

Western Air Quality Studies, Western Air Quality Data Warehouse, and WRAP Regional Technical Support

March 24, 2015

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WESTAR Council

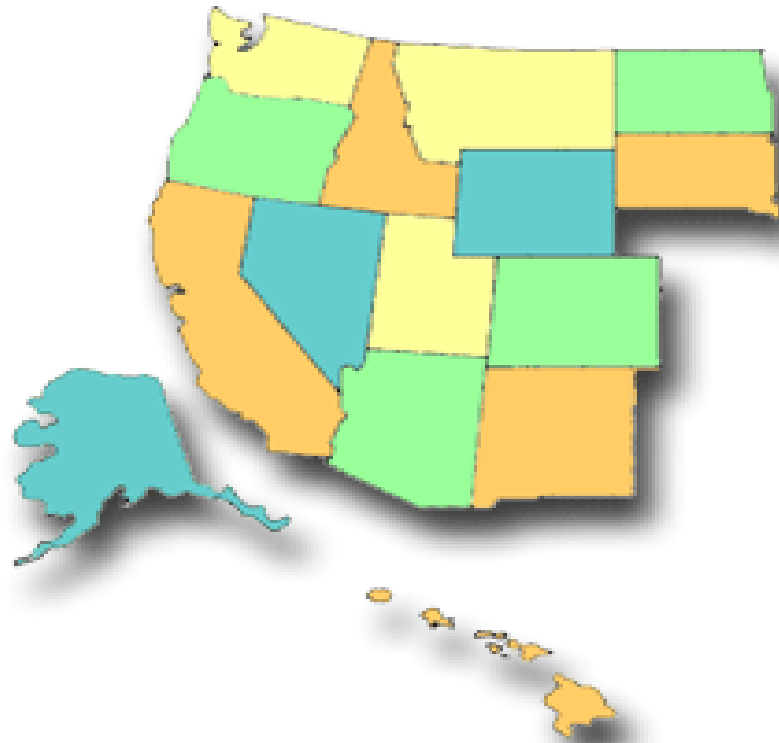
Front Range / Federal Air Quality Forum
NPS Air Resources Division
Lakewood, CO



Topics

- Overview of the WESTAR/WRAP organization
- Key issues and areas of focus
- Western Regional Studies and Projects
 - Planning Applications for Regional Analysis
 - Building the Regional Technical Center

Overview of WESTAR/WRAP



www.westar.org

www.wrapair2.org

Overview of WESTAR/WRAP (cont'd)

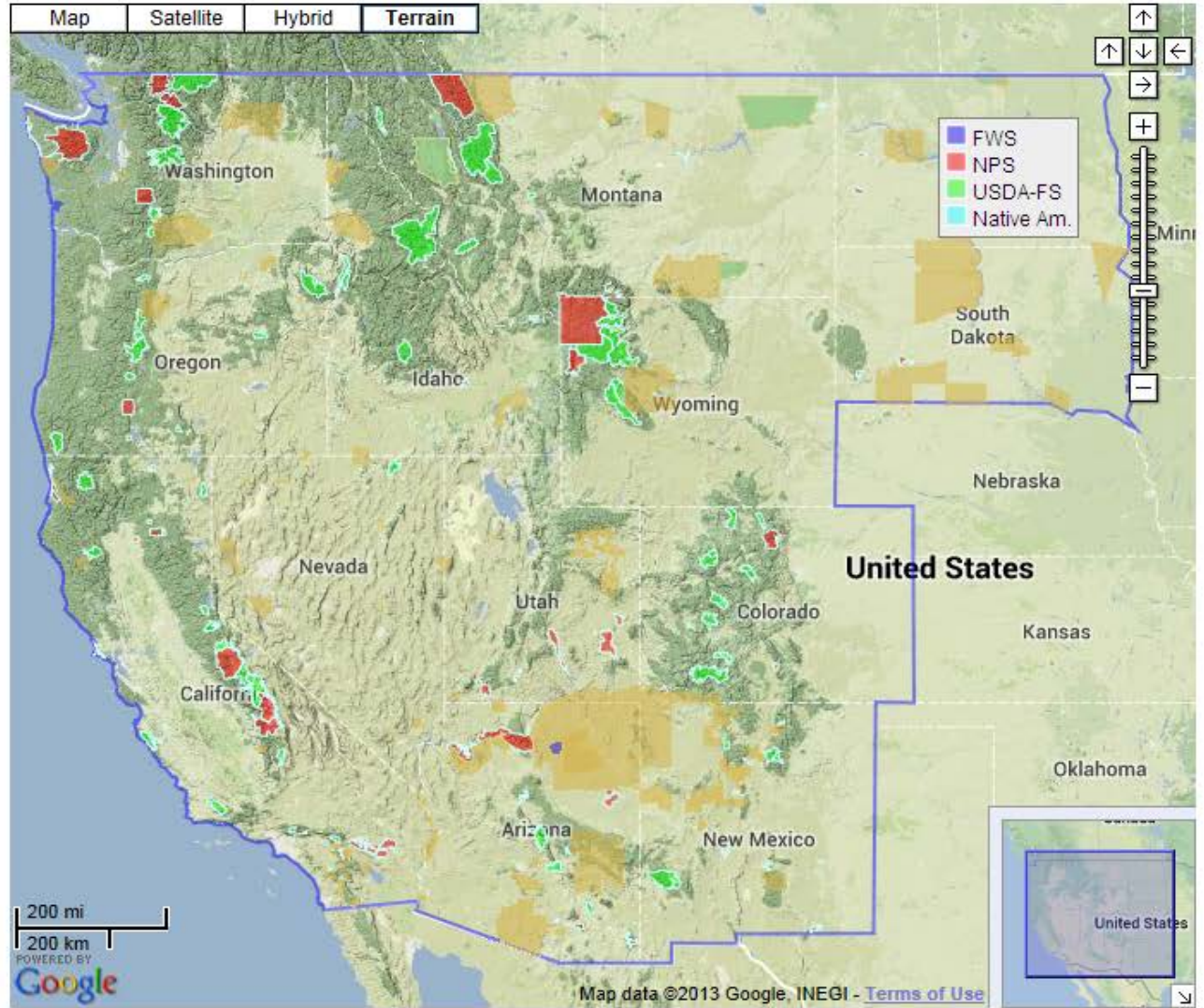
- Purpose
 - Service organization
 - Assist members in achieving their air quality management goals
- Approach
 - Training
 - Provide a forum for discussion
 - Inform policy-related discussions
 - (new) Provide technical support (esp. regional)

Overview of WESTAR/WRAP (cont'd)

WRAP = Western Regional Air Partnership

- www.wrapair2.org
- Same 15-state region as WESTAR
- Virtual organization, not incorporated
- 65 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

About WESTAR/WRAP (cont'd)



- 15 states, federal land managers and EPA, tribes, and local air districts
- Regional analyses for Western sources and air quality impacts

Key Issues and Areas of Focus

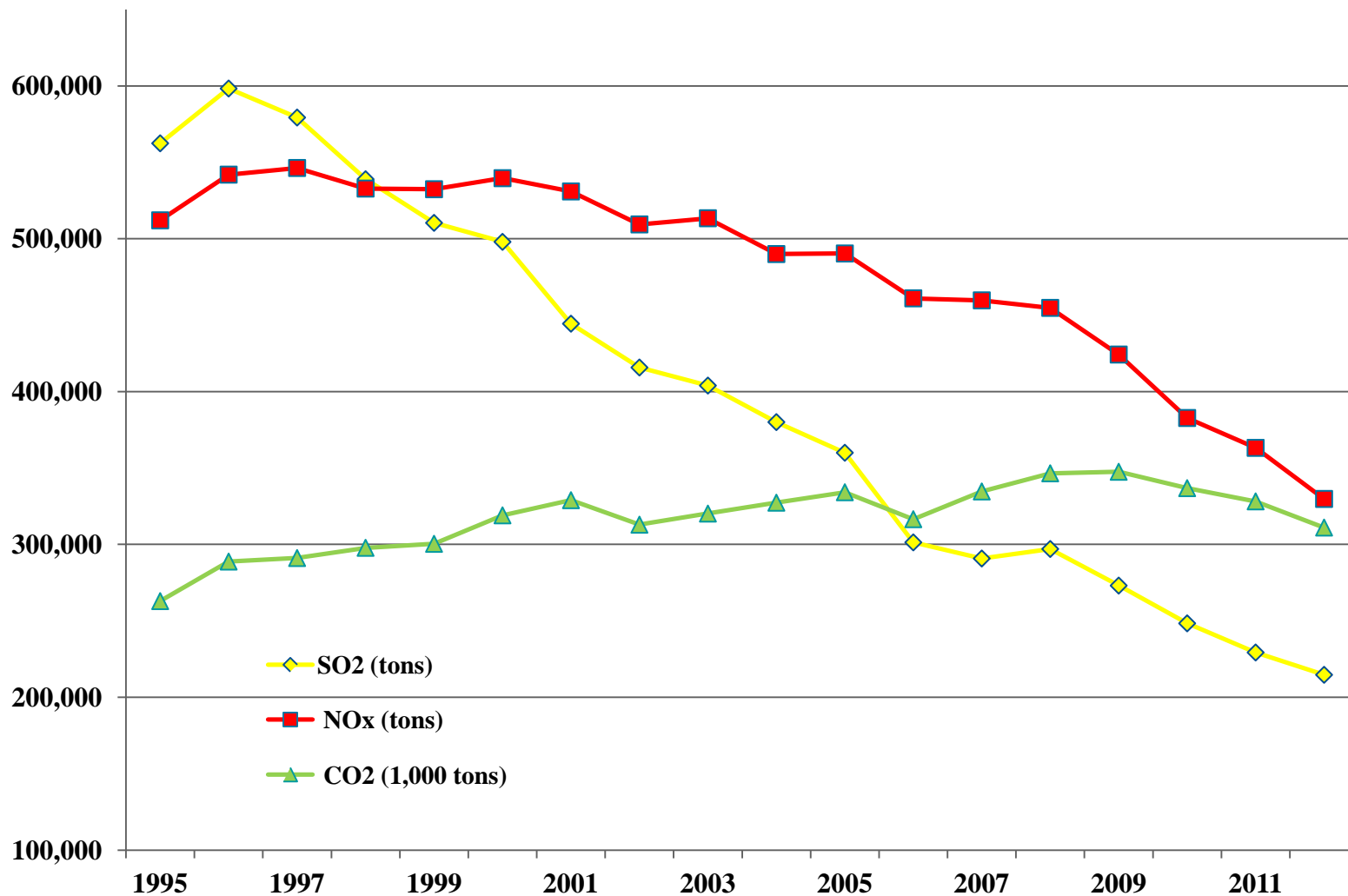
- NAAQS Implementation and Maintenance
 - Data for future infrastructure and transport SIPs
- Exceptional Events
 - Develop technical support data and analysis protocols
- Implementation of Regional Haze SIPs
 - Identify and execute technical work needed for 2018 plans
- Needs of sub-regional groups of states
 - Currently oil and gas, fire
 - Similar efforts in past – dust, BART, other topics



