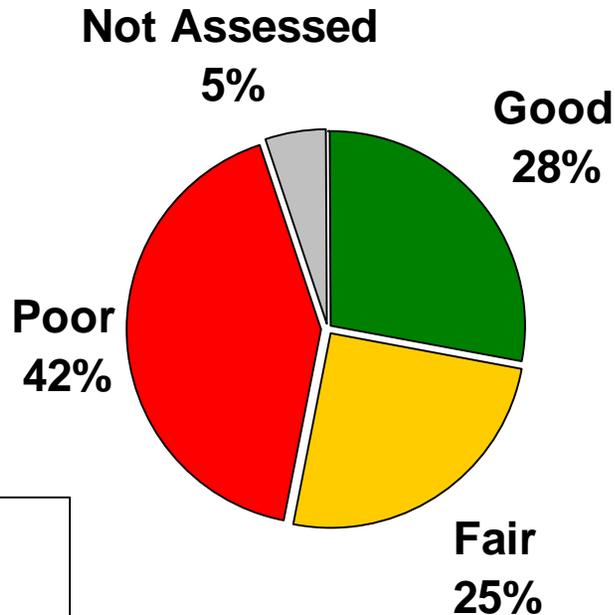


NWQMC
Portland, OR
July 21, 2009

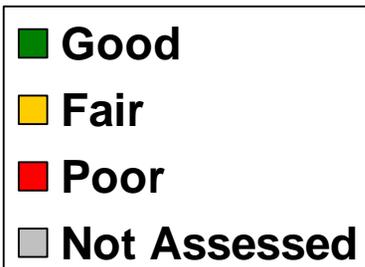
- Trying to think outside our individual world view
 - Status and Trends in Condition and Ranking of Stressors
 - Blending multiple approaches for status and trends (acidification)
 - Leveraging opportunities within National Aquatic Resource Surveys (NES example)

Status – WSA Condition



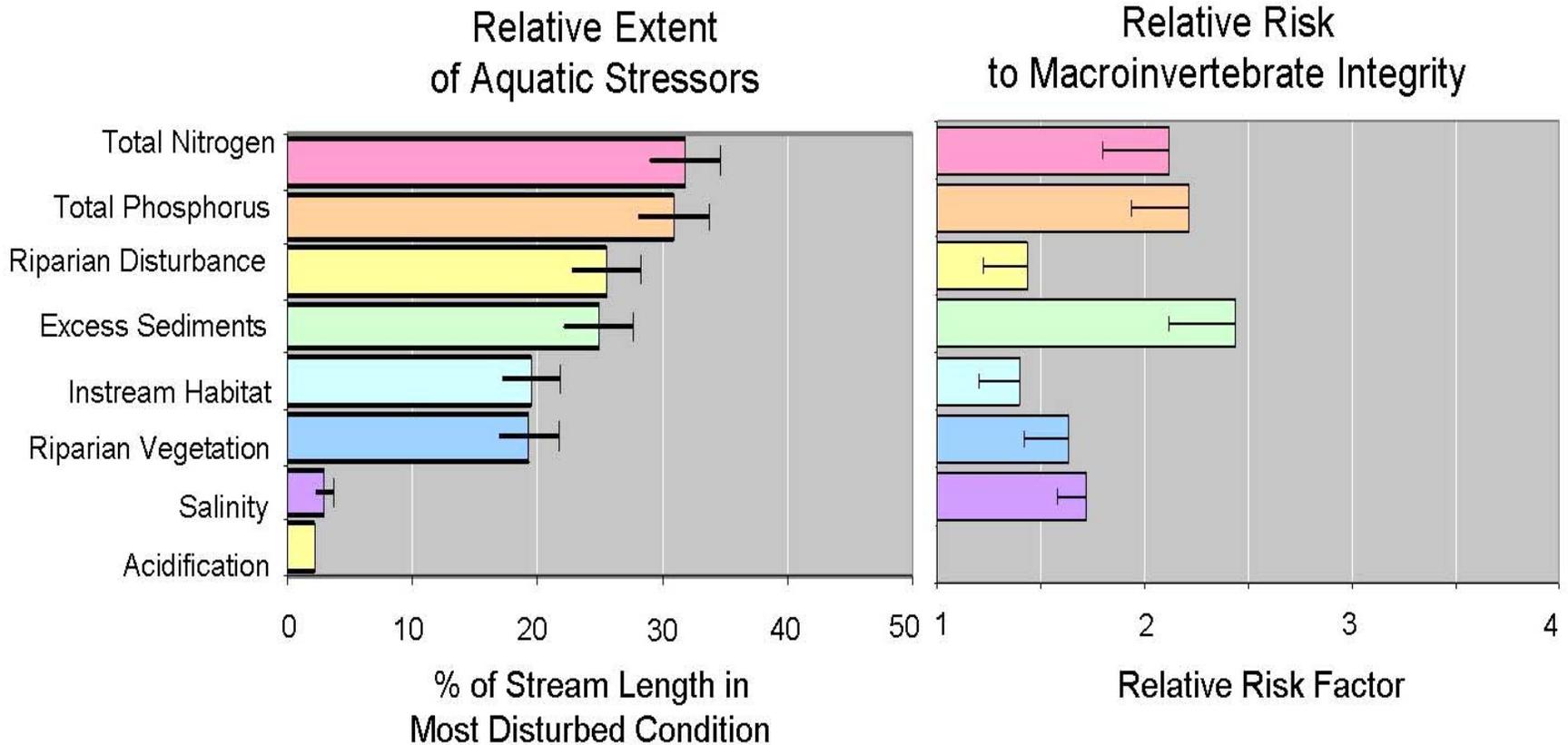
The WSA found that 67% of streams are degraded.

**Biological Condition of Streams
(Index of Biotic Integrity)**



Status – WSA

Relative Ranking of Stressors

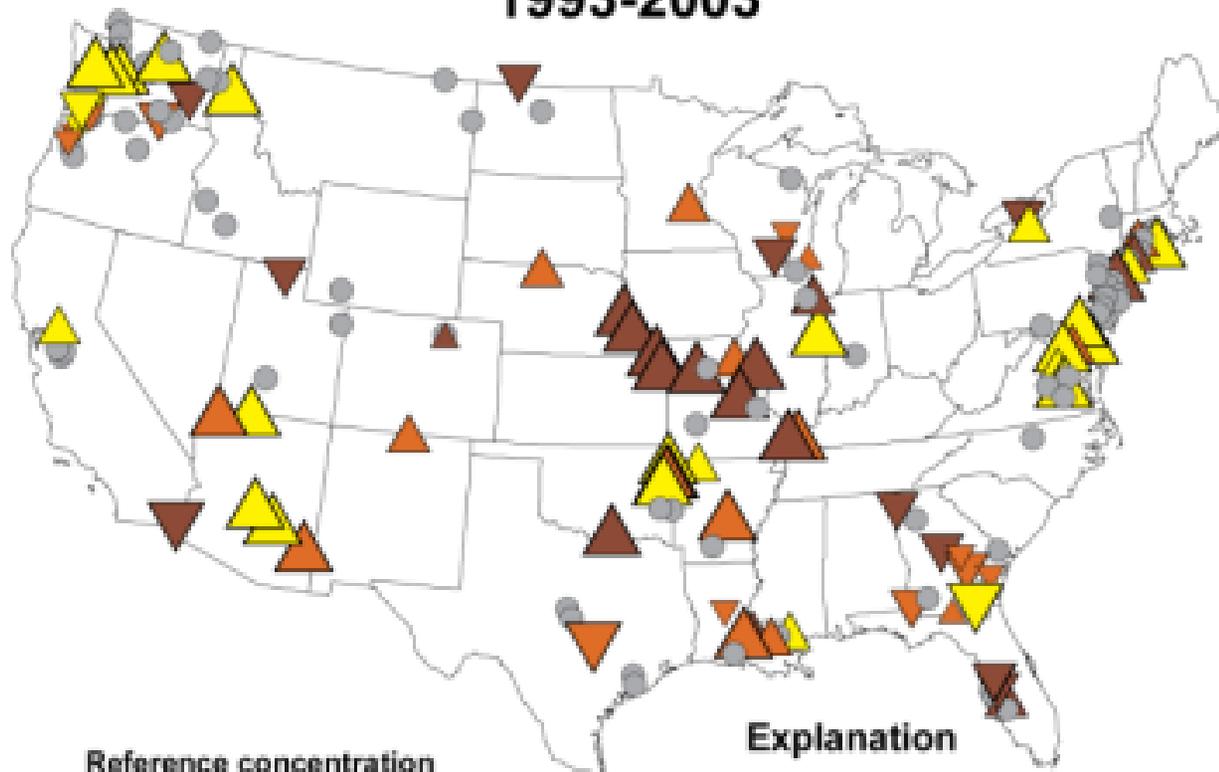


This is a measure that looks at the association between a stressor and biological condition. It answers the question “what is the increased likelihood of poor biological condition when stressor X is rated in poor condition?”. It's important to note that this calculation treats each stressor independently and does not account for the effects of combinations of stressors.

National Aquatic Surveys

- What about other approaches?
- What about changes and/or trends?

Total Phosphorus Concentrations Flow-adjusted 1993-2003



Reference concentration (milligrams per liter)

- Yellow triangle: Less than or equal to 0.0698
- Orange triangle: 0.0699 - 0.1750
- Brown triangle: Greater than or equal to 0.1751

Explanation

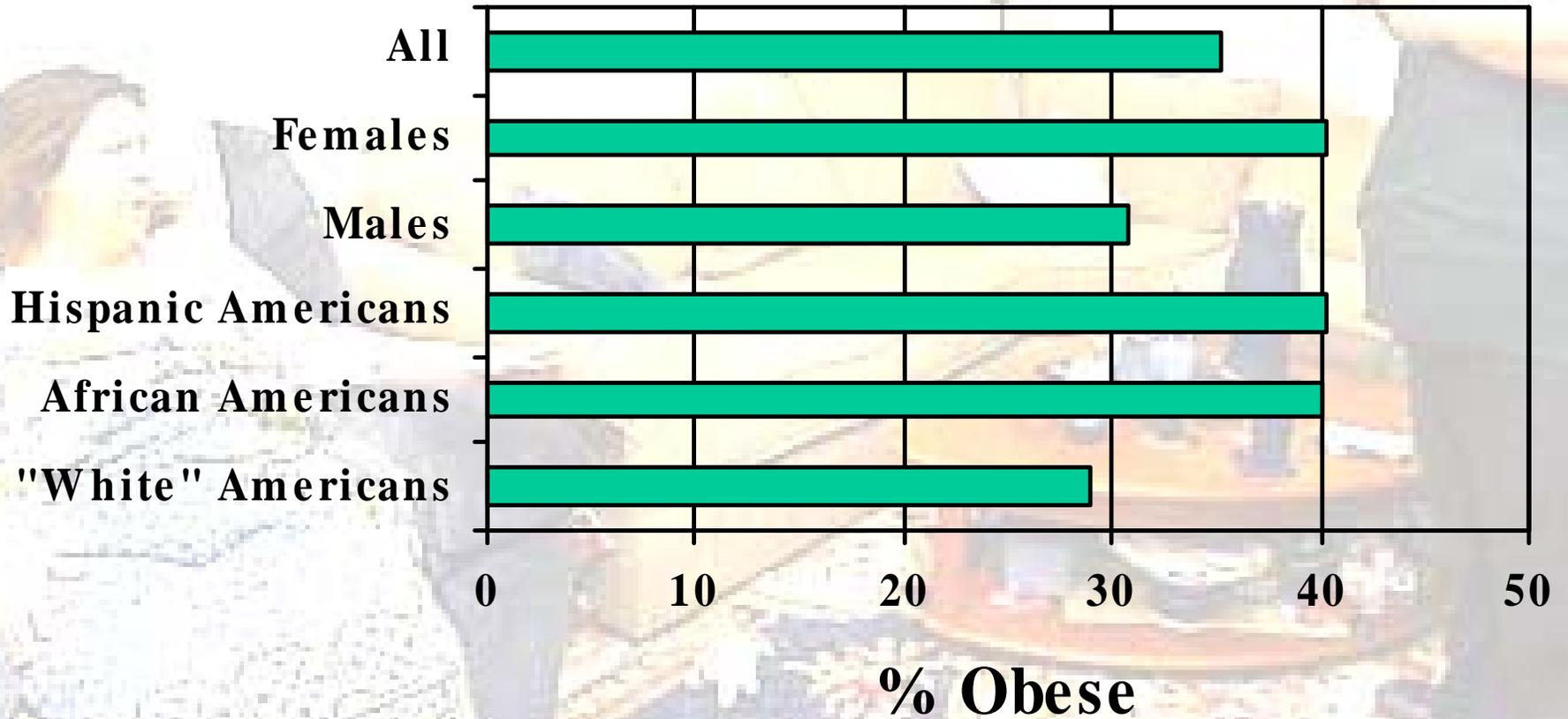
Direction of trend

- Upward-pointing triangle: Upward
- Downward-pointing triangle: Downward
- Gray circle: No significant trend

Magnitude of trend (percent from 1993 to 2003)

- Small triangle: Less than or equal to 33.0
- Medium triangle: 33.1 - 66.0
- Large triangle: Greater than or equal to 66.1

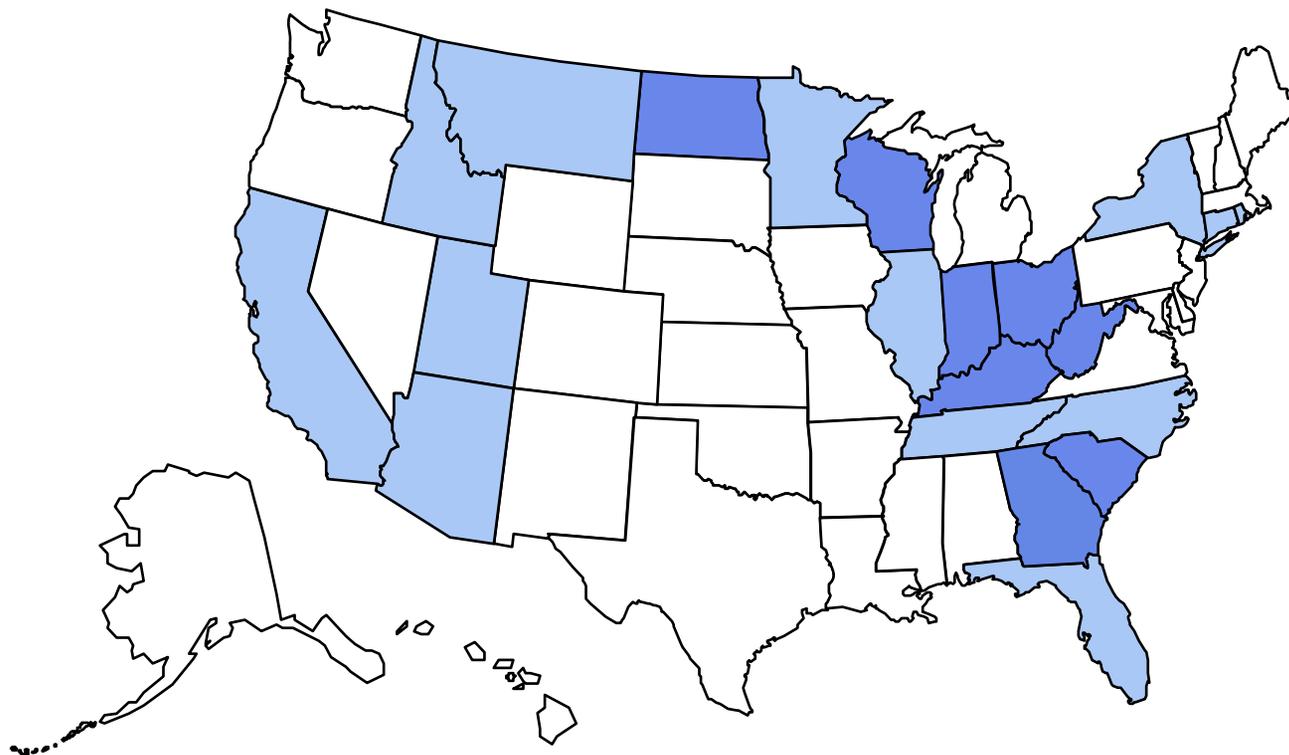
Obesity in U.S.



