Climate Assessment at Denver Water

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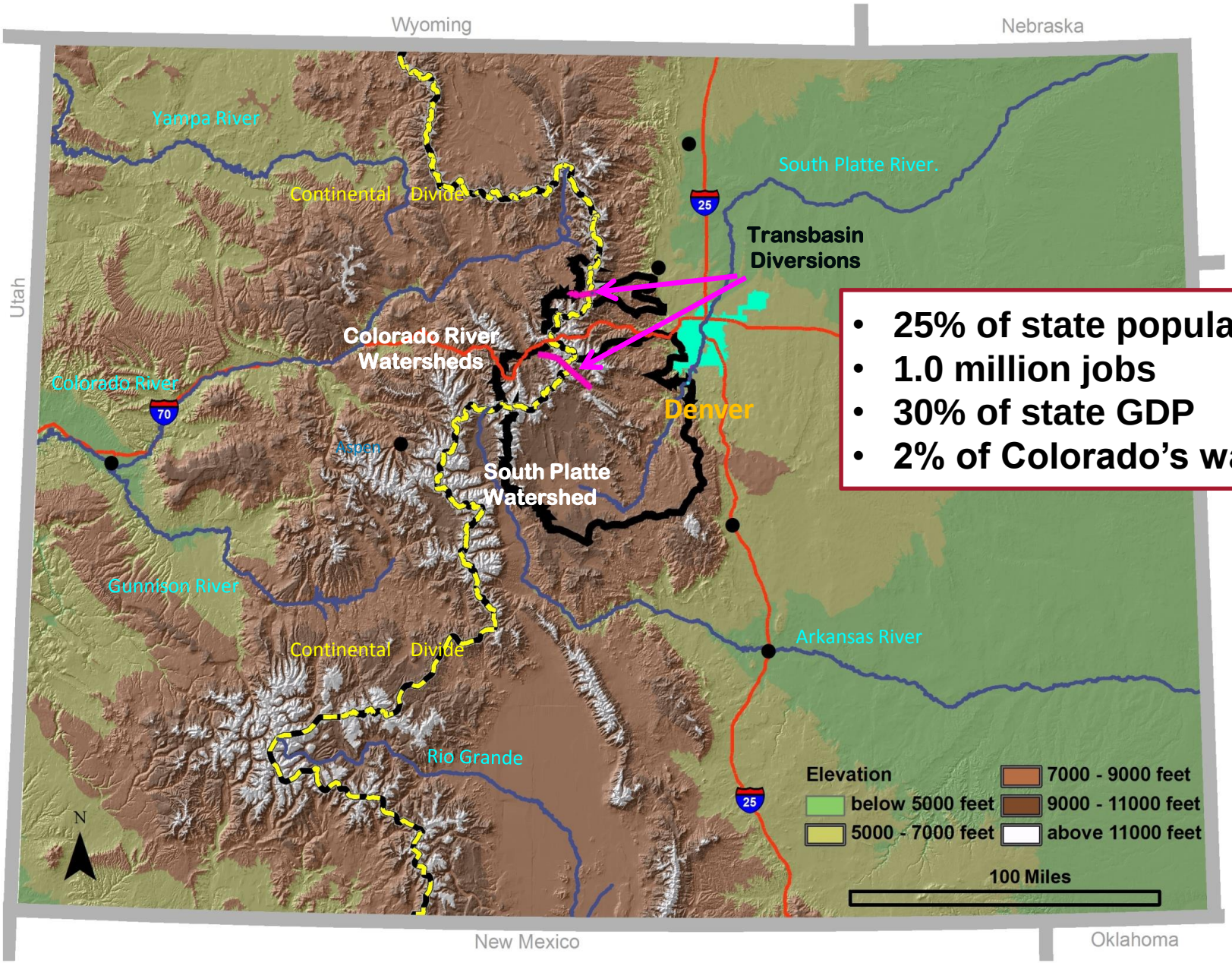
The National Academies of Sciences, Engineering, and Medicine
August 15, 2018


Vancouver
Seattle
Lake Winnipeg
Missouri
Lake Superior
Montréal
Lake Huron
Lake Michigan
Toronto
Lake Ontario
Boston
Detroit
Chicago
Lake Erie
New York
Philadelphia
San Francisco
UNITED STATES
Denver
Washington
Colorado
Arkansas
Los Angeles
Atlanta
Dallas
Houston
Rio Grande
Miami
BAHAMAS
Gulf of Mexico
Havana
MEXICO



- 25% of state population
- 1.0 million jobs
- 30% of state GDP
- 2% of Colorado's water

