



*Groundwater Sustainability Plan
Upper San Luis Rey Groundwater Subbasin*

GEOSCIENCE

The First Name in Groundwater

*Public
Workshop –*







*GSP Overview
December 8, 2021*

Sustainable Groundwater Management Act (SGMA)

SGMA (2014) provides California with a framework for sustainable groundwater management.

Sustainable Groundwater Management is defined as the “...management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results...”
(Water Code Section 10721 (v))

Sustainability Criteria:

					
Chronic Lowering of Groundwater Levels	Reduction of Groundwater in Storage	Interconnected Surface Water Depletions	Water Quality Degradation	Land Subsidence	Seawater Intrusion

Groundwater Sustainability Agency (GSA)

Pauma Valley GSA

- Yuima Municipal Water District
- Pauma Valley Community Services District
- Upper San Luis Rey Resource Conservation District

Pauma Valley GSA

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Groundwater Sustainability Plan (GSP)

Upper San Luis Rey Valley Groundwater Basin GSP developed by Pauma Valley GSA with the goal of ensuring that groundwater continues to be available to everyone who uses it far into the future.

Contents:

- Executive Summary
- Introduction
- Plan Area
- Basin Setting
- Sustainable Management Criteria
- Monitoring Network
- Projects and Management Actions
- Plan Implementation

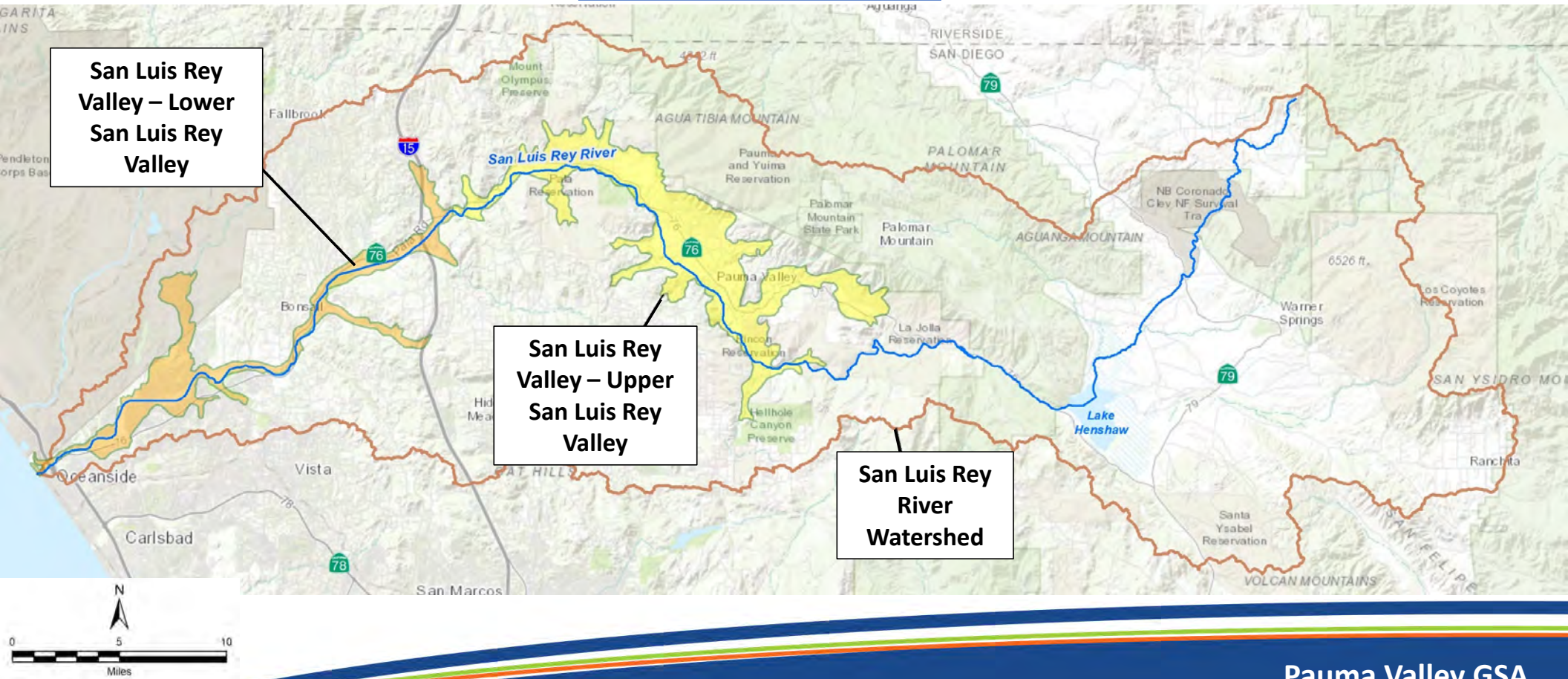
Upper San Luis Rey GSP Schedule

Winter 2018/2019	Summer - Winter 2020	Spring 2021	Summer 2021	Fall 2021	Winter 2021/2022
Notice of Intent to Develop GSP	Data Collection	Plan Area & Basin Setting Stakeholder Meeting 	Sustainable Management Criteria Stakeholder Meeting 	Projects & Management Actions GSP Implementation Stakeholder Meeting 	Notice of Proposed GSP Adoption Public Review of Draft GSP Public Hearing to Adopt GSP 
Ongoing Community Outreach 					

