

Adaptive Water Management in California's Changing Climate

CEPSYM, June 27, 2023

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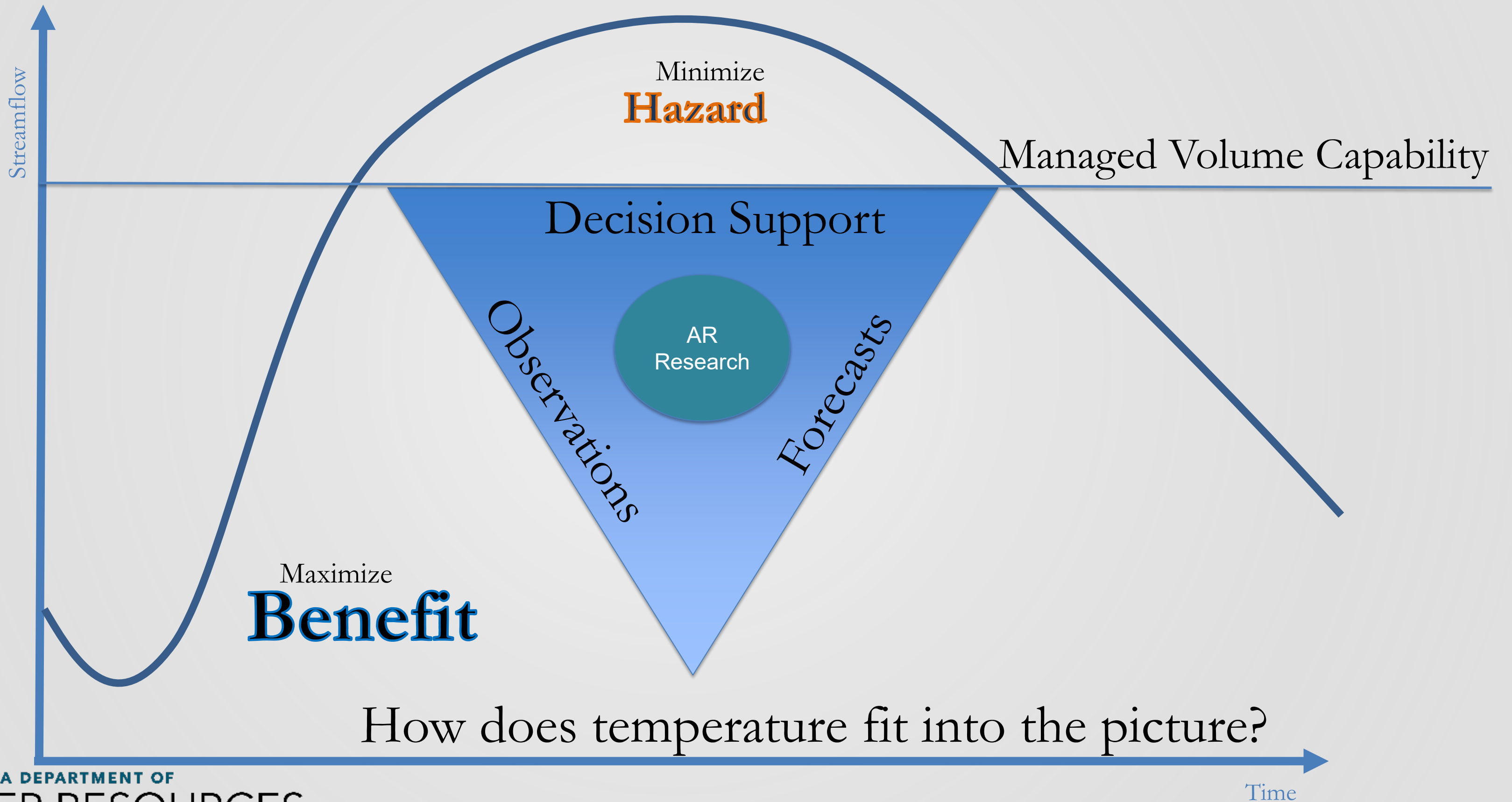
Building the Water Year

- Fall (October/November)
 - Precipitation Onset
 - Temperature Anomaly
 - Soil Moisture State with Snowpack Initiation
- Winter (December/January/February)
 - Wet/Dry
 - Notable Anomalies
- Spring (March/April/May)
 - Late-Season Bailout or Early Shutoff?
 - Peak Snowpack Timing and Magnitude
- Summer (June/July/August/September)
 - Drying Pace and Scale
 - Heat Events
 - Tropical Activity
- Multi-Year Prediction – What about next year?

Climate Change: How much different will the next decade be?



