

Agenda

Upper San Luis Rey Groundwater Subbasin G.S.A
Executive Team - Stakeholder Outreach
Wednesday, October 6, 2021 4:00 P.M.
34928 Valley Center Road, Pauma Valley, California

This meeting will be held via Zoom.

[Join Zoom Meeting](#)

<https://us02web.zoom.us/j/7607423704?pwd=dnZsVU1TM0twc1hmam9aRkxobFUvdz09> Meeting

ID: 760 742 3704 Passcode: 022104

AGENDA TOPICS

1. **Call to Order**

2. **Stakeholder Outreach Presentation**
 - A. Sustainability Goals

The full draft Chapter can be found at the following link

<https://geoscience.syncedtool.com/shares/file/2soPINPfy1Y/>

 - B. Question & Answer

3. **Adjournment**



*Groundwater Sustainability Plan
Upper San Luis Rey Groundwater Subbasin*

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The First Name in Groundwater

*Stakeholder
Workshop
Sustainability
Management Criteria
October 6, 2021*

Sustainable Management Criteria Chapter







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))

Goal

- Develop sustainability goals based on findings from the Basin Setting chapter and desired basin operations. This includes the establishment of Undesirable Results, Measurable Objectives (or sustainability indicators), and Minimum Thresholds.

Sustainability Goals

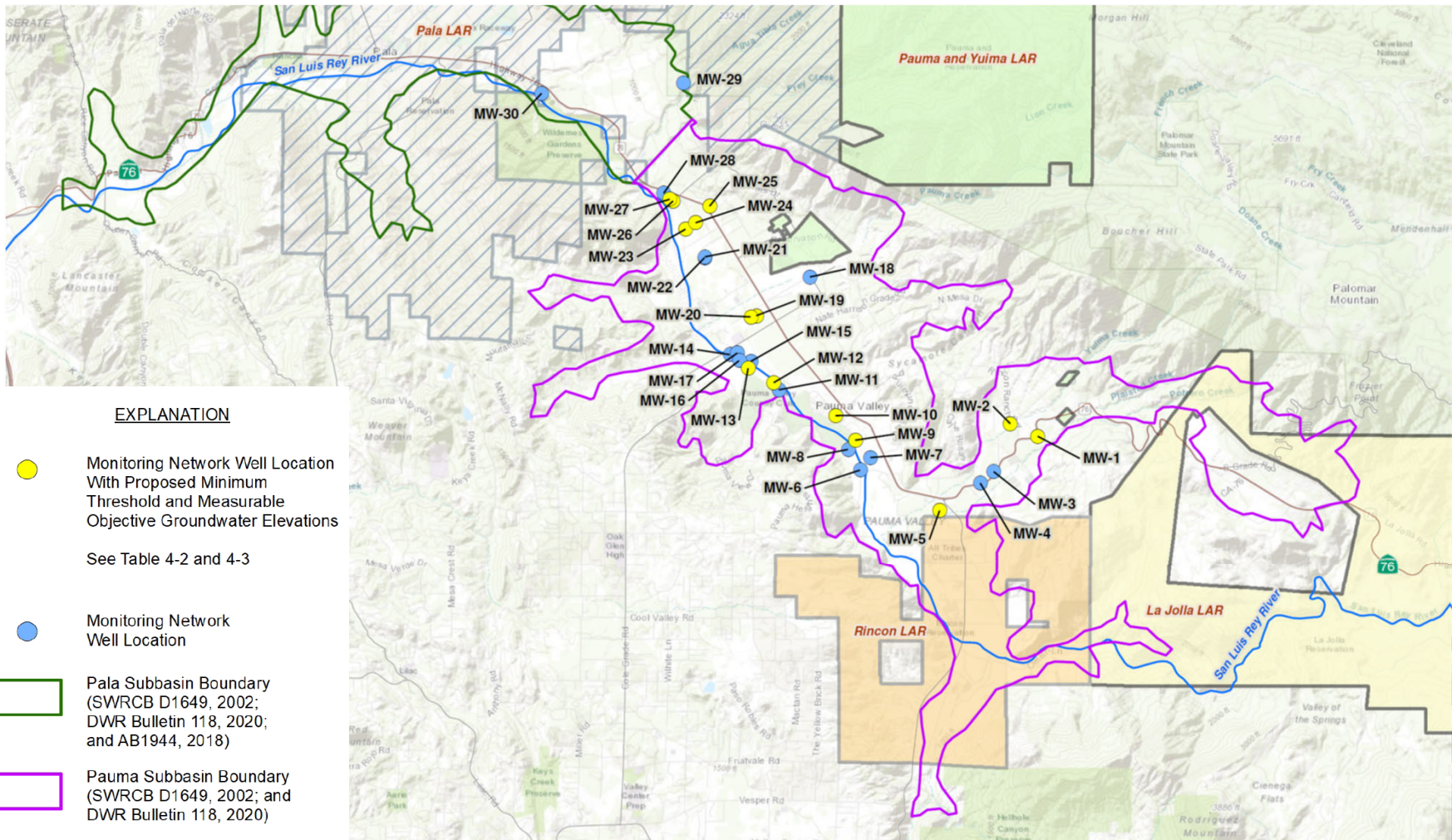
The goal of SGMA is groundwater sustainability, which includes:

SUSTAINABILITY INDICATOR	 CHRONIC LOWERING OF GROUNDWATER LEVELS	 REDUCTION OF GROUNDWATER STORAGE	 INTER-CONNECTED SURFACE WATER DEPLETIONS	 WATER QUALITY DEGRADATION	 LAND SUBSIDENCE	 SEAWATER INTRUSION
METRIC(S) USED	Groundwater elevation	Total volume	Volume or rate of surface water depletion	<ul style="list-style-type: none"> - Migration of plumes - # of Supply wells - Volume - Location of Isocontour 	Rate and extent of land subsidence	Chloride Concentration Isocontour

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.

Representative Monitoring Points



Sustainability Goals: Groundwater Levels

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Sustainability Goals: Groundwater Levels

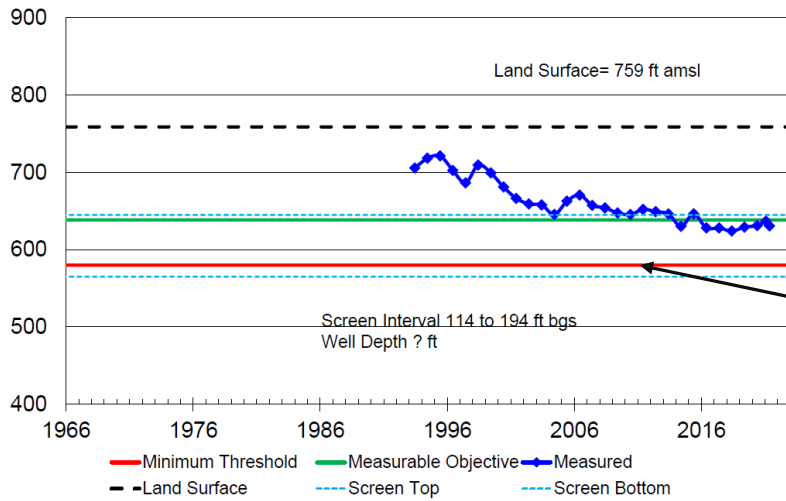
- **Undesirable Result:** Groundwater levels at the elevation of current pump settings
- **Minimum Threshold (MT):** Set at wells by operators as lowest operational level
- **Measurable Objective (MO):** Elevation representing 3-yr of groundwater in storage (approximately 50 ft above MT elevations)
- **Interim Milestone (IM):** 25% of representative pumping wells with current elevations at or above MO. IMs for wells with water levels below the MO will be determined at 5-yr reporting after consistent data collection and on refinement of groundwater model and updated analysis of basin storage to evaluate, if appropriate, the quantity of water needed to reach the MO elevations.

