Game. 2009. California Wildlife Habita	http://www.dfg.ca.gov/biogeodata/cwhr/downloads/GIS/cwhr gis.xml	CWHR
128	28	BIOS Tuolumne aquatic surveys ds193	California Department of Fish and Game. 2009. Tuolumne Aquatic Reso	http://bios.dfg.ca.gov/dataset index.asp	BIOS
129	29	BIOS Herps ds694	Groff, L. 2010. Herptofauna Surveys, Northern California. Humboldt Sta	http://bios.dfg.ca.gov/dataset index.asp	BIOS
130	30	BIOS Wildlife surveys ds325	Garrison, BA. 2005. Wildlife Surveys - CDFG Lands, Region 2. CA Dep	http://bios.dfg.ca.gov/dataset index.asp	BIOS
131	33	BIOS mussel sites 2010 ds662	Krall, M, C Tennant, and ML Westover. 2010. Mussel Sites, Klamath Riv	http://bios.dfg.ca.gov/dataset index.asp	BIOS
132	32	BIOS mussel sites 2007 ds661	Krall, M, C Tennant, and ML Westover. 2007. Mussel Sites, Klamath Riv	http://bios.dfg.ca.gov/dataset index.asp	BIOS
133	38	BIOS ds323	Garrison, BA. 2005. Herp Coverboard Sampling - Spears and Didion Ra	http://bios.dfg.ca.gov/dataset index.asp	BIOS
134	31	BIOS Western Pond Turtle ds313	California Department of Fish and Game. 2010. Western Pond Turtle Ob	http://bios.dfg.ca.gov/dataset index.asp	BIOS
135	34	BIOS ds431	Spiegelberg, M. 2009. Sensitive Wildlife - Center for Natural Lands Mana	http://bios.dfg.ca.gov/dataset index.asp	BIOS
136	35	BIOS San Diego plants ds121	San Diego Dept. of Planning and Land Use. 2005. Species on Multiple S	http://bios.dfg.ca.gov/dataset index.asp	BIOS
137	36	BIOS ds458	Spiegelberg, M. 2007. Sensitive Plants - Center for Natural Lands Manag	http://bios.dfg.ca.gov/dataset index.asp	BIOS
138	37	BIOS ds324	Garrison, BA. 2006. Herp Coverboard Sampling - Spears and Didion Ra	http://bios.dfg.ca.gov/dataset index.asp	BIOS
142	145	SWAMP via CEDEN. Download 10 April 2014, Obs before 13	California State Water Resources Control Board. 2014. Surface Water Ar	http://www.ceden.org	SWAMP
143	146	J Howard mussel data compilation	Howard, J. 2014. Compilation of Freshwater Mussel Surveys (Unpublish	n/a	
144	147	Frest and Johannes 1995	Frest, T. J. and E. J. Johannes. 1995. Interior Columbia Basin mollusk sp	n/a	
147	150	Points approximated from Hershler et al. 2007. Extensive dive	Hershler et al. 2007. Extensive diversification of pebblesnails (Lithoglyphi	http://onlinelibrary.wiley.com/doi/10.1111/j.1096-3642.2007.00243.x/abstra	
148	151	California Natural Diversity Database (4/2016)	California Department of Fish and Wildlife. 2014. California Natural Divers	http://www.dfg.ca.gov/biogeodata/cnddb/	CNDDB
150	153	California Natural Diversity Database (4/2016) - 'Sensitive'			CNDDB
153	156	Mussel ranges based on Xerces HUC8 occurrence or J Howar	Howard, J. 2014. Freshwater Mussel Range Analsyis (Unpublished data	n/a	
158	161	CAS HERP	California Academy of Sciences. Herpetology Collection. 2014. Species R	http://www.herpnet.org/	HerpNet
159	162	CAS SUA	California Academy of Sciences. Amphibian Collection. 2014. Species Re	http://www.herpnet.org/	HerpNet
160	163	CAS SUR	California Academy of Sciences. Reptile Collection. 2014. Species Recor	http://www.herpnet.org/	HerpNet
161	164	CM Herps	Carnegie Museum of Natural History. Herpetology Collection. 2014. Speci	http://www.herpnet.org/	HerpNet
162	165	CMC HERP-V	Cincinnati Museum Center. Herpetology Vouchers. 2014. Species Record	http://www.herpnet.org/	HerpNet
163	166	CUMV Amphibian	Cornell University Museum of Vertebrates. Amphibian Collection. 2014. S|	http://www.herpnet.org/	HerpNet
164	167	CUMV Reptile	Cornell University Museum of Vertebrates. Reptile Collection. 2014. Speci	http://www.herpnet.org/	HerpNet
165	168	KU KUH	University of Kansas. Herpetology Collection. 2014. Species Records. Ac	http://www.herpnet.org/	HerpNet
166	169	LACM Herps	Natural History Museum of Los Angeles County. Herpetology Collection. 2	http://www.herpnet.org/	HerpNet
167	170	MCZ Herp	Harvard University Museum of Comparative Zoology. Herpetology Collecti	http://www.herpnet.org/	HerpNet
168	171	MSB MSBHerp	Museum of Southwestern Biology. Herpetology Collection. 2014. Species	http://www.herpnet.org/	HerpNet
169	172	MSUM HE	Michigan State University Museum. Herpetology Collection. 2014. Specie	http://www.herpnet.org/	HerpNet
170	173	MVZ Herp	University of California Berkeley Museum of Vertebrate Zoology. Herpetolo	http://www.herpnet.org/	HerpNet
171	174	MVZ Hild	University of California Berkeley Museum of Vertebrate Zoology. Hildebrar	http://www.herpnet.org/	HerpNet
172	175	MVZObs Herp	University of California Berkeley Museum of Vertebrate Zoology. Herpetolo	http://www.herpnet.org/	HerpNet
173	176	PSM Herp	James R. Slater Museum of Natural History. Herpetology Collection. 2014	http://www.herpnet.org/	HerpNet
174	177	ROM Herps	Royal Ontario Museum. Herpetology Collection. 2014. Species Records. .	http://www.herpnet.org/	HerpNet
175	178	SBMNH HE	Santa Barbara Museum of Natural History. Herpetology Collection. 2014. S	http://www.herpnet.org/	HerpNet
176	179	SBMNH OS	Santa Barbara Museum of Natural History. Osteological Collection. 2014.	http://www.herpnet.org/	HerpNet
177	180	SDNHM Herps	San Diego Natural History Museum. Herpetology Collection. 2014. Specie	http://www.herpnet.org/	HerpNet
178	181	SMNS Herpetologie	Staatliches Museum für Naturkunde Stuttgart. Herpetology Collection. 201	http://www.herpnet.org/	HerpNet
179	182	UA UAMZ HERPETOLOGY	University of Alberta Museum of Zoology. Herpetology Collection. 2014. S|	http://www.herpnet.org/	HerpNet
180	183	UBCBBM CTC	University of British Columbia Beaty Biodiversity Museum. Cowan Tetrapo	http://www.herpnet.org/	HerpNet
181	184	UCM Herps	University of Colorado Museum of Natural History. Herpetology Collection.	http://www.herpnet.org/	HerpNet
182	185	UNR Herpetology	University of Nevada, Reno. Herpetology Collection. 2014. Species Recor	http://www.herpnet.org/	HerpNet
183	186	USNM Vertebrate Zoology; Amphibians & Reptiles	Smithsonian Institution National Museum of Natural History. Amphibian &	http://www.herpnet.org/	HerpNet
184	187	UWBM Herp	University of Washington Burke Museum. Herpetology Collection. 2014. S	http://www.herpnet.org/	HerpNet
185	188	YPM HER	Yale University Peabody Museum Vertebrate Zoology Division. Herpetolog	http://www.herpnet.org/	HerpNet
186	189	ZIN ZISP	Zoological Institute, Russian Academy of Sciences, St. Petersburg. Ampl	http://www.herpnet.org/	HerpNet
187	190	CASENT	California Academy of Sciences. Entomology Collection. 2014. Species R	http://calbug.berkeley.edu/	CalBug
188	191	CIS	University of California, Berkeley - Essig Museum. California Terrestrial Ar	http://calbug.berkeley.edu/	CalBug
189	192	CSCA	California State Arthropod Collection. 2014. Species Records. Accessed	http://calbug.berkeley.edu/	CalBug
190	193	EMEC	University of California, Berkeley - Essig Museum. California Terrestrial Ar	http://calbug.berkeley.edu/	CalBug
191	194	LACMENT	Los Angeles County Museum. Entomology Collection. 2014. Species Rec	http://calbug.berkeley.edu/	CalBug
192	195	OMC	Oakland Museum of California. 2014. Species Records. Accessed via Ca	http://calbug.berkeley.edu/	CalBug
193	196	SBMNHENT	Santa Barbara Museum of Natural History. Entomology Collection. 2014. S	http://calbug.berkeley.edu/	CalBug
194	197	SDNHM	San Diego Natural History Museum. 2014. Species Records. Accessed v	http://calbug.berkeley.edu/	CalBug
195	198	UCBME	University of California, Davis. Bohart Museum. 2014. Species Records. .	http://calbug.berkeley.edu/	CalBug
196	199	UCRCENT	University of California, Riverside. Entomology Research Museum. 2014.	http://calbug.berkeley.edu/	CalBug
197	200	UMMZI	University of Michigan Museum of Zoology. 2014. Species Records. Acce	http://calbug.berkeley.edu/	CalBug
198	201	A	President and Fellows of Harvard College. Herbarium of the Arnold Arbore	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
199	202	AMES	President and Fellows of Harvard College. Oakes Ames Orchid Herbariun	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
200	203	BLMAR	Bureau of Land Management, Arcata Field Office. Herbarium. Accessed v	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
201	204	CAS	California Academy of Sciences. Herbarium. Accessed via Consortium of	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
202	205	CDA	California Department of Food and Agriculture. Herbarium. Accessed via (	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
203	206	CHSC	California State University, Chico. Chico State Herbarium. Accessed via (	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
204	207	CLARK	Riverside Metropolitan Museum. The Clark Herbarium. Accessed via Con	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
205	208	CSUSB	California State University, San Bernardino. Herbarium. Accessed via Con	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
206	209	DS	California Academy of Sciences. Herbarium. Accessed via Consortium of	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
207	210	ECON	Harvard University. Economic Herbarium of Oakes Ames. Accessed via C	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
208	211	GH	Harvard University. Gray Herbarium. Accessed via Consortium of Californ	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
209	212	HSC	Humboldt State University. Herbarium. Accessed via Consortium of Califo	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
210	213	IRVC	University of California, Irvine. Herbarium. Accessed via Consortium of Ca	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
211	214	JEPS	University of California, Berkeley. Jepson Herbarium. Accessed via Cons	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
212	215	JOTR	Joshua Tree National Park. Herbarium. Accessed via Consortium of Califo	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
213	216	JROH	Stanford University. Jasper Ridge Biological Preserve Herbarium. Access	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
214	217	LA	University of California, Los Angeles. Herbarium. Accessed via Consortiu	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
215	218	NY	New York Botanical Garden. Herbarium. Accessed via Consortium of Cali	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
216	219	OBI	California Polytechnic State University, San Luis Obispo. Herbarium. Acce	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
217	220	PGM	Pacific Grove Museum of Natural History. Herbarium. Accessed via Cons	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
218	221	POM	Pomona College. Herbarium. Accessed via Consortium of California Herb	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
219	222	RSA	Rancho Santa Ana Botanic Garden. Herbarium. Accessed via Consortium	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
220	223	SACT	California State University, Sacramento. Herbarium. Accessed via Consor	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
221	224	SBBG	Santa Barbara Botanic Garden. Herbarium. Accessed via Consortium of C	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
222	225	SD	San Diego Natural History Museum. Herbarium. Accessed via Consortium	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
223	226	SEINET	Southwest Environmental Information Network. Herbarium. Accessed via (	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
224	227	SFV	California State University, Northridge. Herbarium. Accessed via Consorti	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
225	228	SJSU	San Jose State University. Herbarium. Accessed via Consortium of Califo	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
226	229	UC	University of California, Berkeley. University Herbarium. Accessed via Co	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
227	230	UCD	University of California, Davis. Herbarium. Accessed via Consortium of Ca	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
228	231	UCLA	University of California, Los Angeles. Herbarium. Accessed via Consortiu	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
229	232	UCR	University of California, Riverside. Herbarium. Accessed via Consortium o	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
230	233	UCSB	University of California, Santa Barbara. Herbarium. Accessed via Consorti	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
231	234	VVC	Victor Valley College. Herbarium. Accessed via Consortium of California H	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
232	235	YM-YOSE	Yosemite National Park. Herbarium. Accessed via Consortium of Californi	http://ucjeps.berkeley.edu/consortium/	Consortium of CA Herbaria
233	236	AAU Herbarium	The Aarhus University. Herbarium Database. Accessed via Global Biodive	http://www.gbif.org/dataset/833db434-f762-11e1-a439-00145eb45e9a	GBIF
234	237	AEZSC SBMNH-ENT	Santa Barbara Museum of Natural History. California Beetle Project. Acce	http://www.gbif.org/dataset/84b130ac-f762-11e1-a439-00145eb45e9a	GBIF
235	238	ANSP IndoPacfic Mollusc DB	Academy of Natural Sciences. Ocean Biogeographic Information System I	http://www.gbif.org/dataset/83a09216-f762-11e1-a439-00145eb45e9a	GBIF
236	239	ANSP Malacology	Academy of Natural Sciences. Malacology Philadelphia . Accessed via Glo	http://www.gbif.org/dataset/86b50d88-f762-11e1-a439-00145eb45e9a	GBIF
237	240	BLB Bird	Ohio State University Museum of Biological Diversity. Borror Laboratory of	http://www.gbif.org/dataset/85fd399c-f762-11e1-a439-00145eb45e9a	GBIF
238	241	BLB Insects	Ohio State University Museum of Biological Diversity. Charles A. Triplehor	http://www.gbif.org/dataset/84ab7b76-f762-11e1-a439-00145eb45e9a	GBIF
239	242	Borror Laboratory of Bioacoustics, Ohio State University, Colur	Ohio State University Museum of Biological Diversity. Borror Laboratory of	http://www.gbif.org/dataset/f11db245-3f9f-4fc6-a0cc-12b4124d081b	GBIF
240	243	C.A. Triplehorn Insect Collection, Ohio State University, Colum	Ohio State University Museum of Biological Diversity. Charles A. Triplehor	http://www.gbif.org/dataset/84ab7b76-f762-11e1-a439-00145eb45e9a	GBIF
241	244	CANB 516055	Australian National Herbarium. Accessed via Global Biodiversity Informati	http://www.gbif.org/dataset/82cd8df8-f762-11e1-a439-00145eb45e9a	GBIF
242	245	CANB 516058	Australian National Herbarium. Accessed via Global Biodiversity Informati	http://www.gbif.org/dataset/82cd8df8-f762-11e1-a439-00145eb45e9a	GBIF
243	246	CANB 518346	Australian National Herbarium. Accessed via Global Biodiversity Informati	http://www.gbif.org/dataset/82cd8df8-f762-11e1-a439-00145eb45e9a	GBIF
244	247	CANB 589789	Australian National Herbarium. Accessed via Global Biodiversity Informati	http://www.gbif.org/dataset/82cd8df8-f762-11e1-a439-00145eb45e9a	GBIF
245	248	CANB 762494	Australian National Herbarium. Accessed via Global Biodiversity Informati	http://www.gbif.org/dataset/82cd8df8-f762-11e1-a439-00145eb45e9a	GBIF
246	249	CANB 762510	Australian National Herbarium. Accessed via Global Biodiversity Informati	http://www.gbif.org/dataset/82cd8df8-f762-11e1-a439-00145eb45e9a	GBIF
247	250	CANB 796487	Australian National Herbarium. Accessed via Global Biodiversity Informati	http://www.gbif.org/dataset/82cd8df8-f762-11e1-a439-00145eb45e9a	GBIF
248	251	CANB 796488	Australian National Herbarium. Accessed via Global Biodiversity Informati	http://www.gbif.org/dataset/82cd8df8-f762-11e1-a439-00145eb45e9a	GBIF
249	252	CANB 796489	Australian National Herbarium. Accessed via Global Biodiversity Informati	http://www.gbif.org/dataset/82cd8df8-f762-11e1-a439-00145eb45e9a	GBIF
250	253	CANB 809935	Australian National Herbarium. Accessed via Global Biodiversity Informati	http://www.gbif.org/dataset/82cd8df8-f762-11e1-a439-00145eb45e9a	GBIF
251	254	CANB 825801	Australian National Herbarium. Accessed via Global Biodiversity Informati	http://www.gbif.org/dataset/82cd8df8-f762-11e1-a439-00145eb45e9a	GBIF
252	255	CAS BOT	California Academy of Sciences. Botany Collection. Accessed via Global E	http://www.gbif.org/dataset/f934f8e2-32ca-46a7-b2f8-b032a4740454	GBIF
253	256	CAS CAS	Consortium of California Herbaria, California Academy of Sciences. Botan	http://www.gbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9bb03b3ca106	GBIF
254	257	CAS DS	California Academy of Sciences. Botany Collection. Accessed via Global E	http://www.gbif.org/dataset/f934f8e2-32ca-46a7-b2f8-b032a4740454	GBIF
255	258	CAS HERP	California Academy of Sciences. Herpetology Collection. Accessed via Glo	http://www.gbif.org/dataset/cece4fc2-1fec-4bb5-a335-7252548e3f0b	GBIF
256	259	CAS IZ	California Academy of Sciences. Invertebrate Collection. Accessed via Glo	http://www.gbif.org/dataset/44bcde48-ac71-46f2-bf73-24fc3c008b6c	GBIF
257	260	CAS SUA	California Academy of Sciences. Amphibian Collection. Accessed via Glol	http://www.gbif.org/dataset/cece4fc2-1fec-4bb5-a335-7252548e3f0b	GBIF
258	261	CAS SUR	California Academy of Sciences. Reptile Collection. Accessed via Global E	http://www.gbif.org/dataset/cece4fc2-1fec-4bb5-a335-7252548e3f0b	GBIF
259	262	CASENT Arthropods	University of California, Berkeley - Essig Museum. California Terrestrial Ar	http://www.gbif.org/dataset/5d283bb6-64dd-4626-8b3b-a4e8db5415c3	GBIF
260	263	CCBER Herps	Cheadle Center for Biodiversity and Ecological Restoration. Herpetology C	http://www.gbif.org/dataset/1050a336-b87a-44b1-b0ec-6fe5fcb3d298	GBIF
261	264	CDA CDA	Consortium of California Herbaria. California Department of Food and Agr	http://www.gbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9bb03b3ca106	GBIF
262	265	CHSC CHSC	Consortium of California Herbaria. California State University, Chico. Acce	http://www.gbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9bb03b3ca106	GBIF
264	267	CIS Arthropods	University of California, Berkeley - Essig Museum. California Terrestrial Ar	http://www.gbif.org/dataset/5d283bb6-64dd-4626-8b3b-a4e8db5415c3	GBIF
265	268	CLARK-A CLARK-A	Consortium of California Herbaria. Riverside Metropolitan Museum Clark H	http://www.gbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9bb03b3ca106	GBIF
266	269	CM Herps	Carnegie Museums. Herpetology Collection. Accessed via Global Biodiver	http://www.gbif.org/dataset/76dd8f0d-2daa-4a69-9fcd-55e04230334a	GBIF
267	270	CMC HERP-V	Cincinnati Museum Center. Herpetology Vouchers. Accessed via Global E	http://www.gbif.org/dataset/81a975b3-d86f-434e-ad9e-16bc43f68a36	GBIF
268	271	CMN CAN	Canadian Museum of Nature Herbarium. Vascular Plant Collection . Acce	http://www.gbif.org/dataset/830da118-f762-11e1-a439-00145eb45e9a	GBIF

269	272	CMN CMNAR		Canadian Museum of Nature. Amphibian and Reptile Collection - Anura. A	http://www.gbif.org/dataset/830a1f84-f762-11e1-a439-00145eb45e9a	GBIF
270	273	CMN CMNML		Canadian Museum of Nature Mollusc Collection - Unionoida. Accessed vi	http://www.gbif.org/dataset/830c7b08-f762-11e1-a439-00145eb45e9a	GBIF
271	274	Consortium of California Herbaria CAS		Consortium of California Herbaria. California Academy of Sciences. Acces	http://www.gbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
272	275	Consortium of California Herbaria CDA		Consortium of California Herbaria. California Department of Food and Agr	http://www.gbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
273	276	Consortium of California Herbaria CHSC		Consortium of California Herbaria. California State University, Chico. Acce	http://www.gbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
274	277	Consortium of California Herbaria DS		Consortium of California Herbaria. California Academy of Sciences. Acces	http://www.gbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
275	278	Consortium of California Herbaria HSC		Consortium of California Herbaria. Humboldt State University. Accessed v	http://www.gbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
276	279	Consortium of California Herbaria IRVC		Consortium of California Herbaria. University of California, Irvine. Access	http://www.gbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
277	280	Consortium of California Herbaria JEPS		Consortium of California Herbaria. University of California, Berkeley Jepsc	http://www.gbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
278	281	Consortium of California Herbaria PGM		Consortium of California Herbaria. Pacific Grove Museum of Natural Histc	http://www.gbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
279	282	Consortium of California Herbaria POM		Consortium of California Herbaria. Pomona College Herbaria. Accessed v	http://www.gbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
280	283	Consortium of California Herbaria RSA		Consortium of California Herbaria. Rancho Santa Ana Botanic Garden He	http://www.gbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
281	284	Consortium of California Herbaria SBBG		Consortium of California Herbaria. Santa Barbara Botanic Garden. Acces	http://www.gbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
282	285	Consortium of California Herbaria SD		Consortium of California Herbaria. San Diego Natural History Museum. Ac	http://www.gbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
283	286	Consortium of California Herbaria SDSU		Consortium of California Herbaria. San Diego State University. Accessed	http://www.gbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
284	287	Consortium of California Herbaria SJSU		Consortium of California Herbaria. San Jose State University. Accessed v	http://www.gbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
285	288	Consortium of California Herbaria UC		Consortium of California Herbaria. University of California, Berkeley Unive	http://www.gbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
286	289	Consortium of California Herbaria UCLA		Consortium of California Herbaria. University of California, Los Angeles. A	http://www.gbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
287	290	Consortium of California Herbaria UCR		Consortium of California Herbaria. University of California, Riverside. Acc	http://www.gbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
288	291	Consortium of California Herbaria UCSB		Consortium of California Herbaria. University of California, Santa Barbara.	http://www.gbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
289	292	Consortium of California Herbaria UCSC		Consortium of California Herbaria. University of California, Santa Cruz. Ac	http://www.gbif.org/dataset/0fb2c370-a84f-11de-978d-b8a03c50a862	GBIF
290	293	CSCA Arthropods		University of California, Berkeley - Essig Museum. California Terrestrial A	http://www.gbif.org/dataset/5d283bb6-64dd-4626-8b3b-a4e8db5415c3	GBIF
291	294	CSUSB CSUSB		Consortium of California Herbaria. California State University, San Bernar	http://www.gbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9bb03b3ca106	GBIF
292	295	CUML Sound/Film		Cornell Lab of Ornithology. Macaulay Library Audio and Video Collection.	http://www.gbif.org/dataset/7f6d0f7-9ed4-49c0-b71-b2a9c7fed9f1	GBIF
293	296	CUMV Amph		Cornell University Museum of Vertebrates. Amphibian Collection. Access	http://www.gbif.org/dataset/a8ee9bc6-5914-427d-9fba-f8545250ac34	GBIF
294	297	CUMV Rept		Cornell University Museum of Vertebrates. Reptile Collection. Accessed v	http://www.gbif.org/dataset/b99095f3-d1e9-4902-9938-10ff1711ca5d	GBIF
295	298	DS DS		Consortium of California Herbaria. California Academy of Sciences. Acces	http://www.gbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9bb03b3ca106	GBIF
296	299	E E		Royal Botanic Garden Edinburgh. Royal Botanic Garden Edinburgh Living	http://www.gbif.org/dataset/7adf20e0-c955-11de-95c0-b8a03c50a862	GBIF
297	300	EMAP NCA CAL00		Academy of Natural Sciences. Ocean Biogeographic Information System		http://www.gbif.org/dataset/838bb5ee-f762-11e1-a439-00145eb45e9a	GBIF
298	301	EMAP NCA CAL02		Academy of Natural Sciences. Ocean Biogeographic Information System		http://www.gbif.org/dataset/838bb5ee-f762-11e1-a439-00145eb45e9a	GBIF
299	302	EMAP NCA CAL03		Academy of Natural Sciences. Ocean Biogeographic Information System		http://www.gbif.org/dataset/838bb5ee-f762-11e1-a439-00145eb45e9a	GBIF
300	303	EMAP NCA CAL99		Academy of Natural Sciences. Ocean Biogeographic Information System		http://www.gbif.org/dataset/838bb5ee-f762-11e1-a439-00145eb45e9a	GBIF
301	304	EMAP NCA COL00		Academy of Natural Sciences. Ocean Biogeographic Information System		http://www.gbif.org/dataset/838bb5ee-f762-11e1-a439-00145eb45e9a	GBIF
303	306	EMAP NCA COL99		Academy of Natural Sciences. Ocean Biogeographic Information System		http://www.gbif.org/dataset/838bb5ee-f762-11e1-a439-00145eb45e9a	GBIF
304	307	EMEC Arthropods		University of California, Berkeley - Essig Museum. California Terrestrial A	http://www.gbif.org/dataset/5d283bb6-64dd-4626-8b3b-a4e8db5415c3	GBIF
306	309	F Botany		Field Museum of Natural History (Botany). Seed Plant Collection. Access	http://www.gbif.org/dataset/90c853e6-56bd-480b-8e8f-6285c3f8d42b	GBIF
307	310	FLMNH Invertebrate Zoology		Florida Museum of Natural History. Invertebrate Zoology. Accessed via Gl	http://www.gbif.org/dataset/85b1cfb6-f762-11e1-a439-00145eb45e9a	GBIF
308	311	FR Herbarium Senckenbergianum		Senckenberg Nature Research Society. Herbarium Senckenbergianum. A	http://www.gbif.org/dataset/966426ce-f762-11e1-a439-00145eb45e9a	GBIF
309	312	GLM GLMcoll		Staatliche Naturwissenschaftliche Sammlungen Bayerns. The Fungal Col	http://www.gbif.org/dataset/7a2660bc-f762-11e1-a439-00145eb45e9a	GBIF
310	313	GZU Herbarium GZU		Karl Franzens University of Graz. Insitute for Botany - Herbarium. Access	http://www.gbif.org/dataset/807a0573-87ec-4c1e-a23a-15a327c85dd3	GBIF
311	314	Harvard University GH		Harvard University Herbaria. Gray Herbarium. Accessed via Global Biodiv	http://www.gbif.org/dataset/861e6afe-f762-11e1-a439-00145eb45e9a	GBIF
312	315	Herbarium ARIZ		University of Arizona Herbarium. Accessed via Global Biodiversity Informa	http://www.gbif.org/dataset/95b97882-f762-11e1-a439-00145eb45e9a	GBIF
313	316	HSC HSC		Consortium of California Herbaria. Humboldt State University. Accessed v	http://www.gbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9bb03b3ca106	GBIF
315	318	iNaturalist Observations		iNaturalist.org. Research-Grade Observations. Accessed via Global Biodi	http://www.gbif.org/dataset/50c9509d-22c7-4a22-a47d-8c48425ef4a7	GBIF
316	319	INHS Insect Collection		Illinois Natural History Survey. Insect Collection. Accessed via Global Bioc	http://www.gbif.org/dataset/68513375-3aa5-4f6f-9975-d97d56c21d61	GBIF
317	320	IRVC IRVC		Consortium of California Herbaria. University of California, Irvine. Access	http://www.gbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9bb03b3ca106	GBIF
318	321	JEPS JEPS		Consortium of California Herbaria. University of California, Berkeley Jepsc	http://www.gbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9bb03b3ca106	GBIF
319	322	JOTR JOTR		Consortium of California Herbaria. Joshua Tree National Park. Accessed	http://www.gbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9bb03b3ca106	GBIF
320	323	JROH JROH		Consortium of California Herbaria. Jasper Ridge Biological Preserve, Stan	http://www.gbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9bb03b3ca106	GBIF
321	324	K Herbarium		Royal Botanic Gardens. Kew Herbarium. Accessed via Global Biodiversit	http://www.gbif.org/dataset/84aca1ae-f762-11e1-a439-00145eb45e9a	GBIF
322	325	KU KANU		University of Kansas Biodiversity Institute. R. L. McGregor Herbarium Vas	http://www.gbif.org/dataset/95c938a8-f762-11e1-a439-00145eb45e9a	GBIF
323	326	KU KUH		University of Kansas Biodiversity Institute. Herpetology Collection. Access	http://www.gbif.org/dataset/dce00a1f-f6b4-4e11-9771-92c62c40ad80	GBIF
324	327	KU SEMC		University of Kansas Biodiversity Institute. Snow Entomological Museum (	http://www.gbif.org/dataset/aae308f4-9f9c-4cdd-b4ef-c026f48be551	GBIF
325	328	L L		Naturalis Biodiversity Center. Nationaal Herbarium Nederland. Accessed	http://www.gbif.org/dataset/7b33b040-f762-11e1-a439-00145eb45e9a	GBIF
326	329	LA LA		Consortium of California Herbaria. University of California, Los Angeles. A	http://www.gbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9bb03b3ca106	GBIF
327	330	LACM Herps		Natural History Museum of Los Angeles County. Herpetology Collection. A	http://www.gbif.org/dataset/7a25f7aa-03fb-4322-aaeb-66719e1a9527	GBIF
328	331	LACMENT Arthropods		University of California, Berkeley - Essig Museum. California Terrestrial A	http://www.gbif.org/dataset/5d283bb6-64dd-4626-8b3b-a4e8db5415c3	GBIF
329	332	LD General		Lund Botanical Museum. Accessed via Global Biodiversity Information Fa	http://www.gbif.org/dataset/aab0cf80-0c64-11dd-84d1-b8a03c50a862	GBIF
330	333	LI Biologiezentrum Linz		Biologiezentrum Linz Oberoesterreich. Biologiezentrum Linz. Accessed vi	http://www.gbif.org/dataset/857bce66-f762-11e1-a439-00145eb45e9a	GBIF
331	334	LSU Herbarium		Louisiana State University Herbarium. Accessed via Global Biodiversity In	http://www.gbif.org/dataset/56e9c560-bd2a-11dd-b15e-b8a03c50a862	GBIF
332	335	M BSMeryscoll		Staatliche Naturwissenschaftliche Sammlungen Bayerns. The Erysiphales	http://www.gbif.org/dataset/858d51e0-f762-11e1-a439-00145eb45e9a	GBIF
333	336	MA MA		Real Jardin Botanico de Madrid. Algae Collection. Accessed via Global Bi	http://www.gbif.org/dataset/834c9918-f762-11e1-a439-00145eb45e9a	GBIF
334	337	MCZ Herp		Harvard University Museum of Comparative Zoology. Herpetology Collecti	http://www.gbif.org/dataset/4bfac3ea-8763-4f4b-a71a-76a6f5f243d3	GBIF
335	338	MCZ IZ		Harvard University Museum of Comparative Zoology. Invertebrate Zoolog	http://www.gbif.org/dataset/4bfac3ea-8763-4f4b-a71a-76a6f5f243d3	GBIF
336	339	MCZ Mala		Harvard University Museum of Comparative Zoology. Malcology Collectio	http://www.gbif.org/dataset/4bfac3ea-8763-4f4b-a71a-76a6f5f243d3	GBIF
337	340	MCZC SBMNH-ENT		Santa Barbara Museum of Natural History. California Beetle Project. Acce	http://www.gbif.org/dataset/84b130ac-f762-11e1-a439-00145eb45e9a	GBIF
338	341	MHP MHP-H		Sternberg Museum of Natural History. Herpetology Collection. Accessed	http://www.gbif.org/dataset/84e823d2-f762-11e1-a439-00145eb45e9a	GBIF
339	342	MNHN P		Muséum National d'Histoire Naturelle. Vascular Plants Collection. Access	http://www.gbif.org/dataset/b5cdf794-8fa4-4a85-8b26-755d087bf531	GBIF
340	343	MO Tropicos		Missouri Botanical Garden. Tropicos. Accessed via Global Biodiversity Inf	http://www.gbif.org/dataset/7bd65a7a-f762-11e1-a439-00145eb45e9a	GBIF
342	345	MSUM HE		Michigan State University Museum. Ichthyology and Herpetology Collectio	http://www.gbif.org/dataset/847bbbde-f762-11e1-a439-00145eb45e9a	GBIF
343	346	MVZ Herp		Museum of Vertebrate Zoology. Herpetology Collection. Accessed via Glo	http://www.gbif.org/dataset/09c4287e-e6d5-4552-a07f-bff8a00833d8	GBIF
344	347	MVZ Hild		Museum of Vertebrate Zoology. Hildebrand Collection. Accessed via Glob	http://www.gbif.org/dataset/423d9318-4dd4-4d31-81cb-27778c44a3bc	GBIF
345	348	MVZ MVZ Herps		Museum of Vertebrate Zoology. Herpetology Collection. Accessed via Glo	http://www.gbif.org/dataset/09c4287e-e6d5-4552-a07f-bff8a00833d8	GBIF
346	349	MVZ MVZ Hildebrand		Museum of Vertebrate Zoology. Hildebrand Collection. Accessed via Glob	http://www.gbif.org/dataset/423d9318-4dd4-4d31-81cb-27778c44a3bc	GBIF
347	350	MVZ MVZ Observations-Herp		Museum of Vertebrate Zoology. Herpetology Observations. Accessed via	http://www.gbif.org/dataset/f3e4b261-00c5-4f3a-a5b7-d66075b7f3e1	GBIF
348	351	MVZObs Herp		Museum of Vertebrate Zoology. Herpetology Observations. Accessed via	http://www.gbif.org/dataset/f3e4b261-00c5-4f3a-a5b7-d66075b7f3e1	GBIF
349	352	NCSM NCSM-Invert		North Carolina Museum of Natural Sciences. Invertebrates Collection. Ac	http://www.gbif.org/dataset/d7ce3688-e91d-4f26-b2bb-333357c6da9f	GBIF
350	353	NLD037 NLD		Centre for Genetic Resources, the Netherlands. Plant Genetic Resouces	http://www.gbif.org/dataset/85796928-f762-11e1-a439-00145eb45e9a	GBIF
351	354	NMR Insecta		Natural History Museum Rotterdam. Insecta collection. Accessed via Glob	http://www.gbif.org/dataset/d5e61920-9863-4fc3-8e5a-80f0c7bfe640	GBIF
352	355	NOAA 2001 San Francisco Bay		Ocean Biogeographic Information System. San Francisco Bay Data. Acce	http://www.gbif.org/dataset/8399a5be-f762-11e1-a439-00145eb45e9a	GBIF
355	358	NSW NSW		National Herbarium of New South Wales. Herbarium Collection. Accessed	http://www.gbif.org/dataset/853006c0-f762-11e1-a439-00145eb45e9a	GBIF
356	359	NY Herbarium		Consortium of California Herbarium. New York Botanical Garden. Access	http://www.gbif.org/dataset/7133ff0a-f762-11e1-a439-00145eb45e9a	GBIF
358	361	OBI OBI		Consortium of California Herbaria. California Polytechnic State University,	http://www.gbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9bb03b3ca106	GBIF
359	362	Ohio State University - Amphibian Division, Columbus, OH (O		Ohio State University Museum of Biological Diversity Tetrapod Division. A	http://www.gbif.org/dataset/3d84f407-8a76-473a-b8c8-54a58d5f581b	GBIF
360	363	Ohio State University - Reptile Division, Columbus, OH (OSUI		Ohio State University Museum of Biological Diversity Tetrapod Division. R	http://www.gbif.org/dataset/51fa0155-a545-4154-ac20-b89dbb2c312b	GBIF
361	364	Ohio State University Acarology Laboratory, Columbus, OH (O		Ohio State University Museum of Biological Diversity Acarology Laborator	http://www.gbif.org/dataset/96b54e8c-f762-11e1-a439-00145eb45e9a	GBIF
362	365	OMC Arthropods		University of California, Berkeley - Essig Museum. California Terrestrial A	http://www.gbif.org/dataset/5d283bb6-64dd-4626-8b3b-a4e8db5415c3	GBIF
363	366	OMNH Amphibians		Sam Noble Oklahoma Museum of Natural History. Amphibian Specimens.	http://www.gbif.org/dataset/2e64dedd-0996-4cd6-b6cd-4f055a46c38c	GBIF
364	367	OMNH Reptiles		Sam Noble Oklahoma Museum of Natural History. Reptile Specimens. Ac	http://www.gbif.org/dataset/ad0d4b56-c620-45a5-9152-7a0da3bd48e8	GBIF
365	368	OMNH RINVRT		Sam Noble Oklahoma Museum of Natural History. Recent Invertebrates S	http://www.gbif.org/dataset/5378e1cf-522d-4469-8776-b709579b4a3e	GBIF
366	369	OSAL Mites		Ohio State University Museum of Biological Diversity Acarology Laborator	http://www.gbif.org/dataset/96b54e8c-f762-11e1-a439-00145eb45e9a	GBIF
368	371	OSC OSC		Oregon State University. Vascular Plant Collection. Accessed via Global E	http://www.gbif.org/dataset/84aa5ee4-f762-11e1-a439-00145eb45e9a	GBIF
369	372	OSC WILLU		Oregon State University. Vascular Plant Collection. Accessed via Global E	http://www.gbif.org/dataset/84aa5ee4-f762-11e1-a439-00145eb45e9a	GBIF
370	373	OSUC Insects		Ohio State University Museum of Biological Diversity Acarology Laborator	http://www.gbif.org/dataset/84ab7b76-f762-11e1-a439-00145eb45e9a	GBIF
371	374	PBDB 19396		University of California, Santa Barbara Marine Science Institute. Paleobio	http://www.gbif.org/dataset/84806e86-f762-11e1-a439-00145eb45e9a	GBIF
372	375	PBDB 19397		University of California, Santa Barbara Marine Science Institute. Paleobio	http://www.gbif.org/dataset/84806e86-f762-11e1-a439-00145eb45e9a	GBIF
373	376	PBDB 19402		University of California, Santa Barbara Marine Science Institute. Paleobio	http://www.gbif.org/dataset/84806e86-f762-11e1-a439-00145eb45e9a	GBIF
374	377	PBDB 19407		University of California, Santa Barbara Marine Science Institute. Paleobio	http://www.gbif.org/dataset/84806e86-f762-11e1-a439-00145eb45e9a	GBIF
375	378	PBDB 19408		University of California, Santa Barbara Marine Science Institute. Paleobio	http://www.gbif.org/dataset/84806e86-f762-11e1-a439-00145eb45e9a	GBIF
376	379	PBDB 20327		University of California, Santa Barbara Marine Science Institute. Paleobio	http://www.gbif.org/dataset/84806e86-f762-11e1-a439-00145eb45e9a	GBIF
377	380	PBDB 20628		University of California, Santa Barbara Marine Science Institute. Paleobio	http://www.gbif.org/dataset/84806e86-f762-11e1-a439-00145eb45e9a	GBIF
378	381	PBDB 79630		University of California, Santa Barbara Marine Science Institute. Paleobio	http://www.gbif.org/dataset/84806e86-f762-11e1-a439-00145eb45e9a	GBIF
379	382	PBDB 85314		University of California, Santa Barbara Marine Science Institute. Paleobio	http://www.gbif.org/dataset/84806e86-f762-11e1-a439-00145eb45e9a	GBIF
380	383	PGM PGM		Consortium of California Herbarium. Pacific Grove Museum of Natural His	http://www.gbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9bb03b3ca106	GBIF
381	384	POM POM		Consortium of California Herbarium. Pomona College Herbarium. Access	http://www.gbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9bb03b3ca106	GBIF
382	385	PSM Herp		James R. Slater Museum of Natural History. Herpetology Collection. Acce	http://www.gbif.org/dataset/8eddc200-f535-4c65-9b4d-f723eafe607e	GBIF
383	386	RMMU Herps		McGill University Redpath Museum. Herpetological specimens. Accessed	http://www.gbif.org/dataset/7132ed22-f762-11e1-a439-00145eb45e9a	GBIF
384	387	ROM Herps		Royal Ontario Museum. Herpetology Collection. Accessed via Global Biod	http://www.gbif.org/dataset/84bd4658-f762-11e1-a439-00145eb45e9a	GBIF
385	388	Royal Belgian Institute of natural Sciences Amphibia		Royal Belgian Institute of Natural Sciences. Amphibian Collection. Access	http://www.gbif.org/dataset/8138eb72-f762-11e1-a439-00145eb45e9a	GBIF
386	389	Royal Belgian Institute of natural Sciences Types		Royal Belgian Institute of Natural Sciences. Accessed via Global Biodiver	http://www.gbif.org/dataset/8138eb72-f762-11e1-a439-00145eb45e9a	GBIF
387	390	Royal Ontario Museum: ROM Reptiles and Amphibians		Royal Ontario Museum. Herpetology Collection. Accessed via Global Biod	http://www.gbif.org/dataset/8c201186-d997-4b65-aac9-2fcf442a93f6	GBIF
388	391	RSA RSA		Consortium of California Herbarium. Rancho Santa Ana Botanic Garden H	http://www.gbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9bb03b3ca106	GBIF
389	392	SACT SACT		Consortium of California Herbaria. California State University, Sacramento	http://www.gbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9bb03b3ca106	GBIF
390	393	SBBG SBBG		Consortium of California Herbaria. Santa Barbara Botanic Garden. Acces	http://www.gbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9bb03b3ca106	GBIF
391	394	SBMNH	SBMNH-ENT	Santa Barbara Museum of Natural History. Entomology Collection. Acces	http://www.gbif.org/dataset/84b130ac-f762-11e1-a439-00145eb45e9a	GBIF
392	395	SBMNH HE		Santa Barbara Museum of Natural History. Herpetology Collection. Acces	http://www.gbif.org/dataset/75018539-6328-41de-b875-7c2e61dc1635	GBIF
393	396	SBMNH OS		Santa Barbara Museum of Natural History. Osteological Collection. Acces	http://www.gbif.org/dataset/75018539-6328-41de-b875-7c2e61dc1635	GBIF
394	397	SBMNH SBMNH-ENT		Santa Barbara Museum of Natural History. Entomology Collection. Acces	http://www.gbif.org/dataset/84b130ac-f762-11e1-a439-00145eb45e9a	GBIF
395	398	SBMNHENT Arthropods		Santa Barbara Museum of Natural History. Arthropods Collection. Access	http://www.gbif.org/dataset/5d283bb6-64dd-4626-8b3b-a4e8db5415c3	GBIF
396	399	SD SD		Consortium of California Herbaria. San Diego Natural History Museum. Ac	http://www.gbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9bb03b3ca106	GBIF
397	400	SDNHM Arthropods		University of California, Berkeley - Essig Museum. California Terrestrial A	http://www.gbif.org/dataset/5d283bb6-64dd-4626-8b3b-a4e8db5415c3	GBIF
398	401	SDNHM Herps		San Diego Natural History Museum. Herpetological specimens. Accessed	http://www.gbif.org/dataset/84b4d6e4-f762-11e1-a439-00145eb45e9a	GBIF
399	402	SDSU SDSU		Consortium of California Herbaria. San Diego State University. Accessed	http://www.gbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9bb03b3ca106	GBIF
400	403	SFV SFV		Consortium of California Herbaria. California State University, Northridge.	http://www.gbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9bb03b3ca106	GBIF
401	404	SJSU SJSU		Consortium of California Herbaria. San Jose State University. Accessed v	http://www.gbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9bb03b3ca106	GBIF
402	405	SMF Collection Crustacea		Senckenberg Nature Research Society. Crustacean Collection. Accessed	http://www.gbif.org/dataset/9668b676-f762-11e1-a439-00145eb45e9a	GBIF
403	406	SMNK SMNKfungicoll		Staatliche Naturwissenschaftliche Sammlungen Bayerns. Fungus Collecti	http://www.gbif.org/dataset/61a9ca38-b62f-11e2-afcb-00145eb45e9a	GBIF
404	407	SMNS Herpetologie		Staatliches Museum für Naturkunde Stuttgart. Herpetology Collection. Acc	http://www.gbif.org/dataset/9cd0014c-b7b1-4ed1-bef7-0225acfa4ef2	GBIF
405	408	TAMU ENTO		Texas A&M University. Insect Collection. Accessed via Global Biodiversity	http://www.gbif.org/dataset/96193ea2-f762-11e1-a439-00145eb45e9a	GBIF
406	409	TNHC Herpetology		The University of Texas at Austin - Texas Natural History Collections. Her	http://www.gbif.org/dataset/852628c6-f762-11e1-a439-00145eb45e9a	GBIF
407	410	UA ALTA-VP COLLECTION		University of Alberta Museums. Vascular Plant Herbarium. Accessed via	http://www.gbif.org/dataset/7b3e4870-f762-11e1-a439-00145eb45e9a	GBIF
408	411	UA UAMZ HERPETOLOGY		University of Alberta Museums. Amphibian and Reptile Collection. Access	http://www.gbif.org/dataset/88d7437e-f762-11e1-a439-00145eb45e9a	GBIF
409	412	UA UNA		University of Alabama Biodiversity and Systematics. Herbarium. Accessed	http://www.gbif.org/dataset/84f9770e-f762-11e1-a439-00145eb45e9a	GBIF
410	413	UBCBBM CTC		University of British Columbia. Cowan Tetrapod Collection - Herpetology.	http://www.gbif.org/dataset/df9c8b86-9d36-4e29-91b3-4274dff053e5	GBIF
411	414	UC UC		Consortium of California Herbaria. University of California, Berkeley - Univ	http://www.gbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9bb03b3ca106	GBIF
413	416	UCBG California		University of California, Berkeley Natural History Museums. TAPIR Provid	http://www.gbif.org/dataset/51b92d4e-556f-4a05-bc5c-bfe982ee1156	GBIF
414	417	UCBG Californian		University of California, Berkeley Natural History Museums. TAPIR Provid	http://www.gbif.org/dataset/51b92d4e-556f-4a05-bc5c-bfe982ee1156	GBIF
415	418	UCBG Mather Redwood Grove		University of California, Berkeley Natural History Museums. Mather Redw	http://www.gbif.org/dataset/51b92d4e-556f-4a05-bc5c-bfe982ee1156	GBIF
416	419	UCBG Unspecified		University of California, Berkeley Natural History Museums. Unspecified.	http://www.gbif.org/dataset/51b92d4e-556f-4a05-bc5c-bfe982ee1156	GBIF
417	420	UCBME Arthropods		University of California, Berkeley - Essig Museum. California Terrestrial A	http://www.gbif.org/dataset/5d283bb6-64dd-4626-8b3b-a4e8db5415c3	GBIF
418	421	UCD UCD		Consortium of California Herbaria. University of California, Davis. Access	http://www.gbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9bb03b3ca106	GBIF
419	422	UCJEPS JEPS		Consortium of California Herbaria. University of California, Berkeley - Jeps	http://www.gbif.org/dataset/5729fd1d-04af-46bd-9da7-0ff79977c6f8	GBIF
420	423	UCJEPS UC		Consortium of California Herbaria. University of California, Berkeley - Univ	http://www.gbif.org/dataset/5729fd1d-04af-46bd-9da7-0ff79977c6f8	GBIF
421	424	UCLA UCLA		Consortium of California Herbaria. University of California, Los Angeles. A	http://www.gbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9bb03b3ca106	GBIF
422	425	UCM Herps		University of Colorado Museum of Natural History. Amphibian and Reptile	http://www.gbif.org/dataset/8935e64a-f762-11e1-a439-00145eb45e9a	GBIF
423	426	UConn CONN		University of Connecticut. George Safford Torrey Herbarium. Accessed vi	http://www.gbif.org/dataset/5288946d-5fcf-4b53-8fd3-74f4cc6b53fc	GBIF
424	427	UCR UCR		Consortium of California Herbaria. University of California, Riverside. Acc	http://www.gbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9bb03b3ca106	GBIF
425	428	UCRCENT Arthropods		University of California, Berkeley - Essig Museum. California Terrestrial A	http://www.gbif.org/dataset/5d283bb6-64dd-4626-8b3b-a4e8db5415c3	GBIF
426	429	UCSB UCSB		Consortium of California Herbaria. University of California, Santa Barbara.	http://www.gbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9bb03b3ca106	GBIF
427	430	UCSC UCSC		Consortium of California Herbaria. University of California, Santa Cruz. Ac	http://www.gbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9bb03b3ca106	GBIF

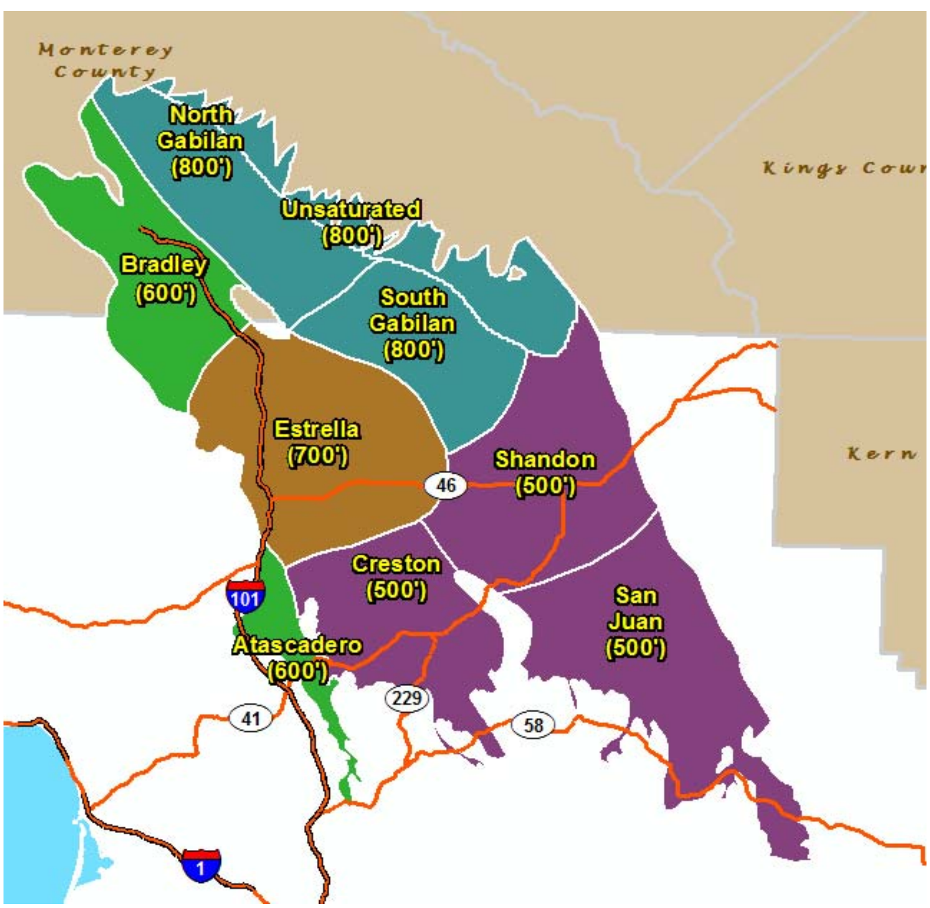
428	431	UMMZI Arthropods	University of California, Berkeley - Essig Museum. California Terrestrial Ar	http://www.gbif.org/dataset/5d283bb6-64dd-4626-8b3b-a4e8db5415c3	GBIF
429	432	University of Alberta Museums ALTA-VP	University of Alberta Museums. Vascular Plant Herbarium. Accessed via (	http://www.gbif.org/dataset/2429287b-ef65-4cfd-afcc-11cc3ba95cca	GBIF
430	433	University of Alberta Museums UASM	University of Alberta Museums. Entomology Collection. Accessed via Glol	http://www.gbif.org/dataset/8971dfba-f762-11e1-a439-00145eb45e9a	GBIF
431	434	University of British Columbia UBC	University of British Columbia Herbarium. Accessed via Global Biodiversit	http://www.gbif.org/dataset/07fd0d79-4883-435f-bba1-58fef110cd13	GBIF
432	435	UNR Herpetology	University of Nevada, Reno. Herpetology Collection. Accessed via Global I	http://www.gbif.org/dataset/c62f7574-d65a-4018-87a2-b96d6df5231b	GBIF
433	436	UPRM INVCOL	University of Puerto Rico. Invertebrate Collection. Accessed via Global Bic	http://www.gbif.org/dataset/1162234d-4e06-4d63-8a49-034184a38c7e	GBIF
434	437	US Botany	Smithsonian Institution National Museum of Natural History. Botany Colle	http://www.gbif.org/dataset/5df38344-b821-49c2-8174-cf0f29f4df0d	GBIF
435	438	USA151 USA151	United States National Plant Germplasm System. USA151 Collection. Acc	http://www.gbif.org/dataset/85802736-f762-11e1-a439-00145eb45e9a	GBIF
436	439	USA955 USA955	United States National Plant Germplasm System. USA955 Collection. Acc	http://www.gbif.org/dataset/85802736-f762-11e1-a439-00145eb45e9a	GBIF
437	440	USGS-NAS NAS	United Stated Geological Survey. Nonindigenous Aquatic Species. Acces	http://www.gbif.org/dataset/d6cc311c-c5ab-4f23-9a20-10514f9eb9c4	GBIF
438	441	USNM Amphibians & Reptiles	Smithsonian Institution National Museum of Natural History. Amphibian &	http://www.gbif.org/dataset/5df38344-b821-49c2-8174-cf0f29f4df0d	GBIF
439	442	USNM Entomology	Smithsonian Institution National Museum of Natural History. Entomology (	http://www.gbif.org/dataset/5df38344-b821-49c2-8174-cf0f29f4df0d	GBIF
440	443	USNM Invertebrate Zoology	Smithsonian Institution National Museum of Natural History. Invertebrate	http://www.gbif.org/dataset/5df38344-b821-49c2-8174-cf0f29f4df0d	GBIF
441	444	USU UTC	Utah State University. Specimen Database. Accessed via Global Biodivers	http://www.gbif.org/dataset/85ac3c18-f762-11e1-a439-00145eb45e9a	GBIF
442	445	UTEP Herps	University of Texas at El Paso. Herpetology Collection. Accessed via Glob	http://www.gbif.org/dataset/bd2feca8-ec39-4480-9dad-e353ab6a506d	GBIF
443	446	UVSC Herb	Utah Valley University. Utah Valley State College Herbarium. Accessed vi	http://www.gbif.org/dataset/854a88d8-f762-11e1-a439-00145eb45e9a	GBIF
444	447	UWBM Herp	University of Washington Burke Museum. Herpetology Collection. Access	http://www.gbif.org/dataset/78122332-6315-41bd-914b-e9c1342d9093	GBIF
445	448	UWBM Plant	University of Washington Burke Museum. Plant Collection. Accessed via (	http://www.gbif.org/dataset/8310f570-f762-11e1-a439-00145eb45e9a	GBIF
446	449	UWBM Plants	University of Washington Burke Museum. Plant Collection. Accessed via (	http://www.gbif.org/dataset/8310f570-f762-11e1-a439-00145eb45e9a	GBIF
448	451	VVC VVC	Consortium of California Herbaria. Victor Valley College. Accessed via Glc	http://www.gbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9bb03b3ca106	GBIF
449	452	W Herbarium W	Vienna Natural History Museum. Herbarium. Accessed via Global Biodiver	http://www.gbif.org/dataset/7f5260c2-f762-11e1-a439-00145eb45e9a	GBIF
450	453	YM-YOSE YM-YOSE	Consortium of California Herbaria. Yosemite National Park Herbarium. Acc	http://www.gbif.org/dataset/4fa894f4-b6c6-4ec0-b816-9bb03b3ca106	GBIF
451	454	YPM ENT	Yale University Peabody Museum. Entomology Division. Accessed via Glc	http://www.gbif.org/dataset/96404cc2-f762-11e1-a439-00145eb45e9a	GBIF
452	455	YPM HER	Yale University Peabody Museum. Vertebrate Zoology Division - Herpetolc	http://www.gbif.org/dataset/861d3d64-f762-11e1-a439-00145eb45e9a	GBIF
453	456	YPM IZ	Yale University Peabody Museum. Vertebrate Zoology Division - Invertebra	http://www.gbif.org/dataset/854e35e6-f762-11e1-a439-00145eb45e9a	GBIF
454	457	ZIN ZISP	Zoological Institute, Russian Academy of Sciences, St. Petersburg. Ampl	http://www.gbif.org/dataset/7e34ea34-f762-11e1-a439-00145eb45e9a	GBIF
455	458	ZMB Collection Crustacea	Senckenberg Nature Research Society: Crustacean Collection. Accessed	http://www.gbif.org/dataset/7b84c0a2-f762-11e1-a439-00145eb45e9a	GBIF
456	459	Don Sada Springsnails database 2003	Sada, D. 2003. Desert Research Institute Springs Database (http://www.(	http://www.dri.edu/directory/4934-don-sada	
457	460	Hershler, Liu, Bradford 2013	R. Hershler, H Liu, and C Bradford. 2013. Systematics of a widely distrib	http://zookeys.pensoft.net/articles.php?id=3635	
459	461	Anymals.org user: 13	Museum für Naturkunde Berlin. Anymals+plants - Citizen Science Data - I	http://www.gbif.org/dataset/e6c97f6e-e952-11e2-961f-00145eb45e9a	GBIF
460	465	CAS ORN	California Academy of Sciences. Ornithology Collection. Accessed via Glc	http://www.gbif.org/dataset/4f29b6ab-20c0-4479-8795-4915bedcebd1	GBIF
461	466	CCBER Birds	Cheadle Center for Biodiversity and Ecological Restoration. Ornithology C	http://www.gbif.org/dataset/4ada1c77-3895-47d8-8dc9-9ce44e1df802	GBIF
462	467	CLO EBIRD	Cornell Lab of Ornithology. eBird Observation Dataset, 'EBIRD' Collection	http://www.gbif.org/dataset/4fa7b334-ce0d-4e88-aaae-2e0c138d049e	GBIF
463	468	CLO EBIRD AK	Cornell Lab of Ornithology. eBird Observation Dataset, 'EBIRD AK' Collec	http://www.gbif.org/dataset/4fa7b334-ce0d-4e88-aaae-2e0c138d049e	GBIF
464	469	CLO EBIRD BCN	Cornell Lab of Ornithology. eBird Observation Dataset, 'EBIRD BCN' Coll	http://www.gbif.org/dataset/4fa7b334-ce0d-4e88-aaae-2e0c138d049e	GBIF
465	470	CLO EBIRD CA	Cornell Lab of Ornithology. eBird Observation Dataset, 'EBIRD CA' Collec	http://www.gbif.org/dataset/4fa7b334-ce0d-4e88-aaae-2e0c138d049e	GBIF
466	471	CLO EBIRD CAN	Cornell Lab of Ornithology. eBird Observation Dataset, 'EBIRD CAN' Coll	http://www.gbif.org/dataset/4fa7b334-ce0d-4e88-aaae-2e0c138d049e	GBIF
467	472	CLO EBIRD CB	Cornell Lab of Ornithology. eBird Observation Dataset, 'EBIRD CB' Collec	http://www.gbif.org/dataset/4fa7b334-ce0d-4e88-aaae-2e0c138d049e	GBIF
468	473	CLO EBIRD CBW	Cornell Lab of Ornithology. eBird Observation Dataset, 'EBIRD CBW' Col	http://www.gbif.org/dataset/4fa7b334-ce0d-4e88-aaae-2e0c138d049e	GBIF
469	474	CLO EBIRD CL	Cornell Lab of Ornithology. eBird Observation Dataset, 'EBIRD CL' Collec	http://www.gbif.org/dataset/4fa7b334-ce0d-4e88-aaae-2e0c138d049e	GBIF
470	475	CLO EBIRD CR	Cornell Lab of Ornithology. eBird Observation Dataset, 'EBIRD CR' Collec	http://www.gbif.org/dataset/4fa7b334-ce0d-4e88-aaae-2e0c138d049e	GBIF
471	476	CLO EBIRD ISS	Cornell Lab of Ornithology. eBird Observation Dataset, 'EBIRD ISS' Colle	http://www.gbif.org/dataset/4fa7b334-ce0d-4e88-aaae-2e0c138d049e	GBIF
472	477	CLO EBIRD KLAM SISK	Cornell Lab of Ornithology. eBird Observation Dataset, 'EBIRD KLAM SI	http://www.gbif.org/dataset/4fa7b334-ce0d-4e88-aaae-2e0c138d049e	GBIF
473	478	CLO EBIRD LWBA	Cornell Lab of Ornithology. eBird Observation Dataset, 'EBIRD LWBA' C	http://www.gbif.org/dataset/4fa7b334-ce0d-4e88-aaae-2e0c138d049e	GBIF
474	479	CLO EBIRD MA	Cornell Lab of Ornithology. eBird Observation Dataset, 'EBIRD MA' Colle	http://www.gbif.org/dataset/4fa7b334-ce0d-4e88-aaae-2e0c138d049e	GBIF
475	480	CLO EBIRD MEX	Cornell Lab of Ornithology. eBird Observation Dataset, 'EBIRD MEX' Coll	http://www.gbif.org/dataset/4fa7b334-ce0d-4e88-aaae-2e0c138d049e	GBIF
476	481	CLO EBIRD NH	Cornell Lab of Ornithology. eBird Observation Dataset, 'EBIRD NH' Colle	http://www.gbif.org/dataset/4fa7b334-ce0d-4e88-aaae-2e0c138d049e	GBIF
477	482	CLO EBIRD NJ	Cornell Lab of Ornithology. eBird Observation Dataset, 'EBIRD NJ' Collec	http://www.gbif.org/dataset/4fa7b334-ce0d-4e88-aaae-2e0c138d049e	GBIF
478	483	CLO EBIRD NY	Cornell Lab of Ornithology. eBird Observation Dataset, 'EBIRD NY' Collec	http://www.gbif.org/dataset/4fa7b334-ce0d-4e88-aaae-2e0c138d049e	GBIF
479	484	CLO EBIRD NZ	Cornell Lab of Ornithology. eBird Observation Dataset, 'EBIRD NZ' Collec	http://www.gbif.org/dataset/4fa7b334-ce0d-4e88-aaae-2e0c138d049e	GBIF
480	485	CLO EBIRD PA	Cornell Lab of Ornithology. eBird Observation Dataset, 'EBIRD PA' Collec	http://www.gbif.org/dataset/4fa7b334-ce0d-4e88-aaae-2e0c138d049e	GBIF
481	486	CLO EBIRD PAN	Cornell Lab of Ornithology. eBird Observation Dataset, 'EBIRD PAN' Coll	http://www.gbif.org/dataset/4fa7b334-ce0d-4e88-aaae-2e0c138d049e	GBIF
482	487	CLO EBIRD TX	Cornell Lab of Ornithology. eBird Observation Dataset, 'EBIRD TX' Collec	http://www.gbif.org/dataset/4fa7b334-ce0d-4e88-aaae-2e0c138d049e	GBIF
483	488	CLO EBIRD VA	Cornell Lab of Ornithology. eBird Observation Dataset, 'EBIRD VA' Collec	http://www.gbif.org/dataset/4fa7b334-ce0d-4e88-aaae-2e0c138d049e	GBIF
484	489	CLO EBIRD VINS	Cornell Lab of Ornithology. eBird Observation Dataset, 'EBIRD VINS' Col	http://www.gbif.org/dataset/4fa7b334-ce0d-4e88-aaae-2e0c138d049e	GBIF
485	490	CLO EBIRD WI	Cornell Lab of Ornithology. eBird Observation Dataset, 'EBIRD WI' Collec	http://www.gbif.org/dataset/4fa7b334-ce0d-4e88-aaae-2e0c138d049e	GBIF
486	491	CLO EBIRD YARD	Cornell Lab of Ornithology. eBird Observation Dataset, 'EBIRD YARD' C	http://www.gbif.org/dataset/4fa7b334-ce0d-4e88-aaae-2e0c138d049e	GBIF
487	492	CLO GBBC	Avian Knowledge Network. Great Backyard Bird Count. Accessed via Glol	http://www.gbif.org/dataset/82cb293c-f762-11e1-a439-00145eb45e9a	GBIF
488	493	CMN CMNAV	Canadian Museum of Nature. Bird Collection. Accessed via Global Biodiv	http://www.gbif.org/dataset/8309005e-f762-11e1-a439-00145eb45e9a	GBIF
489	495	CUMV Bird	Cornell University Museum of Vertebrates. Bird Collection. Accessed via (	http://www.gbif.org/dataset/f96a6f8c-b992-4159-8039-db8f30bac985	GBIF
490	496	DMNH Bird	Delaware Museum of Natural History. Bird Collection. Accessed via Globa	http://www.gbif.org/dataset/c21cd435-718a-4069-b503-776bf0e22b96	GBIF
491	497	DMNS Bird	Denver Museum of Nature & Science. Bird Collection. Accessed via Glob:	http://www.gbif.org/dataset/2f54cb88-4167-499a-81fb-0a2d02465212	GBIF
492	498	DMNS DMNS Birds	Denver Museum of Nature & Science. Bird Collection. Accessed via Glob:	http://www.gbif.org/dataset/2f54cb88-4167-499a-81fb-0a2d02465212	GBIF
493	499	Facultad de Ciencias UNAM MZFC-A	Universidad Nacional Autónoma de México. Museo de Zoología "Alfonso L	http://www.gbif.org/dataset/890c34ee-f762-11e1-a439-00145eb45e9a	GBIF
494	500	HSU WildlifeBirds	Humboldt State University. Wildlife Birds Collection. Accessed via Global	http://www.gbif.org/dataset/9c007868-b667-4c07-9a1a-96b796066f64	GBIF
495	502	LACM Birds	Natural History Museum of Los Angeles County. Birds Collection. Access	http://www.gbif.org/dataset/7a25f7aa-03fb-4322-aaeb-66719e1a9527	GBIF
496	503	MCZ Bird	Harvard University Museum of Comparative Zoology. Bird Collection. Acc	http://www.gbif.org/dataset/4bfac3ea-8763-4f4b-a71a-76a6f5f243d3	GBIF
497	504	MCZ Orn	Harvard University Museum of Comparative Zoology. Ornithology Collecti	http://www.gbif.org/dataset/4bfac3ea-8763-4f4b-a71a-76a6f5f243d3	GBIF
498	505	MSB Bird	Museum of Southwestern Biology. Bird Collection. Accessed via Global Bi	http://www.gbif.org/dataset/c9076cd3-349f-4068-a5c7-bc34449c3916	GBIF
499	506	MSB Host	Museum of Southwestern Biology. Division of Parasitology. Accessed via (	http://www.gbif.org/dataset/b211f32f-326b-43d3-8012-2fbce0cc6dcc	GBIF
500	507	MSB MSB Birds	Museum of Southwestern Biology. Bird Collection. Accessed via Global Bi	http://www.gbif.org/dataset/c9076cd3-349f-4068-a5c7-bc34449c3916	GBIF
501	508	MSB MSB Host	Museum of Southwestern Biology. Division of Parasitology. Accessed via (	http://www.gbif.org/dataset/b211f32f-326b-43d3-8012-2fbce0cc6dcc	GBIF
502	509	MVZ Egg	Museum of Vertebrate Zoology. Egg and Nest Collection. Accessed via Gl	http://www.gbif.org/dataset/9ce52ff6-01b6-44a2-b617-9bc2ee8e8cd1	GBIF
503	511	MVZ MVZ Birds	Museum of Vertebrate Zoology. Bird Collection. Accessed via Global Biod	http://www.gbif.org/dataset/e3b959d6-fcbe-4a28-a166-e4a807c340a0	GBIF
504	512	MVZ MVZ Egg/Nest	Museum of Vertebrate Zoology. Egg and Nest Collection. Accessed via Gl	http://www.gbif.org/dataset/9ce52ff6-01b6-44a2-b617-9bc2ee8e8cd1	GBIF
505	514	MVZ MVZ Observations-Bird	Museum of Vertebrate Zoology. Bird Observations. Accessed via Global E	http://www.gbif.org/dataset/62ad511d-d298-4fd7-80e7-f5d5bd32299e	GBIF
506	515	MVZObs Bird	Museum of Vertebrate Zoology. Bird Observations. Accessed via Global E	http://www.gbif.org/dataset/62ad511d-d298-4fd7-80e7-f5d5bd32299e	GBIF
507	516	naturgucker naturgucker	Naturgucker.de / enjoynature.net. Citizen Science Observations. Accesse	http://www.gbif.org/dataset/6ac3f774-d9fb-4796-b3e9-92bf6c81c084	GBIF
508	517	NBM Aves	New Brunswick Museum. Bird Collection. Accessed via Global Biodiversit	http://www.gbif.org/dataset/84a80b12-f762-11e1-a439-00145eb45e9a	GBIF
509	518	OBIS-SEAMAP 41	Ocean Biogeographic Information System. Spatial Ecological Analysis of I	http://www.gbif.org/dataset/83a1a8c2-f762-11e1-a439-00145eb45e9a	GBIF
510	519	OBIS-SEAMAP 47	Ocean Biogeographic Information System. Spatial Ecological Analysis of I	http://www.gbif.org/dataset/83a1a8c2-f762-11e1-a439-00145eb45e9a	GBIF
511	520	OBIS-SEAMAP 48	Ocean Biogeographic Information System. Spatial Ecological Analysis of I	http://www.gbif.org/dataset/83a1a8c2-f762-11e1-a439-00145eb45e9a	GBIF
512	521	Ohio State University - Bird Division, Columbus, OH (OSUM) I	Ohio State University Museum of Biological Diversity Tetrapod Division. B	http://www.gbif.org/dataset/91aa5e23-9cad-4751-86e0-241da77d7407	GBIF
513	522	OMNH Birds	Sam Noble Oklahoma Museum of Natural History. Birds Specimens. Acco	http://www.gbif.org/dataset/84b018de-f762-11e1-a439-00145eb45e9a	GBIF
514	523	OMNH Egg	Sam Noble Oklahoma Museum of Natural History. Eggs Specimen. Acces	http://www.gbif.org/dataset/39f021d5-240c-445d-b62f-33bfed94938d	GBIF
515	524	PBDB 20585	University of California, Santa Barbara Marine Science Institute. Paleobio	http://www.gbif.org/dataset/84806e86-f762-11e1-a439-00145eb45e9a	GBIF
516	525	PBDB 20624	University of California, Santa Barbara Marine Science Institute. Paleobio	http://www.gbif.org/dataset/84806e86-f762-11e1-a439-00145eb45e9a	GBIF
517	526	PBDB 20639	University of California, Santa Barbara Marine Science Institute. Paleobio	http://www.gbif.org/dataset/84806e86-f762-11e1-a439-00145eb45e9a	GBIF
518	527	PBDB 59063	University of California, Santa Barbara Marine Science Institute. Paleobio	http://www.gbif.org/dataset/84806e86-f762-11e1-a439-00145eb45e9a	GBIF
519	529	PMAE Provincial Museum of Alberta	Canadian Biodiversity Information Facility. Provincial Museum of Alberta. /	http://www.gbif.org/dataset/843df0c4-f762-11e1-a439-00145eb45e9a	GBIF
520	530	PRBO PRBO-PC	Avian Knowledge Network. Point Reyes Bird Observatory - Point Counts. /	http://www.gbif.org/dataset/864c8736-f762-11e1-a439-00145eb45e9a	GBIF
521	531	PSM Bird	James R. Slater Museum of Natural History. Bird Collection. Accessed via	http://www.gbif.org/dataset/8eddc200-f535-4c65-9b4d-f723eafe607e	GBIF
522	532	Royal Belgian Institute of natural Sciences Aves	Royal Belgian Institute of Natural Sciences. Bird Collection. Accessed via	http://www.gbif.org/dataset/8138eb72-f762-11e1-a439-00145eb45e9a	GBIF
523	533	Royal Ontario Museum: ROM Birds	Royal Ontario Museum. Ornithology Collection Non Passeriformes. Acces	http://www.gbif.org/dataset/c0d6b7e8-8263-4224-8dac-32748d945555	GBIF
524	534	RSL PC	Avian Knowledge Network. Redwood Sciences Laboratory - Lamna Point (	http://www.gbif.org/dataset/864da4c2-f762-11e1-a439-00145eb45e9a	GBIF
525	535	SBMNH AV	Santa Barbara Museum of Natural History. Bird Collection. Accessed via (	http://www.gbif.org/dataset/75018539-6328-41de-b875-7c2e61dc1635	GBIF
526	537	SDNHM Birds	San Diego Natural History Museum. Bird specimens. Accessed via Globa	http://www.gbif.org/dataset/84b26828-f762-11e1-a439-00145eb45e9a	GBIF
527	538	SMF Collection Aves (bird skins)	Senckenberg Nature Research Society. Bird Skin Collection. Accessed vi	http://www.gbif.org/dataset/96678e90-f762-11e1-a439-00145eb45e9a	GBIF
528	540	UCLA Dickey-Birds	University of California, Los Angeles. Dickey Collection, Birds. Accessed	http://www.gbif.org/dataset/8631295a-f762-11e1-a439-00145eb45e9a	GBIF
529	541	UCM Birds	University of Colorado Museum of Natural History. Bird Collection. Access	http://www.gbif.org/dataset/89337996-f762-11e1-a439-00145eb45e9a	GBIF
530	542	UMMZ Birds	University of Michigan Museum of Zoology. Birds Collection. Accessed vi	http://www.gbif.org/dataset/be5507b9-7abf-4b69-afe1-5ca2b7561734	GBIF
531	543	UNSM Birds	University of Nebraska State Museum. Vertebrate Specimens. Accessed	http://www.gbif.org/dataset/851ab8c4-f762-11e1-a439-00145eb45e9a	GBIF
532	544	USNM Birds	Smithsonian Institution National Museum of Natural History. Bird Collecti	http://www.gbif.org/dataset/5df38344-b821-49c2-8174-cf0f29f4df0d	GBIF
533	545	UWBM Bird	University of Washington Burke Museum. Ornithology Collection. Access	http://www.gbif.org/dataset/830fd460-f762-11e1-a439-00145eb45e9a	GBIF
534	546	UWYMV Bird	University of Wyoming Museum of Vertebrates. Bird Collection. Accessed	http://www.gbif.org/dataset/abcaccad-9e01-4b2a-b493-32531cbed32a	GBIF
535	547	UWYMV UWYMV Bird	University of Wyoming Museum of Vertebrates. Bird Collection. Accessed	http://www.gbif.org/dataset/abcaccad-9e01-4b2a-b493-32531cbed32a	GBIF
536	548	WAM AVIF	Western Australian Museum. Western Australian Museum provider for O.	http://www.gbif.org/dataset/7c93d290-6c8b-11de-8226-b8a03c50a862	GBIF
537	549	WFVZ Bird	Western Foundation of Vertebrate Zoology. Bird Collection. Accessed via	http://www.gbif.org/dataset/8be43f9b-52e7-47d4-be3e-dbcc066d70ab	GBIF
538	550	WFVZ Eggs	Western Foundation of Vertebrate Zoology. Egg Collection. Accessed via	http://www.gbif.org/dataset/8be43f9b-52e7-47d4-be3e-dbcc066d70ab	GBIF
539	551	Wildlife Sightings Wildlife Sightings	Wildlife Sightings. Citizen Science Data. Accessed via Global Biodiversity	http://www.gbif.org/dataset/b70121ef-b7ea-4316-a05b-abdf30f5ca09	GBIF
540	552	YPM ORN	Yale University Peabody Museum. Vertebrate Zoology Division - Ornitholo	http://www.gbif.org/dataset/854cf79e-f762-11e1-a439-00145eb45e9a	GBIF
541	553	California Avian Datacenter, Level 3 - Bodie Hills and Long Val	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
542	554	California Avian Datacenter, Level 3 - Central Coast	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
543	555	California Avian Datacenter, Level 3 - Clear Creek	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
544	556	California Avian Datacenter, Level 3 - Coastal NPS Monitoring	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
545	557	California Avian Datacenter, Level 3 - Cosumnes River	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
546	558	California Avian Datacenter, Level 3 - Devil's Postpile National	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
547	559	California Avian Datacenter, Level 3 - East/West Walker River	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
548	560	California Avian Datacenter, Level 3 - Inyo National Forest Asp	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
549	561	California Avian Datacenter, Level 3 - KBO Fuel Reduction K	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
551	563	California Avian Datacenter, Level 3 - KBO Inventory KLMN I	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
552	564	California Avian Datacenter, Level 3 - KBO Inventory KLMN I	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
553	565	California Avian Datacenter, Level 3 - KBO Inventory KLMN \	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
554	566	California Avian Datacenter, Level 3 - KBO Longterm BBS	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
555	567	California Avian Datacenter, Level 3 - KBO Longterm KLMN	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
556	568	California Avian Datacenter, Level 3 - KBO Longterm KLMN	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
557	569	California Avian Datacenter, Level 3 - KBO Longterm KLMN	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
558	570	California Avian Datacenter, Level 3 - KBO Longterm KLMN	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
559	571	California Avian Datacenter, Level 3 - KBO Longterm Norther	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
560	572	California Avian Datacenter, Level 3 - KBO Water Manageme	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
561	573	California Avian Datacenter, Level 3 - KBO Water Manageme	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
562	574	California Avian Datacenter, Level 3 - Laguna de Santa Rosa	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
563	575	California Avian Datacenter, Level 3 - Lands End	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
564	576	California Avian Datacenter, Level 3 - Lassen Aspen	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
565	577	California Avian Datacenter, Level 3 - Lassen Black Oak	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
566	578	California Avian Datacenter, Level 3 - Lassen Foothills Oak	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
567	579	California Avian Datacenter, Level 3 - Lassen Management Ind	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
568	580	California Avian Datacenter, Level 3 - Lassen National Forest F	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
569	581	California Avian Datacenter, Level 3 - LNF Inventory	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
570	582	California Avian Datacenter, Level 3 - Long Valley Road Closur	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
571	583	California Avian Datacenter, Level 3 - Lower Owens River Proj	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
572	584	California Avian Datacenter, Level 3 - Lower Sacramento River	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
573	585	California Avian Datacenter, Level 3 - Marble Creek	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
574	586	California Avian Datacenter, Level 3 - Marin County Open Spa	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
575	587	California Avian Datacenter, Level 3 - Merced River	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
576	588	California Avian Datacenter, Level 3 - MMWD Monitoring	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
577	589	California Avian Datacenter, Level 3 - Mono Basin Riparian	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
578	590	California Avian Datacenter, Level 3 - Owens Valley Alluvial Fa	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
579	591	California Avian Datacenter, Level 3 - Palomarin	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
580	592	California Avian Datacenter, Level 3 - Pinnacles National Monu	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter

