



STATE WATER PROJECT ADAPTATION STRATEGY

Reducing the Vulnerability of the State Water Project from Climate Change



JULY 2021



JULY 2023

Looming Effects of Climate Change

Over the next 20 years, California could lose **10 percent** of its overall water supplies because of climate change.

- Rapid climate changes could reduce State Water Project deliveries by as much as a **quarter**
- The SWP water deliveries to public agencies serve **27 million Californians** and is foundational to the California economy



A Hotter, Drier Future

- Governor Newsom's 2022 Water Supply Strategy outlines actions to adapt to California's hotter, drier future.
- The suite of actions – conservation, recycling, storage, infrastructure, desalination and groundwater – are meant to help California's water systems adapt.
- DWR's Climate Action Plan, and the new SWP Adaptation Strategy, help fulfill this mission by providing data to better understand and prioritize adaptation projects.



DWR's Climate Action Plan

Phase 1: Reduce Drivers

Greenhouse Gas Emissions Reduction Plan

By 2030, reduce GHG emissions to at least 60 percent below the 1990 level.

By 2035, supply 100 percent of electricity load with zero-carbon resources and achieve carbon neutrality.

Key Objective:

Contribute to state/federal/global goals

Phase 2: Evaluate Risks

Consistent climate change analysis across all DWR programs

Establish a process for project managers to incorporate climate change impact analysis into DWR activities, including strategic planning documents, investment decisions, risk assessments, and infrastructure development.

Key Objective:

Ensure all investments are climate resilient

Phase 3: Address Risks

Vulnerability Assessment and Adaptation Plan

Describes, evaluates, and quantifies the vulnerabilities of DWR's assets and activities to potential climate change impacts and prioritizes DWR resiliency efforts such as infrastructure improvements, enhanced maintenance and operation procedures, revised health and safety procedures, and improved habitat management.

Key Objective:

Prepare for the future

4 Specific Adaptation Strategies:

1. SWP Operations (This Plan)

2. Staff Safety
3. Feather River Watershed Wildfire Resilience
4. Landscape Resilience

What is an adaptation strategy?

The SWP's Climate Adaptation Strategy:

- Describes 17 strategies that the SWP is pursuing to address anticipated effects of climate change
- Quantitatively evaluates five of these to show how they would be expected to change the future of SWP reliability
- Aims to:
 - enhance resilience
 - increase flexibility and efficiency
 - minimize risks
 - ensure the sustainability of the SWP system

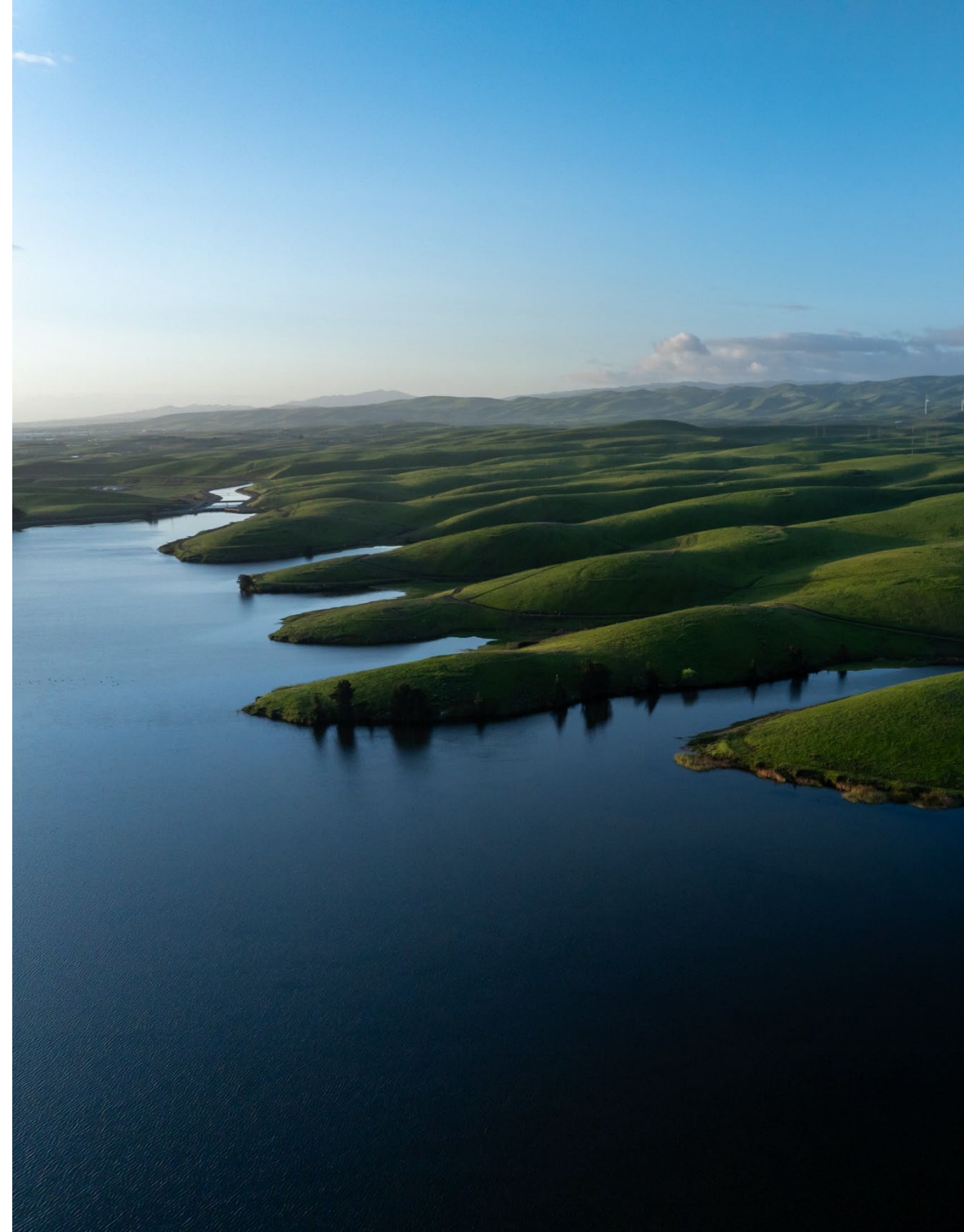
Key Takeaways

- **Maintenance & Restoration** are highest priority.
- On its own, the **Delta Conveyance Project** is the most effective strategy.
- **Forecast Informed Reservoir Operations** is a safe, effective, low-cost strategy.
- **Additional South-of-Delta water storage** is promising, especially when paired with DCP.



