Merced GSP
Joint Coordination & Stakeholder Advisory Committees Meeting

July 17, 2024

Meeting will begin at 10:00 am or a few minutes after – thank you for joining us!

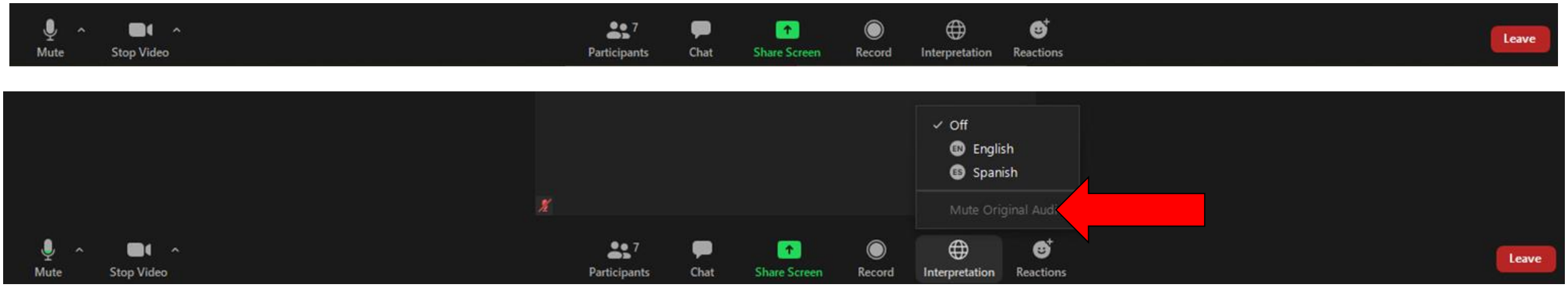
Merced Irrigation-Urban GSA
Merced Subbasin GSA
Turner Island Water District GSA-1

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 Coordination Committee Meeting Minutes
4. Public Comment
5. Reports
6. Sustainable Management Criteria for New Representative Groundwater Level Monitoring Network Wells
7. Modeling Results for Baseline Projected Conditions + Projects/Management Actions Scenarios
8. Next Steps and 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 *(alternate)*	Merced Irrigation-Urban GSA
Mike Gallo	Merced Subbasin GSA
Nic Marchini	Merced Subbasin GSA
Dave Nervino	Merced Subbasin GSA
Eric Swenson *(alternate)*	Merced Subbasin GSA
George Park *(alternate)*	Merced Subbasin GSA
Kel Mitchel	Turner Island Water District GSA #1

Image courtesy: Veronica Adrover/UC Merced

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Stakeholder Advisory Committee Members

Committee Member	Interest/Affiliation	Alternate	Interest/Affiliation
Alvaro Arias	UC Merced	Phillip Woods	UC Merced
Arlan Thomas	MIDAC member	Ben Migliazzo	Live Oak Farms
Bill Eisenstein	River Partners		
Bob Kelley	Stevinson Representative	Blake Nervino	Stevinson/Merquin
Breanne Vandenberg	MCFB		
Caitie Diemel	ESJWQC		
Craig Arnold	Arnold Farms		
Daniel Melendrez	City of Merced		
Danielle Serrano	Serrano Farms - Le Grand		
David Belt	Foster Farms		
Eddie Rojas	E&J Gallo Winery		
Emma Reyes	Martin Reyes Farm/Land Leveling		
Jean Okuye	E Merced RCD		
Joe Sansoni	Sansoni Farms/MCFB		
Joe Scoto	Scoto Brothers/McSwain School Dist.		
Lisa Baker	Clayton Water District	Scott Menefee	Clayton Water District
Lisa Kayser-Grant	Sierra Club		
Maxwell Norton	Unincorporated area		
Nav Athwal	TriNut Farms		
Simon Vander Woude	Sandy Mush MWC		
Susan Walsh	City of Merced	Bill Spriggs	Resident City of Merced
Thomas Dinwoodie	Master Gardener/McSwain		
Trevor Hutton	Valley Land Alliance		
Wes Myers	Merced Grassland Coalition	Lou Myers	Benjamin Land LP
Zachary Hamman	Cal Am Water		

Approval of Coordination Committee Meeting Minutes

Image courtesy: Veronica Adrover/UC Merced

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Approval of Meeting Minutes

- January 24, 2024
- March 20, 2024
- May 22, 2024

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

Image courtesy: Veronica Adrover/UC Merced

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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

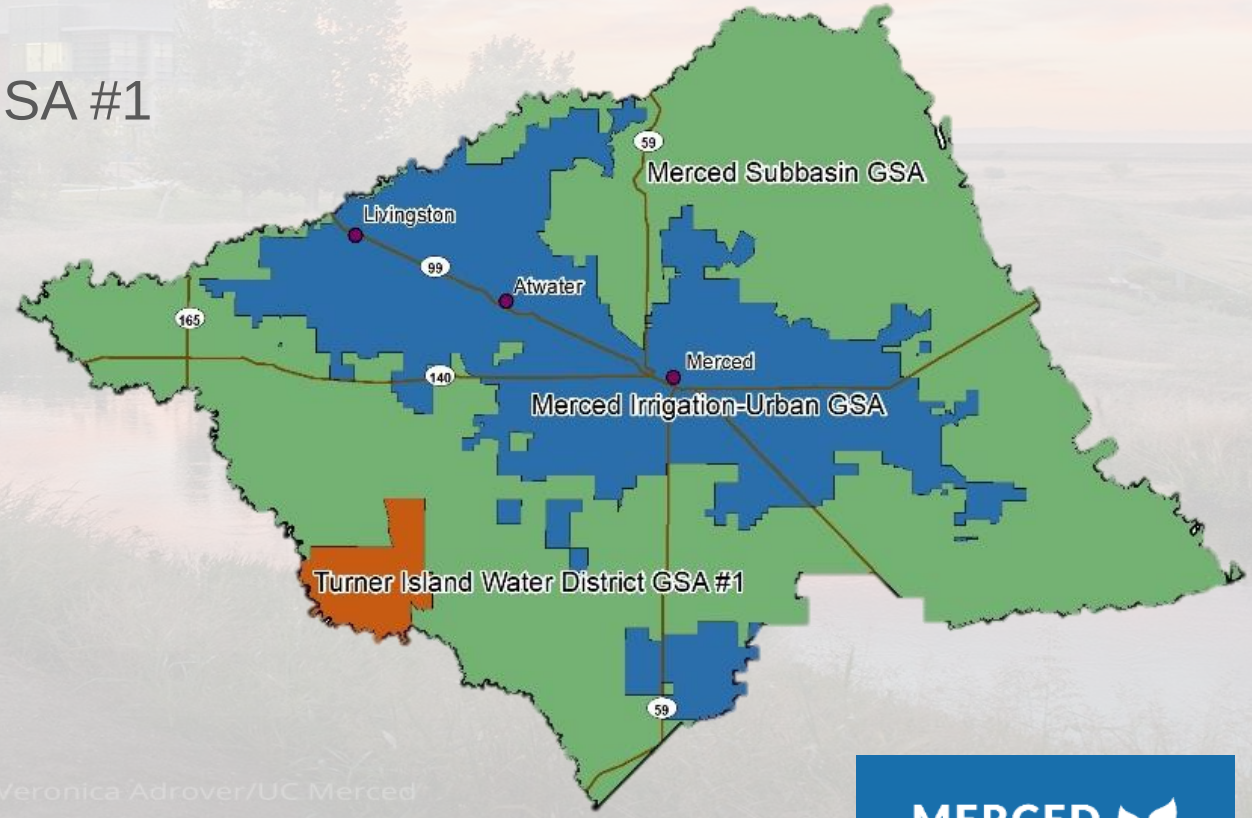

Image courtesy: Veronica Adrover/UC Merced

Merced Subbasin GSA Updates
Allocation Rule Update

- Draft Allocation Rule posted on MSGSA's website for public review.
- Previous events:
  - Workshop with the Board and TAC – June 27th
  - Public hearing – July 11th
- Future events:
  - Workshop with the Board and TAC – July 24th at 2 pm
  - Vote to approve the Allocation Rule – Board Meeting – August 8th at 2pm

Merced Subbasin
Groundwater Sustainability Agency

Merced Subbasin GSA Updates
Groundwater Accounting Platform

- Statistics as of 7/16/2024
  - 36 Mailed letters have been returned (1.9%)
  -

	PINs	Parcels	Area (acres)
Claimed	111	540	69,745.18
Total	988	1919	177,801.04
Percentage	11.23%	28.14%	39.23%

Merced Subbasin
Groundwater Sustainability Agency

Merced Subbasin GSA Updates
Land Repurposing Program Update

- Application for Year 3 is open until July 31
  - Application and information found on mercedsubbasingsa.org
  - Received 3 applications as of 7/16/2024

Merced Subbasin
Groundwater Sustainability Agency

Merced Subbasin GSA Updates

Multibenefit Land Repurposing Program Update

- Valley Eco is developing refined scopes and timeline with all involved subcontractors and MSGSA MLRP partners to kick off the program

Merced Subbasin
Groundwater Sustainability Agency

Merced Irrigation-Urban GSA Updates

- Implementation of adopted Rules and Regulations
  - Well Registration
  - Groundwater Accounting
- Adoption of Additional Rules and Regulations
  - Urban Allocation Plan
- Grants
  - Sustainable Groundwater Management Grant
  - SGMA Implementation Grant (Rounds 1 & 2)
  - Submitted application to USDA-NRCS Regional Conservation Partnership Program (RCPP). If awarded, provides funding for “packages” of sensors: flow meters, soil moisture sensors, weather station/ET data.

MERCED IRRIGATION-URBAN GSA

TIWD GSA-#1

Other Reports

- CIMIS Station Report
- Current Conditions (see separate PDF)

Sustainable Management Criteria for New Representative Groundwater Level Monitoring Network Wells

Image courtesy: Veronica Adrover/UC Merced

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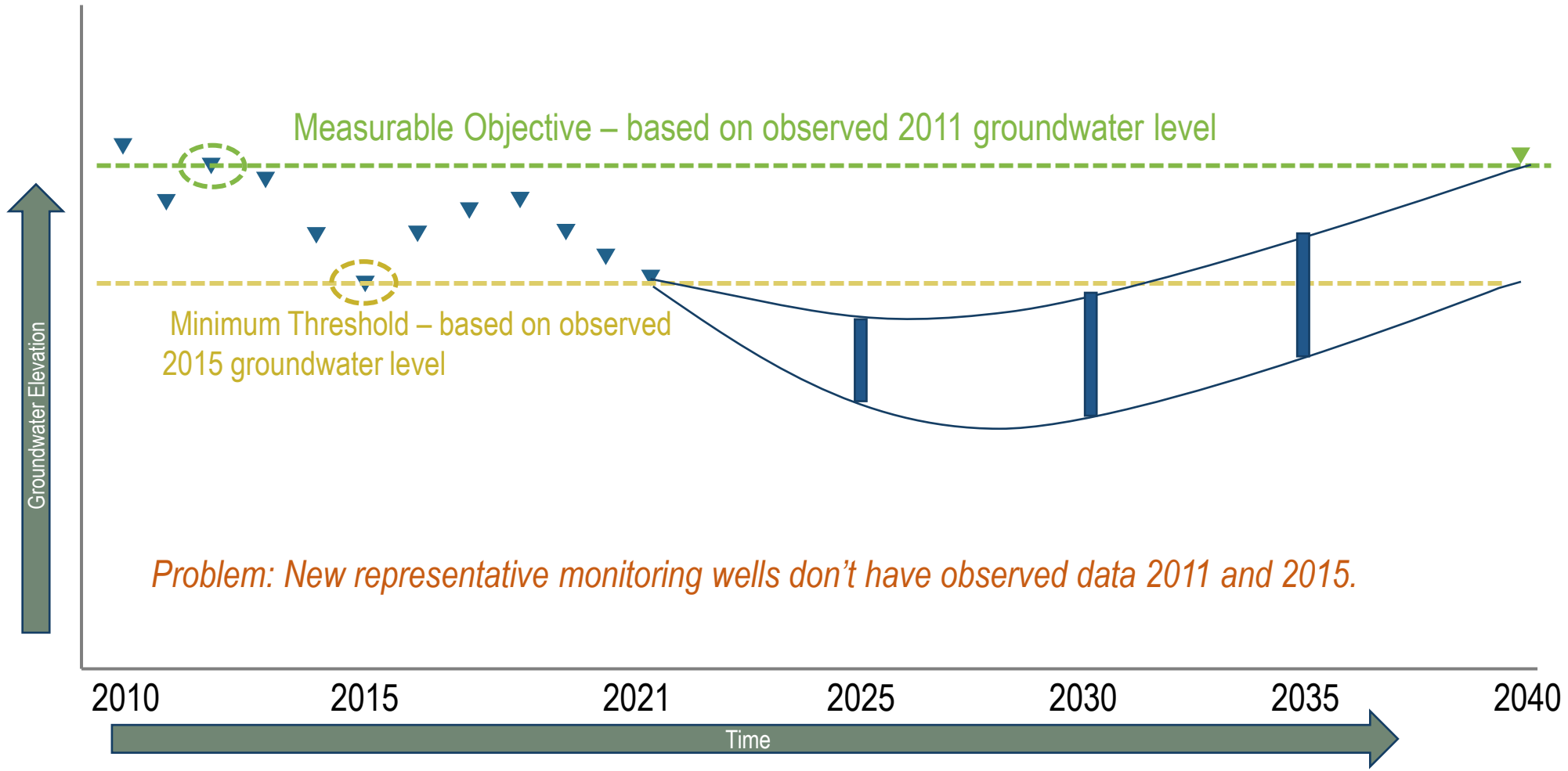
Existing Sustainable Management Criteria (SMC) for Groundwater Levels