581	593	California Avian Datacenter, Level 3 - Plumas/Lassen	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
582	594	California Avian Datacenter, Level 3 - Presidio	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
583	595	California Avian Datacenter, Level 3 - Rancheria Gulch	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
584	596	California Avian Datacenter, Level 3 - RSLCOOPMONITORIN	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
585	597	California Avian Datacenter, Level 3 - RSLCOOPMONITORIN	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
586	598	California Avian Datacenter, Level 3 - RSLCOOPMONITORIN	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
587	599	California Avian Datacenter, Level 3 - RSLLBMETHODSLON	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
588	600	California Avian Datacenter, Level 3 - RSLTRRPMAINSTEM	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
589	601	California Avian Datacenter, Level 3 - RSLTRRPSOUTHFOR	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
590	602	California Avian Datacenter, Level 3 - RSLTRRPTRIBS	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
591	603	California Avian Datacenter, Level 3 - RSLWILDFIREBISCUIT	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
592	604	California Avian Datacenter, Level 3 - RSLWILDFIRECANOE	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
593	605	California Avian Datacenter, Level 3 - RSLWILDFIRELEWIST	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
594	606	California Avian Datacenter, Level 3 - RSLWILDFIREMEGRA	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
595	607	California Avian Datacenter, Level 3 - San Joaquin BOR	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
596	608	California Avian Datacenter, Level 3 - San Joaquin Experiment	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
597	609	California Avian Datacenter, Level 3 - San Joaquin River NWR	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
598	610	California Avian Datacenter, Level 3 - Sierra Meadows	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
599	611	California Avian Datacenter, Level 3 - Sierra Nevada Mgmt Indi	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
600	612	California Avian Datacenter, Level 3 - Sonoma Oaks	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
601	613	California Avian Datacenter, Level 3 - Sonoma Riparian	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
602	614	California Avian Datacenter, Level 3 - Susanville	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
603	615	California Avian Datacenter, Level 3 - Tidal Marsh	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
604	616	California Avian Datacenter, Level 3 - Upper Owens River Wat	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
605	617	California Avian Datacenter, Level 5 - Big Sur Ornithology Lab	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
606	618	California Avian Datacenter, Level 5 - BOR Grasslands	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
607	619	California Avian Datacenter, Level 5 - Lassen Foothills Riparia	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
608	620	California Avian Datacenter, Level 5 - Monterey RCD	Ballard, G., M. Herzog, M. Fitzgibbon, D. Moody, D. Jongsomjit, D. Stralb	http://data.prbo.org/cadc2/	California Avian Datacenter
609	621	BIOS ds463 - Bird Species of Special Concern	Schoenig, S. 2009. Bird Species of Special Concern. Digitized range information from W.D. Shuford and T. Gardali, eds. 2008. California Bird Spe		BIOS
610	48	USGS Nonindigenous Aquatic Species	US Geological Survey Southeast Ecological Science Center. 2011. Nonin	http://nas.er.usgs.gov/	
612	622	CAS MAM	California Academy of Sciences. Mammalogy Collection. Accessed via Gl	www.gbif.org/dataset/6ce7290f-47f6-4046-8356-371f5b6749df	GBIF
613	623	CUMV CUMV Mammal	Cornell University Museum of Vertebrates. Mammal Collection. Accessed	www.gbif.org/dataset/35720b3e-aded-4b83-b4f1-967f1d457d6a	GBIF
614	624	CUMV Mammal	Cornell University Museum of Vertebrates. Mammal Collection. Accessed	www.gbif.org/dataset/35720b3e-aded-4b83-b4f1-967f1d457d6a	GBIF
615	625	FMNH Mammals	Field Museum of Natural History (Zoology). Mammal Collection. Accessed	www.gbif.org/dataset/41fc5c40-5e81-496f-9733-6b5681b3b7a5	GBIF
616	626	KU KUM	University of Kansas Biodiversity Institute. Mammalogy Collection. Access	www.gbif.org/dataset/1d04e739-98a9-4e16-9970-8f8f3bf9e9e3	GBIF
617	627	LACM Mammals	Natural History Museum of Los Angeles County. Mammal Collection. Acc	www.gbif.org/dataset/7a25f7aa-03fb-4322-aaeb-66719e1a9527	GBIF
618	628	LSUMZ Mammals	Louisiana State University Herbarium. Mammals Collection. Accessed via	www.gbif.org/dataset/847e2306-f762-11e1-a439-00145eb45e9a	GBIF
619	629	MSB Mamm	Museum of Southwestern Biology. Mammal Collection. Accessed via Glob	www.gbif.org/dataset/b15d4952-7d20-46f1-8a3e-556a512b04c5	GBIF
621	631	MVZ MVZ Mammals	Museum of Vertebrate Zoology. Mammal Collection. Accessed via Global	www.gbif.org/dataset/0daed095-478a-4af6-abf5-18acb790fbb2	GBIF
622	632	PBDB 20122	University of California, Santa Barbara Marine Science Institute. Paleobiol	www.gbif.org/dataset/84806e86-f762-11e1-a439-00145eb45e9a	GBIF
624	634	PSM Mammal	James R. Slater Museum of Natural History. Mammal Collection. Accesse	www.gbif.org/dataset/8eddc200-f535-4c65-9b4d-f723eafe607e	GBIF
625	635	Royal Ontario Museum: ROM Mammals	Royal Ontario Museum. Mammalogy Collection. Accessed via Global Biod	www.gbif.org/dataset/c5c4a23e-2035-4416-ab64-032d6df52ddb	GBIF
626	636	SBMNH MAM	Santa Barbara Museum of Natural History. Mammal Collection. Accessed	www.gbif.org/dataset/75018539-6328-41de-b875-7c2e61dc1635	GBIF
627	637	TTU Mammals	Museum of Texas Tech University. Mammals Collection. Accessed via Gl	www.gbif.org/dataset/854f70cc-55e3-4af2-9417-0f47d6c7902d	GBIF
628	638	UCLA Mammals	University of California, Los Angeles. Dickey Collection, Mammals. Acces	www.gbif.org/dataset/8631295a-f762-11e1-a439-00145eb45e9a	GBIF
629	639	UMMZ Mammals	University of Michigan Museum of Zoology. Mammal Collection. Accessec	www.gbif.org/dataset/6d2cfc0a-9903-40b8-802b-403398218e4a	GBIF
631	640	NMFS Critical Habitat - Green Sturgeon	National Marine Fisheries Service. 2008. Green Sturgeon Critical Habitat.	http://www.nmfs.noaa.gov/pr/species/criticalhabitat.htm	
632	641	NMFS Critical Habitat - Winter Chinook	National Marine Fisheries Service. 1993. Sacramento River Winter-run Ch	http://www.nmfs.noaa.gov/pr/species/criticalhabitat.htm	
633	642	NMFS Critical Habitat - Chinook and Steelhead	National Marine Fisheries Service. 2005. Chinook and Steelhead Critical H	http://www.nmfs.noaa.gov/pr/species/criticalhabitat.htm	
634	643	USFWS Critical Habitat Designations (2011-2016)	US Fish and Wildlife Service. 2016. Critical Habitat Data. Sacramento, CA	http://www.fws.gov/sacramento/es/Critical-Habitat/Data/es critical-habitat data.htm	
635	644	California dragonfly and damselfly database	Ball-Damerow, JE, PT Oboyski, and VH Resh. 2015. California dragonfly	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4337221/	
636	645	Southern California Stormwater Monitoring Coalition database	Southern California Stormwater Monitoring Coalition. 2013. SMC databas	http://www.socalsmc.org/Bioassessment.aspx	

PRODUCTION WELLS APPROXIMATELY MAPPED WITHIN THE PRGWB

PRGWB SUB-AREAS	PRODUCTION WELL COUNT	DRILLING THRESHOLD	> DRILLING THRESHOLD
ATASCADERO	387	600 FEET	3
BRADLEY	9	600 FEET	0
CRESTON	950	500 FEET	68
ESTRELLA	2,205	700 FEET	253
NORTH GABILAN	0	800 FEET	0
SAN JUAN	53	500 FEET	12
SHANDON	285	500 FEET	26
SOUTH GABILAN	56	800 FEET	5
UNSATURATED	0	800 FEET	0
TOTAL FOR PRGWB	**3,945**		**367**

PLEASE NOTE THAT ENVIRONMENTAL HEALTH IS ACTIVELY WORKING ON INPUTING WELL INVENTORY INTO OUR DATABASE AND HAS CURRENTLY ENTERED 11,965/18,580 PRODUCTION WELLS (DOMESTIC PRIVATE, DOMESTIC PUBLIC AND IRRIGATION) THAT WERE PERMITTED FROM 1964 TO PRESENT. THIS SPREADSHEET DOES NOT REPRESENT OUR COMPLETE INVENTORY AT THIS TIME.



SAN LUIS OBISPO COUNTY FARM BUREAU

4875 MORABITO PLACE, SAN LUIS OBISPO, CA 93401
® PHONE (805) 543-3654 ▪ FAX (805) 543-3697 ▪ www.slofarmbureau.org

October 8, 2018

Supervisor John Peschong, District 1
Supervisor Bruce Gibson, District 2
Supervisor Adam Hill, District 3
Supervisor Lynn Compton, District 4
Supervisor Debbie Arnold, District 5

San Luis Obispo County Board of Supervisors
1055 Monterey St. Room D430
San Luis Obispo, CA 93401

RE: County Groundwater Sustainability Agency (GSA) Meetings

Dear Supervisors:

The San Luis Obispo County Farm Bureau represents hundreds of members who are impacted and actively interested in local groundwater use and availability. As a stakeholder in the process and outcome, our members attend meetings or seek information about the implementation of the Sustainable Groundwater Management Act, which will determine local groundwater use for the designated over drafted basins. Public observation and input are a benefit to the decision-making process.

Farm Bureau is making a recommendation regarding the format of future San Luis Obispo County Groundwater Sustainability Agency (GSA) meetings for the groundwater basins the County serves.

1. Hold dedicated, formal County GSA meetings for each groundwater basin, with appropriate notification (that it will be a GSA meeting), agendas, and minutes.
2. At each meeting, have a presentation of the updates relevant to the individual groundwater basin.
3. Provide for recordation of public comment.

The above recommendations are important to conduct meaningful dialogue between represented landowners and the agency in charge of managing each groundwater basin. Having the GSA meetings incorporated into regular Board of Supervisor meetings creates uncertainty about intent and scope of the item and does not provide landowners or interested parties with clear notice, nor does it provide a forum for presentations and meaningful discussion – especially when the item is placed on your Board's consent agenda.

Thank you for your consideration of this recommendation.

Sincerely,

Anna Negranti

Anna Negranti, President
San Luis Obispo County Farm Bureau

CC: Colt Esenwein, Public Works Director
Carolyn Berg, Senior Water Resources Engineer

Dennis R Loucks
[redacted]

Re: Paso Robles Subbasin General Services Plan (GSP) Development
October 8, 2018

There are substantial concerns with regard to the contracted consultant, Montgomery & Associates performance as it relates to methodology and data that has been presented to date.

The comments listed generally pertain to the Power Point Presentation of September 12, 2018 and to comments made by Montgomery & Associated during a "Groundwater Sustainability Workshop" on October 4, 2018.

<u>Slide 21:</u> Estimated Sustainable Yield for GSP Area.
This slide indicated that the Estimated sustainable yield from 1981 to 2011 was 68,500 AFY.

The estimated sustainable yield from 1981 to 2016 was estimated at 62,300 AFY.

The slides were of surprise to people in attendance since prior scientific reports (Todd & Geoscience) estimated Safe Yields and Perennial Yields up to 97,700 AFY.

Why the drastic change?
When Derrick Williams was asked what his source was for these numbers; he told the group on October 4, that the source was Montgomery & Associates and as hydrologists that's what they do. That answer is insufficient. Where did the data originate? The slide also reflects groundwater pumping from 1981 to 2016 at 76,000 AFY. This figure is very close to the 76,658 AFY (Safe Yield) presented by the City of Paso Robles and County of San Luis Obispo, etal in the recent prescription trial. It should be noted that GSI Environmental (paid by citizens) in that trial estimated the safe yield at 92,000 AFY.

Historical context is in order:

2002 Fugro West Study	94,000 AFY	Paid by Taxpayers (Perennial Yield)
2005 Fugro Study	97,700 AFY	Paid by Taxpayers (Perennial Yield)
2015 Geoscience	90,215 AFY	Paid by Taxpayers (Safe Yield)
2016 Montgomery & Assoc.	62,300 AFY	Paid by Taxpayers (Sustainable Yield)
2018 GSI Environmental	92,000 AFY	Paid by Private Group, No tax dollars (Safe Yield)

As indicated, the methodology is not clear in Montgomery Assoc. figures and is contrary to accepted previous scientific studies. Supporting evidence should be required of Montgomery & Associates.

During the presentation on October 4, terms were stated that have different meanings. Example: In the Power Point the term “overdraft” is used. Derrick Williams explained that their use of “overdraft” reflected a hydrologist’s definition and not a legal definition. The other term that has been introduced is “Estimated sustainable yield” To help avoid the confusion of terms, listed below are definitions from the State Department of Water Resources.

Perennial yield — The maximum quantity of water that can be withdrawn annually from a groundwater basin over a long period of time (during which water supply conditions approximate average conditions) without developing an overdraft condition.

Safe yield — The maximum quantity of water that can be continuously withdrawn from a groundwater basin without adverse effect.

Sustainability — A sustainable system or process has longevity and resilience. A sustainable system manages risk but cannot eliminate it. A sustainable system generally provides for the economy, the ecosystem, and social equity. Water sustainability is the dynamic state of water use and supply that meets today’s needs without compromising the long-term capacity of the natural and human aspects of the water system to meet the needs of future generations. For example, planning ways to eventually eliminate drafting more groundwater than can be recharged over the long term is one approach for improving sustainability.

Groundwater overdraft — The condition of a groundwater basin in which the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years during which water supply conditions approximate average conditions.

Slide 29: Process for Establishing Measurable Objectives:

The basis for establishing measurable objectives and particularly minimum threshold objectives was based on a survey that received 111 responses. The survey asked the property owners their well water level preferences. Did they prefer current water levels? Did they prefer higher water levels?

To establish minimum well water thresholds based on a survey without factual documentation is a flawed process. In essence, you are obtaining opinions and “beliefs” that the respondents well is fine or in some cases would like to see their water level higher, who wouldn't want more water in their wells. As we learned during the presentation of October 4, those that want more water or higher levels in their wells will have water projects presented to them that they will be expected to pay for. I don't recall that aspect being presented in the survey; perhaps it was omitted on purpose?

Considering the hundreds of thousands of dollars spent by the County, City of Paso Robles and other entities pursing an attempted theft of water from property owners overlying the basin, tax payer funds would be better served to establish monitoring stations throughout the basin that would reflect current water levels in real time. This would be actual factual information to determine minimum well thresholds. The property owners of this basin deserve accurate information so that informed decisions can be made.

Slide 35: Measurable Objective and Minimum Threshold at Example Creston Well

What is the source of this hydrograph?
The graph indicates a number 27S/13E-28F01 (Creston) In my research, I was able to determine that the number is from the State of California, Water Data Library/CASGEM program.

I felt it was necessary to examine the groundwater elevation graph presented in Slide 35 and compare with the Groundwater Level information from the State Water Data Library. The number referenced in your slide was determined to be a Station Name/Number. The web site only referenced Water Quality Data with Station Numbers and not Groundwater Levels. (Actually, I was unable to locate any reference to the number on your slide.) Groundwater Levels, for example, Creston is number 355262N1205215W001. Why are you listing Water Quality Data reference numbers when you are presenting Groundwater Level Data?

The graph in slide 35 references a period from about 1970 to about 2016 the information from the Water Data Library/CASGEM references a period from 2012 to 2018. I was unable to retrieve additional historical data for the example Creston area. The water levels from the period 2012 to 2018 were relatively flat, and appear to be different from those indicated in slide 35.

Again, this is why reliable and indisputable accurate well level data is critical to managing the groundwater levels in the basin.

Dennis R Loucks

Cc: Montgomery & Associates
Supervisor John Peschong
Supervisor Debbie Arnold

Frederick C. Hoey

[redacted]

October 12, 2018

Mr. Derrik Williams
Montgomery & Associates
1232 Park Street, Suite 201B
Paso Robles, CA 93446

Derrik:

I am writing as a follow-up to your recent meeting in Creston. Water issues have been front and center in Creston for quite some time and the turnout for the meeting was an indication of the intensity of our passion regarding protecting our water resources. I hope you discovered during the meeting that those of us in Creston are always up to date regarding the operation of our wells and the level of our water.

I also hope that you quickly discovered that Creston residents are familiar with the general condition of the Paso Robles Groundwater Basin and are protective of Creston's unique position within the basin. Therefore, we are offended when Creston data are co-mingled with data from other areas.

Several individuals who asked questions at the meeting were not necessarily familiar with the difference between a GSA and a Planning Sub Area or the fine points of writing the GSP, but that doesn't matter. What they do know is that including data from El Pomar, an area with existing groundwater problems, is a fraud on Creston's data[1]. A radius originating near the intersection of El Pomar and South El Pomar covering roughly 4,000 acres or greater, which comprises several very large vineyard operations, identifies an area with issues not found in Creston.

Creston landowners have always been concerned that our water resources could be used to alleviate problems in other areas of the Paso Basin such as Estrella; however, the co-mingling of Creston and El Pomar data has raised new fears among many Creston landowners that the El Pomar area may actually be the target. If you want people to trust your representations you must think in terms of "how will my audience actually

[1] With regard to the issue of data in general, all data that are referenced in your documents should be footnoted as to the sources of data and where and when published. When you have adjusted data that fact should also be noted along with the purpose and method of adjustment. When data are unreferenced or adjusted without explanation that calls into question the correctness and reliability of your work product.

interpret what I am presenting or saying"?

Before the meeting in Creston, I posted on your groundwater communications portal, comments making the case that the Creston area should be designated a separate Planning Sub Area, a copy of which is enclosed. Clearly, the existing outline of the El Pomar-Estrella Sub Area identified in Figure 3-14 of Chapter 3 is what apparently made it convenient to co-mingle Creston data with El Pomar data. Creston is unique and deserves to be a separate Planning Sub Area.

Last Monday you discussed the need for more monitoring wells. In discussing that topic and related issues with some of my colleagues we have developed specific general thoughts based on the following thesis:

Given the size, the variety of topography, and the geological complexity, the Paso Robles Groundwater Basin presents a wide range of localized issues best managed by several localized Planning/Management areas in order to provide long term reliability to the Paso Robles Basin GSP, therefor:

- Rather than only a few Planning/Management areas a larger number of smaller separate areas should be created each sharing common conditions and issues.
- Ideally, each area would have 5 to 10 monitoring wells depending on the size of the area and specific conditions.
- With several smaller Planning/Management areas throughout the basin comparisons of progress or failure of specific policies, practices or tactics between areas could be easily compared and modified to achieve improved area results on a forward basis, thus contributing to improved basin wide results.
- Conversely, measuring the performance results of very large geographic areas is much more problematic in terms of understanding the actual causes of either over or under performance.

On a related matter I am sure that you are aware of subsidence of nearly two inches in the Shandon, Red Hills areas documented in the 1997 USGS report. However, the issue has not been addressed in subsequent reports, etc. My colleague Dennis Loucks and I believe that the matter deserves critical examination as do other areas of the basin with known significant lowering of water levels that may be prone to subsidence.

Since land subsidence is a sustainability indicator requiring examination under SGMA, it is recommended that the USGS report be updated to determine if land subsidence has been curtailed or if subsidence has continued to occur. The historical data that could be obtained by USGS would indicate areas in the basin that are in need of additional management. I strongly suggest that the Cooperative Committee be asked to make a formal written request to USGS to update their 1997 report. An updated report would be a vital management tool, and since it would be completed by another government entity presumably there should be no cost.

Another matter which concerns several of us is the potential for water banking schemes by very large landowners with high production wells located in strategic areas of the basin. There appear to be several candidates for this activity who would profit from their groundwater resources. A related activity is the sale of paper water allowing a purchaser to exceed their pumping limits in their physical location in exchange for the seller reducing pumping in an equal amount. I am acquainted with many landowners who are vehemently opposed to water banking, which the GSP should prohibit.

A related matter, which is prevalent in our basin, is the fact that the general lowering of groundwater has created void areas above the groundwater level as it may fluctuate season to season. Access to this "space" is attractive to entities wanting to engage in water banking activities. Something that you should present at your next workshops is data on how much of this space exists and how the basin can be protected from water banking activities utilizing this space.

Lastly, my colleagues and I request that you reconsider the management of your Groundwater Communications Portal. We learned on Monday that comments posted on the portal would be reviewed by staff and directed to appropriate GSP representatives. Moreover, the comments would not be available for public review until the plan is at the completion stage, several months hence. If what we understand is in fact accurate, this would be detrimental to the creation of the plan as it would be difficult to revisit chapters that were believed to have been completed. The process as outlined will be frustrating for the public as well as having a limiting influence on basin citizen comment and presumably a burdensome process for your staff. One can only conclude that the process has been designed to intentionally limit public interference with your development of the GSP. The GSP process is, after all, intended to be conducted with significant citizen input not a process principally influenced by large landowners with major water resources under their control.

In reality Your process effectively excludes several thousand landowners reliant on wells who essentially have no responsibility for the current condition of the Paso Robles Groundwater Basin. When thinking about how you should change the Portal process you should review the events surrounding the rejection of the AB2453 mandatory water district, which was overwhelming rejected by basin voters in March 2016. Don't tell me that landowners don't understand basin water issues just because they don't flock to Cooperative Committee meetings. They understand very clearly the nature of the interests who want to control our basin water.

I look forward to hearing from you.

Sincerely,

Attachment: GCP Posting of October 6, 2018

Cc: Supervisor Debbie Arnold
Supervisor John Peschong

GSP Chapter 3 Comments
By
Fred C. Hoey
A Creston resident

Posted to the Paso Robles Groundwater Communications Portal

In reference to Chapter 3, Figure 3-14 North County Planning Subareas: I object to the El Pomar-Estrella-Sub Area as defined. Interestingly, this Sub Area is startlingly similar to the boundaries of the "area of influence" of the Estrella-El Pomar-Creston Water District as defined by SLO-LAFCO. I expect this harmony is deliberate.

The Creston area is distinctly different from both the El Pomar and Estrella areas; accordingly, actions that are appropriate and necessary for the El Pomar and Estrella areas will not be appropriate for Creston. For instance within the Estrella area a significant "cone of depression" has been created by the egregious groundwater pumping by the City of Paso Robles, which has been compounded by the local concentration of large vineyard operations.

Many Creston landowners have long been concerned that Creston groundwater would ultimately be utilized to remedy the damage that has been done to the Estrella groundwater levels.

By combining three geographic areas, each with their own unique issues, into a Planning Subarea the authors of Chapter 3 wrongly assumed that the citizens of Creston would not rise up in strong opposition to such blatant, potential piracy of our water resources to cover the sins of the City of Paso Robles through the exploitation of the Estrella area.

I strongly urge that the Creston area be identified as a separate Planning Subarea, a view shared by all of my Creston friends and connections.

October 6, 2018

Rainfall to Groundwater.net

Verna Jigour, PhD.
V•Jigour LLC
[redacted]

October 15, 2018

Attn. Paso Robles Subbasin Cooperative Committee

Subject: GSP Process Comments: Addendum to comments on Chapters 1-3

Dear Cooperative Committee Leaders,

I congratulate the Cooperative Committee on its exemplary, timely progress toward the Groundwater Sustainability Plan (GSP). Based on what I've been able to glean about the progress of other GSAs around the state, Paso Robles Subbasin appears to be at the forefront of groundwater sustainability planning.

Given my "outsider's" perspective, I attribute that to the combination of leadership by the County of San Luis Obispo, including its skilled planners, sound consultants and the apparent engagement of GSA stakeholders. Most of all, the elegance and efficiency of the cooperative, collaborative approach seems exemplified by the progress y'all have made. So, again, Congratulations!

Further congratulations are offered for your inviting public, including "outsider" interface such as mine via your Paso Robles Groundwater Communication Portal, through which I've been able to catch up some on your efforts to date.

The following offers more general and overall comments on your GSP in progress as background and support for my comments on the draft GSP chapters.

Longtime Academic/Professional Concern with Paso Robles Subbasin

Labeling myself "outsider" is partly tongue-in-cheek. In truth, while I've not lived in San Luis Obispo County, its expansive rangelands have been "on my radar" for two decades. Throughout that time, I've viewed these lands more in the context of upper Salinas River watershed/ catchment.

Around the turn of the millennium, as part of my doctoral program I initiated and secured funding for the Ventana/ Central Coast Wildlands Project, which offered a Geographic Information System (GIS) analysis of habitat connectivity needs for a suite of focal wildlife species spanning the Central West California Ecoregion.

Veering a bit from related projects in California at that time, I selected steelhead as my own focal species and developed, with technical and even some volunteer assistance, a GIS database of historical steelhead streams and their watersheds, extending from San Francisco Bay southward to San Diego County, since my California Department of Fish and Game source data extended through that greater region.

During the second phase of project funding I relinquished project management to a colleague and the project's final report (Thorne and colleagues 2002) included only overall maps of the distribution of steelhead by population status, along with limited description of the database.

The results of analyses I conducted using the steelhead database during the first phase were relegated to my doctoral dissertation, which was approved by my doctoral committee in July 2008 [Jigour 2008 (2011) abstract attached]. The interval between the GIS analyses and committee approval mostly represents the time I spent conducting and documenting an extensive interdisciplinary literature review supporting the importance of woody plant cover to the detention (infiltration and percolation) functions of watersheds/ catchments.

Among the most striking results of my analyses was the massive expanse of **nonnative annual grasslands** in the watersheds of historical steelhead rivers and streams whose runoff is not controlled by large dams, nowhere better exemplified than in the upper Salinas River watershed/ catchment, a.k.a. region of Paso Robles Subbasin.

Note that this applies to much of the inland Monterey County watersheds/ catchments of Salinas River, as well, but especially with many rangelands "hidden" behind the foothills from the agricultural floodplain, the opportunities there are even farther out of sight and mind to Salinas Valley GSAs.

I must emphasize the ***nonnative*** part of that ecological description, which is absolutely the case, contrary to what the current GSP Chapter 3 suggests. That nonnative description is a clue to the fact that these nonnative annual rangelands represent anthropogenically degraded watersheds/ catchments. Thus, History, and even Prehistory of Land Use is an appropriate topic to at least summarily address in Chapter 3.

The fairly recent history of removal of oaks for use in the local charcoal industry is another clue that should be spatially analyzed, as only local sources may best do. My vision is that students could be supported by GSA scholarships in fleshing out such pertinent information as part of their academic programs.

The charcoal industry history should be compared with other historical land use trends, such as the state sanctioned/ funded mid-20th century efforts to remove oaks and other woody plants in the name of "rangeland improvement" summarized, with citations, in my blog post #6. Ball and Chain & Other Links

In recent decades landscape and restoration ecologists have increasingly recognized the influences on historic and current land cover/vegetation by intentional land management practices of indigenous Californians. While it may be impossible in most cases to document exactly how the landscape would look without the recently recognized indigenous land management skills, some inferences based on that awareness may be useful in establishing vegetative goals and processes to restore watershed/ catchment functions.

Thus, consideration of **all anthropogenic impacts (including prehistoric)** to the function of existing and prospective restored watersheds/ catchments is entirely germane to the GSP. For an overview, please see my blog post #4. Think Outside the Basin.

While my initial focus was on improving the function of the Salinas River and other Central West Ecoregion watersheds for steelhead – especially augmenting baseflow – it has always been clear that augmenting baseflow necessarily benefits regional groundwater stocks, since baseflow essentially reflects its net status.

Moreover, detention storage offered in watershed/ catchment vadose zones – "the soil profile as a natural reservoir" (Hursh and Fletcher 1942), as well as in the bedrock aquifers that provide longer-term storage but eventually drain to the alluvial aquifers GSAs are directly concerned with, offers the most cost-effective form of short and longer-term storage because: 1.) no hard infrastructure involved, 2.) reduced complexity of permitting ecological restoration projects, and 3.) over time, restored sites will become relatively self-sustaining, so much lest costly to maintain than engineered structures.

2018 Outreach to Paso Robles GSA Points of Contact

While this is my first input on the draft GSP in progress. I have sent email alerts for each of my seven blog posts to date, beginning January 2018, to the specific points of contact for each of the GSAs in the Paso Robles Subbasin. In mid-April I mailed hard copy letters to a couple of you. But to date I don't believe any of your contacts have taken time to explore the Rainfall to Groundwater web site to learn about these opportunities that you won't see proposed/ defined elsewhere.

To date Rainfall to Groundwater is the only proposed approach to groundwater recharge that does not involve diversion of surface waters. Please see Surface

Water Diversions vs Baseflow Augmentation. Furthermore, Paso Robles Subbasin watersheds/ catchments are the prototypical model of expansive opportunities within a single (greater) watershed/ catchment. So I do hope these comments may finally get your attention.

Water Budget Model & Process

These comments pertain to the July 25, 2018 Project Status Update, Water Budget Status. The third page upper exhibit depicting, "Use Model(s) to Develop Water Budgets" indicates that the sole input to "Watershed Model" is "Daily Streamflow".

I assume that "daily streamflow' would be based on one or more stream gages, but draft chapter 3.6.3 and Figure 3-12: Surface Water Gauging and Precipitation Stations suggest few existing gauges relative to the expanses of associated watershed/ catchment area.

Certainly more gauges are welcome, but my critique here is that daily streamflow ***does not*** represent all contributions from the watershed/ catchment. It fails to account for subsurface detention in the vadose zone as well as in bedrock aquifers, and fails to acknowledge drainage, a.k.a. interflow into the alluvial basins of concern from upstream bedrock aquifers and vadose zones. As noted in the second page exhibit, the water budget must include accounting of all inflows. Since we're taking groundwater in the first place, it should be clear that not all groundwater arose from surface flows. So how can "daily streamflow" be the ***sole* input** to "Watershed Model"?

Nevertheless, your team is far from alone. That surface water bias is among the current prevailing paradigms that blinds practitioners, including DWR, to the opportunities for Rainfall to Groundwater. Please see Stream Networks vs Watersheds/ Catchments.

Recommended Links

I'm running out of time and out of steam so I'll just point you to a few more links from my website and hope you'll try surfing a bit from those. California Case offers an overview. Also recommended for orientation are Surface-Groundwater Systems in a Holistic Water Cycle and Plants in an Ecohydrology Context, both of which emphasize the vadose zone – watershed/ catchment interface between surface and groundwater.

I posted an Executive Summary in May but plan to post an updated/ refined version within the next week. I'll be emailing an alert for a new blog post to the GSA points of contact (and anyone new who may sign up for my newsletter) soon.

I do hope my comments have opened your collective minds to new opportunities for the Paso Robles Subbasin GSP.

Sincerely,

Verna Jigour, PhD

Citations

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Jigour, V. M. 2008 (2011). Watershed restoration for baseflow augmentation. Dissertation. Interdisciplinary Studies: Arts & Sciences: Conservation Ecology. Union Institute & University.

Thorne, J., D. Cameron, and V. Jigour. 2002. A guide to wildlands conservation in the central coast region of California. California Wilderness Coalition, Davis, California, USA.

To: Committee Members, Paso Robles Groundwater Sustainability Plan
From: Dennis R Loucks, Fred Hoey and Greg Grewal
Date: October 17,2018

Re: Groundwater Sustainability Plan, Chapter 5, Subsidence.

Dear Committee Members,

Our group is concerned that the consultant, Montgomery & Associates, is not adequately addressing the subsidence that has occurred in the Paso Robles Groundwater Basin.

We have reviewed the dismissive statements in the PowerPoint presentation and the incomplete statements made in Chapter 5.4 Subsidence. As you know, Subsidence is a key requirement in the Sustainability Plan and it cannot be cavalierly dismissed, as it has been to date.

Please take the time to review our research and reasons why this key SGMA requirement must be considered carefully.

Background:

Several weeks ago, we discovered a USGS report (open file report 00-447), Titled: **Use of InSAR to Identify Land-Surface Displacements Caused by Aquifer-System Compaction in the Paso Robles Area, San Luis Obispo County, California, March to August 1997**

The report authored by D.W. Valentine, Densmore, Galloway and Amelung was completed in 2001 and can be found on the USGS web site. The report, nine pages in length, discusses the methodology, results, areas of study, and provides a summary and conclusion. There are also four maps/images. We encourage the Committee Members to review this report and to compare with the findings of the Consultant.

Our summary of USGS report:

The report stated that in the Paso Robles area, about 3 miles northeast of Paso Robles there was downward land-surface displacement of .06 inches, northwest of Paso Robles, .08 inches downward displacement, and 2.1 inches in the southern signature area encompassing approx..75-squre-miles (Figure 4, USGS)

Subsidence was also located in other areas of the County:

Atascadero Area:

"The phase signature shows about 1 to 2 inches of downward ground displacement, which coincides with the seasonal water-level declines between spring and fall 1997 of about 54 feet (figure 4)"

Paso Robles Groundwater Basin:

"In the Shandon and Red Hills areas, as much as 2 inches of displacement was identified, which is apparently related to pumping for agricultural use." Other areas outside of our basin were also identified, Morro Bay, Arroyo Grande/Pismo Beach/Nipomo, Santa Maria Valley area, and Point Sal areas.

After reading the USGS report, we were astonished that this had not been, to our knowledge, ever discussed in the numerous engineering studies completed in the past twenty years. We felt it was a vital element that required further investigation. Considering the report is 21 years old, and subsidence of 2 inches was documented in a sixth month period, what is the current condition of the basin 21 years later? Has it stabilized? or has it continued to subside? Our fear is that with the growth of agriculture and rural development it may be unwelcome information. Be it as it may, it is necessary, in fact a requirement, of SGMA that subsidence be addressed.

Therefore it was our recommendation that the USGS study be updated and that monitoring stations be established with regard to subsidence. In fact, we forwarded a letter to California Department of Water Resources requesting that subsidence monitors be required in Groundwater Sustainability Plans. A copy was forwarded to the Consultant, Montgomery & Assoc.

Please compare our brief summary of the USGS report to that of Montgomery & Assoc.:

5.4 Subsidence

Land subsidence is the lowering of the land surface. While several human-induced and natural causes of subsidence exist, the only process applicable to the GSP is subsidence due to lowered groundwater elevations caused by groundwater pumping.

Direct measurements of subsidence have not been made in the Subbasin using extensometers or repeat benchmark calibration; however, interferometric synthetic aperture radar (InSAR) has been used in the area to remotely map subsidence. This technology uses radar images taken from satellites that are used to create maps of changes in land surface elevation. The studies done in the area show that a localized area three miles northeast of the City of Paso Robles had a downward displacement of .06 to 2.1 inches between Spring 1997 and Fall 1997 (Valentine, D.W. et al., 2001)

5.4 Subsidence, The Consultant's summary doesn't mention other relevant areas in the referenced USGS report, such as 2.1 inches in an approx. 75 square mile area, and about 2 inches of displacement in the Shandon and Red Hills area, apparently related to pumping for agricultural use.

To further compound this issue, when the Consultant presents a PowerPoint that states in reference to Subsidence:

"No direct measurements"
"Some satellite data suggest small ground surface drops over"
" Not a significant concern"
" Subsidence: Not a significant problem"

We find the Consultant's comments dismissive and incomplete.

Conclusions/Recommendations:

Our group of concerned citizen's are not Engineer's or Hydrologists but we, as many other concerned citizens, recognize that the current condition of the basin must be determined in order to effectively manage the basin in the future for the benefit of all residents.

We firmly believe that evidence exists that would lead a reasonable person to conclude that subsidence in the basin has occurred. We feel it is now reasonable to determine if subsidence has stabilized or has continued, please consider updating the InSAR through the USGS and consider installing subsidence monitors.

Enclosures: USGS Open file report 00-447

Cc: Committee Members

From: Jennifer Caffee
Sent: Tuesday, October 16, 2018 3:41 PM
To: Angela Ruberto
Subject: Fw: [EXTERNAL]SGMA Chapter 5 Subsidence
Attachments: Committee letter subsidence.docx

From: Dennis <[redacted]>
Sent: Monday, October 15, 2018 5:02 PM
To: john@johnpeschong.com Peschong; BOS_District 5_Web Contact
Cc: [redacted]
Subject: [EXTERNAL]SGMA Chapter 5 Subsidence

ATTENTION: This email originated from outside the County's network. Use caution when opening attachments or links.

Attached are our thoughts regarding the subsidence chapter that will be presented tomorrow. Had difficulty scanning the USGS report. Please copy for the committee if possible.

Thank you,

Dennis Loucks

Use of InSAR to Identify Land-Surface Displacements Caused by Aquifer-System Compaction in the Paso Robles Area, San Luis Obispo County, California, March to August 1997

By David W. Valentine[1], Jill N. Densmore[2], Devin L. Galloway[2], and Falk Amelung[3].
Open-File Report 00-447
Version 1.0
2001

U.S. Department of the Interior
Gail A. Norton, Secretary
U.S. Geological Survey
Charles G. Groat, Director

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey (USGS) editorial standards or with the North American Stratigraphic Code. Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

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[3]HIGP/SOEST, University of Hawaii, 2525 Correa Rd., Honolulu, HI 96822

Introduction

During the 1990's, the population of San Luis Obispo County has grown steadily, and some land use has been converted from dry farming and grazing to irrigated vineyards and urban areas. Because surface-water supplies are insufficient to meet the growing demand for water, ground-water pumpage has increased and the resulting water-level declines have raised concern that this water resource may become overstressed. To address this concern many questions need to be answered. One particular concern is whether the larger ground-water basins within the county function as large individual basins or whether subsurface structures divide these large basins into smaller subbasins, as differences in ground-water-level data suggest. In 1999, the San Luis Obispo County Flood Control and Water Conservation District entered into a cooperative agreement with the U.S. Geological Survey to test the validity of using Interferometric Synthetic Aperture Radar (InSAR) as a tool to aid in locating subsurface structures in ground-water basins by determining seasonal and historical land-surface changes. Spaceborne InSAR has been used to identify displacements of the land surface caused by aquifer-system compaction in other ground-water basins, such as the basins in Antelope Valley, California (Galloway and others, 1998); Santa Clara Valley, California (Ikehara and others, 1998); and in the Las Vegas area of Nevada (Amelung and others, 1999). Spatially detailed InSAR imagery of these basins show that InSAR can reveal sub-centimeter vertical land-surface displacements. Owing to the high spatial detail of InSAR imagery, the InSAR-derived displacement maps can be used with ground-water-level data to reveal differential aquifer-system compaction related to the presence of geological structures or the distribution of compressible sediments that may define subbasin boundaries. Many faults have already been identified in San Luis Obispo County, but identifying additional faults or other hydrologic barriers hidden in the subsurface is important to understanding ground-water flow. InSAR displacement maps of the Paso Robles area of San Luis Obispo County were compared with maps of seasonal changes in ground-water levels to detect the presence of aquifer-system compaction. Other areas of potential aquifer-system compaction within the county also were identified but are not discussed in detail here.

Location and Description of Study Area The area of the study includes most of San Luis Obispo County, California, which is located about 160 miles northeast of Los Angeles, California (Figure 1). The climate of the area is characterized by dry summers and relatively wet winters with most of the 13 inches of mean annual precipitation occurring during the winter (Paso Robles Information Services, www page, Internet URL <http://www.pasoroblesschamber.com/facts/index.htm>). The primary focus of this study is a 400-square-mile area near Paso Robles, which includes part of the Paso Robles subunit of the Salinas ground-water basin (Figure 1). This area has been proposed for a more intense study and would benefit from better definition of the extent and continuity of the ground-water basin.

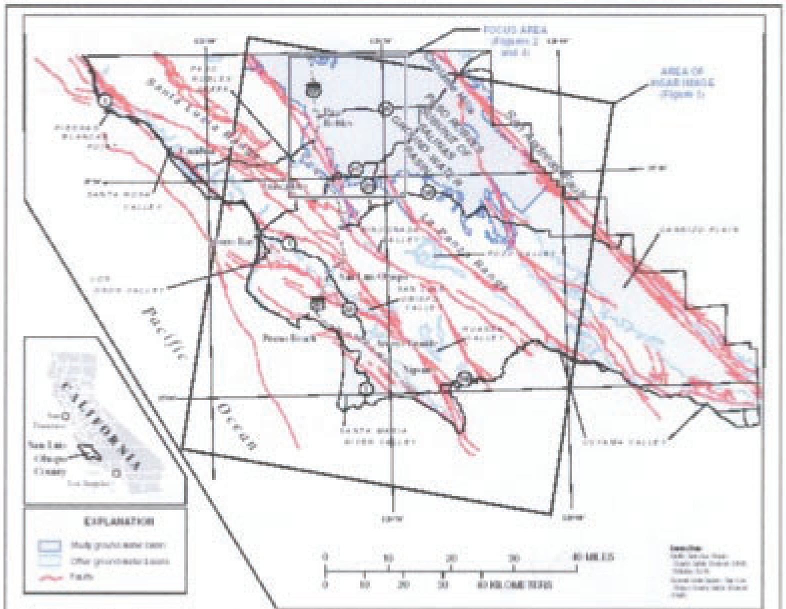

Figure 1. Map of focus area, ground-water basins, physical and cultural features of San Luis Obispo County and area of InSAR coverage.

The Paso Robles subunit is bounded by the Cholame Hills on the northeast, the Santa Lucia Range on the southwest and west, and the La Panza Range on the south. The main water-bearing units in the Paso Robles subunit are Quaternary younger and older alluvium and Quaternary and

Tertiary continental sediments of the Paso Robles Formation (Figure 2). The younger and older alluvium consists of poorly sorted, unconsolidated gravel, sand, and silt. The Paso Robles Formation consists of unconsolidated to poorly consolidated coarse sand and gravel, as well as finer sand, silt, and clay and some limestone that formed from deposition in floodplains and small lakes. The water-bearing units are underlain by non-water-bearing Tertiary and Cretaceous bedrock and granite. Mapped faults crossing the basin include the San Marcos, Rinconada, and La Panza faults (Campion and others, 1983).

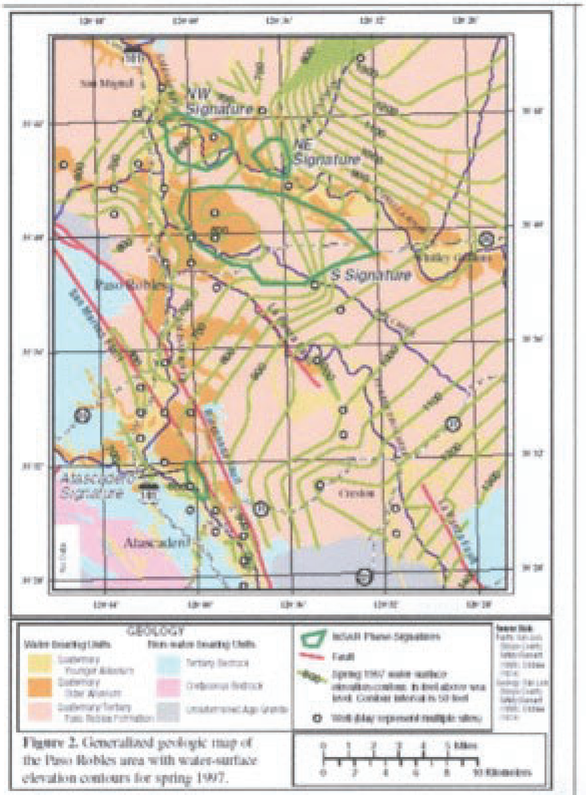

Figure 2. Generalized geologic map of the Paso Robles area with water-surface elevation contours for spring 1997.

Methodology

InSAR

InSAR is a means for remotely mapping land-surface displacements. Paired, synthetic-aperture radar (SAR) images taken from earth-orbiting satellites are used to create an interference image or interferogram. The interferogram shows the change in the radar line-of-sight distance, or range, between land surface and the radar antenna between the paired images. The interferogram can be viewed as a spatially detailed displacement map with 1,600-6,400 square meter pixels generally attainable. For a particular pixel, a resolution of range displacement is on the order of hundredths of an inch (millimeters). In coherent radar echoes, the phase is exactly proportional to the measured time delay and effective path length of the signal. The path differences of two signals can be determined by observing the phase differences or signature of the echoes. This phase signature is represented graphically by a color fringe. Range displacements are identified from coherent phase signatures between the two radar scenes on the interferogram. For C-band radar of the European Remote Sensing (ERS) platforms, the maximum detectable phase shift is one-half the wavelength of the radar microwave, which represents 1.1 inches (28 millimeters) of range displacement. Larger range displacements are calculated by identifying multiple coherent phase signatures from color fringes on the image; 1.1 inches (28 millimeters) of range displacement for each color fringe plus some fraction of 1.1 inches (28 millimeters) for a partial color fringe. Thus, the interferogram represents a displacement map of phase signatures in the range of 0-1.1 inches (0-28 millimeters), but range displacements exceeding 1.1 inches (28 millimeters) can be calculated by counting color fringes on the imagery. Because the line-of-sight of the ERS satellites are reclined 23 degrees from vertical at the center of the radar image, an equivalent vertical displacement represented by one color fringe on an interferogram would be slightly larger than the range displacement, about 1.2 inches (30.5 millimeters).

The resulting map of phase signatures can be related to several factors; displacement of the land surface, topographic effects, and changes in the travel time of the radar signal owing to tropospheric delays. Topographic effects were removed using a 1-day tandem interferogram (Zebker and others, 1994b) processed from SAR scenes imaged on succeeding days. Subtraction of the tandem interferogram from the original interferogram results in the "change" interferogram that contains range displacements from ground displacements plus any tropospheric delays.

For this study, raw SAR images made by European Remote Sensing satellites ERS-1 and ERS-2 were used. Five-month, 7-month, 15-month, and 20-month interferograms were created using techniques described by Zebker and others (1994a), Peltzer and Rosen (1995), Peltzer and others (1996), and Galloway and others (1998). Each of the four interferograms (3861 square miles or 10,000 square kilometers) was examined for coherent phase signatures. Only the 5-month interferogram (Figures 3 and 4) from March 28 to August 15, 1997, showed coherent phase signatures that warranted further examination. Topographic effects were removed using a 1-day tandem interferogram processed from SAR scenes imaged on December 29 and 30, 1995. The lack of coherent phase signatures in the 7-, 15-, and 20-month interferograms is due to atmospheric effects on the radar signal or temporal decorrelation of the interferograms. Areas where it was not possible to correct for tandem effects are excluded from the differential interferograms, and instead, the gray-scale image of the radar amplitude is shown.

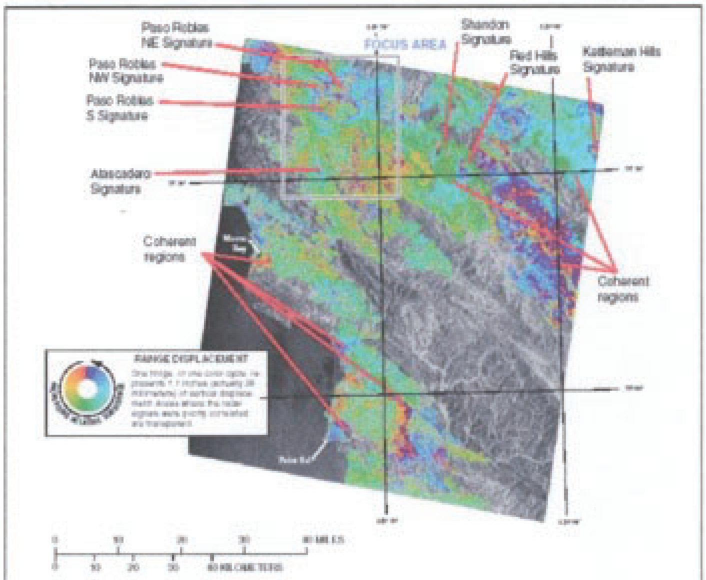

Figure 3. InSAR imagery of full scene covering most of San Luis Obispo County with focus area outlined (area outlined on figure 1).

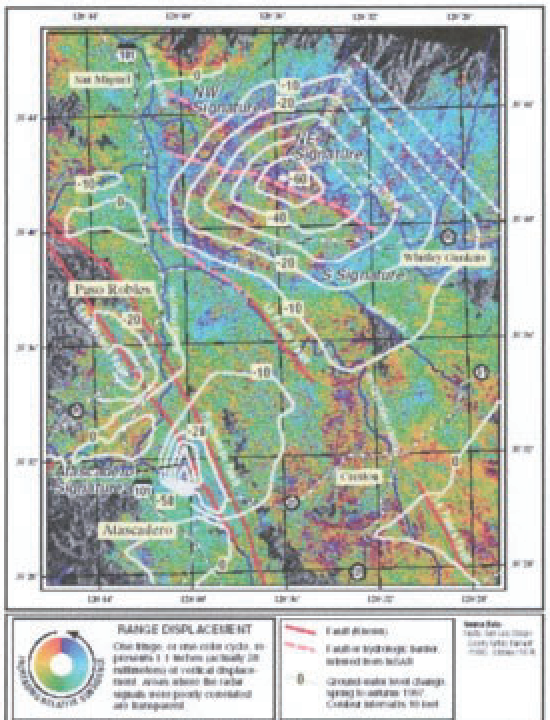

Figure 4. InSAR image of the Paso Robles area and seasonal ground-water level change for spring to autumn 1997.

Ground-Water Levels Water-level data for 58 wells for both the spring and fall of 1997 in 40 public land survey sections were obtained from San Luis Obispo County Flood Control and Water Conservation District (unpublished data, 1999). Although the state well number was provided for the wells, the exact well locations are not known. Therefore, all wells in a section were assigned an approximate position that corresponds with the center of the section, and thus well locations may be off by as much as 0.7 mile. Because the data are sparse, a triangular-irregular mesh was used to construct the contour maps of spring 1997 water-surface elevations (Figure 2) and the seasonal ground-water level change (Figure 4). The seasonal ground-water level change was calculated by subtracting fall 1997 water levels from spring 1997 water levels.

Results

The interferogram for March 28-August 15, 1997, shows four phase signatures in two separate locations within the area of primary focus for this study (Figure 4). Three of these signatures are located northeast of Paso Robles and the other is northeast of Atascadero (Figure 4). Other coherent phase signals, outside of the area of primary focus, are also apparent on this interferogram.

Paso Robles

The interferogram shows three phase signatures about 3 miles northeast of Paso Robles (Figure 4). These three phase signatures lie along the trend of an unmapped syncline with the thicknesses of Paso Robles formation sediments exceeding 4,000 feet (Dibblee, USGS, oral commun., 1999). The southern signature shows a relative change of about two phase signatures (2.1 inches or 56 millimeters) of increasing range distance (downward land-surface displacement) in an approximately 75-square-mile area. The maximum downward displacement in the northwest signature is about 0.8 inches (20 millimeters) and the northeast signature is 0.6 inches (about 14 millimeters). The southern and northeastern phase signatures coincide with an area of seasonal water-level decline of about 60 feet (Figure 4); downward displacement in these areas may be related to water-level declines. The northwestern phase signature also appears to coincide with a depression in the spring 1997 water-surface elevation (Figure 2). The southwestern boundary of the southern phase signature is subparallel to an extension of the La Panza Fault (Dibblee, 1974) and appears to be bounded by the fault. The northwestern and northeastern phase signatures do not appear to be related to any mapped geological structures, but their separation from the southern phase signature may suggest the presence of a ground-water boundary or barrier (Figure 4). The separation of the northeast and northwest phase signatures appear to coincide with the northeast trending ground-water contours (just north of Hog Canyon in Figure 2), which may indicate the presence of a ground-water boundary or barrier. It is also possible that the concentration of pumping in the areas of these three phase signatures and the subsequent water-level declines has caused localized ground-surface displacement and that these are not barriers or subbasin boundaries.

Atascadero area

The interferogram (Figure 4) shows an areally small phase signature in the Atascadero area east of Highway 101 and the Salinas River. The eastern edge of the signature is bordered by the San Marcos and the Rinconada faults. The phase signature appears to be controlled, in part, by the ground-water barriers formed by the faults and by the geometry of the basins adjacent to the faults. The phase signature shows about 1 to 2 inches (28 to 56 millimeters) of downward ground displacement, which coincides with the seasonal water-level declines between spring and fall 1997 of about 54 feet (Figure 4).

Other regions

In addition to the phase signatures identified in the area of primary focus, coherent regions also were identified in seven additional regions of the interferogram (Figure 3). In the Kettleman Hills area, as much as 4 inches (110 millimeters) of land-surface displacement was identified in two oil fields using InSAR (Fielding and others, 1998). This displacement probably is related to withdrawal of oil from the area and not to the withdrawal of ground water. In the Shandon and Red Hills areas, as much 2 inches (56 millimeters) of displacement was identified, which is apparently related to pumping for agricultural use. Coherent phase signals also were identified in the Morro Bay, Arroyo Grande/Pismo Beach/Nipomo, Santa Maria Valley area, and Point Sal areas.

Summary And Conclusions

During the 1990's, the population of San Luis Obispo County has grown steadily and surface-water supplies have been insufficient to meet the growing demand for water. Ground-water pumpage has increased to meet this shortfall, resulting in seasonal water-level declines and concern that the water resources of the area may become overstressed. One particular concern is whether the larger ground-water basins within the county function as large individual basins or whether subsurface structures divide these large basins into smaller subbasins. Interferometric Synthetic Aperture Radar was tested for use as a tool to aid in locating subsurface structures in ground-water basins by determining land-surface changes. Owing to the high spatial detail of InSAR imagery, the InSAR-derived displacement maps can be used with ground-water-level data to reveal differential aquifer-system compaction related to the presence of geological structures or the distribution of compressible sediment that may define subbasins.

The area of this study includes most of San Luis Obispo County, California, which is located about 160 miles northwest of Los Angeles, California. The primary focus of this study is a 400-square-mile area near Paso Robles. This area was selected for more intense investigation because a ground-water study for the area has been proposed that would benefit from better definition of the extent and continuity of the ground-water basins. The main water-bearing units in the Paso Robles area are Quaternary younger and older alluvium and Quaternary/Tertiary continental sediments.

InSAR is a means of remotely mapping land-surface displacements using paired synthetic-aperture radar images taken from earth-orbiting satellites. These images are used to create an interferogram that shows the change in the range between the land surface and the radar antenna on the order of millimeters for the paired images. The differences between two signals can be determined by observing the phase signatures of the radar echoes. These differences are represented graphically by a color fringe, which represents about 1.1 inches (28 millimeters) of range displacement. For this study, raw SAR images taken on March 28 and August 15, 1997, were used to create an interferogram. Water levels from 58 wells with both spring and fall 1997 measurements were used to construct water-level contour map for spring of 1997 and a seasonal water-level-change map for spring to fall 1997.

The interferogram showed three phase signatures about 3 miles northeast of Paso Robles, which indicated ground-surface displacements of from 0.6 to 2.1 inches (14 to 58 millimeters); the southern and northeast phase signatures coincide with an area of water-level decline of over 60 feet. There appears to be a ground-water barrier between the southern signature and the northeast and northwest signatures and also between the northeast and northwest signatures. These may not be actual barriers but more related to concentrated ground-water pumpage in the area of these signatures. The interferogram also shows an areally small phase signature in the Atascadero area that is bounded on the east by previously mapped faults and coincides with an area of seasonal ground-water level change of about 54 feet. The ground deformation in this area is on the order of 1 to 2 inches. In addition to those phase signatures in the area of primary focus, seven additional coherent phase signals were identified in other areas covered by the interferogram; Kettleman Hills, Shandon, Red Hills, Morro Bay, Arroyo Grande/Pismo Beach/Nipomo, Santa Maria Valley area, and Point Sal.

