

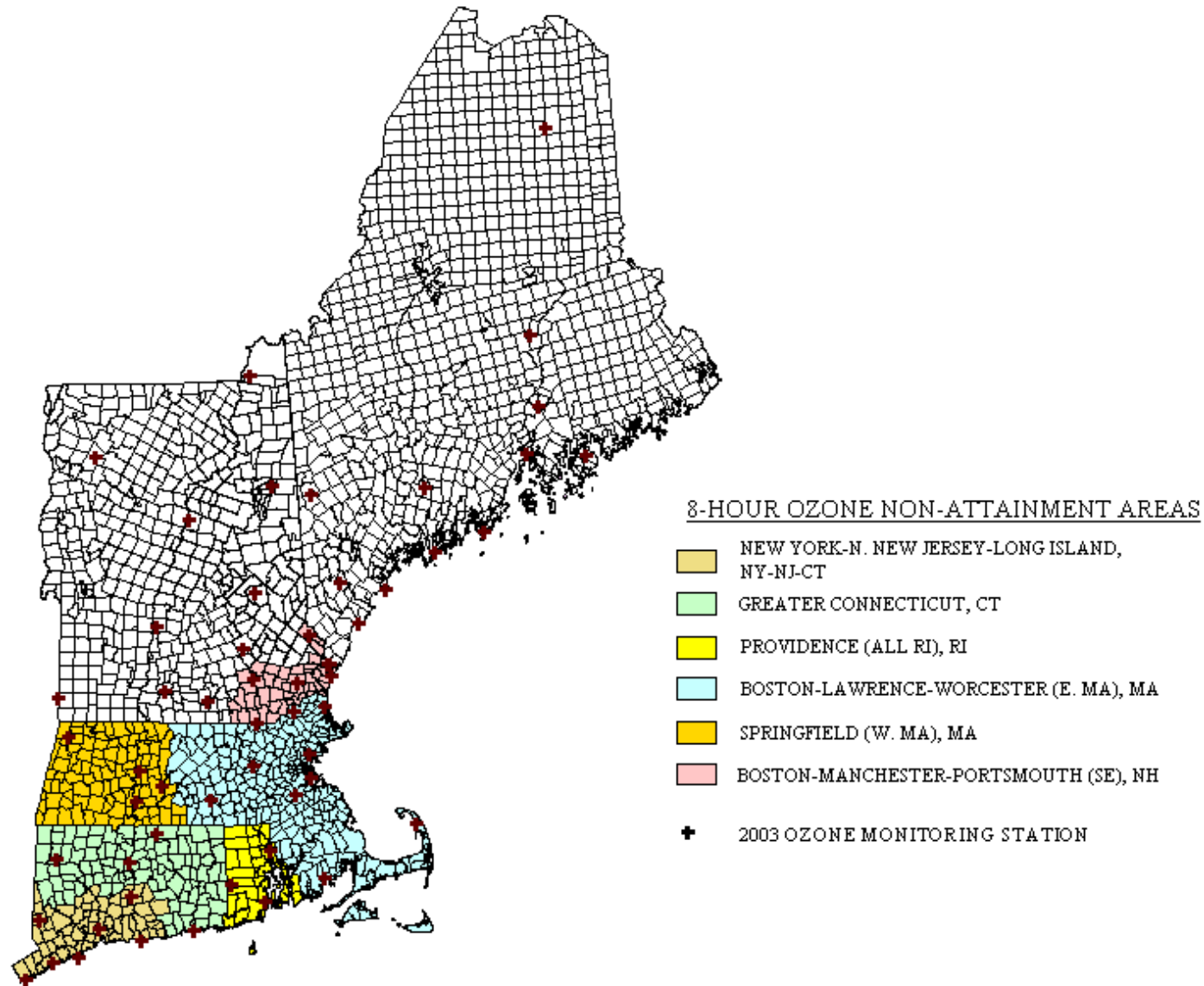
Stuff you may want to know
about...

**NESCAUM Monitoring and Assessment
Committee Meeting
Chelmsford, MA
May 8, 2008**

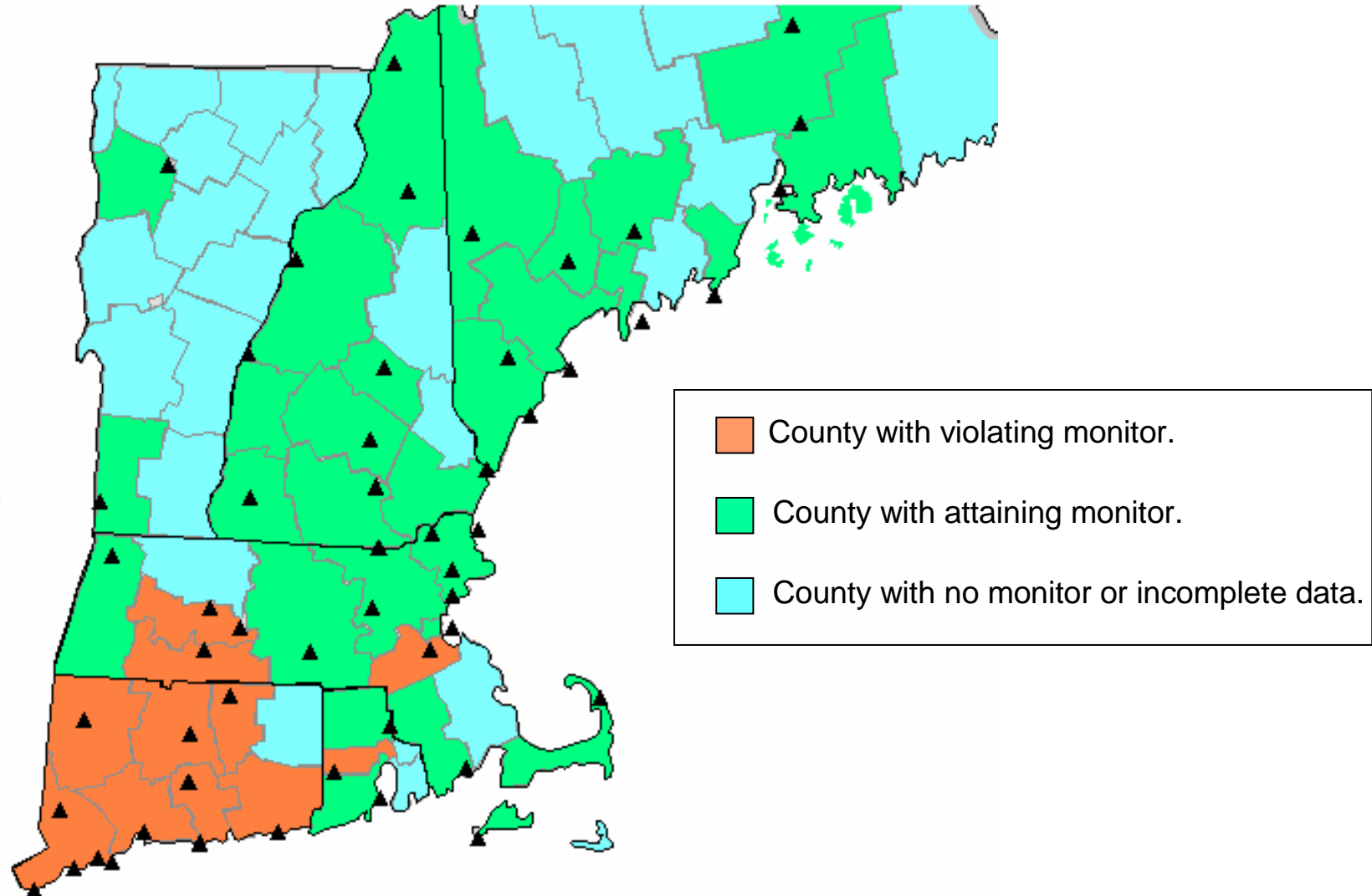
Impacts of the New 8-Hr Ozone Standard

- Increase in Ozone Non-attainment Areas.
- Increase in number of Ozone Exceedance Days.
- Lengthening of the Ozone Monitoring /Forecasting Season.

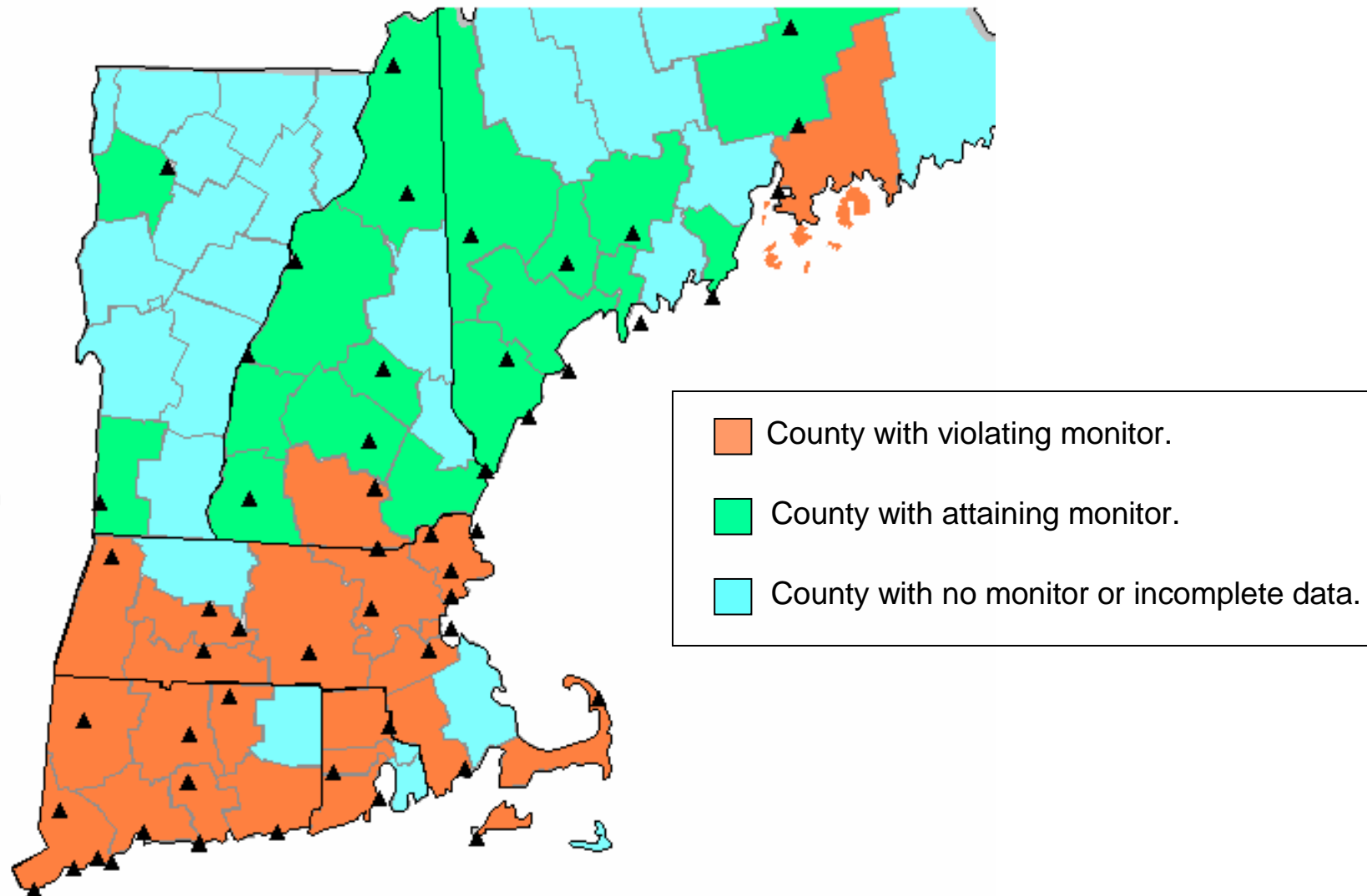
Areas Designated as Non-attainment under the 1997 8-Hr Ozone Standard (0.08 ppm)



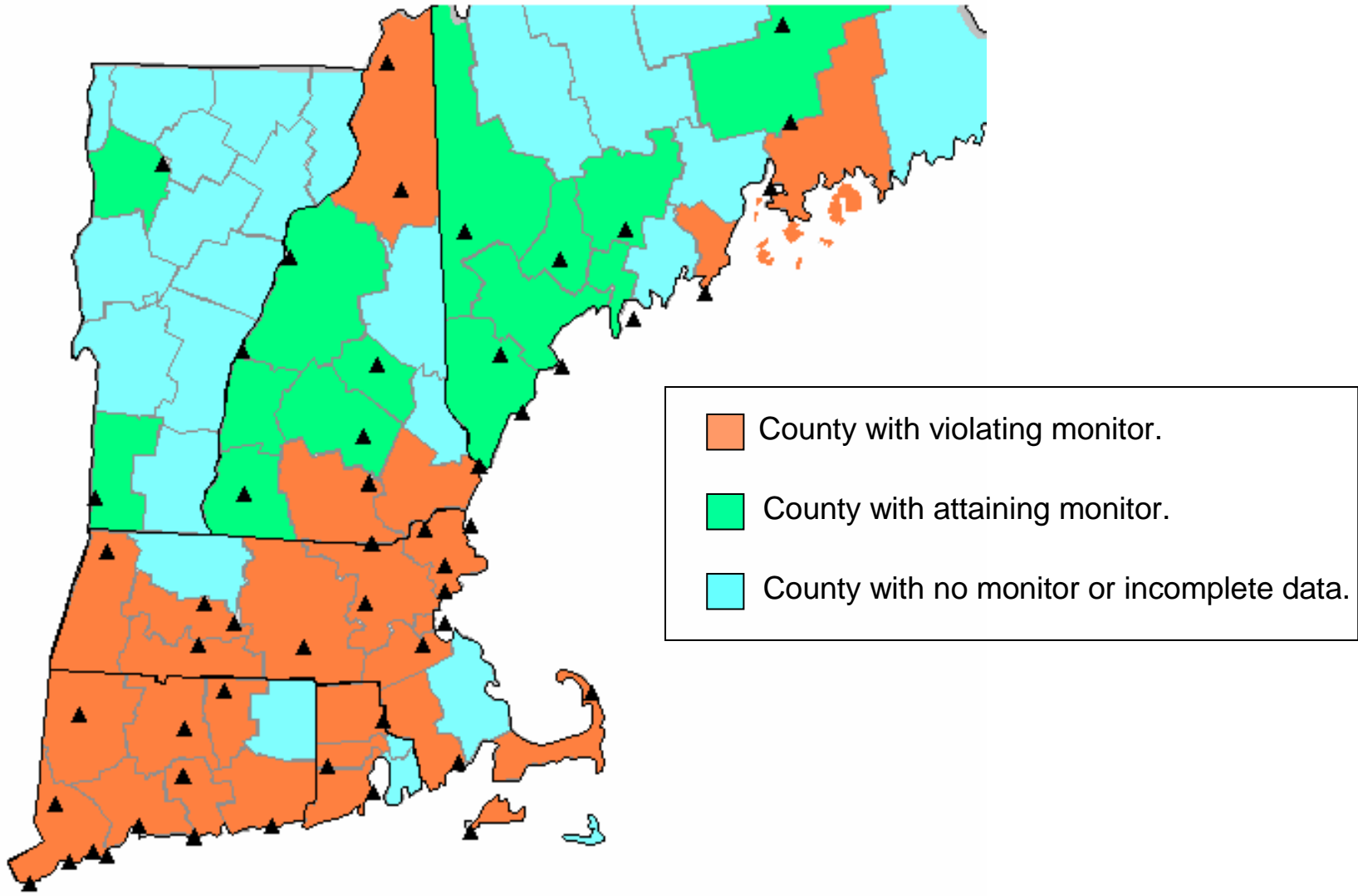
Status of Counties under the 1997 8-Hour Ozone Standard of 0.08 ppm based on 2005 – 2007 data.



