

---

# GSP Coordinating Committee

---

**Coordinating Committee Meeting – April 22, 2019**

**Merced Irrigation-Urban GSA  
Merced Subbasin GSA  
Turner Island Water District GSA-1**

Image courtesy: Veronica Adrover/UC Merced



# Agenda

1. Call to order
2. Approval of minutes for March 25, 2019 meeting
3. Stakeholder Committee update
  1. Update from April 25 morning meeting
4. Presentation by Woodard & Curran on GSP development
  1. Climate Change Analysis
  2. Undesirable Results & Minimum Thresholds
  3. Approach and Timing for Implementing Allocations
  4. Next Steps in GSP Development
  5. Other Updates

Image courtesy: Veronica Adrover/UC Merced

---

# Agenda

---

5. Public Outreach Update
6. Coordination with Neighboring Basins
7. Public Comment
8. Next Steps and Adjourn

Image courtesy: Veronica Adrover/UC Merced



---

# Approval of Minutes

---

Image courtesy: Veronica Adrover/UC Merced





---

# Stakeholder Committee Update

---

Image courtesy: Veronica Adrover/UC Merced





---

# Climate Change Analysis

---

Image courtesy: Veronica Adrover/UC Merced



# Climate Change Analysis:

## Regulatory Requirements

Section 354.18(d)(3) states:

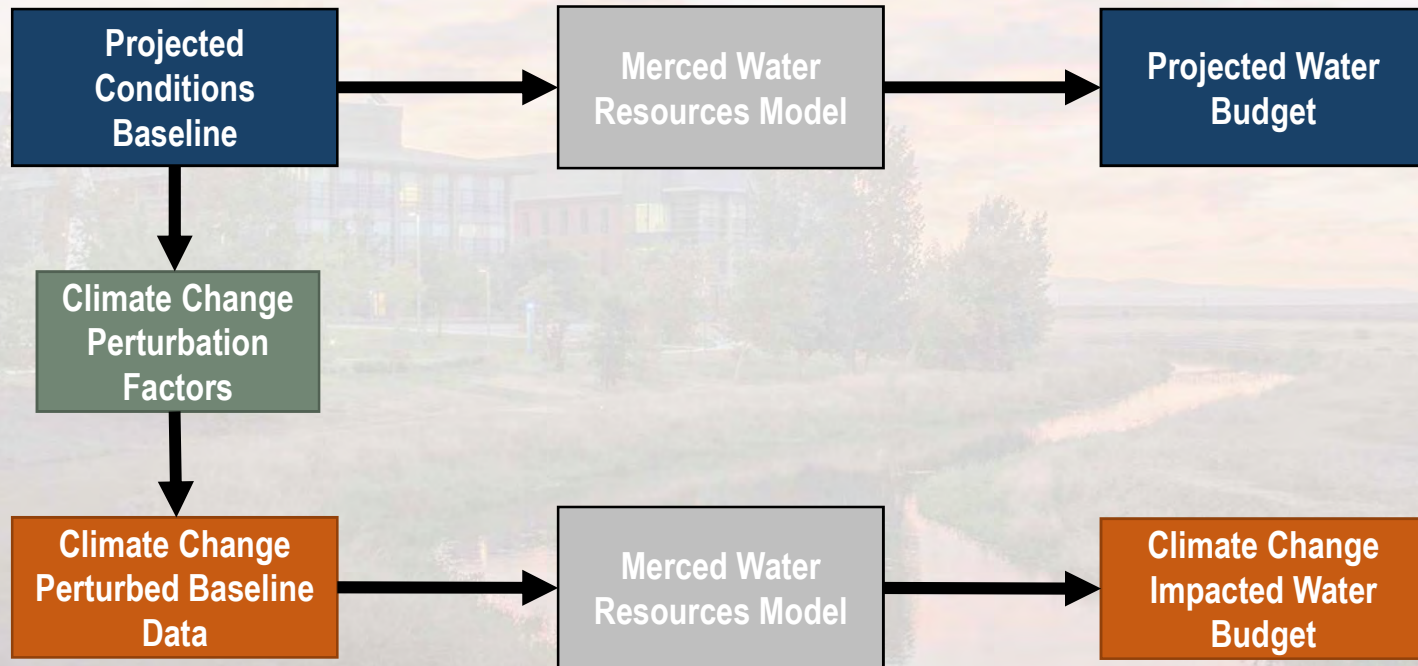
*“(d) The Agency shall utilize the following information provided, as available, by the Department pursuant to Section 353.2, or other data of comparable quality, to develop the water budget:*

- (1) Historical water budget information for mean annual temperature, mean annual precipitation, water year type, and land use.*
- (2) Current water budget information for temperature, water year type, evapotranspiration, and land use.*
- (3) Projected water budget information for population, population growth, **climate change**, and sea level rise.” (emphasis added)*

Image courtesy: Veronica Adrover/UC Merced

# Climate Change Analysis:

Approach for Merced GSP Consistent with DWR Approach



A change factor from DWR is applied to the Projected Data Baseline to simulate the impact of climate change. This creates the Climate Change Baseline, which is put into the Merced model. The output is the Climate Change Water Budget.



# Climate Change Analysis:

DWR has provided Climate Change Data and Guidance

<b>Perturbed Variable</b>
<b>Unregulated Streamflow</b>
<b>Regulated Streamflow</b>
<b>Precipitation</b>
<b>Reference ET</b>

The analysis considered impacts on the individual water resource system elements that directly link to groundwater, including: precipitation, streamflow, and evapotranspiration.

Image courtesy: Veronica Adrover/UC Merced

# Climate Change Analysis:

## Overview of Merced GSP Approach

### Projected Baseline and Sustainability Analysis without Climate Change Analysis\*

Includes variability in:

- Long-term and seasonal hydrology
- Agricultural land use and level of development
- Population, urban growth, and urban water use conditions
- Water Supply conditions and availability

\*Above presented in the Water Budget Memo

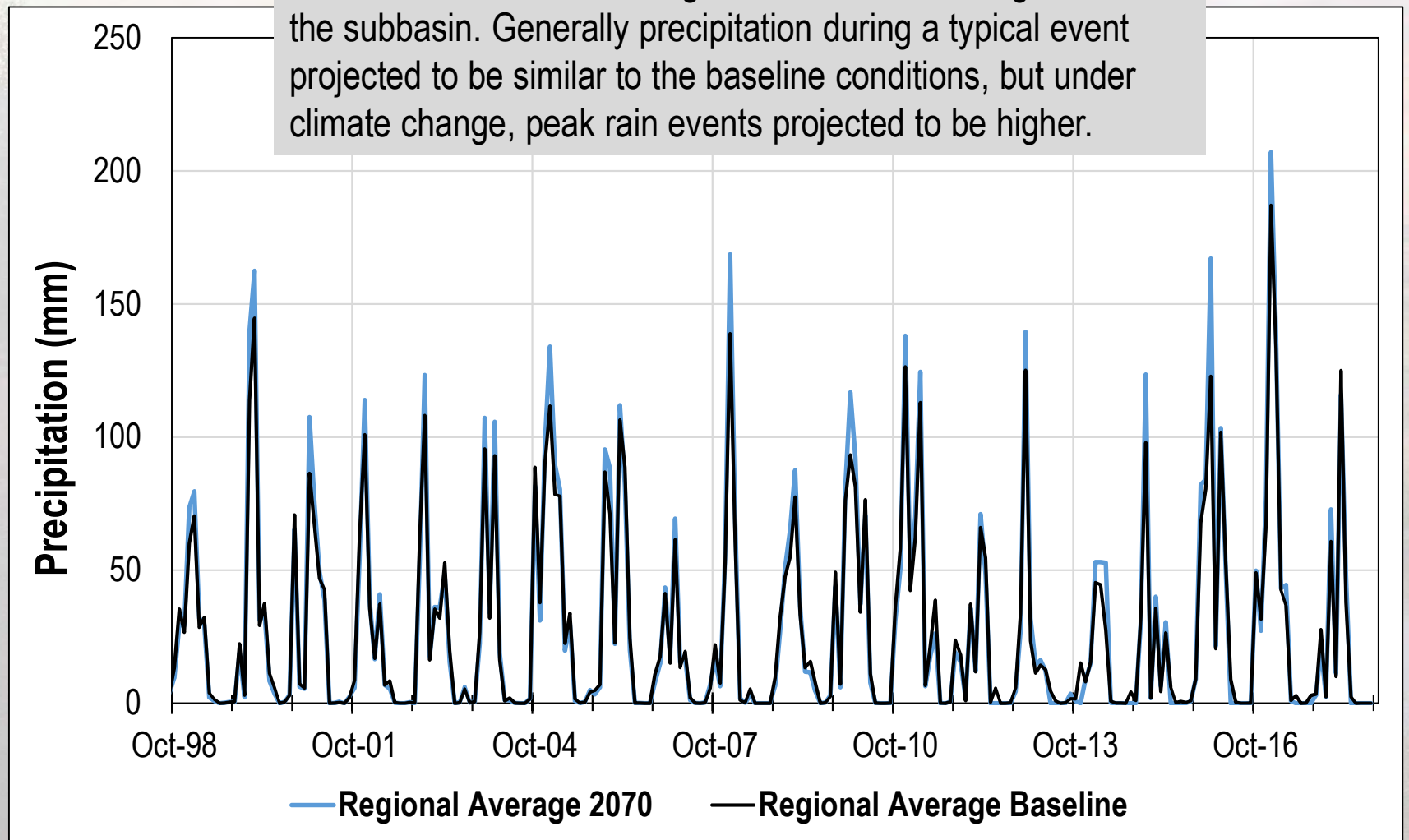
### Projected Baseline with Climate Change Analysis

