Thirty Million People, Seven States, One Colorado River

Eric Kuhn
General Manager, CRWCD
Glenwood Springs, CO

November 15, 2005

www.crwcd.org

COLORADO RIVER WATER CONSERVATION DISTRICT

Thirty Million People,
Seven States,
Two Countries,
Ten Indian Tribes,
Five Endangered Fish and
One Colorado River

How should river managers deal with climate variability and change?

COLORADO RIVER WATER CONSERVATION DISTRICT

The Colorado River System

- As a desert river, the flow is modest. It is about the same as the Hudson River.
- Colorado River water is used in the seven basin states and the Republic of Mexico.
- The Colorado River is a source of municipal water for Las Vegas, Phoenix, Tucson, the Colorado Front Range, the Wasatch Front, Albuquerque and the Southern California Coastal Plain. Exports are a major use.

The Colorado River System
(con't)

- **Except in wet periods like the early 1980's all of the available water is used and not a drop makes it to the Gulf.**
- **The Colorado River is highly regulated. System storage is about four times the annual discharge.**

The Colorado River System
(con't)

- **The Colorado River Ecosystem is under severe stress; endangered fish, Grand Canyon adaptive management, salinity and selenium.**
- **Recreation and hydroelectric power generation are very important to the region.**
- **Water use is allocated and governed by the "Law of the River."**

Two Basic Types of Water Management Decisions

- **Short Term - primarily operational decisions**
- **Long Term - primarily planning, investment and regulatory decisions.**

Short Term Management Decisions

Climate products used by water agencies:

- CPC seasonal and monthly forecasts
- Western Water Assessment
- CLIMAS
- Colorado River forecasts and models
- Some independent work

Long Term Management Decisions

An example of a long term regulatory decision now facing the Secretary of Interior is the formal development of shortage criteria for the operation of Lake Mead.

The First Law of Hydrologic Planning:

“The future will look like the recent past.” *

The First Flaw of Hydrologic Planning:

* No two hydrologists use the same recent past.

- Reclamation is using 1906-2000 for the development of shortage criteria for Lake Mead.
- Reclamation Western Colorado Area Office is using 1975-2004 for the development of operating criteria for Blue Mesa Reservoir.
- Denver Water uses 1947-1991 for its planning decisions.
- The Colorado River District Uses 1953-2004 for our water marketing decisions.

Fundamental Problem

What if future hydrology on the Colorado is different than the past?

A modest change could create significant problems:

- **Based on the 1906-2000 hydrology and modest upstream growth, future shortages are predicted to be rare.**
- **A 10% reduction in flow at Lee Ferry could fundamentally alter that conclusion; shortages could become the normal condition.**

What can climate science do to improve water management decisions?

Suggestions:

1. **Develop paleohydrology: reconstruct stream flows from the distant past.**
   - **Couple these long term reconstructed flow records with climate conditions.**
   - **Break the "voodoo-hydrology" barrier.**

Are there some answers that water management agencies simply don't want to hear?

What can climate science do…?

Suggestions (con't)

2. Investigate the use of multidecadal indices (PDO & AMO) to give us better information about the immediate future (20 to 25 years) based on similar periods in the recent past.

More research is needed to support this approach.

