TURLOCK GSP

PROJECTED CONDITIONS BASELINE

JOINT TECHNICAL ADVISORY COMMITTEES (TACs) MEETING

DECEMBER 17, 2020

Meeting Agenda

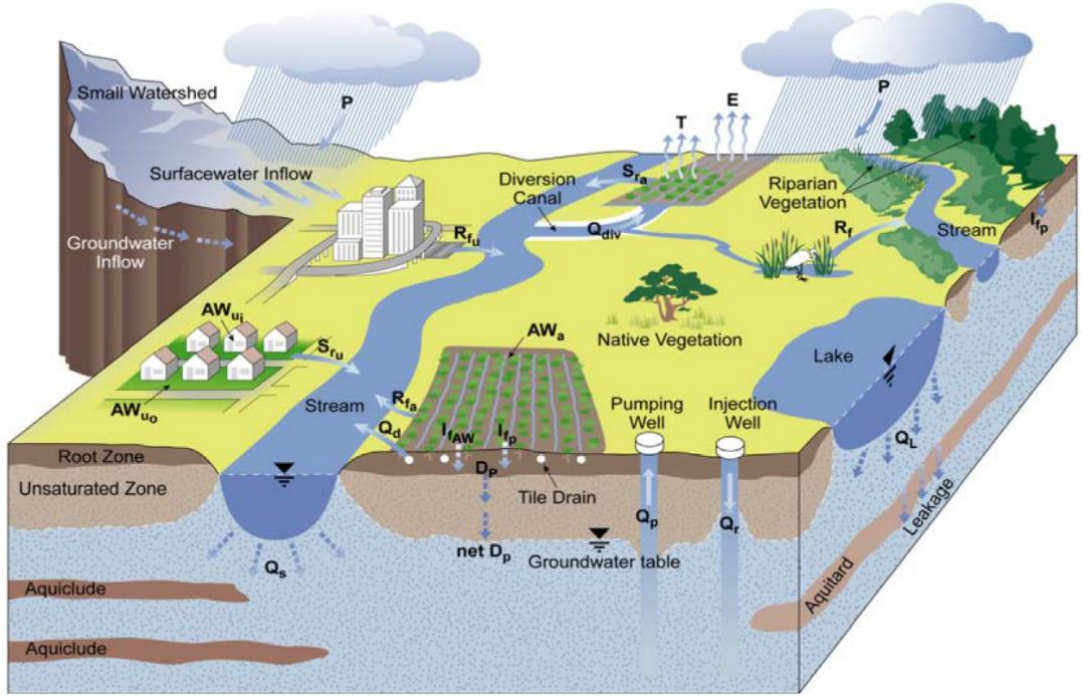
- **Meeting Goals:**
  - Review of the Baseline Conditions Integrated Modeling Results

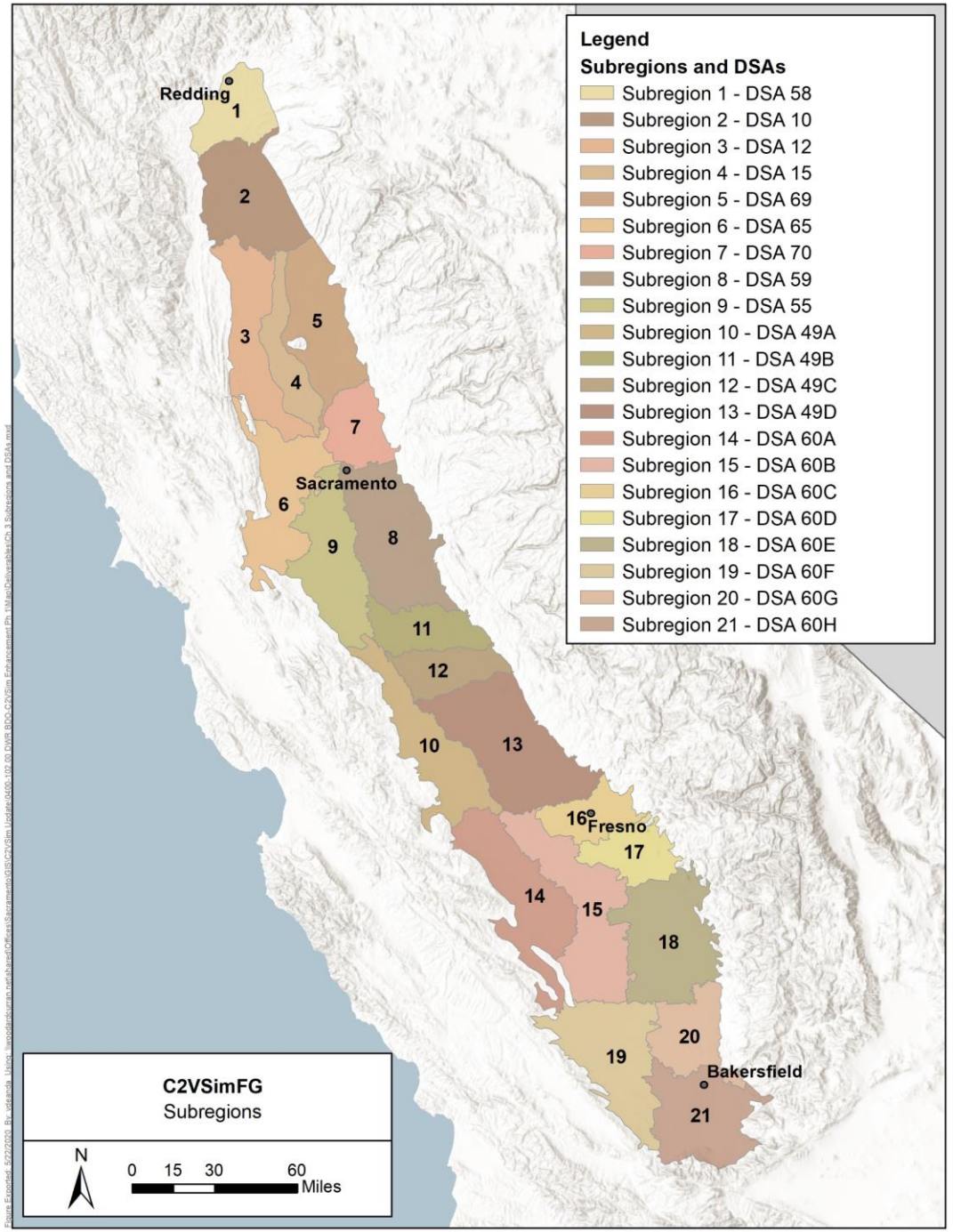
- Water Budgets
  - By Subbasin
  - By Each GSA
- Groundwater Levels
  - GW Elevation Contours
  - GW Level Hydrographs

What is C2VSimFG?

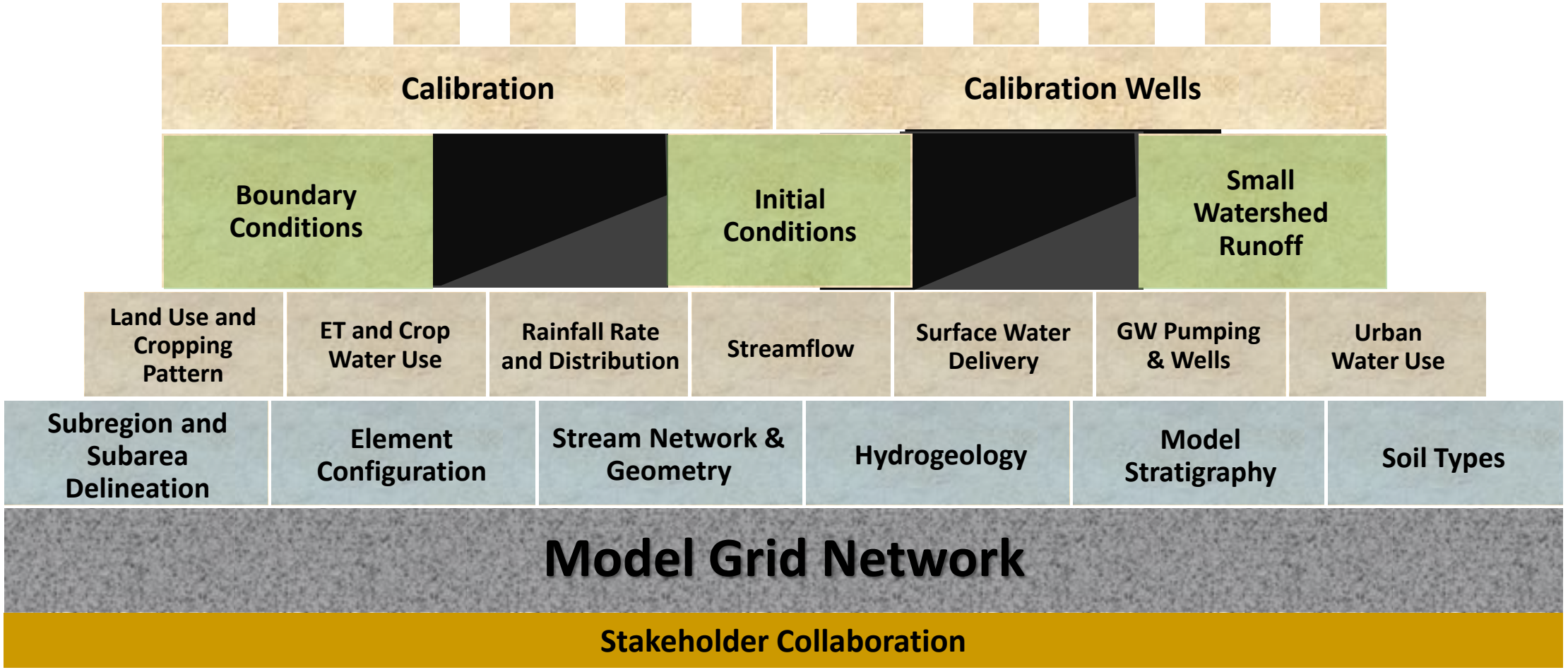
VISION

To better understand the historical evolution of water resources in the Central Valley and planning of future water management programs at the regional level under different land use development and climatic conditions.

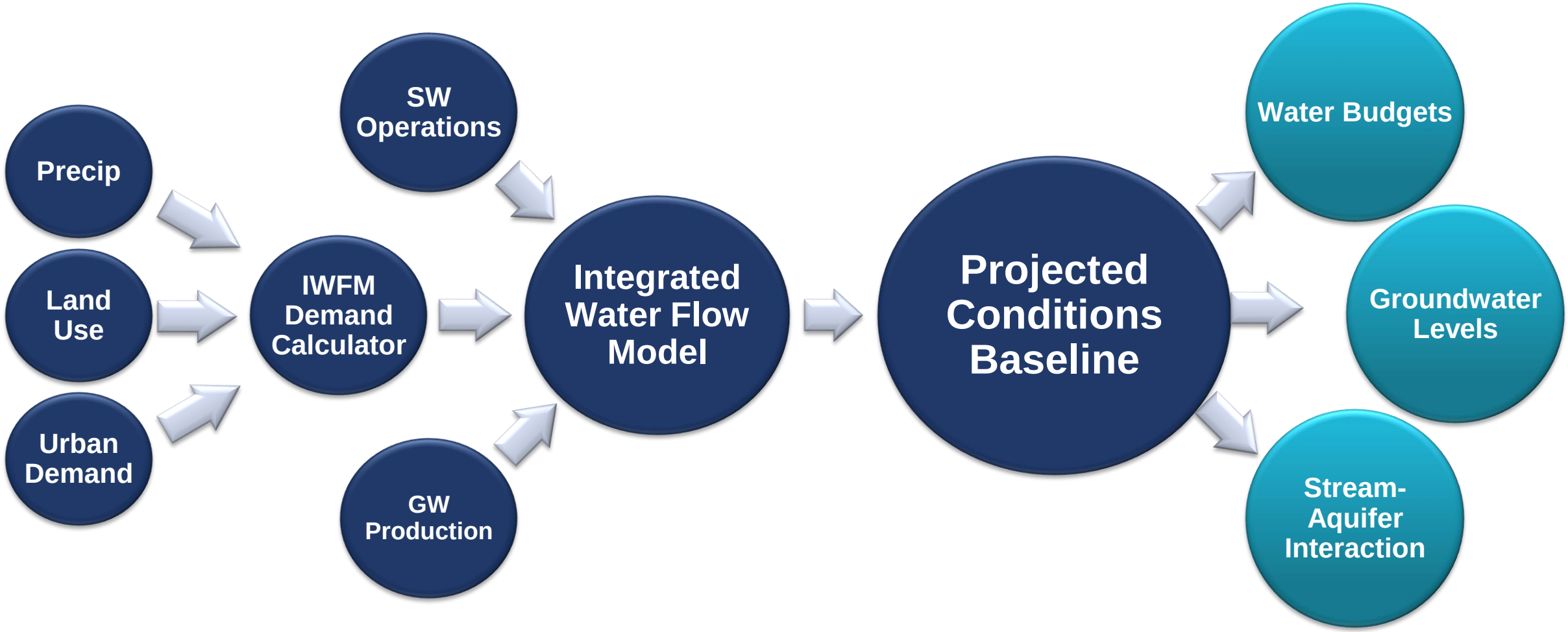




C2VSimTM Model Data Sets



C2VSimTM Baseline Development



Water Budgets: Defining Time Frames

To Be Analyzed in Q1-21

Historical Conditions

Historical
* Land use
* Water use
* Hydrology

Current Conditions

Current
* Land use
* Water use

Historical
* Hydrology

Projected Conditions

Projected
* Land use
* Water use

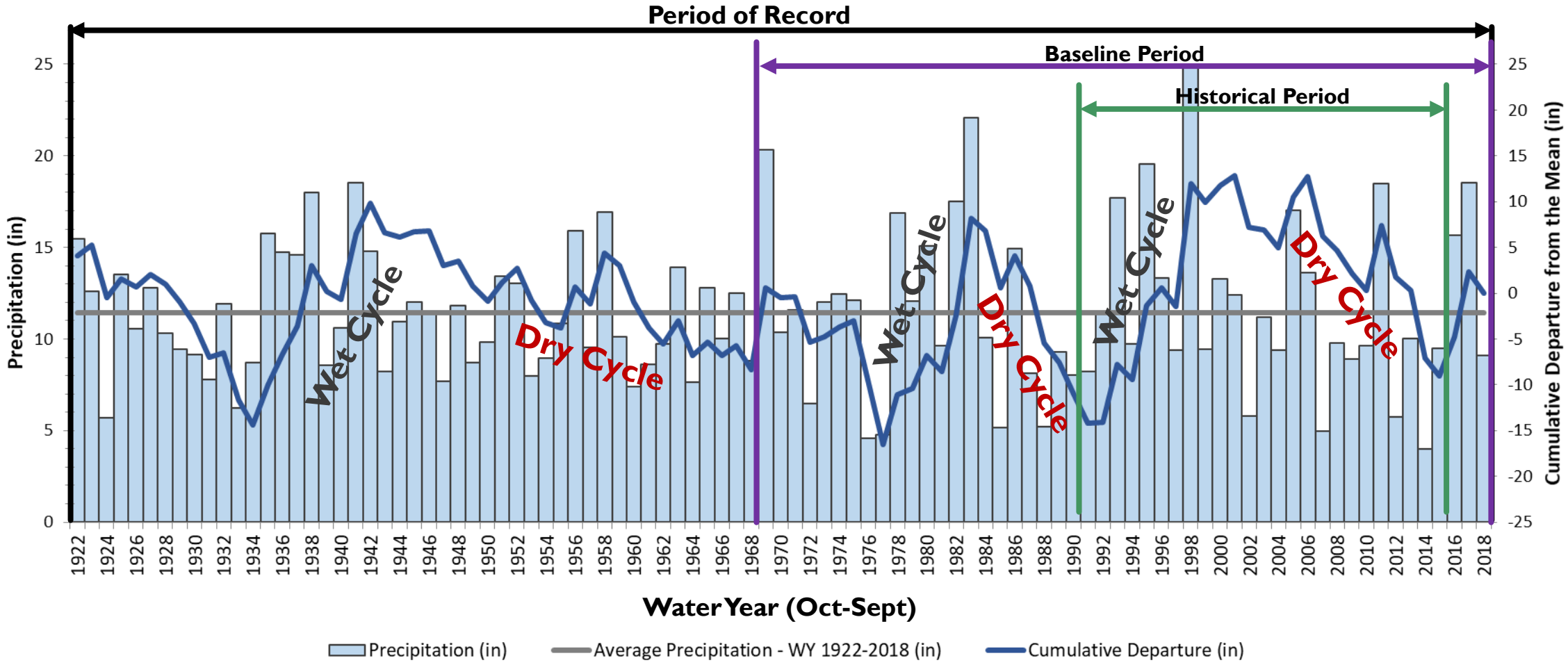
Historical
* Hydrology

Projected with Climate Change

Projected
* Land use
* Water use

Projected
* Hydrology

Historical & Baseline Hydrologic Period



Turlock Subbasin GSP Baseline Assumptions

Baseline Feature	Projected Conditions
Hydrologic Conditions	50-Yr Hydrology (Same as WY 1969-2018)
Land Use	Held constant using 2015 land use and cropping patterns
Ag. Demand	Estimated by model reflective of land use with modern irrigation practices
Ag. Surface Water Supply	Surface water supplies as reported by TID's reservoir operations Model (TRS)
Ag. Groundwater Supply	Groundwater supply estimated to meet demand not otherwise met by surface water
Urban Demand	Projected urban demand based on 2015 UWMPs or other planning documents
Municipal RW Supplies	Projected urban demand based on 2015 UWMPs or other planning documents
Municipal GW Supplies	Projected urban groundwater based on 2015 UWMPs distributed to existing wells
Municipal Wells	Current facilities in place and proposed wells when information available

