

# Modeling Committee Update

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## OTC Annual Meeting

June 3, 2016

Philadelphia, PA



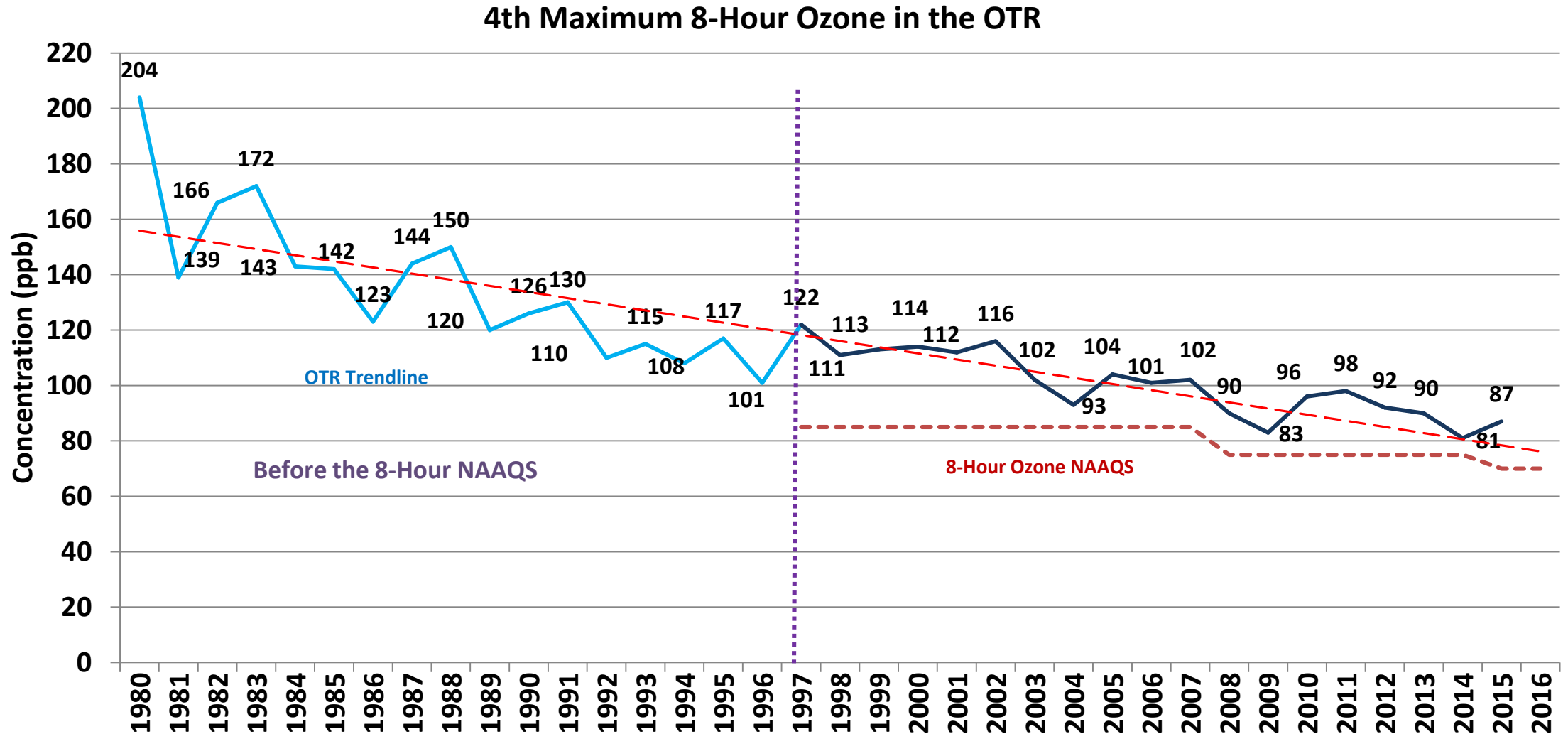
**OZONE** TRANSPORT COMMISSION

# Overview

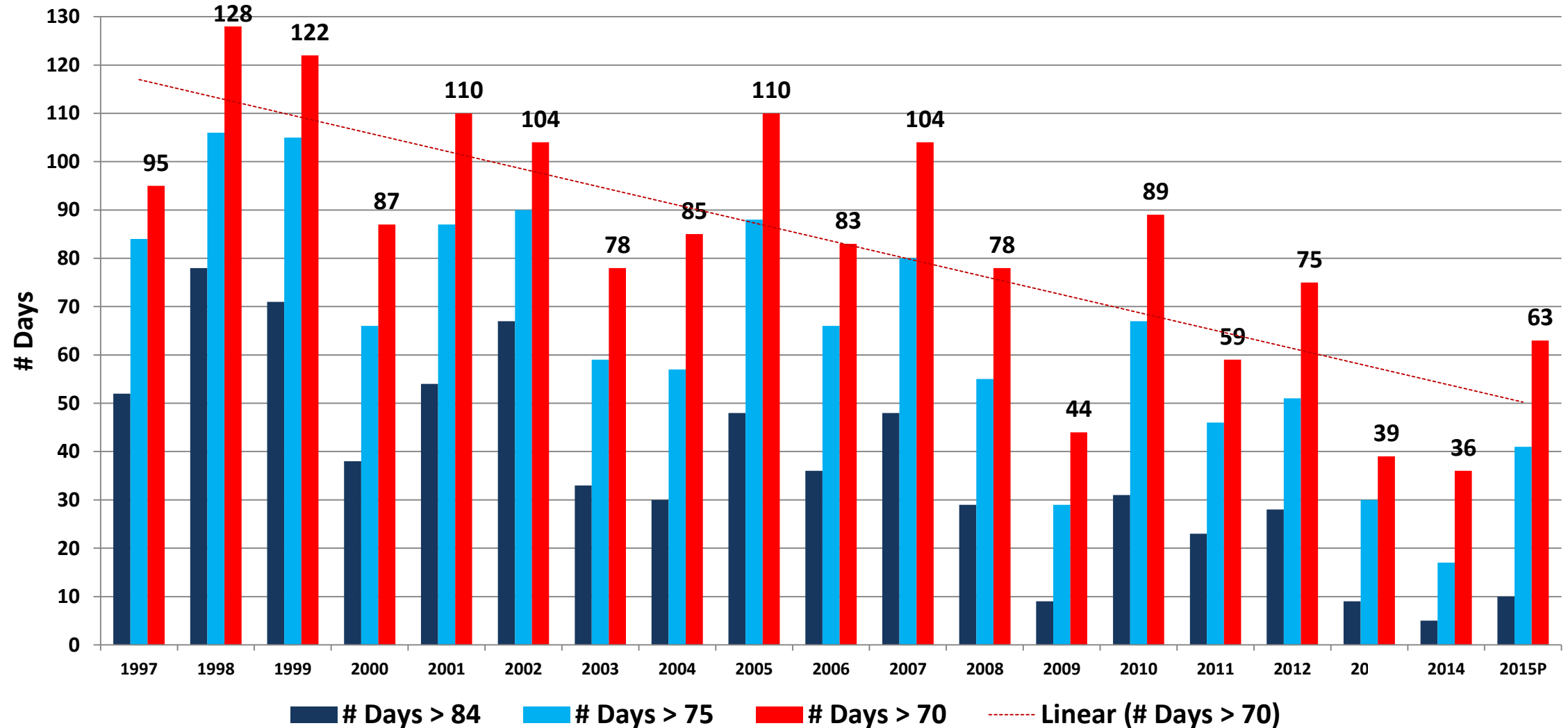
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1. Air Quality Data/Ozone NAAQS
2. Modeling Update
  - a. Emission Inventory
  - b. Episodic Modeling
3. Health Benefits

