

# San Diego Water Outlook

**David W. Pierce**

*Division of Climate, Atmospheric Sciences, and Physical  
Oceanography*

Scripps Institution of Oceanography

La Jolla, CA

# San Diego County's Water Sources

2008

2009\*



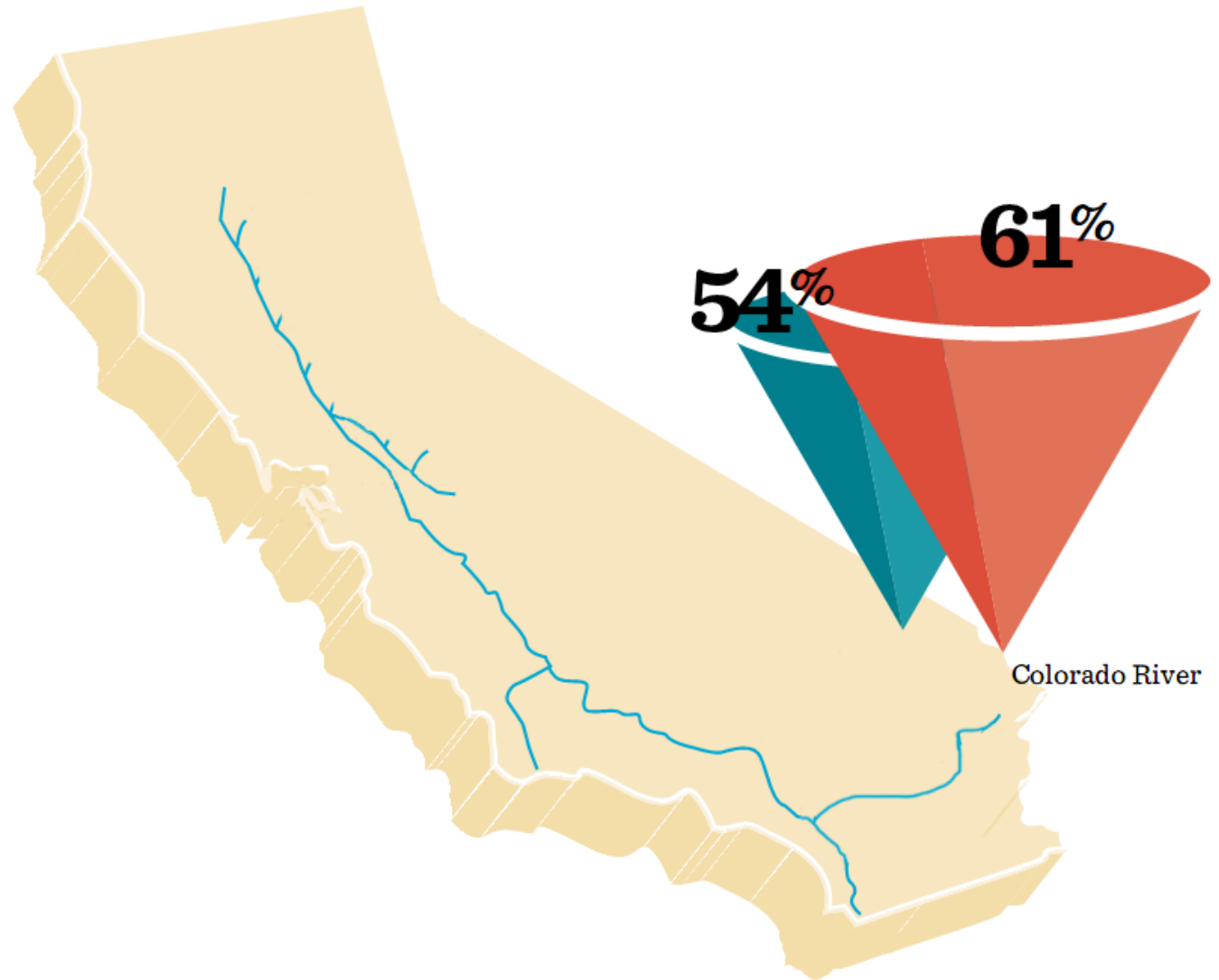
**Cuts in State Water Project supplies have made San Diego County more reliant on Colorado River water supplies.**

\* Based on MWD Water Quality/Supply Reports

# San Diego County's Water Sources

2008

2009\*



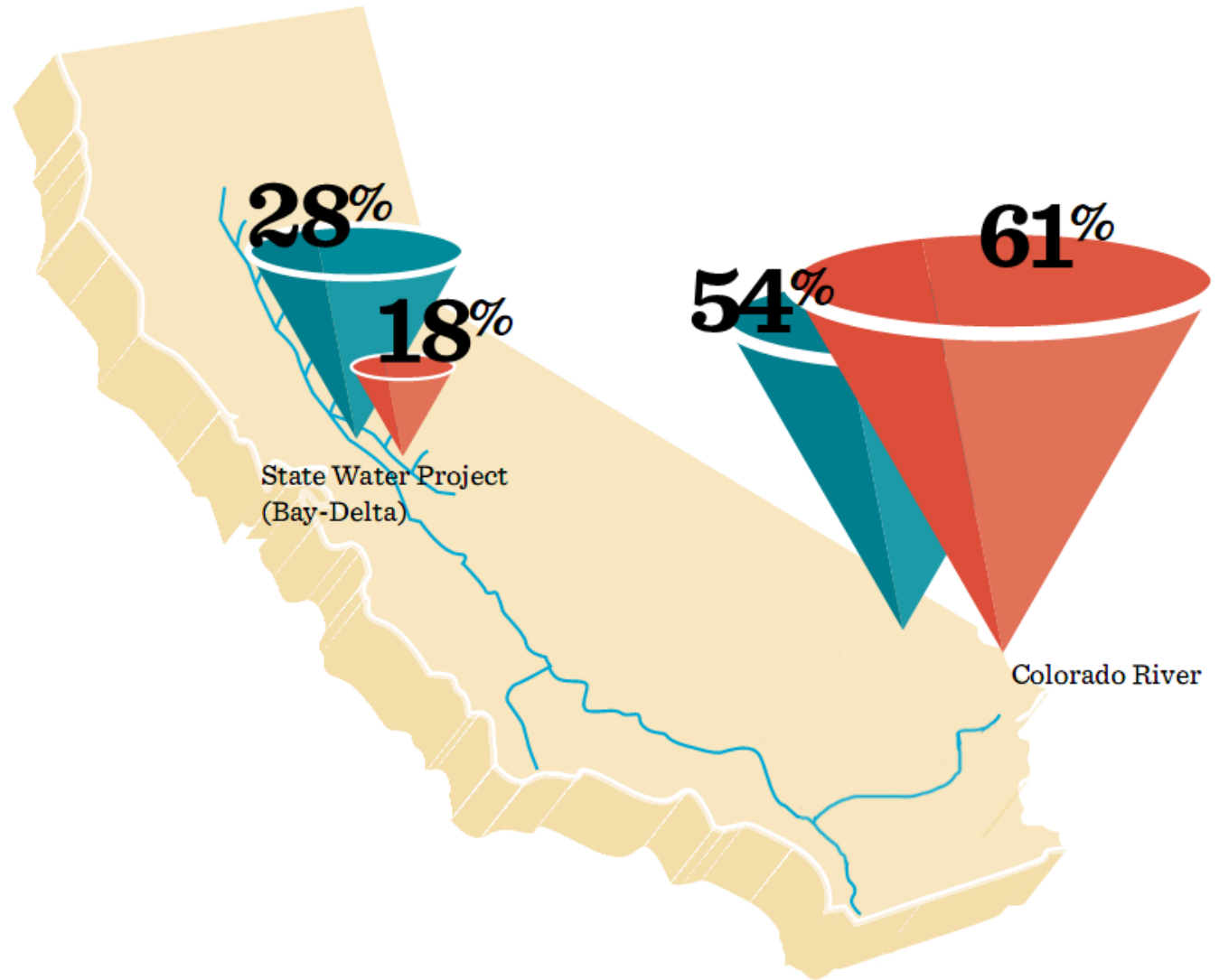
**Cuts in State Water Project supplies have made San Diego County more reliant on Colorado River water supplies.**

