

Merced GSP Coordination Committee Meeting

May 22, 2024

Meeting will begin at 1:30 pm or a few minutes after – thank you for joining us!

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

Image courtesy: Veronica Adrover/UC Merced

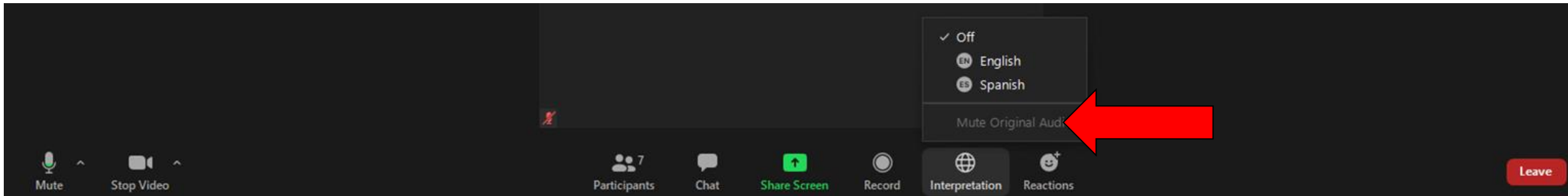
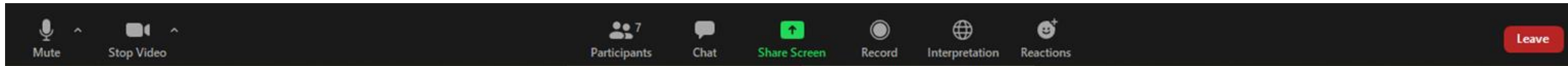


Welcome, Instructions for Zoom

Bienvenidos, Instrucciones para Zoom

We have two language audio channels available. English only speakers, please select English.

Si solamente habla español, debe seleccionar un canal de idioma



The meeting will have simultaneous interpreting, so you are welcome to comment in your native language.
La junta será interpretada simultáneamente, así que le invitamos a que haga comentarios en su lenguaje nativo.

Agenda

1. Call to Order and Welcome
2. Roll Call
3. Approval of Meeting Minutes
4. Public Comment
5. Reports
6. MercedWRM Modeling Scenarios Overview
7. Draft Historical and Baseline Conditions Model Outputs
8. Next Steps
9. Adjourn

Image courtesy: Veronica Adrover/UC Merced

Coordination Committee Roll Call

Representative	GSA
Hicham ElTal	Merced Irrigation-Urban GSA
Scott McBride	Merced Irrigation-Urban GSA
Justin Vinson	Merced Irrigation-Urban GSA
Daniel Chavez	Merced Irrigation-Urban GSA
Ken Elwin (<i>alternate</i>)	Merced Irrigation-Urban GSA
Mike Gallo	Merced Subbasin GSA
Nic Marchini	Merced Subbasin GSA
Dave Nervino	Merced Subbasin GSA
Eric Swenson (<i>alternate</i>)	Merced Subbasin GSA
George Park (<i>alternate</i>)	Merced Subbasin GSA
Kel Mitchel	Turner Island Water District GSA #1

Image courtesy: Veronica Adrover/UC Merced



Approval of Meeting Minutes

Image courtesy: Veronica Adrover/UC Merced

Approval of Meeting Minutes

- January 24, 2024
- March 20, 2024

Image courtesy: Veronica Adrover/UC Merced



Questions/Comments from Public:

For remote attendees, If you would like to make a comment, please type the comment in the chat or raise your hand to request to be taken off mute



Reports

Image courtesy: Veronica Adrover/UC Merced



GSA Reports

- Updates from each GSA on activities within their own jurisdiction:
 - Merced Subbasin GSA
 - Merced Irrigation-Urban GSA
 - Turner Island Water District GSA #1

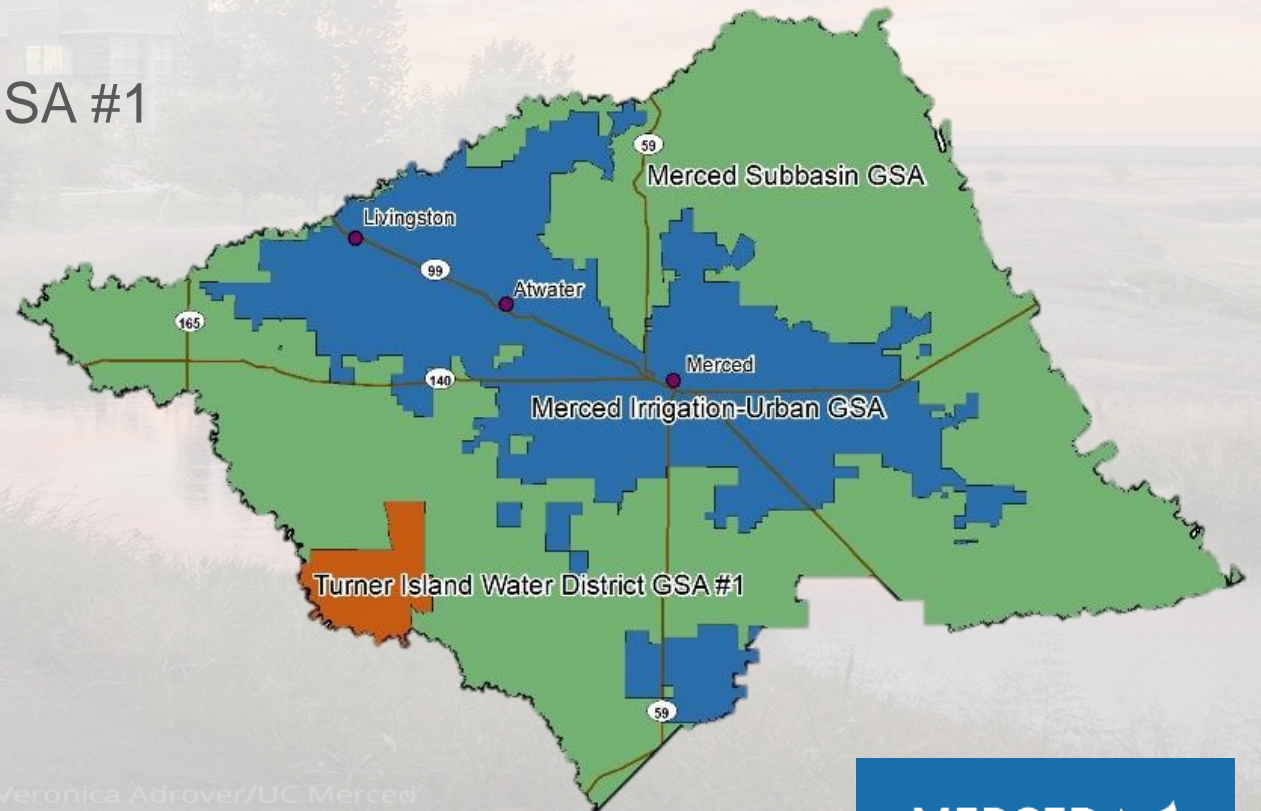


Image courtesy: Veronica Adrover/UC Merced

Merced Subbasin GSA Updates

- Allocation Framework Values Update
- Groundwater Accounting Platform Update
- Update of Stevinson/Merquin Water District New GSA Request
- Land Repurposing Program Update
 - Applications for Year 3 will open June 15 – July 31.
- Multibenefit Land Repurposing Program Update

Merced Irrigation-Urban GSA Updates

- Implementation of adopted Rules and Regulations
 - Well Registration
 - Groundwater Accounting
- Development of Additional Rules and Regulations
 - Urban Allocations
- CIMIS (see separate item)
- Grant Administration
 - Sustainable Groundwater Planning Grant - Completed in April 2024.
 - 2017 Prop 1 Grant and 2019 Prop 68 Grant
 - Sustainable Groundwater Management Grant – Ongoing
 - SGMA Implementation Grant (Rounds 1 & 2)



Other Reports

- CIMIS Station Report
- Current Conditions

Image courtesy: Veronica Adrover/UC Merced



MercedWRM Modeling Scenarios Overview

Image courtesy: Veronica Adrover/UC Merced

Upcoming MercedWRM Modeling Approach

Inputs

- Model upgrade from MercedMAR project
- Refined layering
- Delayed subsidence package
- Evapotranspiration
- & more...

- Surface water operations model update
- New land use projections
- Active projects

- Defined assumptions about:
- Supply-side Projects (e.g., recharge basins)
 - Specific demand reduction Projects (e.g., land repurposing)
 - Targeted demand reduction by region
 - Management Actions

Model Scenario

Historical Conditions

Projected Conditions

Projects & Management Actions

Sustainable Yield

Outputs

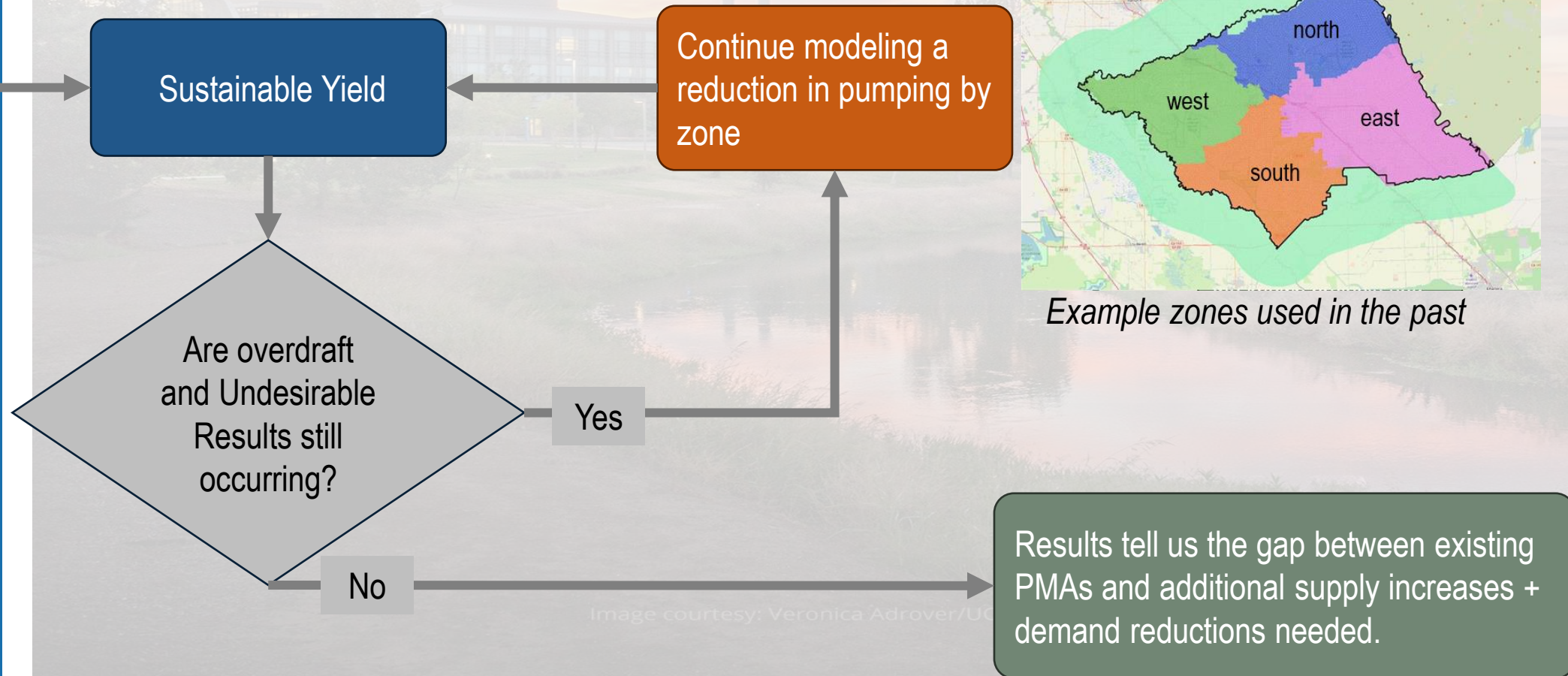
Calibration to make sure the updated model works well

Tells us what a “no additional action” scenario looks like in the future.

What kind of impact do the known projects and management actions have?

See next slide

Upcoming MercedWRM Modeling Approach (continued)





Draft Historical and Baseline Conditions Model Outputs

Image courtesy: Veronica Adrover/UC Merced





Task 1: MercedWRM Enhancement

Image courtesy: Veronica Adrover/UC Merced



MercedWRM Update

New and Updated Features

Land Surface System

- Land Use
- Evapotranspiration
- Irrigation parameters
- Soil Texture Classifications

Groundwater System

- Model Layering
- Aquifer Parameters

Model Use/Type

Completed

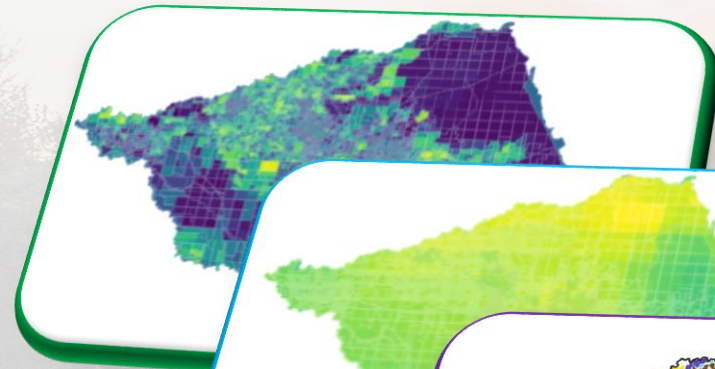
- Historical Calibration
- Projected Conditions Baseline

Next Steps

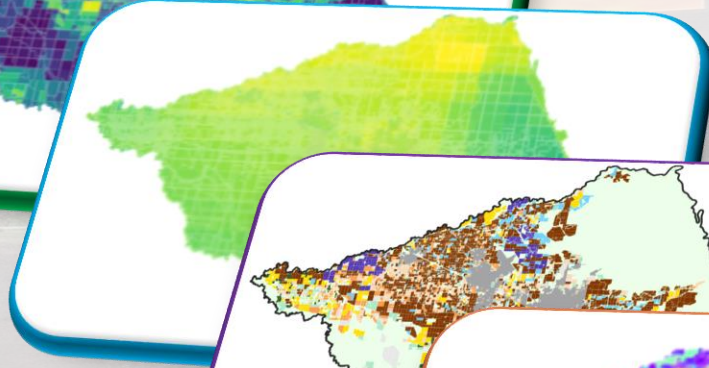
- Climate Scenarios
- Sustainable Yield
- Projects and Management Actions

Image courtesy: Veronica Adrover/UC Merced

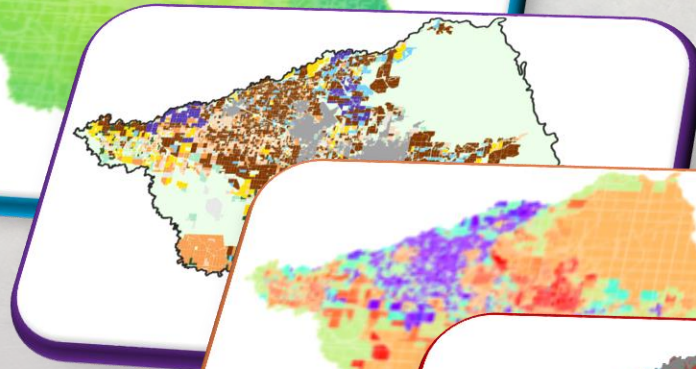
Land Surface System Overview



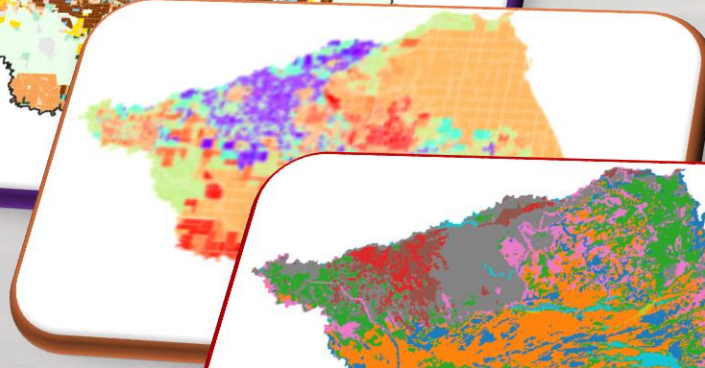
Evapotranspiration (OpenET)



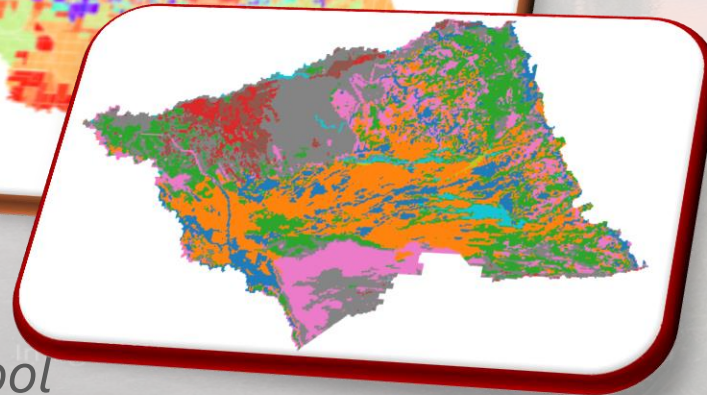
Precipitation (PRISM)