Additionally includes:

- Modified Precipitation
- Modified Crop ETa
- Modified Streamflows

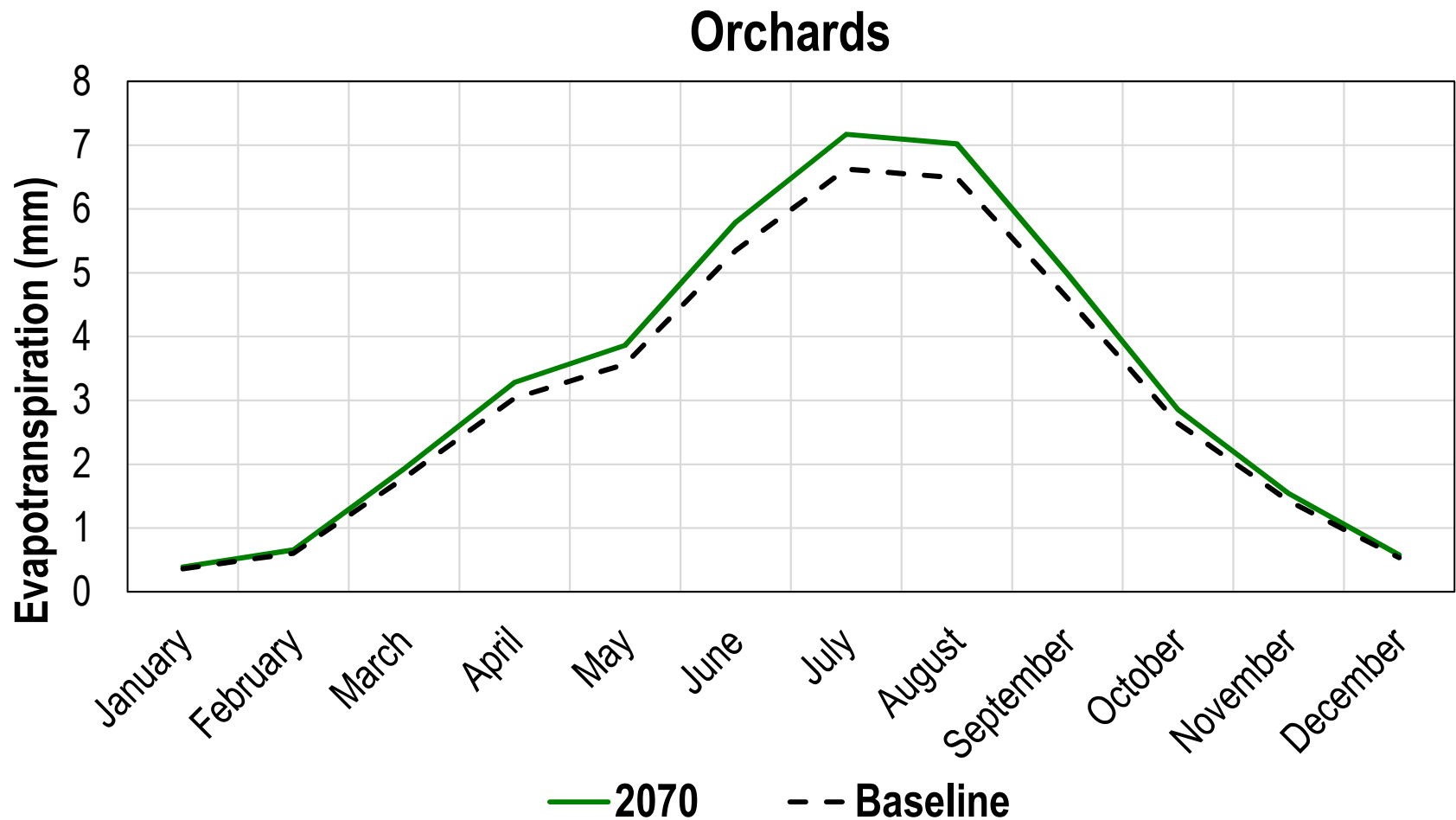
# Climate Change Analysis: Precipitation

Baseline and Climate Change scenarios are averaged over the subbasin. Generally precipitation during a typical event projected to be similar to the baseline conditions, but under climate change, peak rain events projected to be higher.



# Climate Change Analysis: Evapotranspiration

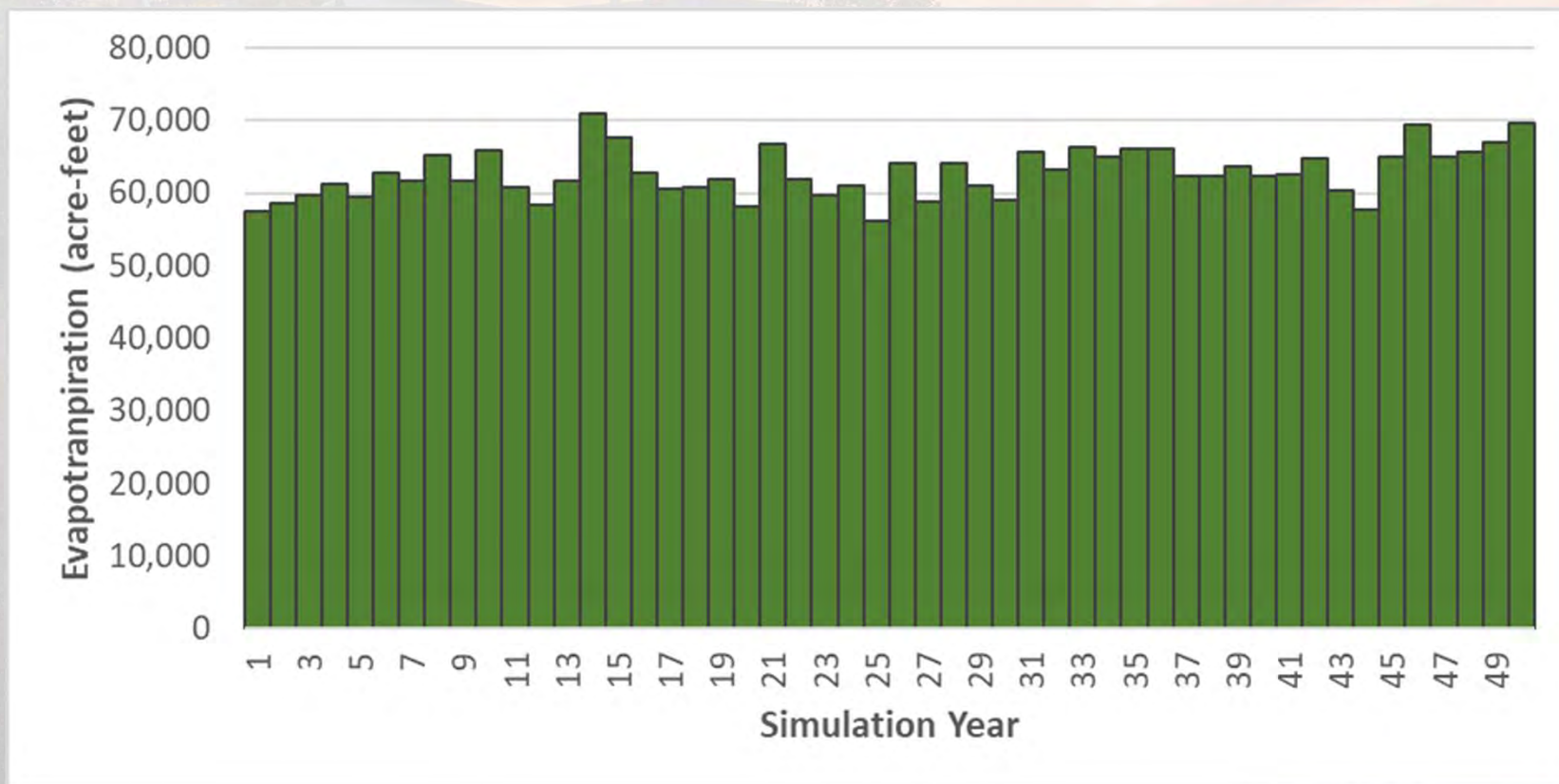
- Under climate change scenario, ET was forecasted to increase 8%



