



# MODESTO SUBBASIN SGMA:

## 2024 ANNUAL REPORT: C2VSIM™ MODEL UPDATE

STRGBA GSA MEETING

MARCH 12, 2025



# MODESTO GSP: 2024 ANNUAL REPORT

- The Revised Modesto GSP was submitted to DWR in July 2024.
- The Revised Modesto GSP was **APPROVED** by DWR in February 2025.
- The fourth Annual Report is due to DWR on April 1, 2025.
  - Annual Reports are due to DWR “by April 1 of each year” (§356.2).
  - The fourth Annual Report covers the 2024 water year (Oct 2023 – Sept 2024).
  - Annual Report regulations require that water budget analyses (i.e., change in storage) use “historical data to the greatest extent available, including from January 1, 2015, to the current reporting year” (§356.2 (b)(1)(B) and §356.2 (b)(5)(B)).

# MODESTO GSP: 2024 ANNUAL REPORT

## Project Tasks

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### ■ Compile Data

- Precipitation
- Evapotranspiration
- Stream Flow & Boundary Conditions
- Land Use & Cropping Patterns
- Surface Water Operations
- Groundwater Operations

### ■ Update C2VSimTM

- Water Use Budgets
- Groundwater Budgets
- Pumping & Change in Storage Maps
- Stream & Groundwater Hydrographs

### ■ Prepare 2024 Annual Report

# MODEL UPDATE

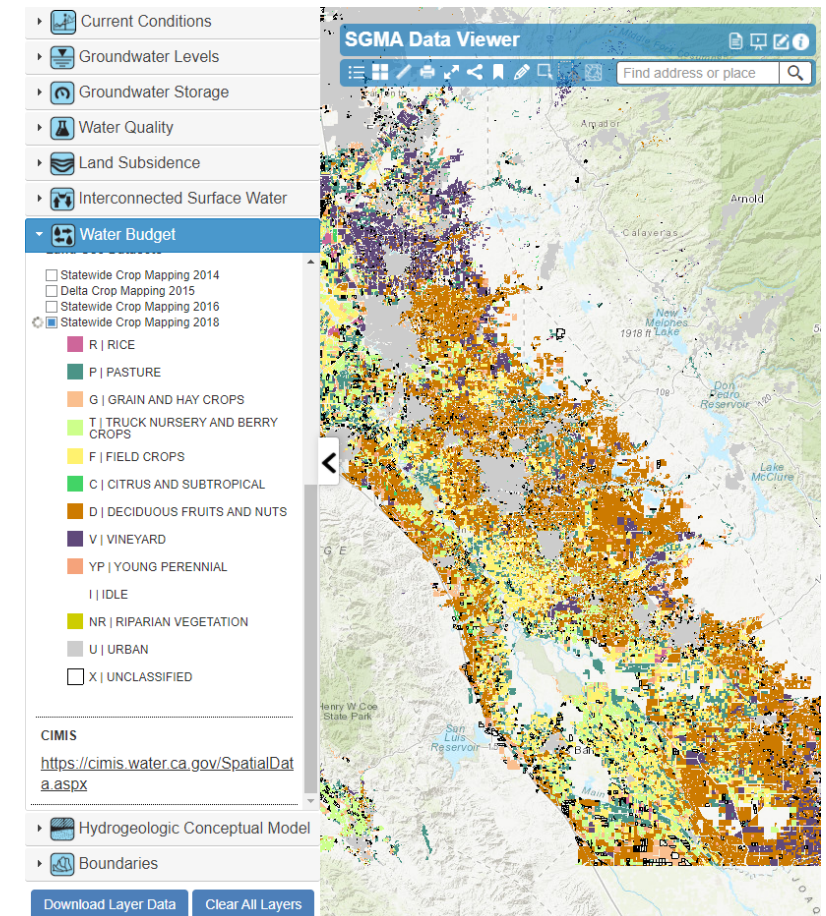
- **Goals:** Support the Annual Report by developing:
  - Subbasin-wide water budgets
  - Temporal and spatial estimates of groundwater production
  - Temporal and spatial estimates of change in storage by aquifer
- **Approach:** Update the Modesto Groundwater Model for WY 2024
  - Extend all time-series input files with the best available data.
  - A verification of the model performance will be performed.
  - **Note:** No changes to model structure or parameters were made.



# PUBLICLY AVAILABLE DATA

## State, Federal, & Other Resources:

- Precipitation PRISM
  - Evapotranspiration CIMIS
  - Land Use Data DWR
  - Riparian Diversions eWRIMS
  - Stream Flow Data CDEC & USGS
  - Groundwater Levels CASGEM & WDL
- DWR SGMA Data Viewer



# LOCAL DATA

## ■ Agricultural Operations

- River diversions
- Farm-gate deliveries
- Municipal deliveries
- Reservoir seepage
- Conveyance seepage
- Groundwater production

### **Agricultural Agencies:**

Modesto Irrigation District  
Oakdale Irrigation District

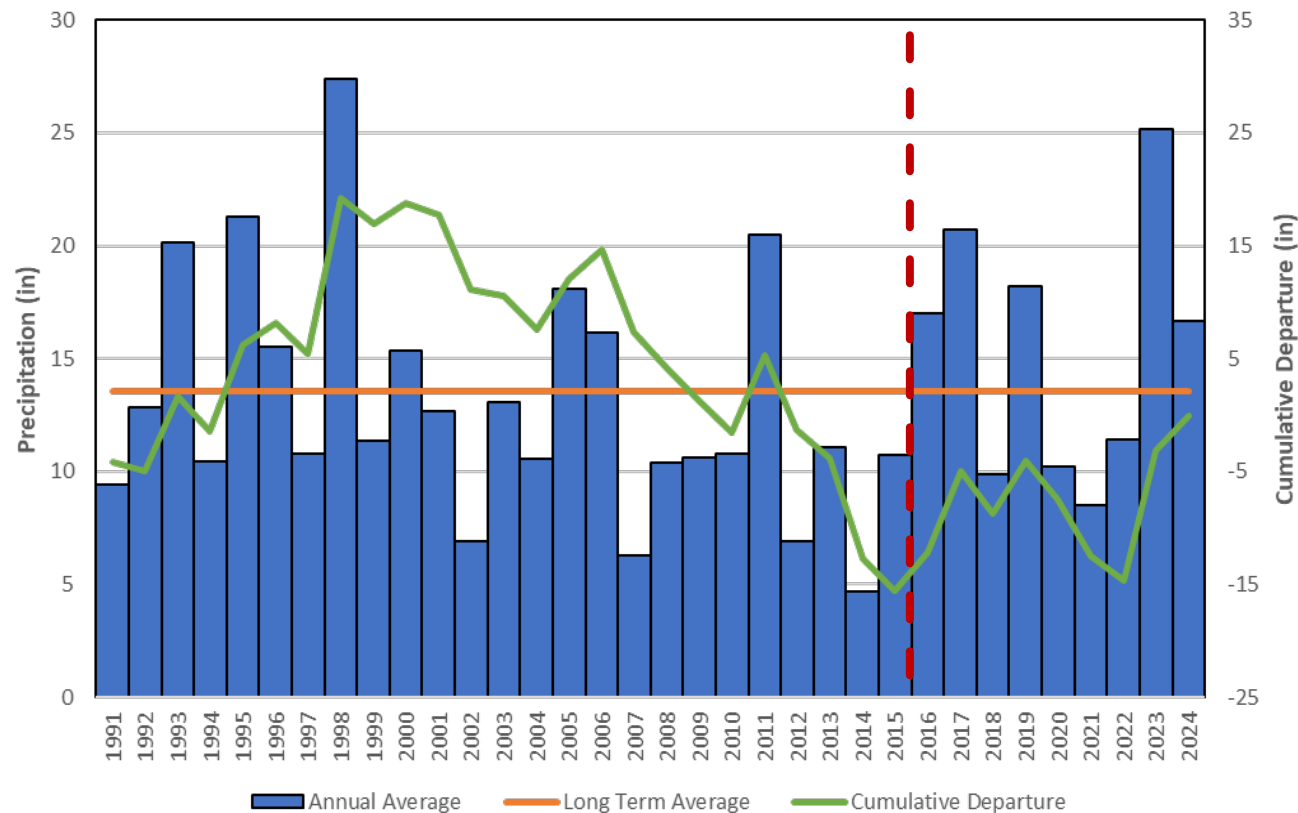
## ■ Urban/Municipal Operations

- Population of service area
- Groundwater production
- Recycled water deliveries

### **Municipal Agencies:**

City of Modesto	City of Oakdale
City of Riverbank	City of Waterford

# PRECIPITATION



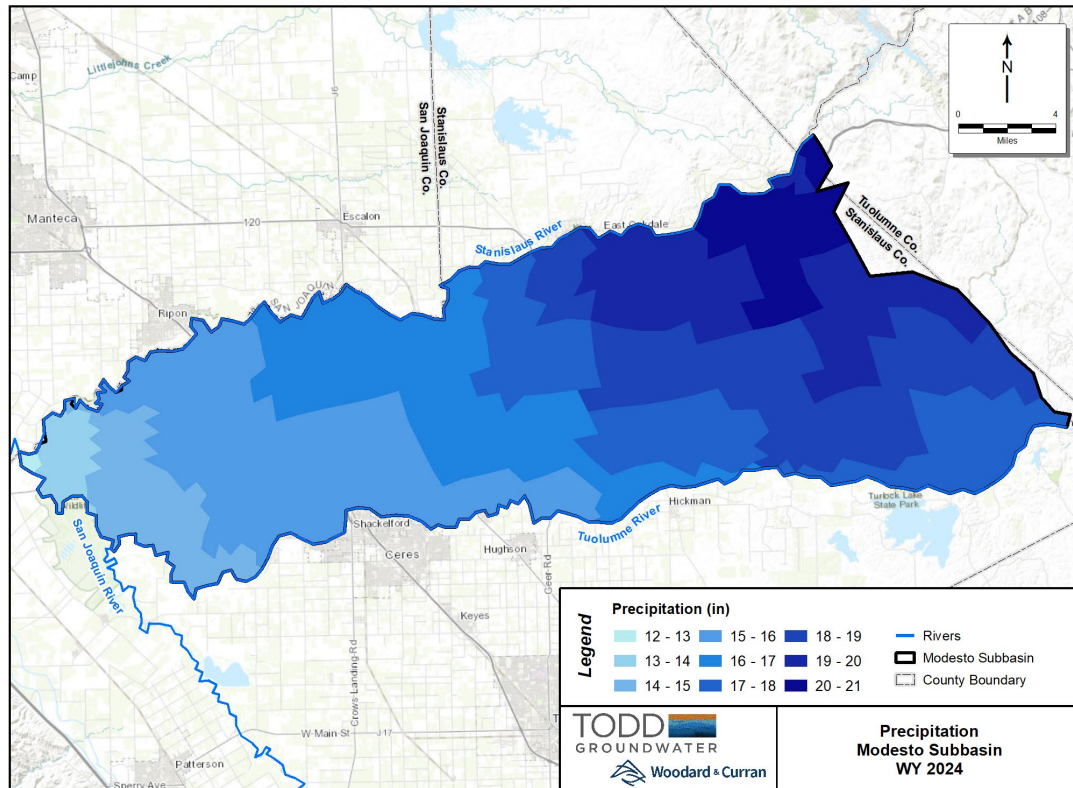
## Data Source: PRISM

2016 (D)	17.01 in
2017 (W)	20.73 in
2018 (BN)	9.88 in
2019 (W)	18.19 in
2020 (D)	10.23 in
2021 (C)	8.51 in
2022 (C)	11.41 in
2023 (W)	25.15 in
2024 (AN)	16.67 in

**Average**

**15.31 in**

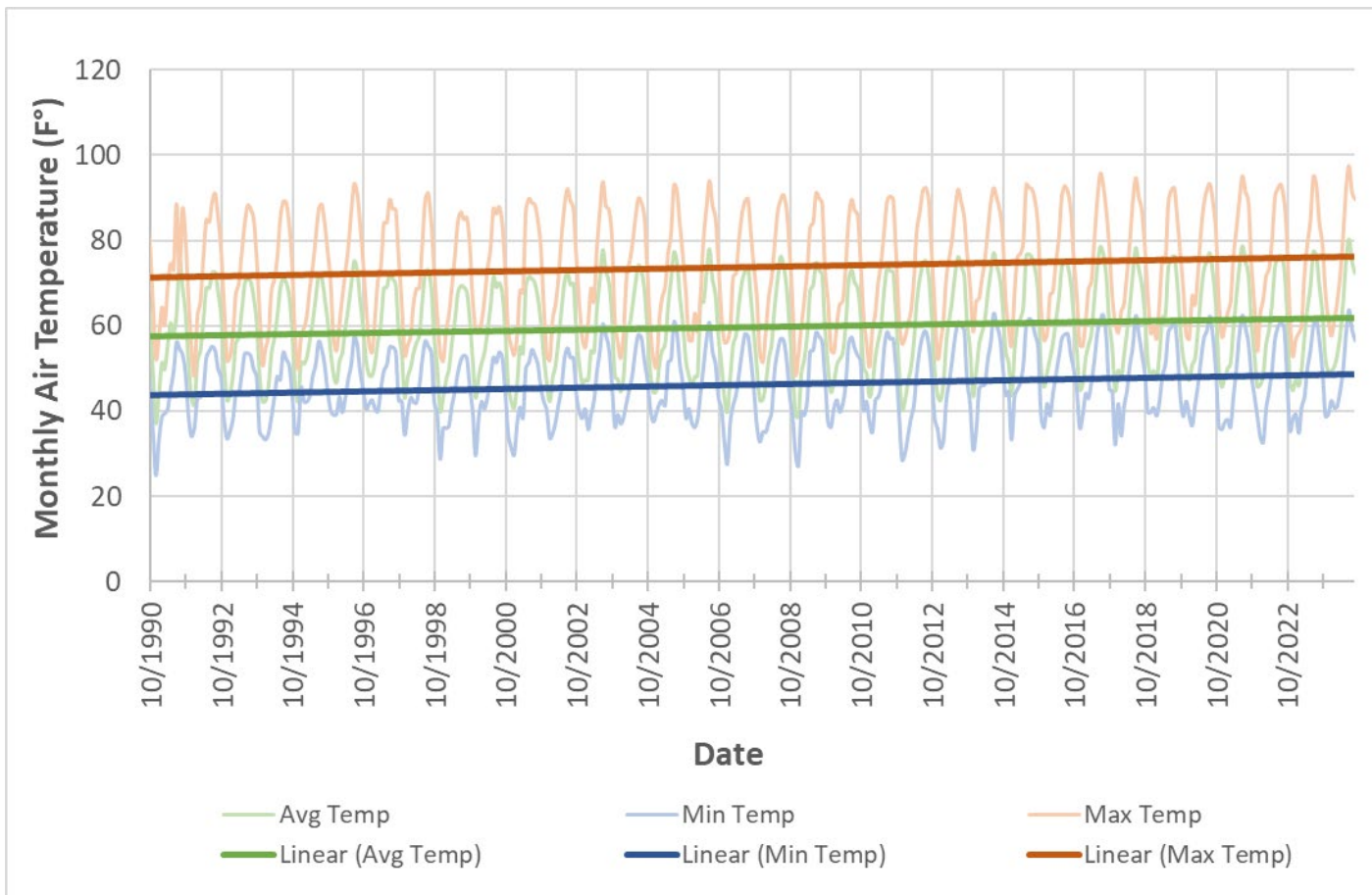
# PRECIPITATION



## Data Source: PRISM

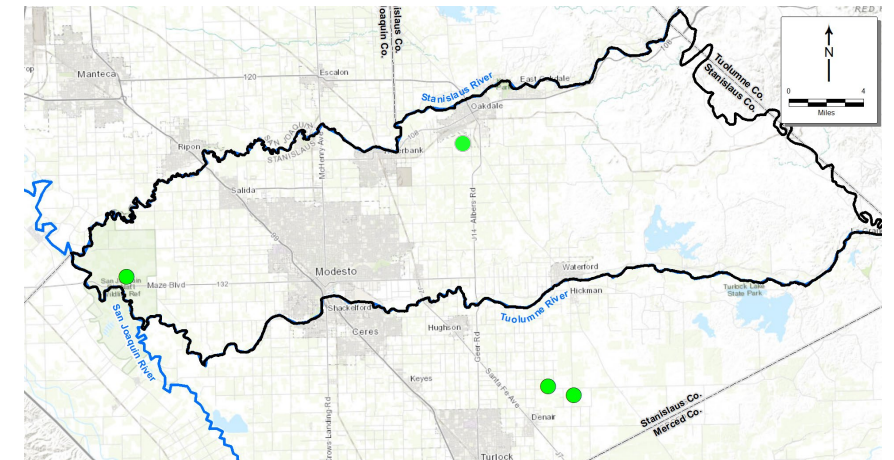
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# TEMPERATURE



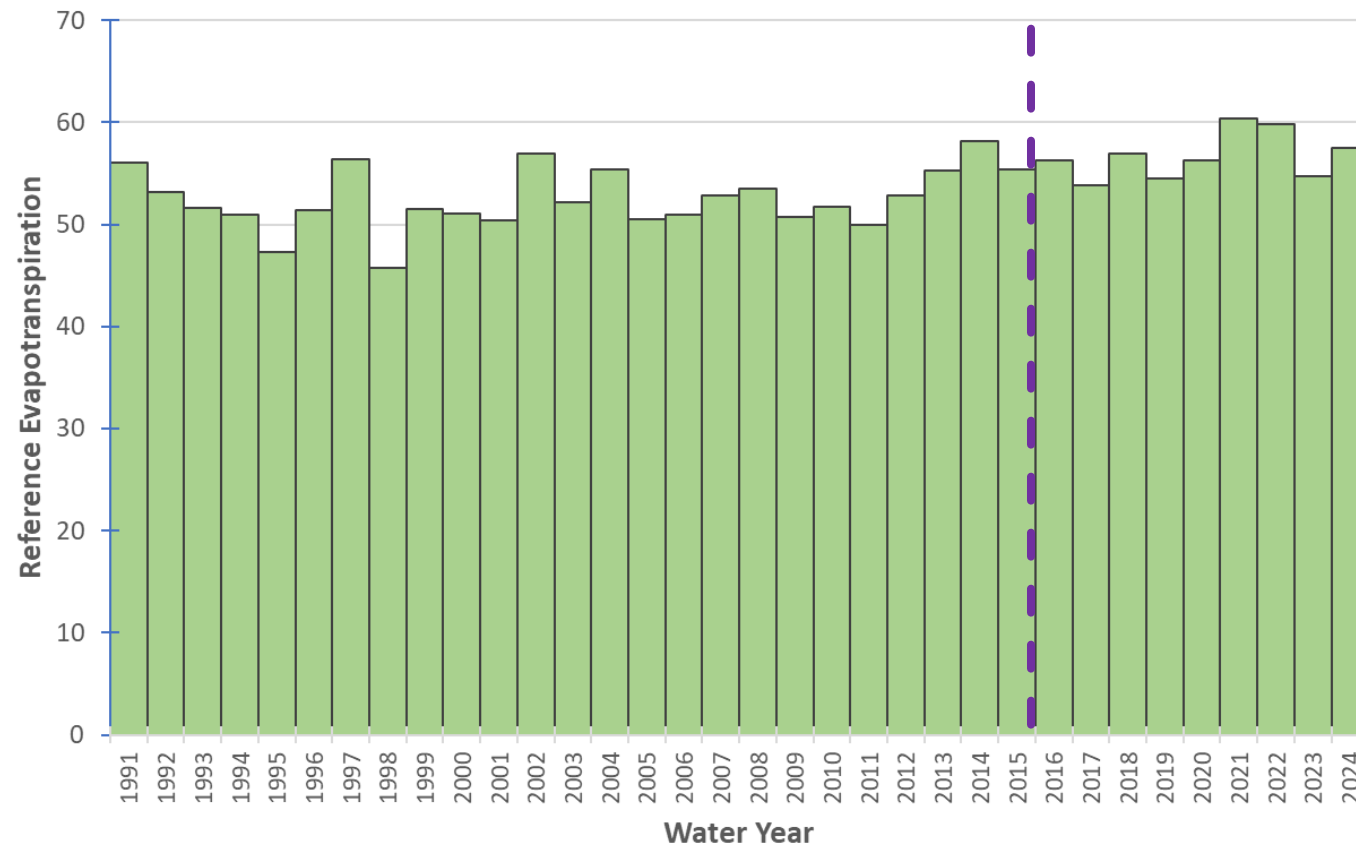
## Data Source: CIMIS

- #71 (Modesto)
- #168 (Denair)
- #206 (Denair II)
- #194 (Oakdale)



