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ACADEMY

# Getting Through the Bottleneck: Vulnerability Assessment

*March 21, 2012*



**Host:**



**Kimery Wiltshire** - Carpe Diem West Executive  
Director



# CARPE DIEM WEST

Our water – Finding solutions together



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*In this time of climate crisis,  
Carpe Diem West engages western  
water leaders to collaboratively  
develop innovative solutions for the  
American West's growing water  
challenges.*

Meet the Players



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Webinar Series:  
Getting Through the  
Bottleneck: Assessing  
Vulnerability



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"Managing in the  
Era of Uncertainty"





# Carpe Diem West Academy

- Supporting a learning community
- Web portal, vetted tools, decision-making framework

[www.carpediemwestacademy.org](http://www.carpediemwestacademy.org)



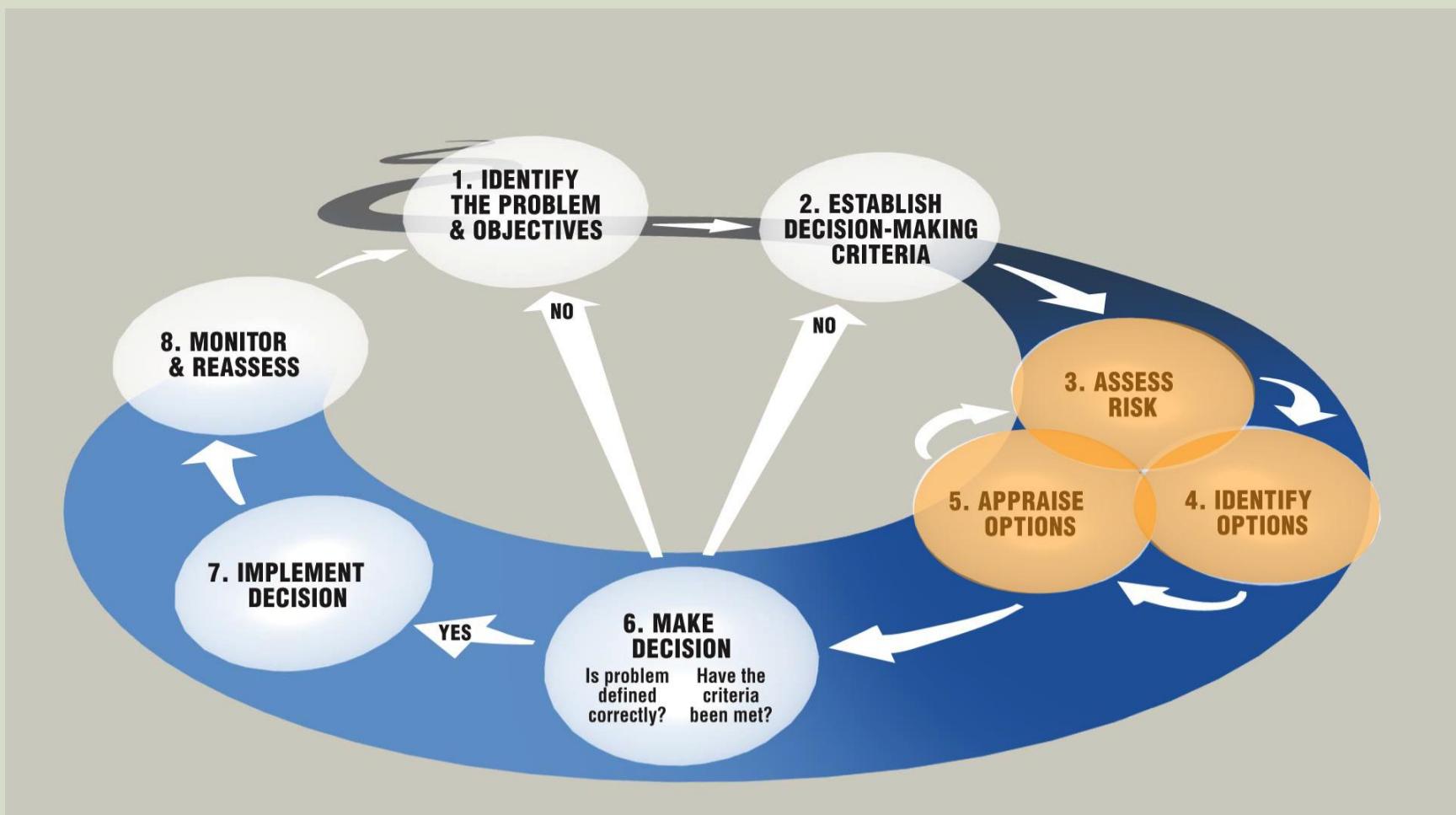
## Moderator:



**Dr. Holly Hartmann** - Carpe Diem West Academy & Director, Arid Lands Information Center, University of Arizona



## Iterative Risk Management Framework



## II. ANALYZE PROBLEM / Stage 3: **WHAT IS RISK?**



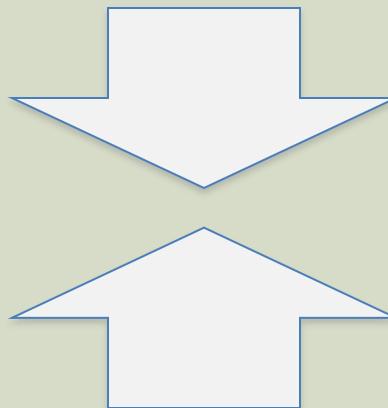
“ Risks exist *in relation* to some level of adaptation or preparedness to climate change...”