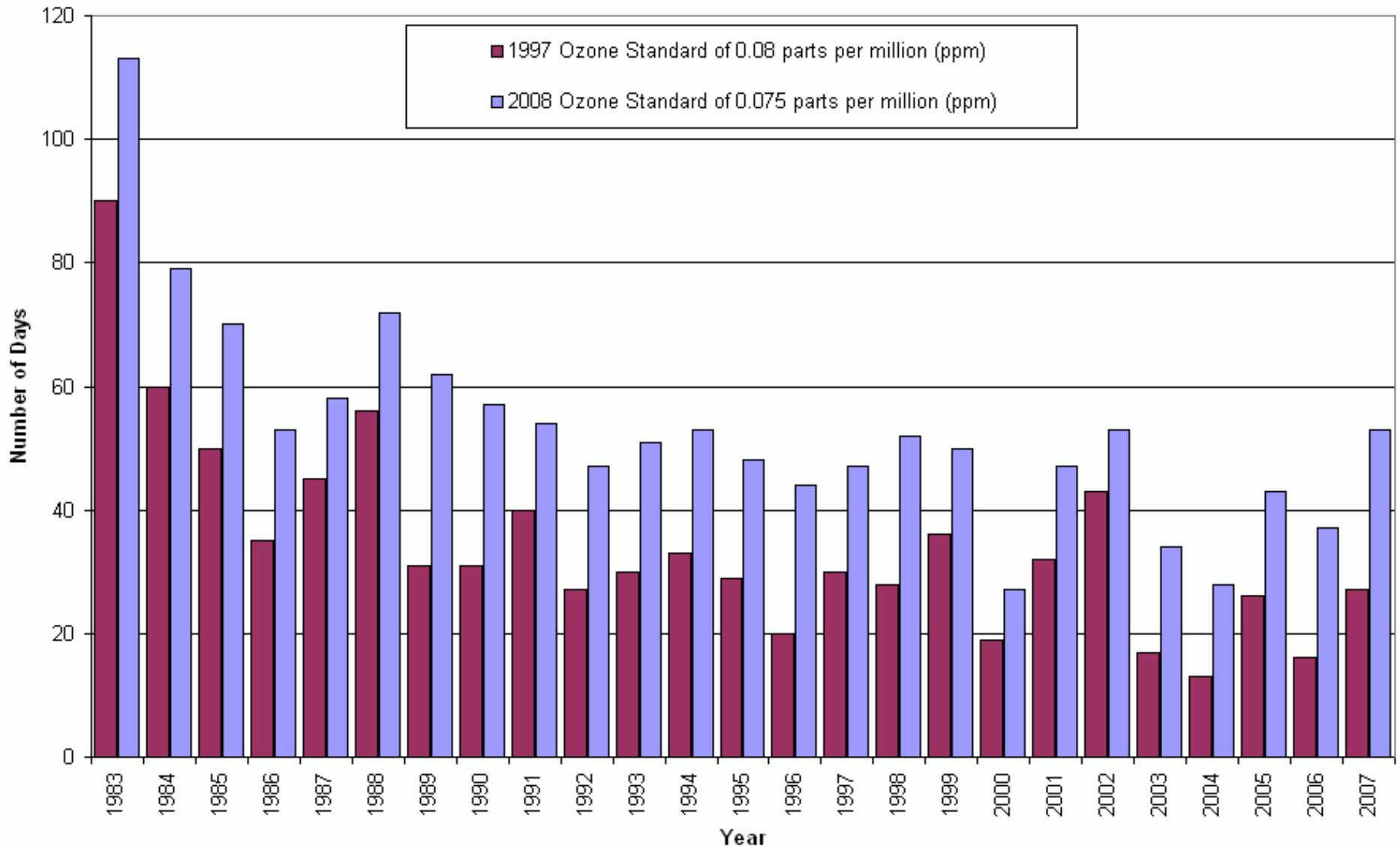
Status of Counties under the new 2008 8-Hour Ozone Standard of 0.075 ppm based on 2004 – 2006 data.



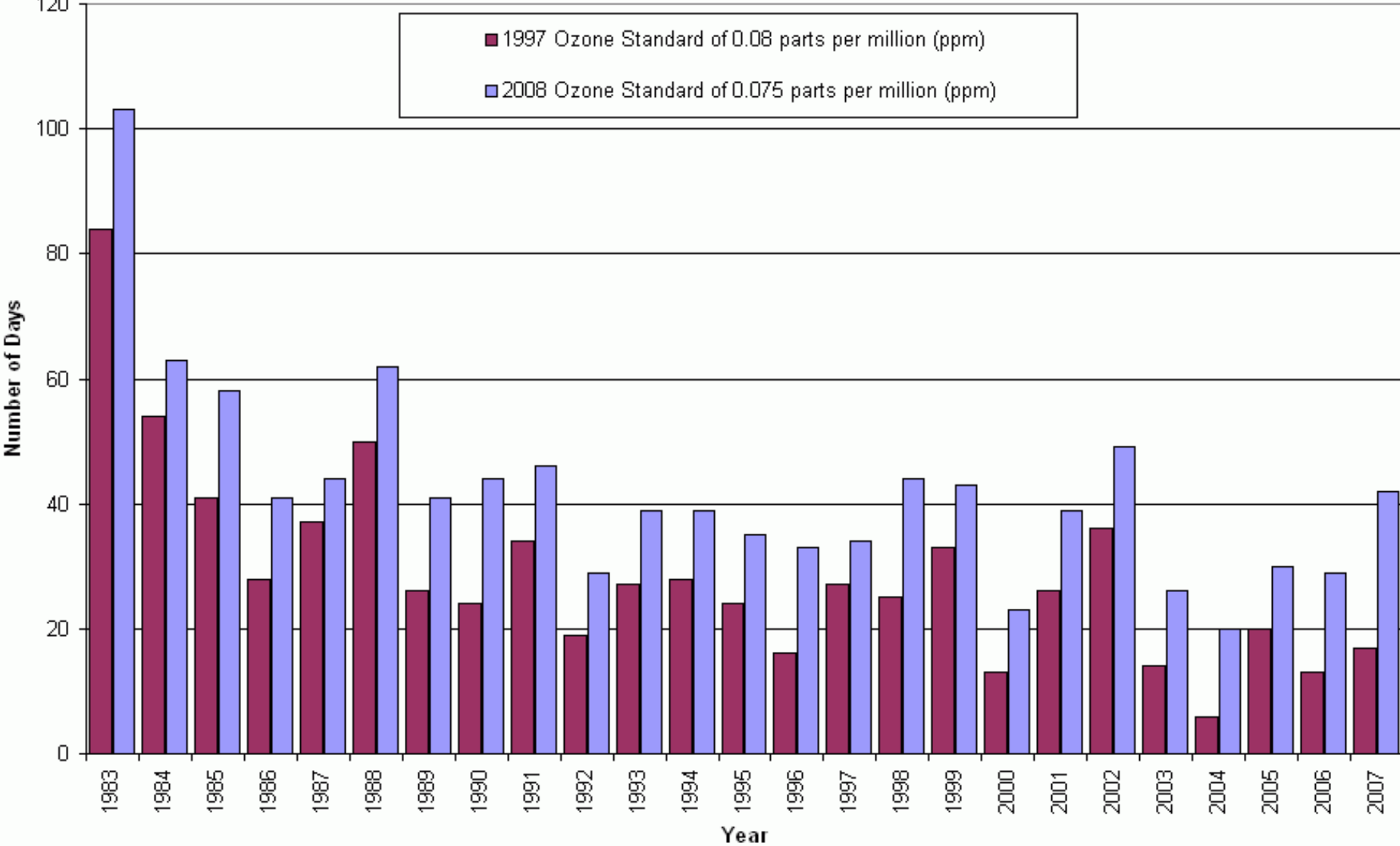
Status of Counties under the new 2008 8-Hour Ozone Standard of 0.075 ppm based on 2005 – 2007 data.



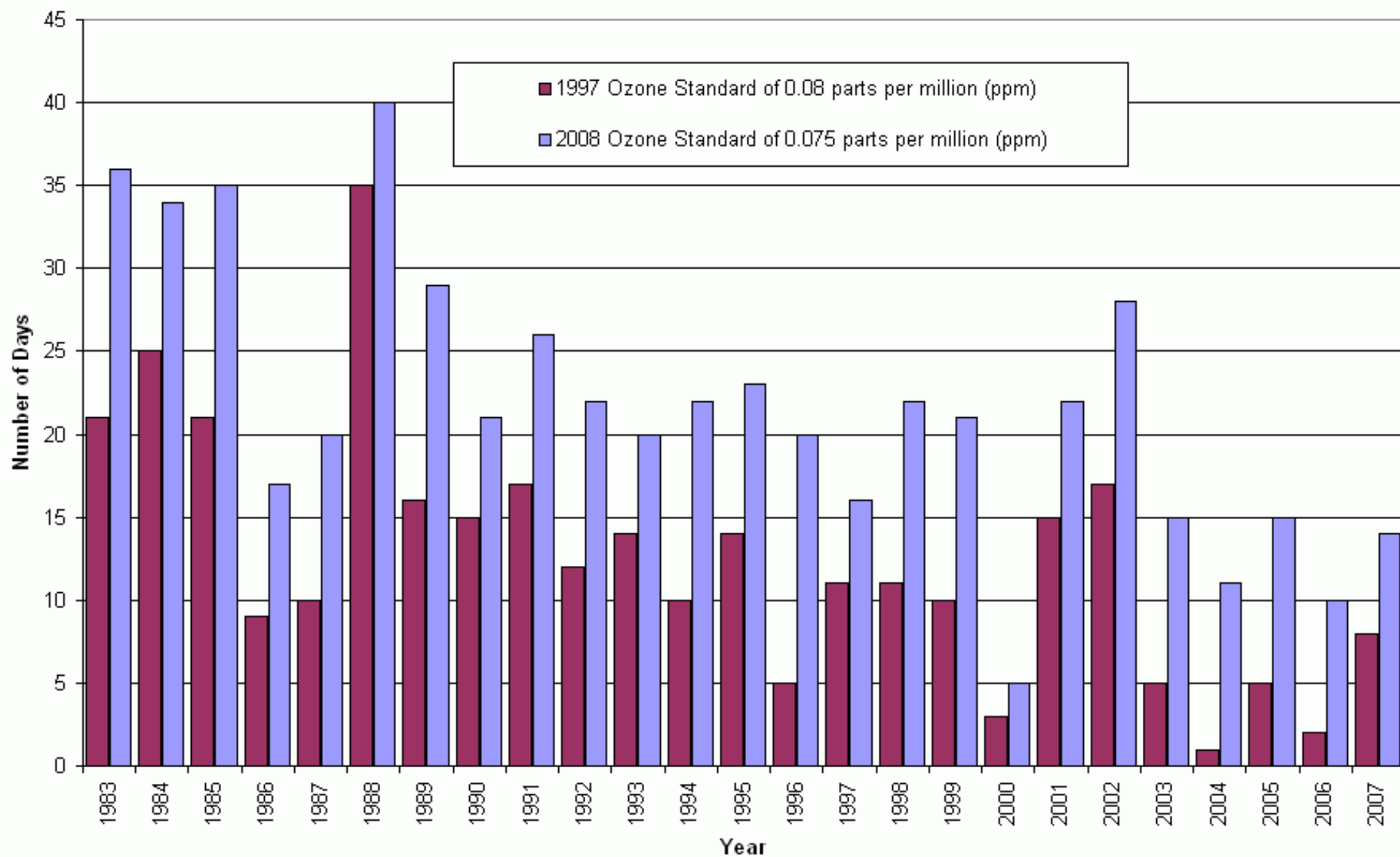
Days Exceeding the 8- Hour Ozone Standard in New England



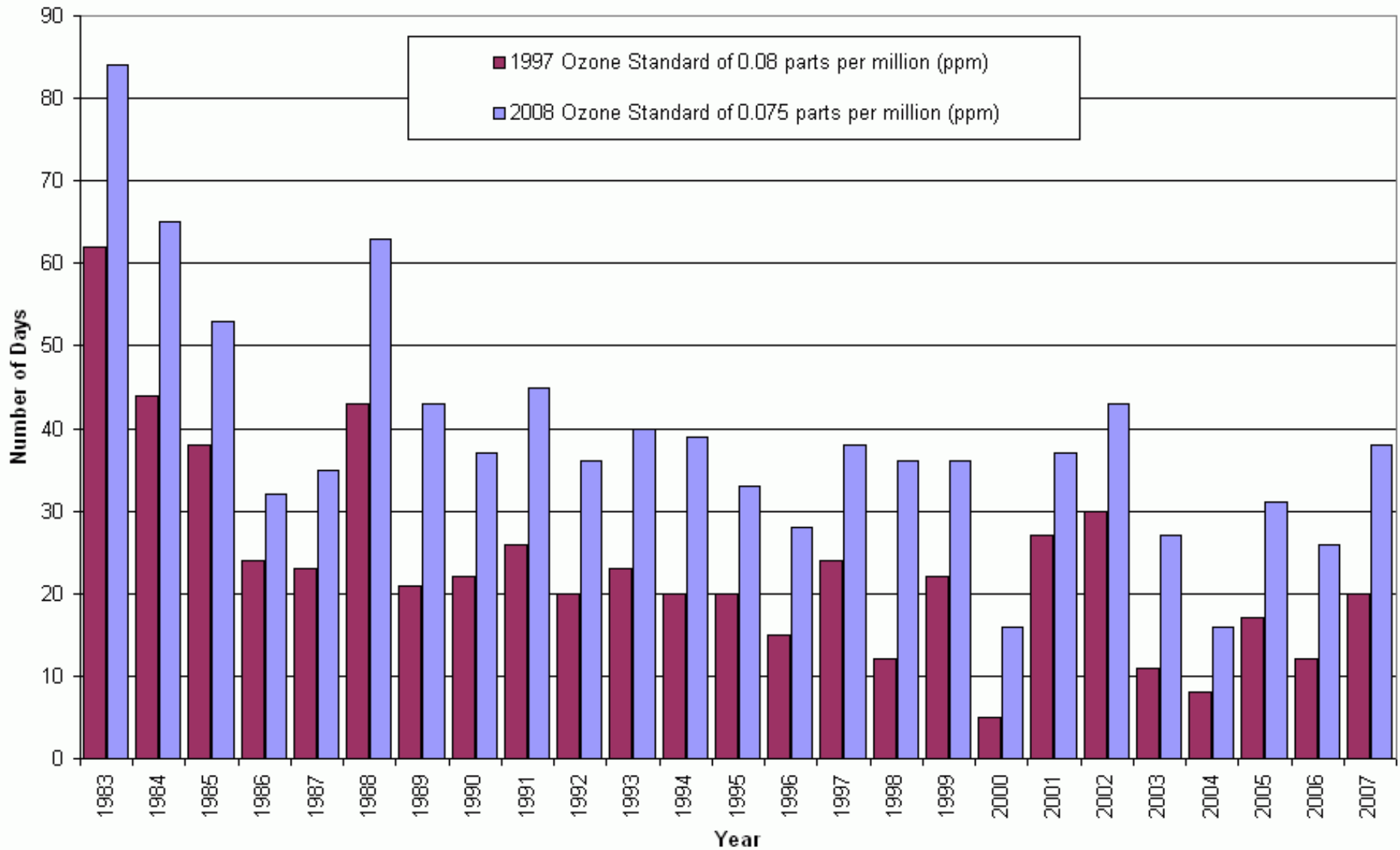
Days Exceeding the 8- Hour Ozone Standard in Connecticut



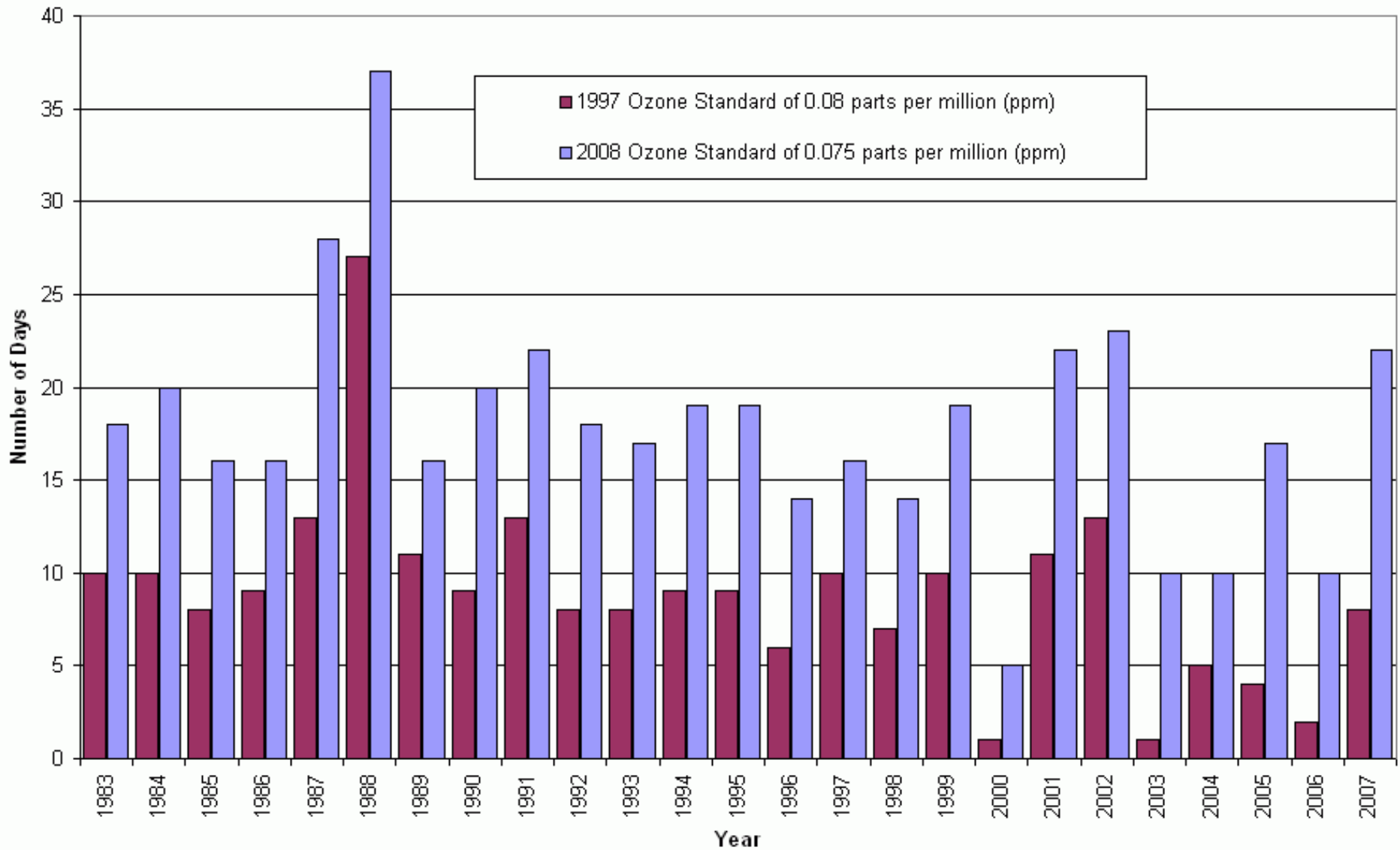
Days Exceeding the 8- Hour Ozone Standard in Maine



