



# **FINAL DRAFT AMENDED KERN COUNTY SUBBASIN GROUNDWATER SUSTAINABILITY PLAN**

**AUGUST 2024**

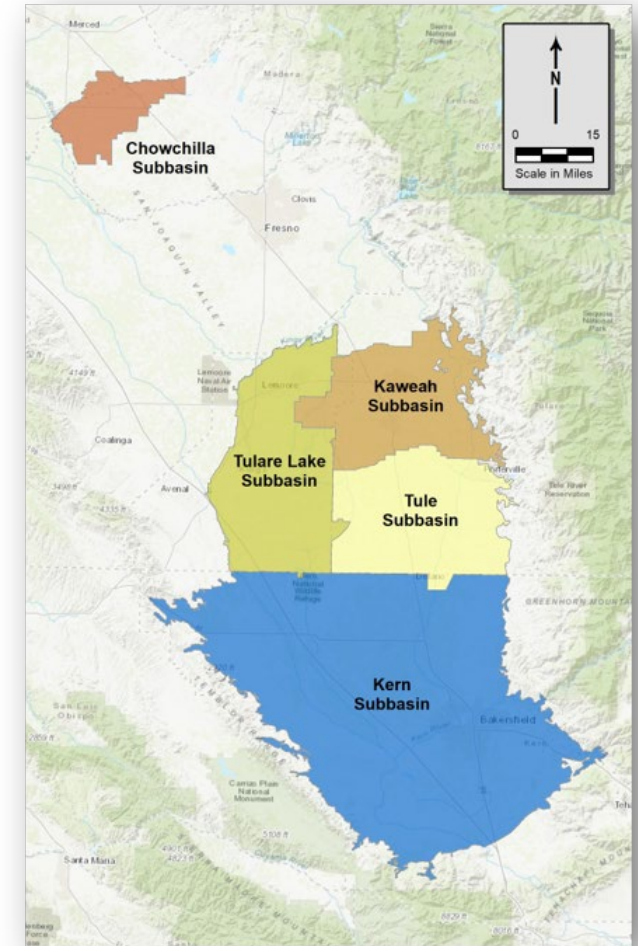
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# OVERVIEW

- Basin overview
- 2024 Amended Subbasin Plan (2024 Plan) Overview
- Response to SWRCB Draft Staff Report

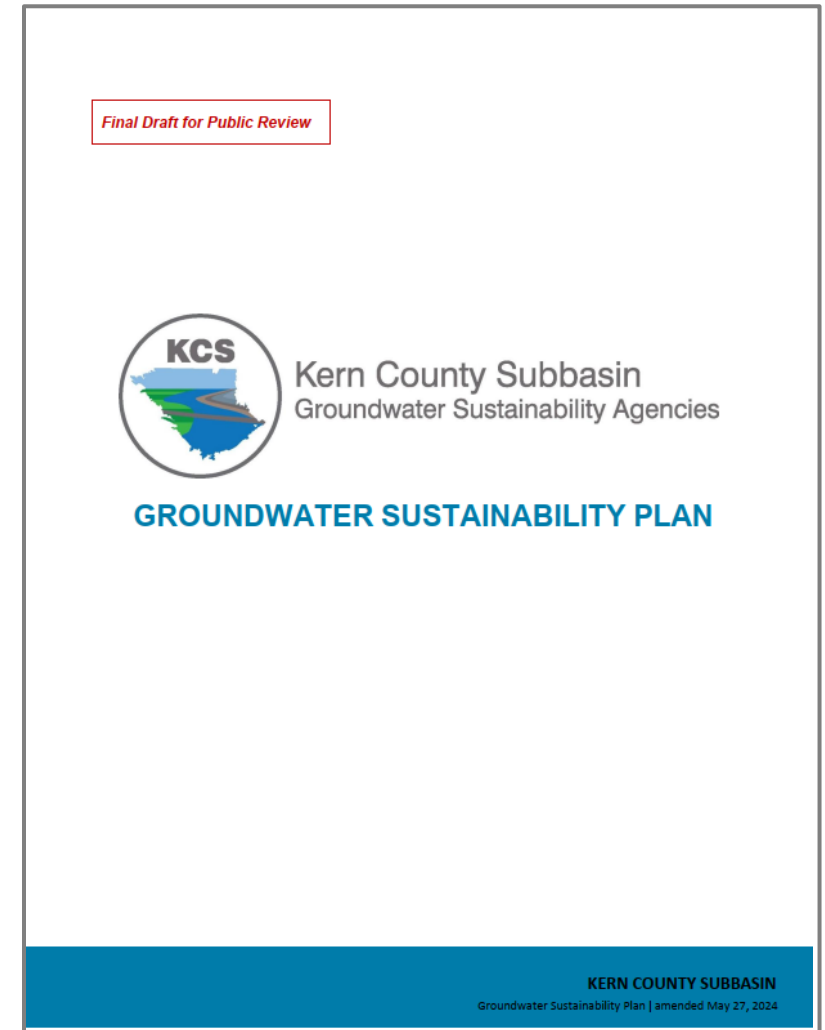
# SUBBASIN PERSPECTIVE

- 1.782 million acres – **the largest Subbasin in the State**
- Subbasin is hydro-geologically complex
- Based on acreage, the following could fit within the Kern County Subbasin:
  - 40 of the 71 approved basins across California, or
  - 6 of the 9 of the approved basins in the Central Valley, or
  - 4 of the other Inadequate subbasins (Tule, Tulare Lake, Kaweah, and Chowchilla) combined
- Over 25 water agencies represented



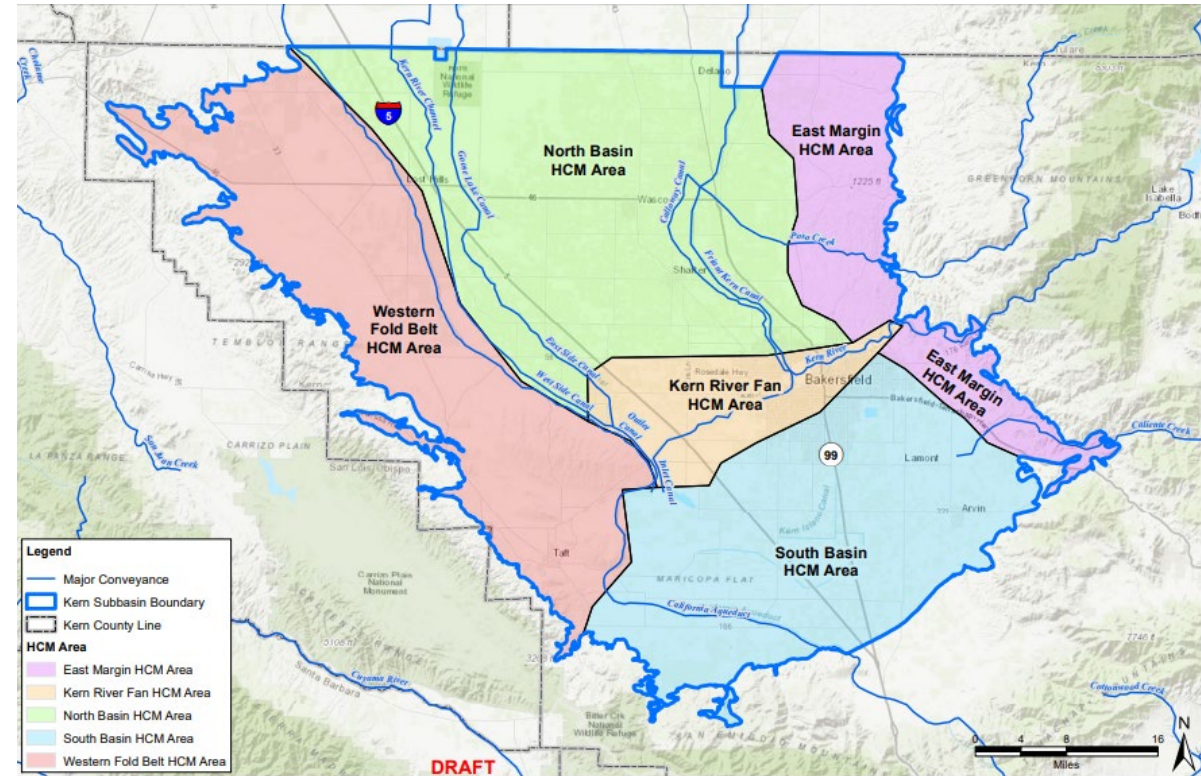
# FINAL DRAFT AMENDED 2024 SUBBASIN PLAN

- ✓ Coordinated development by experts and principals from 7 of the top groundwater consulting firms in the State.
- ✓ Significantly improved coordination across the Subbasin, the largest in the State.
- ✓ Consistent data and technically sound methodologies across the Subbasin.
- ✓ Revised sustainable management criteria, including undesirable results, to be more protective.
- ✓ Coordinated Projects and Management Actions to achieving the Sustainability Goal.
- ✓ Funding an operational well mitigation program by 2025.




