



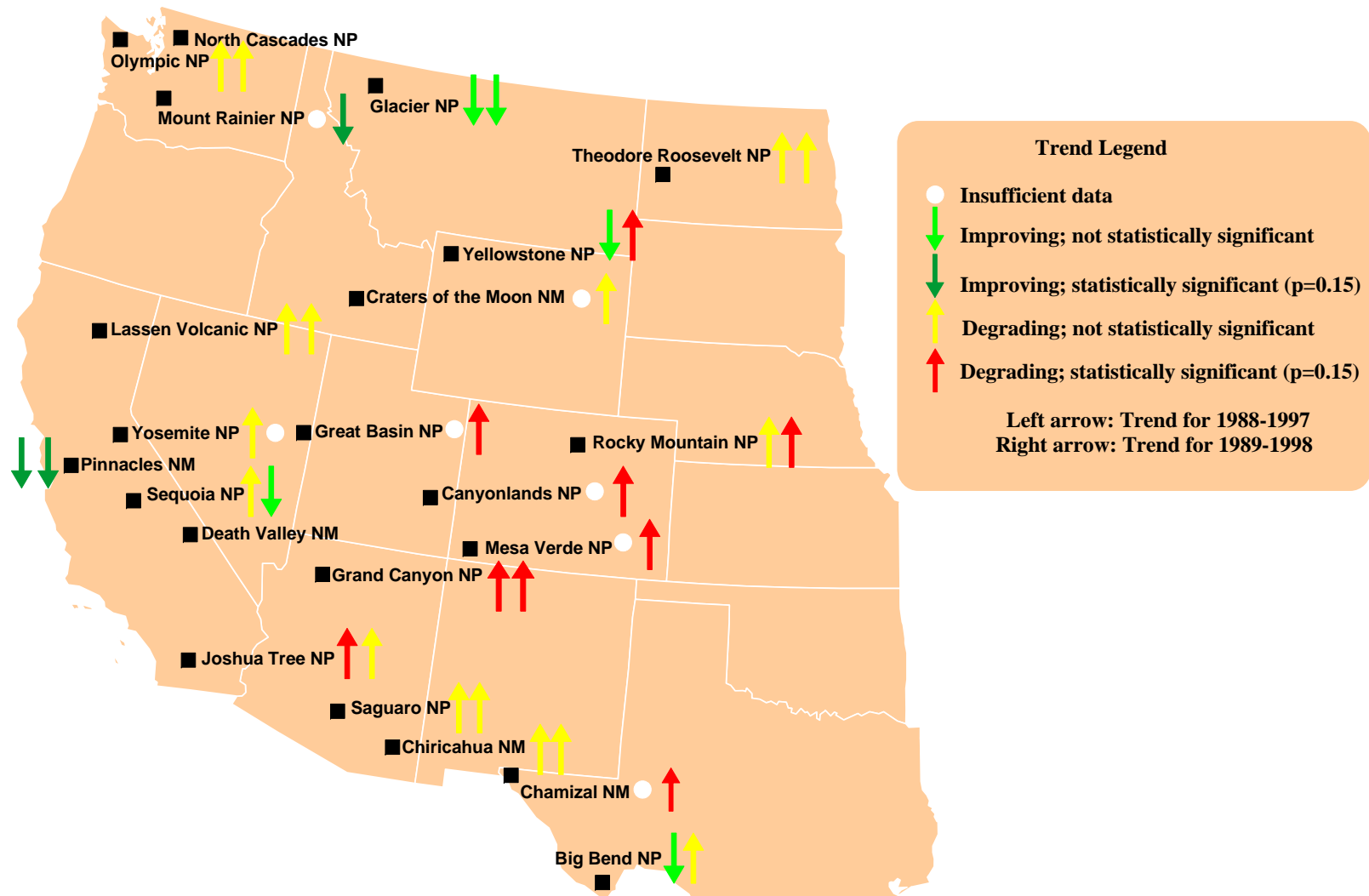
Air Quality Trends in National Parks

- Mike George, National Park Service
December 7, 2004



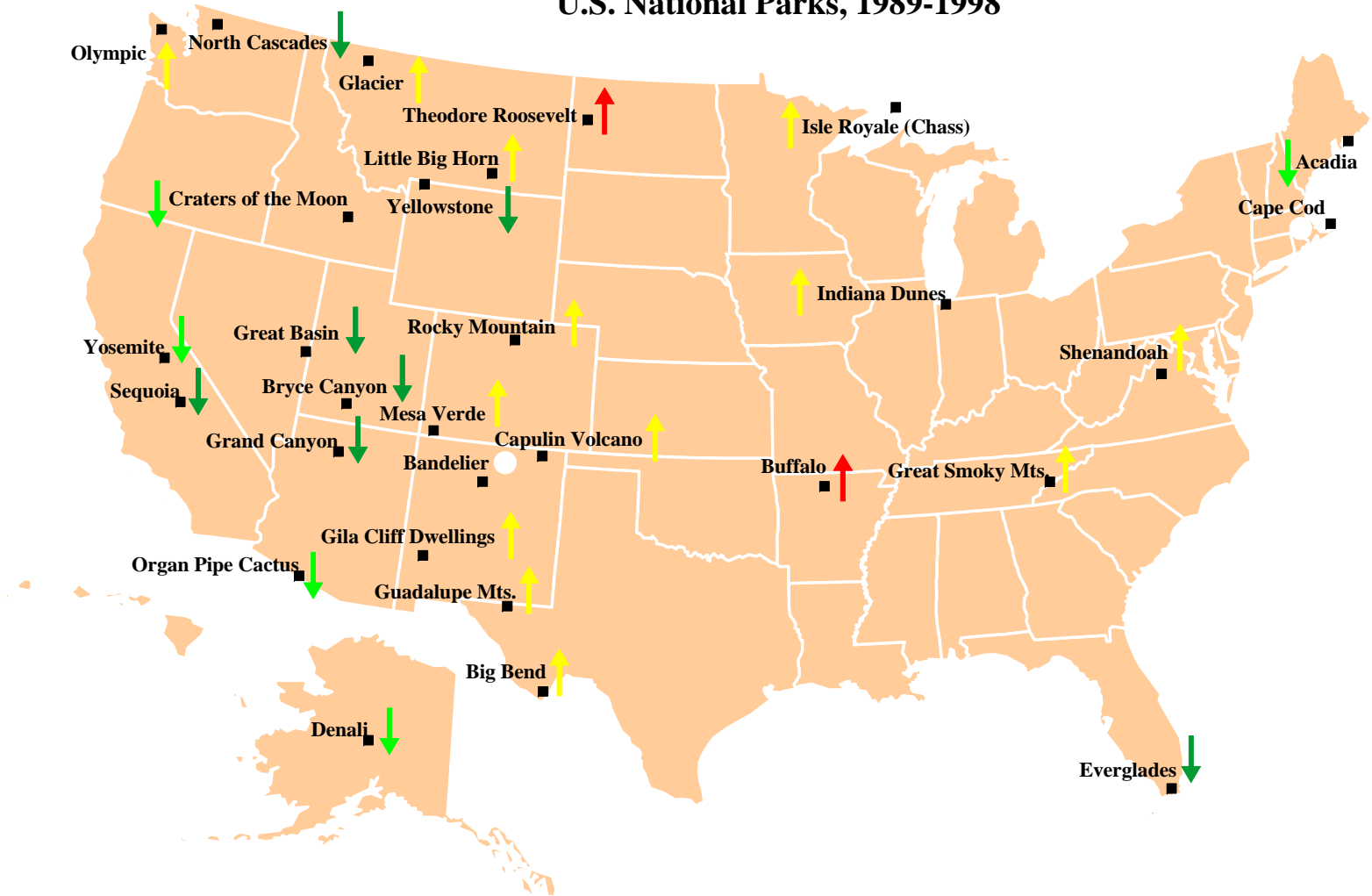
Trend Analysis

- One of the goals of the Interagency Monitoring of Protected Visual Environments (IMPROVE) & NPS criteria monitoring is tracking trends.
- Have been assessing trends since 1995 as performance measure.