# Climate Change Uncertainty Analysis:

Average increase in ET basin-wide is 63,000 AFY

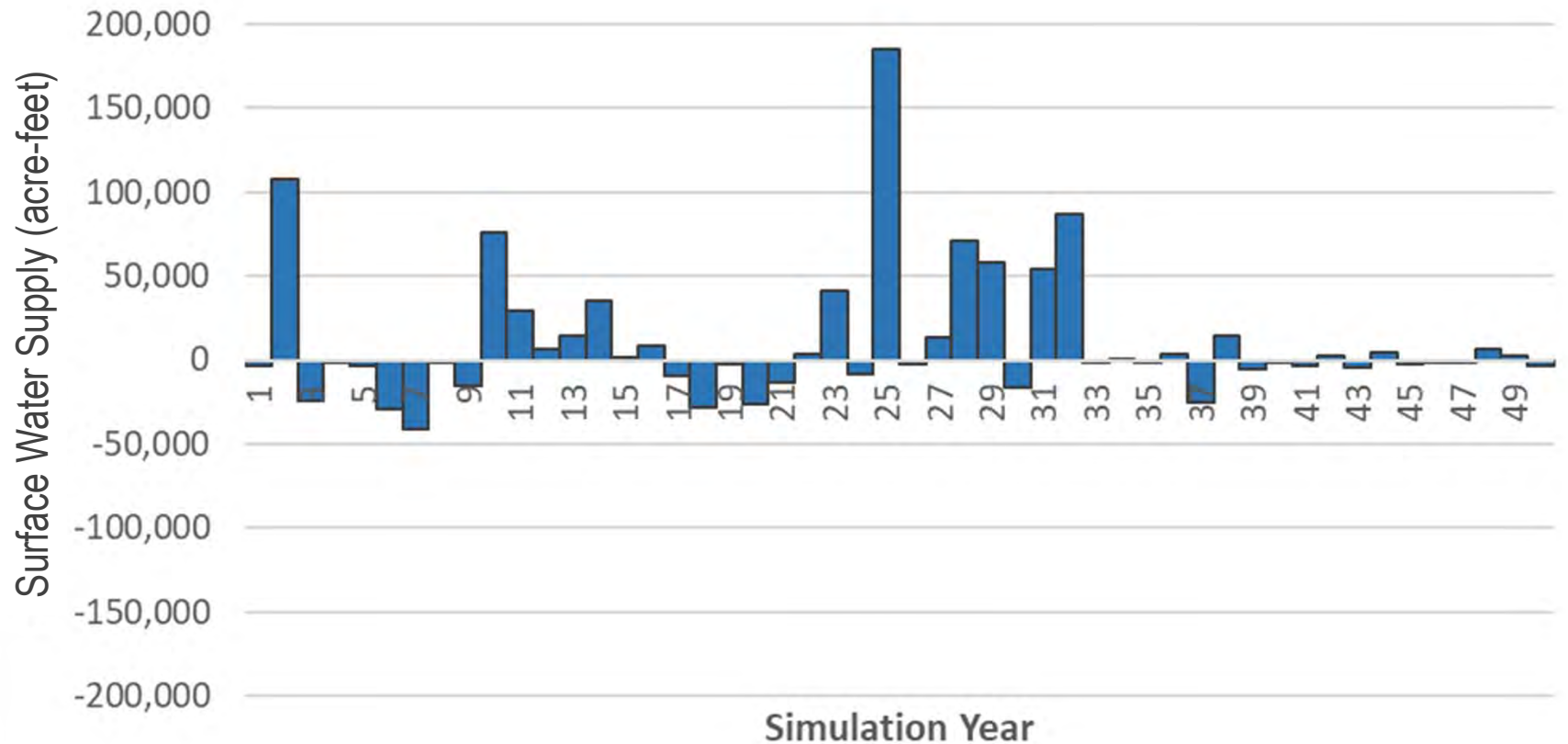
- Changes in ET due to Climate Change (CC Scenario minus Baseline)



# Climate Change Uncertainty Analysis:

Findings from Projected Climate Change Budget Run

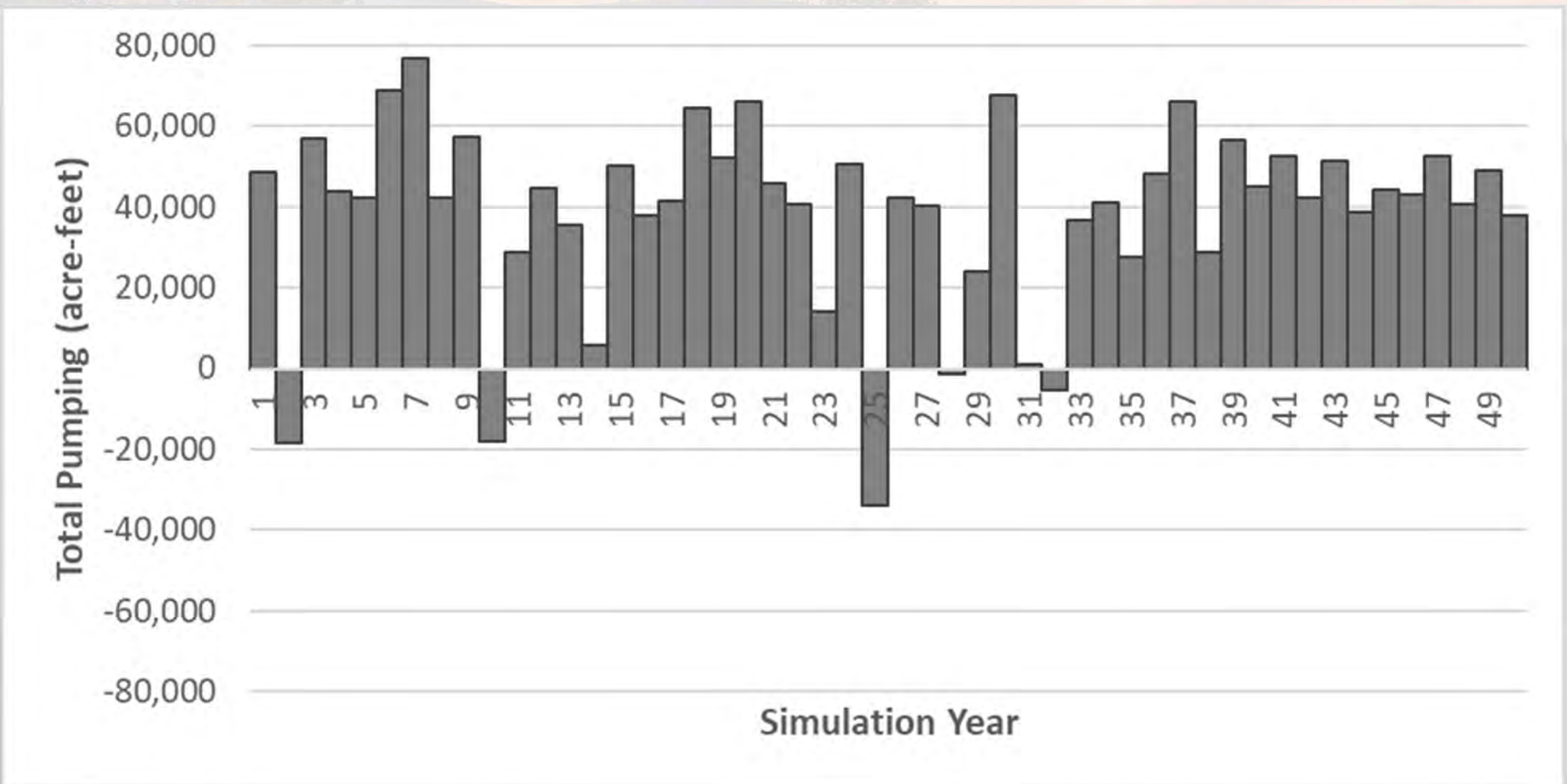
- Changes in Surface Water Supplies due to Climate Change (CC Scenario minus Baseline)



# Climate Change Uncertainty Analysis:

## Groundwater Pumping Increases under Climate Change Scenario

- Changes in Groundwater Production due to Climate Change (CC Scenario minus Baseline)



# Climate Change Uncertainty Analysis:

## Summary of Findings

- Analysis was based on the projected conditions baseline with climate change perturbed inputs for streamflow, precipitation, and ET
- Under CC scenario, evapotranspiration forecasted to increase 8%
- Private groundwater pumping simulated to increase 7% from 536,000 AFY to 565,000 AFY
- Depletion in aquifer storage project to increase from 82,000 AFY to 130,000 AFY
- Analysis based on regional model – recommended future refinement to use MIDH2O to better simulate local operations response to changes in water demands

Image courtesy: Veronica Adrover/UC Merced





---

# Undesirable Results & Minimum Thresholds

---

Image courtesy: Veronica Adrover/UC Merced



---

# Undesirable Results Definition

---

- “Significant and Unreasonable” negative impacts that can occur for each Sustainability Indicator
- Conditions that we do not want to occur
- Used to guide and justify GSP components
  - Monitoring Network
  - Minimum Threshold
  - Projects and Management Actions

## Merced GSP Sustainability Goal

The sustainability goal for the Merced Subbasin is *to achieve sustainable groundwater management on a long-term average basis by increasing recharge and/or reducing groundwater pumping, while avoiding undesirable results.*