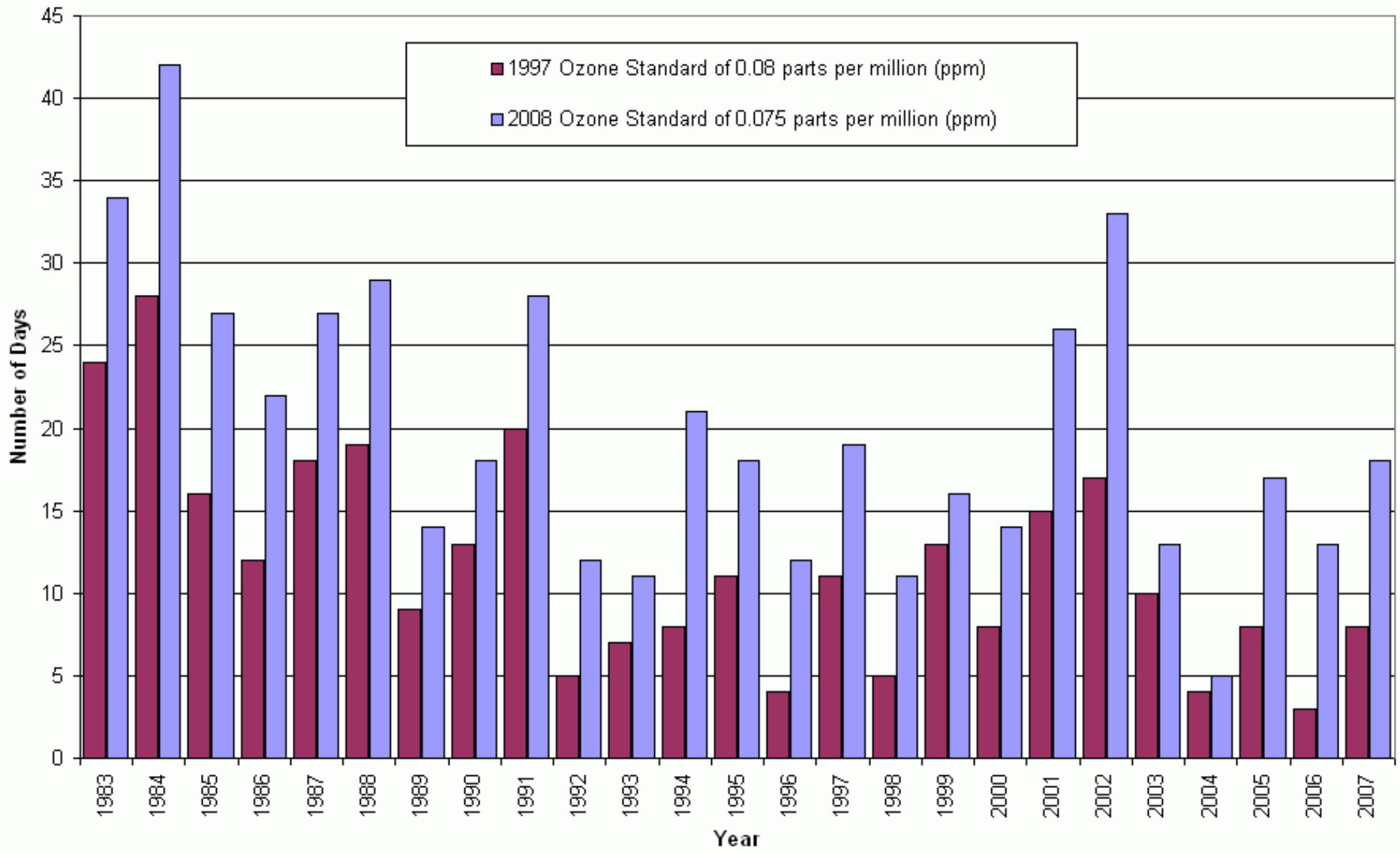
Days Exceeding the 8-Hour Ozone Standard in Massachusetts



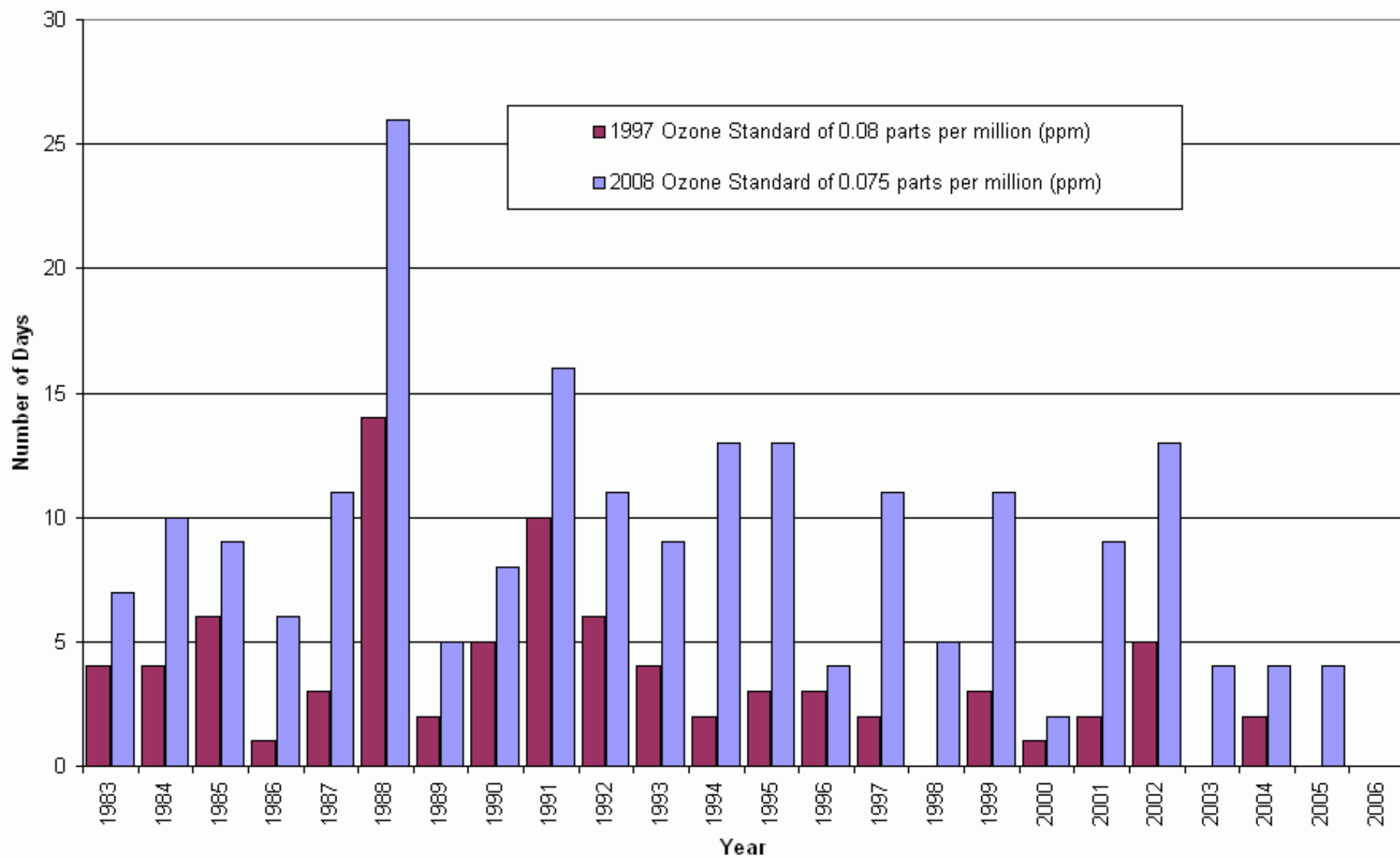
Days Exceeding the 8-Hour Ozone Standard in New Hampshire



Days Exceeding the 8- Hour Ozone Standard in Rhode Island



Days Exceeding the 8- Hour Ozone Standard in Vermont



Revised Ozone AQI

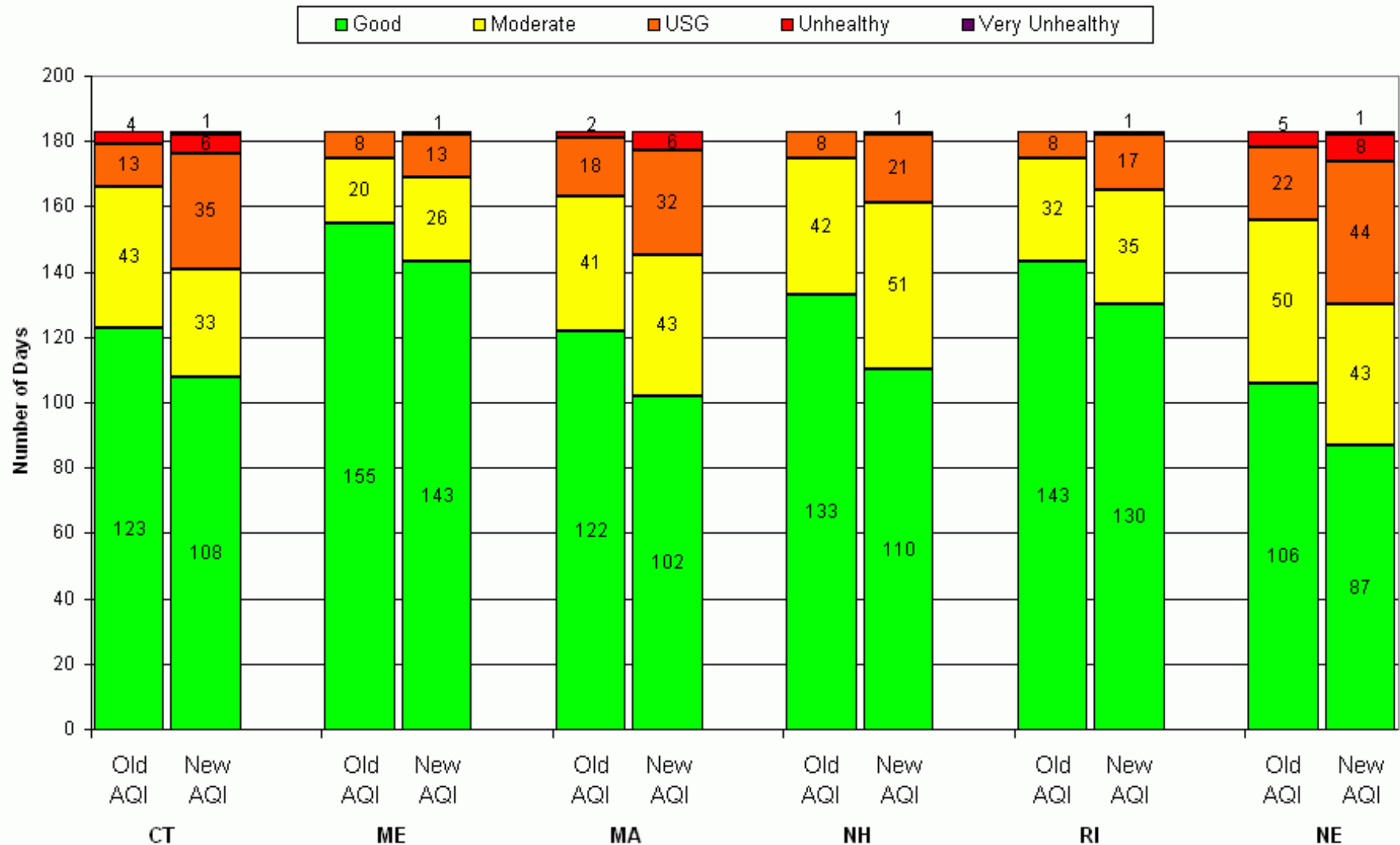
- EPA is changing the Air Quality Index (AQI) to reflect the new primary standard
- EPA is adjusting the 100-level to equal the new 0.075 ppm standard, and making proportional changes to other AQI values
- EPA encourages the States to use the new AQI breakpoints for air quality forecasting by May 1, 2008

Air Quality Index for Ozone

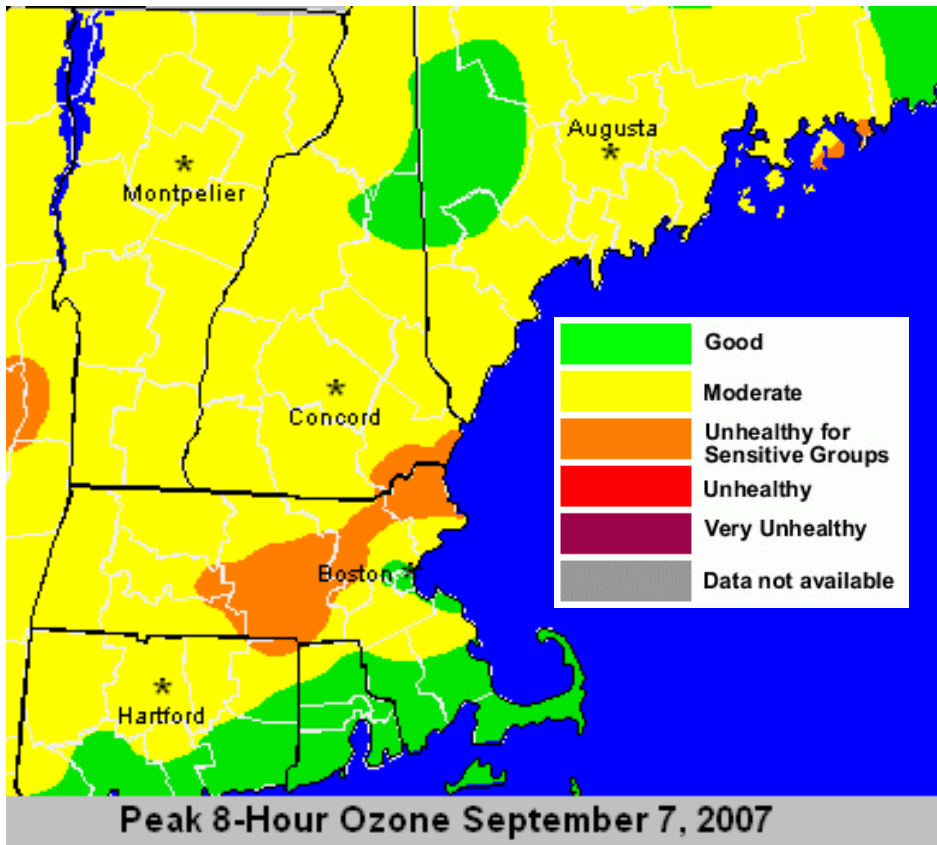
Category	AQI Value	1997 8-hour (ppm)	2008 8-hour (ppm)
Good	0-50	0.000-0.064	0.000-0.059
Moderate	51-100	0.065-0.084	0.060-0.075
Unhealthy for Sensitive Groups	101-150	0.085-0.104	0.076-0.095
Unhealthy	151-200	0.105-0.124	0.096-0.115
Very Unhealthy	201-300	0.125-0.374	0.116-0.374
Hazardous	301-400	No Change	No Change
	401-500	No Change	No Change

The new AQI will result in an increased number of unhealthy for sensitive groups and unhealthy days.

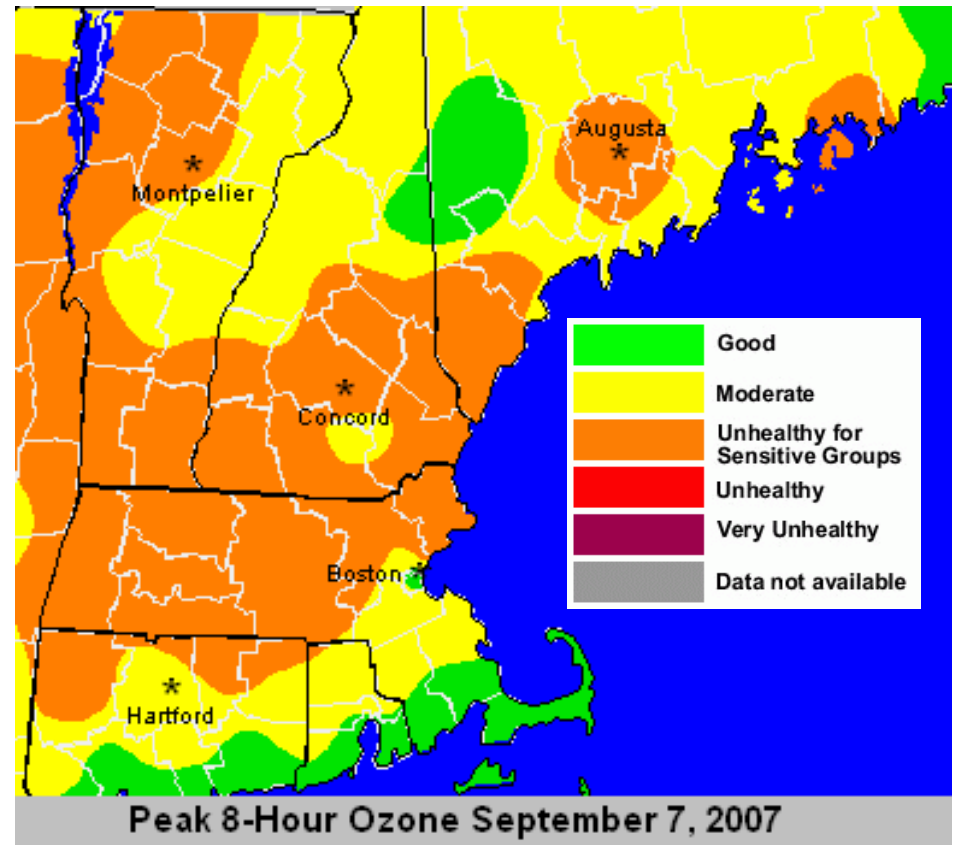
Days in Each AQI Category April 1, - September 30, 2007



The revised AQI will depict more extensive areas of unhealthy air quality.