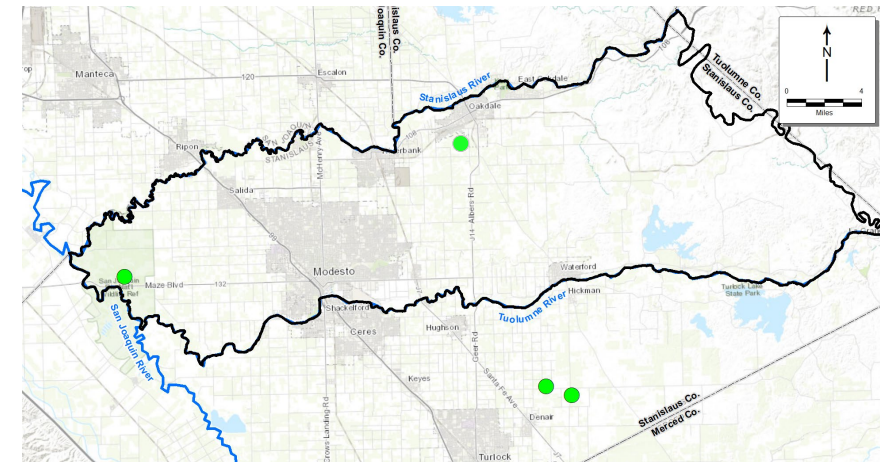


# EVAPOTRANSPIRATION

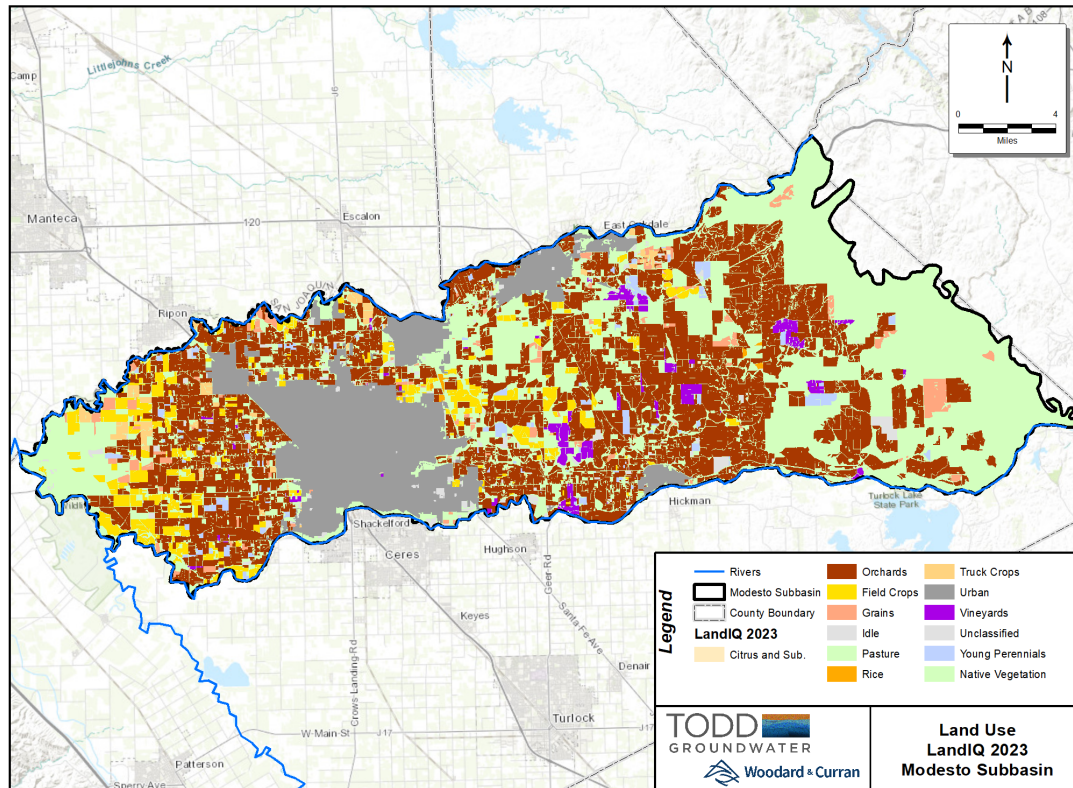


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- #168 (Denair)
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- #194 (Oakdale)



# LAND USE & CROPPING PATTERNS

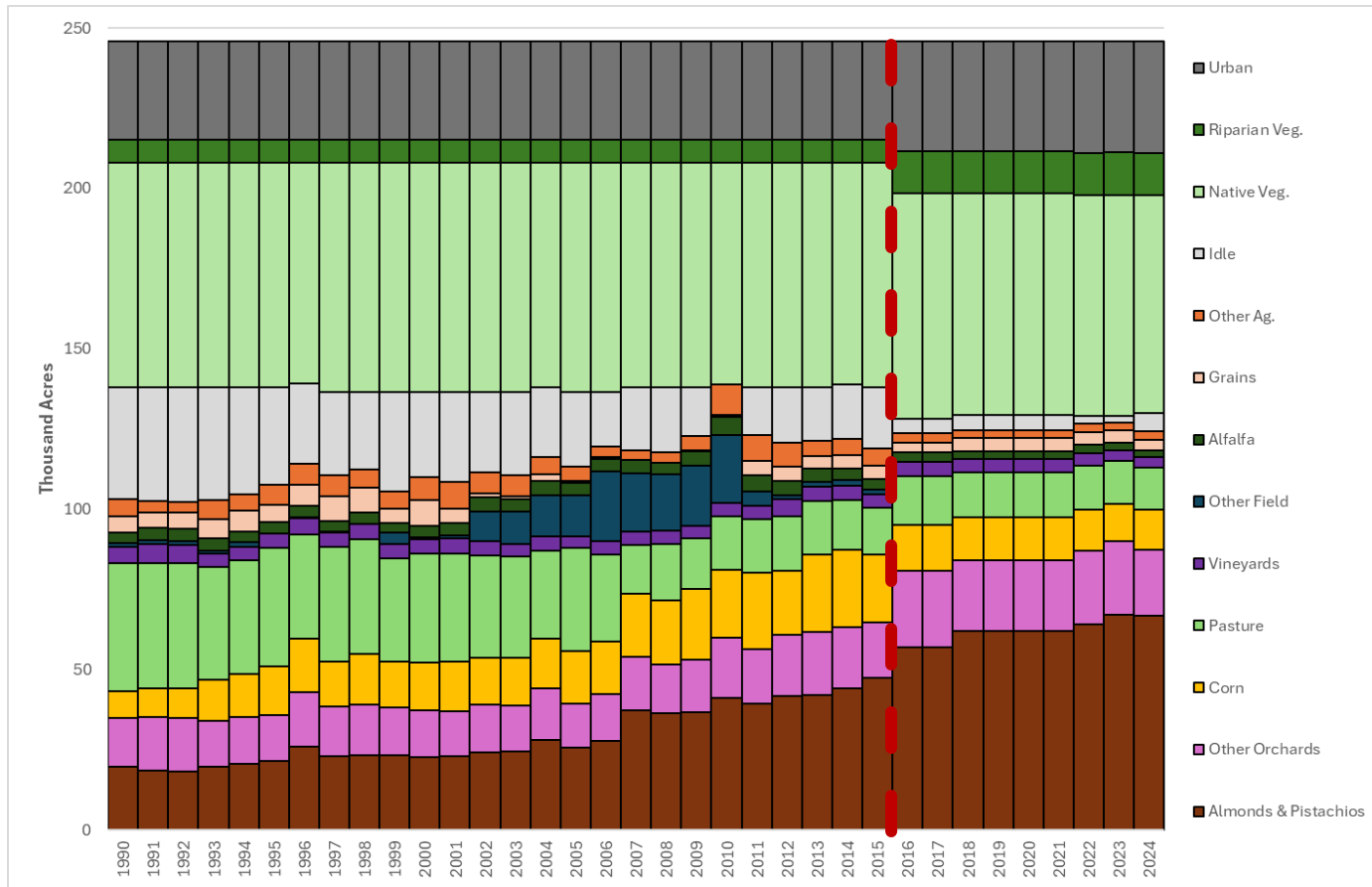


## Data Source: DWR

■ Urban	35,000
■ Native Veg.	68,000
■ Riparian Veg.	13,000
■ Idle	6,000
■ Other Ag.	2,000
■ Grains	3,000
■ Alfalfa	2,000
■ Vineyards	3,000
■ Pasture	13,000
■ Corn	13,000
■ Other Orchards	21,000
■ Almonds & Pistachios	67,000
■ Total	246,000

Units: acres

# LAND USE & CROPPING PATTERNS



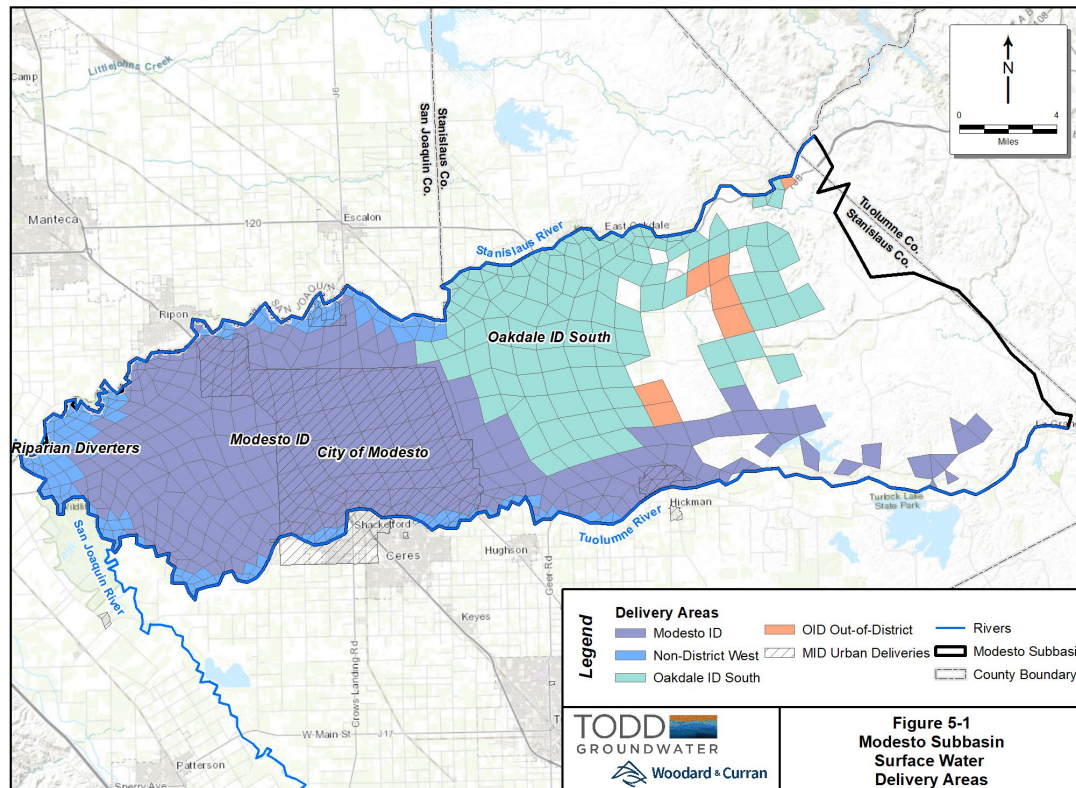
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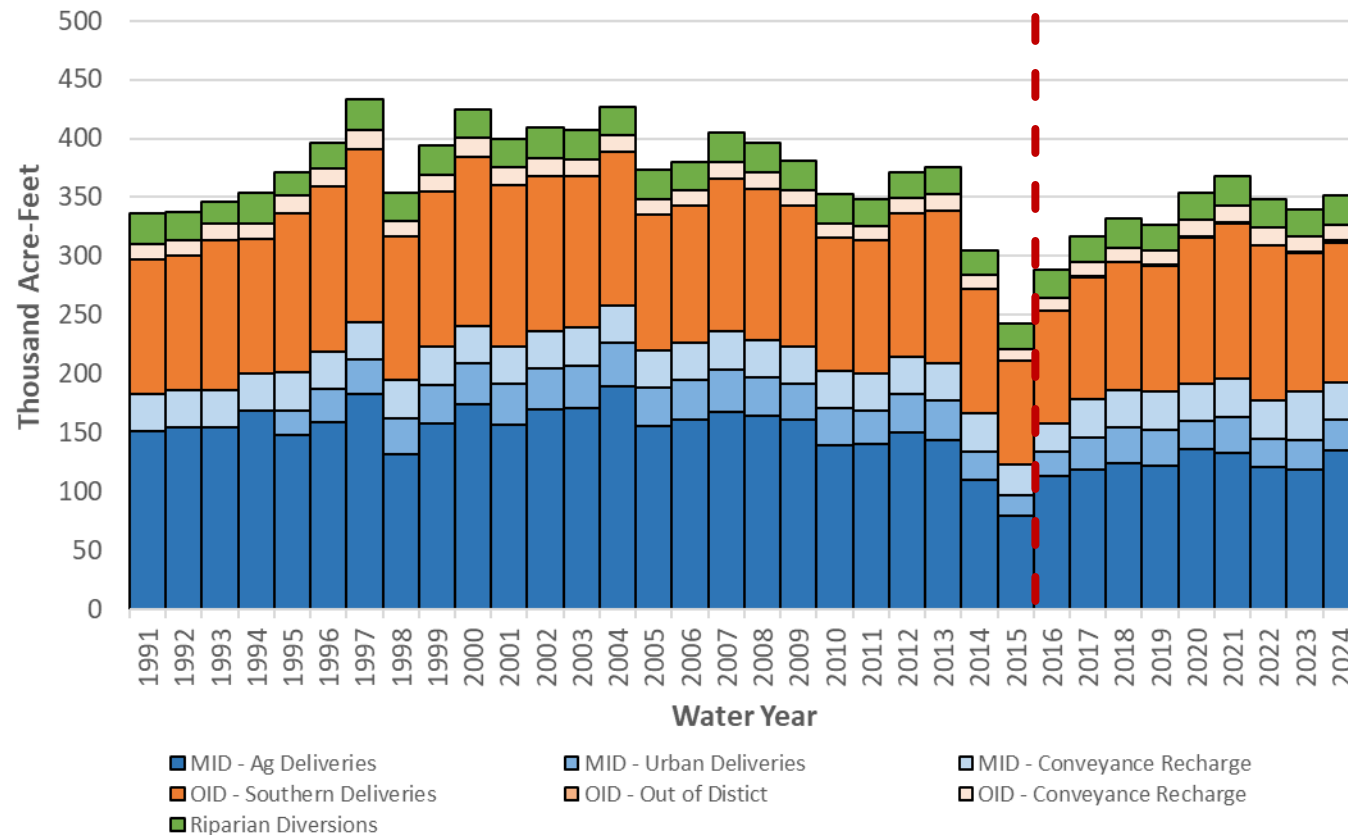
# SURFACE WATER OPERATIONS



## Data Source:

- Modesto ID
  - Ag Deliveries
  - M&I Deliveries
  - Modesto Res. Recharge
  - Conveyance Recharge
- Oakdale ID
  - Southern Deliveries
  - Out of District Sales
  - Conveyance Recharge
- Riparian Diversions

# SURFACE WATER OPERATIONS



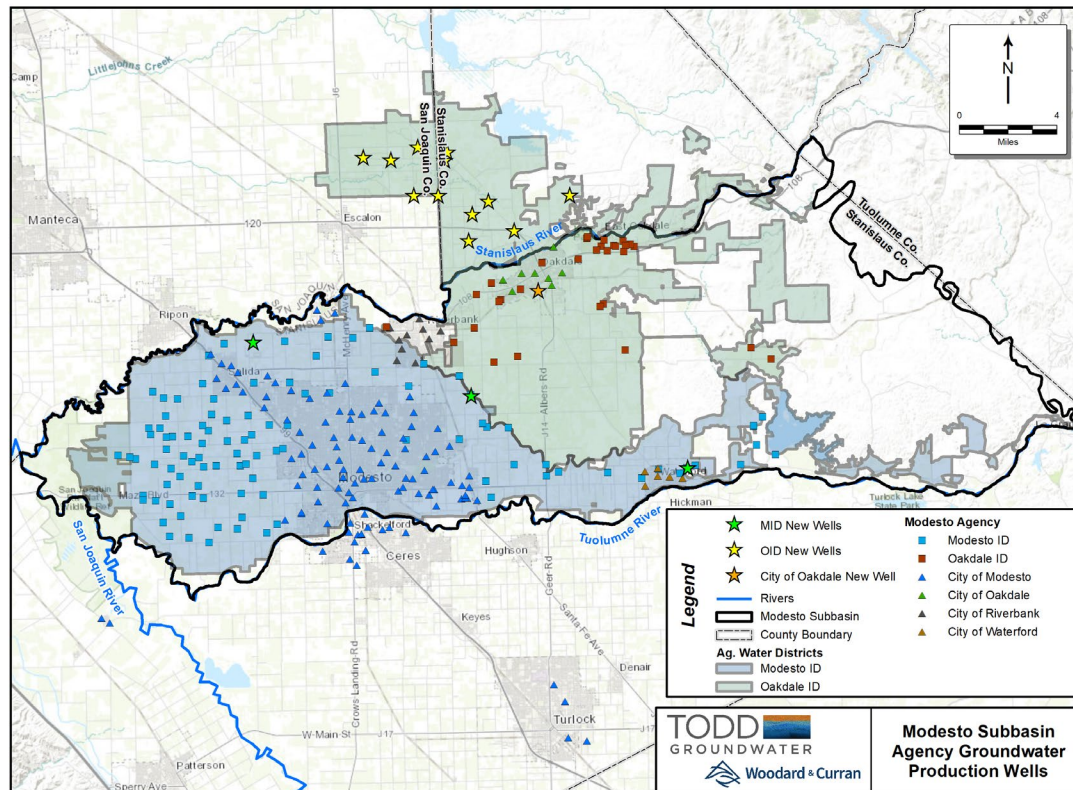
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  - Southern Deliveries
  - Conveyance Recharge
  - Out of District Sales
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# GROUNDWATER OPERATIONS

