



Sierra County Drought Resilience Plan (DRP)

Task Force Meeting 2

Risk Assessment

August 7, 2024

Agenda

1. Meeting Outcomes
2. Recap
3. Risk Assessment Overview
4. Risk Assessment Findings
5. Short-Term Actions and Long-Term Strategies
6. Next Steps



Presenters



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County Lead



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Stantec
Deputy County Lead



Meeting Outcomes



Ensure Task Force understands the Risk Assessment process



Validate Risk Assessment outcomes



Introduce short-term actions and long-term mitigation strategies



Photo Credit: Sierra County

Recap of Drought Resilience Plan Process and Prior Efforts



Drought Resilience Plan Goals

1. Establish a standing **Drought Task Force (Task Force)** to facilitate drought and water shortage preparedness for *state small water systems (SSWS)* and *domestic wells* within the county's jurisdiction
2. Develop a County **Drought Resilience Plan (DRP)** that includes potential drought and water shortage risk and proposed short-term actions and long-term strategies

Primer of Senate Bill 552:
Drought Planning for Small Water
Suppliers and Rural Communities

Prepared by



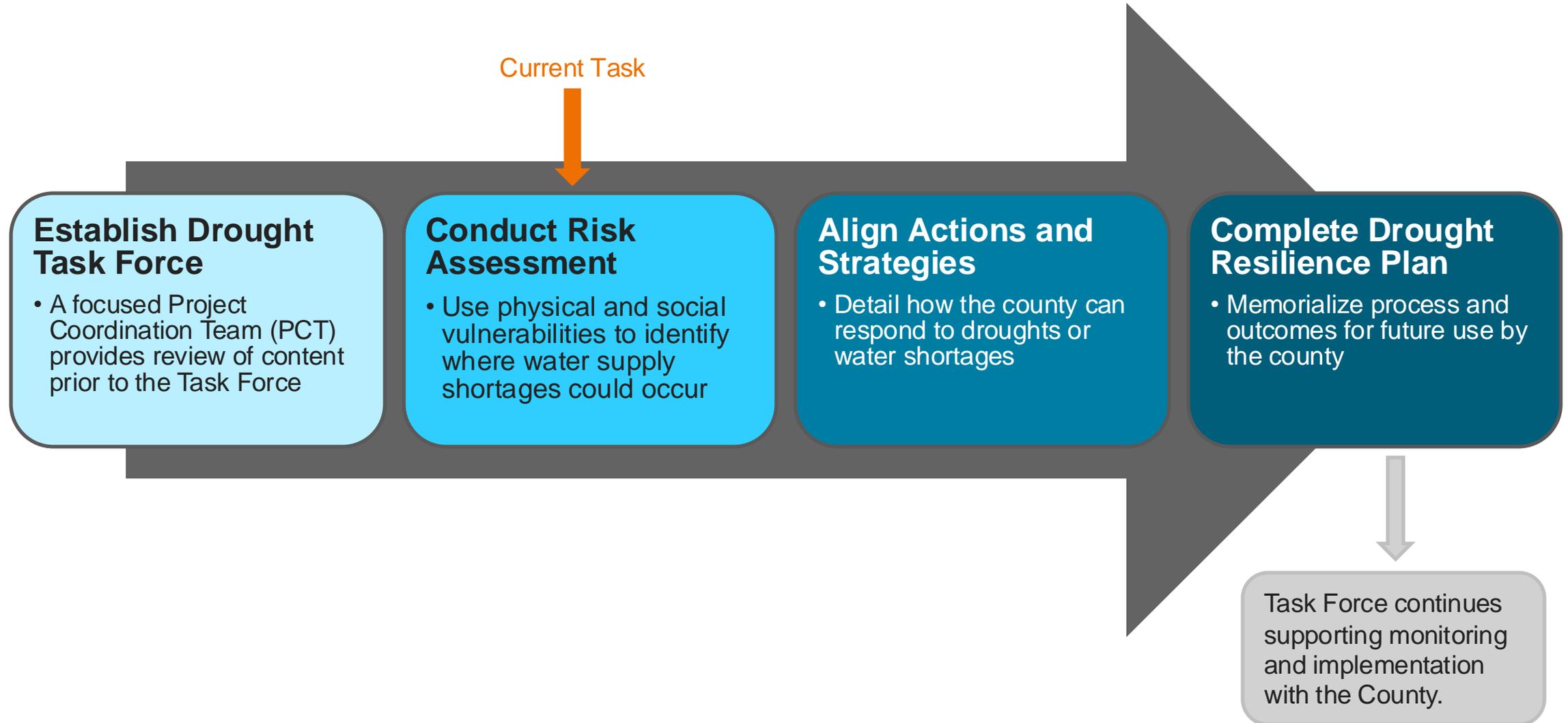
And



May 2022



Drought Resilience Plan Process





Drought Resilience Plan Outline

- Chapter 1: Introduction
- Chapter 2: County Drought and Water Shortage Task Force
- **Chapter 3: Drought and Water Shortage Risk Assessment**
- Chapter 4: Short-Term Response Actions
- Chapter 5: Long-Term Mitigation Strategy and Actions
- Chapter 6: Implementation Considerations



Today we are presenting what will ultimately become this chapter.



Photo Credit: Sierra County

Risk Assessment Overview



Key Definitions

Hazard – Source of harm or difficulty that can be natural or human-made and include social processes that can lead to water shortages in the county.

- Natural hazards, warming temperatures, low income are all hazard examples

Community Assets – The people, structures, facilities, and systems that have value to the community.

- Assets in the DRP must include **state small water systems** and **domestic wells** and populations reliant on these water supplies.

Vulnerability – Characteristics of community assets or population that make them susceptible to damage from a given hazard. It includes both **physical vulnerability** and **social vulnerability**.

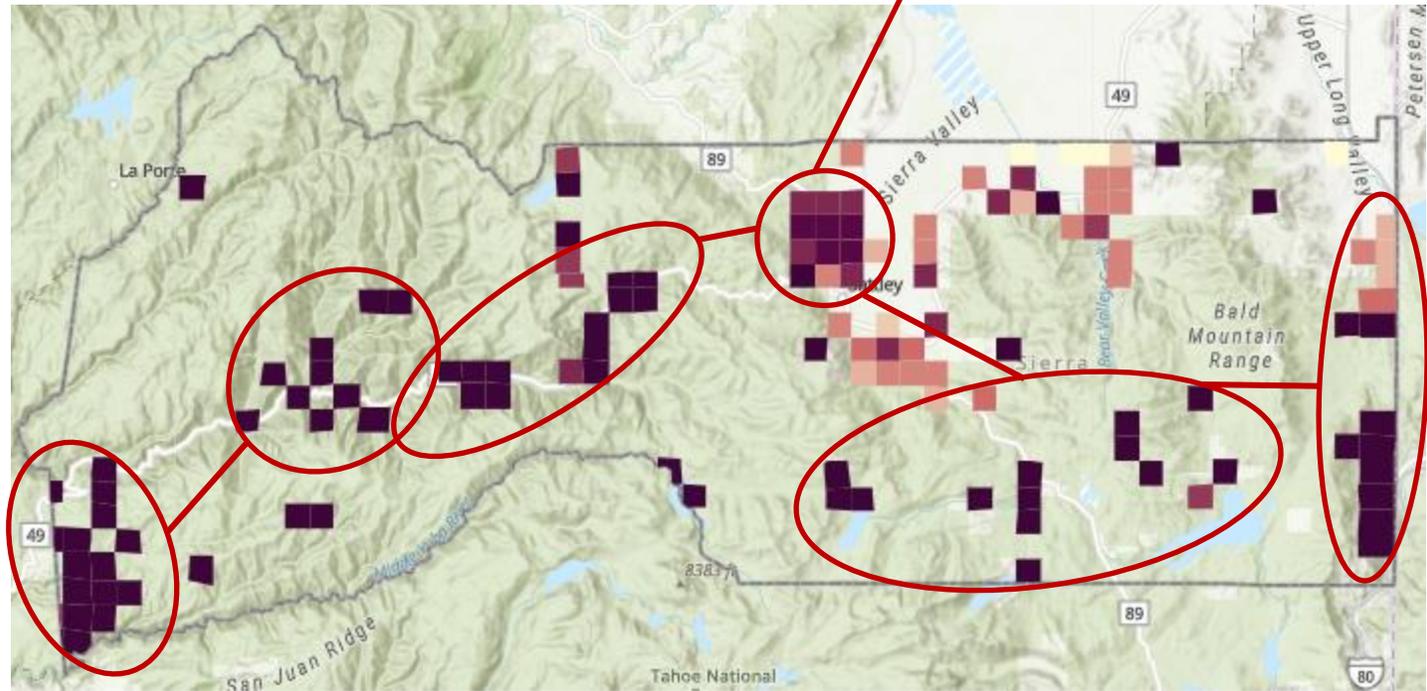
- Physical Vulnerability
- Social Vulnerability



Risk Assessment Objective

Where do physical vulnerabilities intersect with SSWS/domestic wells, and how could social vulnerabilities influence short-term actions and long-term strategies?

