

Water in the West

David M. Kennedy

Donald J McLachlan Professor of History, Emeritus
Co-Director, The Bill Lane Center for the American West
Stanford University

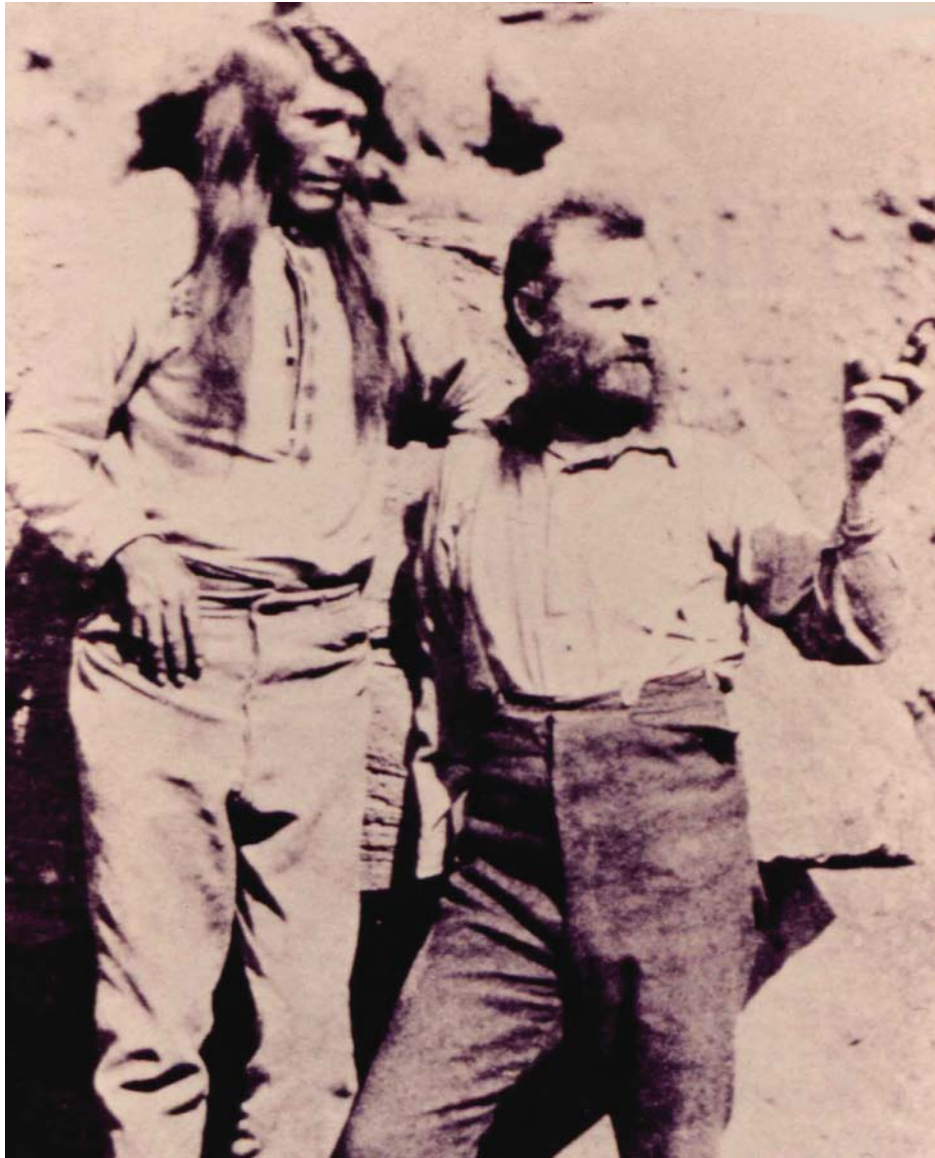


STANFORD UNIVERSITY

THE BILL LANE CENTER
FOR THE AMERICAN WEST

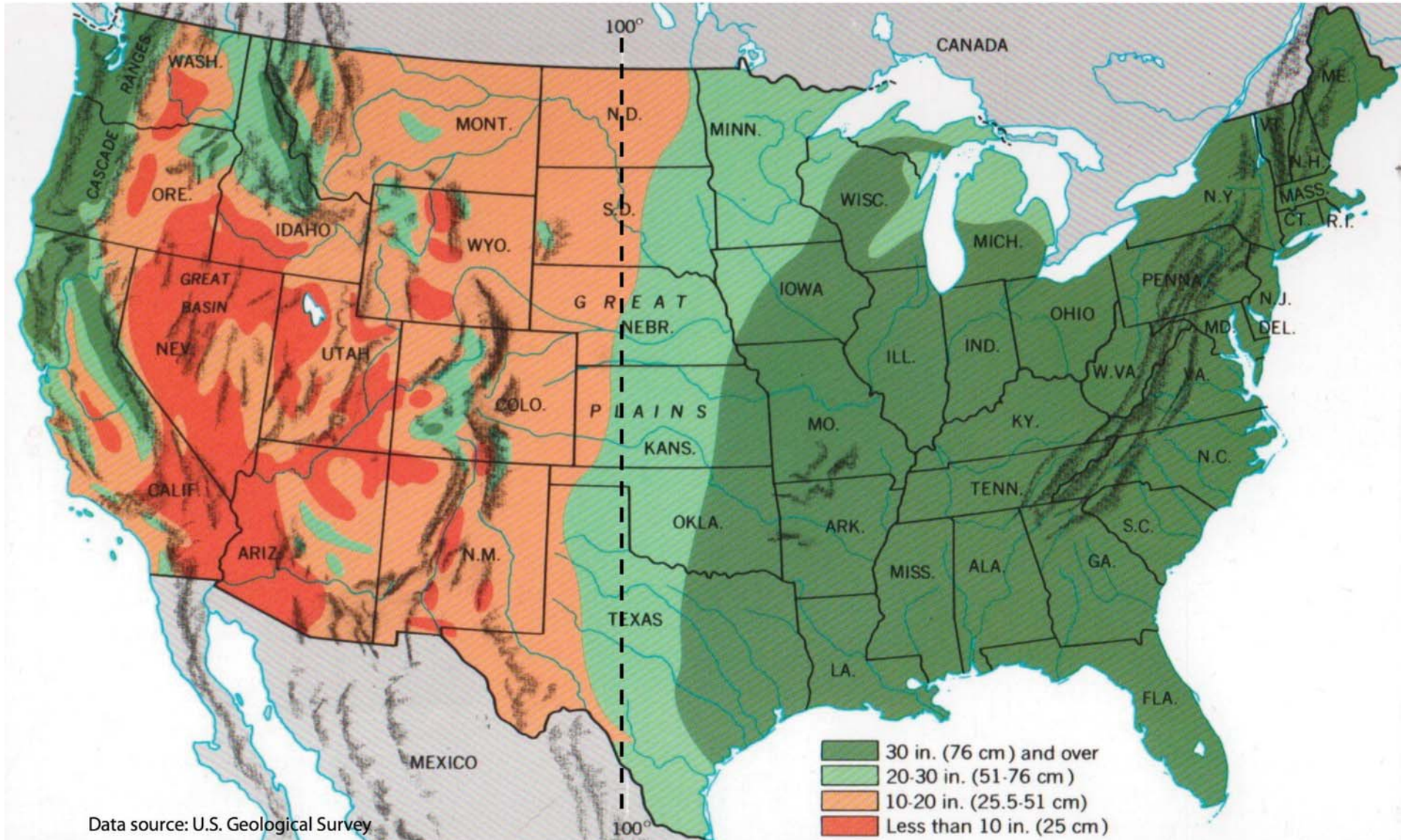