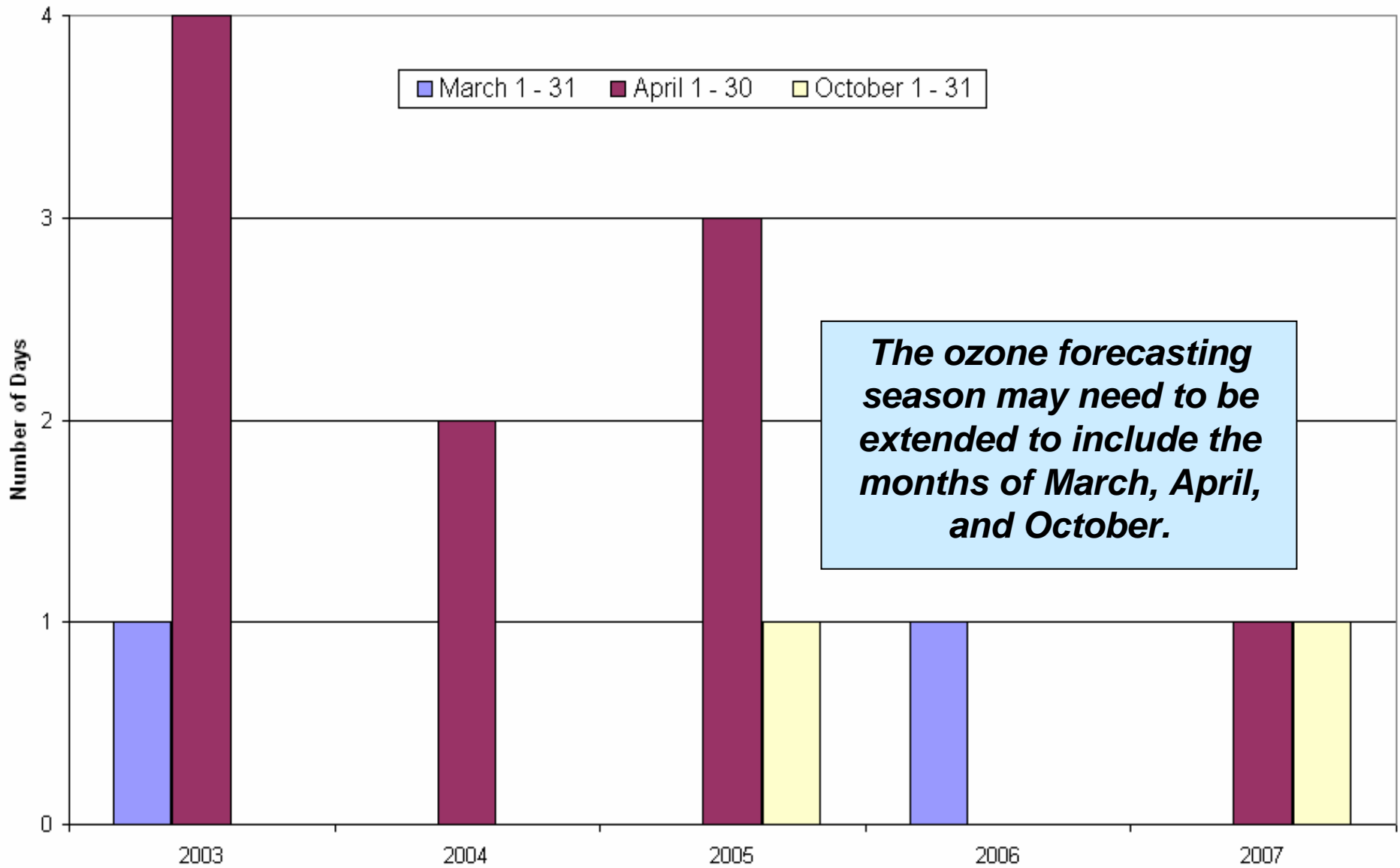


AQI based on 1997 ozone standard

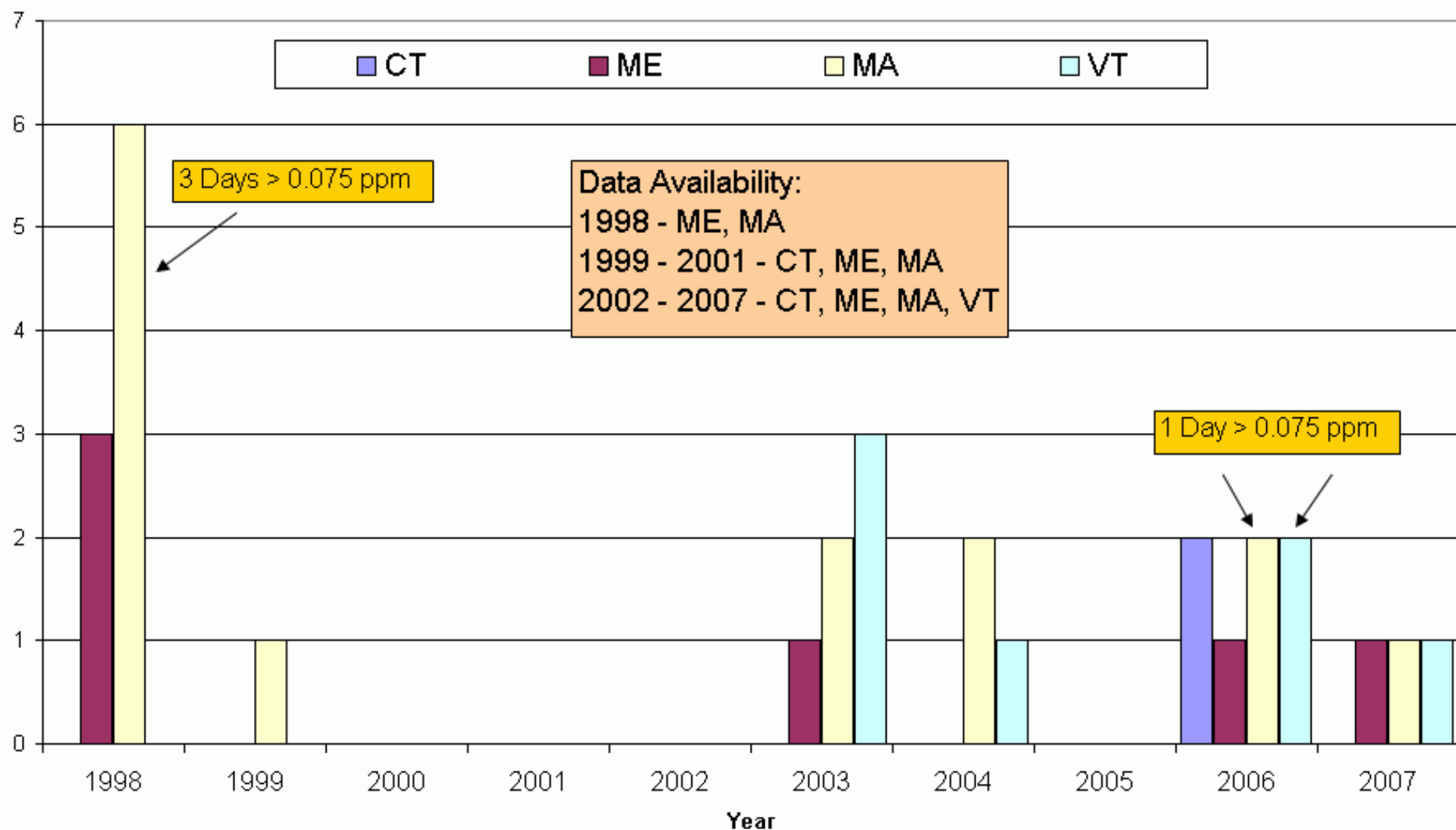


AQI based on 2008 ozone standard

Days in New England Exceeding the 2008 8-Hour Ozone Standard in March, April and October



Number of Days with 8-hour Ozone Concentrations >0.060 ppm between January 1 - March 31



Additional Information/NEXT STEPS

- Published in Federal Register: March 27, 2008.
- Rule Effective May 27, 2008.
- States Forecast using the new AQI: May 1, 2008
- Propose Implementation Rule: ~ Late Fall 2008
- States make designation attainment/nonattainment recommendations to EPA: March 2009

EnviroFlash

EPA has revamped EnviroFlash – air quality
e-mail alert system



EnviroFlash - Background

- Air quality information via email
- Free electronic service
- Launched May 2004
- Partnership between EPA and S/L/T agencies
- Uses AIRNow tech forecasts
- Subscribers receive e-mails



Feedback

- Want easier sign-up page
- Want local look and feel
- Make it pretty, short and sweet
- Want better bounce/auto reply handler
- Want text messaging
- Want to keep name “EnviroFlash”
- Like TV/radio promotion materials
- Need to track progress



“Want easier sign-up page”
“Make it pretty, short, and sweet”

Old Sign-Up Page:

CDX EnviroFlash AQ Index - Microsoft Internet Explorer provided by EPA - version 6

File Edit View Favorites Tools Help

Address <https://enviroflash.epa.gov/airnow/subscriber/Subscriber.do?method=start>

U.S. Environmental Protection Agency

EnviroFlash: AQ Index Forecast and Action Day Notification E-mails

Subscriber services

EnviroFlash is a free service that provides you with information about the air quality in the location of your choice via a daily email. It is produced through a partnership between EPA and State and local air quality agencies. EnviroFlash provides notifications about air quality action days as well as forecasts of air quality for the upcoming day(s), and allows you to select your level of air quality concern. Air quality action days are determined by State and local agencies when the air quality is forecast to reach a locally-determined level of concern and are generally tied to specific local air quality programs. Email address from subscribers may be used for statistical analysis by local government programs, with the intent to better serve the public through information regarding forecasts or action day alerts.

EnviroFlash is now available for many locations across the United States. Many State and local air agencies have expressed interest in using the program, so the list of available cities will continue to grow this summer. Please continue to check the web site for availability or inquire with your State or local air agency.

Use the form below to subscribe, edit your subscription, or un-subscribe (stop receiving) the service.

AQ Index forecasts subscription

All subscribers will receive notification of AQ Action Days

Email Address:

Email Format: Regular Short (for pagers/digital cell phones)

First Name (optional):

Last Name (optional):

Select Forecast by Zip Code:(optional):

or, Select Forecast City by State:

Receive Action Day Alerts only:

Air Quality Index (AQI) Values	Levels of Health Concern	Colors
<input type="radio"/> 0-50	Good	Green
<input type="radio"/> 51-100	Moderate	Yellow
<input type="radio"/> 101-150	Unhealthy for Sensitive Groups	Orange
<input type="radio"/> 151-200	Unhealthy	Red
<input type="radio"/> 201-300	Very Unhealthy	Purple
<input type="radio"/> 301-500	Hazardous	Maroon

Enter confirmation code to [activate your subscription](#).

Done Local intranet

New Sign-Up Page:

EnviroFlash Sign-up - Microsoft Internet Explorer provided by EPA - version 6

Address: http://staging.sonomatech.com/www_enviroflash_info/signup.cfm

Air Quality Notifications

[EnviroFlash Home](#) | [Subscribe to EnviroFlash](#) | [Registered Subscribers](#)

Sign Up and Start Receiving E-mails Today.

Fill out the form below to get started.

Subscriber Information

E-mail Address:*

First Name:

Last Name:

ZIP Code:*

**required fields*

Forecast City Selection [Change](#)

Receive E-mail for: **Please use the selection tool below.**

E-mail Preferences

Format: HTML Text Only Short

Receive Action Day Notifications:

Receive Forecasts:

Select minimum level at which to receive daily forecast e-mails.

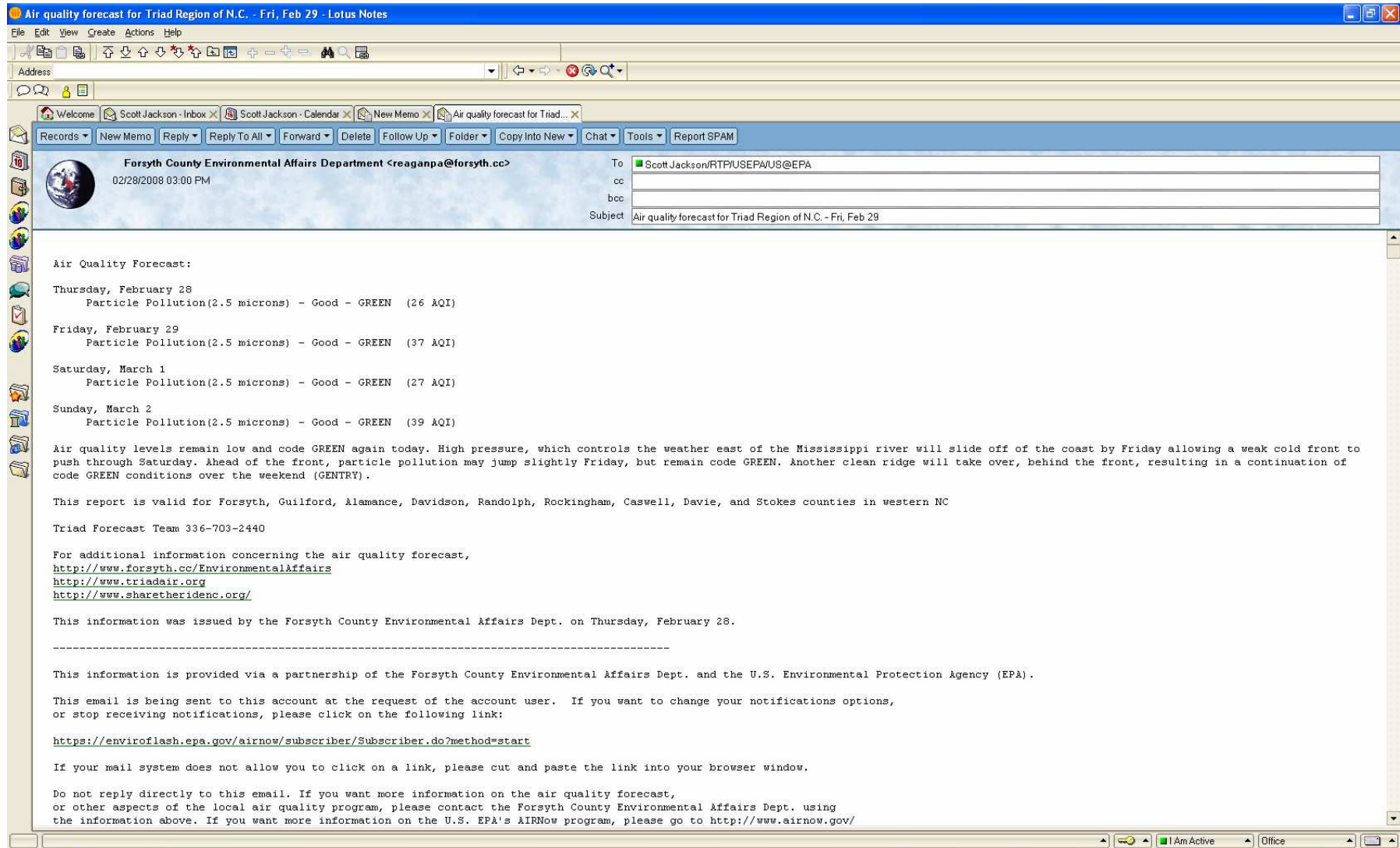
AQI Values	Levels	Colors
<input checked="" type="radio"/> 0-50	Good (receive daily forecast)	Green
<input type="radio"/> 51-100	Moderate	Yellow
<input type="radio"/> 101-150	Unhealthy for Sensitive Groups	Orange
<input type="radio"/> 151-200	Unhealthy	Red
<input type="radio"/> 201-300	Very Unhealthy	Purple
<input type="radio"/> 301+	Hazardous	Maroon

Features:

- Auto zip code lookup
- Allows for email preview before subscribing
- Simpler for subscribers to manage their accounts

“Make it pretty, short, and sweet”

Old E-mail:



The screenshot shows a Lotus Notes window titled "Air quality forecast for Triad Region of N.C. - Fri, Feb 29 - Lotus Notes". The interface includes a menu bar (File, Edit, View, Create, Actions, Help), a toolbar with various icons, and a window title bar. The email content is as follows:

Forsyth County Environmental Affairs Department <reaganpa@forsyth.cc>
02/28/2008 03:00 PM

To: Scott Jackson/RTP/USEPA/US@EPA
cc:
bcc:
Subject: Air quality forecast for Triad Region of N.C. - Fri, Feb 29

Air Quality Forecast:

Thursday, February 28
Particle Pollution(2.5 microns) - Good - GREEN (26 AQI)

Friday, February 29
Particle Pollution(2.5 microns) - Good - GREEN (37 AQI)

Saturday, March 1
Particle Pollution(2.5 microns) - Good - GREEN (27 AQI)

Sunday, March 2
Particle Pollution(2.5 microns) - Good - GREEN (39 AQI)

Air quality levels remain low and code GREEN again today. High pressure, which controls the weather east of the Mississippi river will slide off of the coast by Friday allowing a weak cold front to push through Saturday. Ahead of the front, particle pollution may jump slightly Friday, but remain code GREEN. Another clean ridge will take over, behind the front, resulting in a continuation of code GREEN conditions over the weekend (GENTRY).