Land Use (DWR)



Curve Number (USDA)



Soil Parameters

Goal:

Refine and calibrate the MercedWRM to align with the best available data and align with the *Remote Metering Tool*

Land Surface System Overview



Root Zone Parameters

Land Use

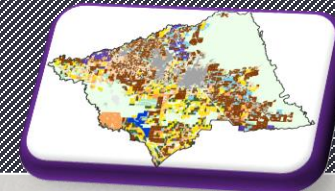


Image courtesy: Veronica Adrover/UC Merced

Land Surface System Overview

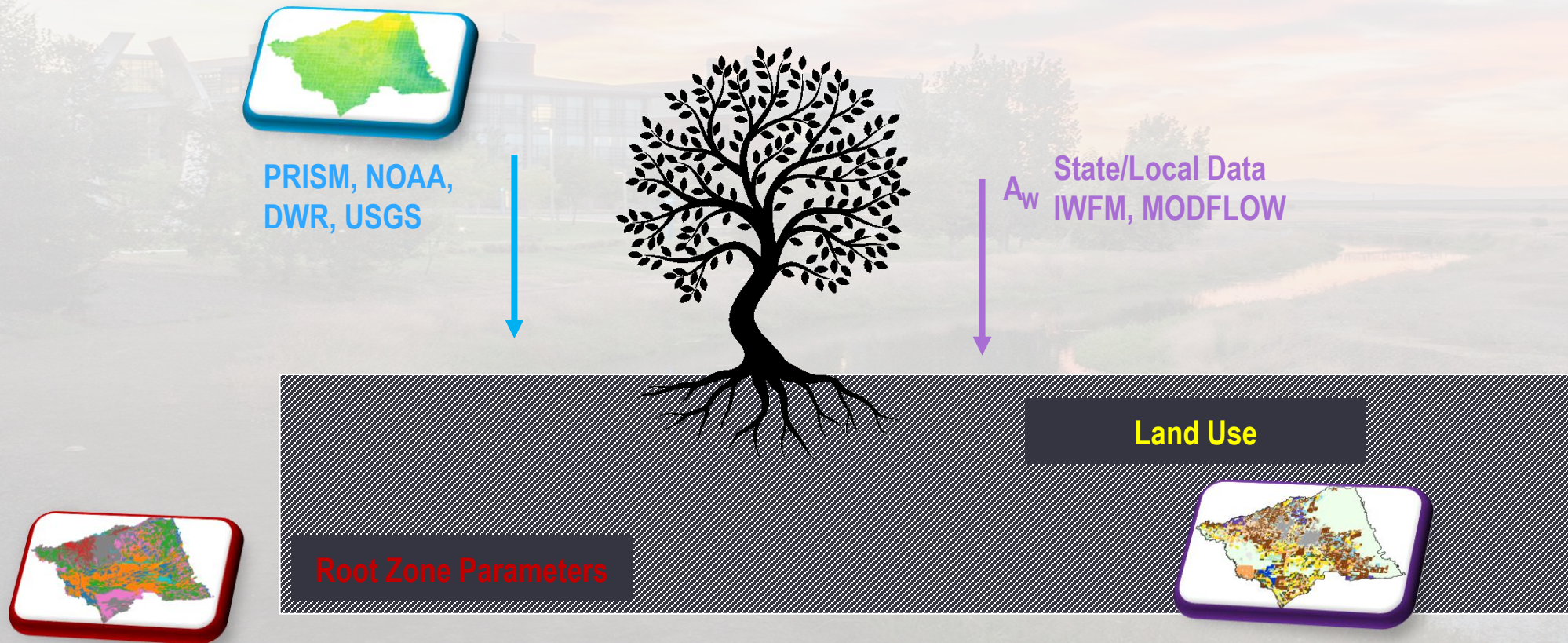


Image courtesy: Veronica Adrover/UC Merced

Land Surface System Overview

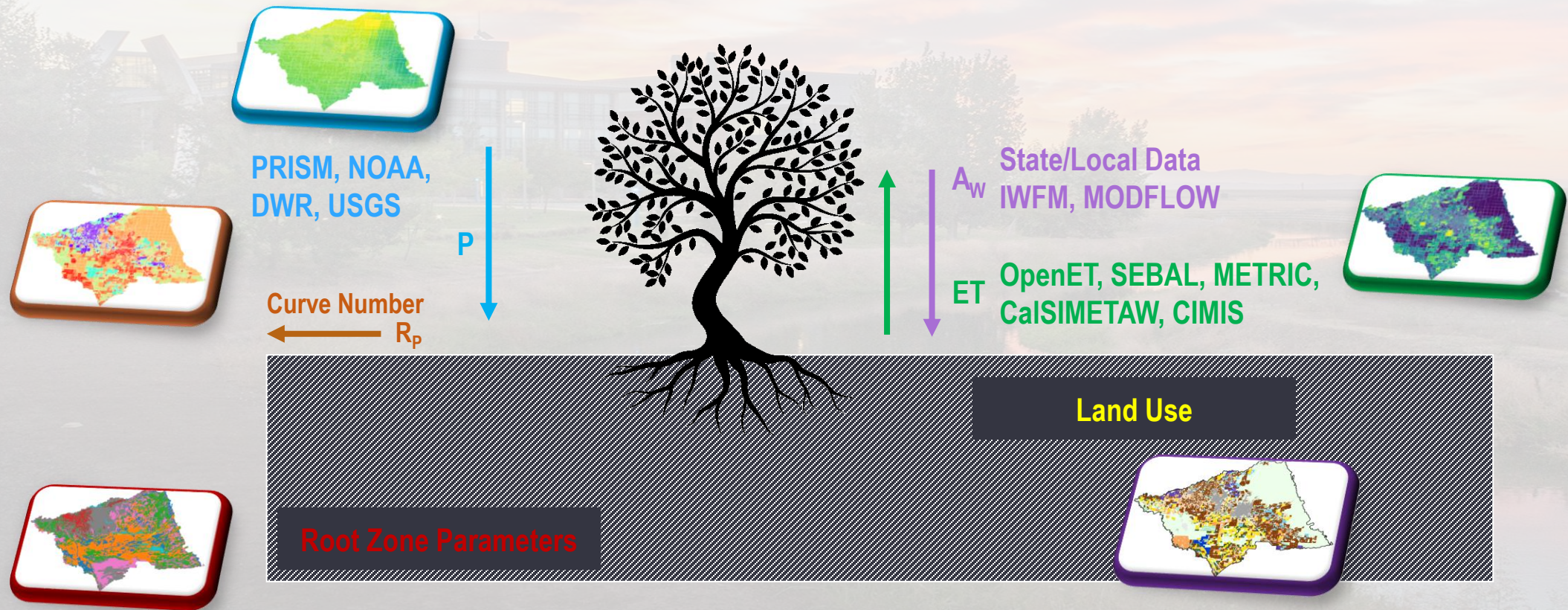


Image courtesy: Veronica Adrover/UC Merced

Land Surface System Overview

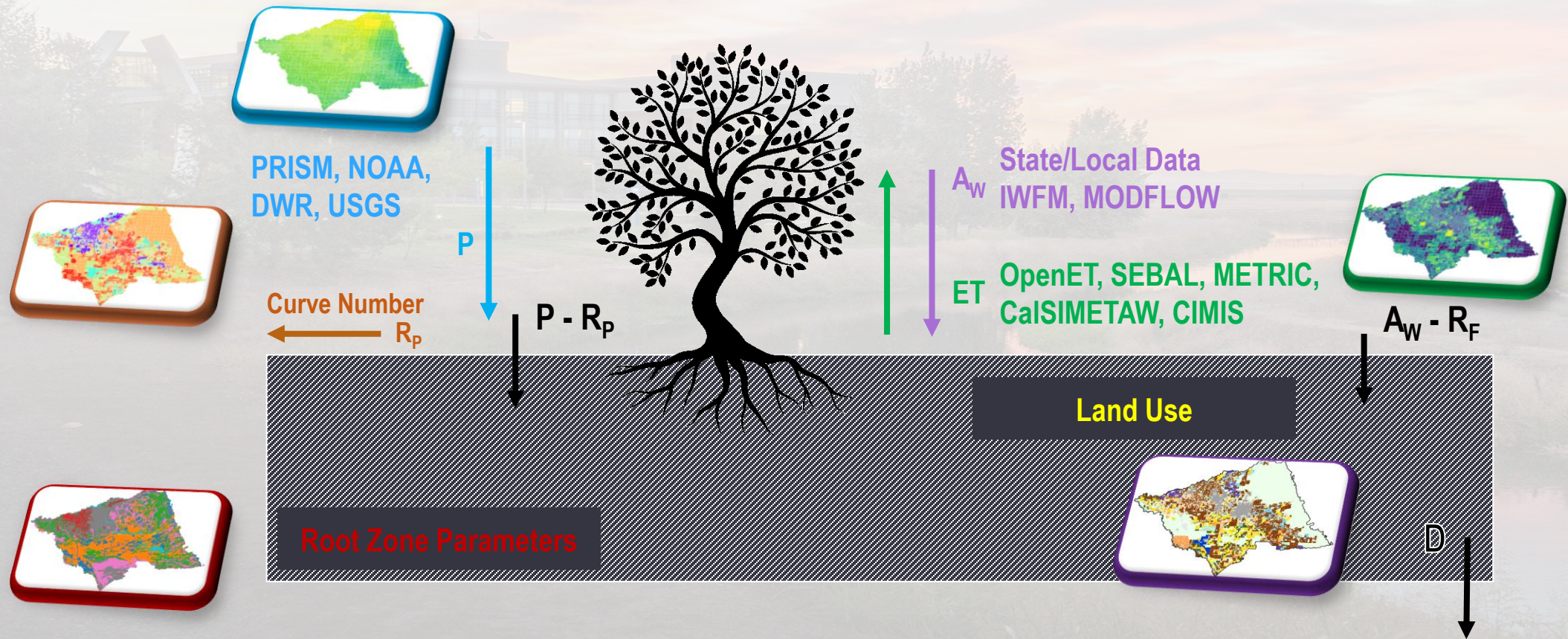
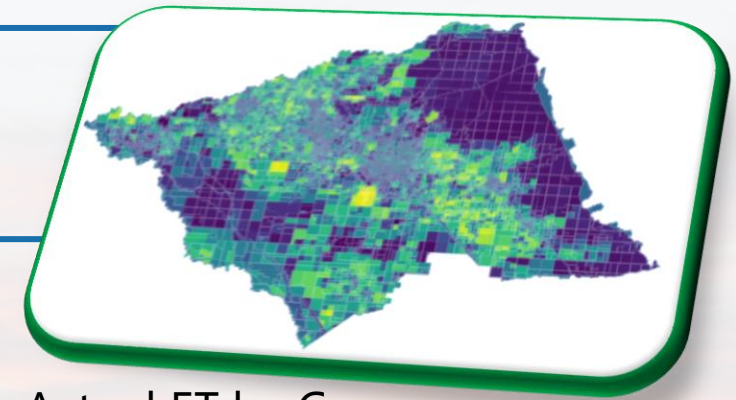
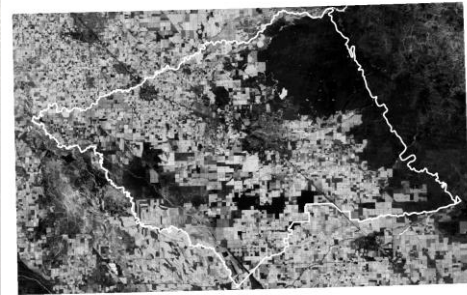


Image courtesy: Veronica Adrover/UC Merced

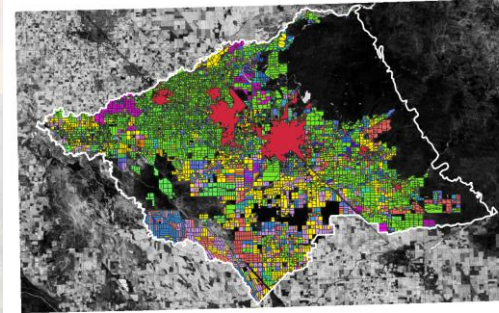
Evapotranspiration (OpenET)



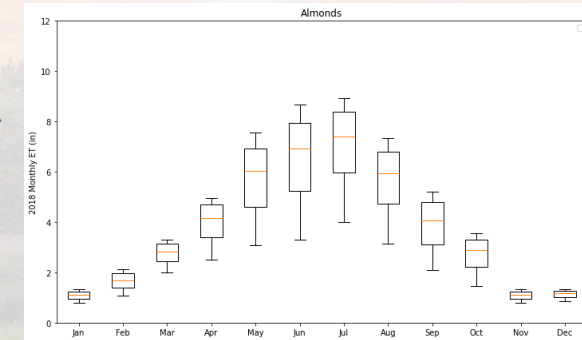
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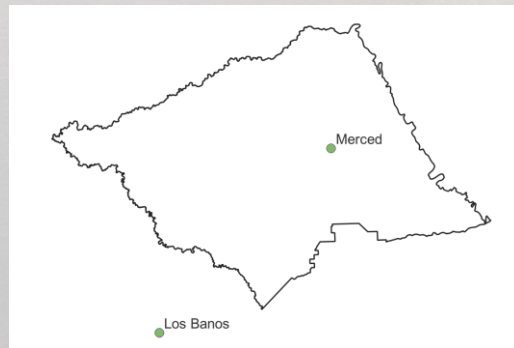
Land Use



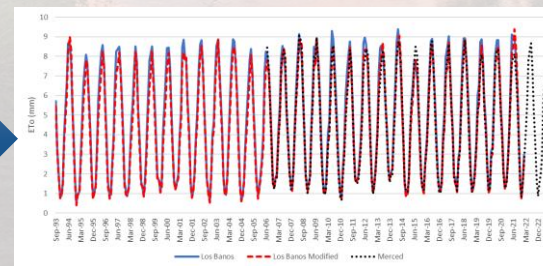
Actual ET by Crop



CIMIS Stations



ET_0



Kc and Potential ET

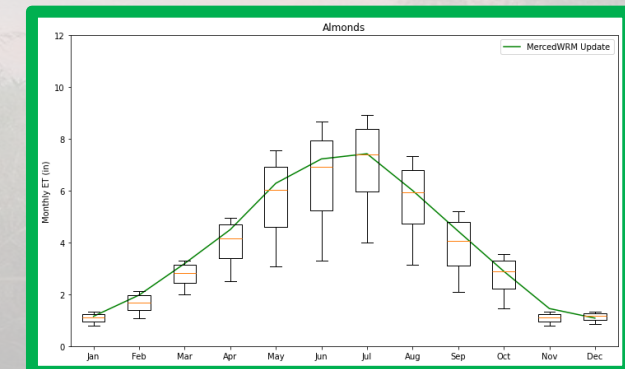
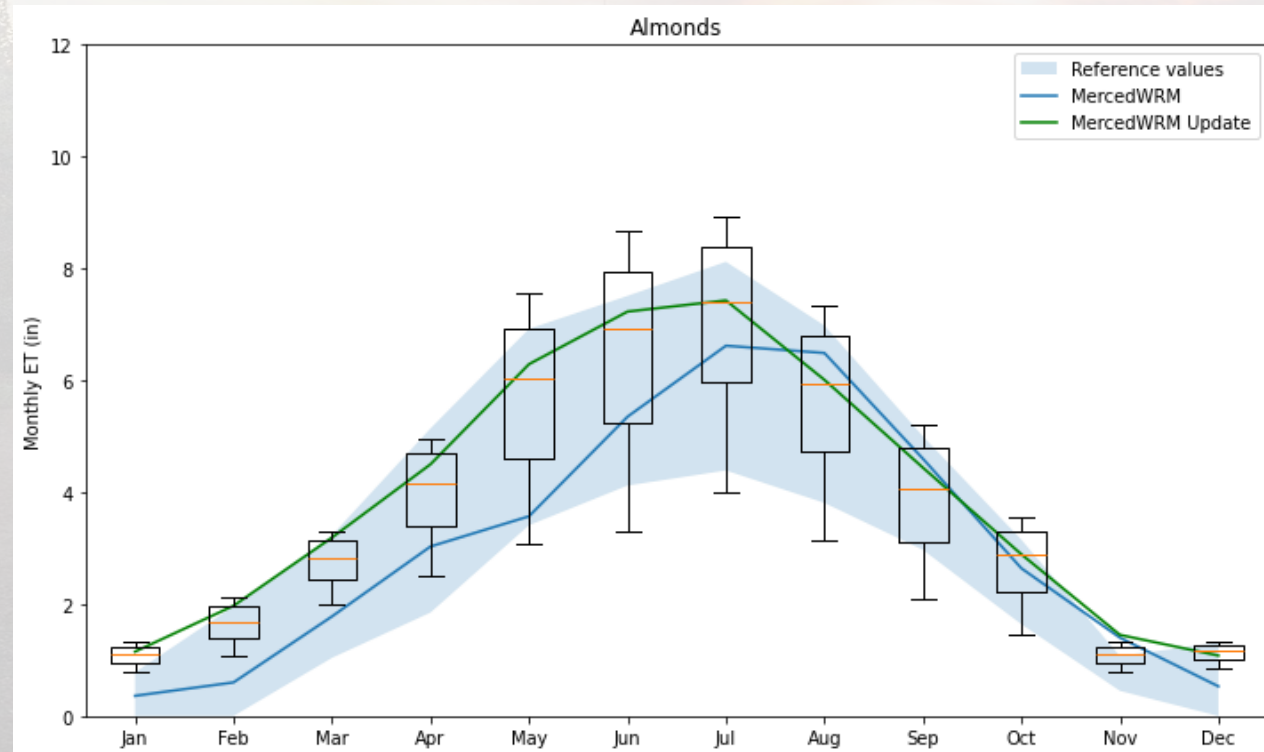


