

Modeling Committee Update

OTC Fall Meeting

November 5, 2015

Baltimore, MD



OZONE
TRANSPORT
COMMISSION

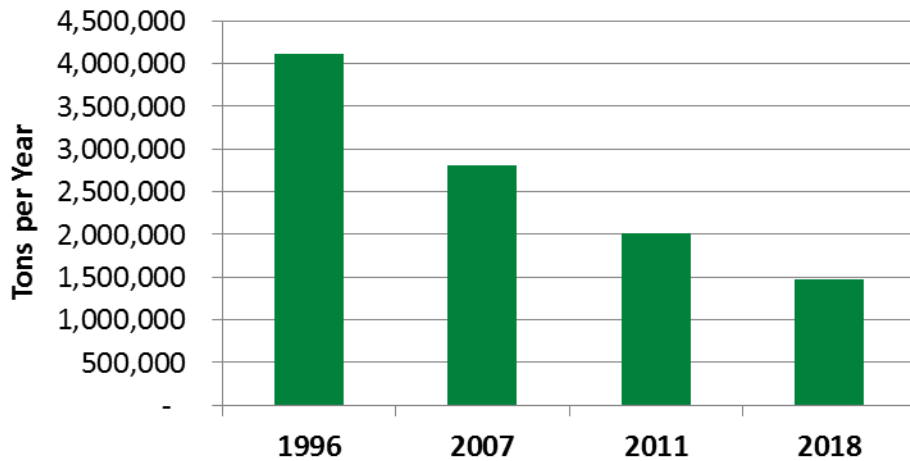
OZONE TRANSPORT COMMISSION

Overview

1. Current Air Quality
2. Modeling Platform Update
 - a) Emission Inventory
 - b) Episodic Modeling
 - c) HEDD
 - d) Future Modeling

Ozone Progress in the OTR since 1996

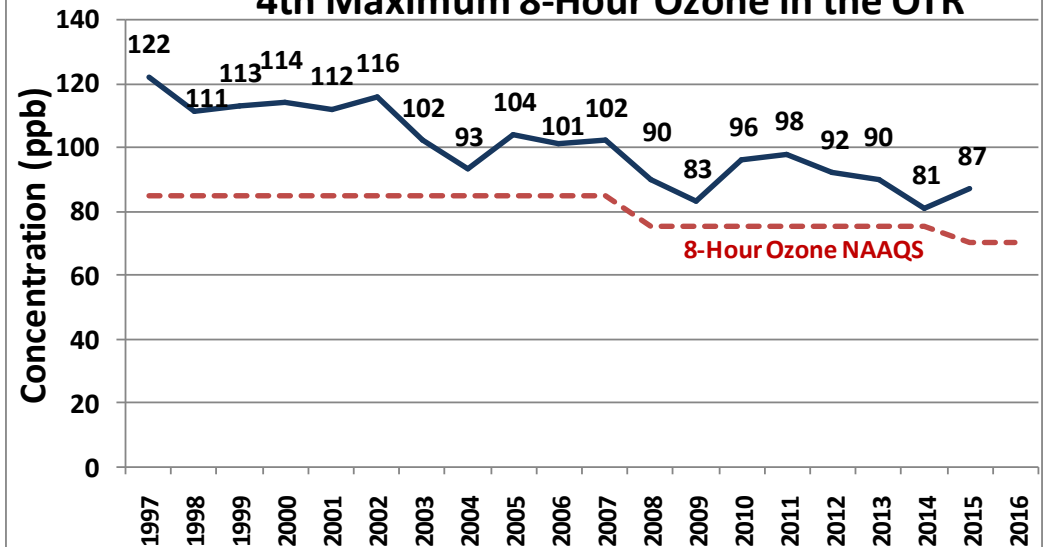
OTR + VA Total NOx Emissions



Annual NOx Emissions are down 50 to 60%

Ozone is down about 30%

4th Maximum 8-Hour Ozone in the OTR



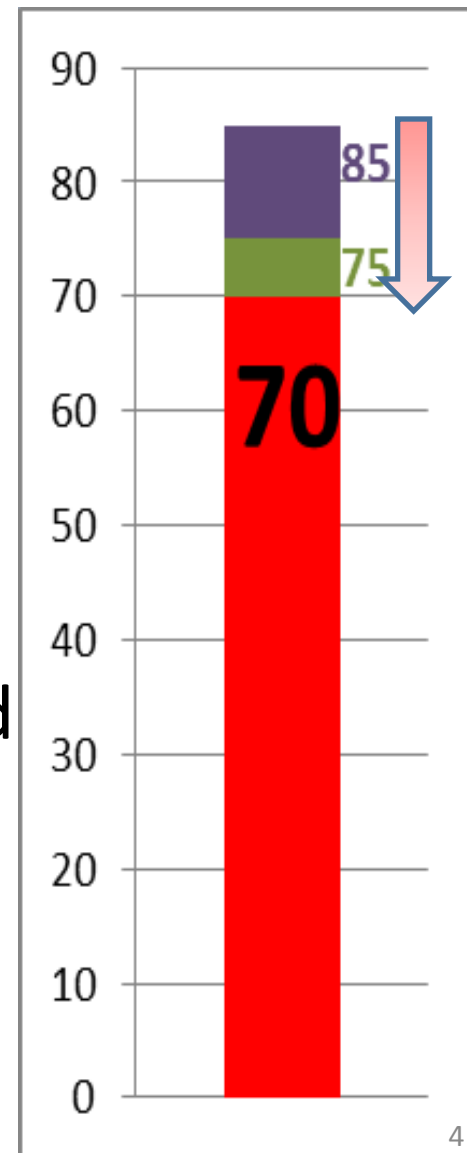
2015 data is preliminary
2018 emissions are projected

New Ozone NAAQS!

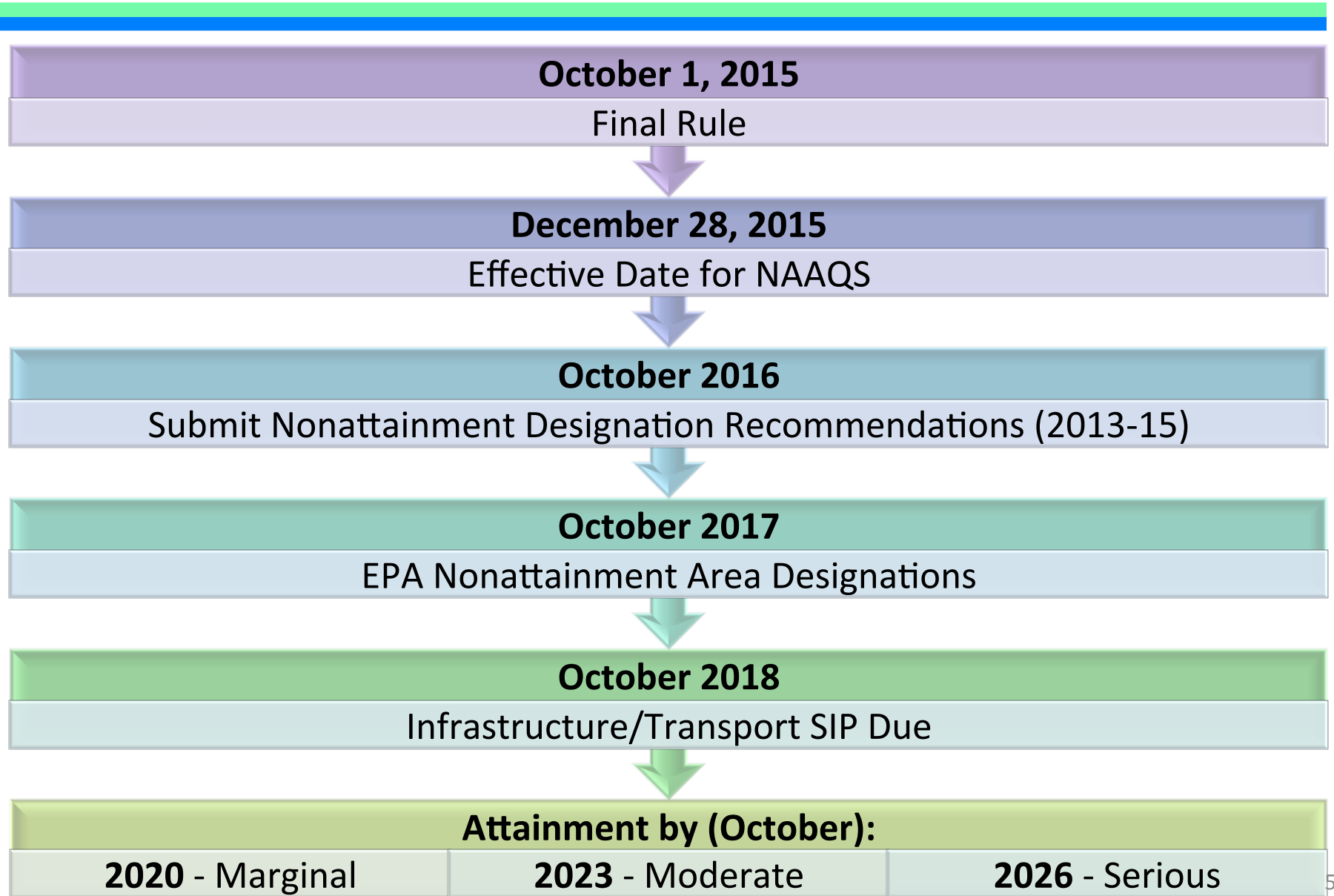
October 1, 2015

70 ppb!

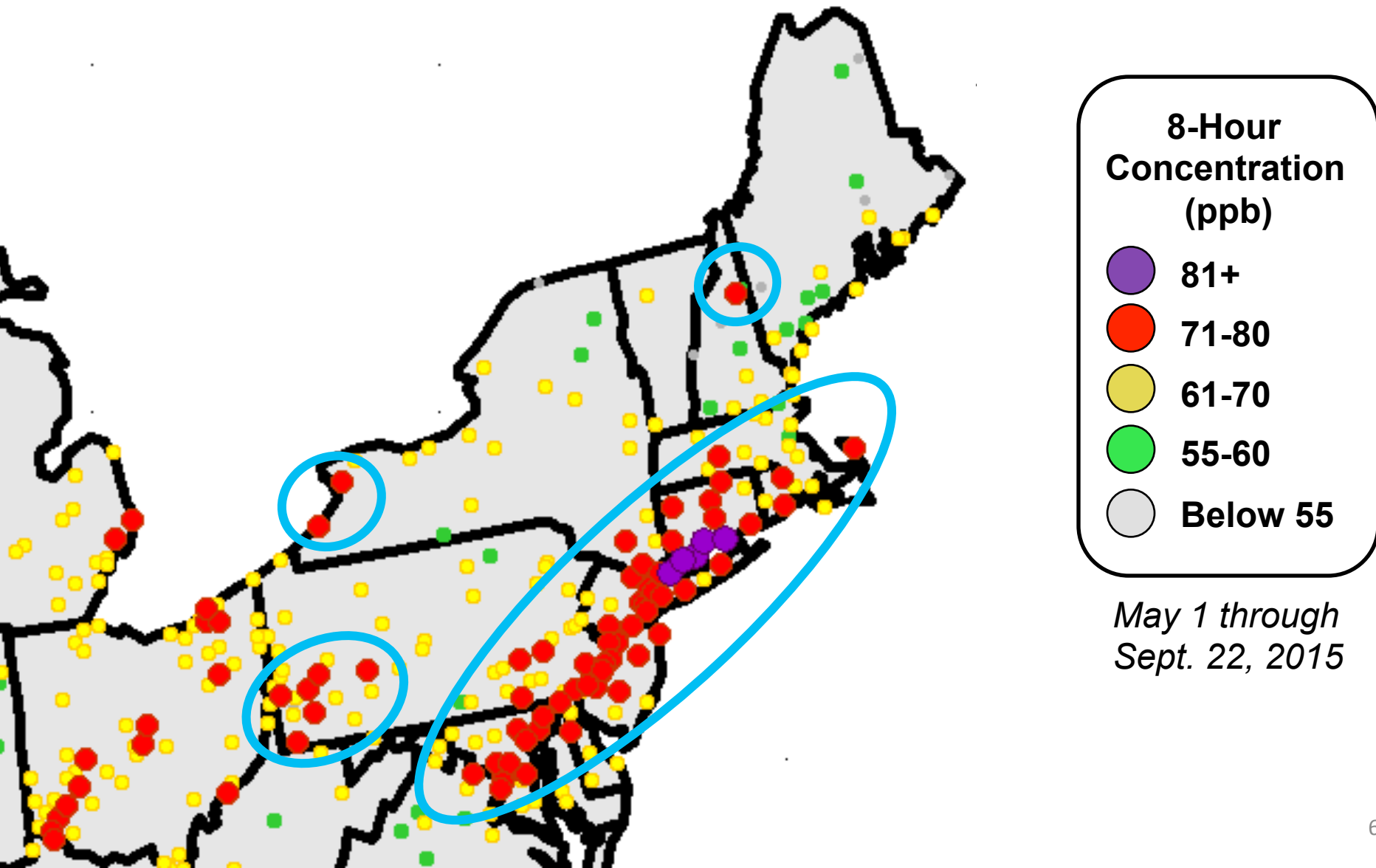
- 8-hour averaging period
- 3-year average of the 4th 8-hour maximum by monitor
- Secondary standard = Primary standard
- Estimated annual benefits and costs
 - \$2.9 to \$5.9 billion in health benefits
 - \$1.4 billion in control costs