BROWN et al. 2011

## II. ANALYZE PROBLEM / Stage 3: TOP-DOWN / BOTTOM-UP



# CLIMATE



# VULNERABILITIES



## Vulnerability Assessment

- Exposure: character, magnitude, rate of climate change
- System sensitivity
- Adaptive capacity



## Presenters:



**Curt Baranowski** – Team Lead, Climate Ready Water Utilities Initiative, USEPA



**Laurna Kaatz** - Climate Scientist, Denver Water



**Dr. Kiyomi Morino** - Researcher, University of Arizona & “Keeper” of Academy’s tool database



**Getting Through the Bottleneck: Vulnerability Assessments**  
**March 21, 2012**



## ***Mission***

Lead to provide the water sector (drinking water, wastewater, and storm water) with the practical tools, training, and technical assistance needed to adapt to climate change by promoting a clear understanding of climate science and adaptation options.

<http://water.epa.gov/infrastructure/watersecurity/climate/>



# *What is Climate Ready and How Does that Relate to Vulnerability Assessments?*

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**Climate Ready Water Utilities  
Working Group**

National Drinking Water Advisory Council Climate Ready Water Utilities report charge:



1. Developing attributes of climate ready water utilities;
2. Identifying climate change-related tools, training and products to address utilities' short- and long-term needs; and
3. Identifying mechanisms that would facilitate the adoption of climate change adaptation and mitigation strategies by the water sector.



# Climate Ready Report

## National Drinking Water Advisory Climate Ready Water Utilities Report

Final work group report provides EPA with recommendations on developing a Climate Ready Water Utilities (CRWU) initiative to support water sector climate resiliency.

<http://water.epa.gov/drink/ndwac/climatechange/upload/CRWU-NDWAC-Final-Report-12-09-10-2.pdf>

## Developing an Adaptive Response Framework

Fundamental guide to build out the concept of a climate ready water utility, integrates with other tools.

## *Working Group Members*

Twenty members of CRWU Working Group:

- 12 from water utilities
- 3 from state and local governments
- 5 from academic, environmental, and other organizations



FEMA



US Army Corps  
of Engineers®



# *Climate Ready Adaptive Response Framework*



## ***Assessment Related Recommendations***

**Recommendation 4:** Build on and strengthen advanced decision support models and tools to support utility climate change efforts.

**Recommendation 5:** Increase interdependent sector knowledge of water sector climate-related challenges and needs.

**Recommendation 7:** Improve access to and dissemination of easy-to-understand and locally relevant climate information.

**Recommendation 8:** Better integrate climate change information into existing utility technical assistance initiatives.



## Contact Information

Curt Baranowski  
[Baranowski.Curt@epa.gov](mailto:Baranowski.Curt@epa.gov)

To receive CRWU updates, email:  
[CRWUhelp@epa.gov](mailto:CRWUhelp@epa.gov)





## CRWU Resources



**Climate Resilience Evaluation & Awareness Tool** – Risk assessment tool designed to build climate change knowledge and support adaptation planning in the water sector.

**CRWU Toolbox** – Searchable resource containing information to support the “Climate Ready” process.

**Adaptation Strategies Guide** – Collection of briefs outlining the potential impacts of climate change and effective adaptation options.

**Workshop Planner** – Scenario-based planning exercises for water utilities

**Joint Projects with Climate Ready Estuaries**



# CLIMATE READY WATER UTILITIES





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**Laurna Kaatz** - Climate Scientist, Denver Water



