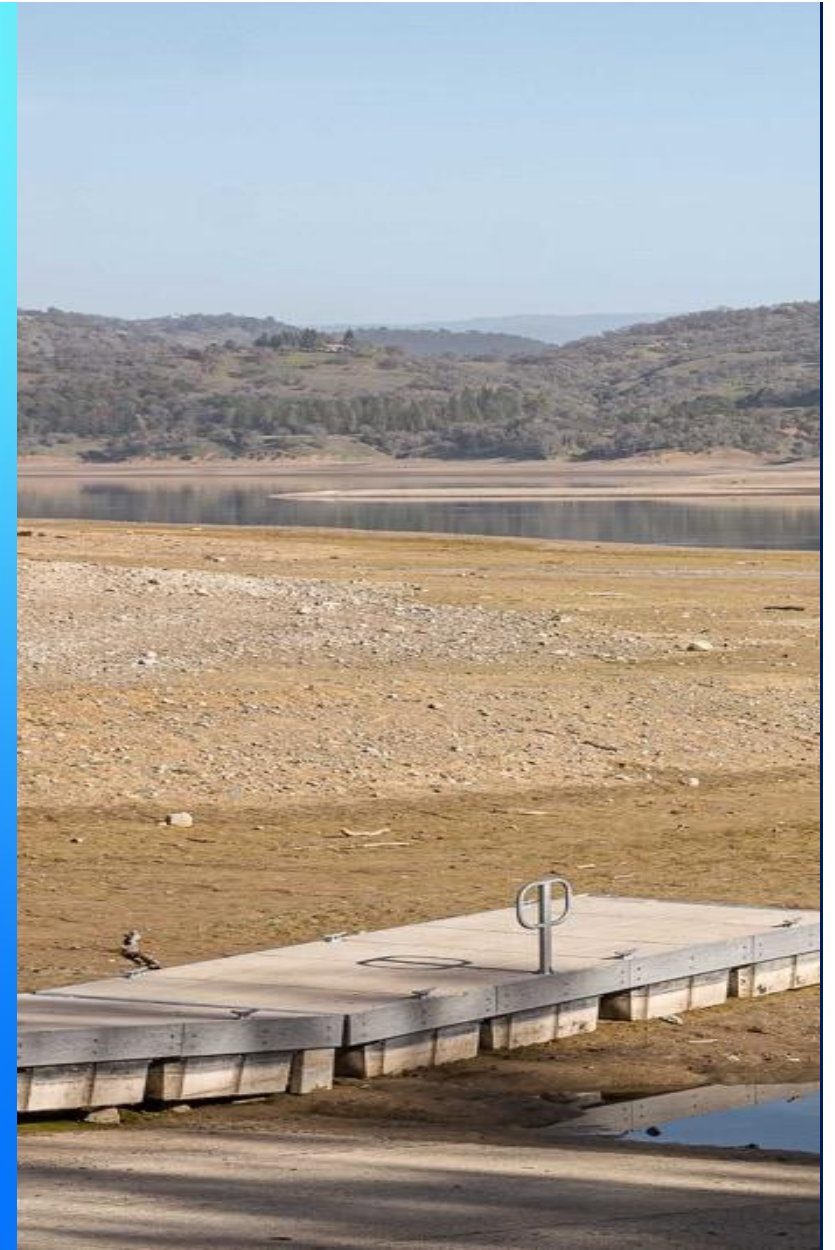


# Sonoma Water Regional Water Supply Resiliency Study

Accelerated Drought Resiliency Update  
Water Advisory Committee  
May 2, 2022



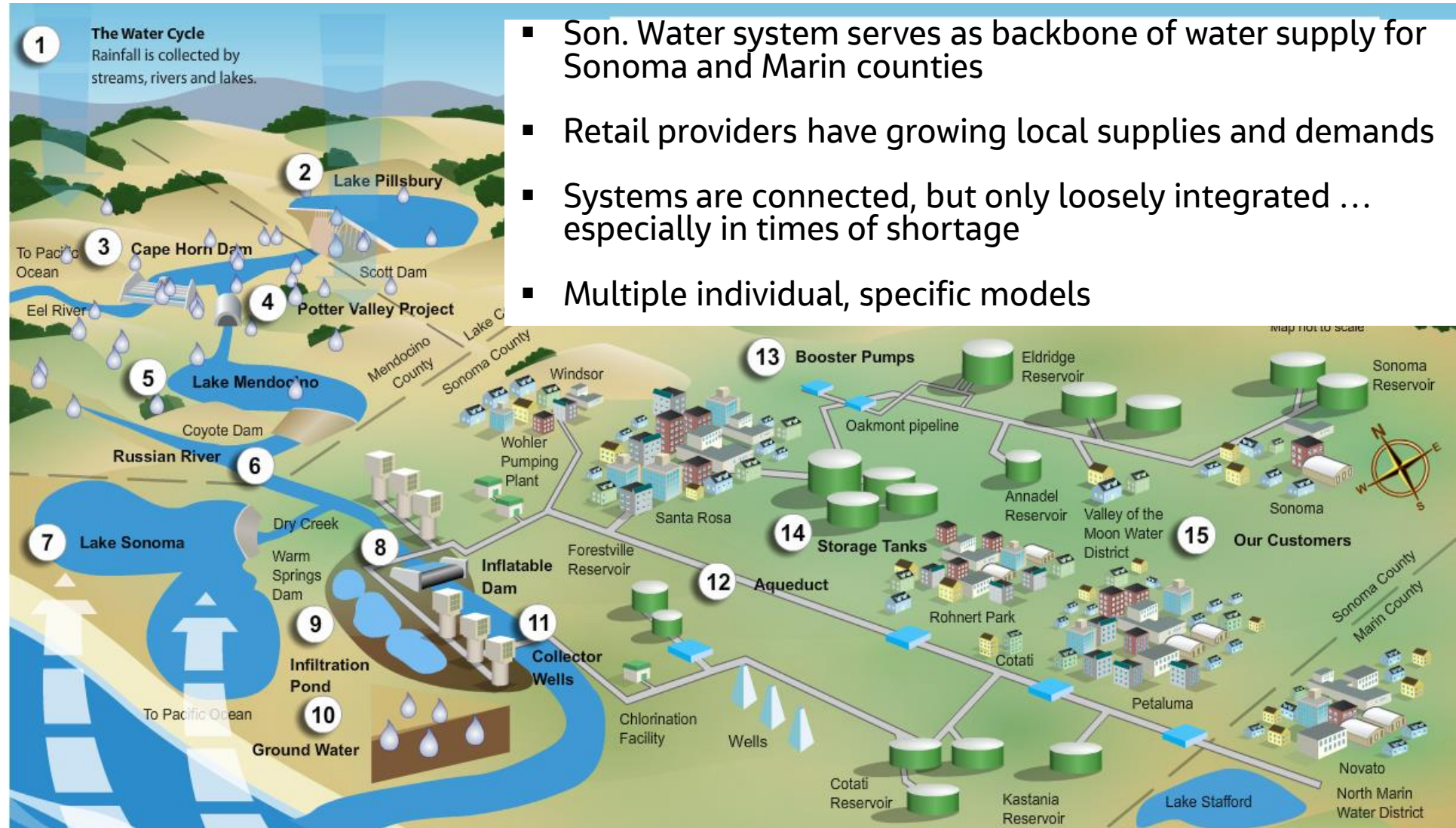
# Meeting Agenda

- Resiliency Study Overview
  - Accelerated Near-Term Drought Resiliency Analysis
  - Findings and Recommendations
  - Resiliency Study Next Steps
  - Q&A
-

