Workshop: Groundwater Allocation Baseline, Reduction Targets and Measurement

East Turlock Subbasin Groundwater Sustainability Agency
Technical Advisory Committee

December 13, 2022

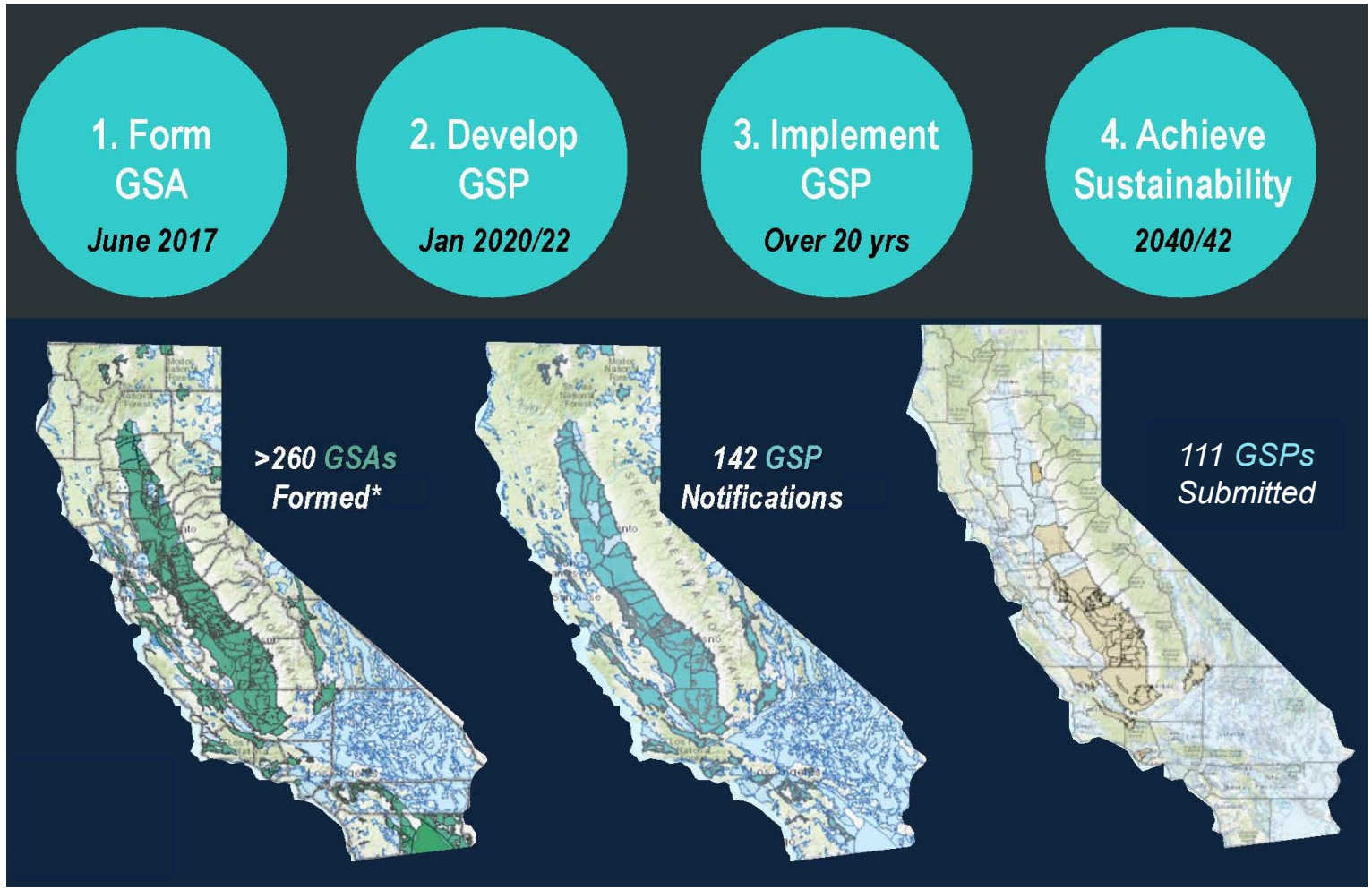
TURLOCK GROUNDWATER

Workshop Topics

- Introduction and Background
- Example Programs in Other Basins
- Pumping Management Framework Development Strategy and Timeline
- Baseline Development and Allocation Targets
- Extraction Monitoring

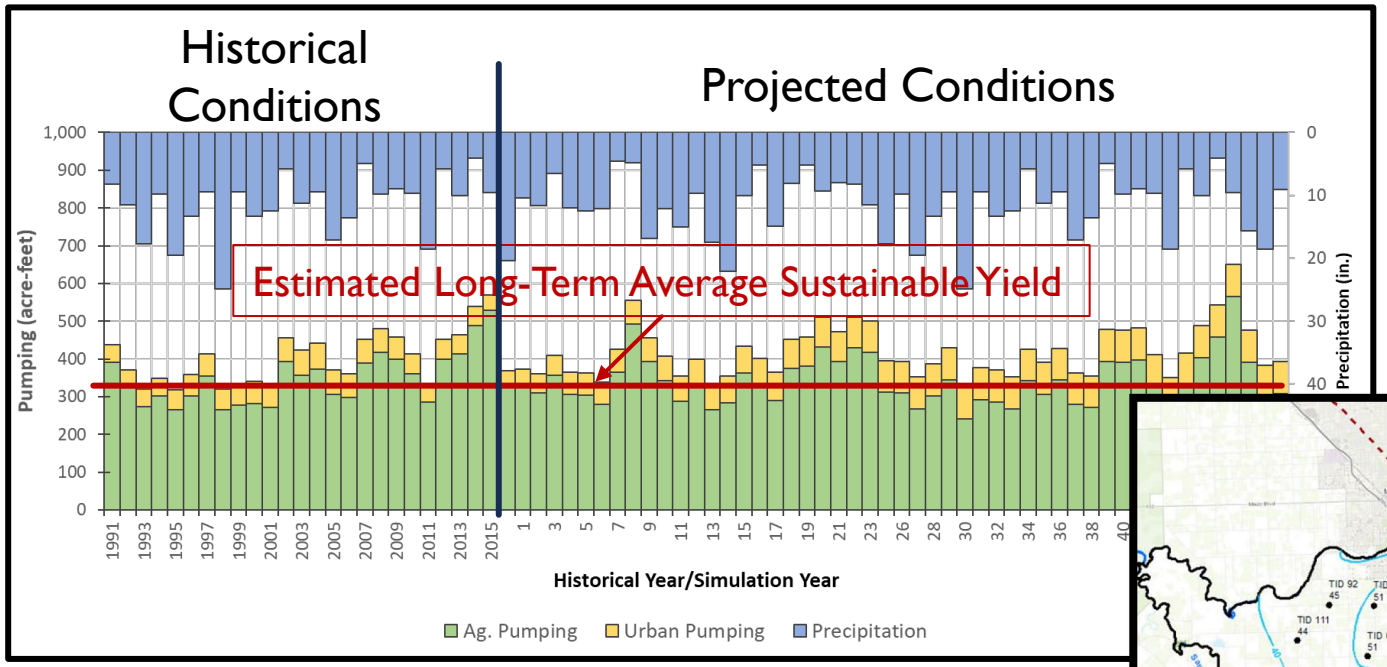
INTRODUCTION AND BACKGROUND

SUSTAINABLE GROUNDWATER MANAGEMENT ACT (SGMA)

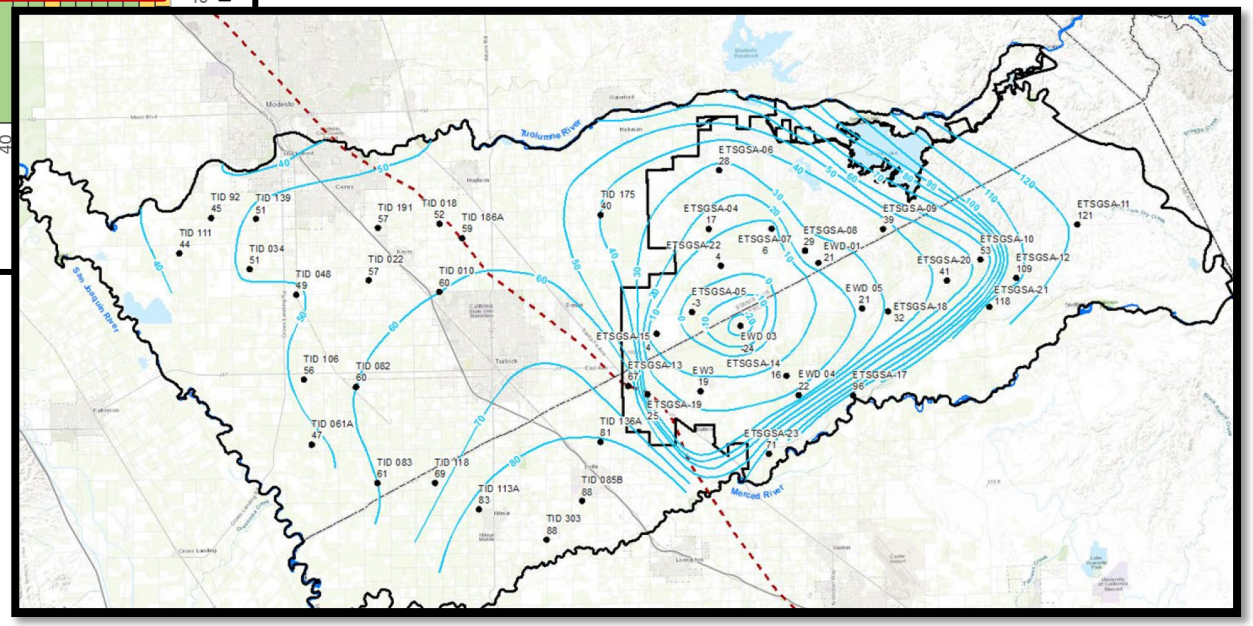


- Achieve groundwater sustainability in medium and high priority GW basins.
- Implement monitoring, projects and management actions to achieve sustainability within 20 years.
- Local control, backstopped by State intervention.

