Salinas Valley Basin GSA

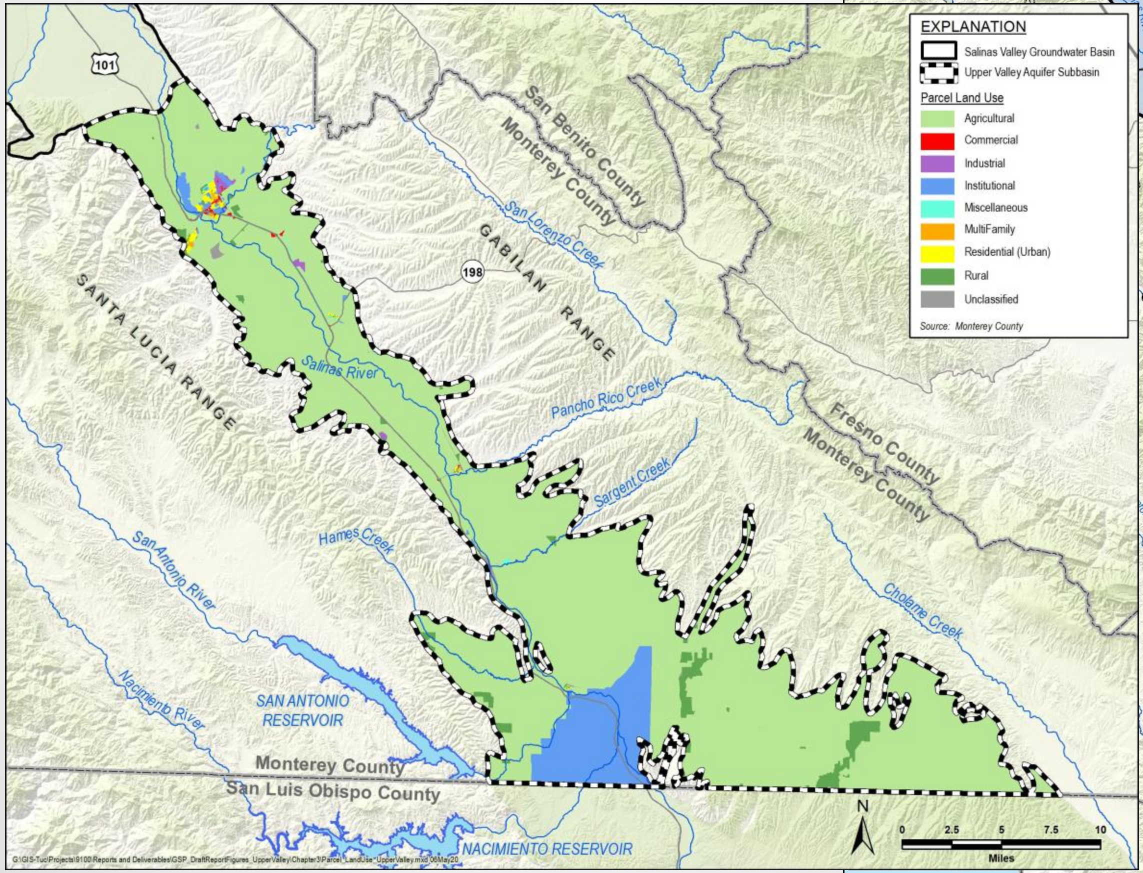
Upper Valley GSP Overview

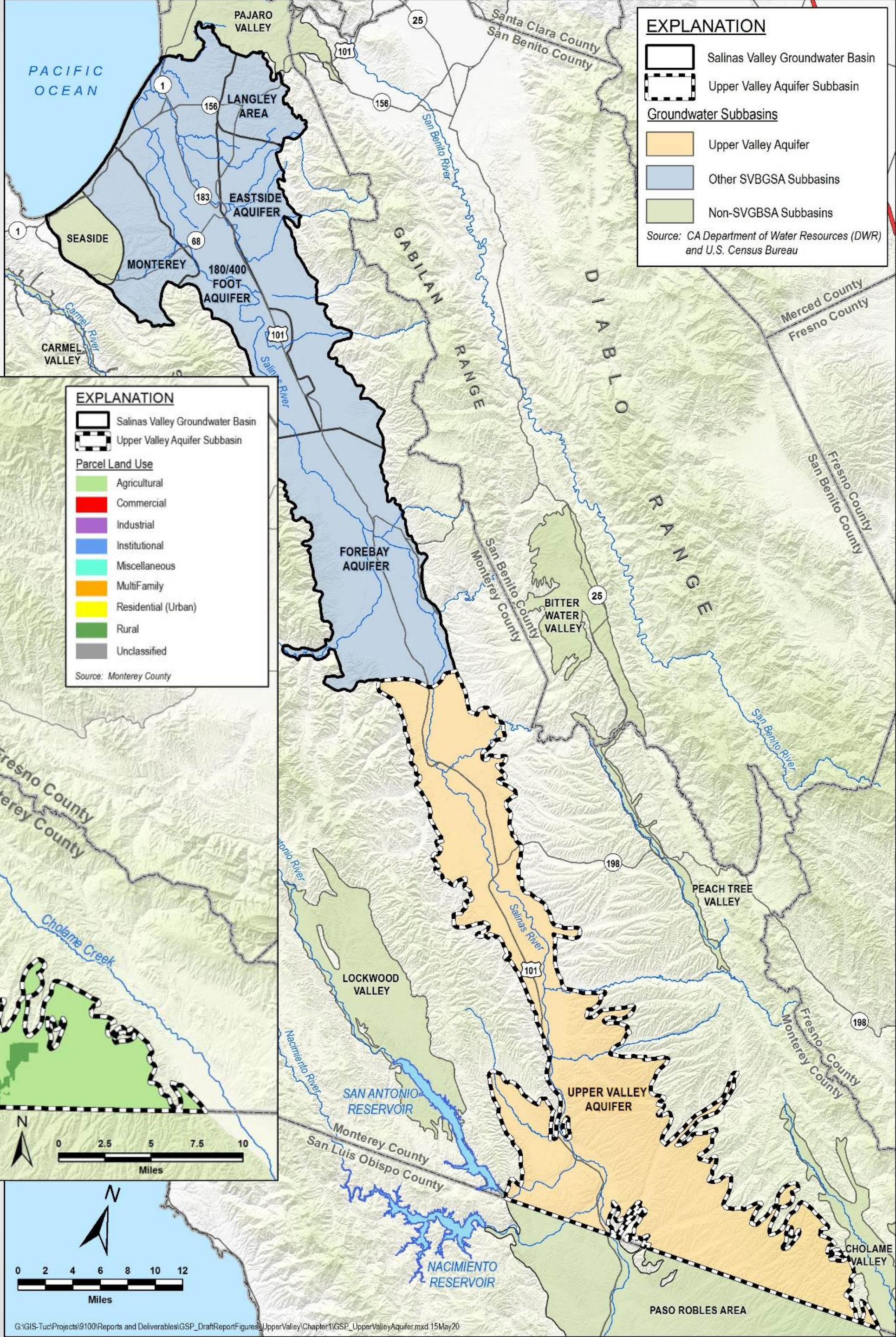
Presented to SVBGSA Advisory Committee
June 17, 2021

MONTGOMERY & ASSOCIATES

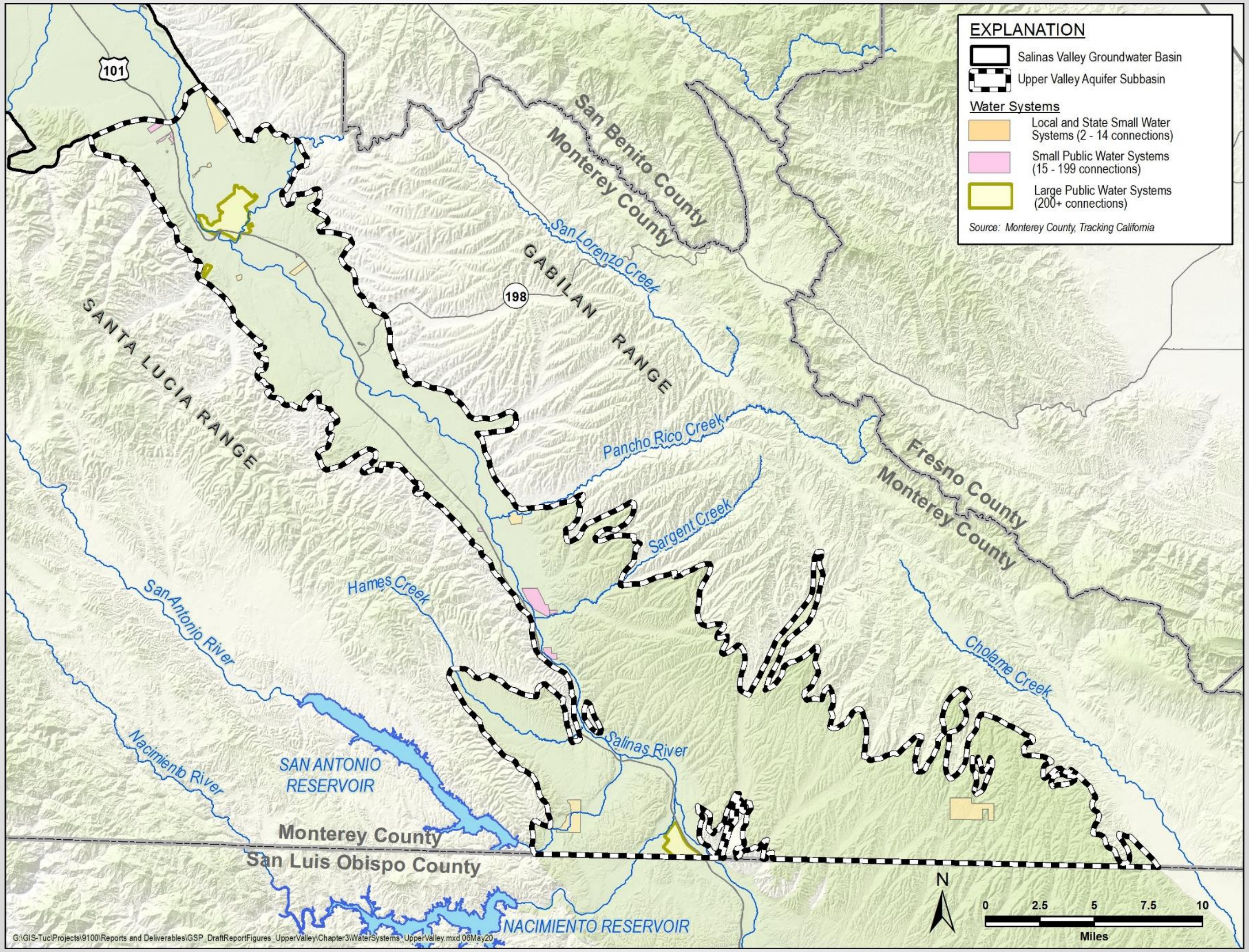
Upper Valley Aquifer Subbasin

- 237,670 acres
- Most land designated agricultural (72,102, irrigated; 136,496, dry)