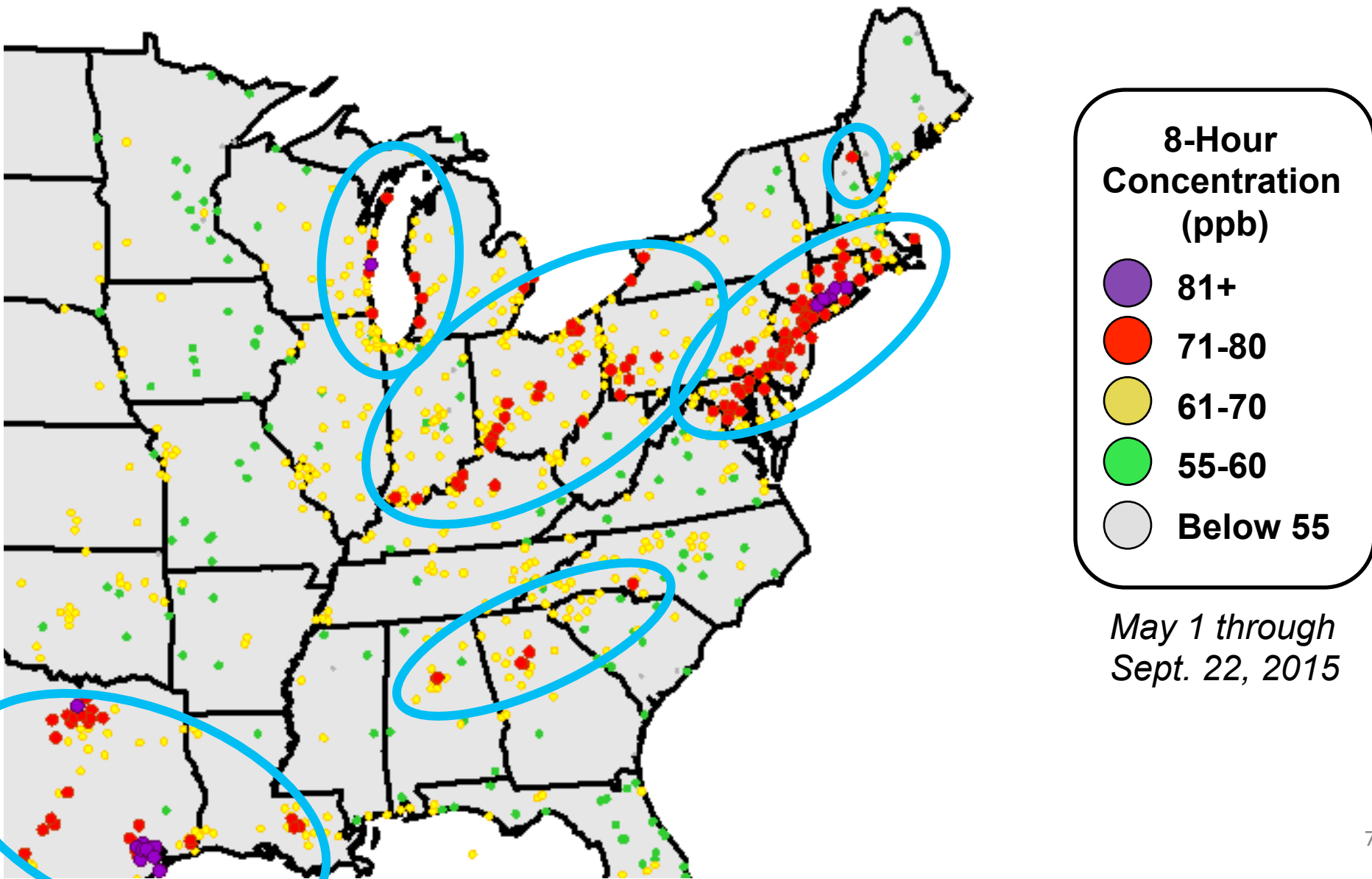
2015 Ozone NAAQS Timeline



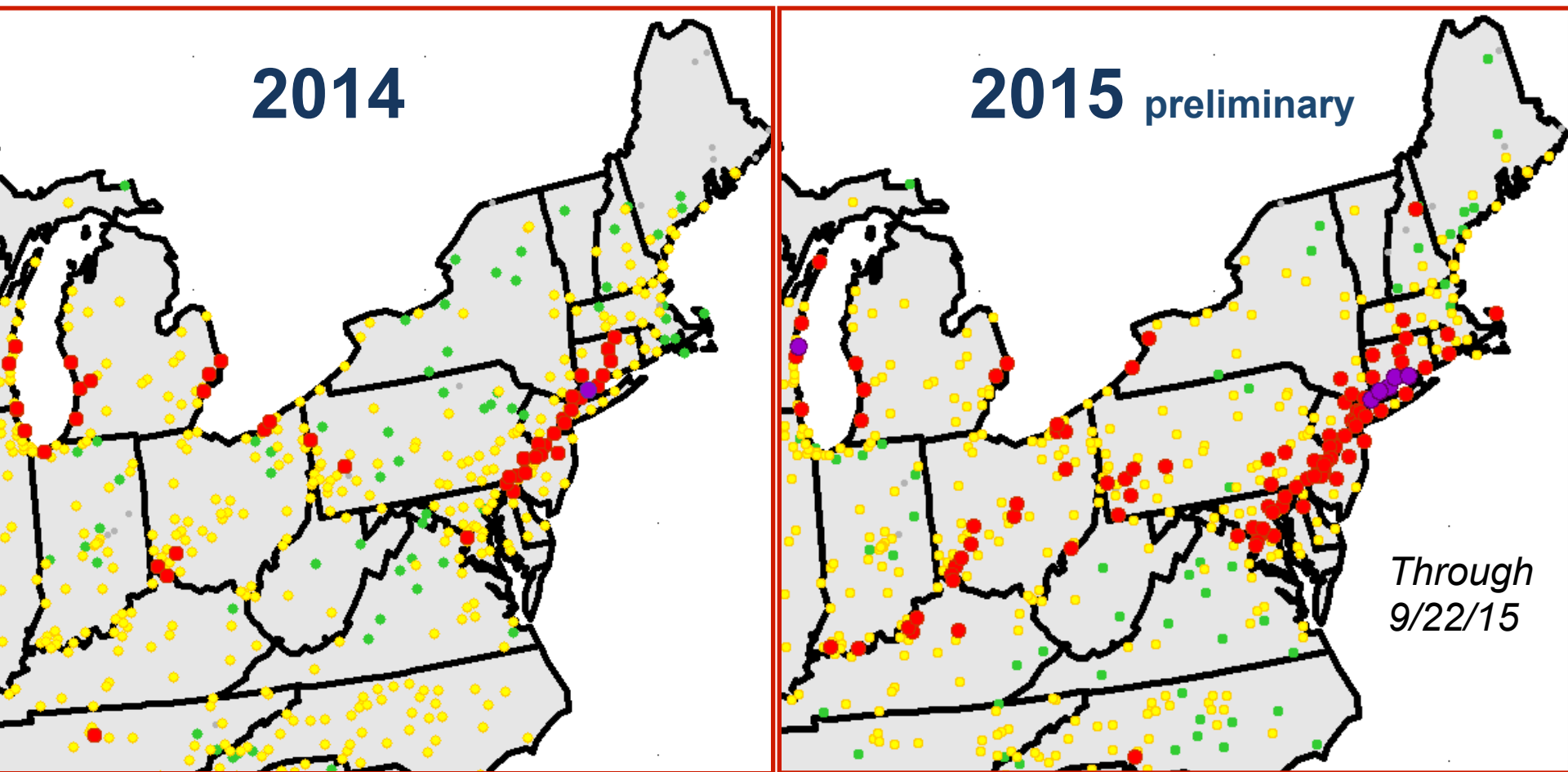
Preliminary 2015 4th Maximum



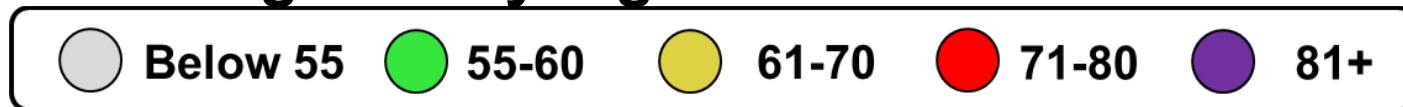
Preliminary 2015 4th Maximum



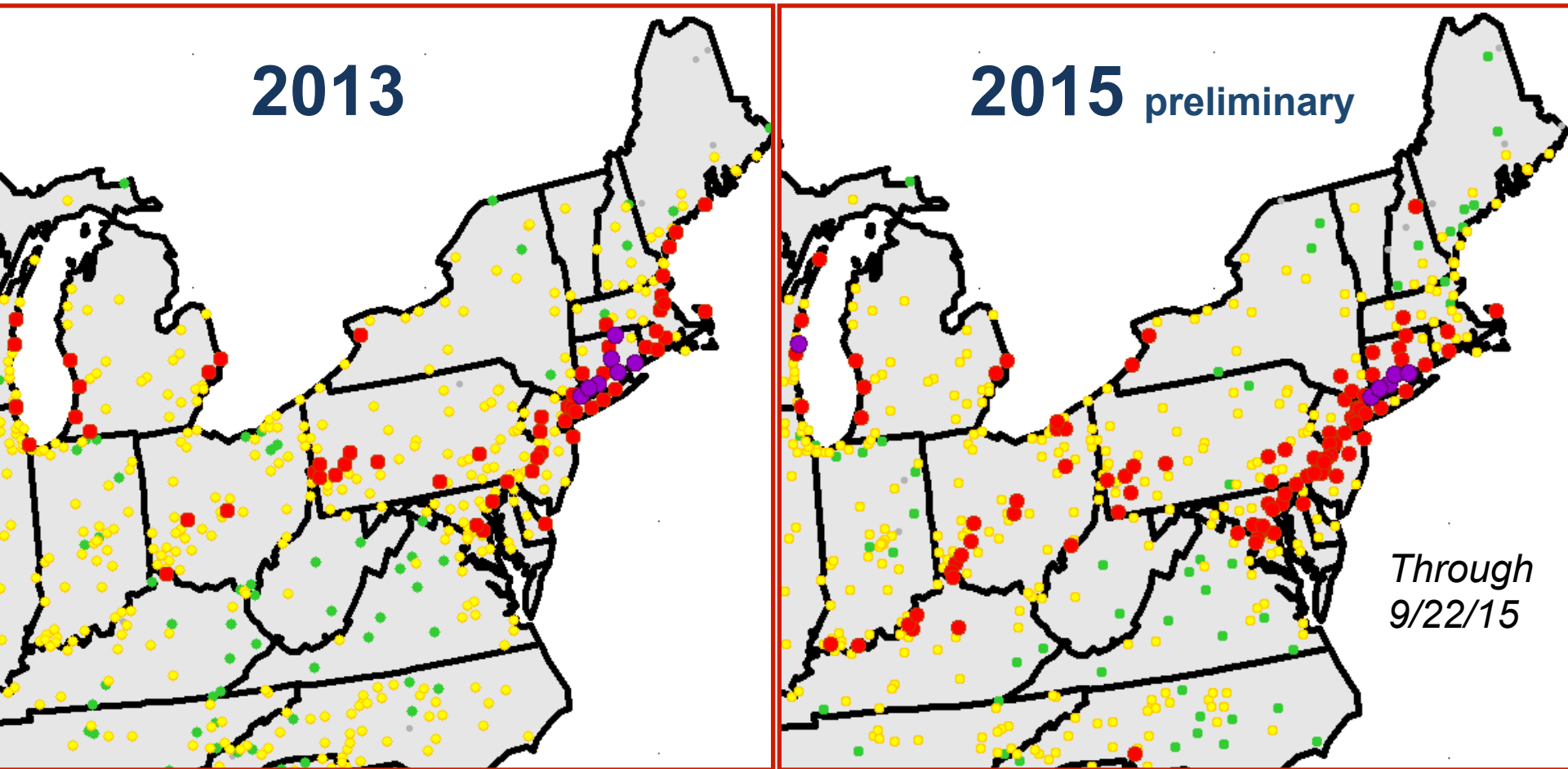
2015 Compared to 2014 (4th Max)