Real-Time Water Management



Paths to Adaptation

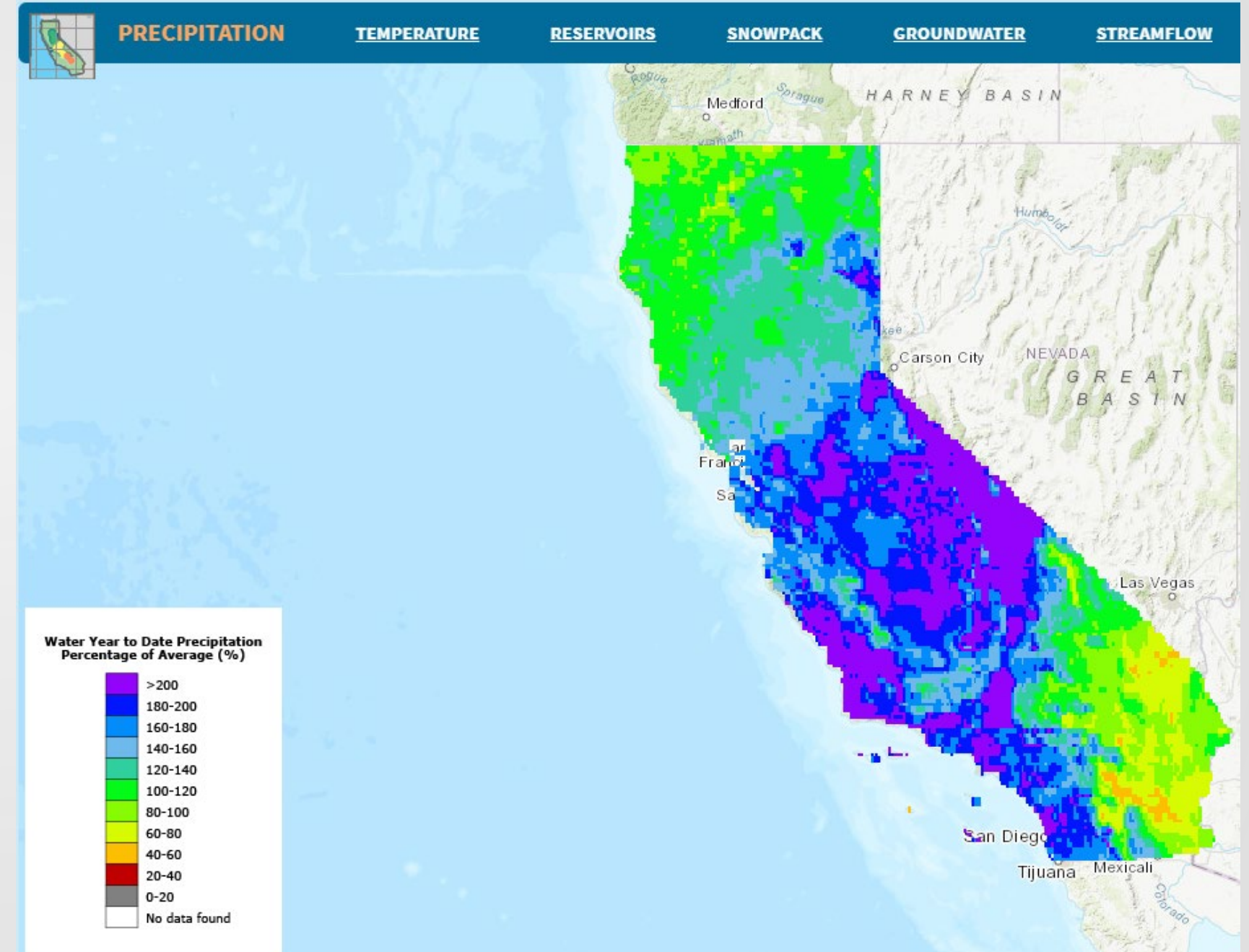
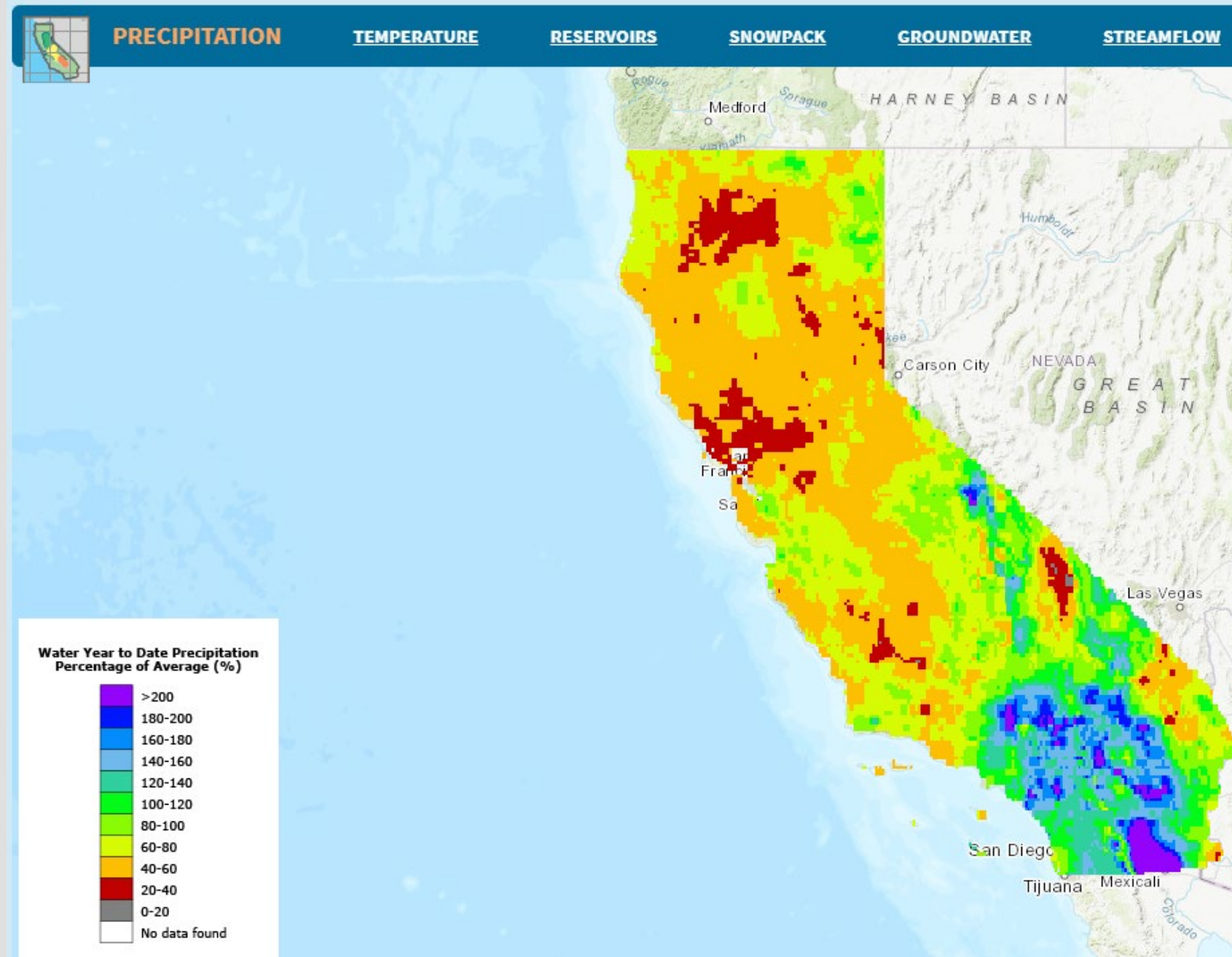
- Collaborate to identify vulnerabilities and form adaptation strategies – [DWR Climate Action Plan](#)
- Recognize the need to act to what and when and how
- Refine and augment adaptation as conditions evolve



