CALIFORNIA DEPARTMENT OF WATER RESOURCES

San Joaquin Flood-MAR Watershed Studies

Efficient Application of Watershed-Scale Recharge

2025 CWEMF Annual Meeting

May 13, 2025

Efficient Application of Watershed-Scale Recharge

Outline

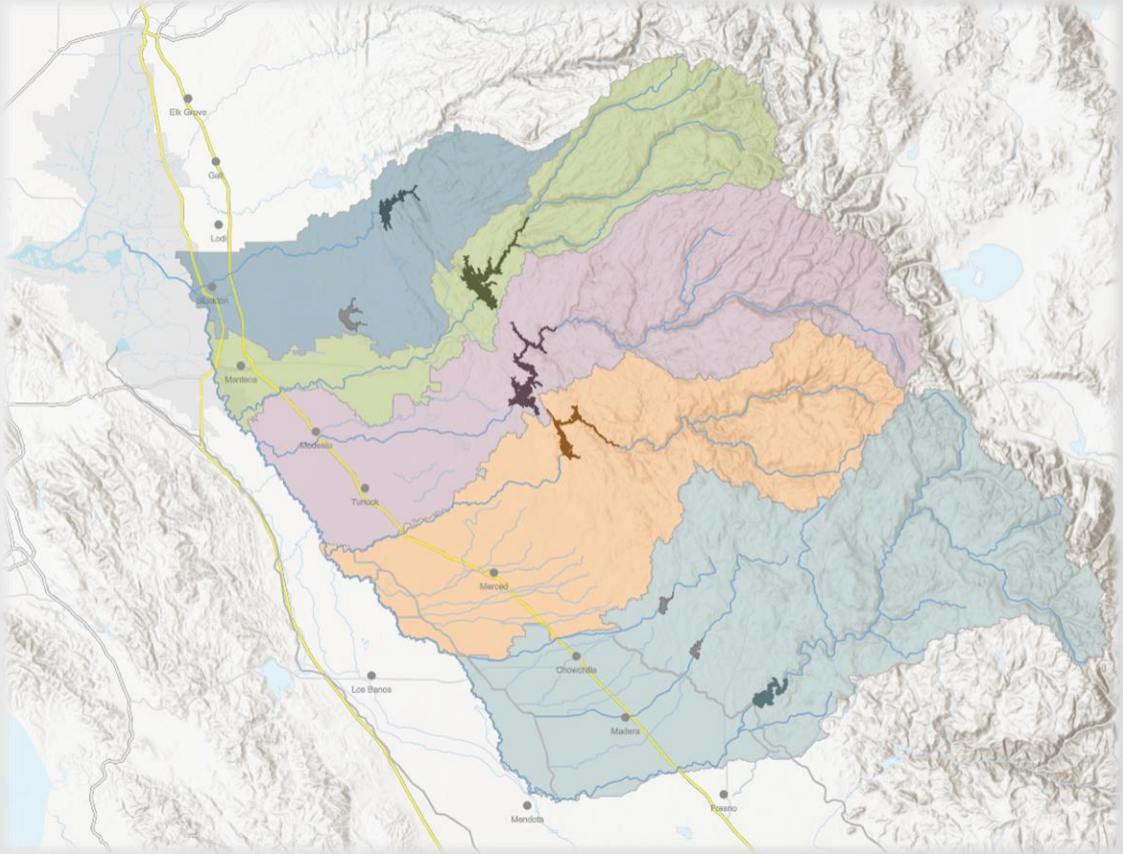
- Watershed Studies Background
- Recharge Suitability Index
- Crop Compatibility Assessment
- Recharge Management Areas
- Local Management Objectives
- Effective and Efficient Recharge

San Joaquin Watershed Studies

Project Background

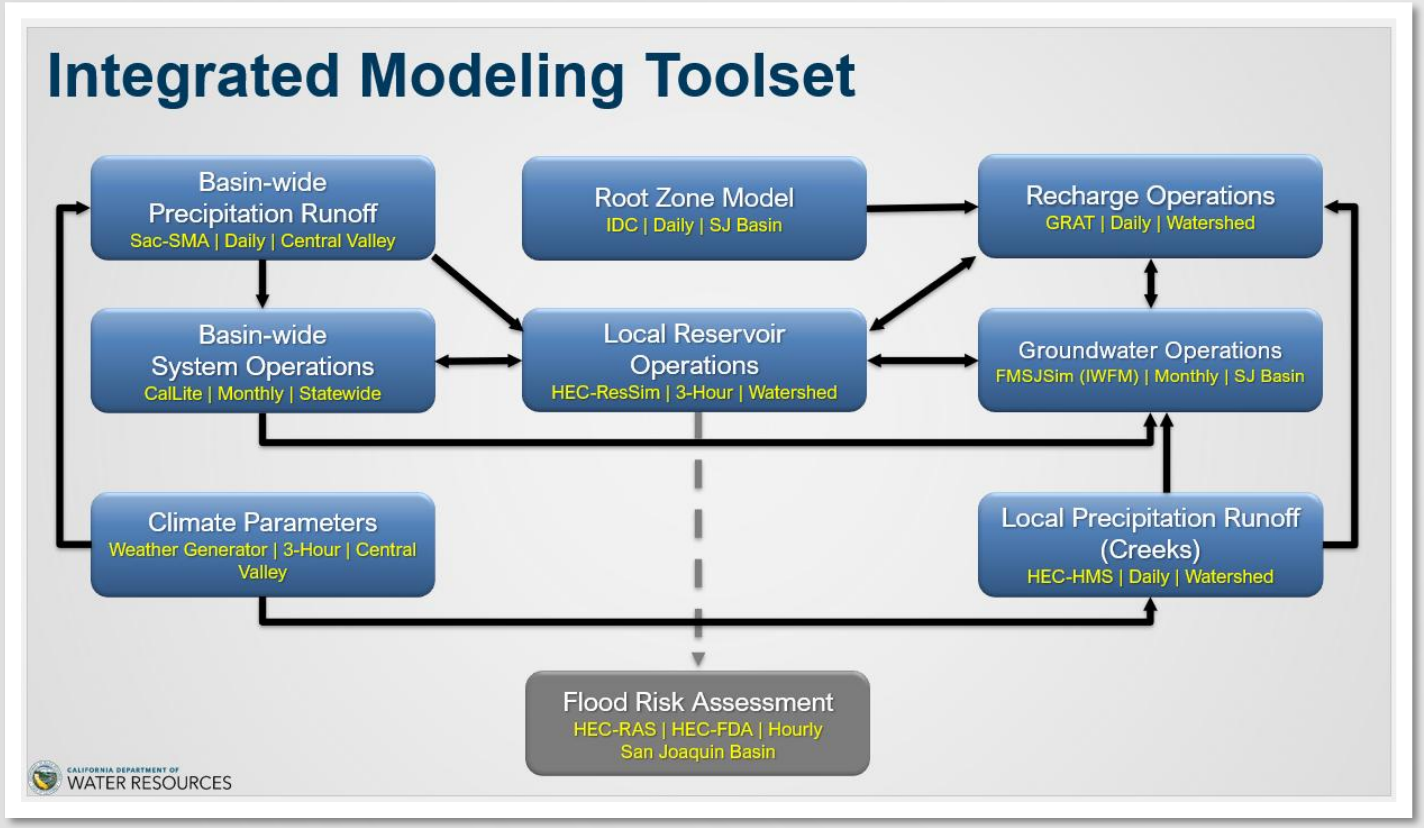
Flood Managed Aquifer Recharge (Flood-MAR)