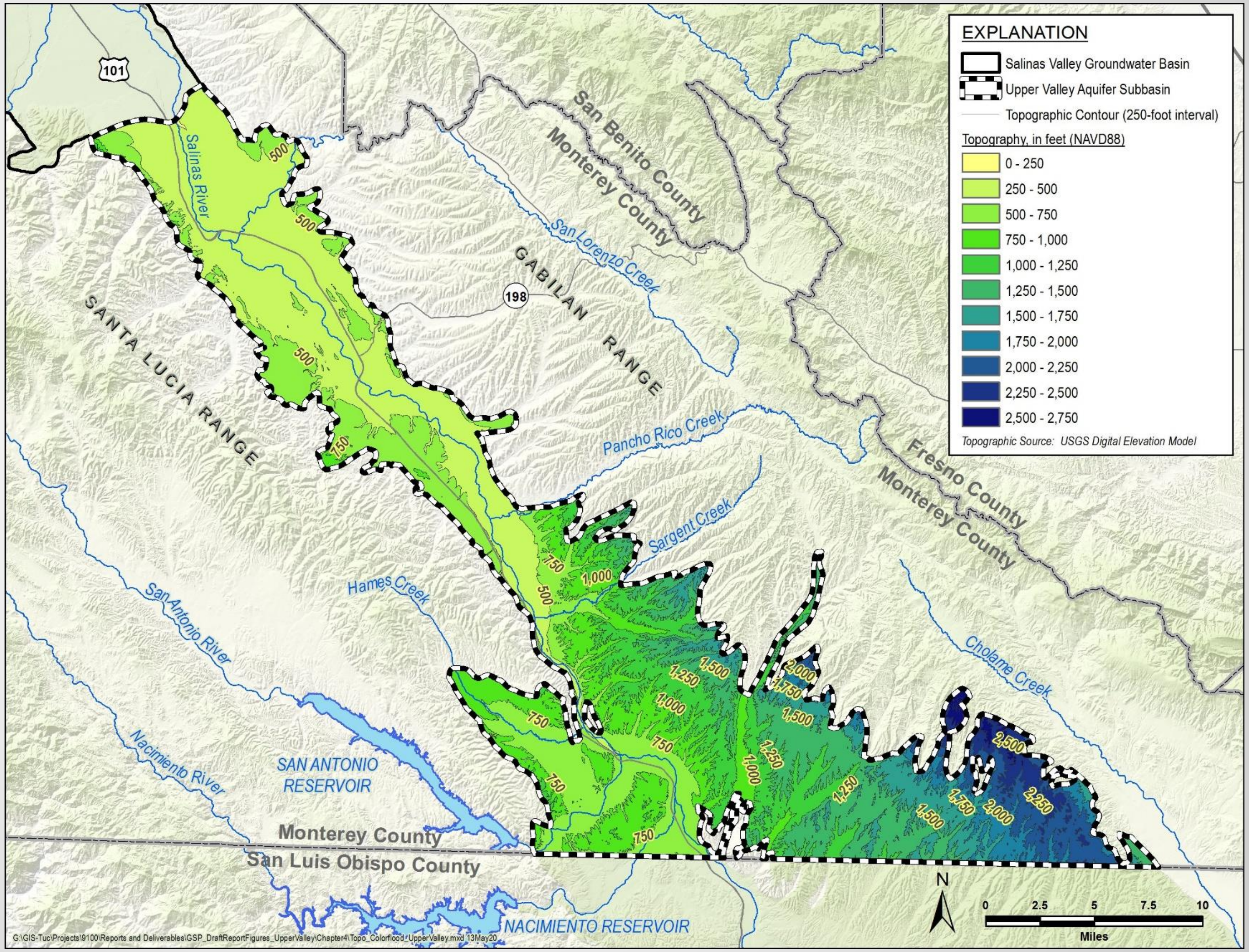




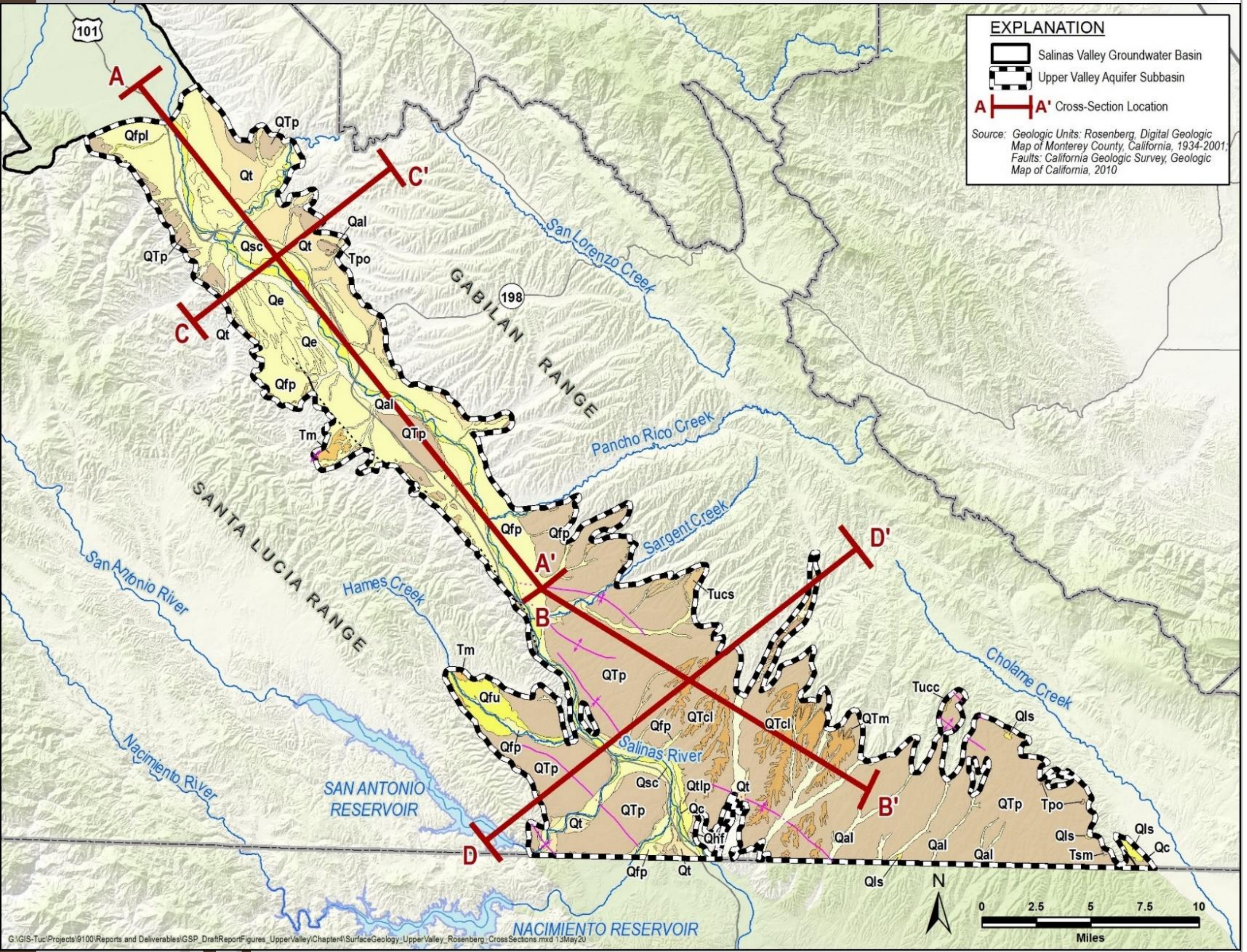
Communities Dependent on Groundwater

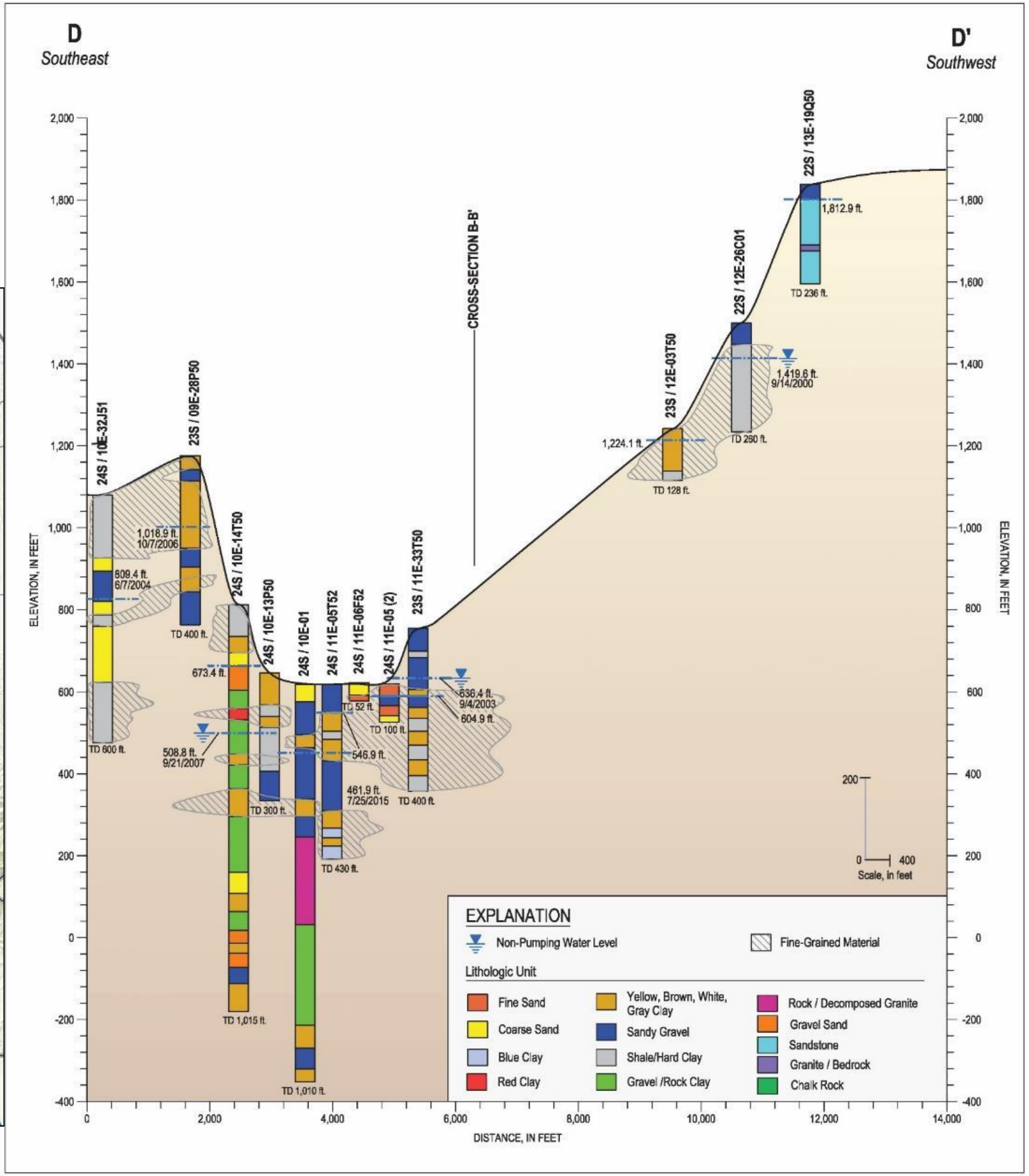


Basin Setting - Topography



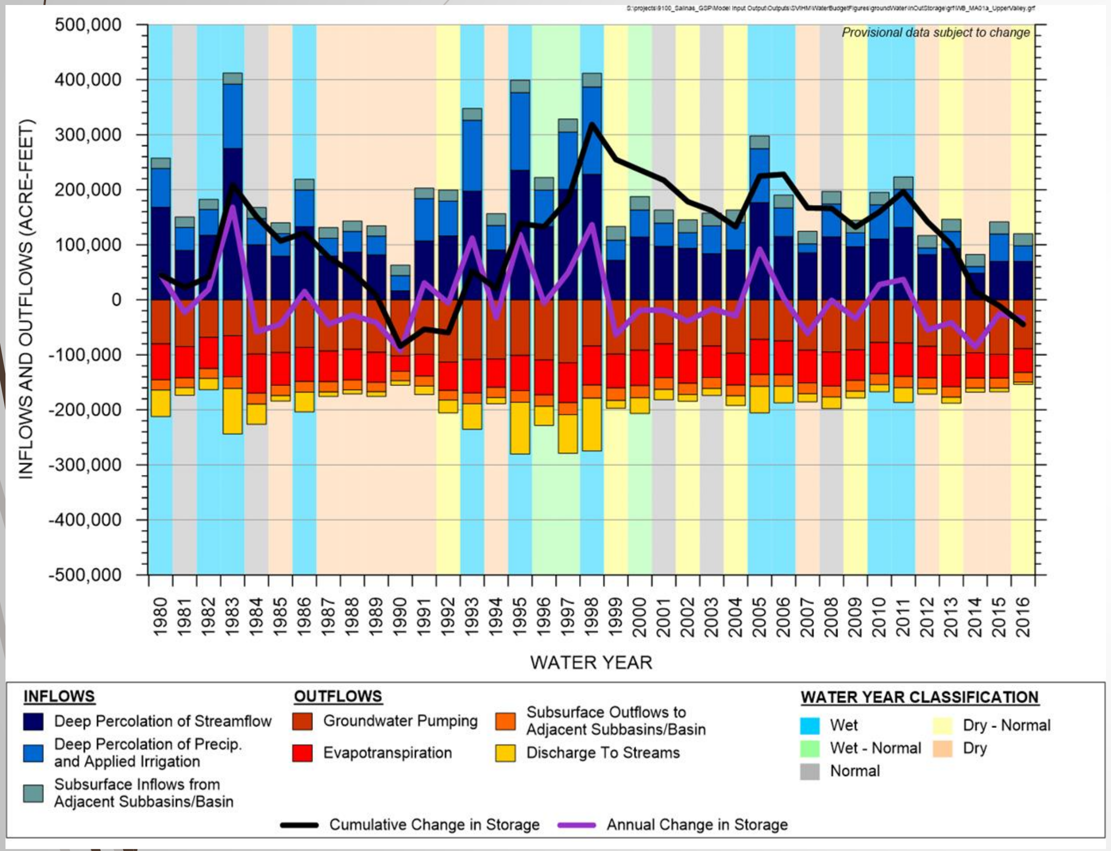
Hydrogeologic Conceptual Model





Groundwater Budget

Updated Water Budget



	Historical Average (WY 1980-2016)	2030	2070
Groundwater Pumping	-91,606	-87,200	-90,900
Net Stream Exchange	89,097	72,500	73,200
Deep Percolation of Precipitation & Applied Irrigation	57,342	61,200	66,700
Net flow to Adjacent Subbasins/Basin	1,903	7,800	8,300
Groundwater Evapotranspiration	-57,946	-43,800	-46,300
Net Storage Gain (+) or Loss (-)	-1,210	10,200	10,800

Provisional data subject to change.
Units are acre-feet per year.
Negative values indicate a loss of groundwater.