Key Takeaways, again

- DWR should continue to pursue adaptation strategies like water supply **forecast improvements** and **Feather River watershed management**.
 - These may be difficult to value, but likely will deliver real benefits and foster future adaptations.
- **Each strategy responds to different climate stressors** such as increasing drought frequency, more extreme precipitation, earlier runoff, and sea level rise, **and a combination of responses is needed**.
- Implementation of a **portfolio** of strategies brings greater adaptation than the sum of individual strategies.



Key Adaptation Strategies

The adaptation strategies that have been identified as the most important and impactful for the SWP include:

- Enhanced Asset Management
- California Aqueduct Subsidence Remediation
- Delta Conveyance Project
- Lake Oroville Flood Control Manual Update to Allow Forecast Informed Reservoir Operations
- Increased South-of-Delta Storage

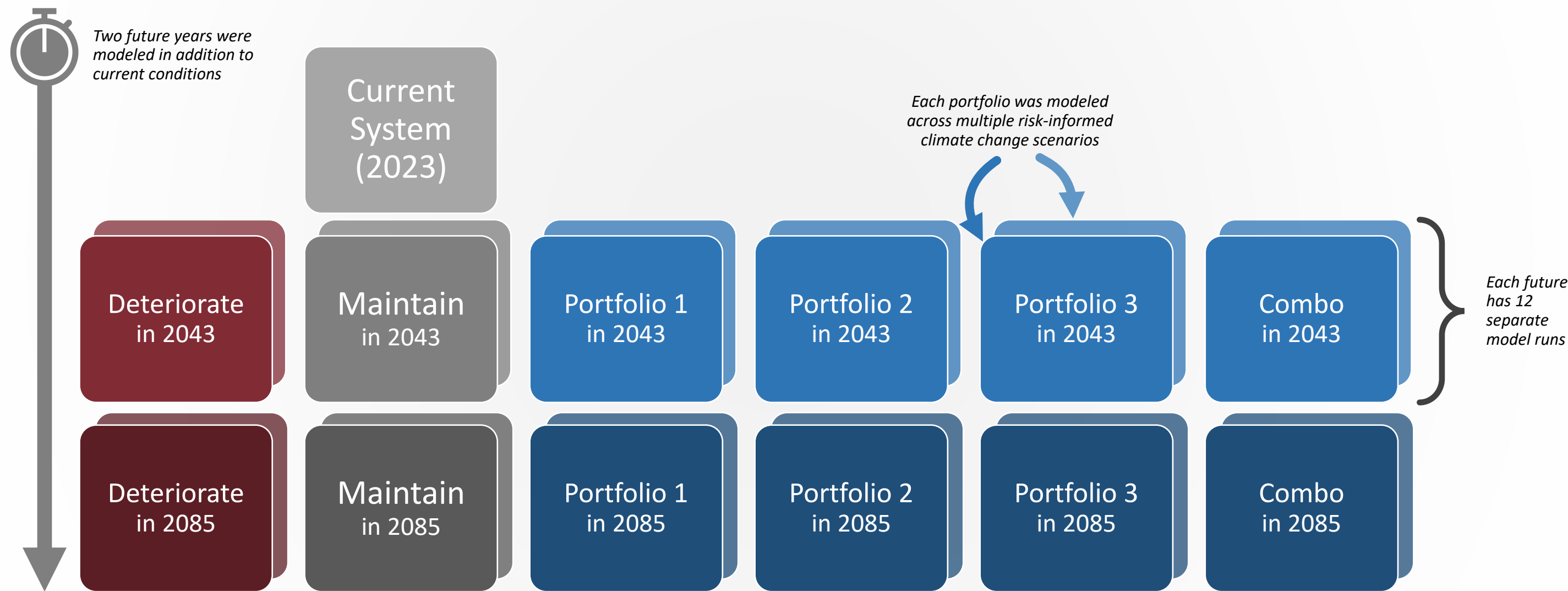
These five key adaptation strategies have been assembled into portfolios that represent alternative adaptation futures for the SWP.