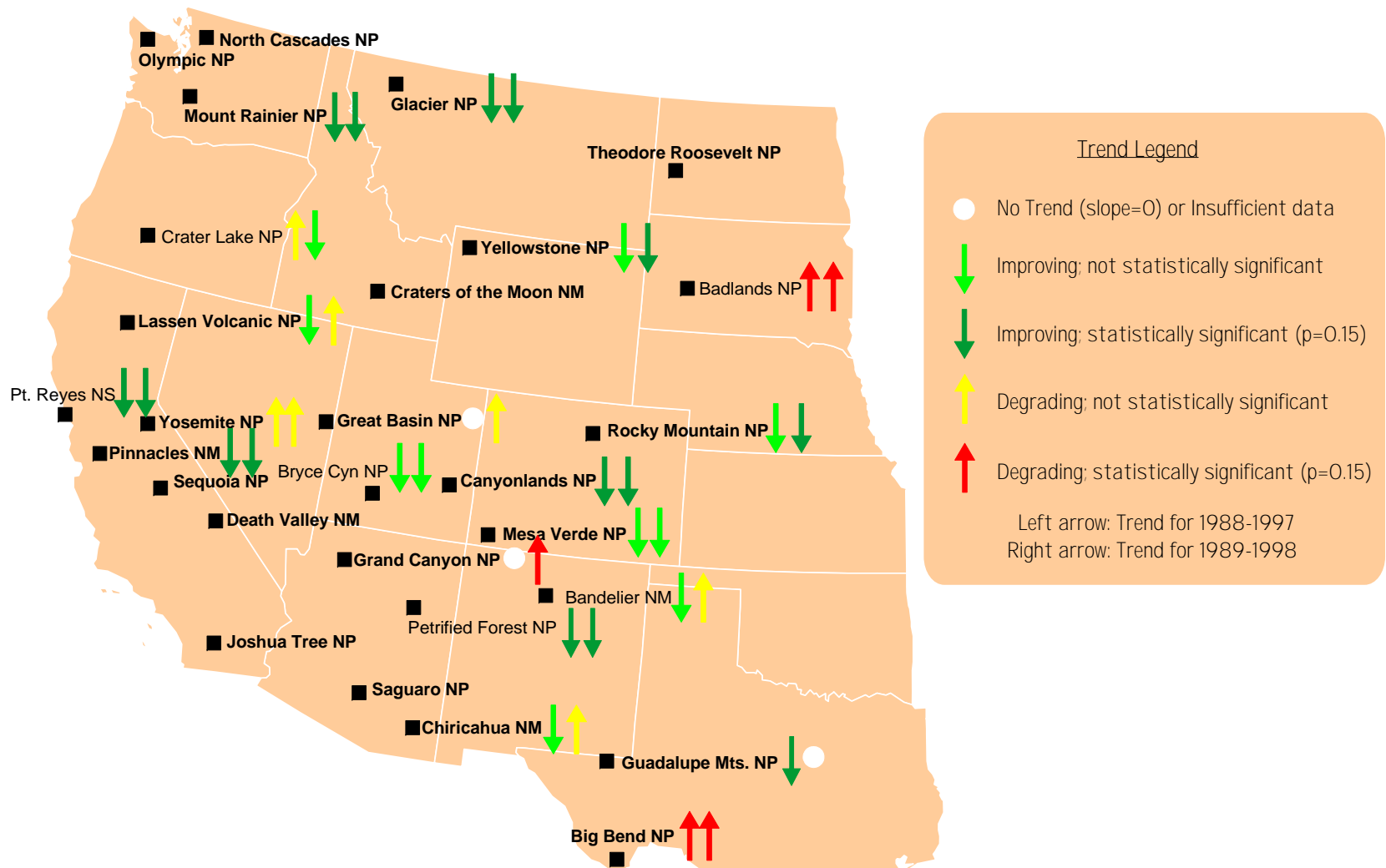


**Ozone Trends in Western National Parks
1988-1997 (Left Arrow) v. 1989-1998 (Right Arrow)
(based on average of daily maxima, May-Sep)**

Trends in Annual Nitrate Concentrations (ueq/l) in Precipitation U.S. National Parks, 1989-1998



Statistically significant Degradation (p <= 0.15)	Statistically significant Improvement (p <= 0.15)
Degradation Not statistically significant	Improvement Not statistically significant
No Trend or Insufficient Data	



**Visibility Trends for Dirtiest Days in Western National Parks
1988-1997 (Left Arrow) v. 1989-1998 (Right Arrow)
(based on Preliminary Data)**



Trend Analysis

- Analysis from late 1990's:
 - Ozone increasing in the Intermountain West
 - Nitrate trending toward increasing
 - Visibility declining in a few areas



How Has It Changed?