# Project Overview

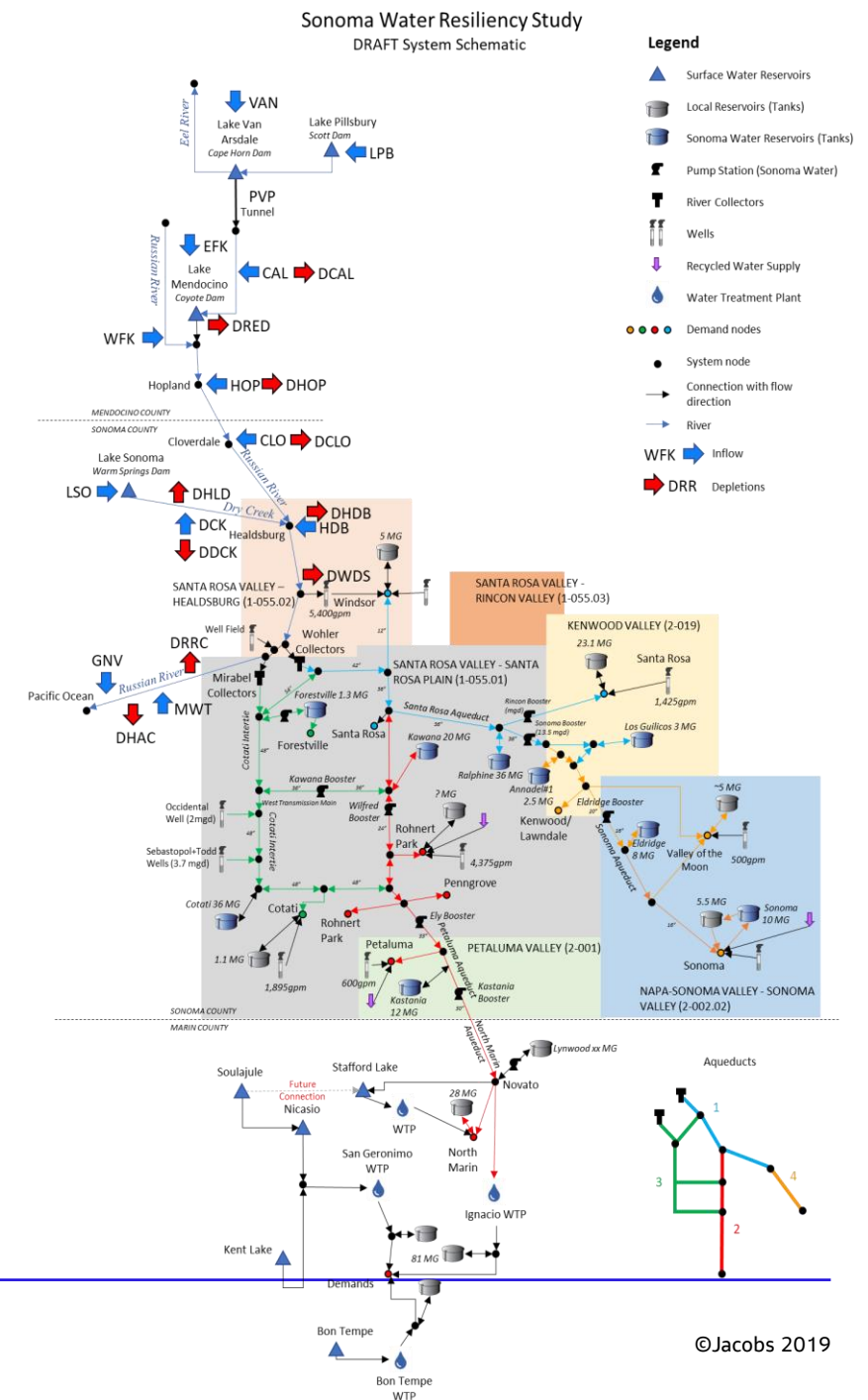


# Complex Inter-Connected System



# Sonoma Water Resiliency Study

- Resiliency Study seeks to:
  - identify the key factors impacting regional water supply resiliency,
  - evaluate the current levels of resiliency,
  - develop a decision support framework model and process, and
  - identify promising opportunities for Sonoma Water and its retail customers to improve regional resilience in the future
- First of a kind look at the Integrated Regional System
  - Russian River & Potter Valley Project (Eel River)
  - Sonoma Water “backbone” system
  - 9 retail customer systems
  - 6 groundwater basins
  - local supplies and recycled water
  - multiple risk drivers
  - decision support model



