SECURING COMMUNITY WATER SUPPLIES · WATER ISSUE OVERVIEW

# Securing community water supplies

How can we ensure reliable drinking water access for Californians in wet years, dry years, and a changing climate?

## INTRO

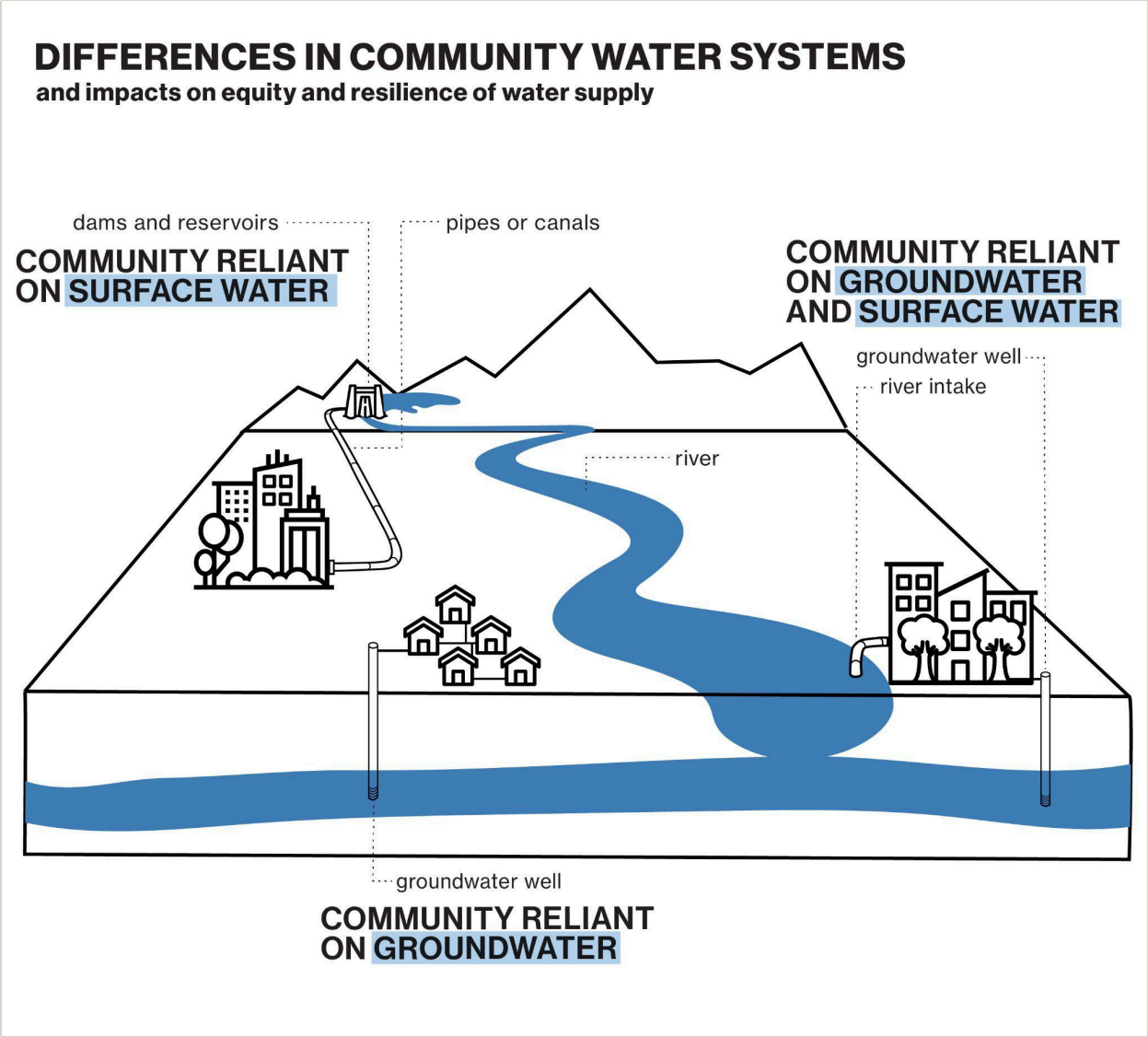
Almost 38 million Californians, 97% of the state's population, depend on community water systems to provide water for drinking, cooking, bathing, schools, hospitals, and local businesses. When these systems are stressed, the impacts are immediate and personal.

## WHY THIS MATTERS

Community water systems serve cities, towns, and rural communities across California. Some rely on surface water delivered through rivers and canals, while others depend on groundwater wells. Many use a combination of both.

