



# The Colorado River in the face of climate change

Aspen Global Change Institute

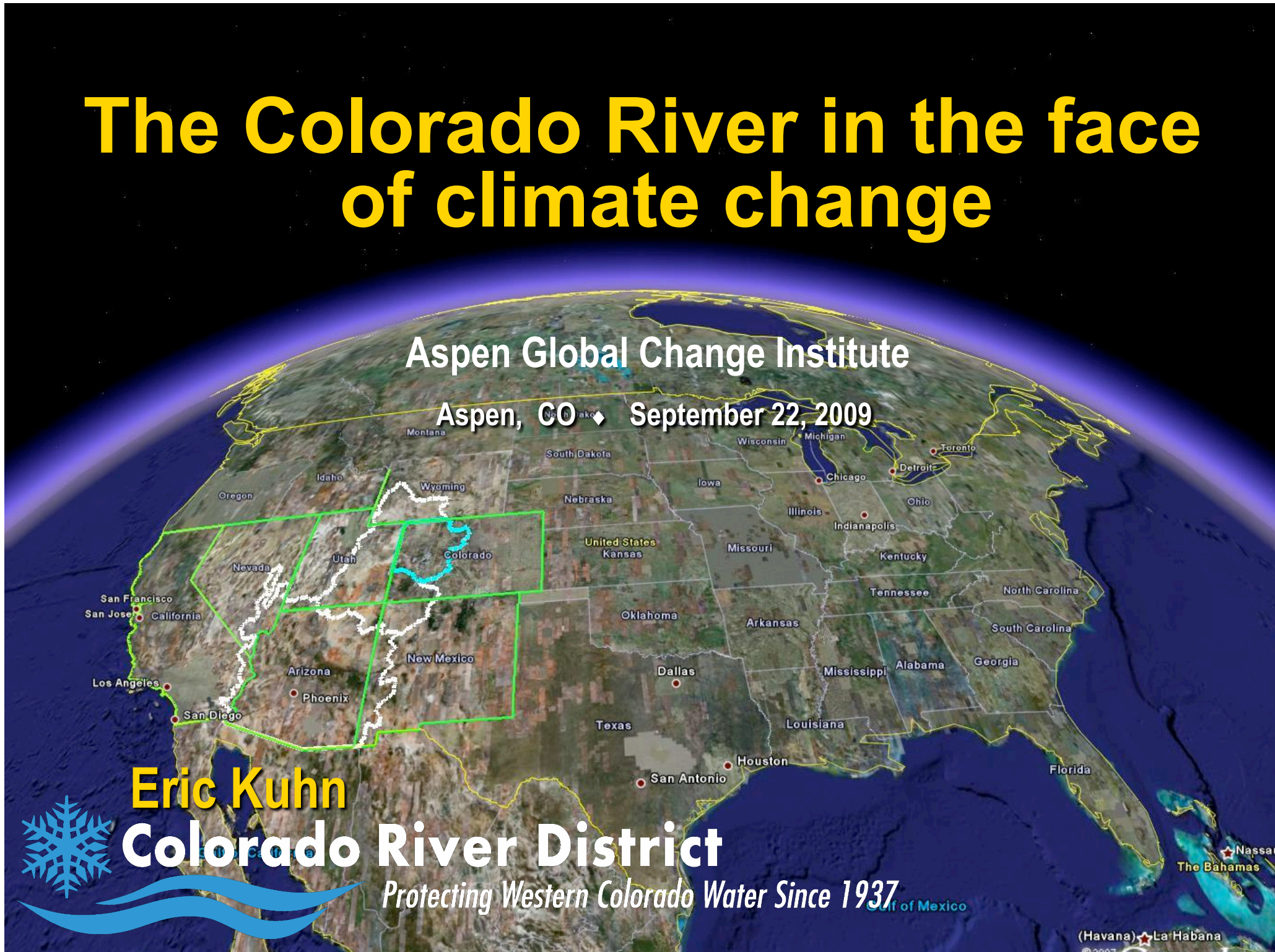
Aspen, CO ♦ September 22, 2009

Eric Kuhn



Colorado River District

*Protecting Western Colorado Water Since 1937*







# 1922 Colorado River Compact

- Divides the Colorado River, including all tributaries, into an Upper and Lower Basin.
- Boundary between the two basins is Lee Ferry, Arizona
- Lower Division states: Nevada, California and Arizona.
- Upper Division states: Wyoming, Colorado, New Mexico and Utah.
- Arizona, Utah and New Mexico have lands within both basins.