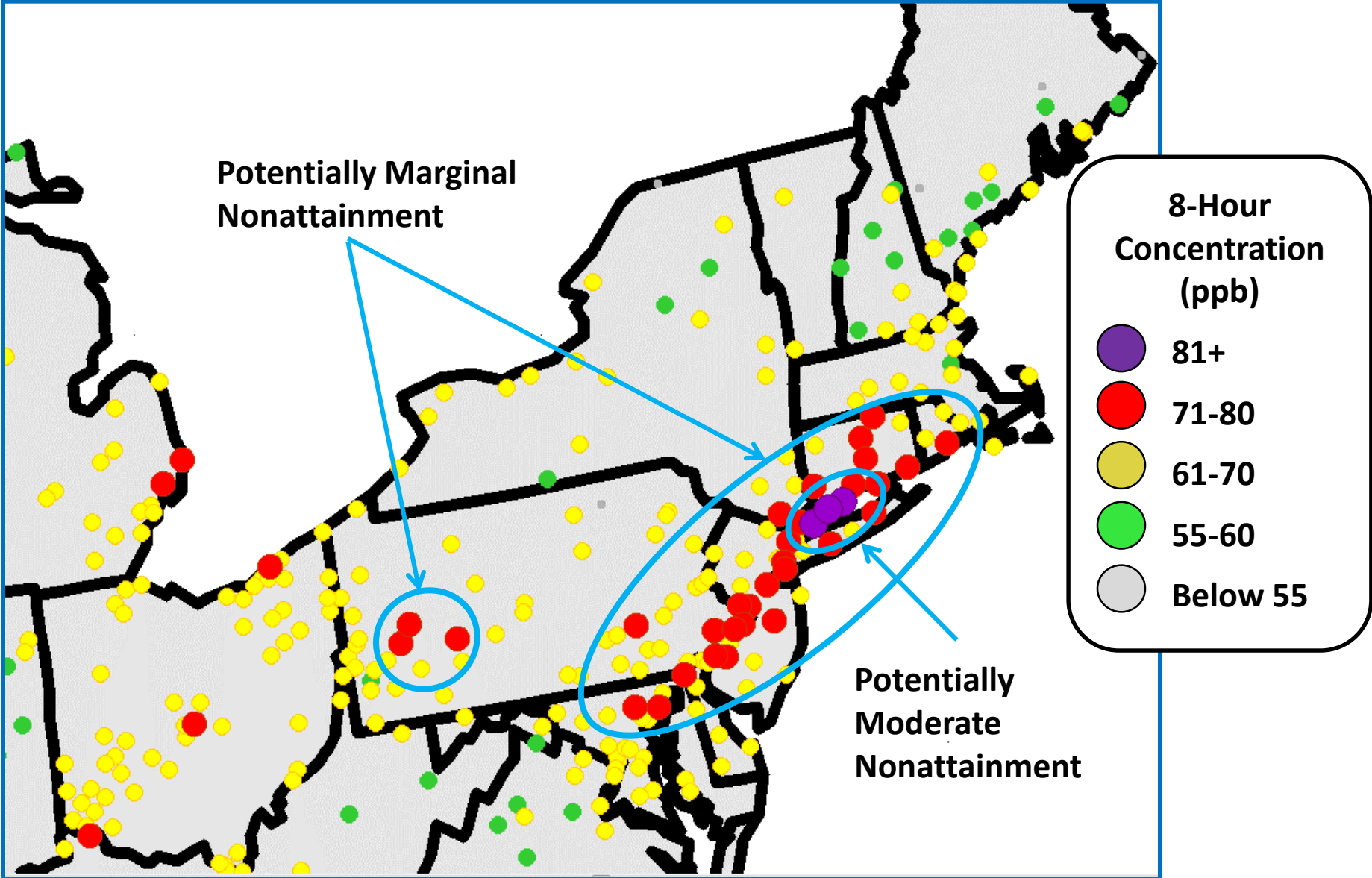
# Ozone Trends in the OTR



# Trends for Exceedance Days

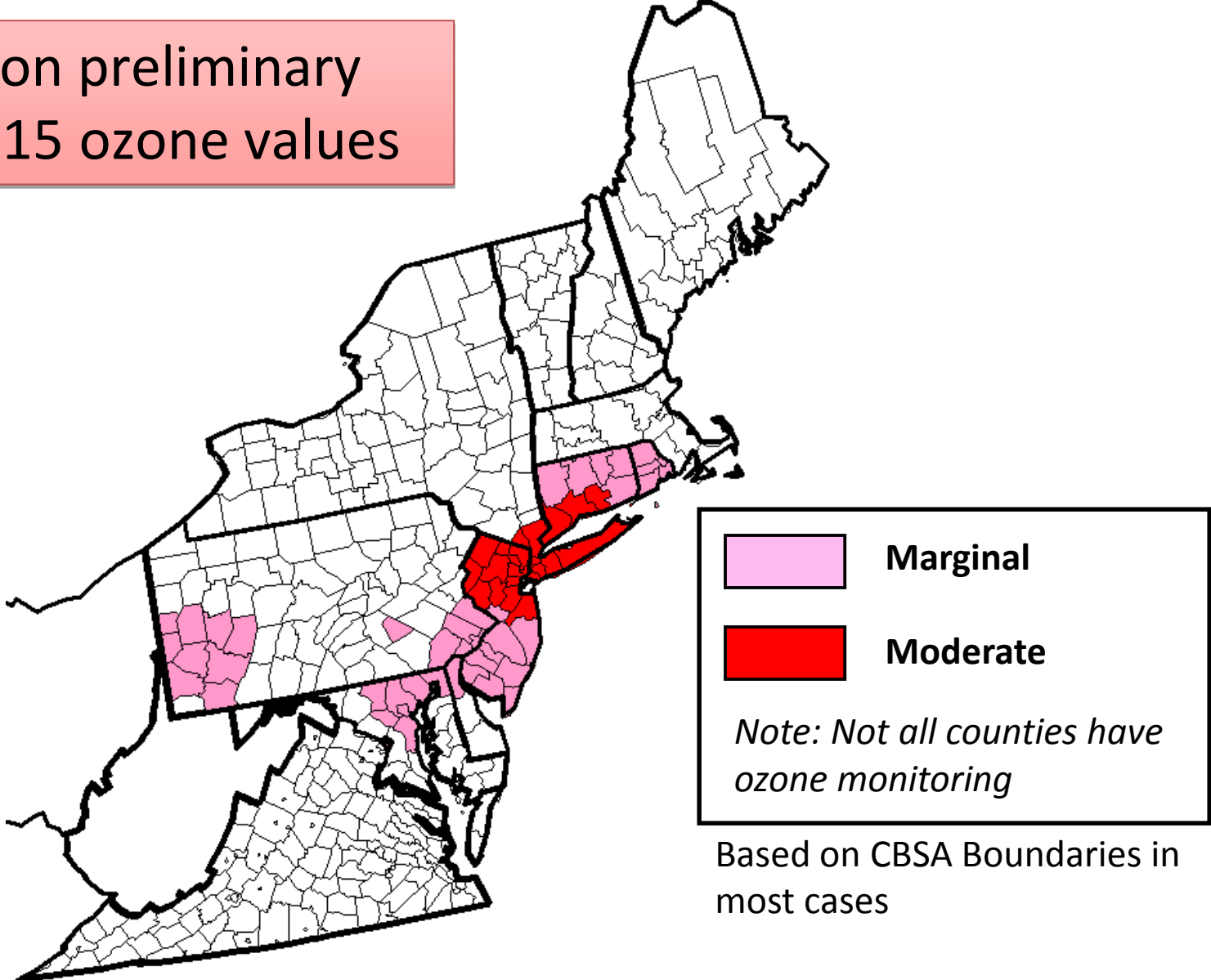


# Preliminary 2013-15 Design Values (DV)



# Potential Nonattainment – 2015 70ppb NAAQS

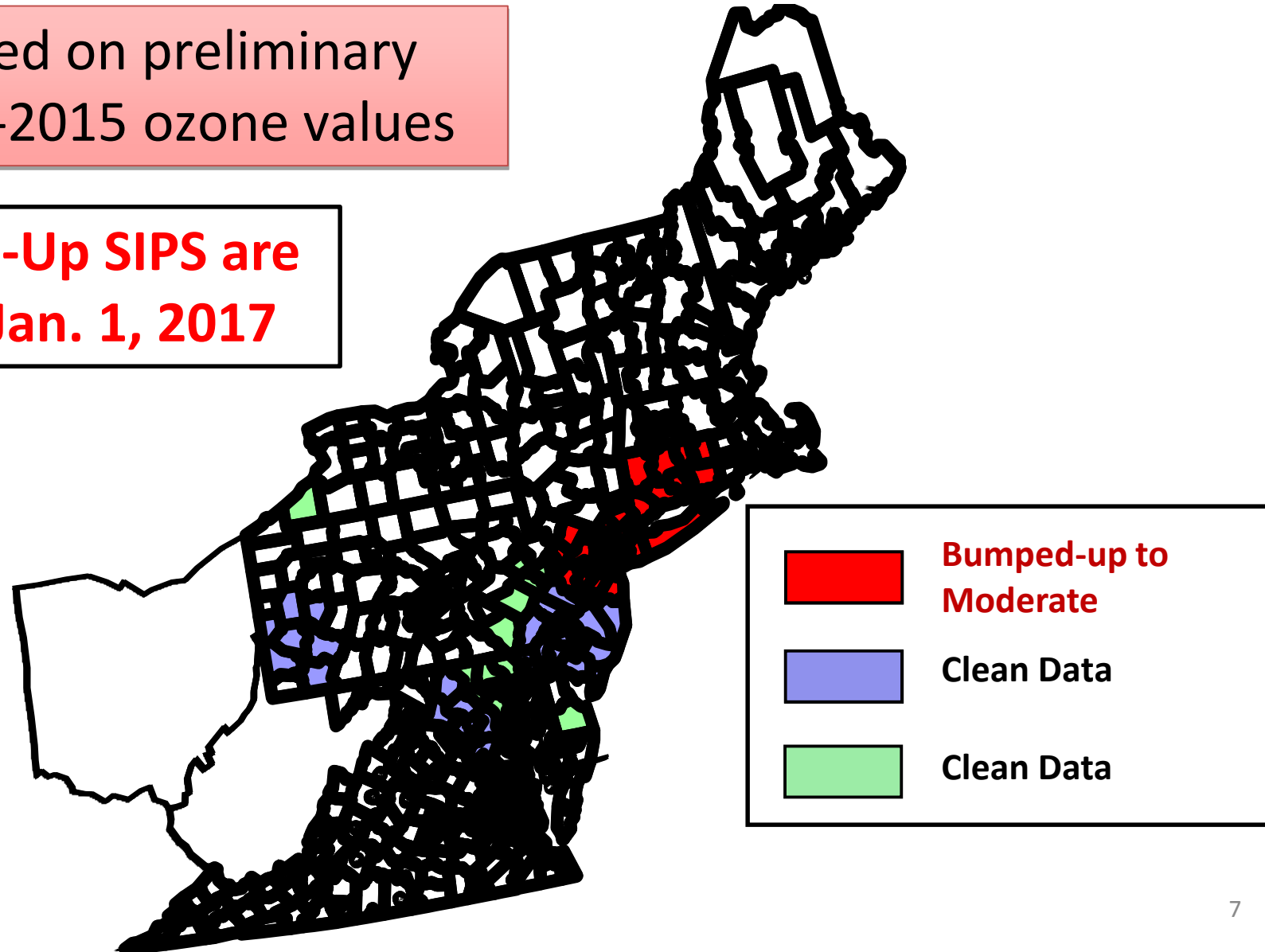
Based on preliminary  
2013-2015 ozone values