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# VULNERABILITY ASSESSMENTS: LESSONS FROM DENVER WATER



Laurna Kaatz

March 21, 2012

# Four Adaptation Steps

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## **1. Understand**

climate science and model projections – capabilities and limitations

## **2. Assess**

water system vulnerabilities to potential change

## **3. Plan**

incorporate assessments into water utility planning

## **4. Implement**

adaptation and mitigation strategies

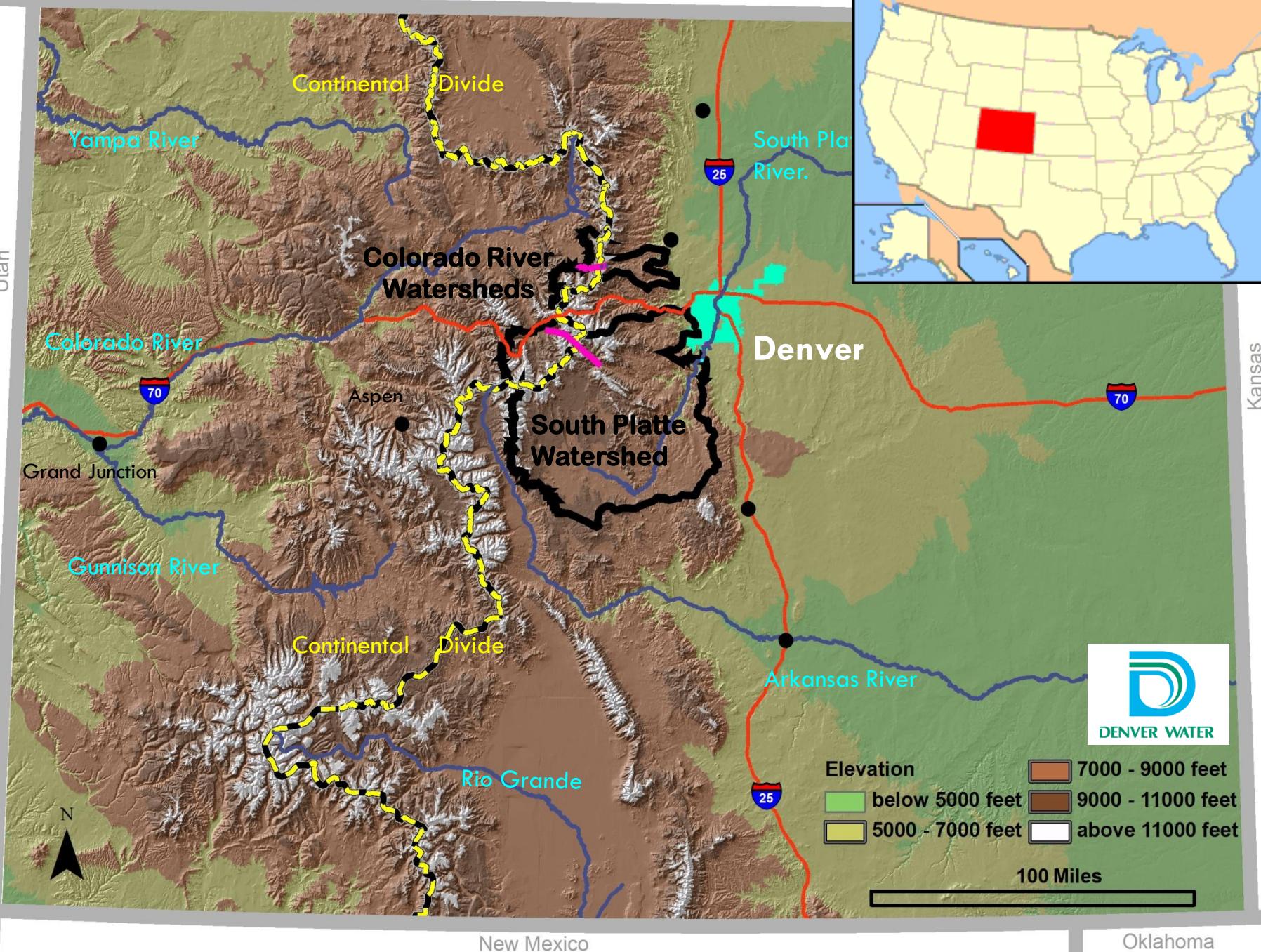


A 3D pie chart is shown, divided into two main segments. The top segment is green and labeled 'Climate Models'. The bottom segment is yellow and labeled 'Vulnerability Assessments'. The chart is set against a background of a blue and white gradient.

Climate  
Models

Vulnerability  
Assessments

Wyoming



# Potential Impacts for Colorado

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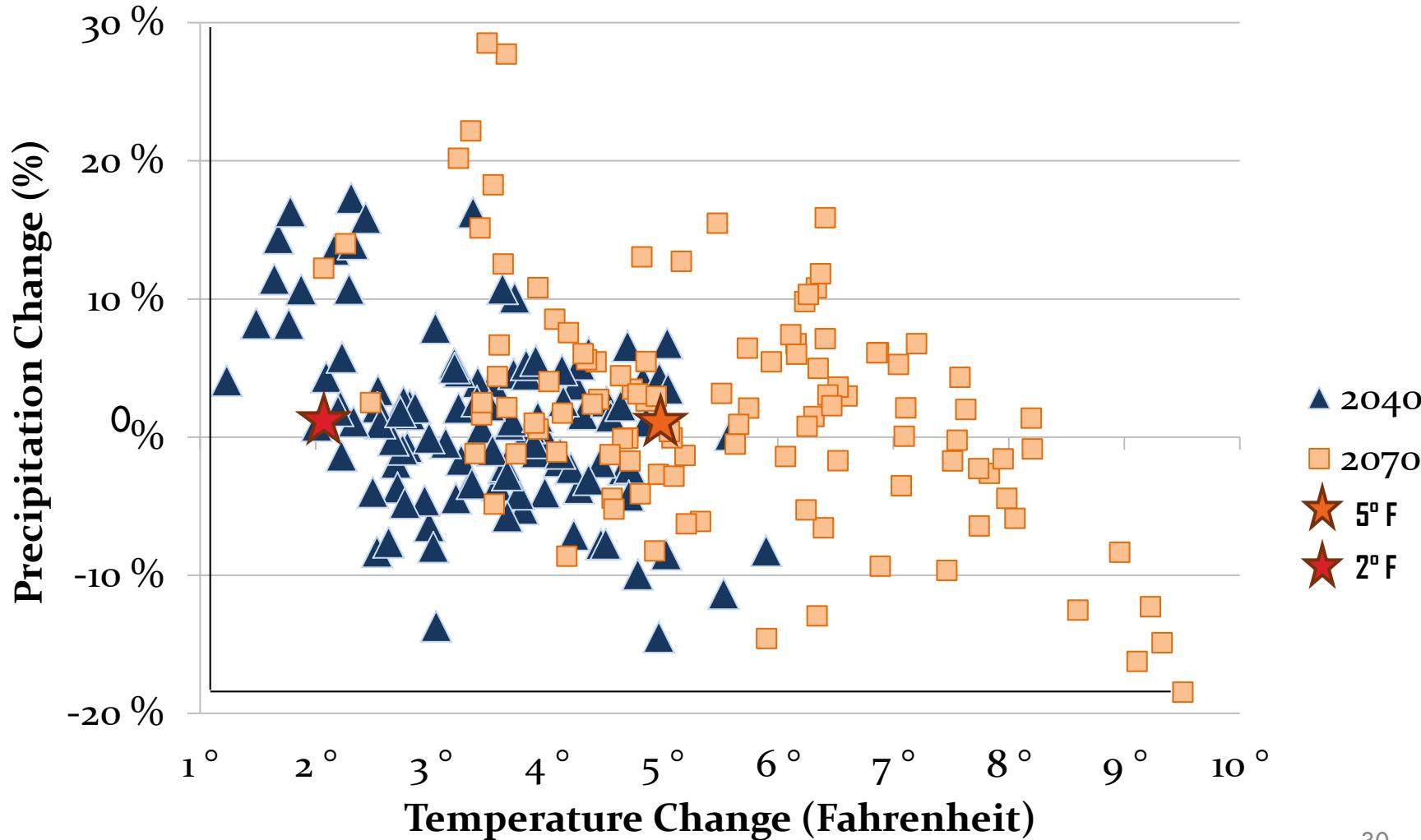
**As Temperatures alone increases, there will be  
Implications to the Hydrologic System:**

