

CV-SALTS: SALT CONTROL PROGRAM

CVCWA Annual Meeting

Thomas Grovhoug, LWA
September 25, 2025





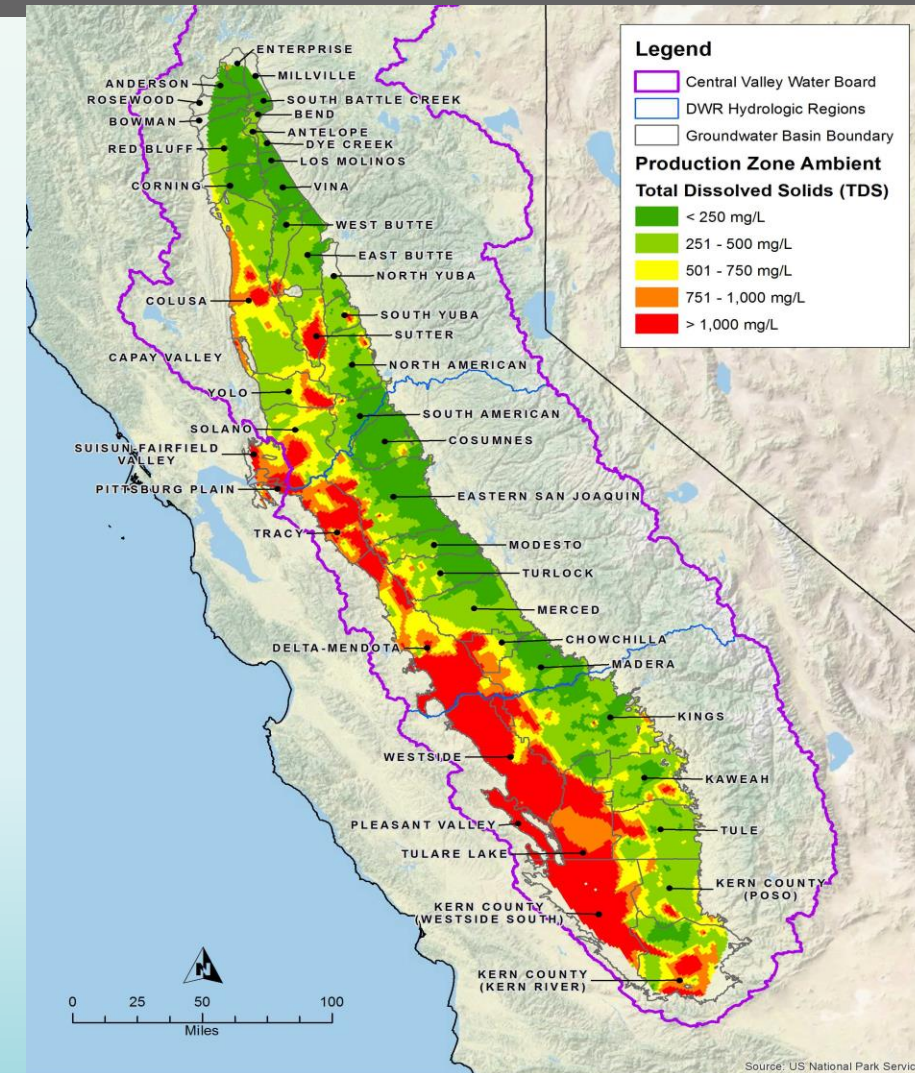
Salt Control Program

THE CENTRAL VALLEY SALT PROBLEM

- Salt is accumulating in the Central Valley Groundwater Basin
- In some areas, high salt concentrations in water supplies limit the crops that can be grown and impact drinking water supplies
- A well supported plan with effective long term solutions is needed to manage salts to protect current beneficial uses in the Central Valley

PHASED SALT CONTROL PROGRAM OVERALL APPROACH

- **Phase I: Prioritization and Optimization (P&O) Study**
 - *Define salt problem areas*
 - *Account for salt sources and impacts*
 - *Assess salt management options*
 - *Develop long-term salt management plan*
- **Phase 2: Project Development**
 - *Facility design, permitting and funding*
 - *Potential regulatory actions*
 - *Alignment with SGMA GSAs' goals*
- **Phase 3: Project Implementation**



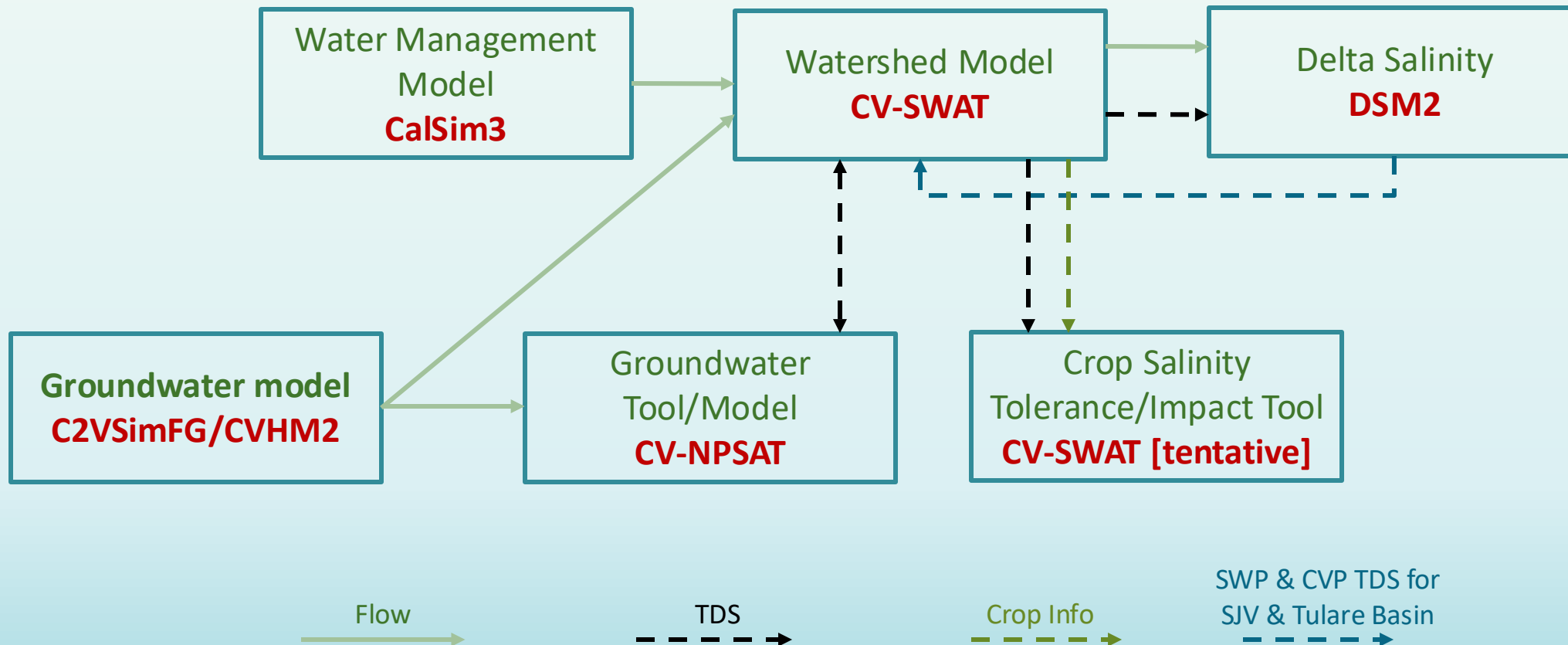
PRIORITIZATION & OPTIMIZATION STUDY TIMELINE



SOPHISTICATED TOOLS ARE NEEDED

- Need a suite of modeling tools to address the complexities of the Central Valley system:
 - *Surface Water hydrology of the watershed*
 - *Reservoir operations and surface water distribution to users*
 - *Land uses and salt sources throughout the Central Valley*
 - *Delta water quality*
 - *Groundwater hydrology, water quality and use*
 - *Crop tolerance to salinity*

FLOW CHART: LINKAGES BETWEEN TOOLS/MODELS

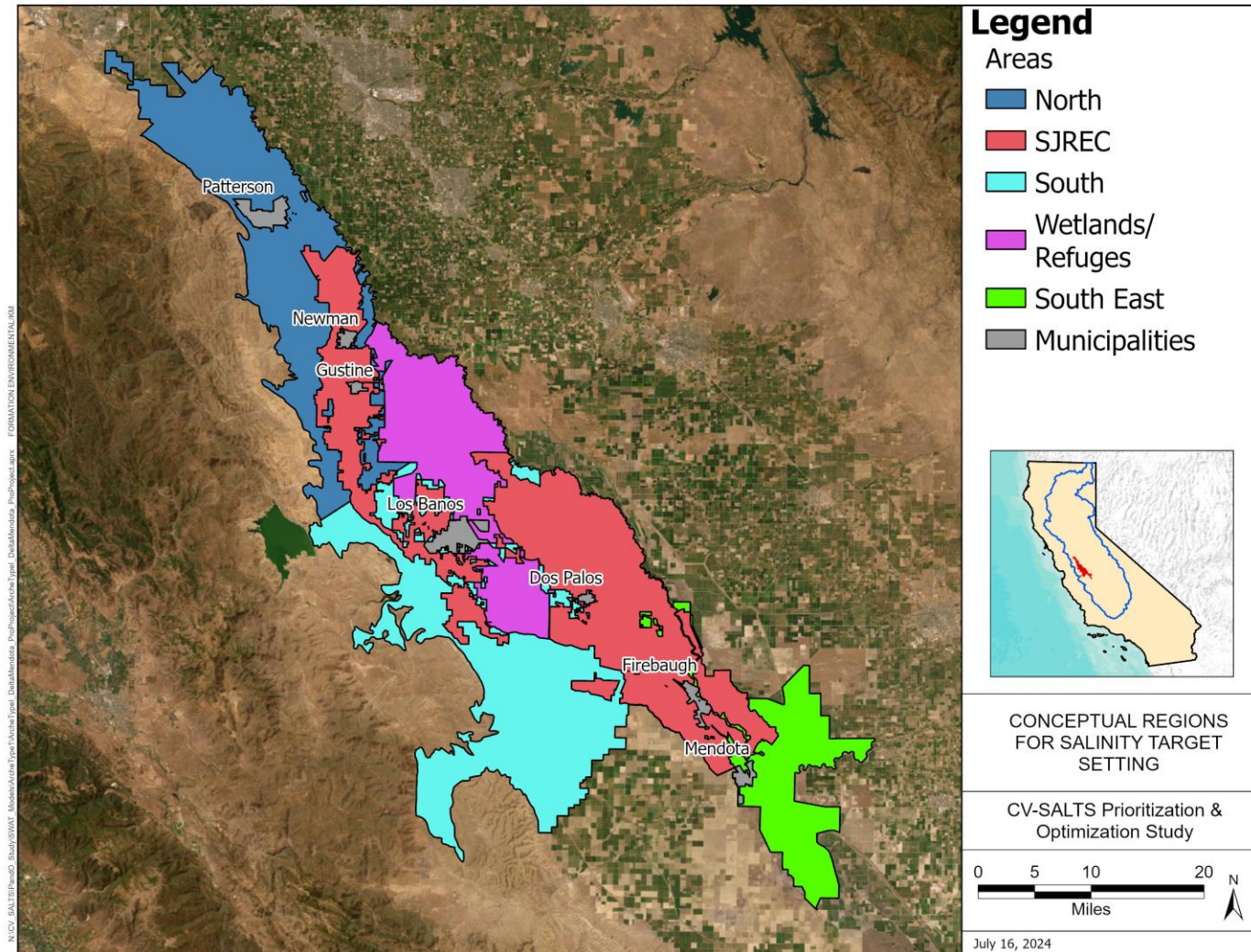


MODELING EFFORT TO DATE

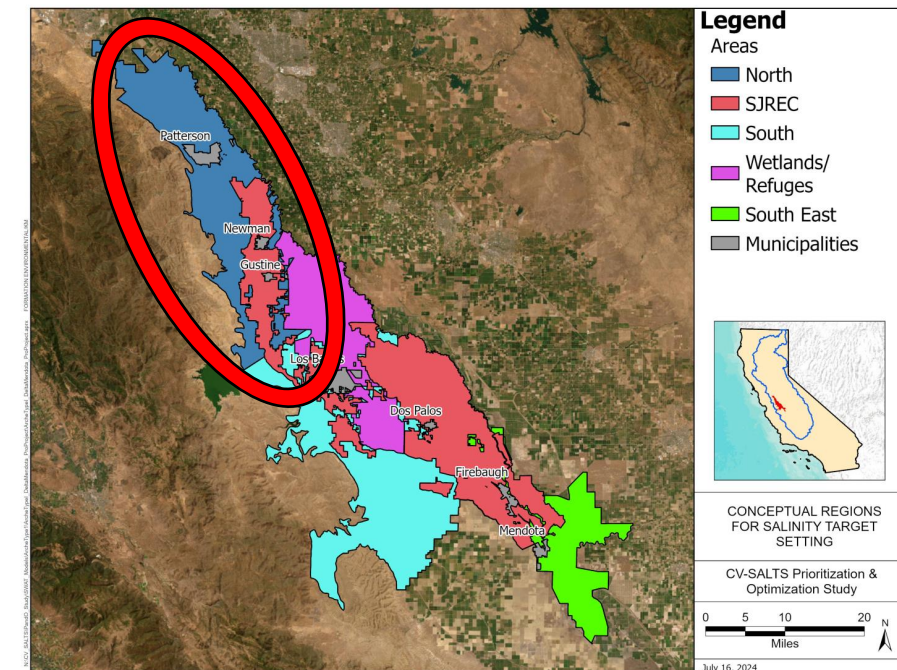
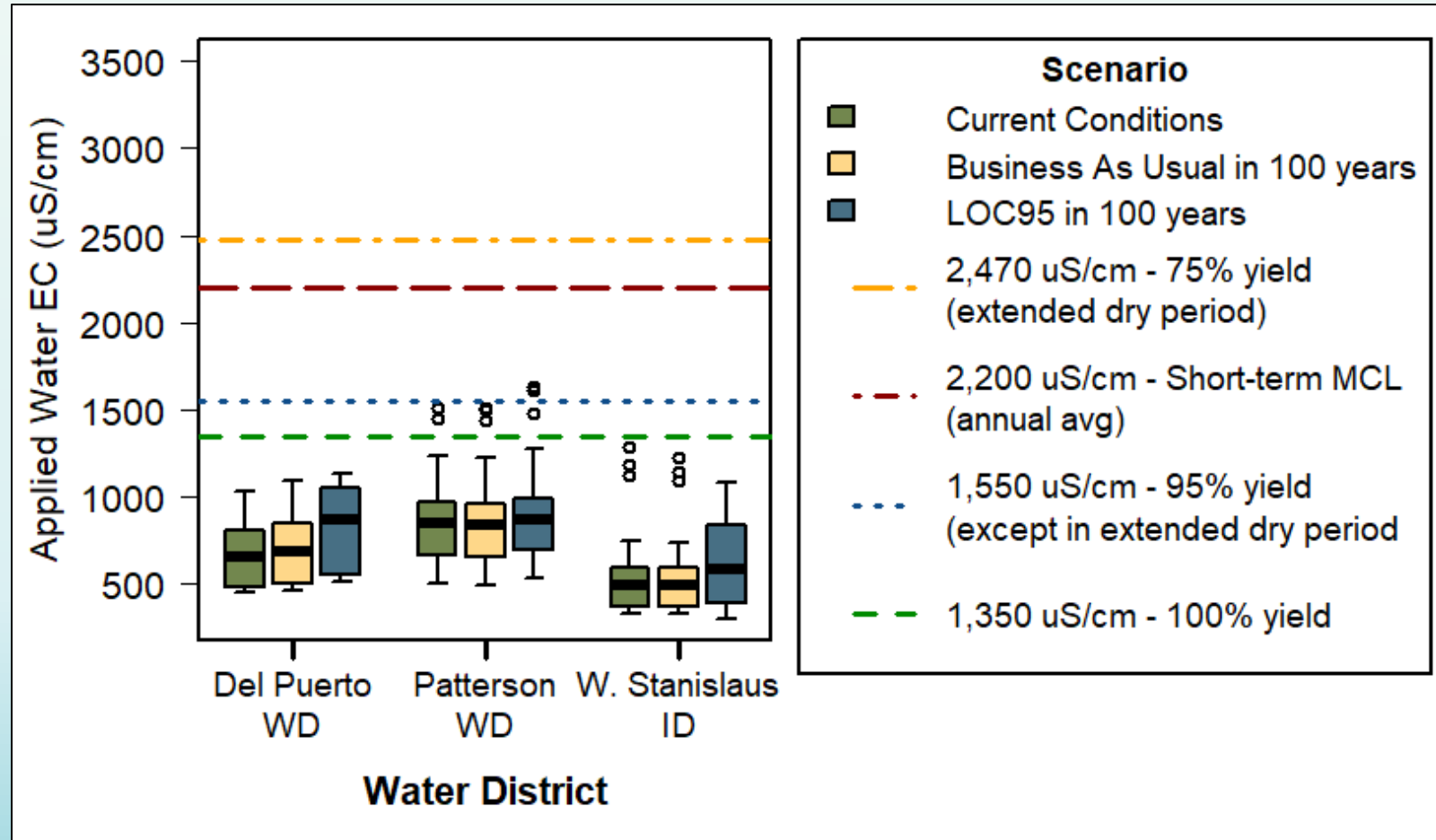
2024-2025