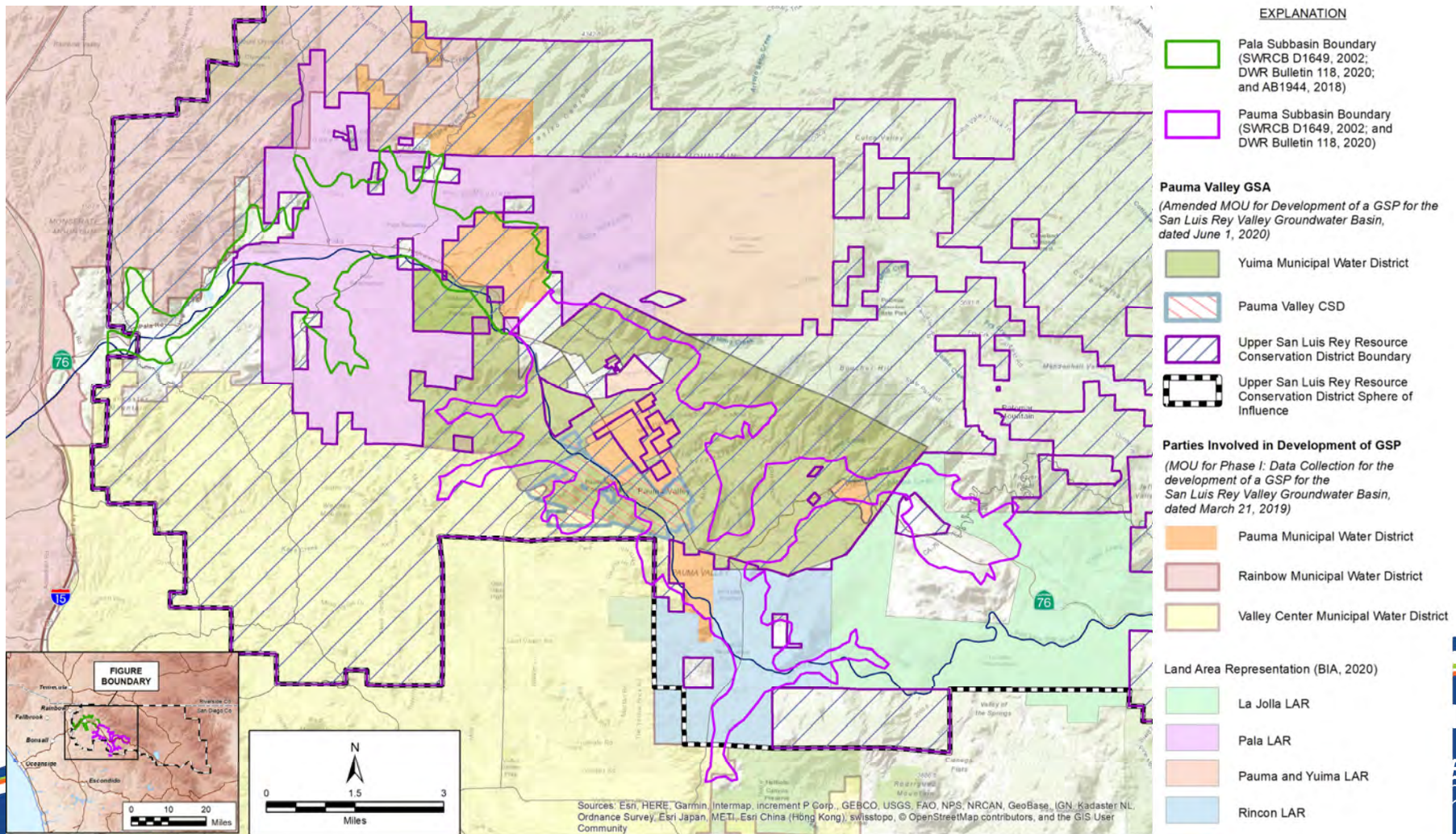
PLAN AREA



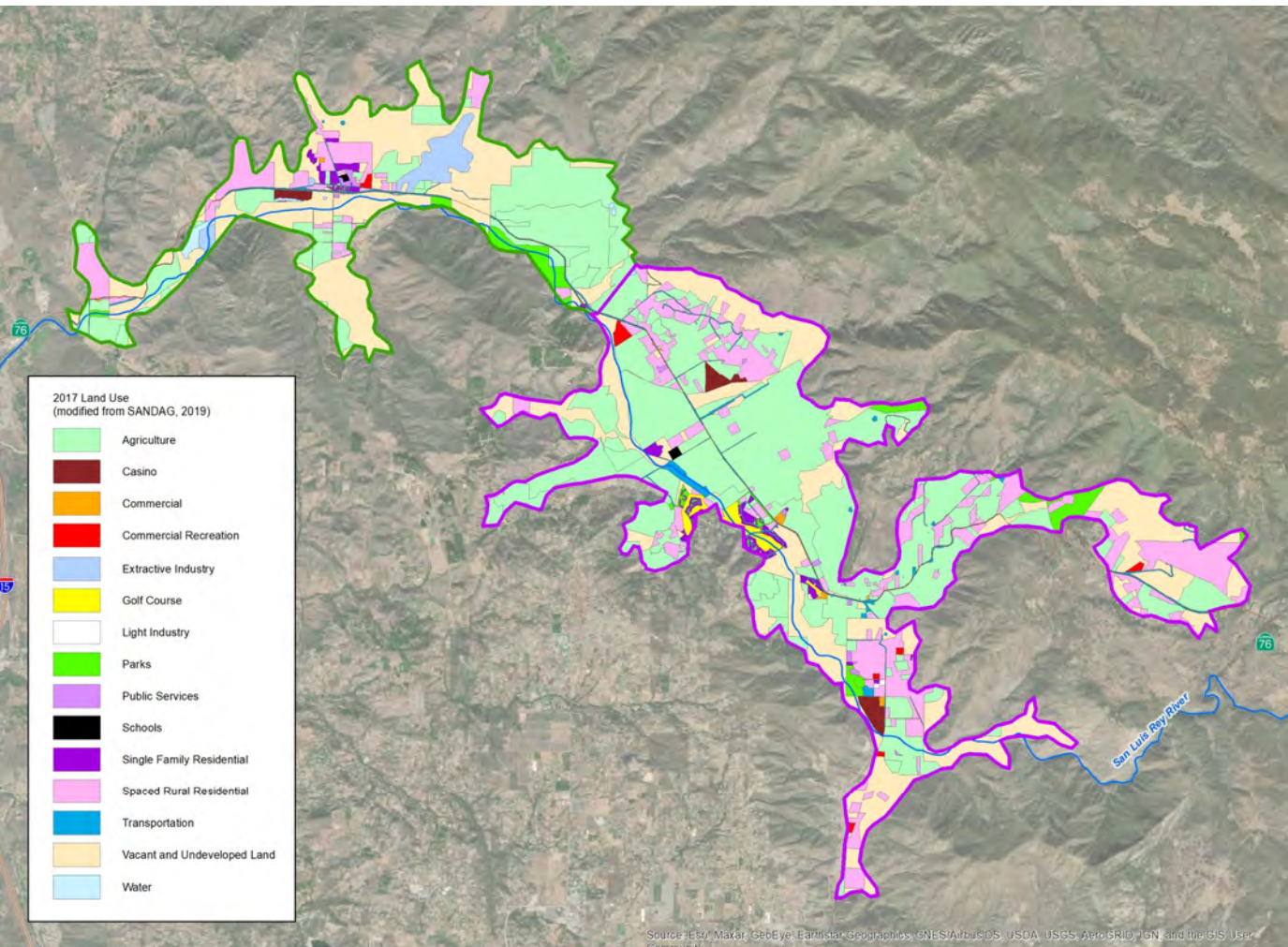
Regional Setting



Upper San Luis Rey Valley Groundwater Basin



Land and Water Use



- **Groundwater**
 - Municipal, private wells
- **Surface Water**
 - Lake Henshaw (Vista Irrigation District)
 - IDA Hegardt Reservoir
 - Surface water diversion rights
- **Imported Water**
 - Metropolitan Water District of Southern California
 - San Diego County Water Authority

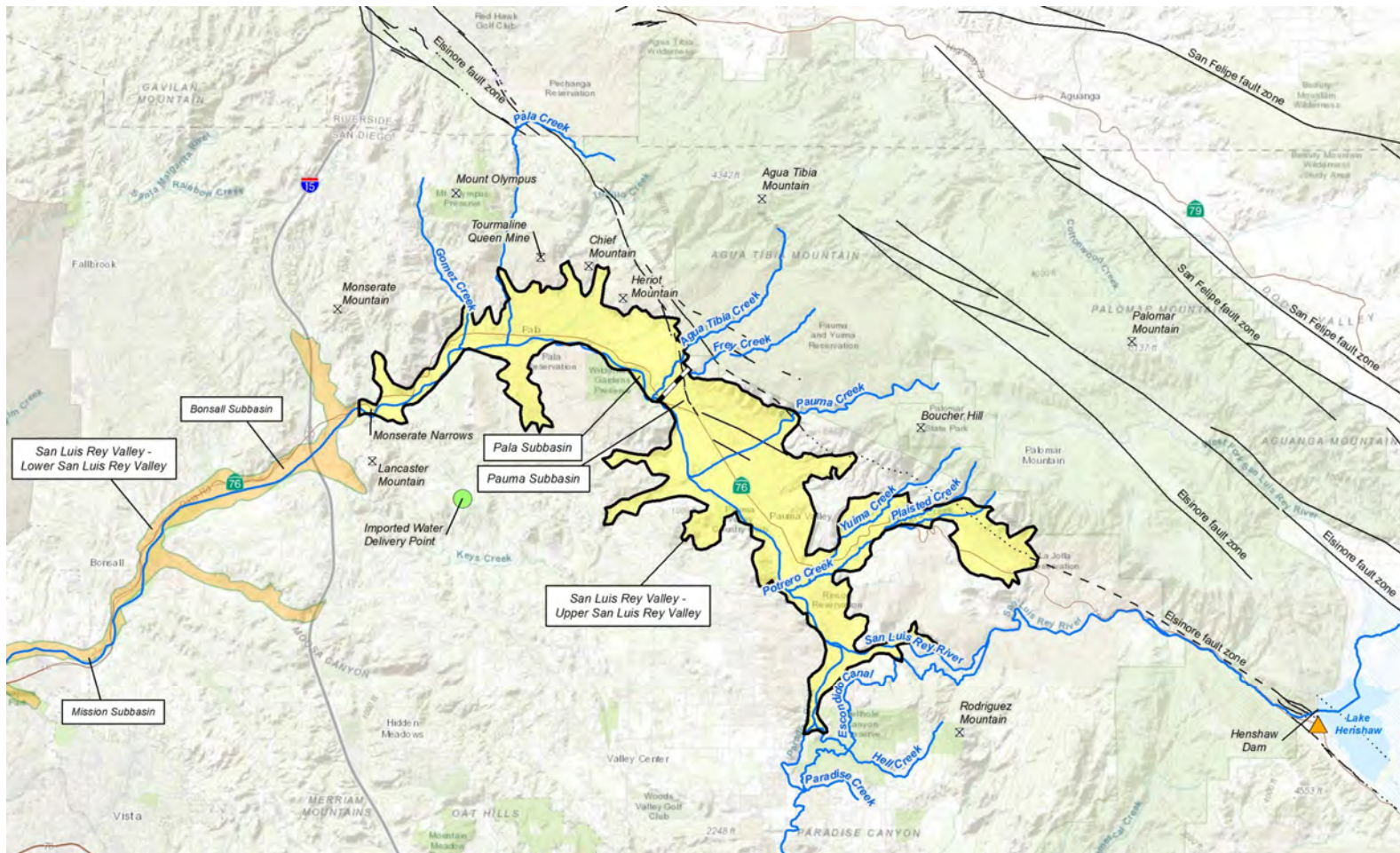
Pauma Valley GSA






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BASIN SETTING

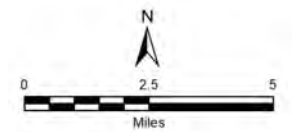


Geographic Setting



-  San Luis Rey Valley Groundwater Basin (DWR Bulletin 118, 2020)
-  Upper San Luis Rey Valley Groundwater Subbasins - Pala and Pauma (AB1944, 2018)
-  Frey Creek (SWRCB D1649, 2002)
-  Imported Water Delivery Point
-  NOAA Precipitation Station Used in Model

- Fault Classification (USGS, 2021)
-  Well Constrained
 -  Moderately Constrained
 -  Inferred



Geology

- **Bedrock**

- Crystalline, limited groundwater

- **Older Alluvium**

- Slightly cemented
- Important source of groundwater

- **Lakebed Deposits**

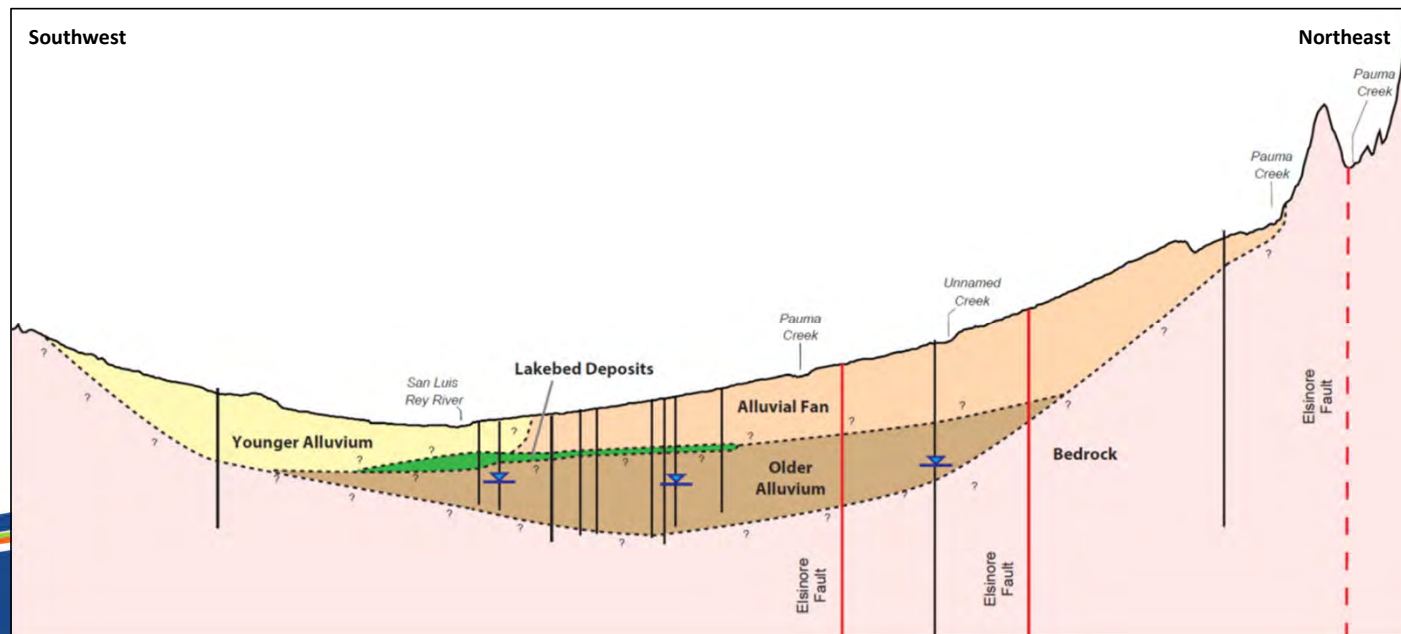
- Localized
- Fine-grained nature can restrict downward movement of groundwater

- **Alluvial Fan Deposits**

- Mixed material, prevalent on western side of basin
- Less groundwater than alluvium

