
GSP Stakeholder Committee

Stakeholder Committee Meeting – April 22, 2019

Image courtesy: Veronica Adrover/UC Merced



Agenda

- Welcome, Introductions, and Agenda Review
- Presentation by Woodard & Curran on GSP development
 - Climate Change Analysis
 - Undesirable Results & Minimum Thresholds
 - Next Steps in GSP Development
 - Other Updates
- Public Outreach Update
- Interbasin Coordination Update
- Public Comment on Items not on the Agenda
- Next Steps and Next Meeting

Image courtesy: Veronica Adrover/UC Merced

Stakeholder Committee Meeting Agreements

Guidelines for successful meetings

- Civility is required.
 - Treat one another with courtesy and respect for the personal integrity, values, motivations, and intentions of each member.
 - Be honest, fair, and as candid as possible.
 - Personal attacks and stereotyping are not acceptable.
- Creativity is encouraged.
 - Think outside the box and welcome new ideas.
 - Build on the ideas of others to improve results.
 - Disagreements are problems to be solved rather than battles to be won.
- Efficiency is important.
 - Participate fully, without distractions.
 - Respect time constraints and be succinct.
 - Let one person speak at a time.
- Constructiveness is essential.
 - Take responsibility for the group as a whole and ask for what you need.
 - Enter commitments honestly, and keep them.
 - Delay will not be employed as a tactic to avoid an undesired result.

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:

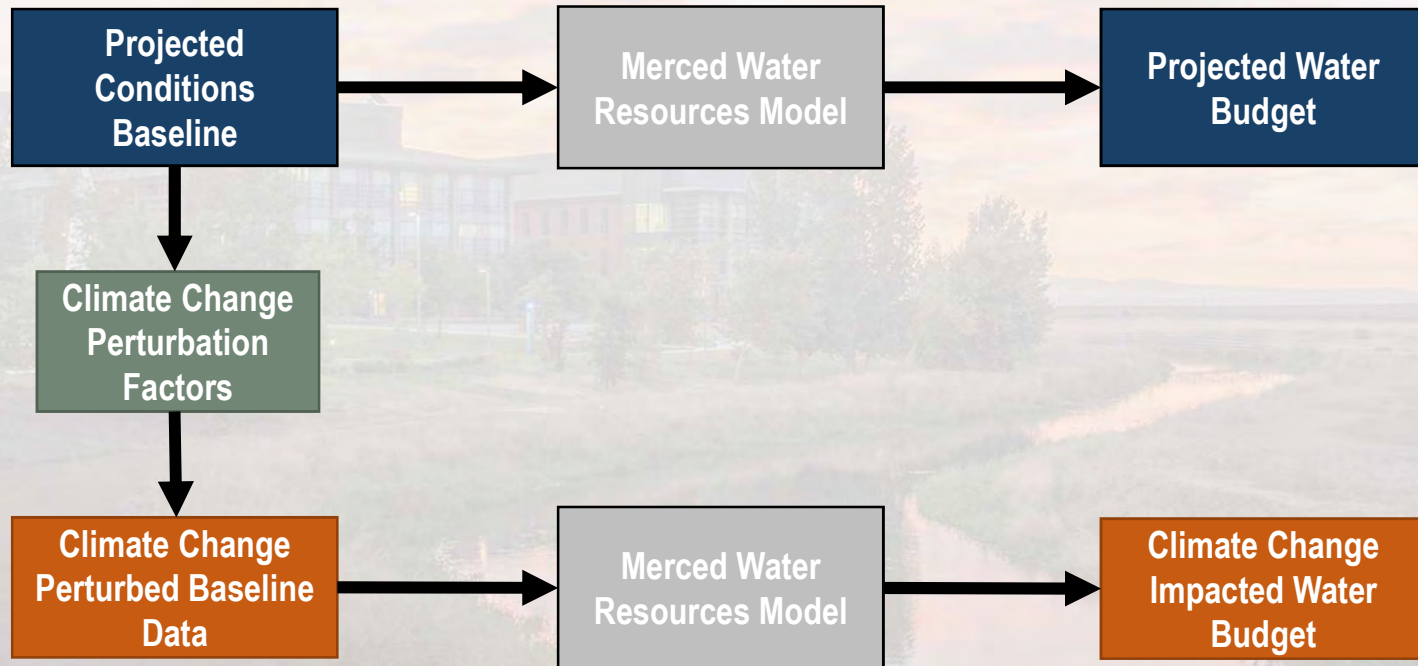
“(d) The Agency shall utilize the following information provided, as available, by the Department pursuant to Section 353.2, or other data of comparable quality, to develop the water budget:

- (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

Perturbed Variable
Unregulated Streamflow
Regulated Streamflow
Precipitation
Reference ET

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

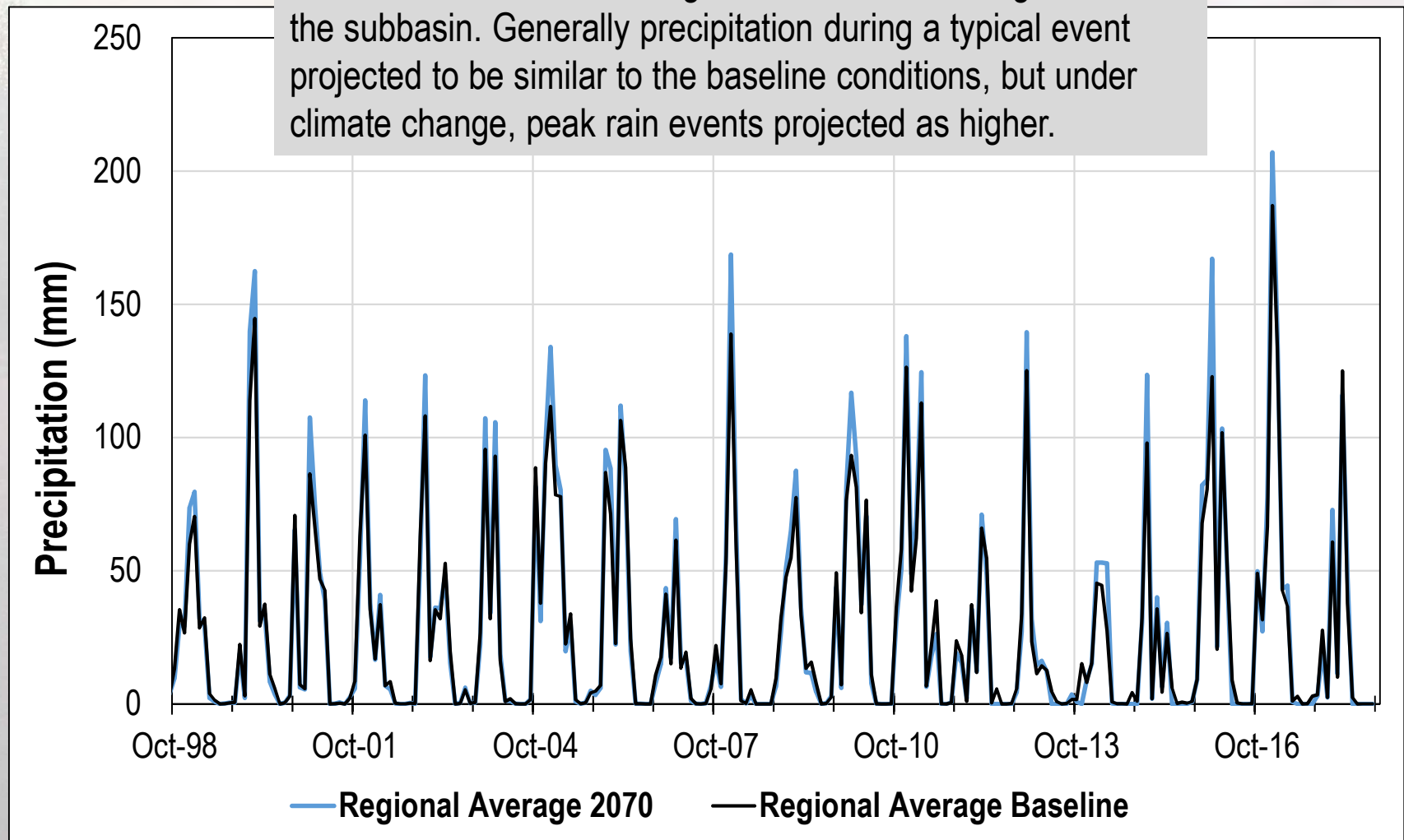
Projected Baseline with Climate Change Analysis