- **Archetype Analyses** using CV-SWAT and CV-NPSAT
 - *Delta-Mendota (CVHM2 verification)*
 - *Western Kings*
- **Central Valley-scale modeling** using CV-SWAT and CV-NPSAT
 - *Preliminary determination of areas in Central Valley where salt accumulation will impact current beneficial uses*

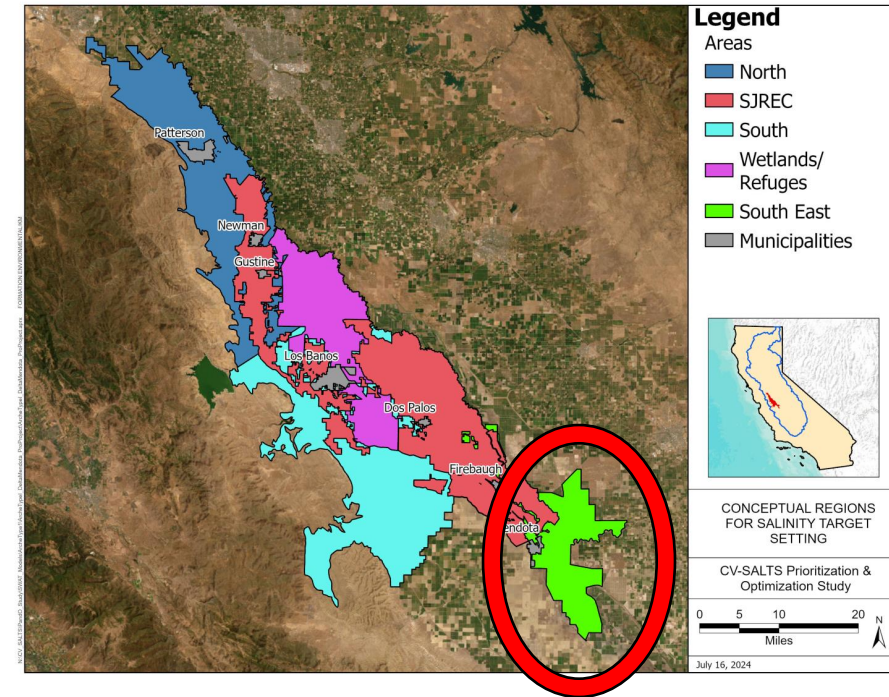
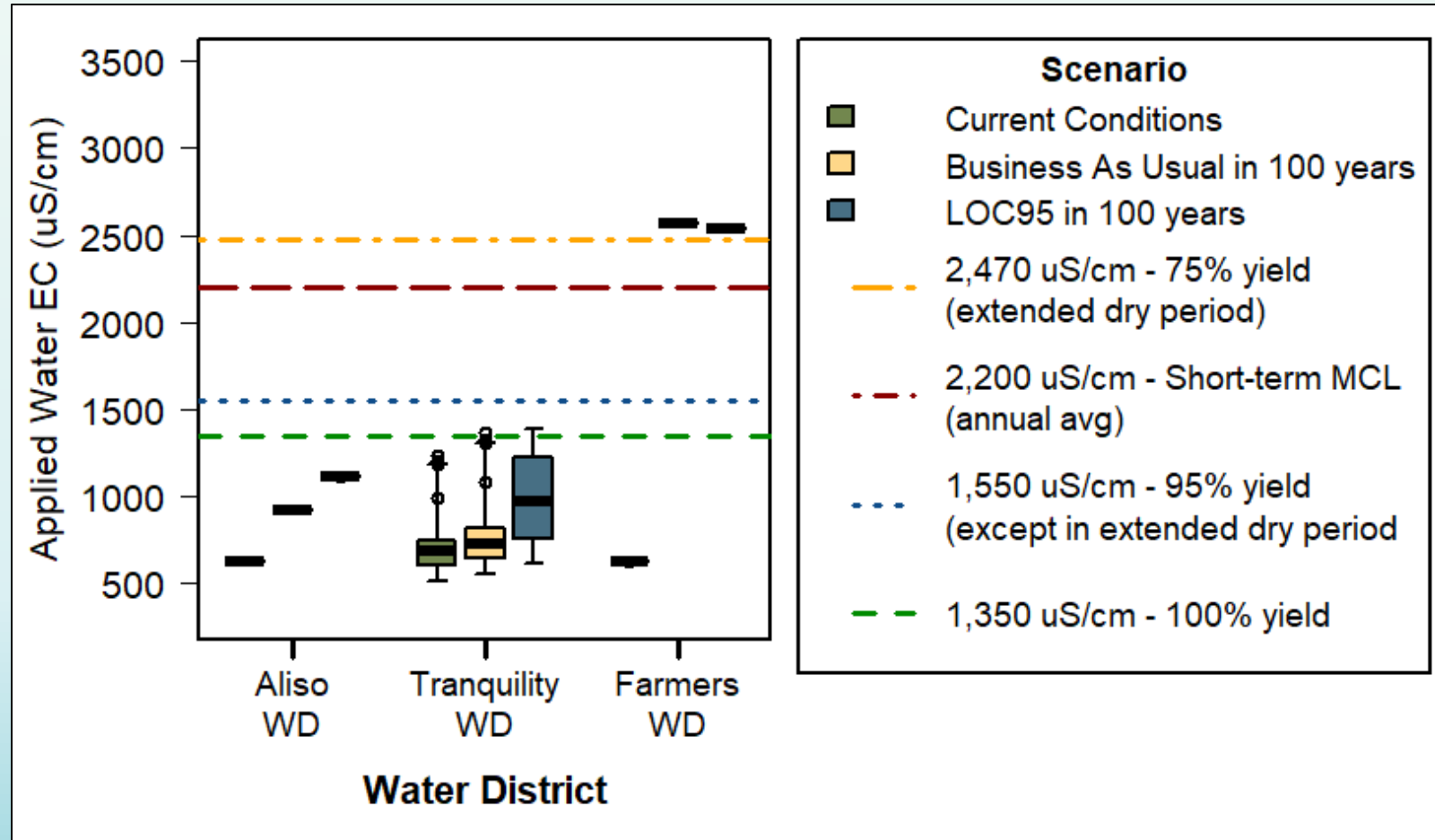
DELTA-MENDOTA SUB-BASIN — ARCHETYPE NO. 1



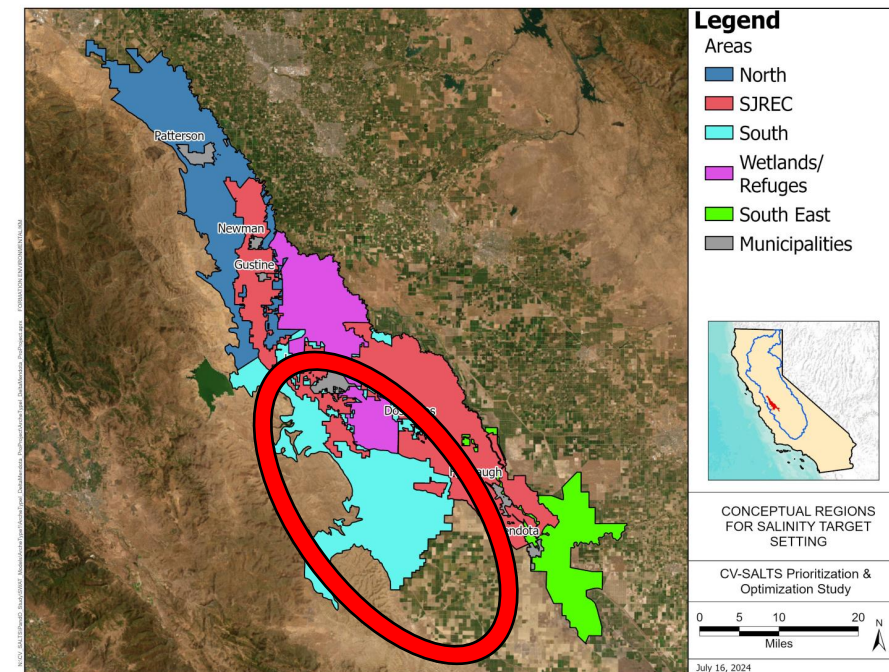
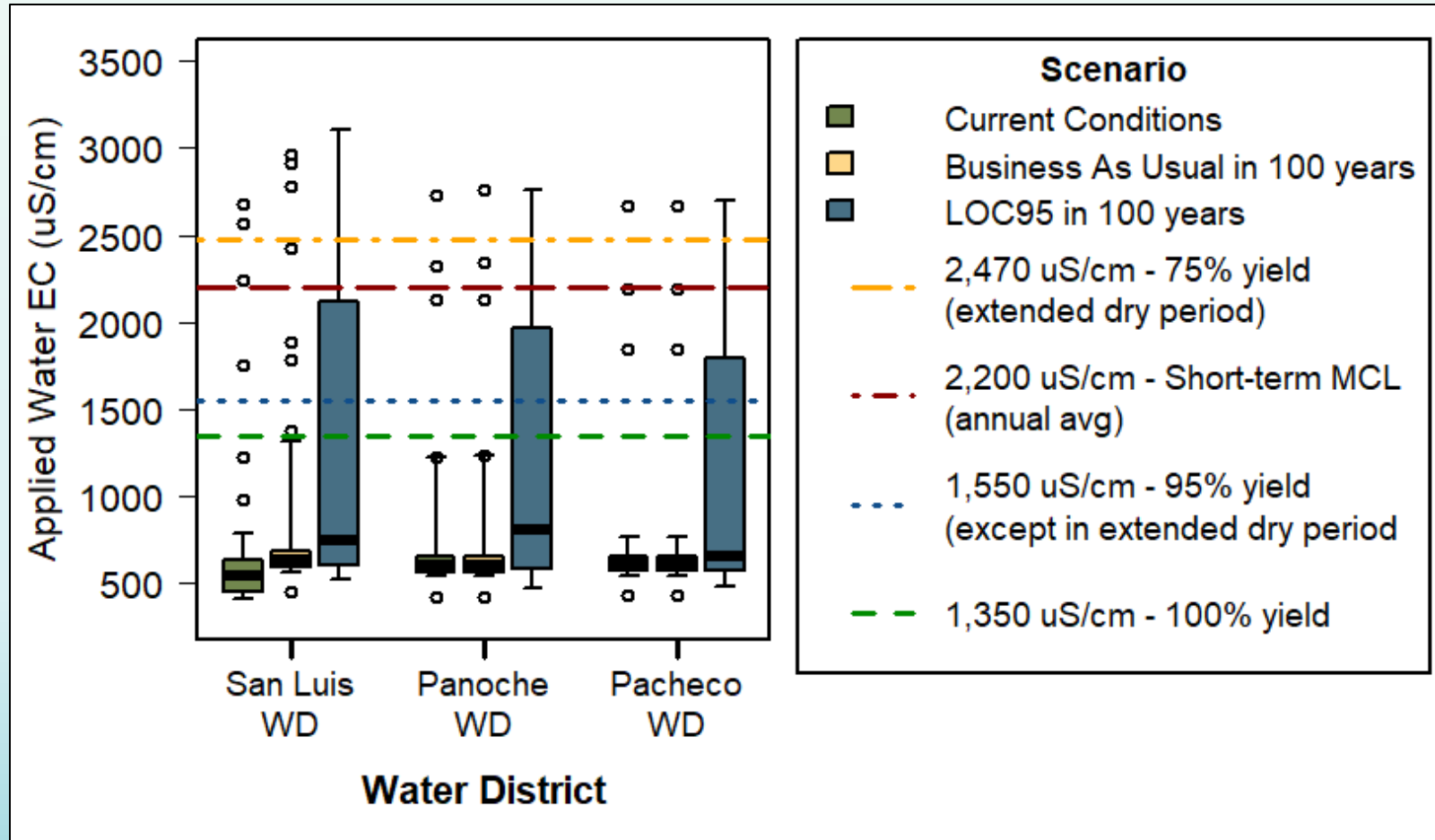
MODELED APPLIED WATER QUALITY AT THE DISTRICT LEVEL - NORTH



