COLUSA SUBBASIN

Colusa Subbasin
Water Year 2024 Updates
Groundwater Conditions and Groundwater Sustainability Plan Implementation

May 20, 2025

Introductions

Davids Engineering

- Katie Klug, PhD
- Jeff Davids, PhD, PE

Colusa Subbasin Groundwater Sustainability Agencies (GSAs)

- Carol Thomas-Keefer, Program Manager
  Colusa Groundwater Authority (CGA)
- Lisa Hunter, Program Manager
  Glenn Groundwater Authority (GGA)

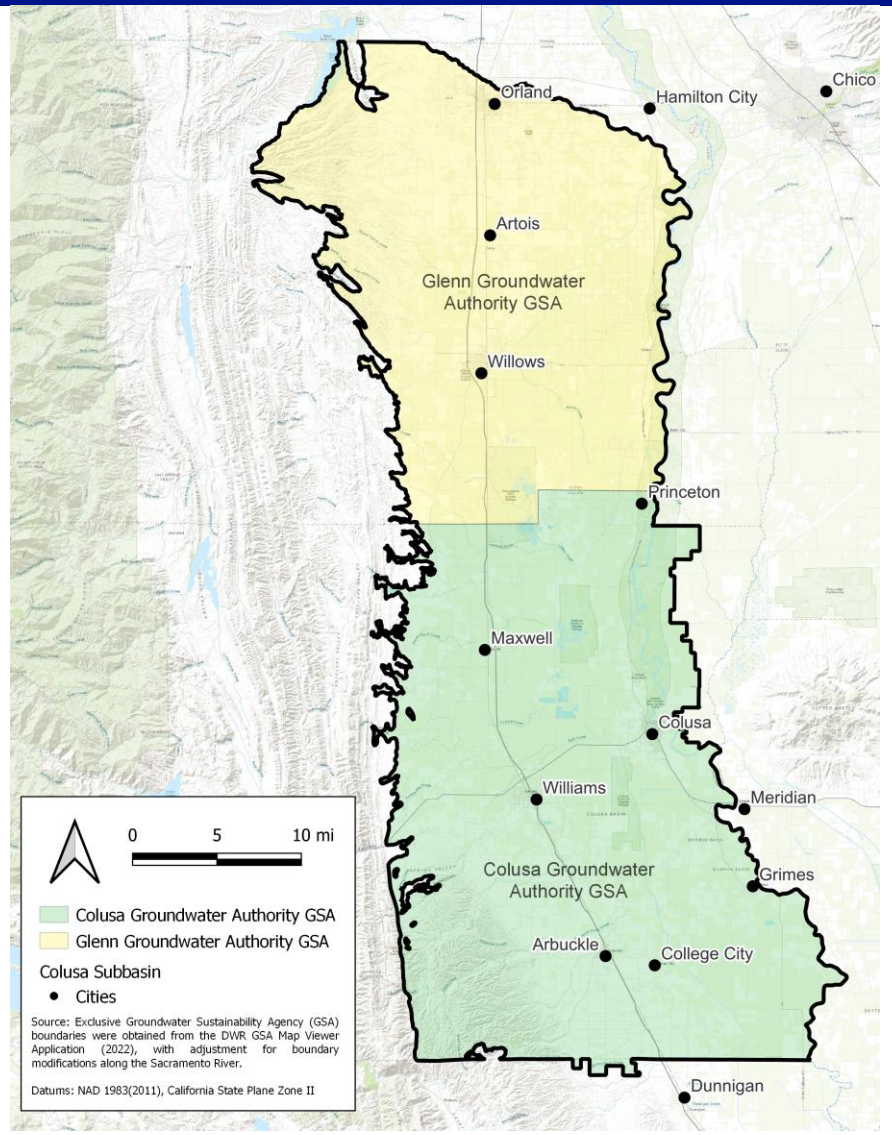
Agenda

1. Introduction
2. Groundwater Conditions in Water Year 2024
3. Groundwater Sustainability Plan Implementation Updates

Introduction

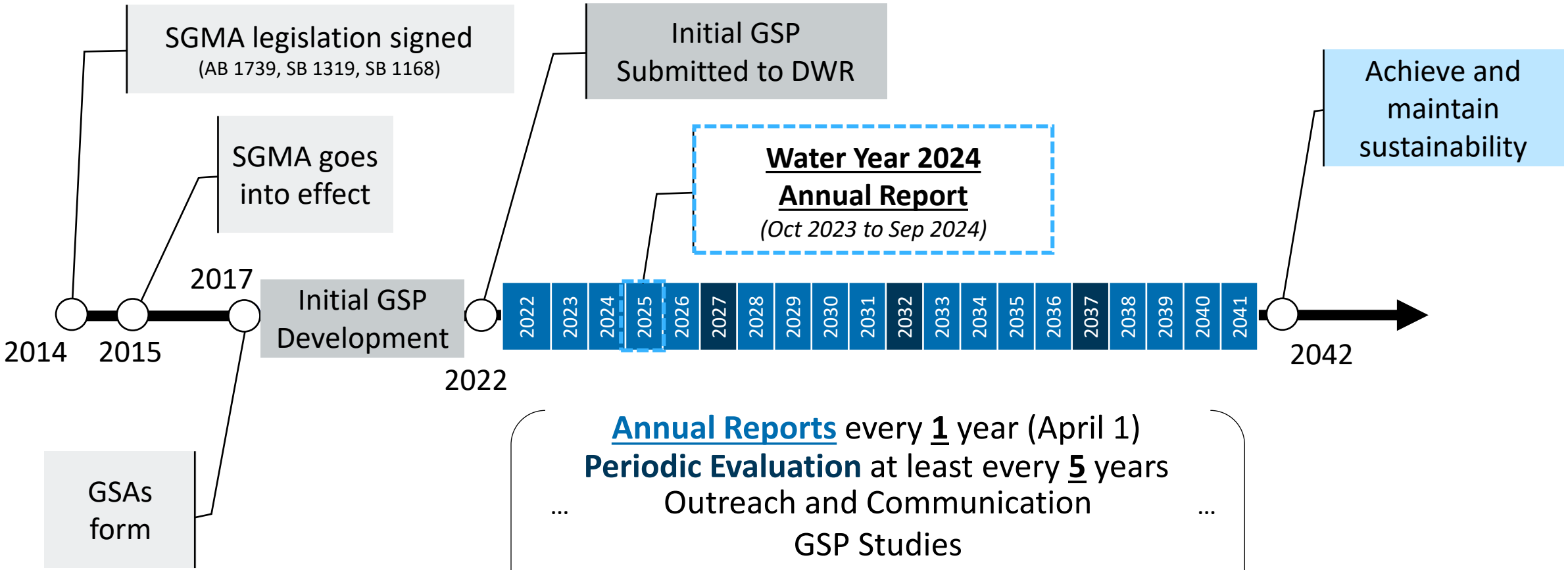
Colusa Subbasin Groundwater Sustainability Plan (GSP)

- The **GSP is a dynamic planning document** that is guiding how groundwater in the Colusa Subbasin will be monitored and managed through 2042.
  - GSP development timeline:
    - Initial GSP: 2016-2022
    - Revised GSP: 2023-2024
    - Approved by the State (DWR) in 2025
  - GSP implementation: 2022-2042
- As conditions change and data gaps are filled, the GSP will be updated.



SGMA Implementation Timeline

Abbreviations:
AB/SB – Assembly/Senate Bill
DWR – Department of Water Resources
GSA – Groundwater Sustainability Agency
GSP – Groundwater Sustainability Plan
SGMA – Sustainable Groundwater Management



Sustainable Groundwater Management Under SGMA

- Groundwater sustainability is managed and monitored relative to sustainable management criteria:
  - Measurable Objectives (MOs): Goal by 2042
  - Interim Milestones (IMs): Steps toward MOs
  - Minimum Thresholds (MTs): Undesirable conditions
- Sustainable management criteria were created for five sustainability indicators in the Colusa Subbasin.

