Salinas Valley Basin GSA

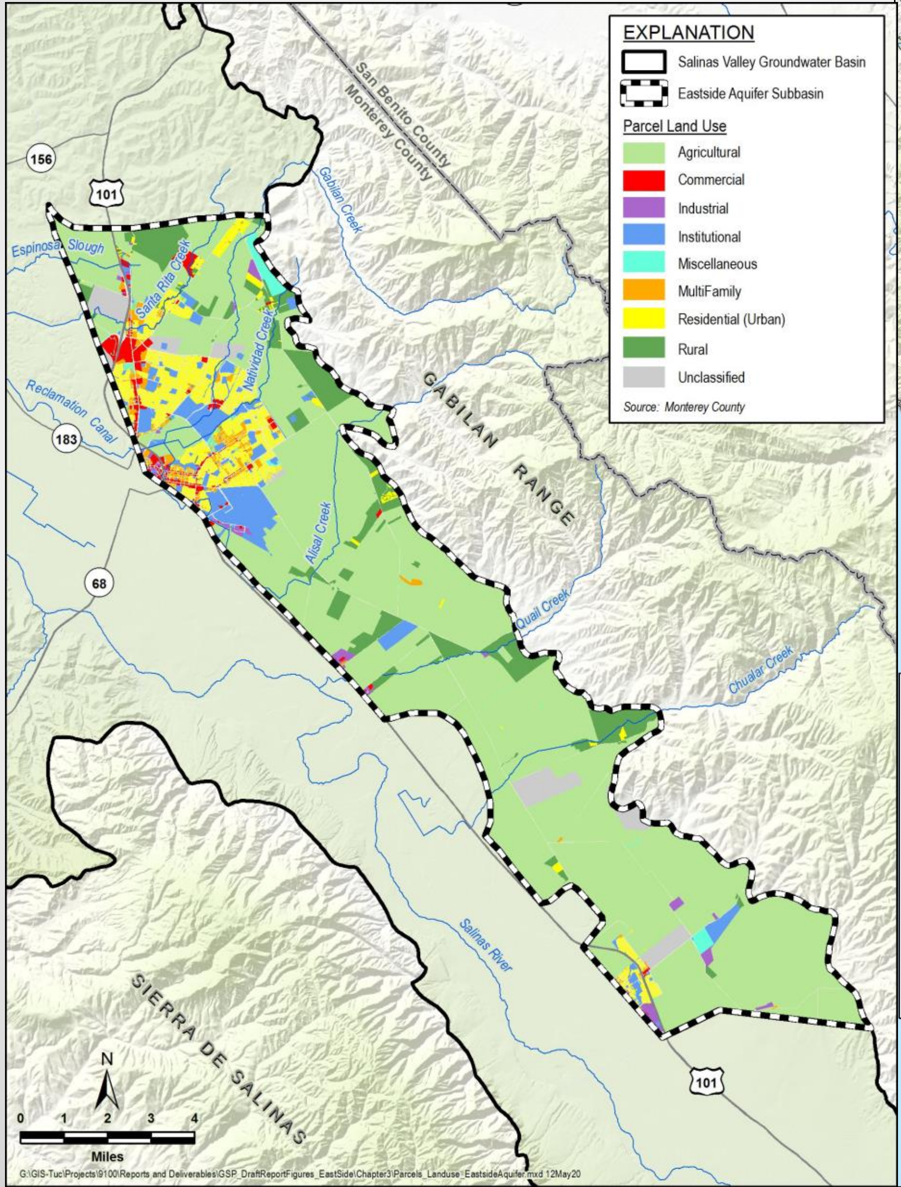
Eastside GSP Overview

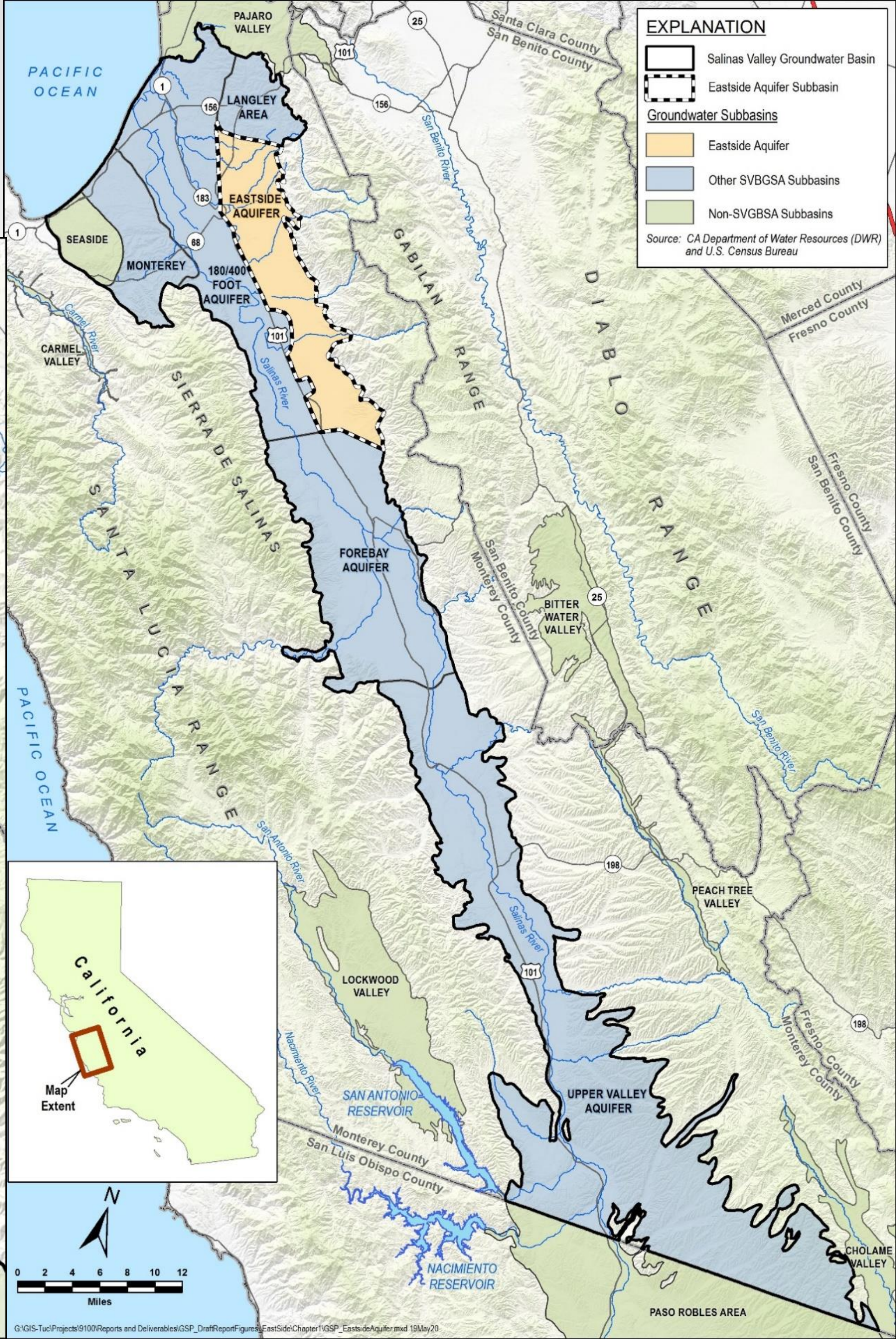
Presented to SVBGSA Advisory Committee
June 17, 2021

MONTGOMERY & ASSOCIATES

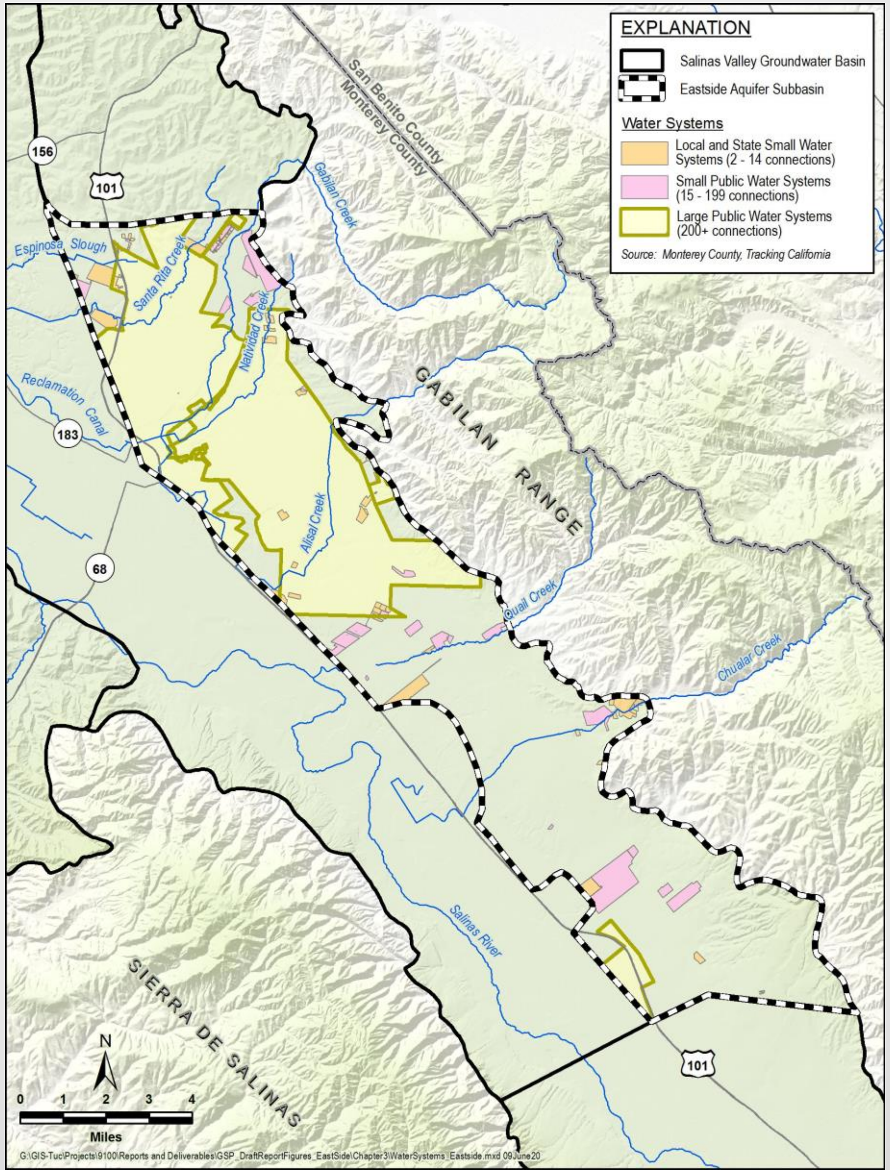
Eastside Aquifer Subbasin

- 57,500 acres
- Most land is agricultural
- Includes part of Salinas and Gonzalez