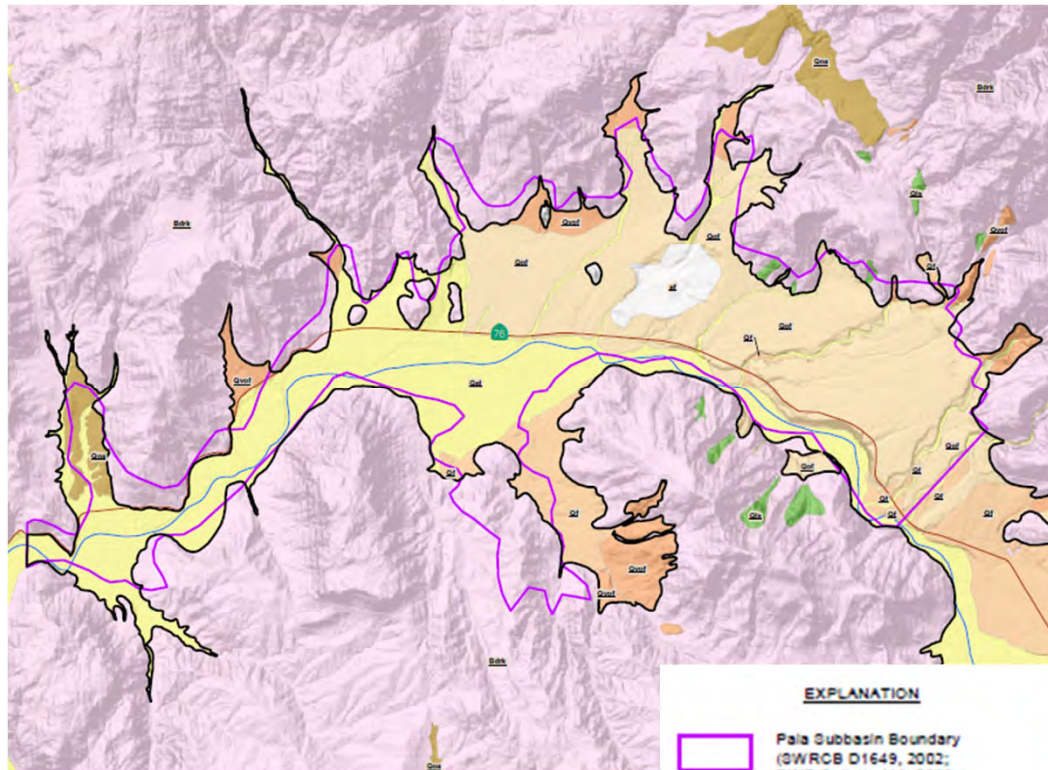
- **Younger Alluvium**

- Recent river deposits





Basin Boundaries

Pala











EXPLANATION

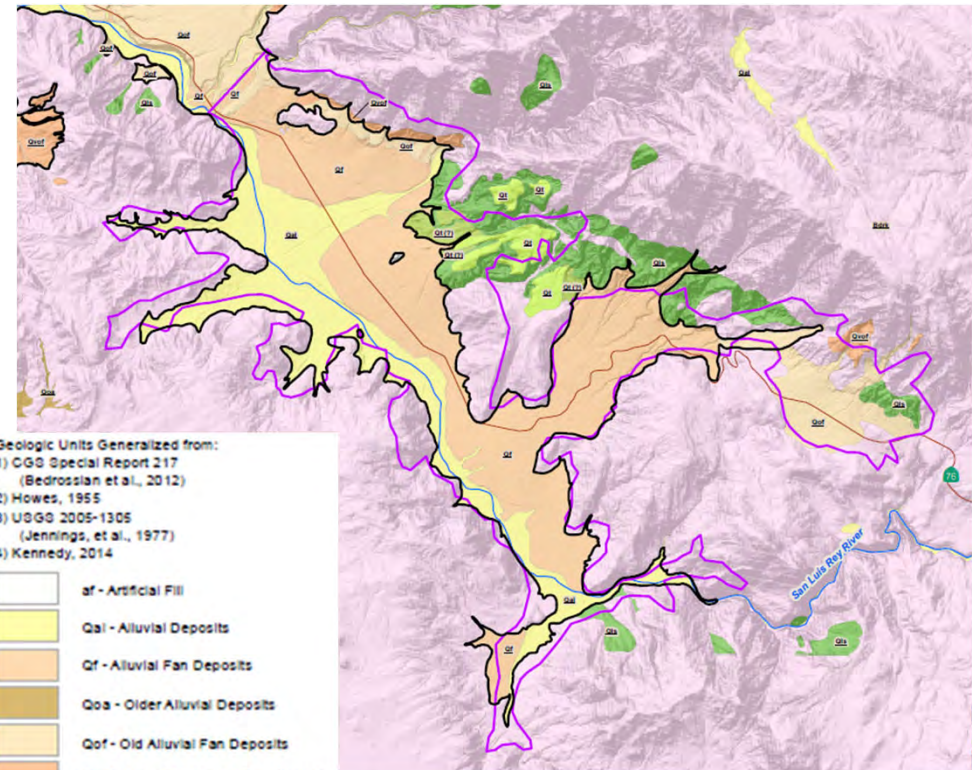
-  Pala Subbasin Boundary (SWRCB D1649, 2002; DWR Bulletin 118, 2020; and AB1944, 2018)
-  Proposed Pauma Subbasin Boundary

Geologic Units Generalized from:

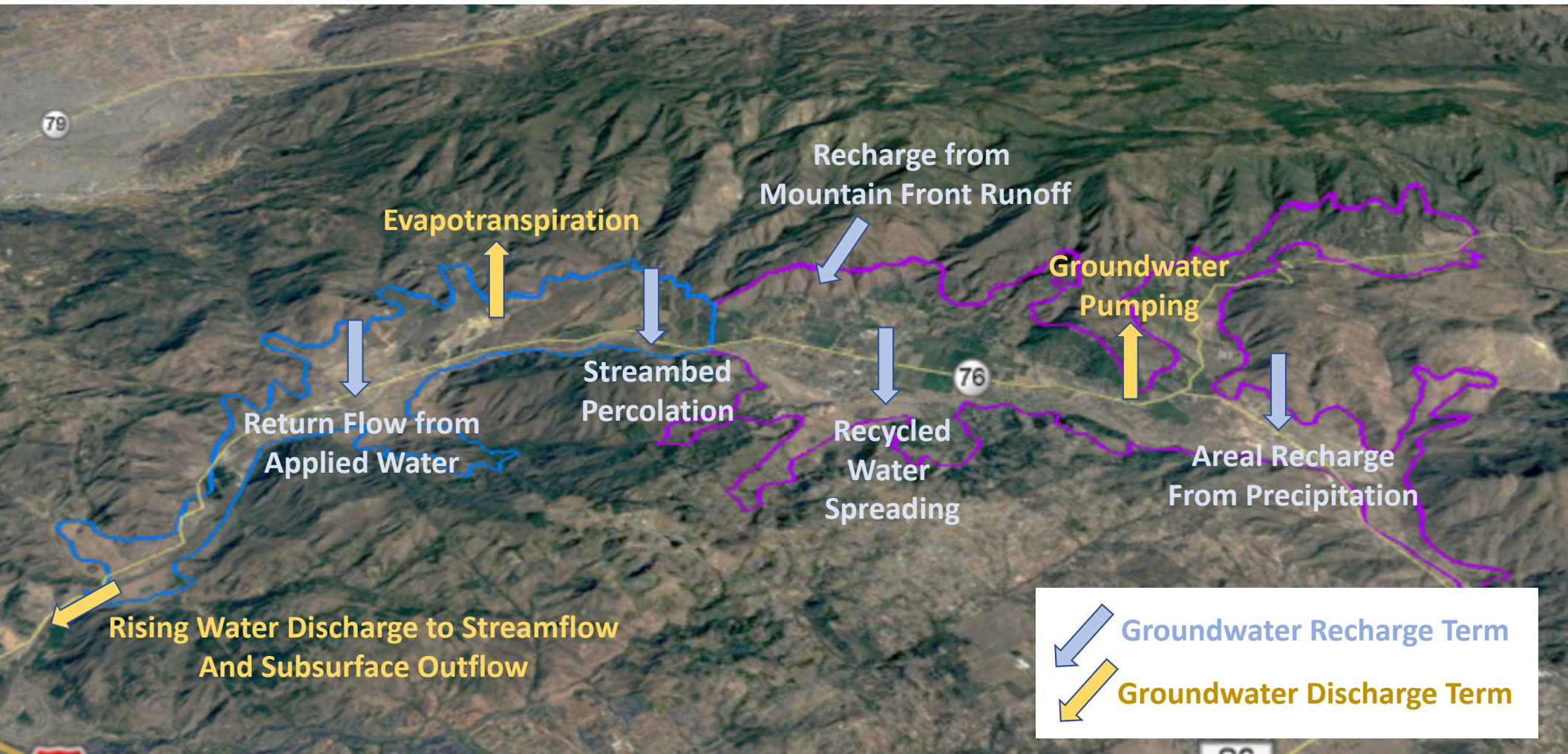
- 1) CGG Special Report 217 (Bedrossian et al., 2012)
- 2) Howes, 1955
- 3) USGG 2005-1305 (Jennings, et al., 1977)
- 4) Kennedy, 2014

-  af - Artificial Fill
-  Qal - Alluvial Deposits
-  Qf - Alluvial Fan Deposits
-  Qoa - Older Alluvial Deposits
-  Qof - Old Alluvial Fan Deposits
-  Qvof - Very Old Alluvial Fan Deposits
-  Qls - Landslide Deposits
-  Bdk - Bedrock (Igneous and Metamorphic)