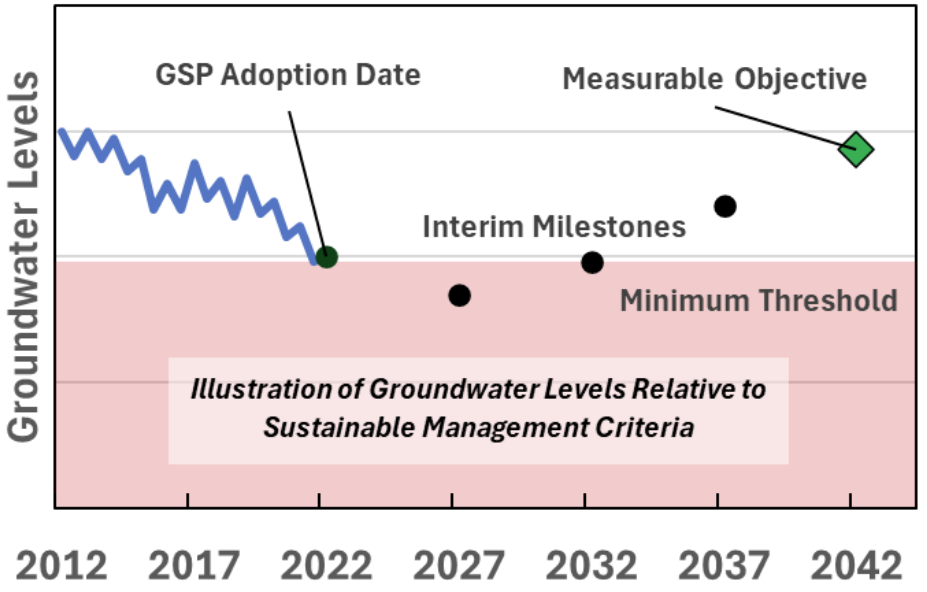


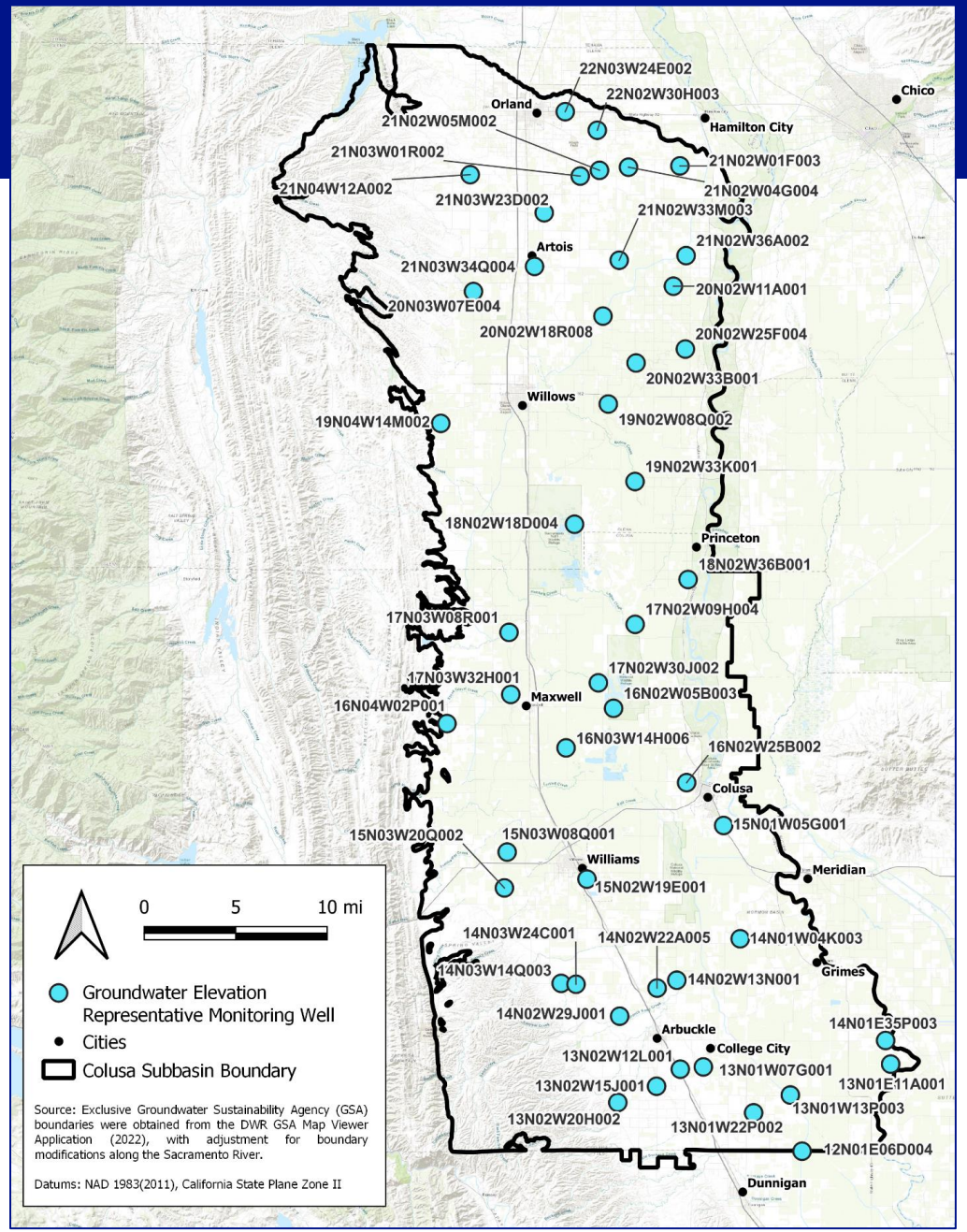
Illustration of Groundwater Levels Relative to Sustainable Management Criteria

Focus of this presentation

Groundwater Conditions in Water Year 2024
(Oct 2023 – Sept 2024)

Groundwater Conditions

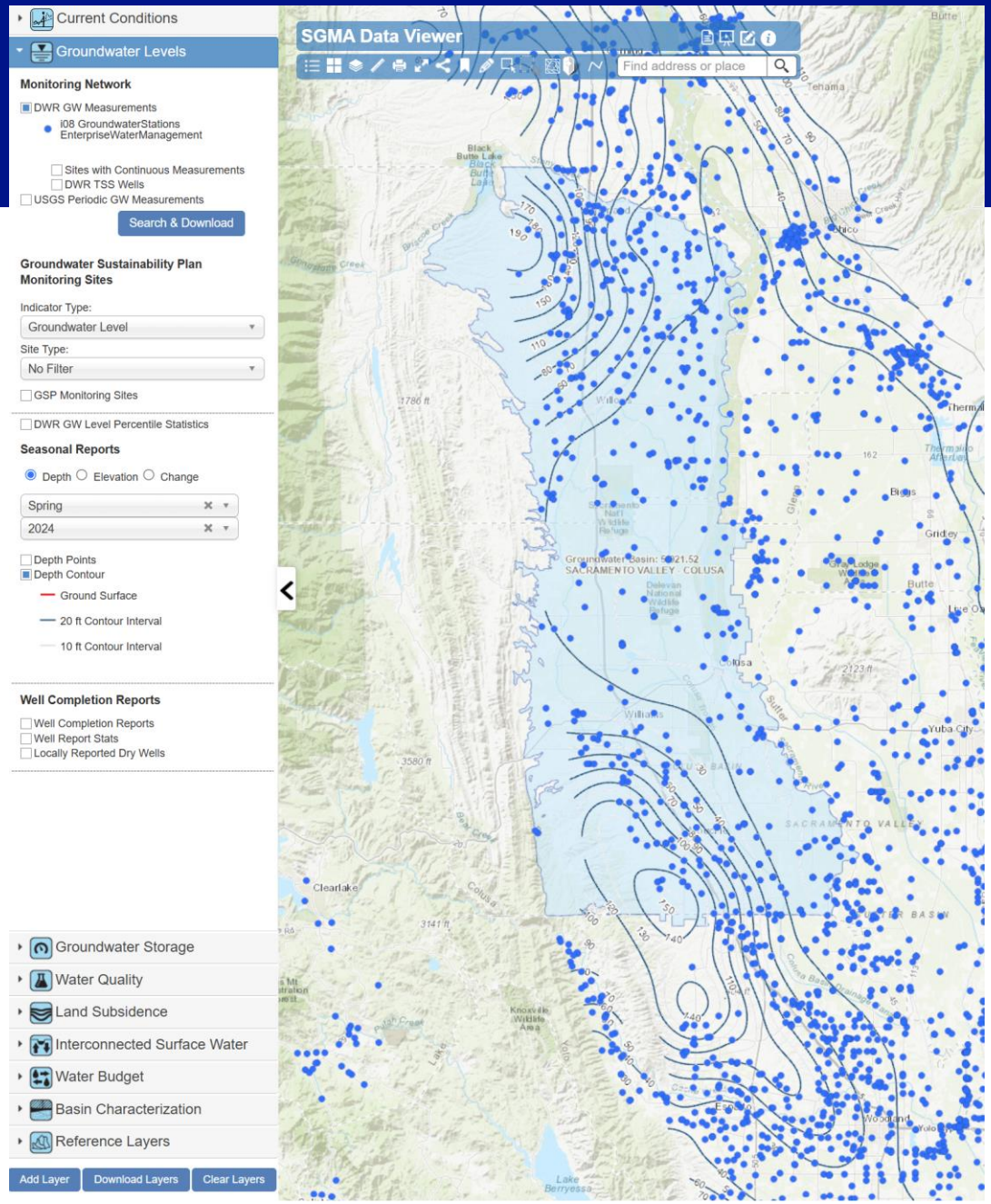
- Groundwater elevations (48 RMS* Wells)
- Groundwater storage change
- Land subsidence



*Representative Monitoring Sites

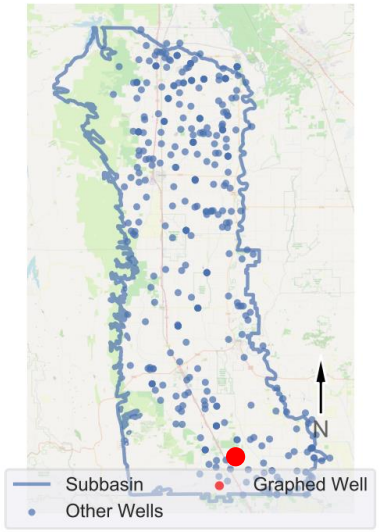
Groundwater Level Data

- DWR provides access to groundwater level data and other information on the **SGMA Data Viewer**: https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer
- Available information includes
  - Groundwater level measurements reported to DWR
  - USGS periodic groundwater measurements
  - GSP monitoring network sites
  - Seasonal reports of groundwater depth, elevation and change
  - Well completion report data
  - Locally reported dry wells



COLUSA Subbasin - State Well Number (SWN): 13N01W07G001M (Focus RMS Well)

