

Maps of Air Quality, Deposition, Emissions, and Population Changes

Prepared for John Seitz, U.S. EPA, OAQPS

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Statistics and underlying data used to prepare maps

PM2.5

- average annual mean PM2.5 concentrations, representing 1999-2000
- maximum site per county
- retrieved from AIRS as raw data on July 11, 2001.
- includes all data, including any flagged data.
- Computation of statistic:
 - quarterly averages developed for the eight calendar quarters in 1999 and 2000.
 - annual means for 1999 and 2000 based on the average of the four quarters for each year.
 - two year average is the average of the 1999 and 2000 means.
 - Minimum data completeness criteria
 - at least 30 obs total over the two-year period
 - at least one data point in three different quarters
 - Primary sampler used among collocated samplers
 - Pollutant occurrence code (POC) with the highest valid value was used to represent that site.
- Note: there are two counties that (based on the previously stated criteria) whose annual average PM2.5 < 15.1 ug/m³, but whose 98th percentile > 65 ug/m³ 24-hour NAAQS (Bannock County, ID and Plumas Co, CA).
- Contact: David Mintz

Statistics and underlying data used to prepare maps (cont)

- PM10
 - maximum annual average concentrations, 1990 and 1999
 - Minimum data completeness criteria
 - Contact: David Mintz
- Pb
 - maximum quarterly average concentrations per county, 1990 and 1999.
 - Minimum data completeness criteria
 - at least 6 valid 24-hr values per calendar quarter for all 4 quarters
 - at least 2 valid samples per quarter for all four quarters for composite data (i.e. AIRS interval code is 'C').
- Contact: David Mintz
- SO2
 - Maximum annual mean concentrations per county, 1990 and 1999
 - 2nd max 24-hour values per county, 1990 and 1999
 - Minimum data completeness criteria
 - annual mean requires at least 4380 valid hours per year.
 - 2nd max 24-hour value requires at least 183 valid days per year.
 - valid day requires 75% of hourly values
- Contact: David Mintz

Statistics and underlying data used to prepare maps (cont)

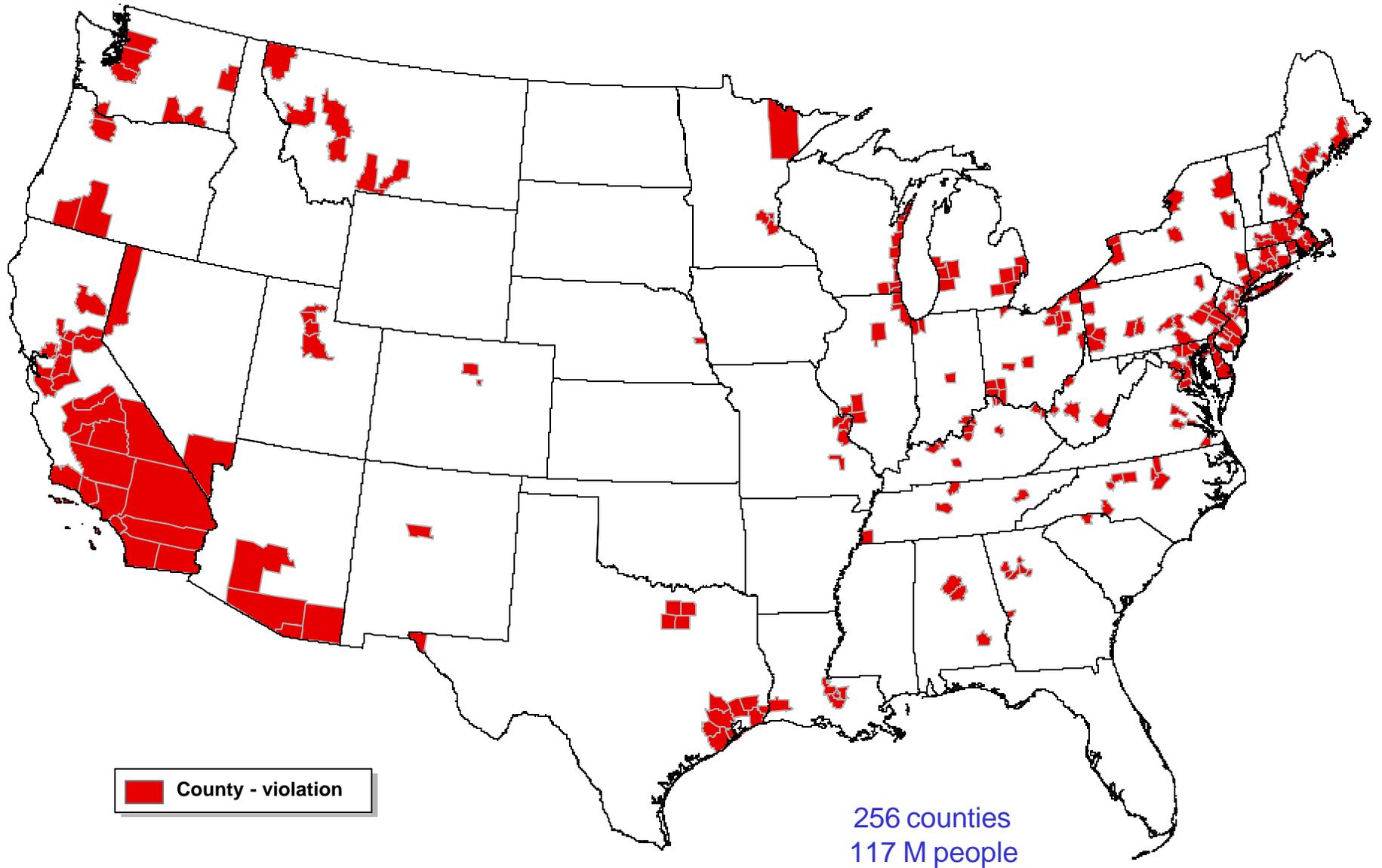
- Ozone:
- maximum 1-hr design values per county for 1990 and 1999
 - 1990 design value based on 1988-1990 data
 - 1999 design value based on 1997-1999 data
- Data selection
 - Design values were calculated for each site in accordance with the *Guidelines for the Interpretation of Air Quality Standards (OAQPS No.1.2-008)*, February 1977 and the *Guideline for Interpretation of Ozone Air Quality Standards (EPA-450/4-79-003)*, January 1979. Generally, the highest design value in the each county is used to represent the county. However, occasionally the raw estimates have been revised to conform to previous regulatory decisions so that no value listed here is inconsistent with earlier regulatory position. The source data set contains daily O3 values for 1988-90 and 1997-99 based on raw data from AIRS (AMP282 file).
- Maximum 8-hr design values per county for 1999
 - based on 1997-1999 data
- Data selection
 - Design values were calculated for each site in accordance with Appendix I to Part 50 - Interpretation of the 8-hour Primary and Secondary National Ambient Air Quality Standards for Ozone, 40 CFR 50. Generally, the highest design value in the each county is used to represent the county. However, occasionally the raw estimates have been adjusted (e.g., sites combined per state recommendation; data flags handled per Regional recommendation) to conform to previous regulatory decisions so that no value listed here is inconsistent with earlier regulatory position. The source data set contains hourly O3 values for 1988-90 and 1997-99 based on raw data from AIRS (AMP350 file).
 - Contact: James Hemby
- CO
- maximum 8-hr design values per county for 1990 and 1999
 - 1990 design value based on 1989-1990 data
 - 1999 design value based on 1998-1999 data
- Derivation of CO Data
 - Design values were calculated for each site in accordance with the *Guidelines for the Interpretation of Air Quality Standards (OAQPS No.1.2-008)*, February 1977. The highest design value in the each county is used to represent the county. The source data set contains daily CO values for 1989-90 and 1998-99 based on raw data from AIRS (AMP282 file).
- Contact: James Hemby

Statistics and underlying data used to prepare maps (cont)

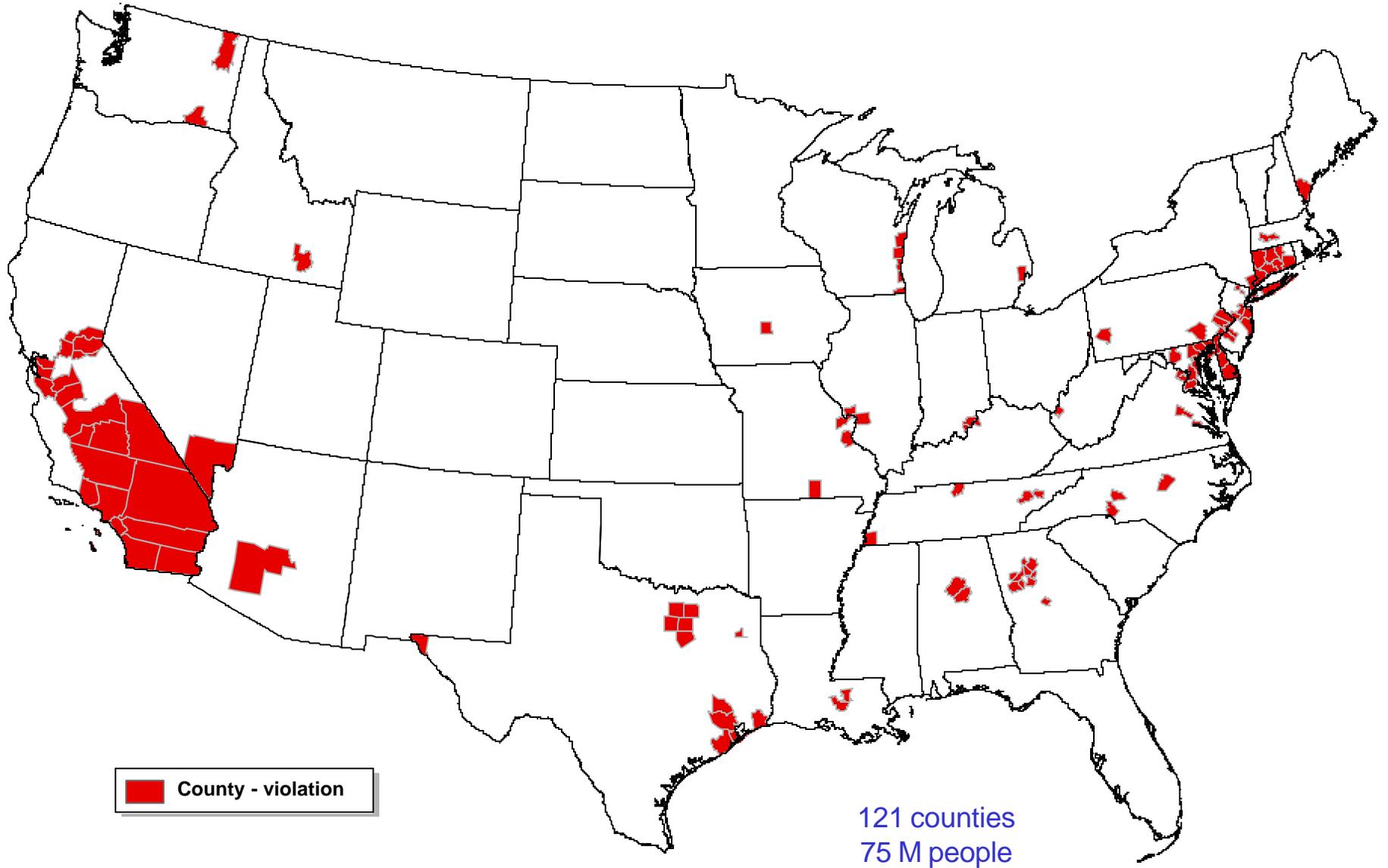
- NO2
 - annual average concentrations for 1990 and 1999
 - Derivation of NO2 Data
 - Annual statistics meeting AIRS minimum completeness criteria were used (Source: AIRS Quicklook AMP450 file). The highest value in the each county is used to represent the county.
- Contact: James Hemby
- Air Toxics
 - Median risk to urban air toxics based on 1996 NATA
 - Contact: Ted Palma
- Radon
 - EPA Radon Map
- Acid Deposition
 - Data from CASTNet and NADP
 - Contact: Tamara Salman, Gary Lear
- Demographics
 - Population - census data
 - Contact: Alan Rush

 - Asthma - national incidence by subgroups weighed by county subgroup populations.
 - Contact: Bryan Hubbell

