ESJ Informational Meeting – Water Budget
November 7, 2018

Water Budget

What is a Water Budget?

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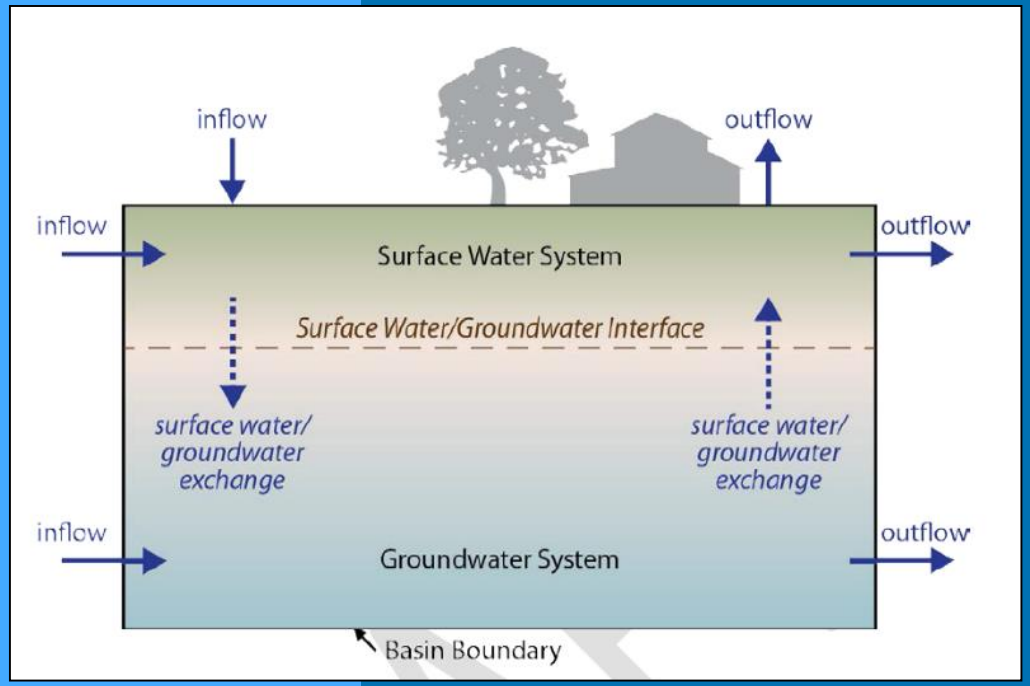

A Water Budget is an accounting of the total groundwater and surface water entering and leaving a groundwater basin.

A Water Budget Operates like a Bank Account

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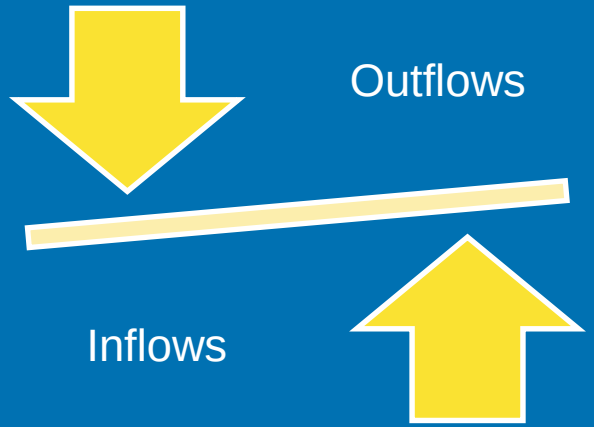
Inflows (supplies) and outflows (demands) are tracked and compared over time to identify change in amount of water stored.



Water Budgets Quantify the Movement of Water

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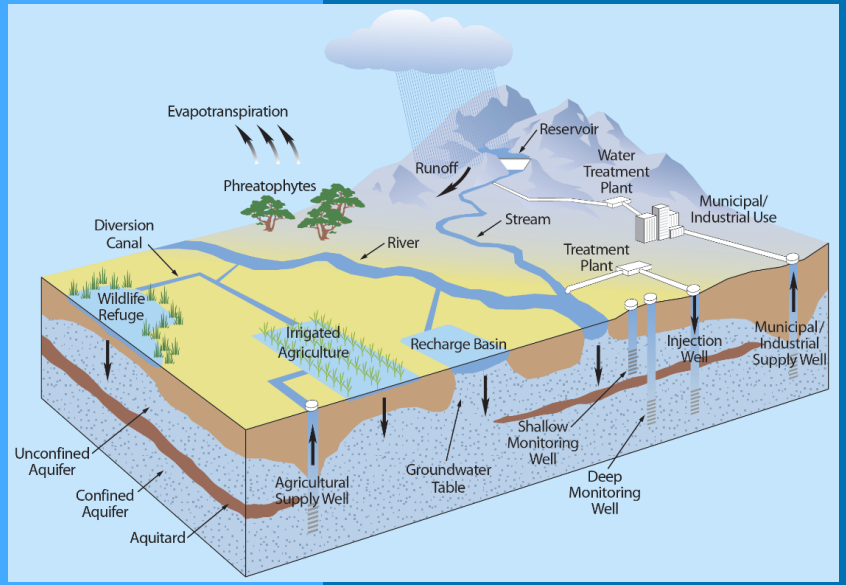

A Water Budget takes into account the storage and movement of water between the four physical systems of the hydrologic cycle:

- Atmospheric system
- Land surface system
- River and stream system
- Groundwater system

Why are Water Budgets Important?

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- "You can't manage what you don't measure"
- A series of ongoing negative balances can result in long-term conditions of overdraft (the ESJ Subbasin is currently classified as "critically overdrafted")
- Carefully calculated Water Budgets increase the likelihood that planned projects and management actions will achieve the intended outcome within the intended timeframe

The Water Budget for the ESJ GSP Pulls Combines Land and Water Use

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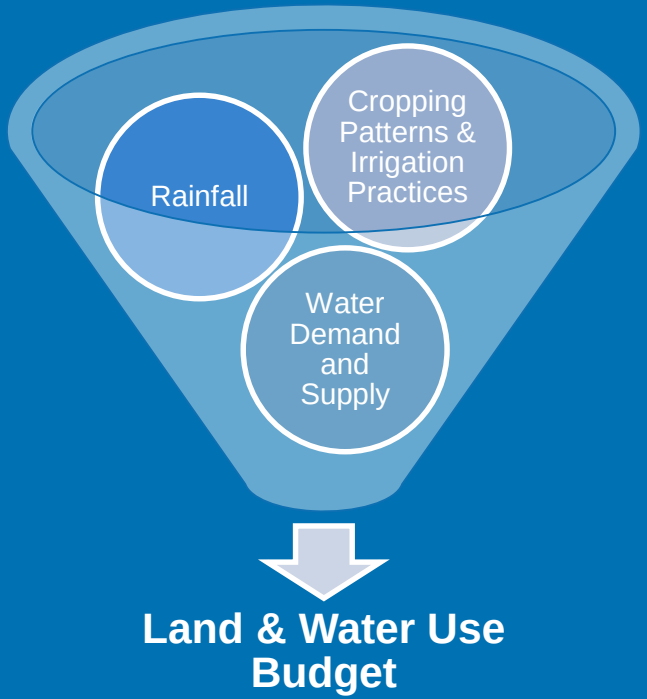

Water Budget Time Frames

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Historical Water Budget

Uses historical information for temperature, precipitation, water year type, and land use going back a minimum of 10 years.

Current Conditions Baseline

Uses the most recent data on population, land use, temperature, year type, and hydrologic conditions projected out over 50 years of hydrology.

Projected Water Budget

Uses estimated future population growth, land use changes, climate change, and sea level rise projected out over 50 years of hydrology.