Image courtesy: Veronica Adrover/UC Merced

# Sustainable Management Criteria Definitions

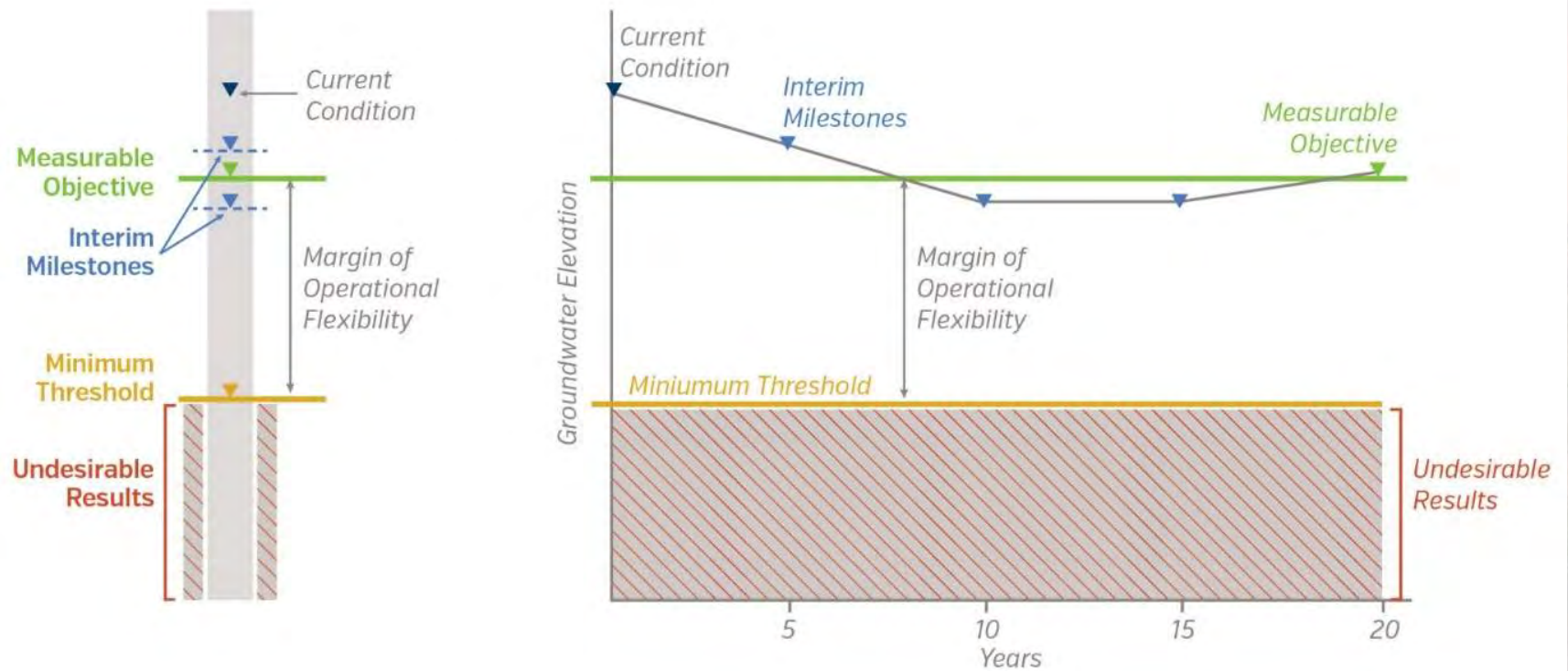


Image courtesy: Veronica Adrover/UC Merced

# Chronic Lowering of Groundwater Levels: Undesirable Results

- Undesirable Results qualitatively described in previous CC meetings
  - Unusable and stranded groundwater extraction infrastructure
  - Reduced groundwater production
  - Increased pumping costs due to greater lift and deeper installation or construction of new wells
  - Shallow domestic wells going dry
- Need to define quantitatively

Image courtesy: Veronica Adrover/UC Merced

# Chronic Lowering of Groundwater Levels: Minimum Thresholds

## Methods used:

- Representative monitoring wells: 30 CASGEM wells (above, below, & outside the Corcoran Clay)
- Minimum threshold is placed at depth of shallowest domestic well:
  - Merced County electronic database with wells permitted 1990s or later
  - Wells less than 50 feet deep not considered (50 ft annular seal requirement)
  - Outliers were removed via interquartile range analysis
  - Used shallowest well within a 2-mile buffer of each CASGEM representative monitoring well
- Then: Compare proposed minimum threshold against modeled groundwater elevations during implementation and sustainable yield periods (2015-2090)

Image courtesy: Veronica Adrover/UC Merced

# Example Hydrograph

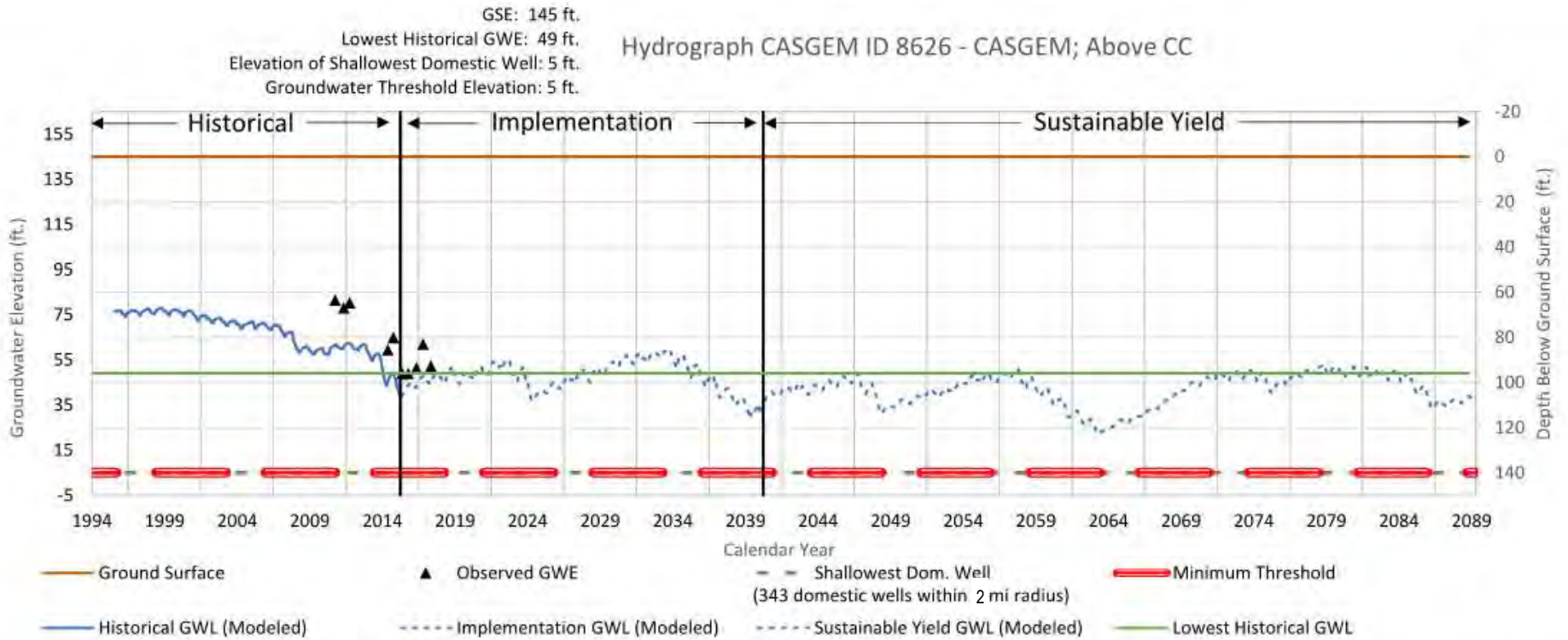
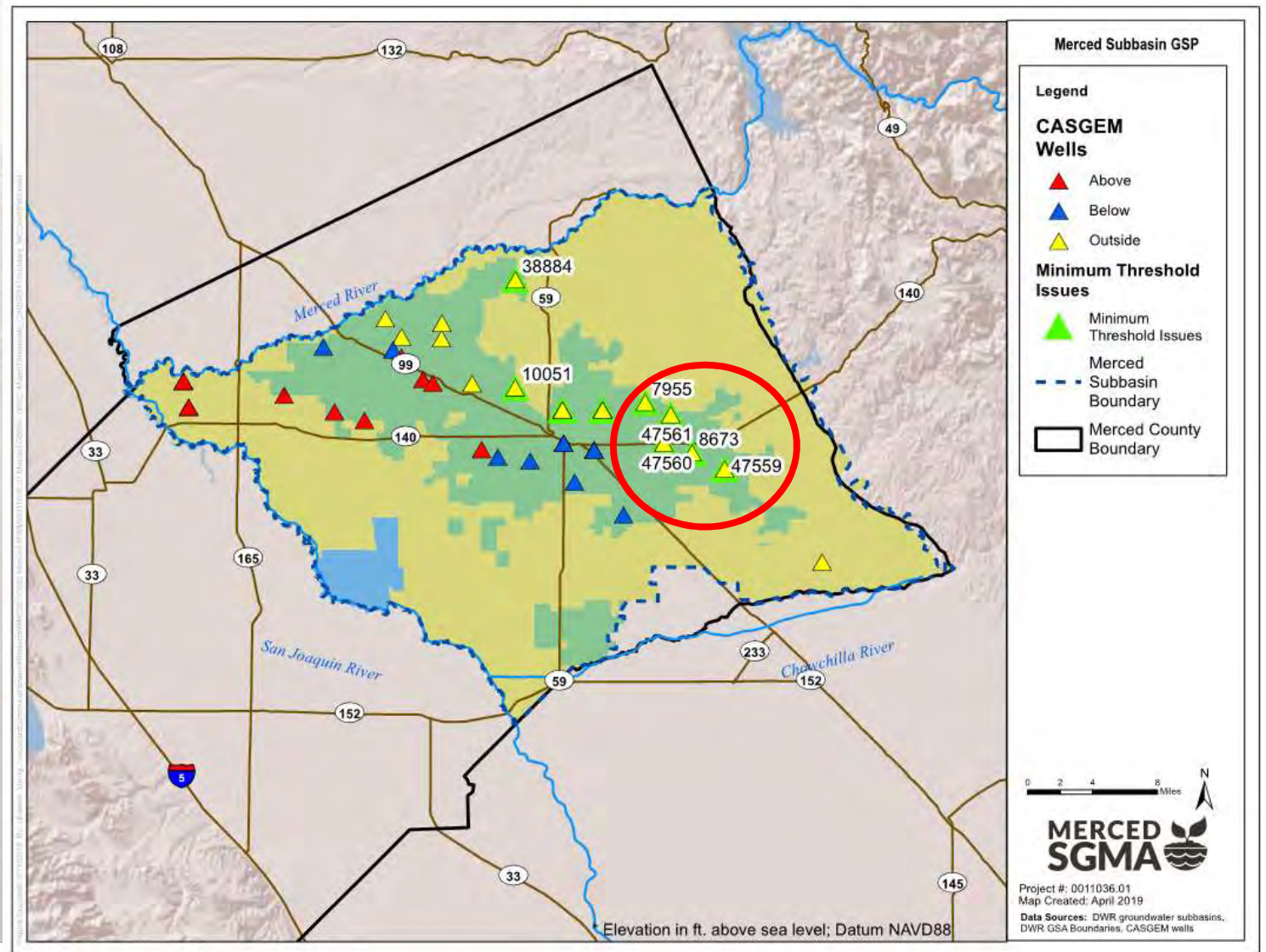