Groundwater Pumping and Sustainable Yield



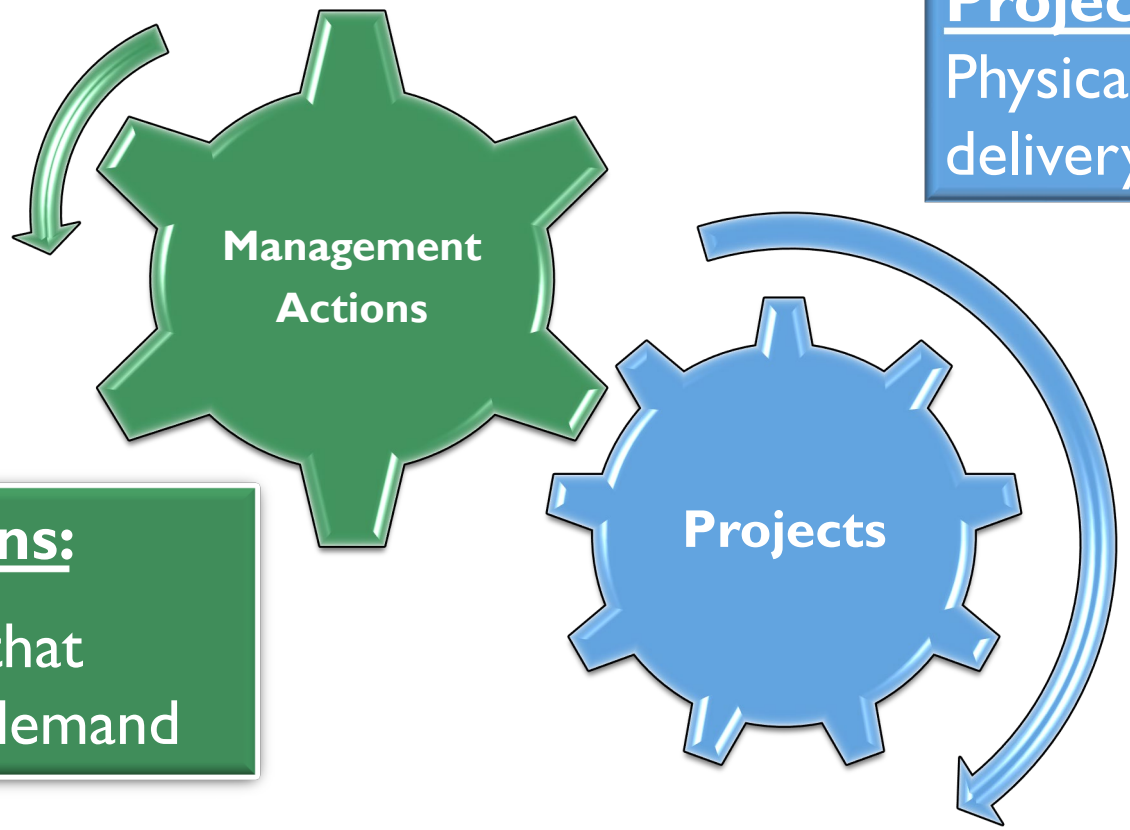
- Long-term average sustainable yield is exceeded under current and projected demand conditions.



- Long-term groundwater extraction has created a cone of depression in the eastern subbasin

How will we Meet Subbasin Sustainability Goals?

Projects:
Physically constructed water delivery and recharge projects



Management Actions:

Programs or policies that reduce groundwater demand

Planned Projects

Planned Now

- Replenishment Water from Highline Canal
- Mustang Creek Flood Control Recharge Project
- Turlock Lake Rehabilitation

Recharge Master Plan

- Dry well FS and Pilot Studies
- Rouse Lake Multi-Benefit FS
- Dispersed Recharge FS and Pilot Studies
- Canal Water Recharge Pilot Study
- Turlock Lake Reoperation FS

Management Actions

Category	Number	Management Action
Demand Reduction Strategies	1	Voluntary Conservation and/or Land Fallowing
	2	Conservation Practices
Pumping Management Framework	3	Groundwater Extraction Reporting Program
	4	Groundwater Allocation and Pumping Management Program
	5	Groundwater Extraction Fee
	6	Groundwater Pumping Credit Market and Trading Program
Mitigation Strategies	7	Domestic Well Mitigation Program
	8	Minimum Threshold Exceedance Response Plan

Management Actions

Category	Number	Management Action
Demand Reduction Strategies	1	Voluntary Conservation and/or Land Fallowing
	2	Conservation Practices
Pumping Management Framework	3	Groundwater Extraction Reporting Program
	4	Groundwater Allocation and Pumping Management Program
	5	Groundwater Extraction Fee
	6	Groundwater Pumping Credit Market and Trading Program
Mitigation Strategies	7	Domestic Well Mitigation Program
	8	Minimum Threshold Exceedance Response Plan

Example Programs in other Basins

Merced Irrigation- Urban GSA

- Allocation:
  - 3.3 AF/acre over three years starting April 2023 (1.1 AF per acre/year average)
- Fees
  - No volumetric fees at this time
- Measurement
  - ET Data, transitioning to meters
- Market, Credits or Trading
  - Considering rules for pooling of extraction allocations across multiple nearby parcels under the same ownership
  - Merced Subbasin GSA has a land repurposing program

Madera Subbasin

- Allocation:
  - Sustainable yield plus "transitional water" which decreases over time
  - 28.70"/acre/year in 2022 decreasing over time to 27.1"/acre/year in 2025
- Fees
  - Fees per enrolled acre increasing from $145/acre in 22/23 to $265/acre in 26/27
  - Penalties begin at $100/AF pumped over safe yield in 2023 and will increase by $100 annually to be capped at $500/AF pumped over safe yield
- Measurement
  - ET Data; Metering for backup/validation
- Market/ Trading
  - Allocations may be pooled across "Farm Units"
  - Pilot water market

East Kaweah Subbasin

- Allocation:
  - For WY 22/23, allocation of up to 1.65AF per acre
  - Ability to purchase penalty water (hard cap of 2.5AF/per acre)
- Fees:
  - No volumetric fees associated with pumping within sustainable yield at this time
  - Pumping of Tier 1 Penalty Water (>1.65/AF/acre) charged at $500/AF
- Measurement:
  - ET Data (Land IQ)
- Market, Credits or Trading:
  - Rules and regulations for trading water
  - Dashboard to facilitate allocation and trading process

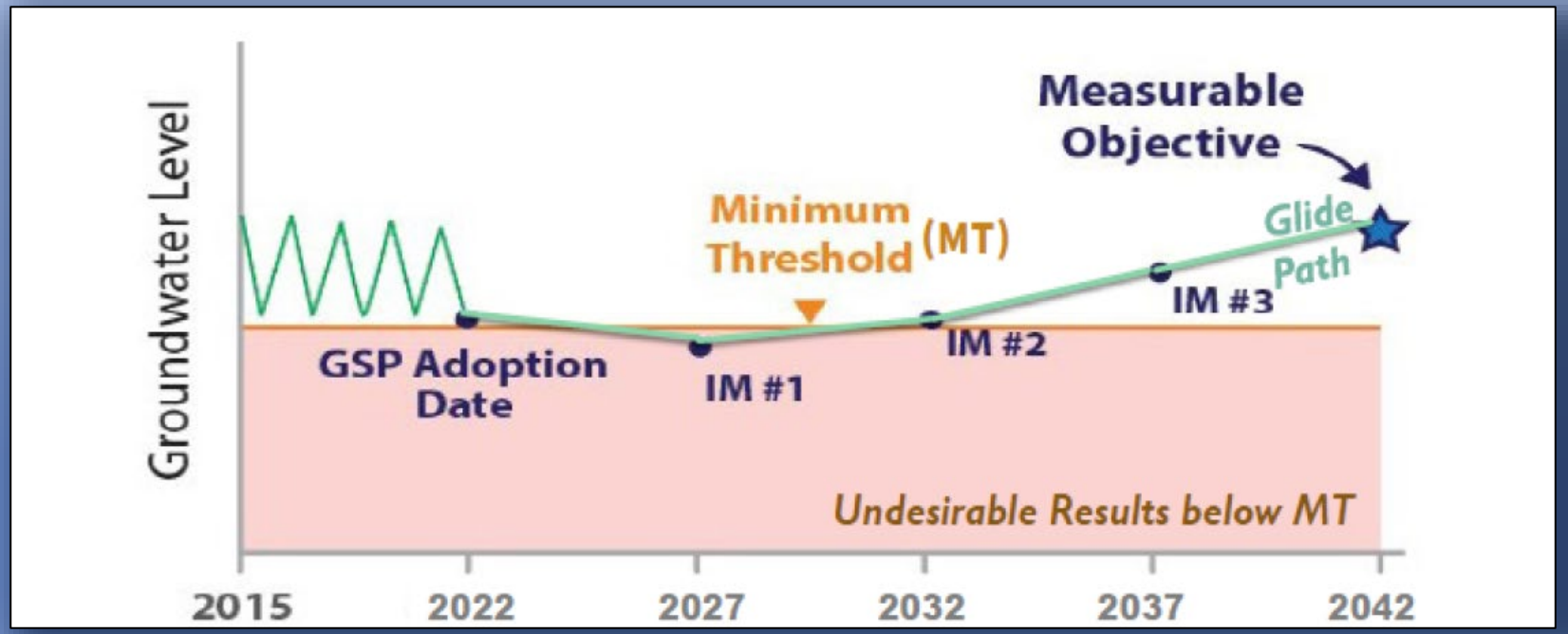
Greater Kaweah Subbasin

- Allocation:
  - Sustainable yield determined annually
  - Allocations include base allocation, plus available Tier 1 and Tier 2 overdraft allocations, ramping down over time to 20% above sustainable yield by 2036
  - Currently 10"/acre/year base allocation, increasing to 2.5 AF/acre for Tier 1 and 3.0 AF/acre for Tier 2
- Fees:
  - No fee for base allocation; Tier 1 fee = $75/AF; Tier 2 fee = $125/AF
  - Tier 3 "Prohibited" water penalty = $500/AF
- Market, Credits or Trading
  - Owner may transfer all or a portion of the base allocation within the basin
  - Owner may transfer 80% of Tier 1 allocation or 60% of Tier 2 within basin
  - Fallowing program to be developed by member agencies

