

Putting Historical Colorado River Hydrology in Current Context



A Presentation to
“The Law of the Colorado River”
CLE International Conference
in Las Vegas, Nevada
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Today's Presentation:

- Put the current Colorado River Basin drought in historical context.
- Observe that our predecessors anticipated water supply challenges.
- Note current water use trends in the Basin.

Colorado River flowing in the Grand Canyon.





Colorado River Compact Relevant Provisions:

- Focal point of the Compact assures a certain quantity of water passing from the Upper Basin to the Lower Basin:
 - Article III (d) requires that the Upper Division States (Colorado, New Mexico, Utah and Wyoming) not cause the flow at Lee Ferry to be depleted below an aggregate of 75,000,000 acre-feet for any 10-year period.

Colorado River Compact Relevant Provisions

- continued:

- Provides for the sharing of any burden which might arise because of a water treaty with Mexico (treaty later signed in 1944); such burden to be met first from the "surplus" above the apportionments, and, if insufficient, the deficiency to be shared equally by both basins [Article III (c)].

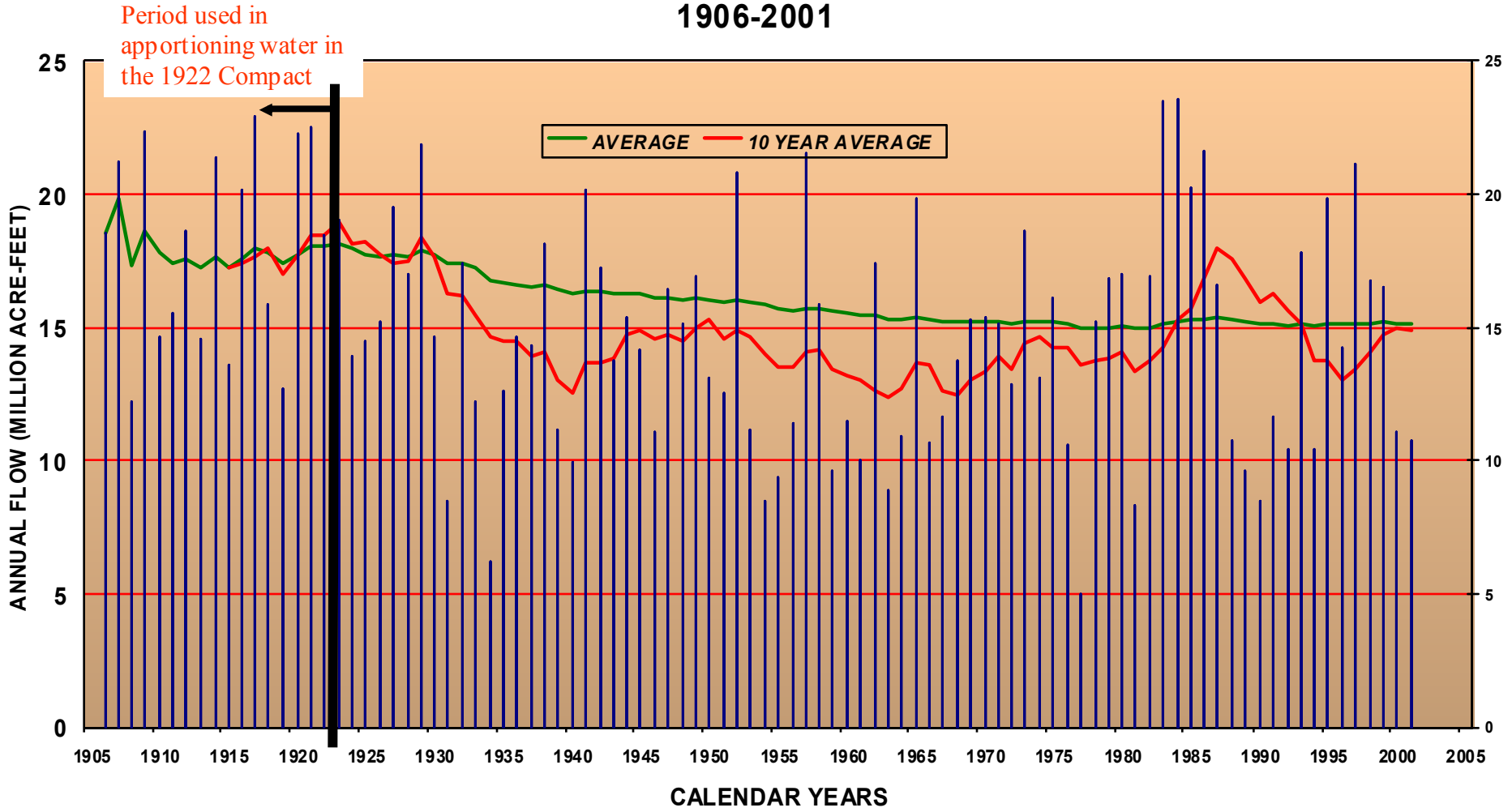
Colorado River Compact Relevant Provisions - continued

- Prohibits the Upper Division from withholding water and the Lower Division from requiring the delivery of water which cannot reasonably be applied to domestic and agricultural uses [Article III (e)].

The Colorado River Commission knew they were dealing with highly-variable Colorado River flows – but the available period of record in 1922 turned out not to be representative of the longer term average annual runoff.