Image courtesy: Veronica Adrover/UC Merced

# Minimum Threshold Conflict Area



# Example Location with Min. Threshold Conflict

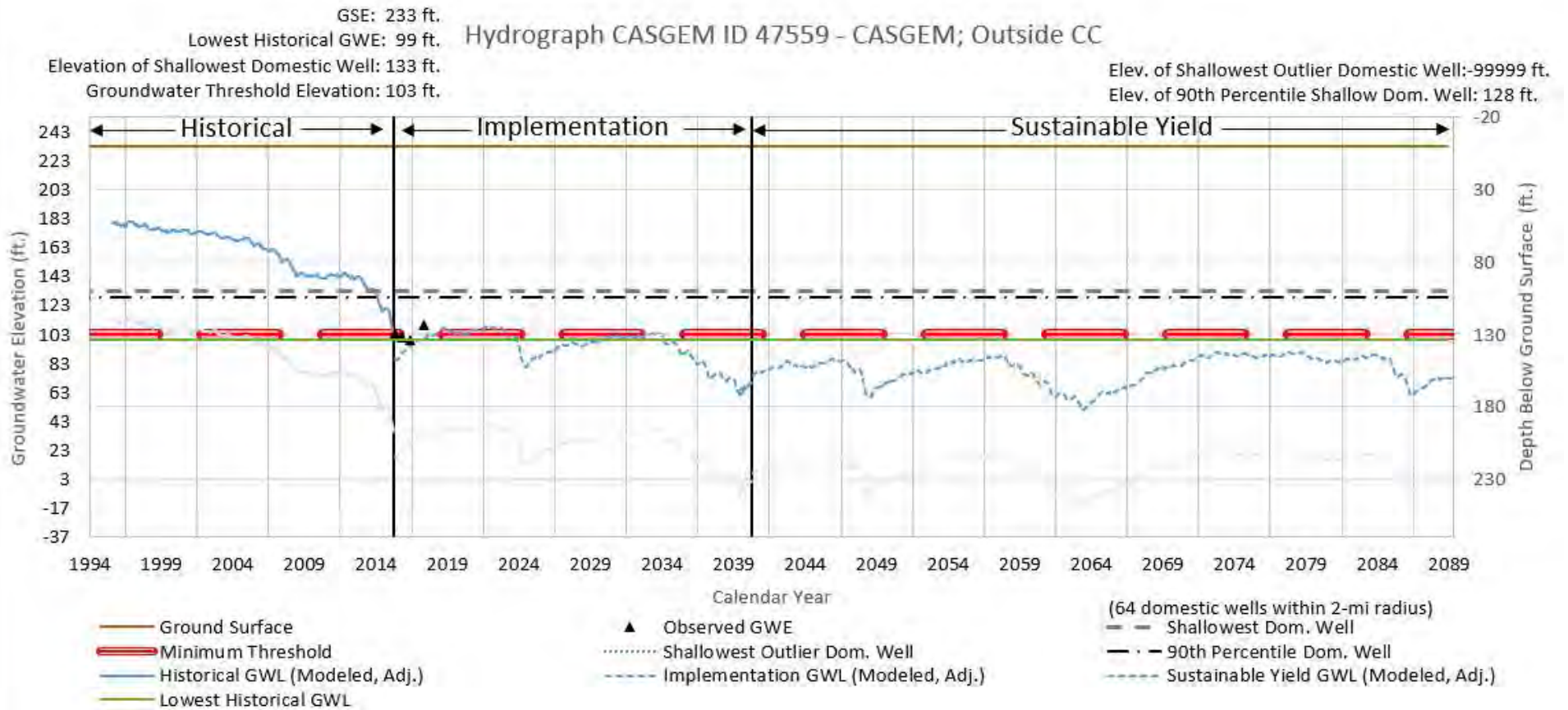
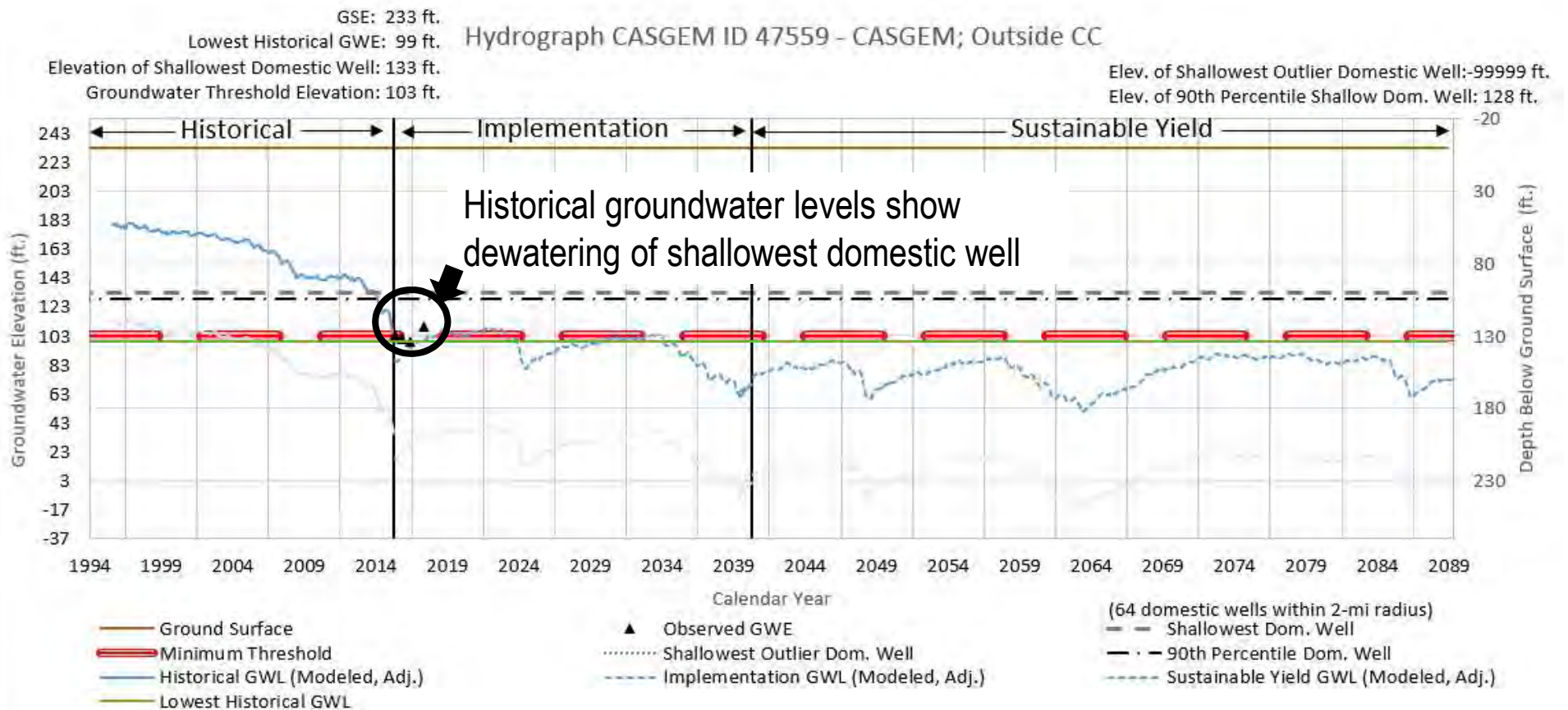