Obesity Trends* Among U.S. Adults

BRFSS, 1985

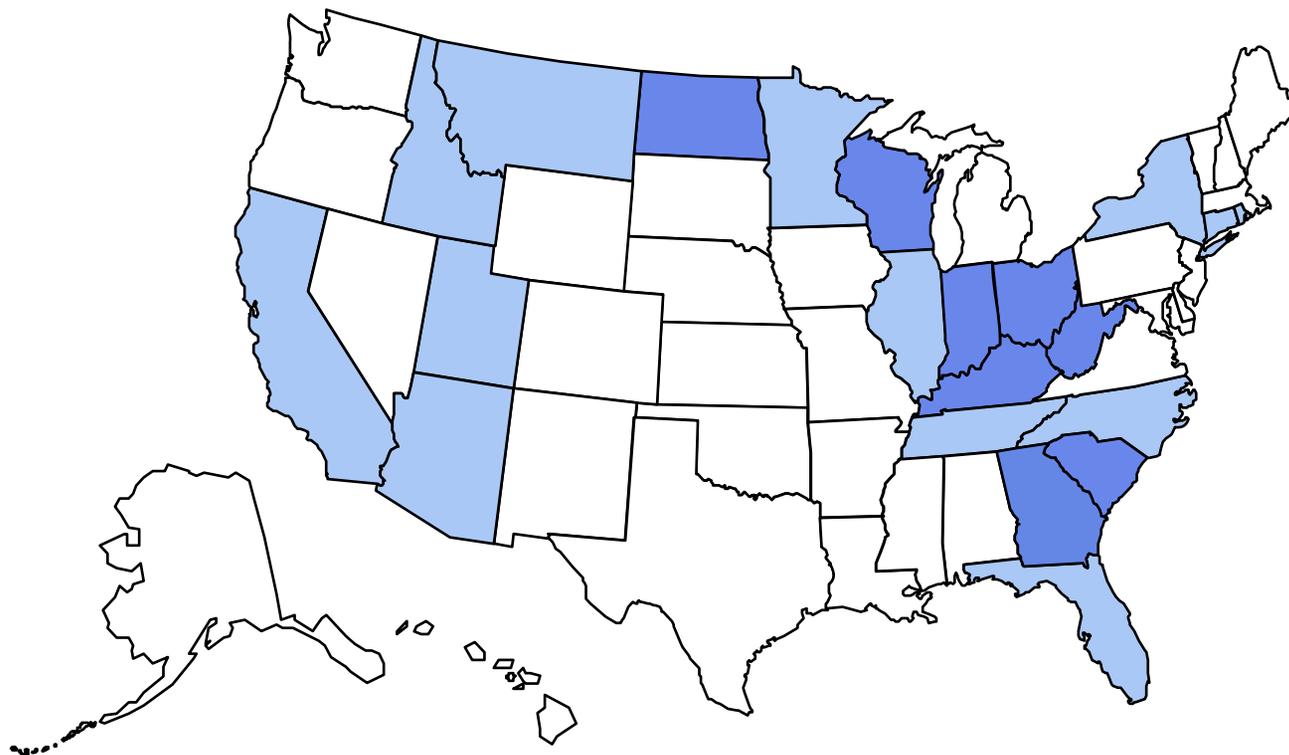
(*BMI ≥ 30 , or ~ 30 lbs. overweight for 5' 4" person)



Obesity Trends* Among U.S. Adults

BRFSS, 1985

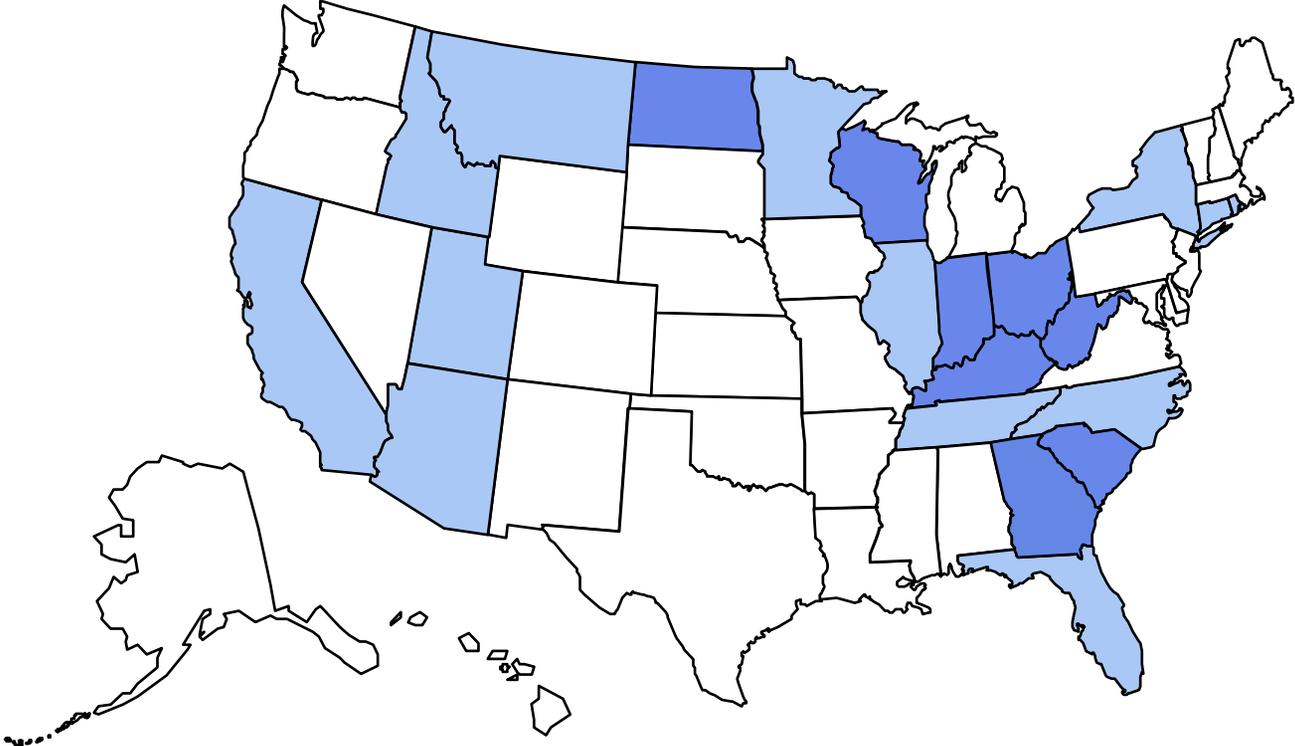
(*BMI ≥ 30 , or ~ 30 lbs. overweight for 5' 4" person)



Obesity Trends* Among U.S. Adults

BRFSS, 1985

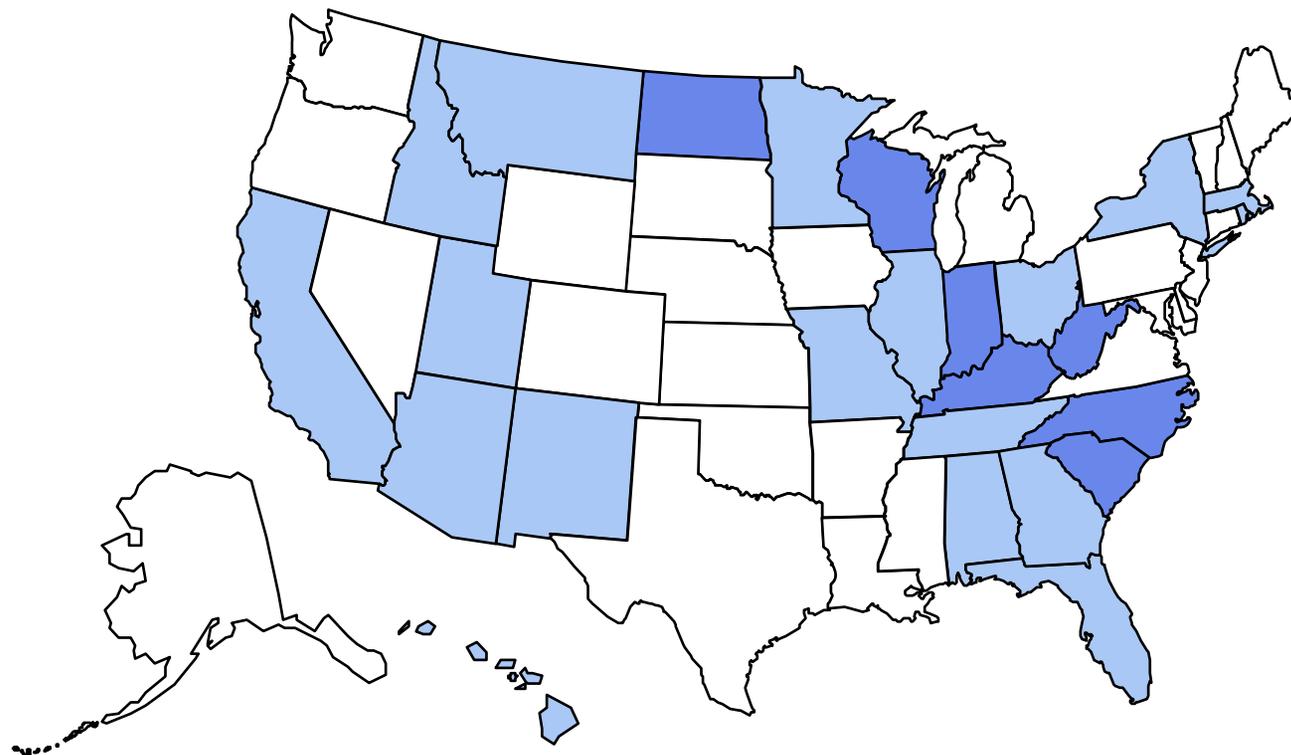
(*BMI ≥ 30 , or ~ 30 lbs. overweight for 5' 4" person)



Obesity Trends* Among U.S. Adults

BRFSS, 1986

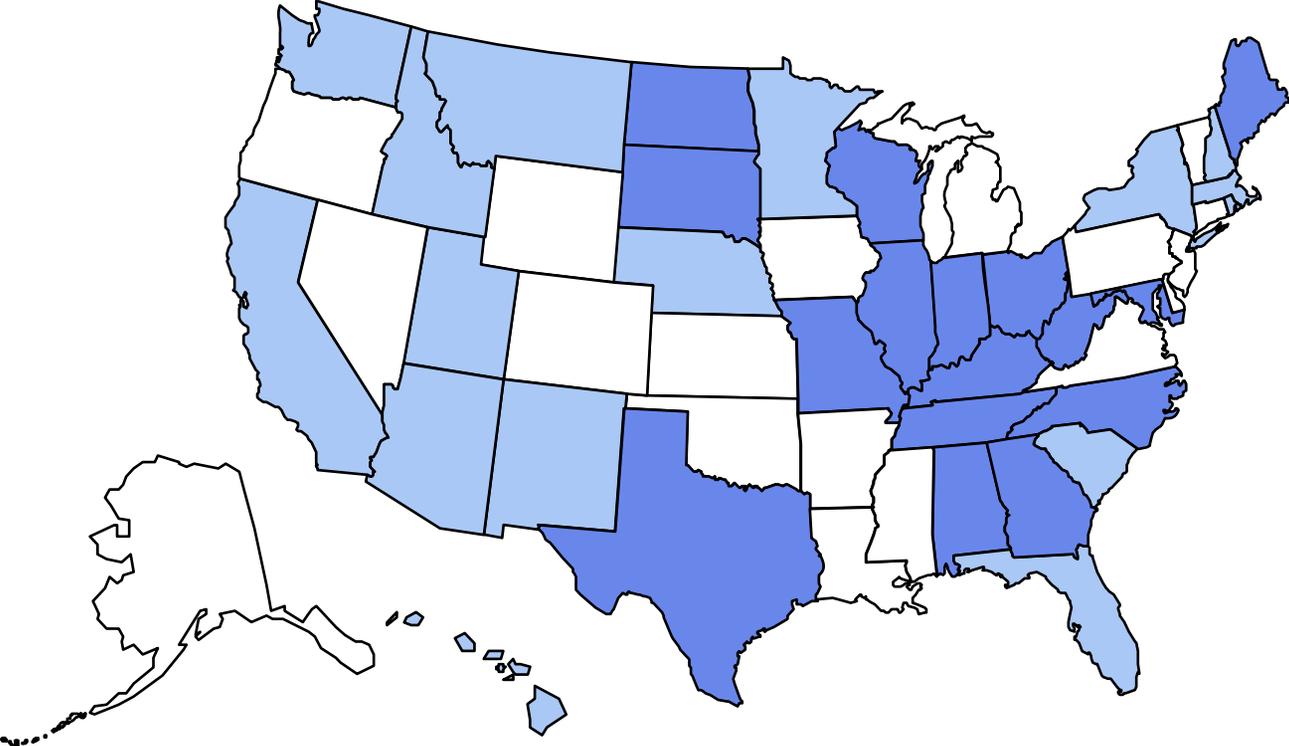
(*BMI ≥ 30 , or ~ 30 lbs. overweight for 5' 4" person)



Obesity Trends* Among U.S. Adults

BRFSS, 1987

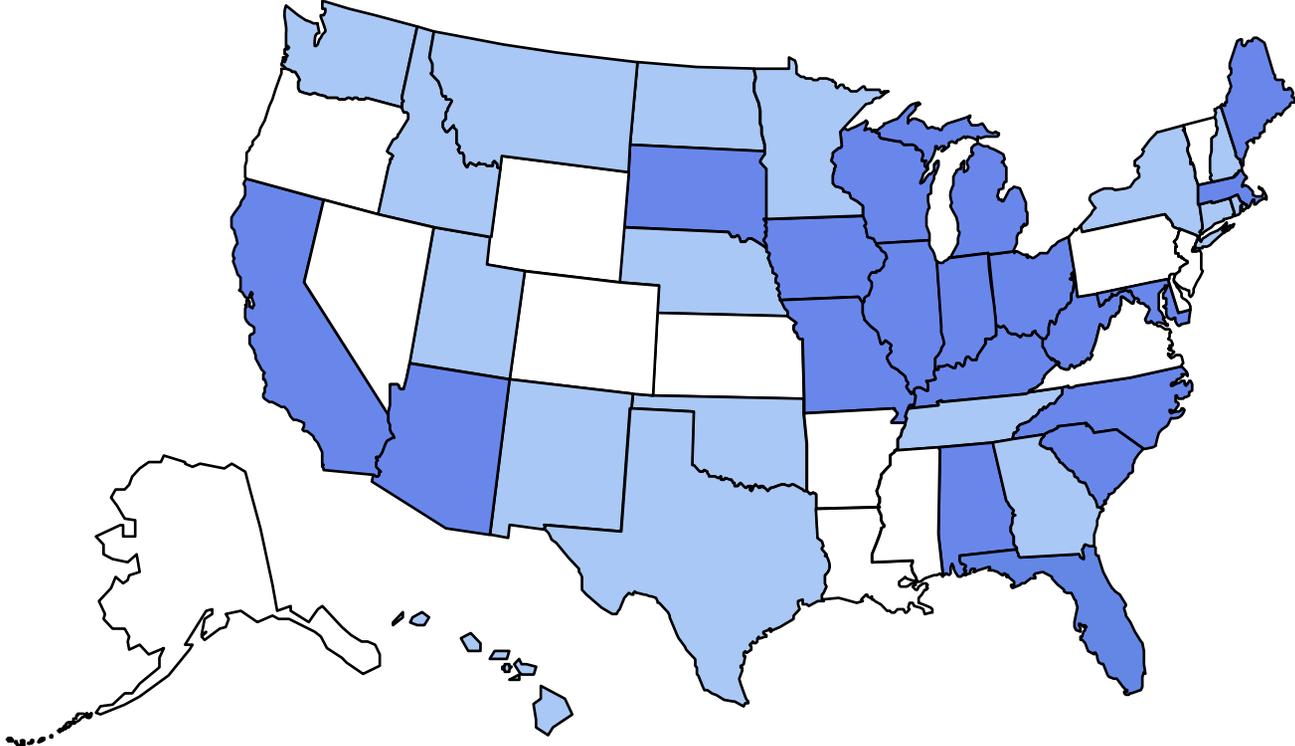
(*BMI ≥ 30 , or ~ 30 lbs. overweight for 5' 4" person)



Obesity Trends* Among U.S. Adults

BRFSS, 1988

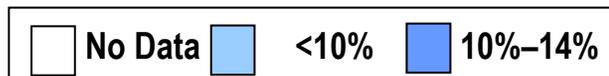
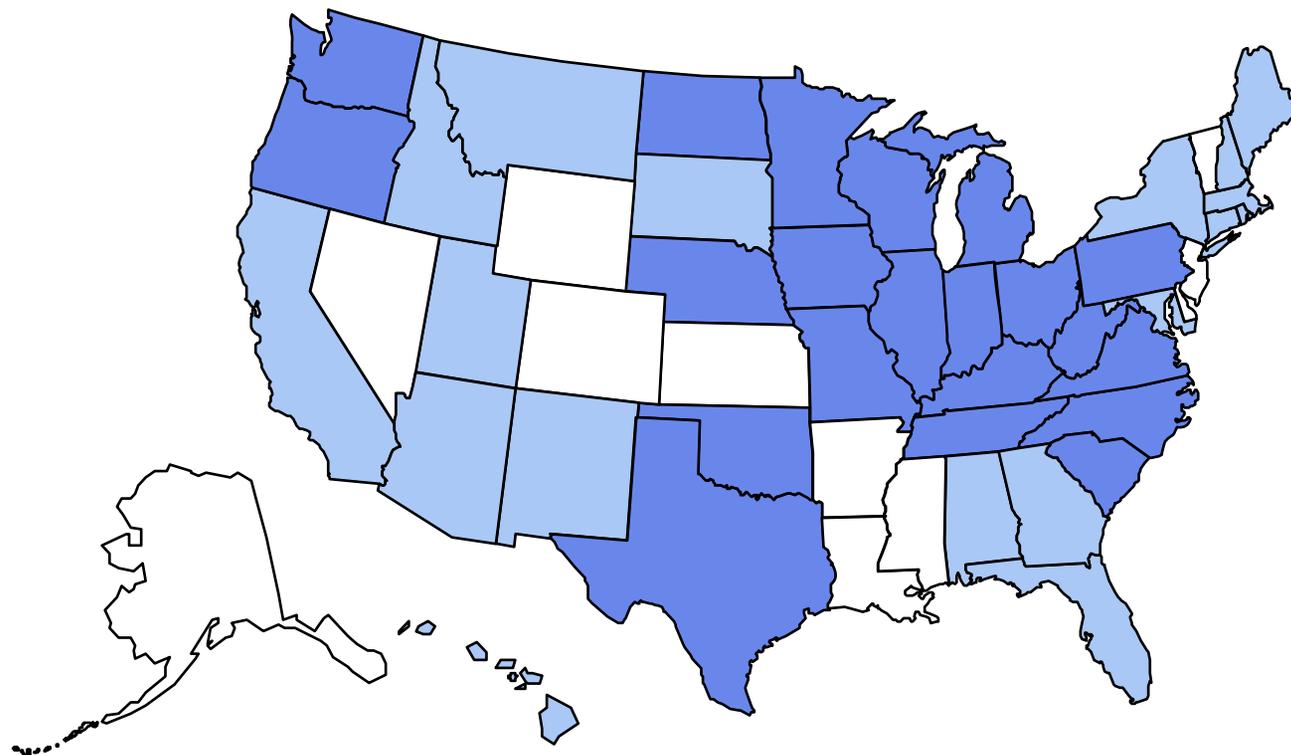
(*BMI ≥ 30 , or ~ 30 lbs. overweight for 5' 4" person)