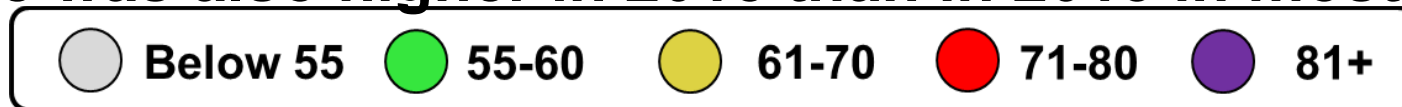
Ozone was generally higher in 2015 than in 2014



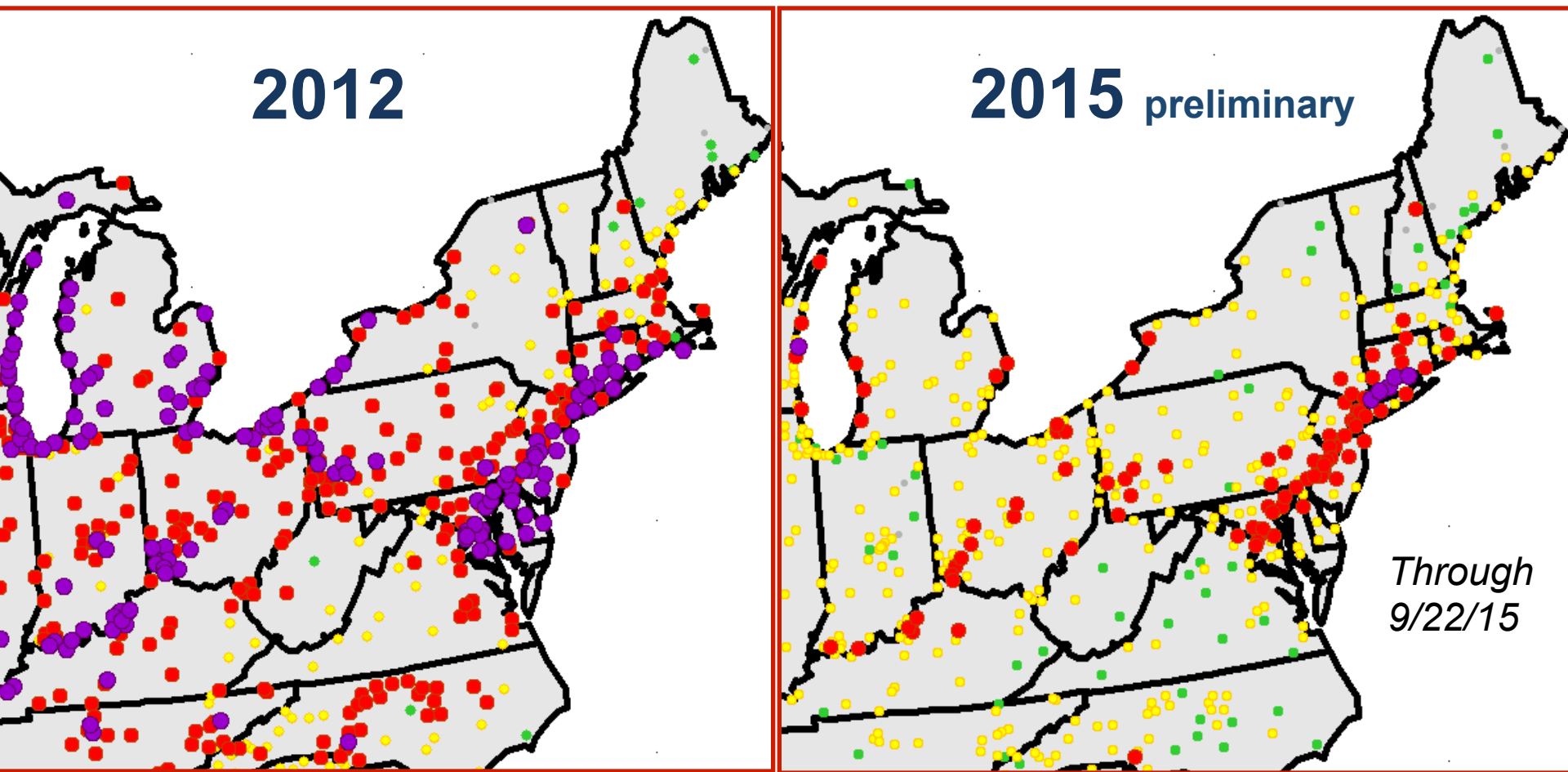
2015 Compared to 2013 (4th Max)



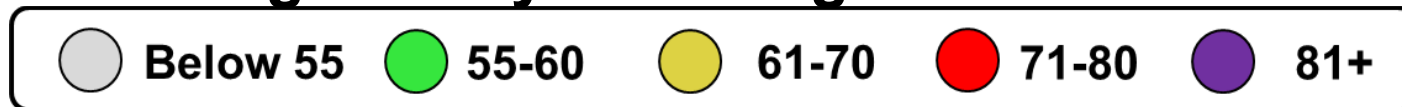
Ozone was also higher in 2015 than in 2013 in most areas



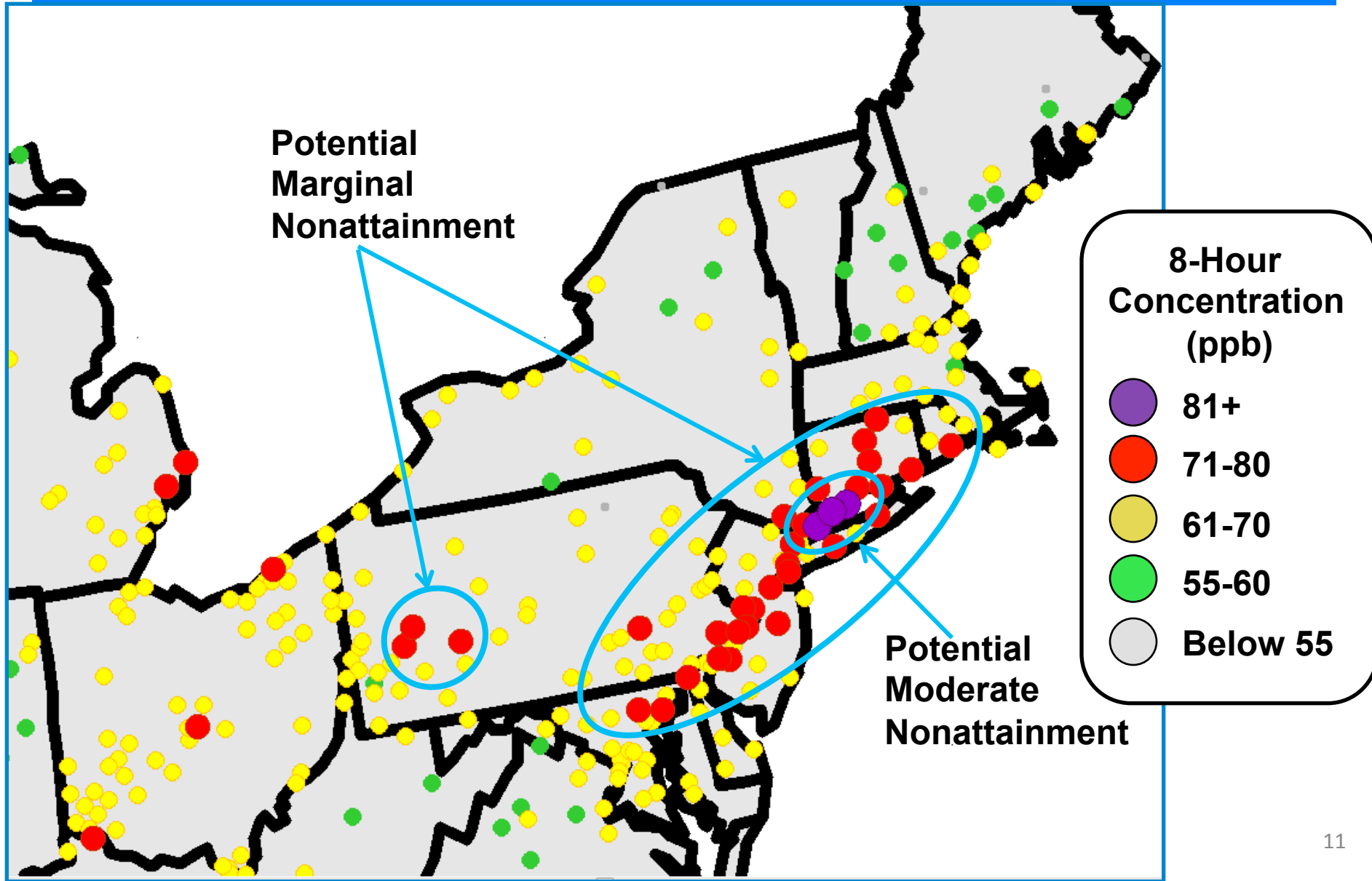
2015 Compared to 2012 (4th Max)