# Resiliency Study Project Overview

**PHASE 1:**  
Work Plan and  
Scoping Document

**PHASE 2:**  
Development and  
Implementation  
of Decision Support Tool

**PHASE 3:**  
Modification and Maintenance  
of Decision Support Tool

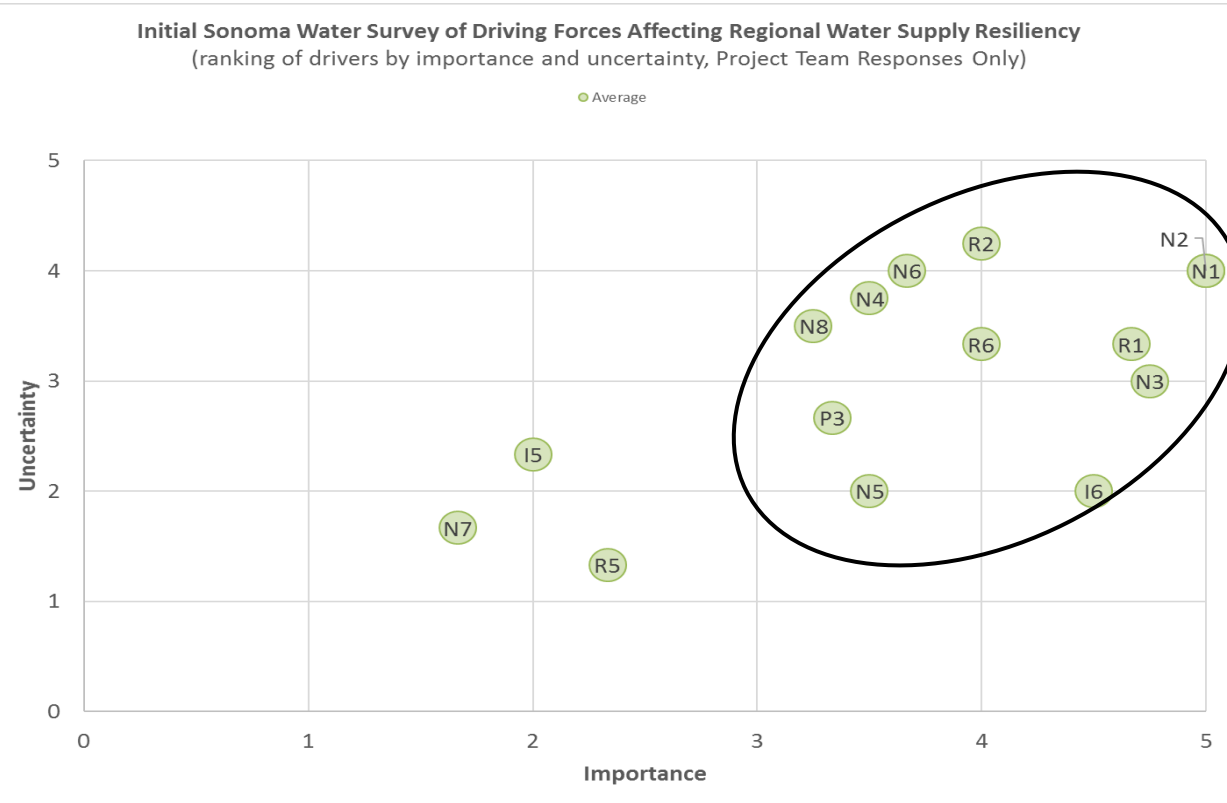
6 -9 months

18 months

24 months

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## Ranking Risk Drivers

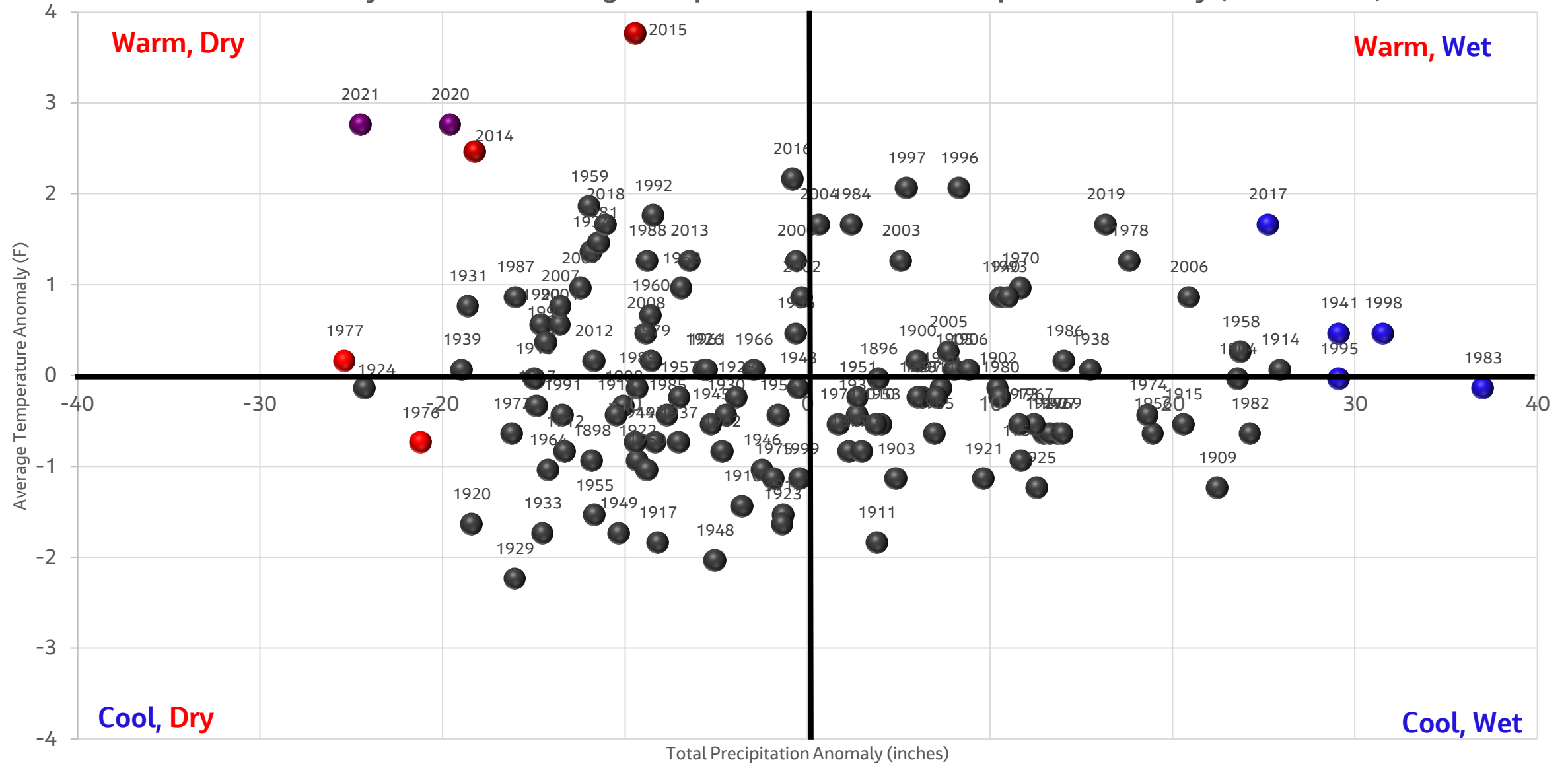


**Figure 4. Average Results for the Risk Driver Survey Conducted by Project Team Members**  
(Note: I11 and I12 risk drivers were not included in the initial survey and are thus not shown in the graphic).