Obesity Trends* Among U.S. Adults

BRFSS, 1989

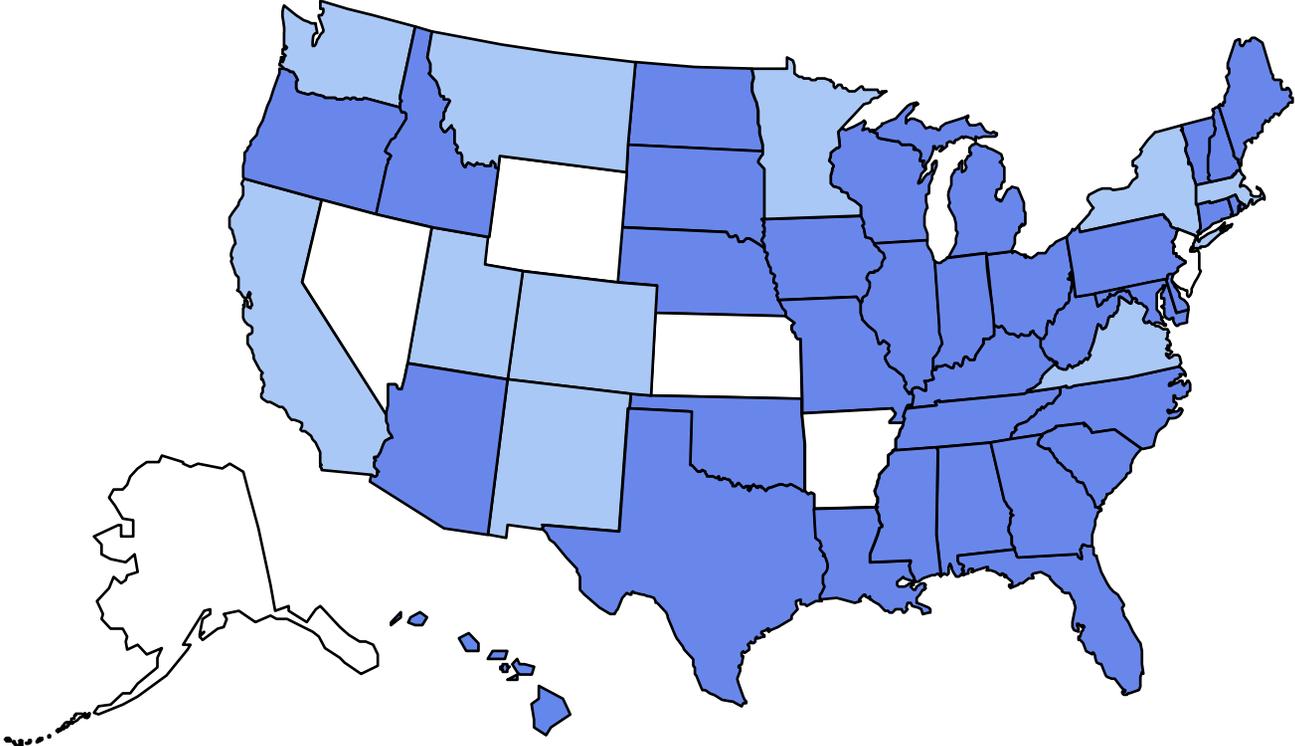
(*BMI ≥ 30 , or ~ 30 lbs. overweight for 5' 4" person)



Obesity Trends* Among U.S. Adults

BRFSS, 1990

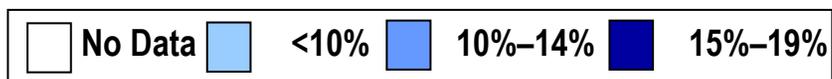
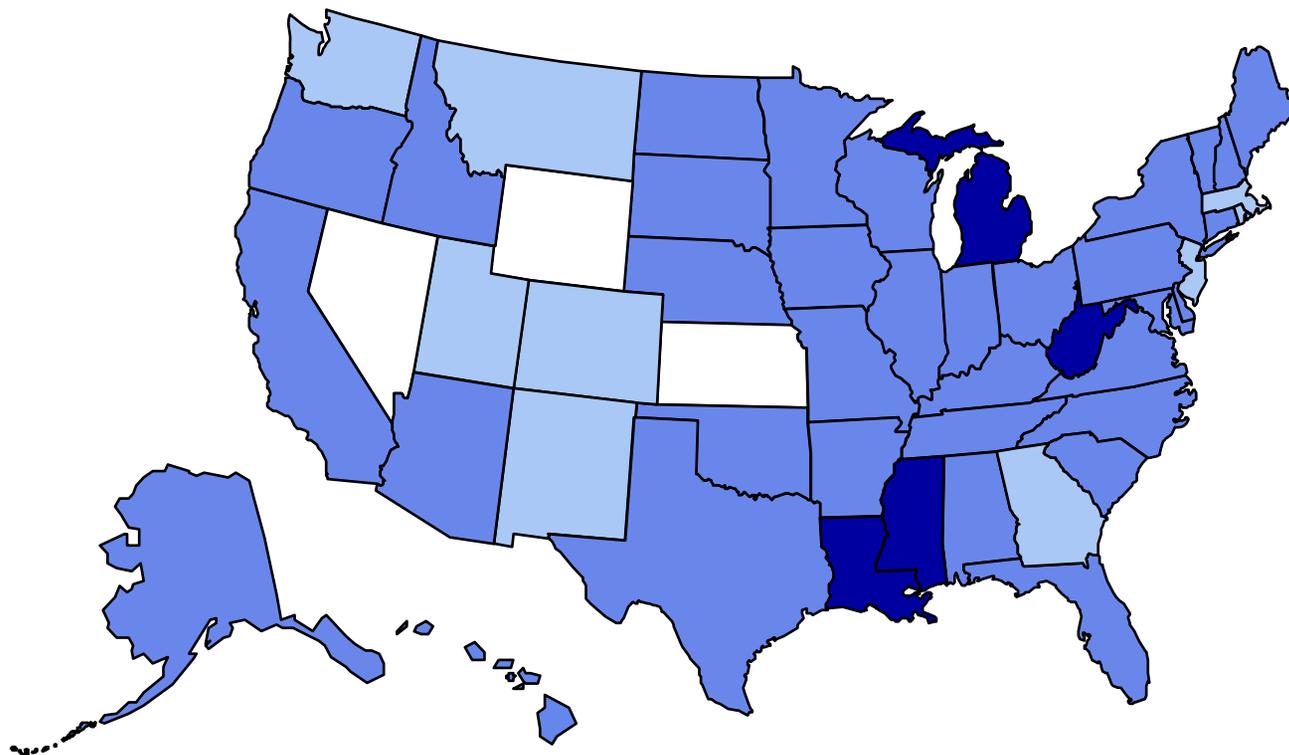
(*BMI ≥ 30 , or ~ 30 lbs. overweight for 5' 4" person)



Obesity Trends* Among U.S. Adults

BRFSS, 1991

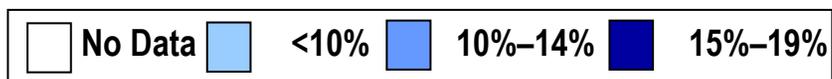
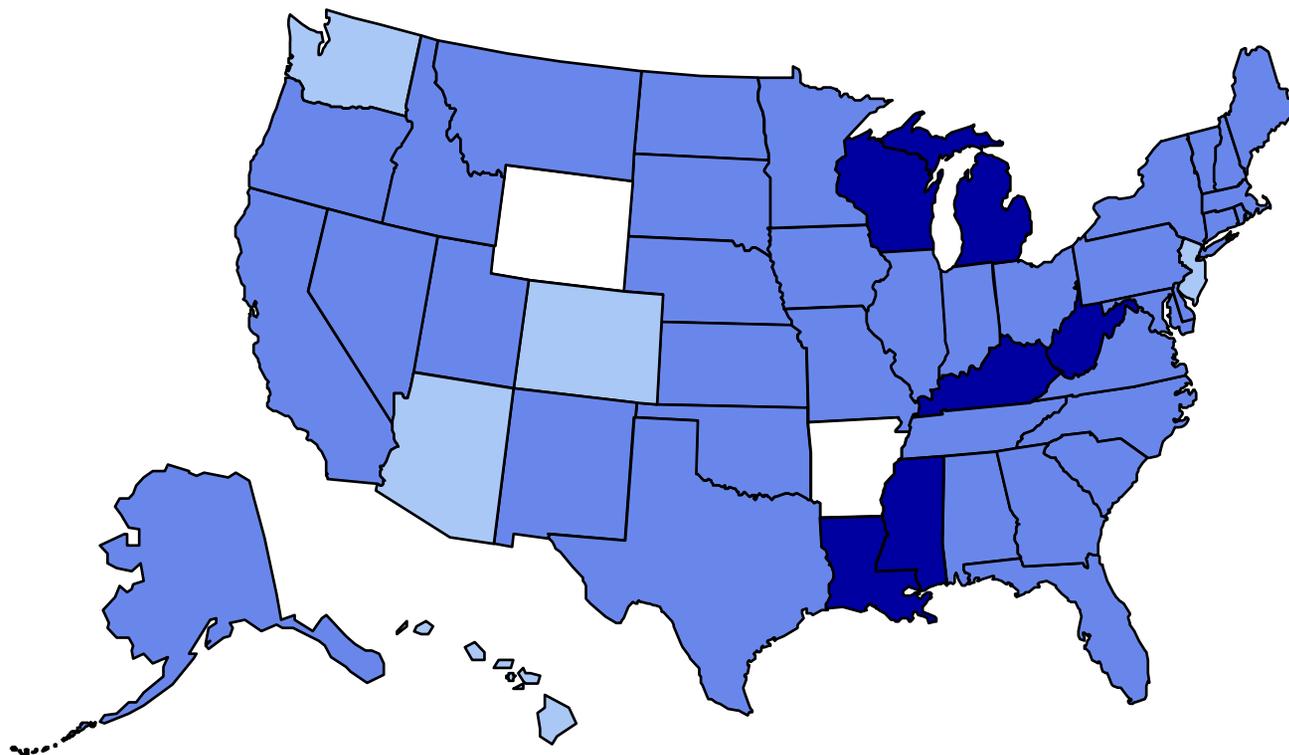
(*BMI ≥ 30 , or ~ 30 lbs. overweight for 5' 4" person)



Obesity Trends* Among U.S. Adults

BRFSS, 1992

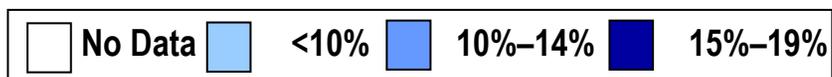
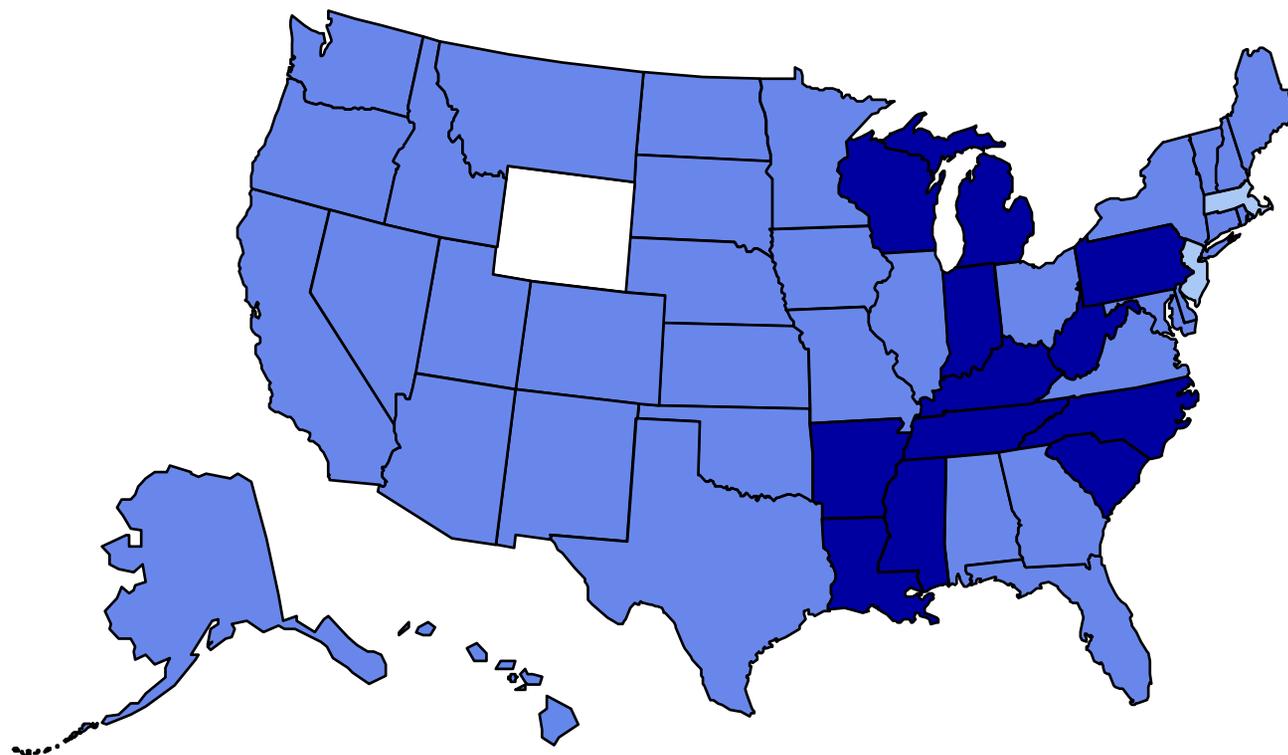
(*BMI ≥ 30 , or ~ 30 lbs. overweight for 5' 4" person)



Obesity Trends* Among U.S. Adults

BRFSS, 1993

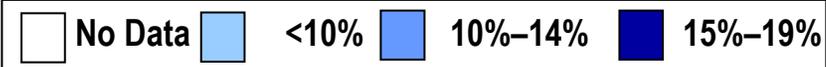
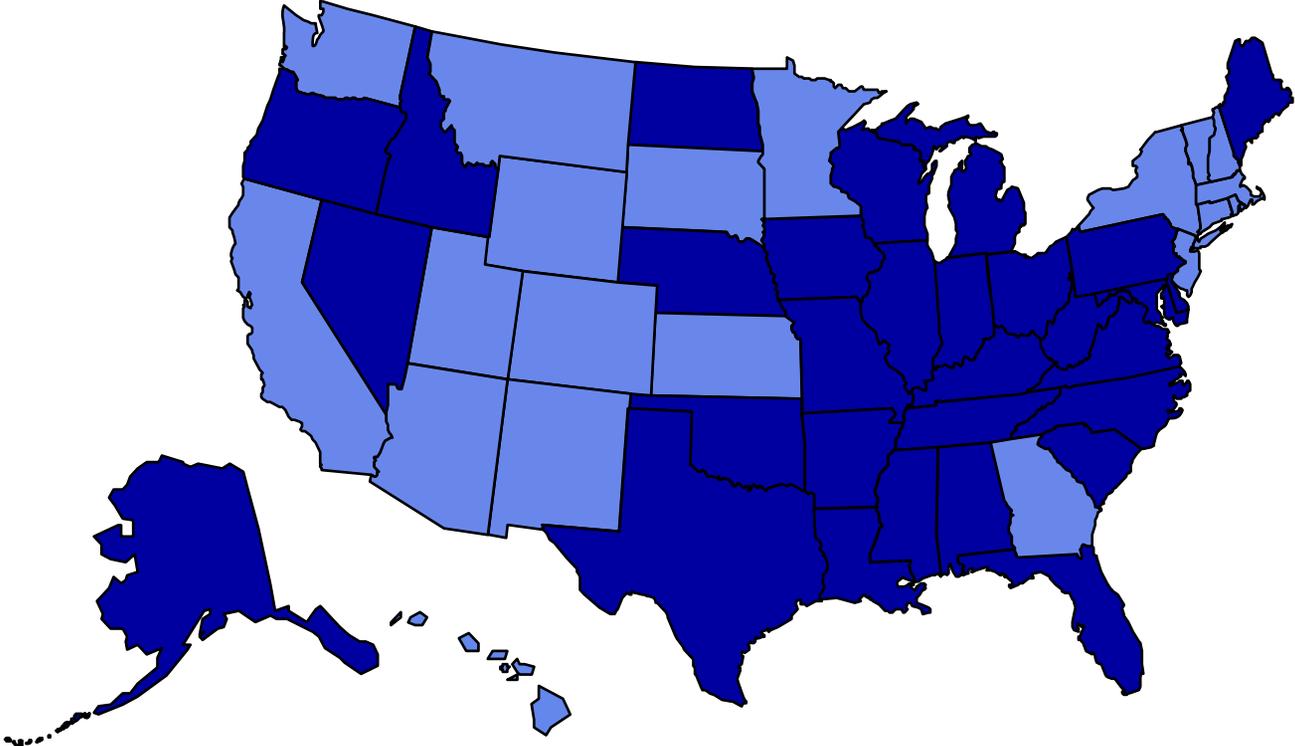
(*BMI ≥ 30 , or ~ 30 lbs. overweight for 5' 4" person)



Obesity Trends* Among U.S. Adults

BRFSS, 1996

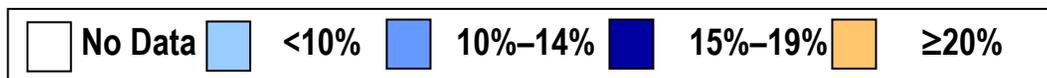
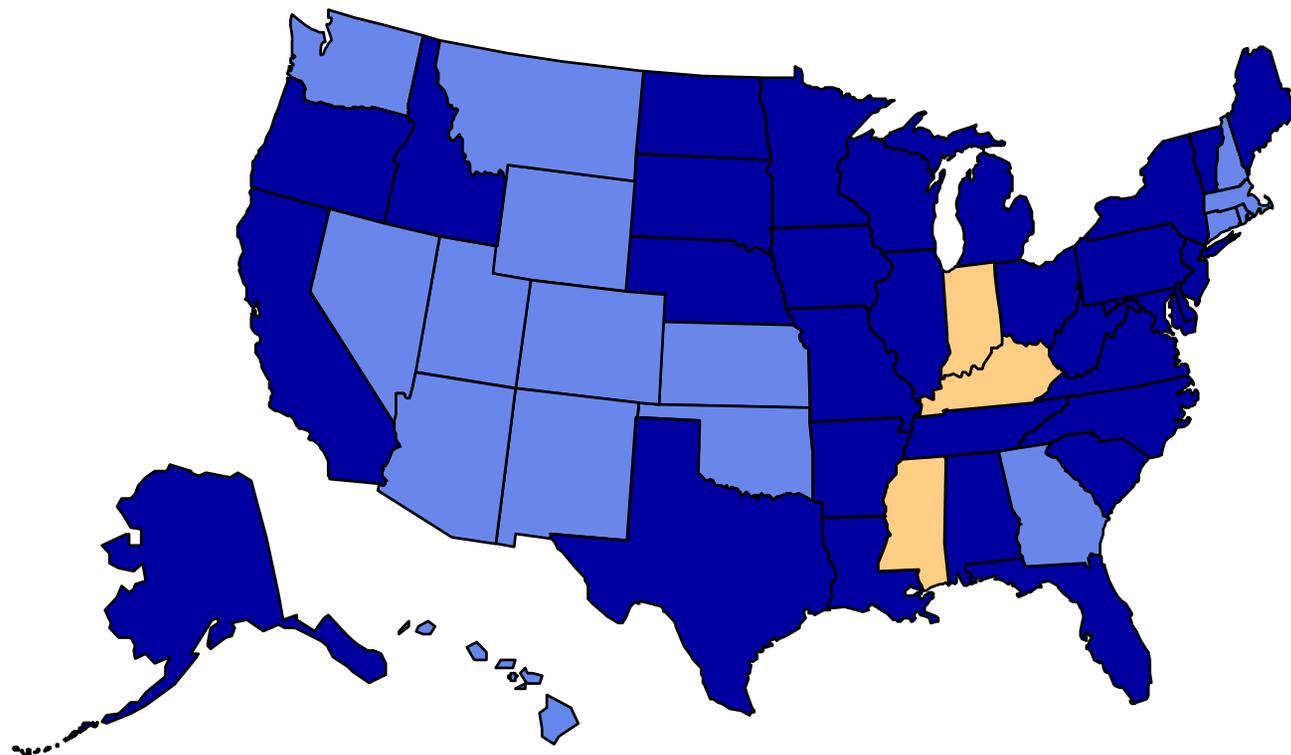
(*BMI ≥ 30 , or ~ 30 lbs. overweight for 5' 4" person)