Image courtesy: Veronica Adrover/UC Merced



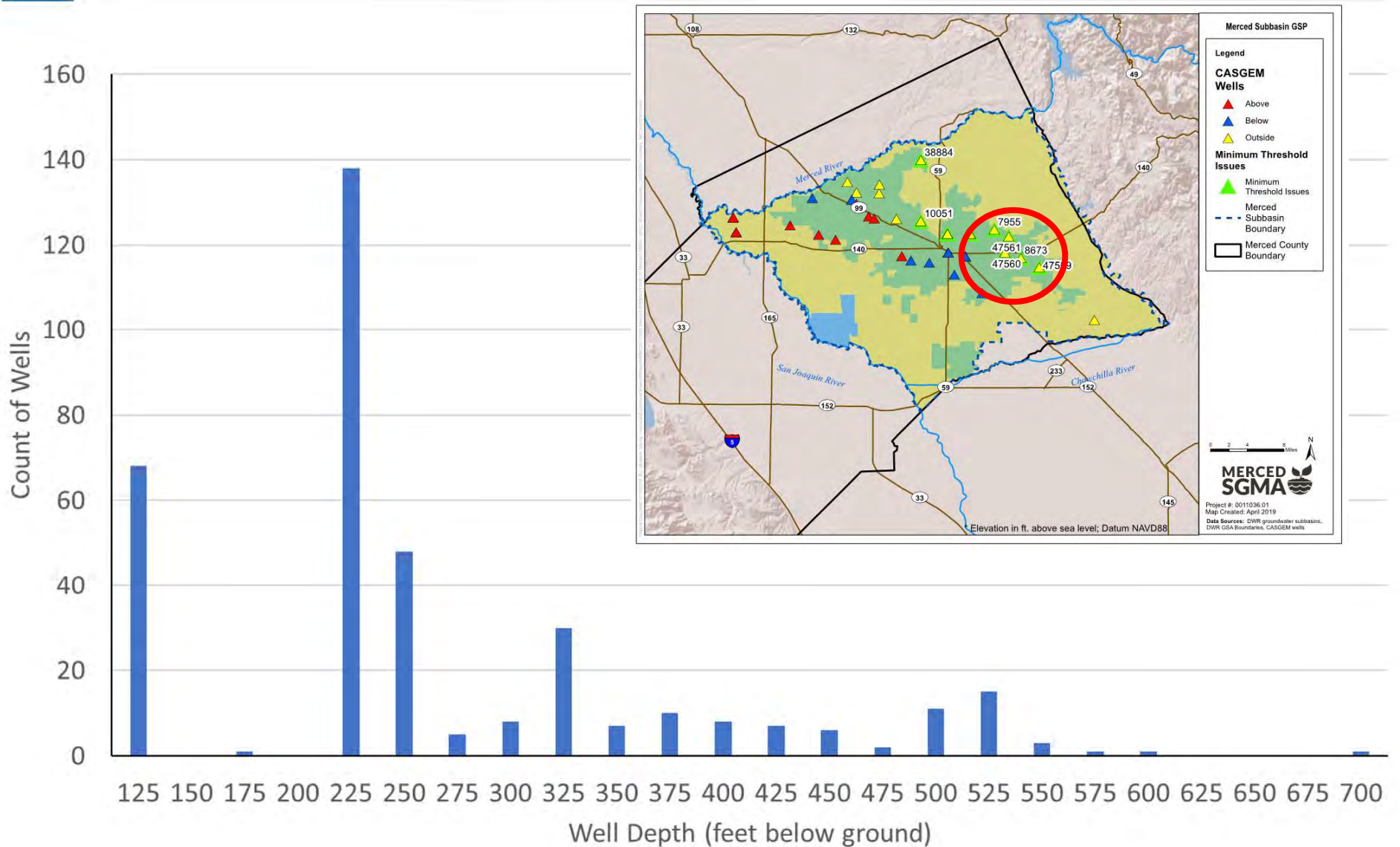
# Example Location with Min. Threshold Conflict



- Conflict identifies potential data gap to address for limited number of wells.

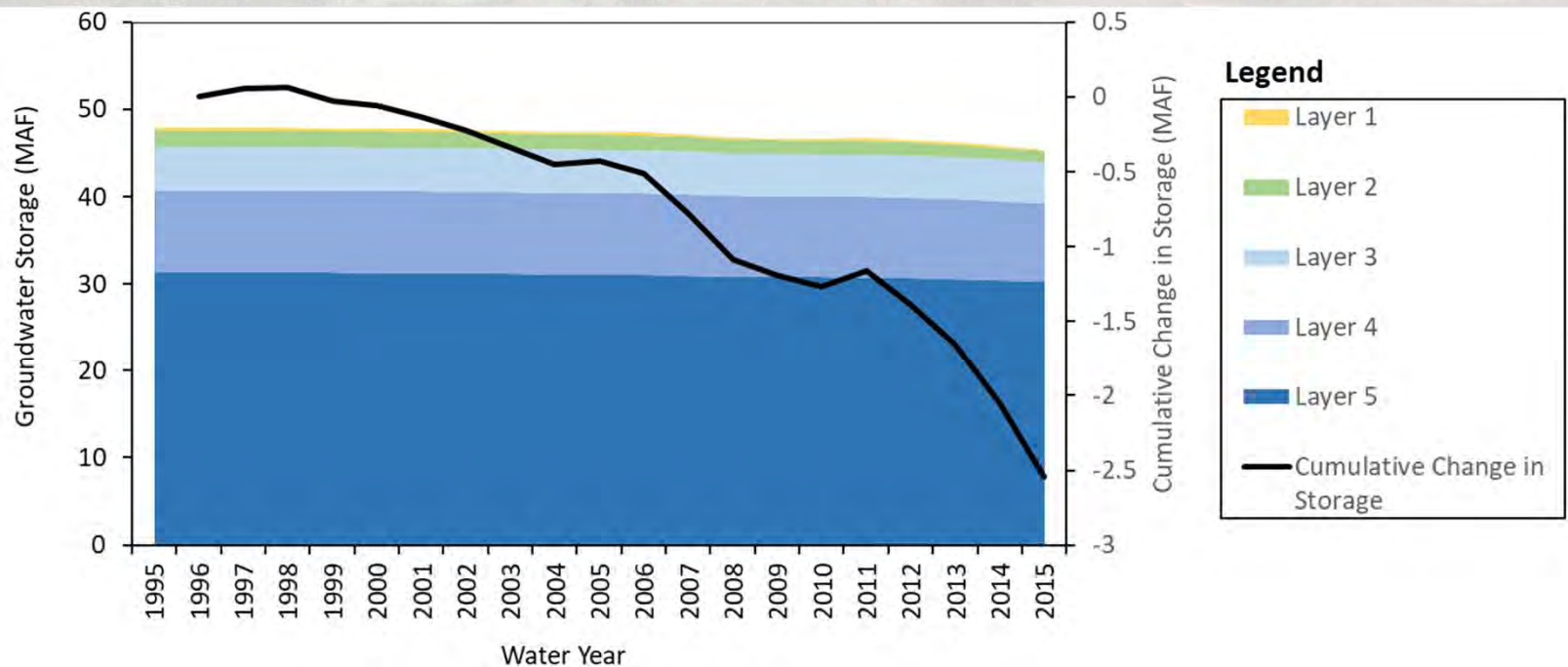
Image courtesy: Veronica Adrover/UC Merced

# Distribution of Domestic Well Depths



# Reduction of Groundwater Storage

- Will not set Minimum Threshold for storage in Merced GSP
  - Undesirable Results not present and not likely to occur
  - Cumulative change in storage currently is  $\sim 0.3\%$  per year (1995-2015); not reasonable to expect available groundwater storage would be exhausted to a significant and unreasonable extent within any foreseeable time period.



# Seawater Intrusion: Undesirable Results

- Seawater intrusion – not applicable
  - Not present and not likely to occur (salinity being addressed as a minimum threshold under “degraded water quality”)

Image courtesy: Veronica Adrover/UC Merced

# Degraded Water Quality: Undesirable Results

- Undesirable result
  - Significant and unreasonable reduction in the long-term viability of domestic, agricultural, municipal, or environmental uses
  - Set minimum thresholds for constituents where groundwater extractions effect groundwater quality (causal nexus)
  - For contaminants regulated under existing programs, establish communication and coordination to prevent migration of existing plumes through recharge and other activities
  - Basin Contaminants
    - Nitrates – CV-SALTS/ILRP
    - Arsenic – Cal/Federal EPA (naturally occurring)
    - Point Source Contamination – Regional Board
    - Toxics – DTSC
    - **Salinity**

Image courtesy: Veronica Adrover/UC Merced

# Degraded Water Quality: Minimum Thresholds

- **Proposed Minimum Threshold: 1,000 mg/L Total Dissolved Solids (TDS, measurement of salinity)**
- Based on:
  - 1,000 mg/L TDS upper limit Secondary Maximum Contaminant Level (SMCL) from SWRCB
  - Salt tolerances range from 640 - 1,100 mg/L TDS