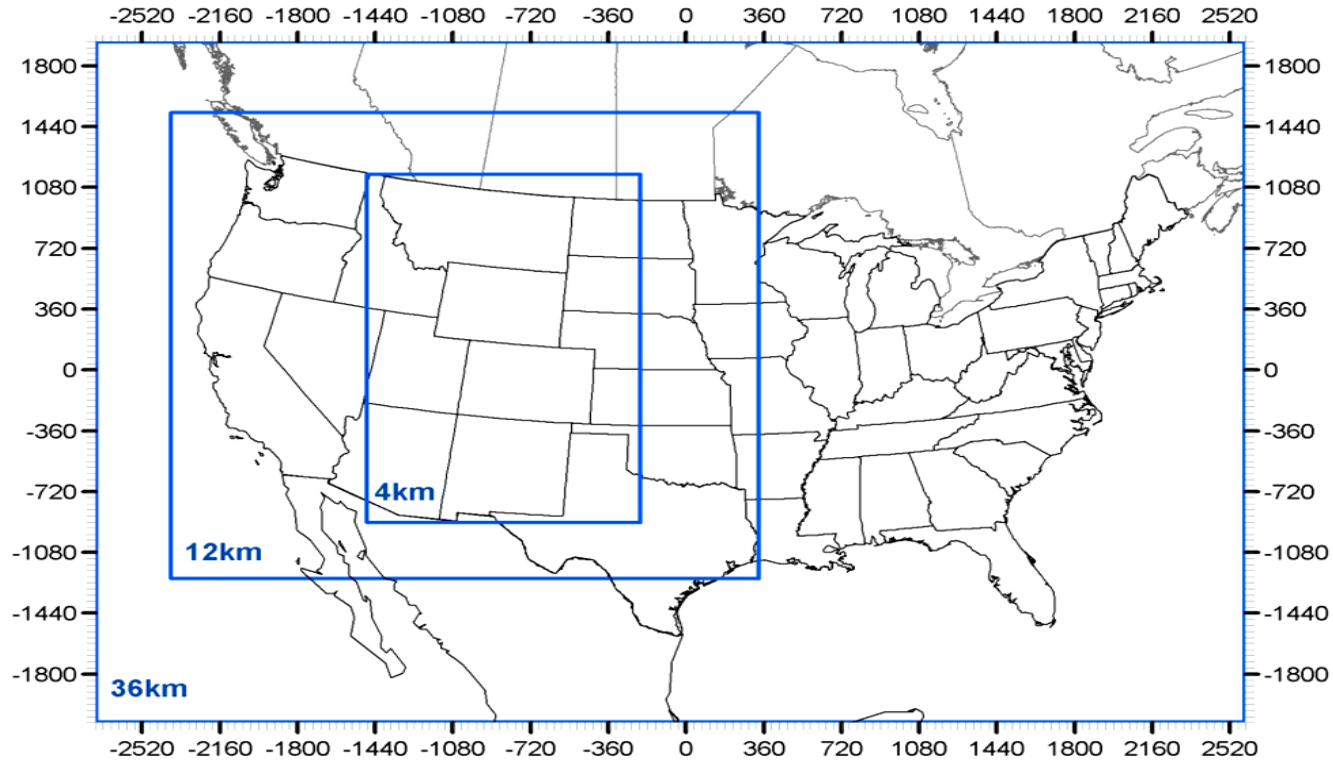
WRAP current projects and priorities

- precursors to Ozone, Particulates, and Regional Haze - key western sources
 - Power plants
 - Mobile sources
 - Fire activity and effects
 - Biogenics (natural) emissions
 - Oil and gas exploration and production
 - All sources studied in comprehensive regional modeling analyses
 - West-wide Jumpstart Air Quality Modeling Study ([WestJumpAQMS](#))
 - [Western Air Quality Data Warehouse](#) and modeling studies

Power Plant Emissions Trends – Western Interconnect



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)

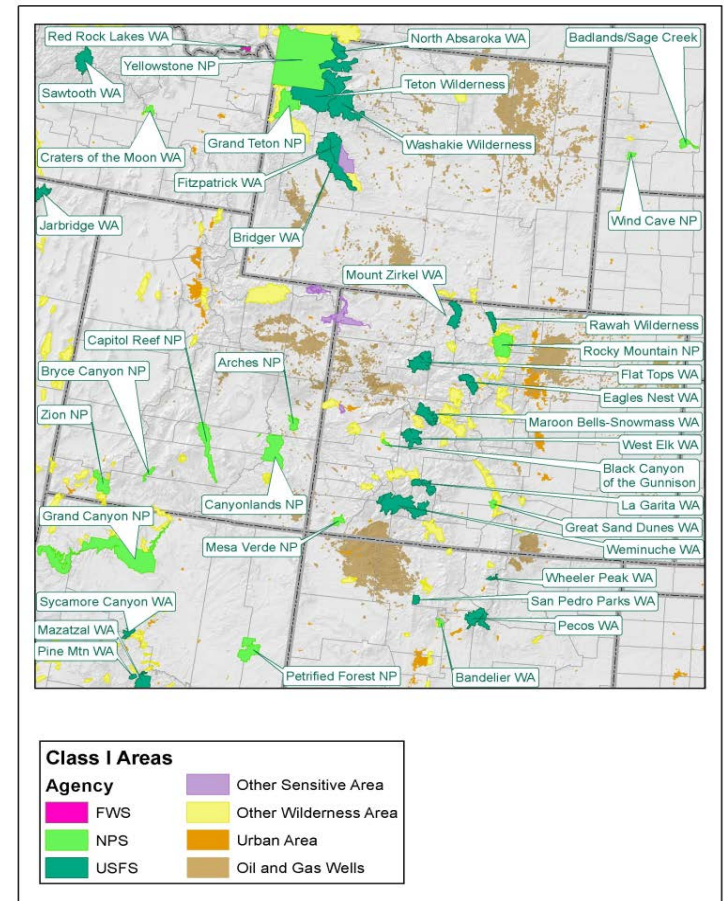
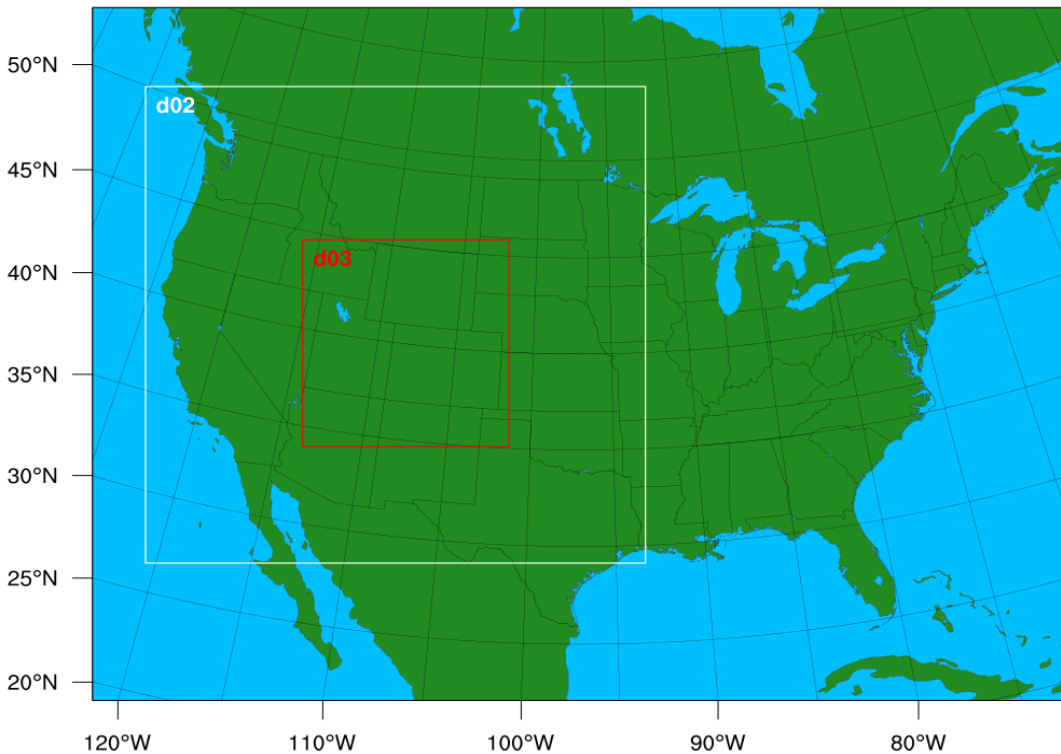
* includes buffer cells