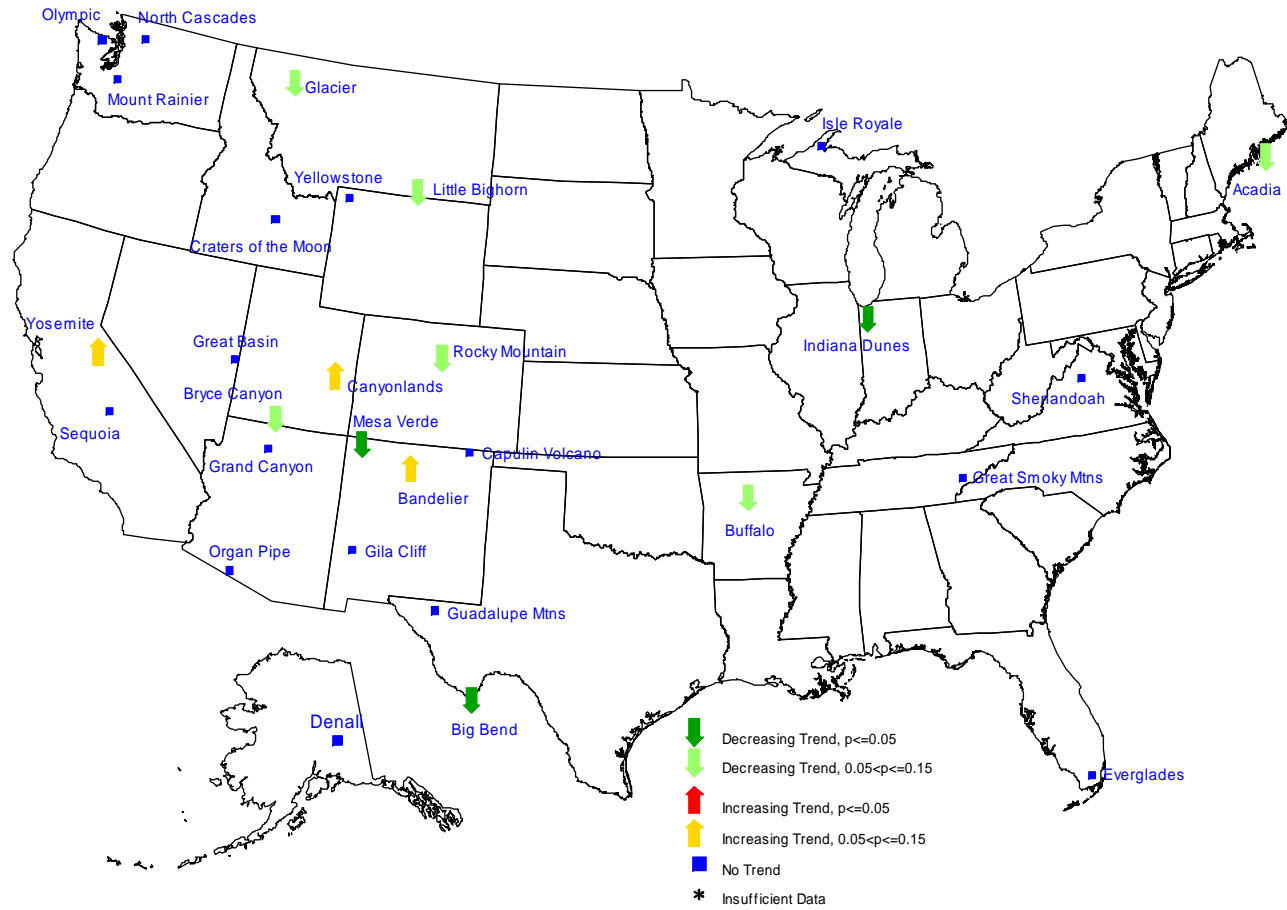
Most Recent Trend Analysis:
1994-2003



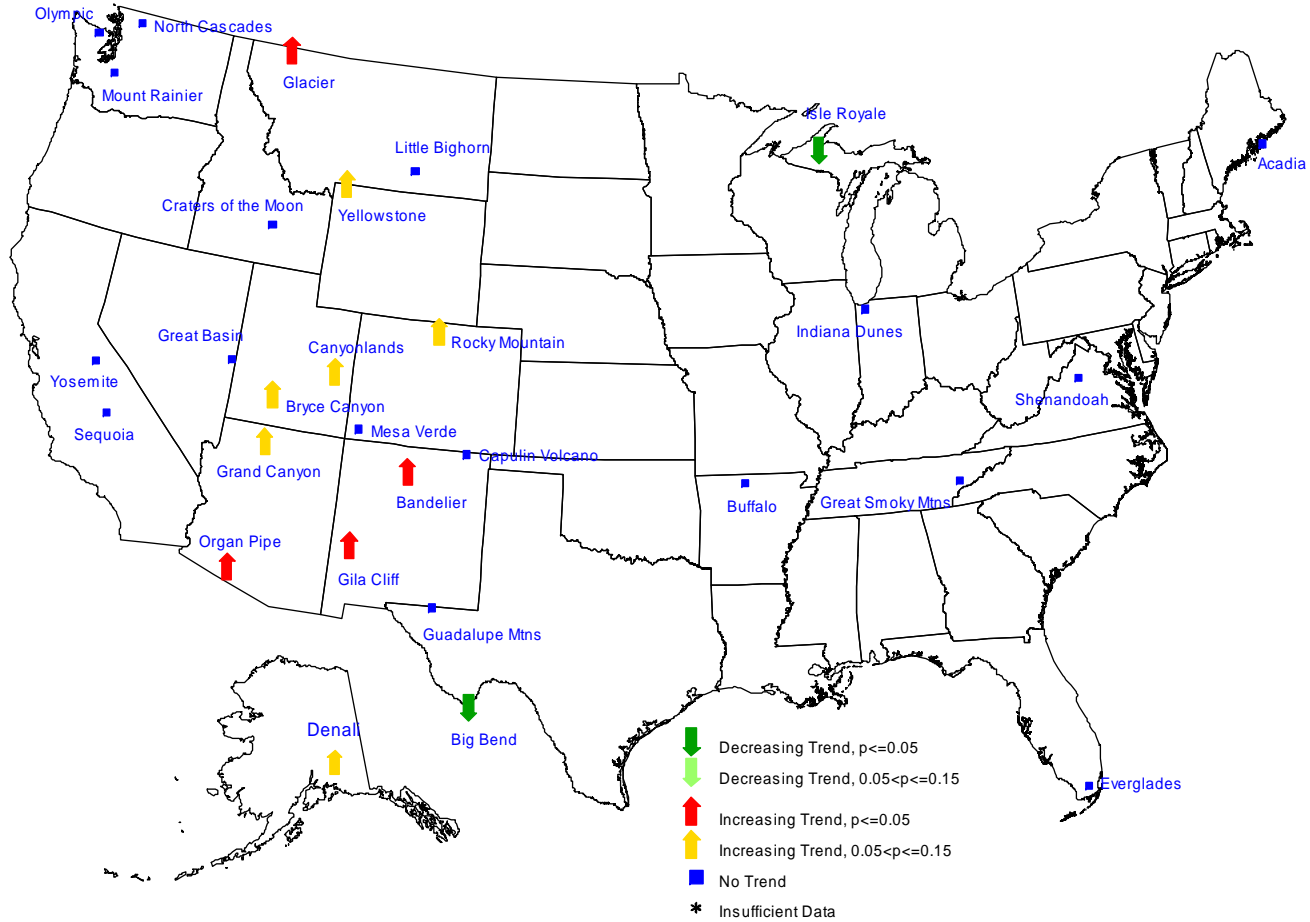
Trend Analysis

- Analysis over sliding ten year period, e.g. 1993-2002 (6 years data minimum, no single baseline year)