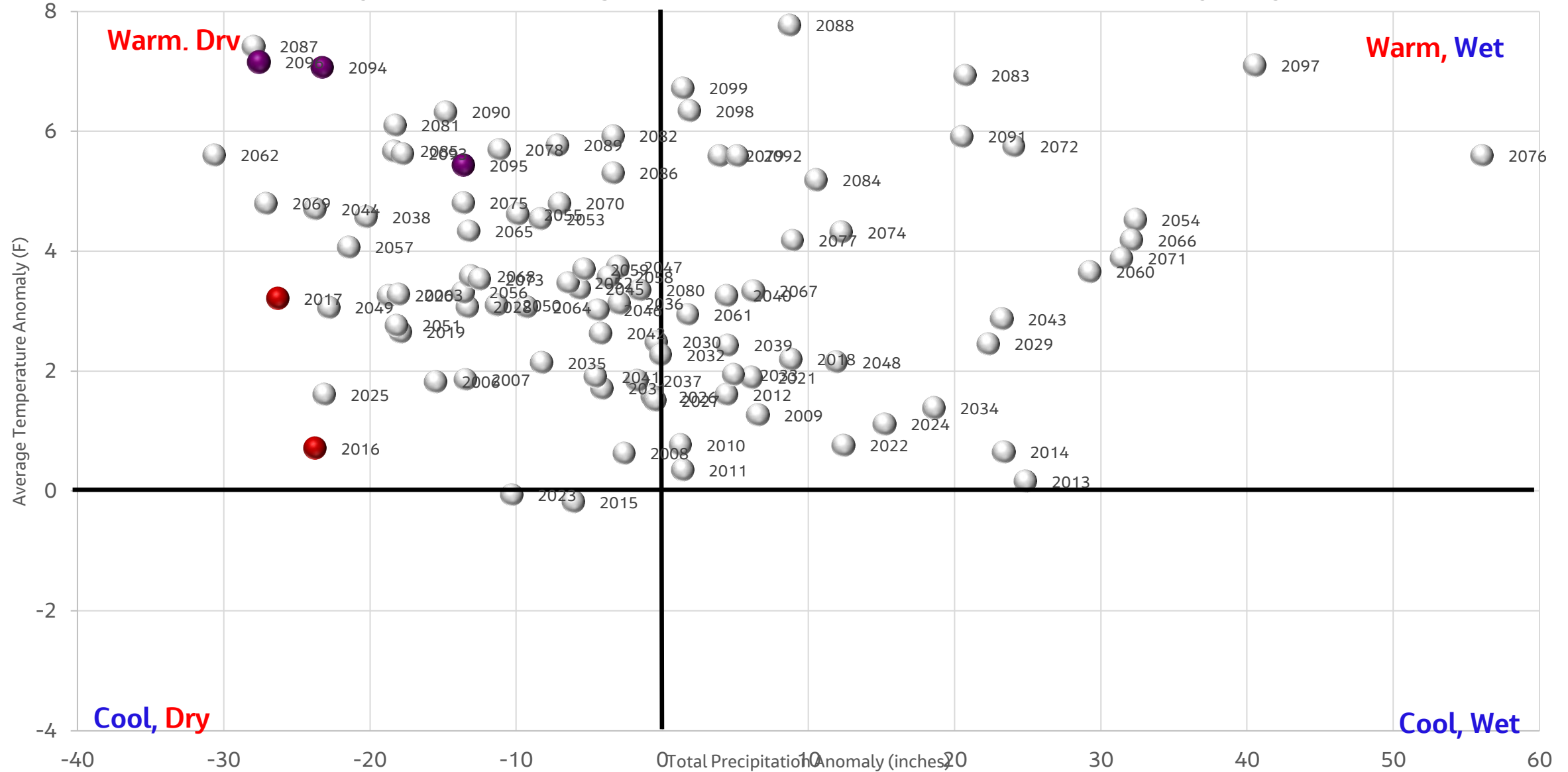
| No. | Risk Driver                                               | Risk Type      | Phase of Study |
|-----|-----------------------------------------------------------|----------------|----------------|
| N1  | Wildfire                                                  | Sudden         | Phase 2        |
| N2  | Earthquake                                                | Sudden         | Phase 2        |
| N3  | Drought                                                   | Sudden/Gradual | Phase 2        |
| N4  | Russian River Water Quality Contamination                 | Sudden         | Phase 2        |
| N5  | Power Loss                                                | Sudden         | Phase 2        |
| N6  | Flooding                                                  | Sudden         | Phase 2        |
| N7  | Sea Level Rise                                            | Gradual        | TBD            |
| N8  | Local Source Water Quality Contamination                  | Sudden         | Phase 2        |
| P3  | Rapid Demand Growth                                       | Sudden/Gradual | Phase 2 (TBD)  |
| R1  | Potter Valley Project Uncertainty (seismic/regulatory)    | Sudden/Gradual | Phase 2        |
| R2  | New Russian River Treatment Regulations                   | Gradual        | TBD            |
| R5  | SGMA Impacts on Groundwater Supply (City of Sonoma/VOMWD) | Gradual        | Phase 2 (TBD)  |
| R6  | Changing Biological Opinions                              | Gradual        | TBD            |
| I5  | Groundwater Well Operational Failures                     | Sudden         | Phase 2        |
| I6  | Aging Infrastructure                                      | Sudden/Gradual | Phase 2        |
| I11 | COVID 19 Workforce Response                               | Sudden/Gradual | TBD            |
| I12 | Operational Control Systems Disruption                    | Sudden         | Phase 2        |