Image courtesy: Veronica Adrover/UC Merced



Data Validation: Almonds



Annual ET Rates

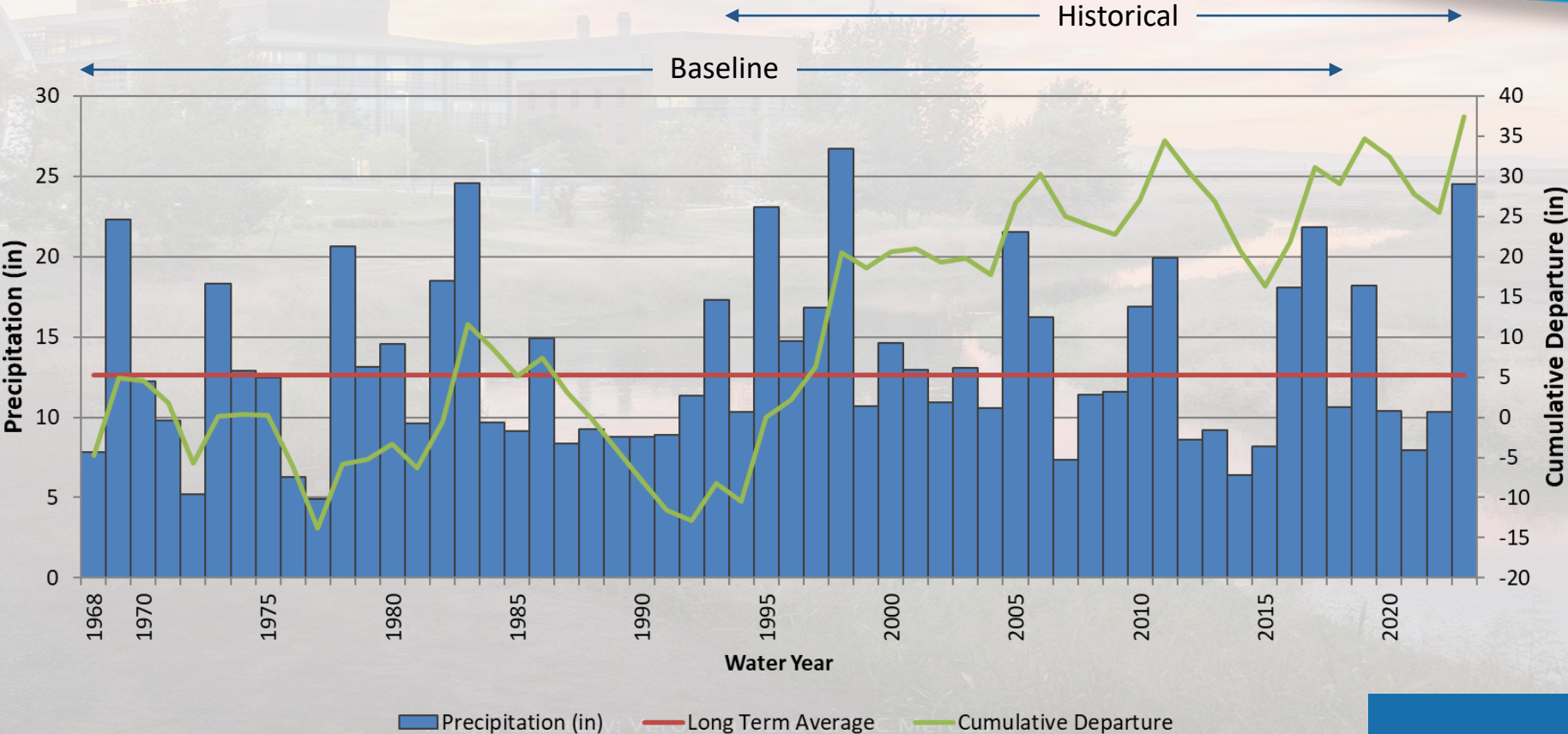
- MercedWRM₂₀₁₉: 37 in
- OpenET: 43 in
- ITRC Adj Factor* 7%
- MercedWRM₂₀₂₃: 46 in**

Note:

- "ET_c values for a water balance must recognize that fields are not blanketed by pristine conditions"
 - Bare spots and decreased vigor
 - Reduction in actual field crop ET of 7%

Image courtesy: Veronica Adrover/UC Merced

Precipitation (PRISM)



Land Use Data (DWR)

Statewide Crop Mapping 2022

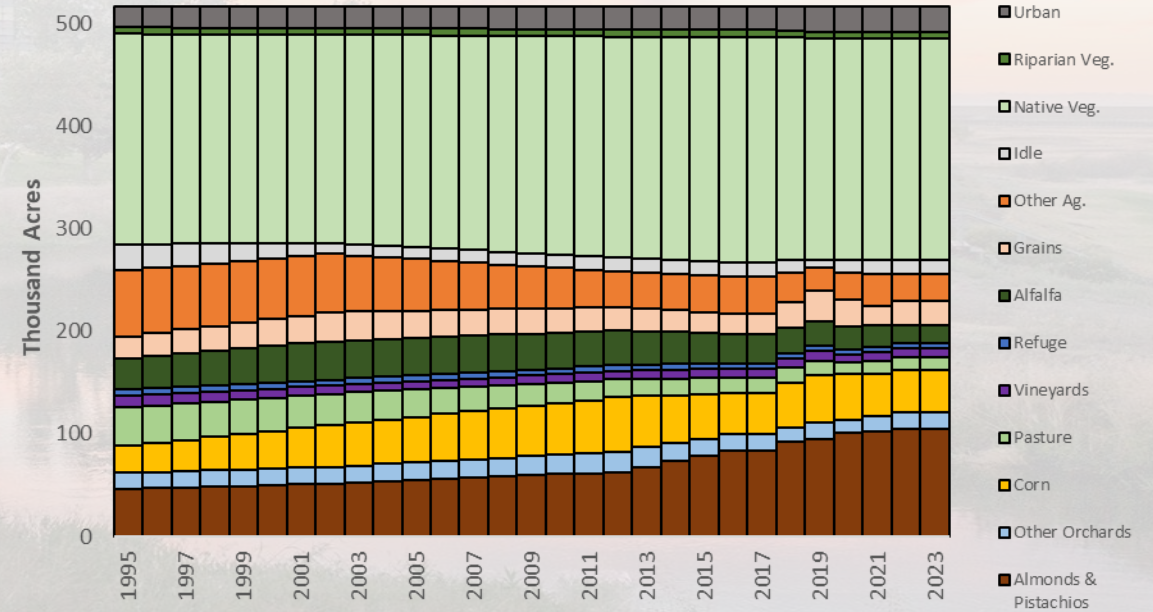
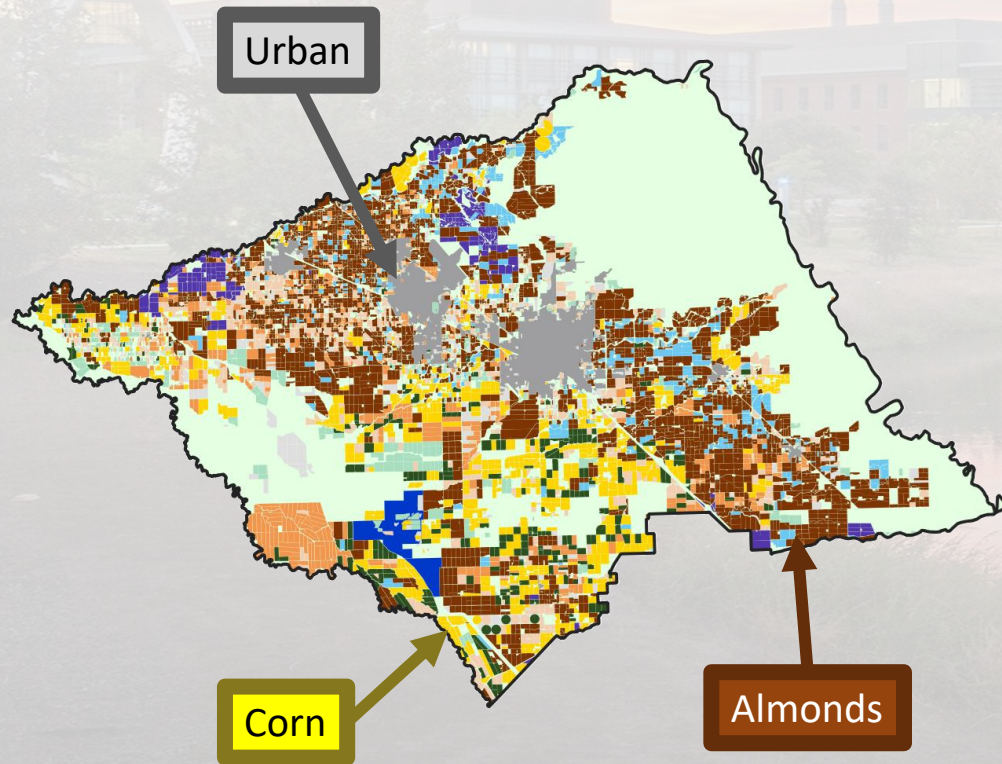
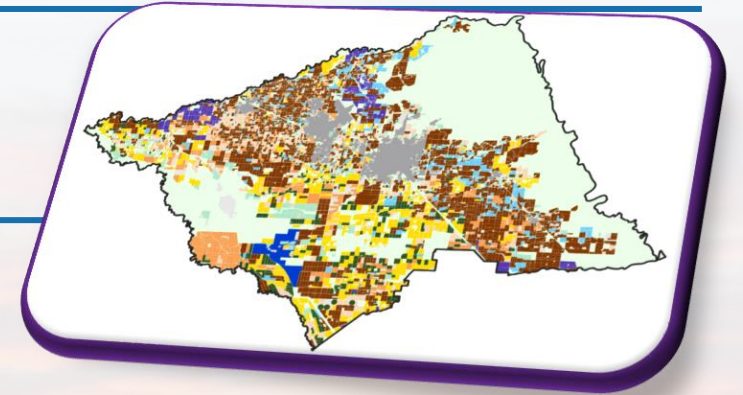


Image courtesy: Veronica Adrover/UC Merced

Curve Number (USDA)

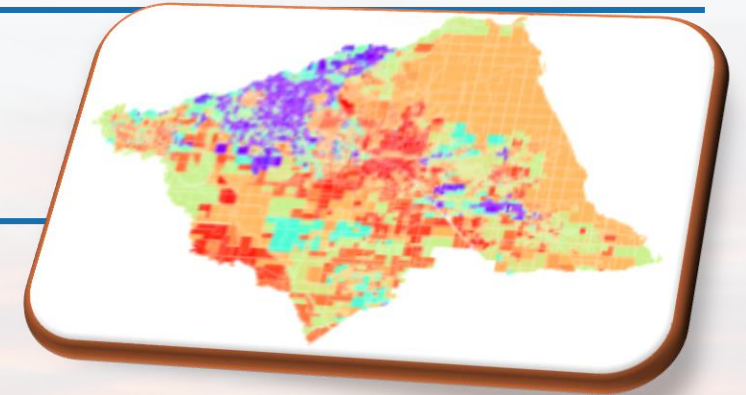


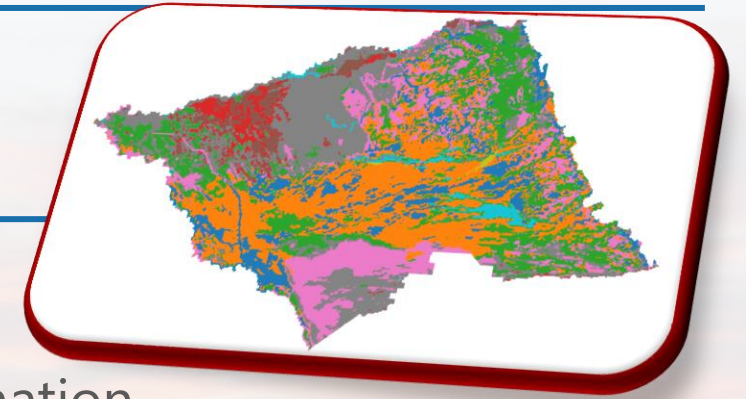
Table 2-2b Runoff curve numbers for cultivated agricultural lands ^{1/}

Cover description			Curve numbers for hydrologic soil group			
Cover type	Treatment ^{2/}	Hydrologic condition ^{3/}	A	B	C	D
Fallow	Bare soil	—	77	86	91	94
	Crop residue cover (CR)	Poor	76	85	90	93
		Good	74	83	88	90
Row crops	Straight row (SR)	Poor	72	81	88	91
		Good	67	78	85	89
	SR + CR	Poor	71	80	87	90
		Good	64	75	82	85
	Contoured (C)	Poor	70	79	84	88
		Good	65	75	82	86
	C + CR	Poor	69	78	83	87
		Good	64	74	81	85
	Contoured & terraced (C&T)	Poor	66	74	80	82
		Good	62	71	78	81
C&T+ CR	Poor	65	73	79	81	
	Good	61	70	77	80	
Small grain	SR	Poor	65	76	84	88
		Good	63	75	83	87
	SR + CR	Poor	64	75	83	86
		Good	60	72	80	84
	C	Poor	63	74	82	85
		Good	61	73	81	84
	C + CR	Poor	62	73	81	84
		Good	60	72	80	83
	C&T	Poor	61	72	79	82
		Good	59	70	78	81
C&T+ CR	Poor	60	71	78	81	
	Good	58	69	77	80	
Close-seeded or broadcast legumes or rotation meadow	SR	Poor	66	77	85	89
		Good	58	72	81	85
	C	Poor	64	75	83	85
		Good	55	69	78	83
	C&T	Poor	63	73	80	83
		Good	51	67	76	80

- Controls the amount of runoff for each type of land use
- Initial CN estimated from USDA Report based on
 - Land use and cropping patterns
 - Hydrologic soil type
- Calibration parameter for Root Zone processes
 - TR-55 values are estimated for precipitation events which are in an hourly scale

Image courtesy: Veronica Adrover/UC Merced

Soil Parameters (SSURGO)



Approach:

- SSURGO soil texture
- 12 soil classifications
- 4 hydrologic soil groups

Parameters: Saxton & Rawls, 2006

- Field Capacity & Wilting Point
- Pore Size Distribution Index
- Hydraulic Conductivity
- Soil Porosity

Benefits:

- Stakeholder Coordination
- Irrigation Management
- **Multi-project Alignment**
- One-time Calibration
 - Parcel Boundaries
 - Irrigation Type

