

Western Air Quality Studies, 3-State Air Quality Pilot Study / Data Warehouse, and Western Regional Modeling Framework

June 4, 2014

Tom Moore
WRAP Air Quality Program Manager
WESTAR Council

Pierre, SD Meeting



Regional Organizations

- WESTAR = Western States Air Resources Council
 - 15 state air agencies are voting members, ex-officio membership includes FLMs, also open to local air agencies and tribes, EPA active participant but not a member
 - Incorporated non-profit, offices in Seattle, Portland, and Fort Collins
 - 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.

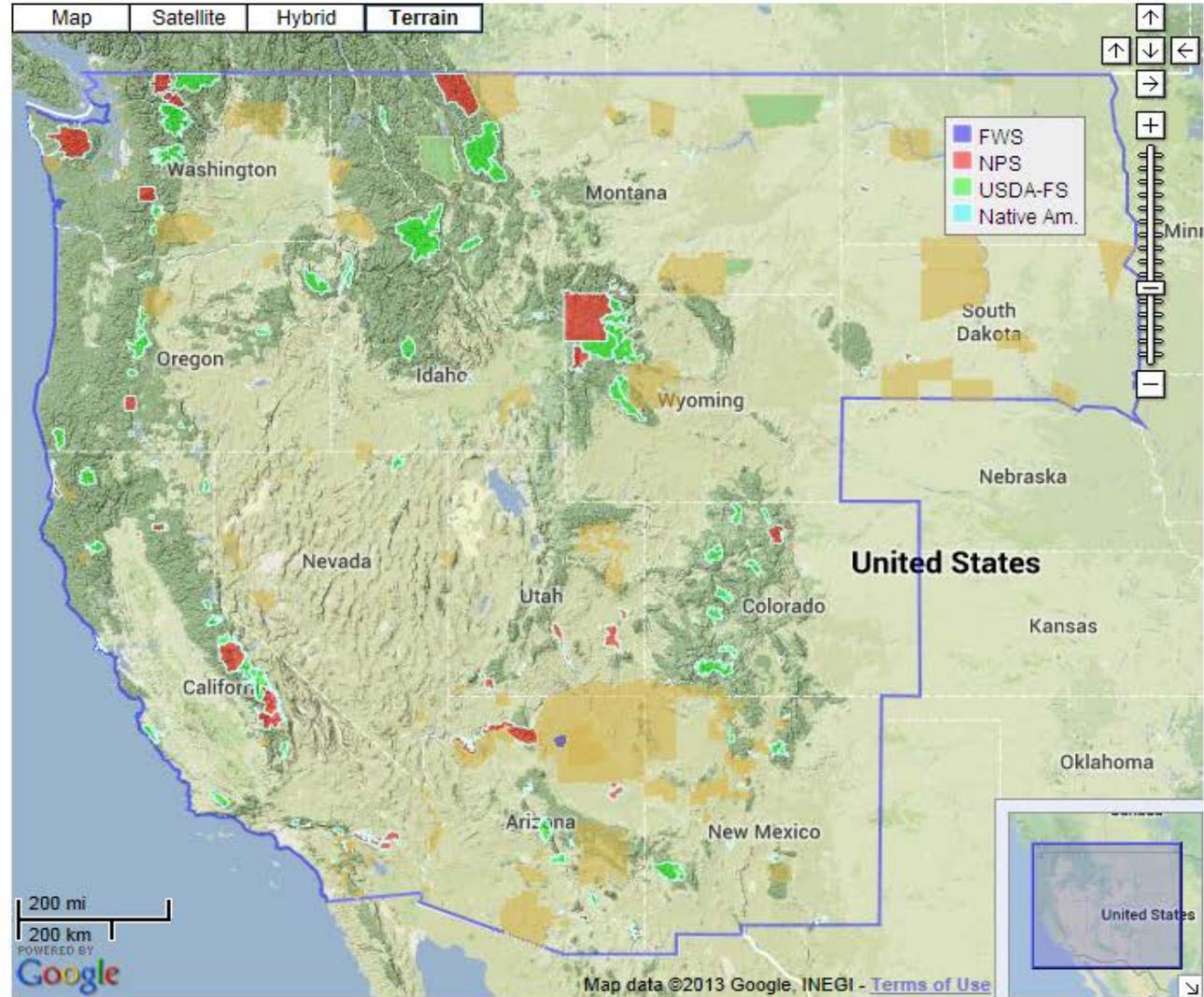
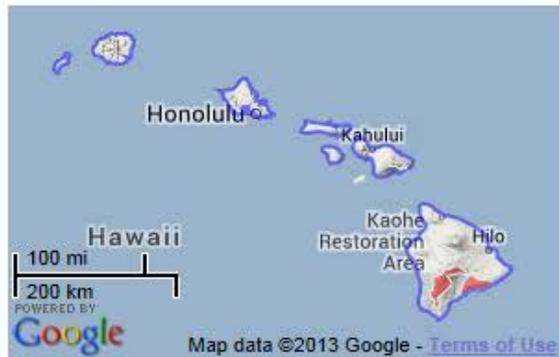
WESTAR / WRAP geographic region