Western Air Quality Data Warehouse & Regional Modeling

– 2008/11/14/20 CAMx/CMAQ Platforms

- 36 km CONUS; 12 km WESTUS; 4 km 3SAQS

3SAQS 36/12/04km CAMx Domains



EPA national Ozone Standard

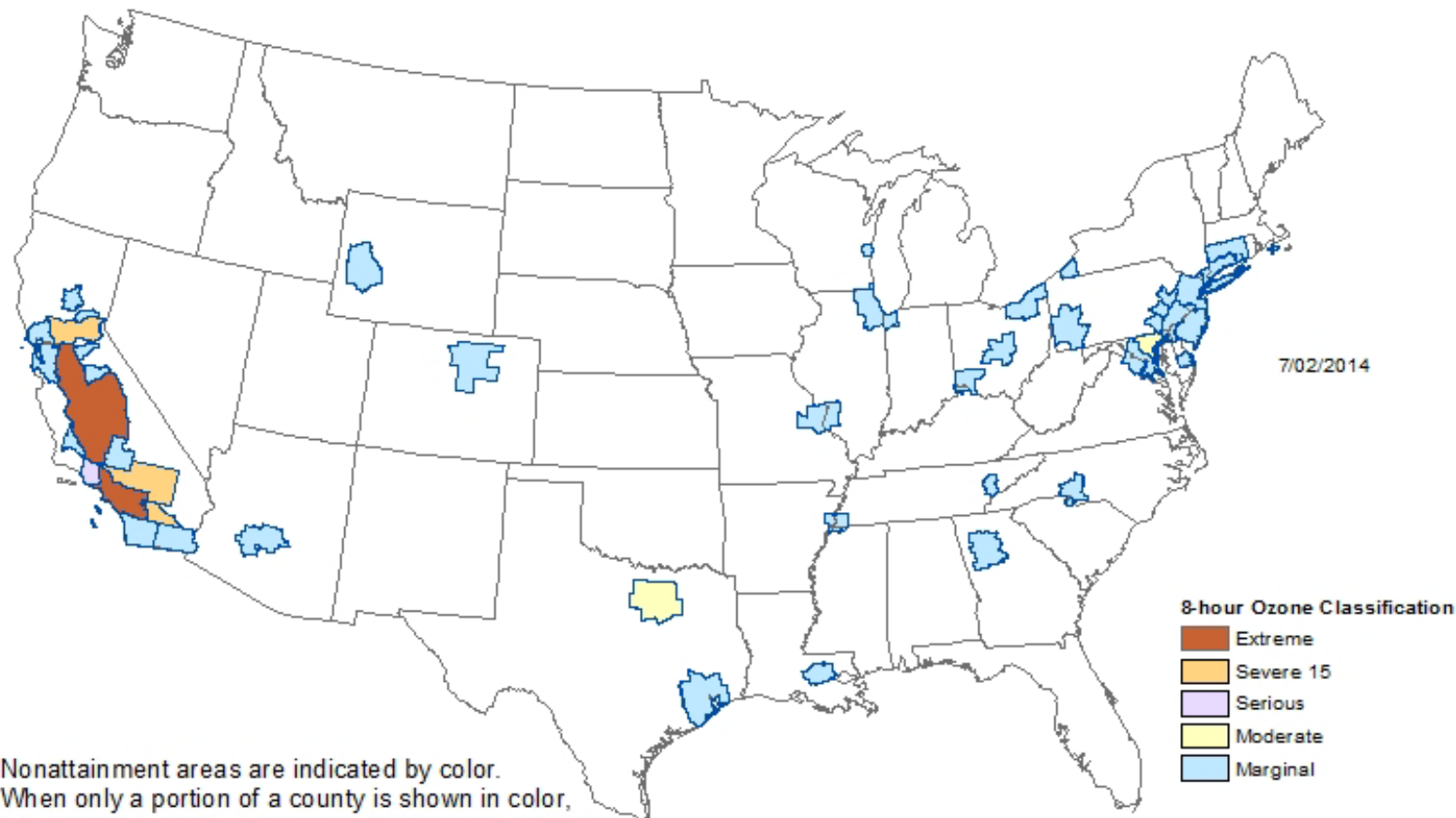
- Measured at ground station sites, highest 8-hour average each day
- 4th highest values each year are averaged over 3-year periods to determine compliance (e.g., 2007-09, 2008-10)
 - Statistic is called a “Design Value” for that site for that time period
- Current Ozone health standard level is 75 ppb
- EPA proposed a revised Ozone health standard in a range of 65 to 70 ppb
- EPA proposed a secondary Ozone standard for ecosystem protection at the same range
 - Proxy for a growing season / daylight hours-weighted cumulative metric

What are (some of) the sources and control issues in the West related to new Ozone standard(s)?

- Urban and rural reactivity
- Transport and formation – how much / how important?
- Public lands with large biogenic emissions and fire activity
 - How to characterize for effects of drought and climate variation ?
- Federal and state mobile fuel and tailpipe controls
- Upstream Gas NSPS rules in place in 2015
 - Industry practices changing rapidly, e.g., green completions
- Point sources (dominated by EGUs for SO₂, NO_x)
 - Significant NO_x BART by ~2018
 - Less coal-fired electricity supply due to climate change rule?
 - 17+ million acres of public lands leased in last 5 years for O&G exploration and production

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

(Based on 2011-2013 Air Quality Data)

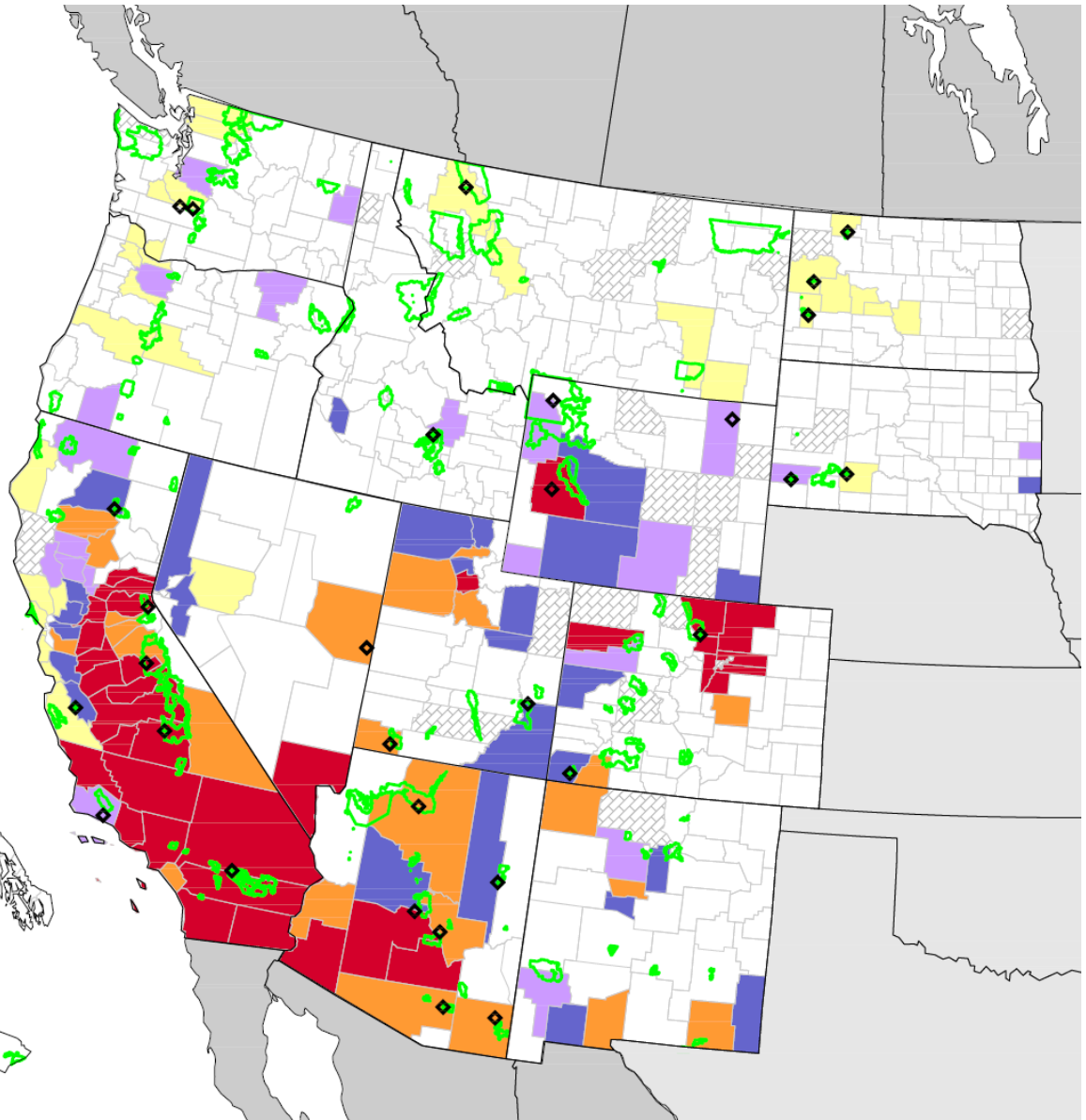


Nonattainment areas are indicated by color. When only a portion of a county is shown in color, it indicates that only that part of the county is within a nonattainment area boundary.