Sustainable Yield = pumping + change in storage

Updated Water Budget

Model results

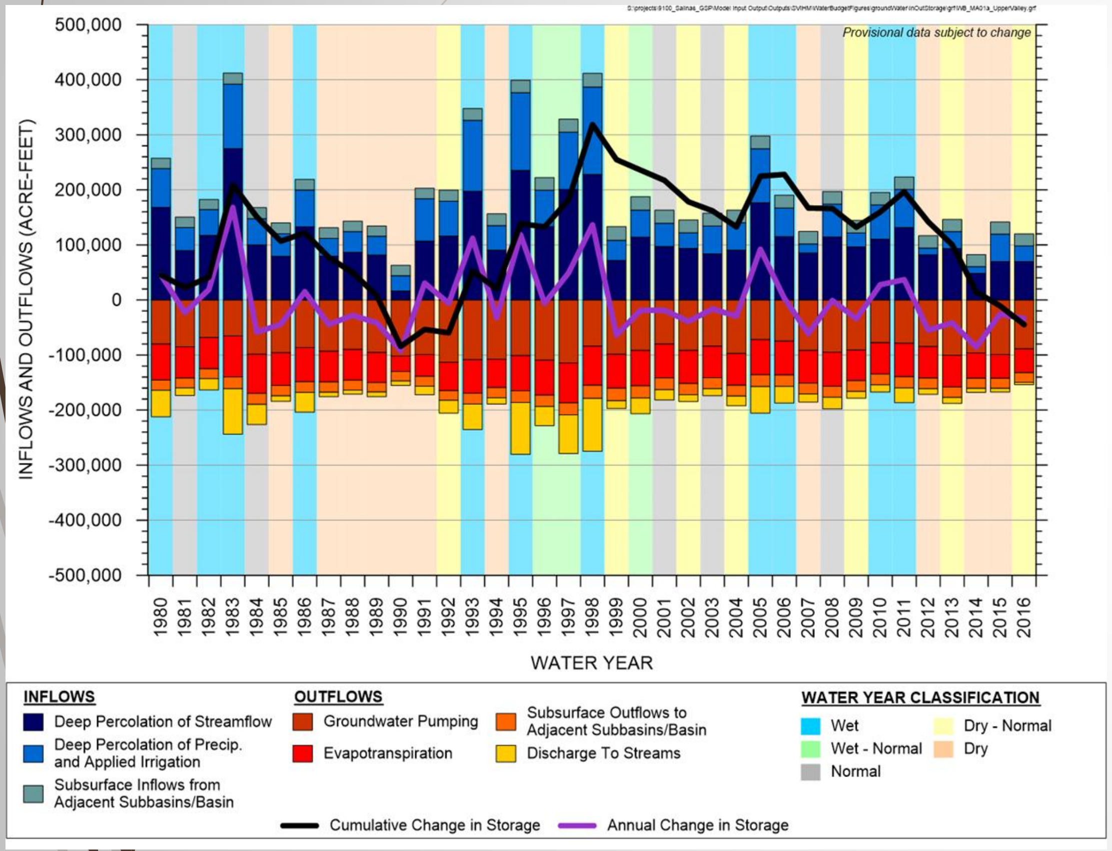
	Historical (WY 1980-2016) Sustainable Yield	2030 Projected Sustainable Yield	2070 Projected Sustainable Yield
Groundwater Pumping	91,600	87,200	90,900
Change in Storage	-1,200	10,200	10,800
Projected Sustainable Yield	54,900	97,400	101,700
% Pumping Change	1% decrease	12% increase	12% increase

Model results adjusted based on GEMS pumping data

	Historical Sustainable Yield Range	2030 Projected Sustainable Yield	2070 Projected Sustainable Yield
Groundwater Pumping	108,480 to 129,560	114,000	118,800
Change in Storage	0	0	0
Projected Sustainable Yield	108,480 to 129,560	114,000	118,800

Provisional data subject to change.
Units are acre-feet per year.
Negative values indicate a loss of groundwater.