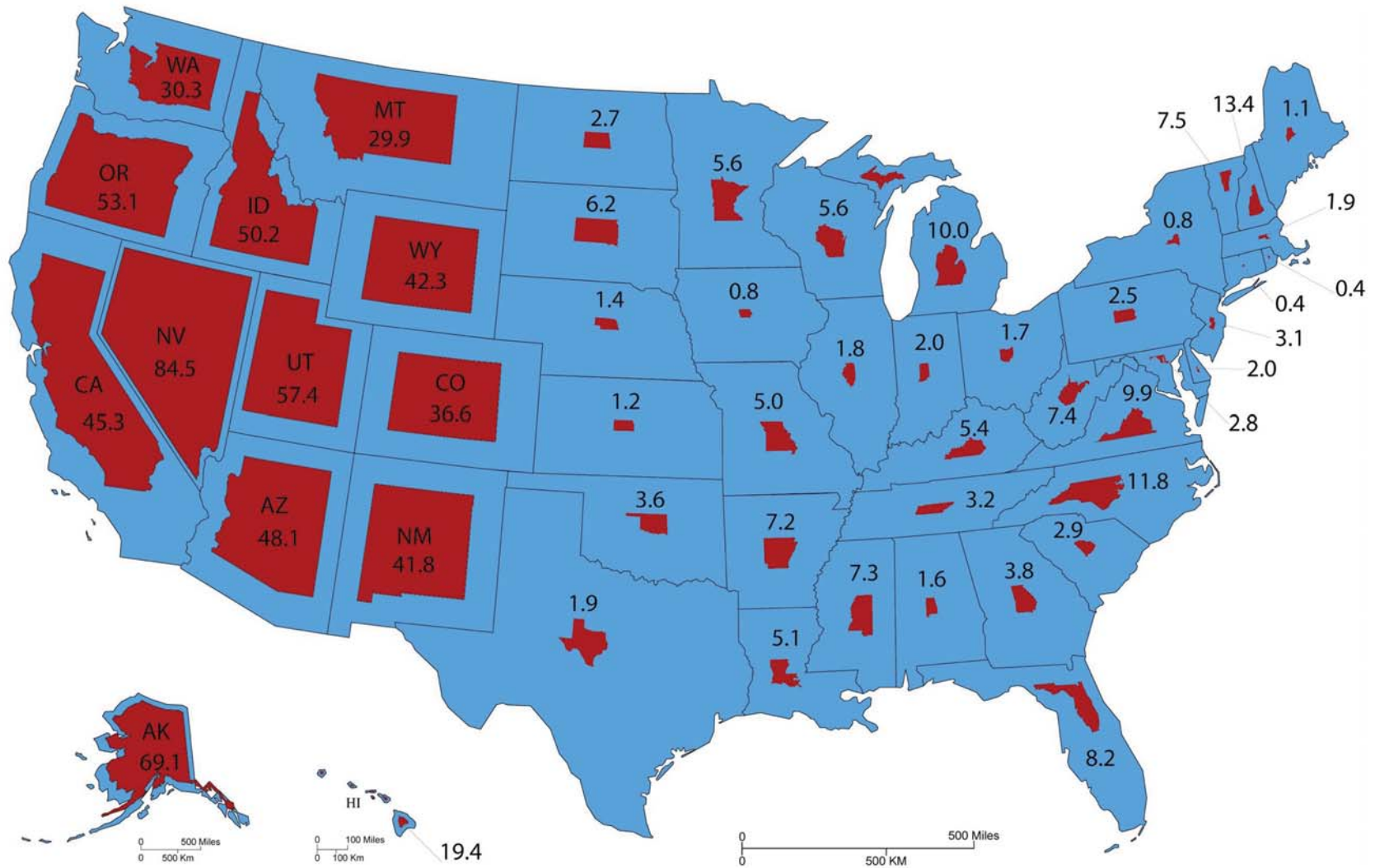
THE GREAT AMERICAN DESERT

Average Annual Precipitation in the Lower 48 States



WHO OWNS THE WEST?

Federal Land as a Percentage of Total State Land Area



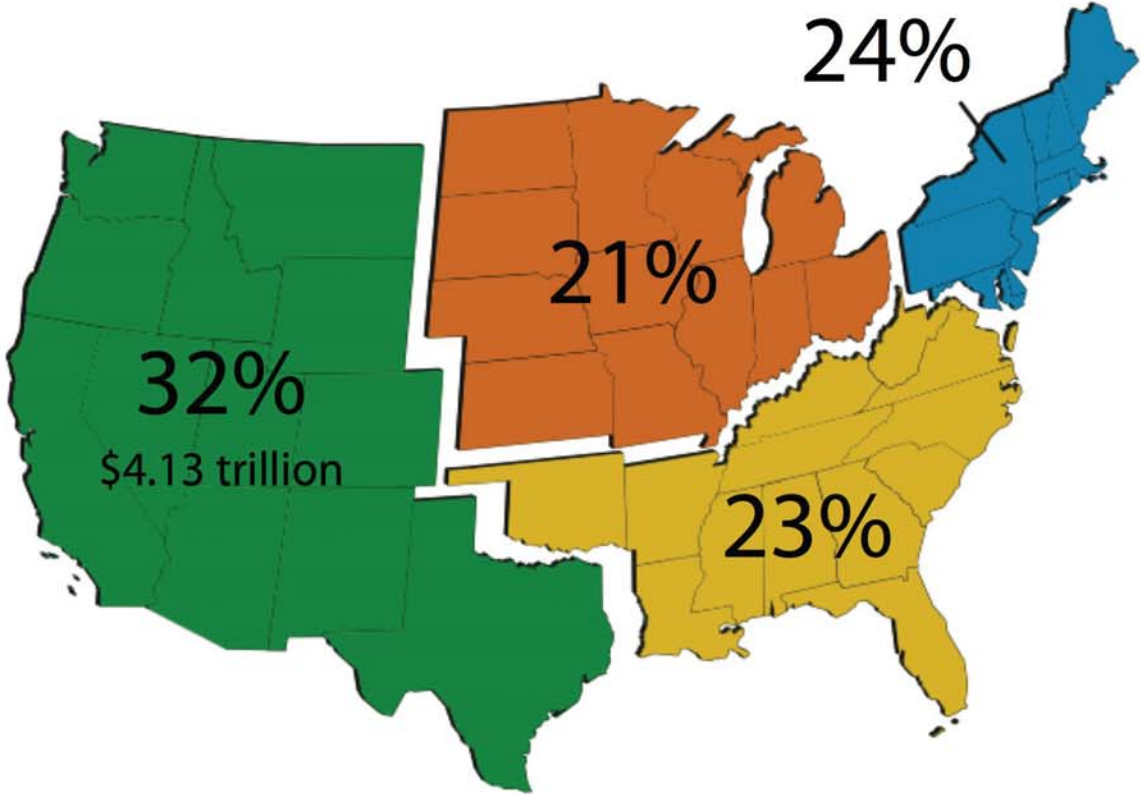
Data source: U.S. General Services Administration, *Federal Real Property Profile 2004*, excludes trust properties

