



WESTERN RESOURCE
ADVOCATES

***Water Use at
Fossil Fuel Power Plants
in the Arid West***



Overview

- *The Last Straw* (2003) and *Balanced Energy Plan* (2004)
- Background on water use at fossil fuel power plants
- Issues and trends

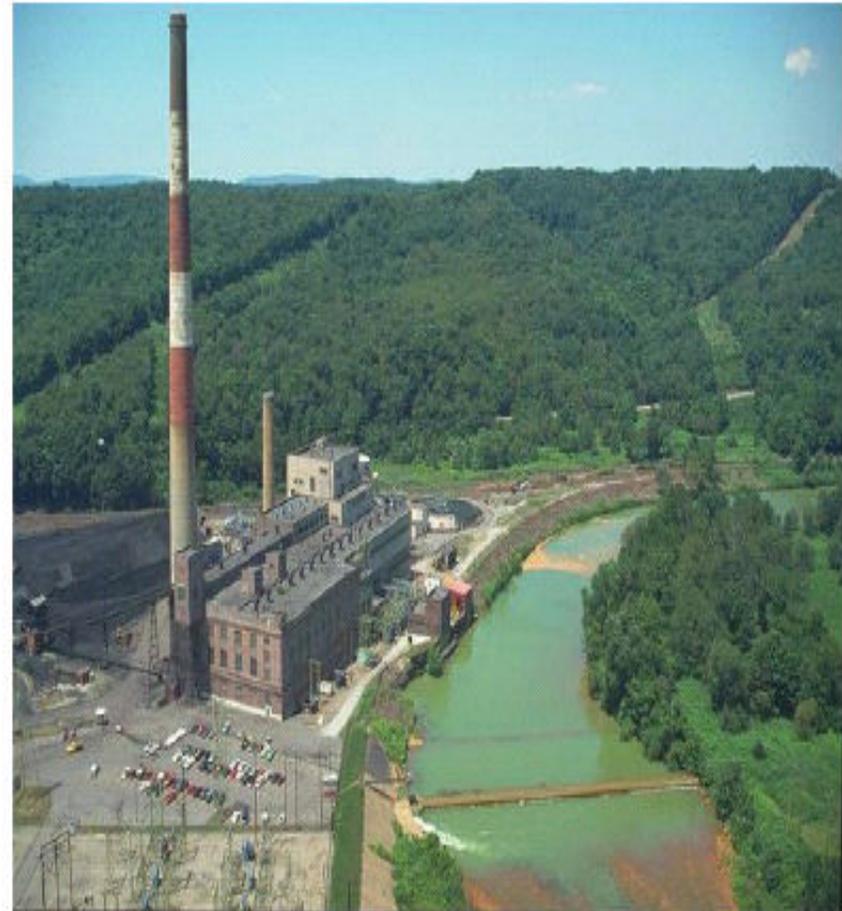
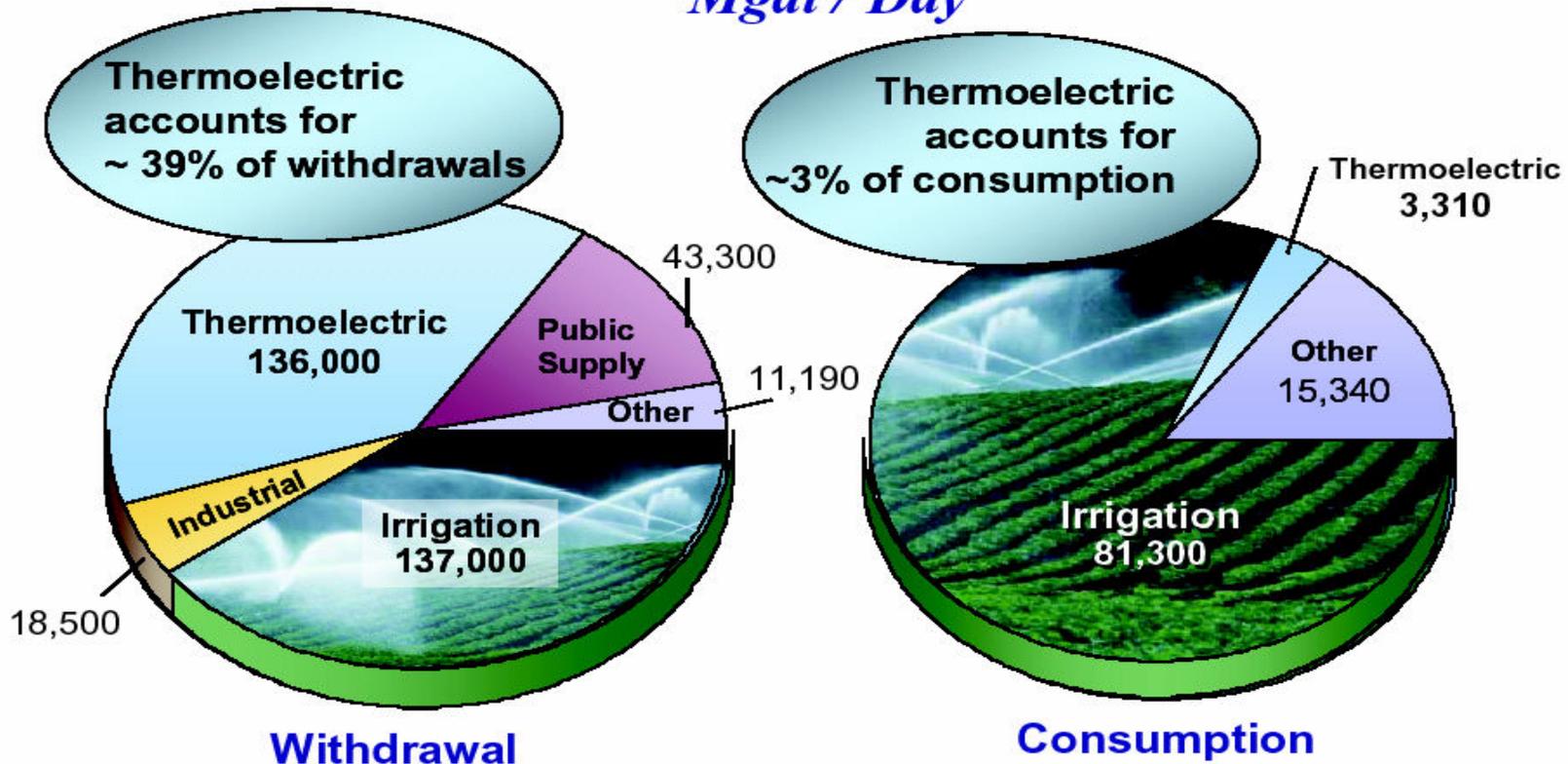