# 2024 PLAN: GUIDING PRINCIPLES

- Commitment to Subbasin Sustainability and Coordination
- Address DWR Deficiencies
- Protect Beneficial Uses and Users
- Prioritize Demand Management
- Recognize Hydrogeologic Conceptual Model (HCM) Areas



# EXTENSIVE STAKEHOLDER OUTREACH



**Wells:** Kern County Environmental Health & Division of Drinking Water



**Well Monitoring & Mitigation:** Kern Water Collaborative & Self-Help Enterprises



**Subsidence:** Friant Water Authority & California Aqueduct Subsidence Program



**SDACs:** GSAs & GSA group committees with CSD representation



**Direct outreach:** landowner meetings



**Inter-basin Coordination:** White Wolf, Tule, Tulare Lake

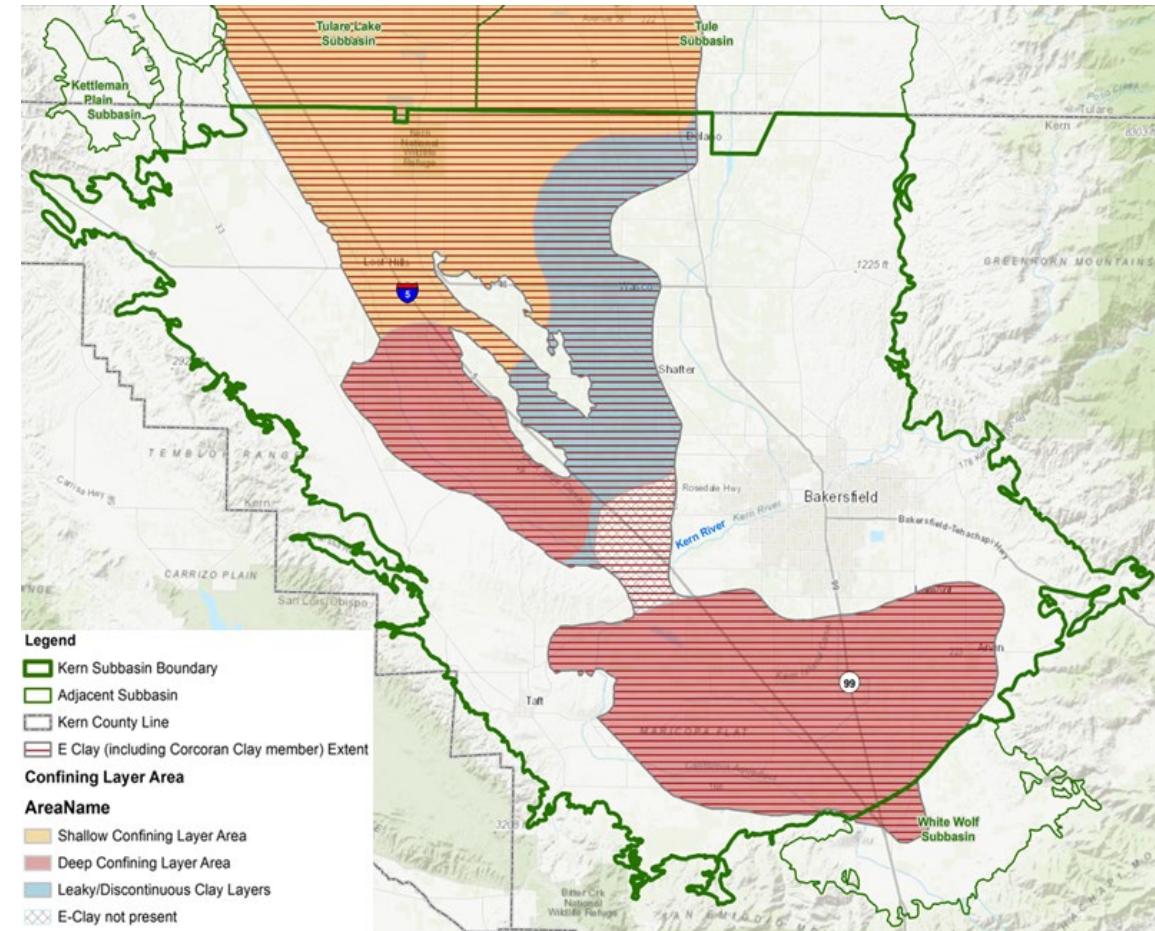


Scan me for draft 2024 GSPs

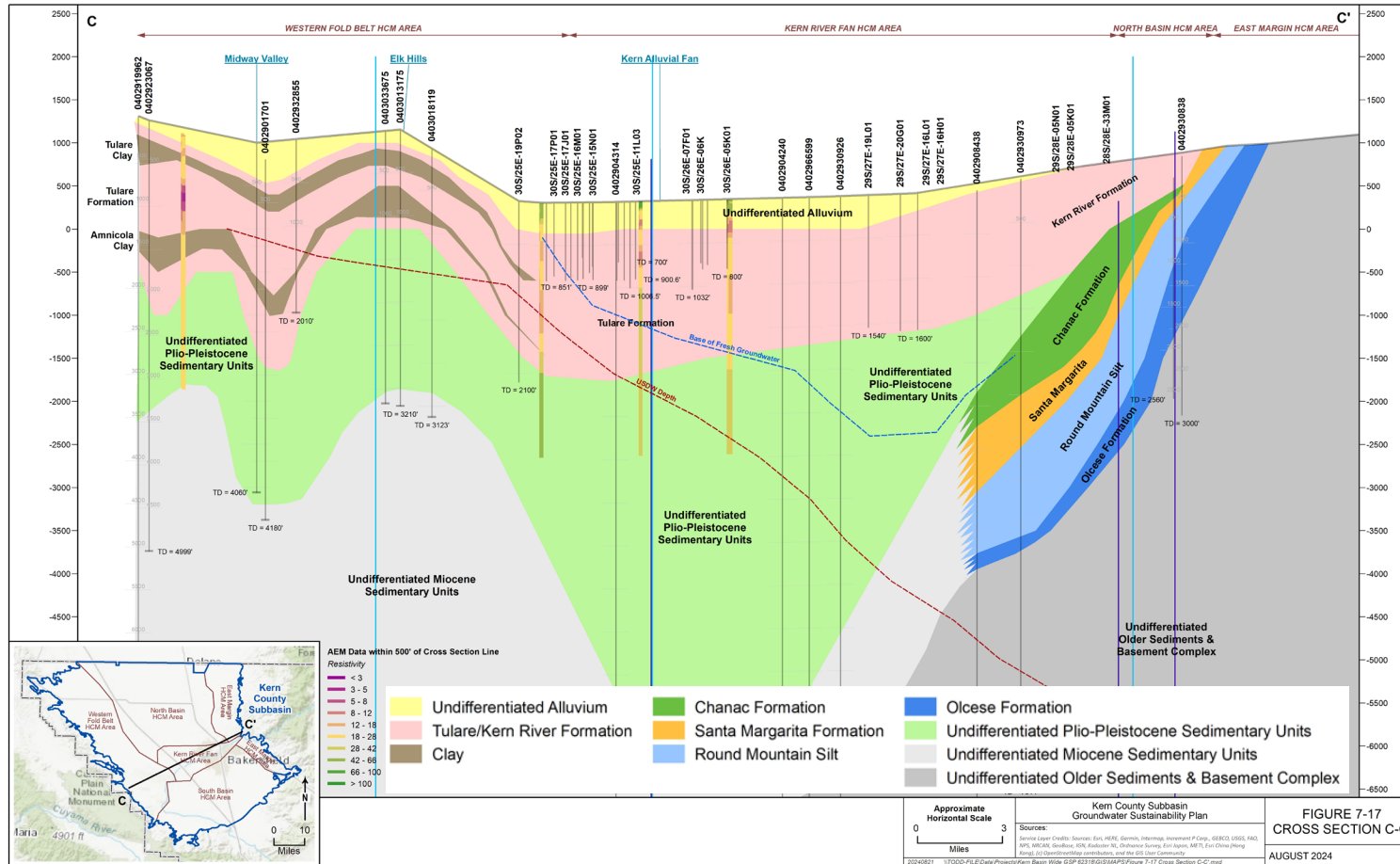


# BASIN HYDROGEOLOGIC CONCEPTUAL MODEL

- § 35 I. (aa) **“Principal aquifers”** refer to aquifers or **aquifer systems** that store, transmit, and yield significant or economic quantities of groundwater to wells, springs, or surface water systems.
- “Because of the heterogeneous character of most unconsolidated alluvial deposits, confinement in them is commonly a matter of degree...where the Corcoran is thin or absent... there is direct hydraulic interaction.” – USGS Open File Report 63-47.
- The Corcoran Clay is only understood to be “competent” in around 10% of the Kern Subbasin, in areas with notably few groundwater beneficial users.
- The remainder of the Corcoran and other clay layers are deep, “leaky”, discontinuous and otherwise consistent with the definition of a single principal aquifer system.