Organizations, continued

- WRAP = Western Regional Air Partnership
 - 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

WRAP Region Areas and Points of Interest



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

WRAP, continued

- Since 2010, WRAP working as regional technical center to support and coordinate Regional Analysis and Planning
- Develop and facilitate use of improved, consistent, comparable, transparent, and reproducible 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

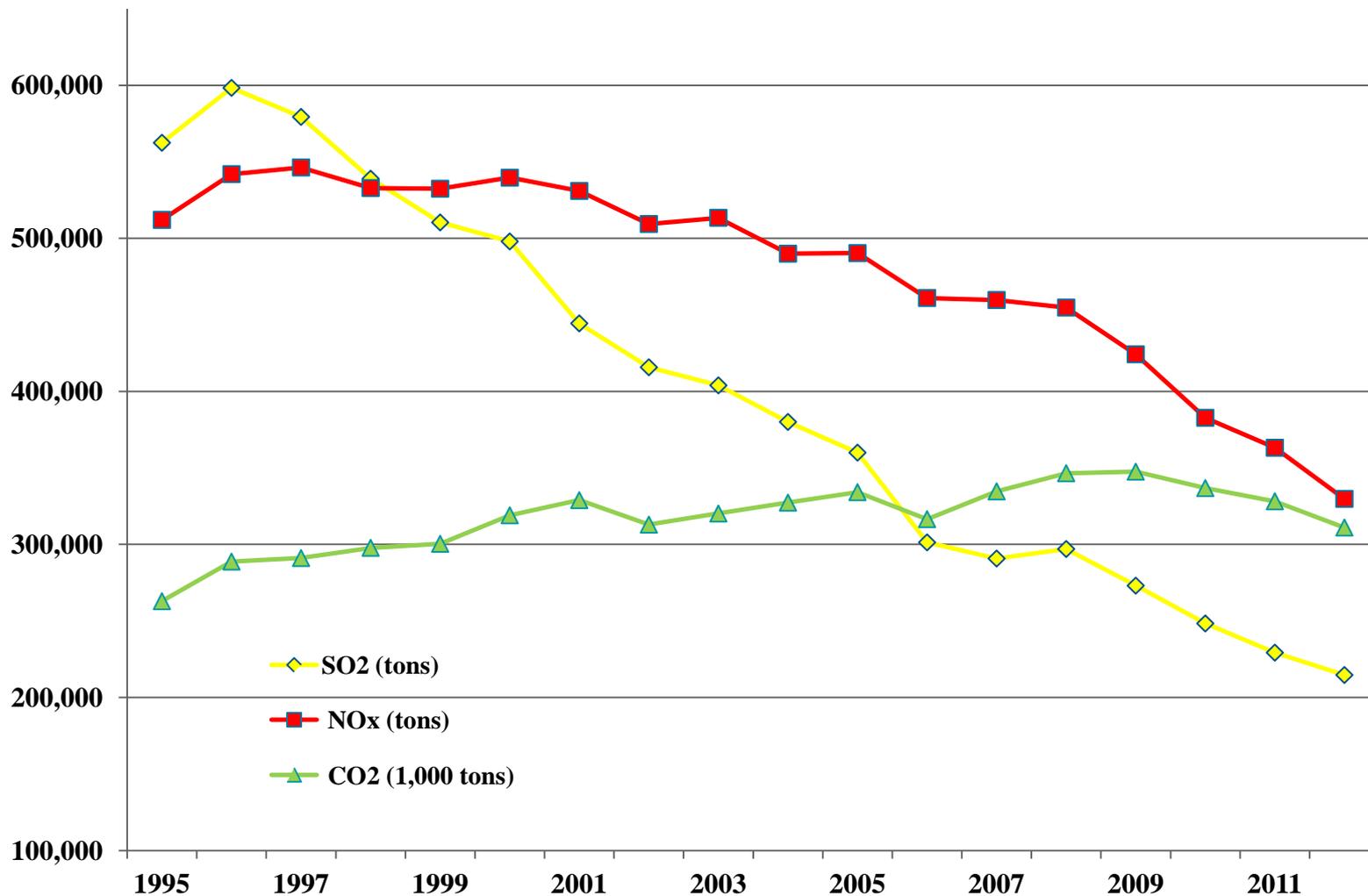
WRAP regional technical support

- 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
 - Similar efforts in past

