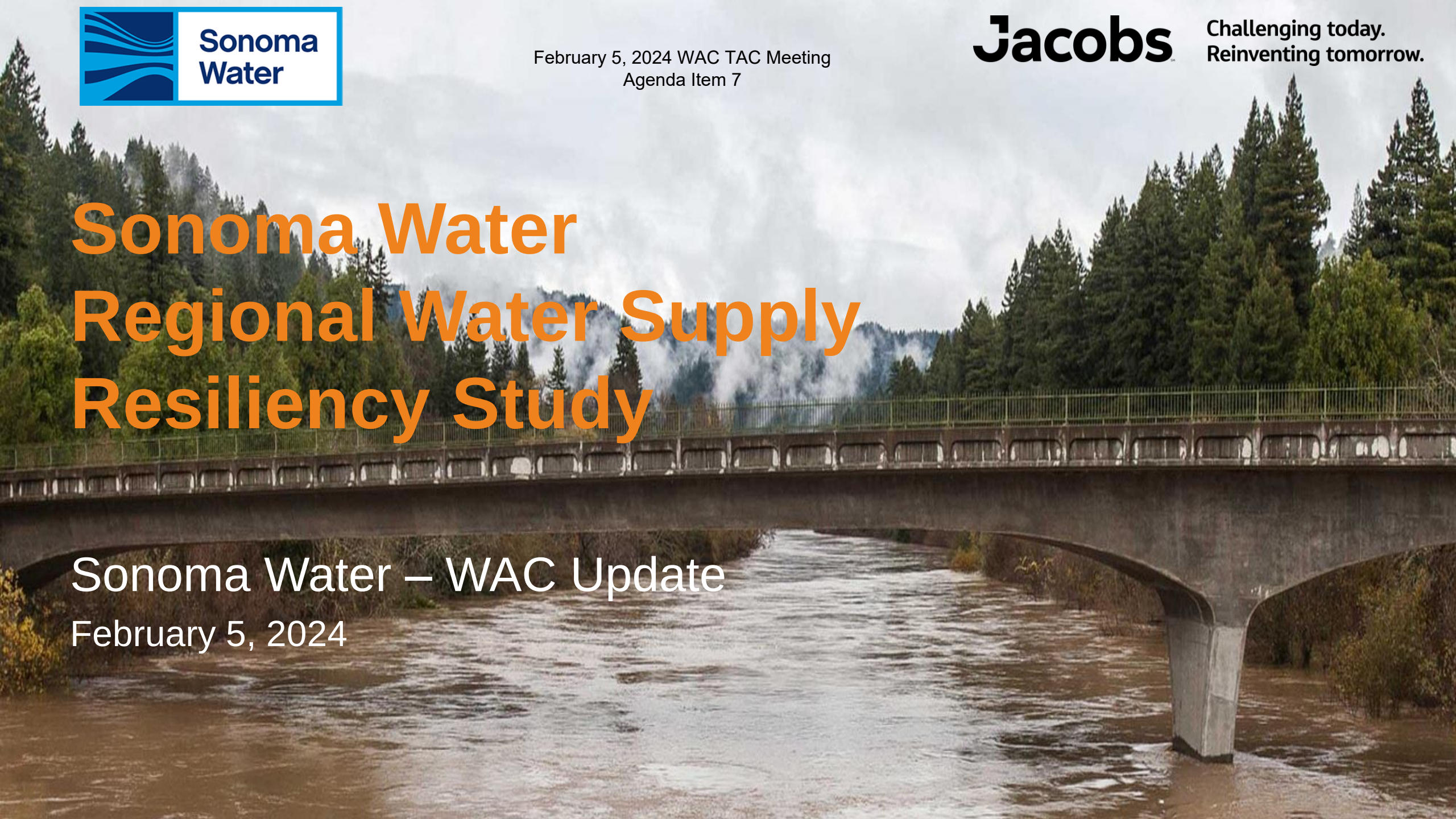
February 5, 2024 WAC TAC Meeting
Agenda Item 7

Challenging today.
Reinventing tomorrow.