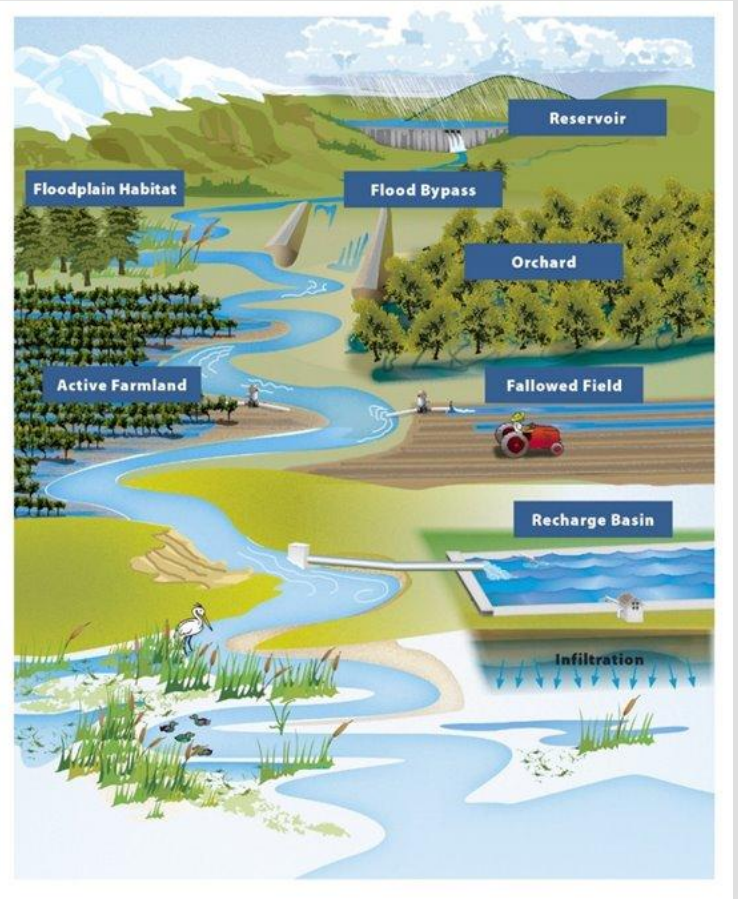
An integrated water management strategy that uses floodwaters to recharge the groundwater system. The program aims to enhance water supply reliability, reduce flood risk, and support regional ecosystems.



San Joaquin Watershed Studies

Project Background





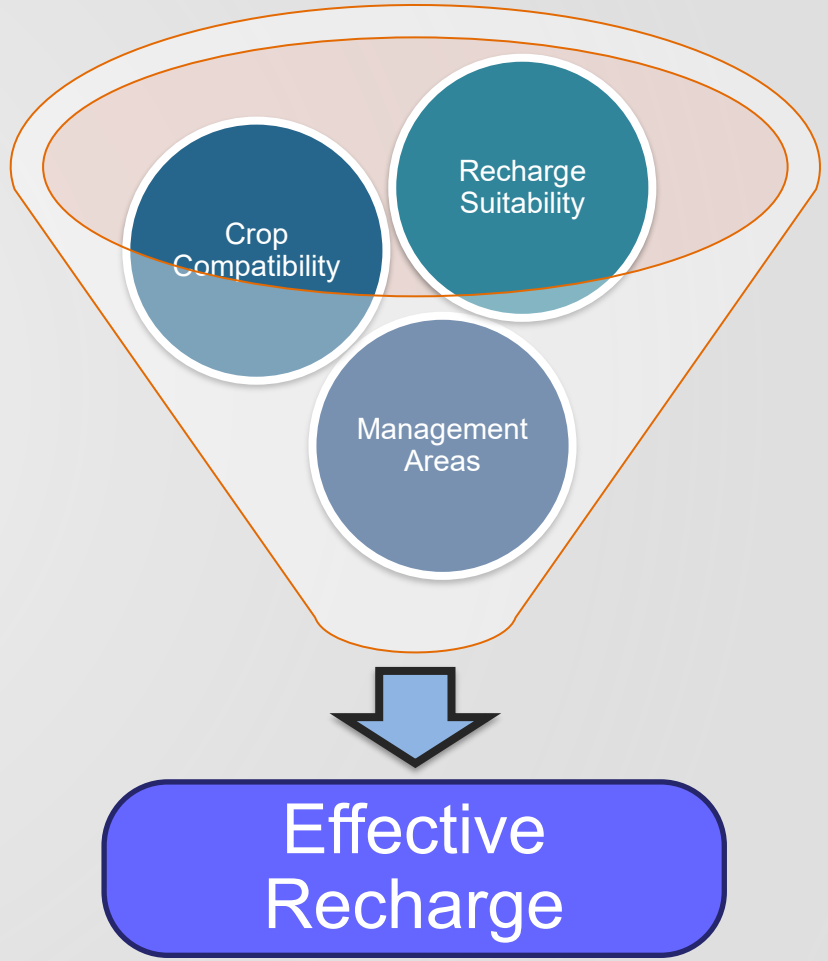
San Joaquin Watershed Studies

Project Background

Where should we recharge

When should we recharge

How should we recharge



Recharge Suitability Index (RSI)

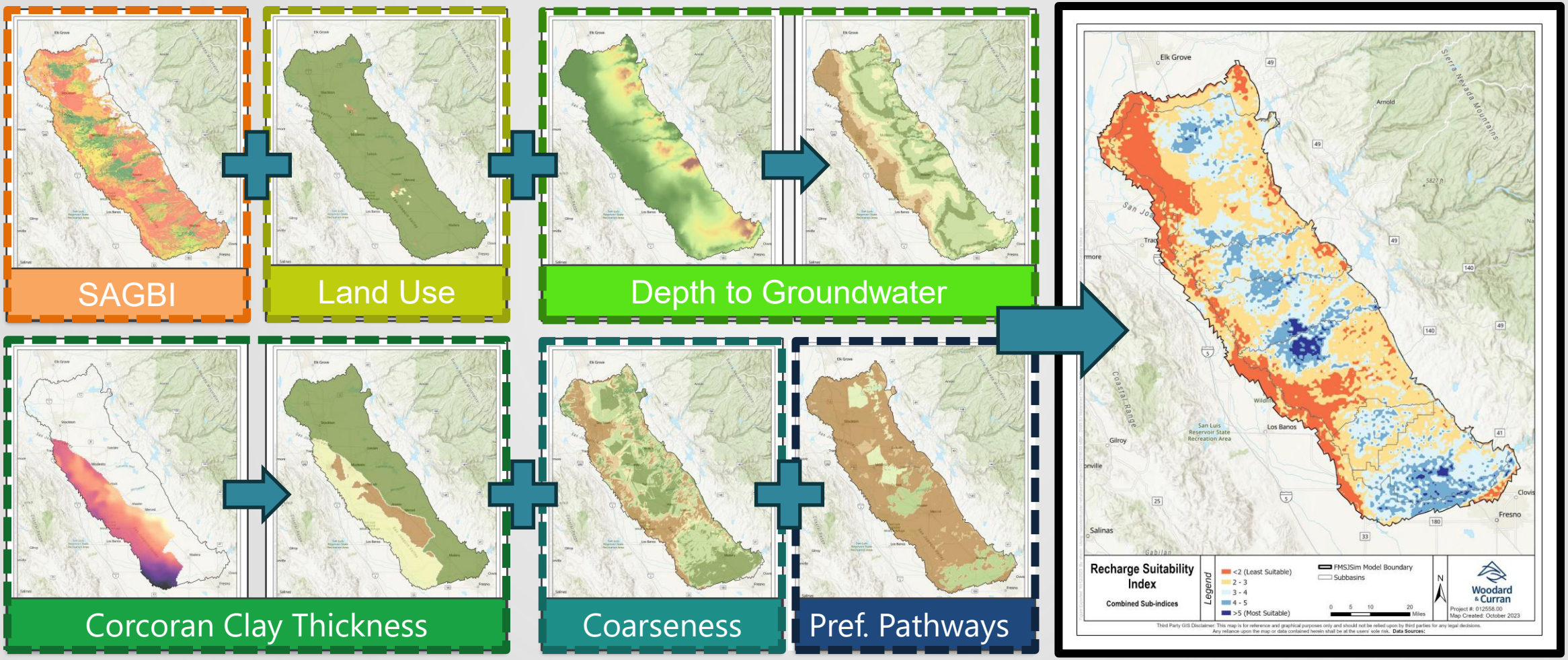
Introduction & Methodology

The **Recharge Suitability Index (RSI)** is a tool that evaluates hydrological and hydrogeological conditions for groundwater recharge. It combines key factors such as:

- SAGBI
- Historical Land Use
- Depth to Water
- Corcoran Clay
- Sediment Coarseness
- Preferential Pathways

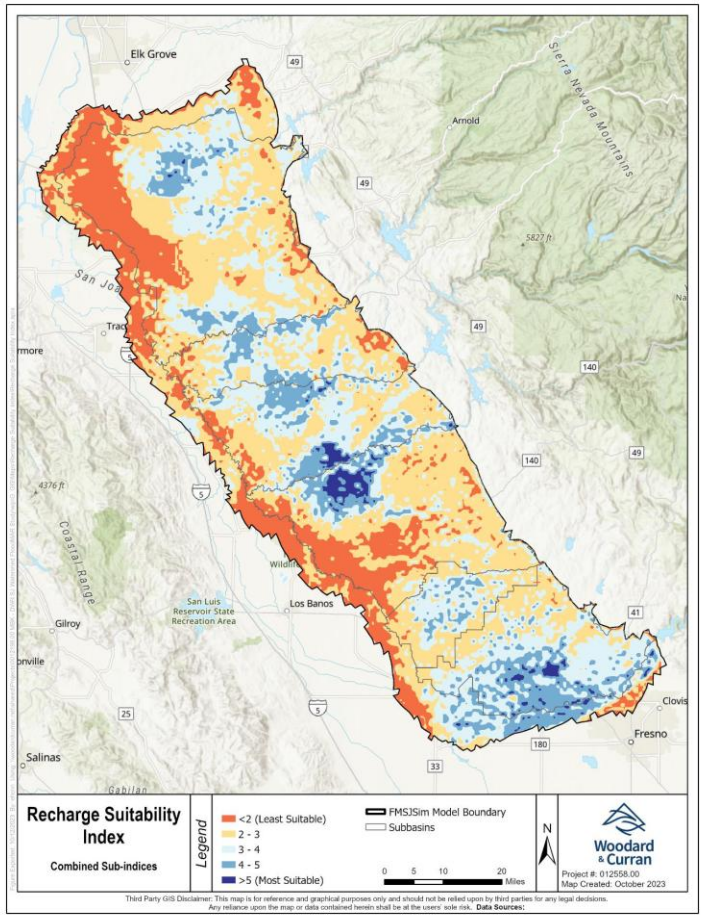
Recharge Suitability Index (RSI)

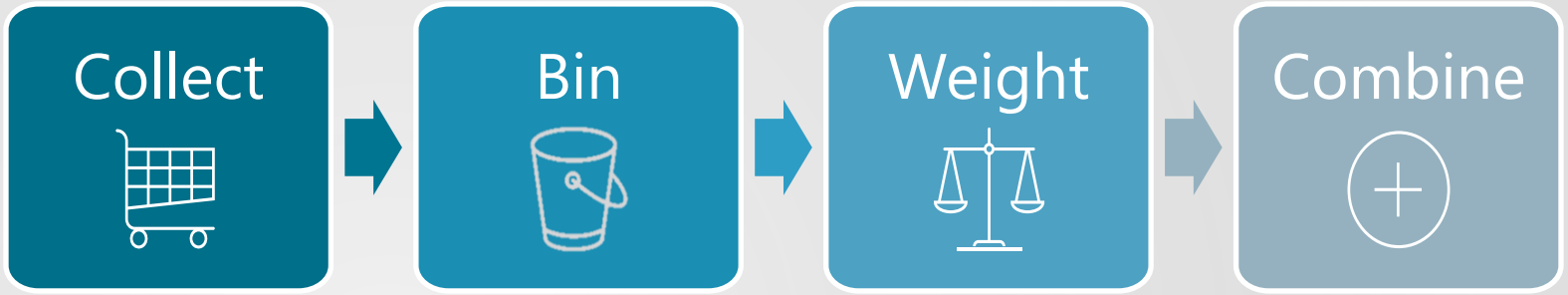
Combining Sub-Indices



Recharge Suitability Index (RSI)

Conclusions and Findings





- **Recharge Potential -** Identifies high-potential zones based on geology and current conditions.
- **Feasibility -** Assesses technical and practical site constraints such land use and operations
- **Prioritization -** Supports implementation efforts, such as infrastructure and stakeholder outreach

Crop Compatibility Assessment

Introduction & Methodology

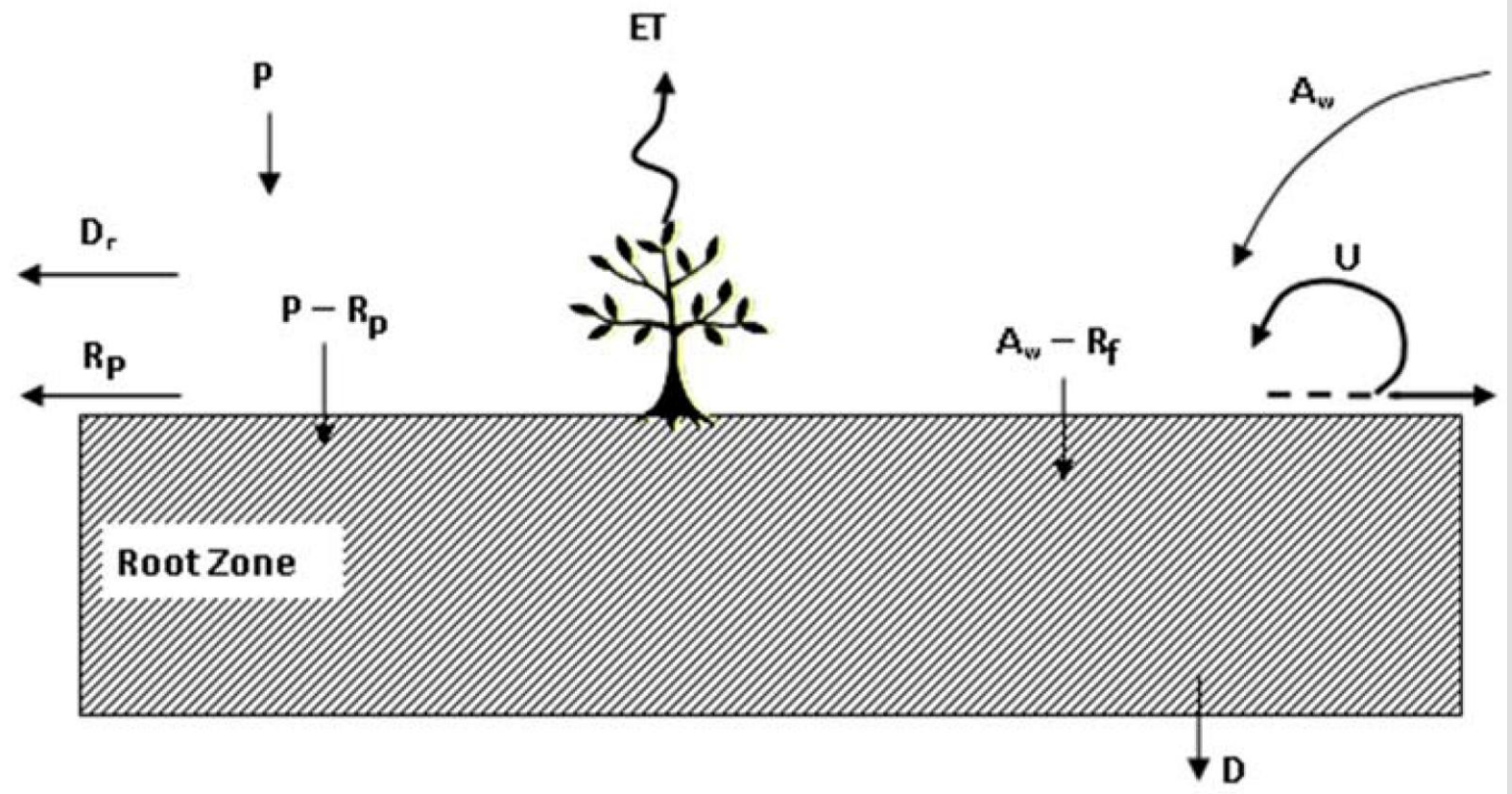
An On-Farm Recharge **Crop Compatibility Calendar (CCC)** is a planning tool that identifies how much water can be safely applied to each soil/crop combination without reducing yield or plant health.