Water Demands are Based on Urban and Agricultural Water Use Estimates

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- Urban water use based on:
  - Population
  - Water Use Per Person
  - Agency projections
- Agricultural water use based on
  - Crop type and acreage
  - Soil conditions
  - Irrigation practices
  - Hydrogeology and climate

Urban Water Demand: Changes in Use Over Time

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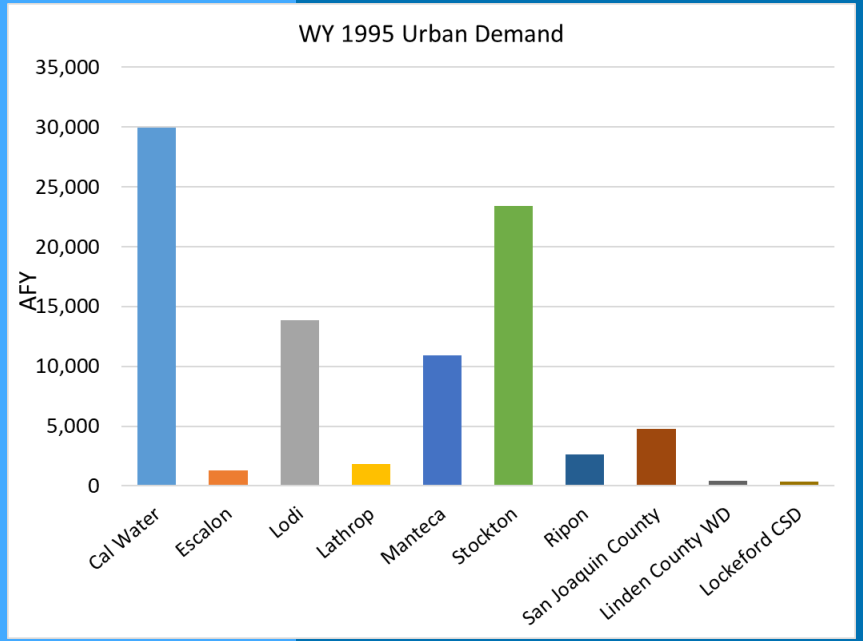

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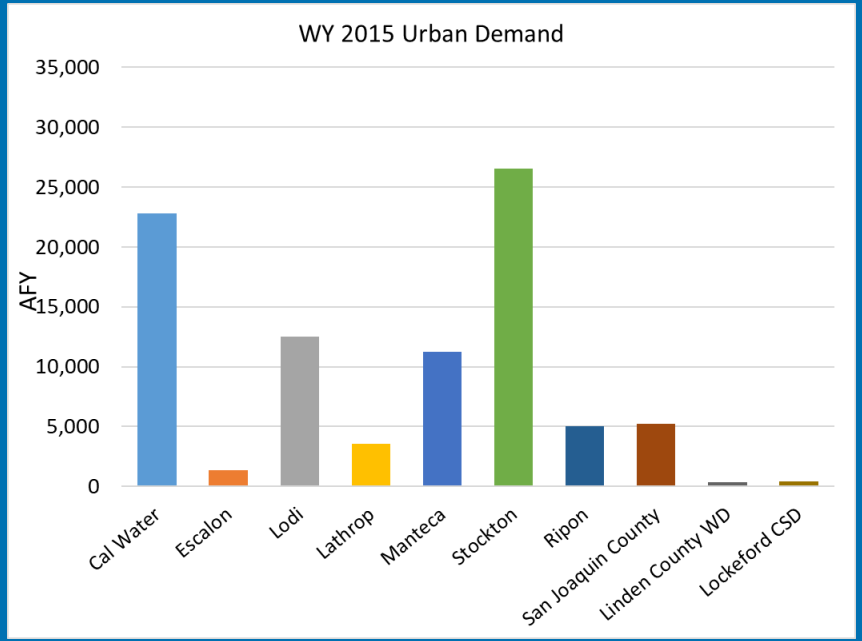

2015

Historical Simulation: Estimated Annual Urban L&WU Budget

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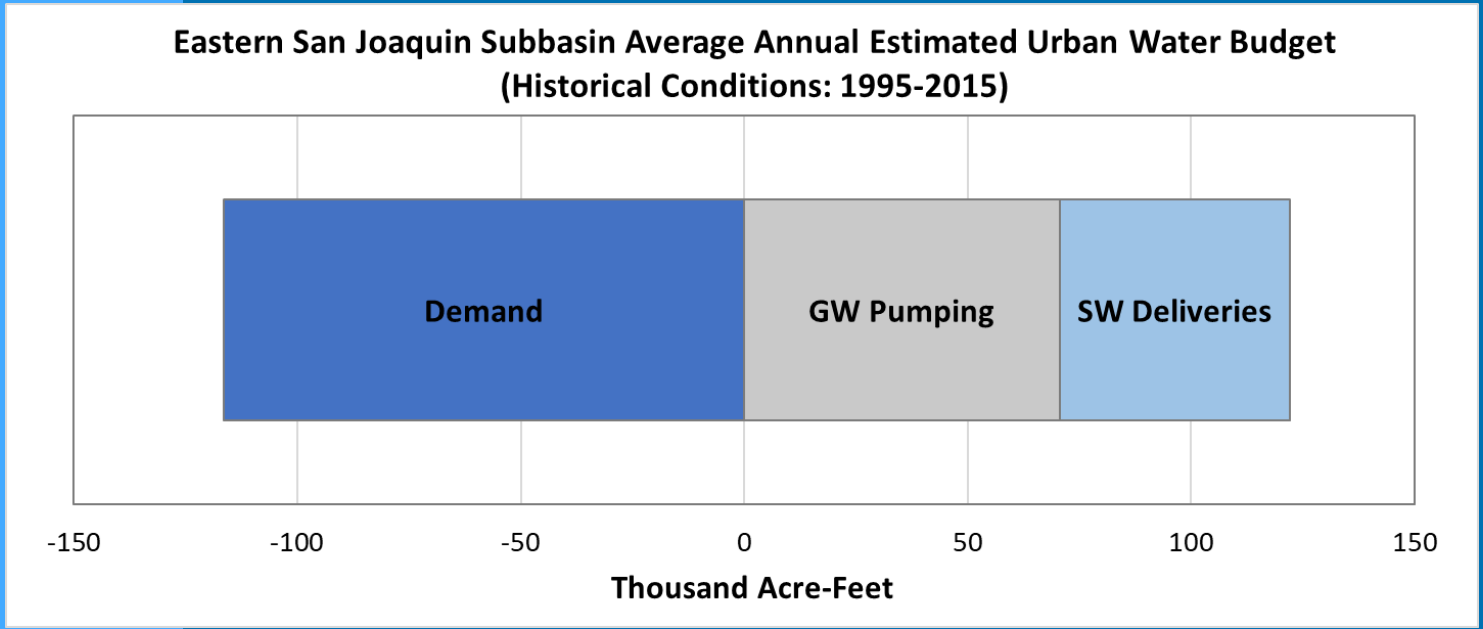

Historical Agricultural Water Demand: Changes in Crop Type Over Time

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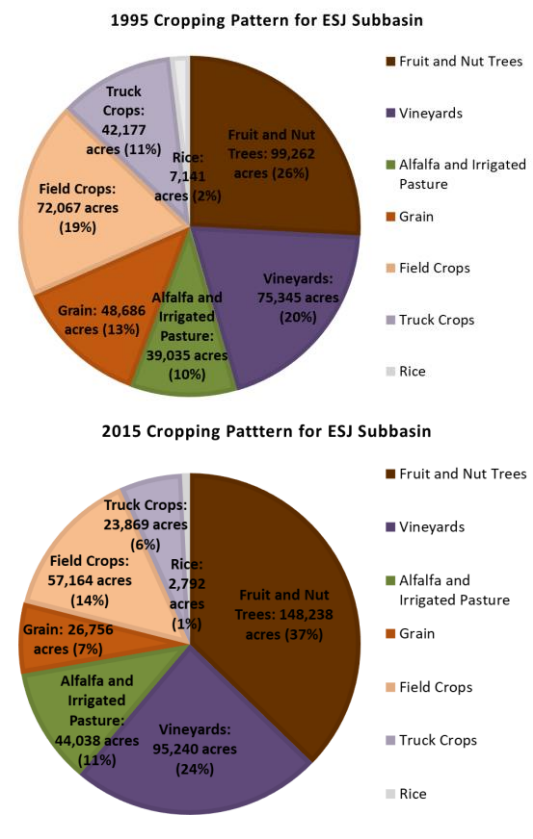

