San Pasqual Valley Groundwater Sustainability Plan (GSP) Stakeholder Workshop

Management Action No 7 – Initial Surface Water Recharge Evaluation

Task 5 – Model Updates and Simulations

Task 6 – Evaluation of Benefits to GDEs

August 29, 2023

The City of SAN DIEGO

Stakeholder Input Format

- This is a stakeholder workshop and anyone is welcome to ask questions or provide comments
- Public comment will take place at the end of each agenda item and at the end of the presentation
- Those wishing to speak should place their name and organization in the **Chat**; participants will be called on in the order received
- Follow-up comments and questions can be sent to **Staci Domasco (SDomasco@sandiego.gov)**

Meeting Agenda

1. Welcome and introductions
2. Scope of Project Management Action (PMA) No. 7: Initial Surface Water Recharge Evaluation
3. Task 5 – Modeling Approach and Results
4. Task 6 – Evaluation of Possible Benefits to Potential GDEs*
5. Public comment
6. Next steps and closing remarks

*GDEs = Groundwater Dependent Ecosystems

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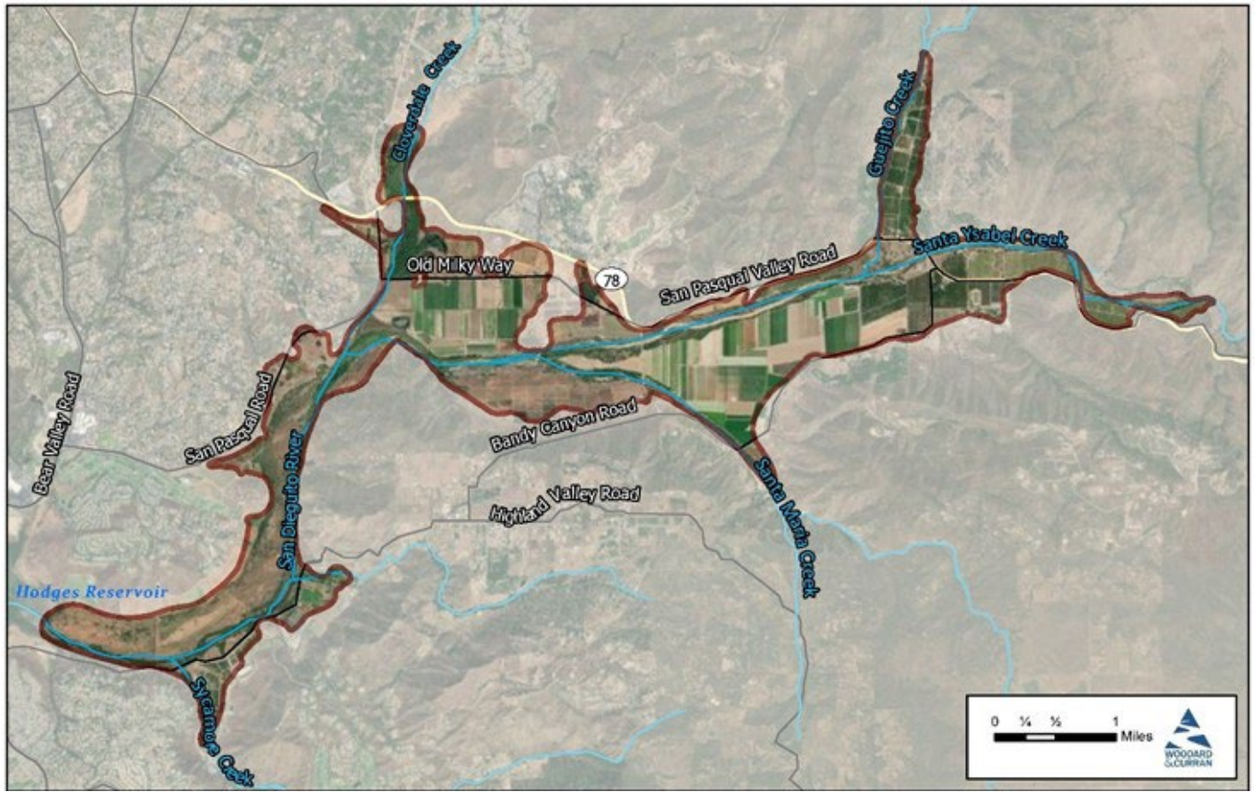
Scope of Initial Surface Water Recharge Evaluation

Surface Water Recharge Evaluation: Scope

A *Preliminary Feasibility Study* will be developed to summarize surface water recharge opportunities in San Pasqual Valley.

The *Preliminary Feasibility Study* will include the following sections:

- Development of Evaluation Criteria (**Task 1**)
- Streambed Investigation (**Task 2**)
- Water Sources for Potential Recharge (**Task 3**)
- Potential Recharge Strategies (**Task 4**)
- Model Simulations and Results (**Task 5**)
- Evaluation of Benefits to GDEs (**Task 6**)

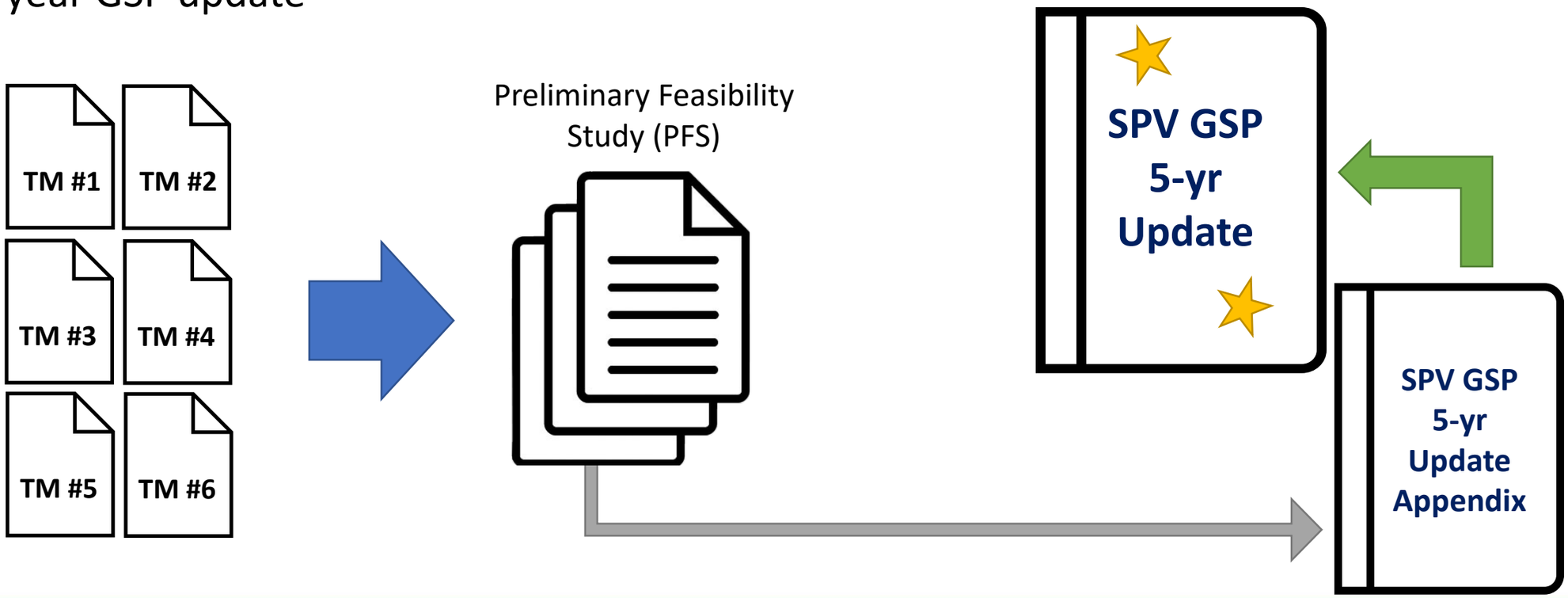


Review of Technical Memoranda (TMs):