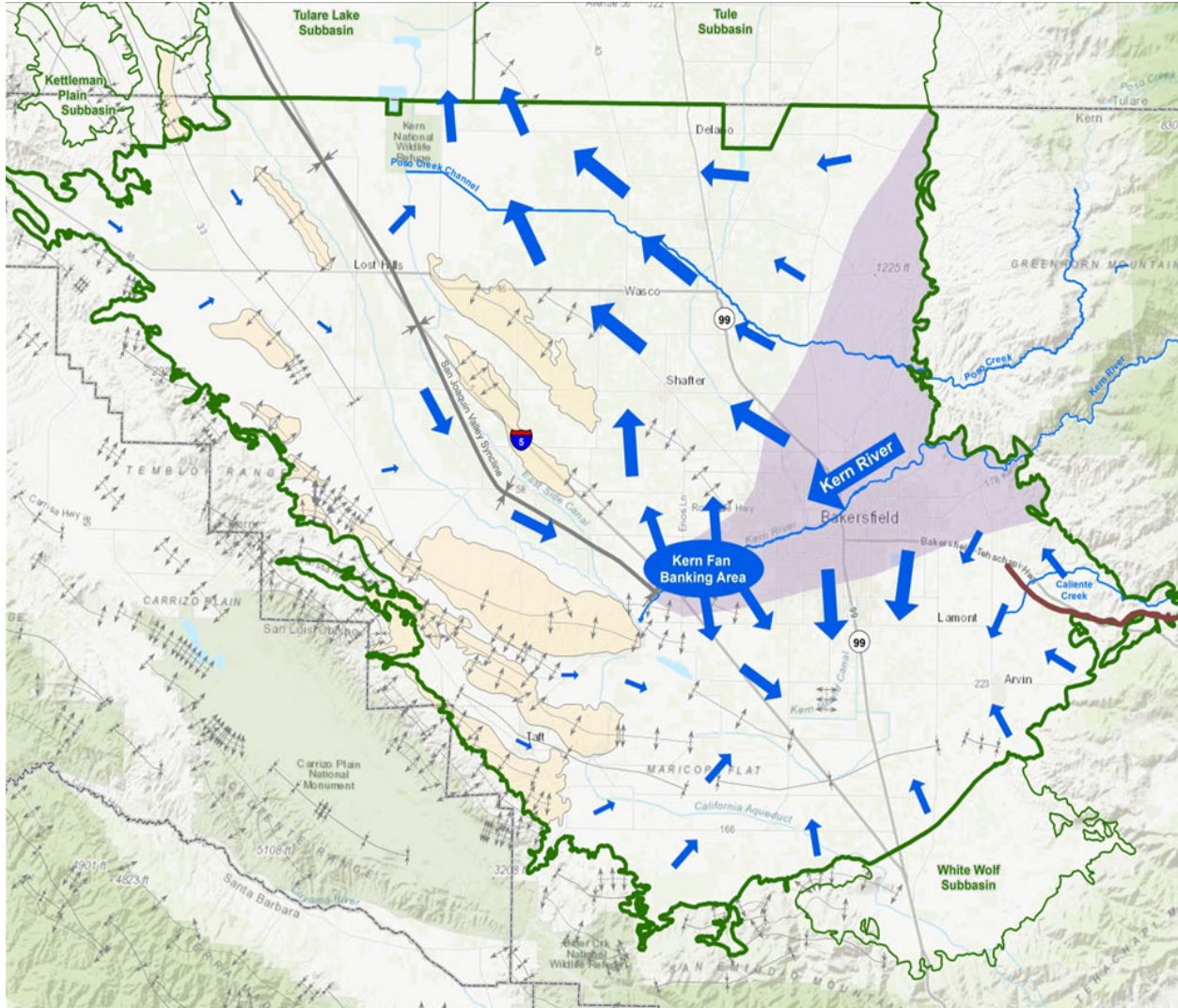
# UNDERSTANDING OF SUBBASIN GEOLOGY



- Complex geology present across Subbasin
  - Aquifer, discontinuous aquitards and clay layers
  - Geologic structures
  - Local and regional variations in water levels and quality
- Defined three principal aquifers
  - Primary Alluvial
  - Santa Margarita
  - Olcese