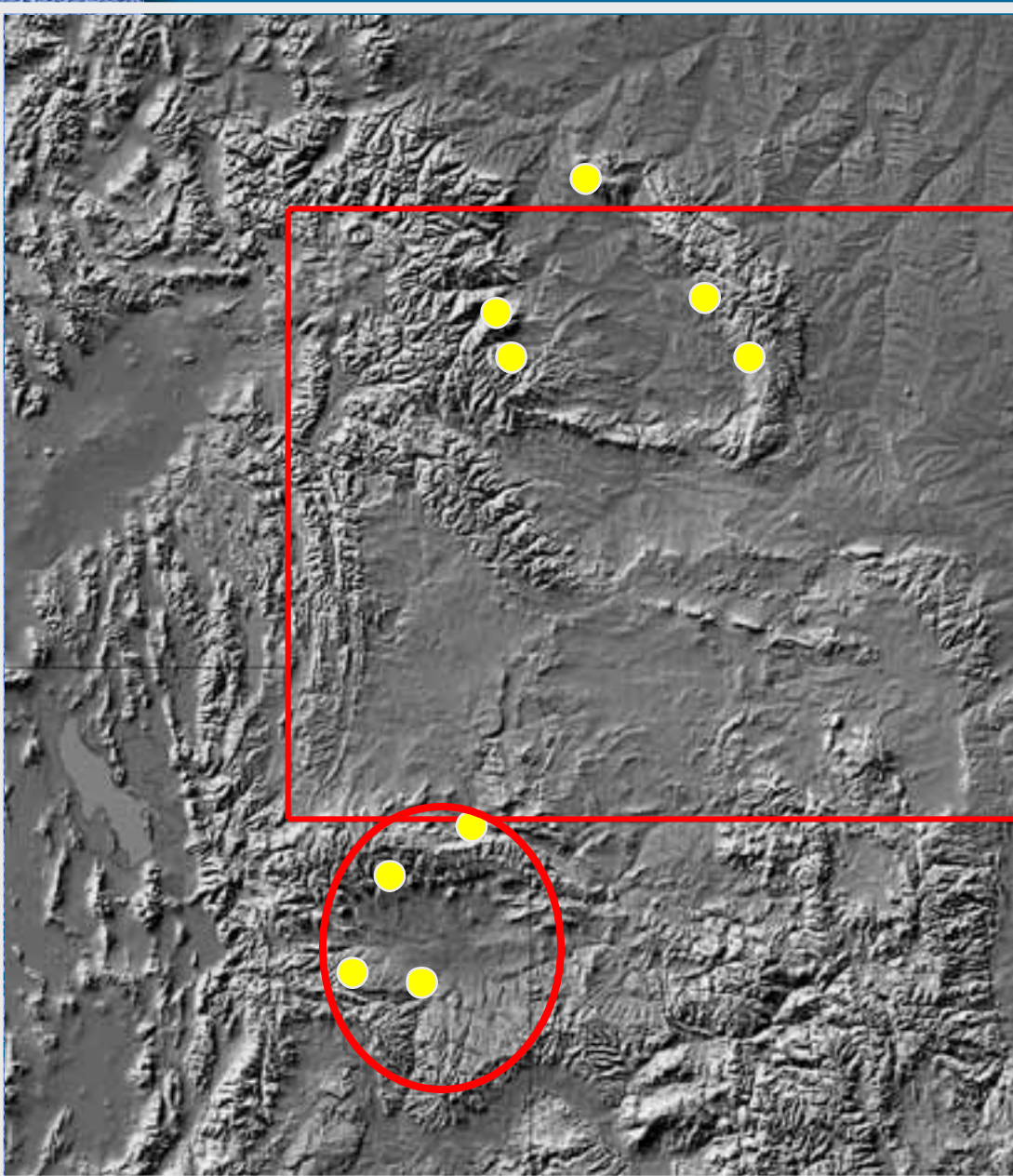


NATURAL FLOW AT LEE FERRY 1906-2001



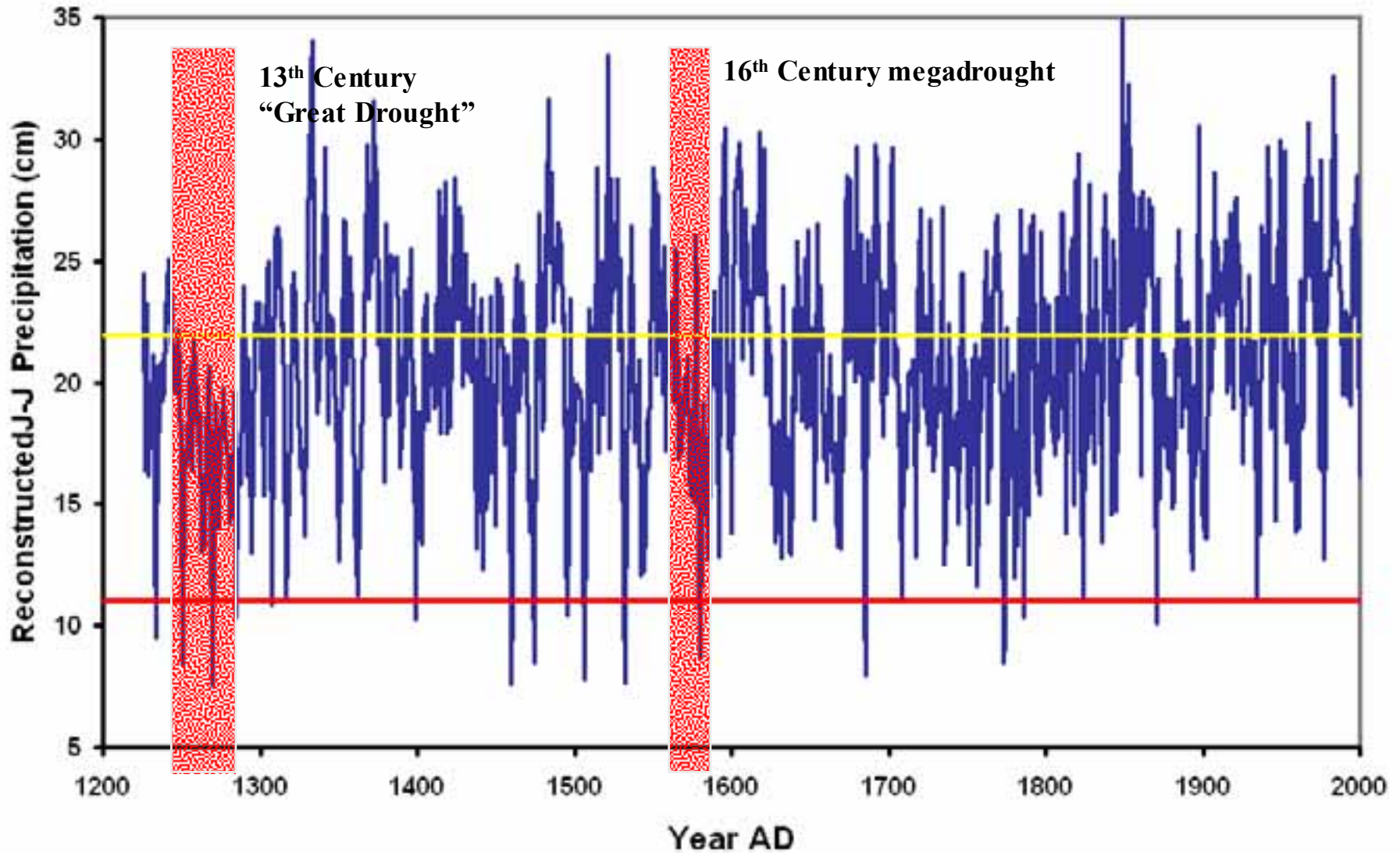
Tree-Rings

- Focused on Wind/
Bighorn and Green River
Drainages
- Over 600 trees sampled
- Pinon pine, limber pine
Ponderosa pine, Douglas-
fir