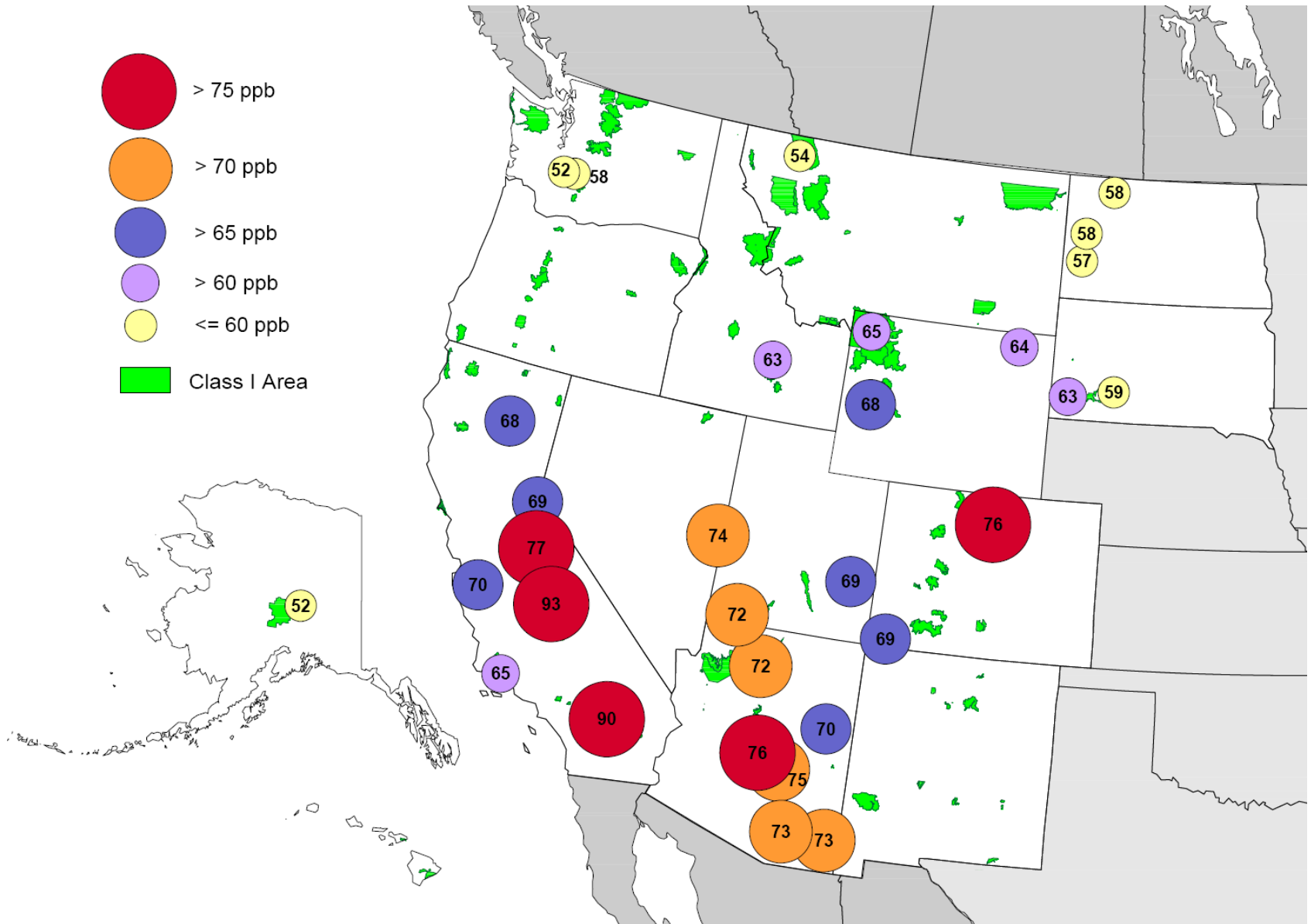
http://www.epa.gov/airquality/greenbook/map8hr_2008.html

3-year Average 4th Highest 8-Hour Ozone value by County 2011-2013

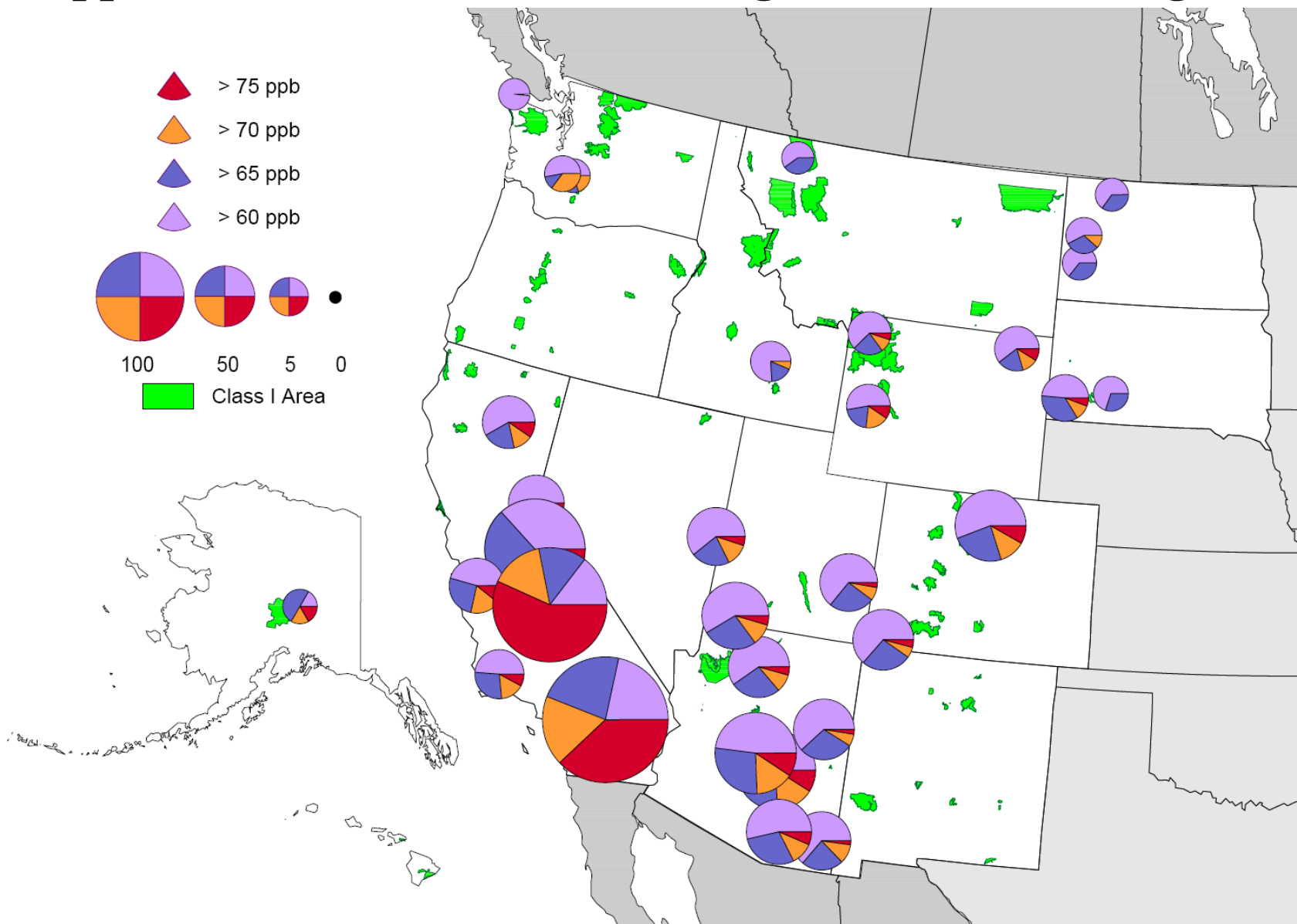
- > 75 ppb
- > 70 ppb
- > 65 ppb
- > 60 ppb
- ≤ 60 ppb
- Insufficient Data
- No monitoring data available
- Rural/Class I Site
- Class I Area