Portfolios Representing Alternative SWP Futures

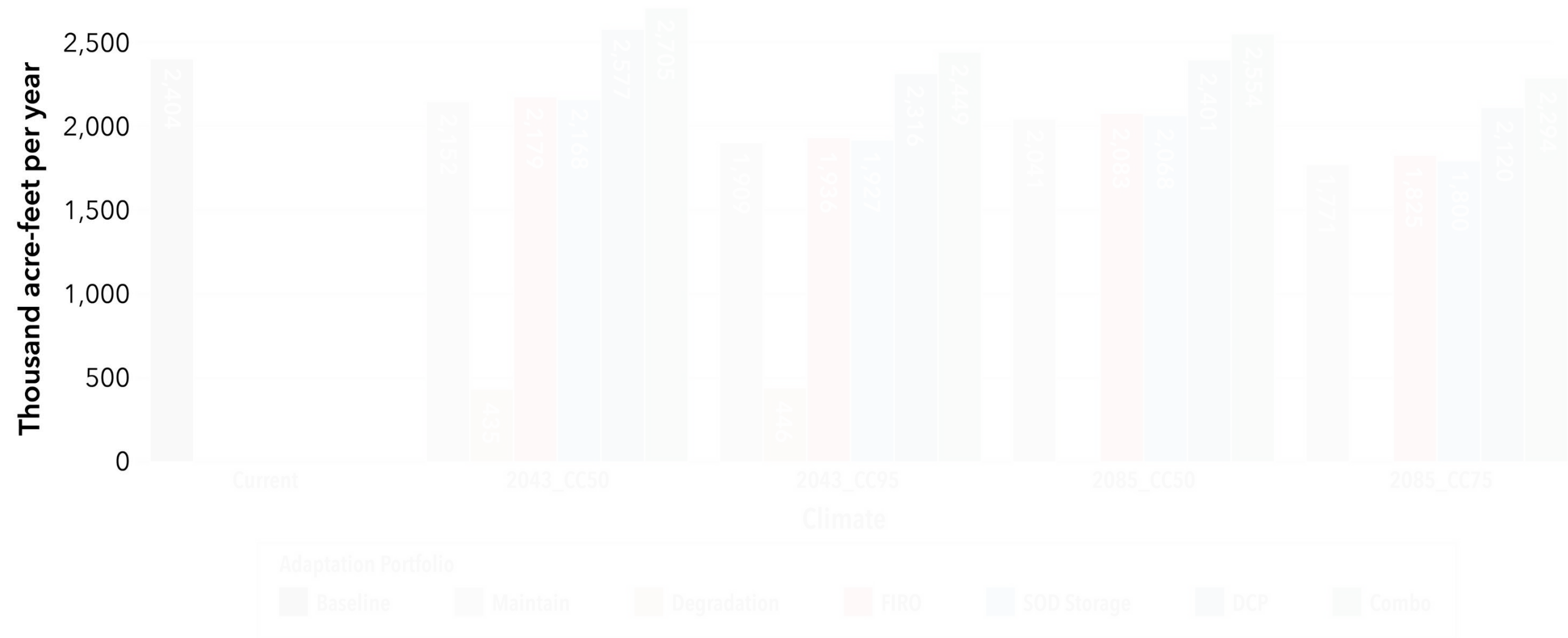
- Deteriorating System (“Run-to-failure”)
- Baseline (“Maintain System”)
 1. Maintain System + Delta Conveyance Project
 2. Maintain System + Forecast Informed Reservoir Operations
 3. Maintain System + South-of-Delta Storage
- C. Combination (Portfolios 1+2+3)