- **TM 1: Evaluation Criteria TM** – review of criteria and options for water recharge and basis for subsequent TMs.
- **TM 2: Streambed Investigation** – field data collection and modeling to provide site-specific data to update model and understand best options for surface recharge
- **TM 3: Water Sources for Potential Recharge** – evaluating options for where recharge water might come from
- **TM 4: Potential Recharge Strategies** – an evaluation of recharge strategies and their feasibility
- **TM 5: Model Updates and Simulations** – documentation of model refinements and simulation of selected recharge strategies
- **TM 6: Evaluation of Benefits to GDEs** – an evaluation of potential effects of recharge strategies on groundwater dependent ecosystems

Relationship to GSP

- Current GSP and estimates show the Basin is sustainable
- If future Basin sustainability conditions change *and* GSA determines enhanced recharge strategies are needed, the *Preliminary Feasibility Study* may be used to help inform decisions on mitigation planning
- The *Preliminary Feasibility Study*, created from these TMs, will be a new appendix in the 5-year GSP update



Surface Water Recharge Evaluation: Schedule

Scope Task		2022										2023												2024		
#	Task	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Planning and Management Action No. 7																										
Task 1	*Development of Evaluation Criteria*																									
	Develop draft evaluation criteria and scoring				Δ																					
Task 2	*Reevaluate Streambed Characteristics*																									
	Oversee streambed infiltration testing at 15 locations											Δ														
Task 3	*Water Sources for Potential Recharge Projects*																									
	Evaluate reservoir operations											Δ														
Task 4	*Potential Recharge Strategies*																									
	Develop potential recharge strategies															Δ										
Task 5	*Model Simulations*																									
	Conduct SPV GSP Model simulations																		Δ							
Task 6	*Evaluate Benefits to GDEs*																									
	Assessment of GDE benefits for recharge alternatives																		Δ							
Task 7	*Preliminary Feasibility Study Report*																									
	Prepare draft Feasibility Study Report																									
	Public Review (45 days)																						Δ			
	Revised Feasibility Study + Responses (30 days)																									
	Prepare final Feasibility Study Report																									
Δ	Stakeholder Workshop																									

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Task 5: Model Updates and Simulations

How Task 5 Fits Into the Big Picture

- Several possible recharge strategies were screened down to four strategies for additional evaluation in Task 4
- SPV GSP Model was updated and four recharge strategies from Task 4 were simulated in Task 5
- Model outputs (projections) used to provide values for…
  - Modeled groundwater levels for Task 6
  - Six of eight evaluation criteria from Task 1, to feed into preliminary feasibility study in Task 7

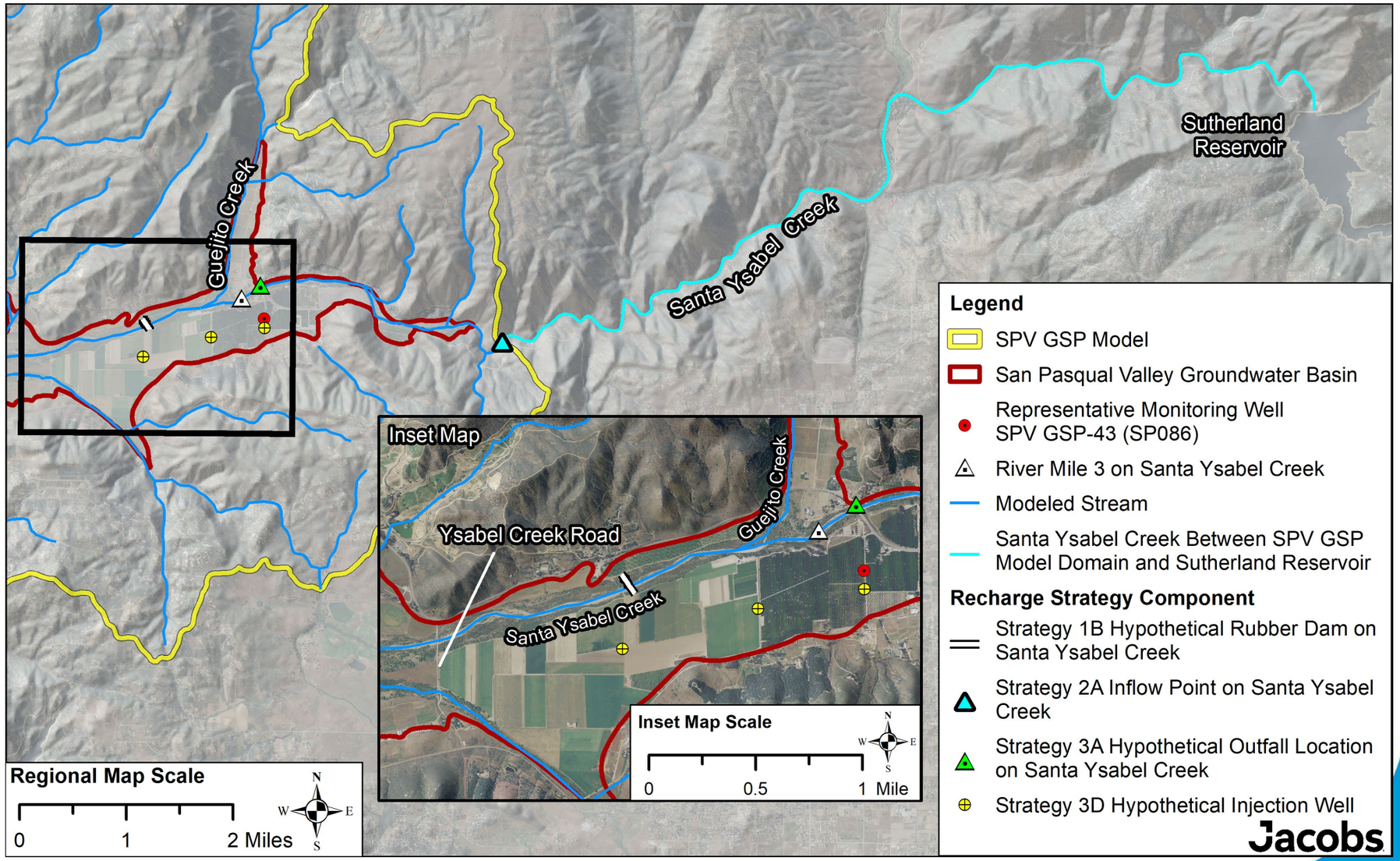
- Task 1–Evaluation Criteria
- Task 2–Streambed Investigation
- Task 3–Water Sources for Potential Recharge
- Task 4–Potential Recharge Strategies
- **Task 5–Model Updates and Simulations**
- Task 6–Evaluation of Benefits to GDEs
- Task 7–Preliminary Feasibility Study

SPV GSP Model Updates

- Recalibrated SPV GSP Model v1.0
  - Updated depth to bedrock near mouth of Rockwood Canyon
  - Improved runoff routing assignments
  - Improved Basin GW responses to water levels in Hodges Reservoir
  - Updated stream properties using data from Task 2 (streambed investigation)
  - Updated stream channel shapes
  - Incorporated daily stress periods during selected historical period
  - Referring to this recalibrated model as **SPV GSP Model v2.0**

Recharge Strategies Selected for Further Evaluation

- **Strategy 1B:** Enhance Streamflow Infiltration with In-stream Modifications
- **Strategy 2A:** Augment Santa Ysabel Creek Streamflow with Sutherland Controlled Releases
- **Strategy 3A:** Augment Santa Ysabel Creek Streamflow with Ramona MWD Deliveries
- **Strategy 3D:** Injection Wells with Ramona MWD Deliveries



Decision Flow Charts Used to Determine When to Implement a Recharge Strategy (67-year simulation period; WYs 2005 to 2072)

Strategy 1B

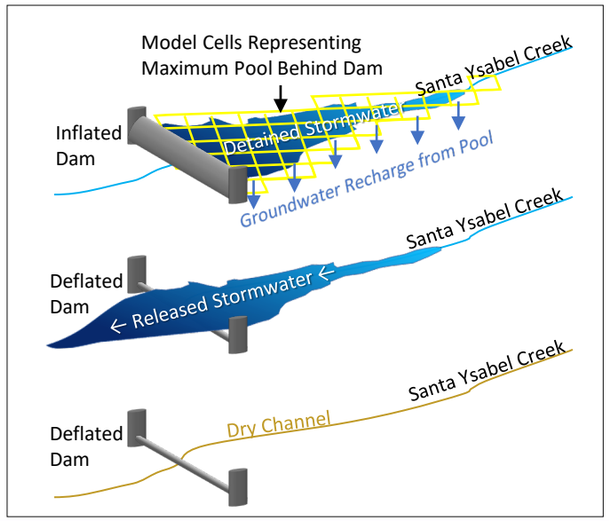
Condition A
There is stormwater adjacent to rubber dam in Santa Ysabel Creek.