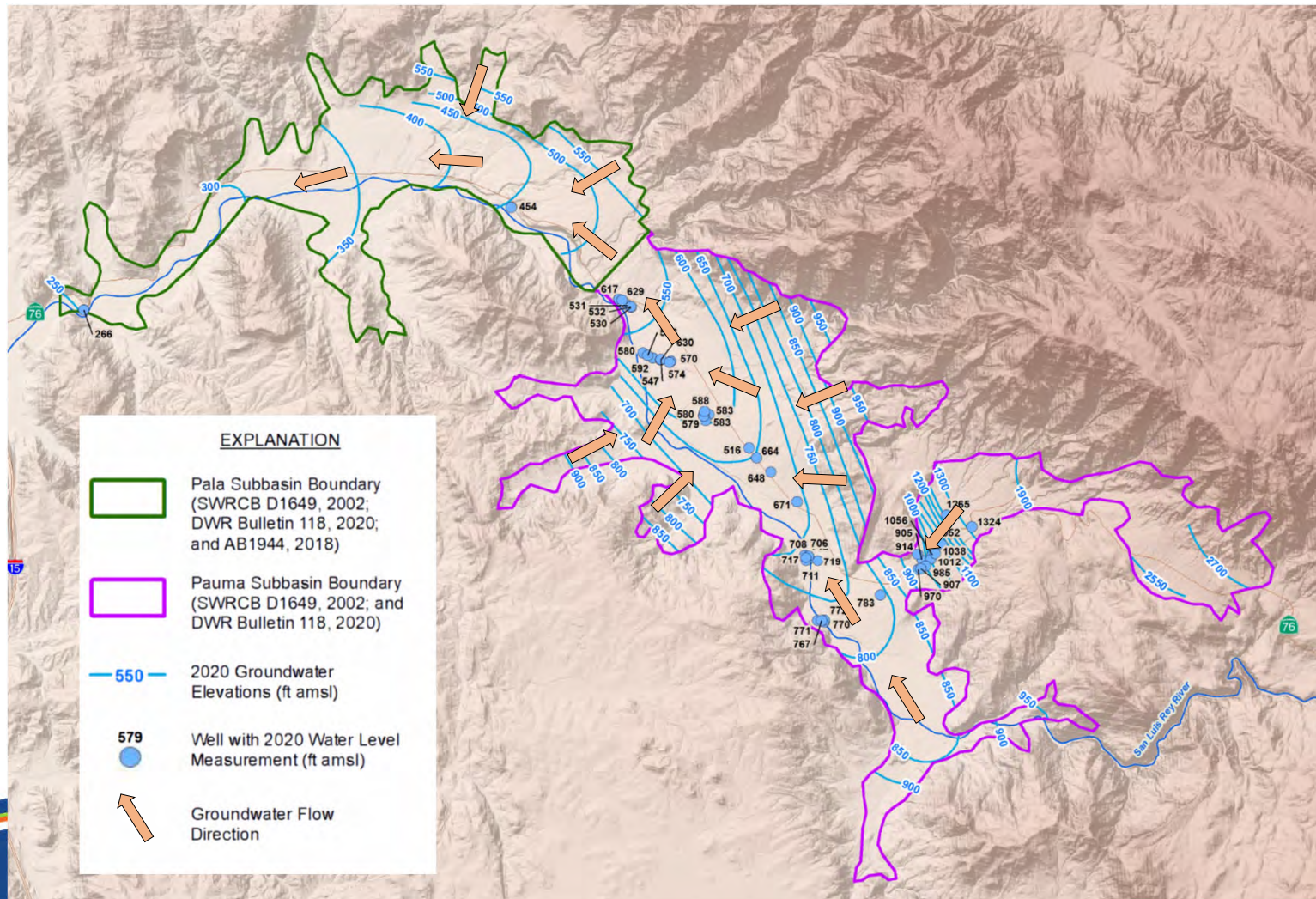
Pauma



Groundwater Recharge and Discharge



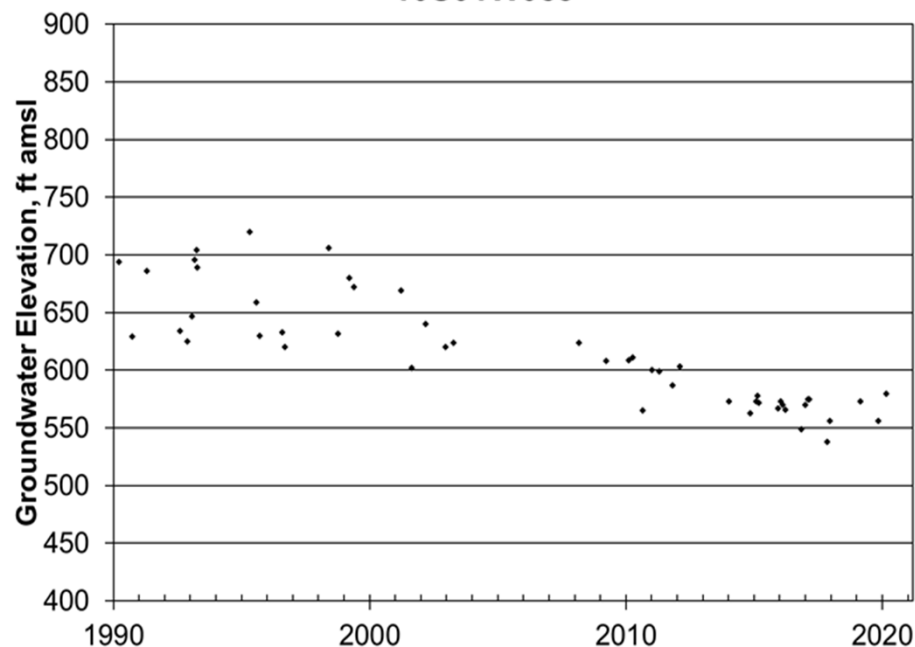
Groundwater Elevations and Flow



Typical Groundwater Hydrographs

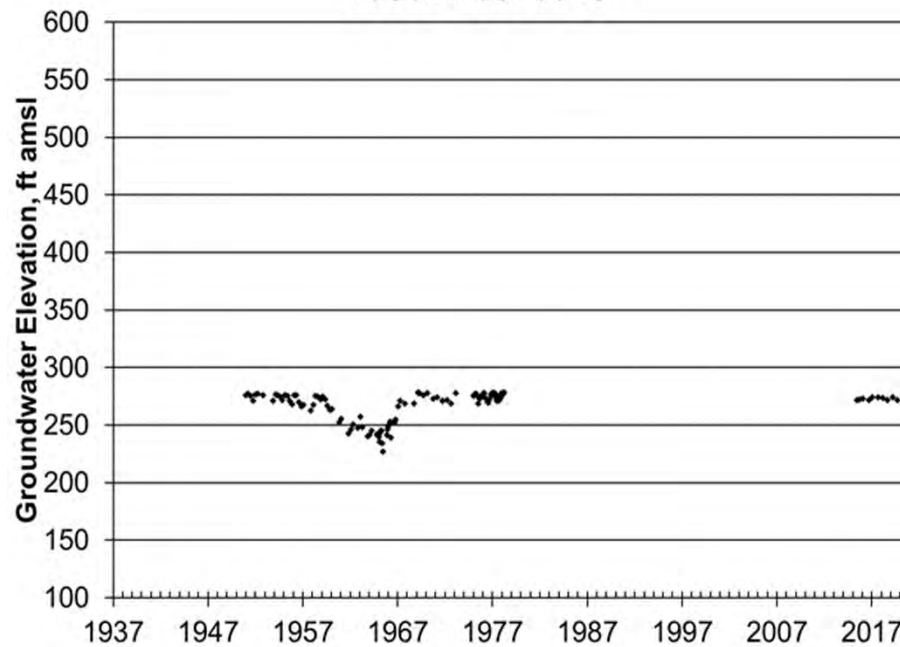
Pauma

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Pala

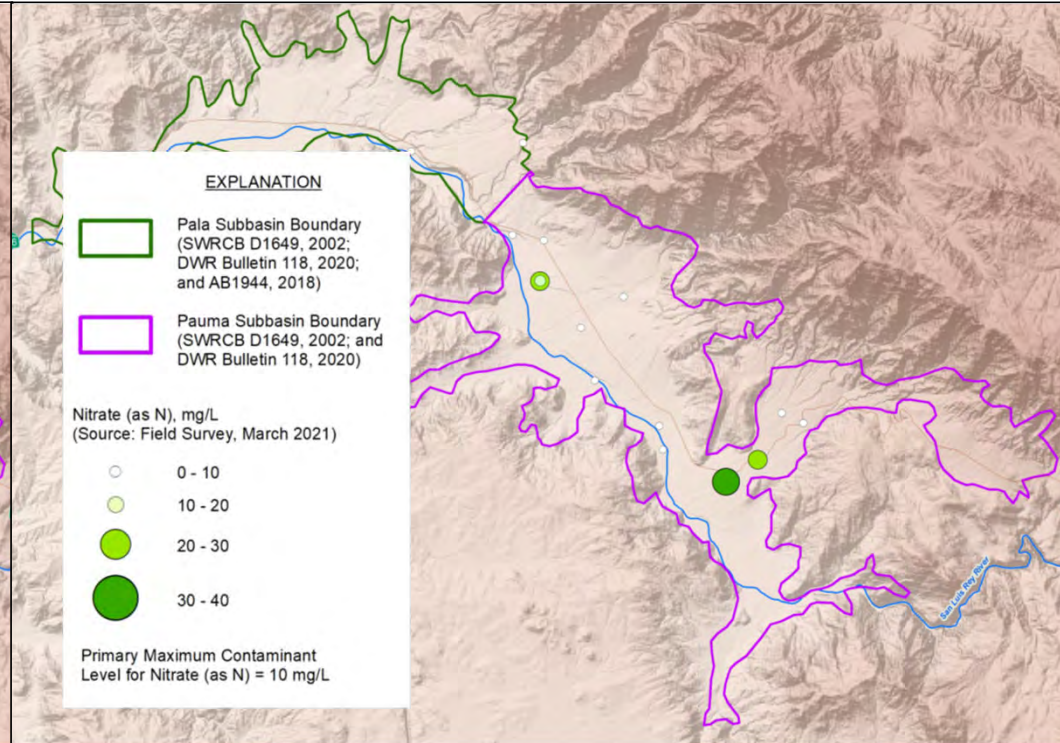
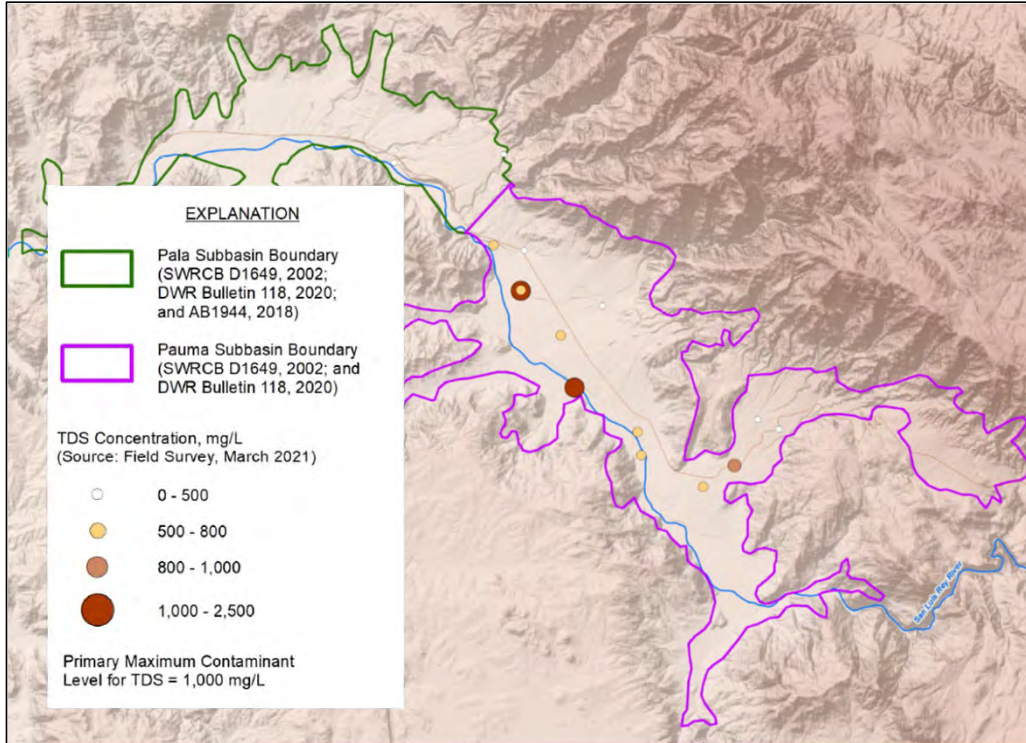
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Groundwater Quality

TDS

Nitrate (as N)



Other Sustainability Criteria

Interconnected Surface Water Systems

- Areas of potentially groundwater dependent vegetation need to be verified through additional field investigation and monitoring.

Seawater Intrusion

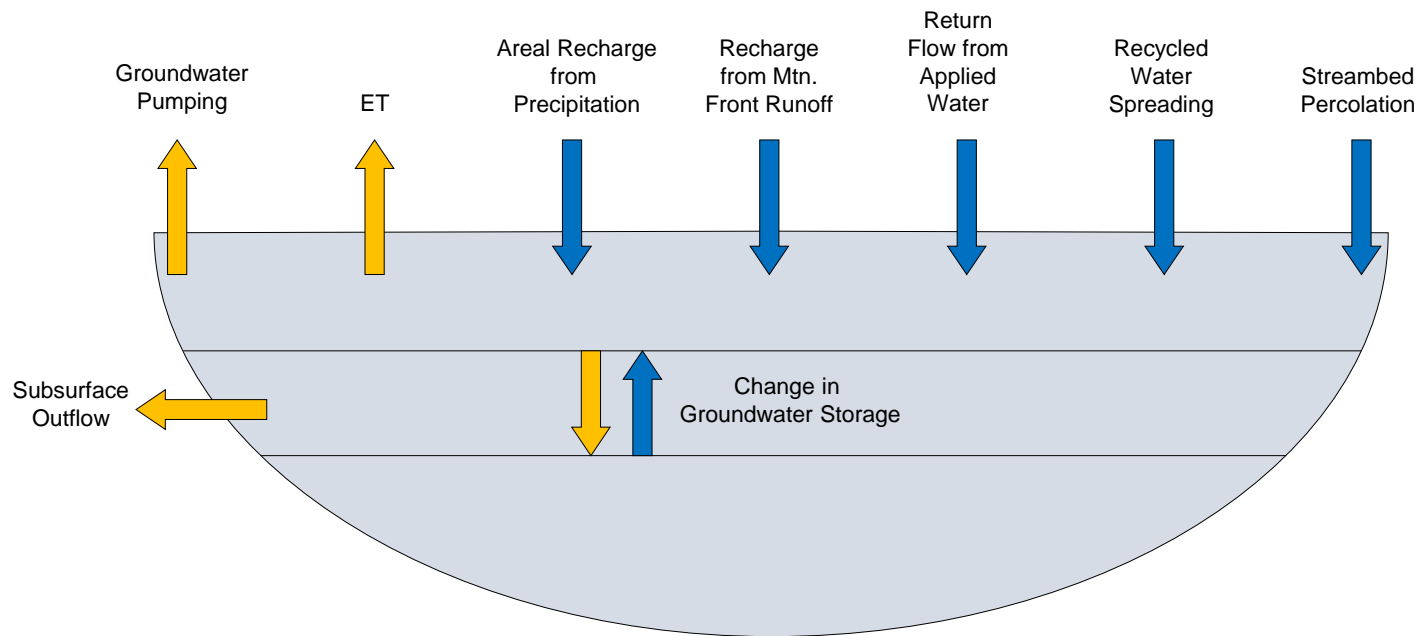
- Far enough away from the coast that possibility not considered a threat.