Photo: NETL



Freshwater Withdrawals and Consumption

Mgal / Day



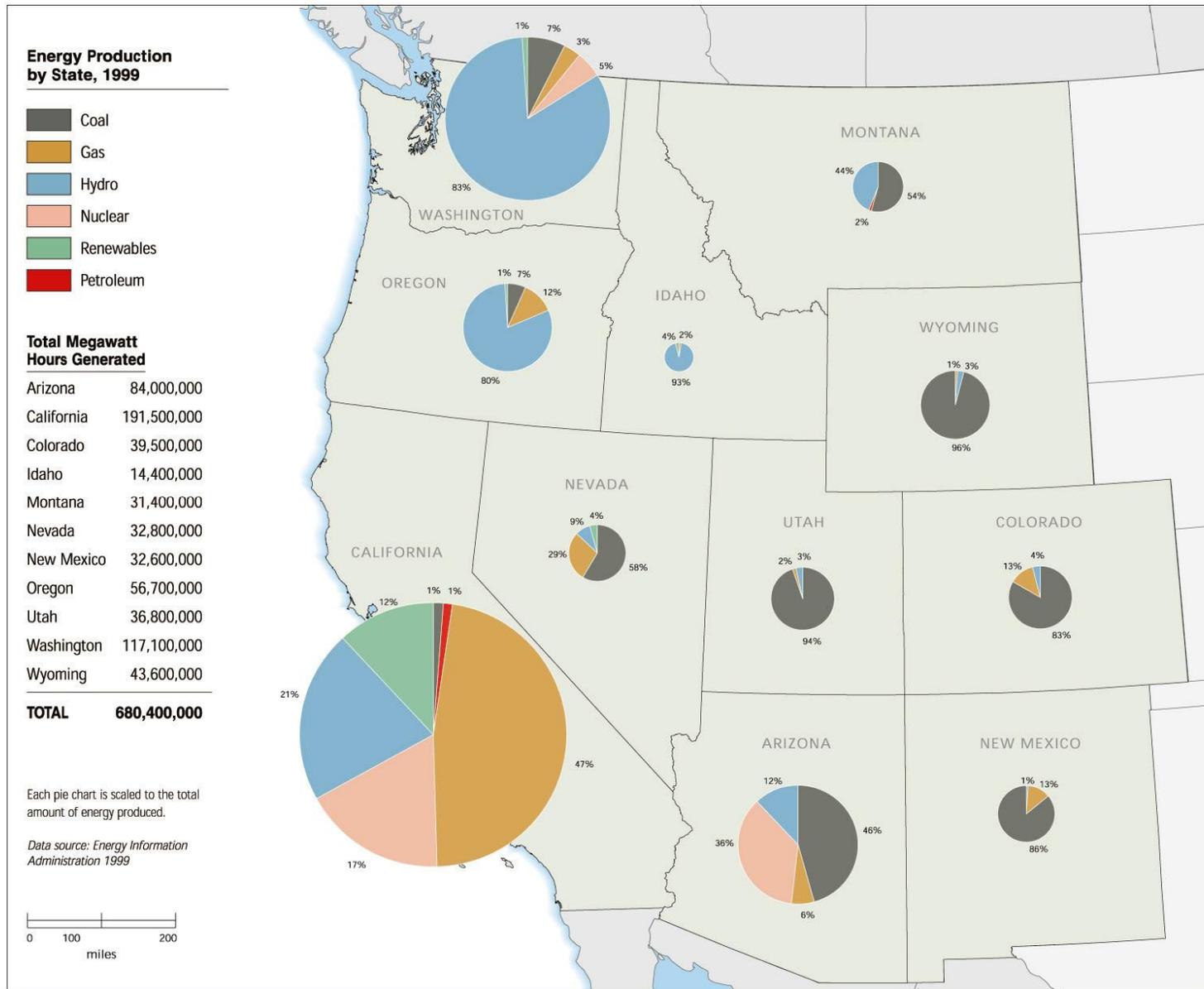
Ref.: "Estimated Use of Water in the United States in 1995," USGS Circular 1200, 1998
 "Estimated Use of Water in the United States in 2000," USGS Circular 1268, March 2004