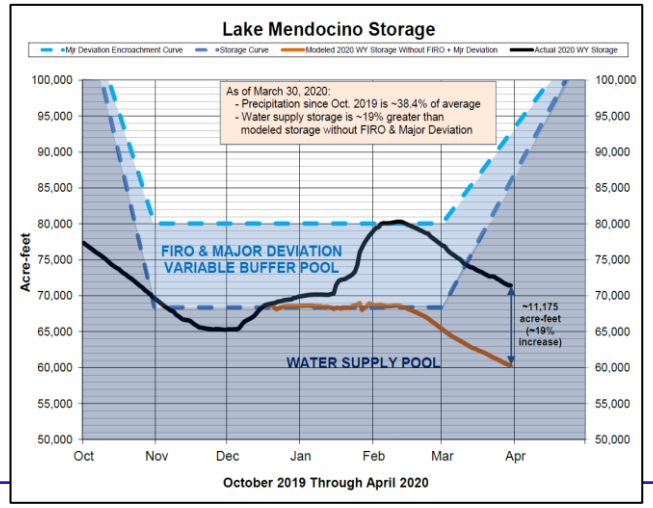
Sonoma Water Regional Water Supply Resiliency Study

Sonoma Water – WAC Update

February 5, 2024

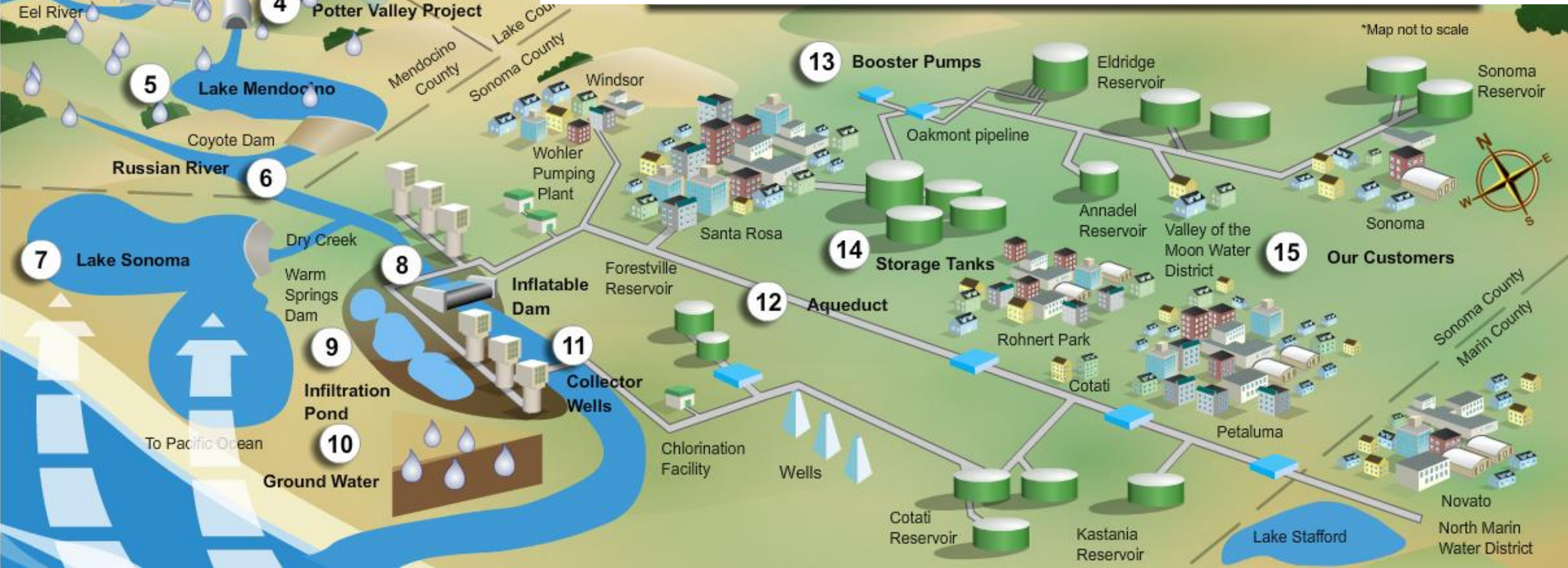
Sonoma Water's Efforts on Adaptation and Resiliency

- Partner in Center for Western Weather and Water Extremes (CW3E) for Atmospheric River Forecasting
- Forecast Informed Reservoir Operations (FIRO)
- Advanced Quantitative Precipitation Information (AQPI)
- Fire Camera Alert System (AlertWildfire)
- NOAA Habitat Blueprint Adaptive Management and Restoration
- Local Hazard Mitigation Plan (LHMP)
- Climate Adaptation Plan (CAP)
- **Regional Water Supply Resiliency Study**