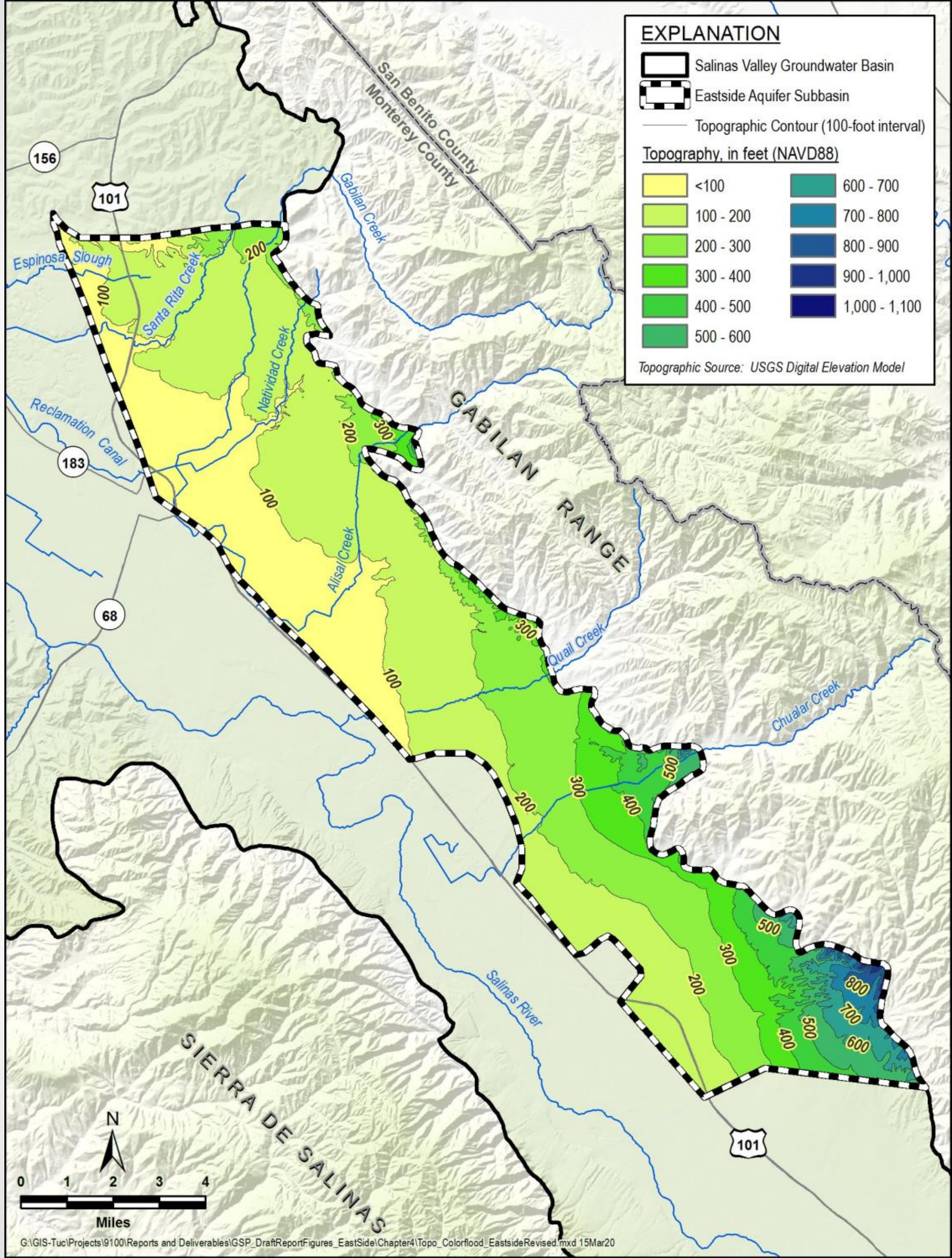


Communities Dependent on Groundwater

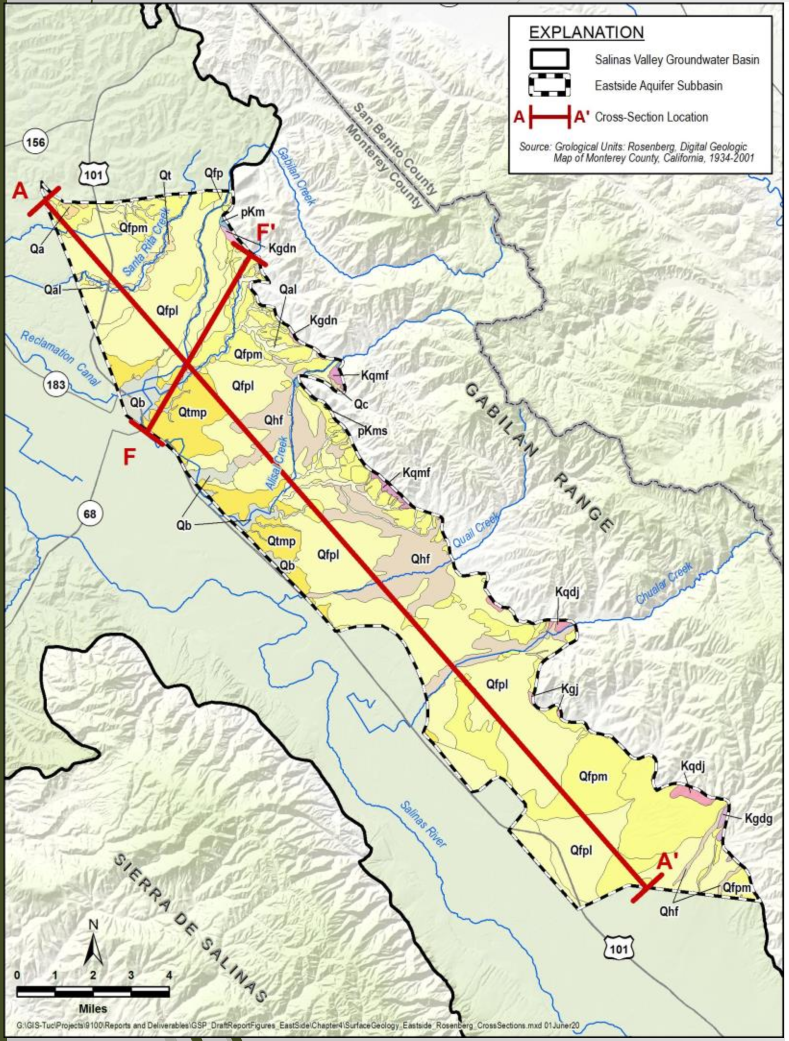


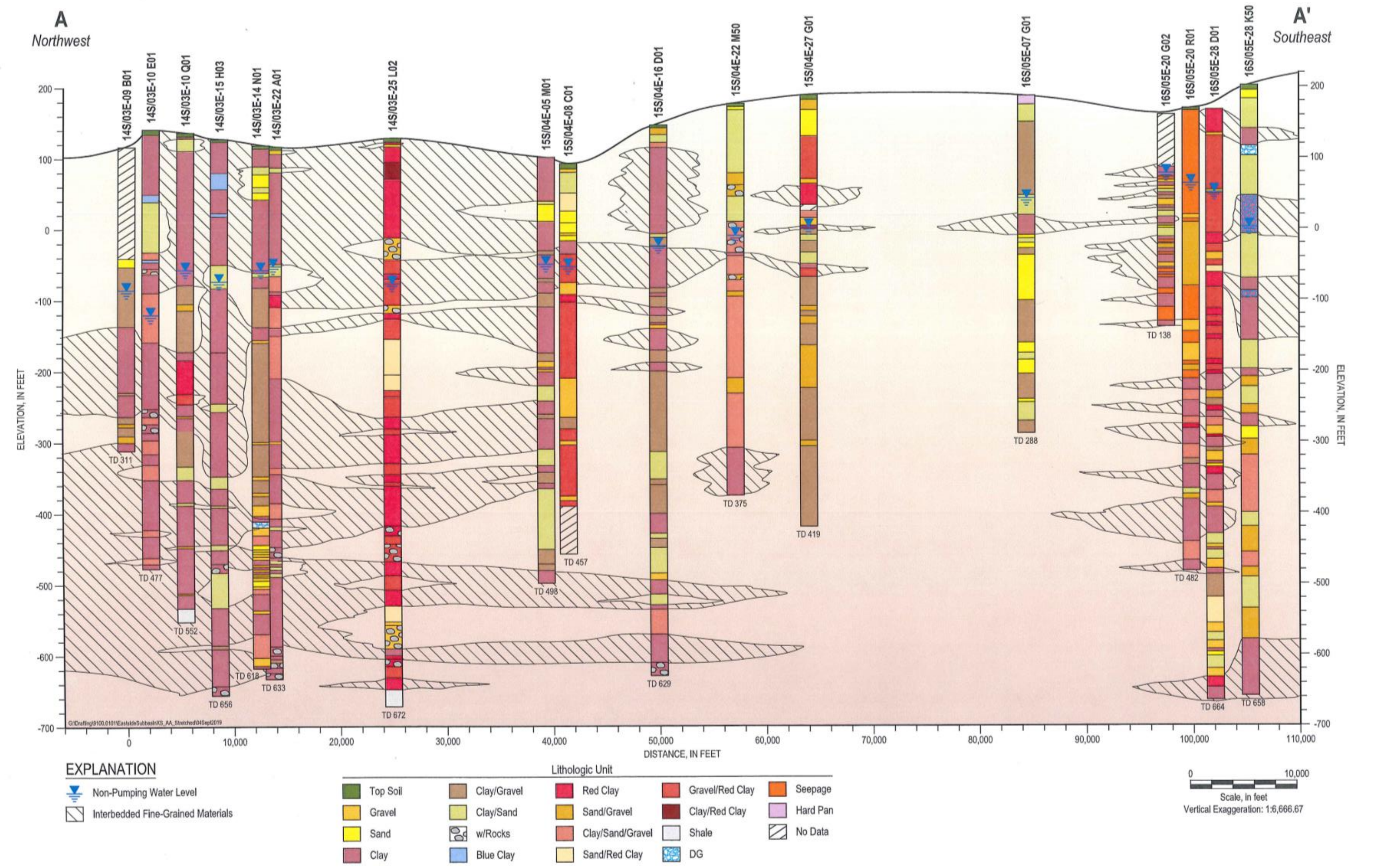
Basin Setting - Topography

- Dominated by alluvial fan deposits

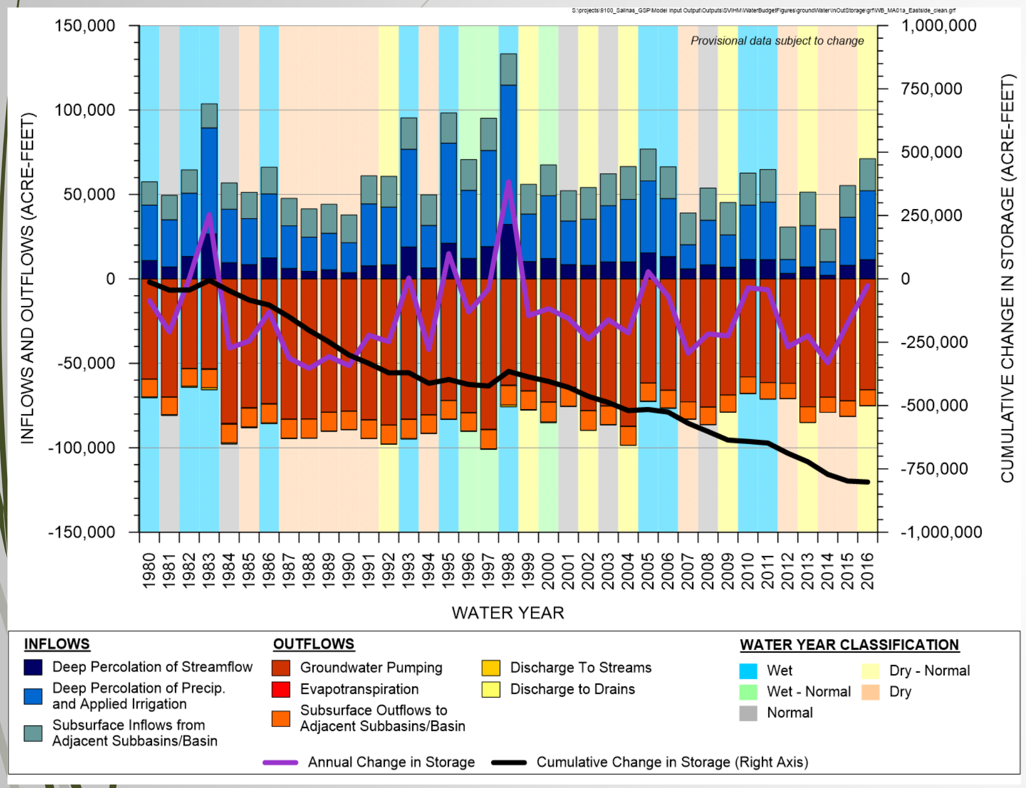


Hydrogeologic Conceptual Model





Groundwater Budget Summary

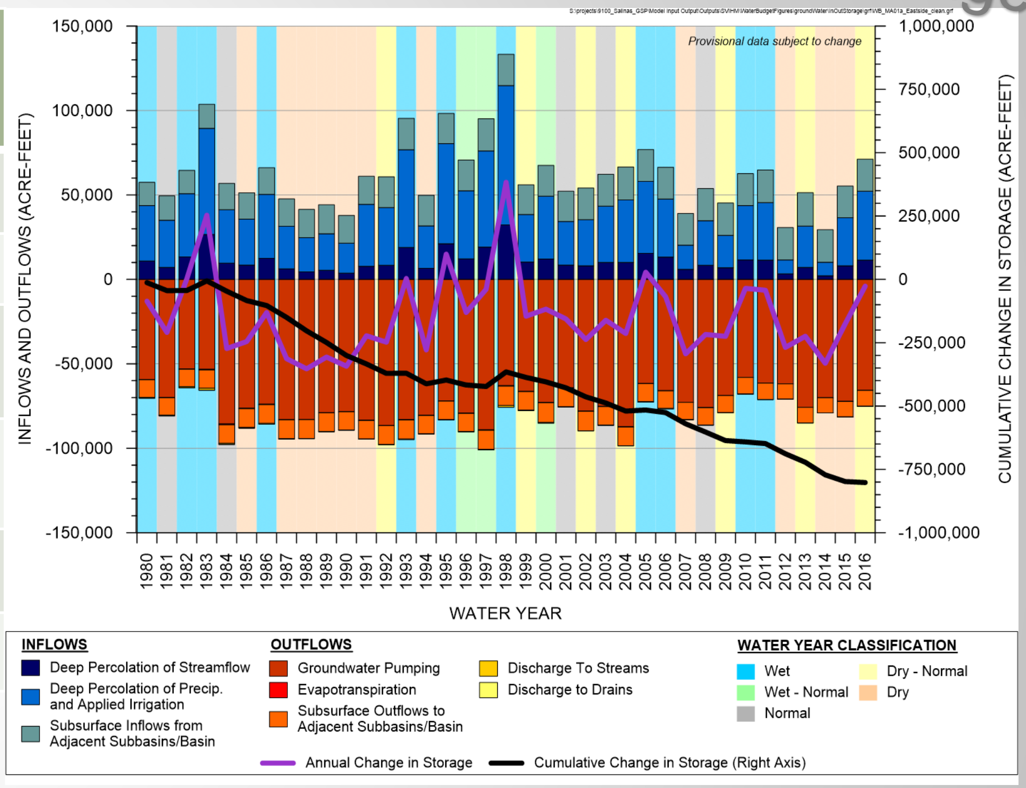


- Overall – there has been chronic decline in water levels
- Historical and future water budget numbers are both averages of many years/hydrologic periods
- Current water budget is a snapshot and does not tell us much since it only views change from one year to the next
- Future water budget incorporates average climate change, but does not represent short-term climate change effects

Groundwater Budget

Updated Water Budget

	Historical Average (WY 1980-2016)	Current (WY 2016)	2030	2070
Groundwater Pumping	-72,600	-65,600	-72,300	-75,600
Net Stream Exchange	10,600	11,400	13,800	14,400
Deep Percolation of Precipitation & Applied Irrigation	33,400	40,800	33,200	36,000