Violations of any NAAQS, 1990



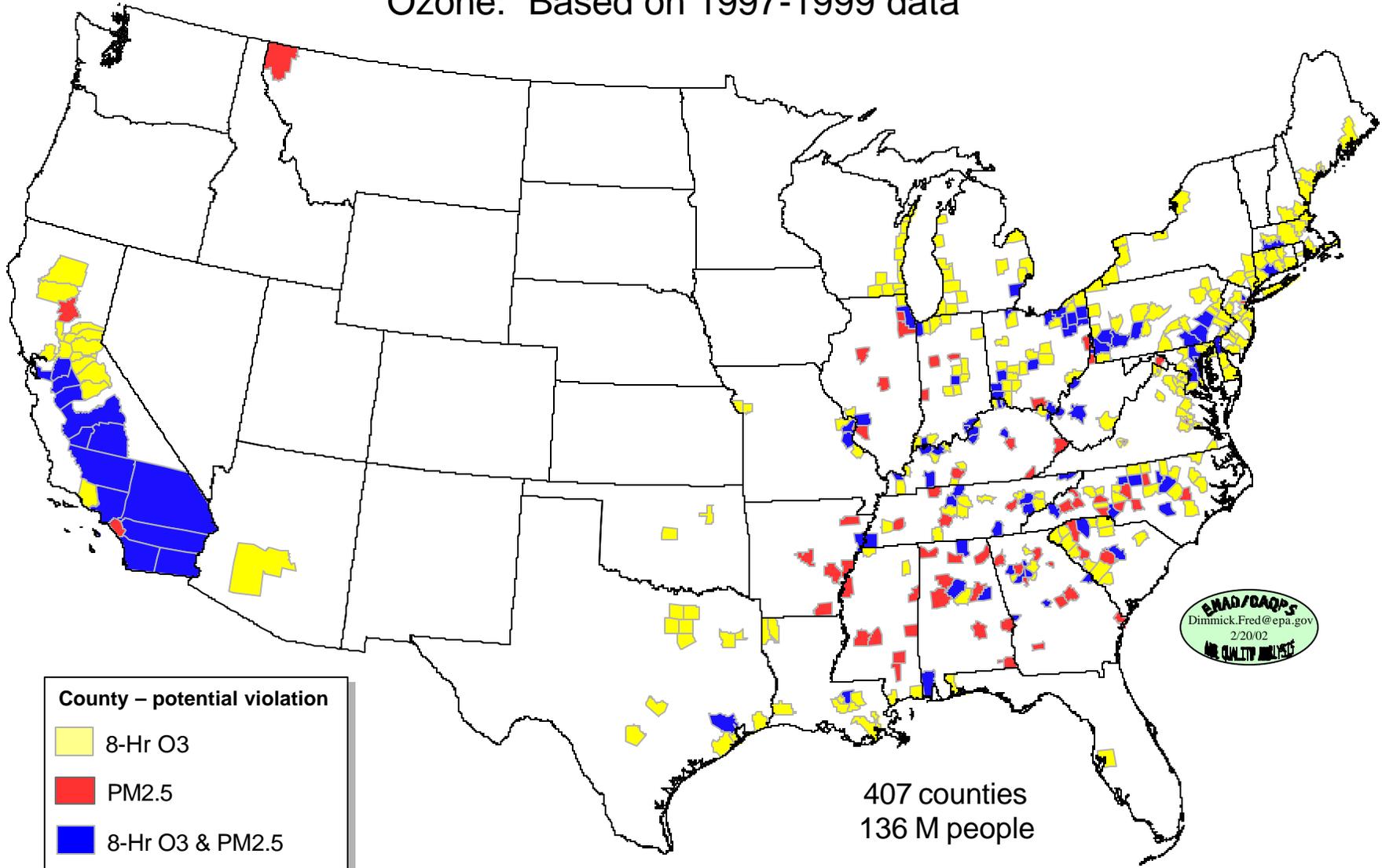
Violations of any NAAQS, 1999



Potential Violations of PM2.5 and 8-Hr Ozone

PM-2.5: Based on 1999-2000 data

Ozone: Based on 1997-1999 data



Background

- Attached is a map with a cursory examination of potential violations of PM2.5 and 8-hr Ozone. The general pattern indicates large areas with potential problem areas for both pollutants. However, there are some areas with ozone and no PM2.5 and visa versa as mentioned below . There are many cavaets as you can imagine:
 - - Ozone is based on the 1997-99 design value
 - - PM2.5 is based on 1999/00 data with fairly loose completeness criteria (see next page)
- --The map is on a county basis and does not reflect the regional nature of these pollutants throughout the eastern US
- --The map does not reflect the multiple counties or entire MSAs that could be in violation based on a single violation county.
- -- There are some areas with ozone violations without any PM2.5 data , e.g. central OH and PA)
- -- Some of the potential PM2.5 violations or lack thereof may be based on relatively incomplete data.
- Nevertheless, this map shows the overlap between the PM2.5 and O3 problem areas. For example:
 - - both PM and O3 in many southeast States; along Ohio Valley, in southern Central Valley, CA; various large MSAs
 - - other PM2.5 problems in the southeast extending thru AR; isolated ones(MT, northern CA)
 - - large areas with only 8-hr O3 problems in Phoenix, TX,/southern central plains, northern CA ,throughout the NE and elsewhere.
- Here is the county summary of these data:

| | number of counties | population |
|----------|--------------------|------------|
| • 8hr O3 | 333 | 119.1 M |
| • PM2.5 | 173 | 81.4 M. |
| • Both | 99 | 64.9 M |
| • Either | 407 | 135.5M |
- Contacts: For PM2.5, David Mintz and Terence Fitz-Simons. For ozone, James Hemby.

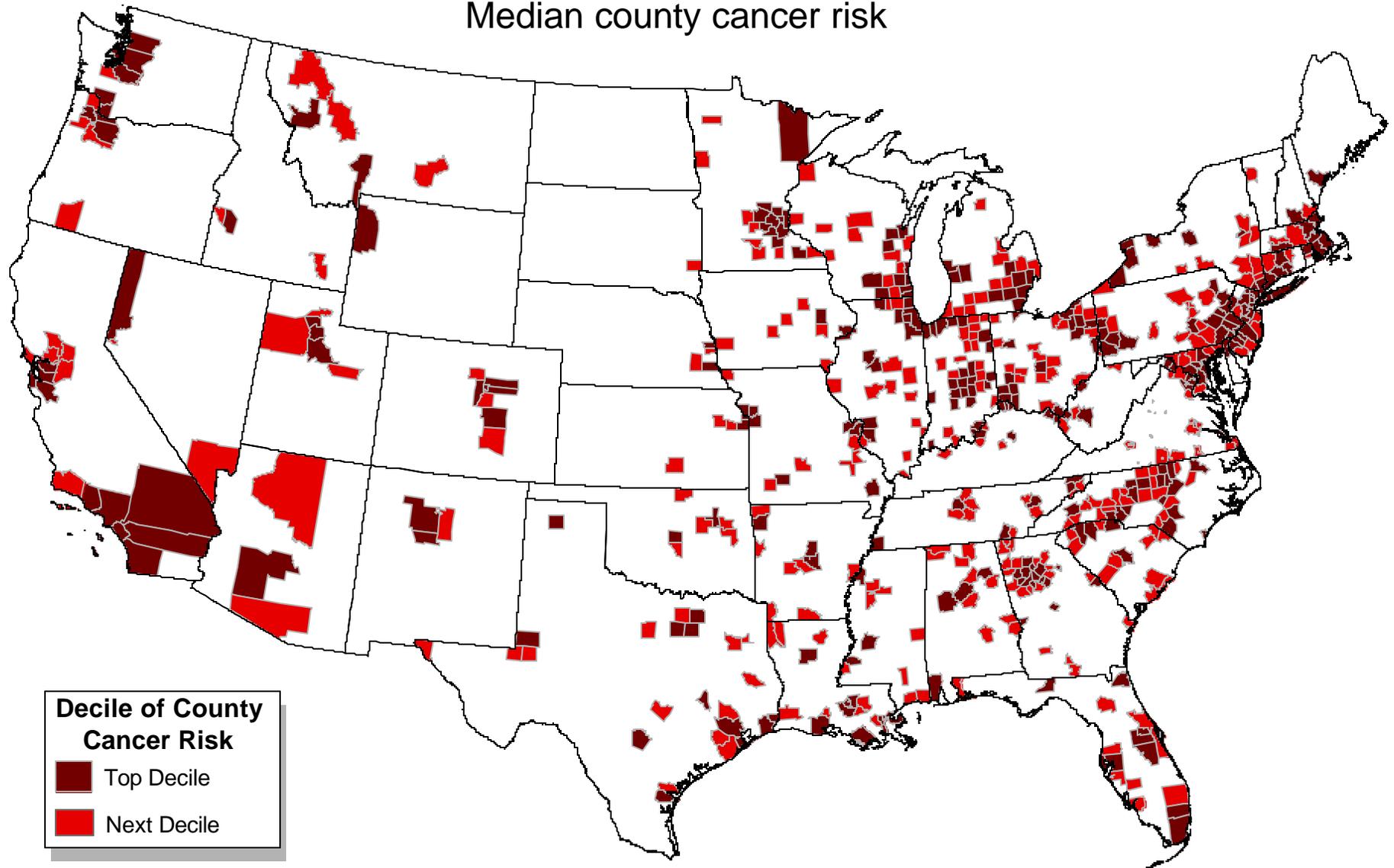
How the PM2.5 data were derived ?

- We retrieved 1999 and 2000 PM2.5 data (parameter code 88101) from AIRS using an AMP350 (raw data) retrieval on July 11, 2001. We used all the data, including any flagged data. For each site, we computed quarterly averages for the eight calendar quarters in 1999 and 2000. We then averaged the four quarters for 1999 and for 2000. We then averaged the 1999 and 2000 means. The resulting value is the one we used, provided it met the following criteria. If a site had at least 30 observations total over the two-year period AND had at least one data point in three different quarters, we considered that value to be valid. If there were multiple POCs at a site, the POC with the highest valid value was used to represent that site. The remaining POCs were deleted. Note that this data set contains only annual means. After you pick the highest annual mean in each county, you will have the value we used to shade counties. Note also that there are two counties that (based on the previously stated criteria) meet the annual but not the 24-hour NAAQS (Bannock County, ID and Plumas Co, CA).

Contacts: David Mintz or Terence Fitz-Simons

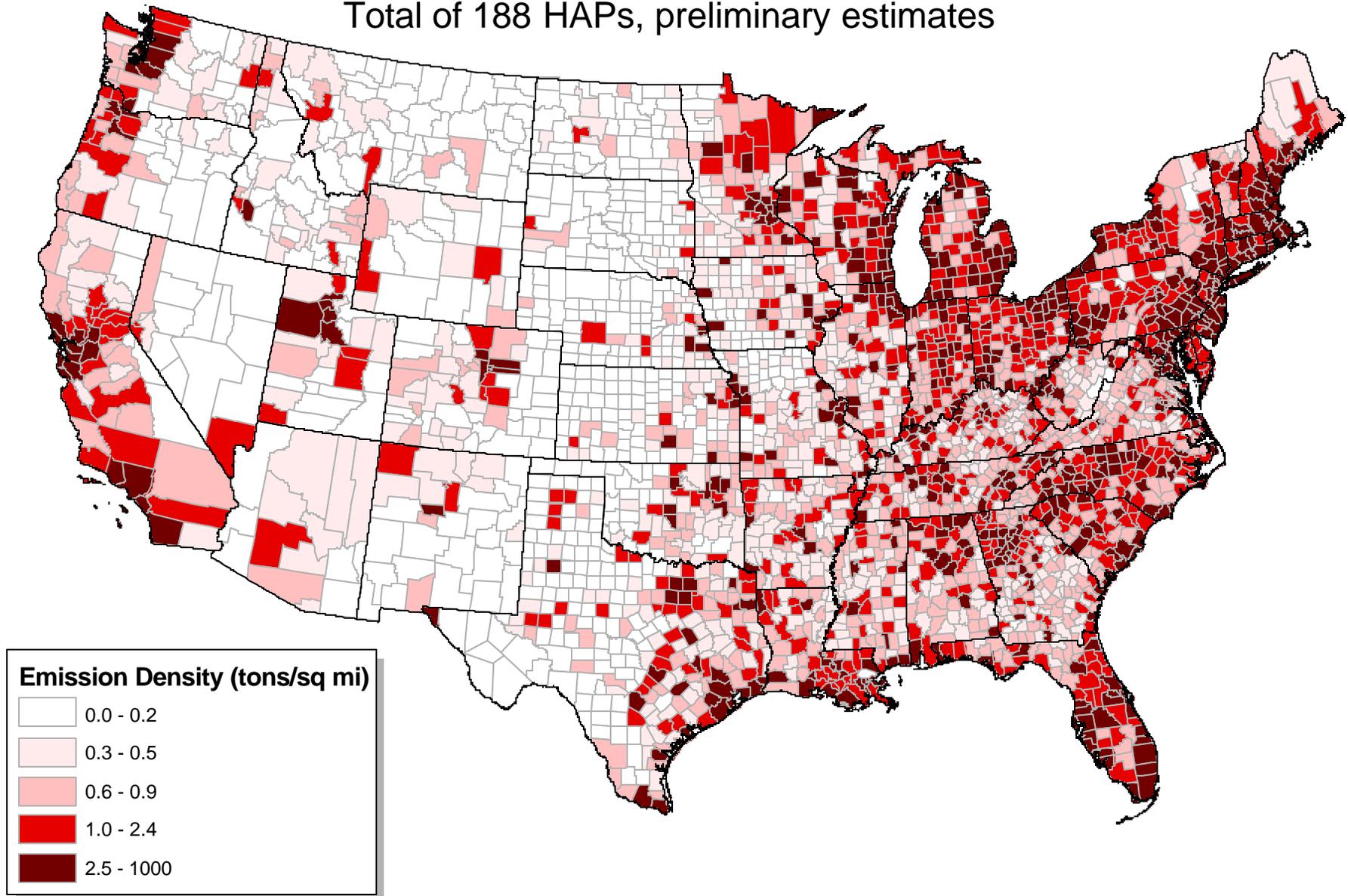
High Cancer Risk Counties for 1996 Urban Air Toxics

