

# Western Impacts from proposed changes to the Ozone National Ambient Air Quality Standards

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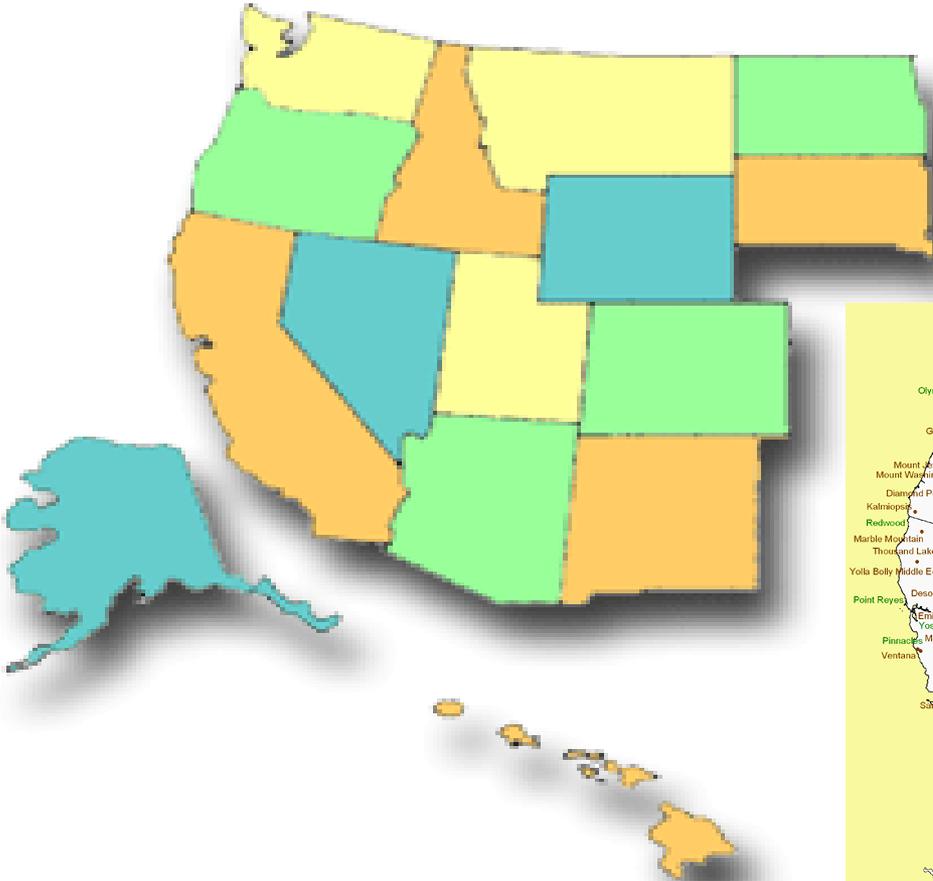
# Regional Organizations

- WESTAR = Western States Air Resources Council
  - 15 western states
  - Led by state air agencies, ex-officio membership includes Federal Land Managers, also open to local air agencies and tribes, EPA active participant
  - Incorporated non-profit, offices in Seattle, Portland, and Fort Collins
  - [www.westar.org](http://www.westar.org)
- Purposes:
  - Exchange information related to air pollution control;
  - Develop processes and procedures to meet air quality objectives and to protect the environmental resources;
  - Discuss air quality issues and report on the status of efforts undertaken to achieve air quality objectives;
  - Establish work groups, task forces, as needed; and
  - Adopt resolutions and policy statements for implementation by Council members.

# Organizations, continued

- WRAP = Western Regional Air Partnership
  - [www.wrapair2.org](http://www.wrapair2.org)
  - Same 15-state region as WESTAR
  - Virtual organization, not incorporated
  - 60+ member agencies include 15 state air agencies, NPS, FWS, BLM, USFS, EPA, and interested tribes and local air agencies/districts in the WRAP region
  - Board has State and Tribal co-chairs, with representatives across states, tribes, federal, and local agencies.
  - Formed in 1997 to implement Grand Canyon Visibility Transport Commission recommendations
    - Led Regional Haze planning effort 1997-2009 for the West
    - 75 % of Class I areas in the WRAP region

# WESTAR / WRAP geographic region



# WRAP

- Regional technical center
  - Supports and coordinates Regional Analysis and Planning
- Develop and facilitate use of western air quality data
  - Interconnected series of regional technical projects
  - Management of ongoing emissions and modeling studies
    - Reviewed / coordinated with federal agencies, states, locals, tribes
    - External review by, and outreach to, industry and environmental groups
- Staff work for WESTAR - report to WRAP and WESTAR Boards, and WESTAR Executive Director

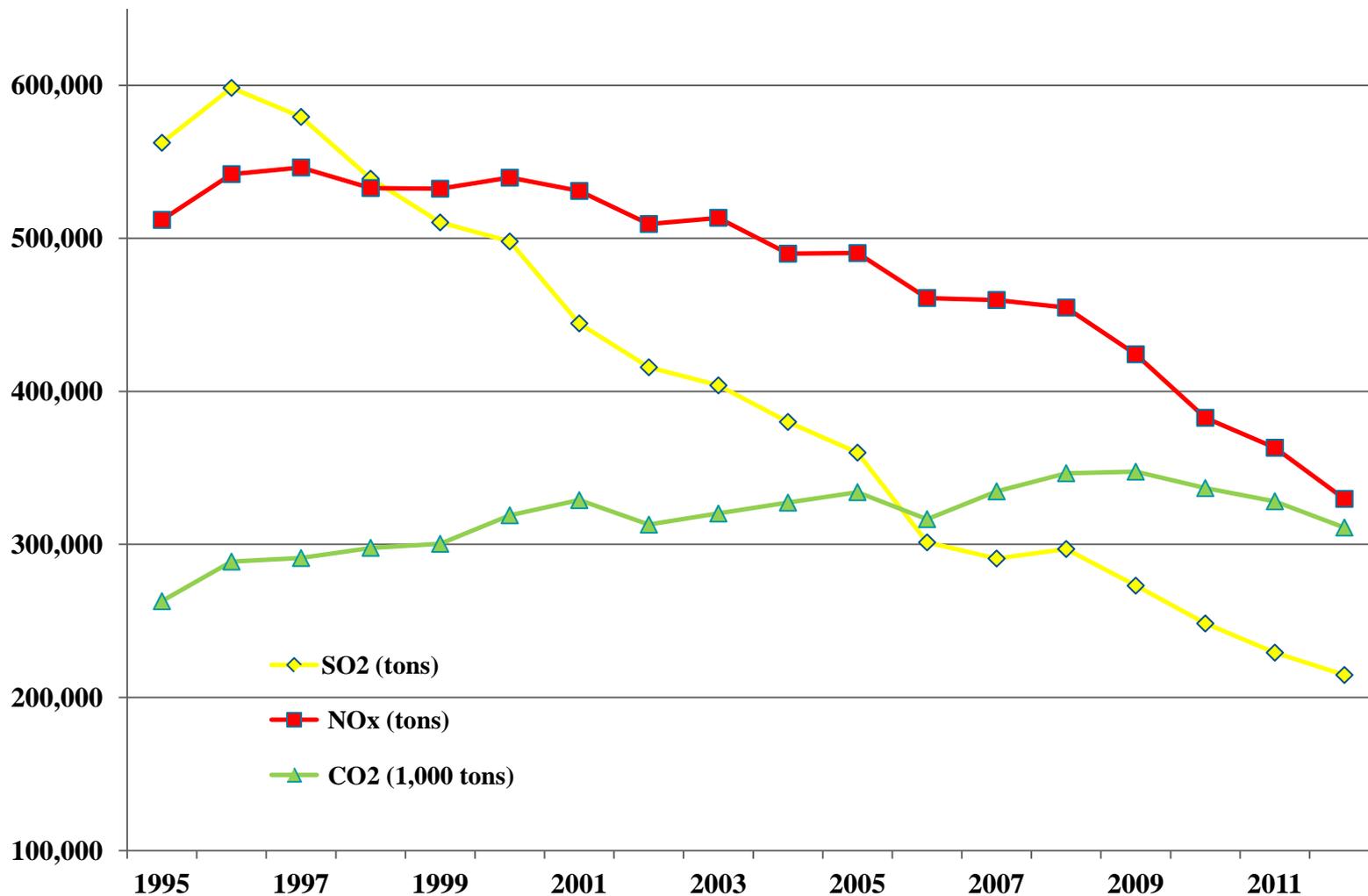


# Western Air Pollution Sources

## Western ozone and PM precursors - key emissions sources

- Power plants decreasing markedly
- Mobile sources controlled and emission rates decreasing markedly through federal rules and state testing programs
- Fire activity and effects are huge, receiving intensive study
  - Smoke's Contribution to Ozone ([DEASCO<sub>3</sub>](#))
  - Prescribed and Other Fire Emission Contribution to Particulate Matter ([PMDetail](#))
  - Others....
- Improved Biogenics Emissions across the West ([PDF](#))
- Oil and gas (WRAP emissions inventories)
  - Emissions Inventories for Intermountain Basins with significant production
  - Coordination for 3-State Air Quality Study
- All sources studied in comprehensive regional modeling analysis
  - 2008 base year - West-wide Jumpstart Air Quality Modeling Study ([WestJumpAQMS](#))