Proposed Approach

- 2021 was a very dry year, associated with low groundwater levels, which can be correlated with the similarly dry conditions in 2015 (minimum threshold)
- 2023 was a very wet year, associated with higher groundwater levels, which can be correlated with the similarly wet conditions in 2011 (measurable objective)

1. Calculate the difference in estimated groundwater elevations from the model:
   a) [2021] – [2015]
   b) [2023] – [2011]
2. Add/subtract those calculated values to observed groundwater levels
   1. MT = [Observed 2021] – [2021-2015 difference]
   2. MO = [Observed 2023] + [2023-2011 difference]

- In the absence of actual historical data, this is meant to estimate historical conditions as closely as possible

Image courtesy Veronica Adrover/UC Merced

Example: Measurable Objective

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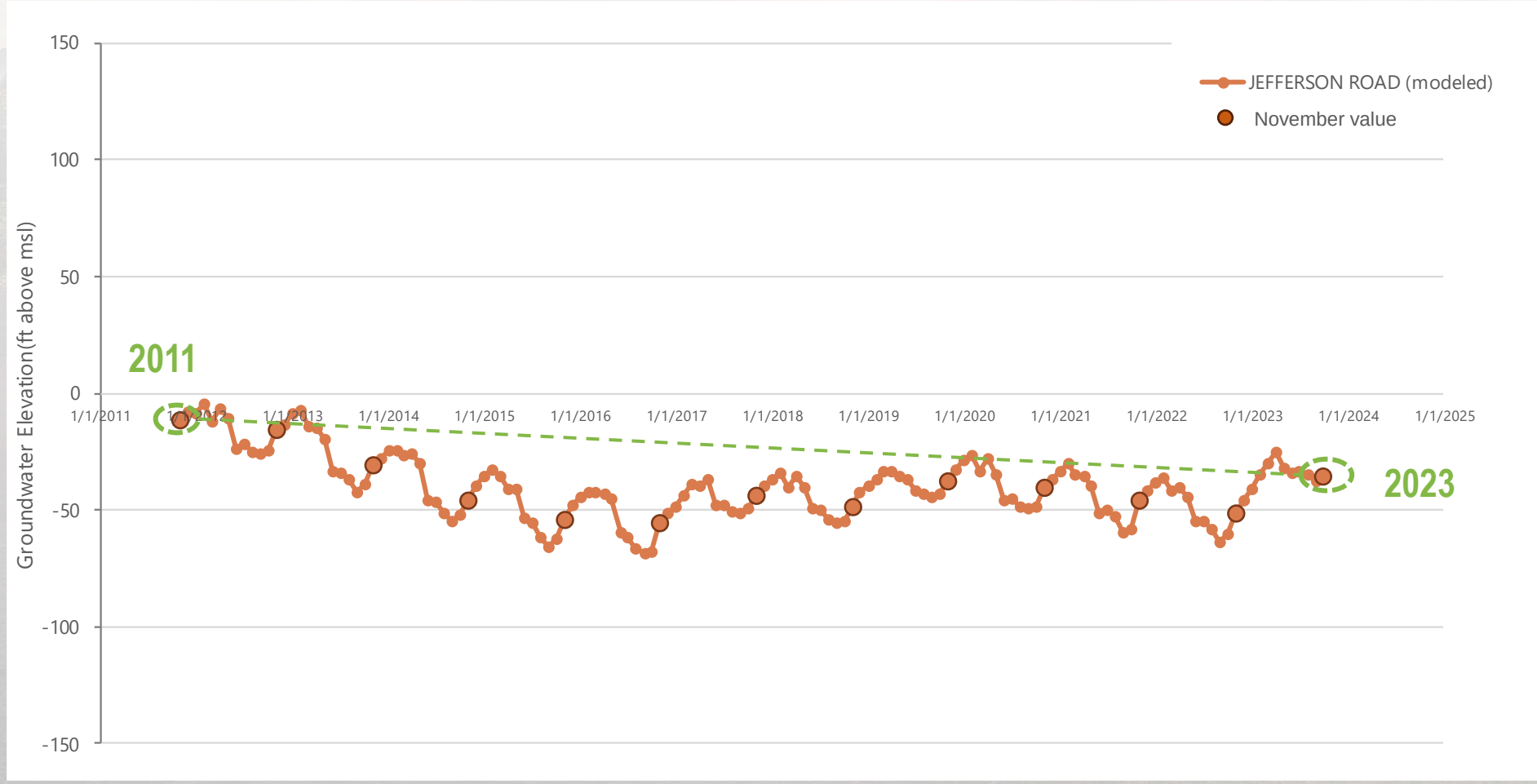
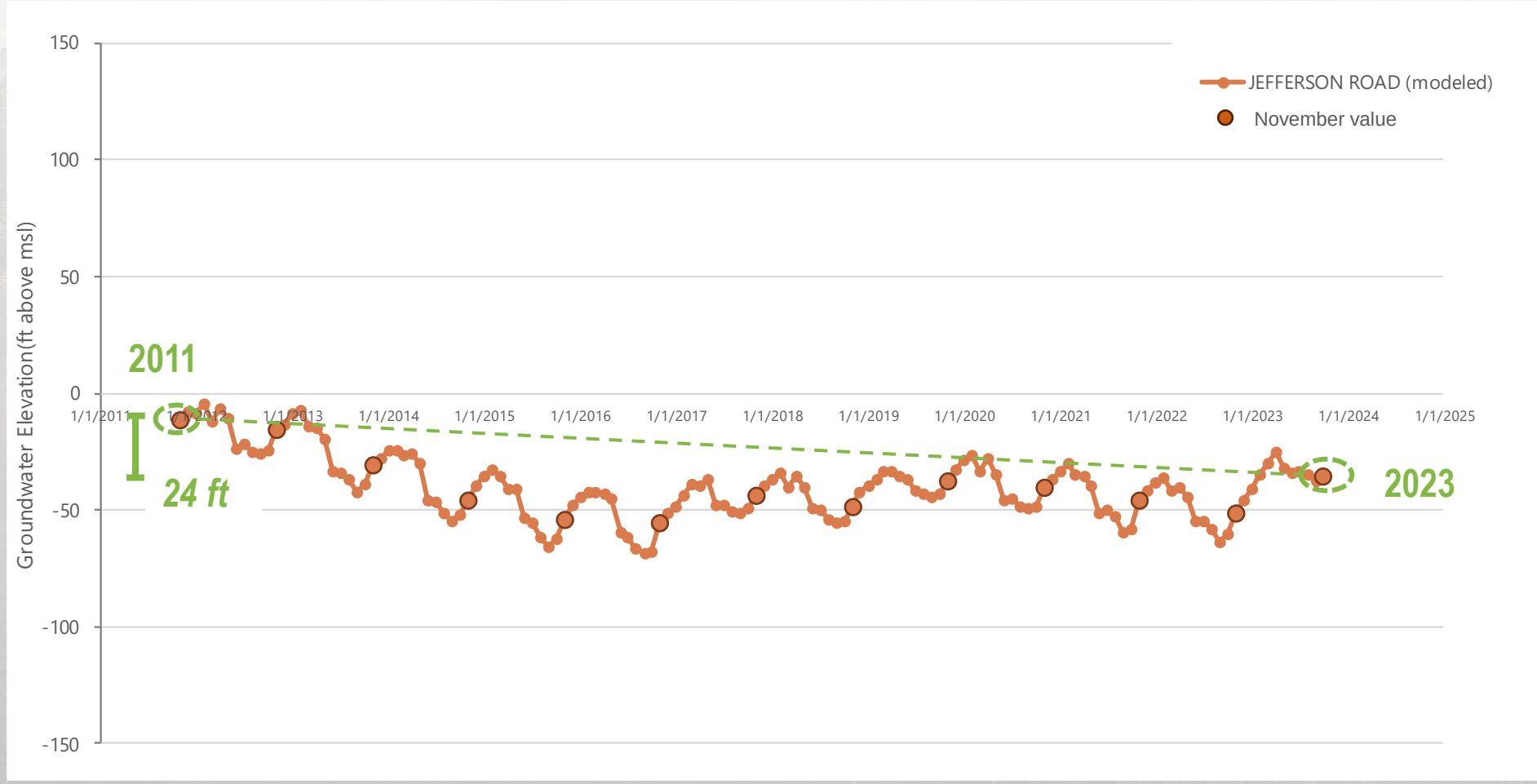
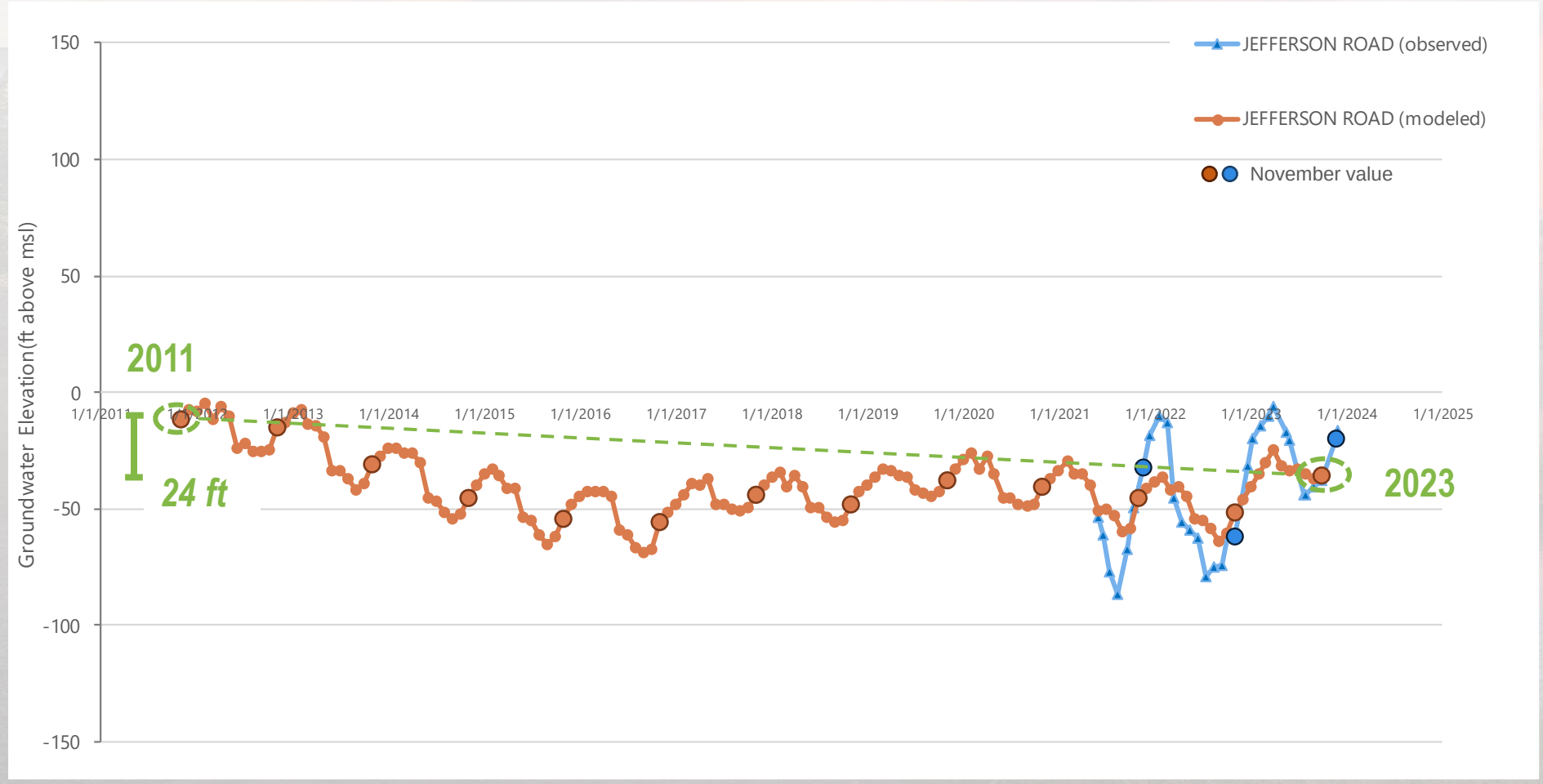