Median county cancer risk

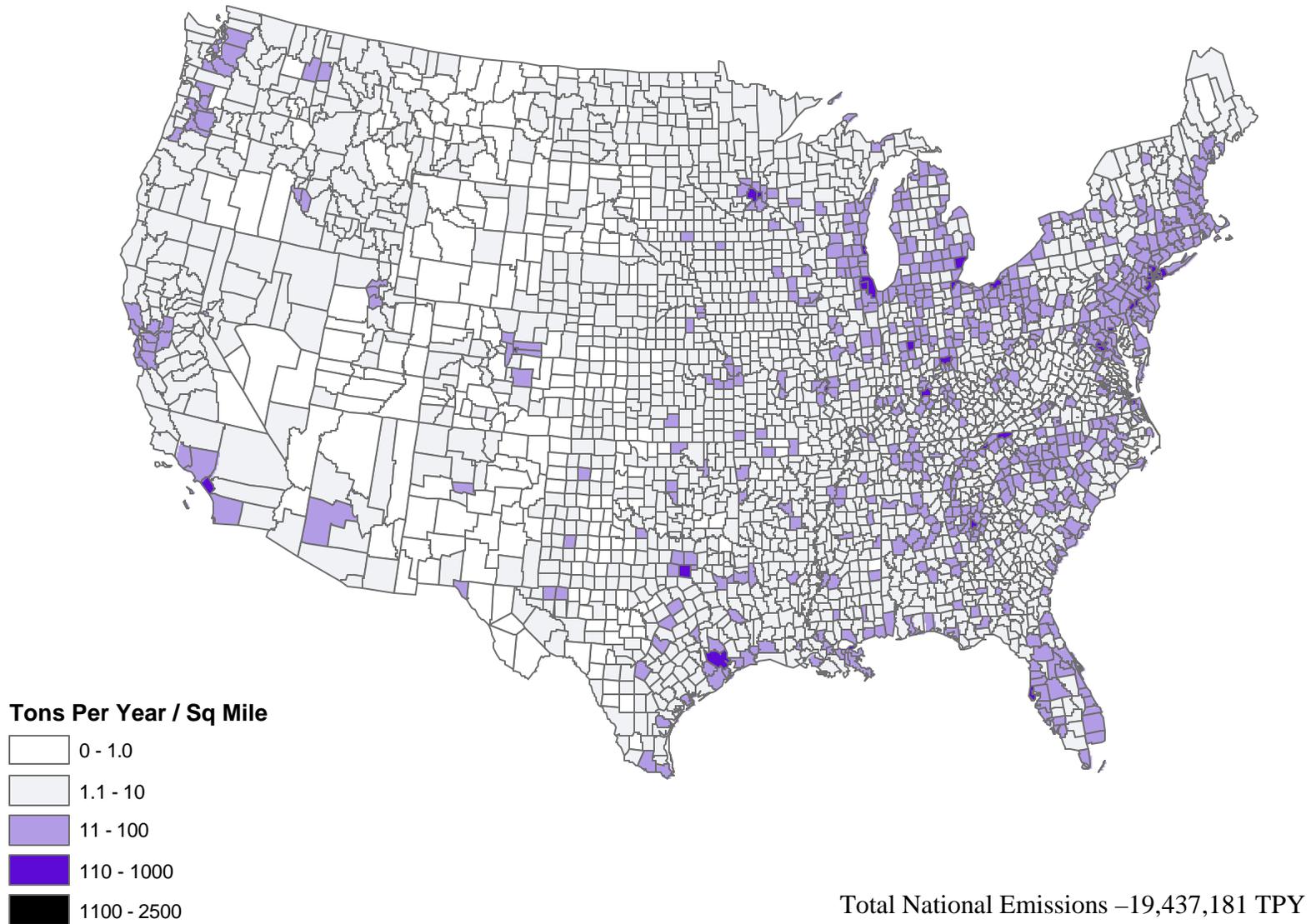


Air Toxics Emissions, 1999

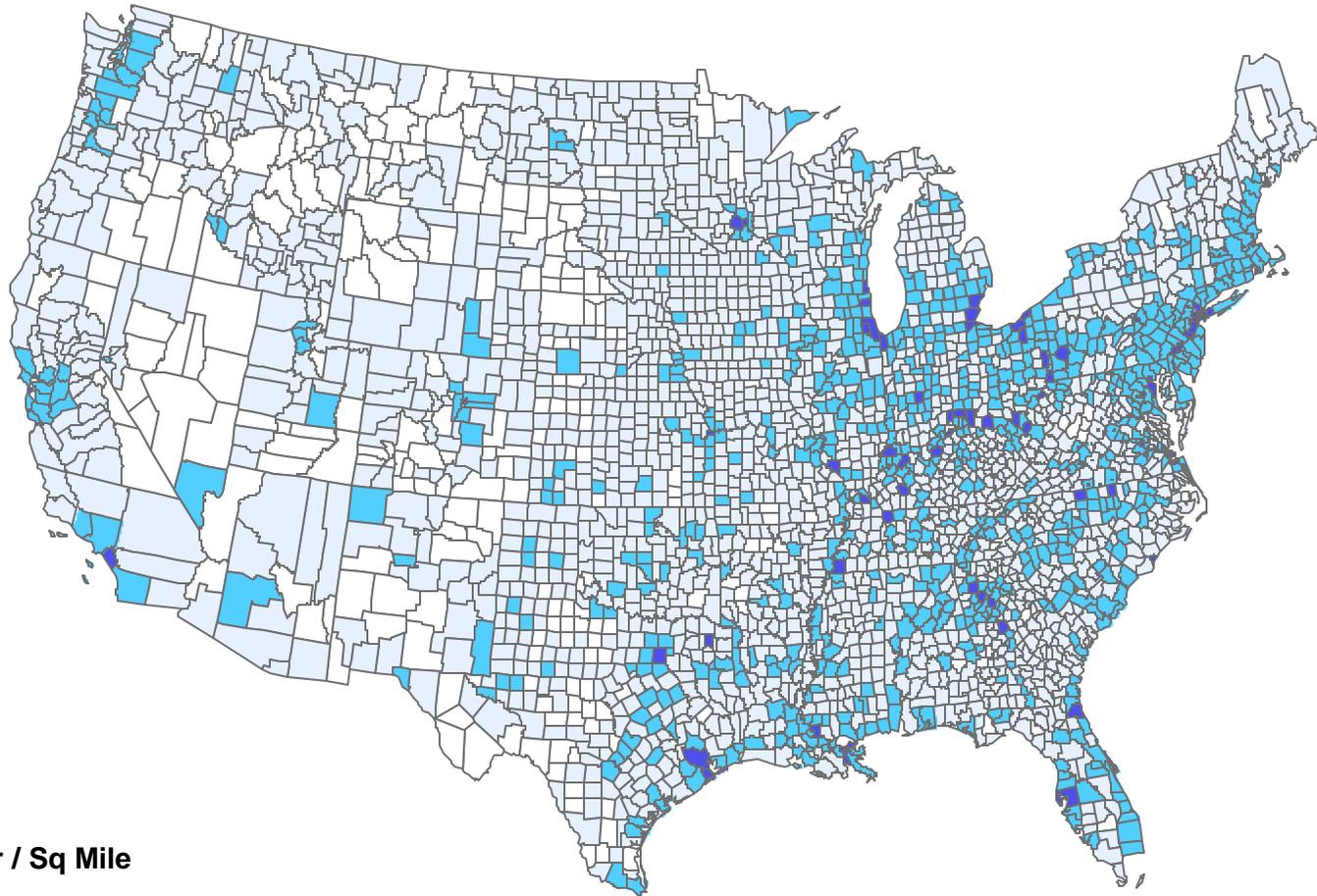
Total of 188 HAPs, preliminary estimates



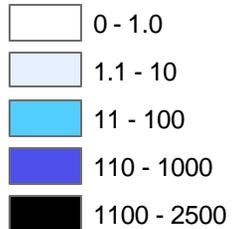
1999 Volatile Organic Compound - Density



