

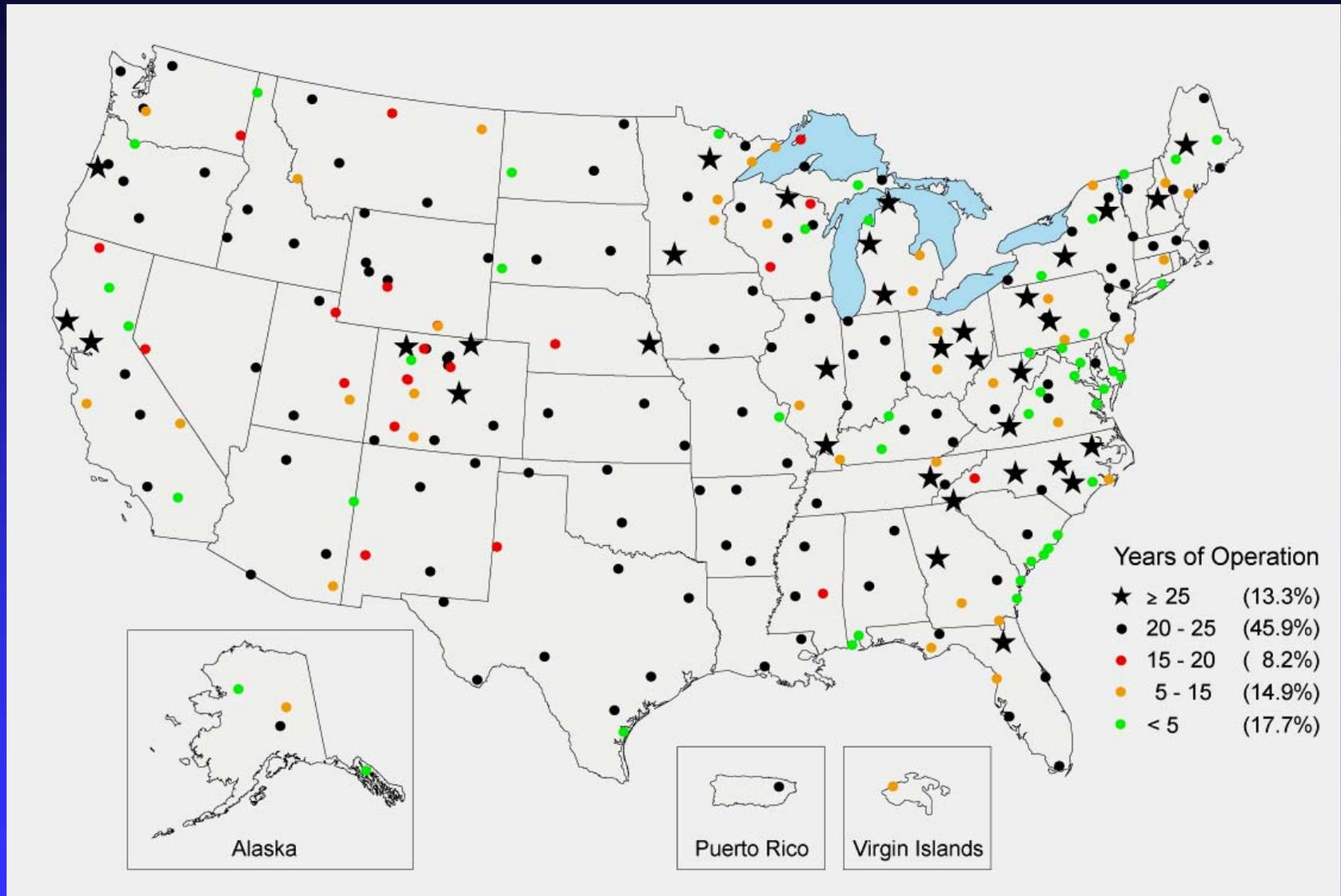
Status and Trends in Wet Atmospheric Deposition of Nitrogen in the United States

