



# Climate Assessment at Denver Water

Lurna Kaatz, Climate Program Director, Denver Water

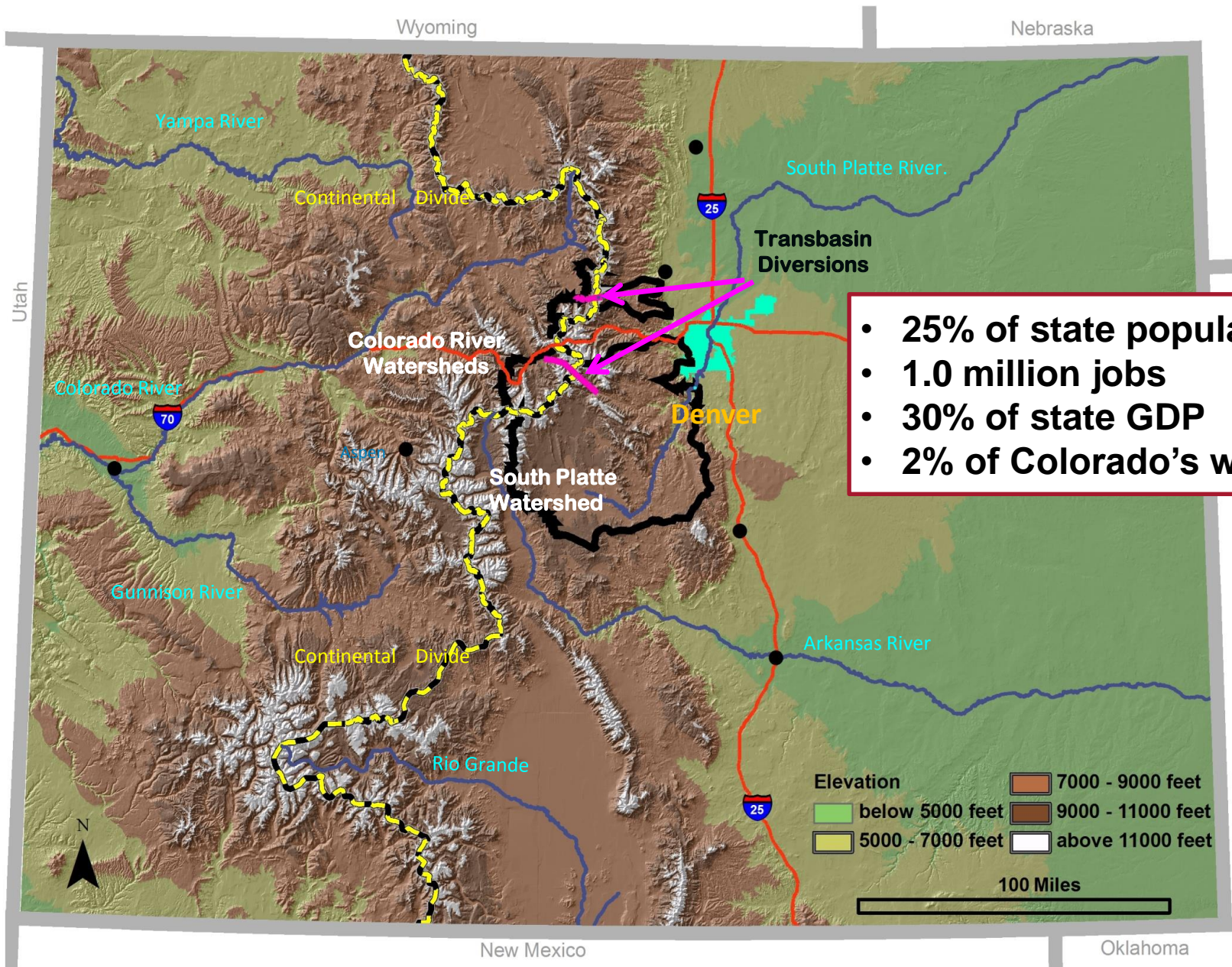
The National Academies of Sciences, Engineering, and  
Medicine

