

Why Decision Scaling: A Smarter Approach to Climate-Informed Water Management

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CWEMF – Annual Meeting

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Key Takeaways – Making Decisions Under Uncertainty

1. Flip the Script with Decision Scaling

- Traditional planning starts with climate scenarios. Decision scaling starts with your system's needs and asks, what breaks it, and when?

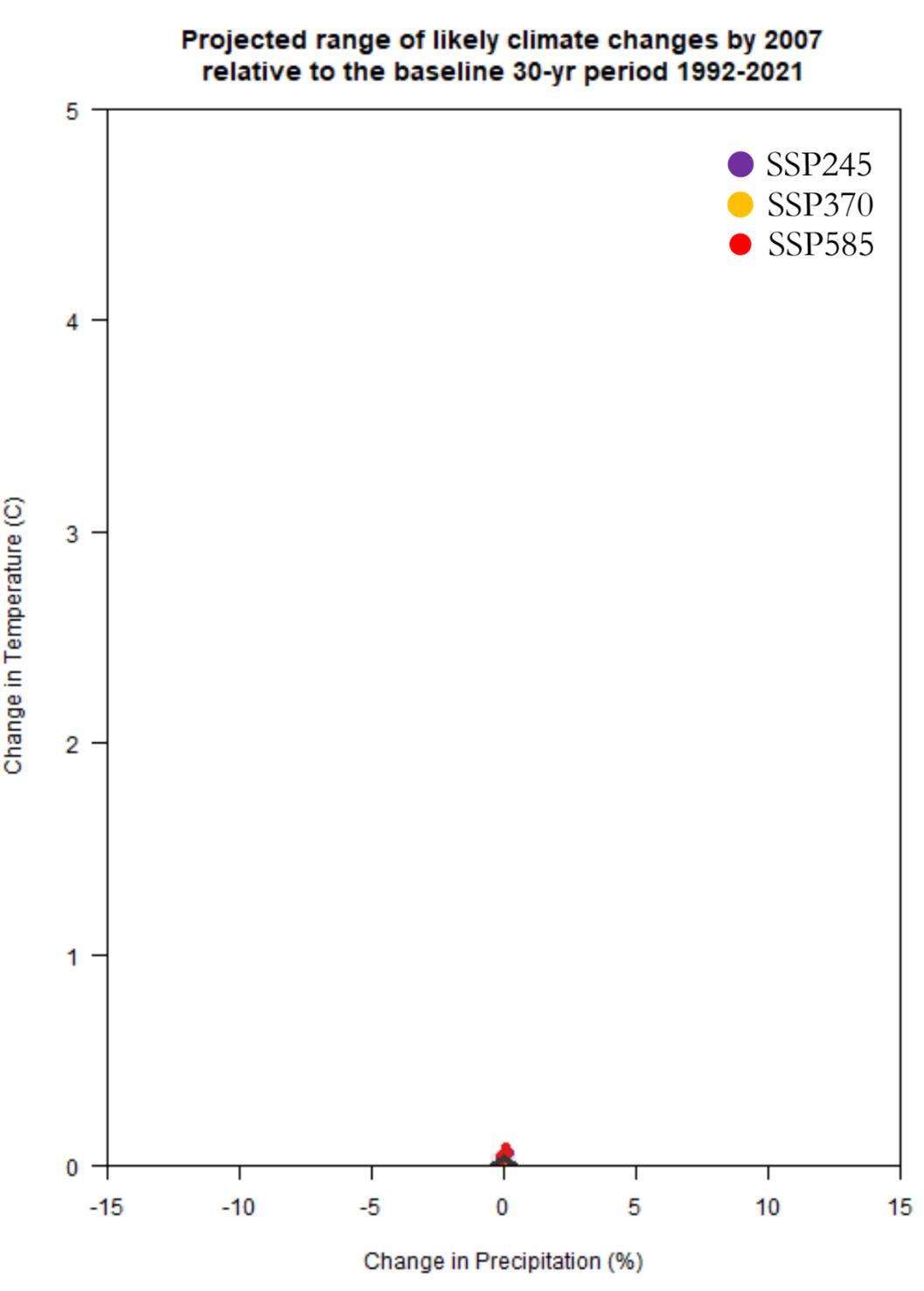
2. Make Risk-Informed, Not Scenario-Dependent Decisions

- By stress-testing your system and overlaying climate probabilities, you gain actionable insights to support resilient and flexible water management.