False → Status of rubber dam: Deflated

True → **Condition B**
Detained stormwater in Santa Ysabel Creek does not exceed maximum pool volume behind dam.

False → Status of rubber dam: Deflated

True → Status of rubber dam: Inflated



Strategies 2A, 3A, & 3D

Condition 1
Modeled groundwater level at SPV GSP-43 (SP086) is below its planning threshold.

False → Do not implement recharge strategy.

True → **Condition 2**
Next year and the year after that will be either dry or critically dry.

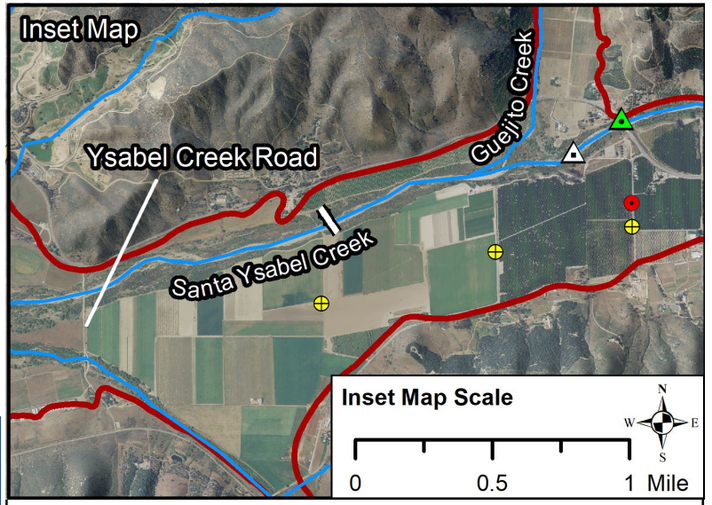
False → Do not implement recharge strategy.

True → Implement Strategy 3D.

Condition 3
The modeled channel at River Mile 3 of Santa Ysabel Creek is dry.

False → Do not implement recharge strategy.

True → Implement Strategy 2A or 3A.



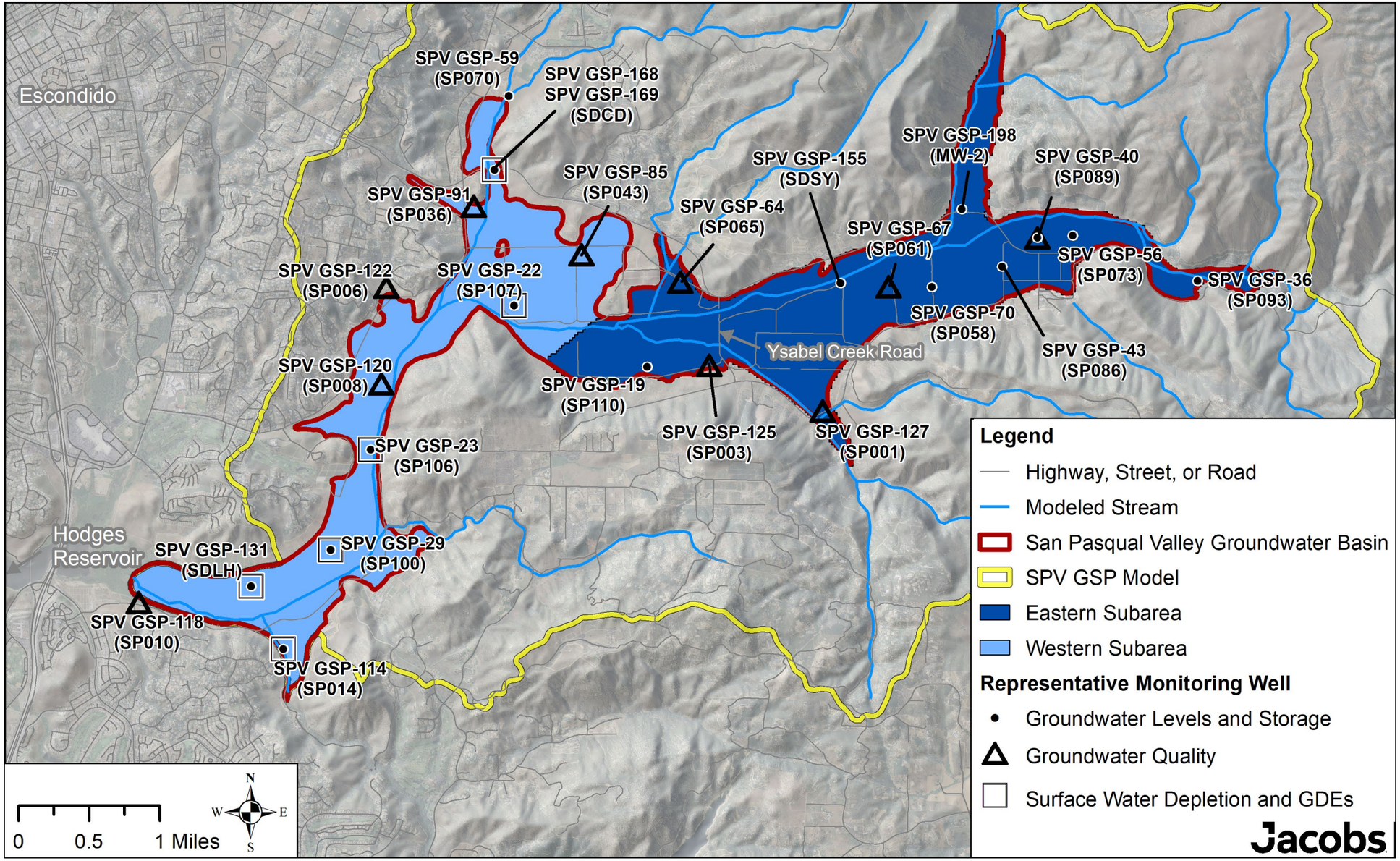
Legend

- SPV GSP Model
- San Pasqual Valley Groundwater Basin
- Representative Monitoring Well SPV GSP-43 (SP086)
- River Mile 3 on Santa Ysabel Creek
- Modeled Stream
- Santa Ysabel Creek Between SPV GSP Model Domain and Sutherland Reservoir