# **Future Baseline Projections**

# Sonoma County Water Year Average Temperature and Total Precipitation Anomaly (1886-2021)



# Sonoma County Water Year Average Temperature and Total Precipitation Anomaly (Projections)

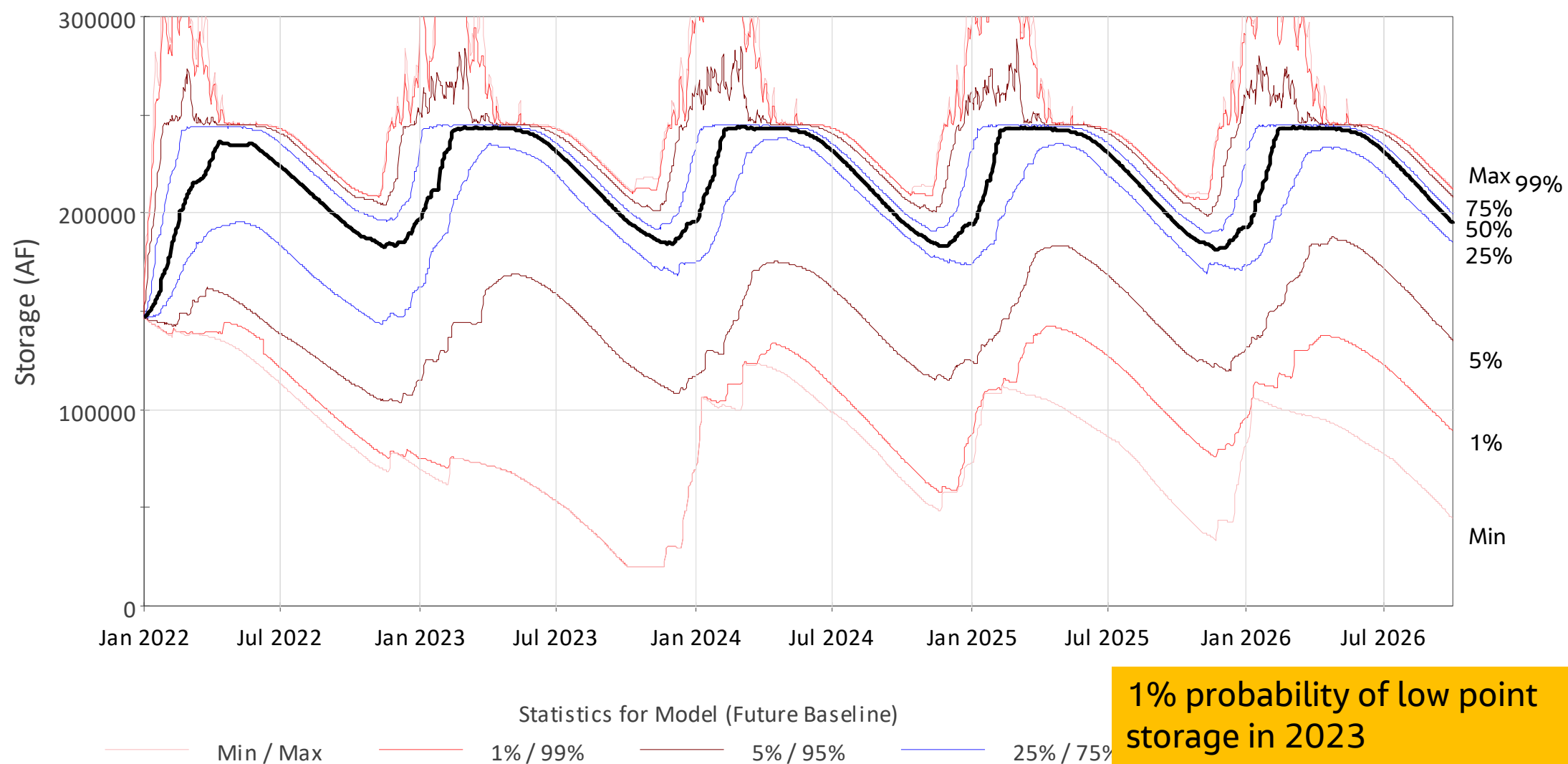


# Future Baseline Simulations

- Assumptions
    - Conditions as of Nov 1, Dec 1, and Jan 1
    - No Actions taken to mitigate drought impacts
    - UWMP demand assumptions
    - Historical hydrology 1910-2017
    - 5-year future simulations: WY 2022-2026
  - Stochastic Simulations
    - Simulations using 108 traces of historical hydrology
    - Index sequential method maintains the hydrological sequences of the past
    - Probabilities of storage and shortage conditions derived from traces
  - Stress Test Hydrology
    - WY 1976-980 hydrology represents the most severe conditions in the historical record
    - Represents a severe 2-year drought following the current 2-years of drought (2020-2021)
    - Used as stress test hydrology for evaluating the resilience of the system and management actions
-

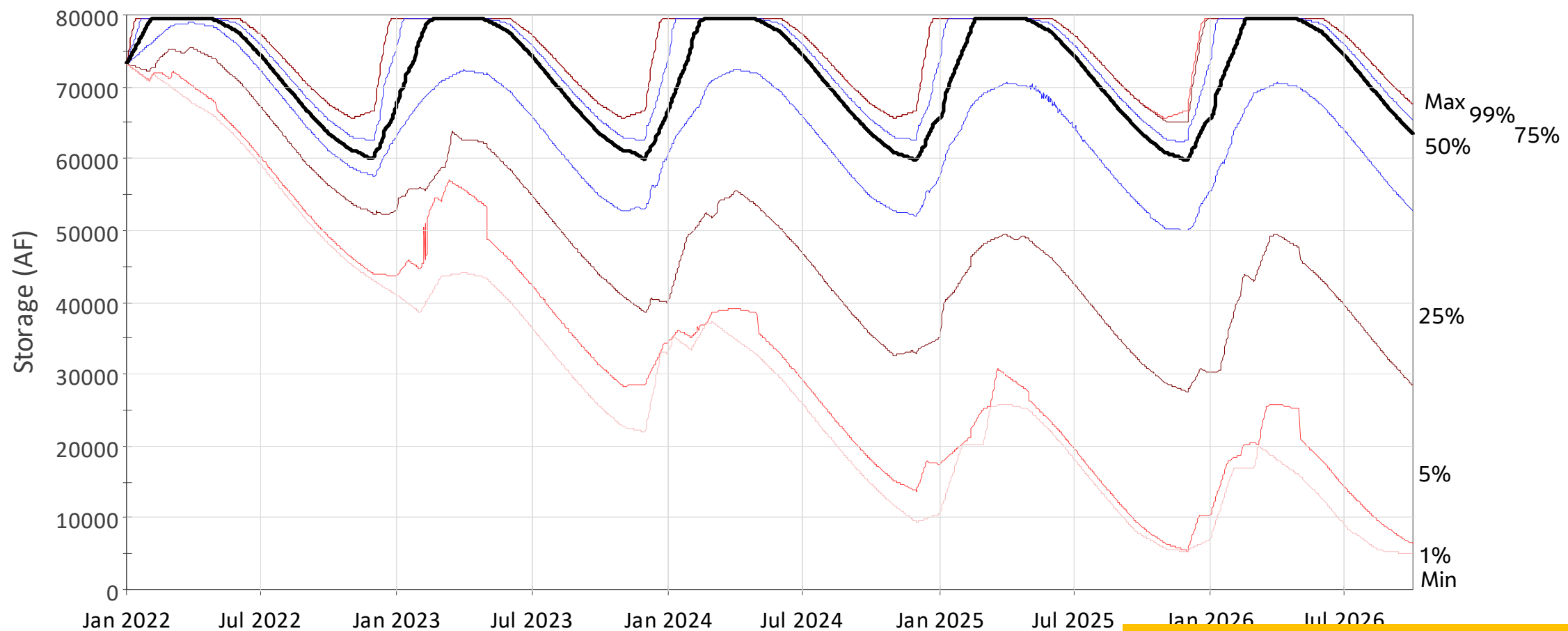
# Lake Sonoma Storage – Probabilities from 108 Historical Hydrological Traces