Net flow to Adjacent Subbasins/Basin	7,100	9,600	5,900	5,500
Groundwater Evapotranspiration	-200	-100	-700	-800
Net Storage Gain (+) or Loss (-)	-21,700	-4,000	-20,400	-20,400



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

Updated Water Budget

Sustainable Yield = pumping + change in storage

	Historical Average (WY 1980-2016)	2030	2070
Groundwater Pumping	72,600	72,300	75,600
Seawater Intrusion	0	0	0
Change in Storage	-21,700	-20,400	-20,400
Projected Sustainable Yield	50,900	51,900	55,200
% Pumping Change	30% decrease	28% decrease	27% decrease

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

Historical extraction measured by GEMS: 89,600 AF/yr.

Sustainable yield from Model is in the process of being adapted based on historical extraction data

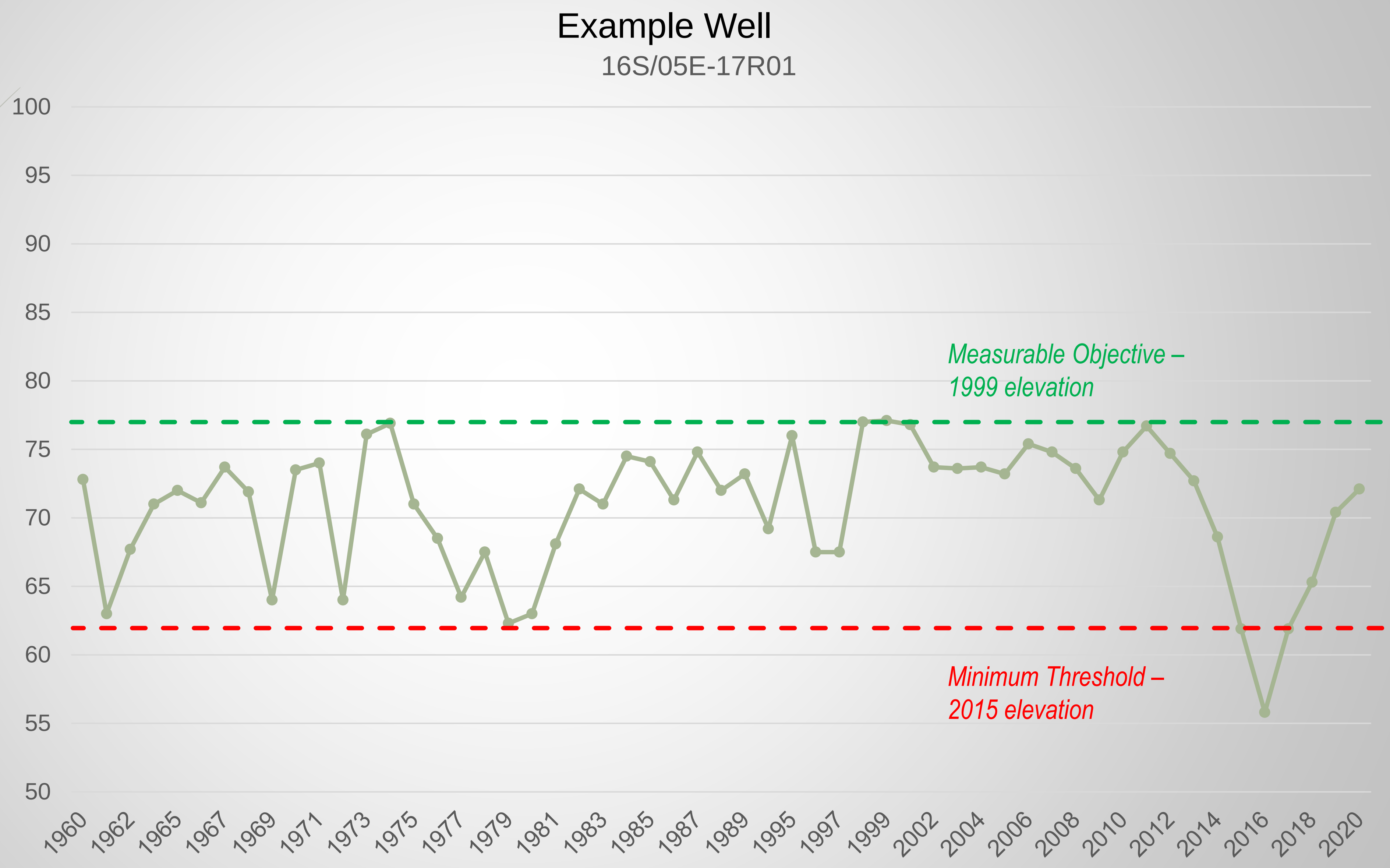
Groundwater conditions/SMC – **Groundwater Levels**

1. Chronic lowering of groundwater levels SMC

Measurable Objective (MO):
1999 groundwater elevations adjusted based on well-specific elevation assessments.