- Snowpack
- Run-Off
- Droughts and Floods
- Evaporation
- Soil Moisture
- Wildfires
- Vegetation
- Water Quality
- Demand



# Projected Changes for Denver's Watersheds

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# Denver Water's Simple Assessments

2005	2° F		5° F	
	% Change	KAF Change	% Change	KAF Change
Yield	-7%	-24	-14%	-48
Demand	6%	+ 21	---	---
2009	2° F		5° F	
	Colorado	South Platte	Colorado	South Platte
Precipitation increase to offset warming	4.75%	4.75%	8.25%	11.50%
2010	5° F			
	% Change		KAF Change	
Yield	-22%		-78	
Demand	20%		+70	

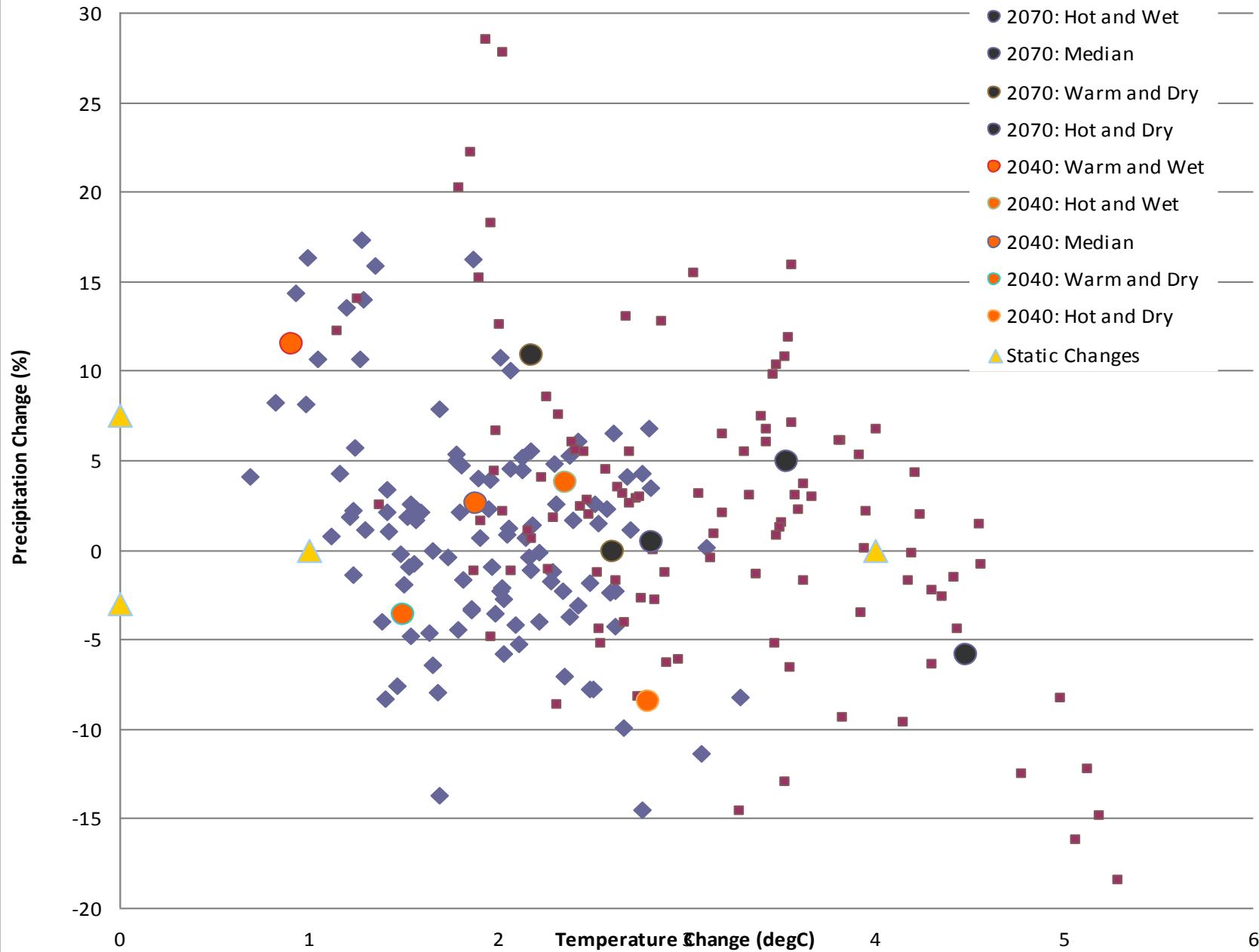
Percent Changes are relative to 345,000 acre-feet of yield and demand