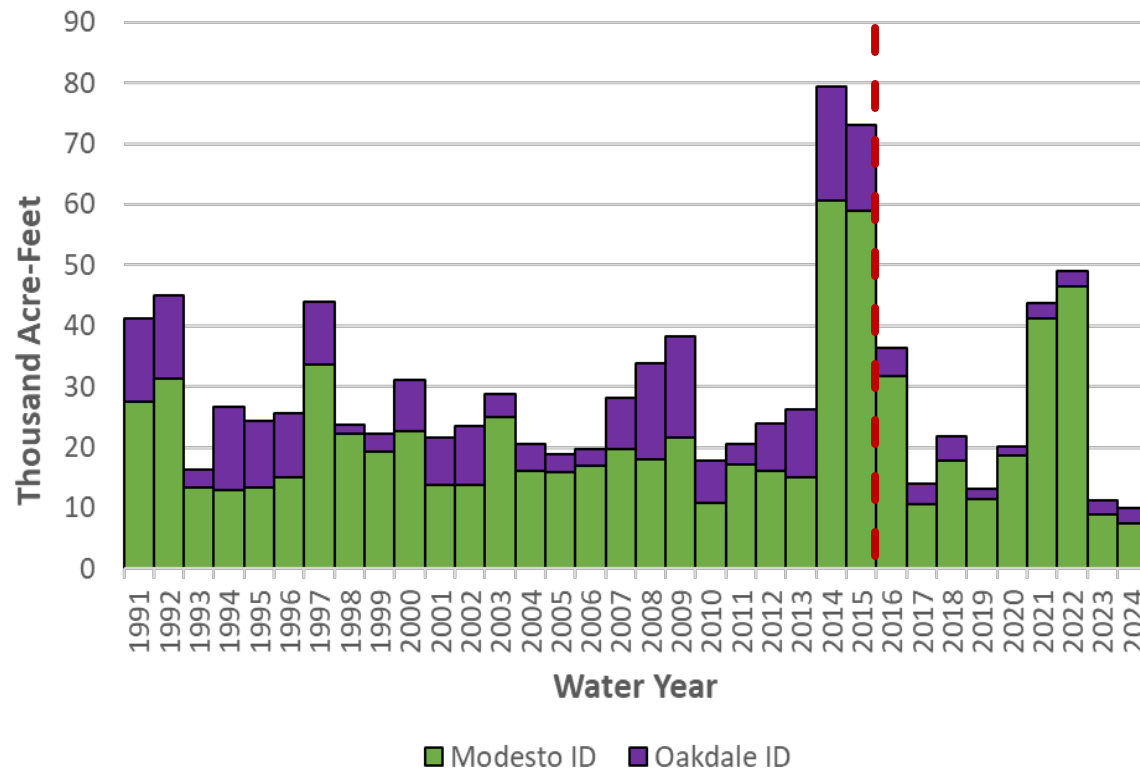
## Data Source:

- Modesto ID
- Oakdale ID
- Modesto, City of
- Oakdale, City of
- Riverbank, City of
- Waterford, City of

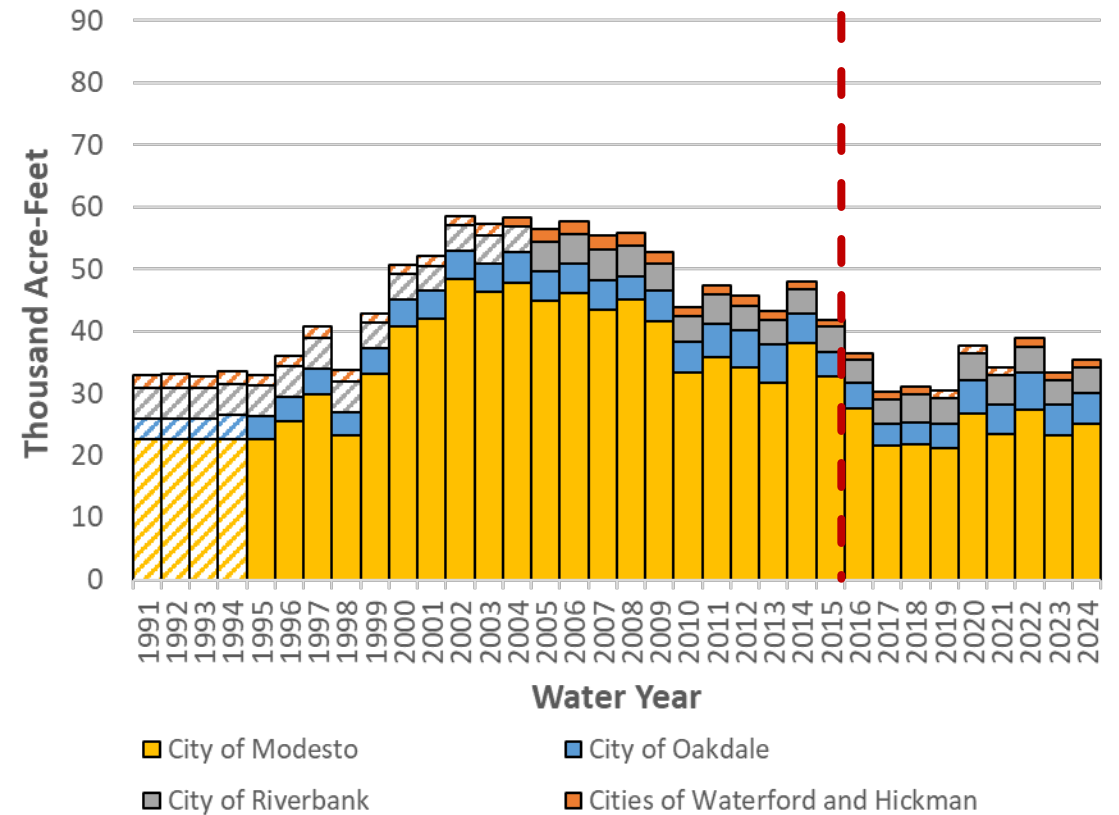


# GROUNDWATER OPERATIONS

## Agricultural Agency Pumping



## Urban Agency Pumping

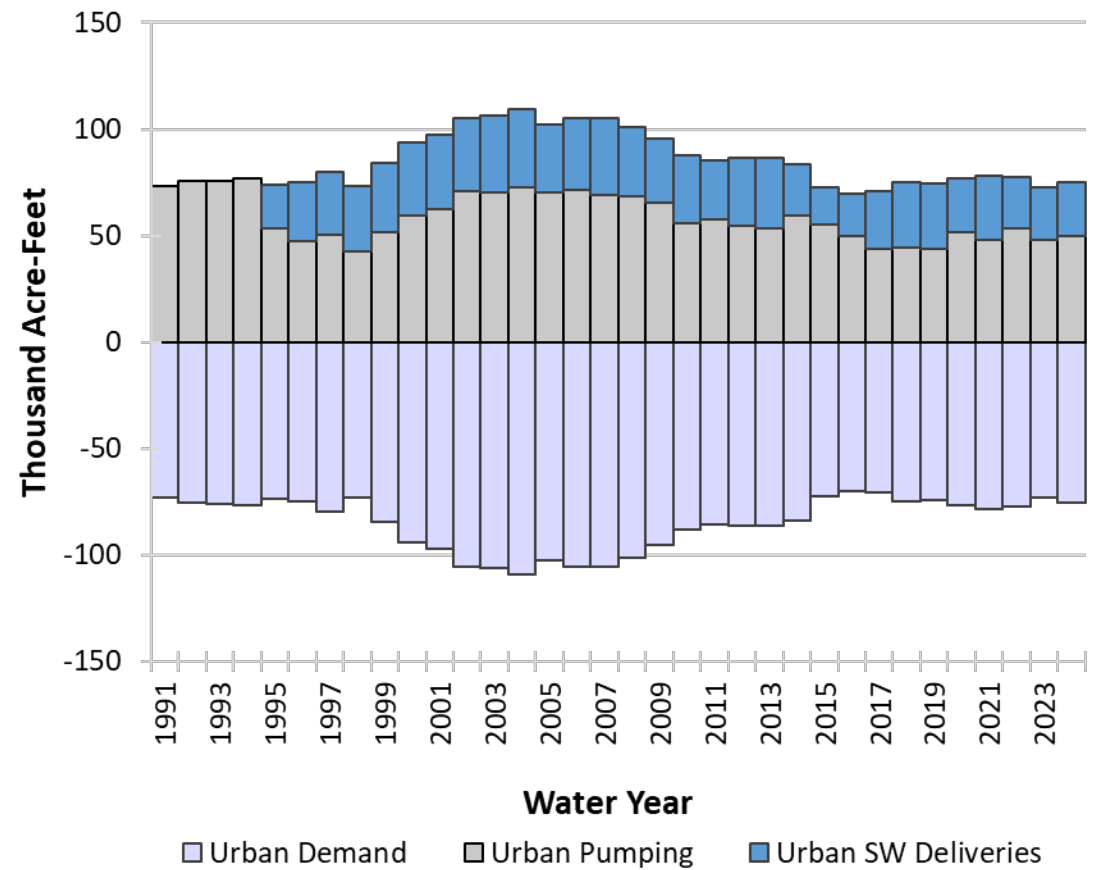
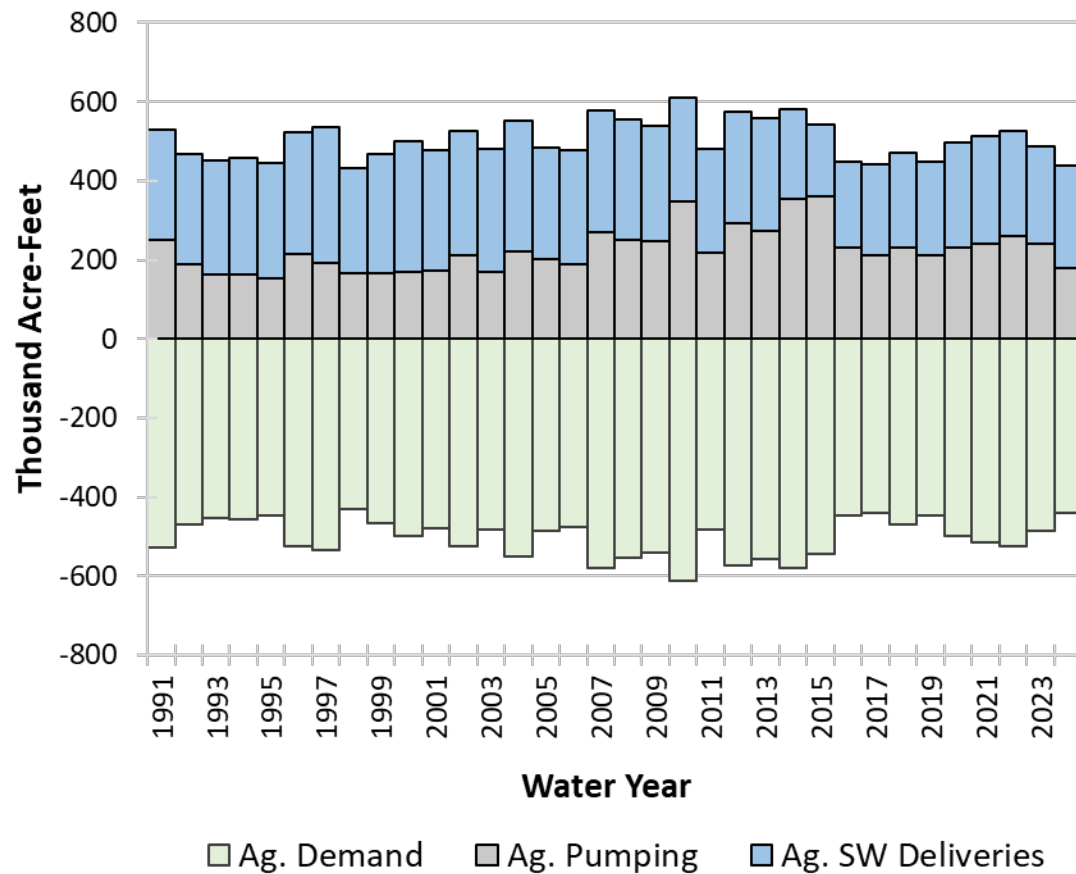