Minimum Threshold (MT):
2015 groundwater elevations adjusted based on well-specific elevation assessments.

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



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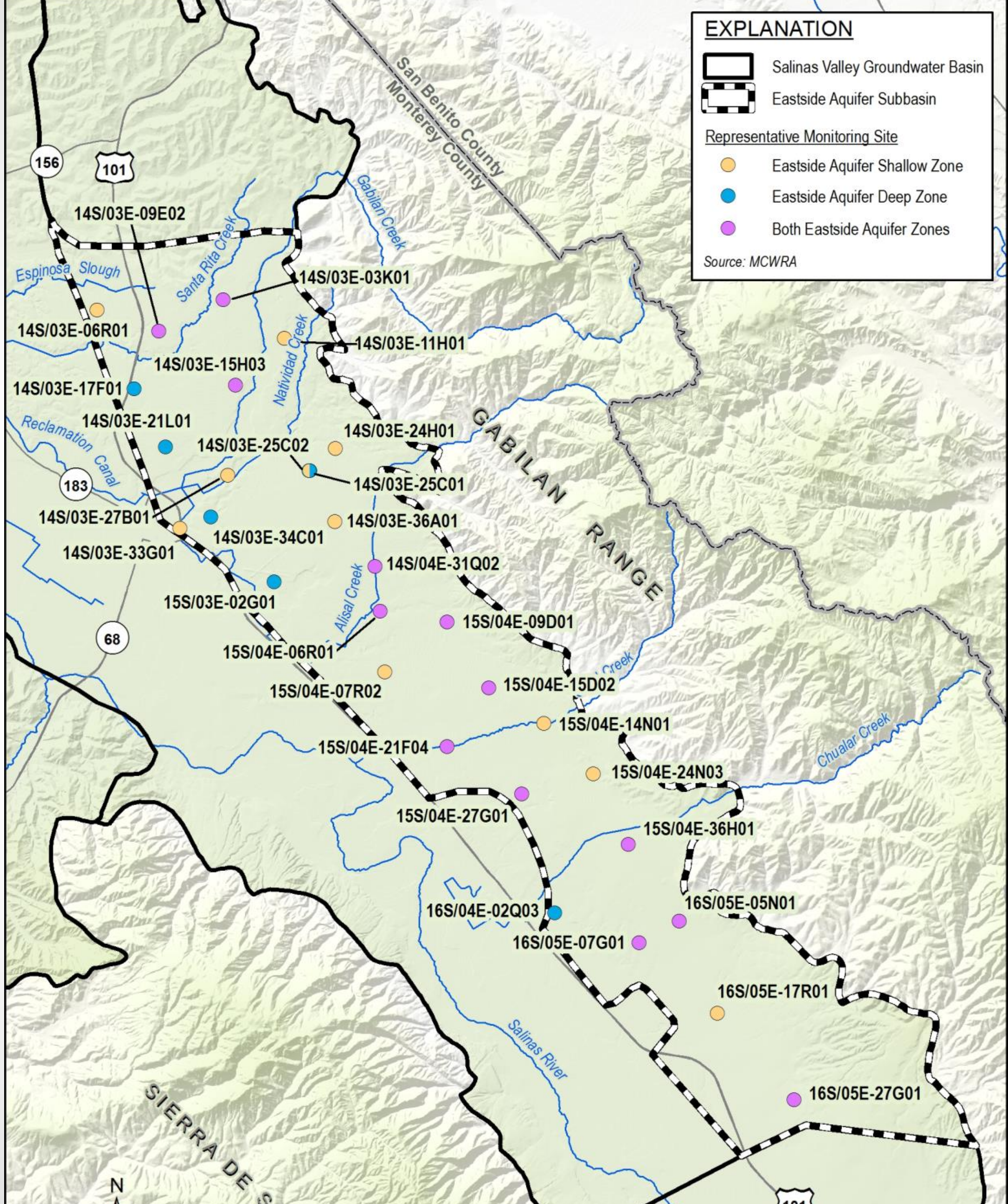
Undesirable Result:
More than 15% of groundwater elevation minimum thresholds are exceeded.

In 2019, one well was above the MO, and the rest had water levels between the MO and MT



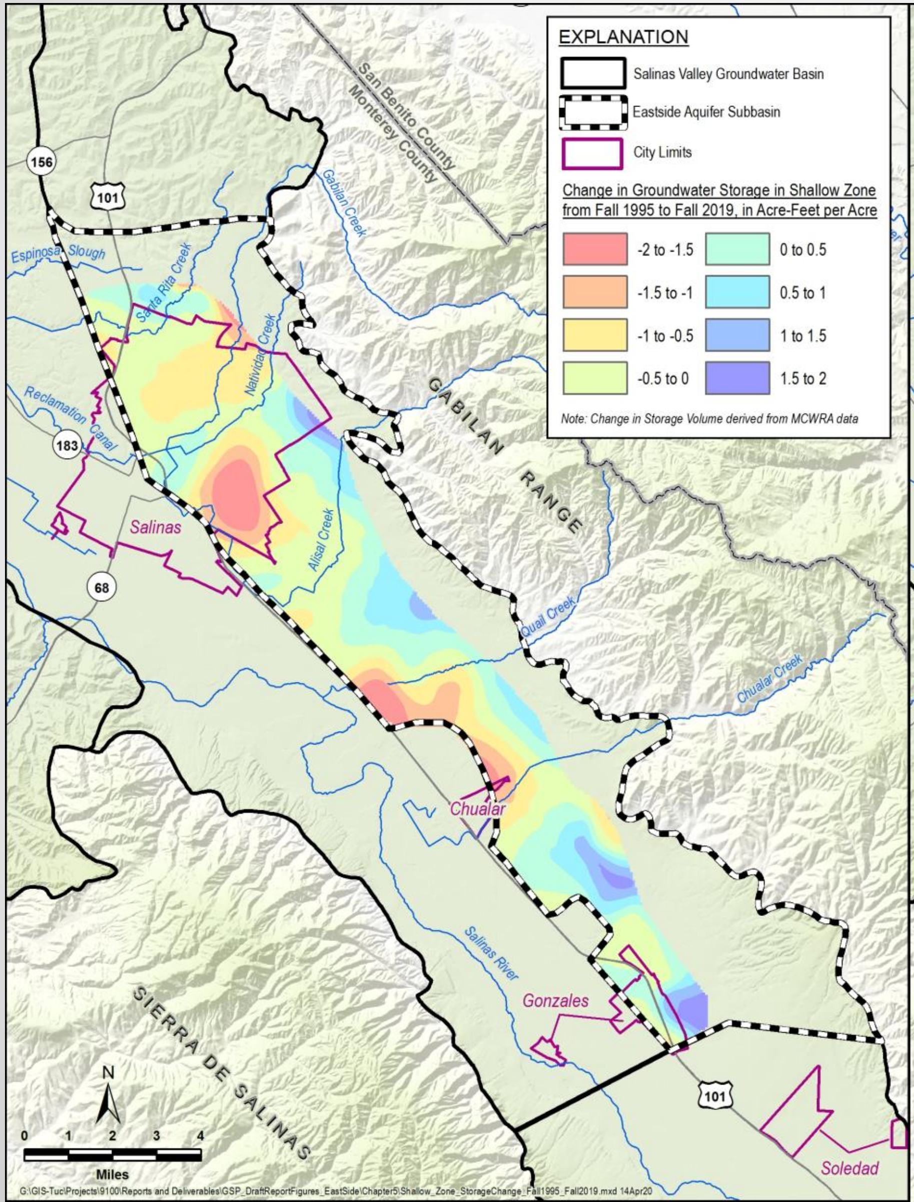
Groundwater conditions/SMC – **Groundwater Storage**