### Different water sources shape community resilience

Some communities rely primarily on surface water delivered through rivers, reservoirs, pipes, and canals, while others draw from both surface water and groundwater wells. Access to multiple water sources can provide greater flexibility when one source becomes less available, while reliance on a single source can leave communities more vulnerable to drought, infrastructure disruptions, and other changes in water supply.




In wet years, water supplies are generally more abundant. In dry years, shortages can emerge, especially when reservoir storage is low or groundwater levels decline. Smaller and rural systems are often more vulnerable because they have limited financial resources and infrastructure to access alternative water sources.

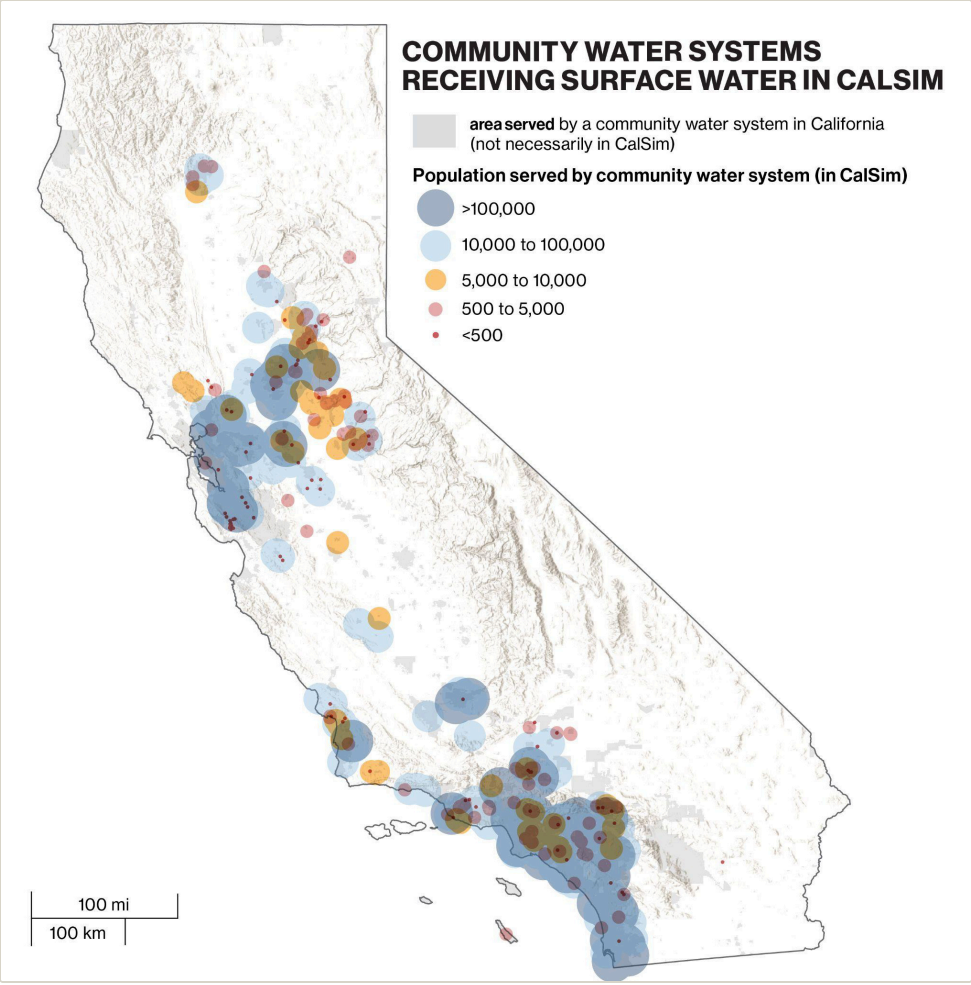
Surface water deliveries are shaped by a complex combination of water rights, contracts, operating rules, infrastructure, and water availability. These arrangements affect how shortages are distributed, meaning that some community water systems may experience larger reductions in project deliveries than others.

Climate change adds new uncertainty. Snowpack is declining, higher temperatures increase evaporation, and droughts may become longer and more severe. These shifts affect how much water is available. Understanding how reliable different water supplies are under changing conditions helps communities anticipate risks, plan ahead, and ensure consistent access to water.