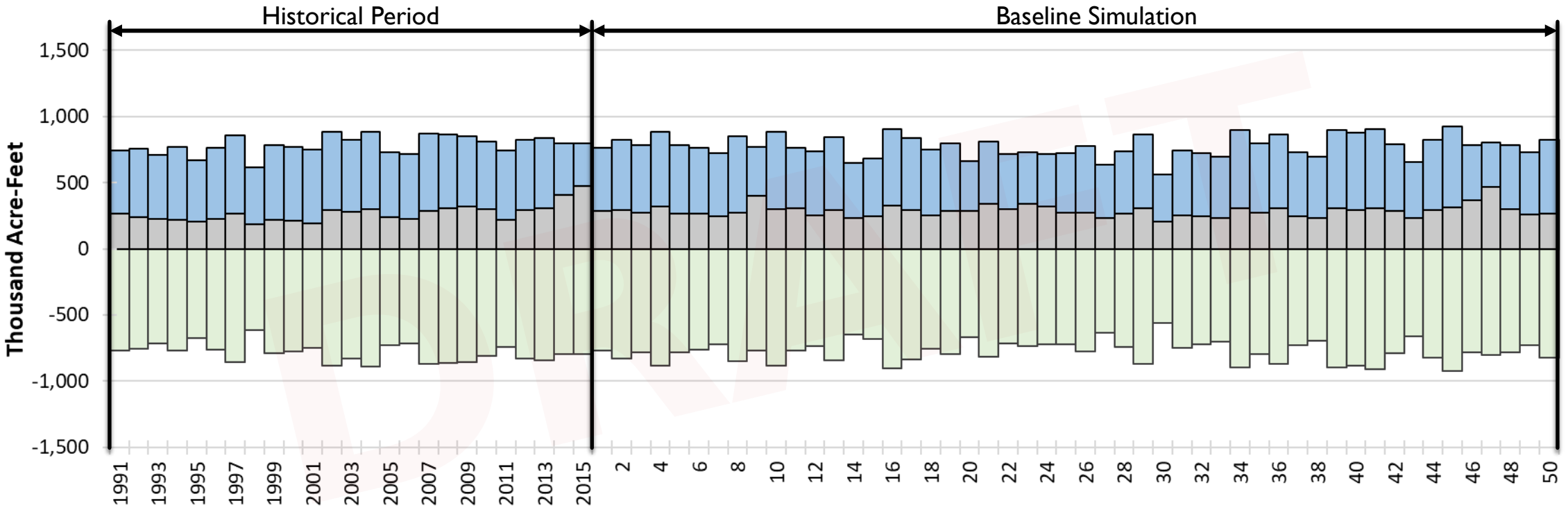
Land & Water Use Budgets

Projected Conditions Baseline

WOODARD &CURRAN

TODD GROUNDWATER

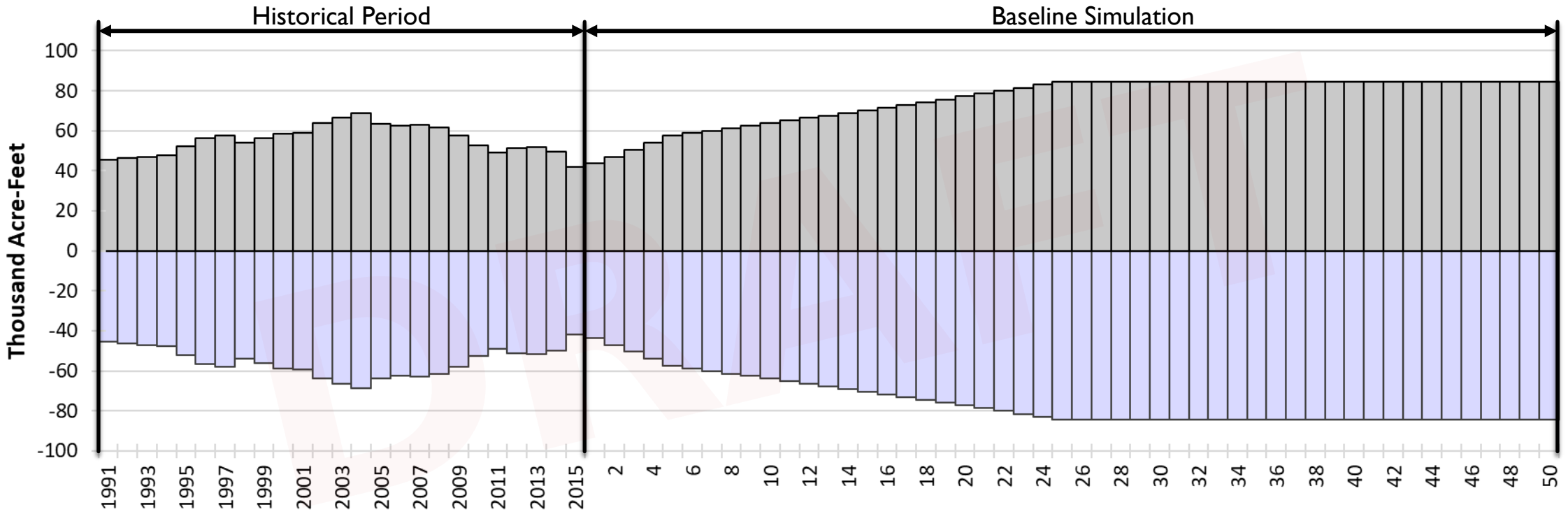
Land & Water Use: Turlock Subbasin



Notes:

1. Baseline period uses the hydrology from WY1969-2018, representing a 50-year hydrologic period required by the GSP regulations
2. Projected ag demand is estimated based on the 2015 land use and cropping patterns and monthly hydrologic data for the 50-yr period, and current irrigation practices
3. Ag deliveries include surface water and groundwater supplied by irrigation districts through the irrigation conveyance network
4. Ag pumping consists of includes private (non-district) groundwater pumping

Land & Water Use: Turlock Subbasin



Notes:

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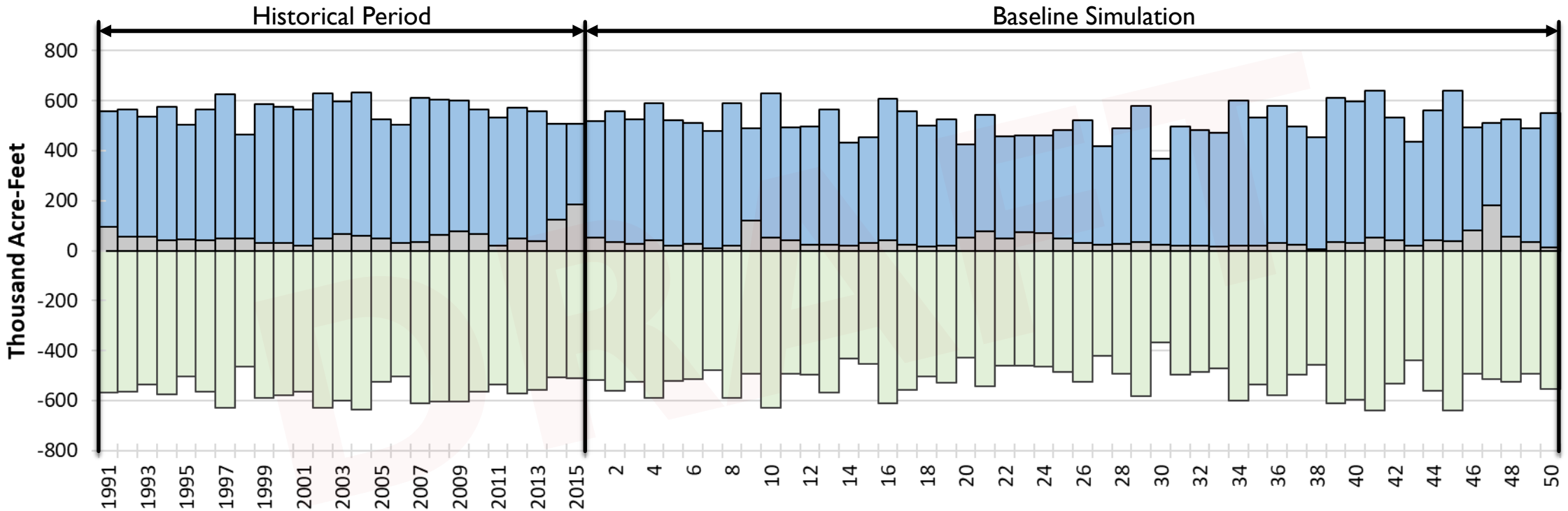
2. Projected urban demands are estimated based on the per-capita water use and population projections through 2040, and no population growth past 2040.
3. Urban pumping consists of groundwater pumping by municipalities and private groundwater wells across the subbasin

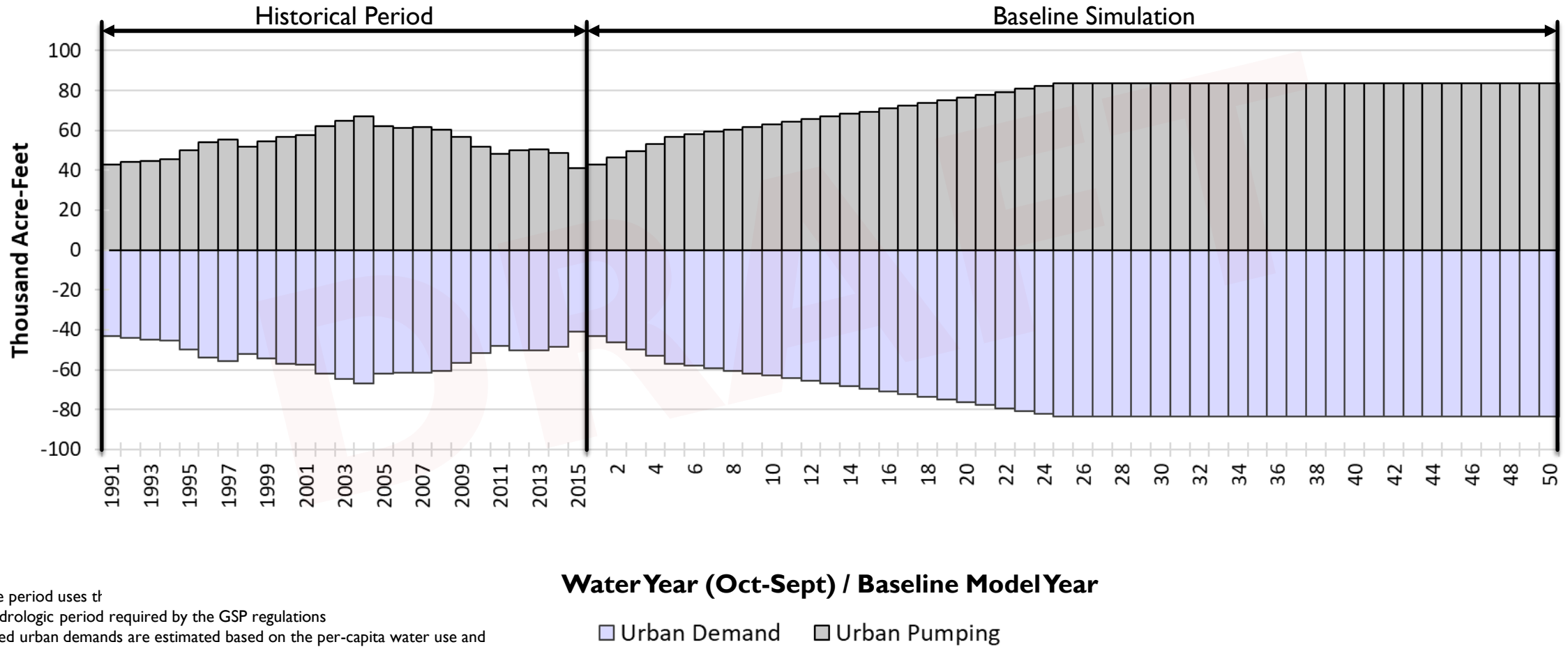
LAND & WATER USE: WTSGSA



Notes:

1. Baseline Period uses the hydrology from WY1969-2019, representing a 50-year hydrologic period required by the GSP regulations
2. Projected ag demand is estimated based on the 2015 land use and cropping patterns and monthly hydrologic data for the 50-yr period, and current irrigation practices
3. Ag deliveries include surface water and groundwater supplied by irrigation districts through the irrigation conveyance network
4. Ag pumping consists of includes private (non-district) groundwater pumping
5. Ag. deliveries include:
   - Turlock ID surface water deliveries
   - Riparian diverters
   - TID groundwater delivered as surface water
   - City of Modesto WWTP recycled water supplied for ag use

LAND & WATER USE: WTSGSA



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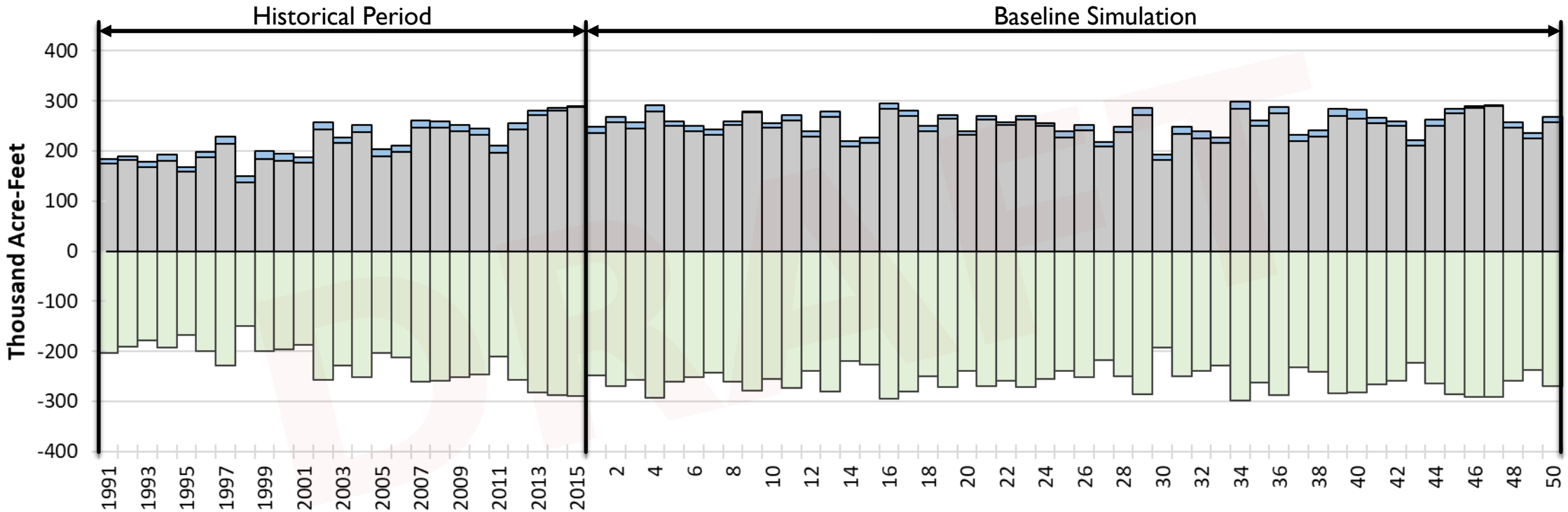
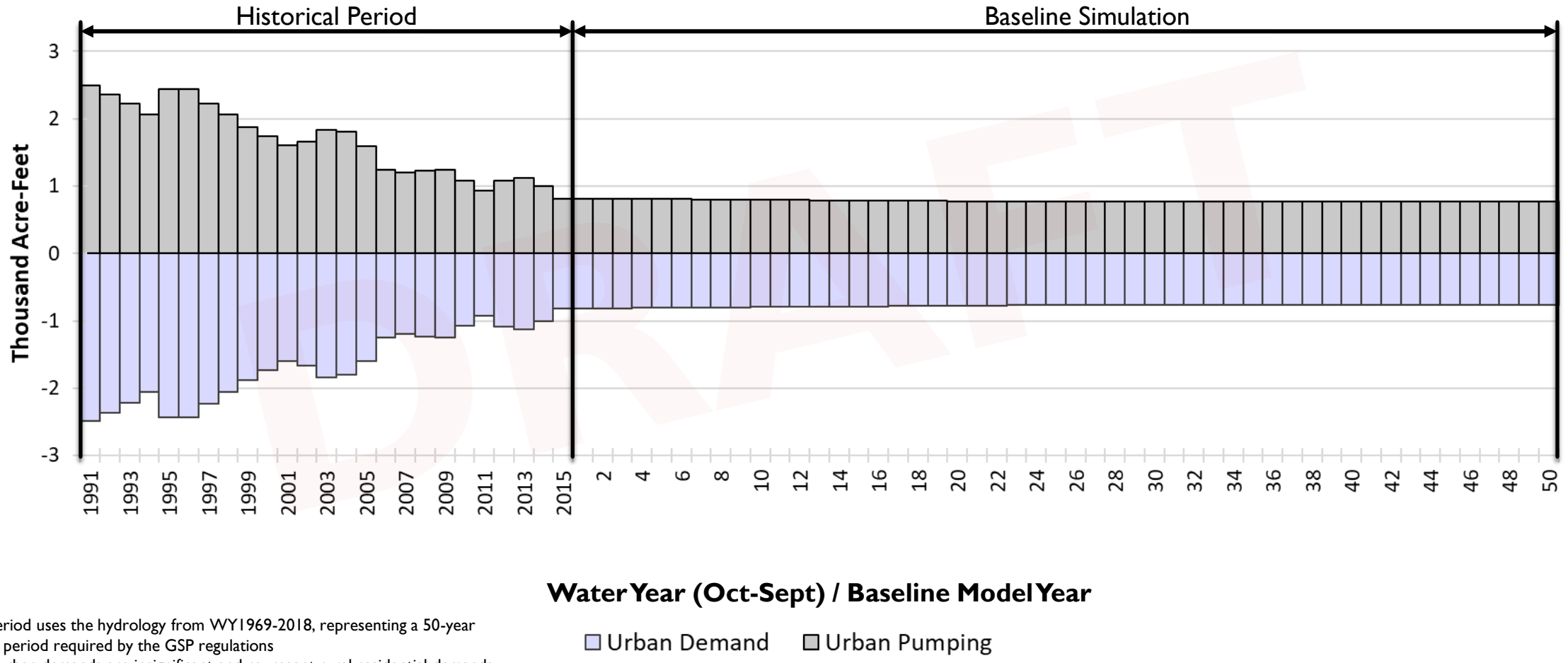
LAND & WATER USE: ETSGSA