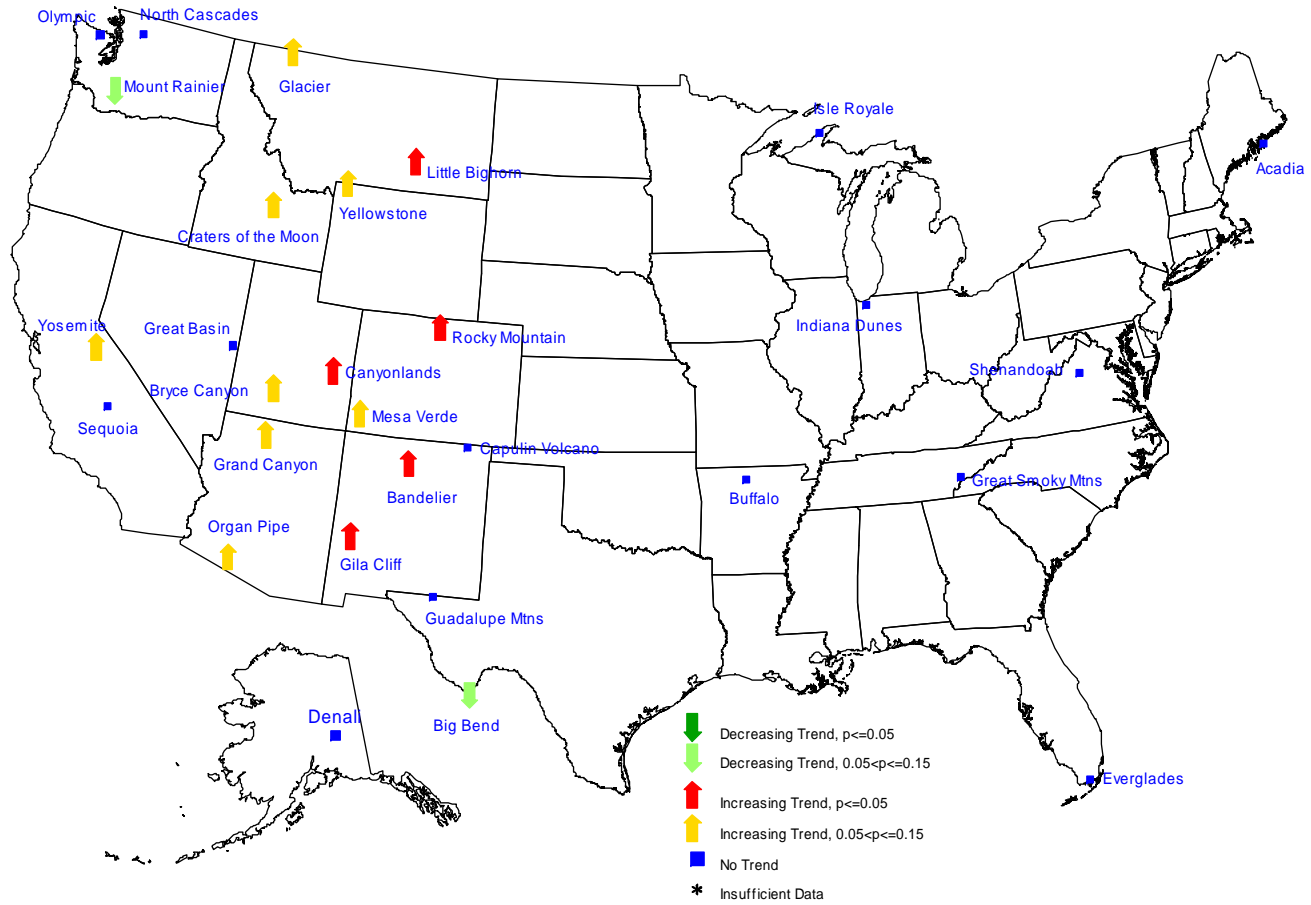
Trends in Annual Sulfate Concentrations in Precipitation, 1994-2003