# Meeting the 2008 Ozone NAAQS

Based on preliminary  
2013-2015 ozone values

**Bump-Up SIPs are  
due Jan. 1, 2017**



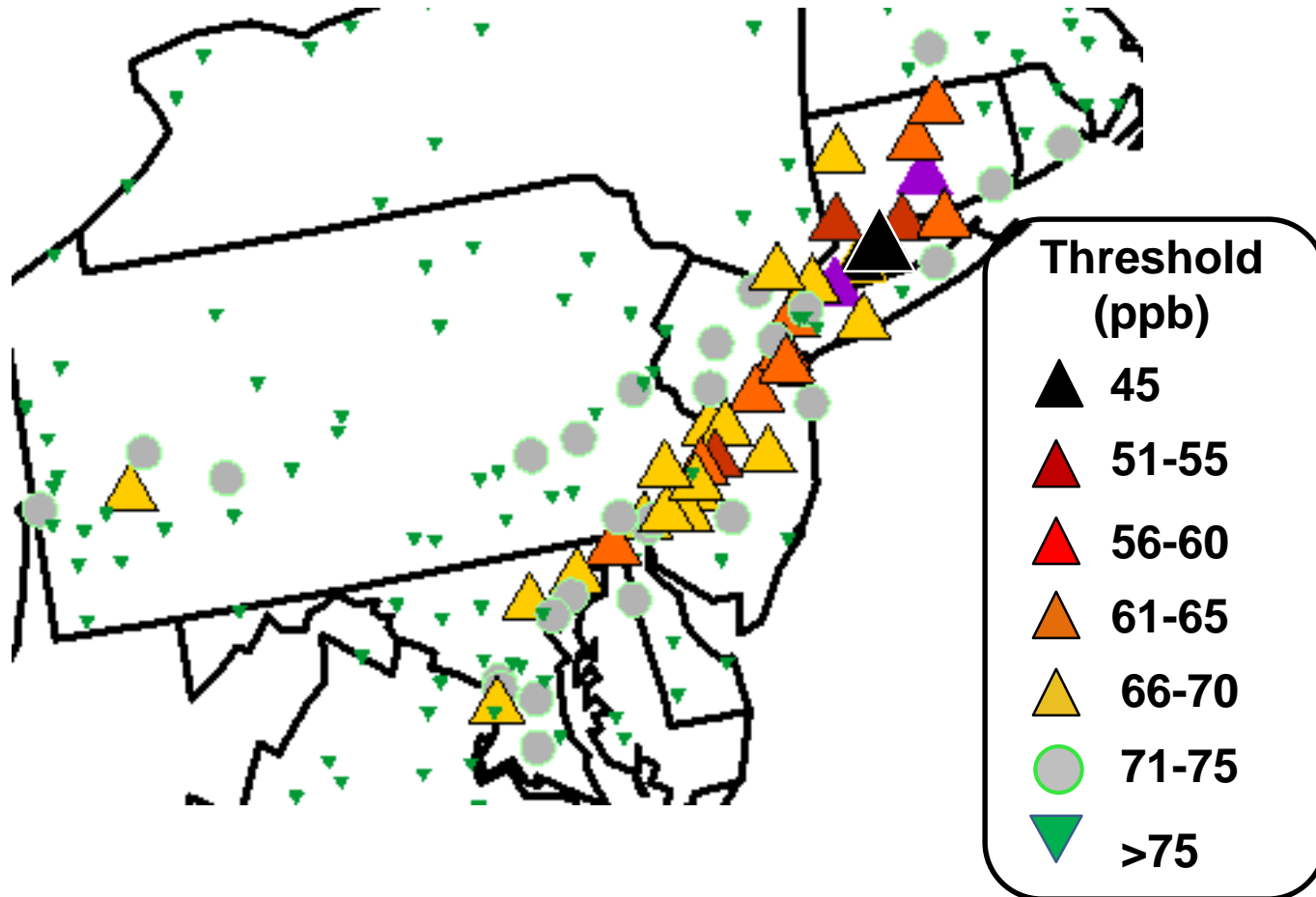
# 2016 Thresholds by State

State	Preliminary 2013-15 DV ppb	2016 4 <sup>th</sup> Max to Exceed 75 ppb	2016 4 <sup>th</sup> Max to Exceed 70 ppb	2016 4 <sup>th</sup> Maximum as of 5/26/2016 ppb (Threshold Monitor)
<b>Connecticut</b>	84	60	45	81* (69)*
Delaware	68	90	68	65 (64) <b>2</b>
District of Columbia	68	88	72	67 (67)
Maine	67	94	79	63 (63)
Maryland	73	80	65	69 (64) <b>1</b>
Massachusetts	69	89	74	78 (68) <b>2</b>
New Hampshire	67	92	77	69 (64)
<b>New Jersey</b>	74	79	64	74* (63)
<b>New York</b>	74	77	62	71* (64)*
<b>Pennsylvania</b>	75	75	60	73 (64)*
Rhode Island	73	88	73	68 (57) <b>2</b>
Vermont	62	103	88	65 (59)
Virginia	70	84	69	67 (67) <b>1</b>



# 2016 Thresholds by Monitor

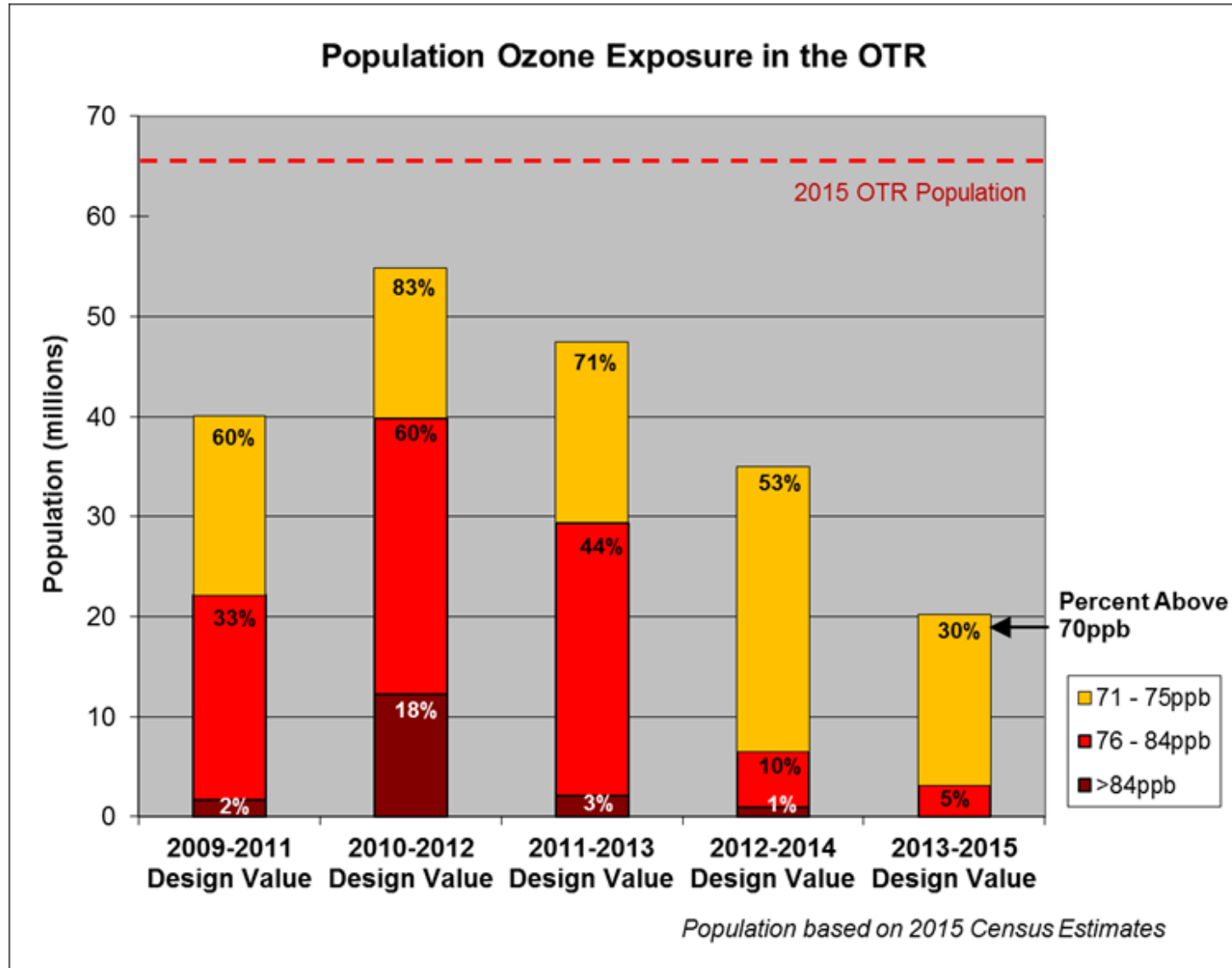
2016 4<sup>th</sup> high ozone value that will cause monitor to exceed NAAQS for 2014-16