Additionally includes:

- Modified Precipitation
- Modified Crop ETa
- Modified Streamflows

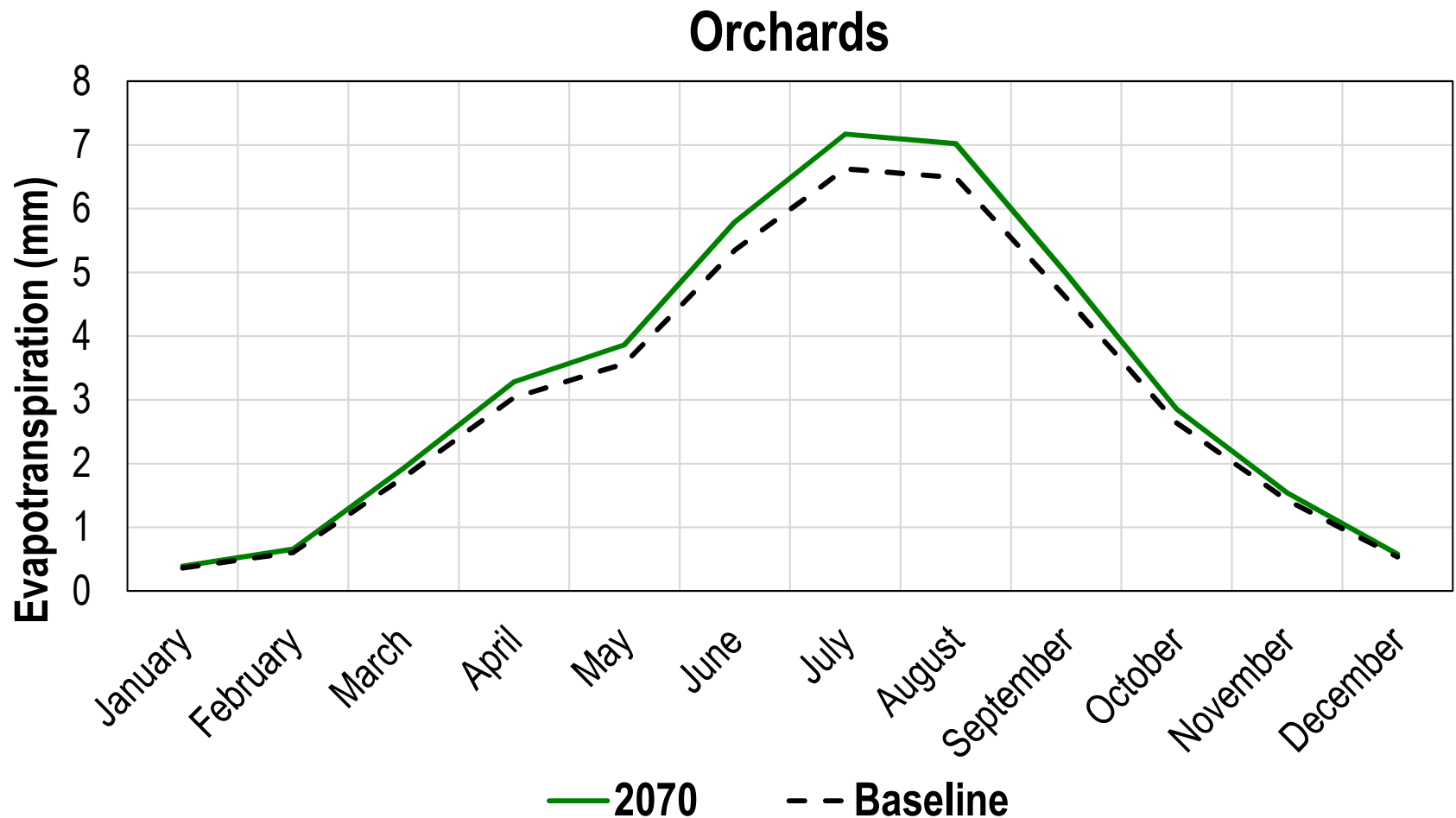
Climate Change Analysis: Precipitation

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 as higher.



Climate Change Analysis: Evapotranspiration

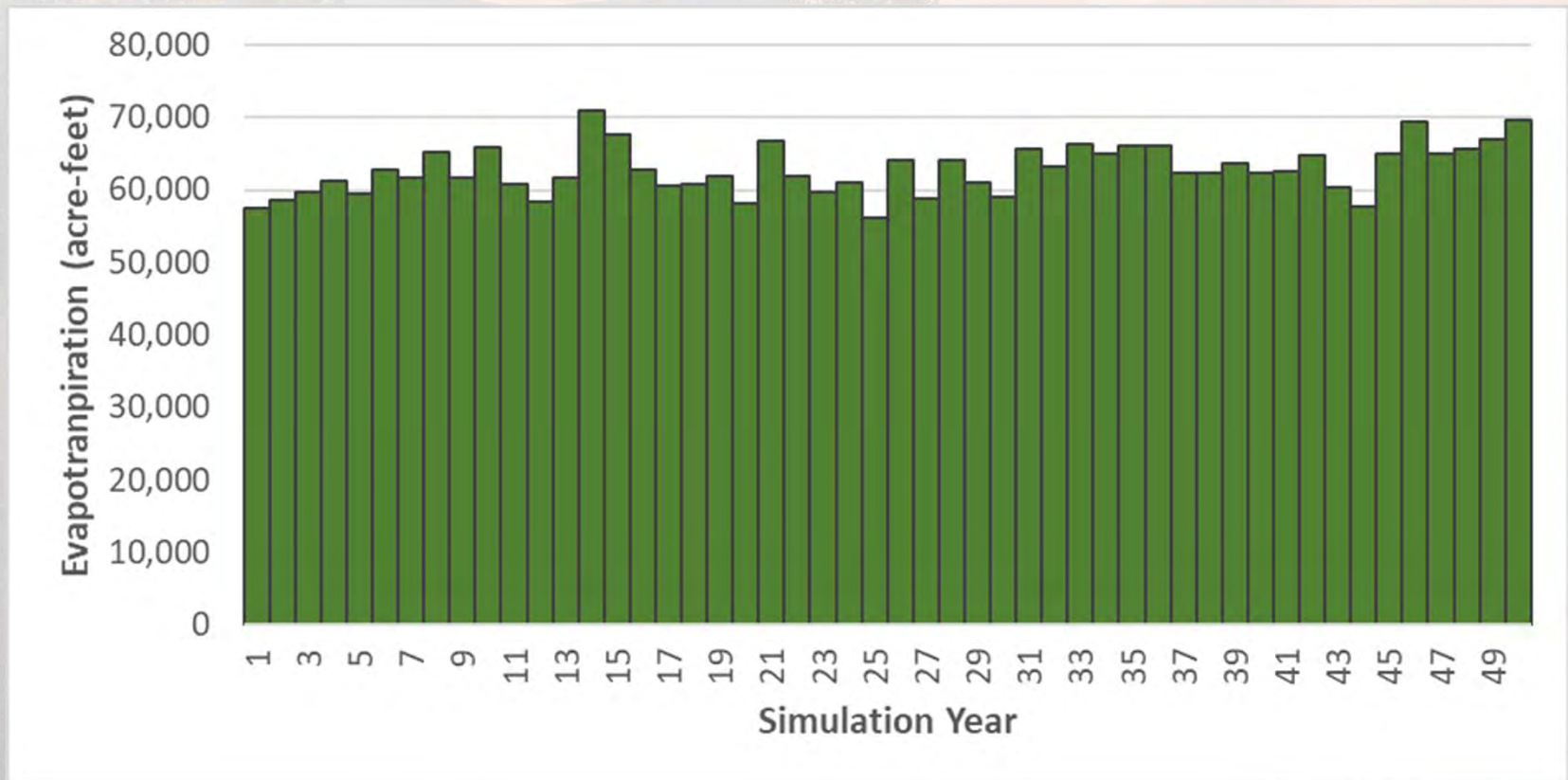
- Under climate change scenario, ET was forecasted to increase 8%