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The report is provided as a PDF file for which you will need Adobe Acrobat Reader to view. You can download a copy of the latest version (5.0 at the time of this publication)

To view the PDF file, ofr00-447.pdf; 4 MB).

Green River
Mutual Water Company

[redacted]
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California Water Rights Issues
January 2019

Under the California Constitution, water must be put to the reasonable and beneficial use of the citizens. No water rights grant any party the right to waste water or use more than is required for their reasonable and beneficial use. Waste by the holder of the water right can be curtailed or revoked.

No water user in the State of California "owns" any water. Instead a water right grants the holder only the right to access the water. Thus a landowner has the right to access the water beneath his property for his/her reasonable and beneficial use. The owner of all water in California is the State. The State is the trustee of the water for the benefit of the public. This is referred to as the Public Trust Doctrine. The benefits to the public that the State must consider are economic, recreational, aesthetic and environmental. If at any time the State determines that the current use does not benefit the public trust the State can reallocate the water. The Public Trust Doctrine therefore means no water rights in California are truly "vested" in the traditional sense of property rights. (A Primer On California Water Rights, Gary W. Sawyers, Esq.)

Unfortunately, there are groups which are manipulating the California Legislature in violation of the Public Trust Doctrine to transfer water allocations from groups such as mutual water companies to the water users who are then allowed to transfer water allocations over the objections of the mutual water companies.

The vast majority of all mutual water companies were organized to provide water to their members only. Green River Mutual Water Company is no exception. Stock of the Green River Mutual Water Company is held by the land owners within the Green River Mutual Water Company district and the shares are appurtenant to the land. However recent legislation is looking to take the private allocations of water of existing mutual water companies and require them to become quasi-public water companies with the ability of the recipients to transfer the water.

AB 240, passed by the California Legislature in 2014, requires existing and future mutual water companies in California to either amend or draft bylaws that allow the directors of the mutual water companies to sell water to others (state agencies, schools and other mutual water companies) at the expense of the members who either paid for the installation and maintenance of the water system or are going to pay for the installation and maintenance of a water system. For existing mutual water companies, AB 240 would appear to be an act of eminent domain without compensation to the members who own the wells, installed and maintain the systems. For newly formed mutual water companies, AB 240 appears to make the shareholders indorse, through their bylaws, the public access to their water.

It can be fairly said that AB 240 is a very clever legislative scheme to force private mutual water companies in California to allow the users to be able to transfer water allocations to others through subtle changes to the California Corporations Code. Some of the more onerous provisions are as follows:

1. The first requirement of AB 240 is for all mutual water companies to amend their articles and by laws incorporating the provisions of AB 240 pursuant to the Corporations Code sections 14300 et. seq.;

2. Once the bylaws and articles are amended, then the water companies are required to record certified copies of articles and bylaws with County Recorder, (Corp. Code Section 14300);

3. Once the provisions of AB 240 are accepted and incorporated in the articles and bylaws the directors may sell water to the state, any department or agency of the state, any school district, to any public agency or to any other mutual water company and, during emergencies, to the County for fire protections. Thus if the directors decide to sell water to another water company that is selling water to Los Angeles or some other public entity, the shareholders could not stop the directors from doing so even if the amount of water sold exceeds the capacity of the current system (Corp. Code 14300);

4. After amending the Corporation articles and bylaws to comply with AB 240, the Corporation is then required to submit a map to LAFCO showing the approximate boundaries of the area the water company serves. This triggers reporting to and oversight by LAFCO (Corp. Code 14301.1 (a));

5. Once the Corporation has registered with LAFCO the Corporation is then required to respond to all requests for information from LAFCO concerning the operation of the water system (Corp. Code 14301.1 (b));

6. Once AB 240 is adopted into the bylaws, the mutual water company must maintain a financial reserve fund for repairs and replacement to its water production, transmission and distribution facilities at a level sufficient for continuous operation in compliance with the federal Safe Drinking Act and the California Safe Drinking Water Act. This is over the top. Current corporate reserves for Green River Mutual Water Company are sufficient for repairs only and would require additional dues from the members to comply with the replacement requirement (Corp. Code 14301.3);

AB 240, under the guise of the Public Trust Doctrine, and through pressure from lobbying groups lobbying for individuals and large wealthy trusts are attempting to drive legislation aimed at granting water user's rights to transfer water allocations over the objections of the water suppliers. In other words, doing the very thing the California Constitution was designed to prevent; turning water into personal property that can be bought and sold for profit.

Green River
Mutual Water Company

[redacted]

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Water By-the Numbers

Sometimes it's a little easier to understand something if you break in down into a simpler form. The following is as simple as it gets.

The average person uses 80 - 100 gallons of water per day, which works out to 2,400 - 3,000 gallons per month. Whitley Gardens has 110 households with an average of 4 people per household. With 440 people using 100 gallons per day it works out to 44,000 gallons per day and 1,320,000 gallons of water per month. If you extend that out for a year, that number becomes 15,840,000 gallons. This number does not include livestock or agriculture.

The average vineyard, using a drip irrigation system uses 20 gallons per acre per minute. For 188 acres this works out to 3,760 gallons per hour. The average vineyard watering cycle is an 8 hour cycle, or 1,804,800 gallons of water per cycle/per day. That's 484,800 gallons more than Whitley Gardens uses in a month.

Let's take another step.

A 500hp pump with an 11inch line, pumps 800gpm. Pumping for 1 hour generates 48,000 gallons. Therefore, over an 8 hour period it pumps 384,000 gallons!

So the average vineyard watering cycle uses 1,804,800 gallons and it waters once a week. That works out to 7,219,200 gallons for a 4 week period. Take it a step further to an 8 month period of time (32 weeks) and it works out to 57,753,600 gallons. Twice a week works out to 115,507,200 gallons. New vines and hot weather would easily require more irrigation. To pump this much water would require 2,406 hours or 300 eight(8) hour days of operation.

Just a reminder, Whitley Gardens uses 15,840,000 per year. The vineyard uses just under 100,000,000 gallons more!

Let's go a step further and we'll call it the "what if" scenario.

What if the pump ran 12 hours a day 5 days a week 3,120 hours a year which equals 149,760,000 gallons of water. That's a lot of water, but that's not the end. This is only 1 well and one pipe. What are the numbers when you have 3 pumps? Yes, 3 wells, 3 - 500hp pumps! Those 3 wells total 1500hp, pumping 2400 gallons per minute, 144,000 gallons per hour and for an 8 hour day 1,152,000 gallons.

This begs the question, why do you need this kind of capacity? Where's the water going?

Whitley Gardens also has 3 wells serving its community. We use a 30hp pump on each well for a grand total of 90hp — 1410hp less than the vineyard!

Respectfully,

Steve Pitts
Board Member
Green River Mutual Water Company

Angela Ruberto

From: Dana Merrill <DMerrill@mesavineyard.com>
Sent: Tuesday, February 26, 2019 7:07 PM
To: Angela Ruberto
Subject: [EXT]Screenshot 2019-02-26 at 7.00.35 PM
Attachments: Image-1.jpg; ATT00001.txt

This cost example has some flaws. 7 tons per acre is at least 2 tons per acre high. On the cost side, we are now spending closer to $4,500 per acre direct cost, plus the long term debt, taxes and equipment. The net revenue after adding the penalty is closer to zero and no way will a grower still net $4,800 per acre.

Who provided these numbers? Why not talk to some of us who own and manage, including budgeting and accounting, for the operations? Some higher grossing vineyards can pay more but the example overstates the average revenue potential of vineyards in the Paso Basin.

slocounty.ca.gov

#4 Pumping Fees Example 5

WestWater Research LLC

Financial Implications for Growers

Revenue and cost assumptions obtained from crop enterprise budgets published by UC Davis, and personal interviews with growers. Actual revenues and costs vary across growers and properties.

Without water charges → Net Revenue

With water charges → Net Revenue

Illustrative Enterprise Budget (Vineyard)

Assumption	Value	Unit
Yield	7	Tons/ac
Price	$1,200	Per ton
Gross Revenue	*$8,400*	*Per ac*
Operating Costs	$2,400	Per ac
Cash Overhead	$1,200	Per ac
Total Cash Costs	*$3,600*	*Per ac*
Net Revenue	**$4,800**	**Per ac**
Pumping Allowance	1	AF/ac
Actual Pumping	1.25	AF/ac
Overproduction	0.25	AF/ac
Base Assessment	$116	Per ac ($93/AF x 1.25 AF)
Overproduction Surcharge	$208	Per ac ($832/AF x 0.25 AF)
Total Water Charges	*$324*	*Per ac*
Net Revenue	**$4,476**	**Per ac**

#4 Pumping Fees Example 6

Angela Ruberto

From: Dana Merrill <DMerrill@mesavineyard.com>
Sent: Monday, February 25, 2019 10:51 PM
To: Angela Ruberto
Subject: [EXT]Comments on projects etc

ATTENTION: This email originated from outside the County's network. Use caution when opening attachments or links.

Angela,

My comments in brief are:

1. Better detailed data is needed before selecting specific projects by area. Shandon and Creston (depending on where Creston extends) seem to have stable water levels vs the Red Zone. So recharge or supplemental water needs to be likely worth the cost to areas in better shape. Or prove taking there does help the Red Zone.
2. Many small users is Jardine, Squirrel Hollow, etc may need regional systems which could be a few deep Wells or supplemental water. Domestic and AG May have different solutions. Antiquated subdivisions have special challenges that require solutions different than commercial Agriculture. Those are a failure of good Planning which didn't exist when the lots created. Government should now help resolve but wells and septic systems on 1 acre parcels not sound planning. Same as Los Osos faced only worse.
3. More spending on dedicated monitoring has been promised for years but never built. Do that first to be sure the solutions will work.

4. Prioritize getting the County Naci share, where the County Paso Basin was left out, into the Basin. Get the city Paso Robles to take its full allotment which would lessen the salt level of its effluent. More purple pipe water could then go to vineyards . Basin landowners could subsidize the lake water treatment plant expansion cost for the city.
5.there should be an alternative to take State water before treatment at Polonio Pass. Maybe pipe to Estrella River then pump out by Whitley Gardens. Save pipeline costs perhaps. More water at lower cost is available although more pipeline is needed.
6. Get representative monitoring well system going and build projects as results of monitoring dictates. Figure out where our projects should be concentrated.
7. Get Irrigated Land Ordinance renewed for 5 years for stability. Expiring is not going to be good in 2020. County has a system and while it's not perfect it's a start we have experience with.
8 An Economic Study needs to be included to know whether Ramp Down or Supplemental water is best. A Ramp Down is not possible as we have few annual irrigated crops, the economic multiplier factor in reverse will devastate the local economy based on the wine and tourist industry. Winegrapes use so little water we have no lower use crop alternatives.
9. Get the Paso Basin on a priority list for State Water, otherwise urban uses will grab it and its gone. Buy a base amount the add annual purchases on high rainfall years at lower prices for recharge. Continue to rely on wells but support groundwater levels with supplemental water.
10. Adopt a Monterey County mandatory reporting system based on meters for Ag Wells 5 inch or larger. Exempt true non commercial de minimous users. They should contribute a minimal fixed admin fee to the system. Commercial Ag pay based on usage to incentivize efficiency. Group by zones as Monterey does.
11. Get more sophisticated data. Water levels have dropped most in the Red Zone but the Basin is deepest there. So many Wells still produce well. If we were to simply concentrate on the Red Zone and have the whole basin pay, would that be logical or fair? Do we know? If not, find out before proposing projects that likely can't pass a 218 election for funding anyway.
12. Our first 5 years post GSP submission need a vast improvement in data. Measure changes is water levels across the basin so we all have confidence in the data. And know the Economic impacts on us all, farmers, retired folks, city

residents. That should help with buy in. Other than the Purple Pipe city of Paso project and getting on the State Water reservation list we are not ready for projects or drastic Ramping Down. Those two projects might be all we need.

I may have further comments but wanted to get these in. Thanks for the opportunity.

Dana Merrill
Paso Robles, CA

Sent from my iPad

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Limoneira's Water Strategy

"When the well is dry, we know the worth of water," Ben Franklin advised. He could have been talking about the 21st Century. Today it should come as no surprise to anyone that, whether land is under active farming or being readied for urban development, the availability and cost of water are crucial to business plans and economic success.

Over the past decade, the availability of and the potential for rising costs of water that is largely supplied by public districts is believed to be a threat both to agriculture and to future urban development. At Limoneira, we have long understood that land with water is worth considerably more than land without it.

Water is often called a public resource, but it is also subject to private ownership, which comes with a responsibility of stewardship. Our land use practices are efficient, and our water use history is long and exemplary. We take our stewardship responsibility seriously and fully understand that our use of an important public natural resource is not only the essence of a public private partnership, but it is also our legacy.

Through our land position, historic water use, sustainable land use practices and by making investments in infrastructure, Limoneira has developed long-term, firm and reliable rights to water sufficient to meet any of our land use objectives. The fair market value of the Company should increase as the investment community begins to appreciate the linkage between Limoneira's water position and its long-term business objectives.

The value of water has escalated at rates greater than 6.5 percent per annum since at least the mid-1960s. There is no expectation that these historic increases, which are translated into higher costs for many companies, will be curtailed. In the face of forecasted increased water supply scarcity and cost, what distinguishes Limoneira from our competitors is our ability to directly and indirectly monetize the value of our water position through enhanced competitiveness positioning and profitability .

We expect to capitalize on our position with each of the following opportunities:

- Less expensive water supply costs. Imported water for the Bay-Delta and the Colorado River is becoming increasingly expensive. Regardless of whether there is an engineering solution to present infrastructure problems, there are no guarantees that quantities will be restored to earlier delivery levels or that environmental issues will be resolved. In any event, all imported water supply costs are expected to rise dramatically over the next several decades. By way of contrast, Limoneira holds rights

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to local groundwater and surface water for which development costs have largely been previously paid.

- High reliability of water (no shortages). Imported supplies are subject to ongoing environmental and regulatory challenges. There is no scenario where these risks can be eliminated. On the other hand, Limoneira has actively maintained sustainable land use practices that can be amply supplied from the company's existing sources of supply.

- Long-term water to support transitional land uses (ag to urban). Land development in the West requires the demonstration of a long-term reliable water supply, sufficient to meet the water supply needs of the land for a minimum of twenty years. Land without water rights and water supplies will struggle to satisfy this legal/planning requirement. Limoneira's historical water position will fulfill even the most stringent of tests for water, thereby ensuring that new development will not be constrained by the absence of water supply.

- Local water transfers. Water transfers and exchanges can create a free market short, interim and long-term return on the redistribution of water. Limoneira has the good fortune of possessing access to a variety of surface water and groundwater supplies that can be traded for compensation in those years where the water is not required for Limoneira's operations. The company's opportunity for success in carrying out water transfers will be enhanced by conditions of increased scarcity. Moreover, our ability to transfer water is inherently more feasible than in other parts of California because they would be local and, in many cases, conducted consistent with over-arching regulatory plans.

Water infrastructure agreements. It's one thing to have access to water rights. It's another thing to get the water from where it originates to where it is needed. Limoneira enjoys rights to water related infrastructure that will allow it to integrate its water supplies and to move water from its point of origin to its highest value use.

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October 1, 2018

Via Email

Derrik Williams
1232 Park Street, Suite 201B
Paso Robles, CA 93446 [MAP]
805.259.4095
dwilliams@elmontgomery.com

Re: Paso Robles Basin GSP

Dear Derrik:

It was a pleasure to meet you at the groundwater sustainability planning meeting at Windfall Farms on September 19, 2018. As I briefly mentioned at the end of the meeting, Windfall Farms is willing to offer wells on our property for monitoring by the Cooperative Committee. Several of the wells are not in use, and thus, may be well situated to monitor static water levels in the basin. Please contact Lee Nesbitt, our general manager (805-239-0711; LNesbitt@limoneira.com), to coordinate this monitoring.

On a broader note, I appreciated your informative presentation of the options for managing groundwater resources in the basin. You asked for our opinion concerning where water levels should be maintained in the area. We wish to see water levels maintained close to current conditions. We could tolerate slightly lower levels if this is necessary to effectuate a gradual transition to sustainable groundwater management, but appreciate that production will need to be limited to achieve sustainable management consistent with SGMA's mandates. We do not anticipate that water levels will be materially raised in the near term and expect that the costs of achieving such result would be prohibitive. Additionally, we would certainly support the County looking at ways to import water utilizing available underground storage.

We look forward to further cooperation with you and the rest of the Cooperative Committee in developing an effective GSP for the basin.

Sincerely,

Alex M. Teague
Senior Vice President/COO
Limoneira Company

cc: Lee Nesbitt, Windfall Farms
Russell McGlothlin, Brownstein Hyatt Farber Schreck, LLP
Debbie Arnold, 5th District Supervisor

Edits **(P. 3)**

8.1 Definitions

 Minimum thresholds refer to numeric values for each sustainability indicator used to define undesirable results.
Minimum thresholds are indicators of where an unreasonable condition might occur. For example, current groundwater elevations might be a minimum threshold if lower groundwater elevations would result in significant and unreasonable costs.

8.2 Sustainability Goal

(P. 5)

The projects and management actions are designed to achieve sustainability within 20 years by one or more of the following means:

- Tiered groundwater pumping fees to promote conservation and fund water supply projects. The tiered fees could be established to promote pumping within the sustainable yield. Pumping that exceeds the sustainable yield would be subject to the higher tiered fees that would fund projects the GSAs find to be cost effective solutions to sustainable management.
- Diligent adherence to Best Management Practices and increased awareness to achieve decreased groundwater use will be pursued.
- Pumping rates could be ramped down until the cumulative pumping rate is at or below the sustainable yield of the Subbasin. This would ensure that the future pumping is within the sustainable yield, which would prevent further lowering of groundwater levels.
- Expanded use of recycled water to offset groundwater pumping in the Subbasin will be pursued. This would contribute to reducing groundwater pumping below its current levels and prevent further lowering of groundwater levels.
- Long-term and short-term contracts for excess surface water from the Nacimiento Reservoir to offset groundwater pumping in the Subbasin would contribute to reducing groundwater pumping below its current levels and prevent further lowering of groundwater levels.
- Long-term and short-term contracts for State Water Project water from the Coastal Branch Aqueduct to offset groundwater pumping in the Subbasin would contribute to reducing groundwater pumping from its current levels and prevent further lowering of groundwater levels.
- Storm water infiltration projects would increase basin recharge.
- Increased reservoir storage behind the Salinas Dam could provide additional water for either direct or in-lieu recharge.

- Enhanced best management practices for crop irrigation could minimize water loss from irrigation systems and agricultural reservoirs.

8.4 Chronic Lowering of Groundwater Levels Sustainable Management Criteria (p. 6)

8.4.1 Locally Defined Significant and Unreasonable Conditions

Locally defined significant and unreasonable conditions were determined based on hydrogeologic data and understanding, GSA input, the Sustainable Management Criteria survey, public meetings, and discussions with GSA staff. Significant and unreasonable groundwater levels in the Subbasin are those that:

- Cause significant financial burden to those who rely on the groundwater resource
    - Increased pumping costs due to greater lift
    - Shallow domestic wells going dry
    - Cost for deeper installation or construction of new wells
- Require reductions in groundwater extraction creating directly proportional reductions in the area economy
- Significantly interfere with other sustainability indicators

8.4.2 Minimum Thresholds (P. 7)

Section §354.28(c)(1) of the SGMA regulations states that "*The minimum threshold for chronic lowering of groundwater levels shall be the groundwater elevation indicating a depletion of supply at a given location that may lead to undesirable results.*"

8.4.2.1 Information and Methodology Used to Establish Minimum Thresholds and Measurable Objectives

The information used for establishing the chronic lowering of groundwater levels minimum thresholds include:

• Information about public definitions of significant and unreasonable conditions and desired groundwater elevations, gathered from the SMC survey and public outreach meetings.

• Feedback about significant and unreasonable conditions gathered during public meetings.

• Historical groundwater elevation data from wells monitored by the County of San Luis Obispo

• Depths and locations of existing wells

• Maps of current and historical groundwater elevation data

Initial minimum thresholds and measurable objectives were established using the process described below.

(P. 9)

Based on hydrogeologic data and understanding of the Basin, the survey and public outreach results, historical groundwater elevations from monitoring wells that represented desired conditions were identified. These desired conditions were used to establish the initial measurable objectives and reasonable minimum thresholds in the Subbasin.

Paso Robles Formation Aquifer. Initial minimum thresholds were set using 2017 groundwater elevations. The thresholds were also based on current and historic groundwater elevations from monitoring wells along with depth of existing wells and of the aquifer in each area of the Basin represented by each specific monitoring well. 2017 standing groundwater levels have been selected as measureable objectives and minimum thresholds are set below those levels and sufficiently above the bottom of adjacent wells to protect groundwater extraction. Groundwater trends are analyzed and relative rates of decline of autumn standing groundwater levels over the last five years are projected to 2025 as an initial elevation for the minimum threshold. This allows at least a five year period for the Agency to begin GSP implementation. The numeric groundwater level selected at each monitoring site to represent the minimum threshold beyond which undesirable results may occur are adjusted to reflect the specific conditions at each monitoring site and the adjacent portion of the Basin the monitoring site is selected to reflect. Protecting a sustainable groundwater supply for existing wells was a guiding consideration. Minimum thresholds were selected to allow

8.4.2.7 Effects on Beneficial Users and Land Uses (p. 16 + 17)

The groundwater elevation minimum thresholds may have several effects on beneficial users and land uses in the Subbasin.

Agricultural land uses and users. The groundwater elevation minimum thresholds limit lowering of groundwater levels in the Subbasin. In the absence of other effective measures this has the effect of potentially limiting the amount of groundwater pumping in the Subbasin. Limiting the amount of groundwater pumping will limit the amount and type of crops that can be grown in the Subbasin, which could result in a proportional reduction in the economic viability of some properties. The groundwater elevation minimum thresholds could therefore limit expansion of the Subbasin's agricultural economy. This could have various effects on beneficial users and land uses:

8.4 Chronic Lowering of Groundwater Levels Sustainable Management Criteria

8.4.4 Undesirable Results (P 24)

8.4.4.1 Criteria for Defining Undesirable Results

The chronic lowering of groundwater elevation undesirable result is a quantitative combinations of groundwater elevation minimum threshold exceedances. For the Paso Robles Subbasin, the groundwater elevation undesirable result is:
Over the course of two years, no more than two exceedances for the groundwater elevation minimum thresholds within a 5-mile radius or within a defined management area of the Basin for any single aquifer. If a single monitoring well is in exceedance for two consecutive years also represents an undesirable result for the area of the Basin represented by the monitoring well. Geographically

isolated exceedances will require investigation to determine if local or Basin wide actions are required in response.

Undesirable results provide flexibility in defining sustainability. Increasing the number of allowed minimum threshold exceedances provides more flexibility, but may lead to significant and unreasonable conditions for a number of beneficial users. Reducing the number of allowed minimum threshold exceedances ensures strict adherence to minimum thresholds, but reduces flexibility due to unanticipated hydrogeologic conditions. The undesirable result was set to balance the interests of beneficial users with the practical aspects of groundwater management under uncertainty.
As the monitoring system grows, the number of exceedances allowed may be adjusted. One additional exceedance will be allowed for approximately every seven new monitoring wells. This was considered a reasonable number of exceedances given the hydrogeologic uncertainty of the basin. Close monitoring of groundwater data over the following years will allow actual numbers to be refined based on observable data. Management of the Basin will adapt to specific conditions and to a growing understanding of basin conditions and processes to adopt appropriate responses.

8.5 Reduction in Groundwater Storage Sustainable Management Criteria

(p. 26)8.5.1 Locally Defined Significant and Unreasonable Conditions

Locally defined significant and unreasonable conditions were assessed based on the Sustainable Management Criteria survey, public meetings, available data, and discussions with GSA staff. Significant and unreasonable changes in groundwater storage in the Subbasin are those that:

- Lead to long-term reduction in groundwater storage
- Interfere with other sustainability indicators

Responses to the Sustainable Management Criteria survey and public input suggest that most areas of the basin would like to see more groundwater in storage to help with droughts, and some areas of the basin would like to see significantly more groundwater in storage. Public input on which concessions would be acceptable to increase the amount of groundwater in storage revealed two highly ranked concessions:

1. New pumping be offset with new recharge or reduced pumping
2. Pumping be reduced in dry years

However, the concession that agricultural pumping be reduced in all years ranked relatively low. This suggests that, while stakeholders would prefer more groundwater in storage, they also would not prefer to reduce existing agricultural pumping during average years. Stakeholders also prefer that groundwater storage be increased by retaining wet year flows for local recharge and/or importing water.

8.5.2 Minimum Thresholds (p. 26)

Section §354.28(c)(2) of the SGMA regulations states that "*The minimum threshold for reduction of groundwater storage shall be a total volume of groundwater that can be withdrawn from the basin* *without causing conditions that may lead to undesirable results. Minimum thresholds for reduction of groundwater storage shall be supported by the sustainable yield of the basin, calculated based on historical trends, water year type, and projected water use in the basin.*"

The reduction of groundwater in storage minimum threshold is established for the Subbasin as a whole, not for individual aquifers. Therefore, one minimum threshold for groundwater in storage is established for the entire Subbasin, but any reduction in storage that would cause an undesirable result in only a limited portion of the basin shall be addressed in that area or areas where declining well levels indicate actions or projects will be effective..

In accordance with the SGMA regulation cited above, the minimum threshold metric is a volume of pumping per year, or an annual pumping rate. Conceptually, the total volume of groundwater that can be pumped annually from the Subbasin without leading to undesirable results is equal to the estimated sustainable yield of the Subbasin. As discussed in Chapter 6, absent the addition of supplemental water, the future estimated long-term sustainable yield of the Subbasin under reasonable climate change assumptions is 61,100 AFY. This estimated sustainable yield will change in the future as additional data become available.

This GSP adopts changes in groundwater elevation as a proxy for the change in groundwater storage metric. As allowed in § 354.36(b)(1) of the SGMA regulations, groundwater elevation data at the RMSs will be reported annually as a proxy to track changes in the amount of groundwater in storage.

The minimum threshold for change in groundwater storage is *the minimum threshold for chronic lowering of groundwater levels minimum threshold*. Based on well-established hydrogeologic principles, stable groundwater elevations held above this minimum threshold represent no change in groundwater storage . Therefore, the minimum threshold using groundwater elevations as a proxy is that the long term groundwater elevation averaged across all the wells in the groundwater level monitoring network will remain above the minimum threshold for chronic lowering of groundwater levels minimum threshold.

Exceedances of this minimum threshold, if limited to specific areas of the Basin, shall be addressed by projects or management actions taken where they will effect those areas of exceedance. Multiple exceedances appearing across the Basin will require proportional Basin wide responses.

8.5.2.4 Effect on Beneficial Uses and Users **(P. 28)**

The reduction in groundwater storage minimum threshold of maintaining stable average groundwater elevations along with its proxy, will potentially require a reduction in the amount of groundwater pumping in the Subbasin. Reducing pumping may impact the beneficial uses and users of groundwater in the Subbasin.

edits for 8.8.2.1 subsidence – reasonable and justifiable **(P. 42)**

8.8.2 Minimum Thresholds for Land Subsidence Management Criteria

Section 354.28(c)(5) of the SGMA regulations states that "*The minimum threshold for land subsidence shall be the rate and extent of subsidence that substantially interferes with surface land uses and may lead to undesirable results.*"

8.8.2.1 Information Used and Methodology for Establishing Subsidence Minimum Thresholds

The information used for establishing the land subsidence minimum thresholds included:

- Historical land surface elevation data from continuous GSP locations in the Subbasin
- Feedback about significant and unreasonable conditions gathered from GSA staff members and stakeholders

Land surface elevation is measured by the University NAVSTAR Consortium (UNAVCO) at five continuous global positioning system (GPS) sites in and around the Subbasin (Figure 7-5). Minimum thresholds for subsidence are set at these five locations. The basis for the subsidence minimum threshold is to protect against long term subsidence that would create significant undesirable results. The five GPS sites in the monitoring network have displayed multi-year land surface fluctuations that do not display a long-term decline in land elevation that indicate subsidence is occurring in the Subbasin. Since 2001 four of the five stations show ground surface elevations are trending upwards. The historical land surface fluctuations at these five sites demonstrate that a decline in land surface observed in one year may be compensated for by a similar rise in land surface the following year.
Discussions with GSA staff and the public indicated that, people were generally in agreement with the goal of no significant subsidence that would harm infrastructure.

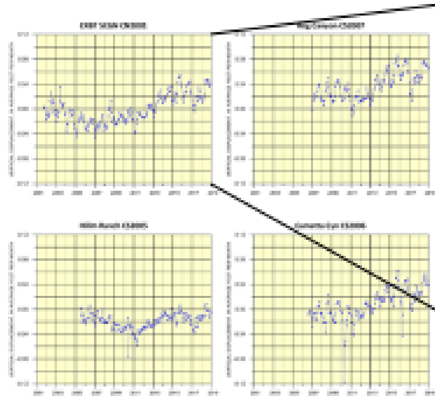
Rate of Subsidence. Any rate of subsidence, if maintained over a long period of time, could lead to significant and unreasonable conditions. A rate of subsidence that would represent significant loss of groundwater storage or produce significant harm to infrastructure over the following twenty years would be unreasonable. An unacceptable rate of subsidence is one that exceeds half inch (0.041 foot) per year over any five year period. Annual land surface fluctuations are acceptable, they occur naturally and do not indicate long-term subsidence.

As shown on Figure 7-6, most of the continuous GPS surface elevation monitors show more years with an annual rise in land surface elevation than not. This rise is likely part of a longer-term trend, and does not appear to be related to seasonal elastic subsidence. The maximum measured rate of rise for each of the five continuous GPS sites is tabulated in Table 8-10.

Extent of Subsidence. An amount of subsidence sufficient to damage infrastructure in any portion of the Subbasin would be significant and unreasonable. Therefore, the same minimum threshold is set for all five of the existing continuous GPS sites.

The State has suggested that there will likely be assistance available in the future for periodic USGS Lidar surveys that give very exacting surface elevation maps that when compared over time could be used to track changes across the whole Basin Surface.

Land Surface Elevation Monitoring Data



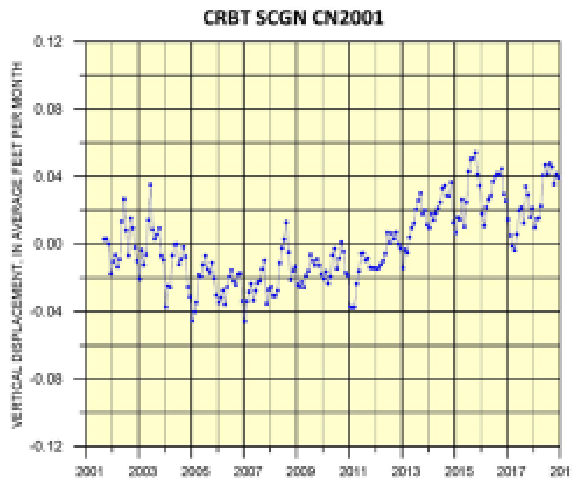


Figure 7-6. Monthly Averages of Vertical Displacement at UNAVCO Continuous GPS Stations

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GroundwaterResourceHub.org

15 April 2019

County Government Center,
1055 Monterey Street, Room 206
San Luis Obispo, CA 93408

Submitted online via: https://www.slocounty.ca.gov/Departments/Public-Works/Committees-Programs/Sustainable-Groundwater-Management-Act-(SGMA)/Paso-Robles-Groundwater-Basin/GSP-Development.aspx

Re: Chapters 4-8 and Appendix B of the Paso Robles Subbasin Draft GSP

Dear Angela Ruberto,

The Nature Conservancy (TNC) appreciates the opportunity to comment on Chapters 4-8 and Appendix B of the Paso Robles Subbasin Draft Groundwater Sustainability Plans (GSP) being prepared under the Sustainable Groundwater Management Act (SGMA).

TNC as a Stakeholder Representative for the Environment

TNC is a global, nonprofit organization dedicated to conserving the lands and waters on which all life depends. We seek to achieve our mission through science-based planning and implementation of conservation strategies. For decades, we have dedicated resources to establishing diverse partnerships and developing foundational science products for achieving positive outcomes for people and nature in California. TNC was part of a stakeholder group formed by the Water Foundation in early 2014 to develop recommendations for groundwater reform and actively worked to shape and pass SGMA.

Our reason for engaging is simple: California's freshwater biodiversity is highly imperiled. We have lost more than 90 percent of our native wetland and river habitats, leading to precipitous declines in native plants and the populations of animals that call these places home. These natural resources are intricately connected to California's economy providing direct benefits through industries such as fisheries, timber and hunting, as well as indirect benefits such as clean water supplies. SGMA must be successful for us to achieve a sustainable future, in which people and nature can thrive within the Paso Robles subbasin and California.

We believe that the success of SGMA depends on bringing the best available science to the table, engaging all stakeholders in robust dialog, providing strong incentives for beneficial outcomes and rigorous enforcement by the State of California.

Given our mission, we are particularly concerned about the inclusion of nature, as required, in GSPs. The Nature Conservancy has developed a suite of tools based on best available science to help GSAs, consultants, and stakeholders efficiently incorporate nature into GSPs.

These tools and resources are available online at GroundwaterResourceHub.org. The Nature Conservancy's tools and resources are intended to reduce costs, shorten timelines, and increase benefits for both people and nature.

Addressing Nature's Water Needs in GSPs

SGMA requires that all beneficial uses and users, including environmental users of groundwater, be considered in the development and implementation of GSPs (Water Code § 10723.2).

The GSP Regulations include specific requirements to identify and consider groundwater dependent ecosystems (23 CCR §354.16(g)) when determining whether groundwater conditions are having potential effects on beneficial uses and users. GSAs must also assess whether sustainable management criteria may cause adverse impacts to beneficial uses, which include environmental uses, such as plants and animals. In addition, monitoring networks should be designed to detect potential adverse impacts to beneficial uses due to groundwater. Adaptive management is embedded within SGMA and provides a process to work toward sustainability over time by beginning with the best available information to make initial decisions, monitoring the results of those decision, and using data collected through monitoring to revise decisions in the future. Over time, GSPs should improve as data gaps are reduced and uncertainties addressed.

To help ensure that GSPs adequately address nature as required under SGMA, The Nature Conservancy has prepared a checklist (**Attachment A**) for GSAs and their consultants to use. The Nature Conservancy believes the following elements are foundational for 2020 GSP submittals. For detailed guidance on how to address the checklist items, please also see our publication, *GDEs under SGMA: Guidance for Preparing GSPs* (https://groundwaterresourcehub.org/public/uploads/pdfs/GWR_Hub_GDE_Guidance_Doc_2-1-18.pdf).

1. Environmental Representation
SGMA requires that groundwater sustainability agencies (GSAs) consider the interests of all beneficial uses and users of groundwater. To meet this requirement, we recommend actively engaging environmental stakeholders by including environmental representation on the GSA board, technical advisory group, and/or working groups. This could include local staff from state and federal resource agencies, nonprofit organizations and other environmental interests. By engaging these stakeholders, GSAs will benefit from access to additional data and resources, as well as a more robust and inclusive GSP.

2. Basin GDE and ISW Maps
SGMA requires that groundwater dependent ecosystems (GDEs) and interconnected surface waters (ISWs) be identified in the GSP. We recommend using the Natural Communities Commonly Associated with Groundwater Dataset (NC Dataset) provided online (https://gis.water.ca.gov/app/NCDatasetViewer/) by the Department of Water Resources (DWR) as a starting point for the GDE map. The NC Dataset was developed through a collaboration between DWR, the Department of Fish and Wildlife and TNC.

3. Potential Effects on Environmental Beneficial Users
SGMA requires that potential effects on GDEs and environmental surface water users be described when defining undesirable results. In addition to identifying GDEs in the basin, The Nature Conservancy recommends identifying beneficial users of surface water, which include environmental users. This is a critical step, as it is impossible to define "significant and unreasonable adverse impacts" without knowing *what* is being impacted. For your convenience, we've provided a list of freshwater species within the boundary of the Paso Robles basin in **Attachment C**. Our hope is that this information will help your GSA better

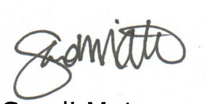
evaluate the impacts of groundwater management on environmental beneficial users of surface water. We recommend that after identifying which freshwater species exist in your basin, especially federal and state listed species, that you contact staff at the Department of Fish and Wildlife (DFW), United States Fish and Wildlife Service (USFWS) and/or National Marine Fisheries Services (NMFS) to obtain their input on the groundwater and surface water needs of the organisms on the freshwater species list. Because effects to plants and animals are difficult and sometimes impossible to reverse, we recommend erring on the side of caution to preserve sufficient groundwater conditions to sustain GDEs and ISWs.

4. Biological and Hydrological Monitoring
If sufficient hydrological and biological data in and around GDEs is not available in time for the 2020/2022 plan, data gaps should be identified along with actions to reconcile the gaps in the monitoring network.

Our comments related to Chapters 4-8 of the Paso Robles Subbasin Draft GSP are provided in detail in **Attachment B,** and where applicable are in reference to the numbered items in **Attachment A. Attachment D** describes six best practices that GSAs and their consultants can apply when using local groundwater data to confirm a connection to groundwater for DWR's Natural Communities Commonly Associated with Groundwater Dataset (https://gis.water.ca.gov/app/NCDatasetViewer/).

Thank you for fully considering our comments as you develop your GSP.

Best Regards,



Sandi Matsumoto
Associate Director, California Water Program
The Nature Conservancy

Attachment A
Considering Nature under SGMA: A Checklist

GSP Plan Element*		GDE Inclusion in GSPs: Identification and Consideration Elements		Item Number
Admin Info	2.1.5 Notice & Communication *23 CCR §354.10*	Description of the types of environmental beneficial uses of groundwater that exist within GDEs and a description of how environmental stakeholders were engaged throughout the development of the GSP.		1.
Basin Setting	2.2.2 Current & Historical Groundwater Conditions *23 CCR §354.16*	Interconnected surface waters:		2.
		Interconnected surface water maps for the basin with gaining and losing reaches defined (included as a figure in GSP & submitted as a shapefile on SGMA portal).		3.
		Estimates of current and historical surface water depletions for interconnected surface waters quantified and described by reach, season, and water year type.		4.
		Basin GDE map included (as figure in text & submitted as a shapefile on SGMA Portal).		5.
		If NC Dataset *was* used:	Basin GDE map denotes which polygons were kept, removed, and added from NC Dataset (Worksheet 1, can be attached in GSP section 6.0).	6.
			The basin's GDE shapefile, which is submitted via the SGMA Portal, includes two new fields in its attribute table denoting: 1) which polygons were kept/removed/added, and 2) the change reason (e.g., why polygons were removed).	7.
			GDEs polygons are consolidated into larger units and named for easier identification throughout GSP.	8.
		If NC Dataset *was not* used:	Description of why NC dataset was not used, and how an alternative dataset and/or mapping approach used is best available information.	9.
		Description of GDEs included:		10.
		Historical and current groundwater conditions described in each GDE unit.		11.
		Ecological condition described in each GDE unit.		12.
		Each GDE unit has been characterized as having high, moderate, or low ecological value.		13.
		Inventory of species, habitats, and protected lands for each GDE unit with ecological importance (Worksheet 2, can be attached in GSP section 6.0).		14.

	2.2.3 Water Budget *23 CCR §354.18*	Groundwater inputs and outputs (e.g., evapotranspiration) of native vegetation and managed wetlands are included in the basin's historical and current water budget.		15.
		Potential impacts to groundwater conditions due to land use changes, climate change, and population growth to GDEs and aquatic ecosystems are considered in the projected water budget.		16.
Sustainable Management Criteria	3.1 Sustainability Goal *23 CCR §354.24*	Environmental stakeholders/representatives were consulted.		17.
		Sustainability goal mentions GDEs or species and habitats that are of particular concern or interest.		18.
		Sustainability goal mentions whether the intention is to address pre-SGMA impacts, maintain or improve conditions within GDEs or species and habitats that are of particular concern or interest.		19.
	3.2 Measurable Objectives *23 CCR §354.30*	Description of how GDEs were considered and whether the measurable objectives and interim milestones will help achieve the sustainability goal as it pertains to the environment.		20.
	3.3 Minimum Thresholds *23 CCR §354.28*	Description of how GDEs and environmental uses of surface water were considered when setting minimum thresholds for relevant sustainability indicators:		21.
		Will adverse impacts to GDEs and/or aquatic ecosystems dependent on interconnected surface waters (beneficial user of surface water) be avoided with the selected minimum thresholds?		22.
		Are there any differences between the selected minimum threshold and state, federal, or local standards relevant to the species or habitats residing in GDEs or aquatic ecosystems dependent on interconnected surface waters?		23.
	3.4 Undesirable Results *23 CCR §354.26*	For GDEs, hydrological data are compiled and synthesized for each GDE unit:		24.
		If hydrological data *are available* within/nearby the GDE	Hydrological datasets are plotted and provided for each GDE unit (Worksheet 3, can be attached in GSP Section 6.0).	25.
			Baseline period in the hydrologic data is defined.	26.
			GDE unit is classified as having high, moderate, or low susceptibility to changes in groundwater.	27.
			Cause-and-effect relationships between groundwater changes and GDEs are explored.	28.
		If hydrological data *are not available* within/nearby the GDE	Data gaps/insufficiencies are described.	29.
			Plans to reconcile data gaps in the monitoring network are stated.	30.
		For GDEs, biological data are compiled and synthesized for each GDE unit:		31.
		Biological datasets are plotted and provided for each GDE unit.		32.
		Data gaps/insufficiencies are described.		33.
		Plans to reconcile data gaps in the monitoring network are stated.		34.
		Description of potential effects on GDEs, land uses and property interests:		35.

		Cause-and-effect relationships between GDE and groundwater conditions are described.	36.
		Impacts to GDEs that are considered to be "significant and unreasonable" are described.	37.
		Known hydrological thresholds or triggers (e.g., instream flow criteria, groundwater depths, water quality parameters) for relevant species or ecological communities are reported.	38.
		Land uses include and consider recreational uses (e.g., fishing/hunting, hiking, boating).	39.
		Property interests include and consider privately and publicly protected conservation lands and opens spaces, including wildlife refuges, parks, and natural preserves.	40.
Sustainable Management Criteria	3.5 Monitoring Network *23 CCR §354.34*	Description of whether hydrological data are spatially and temporally sufficient to monitor groundwater conditions for each GDE unit.	41.
		Description of how hydrological data gaps and insufficiencies will be reconciled in the monitoring network.	42.
		Description of how impacts to GDEs and environmental surface water users, as detected by biological responses, will be monitored and which monitoring methods will be used in conjunction with hydrologic data to evaluate cause-and-effect relationships with groundwater conditions.	43.
Projects & Mgmt Actions	4.0. Projects & Mgmt Actions to Achieve Sustainability Goal *23 CCR §354.44*	Description of how GDEs will benefit from relevant project or management actions.	44.
		Description of how projects and management actions will be evaluated to assess whether adverse impacts to the GDE will be mitigated or prevented.	45.

* In reference to DWR's GSP annotated outline guidance document, available at: https://water.ca.gov/LegacyFiles/groundwater/sgm/pdfs/GD_GSP_Outline_Final_2016-12-23.pdf

Attachment B

TNC Evaluation of Chapters 4 - 8 and Appendix B of the Paso Robles Subbasin GSP Draft

4.1 Subbasin Topography and Boundaries (p.3)

- [Paragraph 2] Please provide additional information on what data was used to determine that "poor quality" groundwater in the Paso Robles Formation would exclude groundwater from being part the subbasin.
- Defining the bottom of subbasin based on geochemical properties is a suitable approach for defining the base of freshwater, however, as noted on page 9 of DWR's Hydrogeologic Conceptual Model BMP (https://water.ca.gov/LegacyFiles/groundwater/sgm/pdfs/BMP_HCM_Final_2016-12-23.pdf) "the definable bottom of the basin should be at least as deep as the deepest groundwater extractions". **Thus, groundwater extraction well depth data should also be included in the determination of the basin bottom.** This will prevent the possibility of extractors with wells deeper than the basin boundary (defined by the base of freshwater) from claiming exemption of SGMA due to their well residing outside the vertical extent of the basin boundary.

4.7.2 Groundwater Discharge Areas Inside the Subbasin (p.31)

- [Paragraph 2] We support the use of the Natural Communities Commonly Associated with Groundwater Dataset (NC Dataset) to map groundwater dependent ecosystems in the Paso Robles Groundwater Basin (GSP Draft Figure 4-18). Since the NC Dataset is intended as a starting point, The Nature Conservancy has developed a Guidance Document to assist GSAs and their consultants address GDEs in GSPs. Also refer to **Attachment D** for best practices when using the NC dataset.

- The identification of GDEs within GSPs is a required GSP element of the Basin Setting Section under the description of Current & Historical Groundwater Conditions (23 CCR §354.16). Recognizing natural points of discharge (seeps & springs) as GDEs is consistent with the SGMA definition of GDEs[1], however, we recommend **the identification of GDEs (GDE map Figure 4-18) for the Paso Robles basin be moved to Chapter 5: Groundwater Conditions and elaborated upon with a description of current and historical groundwater conditions in the GDE areas**. Chapter 5 is a more appropriate place for the identification of GDEs, since groundwater conditions (e.g., depth to groundwater, interconnected surface water maps, groundwater quality) are necessary local information and data from the GSP in assessing whether polygons in the NC dataset are connected to groundwater in a principal aquifer.
- Decisions to remove, keep, or add polygons from the NC dataset into a basin GDE map should be based on best available science in a manner that promotes transparency and accountability with stakeholders. Any polygons that are removed,

[1] *Groundwater dependent ecosystem refer to ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface. [23 CCR §351 (m)]*

added, or kept should be inventoried in the submitted shapefile to DWR, and mapped in the plan. **We recommend revising Figure 4-18 to reflect this recommended methodology.**

5.2.1 Change in Groundwater Storage in the Alluvial Aquifer (p. 5-23)

- While it's true that there was no net change in groundwater storage in the Alluvial Aquifer between 1981 and 2011, groundwater storage losses certainly occurred during dry years and recovered in wet years. Potential impacts on groundwater storage loss due to groundwater is still very possible, especially since groundwater pumping data has been estimated from groundwater flow models populated with insufficient vertical groundwater gradient data, shallow monitoring data, and surface flow data. Groundwater storage in the Paso Robles formation has also be on a decline since 1980 due to groundwater pumping (Figure 5-15). Understanding groundwater storage fluctuations in the Alluvial Aquifer depends on how vertical groundwater gradients are impacted by pumping and groundwater storage changes in the Paso Robles Formation **Please address these data gaps in the monitoring network.**

5.5 Interconnected Surface waters (p. 5-27) - Environmental User Checklist (Attachment A) Items 2-4.

- **Please specify what data were used to determine the elevation of the stream or river bottom.**
- The regulations [23 CCR §351(o)] define interconnected surface waters (ISW) as "surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted". "At any point" has both a spatial and temporal component. Even short durations of interconnections of groundwater and surface water can be crucial for surface water flow and supporting environmental users of groundwater and surface water. Thus, only considering ISWs as those where *simulated* groundwater elevations were above the stream or river bottom for at least half of the time between 2010 and 2016 does not meet the SGMA definition for the following reasons:
  1) groundwater elevations that are above the stream or river bottom only attempts to map gaining reaches, not losing reaches. ISWs can be either gaining and losing (see Figure 5-16). This is especially problematic in places where losing conditions existed, but the river bottom was used to compare groundwater elevations because stream elevation data was missing; however, in reality, the stream elevation was higher than the river bottom.
  2) looking for interconnections that last more than half of the time does not adequately take into consideration shorter interconnections between groundwater and surface water that occur "at any point" in time. This is especially true since the years between 2010 and 2016 were mostly drought years, which would reduce the number of interconnected surface water areas on Figure 5-17. As seen in section 5.2, significant losses in groundwater storage in both the alluvial and Paso Robles formations occur during drought years, thus potentially causing depletions of surface water (also quantified in Section 5.5.1).
  Due to limited shallow monitoring wells and stream gauges in the basin, **Mapping ISWs would be better estimated by first determining which reaches are**

completely disconnected from groundwater. This approach would involve comparing simulated groundwater elevations with a land surface Digital Elevation Model that could identify which surface waters have groundwater consistently below surface water features, such that an unsaturated zone would separate surface water from groundwater. Groundwater elevations that are always deeper than 50 feet below the land surface can be identified as disconnected surface waters. Please also increase the simulated groundwater elevation time period to include 2017-2019 (which have relatively wetter conditions). Also, please reconcile data gaps (shallow monitoring wells, stream gauges, and nested/clustered wells) along surface water features in the Monitoring Network section of the GSP to improve ISW mapping in future GSPs.

<u>6. Water Budget (p.25) - Environmental User Checklist (Attachment A) Items 15-16:</u>

- **Please clarify what assumptions and data were used to calculate Riparian Evapotranspiration.**
- Why was evapotranspiration only calculated for riparian vegetation? In Chapter 3.4.2 of the Draft GSP, native vegetation was identified as the largest water use sector in the subbasin by land area. **Please estimate evapotranspiration for all native vegetation in the subbasin for the water budget.**

<u>7.2.1 Groundwater Level Monitoring Network Data Gaps (p.12) - Environmental User Checklist (Attachment A) Items 41-43:</u>

The last row of Table 7-2 states that "Data must be able to characterize conditions and monitor adverse impacts to beneficial uses and users identified within the basin". Aside from GDEs mapped in the basin (Figure 4-18), environmental surface water users have not been identified in the GSP thus far. SGMA requires that potential effects on GDEs and environmental surface water users be described when defining undesirable results. In addition to identifying GDEs in the basin, The Nature Conservancy recommends identifying beneficial users of surface water, which include environmental users. This is a critical step, as it is impossible to define "significant and unreasonable adverse impacts" without knowing *what* is being impacted, nor is possible to monitor ISWs in a way that can "identify adverse impacts on beneficial uses of surface water" [23 CCR §354.34(c)(6)(D)]. For your convenience, we've provided a list of freshwater species within the boundary of the Paso Robles basin in **Attachment C**. Our hope is that this information will help your GSA better evaluate and monitor the impacts of groundwater management on environmental beneficial users of surface water. We recommend that after identifying which freshwater species exist in your basin, especially federal and state listed species, that you contact staff at the Department of Fish and Wildlife (DFW), United States Fish and Wildlife Service (USFWS) and/or National Marine Fisheries Services (NMFS) to obtain their input on the groundwater and surface water needs of the organisms on the freshwater species list, and how best to monitor them. Because effects to plants and animals are difficult and sometimes impossible to reverse, we recommend erring on the side of caution to preserve sufficient groundwater conditions to sustain GDEs and ISWs. **Please identify appropriate biological indicators that can be used to monitor potential impacts to environmental beneficial users as a current data gap, and make plans to reconcile these in Chapter 10 (Plan Implementation).**

<u>7.6 Interconnected Surface Water Monitoring Network (p.25) - Environmental User Checklist (Attachment A) Items 41-43:</u>

- The first sentence in this section is contradictory to the ISW mapping conducted in Chapter 5 - ISWs do exist in the Paso Robles Subbasin (Figure 5-17).
- Depletions of surface water were also estimated in Section 5.5.1, and the statement that "there is no need for a monitoring network that quantifies surface water depletion from ISW" is false and goes against SGMA requirements. SGMA requires that when monitoring depletions of interconnected surface water that "spatial and temporal exchanges between surface water and groundwater […] are necessary to calculate depletions of surface water caused by groundwater extraction" [23CCR §354.34(c)(6)] and that the monitoring network "shall be designed to ensure adequate coverage of sustainability indicators" [23CCR § 354.34(d)]. Where minimum thresholds for ISWs are to be quantified by "The location, quantity, and timing of depletions of interconnected surface water" [23 CCR §354.28(c)(6)(A)]. **Thus, there is a need for a monitoring network that quantifies surface water depletion from interconnected surface waters.**
- In addition to the need for additional shallow monitoring wells in the Alluvial aquifer to map ISWs, **there is also a need to enhancing monitoring of stream flow and vertical groundwater gradients by installing more stream gauges and clustered/nested wells near streams, rivers or wetlands.** Ideally, co-locating stream gauges with clustered wells that can monitor groundwater levels in both the Alluvial and Paso Robles Formation aquifers would enhance understanding about where ISWs exist in the basin and whether pumping is causing depletions of surface water or impacts on beneficial users of surface water and groundwater.
- **There is a need to integrate biological indicators that can monitor adverse impacts to beneficial uses of surface water and groundwater within ISWs.**

<u>8.3 General Process for Establishing Sustainable Management Criteria - Environmental User Checklist (Attachment A) Items 17-40</u>

- Stakeholder involvement is crucial when establishing sustainable management criteria. The role of the GSA is to represent and balance the needs of *all groundwater* beneficial uses and users in the basin, which has been expressed in the Sustainability goal in Section 8.2. According to p.6, only rural residents, farmers, and local cities were surveyed to gather input on sustainable management criteria. **Please specify what information or efforts have been used/made to protect the interests of environmental users and disadvantaged community members.**
- SGMA requires that sustainable management criteria are consistent with other state, federal or local regulatory standards [23 CCR§354.28(b)(5)]. **Please describe what process was used to identify other regulatory standards that need consideration when establishing minimum thresholds for sustainability criteria.**

<u>8.4 Chronic Lowering of Groundwater Levels Sustainable Management Criteria</u>

- [8.4.1] The definition of 'significant and unreasonable' is a qualitative statement that is used to describe when undesirable results would occur in the basin, such that a minimum threshold can be quantified. Potential effects on all beneficial users of groundwater in the basin need to be taken into consideration. According to the

California Constitution Article X, §2, water resources in California must be "put to beneficial use to the fullest extent of which they are capable". **Please modify the local definition for 'significant and unreasonable' (provided on p. 6), so that it also specifies potential effects on environmental beneficial users of groundwater in the basin, and addresses how water rights amongst beneficial users will be prioritized when establishing thresholds.**

- [8.4.2.1] The use of 2017 groundwater elevations to establish minimum thresholds for the Paso Robles Formation Aquifer is inadequate, since the SGMA benchmark date is January 1, 2015. Also, no scientific rationale was explained for using 2007 groundwater elevation data to establish initial minimum thresholds for the Alluvial Aquifer. SGMA is based on the use of best available science, and selecting minimum thresholds solely on public opinion from a select group of stakeholders (e.g., domestic well users, irrigators, municipalities) in the basin, is not a scientifically-based approach nor does it consider potential effects on environmental beneficial users of groundwater. A better approach is to use 10-year baseline period of groundwater elevation data (2005-2015) to establish how groundwater conditions during that time period affect different water users across the basin**. Please document the consideration of the following when establishing minimum thresholds for chronic lowering of groundwater levels:**
  - Are groundwater elevations between 2005-2015 above the max screen depth for domestic, agriculture, municipal wells?
  - Are the proposed minimum thresholds preserving water rights? [Water Code §10720.5(b)]
  - Are the proposed minimum thresholds consistent with other state, federal or local regulatory standards? [23 CCR§354.28(b)(5)]
  - Are there environmental beneficial groundwater users that need consideration, particularly those that are legally protected under the United States Endangered Species Act or California Endangered Species Act? (See **Attachment C** in the attached letter for a list of freshwater species located in the Paso Robles Subbasin).
  - Is the equity being applied across different beneficial user groups (e.g., domestic, agriculture, municipal, environmental) when establishing minimum thresholds?
- [8.4.2.1] **Please provide a description for how the initial minimum threshold groundwater elevations for the Alluvial Aquifer (Figure 8-3) may impact environmental beneficial users of groundwater (e.g., GDEs) in the basin. When converting groundwater elevations to depth to groundwater contours, please use the USGS digital elevation model (see Attachment D in the letter).**
- [8.4.2.1] **Please make a back-up plan in the Monitoring network chapter on how the GSA will install shallow monitoring wells in the Alluvial Aquifer if confidentially agreements still prevent existing wells from being used as representative monitoring wells for the Chronic Lowering of Groundwater sustainability indicator.**
- [8.4.2.5] Depletions of interconnected surface waters do exist in the Paso Robles Subbasin (Figure 5-17). Depletions of surface water were also estimated in Section 5.5.1, and the statement that "there are no current minimum thresholds or undesirable

results "for interconnected surface water" is inadequate and goes against SGMA requirements. **Thus, there is a need to establish sustainable management criteria for interconnected surface waters in the basin. (See further comments in letter regarding Interconnected Surface Waters).**

- [8.4.2.7] The description of how the groundwater elevation minimum thresholds affect ecological land uses and users (Section 8.4.2.7 – p.17) is inadequate for the following reasons:
    - The draft GSP has failed to describe current and historical groundwater conditions with GDE areas. Thus, it is impossible to assess how the proposed minimum thresholds relate to historical groundwater conditions in the GDE and whether potential adverse effects could occur to the GDEs as a result of groundwater conditions.
    - Legally protected species located with GDEs have not been identified. Thus, it is impossible to evaluate whether federal, state, or local standards exist for groundwater elevations needed to protect these listed species (see Section 8.4.2.8).
- [8.4.3.1] Under SGMA, Measurable Objectives are to be established to achieve the sustainability goal of the basin within 20 years of Plan implementation [23 CCR § 354.30 (a)]. **Please modify the methodology for setting measurable objectives for groundwater levels (p.18-19) so that it helps attain the sustainability goal defined on p. 4 (Section 8.2):** "sustainably manage the groundwater resources of the Paso Robles Subbasin for <u>long-term community, financial, and environmental benefit of residents and business in the Subbasin</u>. This GSP outlines the approach to achieve a sustainable groundwater resource free of undesirable results within 20 years, while maintaining the unique cultural, community, and business aspects of the Subbasin. In adopting this GSP, it is the express goal of the GSAs to <u>balance the needs of all groundwater users in the Subbasin, within the sustainable limits of the Subbasin's resources</u>."
- [8.4.4.1] **Please elaborate how the 15% exceedance criteria balances the interests of environmental beneficial users in comparison with other groundwater users in the basin.**

<u>8.9 Depletion of Interconnected Surface Water Sustainable Management Criteria</u>

- [8.9.1] According to Chapter 5, interconnected surface waters exist in the Paso Robles Subbasin (Figure 5-17). Depletions of surface water were also estimated in Section 5.5.1. While there is certainly data gaps and a need for additional shallow monitoring wells in the Alluvial aquifer to map ISWs, there is also a need to enhancing monitoring of stream flow and vertical groundwater gradients by installing more stream. SGMA is based on best available science and adaptive management**, thus there should be an attempt to identify some minimum thresholds for ISWs,** which are to be quantified by "The location, quantity, and timing of depletions of interconnected surface water" [23 CCR §354.28(c)(6)(A)].
- [8.9.2] There is a need to evaluate potential effects on beneficial uses of surface and groundwater. **Please refer to Attachment C for a list of freshwater species in Paso Robles Subbasin that may be exist within ISWs. We recommend that after identifying which freshwater species exist in your basin, especially**

federal and state listed species, that you contact staff at the Department of Fish and Wildlife (DFW), United States Fish and Wildlife Service (USFWS) and/or National Marine Fisheries Services (NMFS) to obtain their input on the groundwater and surface water needs of the organisms on the freshwater species list. Because effects to plants and animals are difficult and sometimes impossible to reverse, we recommend erring on the side of caution to preserve sufficient groundwater conditions to sustain GDEs and ISWs.

<u>Appendix B: Methodology for Identifying Potential Groundwater Dependent Ecosystems - Environmental User Checklist (Attachment A) Items 5-14:</u>

- For clarification, iGDEs are mapped polygons in DWR's NC dataset.
- Please specify what field verification methods (e.g., isotope analysis, enhanced shallow groundwater monitoring) will be used to definitively determine whether potential GDEs are true GDEs.
- It is highly advised that multiple depth to groundwater measurements are used to verify whether an iGDE (or NC dataset polygon) is connected to groundwater, so that fluctuations in the groundwater regime can be adequately represented. The analysis described on p.7 to create Figure B-3 only relies on Spring 2017 depth data, which is also after the Jan 1, 2015 SGMA benchmark date. Also, according to the shallow monitoring well data gaps described in Chapter 5 and 7, there is insufficient data to confidently remove data for NC polygons that are >5km away from a shallow well. See Attachment D of this letter for six best practices when using groundwater data to verify the NC dataset.
- The NC dataset needs to be groundtruthed with aerial photography to screen for changes in land use that many not be reflected in the NC dataset (e.g., recent development, cultivated agricultural land, obvious human-made features).
- Grouping multiple GDE polygons into larger units by location (proximity to each other) and principal aquifer will simplify the process of evaluating potential effects on GDE due to groundwater conditions under GSP Chapter 7: Sustainable Management Criteria.

- Groundwater conditions within GDEs should be briefly described within the portion of the Basin Setting Section where GDEs are being identified.
- Not all GDEs are created equal. Some GDEs may contain legally protected species or ecologically rich communities, whereas other GDEs may be highly degraded with little conservation value. Including a description of the types of species (protected status, native versus non-native), habitat, and environmental beneficial uses (Refer to **Attachment C** for a list of freshwater species found in the Paso Robles Subbasin and refer to Worksheet 2, p.74 of GDE Guidance Document) can be helpful in assigning an ecological value to the GDEs. Identifying an ecological value of each GDE can help prioritize limited resources when considering GDEs as well as prioritizing legally protected species or habitat that may need special consideration when setting sustainable management criteria.
- Decisions to remove, keep, or add polygons from the NC dataset into a basin GDE map should be based on best available science in a manner that promotes transparency and accountability with stakeholders. Any polygons that are removed, added, or kept should be inventoried in the submitted shapefile to DWR, and mapped in the plan. **We**

recommend revising Figure 4-11, Appendix B, and including it in Chapter 5 to reflect this change.

Attachment C

Freshwater Species Located in the Paso Robles Subbasin

To assist in identifying the beneficial users of surface water necessary to assess the undesirable result "depletion of interconnected surface waters", Attachment C provides a list of freshwater species located in the Paso Robles Subbasin. To produce the freshwater species list, we used ArcGIS to select features within the California Freshwater Species Database version 2.0.9 within the Paso Robles groundwater basin boundary. This database contains information on ~4,000 vertebrates, macroinvertebrates and vascular plants that depend on fresh water for at least one stage of their life cycle. The methods used to compile the California Freshwater Species Database can be found in Howard et al. 2015[2]. The spatial database contains locality observations and/or distribution information from ~400 data sources. The database is housed in the California Department of Fish and Wildlife's BIOS[3] as well as on The Nature Conservancy's science website[4].

Scientific Name	Common Name	Legally Protected Status		
		Federal	State	Other
BIRD				
Actitis macularius	Spotted Sandpiper			
Aechmophorus clarkii	Clark's Grebe			
Aechmophorus occidentalis	Western Grebe			
Agelaius tricolor	Tricolored Blackbird	Bird of Conservation Concern	Special Concern	BSSC - First priority
Aix sponsa	Wood Duck			
Anas americana	American Wigeon			
Anas clypeata	Northern Shoveler			
Anas crecca	Green-winged Teal			
Anas cyanoptera	Cinnamon Teal			
Anas platyrhynchos	Mallard			
Anas strepera	Gadwall			
Anser albifrons	Greater White-fronted Goose			
Ardea alba	Great Egret			
Ardea herodias	Great Blue Heron			
Aythya affinis	Lesser Scaup			
Aythya collaris	Ring-necked Duck			
Aythya valisineria	Canvasback		Special	
Bucephala albeola	Bufflehead			
Bucephala clangula	Common Goldeneye			
Butorides virescens	Green Heron			

[2] Howard, J.K. et al. 2015. Patterns of Freshwater Species Richness, Endemism, and Vulnerability in California. PLoSONE, 11(7). Available at: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0130710
[3] California Department of Fish and Wildlife BIOS: https://www.wildlife.ca.gov/data/BIOS
[4] Science for Conservation: https://www.scienceforconservation.org/products/california-freshwater-species-database

Calidris mauri	Western Sandpiper			
Chen caerulescens	Snow Goose			
Chen rossii	Ross's Goose			
Chroicocephalus philadelphia	Bonaparte's Gull			
Cistothorus palustris palustris	Marsh Wren			
Egretta thula	Snowy Egret			
Fulica americana	American Coot			
Gallinago delicata	Wilson's Snipe			
Gallinula chloropus	Common Moorhen			
Geothlypis trichas trichas	Common Yellowthroat			
Haliaeetus leucocephalus	Bald Eagle	Bird of Conservatio n Concern	Endangered	
Icteria virens	Yellow-breasted Chat		Special Concern	BSSC - Third priority
Lophodytes cucullatus	Hooded Merganser			
Megaceryle alcyon	Belted Kingfisher			
Mergus merganser	Common Merganser			
Mergus serrator	Red-breasted Merganser			
Numenius americanus	Long-billed Curlew			
Nycticorax nycticorax	Black-crowned Night-Heron			
Oxyura jamaicensis	Ruddy Duck			
Pandion haliaetus	Osprey		Watch list	
Pelecanus erythrorhynchos	American White Pelican		Special Concern	BSSC - First priority
Phalacrocorax auritus	Double-crested Cormorant			
Podiceps nigricollis	Eared Grebe			
Podilymbus podiceps	Pied-billed Grebe			
Porzana carolina	Sora			
Rallus limicola	Virginia Rail			
Recurvirostra americana	American Avocet			
Riparia riparia	Bank Swallow		Threatened	
Setophaga petechia	Yellow Warbler			BSSC - Second priority
Tachycineta bicolor	Tree Swallow			
Tringa melanoleuca	Greater Yellowlegs			
Tringa solitaria	Solitary Sandpiper			
Vireo bellii	Bell's Vireo			
Vireo bellii pusillus	Least Bell's Vireo	Endangered	Endangered	

Xanthocephalus xanthocephalus	Yellow-headed Blackbird		Special Concern	BSSC - Third priority
CRUSTACEAN				
Branchinecta lynchi	Vernal Pool Fairy Shrimp	Threatened	Special	IUCN - Vulnerable
Cyprididae fam.	Cyprididae fam.			
Hyalella spp.	Hyalella spp.			
Pacifastacus spp.	Pacifastacus spp.			
FISH				
Oncorhynchus mykiss - SCCC	South Central California coast steelhead	Threatened	Special Concern	Vulnerable - Moyle 2013
Catostomus occidentalis mnioltiltus	Monterey sucker			Least Concern - Moyle 2013
Catostomus occidentalis occidentalis	Sacramento sucker			Least Concern - Moyle 2013
Cottus gulosus	Riffle sculpin		Special	Near-Threatene d - Moyle 2013
Entosphenus tridentata ssp. 1	Pacific lamprey		Special	Near-Threatene d - Moyle 2013
Lavinia exilicauda exilicauda	Sacramento hitch		Special	Near-Threatene d - Moyle 2013
Lavinia exilicauda harengeus	Monterey hitch		Special	Vulnerable - Moyle 2013
Oncorhynchus mykiss irideus	Coastal rainbow trout			Least Concern - Moyle 2013
Orthodon microlepidotus	Sacramento blackfish			Least Concern - Moyle 2013
Ptychocheilus grandis	Sacramento pikeminnow			Least Concern - Moyle 2013
Oncorhynchus mykiss - SCCC	South Central California coast steelhead	Threatened	Special Concern	Vulnerable - Moyle 2013
HERP				

Actinemys marmorata marmorata	Western Pond Turtle		Special Concern	ARSSC
Ambystoma californiense californiense	California Tiger Salamander	Threatened	Threatened	ARSSC
Anaxyrus boreas boreas	Boreal Toad			
Anaxyrus boreas halophilus	California Toad			ARSSC
Anaxyrus californicus	Arroyo Toad	Endangered	Special Concern	ARSSC
Pseudacris cadaverina	California Treefrog			ARSSC
Pseudacris hypochondriaca	Baja California Treefrog			
Pseudacris regilla	Northern Pacific Chorus Frog			
Rana boylii	Foothill Yellow-legged Frog	Under Review in the Candidate or Petition Process	Special Concern	ARSSC
Rana draytonii	California Red-legged Frog	Threatened	Special Concern	ARSSC
Spea hammondii	Western Spadefoot	Under Review in the Candidate or Petition Process	Special Concern	ARSSC
Taricha torosa	Coast Range Newt		Special Concern	ARSSC
Thamnophis hammondii hammondii	Two-striped Gartersnake		Special Concern	ARSSC
Thamnophis sirtalis infernalis	California Red-sided Gartersnake			Not on any status lists
Thamnophis sirtalis sirtalis	Common Gartersnake			
INSECT & OTHER INVERT				
Acentrella spp.	Acentrella spp.			
Agabus spp.	Agabus spp.			
Ambrysus mormon				Not on any status lists
Antocha spp.	Antocha spp.			
Argia emma	Emma's Dancer			
Argia lugens	Sooty Dancer			
Argia spp.	Argia spp.			
Argia vivida	Vivid Dancer			
Baetidae fam.	Baetidae fam.			
Baetis spp.	Baetis spp.			