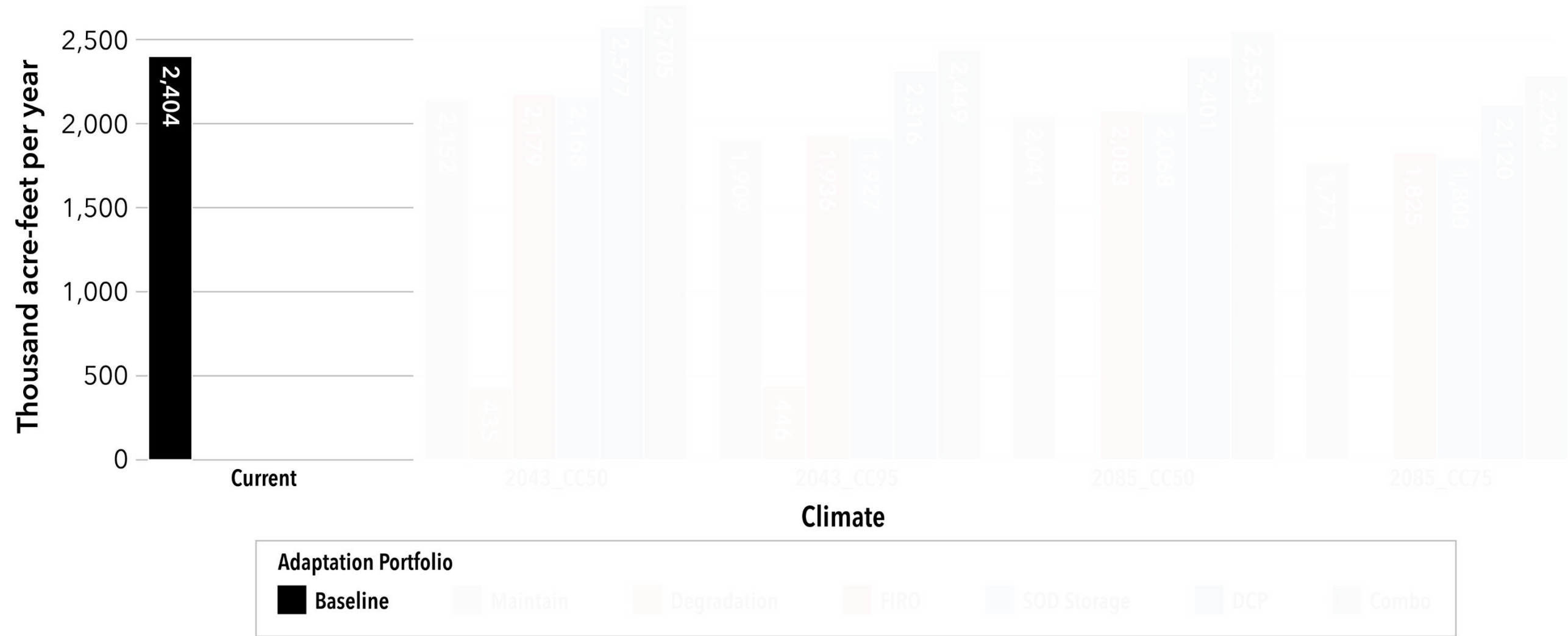
Modeling the Portfolios



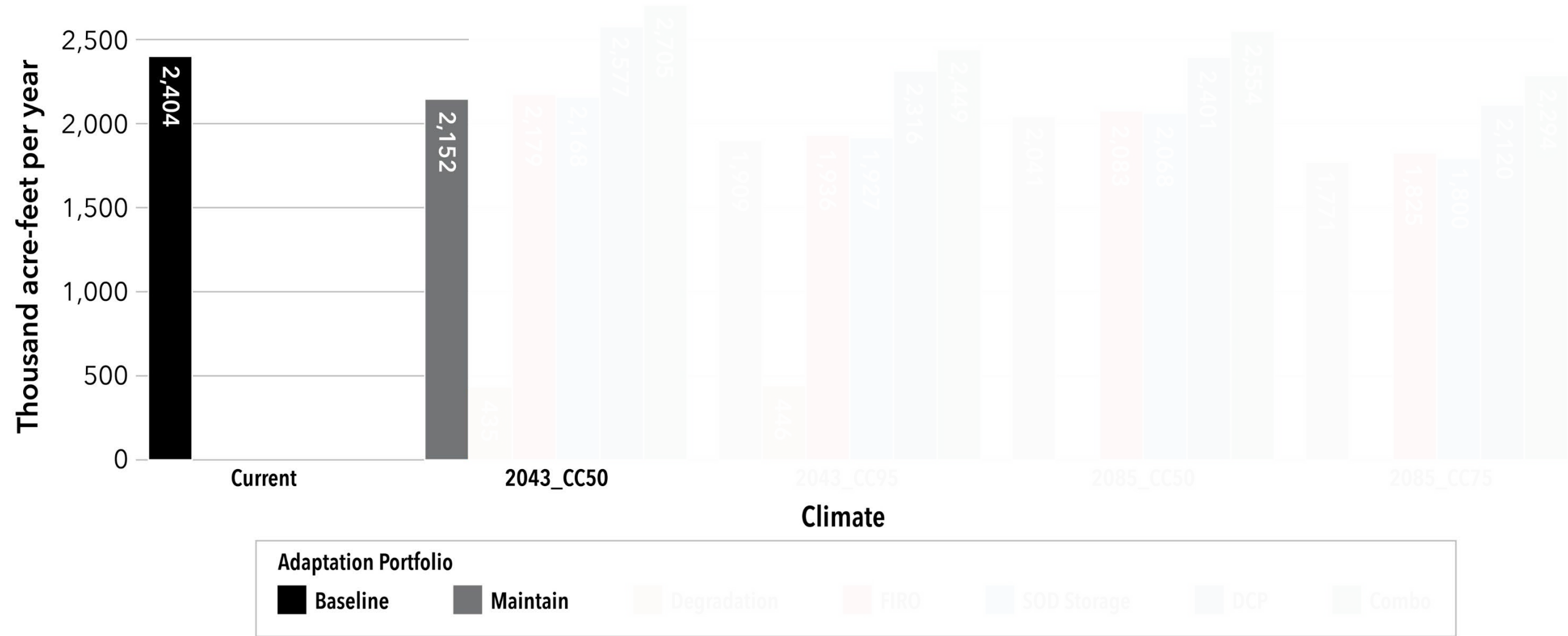
Total Average Annual State Water Project Exports