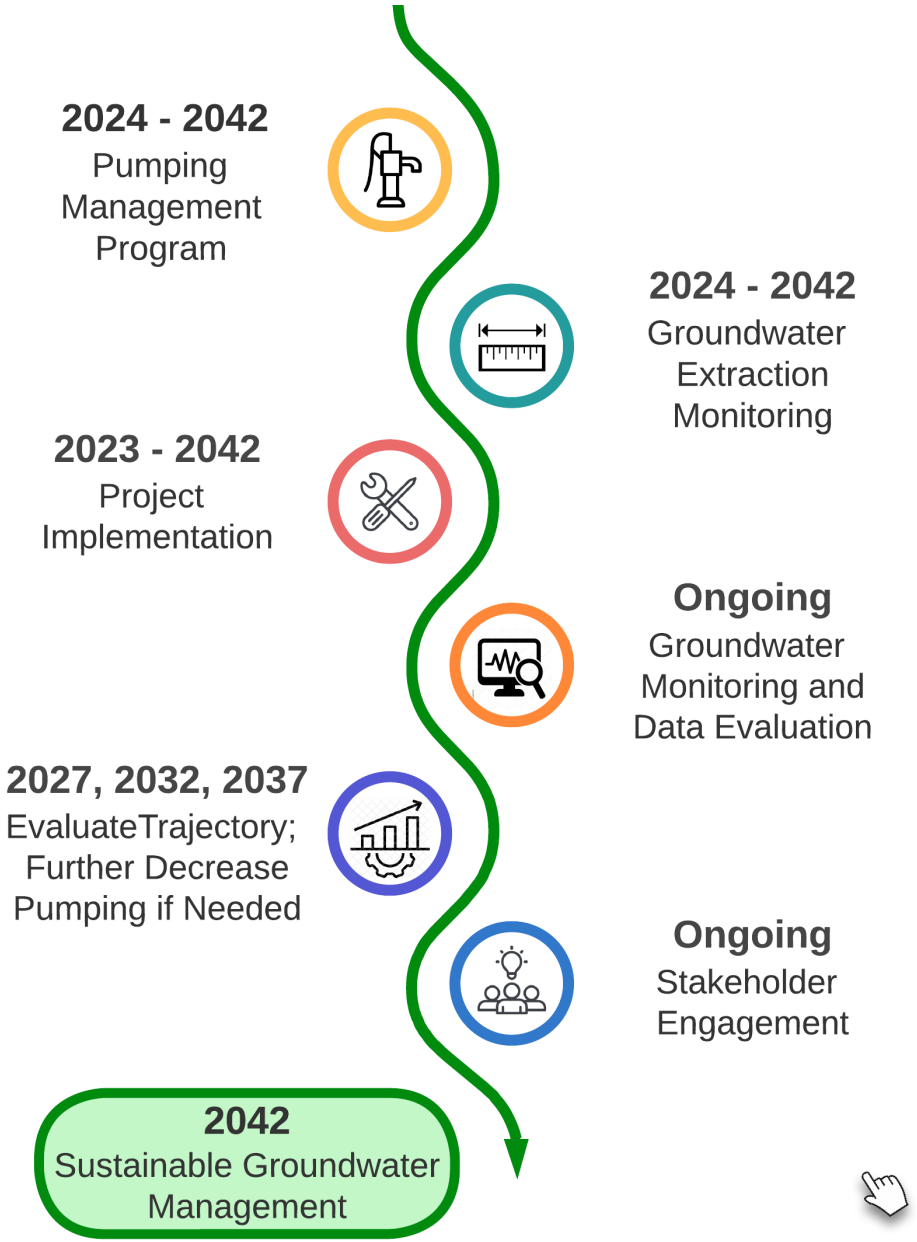
Las Posas Valley Basin

- Allocation:
  - Initial allocation greater of (a) Base Period extraction; (b) 2015 extractions; or (c) minimum allocations established for certain operators
  - For future allocations, sustainable yield divided into management areas and pools
- Fees:
  - Base volumetric fee of $20/AF (until 2024) for pumping within sustainable yield
  - Penalties for excess pumping from $1,549/AF escalating to $2,299/AF
- Measurement:
  - Mandatory metering; Penalties of up to $1,000/day for failing to comply
- Market, Credits or Trading:
  - Designated allocation pools

PUMPING MANAGEMENT FRAMEWORK DEVELOPMENT STRATEGY AND TIMELINE



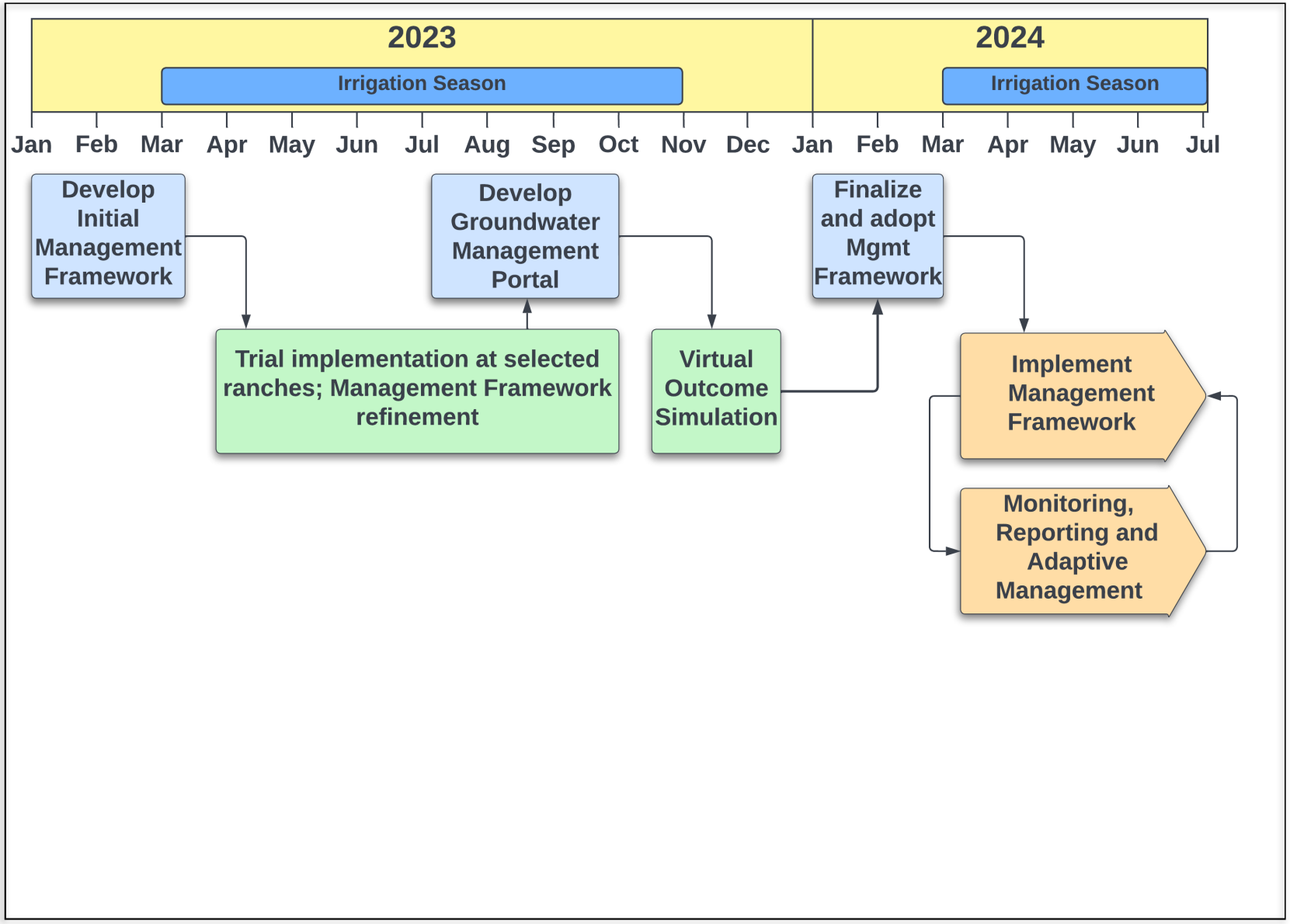
PATHWAY TO SUSTAINABLE GROUNDWATER MANAGEMENT