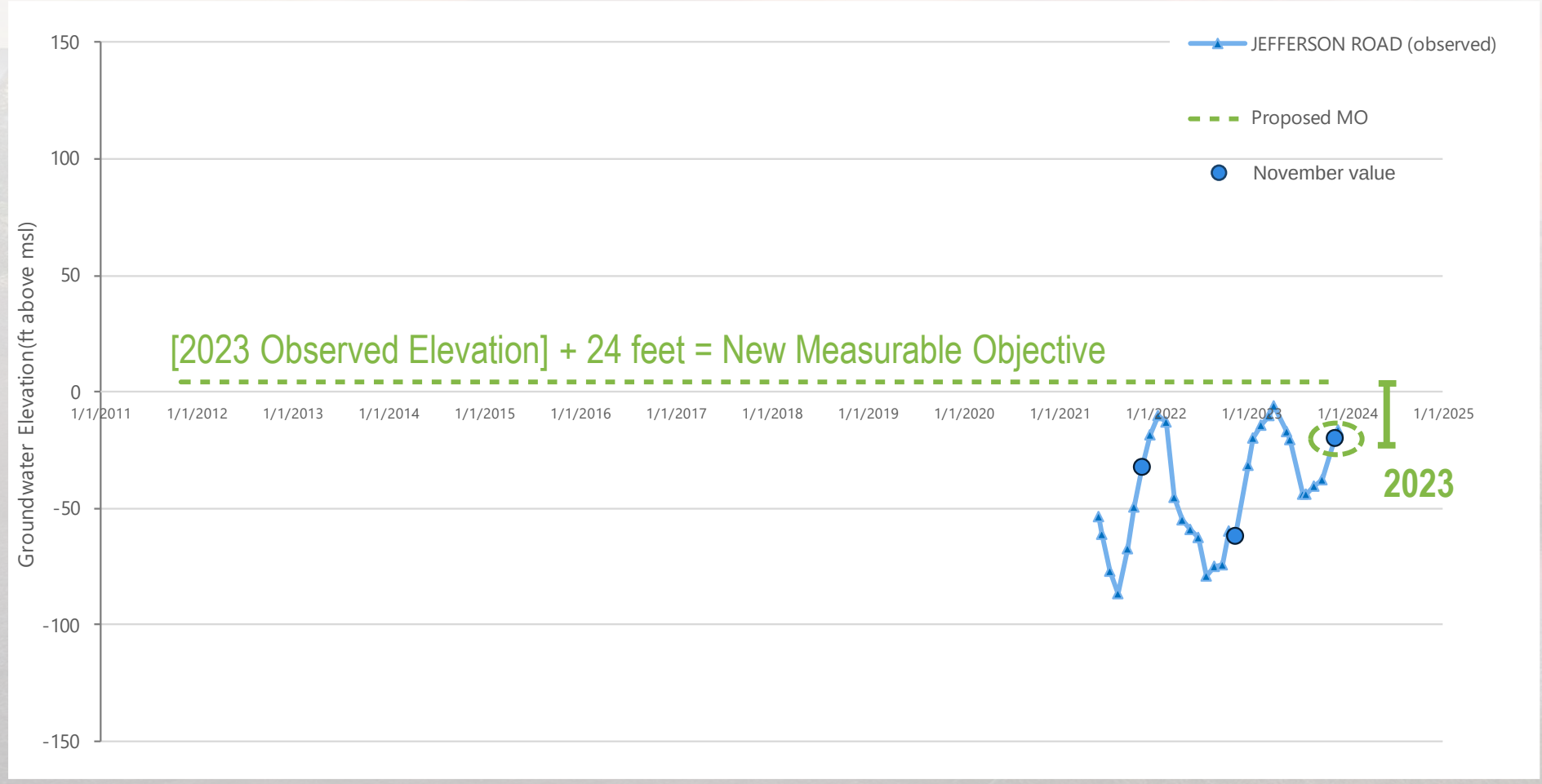
Example: Measurable Objective



Example: Measurable Objective



Example: Measurable Objective



Example: Minimum Threshold

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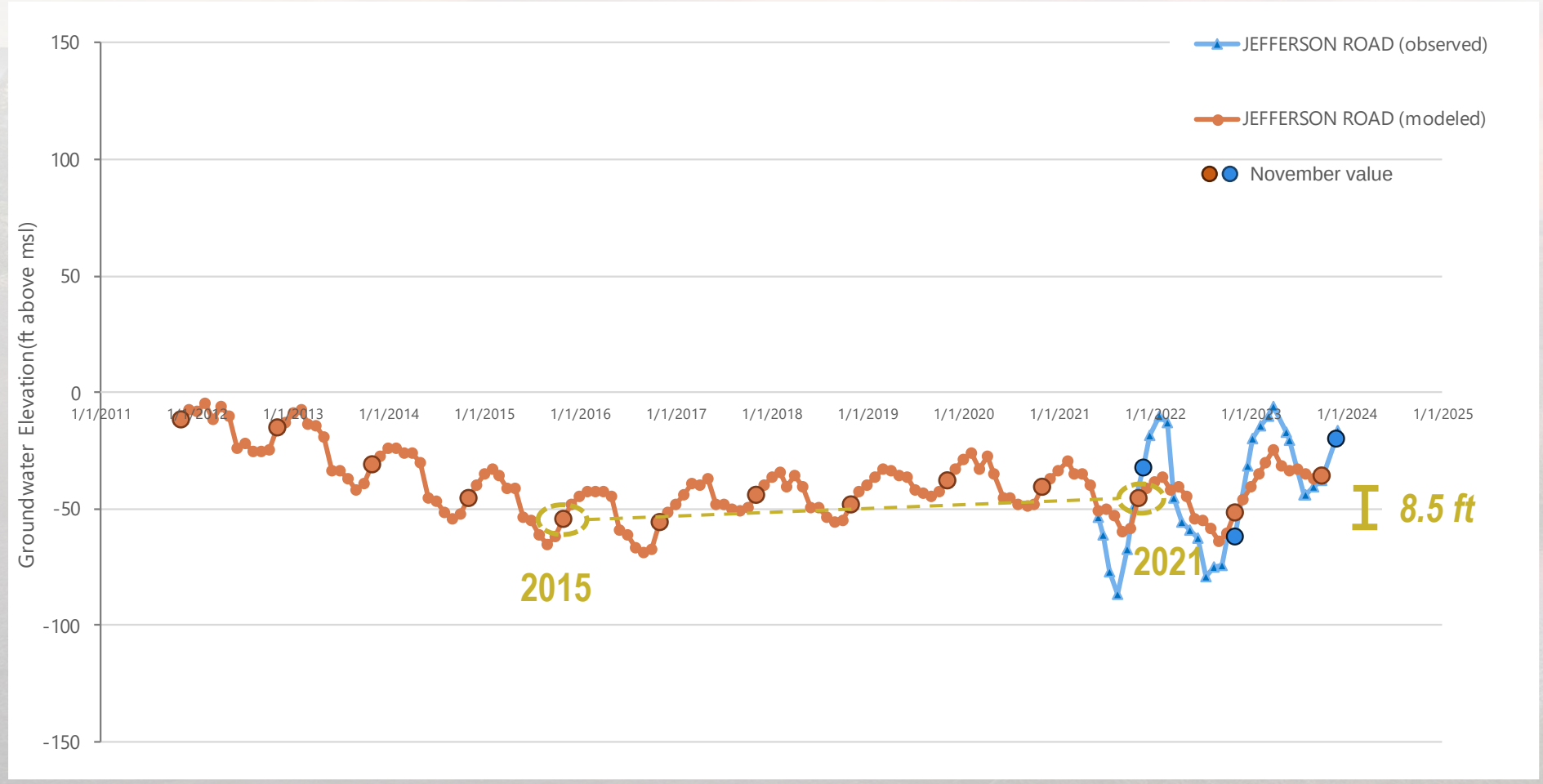
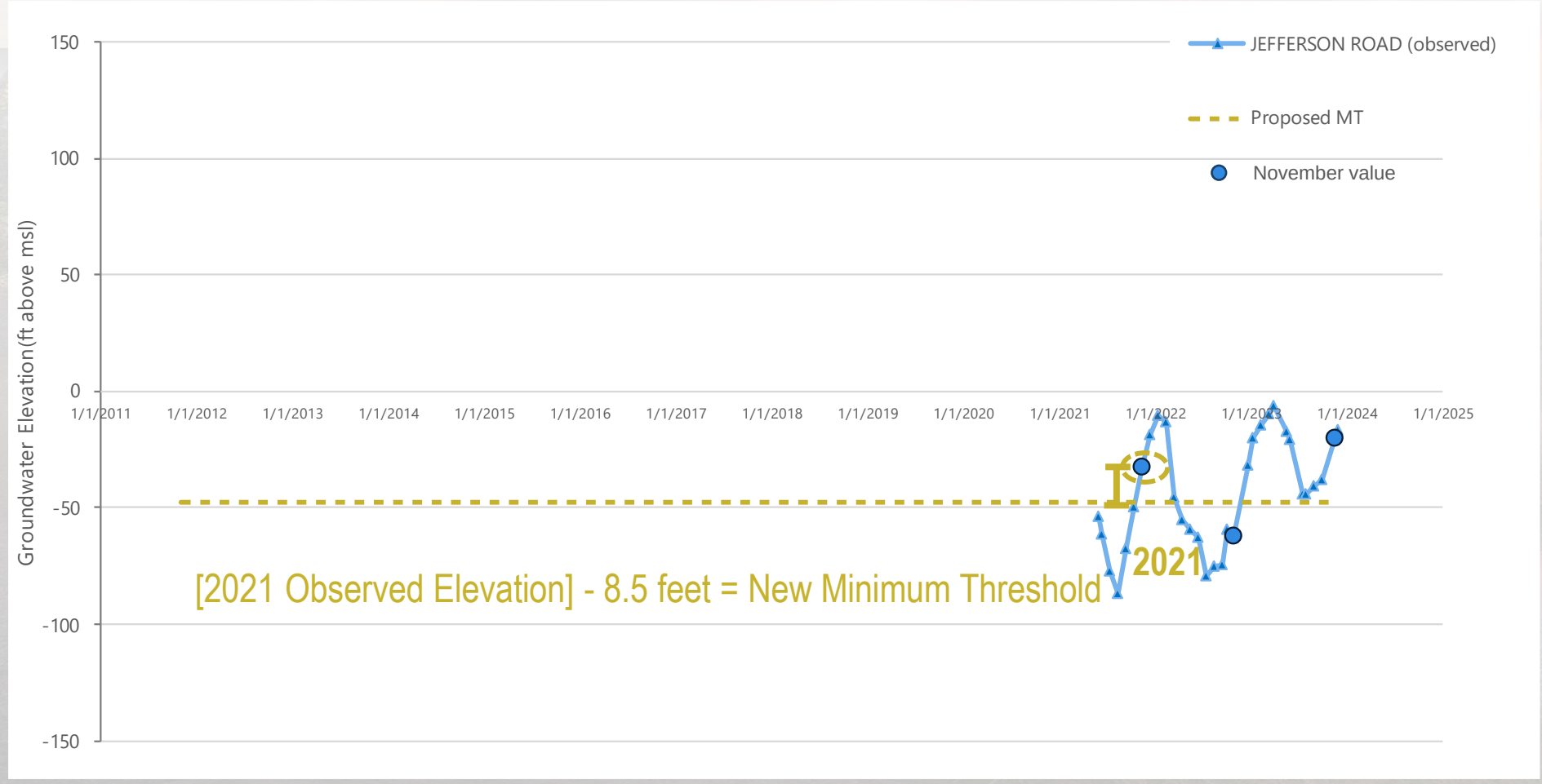
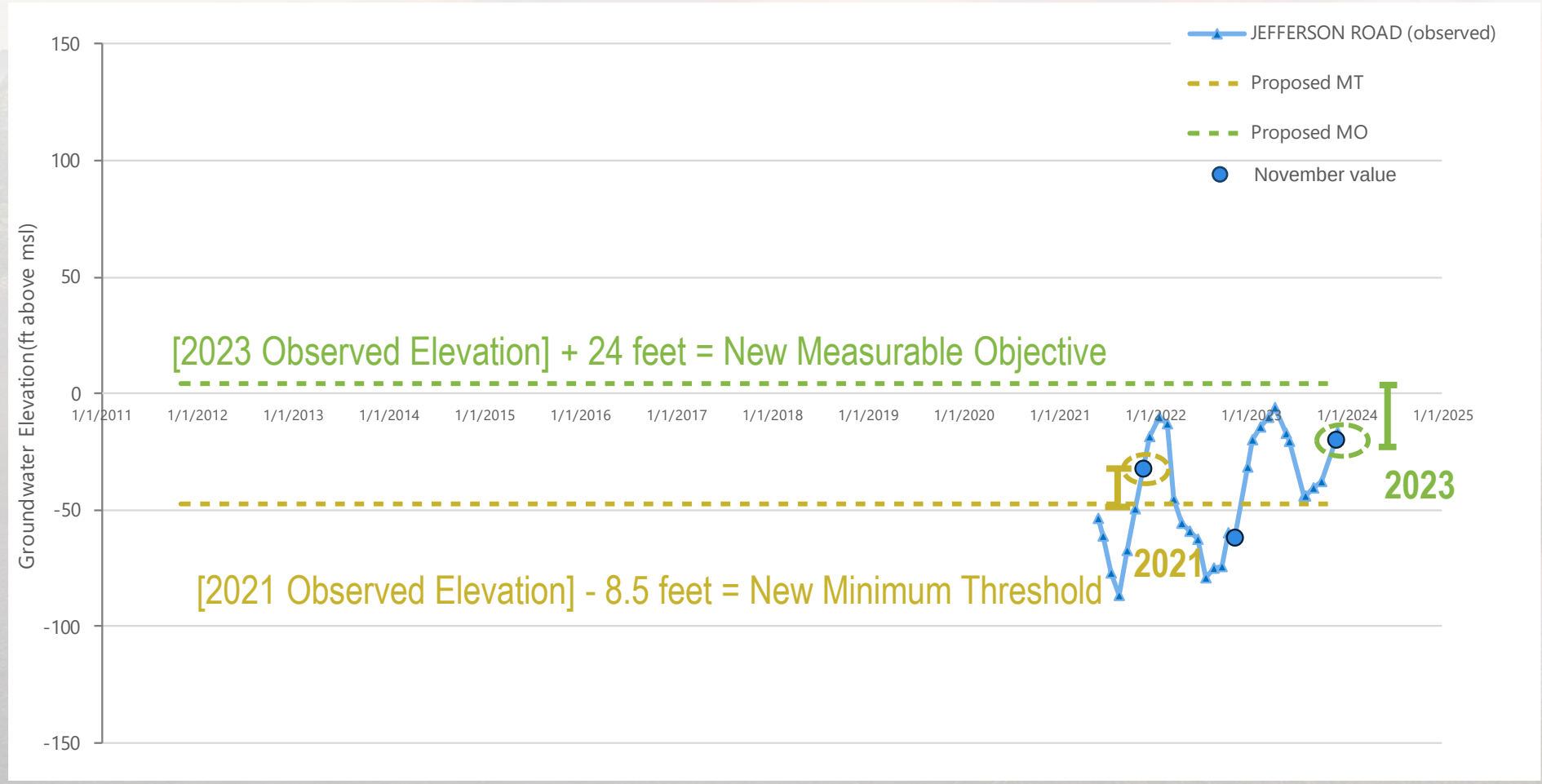