This report is valid for Forsyth, Guilford, Alamance, Davidson, Randolph, Rockingham, Caswell, Davie, and Stokes counties in western NC

Triad Forecast Team 336-703-2440

For additional information concerning the air quality forecast,
<http://www.forsyth.cc/EnvironmentalAffairs>
<http://www.triadair.org>
<http://www.sharetheridenc.org/>

This information was issued by the Forsyth County Environmental Affairs Dept. on Thursday, February 28.

This information is provided via a partnership of the Forsyth County Environmental Affairs Dept. and the U.S. Environmental Protection Agency (EPA).

This email is being sent to this account at the request of the account user. If you want to change your notifications options, or stop receiving notifications, please click on the following link:
<https://enviroflash.epa.gov/airnow/subscriber/Subscriber.do?method=start>

If your mail system does not allow you to click on a link, please cut and paste the link into your browser window.

Do not reply directly to this email. If you want more information on the air quality forecast, or other aspects of the local air quality program, please contact the Forsyth County Environmental Affairs Dept. using the information above. If you want more information on the U.S. EPA's AIRNow program, please go to <http://www.airnow.gov/>

“Make it pretty, short, and sweet”

New E-mail:

From: enviroflash@sonomatech.com Sent: Thu 2/28/2008 1:28 PM
To: Steve Ludewig
Cc:
Subject: Daily Air Quality Forecast for Sacramento

SPARE THE AIR Air Quality Notifications **EnviroFlash**
Your Environmental News Flash

Today and Tomorrow's Forecast

Thursday, Feb 28:	60 AQI	Moderate	Yellow	Particle Pollution (PM _{2.5})
Friday, Feb 29:	56 AQI	Moderate	Yellow	Particle Pollution (PM _{2.5})

Extended Forecast

Saturday, Mar 1:	42 AQI	Good	Green	Particle Pollution (PM _{2.5})
Sunday, Mar 2:	AQI	Good	Green	Particle Pollution (PM _{2.5})
Monday, Mar 3:	AQI	Good	Green	Particle Pollution (PM _{2.5})
Tuesday, Mar 4:	AQI	Good	Green	Particle Pollution (PM _{2.5})

Calm winds in the Sacramento area this morning have reduced dispersion, allowing pollutant levels to increase. These conditions, along with light winds throughout the rest of the day, will cause particle levels will be Moderate. Tomorrow, light winds early in the morning will limit pollutant dispersion. Therefore, despite moderate southerly winds dispersing pollutants in the afternoon, particle levels will be low-Moderate. Saturday, moderate northwesterly winds behind a weak cold front passing through the Sacramento region will disperse pollutants, lowering particle levels to Good.

Features:

- **HTML enabled**
- **Agency logo**
- **Simpler and easier to understand**

“Want local look and feel”/
“Need ability to track progress”

More Customization Available:

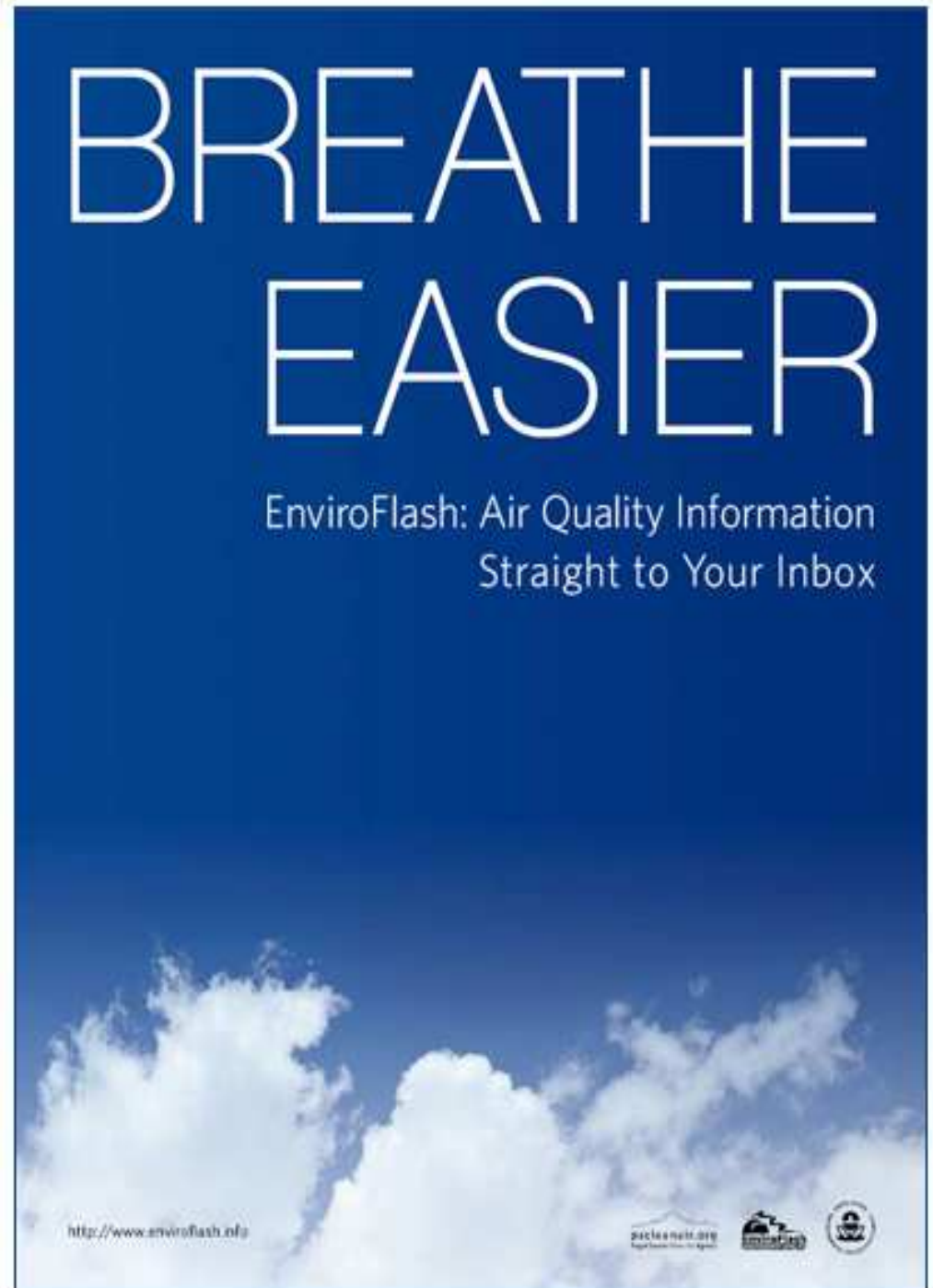
- Can add Agency logo to emails
- Can add Agency logo to sign-up page
- Sign-up page can be city.enviroflash.info
- Agencies can track how many people sign up