1999 Nitrogen Dioxide - Density

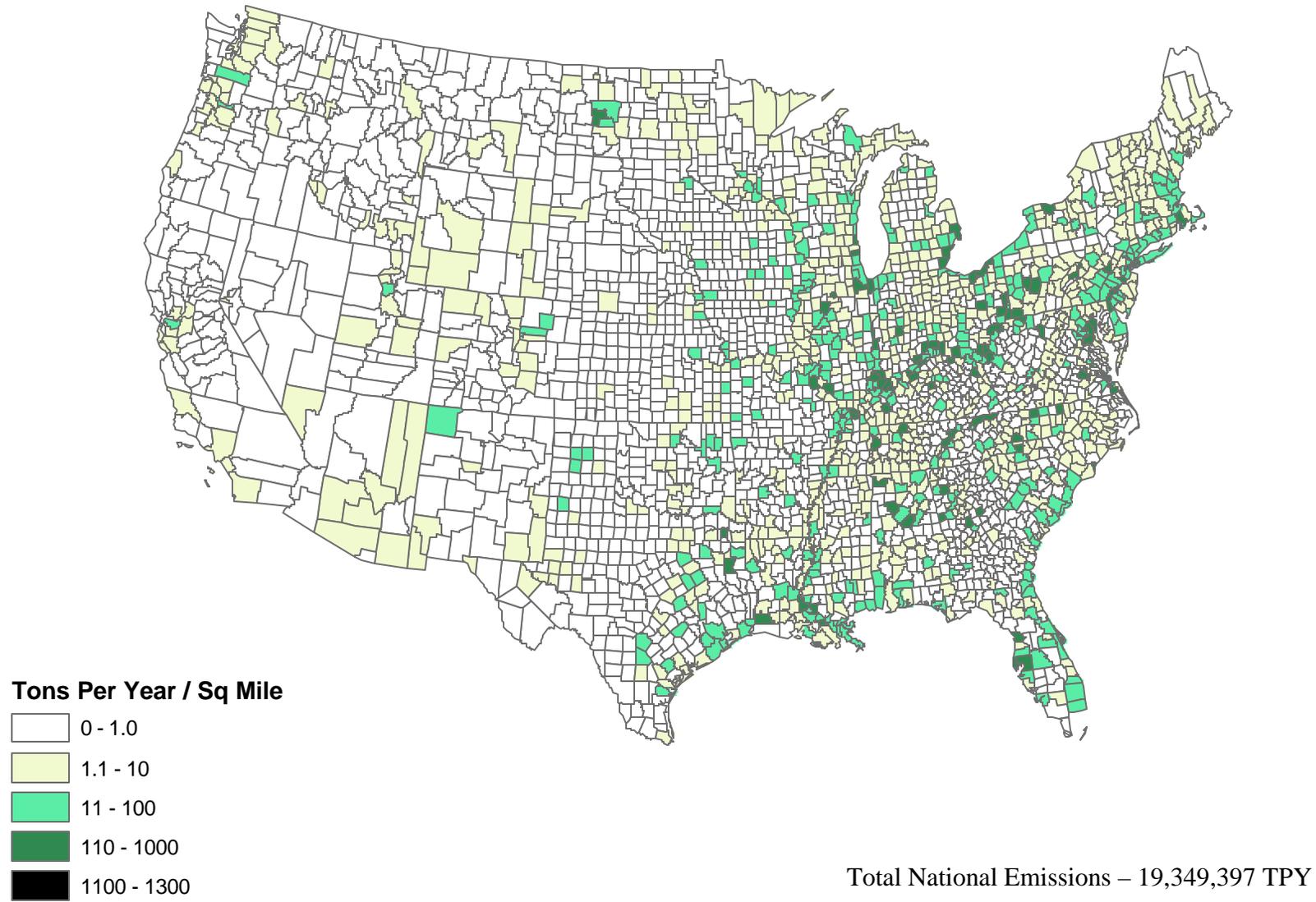


Tons Per Year / Sq Mile

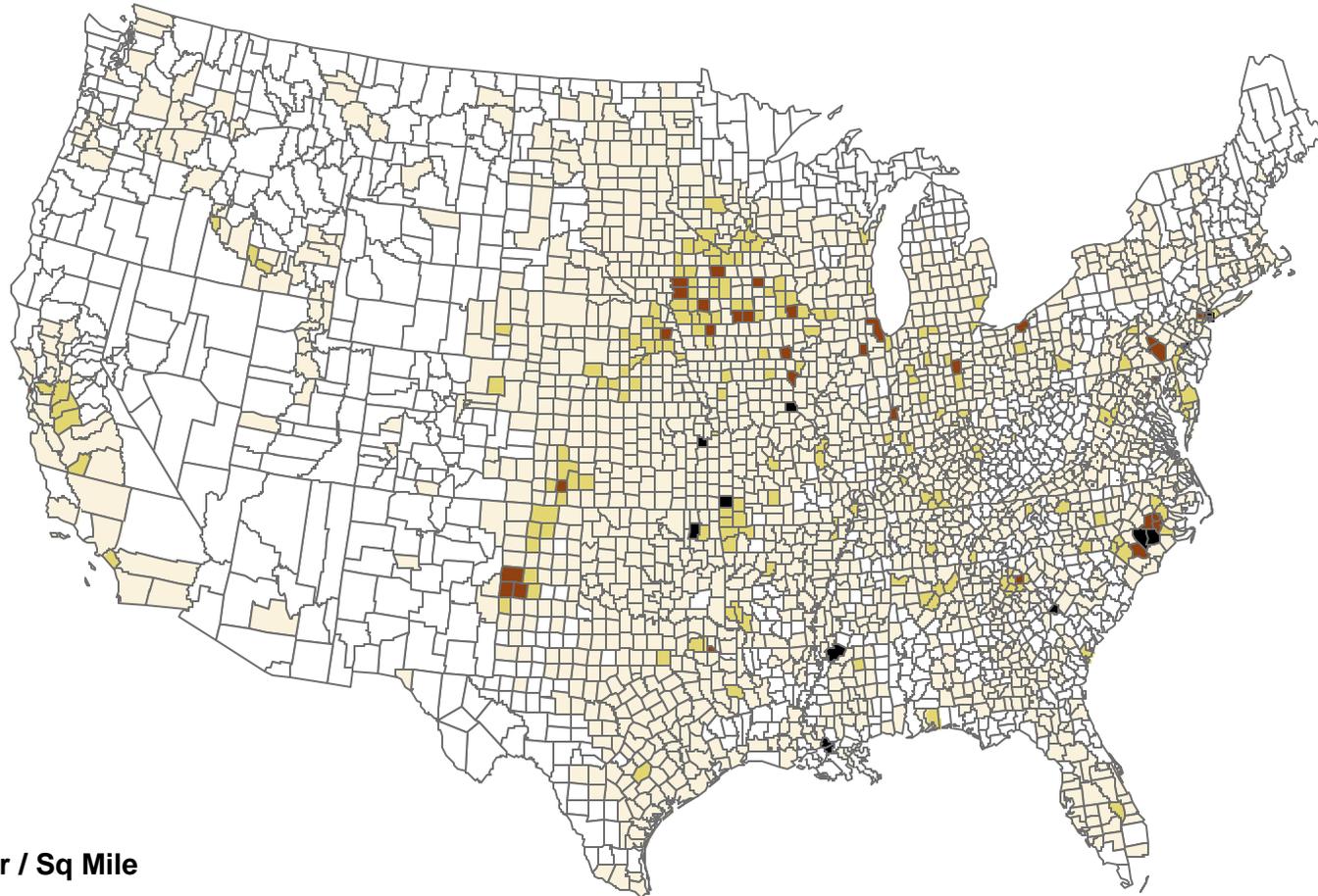


Total National Emissions –25,438,052 TPY

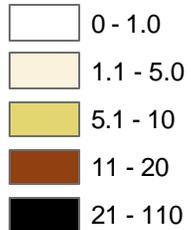
1999 Sulfur Dioxide - Density



1999 Ammonia - Density

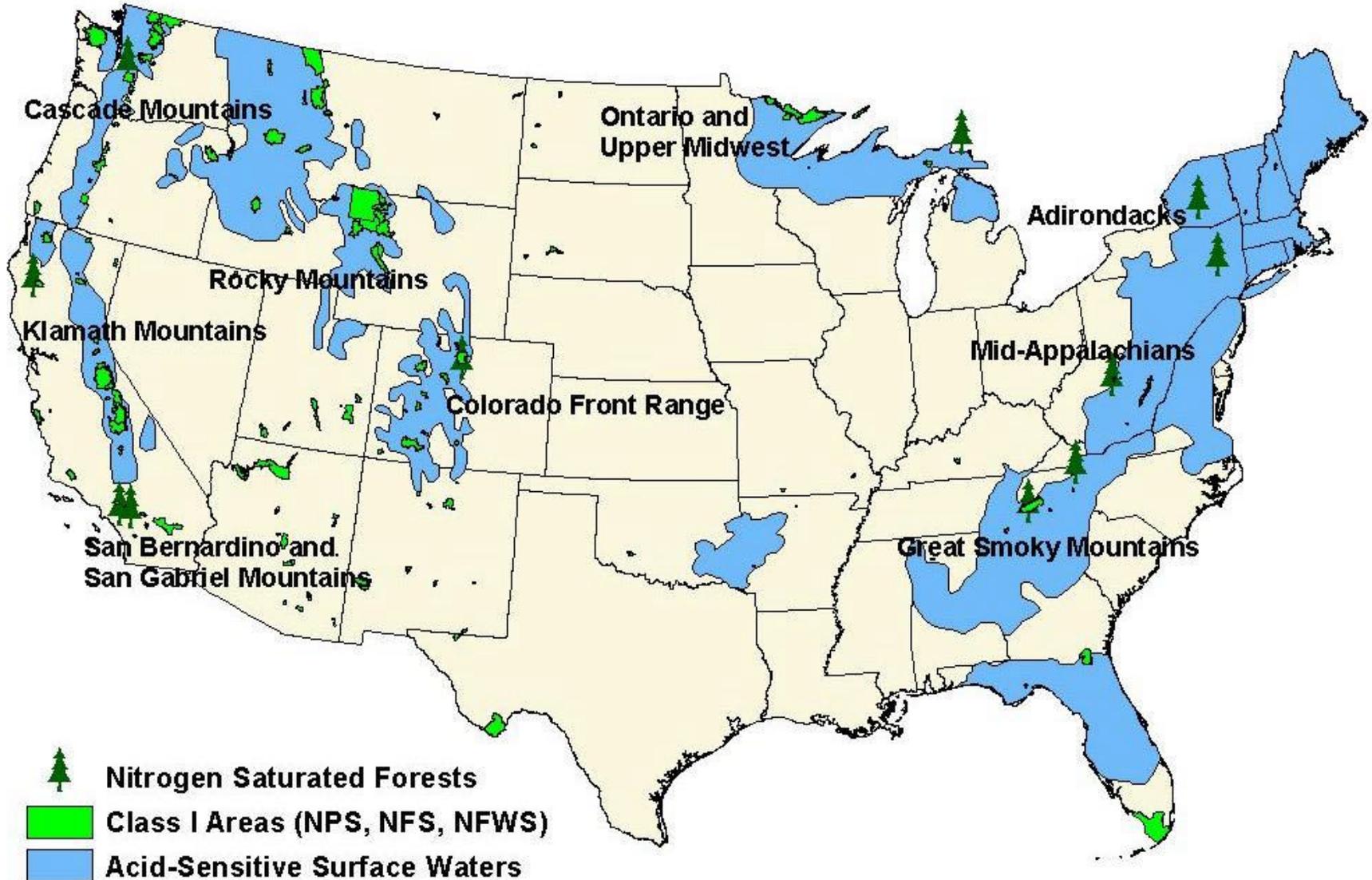


Tons Per Year / Sq Mile

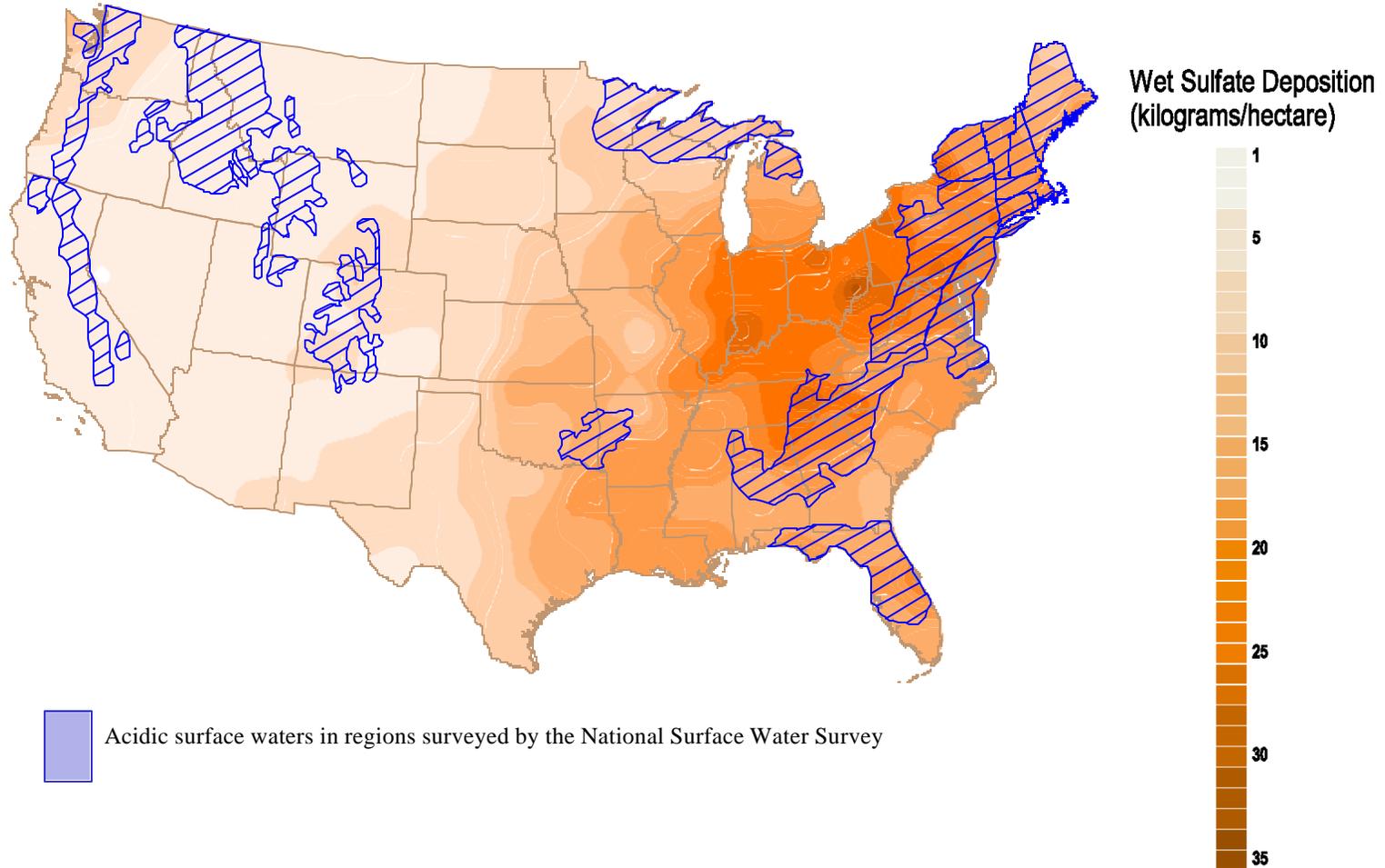


Total National Emissions – 4,914,119 TPY

Acid and Nitrogen Sensitive Resources

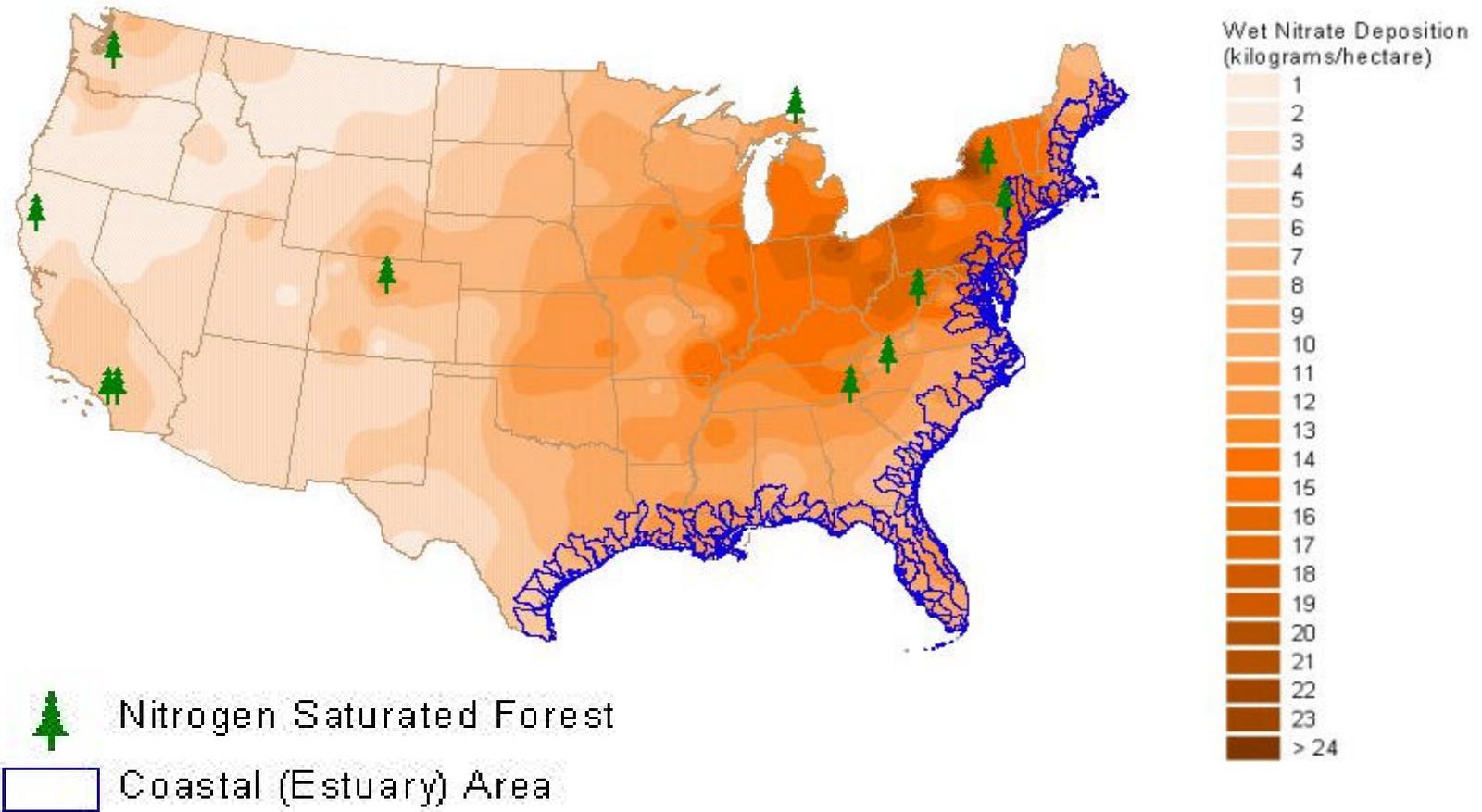