Land Subsidence

- Lack of thick, fine-grained sediments
- No accounts of historical subsidence
- Subsidence potential considered to be very low risk

Water Budget

$$\text{Inflow} = \text{Outflow} +/\text{- Change in Groundwater Storage}$$



Water Budget (continued)

Historical Period

- 1991 - 2020

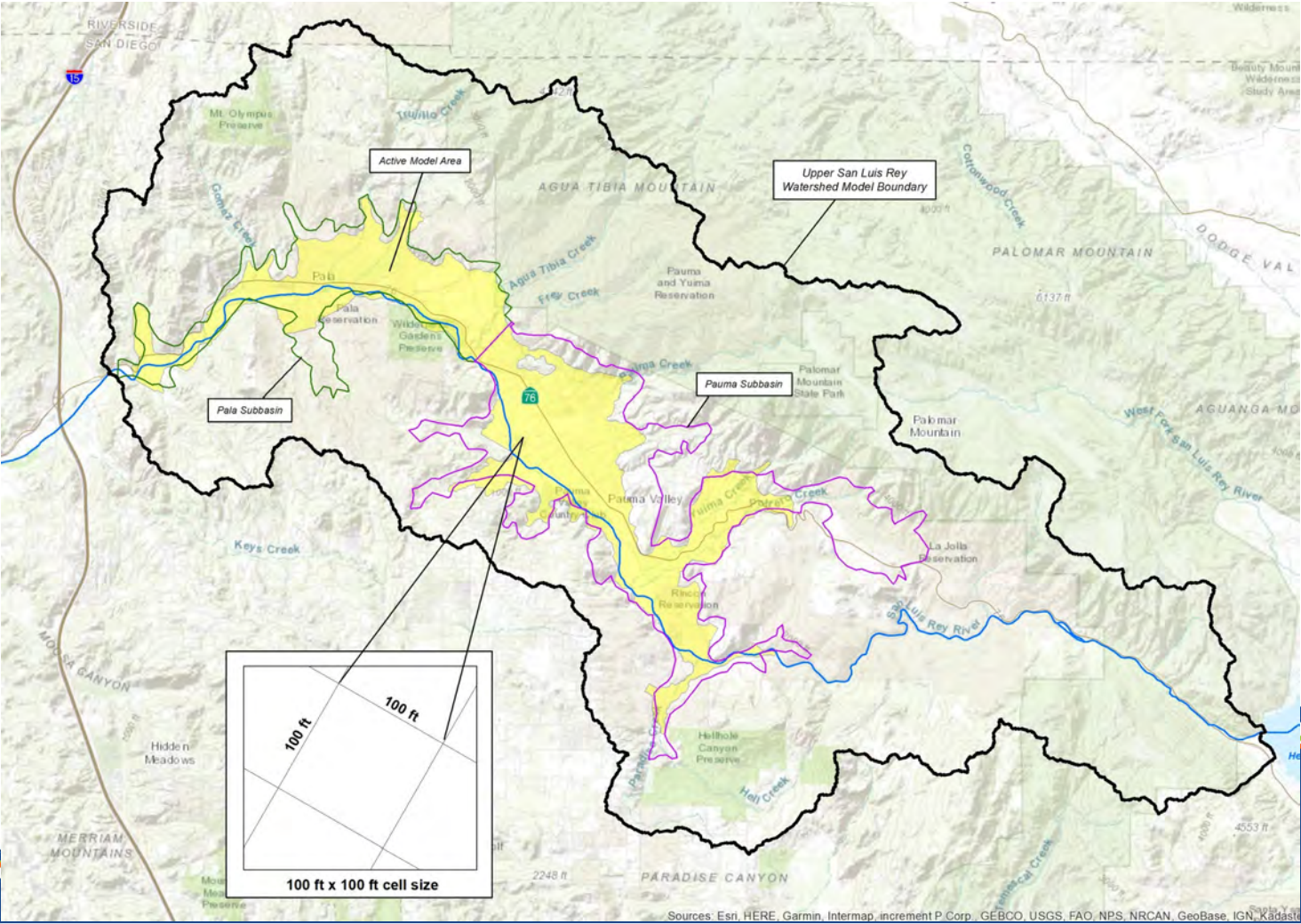
Current

- 2016 - 2020





Future

- 60-year period using hydrology from 1991 – 2020, repeated twice

Upper San Luis Rey Surface Water and Groundwater Model



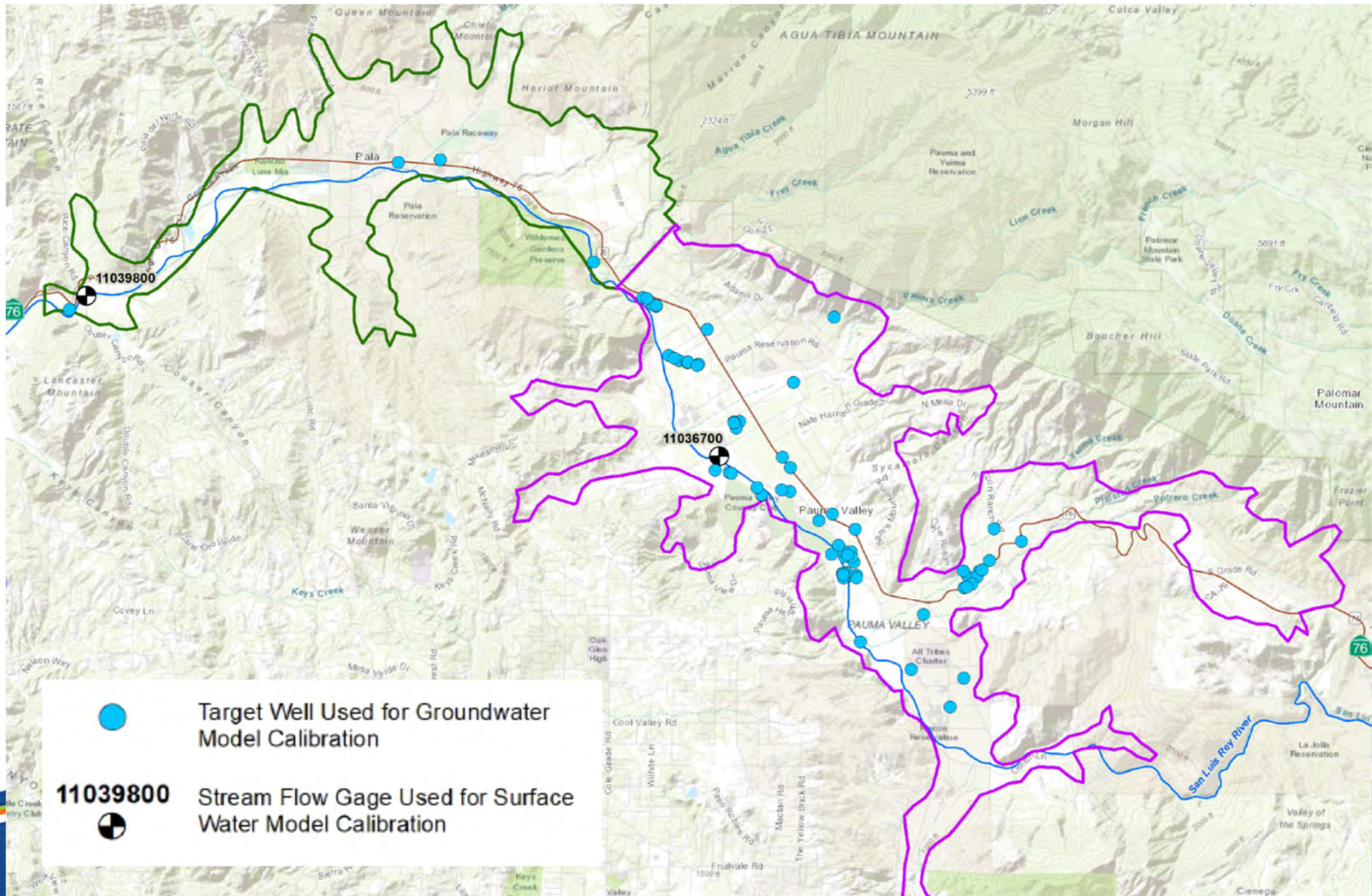
EXPLANATION

-  Upper San Luis Rey Watershed Model Boundary
-  Upper San Luis Rey Groundwater Model (USLRGM) Active Model Area
-  Pala Subbasin Boundary (SWRCB D1649, 2002; DWR Bulletin 118, 2020; and AB1944, 2018)
-  Pauma Subbasin Boundary (SWRCB D1649, 2002; and DWR Bulletin 118, 2020)

Pauma Valley GSA
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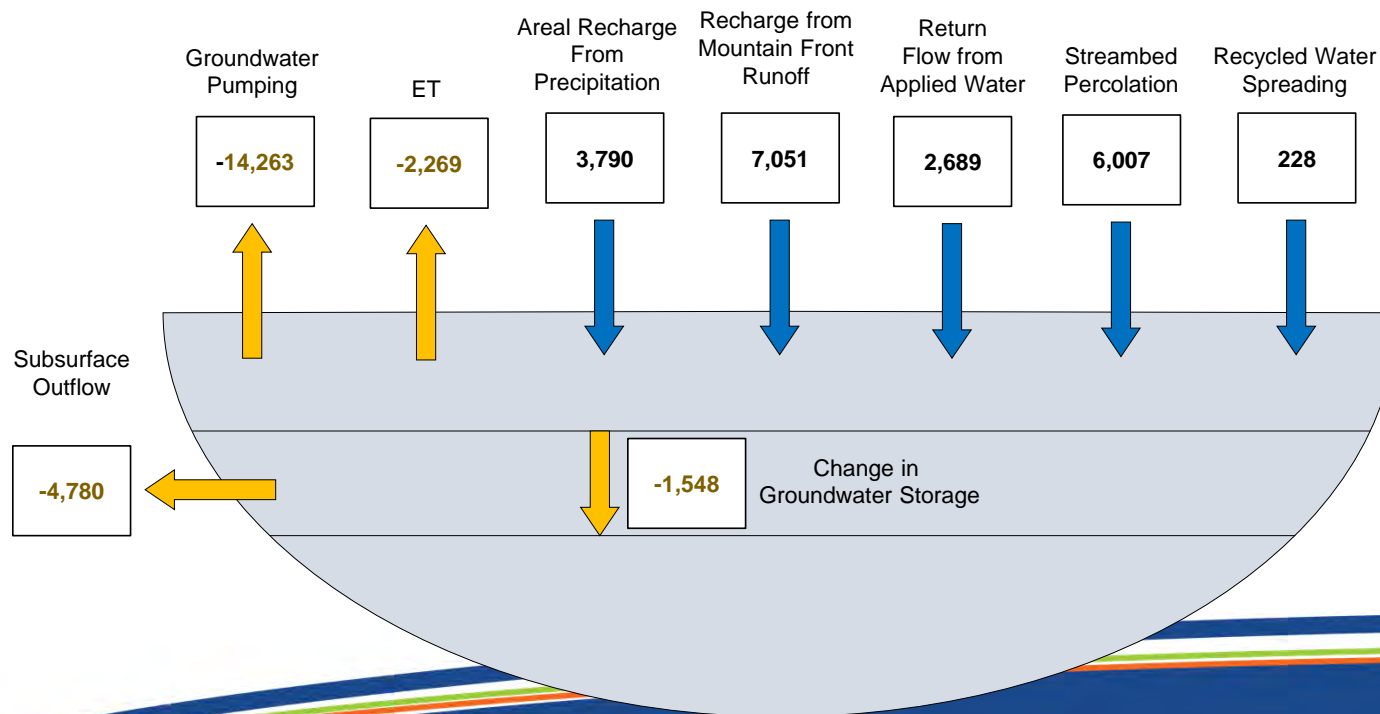
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadast