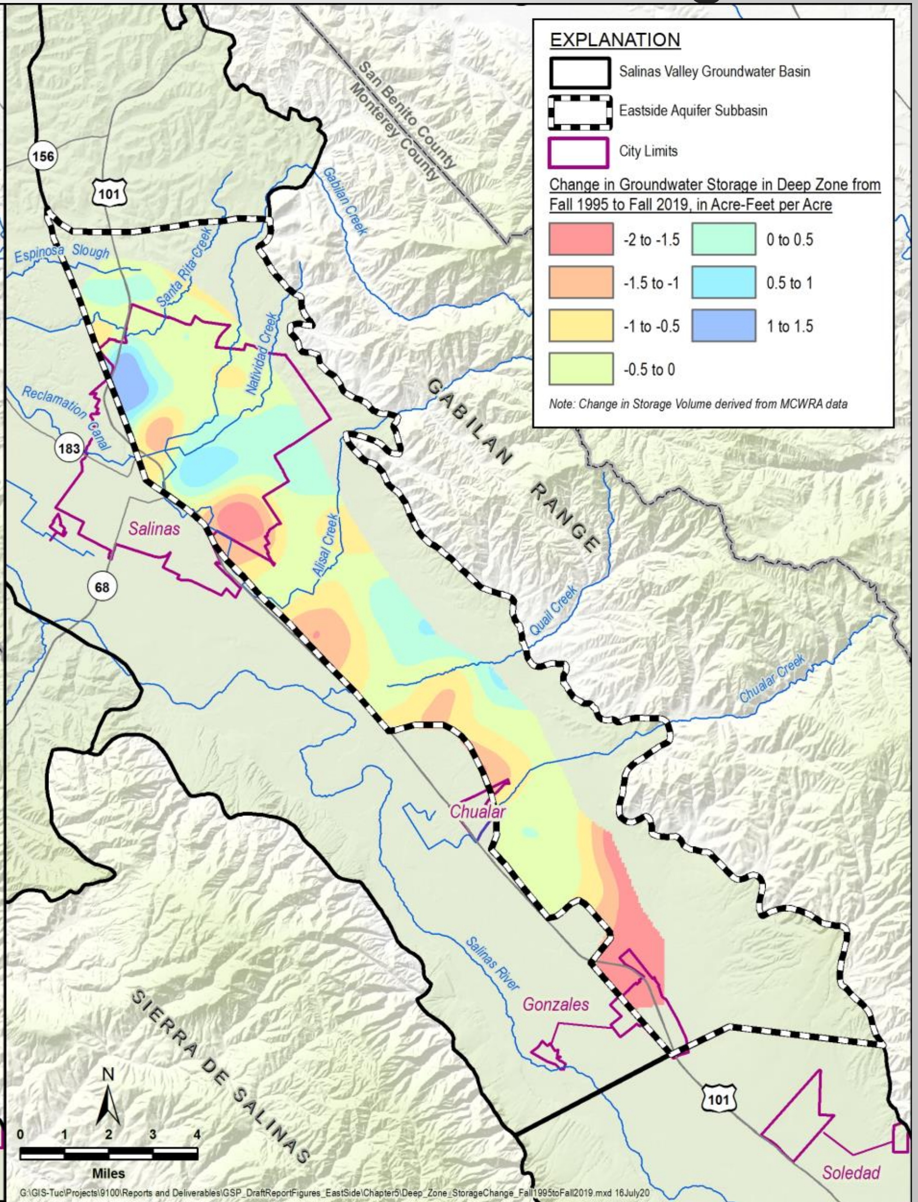
2. Reduction in Groundwater Storage

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 – **Seawater Intrusion**

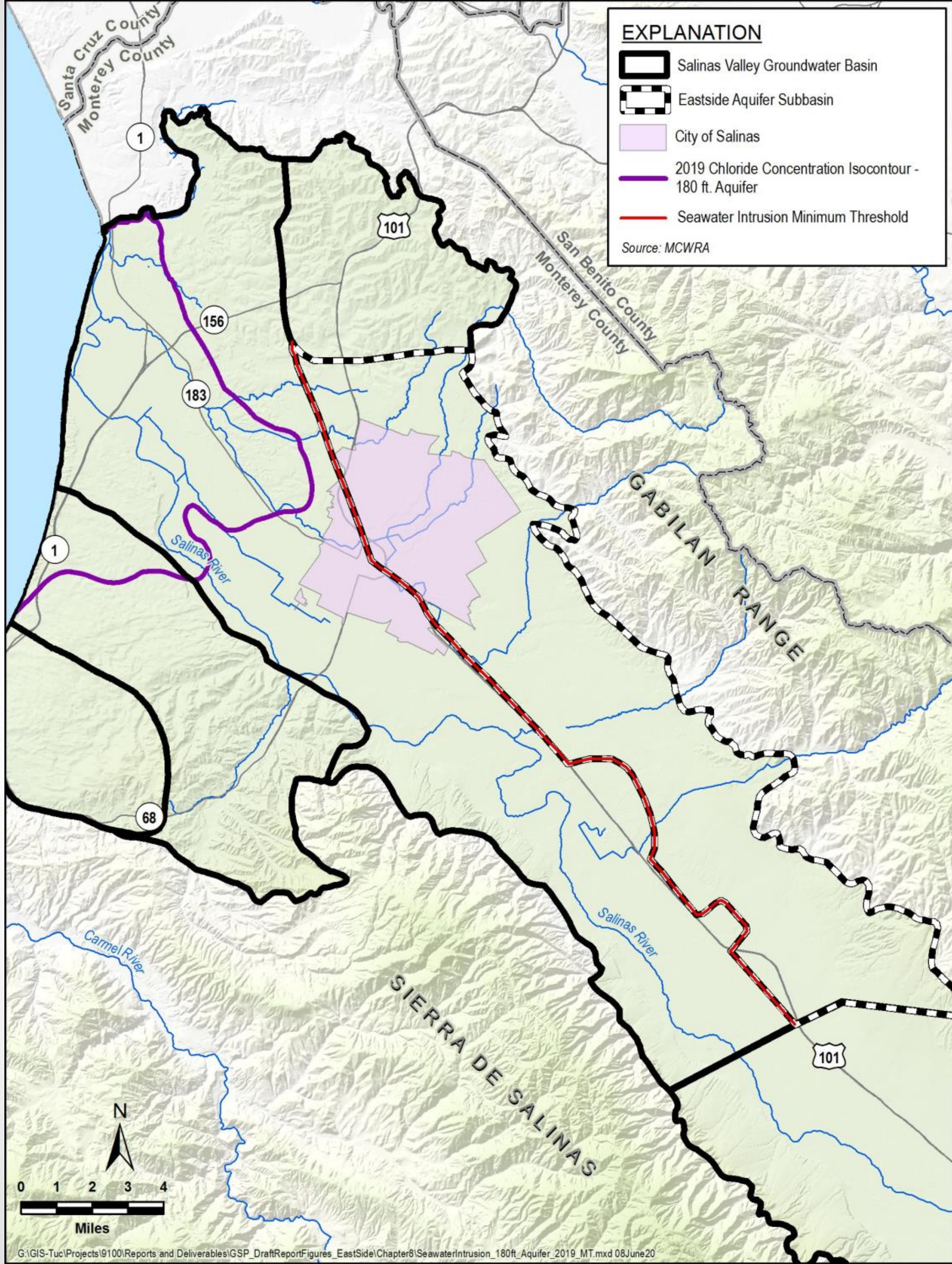
3. Seawater Intrusion

Measurable Objective (MO):
The 500 mg/L chloride isocontour at the Subbasin boundary, resulting in no seawater intrusion in the Eastside Subbasin.

Minimum Threshold (MT):
Same as the measurable objective.

Undesirable Result:
Any exceedance of the minimum threshold, resulting in mapped seawater intrusion within the Subbasin boundary.

- No seawater intrusion in the subbasin
- Aim to keep seawater intrusion out of the Subbasin



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 in 2019 for groundwater quality constituents of concern.

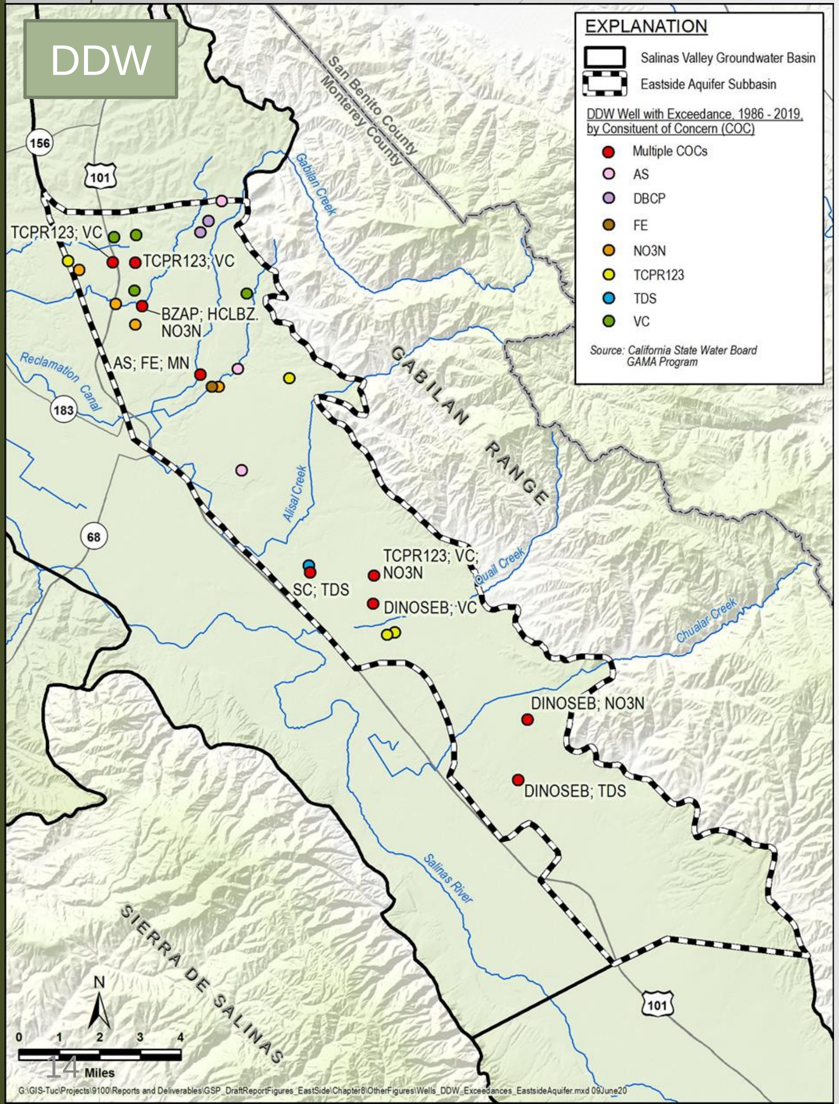
:

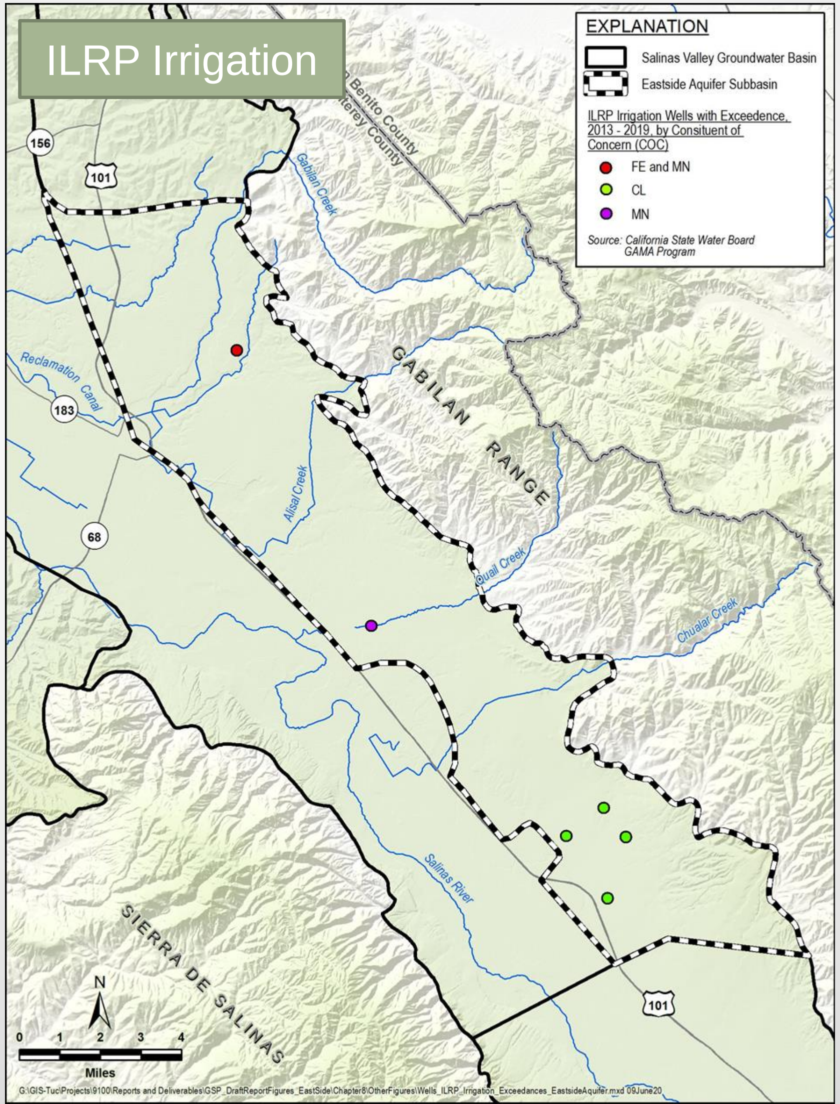
Minimum Threshold (MT)
Same as the measurable objective.