Crop Compatibility Assessment

Setup and Assumptions

IDC Setup

- Parameters
  - Timestep (daily)
  - Textural parameters
- Seasonality
  - Hydrology
  - Crop sensitivity
- Turnout capacity

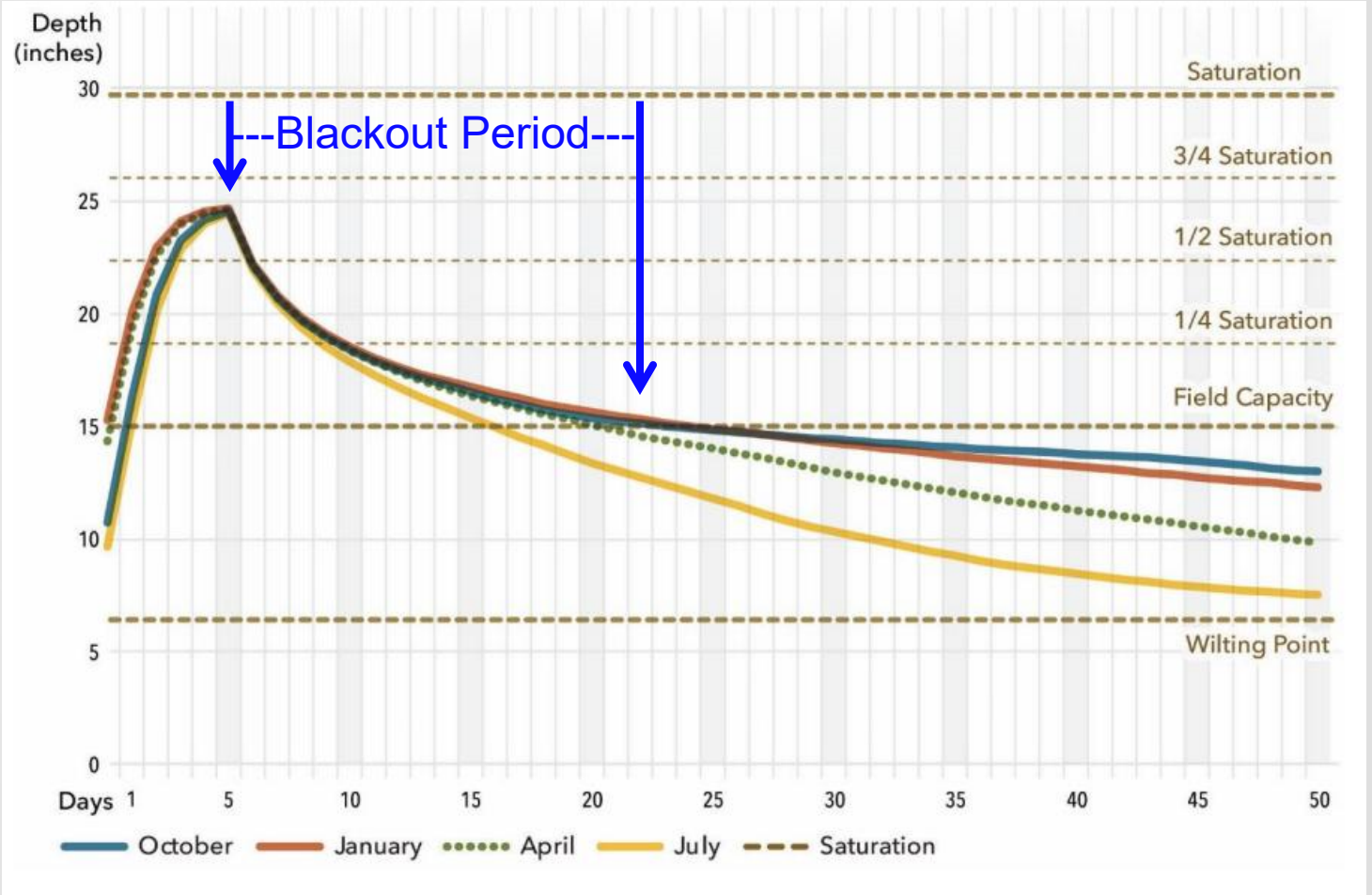


Crop Compatibility Assessment

IWFM Demand Calculator

Applied WAFR was limited by the potential oxygen decline and set at a threshold of 75% saturation to avoid inhibiting plant respiration and growth.

A conservative "black-out period" was employed to avoid overestimating potential recharge