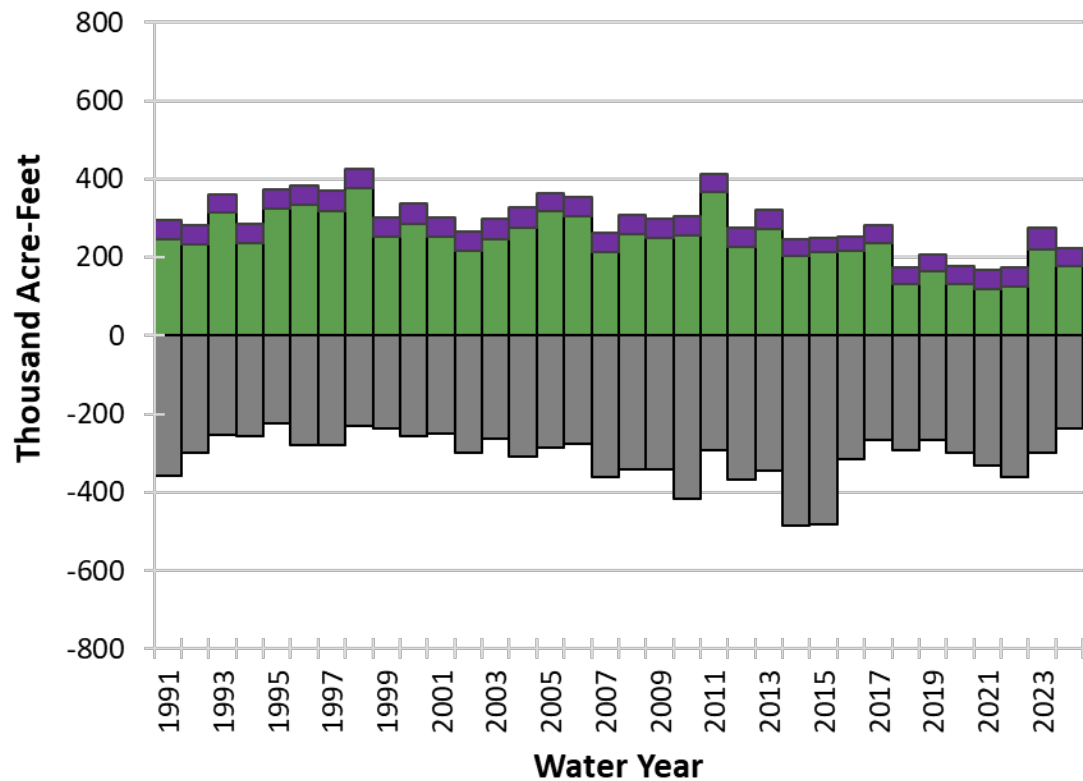
# MODEL RESULTS

## WATER BUDGETS

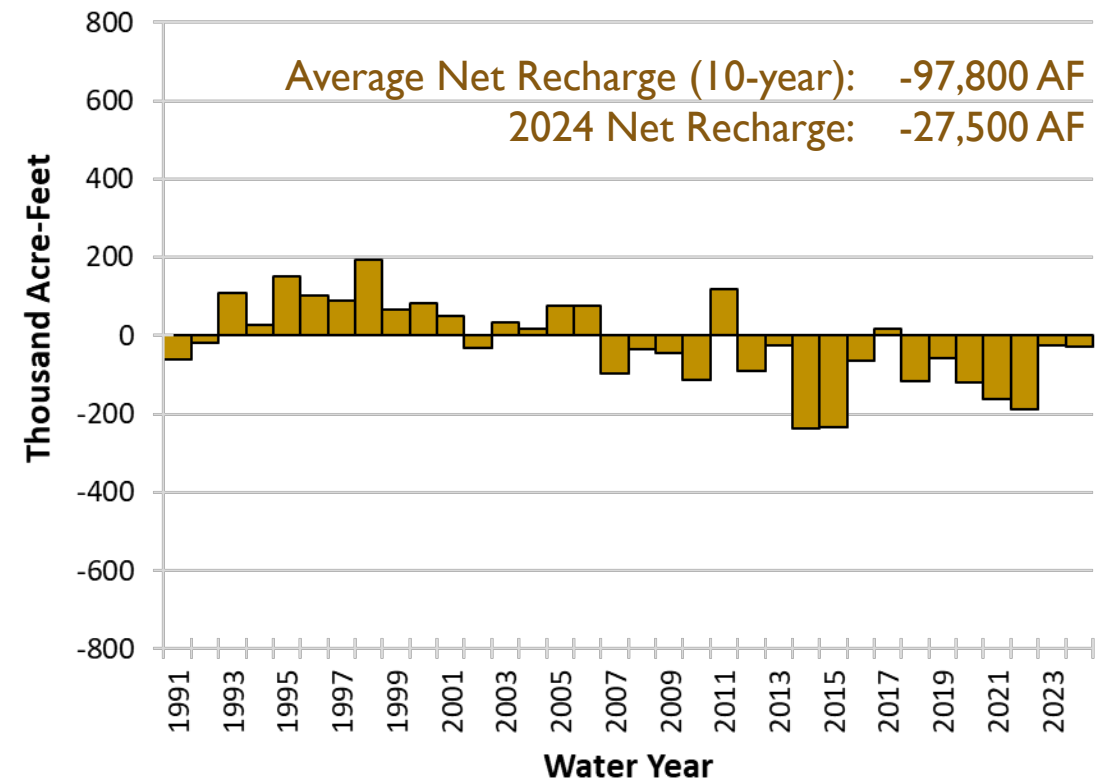
# MODESTO SUBBASIN: LAND AND WATER USE



# MODESTO SUBBASIN: OPERATIONAL BUDGET



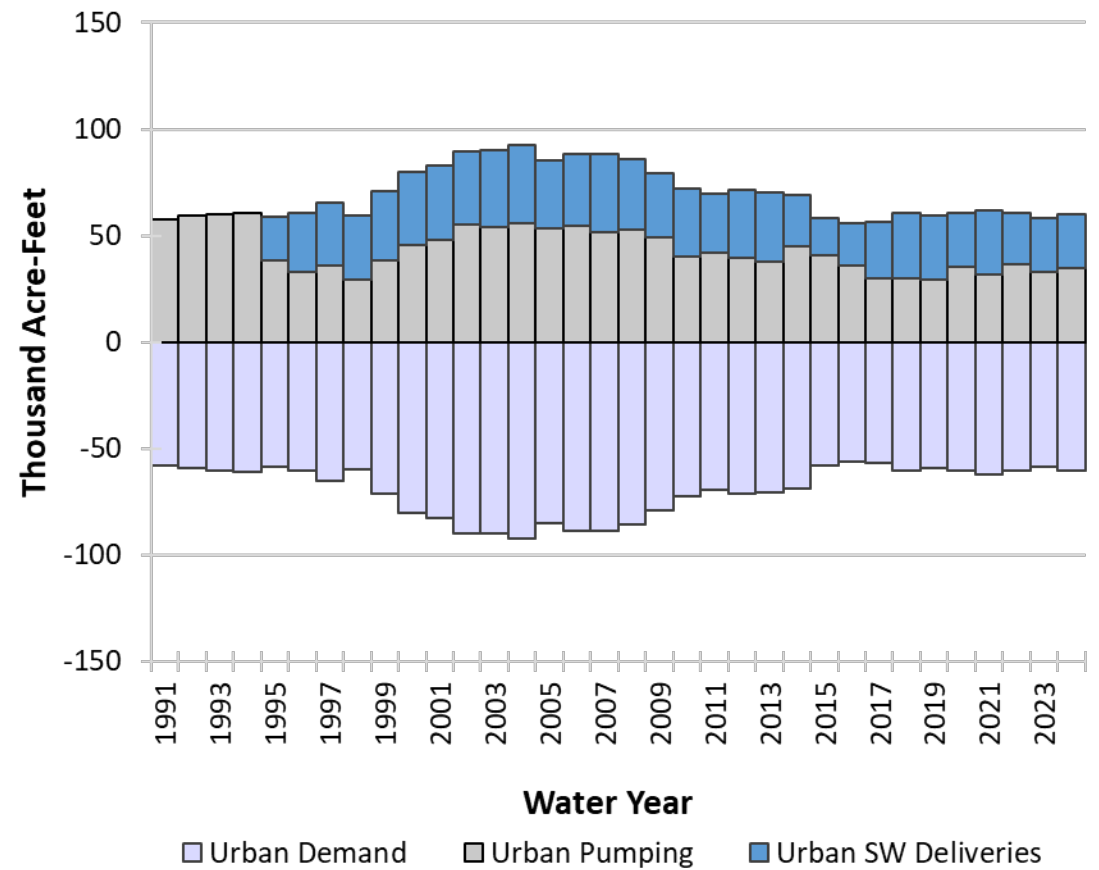
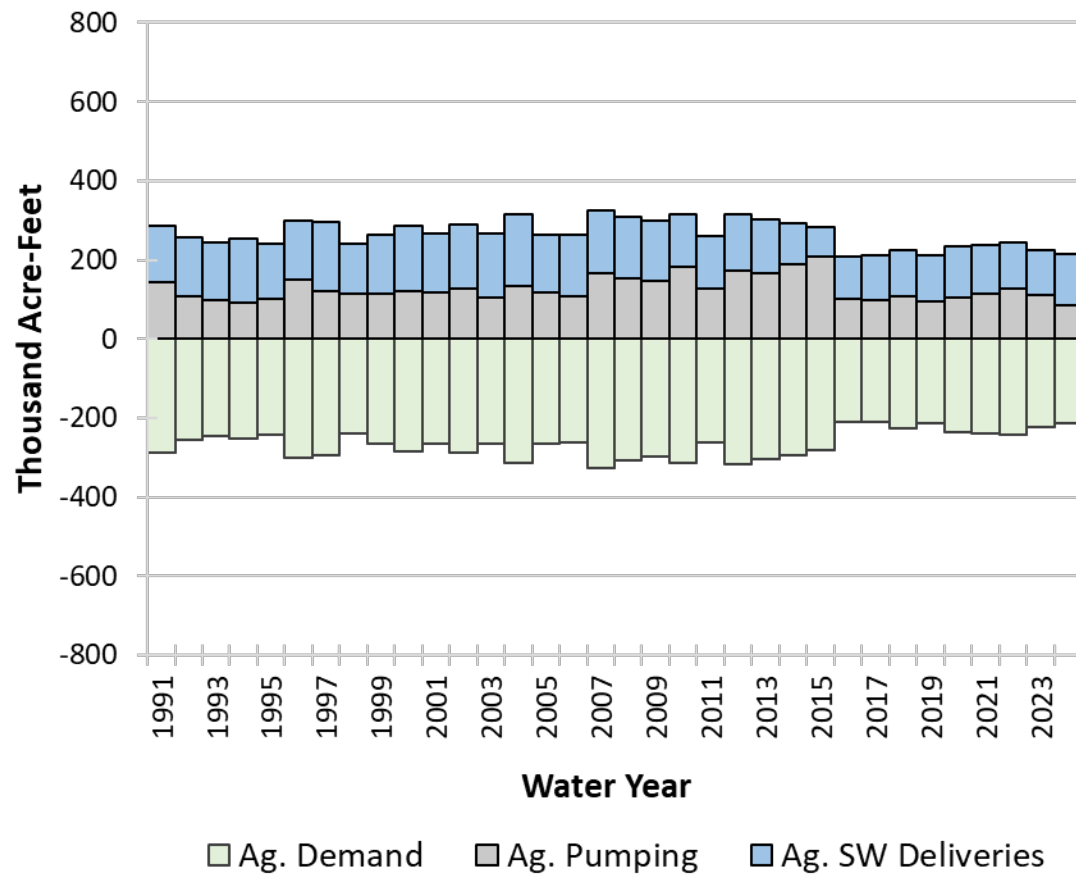
Groundwater Pumping Deep Percolation Canal and Reservoir Recharge



Net Recharge

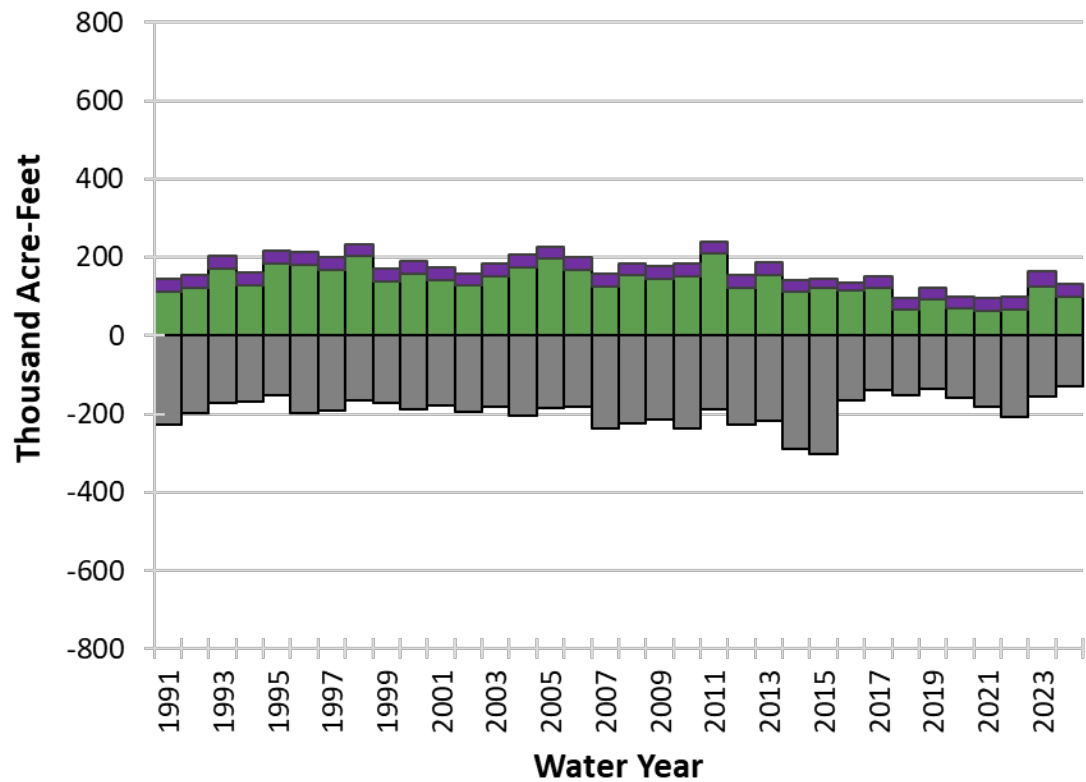


# MODESTO AREA: LAND AND WATER USE

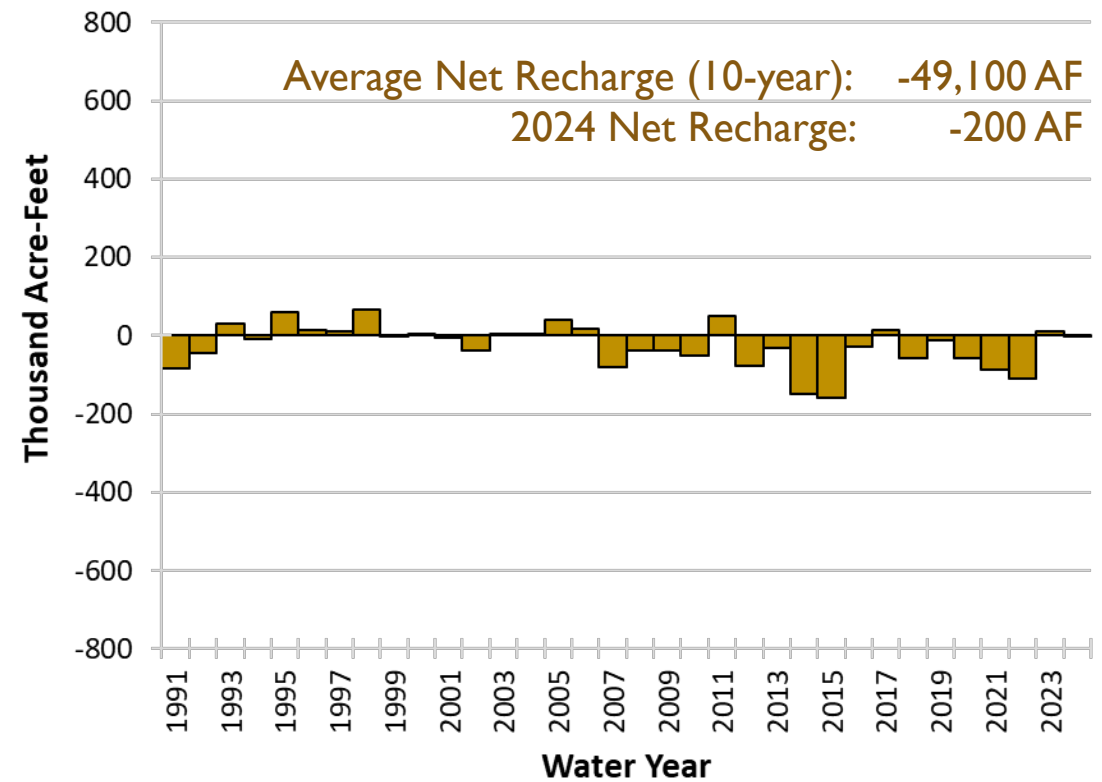




# MODESTO AREA: OPERATIONAL BUDGET

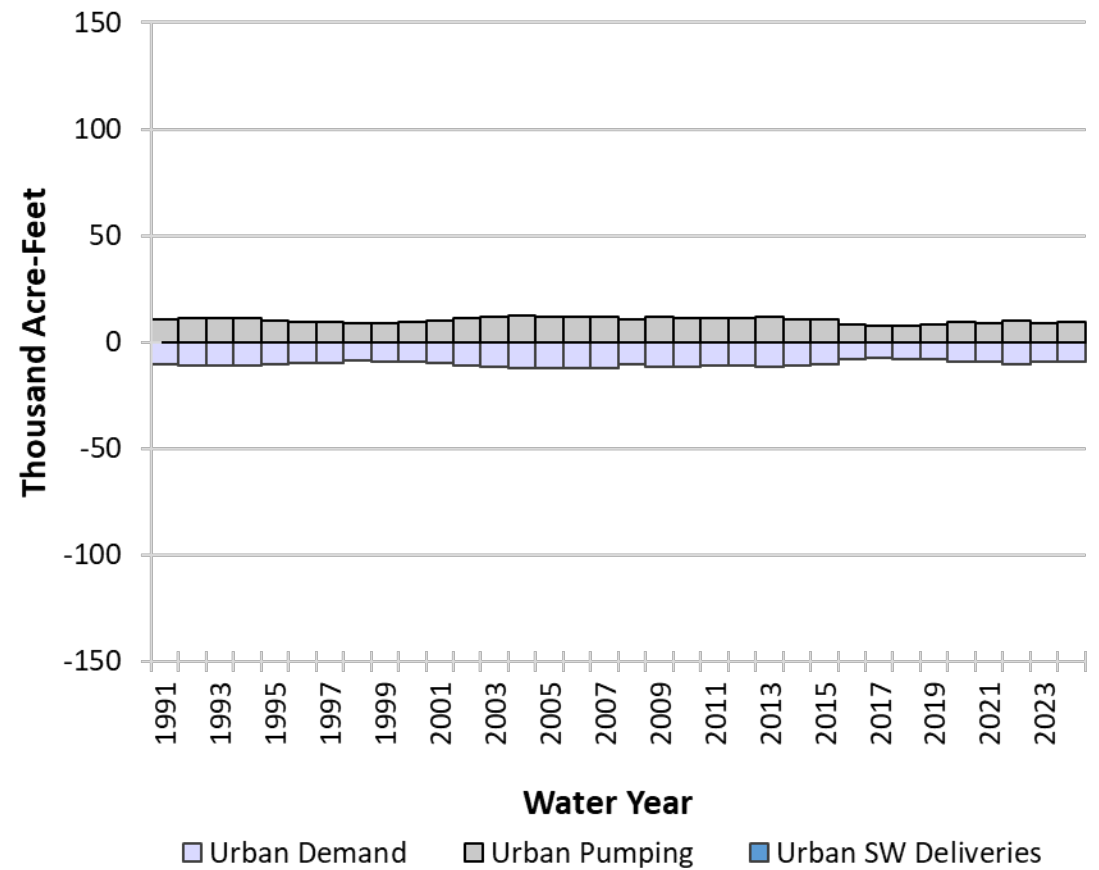
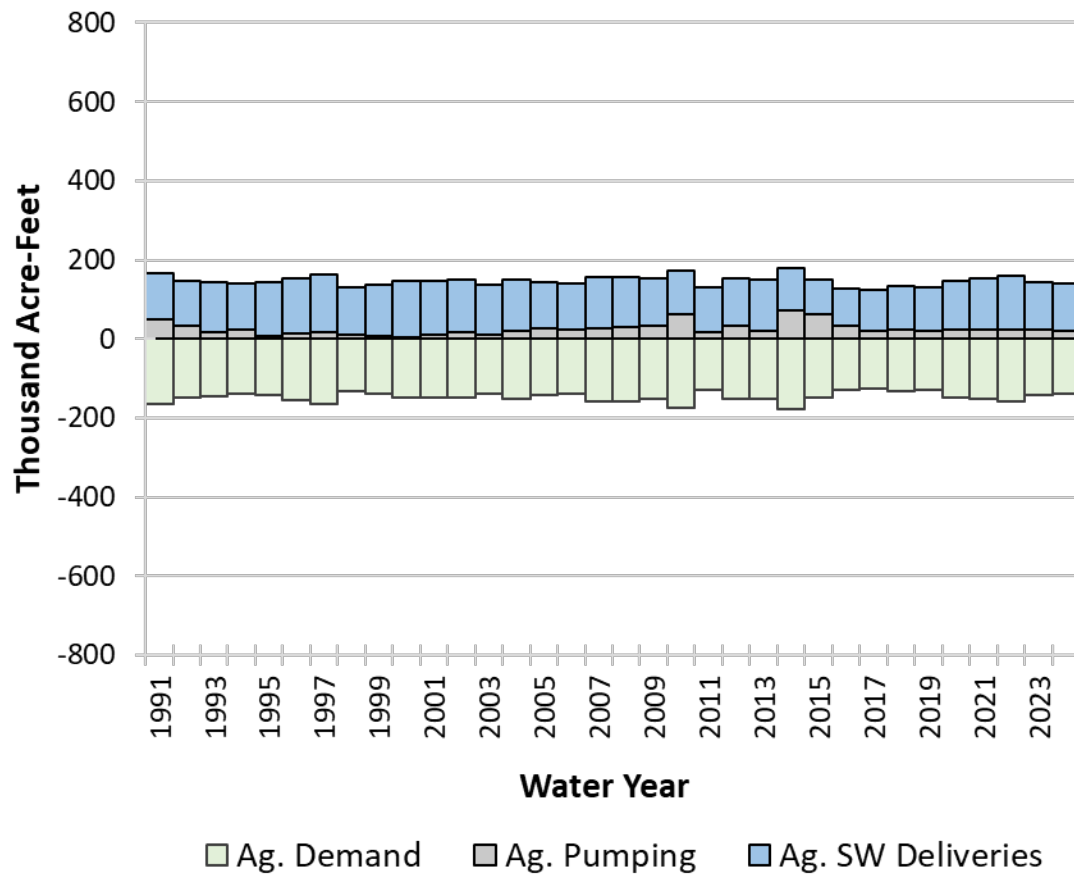