Climate Change Uncertainty Analysis:

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

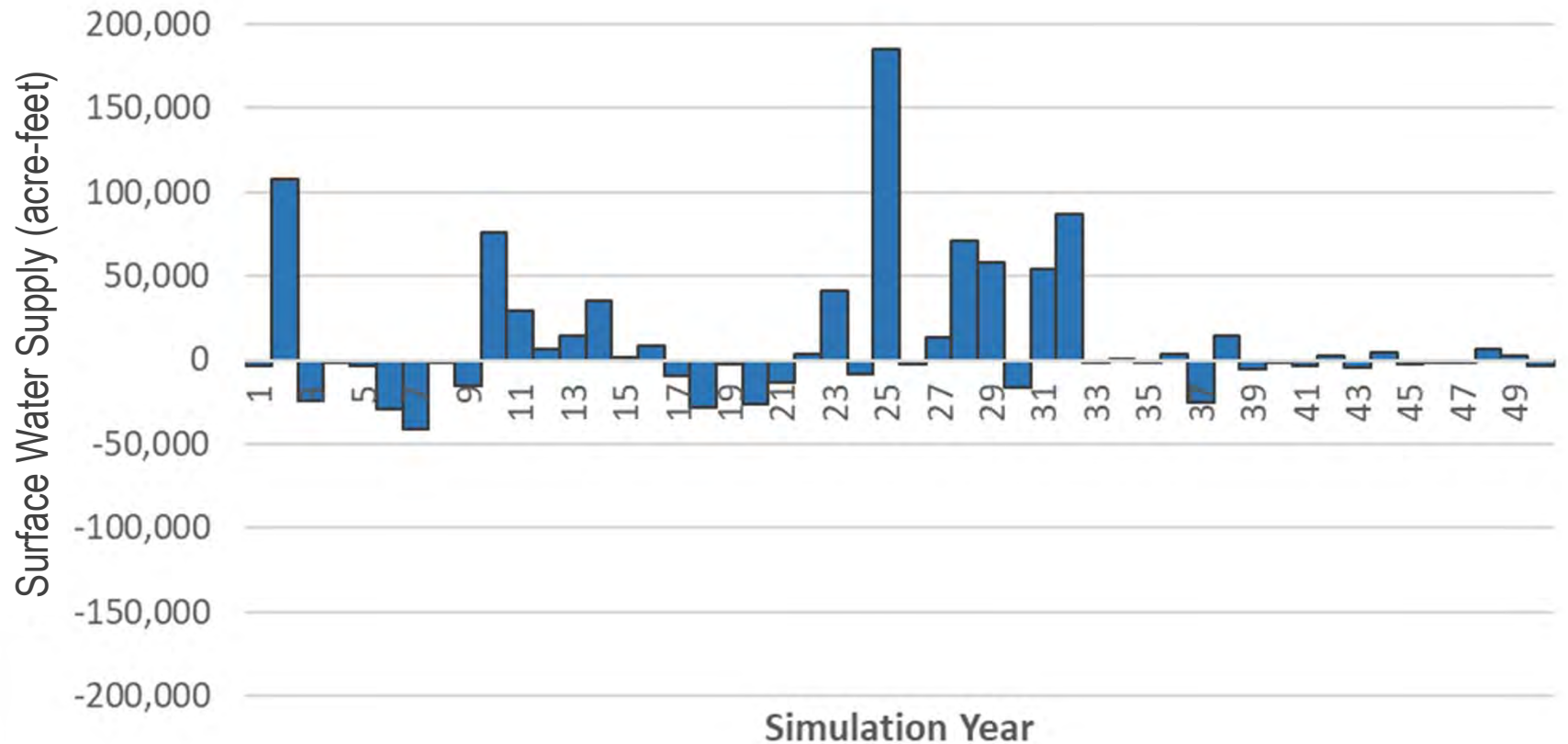
- Changes in ET due to Climate Change (CC Scenario minus Baseline)



Climate Change Uncertainty Analysis:

Findings from Projected Climate Change Budget Run

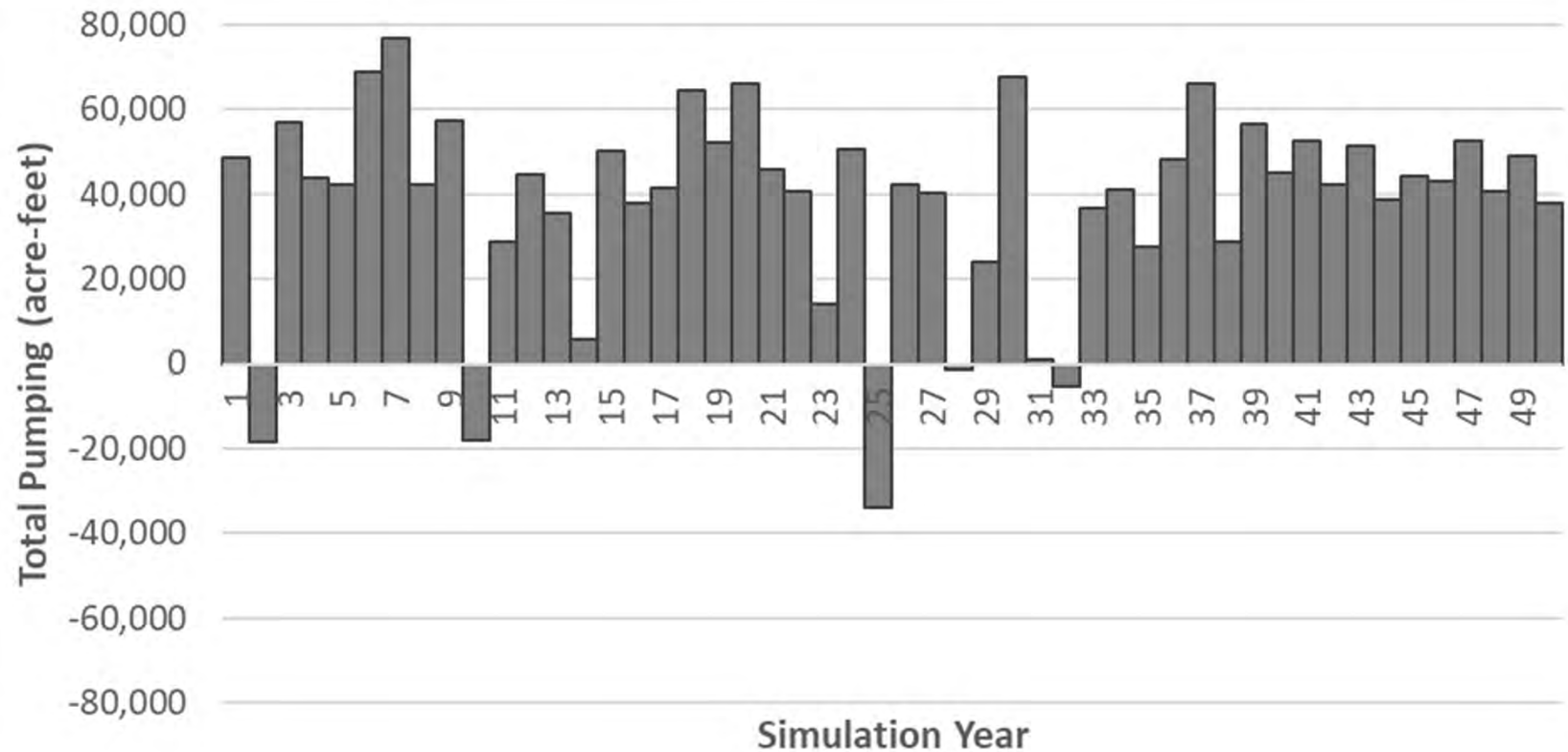
- Changes in Surface Water Supplies due to Climate Change (CC Scenario minus Baseline)