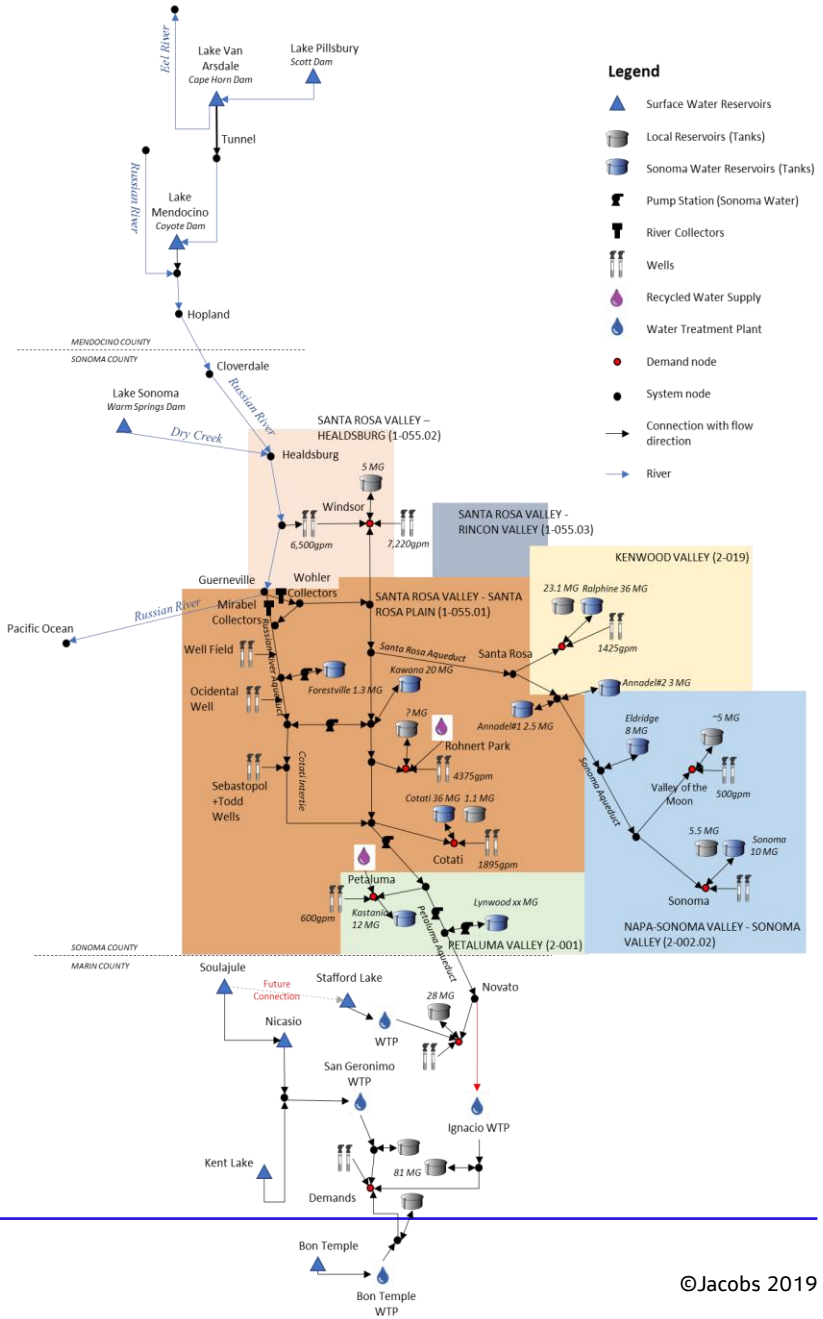
Complex Inter-Connected Regional Water Supply System

- Sonoma Water system serves as backbone of water supply for Sonoma and Marin counties
- Retail providers have growing local supplies and demands
- Systems are connected, but only loosely integrated … especially in times of shortage
- Multiple individual, specific models



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



Regional Water Supply Resiliency Study - Primary Tasks

- **Task 1. Confirm and Develop Risk Scenarios**
- **Task 2. Develop Regional Resiliency Metrics**
- **Task 3. Develop Decision Support Model**
- **Task 4. Conduct Baseline Model Simulations**
- **Task 5. Develop Resiliency Options**
- **Task 6. Conduct Simulations with Resiliency Options**
- Task 7. Evaluate and Prioritize Resiliency Options
- Task 8. Prepare Resiliency Study Report
- Task 9. Stakeholder Engagement