Groundwater Pumping Deep Percolation Canal and Reservoir Recharge

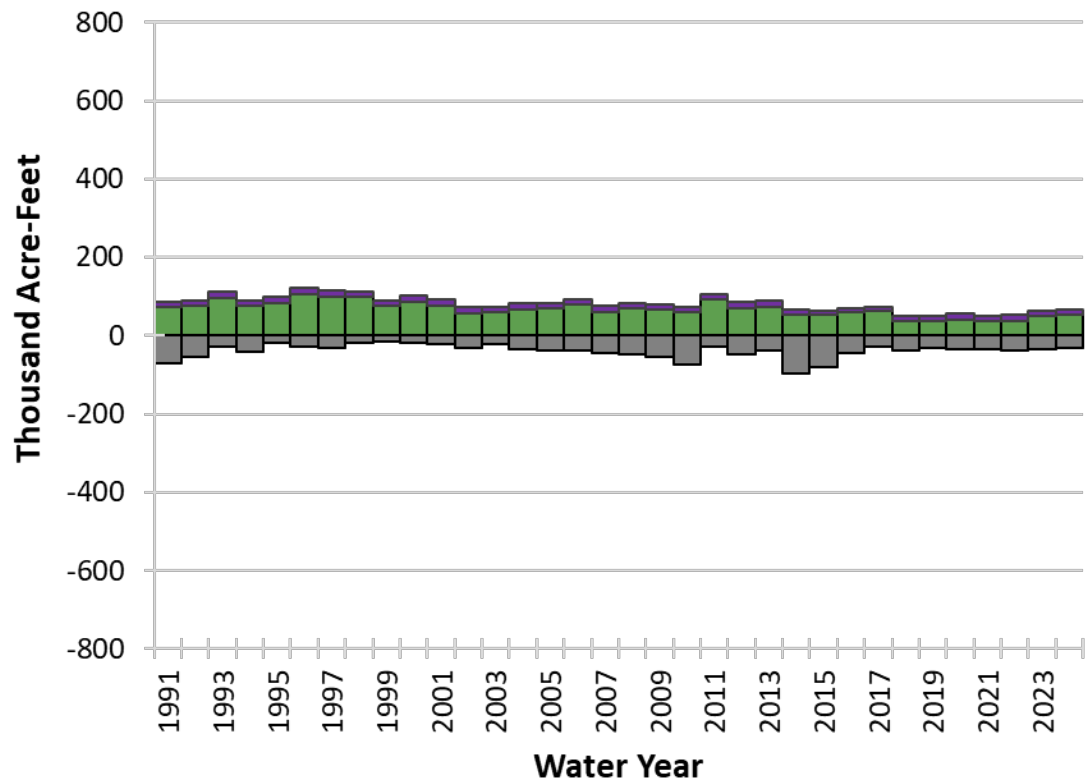


Net Recharge

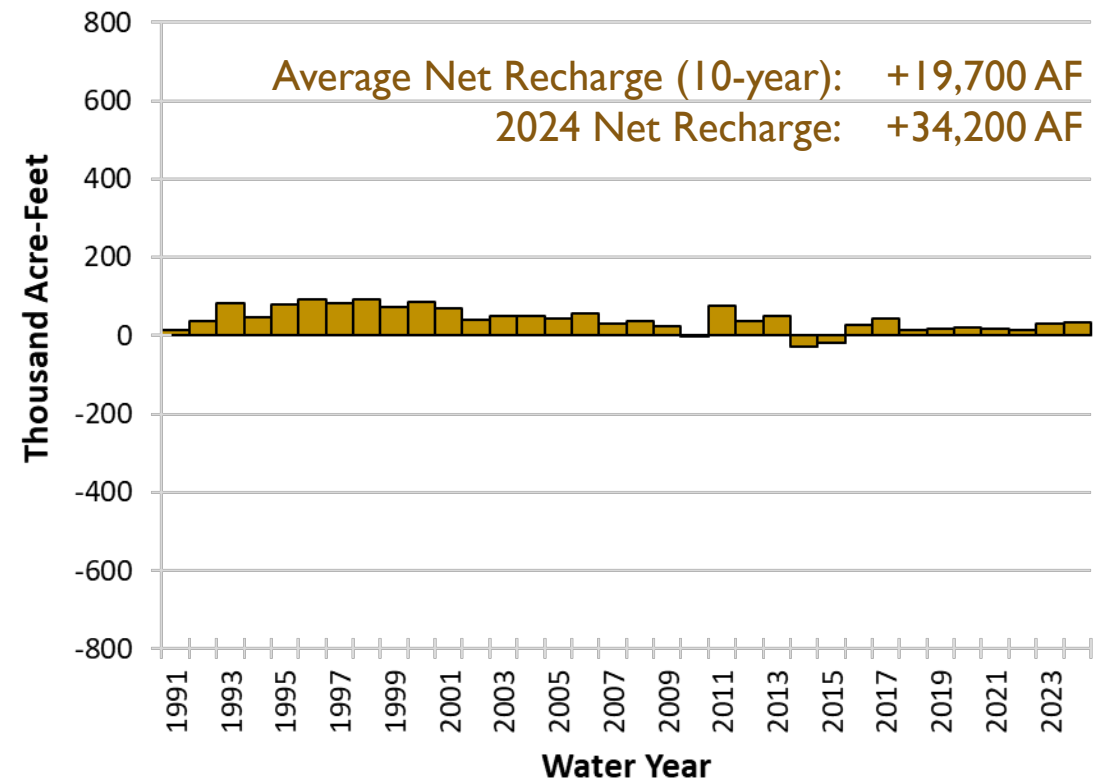
# OAKDALE AREA: LAND AND WATER USE



# OAKDALE AREA: OPERATIONAL BUDGET



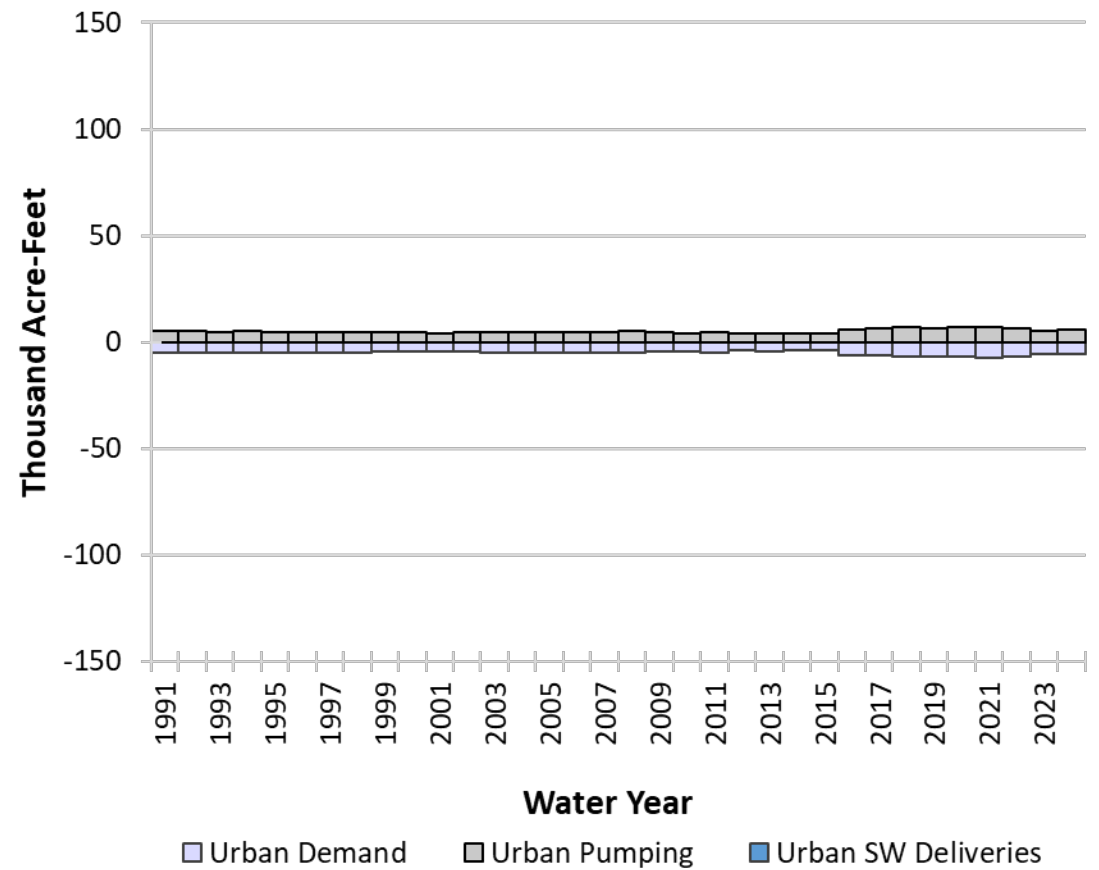
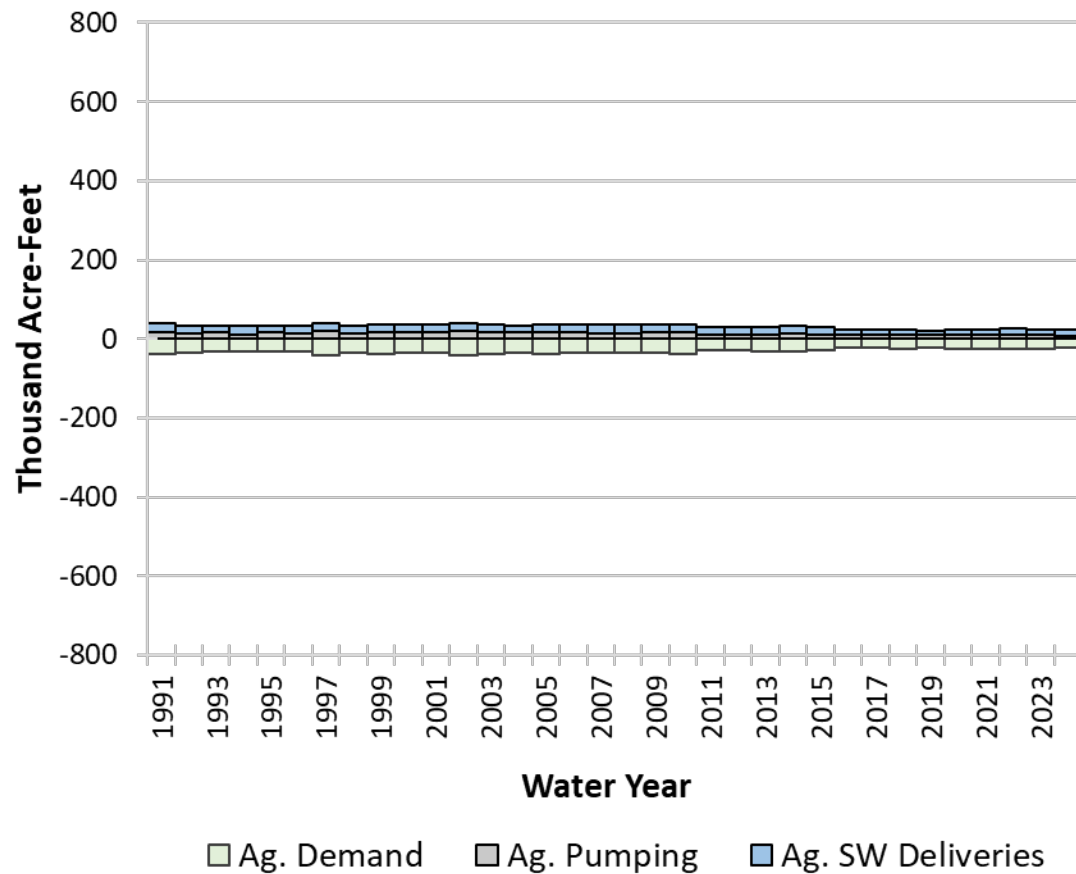
Groundwater Pumping Deep Percolation Canal and Reservoir Recharge



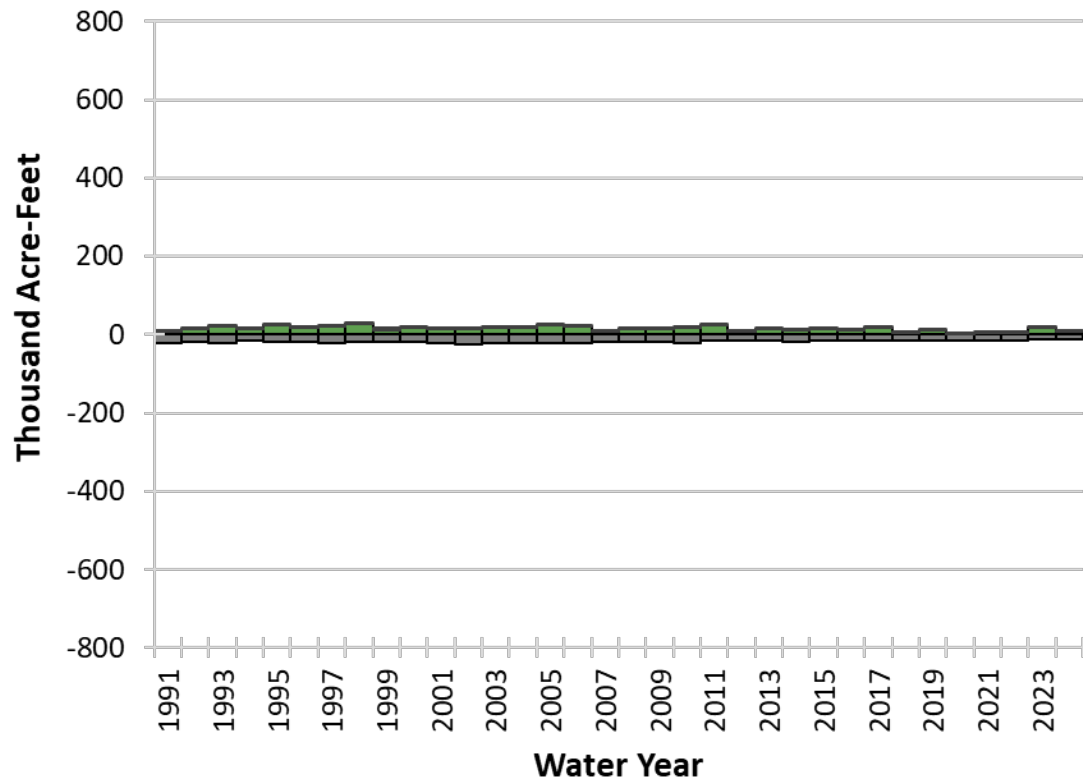
Average Net Recharge (10-year): +19,700 AF  
2024 Net Recharge: +34,200 AF

Net Recharge

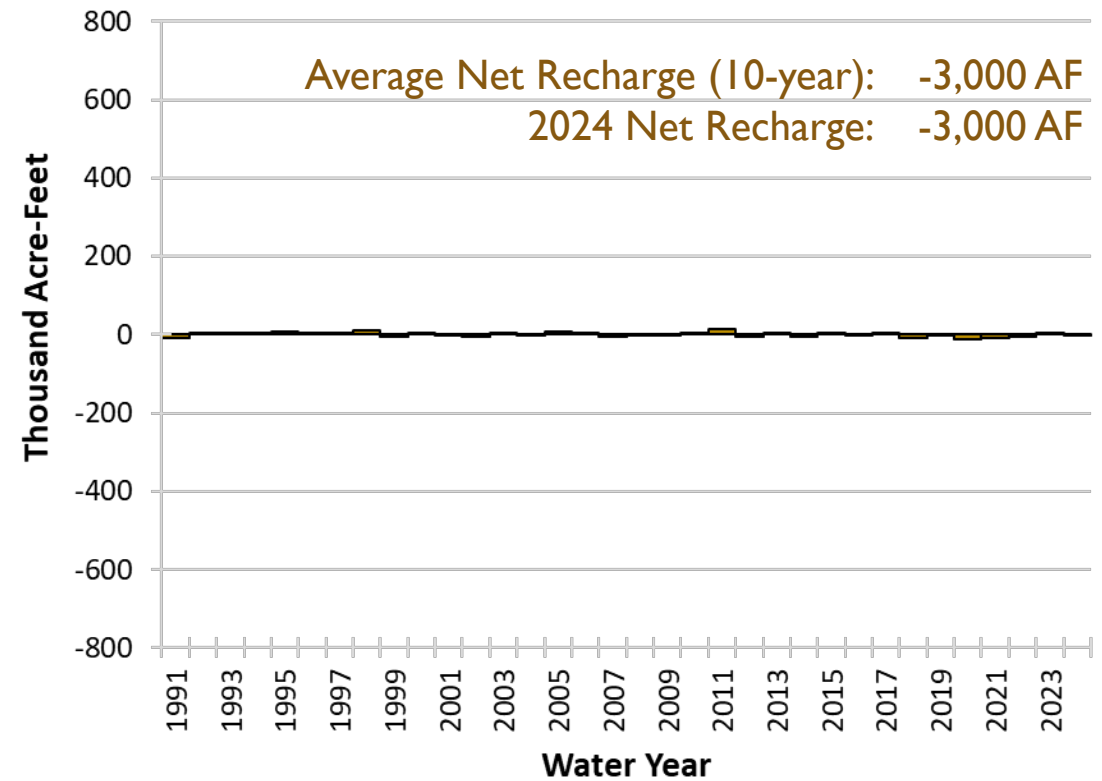
# NON-DISTRICT WEST: LAND AND WATER USE



# NON-DISTRICT WEST: OPERATIONAL BUDGET

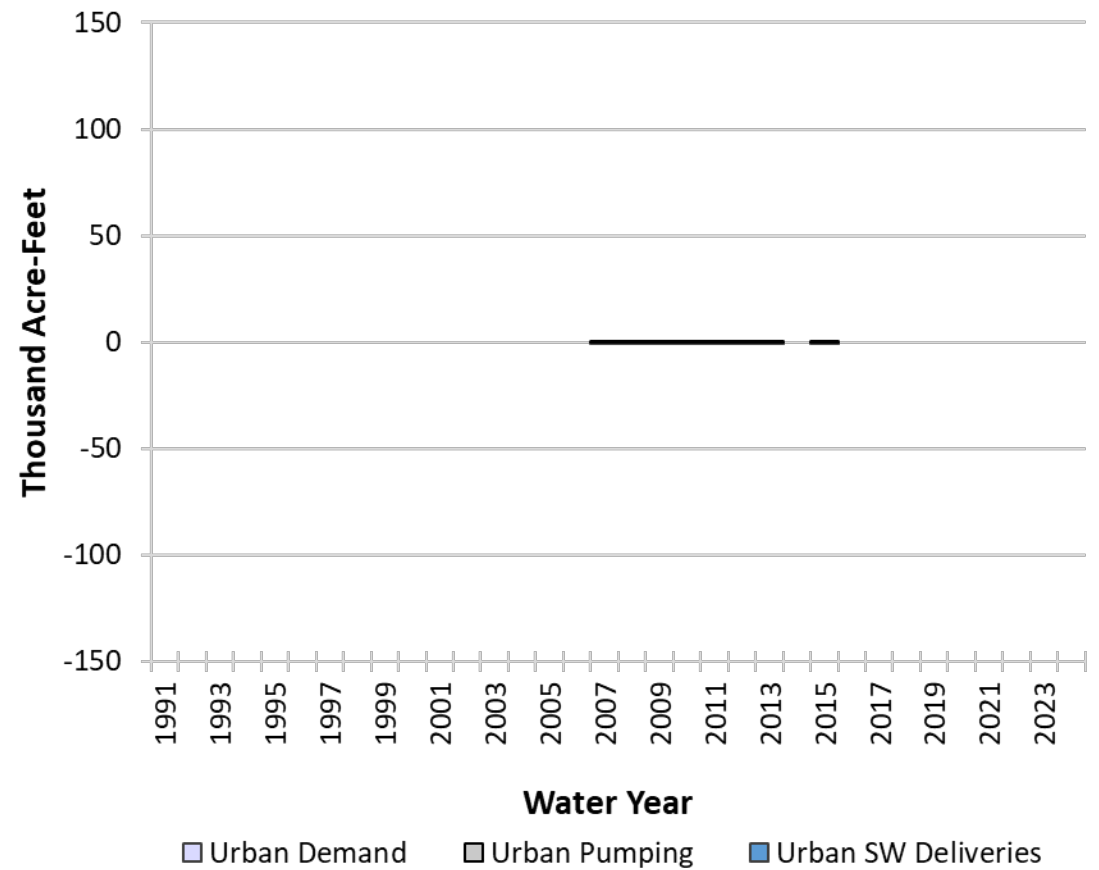
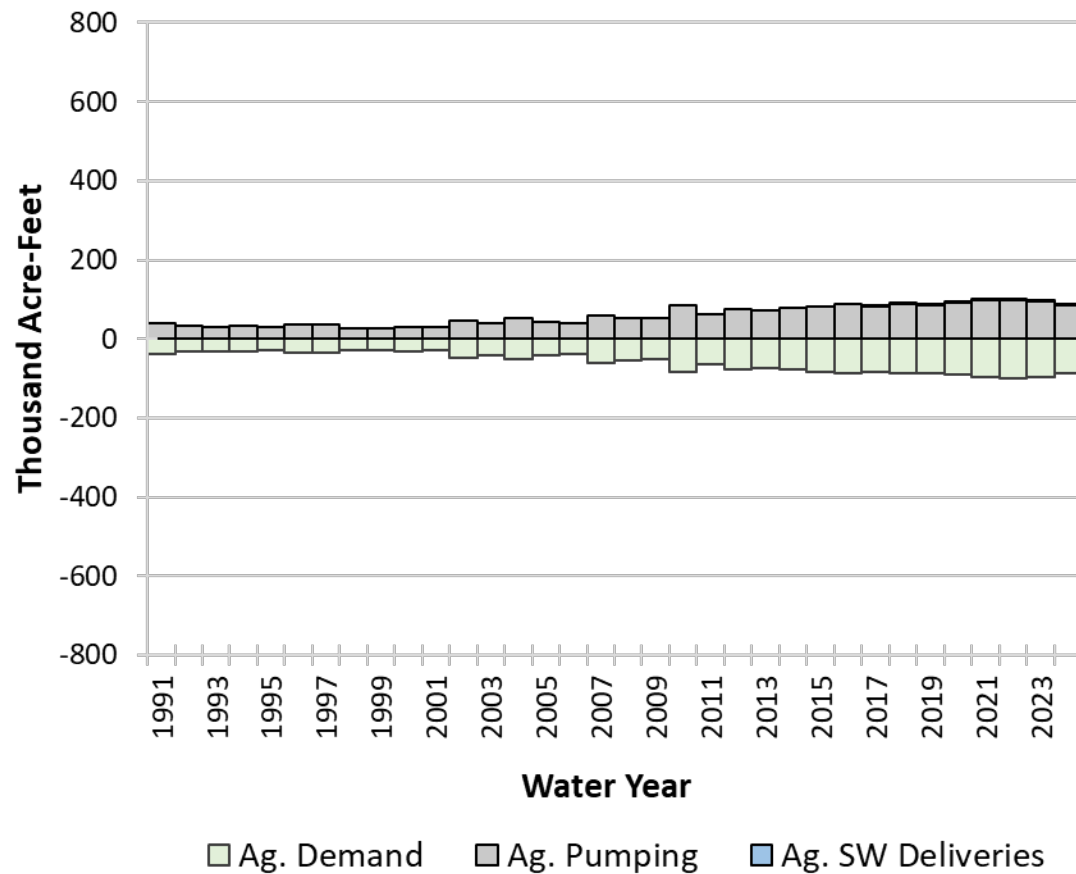