Lake Sonoma Storage



# MMWD Storage – Probabilities from 108 Historical Hydrological Traces

MMWD Reservoir Storage



1% probability of low point storage in 2025; 5% in 2026

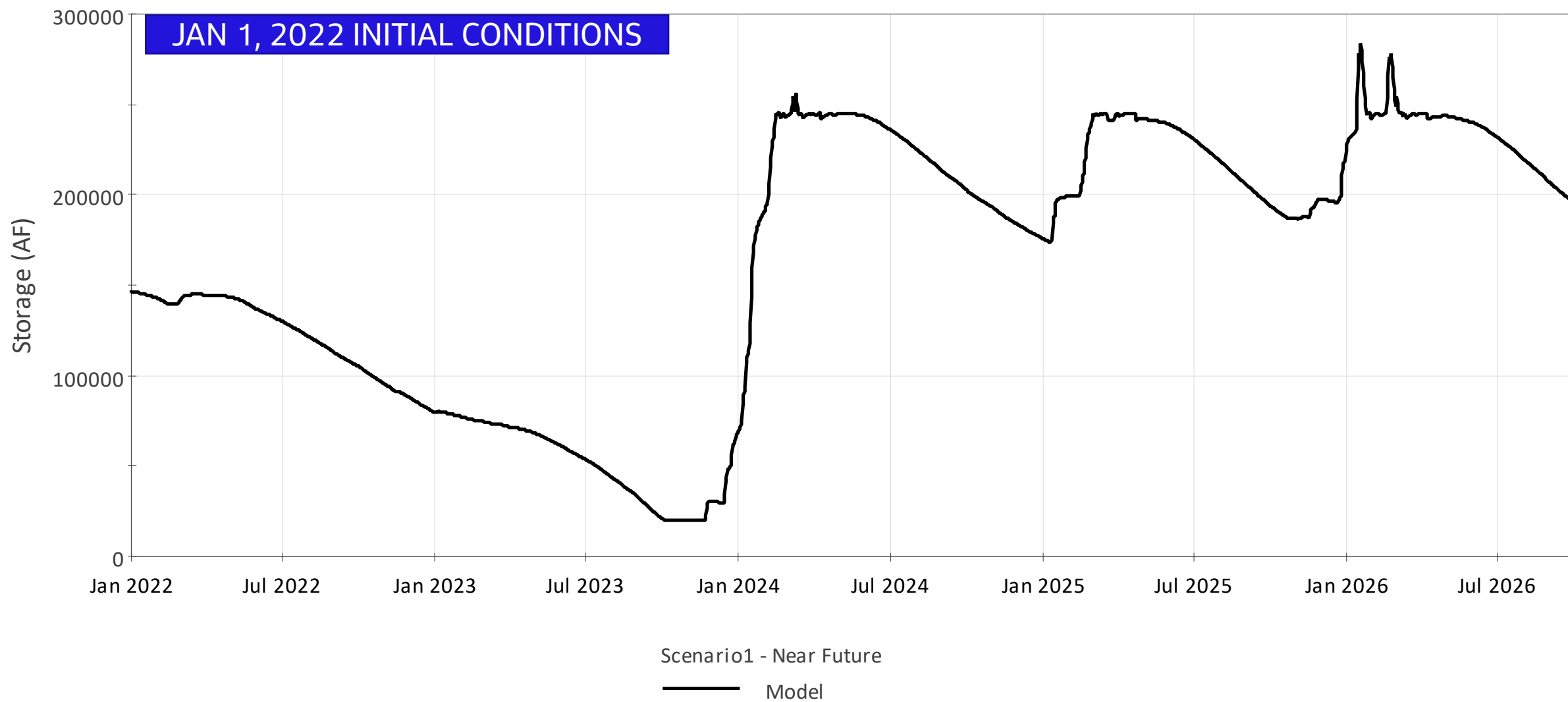
Statistics for Model (Future Baseline)

Min / Max    1% / 99%    5% / 95%    25% / 75%    50%

Scenario does NOT include any actions to mitigate drought impacts

# Lake Sonoma Storage – WY 1976-1980 Stress Test Hydrology

Lake Sonoma Storage



# Near-Term Drought Risk has Lessened, but Not Eliminated

- Outlook improved with December storms, but dry spring and likely continual dry conditions in 2022 suggest drought risk is still a possibility
- Action is still needed to address residual risks of a continued dry seasonal outlook

| Initial Storage Conditions | NO ACTION<br>Projected 5-Year Shortage Total | Shortage as % of<br>Sonoma Water Delivery* | Shortage as % of Total<br>Water Demand* |
|----------------------------|----------------------------------------------|--------------------------------------------|-----------------------------------------|
| Nov 1, 2021                | 25,600 AF                                    | 25%                                        | 13%                                     |
| Dec 1, 2021                | 23,200 AF                                    | 23%                                        | 12%                                     |
| Jan 1, 2022                | 6,900 AF                                     | 7%                                         | 4%                                      |

*\* Percentages estimated from shortage and delivery over the critical 2-year period of 2023-2024*

# **Drought Management Options**

# Survey of Range of Drought Management Options

- Jacobs met with most retail customers to develop ideas on range of drought management options
- Synthesized options into 4 major categories
  - Increase supply
  - Reduce demand
  - Improve operations
  - Modify policy and regulations



# Synthesis of Drought Water Management Options

## ▪ Increase Supply

- Increase groundwater production (new or rehabilitated wells)
- Winter water diversion
- Regional groundwater bank (Santa Rosa Plain, Sonoma Valley, Petaluma)
- Alexander Valley FloodMAR
- Sonoma Developmental Center water supply and forebay for groundwater recharge
- Expand recycled water supply
- Ocean desalination and/or brackish water desalination
- Interconnection with Bay Area supplies (water transfers)

## ▪ Reduce Demand

- Water conservation and water use efficiency in agricultural, municipal, and CII sectors

## ▪ Improve Operations

- Kastania Pump Station improvements
- Expand surface storage (Lake Stafford weir, sediment removal)
- Lake Sonoma Forecast Informed Reservoir Operations (FIRO)
- Increase recycled water storage
- Storage operational management levels
- Lake Mendocino variable gates and outlet channel improvements