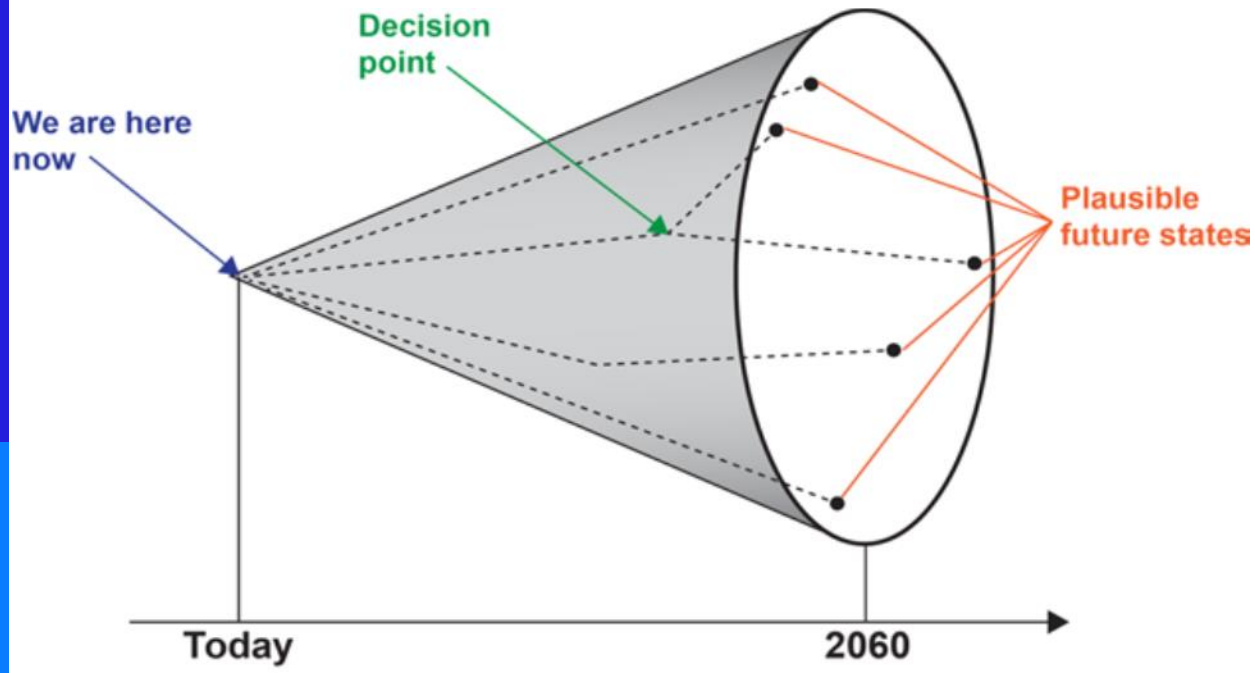
Preparing scenarios, metrics, and DSM development