## WHAT THIS WATER ISSUE FOCUSES ON

### Surface water deliveries from large water projects to communities

Community water systems rely on surface water, groundwater, or a combination of sources to meet their needs. This water issue focuses on surface water delivered from California's major water projects to major metropolitan areas around the Bay Area, Sacramento, and Los Angeles, as well as smaller communities throughout the Central Valley and Southern California. These deliveries represent only a subset of California's community water systems and drinking water supplies.




**Community drinking water deliveries as represented in CalSim3**

The CalSim3 water systems model that is used in COEQWAL simulates surface water deliveries from the major water projects to community water systems at 74 locations of interest throughout California, shown on the map below.


### Assessing delivery reliability and the distribution of impacts

Surface water deliveries are not determined by community need alone. Water rights, contracts, operating rules, infrastructure, and patterns of water availability all influence how project water is distributed and how reductions in deliveries are experienced across communities.

To evaluate these deliveries in the context of community needs, COEQWAL compares modeled surface water deliveries with recent potable (drinking water) demands. This provides a measure of how reliably the modeled project supplies can contribute to meeting community water needs under different management and climate conditions.

This analysis also shows how reliability varies among locations, revealing which community water systems consistently receive reliable project deliveries and which remain more vulnerable.

### WHAT TO KEEP IN MIND

- Community water systems may rely on surface water, groundwater, stored water, or combinations of different sources. Access to these alternative sources varies considerably among systems. COEQWAL evaluates surface water deliveries from major water projects to select community water systems, not each community's complete water supply portfolio.
- Community surface water deliveries are evaluated relative to recent potable water demands, provided by the State Water Resources Control Board's Division of Drinking Water. Project deliveries are influenced by water availability, contracts, water rights, infrastructure, and operating rules and may not fully meet these demands.
- When modeled project deliveries fall below demand, this does not necessarily mean that a community experiences a drinking water shortage. Systems with access to groundwater, local surface water, or other alternatives may be better able to respond to reduced project deliveries than systems with fewer options.
- Community water systems respond to both the severity and frequency of shortages. Water system stress can result from a significant delivery shortfall in a single year or repeated shortfalls over multiple years.

## WHAT MANAGEMENT STRATEGIES ARE EXPLORED

This water issue explores two scenarios that prioritize surface water deliveries for community use:

- Prioritizing human health water deliveries to community water systems
- Prioritizing full demands of community water systems

Together, these scenarios examine how different levels of priority for community water deliveries affect the broader water system, including agricultural water supplies, reservoir storage, environmental flows, and other outcomes.

For more information about each of these scenarios, visit **Data and Documentation** (https://coeqwal.org/data).

## WHAT THE MODELS SHOW

The **Explore Tool** (**https://coeqwal.org/explore**) allows you to explore how scenario outcomes compare under alternative management strategies and climate conditions. There are complementary ways to visualize tradeoffs, equity, and resilience of water management strategies. The examples below illustrate results from select scenarios for this water issue.