Model Calibration



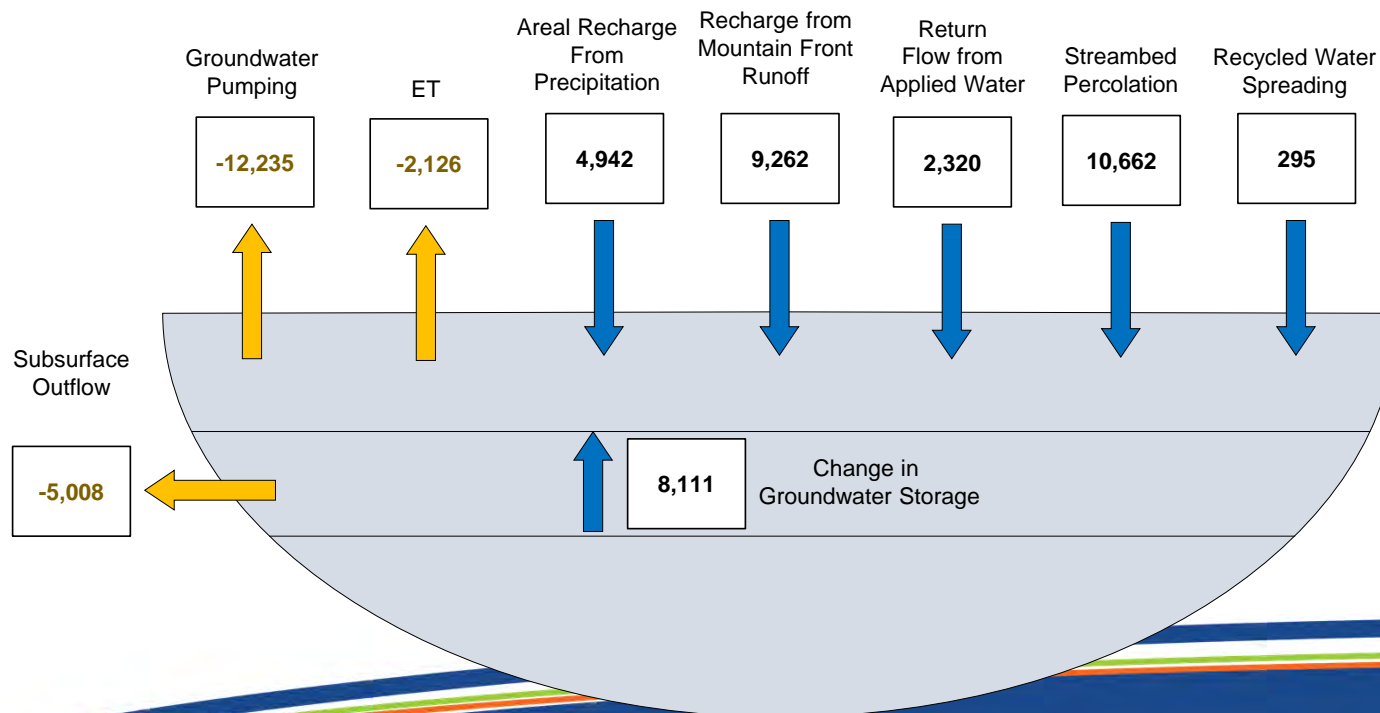
Model-Calculated Water Budget - Historical

1991 - 2020



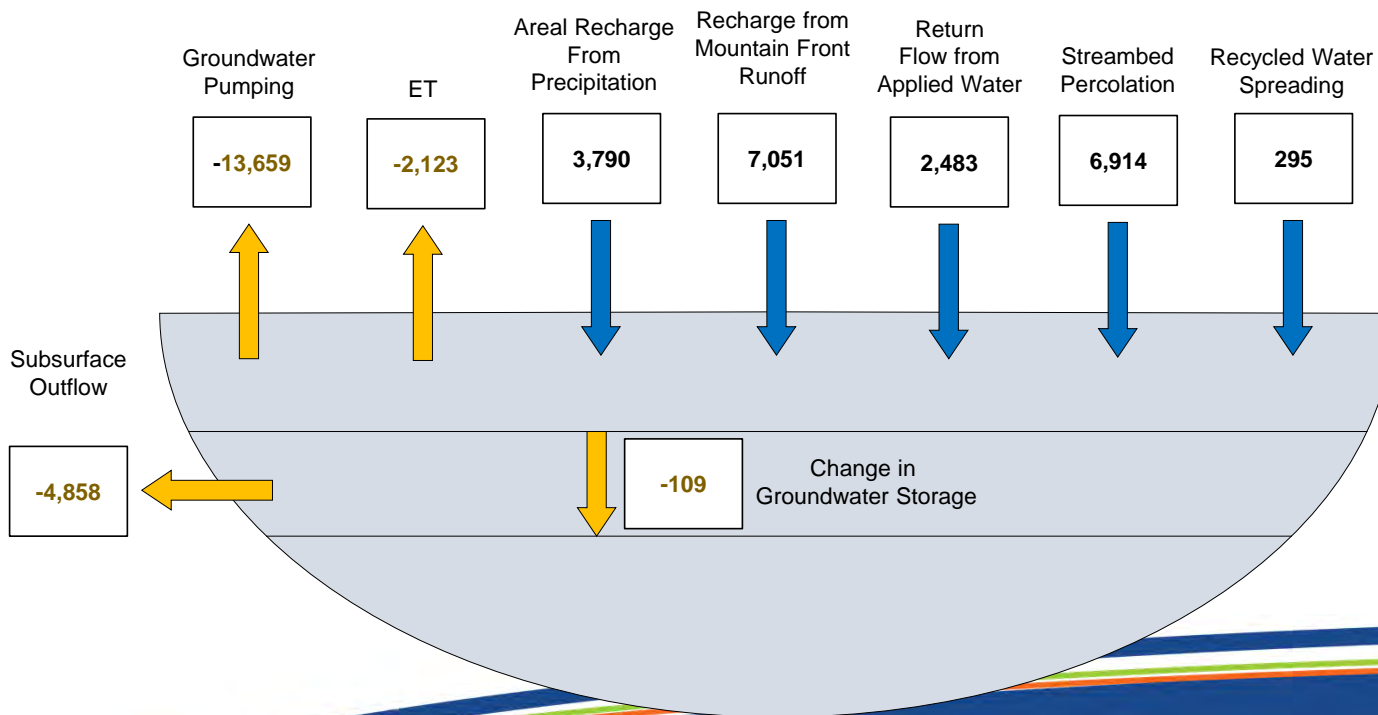
Model-Calculated Water Budget - Current

2016 - 2020



Model-Calculated Water Budget - Future

2022 - 2081



- 60-year period using hydrology from 1991 – 2020, repeated twice
- Current land and water use assumptions

Estimate of Sustainable Yield

- The maximum quantity of water, calculated over a base period representative of long-term conditions in the basin... that can be withdrawn annually from a groundwater supply without causing an undesirable result.

$$\text{Sustainable Yield} = \text{Pumping} \pm \text{Change in Storage}$$

Period	Groundwater Pumping	Change in Storage [acre-ft/yr]	Sustainable Yield
Historical Period (1991 – 2020)	14,300	-1,500	12,700
Current Period (2016-2020)	12,200	8,100	20,300

SUSTAINABLE MANAGEMENT CRITERIA



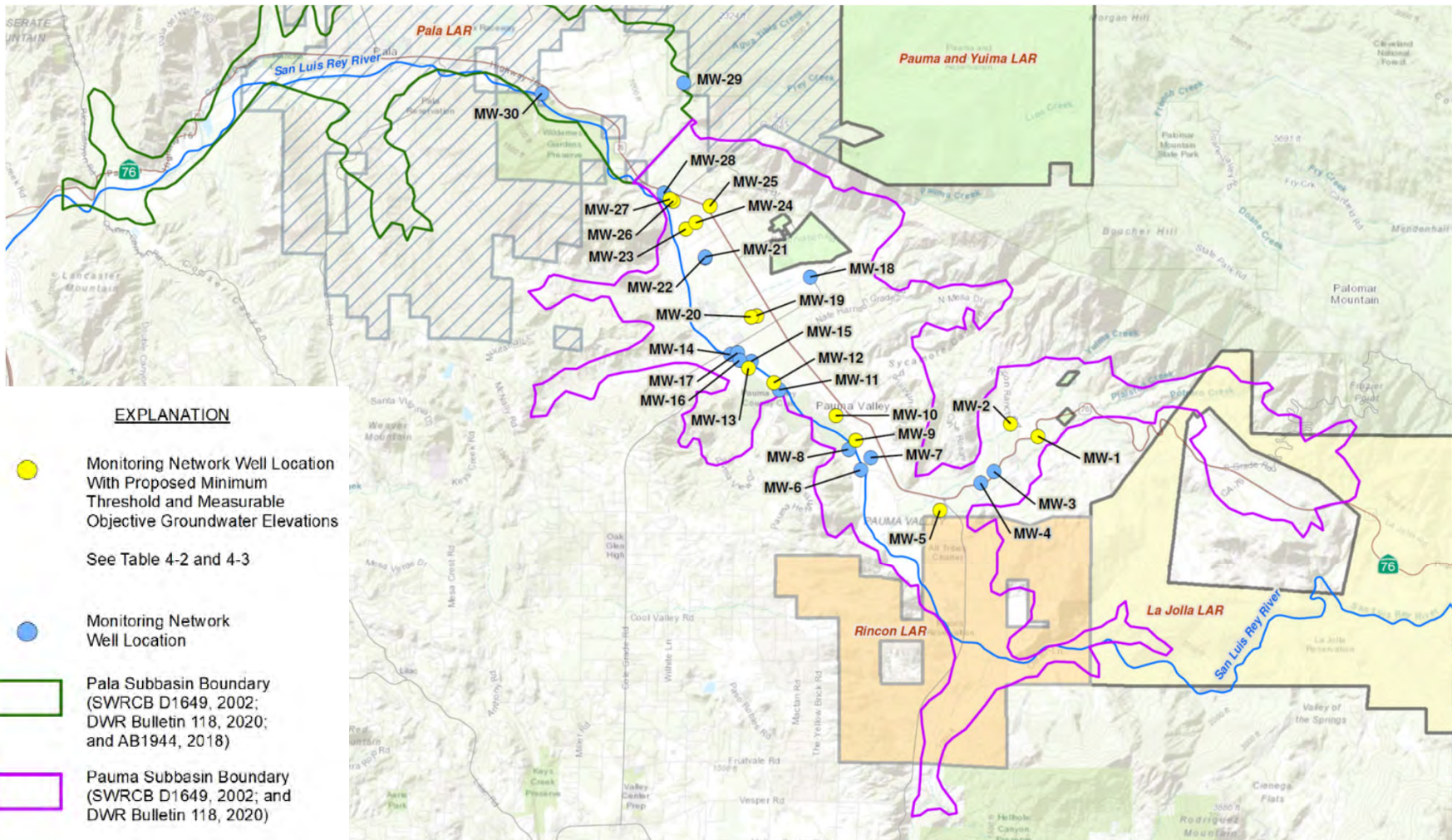
SGMA Terminology

- **Sustainability Goal:** a succinct big-picture statement of the GSA's objectives and desired conditions and how they will be reached.
- **Undesirable Result:** significant and unreasonable conditions for any of the six sustainability indicators.
- **Measurable Objective:** specific, quantifiable goal to track the performance of sustainable management.
- **Minimum Threshold:** numeric value used to define undesirable results for each sustainability indicator.
- **Interim Milestone:** target value representing measurable groundwater conditions, in increments of five years, set by the GSA as part of the GSP.