# Actual Model Selection for Five Climate Scenarios

## 2040 (Blue, Orange), 2070 (Red, Green)

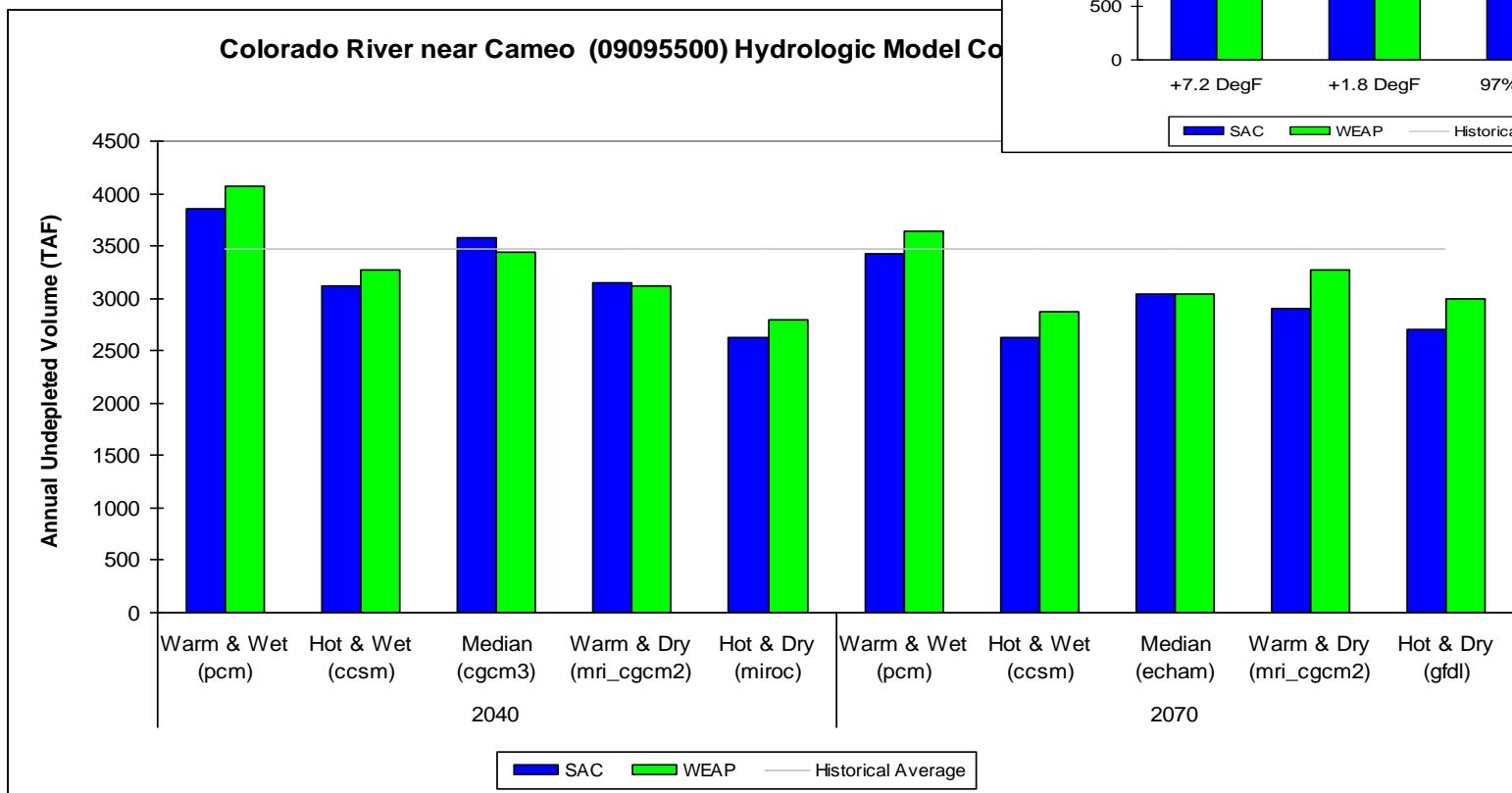
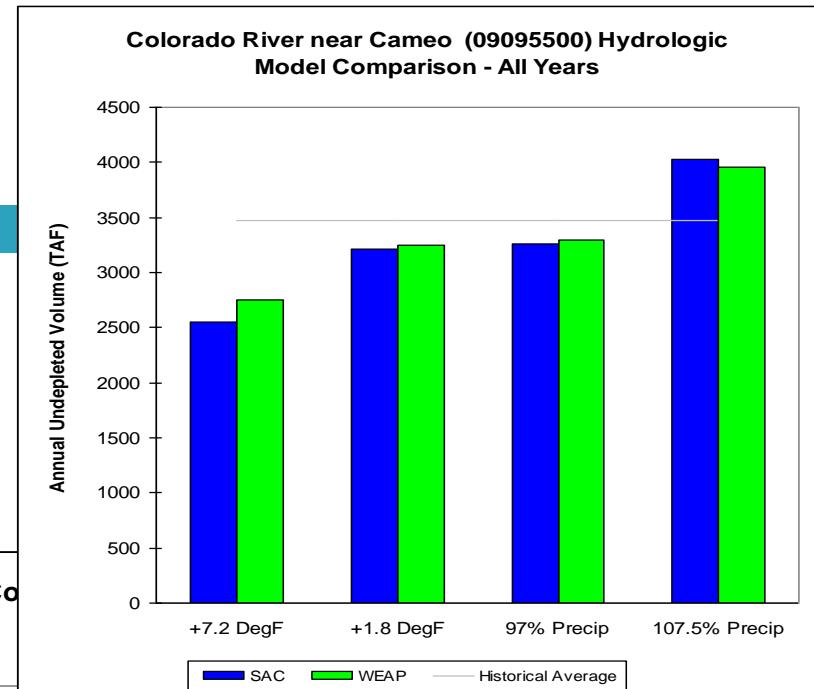
- 2040
- 2070
- 2070: Warm and Wet
- 2070: Hot and Wet
- 2070: Median
- 2070: Warm and Dry
- 2070: Hot and Dry
- 2040: Warm and Wet
- 2040: Hot and Wet
- 2040: Median
- 2040: Warm and Dry
- 2040: Hot and Dry
- Static Changes