Ozone was generally much higher in 2012 than in 2015



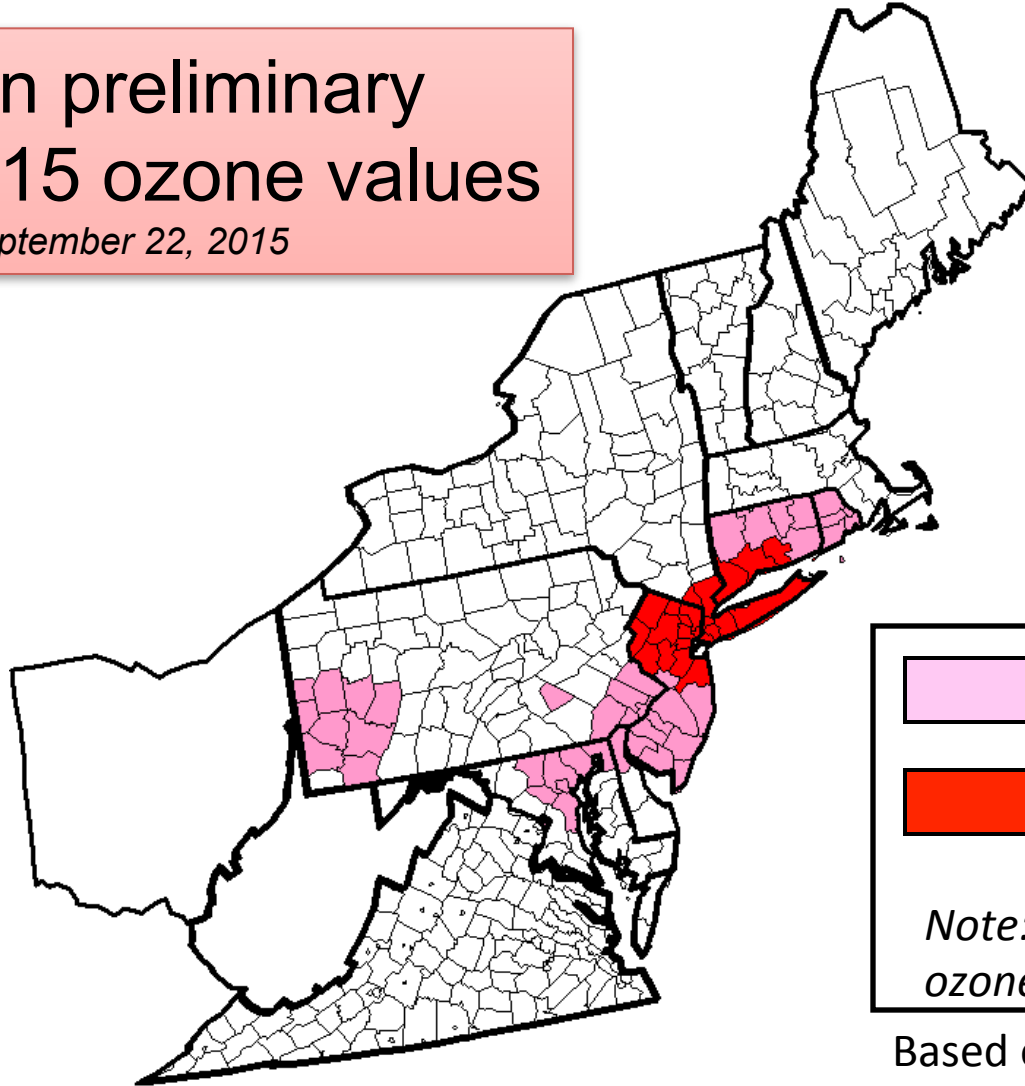
Preliminary 2013-15 Design Values



Potential Nonattainment – 70ppb NAAQS

Based on preliminary
2013-2015 ozone values

Data through September 22, 2015



 Marginal

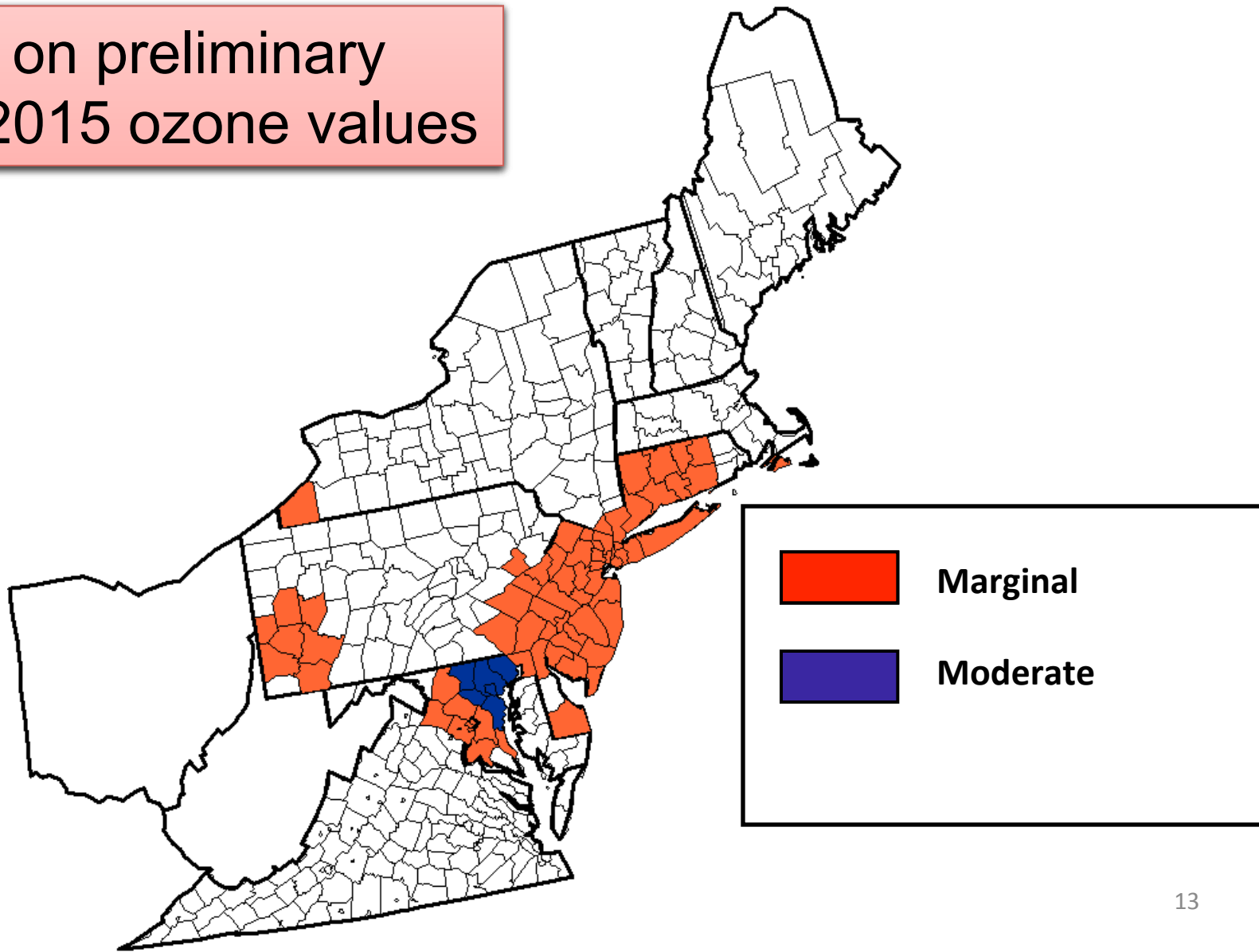
 Moderate

*Note: Not all counties have
ozone monitoring*

Based on CBSA Boundaries in
most cases

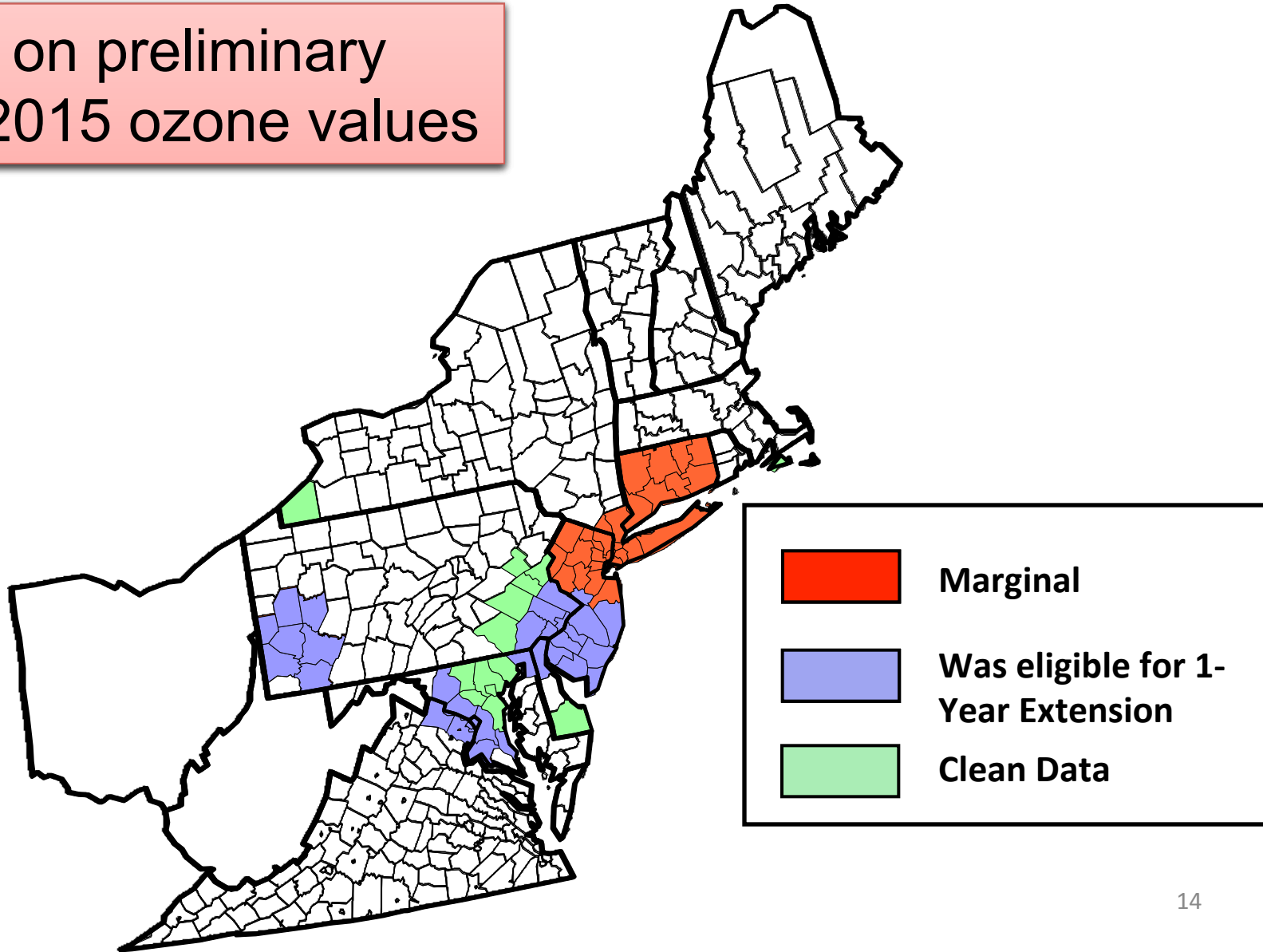
Meeting the 2008 Ozone NAAQS

Based on preliminary
2013-2015 ozone values



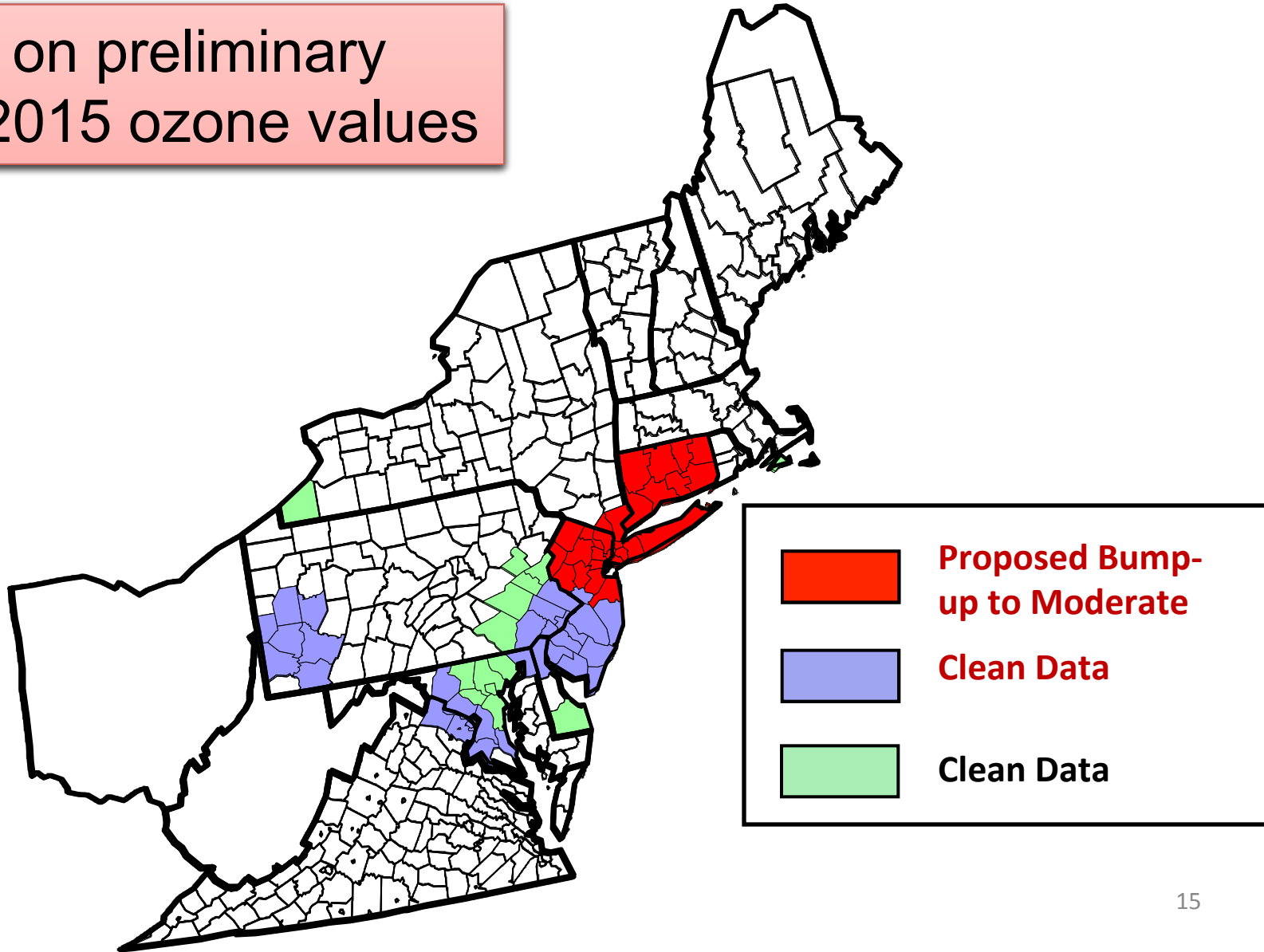
Meeting the 2008 Ozone NAAQS

Based on preliminary
2013-2015 ozone values



Meeting the 2008 Ozone NAAQS

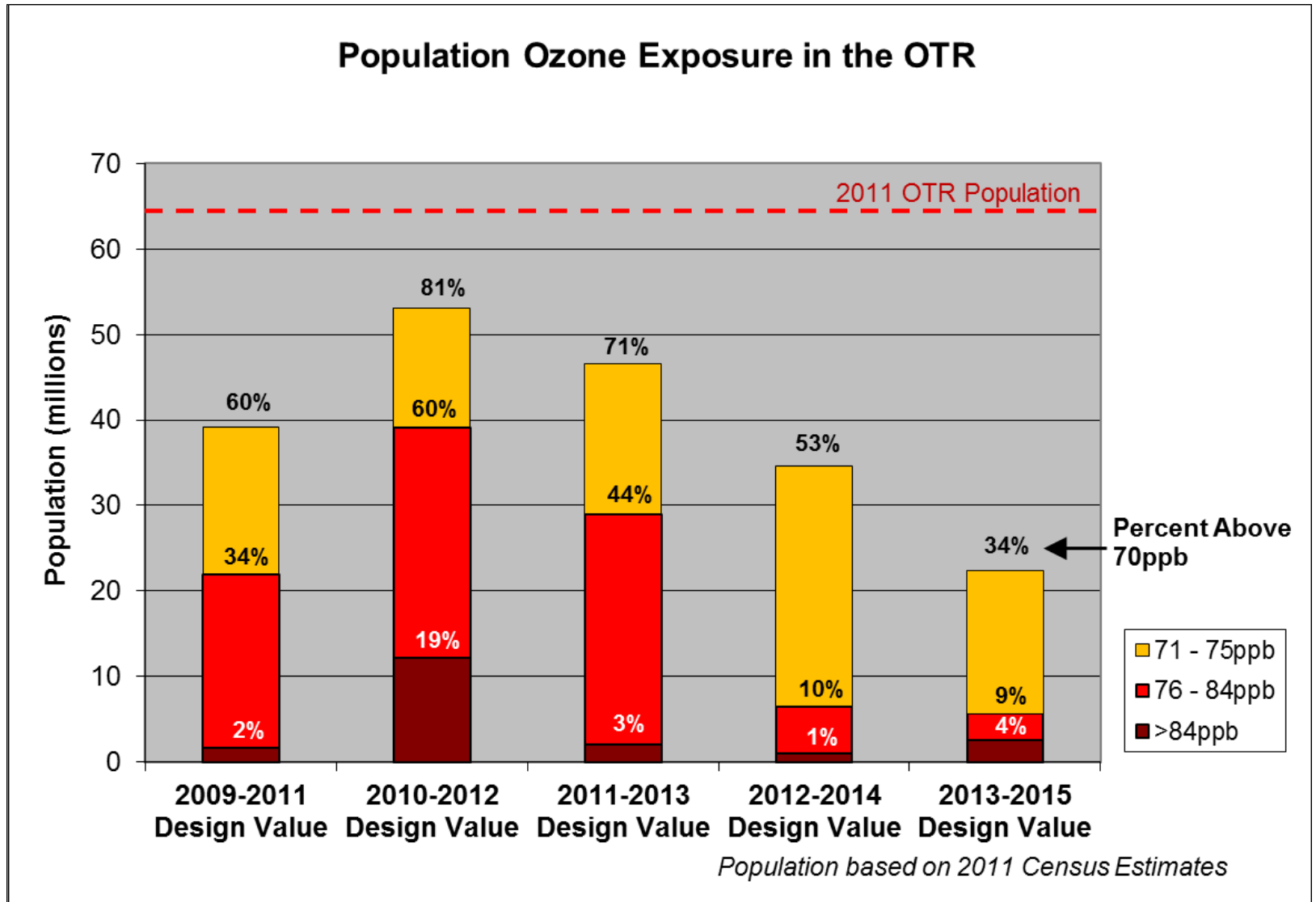
Based on preliminary
2013-2015 ozone values



Ozone Monitoring Summary

- 75 ppb 2015 NAAQS