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

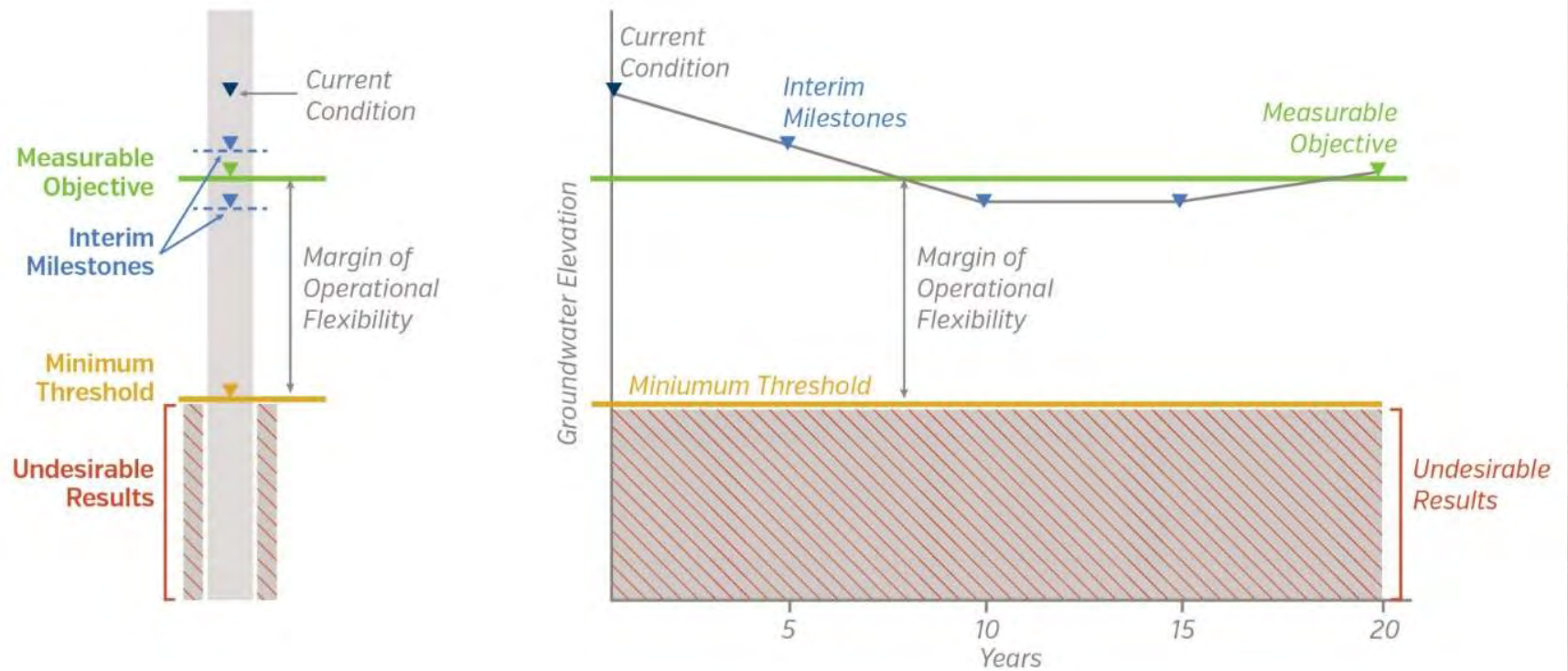


Image courtesy: Veronica Adrover/UC Merced

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 ignored (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