Groundwater Budget Summary



- Overall – there is no chronic decline in water levels and Upper Valley is in balance
- Historical and future water budgets are both averages of many years/hydrologic periods
- Current water budget is a snapshot and does not tell us much since it only views change from one year to the next
- Future water budget incorporates average climate change, but does not represent short-term climate change effects

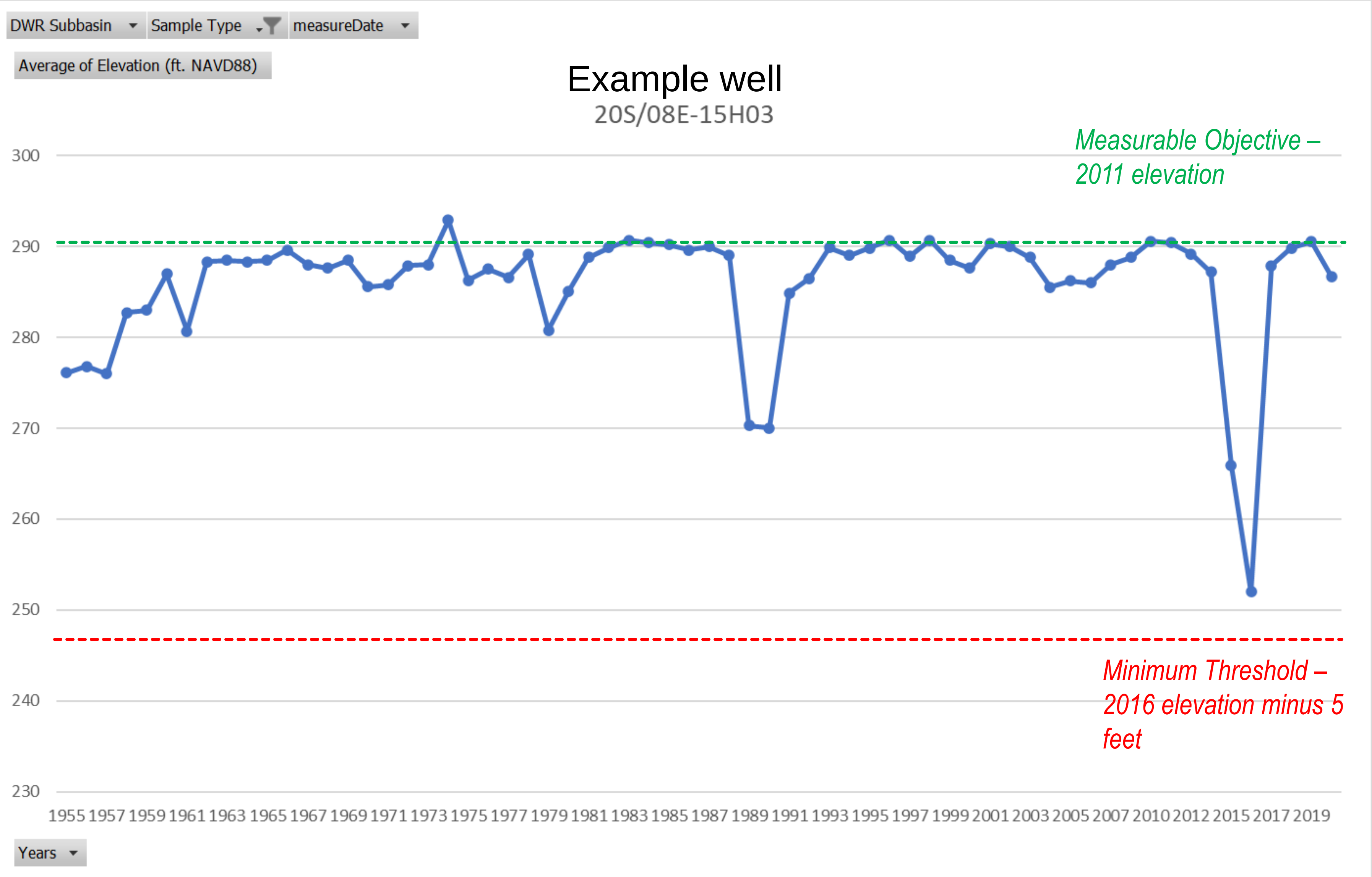
Groundwater conditions/SMC – **Groundwater Levels**

1. Chronic Lowering of Groundwater Levels

Measurable Objective (MO):
Set to 2011 groundwater elevations.

Minimum Threshold (MT):
Set to 5 feet below the lowest groundwater elevation between 2012 and 2016.

Undesirable Result:
More than 15% of groundwater elevation minimum thresholds are exceeded.



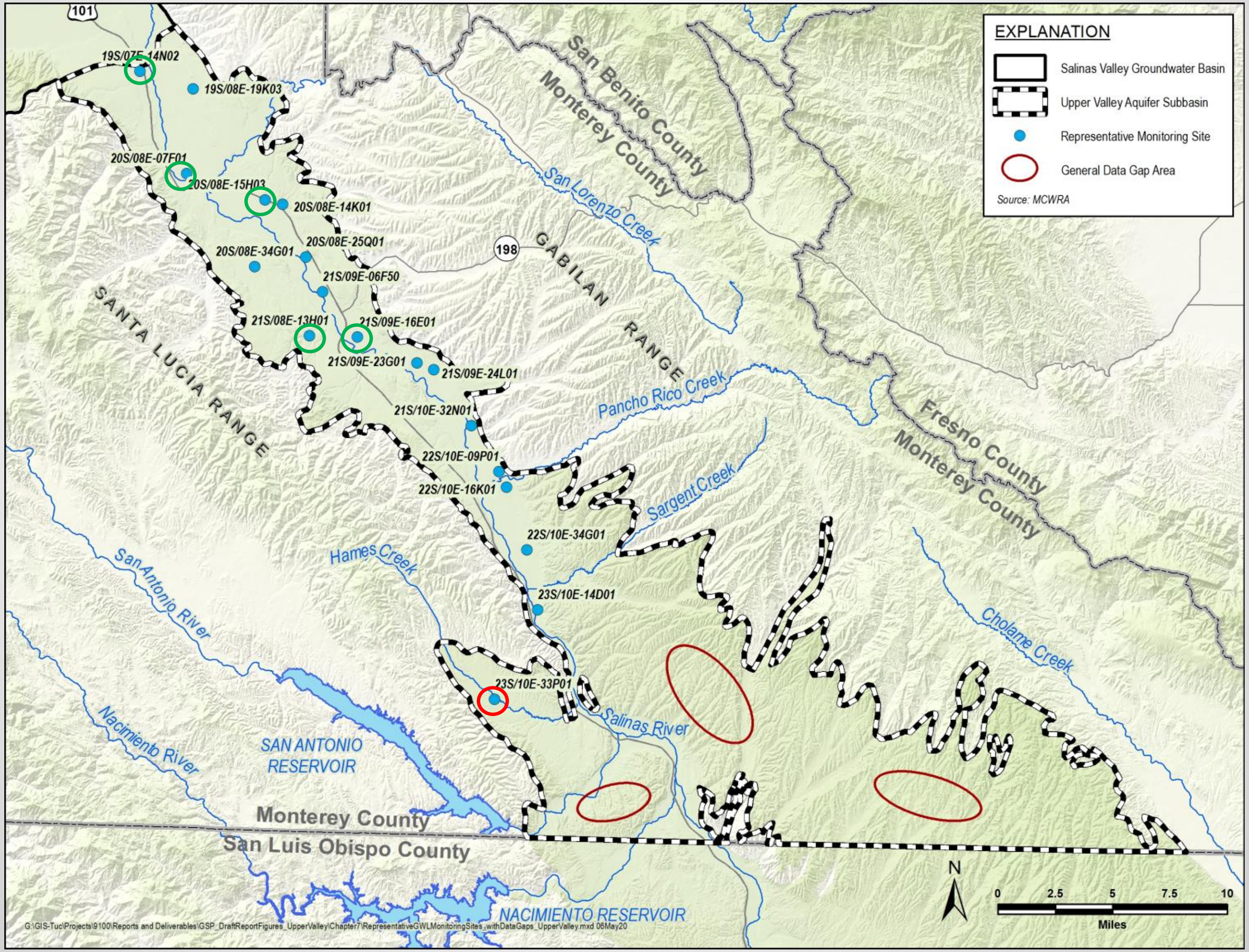
Groundwater conditions/SMC – **Groundwater Levels**

1. Chronic Lowering of Groundwater Levels

Measurable Objective (MO):
Set to 2011 groundwater elevations.