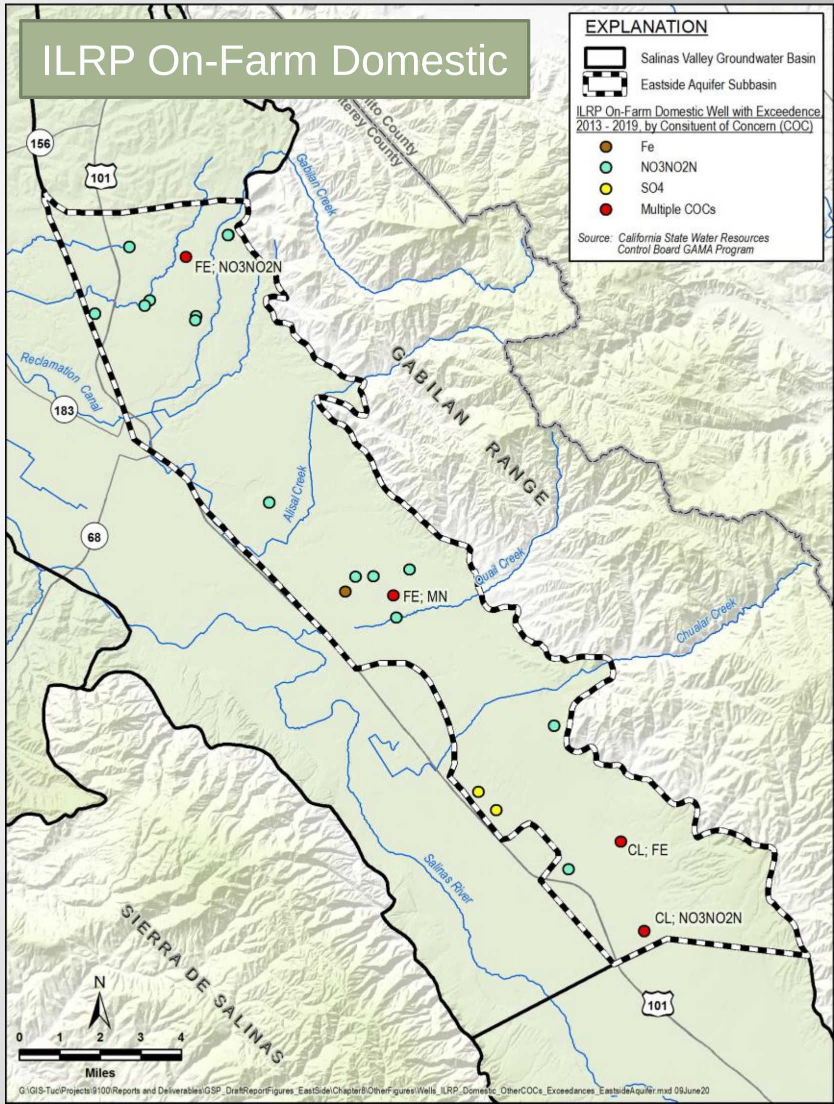
Undesirable Result:
The minimum threshold is exceeded as a direct result of projects or management actions taken as part of GSP implementation.

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		
Arsenic	75	4
Lindane	42	1
Di(2-ethylhexyl)phthalate	63	1
Benzo(a)Pyrene	62	1
1,2 Dibromo-3-chloropropane	53	3
Dinoseb	71	3
Iron	68	5
Hexachlorobenzene	41	1
Manganese	70	2
Nitrate (as nitrogen)	89	8
Specific Conductance	76	1
1,2,3-Trichloropropane	78	10
Total Dissolved Solids	70	3
Vinyl Chloride	91	8
ILRP On-Farm Domestic Wells		
Chloride	109	3
Iron	18	4
Manganese	18	1
Nitrate (as nitrogen)	**119**	**91**
Nitrate + Nitrite (sum as nitrogen)	**28**	**17**
Specific Conductance	114	27
Sulfate	109	2
Total Dissolved Solids	96	22
ILRP Irrigation Wells		
Chloride	206	4
Iron	68	1
Manganese	68	2

Groundwater conditions/SMC – Current Water Quality Exceedance Maps







Groundwater conditions/SMC – **Subsidence**

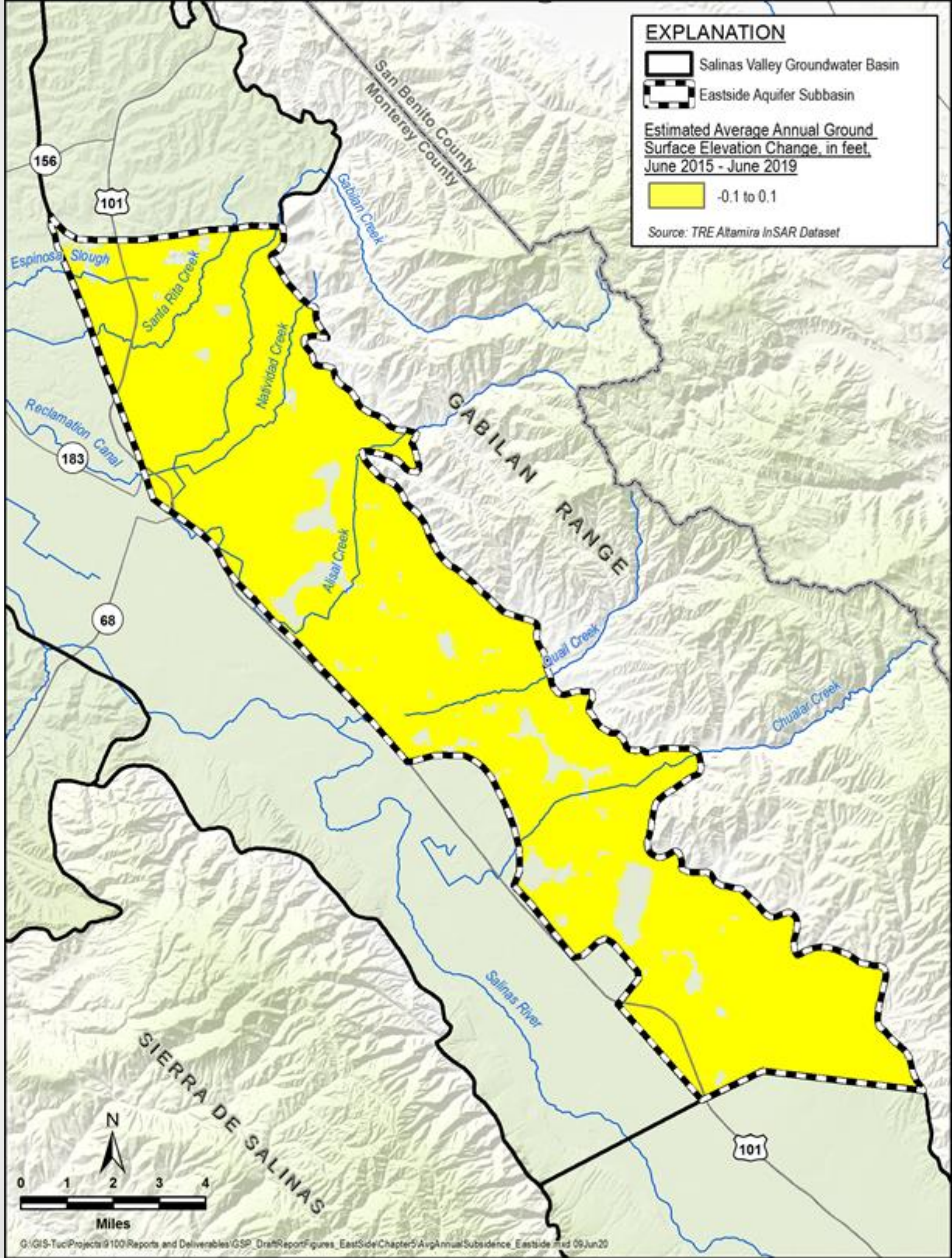
5. Subsidence

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):
Same as the measurable objective.