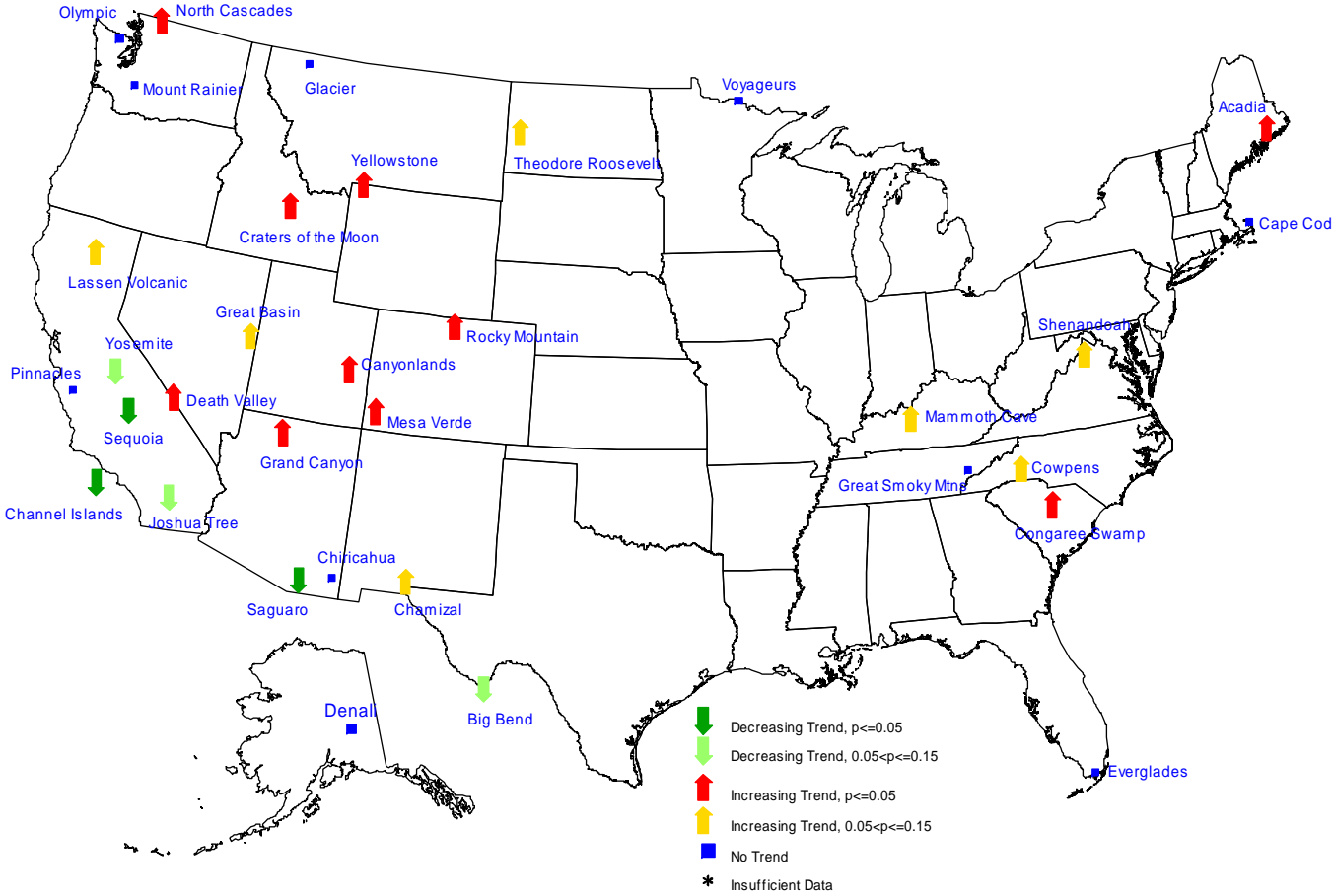
Trends in Annual Nitrate Concentrations in Precipitation, 1994-2003



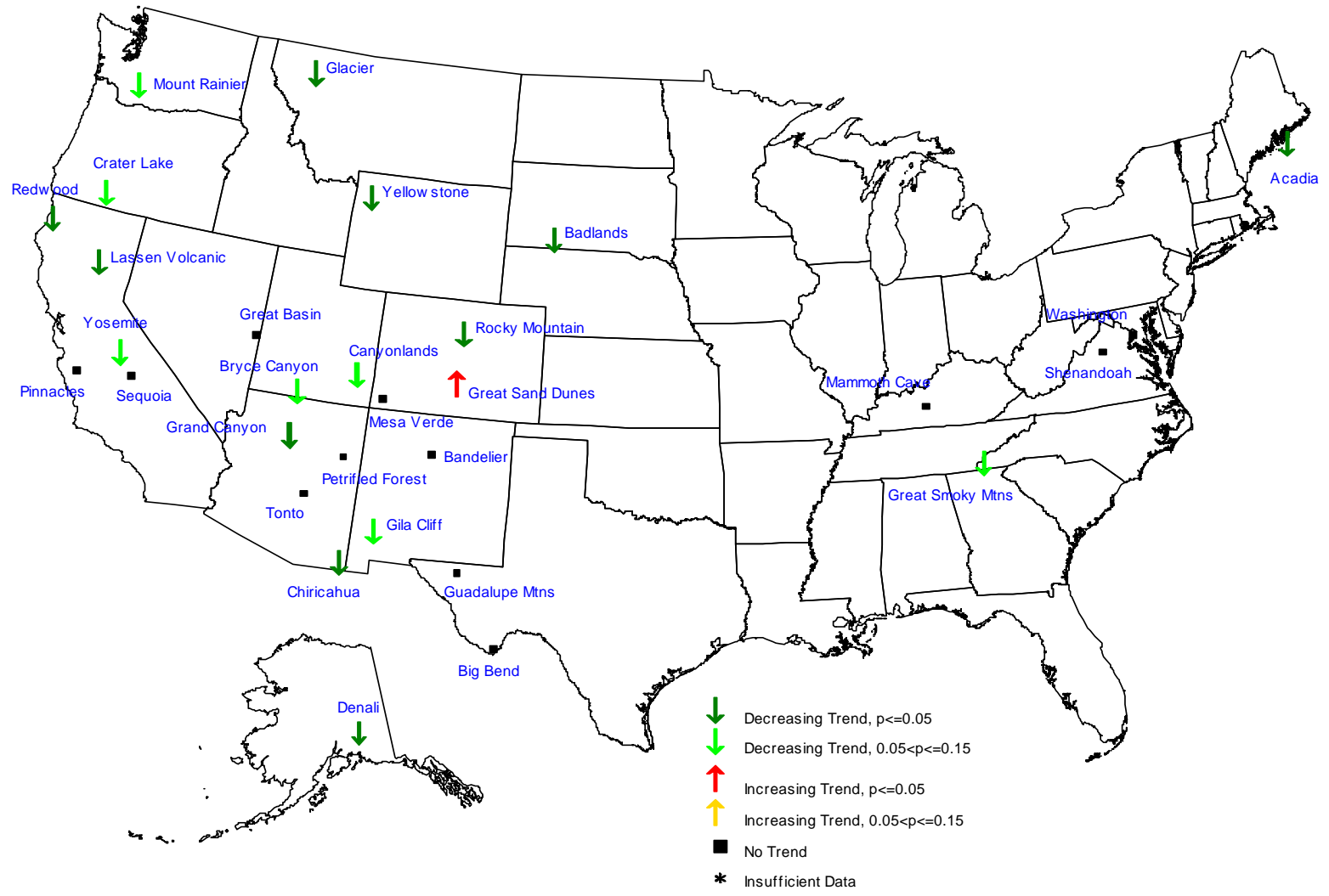
Trends in Annual Ammonium Concentrations in Precipitation, 1994-2003