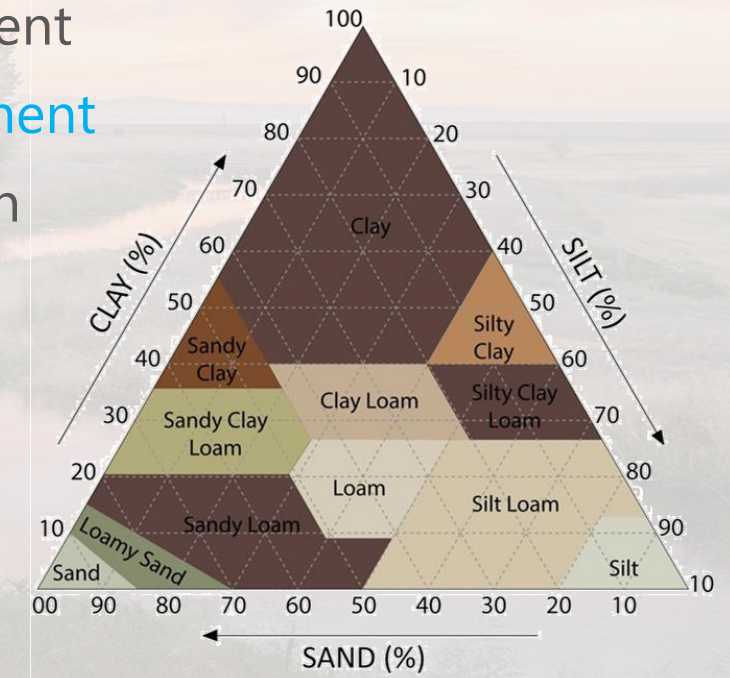
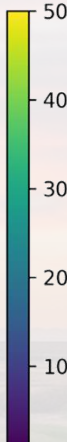
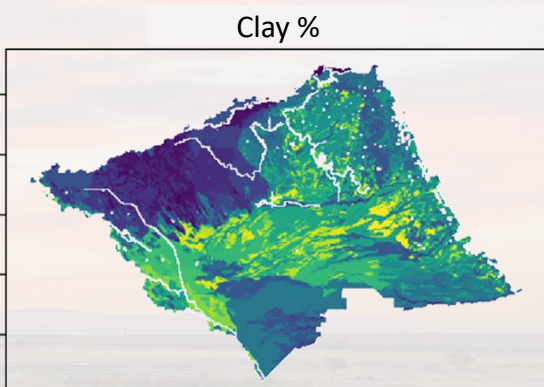
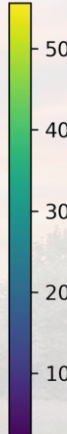
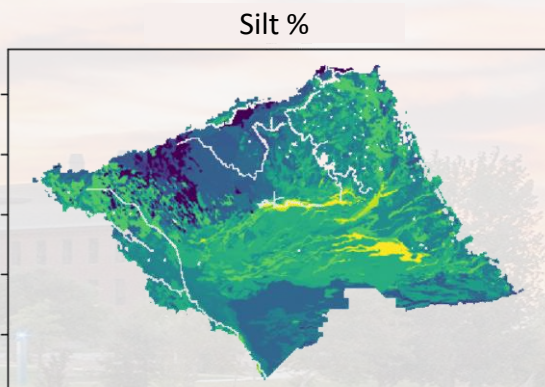
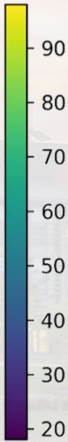
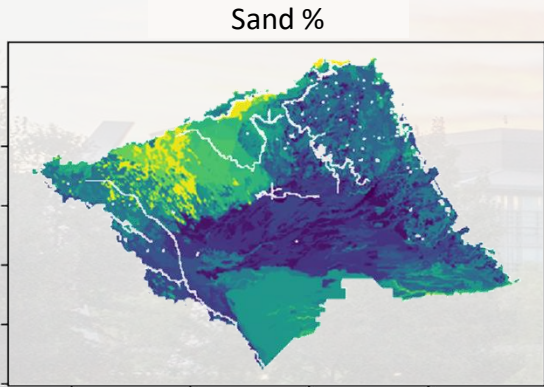
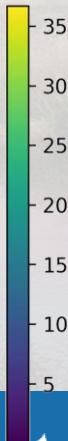
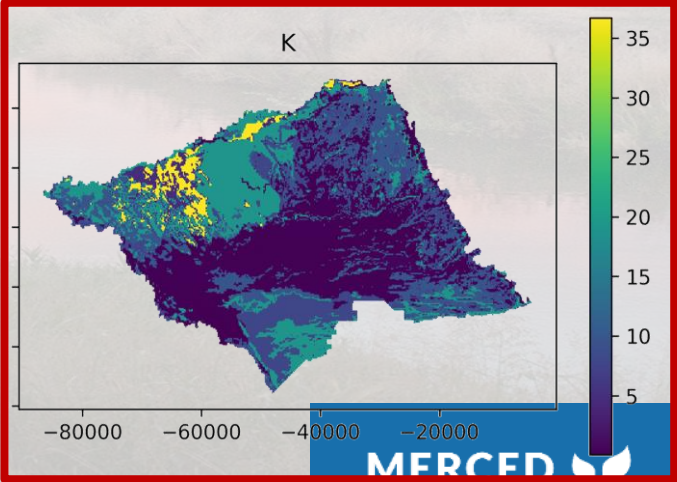
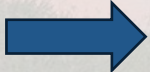
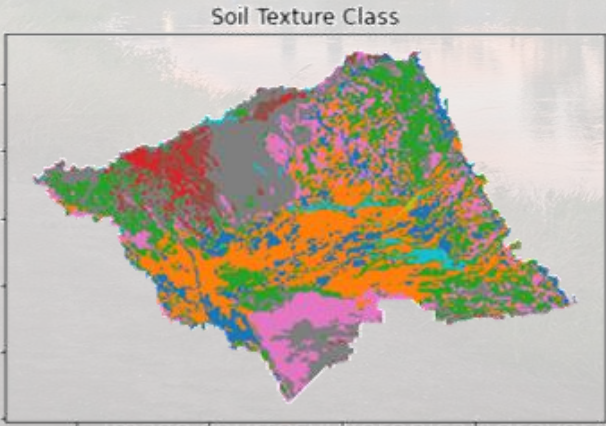
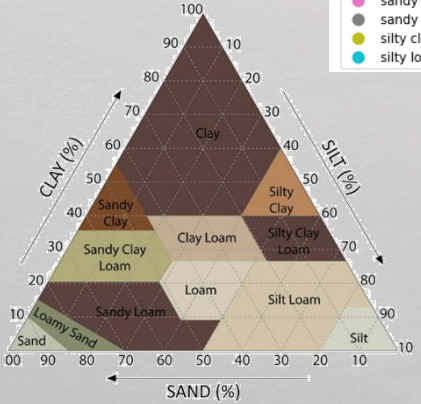


Image courtesy: Veronica Adrover/UC Merced

Soil Parameters (SSURGO)



- clay
- clay loam
- loam
- loamy sand
- sand
- sandy clay loam
- sandy loam
- silty clay loam
- silty loam



Groundwater System

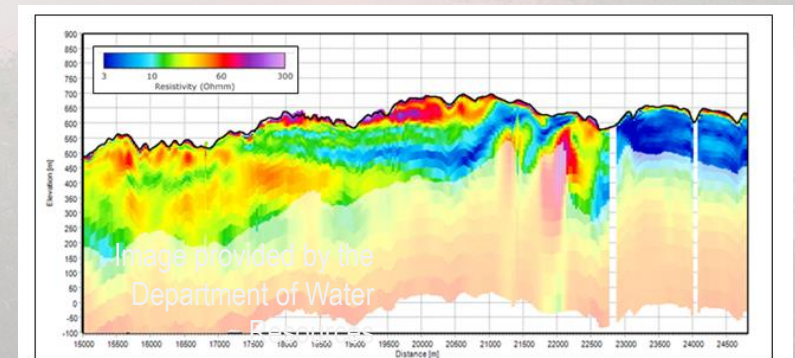
- **Goals:**

- **Model Layering:** Improve stream and groundwater flow dynamics of MercedWRM by refining the groundwater system with the best available data

- **Method:** Compile and analyze publicly available data to define the spatial properties and parameters of the existing model layers using:

- Formations Regional geologic maps, large-scale quadrangles
- Materials [DWR's Airborne Electromagnetic \(AEM\) Surveys](#)
[Well-specific elogs and local lithology information](#)
- Parameters Transmissivity and storativity

Image courtesy: Veronica Adrover/UC Merced



Example AEM data cross section showing the distribution of electrical resistivity values with depth

Groundwater System – Model Layering

Approach

- Develop 3D visualization for regional QC and understanding of lateral continuity of units
- Develop 2D cross sections for local evaluation of layers + coarse fraction
- Implement changes based on best professional judgement
- Import parameter inputs to updated model

Target Areas

Features of Consideration

- Extent, depth, and thickness of clays
- Slope of hydrogeological layers
- Shallow alluvium (Layer 1)

Special Consideration

- Stream-aquifer representation
- Shallow clays (Western Subbasin)

Image courtesy: Veronica Adrover/UC Merced

Groundwater System

AEM Flight Lines

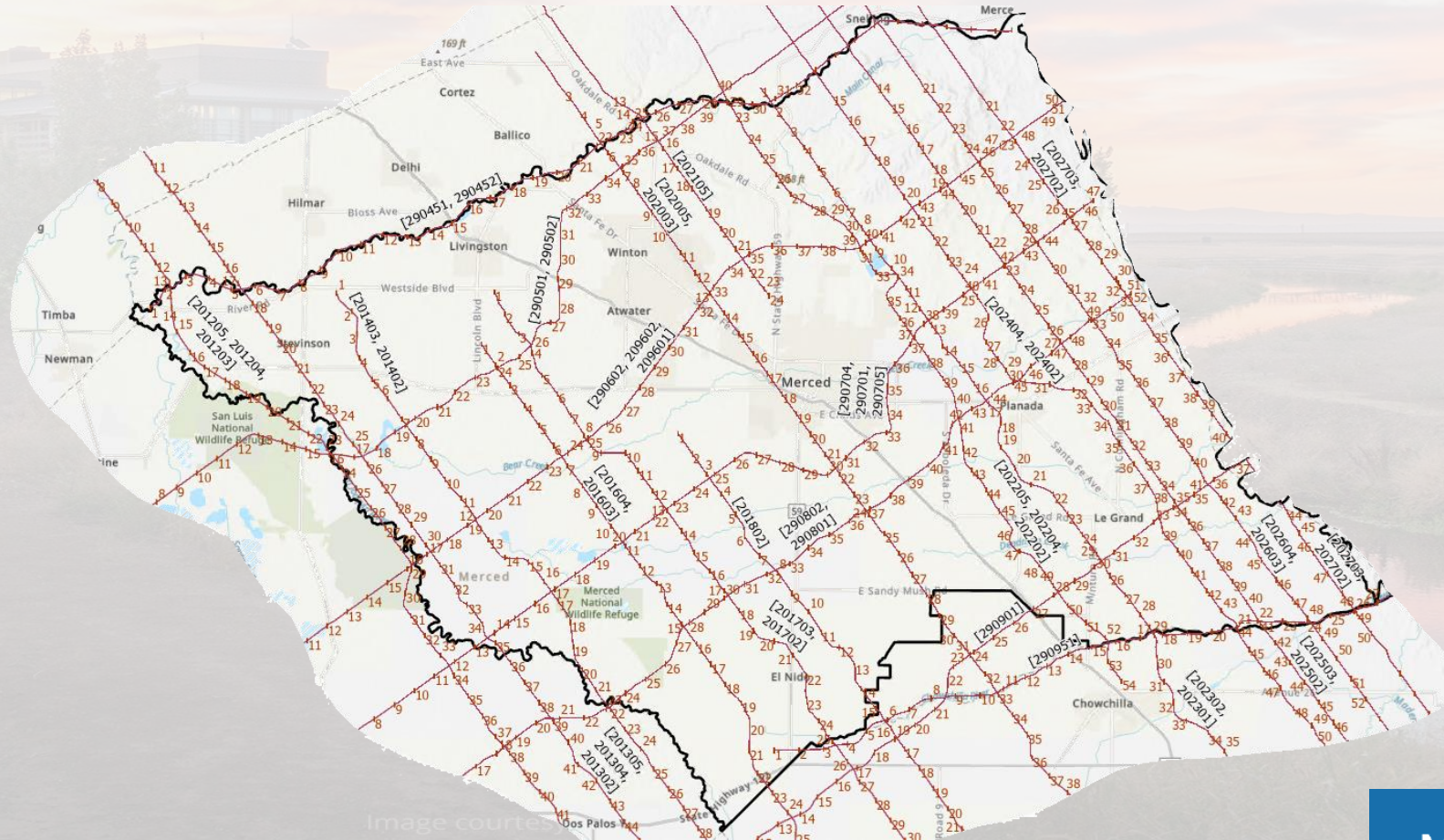
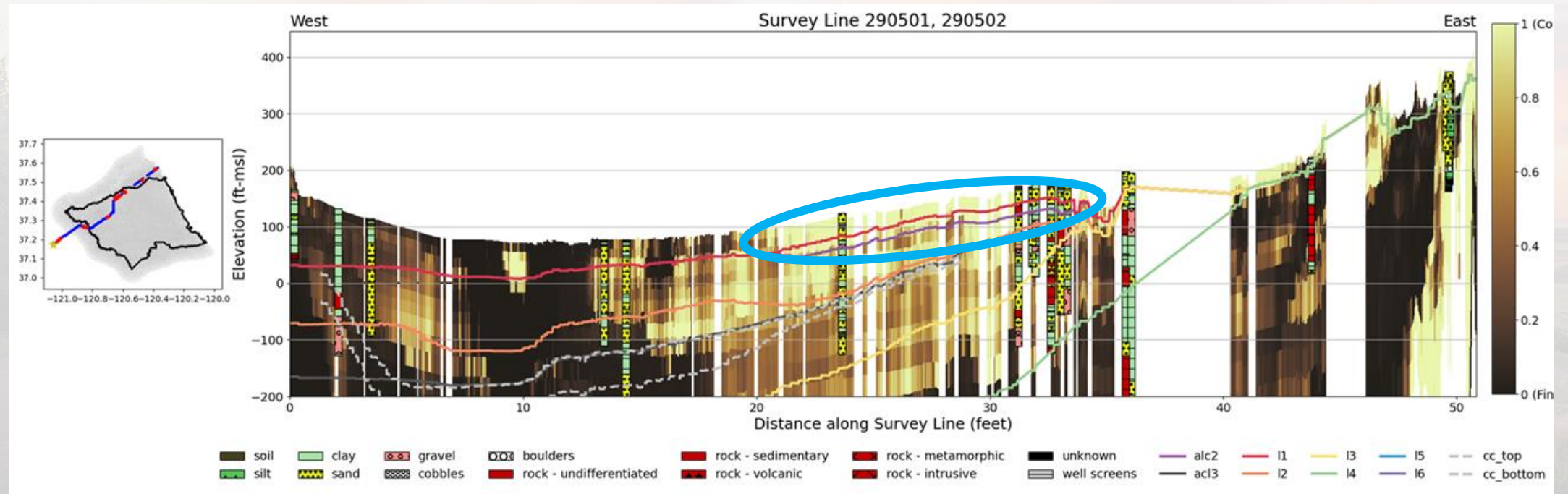


Image courtesy of...

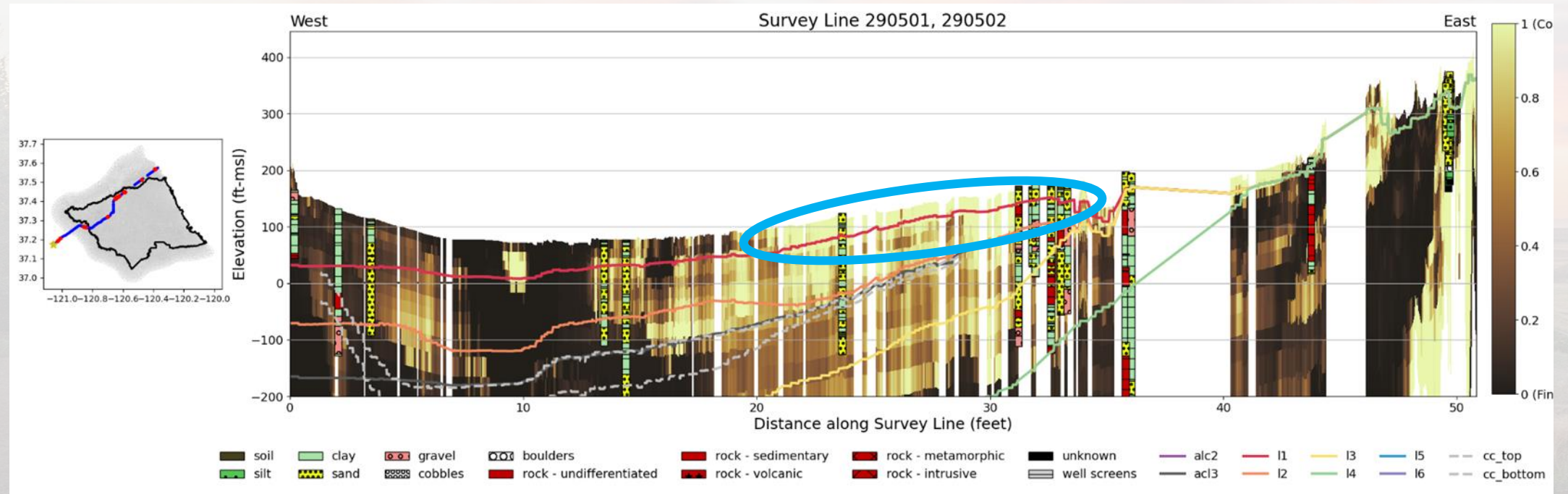
Groundwater System



- Texture data doesn't back up shallow clays in the stretch between group of lithology logs
- Remove shallow clay in circled area.