# Colorado River Basin



# Why did Colorado Want a Compact?

- Upper Basin States concerned with the interstate application of prior appropriation doctrine.
- California wanted basin support for federal legislation to build Hoover Dam and the All-American Canal.

# Colorado River Compact of 1922

**Colorado, like all Upper Division states, shares obligations to the Lower Division**

- **III (d) the Upper Division shall “not cause the flow of the river at Lee Ferry to be depleted below an aggregate of 75,000,000 acre-feet for any ten consecutive years.”**
- **III (c) regarding Mexico...the Upper Division must “deliver at Lee Ferry water to supply one-half of the deficiency so recognized in addition to that provided in paragraph (d).”**

# Upper Colorado River Basin Compact of 1948

## *Purposes of the 1948 Compact include:*

- “...equitable division and apportionment of the use of the waters...apportioned in perpetuity to the Upper Basin”
- “...establish the obligations of each State of the Upper Division with respect to deliveries of water required to be made at Lee Ferry”
- procedures and methodology for determining how much water Colorado would have to provide in the event the “curtailment of the use of water...becomes necessary in order that the flow at Lee Ferry shall not be depleted below that required by Article III (of the 1922 Compact).”



# Important Implications

## Article VIII of the 1922 Compact:

“...present perfected rights to the beneficial use of waters of the Colorado River System are unimpaired by this compact.”

## Article IV(c) of the 1948 Compact:

excludes water rights perfected prior to Nov. 24, 1922 from curtailment

NOTE: The 1964 *Arizona v. California* Supreme Court decree includes a definition of “present perfected rights” that MAY apply.

# Important Considerations

- **Colorado hydrology highly variable**

Paleohydrology suggests past droughts have been more severe than what we've experienced the last 100 years.

- **Drier future**

Climate science, including the recent Colorado Water Conservation Board report, suggests a drier future.

- **Curtailment probability**

The chance of a curtailment in the next decade or two is extremely remote. In the last 10 years, we've delivered MUCH more than 75,000,000 acre-feet at Lee Ferry.

- **Legal matters**

Difficult legal issues will have to be resolved before a curtailment could ever occur.

# Here We Are Again

The policy discussion related to climate change is well into its third decade.

From September 1986:

*“Furthermore, the ‘greenhouse effect’ may diminish river flows even below projections based upon these historical studies.”*

Contrary Views of the Law of the River of the Colorado River. An Examination of Rivalries Between the Upper and Lower Basins, John U. Carlson and Alan E. Boles, Jr.,

# **The Science Keeps Piling Up**

**Colorado Water Conservation Board  
California Department of Water Resources  
Western Water Assessment  
American Society of Civil Engineers  
Natural Research Council of the National Academies  
Intergovernmental Panel on Climate Change  
American Water Resources Association  
American Water Works Association  
US Geological Survey  
US Department of Interior**



# The Message is the Same

*“Climate change will affect Colorado’s use and distribution of water . . . all recent hydrologic projections show a decline in runoff for most of Colorado’s river basins by mid-21<sup>st</sup> century.”*