## ▪ Modify Policy and Regulations

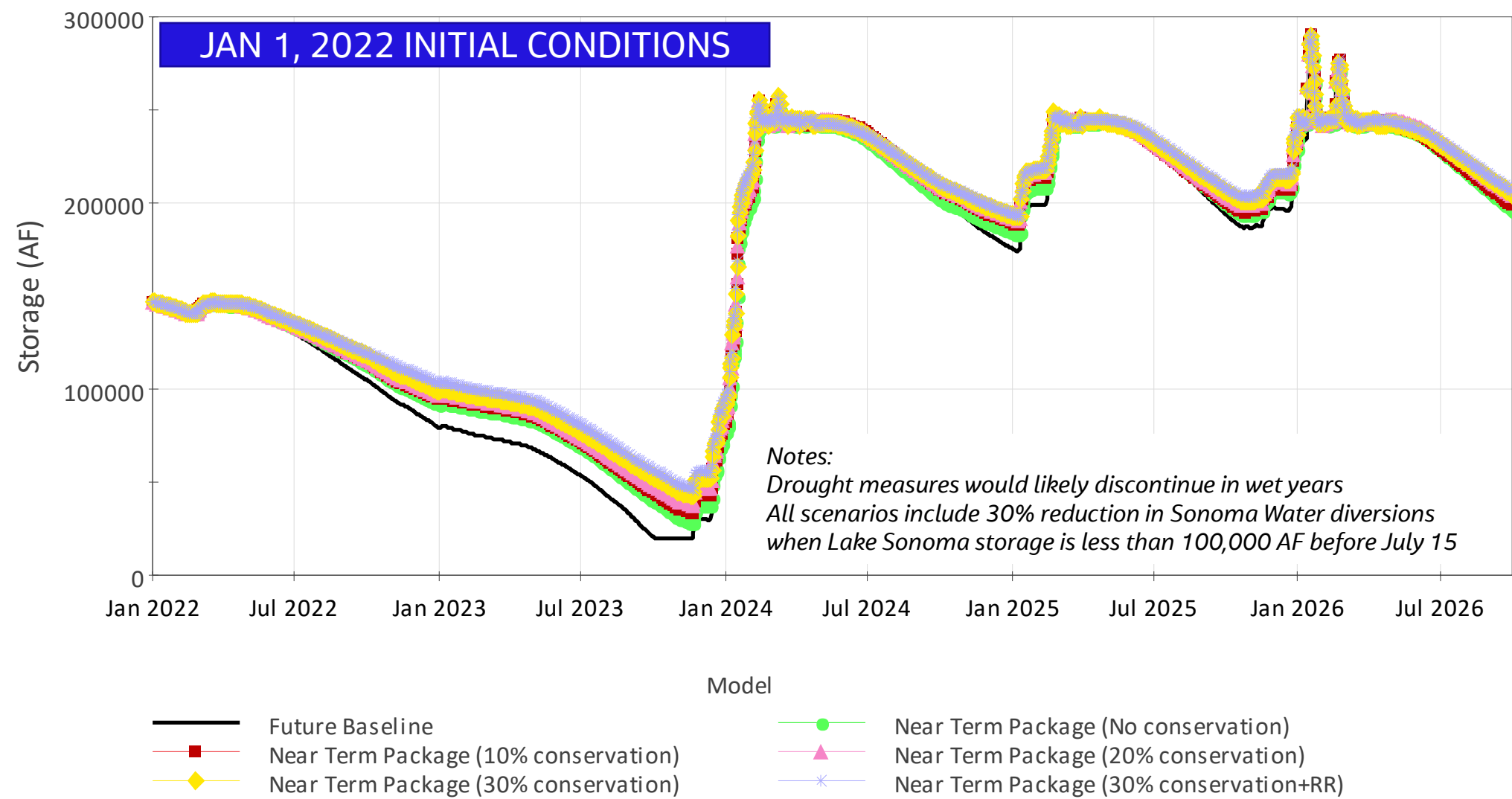
- Regulatory flexibility through TUCPs

# Near-Term Drought Resiliency/Response Actions

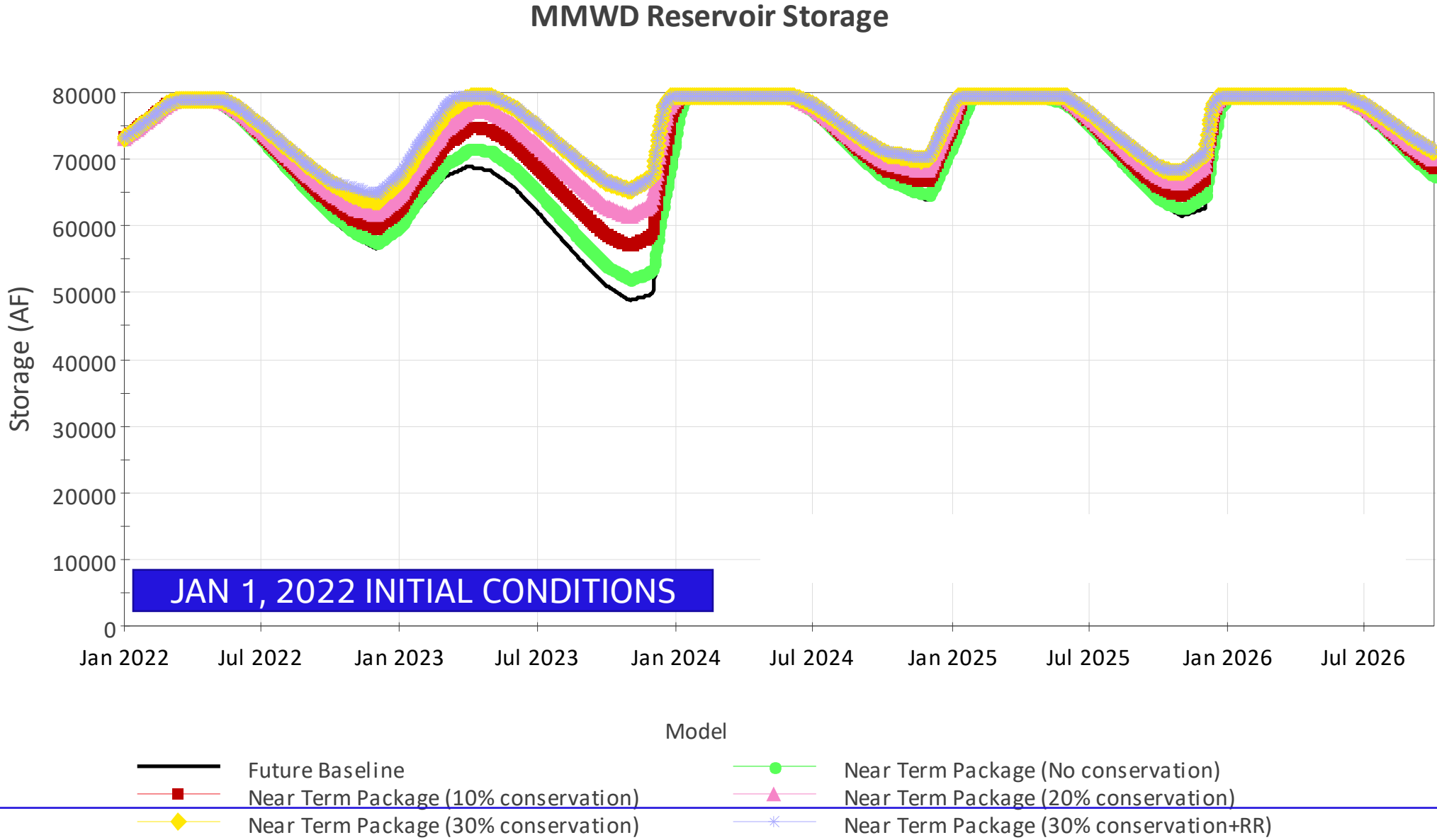
- Maximize delivery of natural flows from Russian River system
- Kastania Pump Station rehabilitation
- Increase groundwater production (Sonoma Water)
- Increase groundwater production (Retail Customers)
- Regulatory flexibility through TUCPs
- Water conservation and water use efficiency (Retail Customers and diverters)