 - The Good – Most of the OTR is meeting the 2008 ozone NAAQS
 - The Bad – Not everyone is there yet
- 70 ppb 2015 NAAQS
 - 7 of the OTC states will likely have areas designated as Nonattainment
 - 3 of the OTC states will likely have areas classified as Moderate
- Designations will be based on 2014-2016 data.

Population Exposed to Unhealthy Ozone Air Quality



Emission Inventory Update

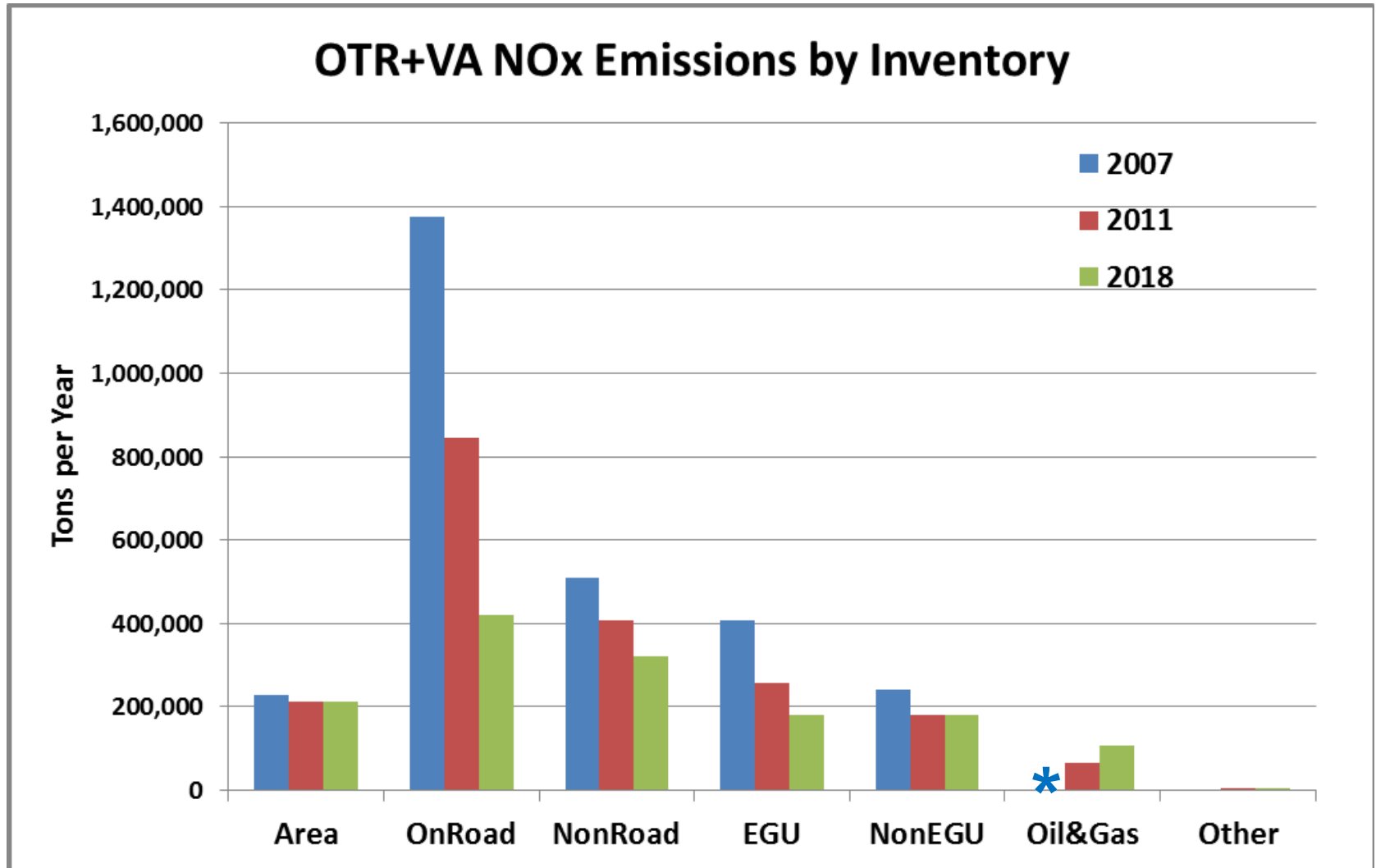
- Work now focused on the 2011-based MARAMA Alpha2 Inventory
- Next round of ozone modeling will use incrementally improved MARAMA Beta Inventory

Created in collaboration with other regions

- 2011 Alpha2, Beta (planned)
- 2018 Alpha2
- 2028 Alpha2
- 2017 Beta (planned)

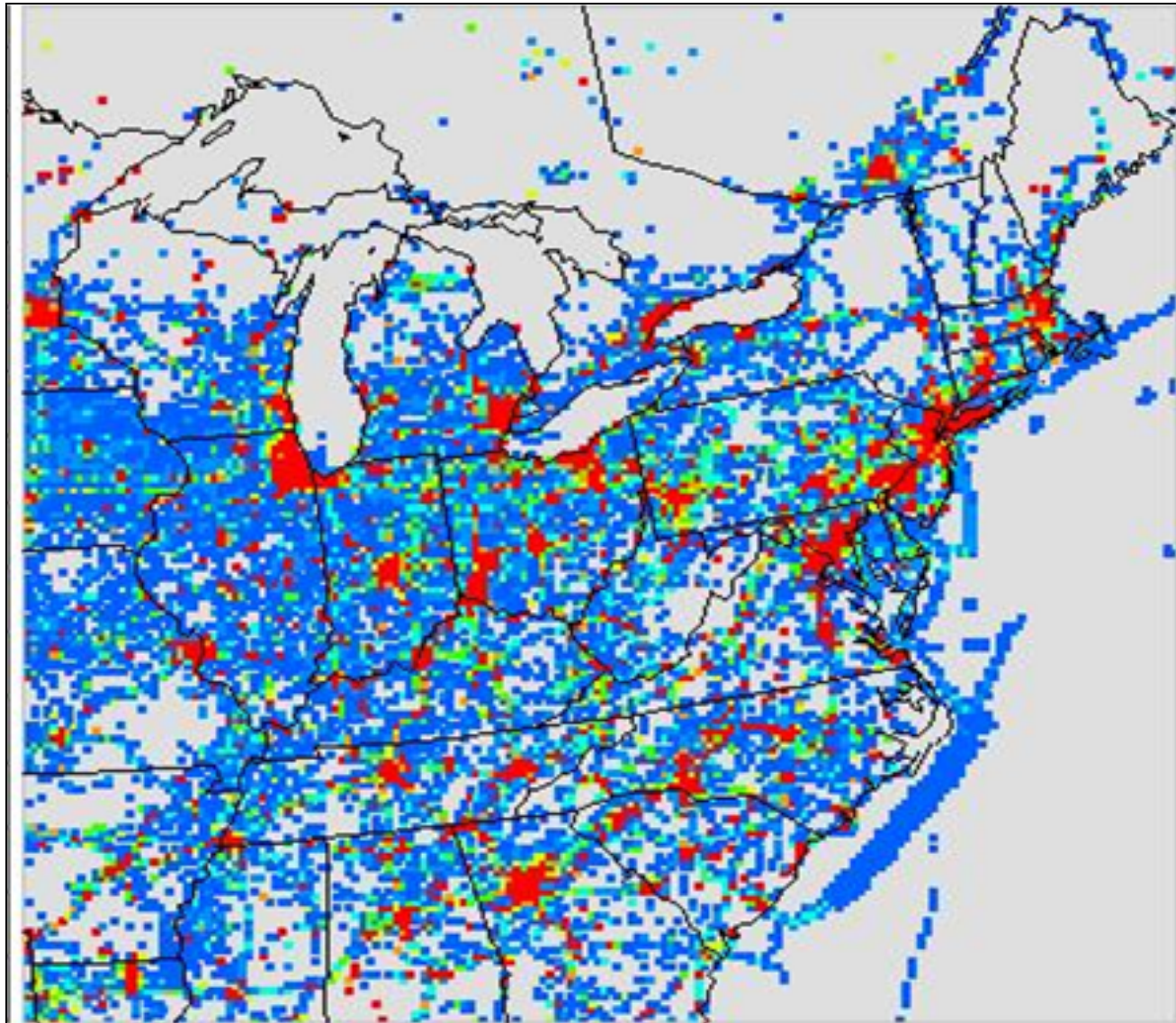
Alpha2 inventories correct portions of the marine sector identified during Q/A.