Notes:

1. Baseline Period uses the hydrology from WY1969-2019, representing a 50-year hydrologic period required by the GSP regulations
2. Projected ag demand is estimated based on the 2015 land use and cropping patterns and monthly hydrologic data for the 50-yr period, and current irrigation practices
3. Ag Deliveries include Ag. deliveries include:
   - Merced ID surface water
   - Riparian diverters on Merced and Tuolumne Rivers
4. Ag pumping consists of includes private (non-district) groundwater pumping

LAND & WATER USE: ETSGSA



Notes:

1. Baseline Period uses the hydrology from WY1969-2018, representing a 50-year hydrologic period required by the GSP regulations
2. Projected urban demands are insignificant and represent rural residential demands estimated from the California Water Plan data
3. Urban Pumping is amount of groundwater pumped to meet the Urban Demand

Operational Water Budgets

Projected Conditions Baseline

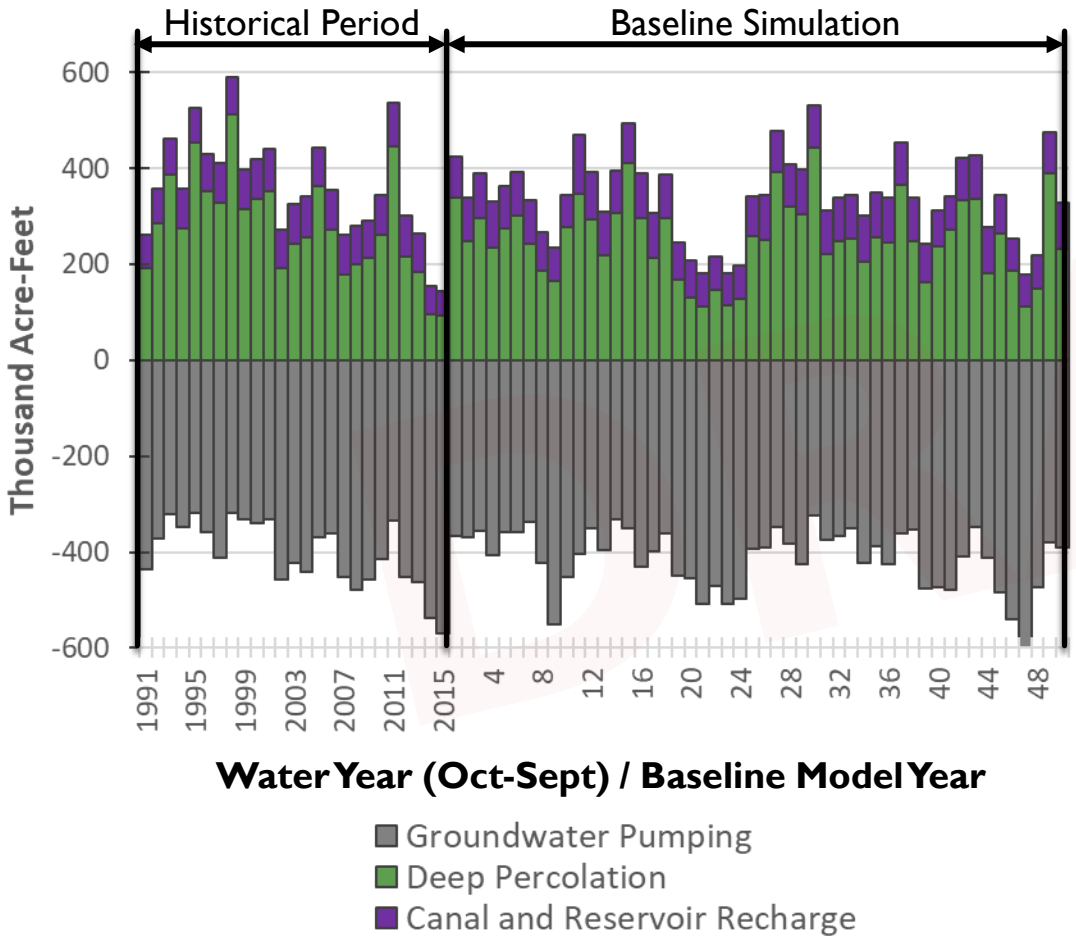
WOODARD &CURRAN

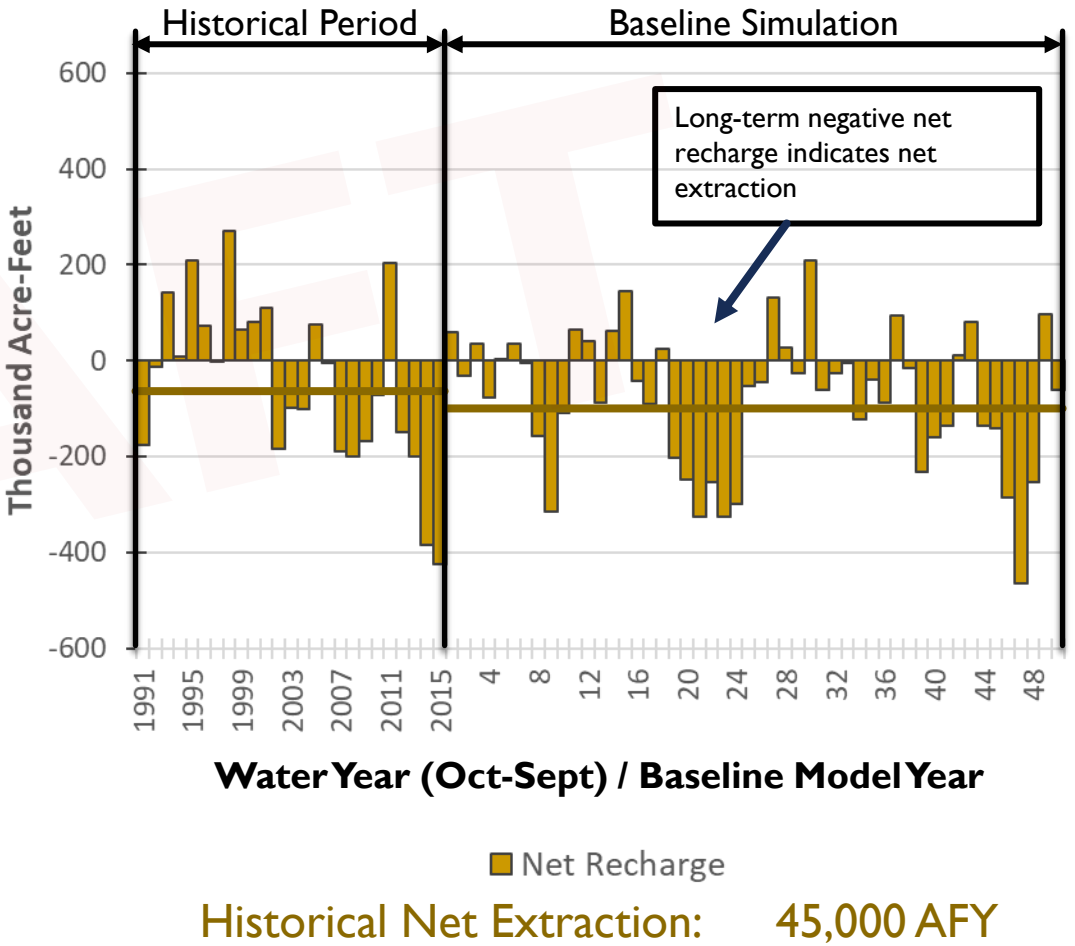
TODD GROUNDWATER

Operational Water Budget Definition

- Operational water budget presents components of the water budget that reflect the direct processes of water supply operations by each of the agricultural and/or urban entities. These budgets help assess if an entity is net extractor from or net contributor to the groundwater basin.
- This includes:
  - Groundwater pumping
  - Recharge and deep percolation of both precipitation and applied water
  - Recharge from agricultural conveyance and distribution systems
- This excludes:
  - Recharge from natural surface water bodies
  - Subsurface flow as a result of operations simulated