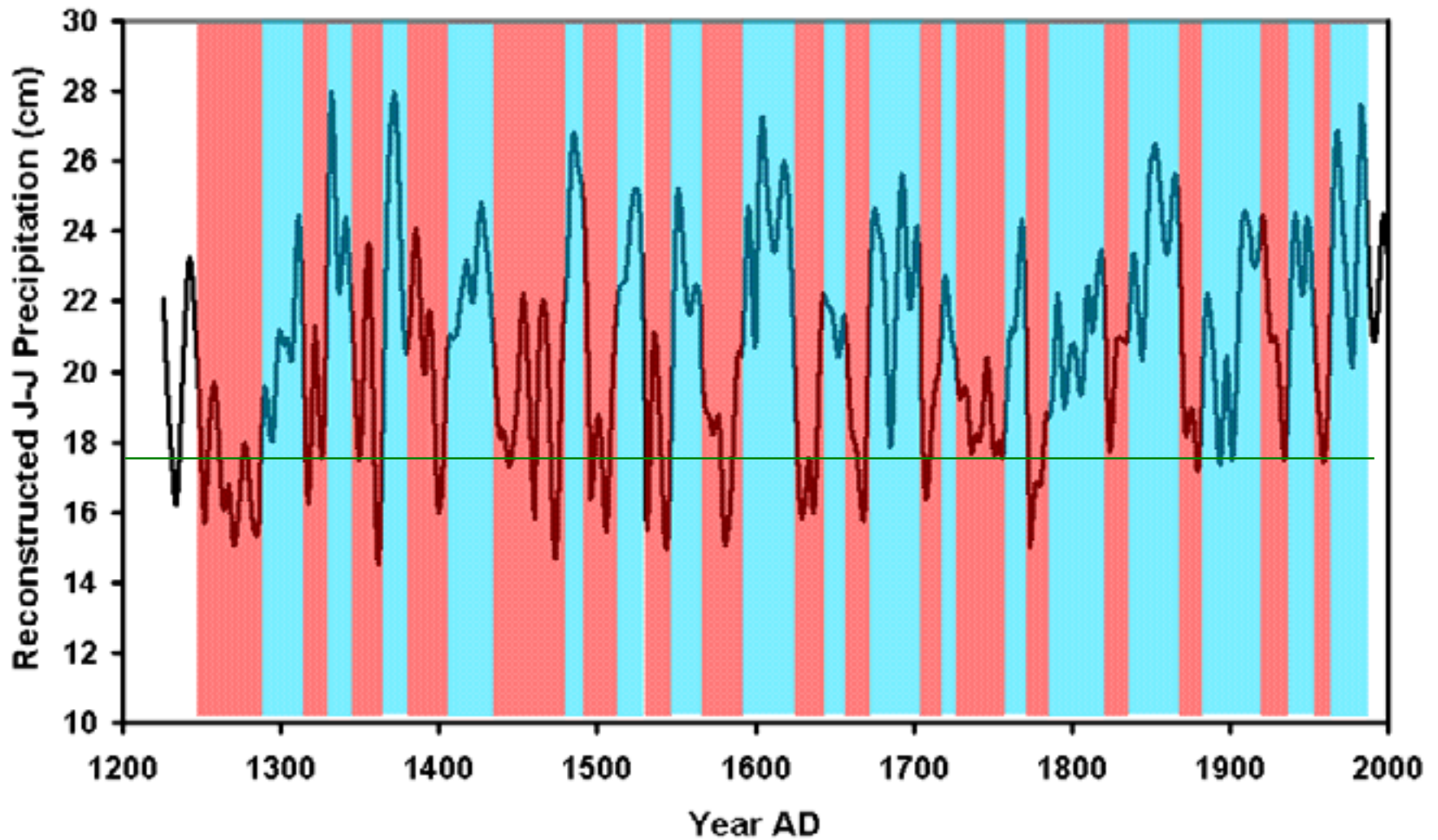
Source: Stephen T. Jackson, Dept. of Botany, University of Wyoming

Green River Basin Reconstructed Precipitation



Source: Stephen T. Jackson, Dept. of Botany, University of Wyoming

Green River Basin Decadal-Scale Wet/Dry Periods



Source: Stephen T. Jackson, Dept. of Botany, University of Wyoming

Five Years of Drought

Lake Powell Unregulated Inflow – Water Years 2000 - 2004

Water Year 2000	62 percent of average*
Water Year 2001	59 percent of average
Water Year 2002	25 percent of average
Water Year 2003	53 percent of average
Water Year 2004	55 percent of average**

The average of the five years would be only 51 percent!

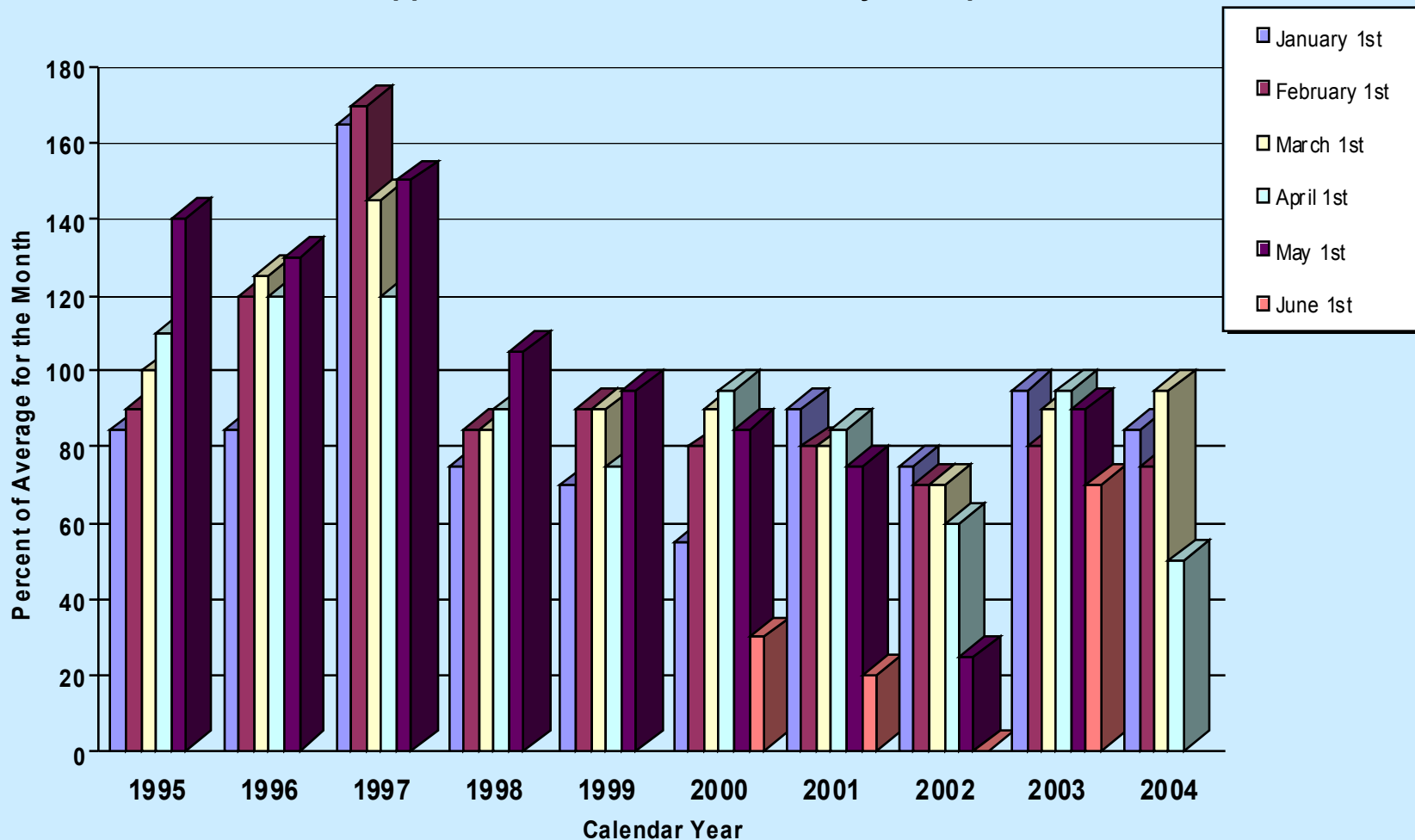
* Average computed using the Water Year 1971 through 2000 period