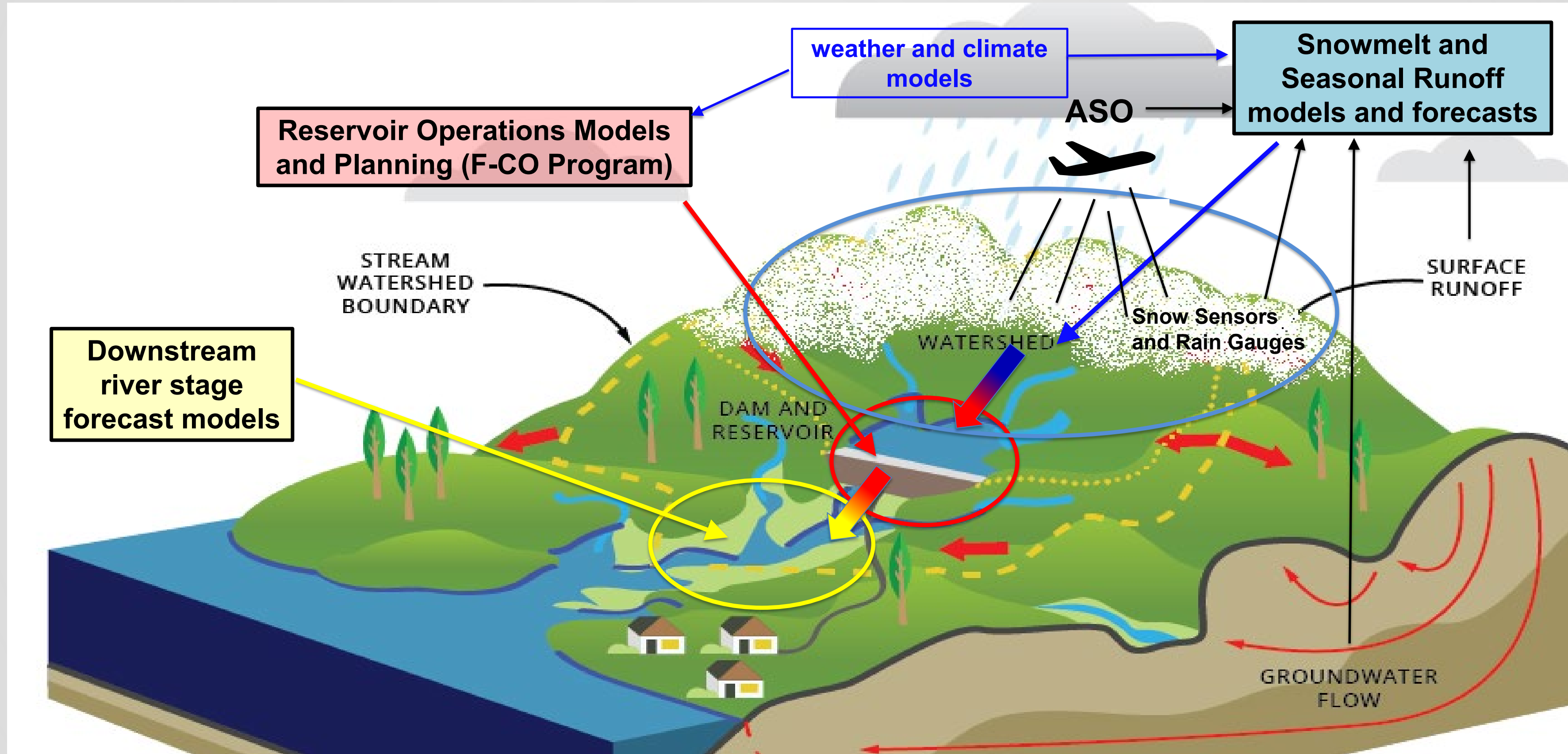
Water Year 2023

December 1, 2022

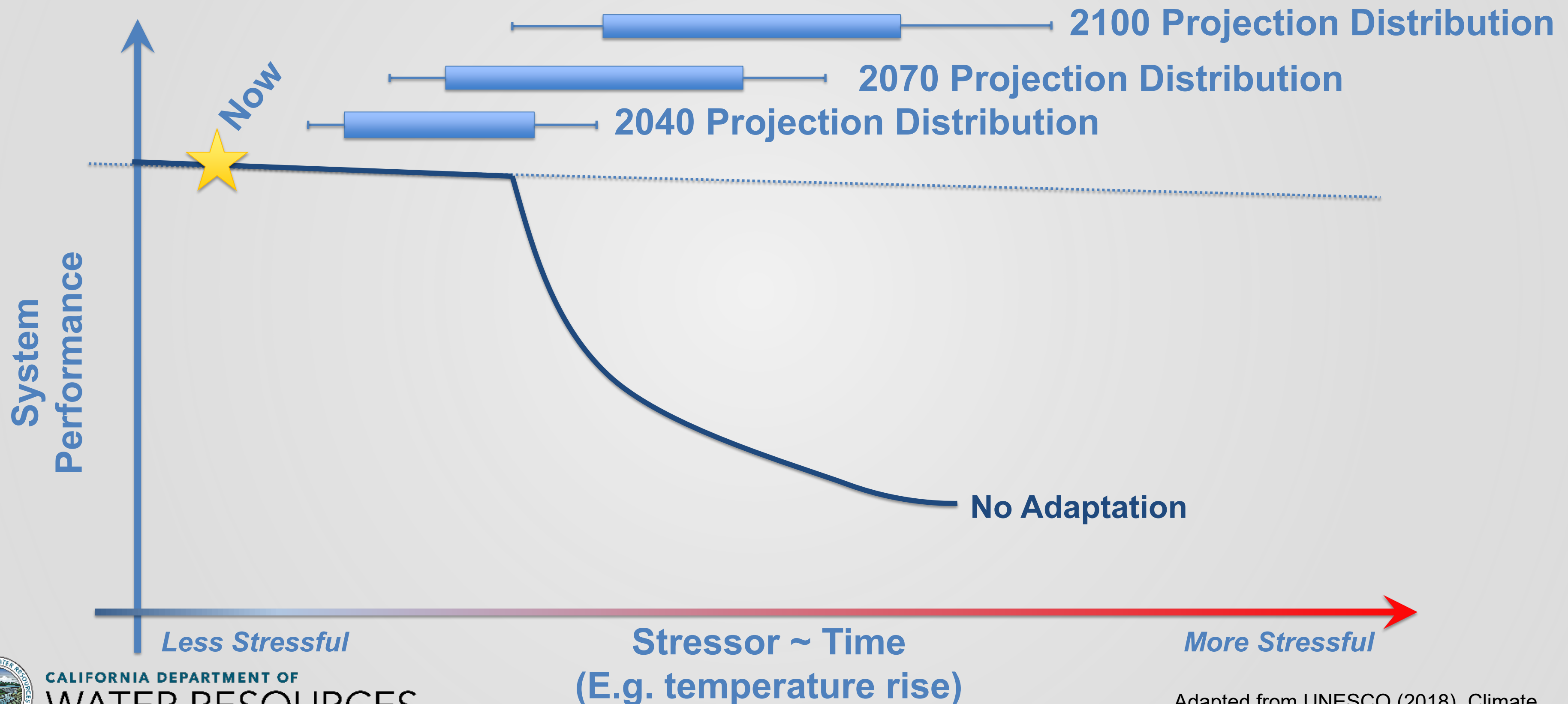
April 1, 2023



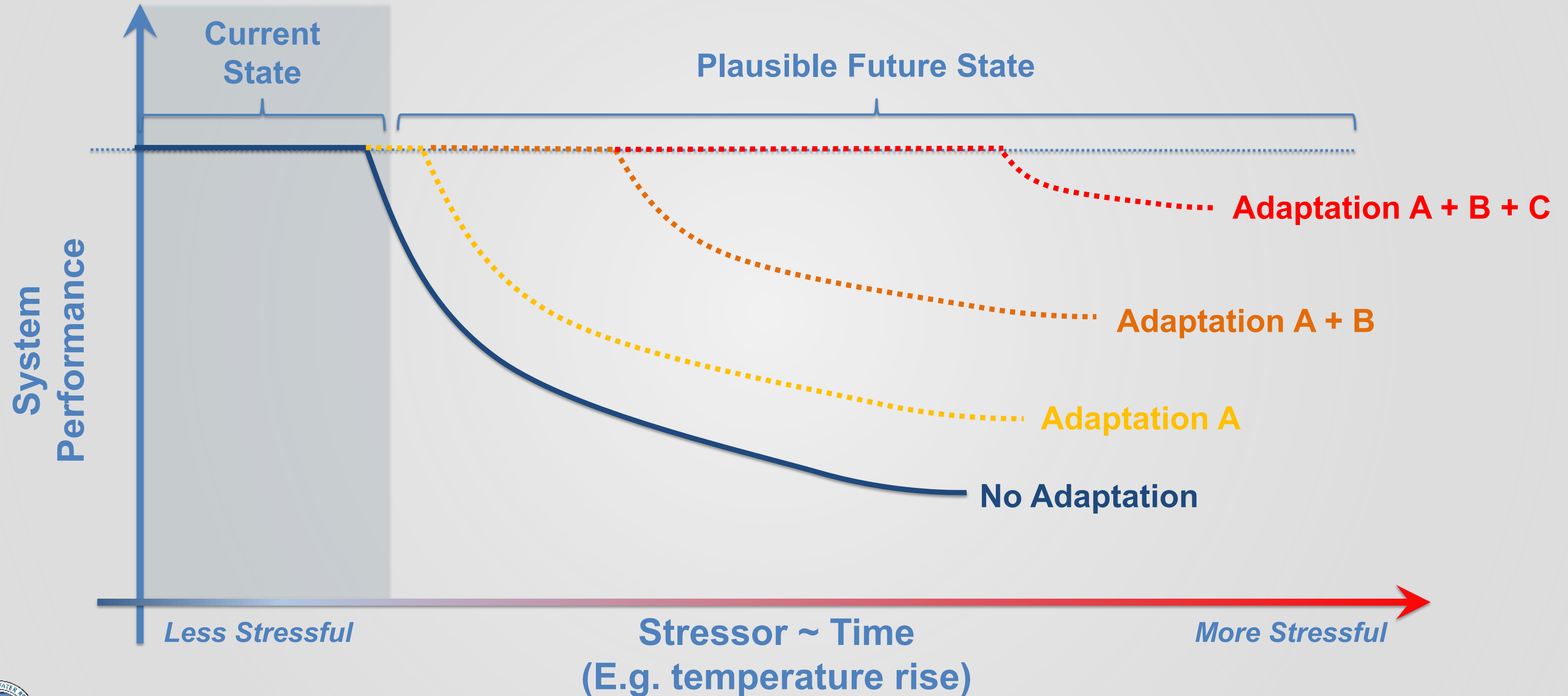
DWR and the CNRFC generate snowmelt and seasonal runoff forecasts, reservoir inflow and operations models, and river stage forecasts