Sulfate Deposition to Acid Surface Waters



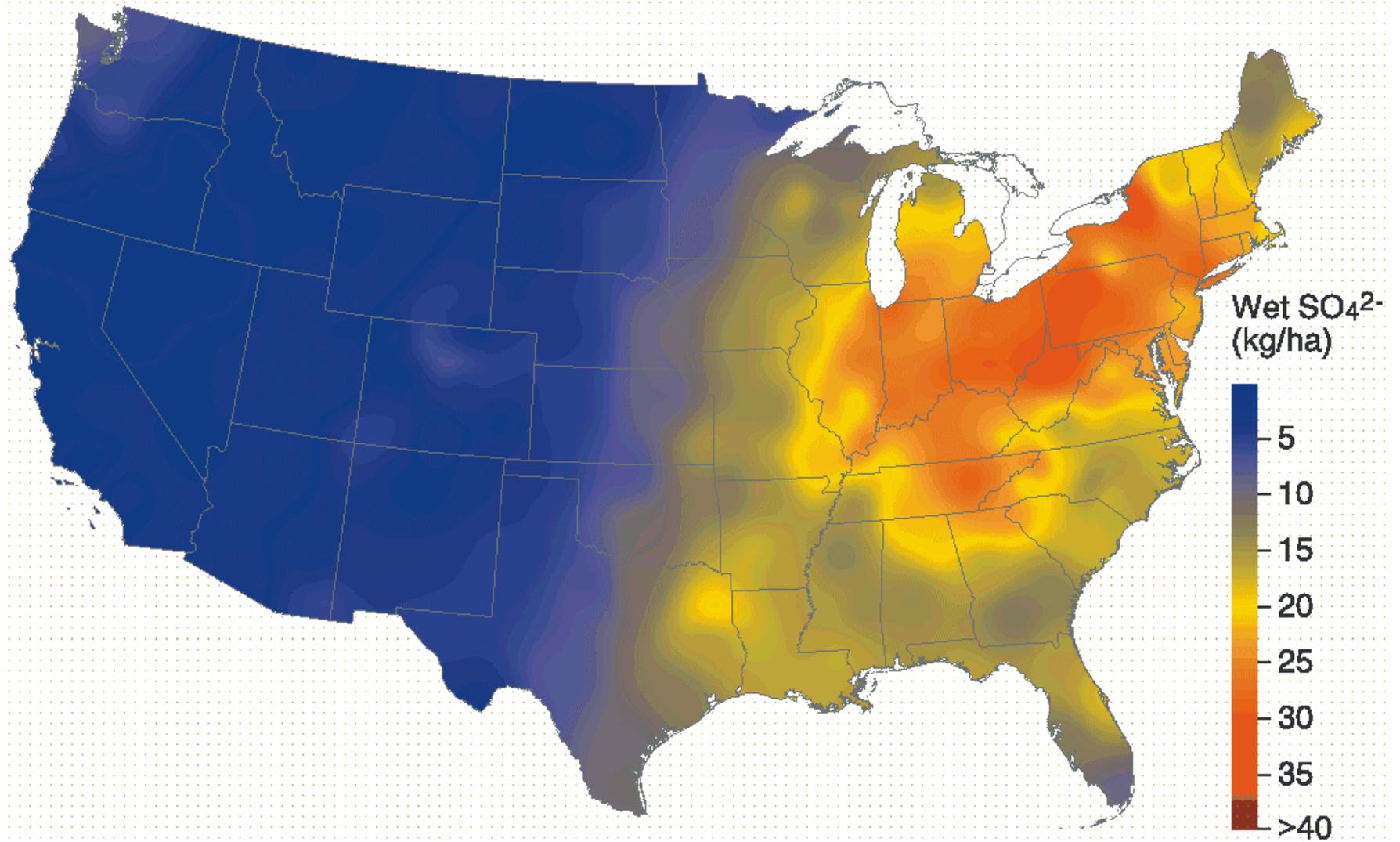
Deposition data measured by CASTNet and NADP, 1997-1999

Nitrogen Deposition in Forests and Coastal Waters



Deposition data measured by CASTNet and NADP, 1997-1999

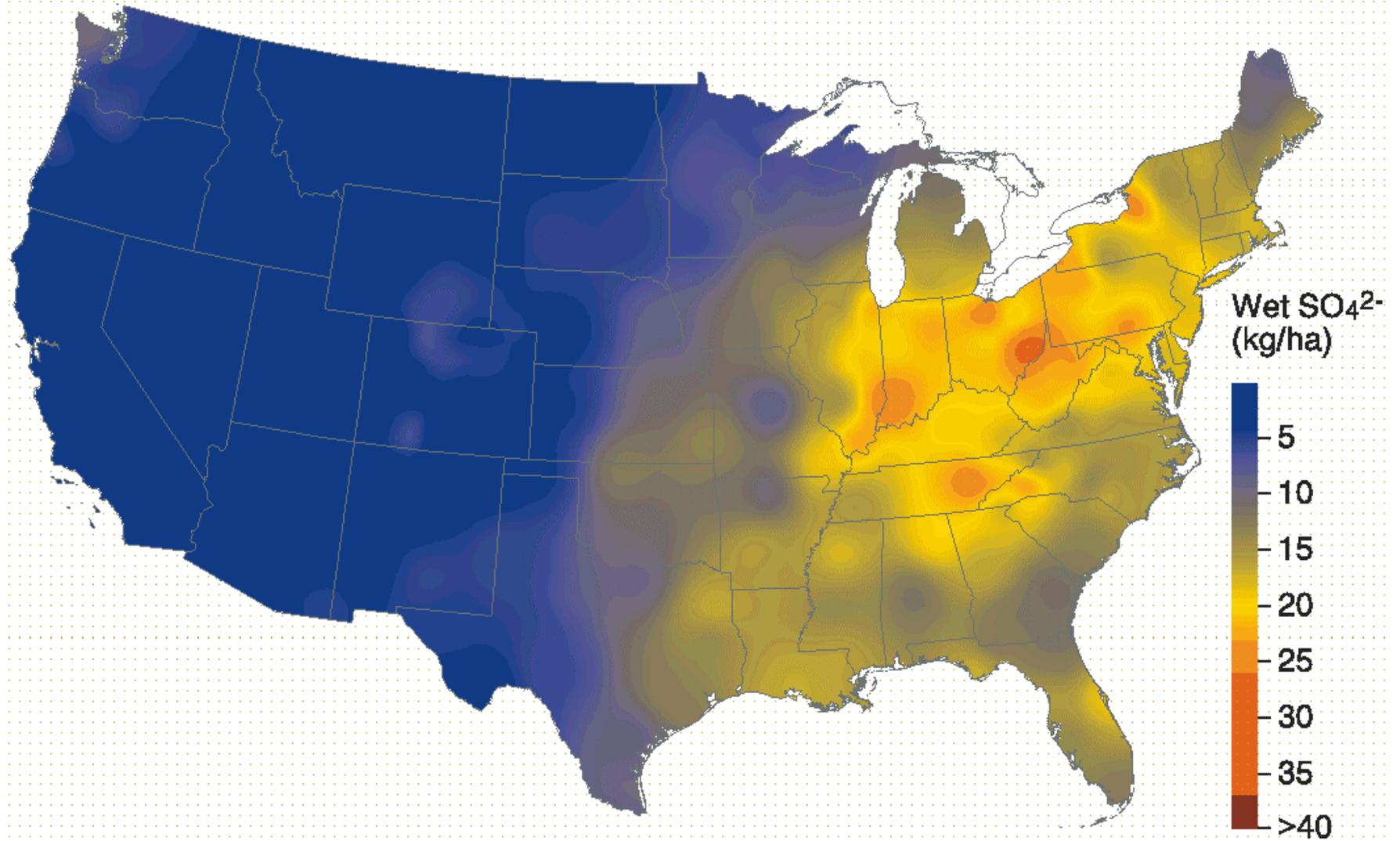
Annual mean sulfate deposition from precipitation, 1990 –1992



Source: CASTNET & NADP/NTN

USEPA/CAMD 03/28/01

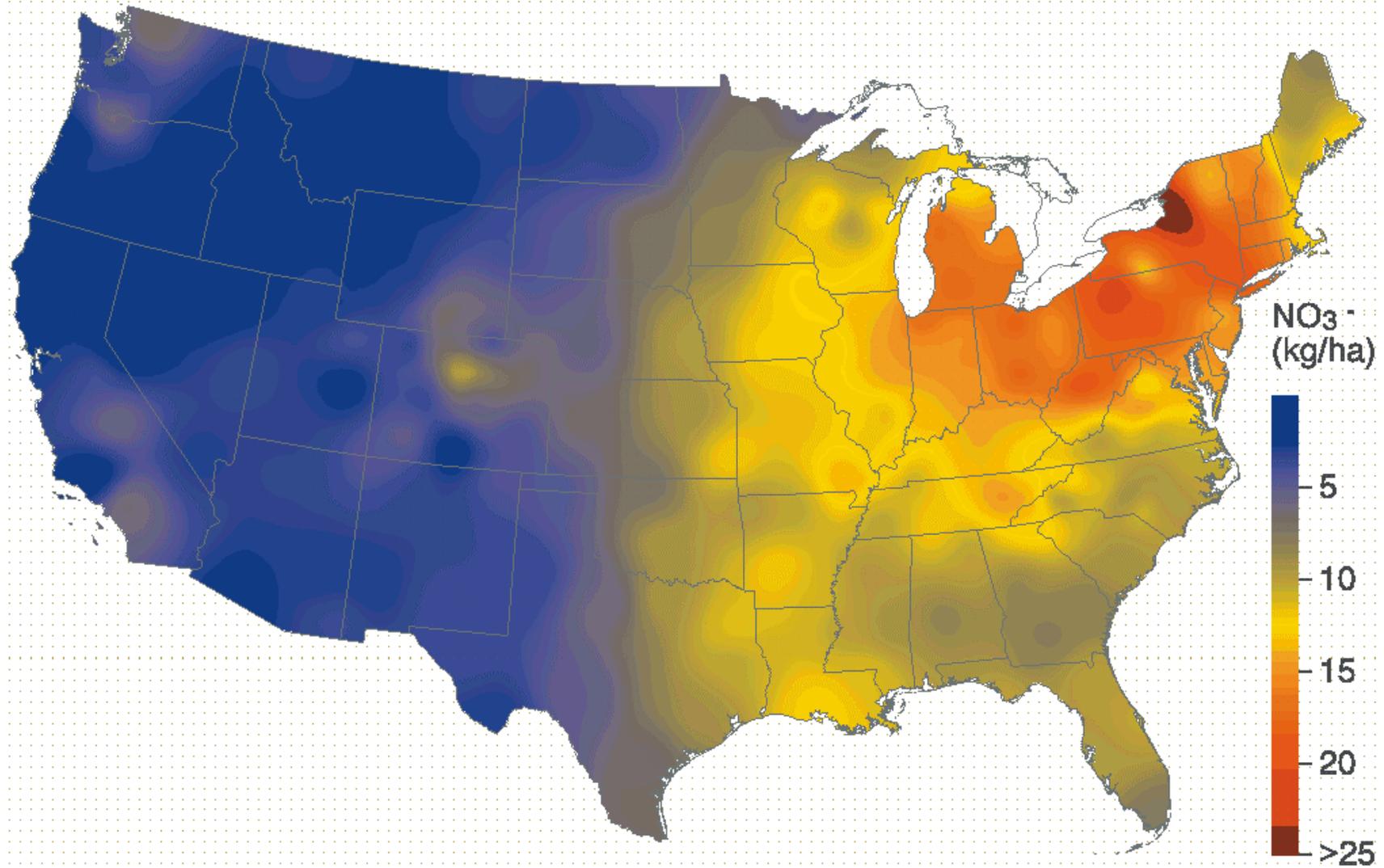
Annual mean sulfate deposition from precipitation, 1997 –1999