This story begins in 2002

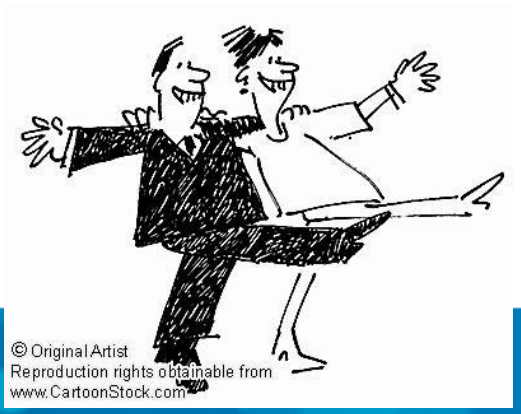
Deterministic thinking

Unprecedented Simultaneous Natural Disasters

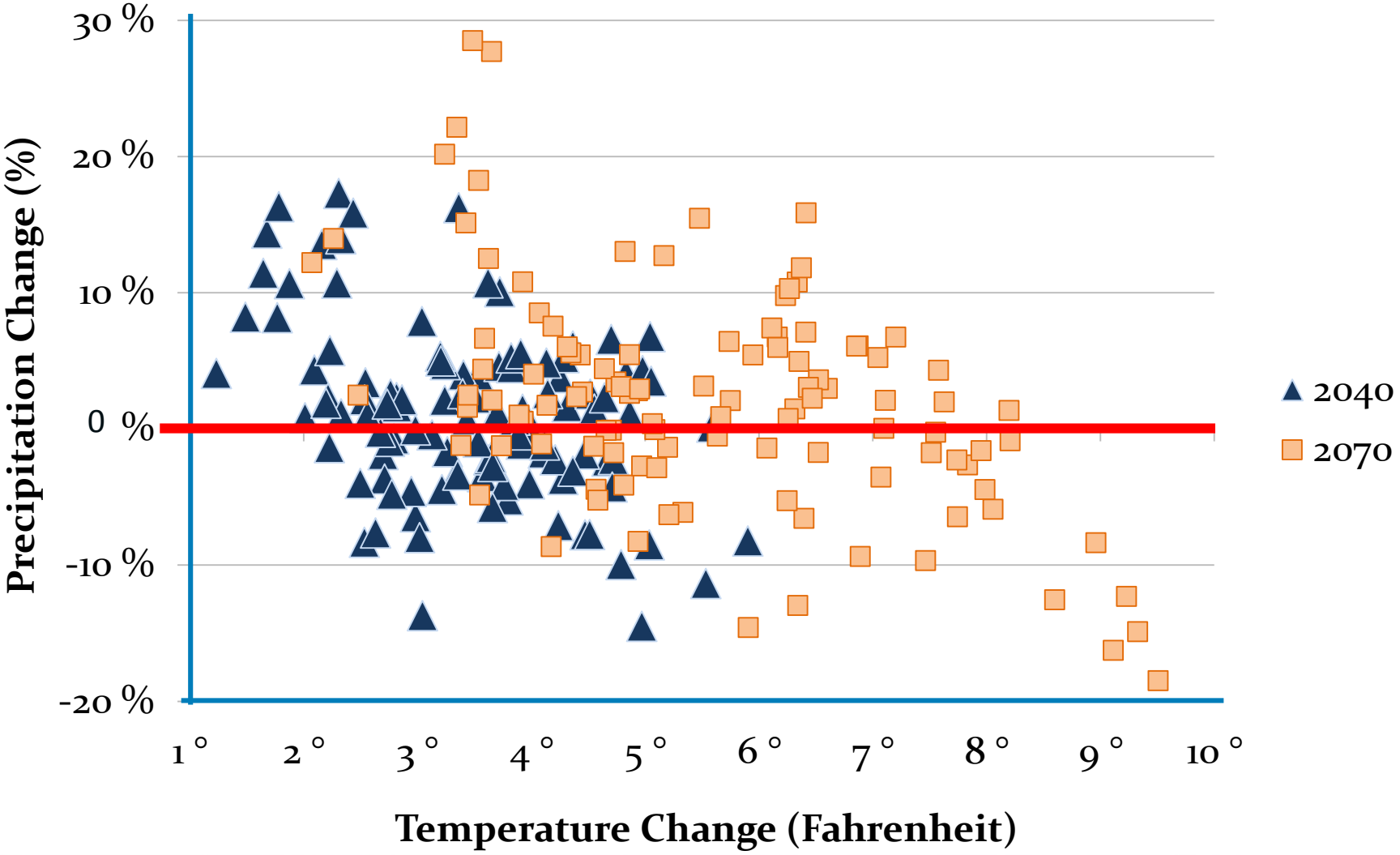
The Joint Front Range Climate Change Vulnerability Study

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%

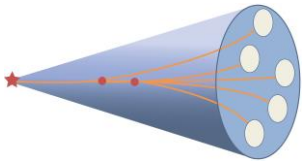
Planning Evolution

- Probabilities based on history
  - You know the risk and can maximize the return
  - Planning in a perfect world
  - Traditional planning