New Design New Materials

- New design
- New toolkit to market EnviroFlash

Allows you to place your Agency's logo on all marketing materials





BREATHE EASIER

EnviroFlash: Air Quality Information
Straight to Your Inbox

<http://www.enviroflash.nj.gov>

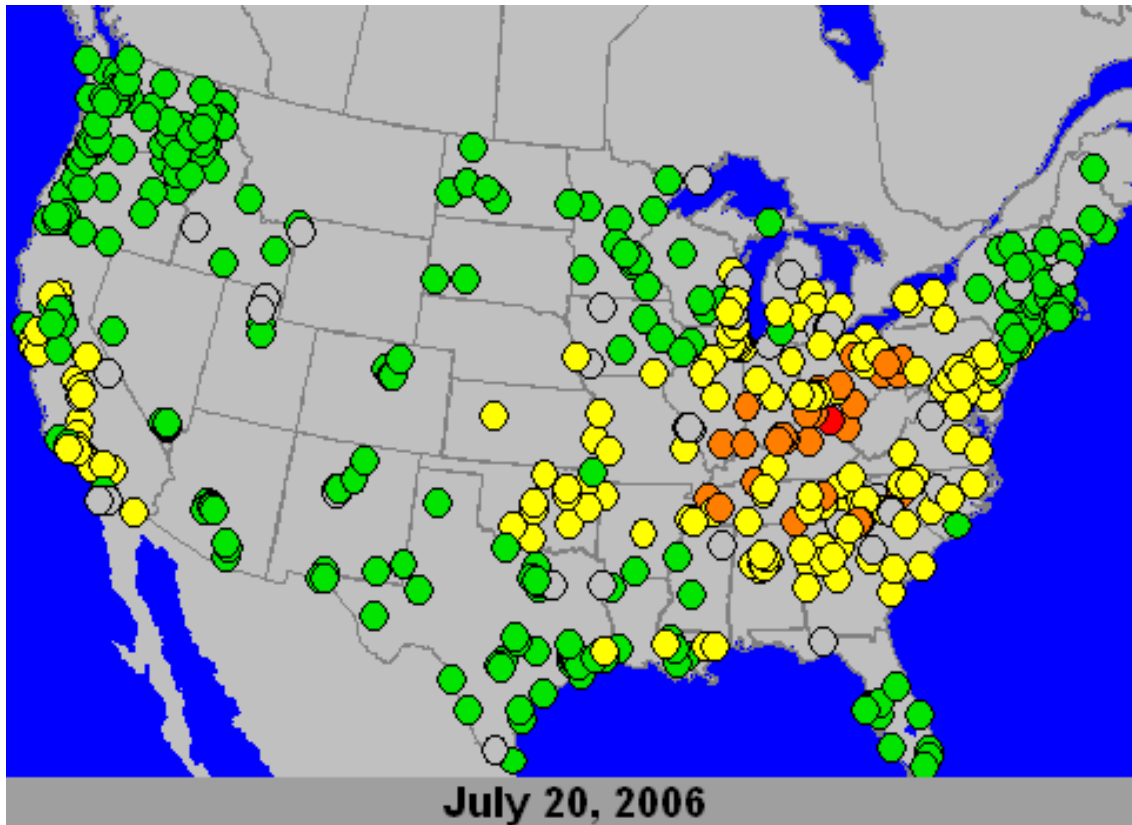
pacleanet.org



Improvements to Airnow Mapper

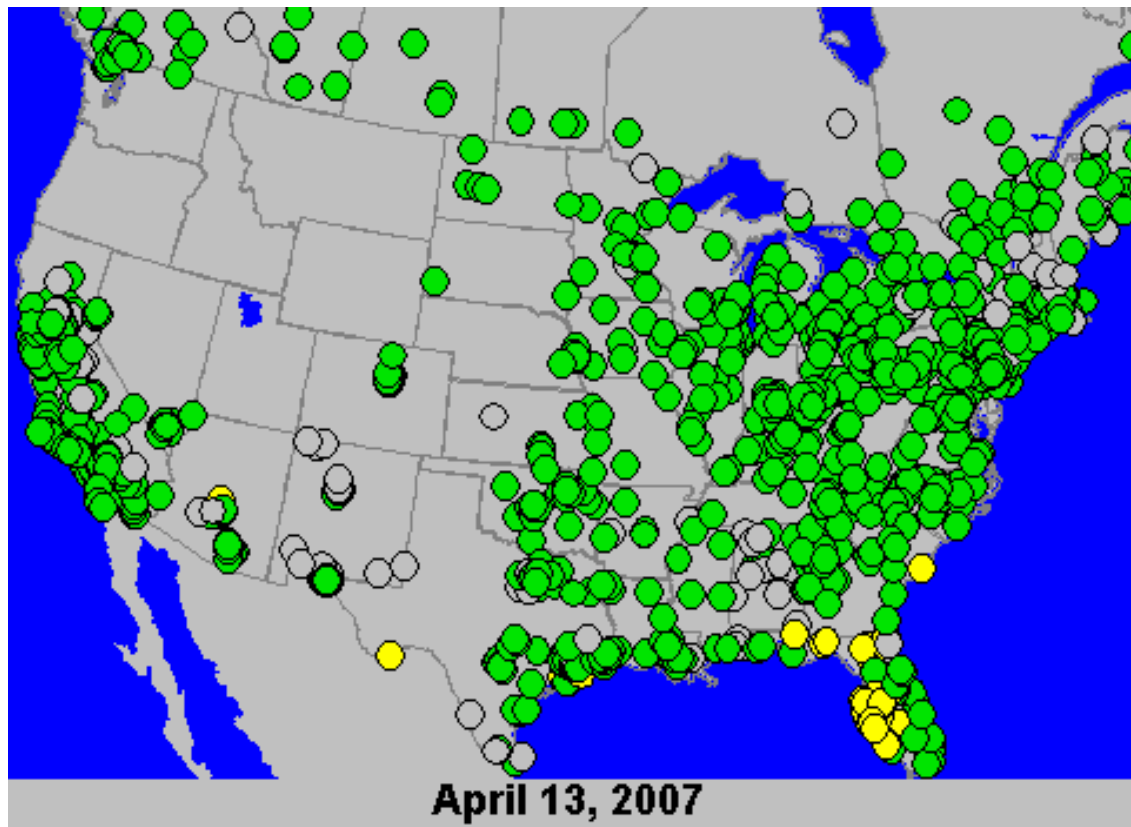
Historical Mapping Methods

- $PM_{2.5}$ maps



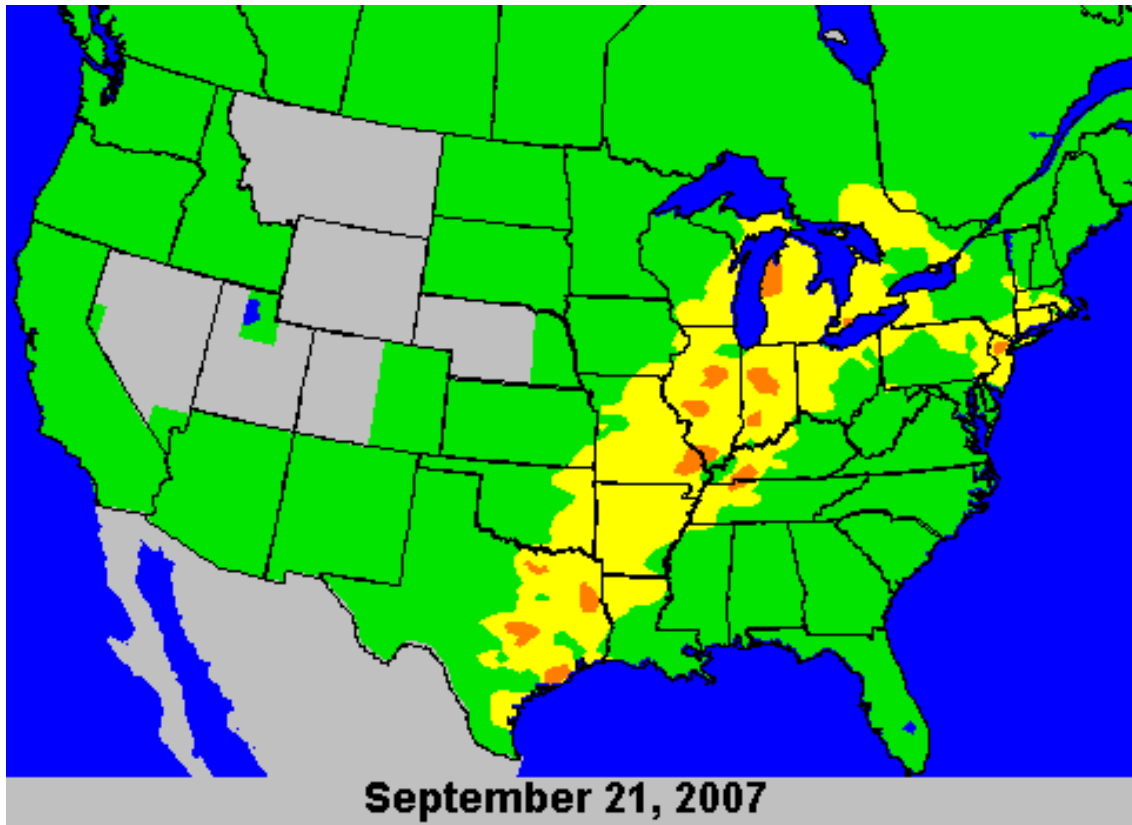
Historical Mapping Methods

- Ozone maps — winter



Historical Mapping Methods

- Ozone maps — summer

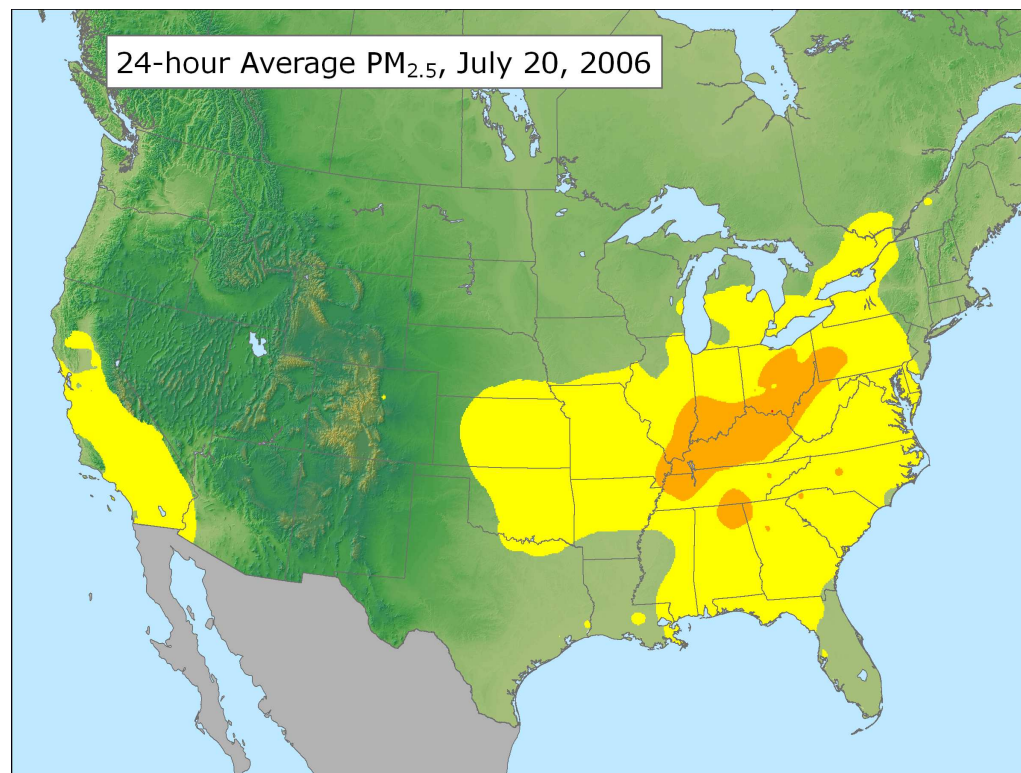
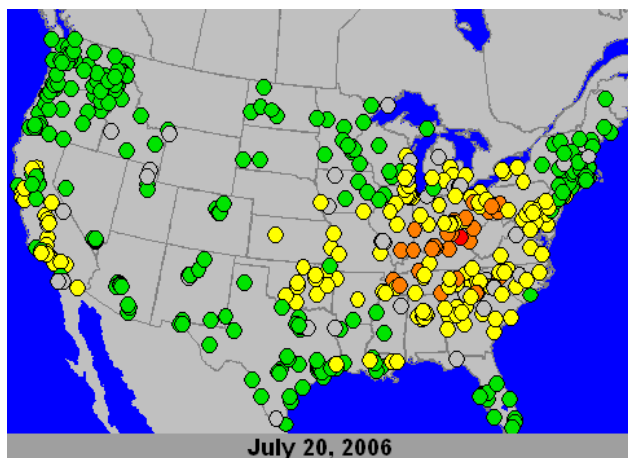


Historical Mapping Methods

- Issues with current maps
 - Bubble maps – no information where there are no monitors (PM_{2.5} and wintertime ozone)
 - Ozone summer maps
 - Inconsistent interpolation techniques for different maps
 - Accuracy not verified
 - Masking technique primitive
 - No combined AQI maps

New Maps

- Interpolate between observations for both ozone *and* $PM_{2.5}$

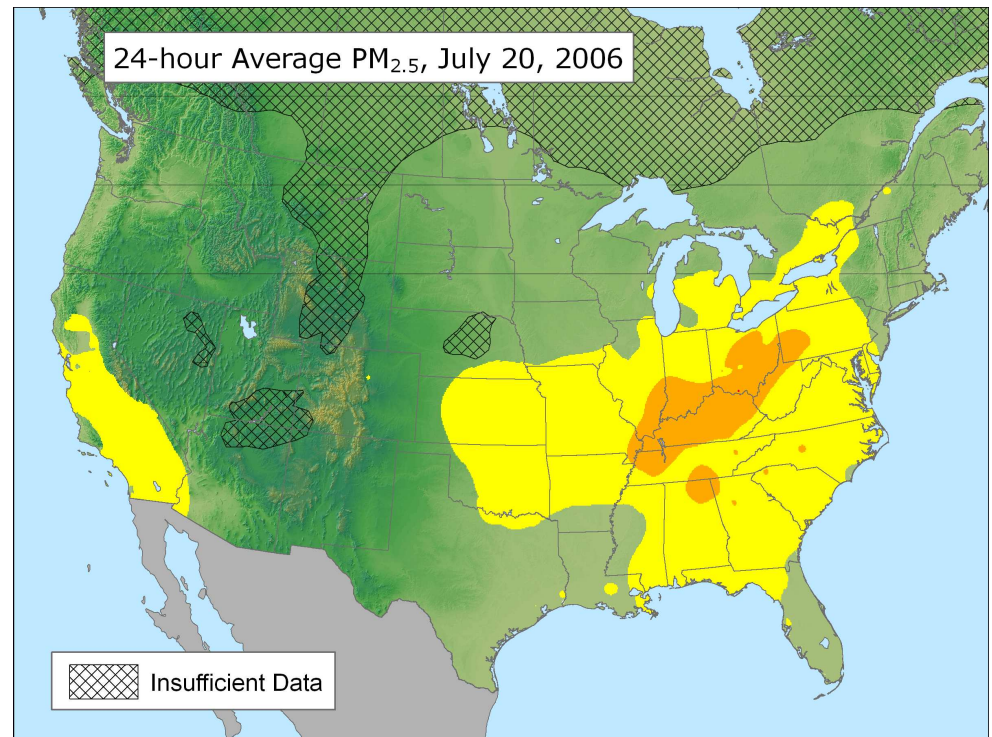
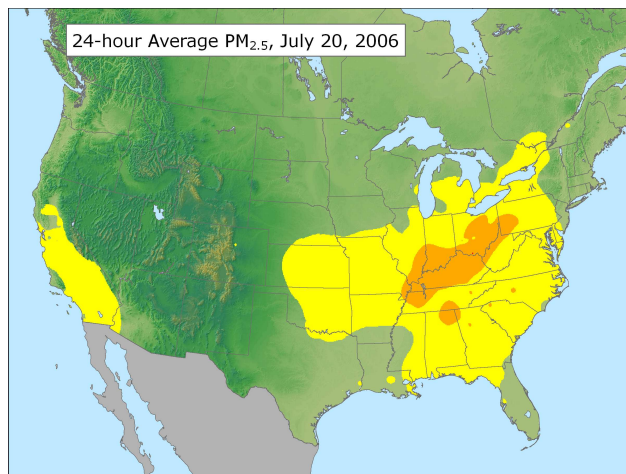


- Old $PM_{2.5}$ map map

New $PM_{2.5}$

New Maps

- Use a statistical technique to mask off areas with sparse measurements



- New PM_{2.5} map

New PM_{2.5} map with masking

Method for Developing New Maps

- Goal: *Accurate* maps that are easy to read and modify
- Accuracy
 - Match observations
 - Capture the peaks
 - Represent AQI in areas void of monitors
- Process
 - Identify mapping techniques
 - Develop accuracy measures
 - Fine-tune each technique
 - Compare fine-tuned techniques

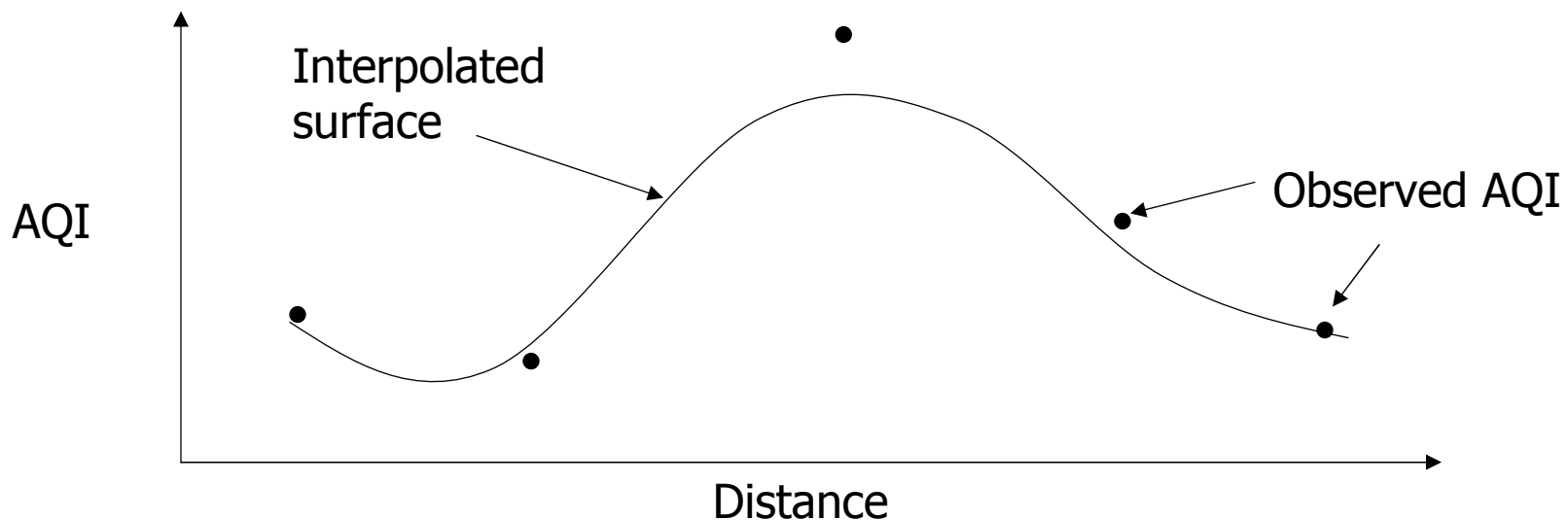
Interpolation Techniques

- Inverse Distance Weighting (IDW)
- Regularized Spline
- Tension Spline
- Kriging
- Constrained Kriging – modified to match (or nearly match) observations

Evaluating Map Accuracy: Point-removal Technique

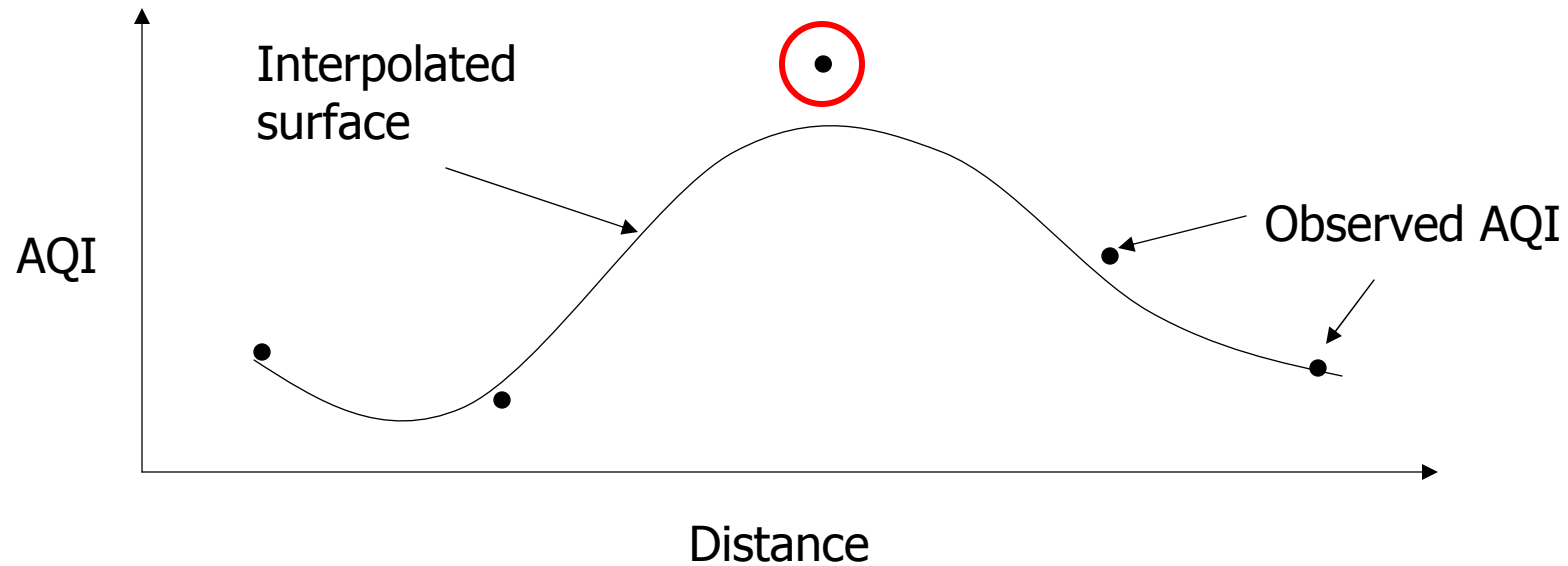
- *Prediction error* quantifies accuracy of maps in areas void of monitors

Calculate interpolated surface based on observations



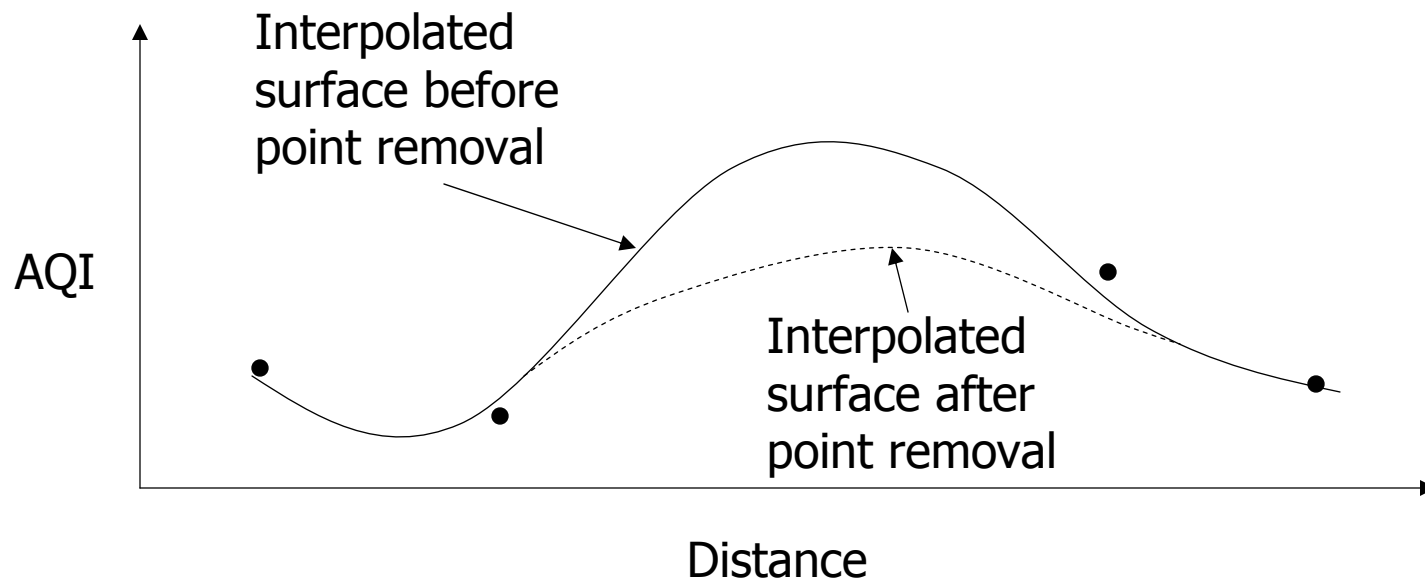
Evaluating Map Accuracy: Point-removal Technique

Remove an individual observation from the data set



Evaluating Map Accuracy: Point-removal Technique

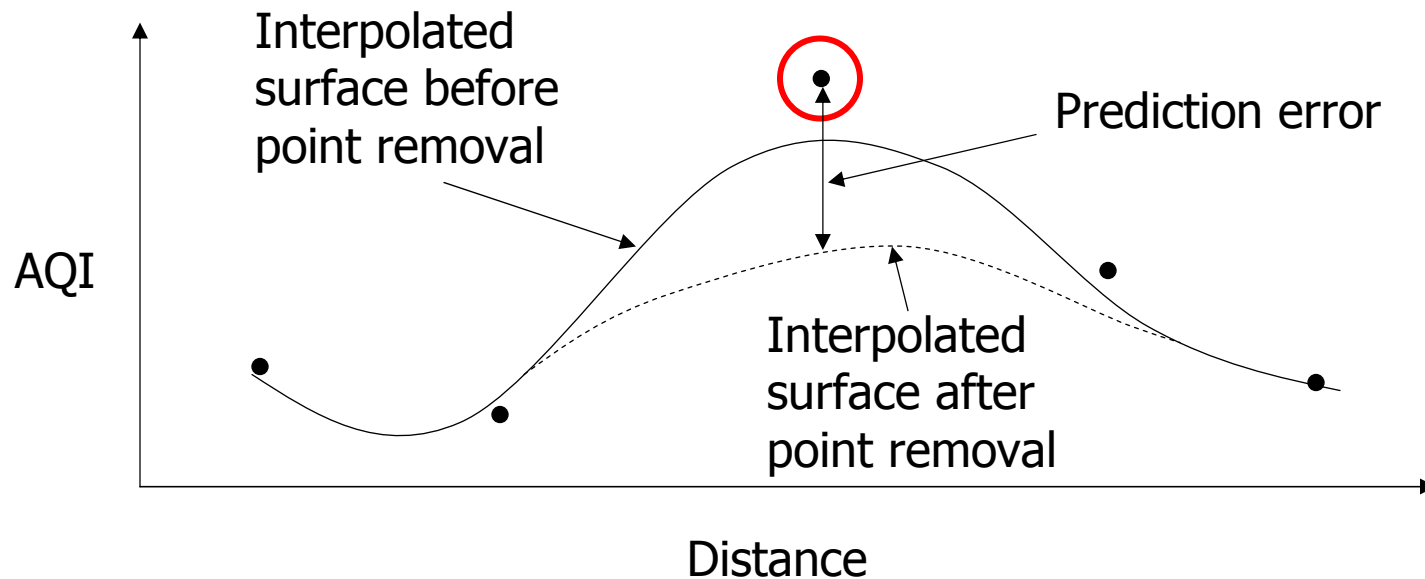
Re-calculate interpolation with point removed