EPRI Environmental Sector Boston 2004

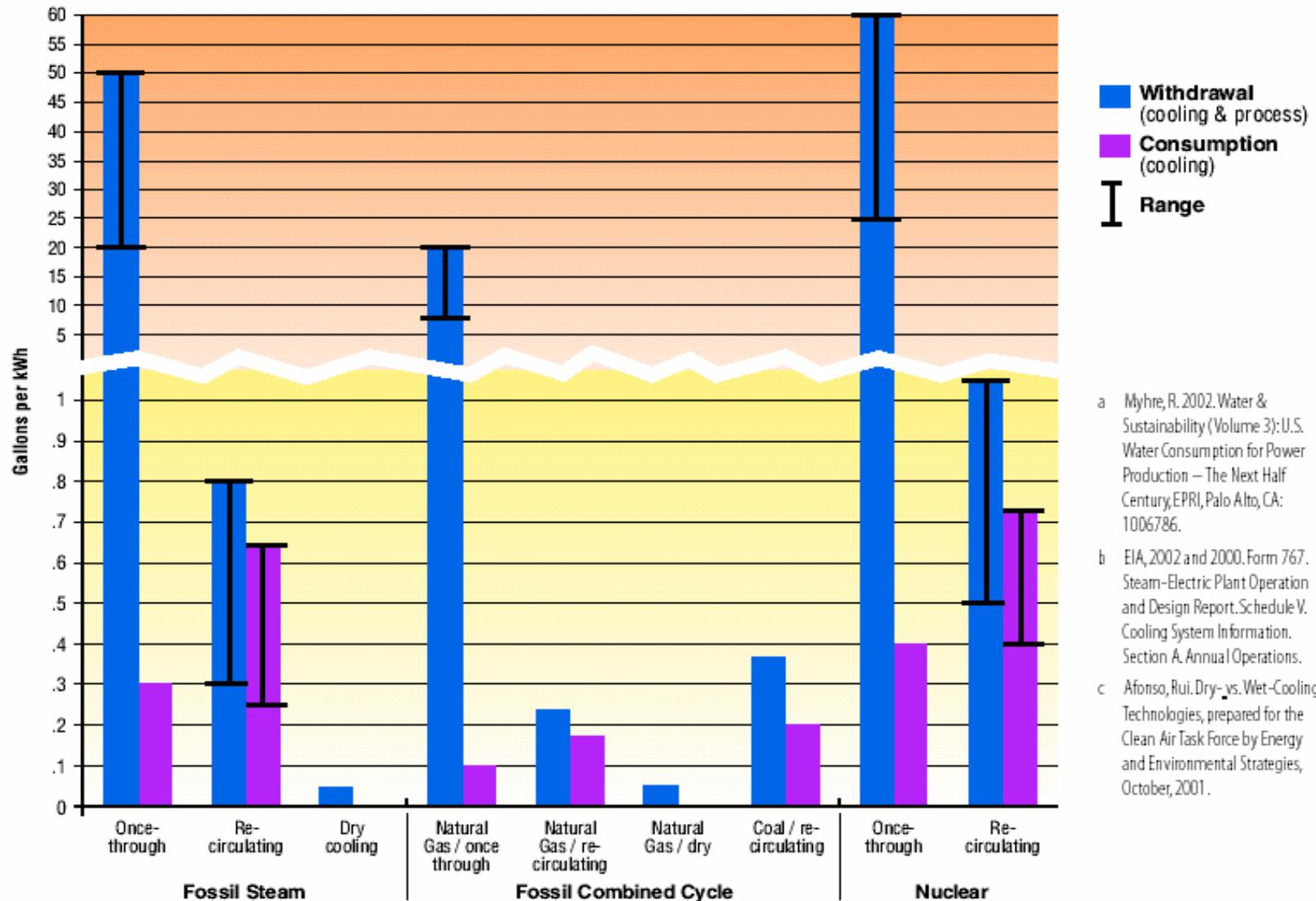


Thomas Feeley, III, "Responding to Emerging Power Plant-Water Issues – DOE/NETL's R&D Program"

Electricity Generation



Cooling Water Withdrawal and Consumption, by fuel and technology in gal/kWh^{a, b, c}



- a Myhre, R. 2002. Water & Sustainability (Volume 3): U.S. Water Consumption for Power Production – The Next Half Century, EPRI, Palo Alto, CA: 1006786.