- Colorado Water Conservation Board, 2008

# Two Major Obstacles

- **Uncertainty**
- **Political (partisan) divide**

# Uncertainty

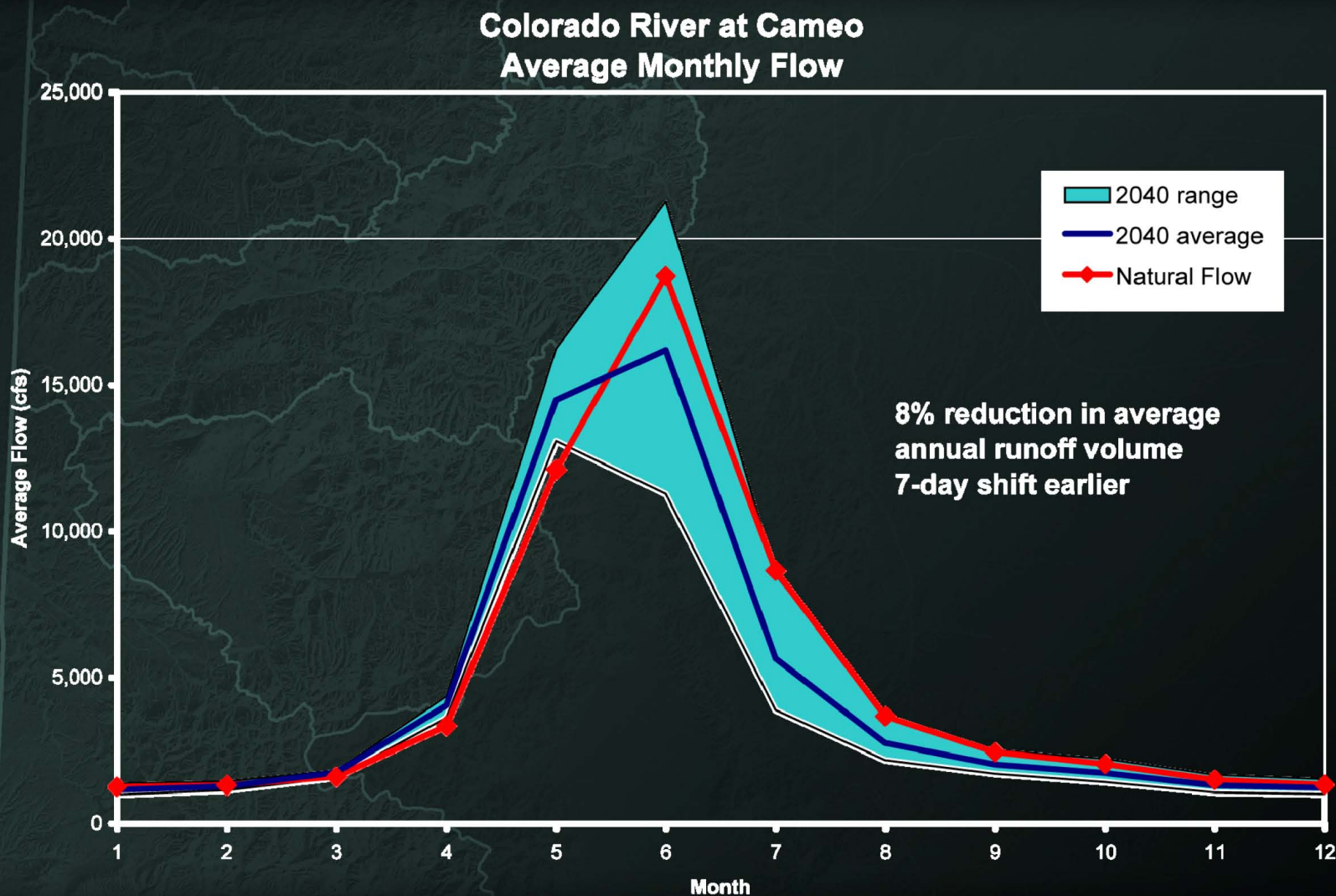
- Studies all point in the same direction, but there is a wide range in results.
- The normal variability (noise) from year to year overwhelms climate change (signal).
- We want certainty, but nature won't cooperate.