32



# Selected Results: Annual Volume

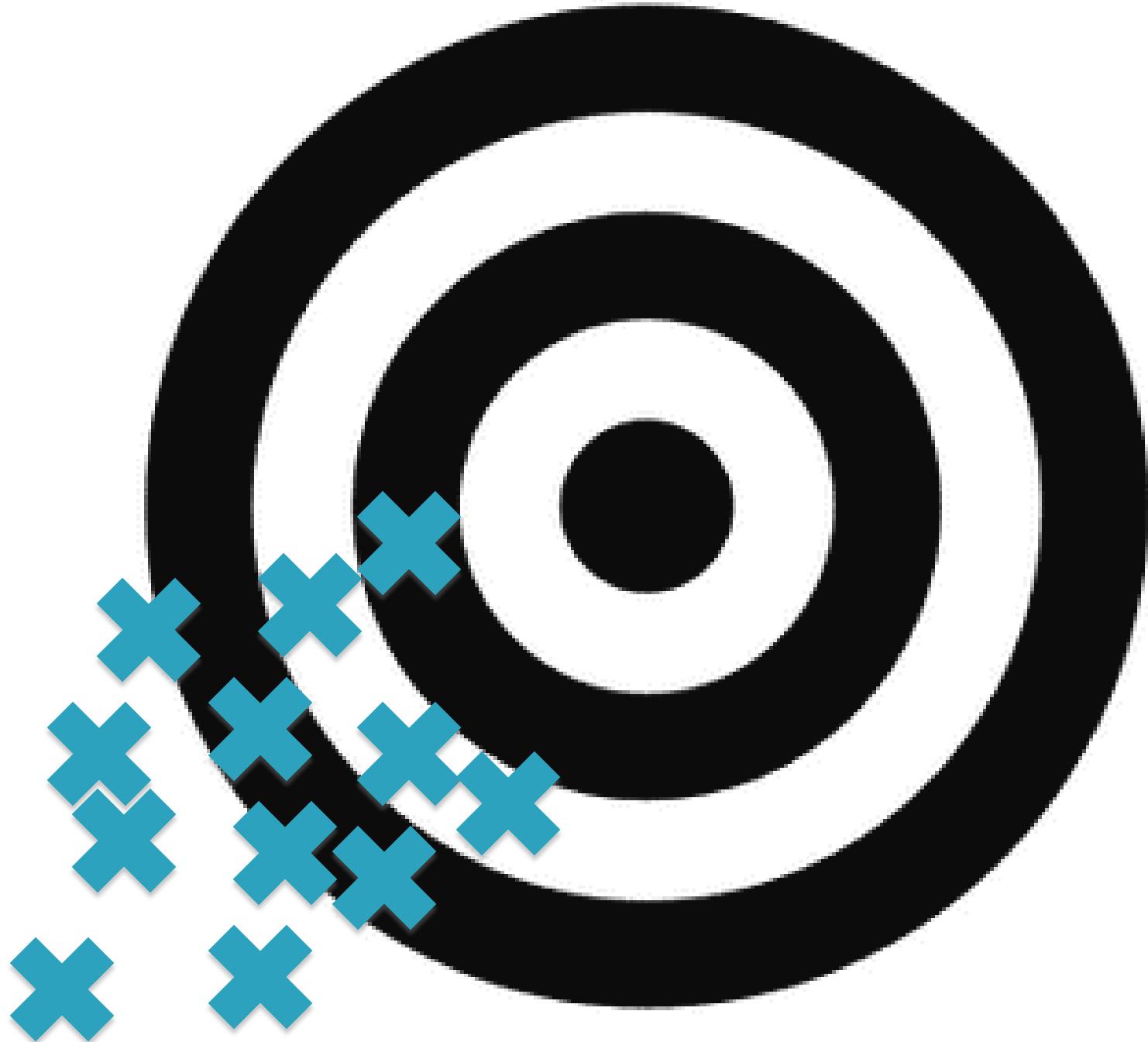
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# Climate Assessment Considerations

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- Why are you doing this assessment?
- Is there anything else out there to use?
- Can you work with others?
- How are you going to use this information?
- How much information do you really want to generate?
- What is best for your agency?
  - ▣ Presentation of findings
  - ▣ Used against you
- How will this fit into your planning?
- Will this get you where you want to go?