# Power Plant Emissions Trends – Western Interconnect





Smoke/Fire & the Ozone and PM  
NAAQS, Regional Haze Rule

**Fire**



*The Big Picture*

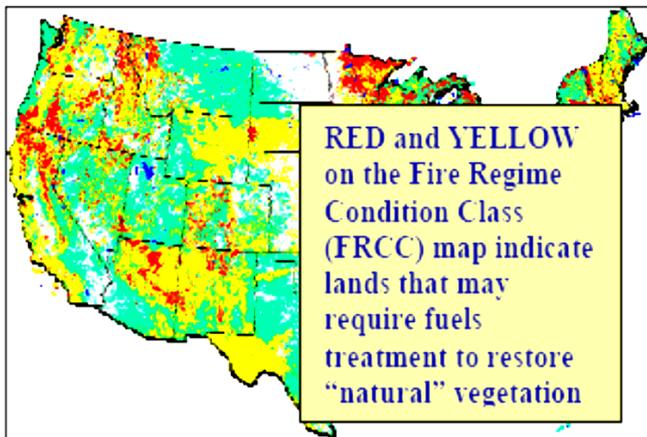
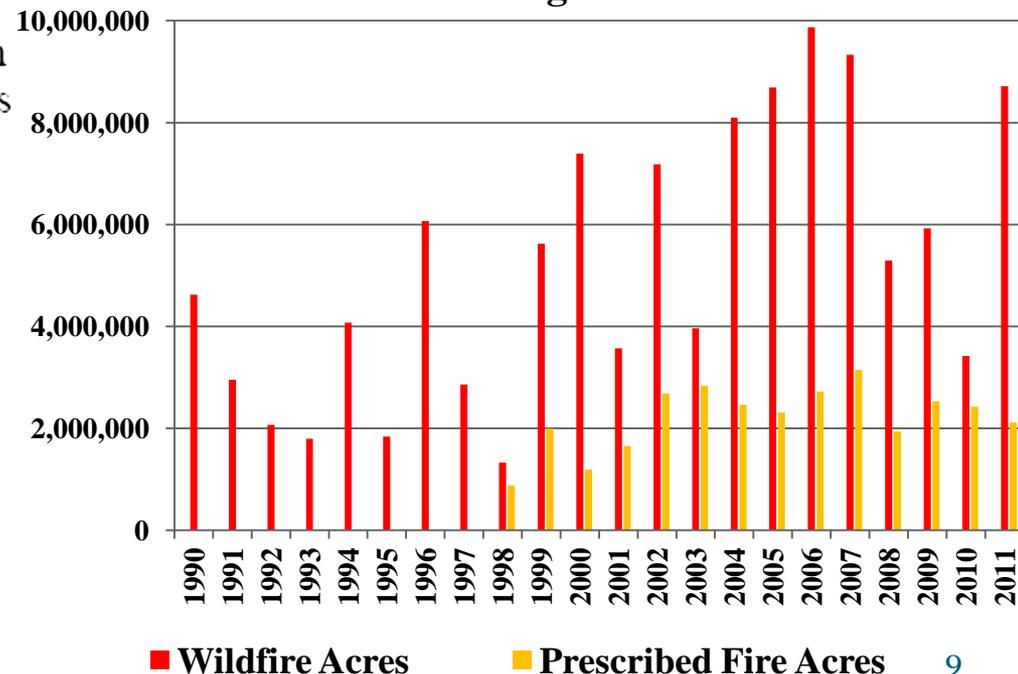
Technical Products for air  
quality planning &  
management as required by  
the Clean Air Act



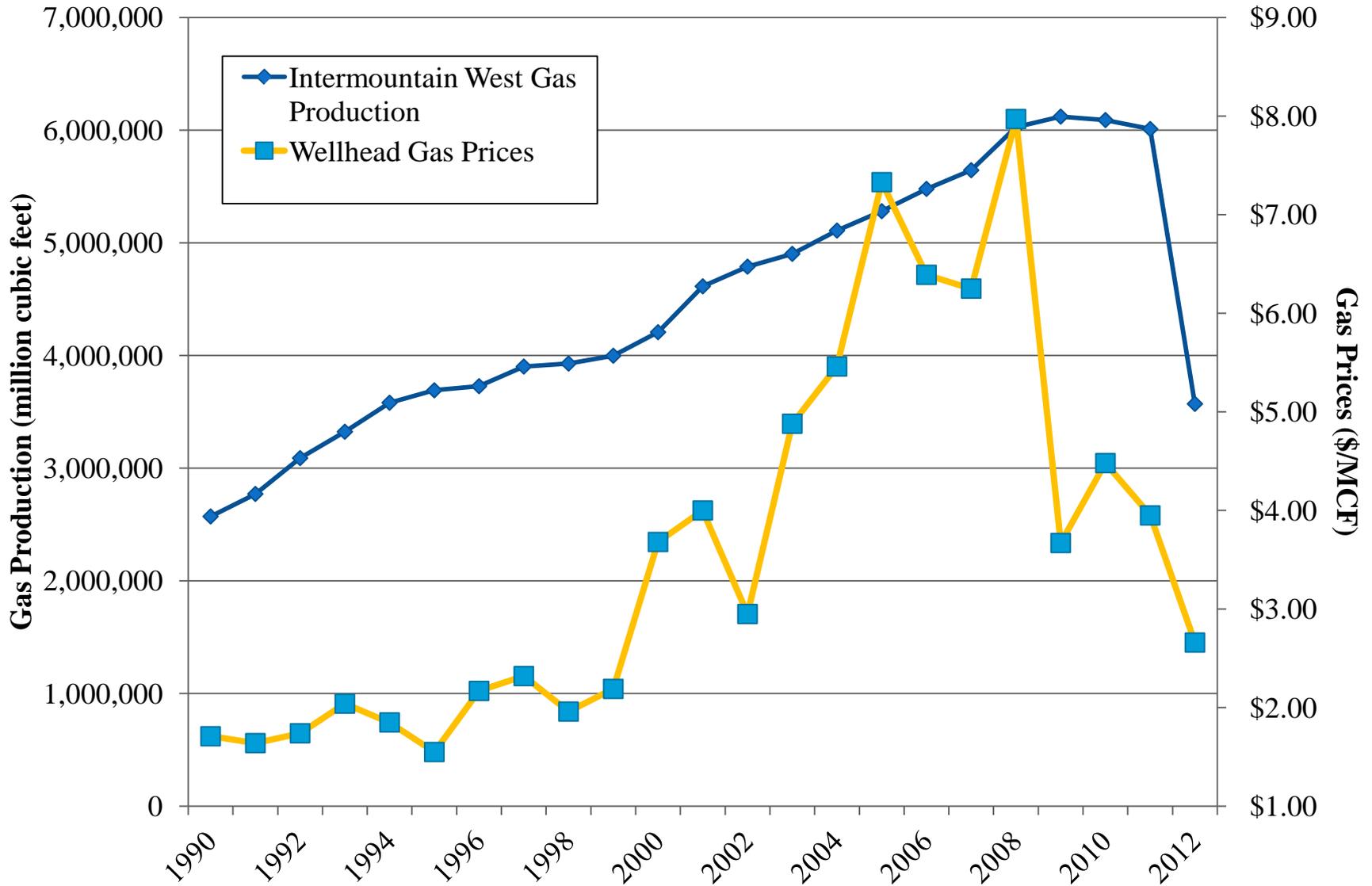
Future emissions, efforts to  
avert emissions &  
health/visibility impacts, &  
adapt to a changing/varying  
climate

The quantity of forest fuels and composition of vegetation in the wildlands of the Western U. S. motivate the land managers to increase the application of prescribed fire to the landscape (from 650,000 acres in 2002 to a projection of up to 3.6 MM acres in 2018).

**U.S. Wildfire and Prescribed Fires Acres Burned - 1990 through 2011**



## Intermountain West - Gas Production and Prices



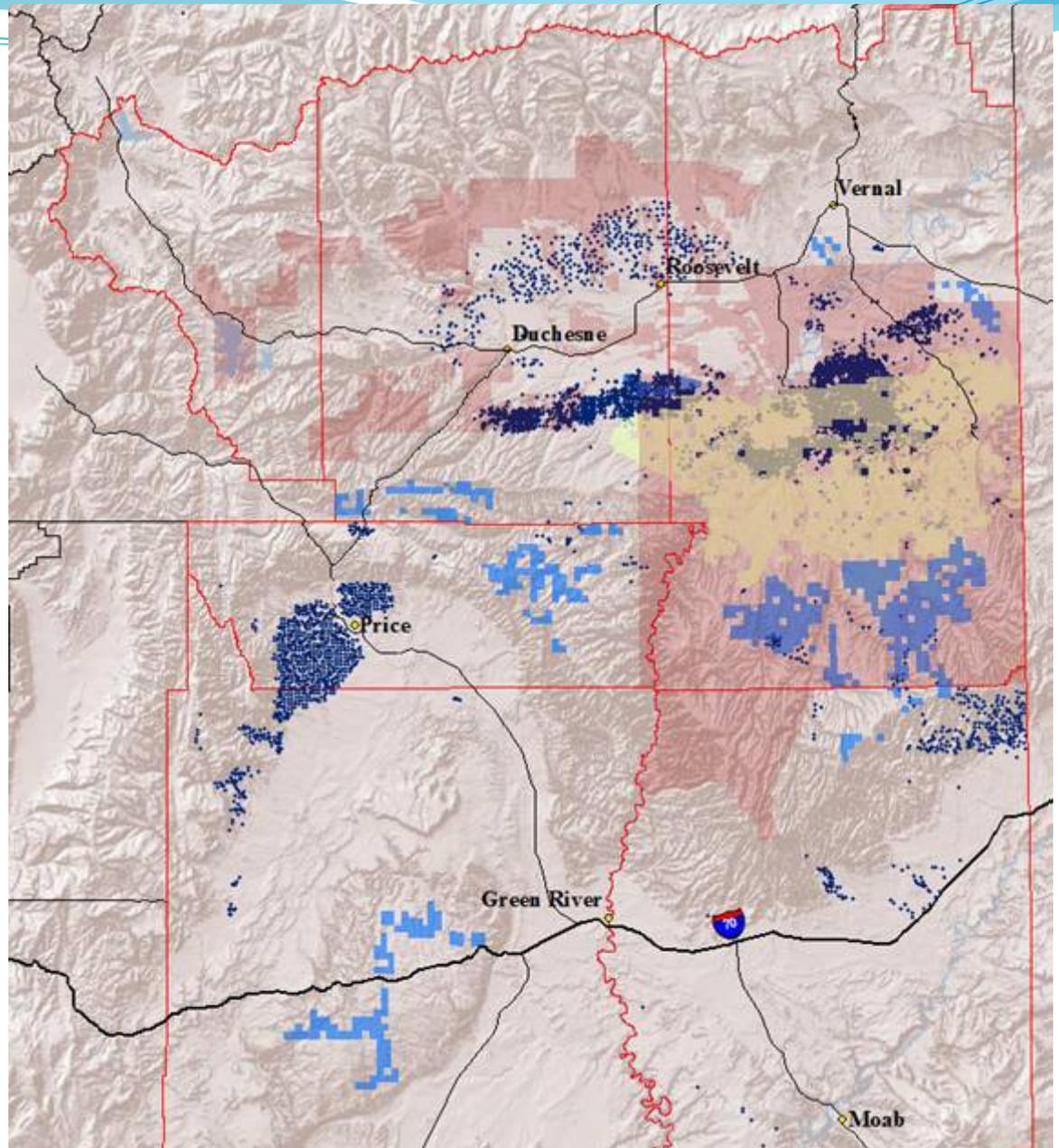
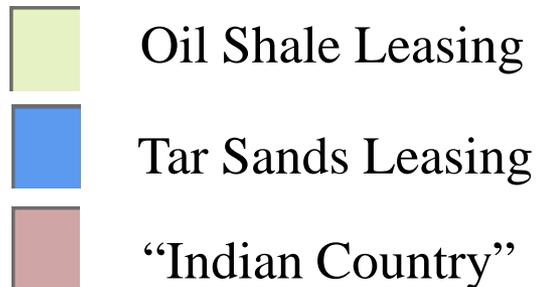
## Eastern Utah Energy Development Area