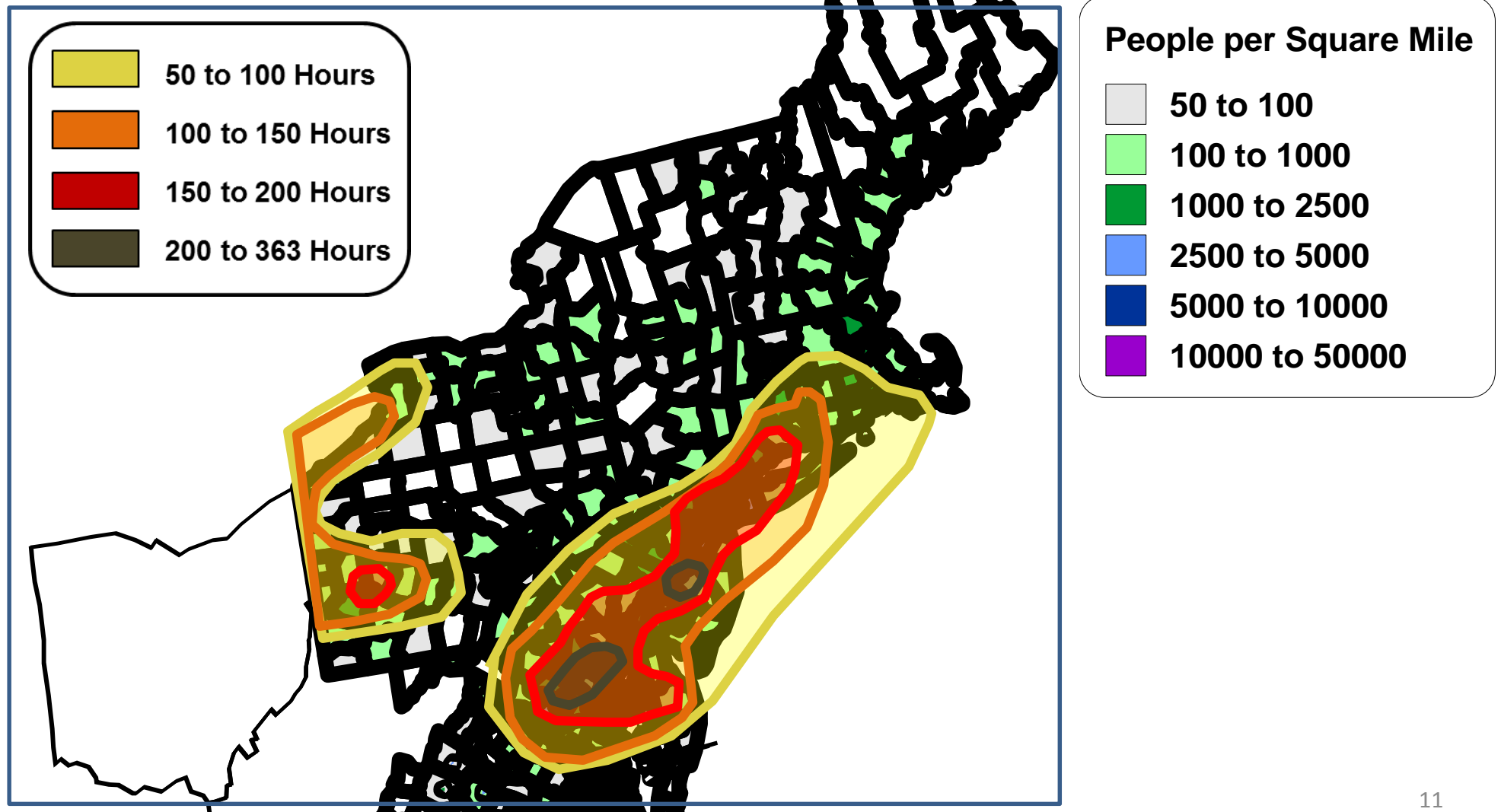
In 2016, there are already:

- 12 ozone exceedance days
- 288 monitor exceedances
- 146 Individual monitors exceeded
- All OTR states exceeded except Maine

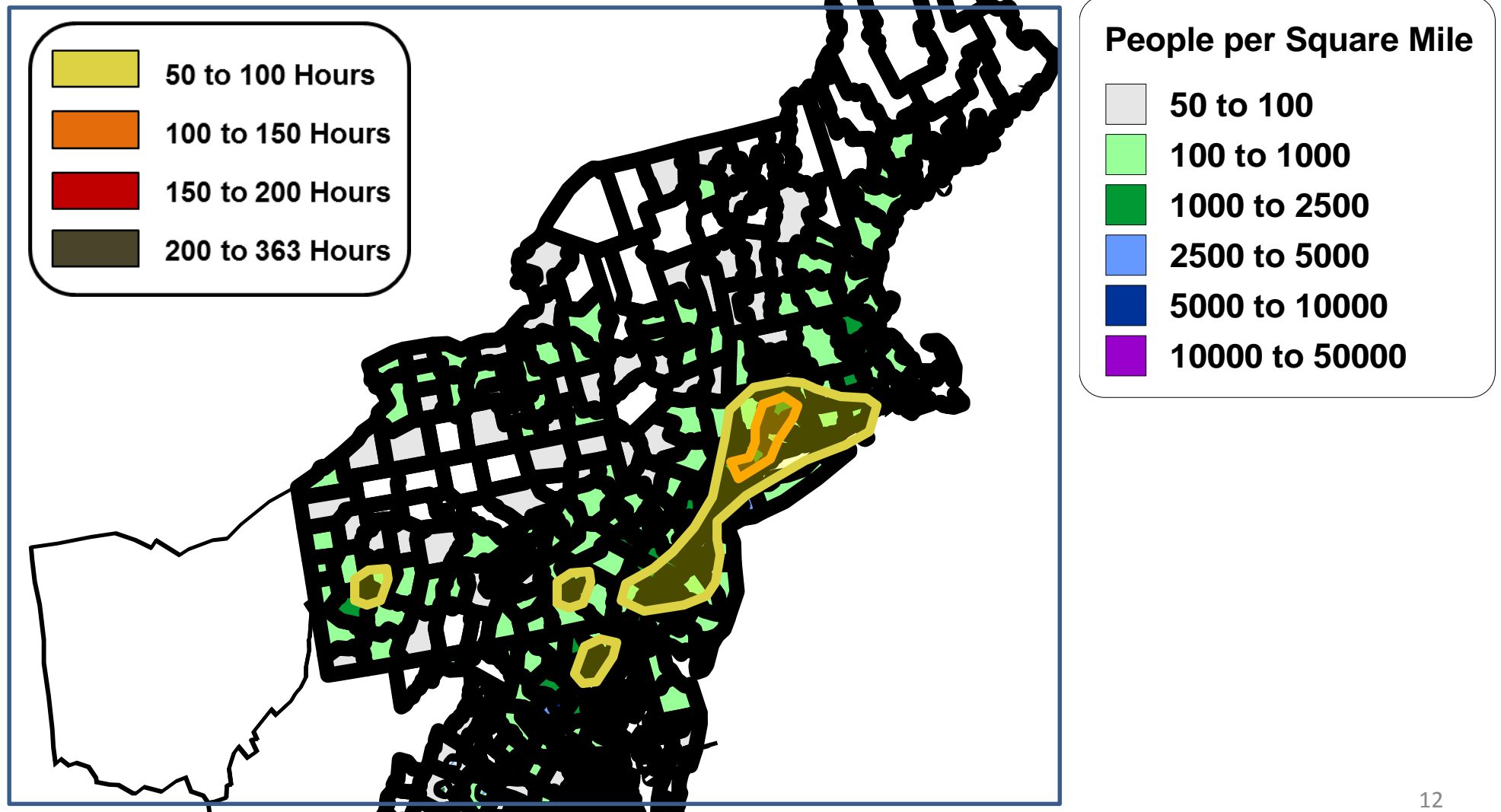
# Population Exposed to Unhealthy Ozone Air Quality