3. DWR Is Leading by Example—And Sharing Tools

- DWR is using decision scaling to build resilience. Resources are available to help you apply it to your own work.

Climate Uncertainty: A Core Challenge for Water Management



CLIMATE CHANGE COMPONENT	CURRENT TRENDS	PROJECTED TRENDS	CONFIDENCE FOR FUTURE CHANGE
Air Temperature	↑ Increasing	↑ Increasing	Very high
Water Temperature	↑ Increasing	↑ Increasing	Medium
Extreme Precipitation	↑ Increasing	↑ Increasing	Medium high
Snowpack	↓ Decreasing	↓ Decreasing (less snow and more rain)	Very high
Sea Level Rise	↑ Increasing	↑ Increasing	Very high
Hydrograph Characteristics	← Shift in streamflow to the earlier months	← Shift in streamflow to the earlier months	Very high
Unregulated Flood Volume	N/A	↑ Increasing	Very high
Regulated Flow	N/A	↑ Increasing (varies based on location)	N/A
Regulated Stage	N/A	↑ Increasing (varies based on location)	N/A

Source: CVFPP 2022

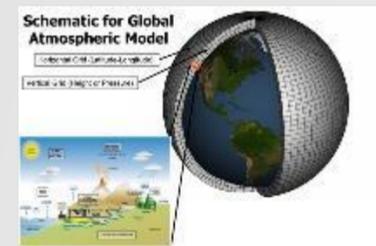
By how much and when?

Moving Beyond “Predict-Then-Act”: The Traditional Paradigm

“Top Down” or Downscaling Approach

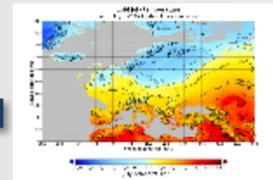
Traditional method of developing
climate change plans

Select a Couple of
General Circulation
Model (GCM)
Projections



Source:
[NOAA GFDL](#)

Downscaling,
Hydrologic Modeling

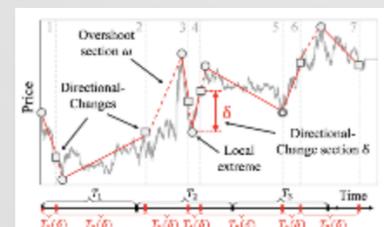


Operations and
Planning Models



Source:
[SEI WEAP](#)

Conditional System
Performance
Projections



There are 100's of Global Climate projections

- Pick a scenario or set of scenarios to localize and use as the “future”
- Predict future performance of your water system
- Determine vulnerabilities and adapt as indicated

Challenges with Traditional Approach

- Different GCMs are not always Independent
- Selecting GCMs based on Skill and/or Independence can Limit Risk Assessment
- Climate Variability is Important but Difficult to Explore