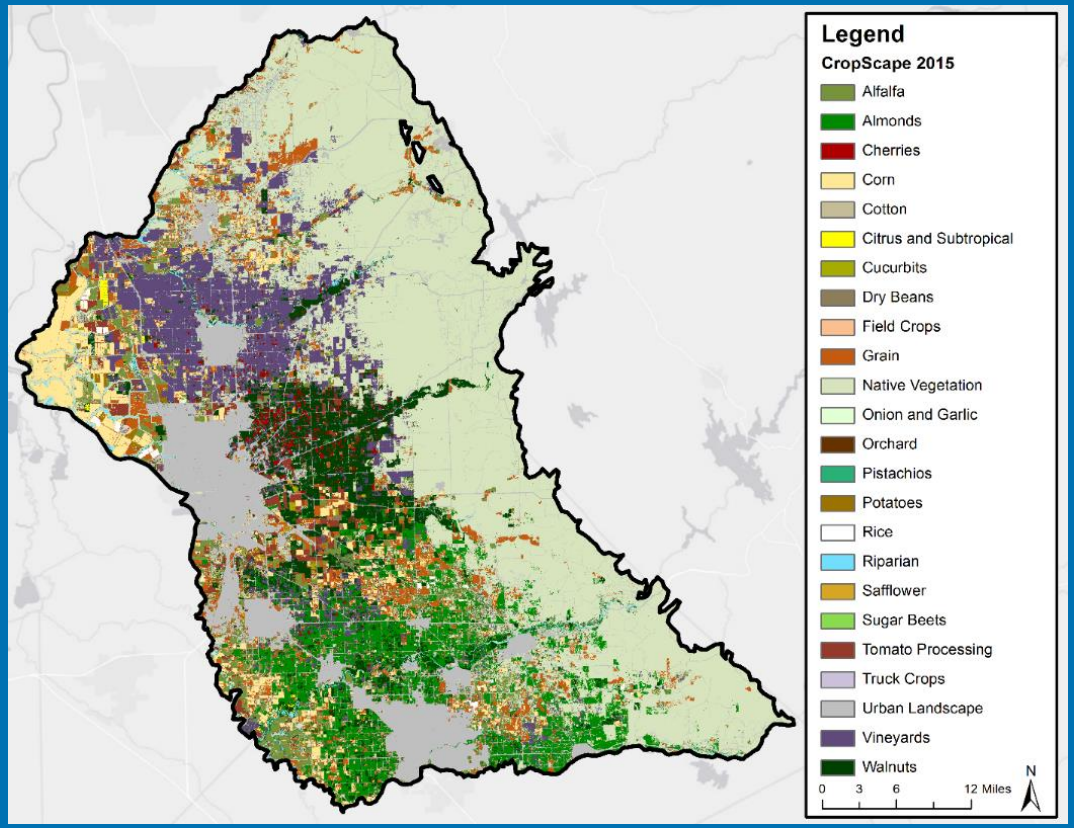

Historical Simulation: Estimated Annual Agricultural L&WU Budget

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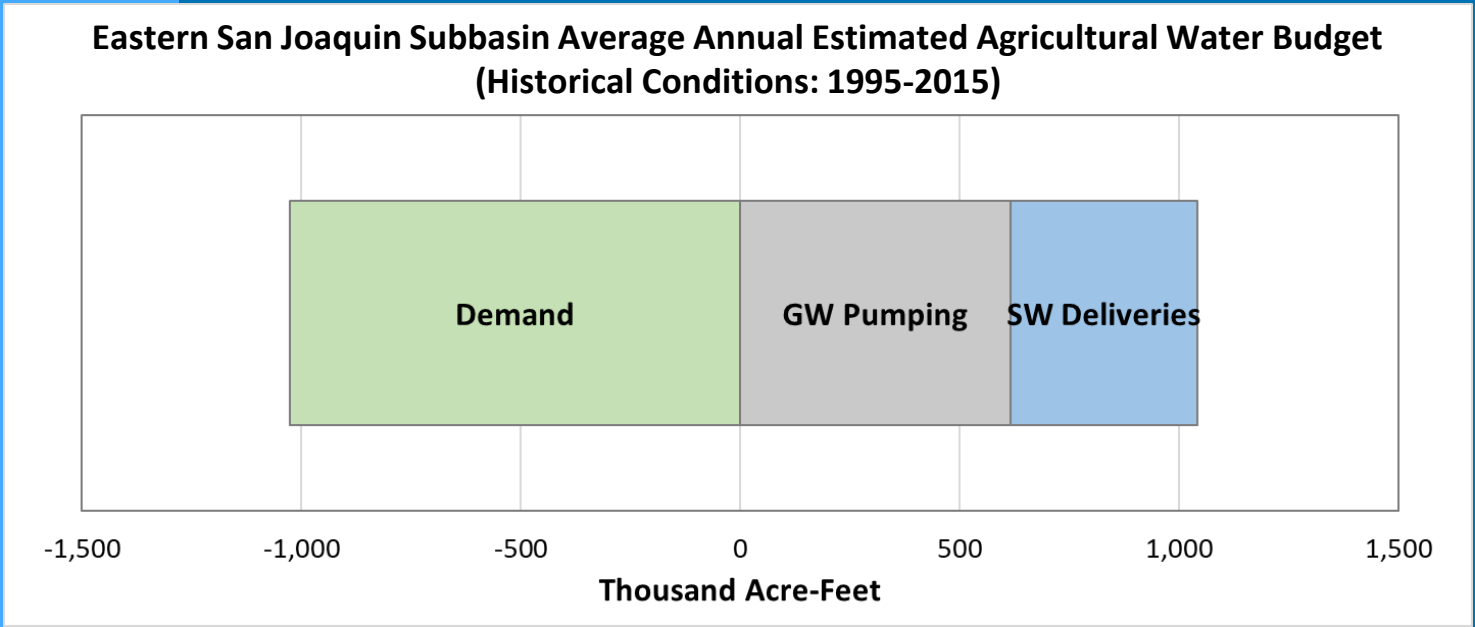

Historical Simulation: Estimated Annual Groundwater Budget

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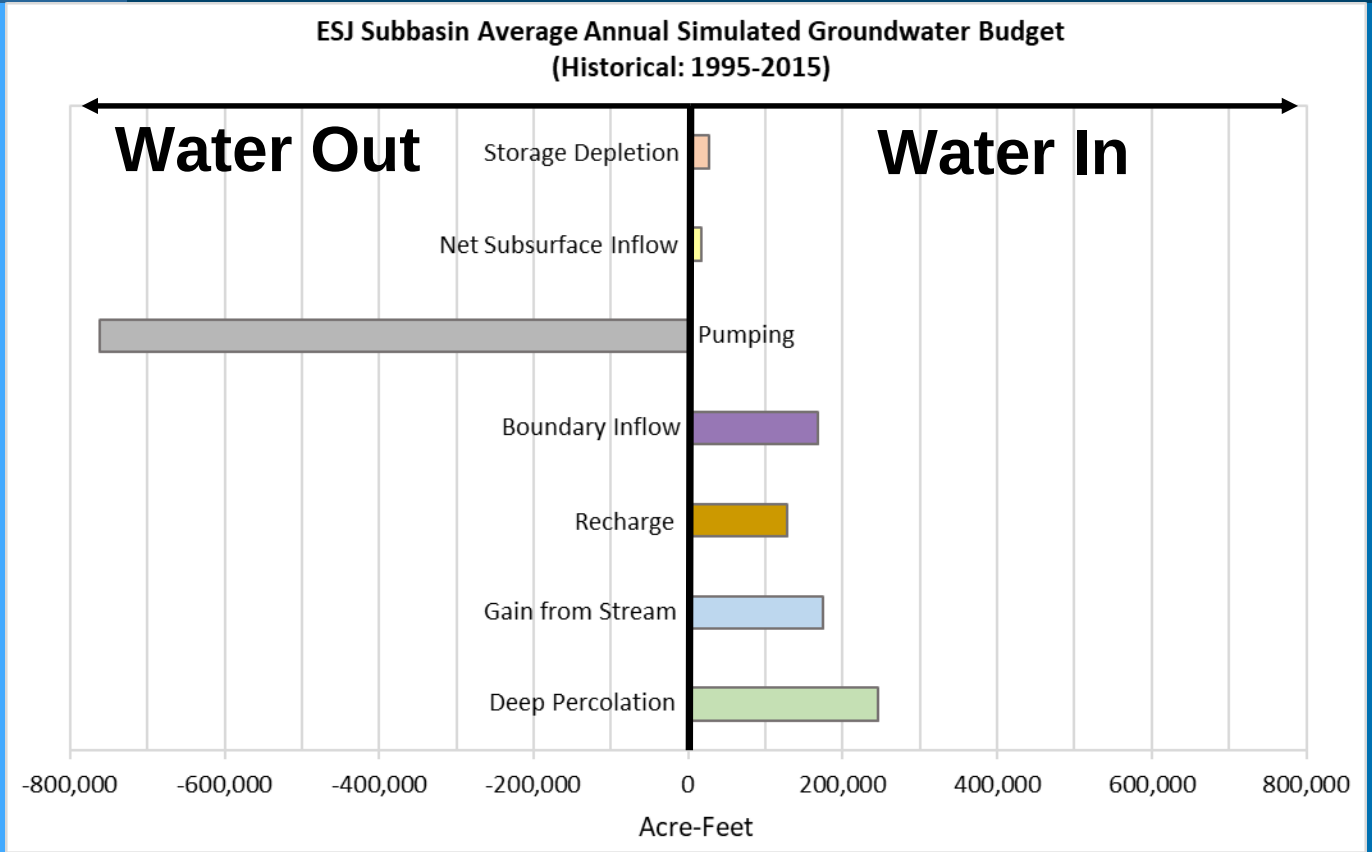