Source: CASTNET & NADP/NTN

USEPA/CAMD 03/28/01

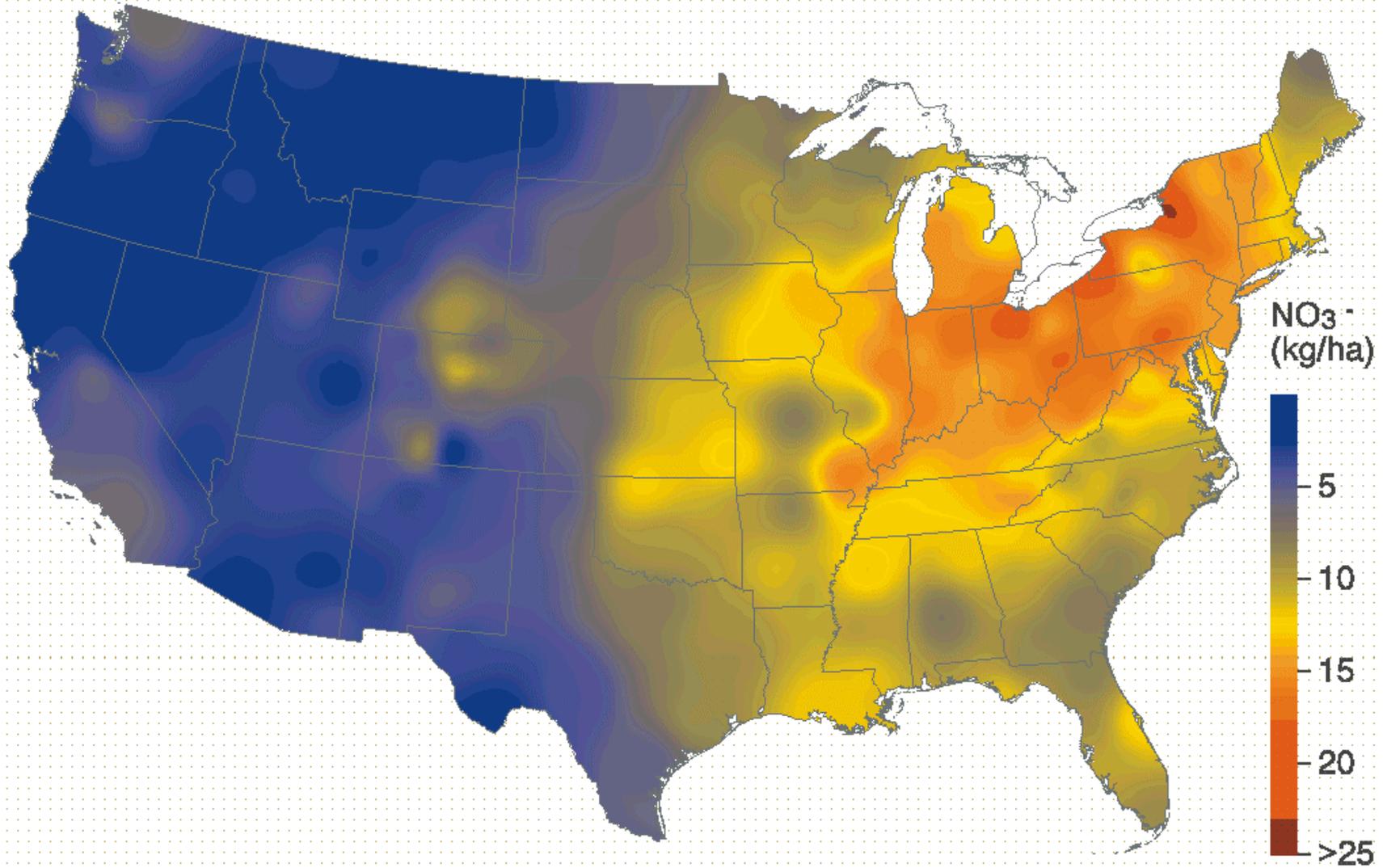
Annual mean nitrogen deposition from precipitation, 1990 – 1992



Source: CASTNET & NADP/NTN

USEPA/CAMD 03/28/01

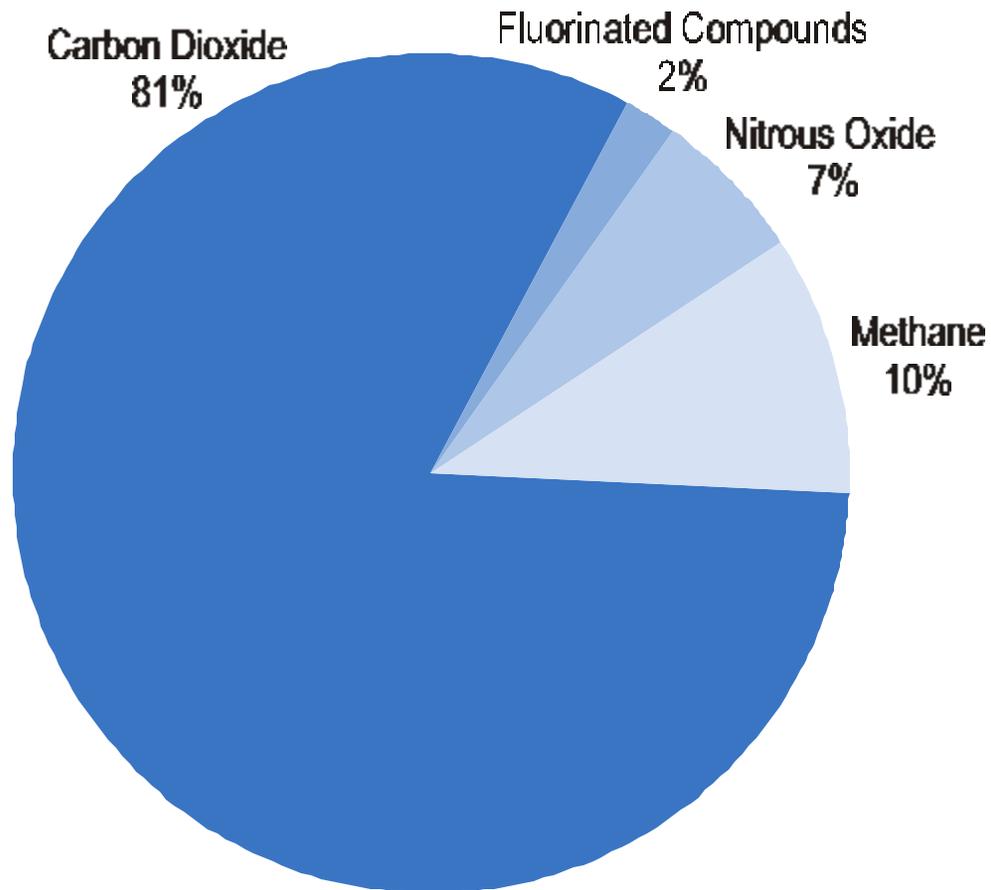
Annual mean nitrate deposition from precipitation, 1997 – 1999