Minimum Threshold (MT):
Set to 5 feet below the lowest groundwater elevation between 2012 and 2016.

Undesirable Result:
More than 15% of groundwater elevation minimum thresholds are exceeded.



Representative Monitoring Sites

Wells with groundwater levels above the MO in 2019 are circled in GREEN

Wells with groundwater levels below the MT in 2019 are circled in RED

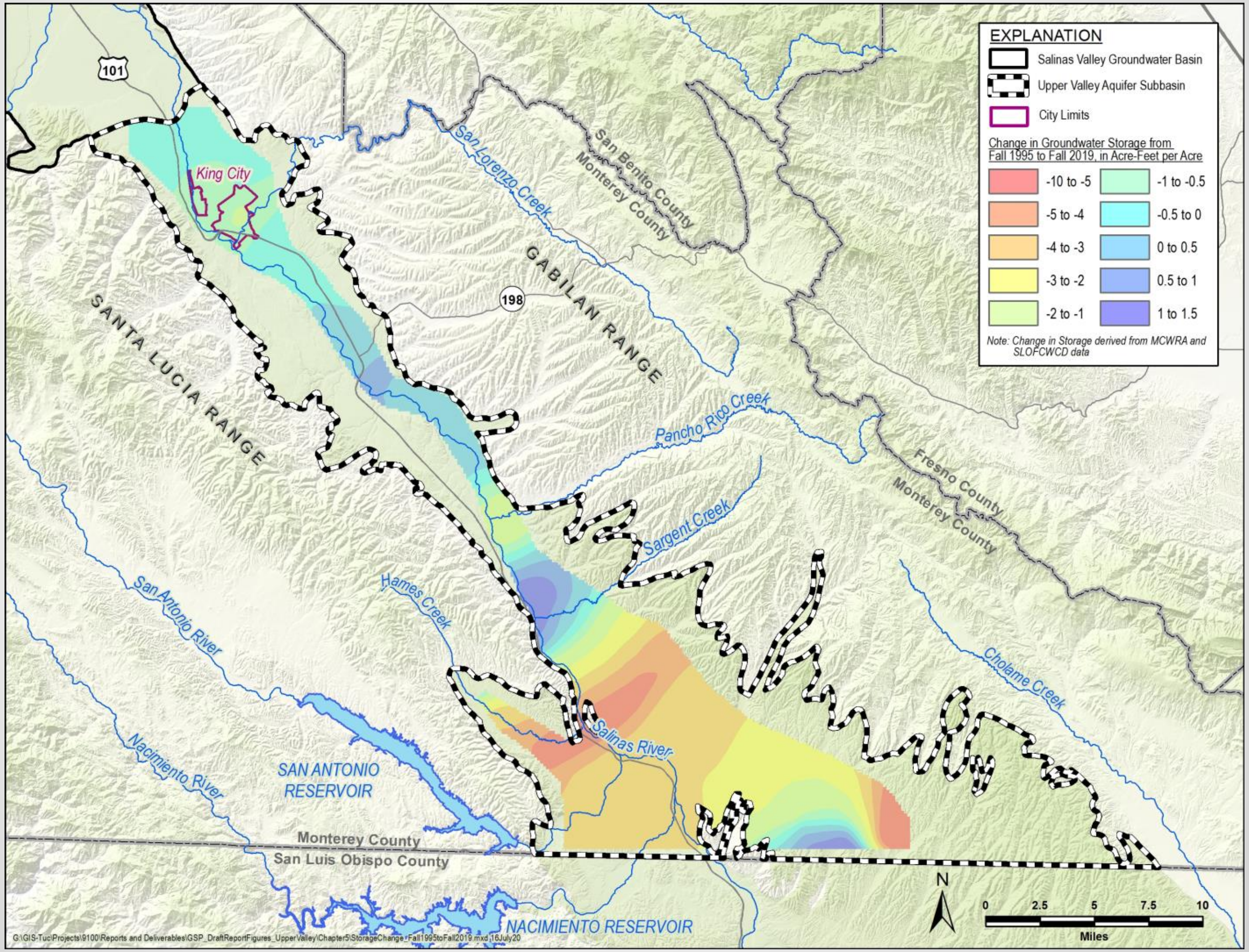
Groundwater conditions/SMC – **Groundwater Storage**

2. Reduction in Groundwater Storage

Measurable Objective (MO):
Established by proxy using groundwater elevations. Set to the same as groundwater levels measurable objectives

Minimum Threshold (MT):
Established by proxy using groundwater elevations. Set to the same as groundwater levels minimum thresholds

Undesirable Result:
More than 15% of groundwater elevation minimum thresholds are exceeded.



Groundwater conditions/SMC – **Water Quality**

4. Degraded Groundwater Quality

Measurable Objective (MO)
Zero additional exceedances of either the regulatory drinking water standards (potable supply wells) or the Basin Plan objectives (irrigation supply wells) beyond those observed in 2019 for groundwater quality constituents of concern.

Minimum Threshold (MT)
Identical to the measurable objective.

Undesirable Result:
The minimum threshold is exceeded as a direct result of projects or management actions taken as part of GSP implementation.

Constituent of Concern (COC)	Number of Wells Sampled for COC	Minimum Threshold/Measurable Objective – Number of Wells Exceeding Regulatory Standard from latest sample
DDW Wells		
Boron	18	2
Lindane	24	2
Benzo(a)Pyrene	22	1
Cadmium	39	1
Dinoseb	29	1
Iron	40	8
Hexachlorobenzene	20	1
Manganese	39	6
Nitrate (as nitrogen)	44	8
Specific Conductance	40	5
Sulfate	40	4
1,2,3-Trichloropropane	37	4
Total Dissolved Solids	37	7
Vinyl Chloride	44	1
ILRP On-Farm Domestic Wells		
Chloride	74	7
Nitrate (as nitrogen)	**72**	**30**
Nitrate + Nitrite (sum as nitrogen)	**28**	**11**
Specific Conductance	**72**	**33**
Sulfate	**74**	**26**
Total Dissolved Solids	**74**	**35**
ILRP Irrigation Wells		
Chloride	133	13

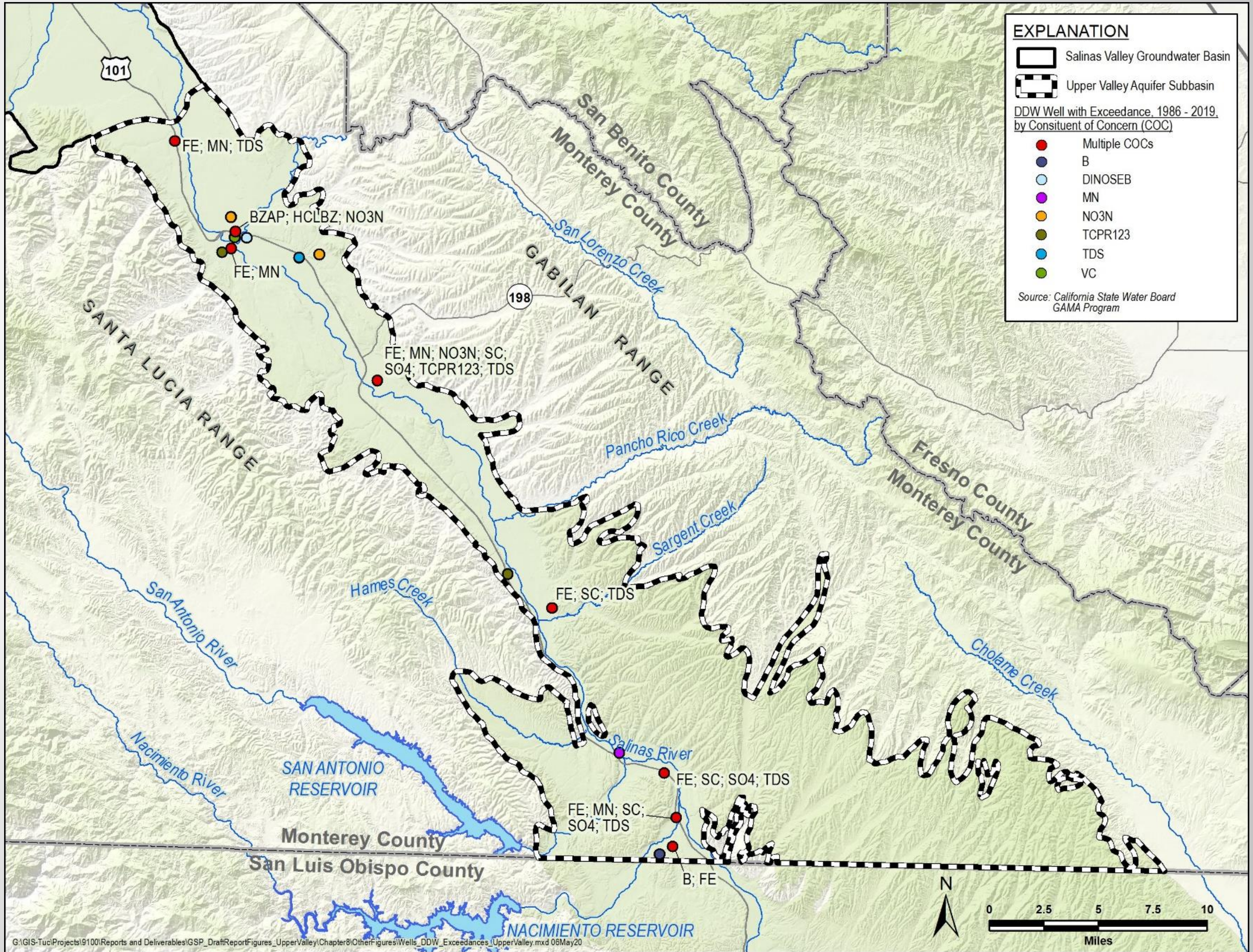
Groundwater conditions/SMC – Current Water Quality Exceedance Maps

4. Degraded Groundwater Quality

Measurable Objective (MO)
Zero additional exceedances of either the regulatory drinking water standards (potable supply wells) or the Basin Plan objectives (irrigation supply wells) beyond those observed in 2019 for groundwater quality constituents of concern.