MANE-VU Base Case NOx Inventories



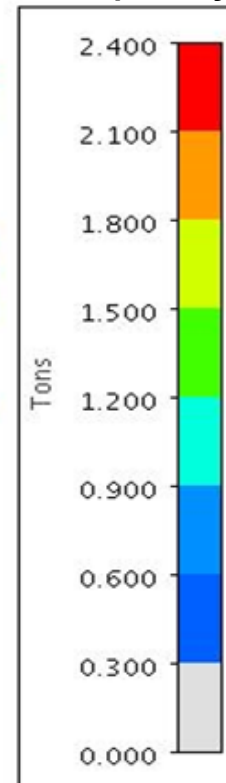
MARAMA Alpha2 EI for 2011 and 2018 * Indicates no estimate available

NOx Emissions – July 22

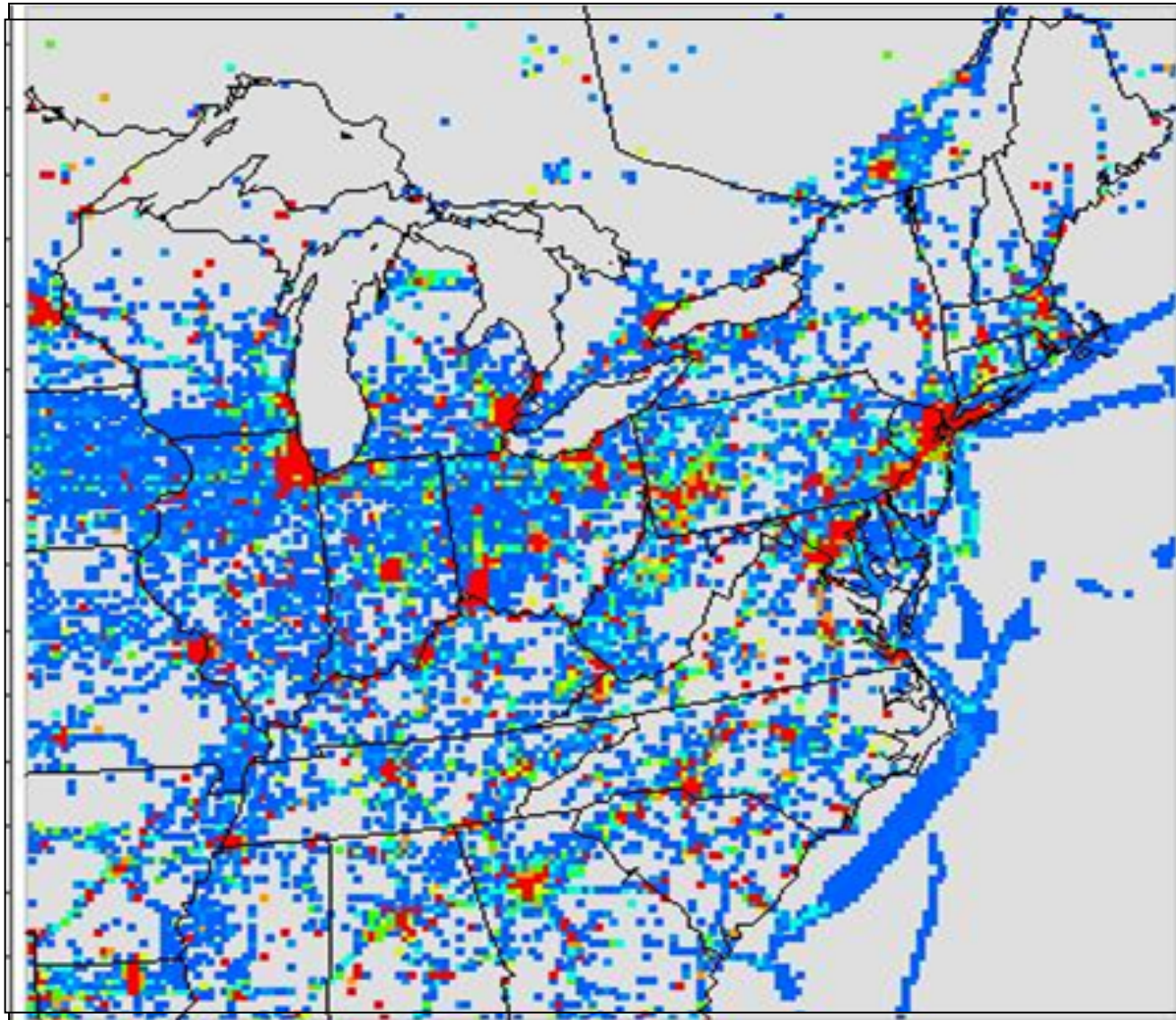


**2018
Projected
Base Case**

Tons per Day

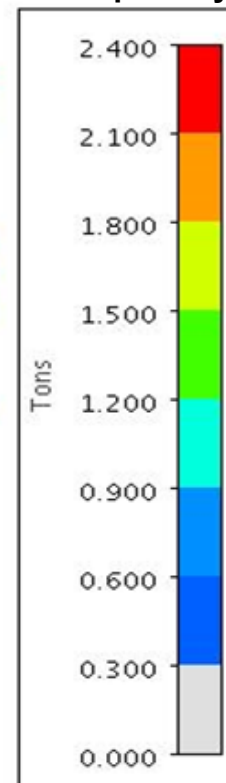


NOx Emissions – July 22



**2018
Projected
Base Case**

Tons per Day



MARAMA Beta Emission Inventories

- Upgrade to **ERTAC v2.4**
- Re-project future year to **2017**
- EMF Growth
 - Evaluate USEPA v2 growth factors and adopt as appropriate.
 - Include new rules (e.g. residential wood NSPS)
 - Updates and corrections to state emissions
 - Include state banked emissions

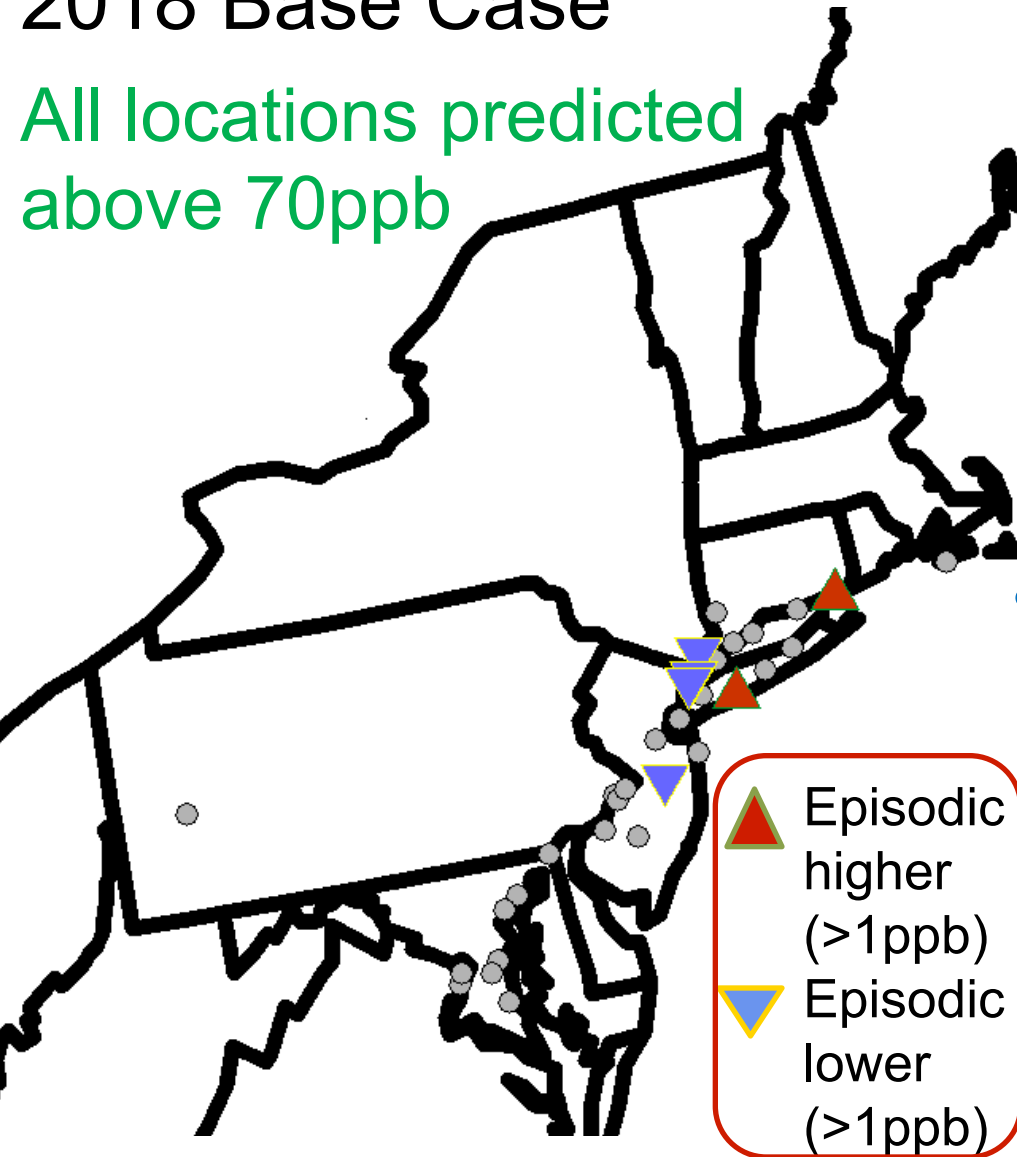
Episodic Modeling

- **Goal:** Develop a tool to conduct policy relevant scenarios quickly that replicate key portions of ozone seasons
- Focus on a time period from late June to early August 2011
 - Representative of many key meteorological regimes
 - Contains several HEDD events
- Episodic modeling to be conducted for screening and sensitivity purposes only

Episodic - Comparison

2018 Base Case

All locations predicted above 70ppb



- Most episodic results were within 1ppb of those for the full season
- Episodic results appear reasonable for screening work but won't be used to fine-tune final attainment strategies