Current Conditions Baseline: Urban L&WU Budget

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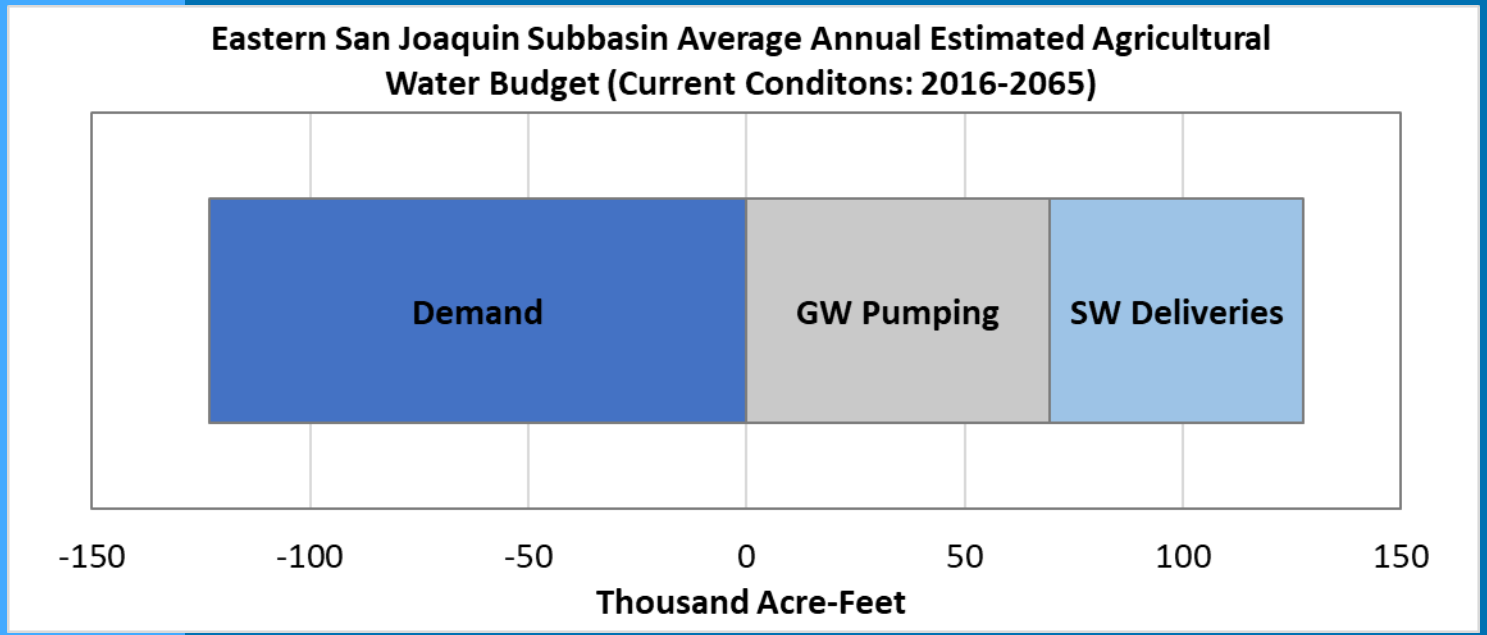

Current Conditions Baseline: Agricultural L&WU Budget

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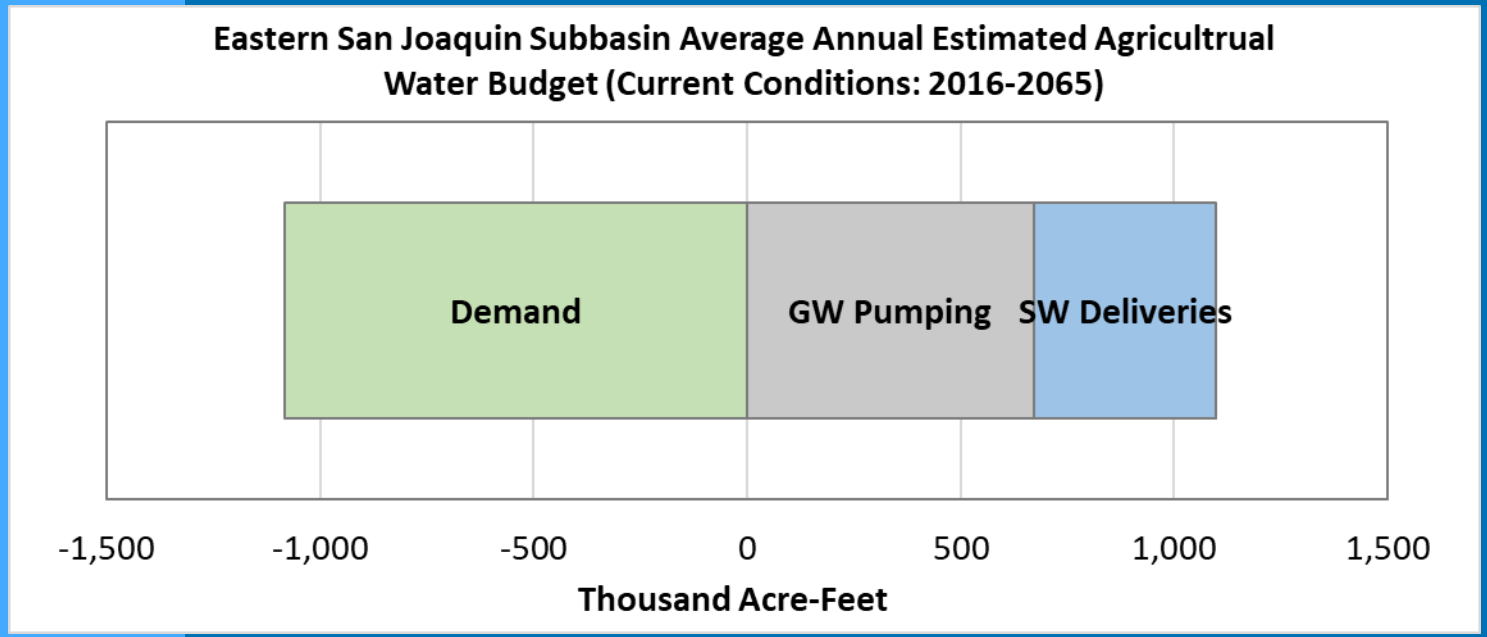

Current Condition Baseline: Groundwater Budget

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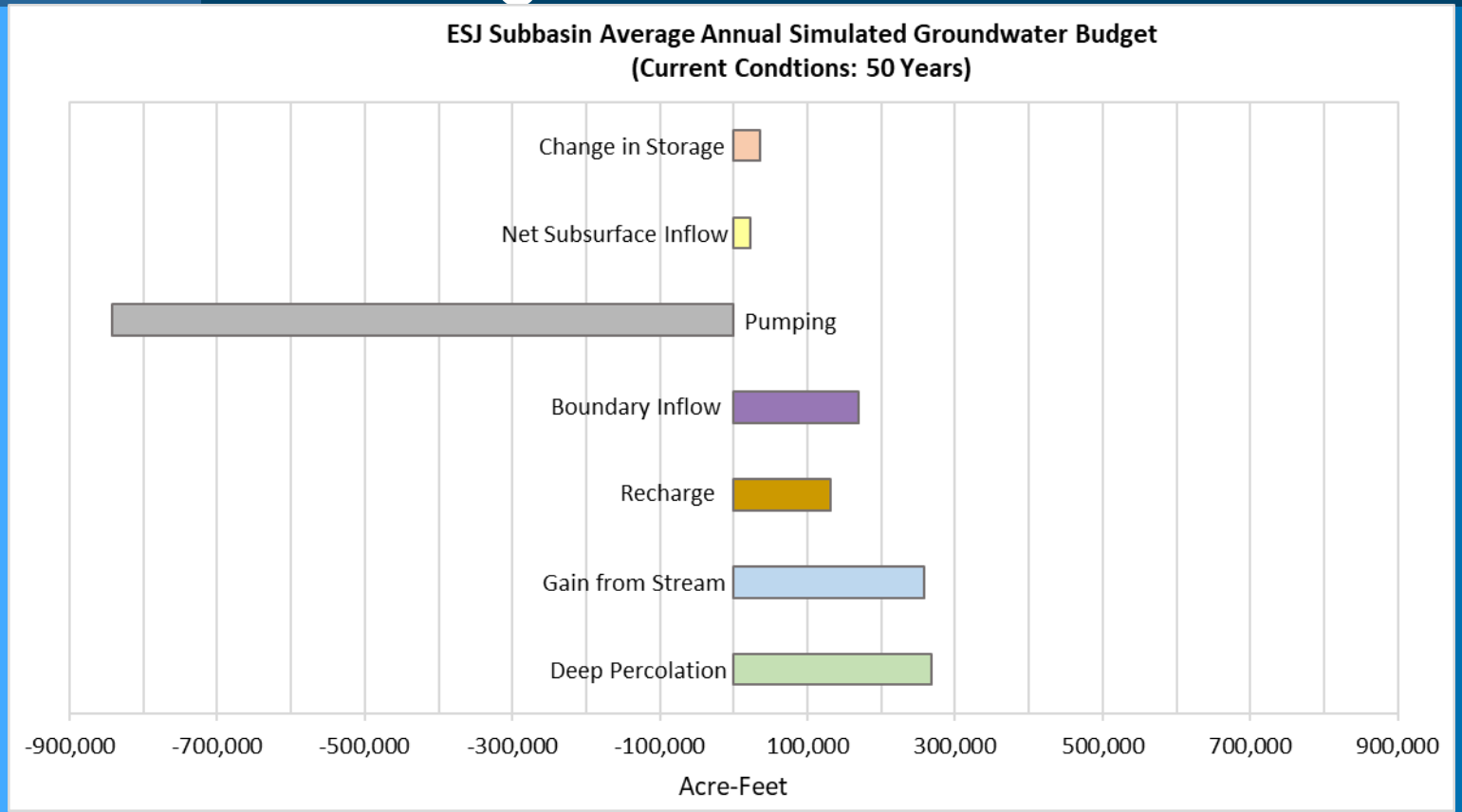