2006 Oil and Gas Production

BLM proposed leasing for oil shale development

BLM proposed leasing for tar sands development

“Indian Country” –  
Regulatory authority controlled by the Tribes and EPA

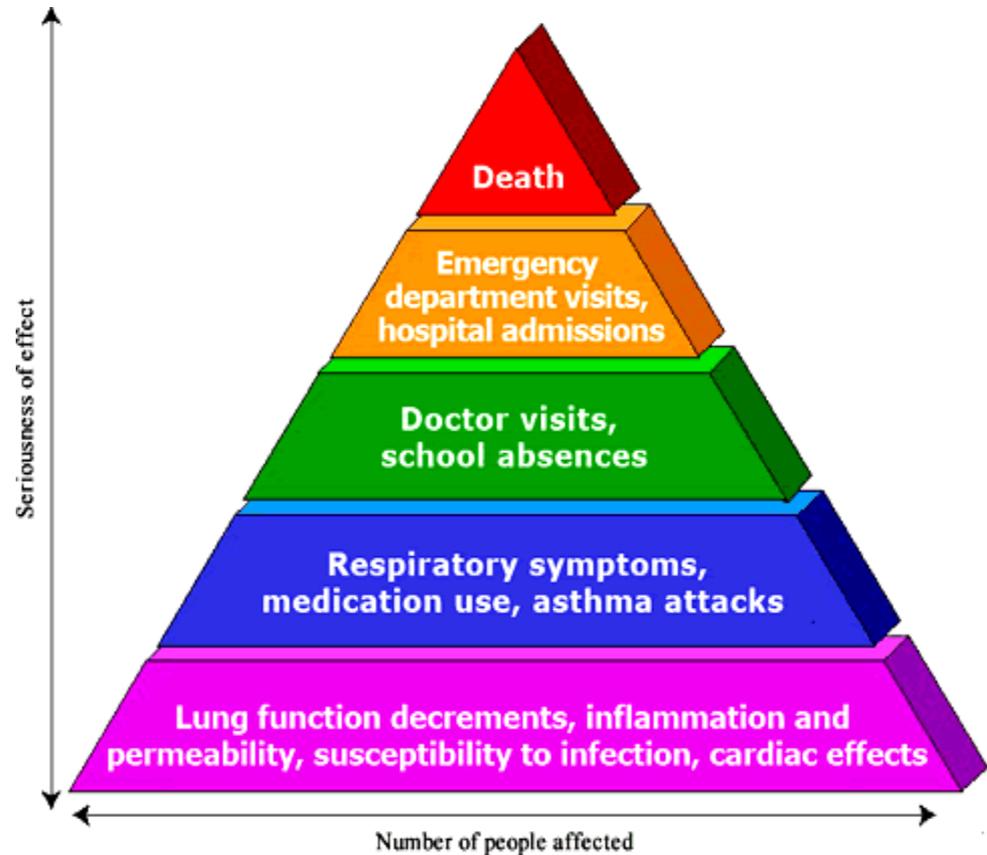




# Ozone National Ambient Air Quality Standard (NAAQS)

# Ozone

- Ozone is an air pollutant of concern, regulated under the Clean Air Act
- High ozone at ground level is unhealthy, especially affecting those with asthma and other upper respiratory illnesses
- At-risk groups include children, the elderly, and those who work or exercise outdoors



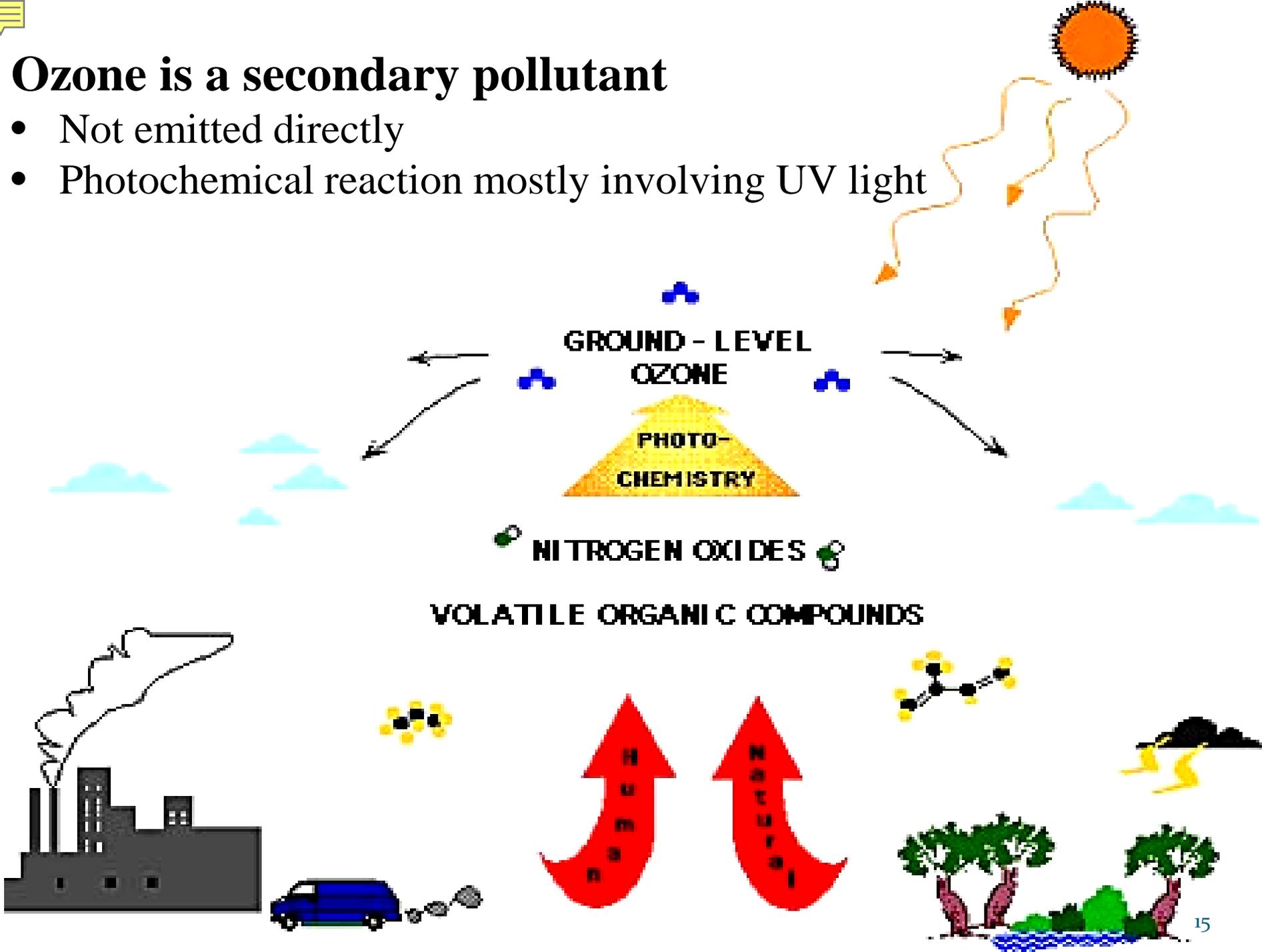
# How Does Ozone Affect the Environment?

- Ground-level ozone damages vegetation and ecosystems
- Crop damage in the United States alone is estimated at \$500 million
- Also damages foliage of trees and other plants