Setting Minimum Thresholds for Groundwater Level

Example of Provided Data

ID	Well Depth	Current Pump Setting Depth	Minimum Operational Groudwater Level
MW-10	229		180' static
MW-11	200	No pump	
MW-12	204		165' static
MW-13	230		185' static
MW-14	210	180	150' static
MW-23	229	210	205' pumping
MW-24	364	340	335' pumping
MW-25	1016	609	604' pumping

MW-12



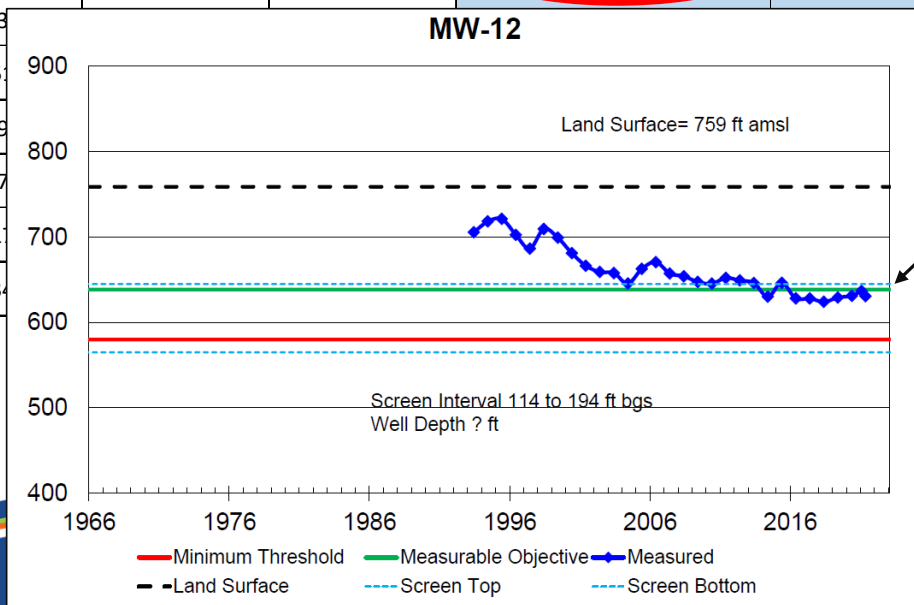
Example from Table of Minimum Thresholds

Well ID	March 2021 (Depth below RP)	June 2021 Depth to Water (below RP)	June 2021 Groundwater Elevation	Minimum Threshold (elevation in ft amsl)	Depth to Water at Minimum Threshold Elevation (ft bgs)
MW-10*	141.48	145.18	663.48	629	180
MW-11	158.88	164.48	603.02	NA	NA
MW-12*	123.73	130.00	630.65	596	165
MW-13*	143.85	148.13	602.54	566	185
MW-14*	151.4	154.10	590.72	595	150
MW-23**	109.13	133.54	577.03	506	205
MW-24**	137.35	244.65	475.01	385	335
MW-25*	217.1	516.91	243.86	157	604
MW-26*	134.6	142.70	544.48	502	185

Setting Measurable Objectives for Groundwater Level

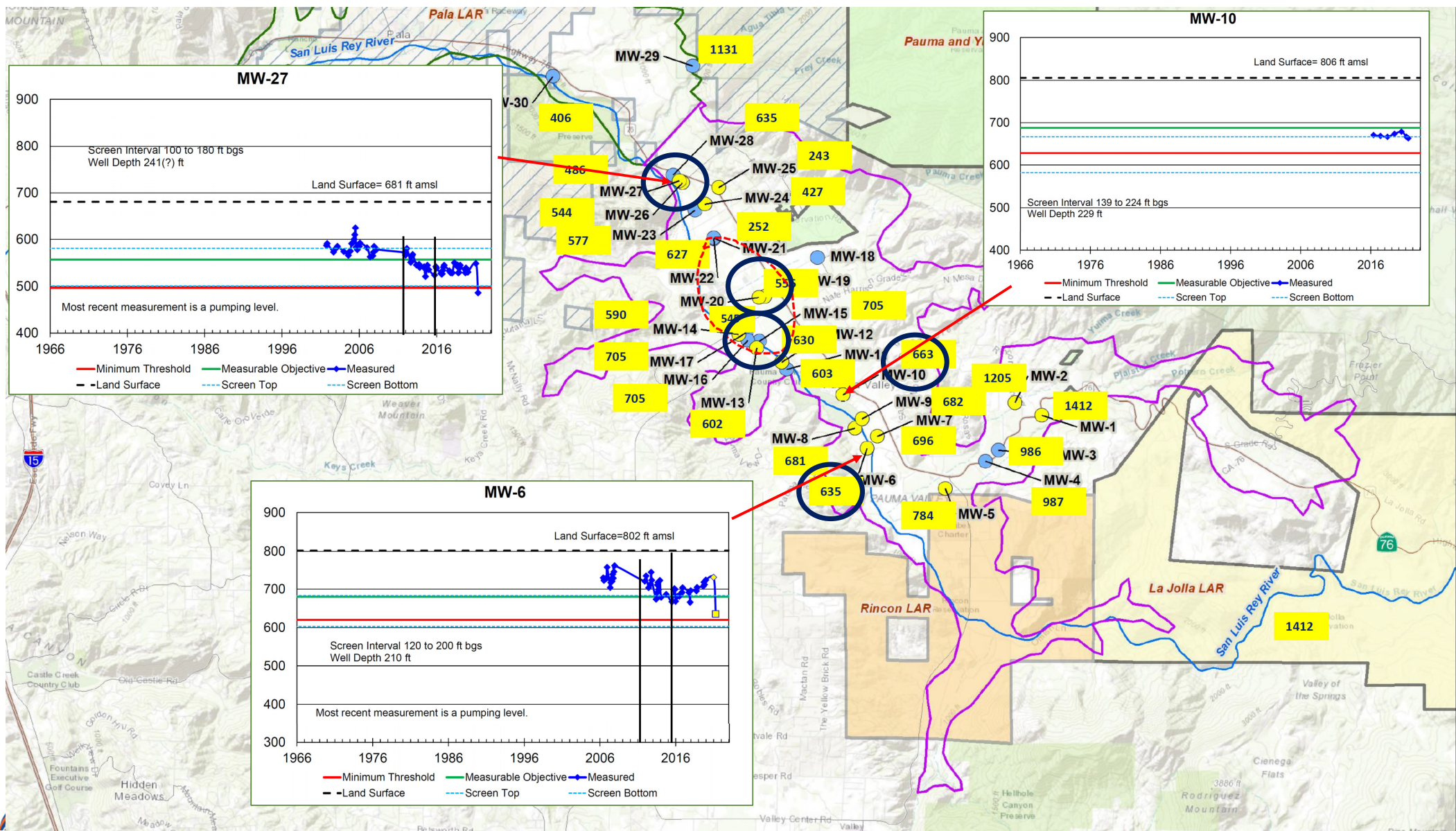
Example from Table of Minimum Thresholds and Measurable Objectives