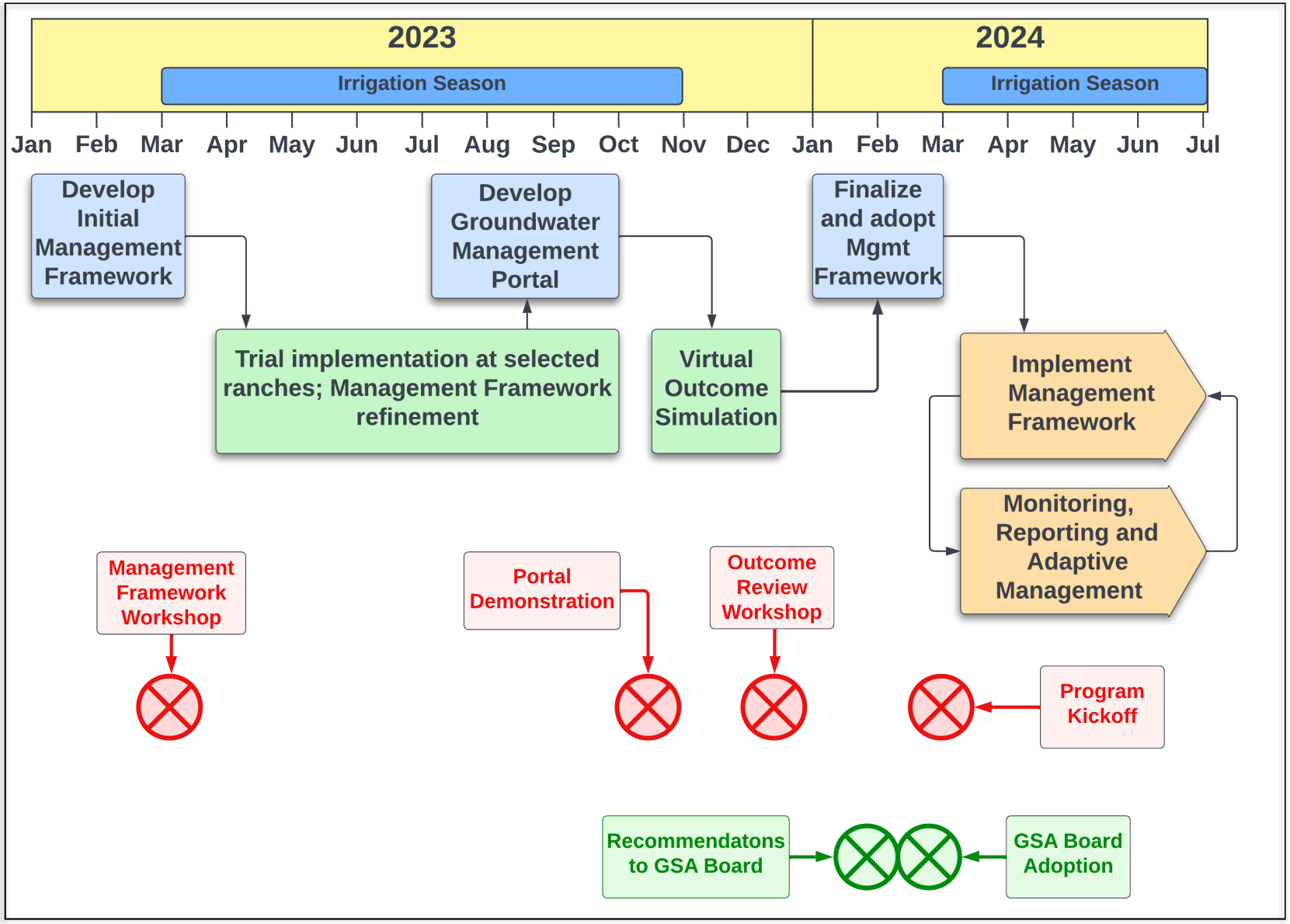
Pumping Management Framework Strategy

- Sustainable Yield can't be precisely quantified yet. Preliminary estimate is ~ 25% reduction in net groundwater demand basin-wide is needed
- Met through combination of Projects **and** Management Actions
- Goal is to achieve sustainable pumping over 20 years
- **Strategy:**
  1. **Identify opportunities and implement recharge projects to the extent water is available and they are physically and economically feasible**
  2. **Begin Management Actions early**
  3. **Monitor results and adjust approach to achieve Interim Milestones**

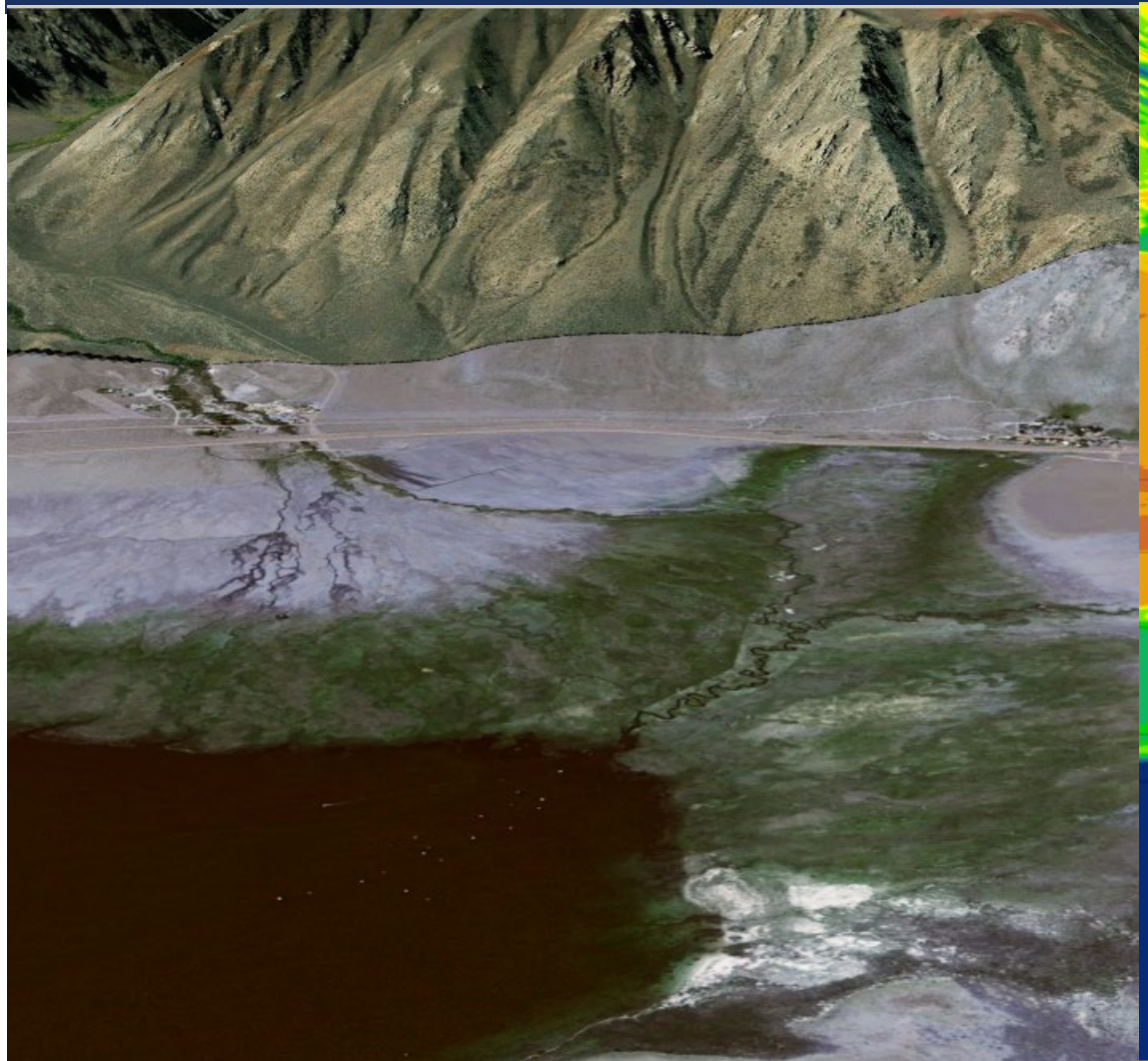
MANAGEMENT ACTION IMPLEMENTATION TIMELINE