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**

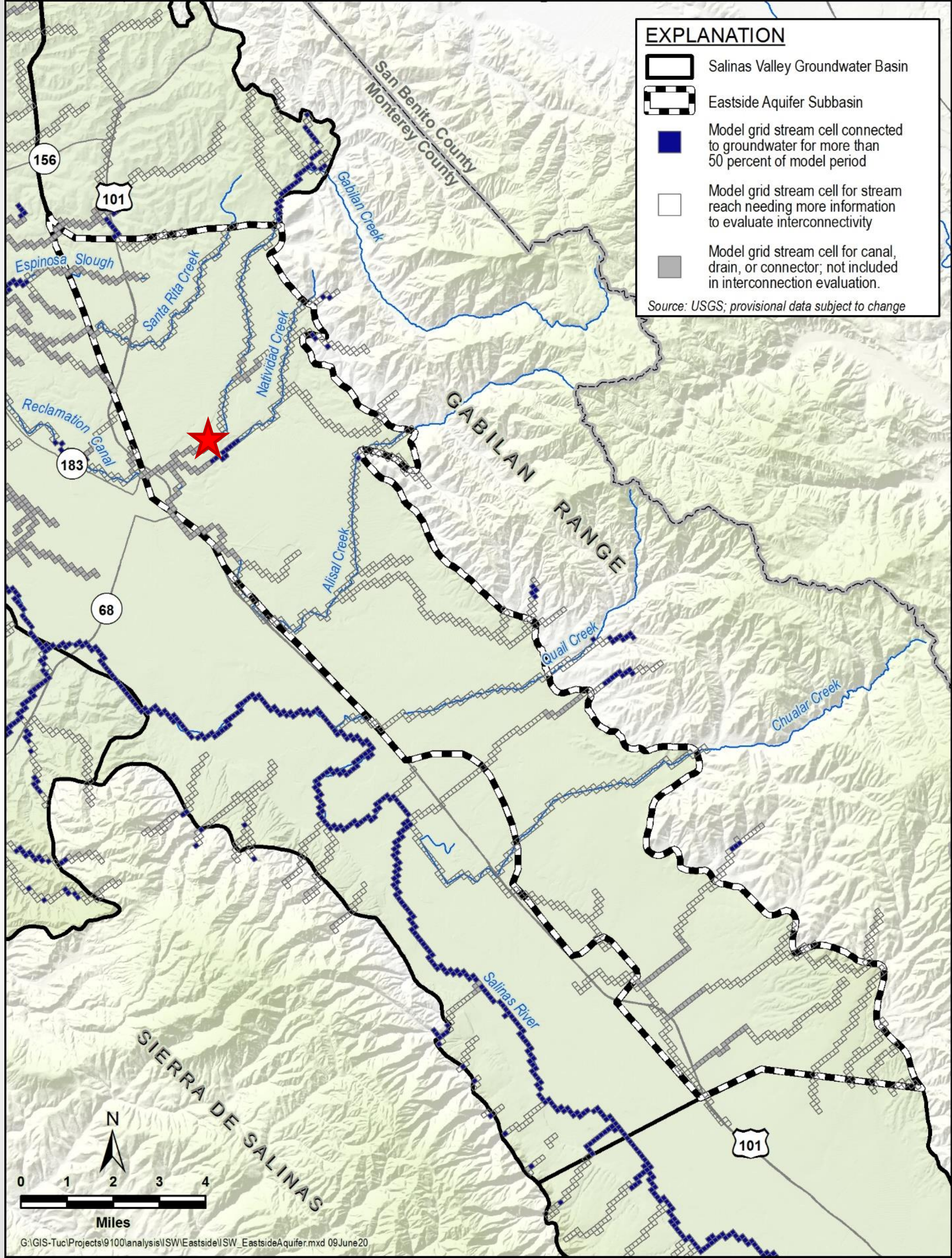
6. Depletion of Interconnected surface water (ISW)

Measurable Objective (MO):
Established by proxy using shallow groundwater elevations observed in 1999 near locations of ISW.

Minimum Threshold (MT):
Established by proxy using shallow groundwater elevations observed in 2015 near locations of ISW.

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

- One location of interconnected surface water (shown on map)
- No interconnected surface water monitoring points yet
- One shallow well will be added on Natividad Creek (red star)



Current Conditions - Overdraft

- Eastside Subbasin has historically been in overdraft, and is projected to still be in overdraft throughout the GSP planning horizon unless projects and management actions bring extraction and the sustainable yield in line.
- Overdraft can be mitigated by reducing pumping or recharging the basin, either through direct or in-lieu means.
- The potential projects and management actions in this chapter are sufficient to mitigate existing overdraft.

Projects & Management Actions

Increased Recharge
- A1. Managed aquifer recharge of overland flow
- A2. Floodplain Enhancement and Recharge

New Water Supplies for Recharge or Direct Use
- B1. 11043 Diversion at Chualar
- B2. 11043 Diversion at Soledad
- B3. Surface Water Diversion from Gabilan Creek
- B4. Eastside Irrigation Water Supply Project (Somavia Road)
- B5. Salinas Scalping Plant

Regional New Water Supplies
- C1. Regional Municipal Supply Project
- C2. CSIP Optimization and Expansion

Demand Management
- D1. Conservation and agricultural Best Management Practices (BMPs)
- D2. Fallowing, Fallow Bank, and Agricultural Land Retirement
- D3. Pumping Allocations and Controls

Salinas River Projects
- E1. Multi-Benefit Stream Channel Improvements
- E2. Winter Releases with ASR
- E3. MCWRA Interlake Tunnel and Spillway Modification
- E4. MCWRA Drought Reoperation

Implementation Actions
- F1. Well Registration
- F2. GEMS Expansion
- F3. Dry Well Notification System
- F4. Domestic Water Partnership
- F5. Support Protection of Areas of High Recharge

Floodplain Enhancement & Recharge, including Gabilan Floodplain Enhancement Project

- **Description:** This project restores areas along creeks and floodplains with to slow and sink flood waters and encourage streambed and floodplain infiltration. **Project Benefit**: The primary benefit is increased groundwater elevations in the proximity of the utilized floodplains. Up to 2,300 AF/yr. available for recharge, 1,000 AF/yr. in increased storage, less erosion, less flooding.
- **Cost**: approximately $12,596,000, Unit Cost: $400/AF

**The potential recharge rate is unknown. There might be additional costs for feasibility studies or dry wells or injection wells.*

https://www.nrcs.usda.gov/wps/portal/nrcs/detail/tx/home/?cid=stelprdb1247762

11043 Diversion at Chualar or Soledad

Description: Constructs diversion facilities and pumps the water to the Eastside Subbasin where the water can be recharged (or used directly).

Project Benefit (modeled for Chualar diversion): Annual average of 6,000 AF/yr. of excess streamflow captured. 3,100 AF/yr. increase in storage. Highly variable.

Chualar Capital cost: $55,684,000;

Unit cost $980/AF including O&M

Soledad Capital Cost*:* $104,688,000;

Unit cost $1,620 including O&M

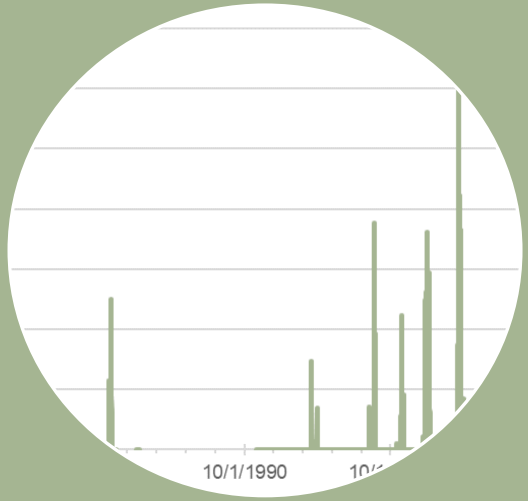
Eastside Irrigation Project (Somavia Road)

Description: Pumps 3,000 AF/yr. from the 180-Foot Aquifer in the 180/400-Foot Aquifer Subbasin on the SW side of the Salinas River, and distributes it for irrigation or recharge in the Eastside.

Project Benefit: increased groundwater elevations from reduced subbasin pumping and in-lieu use of imported water. ~3,000 AF/yr. available for in-lieu use or recharge, and ~1,600 AF/yr. increased storage.

Capital Cost: $139,928,000.

Unit cost $3,980/AF including O&M



Surface Water Diversion from Gabilan Creek

Description: Diverst flood flows from Gabilan Creek and recharges water at a nearby location in recharge basins.

Project Benefit: Based on analysis of historical data, the expected benefit of this project would potentially capture 350 AF/yr. with a diversion structure with a capacity of 20 cfs.

Capital cost: $5,477,000.

Unit cost $1,800/AF including O&M

NEW WATER SUPPLIES FOR RECHARGE OR DIRECT USE

Salinas Scalping Plant

Description: Builds a scalping plant for the future growth area on the east side of Salinas.

Project Benefit and Cost: in-lieu recharge, and increased groundwater elevations and storage.

250,000 gallon per day (gpd) scalping plant generates 280 AF/yr. With a capital cost of $9,839,000, the unit cost is $6,480/AF

500,000 gpd scalping plant

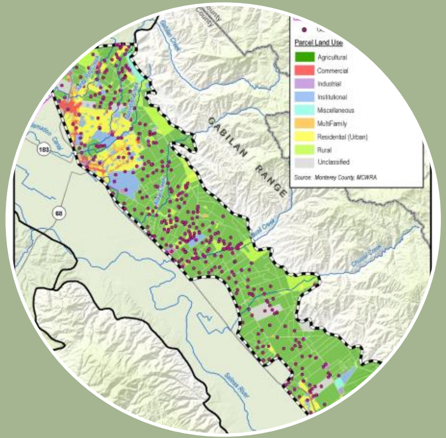
generates 560 AF/yr. With a capital cost of $14,183,000, the unit cost is $4,730/AF

**cost does not include distribution systems*

Regional Municipal Supply Project

Description: Potential supplement to the seawater intrusion extraction barrier project. It would deliver water for direct potable use to municipal systems in the Eastside Subbasin.
Regional Project Benefit: The proposed plant would produce up to 15,000 AF/yr. of desalinated water for the Salinas Valley. A portion of that would go to Eastside Subbasin.

Regional Capital Cost: $375-$395 million, Unit Cost: $2,830-$2,950/AF



CSIP Expansion

Description: This project would expand CSIP into agricultural land in or adjacent to the Eastside Subbasin and could reduce the amount of groundwater pumped from the Subbasin.

Regional Project Benefit: Expanding CSIP to land outside of the Eastside Subbasin may still have positive impacts on groundwater elevations within the Eastside Subbasin.

NEW WATER SUPPLIES

Pumping Allocations and Controls

- **Description:** Pumping allocations and control based on various criteria (allocation structure not yet defined).
- **Project Benefit**: The primary benefits expected for this project is that it is another demand-side management tool and would enhance sustainable yield and groundwater elevations. Working within a groundwater budget allows the subbasin to meet its sustainable yield volume.
- **Cost**: The cost would be relatively low cost in comparison to other projects; however, a more detailed analysis is needed.