Well ID	March 2021 (Depth below RP)	June 2021 Depth to Water (below RP)	June 2021 Groundwater Elevation	Minimum Threshold (elevation in ft amsl)	Depth to Water at Minimum Threshold Elevation (ft bgs)	Measurable Objective Elevation (Threshold for 54,000 Acre-ft Operational Storage)	Depth to Water at Measurable Objective (ft bgs)
MW-10*	141.48	145.18	663.48	629	180	688	121
MW-11	158.88	164.48	603.02	NA	NA	NA	NA
MW-12*	123.73	130.00	630.65	596	165	655	106
MW-13*	143				85	625	126
MW-14*	151				50	654	91
MW-23**	109				05	565	146
MW-24**	137				35	444	276
MW-25*	21				04	216	545
MW-26*	134				85	561	126

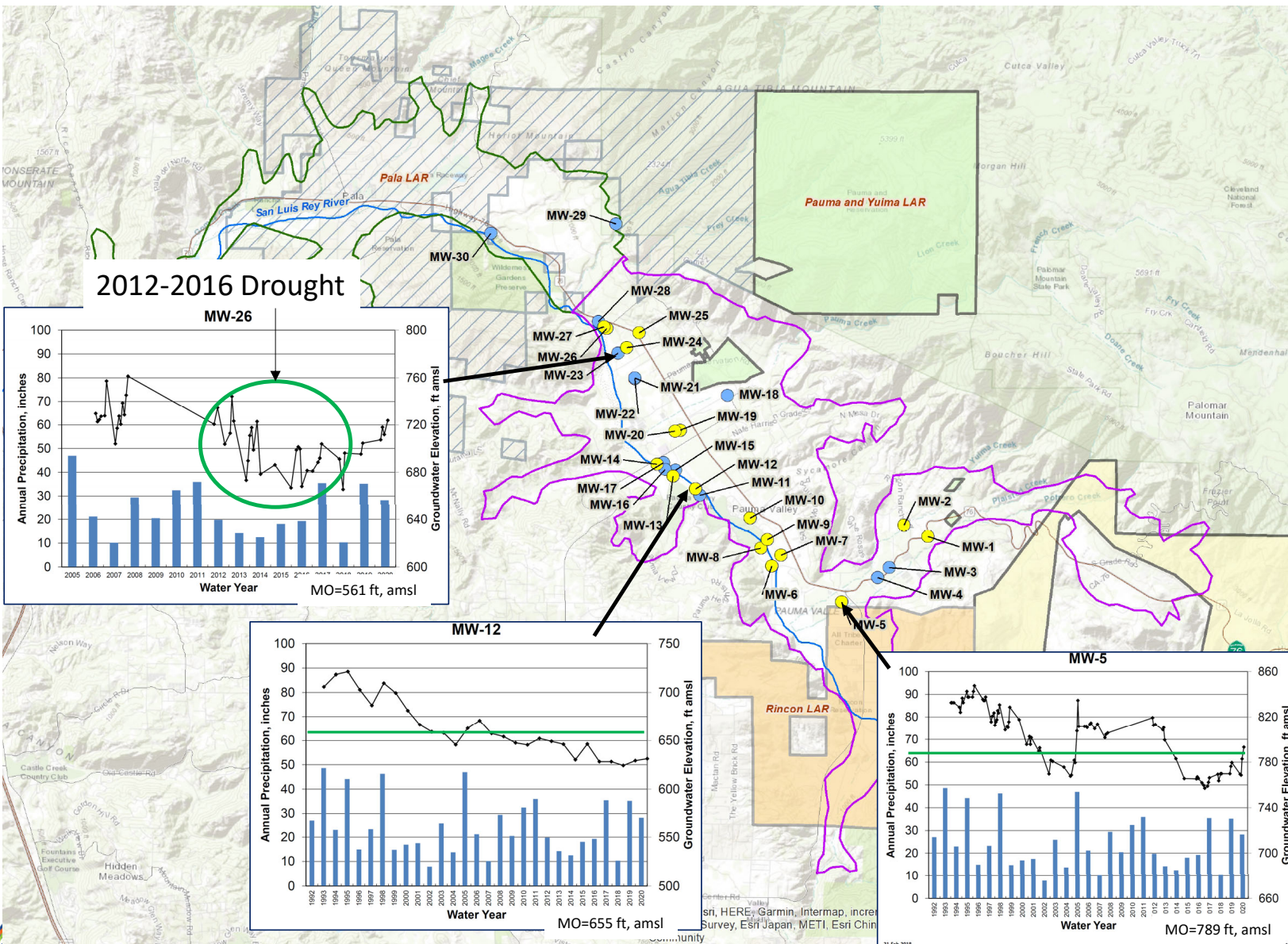


Well ID	March 2021 (Depth below RP)	June 2021 Depth to Water (below RP)	June 2021 Groundwater Elevation	Minimum Threshold (elevation in ft amsl)	Depth to Water at Minimum Threshold Elevation (ft bgs)	Measureable Objective Elevation (Threshold for 54,000 Acre-ft Operational Storage)	Depth to Water at Measureable Objective (ft bgs)
MW-1*	138.51	178.45	1412.46	1291	300	1350	241
MW-2*	265.52	328.21	1205.24	1108	425	1168	366
MW-3	262.17	291.97	986.23	NA	NA	NA	NA
MW-4	207.25	212.10	987.56	NA	NA	NA	NA
MW-5*	195.05	215.88	784.36	730	270	789	211
MW-6***	74.65	170.00	635.36	620	185	680	126
MW-7***	80.19	105.10	696.80	NA	NA	NA	NA
MW-8***	95.52	118.35	681.35	NA	NA	NA	NA
MW-9*	98.2	115.88	682.36	623	175	682	116
MW-10*	141.48	145.18	663.48	629	180	688	121
MW-11	158.88	164.48	603.02	NA	NA	NA	NA
MW-12*	123.73	130.00	630.65	596	165	655	106
MW-13*	143.85	148.13	602.54	566	185	625	126
MW-14*	151.4	154.10	590.72	NA	NA	NA	NA
MW-15	47.9	48.27	708.42	NA	NA	NA	NA
MW-16	41.46	42.70	705.89	NA	NA	NA	NA
MW-17	40.46	41.43	705.88	NA	NA	NA	NA
MW-18	319.55	316.77	639.23	141	NA	NA	NA
MW-19*	222.2	255.01	556.46	549	262	609	203
MW-20*	218.51	258.82	545.36	545	259	604	200
MW-21	216.58	488.10	252.94	--		NA	NA
MW-22	100.2	120.12	621.22	--		NA	NA
MW-23**	109.13	133.54	577.03	506	205	565	146
MW-24**	137.35	244.65	475.01	385	335	444	276
MW-25*	217.1	516.91	243.86	157	604	216	545
MW-26*	134.6	142.70	544.48	502	185	561	126
MW-27*	133.55	196.09	486.28	497	185	557	126
MW-28	114.17	114.85	635.07	NA	NA	NA	NA
MW-29	124.69	117.55	1131.43	NA	NA	NA	NA
MW-30***	45.19	94.98	406.07	NA	NA	NA	NA

Wells with Current Water Levels Below Measurable Objectives









Rainfall and Groundwater Level Recovery



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Sustainability Goals: Groundwater Storage

The goal of SGMA is groundwater sustainability, which includes:







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Sustainability Goals: Groundwater Storage