August 15, 2018









# This story begins in 2002

Deterministic thinking

Unprecedented Simultaneous  
Natural Disasters





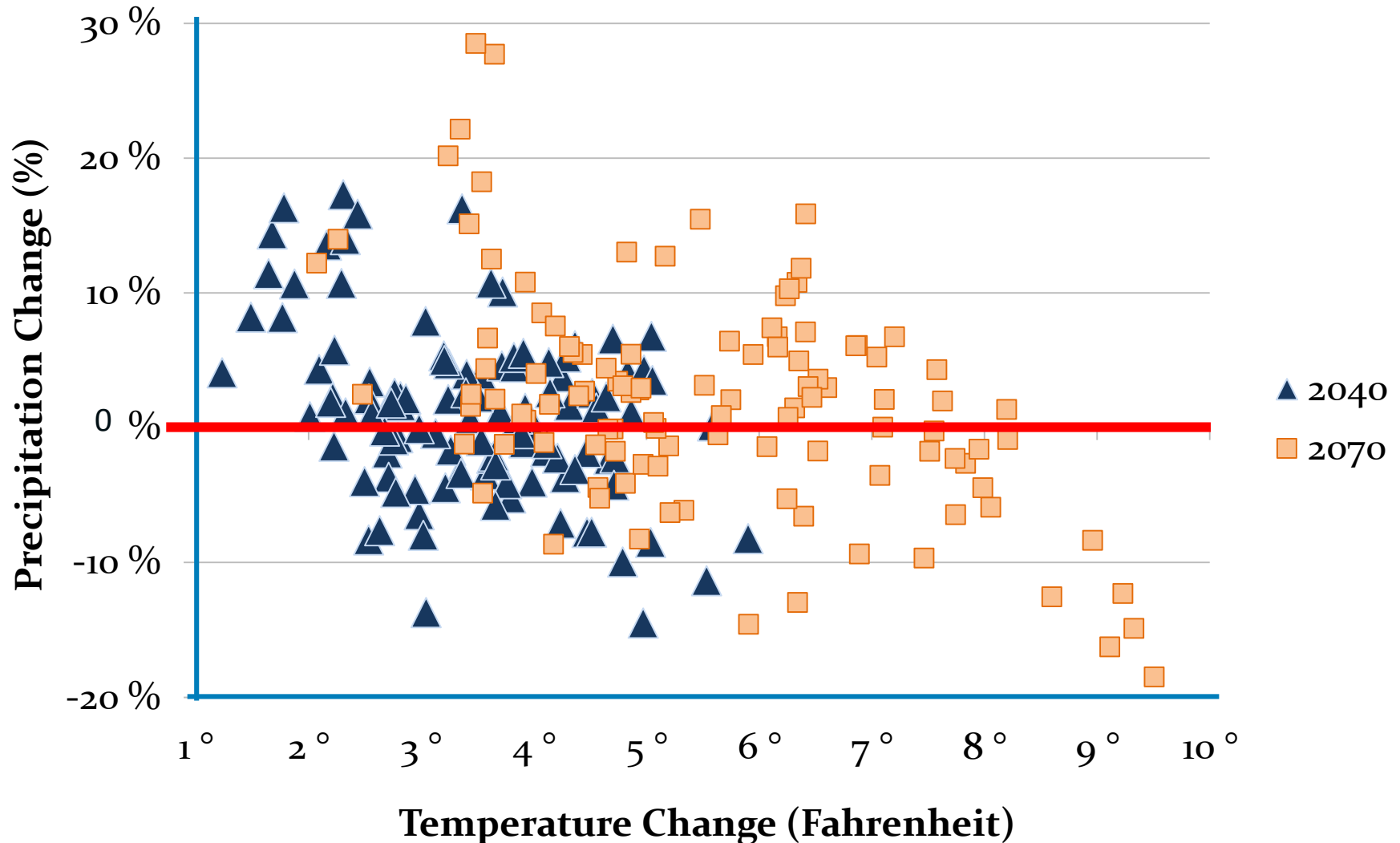
# The Joint Front Range Climate Change Vulnerability Study

## Benefits of a Regional Approach

- **Scale:** Projections are coarse and cover watersheds
- **Communication:** Cohesively communicate with customers and the media
- **Safety:** Provide political coverage
- **Coordination:** Coordinate with and inform other investigations
- **Resources:** Pool finances, staff, and expert resources
- **Attention:** Everyone wanted to work with us
- **Learning:** Monthly meetings and education



# Projected Changes for Central Mountains in Colorado



# Important Outcomes

- Denver Water:
  - climate adaptation and planning philosophy
  - work with WUCA and others
  - value of coproduction and collaboration
- State of Colorado:
  - climate modeling of Colorado River
  - adoption of climate science and scenario planning in CO Water Plan
- Climate Change in Colorado report