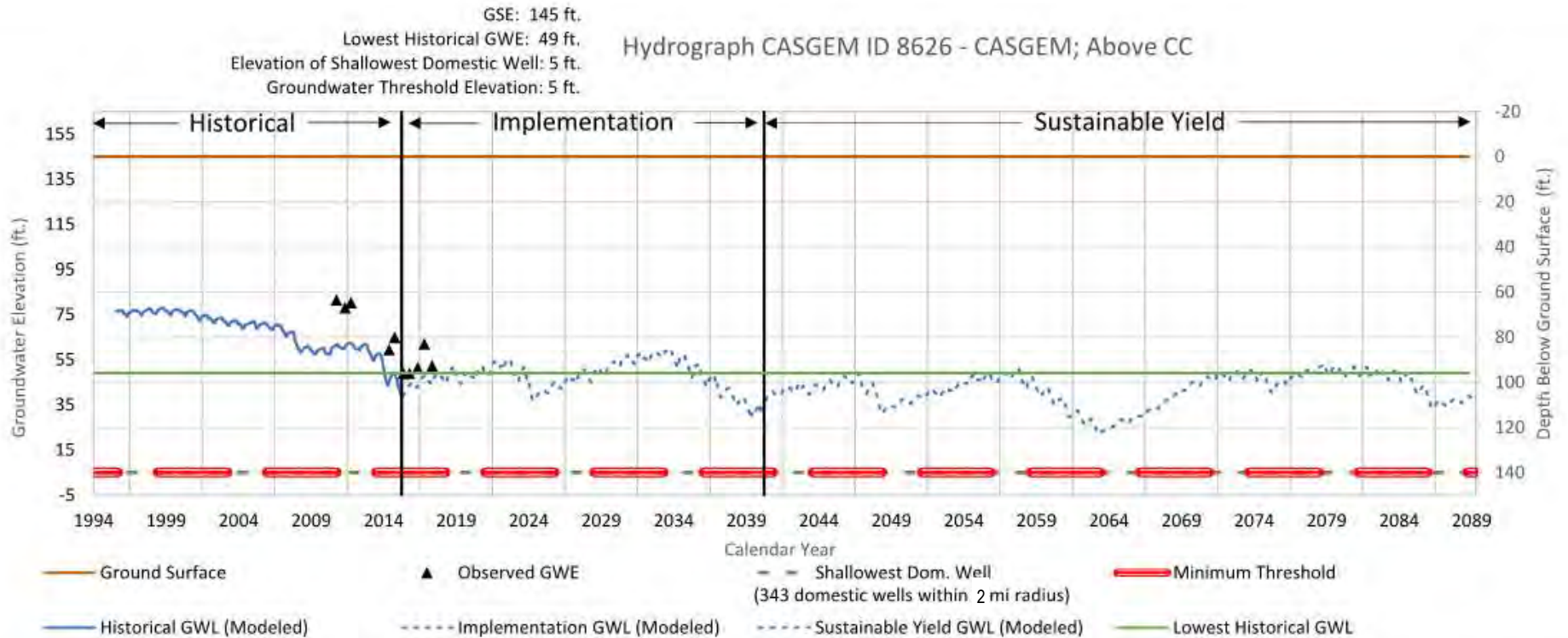
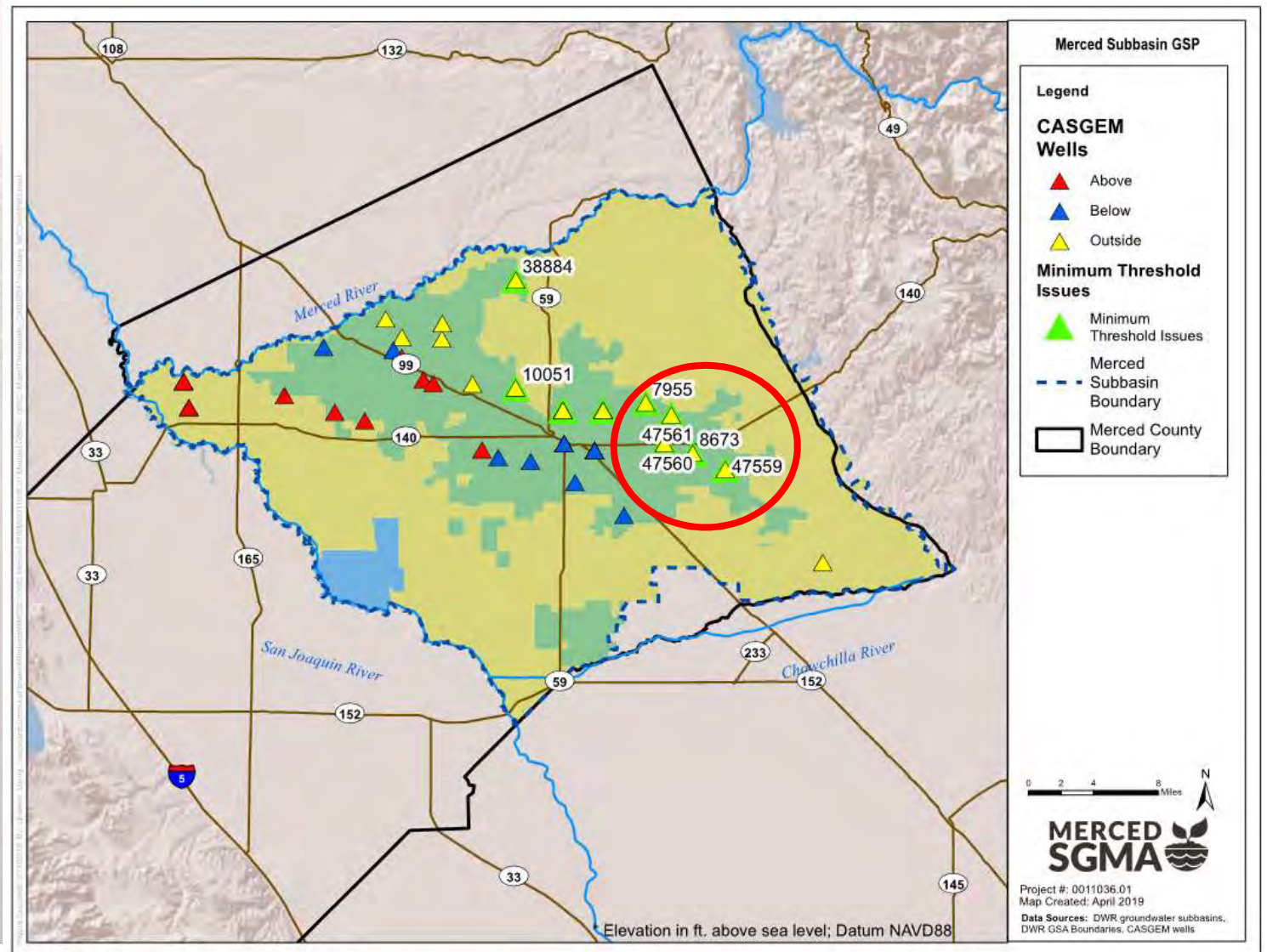


Image courtesy: Veronica Adrover/UC Merced

Minimum Threshold Conflict Area



Example Location with Min. Threshold Conflict

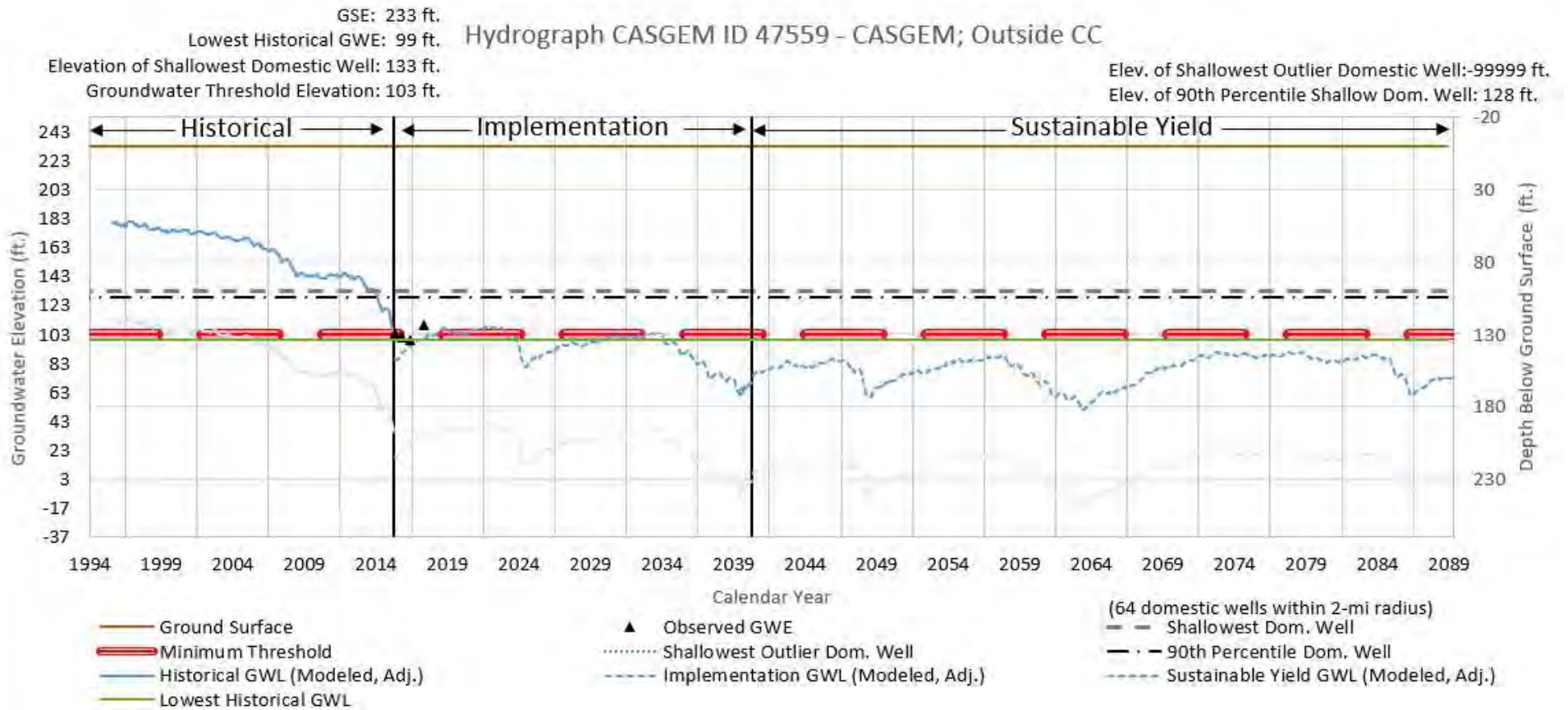
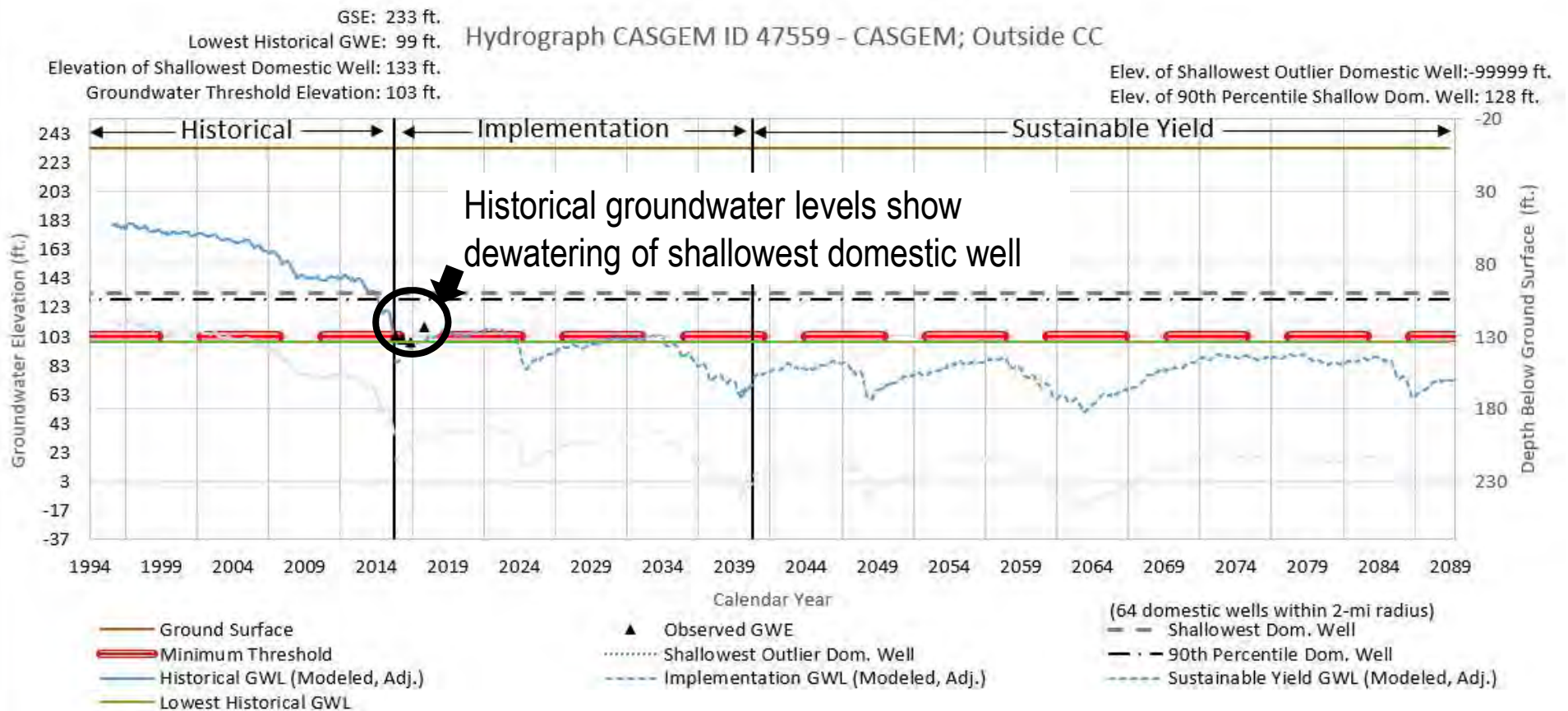