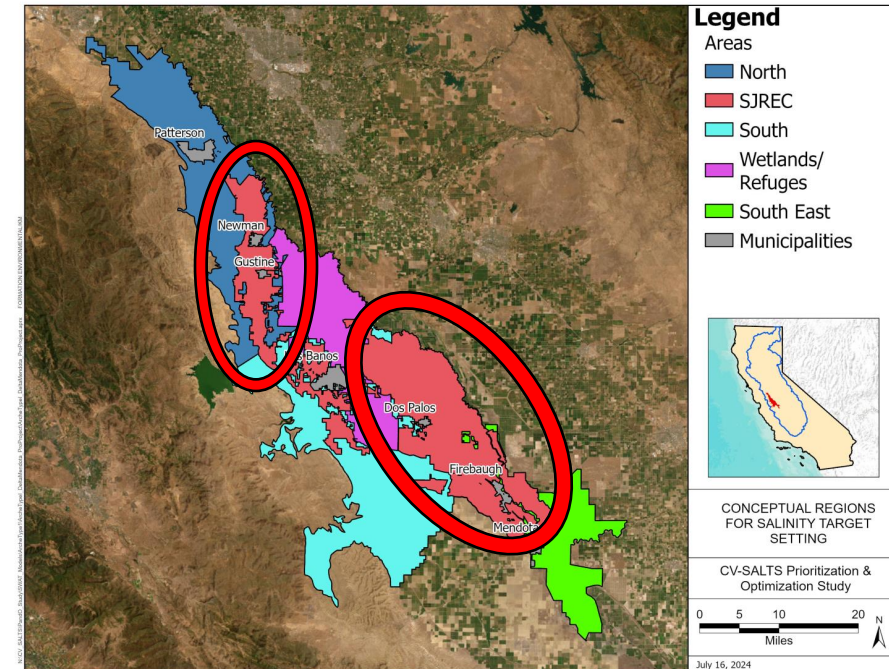
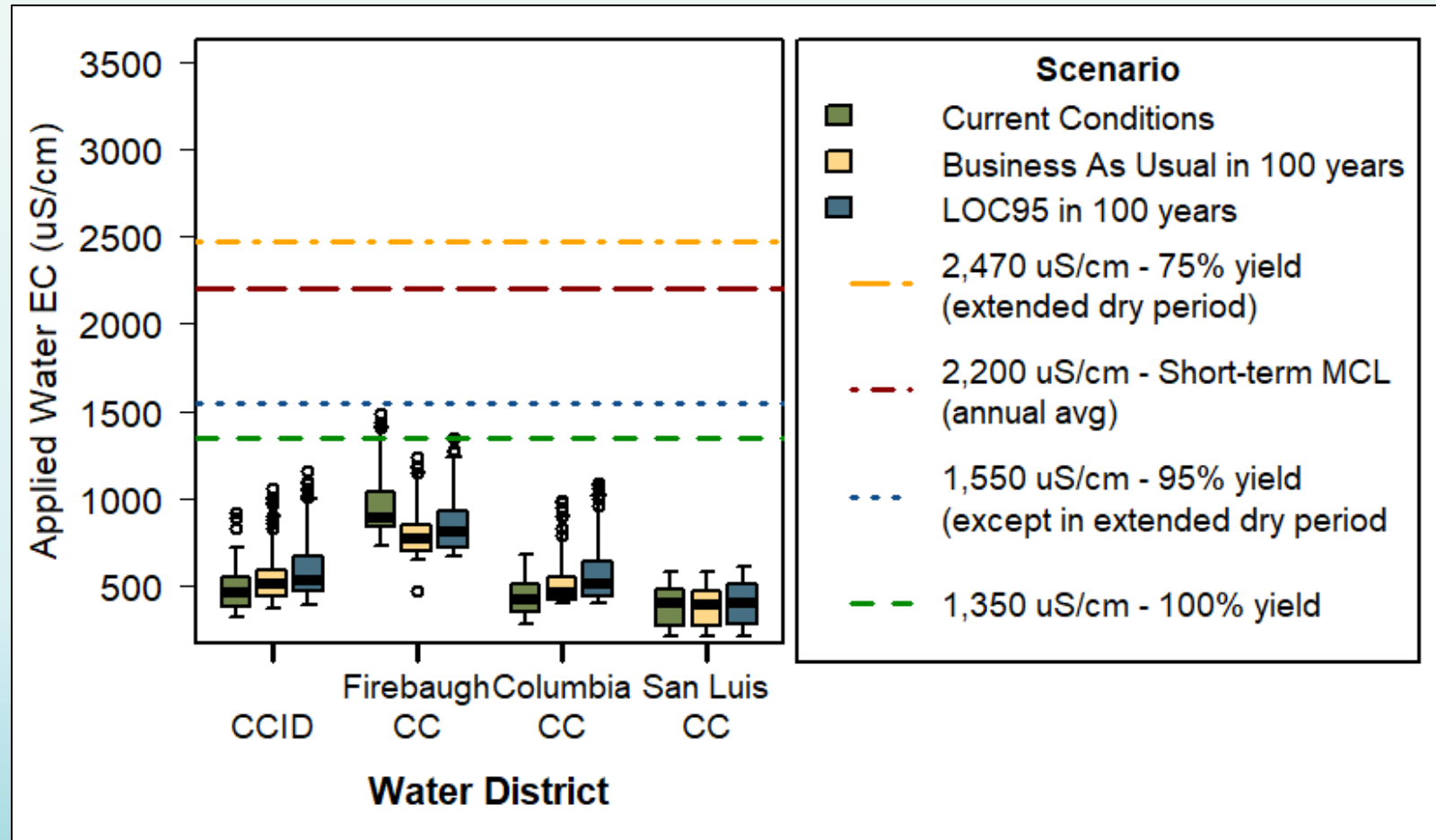
MODELED APPLIED WATER QUALITY AT THE DISTRICT LEVEL - SOUTHEAST



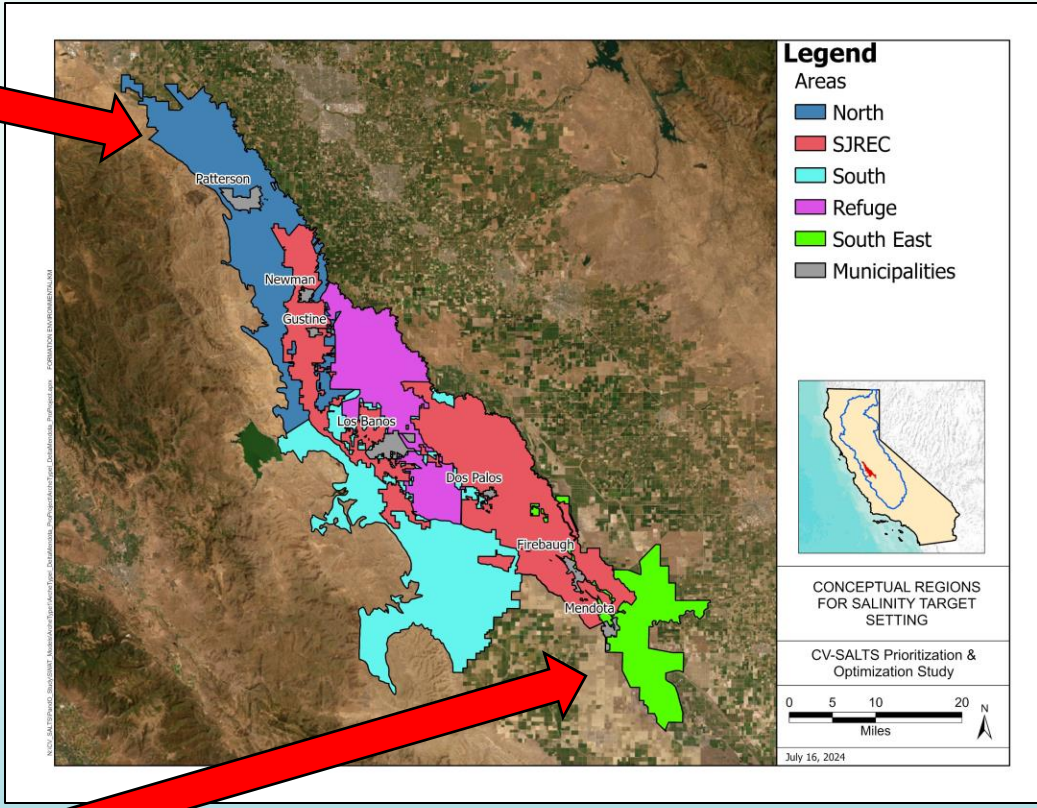
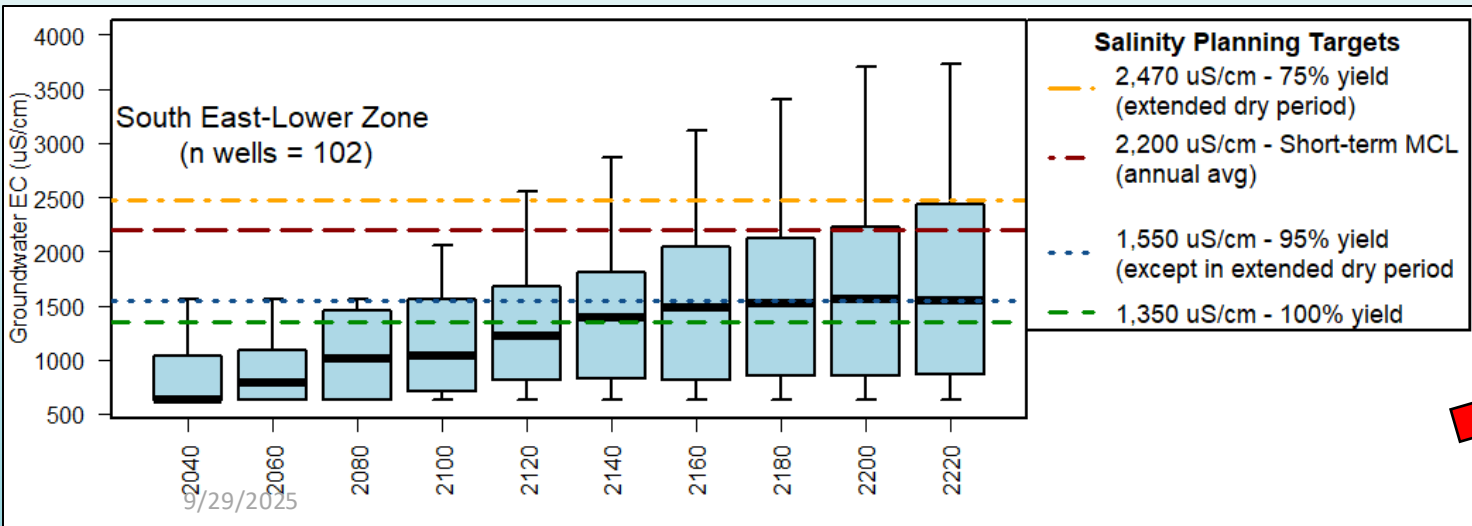
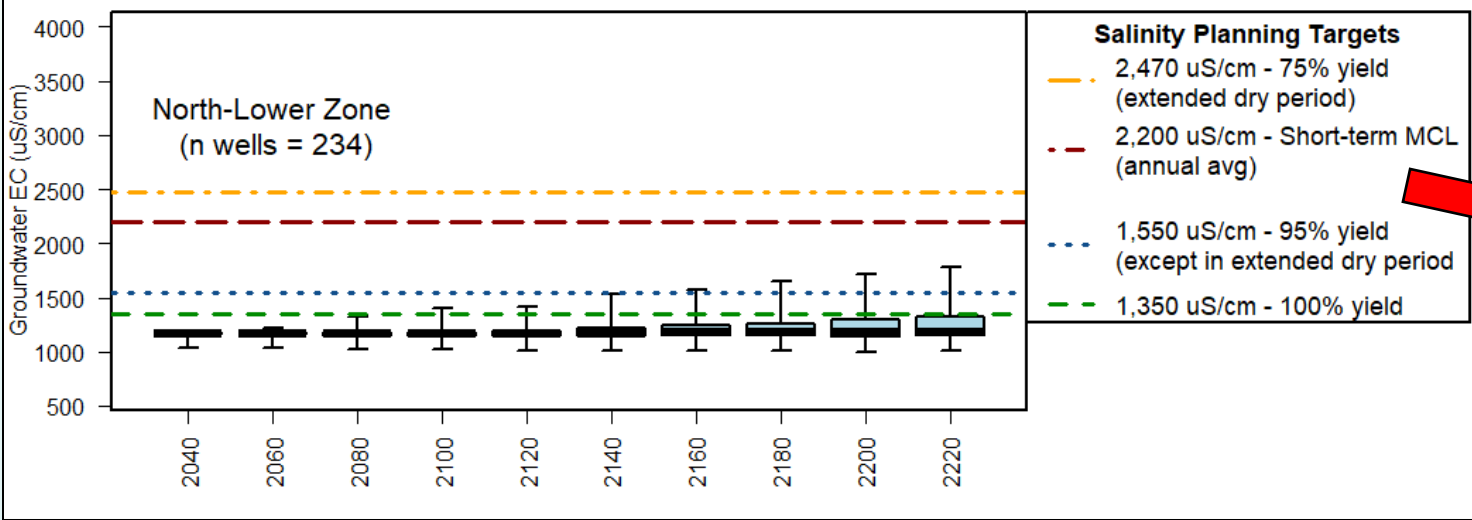
MODELED APPLIED WATER QUALITY AT THE DISTRICT LEVEL - SOUTHWEST