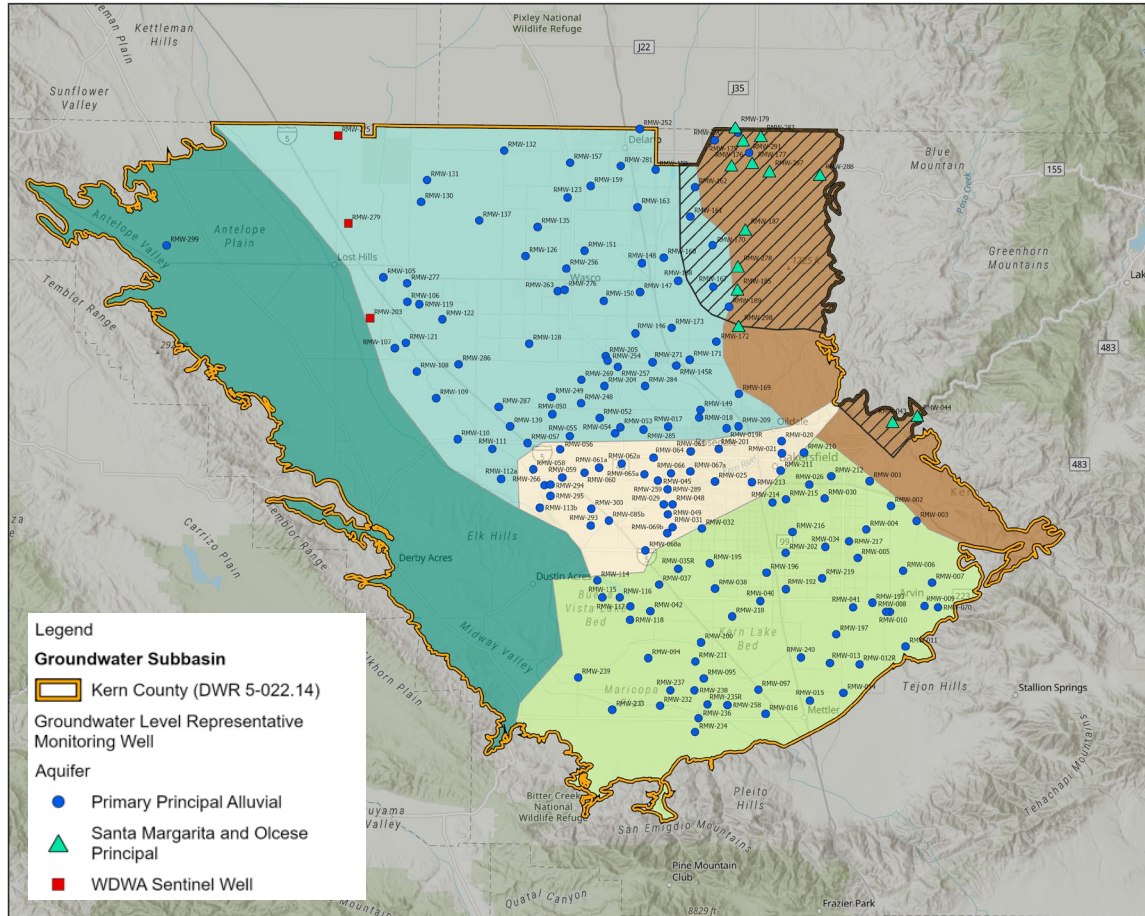
# UNDERSTANDING GROUNDWATER FLOW



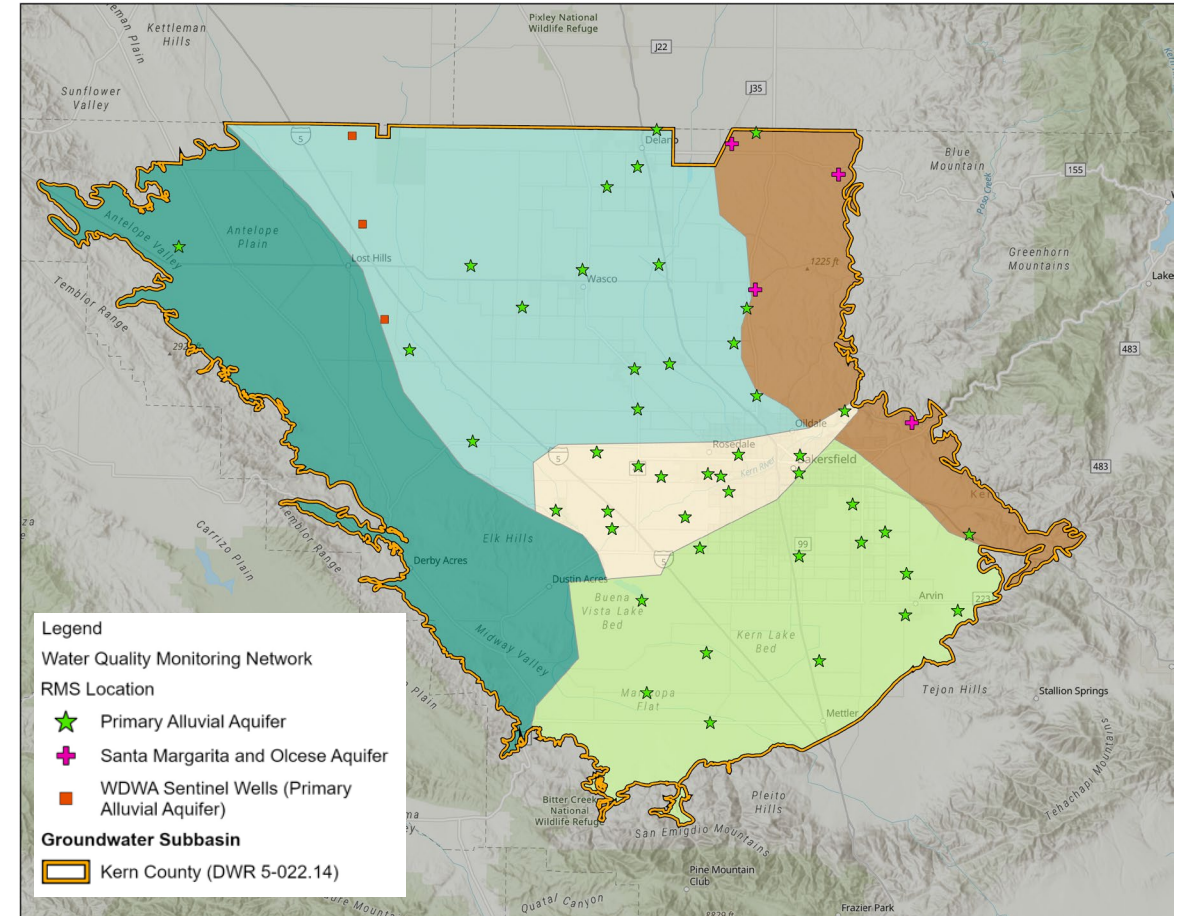
- Groundwater flow patterns reflect:
  - Recharge and outflow areas
  - Geologic features that influence groundwater flow
  - Hydraulically connected "unconfined" and "confined" areas
- Appropriateness of 2024 Plan Approach
  - Reflects local and regional flow patterns
  - Represents groundwater level variability
  - Consistent with decades of interpretation and modeling of the occurrence and flow of groundwater in the Subbasin



# REPRESENTATIVE MONITORING



- 194 RMWs to represent groundwater elevations



- 52 RMWs to represent groundwater quality (41 are also water level RMWs)

# PROTECTIVE SUSTAINABLE MANAGEMENT CRITERIA



## Chronic Lowering of GW Levels

- Revised SMCs definition
  - MOs changed by +11 feet on average
  - MTs changed by +21 ft on average
  - Reduced number of impacted domestic wells from 390 to 77 "most likely" impacted based on modeling scenario
- Subbasin-wide well impacts analyses
- MT Exceedance Policy



## Land Subsidence

- Revised SMCs definition
  - Site-specific SMCs established along Critical Infrastructure
  - SMCs established across the entire Subbasin, based on an average across the HCM Area.
- Subbasin-wide change in slope analysis along critical infrastructure
- MT Exceedance Policy



## Seawater Intrusion

*Does not apply to the Subbasin*



## Degraded Water Quality

- COCs: Arsenic, nitrate, nitrite, nitrate+nitrite, TDS, 1,2,3-TCP, uranium
- Revised SMCs definition
- Established semi-annual sampling
- Revised RMWs
- MT Exceedance Policy



## Reduction of GW Storage

- Using groundwater levels as proxy
- Calculated a range of total useable groundwater storage
- Specified a UR definition



## Depletions of Interconnected Surface Waters

- A few areas with potential ISWs connection is likely transient, short-lived, and involves shallow or perched groundwater that is not part of the principal aquifer systems, so therefore does not apply
- Will re-assess after full DWR guidance on ISWs is released

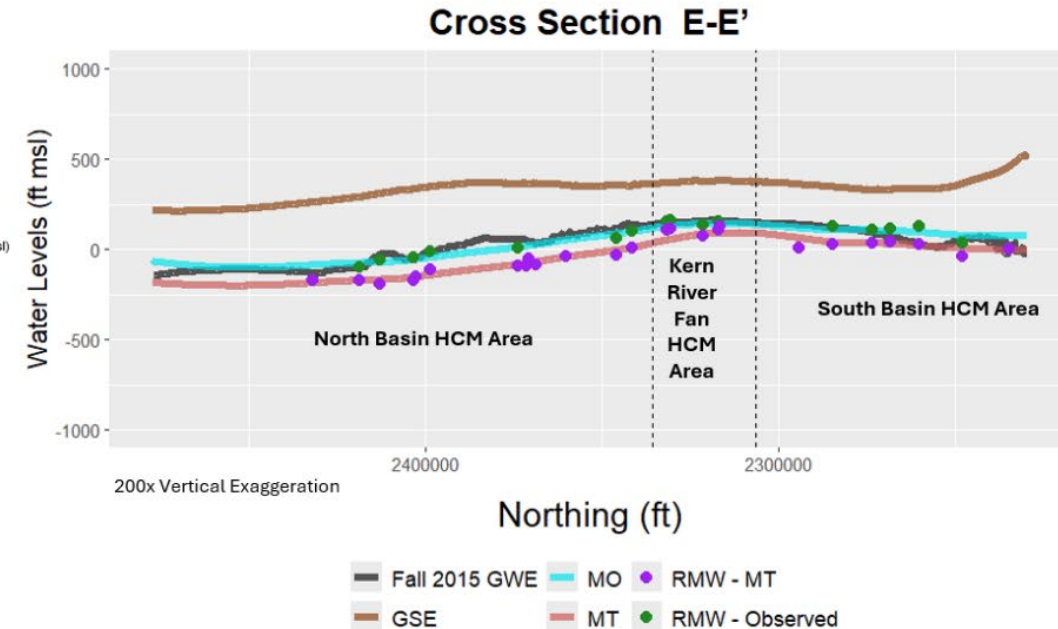
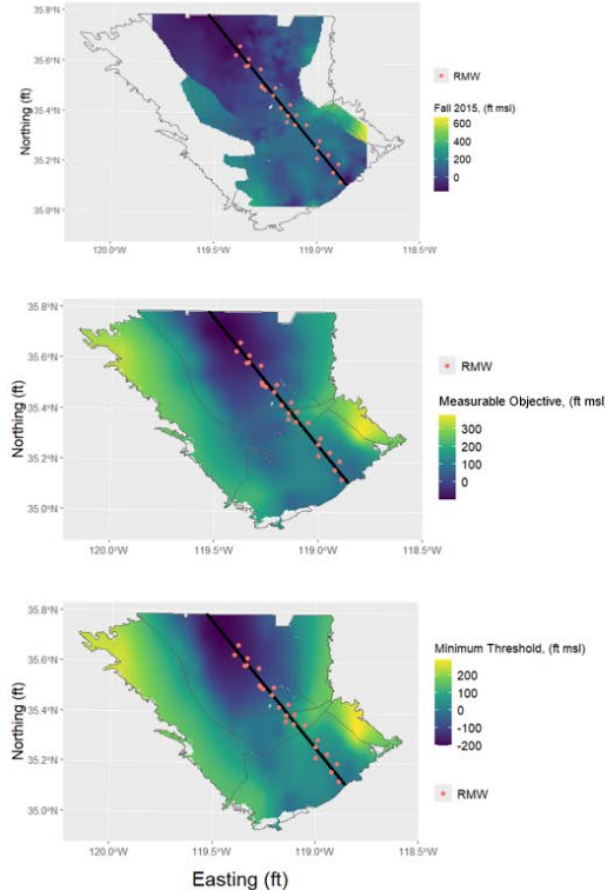
# GROUNDWATER LEVEL SMCs