- b EIA, 2002 and 2000. Form 767. Steam-Electric Plant Operation and Design Report. Schedule V. Cooling System Information. Section A. Annual Operations.
- c Afonso, Rui. Dry- vs. Wet-Cooling Technologies, prepared for the Clean Air Task Force by Energy and Environmental Strategies, October, 2001.



Interior West

Withdrawals of water at
power plants in the
region in 2000

= 650 million gallons/day

= 728,000 acre-feet/year

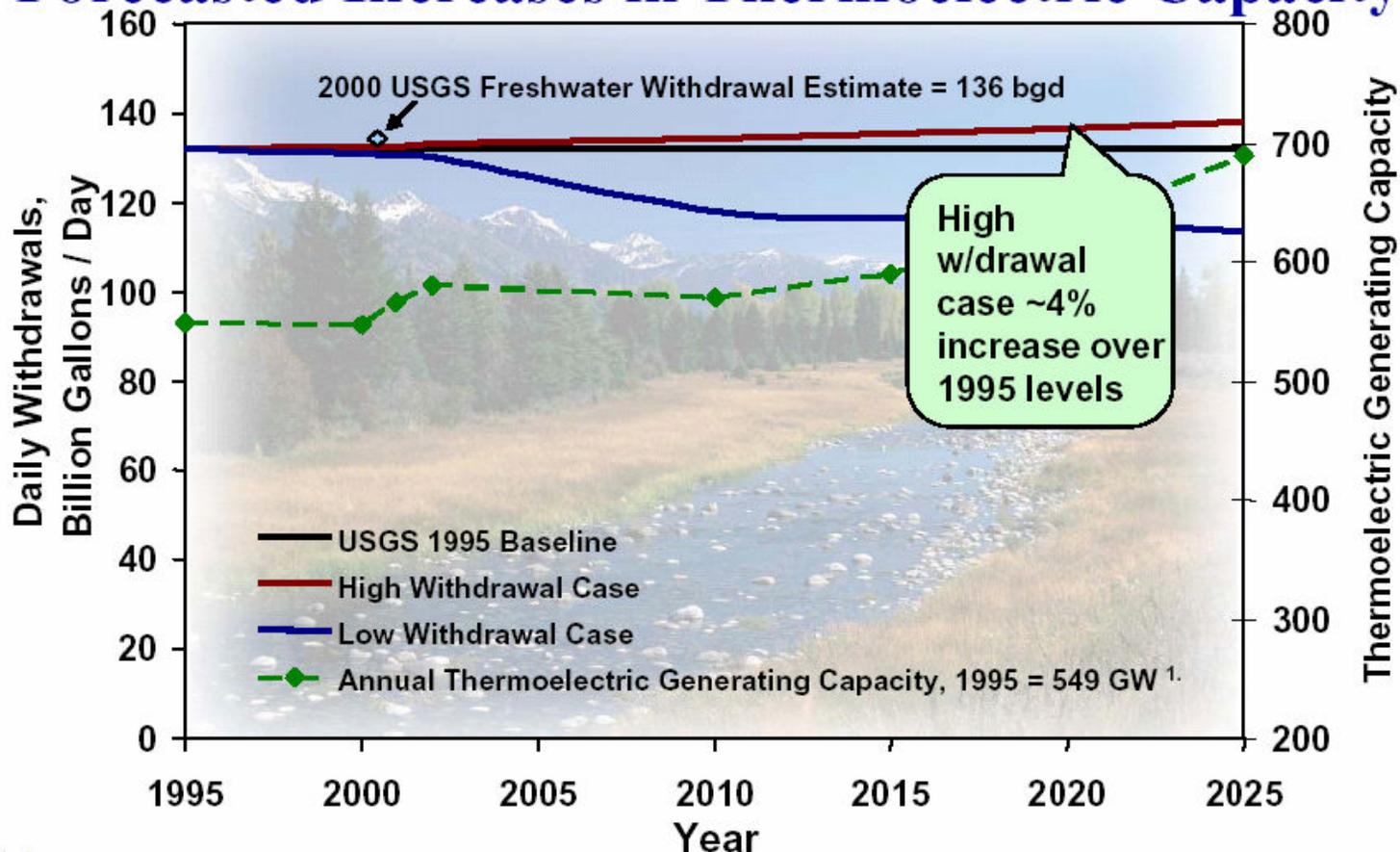
How much is that?