Mark Nilles and Amy Ludtke

Office of Water Quality

U.S. Geological Survey

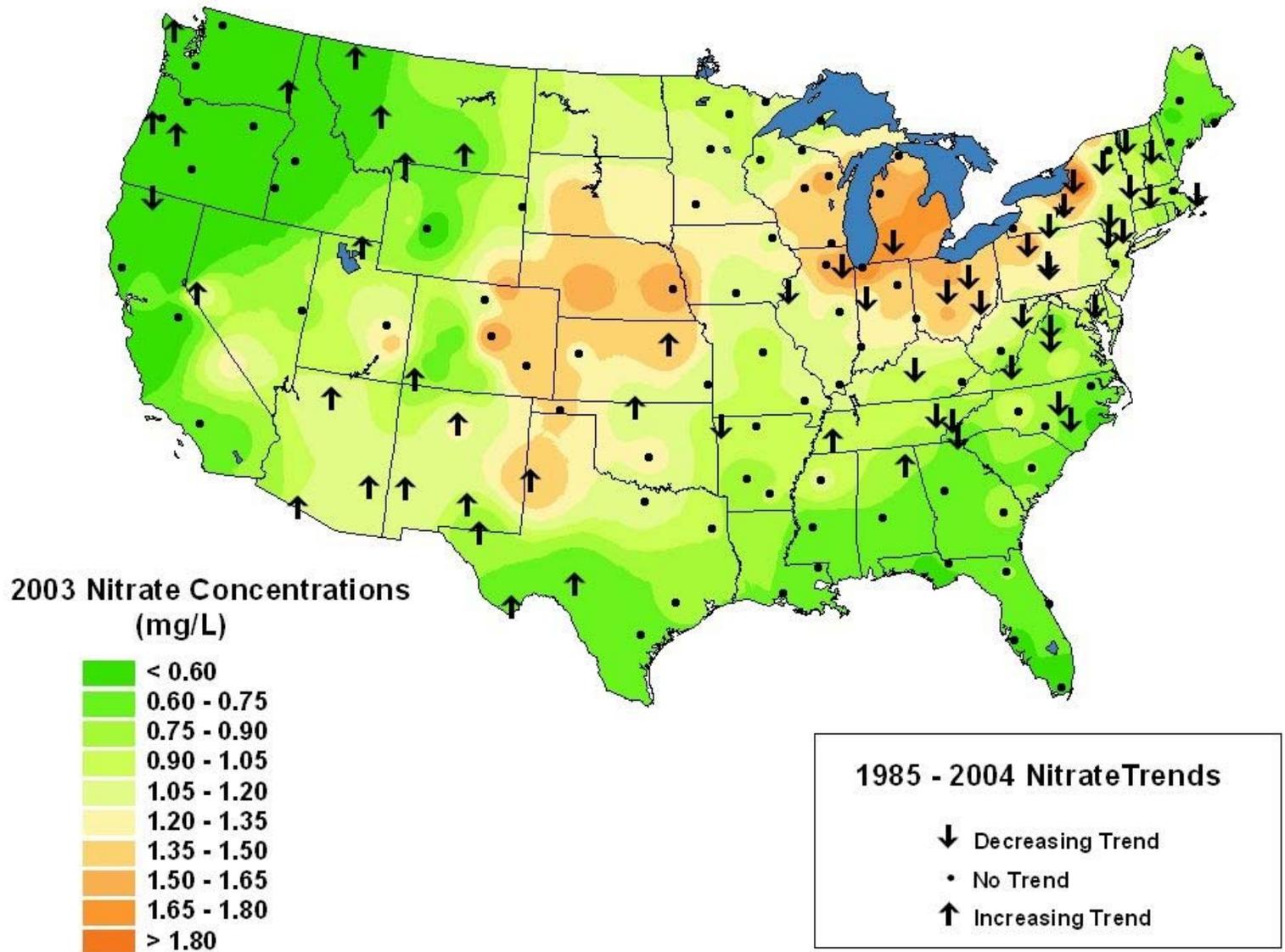
NTN Sites - 31 March 2005



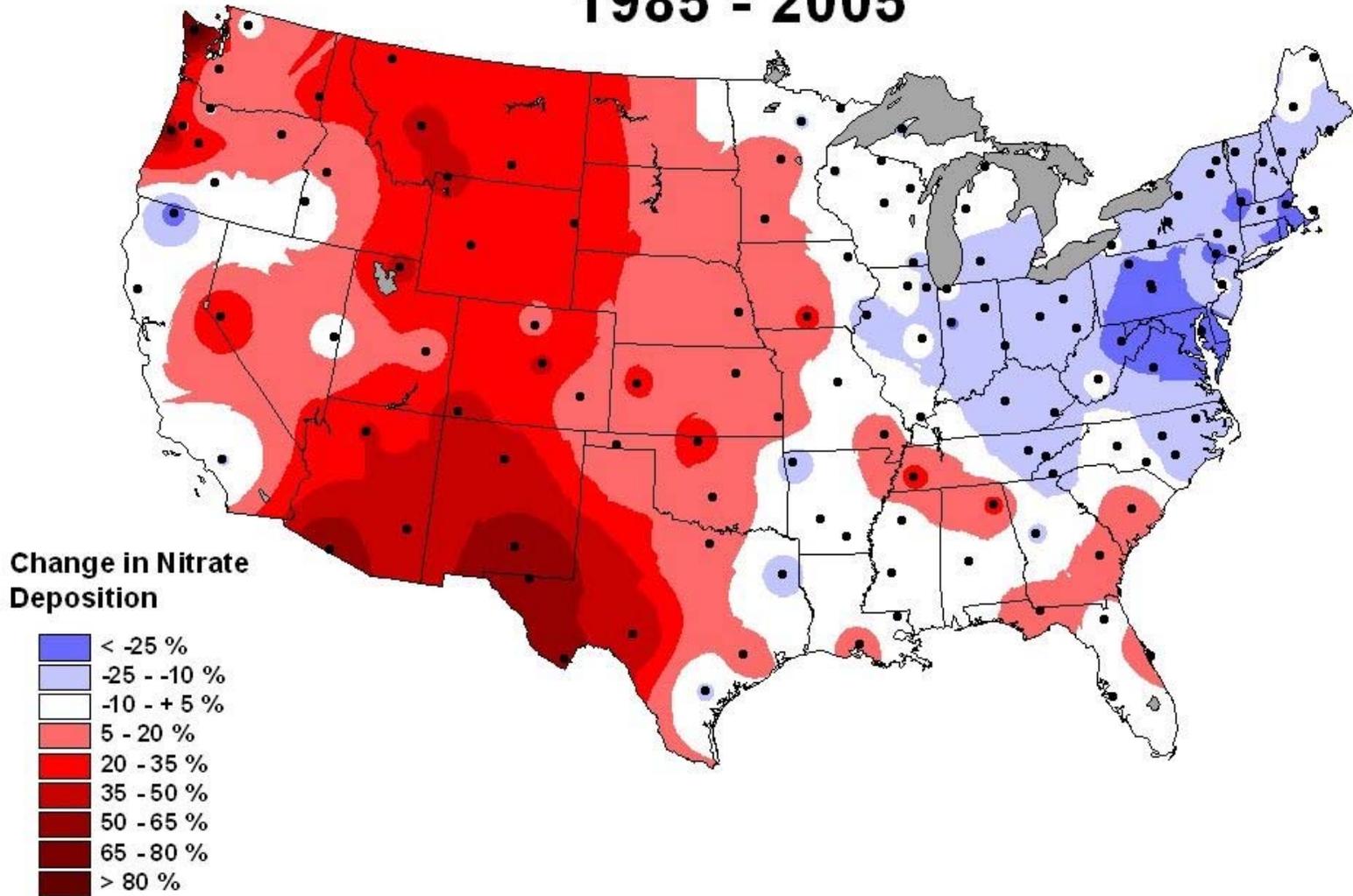
Seasonal Mann-Kendall Test

- ◆ **Initial step - parametric modeling of precipitation versus concentration**
- ◆ **Nonparametric test for trend**
- ◆ **Detects monotonic trends**
- ◆ **Accommodates missing data and non-normal distributions**
- ◆ **Removes effects of seasonality without explicitly modeling it**