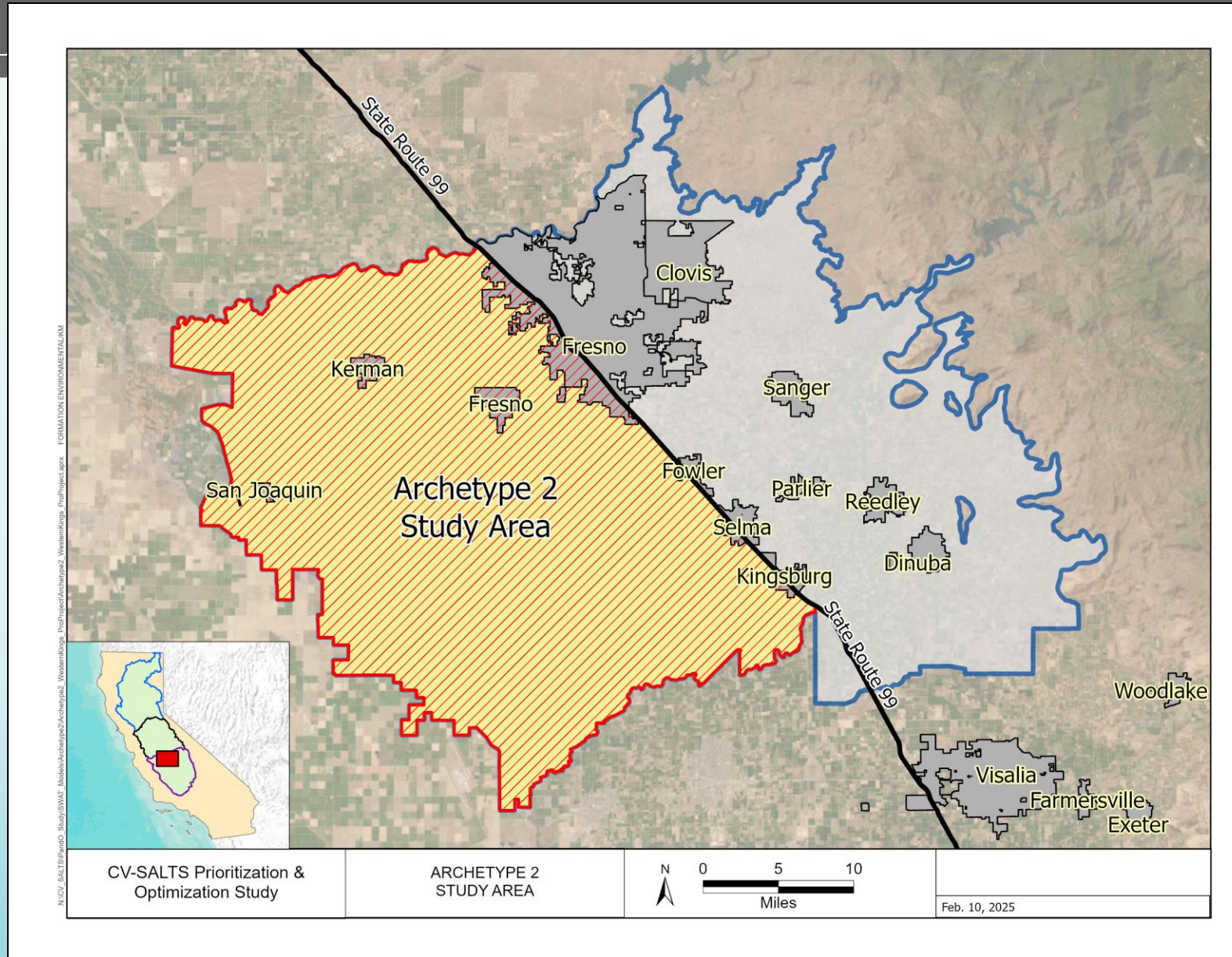
MODELED APPLIED WATER QUALITY AT THE DISTRICT LEVEL - SJREC



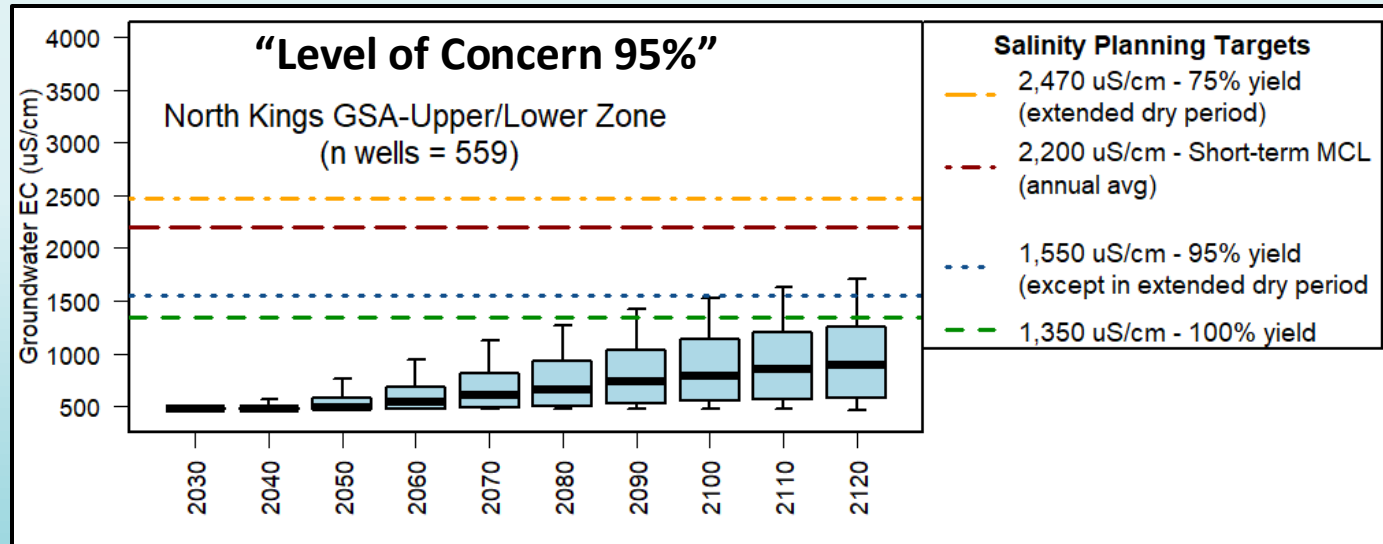
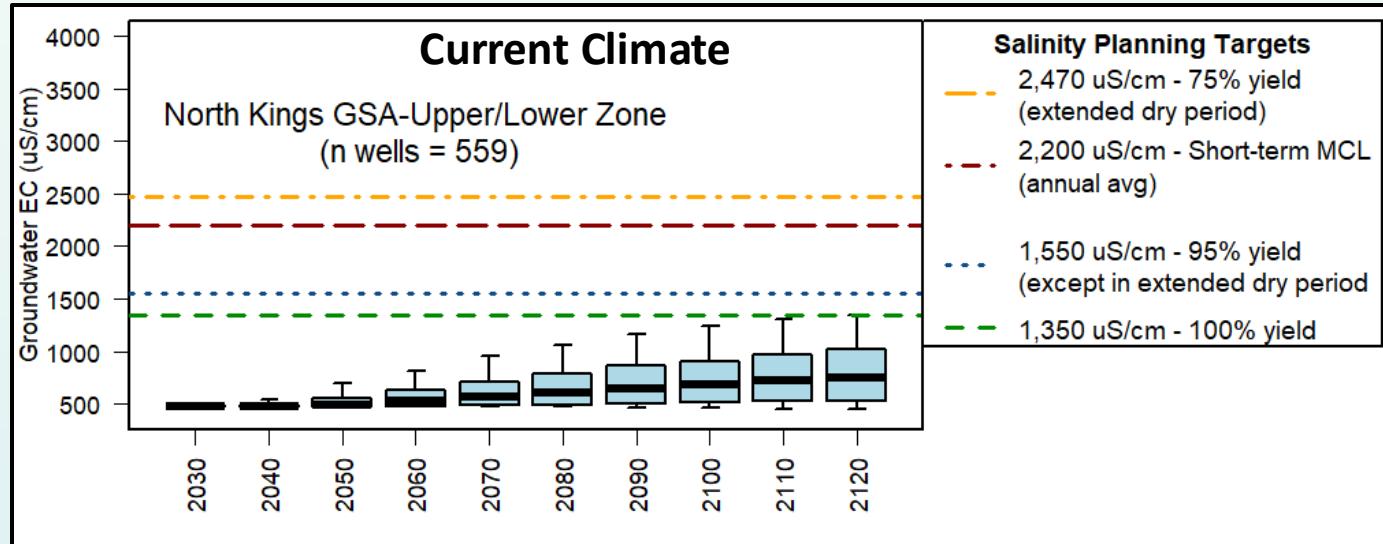
MODELED GROUNDWATER SALINITY IN THE LOWER ZONE – “DWR’S LEVEL OF CONCERN: 95%”



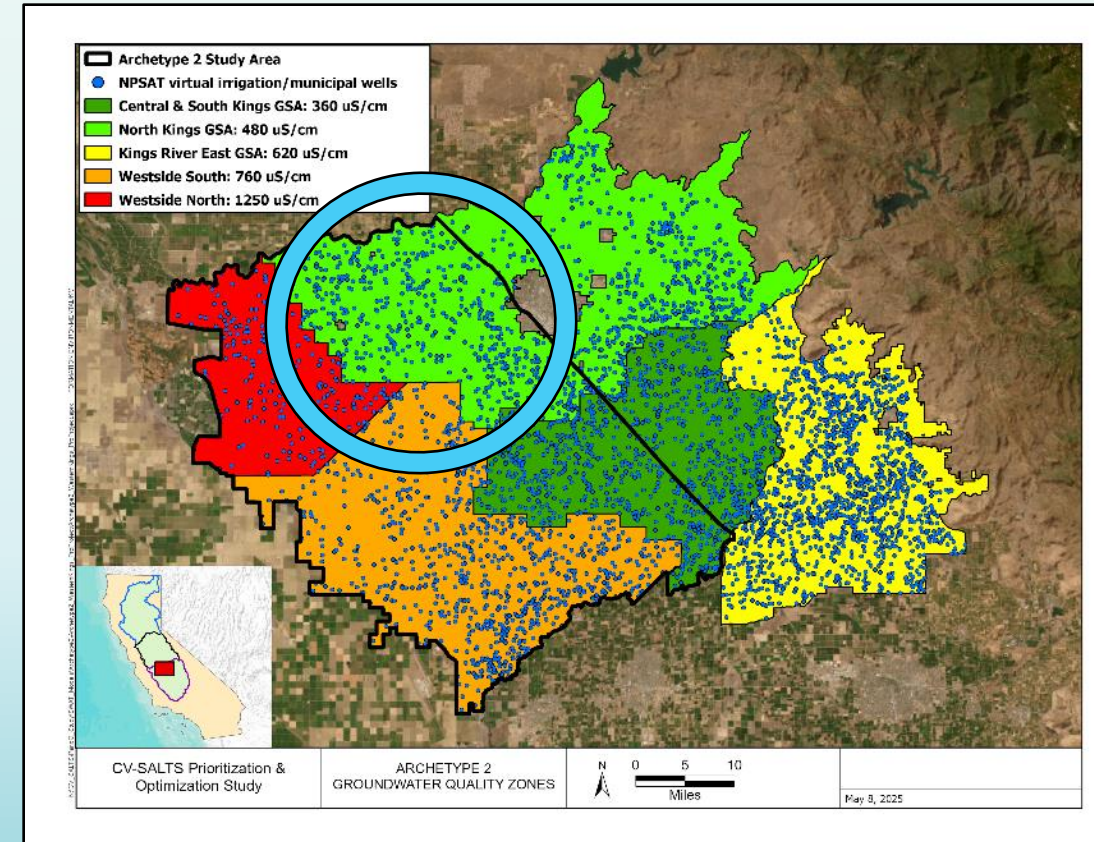
WESTERN KINGS – ARCHETYPE NO. 2



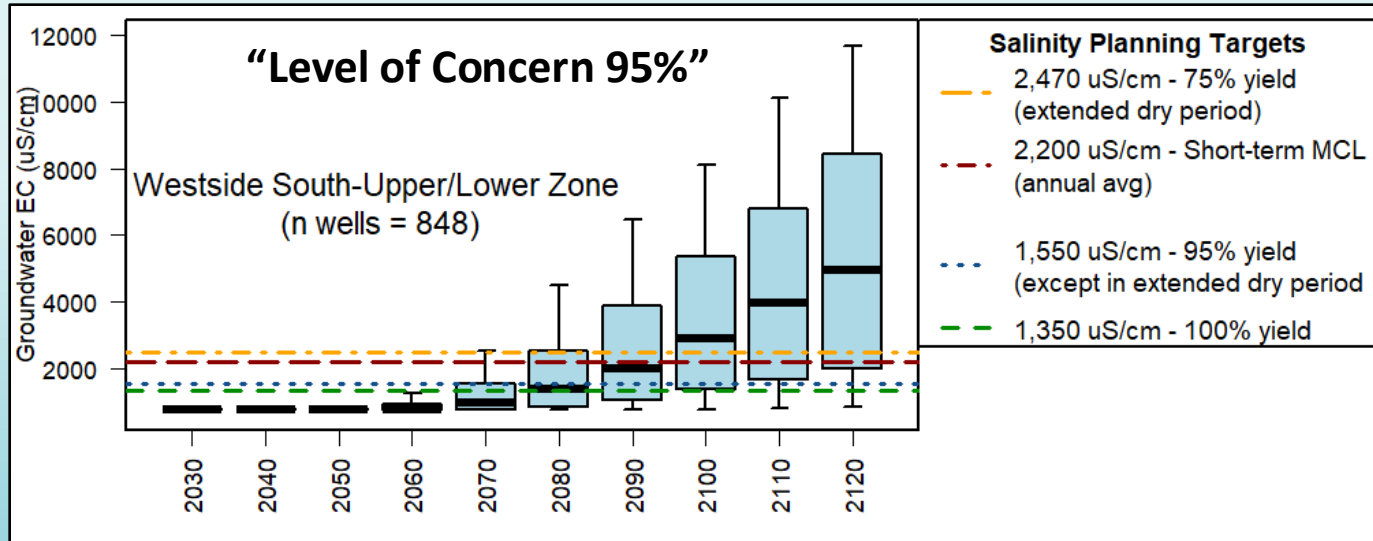
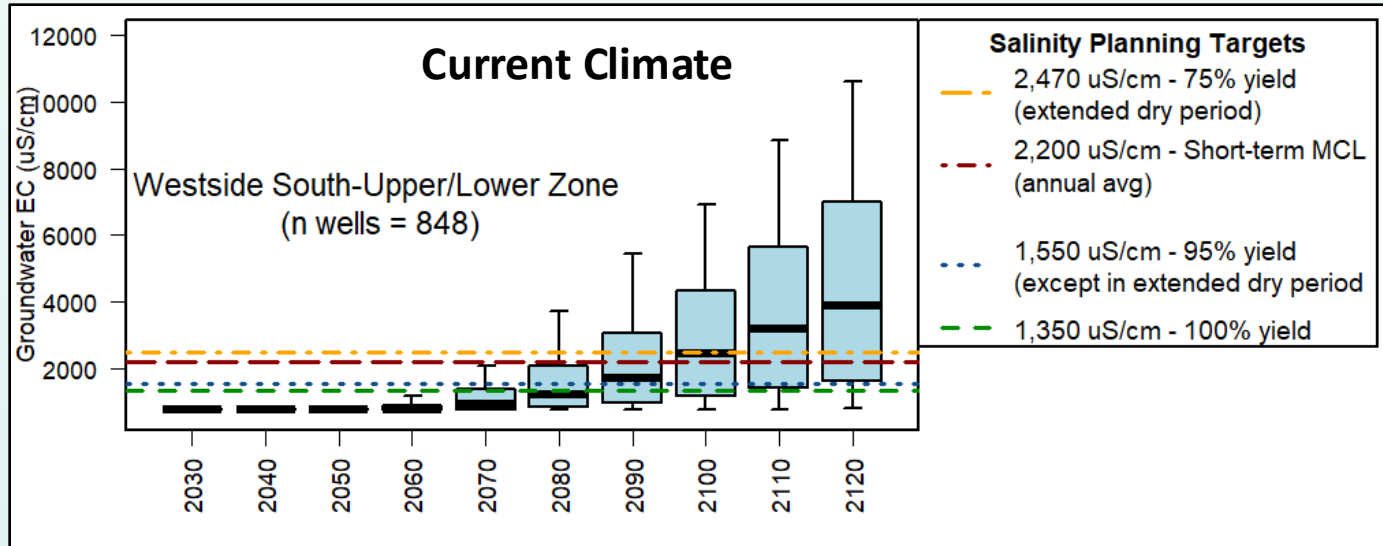
PRELIMINARY GROUNDWATER EC RESULTS – NORTH KINGS AREA - DIFFERENT CLIMATE SCENARIOS