Evaluating baseline level of resilience

Developing and evaluating adaptation strategies to improve resilience

Report preparation, stakeholder engagement, and project management

Envisioning and Evaluating Future Risks

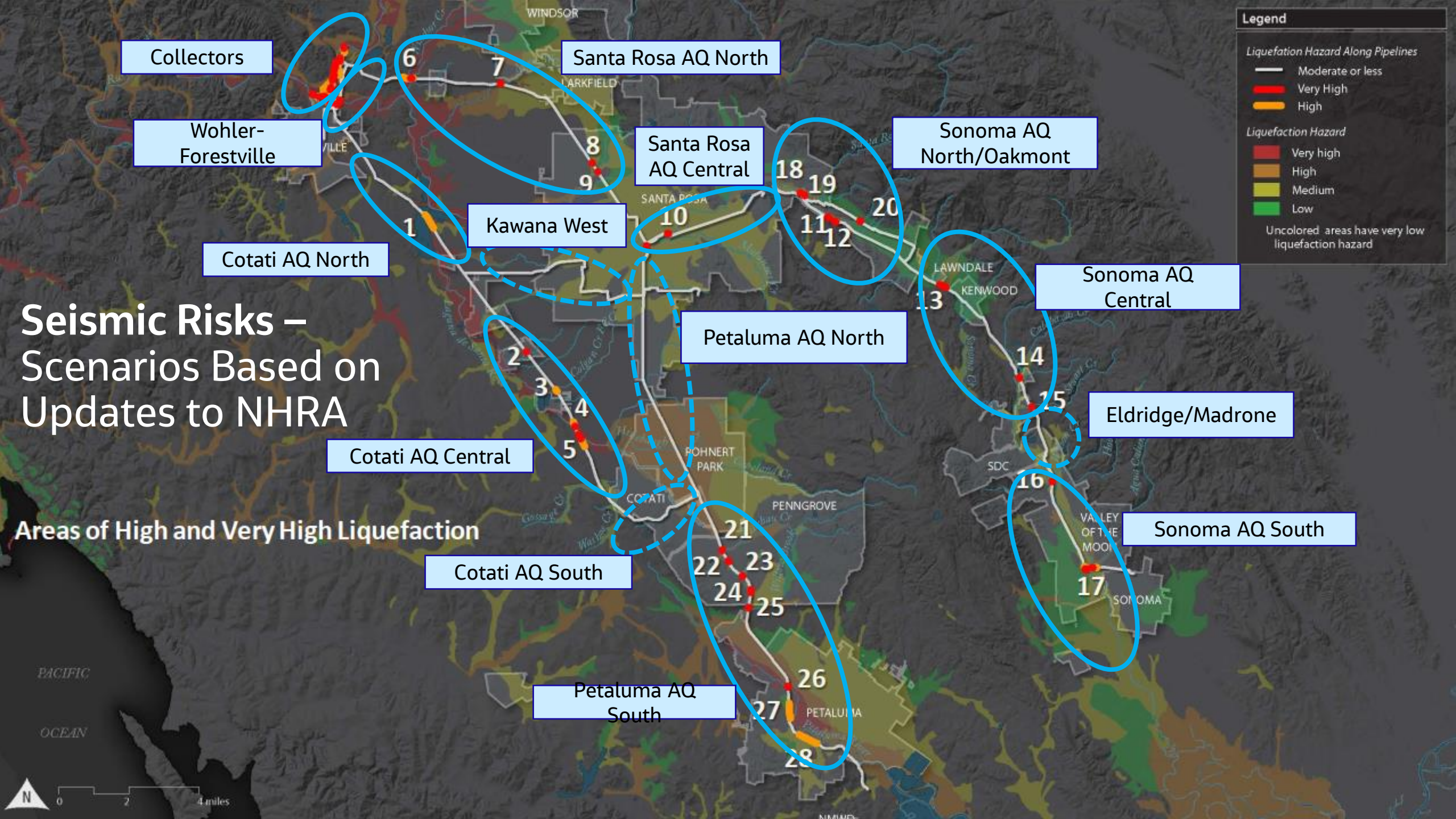


No.	Risk Driver	Risk Type
N1	Wildfire	Sudden
N2	Earthquake	Sudden
N3	Drought	Sudden/Gradual
N4	Russian River Water Quality Contamination	Sudden
N5	Power Loss	Sudden
N6	Flooding	Sudden
N7	Sea Level Rise	Gradual
N8	Local Source Water Quality Contamination	Sudden
P3	Rapid Demand Growth	Sudden/Gradual
R1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

Accelerated 2021-2022 Drought Resiliency Analysis

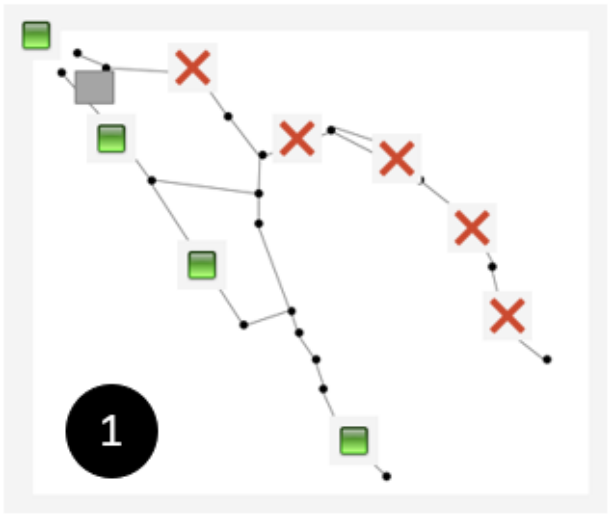
Near-Term Drought Analysis

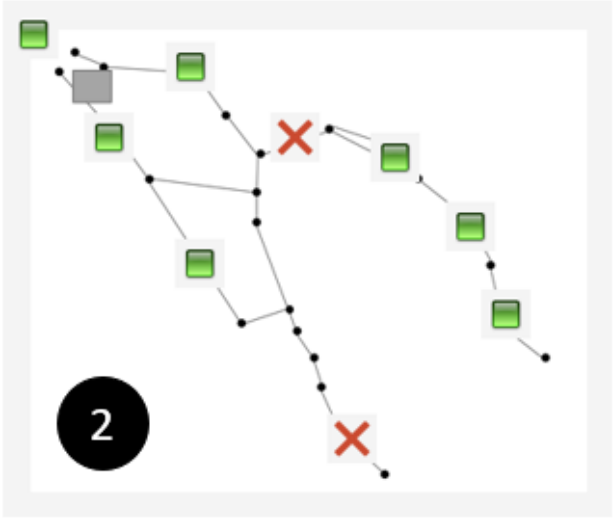
- Process
  - Tracked and projected possible drought conditions through 2021-2024
  - Developed extreme drought “stress test” scenarios
  - Projected possible shortages and response actions
- Observations
  - Near-term package of options resolves stress test shortages
  - *Winter water diversions* and *groundwater production* helps resolve shortages
  - *Conservation* and *regulatory flexibility under TUCPs are* most important in bolstering Lake Sonoma and Mendocino storage
  - Longer-term actions of *regional groundwater bank* and *Lake Sonoma FIRO* will provide benefit for future droughts but require initial wet period to begin storage phase