Source: CASTNET & NADP/NTN

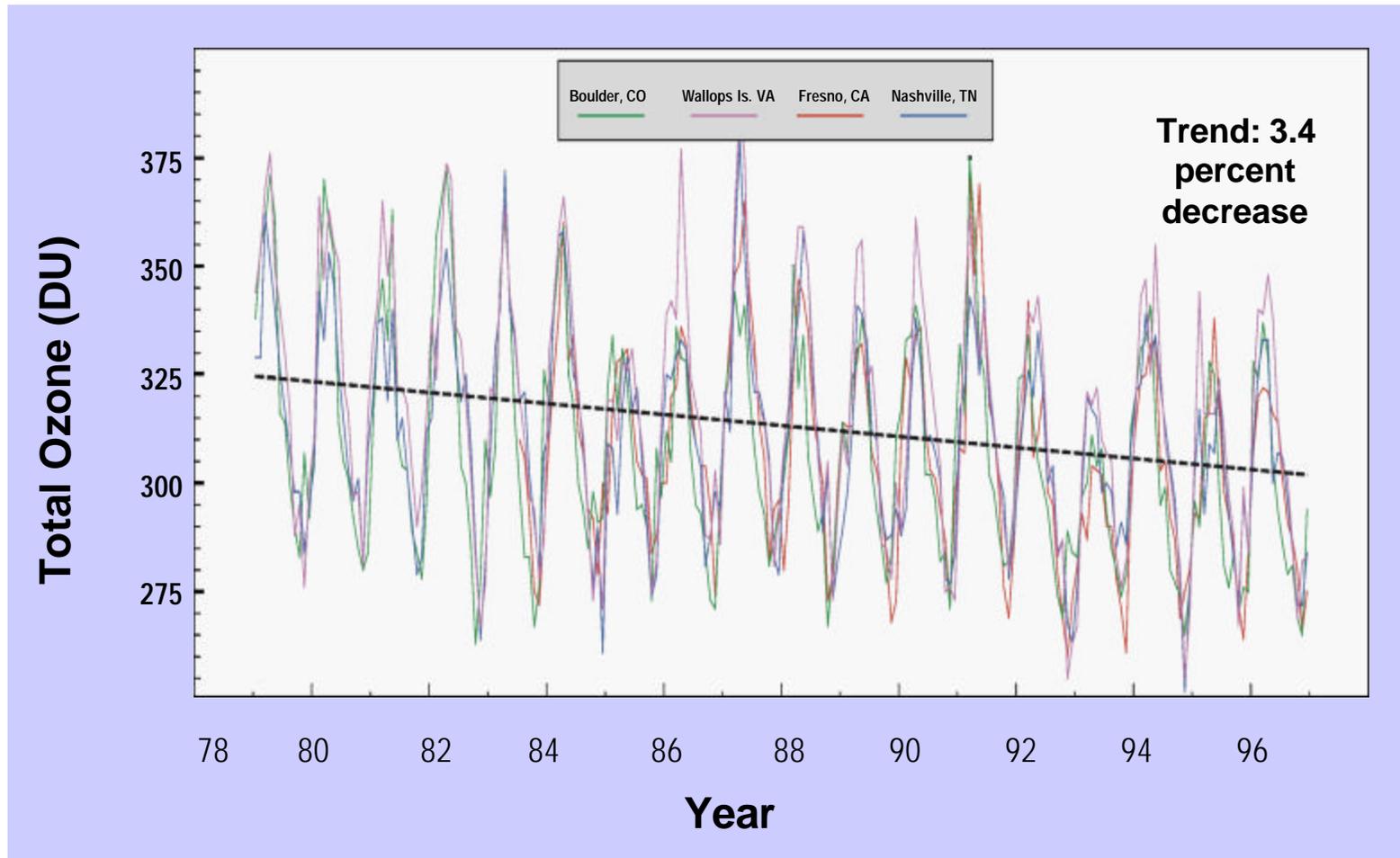
USEPA/CAMD 03/28/01

1998 Greenhouse Gas Emissions in the United States

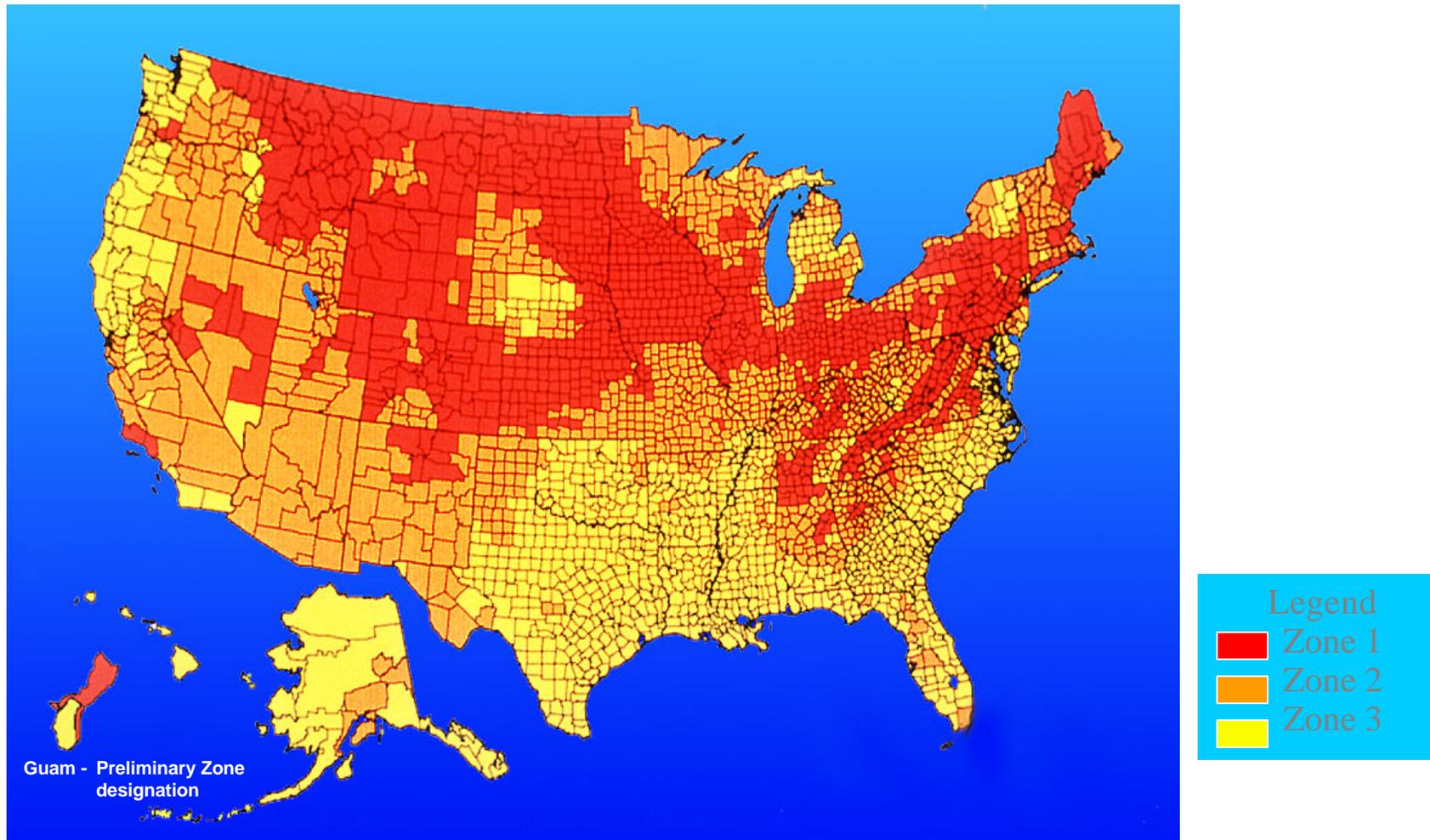


Trend in Total Ozone (stratosphere and ground level)

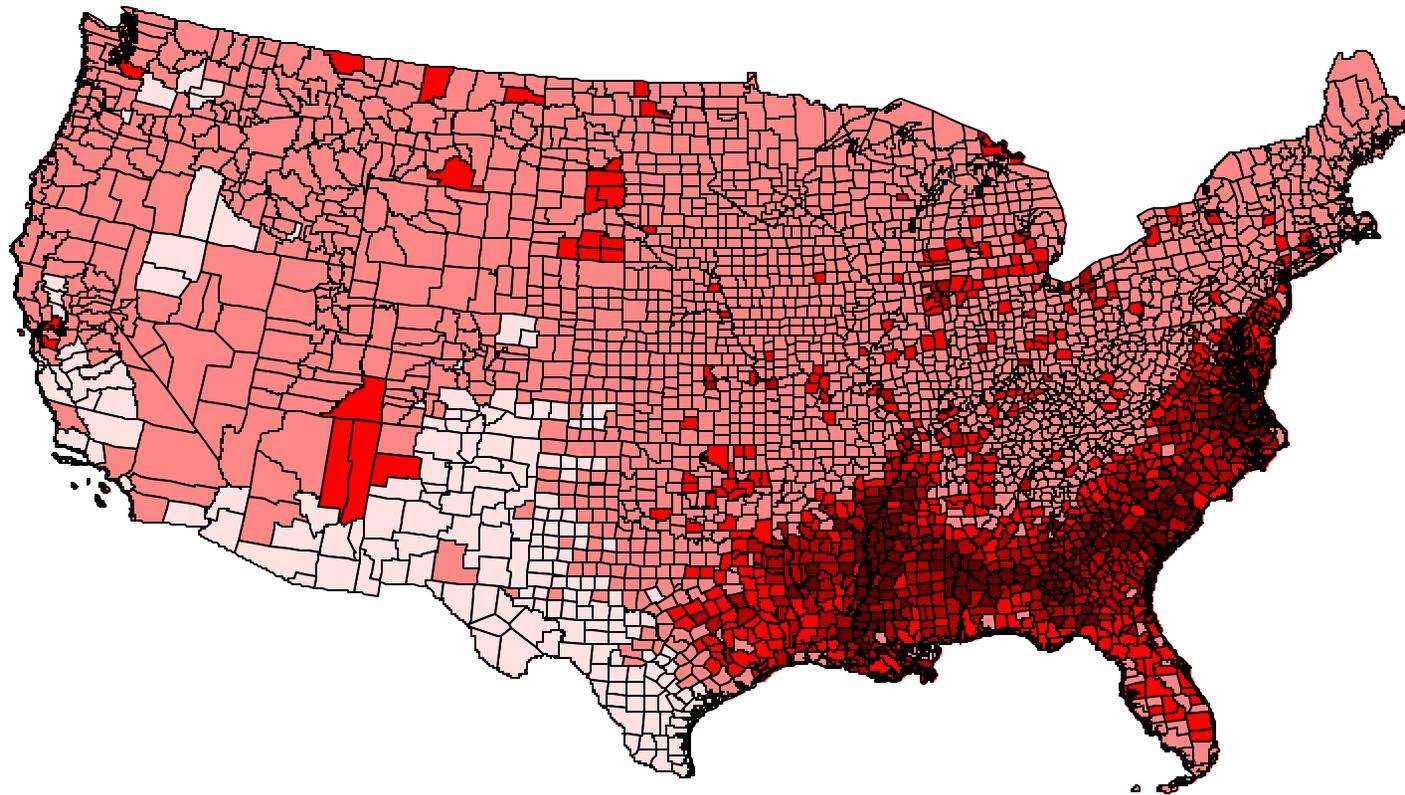
Decreasing O₃ causes an increase in UV-b



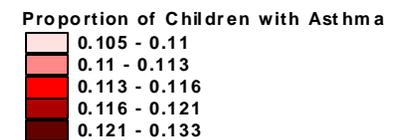
EPA Map of Radon Zones



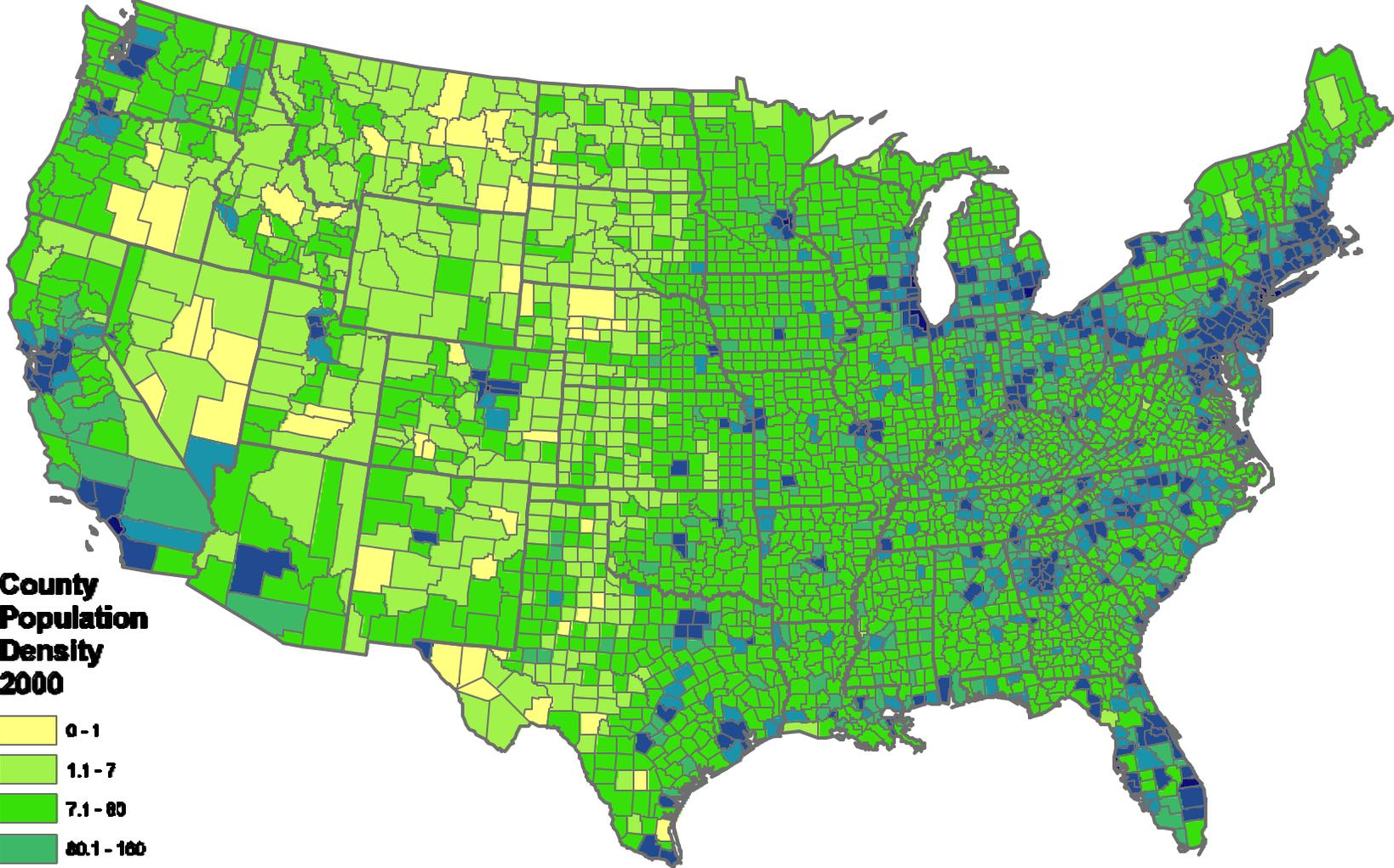
Prevalence of Asthma in Children, 1990



Note: Asthma prevalence rates obtained from responses to the 1997 National Health Interview Survey. Childhood asthma prevalence rates for whites and non-whites applied to 1990 population of children under 17.