The Turlock Subbasin as a whole is a net extractor from the GW system

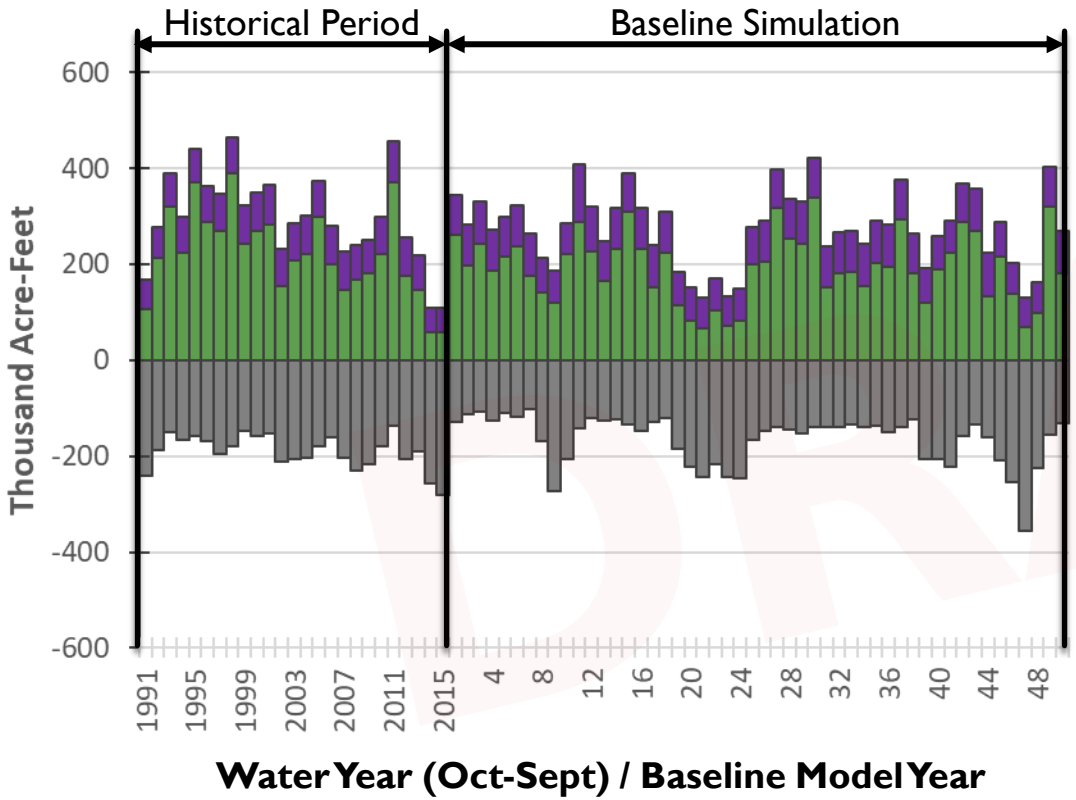


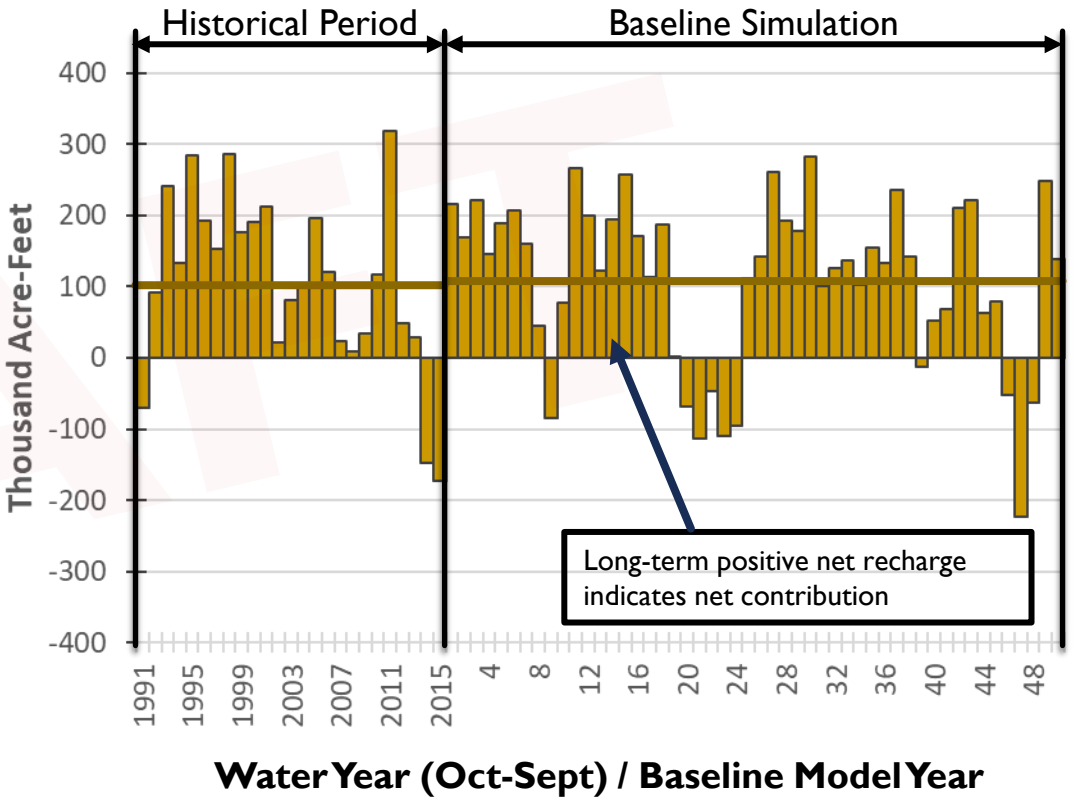


Historical Net Extraction: 45,000 AFY

Baseline Net Extraction: 76,000 AFY

THE WTSGSA IS A NET CONTRIBUTOR TO THE GW SYSTEM

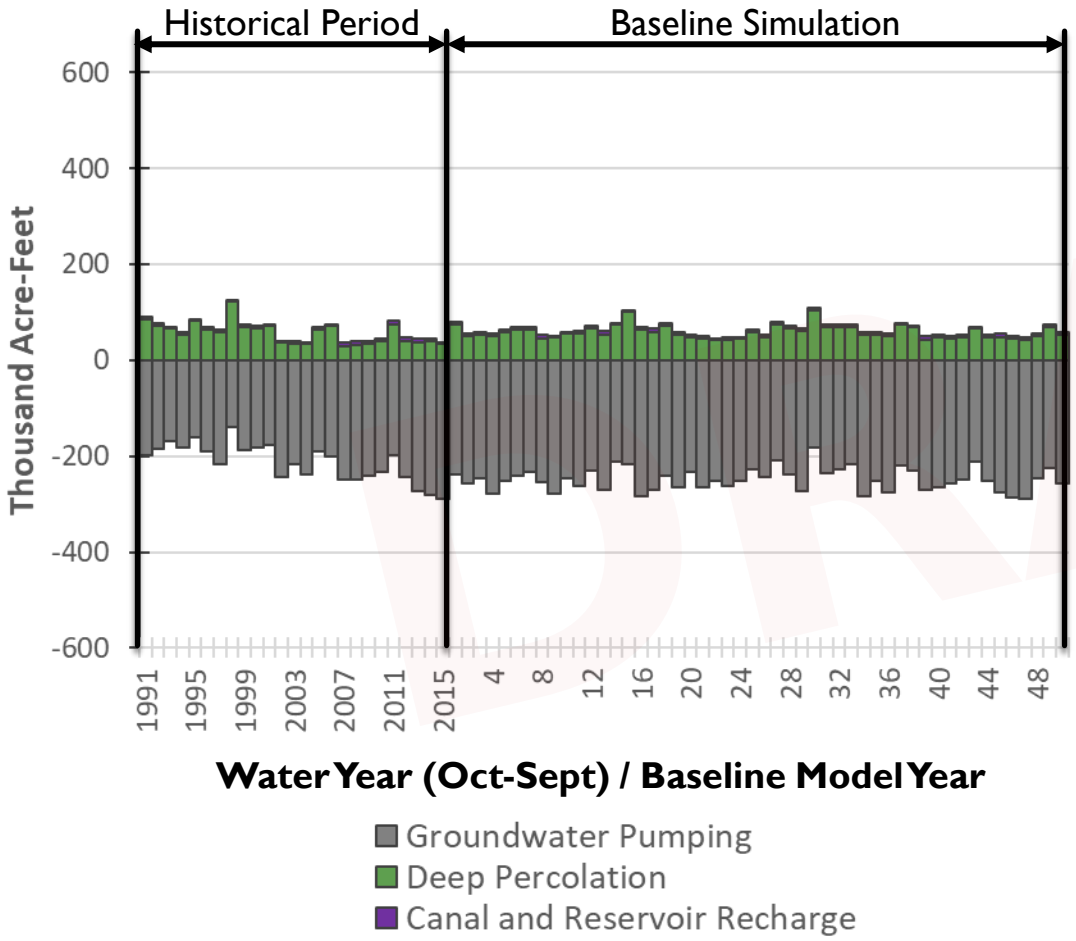


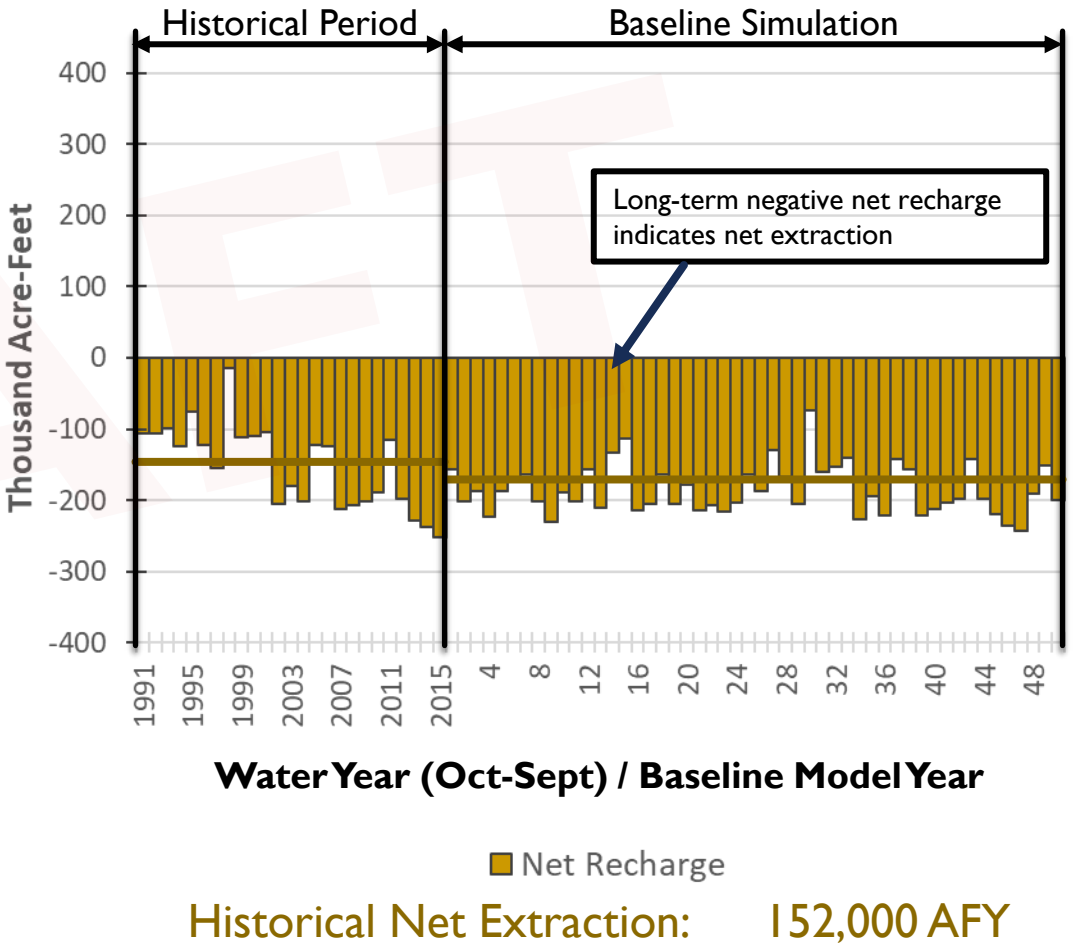


Historical Net Recharge: 107,000 AFY

Baseline Net Recharge: 109,000 AFY

THE ETSGSA
IS A NET EXTRACTOR FROM THE GW SYSTEM





Historical Net Extraction: 152,000 AFY
Baseline Net Extraction: 185,000 AFY

STREAM-AQUIFER INTERACTION

PROJECTED CONDITIONS BASELINE

WOODARD &CURRAN TODD GROUNDWATER

River Operations: Baseline Assumptions

Tuolumne River

- Tuolumne River System Management Model
  - **Tuolumne River inflow**
  - La Grange Dam diversions
  - Canal & reservoir seepage
    - Turlock Lake
    - Upper Main
    - Lower System
  - TID farm gate deliveries
  - TID operational spills

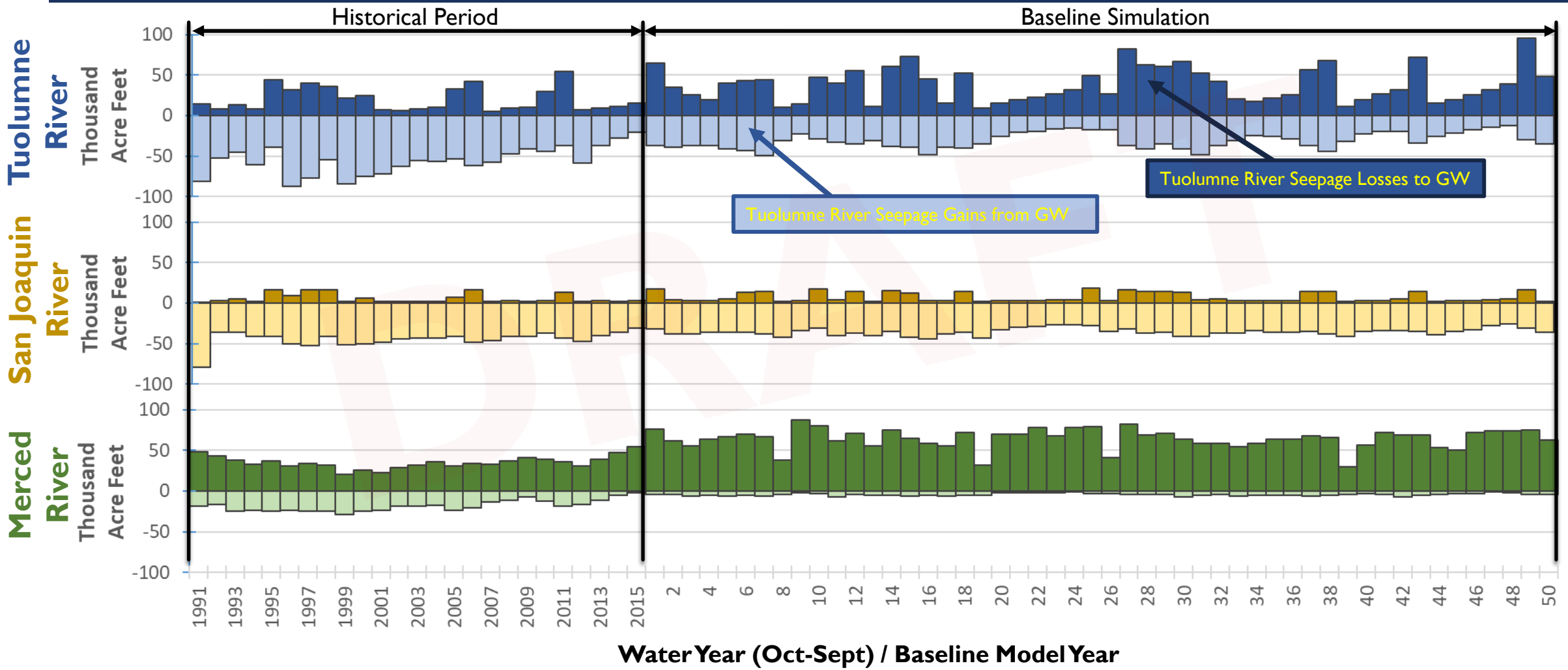
Merced River

- MIDH2O & MercedWRM
  - **Merced River inflow**
  - Merced ID Diversions
    - Northside Canal at Merced Falls
    - Main Canal at Crocker-Huffman Dam
  - Northside Canal farm gate deliveries
  - Northside Canal seepage/spills