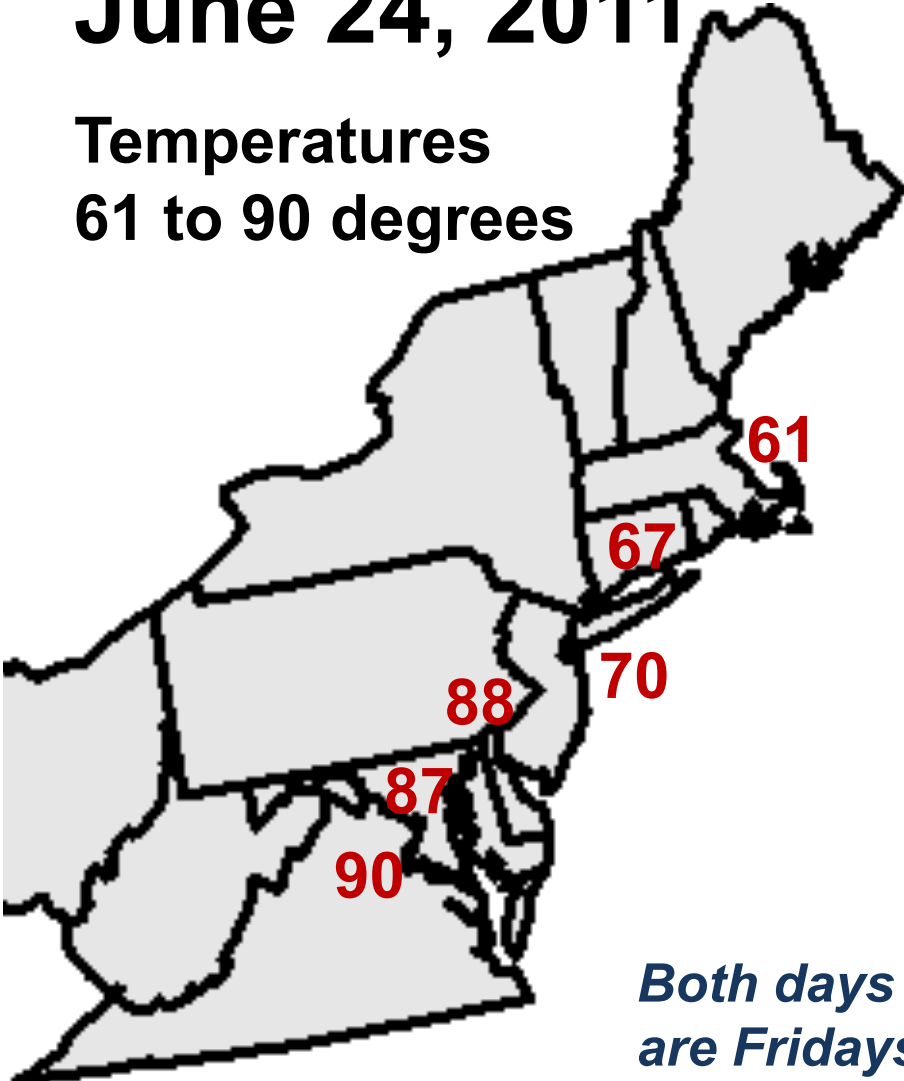
High Electricity Demand Days (HEDD)

- On HEDD more electricity generation than usual is required for reliability
 - More generation leads to more emissions
 - HEDD days typically occur on hot, humid days that are already conducive to high ozone
 - Therefore the higher emissions often occur during critical periods
- Some emissions are not reflected by the CAMD emission database and may not be reported through other typical mechanisms
 - Emissions need to be added to the inventory during HEDD periods to reflect actual emissions

A Tale of Two Days - HEDD

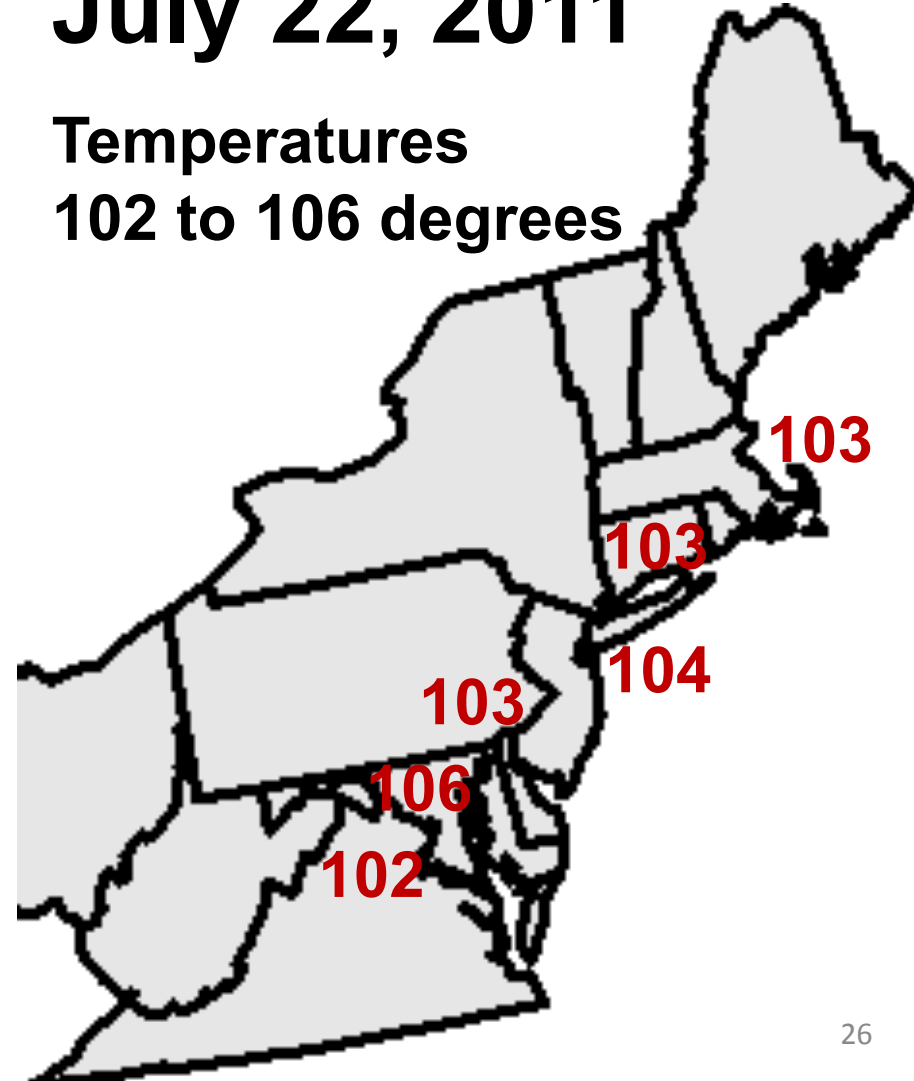
June 24, 2011

Temperatures
61 to 90 degrees



July 22, 2011

Temperatures
102 to 106 degrees

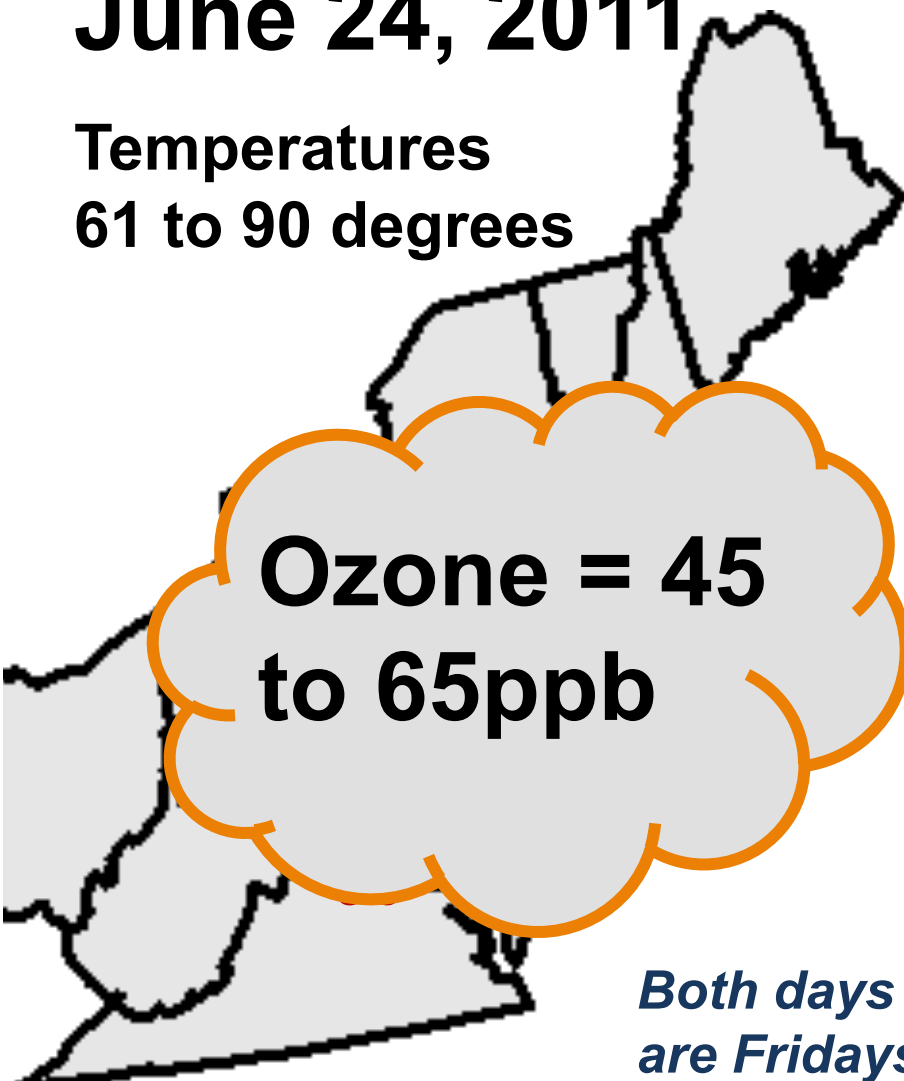


*Both days
are Fridays*

A Tale of Two Days - HEDD

June 24, 2011

Temperatures
61 to 90 degrees

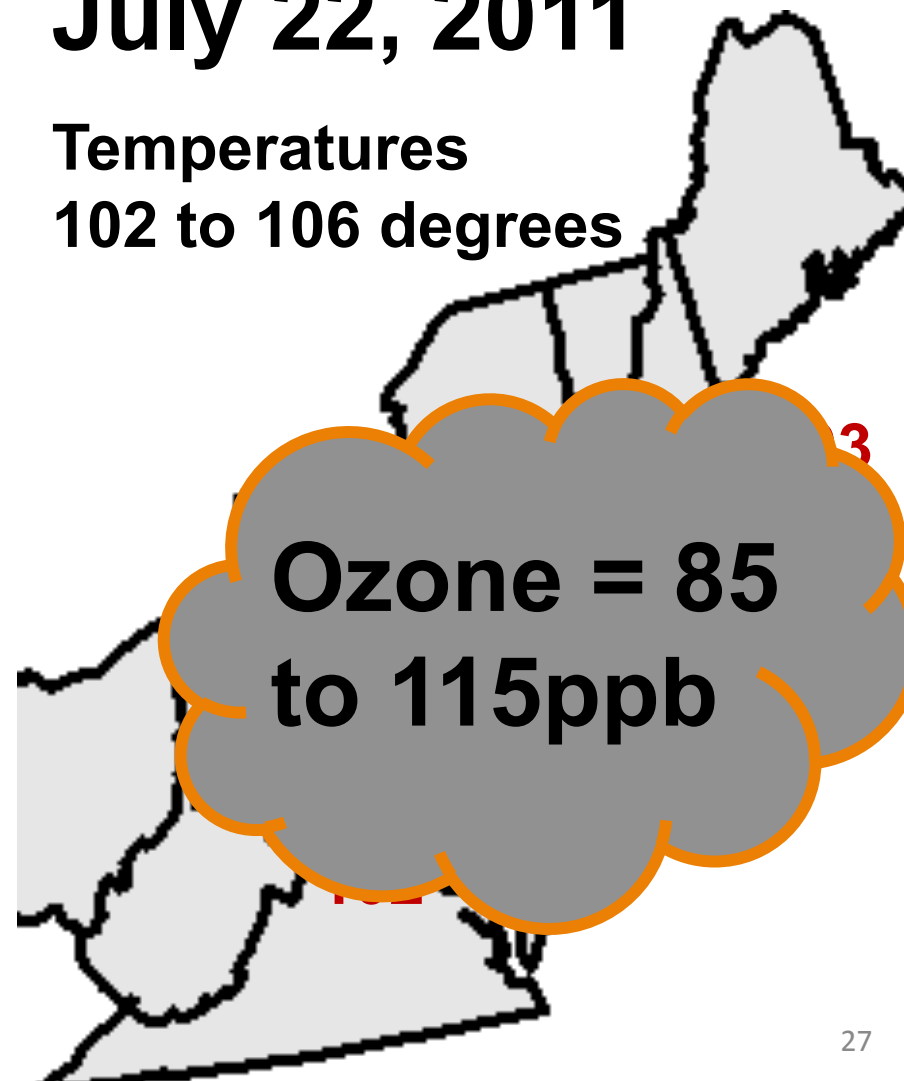
A map of New England (Maine, New Hampshire, Vermont, Massachusetts, Connecticut, and Rhode Island) is shown in light gray. An orange-outlined cloud shape is overlaid on the map, containing text about ozone levels.