Well Location Map



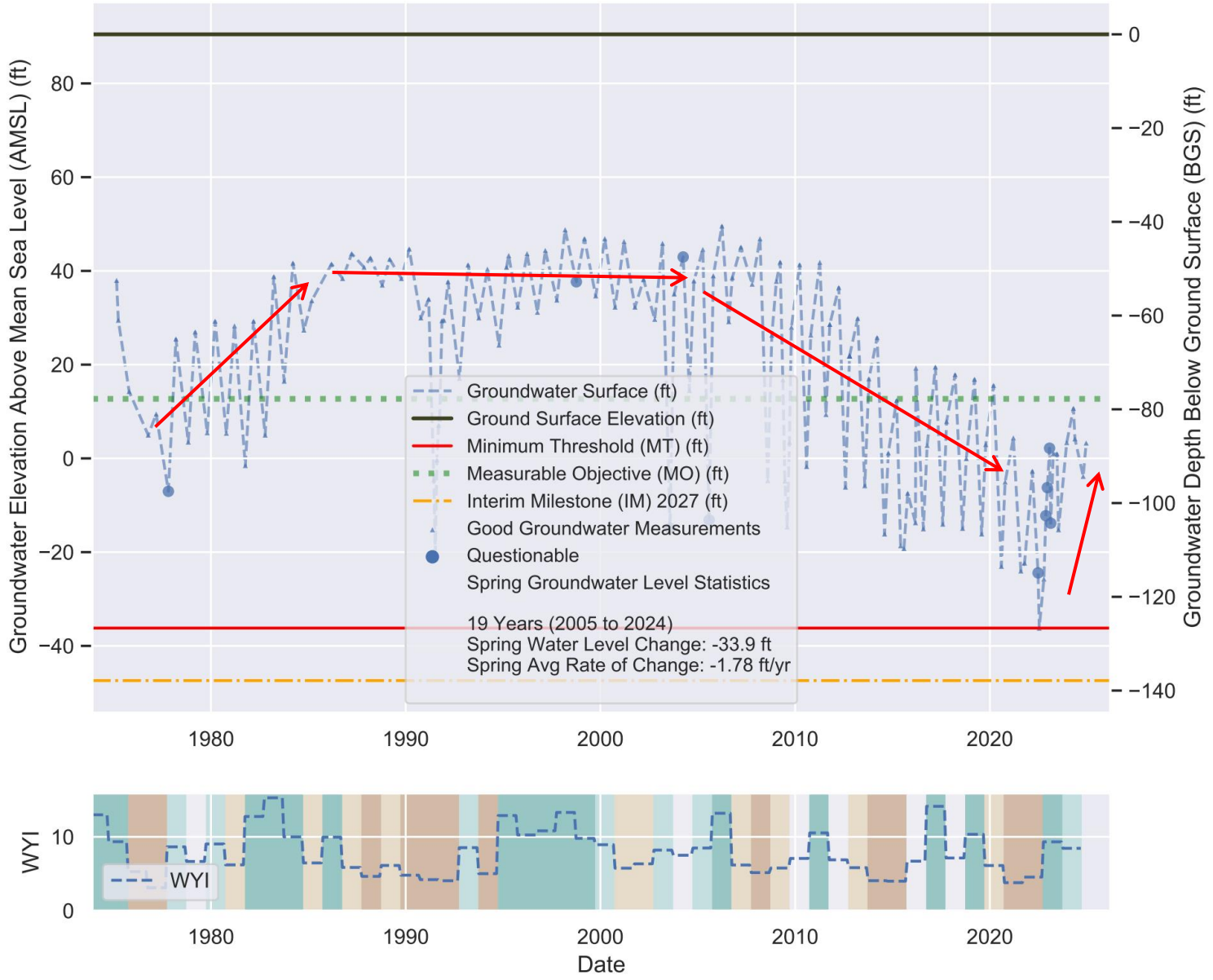
GSP Version: April 2024 Revised GSP
Sustainable Management Criteria:
IM (2027) = -47.4 ft AMSL
MO = 12.7 ft AMSL
MT = -36.2 ft AMSL

Minimum Threshold is the 2020-2022 low.

Sacramento Valley Water Year Index (WYI) shown on lower right. Meaning of colors defined below.

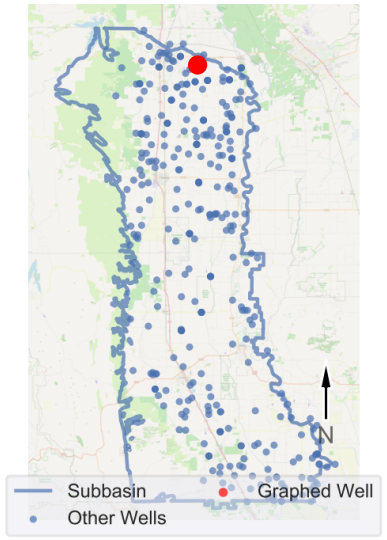
- Wet (W)
- Above Normal (AN)
- Below Normal (BN)
- Dry (D)
- Critical (C)

Perforation 1: 108.0 - 180.0 ft BGS



COLUSA Subbasin - State Well Number (SWN): 22N02W30H003M (Focus RMS Well)

Well Location Map



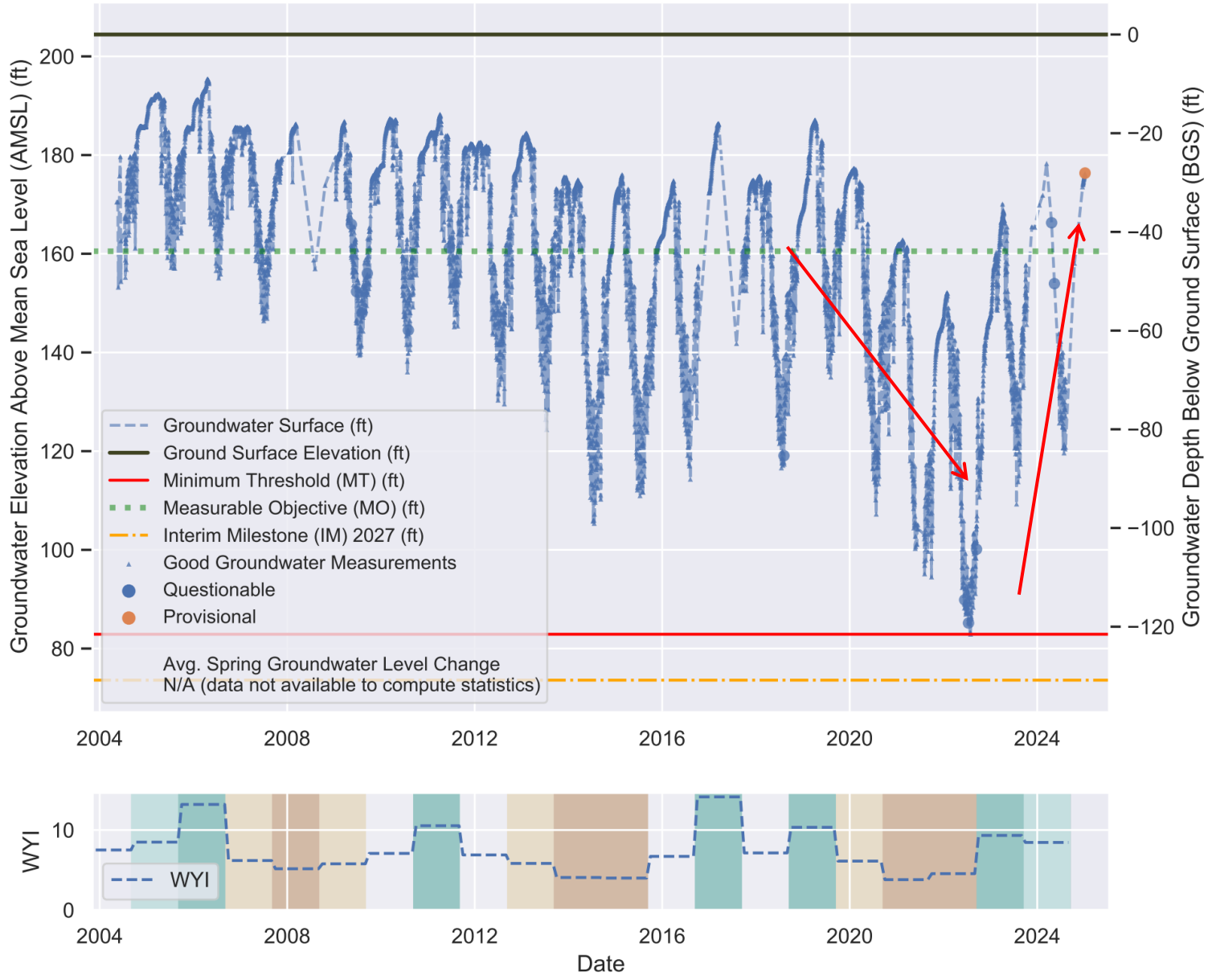
GSP Version: April 2024 Revised GSP
Sustainable Management Criteria:
IM (2027) = 73.6 ft AMSL
MO = 160.5 ft AMSL
MT = 82.9 ft AMSL

Minimum Threshold is the 2020-2022 low.

Sacramento Valley Water Year Index (WYI) shown on lower right. Meaning of colors defined below.