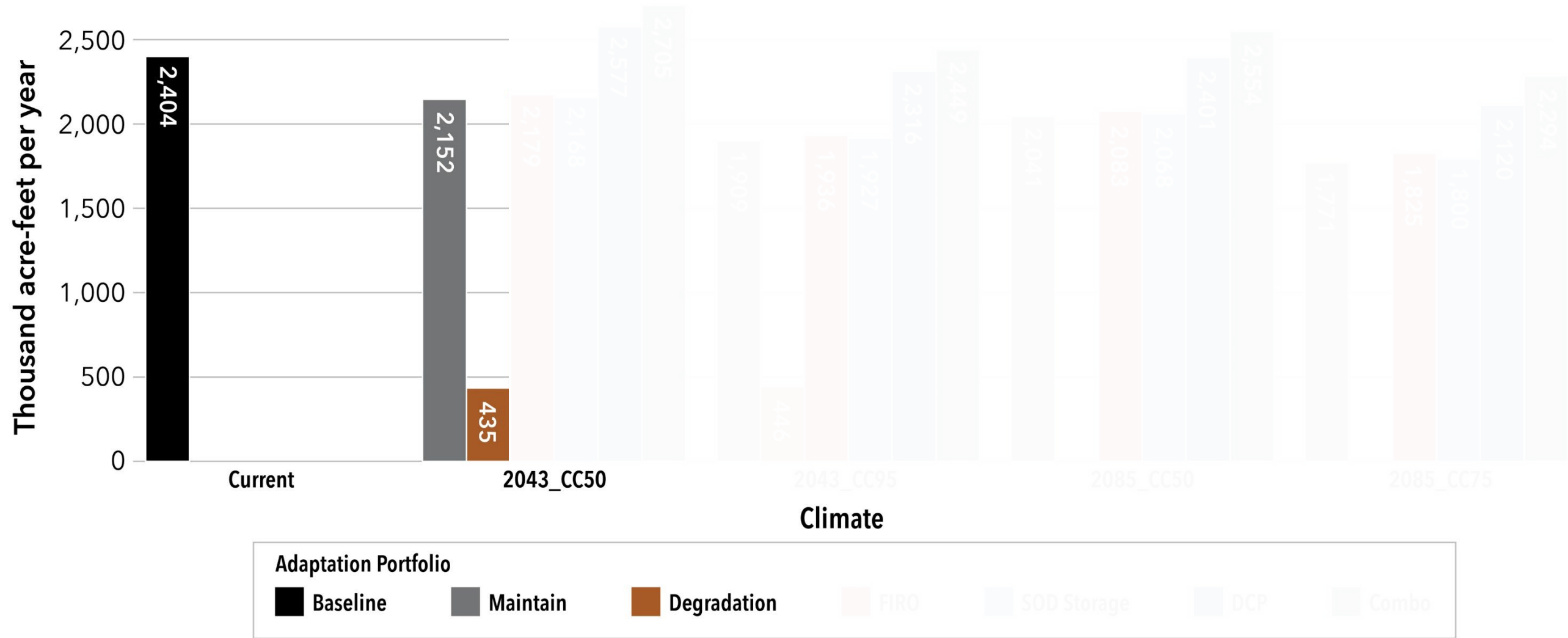
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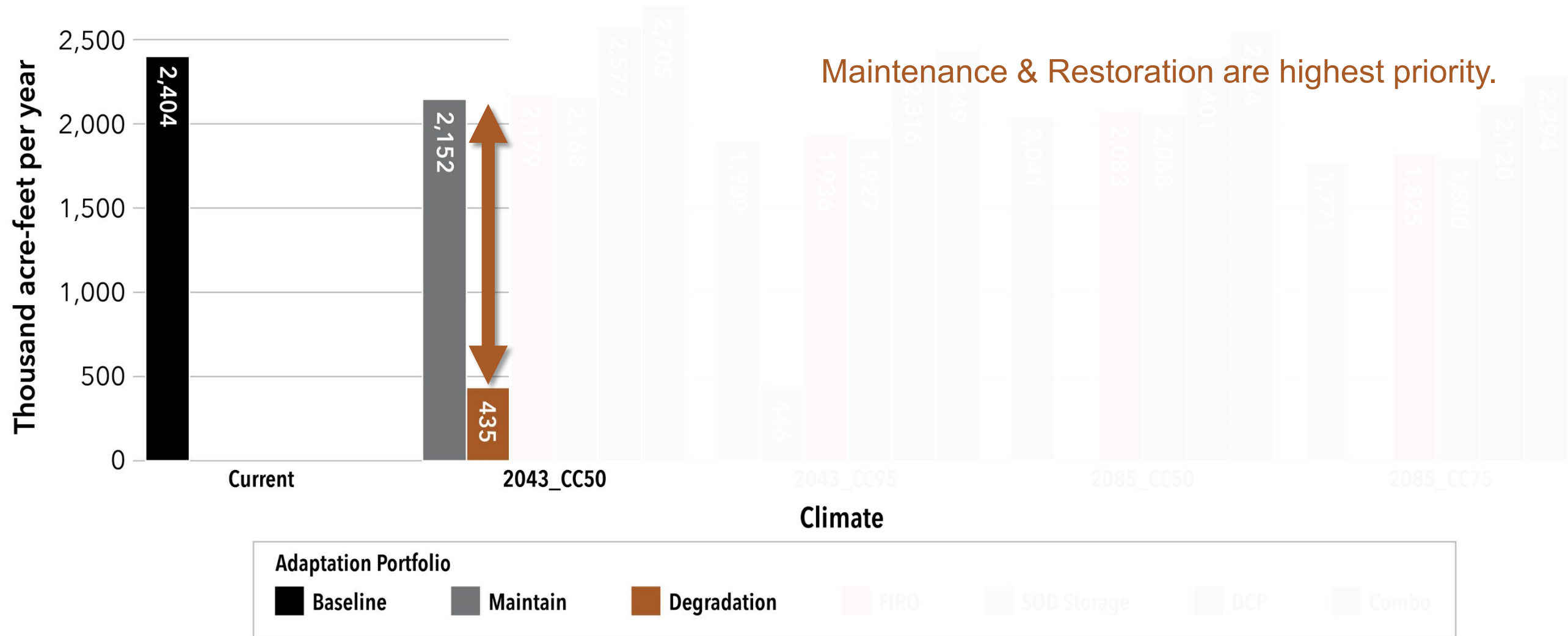
Total Average Annual State Water Project Exports