Nitrate Trends in Precipitation

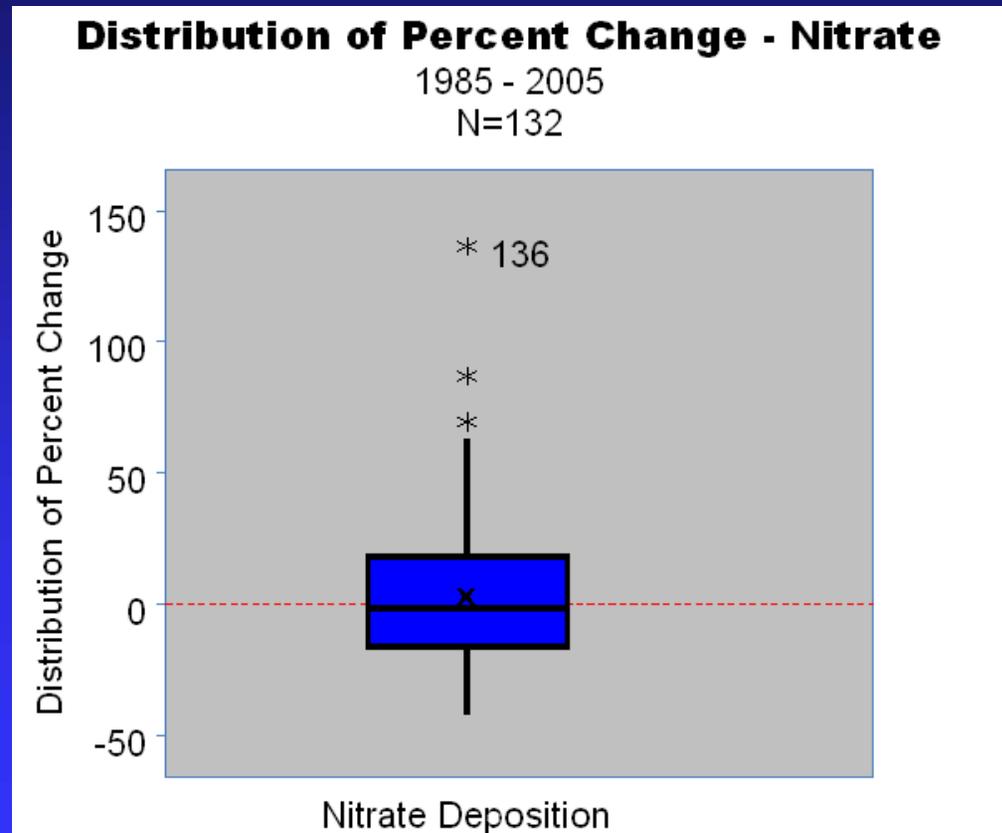


Percent Change in Nitrate Deposition 1985 - 2005

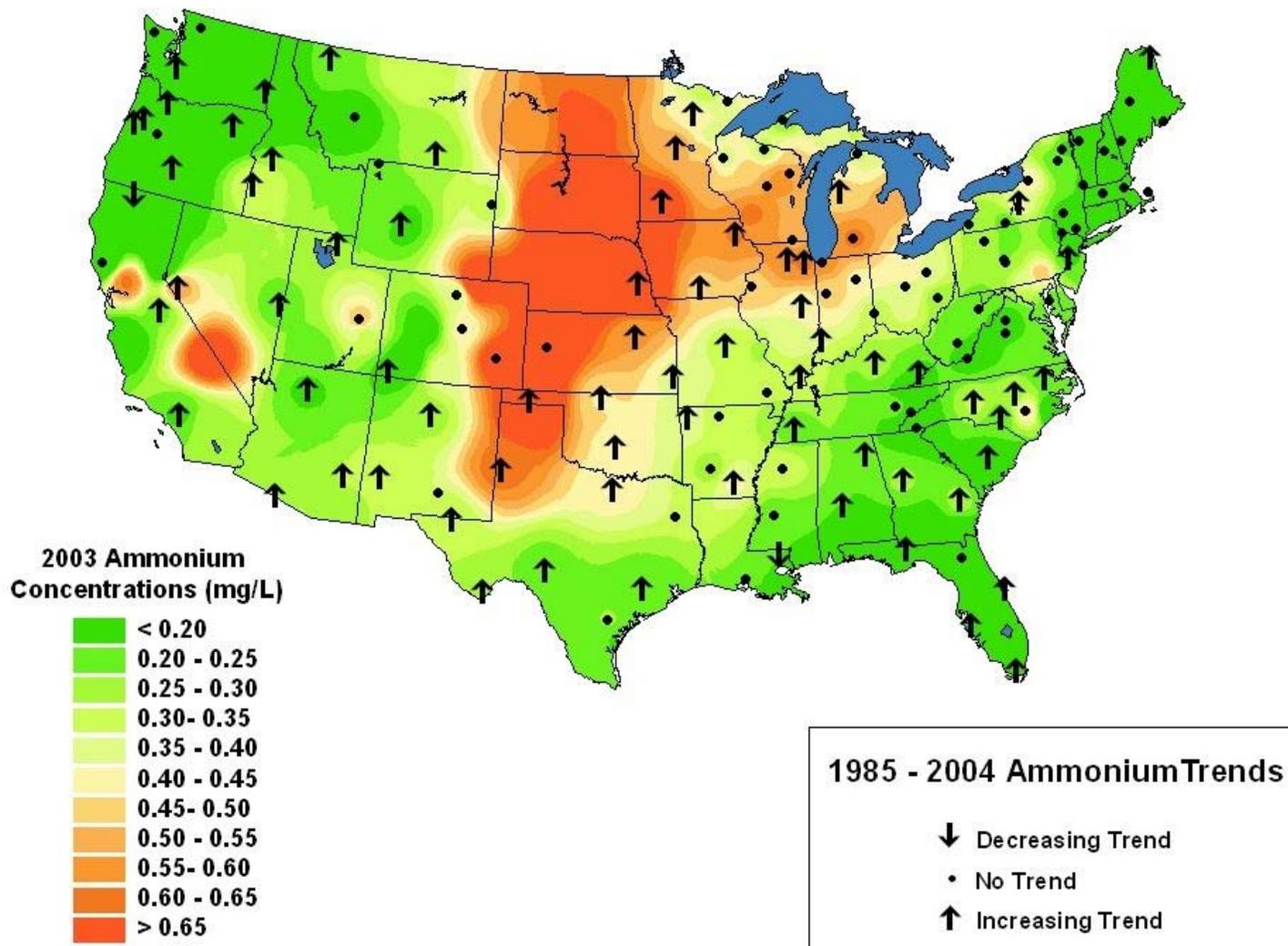


Summary – U.S. Nitrate Trends in Precipitation, 1985-2005