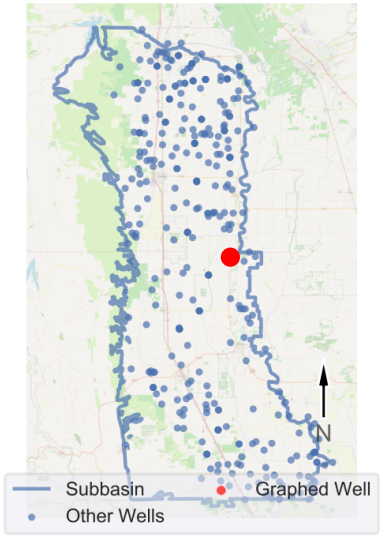
- Wet (W)
- Above Normal (AN)
- Below Normal (BN)
- Dry (D)
- Critical (C)

Perforation 1 (P1): 130.0 - 140.0; P2: 150.0 - 160.0; P3: 250.0 - 260.0 ft BGS



COLUSA Subbasin - State Well Number (SWN): 18N02W36B001M (Non-Focus RMS Well)

Well Location Map



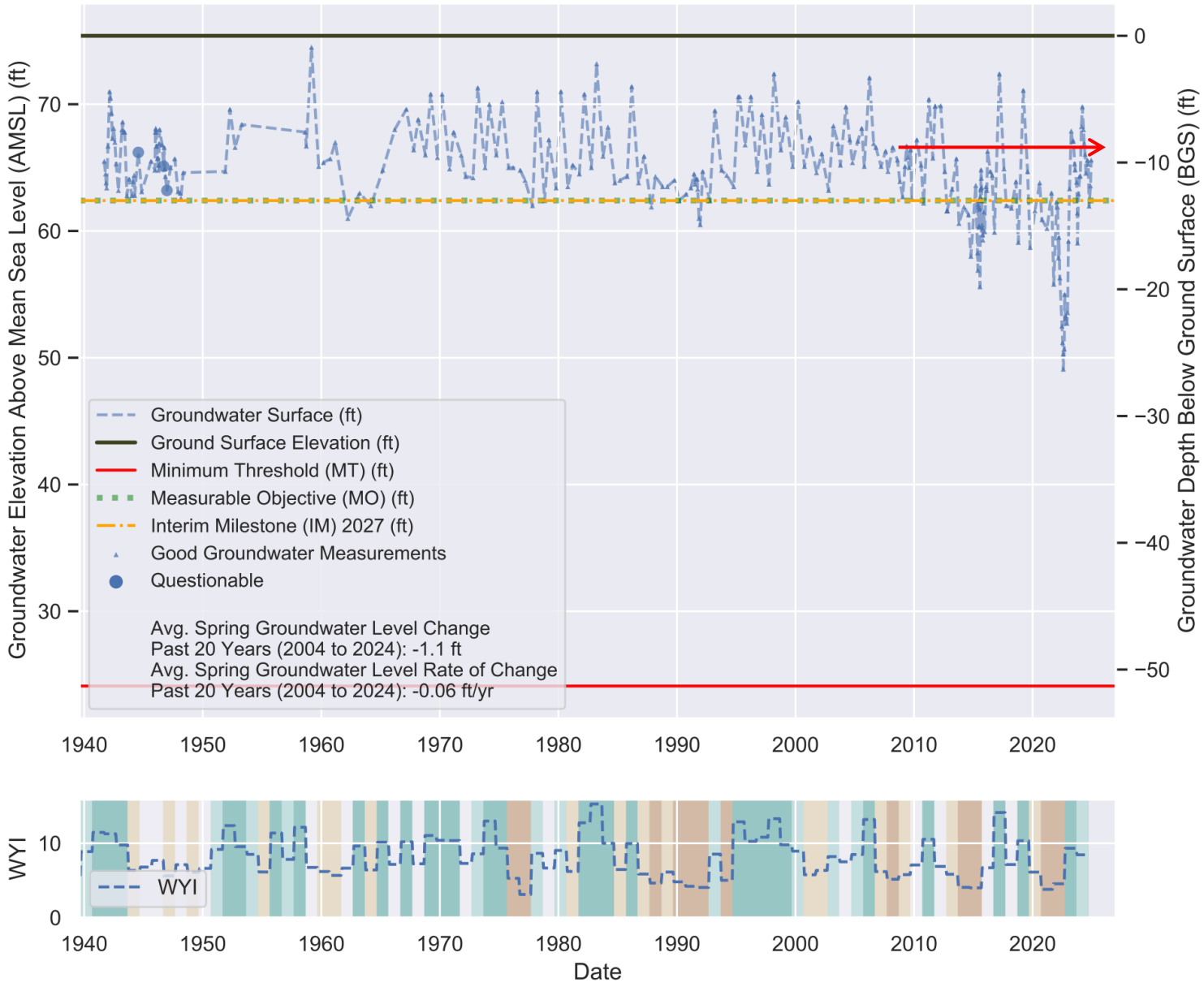
GSP Version: April 2024 Revised GSP
Sustainable Management Criteria:
IM (2027) = 62.4 ft AMSL
MO = 62.4 ft AMSL
MT = 24.1 ft AMSL

Minimum Threshold is the 2020-2022 low minus a margin (25.0 FT).

Sacramento Valley Water Year Index (WYI) shown on lower right. Meaning of colors defined below.

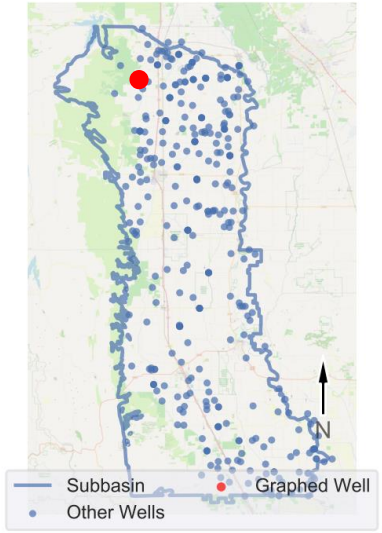
- Wet (W)
- Above Normal (AN)
- Below Normal (BN)
- Dry (D)
- Critical (C)

Perforation 1 (P1): 88.0 - 128.0; P2: 195.0 - 225.0; P3: 240.0 - 340.0 ft BGS



COLUSA Subbasin - State Well Number (SWN): 21N04W12A002M (Focus RMS Well)

Well Location Map



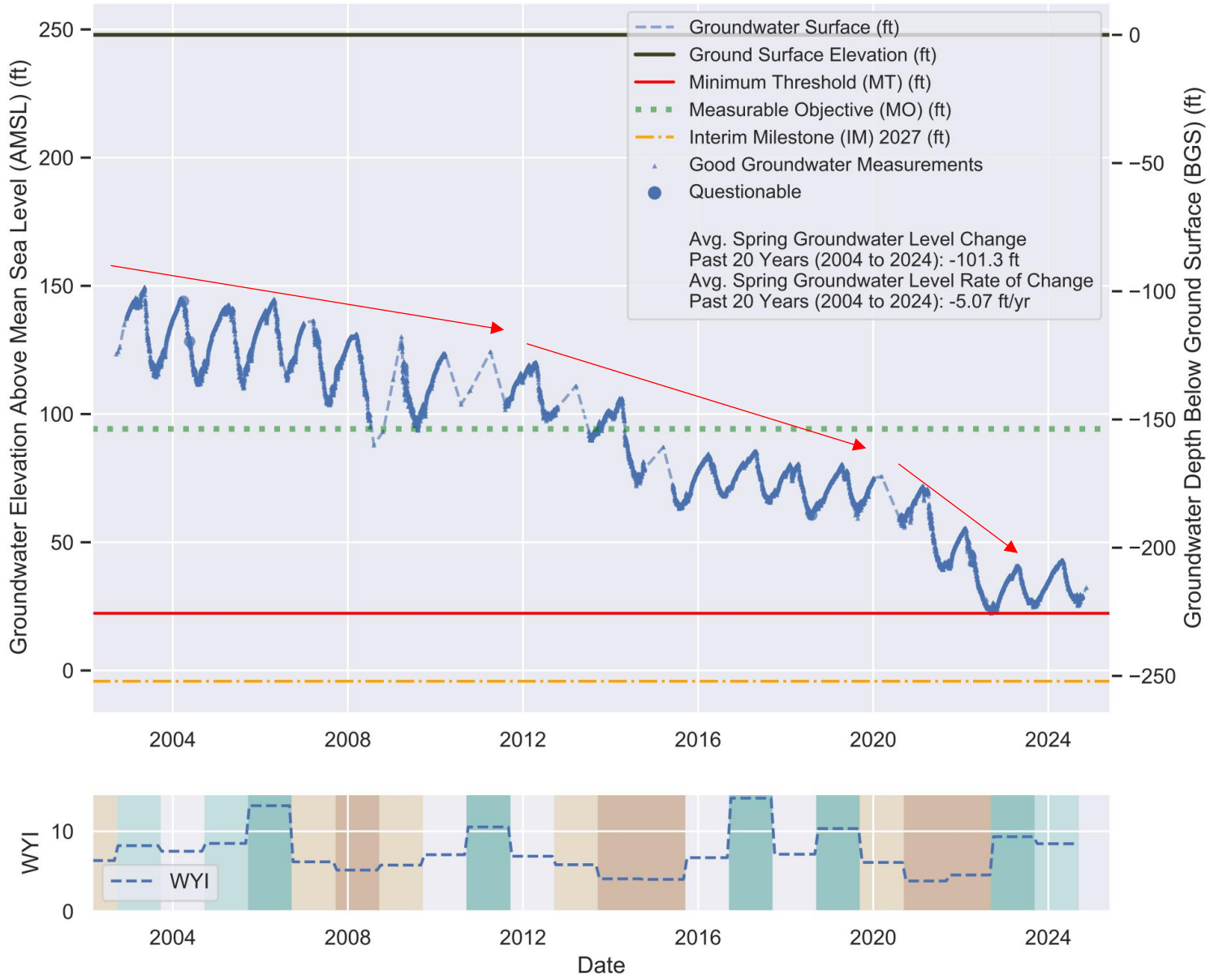
GSP Version: April 2024 Revised GSP
Sustainable Management Criteria:
IM (2027) = -4.2 ft AMSL
MO = 94.2 ft AMSL
MT = 22.3 ft AMSL

Minimum Threshold is the 2020-2022 low.

Sacramento Valley Water Year Index (WYI) shown on lower right. Meaning of colors defined below.