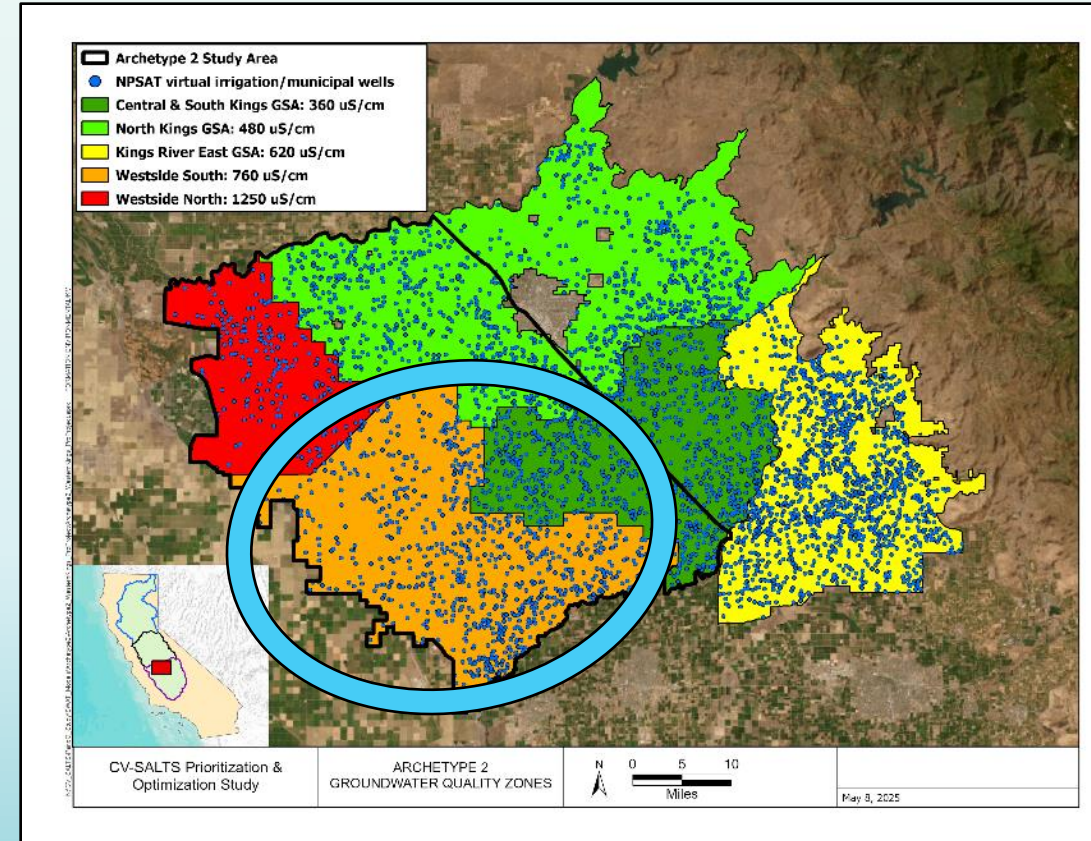
Representation of current average pumped groundwater quality and CV-NPSAT Virtual Irrigation/Municipal Wells



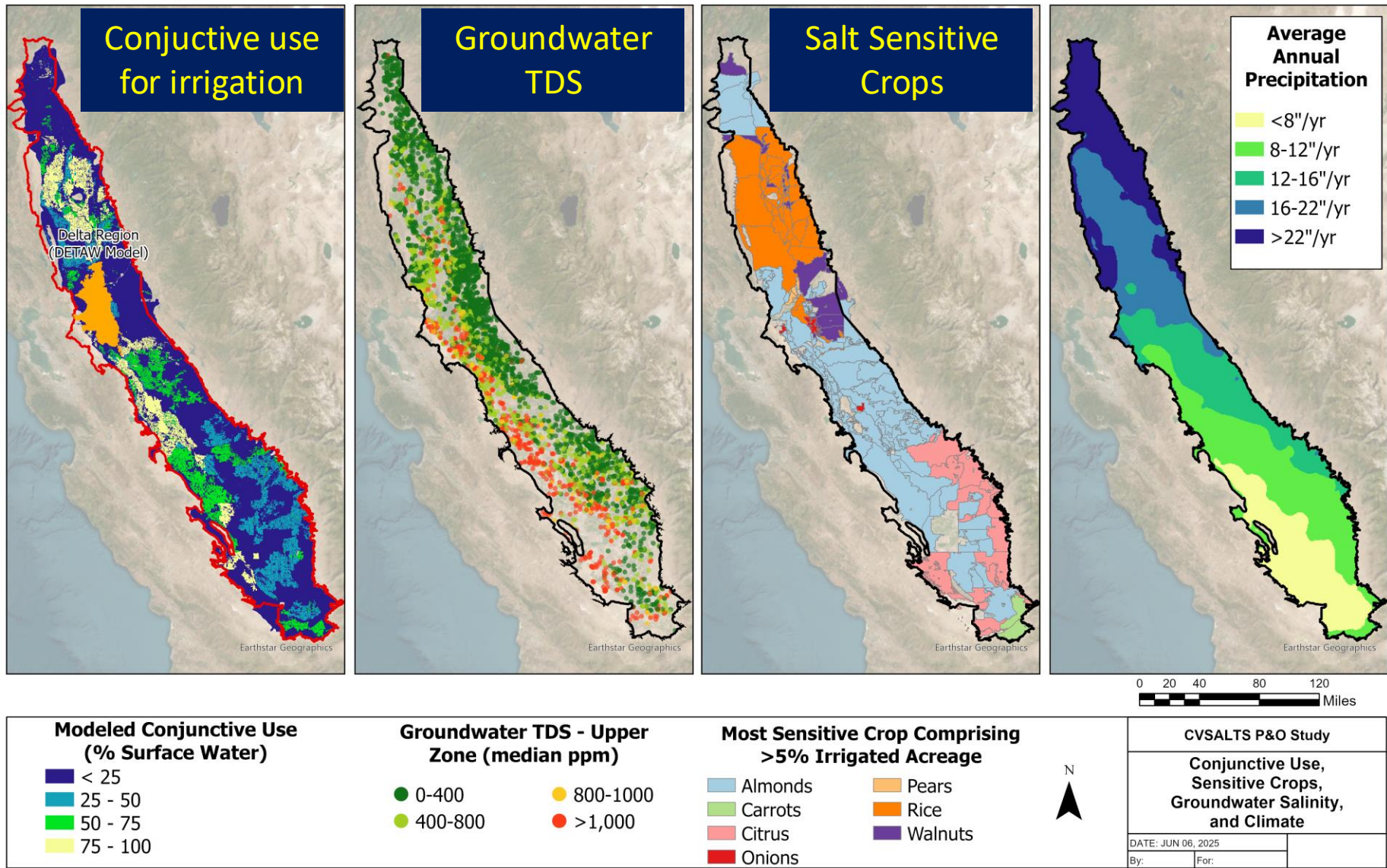
PRELIMINARY GROUNDWATER EC RESULTS – WESTSIDE SOUTH - DIFFERENT CLIMATE SCENARIOS



Representation of current average pumped groundwater quality and CV-NPSAT Virtual Irrigation/Municipal Wells



CENTRAL VALLEY-SCALE ANALYSIS – KEY INFORMATION



CENTRAL VALLEY-SCALE ANALYSIS – PRELIMINARY SALINITY PLANNING TARGETS

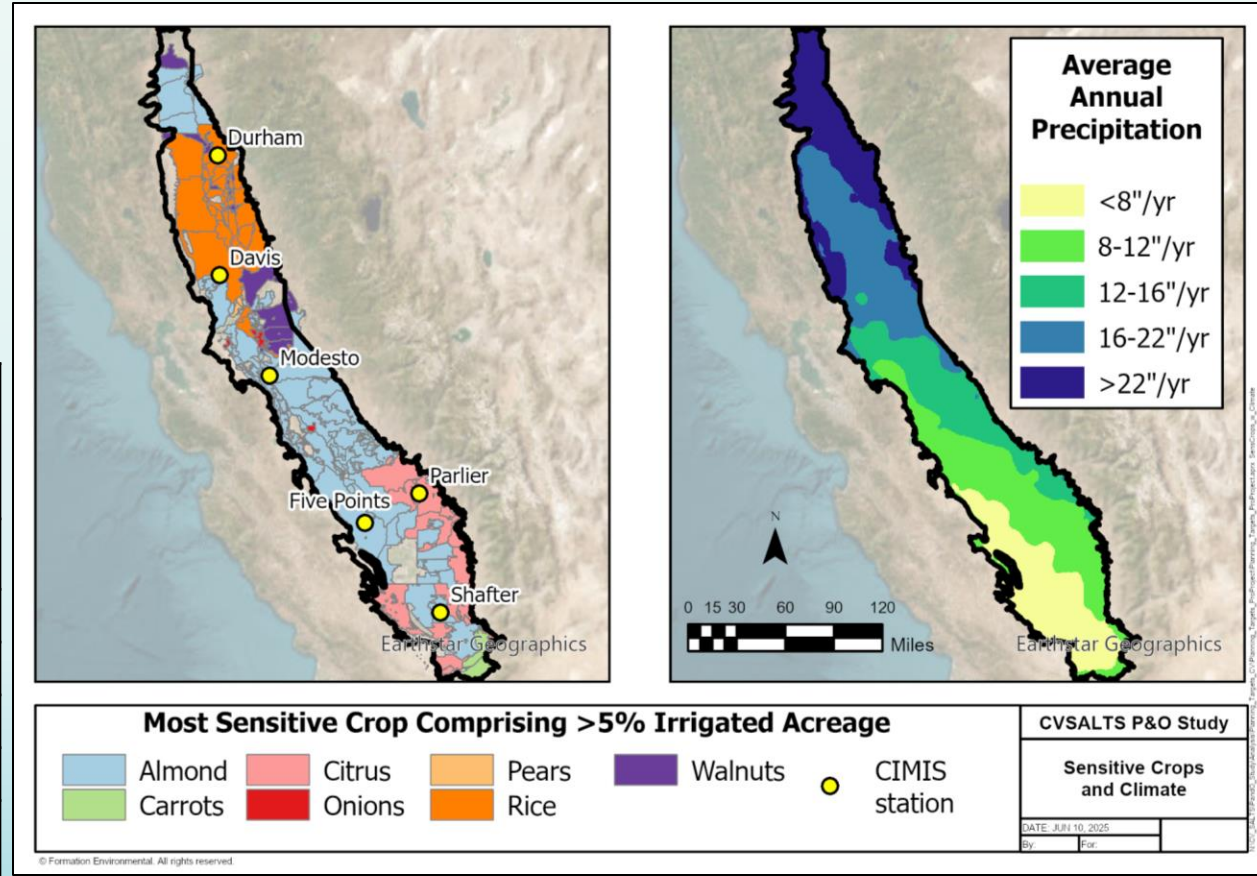
- Values to protect 100% crop yield based on existing salt tolerance thresholds
- Rice values based on Marcos et al. (2018)
- Results for almond, walnut, and carrot based on approximate method used for Lower SJR
 - 5th percentile precipitation
 - 15% leaching fraction

CIMIS station	5th %tile Precip.	Almond (1.5 EC _e)	Walnut (1.7 EC _e)	Rice (0.88 EC _{fw})	Carrot (1.0 EC _e)	Citrus (1.7 EC _e)
	--in/yr--		----target EC irrigation (μS/cm)----			
Durham	13.8	1,630	1,910	600	-	-
Davis	9.1	1,420	1,630	600	-	-
Parlier	5.0	1,330	-	-	-	1,570
Modesto	4.7	1,320	1,510	-	-	-
Five Points	3.6	1,280	-	-	-	-
Shafter	2.4	1,260	-	-	910	1,450