**Ozone = 45
to 65ppb**

*Both days
are Fridays*

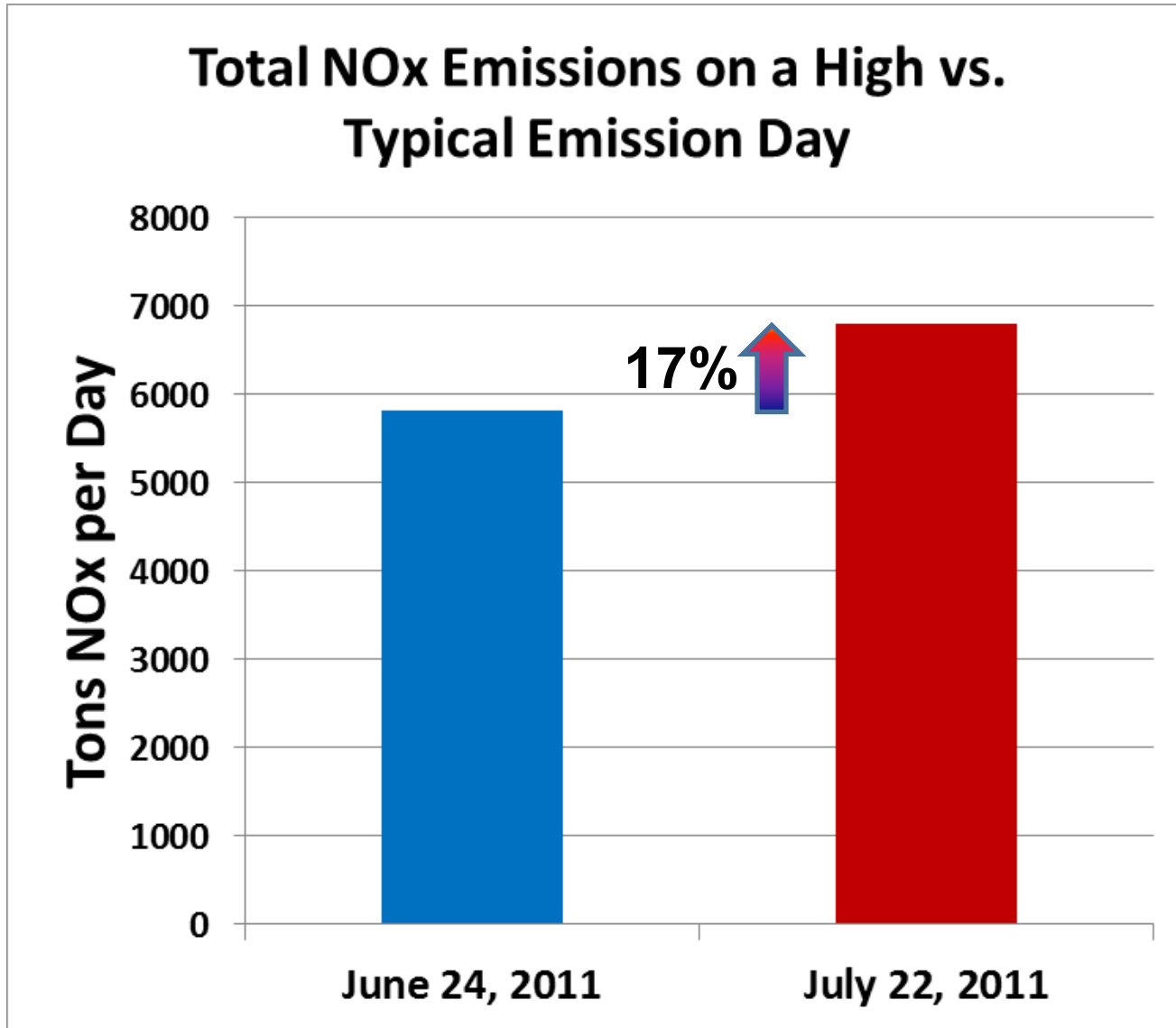
July 22, 2011

Temperatures
102 to 106 degrees

A map of New England is shown in light gray. A gray-outlined cloud shape is overlaid on the map, containing text about ozone levels. A small red number '3' is visible in the top right corner of the cloud.

**Ozone = 85
to 115ppb**

A Tale of Two Days – HEDD NOx

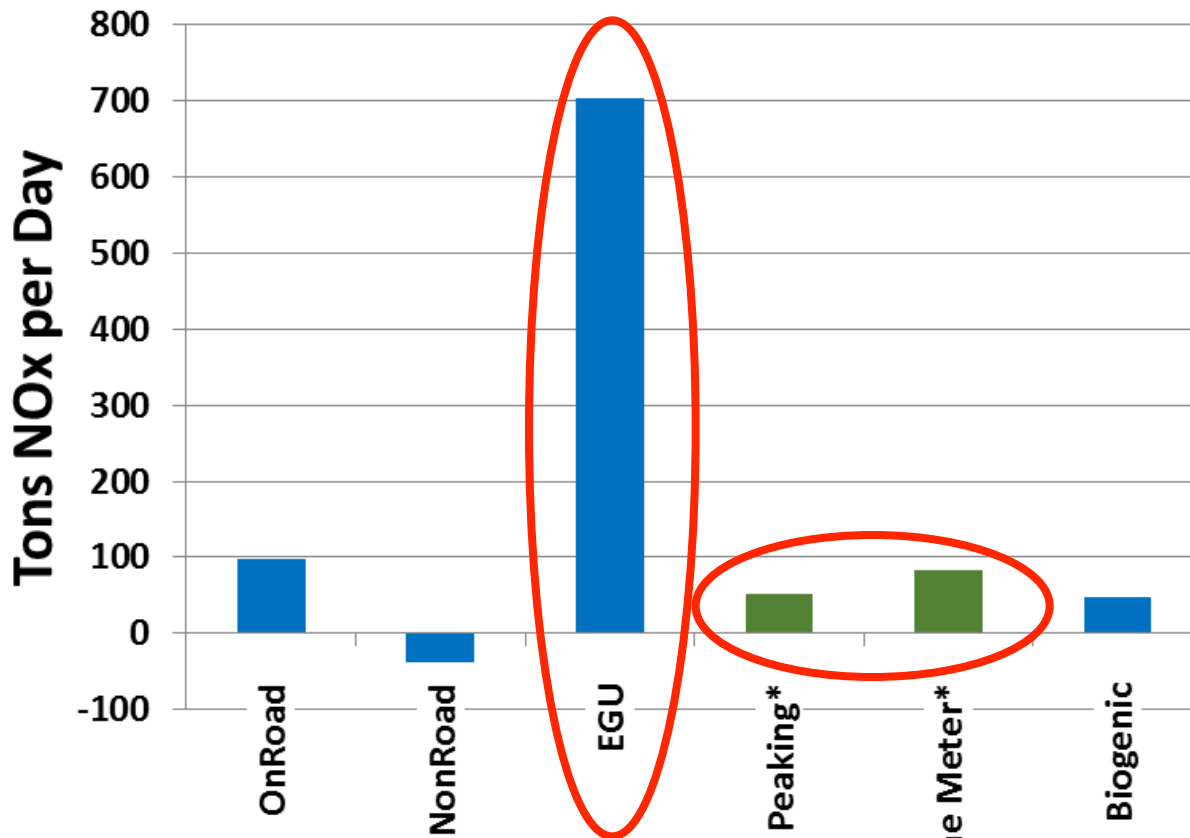


**Regional
NOx
Emissions
About 17%
higher**

*Both days
are Fridays*

A Tale of Two Days – HEDD NOx

NOx Emission Difference between High and Typical Emission Day

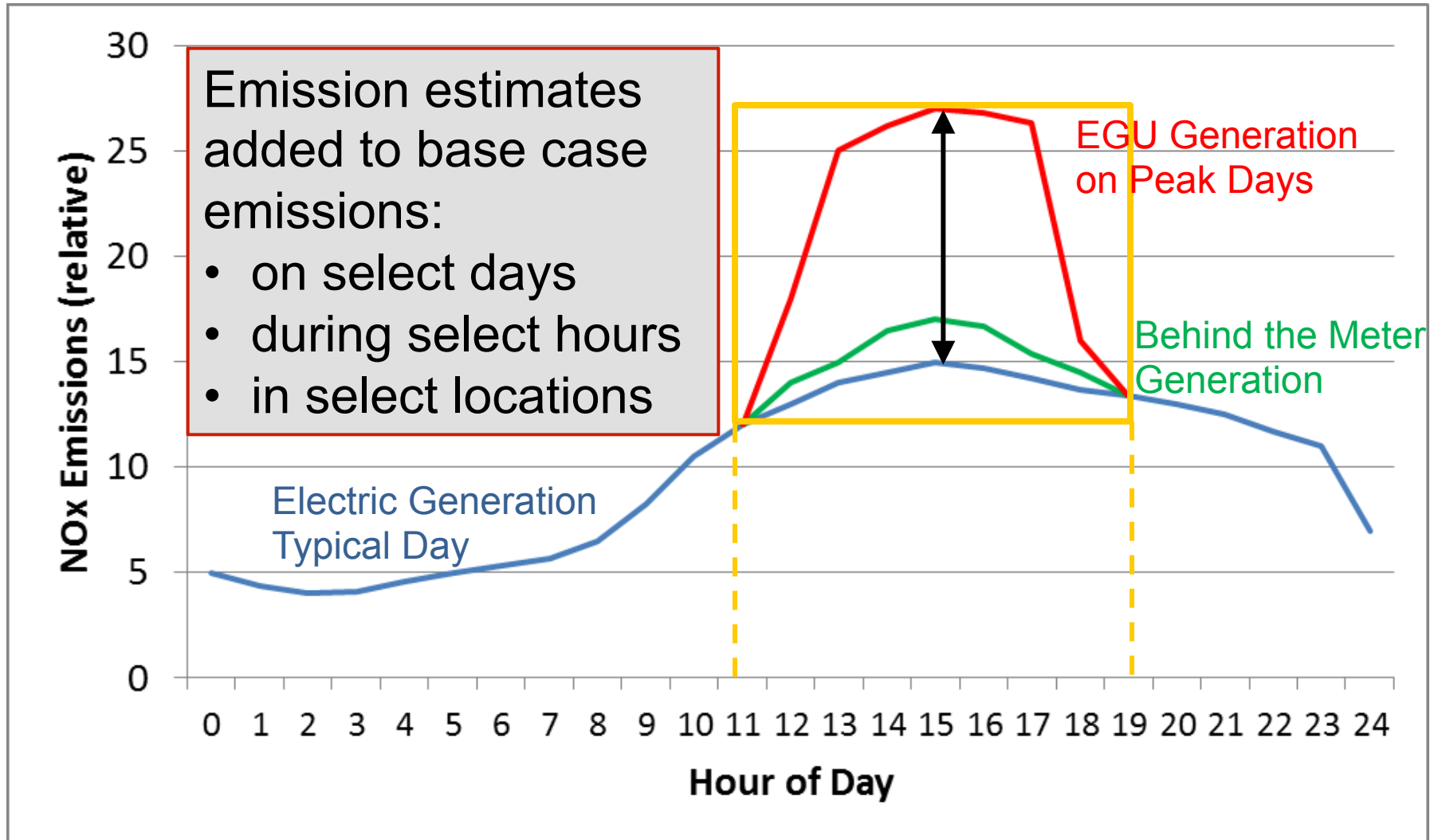


Most additional NOx emissions are from EGUs

*Frídáys
June 24, 2011
and July 22, 2011*

** Indicate estimates that are either not in the base inventory or needs to be better distributed to peak periods*

HEDD NOx Emission Adjustments



Completed/Planned Model Runs

Completed	In Process	Planned
Ozone		
<ol style="list-style-type: none"> 1. 2011 Base w/ Alpha2 2. 2018 Base w/ Alpha2 3. 2018 25% Across-the-board 4. 2028 Mobile 5. 2011 Demand Response (BTM) 	<ol style="list-style-type: none"> 1. 2011 Base – 4km nested grid 2. 2011 Contribution 	<ol style="list-style-type: none"> 1. Additional HEDD Sensitivity Runs 2. 2011 Base w/ Beta 3. 2017 Base w/ Beta 4. 2028 Base
Haze		
<ol style="list-style-type: none"> 1. 2011 Base 		<ol style="list-style-type: none"> 1. 2028 Base 2. 2028 Control

Summary

OTC Modeling Committee is currently working to:

1. Review ozone attainment status for the OTR
2. Improve and revise emissions inventories
 - a) Develop emission estimates for HEDD
 - b) Revise the future projection emissions to 2017
3. Develop and implement an episodic modeling tool for screening modeling
4. Explore other options to improve model performance

Questions

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