Example: Minimum Threshold

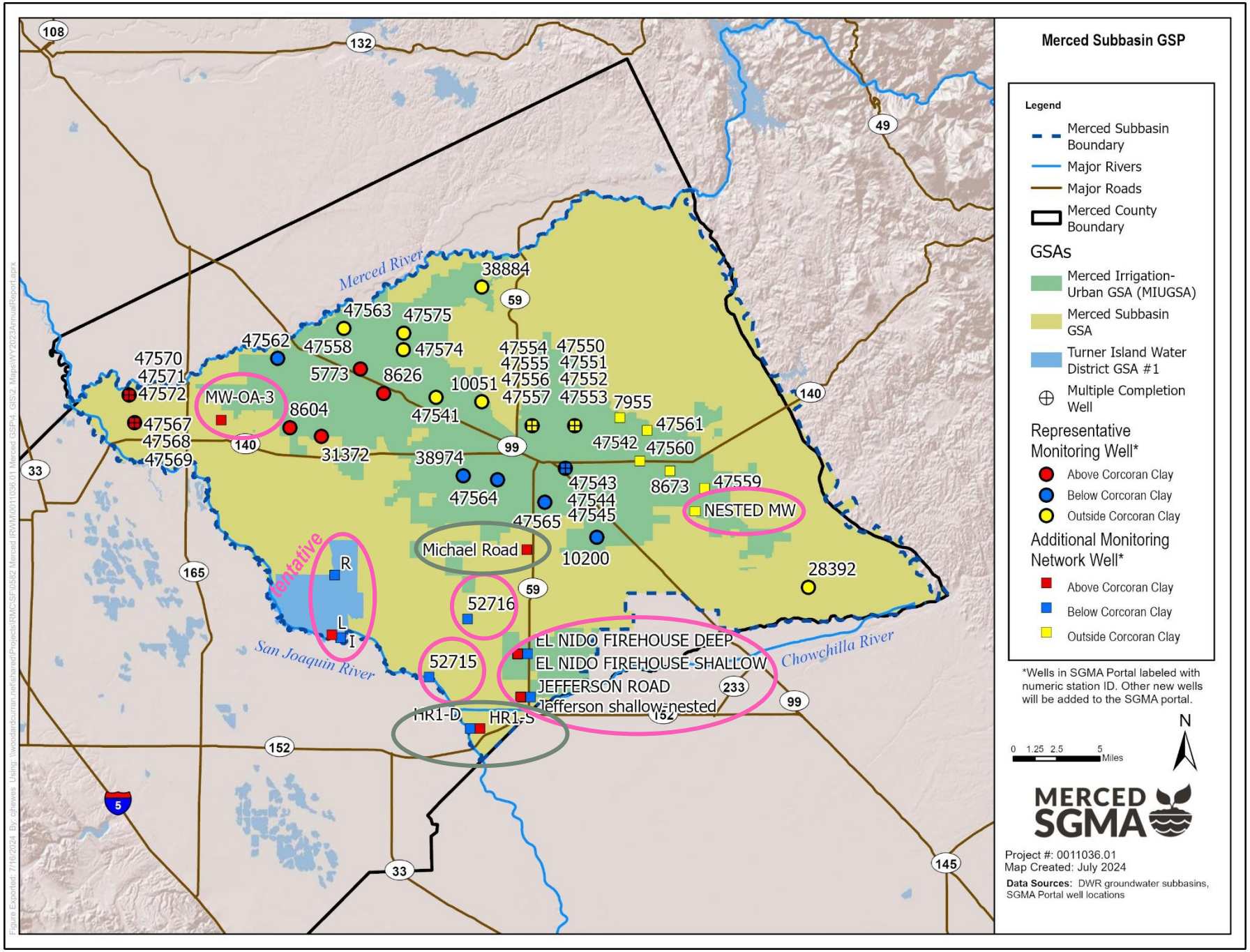


Example:


JEFFERSON ROAD (observed)
Proposed MT
Proposed MO
November value
Groundwater Elevation (ft above msl)
150
100
50
0
-50
-100
-150
1/1/2011
1/1/2012
1/1/2013
1/1/2014
1/1/2015
1/1/2016
1/1/2017
1/1/2018
1/1/2019
1/1/2020
1/1/2021
1/1/2022
1/1/2023
1/1/2024
1/1/2025
[2023 Observed Elevation] + 24 feet = New Measurable Objective
[2021 Observed Elevation] - 8.5 feet = New Minimum Threshold
2021
2023

New Representative Monitoring Wells

Too new, wait to collect more data



Draft Projected Conditions Baseline Conditions Model Outputs

Image courtesy: Veronica Adrover/UC Merced

MERCED SGMA

Presentation Roadmap

- Projected Conditions Baseline
- Project and Management Actions (PMAs)
  - Assumptions for Projects
  - Assumptions for Management Actions
  - Groundwater Budget
- Extra Considerations
- Climate Change Analysis (if time)

Projected Conditions Baseline

New and Updated Features

Land Surface System

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

Groundwater System

- Model Layering
- Aquifer Parameters

Differences from Historical Model

Hydrologic Conditions:

- 1969 through 2018
  - Stream Inflow, Precipitation and Evapotranspiration

Surface Water

- MercedSim

Land Use

- Held constant with latest data
  - DWR's Cropping Map – 2022

Boundary Conditions

- Subsurface flow at model boundary based on historical flows

Image courtesy: Veronica Adrover/UC Merced

Project and Management Actions

- Projects
  1. MID to Lone Tree Mutual Water Company Conveyance Canal
  2. El Nido Conveyance System Improvements
  3. LeGrand-Athlone Water District Intertie Canal (Phase 2)
  4. Vander Dussen Subsidence Priority Area Flood-MAR Project
  5. Vander Woude Storage Reservoir
  6. Crocker Dam Modification
  7. Turner Island Water District Water Conservation
  8. TIWD Shallow Well Drilling
  9. La Paloma Mutual Water Company G Ranch Groundwater Recharge etc.

- Management Actions
  1. Merced Subbasin GSA Allocation Program
  2. Merced Irrigation-Urban GSA Allocation Program

Image courtesy: Veronica Adrover/UC Merced

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Conclusions Preview

- Projects and Management Actions as outlined by the GSAs will positively impact groundwater aquifer conditions and achieve long-term sustainability
  - Total Yield of all projects
    - Projects → Yield of 35.2 TAFY
    - Management actions → Yield of 170 TAFY
  - Average Change in Storage (50-year average)
    - Baseline → -83.1 TAFY (reduction in storage)
    - PMAs → +5.7 TAFY (close to no net change in storage)
- Modeling results are dependent on neighboring subbasins and highlight the need for continued coordination

Image courtesy: Veronica Adrover/UC Merced

Projects (1 of 6)

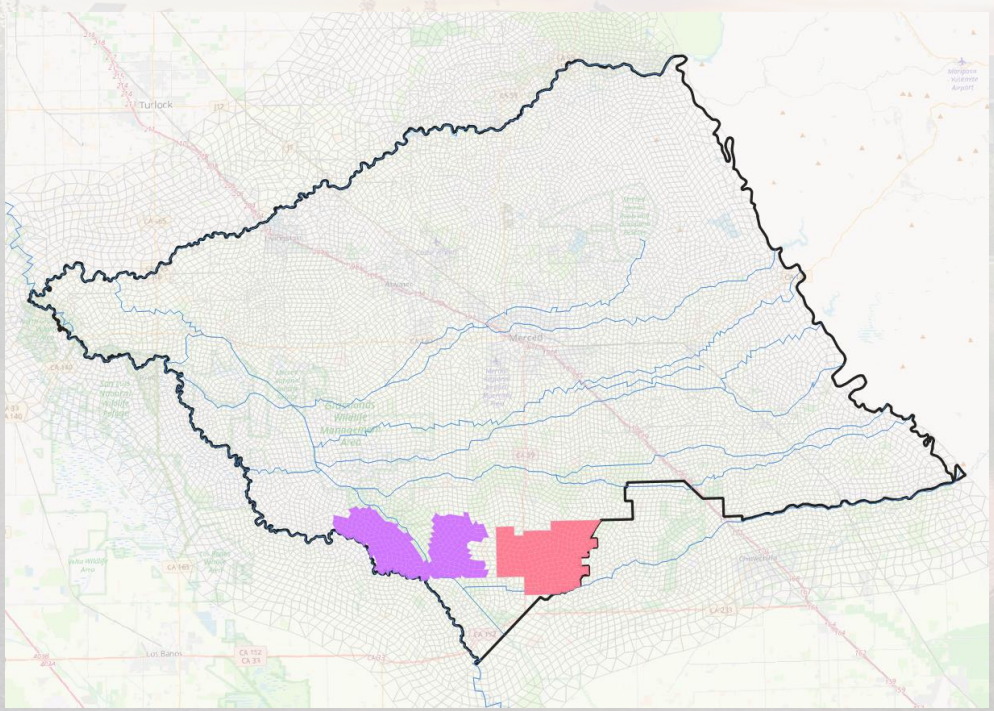

Image courtesy: Veronica Adrover/UC Merced

MID to Lone Tree MWC Conveyance Canal

- In-Lieu Recharge until 2035 (12 years)
- Maximum Capacity: 24,000 AFY
- From MID:
  - C: 1,000 AFY
  - D: 3,000 AFY
  - BN: 4,000 AFY
  - AN: 6,000 AFY
  - W: 8,000 AFY
  - **Avg: 4,700 AFY (1,340 AFY for 50 yr period)**

El Nido Conveyance System

- Direct Recharge
- From MID:
  - C: 0 AFY
  - D: 100 AFY
  - BN: 450 AFY
  - AN: 3,100 AFY
  - W: 5,400 AFY
  - **Avg: 2,300 AFY**

Projects (2 of 6)

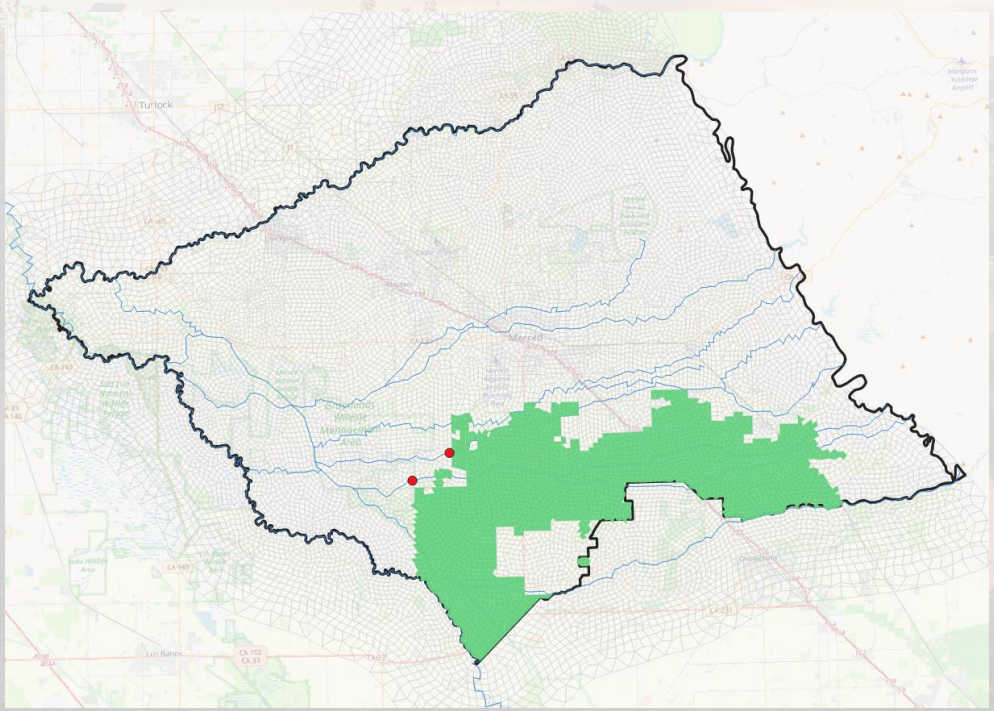

Image courtesy: Veronica Adrover/UC Merced

LeGrand-Athlone Intertie Canal

In-Lieu Recharge (until 2035 – 12 years)