Groundwater Pumping Deep Percolation Canal and Reservoir Recharge

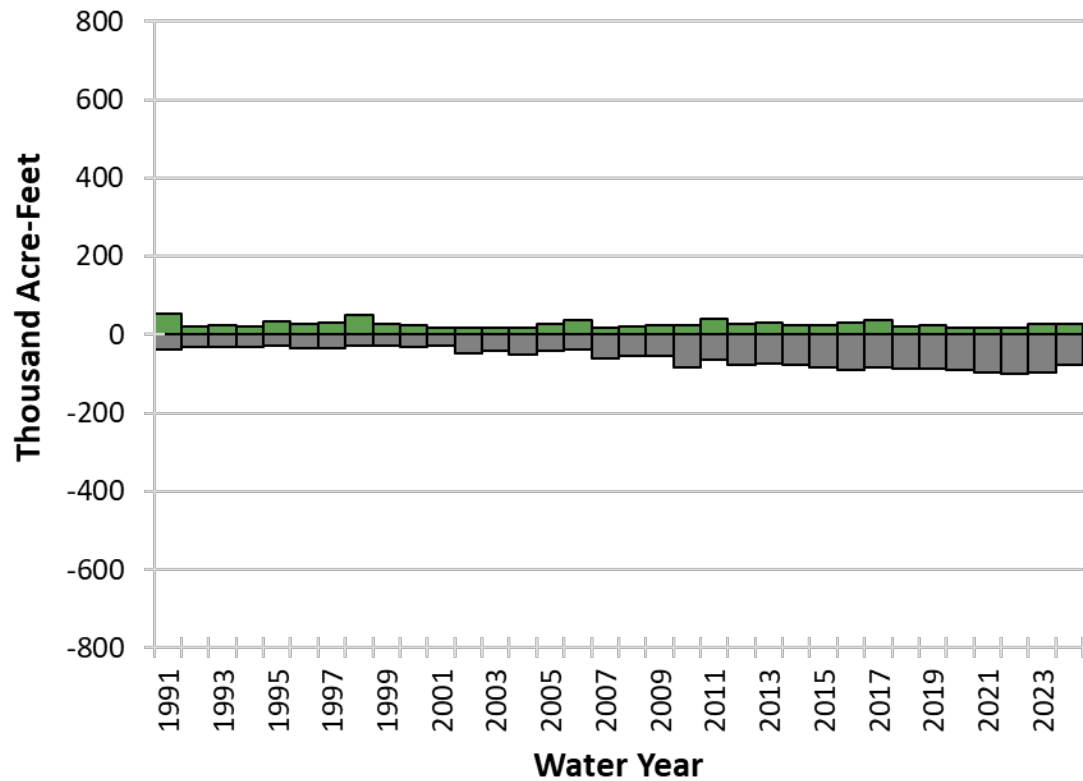


Net Recharge

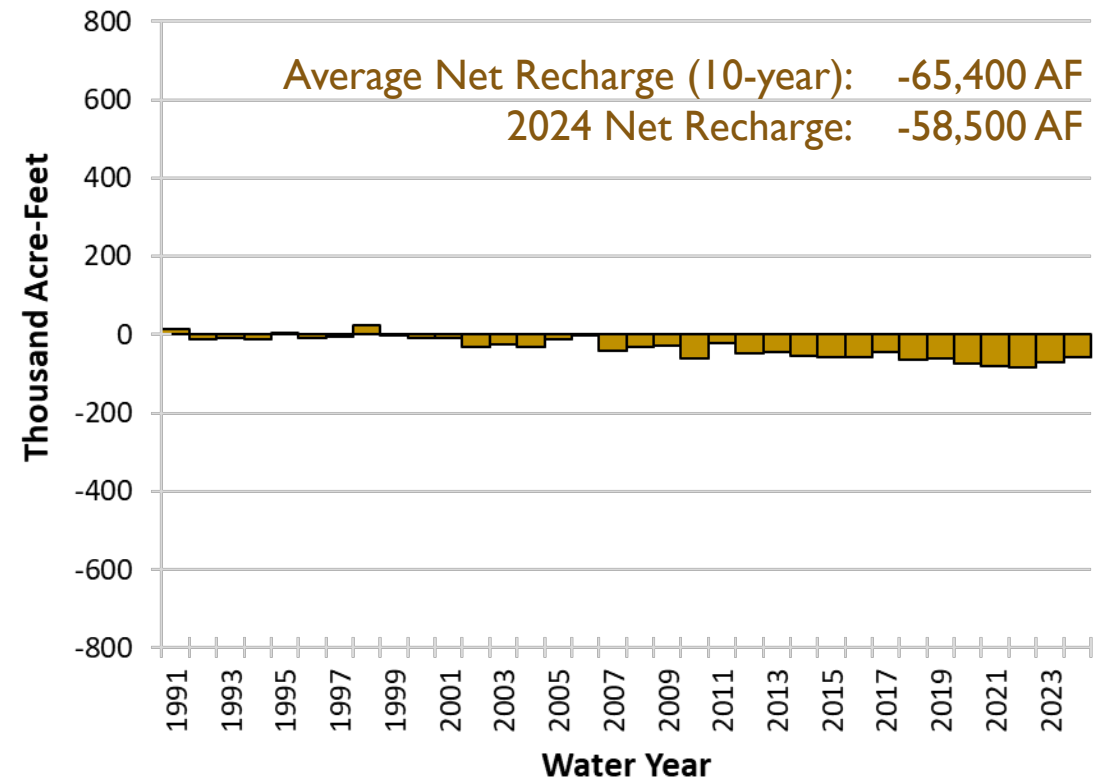
# NON-DISTRICT EAST: LAND AND WATER USE



# NON-DISTRICT EAST: OPERATIONAL BUDGET



Groundwater Pumping Deep Percolation Canal and Reservoir Recharge



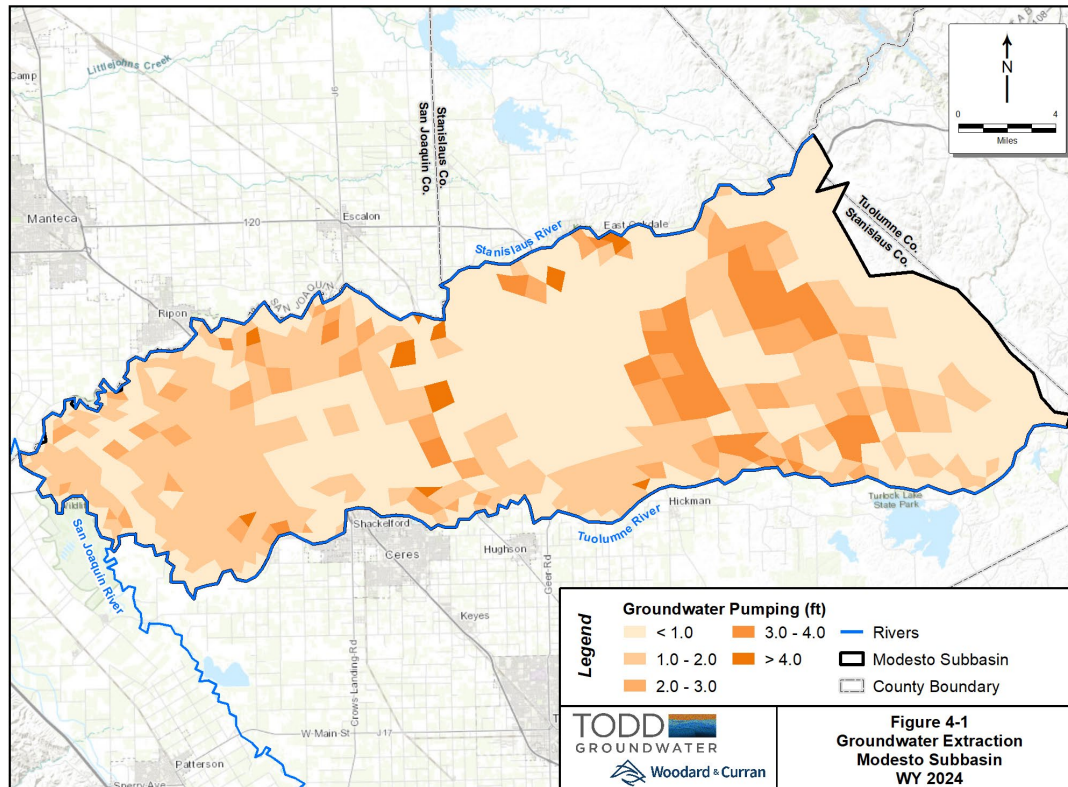
Average Net Recharge (10-year): -65,400 AF  
2024 Net Recharge: -58,500 AF

Net Recharge

# GROUNDWATER PUMPING – SUBBASIN

## Water Year 2024

- Pumping
    - Ag Agency 10,000 AF
    - Ag Private 201,000 AF
    - Urban Agency 35,500 AF
    - Urban Private 14,300 AF
    - **Total 260,800 AF**
- 1.1 ft**





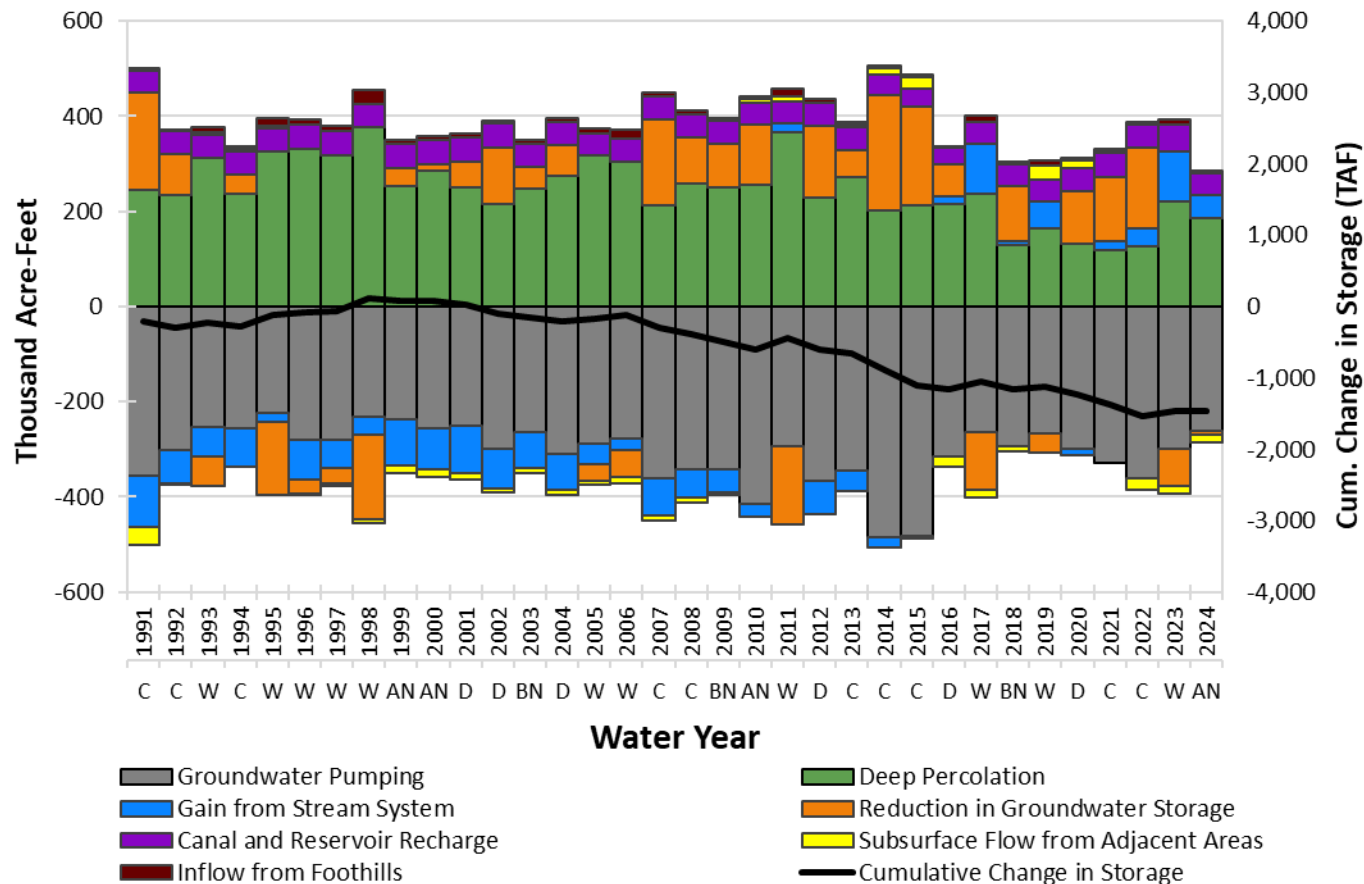


# MODEL RESULTS

## CHANGE IN STORAGE

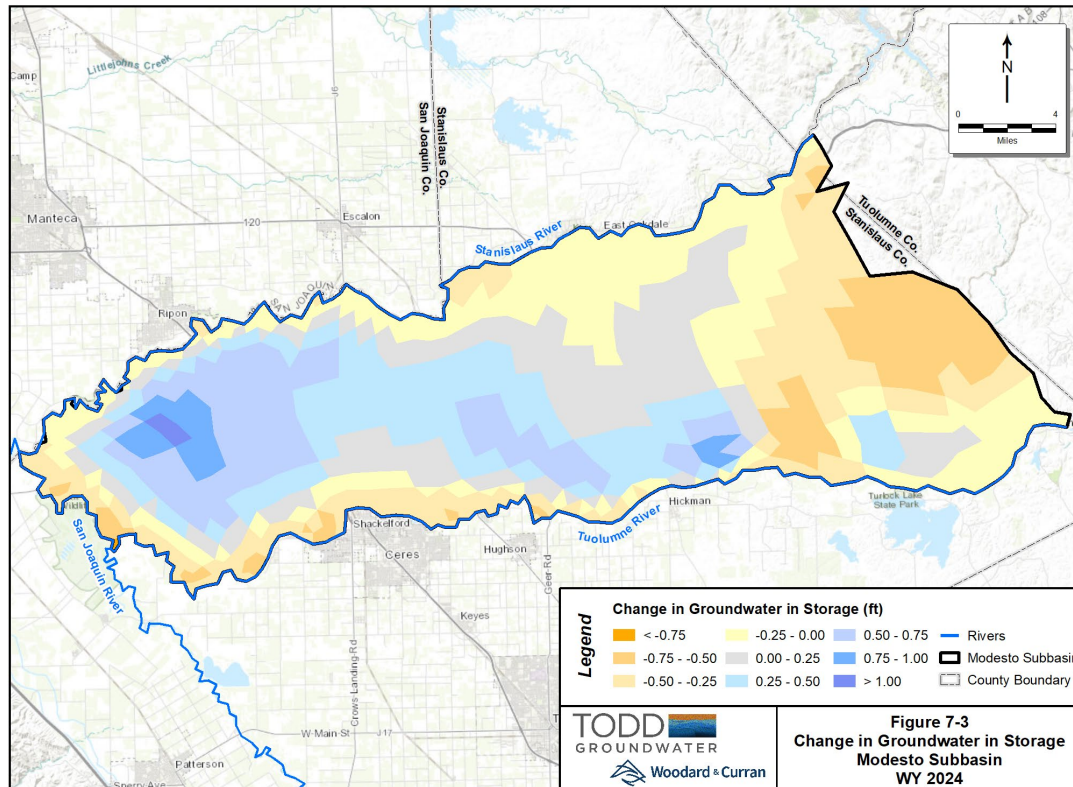


# MODESTO SUBBASIN: GROUNDWATER BUDGET



# CHANGE IN STORAGE – SUBBASIN

## Water Year 2024



## Change in Storage (AF)

■ Subbasin	+7,800
■ Western Upper	+3,500
■ Western Lower	+11,700
■ Eastern	-7,400