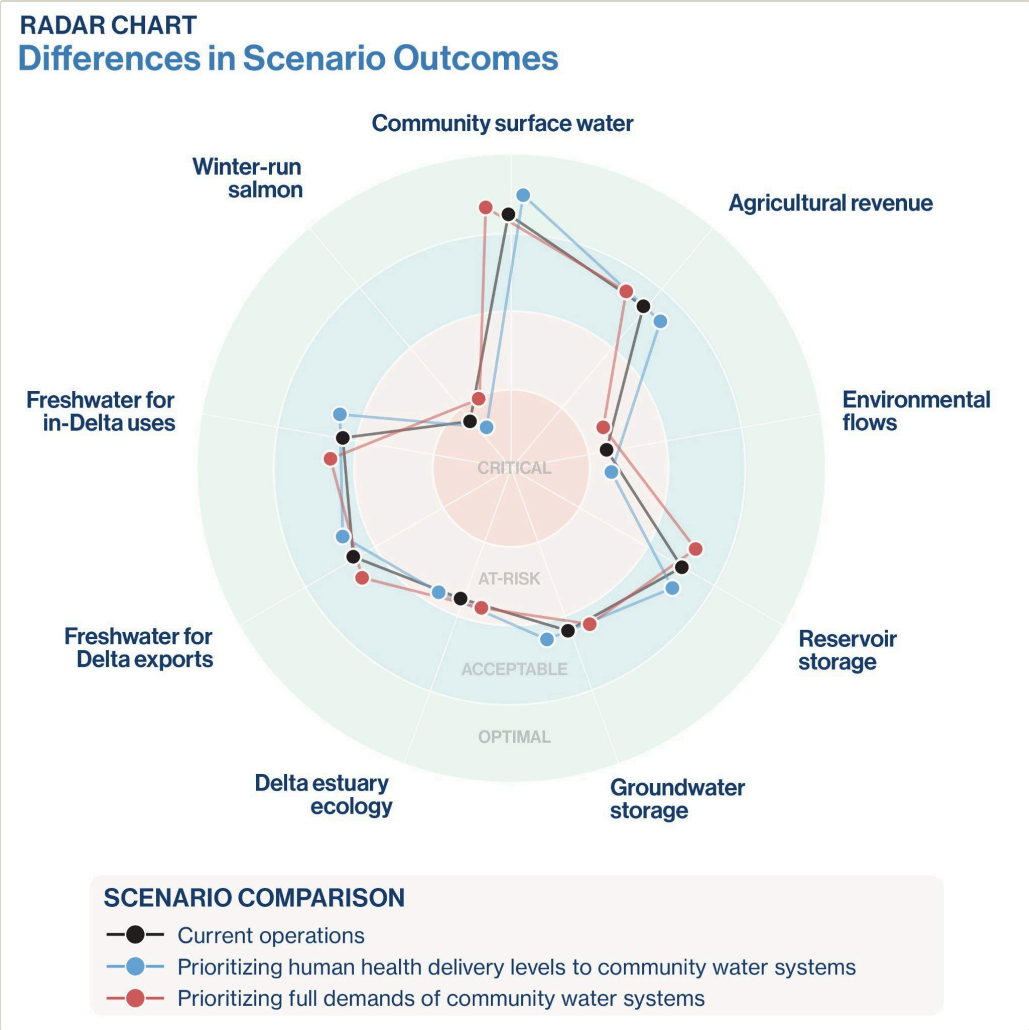
### Trade-offs

How do different management strategies affect overall system performance across multiple outcomes?

The radar chart in the **Explore Tool** (https://coeqwal.org/explore) summarizes performance across nine key outcomes, revealing broad system-level trade-offs within and between scenarios. The chart displays the average performance across all locations of interest for each scenario, providing a system-wide view of how these management strategies influence multiple outcomes simultaneously. The

chart view below specifically compares **Current operations** (black), **Prioritizing human health delivery levels to community water systems** (blue), and **Prioritizing full demands of community water systems** (red) under the historical hydroclimate.

The points show the average condition across all locations of interest for each outcome, classified into four outcome levels: optimal, acceptable, at-risk, and critical. See **Data and Documentation** (https://coeqwal.org/data) for more information on how these categories are defined.




The results show that community surface water deliveries perform well on average under **Current Operations** and improve further under both scenarios that prioritize community water needs. The results also reveal that these

improvements in community surface water outcomes are not associated with notable impacts to other parts of the system. The performance of winter-run salmon does decline in the scenario that prioritizes human health delivery levels, suggesting that additional community water deliveries limit water needed by this salmon population. However, the average values for all other outcomes are similar between the baseline and the two scenarios that prioritize water deliveries to community water systems.