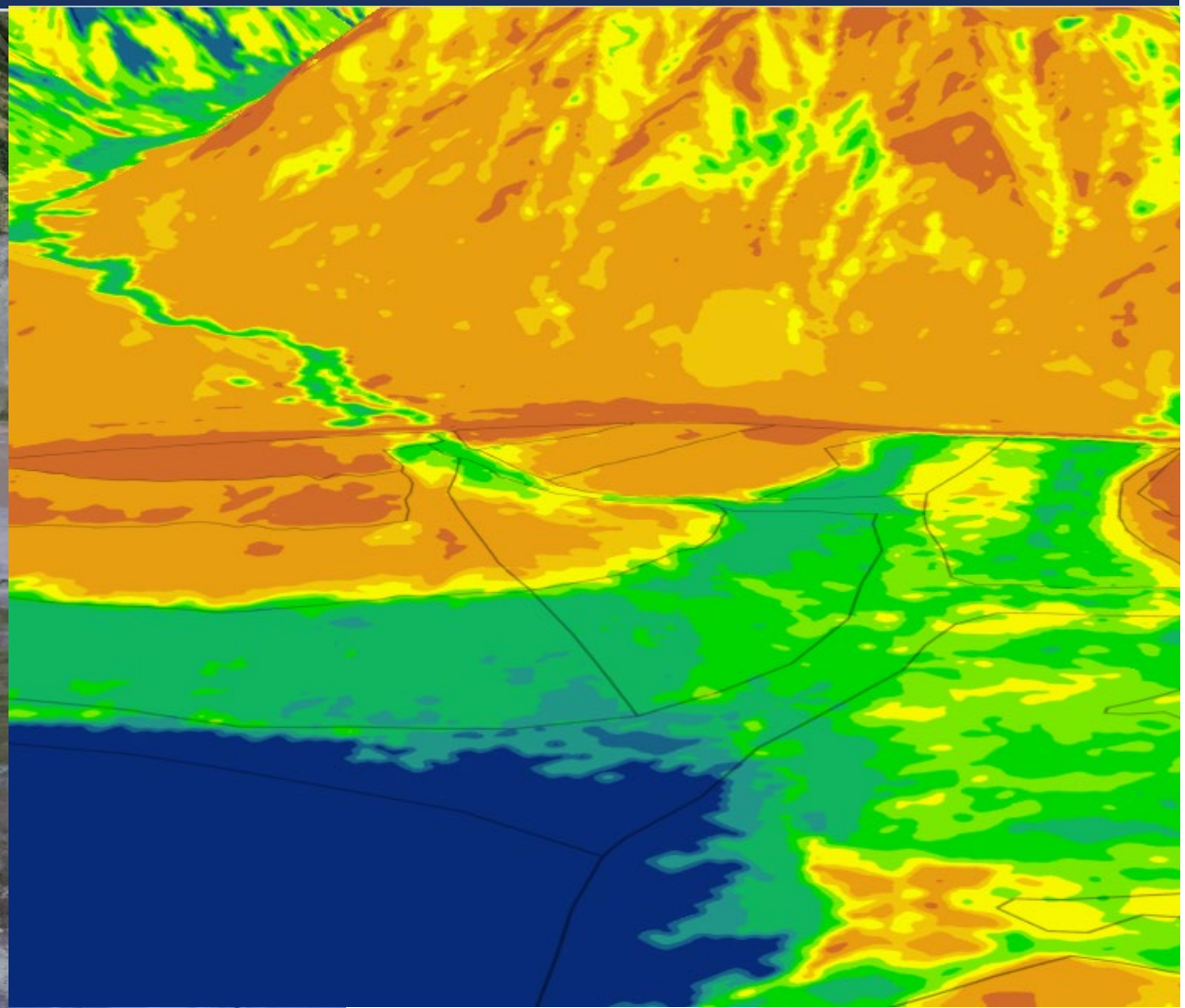


MANAGEMENT ACTION IMPLEMENTATION TIMELINE – WORKSHOPS AND MILESTONES

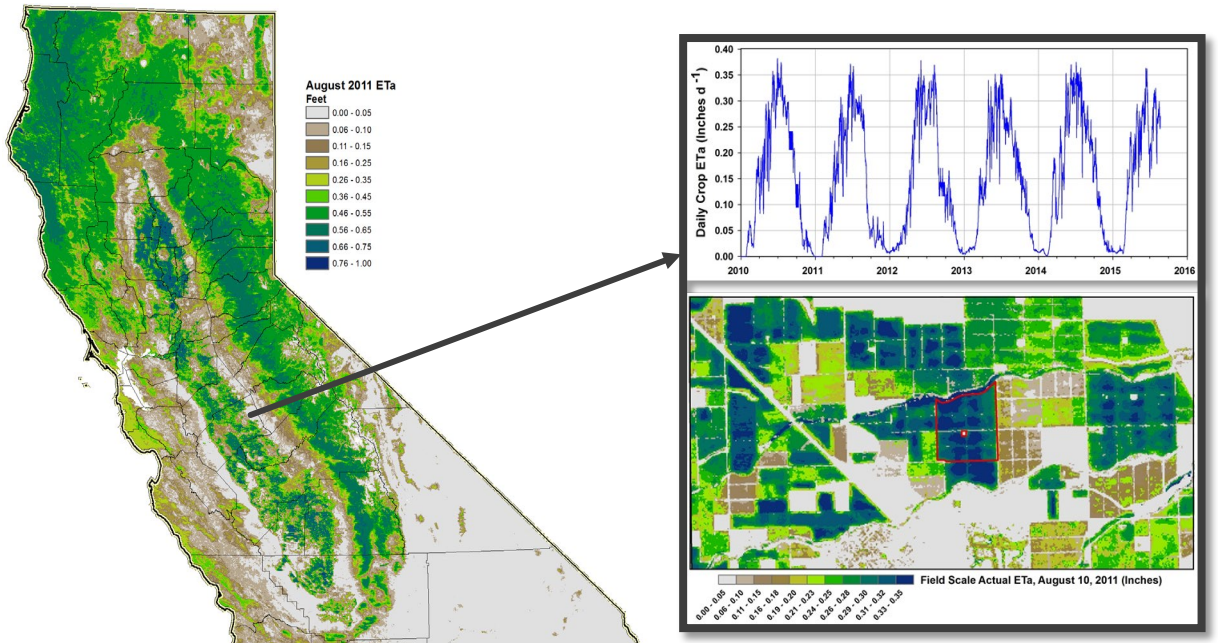


BASELINE AND REDUCTION SCENARIOS





ET DATA USE AND LIMITATIONS



- Evaporation and plant water usage calculated from satellite and weather station data
- Relatively inexpensive, field scale coverage, historical use can be estimated as far back as satellite data are available
- Accuracy can be improved over time by on-the-ground measurement
- Accuracy not as important when two ET measurements are compared to assess trends or percent reductions

HOW WE WILL USE ET AND METER DATA

BASELINE ESTABLISHMENT

ET data provides the best option	Can be scaled to meter data

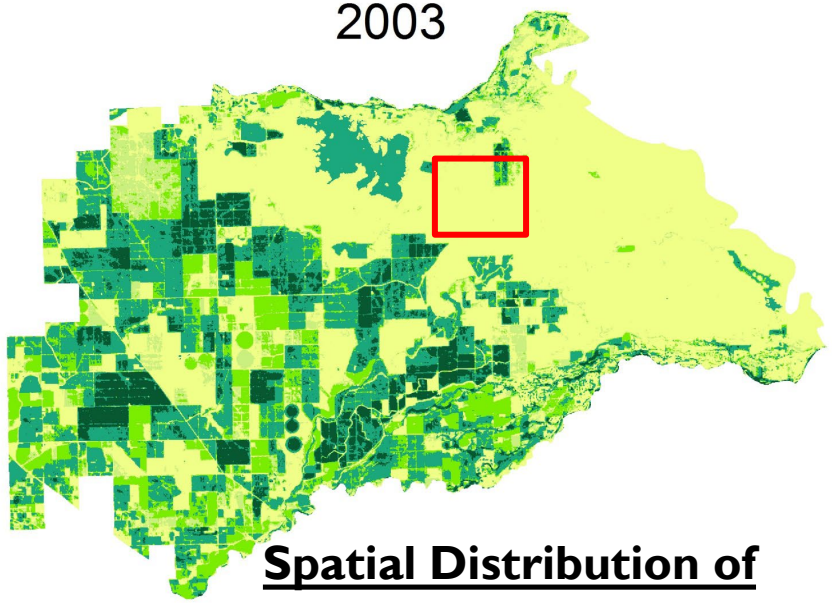
INITIAL IMPLEMENTATION (2023 – 2028)

Use ET data until meters can be deployed	Meter data may be used if available and meets minimum standards

LONG-TERM IMPLEMENTATION (AFTER 2028)

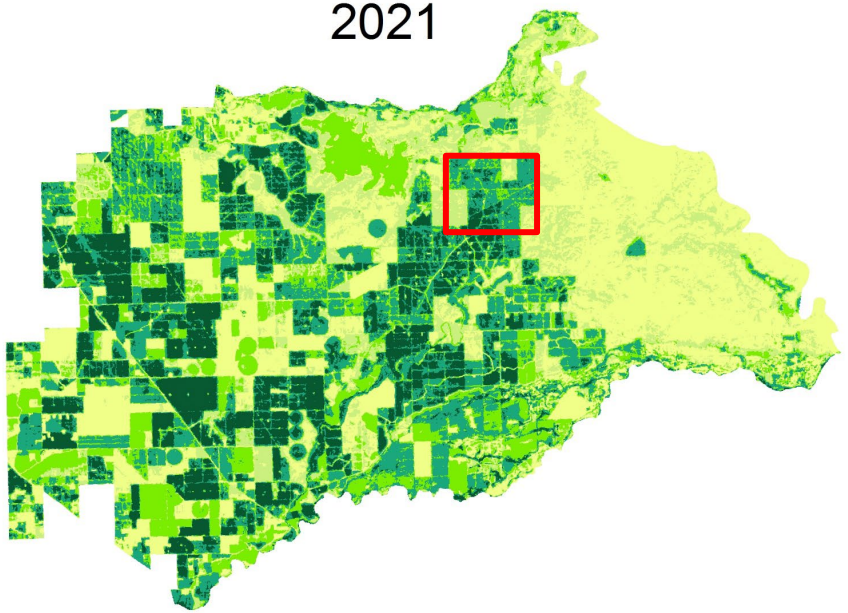
Use meter data	Option to use ET data

2003

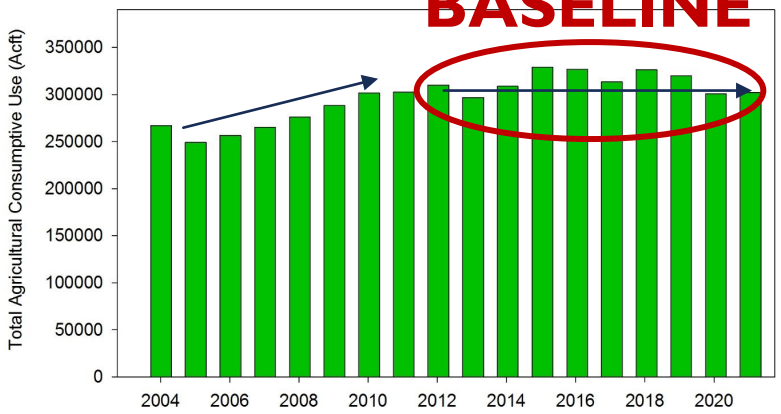


Spatial Distribution of Consumptive Use Over Time

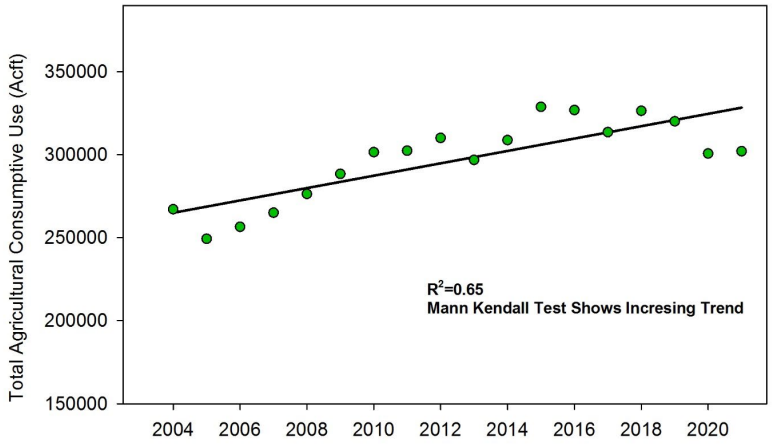
2021



BASELINE



Changes in Average Consumptive Use Over Time



Annual ET

Inches

- 0 - 20
- 21 - 26
- 27 - 42
- 43 - 51
- > 52

East Turlock Sub-basin GSA

FIGURE 2

Long Term Comsumptive Use

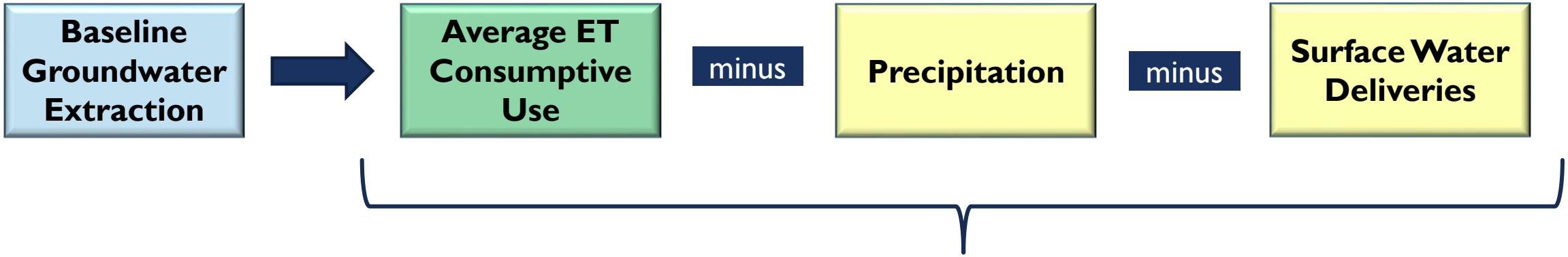
DATE: OCT 06, 2022

BY:

FOR:

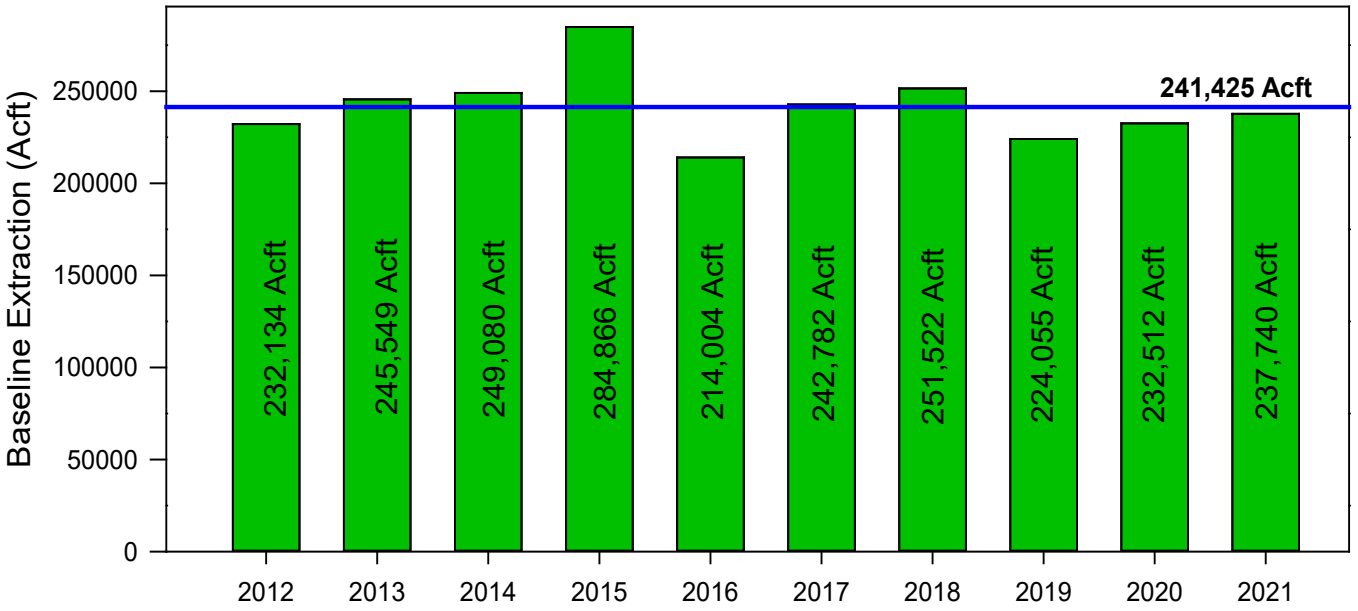
FORMATION ENVIRONMENTAL

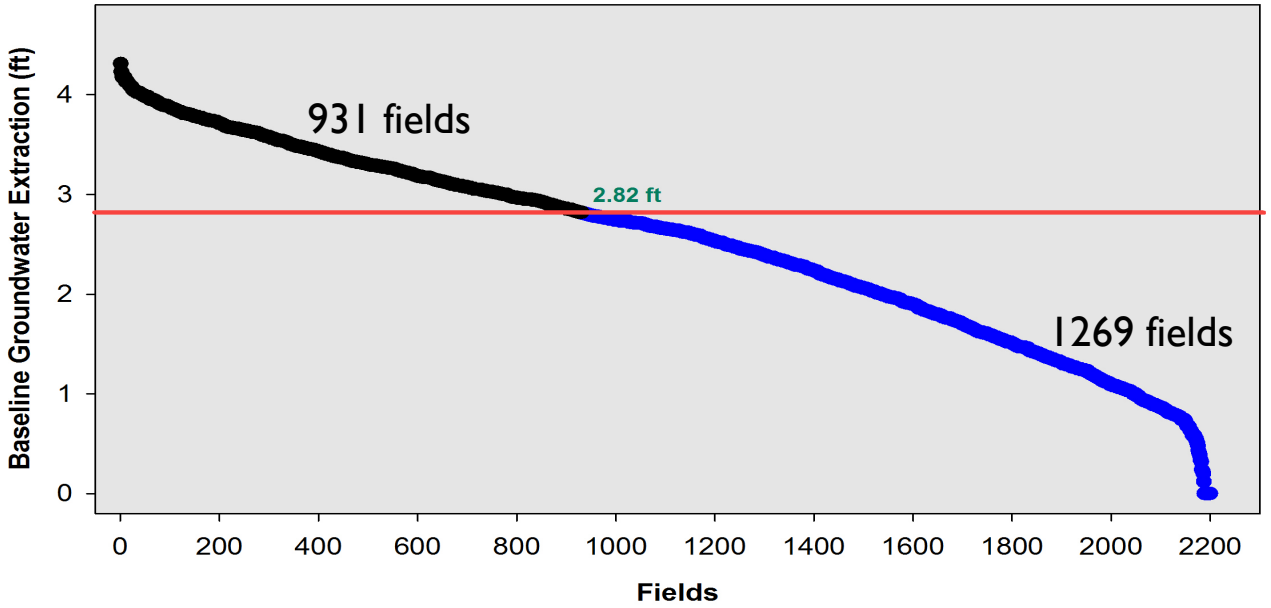
BASELINE CALCULATION



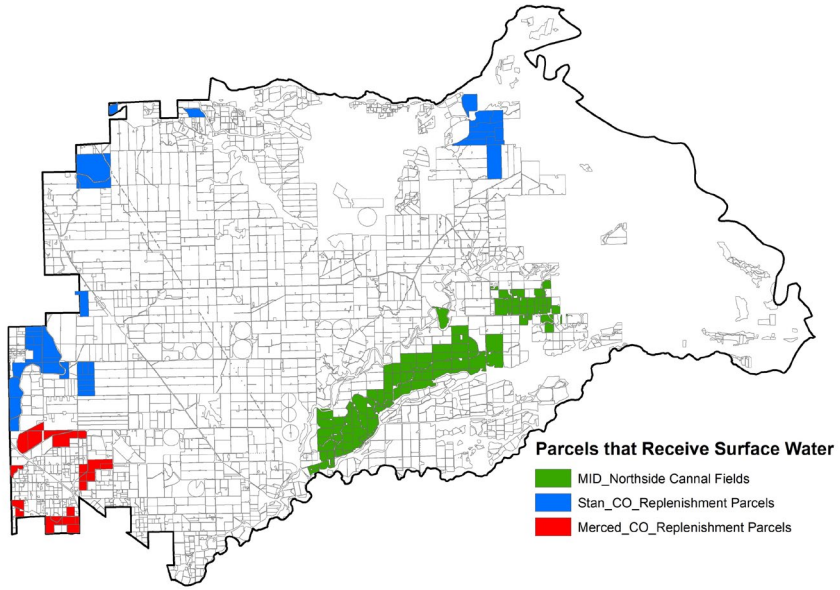
- Surface water deliveries include MID Northside Canal service area deliveries and TID replenishment water deliveries
- Analysis for irrigation season (March – October) to minimize precipitation effects
- Analysis for each field for 2012 to 2021 (10 Years)
- Values averaged