**AND** the FRCCG still meets quarterly!

**AND** DW has ongoing collaborations with NCAR, WWA, RTI!

# Denver Water's simple assessments

2005	2° F Warming	5° F Warming
Reduced Supply	7%	14%
Increased Demand	6%	-

2011	5° F Warming Means
Reduced Supply	20%
Increased Demand	7%

Additional precipitation needed to offset warming	10%
--	-----

2017	Reduced Supply
3°F with wet winters	5%
6°F + more daily variability	24%

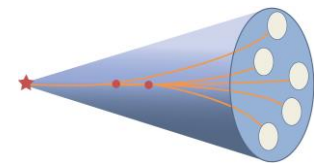


# Planning Evolution

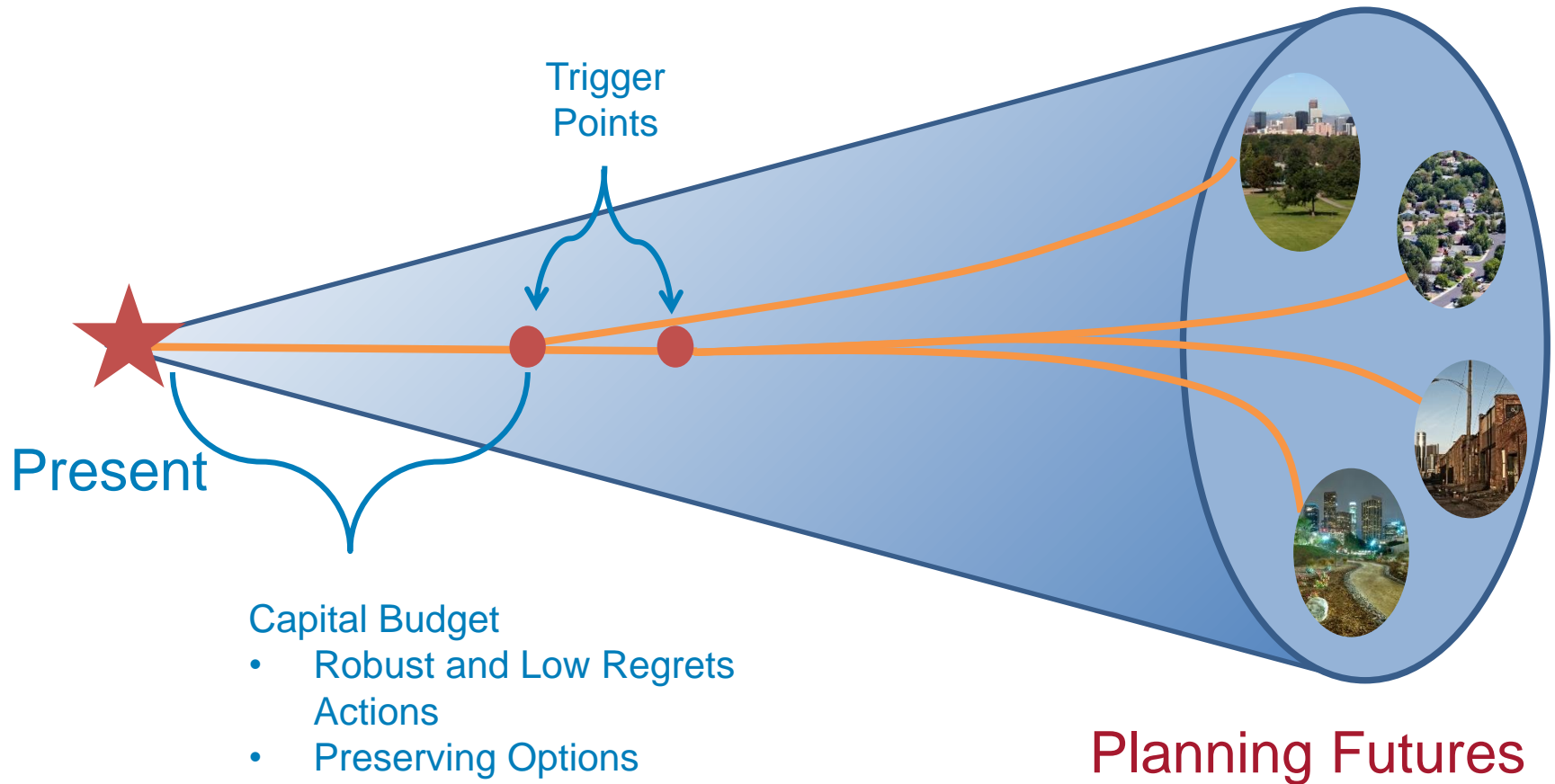
- Probabilities based on history
  - You know the risk and can maximize the return
  - Planning in a perfect world
  - Traditional planning
- Shifting probabilities?
- What else could happen?
- Life without probabilities
  - Spend time determining what may happen or  
Focus on preparing for whatever will happen?