- Identify vulnerable SSWS and domestic wells within the county
- Characterize vulnerabilities
- Use outcomes to:
 - Assist in areas of focus for the county
 - Identify best short-term actions and long-term strategies



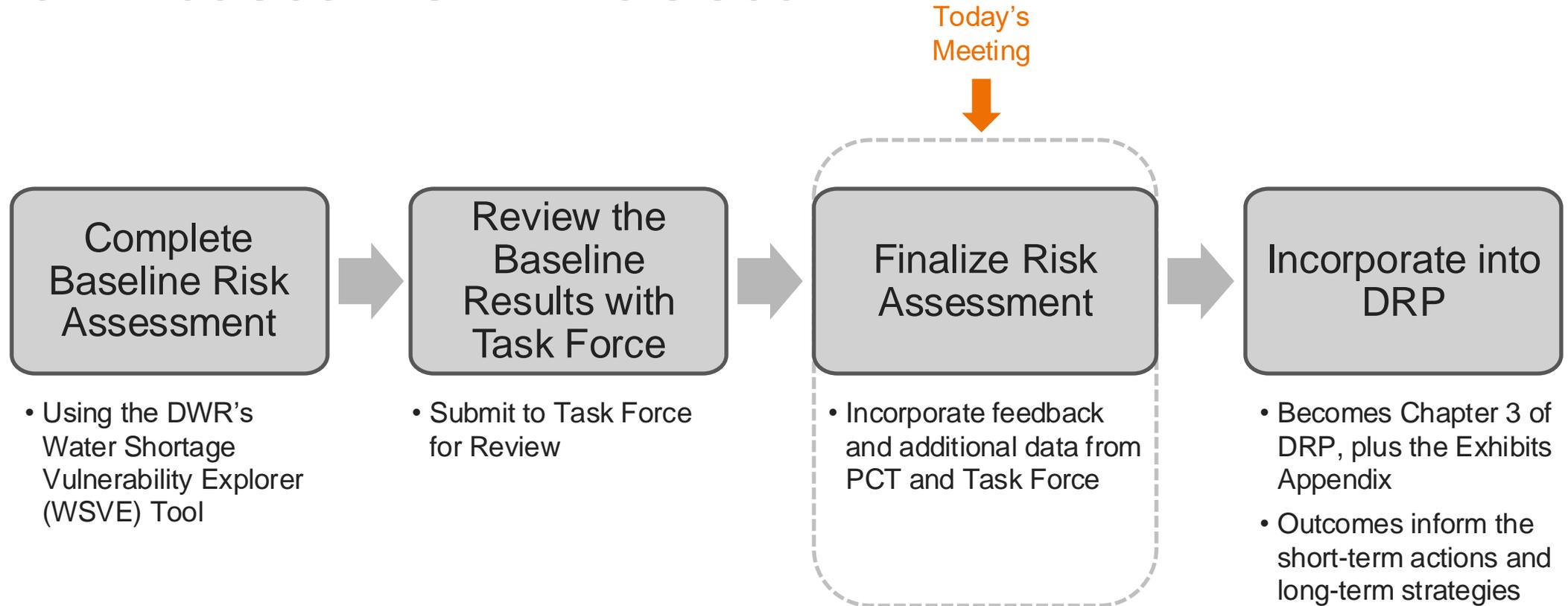
Are these the vulnerable areas?



What is driving high vulnerability scores?



Risk Assessment Process





Physical Vulnerability Score Methodology

- Identified 17 indicators of physical vulnerability of domestic wells and SSWSs to water shortages
- Calculate a value for each indicator
- Indicators' values are multiplied by their corresponding weighting and summed to determine the total physical vulnerability score
 - Indicators weighted based on perceived vulnerability influence
 - Aligns with the State Water Board SAFER Program's Needs Assessment



Physical Vulnerability Indicators with Weights

Climate Change Conditions		Current and Recent Environmental Conditions		Infrastructure Conditions	
Projected Temperature Shift	1	2022 Precipitation Pattern	2	Density of Domestic Wells in Fractured Rock Basins	5
Saltwater Intrusion in Coastal Groundwater	1	Consecutive Dry Years Between 2018 and 2022	2	Dry Well Susceptibility in Alluvial Basins	5
Wildfire Increase	1	Wildfire Risk	3	Dry Well Susceptibility in Fracture Rock Basins	5
		Fractured Rock Area	5	Reported Household Outages on Wells	3
		Presence of Subsidence	2		
		Current Saltwater Incursion	3		
		Critically Overdrafted Basin	2		
		Chronically Declining Water Levels	3		
		Presence and Amount of Irrigated Agriculture	3		
		Groundwater Water Quality	3		



Social Vulnerability Score Methodology

- Applied methodology used by the Center for Disease Control for its social vulnerability index
- Indicators primarily sourced from 2020 Census data
- Indicators are normalized from 0 to 1 across the state and summed to get the Total Social Vulnerability Score.

Socioeconomic Status
Poverty Level
Unemployment
Per Capita Income

Language and Education
Education Attainment
English Language Proficiency

Demographics
Elderly Population
Non-Adult Population
Minority Population
Disability
Single Parent Households

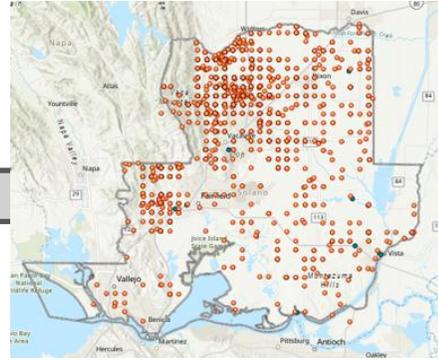
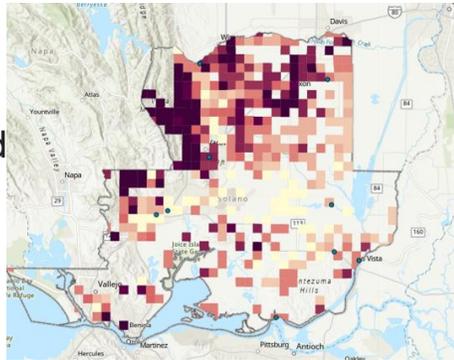
Housing and Transportation
Multi-Unit-Housed Population
Mobile Home-Housed Population
Crowded Conditions
No Vehicle Access



Risk Assessment Analysis

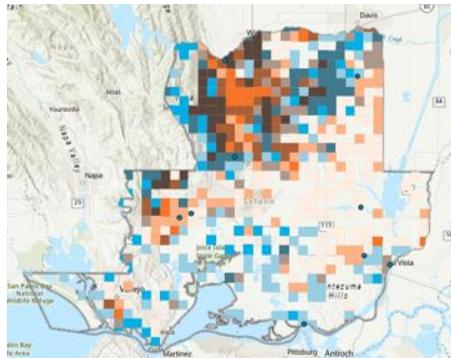
1

Use DWR Risk Assessment tool to evaluate physical and social vulnerabilities within the county



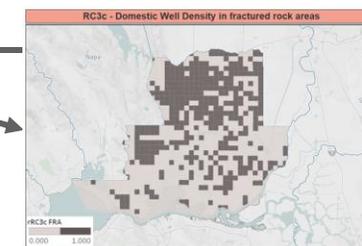
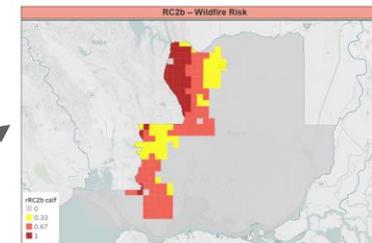
2