Evaluating Map Accuracy: Point-removal Technique

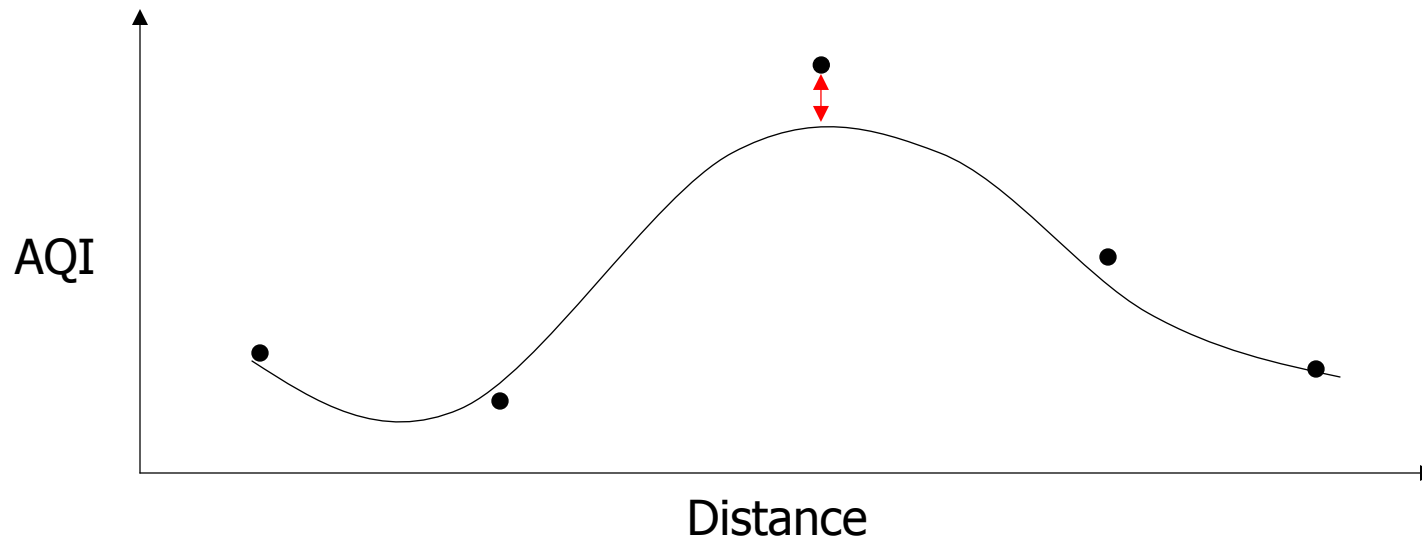
Calculate the difference between the observation and the new interpolated surface

- Usually around 5-10 AQI units
- Little variation between interpolation techniques



Evaluating Map Accuracy: Without Point Removal

- *Interpolation Error (IE)*: Quantifies accuracy of maps at monitor locations
 - Anywhere from 0-10 AQI units
 - Varies drastically between interpolation techniques



Method of Analysis

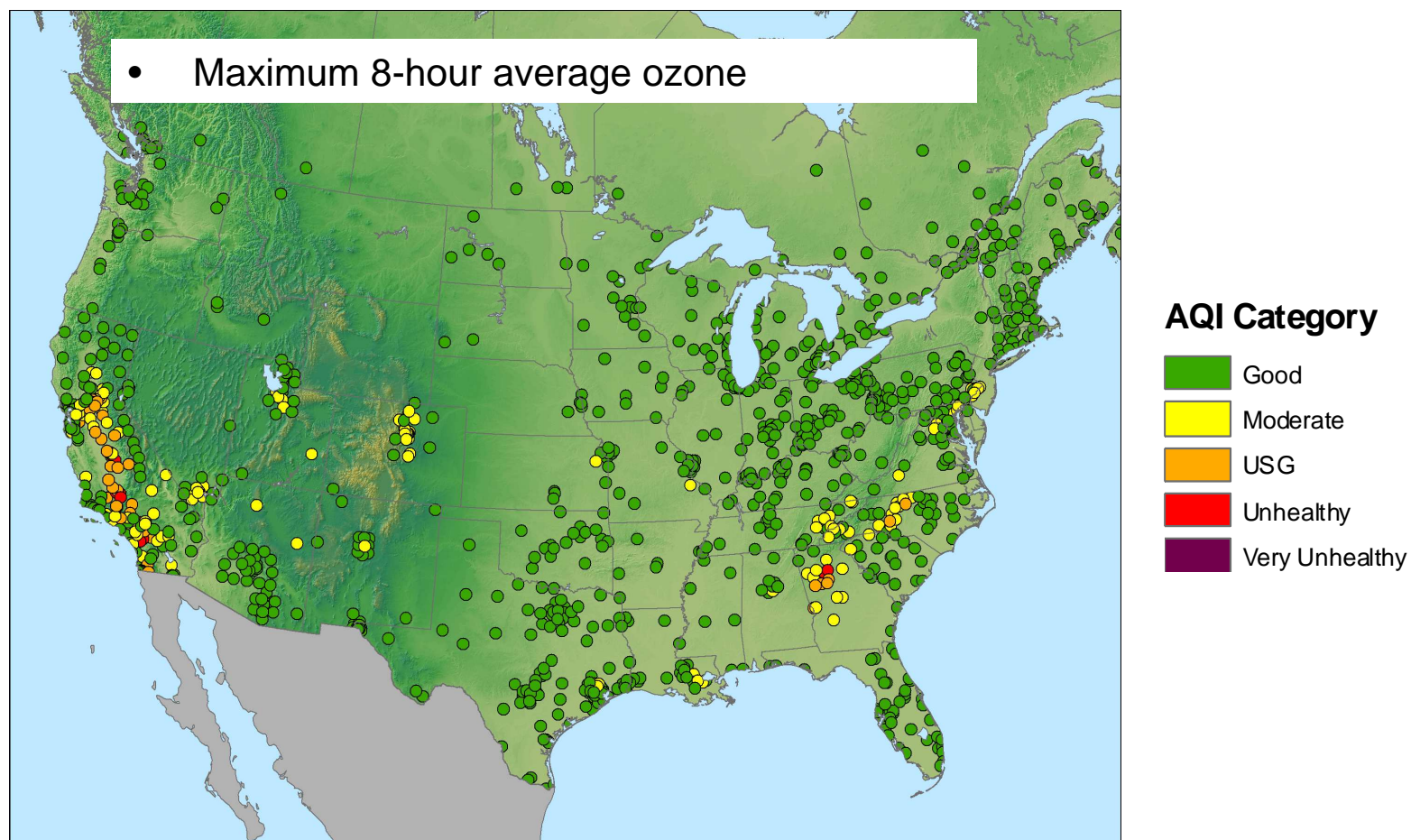
- Data: selection of days over the past two years
- 30 Cases
 - ozone (summer)
 - PM_{2.5} (summer)
 - PM_{2.5} (winter)
- Interpolations using ESRI ArcGIS Geostatistical Analyst
 - Analysis and production
 - Maps look good
 - Easy to validate and modify in the future

Method of Analysis

- Fine-tuned each interpolation technique
 - Minimizing error values
 - Visually appealing maps
- Compared techniques
 - Statistical measures
 - Bias
 - Root-mean-square (RMS) – weighted absolute error
 - Visual appeal and conceptual consistency

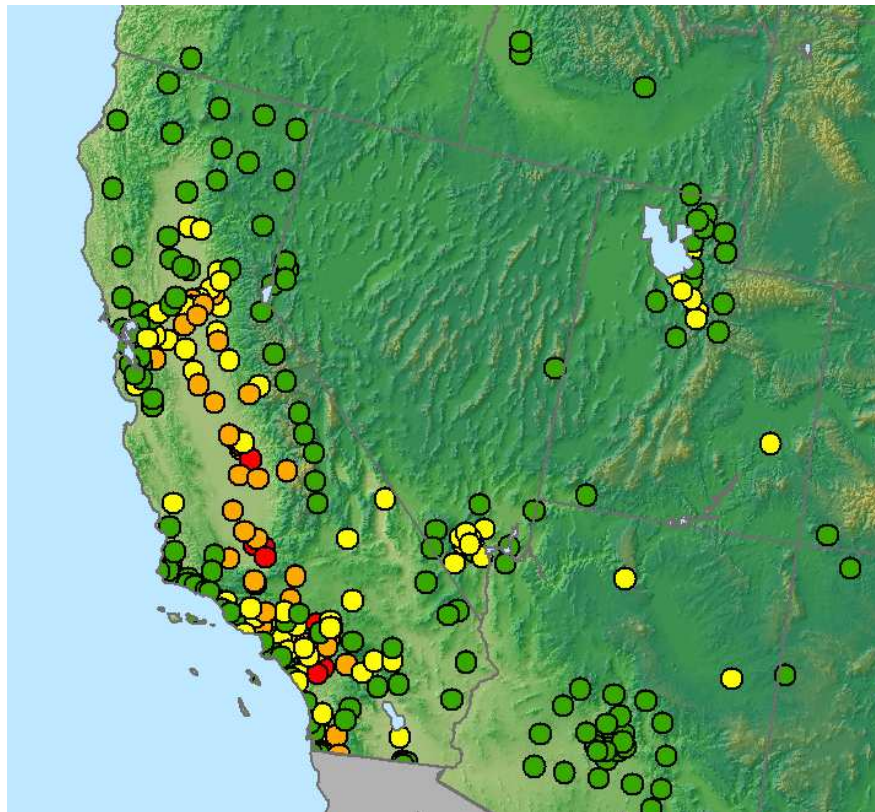
Results of Map Analysis: Ozone

June 23, 2006

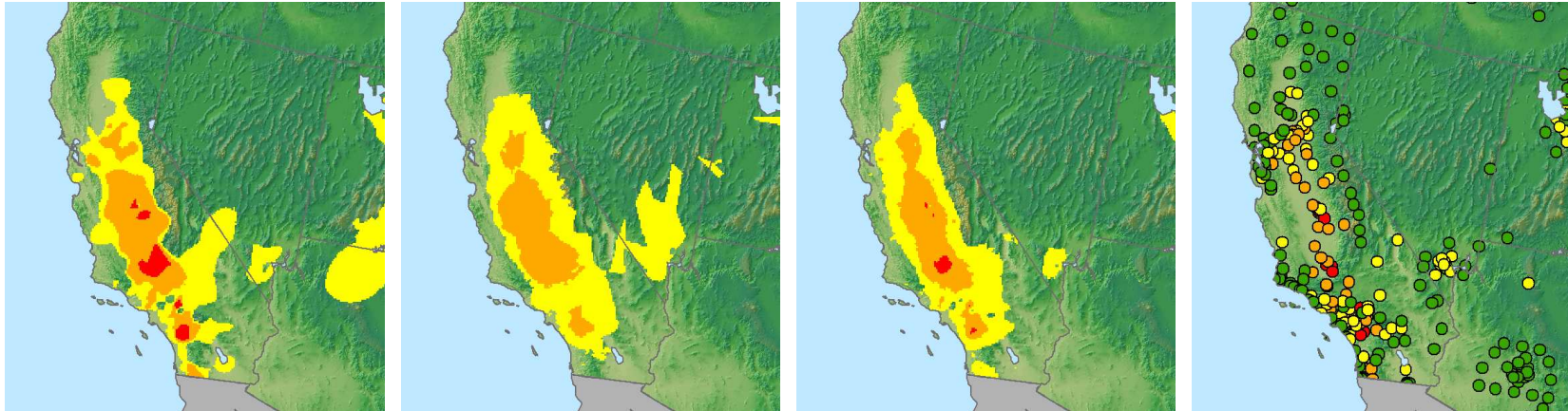


Results of Map Analysis: Ozone

- June 23, 2006



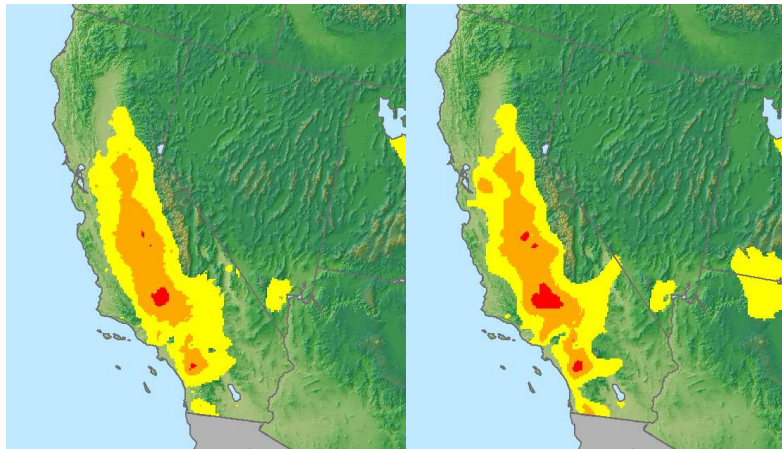
Results of Map Analysis: Ozone



- IDW

- Kriging

- Regularized Spline



- Tension Spline
- Constrained Kriging

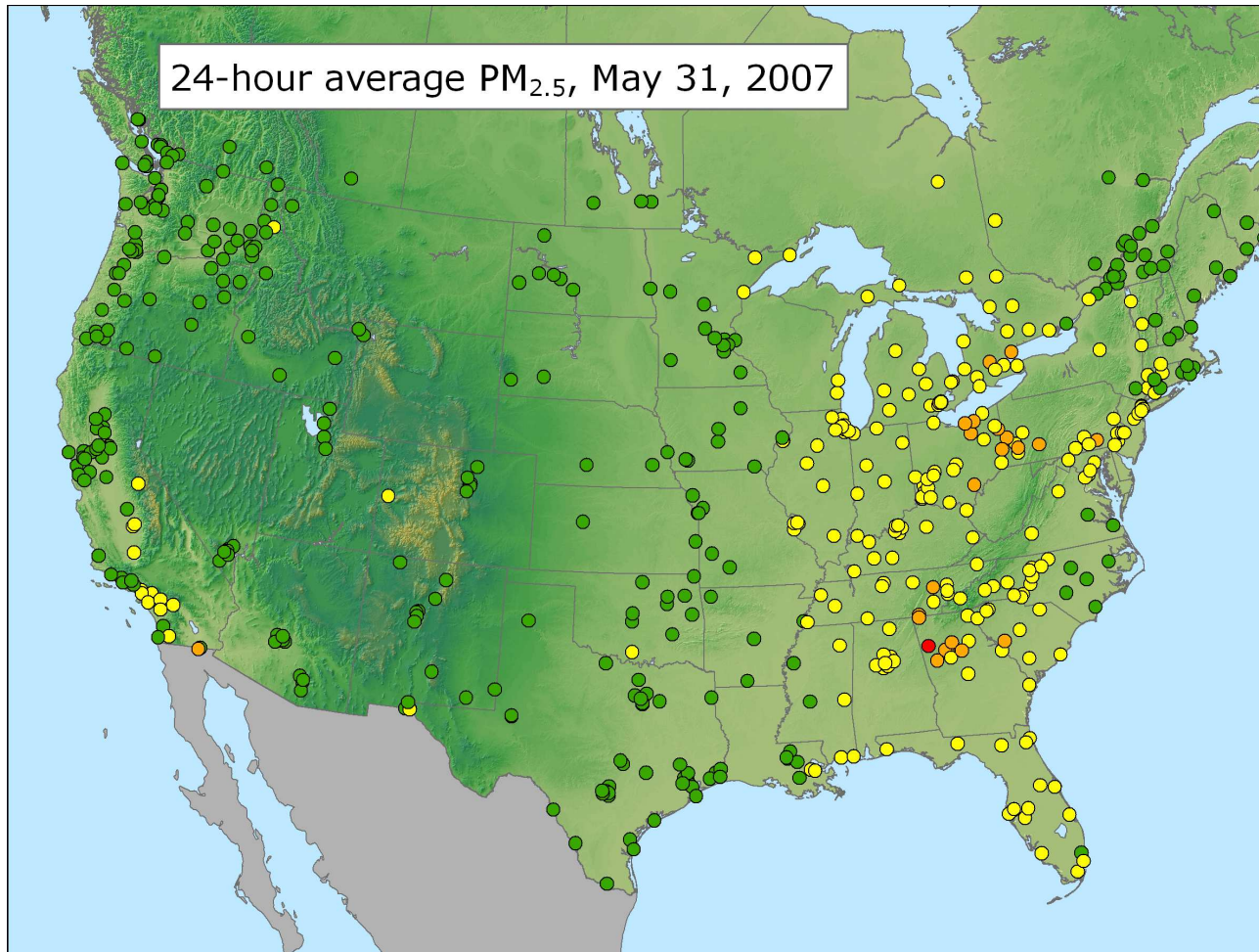
Summary for all ozone cases

Method	RMS Error	Std. Dev.
IDW	1.56	0.28
Kriging	6.56	1.64
Reg. Spline	5.24	2.20
Tension Spline	2.27	0.29
Constr. Kriging	1.77	0.29