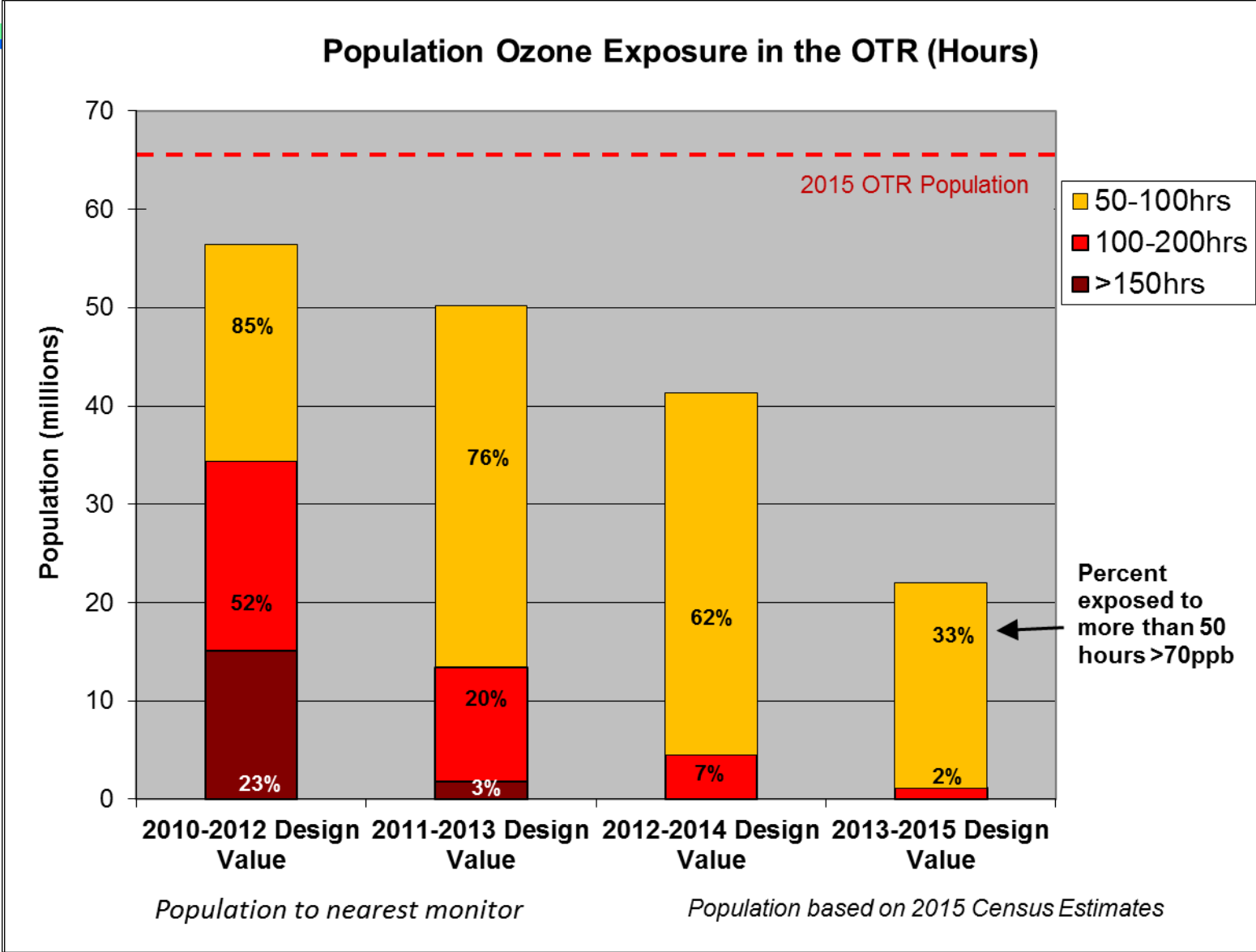
# 2010-2012 Average Hours Above 70ppb



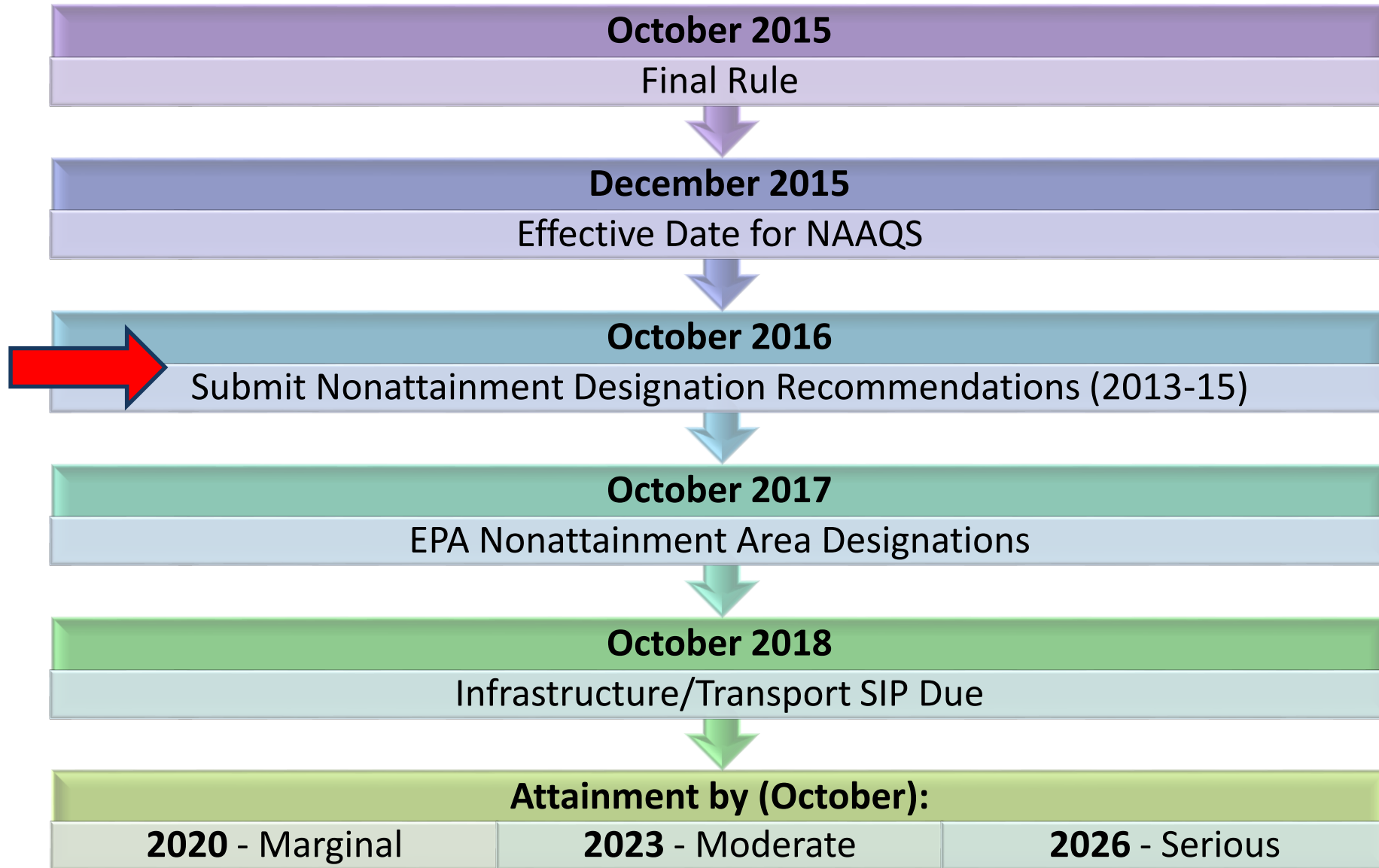
# 2013-2015 Average Hours Above 70ppb



# Hours of Exposure in the OTR



# 2015 Ozone NAAQS Timeline





# 2011 Modeling Platform

# Technical Support Document

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- Progress is well along on 2011 platform TSD
- Includes:
  - Meteorological evaluation
  - Biogenic evaluation
  - Model performance evaluation
  - Documentation of emissions processing
  - Modeling results
  - Episodic modeling protocol (separate document)



# Emission Inventory Update

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- Current modeling still focused on the 2011-based Alpha2 Emission Inventories
- Next round of full season ozone modeling will use incrementally improved Beta emission inventories
  - Target completion is Summer 2016
- A public outreach process for emission inventory improvements will occur in Mid-June through MARAMA

# Emission Inventories

## Alpha

- 2011

## Alpha 2

- 2011
- 2018
- 2028

## Beta

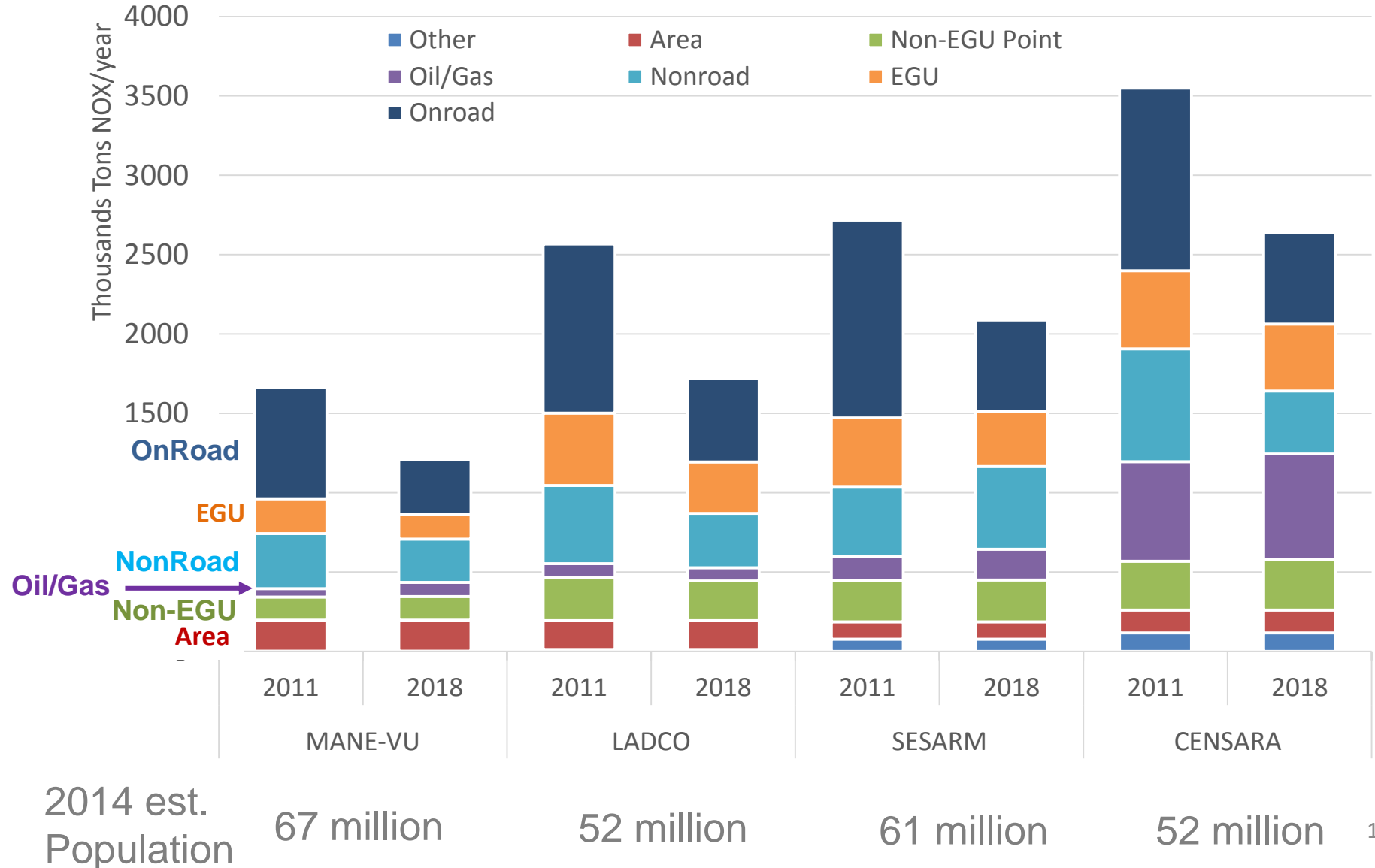
- 2011
- 2017

## ■ Beta Improvements

- Project future year to **2017**
- Upgrade to **ERTAC v2.5**
- MOVES2014a Emission Factors
- Small EGU Temporalization
- Include new rules (e.g. residential wood NSPS)
- State Adjustments/Updates
- BEIS 3.6.1 (from BEIS 3.6)
- Include state banked emissions
- EMF Growth