** Estimate made on April 5, 2004.

The Tale of the “Tell” is in the SNOTEL

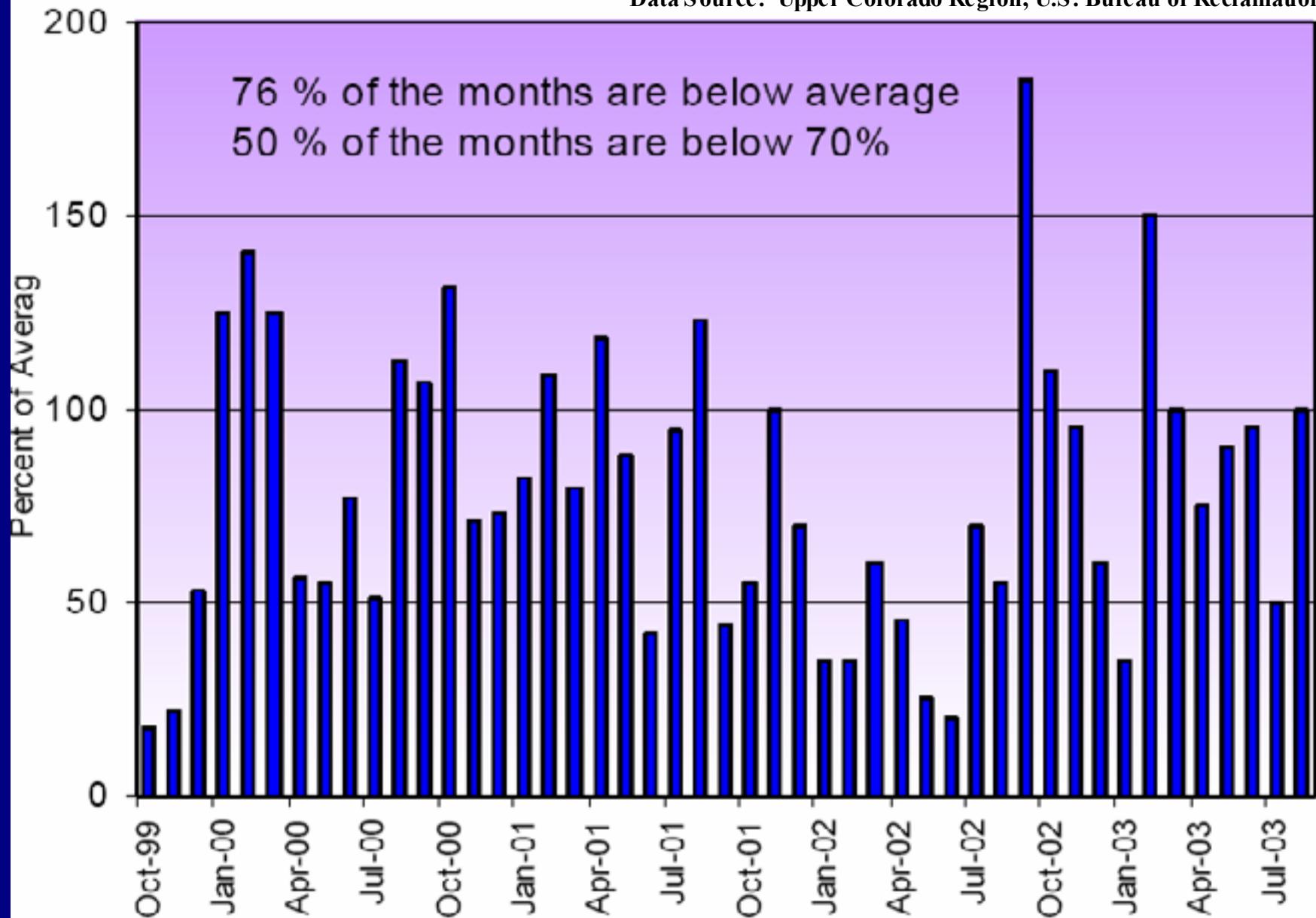
1995 through March 2004 SNOTEL Monthly Precipitation Values

Upper Colorado Mainstem Monthly Snowpack



Upper Colorado River Basin Precipitation October 1999- August 2003

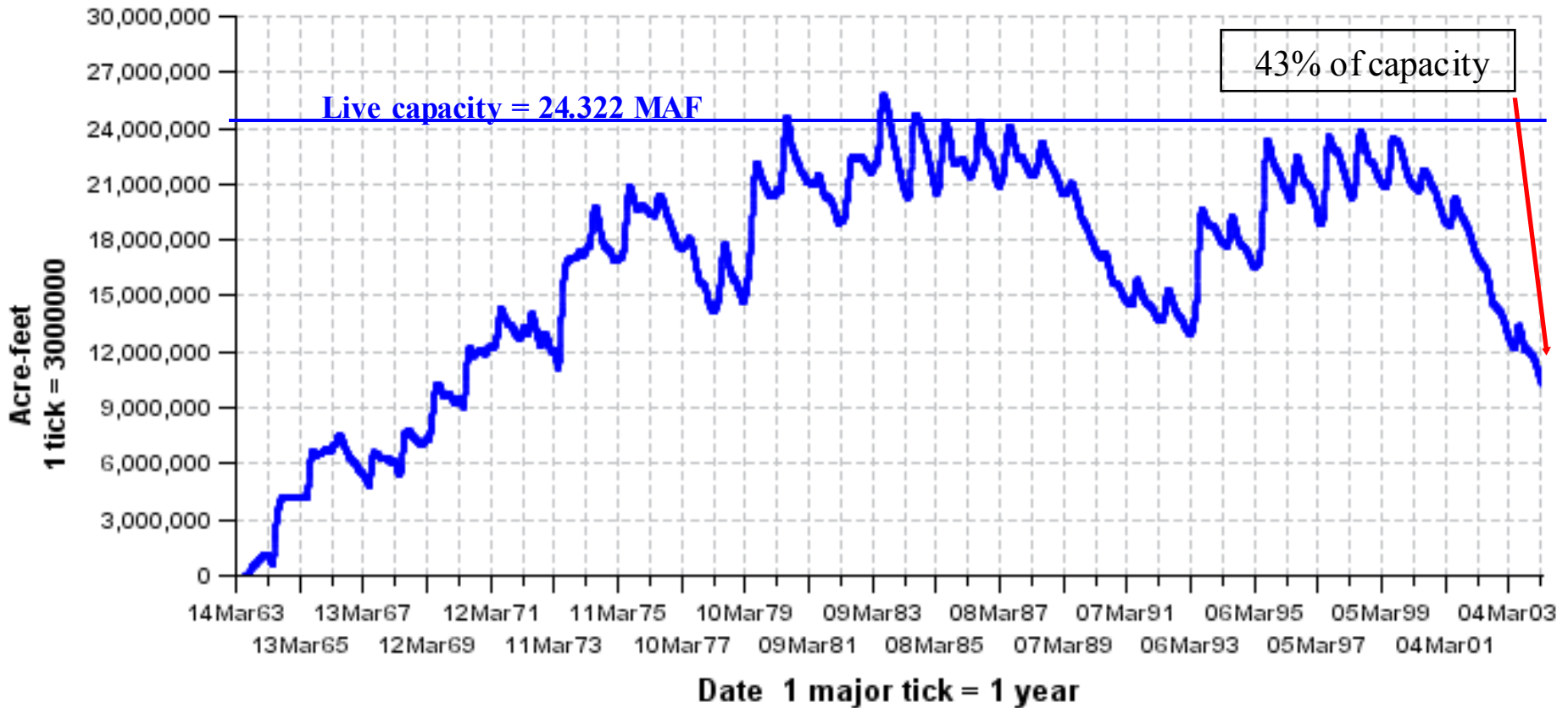
Data Source: Upper Colorado Region, U.S. Bureau of Reclamation