- The GSAs defined Undesirable Results (URs) as 15 dewatered drinking water wells/year (cumulative max of 255 wells by 2040).
- Per § 354.26: (C) GSAs and the TWG then conceptualized numerous potential SMC methods including methods approved by DWR in neighboring subbasins.
- Based on technical analysis including well impacts, gradients, margin of operational flexibility, etc. the TWG assessed these potential SMC methods.
- Selected the SMC approach that best aligned with the SGMA regulations, addressed GSA & stakeholder concerns, could be applied Subbasin-wide, and avoided URs.



# GW LEVEL SMCs ARE REASONABLE & PROTECTIVE

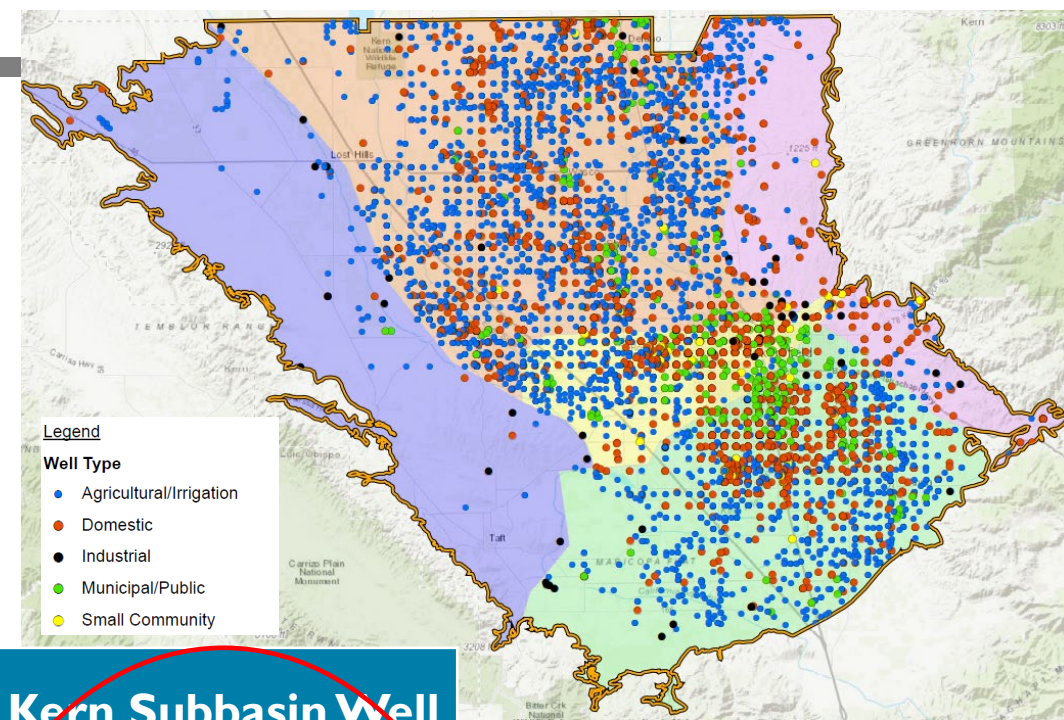
- Raised MTs an average of over 20 ft
- Protective of beneficial users and other sustainability indicators
- Developed consistent with GSP regulation and using common data and methodologies
- Mirrors approach approved by DWR in other basins
- Reflect HCM-specific groundwater conditions and trends
- Do not result in unreasonable gradients relative to current and historical water levels within and between basins





# BENEFICIAL USER INVENTORY

- 2024 Plan presents a detailed review of the water sources, supplies, and relationships between GSAs and local public water suppliers
- Analysis in 2024 Plan informed by comprehensive Subbasin-wide Well Inventory / Beneficial users



User Type	OSWCR Database	USGS Dataset	Kern Subbasin Well Inventory*
Agricultural/Irrigation	4,443	1,286	4,290
Industrial	275	62	97
Municipal/Public	245	214	298
Small Community <sup>1</sup>	---	---	41
Domestic	2,397	2,222	2,501
Other/Unknown	3,677	145	---
<b>Total Wells</b>	<b>11,037</b>	<b>4,244</b>	<b>7,227</b>

\* As of May 3, 2024.

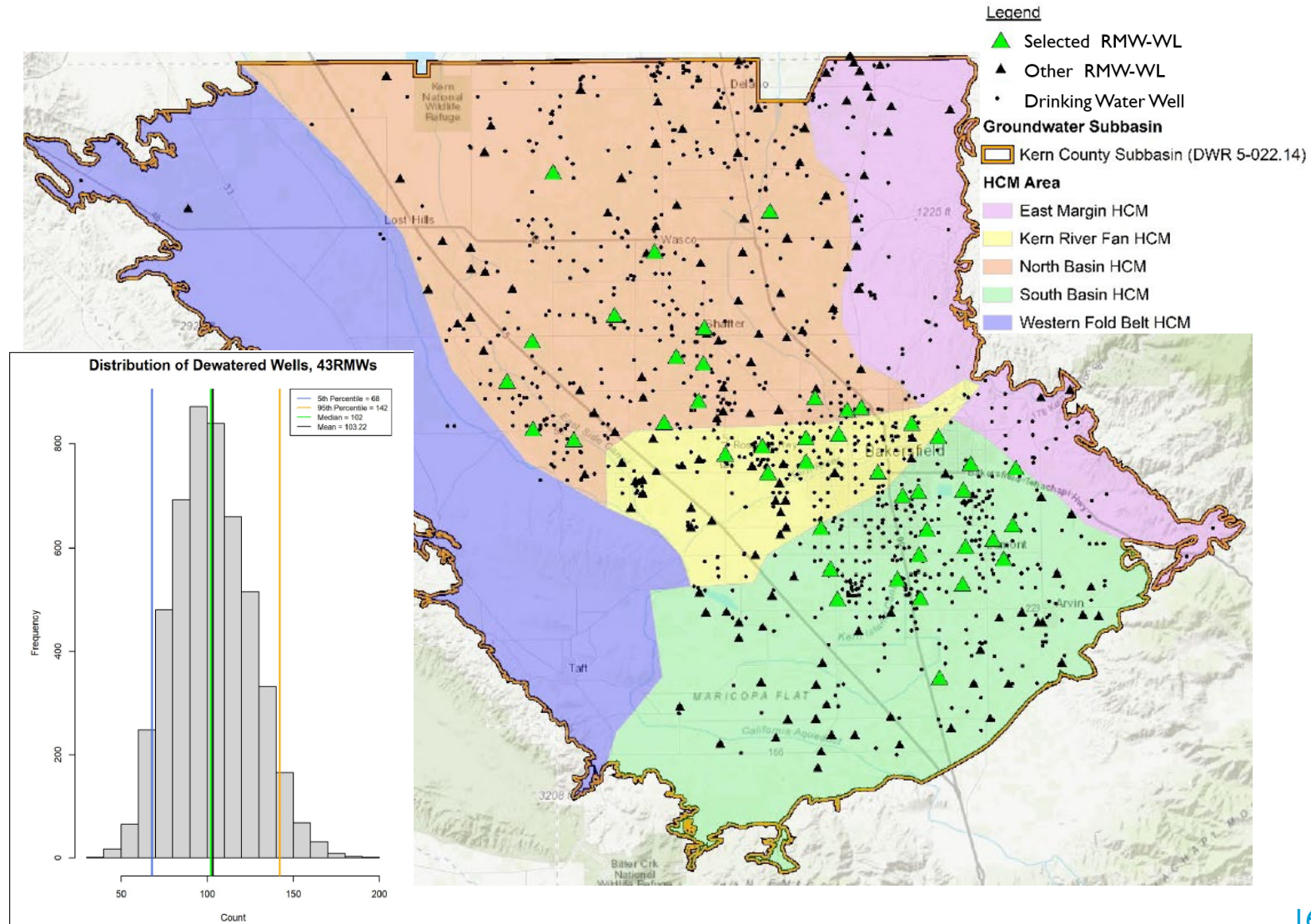
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# ANALYSIS OF DRINKING WATER WELL AND DEPLETION OF SUPPLY IMPACTS