Projected Water Budget Approach

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Step 1	Identify future demands through 2040
Step 2	Identify supply projects with yield and timing
Step 3	Develop water budget from “current” (2016) to 2040

Projected Future Conditions: Land Use and Cropping Patterns

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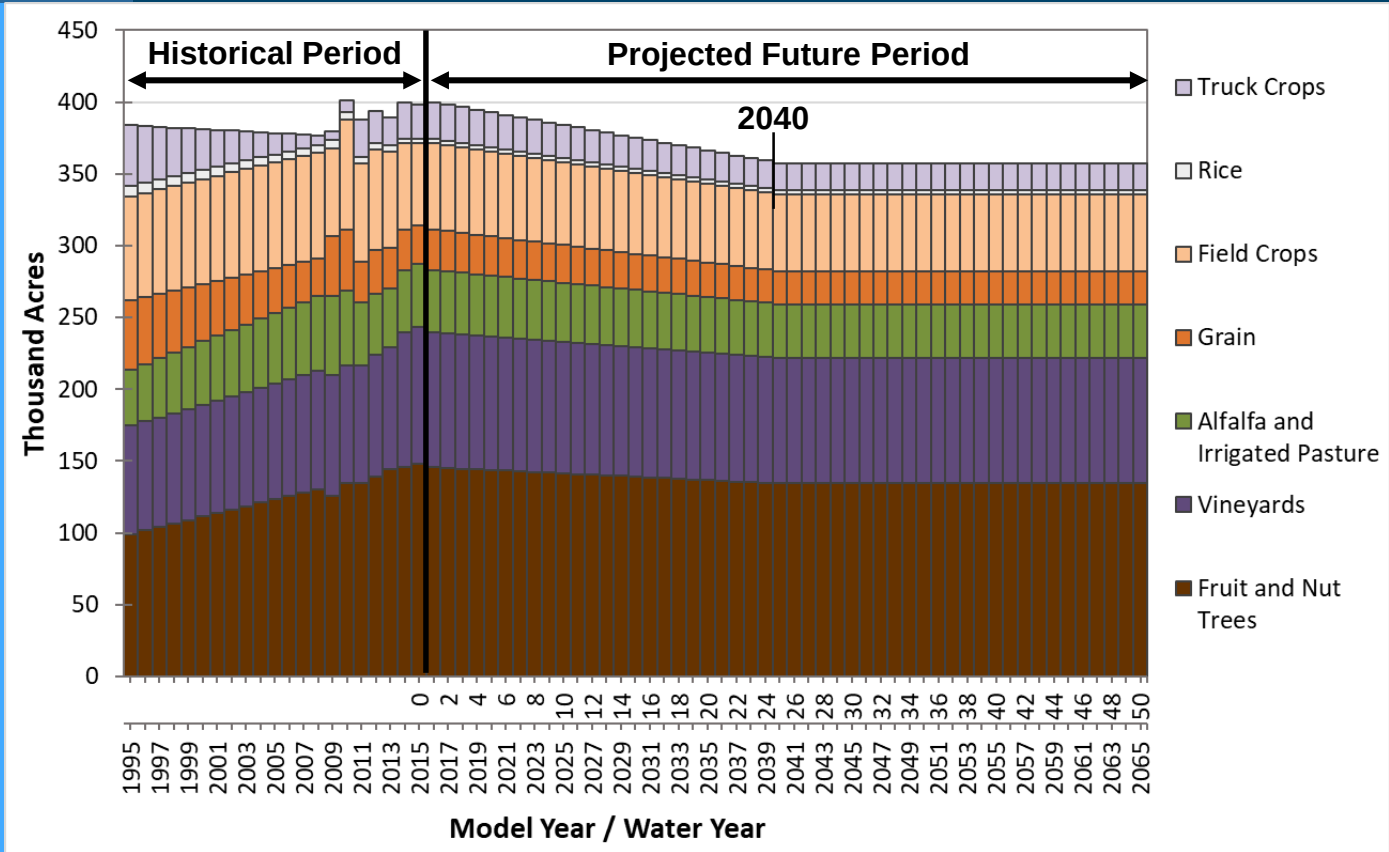

Projected Future Conditions: Estimated Population and Water Use

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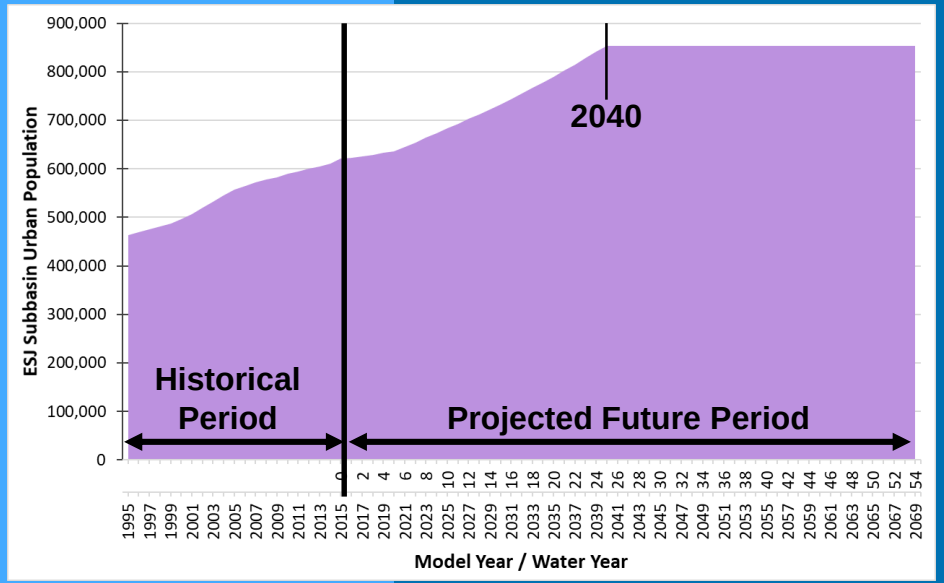