Vulnerability Example



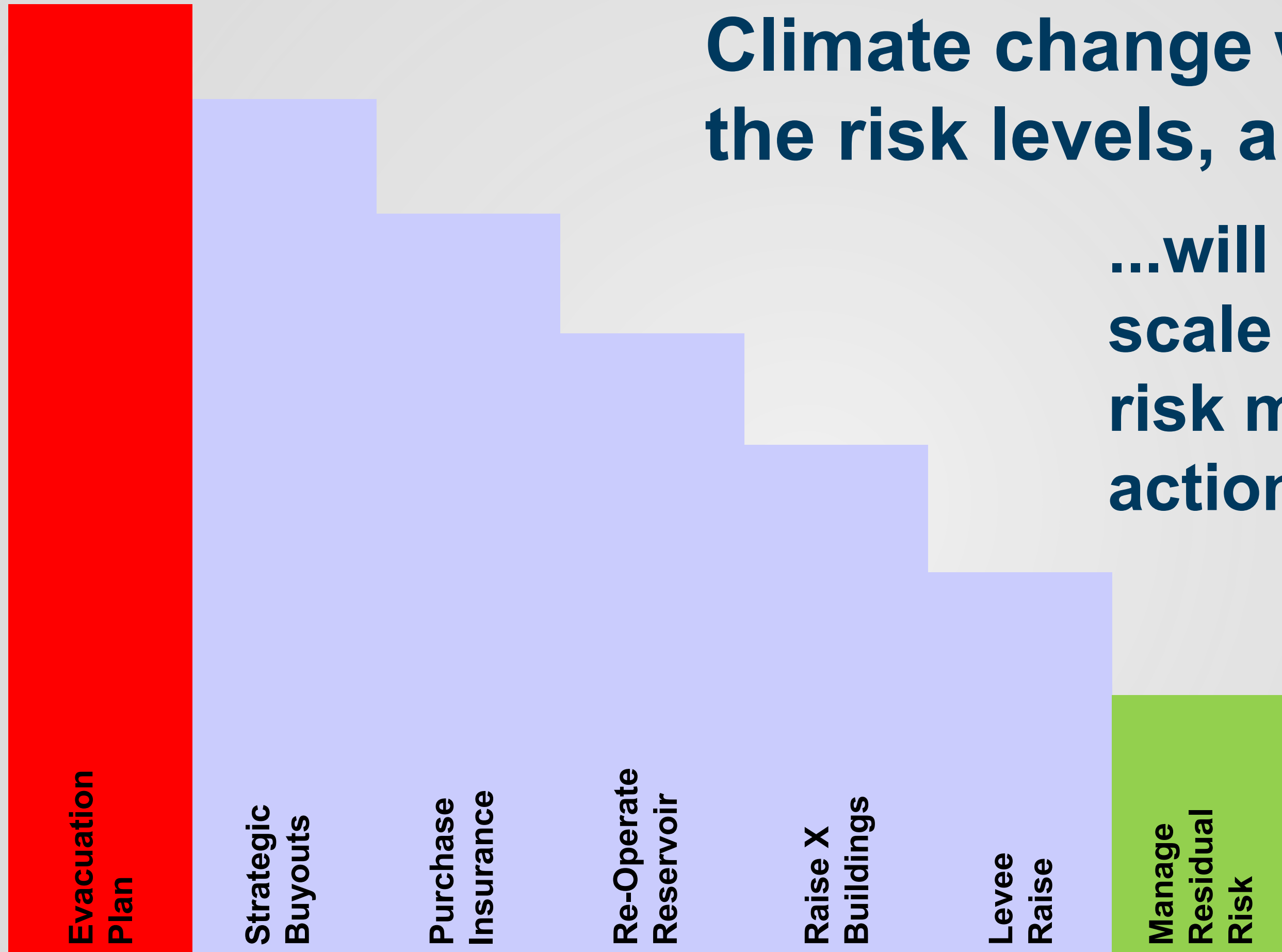
Adaptation Example



Climate change will increase the risk levels, and....