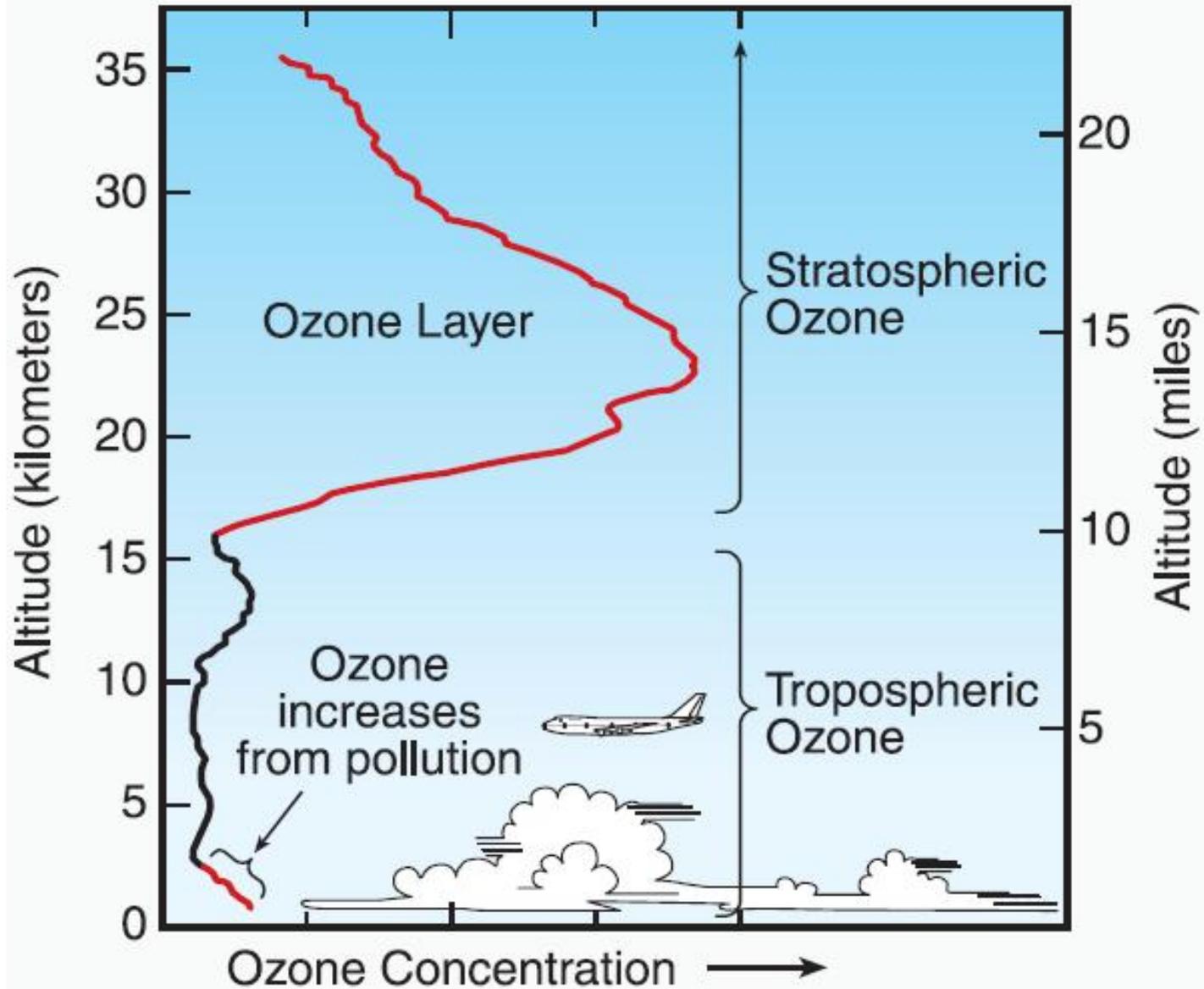


# Ozone is a secondary pollutant

- Not emitted directly
- Photochemical reaction mostly involving UV light



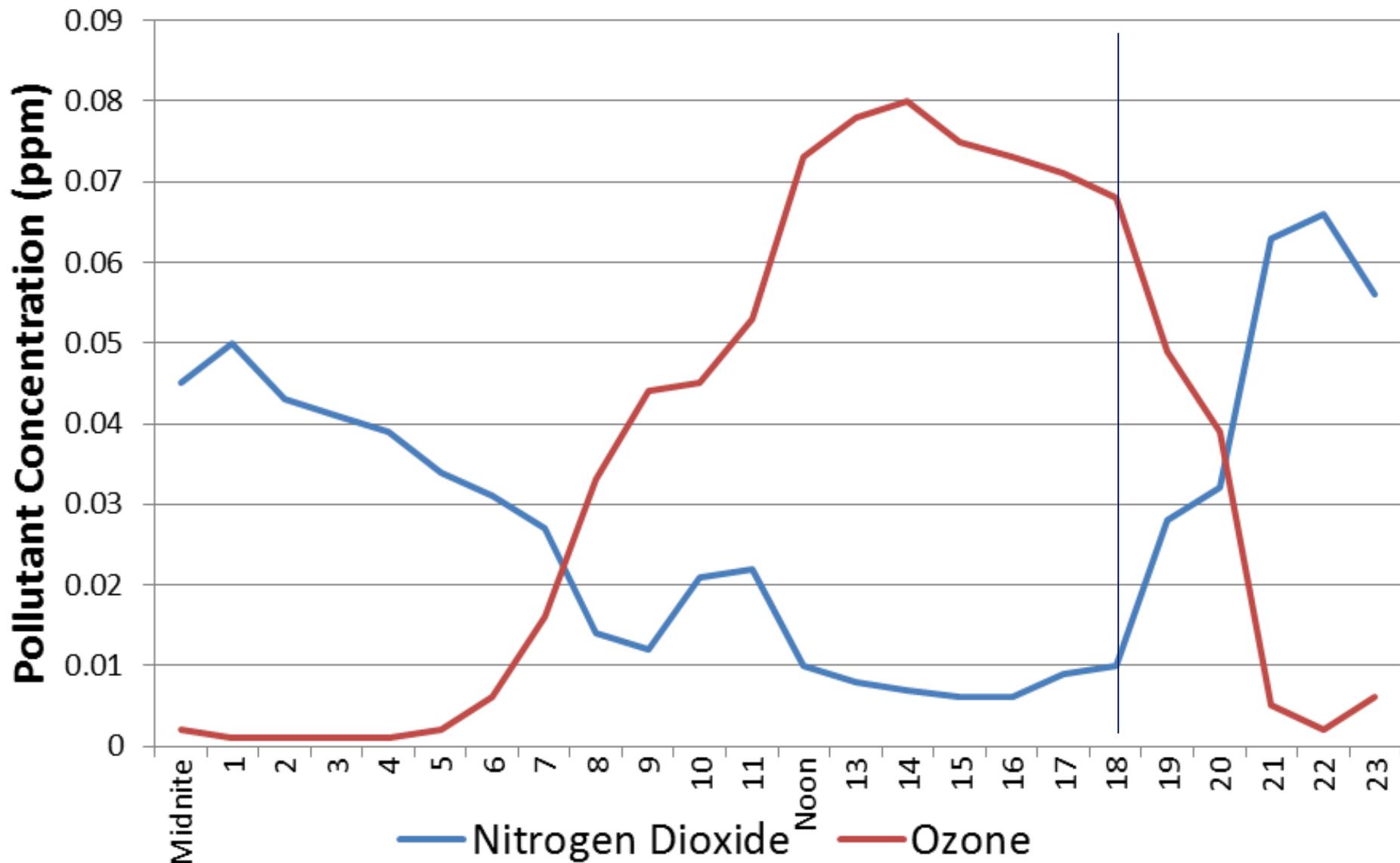
# Ozone in the Atmosphere



# Complex Photochemistry near the ground

- Not a simple path to forming ozone
- NO<sub>x</sub> in the atmosphere
  - Older, aged NO<sub>x</sub> emissions drive ozone formation
  - Fresh NO<sub>x</sub> attacks existing ozone
  - Reduces ozone downwind of high traffic areas and smokestacks
  - Increases ozone as NO<sub>x</sub> plume ages and mixes away from source
- NO<sub>x</sub> and ozone peak at different times of day

# Typical Hourly Profile for Ozone and NO<sub>2</sub> Concentrations at an Urban Site



Data for the Central Phoenix monitoring site, June 5, 2014



# Evolution of EPA National Ozone Standard 1971-2008

Year	Primary/ Secondary	Indicator	Averaging Time	Level (ppm)	Form
1971	Same	Total photo-chemical oxidants	1-hour	0.08	Not to be exceeded more than one hour per year
1979	Same	Ozone	1-hour	0.12	Effectively, no more than 3 exceedance days over a 3-year period
1997	Same	Ozone	8-hour	0.08	Annual fourth-highest daily max 8-hr concentration, averaged over 3 years
2008	Same	Ozone	8-hour	0.075	Annual fourth-highest daily max 8-hr concentration, averaged over 3 years



# Future EPA National Ozone Standard

- Court-ordered deadlines
  - EPA (re)considering revised Ozone health standard in a range of 60 to 70 ppb
  - EPA also considering a secondary Ozone standard for ecosystem protection
    - Growing season / daylight hours-weighted cumulative metric



# Compliance with EPA National Ozone Standard

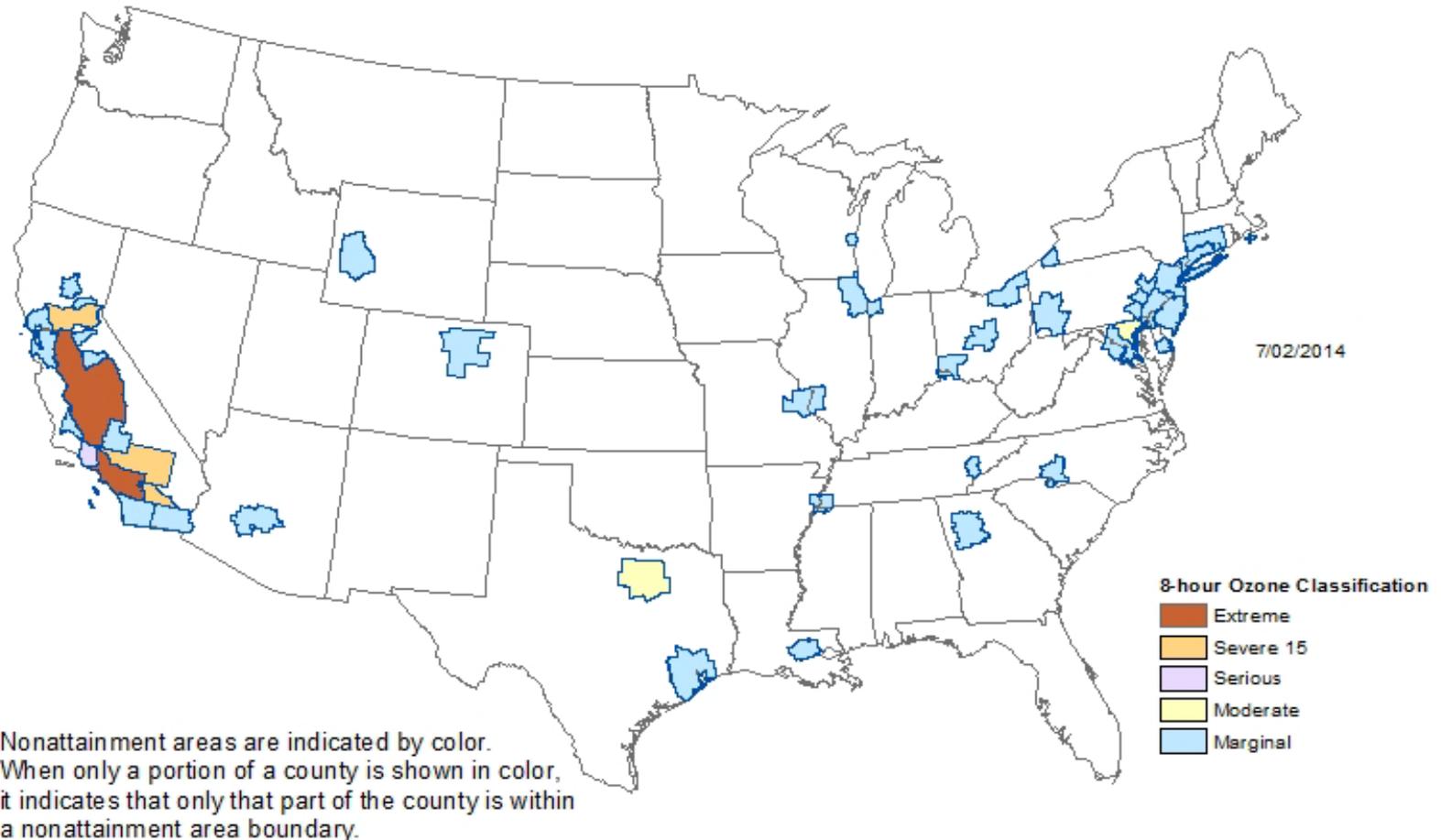
- Measured at ground station sites, highest 8-hour average each day
  - 4<sup>th</sup> highest values each year are averaged over 3-year periods to determine compliance (e.g., 2009-11, 2010-12, 2011-13)
  - Statistic is called a “Design Value” for that site for that time period
  - 3-year average of the 4<sup>th</sup> highest measured values is used to prevent flip-flopping in and out of attainment