Berosus punctatissimus				Not on any status lists
Berosus spp.	Berosus spp.			
Callibaetis spp.	Callibaetis spp.			
Centroptilum spp.	Centroptilum spp.			
Chaetarthria bicolor				Not on any status lists
Chaetarthria ochra				Not on any status lists
Cheumatopsyche spp.	Cheumatopsyche spp.			
Chironomidae fam.	Chironomidae fam.			
Chironomus spp.	Chironomus spp.			
Cladotanytarsus spp.	Cladotanytarsus spp.			
Coenagrionidae fam.	Coenagrionidae fam.			
Corisella spp.	Corisella spp.			
Corixidae fam.	Corixidae fam.			
Cricotopus spp.	Cricotopus spp.			
Dicrotendipes spp.	Dicrotendipes spp.			
Dytiscidae fam.	Dytiscidae fam.			
Enallagma civile	Familiar Bluet			
Enallagma cyathigerum				Not on any status lists
Enochrus carinatus				Not on any status lists
Enochrus cristatus				Not on any status lists
Enochrus piceus				Not on any status lists
Enochrus pygmaeus				Not on any status lists
Enochrus spp.	Enochrus spp.			
Ephemerella spp.	Ephemerella spp.			
Ephemerellidae fam.	Ephemerellidae fam.			
Ephydridae fam.	Ephydridae fam.			
Eukiefferiella spp.	Eukiefferiella spp.			
Fallceon quilleri	A Mayfly			
Graptocorixa spp.	Graptocorixa spp.			
Gyrinus spp.	Gyrinus spp.			
Helichus spp.	Helichus spp.			
Helicopsyche spp.	Helicopsyche spp.			
Hetaerina americana	American Rubyspot			
Hydrochus spp.	Hydrochus spp.			
Hydrophilidae fam.	Hydrophilidae fam.			
Hydroporus spp.	Hydroporus spp.			
Hydropsyche spp.	Hydropsyche spp.			
Hydropsychidae fam.	Hydropsychidae fam.			
Hydroptila spp.	Hydroptila spp.			
Hydryphantidae fam.	Hydryphantidae fam.			

Ischnura spp.	Ischnura spp.			
Laccobius ellipticus				Not on any status lists
Laccobius spp.	Laccobius spp.			
Laccophilus maculosus				Not on any status lists
Lepidostoma spp.	Lepidostoma spp.			
Leptoceridae fam.	Leptoceridae fam.			
Libellula saturata	Flame Skimmer			
Limnophyes spp.	Limnophyes spp.			
Liodessus obscurellus				Not on any status lists
Macromia magnifica	Western River Cruiser			
Malenka spp.	Malenka spp.			
Microcylloepus spp.	Microcylloepus spp.			
Microtendipes spp.	Microtendipes spp.			
Nectopsyche spp.	Nectopsyche spp.			
Ochthebius spp.	Ochthebius spp.			
Ophiogomphus bison	Bison Snaketail			
Optioservus spp.	Optioservus spp.			
Oreodytes spp.	Oreodytes spp.			
Paracloeodes minutus	A Small Minnow Mayfly			
Paracymus spp.	Paracymus spp.			
Paratanytarsus spp.	Paratanytarsus spp.			
Peltodytes spp.	Peltodytes spp.			
Phaenopsectra spp.	Phaenopsectra spp.			
Plathemis lydia	Common Whitetail			
Postelichus spp.	Postelichus spp.			
Procladius spp.	Procladius spp.			
Pseudochironomus spp.	Pseudochironomus spp.			
Psychodidae fam.	Psychodidae fam.			
Rheotanytarsus spp.	Rheotanytarsus spp.			
Rhyacophila spp.	Rhyacophila spp.			
Sigara mckinstryi	A Water Boatman			Not on any status lists
Sigara spp.	Sigara spp.			
Simuliidae fam.	Simuliidae fam.			
Simulium spp.	Simulium spp.			
Sperchon spp.	Sperchon spp.			
Sperchontidae fam.	Sperchontidae fam.			
Stictotarsus spp.	Stictotarsus spp.			
Sweltsa spp.	Sweltsa spp.			
Tanytarsus spp.	Tanytarsus spp.			
Tipulidae fam.	Tipulidae fam.			
Tramea lacerata	Black Saddlebags			
Tricorythodes spp.	Tricorythodes spp.			

Wormaldia spp.	Wormaldia spp.			
MAMMAL				
Castor canadensis	American Beaver			Not on any status lists
MOLLUSK				
Gyraulus spp.	Gyraulus spp.			
Lymnaea spp.	Lymnaea spp.			
Menetus opercularis	Button Sprite			CS
Physa spp.	Physa spp.			
Pisidium spp.	Pisidium spp.			
Planorbidae fam.	Planorbidae fam.			
PLANT				
Alnus rhombifolia	White Alder			
Ammannia coccinea	Scarlet Ammannia			
Anemopsis californica	Yerba Mansa			
Azolla filiculoides	NA			
Baccharis salicina				Not on any status lists
Bolboschoenus maritimus paludosus	NA			Not on any status lists
Callitriche heterophylla bolanderi	Large Water-starwort			
Callitriche marginata	Winged Water-starwort			
Castilleja minor minor	Alkali Indian-paintbrush			
Castilleja minor spiralis	Large-flower Annual Indian-paintbrush			
Cotula coronopifolia	NA			
Crassula aquatica	Water Pygmyweed			
Crypsis vaginiflora	NA			
Cyperus erythrorhizos	Red-root Flatsedge			
Eleocharis macrostachya	Creeping Spikerush			
Eleocharis parishii	Parish's Spikerush			
Epilobium campestre	NA			Not on any status lists
Epilobium cleistogamum	Cleistogamous Spike-primrose			
Eryngium spinosepalum	Spiny Sepaled Coyote-thistle		Special	CRPR - 1B.2
Eryngium vaseyi vaseyi	Vasey's Coyote-thistle			Not on any status lists
Euthamia occidentalis	Western Fragrant Goldenrod			
Helenium puberulum	Rosilla			
Hydrocotyle verticillata verticillata	Whorled Marsh-pennywort			
Juncus dubius	Mariposa Rush			
Juncus effusus effusus	NA			

Juncus luciensis	Santa Lucia Dwarf Rush		Special	CRPR - 1B.2
Juncus macrophyllus	Longleaf Rush			
Juncus xiphioides	Iris-leaf Rush			
Limosella aquatica	Northern Mudwort			
Marsilea vestita vestita	NA			Not on any status lists
Mimulus guttatus	Common Large Monkeyflower			
Mimulus latidens	Broad-tooth Monkeyflower			
Mimulus pilosus				Not on any status lists
Montia fontana fontana	Fountain Miner's-lettuce			
Navarretia prostrata	Prostrate Navarretia		Special	CRPR - 1B.1
Paspalum distichum	Joint Paspalum			
Persicaria lapathifolia				Not on any status lists
Persicaria maculosa	NA			Not on any status lists
Phacelia distans	NA			
Pilularia americana	NA			
Plagiobothrys acanthocarpus	Adobe Popcorn-flower			
Plantago elongata elongata	Slender Plantain			
Platanus racemosa	California Sycamore			
Psilocarphus brevissimus brevissimus	Dwarf Woolly-heads			
Ranunculus aquatilis diffusus				Not on any status lists
Rorippa curvisiliqua curvisiliqua	Curve-pod Yellowcress			
Rumex conglomeratus	NA			
Rumex salicifolius salicifolius	Willow Dock			
Salix exigua exigua	Narrowleaf Willow			
Salix laevigata	Polished Willow			
Salix lasiolepis lasiolepis	Arroyo Willow			
Schoenoplectus americanus	Three-square Bulrush			
Schoenoplectus pungens longispicatus	Three-square Bulrush			
Schoenoplectus pungens pungens	NA			
Schoenoplectus saximontanus	Rocky Mountain Bulrush			
Typha domingensis	Southern Cattail			

Typha latifolia	Broadleaf Cattail			
Veronica anagallis-aquatica	NA			
Veronica catenata	NA			Not on any status lists

Attachment D

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IDENTIFYING GDEs UNDER SGMA
Best Practices for using the NC Dataset

The Sustainable Groundwater Management Act (SGMA) requires that groundwater dependent ecosystems (GDEs) be identified in Groundwater Sustainability Plans (GSPs). The California Department of Water Resources (DWR) has provided the Natural Communities Commonly Associated with Groundwater Dataset (NC Dataset) online (https://gis.water.ca.gov/app/NCDatasetViewer/) to help Groundwater Sustainability Agencies (GSAs) identify GDEs within a groundwater basin. The NC Dataset is a compilation of 48 publicly available State and Federal agency datasets that map vegetation, wetlands, springs, and seeps commonly associated with groundwater in California[5].

The NC Dataset indicates the vegetation and wetland features that are good indicators of a GDE. The NC dataset is a starting point, and it is the responsibility of GSAs to utilize best available science and local knowledge on the hydrology, geology, and groundwater levels to verify its presence or absence, as well as whether a connection to groundwater in an aquifer exists (Figure 1)[6]. Detailed guidance on identifying GDEs within a groundwater basin from the NC dataset is available[7]. This document highlights six best practices that GSAs and their consultants can apply when using local groundwater data to confirm a connection to groundwater for the NC Dataset.

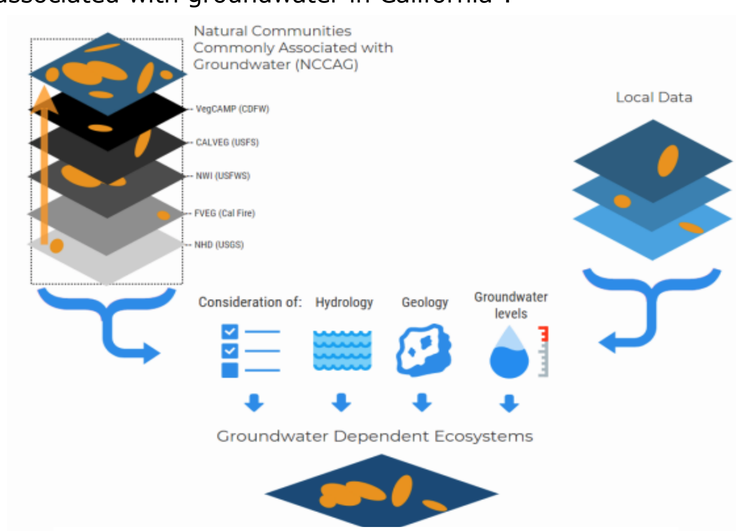

Figure 1. Considerations for GDE identification. Source: DWR[2]

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[5] For more details on the mapping methods, refer to: Klausmeyer, K., J. Howard, T. Keeler-Wolf, K. Davis-Fadtke, R. Hull, A. Lyons. 2018. Mapping Indicators of Groundwater Dependent Ecosystems in California: Methods Report. San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/iGDE_data_paper_20180423.pdf

[6] *California Department of Water Resources (DWR). 2018. Summary of the "Natural Communities Commonly Associated with Groundwater" Dataset and Online Web Viewer. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Data-and-Tools/Files/Statewide-Reports/Natural-Communities-Dataset-Summary-Document.pdf*

[7] "Groundwater Dependent Ecosystems under the Sustainable Groundwater Management Act: Guidance for Preparing Groundwater Sustainability Plans" is available at https://groundwaterresourcehub.org/gde-tools/gsp-guidance-document/

BEST PRACTICE #1. Connection to an Aquifer

Groundwater basins can be comprised of one continuous aquifer or multiple aquifers stacked on top of each other. Basins with a stacked series of aquifers may have varying levels of pumping across aquifers in the basin, depending on the production capacity or water quality associated with each aquifer. If pumping is concentrated in deeper aquifers, SGMA still requires GSAs to sustainably manage groundwater resources in shallow aquifers, such as perched aquifers, that support springs, surface water, and groundwater dependent ecosystems (Figure 2). This is because the goal of SGMA is to sustainably manage groundwater resources for current and future social, economic, and environmental benefits, and while groundwater pumping may not be currently occurring in a shallower aquifer, it could be in the future. For example, if a shallow perched aquifer is currently not being pumped due to poor water quality resulting from irrigation return flow, producing this water will become more appealing and economically viable in future years as pumping restrictions are placed on the deeper production aquifers in the basin to meet the sustainable yield and criteria. Thus, identifying GDEs in the basin should done irrespective to the amount of current pumping occurring in a particular aquifer, so that future impacts on GDEs due to new production can be avoided and a GSA's legal risk be minimized. A good rule of thumb to follow is: *if groundwater can be pumped from a well - it's an aquifer*.

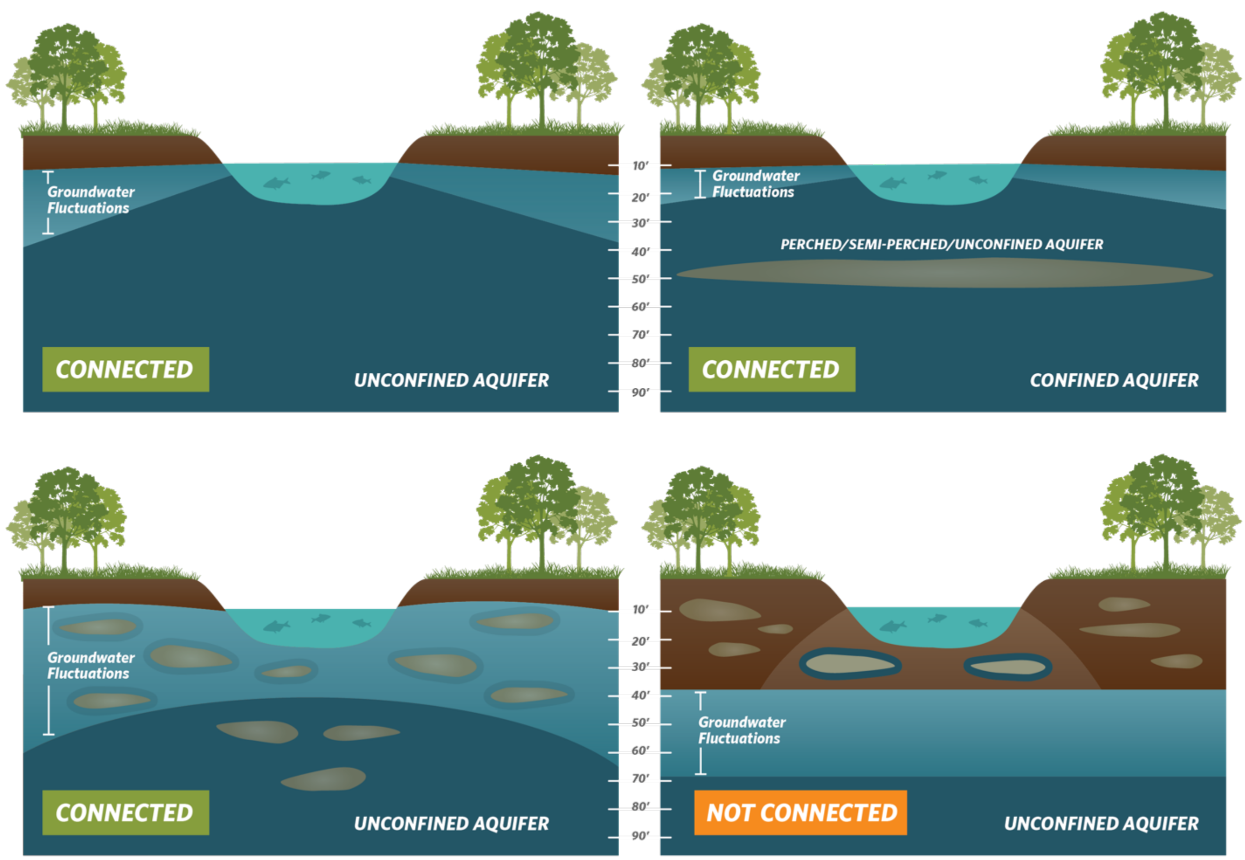

Figure 2. Confirming whether an ecosystem is connected to groundwater in a principal aquifer. Top: (Left) Depth to Groundwater in the aquifer under the ecosystem is an unconfined aquifer with depth to groundwater fluctuating seasonally and interannually within 30 feet from land surface. **(Right)** Depth to Groundwater in the *shallow* aquifer is connected to overlying ecosystem. Pumping predominately occurs in the confined aquifer, but pumping is possible in the *shallow* aquifer. **Bottom: (Left)** Depth to groundwater fluctuations are seasonally and interannually large, however, clay layers in the near surface prolong the ecosystems connection to groundwater. (Right) Groundwater is disconnected from surface water, and any water in the vadose (unsaturated) zone is *due to* direct recharge from precipitation and indirect recharge under surface water feature.

BEST PRACTICE #2. Characterize Groundwater Conditions

SGMA requires GSAs to describe current and historical groundwater conditions when identifying GDEs [23 CCR §354.16(g)]. Relying solely on the SGMA benchmark date (January 1, 2015) or any other single point in time to characterize groundwater conditions (e.g., depth to groundwater) is inadequate because managing groundwater conditions with data from one time point fails to capture the seasonal and interannual variability (i.e., wet, average, dry, and drought years) that is characteristic of California's climate. DWR's Best Management Practices document on water budgets[8] recommends using 10 years of water supply and water budget information to describe how historical conditions have impacted the operation of the basin within sustainable yield, implying that a baseline[9] could be determined based on data between 2005 and 2015.

GDEs existing on the earth's surface depend on groundwater levels being close enough to the land surface to interconnect with surface water systems or plant rooting networks. The most practical approach[10] for a GSA to assess whether polygons in the NC dataset are connected to groundwater is to rely on groundwater elevation data. As detailed in the GDE guidance document[2], one of the key factors to consider when mapping GDEs is to contour depth to groundwater in the aquifer that is in direct contact with the ecosystem.

Groundwater levels fluctuate over time and space due to California's Mediterranean climate (dry summers and wet winters), climate change (flood and drought years), and subsurface heterogeneity in the subsurface (Figure 3). Many of California's GDEs have adapted to dealing with intermittent periods of water stress, however, if these groundwater conditions are prolonged adverse impacts to GDEs can result. While depth to groundwater levels within 30 feet[2] are generally accepted as being a proxy for confirming that polygons in the NC dataset are connected to groundwater, it is highly advised that fluctuations in the groundwater regime are taken into consideration and to characterize the seasonal and interannual groundwater variability in GDEs. Utilizing groundwater data from one point in time can misrepresent groundwater levels required by GDEs, and inadvertently result in adverse impacts to the GDEs. Time series data on groundwater elevations and depths are available on the SGMA Data Viewer[11]. However, if insufficient data are available to describe groundwater conditions within polygons from the NC dataset, it is highly advised that they be included in the GSP until data gaps are reconciled in the monitoring network (See Best Practice #6).

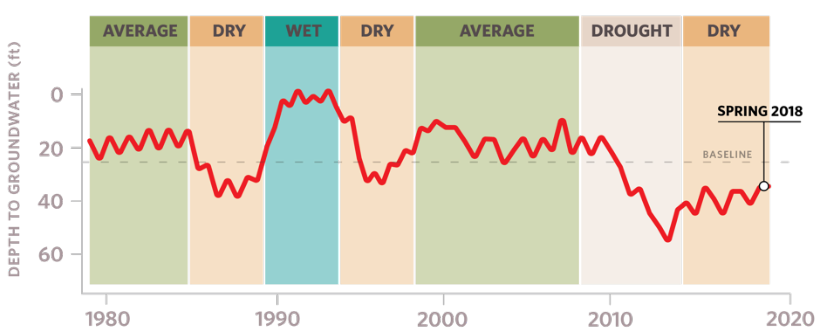

Figure 3. Example seasonality and interannual variability in depth to groundwater over time. Selecting one point in time, such as Spring 2018, to characterize groundwater conditions in GDEs fails to capture what groundwater conditions are necessary to maintain the ecosystem status into the future so adverse impacts are avoided.

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[8] DWR. 2016. Water Budget Best Management Practice. Available at: https://water.ca.gov/LegacyFiles/groundwater/sgm/pdfs/BMP_Water_Budget_Final_2016-12-23.pdf

[9] *Baseline is defined under the GSP regulations as "historic information used to project future conditions for hydrology, water demand, and availability of surface water and to evaluate potential sustainable management practices of a basin." [23 CCR §351(e)]*

[10] Groundwater reliance can also be confirmed via stable isotope analysis and geophysical surveys. For more information see The GDE Assessment Toolbox (Appendix IV, GDE Guidance Document for GSPs - link in footnote above).

[11] *SGMA Data Viewer: https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer*

BEST PRACTICE #3. Ecosystems Can Rely on Both Surface and Groundwater

GDEs can rely on groundwater for all or some of its requirements, using multiple water sources simultaneously and at different temporal or spatial scales. The presence of non-groundwater sources (e.g., surface water, soil moisture in the vadose zone, applied water, treated wastewater effluent, urban stormwater, irrigated return flow) within and around NC polygons does not preclude the possibility that a connection to groundwater exists. SGMA defines GDEs as "ecological communities and species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface" [23 CCR §351(m)]. Hence, depth to groundwater data should be used to identify whether NC polygons are connected to groundwater and should be considered GDEs.

GSAs are only responsible for impacts to GDEs resulting from groundwater conditions in the basin, so if adverse impacts to GDEs result from the diversion of applied water, treated wastewater, or irrigation return flow away from the GDE, then those impacts will be evaluated by other permitting requirements (e.g., CEQA) and would not be the responsibility of the GSA. However, if adverse impacts occur to the GDE due to changing groundwater conditions resulting from pumping or groundwater management activities, then the GSA would be responsible (Figure 4).

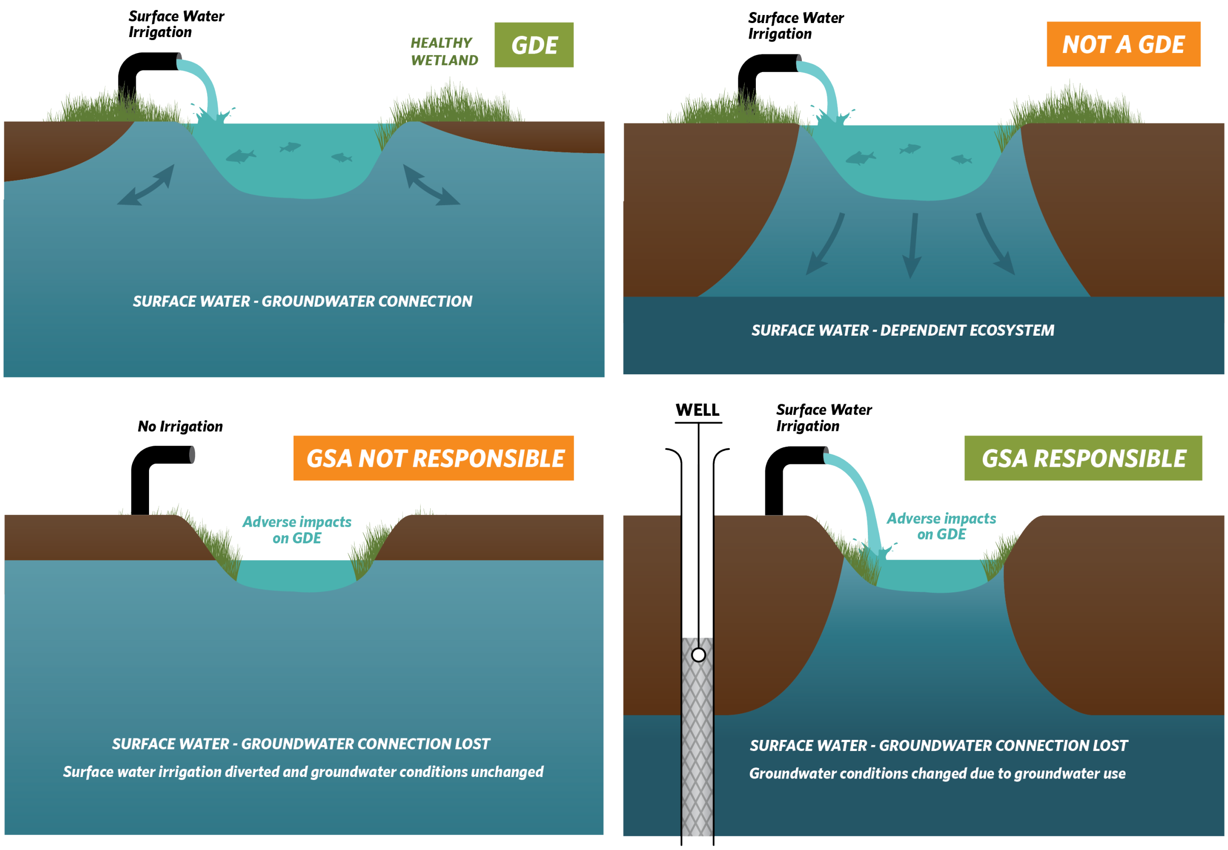

Figure 4. Ecosystems can depend on multiple sources of water. Top: (Left) Surface water and groundwater are interconnected, such that a connection to groundwater exists for the ecosystem. **(Right)** Ecosystems that are only reliant on non-groundwater sources are not groundwater-dependent. **Bottom: (Left)** An ecosystem that was once dependent on an interconnected surface water and groundwater connection, but then loses this connection due to surface water diversions would not be the GSA's responsibility. **(Right)** Groundwater dependent ecosystems in places where a surface water – groundwater connection existed, but then loose that connection due to groundwater pumping would be the GSA's responsibility.

BEST PRACTICE #4. Select Representative Groundwater Wells

Identifying GDEs in a basin require that groundwater conditions are characterized to confirm whether polygons in the NC dataset are connected to an underlying aquifer. Once an aquifer has been identified, representative groundwater wells are necessary to characterize groundwater conditions (Figure 5). It is particularly important to consider the subsurface heterogeneity around NC polygons, especially near surface water features where groundwater and surface water interactions occur around heterogeneous stratigraphic units or aquitards formed by fluvial deposits. The following selection criteria can help ensure groundwater levels are representative of conditions within the GDE area:

- Choose wells that are within 5 kilometers (3.1 miles) of the NC Dataset polygons, and more likely to reflect the local conditions relevant to the ecosystem. NC dataset polygons that are farther than 5 km from a well should not be excluded because of interpolated groundwater depth conditions, as there is insufficient information to make that determination. Instead, they should be retained as potential GDEs until there is sufficient data to determine whether or not the NC Dataset polygon is connected to groundwater and is a GDE.

- Choose wells that are screened within the surficial unconfined aquifer and capable of measuring the true water table.

- Avoid relying on wells that have insufficient well information on the screened well depth interval for excluding GDEs because they could be providing data on the wrong aquifer.

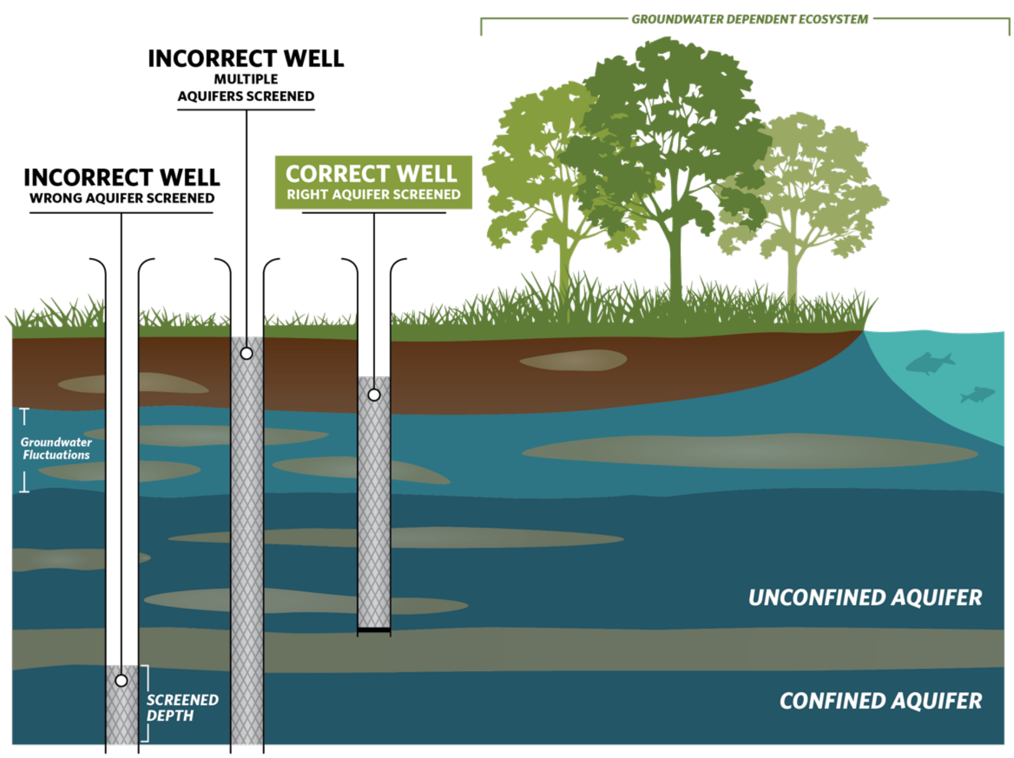

Figure 5. Selecting representative wells to characterize groundwater conditions in the aquifers directly connected with GDEs.

BEST PRACTICE #5. Contouring Groundwater Elevations

A common, but error prone practice, to contour depth to groundwater over a large area is to interpolate depth to groundwater measurements at monitoring wells. This practice causes errors when the land surface contains features like streams and wetlands depressions because it assumes the land surface is constant across the landscape and depth to groundwater is constant below these low-lying areas (Figure 6). A more accurate approach is to interpolate **groundwater elevations** at monitoring wells to get an estimate of groundwater elevation across the landscape. This layer can then be subtracted from the land surface elevation from a Digital Elevation Model (DEM)[12] to estimate depth to groundwater contours across the landscape (Figure 7). This will provide a much more accurate contours of depth to groundwater along streams and other land surface depressions where GDEs are commonly found.

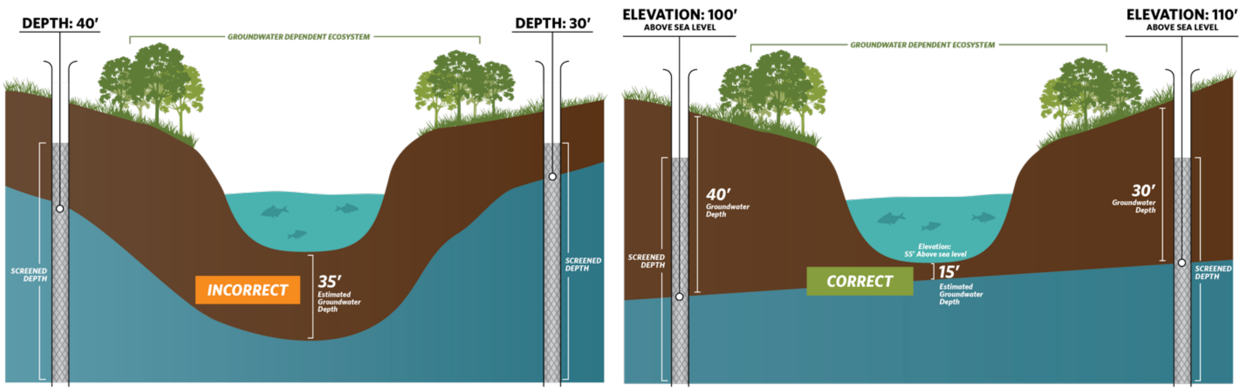

Figure 6. Contouring depth to groundwater around surface water features and GDEs. (Left) Groundwater level interpolation using depth to groundwater data from monitoring wells. **(Right)** Groundwater level interpolation using groundwater elevation data from monitoring wells and DEM data.

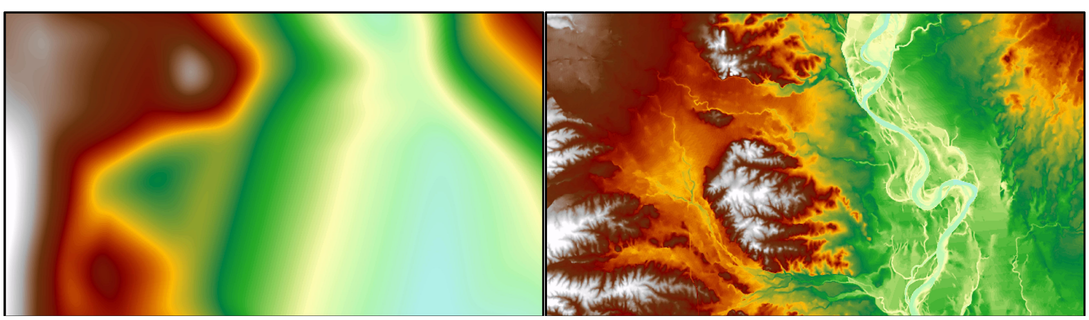

Figure 7. Depth to Groundwater Contours in Northern California. (Left) Contours were interpolated using depth to groundwater measurements determined at each well. **(Right)** Contours were determined by interpolating groundwater elevation measurements at each well and superimposing ground surface elevation from DEM spatial data to generate depth to groundwater contours. The image on the right shows a more accurate depth to groundwater estimate because it takes the local topography and elevation changes into account.

[12] *Digital Elevation Model data is available at: https://catalog.data.gov/dataset/usgs-national-elevation-dataset-ned-1-meter-downloadable-data-collection-from-the-national-map-*

BEST PRACTICE #6. Best Available Science

Adaptive management is embedded within SGMA and provides a process to work toward sustainability over time by beginning with the best available information to make initial decisions, monitoring the results of those decisions, and using the data collected through monitoring to revise decisions in the future. In many situations, the hydrologic connection of NC dataset polygons will not initially be clearly understood if site-specific groundwater monitoring data are not available. If sufficient data are not available in time for the 2020/2022 plan, **The Nature Conservancy strongly advises that questionable polygons from the NC dataset be included in the GSP until data gaps are reconciled in the monitoring network.** Erring on the side of caution will help minimize inadvertent impacts to GDEs as a result of groundwater use and management actions during SGMA implementation.

KEY DEFINITIONS

Groundwater basin is an aquifer or stacked series of aquifers with reasonably well-defined boundaries in a lateral direction, based on features that significantly impede groundwater flow, and a definable bottom. *23 CCR §341(g)(1)*

Groundwater dependent ecosystem (GDE) are ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface. *23 CCR §351(m)*

Interconnected surface water (ISW) surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted. *23 CCR §351(o)*

Principal aquifers are aquifers or aquifer systems that store, transmit, and yield significant or economic quantities of groundwater to wells, springs, or surface water systems. *23 CCR §351(aa)*

ABOUT US

The Nature Conservancy is a science-based nonprofit organization whose mission is *to conserve the lands and waters on which all life depends*. To support successful SGMA implementation that meets the future needs of people, the economy, and the environment, TNC has developed tools and resources (www.groundwaterresourcehub.org) intended to reduce costs, shorten timelines, and increase benefits for both people and nature.

Comments of Chapter 6,7 & 8

I would like to submit the following comments on these Chapters.

Minimum Thresholds

I am against using the 2017 well level reading as the Minimum Thresholds. This will put the GSP at risk of going below the minimums before the GSP even starts to implement actions in the Basin. The two Water Districts, S/SJ and EPC have looked at a number of alternatives and I urge the CC Technical Staff to address this issue and set Minimum Thresholds below the 2017 levels.

Criteria for Defining Undesirable Results, 8.4.4.1

The current Chapter 8 suggest 15% as a trigger for management actions because of undesirable results. With only 12 wells in the GSP at this point, 15% of 12 wells is one perhaps two wells and is not a large enough of a sample to make decisions. I believe the number threshold of 15% is way too low. 30% might be a more realistic number. Also, as the number of wells increases in the monitoring network, the CC Technical Staff might consider a more refined methodology for determining exceedances.

The Number of Well in the Monitoring Network

It is my understanding that only 12 wells are included in the Monitoring Network at this point. Clearly this number is way too small. I am aware that Shandon/San Juan WD is working to increase this number in their area. EPC WD is also working with our Hydrologist, Paul Sorenson, to identify wells in the EPC area that can become candidates for monitoring well. EPC hopes to identify a dozen new wells that can be included. I would hope that the County GSA works on this as well.

Sustainability Goals, 8.2

The primary components of creating a Sustainability Plan for the Paso Robles Groundwater Basin are reduced extraction of groundwater and the availability of new sources of water.

It is my hope that these Chapters as well as Chapters 9 & 10 will include active management actions, programs, and recommendations that will incent pumpers to change their practices and pump less water or provide financial encouragement to farmers to fallow land which has become economically marginal.

In addition, it is my hope the CC and the GSP will help to create a political and social environment that will allow the Basin to pursue sources of 'new' water that are economically viable. The ability to have new supplemental water to offset the pumping deficit will be essential to maintaining agriculture as the economic pillar of our Basin and Community. We all use the same water and we must all participate in the solutions necessary for our Basin's health.

Policy and Survey Results

Early in the process, the CC conducted a survey of interested landowners and water users. The results were interesting but not meaningful for setting policy. The Survey was not scientific and with a small number of respondents. Questions were asked in a vacuum. It's easy to say yes to the question of would you like to see groundwater levels maintained or rise. But without consideration of the corresponding tradeoffs, the answer is meaningless.

I would encourage the CC to base their deliberations on facts and science and not preferences.

Equal Treatment

I would encourage the CC to make sure that all classes of 'extractors' are treated the same within their class and regardless of what jurisdiction they are in. Classes might be such things as agricultural pumpers, rural resident pumpers (de minimis), commercial pumpers and others. Also, any requirements of reporting usage and limits on extraction should also be the same within each class.

Access versus Availability of Groundwater

This is a simple but important distinction to these two aspects of groundwater. Access means how does a person get access to groundwater or more basically what kind of a well does one have. Availability means how much water is readily available in the Basin.

Agricultural pumpers solve their access problem on a routine basis by lowering their pumps, enhancing their equipment, drilling new wells or other efforts. It's just the price of doing business. On the other hand, agricultural users have an availability problem. How much water can our Basin support for agricultural use? That's what SGMA and GSP are all about.

De minimis users have the reverse situation. They have an access problem but not an availability problem. Because de minimis users use a relatively small amount of water, the Basin should be able to provide for their needs in the future.

However, some de minimis users do have a real access problem, their wells are going dry and this problem will likely continue until the Basin is stabilized. Many rural residents have older and/or shallow wells and groundwater levels have been declining.

I encourage the CC and the GSP to address the 'access' problem of rural residents with proposals for projects, managements actions and other efforts. A rural water company could be a cost-effective solution to wells going dry. Rural residents along with all pumpers of groundwater share the responsibility of a sustainable basin and should participate in the solutions. A GSP that does not address the needs and solutions of rural residents could be viewed as an incomplete plan.

Jerry Reaugh, personal comments, not EPC WD comments
April 15, 2019

3/15/83 P.R.Press

The main topic of conversation currently is the WEATHER. Many people are interested in the rainfall of past years so we are publishing our 113-year record.

Season	Inches	Season	Inches	Season	Inches
1869-70	11.83	1907-08	15.31	1945-46	12.05
1870-71	12.97	1908-09	24.21	1946-47	10.26
1871-72	27.02	1909-10	17.09	1947-48	10.47
1872-73	12.97	1910-11	26.64	1948-49	10.60
1873-74	20.52	1911-12	12.37	1949-50	13.74
1874-75	19.69	1912-13	8.06	1950-51	9.97
1875-76	30.12	1913-14	22.02	1951-52	18.09
1876-77	8.15	1914-15	24.96	1952-53	11.99
1877-78	30.60	1915-16	21.54	1953-54	11.22
1878-79	11.66	1916-17	18.51	1954-55	11.05
1879-80	25.12	1917-18	14.37	1955-56	17.77
1880-81	23.69	1918-19	11.91	1956-57	10.92
1881-82	7.66	1919-20	12.81	1957-58	25.10
1882-83	8.00	1920-21	13.70	1958-59	8.93
1883-84	42.40	1921-22	21.81	1959-60	9.56
1884-85	17.59	1922-23	15.45	1960-61	8.66
1885-86	19.30	1923-24	6.38	1961-62	17.23
1886-87	9.59	1924-25	12.74	1962-63	17.78
1887-88	14.30	1925-26	14.79	1963-64	10.25
1888-89	15.84	1926-27	21.91	1964-65	13.49
1889-90	30.57	1927-28	11.49	1965-66	11.83
1890-91	16.42	1928-29	9.82	1966-67	24.90
1891-92	11.93	1929-30	10.96	1967-68	8.76
1892-93	22.55	1930-31	12.13	1968-69	31.85
1893-94	5.94	1931-32	10.59	1969-70	9.17
1894-95	18.93	1932-33	9.62	1970-71	11.10
1895-96	13.14	1933-34	11.62	1971-72	7.69
1896-97	17.96	1934-35	20.77	1972-73	23.15
1897-98	4.77	1935-36	18.17	1973-74	17.42
1898-99	11.53	1936-37	20.26	1974-75	12.79
1899-00	11.66	1937-38	26.04	1975-76	5.66
1900-01	22.80	1938-39	7.51	1977-78	26.79
1901-02	12.75	1939-40	15.80	1798-79	13.95
1902-03	11.24	1940-41	30.64	1979-80	19.45
1903-04	14.51	1941-42	16.69	1980-81	12.31
1904-05	19.89	1942-43	18.37	1981-82	14.78
1905-06	15.23	1943-44	13.24	1982-83	22.63
1906-07	22.00	1944-45	13.01		

113 YEARS OF RAINFALL — the above chart was compiled from several different sources. Seasons 1869-70 to 1880-81 were taken from a chart compiled by the Chamber of Commerce. Seasons 1881-82 and 1882-83 were found in Myron Angel's History of San Luis Obispo County. 1883-84 to 1886-87 were from the Chamber of Commerce chart. Years 1887-88 to 1929-30 were archived in a government pamphlet, A Climatic Summary of the United States. Years 1930-31 to 1945-46 were from the Chamber of Commerce list and 1946-47 to present were from the city water works records.

Paso Robles Subbasin GSP
Chapter 9
Draft of May 15, 2019
Required Corrections

9.1 Introduction

- Water budgets .... Add: Reference should be made to the court mandated reduction in pumping by the City of Paso Robles, et al and the positive impact that will have on the current level of pumping.

Removed lined out portions:

To stop persistent declines in groundwater levels, ~~achieve the sustainability goal by 2040~~ and avoid undesirable results ~~through 2070~~ as required by SGMA regulations, groundwater pumping reductions will be needed. In most cases, a reduction in groundwater pumping will occur as a result of management actions, except where a new water supply is provided and used instead of pumping groundwater. ~~Projects to bring in new water supplies included in this chapter are based on pervious vetted feasibility studies.~~

Note: the goal to reach sustainability should be 2030. To achieve sustainability a reduction in overall pumping will be required.

9.2 Implementation Approach

Add:

- Expand and improve monitoring networks, e.g., the SLO County GSA will monitor water levels at public wells.

Remove:

- ~~Track the development of water supply projects.~~

Page 3:

- Present information on management actions and ~~projects~~ including . . . . . .

Add:

Because the amount of groundwater pumping in the Sub-basin is more than the estimated sustainability yield of about 61,000 AFY ....

Note: the methodology of determining 61,000 AFY needs to be described in a footnote.

Page 3 continued:

In general, management actions will be implemented in all areas ~~before projects because projects take many years to complete~~.

3rd line from the bottom of page3:

.....funds for alternative approaches ~~such as purchasing and following cropland and contributing to projects that bring in new water supplies to offset groundwater demand.~~

Page 4 Bottom Paragraph: Remove entire paragraph.

~~Any rules, ...under this GSP.~~

9.3 Level 1 Management Actions

Level 1 management actions may include:

- ~~Initiate an interference program that includes~~
  - ~~Rotating groundwater pumping on agreed schedules to optimize and reduce groundwater use.~~
  - ~~Well spacing requirements~~

9.3.1.3 Circumstances for implementation

BMPs and related outreach will be promoted ~~and implemented~~ soon after adoption of the GSP.

9.3.1.4 Public Noticing top of page 8

~~The BMPs will be promoted through a focused outreach campaign.~~

9.3.1.6 Implementation Schedule

~~Implementing BMPs will begin immediately after the GSP is adopted and when funds become available.~~

9.3.1.8 Estimated Cost

The estimated cost ....~~Monitoring of BMPs will have an estimated cost of $25,000 to $50,000.~~

9.3.2 Interference Mitigation Program

- Minimum well spacing requirements for new wells will be considered by SLO County.

9.3.2.1 Relevant Measurable Objectives

Remove this section

9.3.2.2. Expected Benefits and Evaluation of Benefits

The first paragraph comes out. Begins ~~The primary benefit~~ and ends with ~~the expected benefits.~~

The last sentence in the second paragraph (page 9) comes out. Begins ~~Isolating the effect of~~ and ends ~~in the subbasin.~~

9.3.2.3 Circumstances for implementation

Remove this section

9.3.2.4 Public Noticing

Remove this section

9.3.25 Permitting and Regulatory Process

Remove this section

9.3.2.6 Implementation Schedule

Remove this section

9.3.2.7 Legal Authority

Remove this section comes out

9.3.2.8 Estimated Cost

The existing paragraph comes out and in its place the following is inserted.

The interference mitigation program has been estimated at up to $750,000, which is deemed too expensive. Accordingly, the program components will be reviewed and revised in order to bring the cost down below $200,000.

9.3.3 Promote Stormwater Capture

First paragraph second line: Change "could" be promoted to "will" be promoted

9.3.3.1 Relevant Measure Objectives

Replace: Stormwater capture "may" benefit with "will" benefit

9.3.4 Voluntary Fallowing of Agriculture Land

Change the first sentence to: The GSAs may consider promoting voluntary fallowing of crop land to reduce overall groundwater demand.

Remove all 5 bullet points.

9.3.4.1 Relevant Measurable Objectives

The voluntary fallowing ~~program~~ would benefit........

9.3.4.2 Expected Benefits and Evaluation of Benefits

Remove all of this section

9.3.4.3 Circumstances for Implementation

Remove all of this section

9.3.4.4 Public Notice

Remove all of this section

9.3.4.5 Permitting and Regulatory Process

The land fallowing program is subject to CEQA, but only if it is a "formal program."

9.3.4.8 Estimated Cost

Remove all of this section as the estimated cost of a formal program is too expensive.

9.3.5 Groundwater Pumping Fees

Paragraph one. Add the concepts: 1) that pumping fees would be tiered, 2) that one of the goals is to reduce overall pumping in the subbasin, & 3) CASGEM data will be used as appropriate to avoid duplication.

Note: $500,000 is too expensive for the development of a fee structure lower this cost!

Page 14: ~~If needed, each GSA shall enact fees by ordinance or resolution that is materially comparable to similar levels and classes of use to the ordinance of the other GSAs.~~

9.4 Level 2 Management Actions

Remove second bullet point "Developing funding..the same reductions.

Remove last bullet point "Retirement of ....groundwater pumping.

9.4.1 Mandatory pumping reductions in specific areas

In the second line "decline ranges from 25 – 65%.

Note: How was this range determined? Requires a footnote to explain the numbers. Moreover, don't we need to know water levels first?

Items:

1. Determination of baseline pumping in specific areas based on:

    a. Area specific declines and estimated yield in that area

    b. Historical use — Explain how will historic use be determined and what evidence will be required over what period of time?

    c. Land uses and corresponding irrigation requirements

2. Remove this item.

3. Change to: The GSP should target achieving sustainability in the area of 2030 not use 2040 as the target.

The paragraph below item 3 on page 15:

Is the concept of "sustainable Yield" still being used? The rumor circulating is that it is not being used any longer.

In critical areas of the subbasin there should be an immediate ramp down of pumping.

4th line from the bottom of the paragraph – 2040 should be changed to 2030

9.4.2 Groundwater Conservation Program

The paragraphs at the bottom of page 15 & top of page 16:

These paragraphs are completely unacceptable and need to be eliminated or re-written.

The bullet points below the second paragraph on page 16:

- A tiered pumping rate structure is OK. The remainder of that point is out.
- Third bullet point is out.
- Fifth bullet point is out.
- Sixth bullet point is out.
- Seventh bullet point is out.
- Eighth bullet point is out. *de minimis* pumpers are exempt!

9.4.2.1 Tiered Pumping Fee Structure

The first and second paragraphs are out and replaced by the following:

A tiered pumping fee structure should be implemented. The thresholds that define each tier along with the fee charged for each tier would be determined in hearings, public outreach and be subject to final Board approval. The tiers and fees will be established to address areas where reduced pumping is needed. Individual groundwater pumpers may choose to switch to less water intensive crops, or implement water use efficiencies.

The fee structure and allowances may not be uniform across the Subbasin in the final groundwater conservation program. Portions of the Subbasin with localized groundwater decline may be subject to different fee structures.

9.4.2.2 Site Specific Carryover

Remove all of this section as it is unacceptable

9.4.2.3 Re-location and Transfer of Pumping Allowances

Remove all of this section as it is unacceptable

9.4.2.4 Non-Irrigated Land

Remove all the existing language and insert the underlined paragraph:

Note: This section needs to take into consideration those landowners who will achieve Quiet Title within the next several weeks some of which may or may not currently farm irrigated crops.

Owners of land that is not under irrigation will be surveyed prior to when the GSP is adopted to determine if they have plans to plant an irrigated crop or crops and, if so, would be assigned a two year provisional pumping allowance. If the landowner has not planted within two years the provisional allowance would expire; however, such landowners would have overlying rights to the reasonable beneficial use of groundwater on their parcels.

9.4.2.5 Relevant Measurable Objectives

Add the use of CASGEM data in determining the progress toward objectives.

9.4.3 Agriculture Land and Pumping Allowance Retirement

Remove all of this section on pages 20 & 21

Note: This approach leads to Owen's Valley type results.
It is in SLO County's interest to keep water with the land on which it is pumped.
Who represents the local property owners in this plan?

9.4.3.1 Relevant Measurable Objectives

Remove the second sentence.

9.4.3.2 Expected Benefits and Evaluation of Benefits

Remove the first paragraph.

9.4.3.3 Circumstances for Implementation

Remove this section entirely.

9.4.3.4 Public Noticing

Remove this section entirely.

9.4.3.5 Permitting and Regulatory Process

Remove this section entirely.

9.4.3.6 Implementation Schedule

Remove this section entirely – this is a bad program!

9.4.3.7 Legal Authority

Remove – this is superfluous!

9.4.3.8 Estimated Cost

Remove entirely.

9.5 Projects

Remove first paragraph entirely.

Add: Projects must not involve public funds, but private funds only. The projects presented in this GSP 1) rely on five potential sources of water for direct delivery only, and 2) cannot involve direct injection into the groundwater basin, as direct injection opens the issue of groundwater ownership.

Retain project numbers: 1, 3, 4, 5, & 6 – remove project number 2 SWP water

Add: /Stormwater capture to item 6

9.5.1 Overview of Project Types

1. Direct delivery for irrigation or municipal use only.

9.5.1.1 In-Lieu Recharge through Direct Delivery

1. Add: in lieu of groundwater pumping.
2. Direct Delivery water may be stored above ground only.
3. Imported water MAY NOT be injected into the Subbasin.

9.5.1.2 Direct Recharge through Recharge Basins

Add: Recharge Basins will be used only for the percolation of Stormwater capture into alluvial areas. Direct recharge through injection wells is not acceptable due to the possibility of contamination and the issue of ownership of injected groundwater.

9.5.2 General Project Provisions

Remove the last sentence: ~~This section assumes ....for illustrative purposes.~~

9.5.2.1 Summary of Permitting and Regulatory Processes

Remove the last paragraph.

9.5.3 Conceptual Projects

Add: a Stormwater Capture project where topographical conditions are compatible and where captured water can reasonably be diverted to alluvial or sandy soil can be used for percolation.

Note: The concept is that with a robust Stormwater capture program the need for any imported water will be obviated. Moreover, if groundwater pumping is reduced through the implementation of best farming practices the subbasin can achieve sustainability well before 2040.

Note: Stormwater capture and percolated into the aquifer is becoming popular in many areas of California to recharge groundwater basins.

9.5.4 Substitute Projects

Remove 9.5.4 and related sections on substitute projects

Note: First, Recharge Basins utilizing purchased or imported water are unacceptable.

The benefits described in 9.5.4 can easily be exceeded though a robust program of Stormwater capture and percolation.

9.8 Management of Groundwater Extractions and Recharge and Mitigation of Overdraft

Replace existing with the following:

This GSP is designed to mitigate the current moderate annual over drafting of the Subbasin through a combined program of management actions designed to promote a reduction in pumping and provide authority for mandatory pumping reductions as necessary.

A three-way program made up of 1) robust capture and percolation of annual Stormwater, 2) the utilization of recycled water (RW) where appropriate, and 3) the rational use of groundwater, for irrigated farming and commercial and domestic use, will result in subbasin sustainability well within the deadline of 2040.

Within a relatively short period of time overall pumping should be reduced to a level not exceeding annual natural recharge while respecting the correlated rights of all subbasin overliers. Also on a forward basis the current level of over pumping will be moderately reduced as a result of the Quiet Title litigation judgment and the required reduction in pumping by the litigation defendants.

In summary, this GSP will soon bring annual subbasin pumping in balance with the natural recharge of the subbasin thus achieving sustainability.

Comments received on Paso Basin GSP Draft Chapters 9-12 from the June 18, 2019 City of Paso Robles Council/GSA Meeting. To view the agenda for this meeting, please click here.

1. Dale Gustin: "As we all know this came about during the drought that hit all of California except maybe Sacramento, and since then, has there been any studies done to see if after the current rainfall, I mean I have a lot out at Oak Shores, and we can't even use our bottom parking lot because the lake is up so high. So that water basin has got to be not in overdraft at this point. Has anybody done a study to find that out?"
2. Gary Dunnivan: "I was just curious, how much water do the vineyards around here take away from us, out of our water basin? And that would be very interesting to me to find out. You know we have to cut back and cut back and people did a wonderful job of cutting back. With the vineyards I drive out in the country and water is blowing everywhere. So, we're all out of the same basin right?
3. Cody Ferguson: "There is one thing I'd like to establish here is the fourteen thousand acre feet per year. That's truth or consequences. That'll come out eventually when the final report is issued. There is one important thing, the previous speaker on another subject mentioned the court case that is going on over quiet title. Completely unnecessary court case, nonetheless it has been adjudicated, and during that court case people, one of them being Christopher Alakel, were asked a question on the stand under oath "are we in overdraft." The answer from both he and Courtney Howard, who is in charge of the water stuff for the County, (and of course Mr. Alakel was recognized as a City employee doing the same type of work) was 'no, we are not in overdraft.' And I don't want that coming out of this meeting that we're in overdraft. In fact, there is truth or consequences going on, manipulation going on, people are trying to fight over this water all the time. And some of these things get offered up and they aren't exactly true, but they will be when they are finished. But the one important thing I want you to take to the bank is, it's been testified to in court by both the City and the County you are not in overdraft.
4. Patty Smith: My concern is the water. There is a constant barrage of complaining we don't have enough water. Yet Mayor Strong can tell us we have excellent amount of water out of Lake Nacimiento. The flooding this year has been unreal, yet all we as residents get to hear about is cut back, cut back, cut back. Yet every vineyard out there… I understand that Paso Robles is becoming a wine town but at what cost to the people who live here, and are trying to raise families here? You know we've got the issue with the water, we have issues with the vineyards, we have the issue with the short term rentals. At what point does the City Council take the people, the residents, people who live here, into consideration and stop cowtowing to the vineyards and the wineries?

Windfall Farms

Chair Supervisor Arnold
County Government Center
1055 Monterey Street
San Luis Obispo, CA 93408

Re: Comments on April 17, 2019 Draft of Chapter 9 of the Paso Robles Basin Groundwater Sustainability Plan

Chair Supervisor Arnold:

This is Lee Nesbitt, General Manager of Windfall Farms, a landowner overlying the Paso Robles Groundwater Basin. Windfall Farms and its predecessors in interest have relied on the basin since 1983 and before for numerous beneficial uses of the land. I have reviewed the April 17, 2019 Draft of Chapter 9 of the Paso Robles Sub-basin Groundwater Sustainability Plan ("Plan") and submit these comments on it for the Cooperative Committee's consideration.

1. **The Plan should be corrected to make clear that any restrictions on pumping will be consistent with common law water rights.** As drafted, Chapter 9 suggests that the burden of pumping restrictions could be geographically discriminatory. [1] This approach is inconsistent with the physically interconnected nature of the basin and with common law water rights.[2] Rather, the Plan should make clear that there will not be disparate treatment of pumpers based on physical location within the basin and that all pumpers on equal legal footing with regard to water rights must bear similar financial responsibility for solving the basin's challenges. Moreover, even "area-specific" responsive management actions must be specifically associated with avoiding undesirable results identified in the Plan. If pumping by a discrete area or growers must be physically restricted, that burden must be shared basin-wide by implementation of a physical solution that distributes that burden legally and equitably among all pumpers according to their allocations.

2. **New and expanded groundwater production should be prohibited.** Consistent with Water Code § 10720.5, the Plan should provide that no new or expanded production, in excess of

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[1] See Plan, p. 14 ("a pumping reduction of approximately 18% will be needed across the basin to reduce pumping to the sustainable yield. <u>Larger pumping reductions will likely be necessary in specific areas</u> to arrest groundwater level declines."); p. 15 ("the rate of ramp down would depend on when the program starts and projections of how <u>long lower pumping rates are required in specific areas</u> in order to achieve sustainability by 2040."); and p. 17 (expanding this concept to differential fees for pumping in "portions of the subbasin with localized groundwater decline."). (Emphasis added.)

[2] We recognize that actual physical pumping restrictions may be required in particular locations to address acute undesirable results. However, the Plan should expressly distinguish between such <u>physical pumping restrictions</u> and <u>allocation of financial burden</u> for reductions necessary to achieve sustainability. The basin is a hydrologically connected unit; pumping in one location affects others over time. Thus, if groundwater rights are determined, they will be determined on a basin-wide basis. (See Water Code § 10721(b); Civ. Proc. Code § 832 (indicating that a comprehensive groundwater adjudication will be made on a basin-wide basis, with "basin" being the hydrogeologic unit defined by Bulletin 118).)

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Windfall Farms

historical production, after January 1, 2015 will count toward any groundwater production allocations implemented to advance Level 2 PMAs. This would put all pumpers on notice that if they initiate new or expanded pumping, they do so at their own risk, and may need to acquire pumping allocation from others or pay surcharges to maintain such production.

3. **The Plan should encourage voluntary fallowing/reductions in pumping.** To encourage voluntary fallowing/reductions in pumping without risk of potential loss of water rights, the Plan rightfully provides, but should confirm, that historical pumping need not be maintained or continued to support a water right claim based on historical pumping from the basin.

4. **The Plan should not delay implementation of Level 2 Proposed Management Actions if required.** The Level 1 proposed management actions ("PMAs") are a valuable first step, may not be sufficient to achieve sustainability. If implementation of Level 2 PMAs are delayed, the impacts on groundwater pumpers may be significantly greater – i.e., more restrictive, more expensive, etc. – than would be the case if the Level 2 PMAs had commenced sooner. The Plan should provide a date (post 2020) for anticipated introduction of Level 2 PMAs **IF** Level 1 PMAs do not achieve sustainability goals.

5. **Implementation of Level 2 PMAs should be based on, and tied to, adaptive management principles based on evolving science.** The Plan should make clear that as the Plan is implemented, our technical understanding of the basin will continue to be evaluated and that target metrics will be refined accordingly.

6. **Level 2 PMAs require allocations and allocations necessarily implicate water rights.** The plan should recognize that implementation of any Level 2 PMAs will necessarily require determinations of pumping allocations across the basin, which necessarily implicates a pumper's water right claim. The Plan should acknowledge that it cannot determine or alter water rights (Water Code § 10720.5). Further, the Plan should anticipate that upon any determination that Level 2 PMAs are required, such PMAs may not go into effect during the pendency of any litigation.

7. **The Plan should include a process by which allocations necessary for Level 2 PMAs are determined.** In an effort to best anticipate the allocation determination process and streamline it, the Plan could provide that upon a determination that Level 2 PMAs are required, a structured and facilitated process will commence to engage stakeholders and seek a negotiated resolution. Ideally, the Plan would highlight the scope, stages, and timing of such a process, based on input from facilitators with relevant experience. By providing a process by which allocations may be determined, the Plan may ameliorate concerns about the Plan's impacts on water right.

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Windfall Farms

We write these comments as part of the community of the Creston/Paso Robles. While this topic can always be a difficult one to discuss, we believe that positive dialogue with solutions based in science and law with a bit of reasonableness thrown in works best for all concerned. I want to thank you for your consideration of these comments. We look forward to continuing to work with you and the Cooperative Committee to develop a GSP that satisfies SGMA's regulatory requirements and benefits the basin as a whole.

Sincerely,

Lee Nesbitt-General Manager
Windfall Farms

P.O Box 1798, Paso Robles, CA 93447 Phone (805) 239-0711

I appreciate the changes made to Chapter 9, especially Section 9.3.4. In addition, I have the following comments and questions about, and recommendations for Chapter 9 of the proposed Paso Robles Groundwater Area Sub-basin Management Plan:

Section 9.2
Modify the criteria for inclusion in the well-monitoring network; monitoring needs to be extended to wells that do not meet all the current criteria for being included in the monitoring network. All wells, to the extent feasible, should be in the network.

Define “individual entities” who … ”may choose to develop programs that would raise funds for alternative approaches…”

Section 9.3
Define by whom “Level 1 management actions will be developed and implemented”

Section 9.3.1:
Define “ET estimates”

Section 9.3.1.4
I request that this section, and all subsequent relevant sections, be re-titled “Public Notification,” as “noticing” has other connotations, and “notification” is unequivocal.

Section 9.3.2
Define “well interference.”

Section 9.3.3
Will “temporary diversions of storm flows from streams” require California Department of Fish and Wildlife approval? Will SLO County or GSA’s have protocols for obtaining, or for helping obtain, such approval, and for designing said diversions?

Section 9.3.4
I most earnestly ask The Committee to adopt this section. This proposal will save water by not forcing users to pump from the basin when land is fallowed or when planted to a crop with less water demand. Also, it provides protection of irrigation rights for landowners, whom for whatever reasons, have decreased their water demand compared to their historical use.

Section 9.4.1
I reiterate here my request that more wells be monitored.

Section 9.4.2
Define “exempt” and “non-exempt” groundwater pumpers.

Section 9.4.2.3
I am adamantly opposed to permanent transfer/relocation of pumping allowances. Permanent removal of pumping rights from a property is the equivalent of condemnation. Previously productive sites will be unusable, and will become the equivalent of rural slums.

Temporary transfer/relocation of irrigation rights should be allowed only on neighboring or near-neighboring properties, as physical transfer of the water itself does not actually take place. Transferring **credits** to an area with historically low groundwater will not put more water into the sub-basin of that low-water area, and therefore will not reduce withdrawal pressure or basin depletion in that area.

Section 9.4.2.4
I am strongly against any interpretation of this section that does not comply with Section 9.3.4. I would agree to this section if it pertains only to land that has never been irrigated.

Section 9.4.2.9
Is it possible to include a brief summary of the requirements of Propositions 218 and 26 referred to?

Section 9.4.3
I feel very strongly that productive farmland should remain productive farmland. Once it is lost to even low-density development, the increased price per acre will prevent its return to agriculture, and small acreages are almost never dedicated to production. While I recognize that housing for an ever-increasing human population lags behind demand, productive land is all the more necessary to sustain that population. Marginally productive or non-productive land should be the highest priority for development.

Section 9.5
I do not support, and I doubt that the general public would support, general funding of any project that benefits mainly one or two growers.

The six potential sources for groundwater recharge or in-lieu use are highly suspect:
- State Water Project water is completely allocated.
- Nacimiento Water Project water is near complete allocation and has no infrastructure for individual delivery.
- Salinas Dam/Santa Margarita Reservoir water is needed to recharge the Salinas River. Communities at the northern end of the river are experiencing salt water intrusion, and less water delivered to the delta means more salt water in one of the nation's most productive growing areas.
- No infrastructure exists for private delivery of recycled water from either Paso Robles or San Miguel.
- Flood flows from local rivers and streams is subject to CA DFW regulation

Section 9.5.3.3.3
One monitoring well is entirely insufficient to trigger implementation of any project. Furthermore, no project should be initiated for the benefit of only one user. Allowing one monitoring well to be the trigger gives no incentive to reduce groundwater pumping if that user will then have the benefit of pooled funds to build a private delivery system. San Miguel CSD may improve the quality the town's waste effluent, but use thereof should benefit the entire community.

I, personally, would like to know the location and ownership of monitoring well 25S/12E-1605 and why it merits such individual consideration. Indeed, if pooled funds are to used for this project, then the public has the right to know this information.

Section 9.5.3.3.5
Do Montgomery and Associates and The Committee expect the public to pay for bonds that benefit only one or two users?

Section 9.5.3.4
This proposal is pure pork. If Figure 9-14 shows the route of the proposed delivery line, the route is nowhere near the confluence of the Salinas and Estrella. In addition, the three wells in the figure are south, southeast, and farther southeast of the confluence. Since both rivers run north, I fail to see how such delivery would recharge the areas of the wells. To top it off, I KNOW WHO OWNS THE PROPERTY situated at the confluence. NEVER ONCE HAS THE LANDOWNER BEEN QUESTIONED ABOUT THE NEED FOR SUCH A PROJECT. Indeed, the immediate Salinas River corridor appears to be a high-recharge area, with little fluctuation in groundwater levels. Again I am compelled to ask who devised this project, to whom the three listed wells belong, and who stands to benefit.