Baseline Extraction

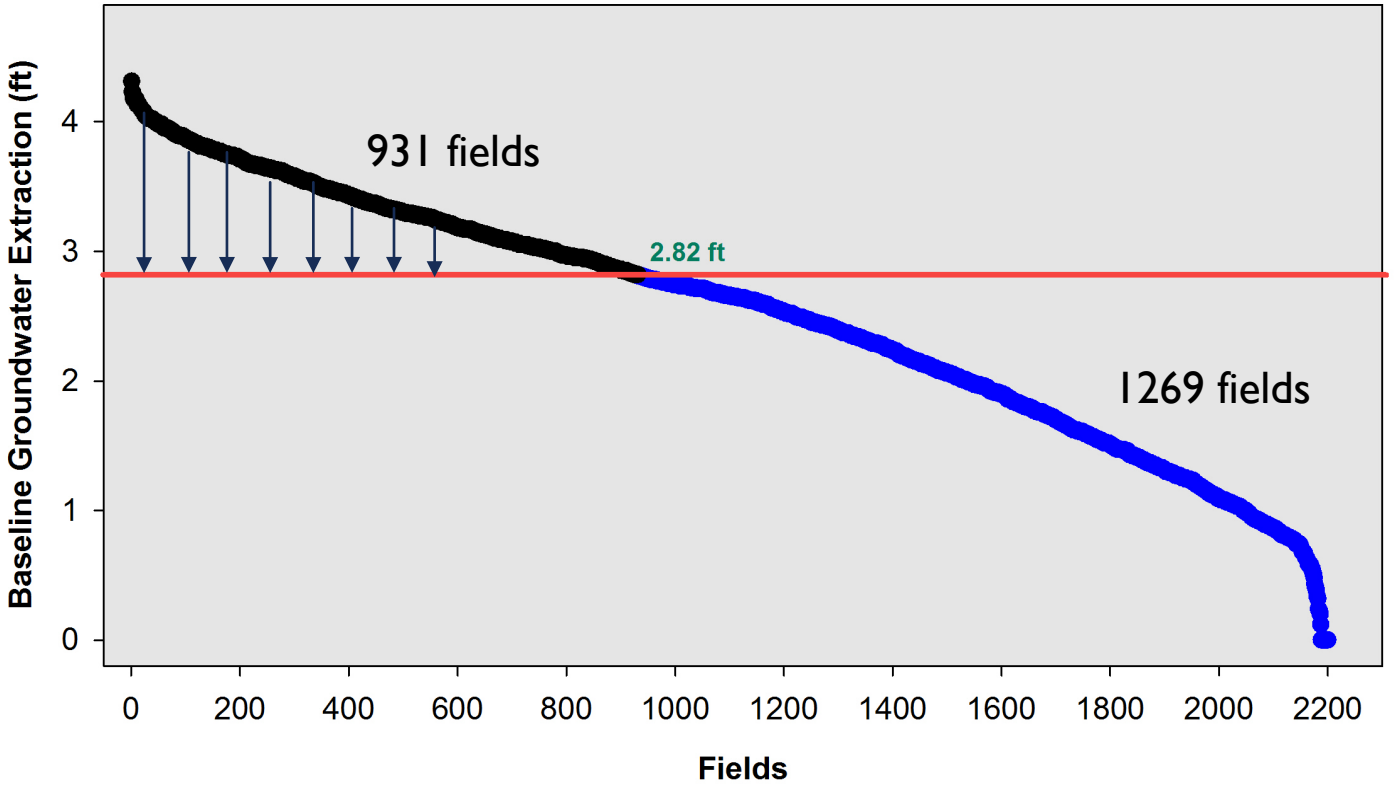




Baseline Groundwater Extraction
= 241,425 AF
Equivalent Irrigation Depth
= 2.82 ft (33.8 inches)
Approximate Surface Water Deliveries
= 12,000 AF



Target Allocation
Scenario 1: Baseline Average



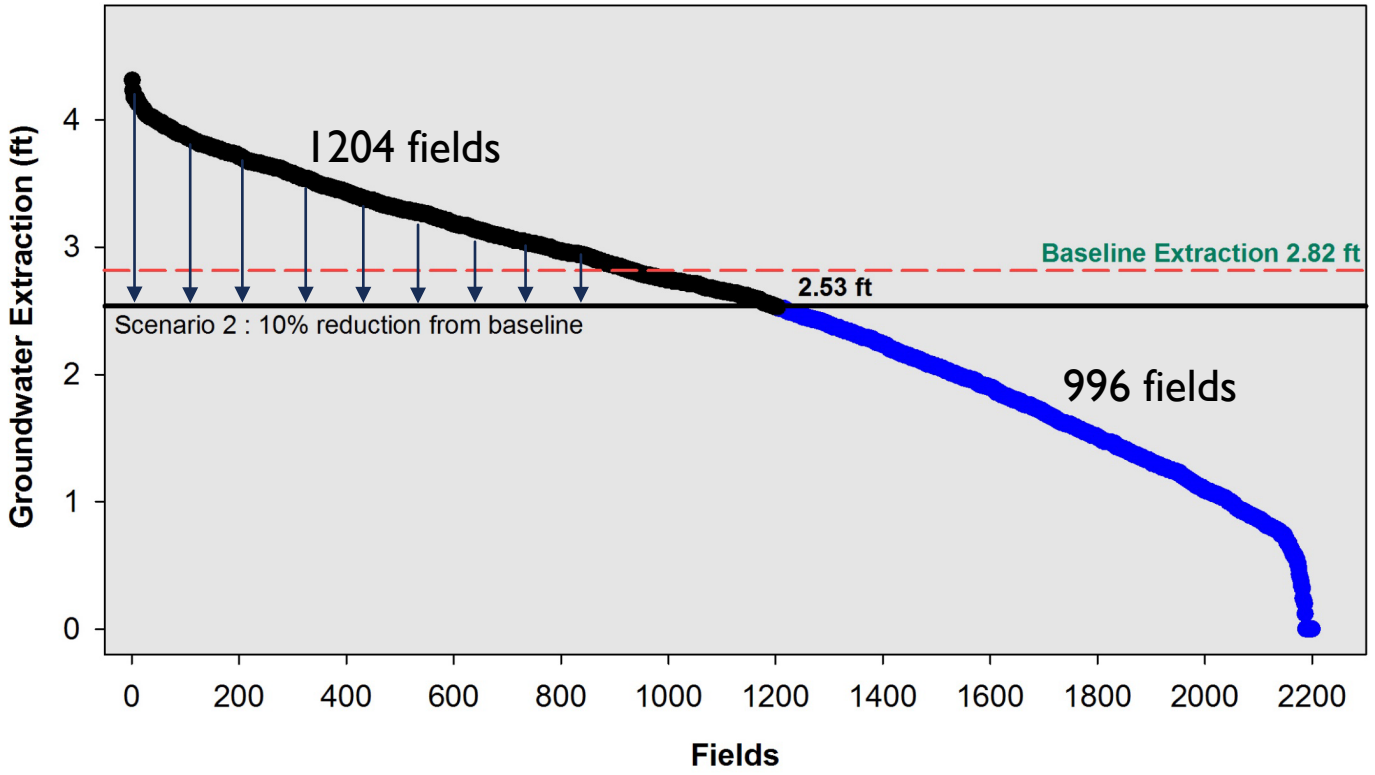
Baseline Irrigation Depth
= 2.82 ft (33.8 inches)

Target Irrigation Depth
= 2.82 ft (33.8 inches)

Average Irrigation Depth Achieved
=2.45 ft (29.5 inches)

Percent Reduction Achieved
= 13 %

Target Allocation
Scenario 2: 10% Reduction Target



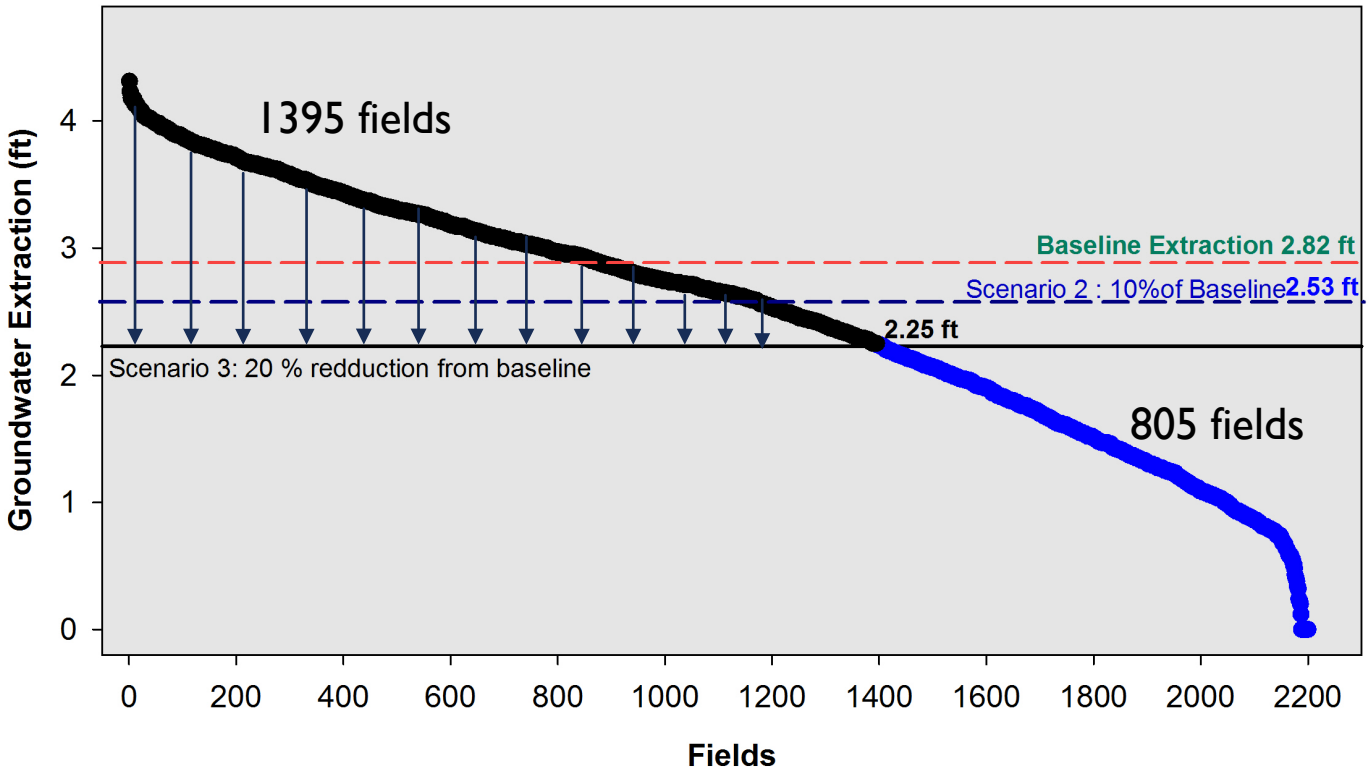
Baseline Irrigation Depth
= 2.82 ft (33.8 inches)

Target Irrigation Depth
= 2.53 ft (30.4 inches)

Average Irrigation Depth Achieved
=2.27 ft (27.3 inches)