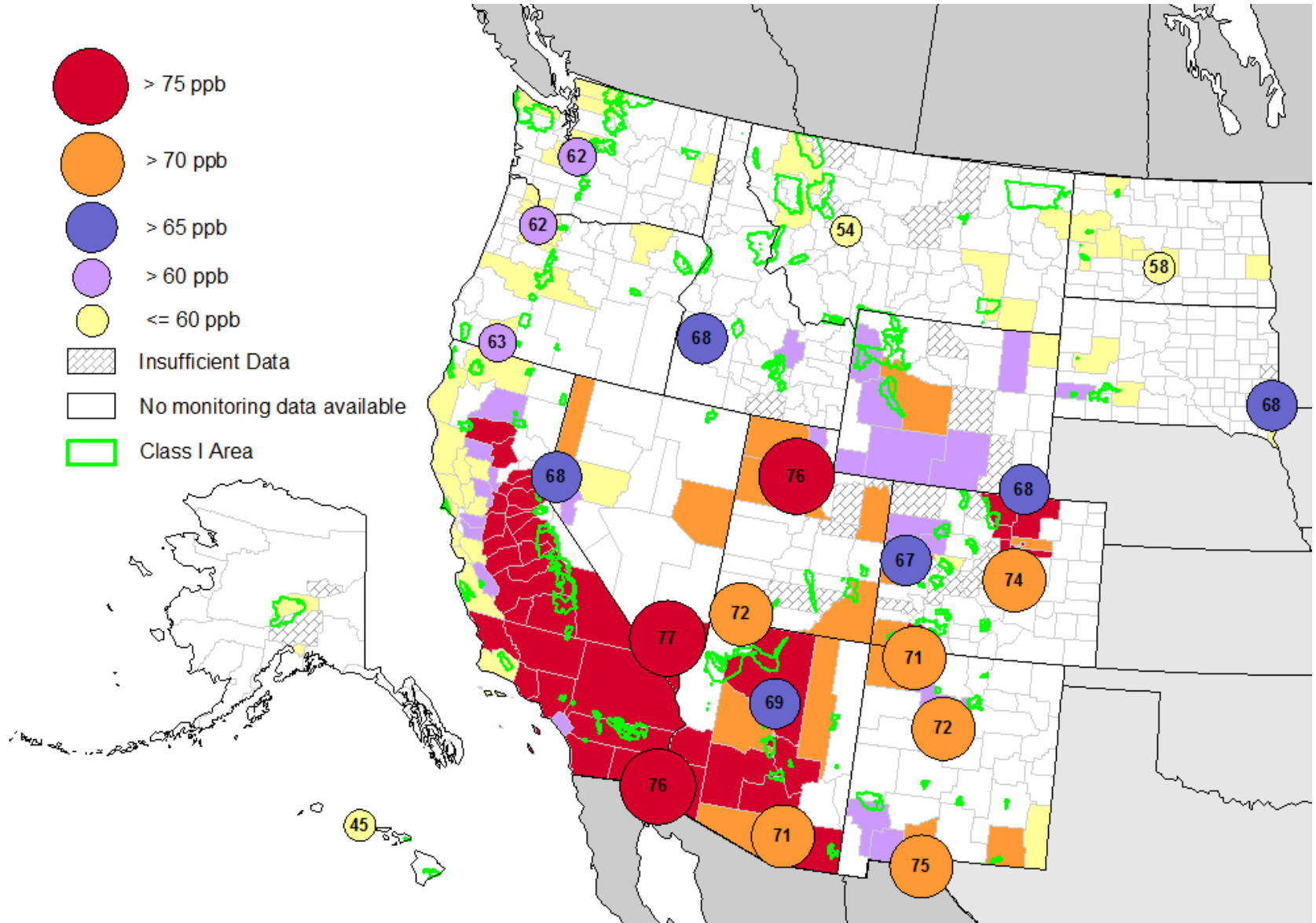
3-year Average 4th Highest 8-Hour Ozone value for Rural/Class I Sites 2011-2013



Average Annual Count of Days with 8-Hour Ozone Averages >60 ppb for Rural/Class I Monitoring Sites – 2004 through 2013

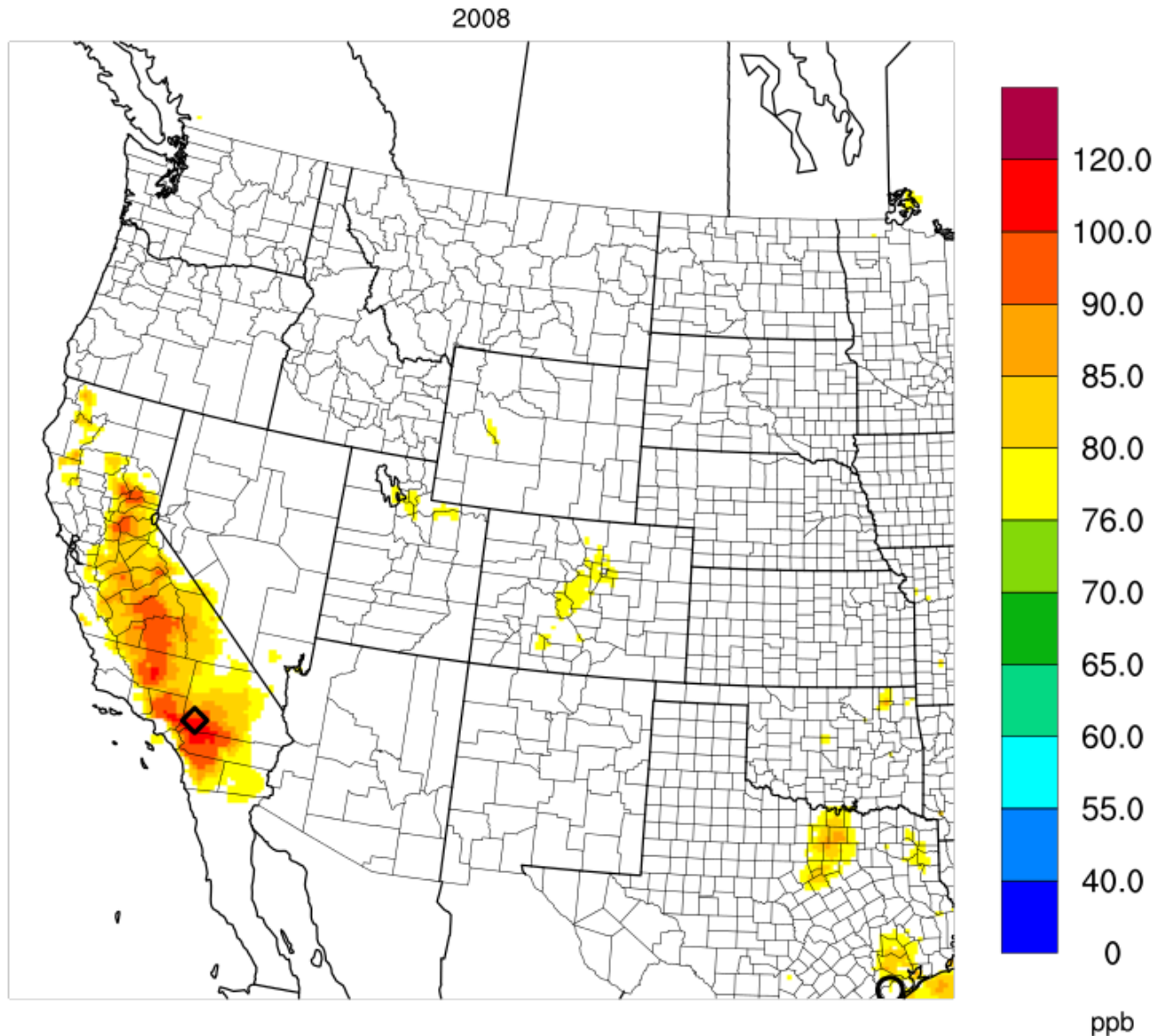


3-year Average 4th Highest 8-Hour Ozone Design Value for Selected Urban Counties currently in Attainment – 2011 through 2013