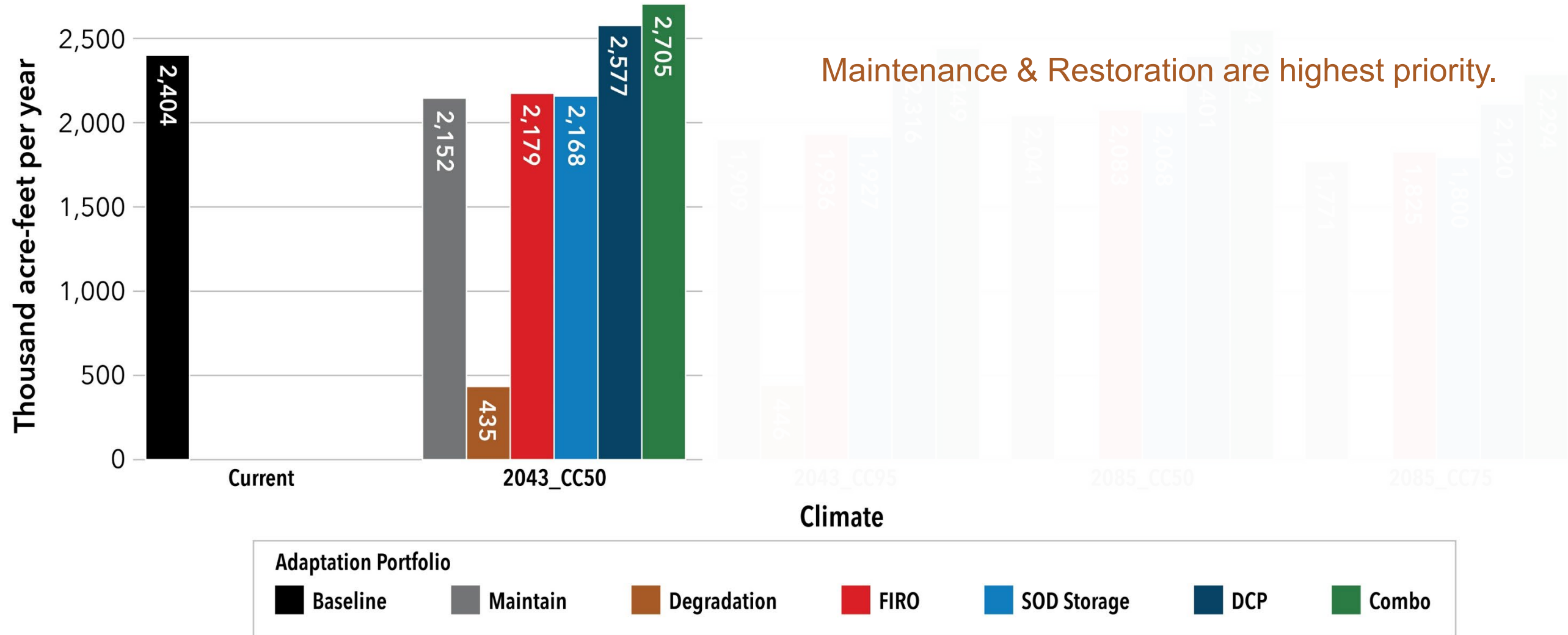
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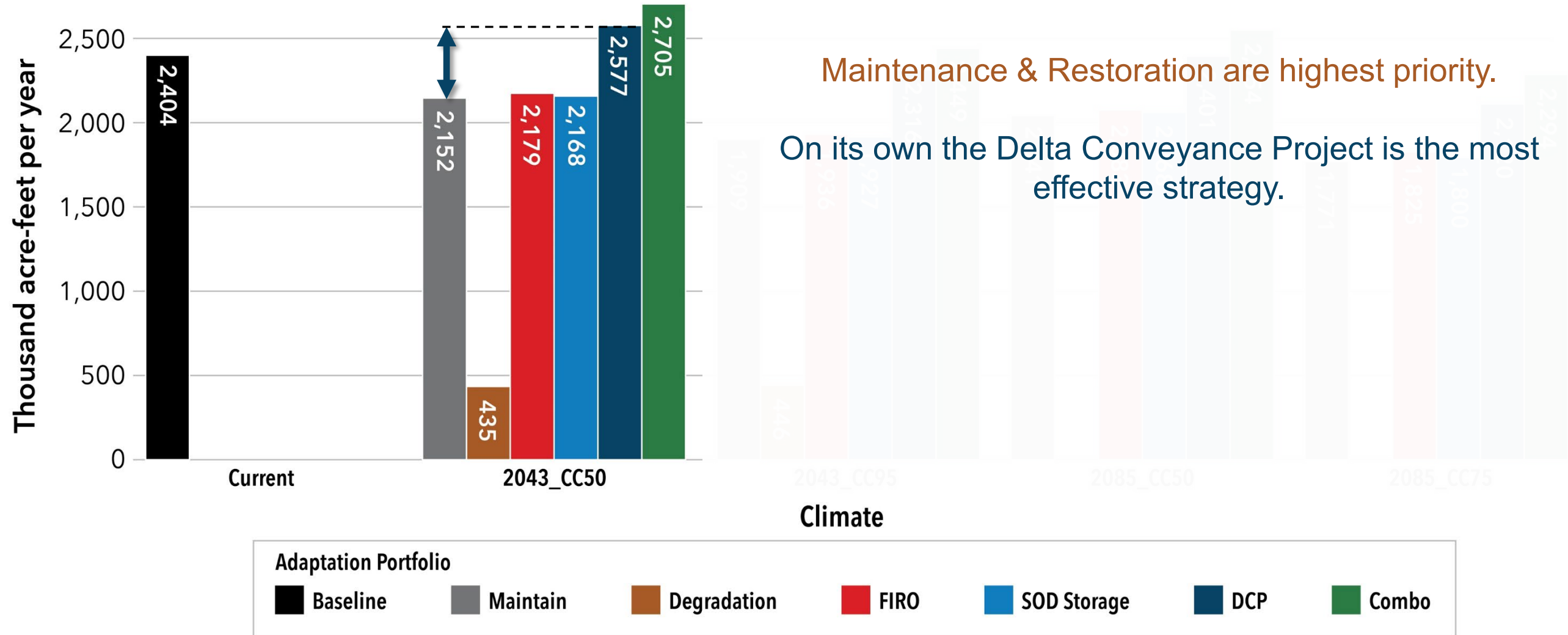
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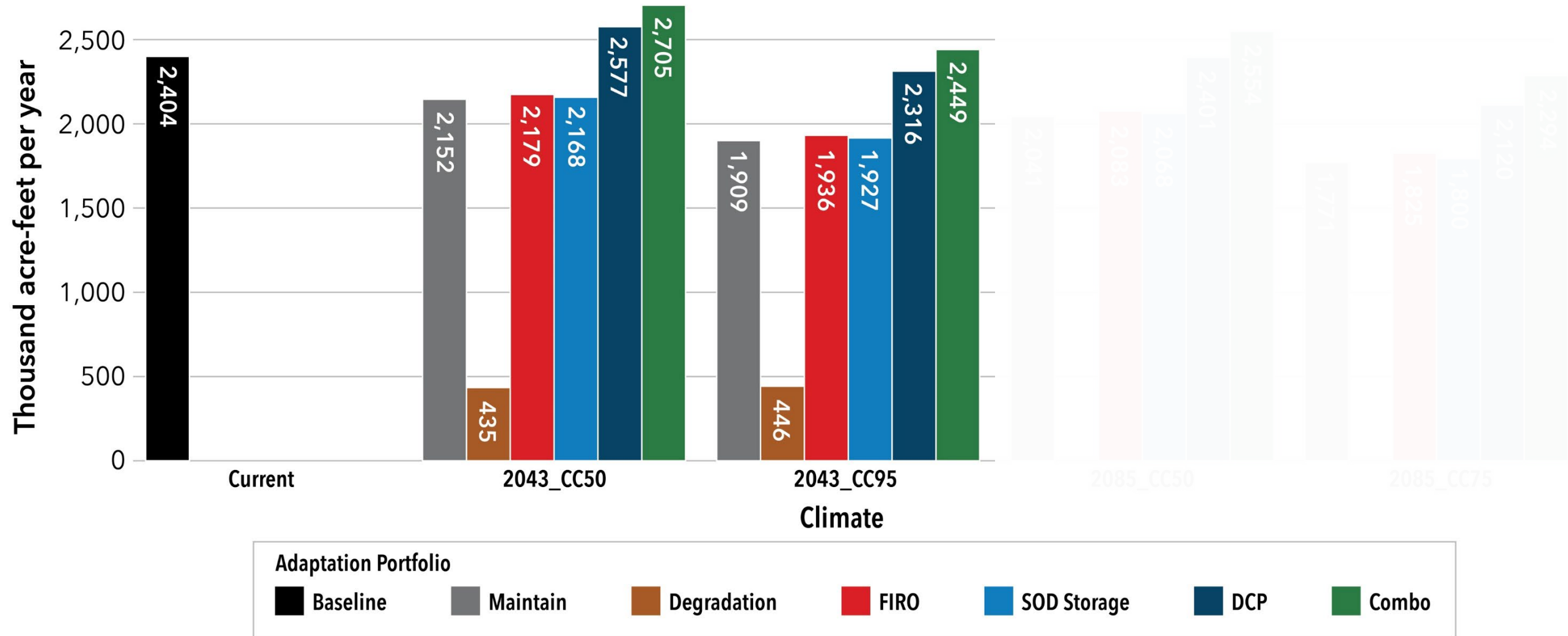