# Thank you

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## Calvin and Hobbes

by Bill Watterson



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## Presenters:



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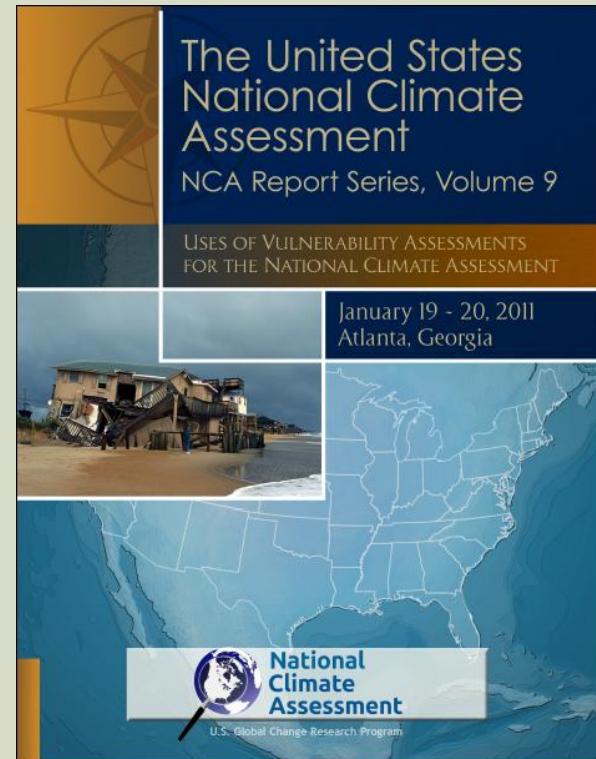
**Laurna Kaatz** - Climate Scientist, Denver Water



**Dr. Kiyomi Morino** - Researcher, University of Arizona & “Keeper” of Academy’s tool database



# Vulnerability Assessment Tools



[http://water.epa.gov/scitech/climatechange/implementation.cfm#CP\\_JUMP\\_489011](http://water.epa.gov/scitech/climatechange/implementation.cfm#CP_JUMP_489011)

<http://www.globalchange.gov/images/NCA/NCA-Vulnerability-Assessments-Workshop-Report.pdf.pdf>

# Vulnerability Assessment Tools



Why do an LCLIP?

How to do an LCLIP

Outputs

Next steps

LCLIP case studies

LCLIP locations

## LCLIP: Local Climate Impacts Profile

The phenomenon of climate change continues to move up the local government agenda. As it does, councils and other organisations are becoming increasingly aware of the potential impacts of a changing climate and the need to develop adaptation responses.

But, is it changing weather events or a changing climate to which local councils must adapt? These pages describe Local Climate Impacts Profile (LCLIP): a simple tool designed to help organisations to assess their exposure to weather and climate.

- [Why do an LCLIP?](#)
- [How to do an LCLIP](#)
- [Outputs](#)
- [Next steps](#)
- [Case studies](#)

The LCLIP process highlights a locality's vulnerability to severe weather events and how these events affect local communities as well as local authority assets, infrastructure and capacity to deliver services.

An LCLIP is a pragmatic, and effective, starting point for a better understanding of the future.

- Download a pdf of the [LCLIP guidance](#) (pdf, 5.6 MB)
- Download the complete [LCLIP guidance Zip file](#).
- Download the [LCLIP spreadsheet](#).
- Download the [LCLIP spreadsheet notes](#).
- Download [Tips for effective interviews](#).

<http://www.ukcip.org.uk/lclip/>



Vulnerability assessment tools (software, checklists, training, literature, etc.) that you've found useful ?

Please email us at [academy@carpediemwest.org](mailto:academy@carpediemwest.org)



## Panel Discussion:



**Curt Baranowski** – Team Lead, Climate Ready Water Utilities Initiative, USEPA



**Laurna Kaatz** - Climate Scientist, Denver Water



**Dr. Kiyomi Morino** - Researcher, University of Arizona



**Dr. Holly Hartmann** - Carpe Diem West Academy Director & University of Arizona



# Questions & Answers

[www.carpediemwestacademy.org](http://www.carpediemwestacademy.org)

[academy@carpediemwest.org](mailto:academy@carpediemwest.org)