Merge with SSWS and domestic wells to determine where the two overlap



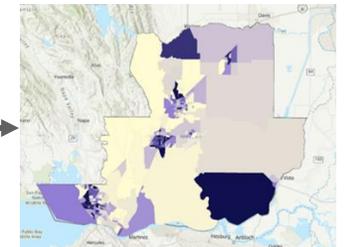
3

Determine what indicators drive physical vulnerability



4

Characterize how social vulnerabilities intersect





Meeting Outcomes



Ensure Task Force understands the Risk Assessment process



Photo Credit: Sierra County

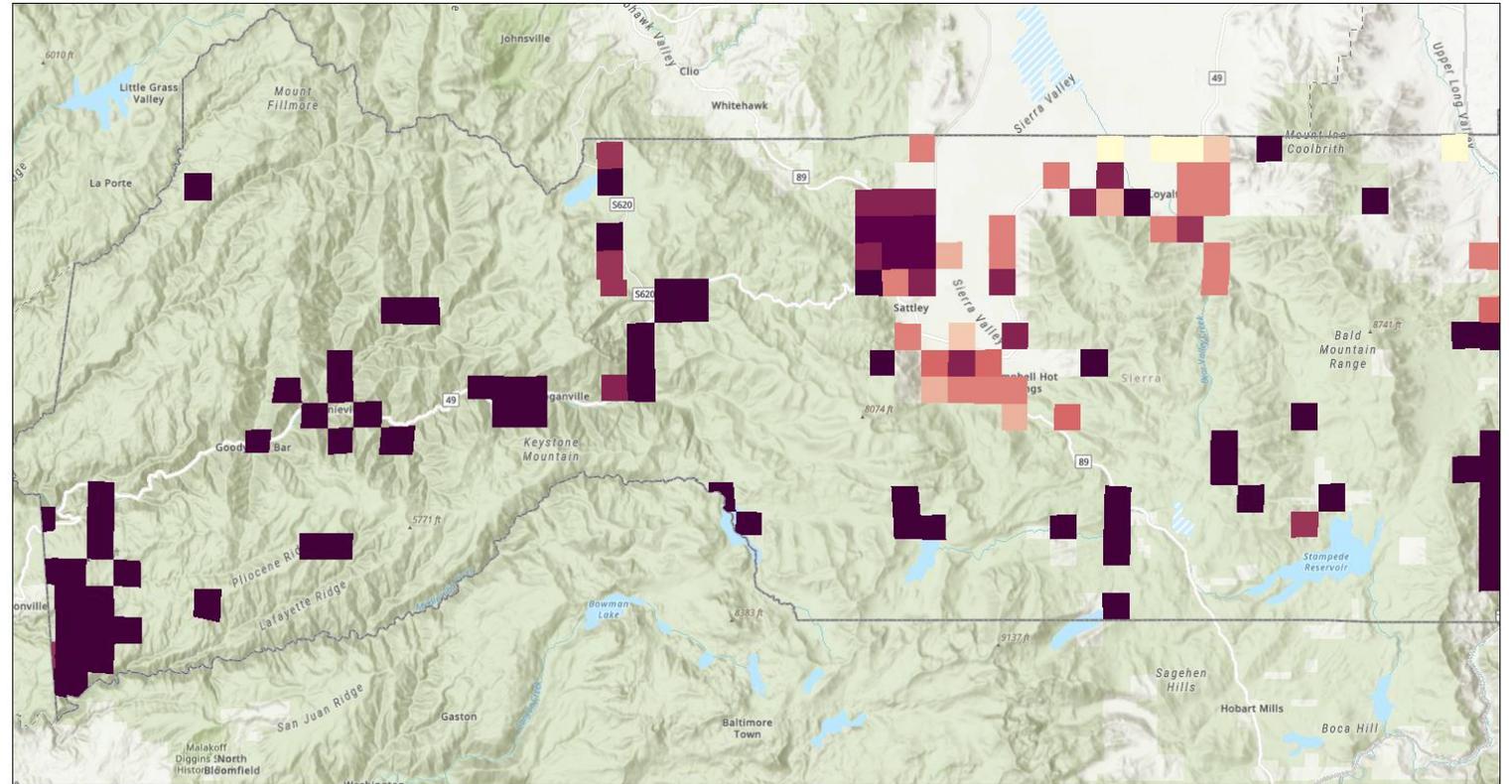
Risk Assessment Results and Findings



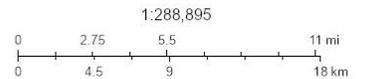
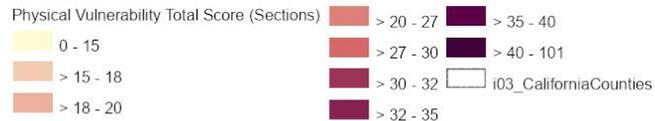
Physical Vulnerability Results

- Darker shades indicate higher physical vulnerability
- Composite of all physical vulnerability indicators

Are the areas with physical vulnerability where you expected?



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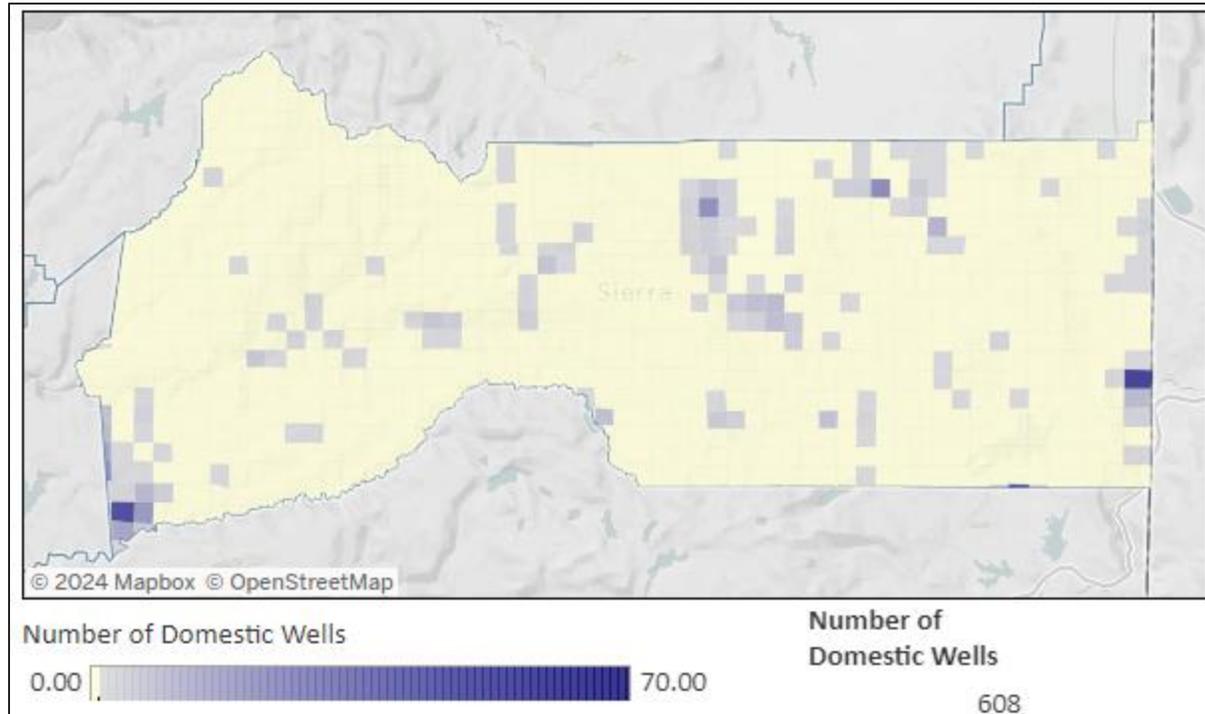
Esri, NASA, NGA, USGS, U.S. Bureau of Reclamation, California Department of Conservation, California Department of Fish and Game, California Department of Forestry and Fire Protection, National Oceanic and Atmospheric Administration. Contact: gis@water.ca.gov.

Please refer to the Drought and Water Shortage Vulnerability Scoring: California's Domestic Wells and State Smalls Systems documentation for more information on indicators and scoring. These estimated indicator scores may sometimes be calculated in several different ways, or may have been calculated from data

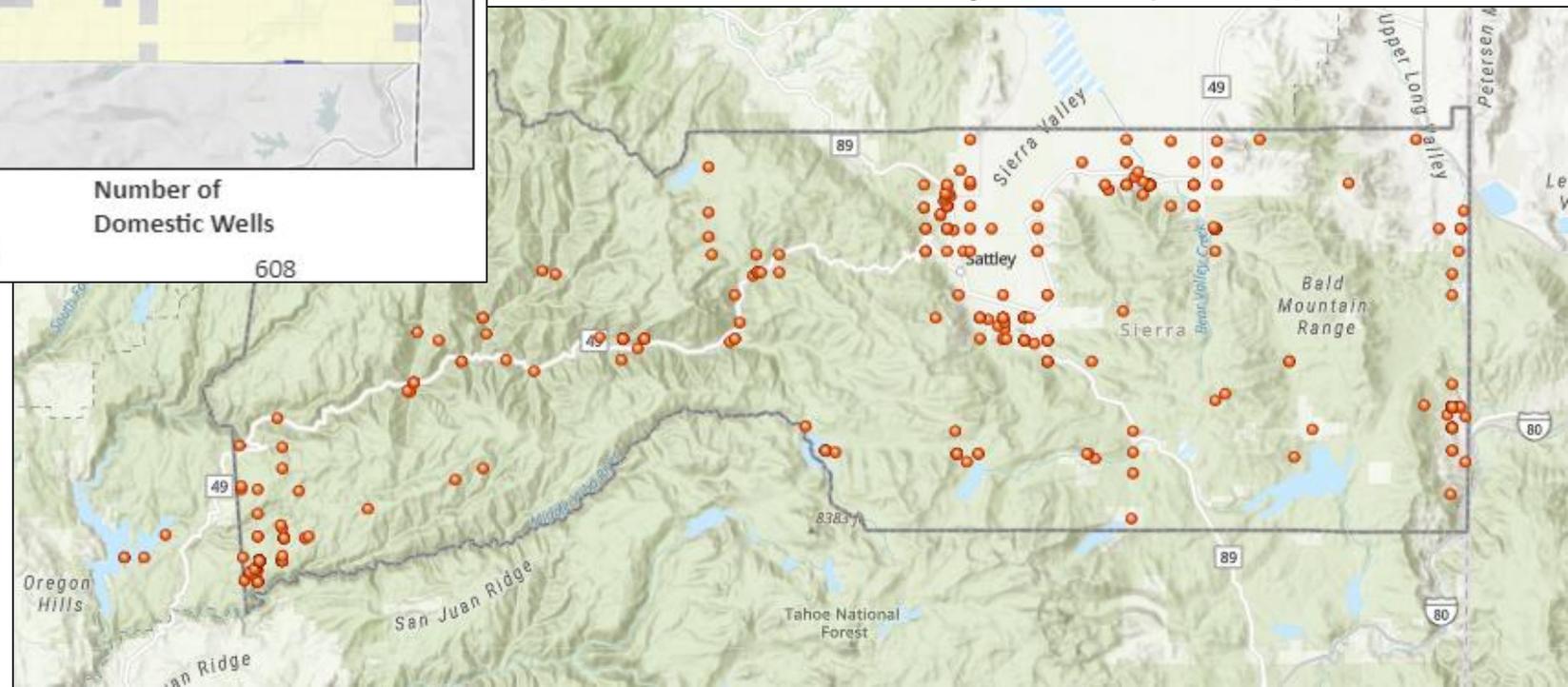


SSWS and Domestic Wells

- Any missing SSWS or domestic wells?