# Lake Sonoma – WY 1976-1980 Stress Test Hydrology

Lake Sonoma Storage



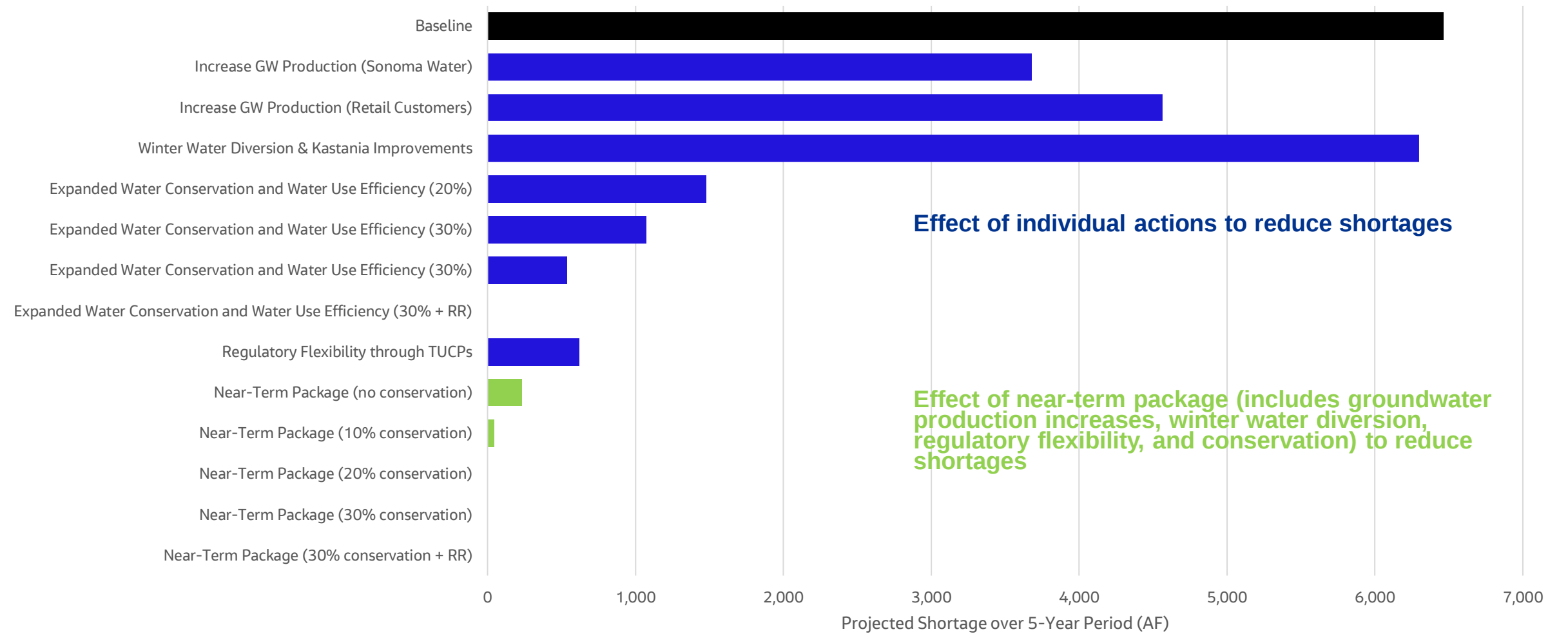
# MMWD Storage – WY 1976-1980 Stress Test Hydrology



# Simulation Results – Near-Term Package Resolves Stress Test Shortages

JAN 1, 2022 INITIAL CONDITIONS

Summary of Projected Shortages over Period 2022-2026 Using 1976-80 Stress Test Hydrology



# Planning for Longer-Term Droughts

- Early Actions Offer Immediate Opportunities for Resiliency Benefits
  - Water conservation
  - Flexibility through TUCPs
  - Increasing groundwater production (Sonoma Water and Retail Customers)
  - Kastania Pump Station improvements
- Longer-Term Actions Offer Potential for Resiliency during Prolonged, Extreme Droughts
  - Lake Sonoma FIRO
  - Regional groundwater bank
  - Expand winter water diversion
  - SDC water supply
  - Ocean and brackish Desalination
  - Water transfers with Bay Area water agencies
  - Expand surface storage
  - Expand recycled water supply
  - Alexander Valley Flood-Managed Aquifer Recharge

# Summary and Recommendations

- Drought Risks
  - Existing hydrologic conditions continue to be challenging
  - December storms have altered near-term drought outlook
  - Unlikely, but possible risk to Lake Mendocino storage and Lake Sonoma storage (2023), and delivery (2023-24)
  - Stress test hydrology of WY 1976-1980 is used to test drought options
- Drought Management Options
  - “Near-term” package of options (increasing Sonoma Water and retail customer groundwater production, increasing diversion of winter water with Kastania PS improvements, regulatory flexibility through TUCPs, and water conservation) provides sufficient capability to address the potential for critically low storage conditions.
  - For the scenarios analyzed, the near-term package of options eliminates stress-test shortages with moderate levels of water conservation
  - Winter water diversions, water conservation, and groundwater production helps reduce shortages and can bolster or save storage in reservoirs
  - Conservation and regulatory flexibility under TUCPs are the most important in bolstering Lake Sonoma and Mendocino storage
  - Longer-term actions of regional groundwater bank and Lake Sonoma FIRO will provide significant benefit for future droughts but require initial wet period to begin storage phase

**Next Steps**



# Next Steps

- Further review of long-term drought management strategies
  - Continue with assessment of resiliency in response to other identified risks
    - Seismic
      - Update of Sonoma Water Natural Hazard Reliability Assessment
    - Wildfire
      - Wildfire Resilience Decision Support Framework
    - Power
    - Water Quality
      - On-going riverbank filtration research
-