Image courtesy: Veronica Adrover/UC Merced

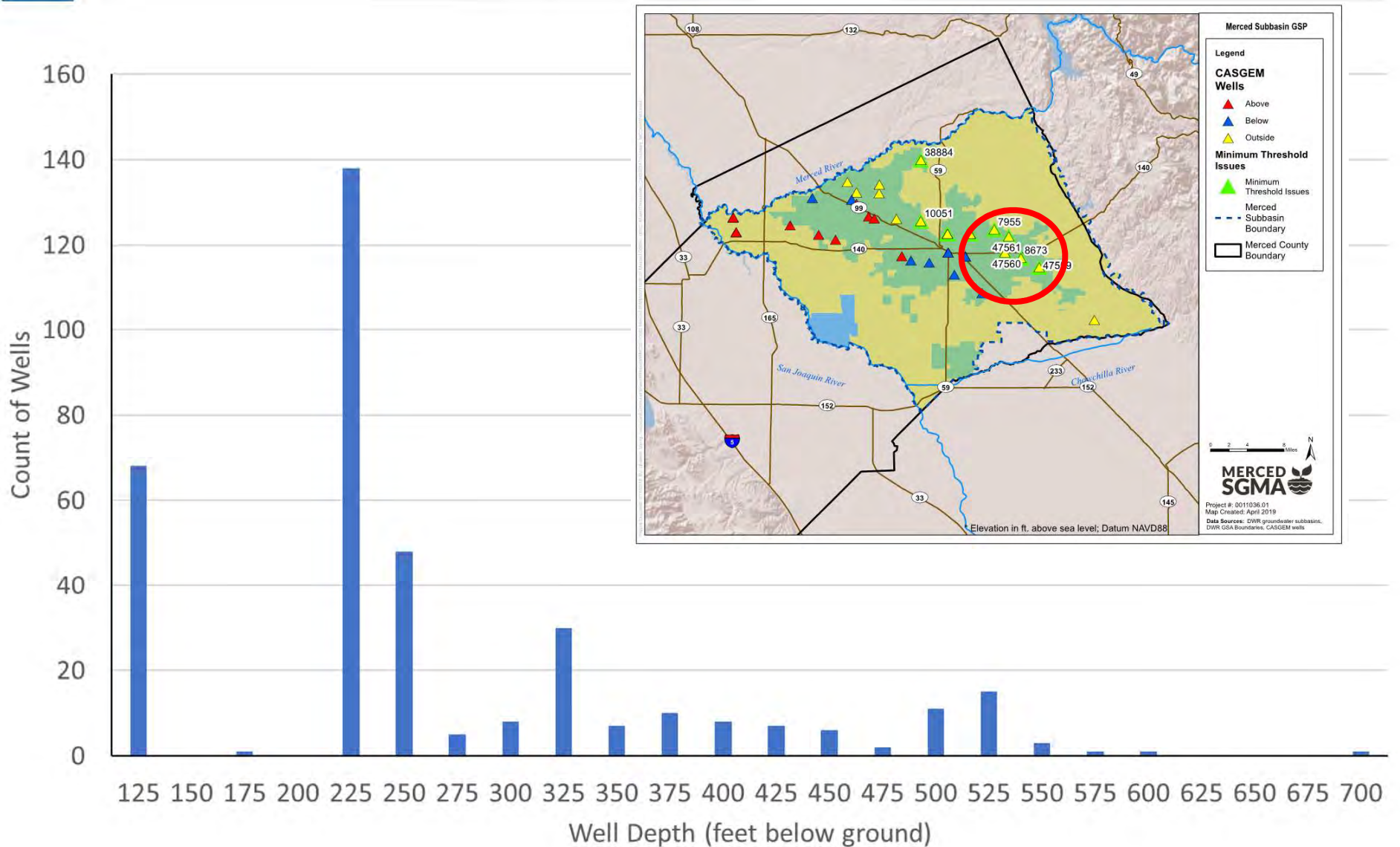
Example Location with Min. Threshold Conflict