Equal to annual water
usage of 3.64 million
people



Photo: Jenny Hager

Daily Freshwater Withdrawals Needed to Meet Forecasted Increases in Thermoelectric Capacity



Ref. DOE/NETL, "Estimating Freshwater Needs to Meet 2025 Electricity Generating Capacity Forecasts," June 2004.

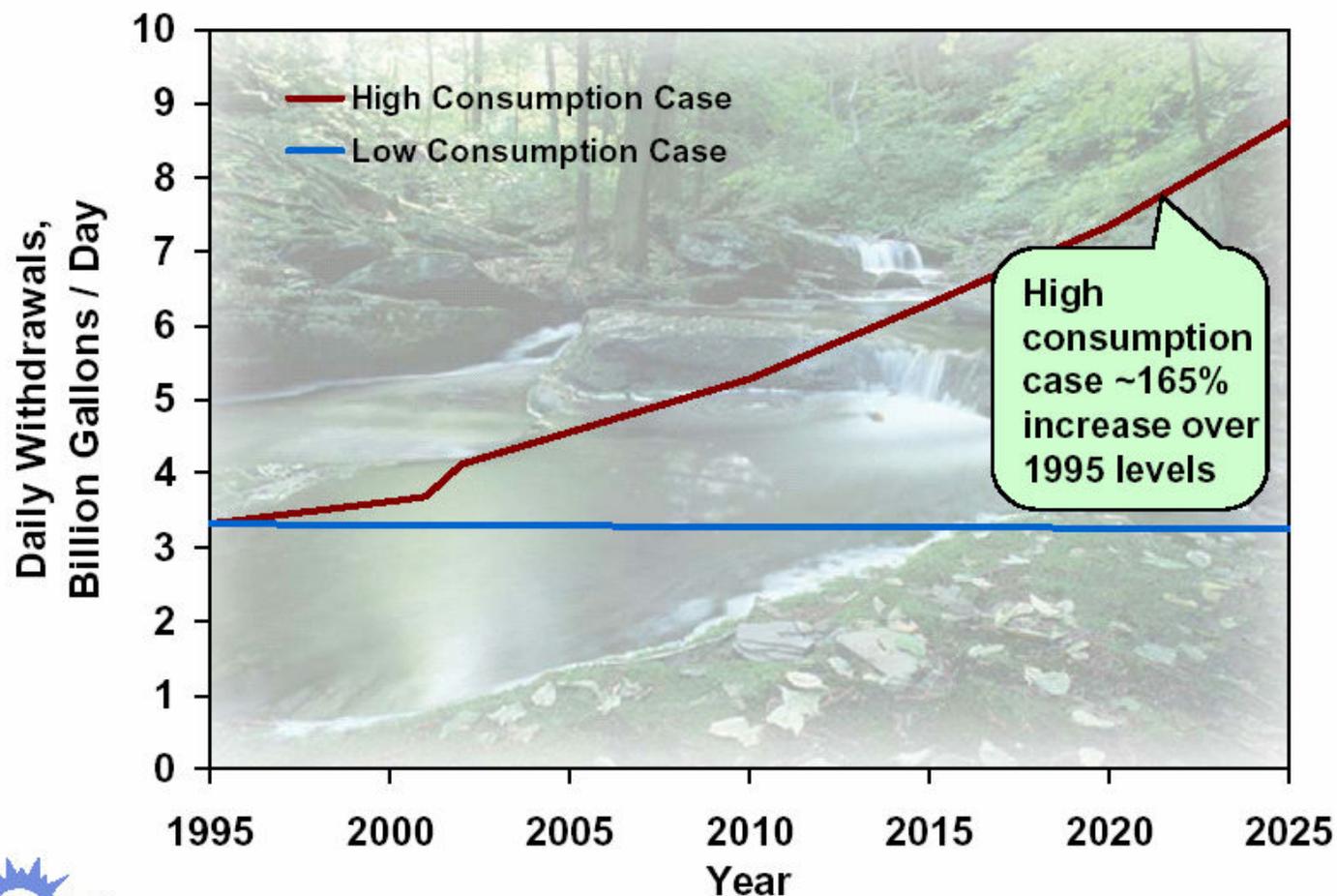