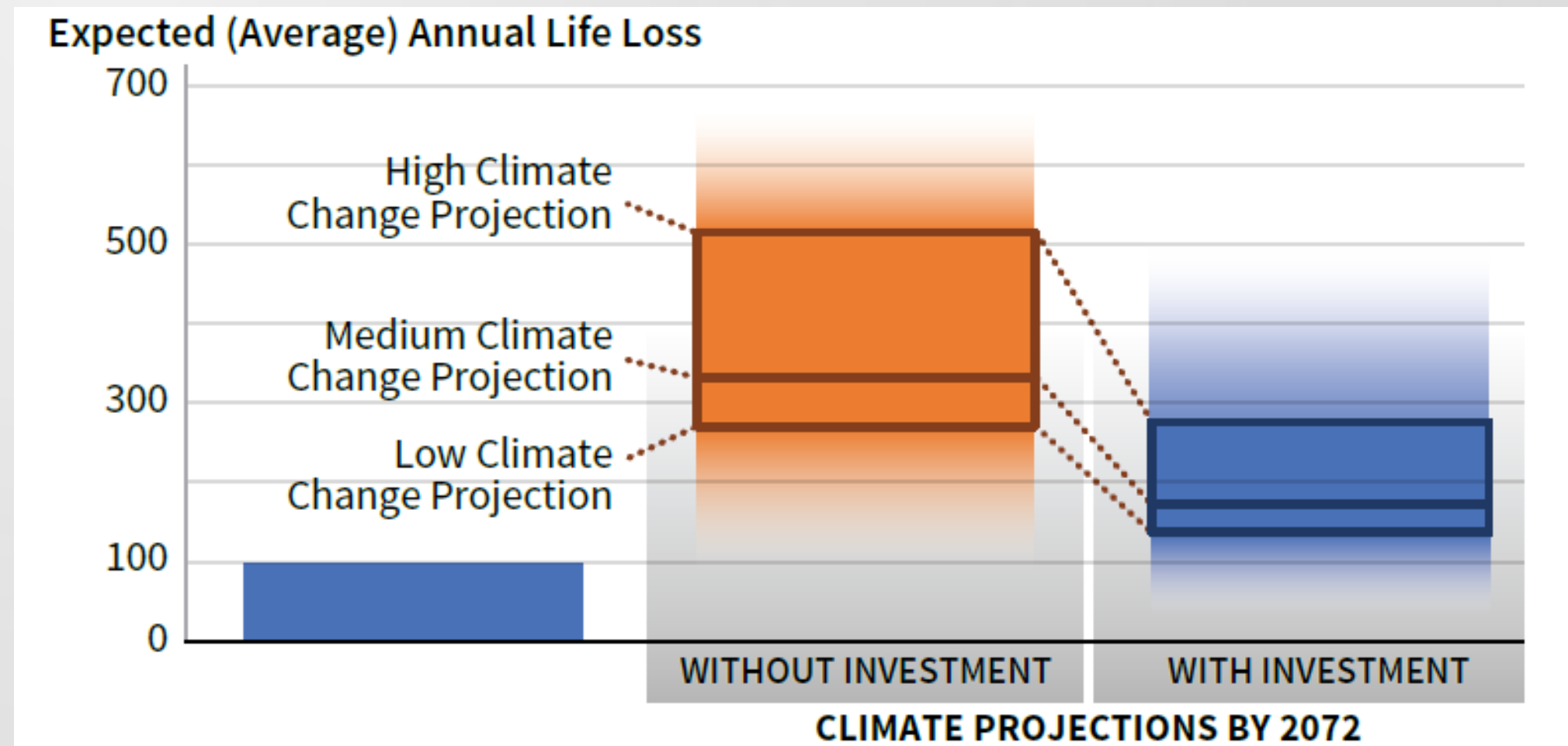
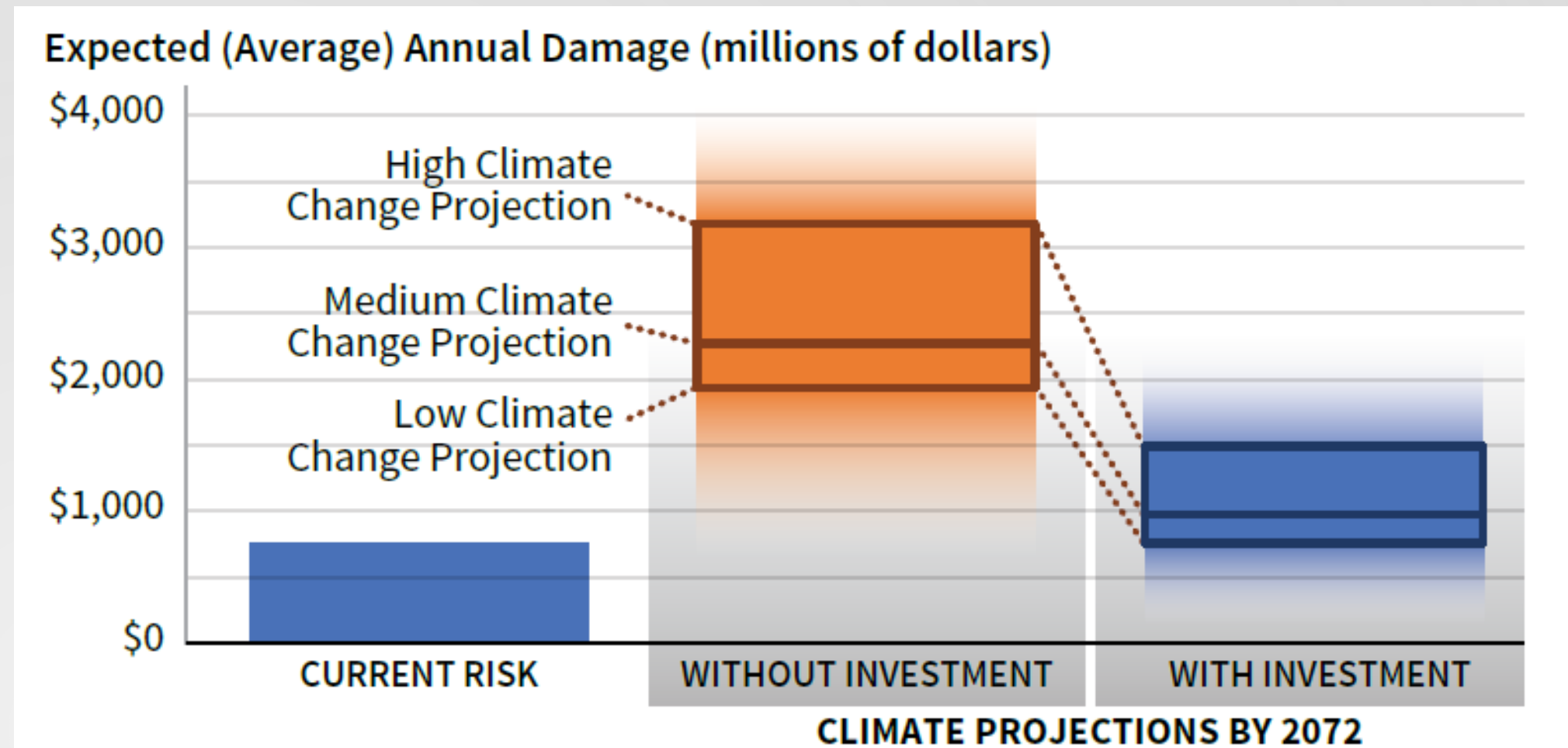
...will require to scale up our flood risk management actions.