# Ozone air quality

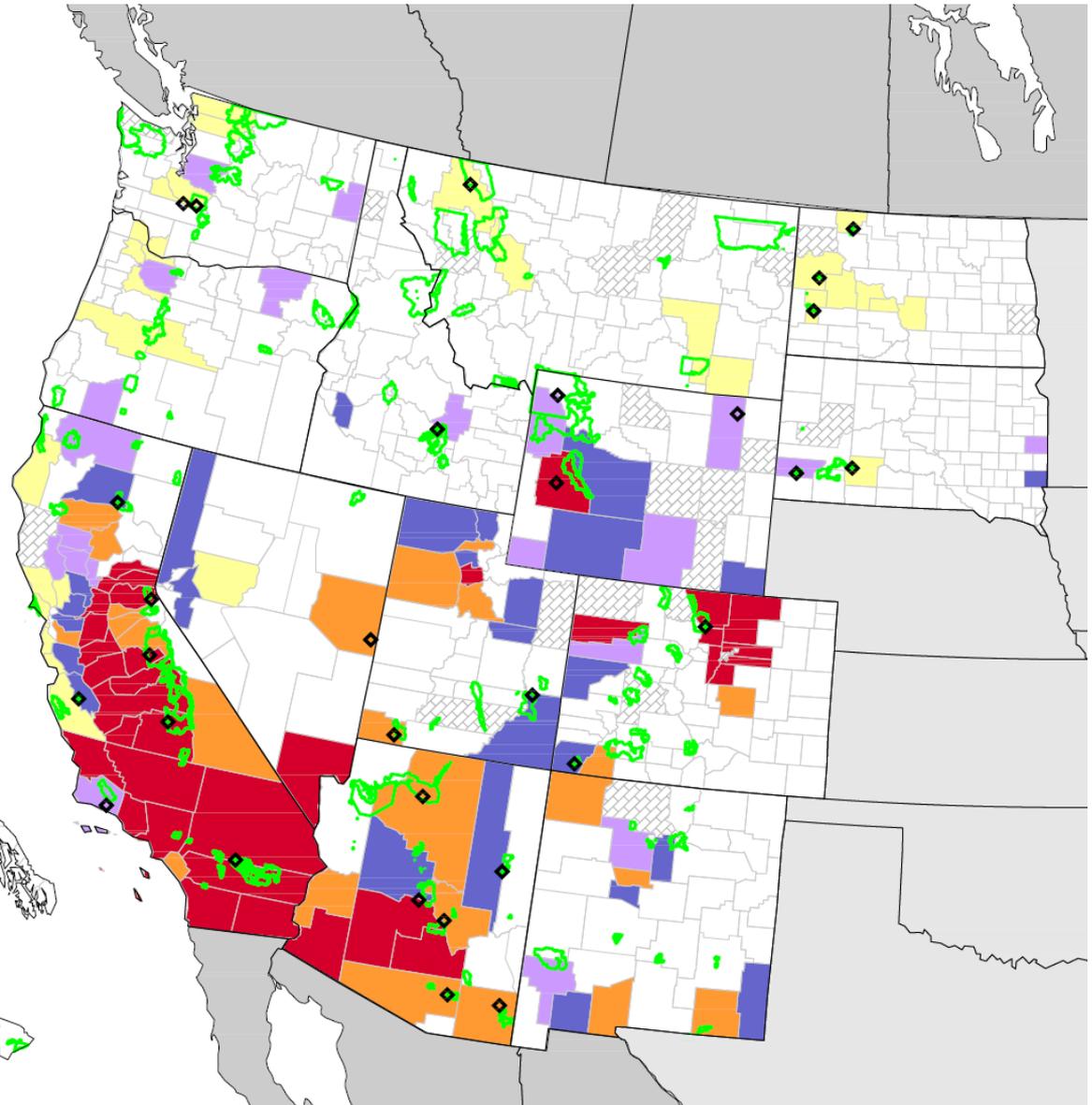
# Counties with Monitors Violating Primary 8-Hour Ground-Level Ozone Standard (0.075 ppb)

(Based on 2011-2013 Air Quality Data)