The Colorado River Gage History can be Divided into 3 Distinct Periods

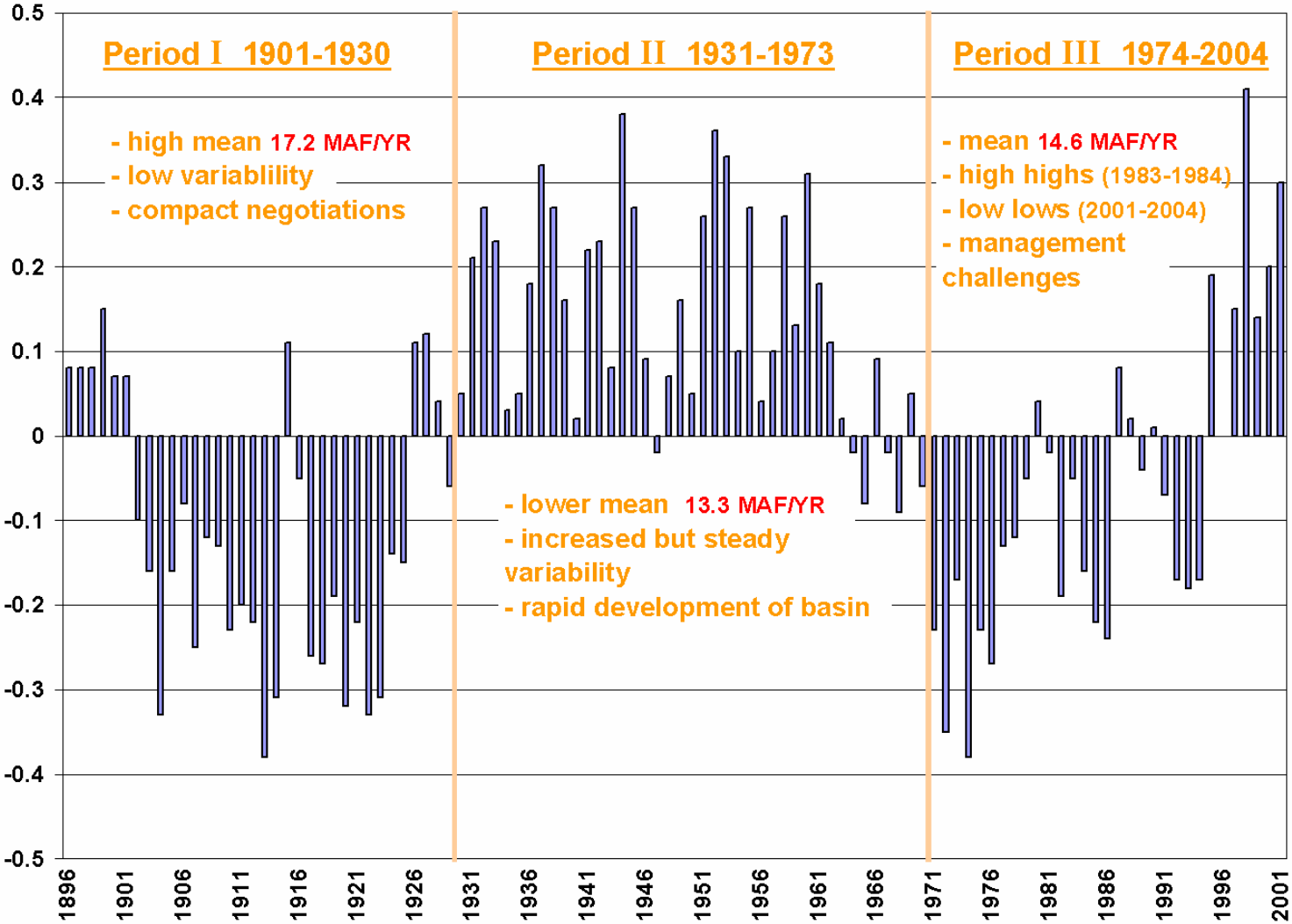
Period I Early 1900's to about 1930

Period II 1931 to the early 1970's

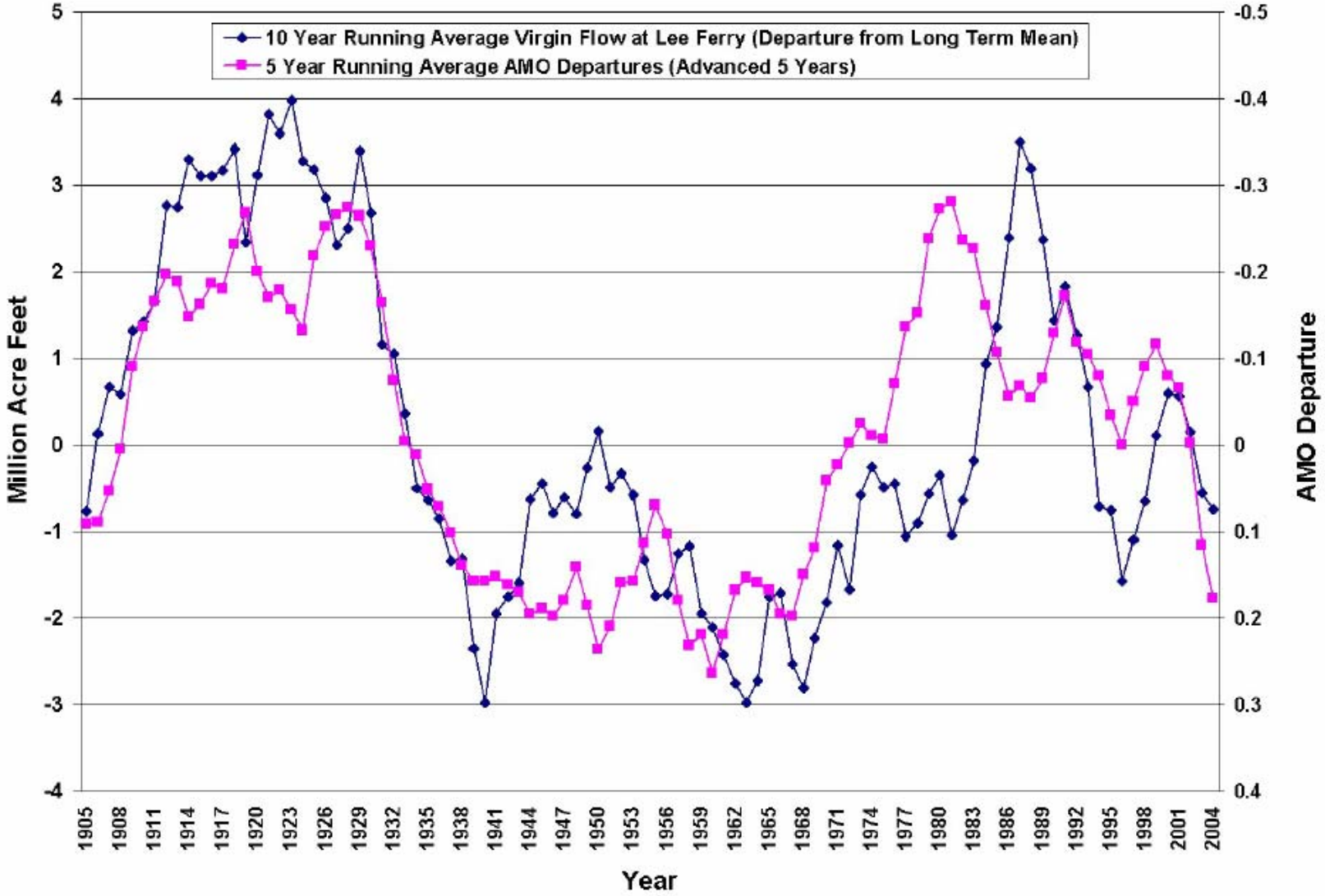
Period III Early 1970's to Present

The undepleted flows, climate conditions, challenges and river politics during each of these periods were all very different.

Atlantic Multidecadal Oscillation Annual Departures



Atlantic Ocean Impact on Colorado River Flows



What can climate science do…?

Suggestions (con't)

3. Develop better models to predict stream discharge under different climate change scenarios.

Central Questions

- ***When will the science be ready to provide data with an acceptable level of confidence?***
- ***Should management agencies begin today to consider climate change alternatives based on worst case assumptions?***

Conclusion

Use today's available science to discuss possible future scenarios that consider the possibility that the future

MAY NOT look like the past.

Beginning a dialogue today based on imperfect science is far better than no dialogue at all.

For more information visit: www.crwcd.org

COLORADO RIVER WATER CONSERVATION DISTRICT