WESTWARD MOVEMENT OF THE CENTER OF POPULATION, 1790-2000



Source: U.S. Census Bureau, Geography Division

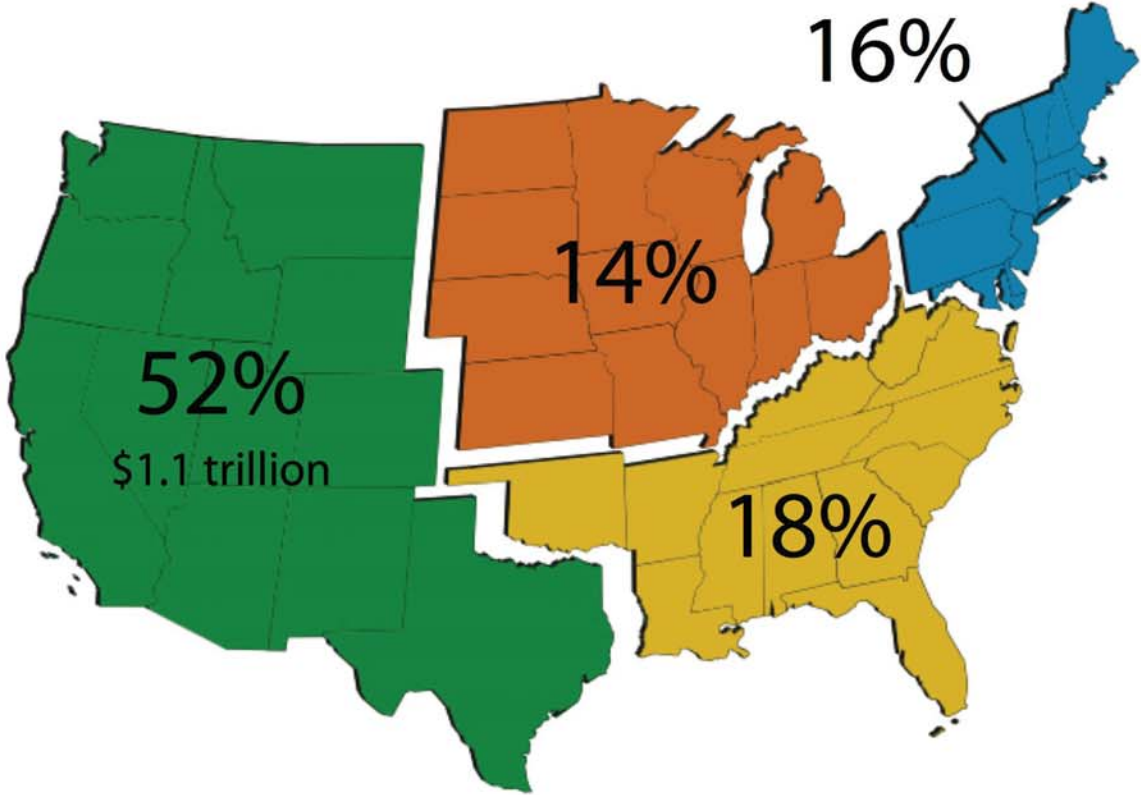
PERCENTAGE OF GDP BY REGION



Data source: U.S. Bureau of Economic Analysis, 2006 figures, \$4.13 trillion is 2006 Nominal GDP for Western region

PERCENTAGE OF U.S. EXPORTS TO ASIA BY REGION

Exports to Six Largest Asian Trading Partners (Japan, China, South Korea, Taiwan, Singapore, and Hong Kong)

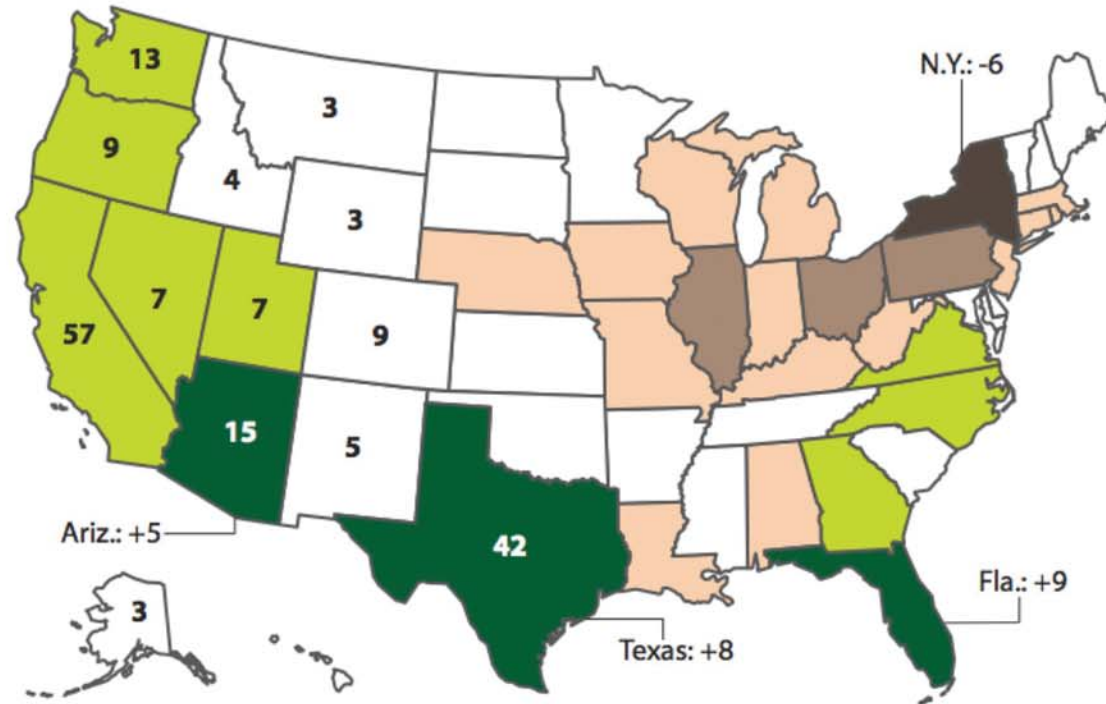
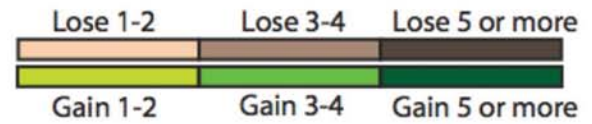