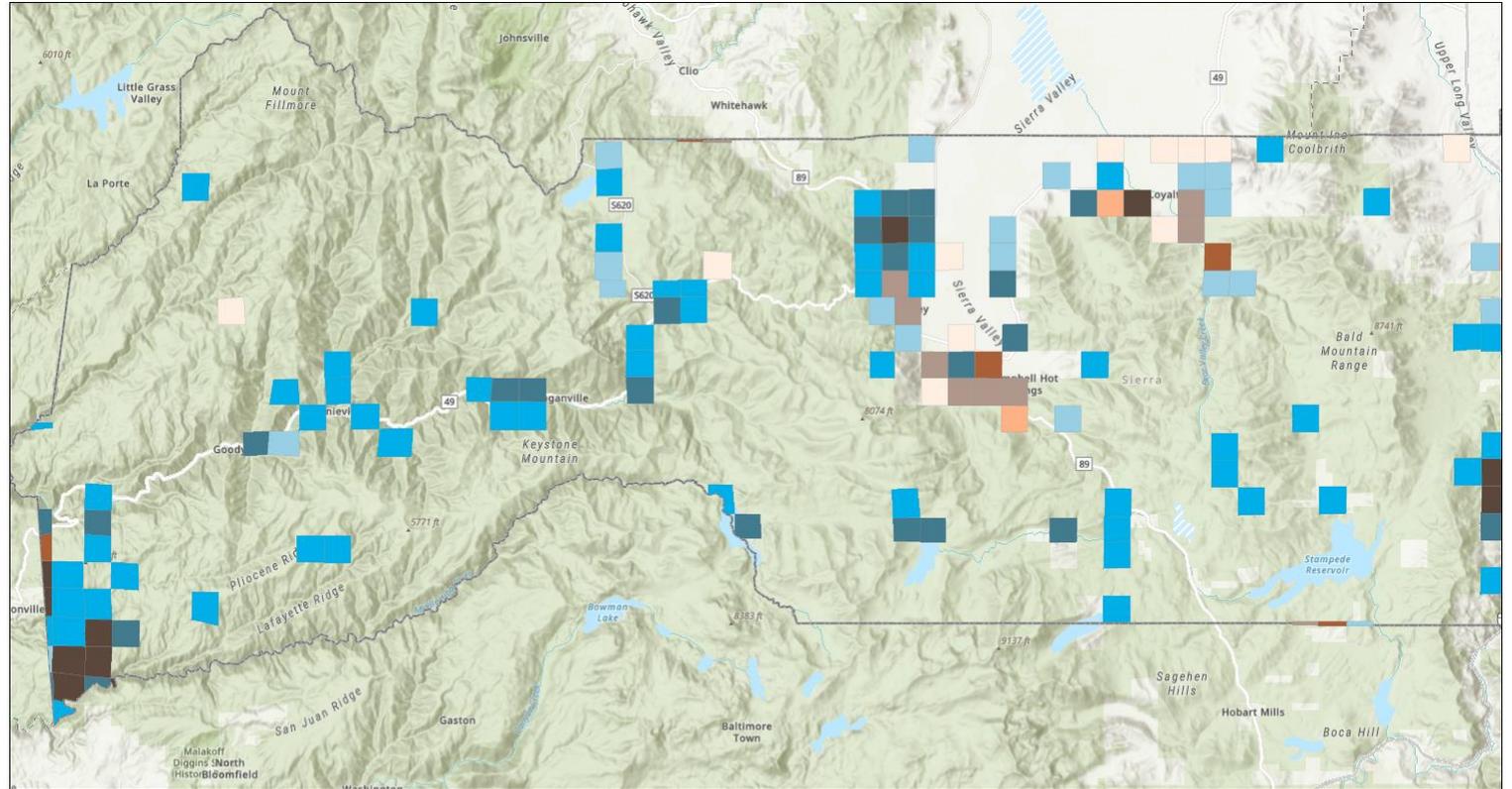
(no wells are hidden, although wells may overlap)





Risk Assessment Analysis Results

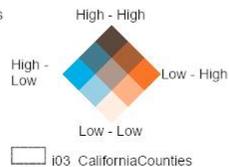
- Combines physical vulnerability with SSWS and domestic well locations
- Darker brown indicates high physical vulnerability and high SSWS and domestic well presence



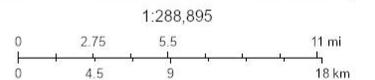
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Physical Vulnerability Total Score by Domestic Wells

■ Total_Score
■ DomWellCount



i03_CaliforniaCounties



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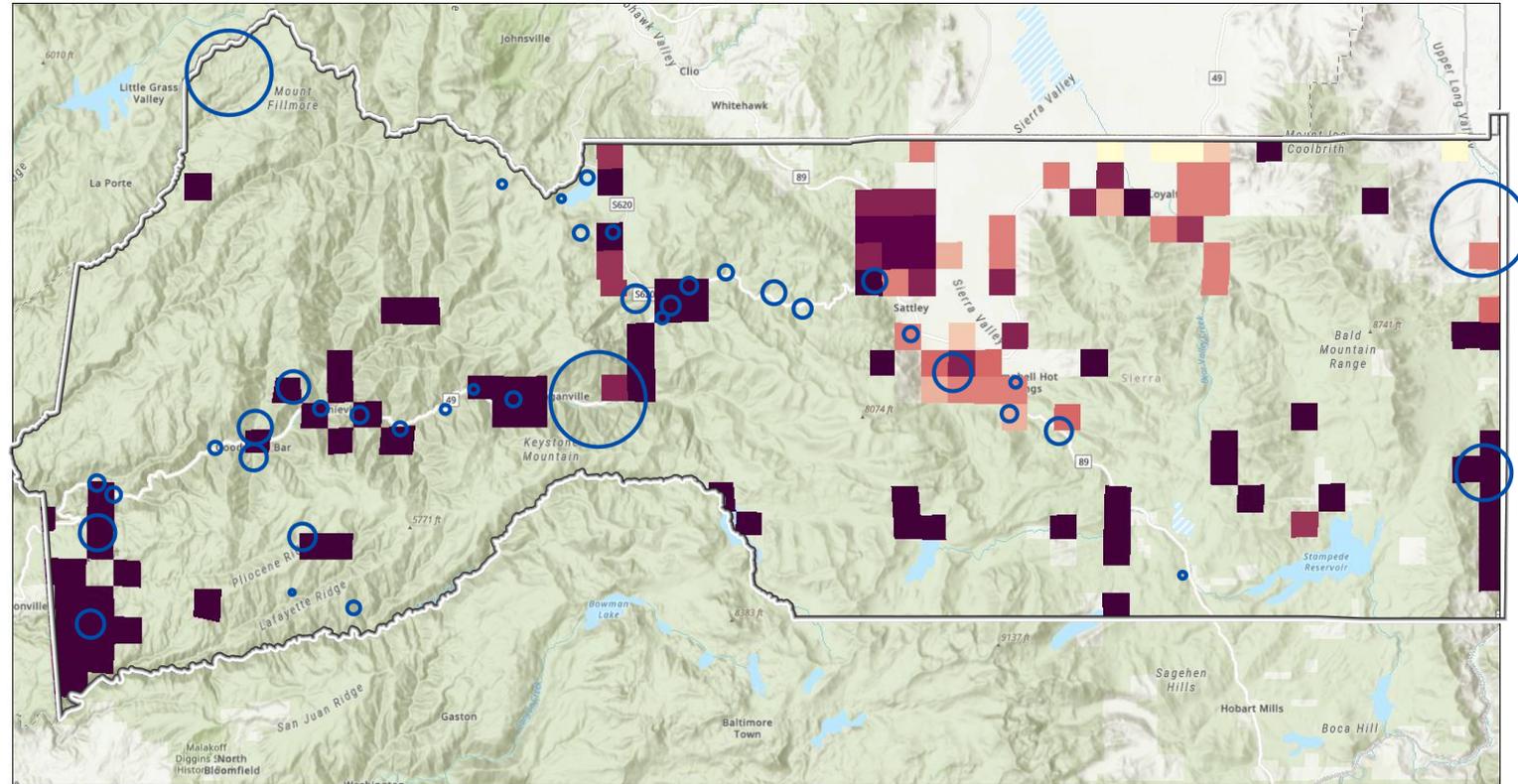
California Department of Water Resources

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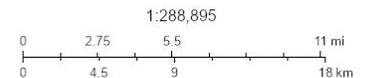
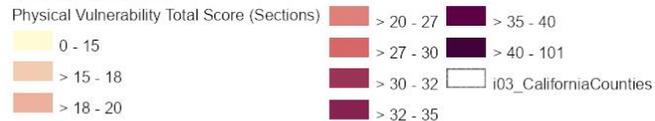


Physical Vulnerability Results with Small Spring-Fed Systems

- Darker shades indicate higher physical vulnerability for groundwater supply
- Does the risk extend to spring-fed supply?



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Esri, NASA, NGA, USGS, U.S. Bureau of Reclamation, California Department of Conservation, California Department of Fish and Game, California Department of Forestry and Fire Protection, National Oceanic and Atmospheric Administration. Contact: gis@water.ca.gov.

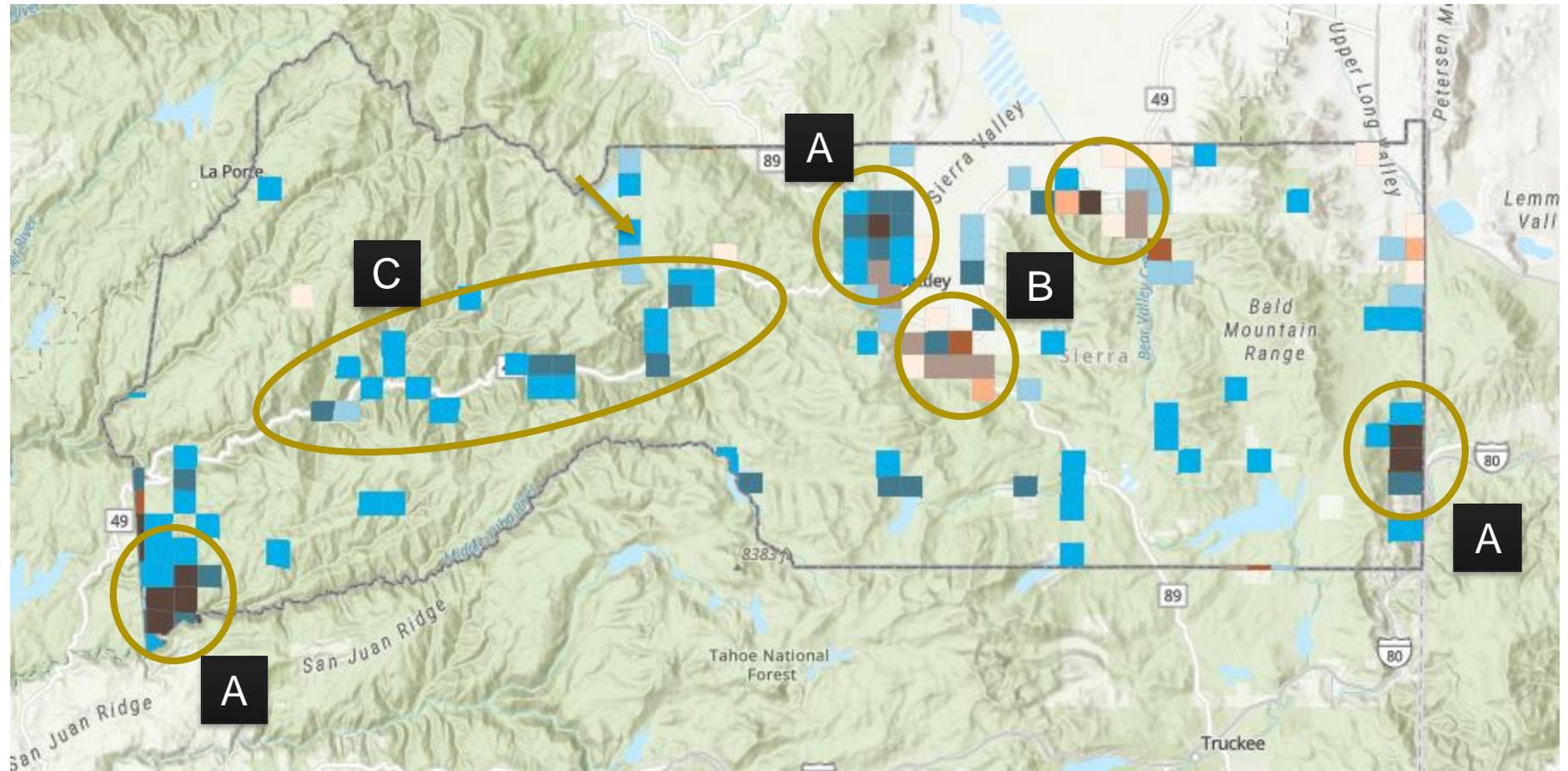
California Department of Water Resources