- **Undesirable Result:** Groundwater in storage when water levels are at the elevation of current pump settings
- **Minimum Threshold (MT):** Groundwater in storage at groundwater level MTs
- **Measurable Objective (MO):** 3-years of groundwater in storage (approximately 54,000 acre-ft)
- **Interim Milestone (IM):** To Be Determined at 5-year reporting period based on refinement of groundwater model and analysis of basin storage from expanded data collection

Sustainability Goals: Interconnected Surface Water

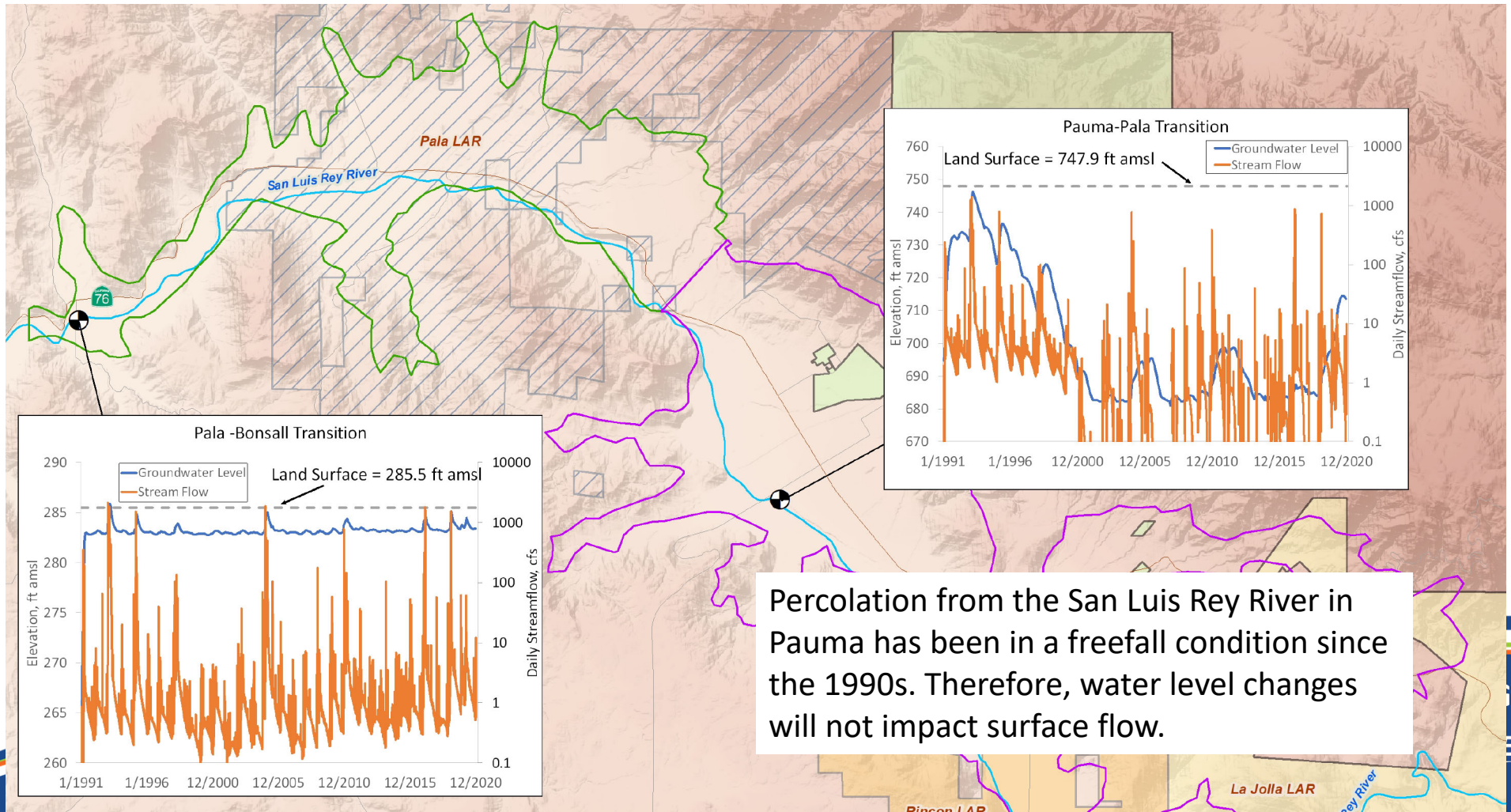
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Sustainability Goals: Interconnected Surface Water





- **Undesirable Result:** Groundwater levels falling below the lowest groundwater level since 2015 in identified areas with potentially dependent vegetation
- **Minimum Threshold (MT):** Lowest groundwater level since 2015 in identified areas with potentially dependent vegetation
- **Measurable Objective (MO):** Maintain seasonal groundwater levels since 2015 in identified areas with potentially dependent vegetation
- **Interim Milestone (IM):** Based on model-simulated hydrographs, none may be needed; groundwater levels in shallow areas are within three feet, at, or above ground surface. This will need to be confirmed through additional monitoring

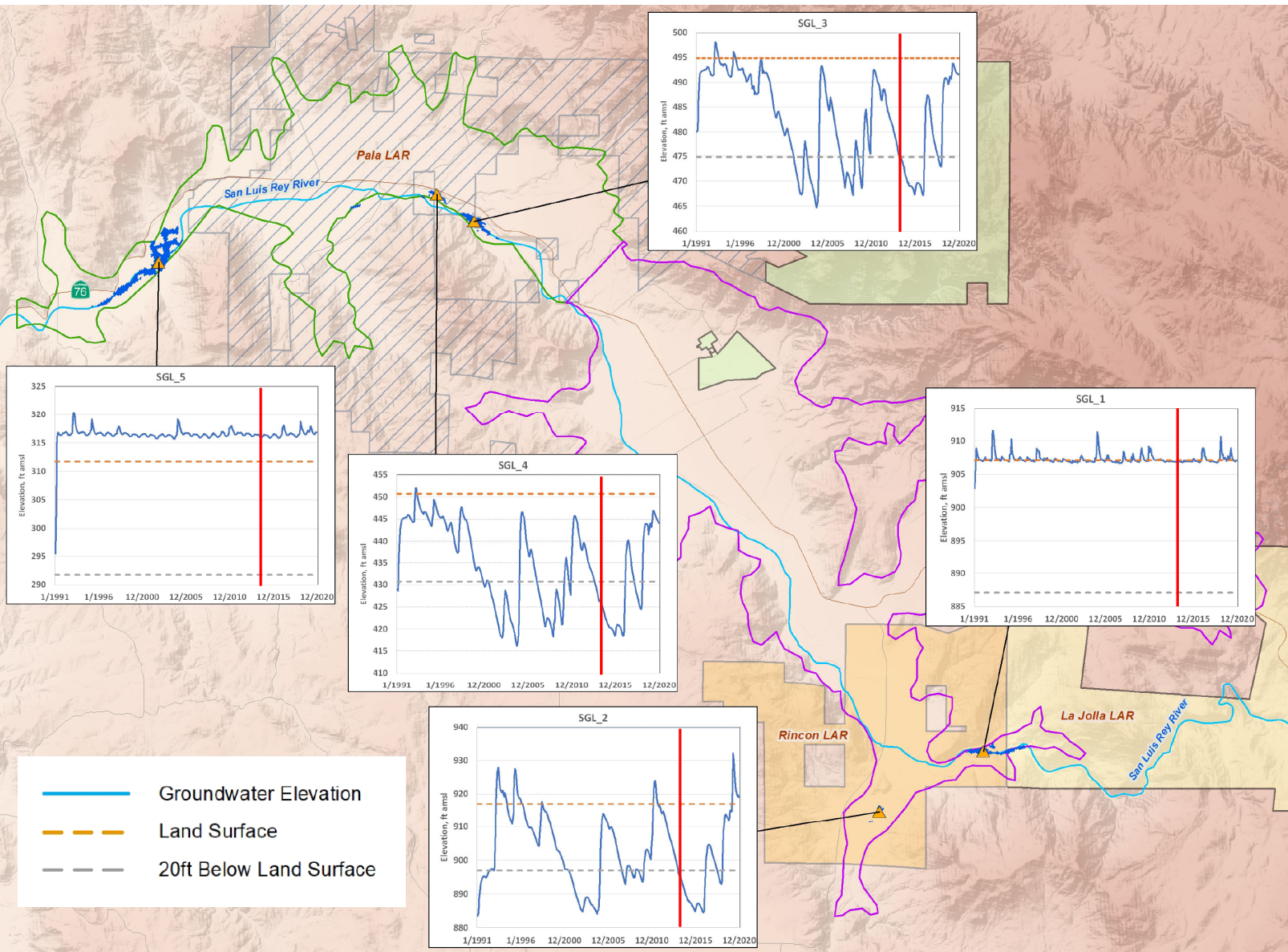
Surface Water Flow and Groundwater Elevations