# GCM Results – Cameo 2040



Canyon Water Resources, LLC

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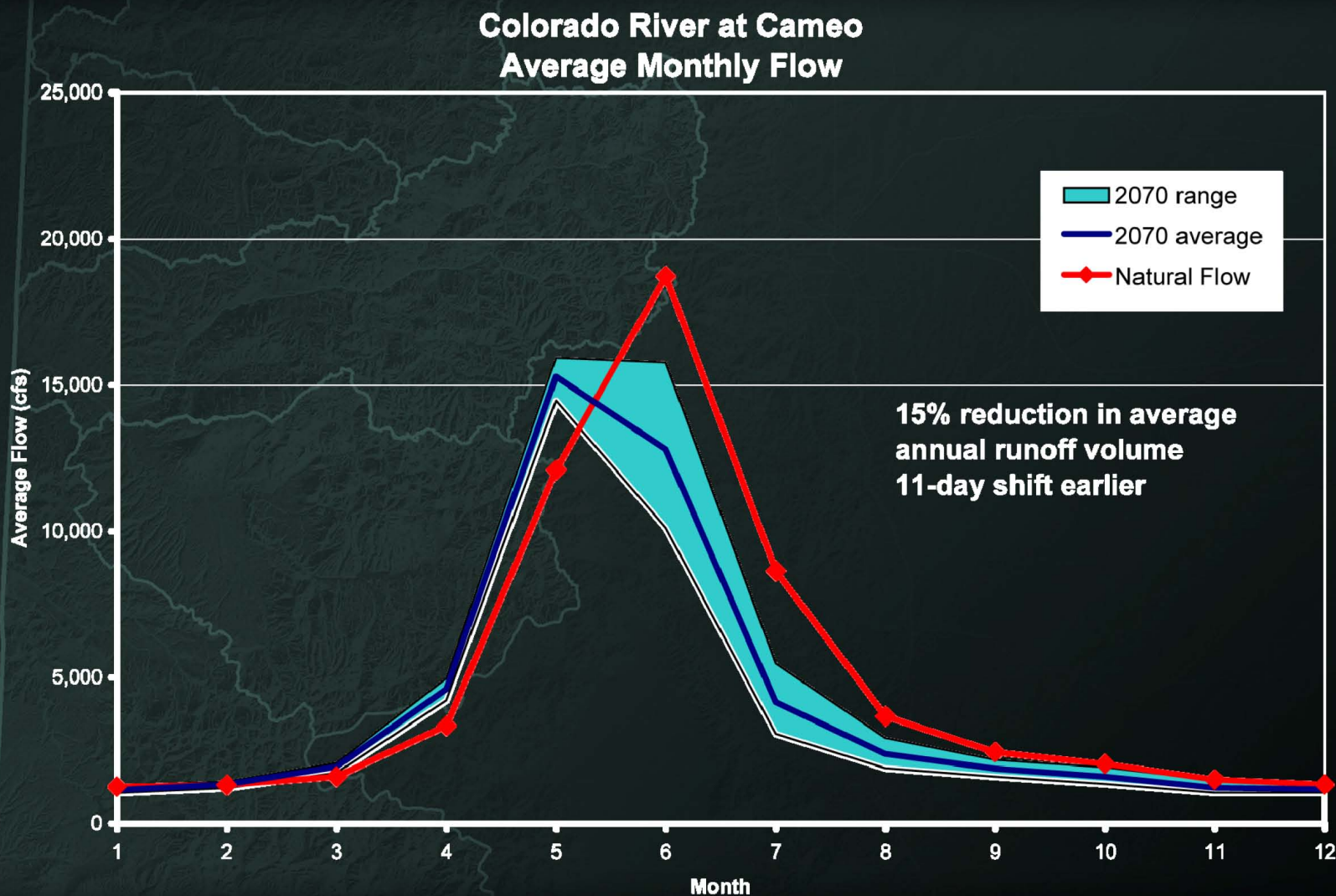


# GCM Results – Cameo 2070



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# Political (Partisan) Divide

- It is real
- It is significant
- It may prevent us from making good long term decisions

# **“Is Climate Change an Established Reality or an Unproven Myth?”**

	<b>Reality</b>	<b>Unproven</b>
<b>CA</b>	<b>62%</b>	<b>30%</b>
<b>AZ</b>	<b>54%</b>	<b>43%</b>
<b>CO</b>	<b>47%</b>	<b>47%</b>
<b>UT</b>	<b>45%</b>	<b>50%</b>
<b>WY</b>	<b>35%</b>	<b>53%</b>
<b>Democrats</b>	<b>74%</b>	<b>20%</b>
<b>Republicans</b>	<b>25%</b>	<b>70%</b>

# Perceived vs. Real Impacts

- Increased temperatures impact water supplies
- Political debate driven by carbon cap and trade (energy) and economic issues

If the cause of increase in temperature is either natural or man-made CO<sub>2</sub> emissions,

***Aren't the water impacts the same?***



# What is a “Conservative” Approach?

**CON·SER·VA·TIVE** — \kən-sər-və-tiv\  
cautious or moderate in approach,  
proceeding with minimal risk.

- American College Dictionary, 1955 edition

# **“Conservative?”**

***“To obtain the most reliable water systems and provide for the protection of the public, (water) engineers must proceed with the utmost of caution and conservatism.”***

**- Herbert Hoover, 1929**

# **“Conservative?”**

***“If he was a true conservative, Senator McCain wouldn’t be drinking the global warming kool-aid.”***

**- Famous “conservative” radio shock jock**

# Colorado River Water “Conservative” District

*Where planning and policy to come together to:*

- Build good science and consensus
- Quantify water supply and demand
- Manage risk
- Create insurance (e.g., water bank)