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

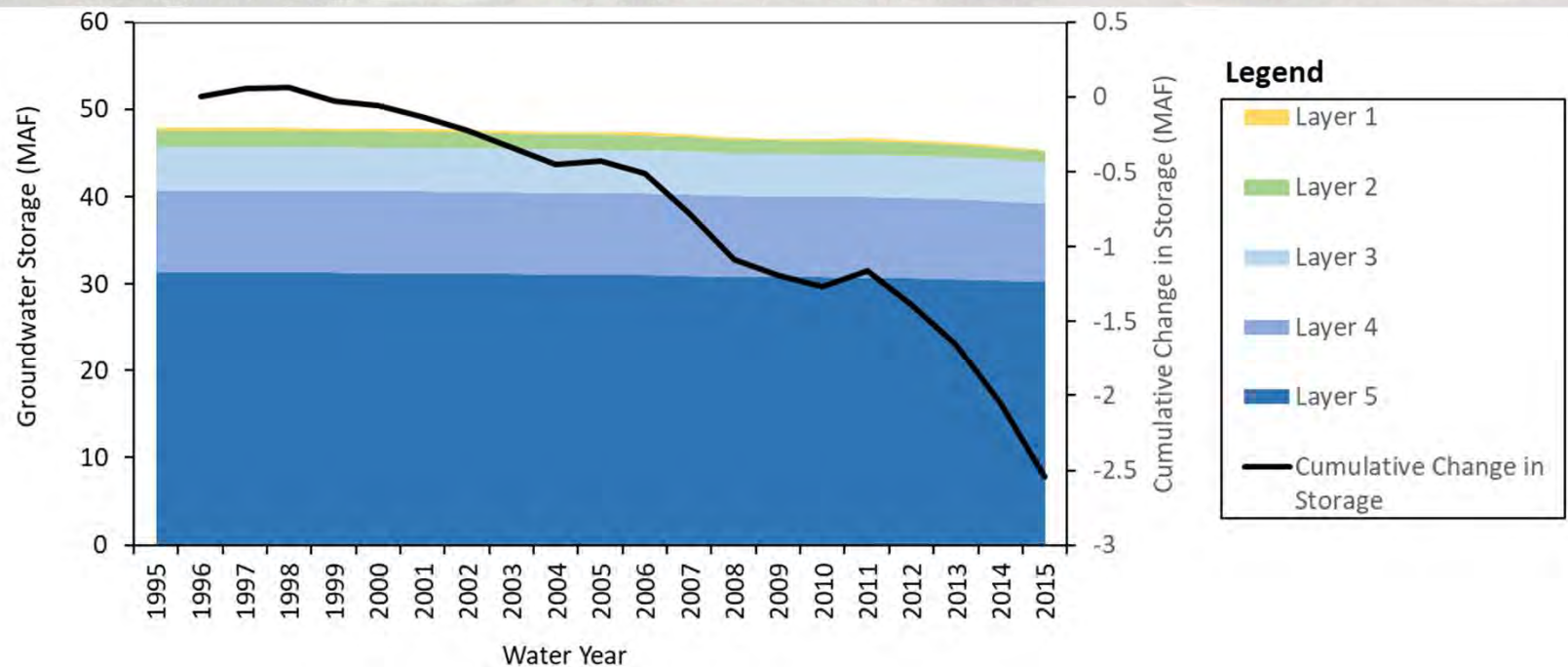
Image courtesy: Veronica Adrover/UC Merced

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 ~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

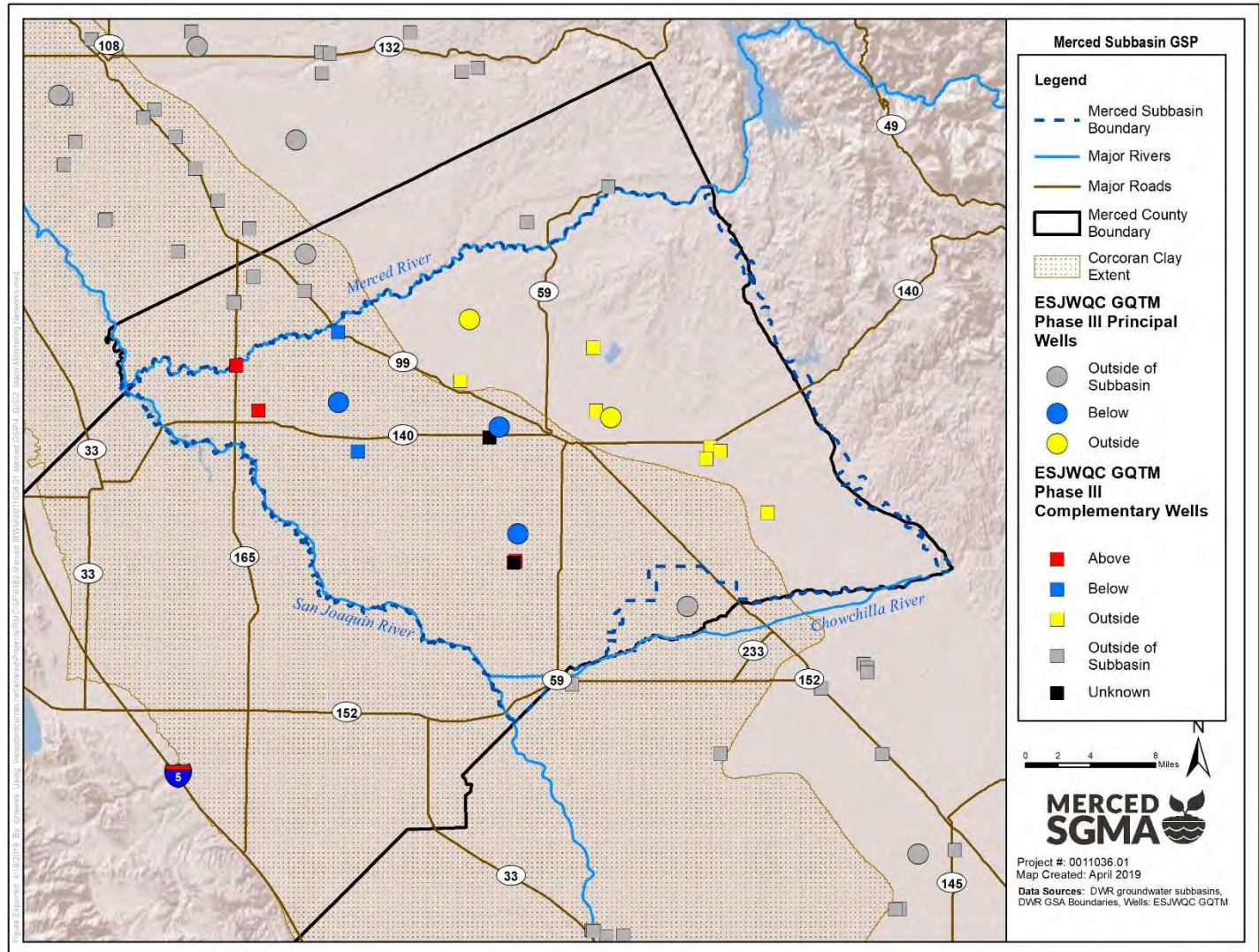
Image courtesy: Veronica Adrover/UC Merced