Recharge Management Areas

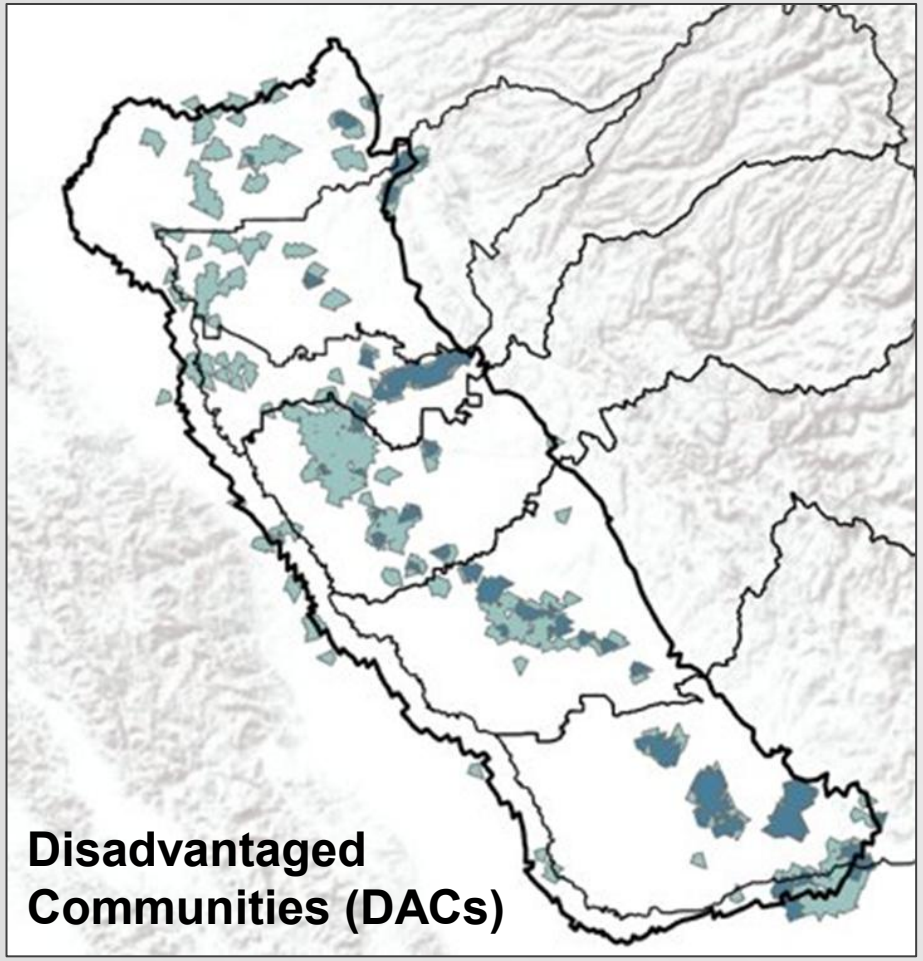
Introduction & Methodology

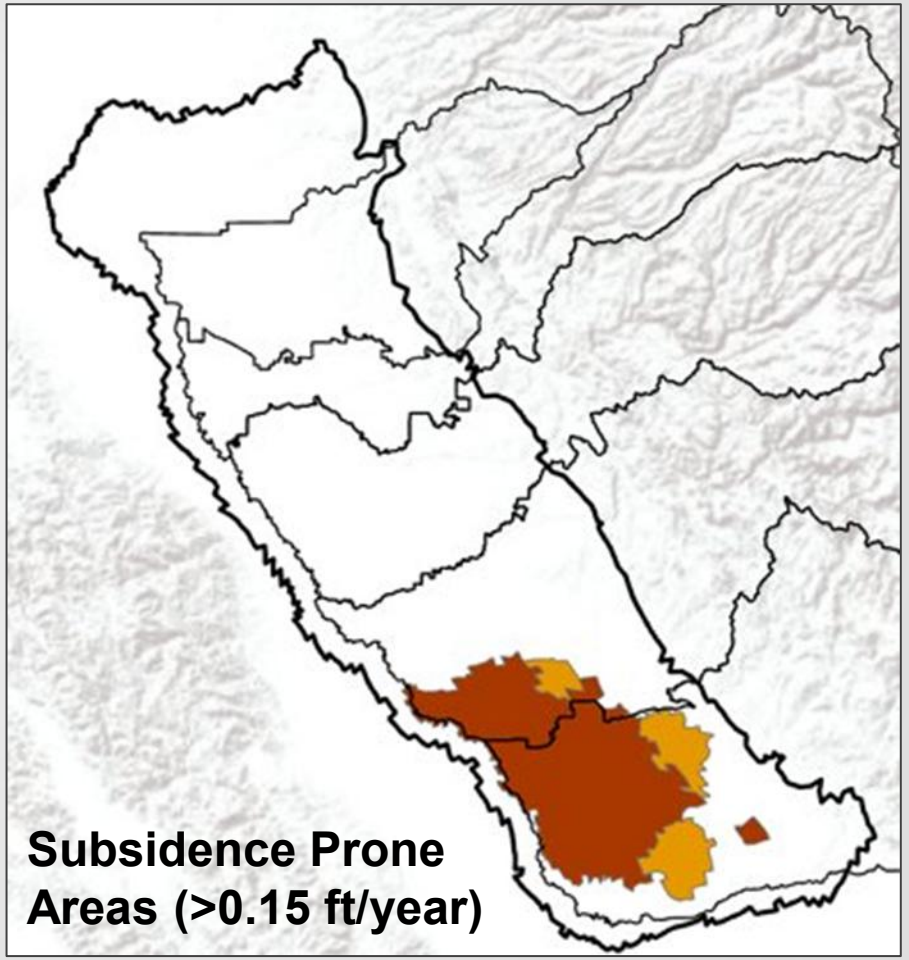
Multi-sector Benefits

- In-Basin Retention
- Subsidence Prevention
- Disadvantaged Communities
- Groundwater Dependent Ecosystems

Recharge Management Areas

Disadvantaged Communities + Subsidence Prone Areas





Recharge Management Areas

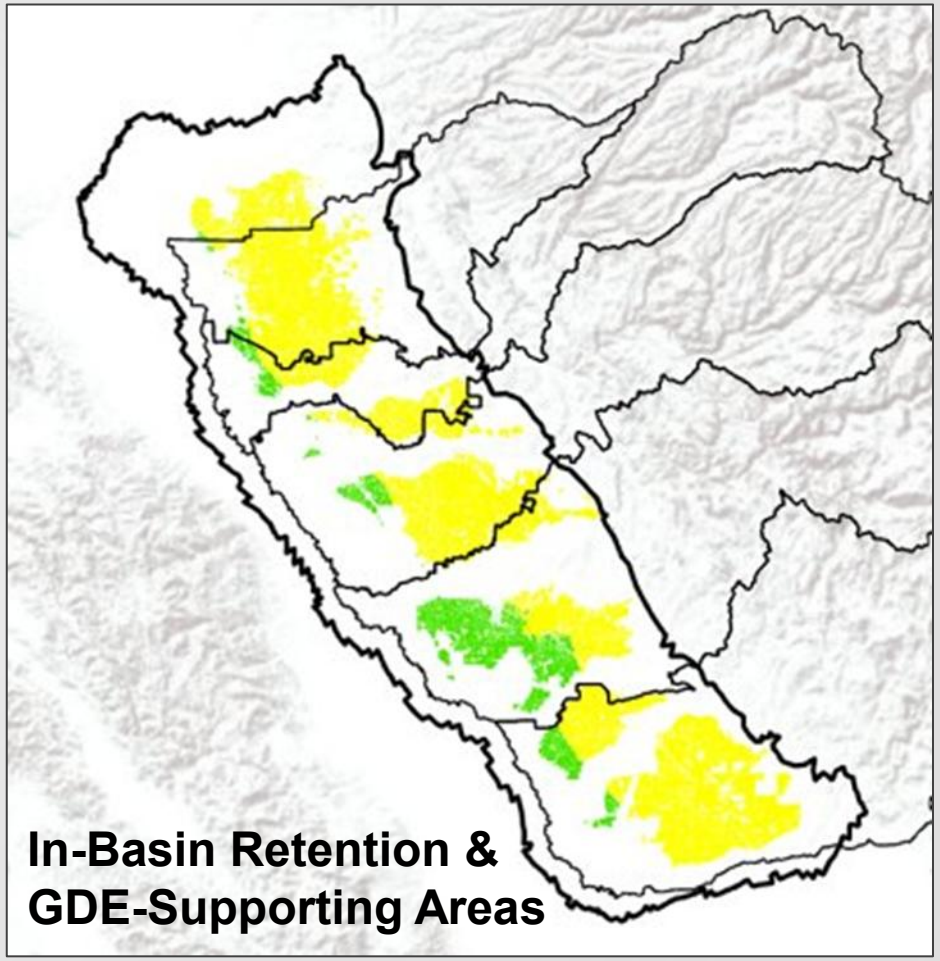
In-Basin Retention & GDE Supporting Areas

Recharge for Long-Term Benefit

- 20-foot depth to groundwater.
- 1-mile from a connected stream.
- Groundwater gradients flow within the watershed / subbasin boundary.

Notes:

Recharge on or near GDEs yielded short-term impacts, while the greatest long-term gains for GDEs came from targeting in-basin retention.