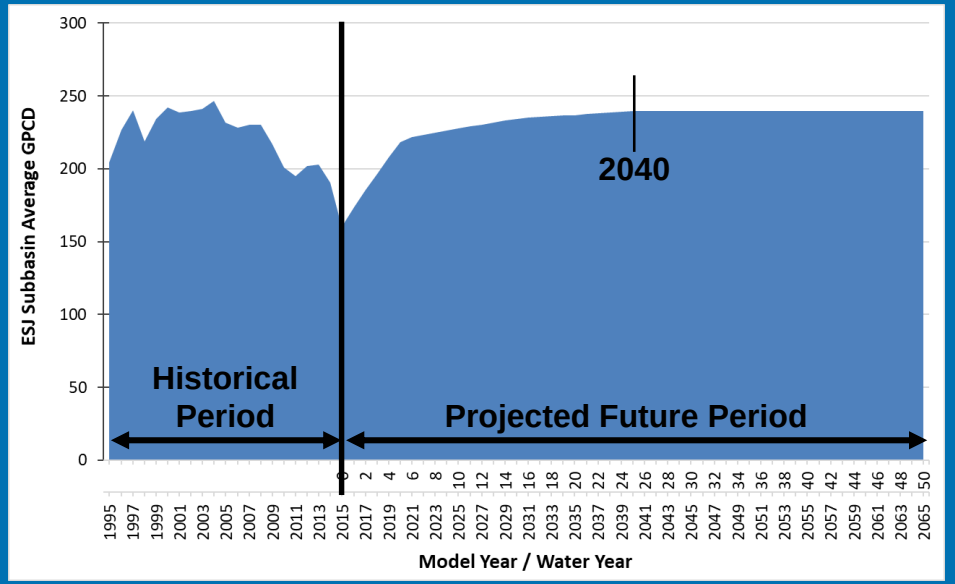

**GPCD = gallons per capita per day*

Projected Future Conditions: Estimated Surface Water Deliveries

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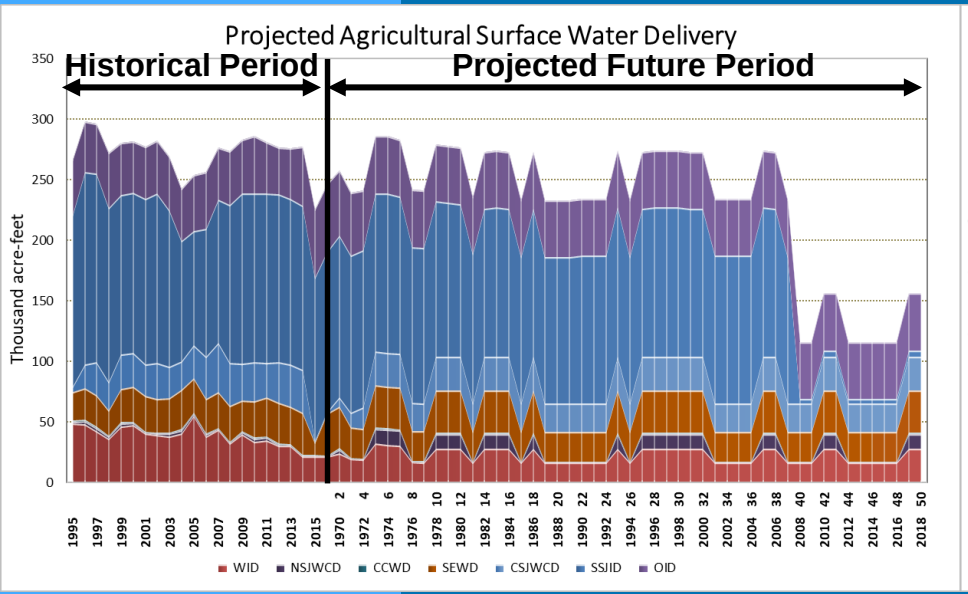

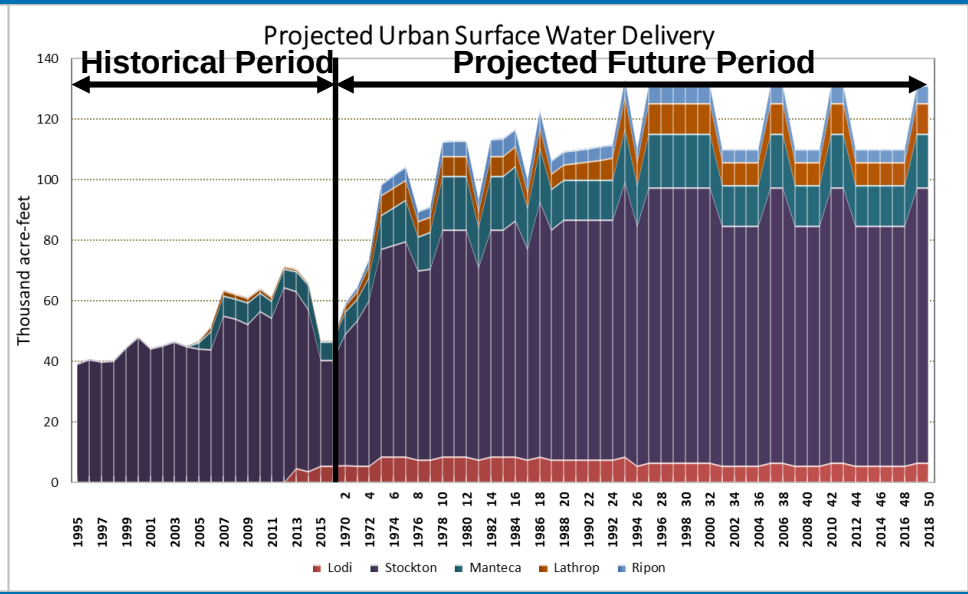

Water Resources Model

Water Resources Model

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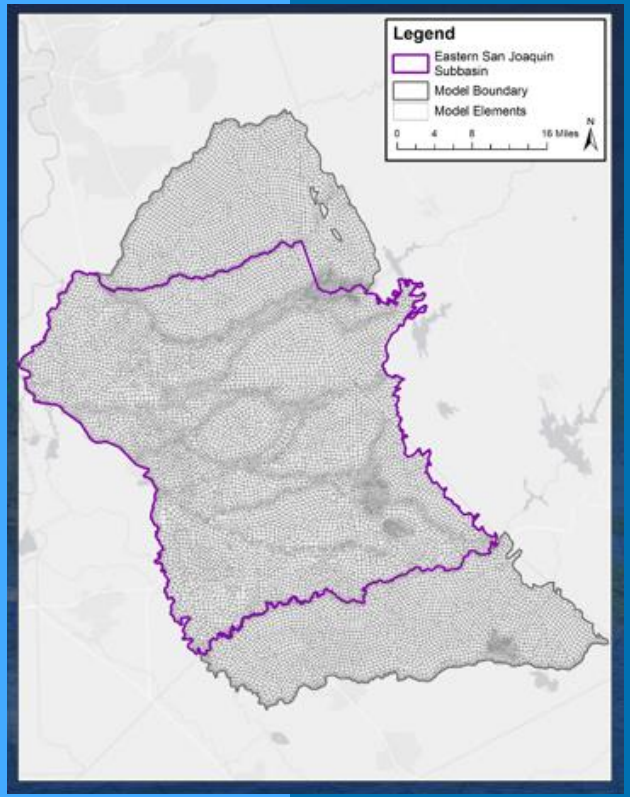

Over the past decades, agencies in the Eastern San Joaquin Subbasin have worked together to build, calibrate, validate, and refine an integrated surface- and groundwater model that serves as a robust and defensible analytical tool to support GSP development.

ESJWRM

Eastern San Joaquin Water Resources Model

The Model Was Approved for Use by the Groundwater Authority Board of Directors

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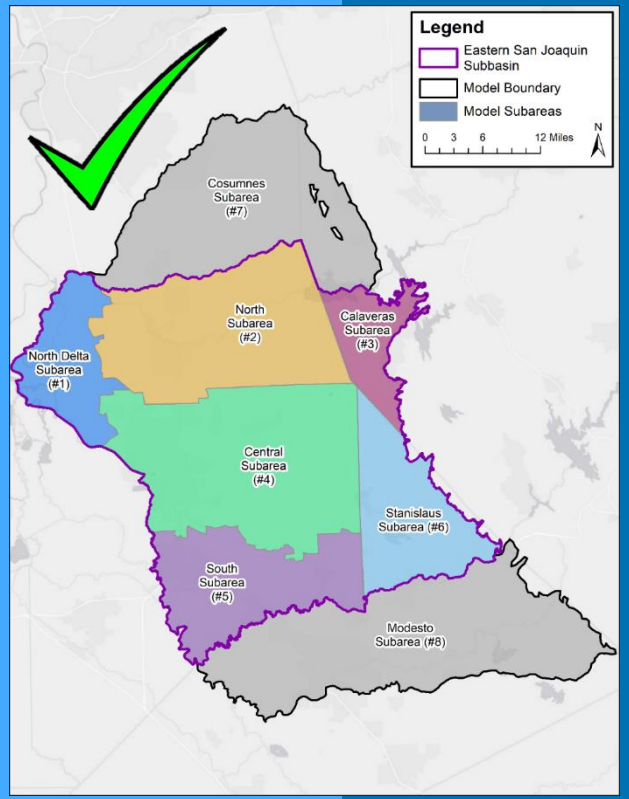

During the May 9, 2018 Groundwater Authority Board meeting, the Board voted to approve the use of the model in the GSP development process.