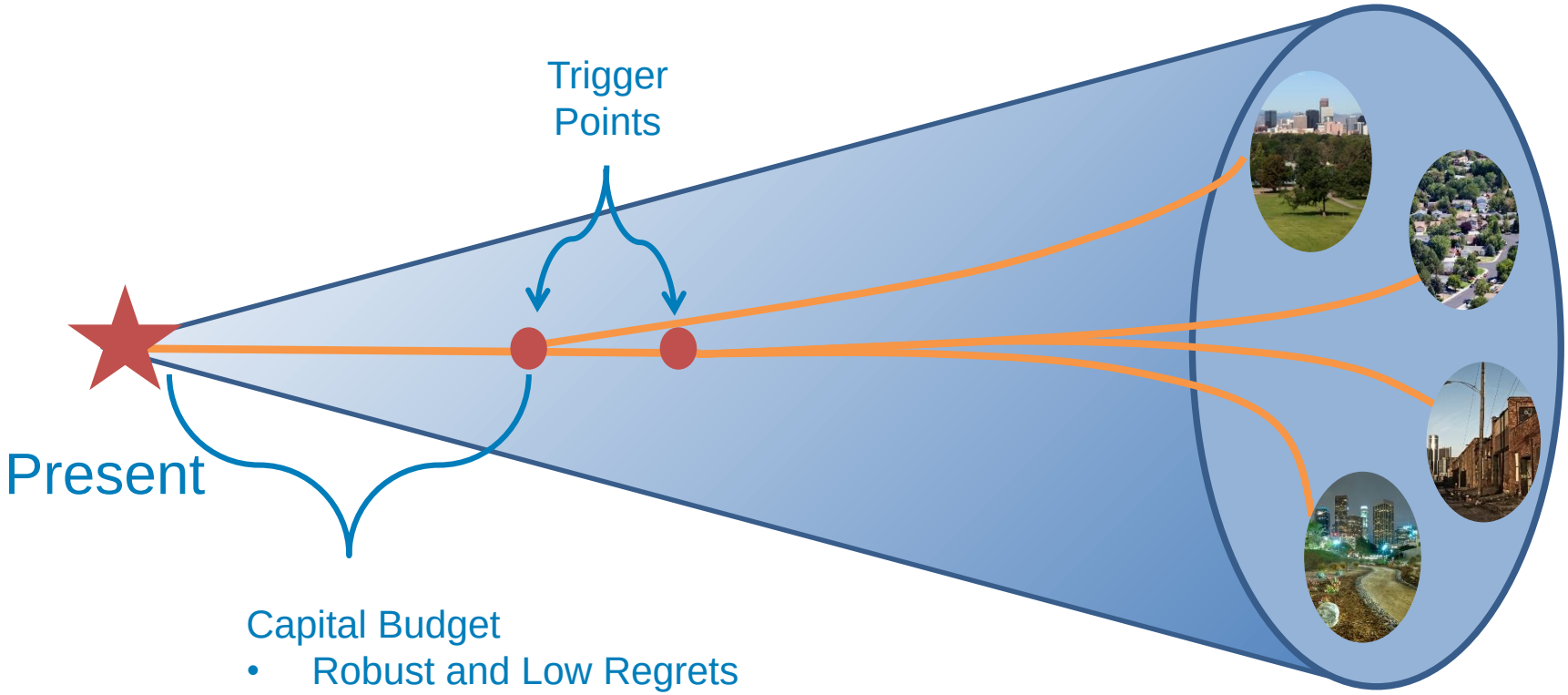
- Shifting probabilities?
- What else could happen?