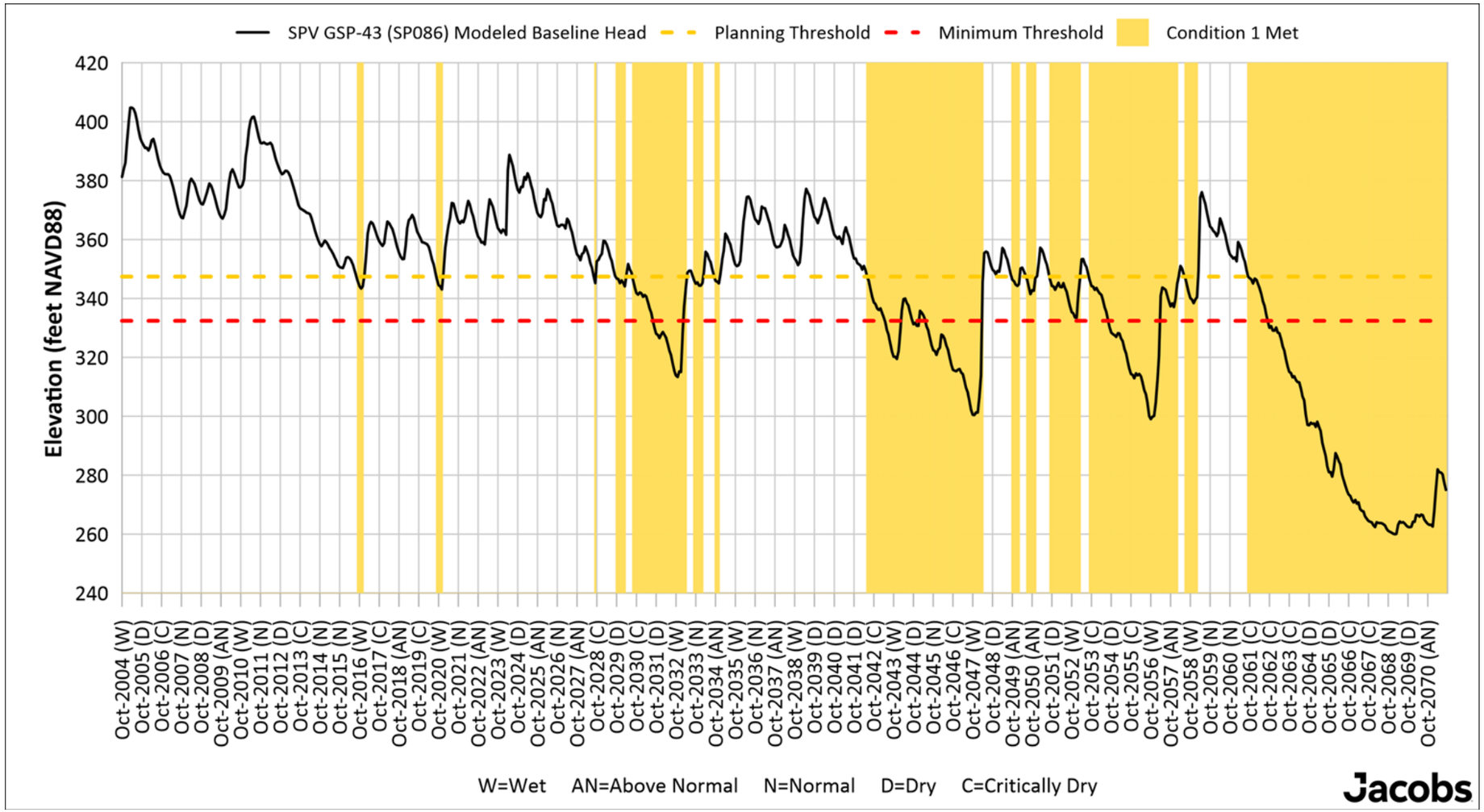
Recharge Strategy Component

- Strategy 1B Hypothetical Rubber Dam on Santa Ysabel Creek
- Strategy 2A Inflow Point on Santa Ysabel Creek
- Strategy 3A Hypothetical Outfall Location on Santa Ysabel Creek
- Strategy 3D Hypothetical Injection Well

Representative Monitoring Wells



SPV GSP-43 (SP086) Modeled Baseline Groundwater Elevations (Head)



Strategies 2A, 3A, & 3D

Condition 1
Modeled groundwater level at SPV GSP-43 (SP086) is below its planning threshold.

False

True

Condition 2
Next year and the year after that will be either dry or critically dry.

False

Do not implement recharge strategy.

True

Implement Strategy 3D.

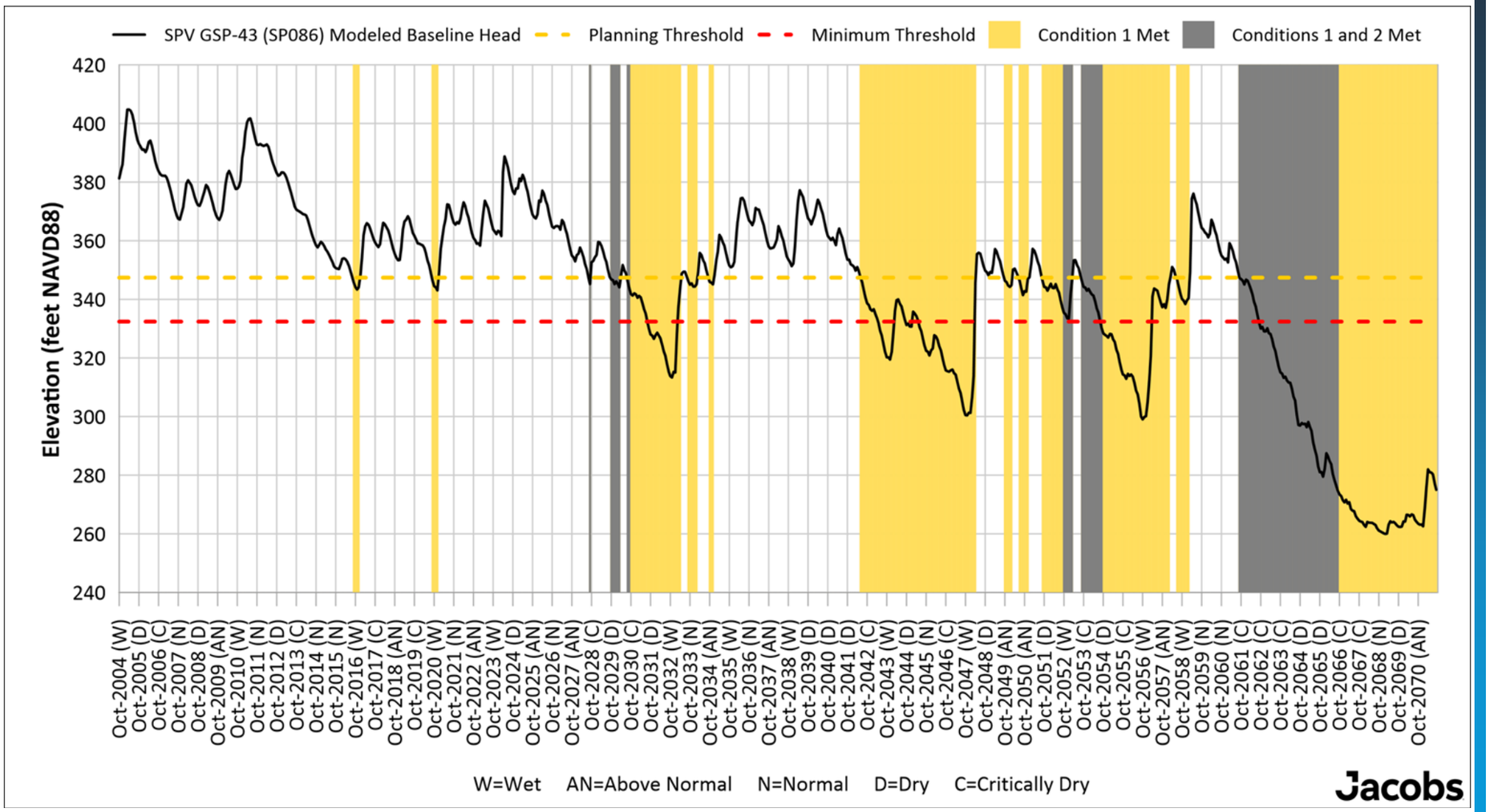
Condition 3
The modeled channel at River Mile 3 of Santa Ysabel Creek is dry.

False

True

Implement Strategy 2A or 3A.

Timing for When Strategy 3D is Implemented (Conditions 1 & 2 are Met)



Strategies 2A, 3A, & 3D

Condition 1
Modeled groundwater level at SPV GSP-43 (SP086) is below its planning threshold.

False → Do not implement recharge strategy.

True →

Condition 2
Next year and the year after that will be either dry or critically dry.

False → Do not implement recharge strategy.