Data source: Foreign Trade Division, U.S. Census Bureau, 2006 figures

A Changing America

Projected change in size of congressional delegations and number of electoral votes, from current numbers, following the 2030 census

Change in Congressional Seats



Impact on the Electoral Vote

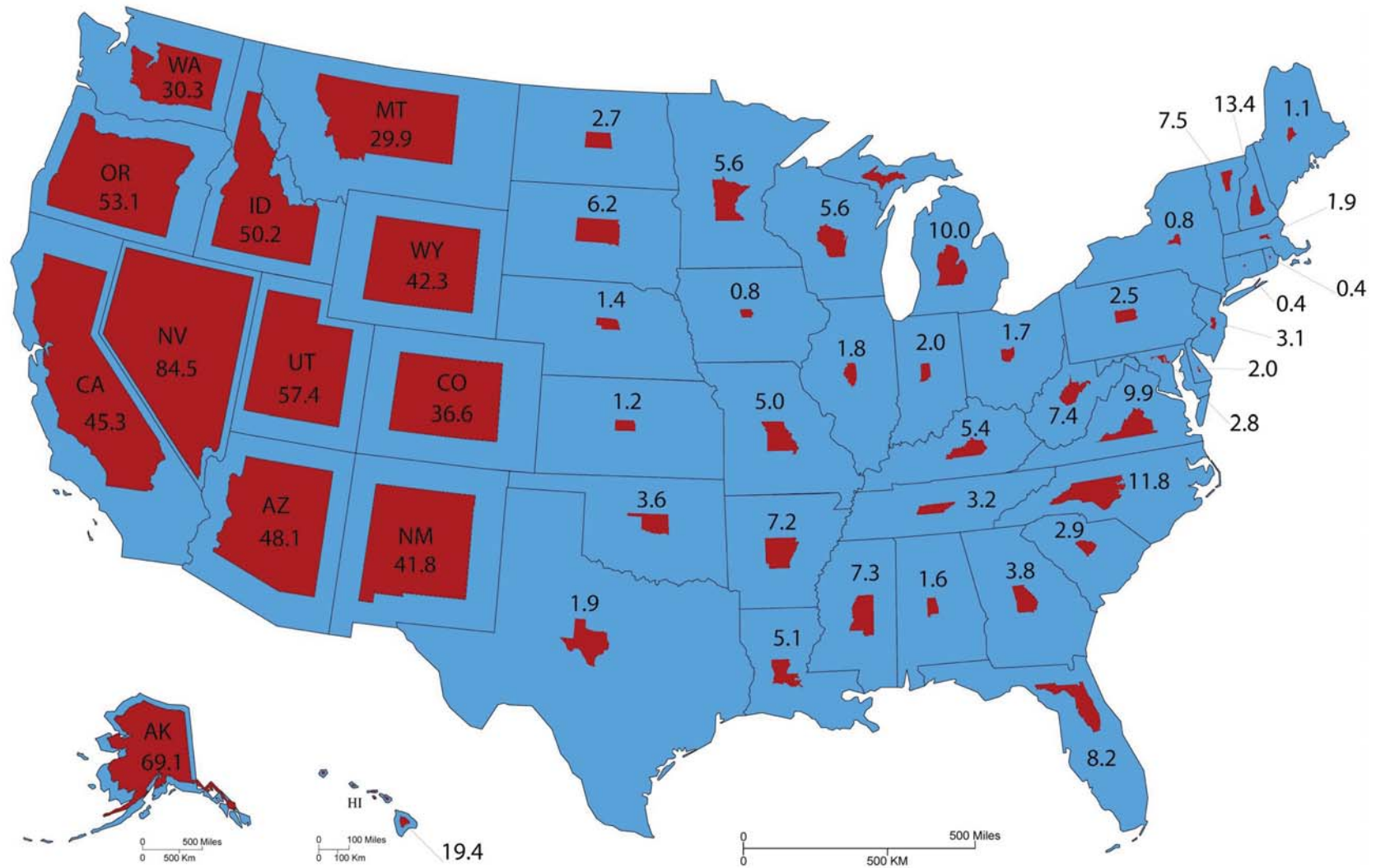
Current and projected number of electoral votes of continental western states

	2004	2030
Western States	154	177
All Others & D.C.	384	361



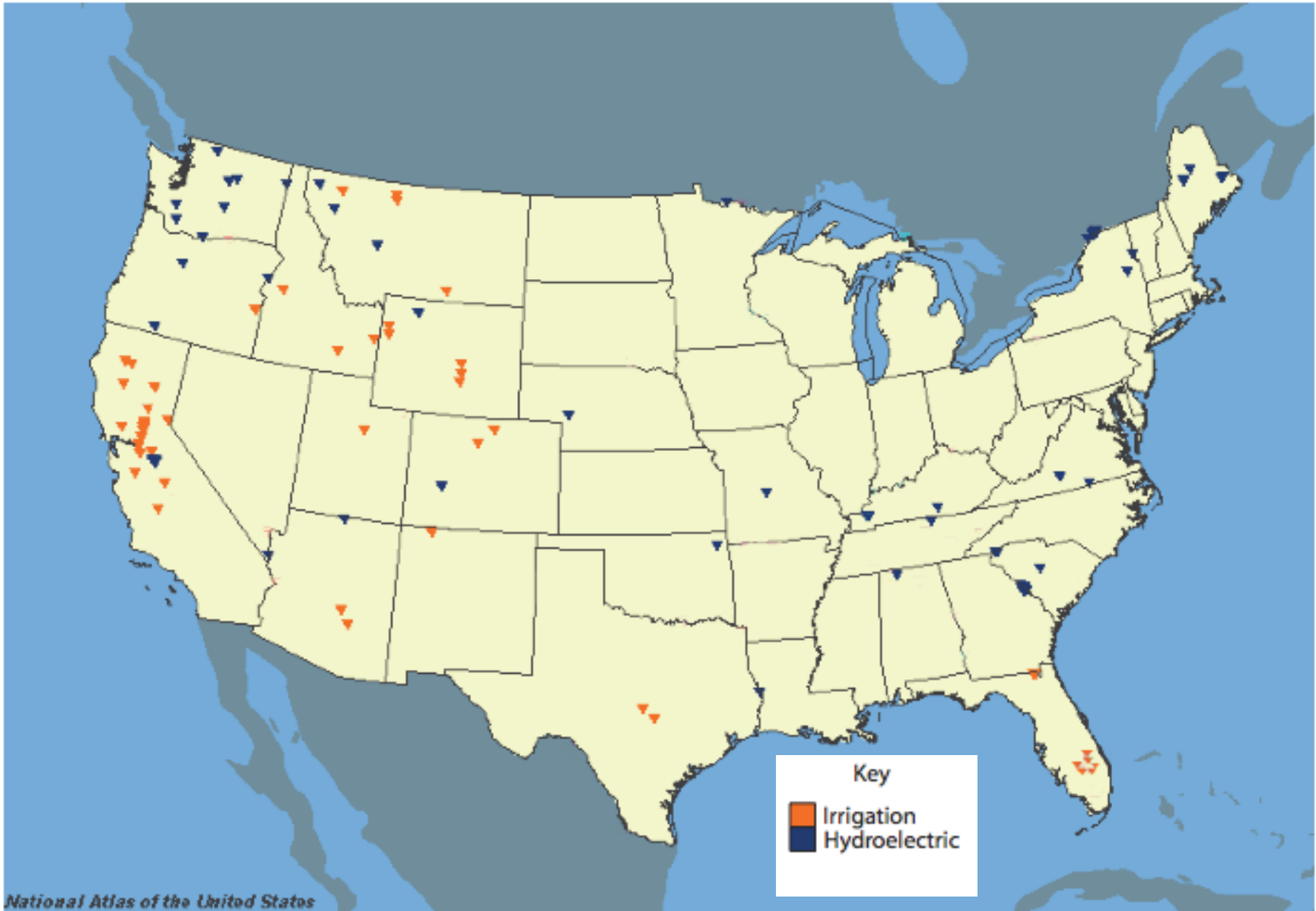
WHO OWNS THE WEST?