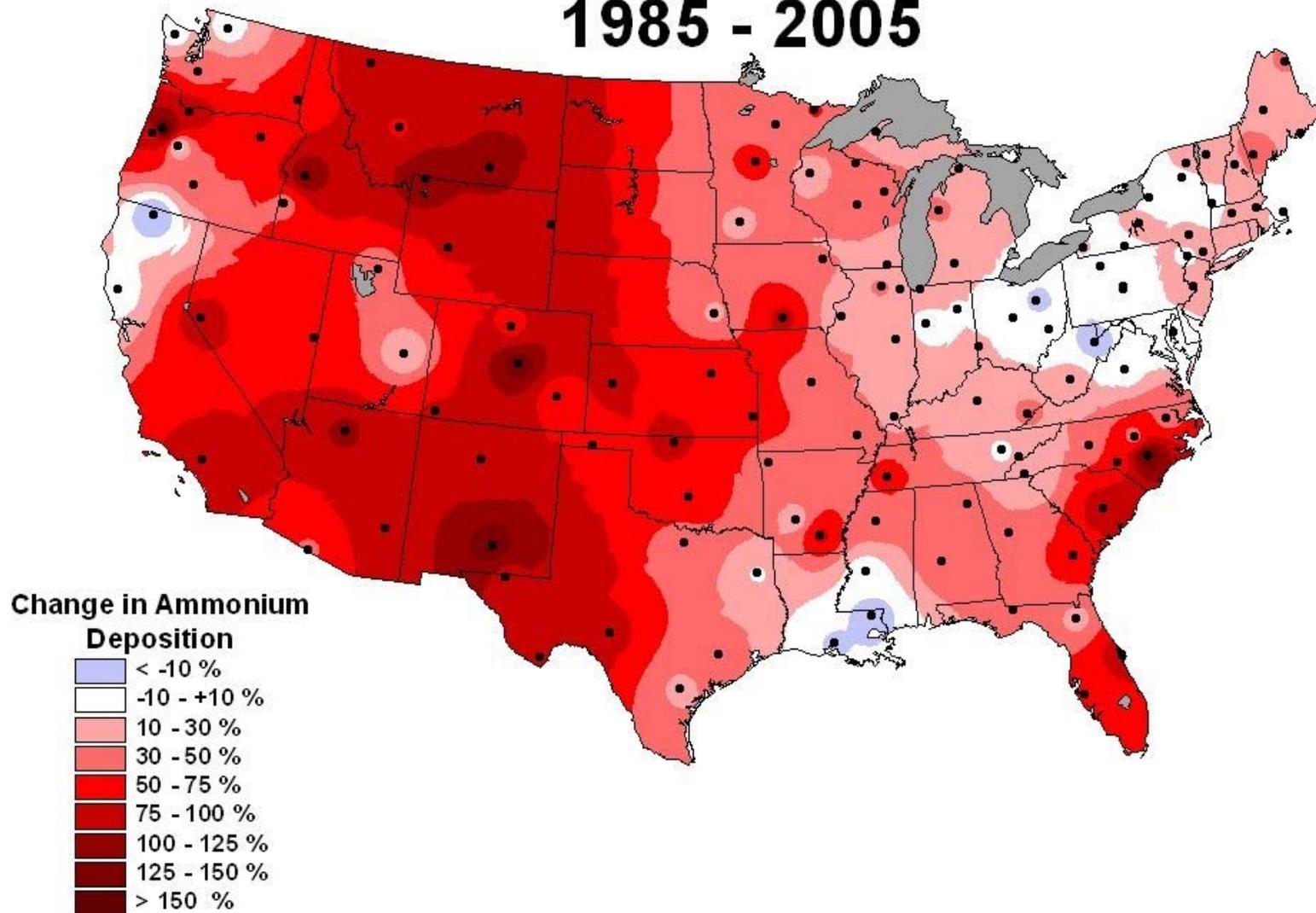
Median Change	-1.5 %
Mean Change	+2.9 %
# of Sites with Positive Trend	25
# of Sites with No Trend	74
# of Sites with Negative Trend	33