Section 9.5.3.4.3
Many more wells need to be monitored in any proposed project area to trigger implementation. Also, having the prospect of increased water delivery does not appear to be an incentive to decrease groundwater pumping. It seems to reward those who have been injudicious.

Section 9.5.3.6
I have the same objections as listed in Sections 9.5.3.3.3 and 9.5.3.4.3

Section 9.5.3.7
As above in Section 9.5.3.6. Additionally, this ain't gonna happen. Any alteration of Salinas Dam will be initiated by SLO County, and subject to years of study and permitting.

I think the first, best step for diminishing groundwater depletion is capping irrigation in historically non-irrigated locations at perhaps 80% of current usage. All wells pumping in such areas would be tested prior to the initiation of such measures, and again after one year, and pumping limits would be adjusted accordingly.

Thank you for your attention to my considerations.

dosrios

J. LOHR
VINEYARDS, INC.

June 28, 2019

The Honorable John Peschong
San Luis Obispo County Supervisor, District 1
County Government Center
1055 Monterey Street
San Luis Obispo, CA 93408

RE: Comments on Chapter 9 of the Paso Robles Basin Groundwater Sustainability Plan

Dear Supervisor Peschong,

I think it is quite clear that Paso Robles Groundwater Basin's (PRB) declining water levels are currently unsustainable. Reductions in groundwater pumping will be required and hopefully new sources of water (supplemental water) will become available through successful "Projects". The public and agricultural pumpers have heard some about this, but actions may not be taken until pumping ramp downs are required or threatened. This might cause litigation. Litigation can be a long and unproductive process during which time water levels continue to fall and the eventual remedial cost becomes much greater. The GSP is our best opportunity to reach accord amongst all stakeholders and avoid litigation.

Chapter 9 is about Management Actions and Projects.

Management Actions are "non-structural programs or policies that are intended to reduce or optimize local groundwater use". Some of the Management Actions under consideration are the following and I encourage the GSP Cooperative Committee to make specific policy recommendations in these areas and provide clear direction for Basin users.

1. Metering, water usage reporting, flowmeter program
2. Better understanding of Basin science
3. Basin best management practices
4. Pumping Allowance System
5. Well monitoring network and additional reference wells
6. Pumping fees and excessive pumping penalties
7. Fallowing both temporary and permanent
8. Restricting new groundwater pumping
9. The endorsement by the GSP of specific Projects "involving new or improved infrastructure to import or develop new water supplies".

I believe Chapter 9 should identify and endorse "projects" that are feasible and can have immediate impact on Basin Sustainability.

At J. Lohr, we have long practiced efficient use of irrigation water. In line with our interest in optimal farming practices, J. Lohr Vineyards and Wines have set a meeting for our growers on July 10, 2019 to discuss currently available research and best practices for vineyard irrigation. We have always taken a proactive approach to best practices and have supported research in farming practices for decades.

Supplemental Water should be the cornerstone of the Paso Robles Groundwater Sustainability Plan. Agricultural and rural water users are totally dependent on groundwater and the choices for these users is to either reduce pumping or find sources of supplemental water or both.

J. Lohr Vineyards and Wines has been working since 2014 to obtain supplemental irrigation water from the Nacimiento pipeline (NPW). Since 2015 we have been working very constructively with the City of Paso Robles to purchase recycled water (RW) from the City. We and other local vineyard owners have formed an LLC, have a State of California approved Mutual Water Company, retained many of the necessary consultants, and the project team is well along with a comprehensive design for the Blended Supplemental Water Project (BSWP). The project entails purchasing RW from Paso Robles and NPW from the Nacimiento Commission and blending and distributing the water through 6 miles of pipeline to areas northeast of Paso Robles and west and north of the Paso Robles airport. This system has the ability to deliver thousands of acre feet of supplemental water to users of the Basin's groundwater which will result in actual reduction in groundwater pumping. This project will have 3 phases:

1. Design, approvals and obtaining commitments to purchase public water for the benefit of the Basin
2. Funding and Construction
3. Providing blended water to offset groundwater pumping and the opportunity for pumpers to purchase in-lieu pumping credits to supplement their water needs.

The design and approval phase of this BSWP is being privately financed through the LLC and can be completed in the next 6 months to a year.

The funding and construction phase will not be able to start prior completion of the first phases of the GSP/SGMA process in which comprehensive landowners pumping allowances and potential cutbacks have been decided in a series of public meetings. Once cutback levels have been established and pumpers understand impacts on their operations, pumpers will be able to assess the need and value of supplemental water and their ability to purchase supplemental water. Commitments by pumpers to buy into the use of supplemental water will determine the funding mechanisms to construct the BSWP Pipeline. Private investors may initiate the funding but ultimately users of groundwater who benefit from the use of supplemental water will have to pay for the BSWP. This can be done without public funding.

I encourage the GSA's to include the Blended Supplemental Water Project as an integral part of the Paso Robles Groundwater Basin's Sustainability Plan. It is vital that the GSP addresses the issues of responsible basin management as well as exploring sources of new supplemental water. Without a balance between these factors and without meaningful options for groundwater users, the threat of litigation looms even larger.

Thank you for your consideration.

Regards,

Jerome J Lohr
Founder J. Lohr Vineyards and Wines

J. LOHR VINEYARDS, INC.
2021 THE ALAMEDA, SUITE 145, SAN JOSE, CA 95126 • 408.984.3355 • F 408.918.2188 • JLOHR.COM

May 23, 2019

Supervisor Peschong

1055 Monterey Street Room D430

San Luis Obispo, Ca 93408

Dear Supervisor Peschong,

I would like to thank you for taking the time to listen to my concerns last night after the Paso Robles Basin Cooperative Committee meeting. As I told you last night, our company is based in Coalinga Ca. but we own 2,680 acres south east of the city of Shandon. We have farmed the property in the past but currently run cattle on the land. We are large Farmers in the Central Valley and have put our efforts into developing our properties in Fresno, Kings, and Kern Counties. It has always been our plan to someday drill a well or two on the Shandon property that we have owned for almost forty years. We have already hired a Geologist to evaluate the property. He has designated several prime locations that water wells might be drilled.

I am writing you to express our strenuous opposition to any GSP that fails to recognize our overlying ground water rights or our right to pump water in the future. We have been good neighbors and good stewards of the land. We have not had a negative effect on the land or contributed to any over draft that may be occurring in that area. I hope that our conservative land practices will not be held against us during the GSP process. We feel that we have a right to access the water that is beneath our property in a thoughtful and sustainable way. Anything less would be an improper taking and would greatly diminish the value of our land. Again I would like to thank you for your time and input.

Sincerely

Craig Finster

William and Doris Land and Energy Co, LLC

June 28, 2019

The Honorable John Peschong
San Luis Obispo County Supervisor, District 1
County Government Center
1055 Monterey Street
San Luis Obispo, CA 93408

Chapter 9 Concepts and Policy

I am writing these comments as an interested and involved participant in groundwater issues in the Paso Robles Basin for many years. My comments have formed as a result of my extensive participation in the Paso Robles Basin. I have been retained by J. Lohr Vineyards and Wines as a Water Consultant and I am a Board Member of the Estrella-El Pomar-Creston Water District. However, these comments do not represent an official position of the EPC Water District. My comments are generally consistent with J. Lohr Vineyards and Wines opinions.

It is my understanding that the current Chapter 9 that was presented in April, 2019 at the Cooperative Committee Meetings is under review and likely to undergo substantial changes. Rather than comment on specifics of the current version of Chapter 9, I would like to present the following conceptual framework that addresses significant policy issues that must be resolved before Chapter 9 can move forward with its Management Actions and Projects. I believe these critical policy decisions must be resolved now in order to move forward. Without broad agreement on policy, details of implementation are impossible. These important policy decisions need to be made in open public discussions now and not buried in future regulations.

1. **Flow Meter Program** - It would be difficult to consider any GSP to be a comprehensive plan without a mechanism to measure groundwater production. Metering and reporting groundwater pumping should be the obvious first action of the GSP. Requiring the registration of wells and reporting of groundwater pumping will be an indication of the seriousness of the GSP. We can't manage what we don't measure. Also, any allocation system resulting in reductions in pumping will have to be based on observable numbers.

   The GSP should make metering mandatory and reporting of all wells other than domestic wells. This should be required by the end of 2020. Reporting of all groundwater extraction should be required starting in the calendar year of 2021 and reported early in the calendar year 2022.

   The GSP should develop its own database of wells and collect and maintain well information. Owners should be required to register their well(s) and provide such information as the APN Number, GPS location of the well, well size and depth, owners names and contact information, responsible person's name and contact information, information on the measuring device used and other information as needed. The GSP will need to develop a robust management structure to collect and maintain the Basin's well information as well as to enforce the requirements of the GSP. Communal data such as well information should be maintained in one location and administered uniformly across the Basin.

There should be a significant annual penalty for not registering wells and for not reporting groundwater production.

When an allocation system is implemented by the GSP using a crop load factor, then those landowners who do not report groundwater production to the GSP should be assumed to be using **double** the crop load duty factor. This assigned usage may be used to calculated extraction fees that may be implemented by the GSP and also the extraction penalty fees for those over producing more water than their allocated amount.

2. **No New Plantings** – the GSP must work closely with the County and the County's Land-use authority to ensure that there will be no new plantings.

3. **Base Pumping Fees –** should be implemented immediately or at least when pumping data is available, see item #1 above. The fees should be in the nominal range of $20 to $80 per AF of groundwater produced in any given year. These fees would be used to fund operation of the GSP and could cover such expenditures as Model refinements, Model Runs, hydrological studies, professional consultants, monitoring wells, well monitoring network, and GSP operations.

4. **Projects** – projects are important tools that can help bring the Basin into sustainability. By their very nature, project will take time, therefore projects need to be started sooner rather than later. Raising the Salinas Dam may take a decade or more, so the GSP must actively embrace this project along with other projects that represent real solutions by bringing supplemental water to the Basin, reduce pumping in the basin or enhance groundwater recharge. Viable projects must be endorsed and supported by the GSP. Projects should not be trivialized by relegating them to an Appendix.

   Specific tangible projects should be recognized and included as an integral component of Chapter 9.

   Cutbacks in groundwater pumping should not be considered until projects are implemented or at least started. A GSP that ignores projects that offer real opportunities to reduce groundwater pumping will be marginalized.

   Projects may take the form of private or public projects. Under either circumstance, the GSP will need to endorse the various projects and provide leadership, public support and outreach and the seek the political will to make them be successful.

5. **In-lieu Water Credits Exchange –** The GSP will need to provide provisions for the exchange of in-lieu 'water credits' resulting from the use of supplemental water.

6. **Mandatory Pumping Reductions and an Allocation System Based on County's Crop Type Factor –** pumping cutbacks seem to be a certainty in the future. The GSP will need to develop a system to determine the baseline pumping 'allowances' for groundwater users. These pumping allowances will likely be less than current pumping production and will represent the cutbacks necessary to bring the Basin into sustainability. Pumping allowances should be based on the County's Crop Type Factor and not on historical usage. The County Crop Type Factors are a more equitable way of allocation of water allotments by leveling the playing field rather than historical usage. Historical usage would tend to reward the over users and penalize the frugal users. Historical usage may also present a fundamental inequity between groundwater users.

   The GSP will grant groundwater users an annual allowance for groundwater production and the GSP will need to be able to verify compliance with these allowances in pumping through its groundwater pumping reporting and monitoring program.

7. **Significant Penalties for Over Production –** to meet the sustainability goals that SGMA mandates, pumpers in the Paso Robles Groundwater Basin will have to reduce groundwater pumping. It is the obligation of the GSP to ensure that groundwater users play fairly and operate within the prescribed limits set by the GSP. Whether by omission, indifference, or calculation by groundwater users, the GSP needs to make sure that over production of groundwater is economically unattractive. Chronic over production should not be tolerated. Over production should not be allowed as an on-going method of operation.

   The GSP should institute meaningful penalties for over production of water. Enforcement of groundwater usage rules will be an additional responsibility of the GSP.

   Users will have the choice of reducing pumping, securing supplemental water or face severe penalties.

8. **Basin Managed as Whole –** DWR's Bulletin 118 defines groundwater basins from a hydrological point of view. The Paso Robles Groundwater Basin should be managed as a single basin. All users share the benefits of the Basin and all users should participate in and share the responsibilities of maintaining the health and sustainability of the Basin on an equal basis.

   For consistency and conformity, all data gathering and storage should be in a repository maintained by the GSP. The GSP should also have one methodology for enforcement.

9. **Minimum Threshold Levels, Chapters 8 -** should be based on 2017 levels, using prior year's levels could result in severe, unrealistic and disruptive cut backs.

10. **Fallowing –**both temporary and permanent fallowing should be supported by the GSP. The GSP should not acquire land in order to permanently fallow land but rather just buyout the pumping allocations.

Voluntary, temporary fallowing should be encouraged and the GSP should support landowners choosing this path by allowing the land to go fallow without the landowner losing their allowances.

Finally, I am concerned about the autonomy granted to GSA's in the current version of Chapter 9. This could profoundly undermine the structure and decision-making process that the current MOA provides. SGMA requires multiple GSP's within a basin to have cooperating agreements. The current structure presented by Chapter 9 seems to be missing any substantial 'cooperating' language between GSA's. The GSP seems to be leaving all major policy decisions to the future and without providing any sort of supporting organizational structure.

Regards,

Jerry Reaugh

The Nature Conservancy
Protecting nature. Preserving life.

CALIFORNIA WATER | **GROUNDWATER**

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July 1, 2019

County Government Center
1055 Monterey Street, Room 206
San Luis Obispo, CA 93408

Submitted online via: https://www.slocounty.ca.gov/Departments/Public-Works/Committees-Programs/Sustainable-Groundwater-Management-Act-(SGMA)/Paso-Robles-Groundwater-Basin/GSP-Development.aspx

Re: Chapters 9-11 of the Paso Robles Subbasin Draft GSP

Dear Angela Ruberto,

The Nature Conservancy (TNC) appreciates the opportunity to comment on Chapters 9-11 of the Paso Robles Subbasin Draft Groundwater Sustainability Plan (GSP) being prepared under the Sustainable Groundwater Management Act (SGMA). Please note that we have previously submitted comments dated 15 April 2019 on Chapters 4-8 and Appendix B of the Paso Robles Subbasin Draft GSP.

TNC is a global, nonprofit organization dedicated to conserving the lands and waters on which all life depends. We seek to achieve our mission through science-based planning and implementation of conservation strategies. For decades, we have dedicated resources to establishing diverse partnerships and developing foundational science products for achieving positive outcomes for people and nature in California. TNC was part of a stakeholder group formed by the Water Foundation in early 2014 to develop recommendations for groundwater reform and actively worked to shape and pass SGMA. We believe that the success of SGMA depends on bringing the best available science to the table, engaging all stakeholders in robust dialog, providing strong incentives for beneficial outcomes and rigorous enforcement by the State of California.

Our specific comments related to Chapters 9-11 of the Draft GSP are provided in detail in **Attachment B** and are in reference to the numbered items in **Attachment A. Attachment C** provides a list of the freshwater species located in the Paso Robles Subbasin. **Attachment D** describes six best practices that GSAs and their consultants can apply when using local groundwater data to confirm a connection to groundwater for DWR's Natural Communities Commonly Associated with Groundwater Dataset[2]. **Attachment E** provides an overview of a new, free online tool that allows GSAs to assess changes in groundwater-dependent ecosystem (GDE) health using satellite, rainfall, and groundwater data.

Thank you for fully considering our comments as you develop your GSP.

Best Regards,

Sandi Matsumoto
Associate Director, California Water Program
The Nature Conservancy

The Nature Conservancy

Attachment A

Considering Nature under SGMA: A Checklist

The Nature Conservancy is neither dispensing legal advice nor warranting any outcome that could result from the use of this checklist. Following this checklist does not guarantee approval of a GSP or compliance with SGMA, both of which will be determined by DWR and the State Water Resources Control Board.

GSP Plan Element*		GDE Inclusion in GSPs: Identification and Consideration Elements	Check Box
Admin Info	**2.1.5 Notice & Communication** *23 CCR §354.10*	**Description of the types of environmental beneficial uses of groundwater that exist within GDEs and a description of how environmental stakeholders were engaged throughout the development of the GSP.**	1
Planning Framework	**2.1.2 to 2.1.4 Description of Plan Area** *23 CCR §354.8*	**Description of jurisdictional boundaries, existing land use designations, water use management and monitoring programs; general plans and other land use plans relevant to GDEs and their relationship to the GSP.**	2
		Description of instream flow requirements, threatened and endangered species habitat, critical habitat, and protected areas.	3
		Summary of process for permitting new or replacement wells for the basin, and how the process incorporates protection of GDEs	4
Basin Setting	**2.2.1 Hydrogeologic Conceptual Model** *23 CCR §354.14*	**Basin Bottom Boundary:** Is the bottom of the basin defined as at least as deep as the deepest groundwater extractions?	5
		Principal aquifers and aquitards: Are shallow aquifers adequately described, so that interconnections with surface water and vertical groundwater gradients with other aquifers can be characterized?	6
		Basin cross sections: Do cross-sections illustrate the relationships between GDEs, surface waters and principal aquifers?	7
	2.2.2 Current & Historical Groundwater Conditions *23 CCR §354.16*	**Interconnected surface waters:**	8
		Interconnected surface water maps for the basin with gaining and losing reaches defined (included as a figure in GSP & submitted as a shapefile on SGMA portal).	9
		Estimates of current and historical surface water depletions for interconnected surface waters quantified and described by reach, season, and water year type.	10
		Basin GDE map included (as figure in text & submitted as a shapefile on SGMA Portal).	11
		If NC Dataset *was* used: Basin GDE map denotes which polygons were kept, removed, and added from NC Dataset (Worksheet 1, can be attached in GSP section 6.0).	12

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			The basin's GDE shapefile, which is submitted via the SGMA Portal, includes two new fields in its attribute table denoting: 1) which polygons were kept/removed/added, and 2) the change reason (e.g., why polygons were removed).	13
			GDEs polygons are consolidated into larger units and named for easier identification throughout GSP.	14
		If NC Dataset *was not* used:	Description of why NC dataset was not used, and how an alternative dataset and/or mapping approach used is best available information.	15
		Description of GDEs included:		16
		Historical and current groundwater conditions and variability are described in each GDE unit.		17
		Historical and current ecological condition and variability are described in each GDE unit and adequate to describe baseline as of 2015.		18
		Each GDE unit has been characterized as having high, moderate, or low ecological value.		19
		Inventory of species, habitats, and protected lands for each GDE unit with ecological importance (Worksheet 2, can be attached in GSP section 6.0).		20
	2.2.3 Water Budget *23 CCR §354.18*	Groundwater inputs and outputs (e.g., evapotranspiration) of native vegetation and managed wetlands are included in the basin's historical and current water budget.		21
		Potential impacts to groundwater conditions due to land use changes, climate change, and population growth to GDEs and aquatic ecosystems are considered in the projected water budget.		22
Sustainable Management Criteria	**3.1 Sustainability Goal** *23 CCR §354.24*	**Environmental stakeholders/representatives were consulted.**		23
		Sustainability goal mentions GDEs or species and habitats that are of particular concern or interest.		24
		Sustainability goal mentions whether the intention is to address pre-SGMA impacts, maintain or improve conditions within GDEs or species and habitats that are of particular concern or interest.		25
	3.2 Measurable Objectives *23 CCR §354.30*	**Description of how GDEs were considered and whether the measurable objectives and interim milestones will help achieve the sustainability goal as it pertains to the environment, beneficial uses and managed areas.**		26
	3.3 Minimum Thresholds *23 CCR §354.28*	**Description of how GDEs and environmental uses of surface water were considered when setting minimum thresholds for relevant sustainability indicators:**		27
		Will adverse impacts to GDEs and/or aquatic ecosystems dependent on interconnected surface waters (beneficial user of surface water) be avoided with the selected minimum thresholds?		28
		Are there any differences between the selected minimum threshold and state, federal, or local standards relevant to the species or habitats residing in GDEs or aquatic ecosystems dependent on interconnected surface waters?		29
	3.4 Undesirable Results *23 CCR §354.26*	**For GDEs, hydrological data are compiled and synthesized for each GDE unit:**		30
		If hydrological data *are available* within/nearby the GDE	Hydrological datasets are plotted and provided for each GDE unit (Worksheet 3, can be attached in GSP Section 6.0).	31
			Baseline period in the hydrologic data is defined.	32
			GDE unit is classified as having high, moderate, or low susceptibility to changes in groundwater.	33

			Cause-and-effect relationships between groundwater changes and GDEs are explored.	34
		If hydrological data *are not available* within/nearby the GDE	Data gaps/insufficiencies are described.	35
			Plans to reconcile data gaps in the monitoring network are stated.	36
		For GDEs, biological data are compiled and synthesized for each GDE unit:		37
		Biological datasets are plotted and provided for each GDE unit, and provide baseline conditions for assessment of trends and variability.		38
		Data gaps/insufficiencies are described.		39
		Plans to reconcile data gaps in the monitoring network are stated.		40
		Description of potential effects on GDEs, land uses and property interests:		41
		Cause-and-effect relationships between GDE and groundwater conditions are described.		42
		Impacts to GDEs that are considered to be "significant and unreasonable" are described.		43
		Known hydrological thresholds or triggers (e.g., instream flow criteria, groundwater depths, water quality parameters) for significant impacts to relevant species or ecological communities are reported.		44
		Land uses include and consider recreational uses (e.g., fishing/hunting, hiking, boating).		45
		Property interests include and consider privately and publicly protected conservation lands and opens spaces, including wildlife refuges, parks, and natural preserves.		46
Sustainable Management Criteria	**3.5 Monitoring Network** *23 CCR §354.34*	Description of whether hydrological data are spatially and temporally sufficient to monitor groundwater conditions for each GDE unit.		47
		Description of how hydrological data gaps and insufficiencies will be reconciled in the monitoring network.		48
		Description of how impacts to GDEs and environmental surface water users, as detected by biological responses, will be monitored and which GDE monitoring methods will be used in conjunction with hydrologic data to evaluate cause-and-effect relationships with groundwater conditions.		49
Projects & Mgmt Actions	**4.0. Projects & Mgmt Actions to Achieve Sustainability Goal** *23 CCR §354.44*	Description of how GDEs will benefit from relevant project or management actions.		50
		Description of how projects and management actions will be evaluated to assess whether adverse impacts to the GDE will be mitigated or prevented.		51

* In reference to DWR's GSP annotated outline guidance document, available at: https://water.ca.gov/LegacyFiles/groundwater/sgm/pdfs/GD_GSP_Outline_Final_2016-12-23.pdf

Attachment B

TNC Evaluation of
Chapters 9 - 11 of the Paso Robles Subbasin Draft GSP

This attachment summarizes our comments on Chapters 9-11 of the Paso Robles Subbasin Draft GSP. In this section, we refer to our previous comments, dated 15 April 2019, on Chapters 4-8 and Appendix B of the Draft GSP.

Chapter 9 Management Actions and Projects
[Checklist Items #50-51]:

- As stated in TNC's previous comments in our previous letter on Chapter 8, Sections 8.4 and 8.9, interconnected surface waters (ISWs) *do* exist in the Paso Robles Subbasin, and thus there is a need to establish sustainable management criteria for ISWs in the basin and minimum thresholds for these ISWs. After identifying these minimum thresholds, **please include ISWs as a specific sustainability indicator to be addressed by management actions and projects as described in Chapter 9**. For the management actions and projects already identified, state how ISWs will be benefited or protected. If ISWs will not be adequately protected by those listed, please include and describe additional management actions and projects.
- Page 1 states that the most important sustainability indicator used in development of the management actions and projects is the stabilization of groundwater levels. However, an important data gap already recognized is the lack of publicly available groundwater elevation data in the Alluvial Aquifer. As discussed in TNC's previous comments on Chapter 8, Section 8.4, a scientifically robust methodology must be proposed for establishing the initial minimum thresholds for the Alluvial Aquifer. **In light of the data gap regarding Alluvial Aquifer groundwater data, please be more specific in stating how GDEs and ISWs would benefit from management actions and projects, and how actions and projects will be evaluated to assess whether adverse impacts to GDEs will be mitigated or prevented**:
    - Well Interference Mitigation Program (Page 8): This management action could be expanded to benefit GDEs and ISWs by choosing wells for the rotation or well spacing program that are screened in the alluvial aquifer and located in close proximity to rivers and streams, thus spreading out potential drawdown effects.
    - Promote Stormwater Capture (Page 10): Please describe how recharge from unallocated storm flows will be evaluated to assess benefits to GDEs and ISWs.
    - Mandatory Pumping Reductions (Page 14): Please discuss the data gap for wells screened in the alluvial aquifer and the data gap for vertical gradient between the alluvial aquifer and Paso Robles Formation, since most wells are screened in the Paso Robles aquifer. When these data gaps are resolved, it will become clearer how mandatory pumping reductions could also benefit GDEs and ISWs.

- Agricultural Land and Pumping Allowance Retirement (Page 21): Retirement of agricultural land may include land near rivers and streams, which could impact GDEs and ISWs by decreasing surface runoff and flow, or by decreasing recharge from deep percolation of irrigation water. Conversely, retirement of agricultural land would increase local groundwater levels in the pumped aquifers. The potential benefit or impact of agricultural retirement on GDEs needs to be evaluated.
- Conceptual Projects (Pages 27-56): Most of the conceptual projects involve in-lieu recharge for the direct use of recycled wastewater. Thus, the recycled water would replace pumped groundwater. Since these conceptual projects are location-specific, please highlight the benefits of these conceptual projects on specific mapped GDEs and ISWs.
- Substitute Project 4 (Page 73): The capture of 10 cfs of Salinas River flood flows for recharge in a basin should include investigation to see if there is an effect on any instream species, GDEs or wetland habitats located on the Salinas River or hydraulically connected to the river. How this diversion will affect instream flow requirements that are currently being met by dam releases should also be described. **Please state the impact of the diversion of 10 cfs Salinas River flow on freshwater species in the Paso Robles Subbasin (see Attachment C).**

- For more case studies on how to incorporate environmental benefits into groundwater projects, please visit our website: https://groundwaterresourcehub.org/case-studies/recharge-case-studies/

Section 10.2.1.1 Improve Monitoring Network (p. 10-11)
(Checklist item #47-49]:

- **Please further describe the expansion of the monitoring program and specify what types of monitoring will be done to identify impacts to GDEs. Be more specific in describing wells and screened intervals that represent the water levels of both the Alluvial Aquifer and Paso Robles Formation Aquifer.**

Section 10.2.5 Evaluating Interconnected Surface Water (p. 14-15)
[Checklist Item #48]:

- The text states "*As discussed in Chapter 5, the consensus among local groundwater experts is that there is no interconnection between surface water and groundwater in the Subbasin*." (p. 14) This sentence is contradictory to the ISW mapping conducted in Chapter 5 (Figure 5-17). Per TNC's previous comments on Chapter 5, interconnected surface waters *do* exist in the Paso Robles Subbasin (Figure 5-17). Depletions of surface water were also estimated in Section 5.5.1. Therefore, sustainable management criteria and an associated monitoring network for interconnected surface water and groundwater *do* need to be developed in the GSP, as stated in our comments on Chapter 9 above, and depletion of ISWs should be monitored. The Draft GSP states that an initial hydrogeologic investigation will be conducted. **Please provide sufficient detail for the investigation and monitoring program including stream gauges, screened intervals and**

aquifers of the shallow wells and frequency of monitoring, in order to describe monitoring of both the extent of ISWs and the quantity of surface water depletions from ISWs.

- Wells should be selected that are at varying distances from the river to capture vertical gradients from one aquifer to the other and to determine the ISWs and monitor any depletion in ISWs. As stated in TNC's previous comments in our previous letter on Chapter 7, **there is a need to enhance monitoring of stream flow and vertical groundwater gradients by installing more stream gauges and clustered/nested wells near streams, rivers or wetlands.** Ideally, co-locating stream gauges with clustered wells that can monitor groundwater levels in both the Alluvial and Paso Robles Formation aquifers would enhance understanding about where ISWs exist in the basin and whether pumping is causing depletions of surface water or impacts on beneficial users of surface water and groundwater.
- As stated in TNC's previous comments in our previous letter on Chapter 7, the Nature Conservancy recommends identifying beneficial users of surface water, which include environmental users. This is a critical step, as it is impossible to define "significant and unreasonable adverse impacts" without knowing *what* is being impacted, nor is possible to monitor ISWs in a way that can "identify adverse impacts on beneficial uses of surface water". For your convenience, we've provided a list of freshwater species within the boundary of the Paso Robles basin in **Attachment C**. **Please identify appropriate biological indicators that can be used to monitor potential impacts to environmental beneficial users as a current data gap and explain how this data gap will be filled.**

<u>Chapter 11 Notice and Communications (including separate Communications and Engagement Plan)</u>
[Checklist Item #1]:

- Section 3.0 of the Communications and Engagement Plan (Page 6) lists aquatic ecosystems as a beneficial groundwater use. However, no details are given as to the types and locations of environmental uses and habitats supported, or the designated beneficial environmental uses of surface waters that may be affected by groundwater extraction in the subbasin. **To identify environmental users, please refer to the following**:
  - Natural Communities Commonly Associated with Groundwater dataset (NC Dataset) - https://gis.water.ca.gov/app/NCDatasetViewer/
  - The list of freshwater species located in the Paso Robles Subbasin in **Attachment C** of this letter. Please take particular note of the species with protected status.
  - Lands that are protected as open space preserves, habitat reserves, wildlife refuges, etc. or other lands protected in perpetuity and supported by groundwater or ISWs should be identified and acknowledged.

Attachment C

Freshwater Species Located in the Paso Robles Subbasin

To assist in identifying the beneficial users of surface water necessary to assess the undesirable result "depletion of interconnected surface waters", Attachment C provides a list of freshwater species located in the Paso Robles Subbasin. To produce the freshwater species list, we used ArcGIS to select features within the California Freshwater Species Database version 2.0.9 within the Paso Robles groundwater basin boundary. This database contains information on ~4,000 vertebrates, macroinvertebrates and vascular plants that depend on fresh water for at least one stage of their life cycle. The methods used to compile the California Freshwater Species Database can be found in Howard et al. 2015[1]. The spatial database contains locality observations and/or distribution information from ~400 data sources. The database is housed in the California Department of Fish and Wildlife's BIOS[2] as well as on The Nature Conservancy's science website[3].

Scientific Name	Common Name	Legally Protected Status		
		Federal	**State**	**Other**
BIRD				
Actitis macularius	Spotted Sandpiper			
Aechmophorus clarkii	Clark's Grebe			
Aechmophorus occidentalis	Western Grebe			
Agelaius tricolor	Tricolored Blackbird	Bird of Conservation Concern	SSC	BSSC - First priority
Aix sponsa	Wood Duck			
Anas americana	American Wigeon			
Anas clypeata	Northern Shoveler			
Anas crecca	Green-winged Teal			
Anas cyanoptera	Cinnamon Teal			
Anas platyrhynchos	Mallard			
Anas strepera	Gadwall			
Anser albifrons	Greater White-fronted Goose			
Ardea alba	Great Egret			
Ardea herodias	Great Blue Heron			
Aythya affinis	Lesser Scaup			
Aythya collaris	Ring-necked Duck			
Aythya valisineria	Canvasback		SSC	
Bucephala albeola	Bufflehead			
Bucephala clangula	Common Goldeneye			
Butorides virescens	Green Heron			

[1] Howard, J.K. et al. 2015. Patterns of Freshwater Species Richness, Endemism, and Vulnerability in California. PLoSONE, 11(7). Available at: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0130710
[2] California Department of Fish and Wildlife BIOS: https://www.wildlife.ca.gov/data/BIOS
[3] Science for Conservation: https://www.scienceforconservation.org/products/california-freshwater-species-database

Calidris mauri	Western Sandpiper			
Chen caerulescens	Snow Goose			
Chen rossii	Ross's Goose			
Chroicocephalus philadelphia	Bonaparte's Gull			
Cistothorus palustris palustris	Marsh Wren			
Egretta thula	Snowy Egret			
Fulica americana	American Coot			
Gallinago delicata	Wilson's Snipe			
Gallinula chloropus	Common Moorhen			
Geothlypis trichas trichas	Common Yellowthroat			
Haliaeetus leucocephalus	Bald Eagle	Bird of Conservation Concern	Endangered	
Icteria virens	Yellow-breasted Chat		SSC	BSSC - Third priority
Lophodytes cucullatus	Hooded Merganser			
Megaceryle alcyon	Belted Kingfisher			
Mergus merganser	Common Merganser			
Mergus serrator	Red-breasted Merganser			
Numenius americanus	Long-billed Curlew			
Nycticorax nycticorax	Black-crowned Night-Heron			
Oxyura jamaicensis	Ruddy Duck			
Pandion haliaetus	Osprey		Watch list	
Pelecanus erythrorhynchos	American White Pelican		SSC	BSSC - First priority
Phalacrocorax auritus	Double-crested Cormorant			
Podiceps nigricollis	Eared Grebe			
Podilymbus podiceps	Pied-billed Grebe			
Porzana carolina	Sora			
Rallus limicola	Virginia Rail			
Recurvirostra americana	American Avocet			
Riparia riparia	Bank Swallow		Threatened	
Setophaga petechia	Yellow Warbler			BSSC - Second priority
Tachycineta bicolor	Tree Swallow			
Tringa melanoleuca	Greater Yellowlegs			
Tringa solitaria	Solitary Sandpiper			
Vireo bellii	Bell's Vireo			
Vireo bellii pusillus	Least Bell's Vireo	Endangered	Endangered	

Xanthocephalus xanthocephalus	Yellow-headed Blackbird		SSC	BSSC - Third priority
CRUSTACEAN				
Branchinecta lynchi	Vernal Pool Fairy Shrimp	Threatened	SSC	IUCN - Vulnerable
Cyprididae fam.	Cyprididae fam.			
Hyalella spp.	Hyalella spp.			
Pacifastacus spp.	Pacifastacus spp.			
FISH				
Oncorhynchus mykiss - SCCC	South Central California coast steelhead	Threatened	SSC	Vulnerable - Moyle 2013
Catostomus occidentalis mnioltiltus	Monterey sucker			Least Concern - Moyle 2013
Catostomus occidentalis occidentalis	Sacramento sucker			Least Concern - Moyle 2013
Cottus gulosus	Riffle sculpin		SSC	Near-Threatened - Moyle 2013
Entosphenus tridentata ssp. 1	Pacific lamprey		SSC	Near-Threatened - Moyle 2013
Lavinia exilicauda exilicauda	Sacramento hitch		SSC	Near-Threatened - Moyle 2013
Lavinia exilicauda harengeus	Monterey hitch		SSC	Vulnerable - Moyle 2013
Oncorhynchus mykiss irideus	Coastal rainbow trout			Least Concern - Moyle 2013
Orthodon microlepidotus	Sacramento blackfish			Least Concern - Moyle 2013
Ptychocheilus grandis	Sacramento pikeminnow			Least Concern - Moyle 2013
Oncorhynchus mykiss - SCCC	South Central California coast steelhead	Threatened	SSC	Vulnerable - Moyle 2013
HERP				
Actinemys marmorata marmorata	Western Pond Turtle		SSC	ARSSC

Ambystoma californiense californiense	California Tiger Salamander	Threatened	Threatened	ARSSC
Anaxyrus boreas boreas	Boreal Toad			
Anaxyrus boreas halophilus	California Toad			ARSSC
Anaxyrus californicus	Arroyo Toad	Endangered	SSC	ARSSC
Pseudacris cadaverina	California Treefrog			ARSSC
Pseudacris hypochondriaca	Baja California Treefrog			
Pseudacris regilla	Northern Pacific Chorus Frog			
Rana boylii	Foothill Yellow-legged Frog	Under Review in the Candidate or Petition Process	SSC	ARSSC
Rana draytonii	California Red-legged Frog	Threatened	SSC	ARSSC
Spea hammondii	Western Spadefoot	Under Review in the Candidate or Petition Process	SSC	ARSSC
Taricha torosa	Coast Range Newt		SSC	ARSSC
Thamnophis hammondii hammondii	Two-striped Gartersnake		SSC	ARSSC
Thamnophis sirtalis infernalis	California Red-sided Gartersnake			Not on any status lists
Thamnophis sirtalis sirtalis	Common Gartersnake			
INSECT & OTHER INVERT				
Acentrella spp.	Acentrella spp.			
Agabus spp.	Agabus spp.			
Ambrysus mormon	Creeping water bug			Not on any status lists
Antocha spp.	Antocha spp.			
Argia emma	Emma's Dancer			
Argia lugens	Sooty Dancer			
Argia spp.	Argia spp.			
Argia vivida	Vivid Dancer			
Baetidae fam.	Baetidae fam.			
Baetis spp.	Baetis spp.			
Berosus punctatissimus	Water scavenger beetles			Not on any status lists
Berosus spp.	Berosus spp.			
Callibaetis spp.	Callibaetis spp.			

Centroptilum spp.	Centroptilum spp.			
Chaetarthria bicolor	Water Scavenger Beetles			Not on any status lists
Chaetarthria ochra	Water Scavenger Beetles			Not on any status lists
Cheumatopsyche spp.	Cheumatopsyche spp.			
Chironomidae fam.	Chironomidae fam.			
Chironomus spp.	Chironomus spp.			
Cladotanytarsus spp.	Cladotanytarsus spp.			
Coenagrionidae fam.	Coenagrionidae fam.			
Corisella spp.	Corisella spp.			
Corixidae fam.	Corixidae fam.			
Cricotopus spp.	Cricotopus spp.			
Dicrotendipes spp.	Dicrotendipes spp.			
Dytiscidae fam.	Dytiscidae fam.			
Enallagma civile	Familiar Bluet			
Enallagma cyathigerum	Common blue damselfly			Not on any status lists
Enochrus carinatus	Water Scavenger Beetles			Not on any status lists
Enochrus cristatus	Water Scavenger Beetles			Not on any status lists
Enochrus piceus	Water Scavenger Beetles			Not on any status lists
Enochrus pygmaeus	Water Scavenger Beetles			Not on any status lists
Enochrus spp.	Enochrus spp.			
Ephemerella spp.	Ephemerella spp.			
Ephemerellidae fam.	Ephemerellidae fam.			
Ephydridae fam.	Ephydridae fam.			
Eukiefferiella spp.	Eukiefferiella spp.			
Fallceon quilleri	A Mayfly			
Graptocorixa spp.	Graptocorixa spp.			
Gyrinus spp.	Gyrinus spp.			
Helichus spp.	Helichus spp.			
Helicopsyche spp.	Helicopsyche spp.			
Hetaerina americana	American Rubyspot			
Hydrochus spp.	Hydrochus spp.			
Hydrophilidae fam.	Hydrophilidae fam.			
Hydroporus spp.	Hydroporus spp.			
Hydropsyche spp.	Hydropsyche spp.			
Hydropsychidae fam.	Hydropsychidae fam.			
Hydroptila spp.	Hydroptila spp.			
Hydryphantidae fam.	Hydryphantidae fam.			
Ischnura spp.	Ischnura spp.			
Laccobius ellipticus	Water scavenger beetles			Not on any status lists
Laccobius spp.	Laccobius spp.			

Laccophilus maculosus	Dingy Diver			Not on any status lists
Lepidostoma spp.	Lepidostoma spp.			
Leptoceridae fam.	Leptoceridae fam.			
Libellula saturata	Flame Skimmer			
Limnophyes spp.	Limnophyes spp.			
Liodessus obscurellus	Predacious Diving Beetle			Not on any status lists
Macromia magnifica	Western River Cruiser			
Malenka spp.	Malenka spp.			
Microcylloepus spp.	Microcylloepus spp.			
Microtendipes spp.	Microtendipes spp.			
Nectopsyche spp.	Nectopsyche spp.			
Ochthebius spp.	Ochthebius spp.			
Ophiogomphus bison	Bison Snaketail			
Optioservus spp.	Optioservus spp.			
Oreodytes spp.	Oreodytes spp.			
Paracloeodes minutus	A Small Minnow Mayfly			
Paracymus spp.	Paracymus spp.			
Paratanytarsus spp.	Paratanytarsus spp.			
Peltodytes spp.	Peltodytes spp.			
Phaenopsectra spp.	Phaenopsectra spp.			
Plathemis lydia	Common Whitetail			
Postelichus spp.	Postelichus spp.			
Procladius spp.	Procladius spp.			
Pseudochironomus spp.	Pseudochironomus spp.			
Psychodidae fam.	Psychodidae fam.			
Rheotanytarsus spp.	Rheotanytarsus spp.			
Rhyacophila spp.	Rhyacophila spp.			
Sigara mckinstryi	A Water Boatman			Not on any status lists
Sigara spp.	Sigara spp.			
Simuliidae fam.	Simuliidae fam.			
Simulium spp.	Simulium spp.			
Sperchon spp.	Sperchon spp.			
Sperchontidae fam.	Sperchontidae fam.			
Stictotarsus spp.	Stictotarsus spp.			
Sweltsa spp.	Sweltsa spp.			
Tanytarsus spp.	Tanytarsus spp.			
Tipulidae fam.	Tipulidae fam.			
Tramea lacerata	Black Saddlebags			
Tricorythodes spp.	Tricorythodes spp.			
Wormaldia spp.	Wormaldia spp.			
MAMMAL				
Castor canadensis	American Beaver			Not on any status lists

MOLLUSK				
Gyraulus spp.	Gyraulus spp.			
Lymnaea spp.	Lymnaea spp.			
Menetus opercularis	Button Sprite			CS
Physa spp.	Physa spp.			
Pisidium spp.	Pisidium spp.			
Planorbidae fam.	Planorbidae fam.			
PLANT				
Alnus rhombifolia	White Alder			
Ammannia coccinea	Scarlet Ammannia			
Anemopsis californica	Yerba Mansa			
Azolla filiculoides	Mosquito Fern			
Baccharis salicina	Willow Baccharis			Not on any status lists
Bolboschoenus maritimus paludosus	Saltmarsh Bulrush			Not on any status lists
Callitriche heterophylla bolanderi	Large Water-starwort			
Callitriche marginata	Winged Water-starwort			
Castilleja minor minor	Alkali Indian-paintbrush			
Castilleja minor spiralis	Large-flower Annual Indian-paintbrush			
Cotula coronopifolia	Brass Buttons			
Crassula aquatica	Water Pygmyweed			
Crypsis vaginiflora	African Prickle Grass			
Cyperus erythrorhizos	Red-root Flatsedge			
Eleocharis macrostachya	Creeping Spikerush			
Eleocharis parishii	Parish's Spikerush			
Epilobium campestre	Smooth Boisduvalia			Not on any status lists
Epilobium cleistogamum	Cleistogamous Spike-primrose			
Eryngium spinosepalum	Spiny Sepaled Coyote-thistle		SSC	CRPR - 1B.2
Eryngium vaseyi vaseyi	Vasey's Coyote-thistle			Not on any status lists
Euthamia occidentalis	Western Fragrant Goldenrod			
Helenium puberulum	Rosilla			
Hydrocotyle verticillata verticillata	Whorled Marsh-pennywort			
Juncus dubius	Mariposa Rush			
Juncus effusus effusus	Common Bog Rush			
Juncus luciensis	Santa Lucia Dwarf Rush		SSC	CRPR - 1B.2
Juncus macrophyllus	Longleaf Rush			
Juncus xiphioides	Iris-leaf Rush			

Limosella aquatica	Northern Mudwort			
Marsilea vestita vestita	Hairy Waterclover			Not on any status lists
Mimulus guttatus	Common Large Monkeyflower			
Mimulus latidens	Broad-tooth Monkeyflower			
Mimetanthe pilosa	Snouted Monkey Flower			Not on any status lists
Montia fontana fontana	Fountain Miner's-lettuce			
Navarretia prostrata	Prostrate Navarretia		SSC	CRPR - 1B.1
Paspalum distichum	Joint Paspalum			
Persicaria lapathifolia	Common Knotweed			Not on any status lists
Persicaria maculosa	Spotted Ladysthumb			Not on any status lists
Phacelia distans	Common Phacelia			
Pilularia americana	Pillwort			
Plagiobothrys acanthocarpus	Adobe Popcorn-flower			
Plantago elongata elongata	Slender Plantain			
Platanus racemosa	California Sycamore			
Psilocarphus brevissimus brevissimus	Dwarf Woolly-heads			
Ranunculus aquatilis diffusus	Whitewater Crowfoot			Not on any status lists
Rorippa curvisiliqua curvisiliqua	Curve-pod Yellowcress			
Rumex conglomeratus	Green Dock			
Rumex salicifolius salicifolius	Willow Dock			
Salix exigua exigua	Narrowleaf Willow			
Salix laevigata	Polished Willow			
Salix lasiolepis lasiolepis	Arroyo Willow			
Schoenoplectus americanus	Three-square Bulrush			
Schoenoplectus pungens longispicatus	Three-square Bulrush			
Schoenoplectus pungens pungens	Common Threesquare			
Schoenoplectus saximontanus	Rocky Mountain Bulrush			
Typha domingensis	Southern Cattail			
Typha latifolia	Broadleaf Cattail			
Veronica anagallis-aquatica	Water Speedwell			

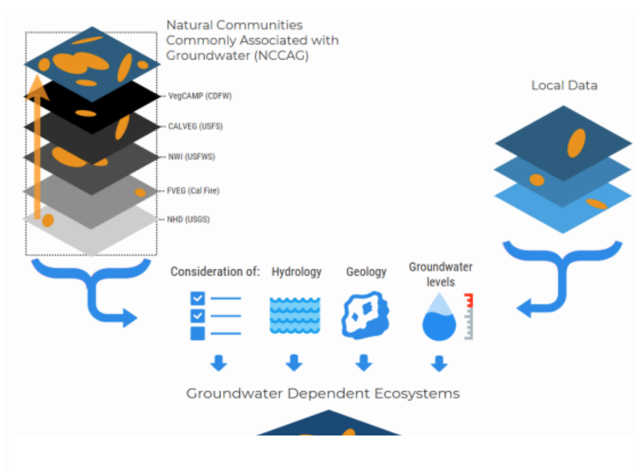
Veronica catenata	Chain Speedwell			Not on any status lists
Notes: ARSSC = At-Risk Species of Special Concern BSSC = Bird Species of Special Concern CRPR = California Rare Plant Rank CS = Currently Stable SSC = Species of Special Concern				

Attachment D

IDENTIFYING GDEs UNDER SGMA
Best Practices for using the NC Dataset

The Sustainable Groundwater Management Act (SGMA) requires that groundwater dependent ecosystems (GDEs) be identified in Groundwater Sustainability Plans (GSPs). As a starting point, the Department of Water Resources (DWR) is providing the Natural Communities Commonly Associated with Groundwater Dataset (NC Dataset) online[4] to help Groundwater Sustainability Agencies (GSAs), consultants, and stakeholders identify GDEs within individual groundwater basins. To apply information from the NC Dataset to local areas, GSAs should combine it with the best available science on local hydrology, geology, and groundwater levels to verify whether polygons in the NC dataset are likely supported by groundwater in an aquifer (Figure 1)[5]. This document highlights six best practices for using local groundwater data to confirm whether a potential GDE identified in the NC dataset is supported to groundwater.

The NC Dataset identifies vegetation and wetland features that are good indicators of a GDE. The dataset is comprised of 48 publicly available state and federal datasets that map vegetation, wetlands, springs, and seeps commonly associated with groundwater in California[6]. It was developed through a collaboration between DWR, the Department of Fish and Wildlife, and The Nature Conservancy (TNC). TNC has also provided detailed guidance on identifying GDEs from the NC dataset[7] on the Groundwater Resource Hub, a website dedicated to GDEs[8].



[4] *NC Dataset Online Viewer is available at: https://gis.water.ca.gov/app/NCDatasetViewer/*
[5] California Department of Water Resources (DWR). 2018. Summary of the "Natural Communities Commonly Associated with Groundwater" Dataset and Online Web Viewer. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Data-and-Tools/Files/Statewide-Reports/Natural-Communities-Dataset-Summary-Document.pdf
[6] *For more details on the mapping methods, refer to: Klausmeyer, K., J. Howard, T. Keeler-Wolf, K. Davis-Fadtke, R. Hull, A. Lyons. 2018. Mapping Indicators of Groundwater Dependent Ecosystems in California: Methods Report. San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/iGDE_data_paper_20180423.pdf*
[7] "Groundwater Dependent Ecosystems under the Sustainable Groundwater Management Act: Guidance for Preparing Groundwater Sustainability Plans" is available at https://groundwaterresourcehub.org/gde-tools/gsp-guidance-document/
[8] *The Groundwater Resource Hub is available at: www.GroundwaterResourceHub.org*

BEST PRACTICE #1. Establishing a Connection to Groundwater

Groundwater basins can be comprised of one continuous aquifer (Figure 2A) or multiple aquifers stacked on top of each other (Figure 2B). In unconfined aquifers (Figure 2A), using the depth to groundwater and the rooting depth of the vegetation is a reasonable method to determine groundwater dependence for GDEs. If groundwater is well below the rooting (and capillary) zone of the plants and any wetland features, the ecosystem is considered disconnected and groundwater management is not likely to affect the ecosystem (Figure 2D). However, it is important to consider local conditions (soil type, groundwater flow gradients, and aquifer parameters) and to review groundwater depth data from multiple seasons and water year types (wet and dry) because intermittent periods of high groundwater levels can replenish perched clay lenses that serve as the water source for GDEs (Figure 2C). Maintaining these natural groundwater fluctuations are important to sustaining GDE health.

Basins with a stacked series of aquifers (Figure 2B) may have varying levels of pumping across aquifers in the basin, depending on the production capacity or water quality associated with each aquifer. If pumping is concentrated in deeper aquifers, SGMA still requires GSAs to sustainably manage groundwater resources in shallow aquifers, such as perched aquifers, that support springs, surface water, domestic wells, and groundwater dependent ecosystems (Figure 2). This is because vertical groundwater gradients across aquifers may result in pumping from deeper aquifers to cause adverse impacts onto beneficial users reliant on shallow aquifers or interconnected surface water. The goal of SGMA is to sustainably manage groundwater resources for current and future social, economic, and environmental benefits. While groundwater pumping may not be currently occurring in a shallower aquifer, use of this water may become more appealing and economically viable in future years as pumping restrictions are placed on the deeper production aquifers in the basin to meet the sustainable yield and criteria. Thus, identifying GDEs in the basin should done irrespective to the amount of current pumping occurring in a particular aquifer, so that future impacts on GDEs due to new production can be avoided. A good rule of thumb to follow is: *if groundwater can be pumped from a well - it's an aquifer*.

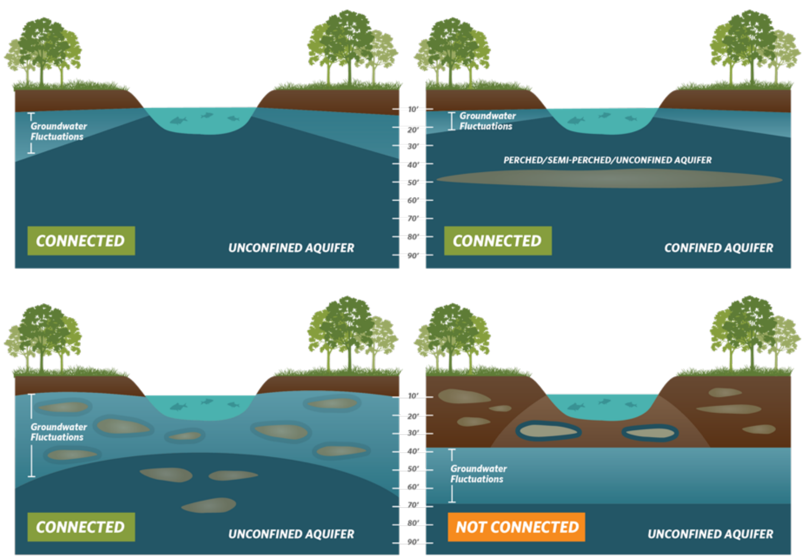


Figure 2. Confirming whether an ecosystem is connected to groundwater in a principal aquifer. Top: (Left) Depth to Groundwater in the aquifer under the ecosystem is an unconfined aquifer with depth to groundwater fluctuating seasonally and interannually within 30 feet from land surface. **(Right)** Depth to Groundwater in the shallow aquifer is connected to overlying ecosystem. Pumping predominately occurs in the confined aquifer, but pumping is possible in the shallow aquifer. **Bottom: (Left)** Depth to groundwater fluctuations are seasonally and interannually large, however, clay layers in the near surface prolong the ecosystem's connection to groundwater. **(Right)** Groundwater is disconnected from surface water, and any water in the vadose (unsaturated) zone is due to direct recharge from precipitation and indirect recharge under surface water feature. These areas typically support species that do not require access to groundwater to survive.

BEST PRACTICE #2. Characterize Seasonal and Interannual Groundwater Conditions

SGMA requires GSAs to describe current and historical groundwater conditions when identifying GDEs [23 CCR §354.16(g)]. Relying solely on the SGMA benchmark date (January 1, 2015) or any other single point in time to characterize groundwater conditions (e.g., depth-to-groundwater) is inadequate because managing groundwater conditions with data from one time point fails to capture the seasonal and interannual variability typical of California's climate. DWR's Best Management Practices document on water budgets[9] recommends using 10 years of water supply and water budget information to describe how historical conditions have impacted the operation of the basin within sustainable yield, implying that a baseline[10] could be determined based on data between 2005 and 2015. Using this or a similar time period, depending on data availability, is recommended for determining the depth-to-groundwater.

GDEs depend on groundwater levels being close enough to the land surface to interconnect with surface water systems or plant rooting networks. The most practical approach[11] for a GSA to assess whether polygons in the NC dataset are connected to groundwater is to rely on groundwater elevation data. As detailed in TNC's GDE guidance document[4], one of the key factors to consider when mapping GDEs is to contour depth-to-groundwater in the aquifer that is supporting the ecosystem (See Best Practice #5).

Groundwater levels fluctuate over time and space due to California's Mediterranean climate (dry summers and wet winters), climate change (flood and drought years), and subsurface heterogeneity in the subsurface (Figure 3). Many of California's GDEs have adapted to dealing with intermittent periods of water stress, however, if these groundwater conditions are prolonged adverse impacts to GDEs can result. While depth-to-groundwater levels within 30 feet[4] are generally accepted as being a proxy for confirming that polygons in the NC dataset are supported by groundwater, it is highly advised that fluctuations in the groundwater regime be characterized to understand the seasonal and interannual groundwater variability in GDEs. Utilizing groundwater data from one point in time can misrepresent groundwater levels required by GDEs, and inadvertently result in adverse impacts to the GDEs. Time series data on groundwater elevations and depths are available on the SGMA Data Viewer[12]. However, if insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons in the GSP <u>until</u> data gaps are reconciled in the monitoring network (See Best Practice #6).

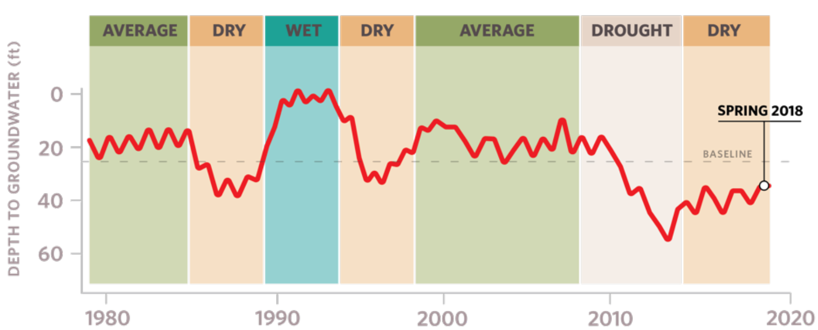


Figure 3. Example seasonality and interannual variability in depth to groundwater over time. Selecting one point in time, such as Spring 2018, to characterize groundwater conditions in GDEs fails to capture what groundwater conditions are necessary to maintain the ecosystem status into the future so adverse impacts are avoided.

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[9] DWR. 2016. Water Budget Best Management Practice. Available at: https://water.ca.gov/LegacyFiles/groundwater/sgm/pdfs/BMP_Water_Budget_Final_2016-12-23.pdf

[10] *Baseline is defined under the GSP regulations as "historic information used to project future conditions for hydrology, water demand, and availability of surface water and to evaluate potential sustainable management practices of a basin." [23 CCR §351(e)]*

[11] Groundwater reliance can also be confirmed via stable isotope analysis and geophysical surveys. For more information see The GDE Assessment Toolbox (Appendix IV, GDE Guidance Document for GSPs - link in footnote above).

[12] *SGMA Data Viewer: https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer*

BEST PRACTICE #3. Ecosystems Often Rely on Both Groundwater and Surface Water

GDEs are plants and animals that rely on groundwater for all or some of its water needs, and thus can be supported by multiple water sources. The presence of non-groundwater sources (e.g., surface water, soil moisture in the vadose zone, applied water, treated wastewater effluent, urban stormwater, irrigated return flow) within and around NC polygons does not preclude the possibility that a connection to groundwater exists. SGMA defines GDEs as "ecological communities and species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface" [23 CCR §351(m)]. Hence, depth-to-groundwater data should be used to identify whether NC polygons are supported by groundwater and should be considered GDEs. In addition, SGMA requires that significant and undesirable adverse impacts to beneficial users of surface water be avoided. Beneficial users of surface water include environmental users such as plants or animals[13], which therefore must be considered when developing minimum thresholds for depletions of interconnected surface water.

GSAs are only responsible for impacts to GDEs resulting from groundwater conditions in the basin, so if adverse impacts to GDEs result from the diversion of applied water, treated wastewater, or irrigation return flow away from the GDE, then those impacts will be evaluated by other permitting requirements (e.g., CEQA) and may not be the responsibility of the GSA. However, if adverse impacts occur to the GDE due to changing groundwater conditions resulting from pumping or groundwater management activities, then the GSA would be responsible (Figure 4).

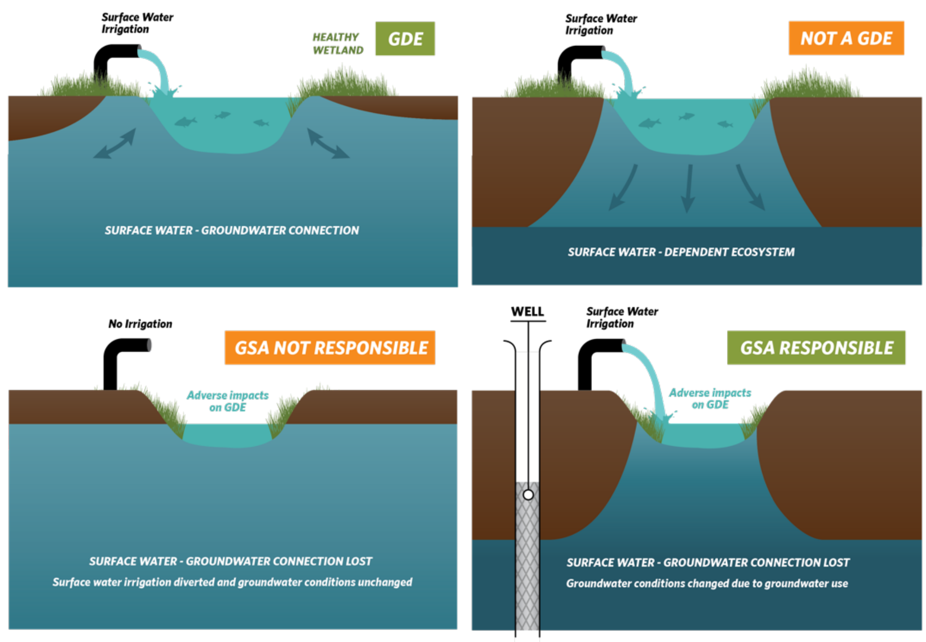


Figure 4. Ecosystems often depend on multiple sources of water. Top: (Left) Surface water and groundwater are interconnected, meaning that the GDE is supported by both groundwater and surface water. **(Right)** Ecosystems that are only reliant on non-groundwater sources are not groundwater-dependent. **Bottom: (Left)** An ecosystem that was once dependent on an interconnected surface water, but loses access to groundwater solely due to surface water diversions may not be the GSA's responsibility. **(Right)** Groundwater dependent ecosystems once dependent on an interconnected surface water system, but loses that access due to groundwater pumping is the GSA's responsibility.

[13] *For a list of environmental beneficial users of surface water by basin, visit: https://groundwaterresourcehub.org/gde-tools/environmental-surface-water-beneficiaries/*

BEST PRACTICE #4. Select Representative Groundwater Wells

Identifying GDEs in a basin requires that groundwater conditions are characterized to confirm whether polygons in the NC dataset are supported by the underlying aquifer. To do this, proximate groundwater wells should be identified to characterize groundwater conditions (Figure 5). When selecting representative wells, it is particularly important to consider the subsurface heterogeneity around NC polygons, especially near surface water features where groundwater and surface water interactions occur around heterogeneous stratigraphic units or aquitards formed by fluvial deposits. The following selection criteria can help ensure groundwater levels are representative of conditions within the GDE area:

- Choose wells that are within 5 kilometers (3.1 miles) of each NC Dataset polygons because they are more likely to reflect the local conditions relevant to the ecosystem. If there are no wells within 5km of the center of a NC dataset polygon, then there is insufficient information to remove the polygon based on groundwater depth. Instead, it should be retained as a potential GDE until there are sufficient data to determine whether or not the NC Dataset polygon is supported by groundwater.

- Choose wells that are screened within the surficial unconfined aquifer and capable of measuring the true water table.

- Avoid relying on wells that have insufficient information on the screened well depth interval for excluding GDEs because they could be providing data on the wrong aquifer. This type of well data should not be used to remove any NC polygons.

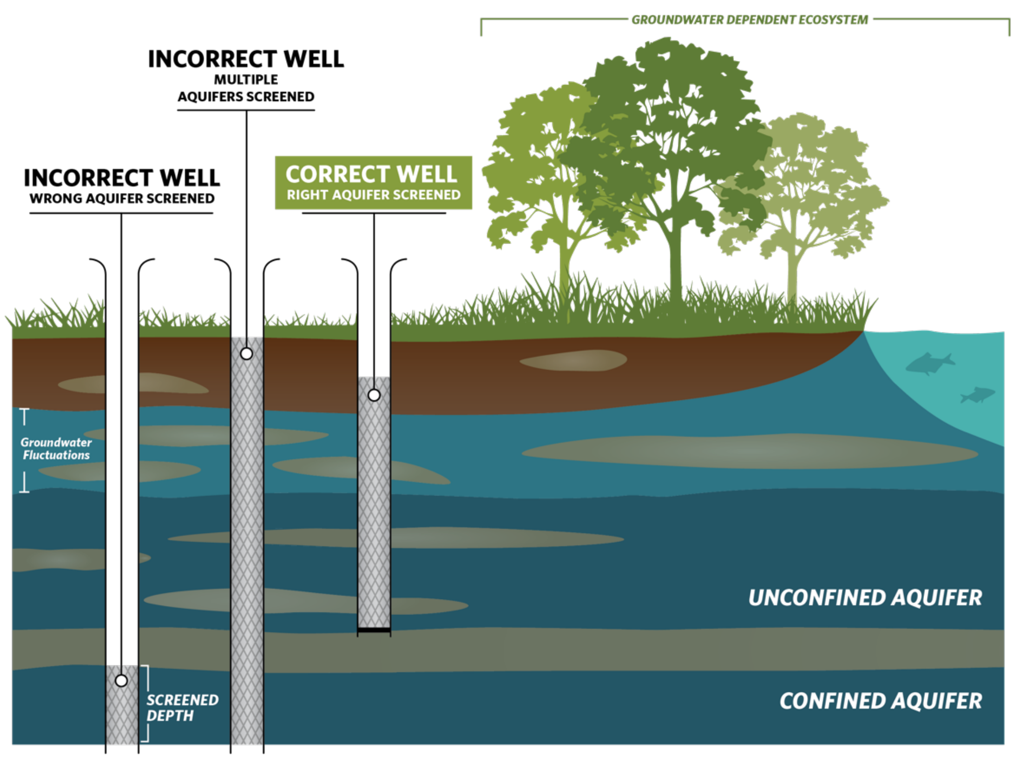


Figure 5. Selecting representative wells to characterize groundwater conditions near GDEs.

BEST PRACTICE #5. Contouring Groundwater Elevations

The common practice to contour depth-to-groundwater over a large area by interpolating measurements at monitoring wells is unsuitable for assessing whether an ecosystem is supported by groundwater. This practice causes errors when the land surface contains features like streams and wetlands depressions because it assumes the land surface is constant across the landscape and depth-to-groundwater is constant below these low-lying areas (Figure 6 - left panel). A more accurate approach is to interpolate **groundwater elevations** at monitoring wells to get an estimate of groundwater elevation across the landscape. This layer can then be subtracted from the land surface elevation from a Digital Elevation Model (DEM)[14] to estimate depth to groundwater contours across the landscape (Figure 6 – right panel; Figure 7). This will provide a much more accurate contours of depth-to-groundwater along streams and other land surface depressions where GDEs are commonly found.

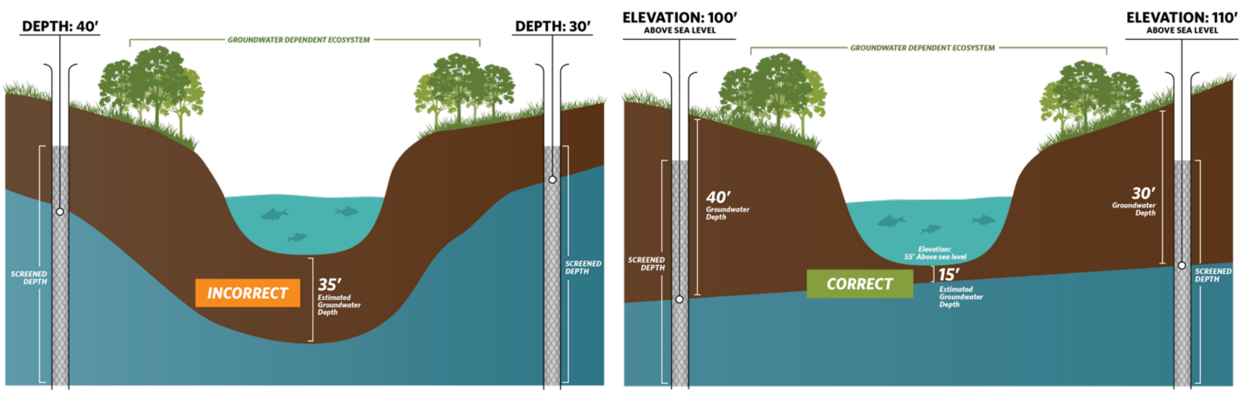


Figure 6. Contouring depth-to-groundwater around surface water features and GDEs. (Left) Groundwater level interpolation using depth-to-groundwater data from monitoring wells. **(Right)** Groundwater level interpolation using groundwater elevation data from monitoring wells and DEM data.