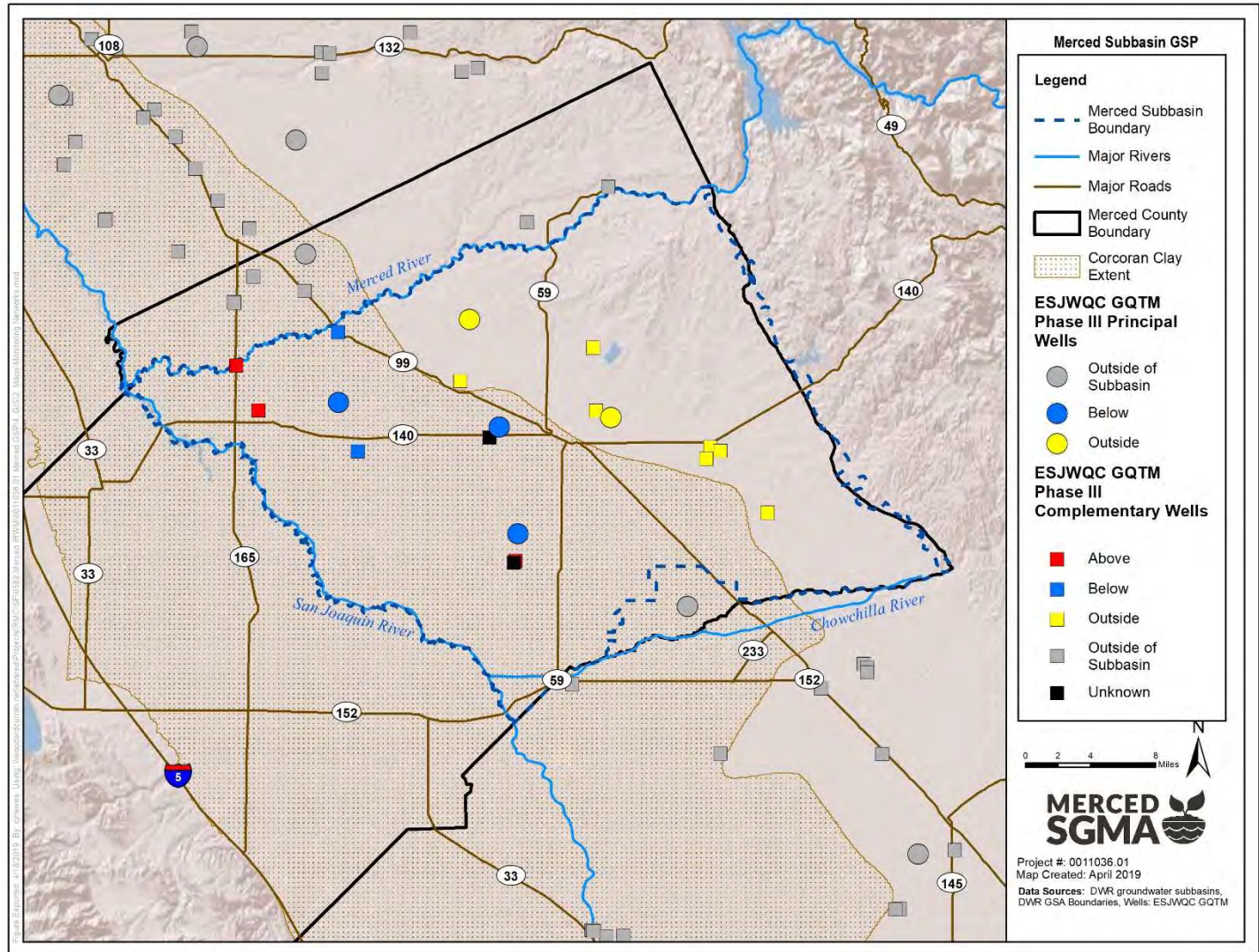
Image courtesy: Veronica Adrover/UC Merced

# Degraded Water Quality: Minimum Thresholds (Monitoring)

- Eastern San Joaquin Water Quality Coalition (ESJWQC) Groundwater Quality Trend Monitoring Workplan, Phase III document targeted domestic wells for GWQ monitoring network
  - Includes 5 wells in Merced Subbasin that meet requirements of Waste Discharge Orders
- 15 additional complementary wells with historical data but don't meet criteria for Principal Wells (similar to CASGEM Voluntary)
  - Public Water Systems (PWS) which monitored separately on a regular basis in accordance with SWRCB DDW protocols

Image courtesy: Veronica Adrover/UC Merced

# Degraded Water Quality – Monitoring Network





# Land Subsidence: Undesirable Results

- Undesirable Results
  - Reduction in the viability of the use of infrastructure (e.g., roads and highways, flood control, canals, pipelines, utilities, public buildings, residential and commercial structures)
- Propose to use groundwater levels as proxy
- In communication with DWR about approach

Image courtesy: Veronica Adrover/UC Merced

# Depletion of Interconnected Surface Water: Undesirable Results

- Undesirable Results
  - Effects on operations of upstream reservoirs and/or reduction in the viability of agricultural, fishery, riparian habitat or recreational uses
  - Reduction in the viability of the use of infrastructure (e.g., roads and highways, flood control, canals, pipelines, utilities, public buildings, residential and commercial structures)
  - Minimum threshold:
    - Undesirable results may occur if the 5-year average stream losses exceed the historical simulation maximum losses plus range (using critical, dry, below normal, and above normal water years)

Image courtesy: Veronica Adrover/UC Merced



---

# Approach and Timing for Implementing Allocations

---

Image courtesy: Veronica Adrover/UC Merced

# Conceptual GSP Implementation Timeline

Implementation will be phased over 20 years, with 5-yr updates.

2020	2025*	2030	2035	2040
Monitoring and Reporting	Preparation for Allocations and Low Capital Outlay Projects	Prepare for Sustainability	Implement Sustainable Operations	
<ul style="list-style-type: none"> <li>• Establish Monitoring Network</li> <li>• Install New Wells</li> <li>• Develop Metering Program</li> <li>• Extensive public outreach</li> <li>• Funded and smaller projects implemented</li> </ul>	<ul style="list-style-type: none"> <li>• GSAs conduct 5-year evaluation/update</li> <li>• Planning/ Design/ Construction for small to medium sized projects</li> <li>• Monitoring and reporting continues</li> <li>• Metering program continues</li> <li>• Outreach continues</li> </ul>	<ul style="list-style-type: none"> <li>• GSAs conduct 5-year evaluation/update</li> <li>• Planning/ Design/ Construction for larger projects begins</li> <li>• Monitoring and reporting continues</li> <li>• Outreach continues</li> <li>• Allocation program begins phase-in</li> </ul>	<ul style="list-style-type: none"> <li>• GSAs conduct 5-year evaluation/update</li> <li>• Project implementation completed</li> <li>• Allocations fully implemented/enforced</li> </ul>	