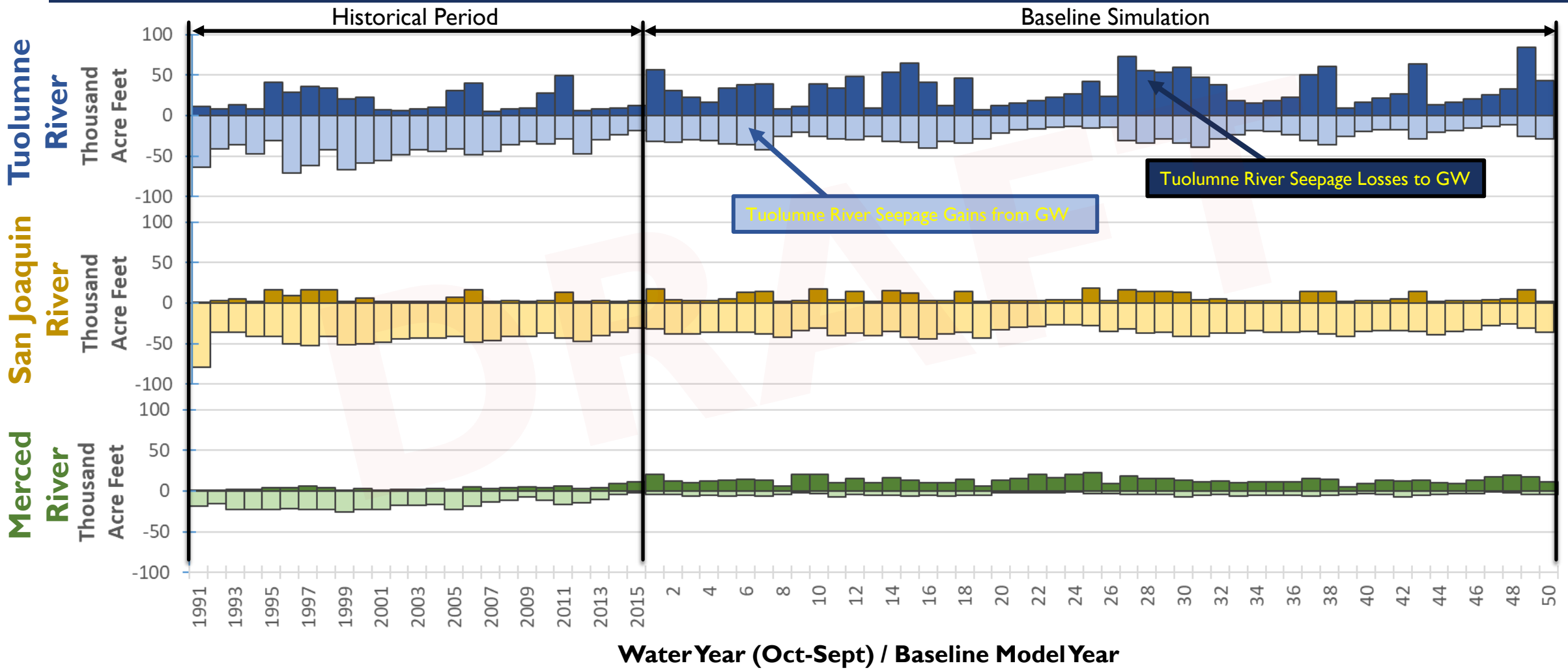
San Joaquin River

- C2VSimFG Historical Operations
  - Riparian Diversions

Stream-Aquifer Interaction: Turlock Subbasin



Stream-Aquifer Interaction: WTSGSA



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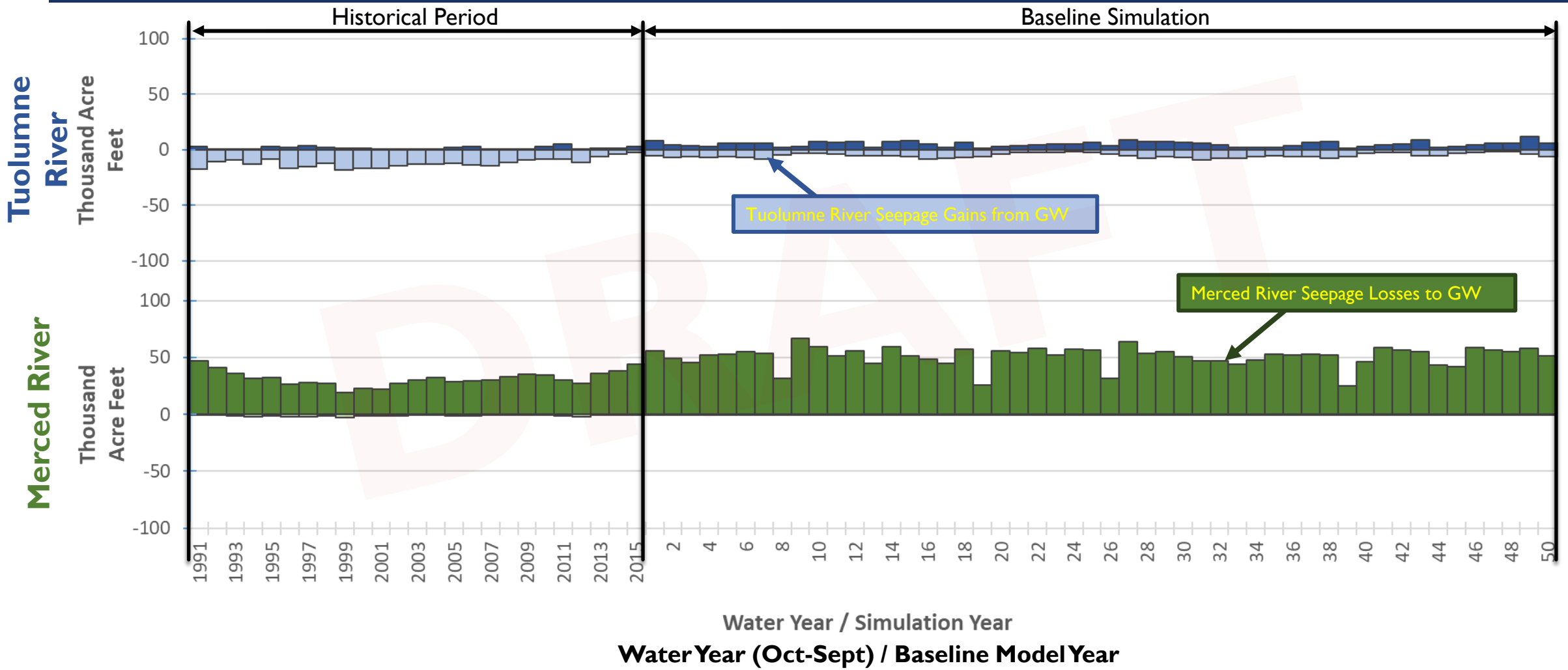
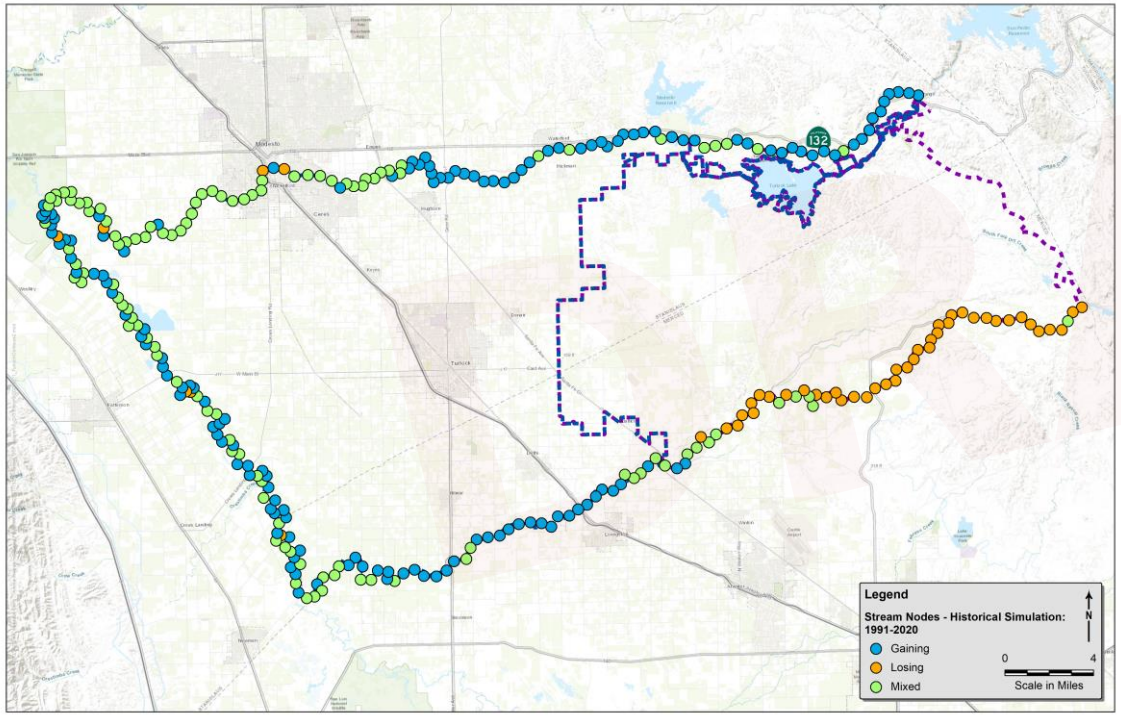
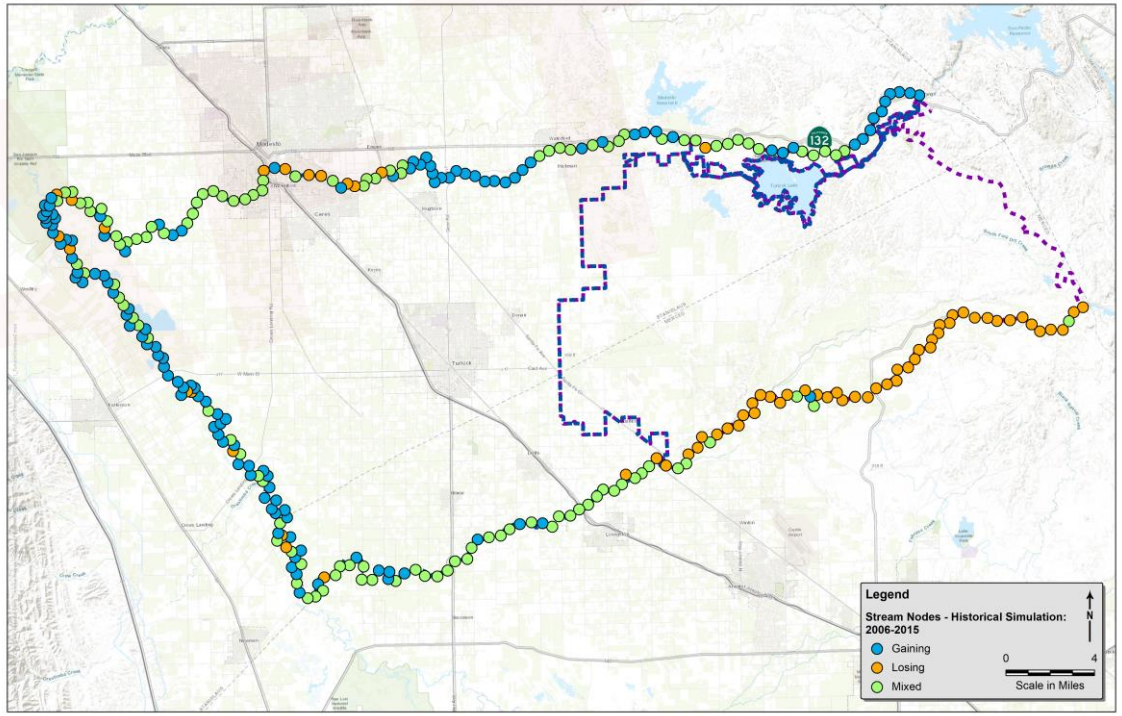


Stream-Aquifer Interaction

Historical Simulation: 1991-2000



Historical Simulation: Years 2006-2015

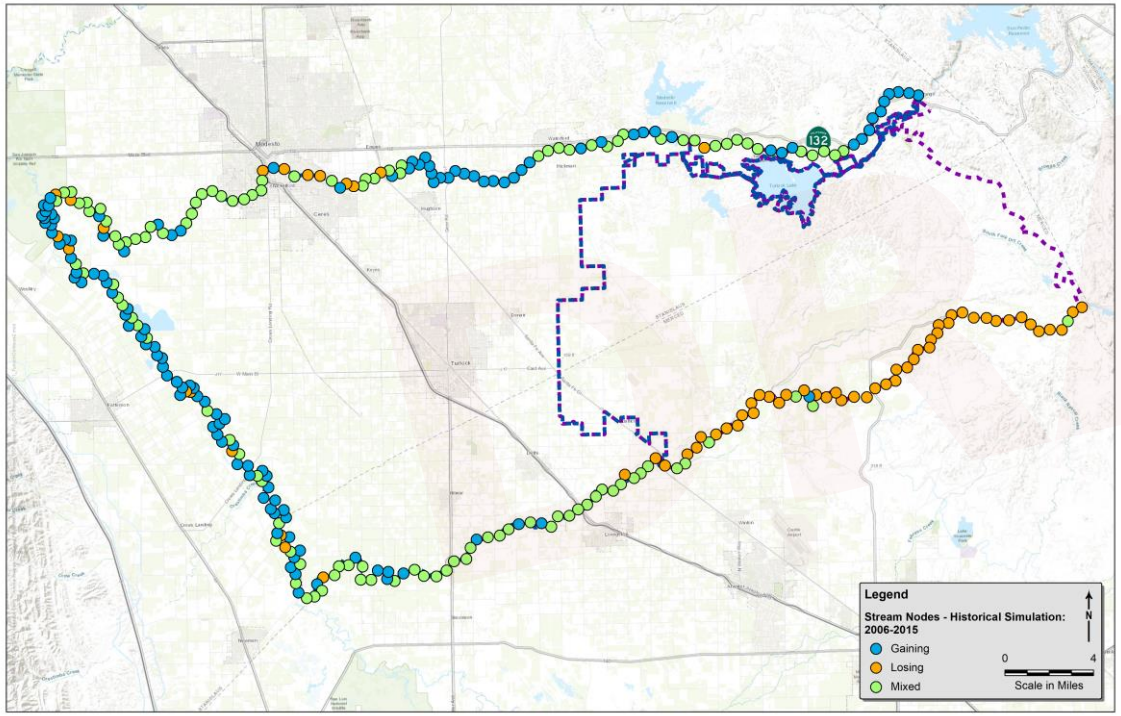


Notes:

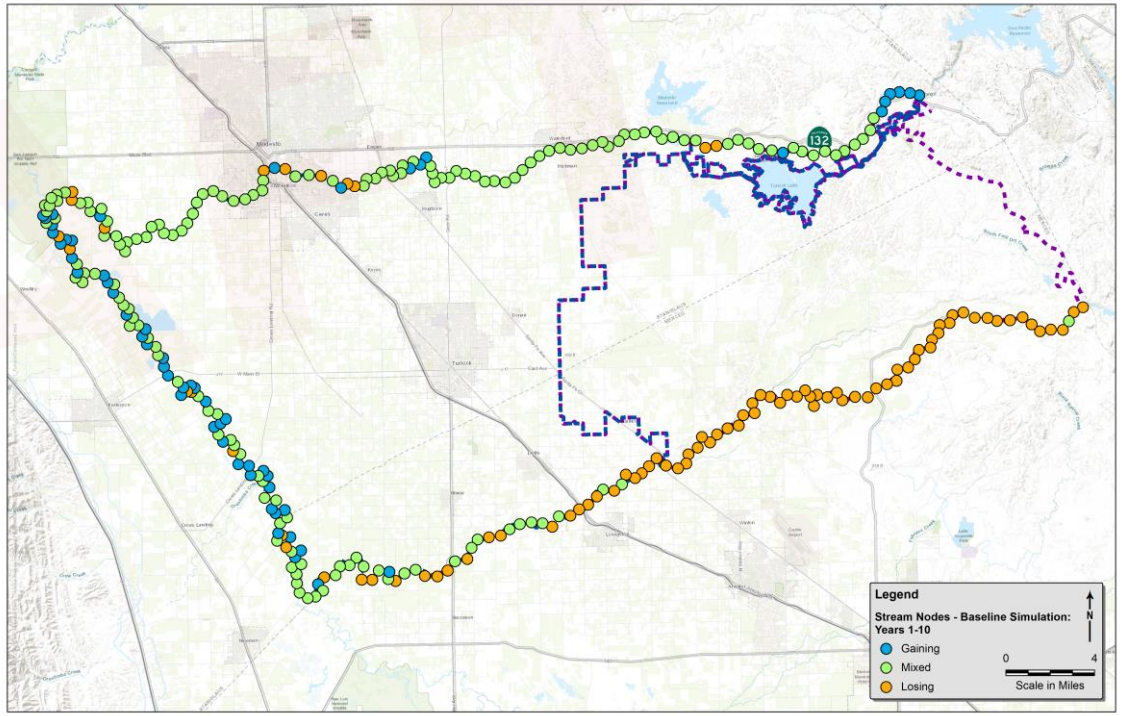
- This chart shows points along each river course that is estimated to be either gaining, losing, or a mixed condition over the long-term hydrologic conditions
- Determination of losing or gaining at each point is made based on the results of the Integrated Modeling

Stream-Aquifer Interaction

Historical Simulation: Years 2006-2015



Baseline Simulation: Years 1-10



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Stream-Aquifer Interaction

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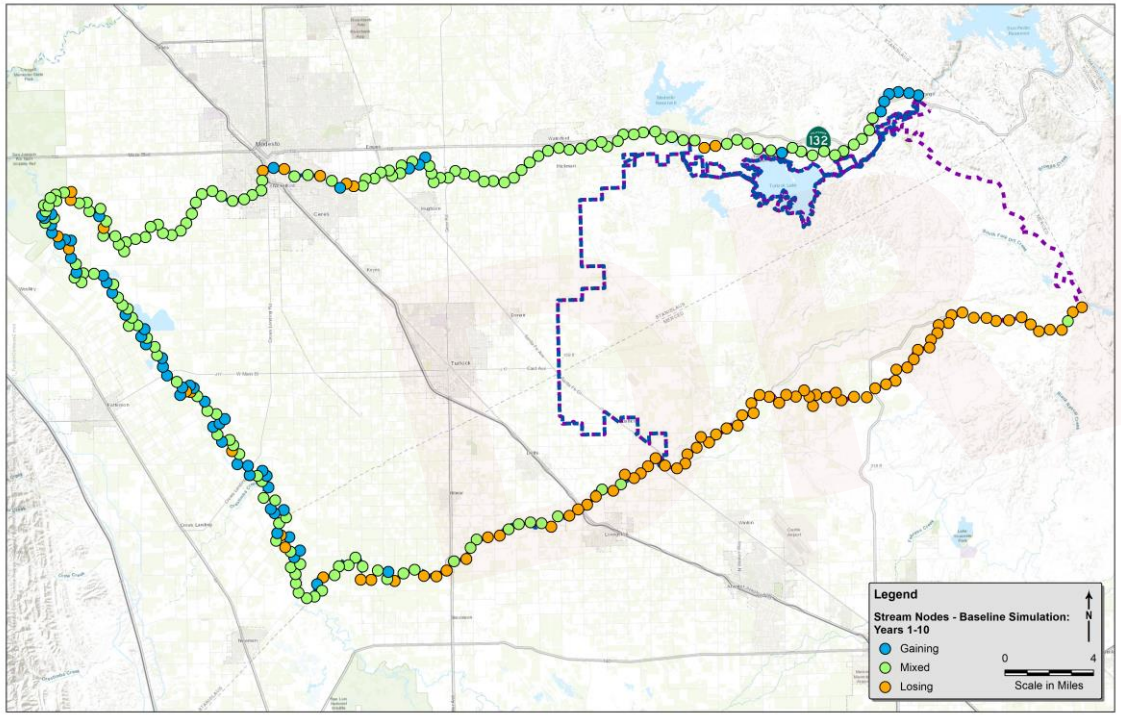
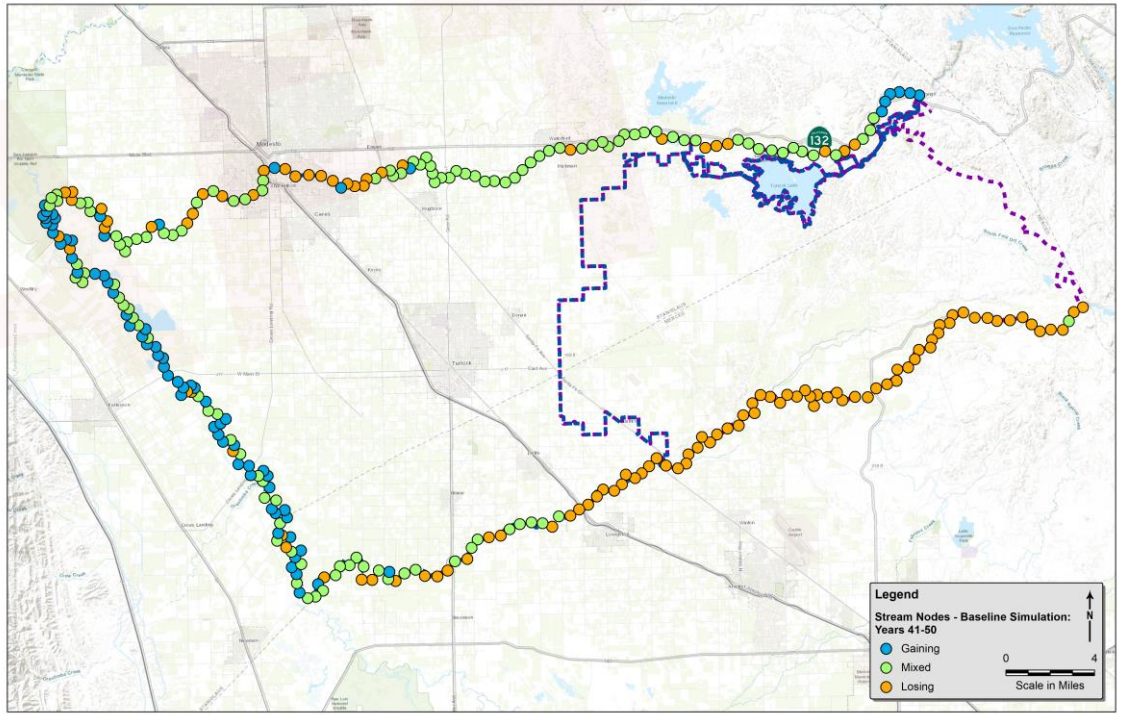