\* Based on MWD Water Quality/Supply Reports

# San Diego County's Water Sources

2008

2009\*



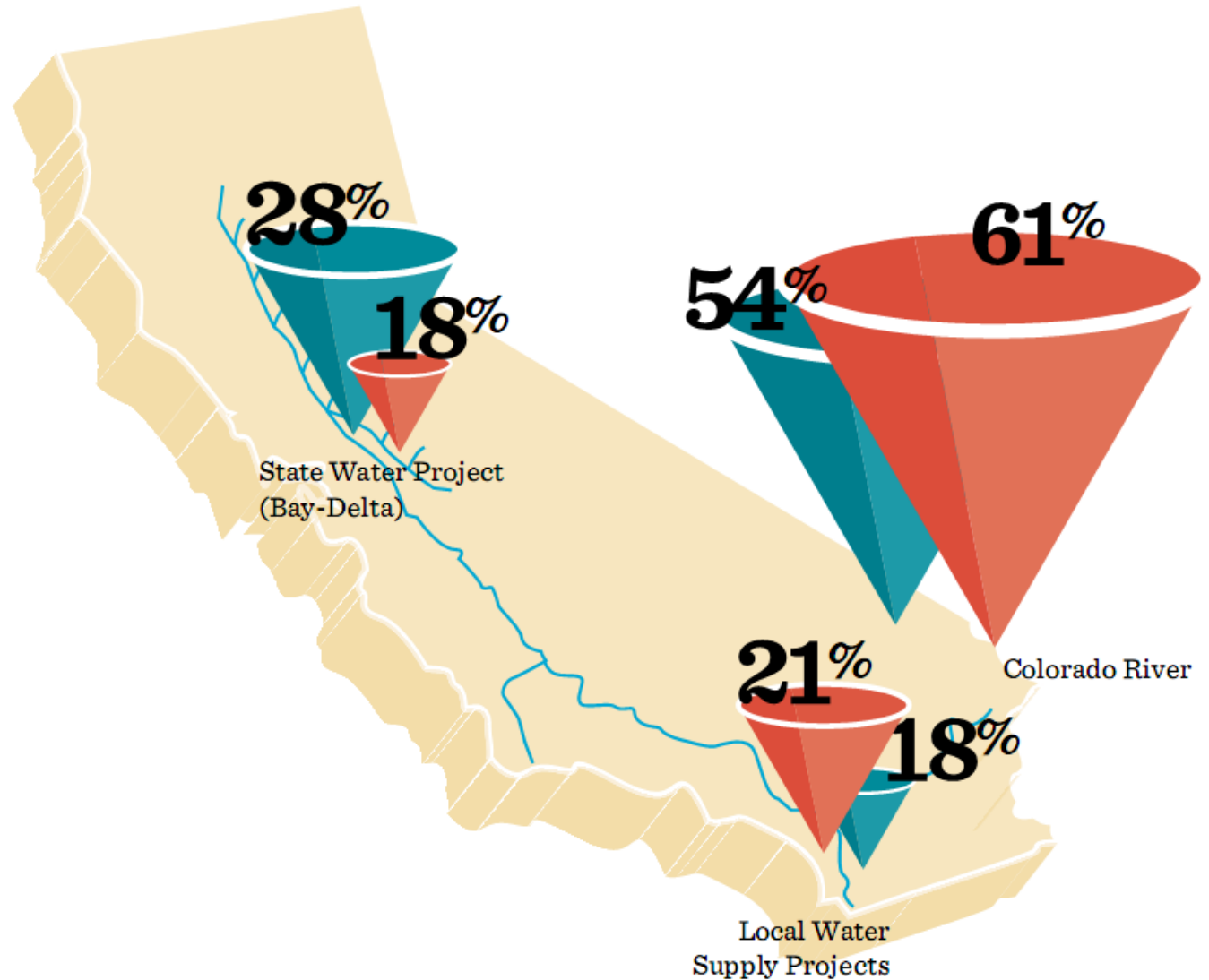
Cuts in State Water Project supplies have made San Diego County more reliant on Colorado River water supplies.

\* Based on MWD Water Quality/Supply Reports

# San Diego County's Water Sources

2008

2009\*



Cuts in State Water Project supplies have made San Diego County more reliant on Colorado River water supplies.

\* Based on MWD Water Quality/Supply Reports



# Colorado River drainage



Water supply for:

- 27 million people
- 3.5 million acres of farmland

Users in:

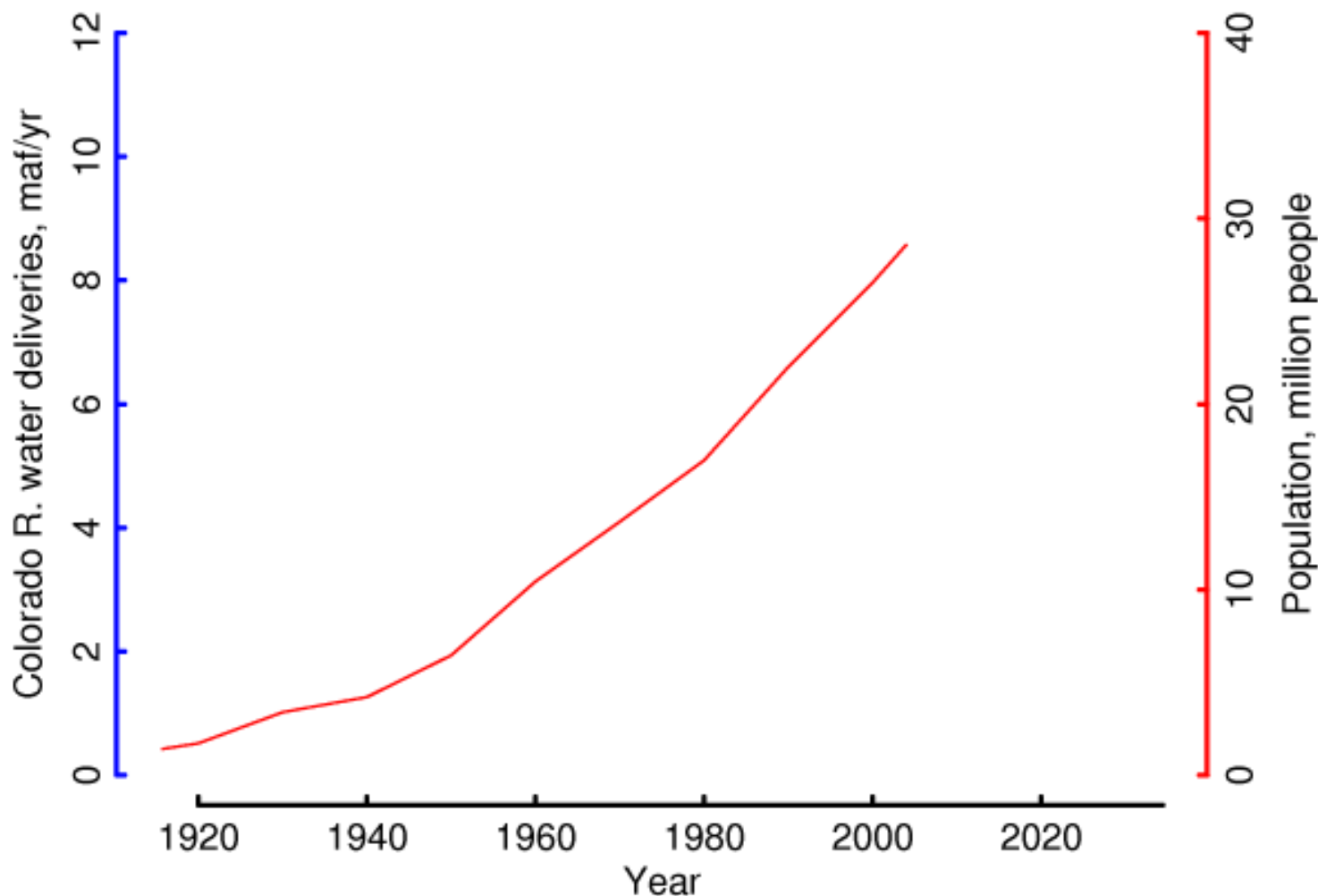
- 7 states
- 2 countries
- Several Native American tribes

Current deliveries:

~13.5 maf/yr, increase to ~14.4 maf/yr by 2060

# Colorado River: Current Status

## Arizona, Nevada, and Southern California



maf/yr = million  
acre-feet/year

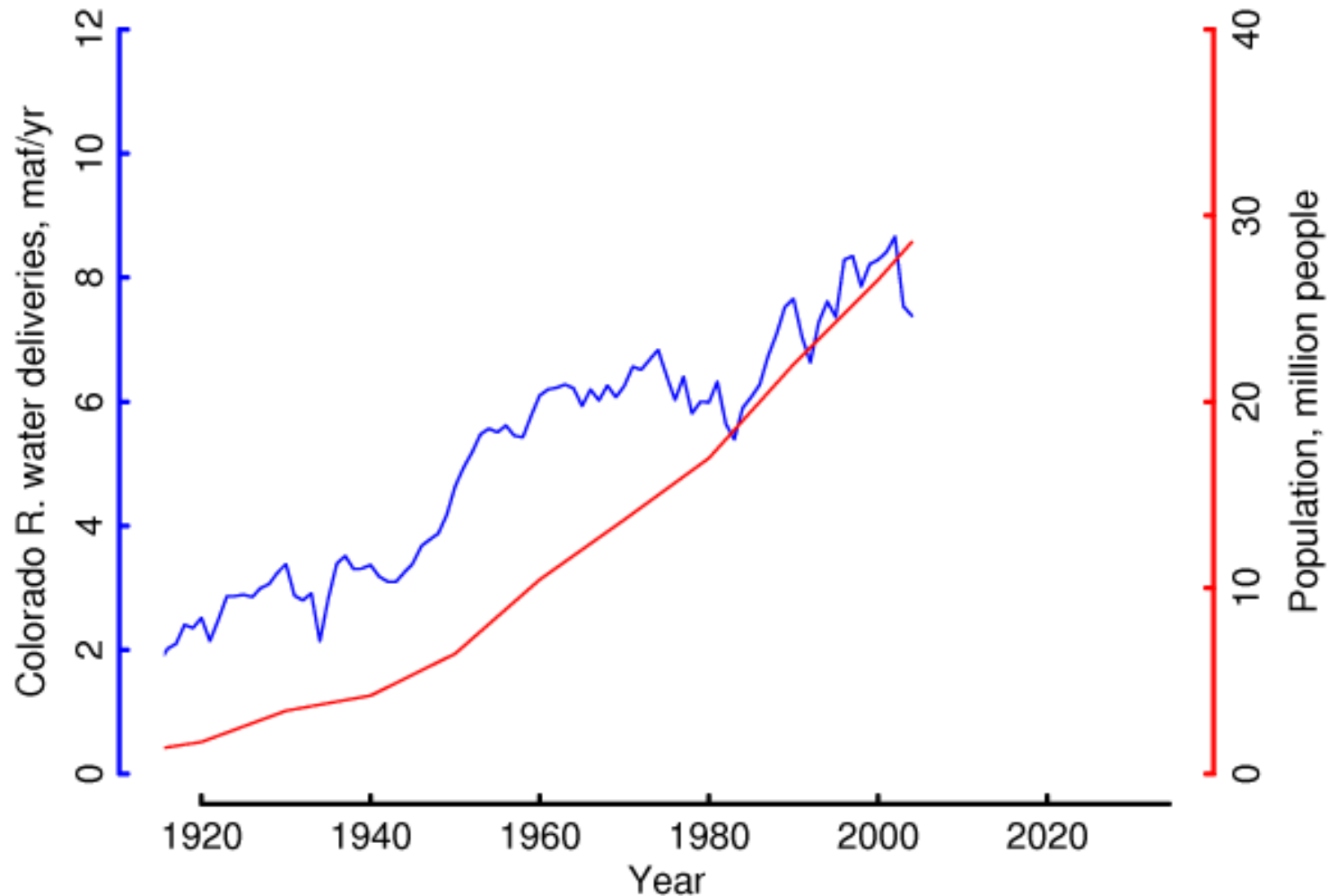
Acre-foot =  
326,000 gallons,  
2 avg. families of  
4 for a year (420  
l/day)