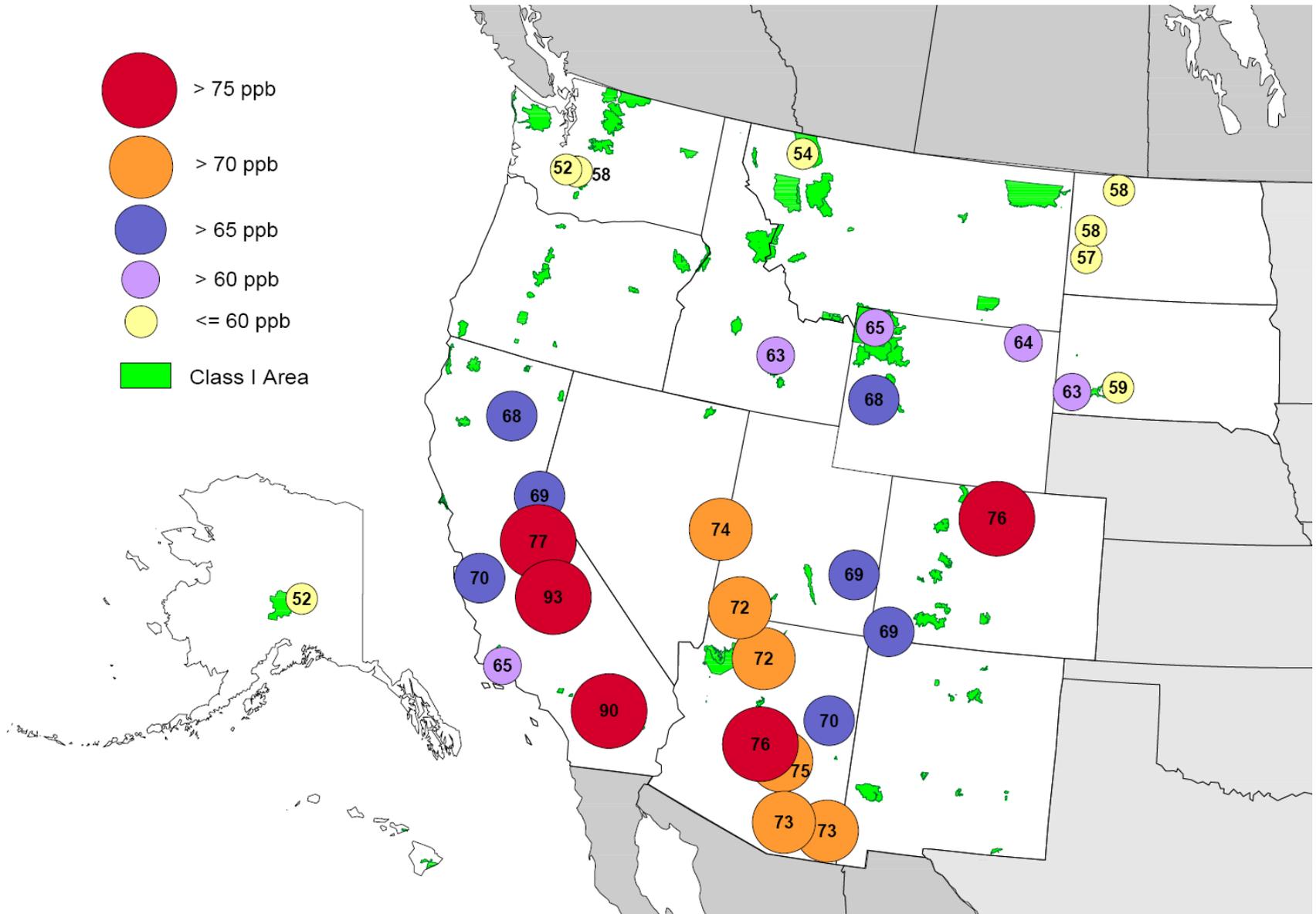


# 3-year Average 4<sup>th</sup> Highest 8-Hour Ozone value by County 2011-2013

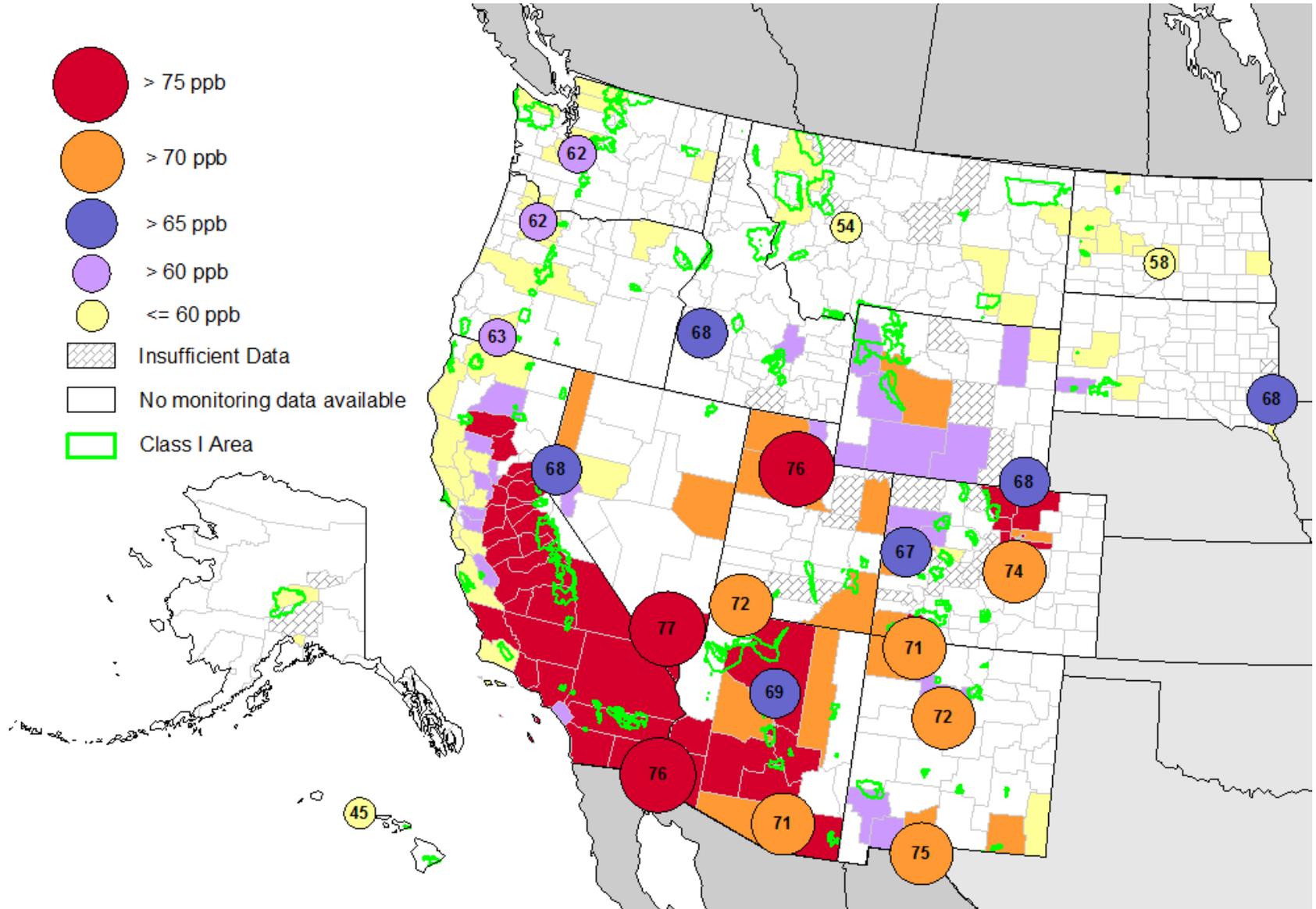
- > 75 ppb
- > 70 ppb
- > 65 ppb
- > 60 ppb
- ≤ 60 ppb
- Insufficient Data
- No monitoring data available
- Rural/Class I Site
- Class I Area



# 3-year Average 4<sup>th</sup> Highest 8-Hour Ozone value for Rural/Class I Sites 2011-2013



# 3-year Average 4<sup>th</sup> Highest 8-Hour Ozone Design Value for Selected Urban Counties currently in Attainment – 2011 through 2013

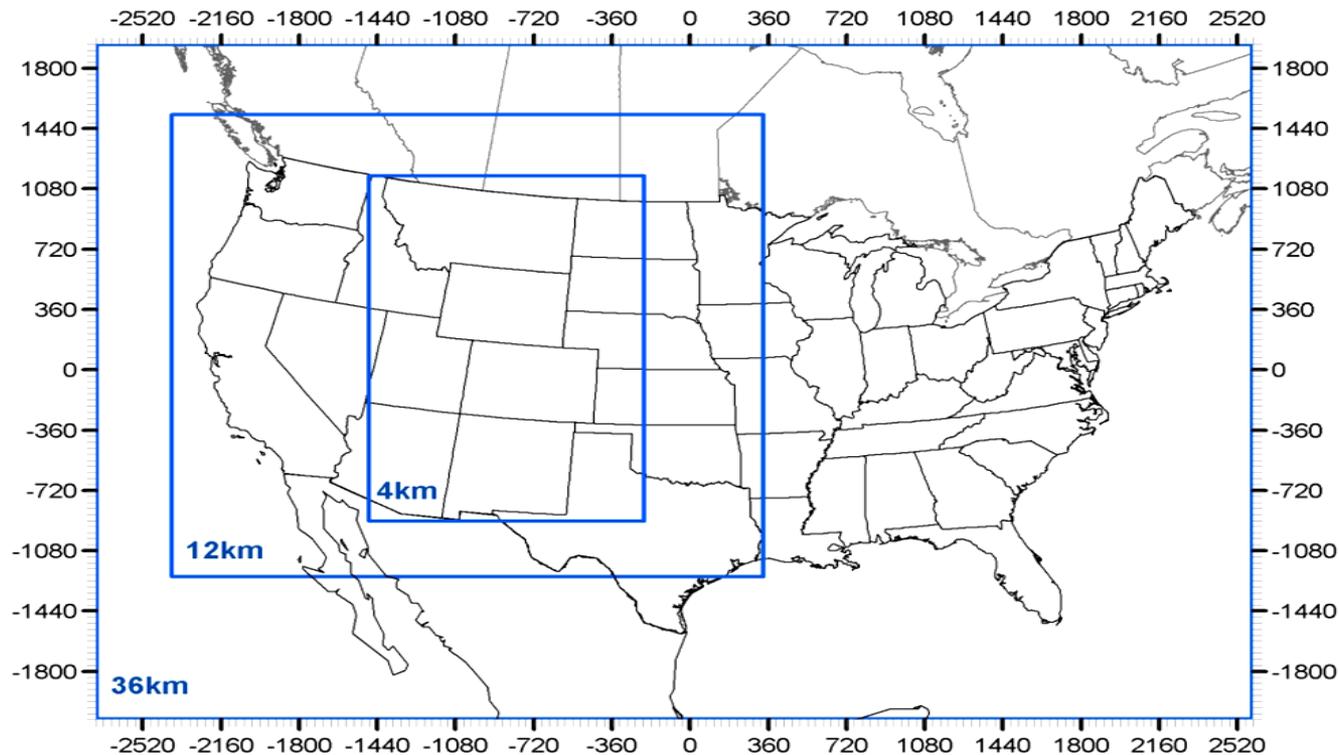


AQS Federal Reference Method data from the monitoring site in each County with the highest Ozone values

## West-Wide Jumpstart Air Quality Modeling Study

- Regional results provide data and context for state and federal planning
  - Uses most current transport and background studies
  - Meteorological and emissions modeling
    - Regionally consistent, High resolution, Comprehensive
  - Photochemical modeling
    - 2008 base case model performance evaluation with Ozone / PM source apportionment
  - Most up-to-date and complete characterization of Western U.S. air quality available
- Study completed September 2013
  - Emissions and Modeling data foundation of 3-State Data Warehouse
  - All materials at: <http://www.wrapair2.org/WestJumpAQMS.aspx>
  - Advances goal to provide a regional modeling framework

# WestJumpAQMS Area



Modeling Domain

36km: 148 x 112 (-2736, -2088) to (2592, 1944)

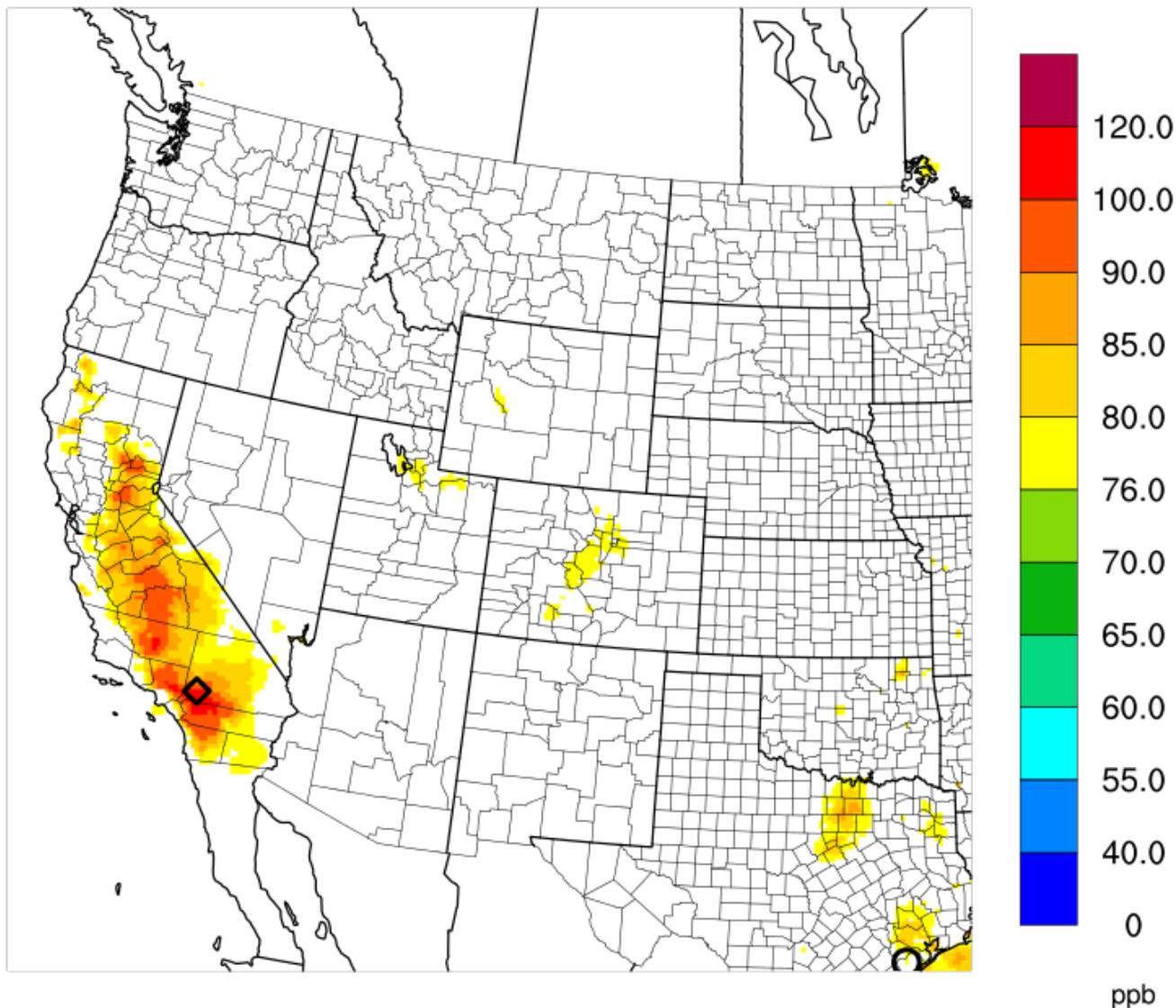
12km\*: 227 x 230 (-2388, -1236) to (336, 1542)

04km\*: 317 x 515 (-1480, -904) to (-212, 1156)