Areas with Historical Depth to Groundwater Less Than or Equal to 20 ft

EXPLANATION

-  Modeled Areas of Shallow Groundwater ≤ 20 ft (extinction depth of most deep-rooted riparian vegetation)
-  SGL-1 Simulated Groundwater Levels Hydrograph in Relation to Land Surface in the Area of Shallow Groundwater
-  Pala Subbasin Boundary (SWRCB D1649, 2002; DWR Bulletin 118, 2020; and AB1944, 2018)
-  Pauma Subbasin Boundary (SWRCB D1649, 2002; and DWR Bulletin 118, 2020)



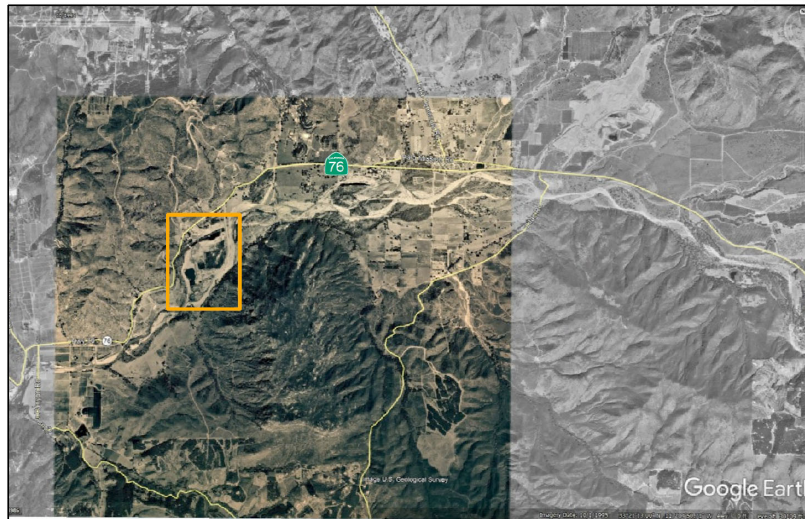
Historical Air Photos Showing Shallow Groundwater In Pala Subbasin

EXPLANATION

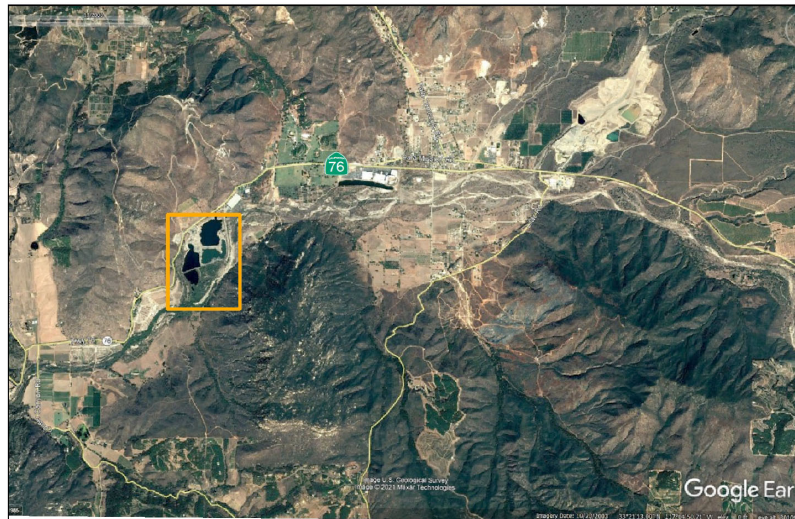


Area of Shallow Groundwater

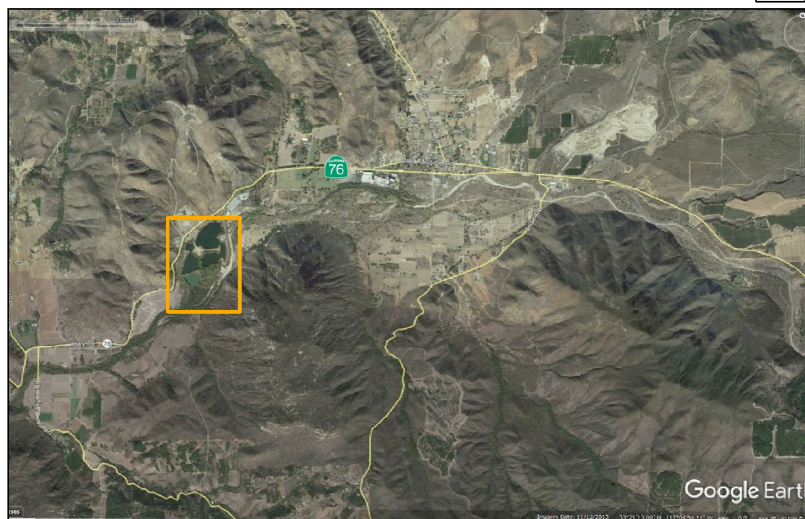
1991



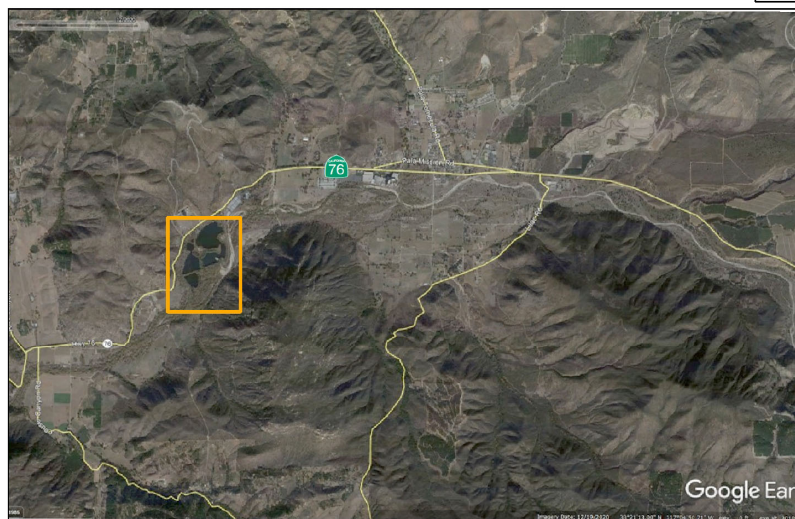
2002



2010









2020



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Sustainability Goals: Water Quality