Federal Land as a Percentage of Total State Land Area

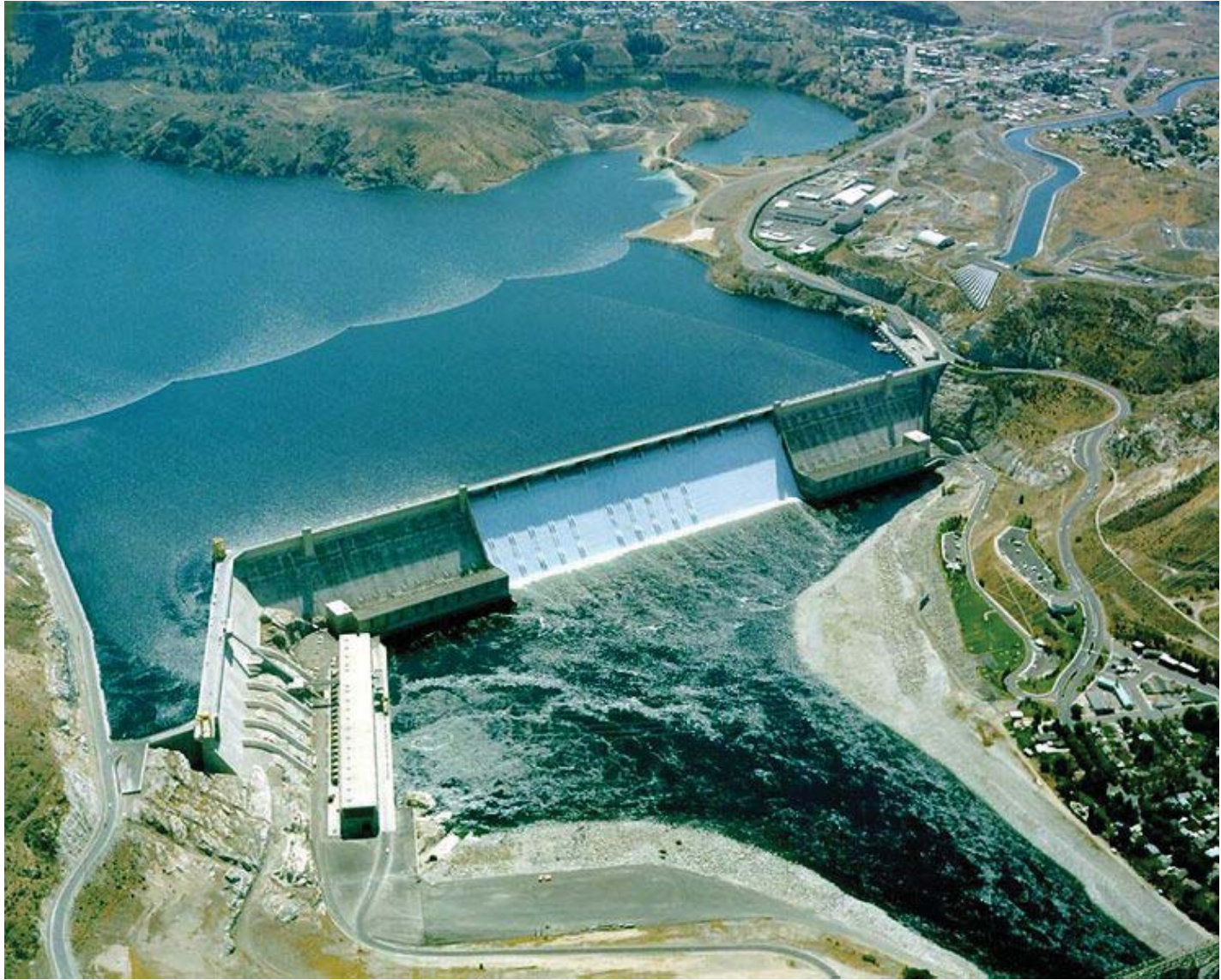


Data source: U.S. General Services Administration, *Federal Real Property Profile 2004*, excludes trust properties