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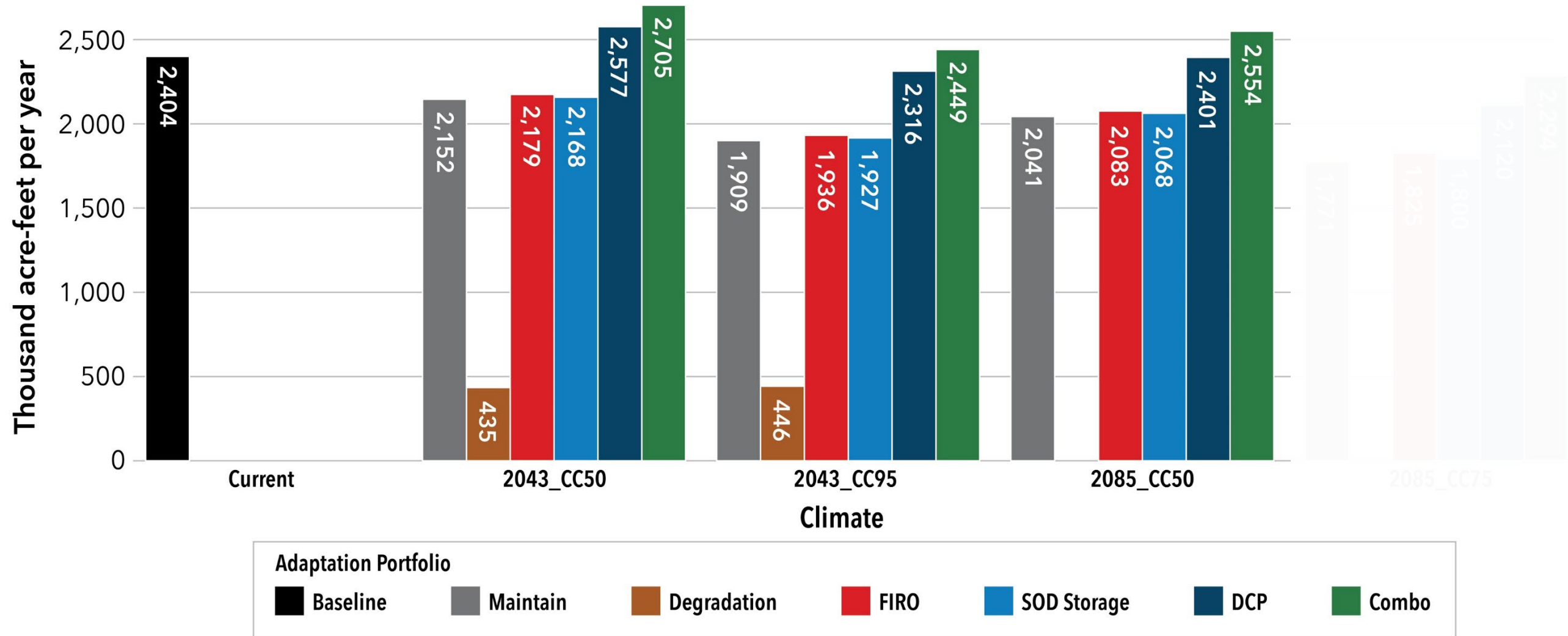
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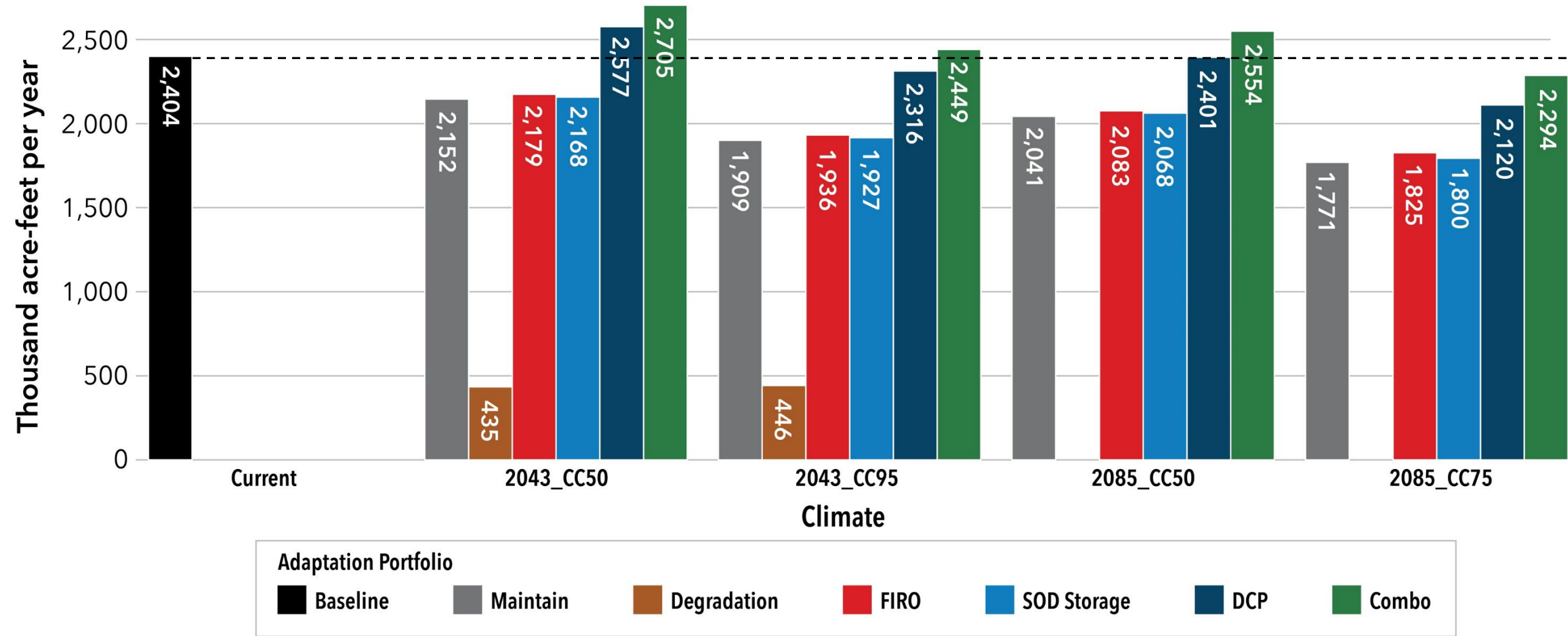
Total Average Annual State Water Project Exports