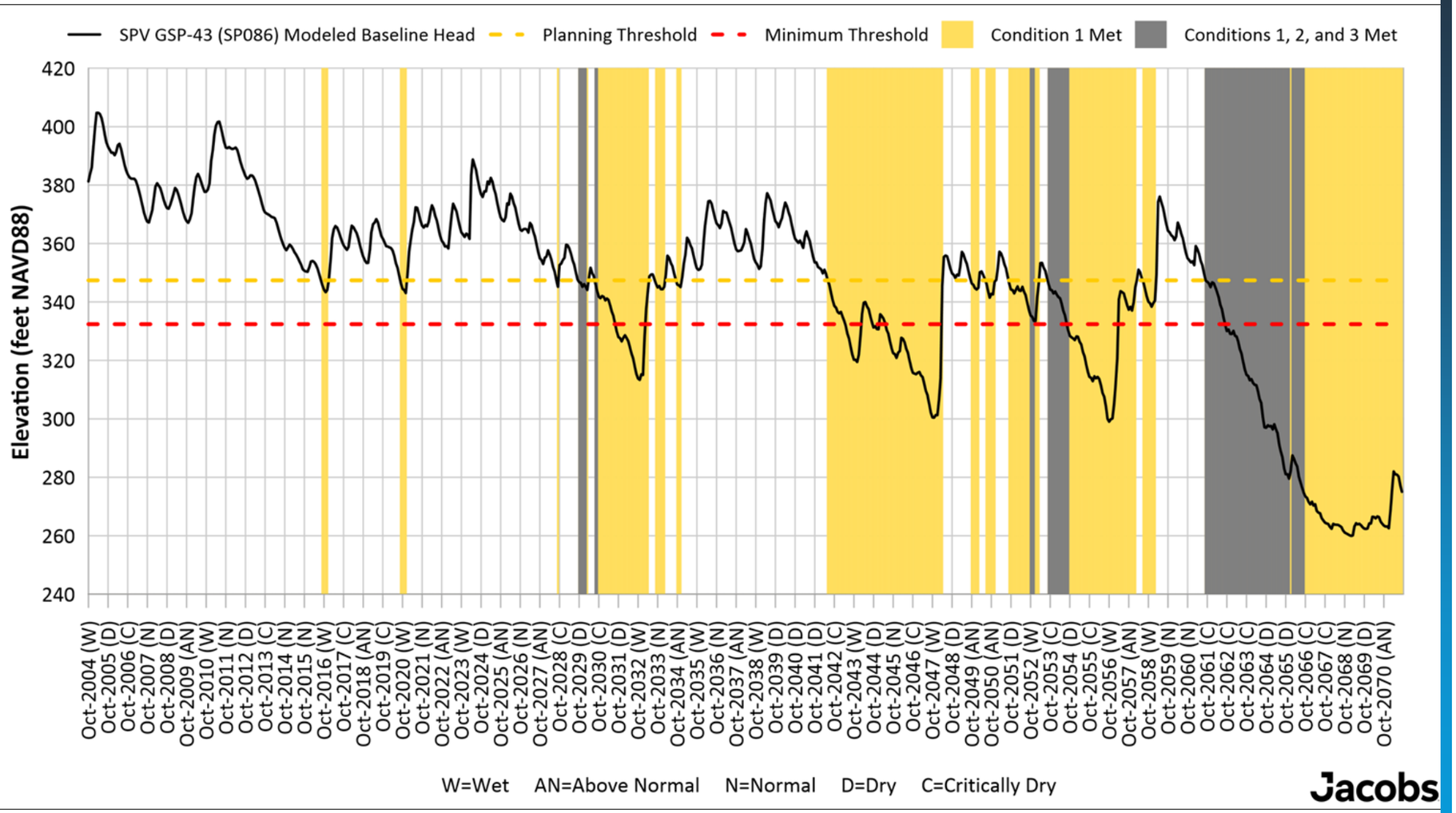
True → Implement Strategy 3D.

Condition 3
The modeled channel at River Mile 3 of Santa Ysabel Creek is dry.

False → Do not implement recharge strategy.

True → Implement Strategy 2A or 3A.

Timing for When Strategies 2A or 3A are Implemented (Conditions 1, 2, & 3 are Met)



Strategies 2A, 3A, & 3D

Condition 1
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Do not implement recharge strategy.

True

Implement Strategy 3D.

Condition 3
The modeled channel at River Mile 3 of Santa Ysabel Creek is dry.