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

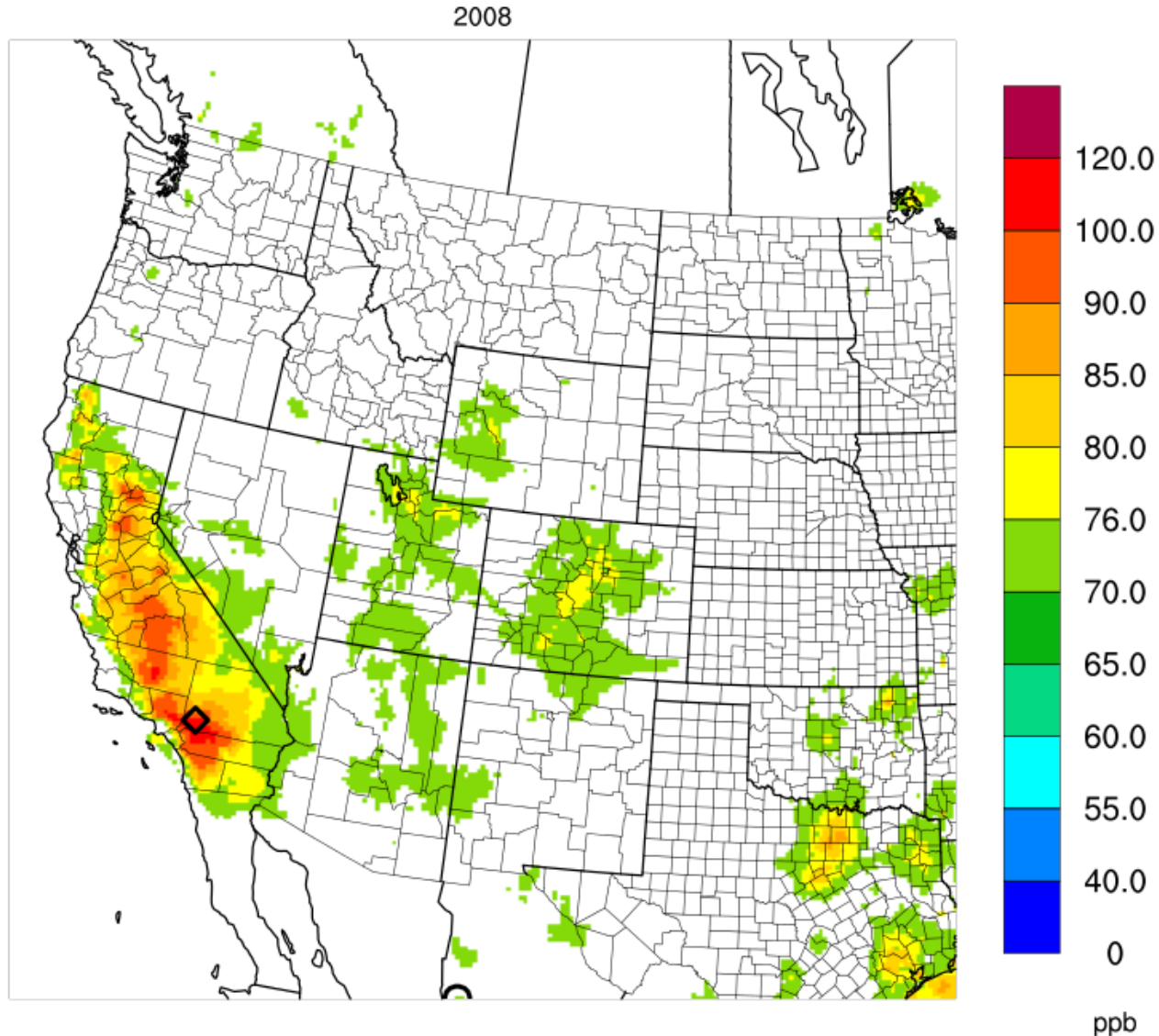
Ozone Modeled Attainment Test Software – Unmonitored Area Analysis with Design Value (2006-2010) ≥ 76 ppb



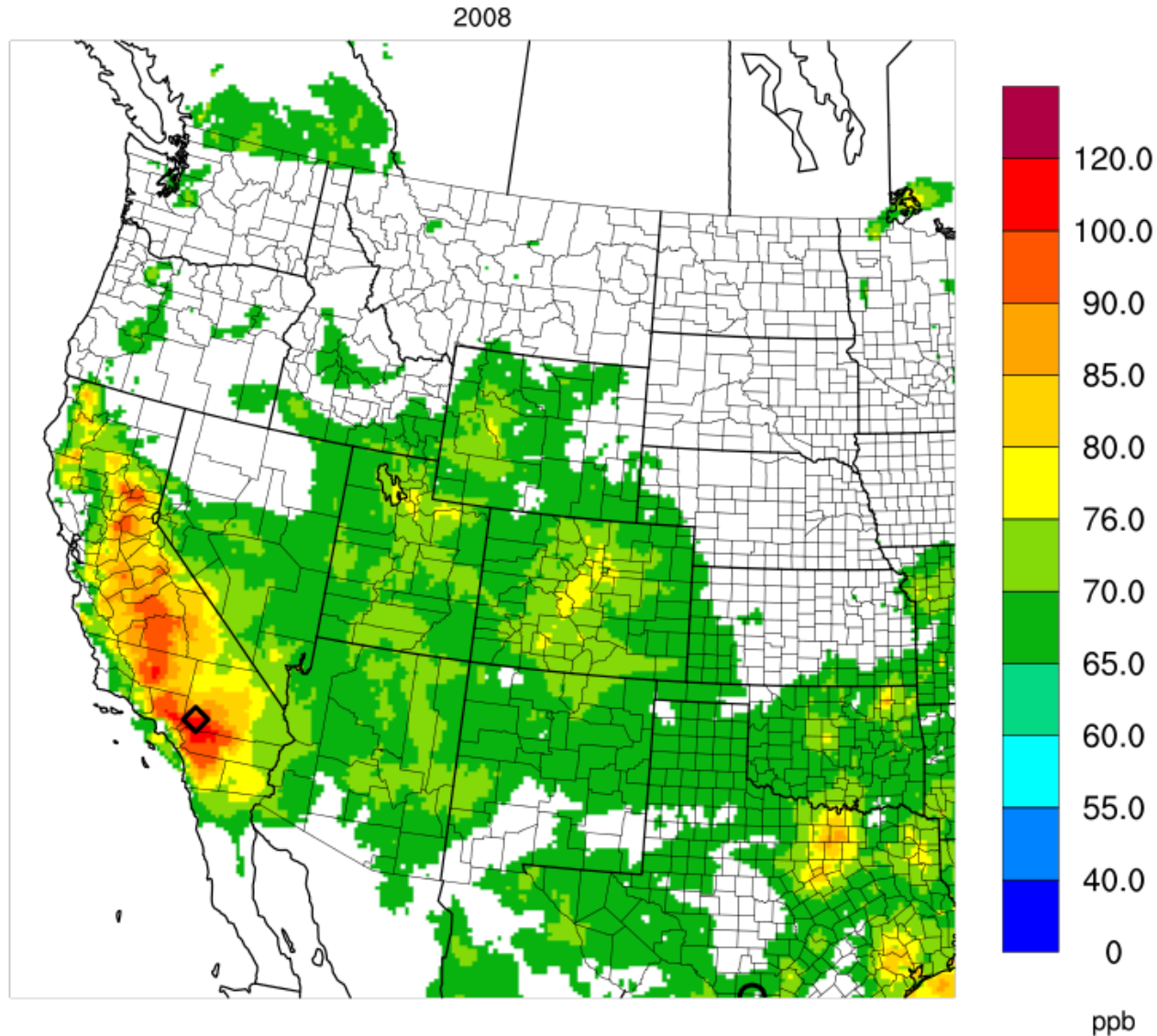
Source: [WestJumpAQMS](#)

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

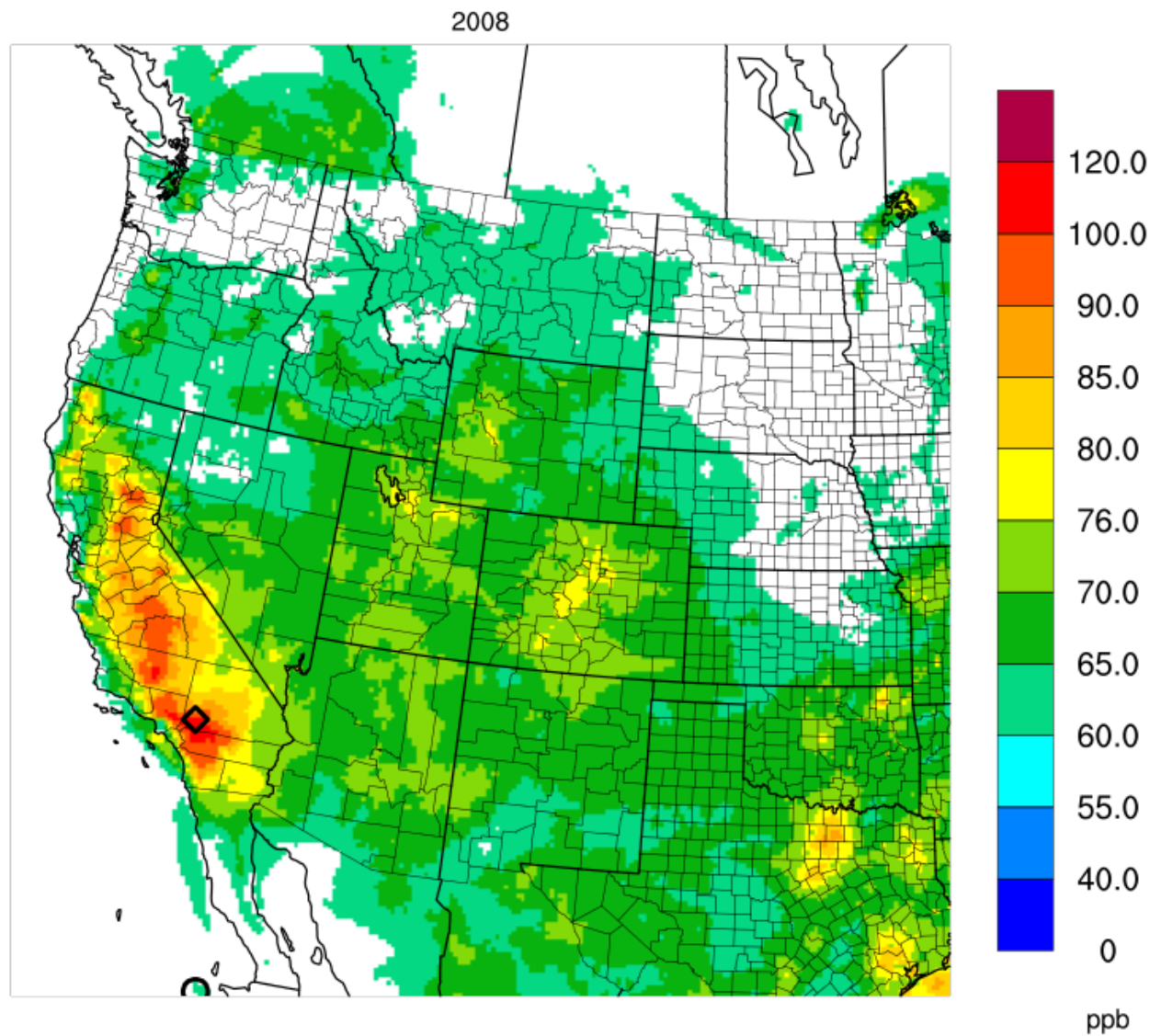
Ozone Modeled Attainment Test Software – Unmonitored Area Analysis with Design Value (2006-2010) ≥ 70 ppb