# Colorado River Water Availability Study

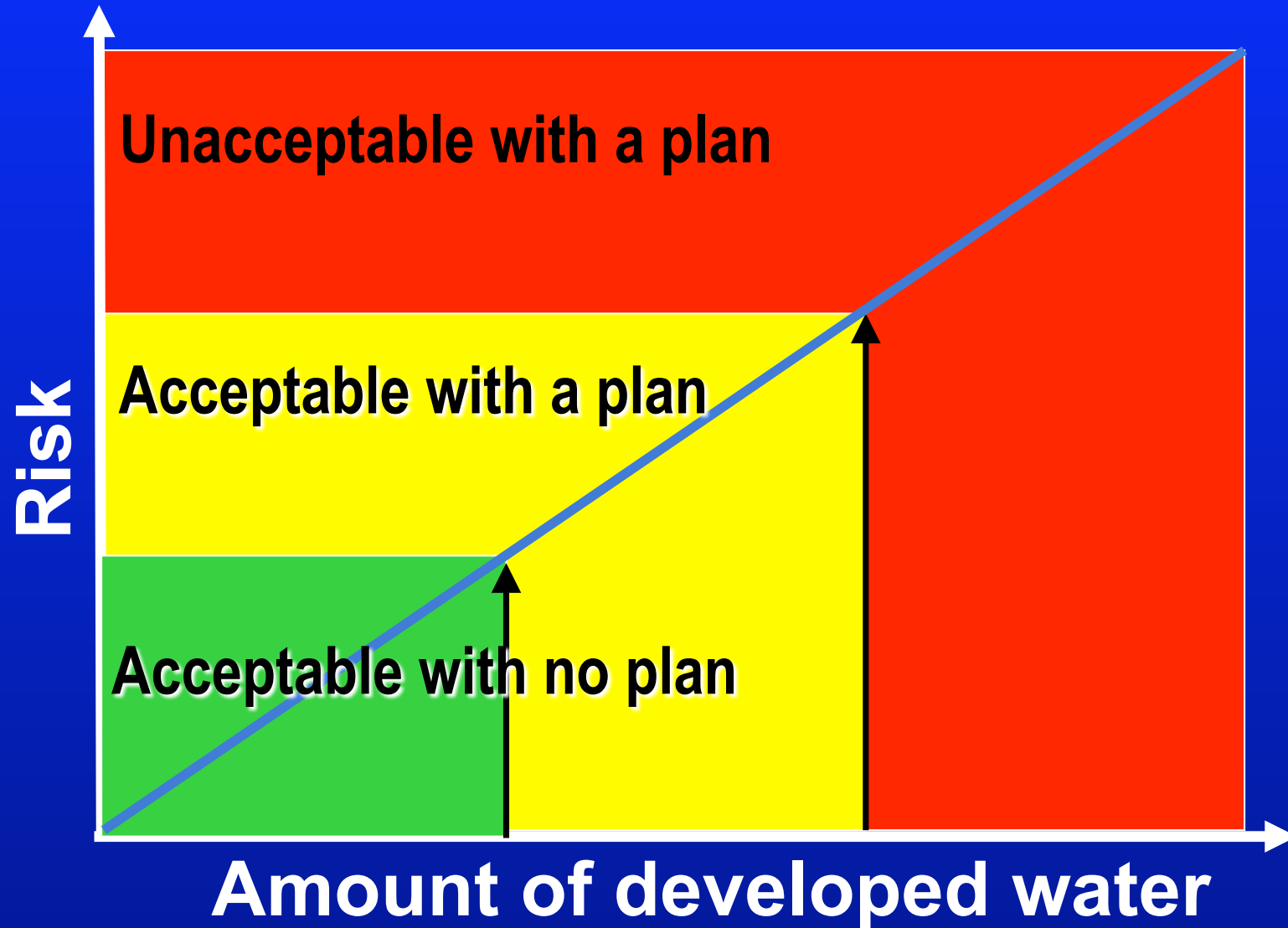
Phase I – completion date Fall 2009

Phase II – completion date 2010

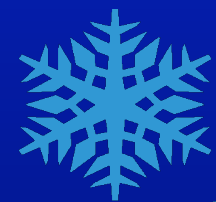
**Question:** How do we use the results?

**Observation:** Need to focus on risk and  
risk management

# Risk Reduced with Insurance Plan



**Creative  
thinking**



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**[www.ColoradoRiverDistrict.org](http://www.ColoradoRiverDistrict.org)**