Lake Powell Water Storage

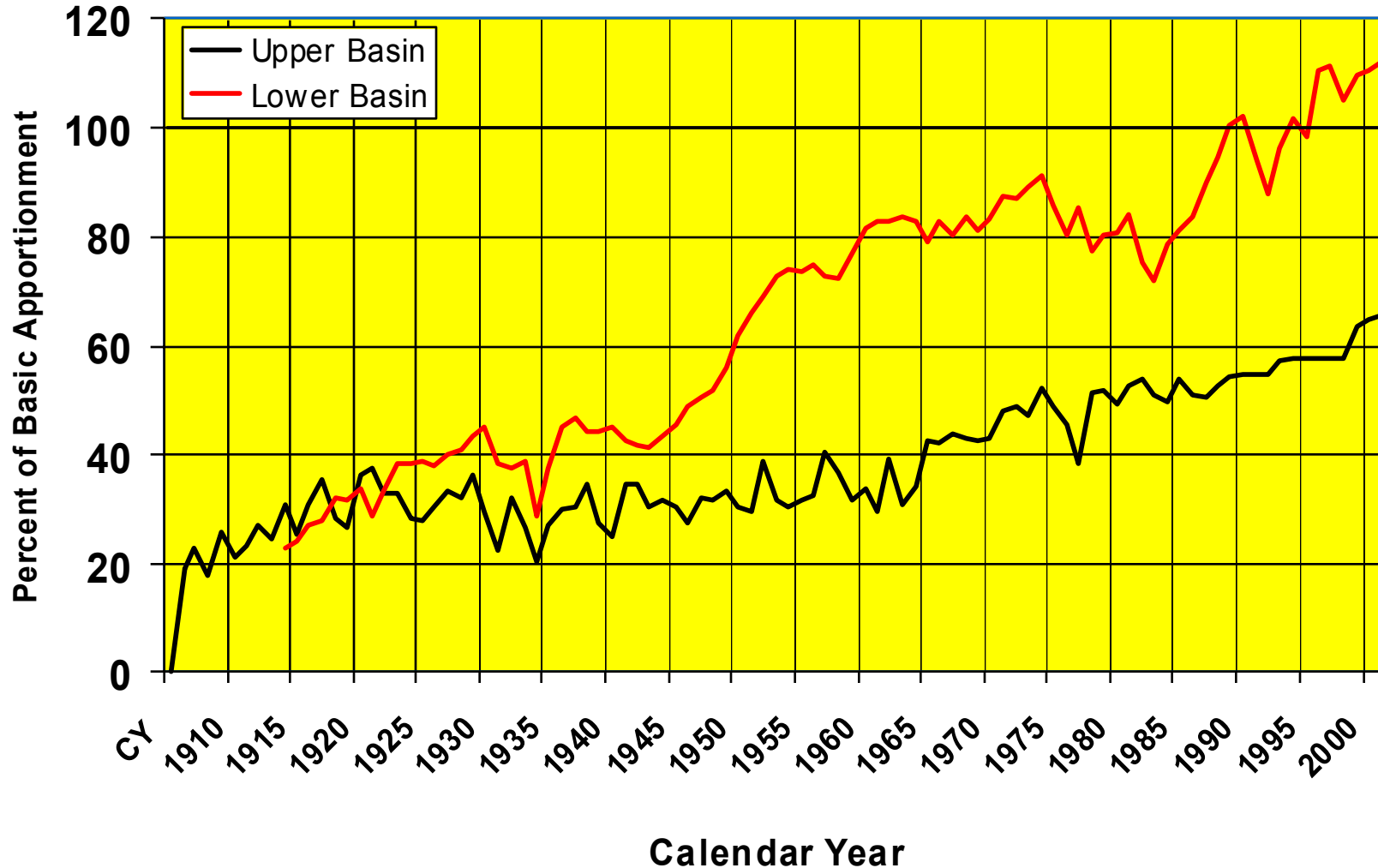
March 14, 1963 through March 23, 2004

Data Source: Upper Colorado Region, U.S. Bureau of Reclamation



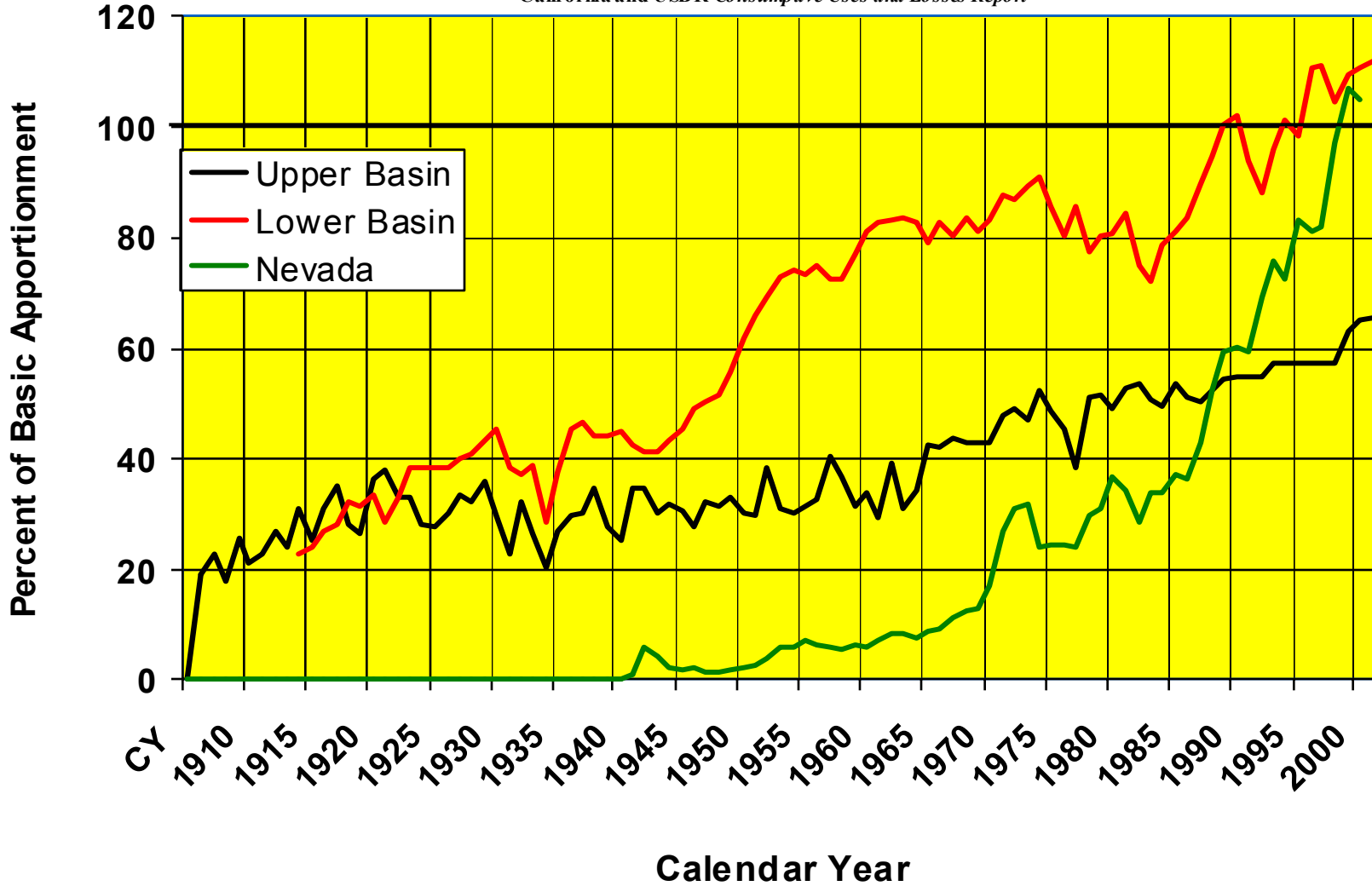
Colorado River Basin Use As Percent of Apportionment