- Wet (W)
- Above Normal (AN)
- Below Normal (BN)
- Dry (D)
- Critical (C)

Perforation 1: 247.0 - 257.0 ft BGS

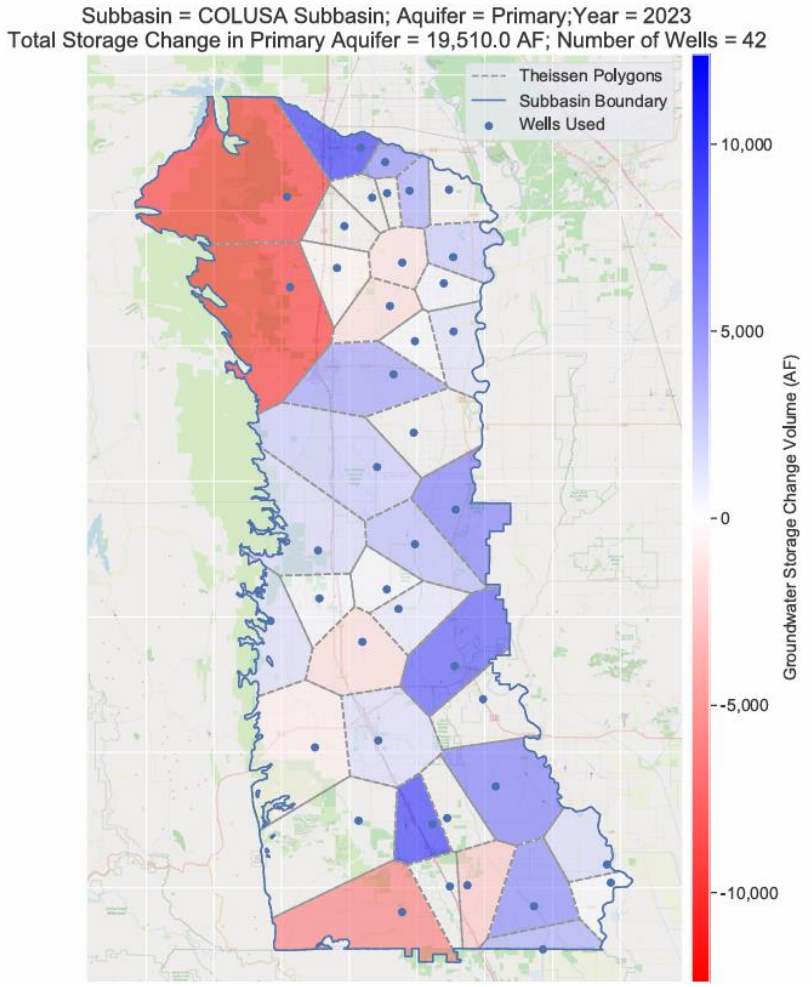


Groundwater Storage Change

- Calculated based on groundwater elevation changes at RMS wells
- Method:
  - Determine spring-to-spring groundwater level change at each RMS well.
  - Estimate the groundwater storage change in the area nearest each RMS well (i.e., polygons) based on the groundwater level change and a representative aquifer storage coefficient.
  - Annual change in storage summed across all polygons across the Subbasin.