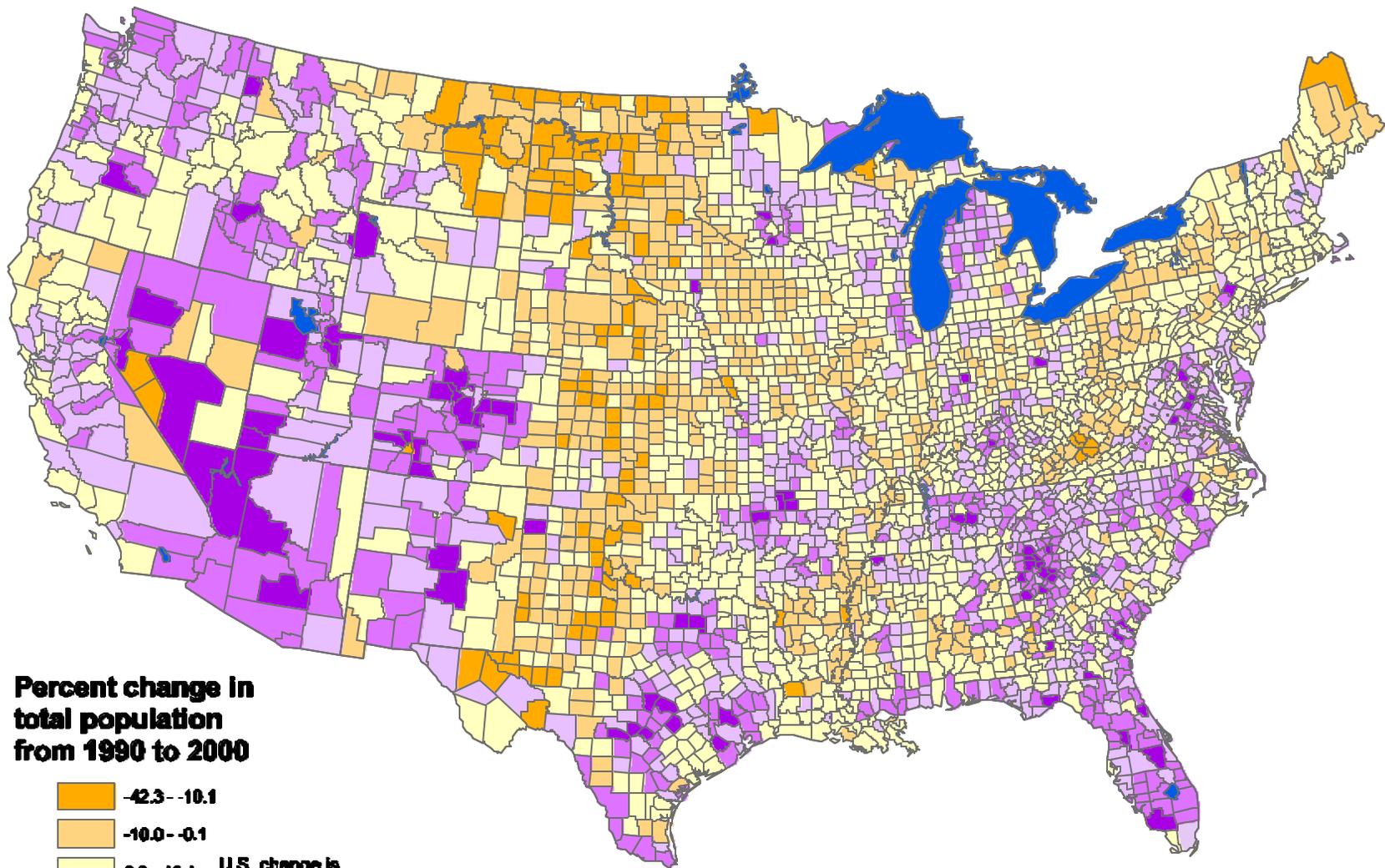


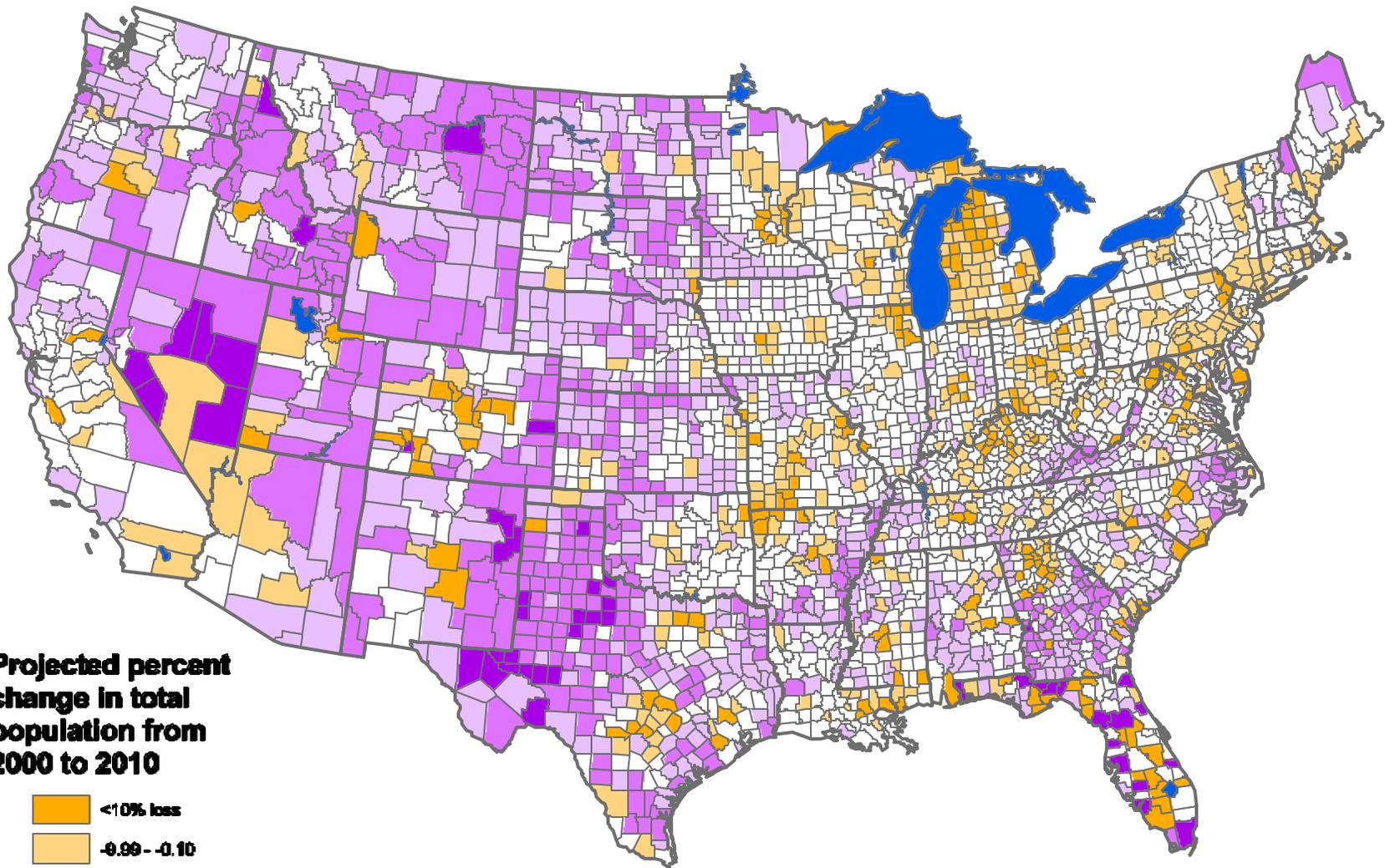
County Population Density in 2000



**County
Population
Density
2000**

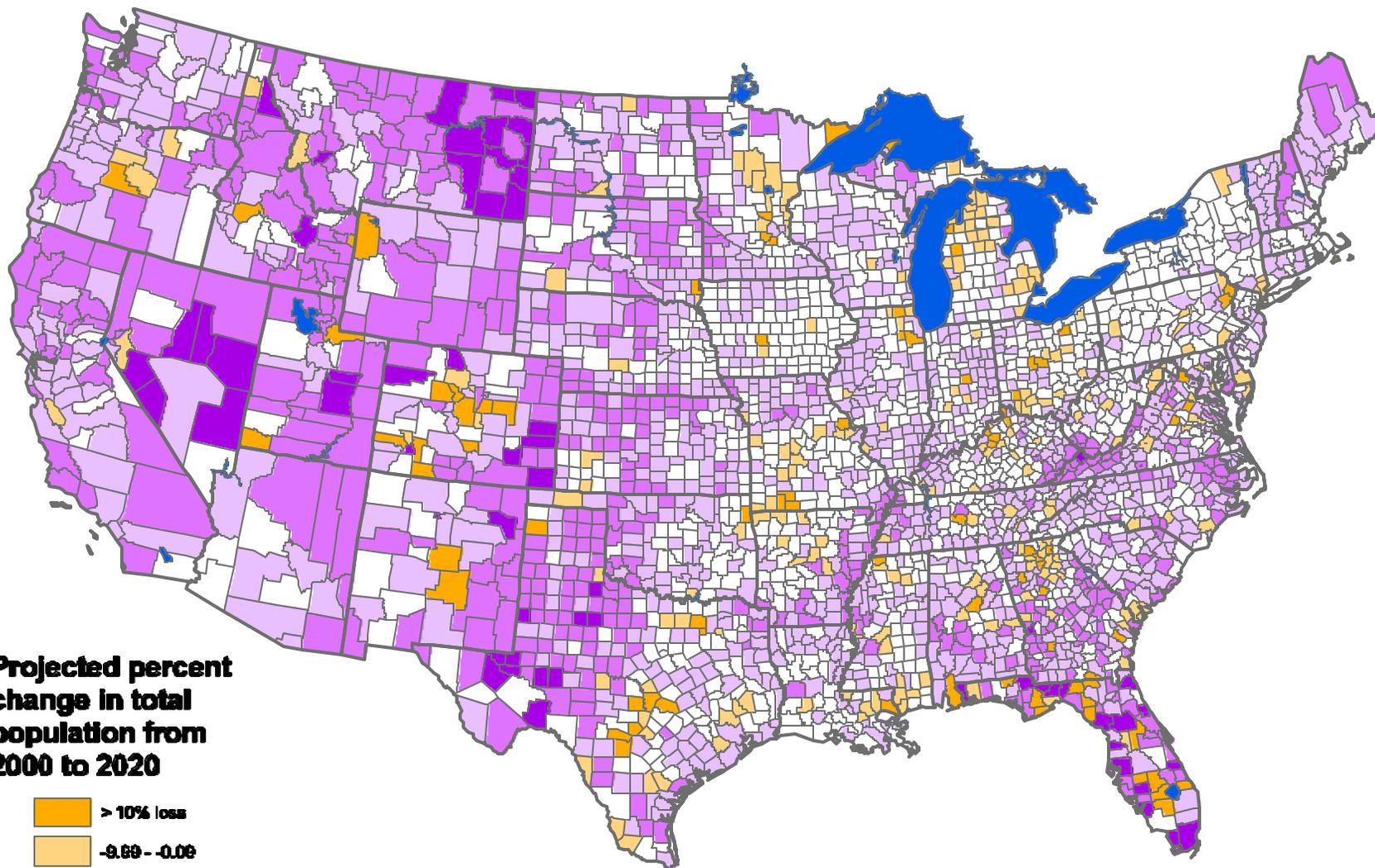
| |
|----------------|
| 0-1 |
| 1.1-7 |
| 7.1-80 |
| 80.1-160 |
| 160.1-300 |
| 300.1-3000 |
| 3000.1-71466.9 |





Projected percent change in total population from 2000 to 2010

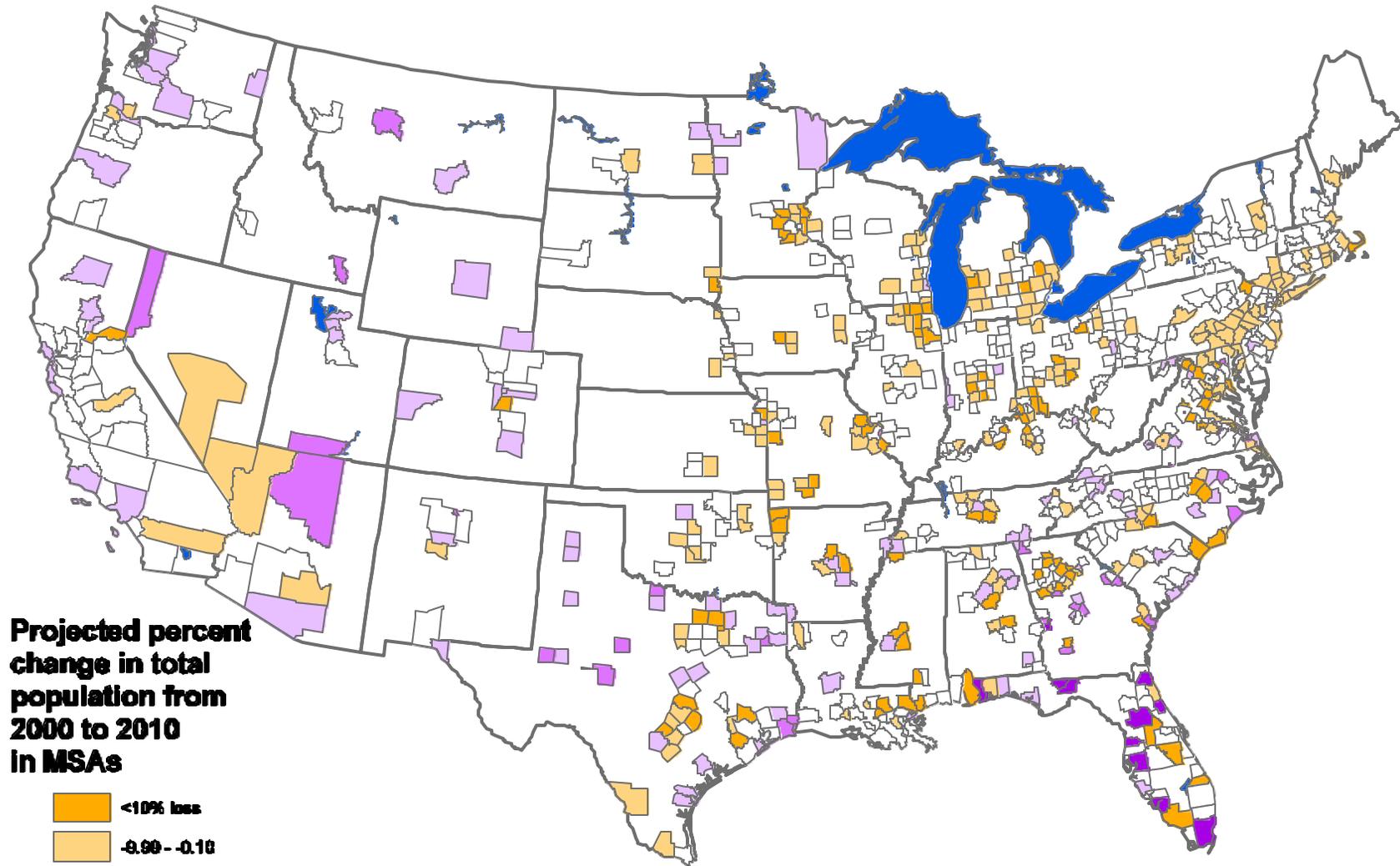
-  <10% loss
-  -0.00 - -0.10
-  -0.00 - 13.0
-  13.01 - 25.0
-  25.01 - 50.0
-  >50% gain



**Projected percent
change in total
population from
2000 to 2020**

-  > 10% loss
-  -9.99 - -0.09
-  -0.1 - 13.0
-  13.01 - 25.0
-  25.01 - 50.0
-  > 50% gain

Projected Change in Metropolitan Area Populations, 2000-2010



**Projected percent
change in total
population from
2000 to 2010
in MSAs**

-  <10% loss
-  -9.99 - -0.18
-  -0.09 - 13.0
-  13.01 - 25.0
-  25.01 - 50.0
-  >50% gain