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

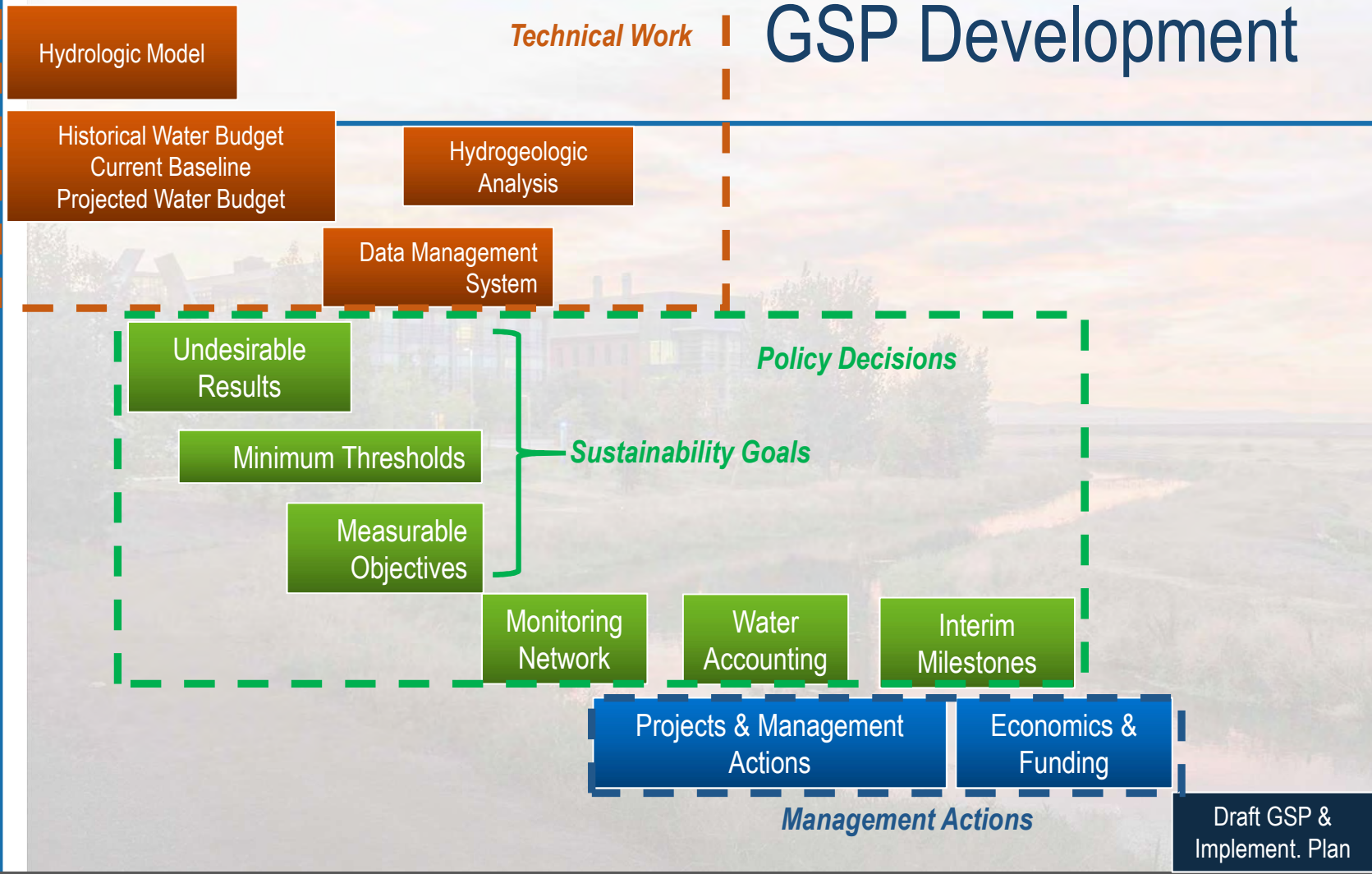


Next Steps in GSP Development

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	Plan Area and Authority	29-Jun-18	20-Jul-18	N/A		24-Jun-2019
2	Basin Setting	(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	Sustainable Management Criteria	30-Apr-19	14-May-19	21-May - 4-Jun-19	29-May-19	24-Jun-2019
4	DMS	15-Mar-19	29-Mar-19	15-Apr - 29-Apr-19	22-Apr-19	24-Jun-2019
5	Projects and Management Actions to Achieve Sustainability Goal	30-Apr-19	14-May-19	21-May - 4-Jun-19	29-May-19	24-Jun-2019
6	Plan Implementation	13-May-19	27-May-19	3-Jun - 17-Jun-19	24-Jun-19	24-Jun-2019

Image courtesy: Veronica Adrover/UC Merced



Other Updates

Image courtesy: Veronica Adrover/UC Merced





Public Outreach Update

Image courtesy: Veronica Adrover/UC Merced



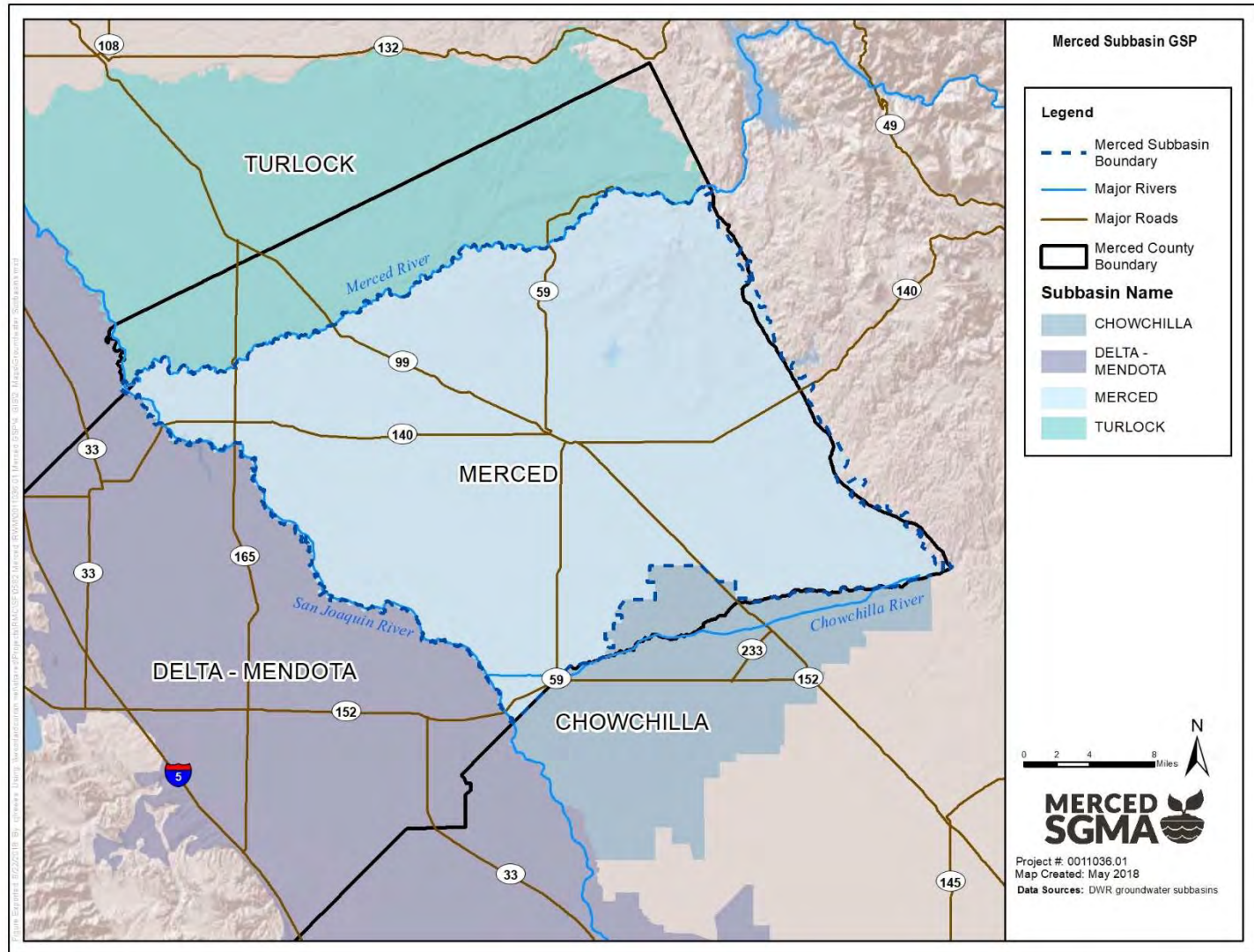


Coordination With Neighboring Basins Update

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 April meeting
 - Minimum Thresholds and Measurable Objectives
 - Implementation planning
- Adjourn to next meeting: May 29th, 9:30 AM at Castle Conference Center

Image courtesy: Veronica Adrover/UC Merced

GSP Stakeholder Committee

Stakeholder Committee Meeting – April 22, 2019

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