The Model will be used to develop the Water Budget and evaluate Projects and Management Actions.

The Model was Developed Based on an Existing DWR Modeling Platform and Local/Statewide Datasets

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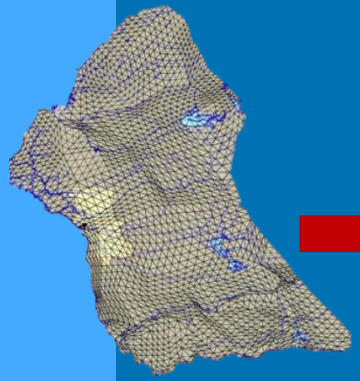
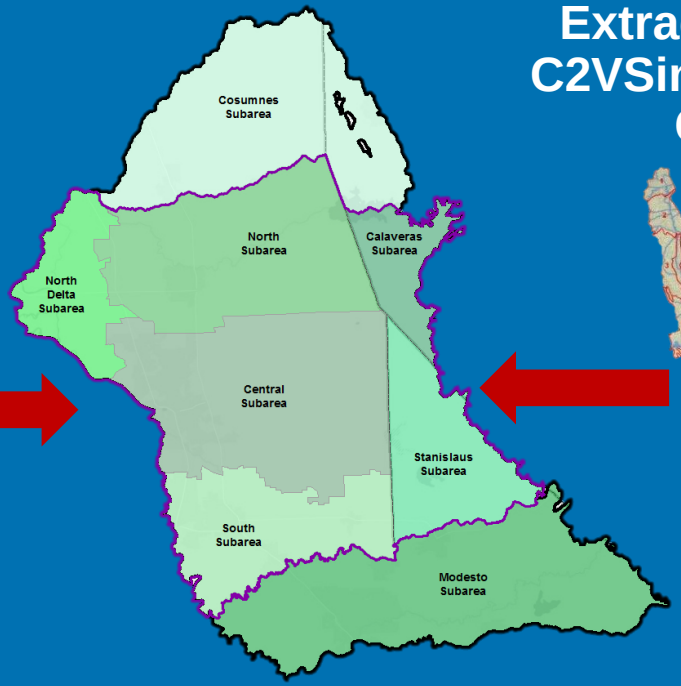
Migration of Existing DYNFLOW (local ESJ Subbasin model) Data





Extract Information from C2VSim-FG (state model of Central Valley)

ESJWRM

The Model Captures the Interplay Between Integrated Hydrologic Processes

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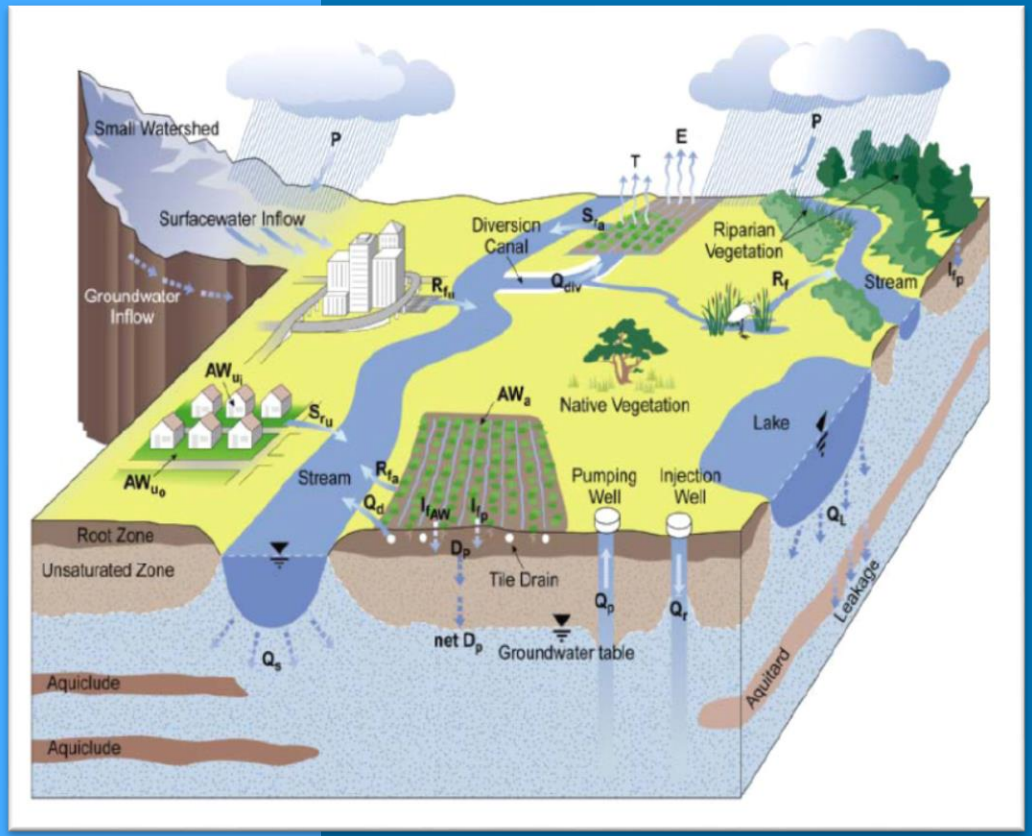