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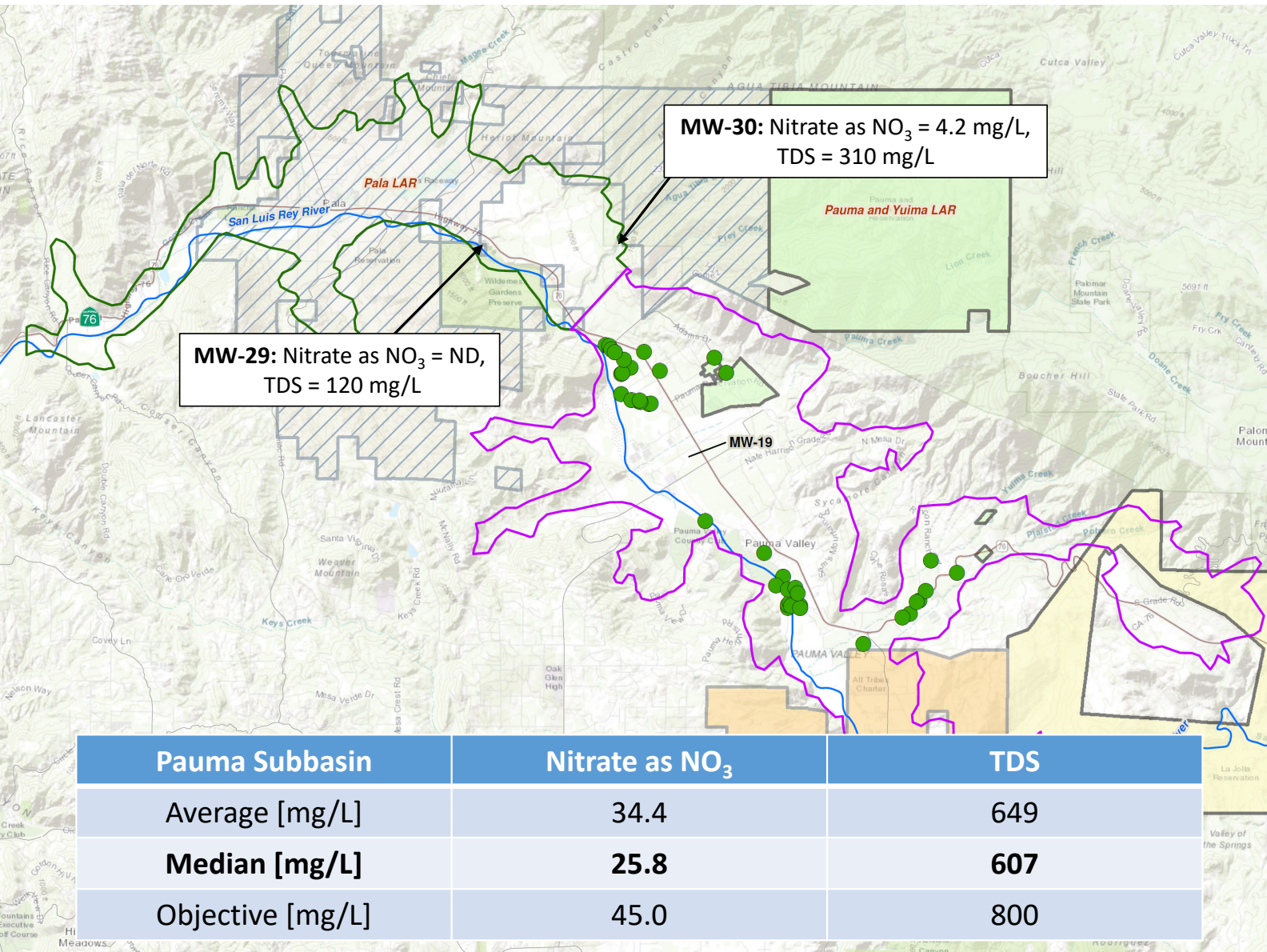
Sustainability Goals: Groundwater Quality

- **Undesirable Result:** Total Dissolved Solids (TDS) and Nitrate above Basin Objectives (800 mg/L for TDS, 45 mg/L for Nitrate as NO₃)
- **Minimum Threshold (MT):** Basin Objectives for TDS and Nitrate
- **Measurable Objective (MO):** Current groundwater quality for TDS and Nitrate as NO₃ at current ambient concentrations (ambient concentrations assumed to be the median of available basin wide concentrations: 607 mg/L for TDS, 25.7 mg/L for Nitrate as NO₃)
- **Interim Milestone (IM):** Current TDS and Nitrate concentrations are at the measurable objectives

Determining Ambient Groundwater Quality







- **Identify wells in groundwater basin with 3 or more water quality datasets (USGS Methodology)**
 - 44 Wells in Pauma Subbasin with 3 or more datasets between 2015-2021
- **Calculate average water quality for each well**
- **Ambient water quality for the subbasin assumed to be median concentration**
 - Medians were used instead of arithmetic averages because:
 - 1) Well medians can be reliably calculated for datasets with mixed censored and non-censored data (detects and non-detects) and
 - 2) Well medians allow for the use of an entire water quality dataset while minimizing the skewing effect of potential data outliers and do not rely on parametric statistical methods that assume normal data distribution to remove potential outliers.

Wells with 3 or More Data Sets (2015 – 2021)