1. Potential “**worst-case**” scenario: All RMWs exceed the MTs
2. **Bracketed** the potential impacts: Assume the 46 RMWs (25%) with the most and least nearby drinking water wells exceed the MTs
3. **Stochastic prediction** of potential well impacts: Ran 5,000 realizations of potential RMW combinations exceeding MTs
4. **Most likely** condition: Used Basin Groundwater Model to estimate well impacts under 2030 climate change conditions (shows which RMWs are most likely to exceed MTs and the associated well impacts)

# NO SIGNIFICANT AND UNREASONABLE IMPACTS ARE PROJECTED TO OCCUR

- Under a random selection (5,000 iterations) where 25% of the RMWs were to reach their MTs, an estimated **103** drinking water wells, or 2% of the urban water supply, would be impacted.

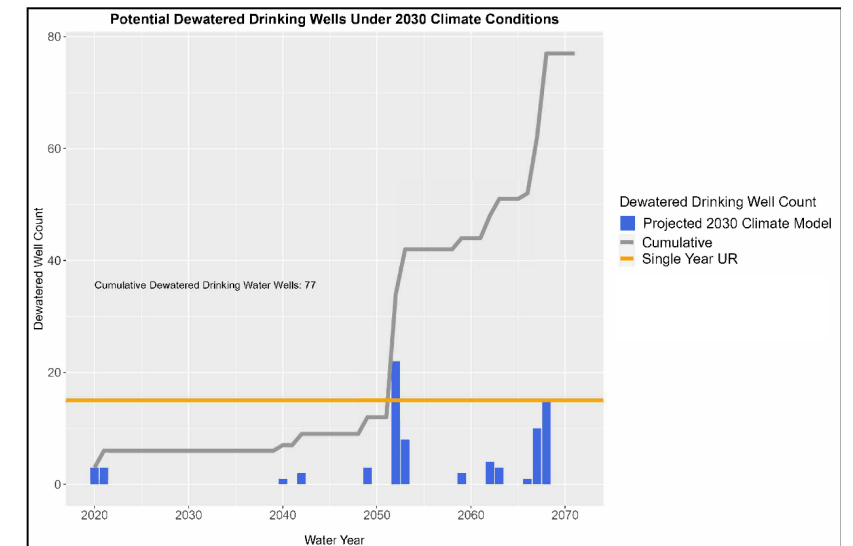
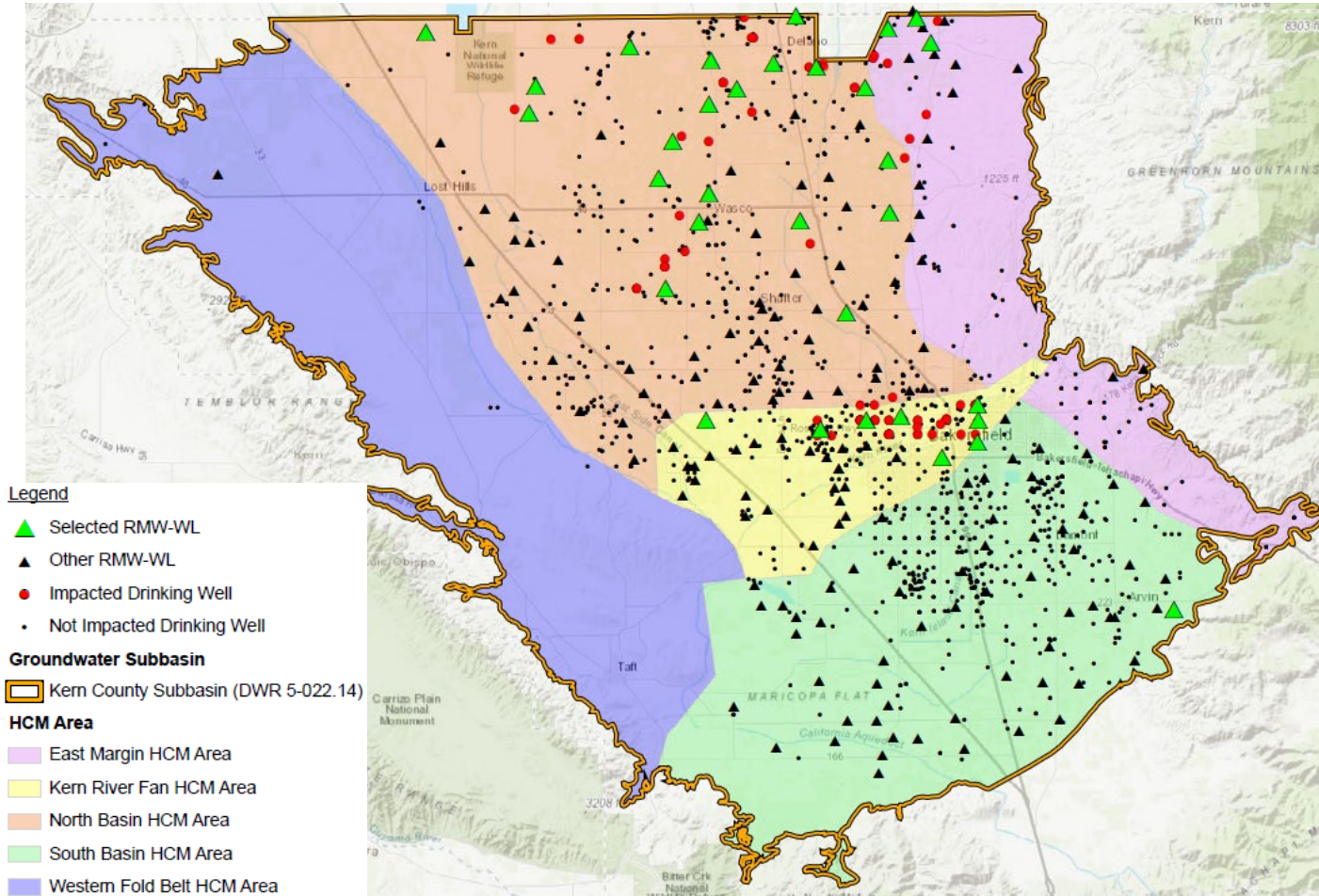


\* Impacts assessed on May 3, 2024 well inventory.



# NO SIGNIFICANT AND UNREASONABLE IMPACTS ARE PROJECTED TO OCCUR

- Projected modeled conditions suggest that between **13** and **77** drinking water wells, or less than 1.3% of the urban water supply, would be impacted.



\* Impacts assessed on May 3, 2024 well inventory.

# SUBBASIN MT EXCEEDANCE POLICY

- Establishes protocols and guidelines for GSAs to investigate exceedance of MTs at RMWs following data collection identification of a MT Exceedance (*reported to GSAs through DMS*).
- Each GSA is responsible for: *monitoring GW conditions, complying with Subbasin Plan requirements, coordinating with other agencies, entities, and beneficial users within their boundaries*
  - Requires GSAs to report MT Exceedances in Annual Reports
  - Reaffirms data collection protocols and policies
- Steps for identification, investigation, and involvement of the Subbasin Coordination Committee to consider actions to prevent continued exceedance.