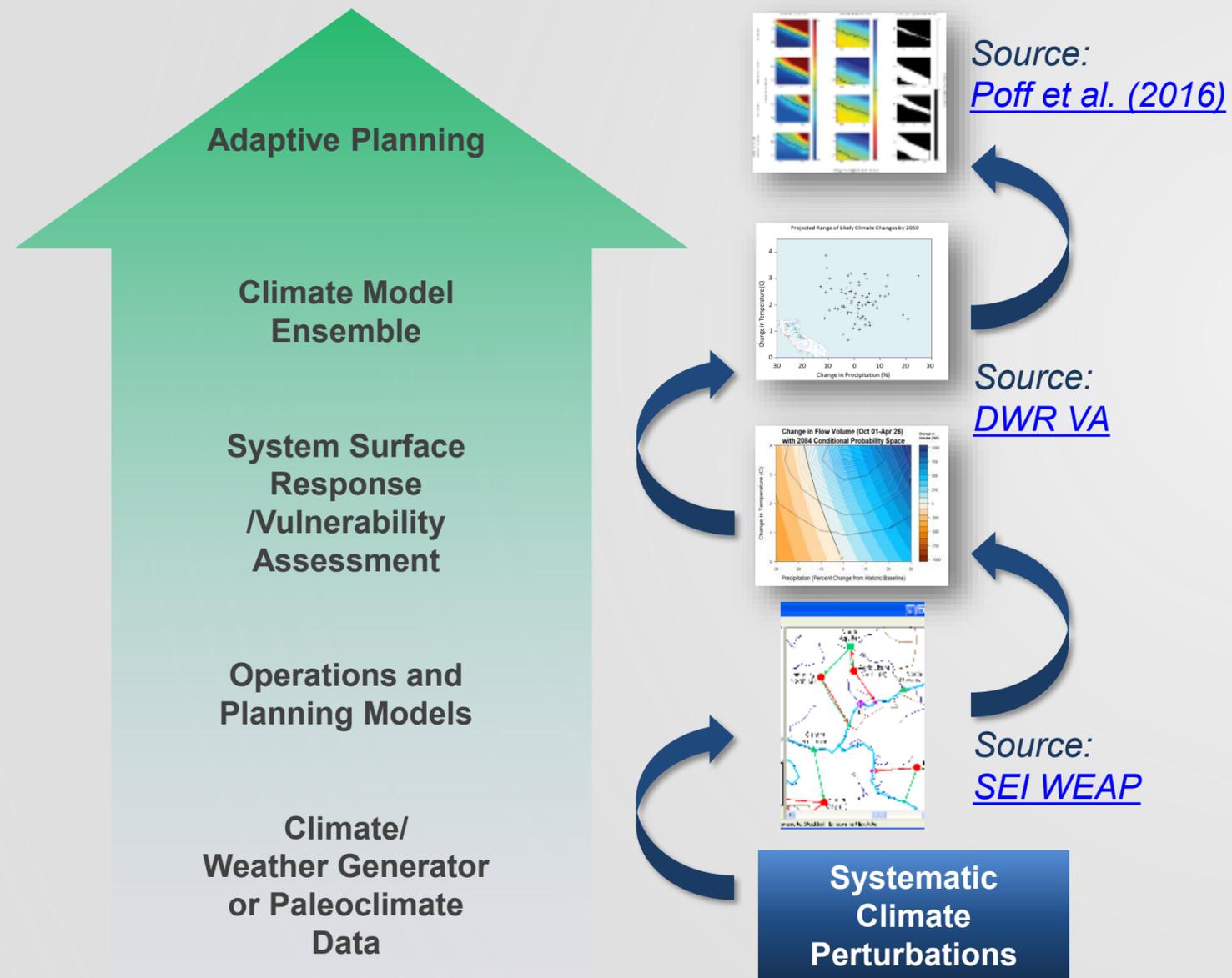


- Did we cover the full range of uncertainty to be prepared?
- Would the results be different if a different set of projections or method were used?
- How likely is this future? What is the risk?

What is Decision Scaling?

“Bottom Up” or
Decision Scaling Approach

A way to prepare when you aren't
sure what's coming (Stress Test)



→ Where is our system vulnerable?

→ Find tipping points.

→ Incorporate climate projections to assess the risk of these “unacceptable outcomes.”