Ozone Modeled Attainment Test Software – Unmonitored Area Analysis with Design Value (2006-2010) ≥ 65 ppb



Ozone Modeled Attainment Test Software – Unmonitored Area Analysis with Design Value (2006-2010) ≥ 60 ppb



○ Min(45,2) = 60.00, ◇ Max(45,67) = 113.30



Western Regional Studies and Projects

- Planning Applications for Regional Analysis

Regional Haze: Reasonable Progress Reports + July 2018 SIP

- WRAP produced a comprehensive, regionally-consistent technical report – completed Summer 2013
 - Regional, state, and Class I area reports
<http://www.wrapair2.org/reghaze.aspx>
 - Monitoring and emissions data analyses as required by Regional Haze Rule
 - Western states will use as a common basis in preparing individual SIP revisions – adding status of state actions to implement controls
 - Progress report SIP revisions are due in the 2013-16 timeframe
- Regional Haze Planning
 - WRAP providing western 2008, 2011, and associated projections (as well as eventually 2014) emissions data
 - Modeling platform leveraged from WestJumpAQMS
 - States will use to evaluate changes in monitored visibility
- Regional technical support for July 2018 SIPs in WRAP Work Plan



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The Western Air Quality Data Warehouse provides air quality data and analysis tools to support regulatory, research, and academic applications. Available datasets include emissions inventories, meteorological data, monitoring data, and air quality modeling platforms. Available modeling platforms support consistent photochemical grid modeling for National Environmental Policy Act projects and other modeling studies.

GET DATA



Access a wide variety of monitored, modeled, emissions, and met data.

USER FORUMS

Forum	Topics	Posts	Last Post
Forum Discussions			
Announcements Information about new releases and fixes. Moderators: Administrators	0	0	No Posts
Requests Post requests you might have in this forum. Moderators: Administrators	0	0	No Posts

DOCUMENT NEEDS REVIEW !

3SAQS WRF 2011
Meteorological Model
Performance Evaluation



DOCUMENT NEEDS REVIEW !

CAMx Photochemical Grid CAMx
Model Draft Model Performance
Evaluation

DRAFT DOCUMENT AVAILABLE

3SAOS WRF



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Exceptional Events Support

Source: [WRAP Fire Tools](#)

The following case studies are related to the Exceptional Events Support analysis type. To begin click on one of the case studies to review it, or select **Start a New Analysis** to begin creating your own study.

The purpose of this analysis tool is to assist with understanding whether fire might have contributed to an ozone exceedance; and assist with knowing what kind of information might be helpful to a state for preparing an Exceptional Event demonstration package(s) for air quality excursions affected by fire and smoke. The effects of wildland fire on ozone are complex, and meeting the exceptional events requirement is difficult for most if not all fire occurrences. This is, in part, because wildland fires occur at the same time of high ozone caused by anthropogenic emissions. Thus, separating the contribution of wildland fire from anthropogenic emissions is challenging: the but-for test. Yet, EPA requires this for their concurrence. Using the combination of observed ozone and CMAX model output, this tool examines selected cases—planned, unplanned, and combinations of the two—fires contribution to ozone impacts.

Exceptional Events Support Overview

A State Exceptional Event demonstration package must provide evidence that:

- A.** The event affects air quality, is not reasonably controllable or preventable, and is an event caused by human activity that is unlikely to recur at a particular location or a natural event;
- B.** There is a clear causal relationship between the measurement under consideration and the event that is claimed to have affected the air quality in the area;
- C.** The event is associated with a measured concentration in excess of normal historical fluctuations, including background; and
- D.** There would have been no exceedance or violation but for the event.

States are responsible for demonstrating to EPA that unplanned fires or certain planned fires were responsible for an exceedance of the ozone standard at a particular monitoring site or group of sites. In attempting to make this demonstration, a state may request certain information from land managers. This might include: the smoke emissions; particulate monitoring particular to the fire or photographs; the timing of the burn along with how it was distributed through the day in terms of combustion and smoldering; and to what extent smoke management regulations were complied with.

Review a Related Analysis

Title	Sections
Biscuit Wildfire	10
Chatfield, CO July 2004-2007	16
Chatfield, CO July 2008	12
Evans Road Wildfire (Pocosin NWR) / Peat burning	12
Fall burning in southern Louisiana, 2008	9
Flint Hills	8
McNally Wildfire	6
Missionary Ridge & Hayman Wildfires	7
Northern California Wildfires, 2008	17

[edit list](#)

These are the current analyses associated with Exceptional Events Support. To review an



Building the Regional Technical Center

Attributes of the WRAP Regional Technical Center

Desirable Capabilities

***Remote sensing/Satellite data,
Improved technical resolution for
international transport,
Efficient regional data and decision
support systems, et cetera***

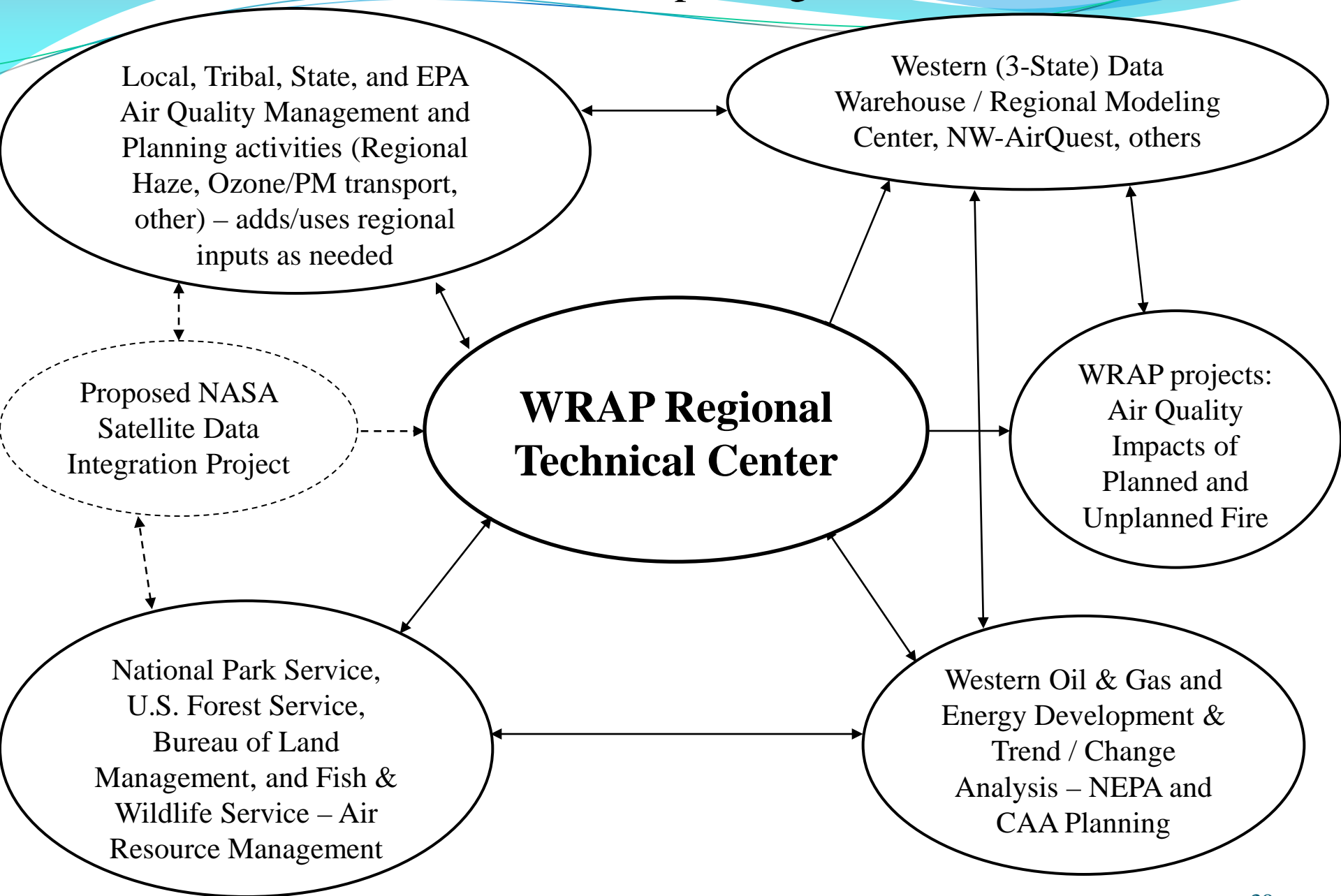
Necessary Regional Activities

***Regional Haze Planning Support,
Tracking and Analysis of Controls, et cetera***

Required Foundational Activities

***(WRAP Regional Technical Center,
Tracking and Projection of Regional Emissions,
Preparation/delivery of ready-to-use Datasets, e.g., Monitoring, Meteorology, et cetera***

WRAP members and relationship to regional technical activities



Opportunities for Western Data Warehouse and Applying Regional Modeling Results from Western Regional Technical Studies

- Leveraged studies address both regulatory planning needs and fill gaps where data are needed
 - Working for the users of the data
- Tracking key western source categories / source areas
 - Regionally consistent, comparable, transparent, and reproducible
- Modeling analyses of Ozone and PM background and transport on a routine basis and during elevated episodes
 - NEPA air quality studies
 - Background data for SIP planning
 - Impacts of fire on ozone and PM across West
- Better oil & gas, fire, biogenics emissions data
 - Improves assessment of natural vs. anthropogenic contributions

Five Ozone Planning Needs

1. Ozone NAAQS planning – requires photochemical modeling for SIP attainment demonstrations for nonattainment areas.
2. Ozone transport SIPs –photochemical source apportionment modeling can be used to quantify U.S. Ozone transport between states and jurisdictions.
3. Identification of Ozone exceptional events caused by stratospheric intrusion and wildfires – requires observations & data analysis, supplemented with global/regional scale photochemical models and regression models.
4. Identification of international transport of Ozone for §179B demonstrations: requires nested global and regional scale photochemical modeling to evaluate international transport of Ozone.
5. Identification of §182 Rural Transport Areas – combination of data analysis and photochemical modeling.