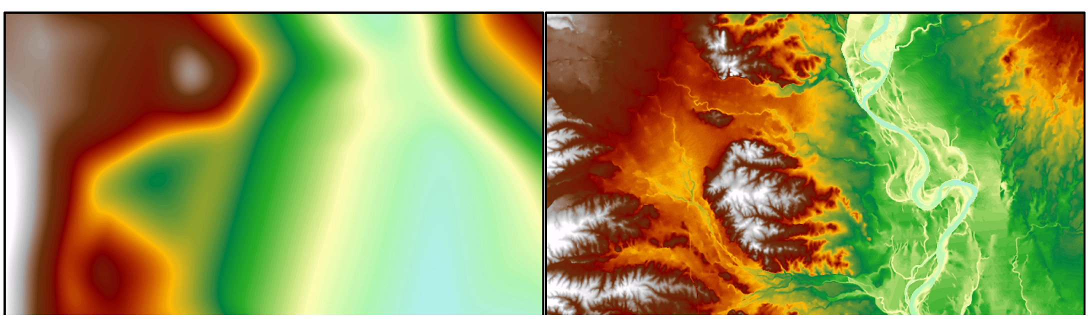


Figure 7. Depth to Groundwater Contours in Northern California. (Left) Contours were interpolated using depth to groundwater measurements determined at each well. **(Right)** Contours were determined by interpolating groundwater elevation measurements at each well and superimposing ground surface elevation from DEM spatial data to generate depth to groundwater contours. The image on the right shows a more accurate depth to groundwater estimate because it takes the local topography and elevation changes into account.

[14] USGS Digital Elevation Model data products are described at: https://www.usgs.gov/core-science-systems/ngp/3dep/about-3dep-products-services and can be downloaded at: https://viewer.nationalmap.gov/basic/

BEST PRACTICE #6. Best Available Science

Adaptive management is embedded within SGMA and provides a process to work toward sustainability over time by beginning with the best available information to make initial decisions, monitoring the results of those decisions, and using the data collected through monitoring to revise decisions in the future. In many situations, the hydrologic connection of NC dataset polygons will not initially be clearly understood if site-specific groundwater monitoring data are not available. If sufficient data are not available in time for the 2020/2022 plan, **The Nature Conservancy strongly advises that questionable polygons from the NC dataset be included in the GSP until data gaps are reconciled in the monitoring network.** Erring on the side of caution will help minimize inadvertent impacts to GDEs as a result of groundwater use and management actions during SGMA implementation.

KEY DEFINITIONS

Groundwater basin is an aquifer or stacked series of aquifers with reasonably well-defined boundaries in a lateral direction, based on features that significantly impede groundwater flow, and a definable bottom. *23 CCR §341(g)(1)*

Groundwater dependent ecosystem (GDE) are ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface. *23 CCR §351(m)*

Interconnected surface water (ISW) surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted. *23 CCR §351(o)*

Principal aquifers are aquifers or aquifer systems that store, transmit, and yield significant or economic quantities of groundwater to wells, springs, or surface water systems. *23 CCR §351(aa)*

ABOUT US

The Nature Conservancy is a science-based nonprofit organization whose mission is *to conserve the lands and waters on which all life depends*. To support successful SGMA implementation that meets the future needs of people, the economy, and the environment, TNC has developed tools and resources (www.groundwaterresourcehub.org) intended to reduce costs, shorten timelines, and increase benefits for both people and nature.

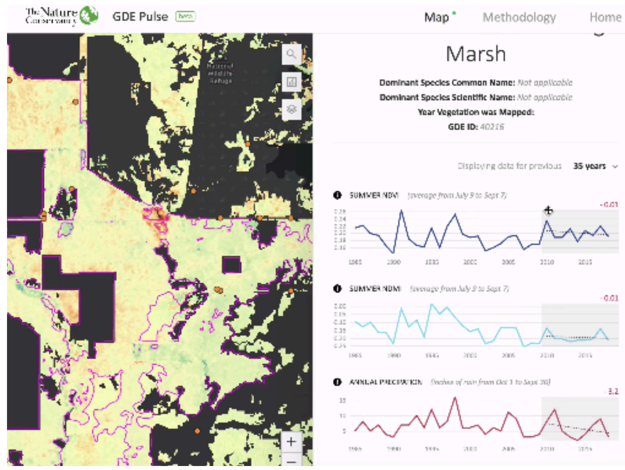
Attachment E

GDE Pulse

A new, free online tool that allows Groundwater Sustainability Agencies to assess changes in groundwater dependent ecosystem (GDE) health using satellite, rainfall, and groundwater data.

The Nature Conservancy
Protecting nature. Preserving life.®

Visit
https://gde.codefornature.org/



Remote sensing data from satellites has been used to monitor the health of vegetation all over the planet. GDE pulse has compiled 35 years of satellite imagery from NASA's Landsat mission for every polygon in the Natural Communities Commonly Associated with Groundwater Dataset[15]. The following datasets are included:

Normalized Difference Vegetation Index (NDVI) is a satellite-derived index that represents the greenness of vegetation. Healthy green vegetation tends to have a higher NDVI, while dead leaves have a lower NDVI. We calculated the average NDVI during the driest part of the year (July - Sept) to estimate vegetation health when the plants are most likely dependent on groundwater.

Normalized Difference Moisture Index (NDMI) is a satellite-derived index that represents water content in vegetation. NDMI is derived from the Near-Infrared (NIR) and Short-Wave Infrared (SWIR) channels. Vegetation with adequate access to water tends to have higher NDMI, while vegetation that is water stressed tends to have lower NDMI. We calculated the average NDVI during the driest part of the year (July–September) to estimate vegetation health when the plants are most likely dependent on groundwater.

Annual Precipitation is the total precipitation for the water year (October 1st – September 30th) from the PRISM dataset[16]. The amount of local precipitation can affect vegetation with more precipitation generally leading to higher NDVI and NDMI.

Depth to Groundwater measurements provide an indication of the groundwater levels and changes over time for the surrounding area. We used groundwater well measurements from nearby (<1km) wells to estimate the depth to groundwater below the GDE based on the average elevation of the GDE (using a digital elevation model) minus the measured groundwater surface elevation.

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[15] *The Natural Communities Commonly Associated with Groundwater Dataset is hosted on the California Department of Water Resources' website: https://gis.water.ca.gov/app/NCDatasetViewer/#*

[16] The PRISM dataset is hosted on Oregon State University's website: http://www.prism.oregonstate.edu/

Steve Lohr

CEO, J. Lohr Vineyards & Wines

J. LOHR
VINEYARDS & WINES

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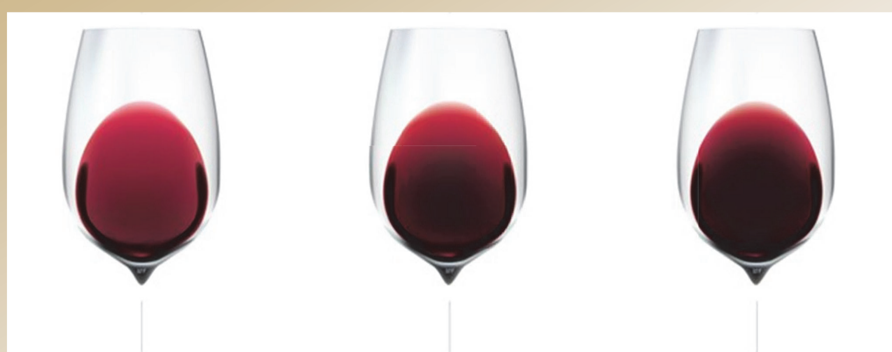
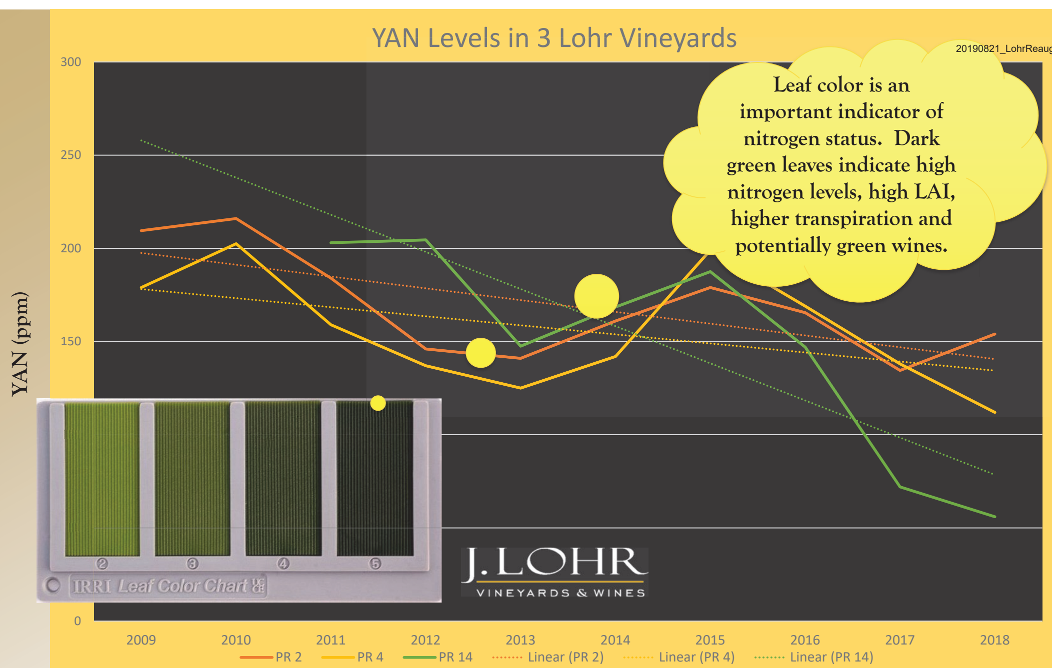
Grower Strategies to Increase Color and Optimize Yields



J. LOHR
VINEYARDS & WINES



Survey of 2018 Cabernet Must YAN vs CD From Estrella & San Miguel sub-AVA's

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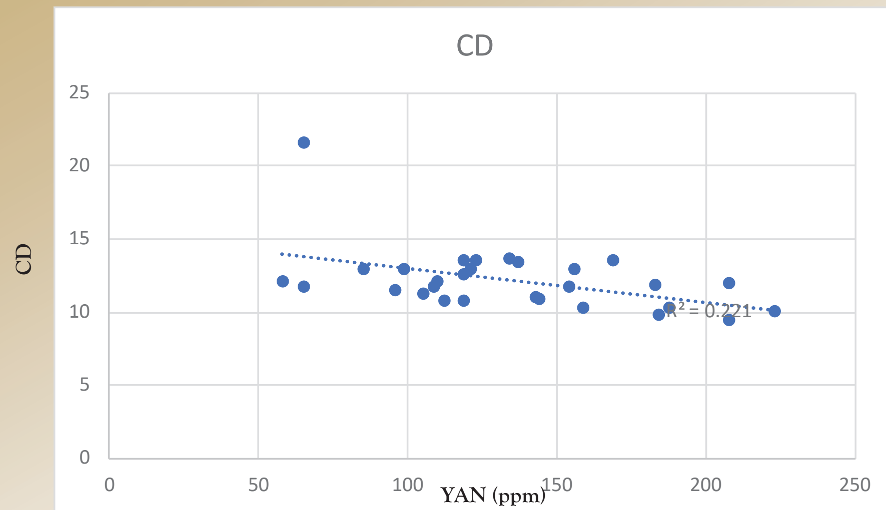

J. LOHR VINEYARDS & WINES

Summary Comments

20190821_LohrReaugh

- Vineyard derived Cabernet color (CD) is a focus (quality over quantity)
  - Likely CD Enhancers –
    - Pressure bomb guided irrigation (higher stress set points)
    - Lower nitrogen status (lower than current recommended levels?)
    - Appropriate fruit zone light environment
  - CD Diminishers
    - Elevated juice YAN's (increase in green flavors)
    - High density canopies (increase in green flavors)
    - Well watered vines

J. LOHR VINEYARDS & WINES

20190821_LohrReaugh

Jerry Reaugh

Water Consultant, J. Lohr Vineyards & Wines

J. LOHR VINEYARDS & WINES

20190821_LohrReaugh

Supplemental Water

Essential Element to Achieve Sustainability

BVB Blended Water Project

20190821_LohrReaugh

There is Available Water Today!

- Paso Robles Treated Water
  - 1,000 - 1,500 AFY maybe more
- NACI Water
  - 4,000 - 6,000 AFY maybe more
- Blended Water to reduce salts

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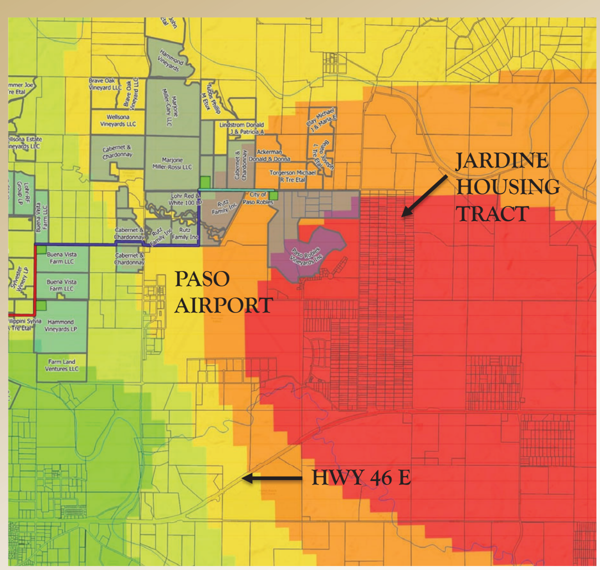
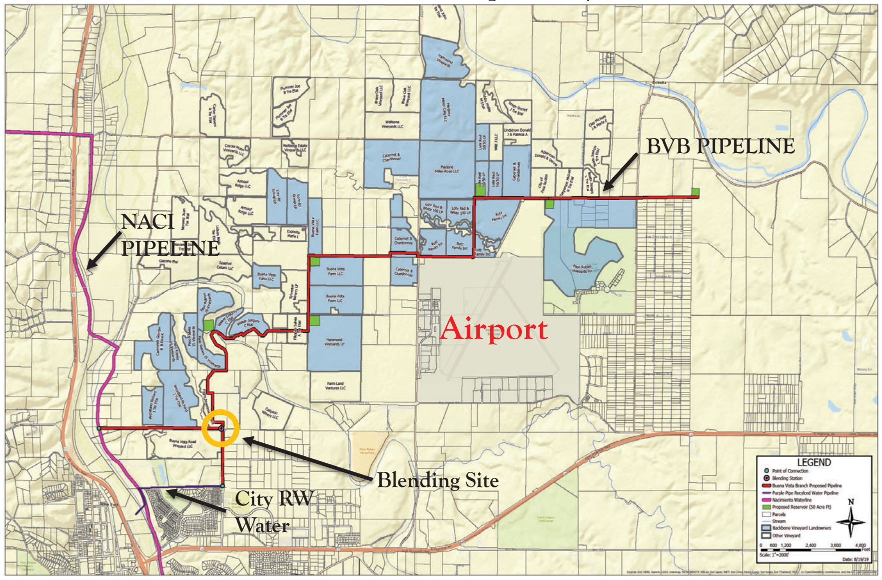


BVB Blended Water Pipeline System



OHR
ARDS & WINES

Amazing Benefits of Supplemental Water

- Red & Orange Zone pumpers greatly reduce groundwater pumping by 50% to 80%
- Red & Orange Zone pumpers irrigate with Supplemental Water
- Supplemental Water a hedge against negative impact on pumpers and to the local economy
- The entire Basin benefits, costs will be shared, all pumpers will remain under GSP Allocation

J. LOHR
VINEYARDS & WINES

Help us build this Project!

We can do this together.

J. LOHR
VINEYARDS & WINES

Jerry Lohr

Founder and CFO, J. Lohr Vineyards & Wines

J. LOHR VINEYARDS & WINES

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J. Lohr Grower Seminar – July 10, 2019

J. LOHR VINEYARDS & WINES

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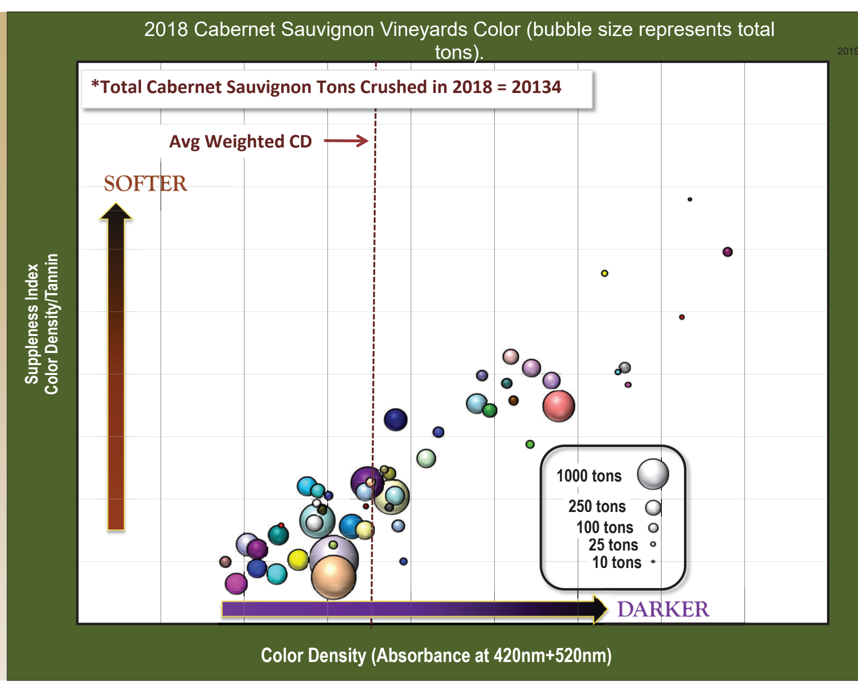

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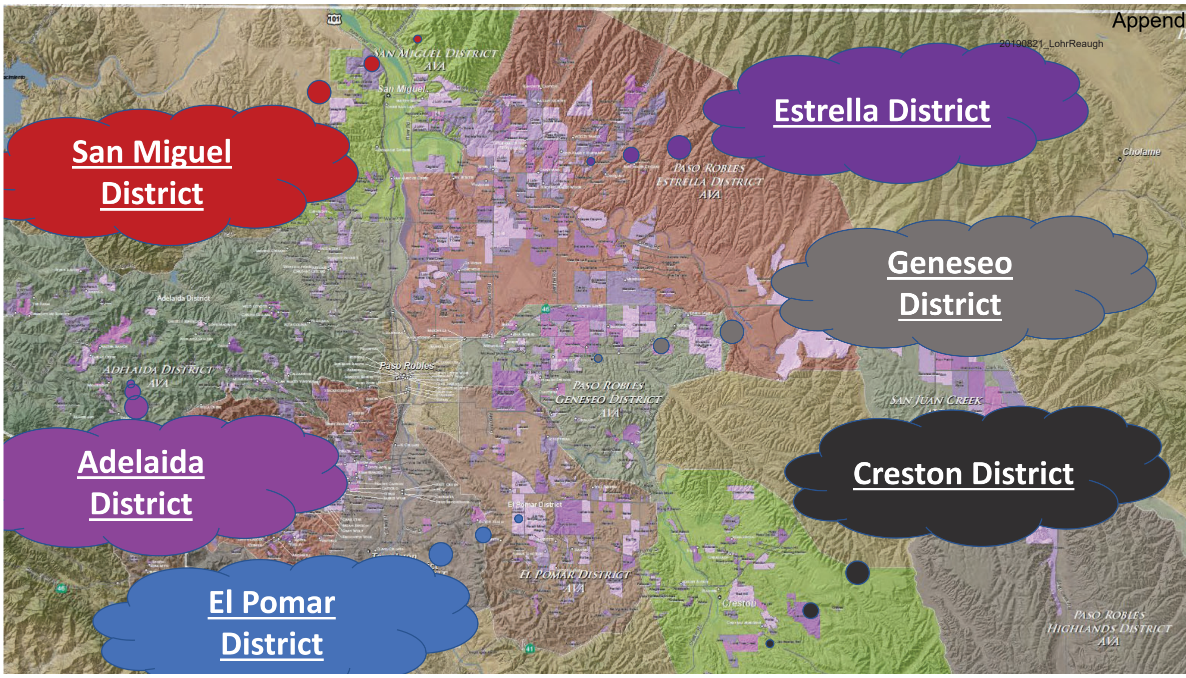
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San Miguel District
Estrella District
Geneseo District
Adelaida District
Creston District
El Pomar District
San Miguel District AVA
Paso Robles Estrella District AVA
Adelaida District AVA
Paso Robles Geneseo District AVA
San Juan Creek
El Pomar District AVA
Paso Robles Highlands District AVA
San Miguel
Paso Robles
Creston
Cholame

Paso Basin Aerial Groundwater Mapping Pilot Study

Paso Basin to Utilize Electromagnetic Measuring Technique to Map Local Aquifer System

The San Luis Obispo County Flood Control and Water Conservation District will conduct a survey of our local aquifer systems using the Aerial Electromagnetic (AEM) method starting mid-October 2019 in the Paso Robles Basin. This will provide a more complete picture of the groundwater basin for more informed decisions with our water in the future.

The surveying method uses instruments mounted on a helicopter, which will fly approximately 497 line-miles in a strategic pattern approximately 100 feet above the ground to collect measurements down to 1,000 feet below the land surface. The survey will send and receive signals that maps out the subsurface geology and groundwater locations in the Paso Robles Basin. The 3 to 5 day study will take place in two areas of the Paso Robles Basin, on the east side of the valley, and the area near Highway 46 and Highway 229 by Creston and Whitley Gardens.

Informational Presentations

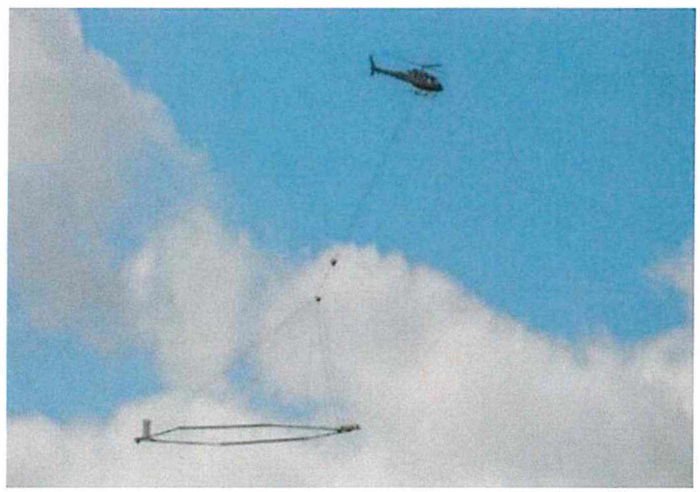
8/13/2019, 9:00 AM: Board of Supervisors Meeting

8/21/2019, 4:00 PM: Paso Basin Cooperative Committee

8/21/2019, 7:00 PM: Creston Advisory Body

8/28/2019, 7:00 PM: San Miguel Advisory Council

9/4/2019, 7:00 PM: Shandon Advisory Committee



Current Status and Next Steps

- In August and September 2019, the District is providing an informational overview on the Pilot Study, meeting dates and times are listed above.
- The flight path will avoid metallic structures (causes interference in the data set); hence the flight areas will avoid urban areas, vineyards, powerlines, etc.
- This project does not pose a risk to health or safety.
- The very low magnetic field is comparable to standing 1 foot away from your toaster for a few seconds, as the helicopter flies over.
- Survey results will be presented in 2020. Stay tuned!

To get involved please visit: SLOCounty.ca.gov/PW/PasoBasinPilotStudy

September 27, 2019

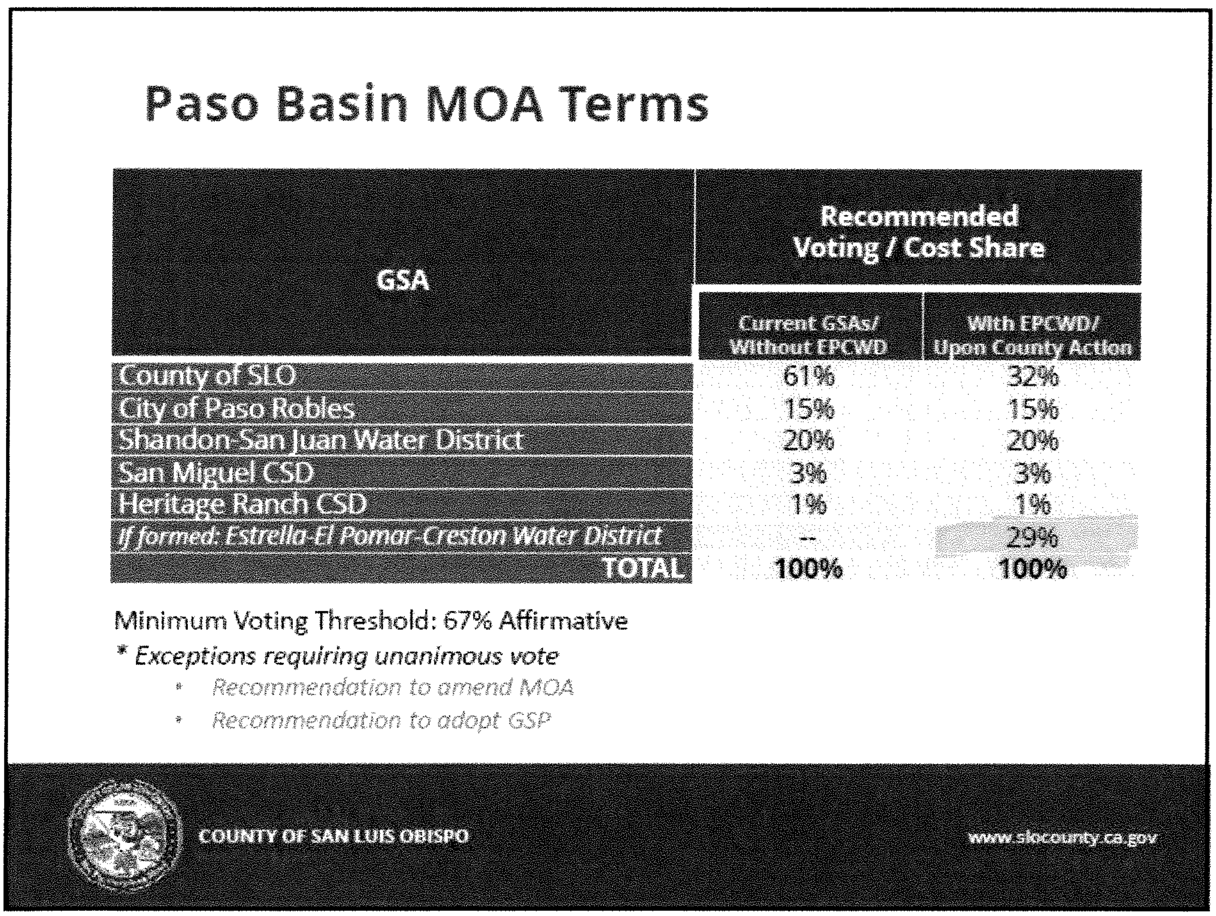
San Luis Obispo County Paso Robles Groundwater Subbasin GSA
County Government Center
1055 Monterey Street
San Luis Obispo, CA 93408

Dear SLO County Paso Robles Subbasin GSA,

Re: Comments from the Estrella-El Pomar-Creston Water District regarding the Paso Robles Groundwater Subbasin GSP

In 2017, the Estrella El Pomar-Creston Water District (EPCWD) was established under the California Water Code (Water Code §§ 34000 et seq) to contribute to the solutions needed to address the Paso Robles Groundwater Subbasin overdraft. EPCWD's primary purpose was to become a Groundwater Sustainability Agency (GSA) and participate in the Groundwater Sustainability Plan (GSP) process.

Not only were the members of the EPCWD committed to help bring the Paso Subbasin into Sustainability, they also committed themselves, through self-assessment, to pay for a major portion of the GSP development. The graphic below shows EPC's commitment to pay for 29% of the costs.



Paso Basin MOA Terms

GSA	Recommended Voting / Cost Share	
	Current GSAs/ Without EPCWD	With EPCWD/ Upon County Action
County of SLO	61%	32%
City of Paso Robles	15%	15%
Shandon-San Juan Water District	20%	20%
San Miguel CSD	3%	3%
Heritage Ranch CSD	1%	1%
If formed: Estrella-El Pomar-Creston Water District	--	29%
TOTAL	100%	100%

Minimum Voting Threshold: 67% Affirmative

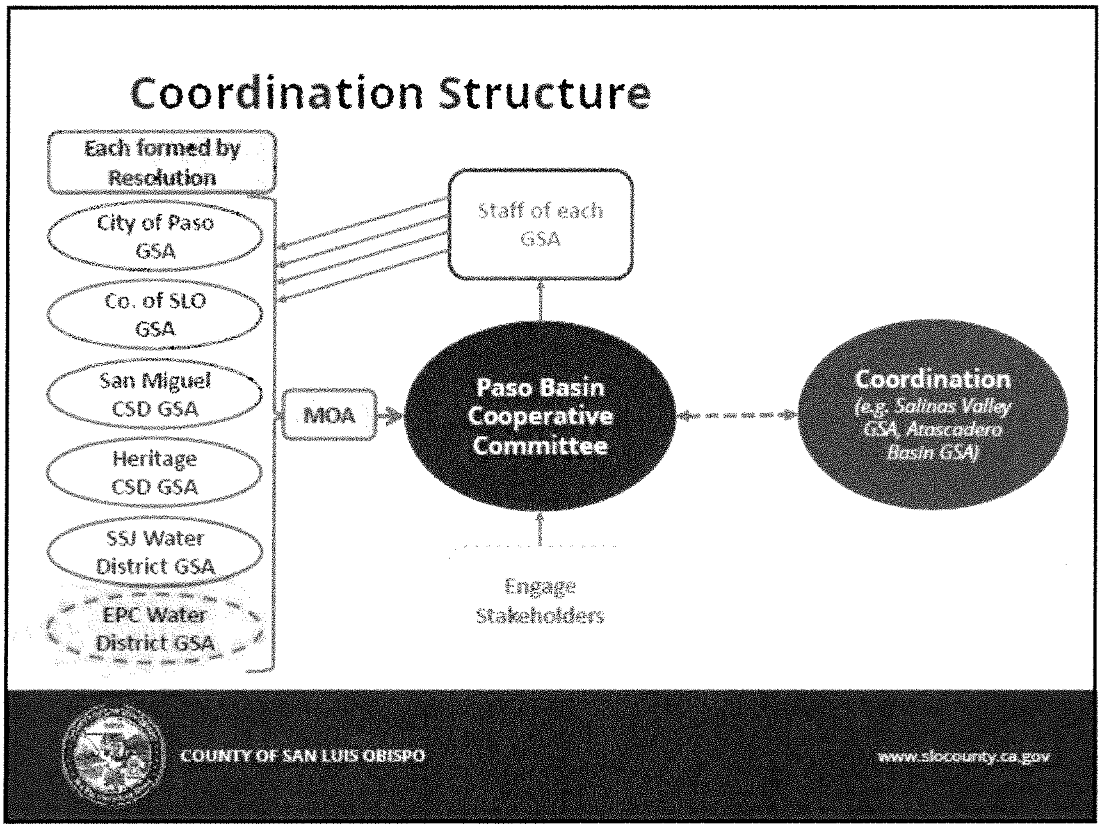
* *Exceptions requiring unanimous vote*

- *Recommendation to amend MOA*
- *Recommendation to adopt GSP*

COUNTY OF SAN LUIS OBISPO

www.slocounty.ca.gov

In September 2016, a group of "Eligible Entities" started meeting to determine how the Paso Robles Groundwater Subbasin was going to prepare the GSP required by the State of California. It was well understood at the time that the EPCWD was forming with the intention of becoming a GSA. For eight months the "Eligible Entities" met on a regular basis. Dana Merrill and Jerry Reaugh, representing the forming EPCWD, were invited to these meetings, participated extensively in these meetings and helped craft the document now known as the Memorandum of Agreement (MOA). The graphic below, from a SLO County presentation, is indicative of EPCWD's inclusion in the process.



EPCWD intends to document in this letter the intentional exclusion of our Water District from the GSP process and the complete failure of the County GSA to satisfy the outreach and dialogue requirement with agricultural pumpers. It is important to address our concerns now as the GSP moves towards adoption and implementation Real choices and actions will be made in the implementation process and it is essential that those who will be asked to sacrifice the most will be included in the decision-making process.

The GSP as proposed in its final draft is a vague document which postpones any meaningful decisions and actions to the future. The organizational structure necessary for the future implementation of the GSP is absent and the various GSAs are granted much autonomy. Some agricultural interests are represented by the Shandon/San Juan Water District which accounts for 34% of agricultural pumping in the Subbasin[1]. What about the other 66% of agricultural pumping in the Subbasin?

Agricultural pumpers must have a "seat at the table".

The Estrella-El Pomar-Creston Water District is concerned about the systematic, intentional and perhaps predatory exclusion by County officials of a legitimate and consequential stakeholder group from the GSP Process. EPCWD represents 44% of agricultural pumping in the Subbasin and is the largest group of pumpers.

Attachment A chronicles the long history of EPCWD's commitment to the GSP and the County's support for EPCWD being included as a GSA. Initially, the County Board of Supervisors was supportive of our work and even encouraged the district formation. The EPC was listed as a party to the MOA. County Supervisors voted at least three times (5-0) in support of EPC becoming as GSA. After considerable effort and expense (over $200,000 of our members funds) EPCWD was formed in December, 2017 as a California Water District. EPCWD met all the requirements of the MOA to become a GSA.

Up until 2018, our EPCWD efforts aligned with San Luis Obispo County established policies. The County said repeatedly, "The County acknowledges that landowners and/or registered voters may prefer to form an eligible entity to ensure their representation on a GSA. The County supports landowner driven eligible entity formation processes".[2] Yet in the final hours, the San Luis Obispo Board of Supervisors reversed direction and voted to deny EPCWD GSA status and consequently excluded the largest group of groundwater pumpers from the GSP Process.

Since formation, EPCWD has operated as a water district with our members successfully self-accessing ourselves by passing two Prop 218 votes, raising over $300,000. These funds have allowed EPCWD to hire, in cooperation with the Shandon-San Juan Water District, a hydrogeologist who has participated in and contributed to the GSP technical committee. Both Districts have also jointly funded an economic study that will evaluate the potential economic impact the GSP might have on our local economy and community. EPCWD has remained engaged in the GSP process but with limited opportunity to influence decision making.

Attachment B reveals the extent of County official's effort to target and exclude the EPCWD. These terms were imposed on EPCWD as conditions for EPC's continued existence as a water district. It is clear that this was a predatory, overt and systematic effort to deny EPCWD and its members the right to represent their interests in determining how the Paso Robles Groundwater Subbasin is going to be managed for decades to come. It appears the EPC's misconduct was to try to be a GSA and to work alongside the rest of Subbasin stakeholders to bring the Subbasin into sustainability.

Even more egregious than EPCWD's exclusion, the County GSA has neglected all agricultural pumpers within their purview. The County GSA has failed its obligation to actively seek the involvement of agricultural stakeholders. This is contrary to the intentions of the SGMA Law and particularly troublesome when considering that the so-called County "white-areas", which includes the EPCWD area, represent 66% of groundwater pumpers. The County has never held an outreach meeting with the irrigated agriculture community. Not a single meeting or open forum for free discussion among irrigated

[1] Agricultural pumping accounts for 90% of all groundwater pumping in the Subbasin, GSP Chapter 6, Table 6-5
[2] SLO County SGMA Strategy, revised March 7,2017, Policy Statement 3b. Membership and Participation on Governing Boards, 2nd bullet point

agricultural stakeholders and public officials has been held by our GSA. A 3-minute speaking time slot during "public comment periods" at Cooperative Committee Meetings does not constitute outreach. County officials have never attended a single EPCWD meeting. One of the cornerstones of SGMA is stakeholder involvement and the necessity of an inclusionary process.

In their own words, the County says, "the County advocates for fair and equitable representation in the decision making process".[3] "Fair and equitable representation could be accomplished in a number of ways, such as through inclusion of appointed seats on a GSA Board for certain beneficial user interests … or through a robust public process and formation of representative advisory committees, and should be negotiated by the eligible entities in each basin.".[4] When an advisory position representing irrigated agriculture was proposed, County officials opposed.

We have not been given one meeting in which the County GSA has met with the Ag Community, no committees, no open forum or dialogue, and no advisory position. The irrigated Ag Community in the County's GSA has been ignored.

EPCWD believes that the County Flood Control District operating as one of the Paso Robles Groundwater Subbasin's GSAs, has been derelict in their obligation to engage the irrigated Ag Community and make sure that the irrigated agriculture community interests have been addressed.

EPCWD feels that those who are going to be affected the most must be included in the process.

Agricultural pumpers must have a "seat at the table".

Regards,

Dana Merrill
President
Estrella-El-Pomar-Creston Water District

[3] SLO County SGMA Strategy, revised March 7,2017, Policy Statement 3b. Membership and Participation on Governing Boards, 3rd bullet point
[4] SLO County SGMA Strategy, revised March 7,2017, Policy Statement 3b. Membership and Participation on Governing Boards, 4th bullet point

Attachment A

Chronology:

- **Spring 2016** – Landowners in the Shandon/San Juan Area start organizing to form their own opt-in, Water District with the intention of being a GSA.

- **August 2016** –SLO County forms "Paso Basin Eligible Entities GSA Meetings". This group includes all agencies that might want to become a GSA. This group included City of Paso Robles, SLO County, Heritage Ranch, San Miguel CSD, Atascadero Mutual Water Company, Templeton CSD, Monterey County, and the proposed Shandon San Juan WD and along with other interested parties.

- **September 2016** – the emerging Estrella-EL Pomar-Creston Water District is invited to join the Paso Basin Eligible Entities GSA Meetings.

- **October 2016** – LAFCO approves the formation of the Shandon/San Juan Water District, SSJ WD. This Water District is a voluntary, opt-in, California Water District.

- **October 2016 through May 2017** – the Paso Basin Eligible Entities GSA Meetings continues to meet with participation of both of the proposed WD's. The MOA, Memorandum of Agreement, is drafted and finalized after considerable work and many revisions. Members from both Water Districts participate extensively in the drafting and re-drafting of the proposed MOA.

- **March 7, 2017** – SLO County updates its SGMA Strategy Document which recognizes both SSJWD and EPCWD as potential participants in the MOA. Quote from SLO County proceedings, "the County supports landowner driven eligible entity formation processes".

- **April 2017** – LAFCO approves the formation of Estrella-EL Pomar-Creston Water District (EPCWD). This Water District is a voluntary, opt-in, California Water District. The vote was 5-2 in favor.

- **May 16, 2017** – SLO County Board of Supervisors votes 5 to 0 to become a GSA. Supervisor Compton was part of this vote. Language in their resolution includes several references to EPC becoming a Water District and the County relinquishing GSA control over EPCWD's lands.

- **May, 29 2017** – The Basin MOA, Memorandum of Agreement, is finalized. The MOA forms a "Cooperative Committee" that will be responsible for creating a single GSP for the Paso Robles Groundwater Basin. It has five members: City of Paso, SLO County, Shandon/San Juan Water District, San Miguel CSD, Heritage Ranch CSD. The EPC Water District is not initially part of the MOA as it is not yet a Water District or a GSA. The MOA includes detailed provisions that will allow EPCWD to join the MOA once EPCWD becomes a GSA. For EPCWD to become a GSA, the EPCWD must be formed as a Water District by December 31, 2017 and SLO County Supervisors will have to vote to relinquish their authority over the lands that are in the EPCWD. This passes the Board of Supervisors by a vote of 5-0.

- **June 2017** – The proposed Shandon/San Juan Water District becomes a California Water District and applies successfully to DWR to become a GSA before the DWR deadline of June 30, 2017.

- **July & August 2017** – The five eligible agencies approve and sign the MOA including the County of San Luis Obispo.

- **October 18, 2017** – The Cooperative Committee holds its first meeting.

- **December 8, 2017** – EPCWD completes its district formation process and LAFCO files the Certificate of Completion. This formation meets the requirements established by the MOA.

- **January 2018** – EPCWD applies to the State DWR to become a GSA. The application is denied by DWR until SLO County relinquishes control.

- **March 6, 2018** – SLO County Supervisors votes 3 to 2 to **NOT** relinquish GSA authority, thus denying EPCWD GSA status and reversing months of understanding and support for EPCWD to become a GSA. Supervisor Compton, as a LAFCO Commissioner, voted to approve formation of EPCWD whose primary purpose was to become a GSA. Compton then reversed her position and voted against EPCWD becoming a GSA.

- **January through December 2018** – EPC Water District conducts normal water district activities including numerous Board Meetings, holding joint Board Meetings with the Shandon/San Juan Water District, signing a Cooperation Agreement with the Shandon/San Juan Water District, partnering with the S/SJ WD to hire a hydrogeologist as a consultant, and most significantly funds the District with Prop 218 assessments of over $200,000. The 2019 Prop 218 Assessment of Members has also been completed raising an additional $100,000.

- **November 15, 2018** – LAFCO holds an extensive hearing to review EPCWD's status and to determine if EPCWD has met its Conditions of Approval. EPCWD presents numerous documents and public testimony in support of EPCWD's successfully meeting LAFCO's Condition of Approval. LAFCO Staff also supported the Conditions of Approval had been met. Several LAFCO Commissioners expressed their belief that EPCWD has not met its Condition of Approval and that EPC WD should be dissolved. A further Hearing was scheduled.

- **Winter, 2018/2019** – EPCWD attorneys and LAFCO Attorney have several meetings, communications and negotiations. LAFCO demands that EPCWD submit to very restrictive terms, otherwise LAFCO will dissolve the Water District. These terms are presented in Appendix A.

- **February 21, 2019** – LAFCO holds its second Hearing. Several Commissioners wanted the Water District dissolved. EPCWD acquiesced to the new conditions imposed by LAFCO. LAFCO voted 4-3 to approve EPCWD continuing as a Water District.

Attachment B

Replacement Language to Condition 11

1. The EPCWD shall be a district as allowed under the California Water District Law Code (Water Code §§ 34000 et seq.) and as determined by and subject to LAFCO's approval (Resolution 2017-02).
2. The LAFCO approval does not grant to EPCWD any additional power or authority beyond the law.
3. The EPCWD shall not become a Groundwater Sustainability Agency (GSA) as provided for in the Sustainable Groundwater Management Act ("SGMA", Water Code §§ 10720 et seq.) prior to the approval by the State Department of Water Resources ("DWR") of the Groundwater Sustainability Plan ("GSP") or January 31, 2022, whichever is earlier.
4. The EPCWD shall not become a party to the Memorandum of Agreement ("MOA") entered into by the GSAs within the Paso Robles Groundwater Basin in September 2017 prior to the approval by the DWR of the GSP or January 31, 2022, whichever is earlier.
5. The EPCWD shall not become a member of the Paso Basin Cooperative Committee established under the current MOA.
6. The District shall comply with SGMA and the subsequent GSP as implemented by the existing GSA with authority in its service area.

VMI
VITICULTURAL MANAGEMENT INC.

Paso Robles Groundwater Cooperative Committee

September 26, 2019

Dear Committee Members:

A great thank you is in order to the Paso Robles Subbasin representatives and other GSA's for the tremendous amount of work that has been put in to drafting the GSA. Creston Valley Vineyards has been a local SIP Certified grower in this community for over 20 years and active member in the Estrella-El Pomar-Creston Water District (EPC WD). As a SIP Certified vineyard, water conservation is of the utmost importance. Pumping reports are submitted annually and succession plans are made for future use. Along with the rest of the Agriculture community, we find it is the responsibility of all groundwater users in the basin to help eliminate the overdraft and ensure long-term groundwater sustainability. The purpose of this letter is to suggest possible improvements to the GSP that will increase its effectiveness, increase the likelihood that the Department of Water Resources will approve the GSP, and reduce the risk of a future groundwater adjudication. Thank you in advance for reading through the following comments and suggestions.

1. As a whole, the GSP is unclear as to what exactly the GSAs will tangibly do to ensure the elimination of the current overdraft in the Paso Robles Basin. This not only risks the health of the basin, but it increases the chances that the California Department of Water Resources will not approve the GSP. The GSP needs to clearly state what and how the GSAs will act.

2. A hallmark of SGMA is the call for including all stakeholders in the decision-making process. The County GSA, however, did not hold any outreach meetings with the Ag Community. Since the EPC WD represents 44% of the agriculture based pumped water, there should be more active involvement in developing the GSP. Successfully reducing the Ag pumping to benefit the groundwater basin will have to include the understanding and support of the Ag Community.

3. Groundwater pumping allocations, monitoring, and enforcement need to be clearly planned out. The implementation process will be doomed to failure if those who must sacrifice are not included in the decision to cutback pumping. Water use should be measured by meters to ensure accuracy. Violations must be enforced through both civil orders and penalties.

4. Most of the projects listed in the current GSP are purely conceptual. Moving forward, the GSP needs to explain how it will ensure and promote the construction of projects generating significant new useable water.

5. The risk of growth in *de minimis* groundwater users needs to be fully addressed. The GSP notes that the current number of *de minimis* users is significant and that their growth could warrant regulation in the future, but it does not say how it will ensure that the growth will not eat into the rights of other existing users. Perhaps a cap should be placed on the total number of *de minimis* users, requiring that any growth is acquired voluntarily from others.

P.O. Box 2030 Paso Robles, CA 93447 P 805.238.3496 F 805.238.3498 www.vmi-inc.com

VMI
VITICULTURAL MANAGEMENT INC.

In closing, it is our hope here to help better develop the drafted GSP so that all parties involved may have appropriate representation. If there are any questions or points that need clarifying, we would be more than happy to continue this dialogue. All of your efforts are greatly appreciated.

Sincerely,

Carter Collins
General Manager
Creston Valley Vineyards

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Carter Collins
General Manager
Paso Robles Vineyards, Inc.

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VMI
VITICULTURAL MANAGEMENT INC.

Paso Robles Groundwater Cooperative Committee

September 26, 2019

Dear Committee Members:

A great thank you is in order to the Paso Robles Subbasin representatives and other GSA's for the tremendous amount of work that has been put in to drafting the GSA. Collins Vineyard has been a local SIP Certified grower in this community for over 20 years and active member in the Estrella-El Pomar-Creston Water District (EPC WD). As a SIP Certified vineyard, water conservation is of the utmost importance. Pumping reports are submitted annually and succession plans are made for future use. Along with the rest of the Agriculture community, we find it is the responsibility of all groundwater users in the basin to help eliminate the overdraft and ensure long-term groundwater sustainability. The purpose of this letter is to suggest possible improvements to the GSP that will increase its effectiveness, increase the likelihood that the Department of Water Resources will approve the GSP, and reduce the risk of a future groundwater adjudication. Thank you in advance for reading through the following comments and suggestions.

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Sincerely,

Carter Collins
General Manager
Collins Vineyard Inc.

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September 26, 2019

Paso Robles Groundwater Sub-basin Cooperative Committee
San Luis Obispo County Paso Robles Groundwater Sub-basin GSA
1055 Montery Street
San Luis Obispo, CA, 93408

Hello SLO County GSA

Re: Comments to the Paso Robles Groundwater Sub-basin GSP

On behalf of the Independent Grape Growers of the Paso Robles Area(IGGPRA), with almost 200 wine grape growers, wineries and business associates, I appreciate the opportunity to make some comments for the final version of the Paso Robles Groundwater Sub-basin GSP.

Introduction

In 2001, IGGPRA was formed by a group of wine grape growers to help small to medium size vineyard owners understand how to plant and cultivate high quality grapes for sale to the wineries. At the time, there were about 60 wineries in the area, while there are now over 300. Today, the Association is dedicated to the advancement of superior grape growing in the Paso Robles Viticultural Area. Through our 8 Seminars per year, marketplace listing service and other critical services, we are able to provide our members with important grape growing methods, best practices and updates on how to most effectively use the water resources we have available.
IGGPRA is NOT a political organization and we do not entertain speakers with political affiliations or agendas. However, our wine grape growers and wineries will be strongly affected by any decisions made about the restrictions on groundwater use. WE ONLY ASK THAT THE AG COMMUNITY BE ADEQUATELY REPRESENTED IN ANY COMMITTEE MEETING AND DECISIONS. So far, that does not appear to be the case
With thousands of planted acres, our growers have a large stake in the economic impact of any decisions made.

Comments on the GSP

1. With an approx.. 14,000 Acre feet per year of over draft, there is no clear picture of what the GSP plans to do about it. The Paso Robles Blended Water Project is an example of how a local community is trying to reduce the over draft, but with no involvement or support from the County.
2. There are other “real” projects that could be implemented in the area, but we have heard nothing from the GSP on proposed solutions. The County remains silent.
3. The County’s so called “white area” accounts for 66% of agricultural pumping. This significant group of groundwater pumpers have many issues that need to be addressed

by the GSP. HOW WILL THESE ISSUES BE HEARD, IF THERE IS NO AG REPRESENTATION??!!

4. The GSP, so far, appears to be full of conjecture, concepts and very few concrete plans for sustainability. Every year, groundwater levels will continue to decline, so "pushing the ball down the road" is not going to solve the problem

Suggested/Needed Actions

A. First and foremost, there needs to be Agricultural representatives "at the table" of decision making. Ie. People who understand Ag, wine grape growing and the economic effects they have on the community

B. The GSP must have specific and actionable plans for use of:
   a. Available local water resources – Nacimiento allocation, Blended Water Project
   b. Accessing State Water Project resources to recharge the aquifer
   c. Reasonable, economically viable, water conservation requirements

C. Provide clear direction on how well water pumping will be monitored -- either by metering, crop type/acreage or formula.

D. The GSP needs to have timeframes for each action that will be taken. Keeping water stakeholders in limbo for too long could well cause a major exodus from the area and affect the overall economy.

I trust my points of concern and suggestions have been clear. The Ag community just wants to be part of the GSP process and decision making. Adding our Voice will only help the GSA make more informed decisions and represent a broader part of the community.

Thank you for this opportunity to submit comments.

Best Regards
Joe Irick
President
Independent Grape Growers of the Paso Robles Area
A 501c3 non profit organization
[redacted]

Comments on Paso Robles Basin GSP 9/26/19

Dana Merrill, Personal comments

[redacted]

The GSP process has a number of structural deficiencies which put agricultural landowners at a severe disadvantage that is disproportionate to their needs and use of groundwater. Economically viable agricultural is by necessity in the Paso Robles Basin “irrigated”; dryland agriculture cannot produce sufficient economic return. Irrigated lands can and often do generate significant income to owners, operators, cities and government entities. Pumping cutbacks will impact that income without sound strategies.

The GSP in process is to heavily dependent on cuts to agricultural pumpers and barely mentions projects for supplemental water. This despite the fact that property owners have paid to reserve rights to State Water for many years, have had rights to Lake Nacimiento water which to date has been allocated by the County to urban entities nearly exclusively and while other projects such as raising the San Luis Reservoir on the upper Salinas River have been mentioned, little in the way of progress has been made to actually take action to obtain its water. The newest positive development comes from private efforts by landowners interacting with the City of Paso Robles to utilize its recycled water, which may include blending with Nacimiento water that will further extend the supply as well as mitigate quality issues with the source if used as in lieu agricultural pumping. It has been frustrating to see no County Water Resources efforts to get projects going and even more frustrating to see some of our Boards of Supervisors actually seek to shut down efforts to form water districts, who have pledged funding as well, to take on the job.

At this point the GSP may be within months of being completed, subject to be approved by the four GSAs and submitted to the State. Whether it is sufficiently robust to be approved is anyone’s guess at this point and the SGMA law is so new, there is no historical standard of actual approval. Reading through hundreds of pages it is clear that there is much work to do in future years even with approval. A few that come to mind :

1. Increase the number of observation and monitoring wells: A number of the wells listed are very shallow by today’s standards and are unlikely to be viable and still being used a decade from now. Dedicated, smaller diameter wells used only for monitoring and not commercial pumping has been mentioned for years by County Water Resources, yet none to my knowledge have ever been drilled. Follow up on areas with data gap, many of us have worked to help sign up production wells that could contribute data without delay.

2. Subareas are poorly understood and undefined generally. Just where are the boundaries if it may be that pumping limits are to be imposed that are not equal across the entire basin?

3. Political decisions have impacted pumping. The original emergency ordinance dating back to 2012 introduced government action as a major force in the process. In the intervening years, times when the ordinance lapsed saw significant new irrigated lands developed by landowners

fearful that it was the last chance to do so. This essentially set aside supply and demand forces for irrigate crop development and made reacting to government policy the main motivator

4. The GSP has had no economic analysis component which would examine what our economy could pay for supplemental water and could help establish where the cost becomes simply higher than what economic return is generated. The economic impact extends far beyond the specific irrigators' interests as many other industries ranging from equipment sales to tourism to property and sales taxes will be impacted by pumping cutbacks. Cutbacks may have to be part of the resolution but their impact should be quantified economically.

5. The future must have more inclusion of those stakeholders left out of the process thus far. That includes most of the irrigated agricultural community. There was not one meeting held in the County GSA for the benefit of its landowners or irrigators. Other required meetings of the multiple GSAs and the comment period at the beginning of County supervisor meetings were judged adequate. This approach leaves out those impacted the most and calls into question how successful a GSP can be if the majority of the pumpers had no role in the process. It also leaves out significant expertise in water related matters that our world class agriculturists would bring to the table.

6. A word must be said about irrational fear of conspiracies by many in charge of the process. Ranging from fear of water export (which is banned by regulation and the GSP law itself in the Paso Robles Basin) has hurt chances for a positive, collaborative approach among stakeholders. This needs resolution beyond simply banishing a majority of agricultural pumpers from the process as has been done thus far. Encouraging "buy in" is what is needed, not expulsion from the process, for SGMA to be effective.

7. Creativity in solutions needs to be expanded. Incentivize short term and long term fallowing that allows individual landowners to utilize and mechanisms for their compensation for doing so. Utilize market forces so that low economic return discourages use while it encourages conservation and efficient use. Remove requirements to irrigate in order to maintain pumping rights which is still in effect as a regulation. If it costs more to irrigate a higher use crop, then let the farmer decide whether it is economically justified, do not ask more efficient water use crops to subsidize those that require more irrigation.

8. State Water Bulletins dating back to the early 1950's identified the likely need for supplemental water. In many respects, we actually have required less water that was projected in those years. Water use was projected to exceed 200,000 acre feet per year in the combined Paso Robles and Atascadero Basin and we have pumped less than half that annual total it appears. It is fortunate as it turned out but the fact that the area was projected to develop economically on many fronts led to forecasts of more water supply needs. It was not a surprise that water use increased.

Although I can go on listing deficiencies in the GSP and its process, the job remains to be done. If we have the cumulative will to succeed and work more collaboratively in the future, we can find a way to balance our Basin. Hopefully a new start can be made in 2020 for more inclusion and collaboration. If not, it is hard to see how our SGMA effort will ultimately be successful.

September 24, 2019

TO: The Paso Basin Cooperative Committee

RE: Comments to be considered for the final draft of the PBCC

My family has been a landowner in the Paso Robles Groundwater Basin for over a decade. We have been closely following the development of the SGMA-directed Groundwater Sustainability Plan.

The irrigated agricultural community has been largely excluded from the process. The County GSA represents 66% of irrigated agriculture and the County GSA has completely failed its responsibility to seek agriculture's involvement in the GSP Process. The County failed to create any sort of ag advisory position in their GSP process. The County has not held a single outreach meeting with the Ag community. County officials have attended none of the EPC WD meetings and very few if any of the SSJ WD meetings. Also, the County has targeted and specifically excluded the EPC WD from participating directly in the GSP. Irrigated Ag needs a “seat at the table”.

The GSP is a weak document that defers meaningful actions and decisions to the future. It's not clear how and when the GSP implementation process will begin and who will run it. There is no sense of urgency. Do we want the Subbasin continue to decline as we ponder what to do?

There is no clear management framework for how implementation decisions are going to be made. Who gets to vote? Who gets to veto? Who gets to cutback pumping?

Pumping cutbacks are coming but we don't know where, when, or how much. Predictable and stable rules are essential for farmers to plan and make informed decisions.

The GSP provides little direction on how users in the Subbasin are going to reduce groundwater pumping and/or pursue additional sources of new water. It seems that projects are left for folks other than our water authorities to do. Why have these agencies if they are unwilling to do anything?

There seems to be no urgency in pursuing and gathering the essential data necessary for informed decisions about basin management.

Best regards,
Anthony Riboli
- Riboli Family of San Antonio Winery

The GSP needs to have strong monitoring, reporting and enforcement regulations. Reporting of groundwater pumping should be measured by water meters, should be mandatory and should start immediately.

De minimis users are largely give a pass in the GSP. However, the GSP should address how to prevent unlimited growth of this class of pumpers and require this group to acquire their own sources of water.

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September 27, 2019

Paso Basin Cooperative Committee
City of Paso Robles
San Miguel Community Services District
County of San Luis Obispo
Shandon-San Juan Water District *Submitted via pasogcp.com*

RE: Draft Paso Robles Groundwater Sustainability Plan

Dear Committee Members & Staff:

San Luis Obispo County Farm Bureau (Farm Bureau) thanks committee members and staff for their continued work to create a plan under the complex Sustainable Groundwater Management Act (SGMA). As you know, many of the 800 Farm Bureau members we represent will be directly impacted by the Paso Robles Groundwater Sustainability Plan (GSP). The $1 billion in annual crop and livestock sales produced in San Luis Obispo County drives our local economy, and the GSP must reflect an understanding by our local leaders that partnering with agriculture is essential to make meaningful progress towards sustainability.

Farm Bureau acknowledges that the Basin, or parts of the Basin, are in decline, and that workable, targeted solutions will come best from collaboration with all stakeholders. Clearly, there is no one, all-inclusive project, requirement, or regulation that can solve the overdraft conditions within the Basin.

We believe the Basin needs to be better defined by gathering more scientific data throughout different areas of the Basin over an extended period of time. It is not possible to address the Basin's challenges without accurate data, and we recognize the GSP as the framework for gathering data needed to develop real solutions. The GSP is a "roadmap" that must be flexible and able to change over time as new data becomes available. Currently, there are simply many unknowns, such as needed watershed data. Recognizing that a perfect picture of the Basin may never be attained, we still recommend the continuation of geographical data collection and analysis so that the Basin is as accurately defined as possible. This will help ensure groundwater users in noncritical areas do not incur unsubstantiated cuts that will potentially be economically disastrous yet do nothing to solve the problem.

As an organization made up of diverse interests, Farm Bureau knows first-hand the importance of having everyone at the table for discussion and especially when it comes to action. Exclusion of affected parties is a recipe for failure, and never more so than when it comes to water. This GSP, understandably, focuses on the largest water users, agriculture, but does not clearly bring them to the discussion. We strongly recommend that there be an open seat for irrigated agriculture on the Paso Basin Cooperative Committee, and ultimately, on whatever agency is charged with implementing the GSP. If all of agriculture is committed to working together, we are confident that meaningful solutions will be uncovered. But, if the responsibility to address the Basin's water issues is placed solely on agriculture, or on any single segment of agriculture, it will cripple the economic vitality of Paso Robles and the region.

There can be viable solutions achieved in the GSP through a combination of more data on pumping practices, increased adoption of Best Management Practices at the farm level, and the inclusion of realistic projects to introduce new water to the basin. In addition to the supply of potential existing resources like Nacimiento and State Water, and municipal recycling projects being developed, the development of streamflow capture projects could be key components in the journey towards basin balance. It is crucial to have water supply portfolio diversification and cooperative efforts among agencies to develop water sources. Agriculture is dedicated to doing our part, but we alone cannot solve the problem.

Farm Bureau looks forward to continuing being a partner in and helping to improve and refine the GSP so that all agriculture can continue to contribute to the economic vitality of the region.

Sincerely,

Hilary Graves, President
San Luis Obispo County Farm Bureau

Background: During the last thirty years the City of Paso Robles has experienced substantial population growth associated with an expanse of residential subdivisions accompanied by significant growth in hotel development and historic growth in both retail businesses along with business serving tourist activities. Moreover, developed irrigated agriculture expanded by 30% during the same period.

The growth and expanded development of the city of Paso Robles has resulted in greater consumption of water resources along with the conversion of undeveloped land area into greater use of land for roads and infrastructure. Thus reducing the historic volume of water percolating underground.

Also during this period the rapid growth of irrigated agriculture has converted largely grazing land and dry farmed land into irrigated land. Unfortunately, even after accounting for percolation there has been a net increase in the use of groundwater to accommodate the increase in irrigated Ag acreage.

Offsetting Activity: A robust program of stormwater capture and percolation into the groundwater would significantly offset the excessive pumping of groundwater associated with the growth of the City of Paso Robles and the introduction of significantly greater irrigated agriculture.

The outline of a plan for a stormwater capture and percolation ponding system must be added to the GSP. The plan must identify the areas where stormwater capture would be diverted and identify the best locations for percolation ponds. Lastly, the plan must identify the cost of developing, creating, and operating the plan. Ideally the County Flood Control and Water Conservation District would manage and operate the plan.

Consider

The Paso Robles Area Sub-basin consists of 436,157 acres.

Assume that 30% of the area is conducive to stormwater capture, which rounded equals 131,000 acres.

Assume that average rainfall over the 131,000 acres is 12 inches on average annually, which would produce 131,000 acre feet of water.[1]

Assume only 20% of the average rainfall can be easily captured each year and 30% of that is lost to evaporation in the percolation ponding process. This produces a net of 26,000 AFY of water on average per year percolating into groundwater.

Conclusion

Montgomery & Associates indicates that 14,000 AFY in excess of the annual safe yield is pumped from the Paso Robles Area Sub-basin each year. Conservatively, a well-designed stormwater project would essentially put the Sub-basin in modest annual surplus as long as overall pumping activity is not allowed to grow beyond the availability of the resource.

An essential element of a robust stormwater capture and percolation program is the necessity to properly maintain the receptiveness of the creeks and rivers in order to facilitate capture and percolation. The creeks will need to be properly maintained in order to accommodate the transmission of stormwater into the larger tributaries; and the larger rivers must be relieved of excess sand in order to expose the alluvium layer, which is conducive to percolation. Also, the creeks and rivers must be cleared of excess brush and tree growth. Lastly, as appropriate percolation ponds must be created and maintained. A stormwater capture program must be actively managed and maintained in order to optimize effectiveness.

For Section 3 as appropriate

In 1972 the SWRCB amended the City of SLO's Salinas Dam Permit to impose a "live stream" requirement. This amendment was designed to override certain diversionary rights to ensure minimum flows for fish in the Salinas River. However, in reality the minimum flows have rarely been seen and the actual result, after the amendment, was less water being released from the Dam annually than had been the case under the voluntary release system. With SLO County managing a stormwater capture and percolation program not only will the Salinas River be healthier, but the recharge process would be enhanced. It should be noted that historically the Salinas River as well as lesser rivers and streams were noteworthy for their ability to "flush" our tributaries, but to enhance the level of groundwater. The management of the sub-basin needs to return to this type of activity, which was proved to be essential.

---

[1] 12 inches per year on 30% of the subject area is conservative in that areas with hills and low mountainous terrain typically produces more measurable rain than flatter terrain.

All Sections Early in the GSP drafting process the issue of the lack of explanatory footnotes in various chapters was identified. At that point Montgomery and Associates committed to the inclusion of appropriate footnotes. However, the absence of essential detailed footnotes continues unabated.

General The legal definitions of "Overlier" and "Purveyor" relative to groundwater need to be added early in the GSP document.

Table 3.4 The source of the land use data needs to be identified and footnoted.

Section 3.4.1 The outcome of the quite title Court action on June 7, 2019 is important to outline within the GSP as it limits the ability of the defendant purveyors to pump ground water.

Defendant	Perfected Prescriptive Rights
City of El Paso de Robles	1,267.70 AFY
County of San Luis Obispo	310 AFY
San Miguel CSD	177.03 AFY
Templeton CSD	308.9 AFY
Combined	2,063.63 AFY

Section 3.5 The number of agricultural and domestic wells should be identified and added to this section. This data should be available from SLO County records. Additionally, the number of domestic wells owned by de-Minimus pumpers should be revealed.

The City of Paso Robles Urban Water management Plan (2016) should be reviewed and critiqued in detail - in particular the representations regarding the water rights claimed by the City need to be corrected. Moreover, the very modest annual groundwater rights awarded to the City as a result of the Quiet Title litigation, in which the City was a defendant needs to be disclosed. Additionally, the City of Paso Robles Urban Water Management Plan should be modified in keeping with the judgment rendered by the Superior Court.

The County has land use authority in the unincorporated areas of the county. Accordingly, the GSP must follow the existing water offset ordinance.

Reference is made to the Salinas River Live Stream agreement:
This section should include data from the last three years indicating the results of recorded observations. Antidotal observations indicate that recent Salinas River Live Stream observations have been unsatisfactory, and have not involved the release of reservoir water. Also, the GSAs cannot use SGMA to ignore or "skirt" SLO County regulations.

Section 4.7 Identifies areas which are receptive for natural recharge shown on Figure 4-16.

However, this chapter does not discuss the benefits of developing a robust stormwater capture program where feasible.

Moreover, the annual rainfall data are available for the last 100 years and should be added to the GSP document.

Section 5.4 Describes the issue of Land Subsidence. However, the Draft GSP does not indicate how the issue of subsidence measurement should be approached.

Moreover, several months ago Montgomery & Associates committed to providing the Cooperative Committee with the cost of engaging USGS to update the data on subsidence collected in 1997.

To date the Committee has not made a decision on this critical matter.

It is essential that all of the data that the County has received or collected regarding subsidence should be added to Chapter 5.

Section 6.3.2.1 Table 6-3 includes a value for Urban Irrigation Return Flow; however, the table does not include a similar value for rural-domestic Irrigation Return Flow. The latter group essentially represents de Minimus rural land owners who typically irrigate vegetable gardens, fruit trees, etc., and a factor should be included for this group. Essentially, all of their pumped groundwater is returned to the basin through their septic systems.

Section 6.3.2.4 The sustainable yield estimate shown needs to be reconciled with **section 9.2**.

Section 6.5.1.1 The City of Paso Robles Urban Water Management Plan needs to be updated based on the Court Judgment limiting groundwater pumping by the City.

Section 9.2 The basis for the sentence "Because the amount of ground water pumping in the Subbasin is more than the estimated sustainable yield of about 61,000 AFY (see Chapter 6) and groundwater levels . . . ." The representation of an estimated 61,000 AFY needs a footnote describing how this number was determined.

Section 9.3.1.1 In the second line of this sentence "will" must be replaced by "may".[2]

Section 9.3.2 **Promoting Best Water Use Practices** – includes the following:

"Optimization of irrigation needs for frost control if sprinklers are used."

Note: This concept is flawed in that sprinklers can be easily used for springtime irrigation in violation of rules. Moreover, frost protection can be achieved through wind machines, which do not use water. The GSP should require the phase out of frost protection using water within three years.