= 1233 m<sup>3</sup>

1 acre-foot/yr =  
3377 liters/day

# Colorado River: Current Status

## Arizona, Nevada, and Southern California



maf/yr = million  
acre-feet/year

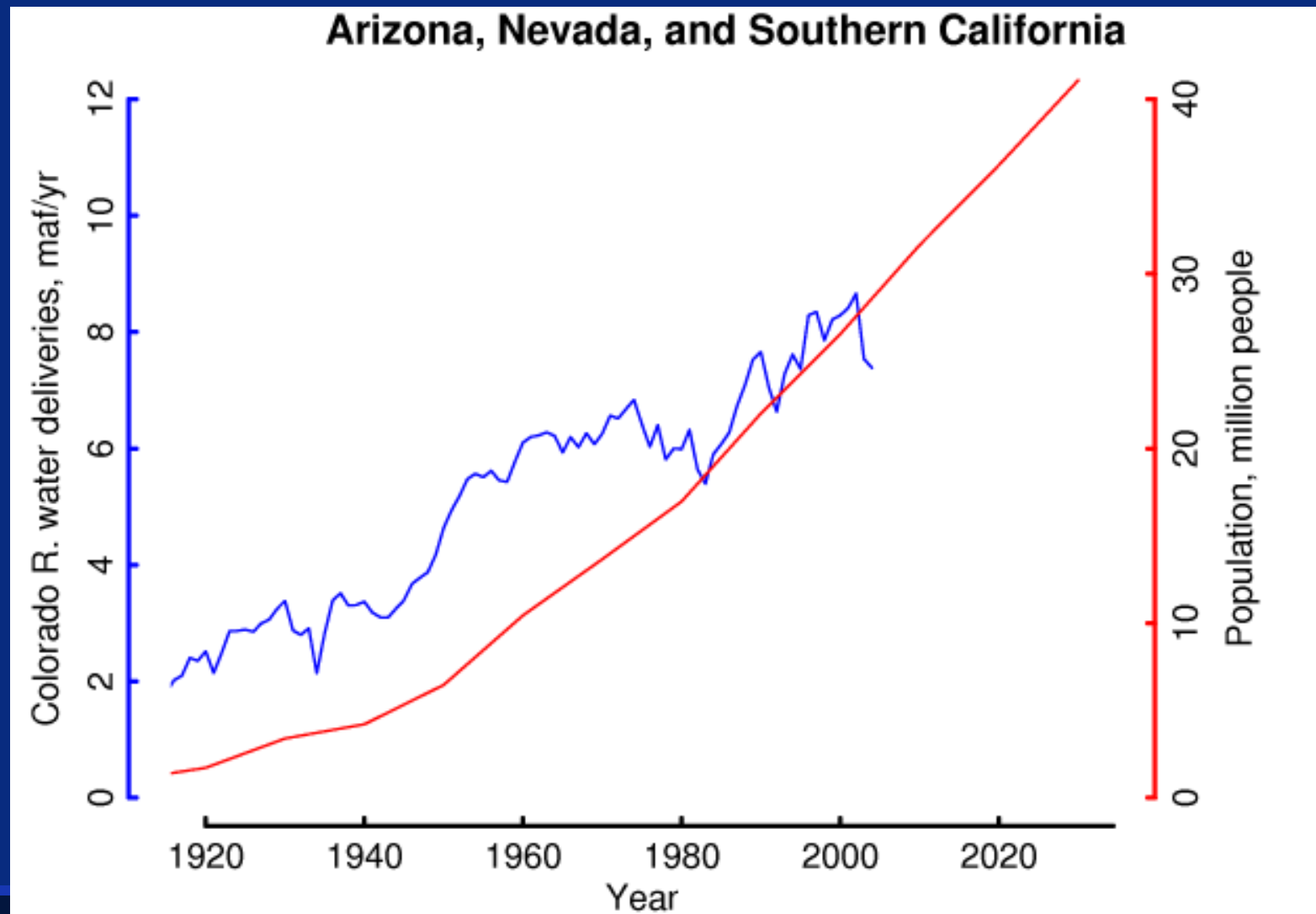
Acre-foot =  
326,000 gallons,  
2 avg. families of  
4 for a year (420  
l/day)