Obesity Trends* Among U.S. Adults

BRFSS, 1997

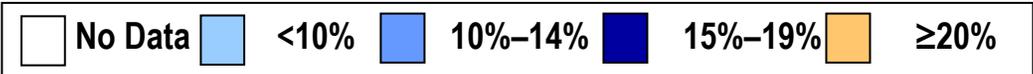
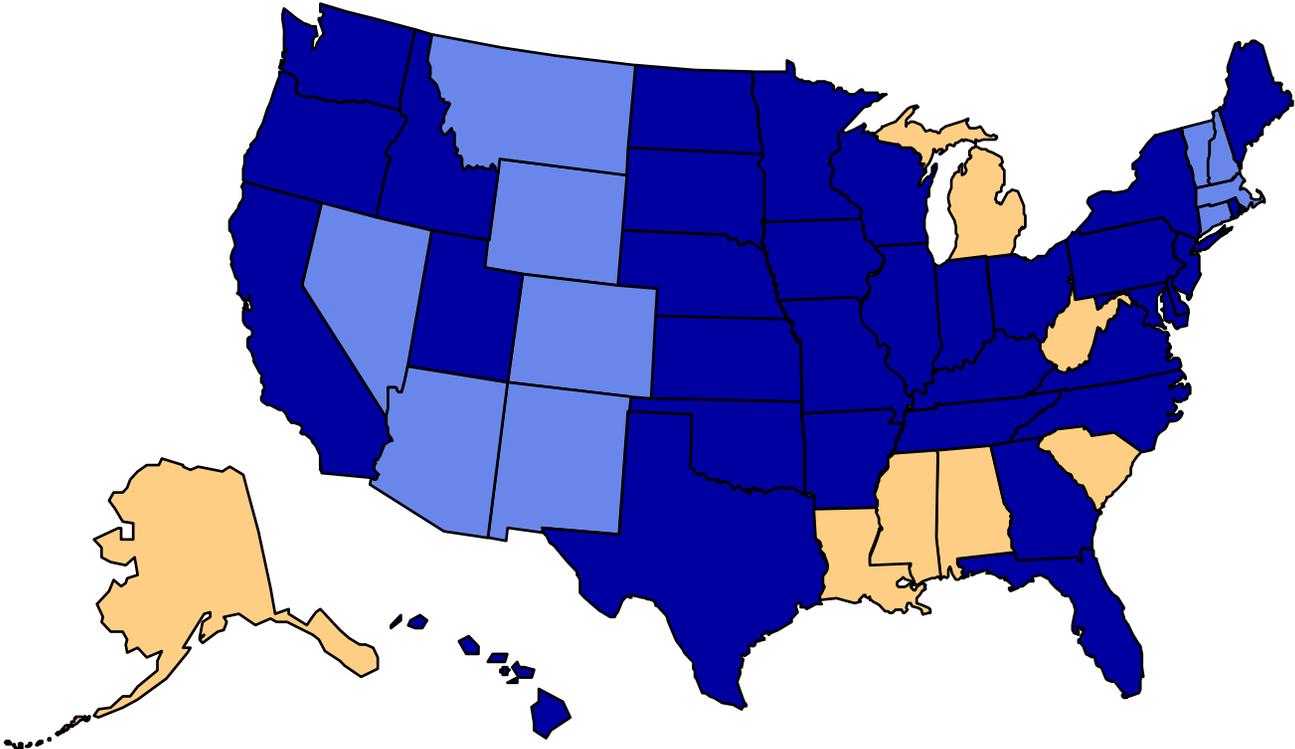
(*BMI ≥ 30 , or ~ 30 lbs. overweight for 5' 4" person)



Obesity Trends* Among U.S. Adults

BRFSS, 1998

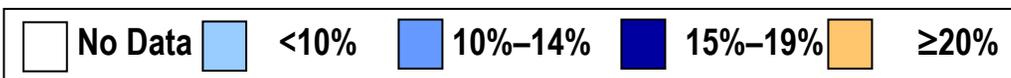
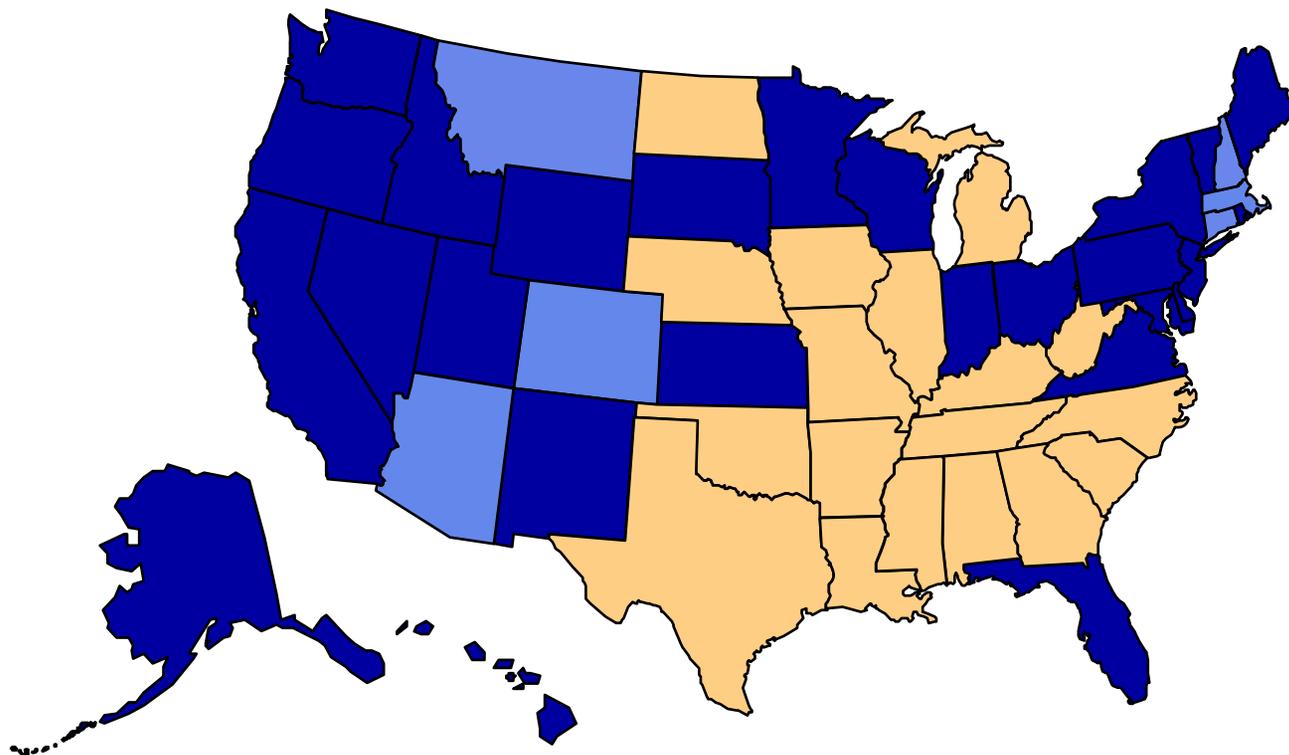
(*BMI ≥ 30 , or ~ 30 lbs. overweight for 5' 4" person)



Obesity Trends* Among U.S. Adults

BRFSS, 1999

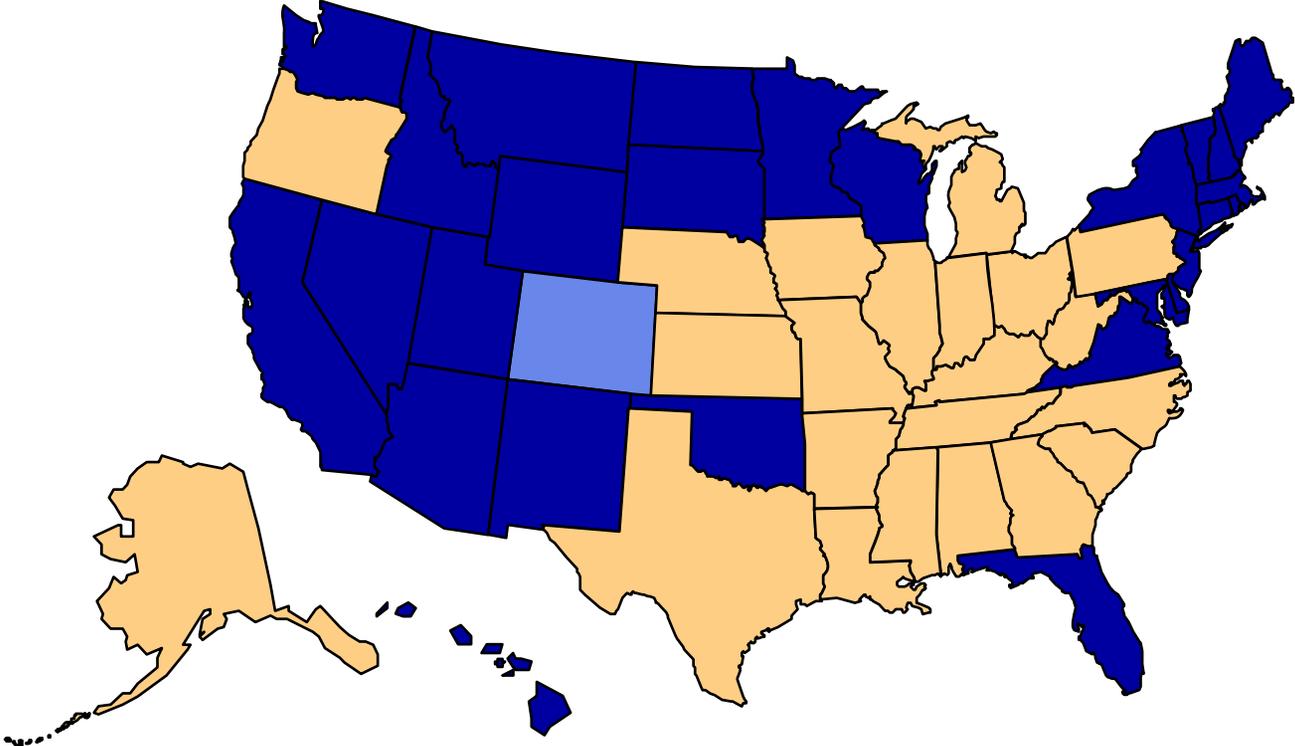
(*BMI ≥ 30 , or ~ 30 lbs. overweight for 5' 4" person)



Obesity Trends* Among U.S. Adults

BRFSS, 2000

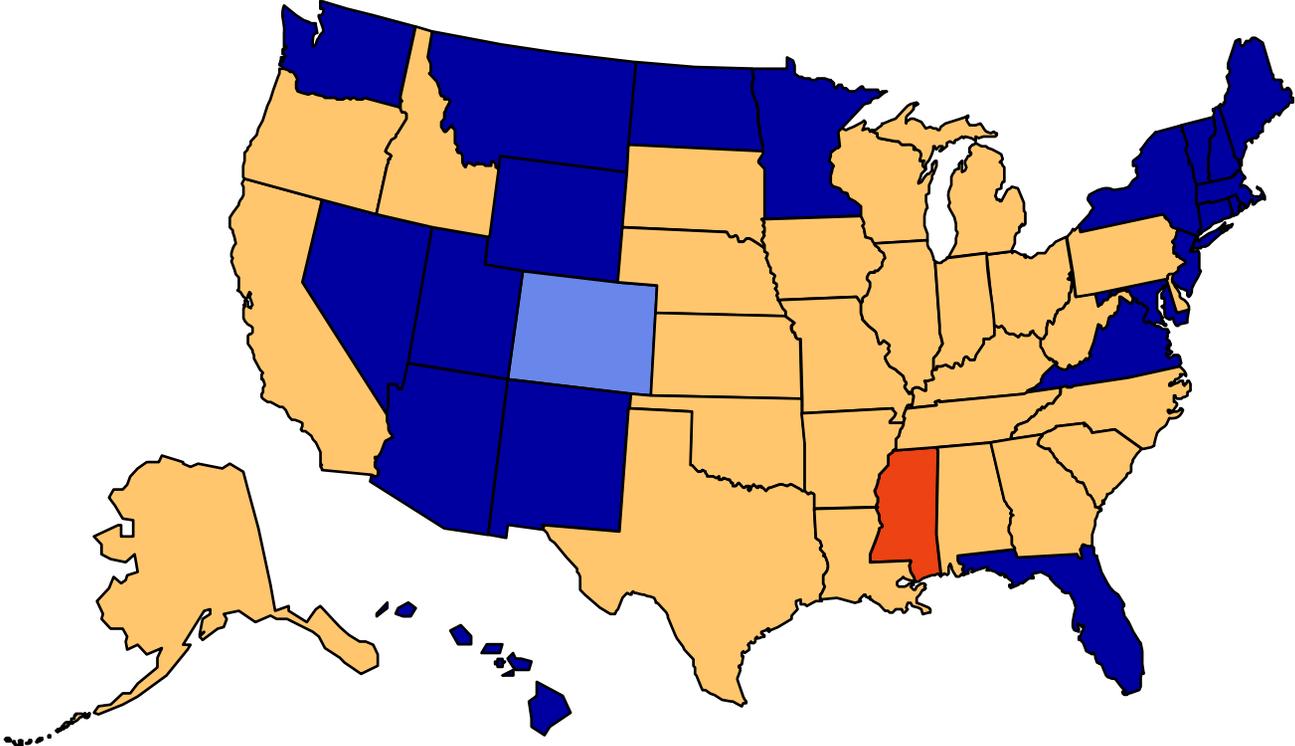
(*BMI ≥ 30 , or ~ 30 lbs. overweight for 5' 4" person)



Obesity Trends* Among U.S. Adults

BRFSS, 2001

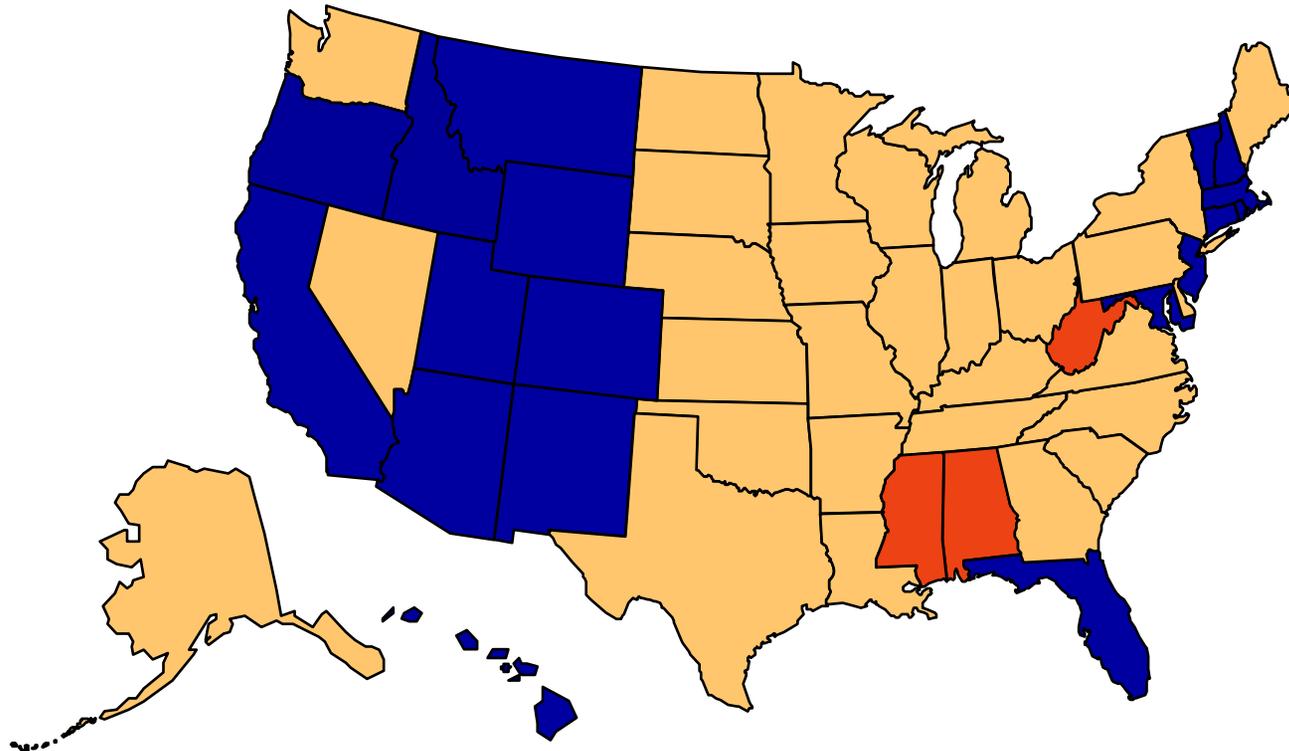
(*BMI ≥ 30 , or ~ 30 lbs. overweight for 5' 4" person)