Trends in Ammonium Concentration

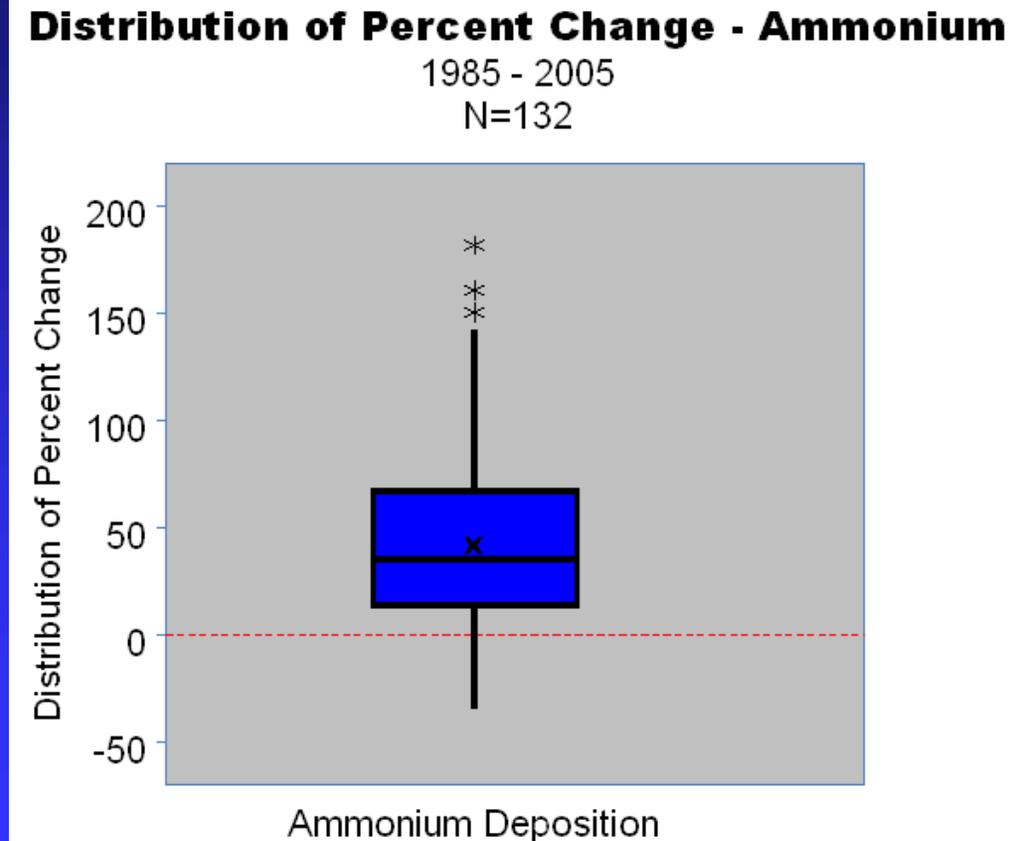


Percent Change in Ammonium Deposition 1985 - 2005

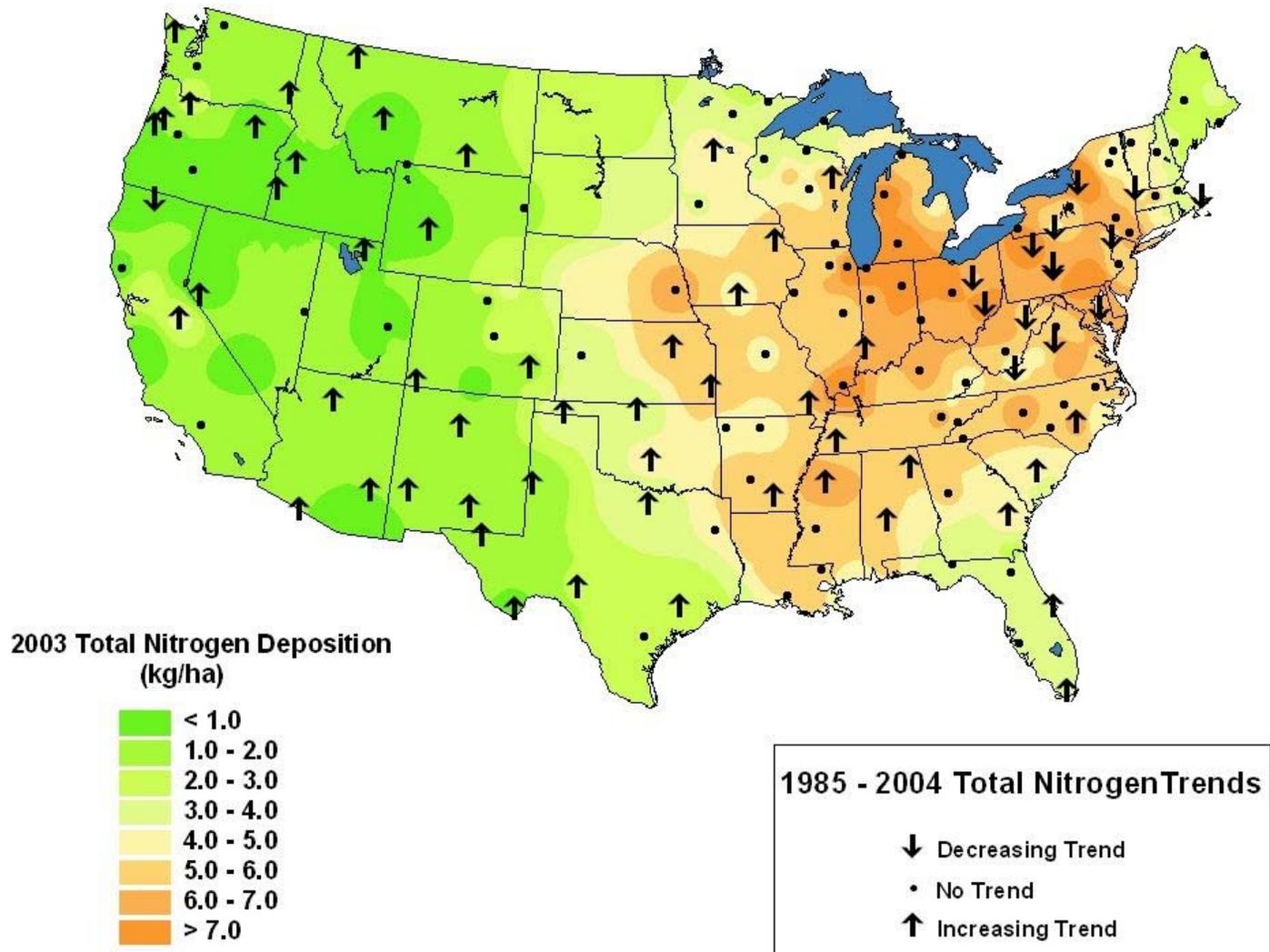


Summary – Ammonium Trends in Precipitation, 1985-2005