## **“Tool Time” with Dr. Kiyomi Morino!**

**...and the winner is...!**



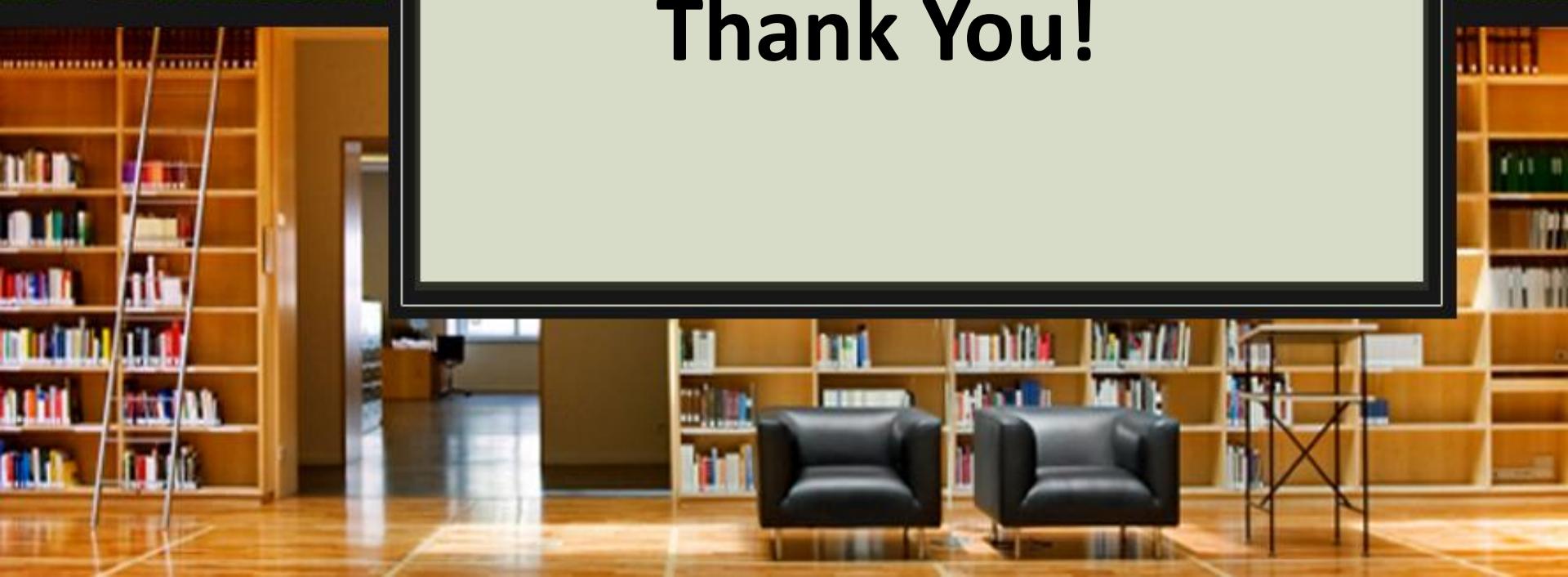
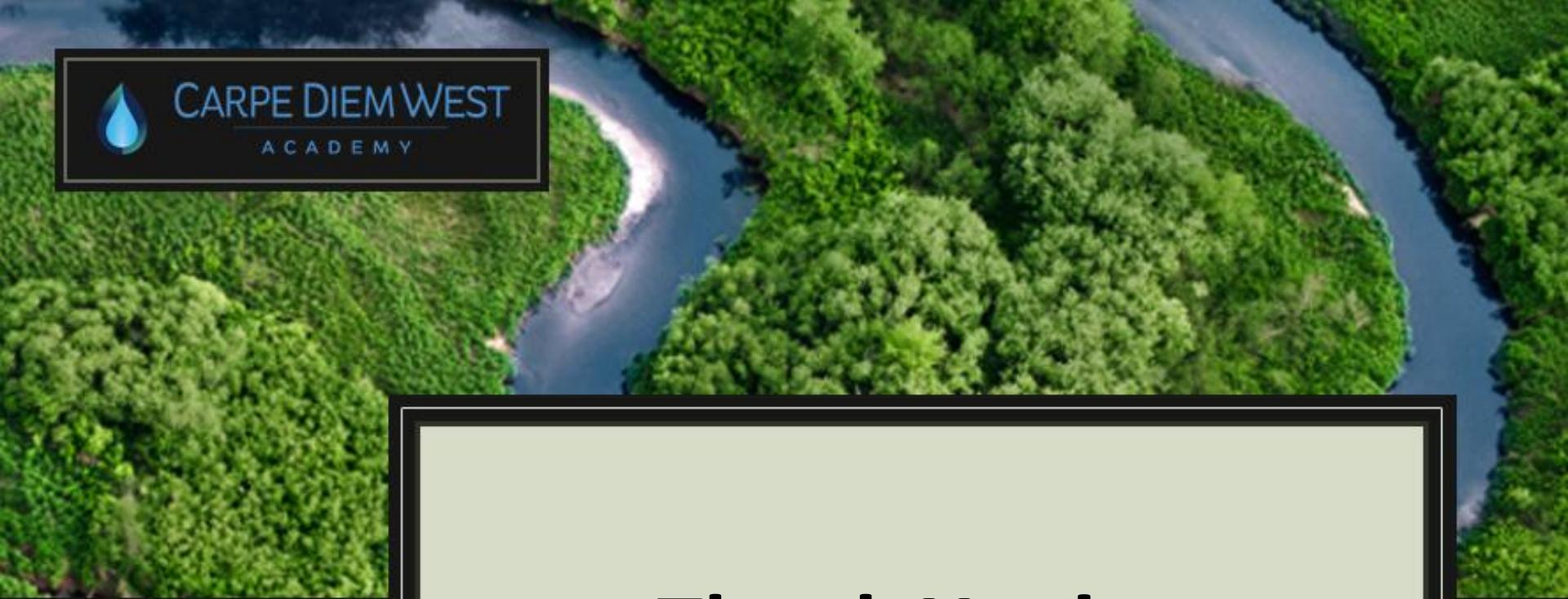
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*Watershed Valuation*  
*May 2012*

*Sign up at:*  
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[academy@carpediemwest.org](mailto:academy@carpediemwest.org)



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**Thank You!**