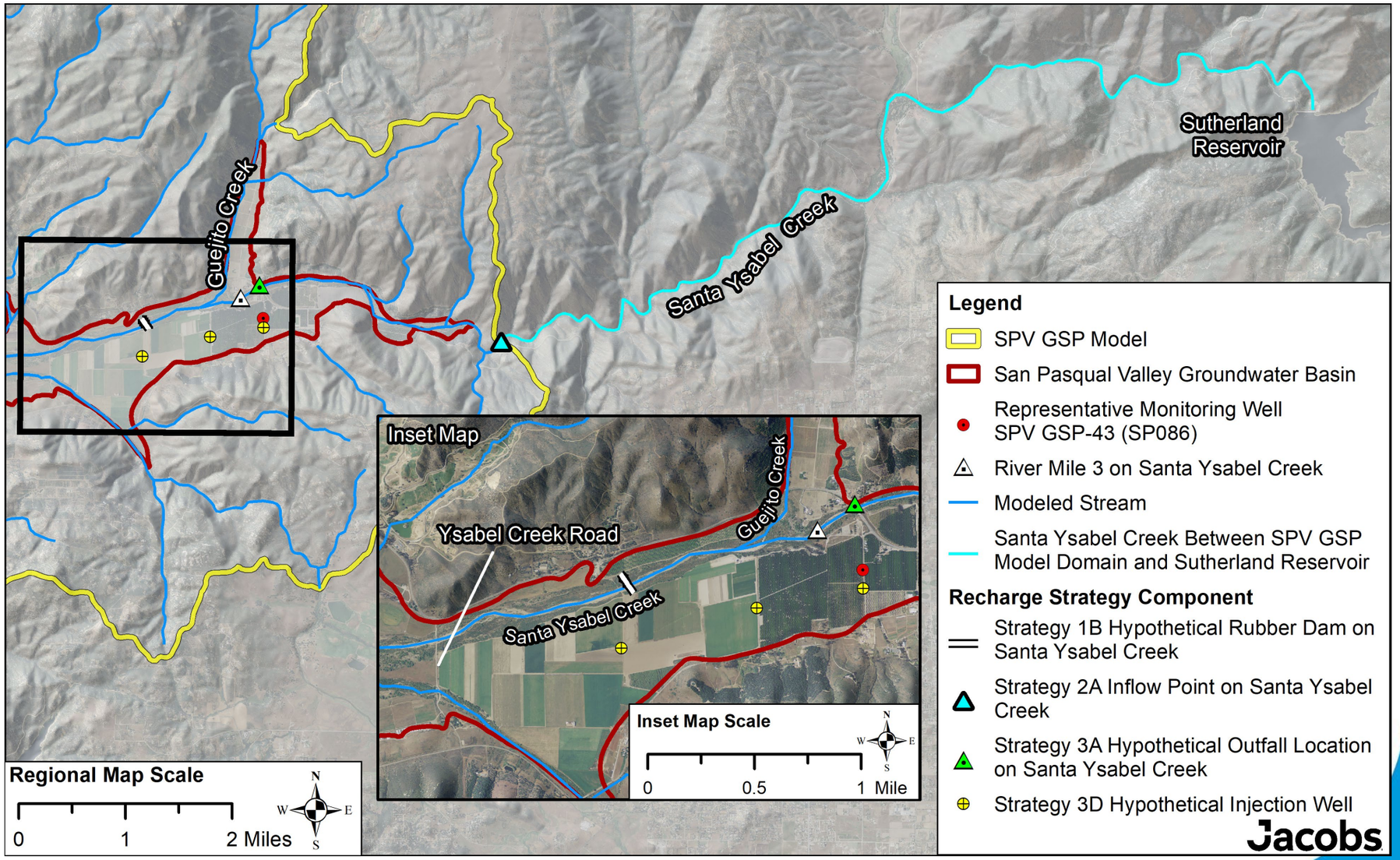
False

True

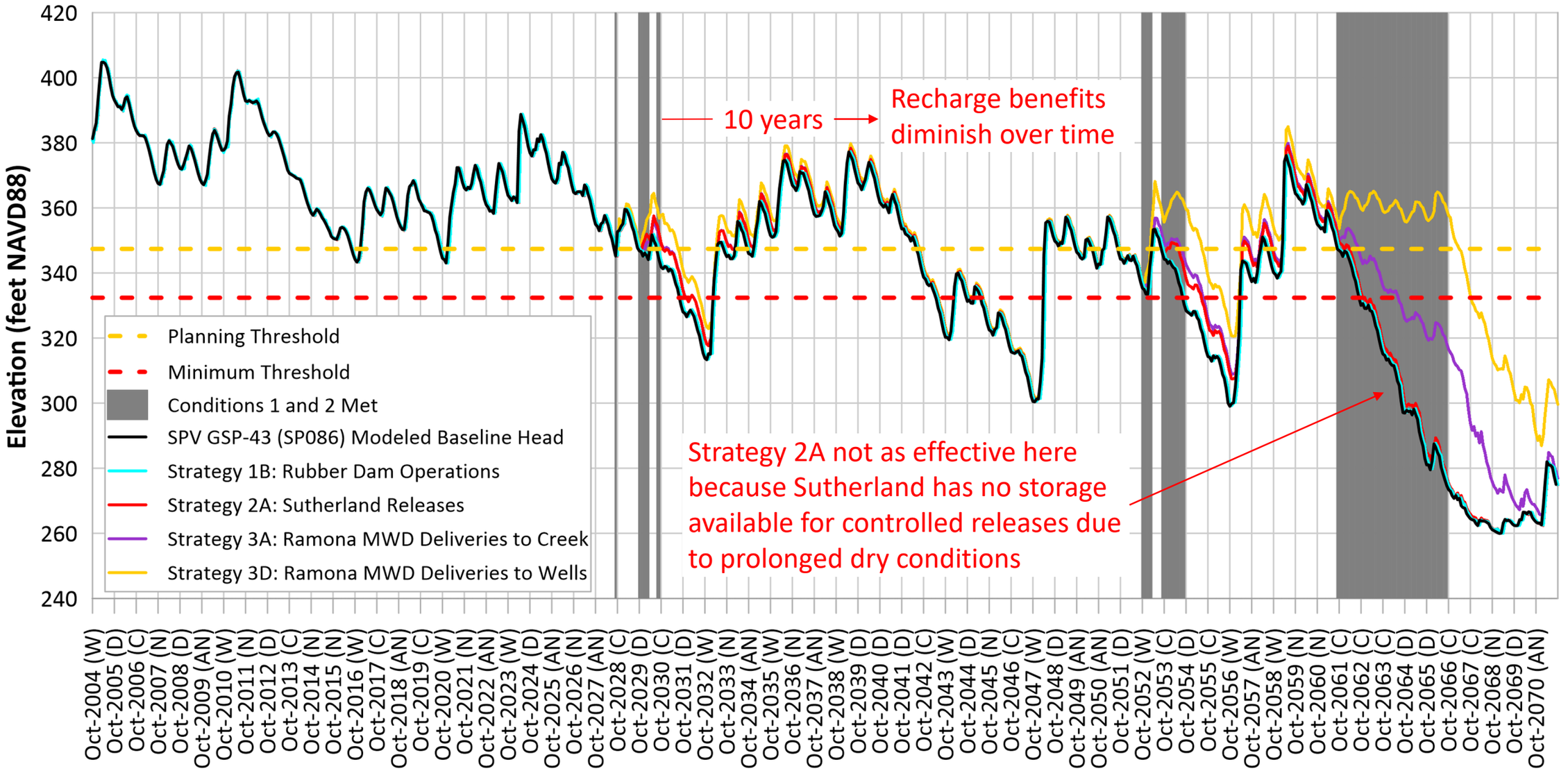
Implement Strategy 2A or 3A.

Recharge Strategies Selected for Further Evaluation

- **Strategy 1B:** Enhance Streamflow Infiltration with In-stream Modifications
- **Strategy 2A:** Augment Santa Ysabel Creek Streamflow with Sutherland Controlled Releases
- **Strategy 3A:** Augment Santa Ysabel Creek Streamflow with Ramona MWD Deliveries
- **Strategy 3D:** Injection Wells with Ramona MWD Deliveries



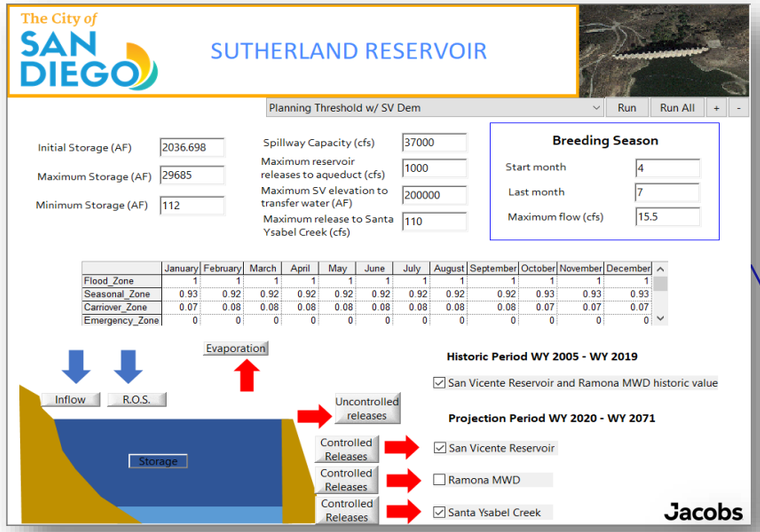
Results from Implementing Recharge Strategies: Example SPV GSP-43 (SP086) Modeled Hydrographs



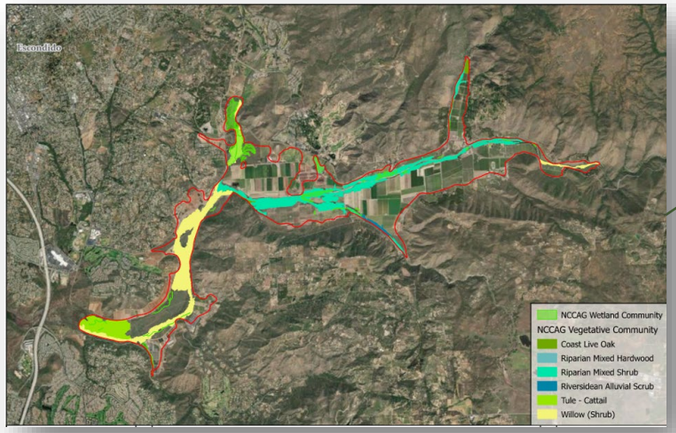
W=Wet AN=Above Normal N=Normal D=Dry C=Critically Dry

Evaluation Criteria Data Sources

GoldSim Sutherland Model



NCCAG Data



Criterion 1: Reduction of Modeled Deficit in GW Storage

Criterion 2: Average Reduction of Depth to Water

Criterion 3: Fewer Exceedances of MTs

Criterion 4: Efficiency of Recharge Strategy

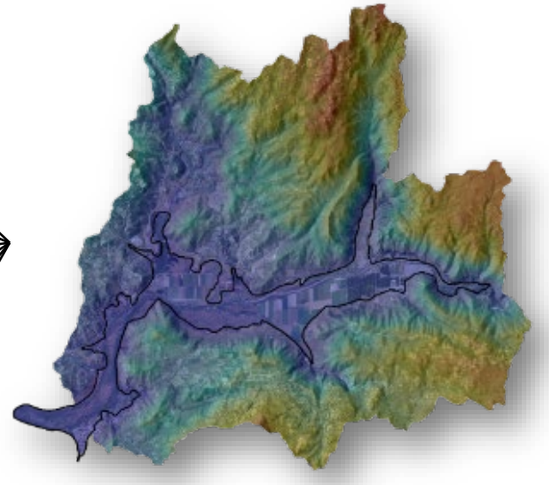
Criterion 5: Average Reduction of Groundwater TDS Concentrations