Minimum Threshold (MT)
Identical to the measurable objective.

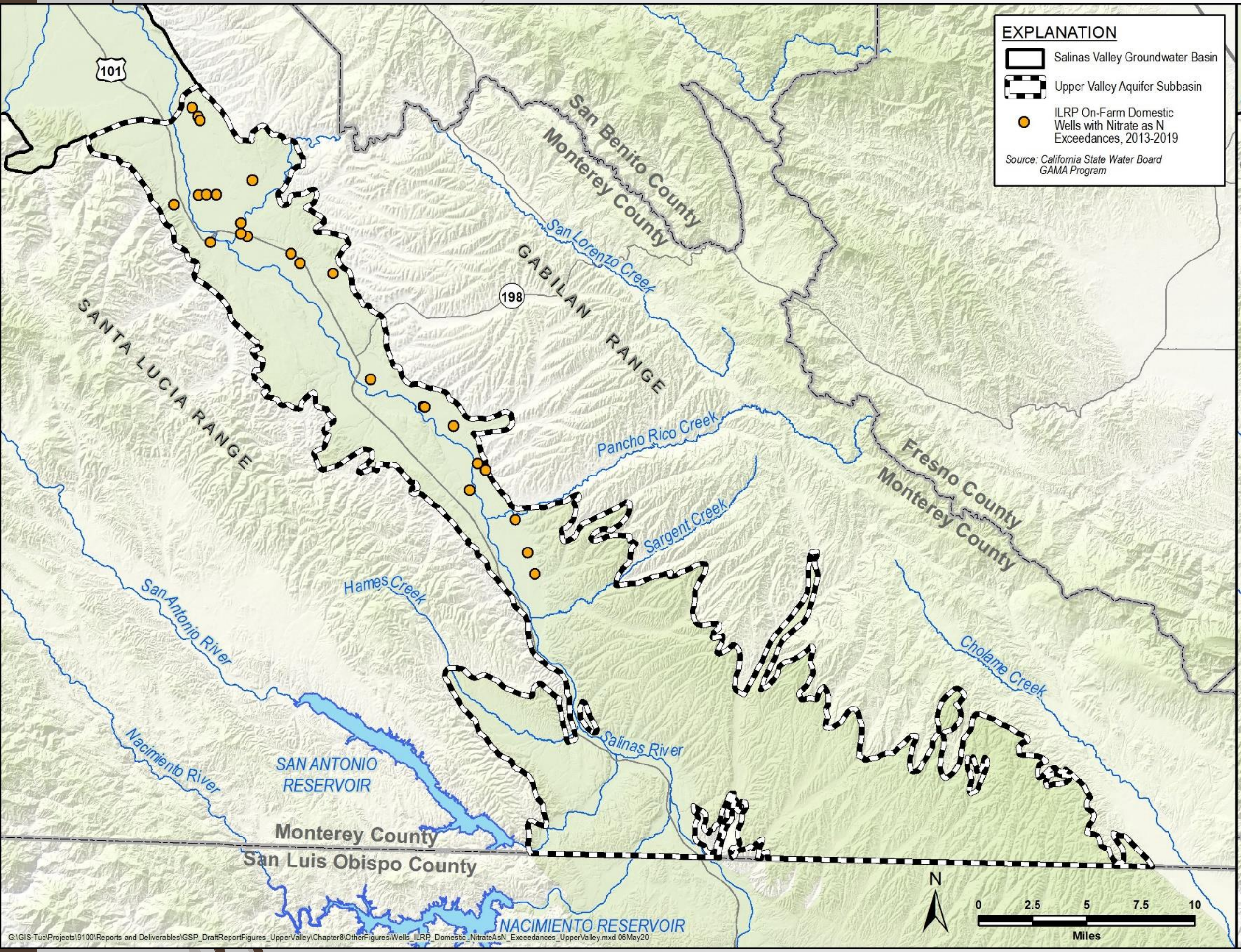
Undesirable Result:
The minimum threshold is exceeded as a direct result of projects or management actions taken as part of GSP implementation.