Dams By Primary Purpose



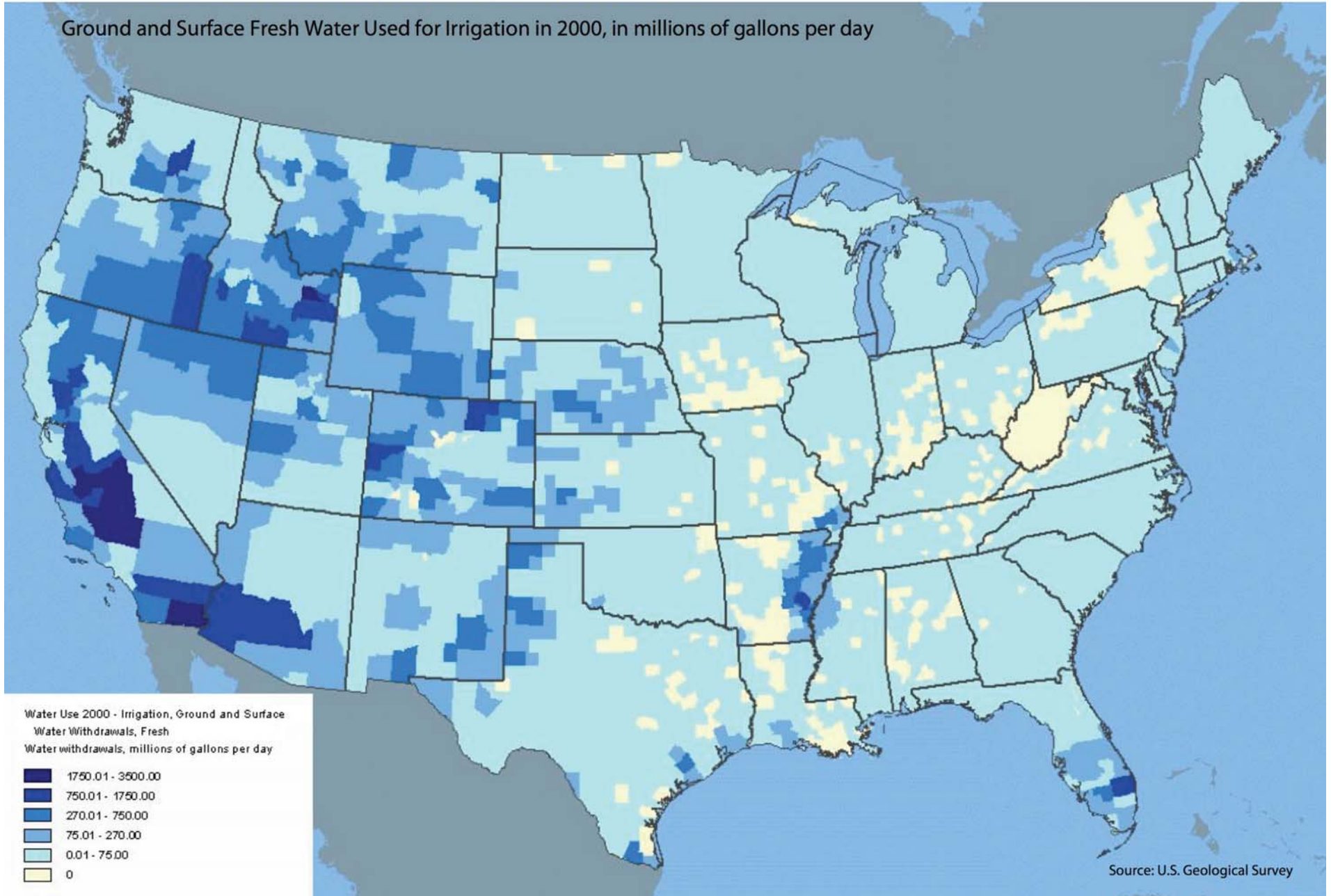
Source: nationalatlas.gov





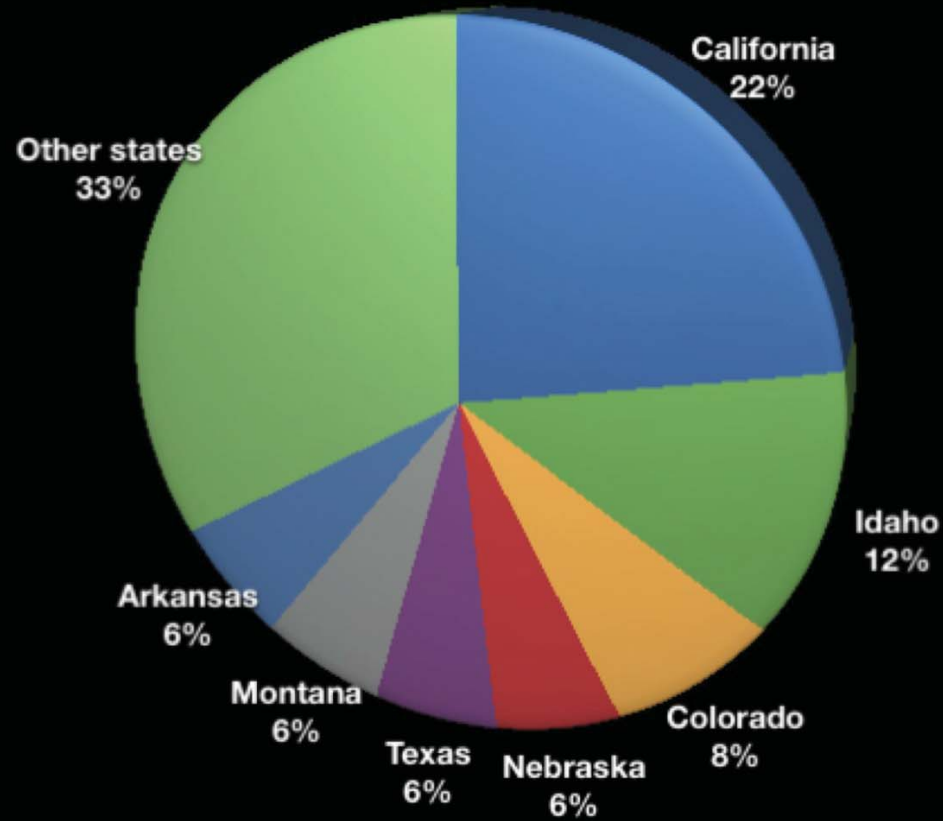
THE IRRIGATED WEST

Ground and Surface Fresh Water Used for Irrigation in 2000, in millions of gallons per day



THE IRRIGATED WEST

Irrigation Water Withdrawals, by State, 2000





Land Subsidence

A USGS scientist shows subsidence from 1925 to 1977 10 miles southwest of Mendota, CA. Sign reads "San Joaquin Valley California, BM S661, Subsidence 9M, 1925-1977"

From USGS Professional Paper 1401-A, "Ground water in the Central Valley, California- A summary report"

Photo by Dick Ireland, USGS, 1977

http://www.uwsp.edu/geo/faculty/ritter/geog101/textbook/hydrosphere/subsurface_water_groundwater.html