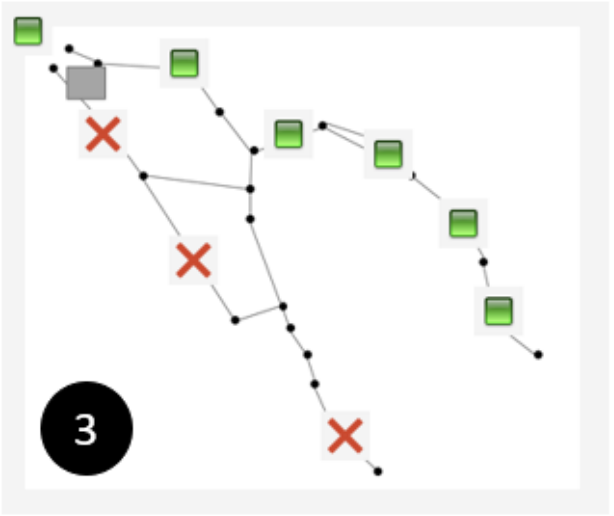

Collectors
Wohler-Forestville
Santa Rosa AQ North
Santa Rosa AQ Central
Kawana West
Cotati AQ North
Cotati AQ Central
Cotati AQ South
Petaluma AQ North
Petaluma AQ South
Sonoma AQ North/Oakmont
Sonoma AQ Central
Eldridge/Madrone
Sonoma AQ South
Seismic Risks – Scenarios Based on Updates to NHRA
Areas of High and Very High Liquefaction
Legend
Liquefaction Hazard Along Pipelines
Moderate or less
Very High
High
Liquefaction Hazard
Very high
High
Medium
Low
Uncolored areas have very low liquefaction hazard
WINDSOR
ROHNERT PARK
COTATI
PENNGROVE
LAWNDALE
KENWOOD
SDC
SONOMA
PETALUMA
PACIFIC
OCEAN
N
0
2
4 miles

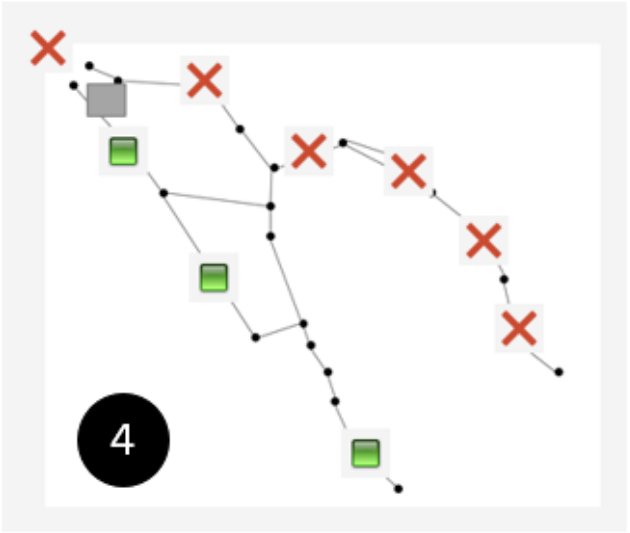
Seismic Scenarios

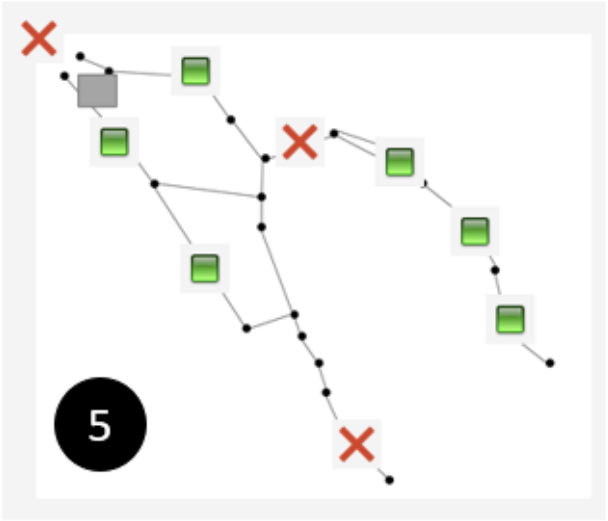
- 6 scenarios with differing transmission system and collector outage combinations