## New Planning Techniques



# Embracing *Deep Uncertainty*





Warmer Climate

## Adaptive Strategy

- Diversified portfolio
- Scalable options
- Preserve options
- Continuous & iterative planning

Weak Economy

Strong Economy

Hot Climate

Suburban  
preference

New urban  
preference

# System Resilience



Foothills Bifurcation



Northwater Treatment Plant



From Forest to Faucets



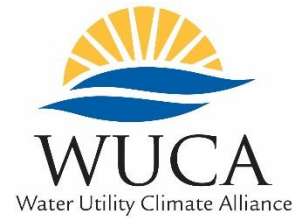
Gross Expansion



# From Forests to Faucets



# Water Utility Climate Alliance



***Vision: Climate-resilient water utilities, thriving communities***

***Mission: Collaboratively advance water utility climate change adaptation***

<http://www.wucaonline.org/>





## Water Utility Climate Alliance 2017–2021 STRATEGIC PLAN

October 15, 2016

## 2017 WATER UTILITY CLIMATE ALLIANCE ANNUAL REPORT



October

### Summary of activities

This report documents the Water Utility Climate Alliance's 2017 Plan progress and provides a list of next steps.

## HOW ARE WUCA UTILITIES COMMUNICATING ABOUT CLIMATE CHANGE?



May 2017

### Summary of findings from a Water Utility Climate Alliance communications survey

K. Heyn, Portland Water Bureau  
K. Brooks, Southern Nevada Water Authority



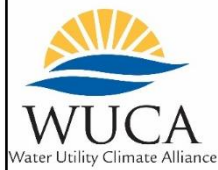
## Climate Risks to Water Utility Built Assets and Infrastructure

A synthesis of interviews with national and international water utilities

With thanks to:

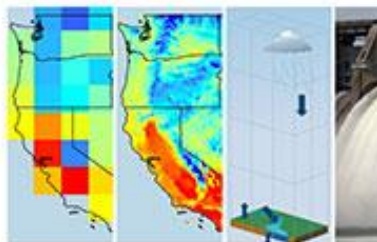
Kerstin Heyn  
Climate Science & Sustainability Coordinator, Portland Water Bureau

Whitney Winsor  
Climate Planning Manager, Portland Water Bureau



## ACTIONABLE SCIENCE IN PRACTICE

Co-producing Climate Change Information for Water Utility Vulnerability Assessments



Final Report of the Planning Utility Modeling Applications (PUMA) Project

## EMBRACING UNCERTAINTY

A Case Study Examination of How Climate Change  
is Shifting Water Utility Planning



Prepared for:

Water Utility Climate Alliance (WUCA)  
American Water Works Association (AWWA)  
Water Research Foundation (WRF)  
Association of Metropolitan Water Agencies (AMWA)  
Project Manager: Laura Kratz, Denver Water



## DECISION SUPPORT PLANNING METHODS: INCORPORATING CLIMATE CHANGE UNCERTAINTIES INTO WATER PLANNING



JANUARY 2010

## OPTIONS FOR IMPROVING CLIMATE MODELING TO ASSIST WATER UTILITY PLANNING FOR CLIMATE CHANGE



December 2009

Available at: [WUCAonline.org](http://WUCAonline.org)

# Denver Water's Climate Adaptation Program

## Knowledge

- Sustain informed and engaged staff
- Create a climate *smart* organization

## Science

- Coproduce science to better meet our needs and bring good science home

## Planning and Preparation

- Develop and apply better water utility planning techniques
- Mainstream climate adaptation across organizational practices

## Partnerships

- Seek regional and national collaborations

## Communication

- Continuously message internally and externally



# Next Steps

- RDM Analysis – bottom-up, stress test
- Mainstreaming
  - Knowledge exchange
  - Risk assessment
  - Strategy design
- Monitoring and trigger
- Explore climate extremes and utility buffers