= 1233 m<sup>3</sup>

1 acre-foot/yr =  
3377 liters/day



# Colorado River: Current Status



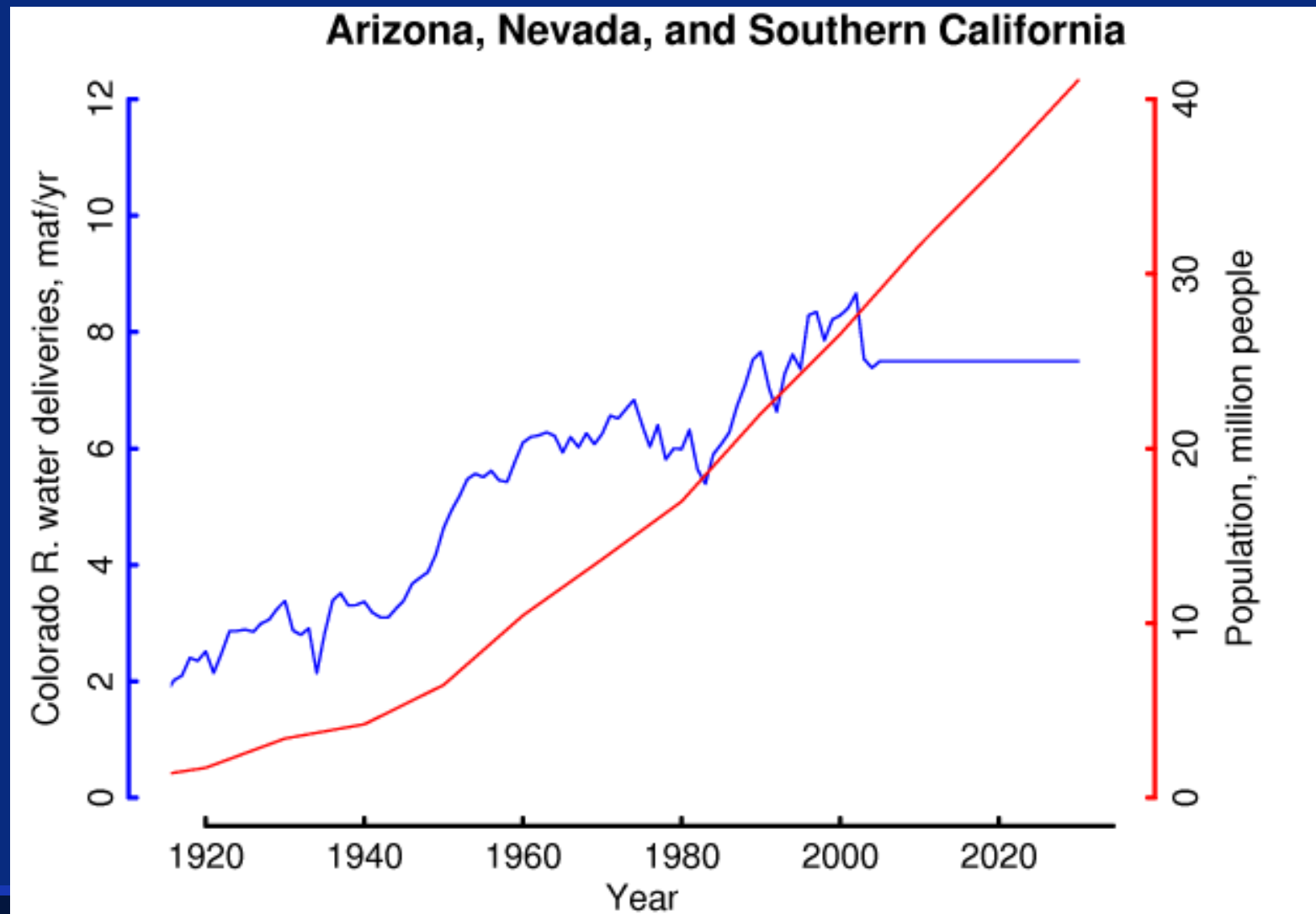
maf/yr = million  
acre-feet/year

Acre-foot =  
326,000 gallons,  
2 avg. families of  
4 for a year (420  
l/day)

=  $1233 \text{ m}^3$

1 acre-foot/yr =  
3377 liters/day

# Colorado River: Current Status



maf/yr = million  
acre-feet/year

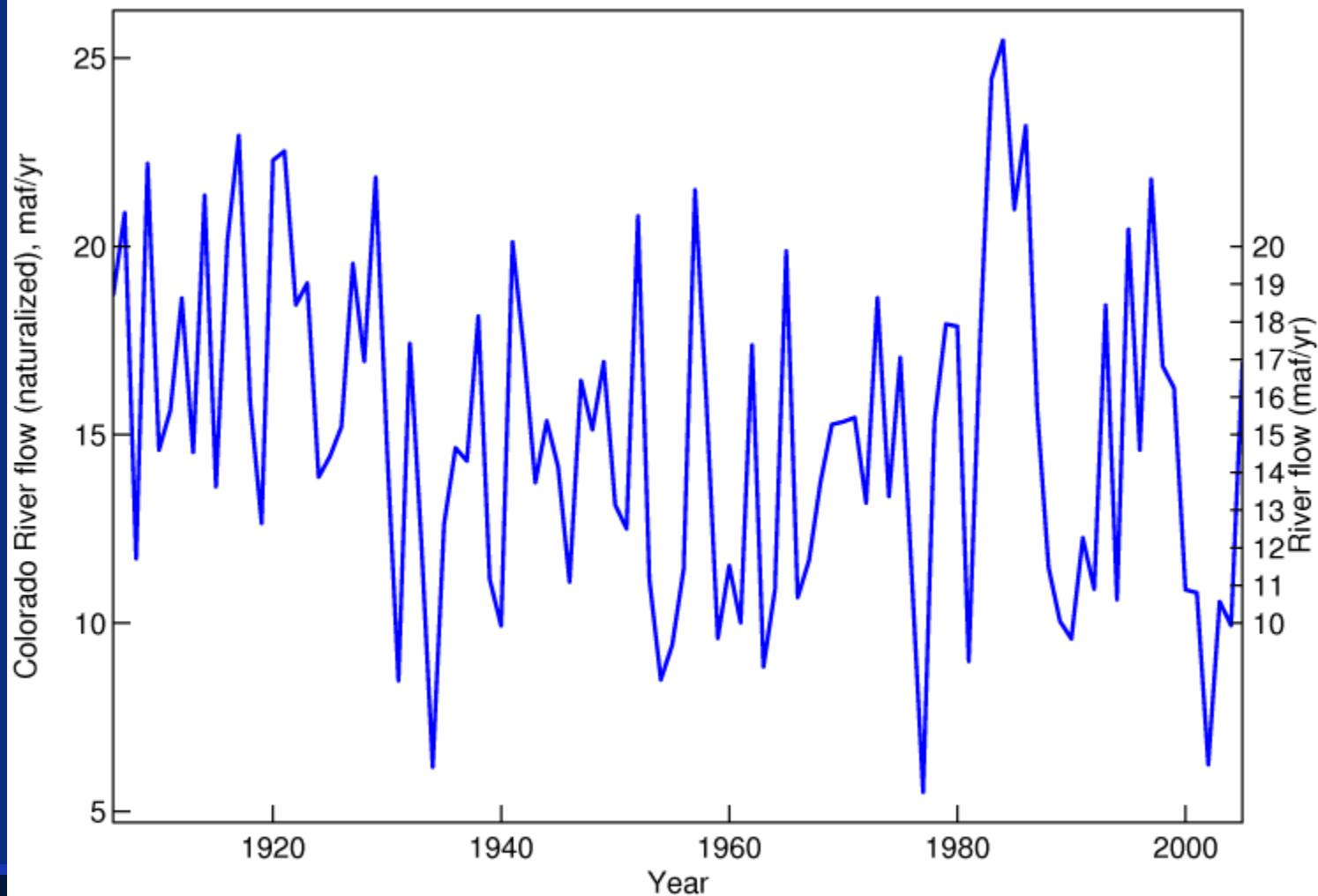
Acre-foot =  
326,000 gallons,  
2 avg. families of  
4 for a year (420  
l/day)