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Source: Thomas Feeley, III, "Responding to Emerging Power Plant-Water Issues – DOE/NETL's R&D Program"

Projected Average Daily Water Consumption by Thermoelectric Power Generation

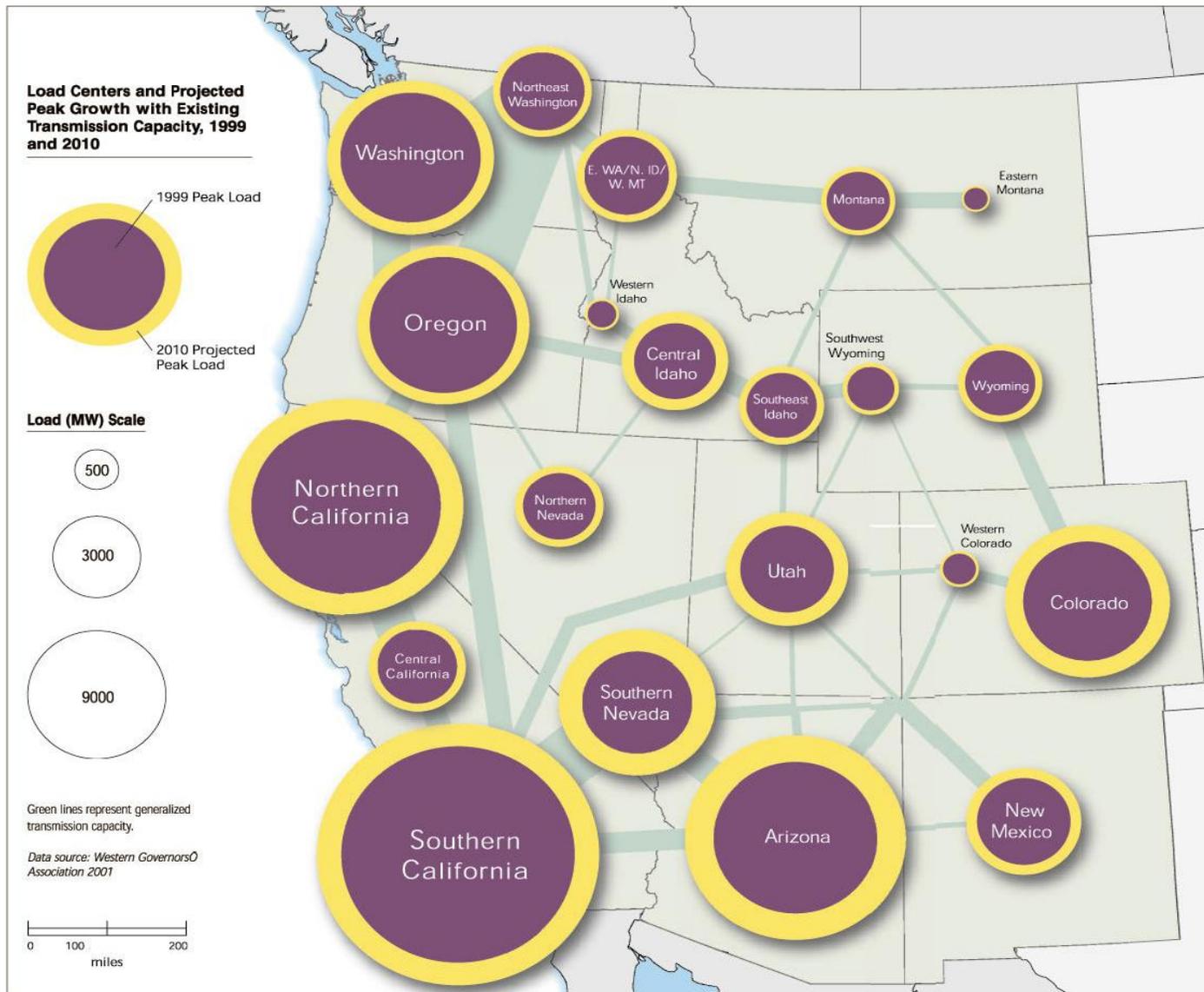


EPR Environmental Sector Boston 2004



Source: Thomas Feeley, III, "Responding to Emerging Power Plant-Water Issues – DOE/NETL's R&D Program"