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Total Average Annual State Water Project Exports



A Deeper Dive:

Findings from the Climate Adaptation Plan Analysis

- DCP Portfolio → +12-14% Table A Deliveries over maintain only
- Combination → +25% Table A Deliveries over maintain only
- The Combination adaptation portfolio maintains Table A deliveries at or above current levels in **all but the most extreme** end-of-century conditions.
- Under 2085 conditions, implementing the FIRO portfolio increases the number of years in which SWP meets its **carryover storage target for drought resilience by 8%**.
- SOD Storage portfolio improves drought **resilience**.
 - In a six-year drought by 24-41%.
 - In a two-year drought by 13-35%.

Sharing Information and Communicating Results

[Results Console](#)



State Water Project Adaptation Strategy

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Drilldown

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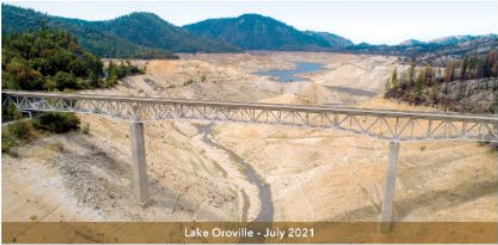
Reducing the Vulnerability of the State Water Project to Climate Change

Over the next 20 years, California could lose 10 percent of its overall water supplies because of climate change. Delivery capability and reliability of the State Water Project could be reduced as much as 23 percent. The State Water Project (SWP) delivers water to public agencies serving 27 million Californians.

The [SWP Adaptation Strategy](#) describes more than a dozen approaches the SWP is pursuing to address the effects of climate change. Five of these strategies are quantitatively evaluated to show how they could be expected to improve SWP reliability in the future.

This work builds on the [SWP Delivery Capability Report \(DCR\)](#), which provides a biennial assessment of how much water the SWP can reliably deliver under current and future conditions. While the DCR illustrates the potential challenges posed by climate change, the Adaptation Strategy extends the analysis by exploring potential solutions.

This is the SWP Adaptation Strategy **Results Console (ReCon)**, an interactive dashboard designed to complement the Adaptation Strategy main report. ReCon presents outputs from [CalSim 3](#)—the operations model used in this analysis—and enables users to explore technical details and scenario outcomes beyond what is summarized in the published reports.



Total Delta exports ⓘ

4,806

Current

4,411

2,826

4,437

4,426

4,827

4,952

2043_CC50

4,002

2,703

4,058

4,049

4,449

4,565

2043_CC95

4,039

4,074

4,065

4,394

4,540

2085_CC50

3,567

3,641

3,615

3,930

4,104

2085_CC75

Climate

Adaptation Portfolio

Baseline

Maintain

Deteriorating System

FIRO

SOD Storage

DCP

Combo

Drilldown

CALIFORNIA DEPARTMENT OF WATER RESOURCES

Get more information:

<https://water.ca.gov/Programs/State-Water-Project>