Percent Reduction Achieved
= 19 %

Target Allocation
Scenario 3: 20% Reduction Target



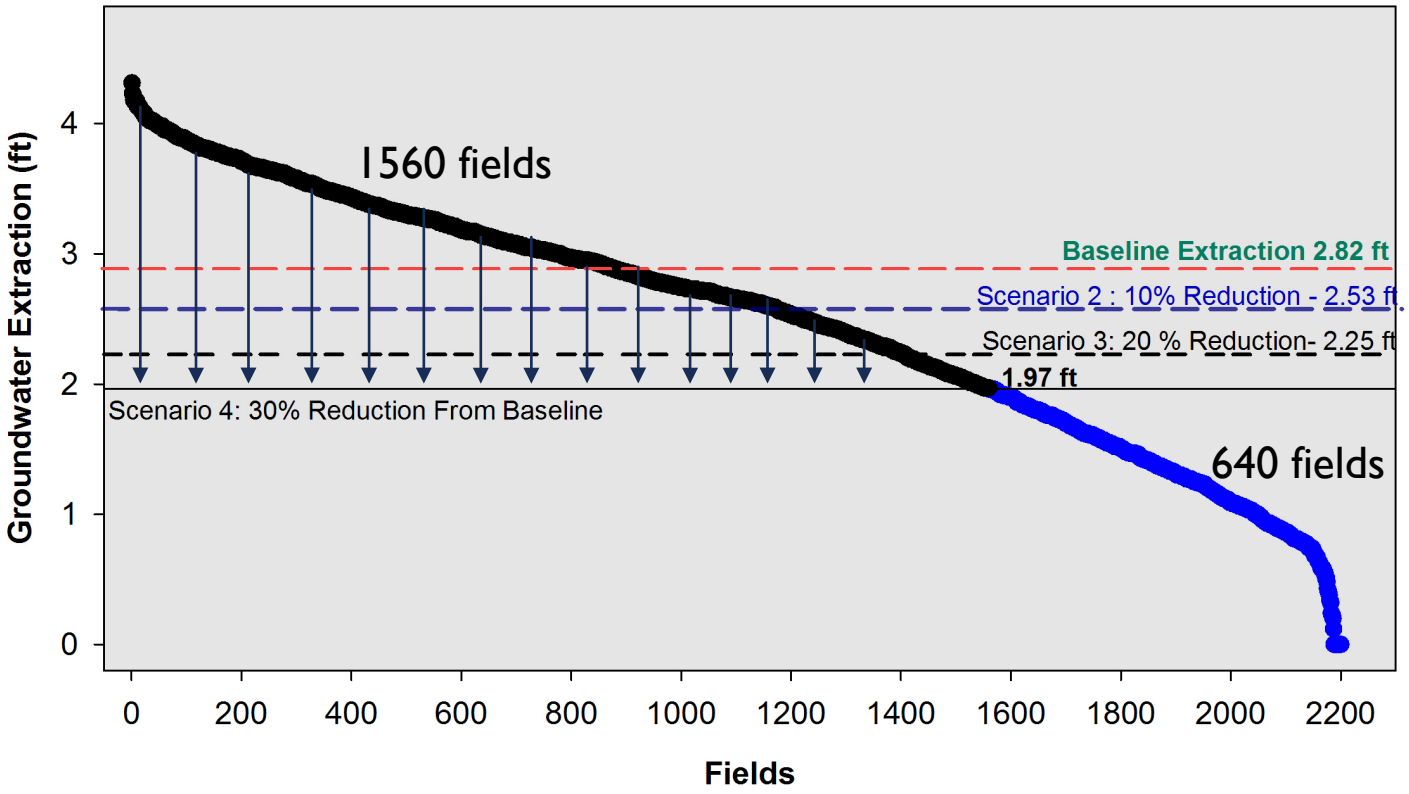
Baseline Irrigation Depth
= 2.82 ft (33.8 inches)

Target Irrigation Depth
= 2.25 ft (27.0 inches)

Average Irrigation Depth Achieved
=2.07 ft (24.8 inches)

Percent Reduction Achieved
= 26 %

Target Allocation
Scenario 4: 30% Reduction Target

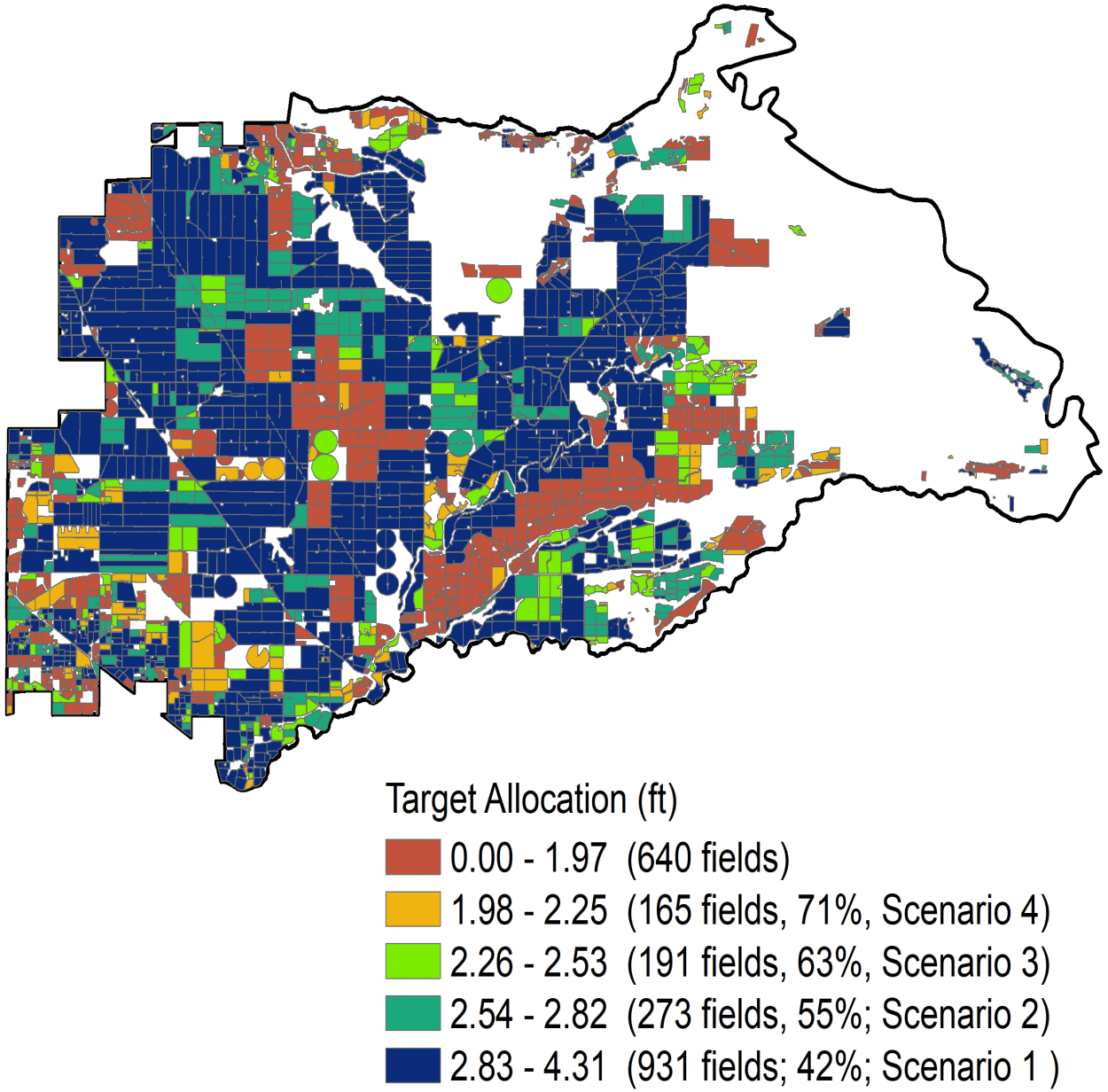


Baseline Irrigation Depth
= 2.82 ft (33.8 inches)

Target Irrigation Depth
= 1.97 ft (23.7 inches)

Average Irrigation Depth Achieved
=1.85 ft (22.3 inches)

Percent Reduction Achieved
= 34 %



DISTRIBUTION OF PARCELS AFFECTED BY DIFFERENT REDUCTION TARGETS

Credits, Carryover, Pooling and Trading

- Will be addressed in next workshop
- Add operational flexibility, increase feasibility of pumping reduction
- ***Credits*** - Credit for pumping below allocation
- ***Carryover*** - Allowing pumping allocations to be met over a period of several years
- ***Pooling*** - Allowing nearby properties within the Turlock Subbasin to pool allocations
- ***Trading*** – Private transactions to transfer pumping credits

GROUNDWATER USE MEASUREMENT OPTIONS

Groundwater Extraction Measurement Options

OPTION	ADVANTAGES	DISADVANTAGES
Meters	• Site specific measurement of actual extraction • Widely used and accepted • Data loggers and remote telemetry options	• Requires GSA-wide installation, reporting and maintenance • Takes several years to establish baseline
Satellite-Based ET	• Historical data available to establish baseline • Reasonably accurate if calibrated • Accuracy not important for trend and percent change analysis • Relatively inexpensive	• Accuracy requires calibration through meter comparisons, ET measurement and cropping confirmation • Some data variability is inherent
Electrical Consumption	• Readily available for many wells • Meters already installed	• Requires site-specific calibration • Per ITRC, results are often unreliable

Metering Program Overview

- Program requirements: Standard specifications, Minimum meter performance requirements, Approved installers, Required maintenance, Reporting
- Acceptable meters
  - EM-type meters fitted with data loggers
  - Can refer to list of meters accepted by East Kaweah Subbasin GSA
  - Installed by approved vendors per standard AWWA specifications
- Grandfathering of meters installed prior to program adoption
  - Meters must be verified meet installation and calibration requirements
  - Meters can be various types
- Considering telemetry for automatic uploads
- Round 2 SGMA Support Grant Application seeks $985,000 to develop program and subsidize meter costs, owner pays for installation and maintenance.