Baseline Simulation: Years 41-50



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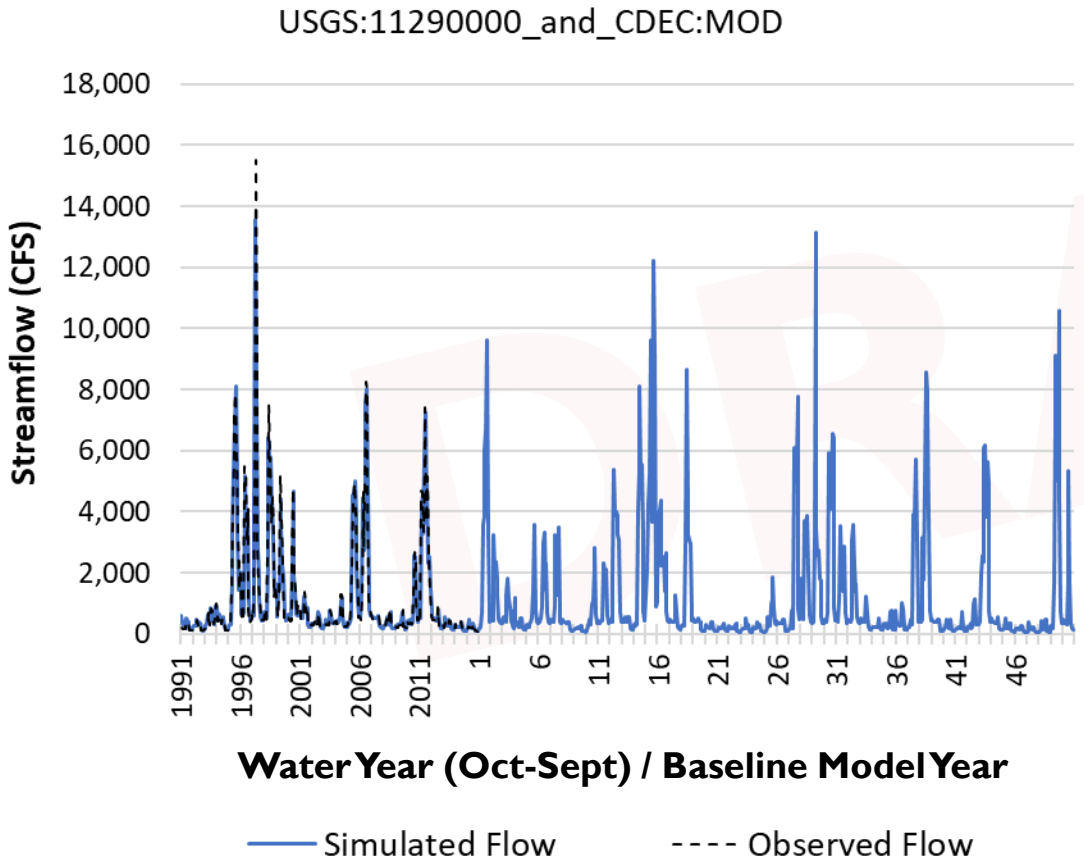
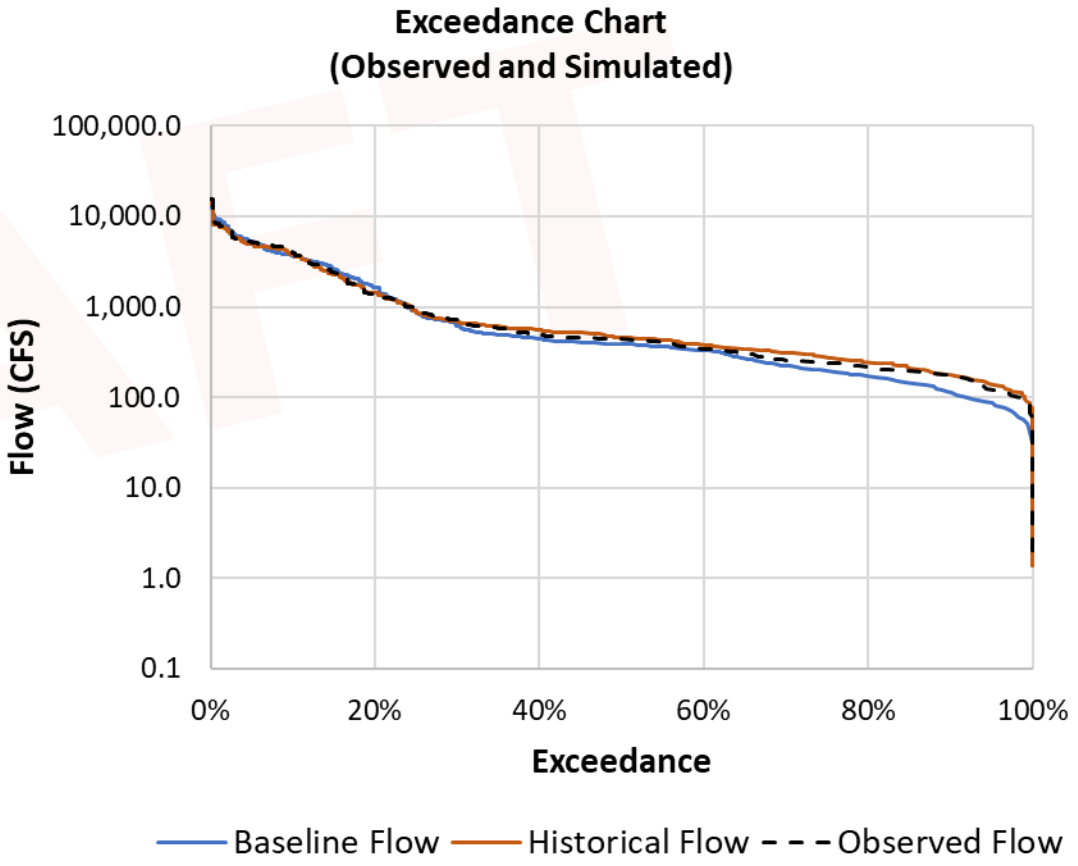
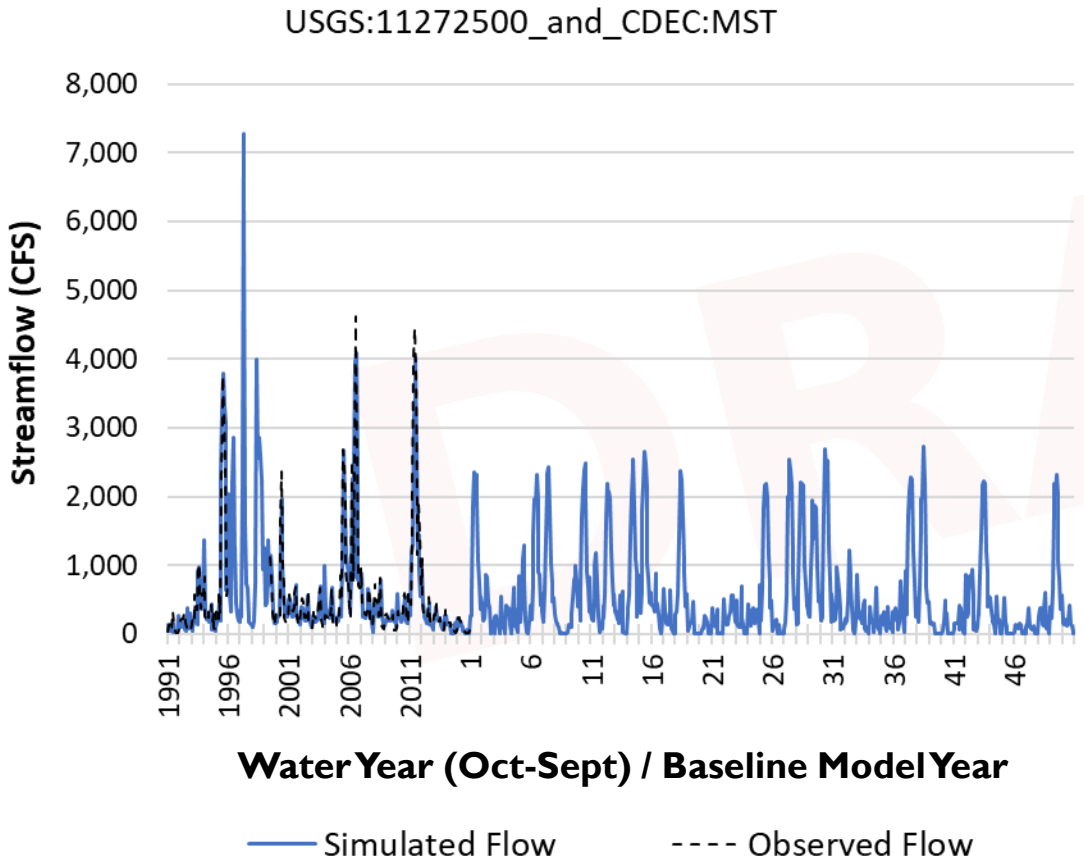
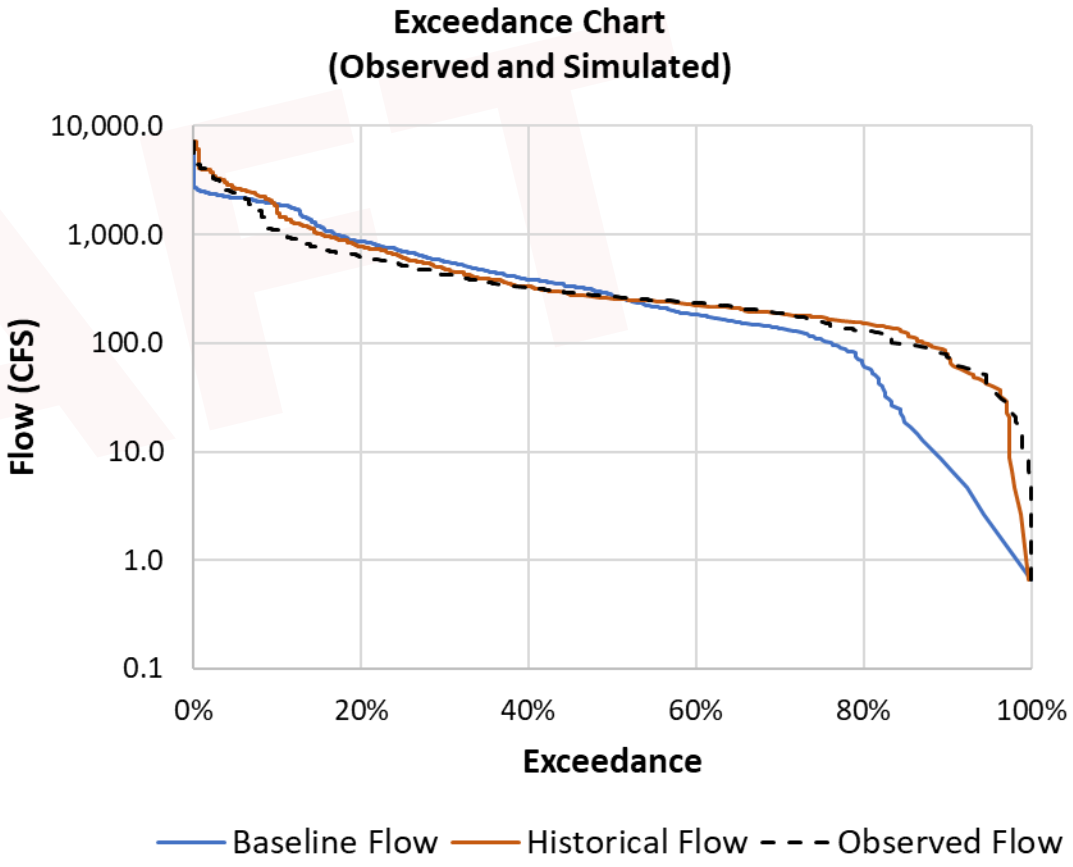
Stream Flow: Tuolumne River at Modesto





Stream Flow: Merced River at Stevinson



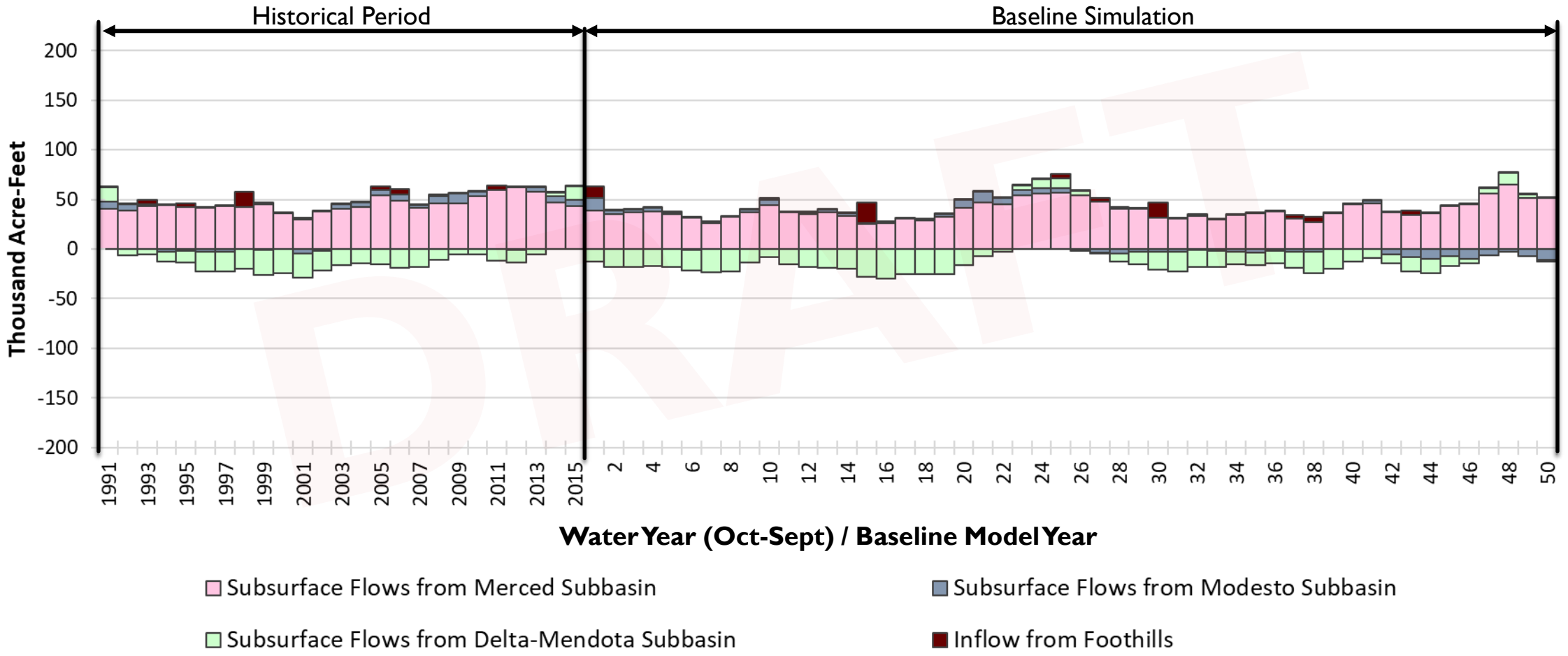


SUBSURFACE FLOW

PROJECTED CONDITIONS BASELINE

WOODARD &CURRAN TODD GROUNDWATER

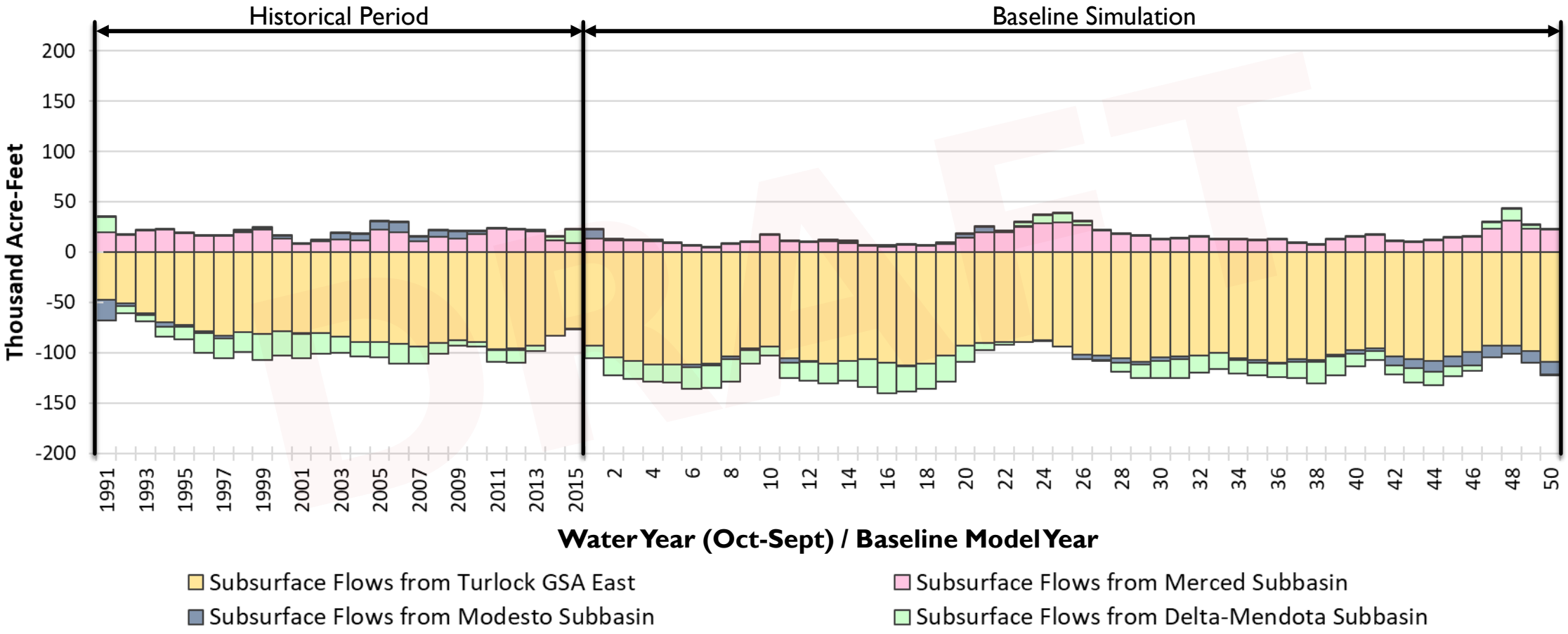
Boundary and Subsurface Flows: Turlock Subbasin



Notes:

- This chart shows annual net boundary and subsurface flows across each of the boundaries between the Turlock Subbasin and the neighboring Subbaisns