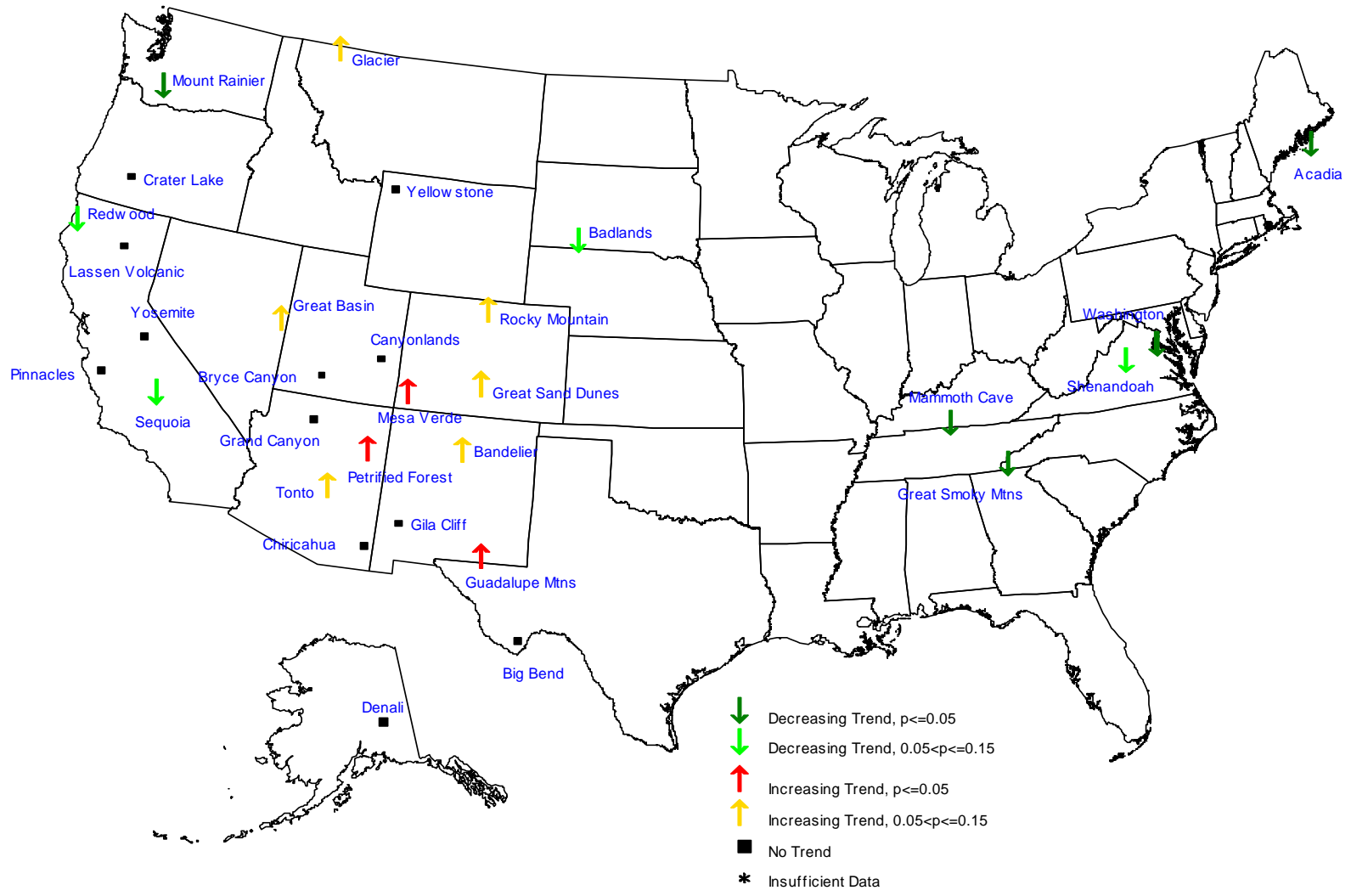
Trends in 3-year Average 4th-Highest 8-Hour Ozone, 1994-2003