Section 9.3.3 This section is a good start; but it needs to focus principally on major stormwater capture projects as a "residential" focus will yield limited benefits. Conversely, projects focusing on stormwater capture and diversion to recharge locations will provide the most benefit for the groundwater subbasin. Much of the topography of the land over the subbasin is ideal for stormwater capture, which can be easily diverted to locations providing ideal recharge conditions.

Note: Refer to the discussion on stormwater capture on page 2.

[2] This change is mandatory!

Section 9.3.4 Voluntary fallowing of land planted to permanent crops will not yield much benefit. The majority of permanent crops over the subbasin are wine grapes many acres of which have been planted in the last several years. Fallowing grape land and replanting in future years is not economically beneficial. Therefore this section needs more study and analysis.

Section 9.5 Projects Number 2: State Water Project (SWP) is unacceptable and needs to be removed from the list.

Many of the reasons for not relying on additional SWP water are outlined in a June 6, 2018 letter authored by O'Laughlin & Paris LLP. Moreover, some recipients of SWP water will have a desire to inject the water into the groundwater basin, thus altering the ownership and pumping rights to basin water. Contracting for additional SWP water injected into groundwater is a non-starter and will not be allowed!

Note: At the September 18th meeting of LAFCO the Commission approved the detachment of 33,000 acres from the Shandon-San Juan Water District. Accordingly, that land will be transferred out of the Shandon-San Juan GSA and transferred into the jurisdiction of the SLO County GSA.

Therefore, the applicable maps need to be revised reflecting the transfer before the final GSP is submitted to the DWR.

J. LOHR
VINEYARDS, INC.

September 26, 2019

J. Lohr Vineyards and Wines
6169 Airport Rd.
Paso Robles, CA 93446

Paso Robles Groundwater Subbasin Cooperative Committee
Paso Robles Groundwater Sustainability Agency
1055 Monterey St.
San Luis Obispo, CA 93408

Dear Committee,

We at J. Lohr Vineyards and Wines (JLV&W) want to thank SLO County and the three other GSA's for all their efforts thus far. Our goal in this letter is to suggest improvements in the Groundwater Sustainability Plan (GSP) that will increase its effectiveness, increase the likelihood that the Department of Water Resources (DWR) will approve the GSP, and reduce the risk of a groundwater adjudication.

JLV&W started purchasing bulk wine and grapes from the Paso Robles area in 1981. We planted vineyards in 1986 and built our winery in 1987. We now farm almost 3,000 net vine count (nvc) acres of vineyards and purchase grapes from an additional ~3,000 nvc acres of vineyards. For 25+ years we have had our sales staff, deployed around the United States and Canada, work very hard to build awareness of Red and Rhone wines from Paso Robles. We are a major local employer. My children are all fully immersed in the business.

We recognize that the Paso Robles Groundwater Basin (PRGB) is in overdraft and that it should be the responsibility of all users, including agricultural pumpers, to help eliminate the overdraft and ensure long-term groundwater sustainability. We would like this to happen as soon as possible!

Three major efforts we are pushing to reduce groundwater pumping in the basin are:

A. Best Management Practices (BMPs)
B. Fallowing Policy
C. Investigation of a Blended Water Project (BWP)

We think the PRGB is best managed ***locally*** by the groundwater users and their local representatives. The GSP needs to be rigorous enough to satisfy DWR review. We are concerned that the current GSP lacks key features needed to satisfy that review such as:

1) A sense of urgency.
2) A timetable to involve local groundwater users in the complex decision of pumping allocations.
3) Incentives to increase supplies or decrease water use.
4) A predictable and stable set of rules developed as soon as possible to allow growers to make rational decisions.

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To further expand on the ***sense of urgency*** concern, consider the following:

a. At the end of harvest, growers review their yields, grape quality, and costs for the past year and plan for the next year. On July 10, 2019, we at JLV&W held a half day meeting on efficient water use for our own people and many of our outside growers. 45 people were in attendance. Three outside consultants presented their research, we tasted wines of different quality levels, and we discussed the reasons to limit nitrogen to have a higher probability of harvesting before frost. ***The simple BMP message was that we used less irrigation water, achieved better grape and subsequent wine quality, and had increased yields***. We immediately applied some of these successful irrigation practices working with some of our growers who were in attendance. Results will show up in their 2019 harvest! These and other BMP's could be *implemented* immediately across entire vineyards or on large experimental blocks in grower vineyards. It is our 10th year of using these methods. At JLV&W we clearly think that ***on average***, all growers could save at least 2" of irrigation water. On 36,000 acres, this is 6,000 acre feet of irrigated water saved per year. Rather than waiting a year, as the draft GSP suggests, we would like the GSP to immediately promote and actively encourage growers to participate in exploring BMP's to reduce their pumping now.
b. Another immediate opportunity is to include a policy for fallowing. This would include several concepts, that would ***not make it initially necessary to pay growers to fallow***. There are a number of vineyards in the area which are older, diseased or haven't found a market for their grapes in 2018 or 2019 and may not in 2020. If regulations were promptly passed to allow growers to keep their pumping rights, without a minimum of pumping each year, more growers would fallow sooner. They could then take some time to learn more about the market for grapes, which grapes grow best in their climate and soil, and current BPMs for pre-plant soil preparation, root stock choice, vine spacing, trellis methods, etc. These fallowing concepts could save 2,000 to 4,000 acre feet of irrigation water per year and reductions in groundwater pumping and could go into effect immediately.
c. We at JLV&W, several of our neighboring growers, and the City of Paso Robles have been working for several years on a ***Blended Water Project (BWP)*** which started with the concept of using treated waste water from the City of Paso Robles for irrigation to reduce pumping. Even though Paso Robles is using some Nacimiento water to supply its residents, the resultant treated water is still somewhat "salty" for long term use in irrigation. The Nacimiento pipeline is only a mile from our proposed treated water blending point. In further development of this concept, we growers realized we could build a "backbone" pipeline from the blending point to north and east of the airport and Jardine area. This is a very powerful opportunity to allow several growers in the new heart of the "red zone" to irrigate with a variable high percentage of blended water and other area growers to pay "in lieu" pumping fees. This saves the "in lieu" pumpers from needing to build reservoirs and filters and connect into their own systems. We think this system could be built for less than $10,000,000 compared to three possible systems listed in Chapter 9 which in total could cost $102,000,000. We already have the "backbone" project designed. The GSP should include reference to this project because it demonstrates progress and could be a crucial element of balancing local water needs.

In addressing the ***time table*** concern:

a. We believe it is necessary to help all growers understand we all need to pump less water. Their water use for the 2019 crop year must be reported by the GSP to the State by April 30, 2020. For those who don't have meters, an estimate will be used. This data should be quickly assembled and analyzed for trends and major indications. Individual growers should be able to compare their pumping data to overall basin pumping data.
b. The eventual assigning of pumping allocations is going to be exceedingly complex. It will not be possible to be done without extensive grower participation or the use of adjudication will loom large. We at JLV&W would like to minimize the risk of a full-fledged adjudication, because unless handled very differently from previous adjudications, it could be very costly and delay progress.
c. We suggest that the GSP provide for a facilitated process to establish pumping allocations. To accommodate busy schedules, the facilitated meetings could be held on a bi-weekly basis to give as many persons as possible a chance to attend, analyze data, go back and confer with others, talk among themselves etc. This effort needs legal input every step of the way and ***cannot be dictated but needs to be negotiated***. Because this process is urgent but will take time, it should start immediately after adoption of the GSP with a goal of finishing within two years.

In so far as ***incentives:***

Each of the actions discussed earlier--A (BMPs), B (Fallowing), C (BWP)-- needs a different set of incentives.

a. BMPs are something that all growers need to be aware of and growers shouldn't need to be paid to adopt. Growers do, however, need to know that they will need to live within groundwater restrictions.
b. Fallowing also does not need payments to growers. As described above, however, growers need to know that, if fallowing is done in the normal course of business, it will not affect their allocations in the future.
c. The BWP requires building a pipeline, amortizing its cost and paying an annual fee for management, maintenance and power. Similar projects exist all over California. In order to decide, and at what level, to participate, growers need to fully understand these costs as well as their pumping allocations. The plans, permits, contracts for supply, etc., therefore need to move forward in parallel with the process of setting pumping allocations and implementing other management actions. This will allow growers to make a business decision as to which, or all, of the BMPs, fallowing or BWP they want to use. If the BWP pipeline project is ready to be built by the time allocations are made, growers who are willing to pay a fee to participate in the BWP will not need to wait any unnecessary, additional time for the project to be built.

Addressing the concern around the ***set of rules as soon as possible***:

Growers need to know as soon as possible the rules by which groundwater will be managed in the Paso Robles basin. BMPs, fallowing, and groundwater allocations are all part of the solution, and work, therefore, should begin on all of these actions immediately and in parallel. There should be no doubt in anyone's mind that we have a major problem of pumping beyond the sustainable yield in the Paso Robles groundwater basin. We don't need to continue to study this problem for years. We need to immediately begin to take action. DWR expects a more aggressive plan than proposed at present.

In moving forward, there needs to be much greater participation by growers who are the major pumpers and this ***includes having irrigated agriculture as a full member of the process***.

Thus, let's get on very quickly with the work that needs to be done by including ***representation from all partners***. We all care about the health of the groundwater basin and the local economy as well as the health of our own employees and the community.

Jerome J. Lohr
President, J. Lohr Vineyards, Inc.
Founder, J. Lohr Winery

J. LOHR
VINEYARDS, INC.

Comprehensive Plan to Bring the Paso Robles Groundwater Basin into Sustainability

Introduction

It is apparent that groundwater levels in the Paso Robles Basin have been declining and that GSP Management Actions will be necessary to bring the Basin into sustainability. J. Lohr Vineyards & Wines (JLVW) believes that, with the cooperation of the agricultural community, significant reductions in groundwater pumping are achievable and much of the current 13,700 AFY overdraft can be overcome. JLVW would like to present two programs that are essential if pumpers in the Basin are to achieve meaningful reductions in groundwater pumping. ***First*** is the opportunity to bring supplemental water to the Basin. ***Second*** is to adopt Best Management Practices. It is important that these programs be considered for inclusion in the GSP

Supplemental Water

For several years, JLVW has been working with the City of Paso Robles and other fellow growers to design a backbone pipeline system that would deliver 'blended' water to high density agricultural areas around the Airport and east over the Red Zone. By blending treated water from the City of Paso Robles with Nacimiento Lake water, the system could provide a supplemental water source to farmers in the area for irrigation 'in lieu' of pumping groundwater. This could achieve meaningful reductions in groundwater pumping and specifically target reduced pumping in the most impacted areas.

Best Management Practices (BPMs)

1. On July 10th, 2019, JLVW held a seminar with its contracted growers. There were presentations by three outside experts. JLVW shared their accumulated knowledge on the optimal use of water in vineyard operations and attendees contributed to the discussion. There were 45 growers, vineyard managers and winery representatives in attendance. As an outcome, a list of management actions was generated which vineyard operators can implement immediately to reduce pumping while increasing fruit quality.
2. JLVW is currently individually contacting an expanded list of other vineyard owners and managers, wineries and local organizations to further discuss and refine best management practices. These BMPs (which we have been using at JLVW for 10 years) will demonstrate how others can increase quality, ***use less water and fertilizer***, and maintain or increase yields.
3. After the 2019 harvest, we will hold additional technical sessions and tastings, open to all basin residents as well as growers and vintners, to demonstrate these aspects. This, hopefully, will help prepare growers for the very complex discussions needed for future pumping allocations.

Conclusion

J. Lohr Vineyards & Wines looks forward to leading this effort to bring Supplemental Water to the basin and to define and inculcate Best Management Practices to help ensure that Paso Robles remains one of the three featured wine regions in the United States while striving to create a sustainable groundwater basin for generations to come.

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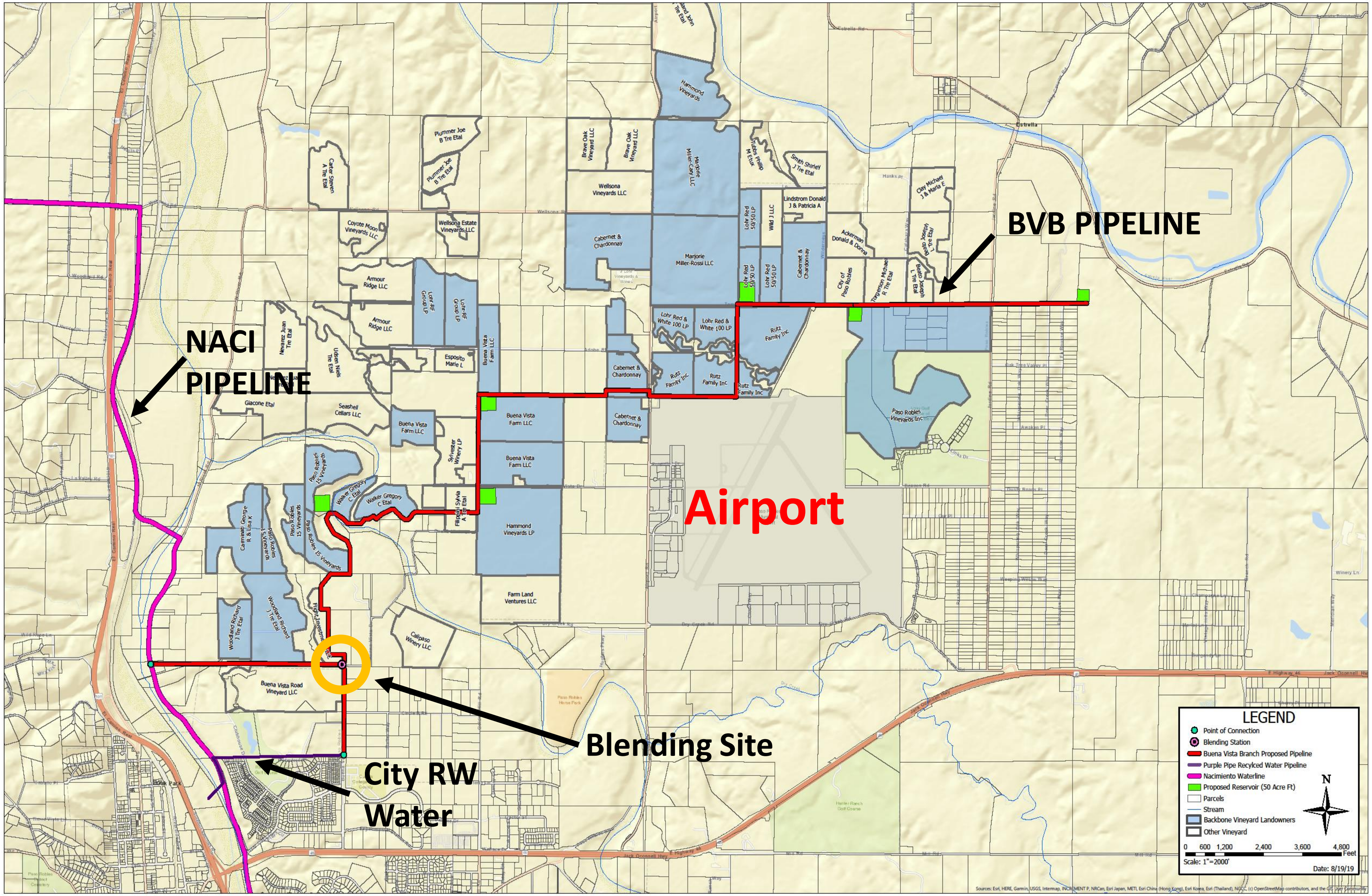
BVB Blended Water Backbone System



September 27, 2019

Paso Robles Groundwater Subbasin Cooperative Committee
San Luis Obispo County, Paso Robles Groundwater Subbasin GSA
1055 Monterey Street
San Luis Obispo, CA 93408

Dear SLO County Paso Robles GSA,

Re: Comments of the Paso Roble Groundwater Subbasin GSP

I would like to thank all those who spent endless hours in developing the Groundwater Sustainability Plan (GSP). I appreciate this opportunity to submit my comments of the final version of the GSP.

I have been involved in the Subbasin's groundwater issues for almost a decade now. I was a leading figure in proposing the failed AB2453 Water District. I was a founding member of the group that formed the Estrella-El Pomar-Creston Water District (EPC WD). I currently serve on the Board of Directors of the EPC WD. I am a resident in the area for 21 years and a former winegrape grower for 18 years. I also served on the Board of Directors of the Paso Robles Wine Country Alliance for 6 years. My comments are presented as a concerned citizen and stakeholder and my comments do not represent any official position of the EPC WD.

I would like to split my comments into two categories. First, I'd like to discuss my general thoughts about the GSP and its shortcomings. Secondly, I'd like to comment on management actions that can be taken immediately and need to be pursued now as the GSP implementation begins.

General Comments

The GSP is a weak document and almost all important decisions have been delayed to the future.

The GSP does not define a new management structure or the decision-making process necessary to implement the GSP. It seems clear that the current MOA structure has not been able to resolve the many critical decisions that have to be made. There needs to be a new MOA or some other governance structure.

Similar to the item above, the GSP provides little insight into how the GSP implementation is going to be funded. Like myself, I suspect that Subbasin stakeholders would like to know who pays for what and how much?

The GSP makes clear that pumping cutbacks are coming but doesn't say where, when, or by how much. Predictable and stable rules are essential for farmers to plan and make informed decisions. For this reason, the GSP should spell out clearly a process, to begin immediately upon adoption of the plan, to determine future groundwater allocations. This process should ensure that agriculture, like all groundwater users, have meaningful input and involvement. Allocating groundwater will be doomed to failure if those who must sacrifice are not included in the decision-making process.

The GSP seems to list projects in a perfunctory manner with pie in the sky generalities and hefty budgets. There is one project that's real, doable and has already received significant funding from private sources to development preliminary engineering plans, reviewed pipeline routes and has begun environmental studies. This 'real' project is the Blended Water Project which utilizes Nacimiento Lake Water along with the City of Paso Robles' Recycled Water. The Blended Water Project has the ability to bring needed supplemental water to the Paso Robles Subbasin. This project along with any other 'real' projects should receive the endorsement of the GSP and start immediately. Supplemental water is a key component to help solve the Subbasin's declining water levels.

The GSP is unclear and insufficiently aggressive in setting schedules and deadlines for its management actions. The GSP does not address who does what next? Who's in charge?

The GSP states that the GSAs will "promote" voluntary fallowing, but does not explain how. Fallowing of land could have a significant positive influence in groundwater levels but there is little in the GSP to ensure that pumpers who choose to fallow will be protected in the future in preserving their pumping allocations. In other word, if I stop irrigating a crop today, will I be able to pump in the future?

The GSP, for example, says that the GSAs will "promote" BMPs, but does not say how.

Without any sort of timetables or specific management action goals, the subbasin remains at risk of further decline while solutions are pondered. The GSP provides no timetable for implementing important actions of the GSP. The GSP commits to do nothing.

The GSP does not mandate metering and extraction reporting. How can you manage a basin if you don't know what's being pumped? Fair and equitable decisions about extraction must be backed up by a vigorous monitoring system and a policing mechanism. The GSP is mostly silent on this issue.

The GSP gives a pass to de minimis users and does not address future growth of de minimis users.

Immediate Management Actions Needed

There are certain management actions that need to start immediately. The following are several of these actions.

The GSP needs to establish a metering and groundwater pumping reporting system and it needs to start now. On April 1, 2020, our Subbasin will be required to report its groundwater status. Our Subbasin has very little 'data' on who pumps and how much. As we move towards possible pumping cutbacks, the GSP has to have answers to these basic facts. Monitoring and report must start now.

As a corollary to the previous item, the GSP needs to define and fund an immediate effort to determine what other data gaps exist and identify other informational needs that will be necessary in the decision-making process as GSP implementation proceeds.

Projects need to be identified, endorsed and started

Concluding Comments

As an early member of the group that formed the EPC WD and now as an EPC WD Board of Directors Member, I am particularly distressed about actions of County Supervisors that undermined the efforts of a legitimate and significant group of stakeholders in their efforts to participate in the SGMA/GSP process. EPC WD represents 40% of groundwater pumping in the subbasin. EPC WD is the largest group of pumpers in the subbasin and EPC WD was prevented from becoming a GSA and consequently denied the opportunity to represent its members in the GSP process. This is contrary to the spirit and intent of the SGMA Law.

Additionally, EPC WD members have been committed to working to achieve a sustainable Subbasin and have self-assessed themselves with Prop 218 votes to fund efforts in support of a sustainable Subbasin.

The County acting as the GSA for the so called “white area” has failed to properly represent the agricultural pumpers in the GSA. The County GSA did not hold a single outreach meeting. County GSA did not create any sort of ag advisory position for their GSA. The County GSA did not create any sort of forum where there could be open dialogue and exchange of ideas between stakeholders and public officials. Individuals speaking in 3-minute time slots at CC meetings does not constitute outreach by the County.

The irrigated agriculture community in the County’s white area accounts for 55% of groundwater pumping in the Paso Robles Subbasin. The County has demonstrated its unwillingness or its inability to include this very large and significant group of groundwater pumpers in developing the current GSP. In addition, irrigate agriculture is one of the major economic drivers in the North County and continued success of the irrigated ag community must be considered.

Since irrigated ag in the white area represents more than 50% of the total pumping in the Subbasin, irrigated agriculture’s interests should not be ignored by the lack of a 'seat at the table', a seat that has been unaccounted for in the GSP process to date as the County GSA has had virtually no outreach to these stakeholders. In that regard, the County GSA has severely underrepresented these constituents in the Subbasin by denying them any effective voice in the proceedings. Going forward, irrigated agriculture's input to the GSP will be vital to ensure the Subbasin moves towards sustainability while maintaining the economic powerhouse that is irrigated agriculture in the Subbasin. In conclusion, there needs to be an equal participant "seat" for irrigated agriculture on the new MOA which will define implementation of the Plan.

Thank you for this opportunity to submit my comments and I look forward to working with a newly constituted Memorandum of Agreement where irrigate ag is properly represented.

Regards,

Jerry Reaugh

The Nature Conservancy
Protecting nature. Preserving life.

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September 27, 2019

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Submitted online via: https://www.slocounty.ca.gov/Departments/Public-Works/Committees-Programs/Sustainable-Groundwater-Management-Act-(SGMA)/Paso-Robles-Groundwater-Basin/GSP-Development.aspx

Re: Paso Robles Subbasin Draft Groundwater Sustainability Plan

Dear Angela Ruberto,

The Nature Conservancy (TNC) appreciates the opportunity to comment on the Paso Robles Subbasin Draft Groundwater Sustainability Plan (GSP) being prepared under the Sustainable Groundwater Management Act (SGMA). Please note that we have previously submitted comments dated 15 April 2019 on Chapters 4-8 and Appendix B and comments dated 1 July 2019 on Chapters 9-11 of the Paso Robles Subbasin Draft GSP. Where these comments have not yet been addressed in the most recent draft, they are restated in this letter with updated section number and page number callouts. In reviewing this version of the plan, we recognize that several TNC tools and approaches were used in the preparation of the sections related to ecosystems, notably the initial identification of groundwater dependent ecosystems (GDEs) in the Paso Robles Subbasin. This is clearly an important first step; however, our comments in this letter highlight additional refinement, monitoring, and future management activities that are needed to fulfil SGMA requirements with respect to GDEs in this basin.

TNC as a Stakeholder Representative for the Environment

TNC is a global, nonprofit organization dedicated to conserving the lands and waters on which all life depends. We seek to achieve our mission through science-based planning and implementation of conservation strategies. For decades, we have dedicated resources to establishing diverse partnerships and developing foundational science products for achieving positive outcomes for people and nature in California. TNC was part of a stakeholder group formed by the Water Foundation in early 2014 to develop recommendations for groundwater reform and actively worked to shape and pass SGMA.

Our reason for engaging is simple: California's freshwater biodiversity is highly imperiled. We have lost more than 90 percent of our native wetland and river habitats, leading to precipitous declines in native plants and the populations of animals that call these places home. These natural resources are intricately connected to California's economy providing direct benefits through industries such as fisheries, timber and hunting, as well as indirect benefits such as clean water supplies. SGMA must be successful for us to achieve a sustainable future, in which people and nature can thrive within Paso Robles Subbasin region and California.

We believe that the success of SGMA depends on bringing the best available science to the table, engaging all stakeholders in robust dialog, providing strong incentives for beneficial outcomes and rigorous enforcement by the State of California.

Given our mission, we are particularly concerned about the inclusion of nature, as required, in GSPs. The Nature Conservancy has developed a suite of tools based on best available science to help GSAs, consultants, and stakeholders efficiently incorporate nature into GSPs. These tools and resources are available online at GroundwaterResourceHub.org. Some of these tools have been used in the preparation of the present draft plan. Additional resources are available and referred to in the comments that follow, and are considered pertinent to the development of this plan.

Addressing Nature's Water Needs in GSPs

SGMA requires that all beneficial uses and users, including environmental users of groundwater, be considered in the development and implementation of GSPs (Water Code § 10723.2).

The GSP Regulations include specific requirements to identify and consider groundwater dependent ecosystems [23 CCR §354.16(g)] when determining whether groundwater conditions are having potential effects on beneficial uses and users. GSAs must also assess whether sustainable management criteria may cause adverse impacts to beneficial uses, which include environmental uses, such as plants and animals. The Nature Conservancy has identified each part of the GSP where consideration of beneficial uses and users are required. That list is available here: https://groundwaterresourcehub.org/importance-of-gdes/provisions-related-to-groundwater-dependent-ecosystems-in-the-groundwater-s. Please ensure that environmental beneficial users are addressed accordingly throughout the GSP. Adaptive management is embedded within SGMA and provides a process to work toward sustainability over time by beginning with the best available information to make initial decisions, monitoring the results of those decision, and using data collected through monitoring to revise decisions in the future. Over time, GSPs should improve as data gaps are reduced and uncertainties addressed.

To help ensure that GSPs adequately address nature as required under SGMA, The Nature Conservancy has prepared a checklist (**Attachment A**) for GSAs and their consultants to use. The Nature Conservancy believes the following elements are foundational for 2020 GSP submittals and are developed from our publication, *GDEs under SGMA: Guidance for Preparing GSPs*[1].

1. Environmental Representation

SGMA requires that groundwater sustainability agencies (GSAs) consider the interests of all beneficial uses and users of groundwater. To meet this requirement, we recommend actively engaging environmental stakeholders by including environmental representation on the GSA board, technical advisory group, and/or working groups. This could include local staff from state and federal resource agencies, nonprofit organizations and other environmental interests. By engaging these stakeholders, GSAs will benefit from access to additional data and resources, as well as a more robust and inclusive GSP.

[1]GDEs under SGMA: Guidance for Preparing GSPs is available at: https://groundwaterresourcehub.org/public/uploads/pdfs/GWR_Hub_GDE_Guidance_Doc_2-1-18.pdf

2. Basin GDE and ISW Maps
SGMA requires that groundwater dependent ecosystems (GDEs) and interconnected surface waters (ISWs) be identified in the GSP. We recommend using the Natural Communities Commonly Associated with Groundwater Dataset (NC Dataset) provided online[2] by the Department of Water Resources (DWR) as a starting point for the GDE map. The NC Dataset was developed through a collaboration between DWR, the Department of Fish and Wildlife and TNC.

3. Potential Effects on Environmental Beneficial Users
SGMA requires that potential effects on GDEs and environmental surface water users be described when defining undesirable results. In addition to identifying GDEs in the basin, The Nature Conservancy recommends identifying beneficial users of surface water, which include environmental users. This is a critical step, as it is impossible to define "significant and unreasonable adverse impacts" without knowing *what* is being impacted. For your convenience, we've provided a list of freshwater species within the boundary of the Paso Robles Subbasin in **Attachment C**. Our hope is that this information will help your GSA better evaluate the impacts of groundwater management on environmental beneficial users of surface water. We recommend that after identifying which freshwater species exist in your basin, especially federal and state listed species, that you contact staff at the Department of Fish and Wildlife (DFW), United States Fish and Wildlife Service (USFWS) and/or National Marine Fisheries Services (NMFS) to obtain their input on the groundwater and surface water needs of the organisms on the GSA's freshwater species list. We also refer you to the Critical Species Lookbook[3] prepared by The Nature Conservancy and partner organizations for additional background information on the water needs and groundwater reliance of critical species. Because effects to plants and animals are difficult and sometimes impossible to reverse, we recommend erring on the side of caution to preserve sufficient groundwater conditions to sustain GDEs and ISWs.

4. Biological and Hydrological Monitoring
If sufficient hydrological and biological data in and around GDEs is not available in time for the 2020/2022 plan, data gaps should be identified along with actions to reconcile the gaps in the monitoring network.

The Nature Conservancy has reviewed the Paso Robles Draft GSP. We appreciate the work that has gone into the preparation of this plan. Specifically, we recognize the use of the NC dataset and other TNC guidance for initial identification of GDE areas in the basin. However, we believe that additional work is needed to refine the initial area estimates including identification of species that may be present in the GDEs, development of monitoring plans to address data gaps, and a more complete evaluation of future management actions to protect GDEs in the basin. Hence, we consider the current GSP draft to be **incomplete** under SGMA.

Our specific comments related to the Paso Robles Subbasin Draft GSP are provided in detail in **Attachment B** and are in reference to the numbered items in **Attachment A. Attachment C** provides a list of the freshwater species located in the Paso Robles Subbasin. **Attachment D** describes six best practices that GSAs and their consultants can apply when using local groundwater data to confirm a connection to groundwater for DWR's Natural Communities Commonly Associated with Groundwater Dataset[2]. **Attachment E** provides an overview of a

[2] The Department of Water Resources' Natural Communities Commonly Associated with Groundwater dataset is available at: https://gis.water.ca.gov/app/NCDatasetViewer/
[3] Available online at: https://groundwaterresourcehub.org/sgma-tools/the-critical-species-lookbook/

new, free online tool that allows GSAs to assess changes in groundwater dependent ecosystem (GDE) health using satellite, rainfall, and groundwater data.

Thank you for fully considering our comments as you develop your GSP.

Best Regards,

Sandi Matsumoto
Associate Director, California Water Program
The Nature Conservancy

Attachment A

Environmental User Checklist

The Nature Conservancy is neither dispensing legal advice nor warranting any outcome that could result from the use of this checklist. Following this checklist does not guarantee approval of a GSP or compliance with SGMA, both of which will be determined by DWR and the State Water Resources Control Board.

GSP Plan Element*		GDE Inclusion in GSPs: Identification and Consideration Elements	Check Box
Admin Info	**2.1.5 Notice & Communication** *23 CCR §354.10*	**Description of the types of environmental beneficial uses of groundwater that exist within GDEs and a description of how environmental stakeholders were engaged throughout the development of the GSP.**	1
Planning Framework	**2.1.2 to 2.1.4 Description of Plan Area** *23 CCR §354.8*	**Description of jurisdictional boundaries, existing land use designations, water use management and monitoring programs; general plans and other land use plans relevant to GDEs and their relationship to the GSP.**	2
		Description of instream flow requirements, threatened and endangered species habitat, critical habitat, and protected areas.	3
		Summary of process for permitting new or replacement wells for the basin, and how the process incorporates any protection of GDEs	4
Basin Setting	**2.2.1 Hydrogeologic Conceptual Model** *23 CCR §354.14*	**Basin Bottom Boundary:** Is the bottom of the basin defined as at least as deep as the deepest groundwater extractions?	5
		Principal aquifers and aquitards: Are shallow aquifers adequately described, so that interconnections with surface water and vertical groundwater gradients with other aquifers can be characterized?	6
		Basin cross sections: Do cross-sections illustrate the relationships between GDEs, surface waters and principal aquifers?	7
	2.2.2 Current & Historical Groundwater Conditions *23 CCR §354.16*	**Interconnected surface waters:**	8
		Interconnected surface water maps for the basin with gaining and losing reaches defined (included as a figure in GSP & submitted as a shapefile on SGMA portal).	9
		Estimates of current and historical surface water depletions for interconnected surface waters quantified and described by reach, season, and water year type.	10
		Basin GDE map included (as figure in text & submitted as a shapefile on SGMA Portal).	11

		If NC Dataset *was* used:	Basin GDE map denotes which polygons were kept, removed, and added from NC Dataset (Worksheet 1, can be attached in GSP section 6.0).	12
			The basin's GDE shapefile, which is submitted via the SGMA Portal, includes two new fields in its attribute table denoting: 1) which polygons were kept/removed/added, and 2) the change reason (e.g., why polygons were removed).	13
			GDEs polygons are consolidated into larger units and named for easier identification throughout GSP.	14
		If NC Dataset *was not* used:	Description of why NC dataset was not used, and how an alternative dataset and/or mapping approach used is best available information.	15
		Description of GDEs included:		16
		Historical and current groundwater conditions and variability are described in each GDE unit.		17
		Historical and current ecological conditions and variability are described in each GDE unit.		18
		Each GDE unit has been characterized as having high, moderate, or low ecological value.		19
		Inventory of species, habitats, and protected lands for each GDE unit with ecological importance (Worksheet 2, can be attached in GSP section 6.0).		20
	2.2.3 Water Budget *23 CCR §354.18*	Groundwater inputs and outputs (e.g., evapotranspiration) of native vegetation and managed wetlands are included in the basin's historical and current water budget.		21
		Potential impacts to groundwater conditions due to land use changes, climate change, and population growth to GDEs and aquatic ecosystems are considered in the projected water budget.		22
Sustainable Management Criteria	**3.1 Sustainability Goal** *23 CCR §354.24*	**Environmental stakeholders/representatives were consulted.**		23
		Sustainability goal mentions GDEs or species and habitats that are of particular concern or interest.		24
		Sustainability goal mentions whether the intention is to address pre-SGMA impacts, maintain or improve conditions within GDEs or species and habitats that are of particular concern or interest.		25
	3.2 Measurable Objectives *23 CCR §354.30*	**Description of how GDEs were considered and whether the measurable objectives and interim milestones will help achieve the sustainability goal as it pertains to the environment.**		26
	3.3 Minimum Thresholds *23 CCR §354.28*	**Description of how GDEs and environmental uses of surface water were considered when setting minimum thresholds for relevant sustainability indicators:**		27
		Will adverse impacts to GDEs and/or aquatic ecosystems dependent on interconnected surface waters (beneficial user of surface water) be avoided with the selected minimum thresholds?		28
		Are there any differences between the selected minimum threshold and state, federal, or local standards relevant to the species or habitats residing in GDEs or aquatic ecosystems dependent on interconnected surface waters?		29
	3.4 Undesirable Results *23 CCR §354.26*	**For GDEs, hydrological data are compiled and synthesized for each GDE unit:**		30
		If hydrological data *are available* within/nearby the GDE	Hydrological datasets are plotted and provided for each GDE unit (Worksheet 3, can be attached in GSP Section 6.0).	31
			Baseline period in the hydrologic data is defined.	32

			GDE unit is classified as having high, moderate, or low susceptibility to changes in groundwater.	33
			Cause-and-effect relationships between groundwater changes and GDEs are explored.	34
		If hydrological data *are not available* within/nearby the GDE	Data gaps/insufficiencies are described.	35
			Plans to reconcile data gaps in the monitoring network are stated.	36
		For GDEs, biological data are compiled and synthesized for each GDE unit:		37
		Biological datasets are plotted and provided for each GDE unit, and when possible provide baseline conditions for assessment of trends and variability.		38
		Data gaps/insufficiencies are described.		39
		Plans to reconcile data gaps in the monitoring network are stated.		40
		Description of potential effects on GDEs, land uses and property interests:		41
		Cause-and-effect relationships between GDE and groundwater conditions are described.		42
		Impacts to GDEs that are considered to be "significant and unreasonable" are described.		43
		Known hydrological thresholds or triggers (e.g., instream flow criteria, groundwater depths, water quality parameters) for significant impacts to relevant species or ecological communities are reported.		44
		Land uses include and consider recreational uses (e.g., fishing/hunting, hiking, boating).		45
		Property interests include and consider privately and publicly protected conservation lands and opens spaces, including wildlife refuges, parks, and natural preserves.		46
Sustainable Management Criteria	**3.5 Monitoring Network** *23 CCR §354.34*	Description of whether hydrological data are spatially and temporally sufficient to monitor groundwater conditions for each GDE unit.		47
		Description of how hydrological data gaps and insufficiencies will be reconciled in the monitoring network.		48
		Description of how impacts to GDEs and environmental surface water users, as detected by biological responses, will be monitored and which GDE monitoring methods will be used in conjunction with hydrologic data to evaluate cause-and-effect relationships with groundwater conditions.		49
Projects & Mgmt Actions	**4.0. Projects & Mgmt Actions to Achieve Sustainability Goal** *23 CCR §354.44*	Description of how GDEs will benefit from relevant project or management actions.		50
		Description of how projects and management actions will be evaluated to assess whether adverse impacts to the GDE will be mitigated or prevented.		51

* In reference to DWR's GSP annotated outline guidance document, available at: https://water.ca.gov/LegacyFiles/groundwater/sgm/pdfs/GD_GSP_Outline_Final_2016-12-23.pdf

Attachment B

**TNC Evaluation of the
Paso Robles Subbasin Groundwater Sustainability Plan**

A complete draft of the Paso Robles Subbasin Groundwater Sustainability Plan (GSP) Public Draft was provided for public review on August 14, 2019. This attachment summarizes our comments on the complete public draft GSP. Please note that we have previously submitted comments dated 15 April 2019 on Chapters 4-8 and Appendix B (now Appendix C) and comments dated 1 July 2019 on Chapters 9-11. Where these comments have not yet been addressed in the most recent draft, they are restated herein with updated section number and page number callouts. Comments are provided in the order of the checklist items included as Attachment A.

<u>Checklist Item 1 - Notice & Communication (23 CCR §354.10)</u>

[Chapter 11 Notice and Communications (including separate Communications and Engagement Plan, Appendix M)]

- Section 3.0 of the Communications and Engagement Plan (Page 6) lists aquatic ecosystems as a beneficial groundwater use. **However, no details are given as to the types and locations of environmental uses and habitats supported, or the designated beneficial environmental uses of surface waters that may be affected by groundwater extraction in the subbasin. To identify environmental users, please refer to the following**:
    - Natural Communities Commonly Associated with Groundwater dataset (NC Dataset) - https://gis.water.ca.gov/app/NCDatasetViewer/
    - The list of freshwater species located in the Paso Robles Subbasin in **Attachment C** of this letter. Please take particular note of the species with protected status.
    - Lands that are protected as open space preserves, habitat reserves, wildlife refuges, etc. or other lands protected in perpetuity and supported by groundwater or ISWs should be identified and acknowledged.

<u>Checklist Items 2 to 4 - Description of general plans and other land use plans relevant to GDEs and their relationship to the GSP (23 CCR §354.8</u>

[Section 3.6 Existing Monitoring Programs (p. 3-17)]

- Per the GSP Regulations (23 CCR §354.34 (a) and (b)), monitoring must address trends in groundwater and *<u>related surface conditions</u>* (emphasis added). In order for this section to provide the appropriate context and help assure integration of GSP implementation with other ongoing regulatory programs, this section should describe the following:

- Monitoring activities and responsibilities by State, Federal and local agencies and jurisdictions related to aquatic resources and GDEs that could be affected by groundwater withdrawals should be discussed.**
- The Critical Habitat for Threatened and Endangered Species website maintained by the US Fish and Wildlife Service (https://fws.maps.arcgis.com/home/webmap/viewer.html?webmap=9d8de5e265ad4fe09893cf75b8dbfb77) identifies lands with endangered and threatened species in the Basin, including species potentially associated with interconnected surface waters ISWs, including Steelhead (Onocorhynchus mykiss). Also please refer to the Critical Species Lookbook[4] to review and discuss the potential groundwater reliance of critical species in the basin. **Please include a discussion regarding the management of critical habitat for these aquatic species and its relationship to the GSP.**

[Section 3.8.6 Requirements for New Wells (p. 3-30)]

- **Future well permitting must be coordinated with the GSP to assure achievement of the Plan's sustainability goals.**
- The State Third Appellate District recently found that Counties have a responsibility to consider the potential impacts of groundwater withdrawals on public trust resources when permitting new wells near streams with public trust uses (ELF v. SWRCB and Siskiyou County, No. C083239). **The need for well permitting programs to comply with this requirement should be stated.**

[Section 3.10 Land Use Plans (p. 3-31)]

- This section should include a discussion of General Plan goals and policies related to the protection and management of GDEs and aquatic resources that could be affected by groundwater withdrawals. **Please include a discussion of how implementation of the GSP may affect and be coordinated with General Plan policies and procedures regarding the protection of wetlands, riparian areas, oak woodlands, aquatic resources and other GDEs and ISWs.**
- This section should identify Habitat Conservation Plans (HCPs) or Natural Community Conservation Plans (NCCPs) within the Subbasin and if they are associated with critical, GDE or ISW habitats. **Please identify all relevant HCPs and NCCPs within the Subbasin and address how GSP implementation will coordinate with the goals of these HCPs or NCCPs.**

Checklist Items 5, 6, and 7 – Hydrogeologic Conceptual Model (23 CCR §354.14)

[Section 4.1 Subbasin Topography and Boundaries (p. 4-1)]

- Please provide additional information on what data was used to determine that "poor quality" groundwater in the Paso Robles Formation would exclude groundwater from being part of the subbasin.

[4] Available online at: https://groundwaterresourcehub.org/sgma-tools/the-critical-species-lookbook/

- Defining the bottom of subbasin based on geochemical properties is a suitable approach for defining the base of freshwater, however, as noted on page 9 of DWR's Hydrogeologic Conceptual Model BMP (https://water.ca.gov/LegacyFiles/groundwater/sgm/pdfs/BMP_HCM_Final_2016-12-23.pdf) "the definable bottom of the basin should be at least as deep as the deepest groundwater extractions". **Thus, groundwater extraction well depth data should also be included in the determination of the basin bottom.** This will prevent the possibility of extractors with wells deeper than the basin boundary (defined by the base of freshwater) from claiming exemption of SGMA due to their well residing outside the vertical extent of the basin boundary.

[Section 4.7.2 Groundwater Discharge Areas Inside the Subbasin (p. 4-32)]

- We support the use of the Natural Communities Commonly Associated with Groundwater Dataset (NC Dataset) to map groundwater dependent ecosystems in the Paso Robles Groundwater Basin (GSP Draft Figure 4-18). Since the NC Dataset is intended as a starting point, The Nature Conservancy has developed a Guidance Document to assist GSAs and their consultants in addressing GDEs in GSPs[5]. Also refer to **Attachment D** for best practices when using the NC dataset.
- The identification of GDEs within GSPs is a required GSP element of the Basin Setting Section under the description of Current & Historical Groundwater Conditions (23 CCR §354.16). Recognizing natural points of discharge (seeps & springs) as GDEs is consistent with the SGMA definition of GDEs[6]; **however, we recommend the identification of GDEs (GDE map Figure 4-18) for the Paso Robles basin be moved to Chapter 5: Groundwater Conditions, and elaborated upon with a description of current and historical groundwater conditions in the GDE areas.** Chapter 5 is a more appropriate place for the identification of GDEs, since groundwater conditions (e.g., depth to groundwater, interconnected surface water maps, groundwater quality) are necessary local information and data from the GSP in assessing whether polygons in the NC dataset are connected to groundwater in a principal aquifer.
- Decisions to remove, keep, or add polygons from the NC dataset into a basin GDE map should be based on best available science in a manner that promotes transparency and accountability with stakeholders. Any polygons that are removed, added, or kept should be inventoried in the submitted shapefile to DWR, and mapped in the plan. **We recommend revising Figure 4-18 to reflect this recommended methodology.**

[Section 5.2 Change in Groundwater Storage (p. 5-20)]

- Figure 5-11 illustrates that groundwater storage losses occurred during dry years and recovered in wet years. Potential impacts on groundwater storage loss due to

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[5] GDEs under SGMA: Guidance for Preparing GSPs is available at: https://groundwaterresourcehub.org/public/uploads/pdfs/GWR_Hub_GDE_Guidance_Doc_2-1-18.pdf

[6] Groundwater dependent ecosystem refer to ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface. [23 CCR §351 (m)]

groundwater pumping is still very possible, especially since groundwater pumping data has been estimated from groundwater flow models populated with insufficient vertical groundwater gradient data, shallow monitoring data, and surface flow data. Groundwater storage in the Paso Robles formation has also been on a decline since 1980 due to groundwater pumping (Figure 5-12). Understanding groundwater storage fluctuations in the Alluvial Aquifer depends on how vertical groundwater gradients are impacted by pumping and groundwater storage changes in the Paso Robles Formation. **Please address these data gaps in the monitoring network.**

Checklist Items 8, 9, and 10 – Interconnected Surface Waters (ISW) (23 CCR §354.16)

[Section 5.5 Interconnected Surface Waters (p. 5-26)]

- **Please note the following best practices when filling the data gap in delineating any connections between surface water and groundwater.**
    - **Specify what data are used to determine the elevation of the stream or river bottom.**
    - The regulations [23 CCR §351(o)] define interconnected surface waters (ISW) as "surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted". **"At any point" has both a spatial and temporal component.** Even short durations of interconnections of groundwater and surface water can be crucial for surface water flow and supporting environmental users of groundwater and surface water. ISWs can be either gaining or losing.
    - Due to limited shallow monitoring wells and stream gauges in the basin, **mapping ISWs are best estimated by first determining which reaches are completely disconnected from groundwater. This approach would involve comparing simulated groundwater elevations with a land surface Digital Elevation Model that could identify which surface waters have groundwater consistently below surface water features, such that an unsaturated zone would separate surface water from groundwater. Groundwater elevations that are always deeper than 50 feet below the land surface can be identified as disconnected surface waters. Also, please reconcile data gaps (shallow monitoring wells, stream gauges, and nested/clustered wells) along surface water features in the Monitoring Network section of the GSP to improve ISW mapping in future GSPs**.

Checklist Items 11 to 20, Identifying, Mapping, and Describing GDEs (23 CCR §354.16)

[Appendix C: Methodology for Identifying Potential Groundwater Dependent Ecosystems]

- For clarification, iGDEs are mapped polygons in DWR's NC dataset.

- **Please specify what field verification methods (e.g., isotope analysis, enhanced shallow groundwater monitoring) will be used to definitively determine whether potential GDEs are true GDEs.**
- **It is highly advised that multiple depth to groundwater measurements are used to verify whether an iGDE (or NC dataset polygon) is connected to groundwater, so that fluctuations in the groundwater regime can be adequately represented.** The analysis described on p.7 to create Figure C-3 only relies on Spring 2017 depth data, which is also after the Jan 1, 2015 SGMA benchmark date. Also, according to the shallow monitoring well data gaps described in Chapter 5 and 7, there is insufficient data to confidently remove data for NC polygons that are >5km away from a shallow well. See Attachment D of this letter for six best practices when using groundwater data to verify the NC dataset.
- **The NC dataset needs to be groundtruthed with aerial photography to screen for changes in land use that many not be reflected in the NC dataset (e.g., recent development, cultivated agricultural land, obvious human-made features).**
- Grouping multiple GDE polygons into larger units by location (proximity to each other) and principal aquifer will help to characterize GDEs under Section 4.7.2 and would simplify the process of evaluating potential effects on GDEs due to groundwater conditions under GSP Chapter 8: Sustainable Management Criteria.
- **Groundwater conditions within GDEs and the interaction between GDEs and groundwater should be briefly described within the portion of the Basin Setting Section (Section 4.7.2) where GDEs are being identified.**
- Not all GDEs are created equal. Some GDEs may contain legally protected species or ecologically rich communities, whereas other GDEs may be highly degraded with little conservation value. Including a description of the types of species (protected status, native versus non-native), habitat, and environmental beneficial uses (Refer to **Attachment C** for a list of freshwater species found in the Paso Robles Subbasin, refer to Worksheet 2, p.74 of GDE Guidance Document, and see the Critical Species Lookbook[7]) can be helpful in assigning an ecological value to the GDEs. **Identifying an ecological value of each GDE can help prioritize limited resources when considering GDEs as well as prioritizing legally protected species or habitat that may need special consideration when setting sustainable management criteria.**
- Decisions to remove, keep, or add polygons from the NC dataset into a subbasin GDE map should be based on best available science in a manner that promotes transparency and accountability with stakeholders. Any polygons that are removed, added, or kept should be inventoried in the submitted shapefile to DWR, and mapped in the plan. **We recommend revising Figure 4-18 (replicated as Figure C-7) and including it in Chapter 5 to reflect this change. Please provide the final acreage of subbasin GDE polygons.**
- While depth to groundwater levels within 30 feet are generally accepted as being a proxy for confirming that polygons in the NC dataset are connected to groundwater, the variable needs of plant species and their dependence on seasonal and inter-

[7] Available online at: https://groundwaterresourcehub.org/sgma-tools/the-critical-species-lookbook/

annual groundwater level fluctuations should be considered when applying this criterion. Studies have found the roots of oaks can extend deeper than 70 feet to extract water from the capillary fringe immediately above the water table during the summer and fall, and that groundwater reserves provide a buffer to rapid changes in their hydroclimate, as long as groundwater reserves are not depleted by drought or human consumption.[8] **It is highly advised that seasonal and interannual fluctuations in the groundwater regime are taken into consideration. Utilizing groundwater data from one point in time or contoured with too few shallow monitoring wells can misrepresent groundwater levels required by GDEs, and inadvertently result in adverse impacts to the GDEs.** Based on a study we recently submitted to Frontiers in Environmental Science Journal, we've observed riparian forests along the Cosumnes River to experience a range in groundwater levels between 1.5 and 75 feet over seasonal and interannual timescales. Seasonal fluctuations in the regional water table can support perched groundwater near an intermittent river that seasonally runs dry due to large seasonal fluctuations in the regional water table. While perched groundwater itself cannot directly be managed due to its position in the vadose zone, the water table position within the regional aquifer (via pumping rate restrictions, restricted pumping at certain depths, restricted pumping around GDEs, well density rules) and its interactions with surface water (e.g., timing and duration) can be managed to prevent adverse impacts to ecosystems due to changes in groundwater quality and quantity under SGMA.

Checklist Items 21 and 22 – Water Budget (23 CCR §354.18)

[Chapter 6. Water Budget (p. 6-1)]

- **Please clarify what assumptions and data were used to calculate Riparian Evapotranspiration**.
- Why was evapotranspiration only calculated for riparian vegetation? In Chapter 3.4.2 of the Draft GSP (p. 3-11), native vegetation was identified as the largest water use sector in the subbasin by land area. **Please estimate evapotranspiration for all native vegetation in the subbasin for the water budget. Environmental beneficial users of groundwater, such as wetlands and phreatophyte (oak) woodlands are of particular importance and should be explicitly mentioned. Calculations should be provided to quantify the amount of ET in the GDEs both spatially and temporally, including water year type. Please identify any data gaps.**

Checklist Items 23 to 46 – Sustainable Management Criteria

[Section 8.1 Sustainability Goal]

[8] Miller and others. 2009. Groundwater Uptake by Woody Vegetation in a Semi-Arid Oak Savannah. Water Resources Research. Volume 46. November.

- This section states that the groundwater resources in the Paso Robles Subbasin will be managed for the long-term community, financial and environmental benefit of Subbasin users. The discussion of how this goal will be achieved references cultural, community and business needs and related management actions and projects to obtain sustainability, but provides no explanation how environmental beneficial uses will be protected. **Please describe how the sustainability of environmental groundwater and interconnected surface water uses will be protected, and what management actions and conceptual projects will address environmental beneficial uses and users of groundwater.**

[Section 8.2 General Process for Establishing Sustainable Management Criteria]

- Stakeholder involvement is crucial when establishing sustainable management criteria. The role of the GSA is to represent and balance the needs of *all groundwater* beneficial uses and users in the basin, which has been expressed in the Sustainability goal in Section 8.1. According to p. 8-5, only rural residents, farmers, local cities and the county were surveyed to gather input on sustainable management criteria. **Please specify what information or efforts have been used/made to protect the interests of environmental users and disadvantaged community members.**
- SGMA requires that sustainable management criteria are consistent with other state, federal or local regulatory standards [23 CCR§354.28(b)(5)]. No reference is made to the review of supporting documents for General Plan Conservation or Land Use Elements, or to the review of environmental management studies and documents such as Biological Assessments, Biological Opinions, HCPs, NCCPs, or other studies regarding the current and historical conditions of the beneficial uses being evaluated. **Please describe what process was used to identify other regulatory standards that need consideration when establishing minimum thresholds for sustainability criteria, especially those related to protected habitats, minimum flow requirements and habitat conservation plans. Please provide detail on how sustainable management criteria were developed for GDEs and streamflow habitat, and how the above supporting documents were considered.**

[Section 8.3 Chronic Lowering of Groundwater Levels Sustainable Management Criteria]

- [8.3.2] The definition of 'significant and unreasonable' is a qualitative statement that is used to describe when undesirable results would occur in the basin, which is then related to how a minimum threshold can be quantified. Potential effects on all beneficial users of groundwater in the basin need to be taken into consideration. According to the California Constitution Article X, §2, water resources in California must be "put to beneficial use to the fullest extent of which they are capable". **Please modify the local definition for 'significant and unreasonable' (provided on p. 8-7), so that it also specifies potential effects on environmental beneficial users of groundwater in the basin.**
- [8.3.3] Under SGMA, Measurable Objectives are to be established to achieve the sustainability goal of the basin within 20 years of Plan implementation [23 CCR §

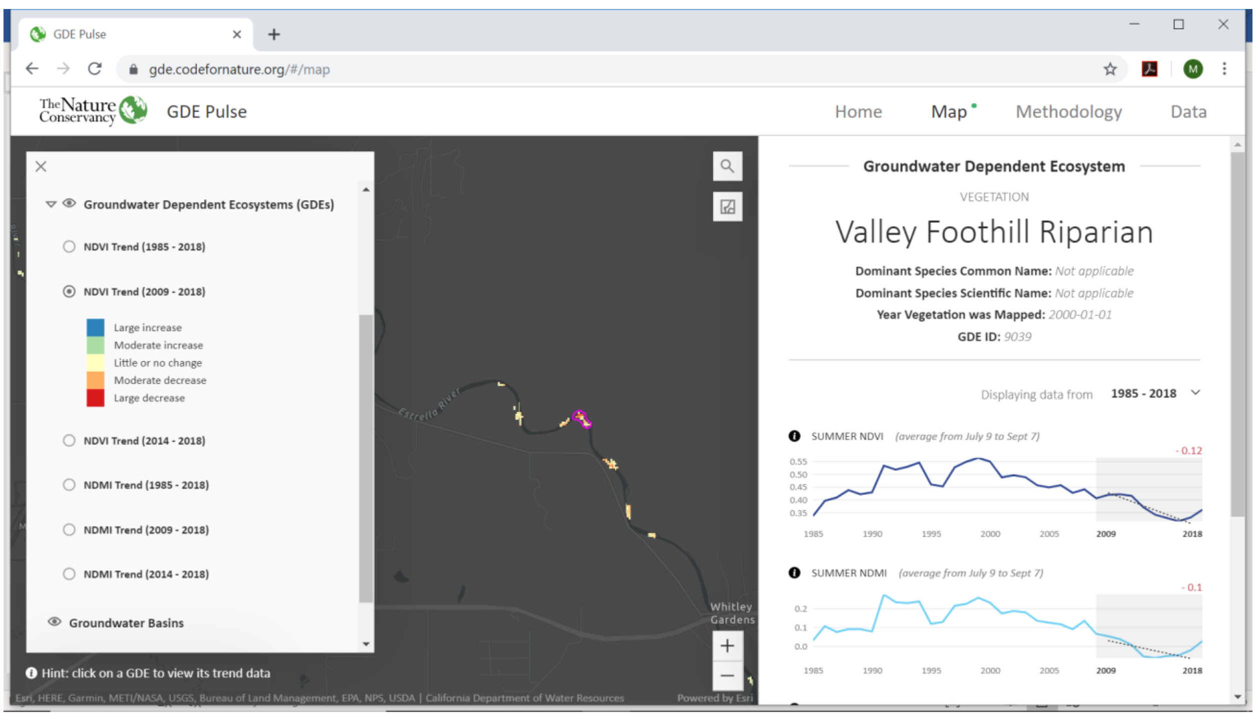
354.30 (a)]. **Please modify the methodology for setting measurable objectives for groundwater levels so that it helps attain the sustainability goal defined on p. 8-4:** "sustainably manage the groundwater resources of the Paso Robles Subbasin for long-term community, financial, ***and environmental*** benefit of Subbasin users. … In adopting this GSP, ***it is the express goal of the GSAs to balance the needs of all groundwater users*** in the Subbasin, within the sustainable limits of the Subbasin's resources." (emphasis added)

- Section 8.3.3.1 states that environmental interests were considered when establishing measurable objectives. **Please provide a discussion regarding the environmental beneficial uses and users that were considered and how this was accomplished.**
- Section 8.3.3.2 and 8.3.3.3 present measurable objective for specific wells completed in each principal aquifer, but provide no discussion how a determination was made that these groundwater levels are protective of environmental beneficial uses and users, including GDEs. **Chronic lowering of groundwater levels can have a direct effect on environmental beneficial users and this effect should be considered when setting measurable objectives for this sustainability indicator and discussed in this section and supporting materials provided. Section 8.3.3.1 should describe how environmental beneficial uses and users, including GDEs were considered when establishing measurable objectives for chronic lowering of groundwater levels. Section 8.3.3.2 and 8.3.3.3 should describe how the identified measurable objectives will succeed in preventing significant and unreasonable harm to environmental beneficial uses of groundwater, including GDEs.**

- [8.3.4] **Chronic lowering of groundwater levels can have a direct effect on environmental beneficial users and this effect should be considered when setting minimum thresholds for this sustainability indicator and discussed in this section and supporting materials provided.** A technically defensible approach is to use 10-year baseline period of groundwater elevation data (2005-2015) to establish how groundwater conditions during that time period affect different beneficial water uses and users across the basin, including GDEs**. Please document the consideration of the following when establishing minimum thresholds for chronic lowering of groundwater levels:**
    - The relationship between the minimum threshold for chronic lowering of groundwater levels and potential significant and unreasonable impacts to GDEs and ecological beneficial uses of surface water are not described. **Please provide additional analysis to substantiate that the potential impacts of applying the proposed minimum thresholds will not cause significant and unreasonable impacts to GDEs and ecological beneficial uses of ISW, or identify this as a data gap.**
    - The potential effects of undesirable results on environmental beneficial users are not described and quantified. **Please expand the section to describe the potential effects of undesirable results on all beneficial uses and users, including environmental uses and users.**

- Are the proposed minimum thresholds consistent with other state, federal or local regulatory standards, including those applicable to interconnected surface waters, protected habitats and habitat conservation plans? [23 CCR§354.28(b)(5)]?
- Are there environmental beneficial groundwater users that need consideration, particularly those that are legally protected under the United States Endangered Species Act or California Endangered Species Act? (See **Attachment C** in the attached letter for a list of freshwater species located in the Paso Robles Subbasin)?

- The GDE Pulse web application developed by The Nature Conservancy (**Attachment E**) provides easy access to 35 years of satellite data to view trends of vegetation metrics, groundwater depth (where available), and precipitation data. This satellite imagery can be used to observe trends for NC dataset polygons within the Subbasin, and relate those trends to nearby groundwater level trends. Over the past 10 years (2009-2018), some NC dataset vegetation polygons have experienced adverse impacts to vegetation growth and moisture in the western portion of the Subbasin. An example is shown in the screen shot below. **Please review these spatial patterns and, where possible, correlate them with water level trends when developing minimum thresholds. Any indications of adverse trends and any data gaps should be identified.**



- [8.3.4.2] This section states that only one monitoring well was identified where minimum thresholds could be assessed in the Alluvial Aquifer. This is a significant data gap for a variety of beneficial uses and users, including GDEs and interconnected surface water. **Please describe a plan in the Monitoring network chapter on how the GSA will install shallow monitoring wells in the alluvial aquifer if confidentially agreements prevent existing wells from being used as**

representative monitoring wells for the Chronic Lowering of Groundwater sustainability indicator in this important aquifer.

- [8.3.4.4 and 8.3.4.6] The description of how the groundwater elevation minimum thresholds affect interconnected surface waters and ecological land uses and users is inadequate for the following reasons:
    - The draft GSP has failed to describe current and historical groundwater conditions near GDE areas, the nature of the GDEs and their potential sensitivity to groundwater level declines, and the potential effect of groundwater level declines on GDEs. Thus, it is impossible to assess how the proposed minimum thresholds relate to historical groundwater conditions in the GDE and whether potential adverse effects could occur to the GDEs as a result of groundwater conditions. **Please include a discussion of how minimum thresholds will affect the GDEs identified in Appendix C and identify any data gaps.**
- [8.3.4.7] The identified GDEs have not been adequately described or characterized. Different GDE species will have different susceptibilities to groundwater level declines. Please refer to the Critical Species Lookbook[9] to review and discuss the potential groundwater reliance of critical species in the basin. Legally protected species located with GDEs have not been identified. Thus, it is impossible to evaluate whether federal, state, or local standards exist for groundwater elevations needed to protect these listed species. **Please provide a discussion regarding how the selected minimum thresholds will affect compliance with federal, state and local standards related to protected habitats, protected species, and other requirements, such as biological opinions, habitat conservation plans and other applicable standards.**
- [8.3.4.9] Irreversible harm to GDEs can occur within a relatively short period of time. This section summarizes interim milestones to prevent chronic lowering of groundwater levels to achieve the sustainability goal by at least 2040. **Please discuss how significant and unreasonable harm to GDEs will be prevented in the interim.**
- [8.3.5.1 and 8.3.5.3] The GSP proposes to allow violation of minimum thresholds at a certain percentage of locations prior to considering threshold violations as representative of an undesirable result. As stated above, damage to GDEs is often irreversible, leading to the permanent loss of a protected resource. A percentage violation trigger is therefore inadequate to assure that the sustainability goals of the GSP are met. **Please elaborate on how the exceedance criteria would be applied in a way that is protective of significant and unreasonable harm to GDEs. A procedure should be included for violation of minimum thresholds that includes early identification of potential GDE impacts and prioritization potentially impacted areas for investigation of impacts and appropriate response actions. This could be accomplished efficiently and cost-effectively through the use of remote sensing tools, such as GDE Pulse or other remote sensing approaches.**

[9] Available online at: https://groundwaterresourcehub.org/sgma-tools/the-critical-species-lookbook/

[Section 8.8 Depletion of Interconnected Surface Water Sustainable Management Criteria]

- The GSP fails to establish measurable objectives or minimum thresholds for this sustainability indicator, citing it as a data gap. The existence of riparian GDEs along the streams in the basin has been identified in Appendix C, and their connection to groundwater is assumed. Their occurrence in the riparian zone means that these GDEs should be considered a beneficial user of groundwater that could be affected by chronic groundwater level decline as discussed above, as well as beneficial users of surface water that could be depleted by groundwater extraction. **A more robust discussion of the known facts regarding these surface-groundwater interactions in the riparian zone should be provided. In addition, more detailed discussion regarding specific data gaps should be included. In our opinion, these changes are required in order for the GSP to be found adequate.**
- [8.8.1] While there are certainly data gaps and a need for additional shallow monitoring wells in the Alluvial aquifer to map ISWs, there is also a need to enhancing monitoring of stream flow and vertical groundwater gradients. After filling the data gaps for ISWs and further analysis**, specific plans and schedules should be provided for the establishment of minimum thresholds for ISWs.**
- [8.8.2] There is a need to evaluate and discuss potential effects on beneficial uses of surface and groundwater. In addition, the applicable state, federal and local standards for the protection of aquatic, riparian and other protected habitats should be discussed. This is necessary, at a minimum, so that the nature of the data gaps can be understood. **Please refer to Attachment C for a list of freshwater species in Paso Robles Subbasin that may be exist within ISWs. We recommend that after identifying which freshwater species exist in your basin, especially federal and state listed species, that you contact staff at the Department of Fish and Wildlife (DFW), United States Fish and Wildlife Service (USFWS) and/or National Marine Fisheries Services (NMFS) to obtain their input on the groundwater and surface water needs of the organisms on the freshwater species list. Because effects to plants and animals are difficult and sometimes impossible to reverse, we recommend erring on the side of caution to preserve sufficient groundwater conditions to sustain GDEs and ISWs. Please refer to the Critical Species Lookbook[10] to review and discuss the potential groundwater reliance of critical species in the basin.**

<u>Checklist Items 47, 48 and 49 – Monitoring Network (23 CCR §354.34)</u>

[Section 7.2.1 Groundwater Level Monitoring Network Data Gaps (p. 7-10)]

- The last row of Table 7-3 states that "Data must be able to characterize conditions and monitor adverse impacts to beneficial uses and users identified within the basin". Aside from GDEs mapped in the basin (Figure 4-18), environmental surface water

[10] Available online at: https://groundwaterresourcehub.org/sgma-tools/the-critical-species-lookbook/

users have not been identified in the GSP thus far. SGMA requires that potential effects on GDEs and environmental surface water users be described when defining undesirable results. In addition to identifying GDEs in the basin, The Nature Conservancy recommends identifying beneficial users of surface water, which include environmental users. This is a critical step, as it is impossible to define "significant and unreasonable adverse impacts" without knowing what is being impacted, nor is possible to monitor ISWs in a way that can "identify adverse impacts on beneficial uses of surface water" [23 CCR §354.34(c)(6)(D)]. For your convenience, we've provided a list of freshwater species within the boundary of the Paso Robles basin in **Attachment C**. Our hope is that this information will help your GSA better evaluate and monitor the impacts of groundwater management on environmental beneficial users of surface water. We recommend that after identifying which freshwater species exist in your basin, especially federal and state listed species, that you contact staff at the Department of Fish and Wildlife (DFW), United States Fish and Wildlife Service (USFWS) and/or National Marine Fisheries Services (NMFS) to obtain their input on the groundwater and surface water needs of the organisms on the freshwater species list, and how best to monitor them. Because effects to plants and animals are difficult and sometimes impossible to reverse, we recommend erring on the side of caution to preserve sufficient groundwater conditions to sustain GDEs and ISWs. **Please identify appropriate biological indicators that can be used to monitor potential impacts to environmental beneficial users as a current data gap and make plans to reconcile these in Chapter 10 (Plan Implementation).**

[Section 7.6.1 Interconnected Surface Water Monitoring Data Gaps (p. 7-25)]

- In addition to the need for additional shallow monitoring wells in the Alluvial aquifer to map ISWs, **there is also a need to enhancing monitoring of stream flow and vertical groundwater gradients by installing more stream gauges and clustered/nested wells near streams, rivers or wetlands.** Ideally, co-locating stream gauges with clustered wells that can monitor groundwater levels in both the Alluvial and Paso Robles Formation aquifers would enhance understanding about where ISWs exist in the basin and whether pumping is causing depletions of surface water or impacts on beneficial users of surface water and groundwater.
- **There is a need to integrate biological indicators that can monitor adverse impacts to beneficial uses of surface water and groundwater within ISWs.**
- **Please provide sufficient detail for the investigation and monitoring program including stream gauges, screened intervals and aquifers of the shallow wells and frequency of monitoring, in order to describe monitoring of both the extent of ISWs and the quantity of surface water depletions from ISWs.**

[Chapter 10 Groundwater Sustainability Plan Implementation]

- **Please describe the expansion of the monitoring program and specify what types of monitoring will be done to identify impacts to GDEs. Be specific in describing wells and screened intervals that represent the water levels of both the Alluvial Aquifer and Paso Robles Formation Aquifer.**

Checklist Items 50 and 51 – Projects and Management Actions to Achieve Sustainability Goal (23 CCR §354.44)

[Chapter 9 Management Actions and Projects]

- As stated in GSP Section 5.5, a data gap exists around interconnected surface waters (ISWs) in the Paso Robles Subbasin. Please recognize the data gap in this Chapter and the possibility that if ISWs are present in the Subbasin, there is a need to establish sustainable management criteria for ISWs in the basin and include ISWs as a specific sustainability indicator to be addressed by management actions and projects as described herein. **For the management actions and projects already identified, state how GDEs and ISWs will be benefited or protected. If GDEs and ISWs will not be adequately protected by those listed, please include and describe additional management actions and projects.**
- An important data gap already recognized is the lack of publicly available groundwater elevation data in the Alluvial Aquifer. As discussed in TNC's comments on Section 8.3 above, a scientifically robust methodology must be proposed for establishing the initial minimum thresholds for the Alluvial Aquifer. **In light of the data gap regarding Alluvial Aquifer groundwater data, please be more specific in stating how GDEs and ISWs would benefit from management actions and projects, and how actions and projects will be evaluated to assess whether adverse impacts to GDEs will be mitigated or prevented**:
  - Promote Stormwater Capture (Page 9-10): Please describe how recharge from unallocated storm flows will be evaluated to assess benefits to GDEs and ISWs.
  - Mandatory Pumping Reductions (Page 9-13): Please discuss the data gap for wells screened in the alluvial aquifer and the data gap for vertical gradient between the alluvial aquifer and Paso Robles Formation, since most wells are screened in the Paso Robles aquifer. When these data gaps are resolved, it will become clearer how mandatory pumping reductions could also benefit GDEs and ISWs.
  - Conceptual Projects (Pages 9-18 to 9-44): Most of the conceptual projects involve in-lieu recharge for the direct use of recycled wastewater. Thus, the recycled water would replace pumped groundwater. Since these conceptual projects are location-specific, please highlight the benefits of these conceptual projects on specific mapped GDEs and ISWs.
- For more case studies on how to incorporate environmental benefits into groundwater projects, please visit our website: https://groundwaterresourcehub.org/case-studies/recharge-case-studies/

Attachment C

Freshwater Species Located in the Paso Robles Subbasin

To assist in identifying the beneficial users of surface water necessary to assess the undesirable result "depletion of interconnected surface waters", Attachment C provides a list of freshwater species located in the Paso Robles Subbasin. To produce the freshwater species list, we used ArcGIS to select features within the California Freshwater Species Database version 2.0.9 within the Paso Robles groundwater basin boundary. This database contains information on ~4,000 vertebrates, macroinvertebrates and vascular plants that depend on fresh water for at least one stage of their life cycle. The methods used to compile the California Freshwater Species Database can be found in Howard et al. 2015[11]. The spatial database contains locality observations and/or distribution information from ~400 data sources. The database is housed in the California Department of Fish and Wildlife's BIOS[12] as well as on The Nature Conservancy's science website[13].