Obesity Trends* Among U.S. Adults

BRFSS, 2002

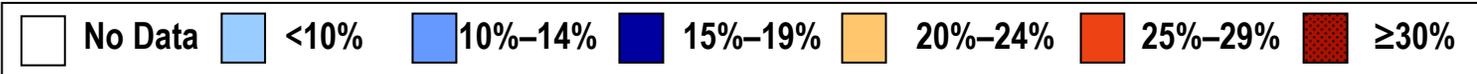
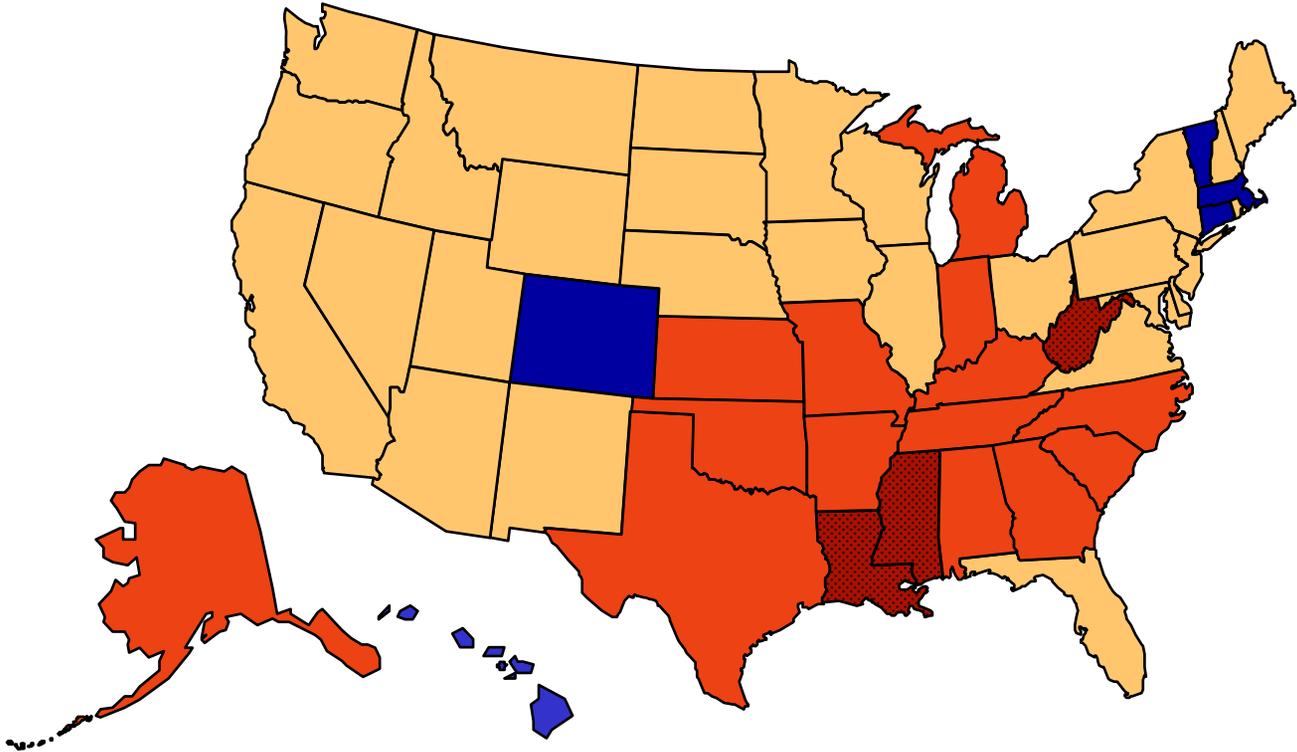
(*BMI ≥ 30 , or ~ 30 lbs. overweight for 5' 4" person)



Obesity Trends* Among U.S. Adults

BRFSS, 2005

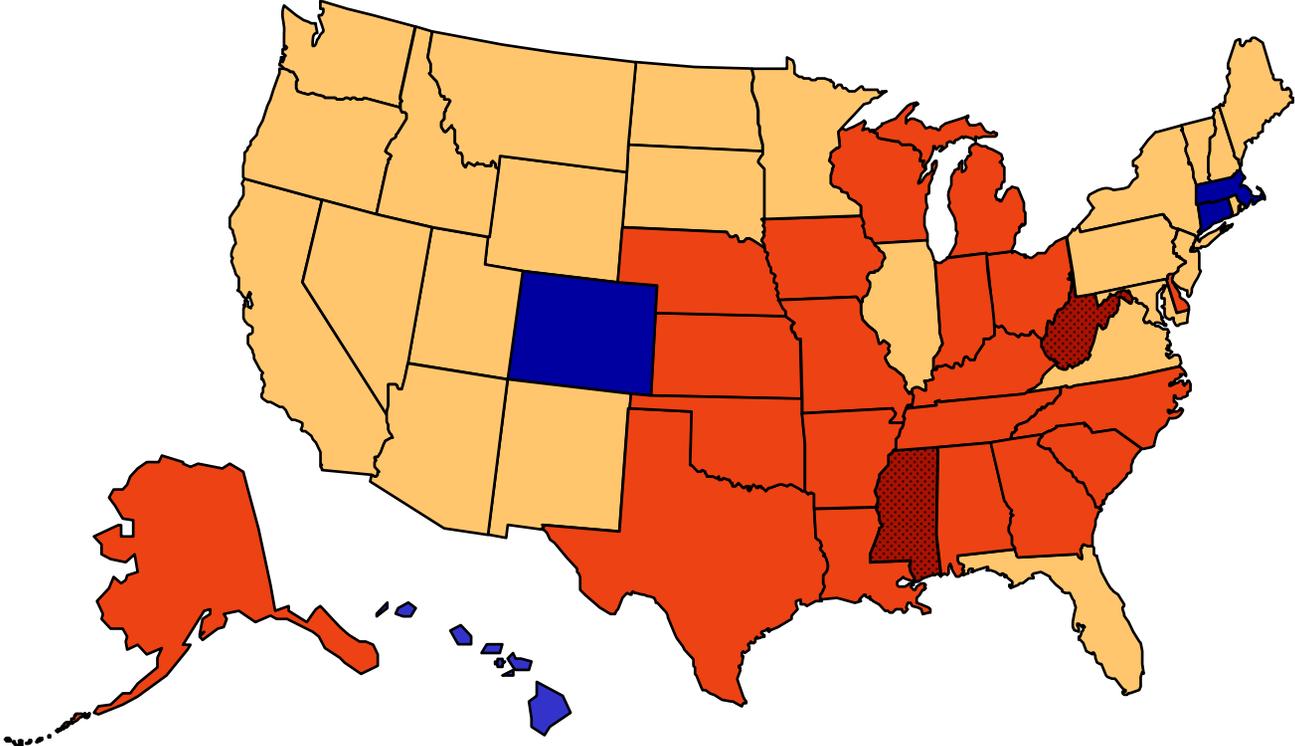
(*BMI ≥ 30 , or ~ 30 lbs. overweight for 5' 4" person)



Obesity Trends* Among U.S. Adults

BRFSS, 2006

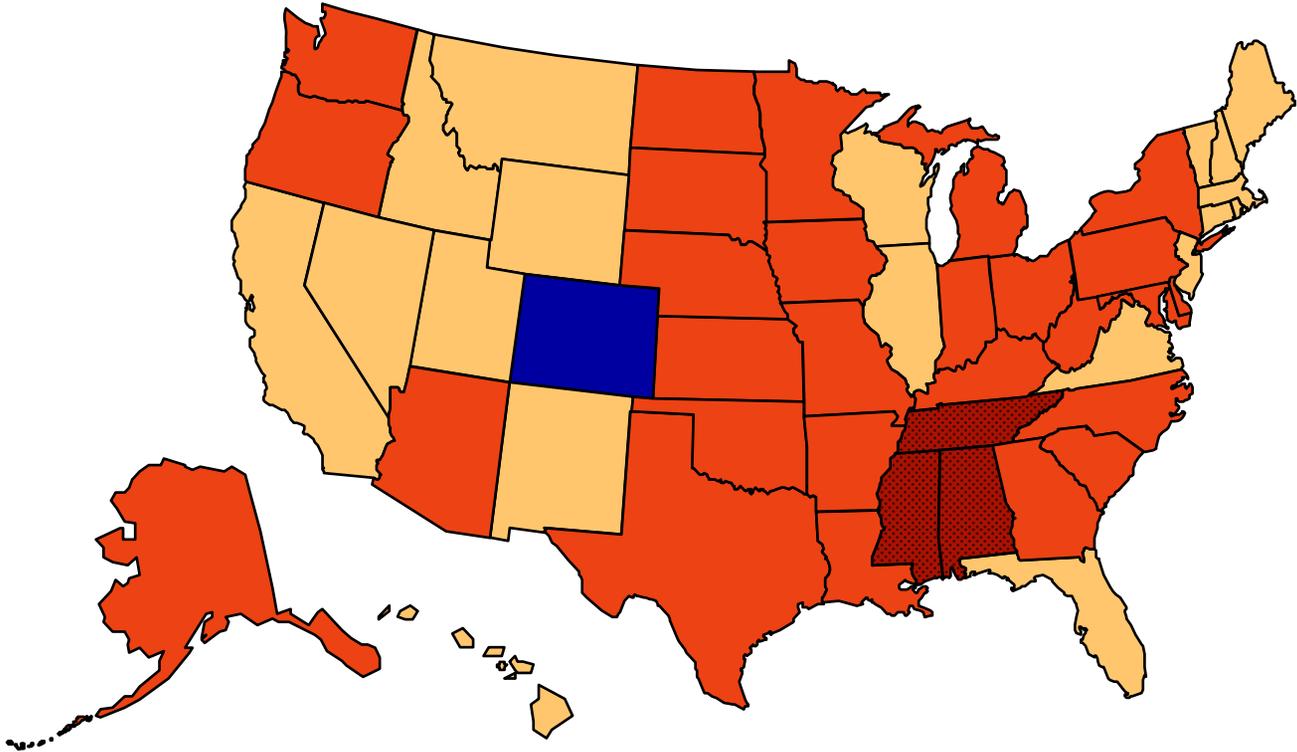
(*BMI ≥ 30 , or ~ 30 lbs. overweight for 5' 4" person)



Obesity Trends* Among U.S. Adults

BRFSS, 2007

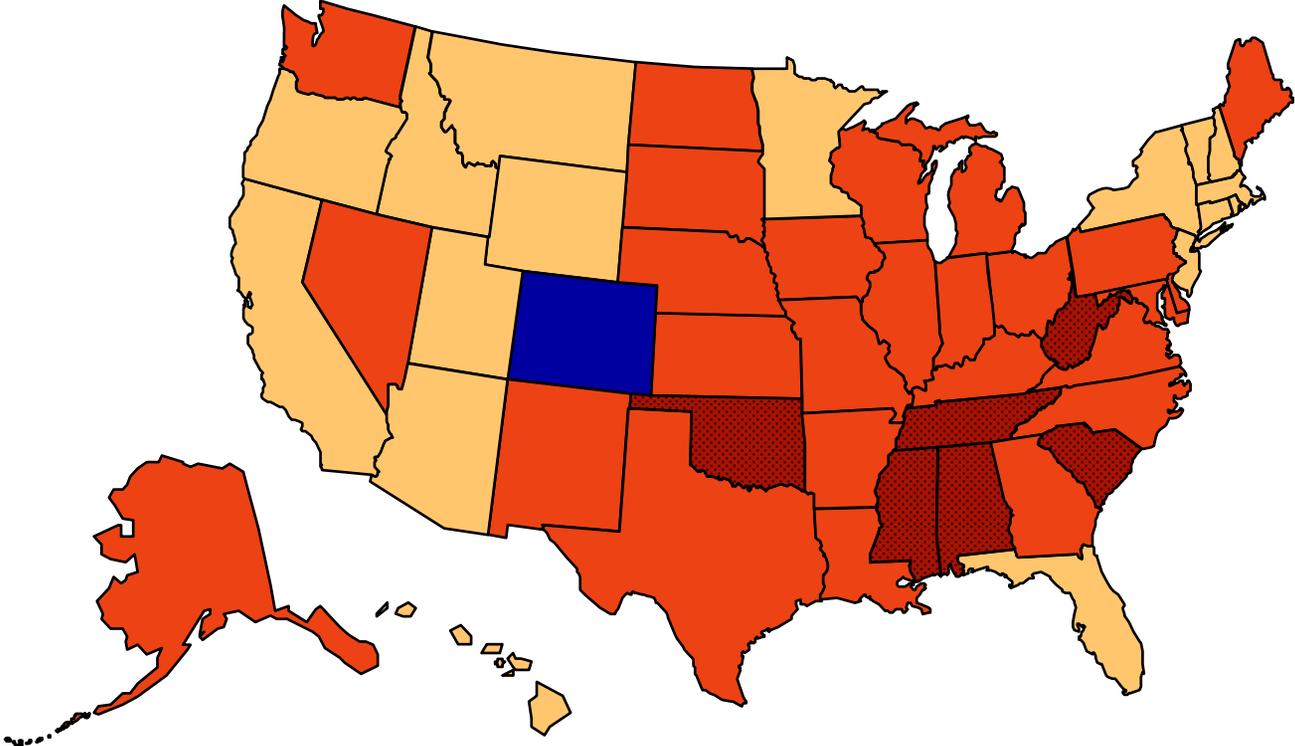
(*BMI ≥ 30 , or ~ 30 lbs. overweight for 5' 4" person)



Obesity Trends* Among U.S. Adults

BRFSS, 2008

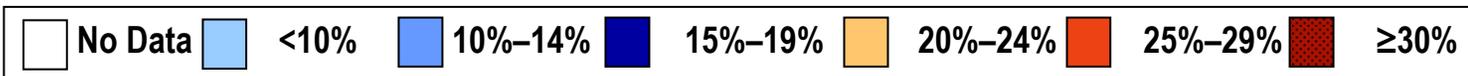
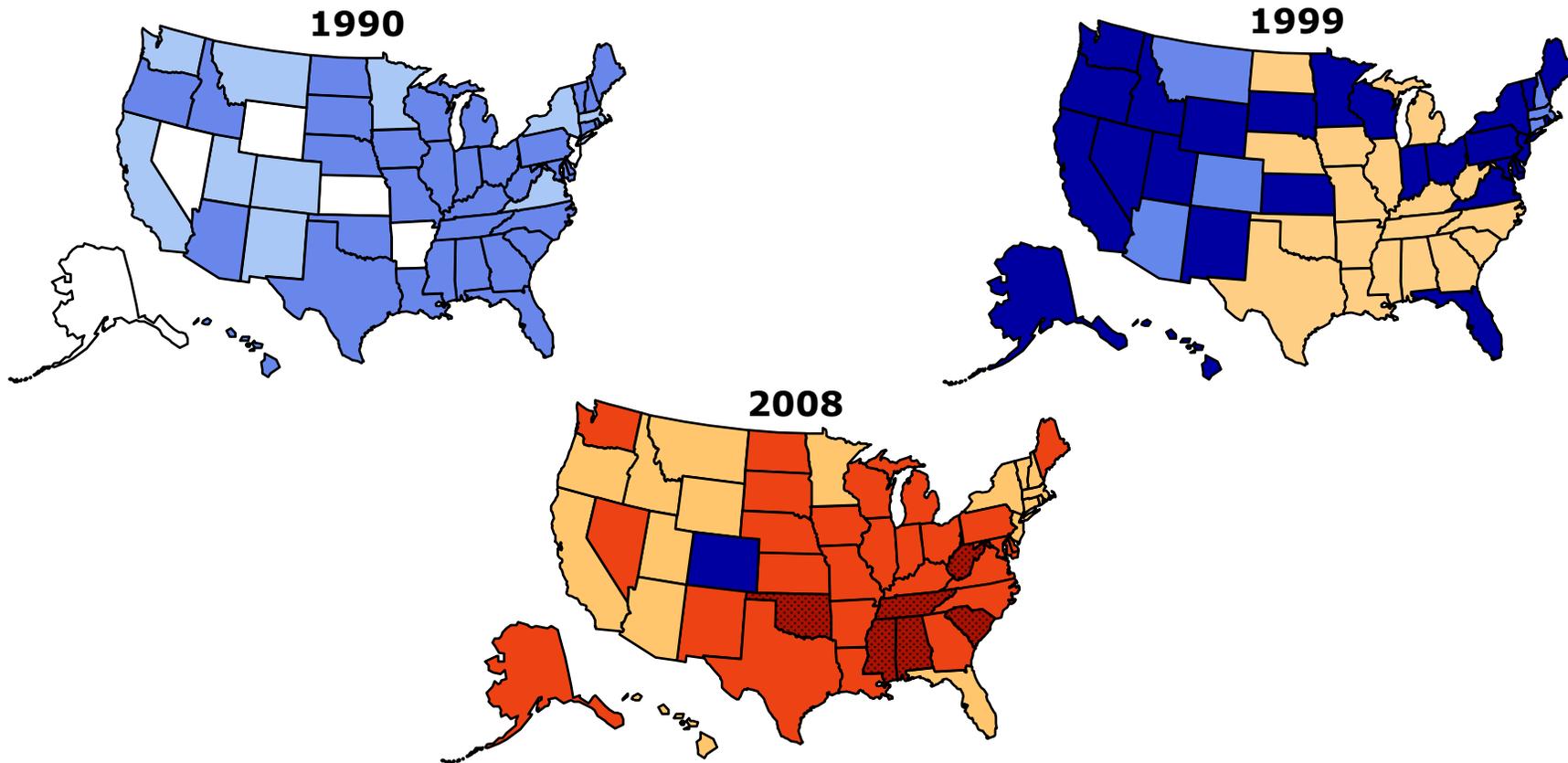
(*BMI ≥ 30 , or ~ 30 lbs. overweight for 5' 4" person)



Obesity Trends* Among U.S. Adults

BRFSS, 1990, 1999, 2008

(*BMI ≥ 30 , or about 30 lbs. overweight for 5'4" person)



In this case...

- Trends come from Status through time...but it takes time
- Status, Changes and Trends are all useful to policy
- Does not negate the value of case studies tracking individuals...but they are not the same

Obesity Trends Among U.S. Adults between 1985 and 2008

Definitions:

- **Obesity: Body Mass Index (BMI) of 30 or higher.**
- **Body Mass Index (BMI): A measure of an adult's weight in relation to his or her height, specifically the adult's weight in kilograms divided by the square of his or her height in meters.**

Obesity Trends Among U.S. Adults between 1985 and 2008

Source of the data:

- The data shown in these maps were collected through CDC's Behavioral Risk Factor Surveillance System (BRFSS). Each year, state health departments use standard procedures to collect data through a series of telephone interviews with U.S. adults.
- Prevalence estimates generated for the maps may vary slightly from those generated for the states by BRFSS (<http://aps.nccd.cdc.gov/brfss>) as slightly different analytic methods are used.