Boundary and Subsurface Flows: WTSGSA



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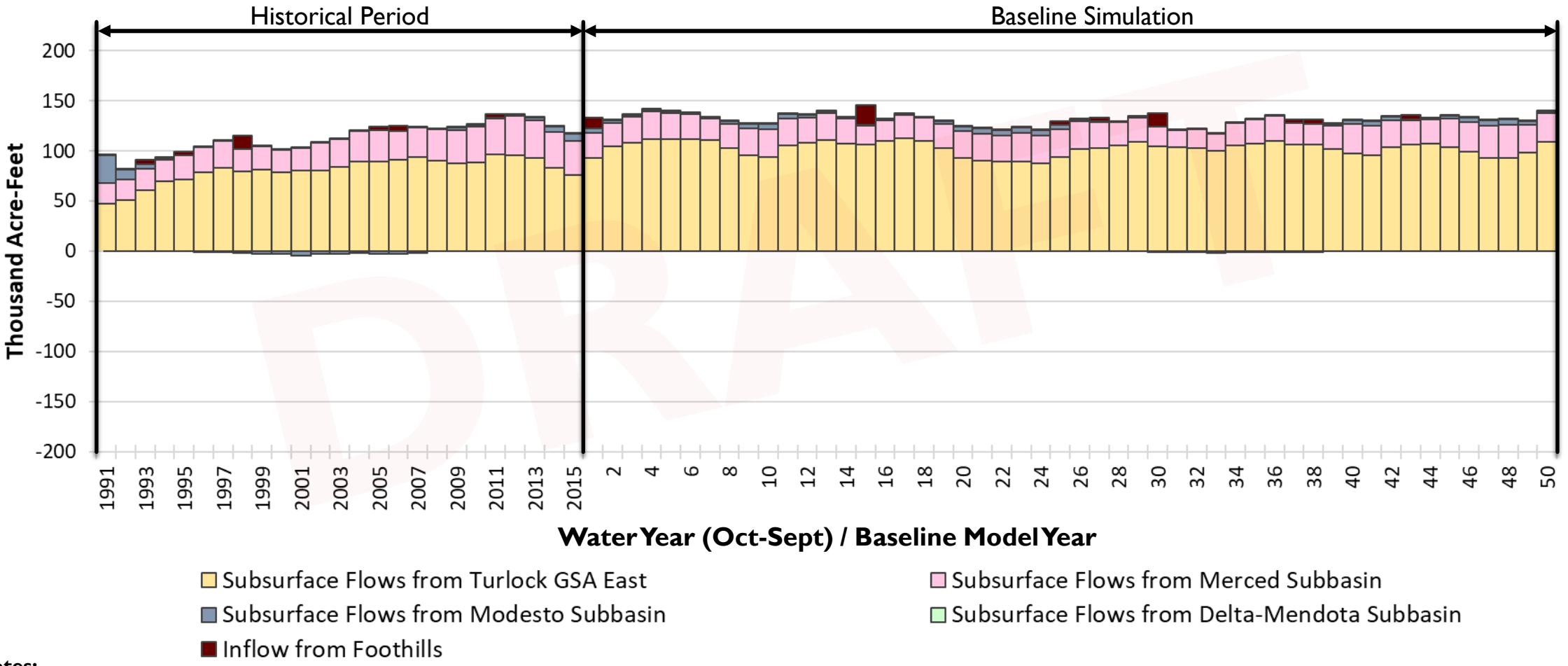

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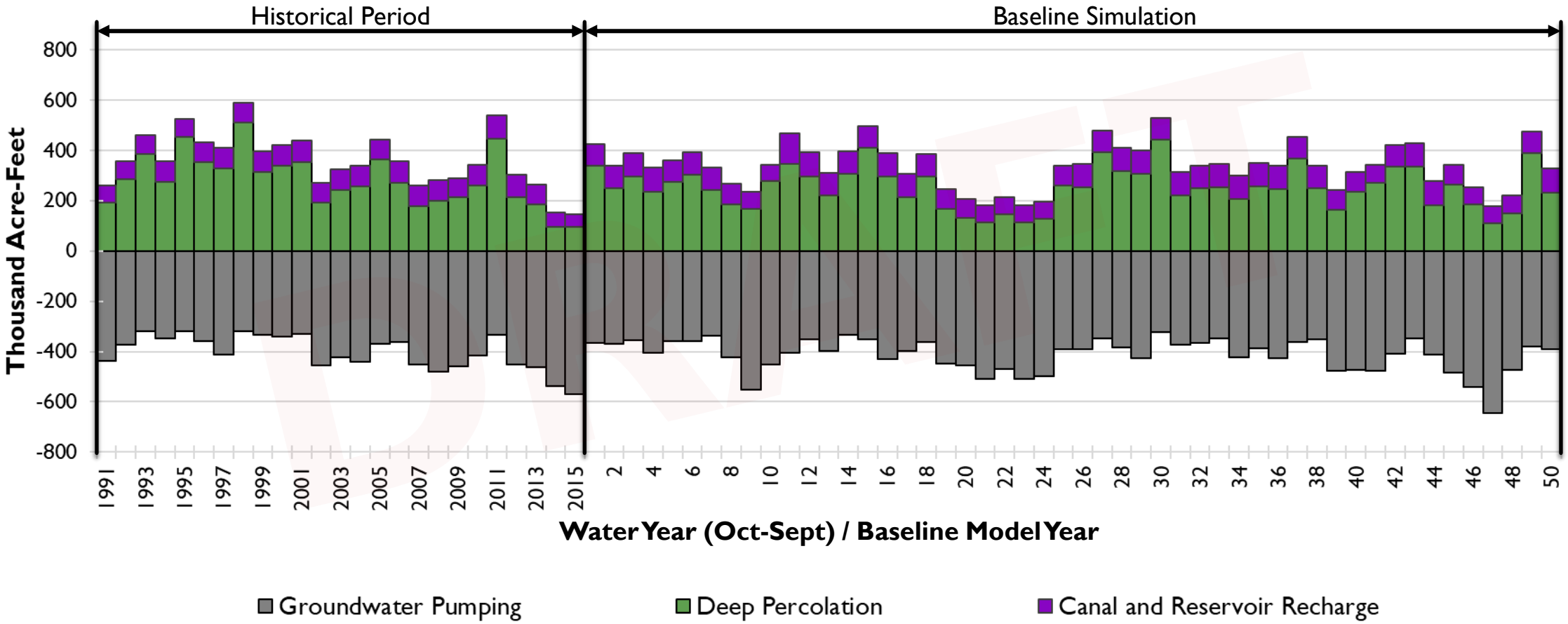
GROUNDWATER BUDGETS