Sustainability Goal

- **Operate the USLR Subbasin groundwater resource within the sustainable yield.**
- **Implement projects and management actions, as needed, to reduce USLR Subbasin groundwater demands, increase efficient use of current supplies, maximize use of supplemental water supplies, and mitigate undesirable results.**
- **Actively monitor the USLR Subbasin and adaptively manage projects and management actions to ensure the GSP is effective and that undesirable results are avoided.**



Representative Monitoring Sites





Sustainable Management Criteria

Sustainability Indicator	Undesirable Result	Minimum Threshold	Measurable Objective	Interim Milestone
Groundwater Levels 	Groundwater levels at the elevation of current pump settings in representative wells (wells with known construction details and historical water level elevations)	Set at wells by operators as lowest operational level	Elevation representing 3-years of groundwater in storage (approximately 50 ft above MT elevations)	IMs for wells with water levels below the MOs will be determined at 5-year reporting after consistent data collection, refinement of groundwater model, and updated analysis of basin storage to evaluate, if appropriate, the quantity of water needed to reach MO elevations
Groundwater in Storage 	Groundwater in storage when water levels are at the elevation of current pump settings	Groundwater in storage at MTs for groundwater levels	3-years of groundwater in storage (approximately 54,000 acre-ft)	To be determined at 5-year reporting period based on refinement of groundwater model and analysis of basin storage from expanded data collection

Sustainable Management Criteria (continued)

Sustainability Indicator	Undesirable Result	Minimum Threshold	Measurable Objective	Interim Milestone
Interconnected Surface Water/ Groundwater 	Groundwater levels fall below the lowest groundwater level since 2015 in identified areas with potentially dependent vegetation	Lowest groundwater level since 2015 in identified areas with potentially dependent vegetation	Maintain seasonal groundwater levels since 2015 in identified areas with potentially dependent vegetation	Based on model-simulated hydrographs, none may be needed. This will need to be confirmed through additional monitoring
Groundwater Quality 	TDS and Nitrate below Basin Objectives (800 mg/L for TDS, 45 mg/L for Nitrate as NO ₃)	Basin Objectives	TDS and Nitrate as NO ₃ at current ambient concentrations (assumed to be the median of available basin wide concentrations: 607 mg/L for TDS, 25.8 mg/L for Nitrate as NO ₃)	Current TDS and Nitrate concentrations are at the measurable objectives

Sustainable Management Criteria (continued)

Sustainability Indicator	Undesirable Result	Minimum Threshold	Measurable Objective	Interim Milestone
Subsidence 	Not applicable	Not applicable	Not applicable	Evidence of or potential for land subsidence will be reevaluated in the 5-year report
Seawater Intrusion 	Not applicable	Not applicable	Not applicable	The absence of seawater intrusion will be verified in the 5-year report

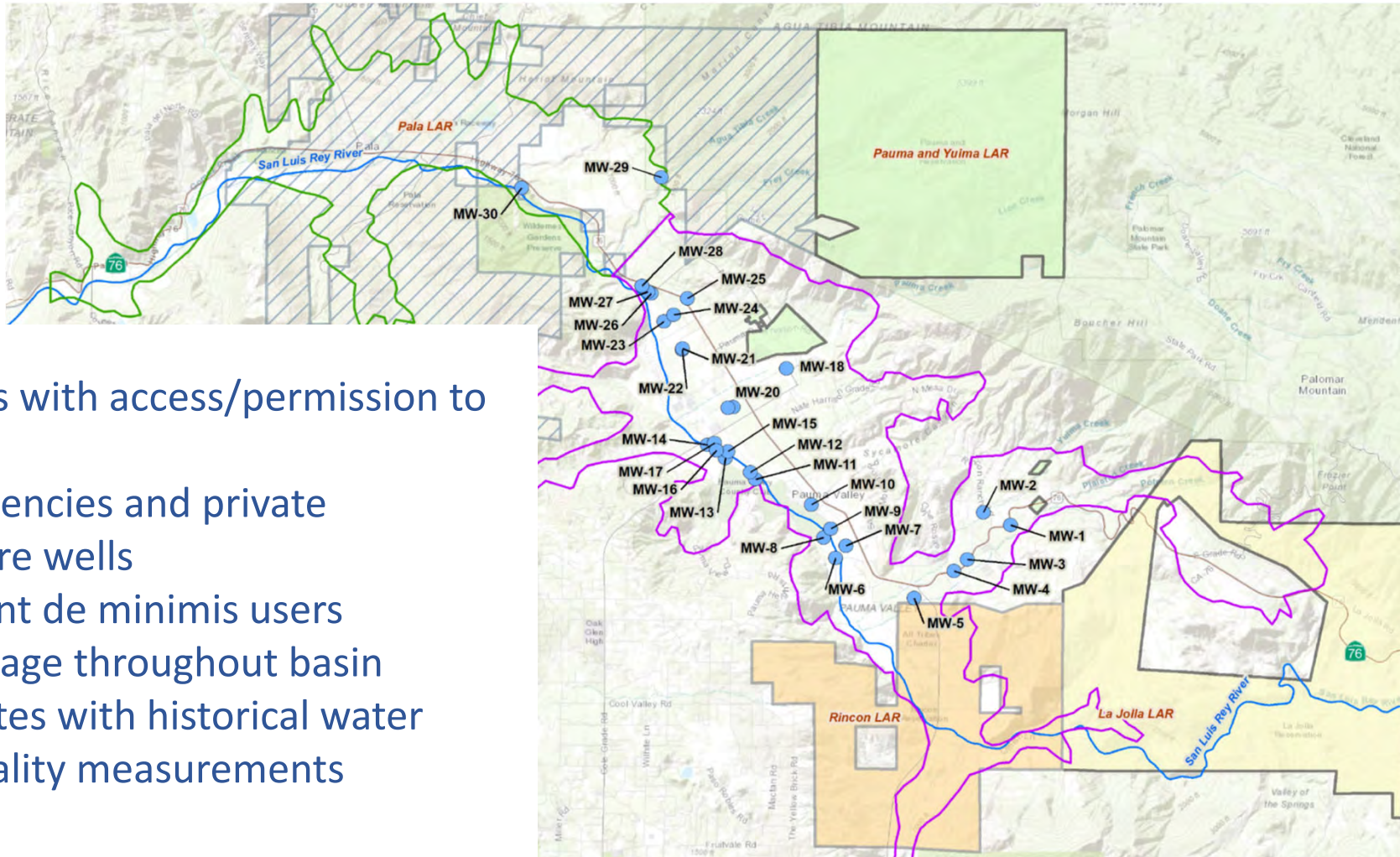
MONITORING NETWORK



Purpose of Monitoring Network

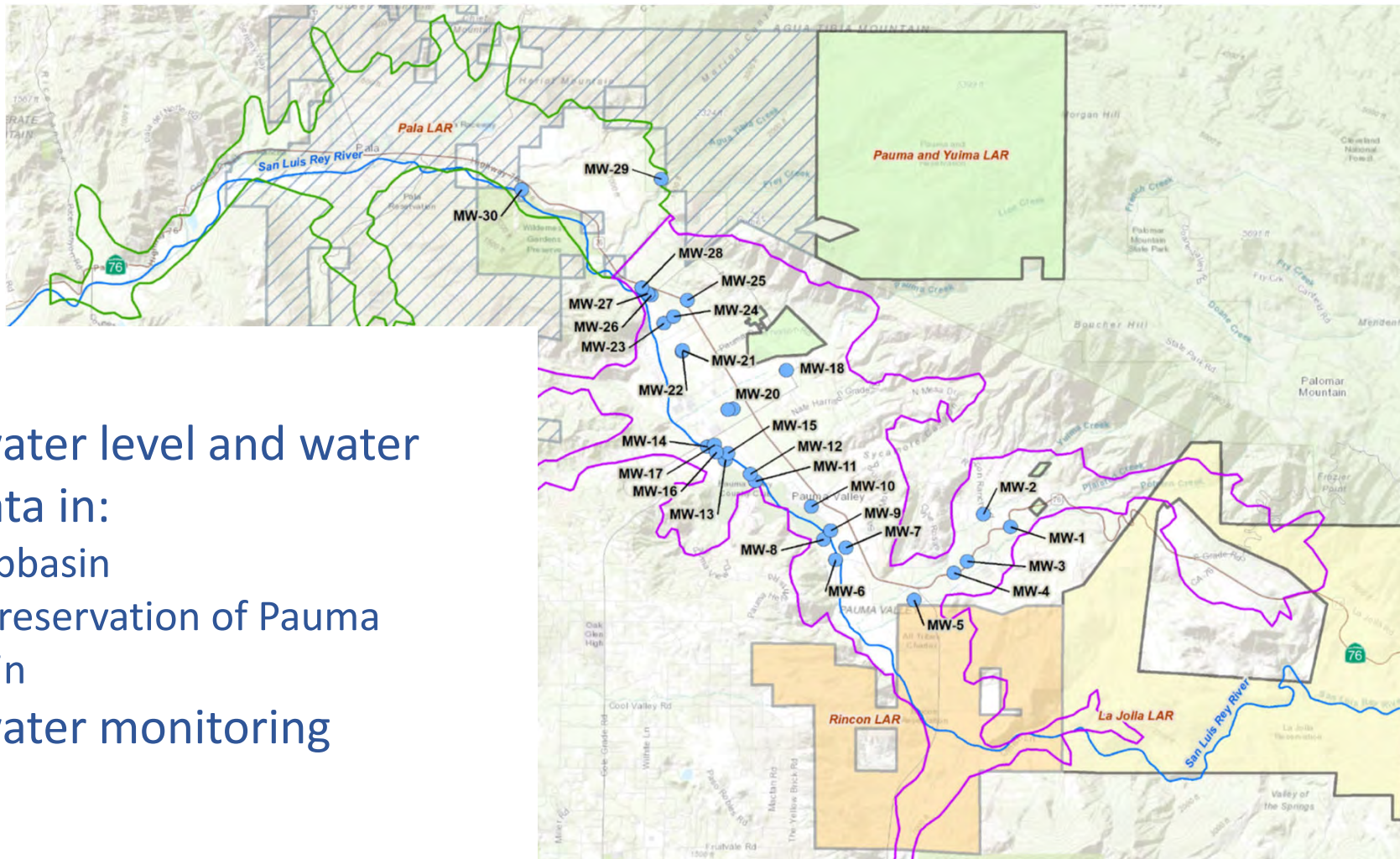
- Provide data to establish ambient conditions
- Characterize short-term, seasonal, and long-term trends
- Quantify changes in water budget terms
- Provide representative data to evaluate sustainability indicators/objectives
- Demonstrate progress toward achieving measurable objectives