Sustainability Goals: Land Subsidence

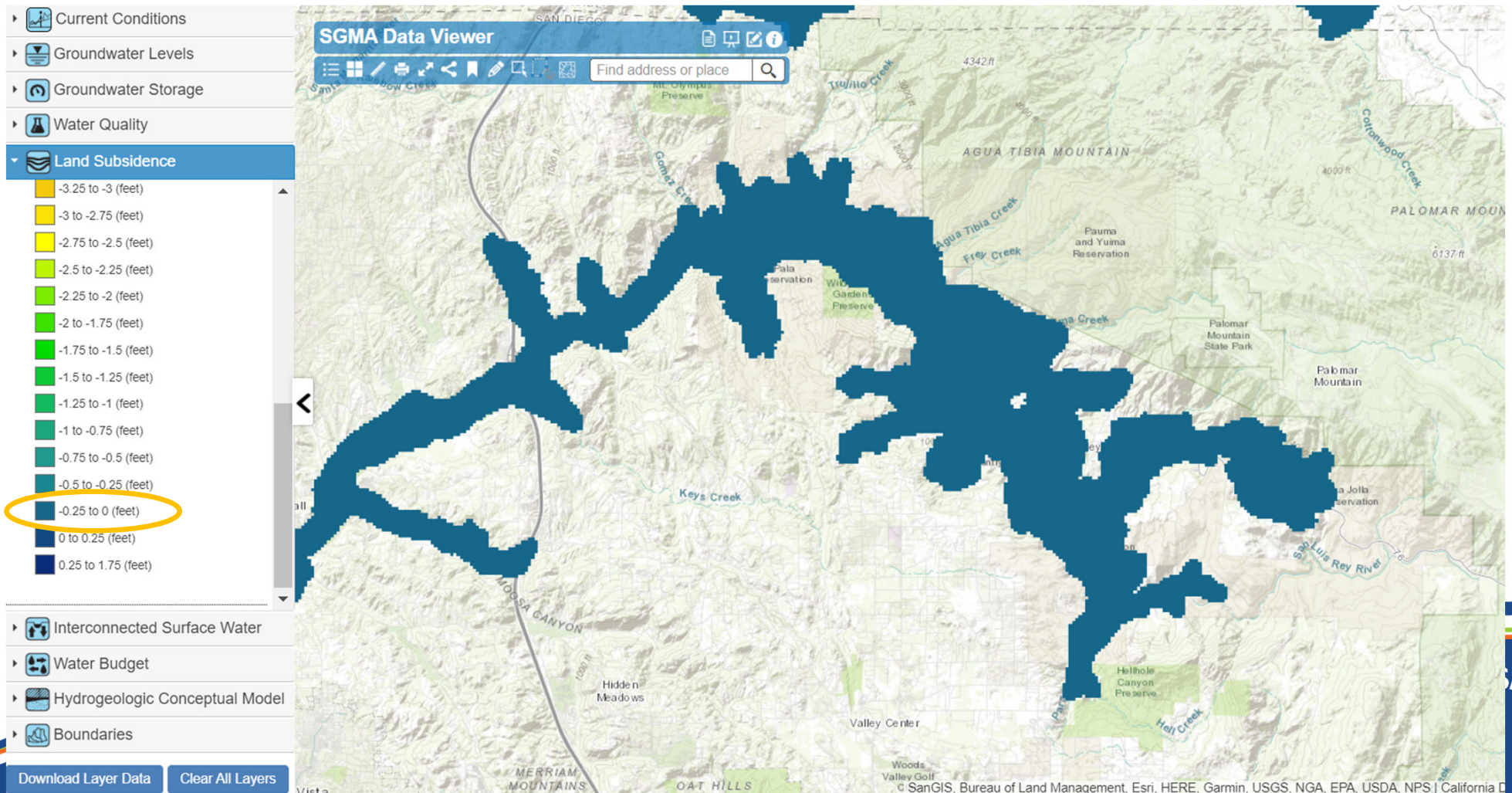
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<p>METRIC(S) USED</p>	<p>Groundwater elevation</p>	<p>Total volume</p>	<p>Volume or rate of surface water depletion</p>	<ul style="list-style-type: none"> - Migration of plumes - # of Supply wells - Volume - Location of Isocontour 	<p>Rate and extent of land subsidence</p>	<p>Chloride Concentration Isocontour</p>

Sustainability Goals: Land Subsidence







- Not applicable based on current information
- The GSP will include sections describing the indicator and note that there is no current reports/evidence of this issue occurring in the basin, but stipulate that 5-year reports will include a review of potential data to confirm or address whether these issues show new evidence during the five-year reporting period.

TRE Altamira InSAR Dataset (June 2015 – September 2020)



Sustainability Goals: Seawater Intrusion

The goal of SGMA is groundwater sustainability, which includes:

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Sustainability Goals: Seawater Intrusion

- Not applicable based on current information
- The GSP will include sections describing the indicator and note that there is no current evidence of this issue occurring in the basin, but stipulate that 5-year reports will include a review of potential data to confirm or address whether these issues show new evidence during the five-year reporting period.

Achieving Sustainability

Basin-Wide Sustainability Goal

Set Minimum Thresholds
and Measurable Objectives
for all Sustainable
Management Criteria



SUSTAINABLE MANAGEMENT CRITERIA

Measure and monitor
at each representative
monitoring well



REPRESENTATIVE MONITORING WELLS

Achieve goals using
projects and
management actions, if
necessary



PROJECTS & MANAGEMENT ACTIONS

Basin-Wide Sustainability Goal

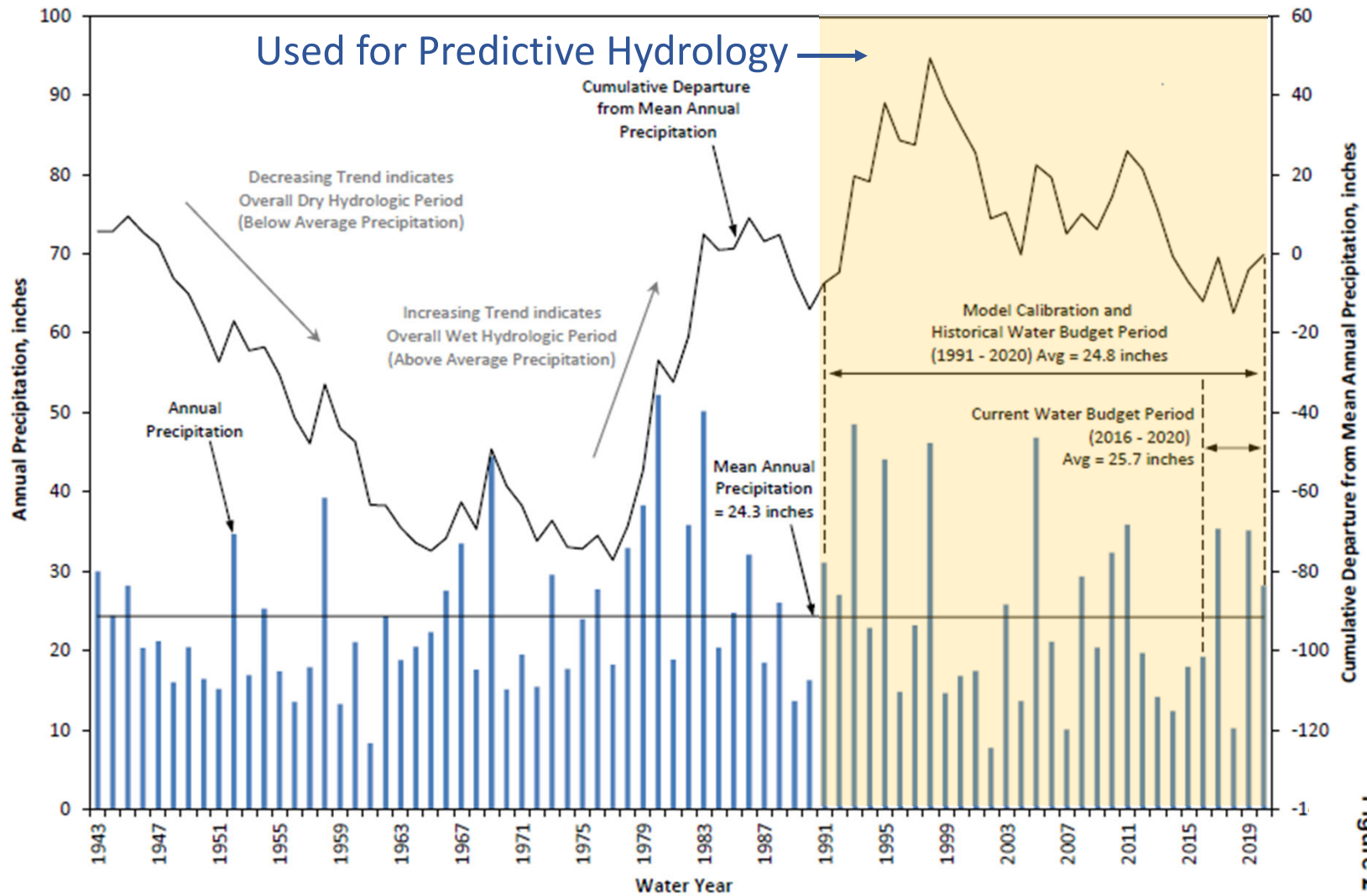
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Projects and Management Actions