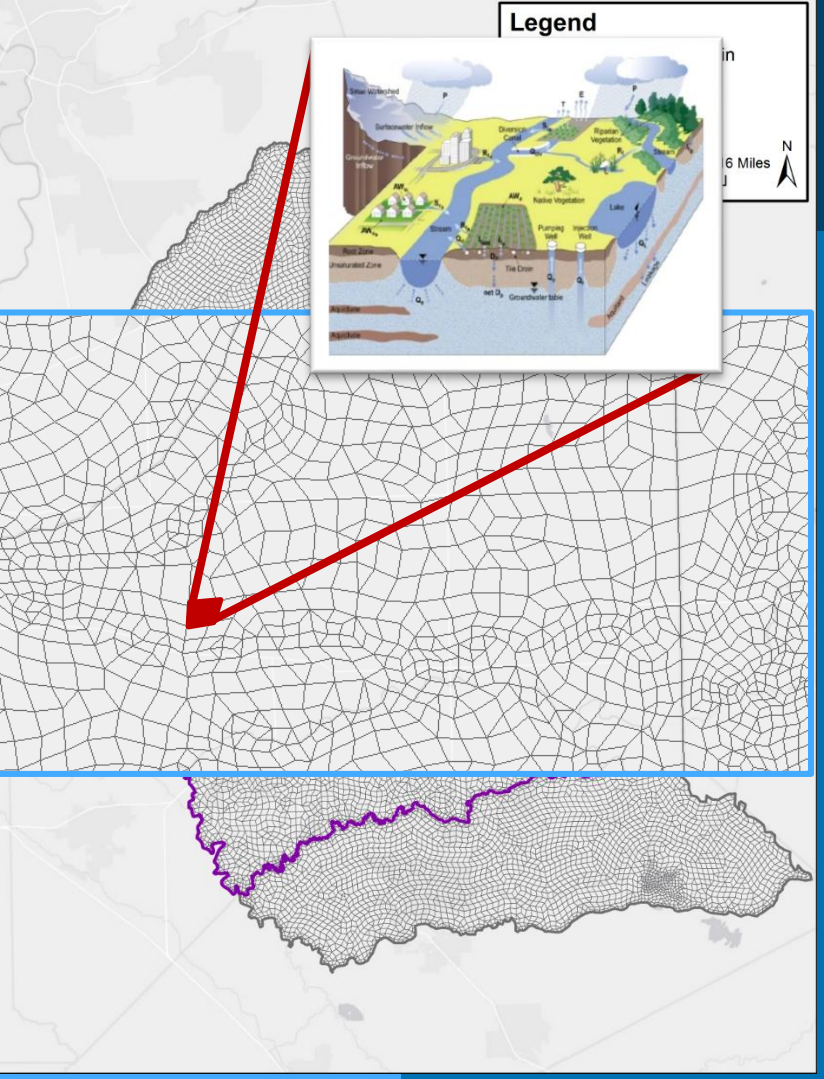
Land Surface Processes

Groundwater Flow

Streamflow

Physical Systems Integration

Water Budgets



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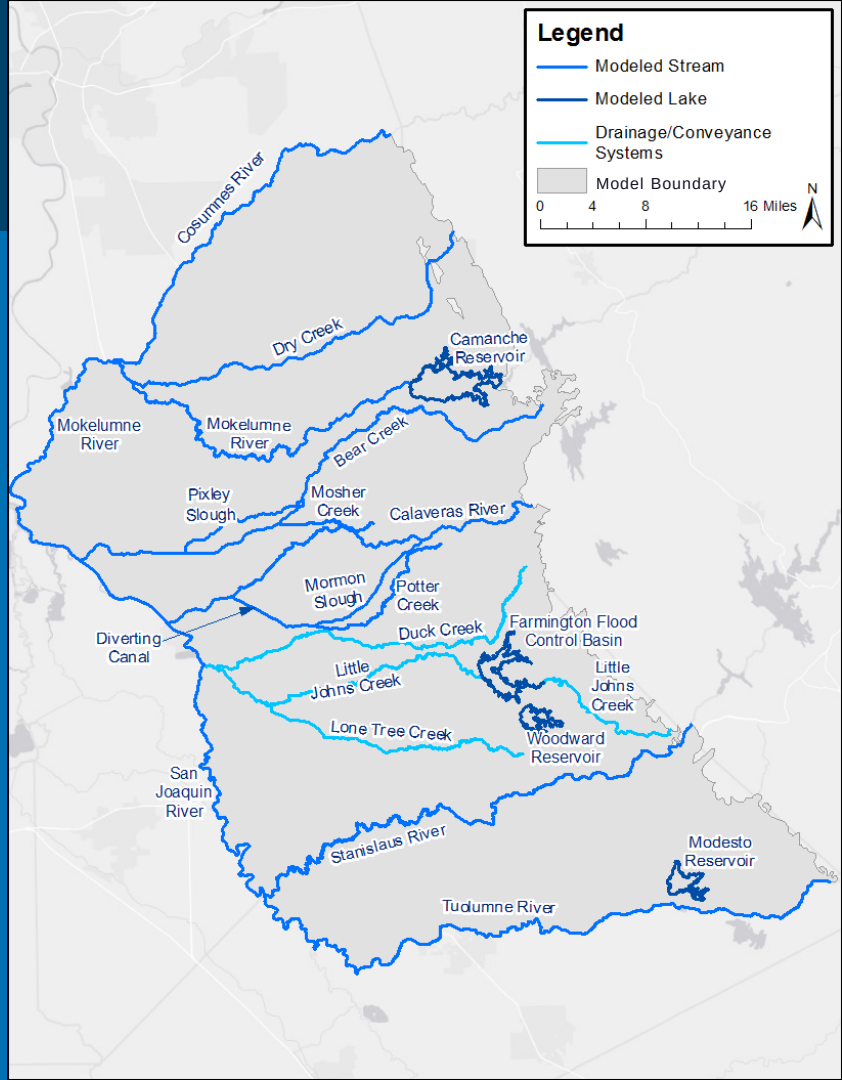
Hydrologic and Hydrogeologic Computations are Performed at Model Grid Elements and Nodes

- Model Grid
  - 16,054 elements
    - Average Area: 76.5 acres
  - 15,302 nodes
    - Node Spacing:
      - Across Model Area: 0.37 mile
      - Along the Rivers/Water Courses: 0.28 miles

The Model Simulates Major Surface Water Features

Streamflow and surface water diversions are simulated, as well as groundwater-surface water interactions



The Model was Built Using Data Going Back to 1922

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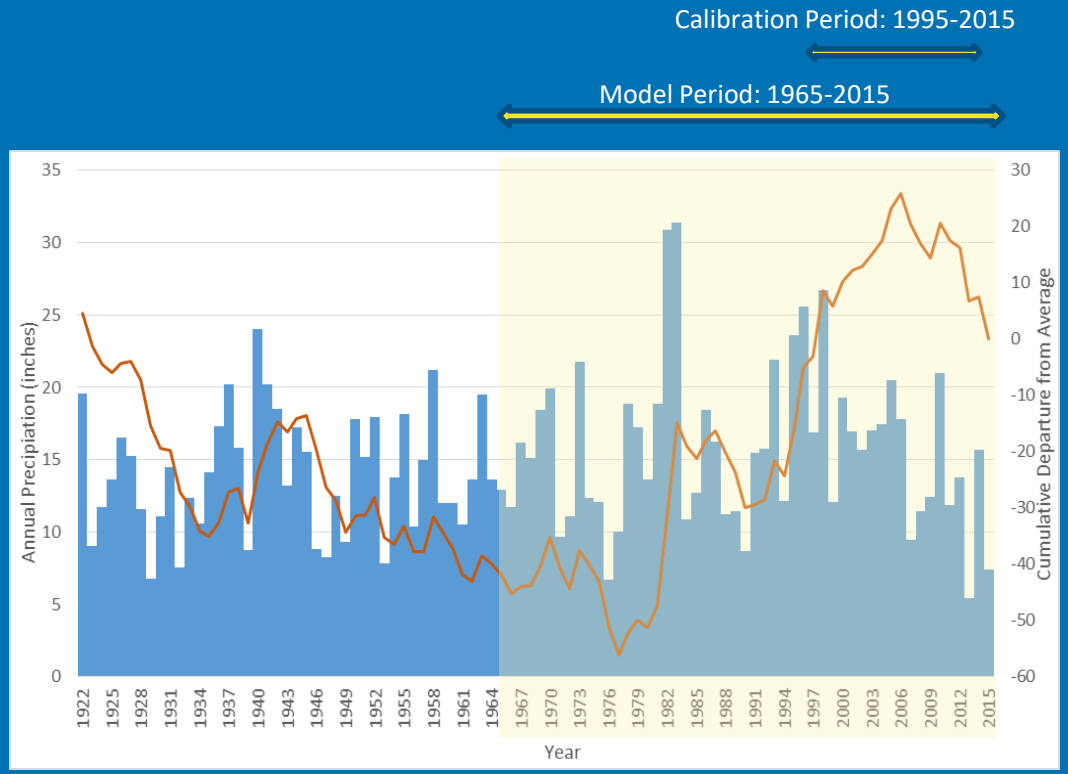

*Source: PRISM (Parameter elevation Regression on Independent Slopes Model)

How Will the Model be Used?

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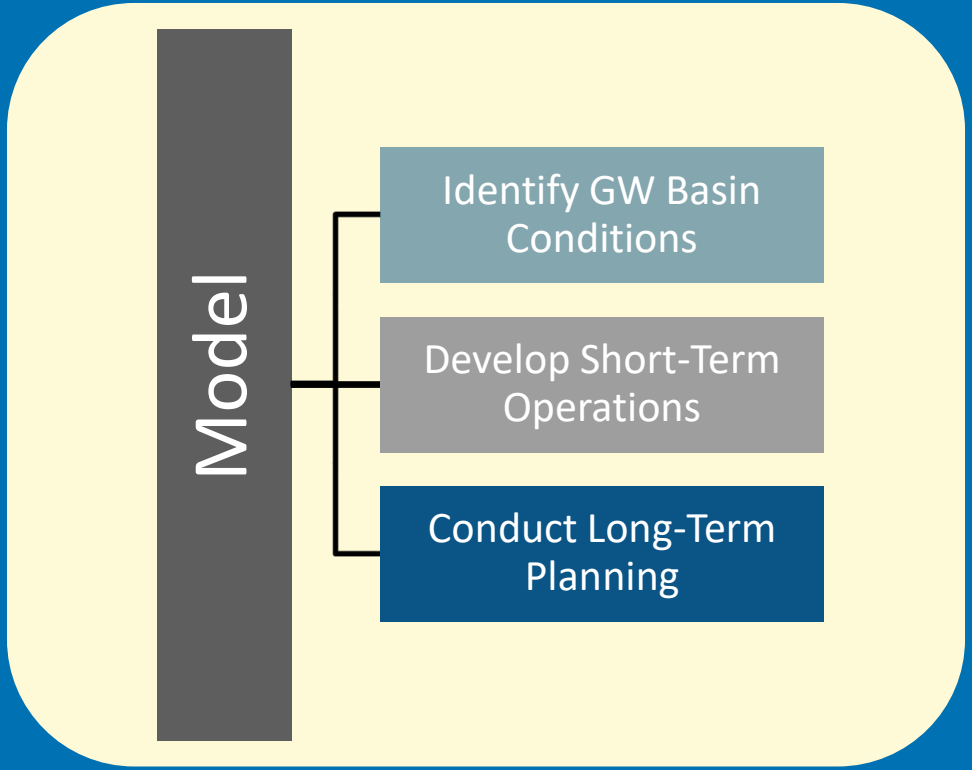

What Questions Can the Model Answer?

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The model will help answer some of the big SGMA questions.

How long will it take to achieve sustainability?

What are our thresholds for sustainability?

What are the economic implications of sustainability?

What is the current status of the groundwater basin?

How is sustainability measured?

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