Image courtesy: Veronica Adrover/UC Merced

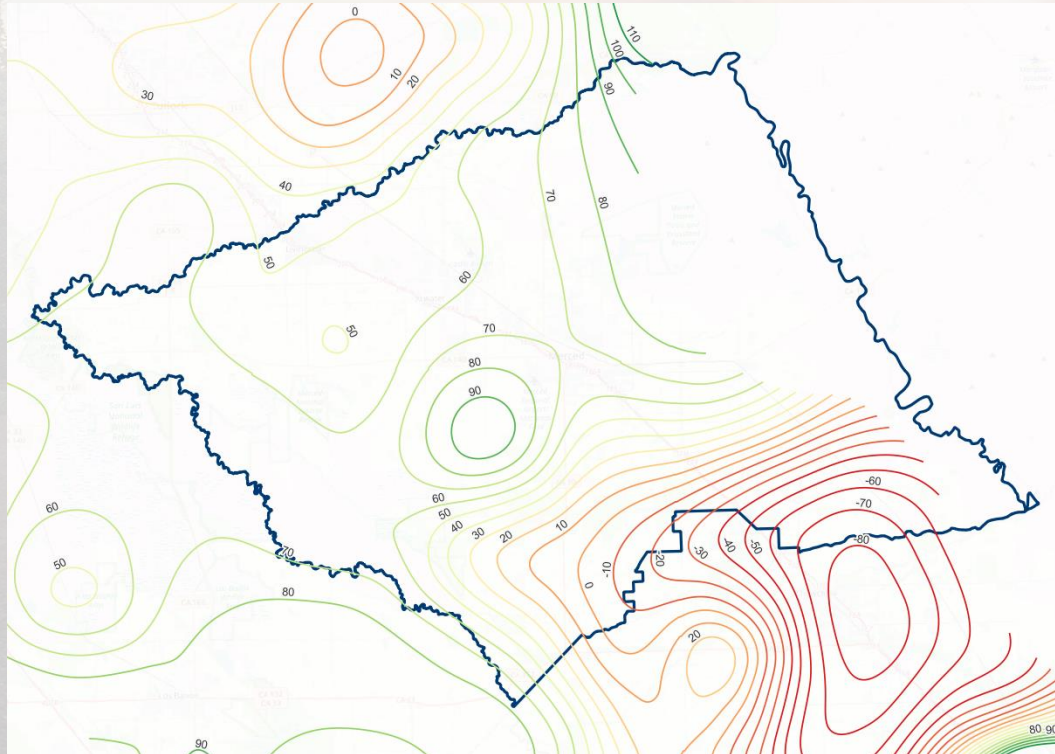
Groundwater System



- Texture data doesn't back up shallow clays in the stretch between group of lithology logs
- Remove shallow clay in circled area.

Image courtesy: Veronica Adrover/UC Merced

Groundwater System – Boundary Conditions

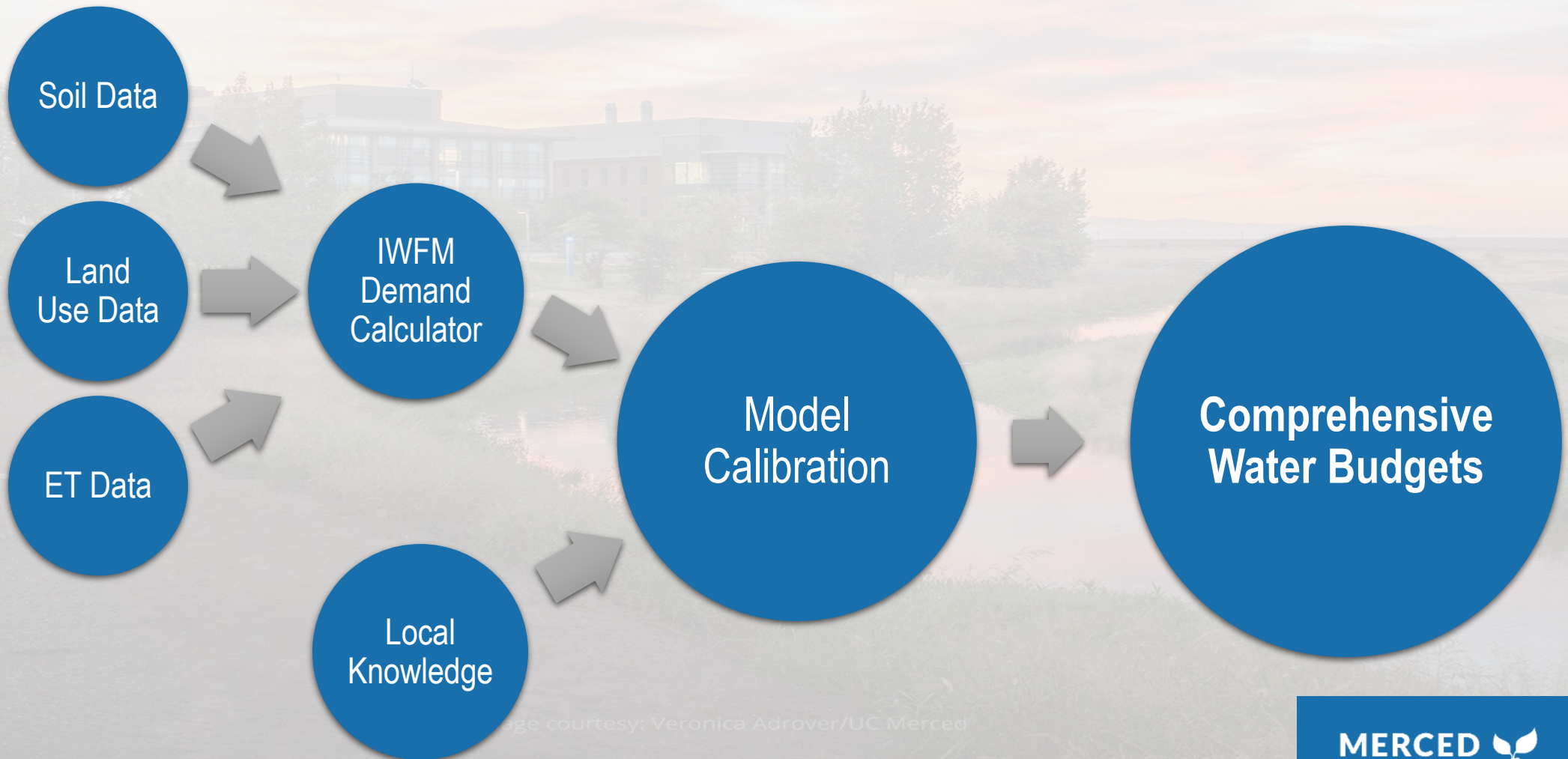


- Historical Boundary Conditions
 - Observed water levels
 - Groundwater Data Library
 - SGMA Data Viewer
- Baseline Boundary Conditions
 - Monthly average of flux at boundary nodes from the Historical model
 - Fluxes were validated with observed groundwater level contours

Image courtesy: Veronica Adrover/UC Merced

Image provided by the
Department of Water
Resources

Estimation of Agricultural Water Demand



Model Calibration

Base Calibration - Phase 1:

- Representative of flood irrigation and precipitation
- Adjust soil parameters within published range
- Refine the consumptive use factor (CUF) between 0.58 and 0.90 based on soil and irrigation management
- Adjust aquifer and stream parameters to align groundwater levels and streamflow hydrographs.

Advanced Calibration - Phase 2:

- Calibrate based on local studies and published data

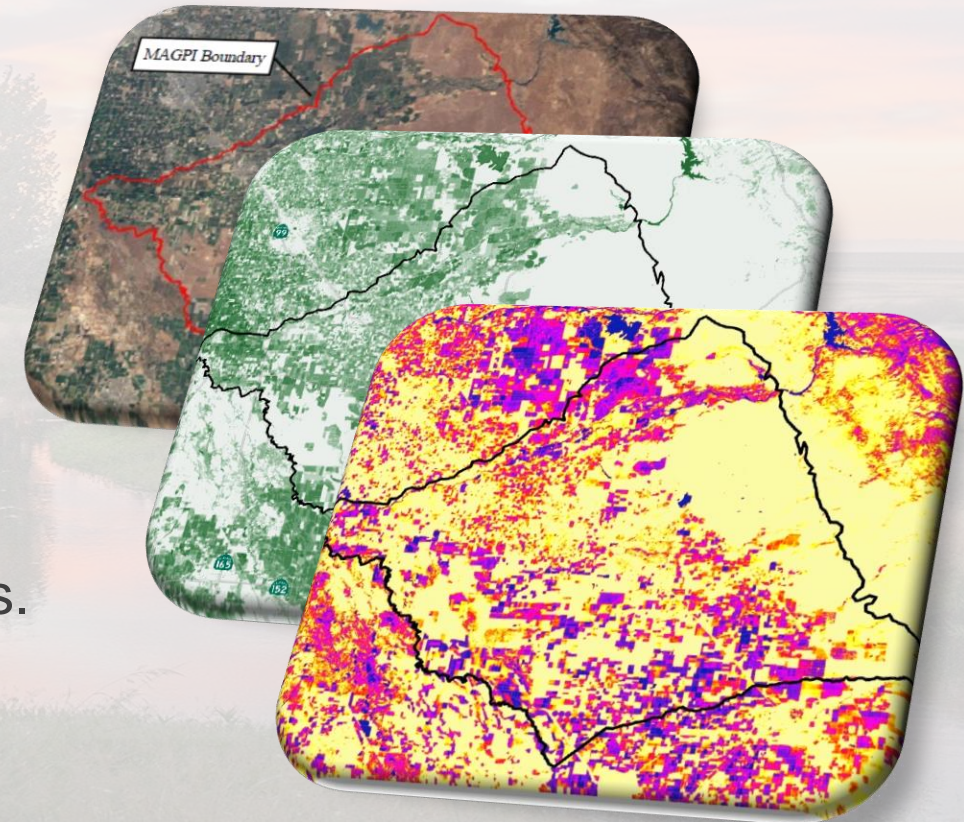


Image courtesy: Veronica Adrover/UC Merced



Model Results

Image courtesy: Veronica Adrover/UC Merced



Model Calibration: Groundwater Levels

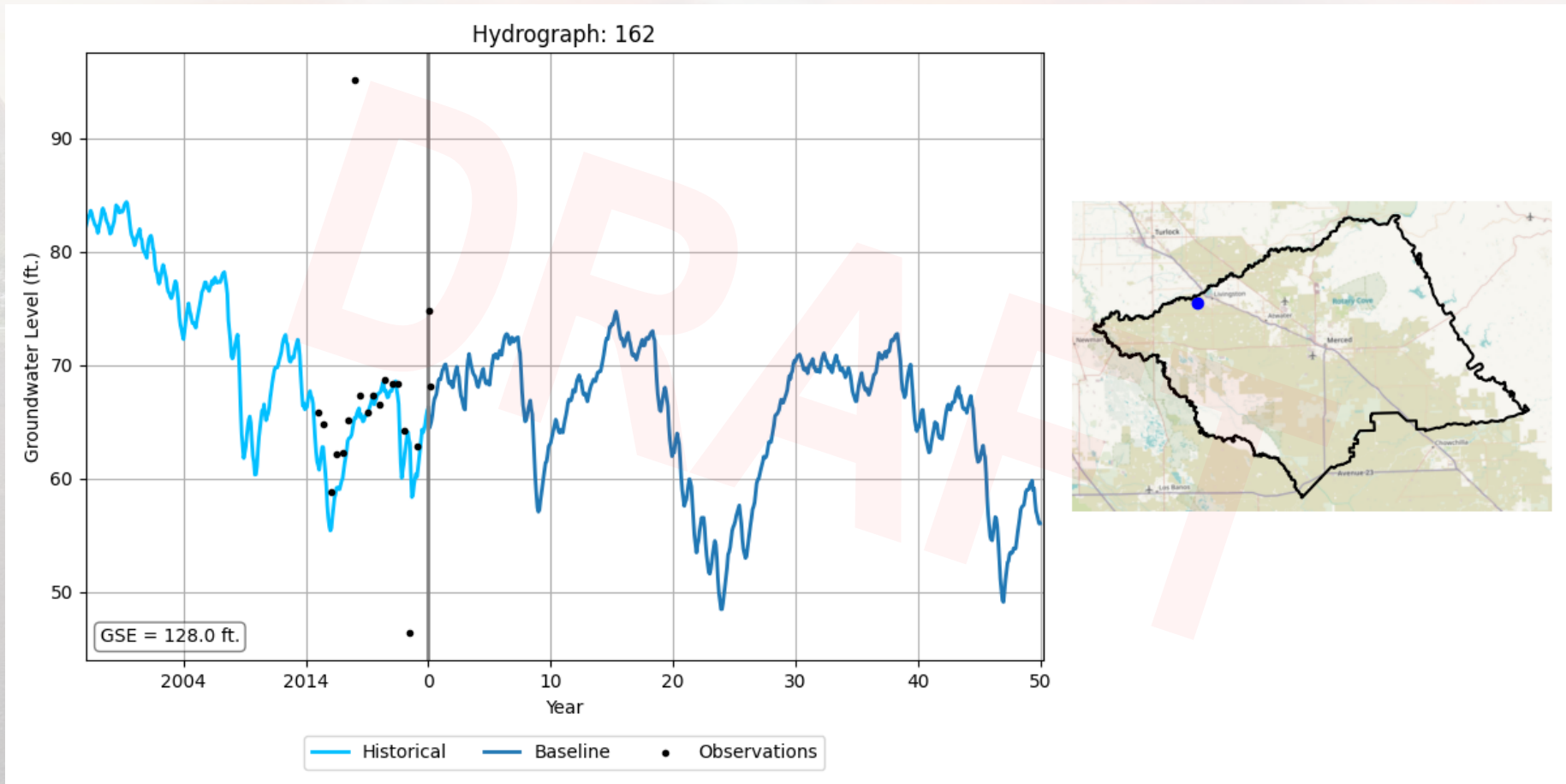


Image courtesy: Veronica Adrover/UC Merced

Model Calibration: Groundwater Levels

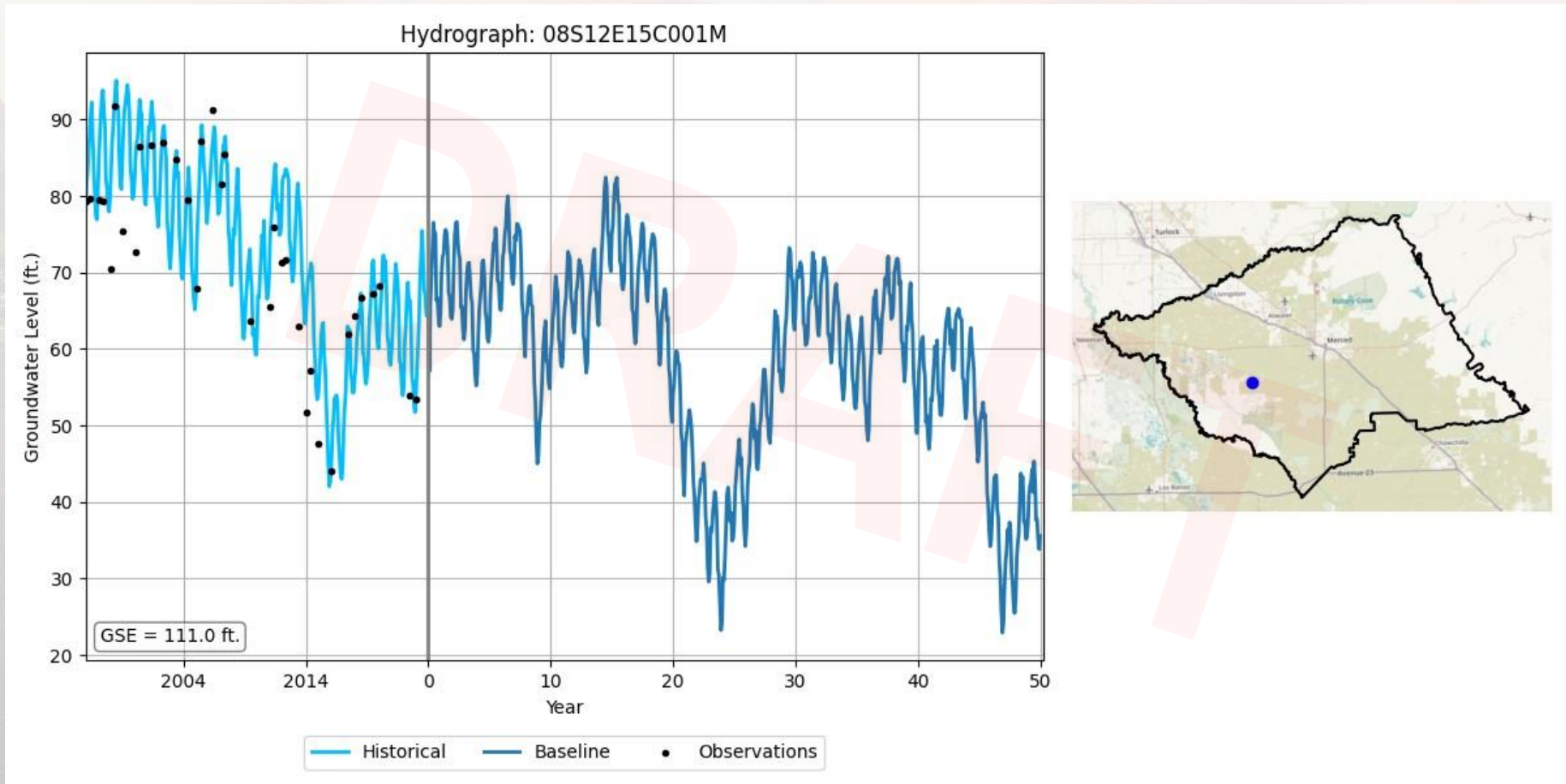


Image courtesy: Veronica Adrover/UC Merced

Model Calibration: Groundwater Levels

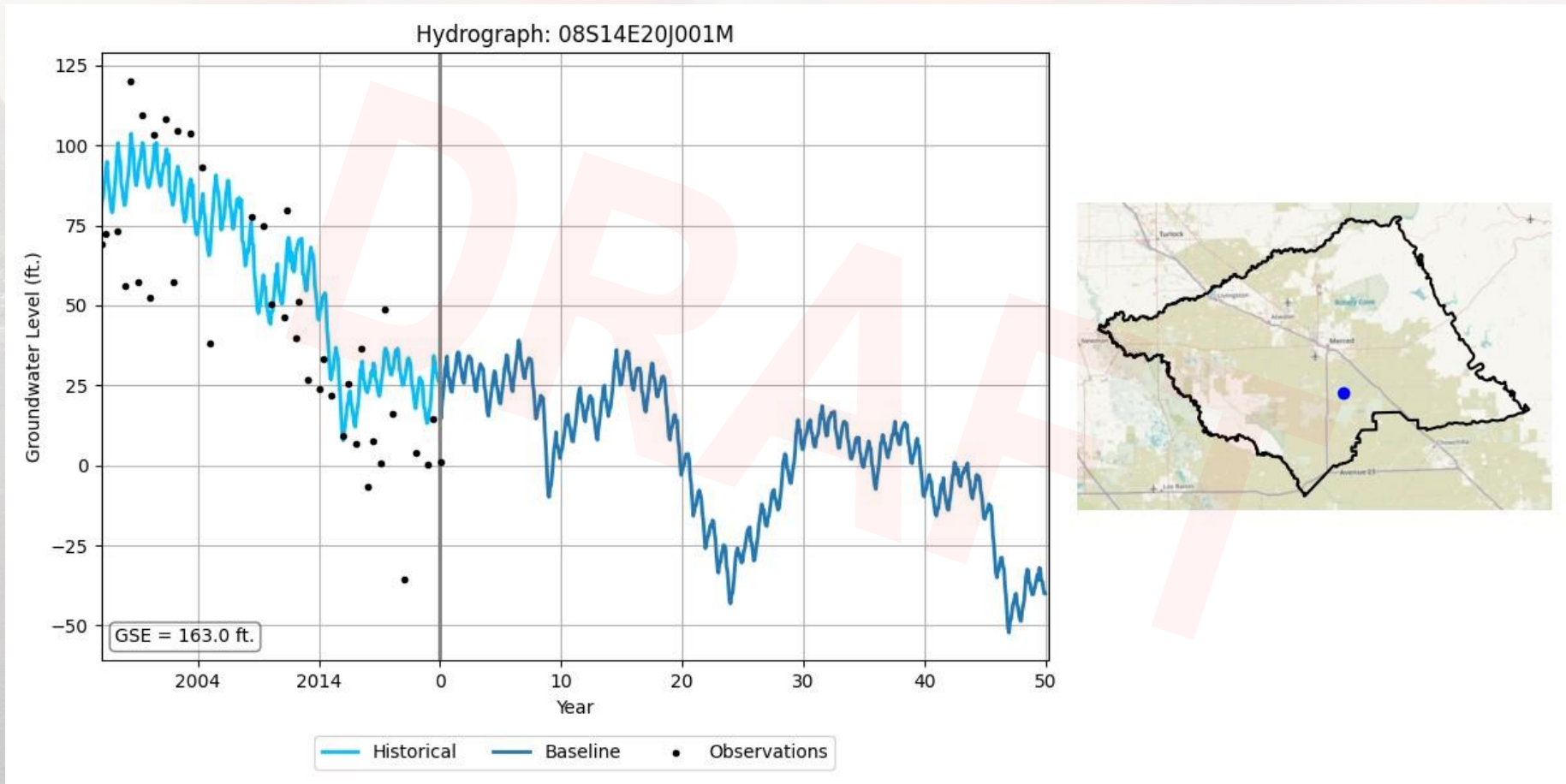


Image courtesy: Veronica Adrover/UC Merced

Model Calibration: Groundwater Levels

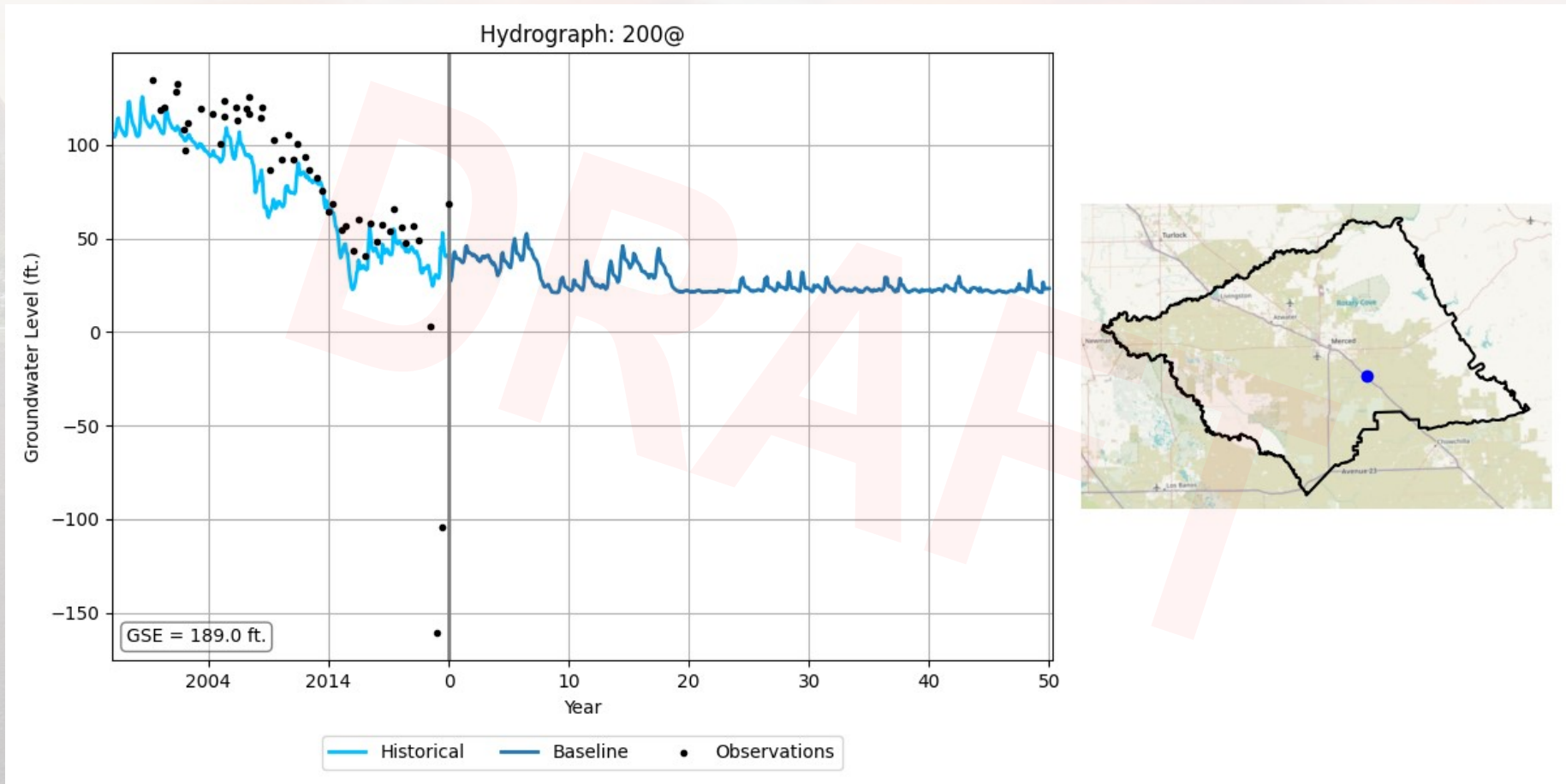


Image courtesy: Veronica Adrover/UC Merced

Model Calibration: Groundwater Levels

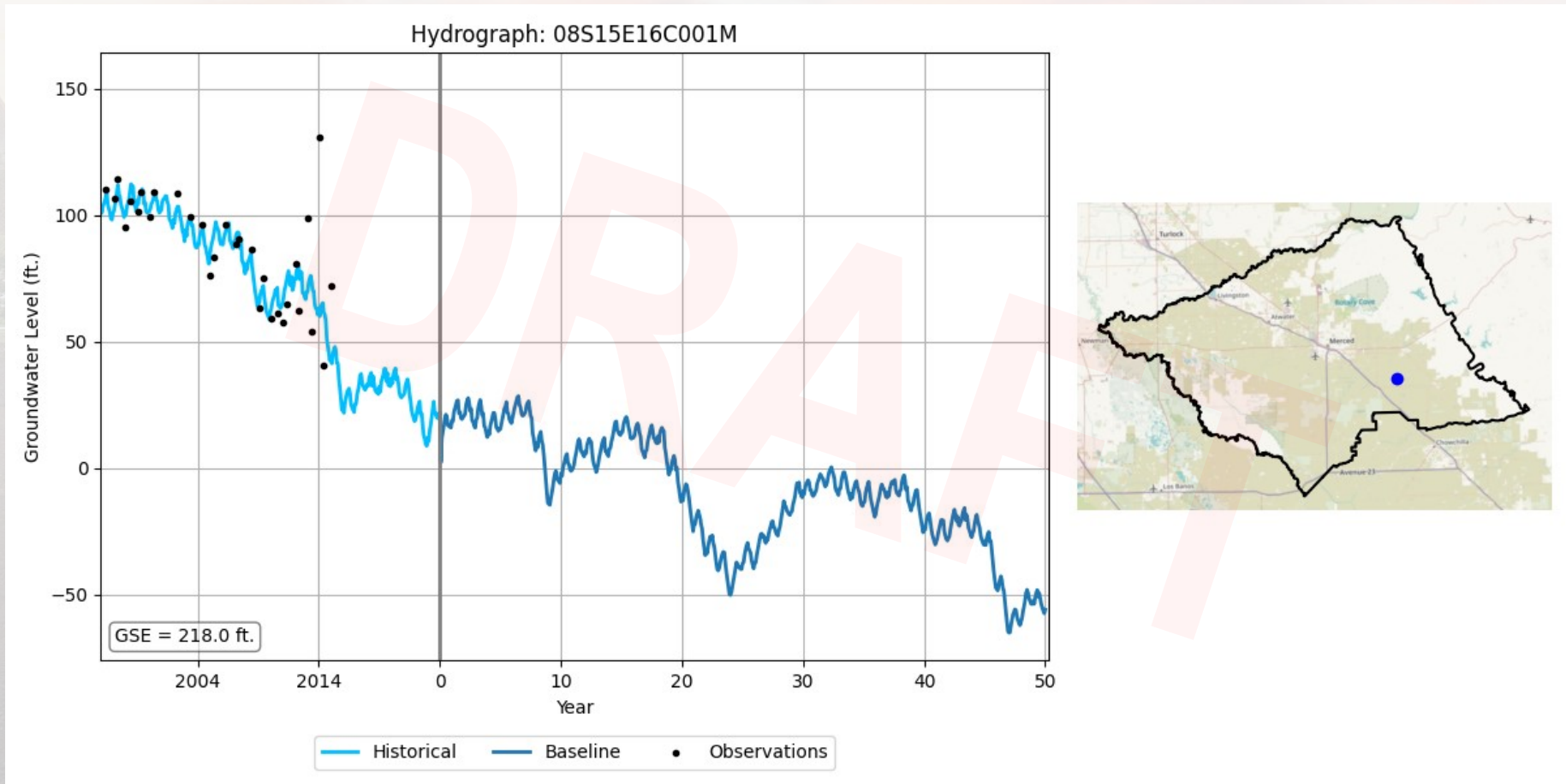
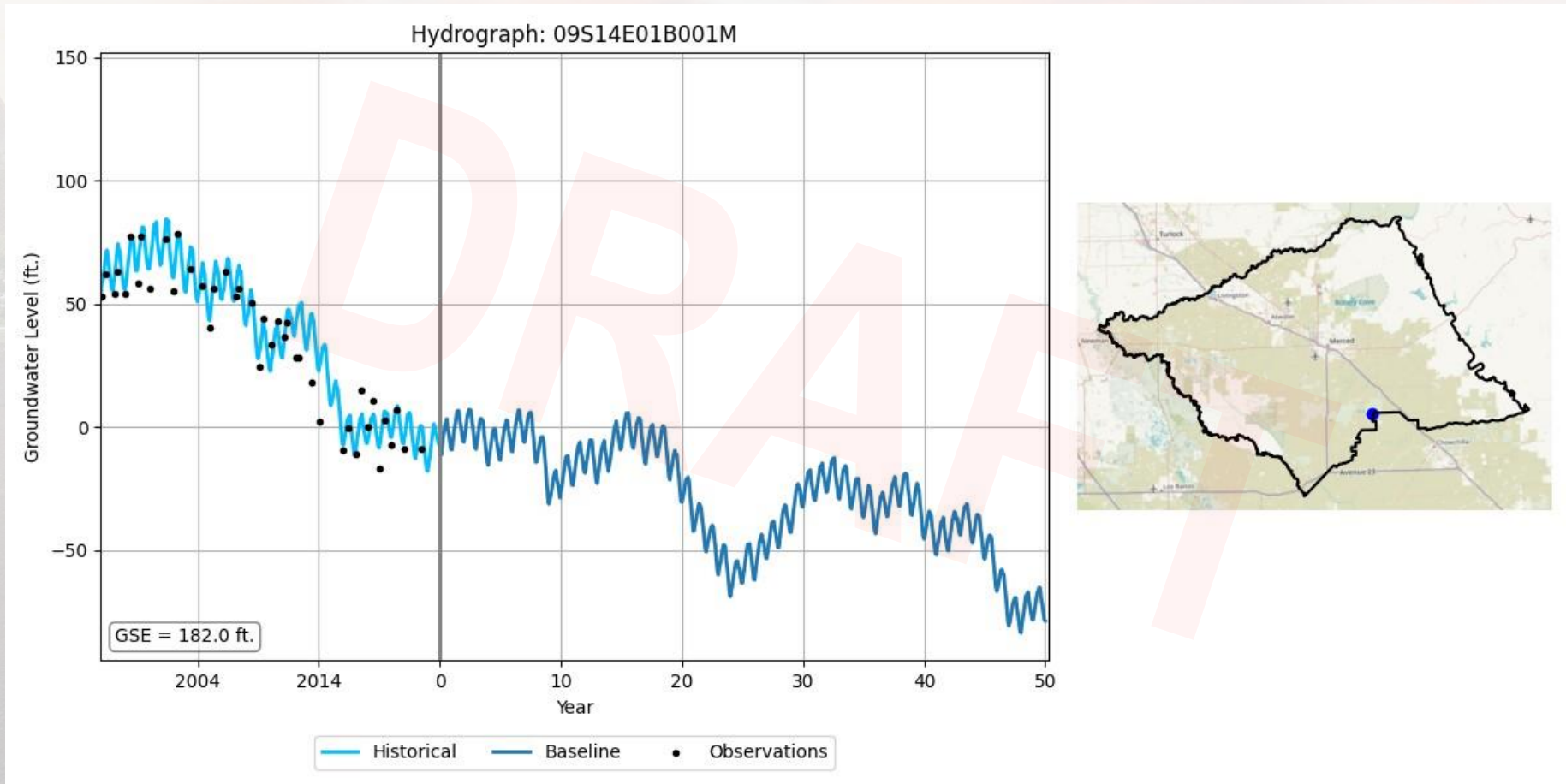