Scientific Name	Common Name	Legally Protected Status		
		Federal	**State**	**Other**
BIRD				
Actitis macularius	Spotted Sandpiper			
Aechmophorus clarkii	Clark's Grebe			
Aechmophorus occidentalis	Western Grebe			
Agelaius tricolor	Tricolored Blackbird	Bird of Conservation Concern	SSC	BSSC - First priority
Aix sponsa	Wood Duck			
Anas americana	American Wigeon			
Anas clypeata	Northern Shoveler			
Anas crecca	Green-winged Teal			
Anas cyanoptera	Cinnamon Teal			
Anas platyrhynchos	Mallard			
Anas strepera	Gadwall			
Anser albifrons	Greater White-fronted Goose			
Ardea alba	Great Egret			
Ardea herodias	Great Blue Heron			
Aythya affinis	Lesser Scaup			
Aythya collaris	Ring-necked Duck			
Aythya valisineria	Canvasback		SSC	
Bucephala albeola	Bufflehead			
Bucephala clangula	Common Goldeneye			
Butorides virescens	Green Heron			

[11] Howard, J.K. et al. 2015. Patterns of Freshwater Species Richness, Endemism, and Vulnerability in California. PLoSONE, 11(7). Available at: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0130710
[12] California Department of Fish and Wildlife BIOS: https://www.wildlife.ca.gov/data/BIOS
[13] Science for Conservation: https://www.scienceforconservation.org/products/california-freshwater-species-database

Calidris mauri	Western Sandpiper			
Chen caerulescens	Snow Goose			
Chen rossii	Ross's Goose			
Chroicocephalus philadelphia	Bonaparte's Gull			
Cistothorus palustris palustris	Marsh Wren			
Egretta thula	Snowy Egret			
Fulica americana	American Coot			
Gallinago delicata	Wilson's Snipe			
Gallinula chloropus	Common Moorhen			
Geothlypis trichas trichas	Common Yellowthroat			
Haliaeetus leucocephalus	Bald Eagle	Bird of Conservation Concern	Endangered	
Icteria virens	Yellow-breasted Chat		SSC	BSSC - Third priority
Lophodytes cucullatus	Hooded Merganser			
Megaceryle alcyon	Belted Kingfisher			
Mergus merganser	Common Merganser			
Mergus serrator	Red-breasted Merganser			
Numenius americanus	Long-billed Curlew			
Nycticorax nycticorax	Black-crowned Night-Heron			
Oxyura jamaicensis	Ruddy Duck			
Pandion haliaetus	Osprey		Watch list	
Pelecanus erythrorhynchos	American White Pelican		SSC	BSSC - First priority
Phalacrocorax auritus	Double-crested Cormorant			
Podiceps nigricollis	Eared Grebe			
Podilymbus podiceps	Pied-billed Grebe			
Porzana carolina	Sora			
Rallus limicola	Virginia Rail			
Recurvirostra americana	American Avocet			
Riparia riparia	Bank Swallow		Threatened	
Setophaga petechia	Yellow Warbler			BSSC - Second priority
Tachycineta bicolor	Tree Swallow			
Tringa melanoleuca	Greater Yellowlegs			
Tringa solitaria	Solitary Sandpiper			
Vireo bellii	Bell's Vireo			
Vireo bellii pusillus	Least Bell's Vireo	Endangered	Endangered	

Xanthocephalus xanthocephalus	Yellow-headed Blackbird		SSC	BSSC - Third priority
CRUSTACEAN				
Branchinecta lynchi	Vernal Pool Fairy Shrimp	Threatened	SSC	IUCN - Vulnerable
Cyprididae fam.	Cyprididae fam.			
Hyalella spp.	Hyalella spp.			
Pacifastacus spp.	Pacifastacus spp.			
FISH				
Oncorhynchus mykiss - SCCC	South Central California coast steelhead	Threatened	SSC	Vulnerable - Moyle 2013
Catostomus occidentalis mnioltiltus	Monterey sucker			Least Concern - Moyle 2013
Catostomus occidentalis occidentalis	Sacramento sucker			Least Concern - Moyle 2013
Cottus gulosus	Riffle sculpin		SSC	Near-Threatened - Moyle 2013
Entosphenus tridentata ssp. 1	Pacific lamprey		SSC	Near-Threatened - Moyle 2013
Lavinia exilicauda exilicauda	Sacramento hitch		SSC	Near-Threatened - Moyle 2013
Lavinia exilicauda harengeus	Monterey hitch		SSC	Vulnerable - Moyle 2013
Oncorhynchus mykiss irideus	Coastal rainbow trout			Least Concern - Moyle 2013
Orthodon microlepidotus	Sacramento blackfish			Least Concern - Moyle 2013
Ptychocheilus grandis	Sacramento pikeminnow			Least Concern - Moyle 2013
Oncorhynchus mykiss - SCCC	South Central California coast steelhead	Threatened	SSC	Vulnerable - Moyle 2013
HERP				
Actinemys marmorata marmorata	Western Pond Turtle		SSC	ARSSC

Ambystoma californiense californiense	California Tiger Salamander	Threatened	Threatened	ARSSC
Anaxyrus boreas boreas	Boreal Toad			
Anaxyrus boreas halophilus	California Toad			ARSSC
Anaxyrus californicus	Arroyo Toad	Endangered	SSC	ARSSC
Pseudacris cadaverina	California Treefrog			ARSSC
Pseudacris hypochondriaca	Baja California Treefrog			
Pseudacris regilla	Northern Pacific Chorus Frog			
Rana boylii	Foothill Yellow-legged Frog	Under Review in the Candidate or Petition Process	SSC	ARSSC
Rana draytonii	California Red-legged Frog	Threatened	SSC	ARSSC
Spea hammondii	Western Spadefoot	Under Review in the Candidate or Petition Process	SSC	ARSSC
Taricha torosa	Coast Range Newt		SSC	ARSSC
Thamnophis hammondii hammondii	Two-striped Gartersnake		SSC	ARSSC
Thamnophis sirtalis infernalis	California Red-sided Gartersnake			Not on any status lists
Thamnophis sirtalis sirtalis	Common Gartersnake			
INSECT & OTHER INVERT				
Acentrella spp.	Acentrella spp.			
Agabus spp.	Agabus spp.			
Ambrysus mormon	Creeping water bug			Not on any status lists
Antocha spp.	Antocha spp.			
Argia emma	Emma's Dancer			
Argia lugens	Sooty Dancer			
Argia spp.	Argia spp.			
Argia vivida	Vivid Dancer			
Baetidae fam.	Baetidae fam.			
Baetis spp.	Baetis spp.			
Berosus punctatissimus	Water scavenger beetles			Not on any status lists
Berosus spp.	Berosus spp.			
Callibaetis spp.	Callibaetis spp.			

Centroptilum spp.	Centroptilum spp.			
Chaetarthria bicolor	Water Scavenger Beetles			Not on any status lists
Chaetarthria ochra	Water Scavenger Beetles			Not on any status lists
Cheumatopsyche spp.	Cheumatopsyche spp.			
Chironomidae fam.	Chironomidae fam.			
Chironomus spp.	Chironomus spp.			
Cladotanytarsus spp.	Cladotanytarsus spp.			
Coenagrionidae fam.	Coenagrionidae fam.			
Corisella spp.	Corisella spp.			
Corixidae fam.	Corixidae fam.			
Cricotopus spp.	Cricotopus spp.			
Dicrotendipes spp.	Dicrotendipes spp.			
Dytiscidae fam.	Dytiscidae fam.			
Enallagma civile	Familiar Bluet			
Enallagma cyathigerum	Common blue damselfly			Not on any status lists
Enochrus carinatus	Water Scavenger Beetles			Not on any status lists
Enochrus cristatus	Water Scavenger Beetles			Not on any status lists
Enochrus piceus	Water Scavenger Beetles			Not on any status lists
Enochrus pygmaeus	Water Scavenger Beetles			Not on any status lists
Enochrus spp.	Enochrus spp.			
Ephemerella spp.	Ephemerella spp.			
Ephemerellidae fam.	Ephemerellidae fam.			
Ephydridae fam.	Ephydridae fam.			
Eukiefferiella spp.	Eukiefferiella spp.			
Fallceon quilleri	A Mayfly			
Graptocorixa spp.	Graptocorixa spp.			
Gyrinus spp.	Gyrinus spp.			
Helichus spp.	Helichus spp.			
Helicopsyche spp.	Helicopsyche spp.			
Hetaerina americana	American Rubyspot			
Hydrochus spp.	Hydrochus spp.			
Hydrophilidae fam.	Hydrophilidae fam.			
Hydroporus spp.	Hydroporus spp.			
Hydropsyche spp.	Hydropsyche spp.			
Hydropsychidae fam.	Hydropsychidae fam.			
Hydroptila spp.	Hydroptila spp.			
Hydryphantidae fam.	Hydryphantidae fam.			
Ischnura spp.	Ischnura spp.			
Laccobius ellipticus	Water scavenger beetles			Not on any status lists
Laccobius spp.	Laccobius spp.			

Laccophilus maculosus	Dingy Diver			Not on any status lists
Lepidostoma spp.	Lepidostoma spp.			
Leptoceridae fam.	Leptoceridae fam.			
Libellula saturata	Flame Skimmer			
Limnophyes spp.	Limnophyes spp.			
Liodessus obscurellus	Predacious Diving Beetle			Not on any status lists
Macromia magnifica	Western River Cruiser			
Malenka spp.	Malenka spp.			
Microcylloepus spp.	Microcylloepus spp.			
Microtendipes spp.	Microtendipes spp.			
Nectopsyche spp.	Nectopsyche spp.			
Ochthebius spp.	Ochthebius spp.			
Ophiogomphus bison	Bison Snaketail			
Optioservus spp.	Optioservus spp.			
Oreodytes spp.	Oreodytes spp.			
Paracloeodes minutus	A Small Minnow Mayfly			
Paracymus spp.	Paracymus spp.			
Paratanytarsus spp.	Paratanytarsus spp.			
Peltodytes spp.	Peltodytes spp.			
Phaenopsectra spp.	Phaenopsectra spp.			
Plathemis lydia	Common Whitetail			
Postelichus spp.	Postelichus spp.			
Procladius spp.	Procladius spp.			
Pseudochironomus spp.	Pseudochironomus spp.			
Psychodidae fam.	Psychodidae fam.			
Rheotanytarsus spp.	Rheotanytarsus spp.			
Rhyacophila spp.	Rhyacophila spp.			
Sigara mckinstryi	A Water Boatman			Not on any status lists
Sigara spp.	Sigara spp.			
Simuliidae fam.	Simuliidae fam.			
Simulium spp.	Simulium spp.			
Sperchon spp.	Sperchon spp.			
Sperchontidae fam.	Sperchontidae fam.			
Stictotarsus spp.	Stictotarsus spp.			
Sweltsa spp.	Sweltsa spp.			
Tanytarsus spp.	Tanytarsus spp.			
Tipulidae fam.	Tipulidae fam.			
Tramea lacerata	Black Saddlebags			
Tricorythodes spp.	Tricorythodes spp.			
Wormaldia spp.	Wormaldia spp.			
MAMMAL				
Castor canadensis	American Beaver			Not on any status lists

MOLLUSK				
Gyraulus spp.	Gyraulus spp.			
Lymnaea spp.	Lymnaea spp.			
Menetus opercularis	Button Sprite			CS
Physa spp.	Physa spp.			
Pisidium spp.	Pisidium spp.			
Planorbidae fam.	Planorbidae fam.			
PLANT				
Alnus rhombifolia	White Alder			
Ammannia coccinea	Scarlet Ammannia			
Anemopsis californica	Yerba Mansa			
Azolla filiculoides	Mosquito Fern			
Baccharis salicina	Willow Baccharis			Not on any status lists
Bolboschoenus maritimus paludosus	Saltmarsh Bulrush			Not on any status lists
Callitriche heterophylla bolanderi	Large Water-starwort			
Callitriche marginata	Winged Water-starwort			
Castilleja minor minor	Alkali Indian-paintbrush			
Castilleja minor spiralis	Large-flower Annual Indian-paintbrush			
Cotula coronopifolia	Brass Buttons			
Crassula aquatica	Water Pygmyweed			
Crypsis vaginiflora	African Prickle Grass			
Cyperus erythrorhizos	Red-root Flatsedge			
Eleocharis macrostachya	Creeping Spikerush			
Eleocharis parishii	Parish's Spikerush			
Epilobium campestre	Smooth Boisduvalia			Not on any status lists
Epilobium cleistogamum	Cleistogamous Spike-primrose			
Eryngium spinosepalum	Spiny Sepaled Coyote-thistle		SSC	CRPR - 1B.2
Eryngium vaseyi vaseyi	Vasey's Coyote-thistle			Not on any status lists
Euthamia occidentalis	Western Fragrant Goldenrod			
Helenium puberulum	Rosilla			
Hydrocotyle verticillata verticillata	Whorled Marsh-pennywort			
Juncus dubius	Mariposa Rush			
Juncus effusus effusus	Common Bog Rush			
Juncus luciensis	Santa Lucia Dwarf Rush		SSC	CRPR - 1B.2
Juncus macrophyllus	Longleaf Rush			
Juncus xiphioides	Iris-leaf Rush			

Limosella aquatica	Northern Mudwort			
Marsilea vestita vestita	Hairy Waterclover			Not on any status lists
Mimulus guttatus	Common Large Monkeyflower			
Mimulus latidens	Broad-tooth Monkeyflower			
Mimetanthe pilosa	Snouted Monkey Flower			Not on any status lists
Montia fontana fontana	Fountain Miner's-lettuce			
Navarretia prostrata	Prostrate Navarretia		SSC	CRPR - 1B.1
Paspalum distichum	Joint Paspalum			
Persicaria lapathifolia	Common Knotweed			Not on any status lists
Persicaria maculosa	Spotted Ladysthumb			Not on any status lists
Phacelia distans	Common Phacelia			
Pilularia americana	Pillwort			
Plagiobothrys acanthocarpus	Adobe Popcorn-flower			
Plantago elongata elongata	Slender Plantain			
Platanus racemosa	California Sycamore			
Psilocarphus brevissimus brevissimus	Dwarf Woolly-heads			
Ranunculus aquatilis diffusus	Whitewater Crowfoot			Not on any status lists
Rorippa curvisiliqua curvisiliqua	Curve-pod Yellowcress			
Rumex conglomeratus	Green Dock			
Rumex salicifolius salicifolius	Willow Dock			
Salix exigua exigua	Narrowleaf Willow			
Salix laevigata	Polished Willow			
Salix lasiolepis lasiolepis	Arroyo Willow			
Schoenoplectus americanus	Three-square Bulrush			
Schoenoplectus pungens longispicatus	Three-square Bulrush			
Schoenoplectus pungens pungens	Common Threesquare			
Schoenoplectus saximontanus	Rocky Mountain Bulrush			
Typha domingensis	Southern Cattail			
Typha latifolia	Broadleaf Cattail			
Veronica anagallis-aquatica	Water Speedwell			

Veronica catenata	Chain Speedwell			Not on any status lists
Notes: ARSSC = At-Risk Species of Special Concern BSSC = Bird Species of Special Concern CRPR = California Rare Plant Rank CS = Currently Stable SSC = Species of Special Concern				

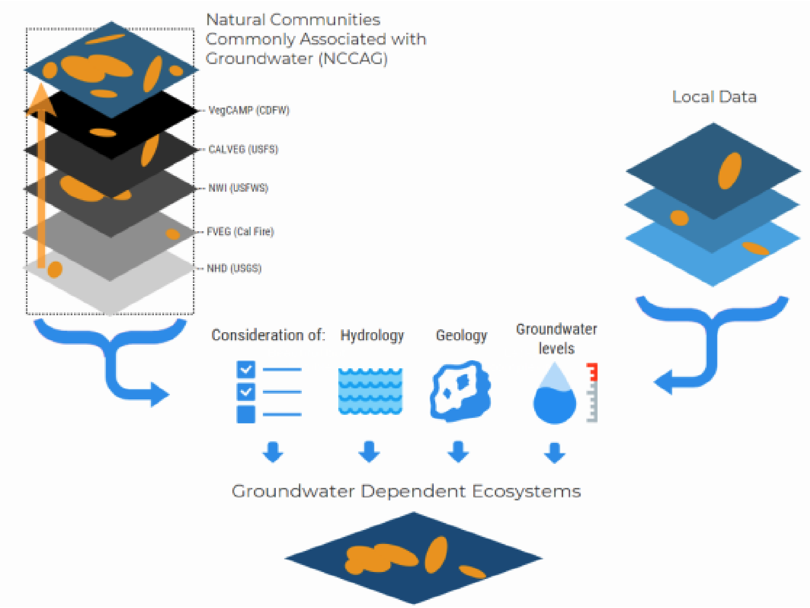
Attachment D

The Nature Conservancy

July 2019

IDENTIFYING GDEs UNDER SGMA
Best Practices for using the NC Dataset

The Sustainable Groundwater Management Act (SGMA) requires that groundwater dependent ecosystems (GDEs) be identified in Groundwater Sustainability Plans (GSPs). As a starting point, the Department of Water Resources (DWR) is providing the Natural Communities Commonly Associated with Groundwater Dataset (NC Dataset) online[14] to help Groundwater Sustainability Agencies (GSAs), consultants, and stakeholders identify GDEs within individual groundwater basins. To apply information from the NC Dataset to local areas, GSAs should combine it with the best available science on local hydrology, geology, and groundwater levels to verify whether polygons in the NC dataset are likely supported by groundwater in an aquifer (Figure 1)[15]. This document highlights six best practices for using local groundwater data to confirm whether mapped features in the NC dataset are supported by groundwater.



[14] *NC Dataset Online Viewer: https://gis.water.ca.gov/app/NCDatasetViewer/*

[15] California Department of Water Resources (DWR). 2018. Summary of the "Natural Communities Commonly Associated with Groundwater" Dataset and Online Web Viewer. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Data-and-Tools/Files/Statewide-Reports/Natural-Communities-Dataset-Summary-Document.pdf

The NC Dataset identifies vegetation and wetland features that are good indicators of a GDE. The dataset is comprised of 48 publicly available state and federal datasets that map vegetation, wetlands, springs, and seeps commonly associated with groundwater in California[16]. It was developed through a collaboration between DWR, the Department of Fish and Wildlife, and The Nature Conservancy (TNC). TNC has also provided detailed guidance on identifying GDEs from the NC dataset[17] on the Groundwater Resource Hub[18], a website dedicated to GDEs.

BEST PRACTICE #1. Establishing a Connection to Groundwater

Groundwater basins can be comprised of one continuous aquifer (Figure 2a) or multiple aquifers stacked on top of each other (Figure 2b). In unconfined aquifers (Figure 2a), using the depth-to-groundwater and the rooting depth of the vegetation is a reasonable method to infer groundwater dependence for GDEs. If groundwater is well below the rooting (and capillary) zone of the plants and any wetland features, the ecosystem is considered disconnected and groundwater management is not likely to affect the ecosystem (Figure 2d). However, it is important to consider local conditions (e.g., soil type, groundwater flow gradients, and aquifer parameters) and to review groundwater depth data from multiple seasons and water year types (wet and dry) because intermittent periods of high groundwater levels can replenish perched clay lenses that serve as the water source for GDEs (Figure 2c). Maintaining these natural groundwater fluctuations are important to sustaining GDE health.

Basins with a stacked series of aquifers (Figure 2b) may have varying levels of pumping across aquifers in the basin, depending on the production capacity or water quality associated with each aquifer. If pumping is concentrated in deeper aquifers, SGMA still requires GSAs to sustainably manage groundwater resources in shallow aquifers, such as perched aquifers, that support springs, surface water, domestic wells, and GDEs (Figure 2). This is because vertical groundwater gradients across aquifers may result in pumping from deeper aquifers to cause adverse impacts onto beneficial users reliant on shallow aquifers or interconnected surface water. The goal of SGMA is to sustainably manage groundwater resources for current and future social, economic, and environmental benefits. While groundwater pumping may not be currently occurring in a shallower aquifer, use of this water may become more appealing and economically viable in future years as pumping restrictions are placed on the deeper production aquifers in the basin to meet the sustainable yield and criteria. Thus, identifying GDEs in the basin should done irrespective to the amount of current pumping occurring in a particular aquifer, so that future impacts on GDEs due to new production can be avoided. A good rule of thumb to follow is: *if groundwater can be pumped from a well - it's an aquifer*.

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[16] *For more details on the mapping methods, refer to: Klausmeyer, K., J. Howard, T. Keeler-Wolf, K. Davis-Fadtke, R. Hull, A. Lyons. 2018. Mapping Indicators of Groundwater Dependent Ecosystems in California: Methods Report. San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/iGDE_data_paper_20180423.pdf*

[17] "Groundwater Dependent Ecosystems under the Sustainable Groundwater Management Act: Guidance for Preparing Groundwater Sustainability Plans" is available at: https://groundwaterresourcehub.org/gde-tools/gsp-guidance-document/

[18] *The Groundwater Resource Hub: www.GroundwaterResourceHub.org*

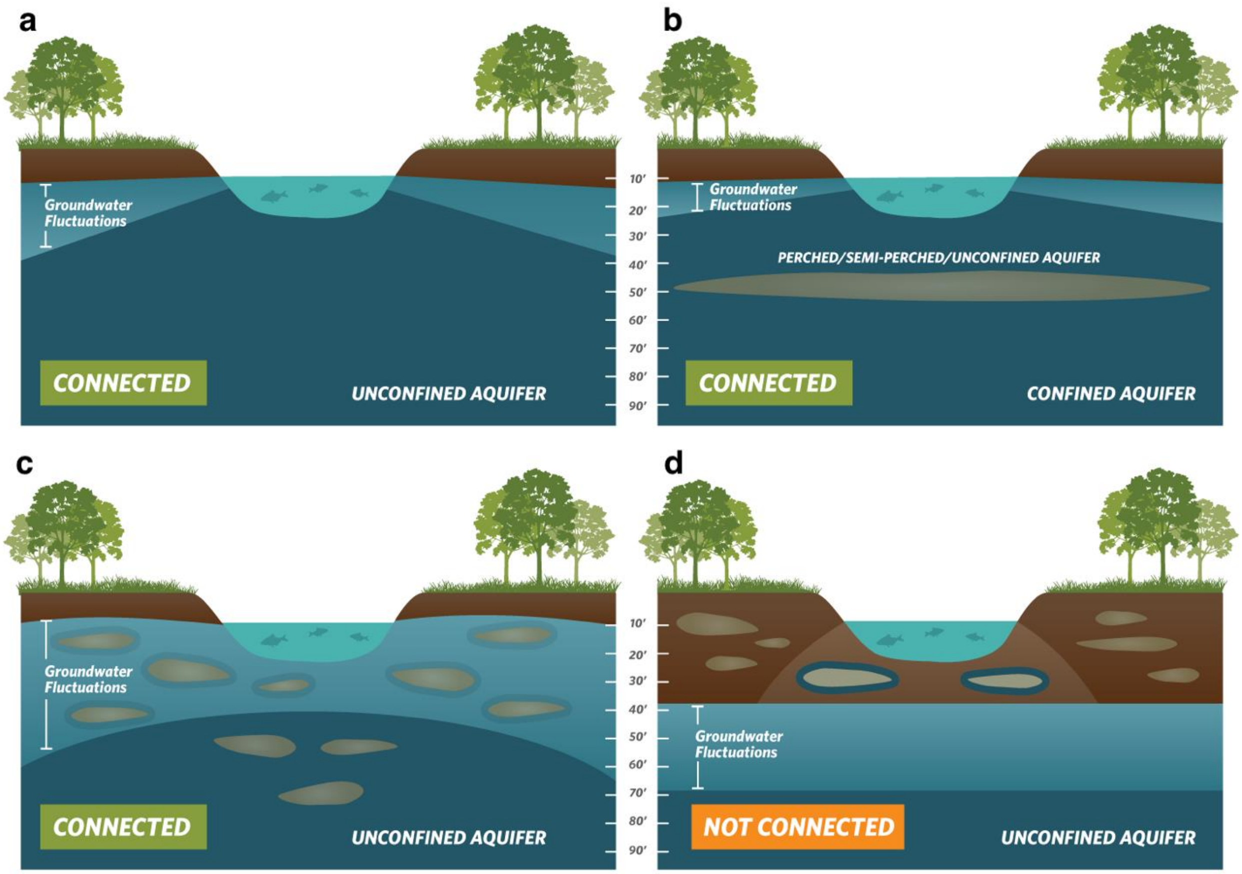

Figure 2. Confirming whether an ecosystem is connected to groundwater. Top: (a) Under the ecosystem is an unconfined aquifer with depth-to-groundwater fluctuating seasonally and interannually within 30 feet from land surface. **(b)** Depth-to-groundwater in the shallow aquifer is connected to overlying ecosystem. Pumping predominately occurs in the confined aquifer, but pumping is possible in the shallow aquifer. **Bottom: (c)** Depth-to-groundwater fluctuations are seasonally and interannually large, however, clay layers in the near surface prolong the ecosystem's connection to groundwater. **(d)** Groundwater is disconnected from surface water, and any water in the vadose (unsaturated) zone is due to direct recharge from precipitation and indirect recharge under the surface water feature. These areas are not connected to groundwater and typically support species that do not require access to groundwater to survive.

BEST PRACTICE #2. Characterize Seasonal and Interannual Groundwater Conditions

SGMA requires GSAs to describe current and historical groundwater conditions when identifying GDEs [23 CCR §354.16(g)]. Relying solely on the SGMA benchmark date (January 1, 2015) or any other single point in time to characterize groundwater conditions (e.g., depth-to-groundwater) is inadequate because managing groundwater conditions with data from one time point fails to capture the seasonal and interannual variability typical of California's climate. DWR's Best Management Practices document on water budgets[19] recommends using 10 years of water supply and water budget information to describe how historical conditions have impacted the operation of the basin within sustainable yield, implying that a baseline[20] could be determined based on data between 2005 and 2015. Using this or a similar time period, depending on data availability, is recommended for determining the depth-to-groundwater.

GDEs depend on groundwater levels being close enough to the land surface to interconnect with surface water systems or plant rooting networks. The most practical approach[21] for a GSA to assess whether polygons in the NC dataset are connected to groundwater is to rely on groundwater elevation data. As detailed in TNC's GDE guidance document[4], one of the key factors to consider when mapping GDEs is to contour depth-to-groundwater in the aquifer that is supporting the ecosystem (see Best Practice #5).

Groundwater levels fluctuate over time and space due to California's Mediterranean climate (dry summers and wet winters), climate change (flood and drought years), and subsurface heterogeneity in the subsurface (Figure 3). Many of California's GDEs have adapted to dealing with intermittent periods of water stress, however if these groundwater conditions are prolonged, adverse impacts to GDEs can result. While depth-to-groundwater levels within 30 feet[4] of the land surface are generally accepted as being a proxy for confirming that polygons in the NC dataset are supported by groundwater, it is highly advised that fluctuations in the groundwater regime be characterized to understand the seasonal and interannual groundwater variability in GDEs. Utilizing groundwater data from one point in time can misrepresent groundwater levels required by GDEs, and inadvertently result in adverse impacts to the GDEs. Time series data on groundwater elevations and depths are available on the SGMA Data Viewer[22]. However, if insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons in the GSP <u>until</u> data gaps are reconciled in the monitoring network (see Best Practice #6).

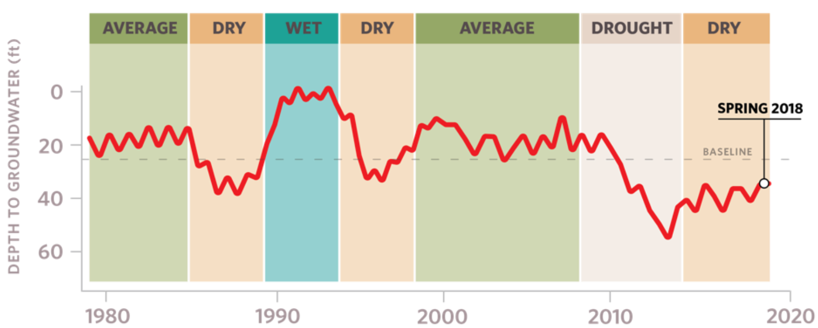

Figure 3. Example seasonality and interannual variability in depth-to-groundwater over time. Selecting one point in time, such as Spring 2018, to characterize groundwater conditions in GDEs fails to capture what groundwater conditions are necessary to maintain the ecosystem status into the future so adverse impacts are avoided.

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[19] DWR. 2016. Water Budget Best Management Practice. Available at: https://water.ca.gov/LegacyFiles/groundwater/sgm/pdfs/BMP_Water_Budget_Final_2016-12-23.pdf

[20] *Baseline is defined under the GSP regulations as "historic information used to project future conditions for hydrology, water demand, and availability of surface water and to evaluate potential sustainable management practices of a basin." [23 CCR §351(e)]*

[21] Groundwater reliance can also be confirmed via stable isotope analysis and geophysical surveys. For more information see The GDE Assessment Toolbox (Appendix IV, GDE Guidance Document for GSPs[4]).

[22] *SGMA Data Viewer: https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer*

BEST PRACTICE #3. Ecosystems Often Rely on Both Groundwater and Surface Water

GDEs are plants and animals that rely on groundwater for all or some of its water needs, and thus can be supported by multiple water sources. The presence of non-groundwater sources (e.g., surface water, soil moisture in the vadose zone, applied water, treated wastewater effluent, urban stormwater, irrigated return flow) within and around a GDE does not preclude the possibility that it is supported by groundwater, too. SGMA defines GDEs as "ecological communities and species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface" [23 CCR §351(m)]. Hence, depth-to-groundwater data should be used to identify whether NC polygons are supported by groundwater and should be considered GDEs. In addition, SGMA requires that significant and undesirable adverse impacts to beneficial users of surface water be avoided. Beneficial users of surface water include environmental users such as plants or animals[23], which therefore must be considered when developing minimum thresholds for depletions of interconnected surface water.

GSAs are only responsible for impacts to GDEs resulting from groundwater conditions in the basin, so if adverse impacts to GDEs result from the diversion of applied water, treated wastewater, or irrigation return flow away from the GDE, then those impacts will be evaluated by other permitting requirements (e.g., CEQA) and may not be the responsibility of the GSA. However, if adverse impacts occur to the GDE due to changing groundwater conditions resulting from pumping or groundwater management activities, then the GSA would be responsible (Figure 4).

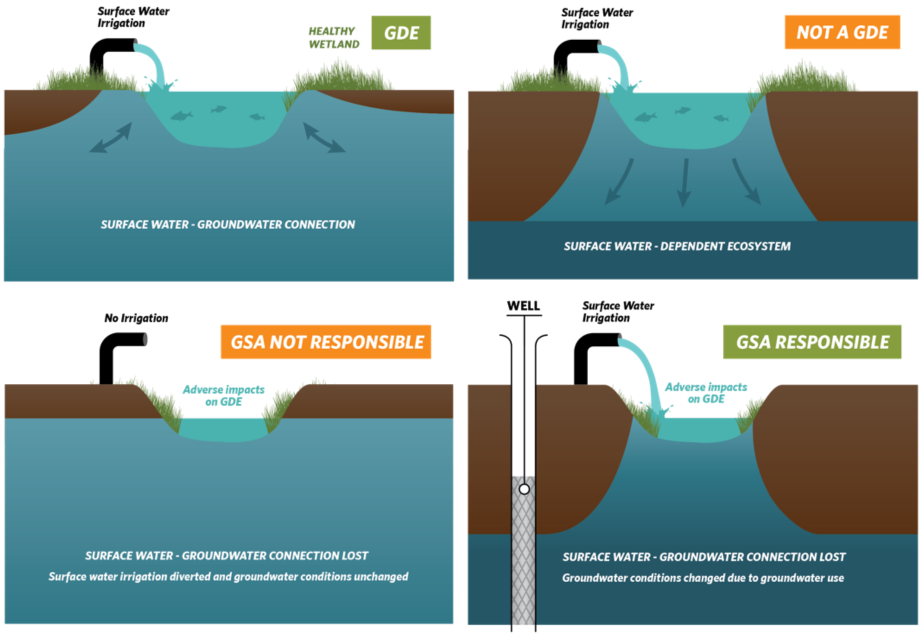


Figure 4. Ecosystems often depend on multiple sources of water. Top: (Left) Surface water and groundwater are interconnected, meaning that the GDE is supported by both groundwater and surface water. **(Right)** Ecosystems that are only reliant on non-groundwater sources are not groundwater-dependent. **Bottom: (Left)** An ecosystem that was once dependent on an interconnected surface water, but loses access to groundwater solely due to surface water diversions may not be the GSA's responsibility. **(Right)** Groundwater dependent ecosystems once dependent on an interconnected surface water system, but loses that access due to groundwater pumping is the GSA's responsibility.

[23] *For a list of environmental beneficial users of surface water by basin, visit: https://groundwaterresourcehub.org/gde-tools/environmental-surface-water-beneficiaries/*

BEST PRACTICE #4. Select Representative Groundwater Wells

Identifying GDEs in a basin requires that groundwater conditions are characterized to confirm whether polygons in the NC dataset are supported by the underlying aquifer. To do this, proximate groundwater wells should be identified to characterize groundwater conditions (Figure 5). When selecting representative wells, it is particularly important to consider the subsurface heterogeneity around NC polygons, especially near surface water features where groundwater and surface water interactions occur around heterogeneous stratigraphic units or aquitards formed by fluvial deposits. The following selection criteria can help ensure groundwater levels are representative of conditions within the GDE area:

- Choose wells that are within 5 kilometers (3.1 miles) of each NC Dataset polygons because they are more likely to reflect the local conditions relevant to the ecosystem. If there are no wells within 5km of the center of a NC dataset polygon, then there is insufficient information to remove the polygon based on groundwater depth. Instead, it should be retained as a potential GDE until there are sufficient data to determine whether or not the NC Dataset polygon is supported by groundwater.

- Choose wells that are screened within the surficial unconfined aquifer and capable of measuring the true water table.

- Avoid relying on wells that have insufficient information on the screened well depth interval for excluding GDEs because they could be providing data on the wrong aquifer. This type of well data should not be used to remove any NC polygons.

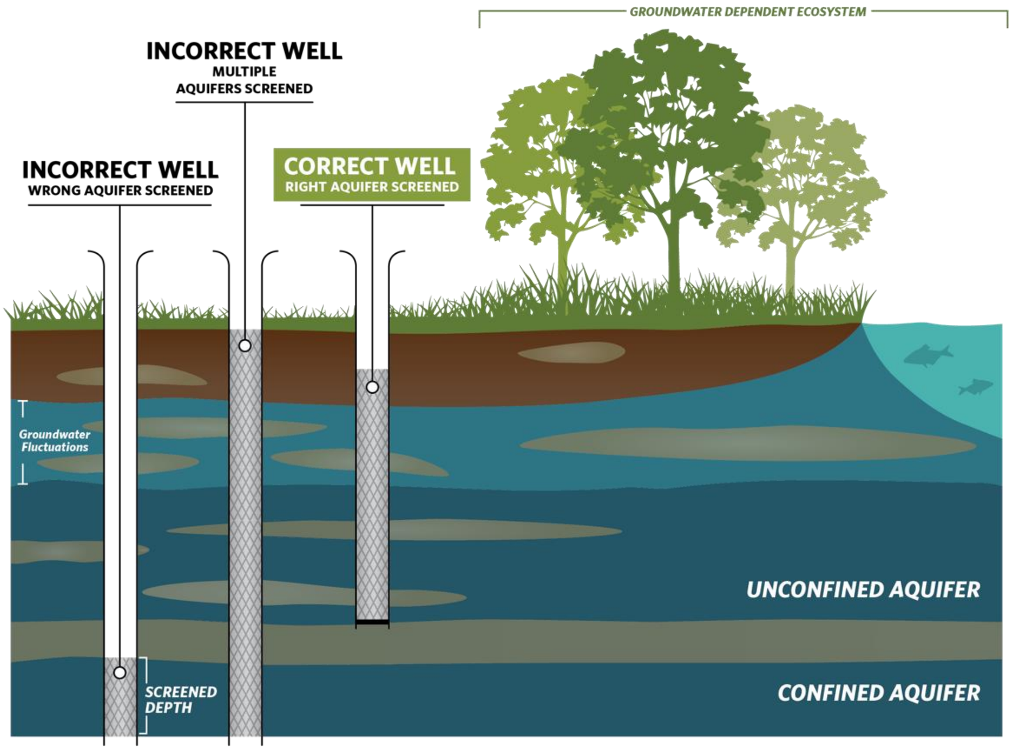


Figure 5. Selecting representative wells to characterize groundwater conditions near GDEs.

BEST PRACTICE #5. Contouring Groundwater Elevations

The common practice to contour depth-to-groundwater over a large area by interpolating measurements at monitoring wells is unsuitable for assessing whether an ecosystem is supported by groundwater. This practice causes errors when the land surface contains features like stream and wetland depressions because it assumes the land surface is constant across the landscape and depth-to-groundwater is constant below these low-lying areas (Figure 6a). A more accurate approach is to interpolate **groundwater elevations** at monitoring wells to get groundwater elevation contours across the landscape. This layer can then be subtracted from land surface elevations from a Digital Elevation Model (DEM)[24] to estimate depth-to-groundwater contours across the landscape (Figure b; Figure 7). This will provide a much more accurate contours of depth-to-groundwater along streams and other land surface depressions where GDEs are commonly found.

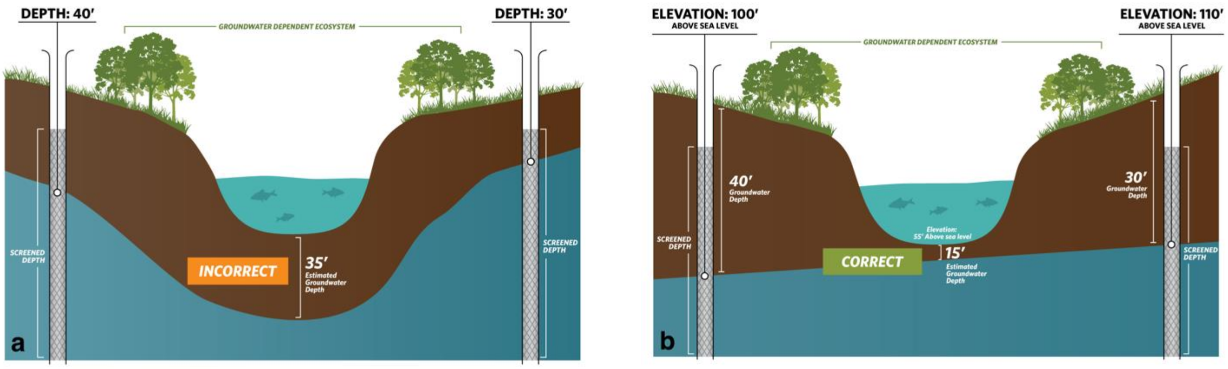


Figure 6. Contouring depth-to-groundwater around surface water features and GDEs. (a) Groundwater level interpolation using depth-to-groundwater data from monitoring wells. **(b)** Groundwater level interpolation using groundwater elevation data from monitoring wells and DEM data.

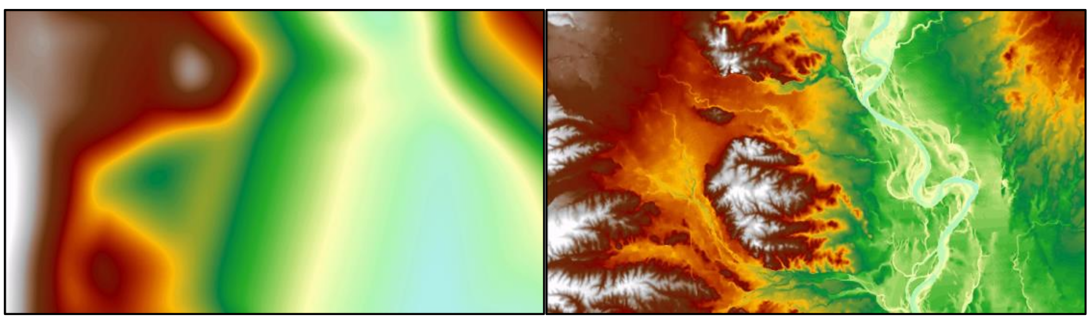


Figure 7. Depth-to-groundwater contours in Northern California. (Left) Contours were interpolated using depth-to-groundwater measurements determined at each well. **(Right)** Contours were determined by interpolating groundwater elevation measurements at each well and superimposing ground surface elevation from DEM spatial data to generate depth-to-groundwater contours. The image on the right shows a more accurate depth-to-groundwater estimate because it takes the local topography and elevation changes into account.

[24] USGS Digital Elevation Model data products are described at: https://www.usgs.gov/core-science-systems/ngp/3dep/about-3dep-products-services and can be downloaded at: https://iewer.nationalmap.gov/basic/

BEST PRACTICE #6. Best Available Science

Adaptive management is embedded within SGMA and provides a process to work toward sustainability over time by beginning with the best available information to make initial decisions, monitoring the results of those decisions, and using the data collected through monitoring programs to revise decisions in the future. In many situations, the hydrologic connection of NC dataset polygons will not initially be clearly understood if site-specific groundwater monitoring data are not available. If sufficient data are not available in time for the 2020/2022 plan, **The Nature Conservancy strongly advises that questionable polygons from the NC dataset be included in the GSP until data gaps are reconciled in the monitoring network.** Erring on the side of caution will help minimize inadvertent impacts to GDEs as a result of groundwater use and management actions during SGMA implementation.

KEY DEFINITIONS

Groundwater basin is an aquifer or stacked series of aquifers with reasonably well-defined boundaries in a lateral direction, based on features that significantly impede groundwater flow, and a definable bottom. *23 CCR §341(g)(1)*

Groundwater dependent ecosystem (GDE) are ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface. *23 CCR §351(m)*

Interconnected surface water (ISW) surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted. *23 CCR §351(o)*

Principal aquifers are aquifers or aquifer systems that store, transmit, and yield significant or economic quantities of groundwater to wells, springs, or surface water systems. *23 CCR §351(aa)*

ABOUT US

The Nature Conservancy is a science-based nonprofit organization whose mission is *to conserve the lands and waters on which all life depends*. To support successful SGMA implementation that meets the future needs of people, the economy, and the environment, TNC has developed tools and resources (www.groundwaterresourcehub.org) intended to reduce costs, shorten timelines, and increase benefits for both people and nature.

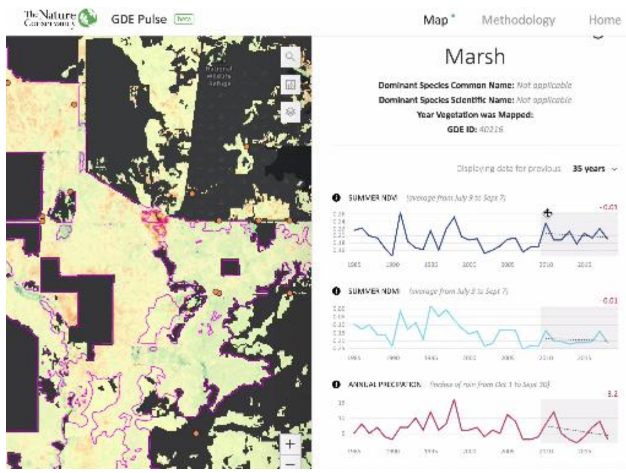
Attachment E

GDE Pulse

A new, free online tool that allows Groundwater Sustainability Agencies to assess changes in groundwater dependent ecosystem (GDE) health using satellite, rainfall, and groundwater data.

The Nature Conservancy
Protecting nature. Preserving life.

Visit
https://gde.codefornature.org/



Remote sensing data from satellites has been used to monitor the health of vegetation all over the planet. GDE pulse has compiled 35 years of satellite imagery from NASA's Landsat mission for every polygon in the Natural Communities Commonly Associated with Groundwater Dataset[25]. The following datasets are included:

Normalized Difference Vegetation Index (NDVI) is a satellite-derived index that represents the greenness of vegetation. Healthy green vegetation tends to have a higher NDVI, while dead leaves have a lower NDVI. We calculated the average NDVI during the driest part of the year (July - Sept) to estimate vegetation health when the plants are most likely dependent on groundwater.

Normalized Difference Moisture Index (NDMI) is a satellite-derived index that represents water content in vegetation. NDMI is derived from the Near-Infrared (NIR) and Short-Wave Infrared (SWIR) channels. Vegetation with adequate access to water tends to have higher NDMI, while vegetation that is water stressed tends to have lower NDMI. We calculated the average NDVI during the driest part of the year (July–September) to estimate vegetation health when the plants are most likely dependent on groundwater.

Annual Precipitation is the total precipitation for the water year (October 1st – September 30th) from the PRISM dataset[26]. The amount of local precipitation can affect vegetation with more precipitation generally leading to higher NDVI and NDMI.

Depth to Groundwater measurements provide an indication of the groundwater levels and changes over time for the surrounding area. We used groundwater well measurements from nearby (<1km) wells to estimate the depth to groundwater below the GDE based on the average elevation of the GDE (using a digital elevation model) minus the measured groundwater surface elevation.

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[25] *The Natural Communities Commonly Associated with Groundwater Dataset is hosted on the California Department of Water Resources' website: https://gis.water.ca.gov/app/NCDatasetViewer/#*

[26] The PRISM dataset is hosted on Oregon State University's website: http://www.prism.oregonstate.edu/

My name is Robert Woodland. My family has been part of San Luis Obispo county for three generations. We have been involved in Farming for many years. I am the managing member and or family representative of approx. 300 acres of vineyard in the north county.

Thank you SLO Co and the other GSAs for all of your time and effort in forming the current draft of the Groundwater Sustainability Plan.

There are a few issues that I am concerned about that aren't answered or addressed in the current draft.

I am concerned that there is no agriculture related representations or inclusion in the various GSP meetings or involvement in the draft policy. I am also concerned that in an agricultural county there is no agricultural voice and that there should be at least 1 voting representative from the ag community.

I am concerned that growth doesn't appear to have been considered regarding de minimis users and that there doesn't appear to be a way of monitoring or policing water use.

I am concerned that there has been nothing addressed regarding farmers that have been and are working on best farming practices versus farmers that don't. If there is a blanket cut back in water use, those who have invested time and money into reducing water usage will be hurt the most.

Thanks again to the County and other GSAs for your hard work and dedication. The GSP will impact everyone in the area and I believe should be represented by all facets of those impacted.

Respectfully,

Robert Woodland

Appendix O

SGMA Implementation Grant Spending Plan, Paso Robles Subbasin of the Salinas Valley Basin

Applicant Name: County of San Luis Obispo
Basin Name: Salinas Valley – Paso Robles Area (3-004.06)

Table 1 – Spending Plan

Rank	Name	Estimated Score	COD SJV Component Requirement	Benefactors	Cost	Justification
1	GRANT ADMINISTRATION	N/A	☐	☐ Tribe(s) ☒ URC(s) ☒ SDAC(s)	$ 250,000	As required under the Basin's current Grant Agreement, this task will involve the preparation of reimbursement request packages containing invoices and quarterly progress reports. This task is required for successful grant implementation.
2	RECYCLED WATER PROJECT • City of Paso Robles Recycled Water Supply – Salinas Segment • San Miguel CSD Recycled Water Supply	26	☐	☐ Tribe(s) ☒ URC(s) ☒ SDAC(s)	$ 4,500,000	1.) The City of Paso Robles has a master plan to distribute tertiary-quality recycled water currently being produced at the City's WWTP to east Paso Robles, where it may be safely used for irrigation of City parks, golf courses, and vineyards. This direct use of recycled water will reduce the need to pump groundwater from the Basin and further improve the sustainability of the City's water supply and provide a supplemental water supply to irrigators in the basin that will further offset groundwater pumping. The City is nearing completion of the design of a major distribution system to deliver recycled water to east Paso Robles. When completed, the distribution system project will be capable of delivering up to 4,900 AFY of disinfected tertiary effluent. Of this amount, approximately 2,000 AFY is currently available for use by agricultural irrigators in-lieu of groundwater extraction, in the central portion of the basin near and inside the City of Paso Robles. Water that is not used in lieu of groundwater pumping will be discharged to Huer Huero Creek with the potential for additional recharge benefits. The component of the project to be funded in conjunction with the SGM GSP Implementation Grant would include the infrastructure required to convey the treated effluent supply from the City WWTF and will include a critical segment of the pipeline infrastructure to provide for delivering across the Salinas River to a point of

						connection to a segment of recycled water line the City has already constructed. These initial pipeline segments will facilitate a new turn-out for future extension of the "purple-pipe" distribution system to irrigation users including vineyards, municipal parks, golf courses, residential developments, and the local community college. 2.) The San Miguel Community Services District (CSD) is currently in the final design and permitting phases for a major upgrade to their wastewater treatment facility (WWTF) which will allow the District to produce effluent which meets California Code of Regulations (CCR) Title 22 criteria for disinfected secondary recycled water for irrigation use by vineyards. The WWTF upgrade construction phase is scheduled to be completed in 2023. The District has been in preliminary discussions with a group of agricultural customers in close proximity to the WWTF that are interested in taking delivery of the treated effluent to be used for vineyard irrigation in-lieu of pumping groundwater from the Basin. The project could provide between 200 and 450 AFY of in-lieu water supplies. The component of the project to be funded in conjunction with the SGM GSP Implementation Grant would include the infrastructure required to convey the treated effluent supply from the WWTF to the vineyard and would include a new recycled water pumping station, pipeline, and turn-out infrastructure to provide for delivering water to the vineyard.

Applicant Name: County of San Luis Obispo
Basin Name: Salinas Valley – Paso Robles Area (3-004.06)

3	ADDRESS GSP DATA GAPS – HIGH PRIORITY • Expand and Improve Existing Basin Monitoring Network • Supplemental Hydrogeologic Investigation(s) • Install New MWs, Stream Gages, Climatologic Stations	25	☐	☐ Tribe(s) ☒ URC(s) ☒ SDAC(s)	$ 1,400,000	1.) The SGMA regulations require a sufficient spatial coverage and density of monitoring wells to characterize the groundwater table or potentiometric surface for each principal aquifer, which in this Basin includes the Paso Robles Formation aquifer and the alluvial aquifers associated with the Salinas River and major perennial streams. The Basin is approximately 682 square miles in area, and the current groundwater level monitoring network includes 22 wells in the Paso Robles Formation Aquifer, which equates to approximately 3 wells per 100 square miles for well density in the Paso Robles Formation. The proposed strategy for adding monitoring wells and representative monitoring sites (RMS) to the monitoring network will be to first incorporate existing wells to the extent possible. 2.) New monitoring wells will be drilled in data gap areas where existing wells do not exist or areas where access to existing wells could not be secured. The GSAs will obtain required permits and access agreements before drilling new wells. In addition to new monitoring wells, the GSAs will install new stream gages and climatologic stations to allow for an enhanced understanding of the interaction between surface waters and groundwater, both in the alluvial and Paso Robles Formation aquifers. Additional climatologic stations will provide valuable information regarding crop water usage and evapotranspiration which will be used in future groundwater extraction calculations. 3.) The goal of the supplemental hydrogeologic investigations will be to improve our understanding of the hydrogeologic conceptual model of the Basin to support an equitable decision-making process and adaptive management of the programs and actions designed to achieve sustainability. The supplemental hydrogeologic investigations will be conducted in tandem with improving the

						groundwater level monitoring network. The investigation will rely on existing information first and conduct additional investigations, as deemed appropriate by the GSAs, to address targeted data gaps.
4	HIGH PRIORITY MANAGEMENT ACTIONS • Well verification and registration program • Groundwater extraction measurement program • Well interference mitigation program • Multi-benefit land repurposing program	23	☐	☐ Tribe(s) ☒ URC(s) ☒ SDAC(s)	$ 800,000	1.) The Well Verification and Registration Program will ensure that the GSA's information regarding the location and spatial distribution of groundwater use is correct and will help fill data gaps about groundwater users and well owners in the basin. Well registration is intended to establish a relatively accurate count of all the active wells in the Basin. If the information obtained through the well registration program indicates that there is a potential for adverse impacts to the future water supply adequacy or water quality of domestic and/or community drinking water supply wells, then the GSA can elect to develop and implement a Drinking Water Well Impact Mitigation Program 2.) The GSAs will also require all non-de minimis groundwater pumpers to report extractions annually and use a water-measuring method satisfactory to the GSAs in accordance with Water Code § 10725.8. Extraction measurements by private well owners within the Basin have not been heretofore required. Extractions from these wells, which are used primarily for irrigated agricultural operations, will be required to be metered and extractions reported. 3.) The GSAs also intend to develop and implement a Drinking Well Impact Mitigation Program to provide drinking water wells, and especially domestic well users, protection from

						the effects of agricultural pumping, with specific emphasis on protecting those areas within the Basin where there are concentrations of shallow domestic wells. Recent experience has demonstrated that some of these areas have experienced several wells going dry and domestic water supply disruptions. 4.) The GSAs will also develop and implement a voluntary multi-benefit land repurposing program that will facilitate the conversion of high-water use irrigated agricultural land to low water use agriculture use or open space, public land, or other land uses on a voluntary basis. The GSAs propose to develop and implement programs that will permit both voluntary temporary and long-term or permanent fallowing and conversion to other land uses. An important consideration in developing the voluntary multi-benefit land repurposing programs will be to include protections of water rights for the overlying landowners that choose to temporarily repurpose irrigated lands.
5	SUPPLEMENTAL WATER SUPPLY FEASIBILITY / ENGINEERING STUDIES • Nacimiento Lake supplemental supply projects • State Water Project (SWP) supplemental supply projects • Santa Margarita Lake supplemental supply projects • Well Impact Mitigation and Alternative Water Supply Projects	22	☐	☐ Tribe(s) ☒ URC(s) ☒ SDAC(s)	$ 650,000	1.) The Nacimiento Water Project (NWP) consists of 45 miles of pipeline that conveys raw water from Lake Nacimiento in the northern portion of San Luis Obispo County to communities within San Luis Obispo County. Monterey County Water Resource Agency (MCWRA) manages and operates Lake Nacimiento and San Luis Obispo County Flood Control and Water Conservation District (SLOCFCWD) has an entitlement of 17,500 AFY through a Master Water Agreement with MCWRA negotiated in 1959. Any surplus NWP water must be obtained from the existing participants through a "turn back pool" arrangement. Several potential projects that considered the use of Lake Nacimiento water were identified in the GSP. One project that has gained local support in the Basin has been proposed by a consortium of vineyard growers which have operations in the central portion of the Basin. The group of private growers is

						considering plans to use a blended supply of recycled water from the City of Paso Robles and a supply from the NWP to produce a irrigation supply water that has desirable water quality properties. The proposed project would provide funding for an engineering study to assess the feasibility of the proposed project, perform design alternatives analyses and develop recommendations for the final project design criteria, including pipeline alignments, and design criteria for the proposed blending facility and pump station(s). 2.) A study performed on behalf of the Central Coast Water Authority (2021) concluded that SLOFCWCD has adequate SWP water supplies to meet its current Participant and simulated additional demands in all years under historic hydrologic patterns. The study further recommended that SLOFCWCD explore alternative management of SLOFCWCD's uncontracted SWP Table A. Available options include entering into contracts with other entities for purposes such as groundwater basin supply augmentation, among others. Since a supplemental supply for groundwater basins is typically used to maintain long term sustainability, the SWP supplemental deliveries would not necessarily be needed in every year. Given the considerably higher value of SWP supplies through sales in drier years, an alternative approach for supplemental groundwater basin supply would be to provide higher amounts of water deliveries in wetter years and lower amounts (or none at all) in drier years. An intermittent SWP supply approach would likely be more cost effective for SWP supplies, but there would be a tradeoff from increased turnout and delivery facility costs for higher capacity deliveries and lower use factors. The proposed project would provide funding for an engineering study to assess the feasibility using unallocated SLOCFCWD SWP supplies, and other supplemental water supplies as may become

						available, for the benefit of the Basin to help in achieving sustainability. 3.) SLOCFCWCD operates the Salinas Dam to provide water to the City of San Luis Obispo. The storage capacity of the lake is 23,843 AF; however, the City has existing water rights of 45,000 AF of storage. The SLOCFCWCD is leading a project to transfer ownership of the Dam from the Army Corp of Engineers to the SLOCFCWCD in order to pursue opportunities to optimize its use and provide additional supplies to beneficiaries. This involves retrofitting the dam and expanding the storage capacity by installing gates along the spillway in order to retain flood flow/stormwater for beneficial use. There may be opportunities to use the water from the expanded and/or reoperated reservoir to benefit the Basin. One possibility would be to schedule summer releases from the storage to the Salinas River, which would benefit the Basin by recharging the basin through the Salinas River. Another way this project might indirectly benefit the Basin is if the City of San Luis Obispo were to use more of their Salinas River water allocation, thereby freeing up the NWP water for purchase by the GSAs. The proposed project would provide funding for identifying and evaluating the options and determining the best way to stabilize groundwater levels and address surface water depletion utilizing any available Salinas River flood flow/stormwater provided by the SLOCFCWCD project.
6	MEDIUM PRIORITY MANAGEMENT ACTIONS • Pumping fee program • Groundwater pumping allocation program	21	☐	☐ Tribe(s) ☒ URC(s) ☒ SDAC(s)	$ 700,000	The GSP identified the activities included in this Project as critical for achieving sustainability within the Basin and for compliance with the provisions of SGMA. As part of the Project review process, the Project Review Panel discussed each of these activities in detail and determined that of the Management Actions being considered, the Project proposed herein will provide significant benefit to the communities and rural residents, agricultural community, the environment, and the overall

						health of the Basin. This Project is considered very feasible, cost effective, and critically important. Although extremely important and feasible, the Project Review Panel determined that this Project should be of a lower priority to Project #3 and will be implemented at such time that funding is available, either from future grant funding opportunities or as funding from the GSAs (or other sources) becomes available. 1.) The GSAs intend to develop and implement a regulatory program to equitably allocate a groundwater Base Pumping Fee and Allocation (BPA). Once the program is implemented, individual non-de minimis pumper's will be provided an annual groundwater BPA which may be based on historically used quantities of water. Alternatively, the GSAs may define the BPA, based on acreage and crop type. Under whatever allocation structure is adopted, the GSAs anticipate that the BPAs for each regulated pumper will be ramped down over time to bring pumping in the Basin within its sustainable yield by 2040. As described in SGMA, any limitation on extractions by the GSAs "shall not be construed to be a final determination of rights to extract groundwater from the basin or any portion of the basin" (Water Code § 10726.4(a)(2)). With respect to those pumpers that are not anticipated to be subject to the fee, the GSAs plan to develop a program pursuant to which such pumpers will be required to self-certify that they only pump for domestic and / or non-commercial purposes.
7	GROUNDWATER BASIN RECHARGE TECHNICAL / ENGINEERING STUDIES • Floodplain expansion / enhancement • Distributed stormwater collection and managed aquifer recharge (DSC-MAR)	16	☐	☐ Tribe(s) ☒ URC(s) ☒ SDAC(s)	$ 400,000	The GSP identified the activities included in this Project as extremely valuable for achieving sustainability within the Basin and for compliance with the provisions of SGMA. As part of the Project review process, the Project Review Panel discussed each of these activities in detail and determined that this Project is considered feasible, cost effective, and important. The Project Review Panel considered this Project, and the activities

						included therein, should be a lesser priority than the higher scored projects and should be considered in the future after other projects and management actions are implemented. These Project activities may also be considered by other agencies and private entities on a localized or area-specific scale, rather than Basin-wide. 1.) The proposed activity would provide funding for an engineering study to assess the feasibility of the developing floodplain / stream channel modifications, perform design alternatives analyses and develop recommendations for the final project design criteria for those sites that are deemed potentially viable for floodplain / stream channel modifications which would result in riparian corridor enhancements, groundwater recharge, and/or in-channel storage of excess floodwater and / or supplemental water for subsequent irrigation use in-lieu of groundwater pumping from the Basin. 2.) DSW-MAR is a landscape management strategy that can help to reduce the storage deficit and maintain long-term water supply reliability. DSW-MAR targets relatively small drainage areas (generally 100 to 1,000 acres) from which stormwater runoff can be collected to infiltrate 100 to 300 AF of water per year, per individual basin. Infiltration can be accomplished in surface basins, typically having an area of 1 to 5 acres, or potentially through flooding of agricultural fields or flood plains, use of drywells, or other strategies. The proposed activity would include the completion of a engineering study to identify the optimal number and location of a series of DSW-MAR facilities, based on hydrogeologic and watershed conditions.
8	ADDRESS DATA GAPS – MEDIUM PRIORITY • Update GSP hydrogeologic model	15	☐	☐ Tribe(s) ☒ URC(s) ☒ SDAC(s)	$ 250,000	The GSP identified numerous data gaps and subsequent notification by DWR that the GSP was deemed "Incomplete" was determined to be largely due to significant data gaps, especially regarding the potential for risk to

						interconnected surface water depletions from pumping and unknowns regarding adverse impacts to shallow domestic wells. The GSA's recognize that at some point in the future it will be necessary to update and recalibrate, or possibly replace the Basin hydrogeologic model. The Project Review Panel determined that this Project is work that should be delayed until such time that the data gaps to be addressed in conjunction with Project #2 are filled and the impacts from the implementation of the higher ranked Projects are assessed.
9	SGMA COMPLIANCE ACTIVITIES	12	☐	☐ Tribe(s) ☐ URC(s) ☐ SDAC(s)	$ 1,050,000	The GSAs recognize that there are ongoing costs that must be incurred to maintain compliance with the requirements of SGMA, including costs associated with the preparation of GSP Annual Reports, Bi-Annual monitoring of Basin Conditions, and preparing regular updates of the GSP as conditions in the Basin dictate. The Project Review Panel determined that the costs associated with the activities in this Project were "part of doing business" as a GSA and that the grant funds would provide more benefit to the Basin and move the Basin toward sustainability if the higher ranked projects were implemented.
				Total Cost:	**$10,000,000**	

Applicant Name: County of San Luis Obispo
Basin Name: Salinas Valley – Paso Robles Area (3-004.06)

Grant Proposal Summary Budget

TABLE 2 – GRANT PROPOSAL SUMMARY BUDGET

Budget Categories	Requested Grant Amount
Component 1: GRANT ADMINISTRATION	$250,000
Component 2: RECYCLED WATER PROJECT	$4,500,000
Component 3: ADDRESS GSP DATA GAPS – HIGH PRIORITY	$1,400,000
Component 4: HIGH PRIORITY MANAGEMENT ACTIONS	$800,000
Component 5: SUPPLEMENTAL WATER SUPPLY FEASIBILITY / ENGINEERING STUDIES	$650,000
Component 6: MEDIUM PRIORITY MANAGEMENT ACTIONS	$700,000
Component 7: GROUNDWATER BASIN RECHARGE TECHNICAL / ENGINEERING STUDIES	$400,000
Component 8: ADDRESS DATA GAPS – MEDIUM PRIORITY	$250,000
Component 9: SGMA COMPLIANCE ACTIVITIES	$1,050,000
Grand Total *Sum rows (1) through (n) for each column*	**$10,000,000**

Grant Proposal Summary Schedule

TABLE 3B – GRANT PROPOSAL SCHEDULE

Categories	Start Date	End Date
Component 1: Grant Administration	**6/1/2022**	**6/30/2025**
Component 2: Recycled Water Project	**6/1/2022**	**6/30/2025**
Component 3: Address GSP Data Gaps – High Priority	**6/1/2022**	**6/30/2025**
Component 4: High Priority Management Actions	**6/1/2022**	**6/30/2025**
Component 5: Supplemental Water Supply Feasibility / Engineering Studies	**6/1/2022**	**6/30/2025**
Component 6: Medium Priority Management Actions	**7/1/2023**	**6/30/2025**
Component 7: Groundwater Basin Recharge Technical / Engineering Studies	**7/1/2023**	**6/30/2025**
Component 8: Address Data Gaps – Medium Priority	**7/1/2023**	**6/30/2025**
Component 9: SGMA Compliance Activities	**12/17/2021**	**6/30/2025**