## Change in Storage (ft)

■ Subbasin	0.0
■ Western Upper	+0.1
■ Western Lower	+0.2
■ Eastern	0.0

# CHANGE IN STORAGE – WESTERN UPPER PRINCIPAL AQUIFER

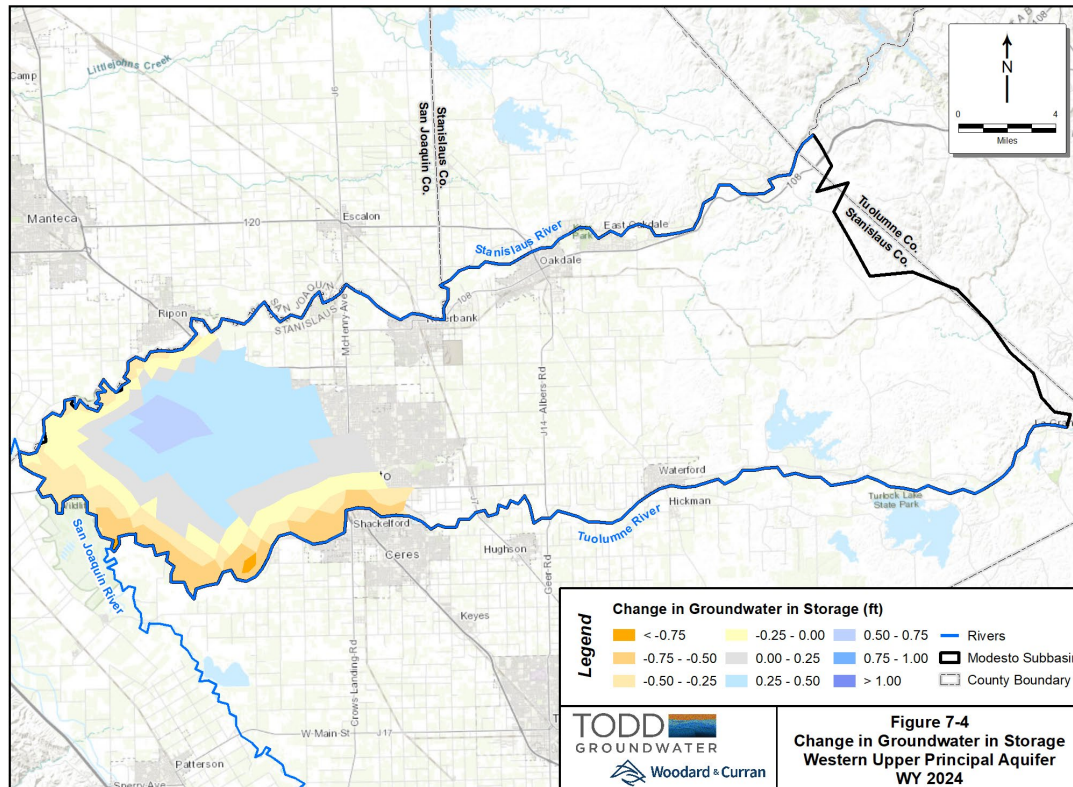
## Water Year 2024

### Change in Storage (AF)

■ Subbasin	+7,800
■ <b>Western Upper</b>	<b>+3,500</b>
■ Western Lower	+11,700
■ Eastern	-7,400

### Change in Storage (ft)

■ Subbasin	0.0
■ <b>Western Upper</b>	<b>+0.1</b>
■ Western Lower	+0.2
■ Eastern	0.0





# CHANGE IN STORAGE – WESTERN LOWER PRINCIPAL AQUIFER

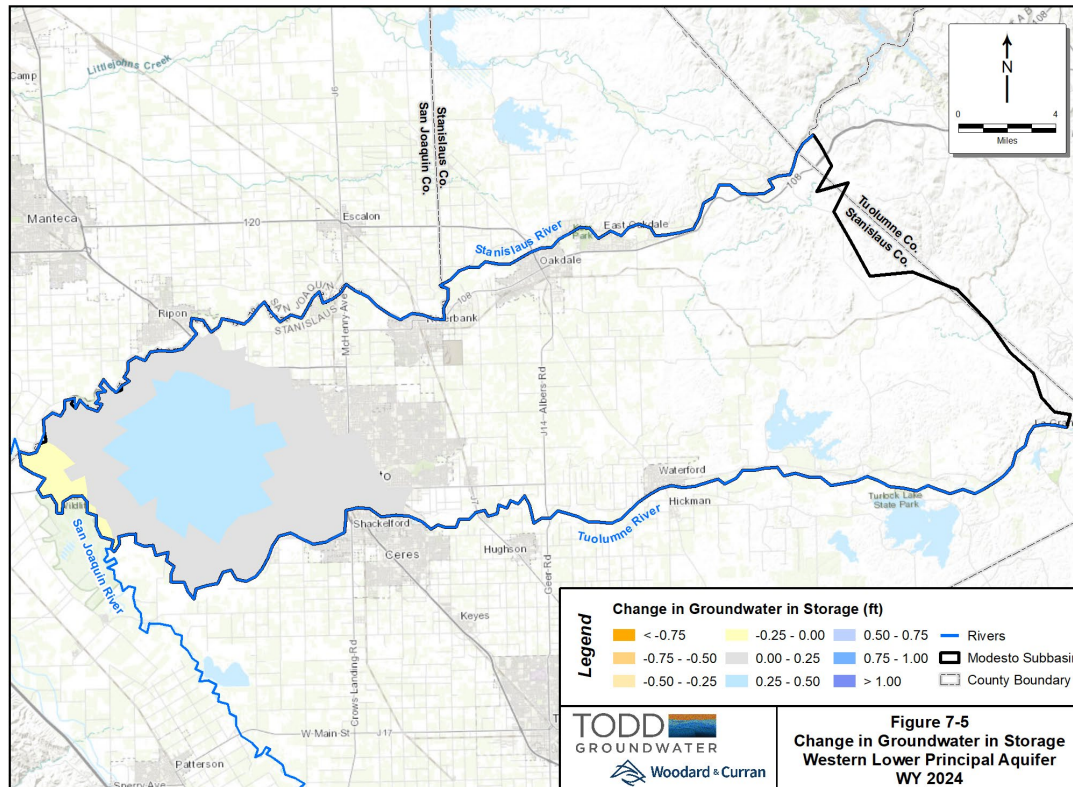
## Water Year 2024

### Change in Storage (AF)

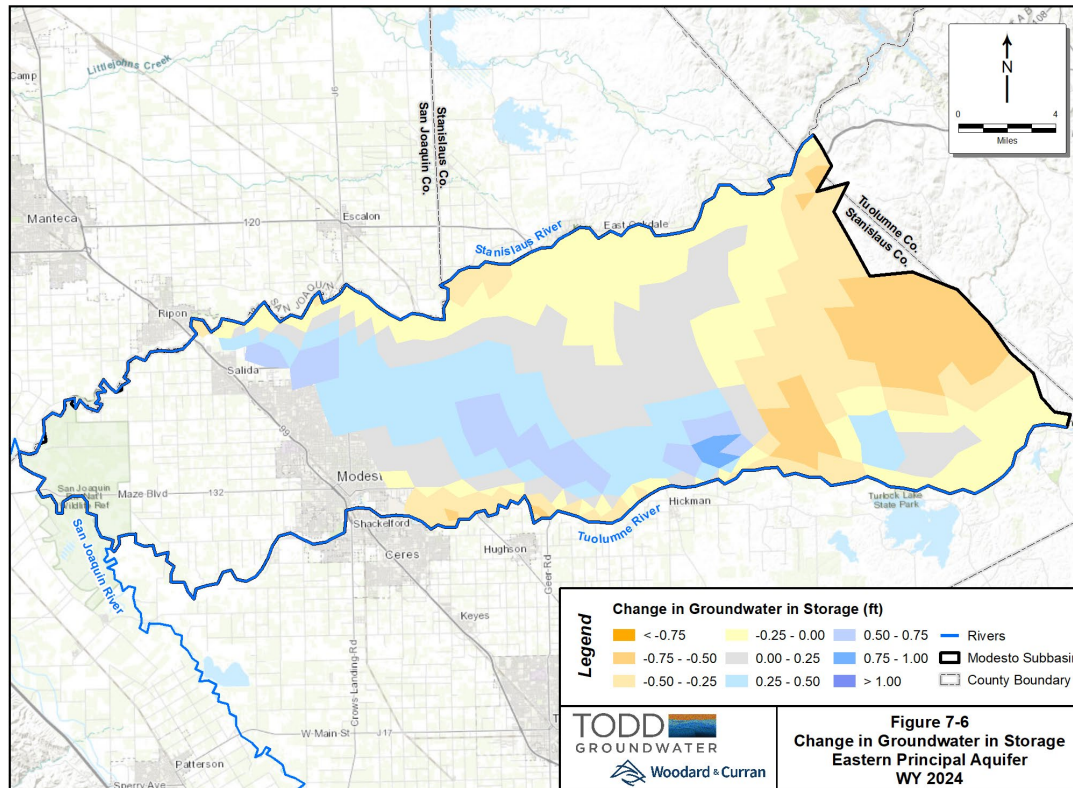
■ Subbasin	+7,800
■ Western Upper	+3,500
■ <b>Western Lower</b>	<b>+11,700</b>
■ Eastern	-7,400

### Change in Storage (ft)

■ Subbasin	0.0
■ Western Upper	+0.1
■ <b>Western Lower</b>	<b>+0.2</b>
■ Eastern	0.0



# CHANGE IN STORAGE – EASTERN PRINCIPAL AQUIFER



## Water Year 2024

### Change in Storage (AF)

■ Subbasin	+7,800
■ Western Upper	+3,500
■ Western Lower	+11,700
■ <b>Eastern</b>	<b>-7,400</b>

### Change in Storage (ft)

■ Subbasin	0.0
■ Western Upper	+0.1
■ Western Lower	+0.2
■ <b>Eastern</b>	<b>0.0</b>

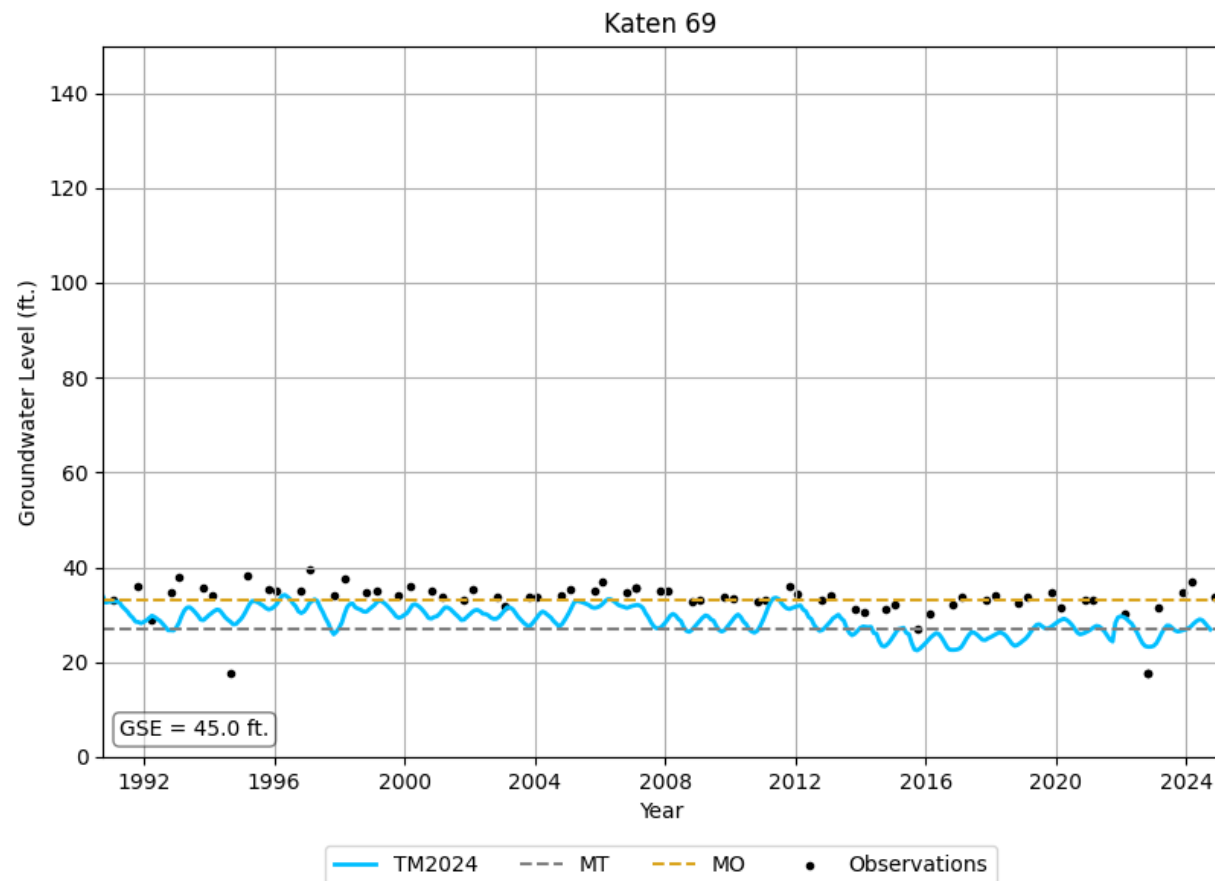


# MODEL RESULTS

## HYDROGRAPHS

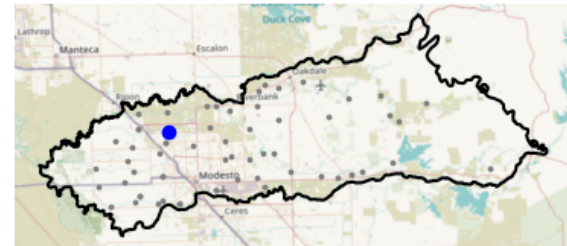
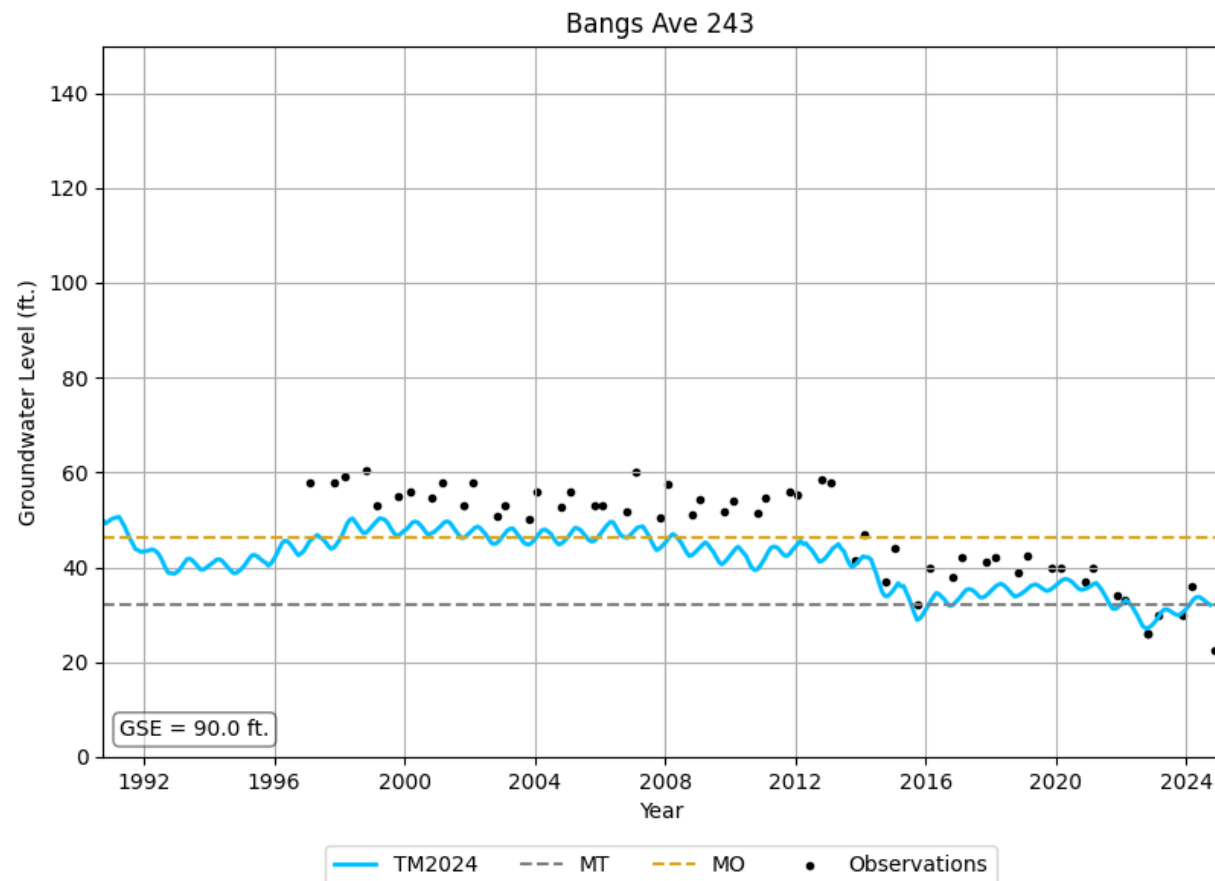


# GROUNDWATER LEVEL HYDROGRAPHS

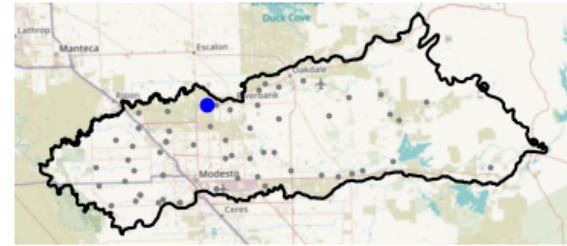
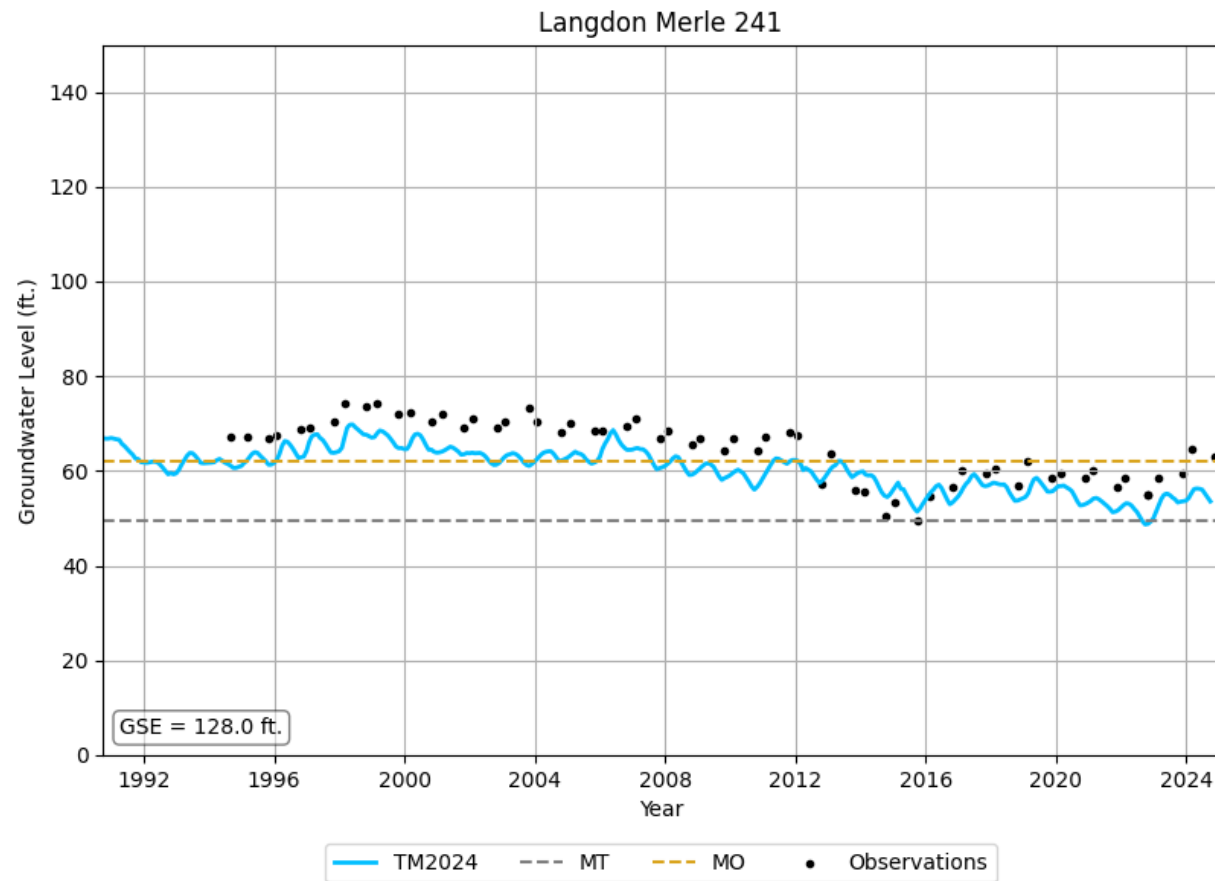