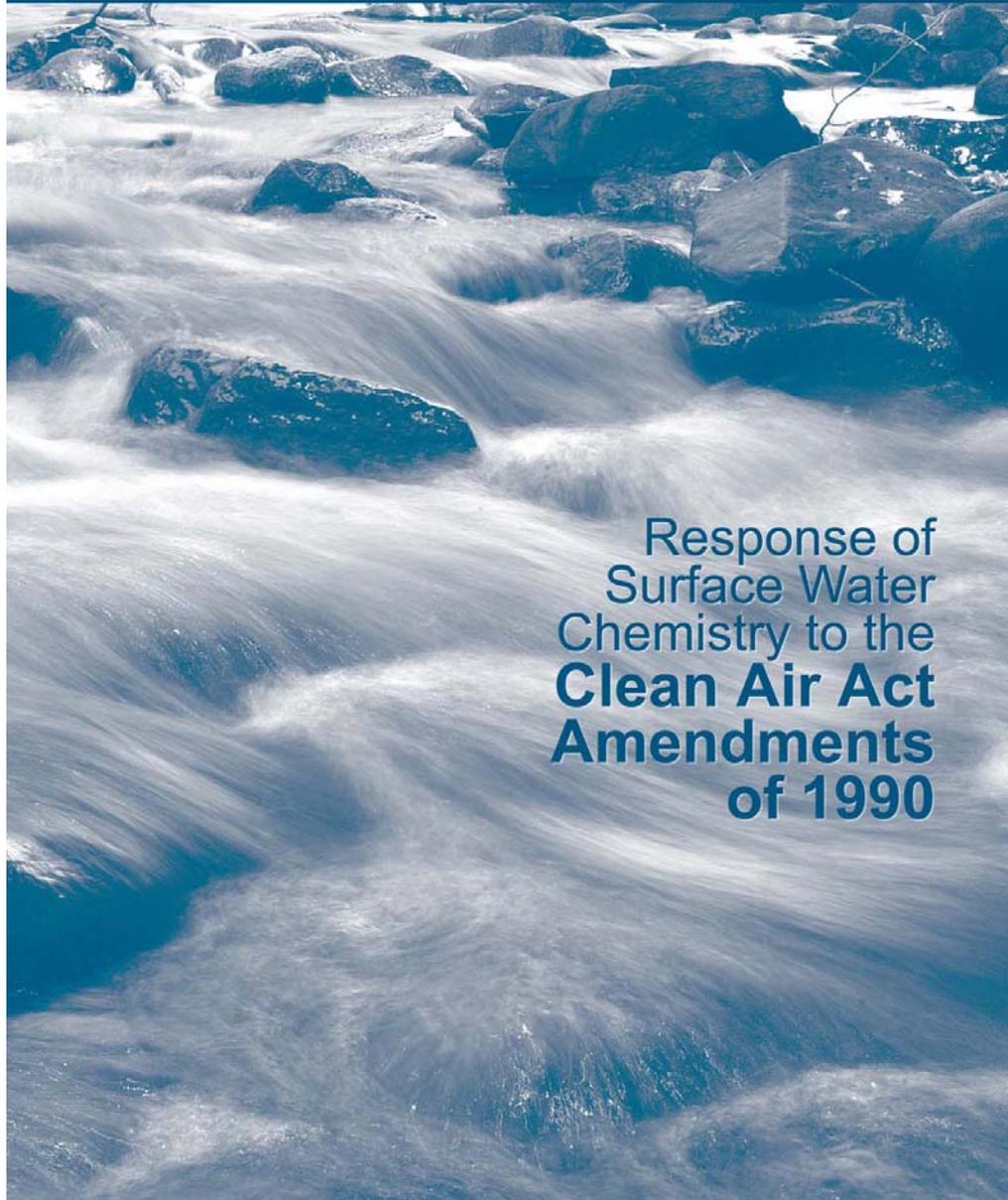
Blending Different Approaches

- Acidification – Northeastern US
- National Eutrophication Survey

Clean Air Act Amendments of 1990

Goal of Title IV:

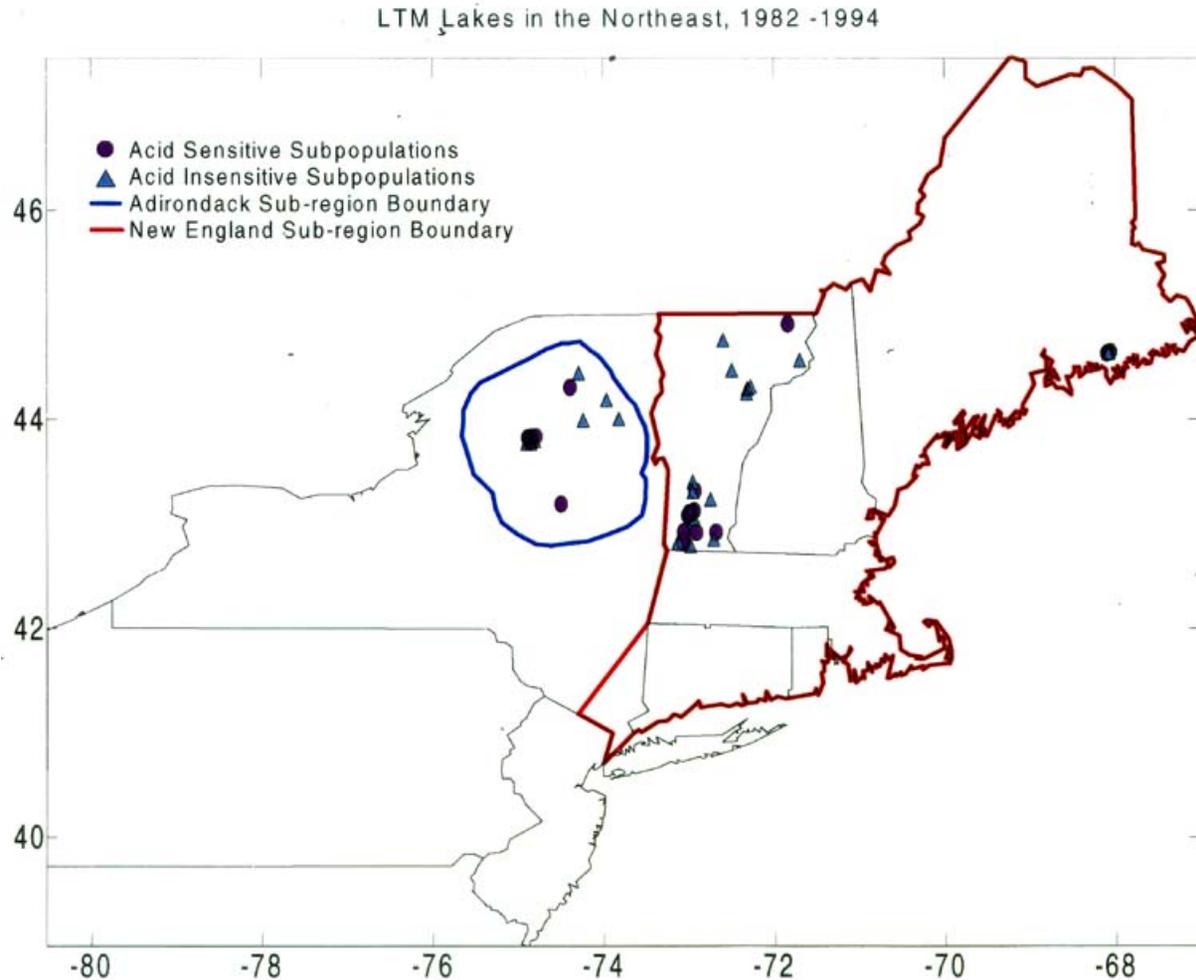
“reduce the adverse effects of acid deposition through reductions in annual emissions of sulfur dioxide of ten million tons from 1980 emission levels, and . . . of nitrogen oxides emissions of approximately two million tons from 1980 emission levels.”



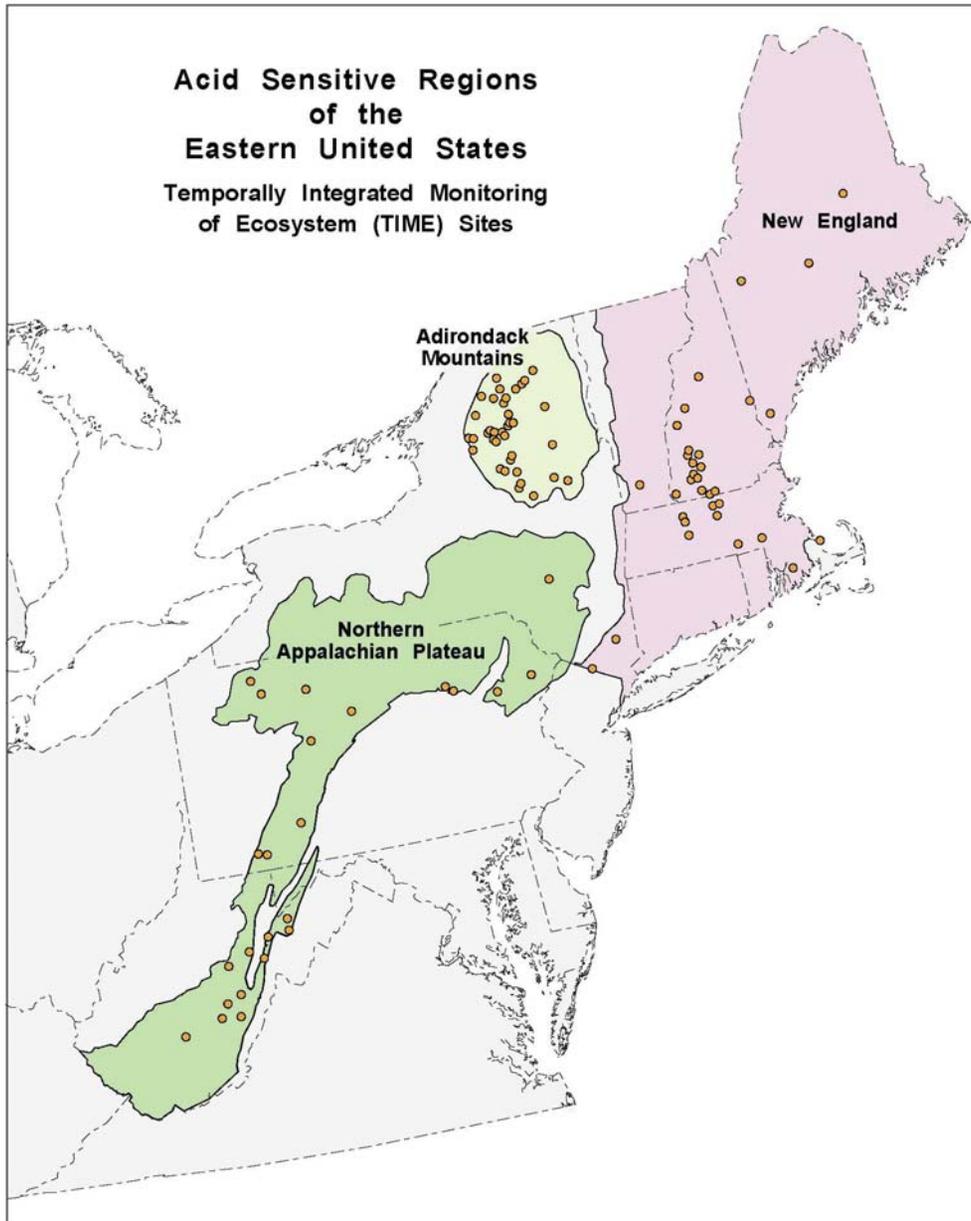
Response of Surface Water Chemistry to the **Clean Air Act Amendments of 1990**



Early Efforts in Monitoring



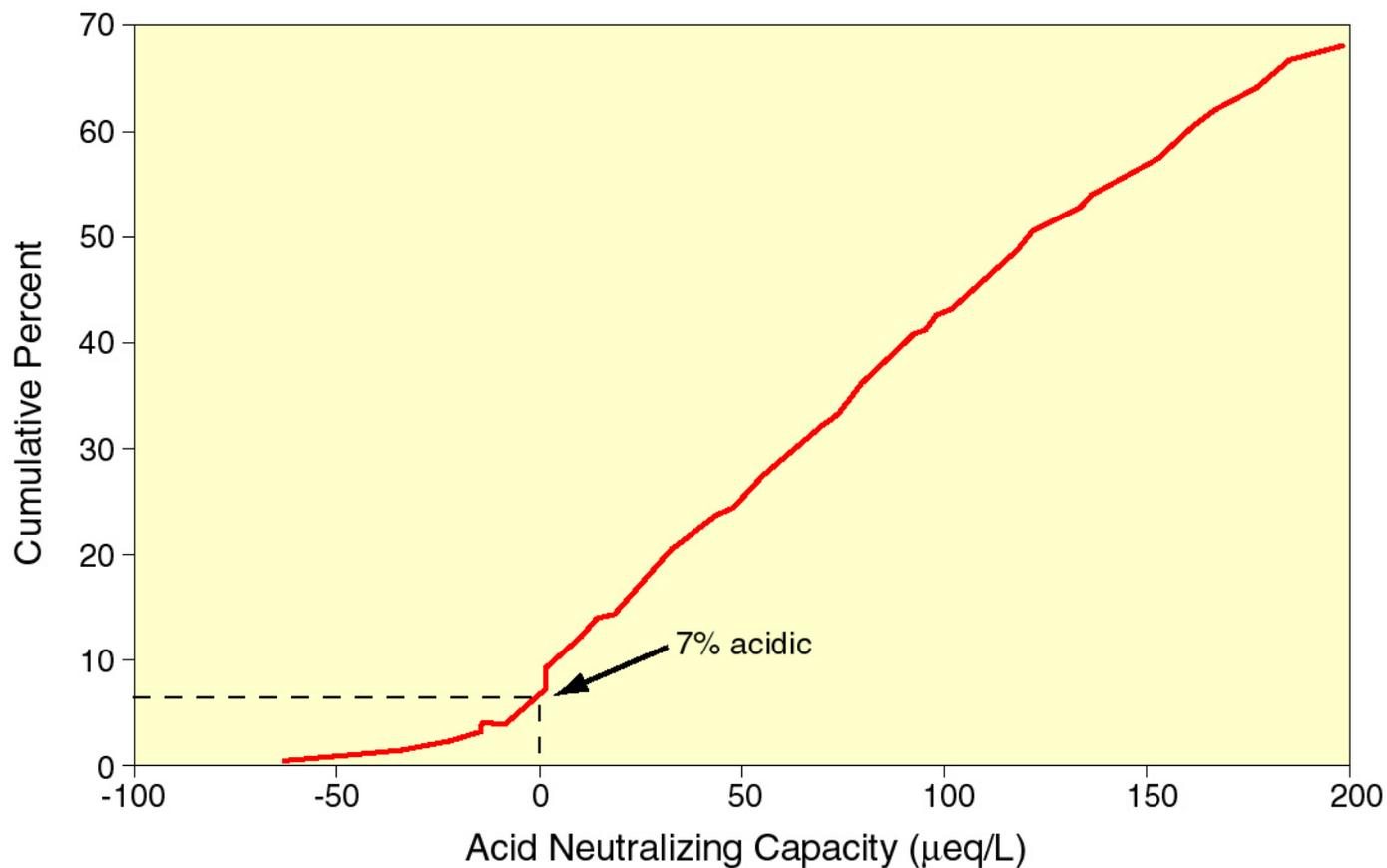
Acid Sensitive Regions - TIME



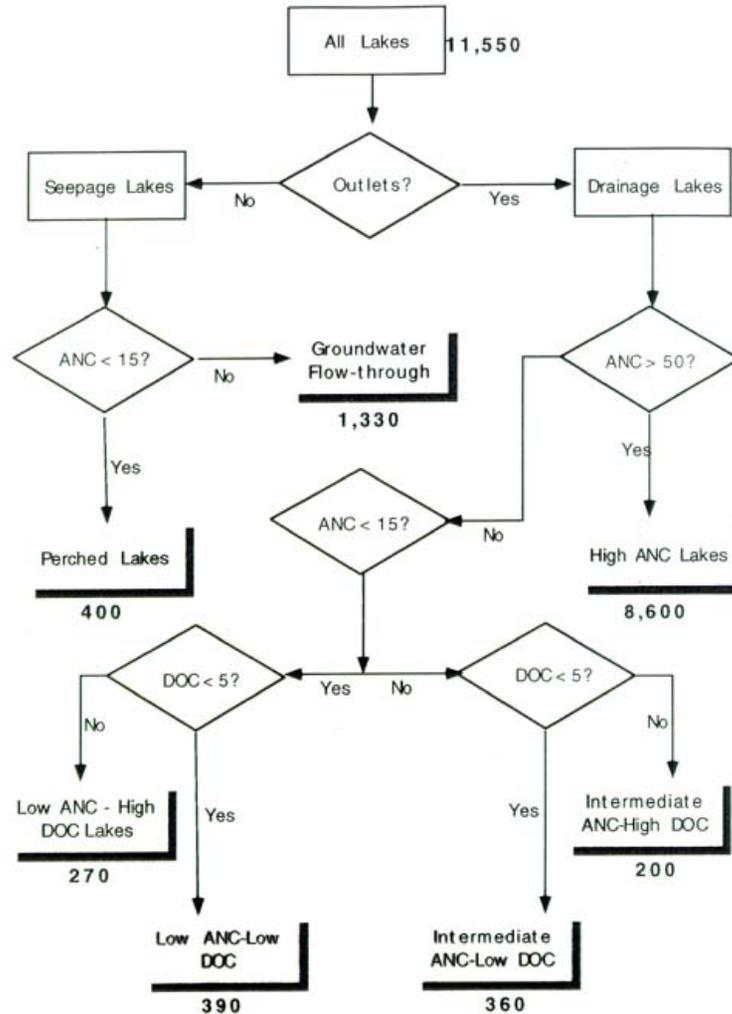
- All sites chosen with probability design
- Northeast lake data since 1991
- Mid-Atlantic stream data since 1993