9/29/2025

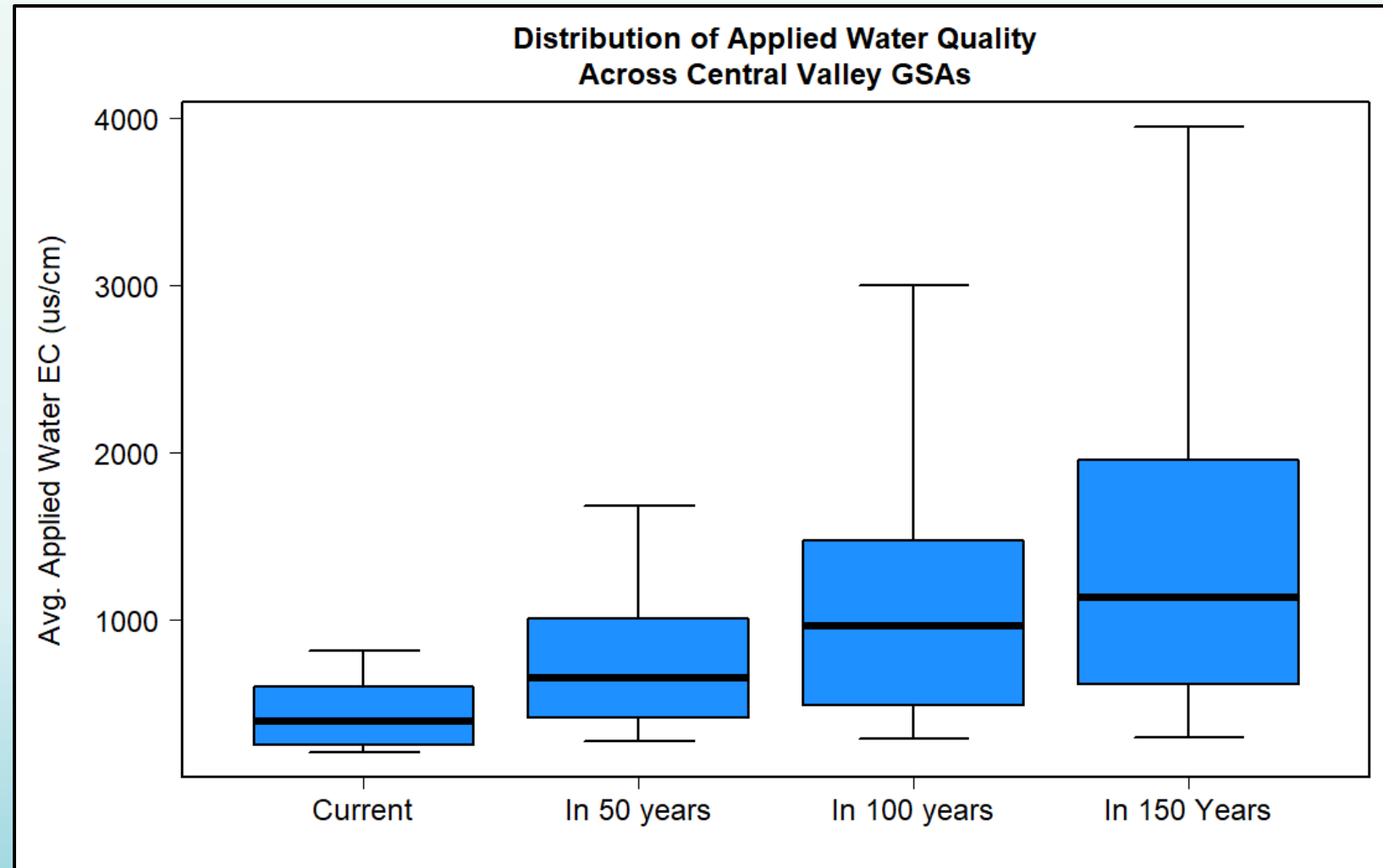
EC_e = EC of soil, saturated paste extract

EC_{fw} = EC of field (pond) water



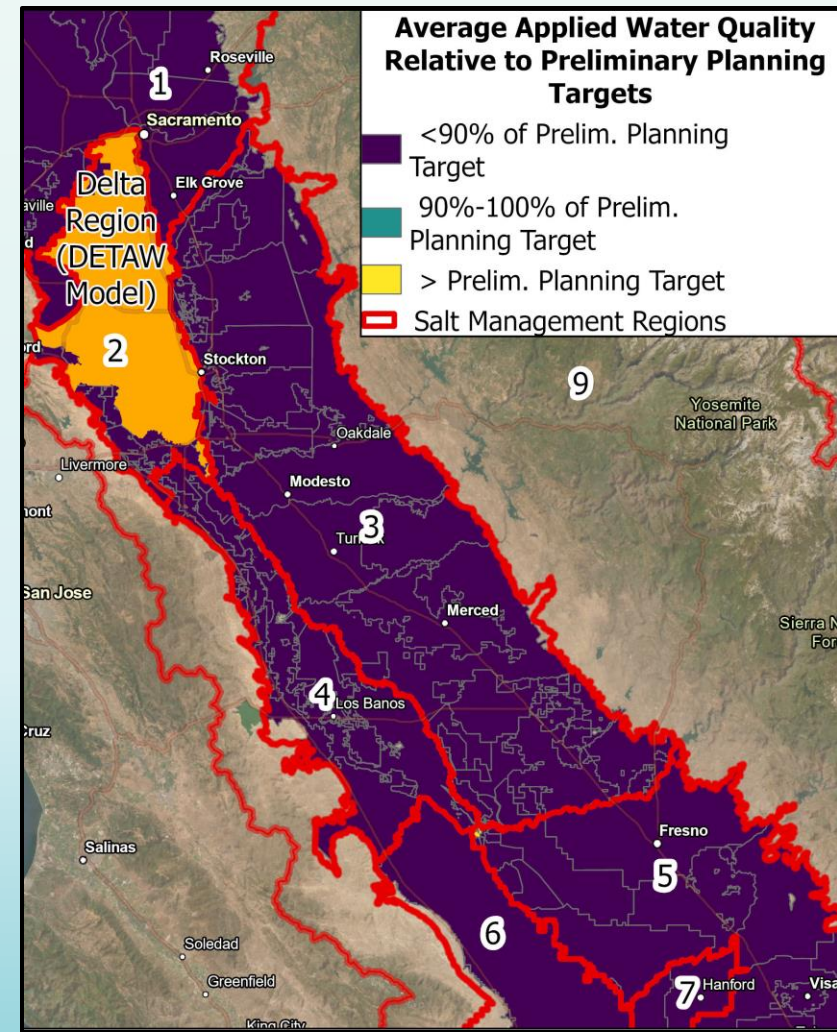
PRELIMINARY – PREDICTED APPLIED WATER QUALITY IN CENTRAL VALLEY

- Box and whiskers depict **average applied water quality across GSAs**
- Surface water quality/amounts are assumed to be the same over time
- Changes over time are due to predicted increases in groundwater salinity

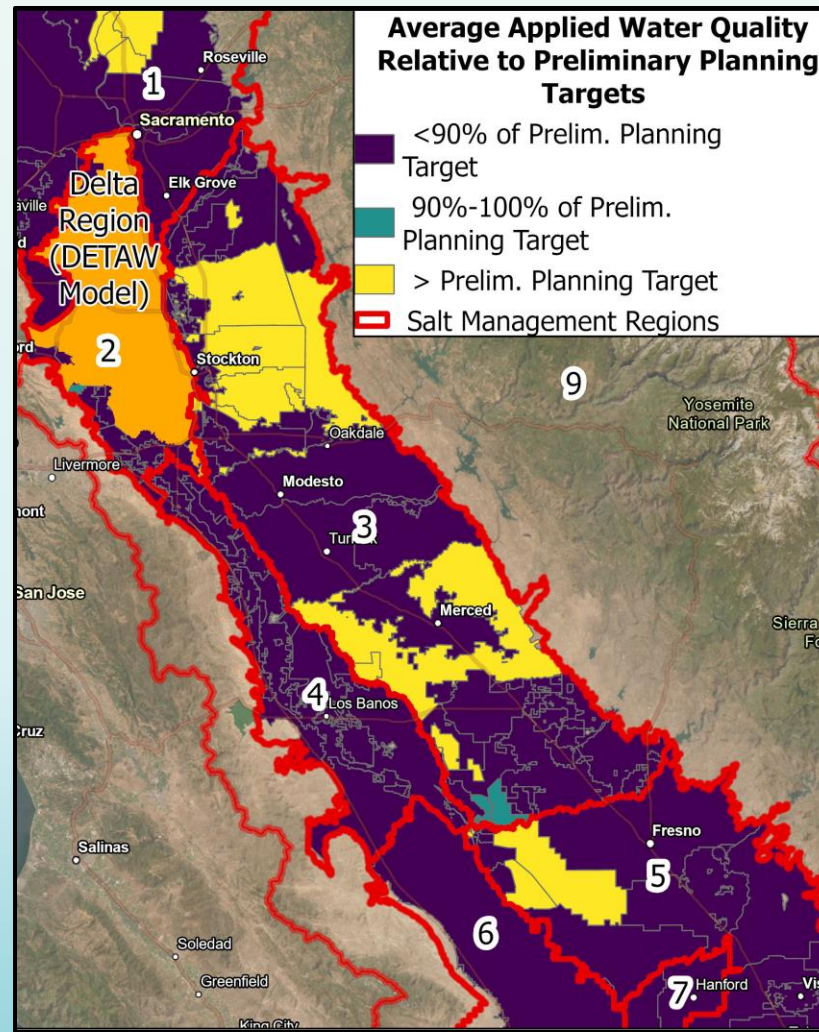


PRELIMINARY RESULTS – CENTRAL VALLEY SCALE PROBLEM IDENTIFICATION – “HEAT MAP” - [EXAMPLE ONLY]

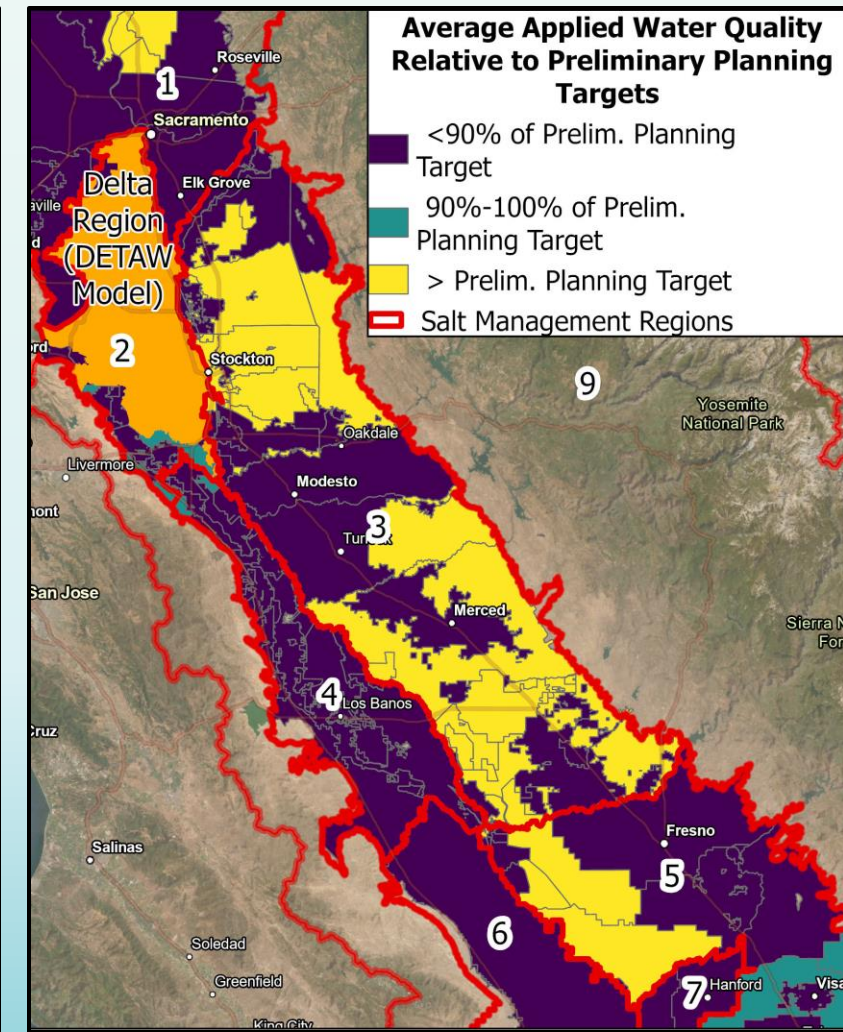
Current



In 50 Years

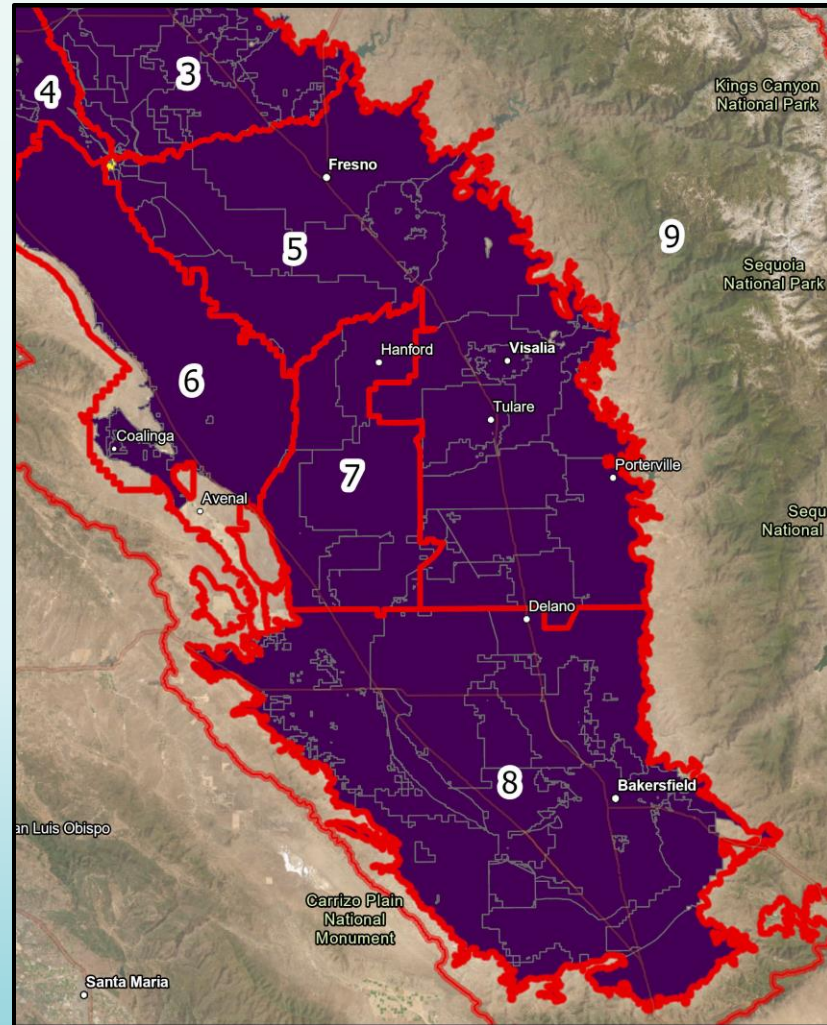


In 100 Years

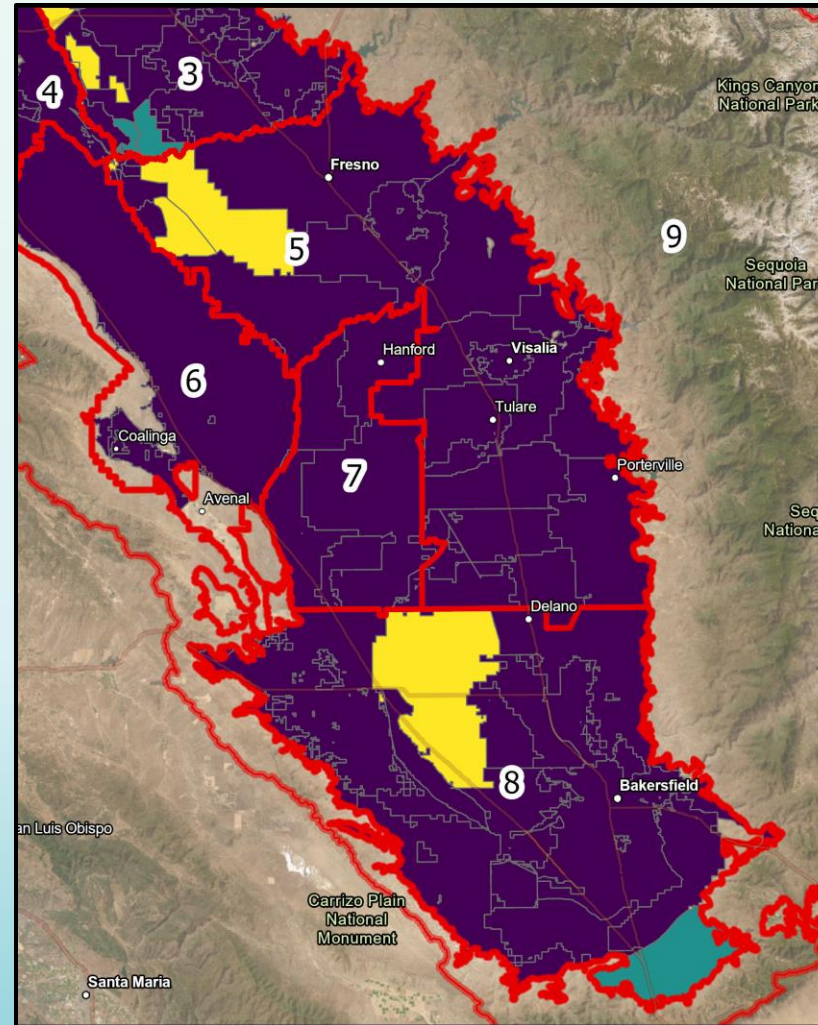


PRELIMINARY RESULTS – CENTRAL VALLEY SCALE PROBLEM IDENTIFICATION – [EXAMPLE ONLY]