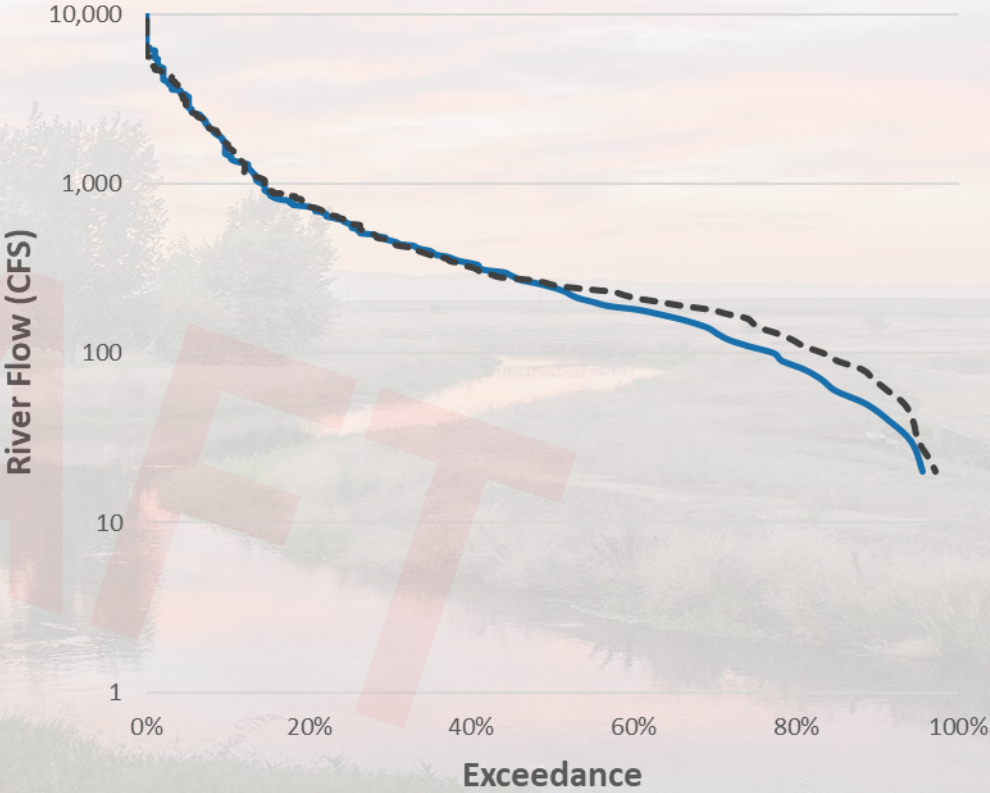
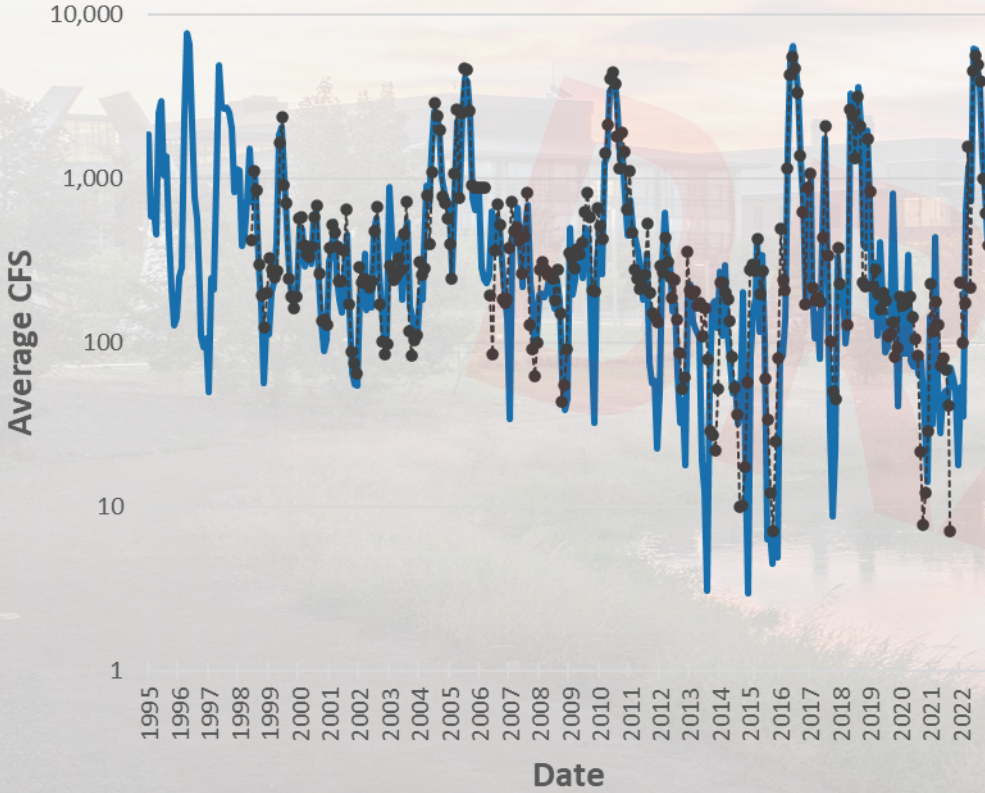
Image courtesy: Veronica Adrover/UC Merced

Model Calibration: Groundwater Levels



Stream Hydrograph

Merced River at Stevinson



— Simulated - - - ● - - - Observed

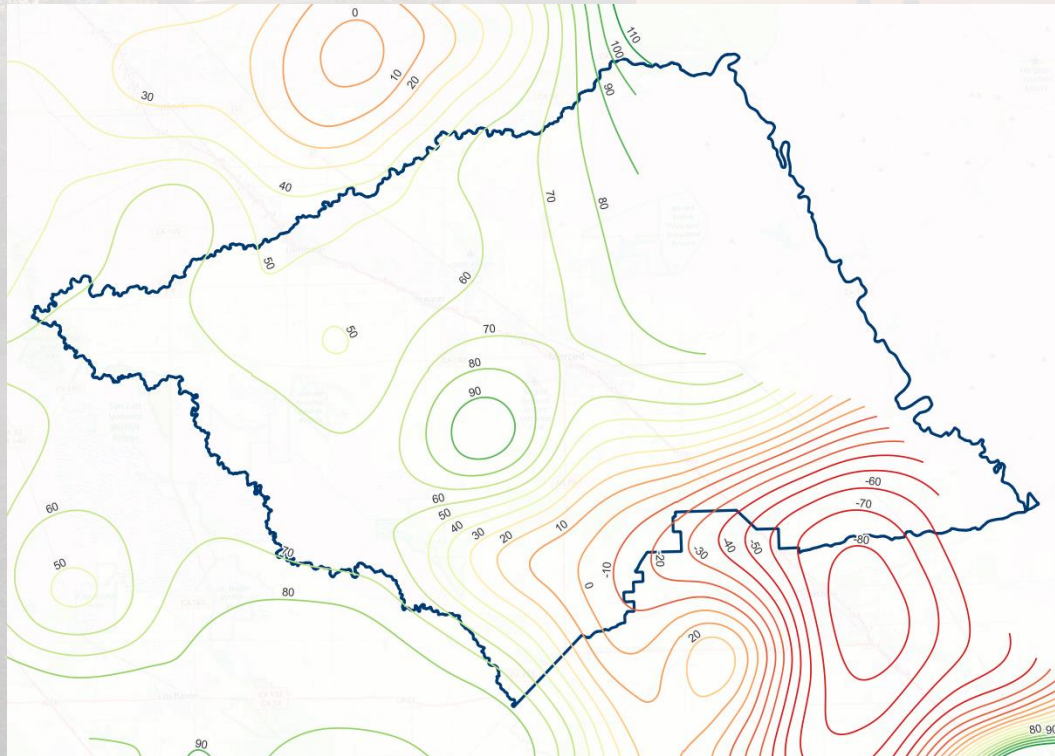
— Simulated - - - Observed

Image courtesy: Veronica Adrover/UC Merced



Groundwater Level Contours – Fall 2023

SGMA Data Viewer



MercedWRM (Layers 4 and 5)