- Maximum Capacity: 30,000 AFY
- From MID:
  - C: 760 AFY
  - D: 2,240 AFY
  - BN: 3,000 AFY
  - AN: 4,500 AFY
  - W: 6,000 AFY
  - **Avg: 3,500 AFY (1,000 AFY for 50 yr period)**

Direct Recharge

- From Mariposa Creek and Deadman's Creek
- Maximum Capacity: 15,840 AFY
- Assume 90/20 Rule for diversions
  - Mariposa Creek: 2,200 AFY
  - Deadman's Creek: 1,200 AFY
  - **Total: 3,400 AFY**

Projects (3 of 6)

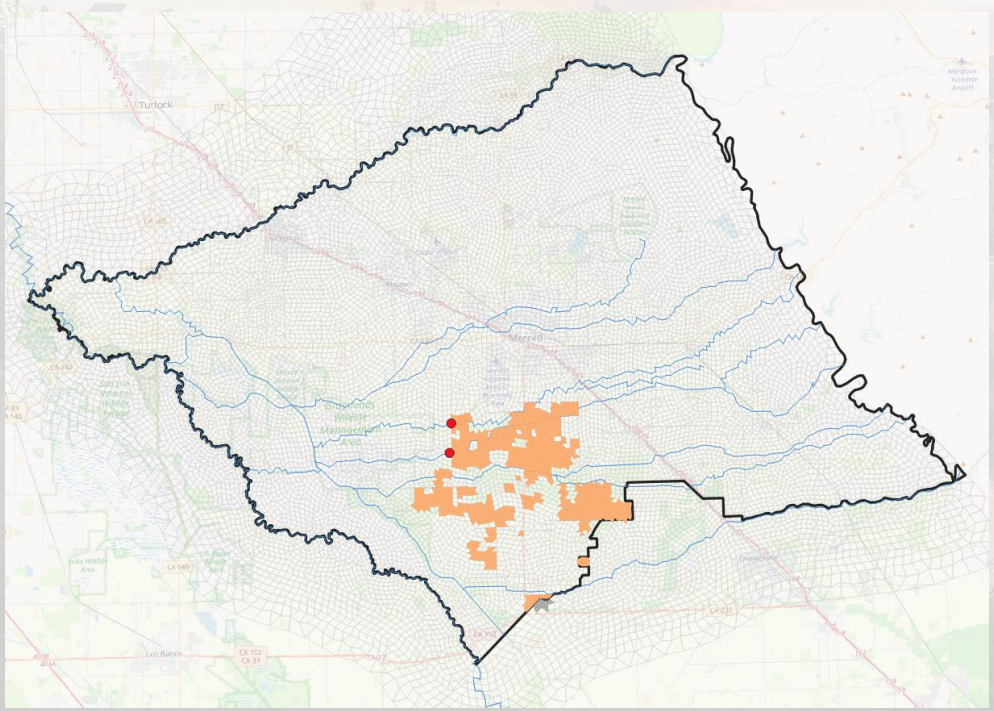

Image courtesy: Veronica Adrover/UC Merced

Vander Dussen Flood-MAR

- Direct Recharge
- Assume 90/20 Rule for diversion in Mariposa Ck
  - 2,200 AFY on average
- Delivery area – Sandy Mush + 300 ac in Madera County GSA

Vander Woude Storage Reservoir

- In-Lieu Recharge
- From Owens and Mariposa Creeks
  - 750 AFY for all year types
- Reduction of 30 ac. of irrigated land
  - ~ 80 AFY of yield

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Projects (4 of 6)

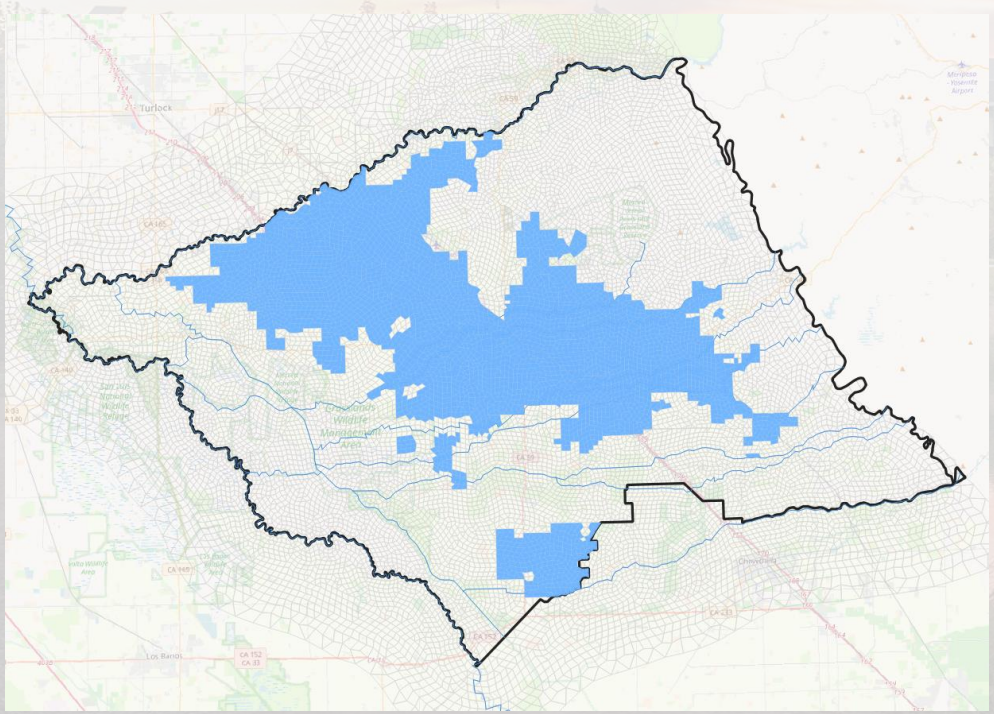

Image courtesy: Veronica Adrover/UC Merced

Crocker Dam Modification

In-Lieu Recharge

- From MID:
  - C: 0 AFY
  - D: 0 AFY
  - BN: 0 AFY
  - AN: 12,000 AFY
  - W: 12,000 AFY
  - **Avg: 5,760 AFY**

Direct Recharge

- From MID:
  - C: 0 AFY
  - D: 0 AFY
  - BN: 4,000 AFY
  - AN: 20,000 AFY
  - W: 20,000 AFY
  - **Avg: 9,920 AFY**

Projects (5 of 6)

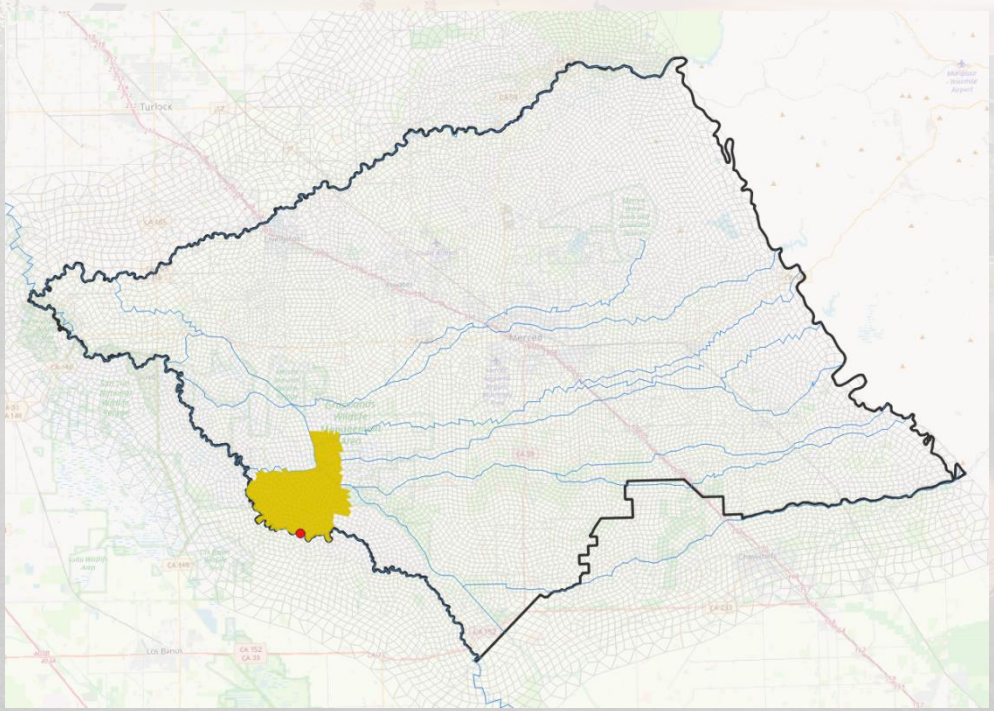

Image courtesy: Veronica Adrover/UC Merced

TIWD Water Conservation

- In-Lieu Recharge
- From San Joaquin River:
  - C: 1,500 AFY
  - D: 1,500 AFY
  - BN: 1,500 AFY
  - AN: 1,500 AFY
  - W: 2,500 AFY
  - **Avg: 1,840 AFY**

TIWD Shallow Well Drilling

- Modify screen depth for two wells (P and G) to pump at shallower depths – above the Corcoran clay
  - Average of 1,500 AFY

Projects (6 of 6)

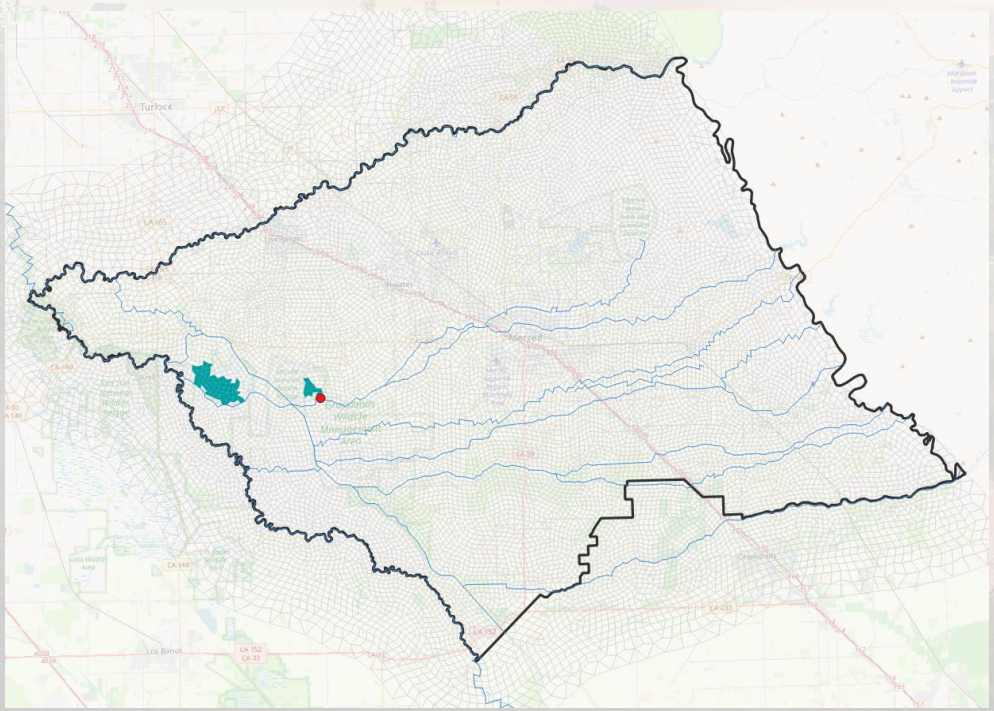

Image courtesy: Veronica Adrover/UC Merced

La Paloma MWC G Ranch Recharge Project

- Direct Recharge
- From Bear Creek **1,800 AFY** all years
- Reduction of 169 ac. of irrigated land
  - ~ 450 AFY of yield

Projects - Summary

Project	In-Lieu Recharge	Direct Recharge	Land Reduction*	Total Yield (AFY)
MID to LTMWC	1,300	0	0	**1,300**
El Nido Conveyance Improvements	0	2,300	0	**2,300**
LeGrand-Athlone Intertie Canal	1,000	3,400	0	**4,400**
Vander Dussen Flood-MAR	0	2,200	0	**2,200**
Vander Woude Storage Reservoir	700	0	100	**800**
Crocker Dam Modification	5,800	9,900	0	**15,700**
TIWD Water Conservation	1,800	0	0	**1,800**
La Paloma Mutual Water Company Project	0	1,800	500	**2,300**
MID out of district	4,400	0	0	**4,400**
Total	**15,000**	**19,700**	**600**	**35,200**

Image courtesy: Veronica Adrover/UC Merced

* Assume 2.7 ft / acre of yield

Management Actions – Pumping Allocation Programs

Allocation Programs

- MIUGSA
  - 1.1 AF/ac per year over three years
- MSGSA
  - Discretized in Sustainability Zones
  - Sustainable Yield of Native Groundwater (SY)
    - 13 inches per acre
  - Additional Pumping Allowance (APA)
    - 11 inches per acre
    - Decreases to zero in 10 years
    - Unless GSP groundwater levels are achieved