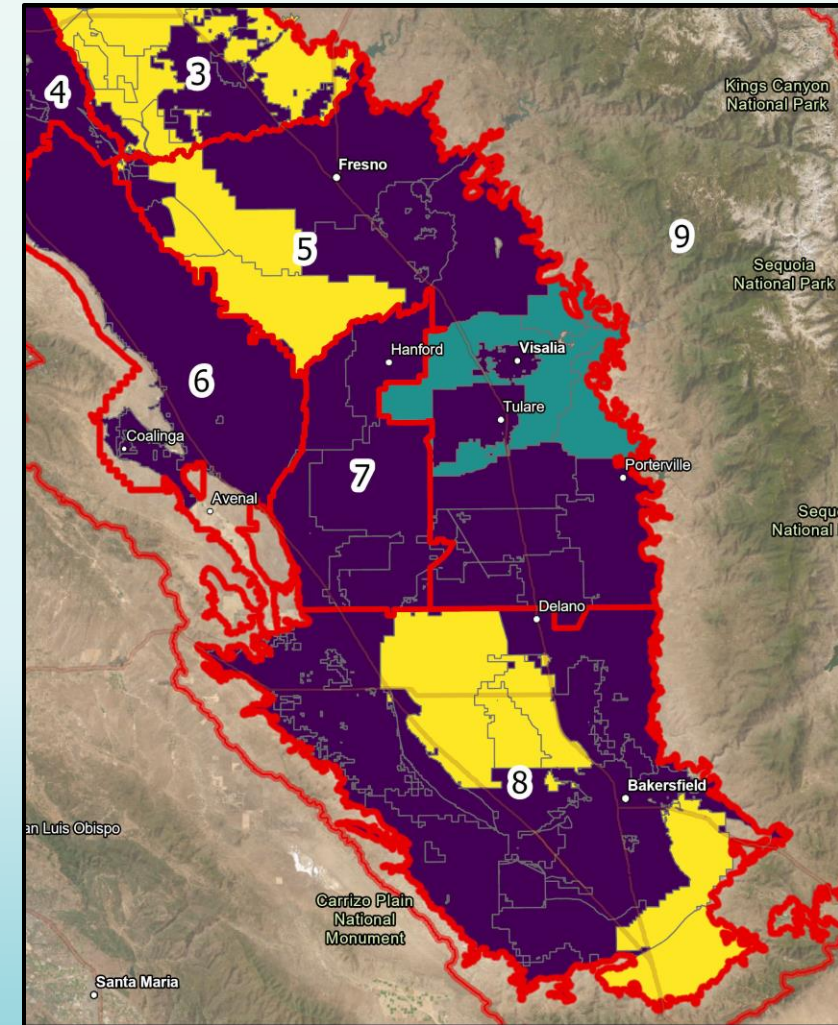
Current



In 50 Years



In 100 Years



CENTRAL VALLEY-SCALE ANALYSIS - SUMMARY

- Preliminary results will continue to be reviewed and modified, as necessary.
- Goal is to confirm “heat maps” by the end of 2025.
- Maps will be used to select several “pilot areas” for evaluation of salt management options in 2026

MAJOR POLICY ISSUES – PARALLEL WORK

- Point of Compliance for salinity objectives:
 - *Applied Water vs Groundwater*
- Domestic Wells – need for holistic solutions to address multiple issues
- In-valley Salt Management Areas – De-designation of AGR and MUN
- Future regulatory approach for POTWs and other permittees

SUMMARY – P&O STUDY

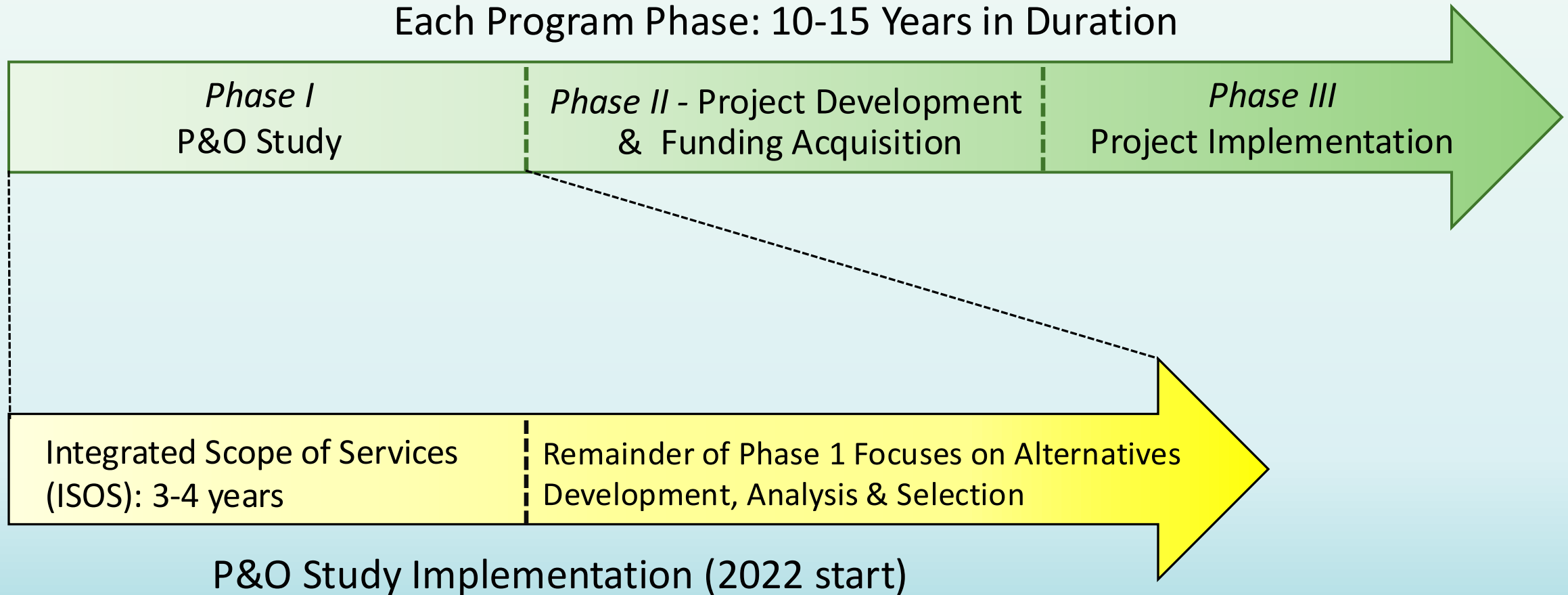
- The end game: A region-wide, integrated, cost-effective plan to address salt problems
- Information generated under SGMA and other programs will be used – (water use, recharge, land use changes, future projects)
- Modeling tools are key to understanding future salt conditions and risks in the Central Valley over a long planning horizon
- Major policy issues must be addressed



Thank You - Questions?

TIMELINE - SALT CONTROL PROGRAM

Each Program Phase: 10-15 Years in Duration



SUMMARY SCHEDULE

- Schedule established in the approved P&O Study Workplan

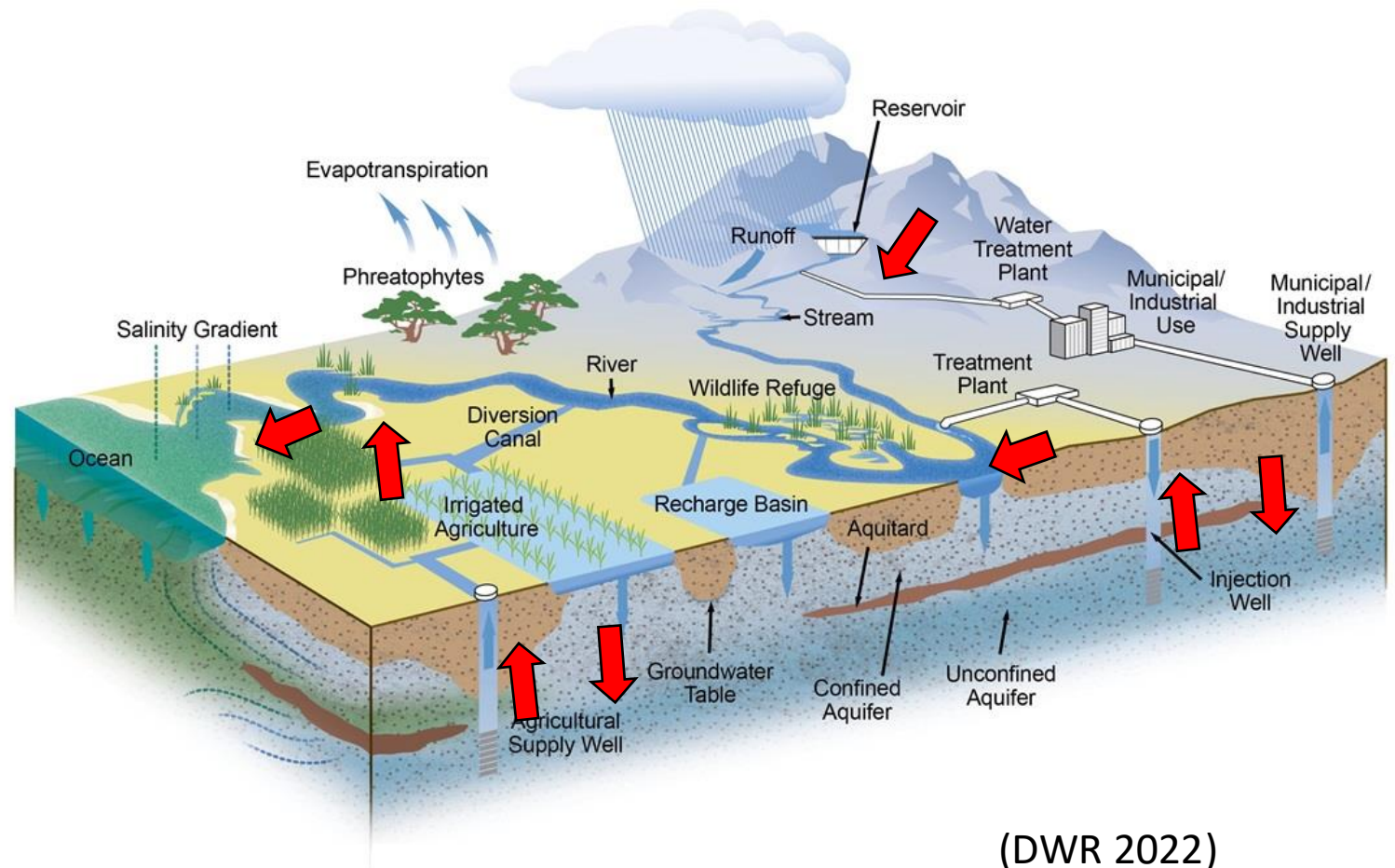
Key P&O Workplan Element	General Timing
Central Valley Characterization	Years 1-2
Numeric Tool Development	Years 2-3
Establishment of Numeric Salt Targets	Years 3-4
Evaluate Existing Salt Management Requirements, Source Control BMPs and Land Management	Years 3-4
Develop Salt Management Regions	Years 3-4
Identify Salt Management Areas	Years 4-5
Salt Management Alternatives Development	Years 4-9
• Non-Physical Projects	<i>Years 4-5</i>
• Physical Projects	<i>Years 5-9</i>