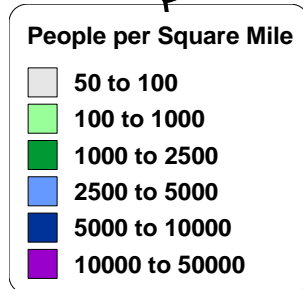
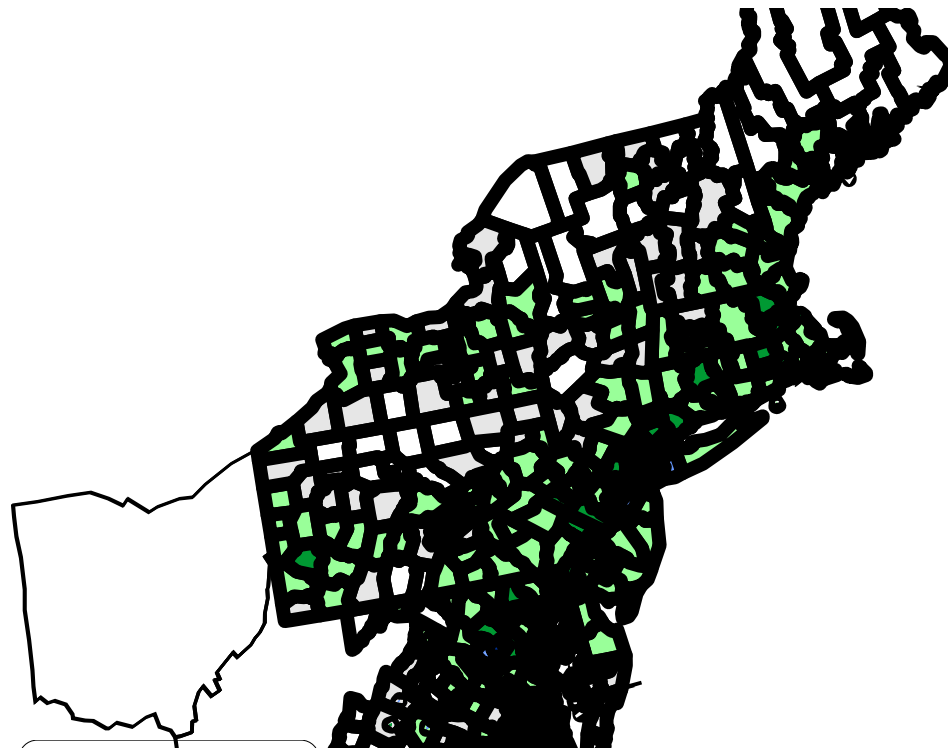
Grey years are complete

# Alpha 2 NO<sub>x</sub> Inventory Summary

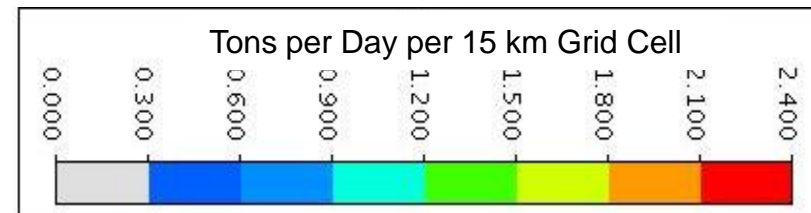
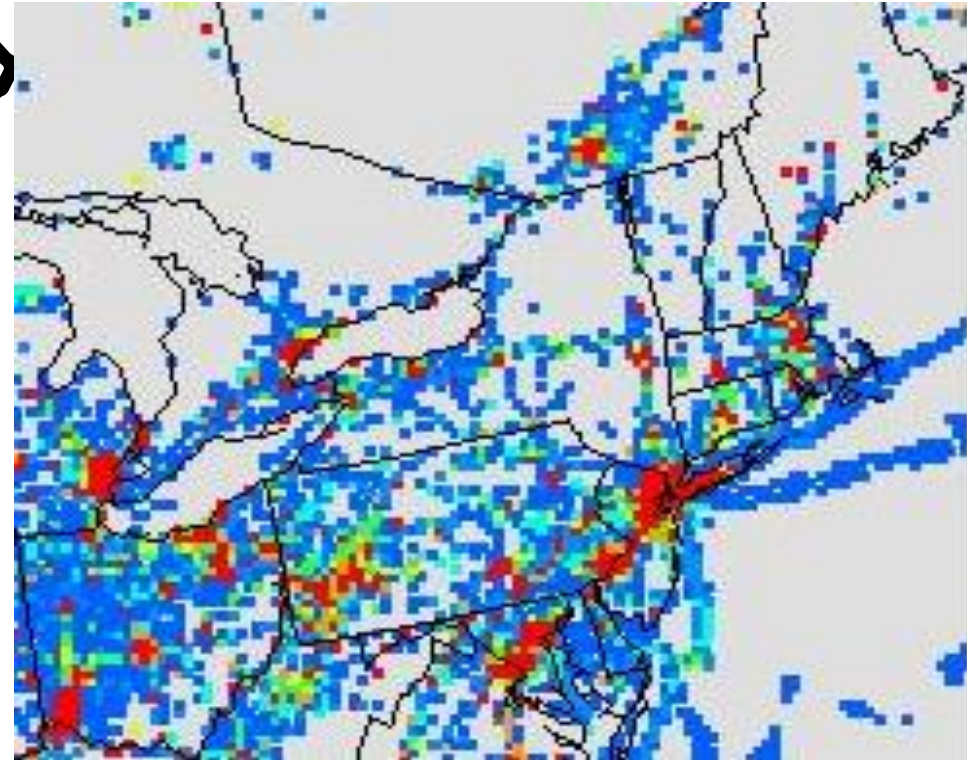


# NOx Emission Distribution

2014 Population Density

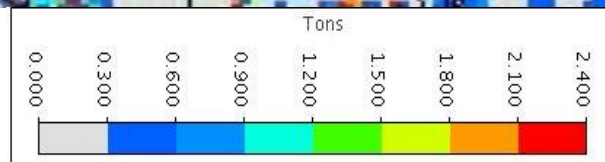
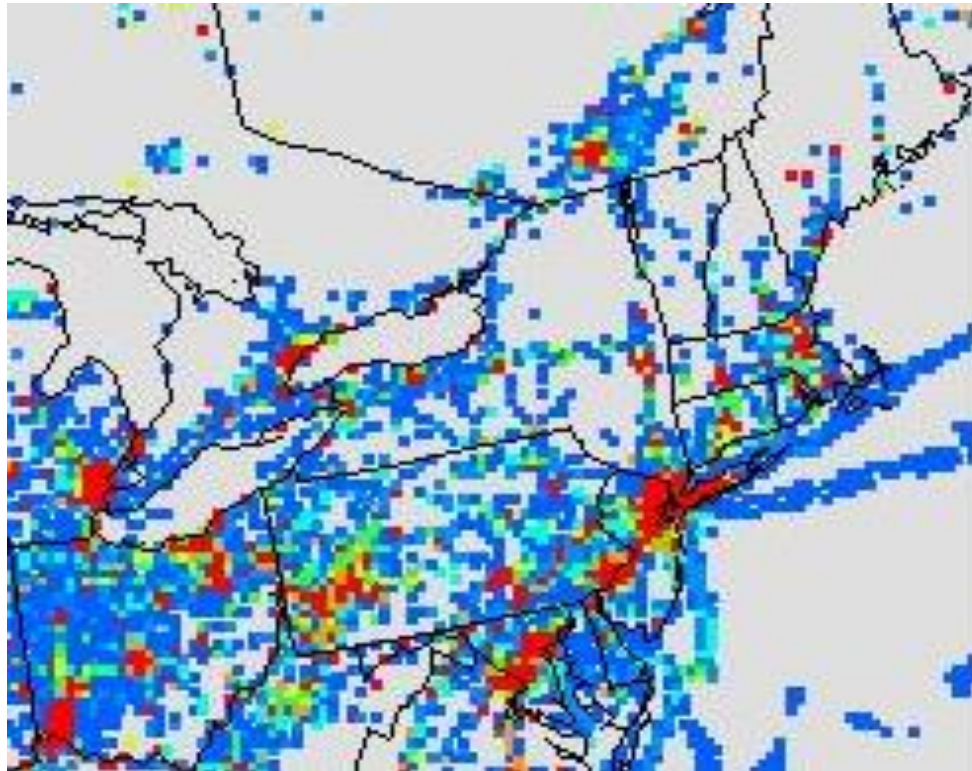