Recharge Management Areas

Combining RMAs

Preliminary Groups

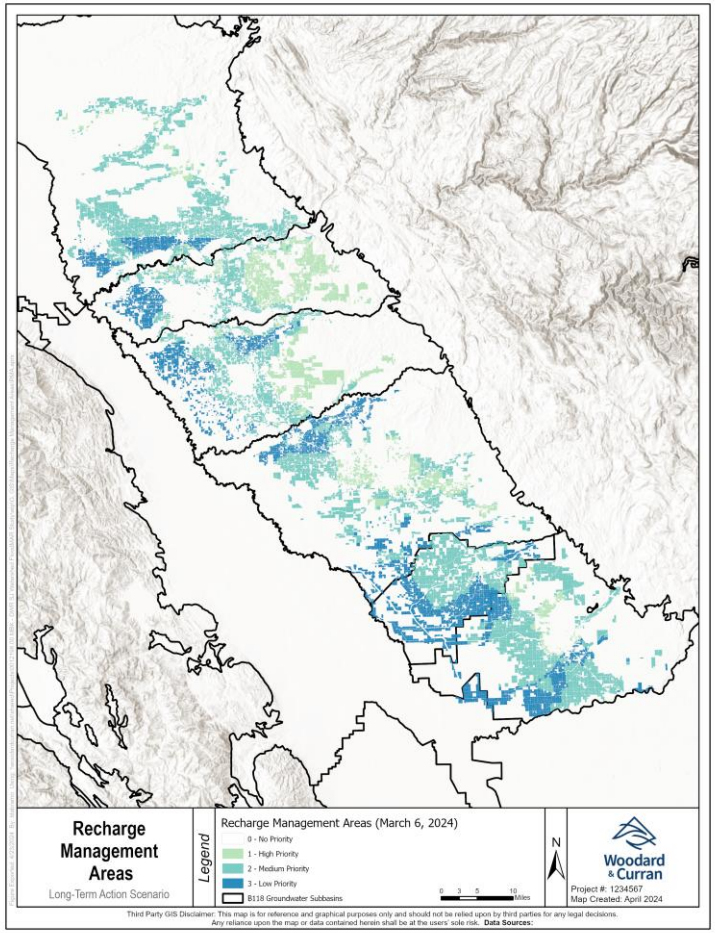
- **Northern Subbasins** — Targets cones of depression
- **Southern Subbasins** — GDE & IBR RMAs

Elevate GDEs & Subsidence

- +1 for Group 1 with GDE areas
- +1 for Group 1 with GDE or subsidence prone areas