CV-SWAT ADDRESSES COMPLEX HYDROLOGY AND SALINITY

Assess key components of water and salt balances

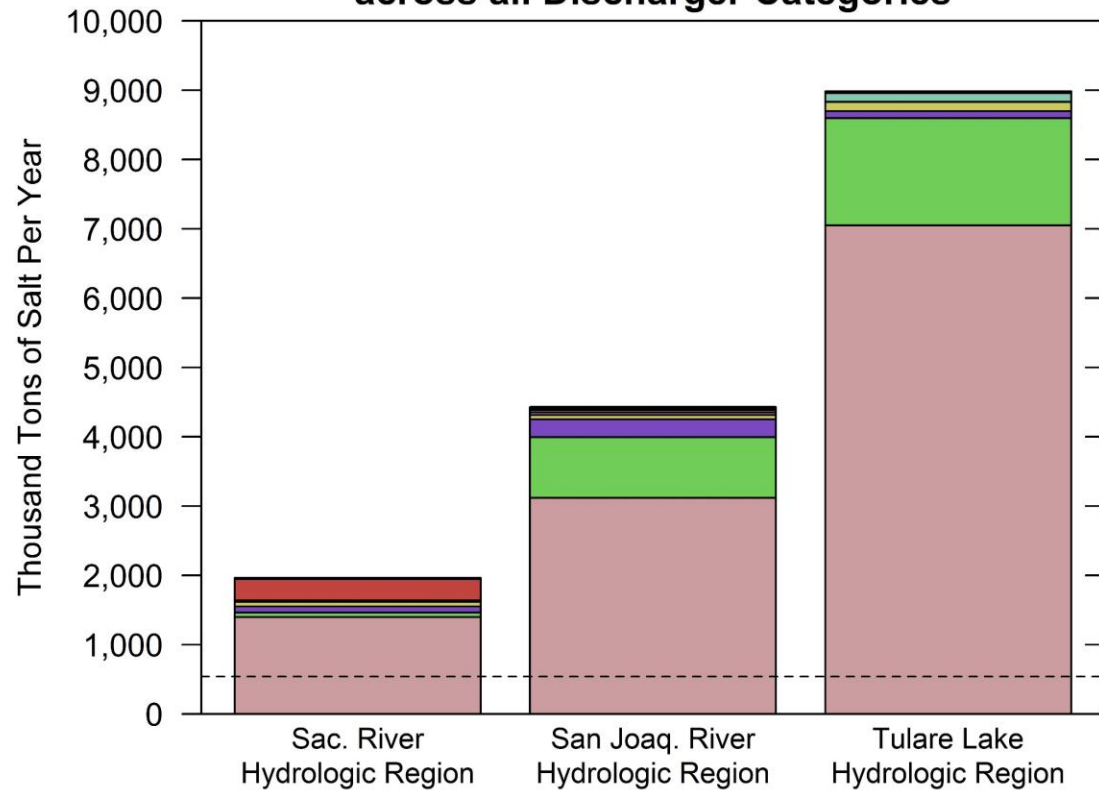
- Inflows to valley floor
- Irrigation volumes and water sources
- Crop ET
- Surface flows and salinity
- Large scale salt fluxes

Assess key components of water and salt balances

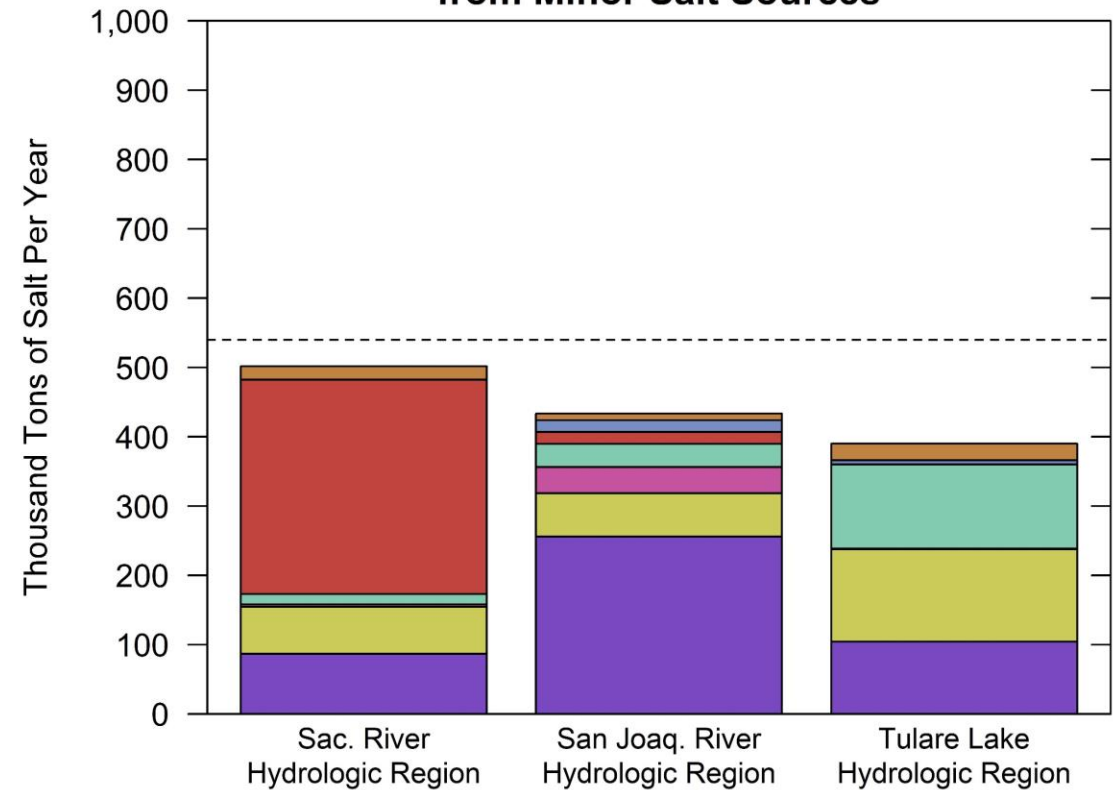


ESTIMATED SALT LOADS - BOTTOM OF ROOT ZONE

**Total Estimated Salt Load
at the Bottom of the Root Zone
across all Discharger Categories**

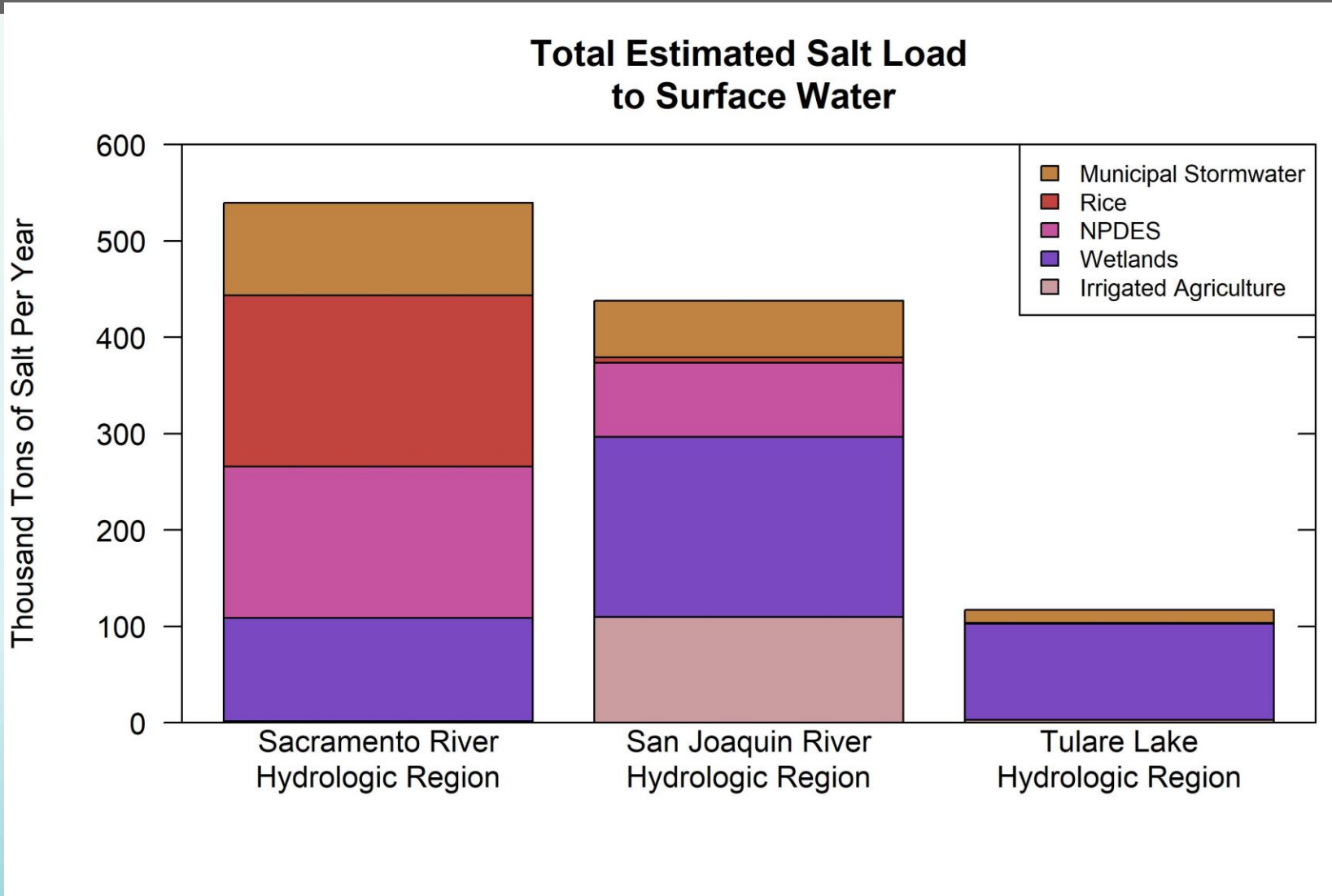


**Total Estimated Salt Load
at the Bottom of the Root Zone
from Minor Salt Sources**



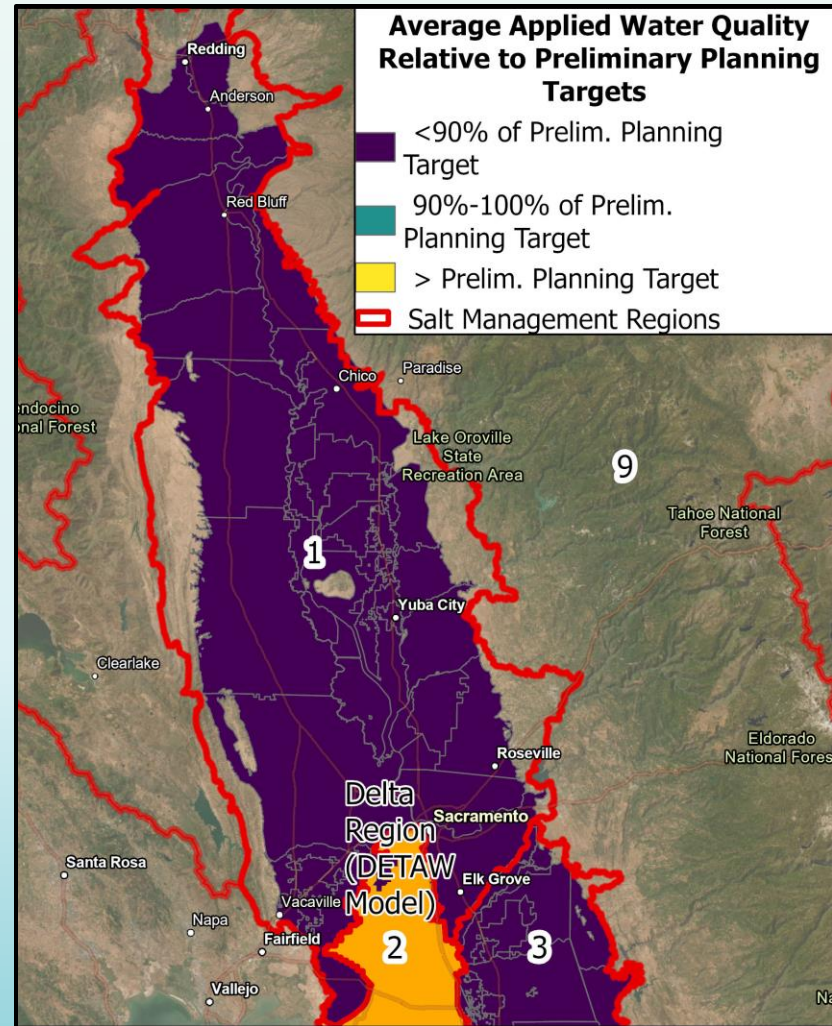
- | | | |
|-----------------------------|-----------------|----------------------|
| Irrigated Agriculture | Food Processors | Rice |
| Dairy Cropland and Feedlots | NPDES | Wineries |
| Wetlands | Non15 | Municipal Stormwater |

TOTAL ESTIMATED SALT LOAD TO SURFACE WATER

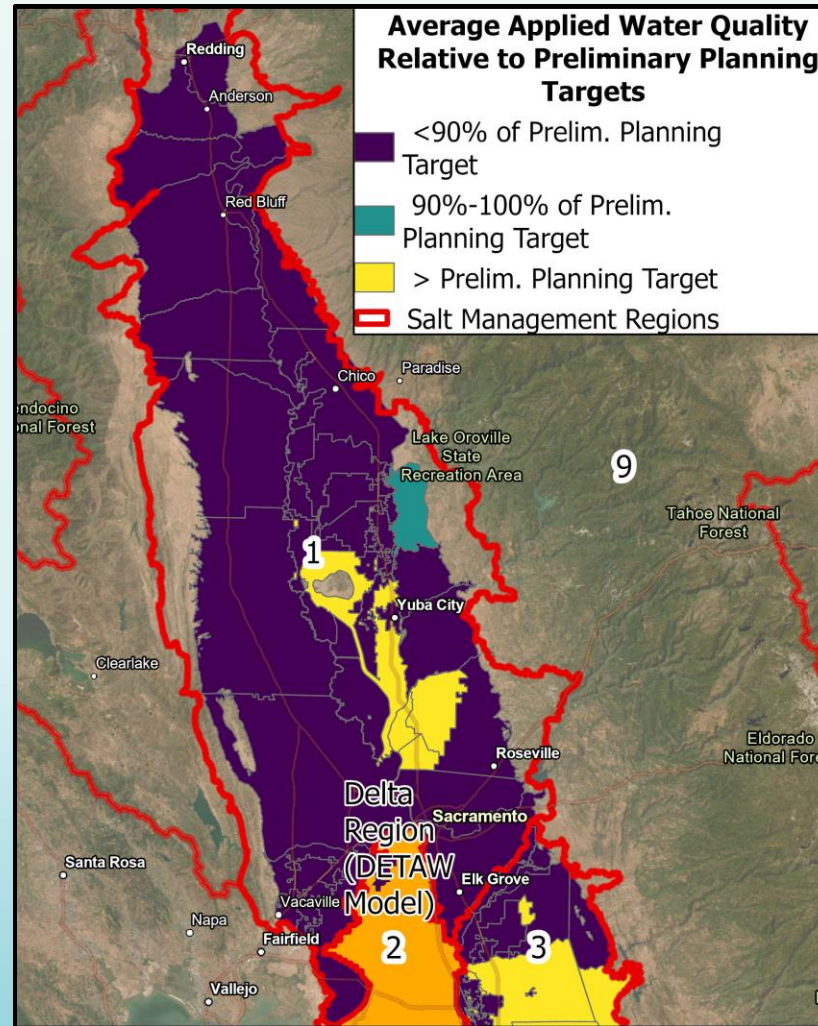


PRELIMINARY “HEAT MAPS” – CENTRAL VALLEY SCALE PROBLEM IDENTIFICATION – “HEAT MAP” - [EXAMPLE ONLY]

Current



In 50 Years



In 100 Years