Risk Level →



Central Valley Flood Protection Plan Update 2022

- Run a suit of models:
 - Hydrological
 - Hydraulics
 - Economics
- Current and With Climate Change
 - 50-Year Planning Horizon
 - 3 Future Projections
- With and Without Investment
 - State Systemwide Investment Approach



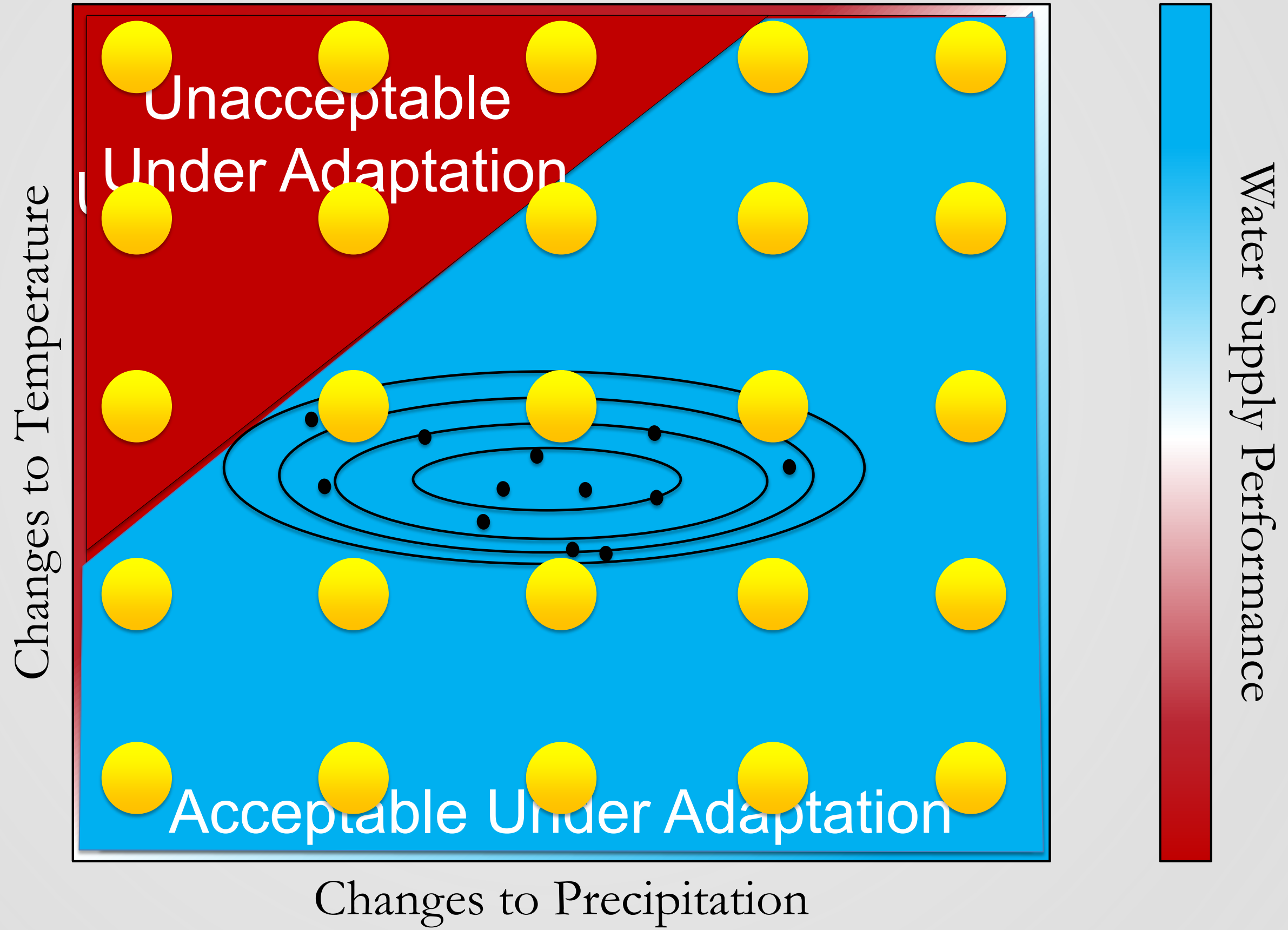
Flood-MAR: Multi-sector Solutions for Watershed Resilience