Survey Results

Proportion of Chronically Acidic Northeast Lakes

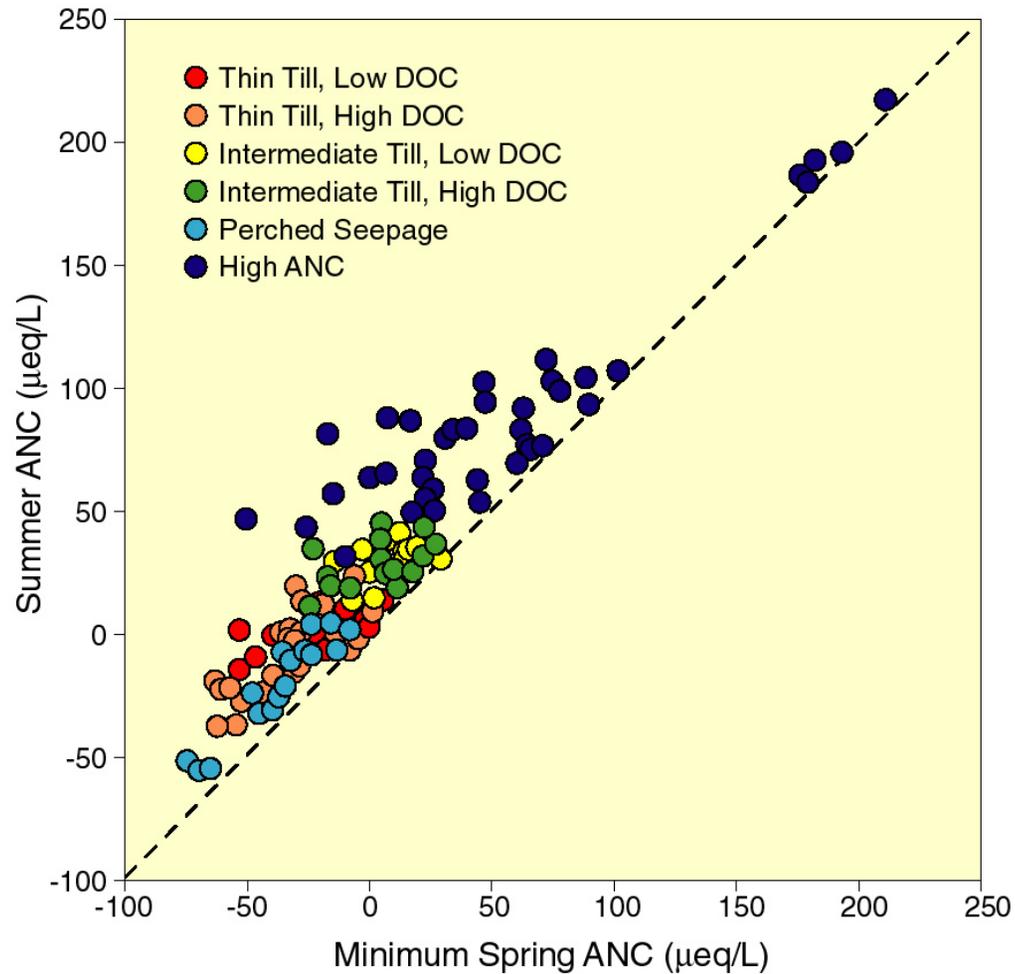


Classification of Sensitive Systems



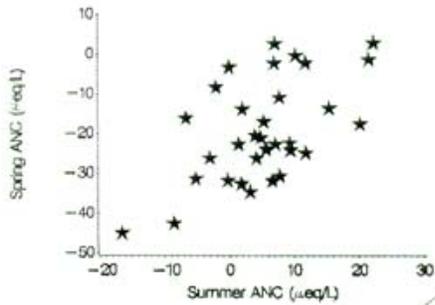
Simple Modeling

Spring vs. Summer ANC

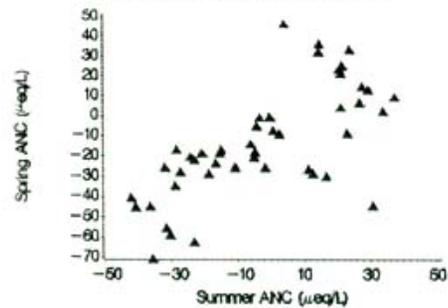


Modeling within Classes

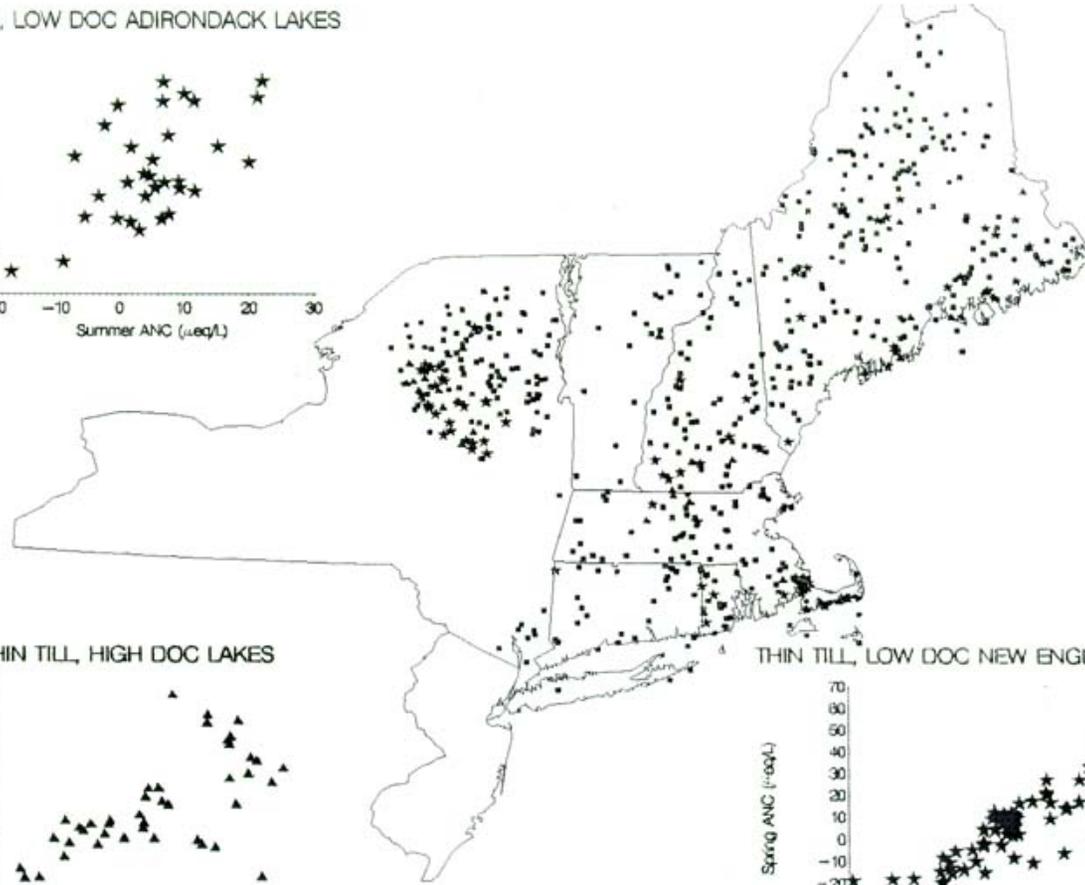
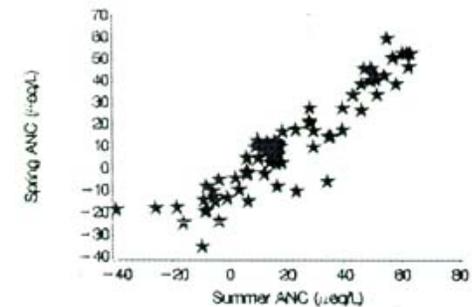
THIN TILL, LOW DOC ADIRONDACK LAKES



THIN TILL, HIGH DOC LAKES

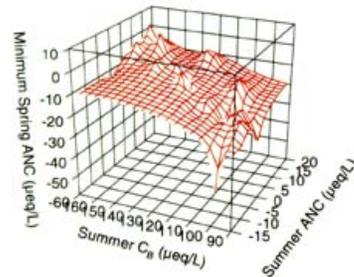


THIN TILL, LOW DOC NEW ENGLAND LAKES

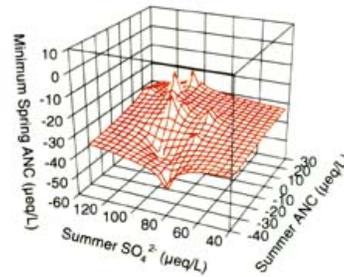


Complex Modeling

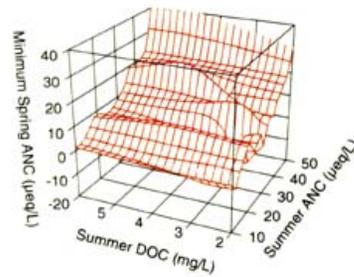
Low ANC, Low DOC



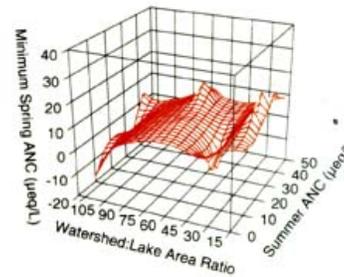
Low ANC, High DOC



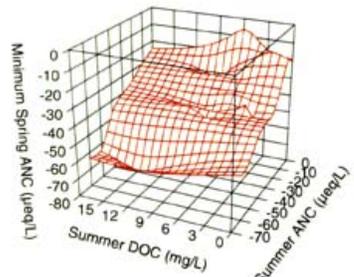
Intermediate ANC, Low DOC



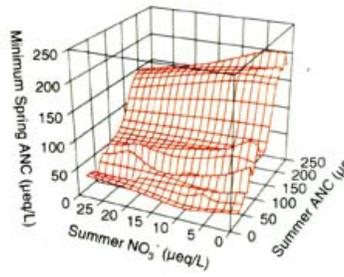
Intermediate ANC, High DOC



Seepage

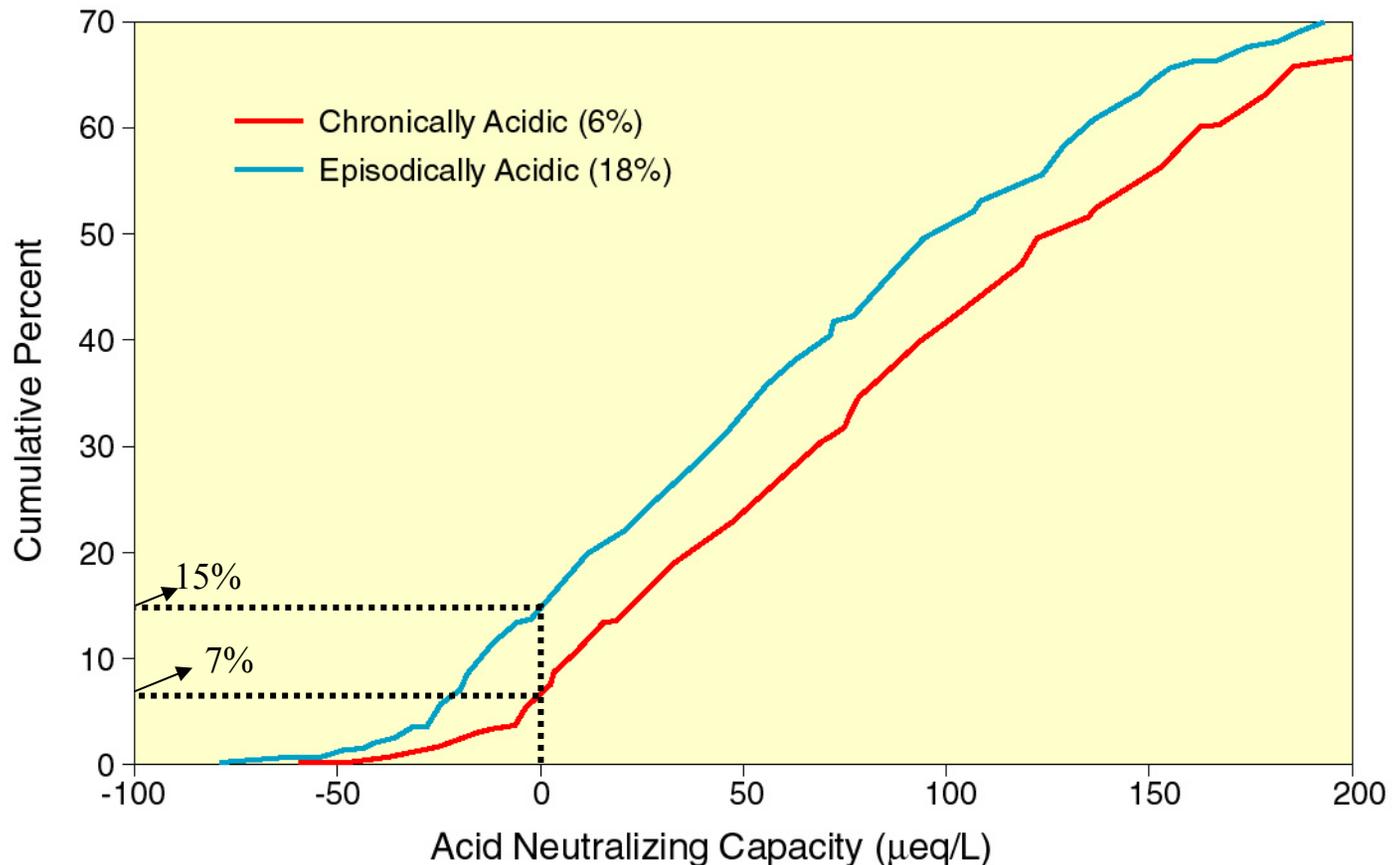


High ANC



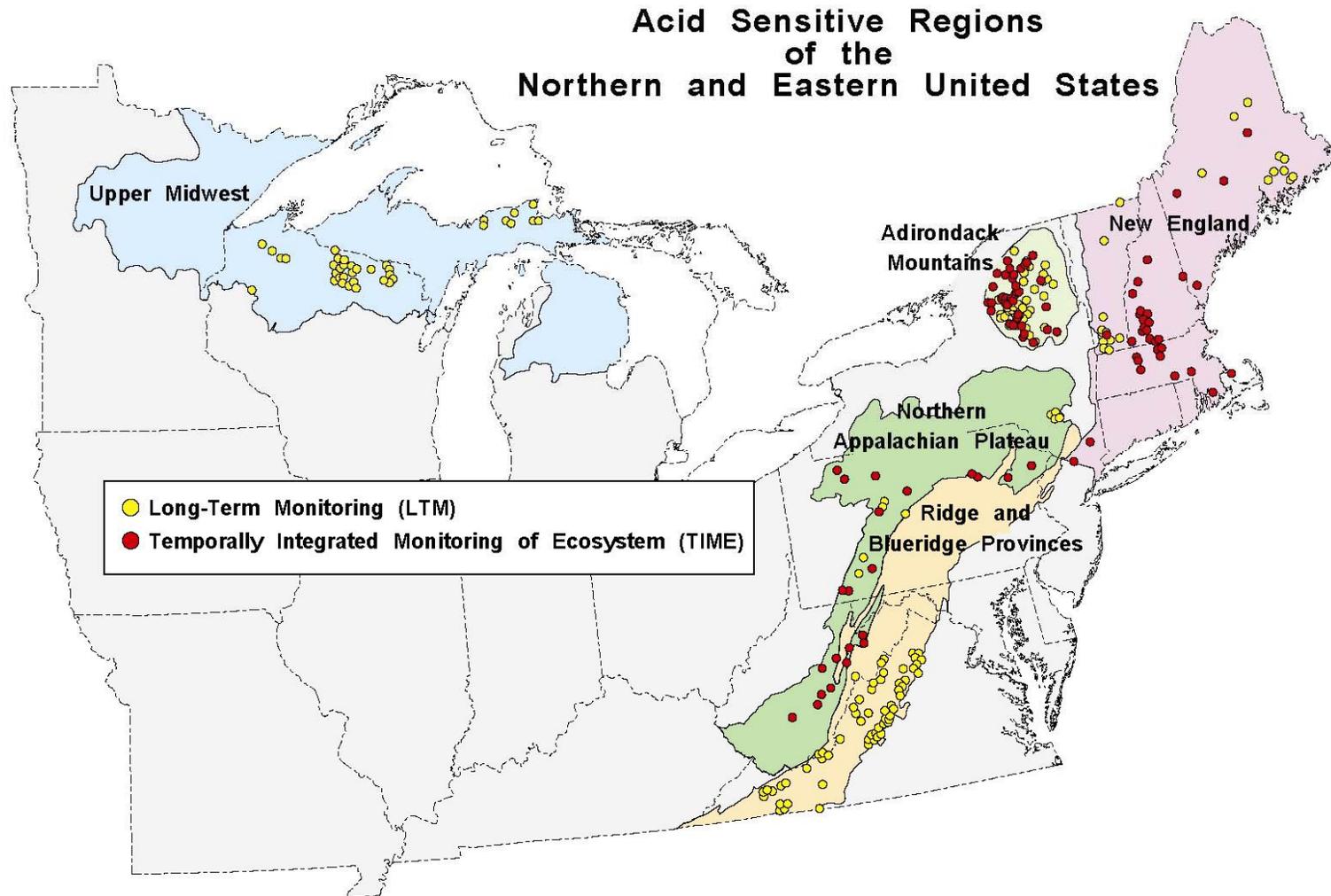
Survey Estimates + Modeled Estimates

Proportion of Chronically and Episodically Acidic Northeast Lakes
(episodic proportion modeled from LTM data)