SHEPARD GLACIER GLACIER NATIONAL PARK



Photo by W.C. Alden, USGS

1913



Photo by B. Reardon, USGS

2005

RELATIVE TREND IN APRIL 1ST SNOW WATER EQUIVALENT, 1950-2000

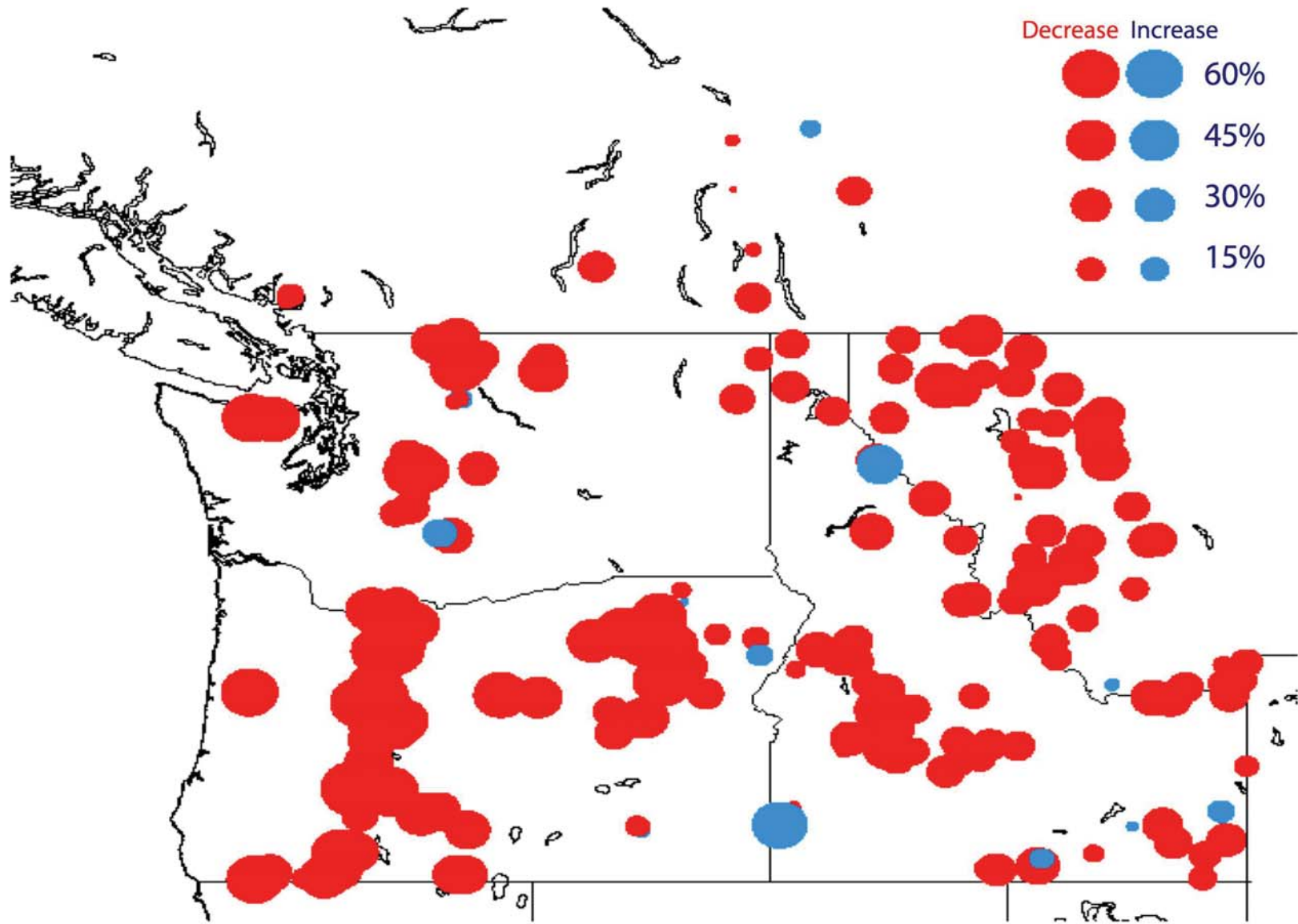


Image Courtesy of Steven W. Running, University of Montana, based on results from P.W. Mote. "Trends in Snow Water Equivalent in the Pacific Northwest and Their Climatic Causes," *Geophysical Research Letters*. (2003).

TRENDS IN TIMING OF SPRING SNOWMELT, 1948-2000

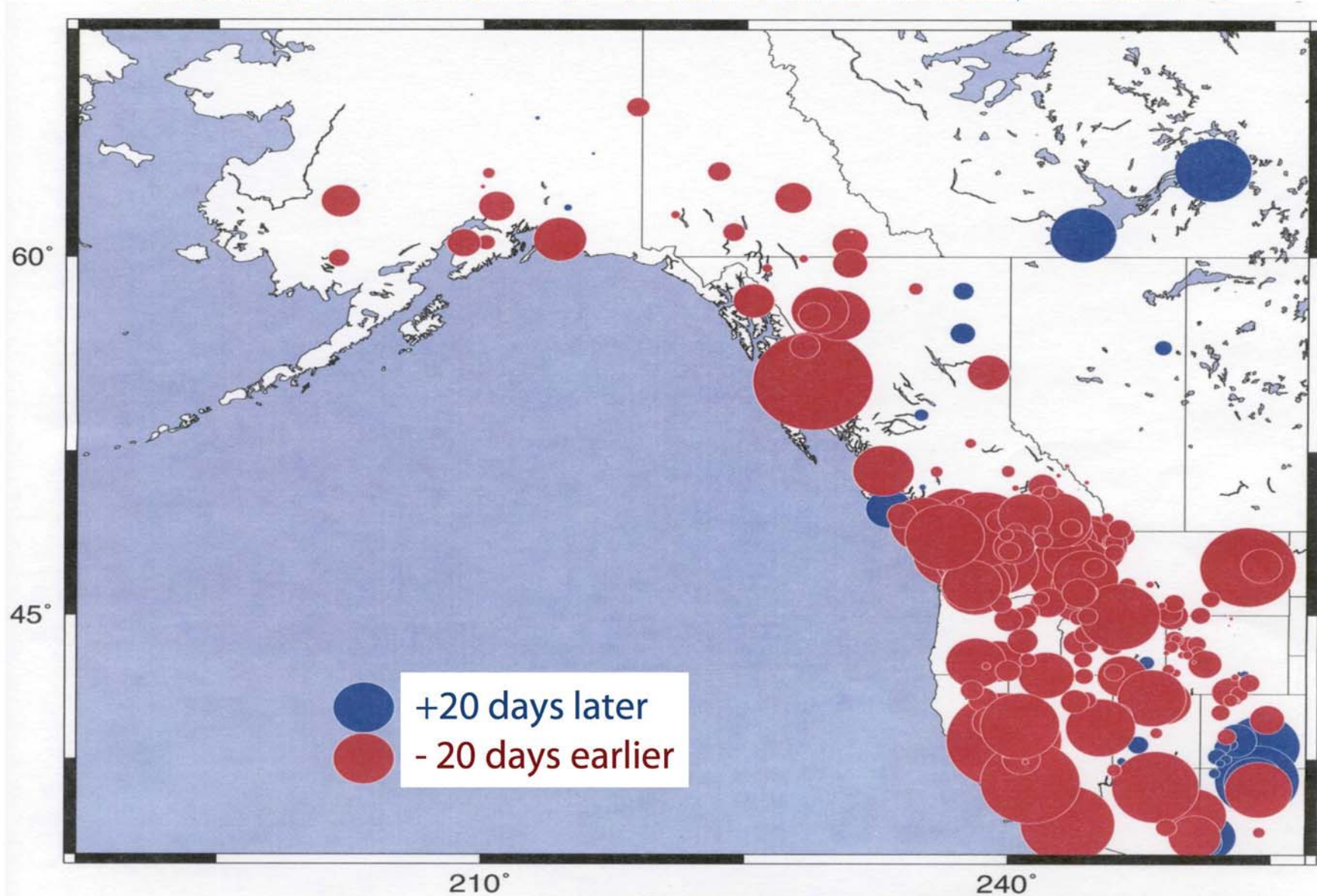
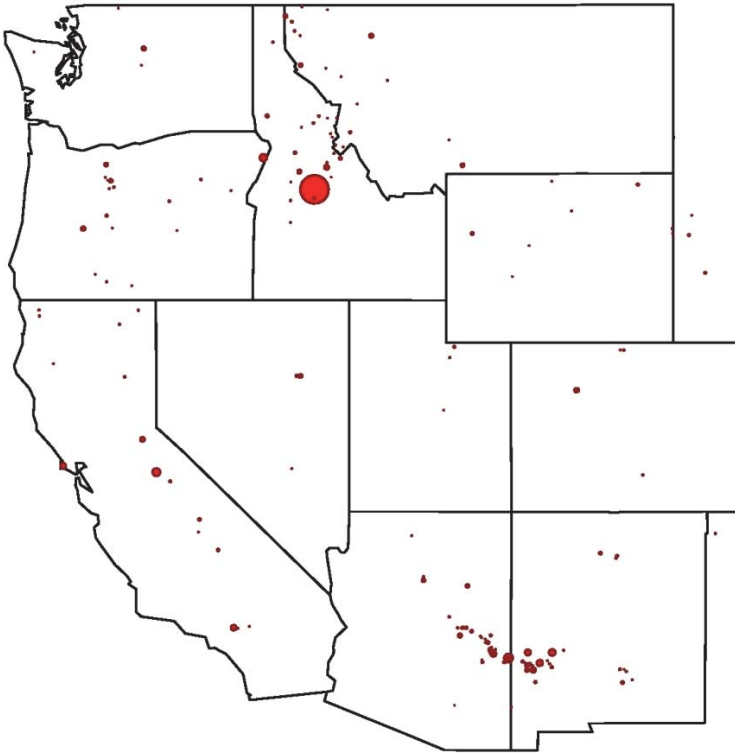