\* includes buffer cells

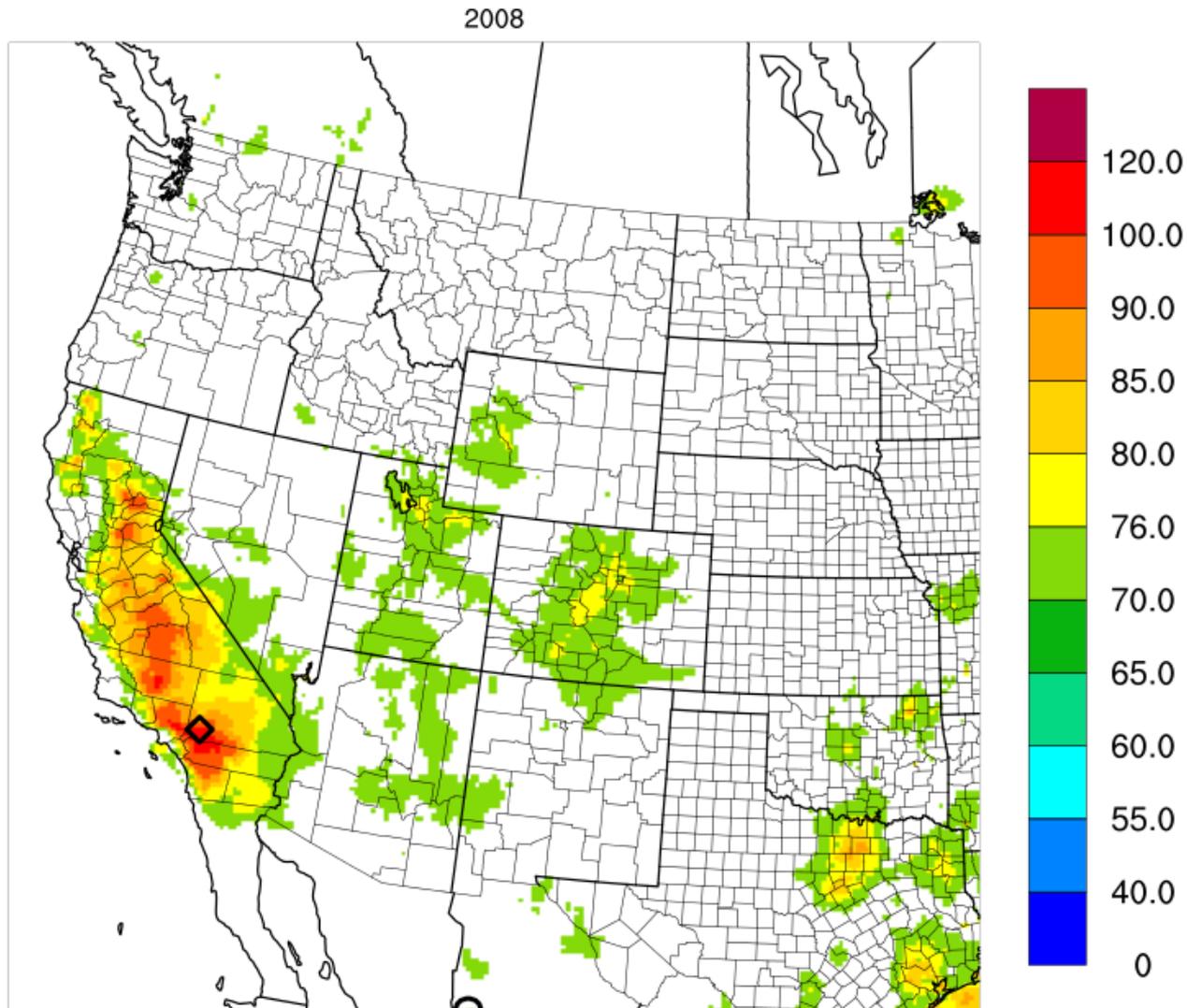
# Ozone Modeled Attainment Test Software – Unmonitored Area Analysis with Design Value (2006-2010) $\geq 76$ ppb

2008



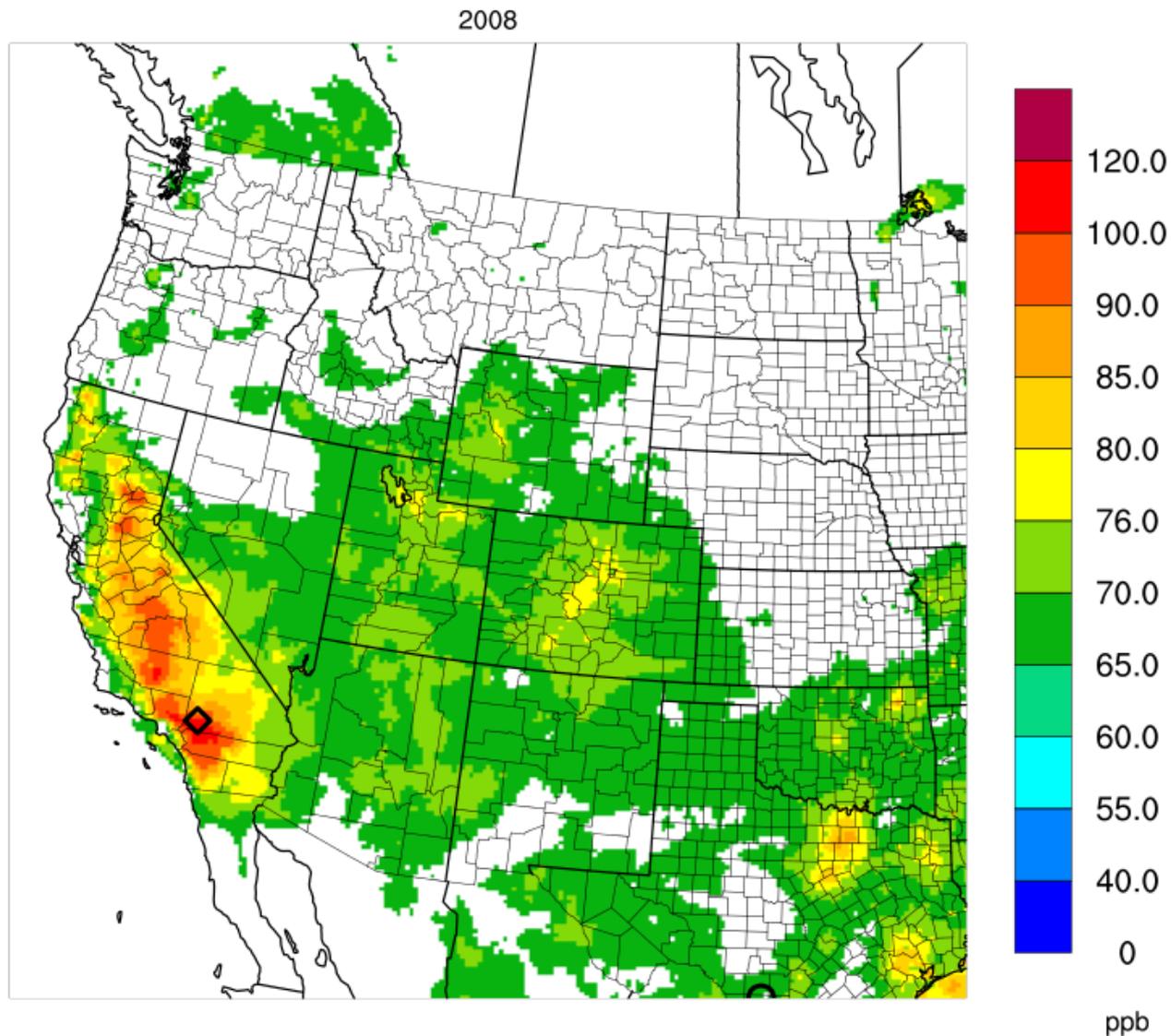
○ Min(210,3) = 76.00, ◇ Max(45,67) = 113.30

# Ozone Modeled Attainment Test Software – Unmonitored Area Analysis with Design Value (2006-2010) $\geq 70$ ppb



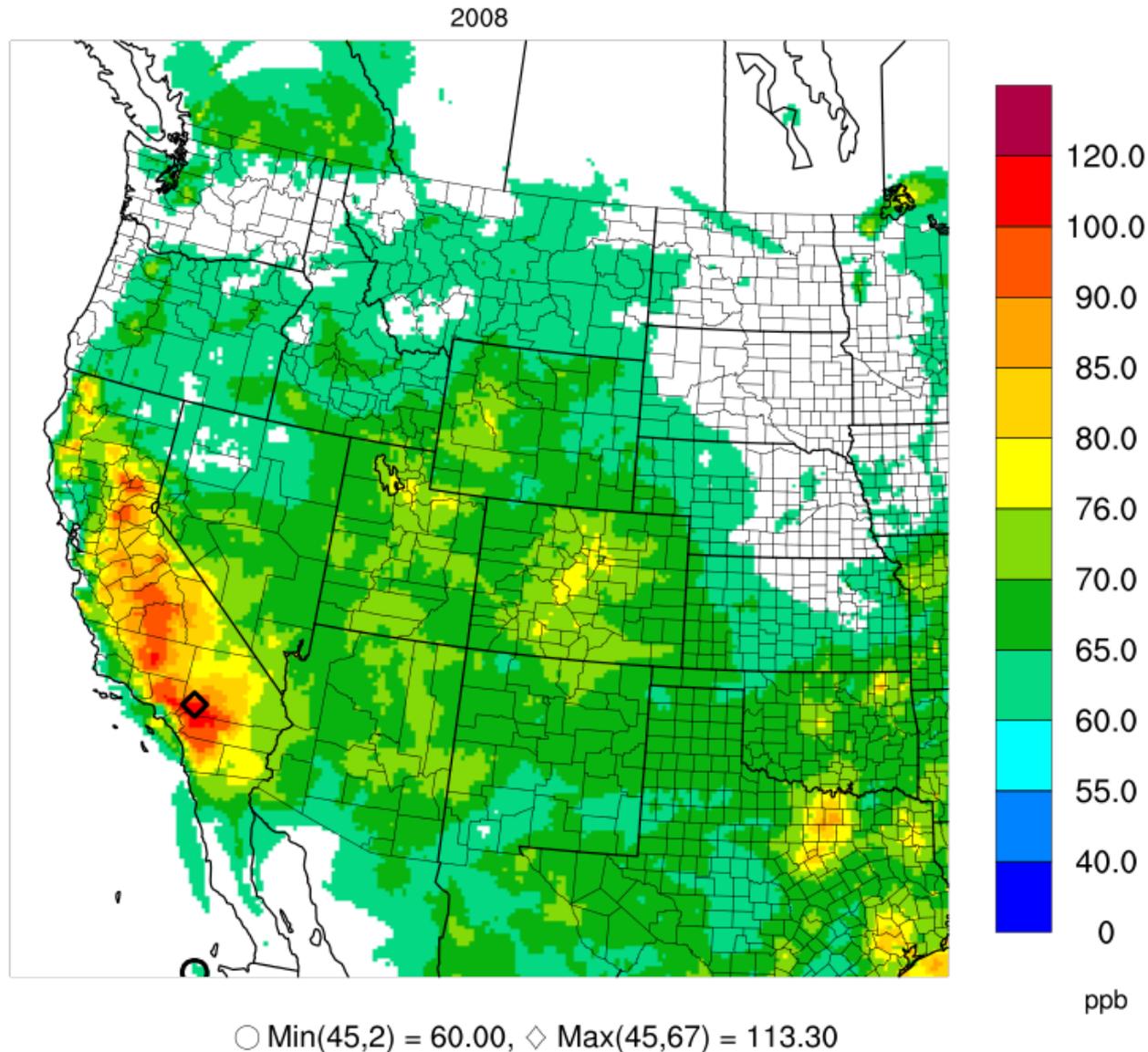
○ Min(107,1) = 70.00, ◇ Max(45,67) = 113.30