Sources of Data: U.S. Bureau of Reclamation Lower Colorado Regional Website – data from Colorado River Board of California and USBR *Consumptive Uses and Losses Report*



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An engineer by trade and a politician by chance, Nevada's first state engineer and Colorado River Compact Commissioner brought prosperity to the place he was proud to call home.

Nevada's Colorado River Compact Commissioner, JG Scrugham joked that the federal government's answer to the West's need for water was to suggest that farmers in desert states plant alternating rows of onions and potatoes. The onions would cause the potato eyes to cry, thus creating their own irrigation system.

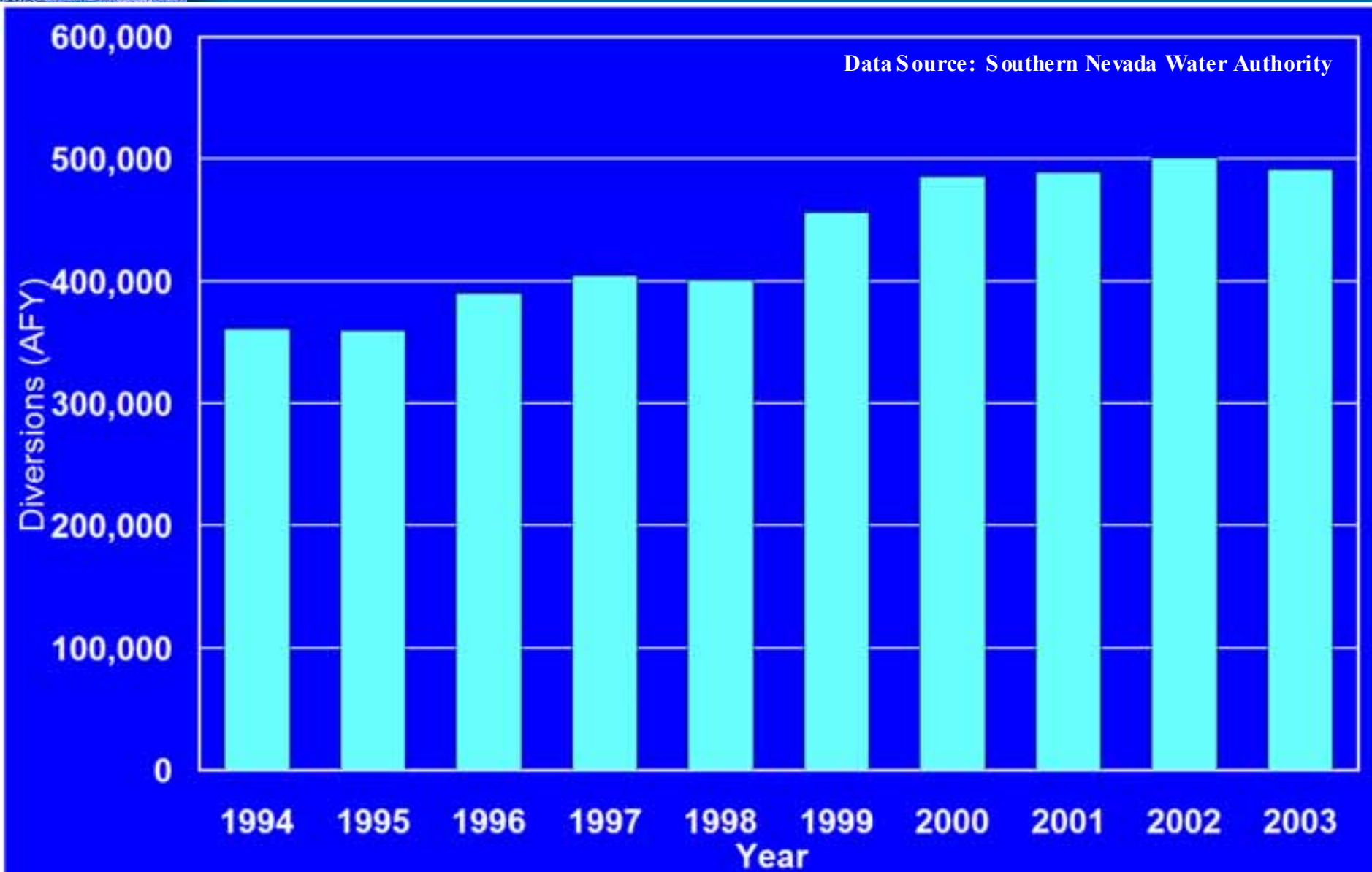


Gov. James Graves Scrugham, from his official portrait that hangs in the state capitol.