Criterion 6: Fewer Consecutive Days GW Levels are Below 30 Feet BGS

Criterion 7: Cost of Implementation & Maintenance

Criterion 8: Feasibility of Implementation and Maintenance

SPV GSP Model v2.0



Woodard & Curran

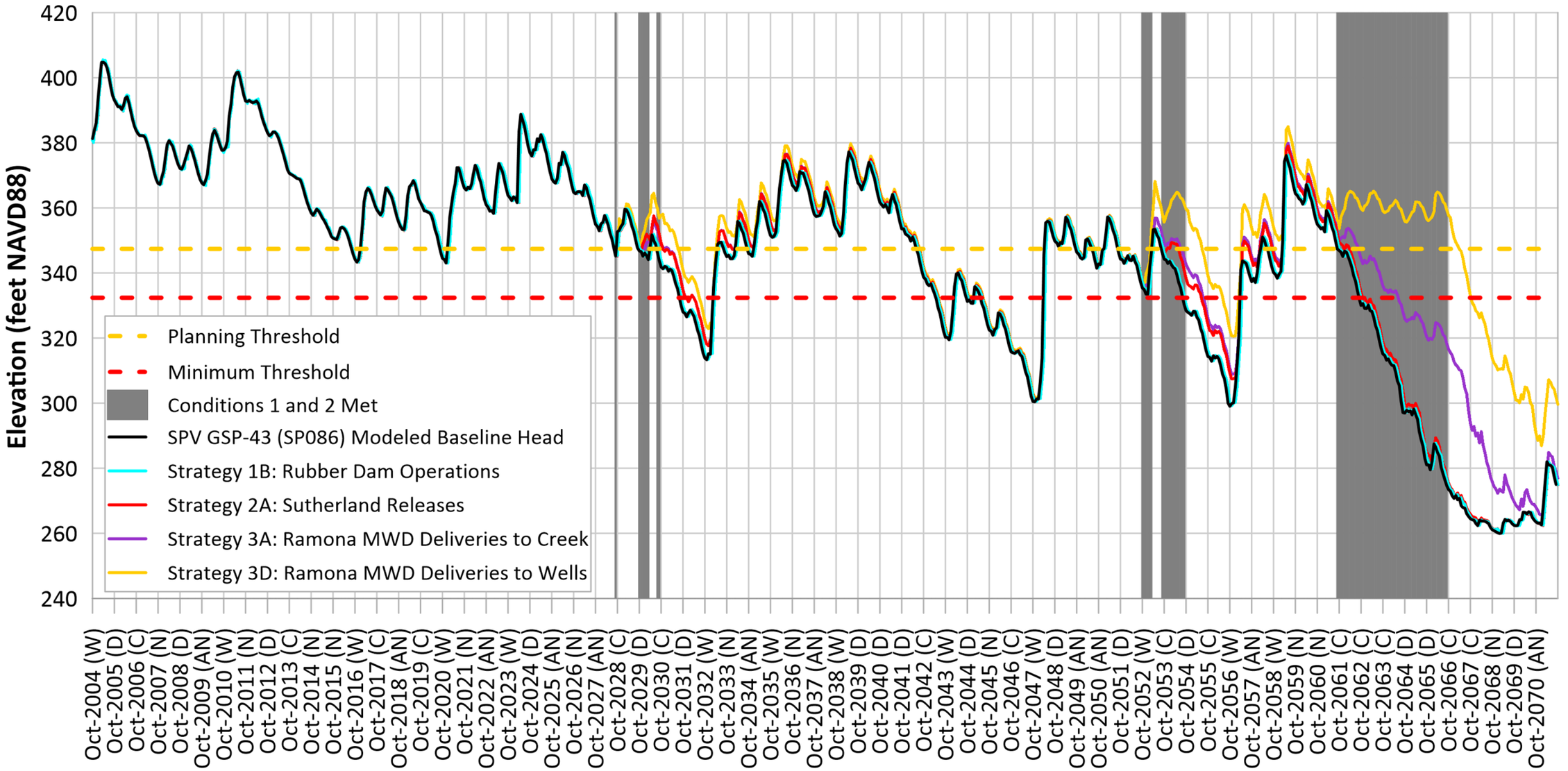
Jacobs

Evaluation of Selected Recharges Strategies

Recharge Strategy	**Criterion 1** Reduction of Modeled Deficit in Groundwater Storage (AF)	**Criterion 2** Average Reduction of Depth to Water (feet bgs)	**Criterion 3** Fewer Exceedances of Minimum Thresholds (count)	**Criterion 4** Efficiency of Recharge Strategy (percent)	**Criterion 5** Average Reduction of Groundwater TDS Concentration (mg/L)	**Criterion 6** Fewer Consecutive Days Groundwater Levels are Below 30-feet bgs
1B–Enhance Streamflow Infiltration with In-stream Modifications	-1	0	4	110	-0.3	0
2A–Augment Streamflow with Sutherland Controlled Releases	0	1	41	84	3.1	1
3A–Augment Streamflow with Ramona MWD Deliveries	17	4	208	93	3.1	2
3D–Injection Wells with Ramona MWD Deliveries	80	10	476	97	6.7	10
Larger positive values indicate larger benefits from implementing the recharge strategy.						

These values along with those for Evaluation Criteria 7 (cost) and 8 (feasibility) will be ranked as part of the draft Preliminary Feasibility Study, which will be completed in 2023.

Results from Implementing Recharge Strategies: Example SPV GSP-43 (SP086) Modeled Hydrographs



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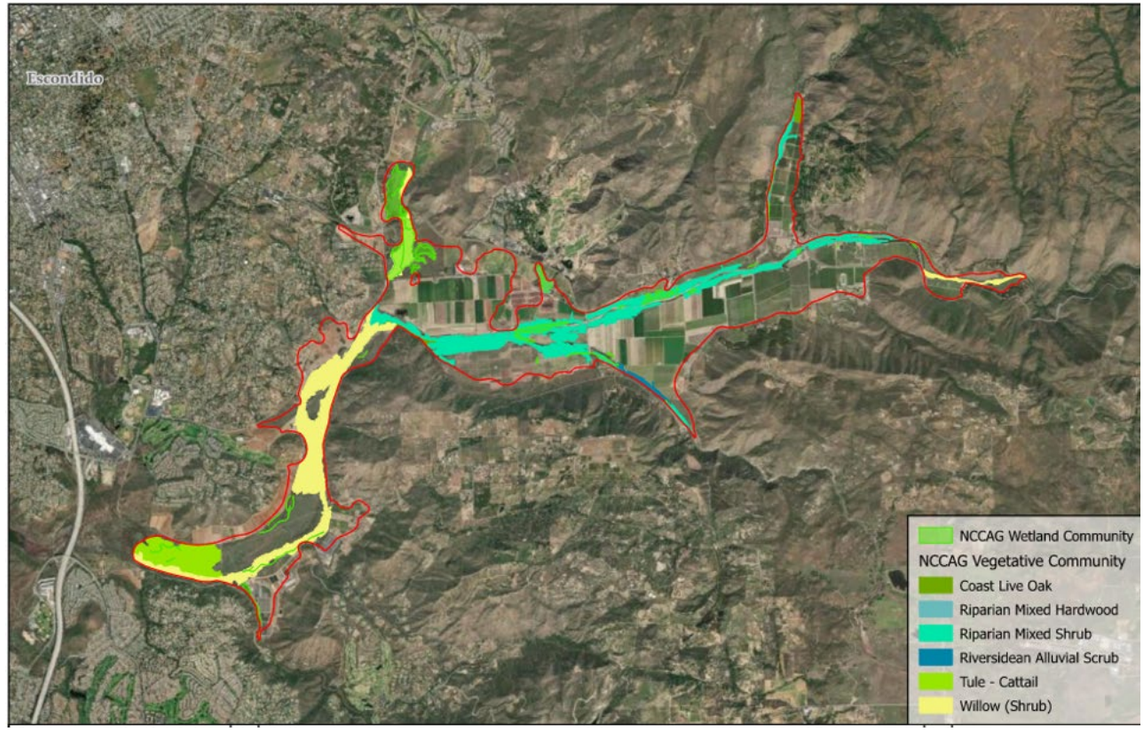
Task 6: Evaluation of Possible Benefits to Potential GDEs