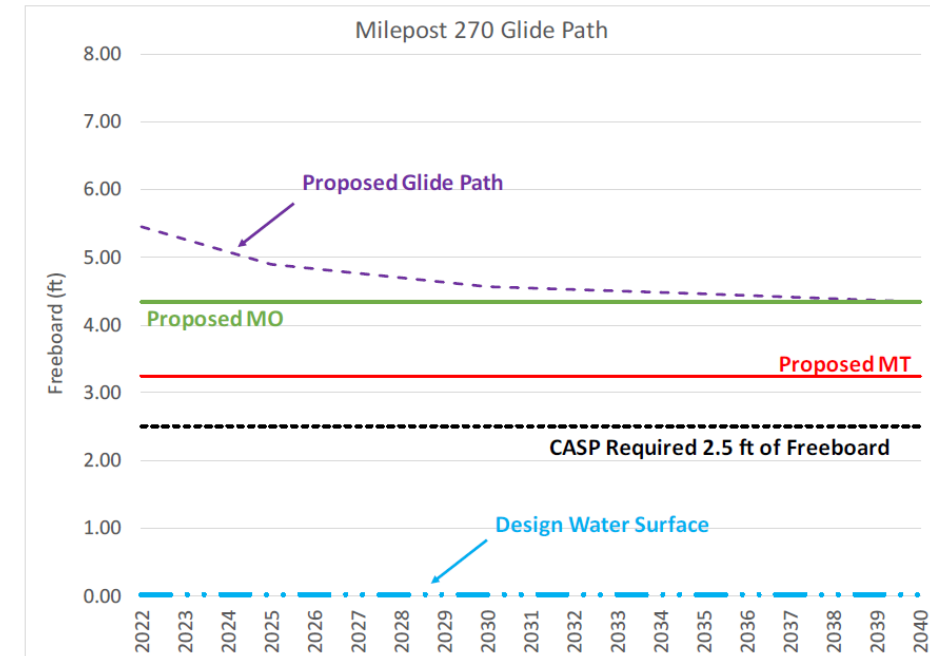
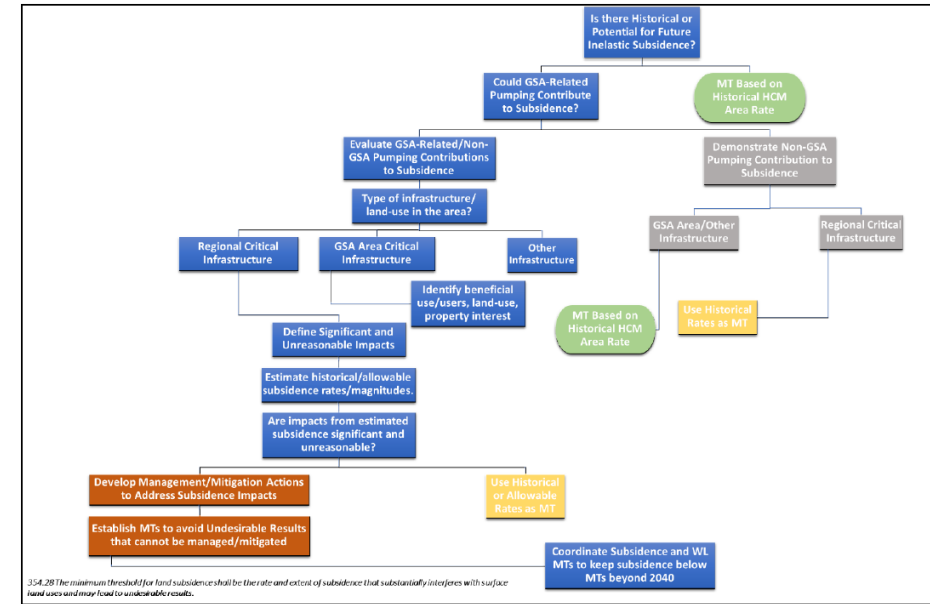
# SUBBASIN DOMESTIC WELL MITIGATION PROGRAM

- Subbasin initiated contract negotiations with **Self-Help Enterprises** for implementation of a *Subbasin-wide Domestic Well Mitigation Program* and **Kern Water Collaborative** for water quality
  - Implementation by January 2025



# SUBSIDENCE

- Subsidence in the Kern Subbasin is driven by multiple factors: groundwater pumping, O&G activities, subsidence outside the Kern subbasin, and natural geologic/seismic/geotechnical factors.
- 2024 Plan uses a regional coordinated risk-based approach for development of SMCs and URs.
- Protective of significant and undesirable impacts on regional and GSA-specific infrastructure and includes GSA mitigation for the FKCs.
- Subsidence (driven by GSA-related activities) to be minimized by 2040 and groundwater levels stabilized by 2030.
- Approach supported by FWA and CASP.



# WATER QUALITY

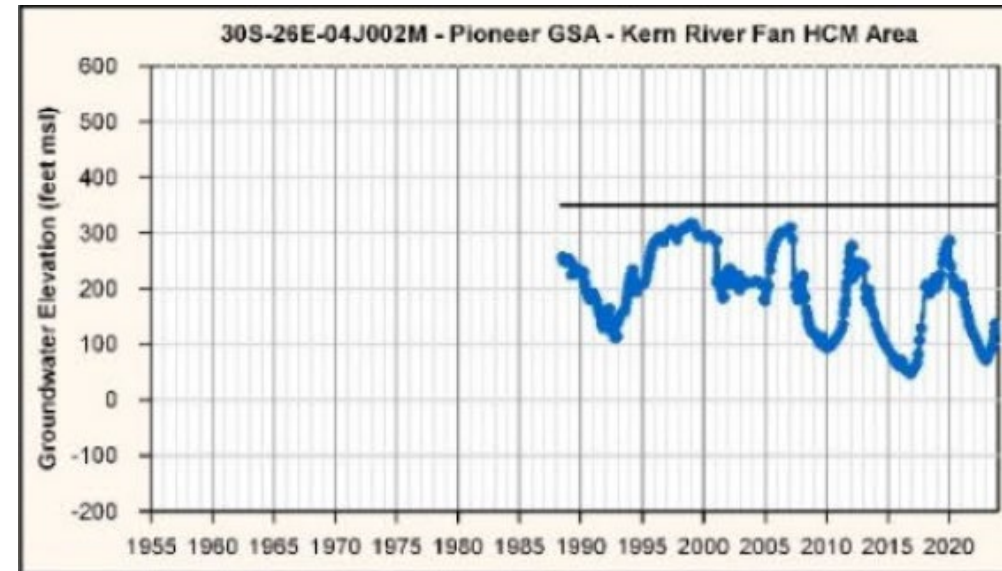
- Applied SWRCB recommended methodology to evaluate the Constituents of Concern (COCs).
- 6 COCs will be monitored semi-annually
  - Of the 54 wells, 18 are public supply wells and 8 used to represent ILRP first encounter groundwater conditions.
  - Samples collected within 2 weeks of water level measurements for a clear correlation between water level and quality changes.
- Annual water quality reports will also include data collected for drinking water and ILRP compliance to cover the full list of SWRCB COCs.
- MT Exceedance Policy applies to water quality.
- Partnerships with Kern Water Collaborative and Self-Help Enterprises will be leveraged to ensure mitigation is consistent and comprehensive with other programs.

# INTERCONNECTED SURFACE WATER (ISW)

- 2024 Plan systematically evaluated ISWs based on the best available data in accordance with the GSP regulations (§ 354.16 (f)) and available DWR Guidance.
- Subbasin GSAs relied on existing ISW mapping including:
  - Natural Communities Commonly Associated with Groundwater (NCCAG) dataset
  - ICONS: Interconnected Surface Water in the Central Valley
- There are no Groundwater Dependent Ecosystems (GDEs) and undesirable results from ISWs are identified as not present and are not likely to occur.
- Subbasin GSAs plan to review and incorporate forthcoming DWR Guidance (when available) for inclusion in future periodic evaluations.

# WATER BANKING

- Banking projects are an essential recharge component in the Subbasin – many have been operating successfully for over 25 years.
- Banking projects conserve surplus surface water supplies in wet years to provide water supplies in dry years thereby reducing overdraft pumping.
- Banking projects only recover previously stored supplies after appropriate losses have been applied
- Banking projects have resulted in improved groundwater levels and quality and are a critical part of the sustainability of the Kern Subbasin and the State.