Load Growth



Interior West

39,000 MW of new
generation proposed

Additional 270 million
gallons/day (~40%
increase)

or annual water needs
of 1.4 million people
(~population of
Albuquerque)



Photo: Jenny Hager



Issues and Trends

- Water quality concerns
- Drought
- Growth in demand
- Permitting conflicts



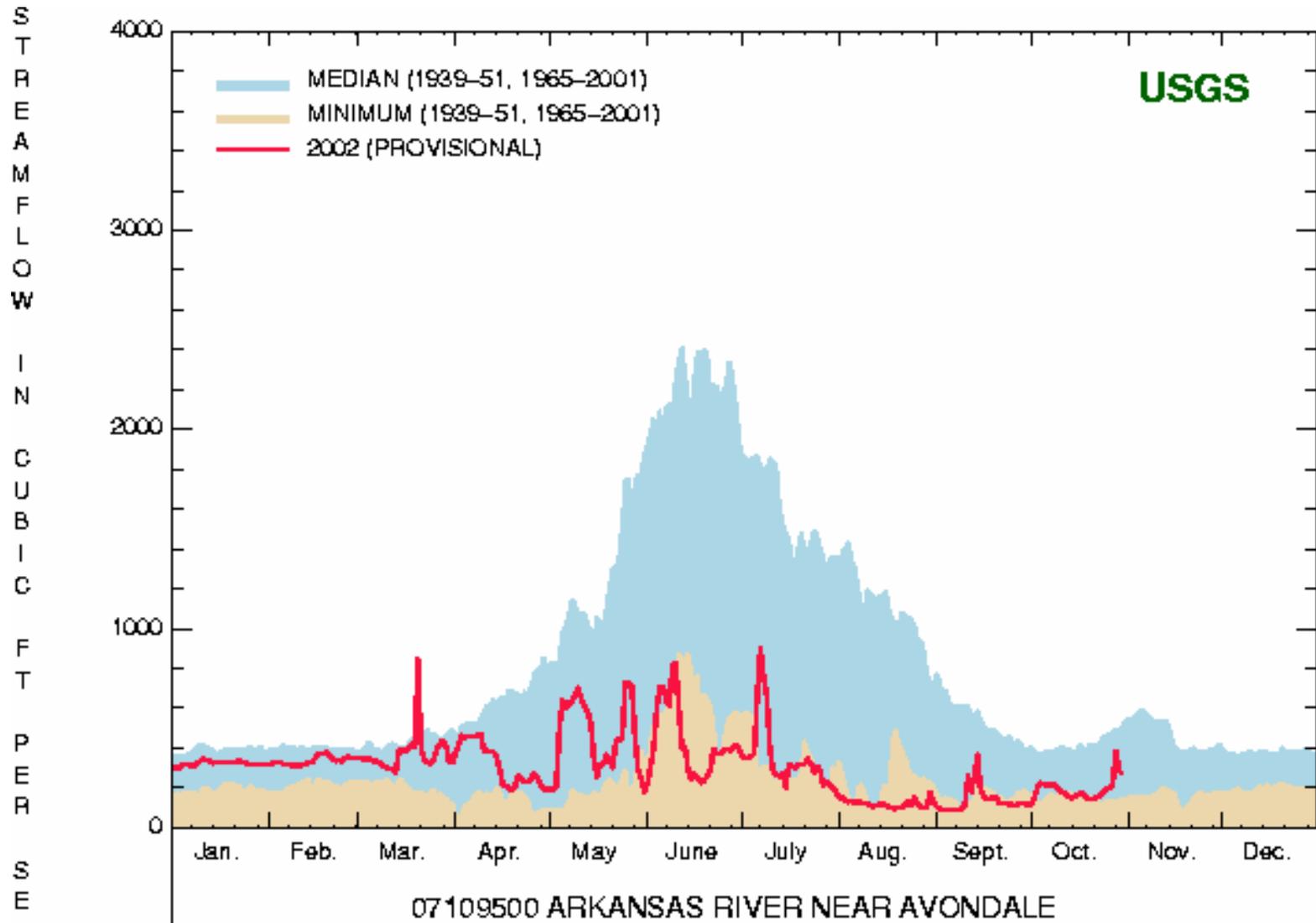
Water Quality

Once-through systems with large temperature changes in source water include---

- JE Corette (MT, Yellowstone river)
 - 68 degrees (winter)
 - 39 degrees (summer)
- Dave Johnston (WY, North Platte river)
 - 28 degrees (winter)
- Zuni (CO, S. Platte river)
 - 25 degrees (winter)