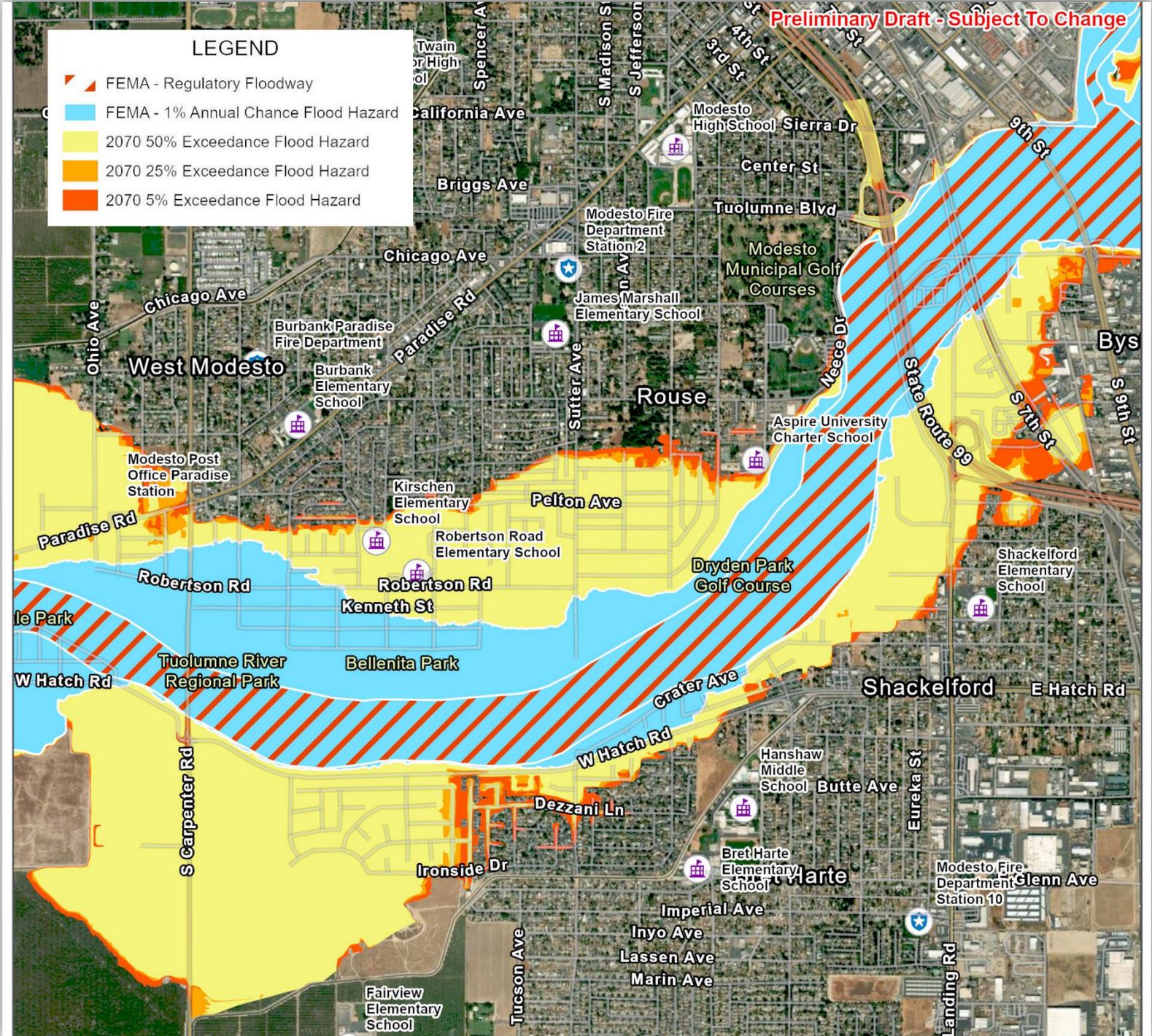
→ **ADAPT!**

Why DWR Uses Decision Scaling?

- Starts with system vulnerabilities and system performance, not climate projections
- Enables robust, risk-informed planning actions under deep uncertainty
- Helps depoliticize future scenarios, avoids over-reliance on a small set of GCMs or scenarios
- Aligns with DWR's Climate Action Plan II, in a tailored and scalable method
- Supports DWR's investment decisions under a consistent approach