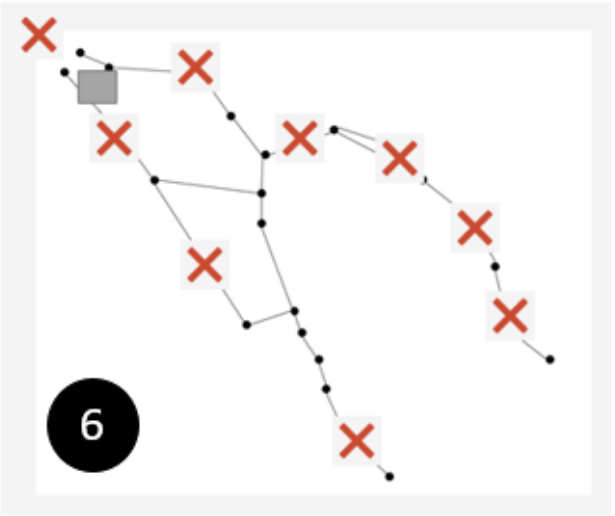




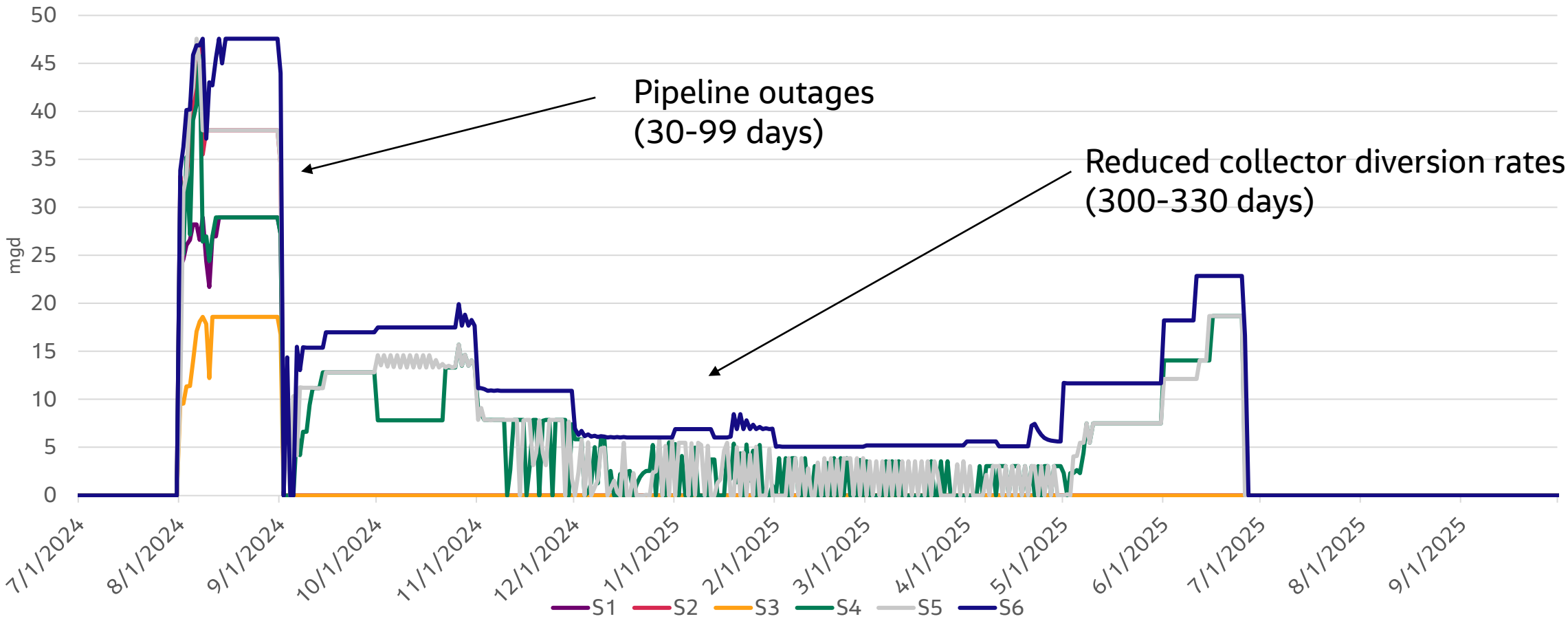








Potential Magnitude and Duration of Transmission System Shortages



* DRAFT - Results shown for minimum outage durations of ~30 days for pipelines and ~300 days for collectors

Potential Seismic Mitigation Strategies being Evaluated

- **Collectors Mitigation Strategies**
  - Secant wall at collectors, strengthening of caissons, new or retrofit vertical wells
- **Transmission System Seismic Resilience**
  - CPT, isolation valves, seismic retrofits, temporary piping, LHMP projects
  - Interconnections: Petaluma-Sonoma AQ loop, Kawana-Ralphine connection, Marin-SW reverse connection
- **Transmission System Emergency Supply**
  - Groundwater bank, transmission system emergency wells, emergency distribution points, truck hauling
- **Local Emergency System Supply**
  - Maximize groundwater production, expand local system storage