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
 - Deterministic & Empirical Assessment of Smoke's Contribution to Ozone ([DEASCO₃](#))
 - Prescribed and Other Fire Emissions: Particulate Matter Deterministic & Empirical Tagging & Assessment of Impacts on Levels ([PMDetail](#))
 - Others....
- Biogenics ([natural plant sources](#))
- Oil and gas (WRAP emissions inventories)
 - Emissions Inventories for Intermountain Basins with significant production
 - Currently completing [ND-MT Williston and MT North Central \(Great Plains\) Basins](#)
 - 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

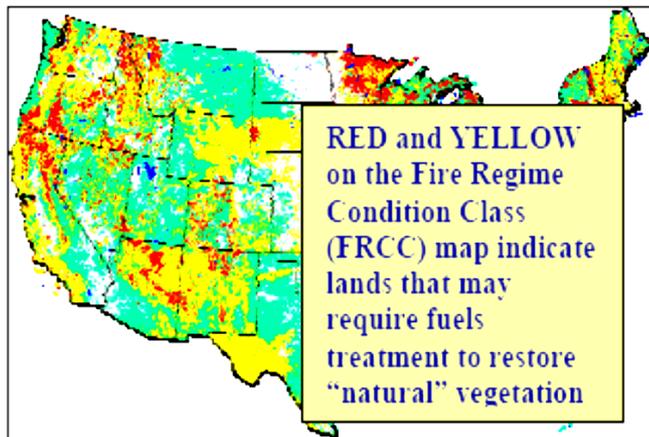
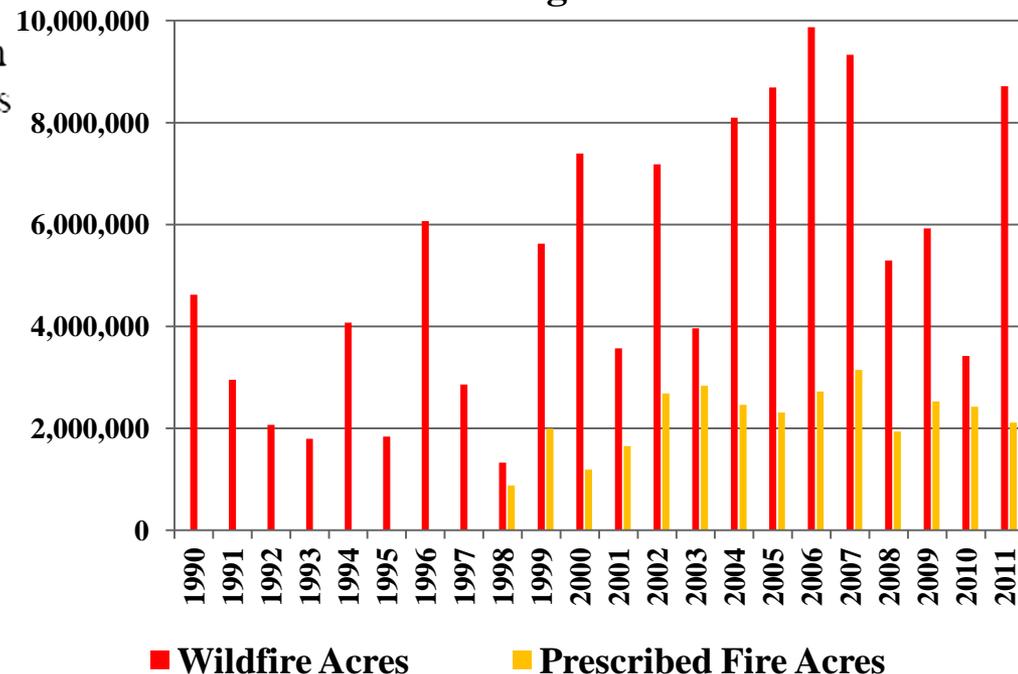
Technical Products for air quality planning & management as required by the Clean Air Act