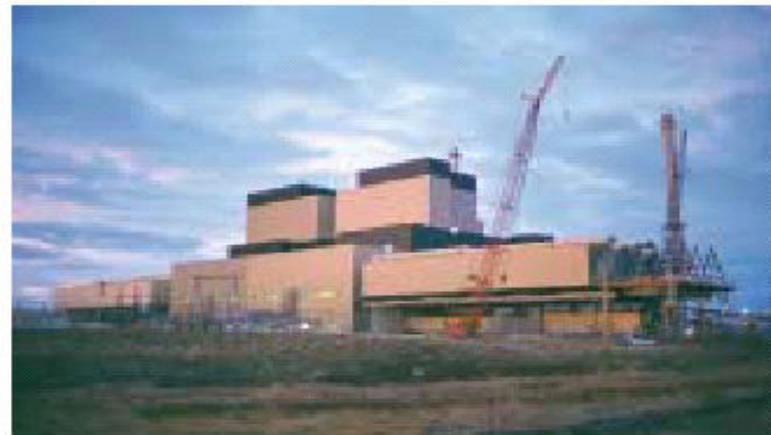
Drought



Drought

- Water scarcity (especially in the West)
- Uncertainty over length of drought
- Is it really a drought or is this “normal”?
- Competition for water – municipalities will pay top dollar

Result: Re-evaluation of levels of water use



BLACK HILLS CORPORATION,
GILLETTE, WYOMING



Population Growth in the Southwest

Top 12 States by Percent Population Growth, 1990-2000

		2000 Population	1990 Population	Growth 1990-2000	Percent Growth 1990-2000
1	Nevada	1,998,257	1,201,833	796,424	66.3
2	Arizona	5,130,632	3,665,228	1,465,404	40.0
3	Colorado	4,301,261	3,294,394	1,006,867	30.6
4	Utah	2,233,169	1,722,850	510,319	29.6
5	Idaho	1,293,953	1,006,749	287,204	28.5
6	Georgia	8,186,453	6,478,216	1,708,237	26.4
7	Florida	15,982,378	12,937,926	3,044,452	23.5
8	Texas	20,851,820	16,986,510	3,865,310	22.8
9	North Carolina	8,049,313	6,628,637	1,420,676	21.4
10	Washington	5,894,121	4,866,692	1,027,429	21.1
11	Oregon	3,421,399	2,842,321	579,078	20.4
12	New Mexico	1,819,046	1,515,069	303,977	20.1

Source: U.S. Census Bureau, "Census 2000 PHC-T-2. Ranking Tables for States: 1990 and 2000" (www.census.gov/population/cen2000/phc-t2/tab03.xls, accessed July 2003)



Permitting Issues

- **Idaho** - Cogentrix Energy's 800 MW and New Port Northwest's 1,000 MW gas fired power plants were denied permits because of impact on Spokane-Rathdrum Prairie aquifer
- **Arizona** halted plans for 2 gas fired power plants because of water concerns – 720 MW Big Sandy (proposed drawing 5,267 acre-feet/year from aquifer) and 1,800 MW Toltec (10,000 acre-feet of groundwater)
- **New Mexico** legislature considered adopting regulations to review water efficiency in power plants greater than 50 MW, including an analysis of dry cooling options in 2003
- **Montana's** Yellowstone Conservation District Board denied a permit for a dam that would've helped with water intake problems at the 160 MW Corette plant in Billings. The facility must find a different solution to water supply during low flow periods on the Yellowstone River.



Save Trout. Use Wind.

WRA's
Balanced Energy Plan
would
**reduce water use
by 42%**
in 2020 over business-as-
usual scenario by
incorporating more
energy efficiency and
renewable energy

(That's 82 billion gallons
252,000 acre-feet per year)



NREL, FOOTE CREEK RIM WIND FARM, WY



Reports on Water and Energy

www.westernresources.org

The Last Straw: Water Use by Power Plants

<http://www.westernresources.org/media/pdf/WaterBklet-Final.pdf>

Smart Water: A Comparative Study of Urban Water Use

<http://www.westernresources.org/water/smartwater.php>

Water Rate Structures in Colorado

<http://www.westernresources.org/media/pdf/Colorado%20Water%20Rate%20Structures.pdf>

A Balanced Energy Plan

<http://www.westernresources.org/energy/bep.php>



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