- 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

Weak Economy

Adaptive Strategy

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

Strong Economy

Hot Climate

Suburban preference

New urban preference

System Resilience

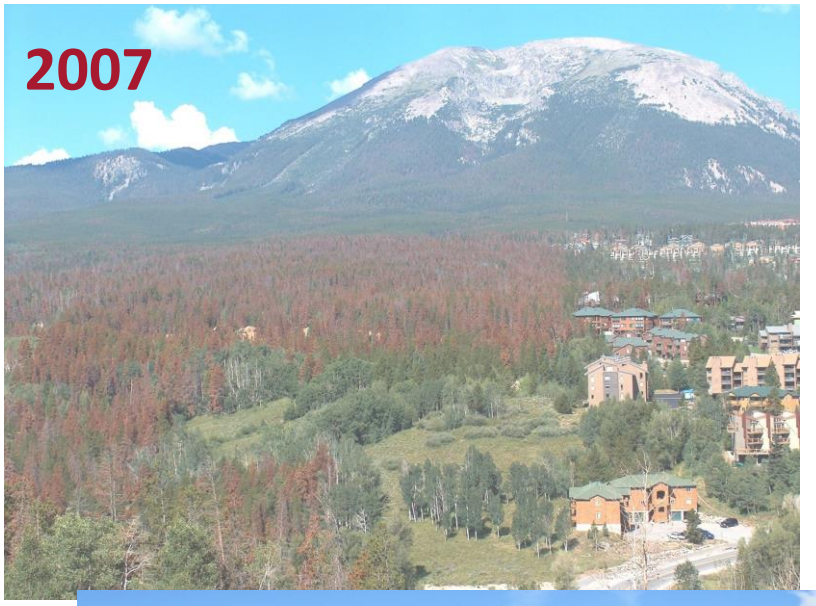
Foothills Bifurcation

Northwater Treatment Plant

From Forest to Faucets

Gross Expansion

From Forests to Faucets



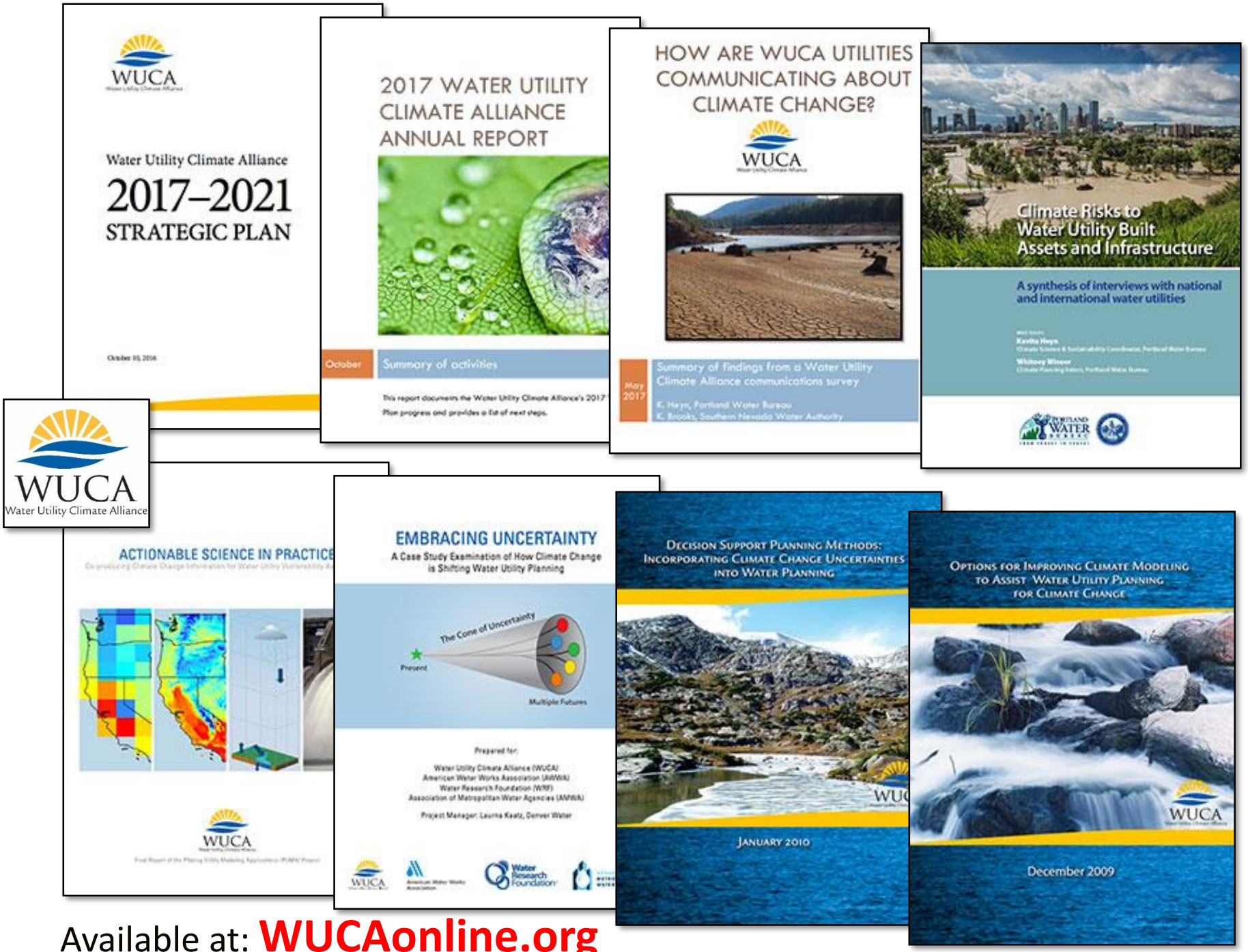
Water Utility Climate Alliance

WUCA
Water Utility Climate Alliance

Vision: Climate-resilient water utilities, thriving communities

Mission: Collaboratively advance water utility climate change adaptation

http://www.wucaonline.org/



Available at: **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