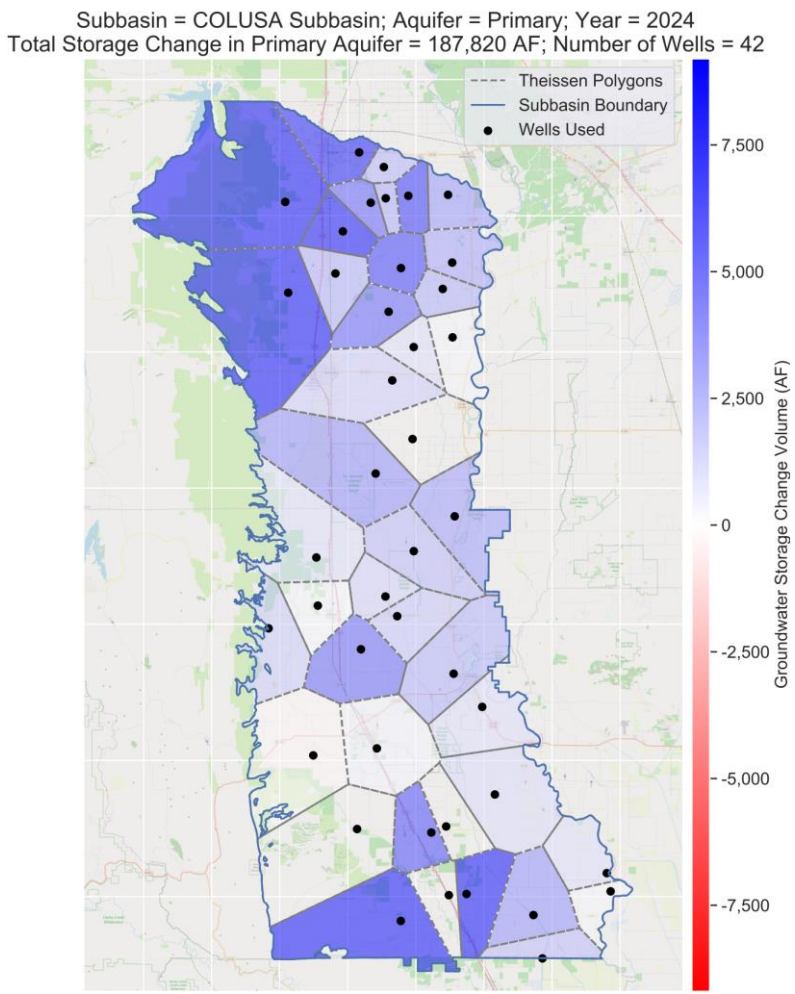
Spring 2022 – Spring 2023

2023: +20 TAF

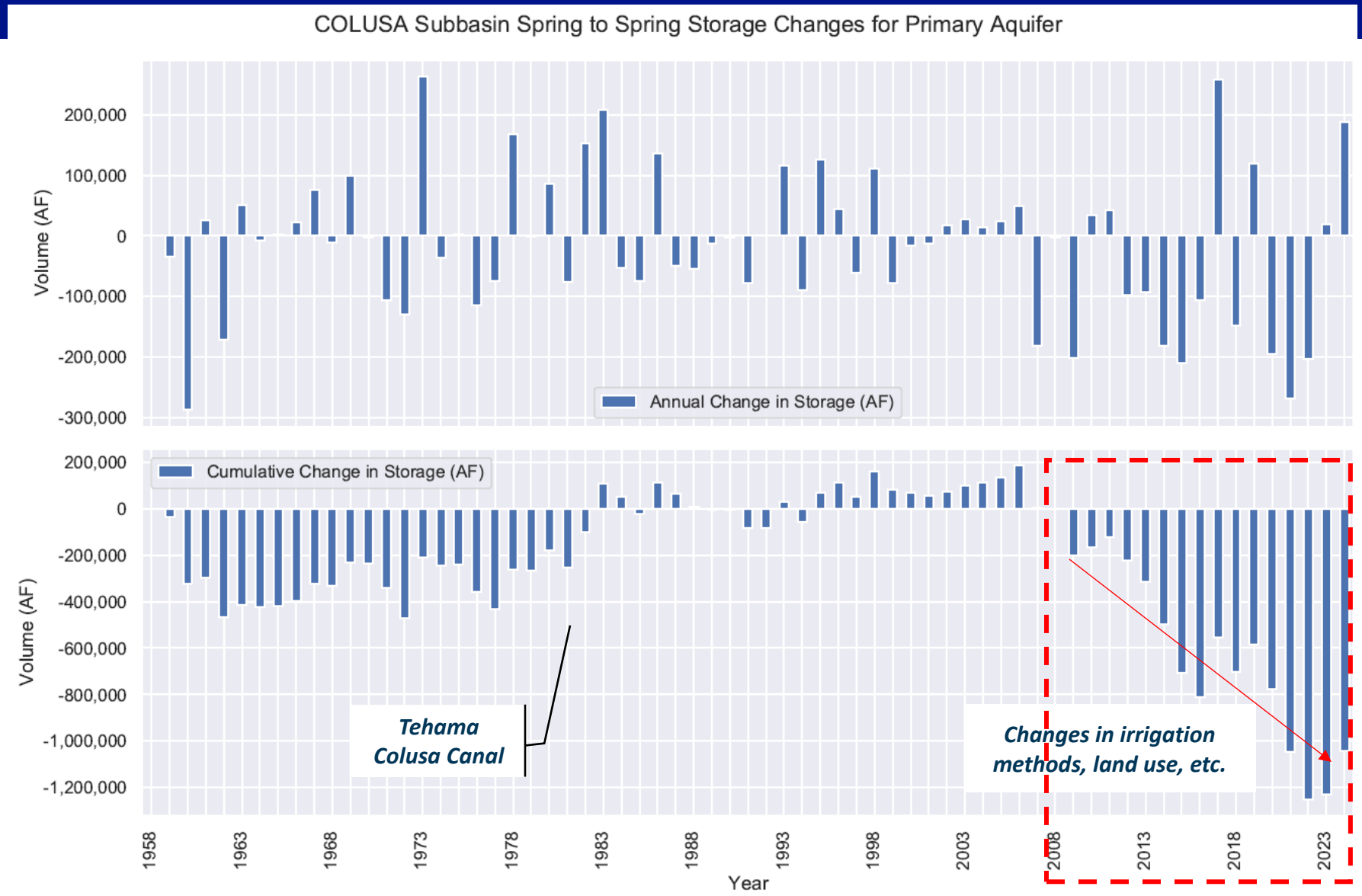


Spring 2023 – Spring 2024

2024: +188 TAF

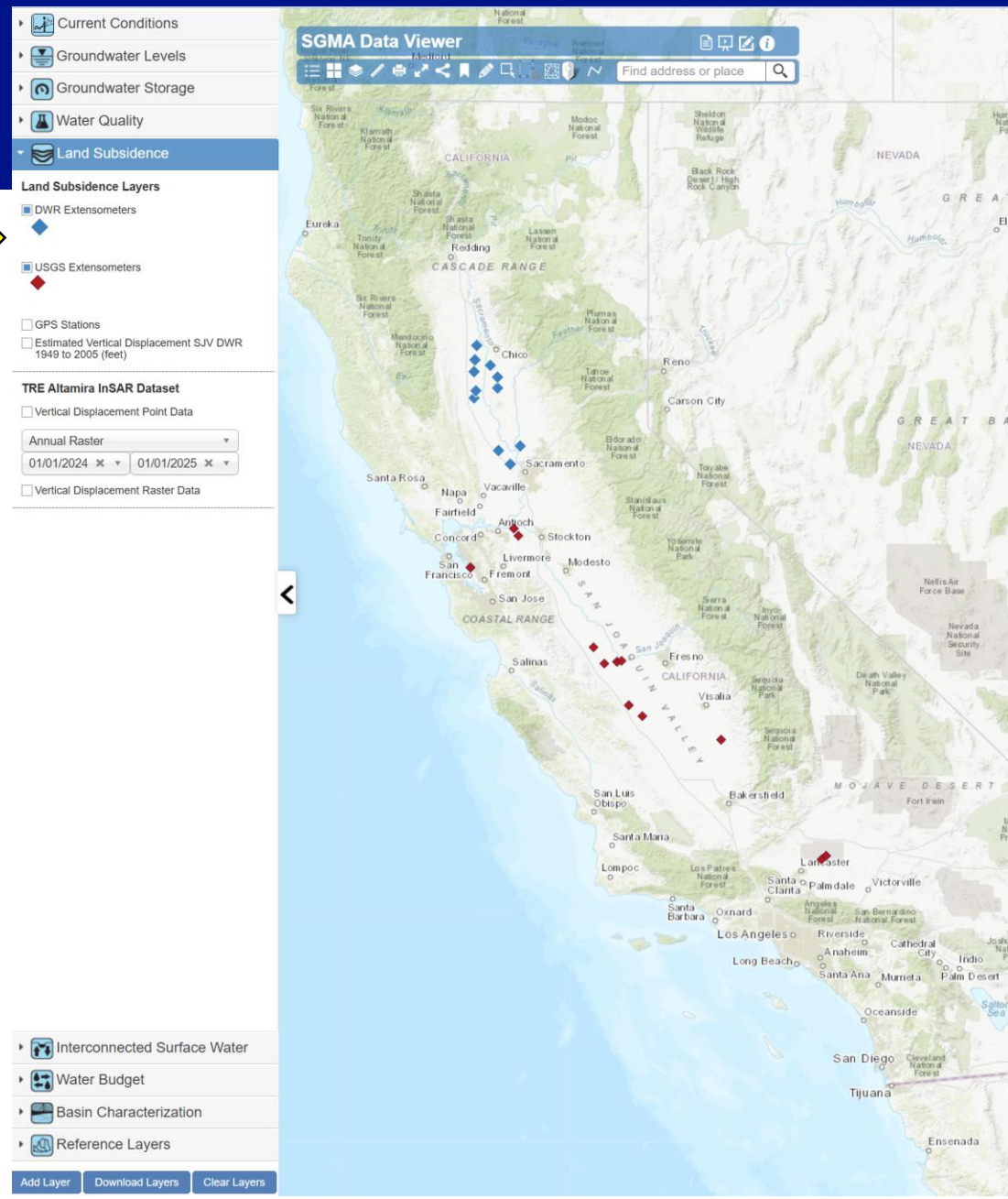


Groundwater Storage Change Since the 1960s



Land Subsidence Data

- DWR provides access to subsidence data and other information on the **SGMA Data Viewer**: https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer
- Subsidence can be quantified through a variety of methods, e.g.
  - Extensometers
  - Benchmark surveys using Global Positioning System (GPS) or conventional survey methods
  - InSAR* data



* ***In****terferometric* ***S****ynthetic* ***A****perture* ***R****adar.*

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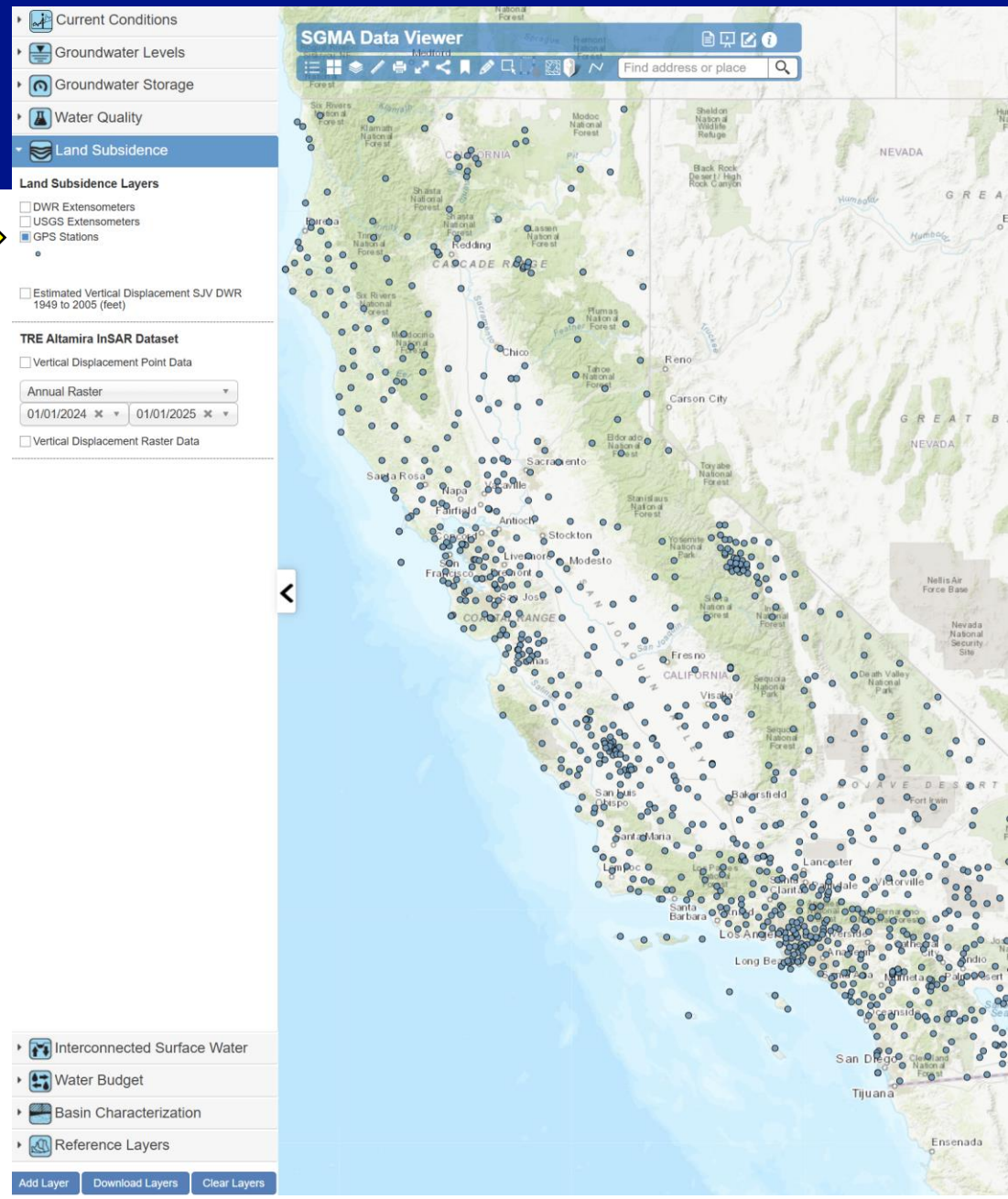

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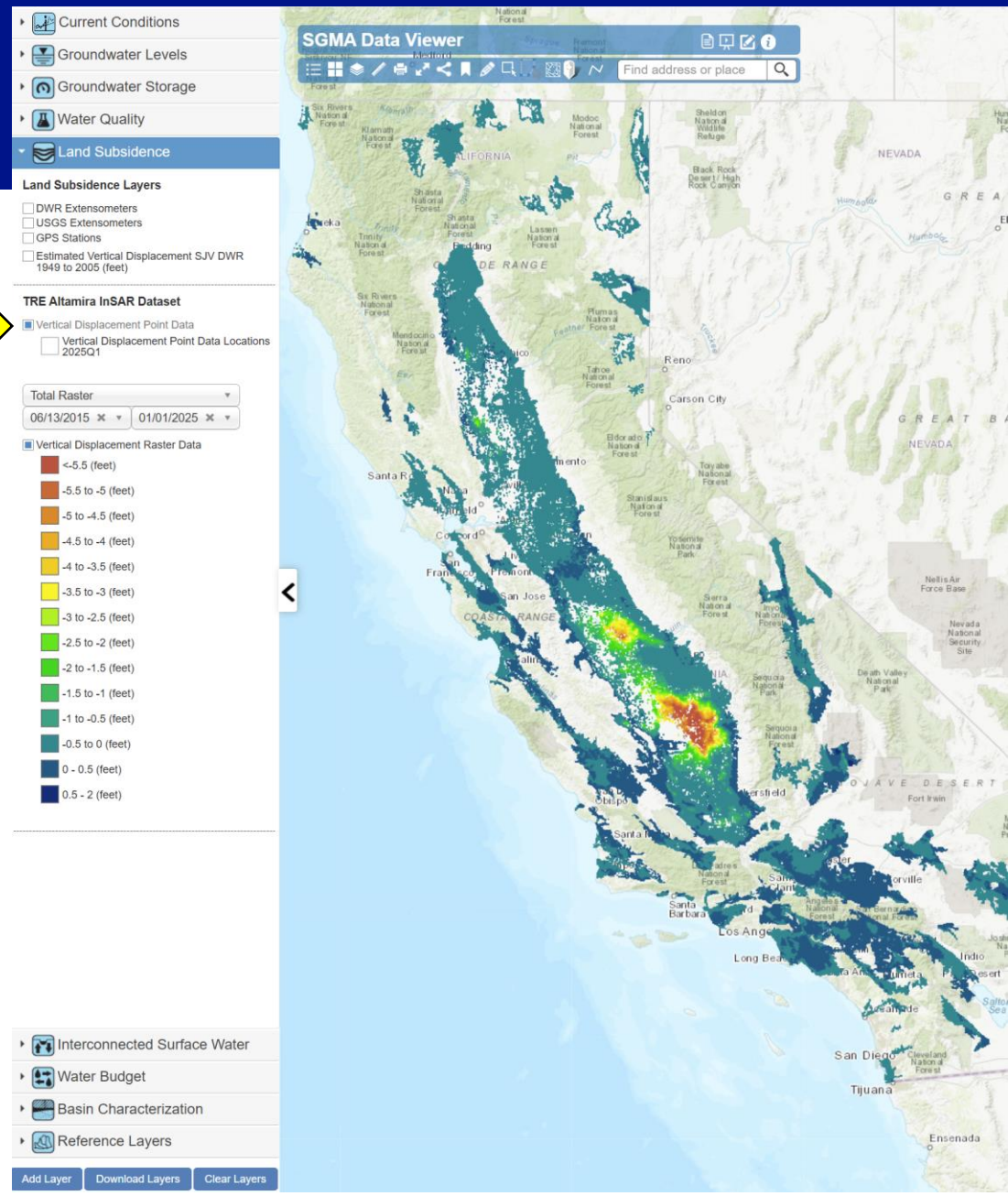