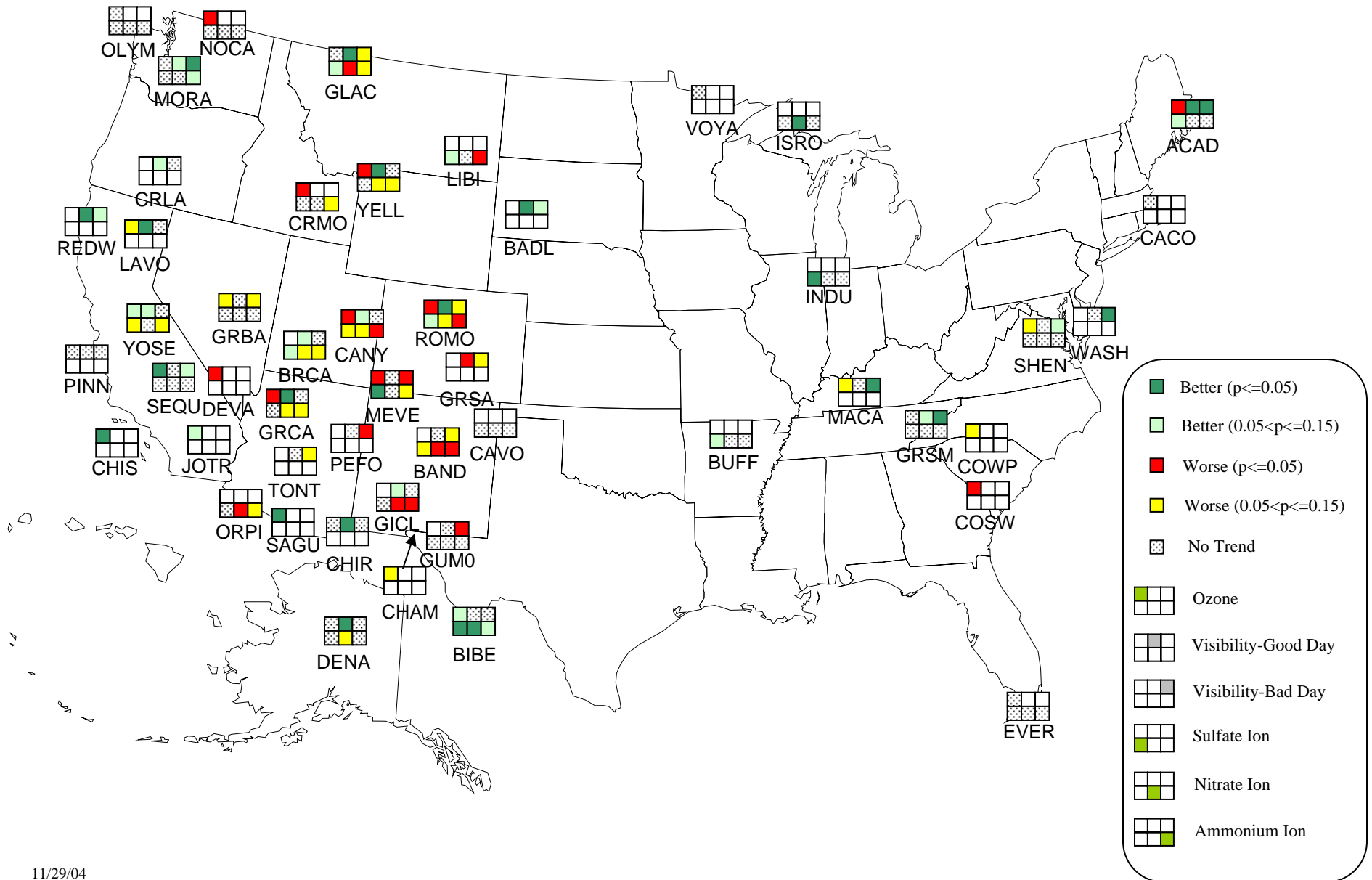
Trends in Deciview on Best Days, 1994-2003



Trends in Deciview on Worst Days, 1994-2003



Air Quality Trends in National Parks, 1994-2003



Trend Analysis

- More recent analysis
 - Ozone still increasing in the Intermountain West
 - Nitrate increasing
 - Visibility generally improving