Two studies:

- Merced River Reconnaissance Study (Summer 2023)
- San Joaquin Watershed Studies (Summer 2024)

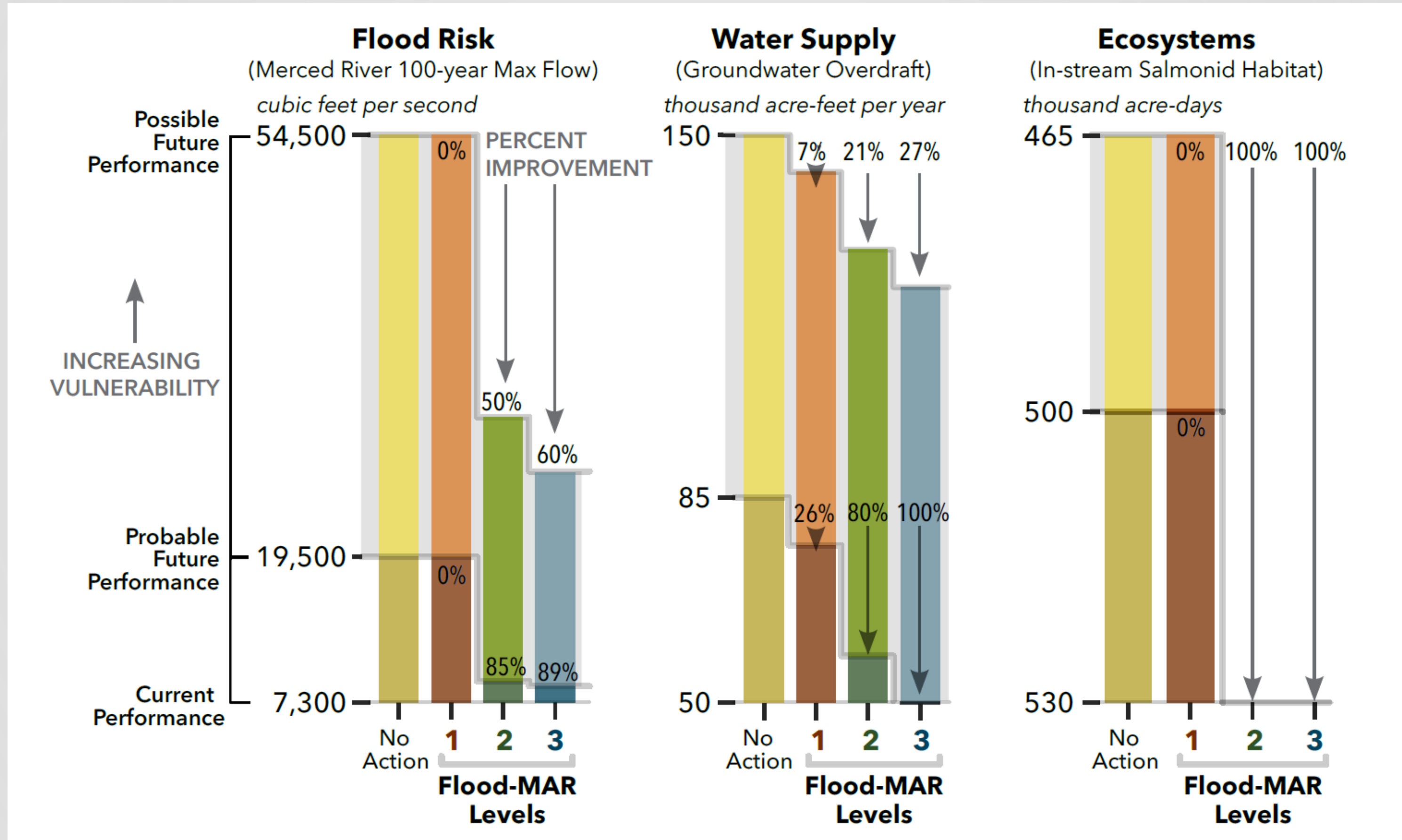
Merced Study and on-going San Joaquin Valley watershed studies are assessing ***climate vulnerability*** and evaluating ***adaptation solutions*** at the ***watershed scale***.

Both studies are evaluating the potential for ***robust benefits*** by combining ***groundwater recharge*** (Managed Aquifer Recharge – MAR) with ***Forecast Informed Reservoir Operations*** (FIRO) and other reservoir reoperation concepts, as well as from ***infrastructure improvements***.



Flood-MAR multi-sector adaptation performance reflects an increasing improvement as an increasing implementation commitment over time generates better outcomes.

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Closing Thoughts

- A warming world has already shown new and more frequent extremes impacting water management actions.
- Expectations are for these extremes to amplify further leading to longer dry spells between larger storms requiring adaptation strategies to maintain supply reliability and reduce flood risk.



Closing Thoughts

- Adaptation pathways look to package and employ a variety of strategies to adapt as conditions change.
- Collaborations with the research community and with local, state, and federal government are in progress and will facilitate meeting water management objectives using emerging science and technology to meet the evolving challenges.



Questions

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Acknowledgment:

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