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Regions with Water Shortage Vulnerability

- A) Communities in Fractured Rock Basins (Pike, Calpine, and Verdi)
- B) Areas within the Sierra Valley Basin near Loyalton and Sierraville
- C) Domestic Wells, SSWS, and Small Spring Systems along the North Yuba River
- D) Isolated Domestic Wells in Fractured Rock Area Across the County



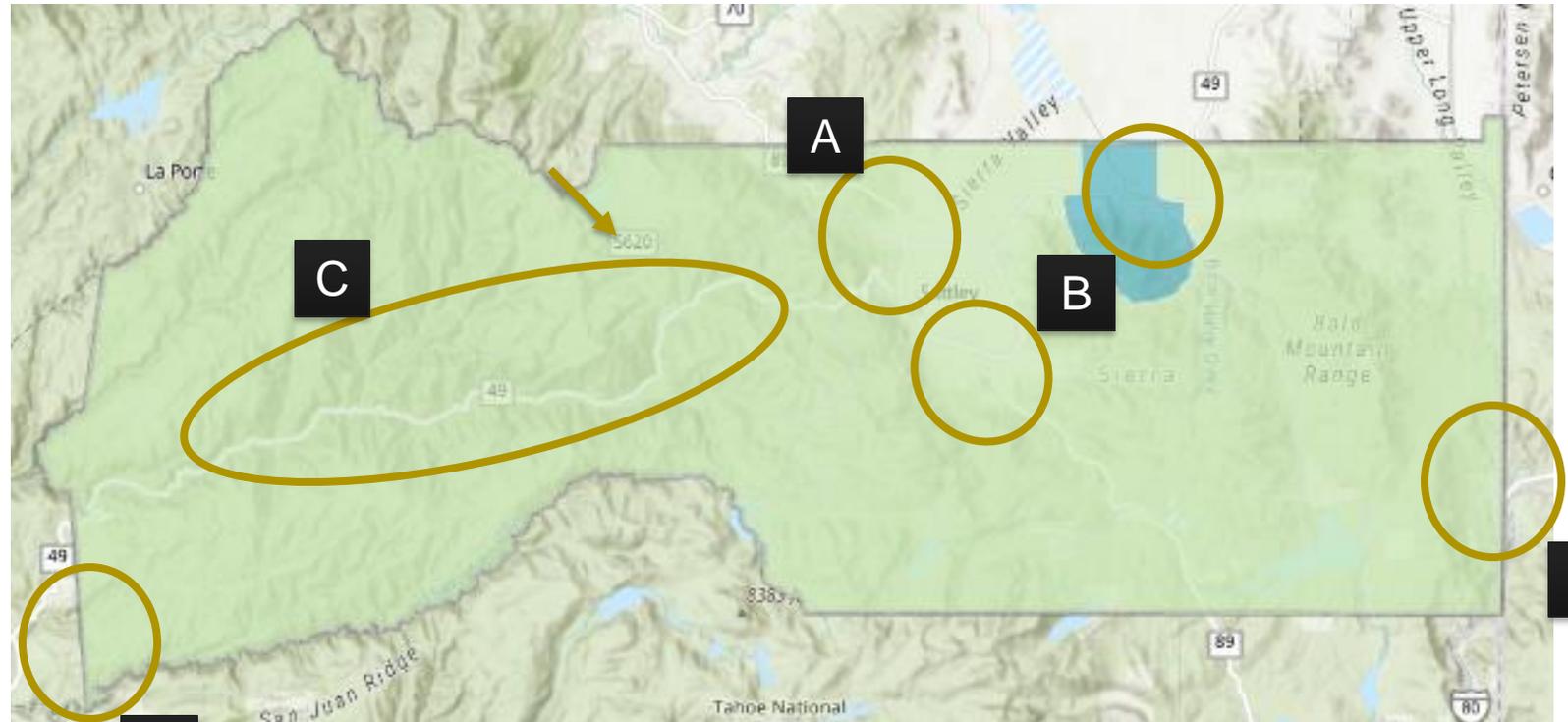


Intersection with Social Vulnerability

- A) Low Social Vulnerability
- B) Low Social Vulnerability
- C) High and Low Social Vulnerability
- D) Low Social Vulnerability
- E) High Social Vulnerability

Social Vulnerability Score

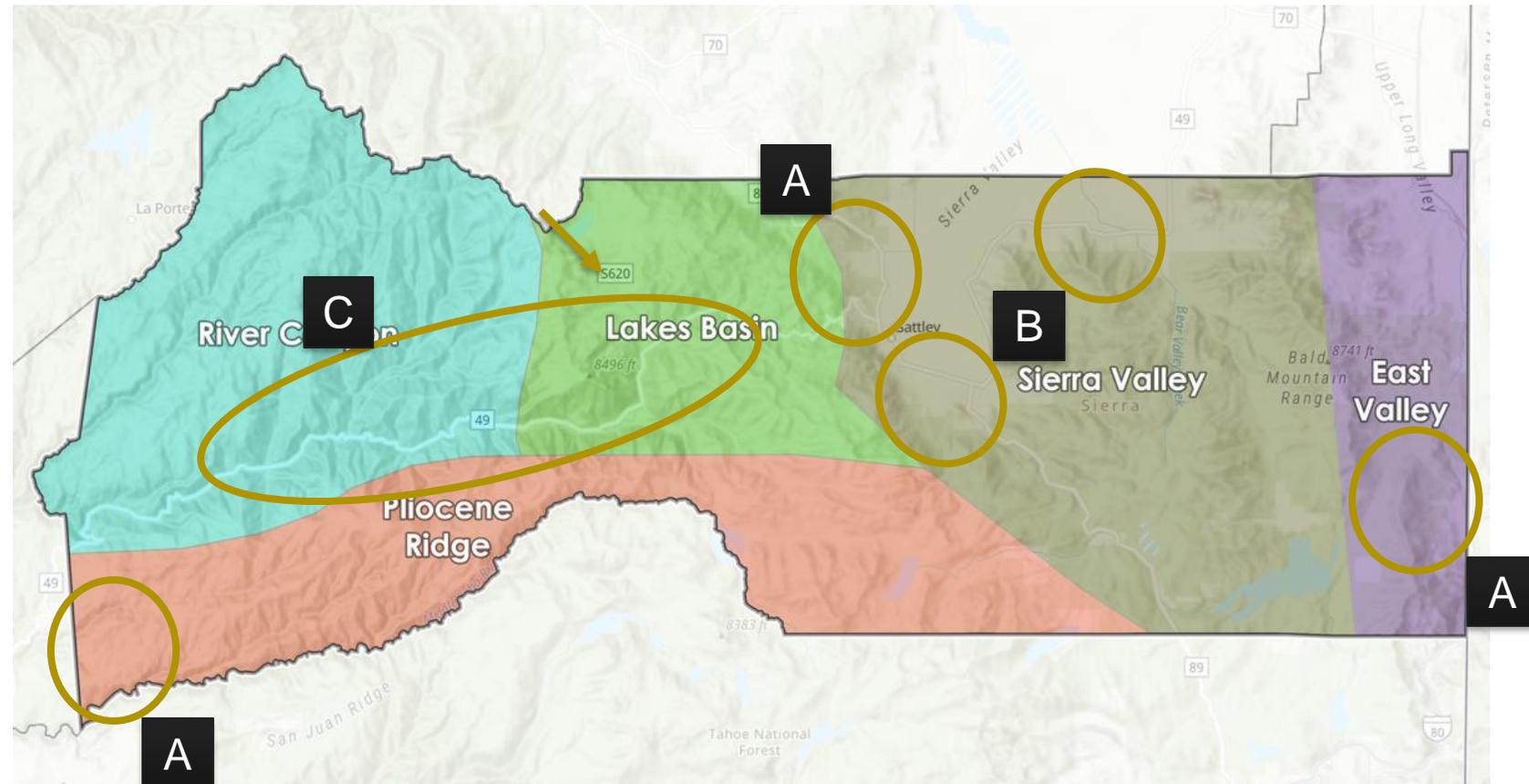
- High Social Vulnerability Score (Top 20%)
- Medium-High Social Vulnerability Score
- Medium Social Vulnerability Score
- Medium-Low Social Vulnerability Score
- Low Social Vulnerability Score (Lowest 20%)