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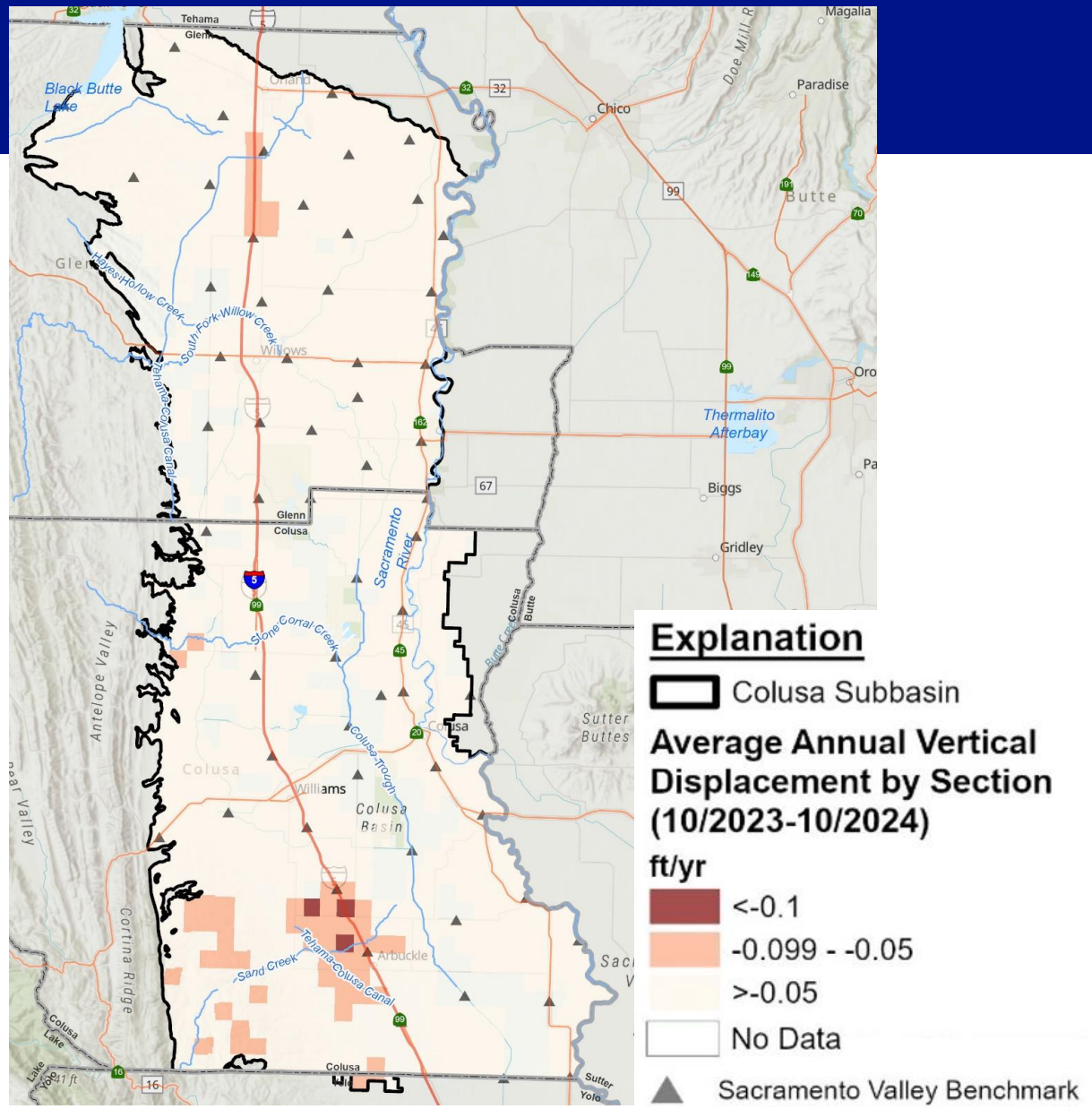
Land Subsidence

Avg. Annual Vertical Displacement (2024)

- Monitored by InSAR *(Interferometric Synthetic Aperture Radar)*
- Definition of Undesirable Results (Average Annual Rate):
  - Avg. annual subsidence* exceeds 0.1 ft/yr (10+ contiguous PLSS sections for 2 consecutive years)
- Findings in 2024:
  - Avg annual subsidence ≥ 0.1 ft/yr in 3 sections north/west of Arbuckle (Oct 2023–Oct 2024)
  - No reported subsidence impacts at this time per critical infrastructure owners/operators
  - Will continue monitoring

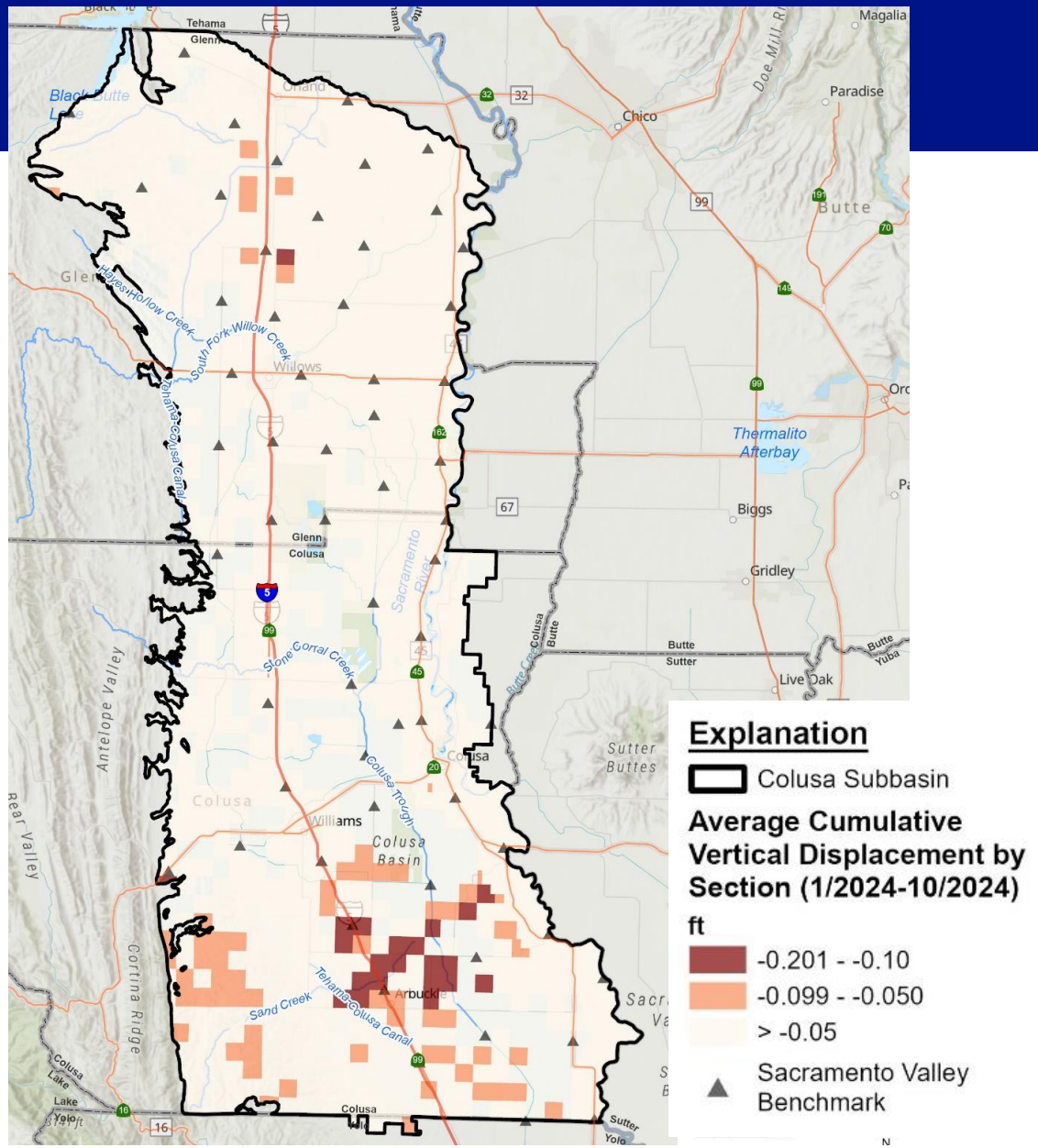
** Subsidence corresponds to negative vertical displacement.*



Land Subsidence

Avg. Cumulative Vertical Displacement (since Jan 2024)

- Monitored by InSAR *(Interferometric Synthetic Aperture Radar)*
- Definition of Undesirable Results (Cumulative):
  - Cumulative subsidence* exceeds 2 ft from Jan 2024 (1 PLSS section)
- Findings in 2024:
  - Cumulative subsidence ≤ 0.2 ft from Jan 2024



** Subsidence corresponds to negative vertical displacement.*

GSP Implementation Updates

GSP Revisions and Implementation

- The Revised GSP was completed in April 2024 to address comments from DWR and make several important commitments and updates:

FOCUS TODAY

  - Commitment to a Domestic Well Mitigation Program (by 2026).
  - Commitment to develop and prepare for Groundwater Demand Management (by 2027).
  - Updates to other projects and actions to achieve sustainable groundwater conditions.