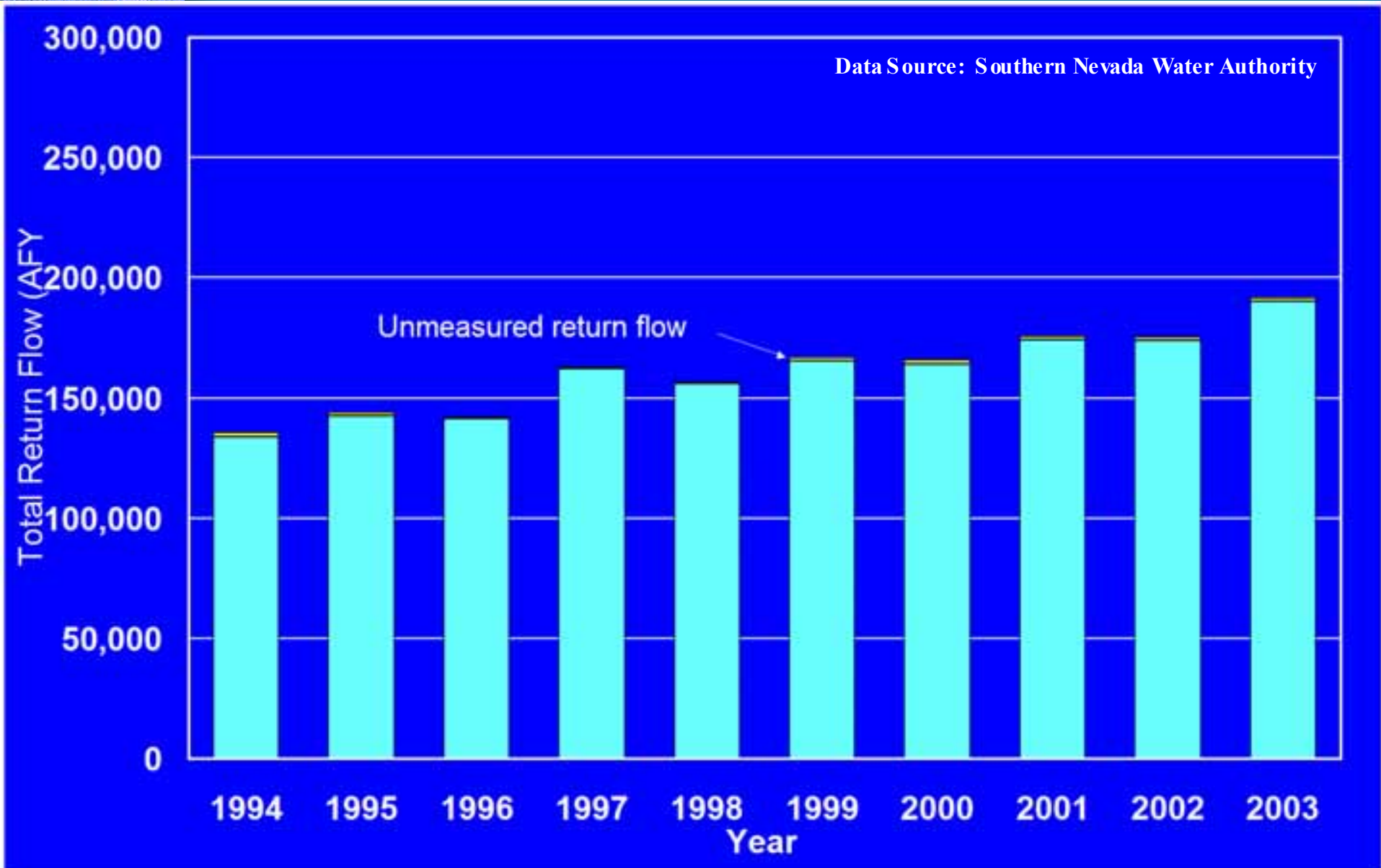
Nevada State Archives

Source: The First 100 Persons Who Shaped Southern Nevada
[<http://www.1st100.com/part1/scrugham.html>]

Nevada Colorado River Diversions



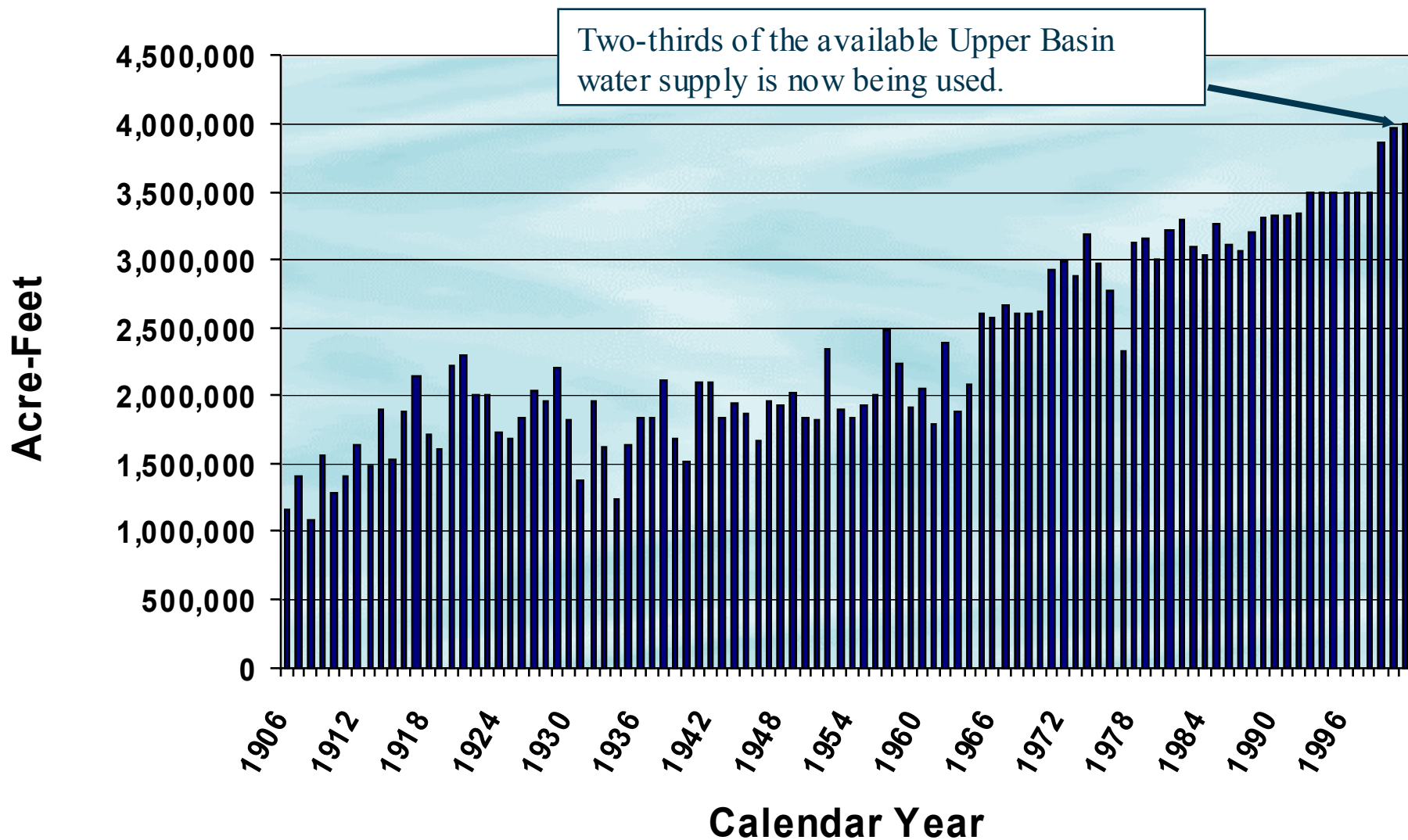
Nevada Return Flow Credits



The Upper Colorado River Basin
States are Increasing Annual Use of
Their Apportioned Colorado River
Water Supply



Historical Upper Basin Use of Colorado River Water



Upper Basin Demands Will Continue to Significantly Increase

- By 2030, Colorado's portion of the Colorado River basin will have a population of more than 490,000, nearly double the 248,000 listed in the 2000 census.*
- Preliminary estimates also predict a 58 percent increase in demands for municipal and industrial water use in the basin by 2030.