Intersection with Social Vulnerability

- A) Low Social Vulnerability
- B) Low Social Vulnerability
- C) High and Low Social Vulnerability
- D) Low Social Vulnerability
- E) High Social Vulnerability

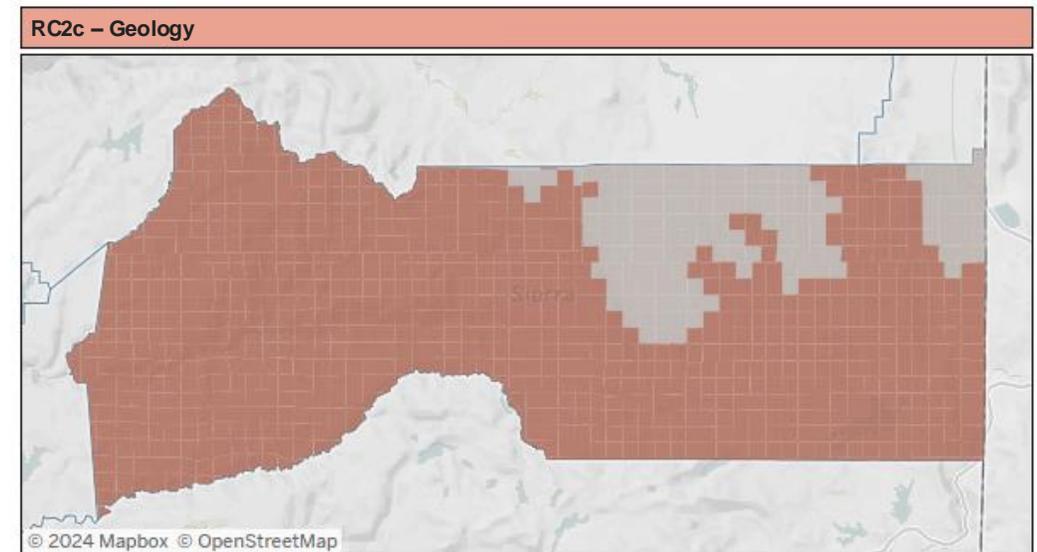




Physical Vulnerability Drivers

- Indicators driving physical vulnerability:
 - Dry well susceptibility in fractured rock area
 - Multiple dry years within the past five years
 - Wildfire Hazard
 - Percent land as irrigated agricultural
 - Water quality index
- Vulnerability results for all indicators are included in the Risk Assessment Appendix

Drivers in Fractured Rock Basins



rRC2c - Fractured Rock Basin
 ■ Fractured Rock Basin ■ INA



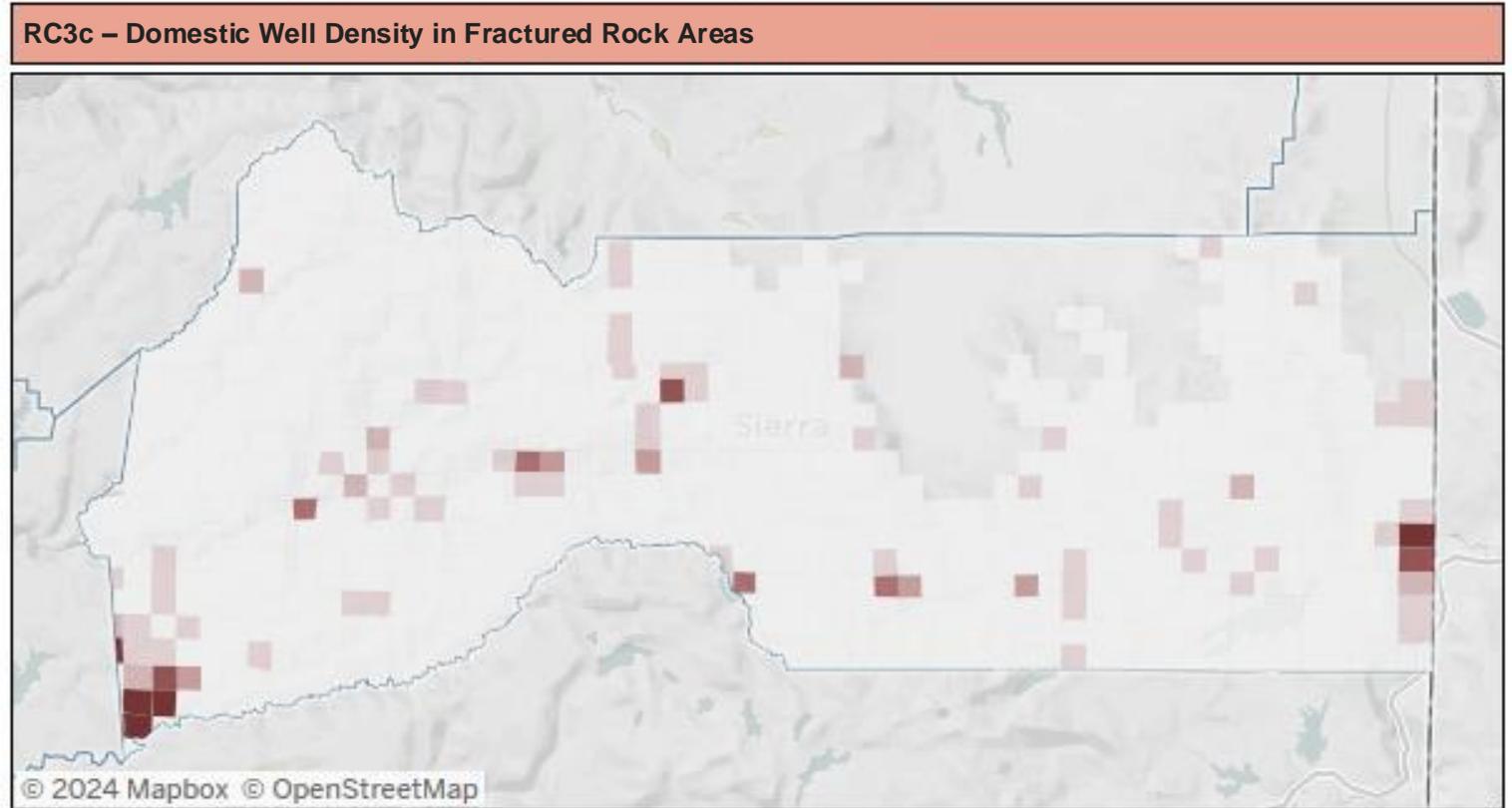
Indicator Detail: Dry Well Susceptibility in Fracture Rock Basins

Indicator Metric:

Density of domestic wells in fractured rock basins

Vulnerability Impact:

Higher density of domestic wells in fractured rock areas increases the vulnerability of well outages, particularly during dry periods



RC3c – Number of Domestic Wells in Fractured Rock Area





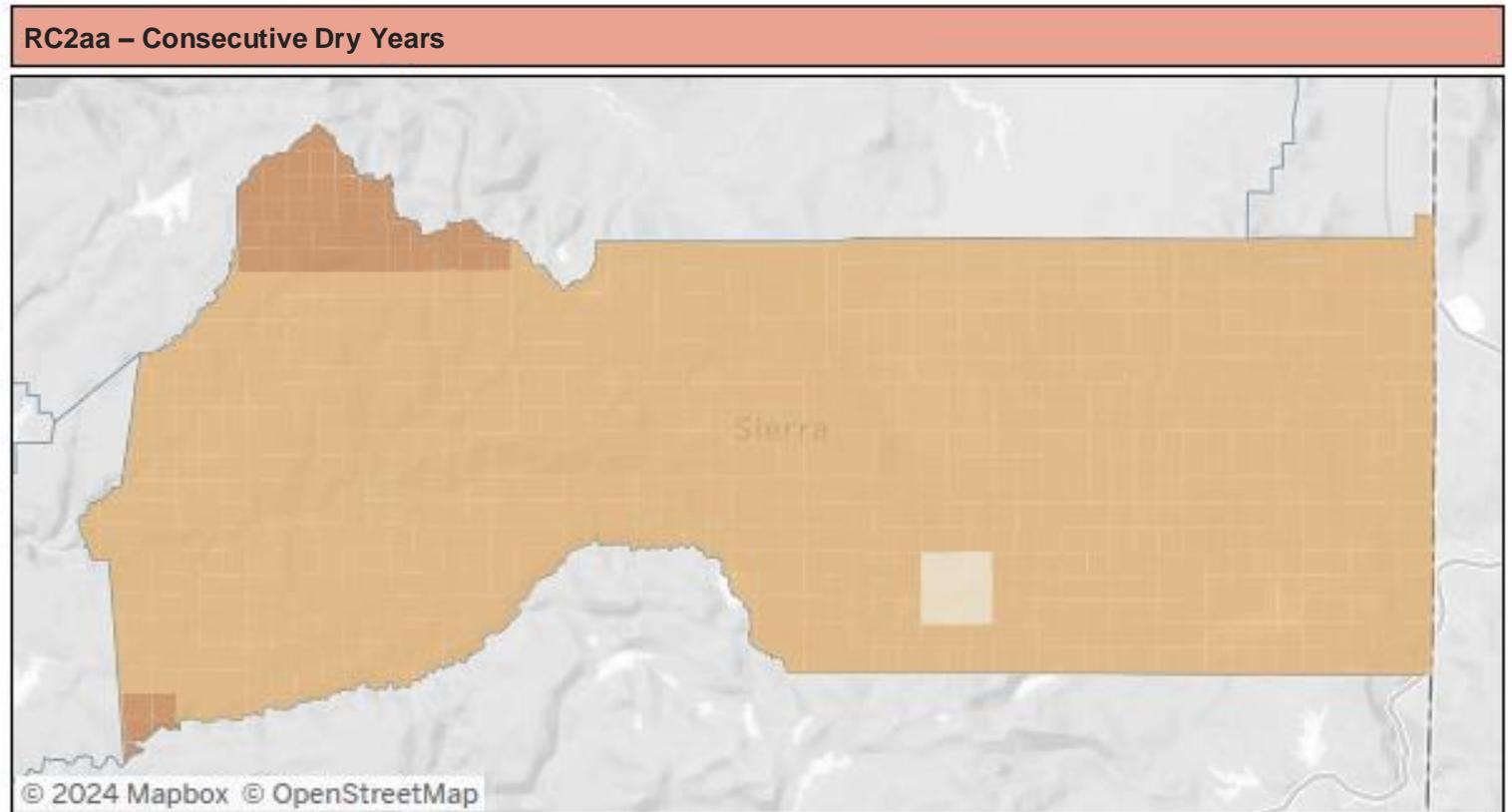
Indicator Detail: Consecutive Dry Years

Indicator Metric:

Count of precipitation less than the average within the last five years.