= 1233 m<sup>3</sup>

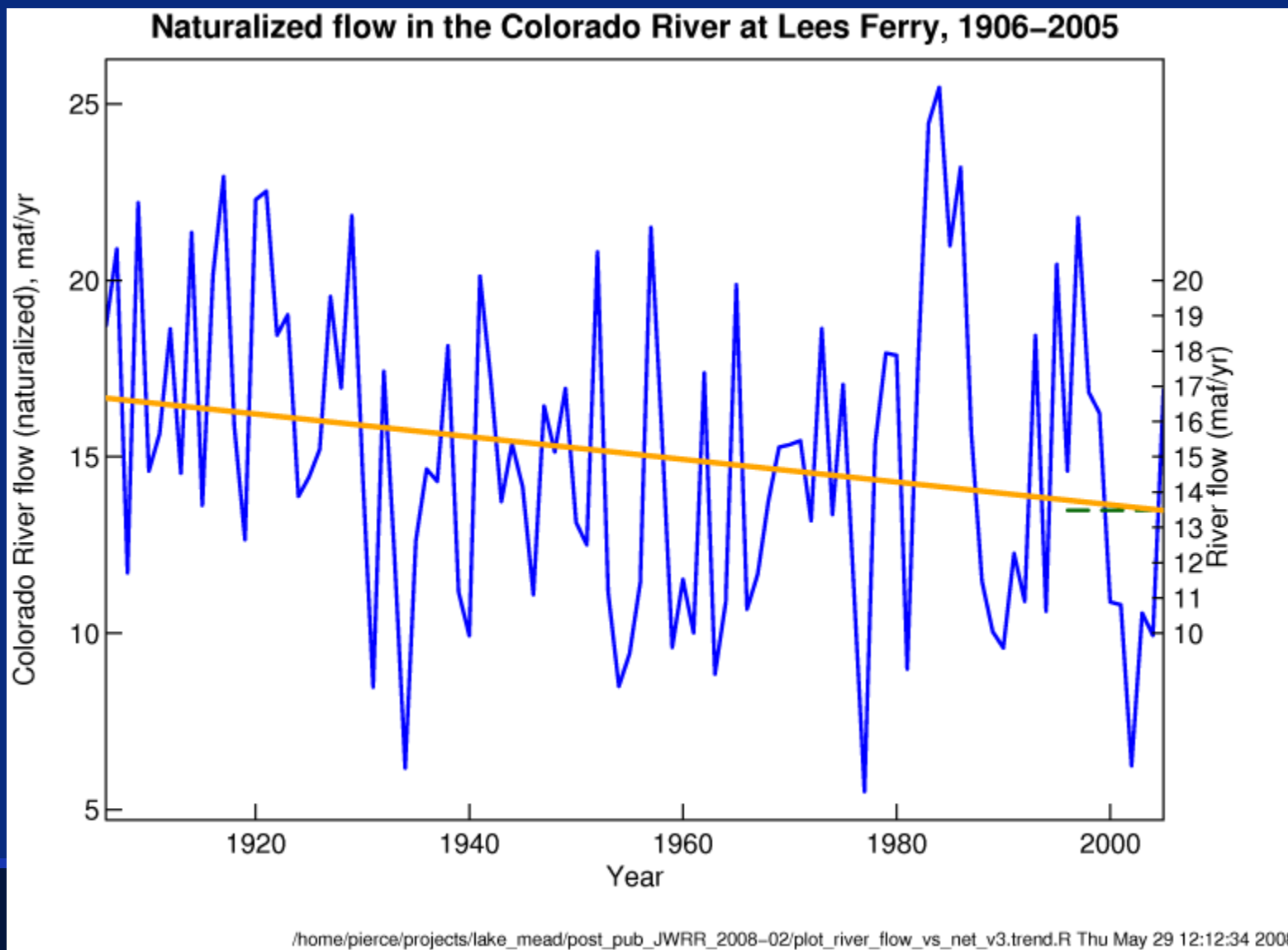
1 acre-foot/year =  
3377 liters/day

# Colorado River flow history

Naturalized flow in the Colorado River at Lees Ferry, 1906–2005

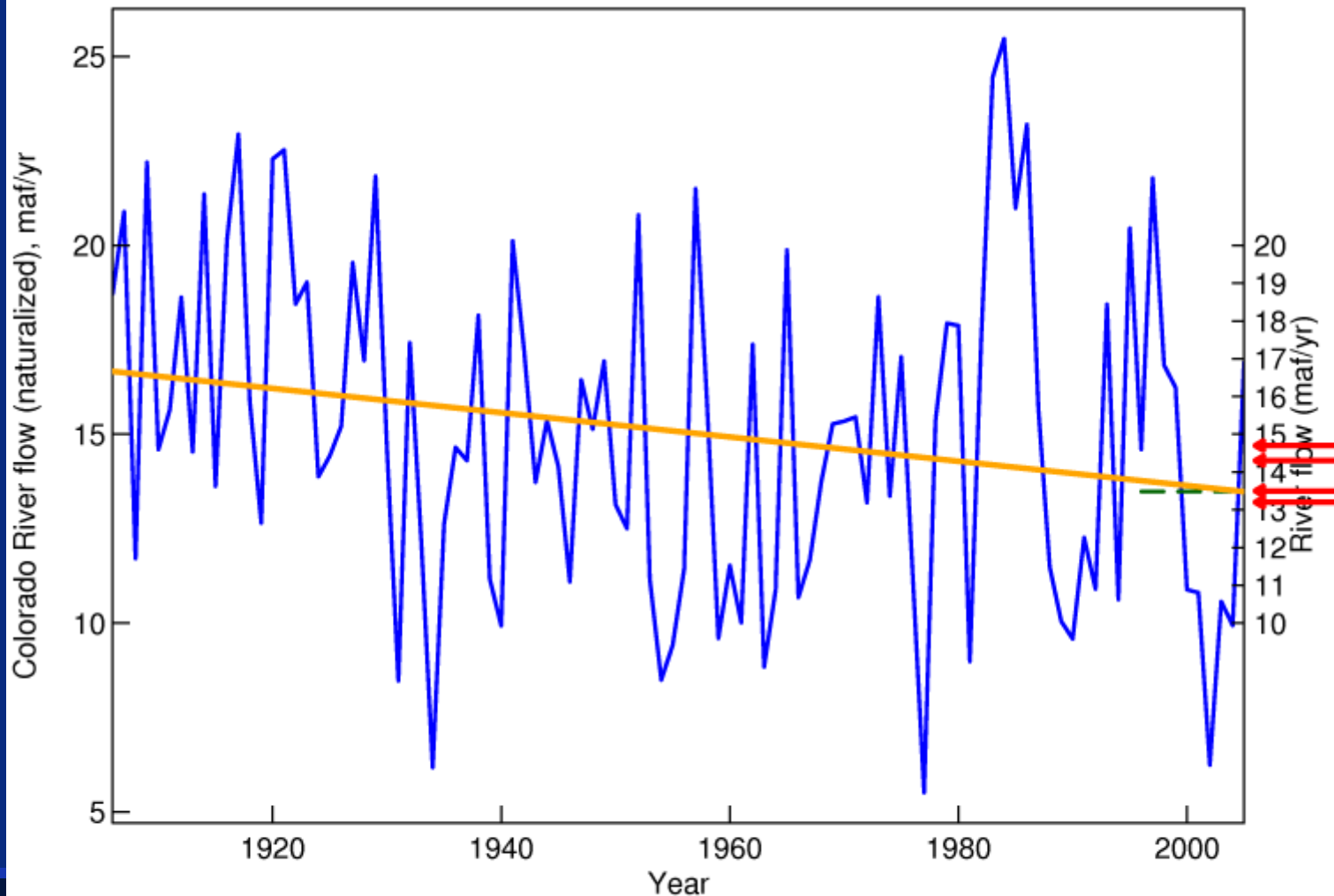


# Colorado River flow history



# Colorado River flow history

Naturalized flow in the Colorado River at Lees Ferry, 1906–2005



Woodhouse et al. (2007): 14.7, 14.3

Stockton and Jacoby (1976): 13.5

Hidalgo et al. (2000): 13.2

Maf/yr

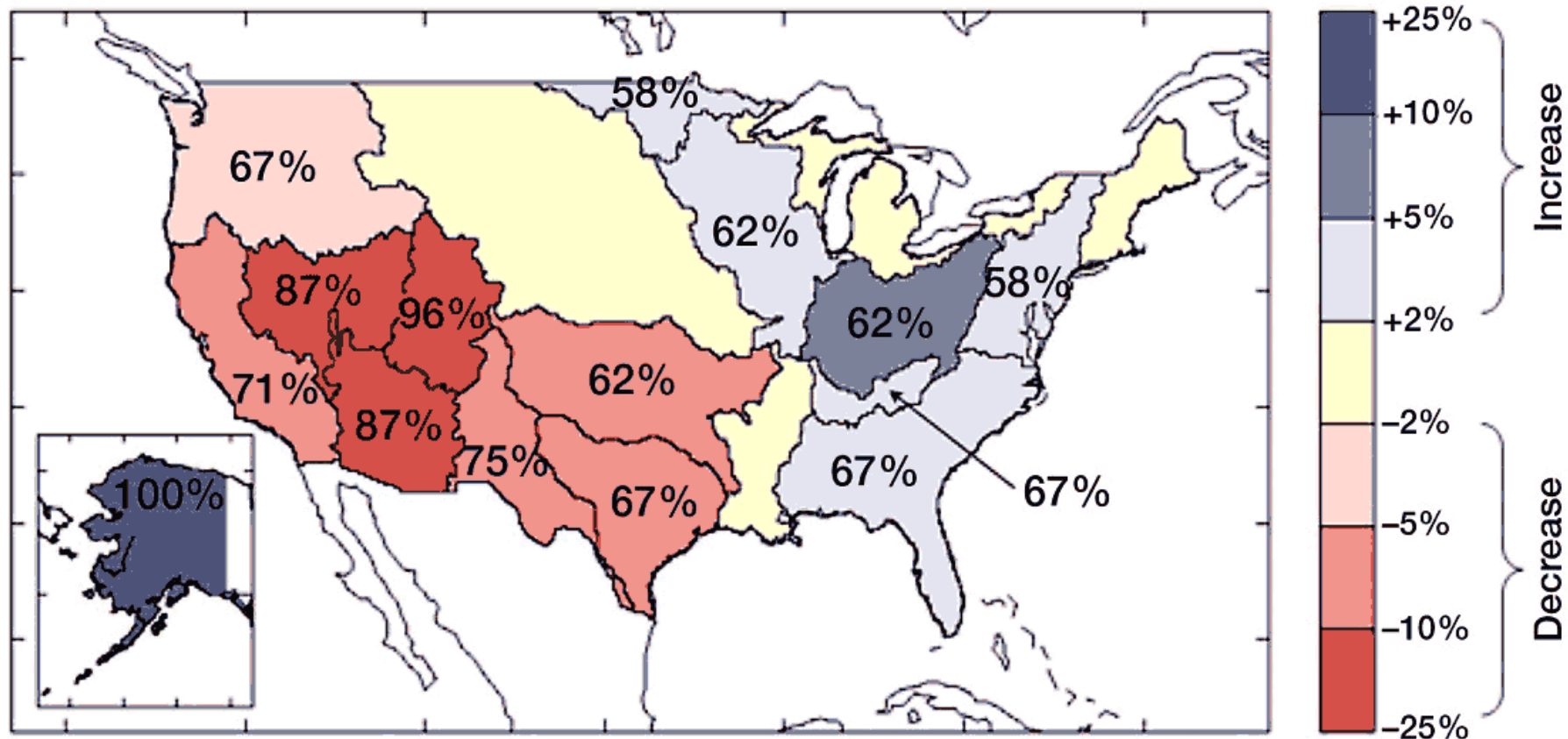
# 20<sup>th</sup> century unusually wet

Tree ring reconstruction	Year starts	Rank of 20 <sup>th</sup> century	Percentile of 100-yr mean
Hidalgo et al.	1493	1	99
Meko et al.	762	2	95
Stockton & Jacoby A	1520	1	99
Stockton & Jacoby B	1520	1	99
Stockton & Jacoby C	1520	1	99
Stockton & Jacoby D	1520	1	99
Woodhouse et al. A	1490	1	95
Woodhouse et al. B	1490	1	97
Woodhouse et al. C	1490	1	99
Woodhouse et al. D	1490	1	99



## Changes in Runoff by midcentury

(Numbers show *model agreement*; colors show *change*)