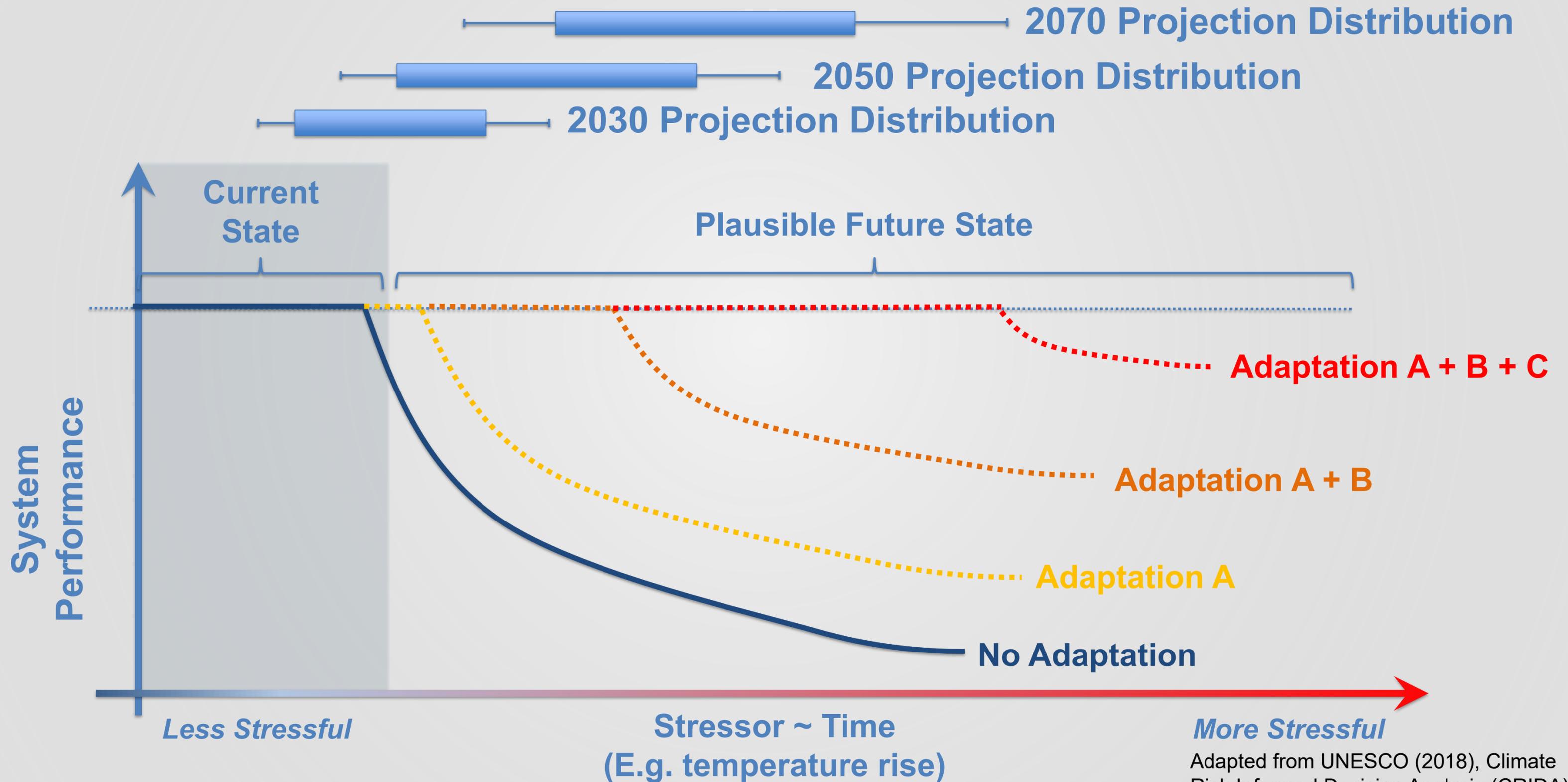
Application Example: FEMA CTP Floodplain Mapping

Developed Preliminary Inundation Maps for the Tuolumne River for Select Draft Climate Change Scenarios