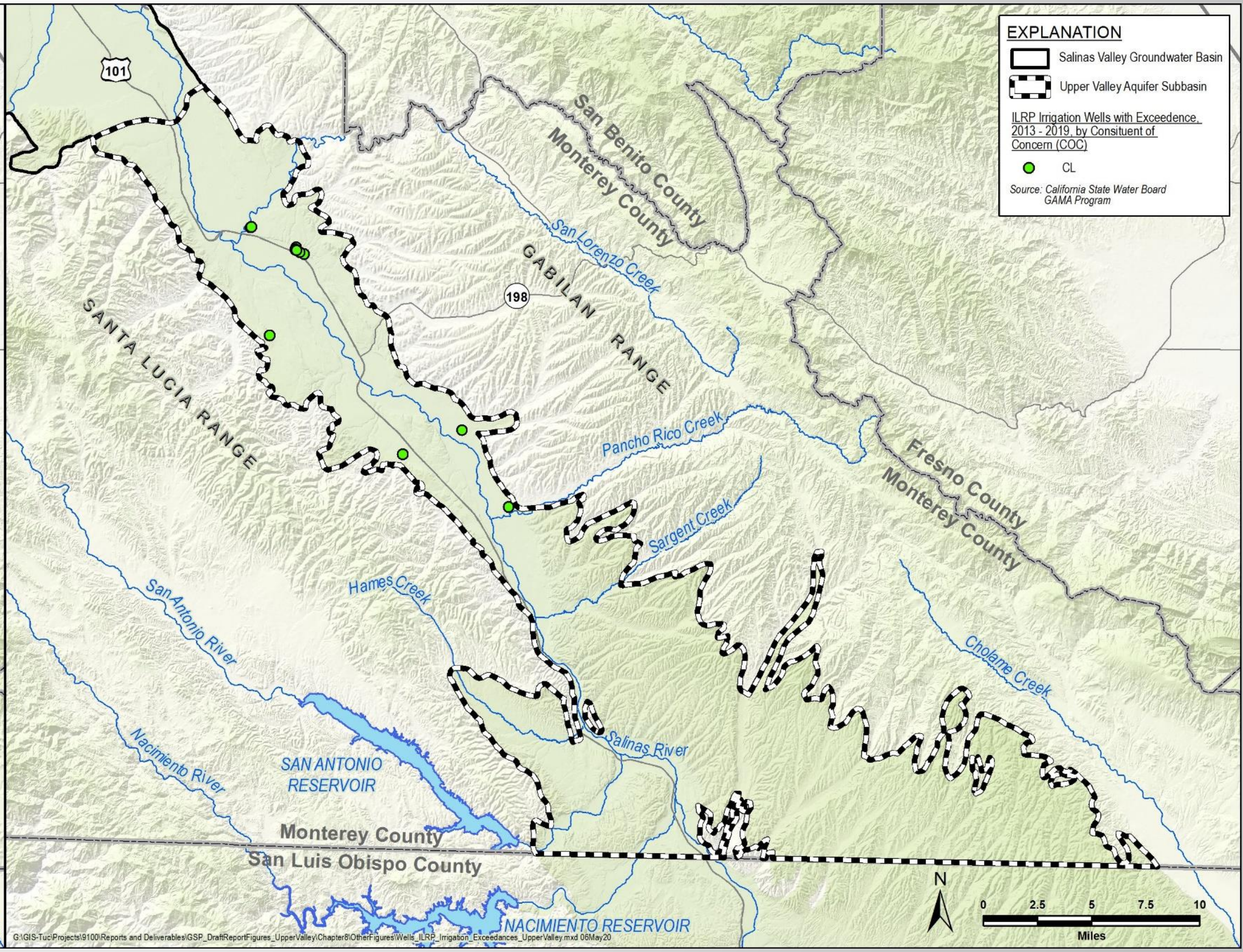
DDW

Groundwater conditions/SMC – Current Water Quality Exceedance Maps

ILRP On-Farm Domestic



ILRP Irrigation



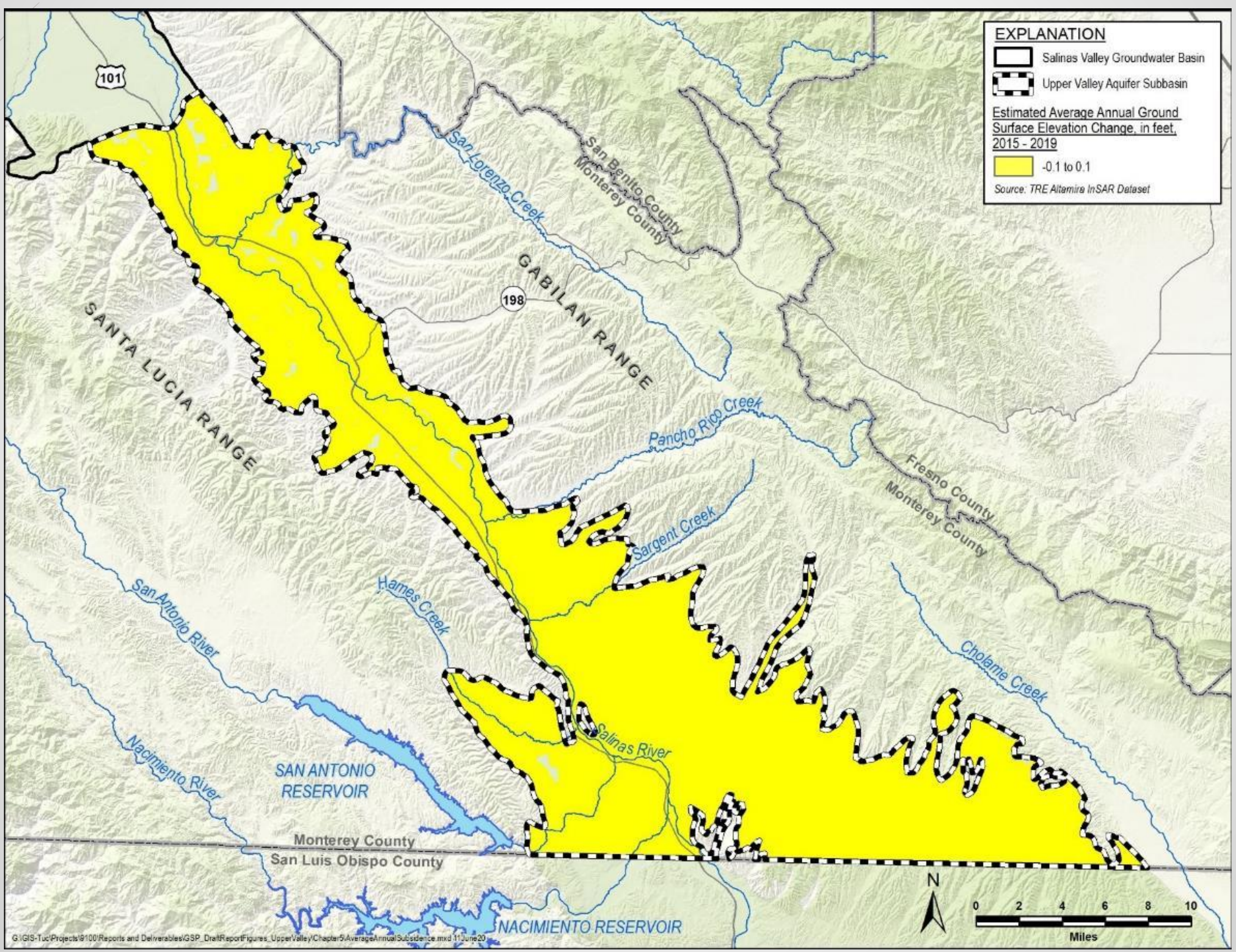
Groundwater conditions/SMC – **Subsidence**

5. Subsidence

Measurable Objective (MO):
Zero net long-term subsidence, with no more than 0.1 foot per year of estimated land movement to account for InSAR errors

Minimum Threshold (MT):
Zero net long-term subsidence, with no more than 0.1 foot per year of estimated land movement to account for InSAR errors

Undesirable Result:
There is an exceedance of minimum thresholds for subsidence.



- Negligible current subsidence
- Future subsidence due to groundwater conditions is unlikely
- Minimum threshold and measurable objective set at zero long-term subsidence

Groundwater conditions/SMC – Interconnected Surface Water

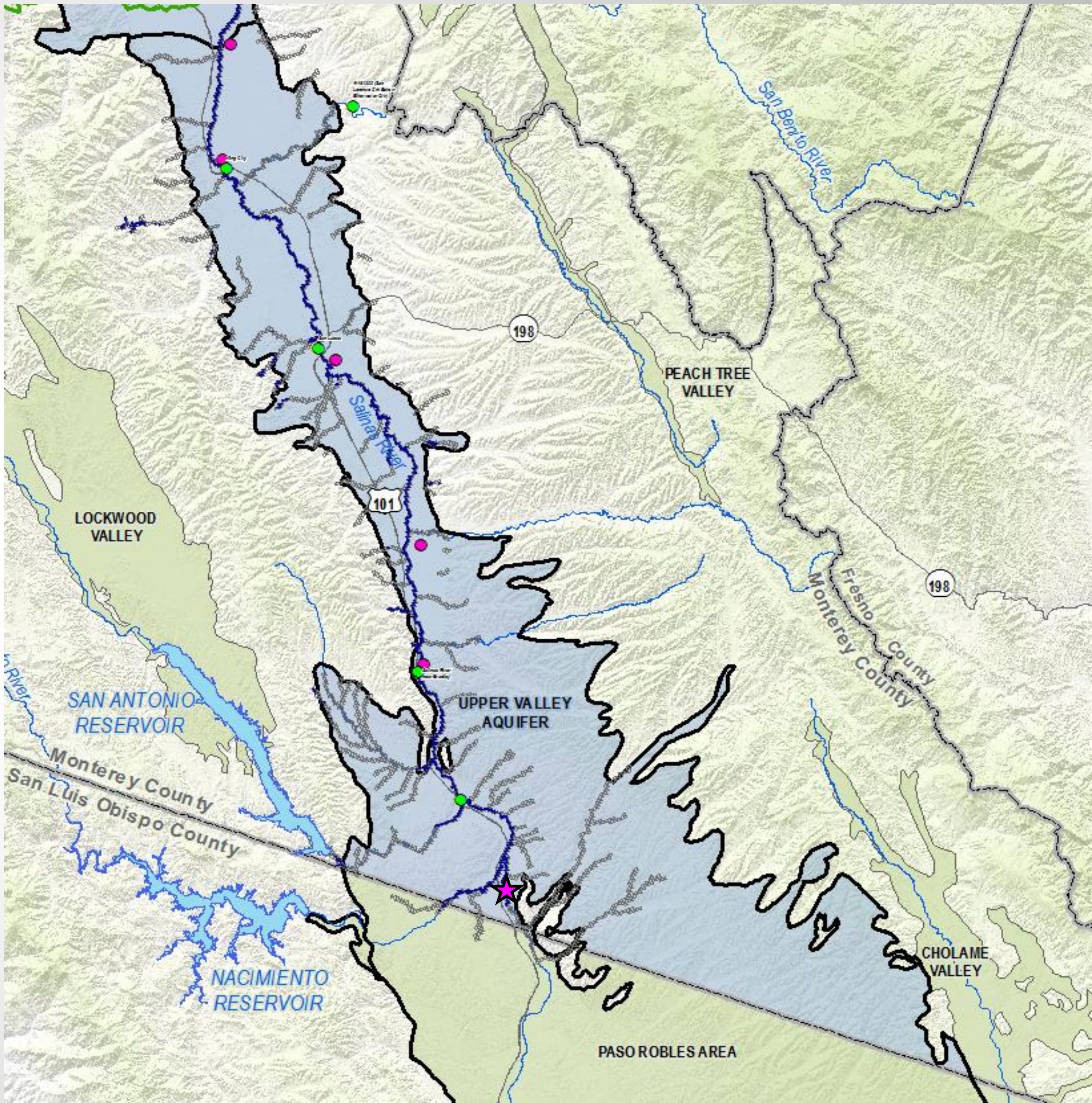
6. Depletion of Interconnected surface water (ISW)

Measurable Objective (MO):
Established by proxy using shallow groundwater elevations observed in 2011 near locations of ISW

Minimum Threshold (MT):
Established by proxy using shallow groundwater elevations near locations of ISW, set to 5 feet below the lowest groundwater elevation between 2012 and 2016

Undesirable Result:
There is an exceedance of the minimum threshold in a shallow groundwater monitoring well used to monitor ISW.

- No interconnected surface water monitoring points yet
  - Green dots are USGS gauge and MCWRA River Series measurement site
  - Pink dots are existing wells that will be added to network
- One new well will be added upstream of conservation releases (pink star)



Summary of Current Conditions in Relation to SMC

- Upper Valley Aquifer Subbasin has not historically been in overdraft, nor experienced chronic lowering of groundwater levels
- From 1980 to 2016, the basin was in overdraft during only 5 years
- However, there are a few areas away from the river where groundwater elevations have been declining
- Given that the Subbasin's extraction is currently close to the sustainable yield, this chapter includes a robust set of potential projects and management actions that could be undertaken if needed

Projects & Management Actions

RECHARGE PROJECTS

- Multi-benefit stream channel improvements
- MAR Overland Flow

PROJECTS THAT RESULT IN REOPERATIN OF THE RESERVOIRS

- Winter releases with ASR in the 180/400-Foot Aquifer Subbasin
- Interlake Tunnel & Spillway Modification
- Drought Reoperation

Projects & Management Actions

MANAGEMENT ACTIONS

- Conservation and Agricultural BMPs
- Fallowing, Fallow Bank, and Agricultural Land Retirement
- SMC TAC

IMPLEMENTATION ACTIONS

- Well Registration
- GEMS Expansion
- Dry Well Notification System
- Water Quality Partnership

SMC Technical Advisory Committee

- Technical TAC to review groundwater conditions and provide science-based advice on projects & management actions to Subbasin Planning Committee
- TAC will initially meet to define guiding principles, triggers (groundwater condition levels that trigger the need for projects and management actions), and decision-making process
- TAC will convene annually in April to review Annual Report and work with SVBGSA to develop recommendations to correct negative trends in groundwater conditions and continue to meet the measurable objectives
- Will consider recharge projects, demand management, and projects & management actions that mitigate groundwater quality degradation from GSA actions; may also analyze how non-SVBGSA projects will affect maintaining sustainability