Image Courtesy of Dan Cayan, Mike Dettinger, Iris Stewart, based on results published in the *Bulletin of the American Meteorological Society* (2001).

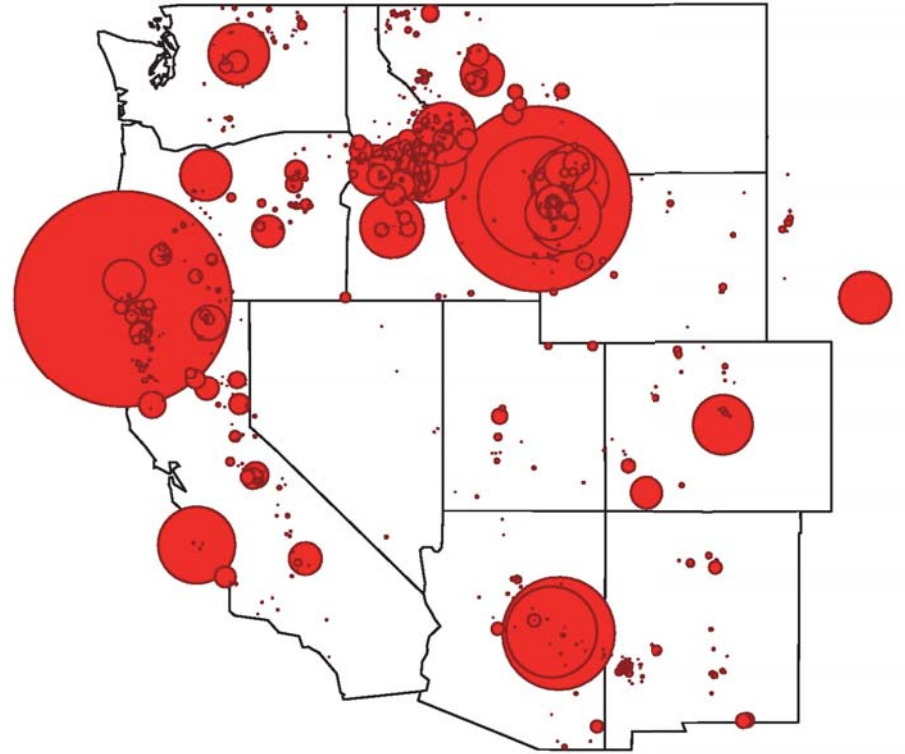
Extreme Events: Wildfires

Fewer, smaller fires



Late Snowmelt Years

More, larger fires



Early Snowmelt Years

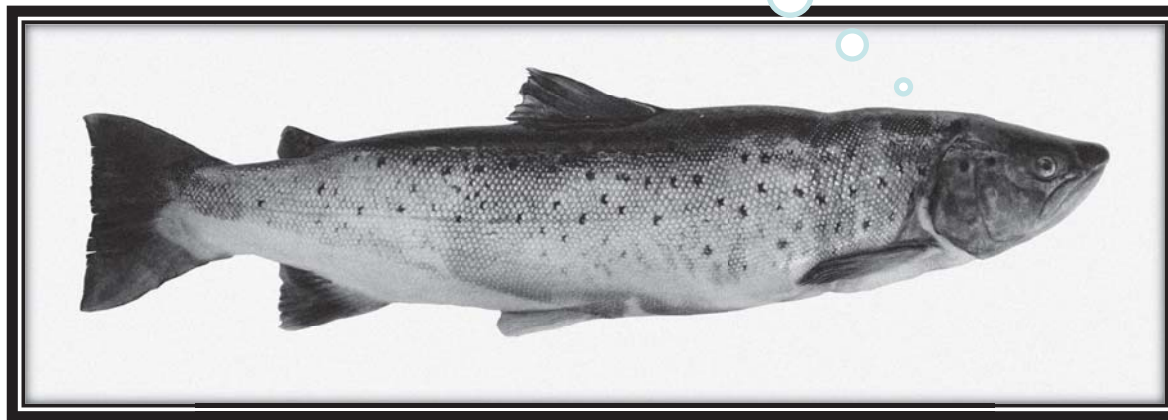








David: thank you for
saving our water!



Predicted water scarcity and stress in 2025



The Big Questions

- **#1: Availability**

- How will we secure adequate supplies of high quality freshwater for the West, a region which is simultaneously experiencing greater demands for water and increasing uncertainty about the volume of its freshwater supply?

- **#2: Allocation**

- Considering the competing demands for freshwater between growing residential populations, agricultural users, recreational users, species, and the ecosystem, how do we design water management policies that are both grounded on the best scientific evidence *and politically feasible*?