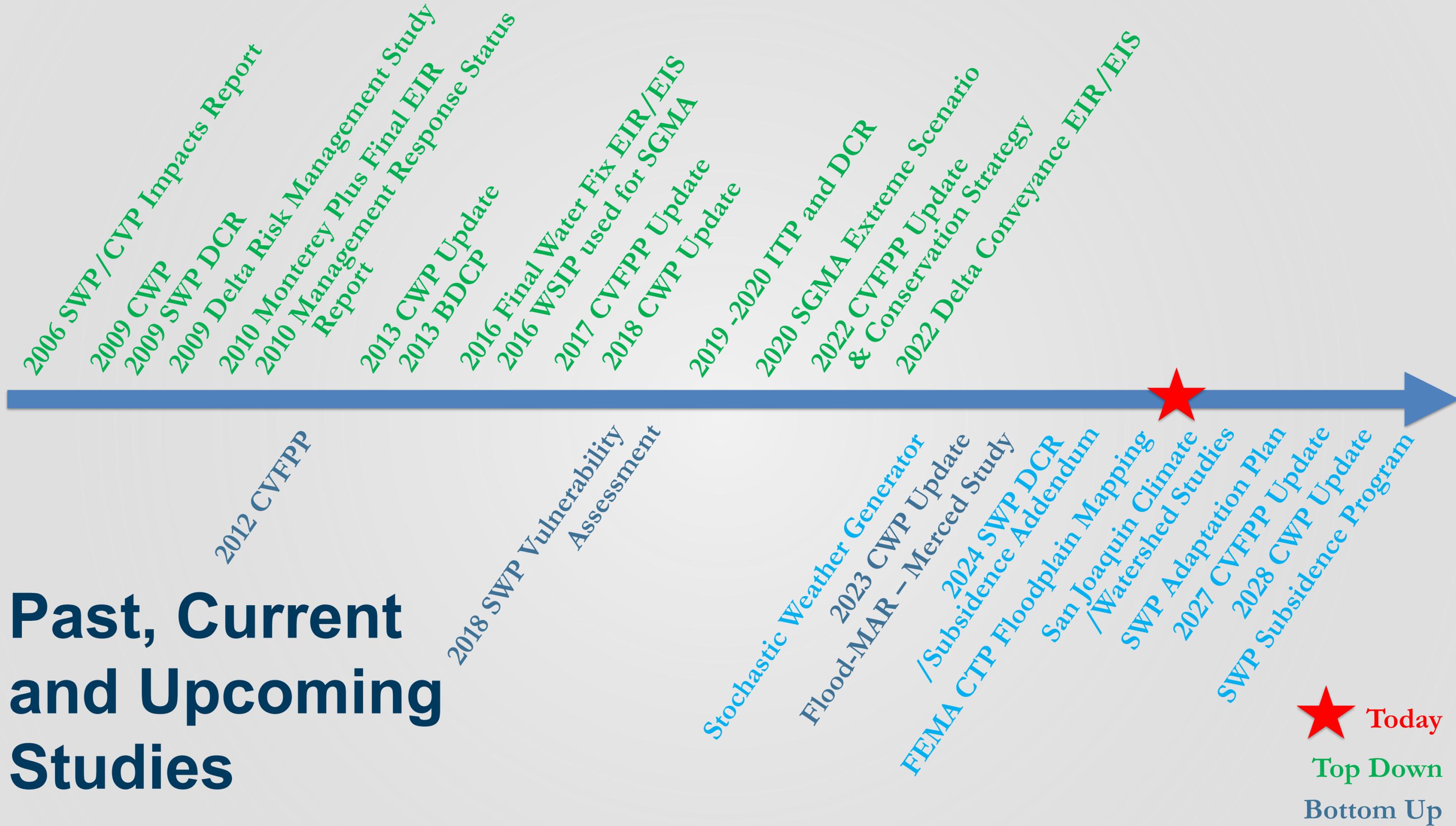


Scenario	Planning Horizon	Levels of Concern
Current	2007	NA
Future Near-Term	2040	50%, 25%, 5%
Future Long-Term	2070	50%, 25%, 5%

Application Example:



Past, Current and Upcoming Studies

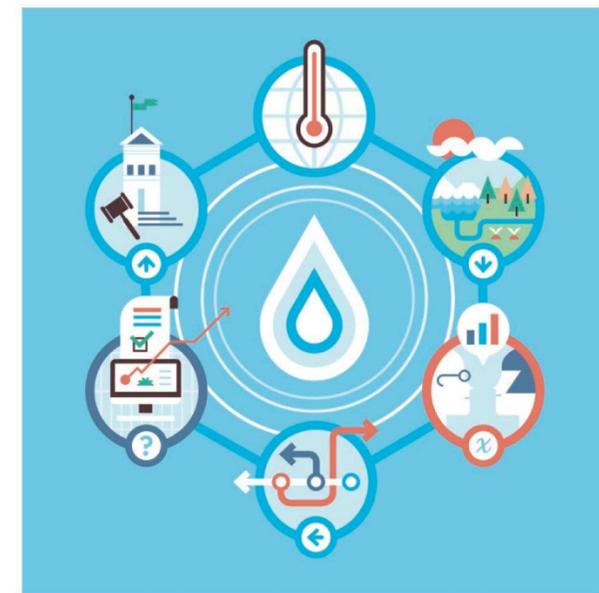


The Opportunity of Decision Scaling

- Climate uncertainty is a constraint – but also an innovation driver
- Decision scaling provides a transparent, adaptive, and defensible planning tool
- Encourages collaboration across science, policy, and operations

Climate Risk Informed Decision Analysis (CRIDA)

Collaborative Water Resources
Planning for an Uncertain Future



What Comes Next: From Why to How

The next speakers will:

- Show how decision scaling is implemented (tools, data, models)
- Share examples from Watershed Studies and Future Scenarios Projects
- Offer resources to tailor this approach to your system and level of expertise

Think About Your System...

- What decisions are you making that depend on an uncertain future?
- Where do you feel least confident in your current planning framework?
- How would knowing your system's response to a range of futures help?

Thank you!

DWR's Climate Action Plan: <https://water.ca.gov/Programs/All-Programs/Climate-Change-Program/Climate-Action-Plan>

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