Details in Revised GSP and Annual Report

  - Commitment to recurring evaluation of overdraft (groundwater storage change).
  - Updates to monitoring approaches and sustainable management criteria the GSAs are using to evaluate groundwater levels and subsidence in the Subbasin.

- The Revised GSP was approved by DWR in February 2025.
- GSP implementation is continuing through 2042.

Domestic Well Mitigation (DWM) Program

- Mitigate drinking water well impacts (e.g., dry wells) due to declining groundwater levels and subsidence related to GSA management activities during GSP implementation.
- Mitigation measures:
  - Temporary measures (e.g., tanks, bottled water)
  - Permanent measures (e.g., well replacement, deepening existing wells, municipal connections)
- Develop and implement no later than January 2026.

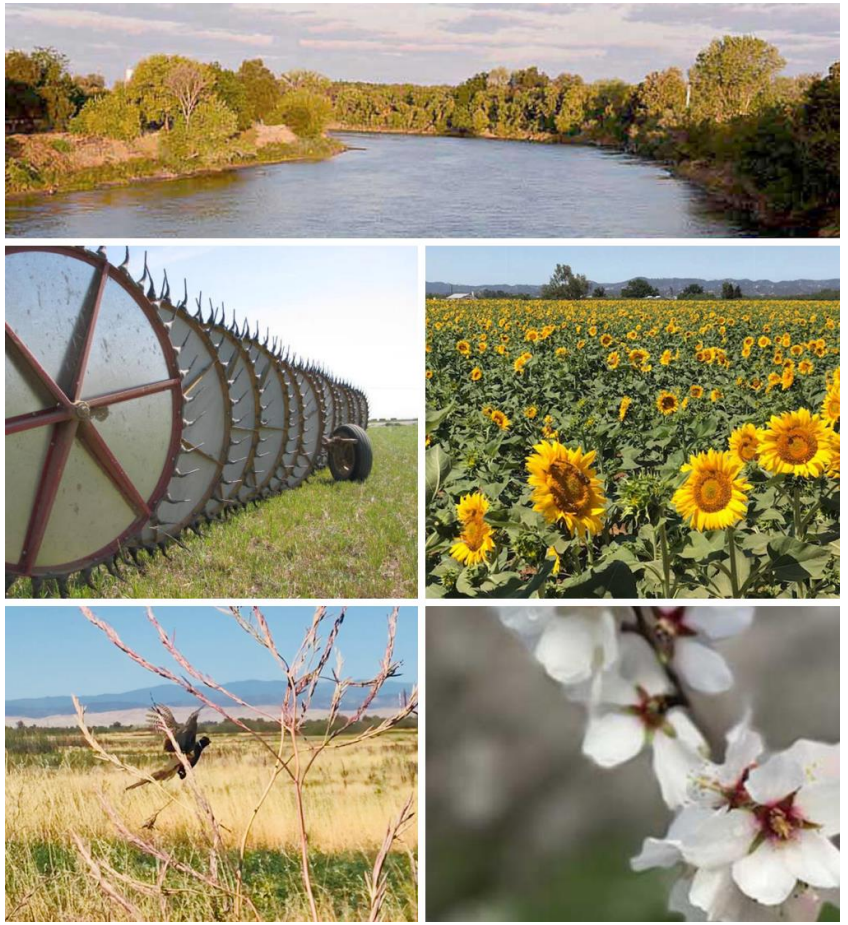
Source: https://norcalwater.org/2023/05/24/be-well-prepared-to-ensure-safe-and-reliable-drinking-water/

Groundwater Demand Management (GDM) Program

- Reduce groundwater demand in the Subbasin through voluntary measures (e.g., land use changes, water conservation) and mandatory measures (e.g., groundwater allocation).
- Backstop and means of mitigating overdraft and addressing undesirable results if other PMAs are unable to sufficiently address groundwater sustainability issues in the Subbasin.
- Develop and prepare to implement no later than January 2027 if undesirable results are occurring.

DWM and GDM Programs

- Active efforts in progress by both GSAs since 2024:
  - GSA Boards are holding joint monthly meetings to discuss and develop both programs.
  - Ad Hoc Committees appointed for each program.
  - Ad Hoc Committees meet regularly to discuss and make program recommendations to Boards.
  - Working together and with consultant support to make program development decisions.
  - Decisions informed by discussions with representatives from other Subbasins that have successfully developed and implemented similar programs.
- The GSAs remain on track to develop both programs according to their proposed timelines.



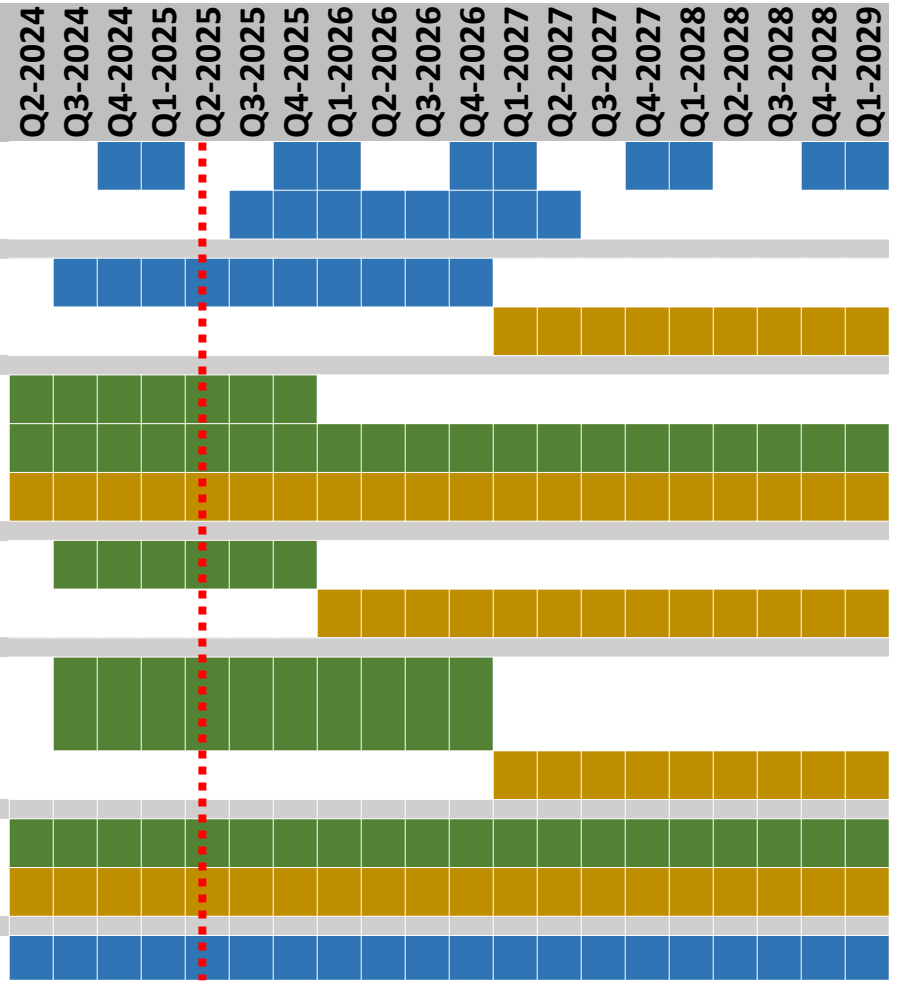
Other GSP Implementation Activities as of Early 2025

- Other projects and management actions are being implemented alongside development of the DWM and GDM programs:
  - **In lieu recharge** (e.g., Orland-Artois Water District land annexation, surface water incentives and in-basin sales, ongoing and expanded use of available surface water under existing water rights and new temporary permit(s))
  - **Direct recharge** (e.g., GGA recharge projects, Tehama Colusa Canal Trickle Flow Recharge pilot program)
- Long-term Funding/Financing Efforts by the GSAs
  - Support GSP implementation, including projects and management actions.
  - Rate analysis and SGMA fee process (GGA completed, CGA in progress).

Five-Year Timeline for GSP Implementation

Legend:
- Recurring/Ongoing Activity
- Planning/Development/Permitting/Construction
- Implementation

Task	Subtask
SGMA Compliance	GSP Annual Reports
	GSP Periodic Evaluation and Updates
Long-term Funding Planning	Update Revenue Requirements
	Implement New Rates
Project Implementation	Obtain Programmatic EIR for Projects
	Refine/Develop Projects
	Implement Projects
Domestic Well Mitigation (Management Action Implementation)	Refine Domestic Well Mitigation Program
	Implement Domestic Well Mitigation Program
Demand Management (Management Action Implementation)	Refine Mandatory Demand Management/ Groundwater Allocation Program
	Implement Demand Management Program
Study Implementation (Data Gaps)	Refine/Develop Studies
	Implement Studies to Fill Data Gaps
Public Engagement and Outreach	



Thank you!

For More Information, Please Contact:

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Lisa Hunter
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