PROJECTED CONDITIONS BASELINE

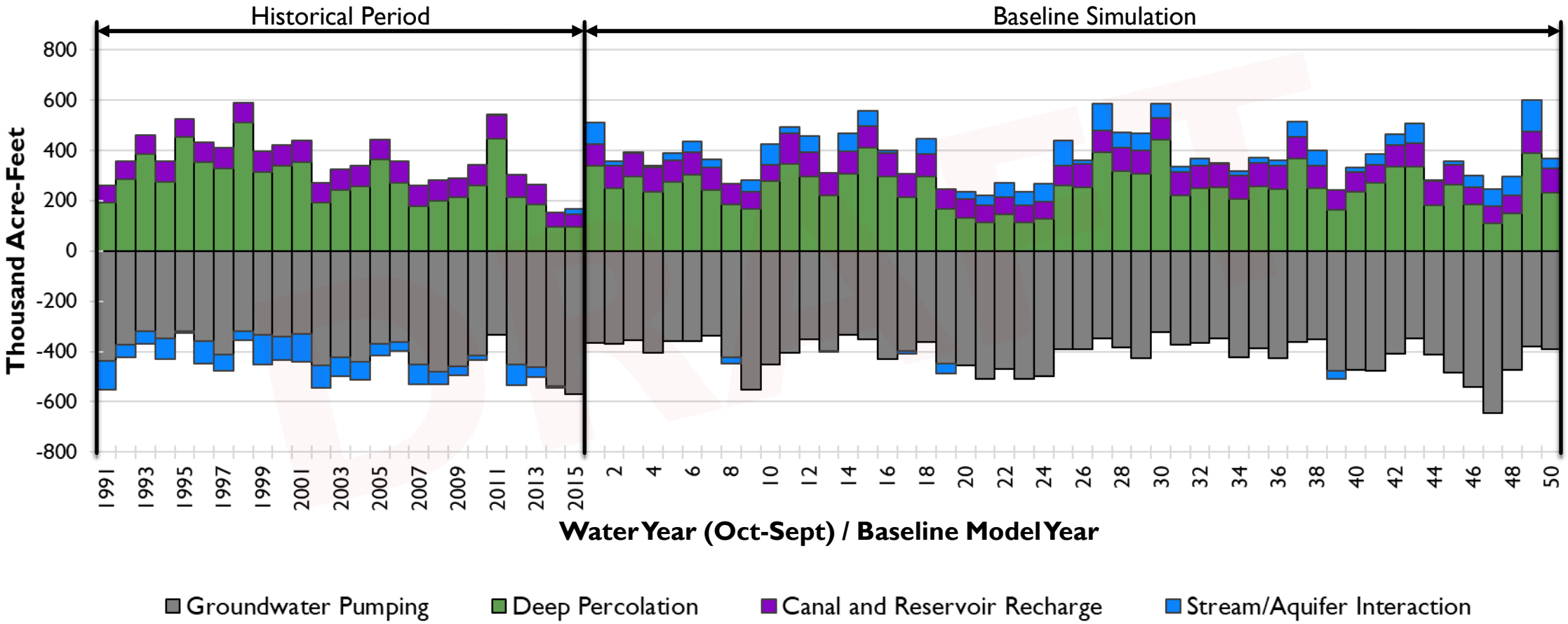
WOODARD &CURRAN

TODD GROUNDWATER

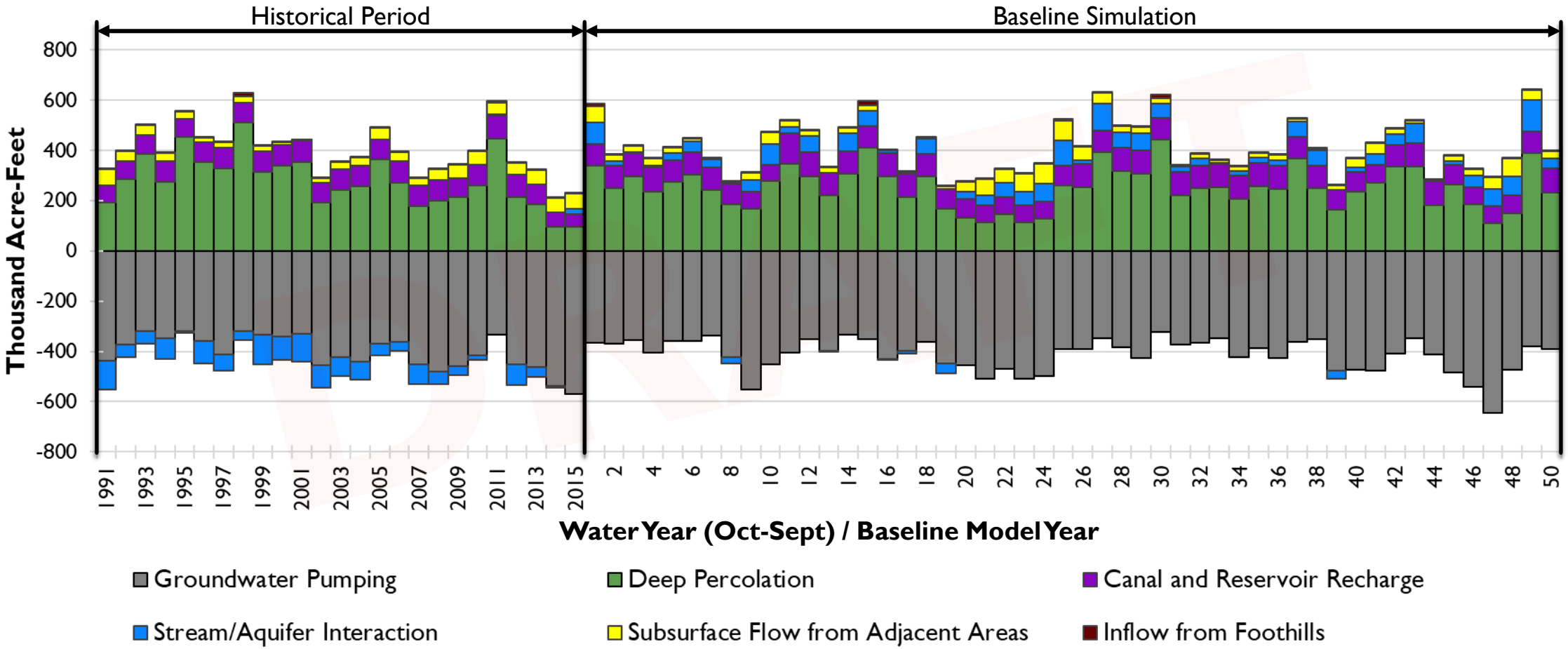
GROUNDWATER BUDGET: TURLOCK SUBBASIN



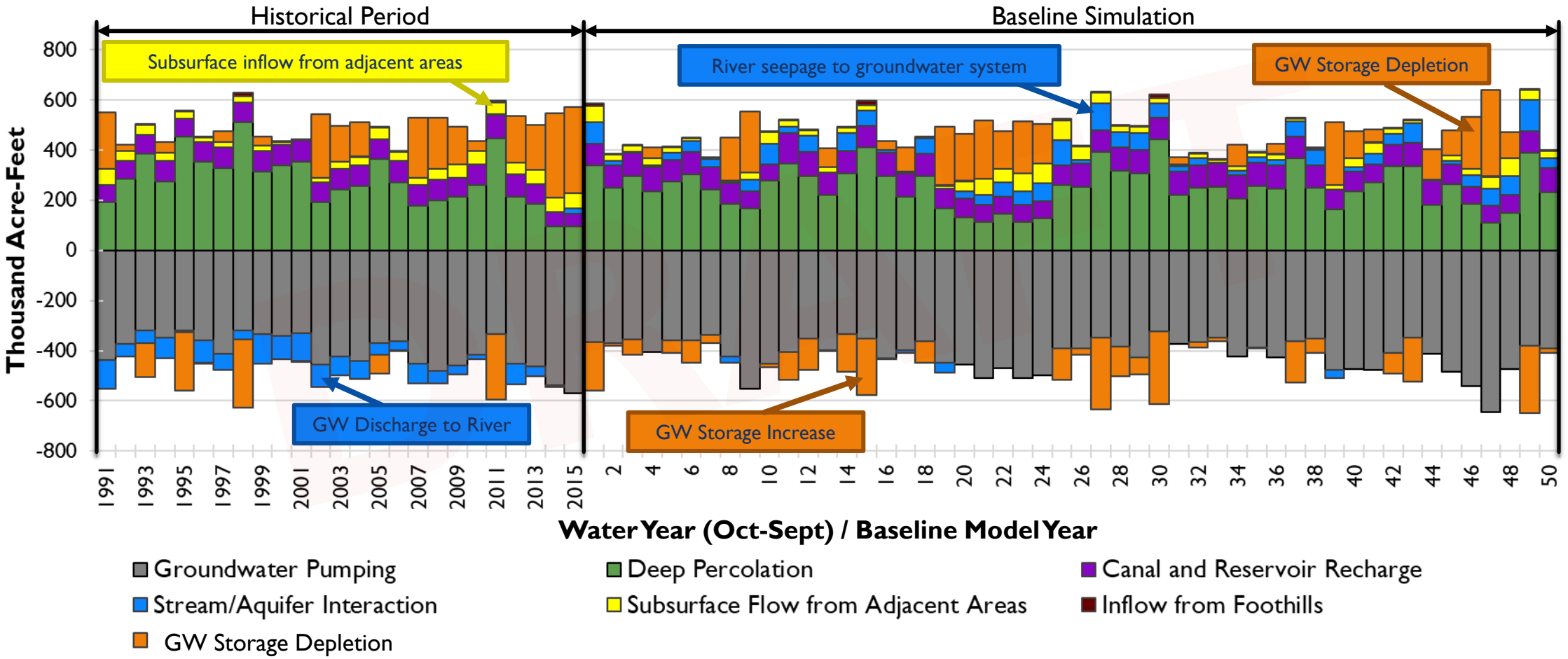
GROUNDWATER BUDGET: TURLOCK SUBBASIN



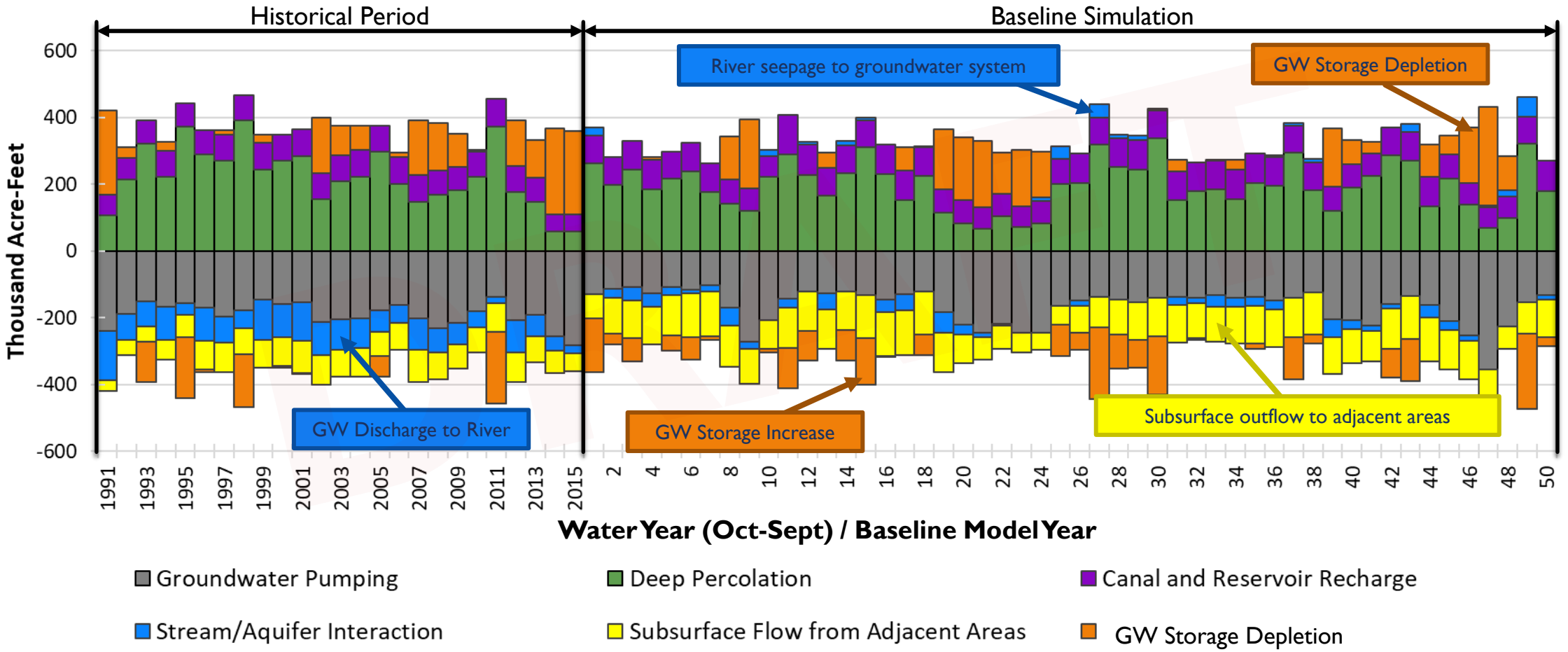
GROUNDWATER BUDGET: TURLOCK SUBBASIN



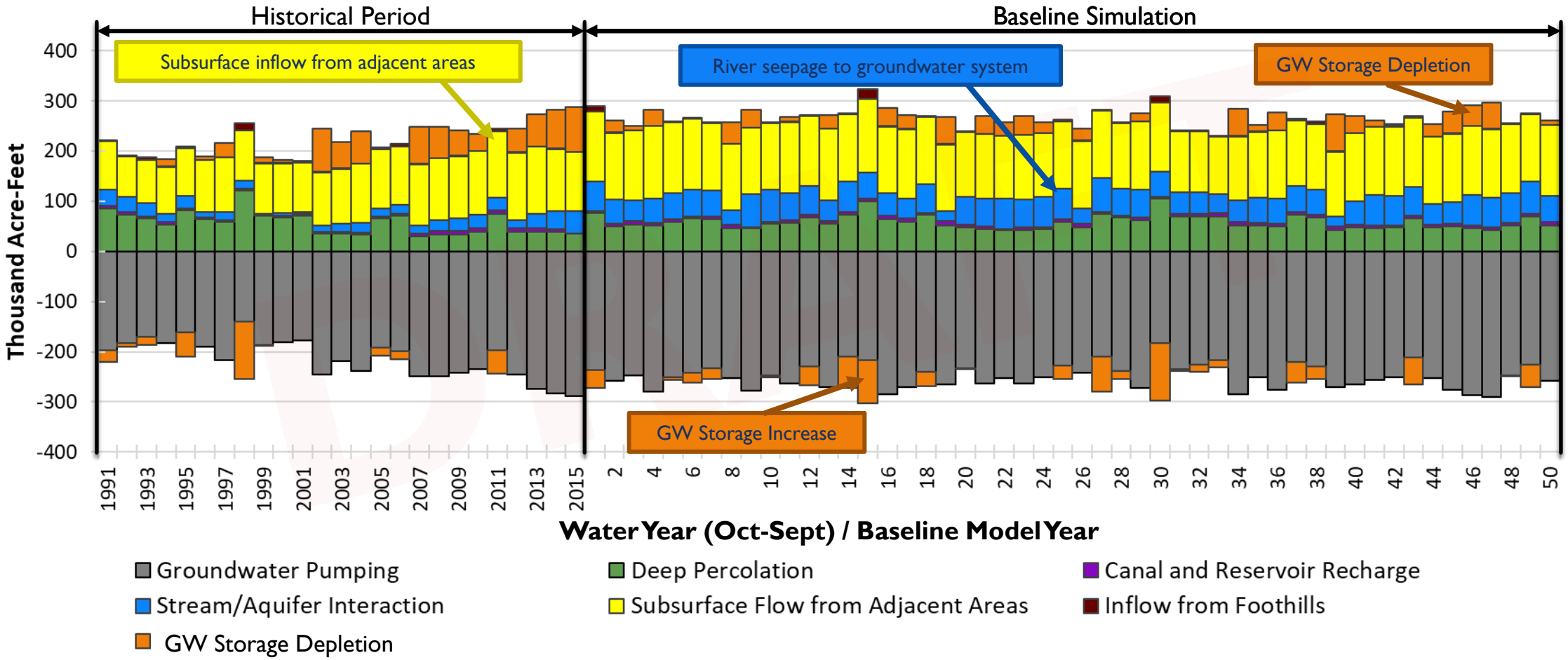
Complete Groundwater Budget
Turlock Subbasin



WTSGSA: Complete Groundwater Budget



ETSGSA: Complete Groundwater Budget



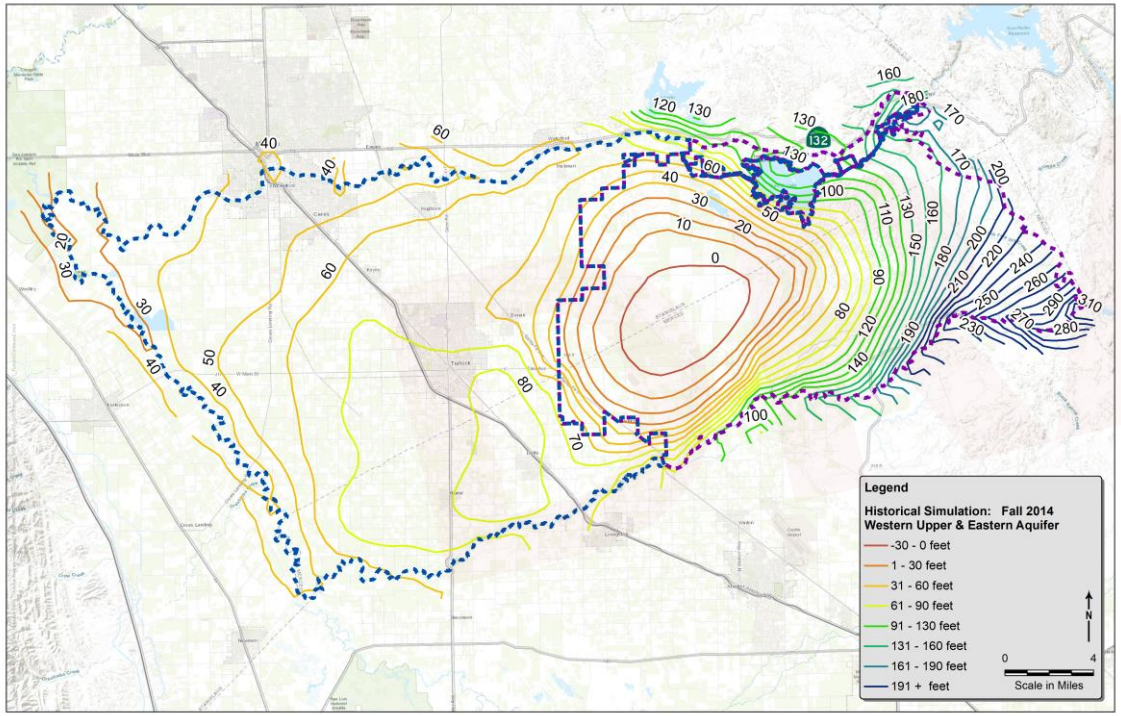
WATER LEVELS

PROJECTED CONDITIONS BASELINE

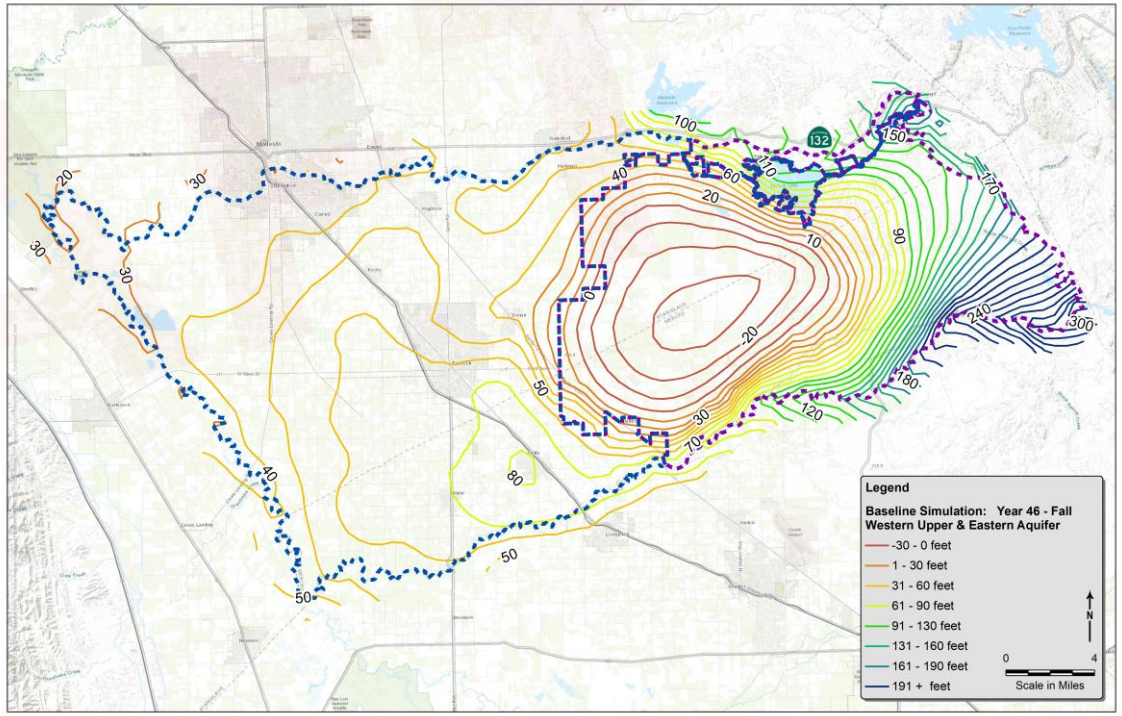
WOODARD &CURRAN TODD GROUNDWATER

Groundwater Level Contours (Upper)

Historical Simulation: Fall 2014
Western **Upper** & Eastern Aquifer

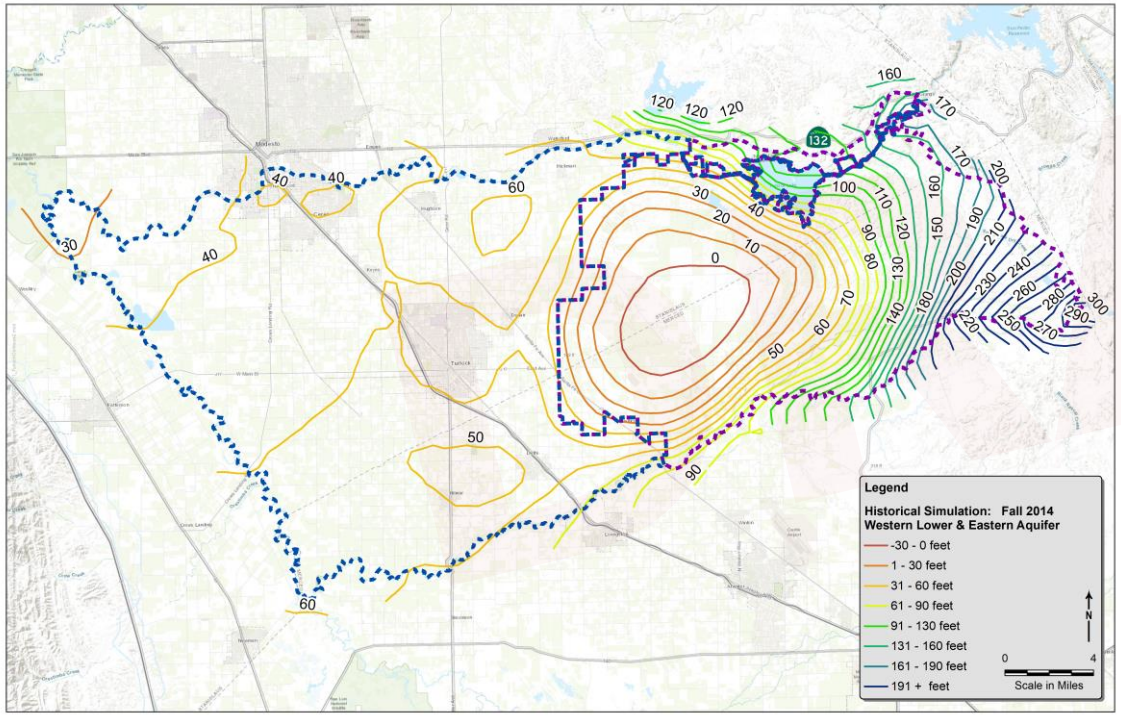


Baseline Simulation: Year 46 (Fall 2014 Hydrology)
Western **Upper** & Eastern Aquifer

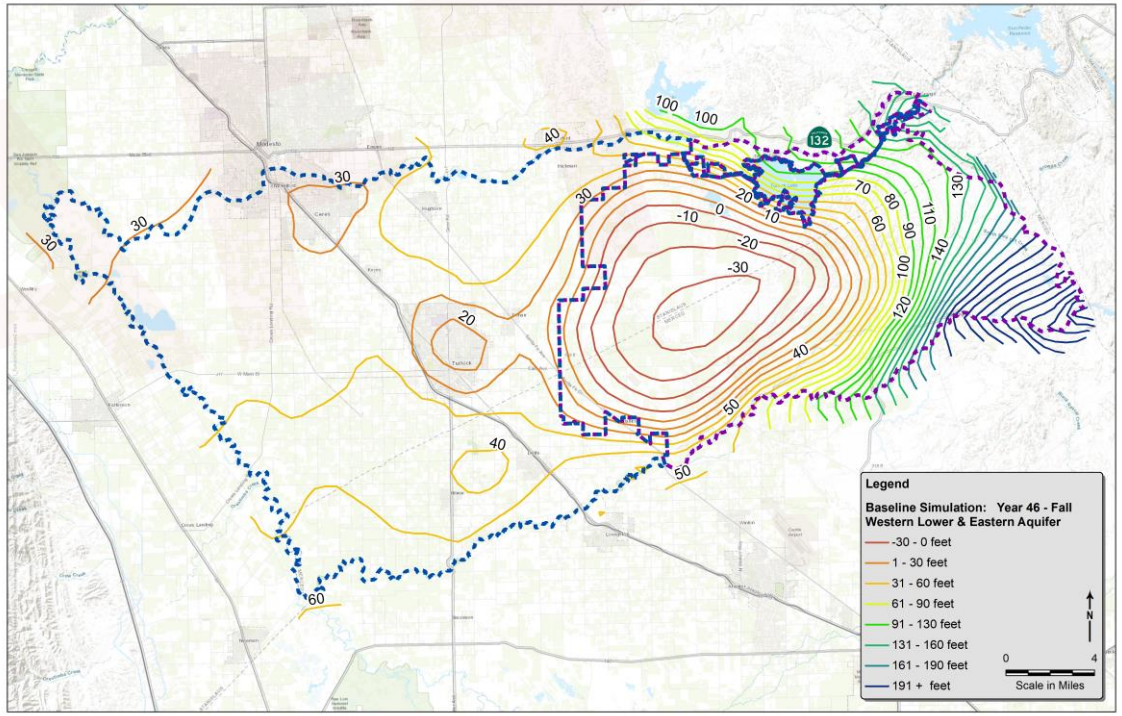


GROUNDWATER LEVEL CONTOURS (LOWER)

Historical Simulation: Fall 2014
Western **Lower** & Eastern Aquifer



Baseline Simulation: Year 46 (Fall 2014 Hydrology)
Western **Lower** & Eastern Aquifer



Groundwater Level Hydrographs

Hydrographs Available on Google Maps

Next Steps

Upcoming Modeling Scenarios

- Sustainable Yield
- Climate Change

- **Continue coordination with local GSAs**

QUESTIONS?