Model Results

- Baseline with Projects incorporated
- MIUGSA
  - 0.88 AF/ac of CU of groundwater
- MSGSA
  - 1.95 AF/ac of CU of groundwater
- TIWD
  - 0.97 AF/ac of CU of groundwater

$$CU_{GW} = ETAW \times \frac{GW\ Pumping}{GW\ Pumping + SW\ Deliveries}$$

Image courtesy: Veronica Adr[illegible]r/UC Merced

CU_{GW} = Consumptive use of groundwater
ETAW = evapotranspiration of applied water

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Management Actions – MSGSA Allocation Program

- Estimated consumptive use of groundwater (CU) for each zone
  - Long term avg. CU of each zone was compared against allocation (SY + APA)
- Land Reduction is the functional method used to model water allocation
- For each zone, land reduction was estimated as:

$$Land\ Reduction_{WY} = 1 - \frac{Allocation_{WY}}{Avg\ CU}$$

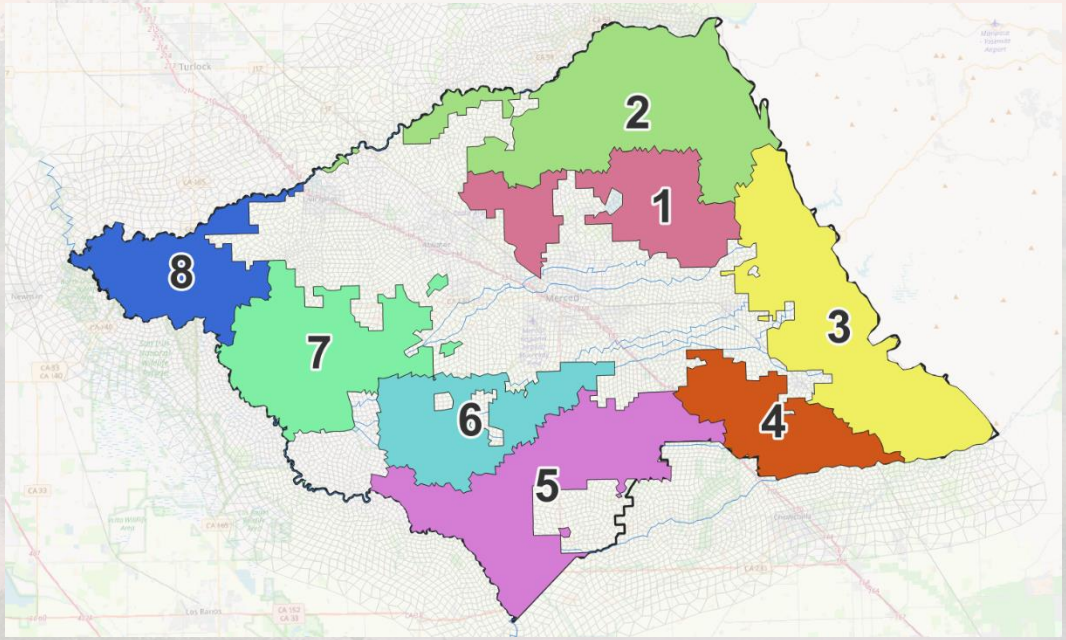

Image courtesy: Veronica Adrover/UC Merced

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Management Actions – MSGSA Allocation Program

- Assumptions
  - CU is estimated as long-term average for each sustainable zone
  - All zones have the same allocation depths
  - No check with Groundwater Levels against MTs
  - 13 in. allocation is held constant for last 39 years of simulation

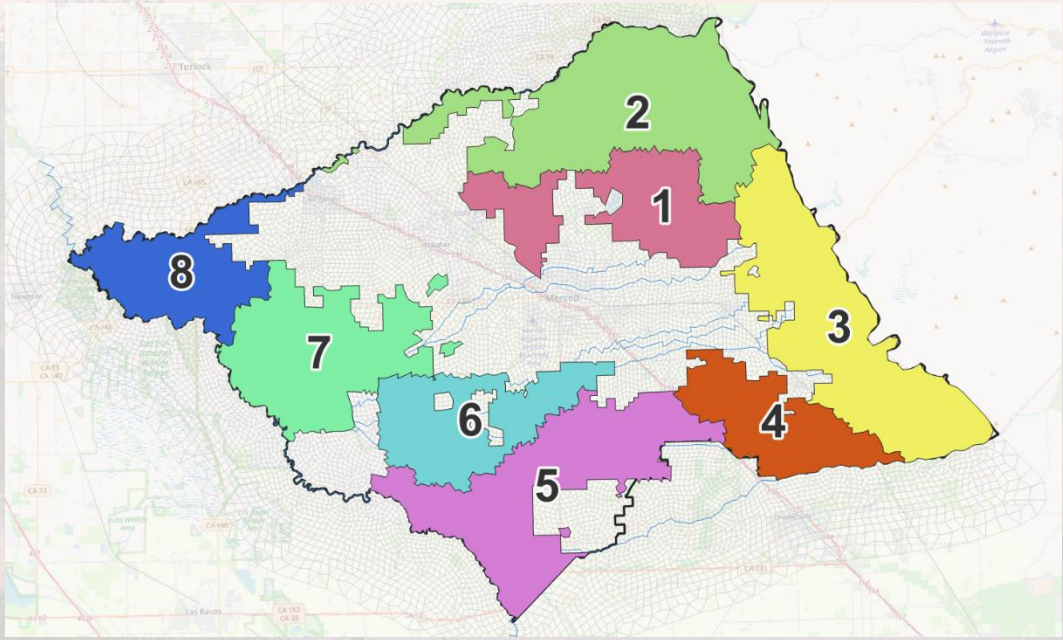

Image courtesy: Veronica Adrover/UC Merced

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Management Actions – MSGSA Allocation Program

Example

- Avg CU: 28.42 in
- WY 2024
  - Allocation: 24 in
  - Land Reduction = 1 – 24/28.42 = 16%
- WY 2025
  - Allocation: 23 in
  - Land Reduction = 1 – 23/28.42 = 19%
- WY 2035
  - Allocation: 13 in
  - Land Reduction = 1 – 13/28.42 = 54%

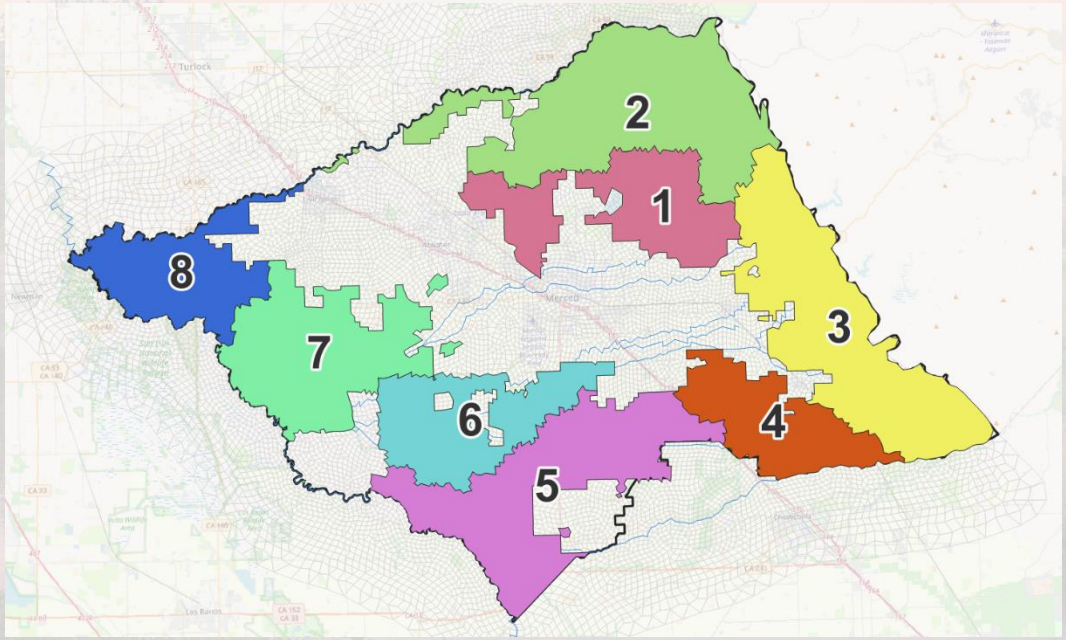
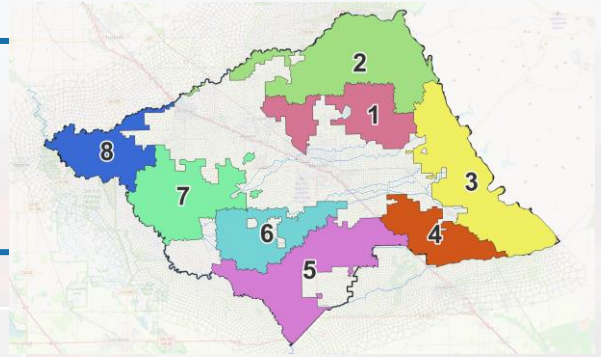


Image courtesy: Veronica Addyor/UC Merced

$$Land\ Reduction_{WY} = 1 - \frac{Allocation_{WY}}{Avg\ CU}$$

Management Actions – MSGSA Allocation Program



		Sustainability Zones – Land Reduction							
WY	Allocation (inches)	1	2	3	4	5	6	7	8
2024	24	15%	18%	1%	16%	2%	0%	0%	0%
2025	23	18%	22%	5%	19%	6%	0%	0%	0%
2026	22	22%	25%	9%	23%	10%	0%	0%	0%
2027	21	25%	29%	14%	26%	14%	0%	0%	0%
2028	20	29%	32%	18%	30%	19%	0%	4%	0%
2029	19	33%	35%	22%	33%	23%	5%	9%	0%
2030	18	36%	39%	26%	37%	27%	10%	14%	0%
2031	17	40%	42%	30%	40%	31%	15%	18%	0%
2032	16	43%	46%	34%	44%	35%	20%	23%	3%
2033	15	47%	49%	38%	47%	39%	25%	28%	9%
2034	14	50%	52%	42%	51%	43%	30%	33%	15%
2035 - 2073	13	54%	56%	46%	54%	47%	35%	38%	21%
Base CU (inches)		28.2	29.4	24.3	28.4	24.6	20.1	20.8	16.4

Groundwater Budget with PMAs

Component	Baseline	PMAs	Difference
Deep Percolation	343,300	308,600	-34,700
Stream Seepage	209,700	134,200	-75,500
On-Farm and Canal Recharge	140,300	160,100	+19,800
Inflow from Foothills	8,000	8,000	0
Groundwater Pumping	-721,900	-539,300	+182,600
Inflow/Outflow to Adjacent Areas	-62,400	-66,000	-3,600
Turlock	-27,200	-28,000	-800
Chowchilla	-41,300	-43,200	-1,900
Delta-Mendota	+6,100	+5,200	-900
Reduction in Storage	**83,100**	**-5,700**	**-88,800**