Vulnerability Impact:

Higher count of dry years could signal a potential near-term challenge in meeting water demands, stressing water resources and infrastructure



Count of Dry Years within the Last 5 Years





Indicator Detail: Wildfire Risk

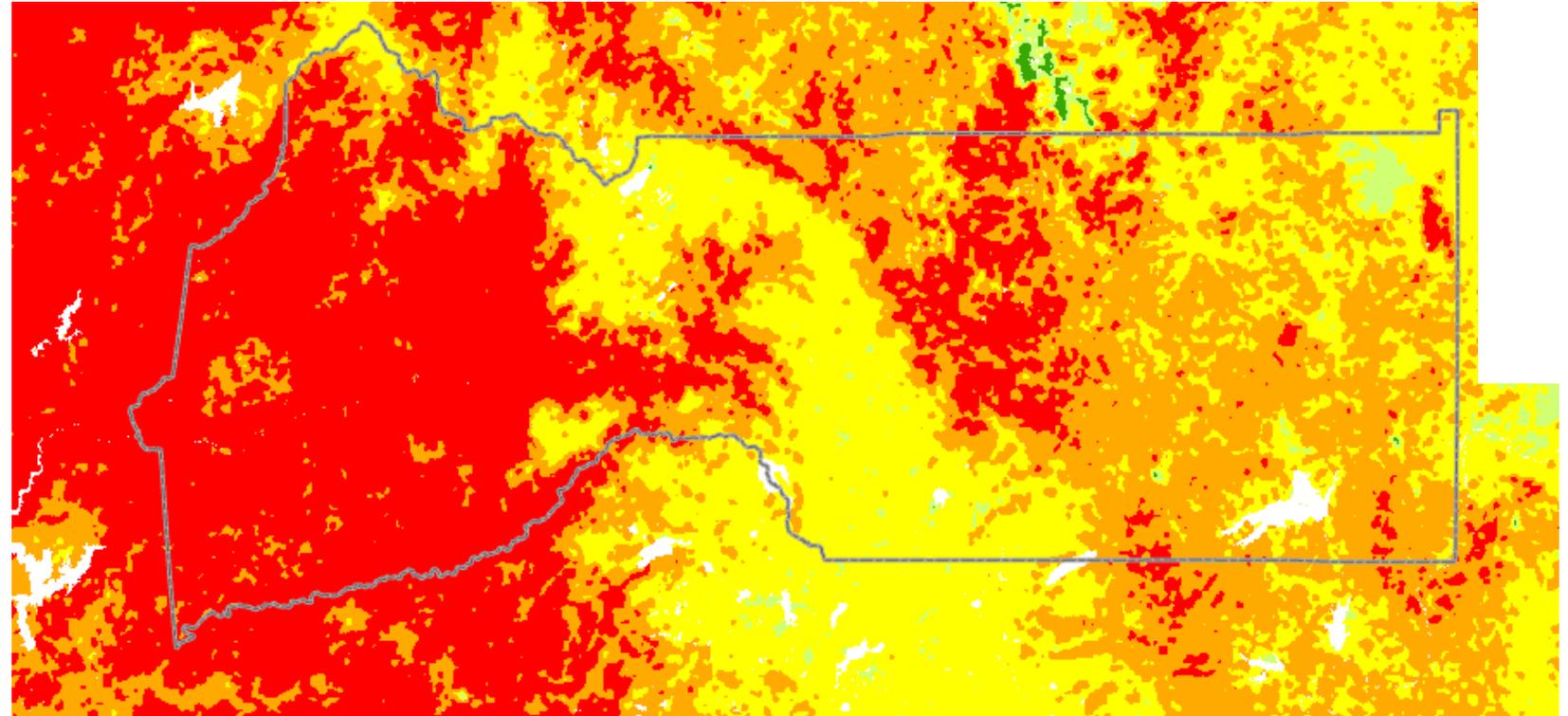
Indicator Metric:

The relative potential for high-intensity wildfire that may be difficult to manage

Vulnerability Impact:

Damage or destroy natural and built infrastructure that can alter water quality and stress water resources

US Forest Service Wildfire Hazard Potential





Indicator Detail: Water Quality Risk

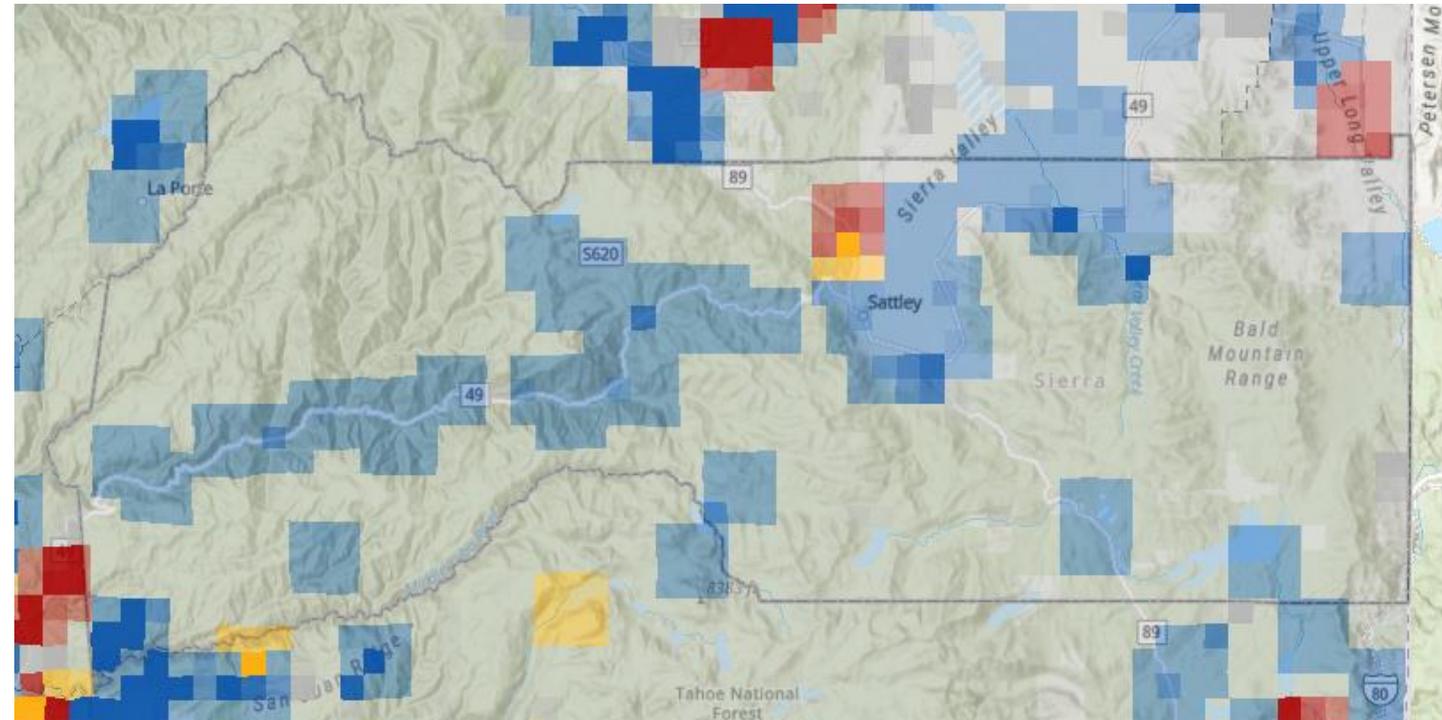
Indicator Metric:

Applied 2024 SAFER Needs Assessment for water quality, which shows the raw groundwater quality risk based on existing data. Does not predict or estimate actual water quality at given locations.

Vulnerability Impact:

Increased risk of domestic well or SSWS being unable to deliver drinking water due to water quality impact

California State Water Resources Control Board 2024 Water Quality Risk



SWRCB 2024 Water Quality Risk

- high (> comparison concentration)
- medium (80% - 100% of comparison concentration)
- low (< 80% of comparison concentration)
- unknown