Potential GDEs

- Groundwater Dependent Ecosystems (GDEs) are defined under SGMA as ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface.
- Potential GDEs and Potential Non-GDEs were identified in the 2021 GSP

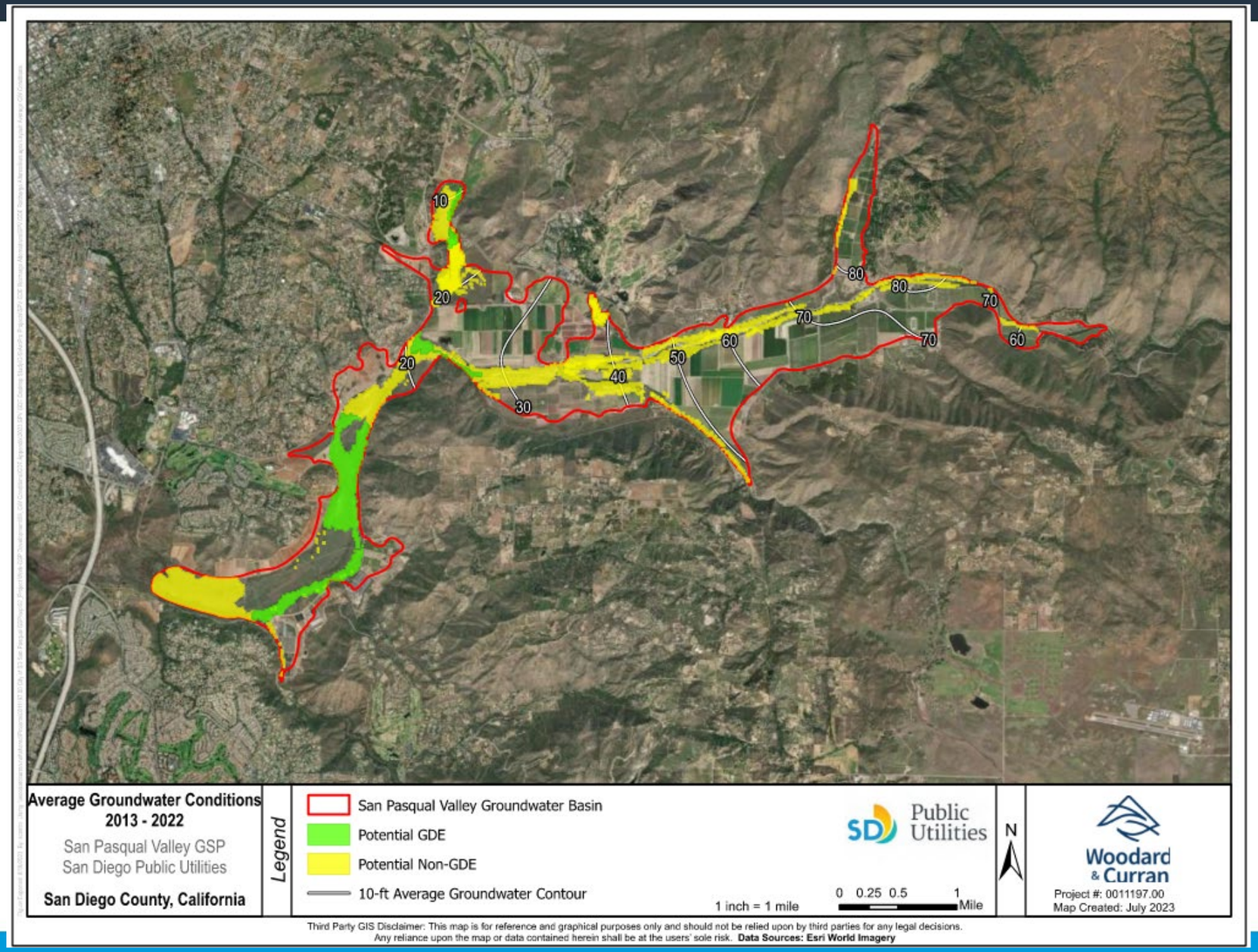


Vegetation Communities in GDEs

Community Type	Community Average Maximum Root Depth (feet bgs)	Present within Target Recharge Area
Vegetative Community		
Coast Live Oak Alliance	35	No
Riparian Mixed Hardwood Alliance	8	No
Riparian Mixed Shrub Alliance	**23**	**Yes**
Riversidean Alluvial Scrub Alliance	15	No
Tule – Cattail Alliance	1	No
Willow (Shrub) Alliance	**14**	**Yes**
Wetland Community		
Palustrine Emergent Marsh (PEM)	**1**	**Yes**
Palustrine Scrub-Shrub (PSS)	**13**	**Yes**
Palustrine Forested (PFO)	14	No

Potential GDEs in the target recharge areas had community average maximum rooting depths between 1 and 23 feet.

Potential GDEs and Historical Groundwater Levels



Modeled changes to Potential GDEs

Recharge Strategy	Baseline Potential GDE Area (acres)	Modeled Potential GDE Area West of Ysabel Ck Rd/ Percent Change	Modeled Potential GDE Area East of Ysabel Ck Rd/ Percent Change
Implementation Year 2030			
Recharge Strategy 1B	198.45	198.68 / 1.00%	0.00 / 0%
Recharge Strategy 2A		199.36 / 1.00%	0.00 / 0%
Recharge Strategy 3A		207.55 / 1.05%	0.00 / 0%
Recharge Strategy 3D		210.05 / 1.06%	0.00 / 0%

Additional surface water flows in Strategy 1B, 2A, and 3A could provide benefits to potential GDEs or sensitive species that may exist that relay on riparian and wetland areas or benefits to potential non-GDEs via near-surface root hydration.

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PUBLIC COMMENT

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NEXT STEPS & CLOSING REMARKS

Next Steps

- **Stakeholder comments on TMs 5 and 6 requested by September 14 to SDomasco@sandiego.gov**

- Prepare Draft Preliminary Feasibility Study (PFS) based on body of work from six TMs
- Final workshop on PMA 7: Surface Water Recharge Evaluation in December will focus on the draft PFS

Surface Water Recharge Evaluation: Schedule

Scope Task		2022										2023												2024		
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SPV GSP Implementation

Status of Management Action (MA) Implementation:

- **MA 3 –** Support Water Quality Improvement Plan (WQIP) Actions – *Continuous*
- **MA 4 –** Coordinate/Collaborate Regionally with Other Entities to Perform Monitoring & Implement Regional Projects – *Continuous*
- **MA 5 –** Education & Outreach for TDS & Nitrate – *Emailed to Stakeholders and posted online*
- **MA 6 –** Coordinate with City on Hodges Watershed Improvement Project – *Continuous*
- **MA 7 –** Initial Surface Water Recharge Evaluation – *Underway*
- **MA 8 –** Study GDEs, Phase I Desktop Study – *Underway*

GSP Resources

- San Pasqual Valley GSP Website
  - https://www.sandiegocounty.gov/content/sdc/pds/SGMA/san-pasqual-valley.html
- San Pasqual Valley GSP
  - https://sgma.water.ca.gov/portal/gsp/preview/75
  - Annual Report for Water Years 2020, 2021, and 2022
  - https://sgma.water.ca.gov/portal/gspar/preview/140
- San Pasqual Valley GSP Data Management System (Opti)
  - https://opti.woodardcurran.com/sanpasqual/login.php

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THANK YOU!