2011 NOx Emissions

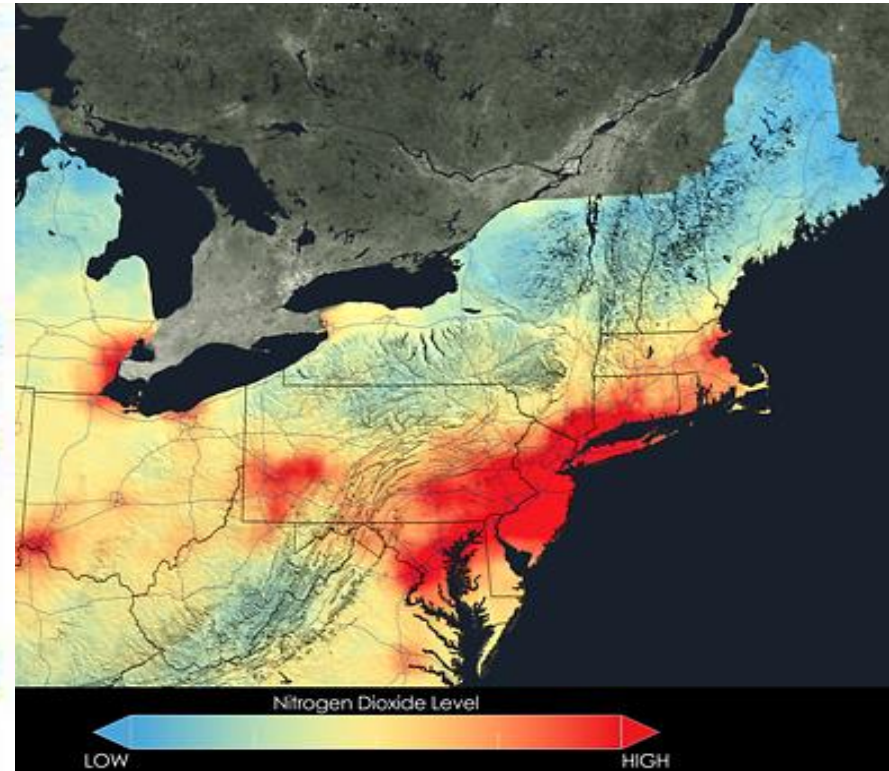


# Emission Inventory vs. NASA Satellite

2011 NOx Emissions



2011 NOx Observed

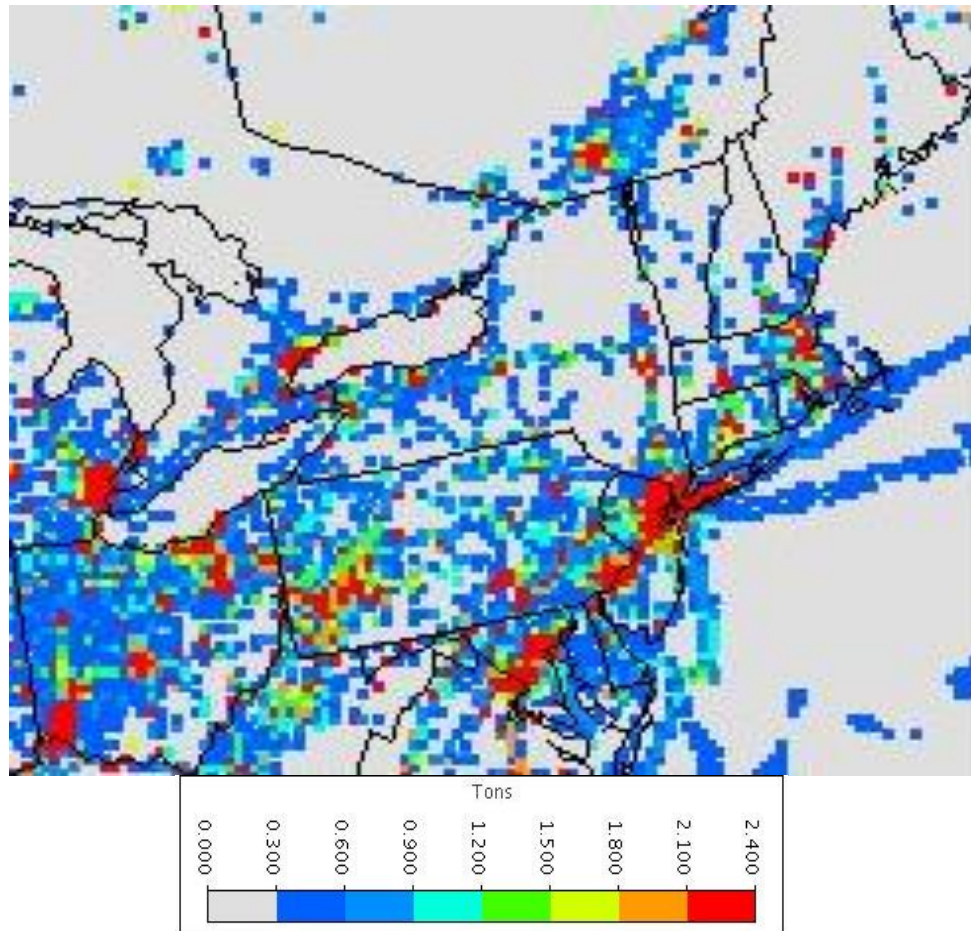


General emission patterns match observed satellite data

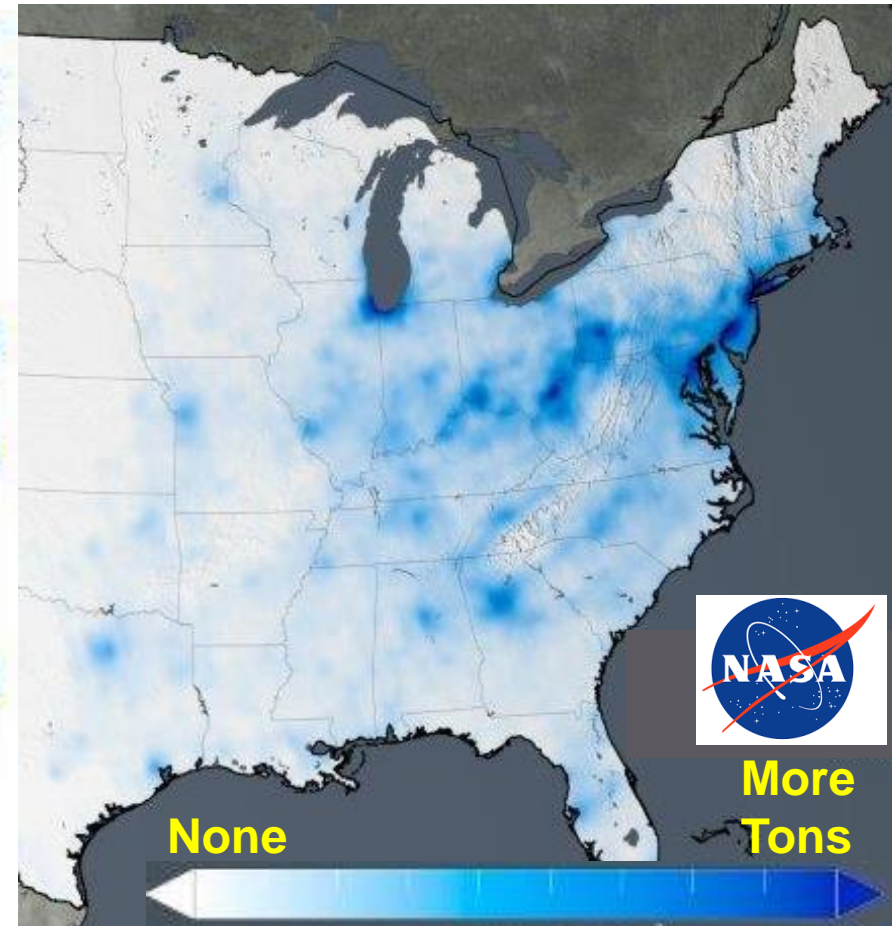


# Emission Inventory vs. NASA Satellite

2011 NO<sub>x</sub> Emissions



NO<sub>2</sub> Reduction (2005 to 2014)



# Modeling Planning

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2011 Base Case – Beta Emissions

2017 Base Case – Beta Emissions

2028 Base Case – Alpha2 Emissions

Sensitivity Modeling

- 2011 Base Case Contribution
- 2011 Base Case 4km Nested Grid
- 2018 Episodic Scenarios