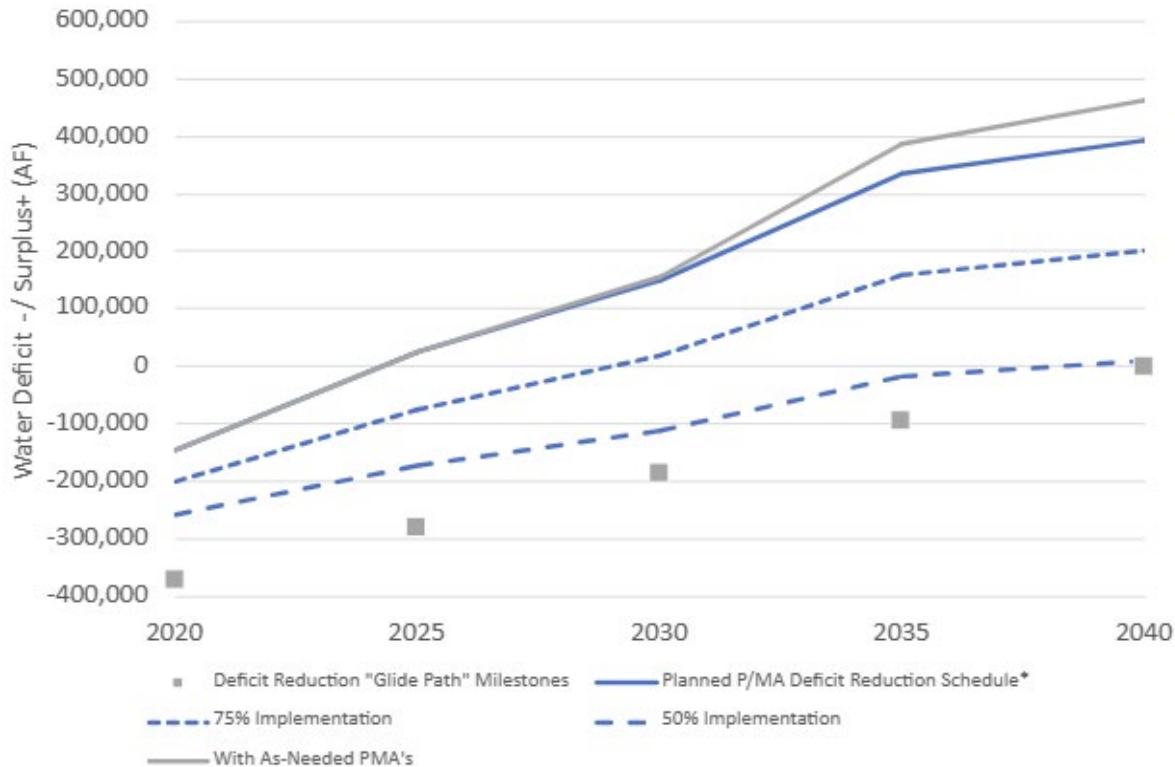




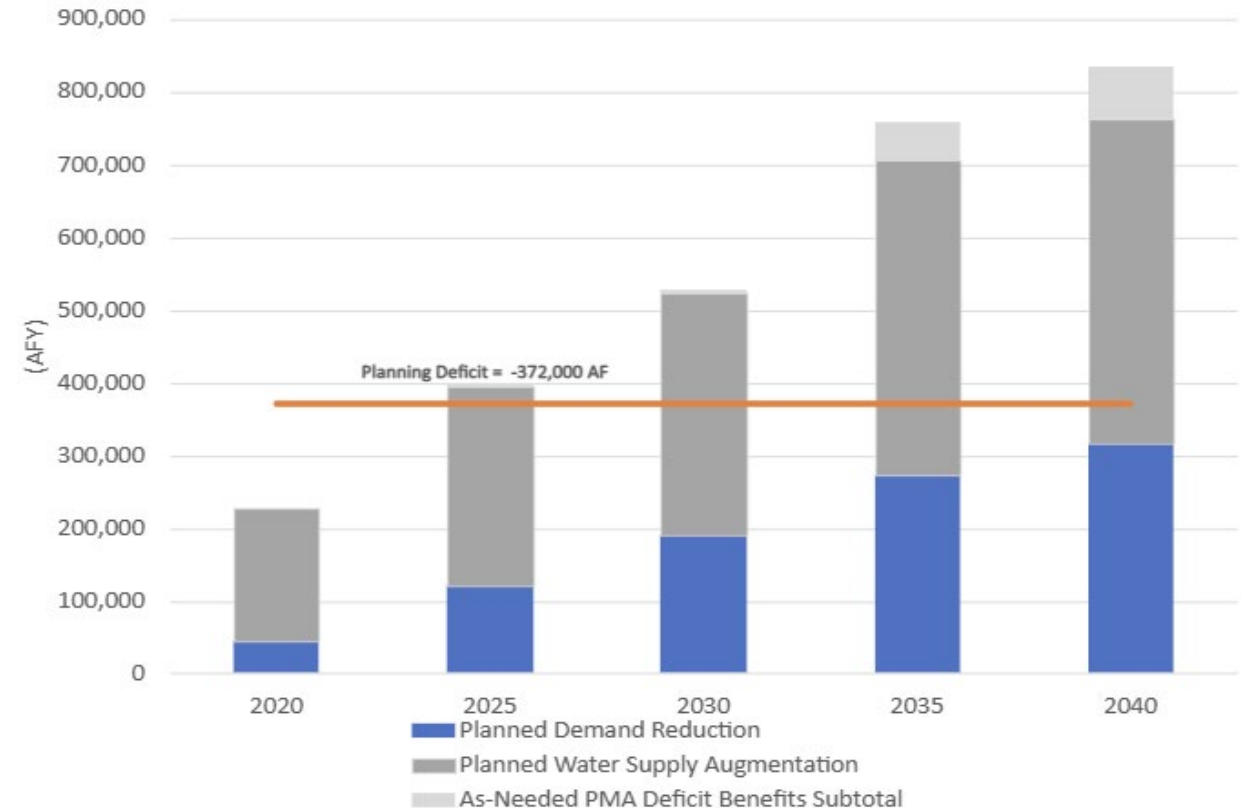
# PROJECTS & MANAGEMENT ACTIONS

- **130 P/MAs** with **~800,000 AFY** of projected benefit relative to **372,000 AFY** of projected deficit.
- **80%** of benefit achieved through Demand Management.

Kern County Subbasin Projected-Future Scenerio  
Deficit Reduction "Glide Path" 354.44 (b)(2)



Kern County Subbasin P/MA Benefits by Category 354.44 (b)(1)



# SOME CONCERNS WITH DRAFT STAFF REPORT

- ~200 pages focused on the 2020 and 2022 GSPs, with only 2 pages dedicated to a cursory review of 2024 Plan.
- The potential corrective actions identified have already been addressed in the 2024 Plan.
- Report identifies seven more deficiencies than DWR; all have been addressed in the 2024 Plan.
- Comments on the 2024 Plan were not previously raised by the SWRCB staff during ~20 hours of meetings; no supporting data or analysis are provided to justify conclusions.
- Prematurely recommends Subbasin for probation.

# CLOSING REMARKS

- The 2024 Plan was submitted to the SWRCB to review in May 2024 and is available for public review and comment.
- The 2024 Plan is SGMA compliant, addresses the DWR Corrective Actions, and incorporates the feedback provided by SWRCB staff.
- The Kern County Subbasin GSAs are committed to ongoing and coordinated SGMA implementation.
- The Subbasin GSAs welcome the opportunity to continue to coordinate with SWRCB with what we hope is a shared goal to have the Subbasin achieve sustainability and avoid probation.



# THANK YOU!



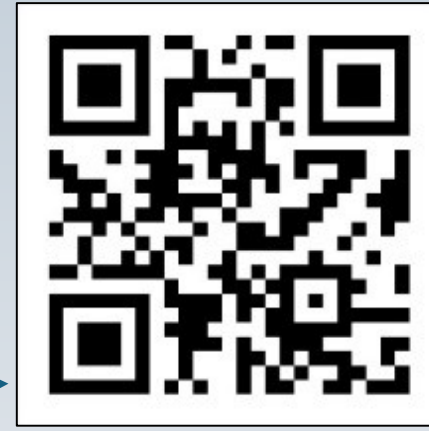
Coordinated  
Sustainable  
Groundwater  
Management



Scan me for draft 2024 GSPs



Gestión  
Sostenible  
Coordinada de  
las Aguas  
Subterráneas



Escanéame para ver los  
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