PMAs achieve increase in storage

Groundwater Budget with PMAs

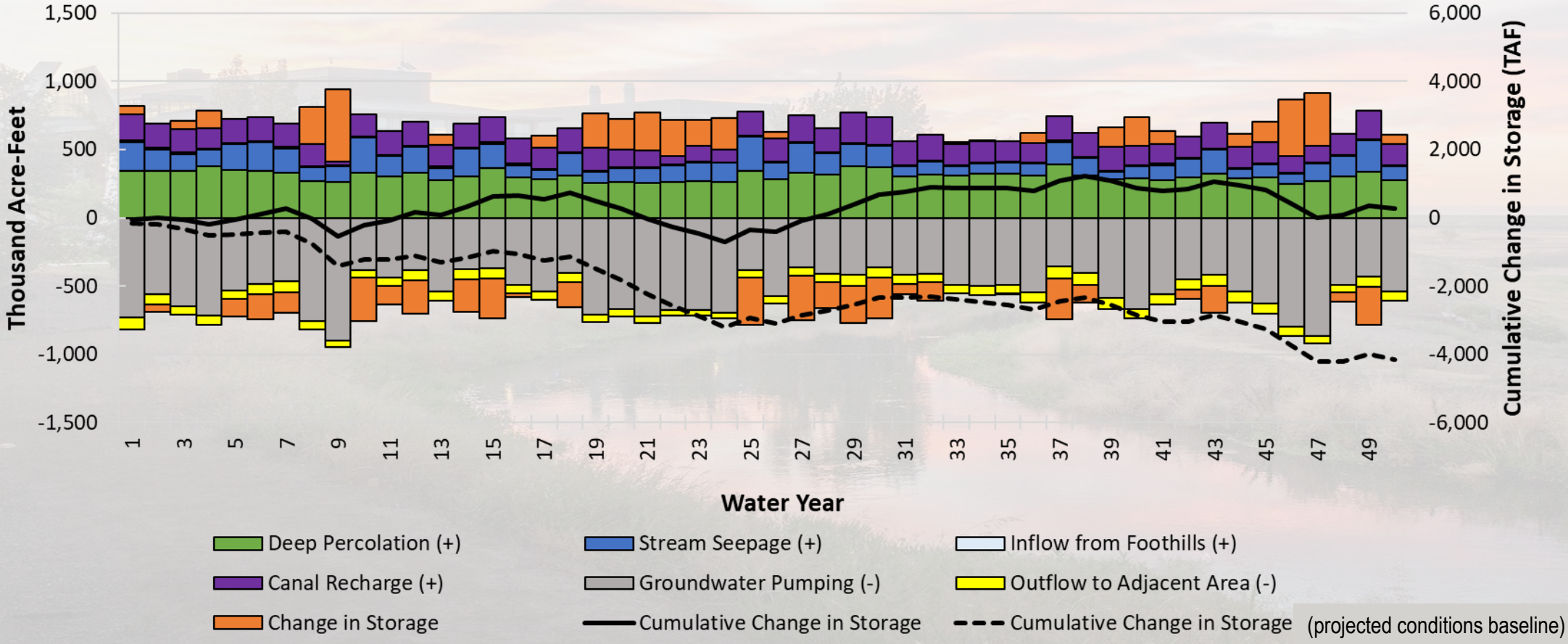
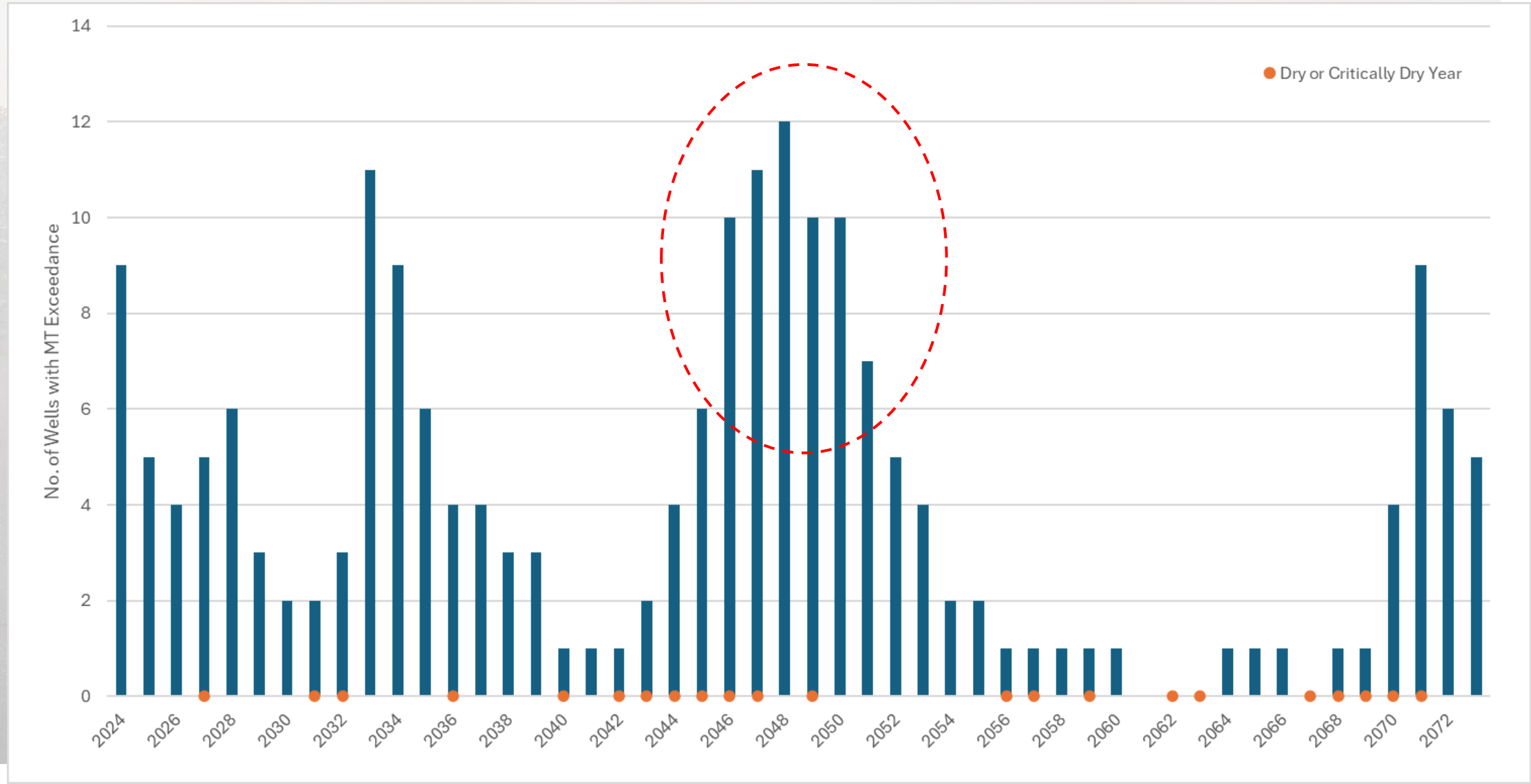


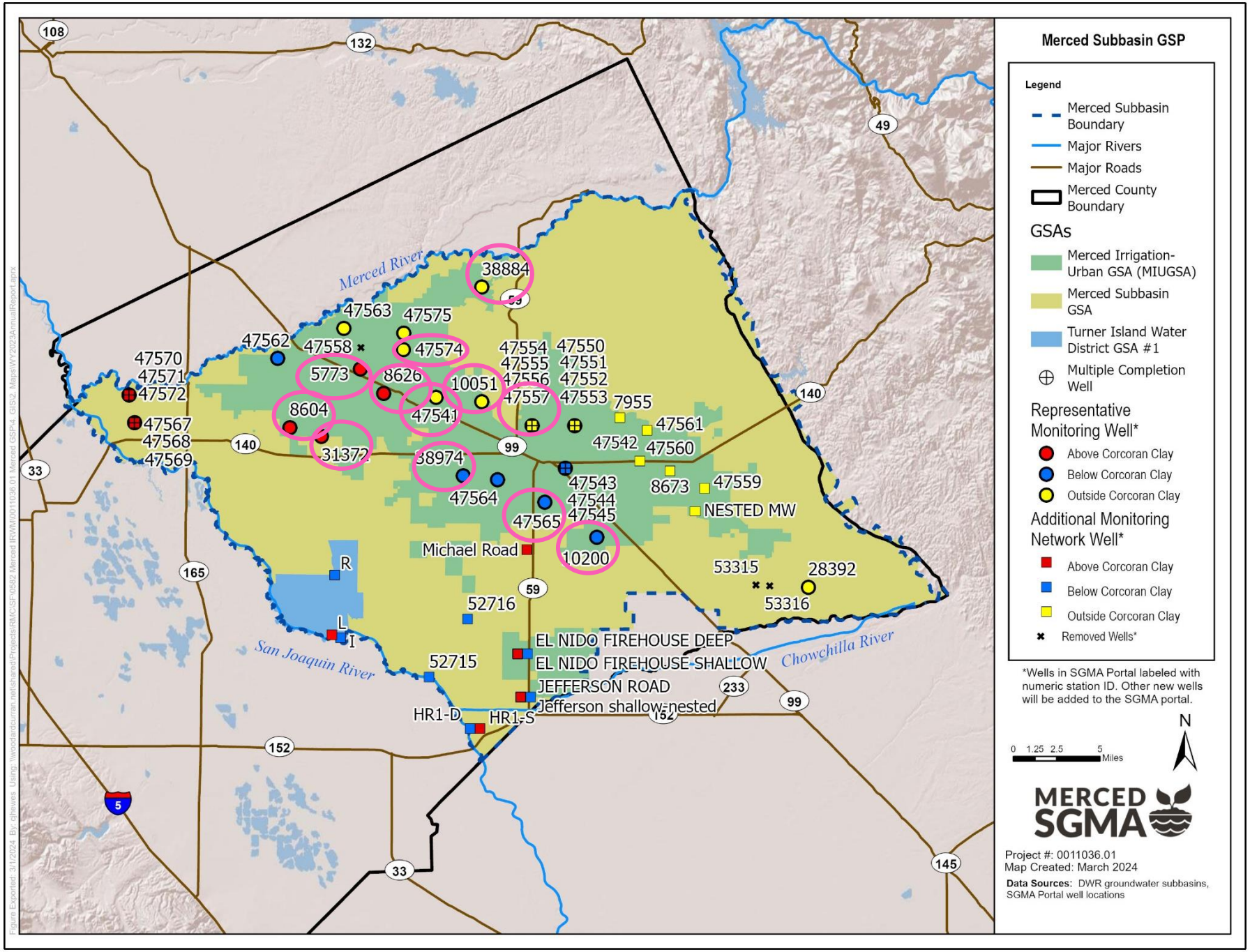
Image courtesy: Veronica Adrover/UC Merced

Minimum Threshold Exceedances

…when Nov. levels at >25% of representative monitoring wells (6 of 21) fall below their minimum thresholds for two consecutive years."



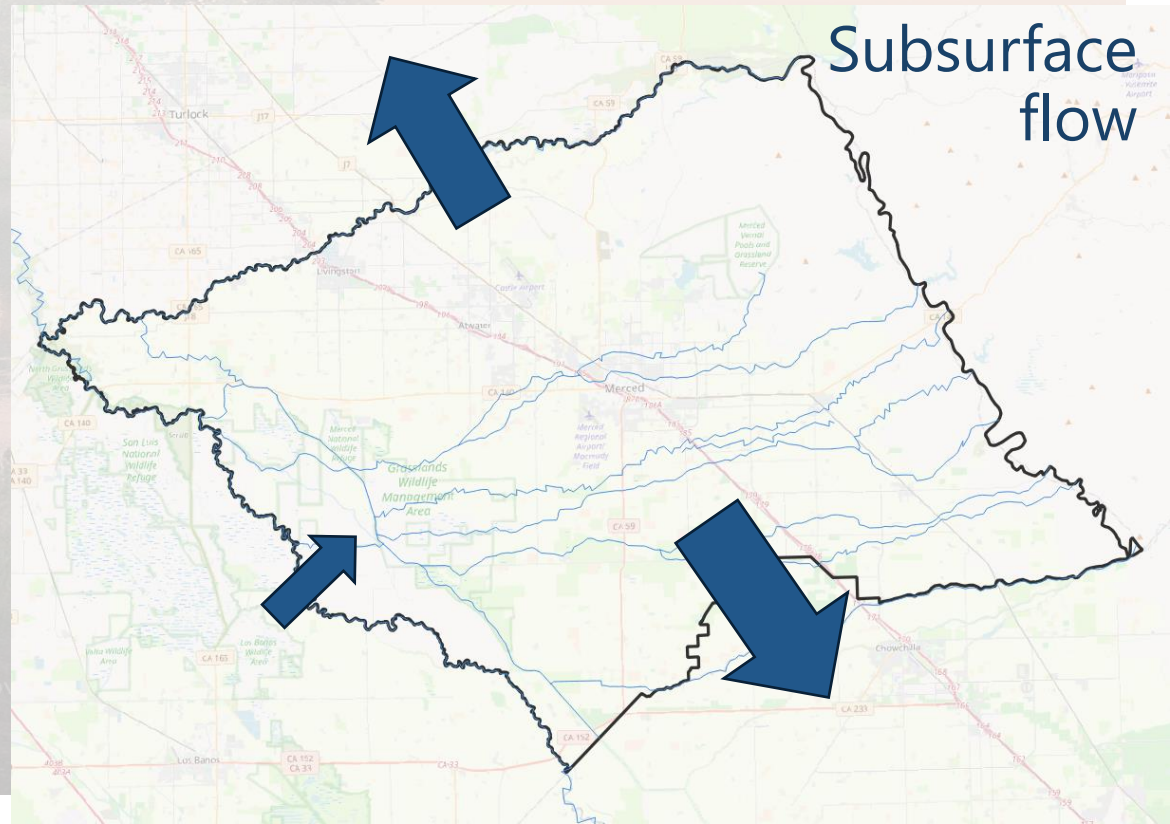
Locations of potential MT exceedances in 2048



Extra Considerations – Boundary Conditions

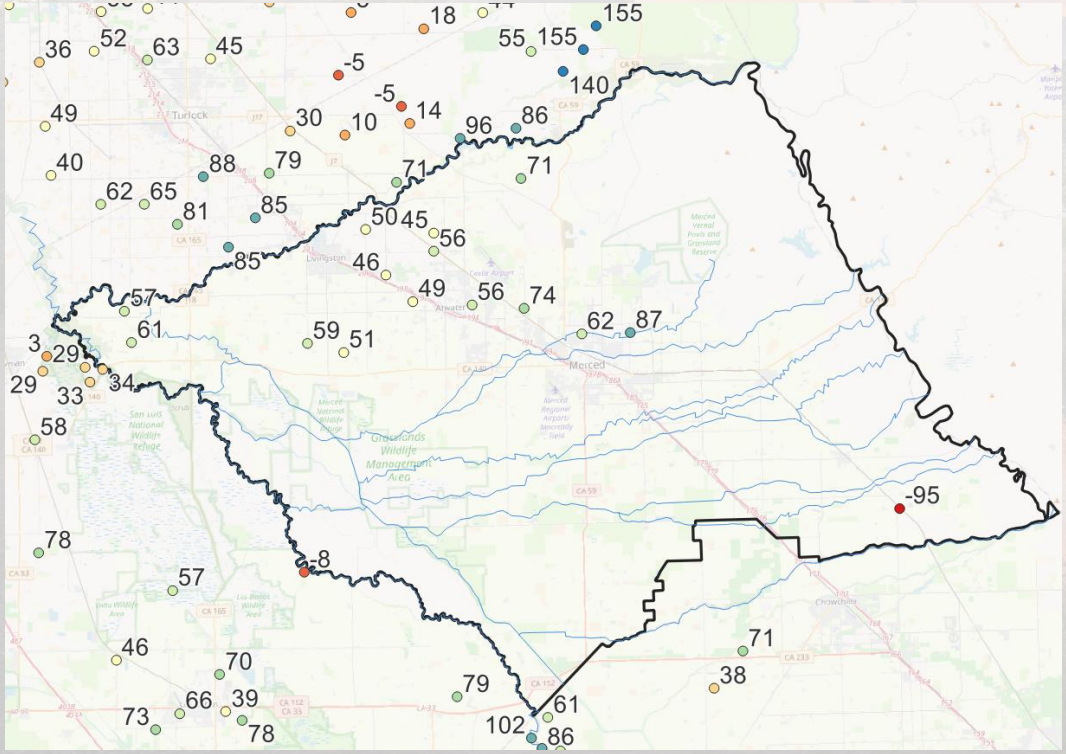
- The model is sensitive to boundary conditions
  - Significant uncertainty on how the neighboring basins are going to be operated
- Two different boundary conditions evaluated for the PMAs scenario:

1. Consistent flow – maintain historical subsurface flows between subbasins
   - Assumes neighboring subbasins manage groundwater levels similarly to Merced
   - Results in change in storage of +5,700 AFY (presented a few slides earlier)
2. Specified groundwater levels – based on Minimum Thresholds (i.e., groundwater levels remain deep/low)
   - More subsurface outflow compared to historical conditions
   - Results in change in storage of -22,400 AFY

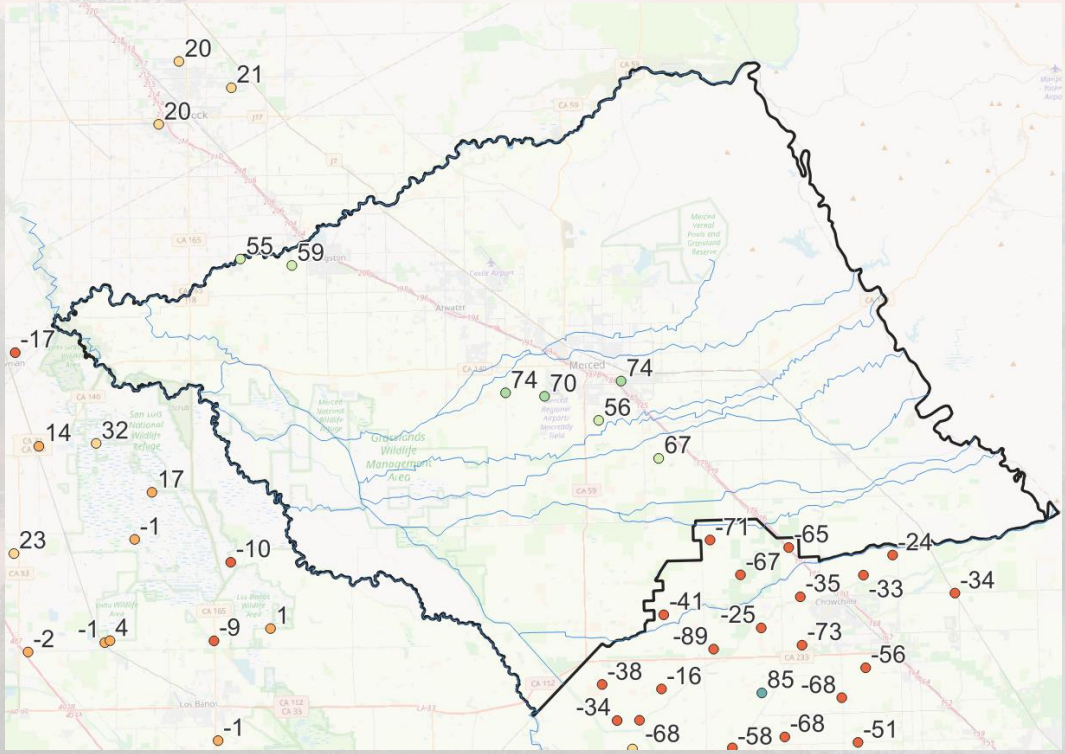


Boundary Conditions – Minimum Threshold Elevations across subbasins

Above and Outside CC principal aquifers



Below CC principal aquifer



Most portions of neighboring subbasins have substantially lower minimum thresholds.

MERCED SGMA

Conclusion

- MercedWRM – PMAs
  - Projects and Management Actions as outlined by the GSAs will positively impact groundwater aquifer conditions and achieve long-term sustainability
  - Total Yield of all projects
    - Projects → Yield of 35.2 TAFY
    - Management actions → Decrease of 62,800 acres of irrigated land → Yield of 170 TAFY
  - Average Change in Storage (50-year average)
    - Baseline → -83.1 TAFY
    - PMAs → +5.7 TAFY
- Interbasin Coordination
  - Subbasins are interdependent to achieve long-term groundwater sustainability
  - Recommend continued coordination with neighboring subbasins

Image courtesy: Veronica Adrover/UC Merced

MERCED SGMA

2070 Climate Change Scenario

Assumptions

(No Change from 2020 GSP methodology)

- Climate Change Factors – 2070 central tendency from DWR
  - Climate period analysis between Jan 1915 and Dec 2011
    - Use proxy years for 2012 – 2018
  - DWR's VIC model grid translated into MercedWRM grid
- Precipitation ~ 4% increase
- Evapotranspiration ~ 8% increase
- Stream Inflows
  - Regulated (Merced, Chowchilla, San Joaquin)
  - Unregulated (Bear, Owens, Mariposa)
- Surface water supply ~ <1% increase

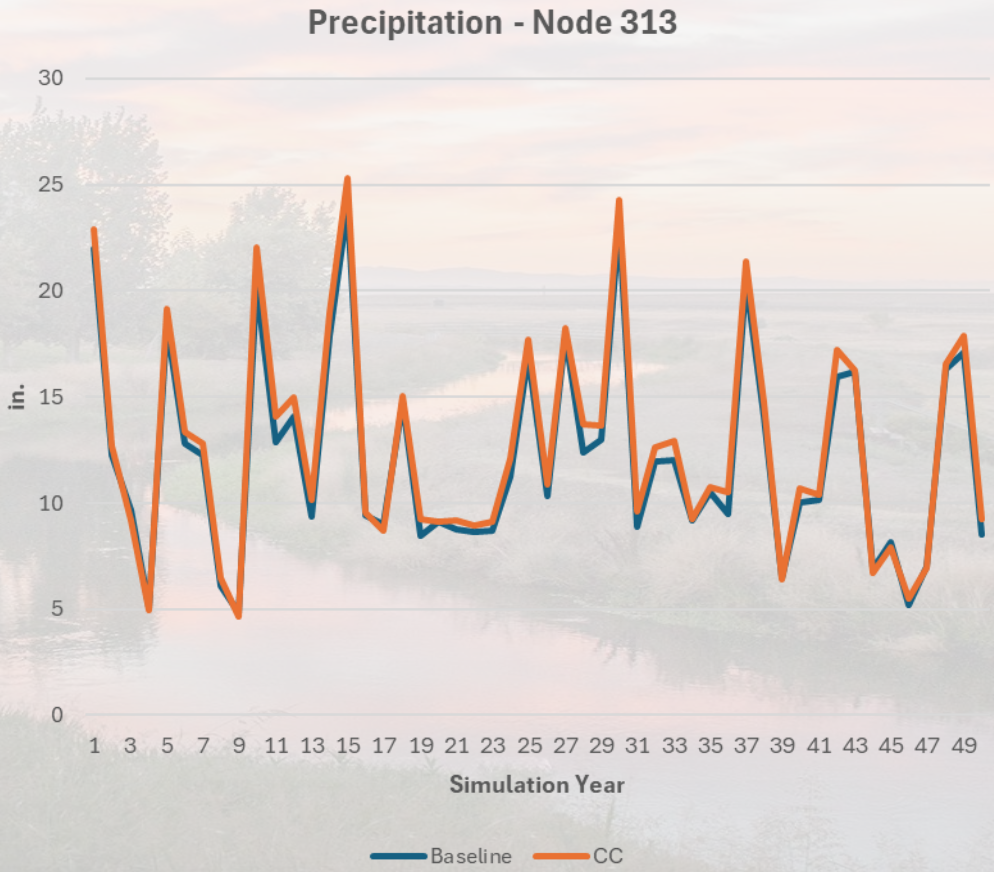


Image courtesy: Veronica Adrover/UC Merced

Groundwater Budget – Climate Change

Component	Baseline	CC	Impact CC
Deep Percolation	343,300	335,500	-7,800
Stream Seepage	209,700	234,500	+24,800
On-Farm, Canal and Reservoir Recharge	140,300	140,300	0
Inflow from Foothills	8,000	7,800	-200
Groundwater Pumping	-721,900	-762,800	-40,900
Inflow/Outflow to Adjacent Areas	-62,400	-71,700	-9,300
Turlock	-27,200	-31,500	-4,300
Chowchilla	-41,300	-42,500	-1,200
Delta-Mendota	6,100	2,300	-3,800
Reduction in Storage	**83,100**	**116,400**	**+33,300**

Image courtesy: Veronica Ardiver/UC Merced

Groundwater Budget – Climate Change

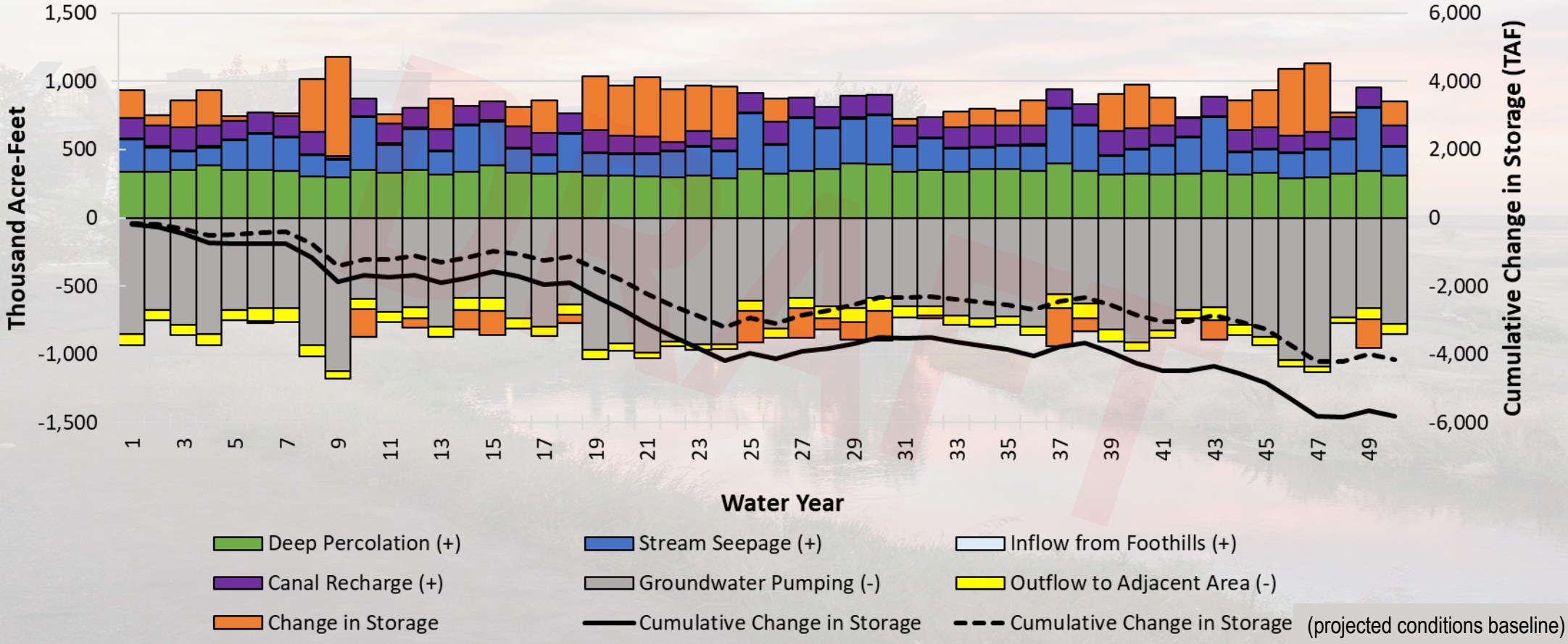


Image courtesy: Veronica Adrover/UC Merced

Next Steps

Image courtesy: Veronica Adrover/UC Merced

MERCED SGMA

What's coming up next?

- Late Aug/early Sept - Public Workshop (similar to today's topics)
- Now through late September - Develop the GSP Update and Periodic Evaluation documents
- Early October through mid-November - Public Comment on draft documents
- Mid-October - next SAC/CC meeting to review GSP
- December 2024 & January 2025 - Final GSP preparation, adoption, and submittal

Image courtesy: Veronica Adrover/UC Merced

Merced GSP
Joint Coordination & Stakeholder Advisory Committees Meeting

July 17, 2024

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

Image courtesy: Veronica Adrover/UC Merced

MERCED SGMA