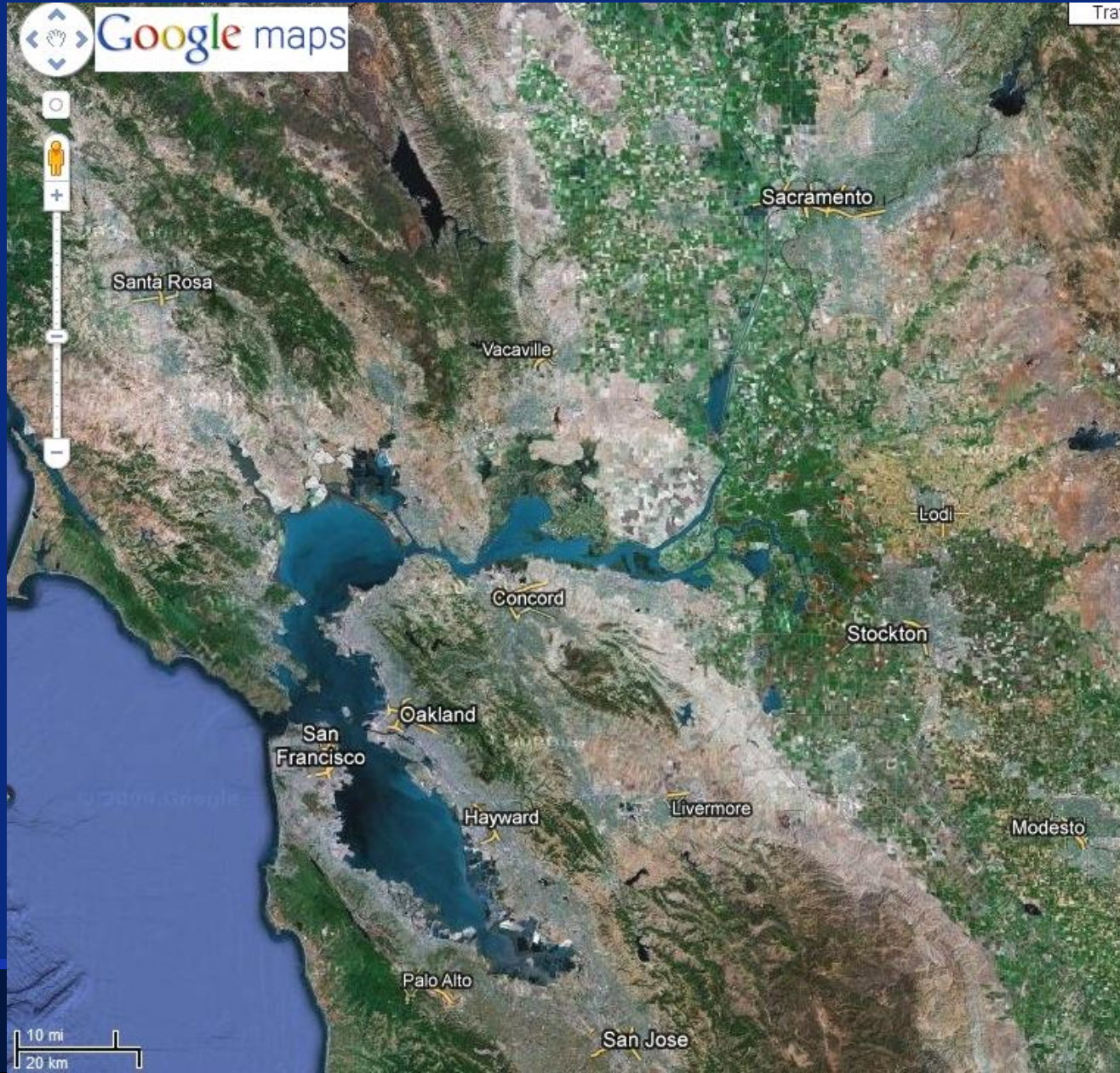
From Milly et al., *Nature*, 2005, as redrawn in Lettenmaier et al., CCSP report SAP 4.3, 2008







# Sacramento/San Joaquin River delta



# Sacramento/San Joaquin River delta

- Fresh water channeled through the Sacramento/San Joaquin River delta
- Subject to salt water intrusion and levee breaks

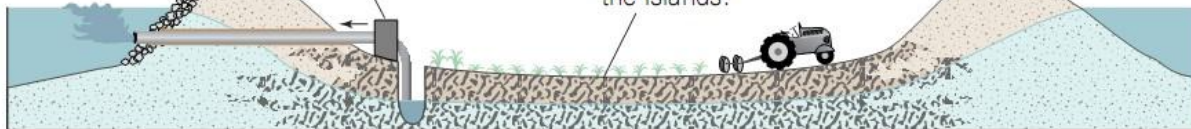
## POSTDEVELOPMENT

Riparian vegetation was cleared and levees were built to create farmland.

Semicontinuous pumps remove agricultural drainage to maintain a low water table.

Saucer-shaped profile reflects greatest thickness and subsidence of peat soils near the center of the islands.

Levees must be periodically raised and reinforced to support increasing stresses from stream channels.



Not to scale



(California Department of Water Resources)





Monday

»Next Story»

News

Local News

Opinion

Personal Tech

Sports

Currents Monday

Front Page (PDF)

The Last Week

Sunday

Monday

Tuesday

Wednesday

Thursday

Friday

Saturday

Weekly Sections

Books UT-Books

Family

Food

Health

Home

Homescape

Insight

InStyle

Night & Day

Sunday Arts

Travel

Quest

Wheels

Subscribe to the UT

The San Diego  
Union-Tribune.

## The San Diego Union-Tribune.

SAVE THIS EMAIL THIS PRINT THIS MOST POPULAR

# Thirsty state could lose key supply of water

## Ruling may complicate north-south transfers

By Michael Gardner

COPLEY NEWS SERVICE

September 17, 2007

SACRAMENTO – For years, environmentalists have promoted water transfers as a cost-effective, fish-friendly alternative to new dams.

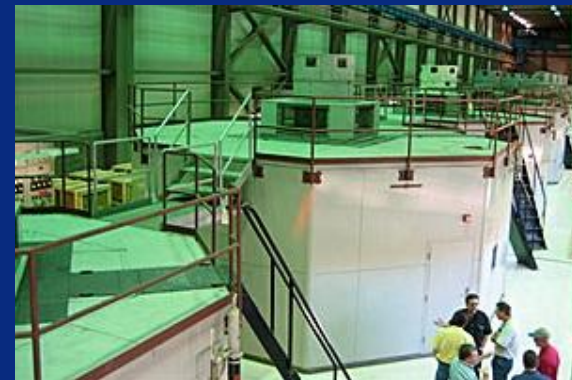
But a federal judge's decision to protect a tiny, endangered fish in the Sacramento Delta could jeopardize north-to-south water sales when transfers may be crucial.

The last drought provides a lesson on the value of water transfers.

California was rescued from the 1987-92 dry spell by a then-relatively new water market. The transfers provided a combined 815,000 acre-feet – enough to meet the needs of 1.6 million households – in 1991 and 1992.

Now, Gov. Arnold Schwarzenegger and legislative leaders have agreed to call back lawmakers for a special session this fall that could produce a compromise on building reservoirs and reconfiguring the plumbing system for the delta. A plan could be placed on the Feb. 5 presidential primary ballot.

Advertisement



<http://www.kqed.org/quest/blog/2008/06/05/where-water-runs-uphill/>







# Economics of water in the Southwest

- Cost of Colorado River water to farmers in Imperial Valley, CA:  
~\$15/acre-foot (transport only)
- San Diego buys water from Imperial Valley:  
~\$330/acre-foot (*plus* transport costs)
- San Diego County Water authority price to member agencies:  
~\$910/acre-foot
- Cost of desalinated water: *no one knows*, but:  
~\$950-1100/acre-foot *after* \$250/acre-foot MWD subsidy (gone now??)  
Tampa Bay: \$1140/acre-foot
- Orange County recycled water:  
\$600/acre-foot

# Summary

- San Diego is critically dependent on imported water, 80% of our supply.
- Climate change will alter cycle of snowfall and melting in the Sierra Nevada (23% of our water).
- The Sacramento/San Joaquin Delta is a weak link in our supply chain (sea level rise, levee collapse, vulnerable to earthquakes).
- Colorado river water system built during one of the wettest periods in 1200 years!
- Climate change is likely to give a drier American Southwest, giving reduced water deliveries from the Colorado River (57% of our supply).