- Interpolation Error (ppb)

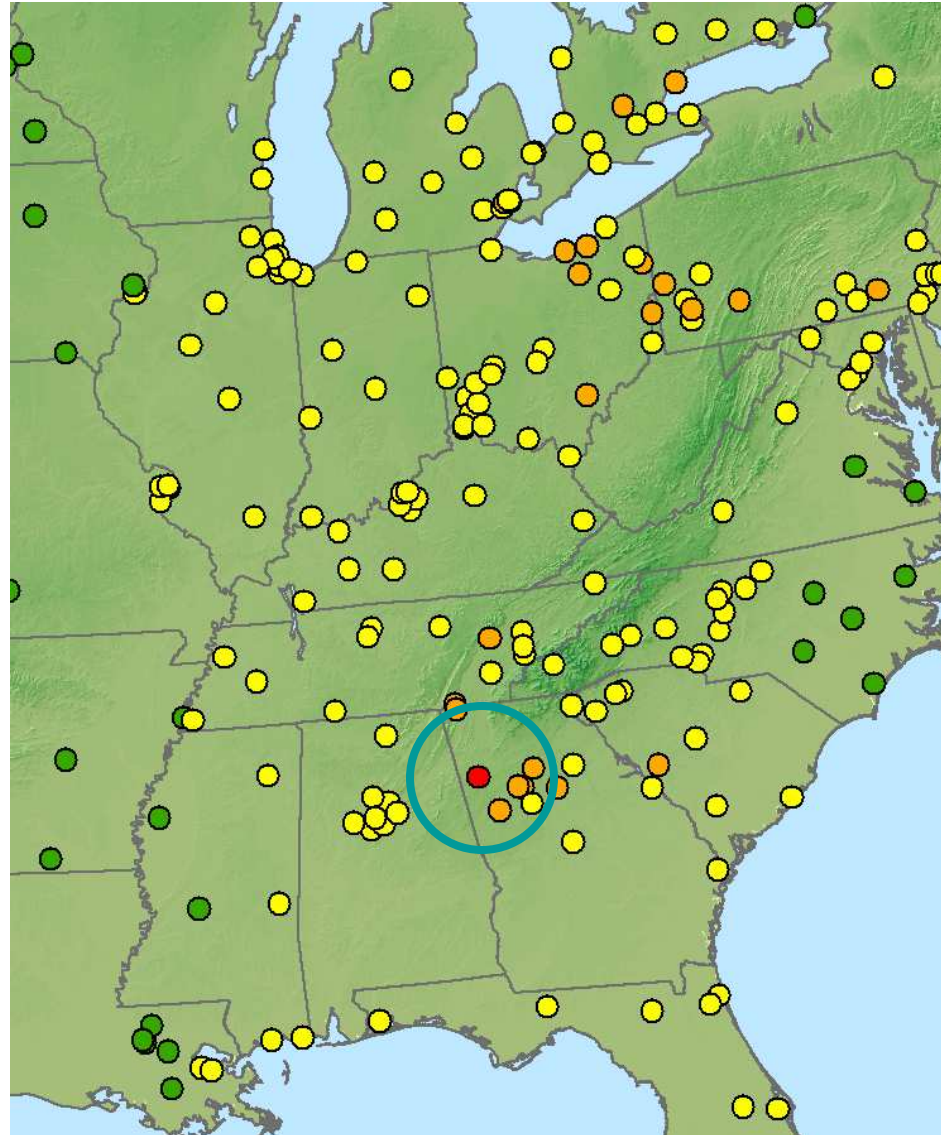
Results of Map Analysis: PM_{2.5} – Summer

- May 31, 2007

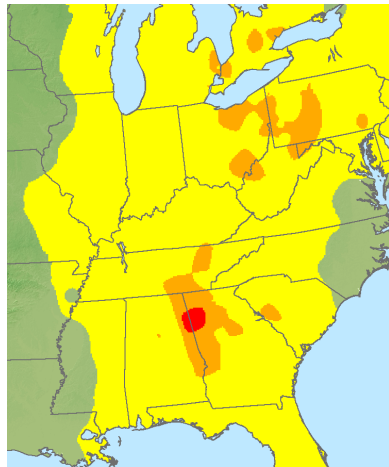


Results of Map Analysis: PM_{2.5} – Summer

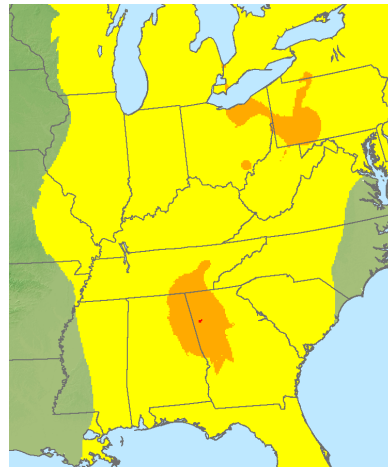
- May 31, 2007



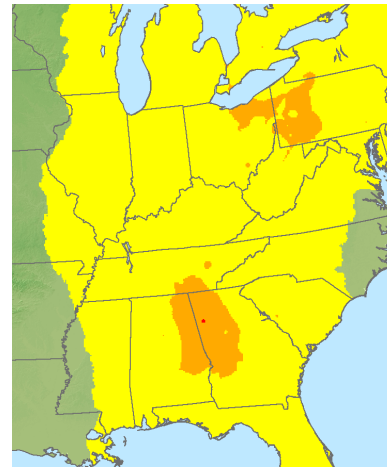
Results of Map Analysis: PM_{2.5} – Summer



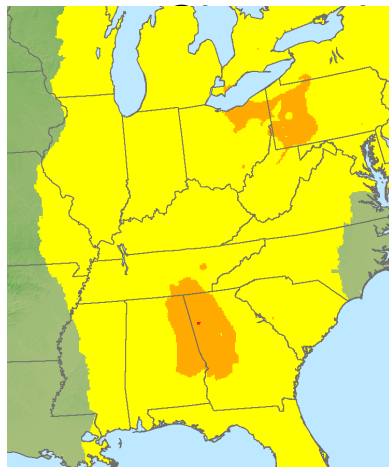
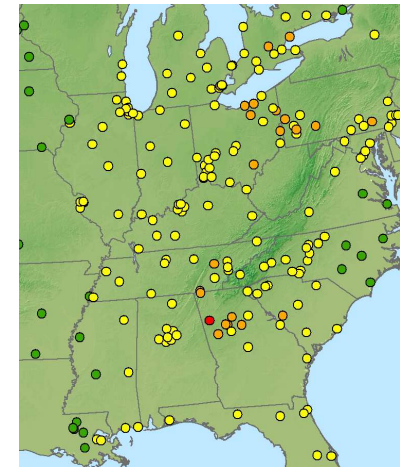
• IDW



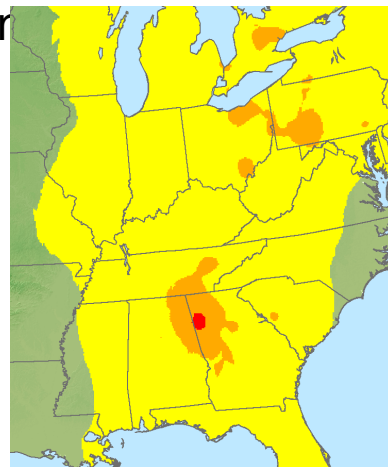
Kriging



Regularized Spline



• Tension Spline



Constrained Kriging

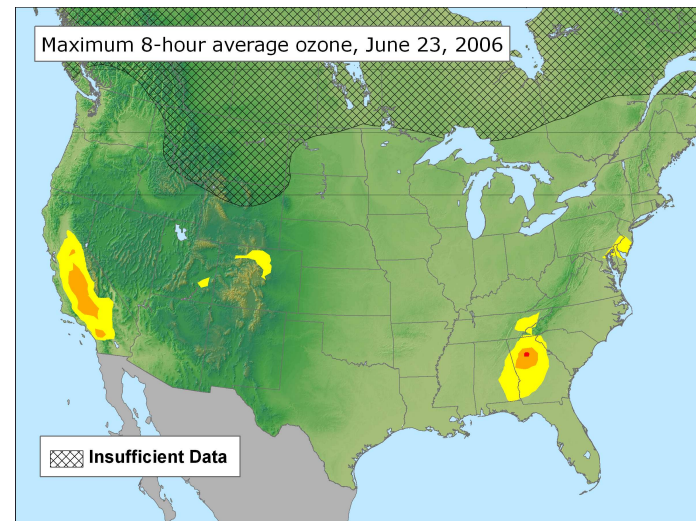
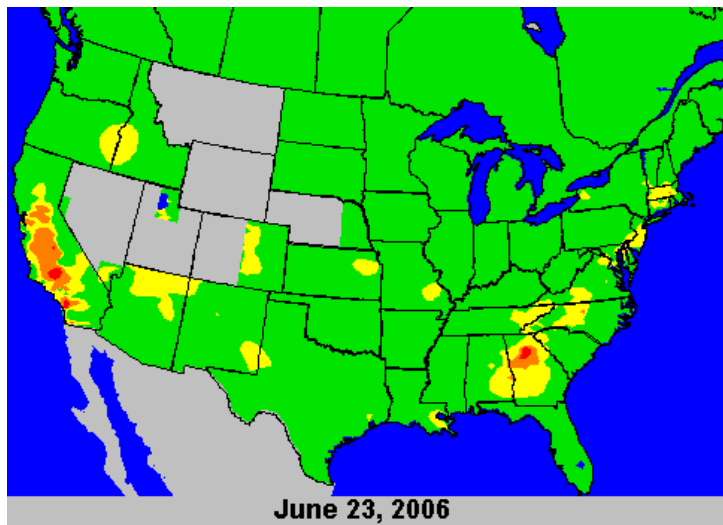
Summary for all PM_{2.5} summer cases

Method	RMS IE	Std. Dev.
IDW	0.70	0.24
Kriging	2.69	1.33
Reg. Spline	1.13	0.24
Tension Spline	1.16	0.16
Constr. Kriging	0.85	0.22

• Interpolation Error ($\mu\text{g}/\text{m}^3$)

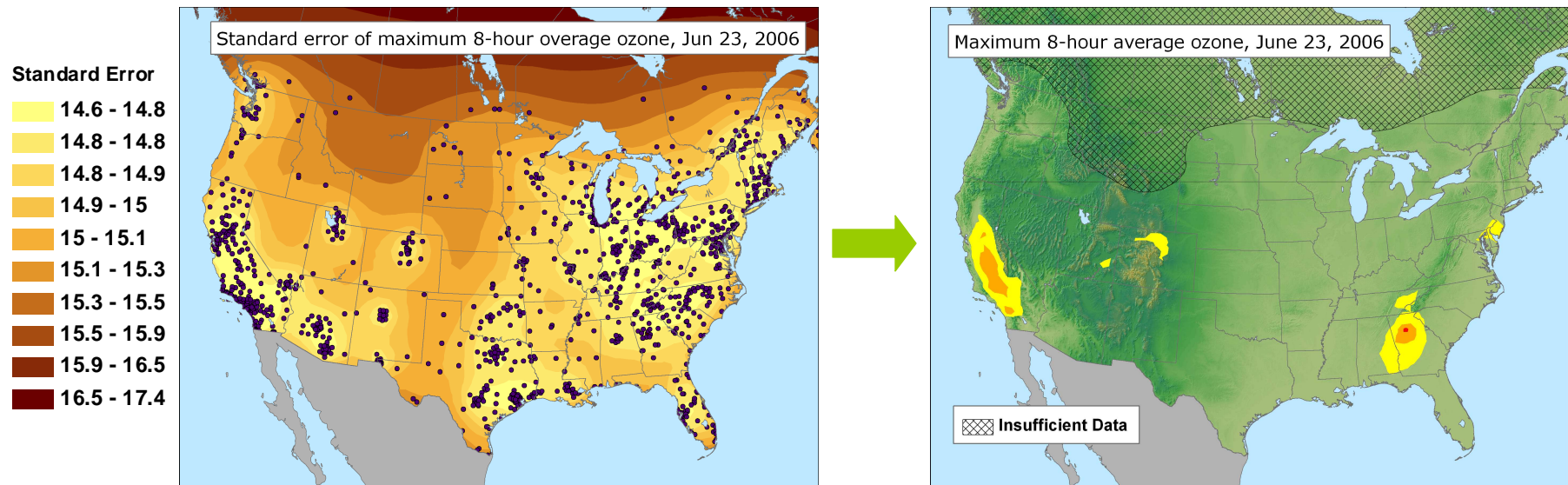
Masking

- Q: How do we deal with areas that have sparse monitoring networks?
- A: Historically, we manually blank out entire states when monitor data are unavailable.
- New method: use a statistical measure to determine where we should not plot AQI using *standard error*



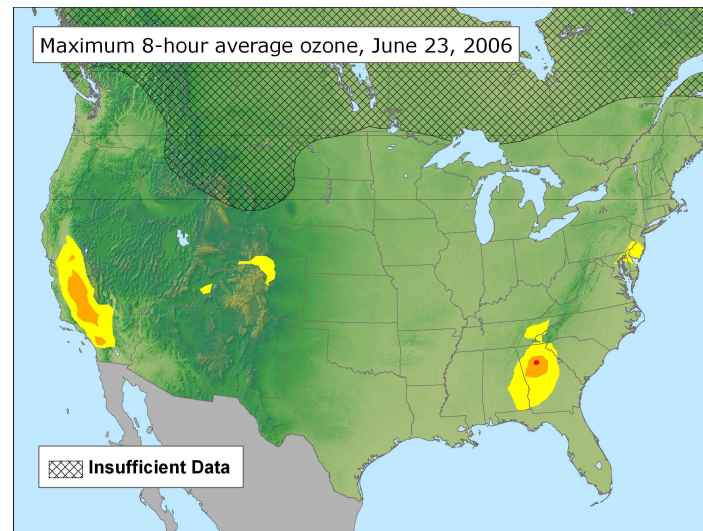
Masking

- *Standard error* – measure of the uncertainty of AQI
- Where observations are sparse, standard error is large (uncertainty in the interpolated AQI is high)
- Set a threshold for standard error, above which we apply a mask to prevent AQI from being displayed



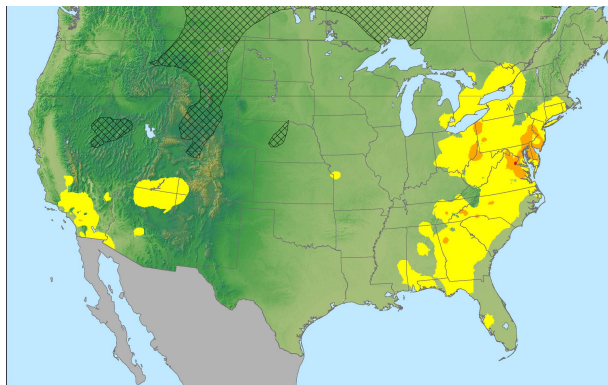
Masking

- Advantages of using a standard error mask
 - Carried out automatically by the mapping system
 - Can be static in time, or updated daily or seasonally as monitors come in and out of the network

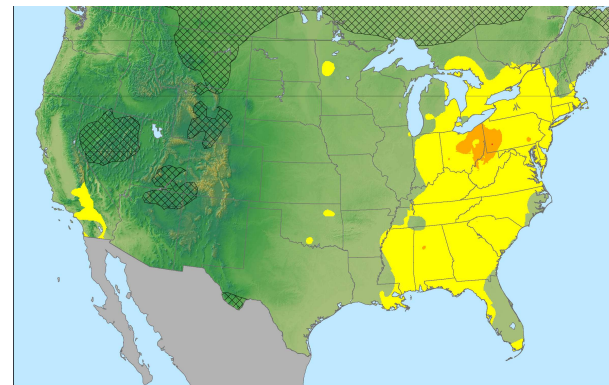


Combined AQI Maps – PM_{2.5} and Ozone

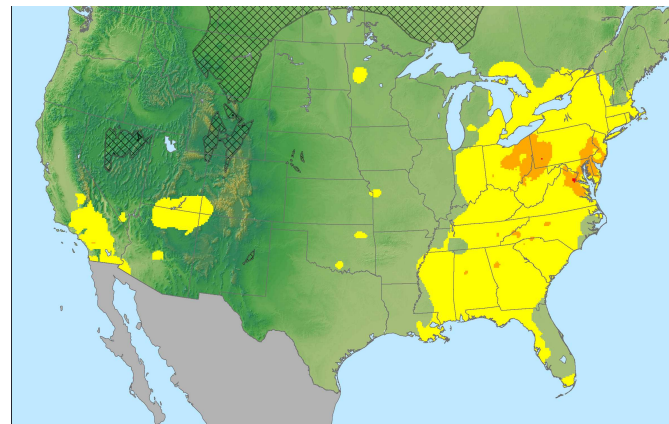
- Select maximum AQI for each location
- Produce AQI values for areas that are masked out for one parameter, but not for another



Ozone with mask



PM_{2.5} with mask



Combined AQI with mask