* Data presented at Colorado statewide water-supply-initiative basin roundtable in Glenwood Springs, Colorado on January 13, 2004, and reported in the 1/14/2004 issue of the Glenwood Springs' *Daily Sentinel* newspaper.

Upper Basin Demands Will Continue to Significantly Increase

By 2050, Utah's population is expected to more than **double to about five million.**

Assuming that current per capita use rates remain steady, this population growth will increase municipal and industrial water diversion from current levels of about 900,000 acre-feet per year to over 1.9 million acre-feet per year.



“The vision of Utah’s leaders has provided sufficient water for present needs. Continued vision and careful planning will assure these needs are met for future generations. (Photo of Salt Lake City from City Creek Canyon.)”

Quote from Utah's Water Resources: Planning for the Future, May 2001.

Members of the Colorado River Commission. Left to right. Delph Carpenter, Colorado; W.S. Norviel, Arizona, Clarence Stetson, executive secretary of the commission; Herbert Hoover, US Secretary of Commerce; James Scrugham, Nevada; R.E. Caldwell, Utah; W.F. McClure, CA; Stephen B. Davis, Jr., NM; and **Frank C. Emerson, Wyoming**



Frank C. Emerson, Wyoming State Engineer, in his *Sixteenth Biennial Report of the State Engineer of Wyoming (1921-1922)* discussing the wording in the Colorado River Compact:

"The present apportionment of the use of 7,500,000 acre feet per annum to the Upper Basin is **"in perpetuity."** These two words are of especial significance as **their use means that Wyoming and the other States of the Upper Division will find water supply available for the developments of the future whenever our projects may become economically feasible of undertaking, and whether the time may be in the near future or a century or more from now."**

Our Bottom Line:

Wyoming's fundamental objective in the Colorado River Basin is to preserve the State's ability to develop its full Colorado River entitlement in anticipation of future development potential.

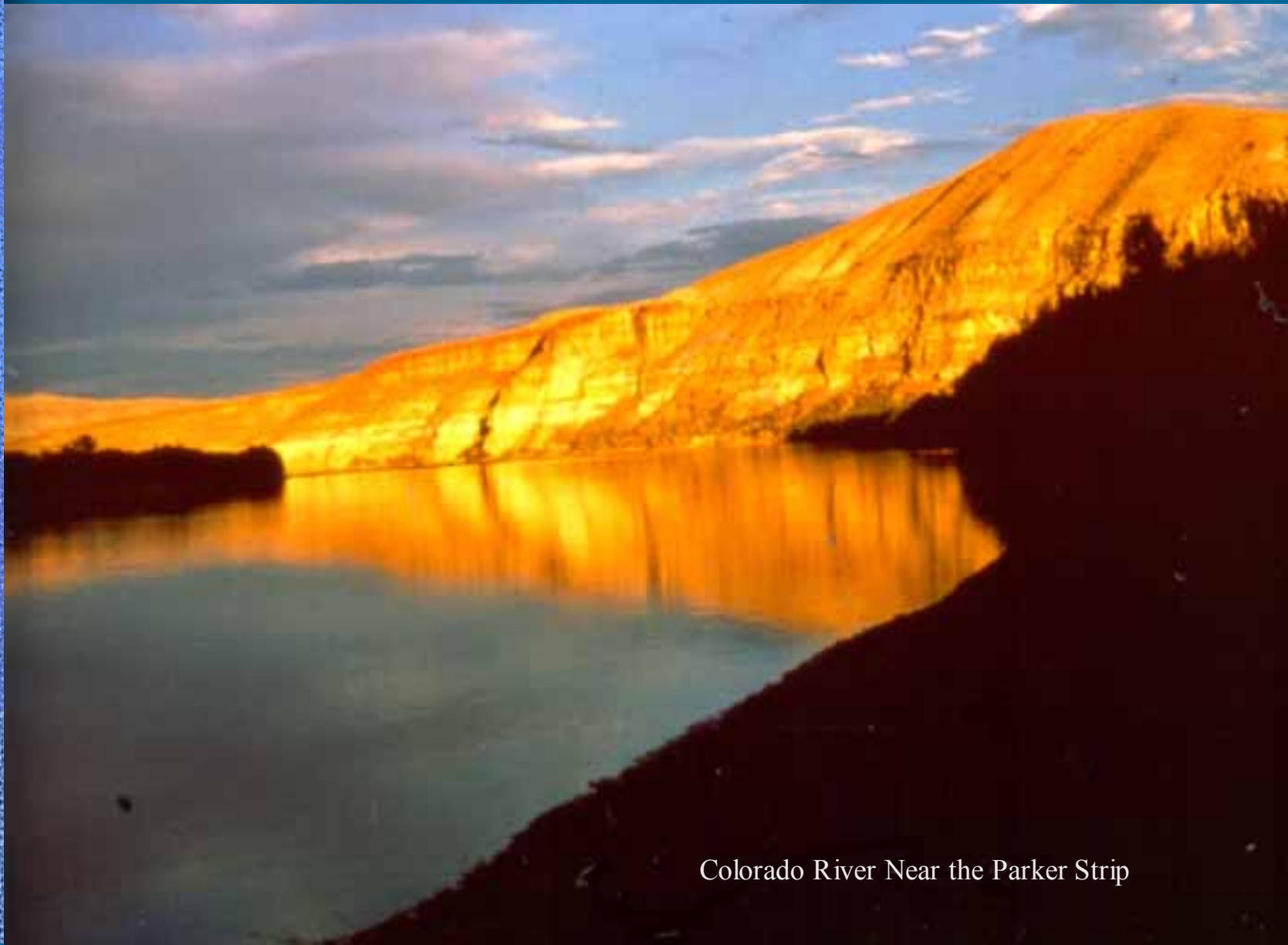
Conclusions:

- **Compact negotiators recognized that Lower Basin water uses were developing much faster than those in the Upper Basin – and that rate of development differential would continue into the future.**
 - Lower Basin States having to “reckon” with full use of their apportionments was not unanticipated.
 - This should come as no surprise. Having developed first, it follows that the necessity for the Lower Basin to deal with water supply challenges precedes the Upper Basin.
- **The Compact means what it says.**
 - The apportionments of use of Colorado River water are “in perpetuity.” To repeat Wyoming State Engineer Frank Emerson’s words: “Wyoming and the other States of the Upper Division will find water supply available for the developments of the future whenever our projects may become economically feasible of undertaking, and whether the time may be in the near future or a century or more from now.”

Conclusions - continued:

- **The Lower Basin first reached full use of its 7.5 MAFY basic apportionment in 1989. Lower Basin uses were at 2/3 of that level about 50 years ago and have had the intervening time to anticipate and plan for the consequences of full development.**
- **The Lower Basin is able to operate as if a normal water supply exists every year (no shortage declaration has ever been made) on account of the Upper Basin delivery requirement in the Colorado River Compact.**
- **We encourage and want to facilitate Lower Basin water supply problems being solved with Lower Basin water.**

Thanks for your attention!



Colorado River Near the Parker Strip