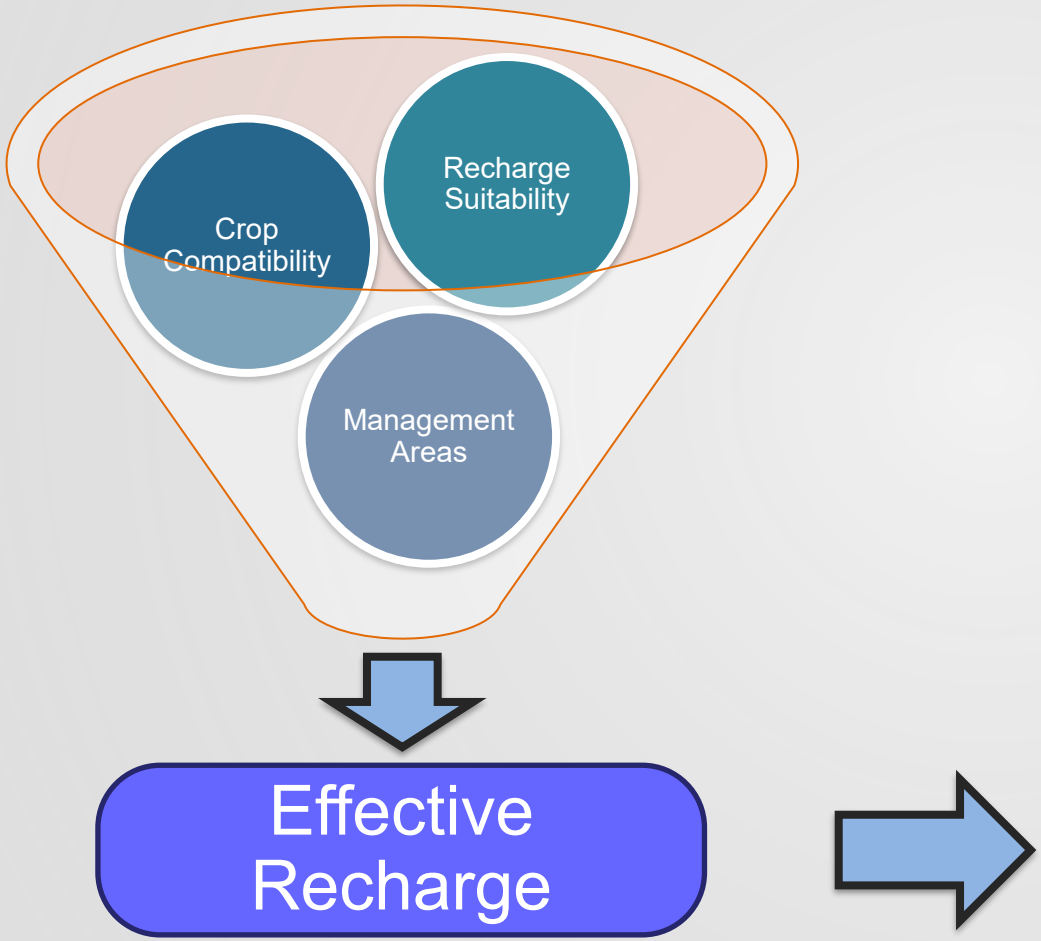
Elevate DACs

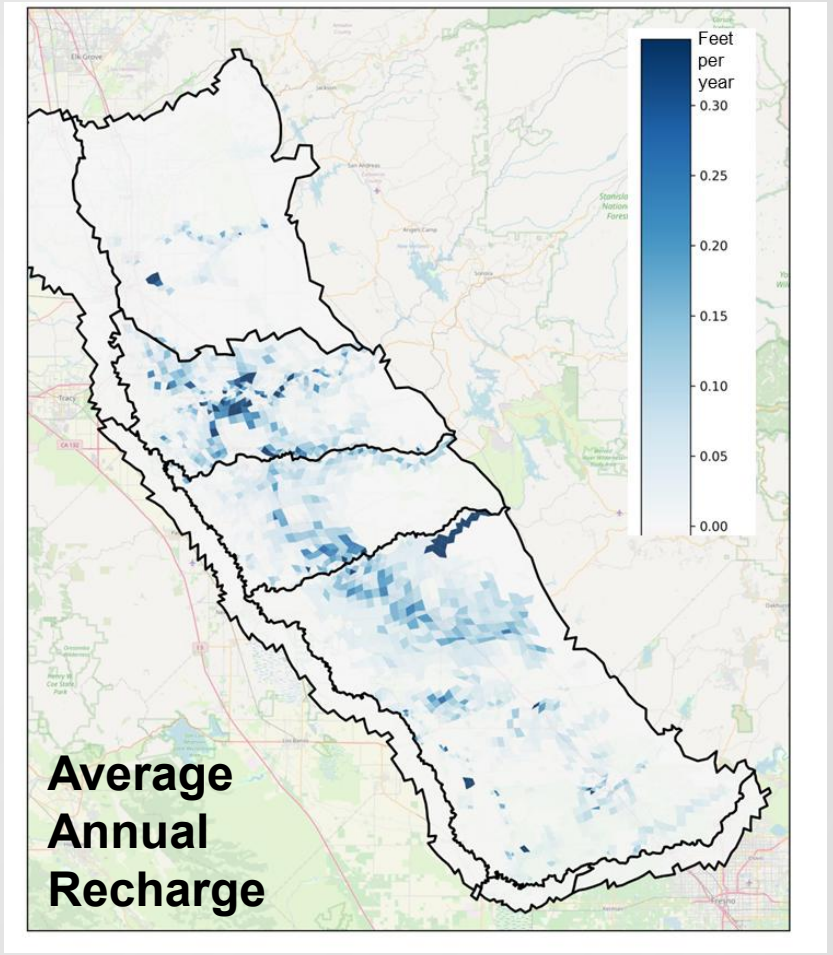
- +1 for parcels in DAC areas



Efficient Application of Recharge

MAR 90/20 – Sneak Peak





Efficient Application of Recharge

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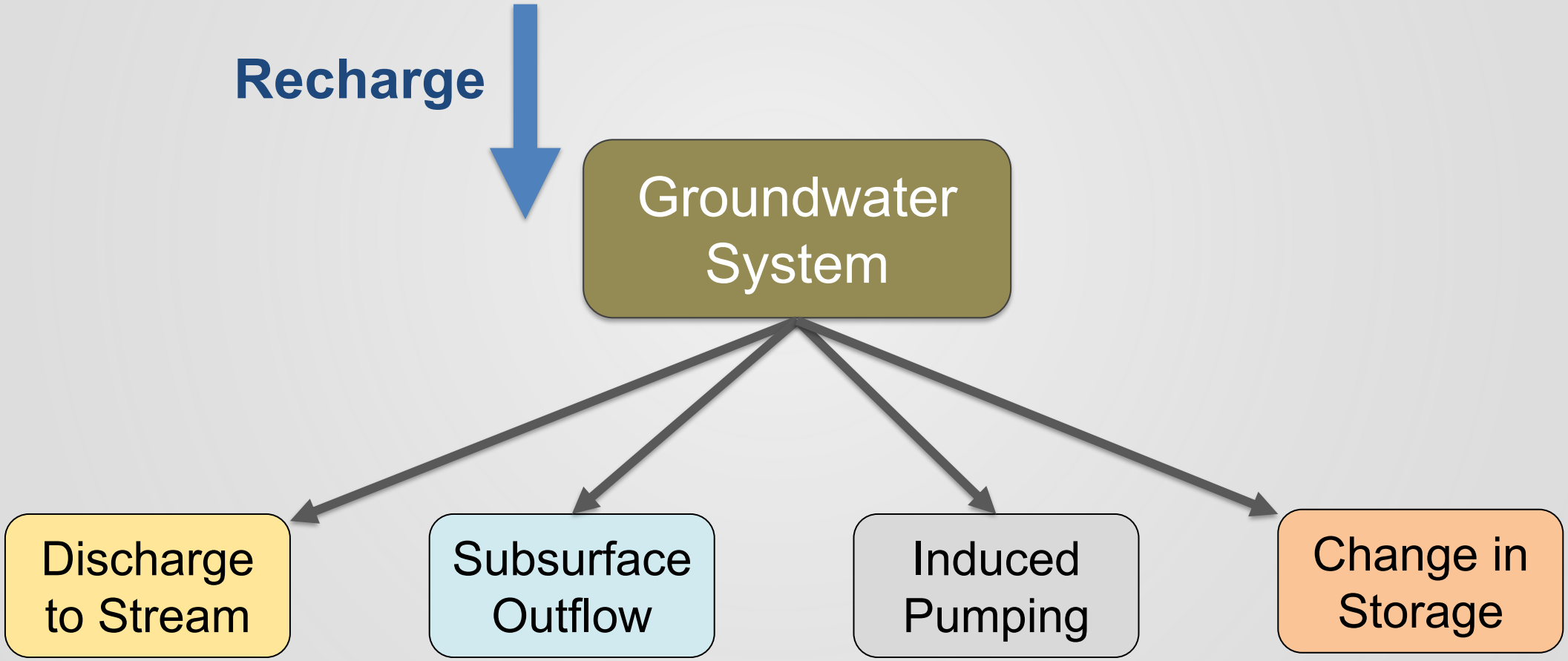


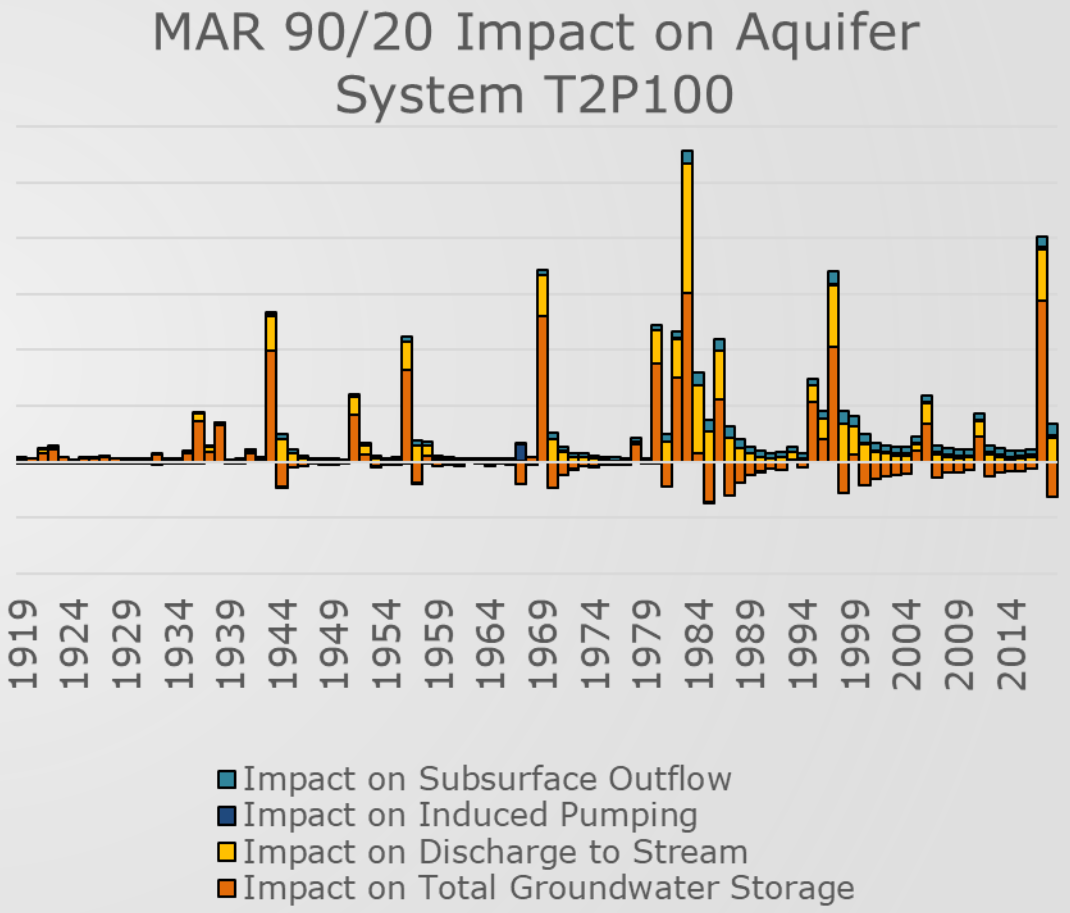
Efficient Application of Recharge

MAR 90/20 – Sneak Peak

Lessons Learned

- Flood-MAR alone does not completely arrest overdraft
- Project impacts are sensitive to existing groundwater conditions
- Fate of Recharge:
  - Aquifer Storage
  - Stream Baseflow
  - Subsurface Flow

- **Where you recharge matters!**



Local Management Objectives

Introduction & Methodology

Local Knowledge

- Work with study partners
- Review planning documents
  - Groundwater Sustainability Plans
  - Ag Water Management Plans
  - Urban Water Management Plans