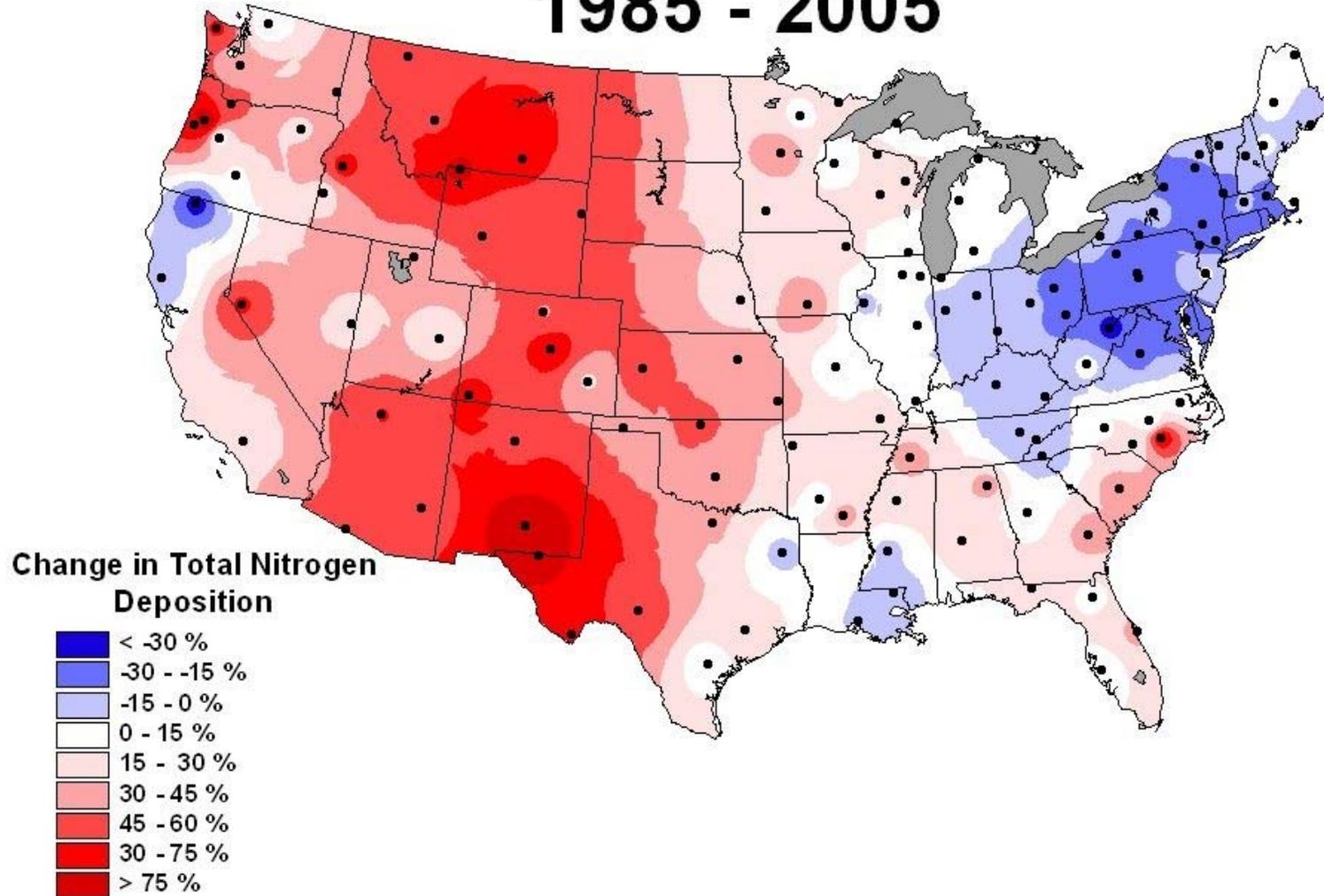
Median Change	+ 35 %
Mean Change	+ 42 %
# of Sites with Positive Trend	80
# of Sites with No Trend	50
# of Sites with Negative Trend	2