**\*Need for mechanisms to prevent overpumping prior to implementation period**



---

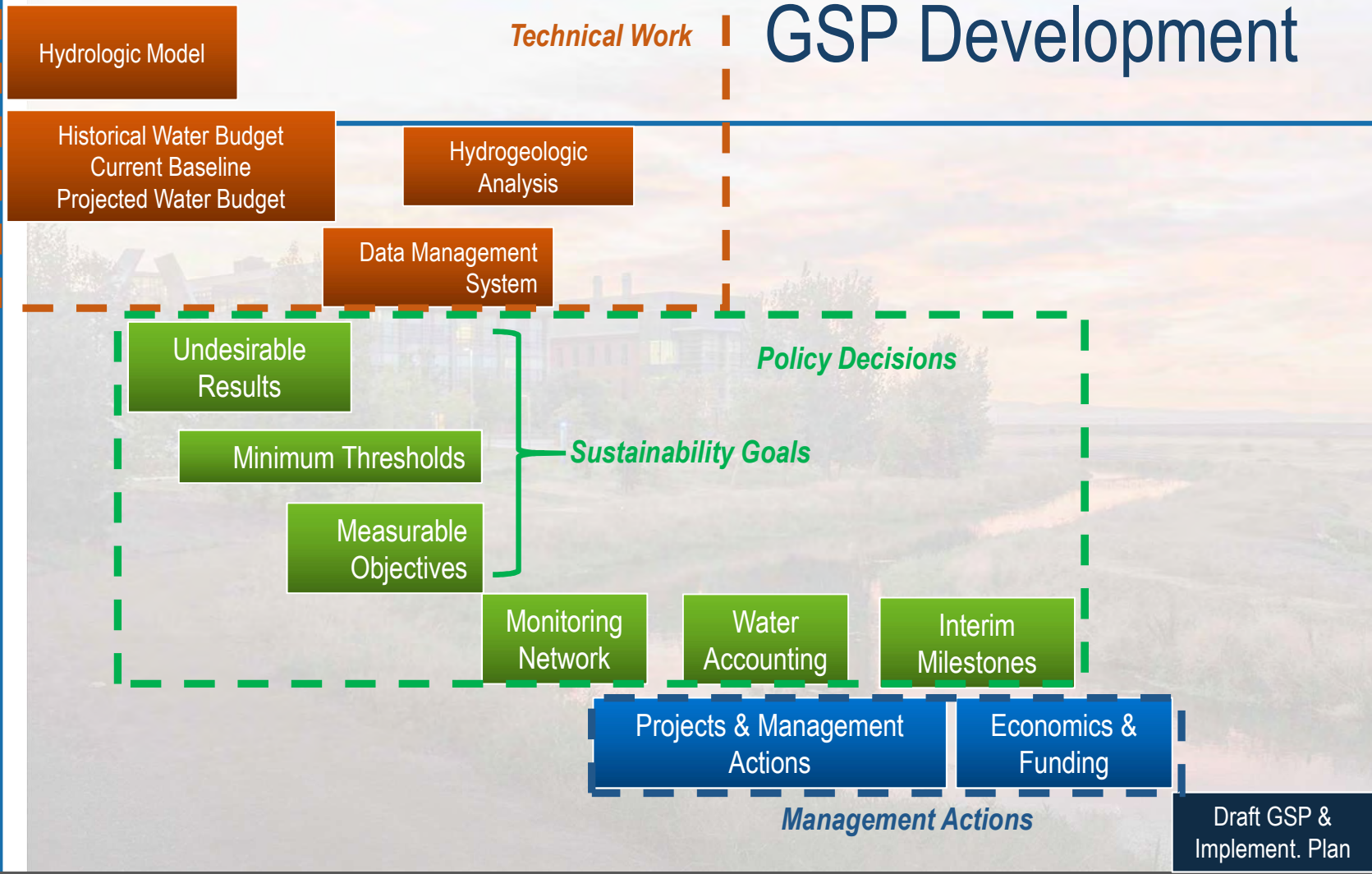
# Next Steps in GSP Development

---

Image courtesy: Veronica Adrover/UC Merced



# GSP Development



Jun 2018 Jul 2018 Aug 2018 Sep 2018 Oct 2018 Nov 2018 Dec 2018 Jan 2019 Feb 2019 Mar 2019 Apr 2019 May 2019 Jun 2019 Jul 2019

Image courtesy: Veronica Adrover/UC Merced



# GSP Development: Sections Review Schedule

#	Section	Admin Review Draft Sent Out	Deadline for Consolidated Comments (2 wks)	SC and CC Review Period	Relevant Mtg for Discussion	Final Public Draft Deadline (June mtg on 6/24)
1	<b>Plan Area and Authority</b>	29-Jun-18	20-Jul-18	N/A		24-Jun-2019
2	<b>Basin Setting</b>	(in sections, see below)				24-Jun-2019
2.1	<i>Hydrogeologic Conceptual Model</i>	6-Nov-18	30-Nov-18	N/A		
2.2	<i>Current and Historical Groundwater Conditions</i>	15-Mar-19	29-Mar-19	15-Apr - 29-Apr-19	22-Apr-19	
2.3	<i>Water Budget Information</i>	5-Mar-19	19-Mar-19	26-Mar - 9-Apr-19		
2.4	<i>Climate Change Analysis</i>	19-Apr-19	3-May-19	10-May - 24-May-19	29-May-19	
3	<b>Sustainable Management Criteria</b>	30-Apr-19	14-May-19	21-May - 4-Jun-19	29-May-19	24-Jun-2019
4	<b>DMS</b>	15-Mar-19	29-Mar-19	15-Apr - 29-Apr-19	22-Apr-19	24-Jun-2019
5	<b>Projects and Management Actions to Achieve Sustainability Goal</b>	30-Apr-19	14-May-19	21-May - 4-Jun-19	29-May-19	24-Jun-2019
6	<b>Plan Implementation</b>	13-May-19	27-May-19	3-Jun - 17-Jun-19	24-Jun-19	24-Jun-2019

Image courtesy: Veronica Adrover/UC Merced

# Proposed Merced GSP Review & Submission Timeline

90 Days Post-Notice of Intent to Adopt  
(Can adopt or amend from 13-Oct if  
notice issued by 29-Jul)

Full GSP Available for Public Review

MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV/DEC
Continue writing sections, providing for review	Deliver full GSP draft June 24	Review and Comments on Draft GSP	Review and Comments on Draft GSP	Consulting team revisions to incorporate comments	Recirculate to GSA Boards	Submit to DWR
SC & CC meetings May 29	SC & CC meetings June 24	SC & CC meetings July 22	Public workshop at CC meeting August 26			
Public Workshop May 29		Issue Notice of intent to adopt by July 29	Evening Public workshop August 26		Joint GSA Board meeting (Potential Adoption)	

Image courtesy: Veronica Adrover/UC Merced







---

# Other Updates

---

Image courtesy: Veronica Adrover/UC Merced



---

# Comments for GSP Sections

---

- Data Management System and Current Conditions Admin Drafts sent to SC and CC
  - Please provide comments by April 29<sup>th</sup>
- Climate Change Analysis Admin Draft sent to GSP Staff
- Projects & Management Actions Draft and Sustainable Management Criteria anticipated for end of this month

Image courtesy: Veronica Adrover/UC Merced



---

# Public Outreach Update

---

Image courtesy: Veronica Adrover/UC Merced





---

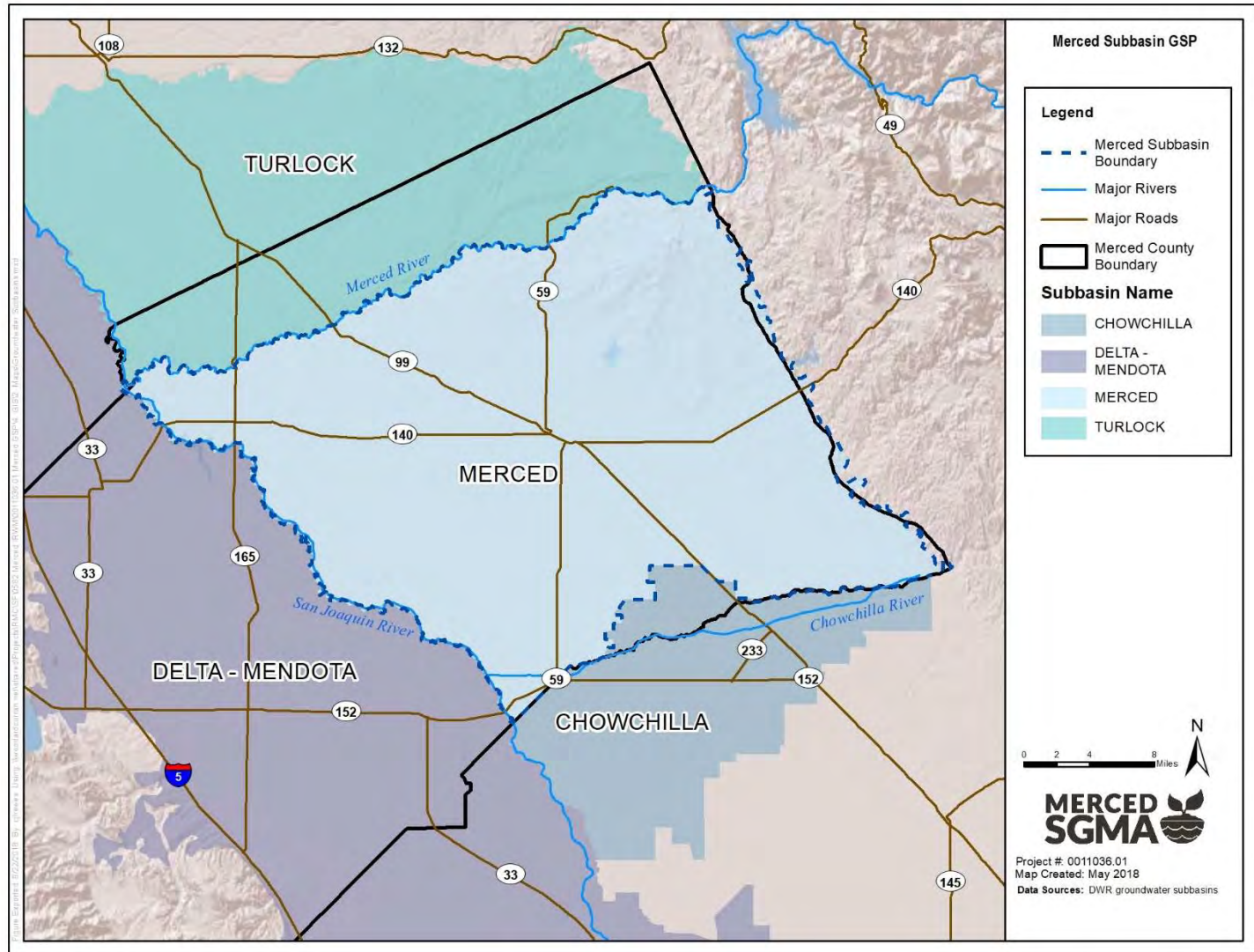
# Coordination With Neighboring Basins Update

---

Image courtesy: Veronica Adrover/UC Merced



# Coordination with Neighboring Basins





---

# Questions/Comments from Public

---

Image courtesy: Veronica Adrover/UC Merced





---

# Next Steps

---

Image courtesy: Veronica Adrover/UC Merced



---

# What's coming up next?

---

- GSP Development Items:
  - Sustainable Management Criteria
  - Projects and Management Actions
  - Climate Change Analysis
- Focus for May meeting
  - Minimum Thresholds and Measurable Objectives
  - Implementation planning
- Adjourn to next meeting: May 29<sup>th</sup>, 1:30 PM at Castle Conference Center

Image courtesy: Veronica Adrover/UC Merced



---

# GSP Coordinating Committee

---

**Coordinating Committee Meeting – April 22, 2019**

**Merced Irrigation-Urban GSA  
Merced Subbasin GSA  
Turner Island Water District GSA-1**

Image courtesy: Veronica Adrover/UC Merced