Monitoring Sites



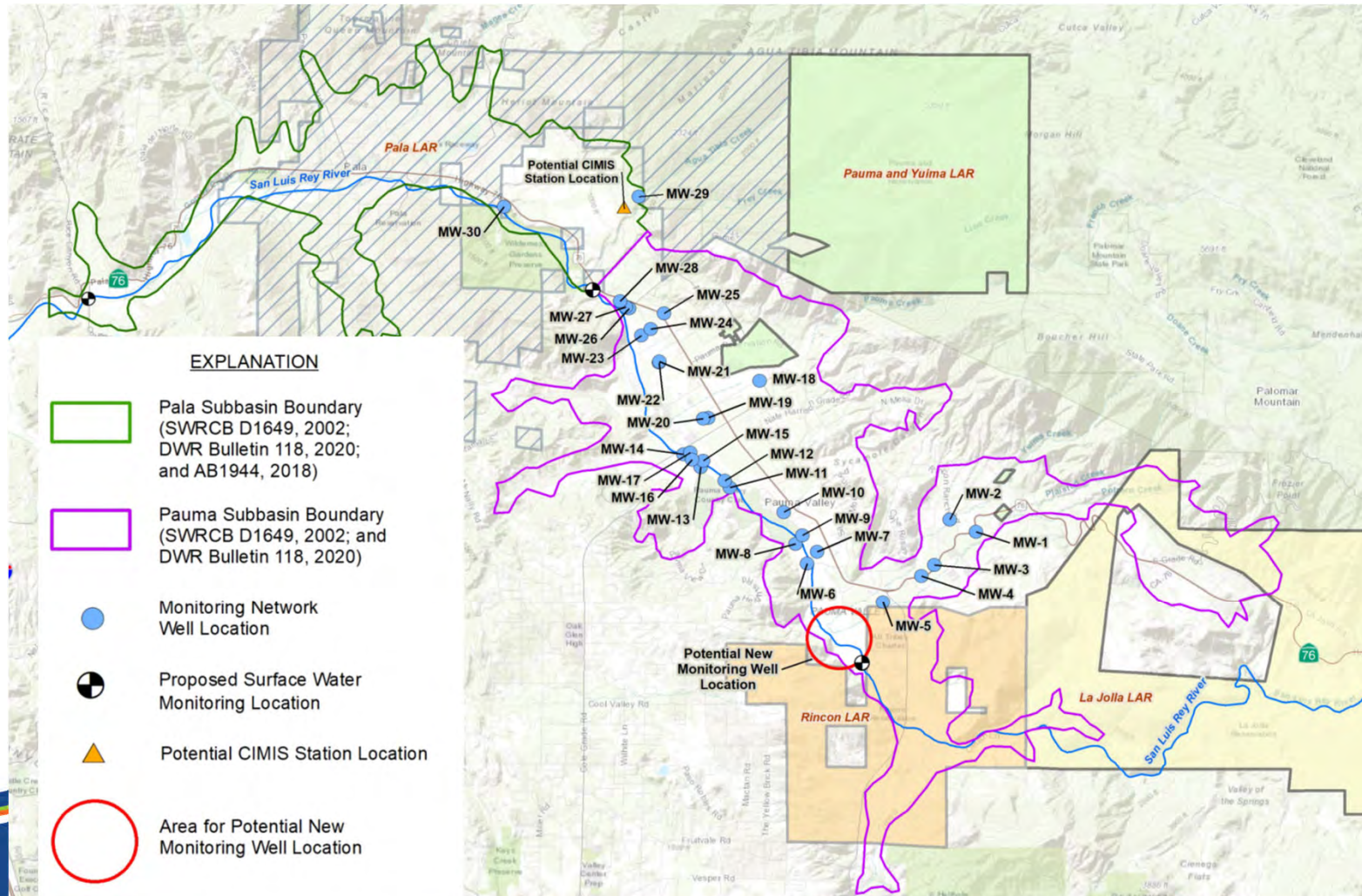
- Existing wells with access/permission to sample
 - Water agencies and private agriculture wells
 - No current de minimis users
- Spatial coverage throughout basin
- Prioritized sites with historical water level and quality measurements

Data Gaps



- Limited water level and water quality data in:
 - Pala Subbasin
 - Rincon reservation of Pauma Subbasin
- Surface water monitoring

Recommendations



PROJECTS AND MANAGEMENT ACTIONS



Current Management Actions

- Agricultural Management Plan and Best Management Practices (BMPs)
- Drought Response Conservation Program
- Groundwater Level and Water Quality Monitoring
 - Planned collection of additional data, including voluntary collection of pumping records

Potential Future Management Actions/Projects

- Tiered Implementation of Proposed Projects

Tier 1

Begin process of implementing/feasibility study within 5 years after GSP adoption

Tier 2

Begin process of implementing/feasibility study as needed to avoid undesirable results

Tier 3

Only if undesirable results cannot be mitigated with Tier 1 or 2 projects

Tier 4

As last resort to address undesirable results

Potential Tier 1 Projects/Management Actions

- Convening an Interactive Tribal Work Group
- Convening a Drought Resilience Work Group
- Adaptive Groundwater Management
- Ongoing Water Level and Water Quality Monitoring
- Agricultural Management Plan and BMPs
- Install Local CIMIS Station
- Water Conservation Activities
 - *Community Outreach, Irrigation Efficiency and BMPs*
- Outreach to San Diego County for GSA Collaboration
- Pumping Record Collection
- Well Registration and Meter Installation

PLAN IMPLEMENTATION



GSP Implementation Schedule

GSP Implementation Activities	Fiscal Year				
	2021	2022	2023	2024	2025
GSP Adoption	X				
GSP Submittal to DWR		X			
JPA Administration and Operations					
Convene Interactive Tribal Work Group		X	X	X	X
Convene Drought Resilience Work Group		X	X	X	X
Adaptive Groundwater Management		X	X	X	X
Groundwater Monitoring and Data Collection	X	X	X	X	X
Potential Management Actions					
Address Data Gaps		X	X	X	X
Outreach to San Diego County to Layout a Framework for GSA Collaboration		X	X	X	X
Outreach and Education for Agricultural Best Management Practices		X	X	X	X
Water Use Efficiency and Conservation Programs	X	X	X	X	X
Well Registration and Meter Installation Program			X	X	X

Estimated Costs

GSP Implementation Activities	Implementation Tier	Relevant Measurable Objective Benefit				Estimated Implementation Cost	Cost Unit	Estimated Costs During Startup (2020-2025)
		Groundwater Levels	Groundwater Storage	Water Quality	Groundwater Dependent Ecosystem			
Administration and Finance								
Administration Development	1	N/A	N/A	N/A	N/A	\$53,430	\$102.75/hr	\$267,150
Ongoing GSP Implementation Administration and Legal Support	1	N/A	N/A	N/A	N/A	\$25,000	Annual	\$125,000
Potential Management Actions								
Convene an Interactive Tribal Work Group	1	X	X	N/A	X	\$5,000	Annual	\$25,000
Convene a Drought Resilience Work Group	1	X	X	N/A	N/A	\$5,000	Annual	\$25,000
Address Data Gaps								
<i>Expand Monitoring Well Network- Drill Monitoring Only Well</i>	1	X	X	X	X	\$450,000	Lump Sum	\$450,000
<i>Install surface flow gauge in river</i>	1	X	X	N/A	X	\$17,000	First 2 years	\$34,000
<i>Field validation of aquifer properties (aquifer testing,</i>	1	X	X	X	X	\$100,000	First 2 years	\$200,000
Ongoing Groundwater Level and Water Quality Monitoring	1	X	X	X	X	\$100,000	Annual	\$500,000
Outreach to San Diego County to layout a framework for GSA collaboration	1	X	X	X	X	\$5,000	Lump Sum	\$5,000
Agricultural management plan and best management practices	1	X	X	X	X	\$50,000	Lump Sum	\$50,000
Water Use Efficiency and Conservation Programs	1	X	X	X	X	\$10,000	Annual	\$50,000
Well Registration and Meter Installation Program	2	X	X	X	X	\$150,000	First 2 years	\$300,000
Potential Projects								
Additional water conservation activities (rebate programs, rainwater capture, crop swap programs, leak detection assessments, etc.)	2	X	X	N/A	N/A	\$200,000	Annual	\$1,000,000
In-Lieu recharge through increased surface water delivery	3	X	X	X	N/A	\$5,000,000	Lump Sum	\$5,000,000
Indirect recharge through decreased evapotranspiration (e.g., removal of invasive species)	3	X	X	X	X	\$250,000	Lump Sum	\$250,000

Total Estimated Costs during Startup (2020-2025) \$8,281,150
Average Annual Estimated Costs during Startup (2020-2025) \$1,656,230



Implementation Costs and Funding

- **GSA developing a Joint Power Authority (JPA)**
 - Will go into place within one to two months following GSP submittal
 - JPA member agencies will cover initial costs
 - A permanent source of funding will be developed following GSP implementation

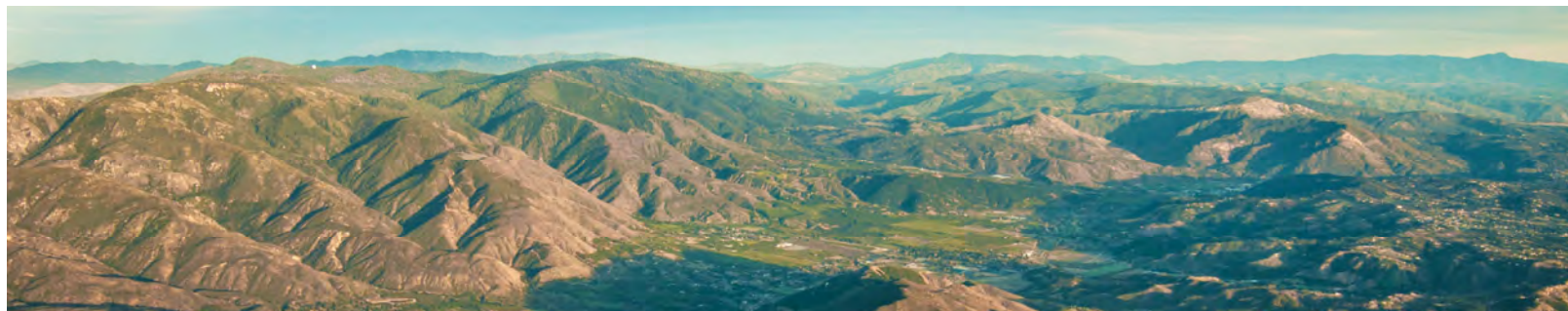
Reporting

- **Annual Reporting**
 - Groundwater elevation, pumping, recharge, water use data
 - Progress towards implementing Plan, achieving interim milestones, and implementation of any projects/management actions
- **5-Year Reporting**
 - Sustainability evaluation
 - Plan implementation progress
 - Reconsideration of GSP elements
 - Monitoring network
 - New information
 - Plan amendments

Upcoming Dates

Date	Event
January 7, 2022	Comments on Draft GSP Due
January 24, 2022	Public hearing for GSP Adoption
January 31, 2022	GSP due to DWR

Submit formal comments to: gsa@yuimamwd.com



Questions

Please feel free to contact us!

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Pauma Valley GSA

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