Trends in Total Inorganic Nitrogen

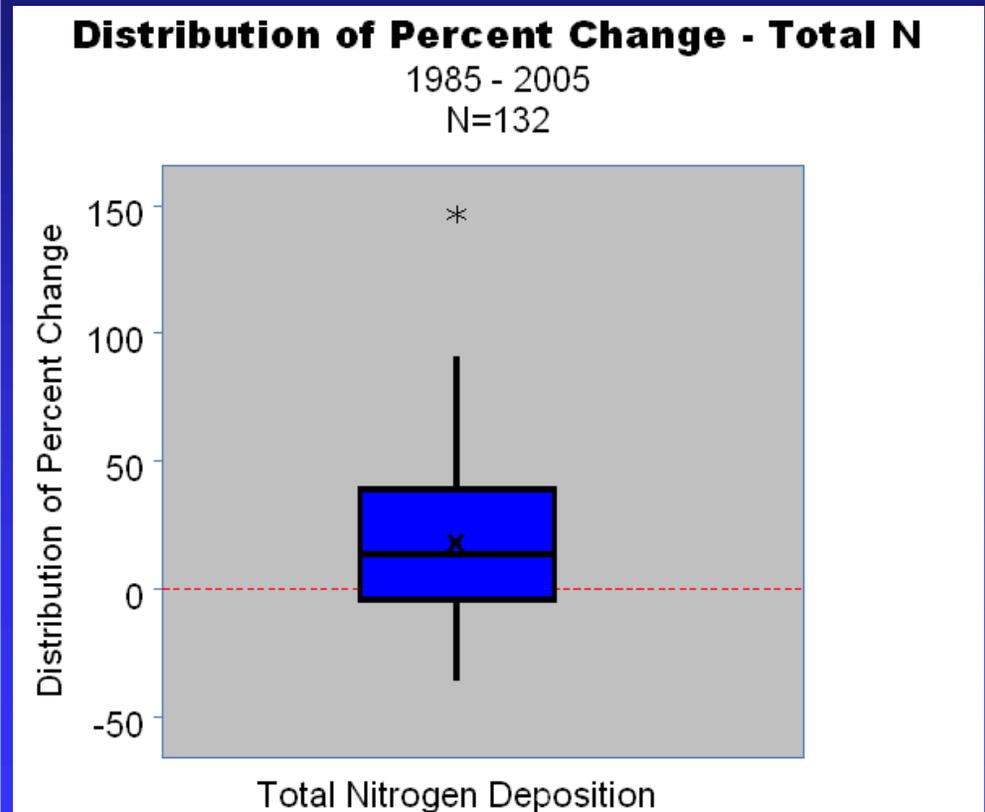


Percent Change in Total N Deposition 1985 - 2005



Summary – Total Nitrogen Trends in Precipitation, 1985-2005

Median Change	+ 13 %
Mean Change	+ 19 %
# of Sites with Positive Trend	52
# of Sites with No Trend	66
# of Sites with Negative Trend	14



Outcomes

- An accountability measure for emission reduction programs.
- Input for terrestrial and aquatic ecosystem impacts, especially important as point-sources are reduced.
- Research support data for a myriad of environmental research topics.

On-line Resources

- <http://nadp.sws.uiuc.edu/>
 - ◆ Weekly, monthly, seasonal and annual averages for U.S. wet deposition
 - ◆ U.S. maps of deposition patterns
- <http://water.usgs.gov/ntn>
 - ◆ On-line reports for trends and environmental effects research
- <http://www.epa.gov/castnet/>
 - ◆ Data for a 70 site wet + dry deposition network