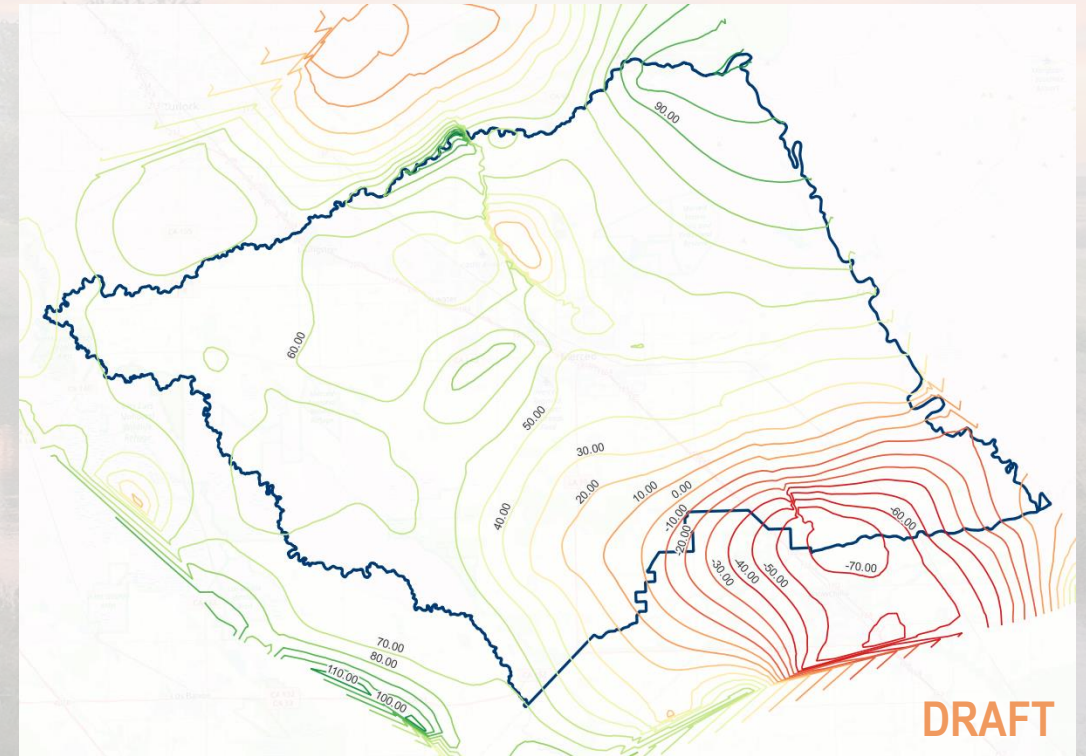


Image courtesy: Veronica Adrover/UC Merced

Groundwater Calibration Statistics – 2023 Annual Report

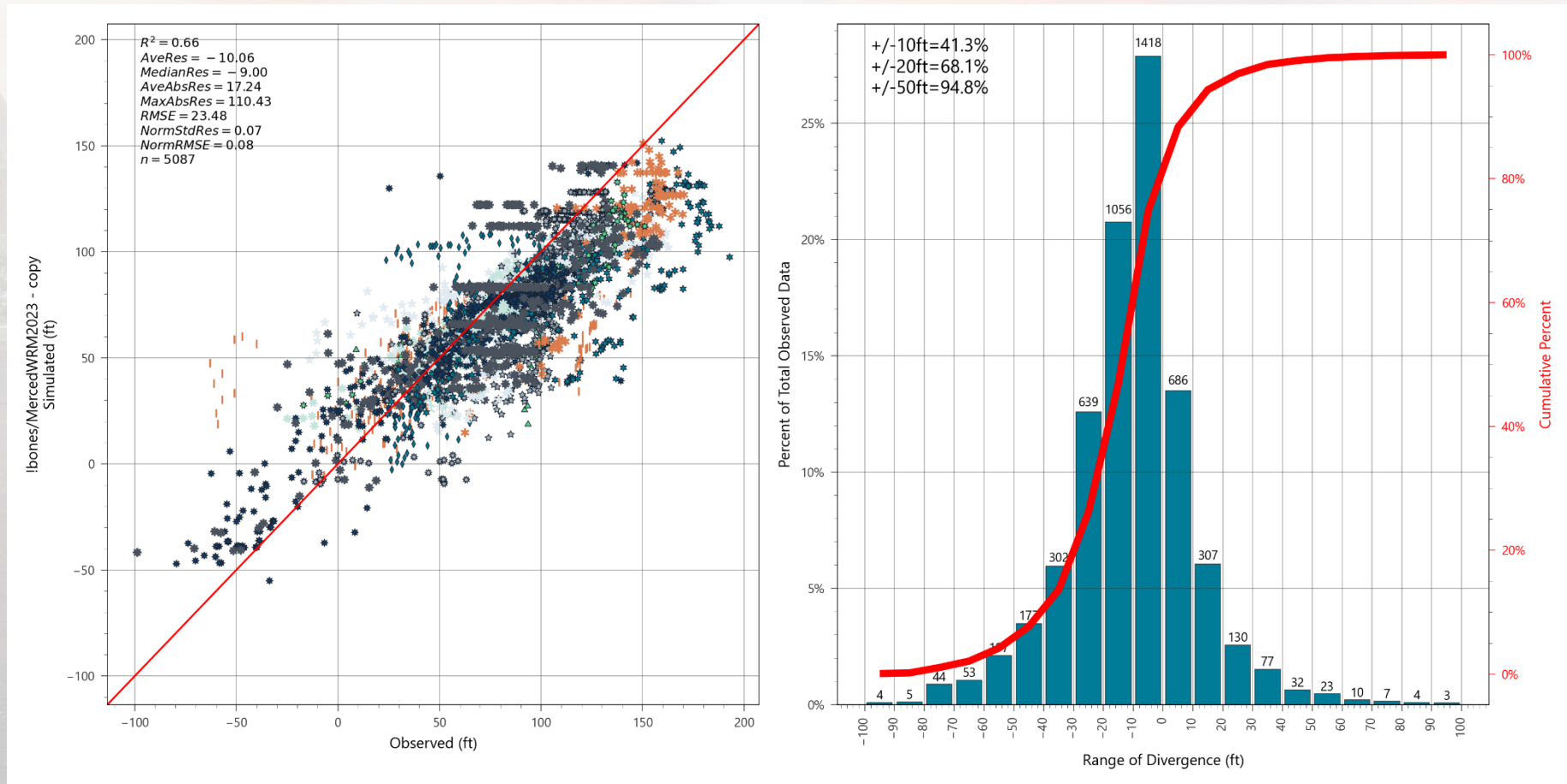


Image courtesy: Veronica Adrover/UC Merced

Groundwater Calibration Statistics – Model Update

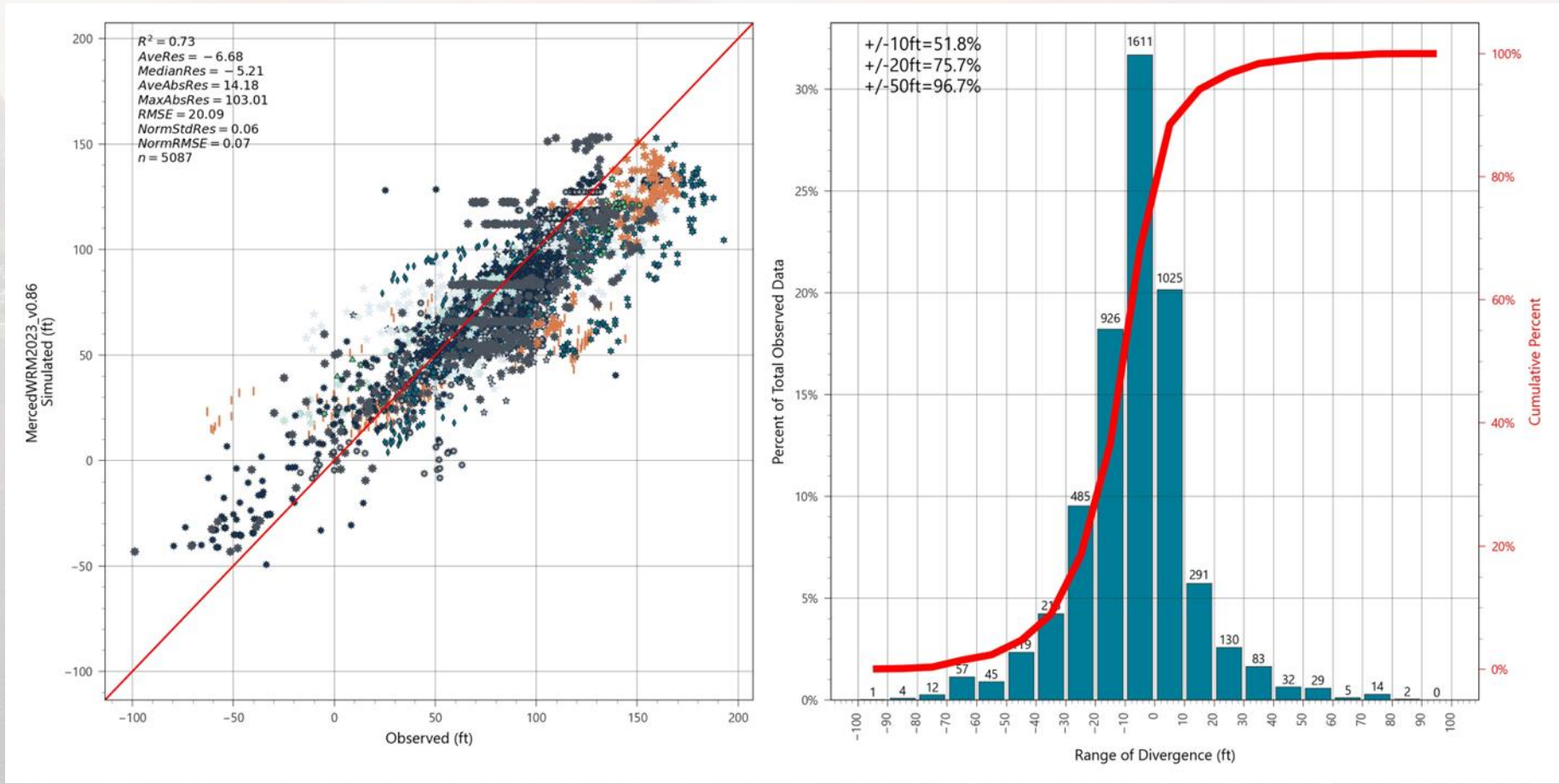


Image courtesy: Veronica Adrover/UC Merced

Land and Water Use Budget – Historical

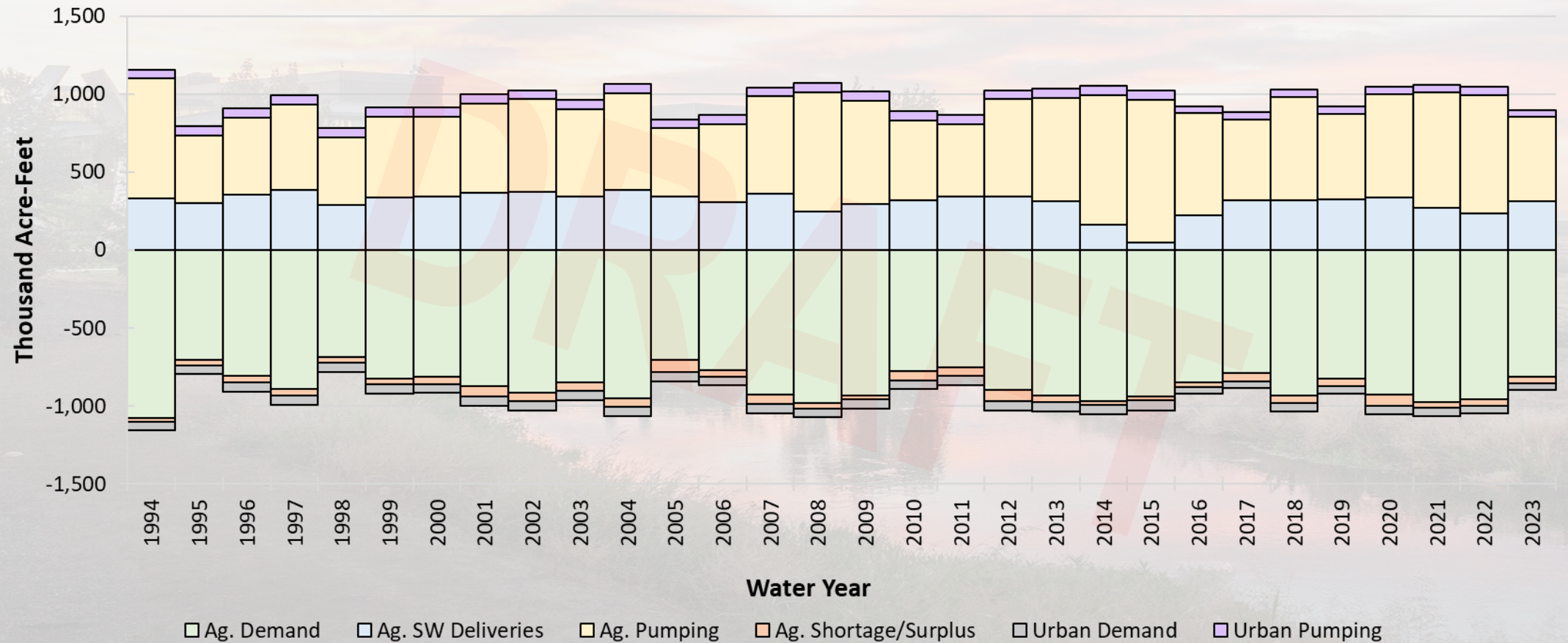


Image courtesy: Veronica Adrover/UC Merced

Groundwater Budget - Historical

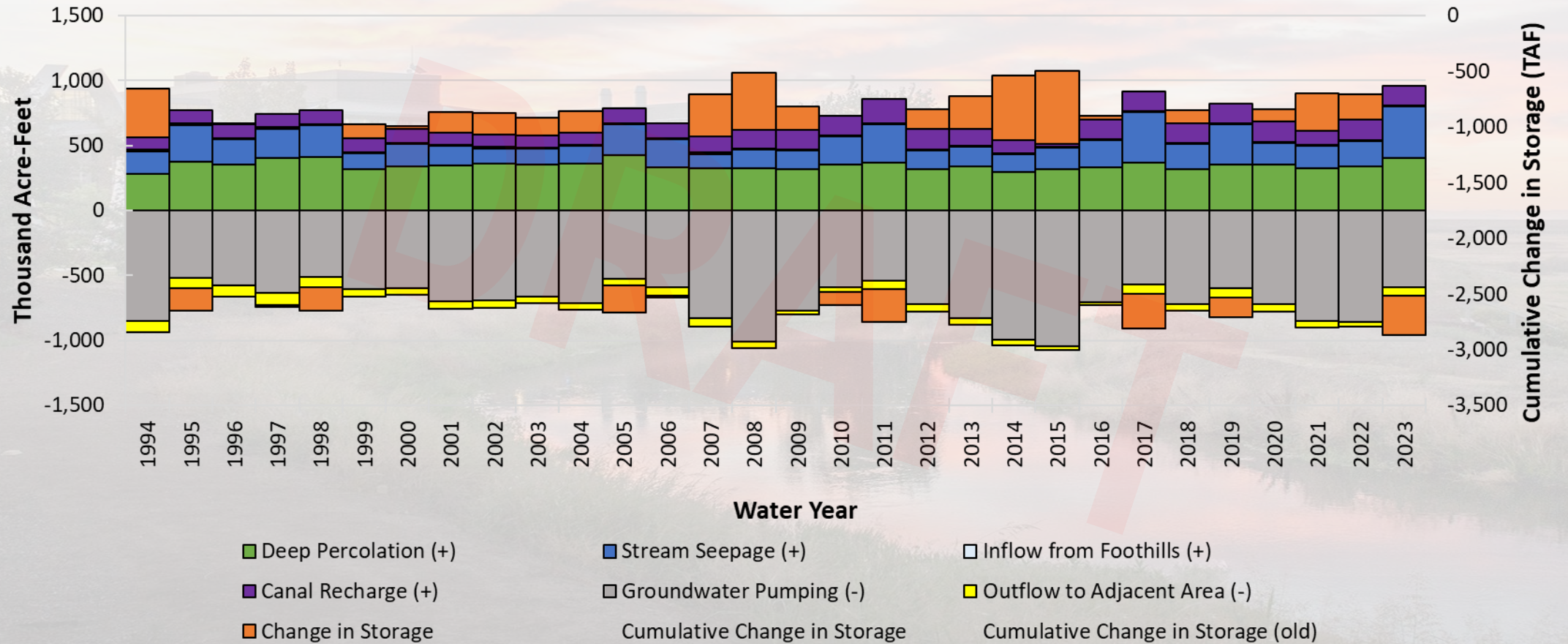


Image courtesy: Veronica Adrover/UC Merced

Groundwater Budget - Historical

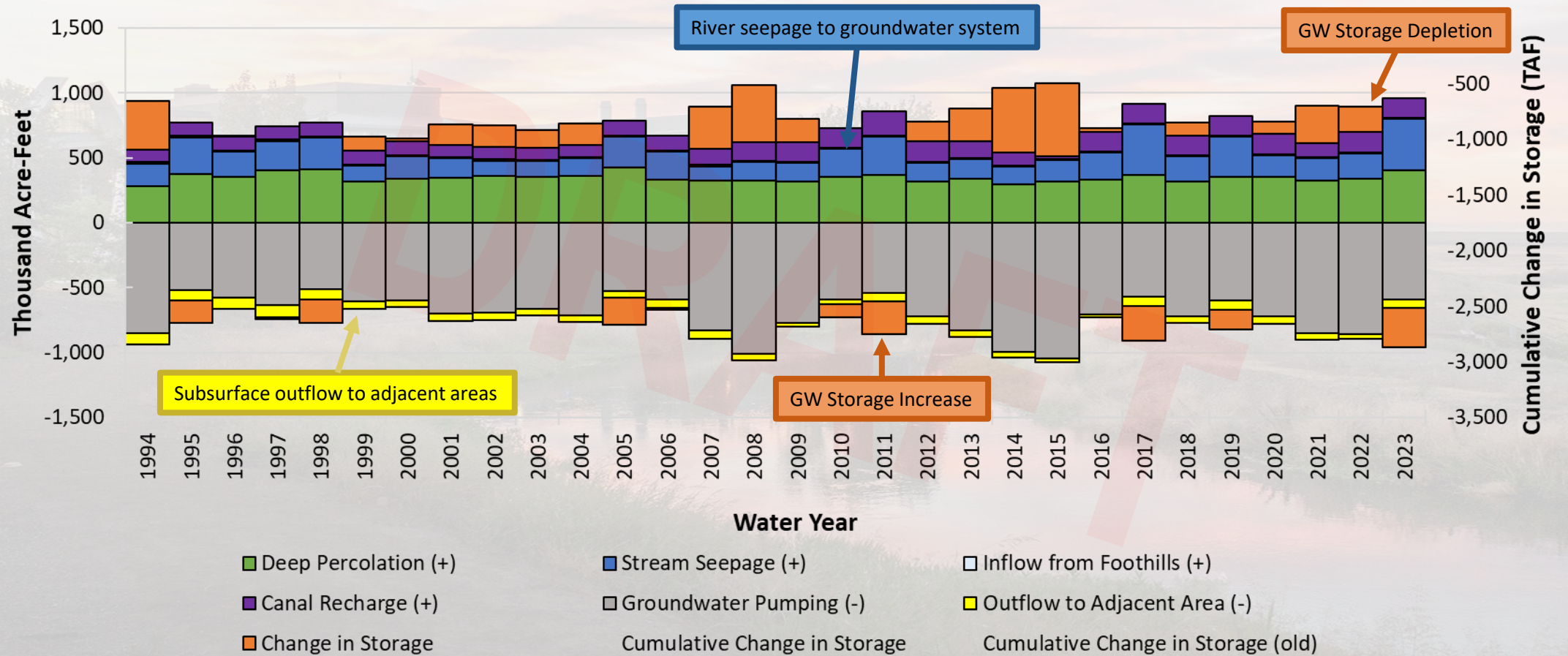


Image courtesy: Veronica Adrover/UC Merced

Groundwater Budget - Historical

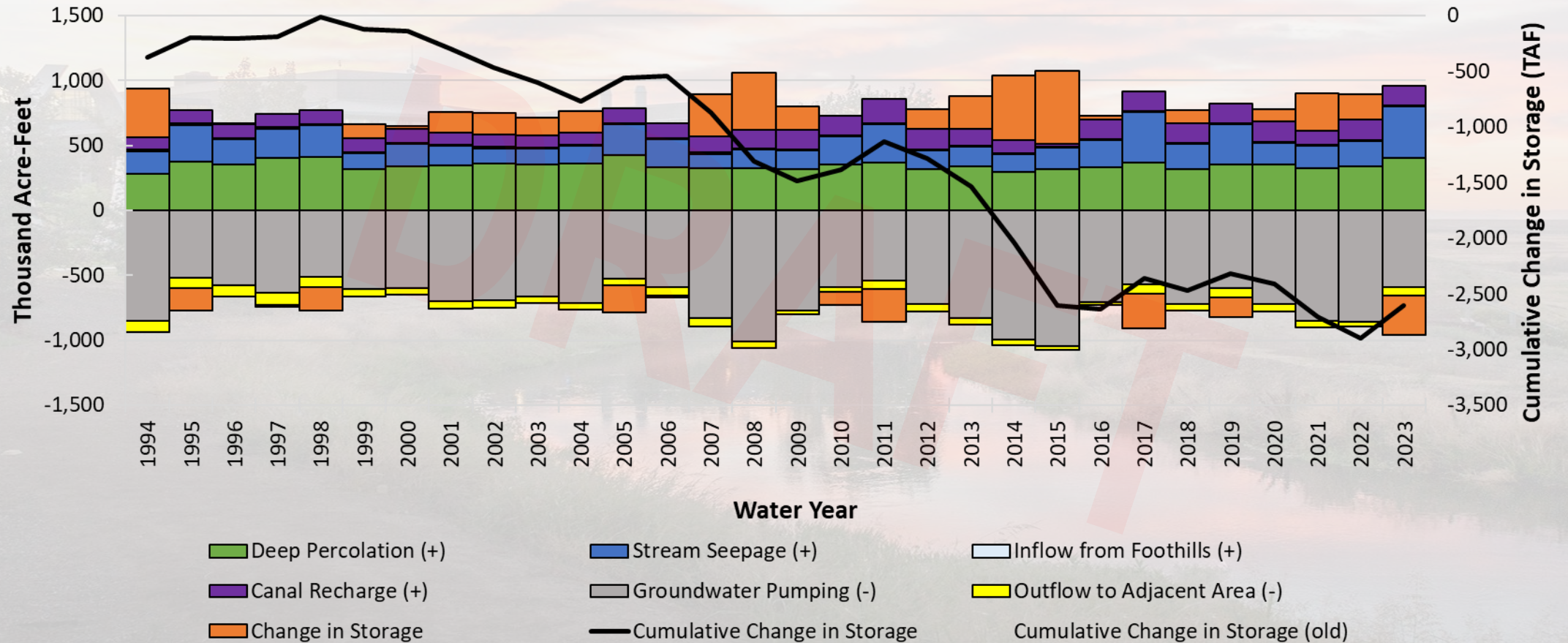


Image courtesy: Veronica Adrover/UC Merced

Groundwater Budget - Historical

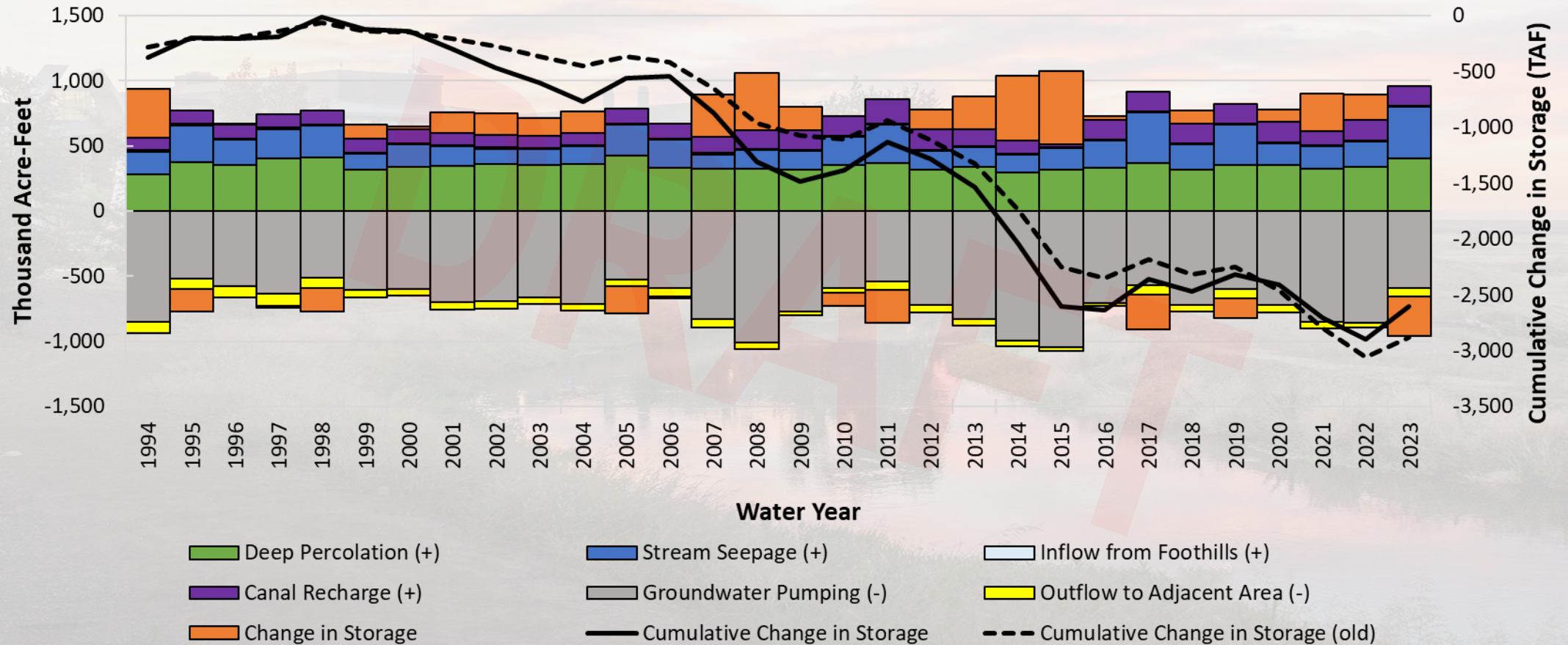


Image courtesy: Veronica Adrover/UC Merced

Conclusions and Next Steps

- MercedWRM shows a good approximation of historical groundwater levels and stream flows
- Refinements support continued improvement of the model
 - Changes in Land Surface inputs align with other tools developed for the subbasin
 - Use of new technology and inputs that give a better characterization and understanding of the basin
- Next Steps
 - Develop new model versions to include climate change scenarios, sustainable yield and PMAs

Image courtesy: Veronica Adrover/UC Merced



Next Steps

Image courtesy: Veronica Adrover/UC Merced



What's coming up next?

- Public Workshop tonight at 6:30 pm at Sam Pipes Room, Merced Civic Center, 678 West 18th Street, Merced, CA 95340
- Adjourn to next meeting (joint with SAC), proposed July 17, 2024 at 10am*
 - **Correction from agenda which stated 1:30pm*
- Anticipated topics:
 - Water budgets for scenarios with projects & management actions + sustainable yield
 - Projects and management actions
 - Review of sustainable management criteria for new groundwater level monitoring wells.

Image courtesy: Veronica Adrover/UC Merced

Merced GSP Coordination Committee Meeting

May 22, 2024

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

Image courtesy: Veronica Adrover/UC Merced