Projects & Management Actions - Summary

Project/ Management Action #	Name	Description	Project Benefits	Quantification of Project Benefits	Cost
A - INCREASED RECHARGE					
A1	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	400 AF/yr. in increased recharge.	Capital Cost: $4,128,000 Unit Cost: $870/AF
A2	Floodplain Enhancement and Recharge	Restore creeks and floodplains to slow the flow of water	More infiltration, less erosion, less flooding	2,300 AF/yr. of water available for recharge. 1,000 AF/yr. increase in storage.	Capital Cost: $12,596,000 Unit Cost: $400/AF
B - NEW WATER SUPPLIES FOR RECHARGE OR IN LIEU USE					
B1	11043 Diversion at Chualar	Build a new facility near Chualar that would be allowed to divert water from the Salinas River when streamflow is high.	Less groundwater pumping, moderately less seawater intrusion in other subbasins.	Annual average of 6,000 AF/yr. of excess streamflow for in lieu use or recharge. 3,100 AF/yr. increase in storage.	Capital Cost: $55,684,000 Unit Cost: $980/AF
B2	11043 Diversion at Soledad	Build a new facility near Soledad that would be allowed to divert water from the Salinas River when streamflow is high.	Less groundwater pumping, slightly less seawater intrusion in other subbasins.	Annual average of 6,000 AF/yr. of excess streamflow is saved for in lieu use or recharge. 3,100 AF/yr. increase in storage.	Capital Cost: $104,688,000 Unit Cost: $1,620/AF
B3	Surface Water Diversion from Gabilan Creek	Build a new facility on Gabilan Creek that would be allowed to divert water when streamflow is high.	Collects streamflow that would otherwise be lost to the ocean	On average, 350 AF/yr. of excess streamflow is recharged.	Capital Cost: $5,477,000 Unit Cost: $1,800/AF
B4	Eastside Irrigation Water Supply Project (or Somavia Road Project)	Import groundwater from the 180/400-Foot Aquifer Subbasin	Less groundwater pumping in the Eastside Aquifer Subbasin	3,000 AF/yr. of imported water for in lieu use or recharge. 1,600 AF/yr. increase in storage.	Capital Cost: $139,928,000 Unit Cost: $3,980/AF
B5	Salinas Scalping Plant	Build a water treatment facility to recycle wastewater for agricultural use	Less groundwater pumping	Recycling water for irrigation reduces groundwater extraction by 280 to 560 AF/yr. of groundwater.	Capital Cost: $10,000,000 Unit Cost: $4,730/AF (plant only)

Projects & Management Actions - Summary

Project/ Management Action #	Name	Description	Project Benefits	Quantification of Project Benefits	Cost
C - REGIONAL NEW WATER SUPPLIES					
C1	Regional Municipal Supply Project	Build a regional desalination plant that would treat brackish water extracted from seawater intrusion barrier and supply drinking water to municipalities in the Eastside Aquifer Subbasin and other subbasins.	Less groundwater pumping, reduced risk of seawater intrusion	Regional benefit: 15,000 AF/yr. of imported desalinated water reduces groundwater extraction. Portion of this benefiting the Eastside Subbasin has yet to be determined.	Regional Capital Cost: $375-$395 million Unit Cost: $2,830-$2,950/AF
C2	CSIP Optimization and Expansion	Expand Castroville Seawater Intrusion Project (CSIP) into the northwest corner of the Eastside Aquifer Subbasin	Valley-wide benefits: less groundwater pumping	Regional benefit for 3,500-acre expansion: 9,900 AF/yr. of recycled and river water reduces groundwater extraction. Portion benefitting the Eastside has yet to be determined.	Regional Capital Cost for 3,500-acre expansion: $73,366,000 Unit Cost: $630/AF
D - DEMAND MANAGEMENT					
D1	Conservation and Agricultural Best Management Practices (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.
D2	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	Range of potential project benefits.	$195-$395/AF if land is fallowed $810-$2,000/AF if land is retired
D3	Pumping Allocations and Controls	Proactively determines how extraction should be fairly divided and controlled if needed.	Decreases extraction if needed	Range of potential project benefits.	Approximately $400,000 for establishment of pumping allocations and pumping controls

Projects & Management Actions - Summary

Project/ Management Action #	Name	Description	Project Benefits	Quantification of Project Benefits	Cost
E - SALINAS RIVER PROJECTS, INCLUDING PROJECTS THAT RESULT IN REOPERATION OF RESERVOIRS (projects will likely have indirect benefits for the Eastside Subbasin that may reduce the need for other projects and management actions)					
E1	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	Multi-subbasin benefits: groundwater recharge, flood risk reduction, returns streams to a natural state of dynamic equilibrium	Component 1: Multi-subbasin benefits not quantified Component 2: Multi-subbasin benefit of 2,790 to 20,880 AF/yr. of increased recharge Component 3: Multi-subbasin benefit of 1,000 AF/yr. from 10 recharge basins	<u>Component 1</u> Multi-subbasin 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> Multi-subbasin Average Cost: $16,500,000 Unit Cost: $60 to $740/AF <u>Component 3</u> Multi-subbasin Cost: $11,160,000 Unit Cost: $930/AF
E2	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.	Multi-subbasin benefits: more regular winter reservoir releases and greater groundwater recharge in the Salinas Valley Basin, and help reducing spread of Arundo.	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)
E3	MCWRA Interlake Tunnel and Spillway Modification	Tunnel to transfer excess water from Nacimiento to San Antonio Reservoir	Multi-subbasin benefits: 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)
E4	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	Multi-subbasin benefits: 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

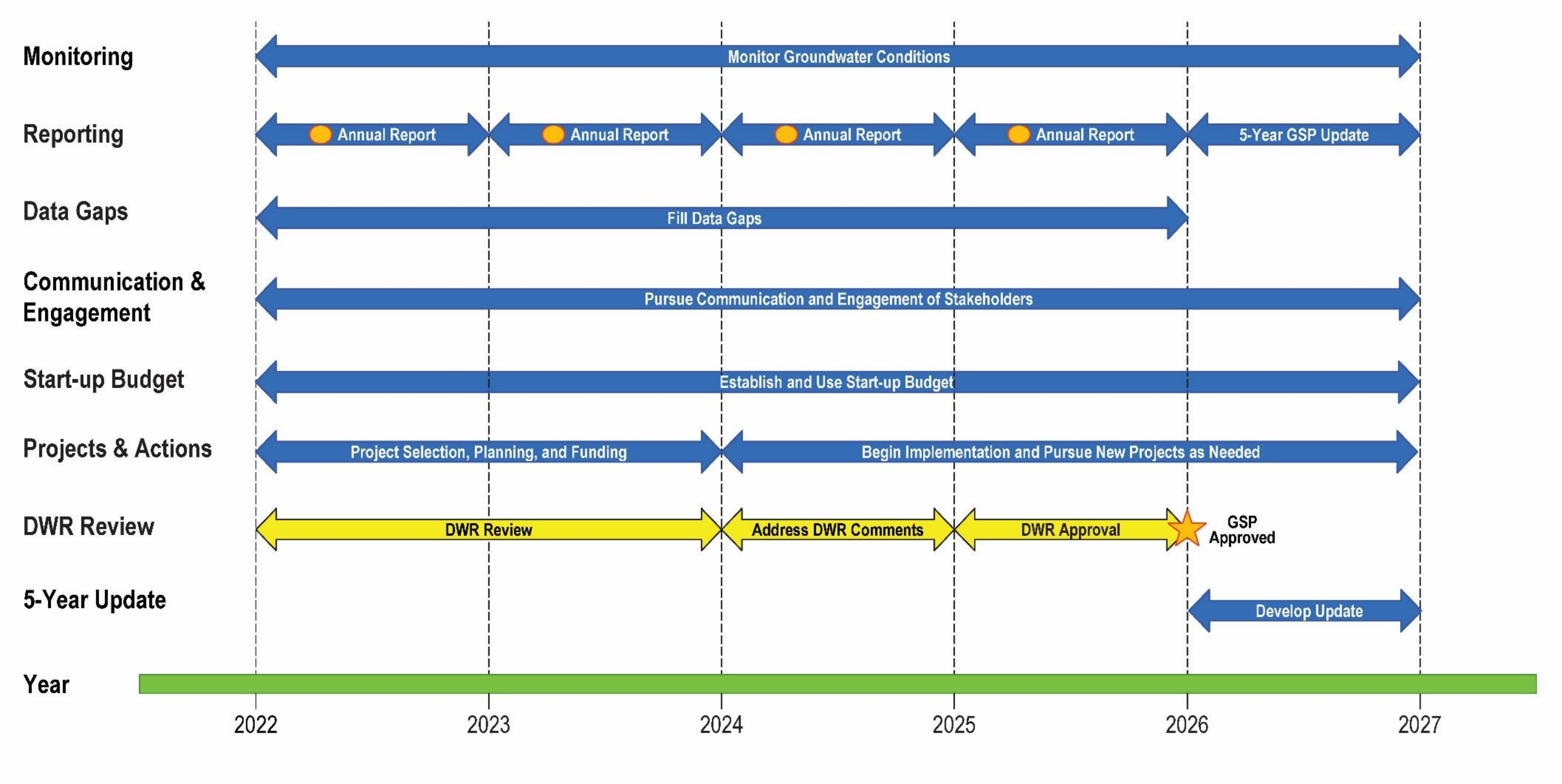
Implementation Actions - Summary

Project/ Management Action #	Name	Description	Project Benefits	Quantification of Project Benefits	Cost
F - IMPLEMENTATION ACTIONS					
F1	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
F2	Groundwater Extraction Management System (GEMS) Expansion	Update current GEMS program, by collecting groundwater extraction 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
F3	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
F4	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
F5	Support Protection of Areas of High Recharge	Identify land with high recharge potential and advocate to protect it from future development	More infiltration	N/A – Implementation Action	Not estimated at this time

Eastside P&MA Road Map

Years	Implementation Actions	Increased Recharge (Floodplain Enhancement & Overland Flow MAR)	New Water Supply & Regional Municipal Supply Projects	Salinas River Projects & CSIP Expansion	Decreased Demand
Year 1-2	Develop well registration program, GEMS expansion ordinance, and Trigger program	Evaluate floodplain enhancement & overland flow recharge opportunities; Outreach; Apply for grants; Begin projects	Further scope, analyze benefits, compare water supply projects, select project	.	.
Year 3-4	Implement well registration, GEMS expansion, and Dry Well Notification Establish Water Quality Partnership	Strategic outreach to landowners and site assessments; Development of recharge program; Evaluation of programmatic permit	Complete permitting and CEQA; Develop funding mechanism	If other subbasins move forward with these projects, consider implementing in Eastside	Develop pumping allocation structure & trigger for enacting pumping controls; consider incentivizing fallowing and land retirement
Year 5-6+		Build recharge basins	Continue project development; Pursue additional projects as needed	.	If triggered, implement pumping controls

Implementation Schedule



Adaptive Management

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

Questions