Indicator Detail: Presence of Irrigated Agriculture

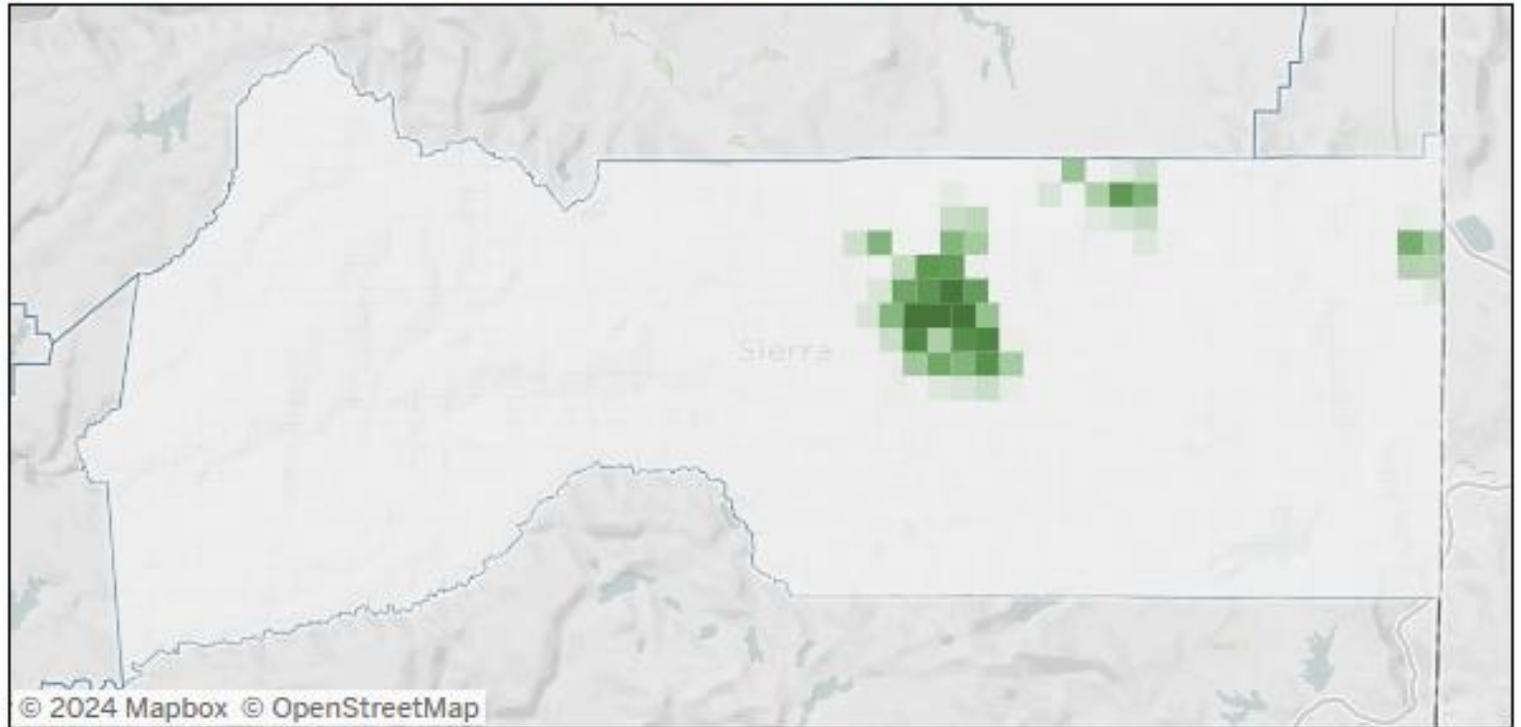
Indicator Metric:

Percentage of land use as irrigated agriculture within the County in 2019

Vulnerability Impact:

Increased competition for groundwater supplies during droughts or water shortages, with domestic wells and SWSs being more vulnerable

RC2j – Presence and Amount of Irrigated Agriculture in PLSS



rRC2j – Percent Land as Irrigated Agriculture





Risk Assessment Findings

Regions with Water Shortage Vulnerability and Domestic Wells/SSWSs	Vulnerability Drivers	Social Vulnerability
Communities in Fractured Rock Basins (Pike, Calpine, and Verdi)	<ul style="list-style-type: none"> • Dry well susceptibility in fractured rock area • Multiple dry years within the past five years • Wildfire Hazard • Water Quality Index 	Medium-Low
Areas within the Sierra Valley Basin near Loyalton and Sierraville	<ul style="list-style-type: none"> • Percent land as irrigated agricultural • Water quality index 	Medium
Domestic wells, SSWS, and small spring systems along the North Yuba River	<ul style="list-style-type: none"> • Dry well susceptibility in fractured rock area • Multiple dry years within the past five years • Wildfire Hazard 	Medium-Low
Isolated Domestic Wells in Fractured Rock Area Across the County	<ul style="list-style-type: none"> • Dry well susceptibility in fractured rock area • Multiple dry years within the past five years • Wildfire Hazard 	Medium-Low



Meeting Outcomes



Ensure Task Force understands the Risk Assessment process



Validate Risk Assessment outcomes



Photo Credit: Sierra County

Overview of Short-Term Actions and Long-Term Strategies



Legislative Directive

SB 552, CWC Section 10609.70:

(b) A county shall develop a plan that includes potential drought and water shortage risk and proposed interim and long-term solutions for state small water systems and domestic wells within the county's jurisdiction. The plan may be a stand-alone document or may be included as an element in an existing county plan, such as a local hazard mitigation plan, emergency operations plan, climate action plan, or general plan. A county shall consult with its drought task force or alternative coordinating process as established by this section in developing its plan. A county shall consider, at a minimum, all of the following in its plan:

- (1) Consolidations for existing water systems and domestic wells.*
- (2) Domestic well drinking water mitigation programs.*
- (3) Provision of emergency and interim drinking water solutions.*
- (4) An analysis of the steps necessary to implement the plan.*
- (5) An analysis of local, state, and federal funding sources available to implement the plan.*



Definitions

Short-Term **Actions mitigate impacts** during drought/ water shortage onset and throughout a drought/ water shortage event

Long-Term Mitigation **Strategies reduce the vulnerability** to drought/ water shortage events

The DRP will select actions and strategies and develop an implementation strategy



Drought Resilience Plan Outline

- Chapter 1: Introduction
- Chapter 2: County Drought and Water Shortage Task Force
- Chapter 3: Drought and Water Shortage Risk Assessment
- **Chapter 4: Short-Term Response Actions**
- **Chapter 5: Long-Term Mitigation Strategy and Actions**
- **Chapter 6: Implementation Considerations**



Initiating development of Chapters 4, 5, and 6.



Short-Term Actions Overview

- DRP Includes Water Shortage Emergency Response Plan
 - Stages tied to Conditions
 - Atmospheric, wildfire, earthquake, contamination, etc.
 - Portfolio of Actions Tied to Stages
 - Emergency and Interim Drinking Water Distribution Checklist
 - Communication Strategy
- Actions to be Evaluated
 - Emergency and Interim Drinking Water Supplies
 - Mutual Aid Agreements
 - Permit streamlining for well construction, deepening, and rehabilitation
 - Interties



Long-Term Mitigation Strategies Overview

- DRP will evaluate:
 - Effectiveness of system consolidation
 - Potential regional water infrastructure
 - Strategies to address identified data gaps
- Implementation Strategy will outline a path to a Drinking Water Well Mitigation Program
 - Steps for realizing identified actions and strategies
 - Agency, GSA, County coordination
 - Policy Alignment
 - Funding and Assistance Opportunities

Drinking Water Well Mitigation Program Could Include:

- Assistance programs for well installation and remediation
- Education and outreach
- Groundwater monitoring network
- Coordination with GSAs and agricultural and municipal well operators
- System consolidation
- Regional water infrastructure



Meeting Outcomes



Ensure Task Force understands the Risk Assessment process



Validate Risk Assessment outcomes



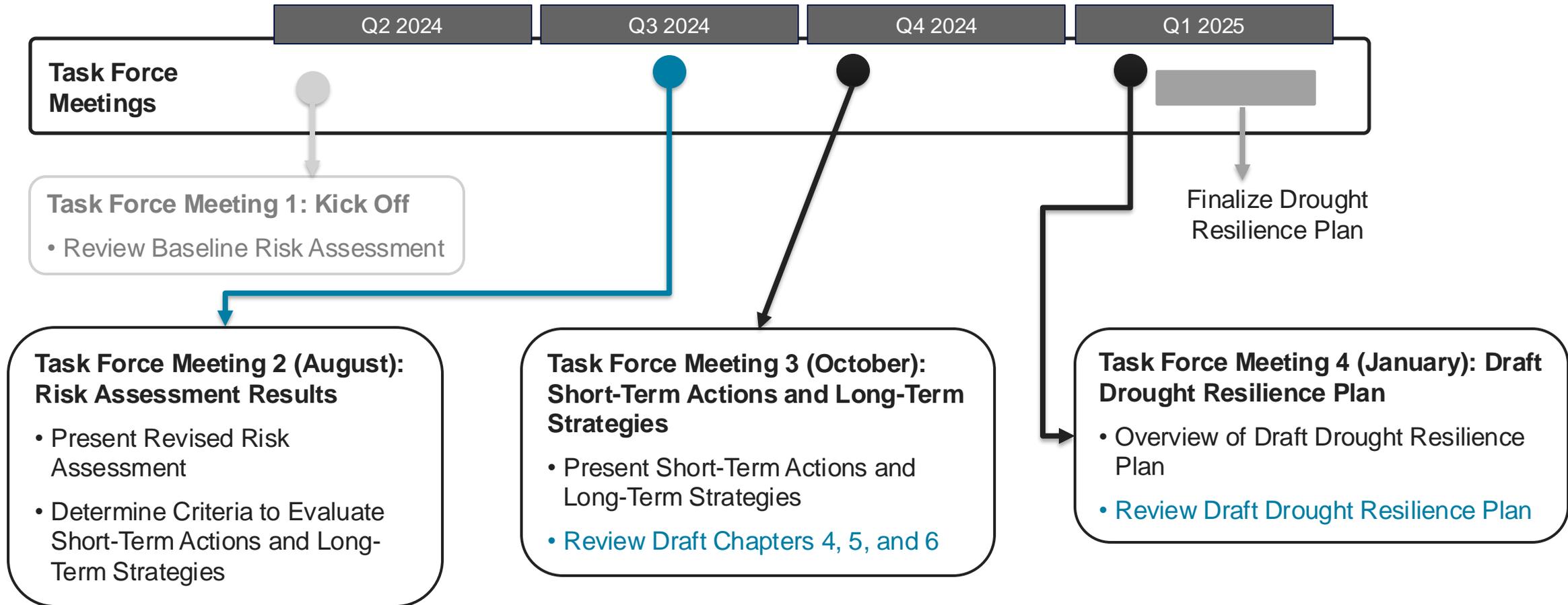
Introduce short-term actions and long-term mitigation strategies



Next Steps



Upcoming Activities and Schedule





Additional Questions and Discussion



Contact Us

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Neil.Stewart@stantec.com