# Ozone Modeled Attainment Test Software – Unmonitored Area Analysis with Design Value (2006-2010) $\geq 65$ ppb



○ Min(177,1) = 65.00, ◇ Max(45,67) = 113.30

# Ozone Modeled Attainment Test Software – Unmonitored Area Analysis with Design Value (2006-2010) $\geq 60$ ppb



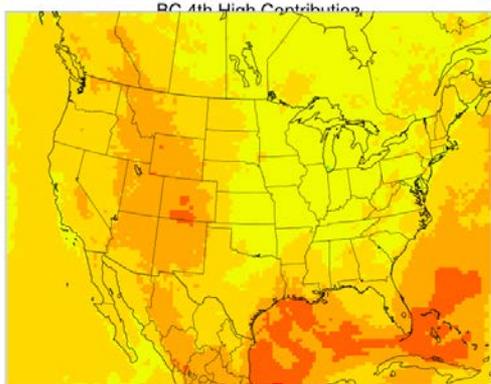
# “Other Sources” Max Contrib. 4<sup>th</sup> High DMAX8 Ozone

Boundary Conditions

Natural

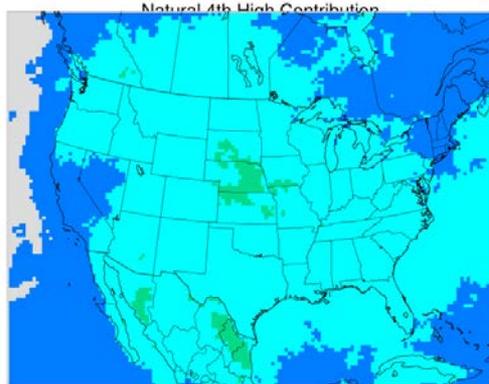
Anthropogenic

Contrib. to CAMx Daily Max 8-Hour Ozone  $\geq 0$  ppb



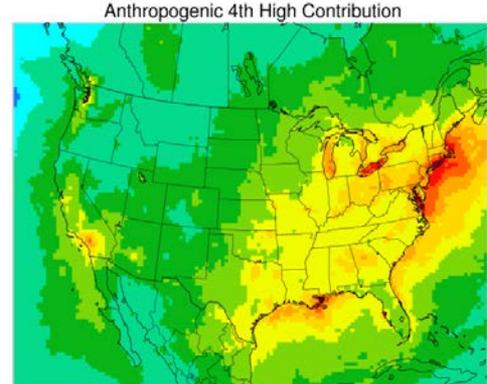
Max(82,2) = 80.37

Contrib. to CAMx Daily Max 8-Hour Ozone  $\geq 0$  ppb



Max(70,11) = 12.84

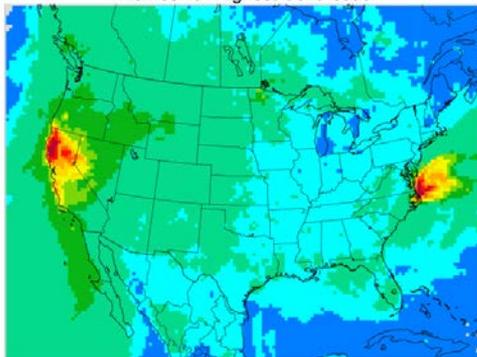
Contrib. to CAMx Daily Max 8-Hour Ozone  $\geq 0$  ppb



Max(133,70) = 110.89

Contrib. to CAMx Daily Max 8-Hour Ozone  $\geq 0$  ppb

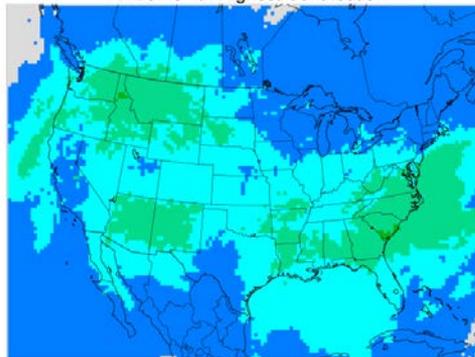
Wildfires 4th Highest Contribution



Max(129,53) = 60.13

Contrib. to CAMx Daily Max 8-Hour Ozone  $\geq 0$  ppb

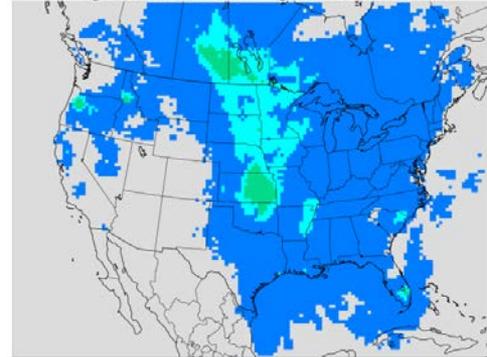
Rx Burns 4th Highest Contribution



Max(116,41) = 6.16

Contrib. to CAMx Daily Max 8-Hour Ozone  $\geq 0$  ppb

Agricultural Burns 4th Highest Contribution



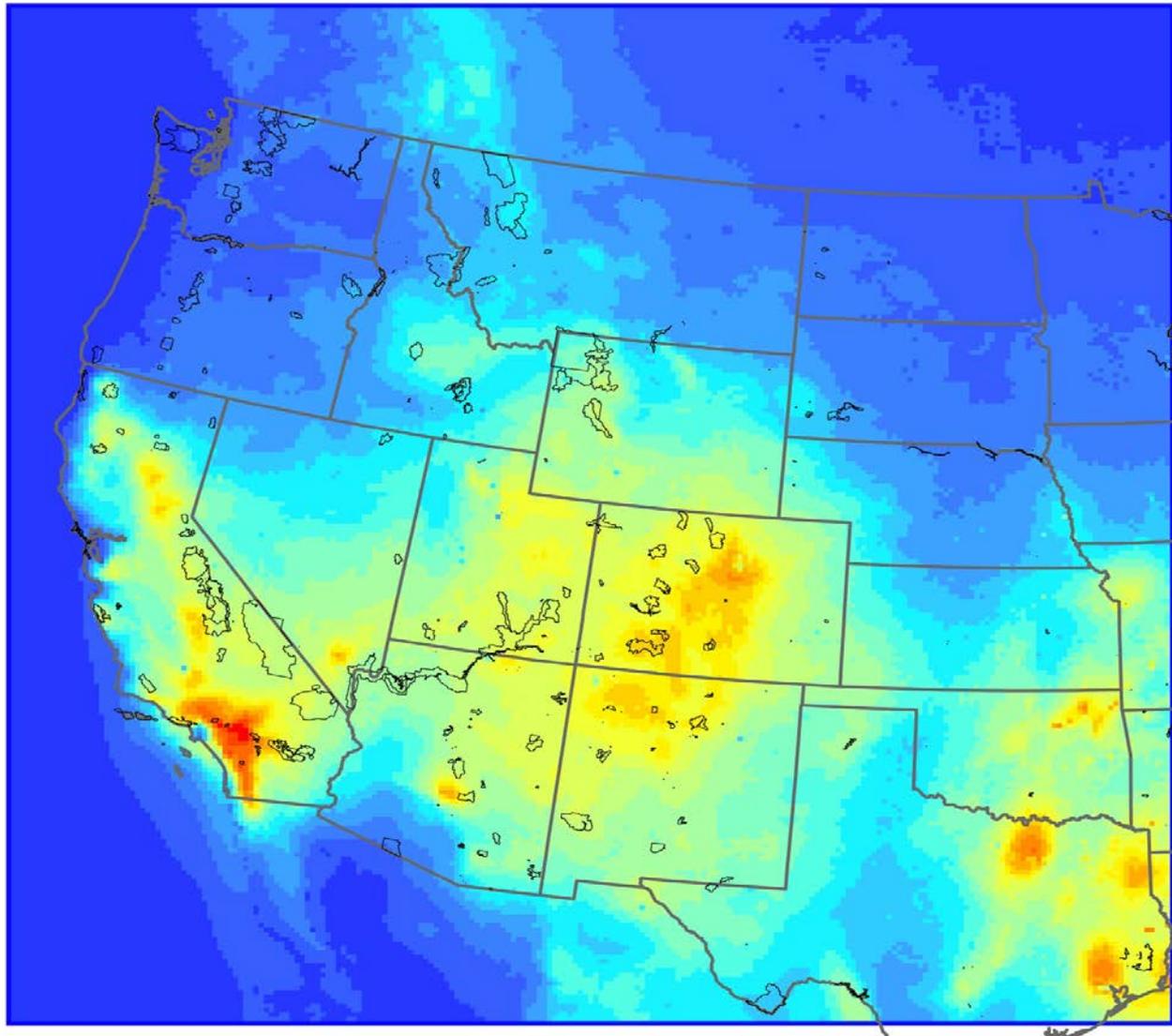
Max(79,51) = 3.15

Wildfire

Prescribed Fire

Agricultural Fire

# WestJumpAQMS Maximum Ozone Season W126



Max W126 (ppm-hrs)

BC\_w126





Thanks –

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Western Regional Air Partnership | [www.wrapair2.org](http://www.wrapair2.org)