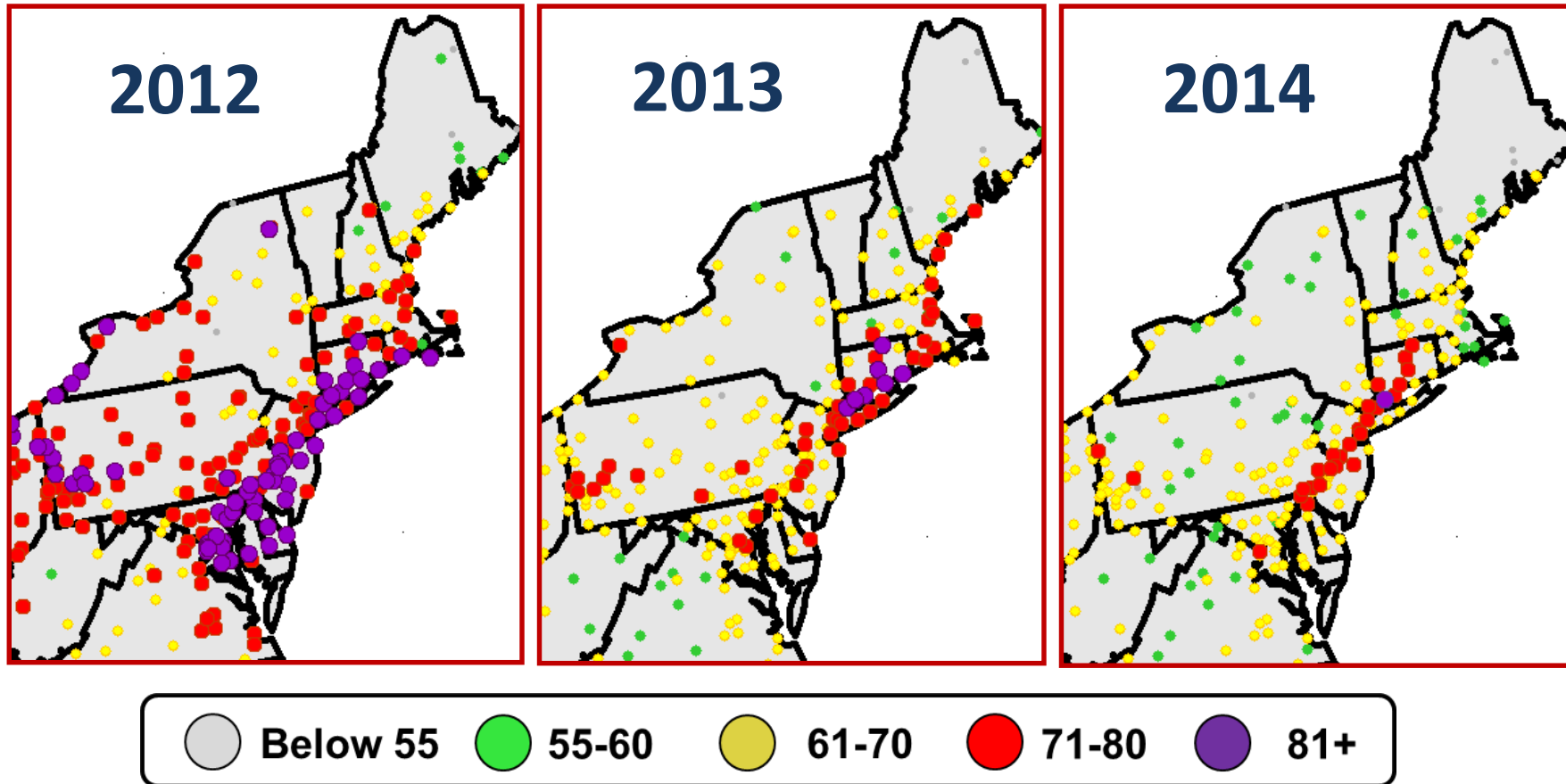
# Health Benefits



# Rollback Overview

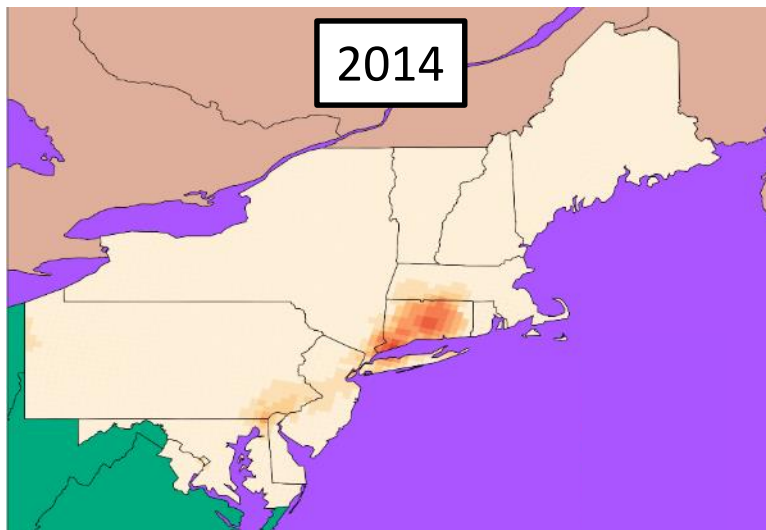
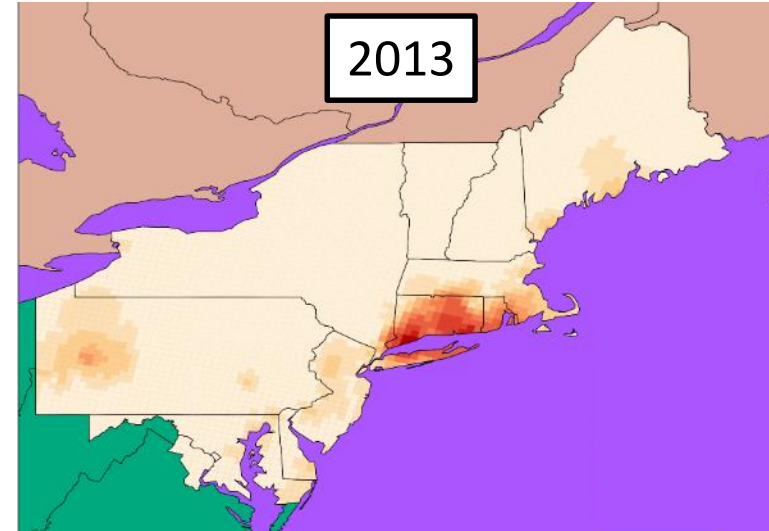
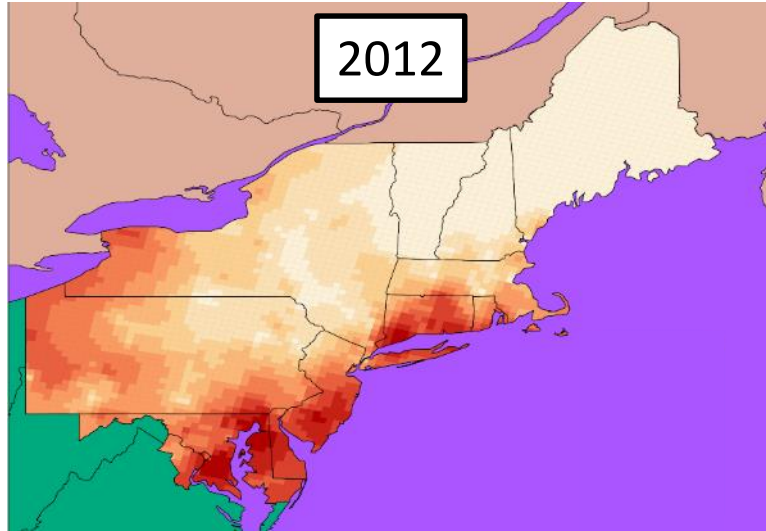
- Data from 2012-14 hourly monitored Ozone data
- “Rolled back” the monitor data
  - Monitors with a 4th high >70ppb had ozone reduced through “peak shaving” to meet the NAAQS
- Employed health functions and economic valuations that are used by EPA in RIAs
- 2012-14 population projected from 2010 Census
- Conservative Estimate
  - Analysis does not consider
    - Downwind benefits from upwind controls
    - Benefit of over control on borderline monitors
    - Mortality from long-term Ozone exposure

# 4<sup>TH</sup> High 8-hour Ozone

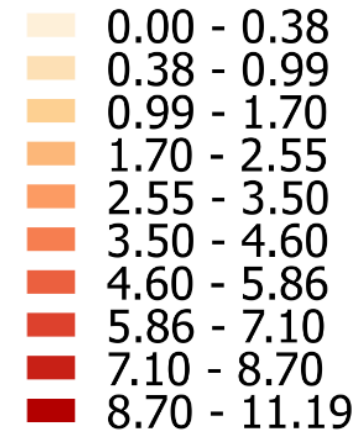


# Changes in O<sub>3</sub> Concentration after Rollback

Average ppb change in max 8hr ozone



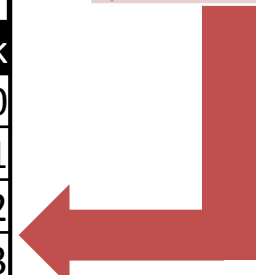
## Legend



# Costs of Ozone Mortality from 2012-14

	Reduced Incidence/Economic Benefit (95% CI)		
	2012	2013	2014
Mortality, All Causes (all ages)	920 (460-1,400)	190 (97-290)	100 (50-150)
	\$7,900 (\$990-\$14,000)	\$1,400 (\$200-\$2,800)	\$800 (\$100-\$1,510)

Ranked 2016 OTR+VA Mortality Causes		
Endpoint	Deaths	Rank
Hepatitis C	1266	40
Low Birth Weight	1077	41
Skin Disease	995	42
Multiple Sclerosis	798	43
Asthma	728	44
Cervical Cancer	722	45



**Note 1: Mortality that results from ozone exposure could be labeled in data as from asthma, COPD, etc.**  
**Note 2: OTC BenMap results only include VA in OTR**

# Questions

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- Committee Chair:
  - Jeff Underhill (NH)  
[jeffrey.underhill@des.nh.gov](mailto:jeffrey.underhill@des.nh.gov) (603) 271-1102
- Modeling Lead:
  - Mike Ku (NY)  
[michael.ku@dec.ny.gov](mailto:michael.ku@dec.ny.gov) (518) 402-8402
- Emissions Inventory Lead:
  - Julie McDill (MARAMA)  
[jmcdill@marama.org](mailto:jmcdill@marama.org) (443) 901-1882
- OTC Committee Lead:
  - Joseph Jakuta  
[jjakuta@otcair.org](mailto:jjakuta@otcair.org) (202) 508-3839



# Extra Slides