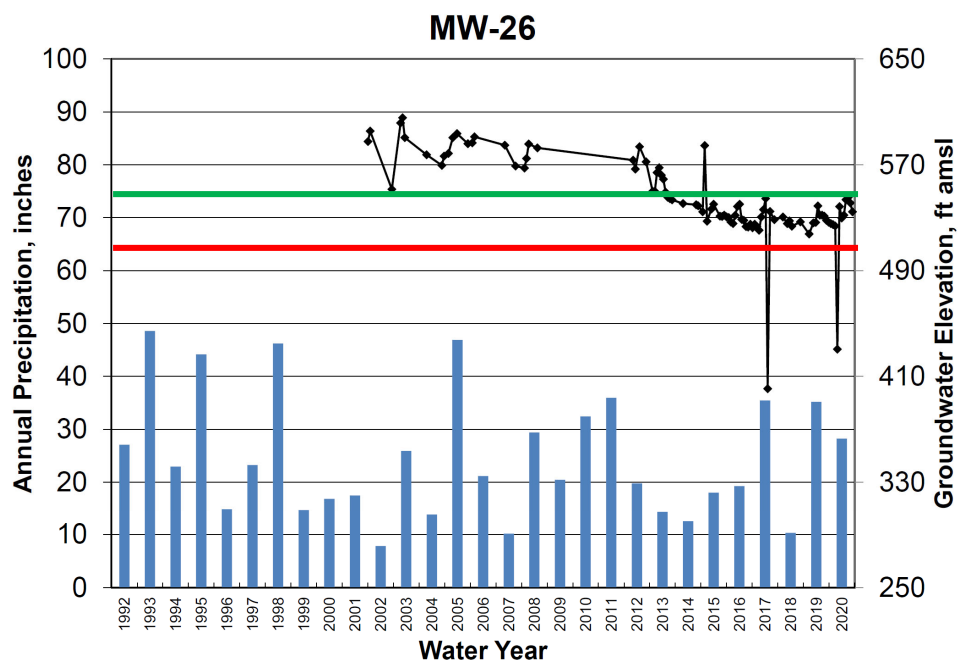
- **A predictive scenario was run with the calibrated groundwater flow model to evaluate whether historical hydrology would provide enough natural recharge to meet measurable objectives without additional management actions.**
 - Current estimated pumping relationship based on hydrology
 - Run for 30 years
 - Hydrologic period from 1991 through 2020
 - *Represents average hydrologic conditions, including wet and dry periods*

Precipitation at Henshaw Dam



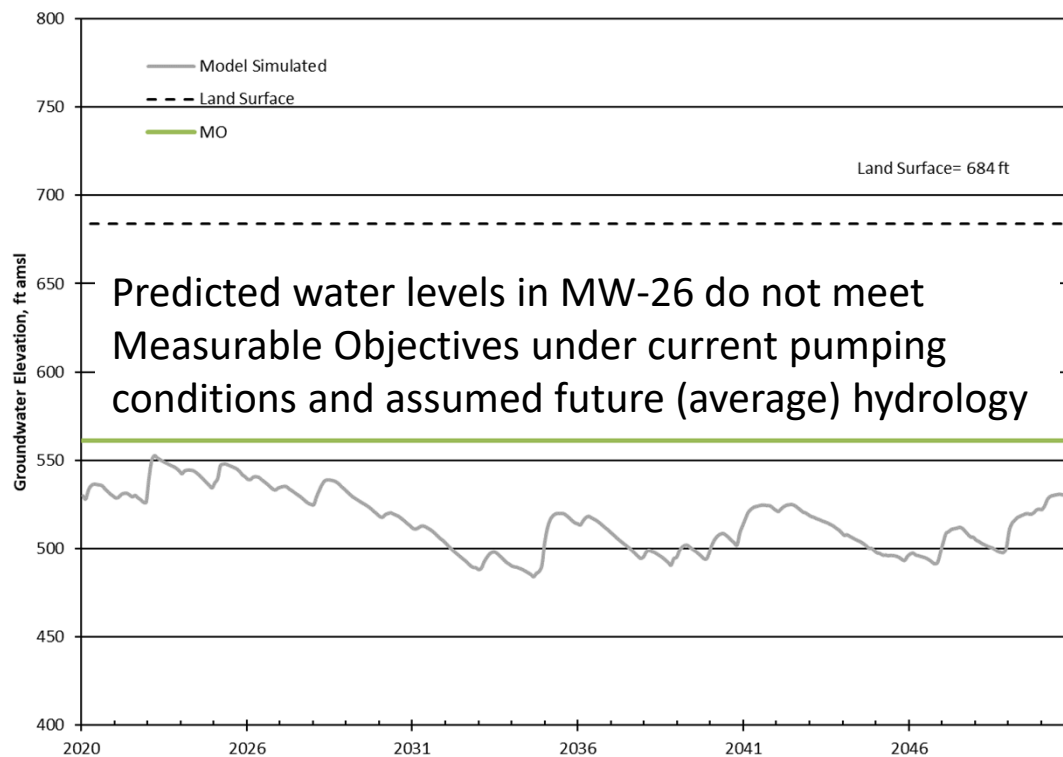
Example of Scenario Results

Observed



Model-Predicted

MW-26



Upper San Luis Rey Valley Groundwater Balance – Predictive Model Scenario

Calendar Year	Total Inflow	Groundwater Pumping	Underflow Outflow to Bonsall Basin	Total Outflow	Change in Storage
	acre-ft	acre-ft	acre-ft	acre-ft	acre-ft
2021	18,324	14,154	4,822	21,564	-3,240
2022	15,953	13,946	4,760	20,946	-4,993
2023	42,937	14,808	5,448	24,019	18,919
2024	11,429	14,388	4,754	21,990	-10,561
2025	30,314	14,599	5,099	23,059	7,255
2026	13,135	14,266	4,728	21,558	-8,422
2027	12,178	13,972	4,733	20,920	-8,741
2028	32,970	14,294	5,010	22,001	10,969
2029	5,881	13,935	4,690	20,707	-14,826
2030	11,938	13,517	4,661	20,016	-8,079
2031	12,618	13,350	4,737	19,829	-7,211
2032	5,584	12,971	4,626	19,057	-13,473
2033	22,816	13,027	4,731	19,384	3,432
2034	17,675	12,723	4,665	18,810	-1,135
2035	49,016	14,250	5,311	22,009	27,007
2036	14,170	13,751	4,757	20,500	-6,330
2037	2,999	13,314	4,663	19,564	-16,565
2038	19,592	13,154	4,728	19,410	182
2039	20,420	13,251	4,701	19,605	815
2040	33,677	13,457	4,849	20,223	13,455
2041	34,951	13,953	5,181	21,662	13,289
2042	15,257	13,763	4,845	20,773	-5,516
2043	9,567	13,483	4,762	20,108	-10,541
2044	9,500	13,202	4,722	19,568	-10,068
2045	13,242	13,009	4,746	19,301	-6,059
2046	18,989	12,974	4,792	19,318	-329
2047	36,227	13,466	5,113	20,748	15,480
2048	10,578	13,207	4,753	19,653	-9,075
2049	44,356	13,686	5,251	21,348	23,007
2050	28,812	13,983	5,118	21,741	7,071
Average 2021 to 2050	20,504	13,662	4,858	20,646	-143

- Small amount of change in storage (approximately -143 acre-ft/yr) manageable through potential projects and management actions
- **NEXT STEPS:** Evaluate potential projects/management actions



Questions

Please feel free to contact us!

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