Other Risks being Evaluated in 2024

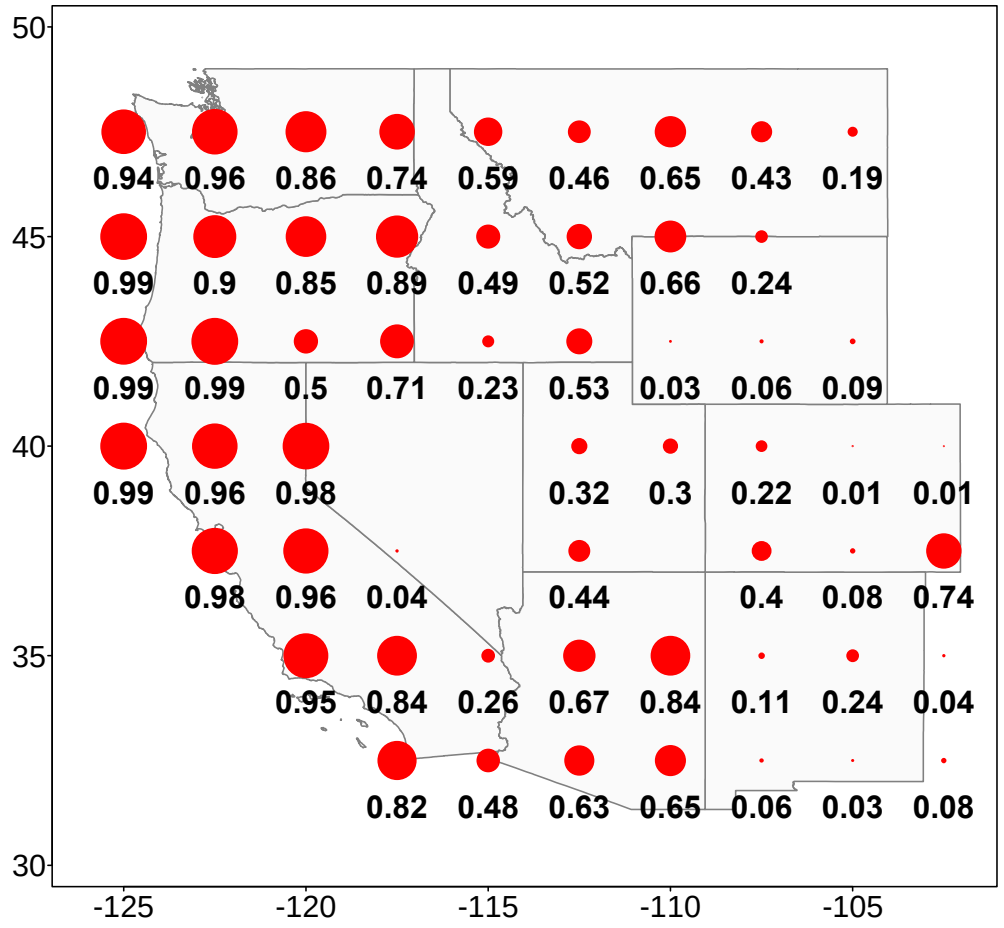
- Wildfires
- Flooding
- Power Loss
- Potter Valley Project Uncertainty

WILDFIRES – North Coast is Highly Vulnerable to Wildfires

Wildfire Risks –
Scenarios in Progress
Based on Projected
Burn Probability in
Critical Watersheds

FLOODING – Atmospheric Rivers Drive Flood Damages

Proportion of Economic Losses Due to ARs



County	AR proportion of insured losses	Claims	Insured losses ($m)	Total damages ($b)	AR damages ($b)
Sonoma, CA	**0.998**	**6650**	**172.0**	**5.2**	**5.2**

T. Corringham, 2018

Next Steps

- Completion of Additional Risk Scenarios
- Cascading Risk Scenarios
- Summarize and Recommend Regional Strategies
- Prepare Study Report
- Schedule
  - Completion of risk scenarios - April
  - Cascading risk scenarios – June
  - Recommended strategies – Summer 2024
  - Study Report – Fall 2024

Questions?

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Armin Munévar, Global Water Resources, Jacobs (armin.munevar@jacobs.com)

Total Potential Transmission System Shortage

- Pipeline outages may result in shortages of 1,500 – 10,000 AF (H&S 400 – 4,000 AF)
- Collector risks compound shortage risks up to 14,000 – 20,000 AF (H&S 3,000 – 6,100 AF)