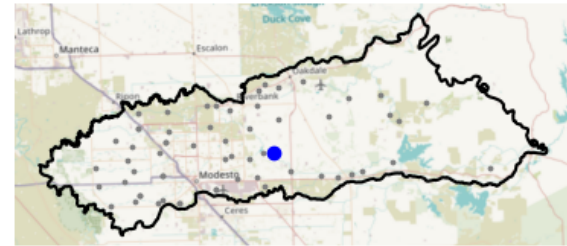
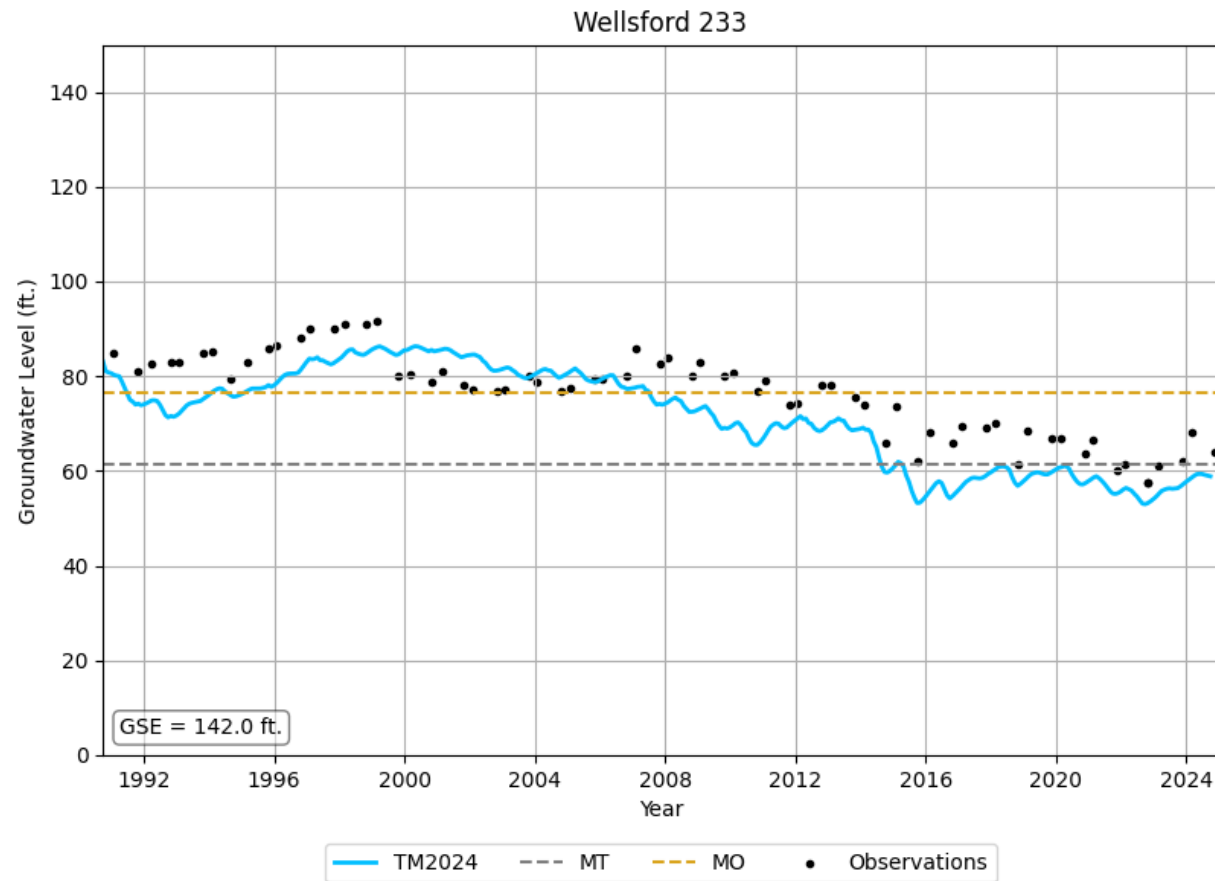
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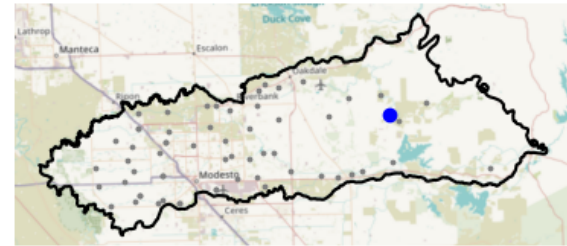
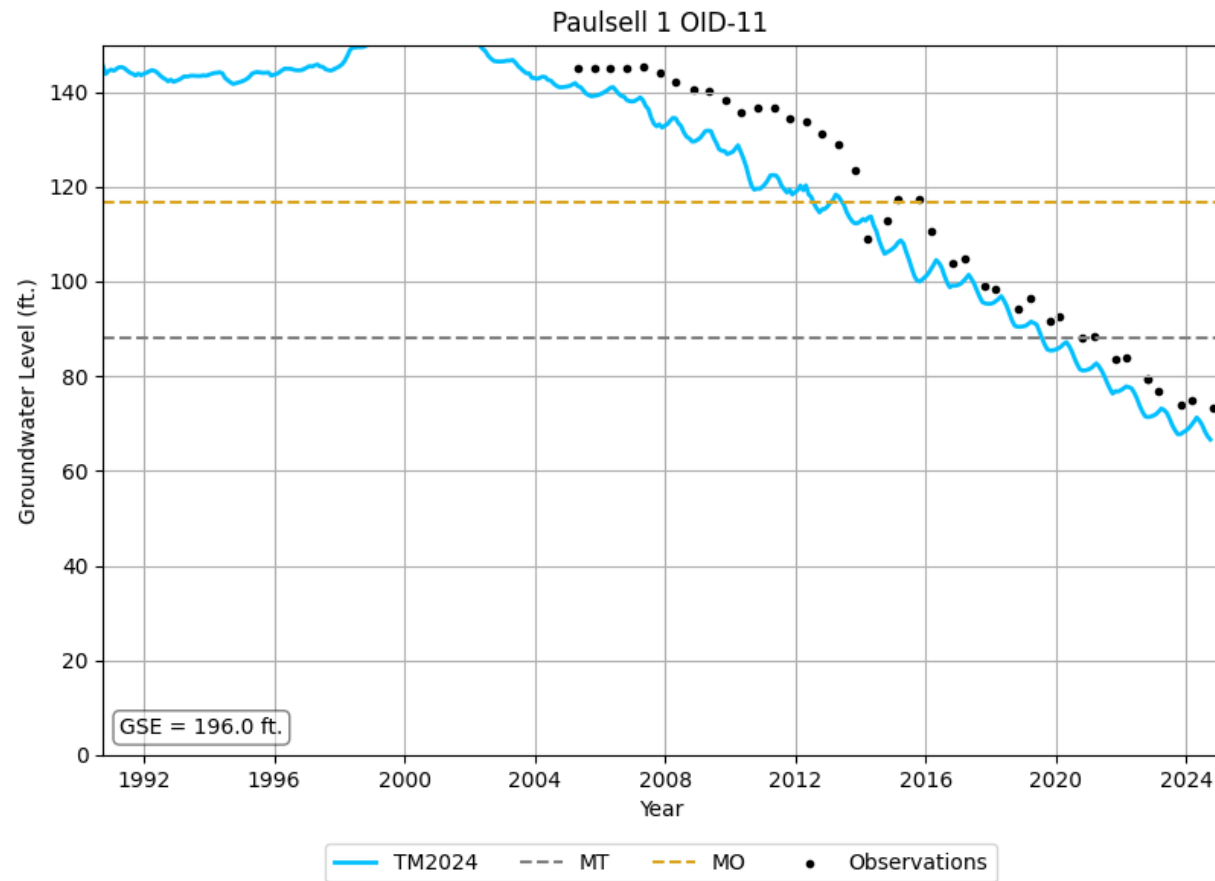
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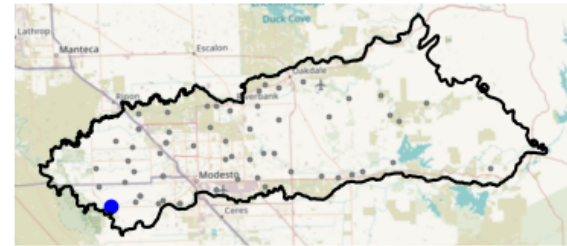
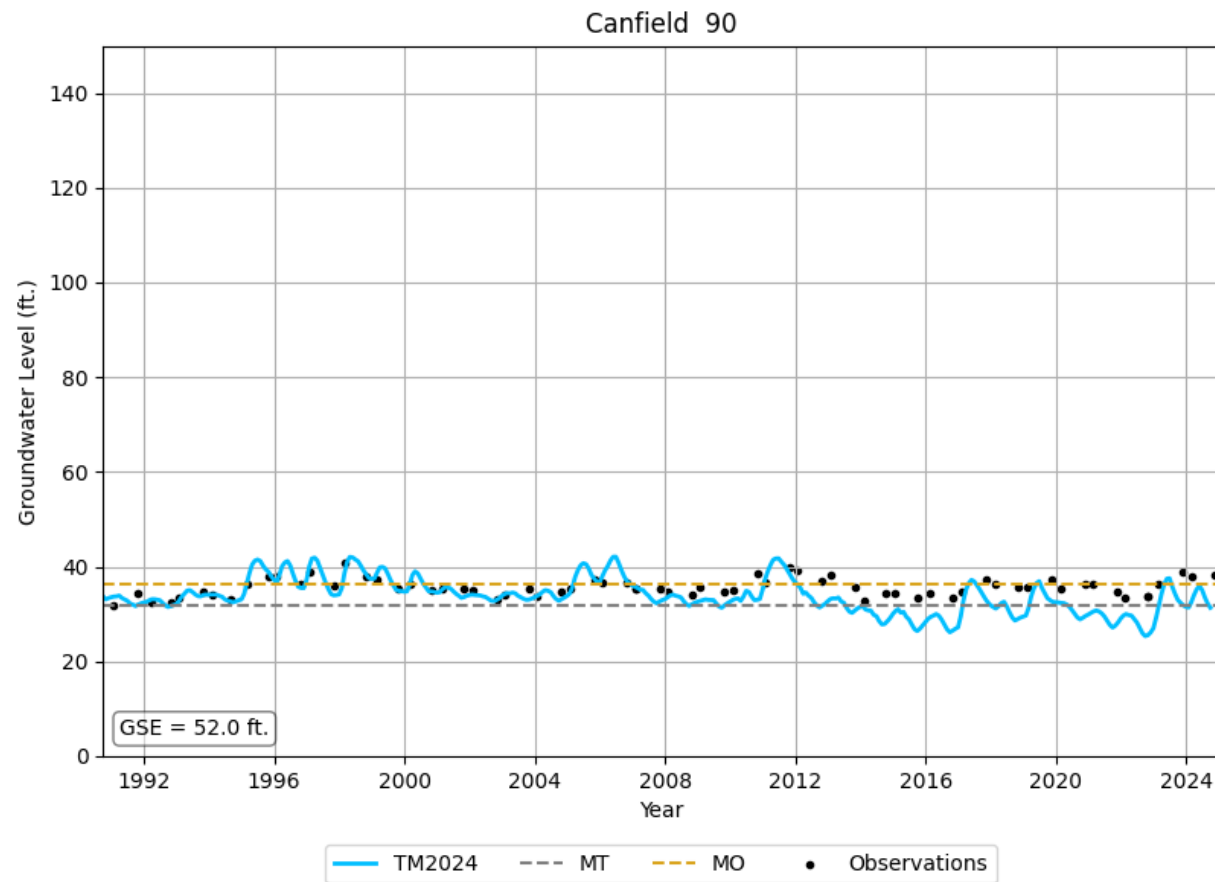
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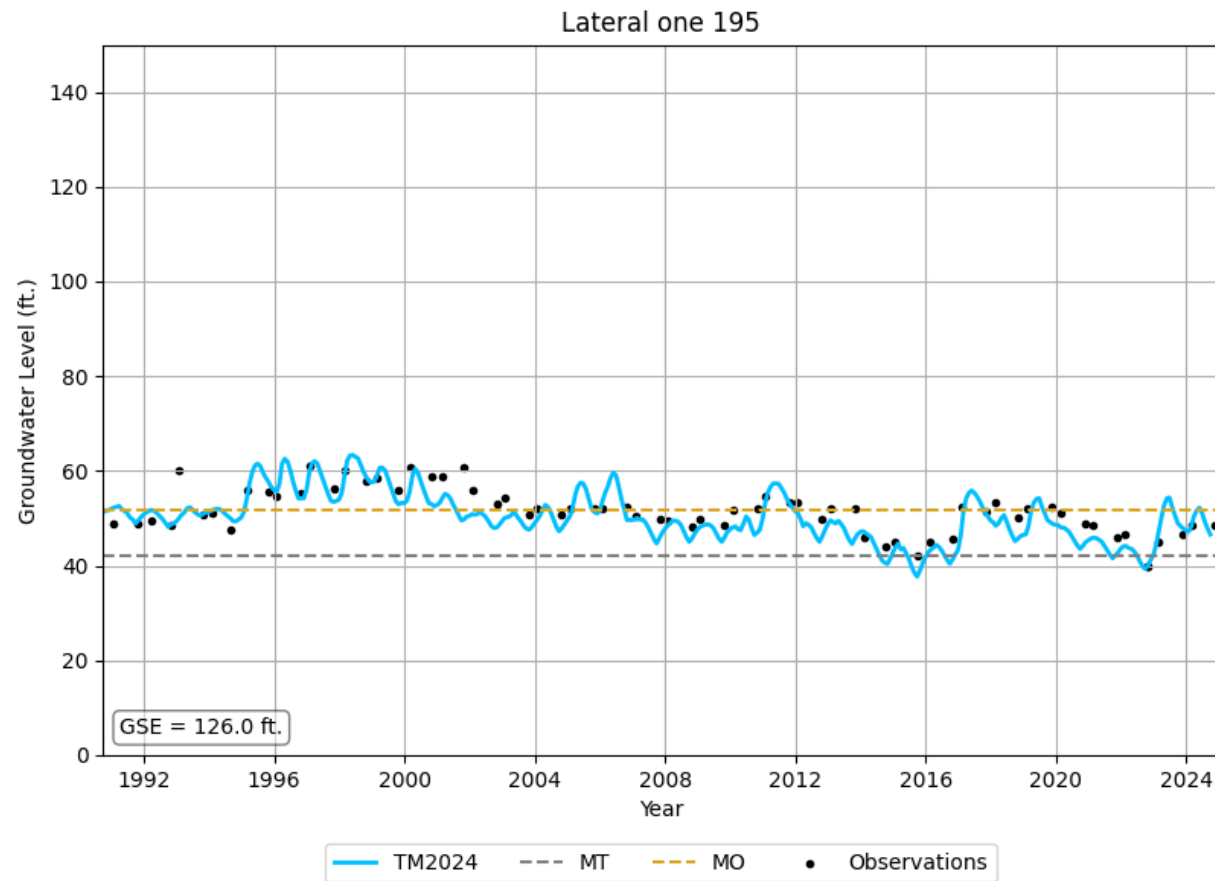
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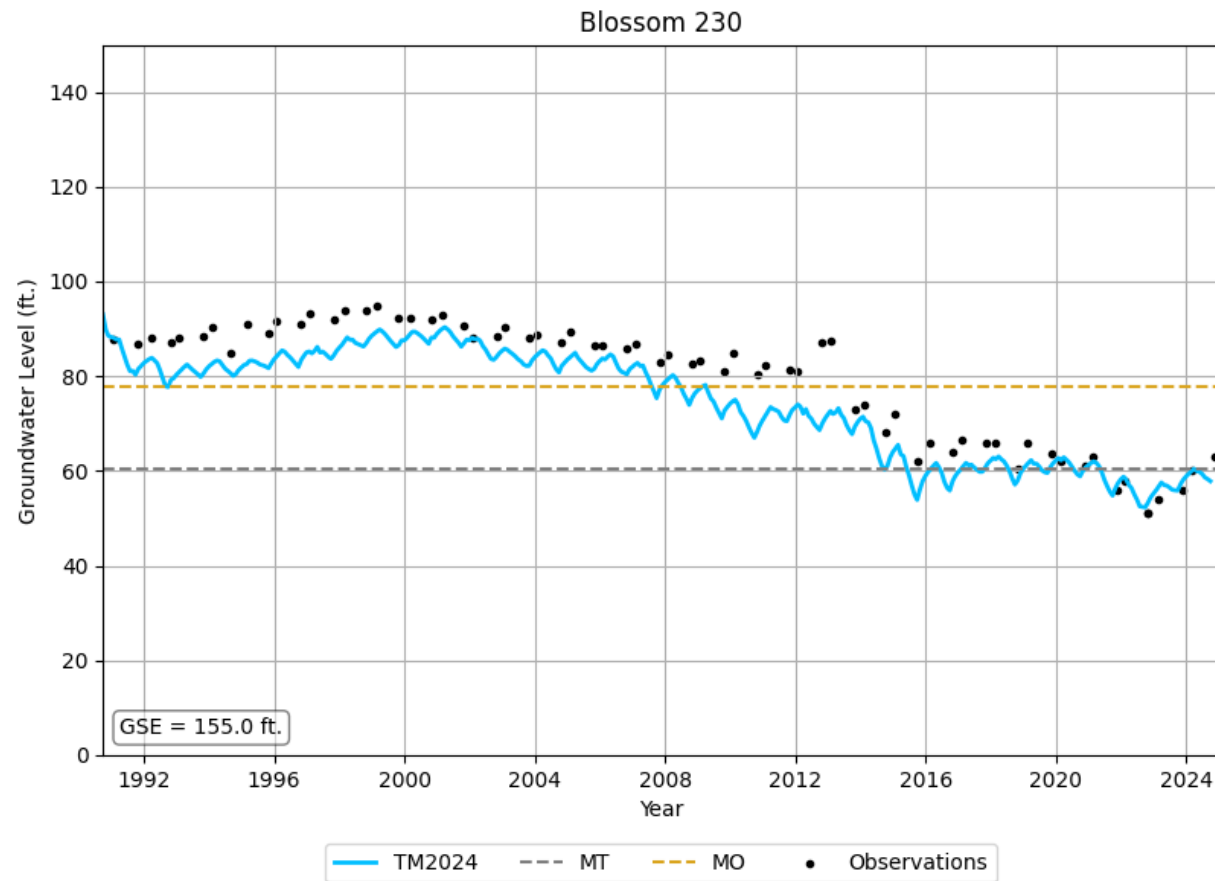
# GROUNDWATER LEVEL HYDROGRAPHS



# GROUNDWATER LEVEL HYDROGRAPHS



# GROUNDWATER LEVEL HYDROGRAPHS





# QUESTIONS?