Implemented Objectives

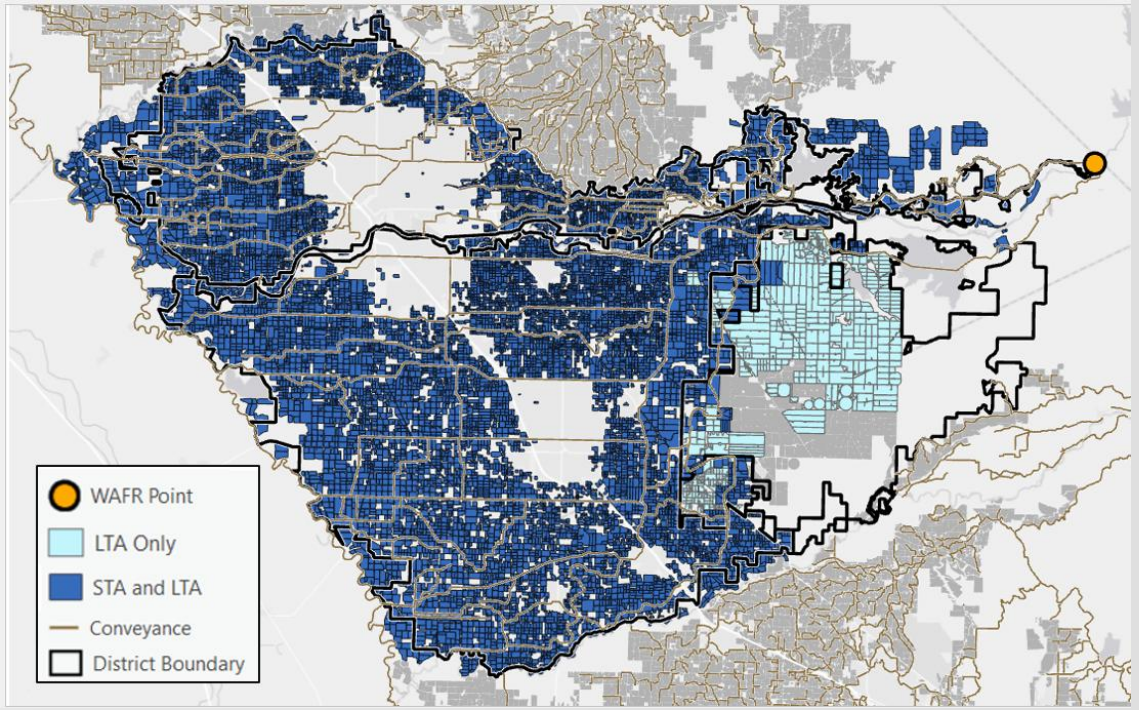
- Projects
  - Conveyance Expansion
  - Out-of-District Programs
- Management Actions
  - Revised RMAs
  - Objective-based recharge
  - Multibenefit Land Repurposing Programs (MLRP)

Efficient Application of Recharge

I-FIRM Strategies

Improvements

- Reservoir Operations
  - FIRO-MAR
- Conveyance Infrastructure
  - Distribution Area
  - Bottlenecks
  - Turnouts
- Recharge Management Areas



Efficient Application of Recharge

I-FIRM Strategies

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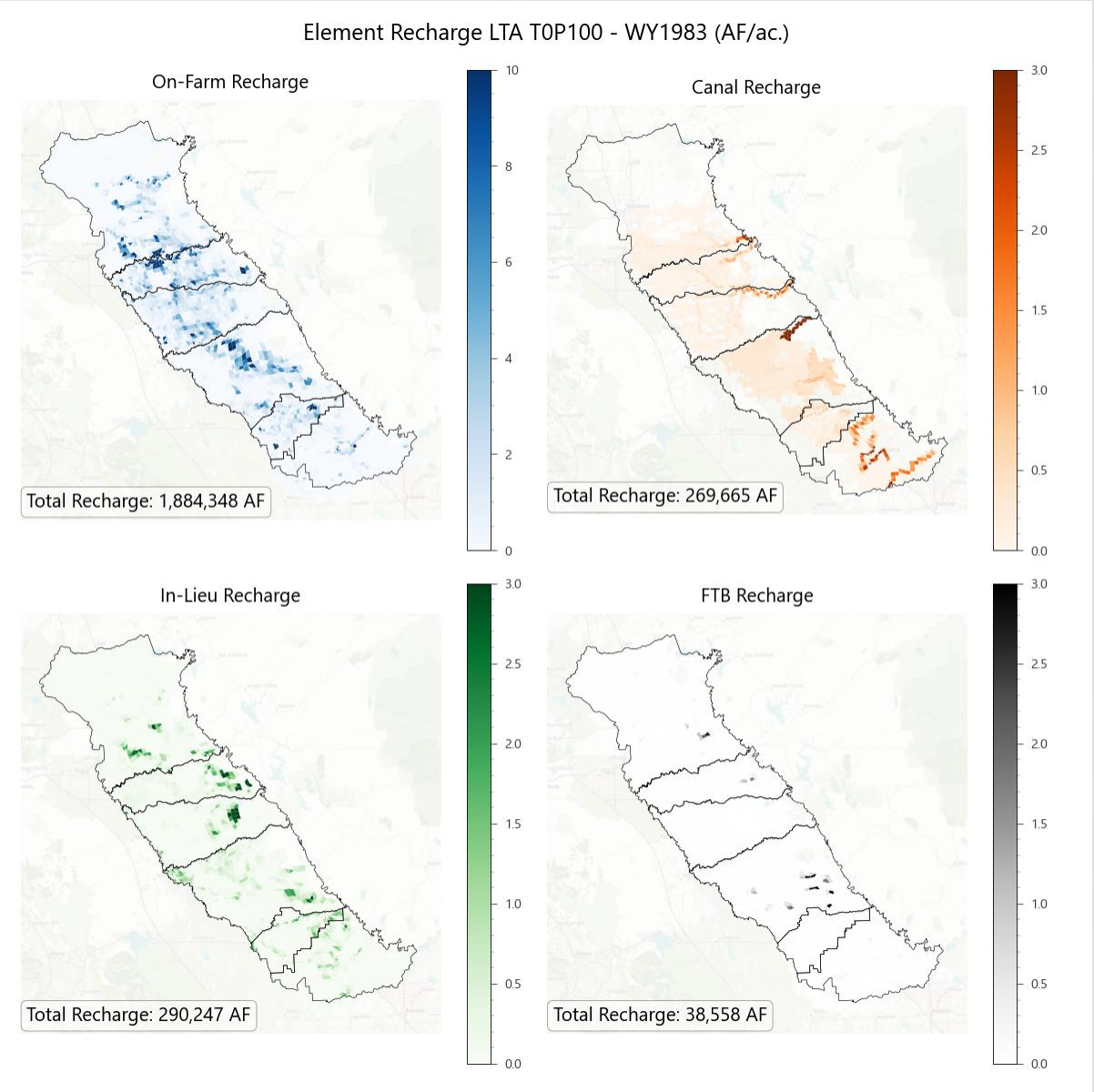
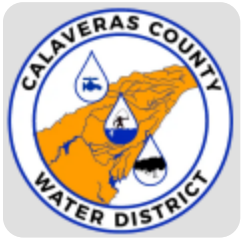


Efficient Application of Recharge

Conclusions

- **Where You Recharge Matters**
  - Location drives impact and enhances benefits
  - Local knowledge and support is critical
  - One size doesn't fit all
- **Join us tomorrow!**
  - Advancing Sustainable Water Management Through Flood Managed Aquifer Recharge: Insights from the San Joaquin Flood-MAR Watershed Studies
  - Sesson 27 → 8:00am in Sierra 1

San Joaquin County
Flood Control & Water
Conservation District



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