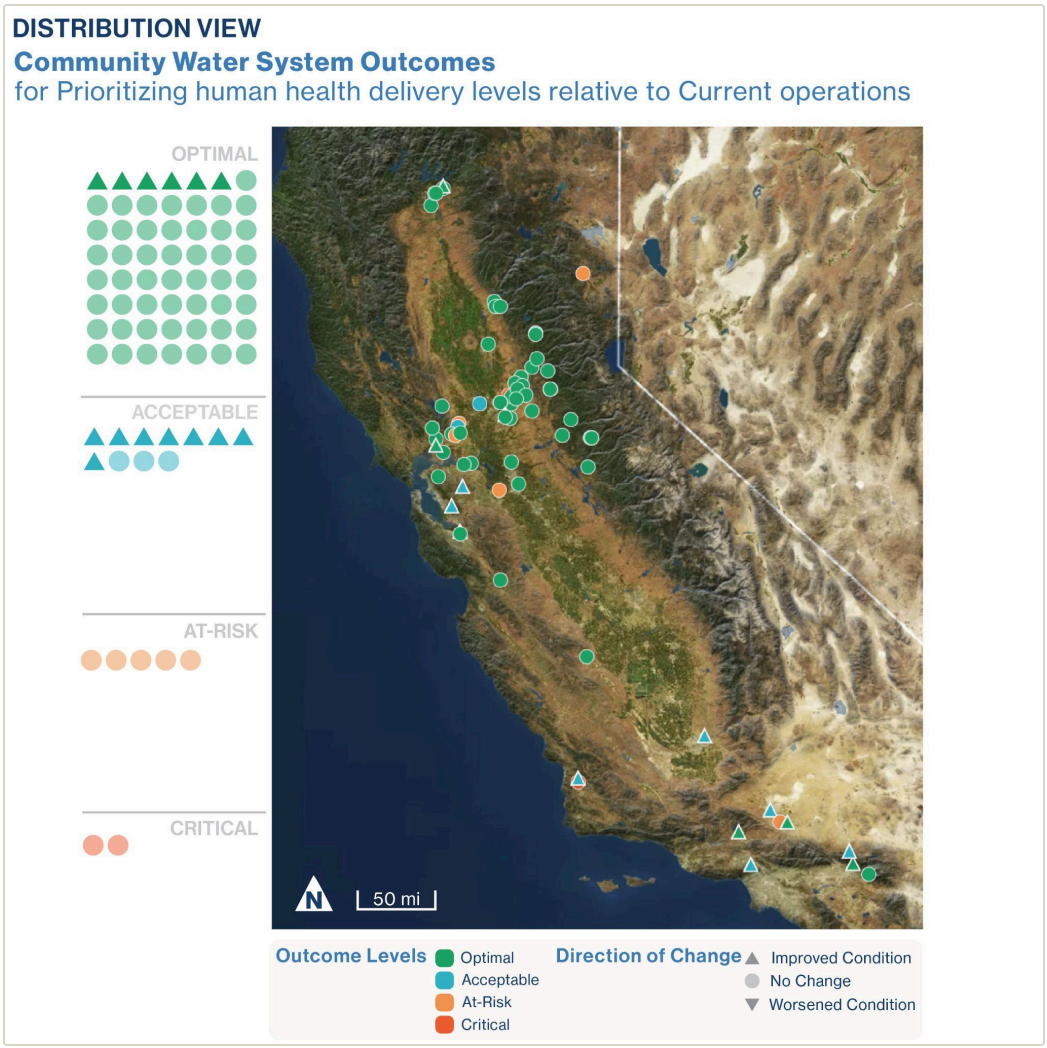
The radar chart shows system-wide performance of outcomes, while the Distribution view reveals the specific locations where benefits or impacts occur.

#### Equity

Where do benefits and impacts occur, and who is most affected?

System-wide averages can hide important differences in scenario impacts. Water availability and access can vary substantially between regions and served systems, meaning that the same management strategy can produce different outcomes in different places.

The Distribution view in the **Explore Tool** (https://coeqwal.org/explore) shows results for individual locations of interest. This figure displays outcomes for community surface water deliveries for **Prioritizing human health delivery levels to community water systems**, relative to **Current operations**. Arrows indicate the direction of change relative to current operations, and color represents optimal (green), acceptable (blue), at-risk (orange), or critical (red) outcomes for the scenario. Circles represent locations that did not change condition relative to current operations.




The results show that surface water deliveries to most locations of interest are "Optimal" or "Acceptable" under the human health priority scenario, and deliveries improve for many systems. However, seven locations remain "At-risk" or "Critical" and do not improve relative to **Current operations**. This shows that prioritizing community water deliveries across the system does not benefit every community equally or eliminate existing vulnerabilities.