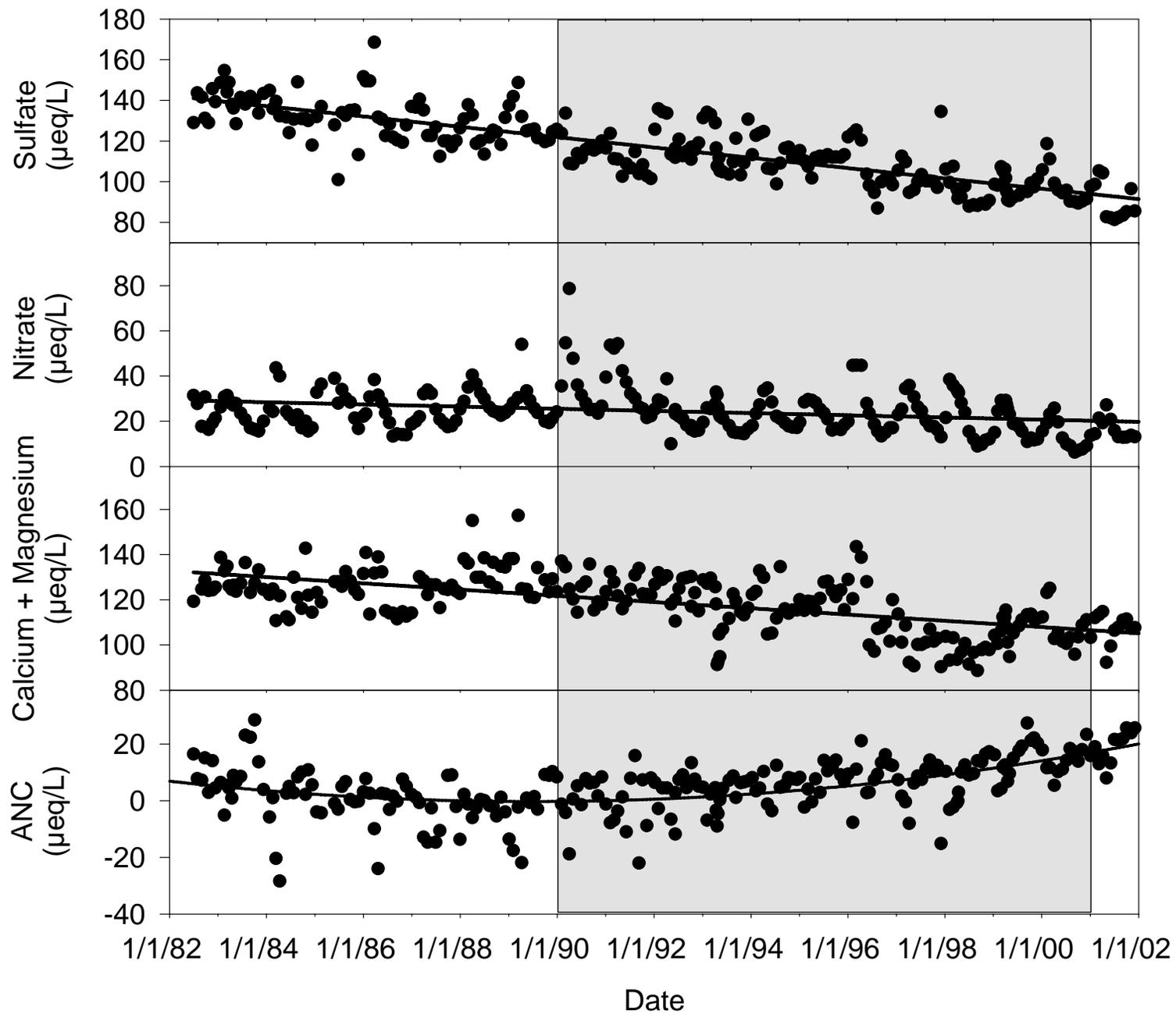


TIME/LTM Monitoring Network

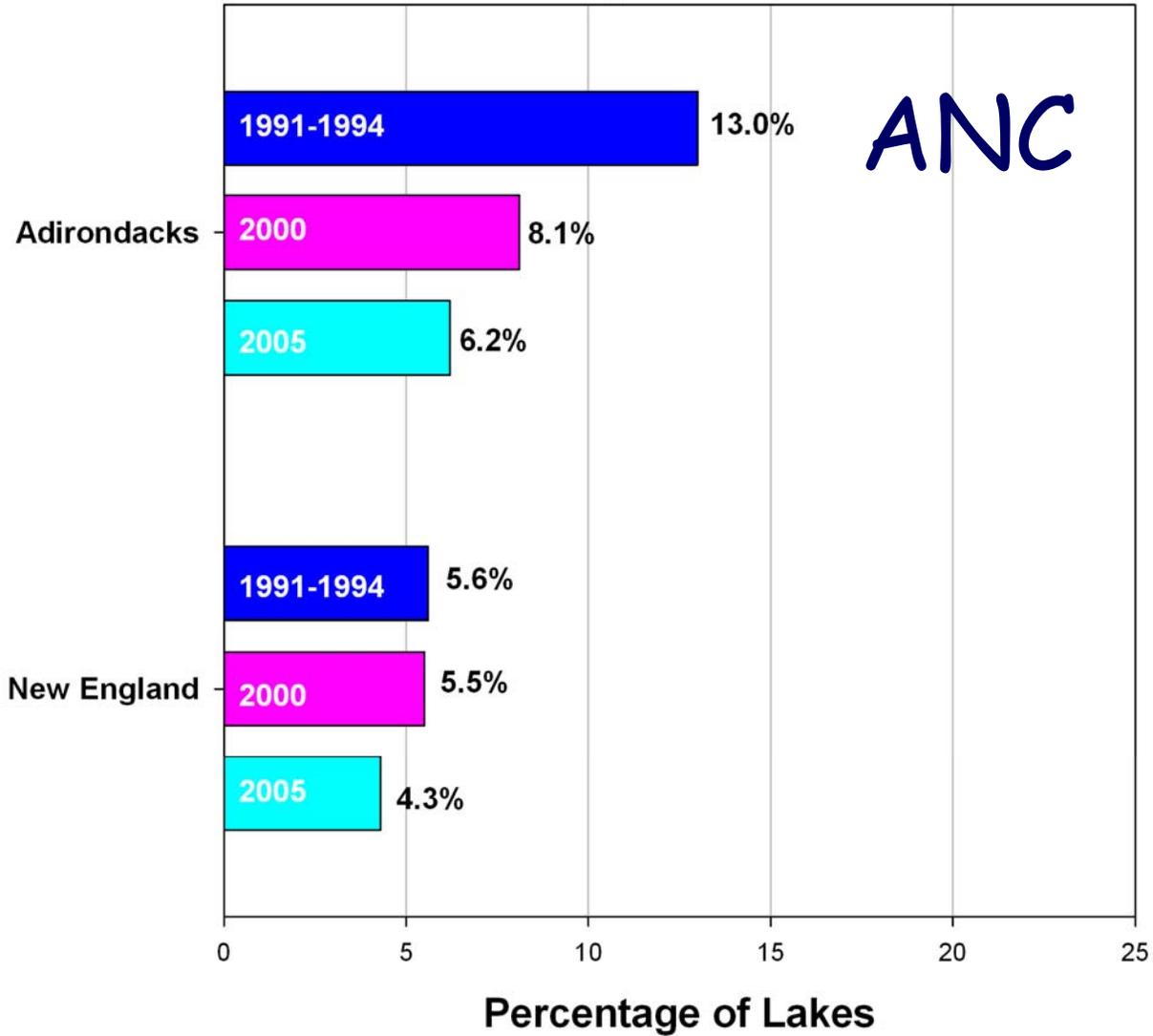
surface water monitoring in all acid-sensitive regions of the U.S.



Darts Lake (Adirondacks)



Percentage of Acidic Lakes

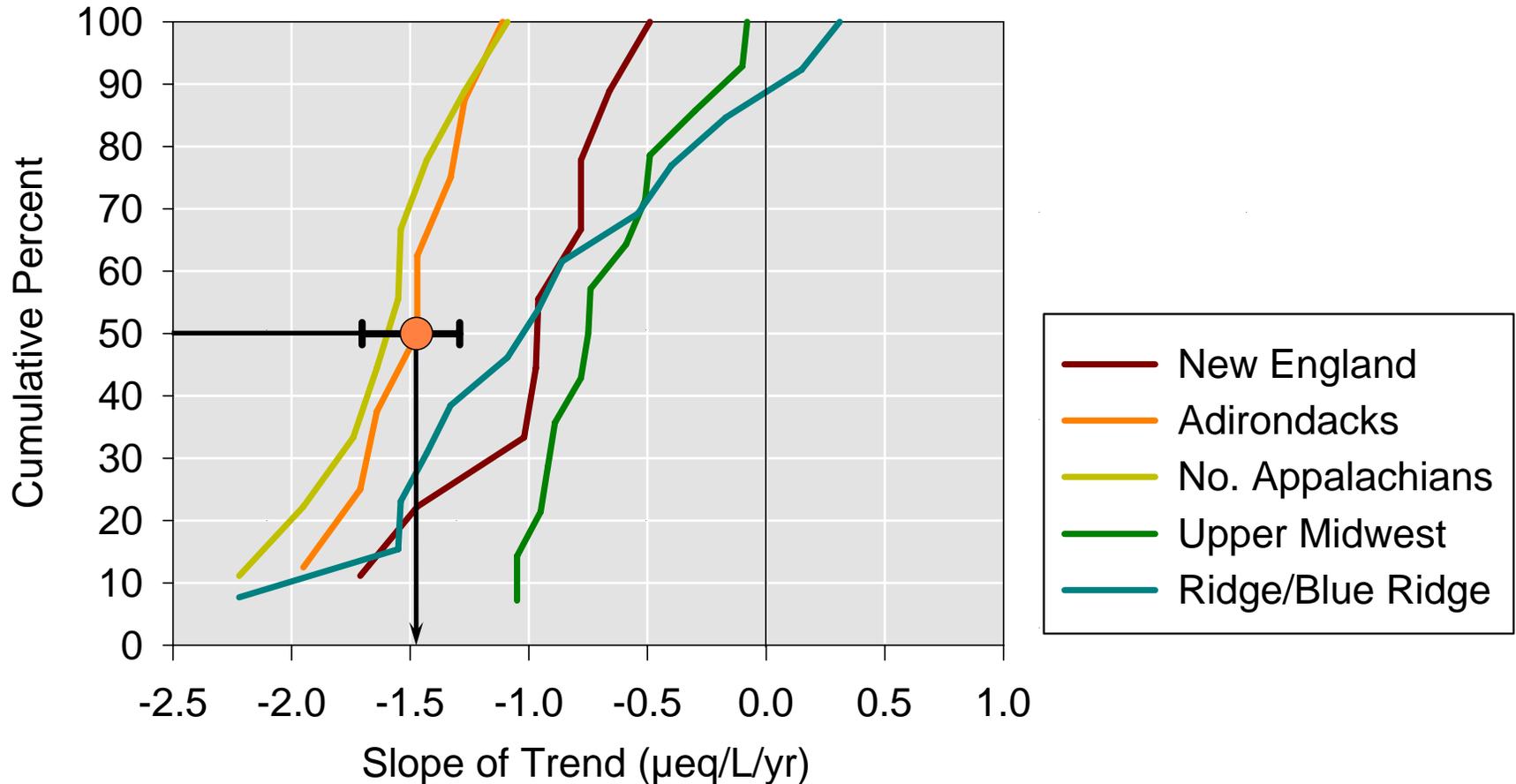


If you get creative...

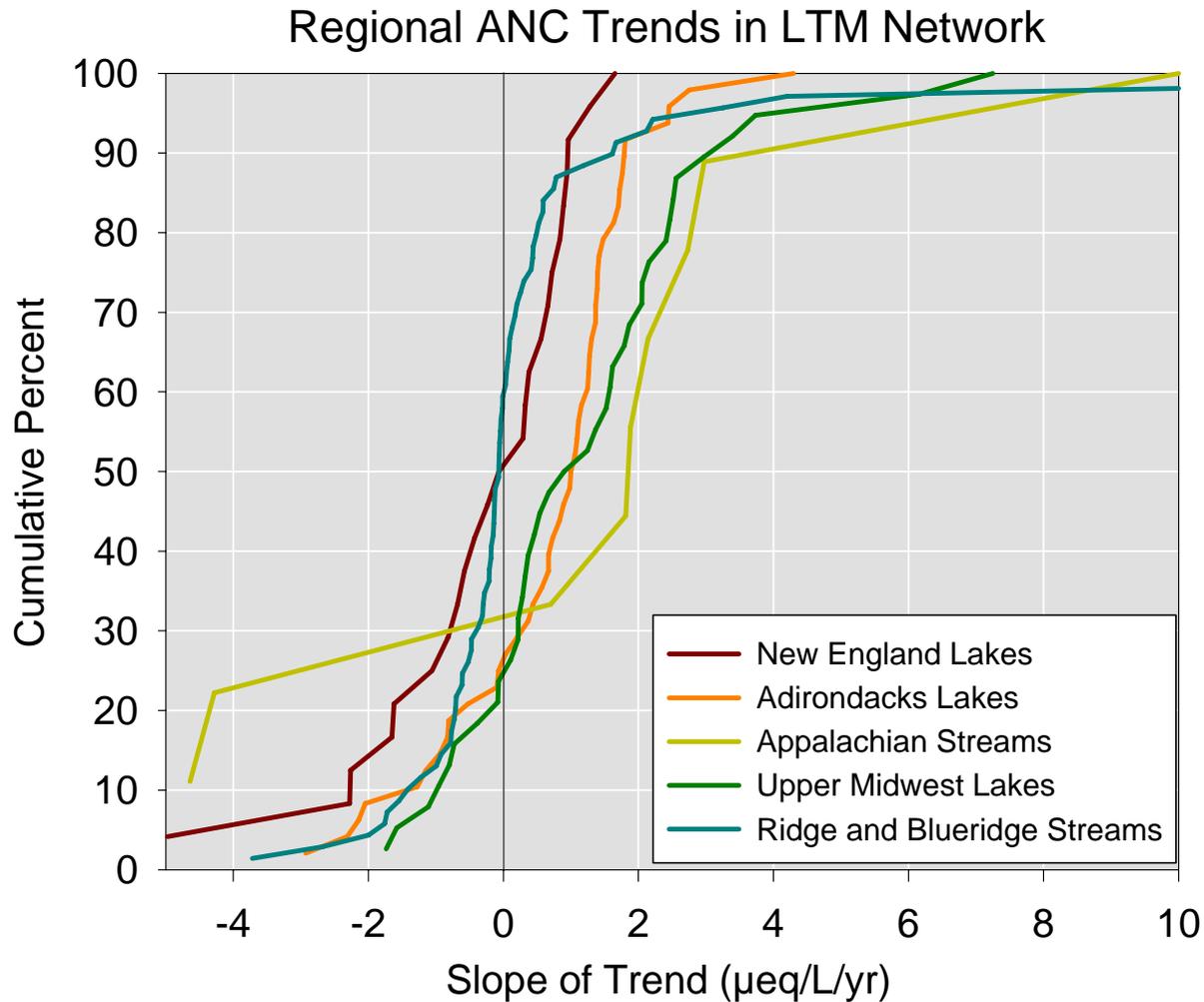
- Monitor same sites or subset of sites every year...your reporting options increase...

Sulfur Deposition

Sulfate Concentration Trends in Wet Deposition



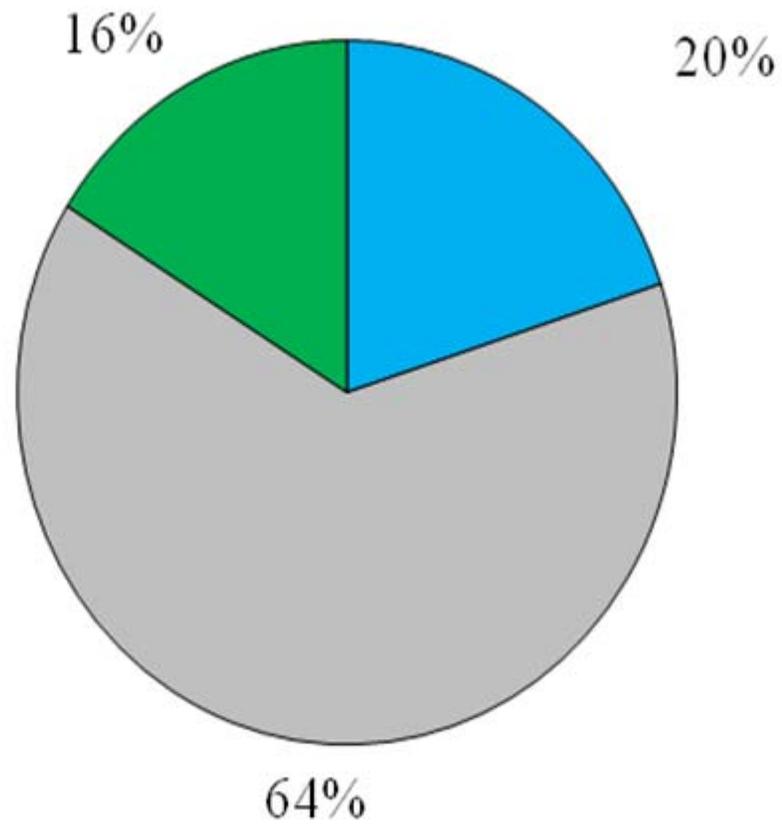
ANC Trends in TIME/LTM Regions



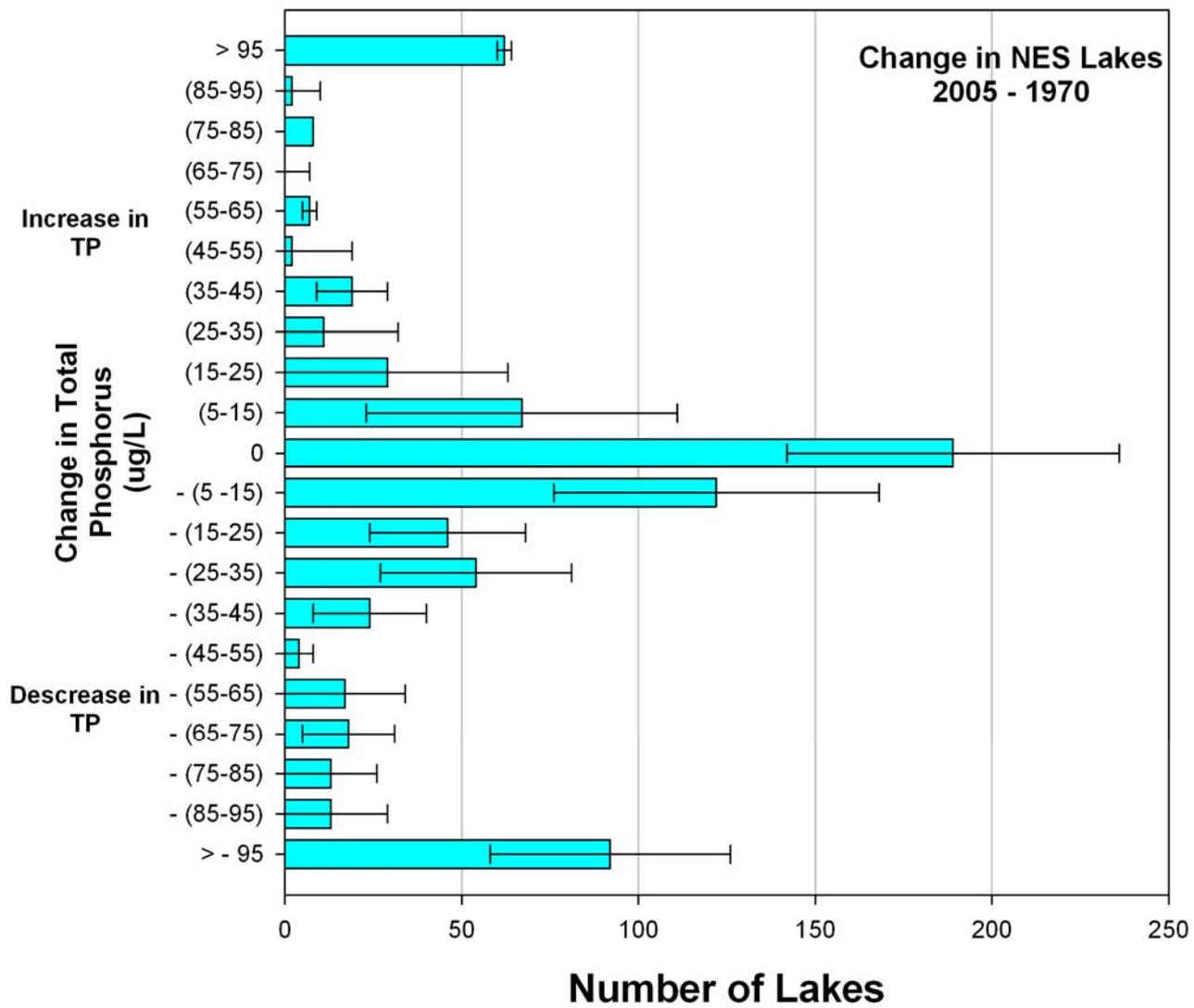
National Eutrophication Survey – Revisited

- Early 1970 – survey of ~ 800 lakes
- Hand selected – treatment plant on lake or within specified distance of lake
- 2005 – National Lake Survey – selected random subset of NES to include
- Evaluated change for this subset to infer change for NES “population” of lakes

		Trophic state determined from NLA				Total improved ↓
		Hypereutrophic	Eutrophic	Mesotrophic	Oligotrophic	
Trophic state determined from NES	↓Trophic state→					
	Hypereutrophic	245	56	25	7	160
	Eutrophic	28	81	31	26	
	Mesotrophic	7	46	26	15	
	Oligotrophic	0	2	46	158	Total unchanged ↓
Total degraded→	129			510		



■ Improved ■ Unchanged ■ Degraded



Lessons, Challenges, Opportunities

- Value in multiple approaches
- How to strategically blend the pieces while still recognizing contributions of individual pieces
- Potential huge upsides – also some risks