Summary of Projects & Management Actions - Recharge Projects

Project/ Management Action #	Name	Description	Project Benefits	Quantification of Project Benefits	Cost
A1	Multi-benefit Stream Channel Improvements	Prune native vegetation and remove non-native vegetation, manage sediment, and enhance floodplains for recharge. Includes 3 components: 1. Stream Maintenance Program 2. Invasive Species Eradication 3. Floodplain Enhancement and Recharge	Groundwater recharge, flood risk reduction, returns streams to a natural state of dynamic equilibrium	Component 1: Valley-wide benefits not quantified Component 2: Valley-wide benefits of 2,790 to 20,880 AF/yr. of increased recharge Component 3: Valley-wide benefits of 1,000 AF/yr. from 10 recharge basins	<u>Component 1</u> Valley-wide Cost: $150,000 for annual administration and $95,000 for occasional certification; $780,000 for the first year of treatment on 650 acres, and $455,000 for annual retreatment of all acres <u>Component 2</u> Valley-wide Average Cost: $16,500,000 Unit Cost: $60 to $740/AF <u>Component 3</u> Cost: $11,160,000 Unit Cost: $930/AF
A2	Managed Aquifer Recharge with Overland Flow	Construct basins for managed aquifer recharge of overland flow before it reaches streams	Groundwater recharge, less stormwater and erosion, more regular surface temperature	400 AF/yr. in increased recharge	Capital Cost: $4,128,000 Unit Cost: $870/AF

Summary of Projects & Management Actions - Reservoir Reoperation

Project/ Management Action # Name		Description	Project Benefits	Quantification of Project Benefits	Cost
B1	Winter Releases with Aquifer Storage and Recovery	Shift reservoir releases to winter months and inject winter releases into the 180/400-Foot Aquifer Subbasin for Aquifer Storage and Recovery to provide summer irrigation water to CSIP	More regular winter reservoir releases, greater groundwater recharge in the Forebay Subbasin, and help reducing spread of Arundo; additional benefits for other subbasins	Analysis underway	Multi-subbasin Capital Cost: $172,141,000 Unit Cost for 12,900 AF/yr. ASR: $1,450/AF *(distribution of benefits throughout Valley will be determined through a benefits assessment)*
B2	MCWRA Interlake Tunnel and Spillway Modification	Tunnel to transfer excess water from Nacimiento to San Antonio Reservoir	Greater surface water stored in reservoirs; more groundwater recharge	30,500 AF/yr. of increased groundwater recharge from the Salinas River throughout the Salinas Valley	Multi-subbasin Capital Cost: $118,503,000 Unit Cost: $393/AF *(distribution of benefits throughout Valley will be determined through a benefits assessment)*
B3	MCWRA Drought Reoperation	Establishment of the Drought Technical Advisory Committee (D-TAC) to develop a plan for how to manage reservoir releases during drought conditions	More regular winter reservoir releases; drought resilience	Unable to quantify benefits since drought operations have yet to be triggered	Minimal SVBGSA staffing costs for participation; No additional MCWRA costs since already formed

Summary of Projects & Management Actions - Demand Management

Project/ Management Action #	Name	Description	Project Benefits	Quantification of Project Benefits	Cost
C1	Conservation and Agricultural BMPs	Promote agricultural best management practices and support use of evapotranspiration data as an irrigation management tool for growers	Better tools assist growers to use water more efficiently; decreased groundwater extraction	Unable to quantify benefits until specific BMPs are identified and promoted	Approximately $100,000 for 4 workshops, grant writing, and demonstration trials. Cost could be reduced if shared between subbasins.
C2	Fallowing, Fallow Bank, and Agricultural Land Retirement	Includes voluntary fallowing, a fallow bank whereby anybody fallowing land could draw against the bank to offset lost profit from fallowing, and retirement of agricultural land	Decreased groundwater extraction for irrigated agriculture	Dependent on program participation	$195-$395/AF if land is fallowed $810-$2,000/AF if land is retired
C3	Forebay Pumping Technical Advisory Committee (TAC)	Establish TAC to convene if triggered by groundwater levels declines, groundwater storage loss, or low Arroyo Seco flows to determine potential pumping restrictions	Decreased groundwater extraction when pumping restrictions enacted	Dependent on specific pumping restrictions implemented	Staffing costs plus $10,000 per year (if TAC is triggered)

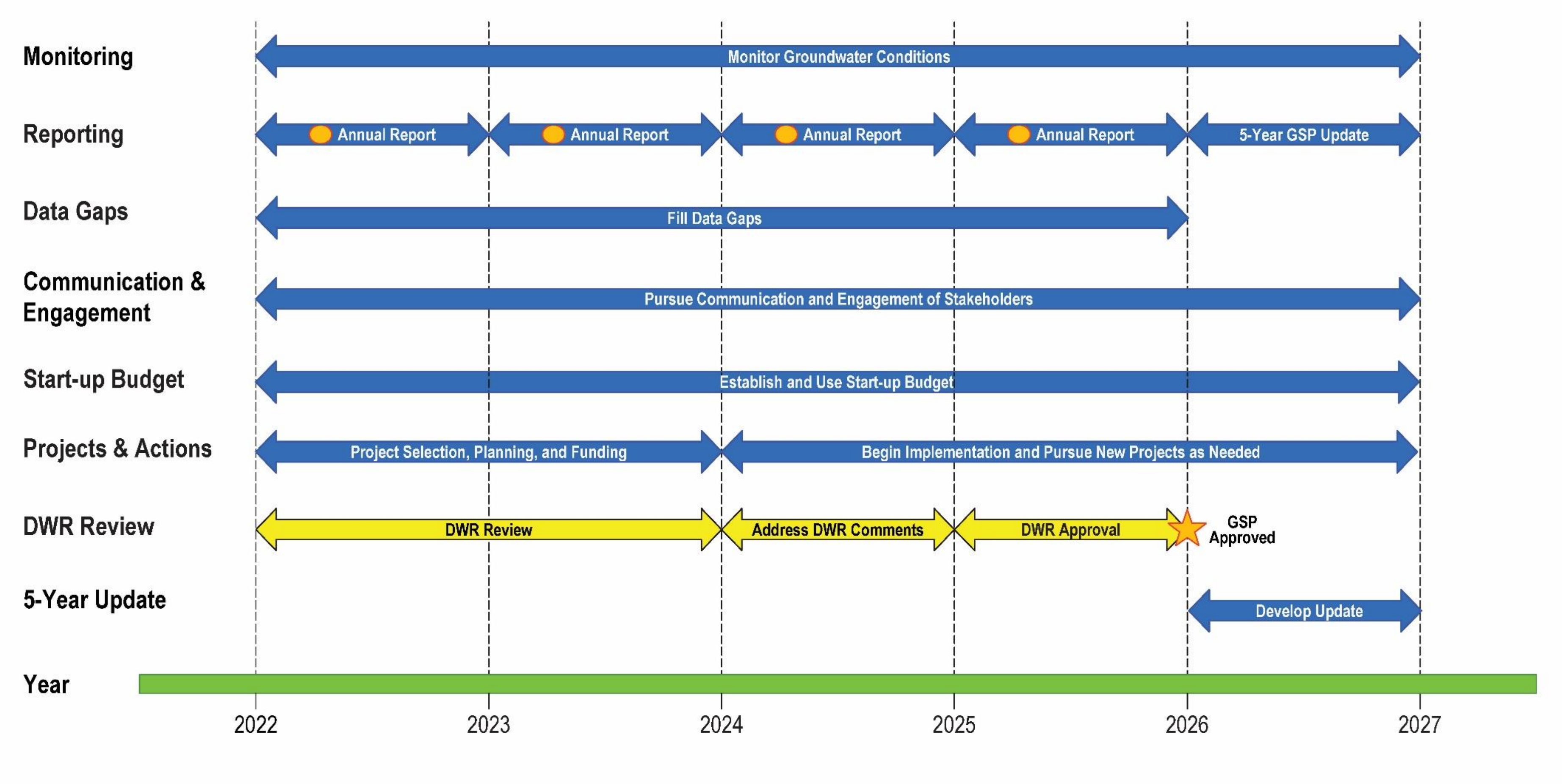
Summary of Implementation Actions

Project/ Management Action #	Name	Description	Project Benefits	Quantification of Project Benefits	Cost
D1	Groundwater Elevation Management System (GEMS) Expansion	Update current GEMS program, by collecting groundwater elevation data from wells in areas not currently covered by GEMS and enhance data collection	Better informed decisions	N/A – Implementation Action	Not estimated at this time
D2	Water Quality partnership	Form a working group for different agencies to coordinate on water quality issues	Better access to quality water	N/A – Implementation Action	Not estimated at this time
D3	Dry Well Notification System	Develop a system for well owners to notify the GSA if their wells go dry. Refer those owners to resources to assess and improve their water supplies. Form a working group if concerning patterns emerge.	Support affected well owners with analysis of groundwater elevation decline	N/A – Implementation Action	Not estimated at this time
D4	Well Registration	Register all production wells. Monitor flowmeters on all non- *de minimis* wells.	Better informed decisions, more management options	N/A – Implementation Action	Not estimated at this time

UV Projects & Management Actions Road Map

Years	Data/ Implementation Actions	SMC TAC	Multi-benefit Stream Channel Improvements	Projects that result in Reservoir Reoperation	Other projects (Overland Flow, Ag BMPs)
Year 1-2	Develop well registration program, GEMS expansion ordinance, and Dry Well Notification System	Establish SMC TAC (membership, guiding principles, decision-making procedures)	Continue administration of SMP and Arundo removal with RCD; Apply for grant funding for SMP and Arundo removal	Evaluate benefits to UV and compare projects; D-TAC will meet when triggered	.
Year 3-4	Implement well registration, GEMS expansion, and Dry Well Notification System Establish Water Quality Partnership	Finish establishment	Review permits and relation between components	Evaluate reservoir reoperation rules	If other subbasins move forward with these projects, consider implementing in UV
Year 5-6+		Meet annually, develop pumping restrictions if triggered	Identify floodplain enhancement opportunities	Develop funding mechanism	.

Implementation Schedule



Adaptive Management

Image source: https://reefresilience.org/management-strategies/marine-protected-areas/adaptive-management

Questions