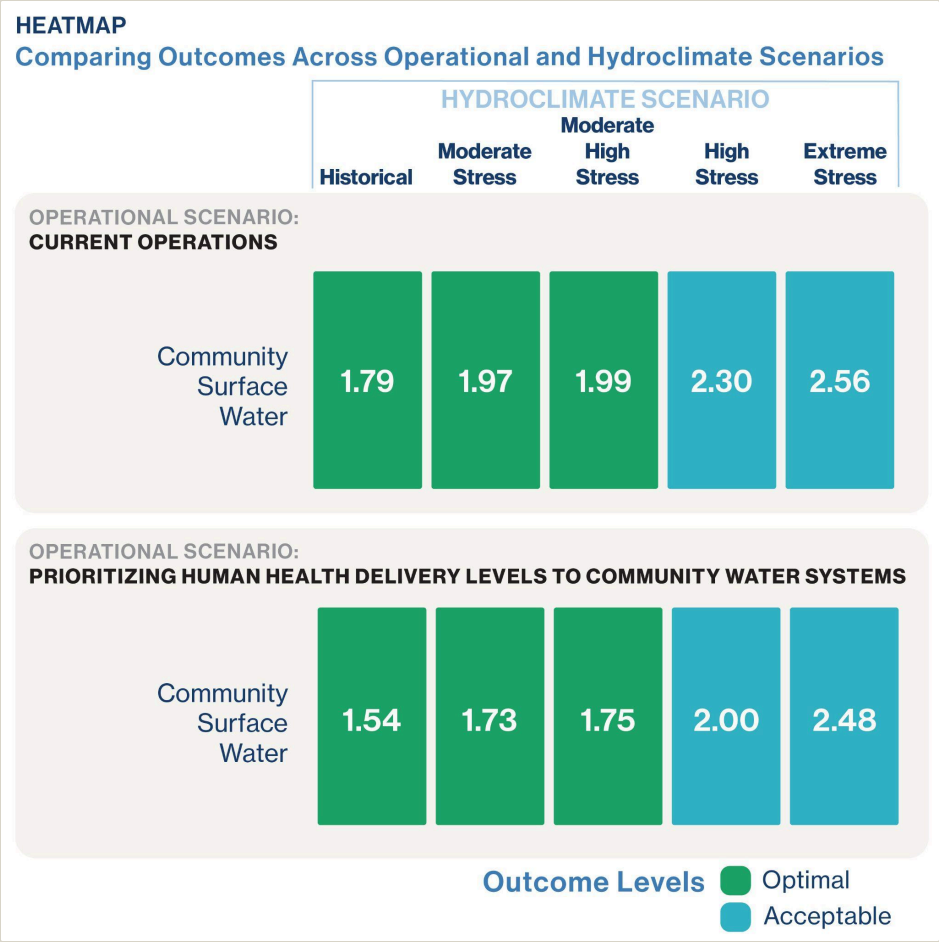
Because communities differ in their access to groundwater, local storage, alternative supplies, financial resources, and other sources of resilience, similar surface water delivery outcomes may have different implications in different places. Overall, the Distribution view reveals patterns hidden by the system-wide averages and helps identify which locations benefit from changes in management and which remain vulnerable.

### Resilience

How consistently do management strategies perform under different climate futures?

Climate change is expected to place increasing stress on California's water system. A management strategy that performs well today may respond differently as droughts become more frequent, temperatures rise, and water availability changes. The Resilience heatmap in the **Explore Tool** (https://coeqwal.org/explore) examines how management strategies perform across a range of plausible hydroclimate futures, representing increasing levels of stress to the water system. Visit **Data and Documentation** (https://coeqwal.org/data) for more information about hydroclimate futures.

This Resilience heatmap summarizes community surface water deliveries under the historical hydroclimate and future hydroclimates representing Moderate, Moderate-High, High and Extreme levels of climate stress for **Current Operations** and **Prioritizing human health delivery levels to community water systems.** Outcomes are categorized as optimal (1.00 - 1.99), acceptable (2.00 - 2.99), at-risk (3.00 - 3.99), or critical (4.00 - 4.99), with higher numerical values indicating worse performance.




Community surface water deliveries decline as climate stress increases under both management strategies. Under **Current operations**, average performance remains "Optimal" from the historical through Moderate-High hydroclimates, before declining to "Acceptable" under High and Extreme climate stress. Prioritizing human health delivery levels improves average community surface water delivery performance under every hydroclimate examined. However, performance still declines as climate stress increases, shifting from "Optimal" through Moderate-High stress to "Acceptable" under High and Extreme stress.

These results suggest that prioritizing essential community water needs improves the resilience of modeled surface water deliveries across a range of climate futures, but cannot fully offset the effects of increasingly severe water scarcity.

## HOW TO EXPLORE FURTHER

Together, these trade-offs, equity, and resilience views show how prioritizing community water supplies affects other parts of the water system, how benefits are distributed among locations, and whether those benefits persist under increasing climate stress. Visit the **Explore Tool** (https://coeqwal.org/explore) to examine how different strategies affect community surface water deliveries and other outcomes across locations and hydroclimates.

If this is the first time using the **Explore Tool** (https://coeqwal.org/explore), we recommend visiting the **Get Started** (https://coeqwal.org/learn) section of the site before you begin your exploration.

## CONTACT US

Do you have questions or feedback about this water issue and the COEQWAL project? Please email coeqwal@berkeley.edu (mailto:coeqwal@berkeley.edu)