In the West
under CAA,
whom to do
which ?

Alone or
together ?

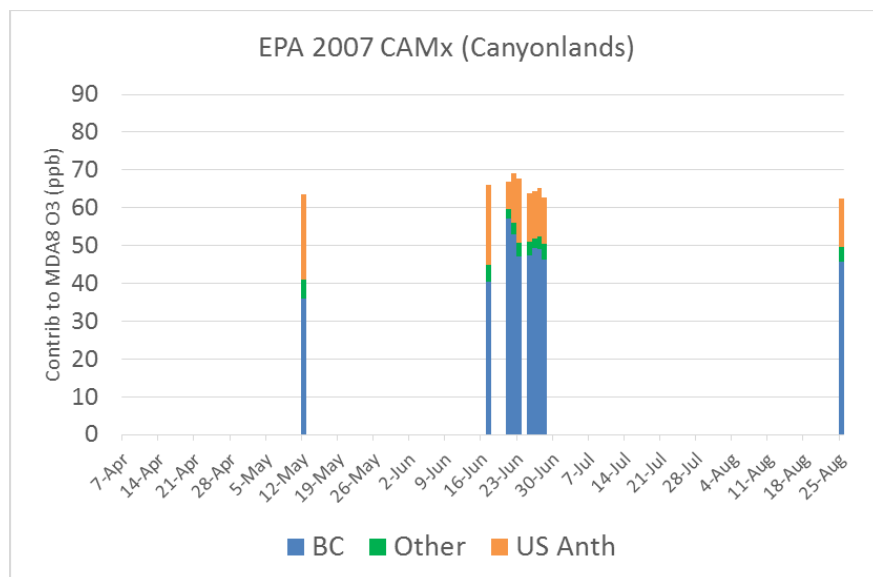
- States

- Regional

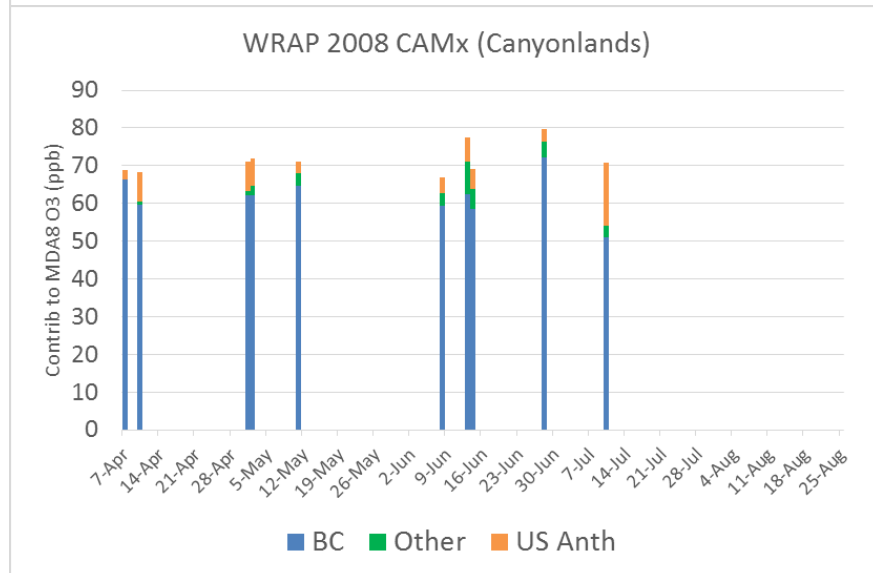
- Federal

Uncertainty in model estimates of U.S. Background

CAMx simulations for 2007 and 2008 at Canyonlands National Park – Eastern UT



EPA 2007 CAMx model:
BC contributions of 36-57 ppb;
still substantial U.S.
anthropogenic contribution to O3.



WRAP 2008 CAMx model:
BC contributions of 50-72 ppb,
much larger than OAQPS
modeling.

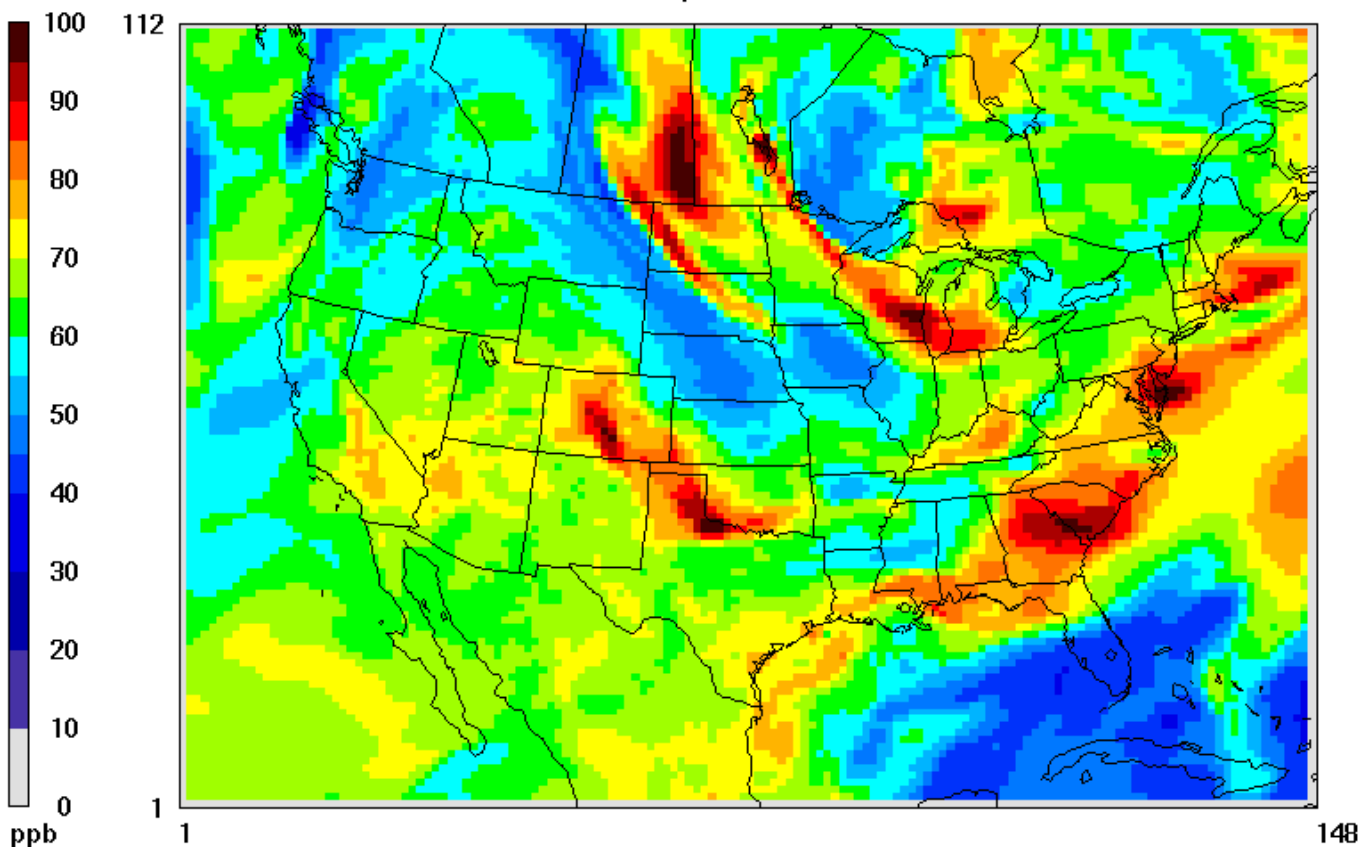
Same methodology - reasons for modeled differences are not fully understood

O₃ in upper free troposphere is determined primarily by transport from boundaries

O₃ animation in Layer 21 (6-7 km) June 22 through July 4, 2008

Layer 21 1000*O3a

CAMx v5.41 Mech6 CF westjump.3612K.25L.base08b
a=epa.36km.chain



June 22, 2008 1:00:00
Min= 0 at (1,1), Max= 104 at (77,95)



Thanks –

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Western Regional Air Partnership | www.wrapair2.org