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



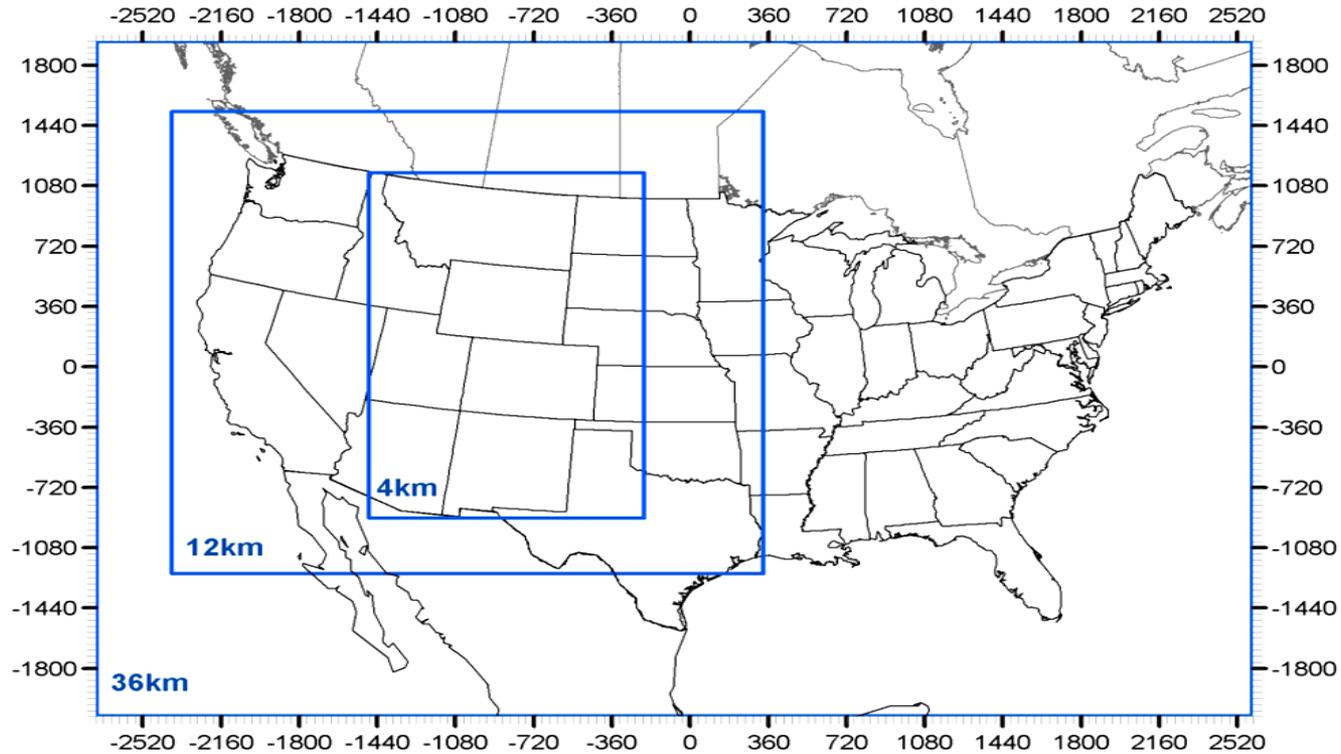


Western Regional Studies and Projects

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

Tracking and Managing Smoke

- Significant impacts to both local and regional air quality
 - Large summer wildfires
 - Prescribed and agricultural burns in spring and fall
- States & tribes manage both planned burns & wildfire impacts
 - FLM Joint Fire Science Program projects enable continuing operation of WRAP's Fire Emissions Tracking System (<http://www.wrapfets.org/>)
 - Used daily by western states, tribes, and federal agencies to track planned fire and manage smoke
 - FETS
 - Used by states and OAQPS to evaluate 2008 NEI
 - Fire activity and emissions data being sent to EPA for 2011 NEI

Fire's Effects on Elevated Regional Ozone & PM

Deterministic & Empirical Assessment of Smoke's Contribution to Ozone (DEASCO₃) – completed Summer 2013

and leveraged companion study underway:

Prescribed and Other Fire Emissions: Particulate Matter Deterministic & Empirical Tagging & Assessment of Impacts on Levels (PMDETAIL)

Funding for both from FLM Joint Fire Sciences Program

**Both projects, analysis toolbox / data, and FETS access at:
<http://wraptools.org/>**

New proposal under JFSP review:

Contribution of Smoke Emissions to Secondary Organic Aerosols (SOA): Real-World Evaluation of Fire SOA Emissions Factors from Fires in a Data Management System (REFERS-DMS)

Leveraging

EPA NEI &
WRAP Western Data

WestJumpAQMS

Improved AQ
Planning



DEASCO₃

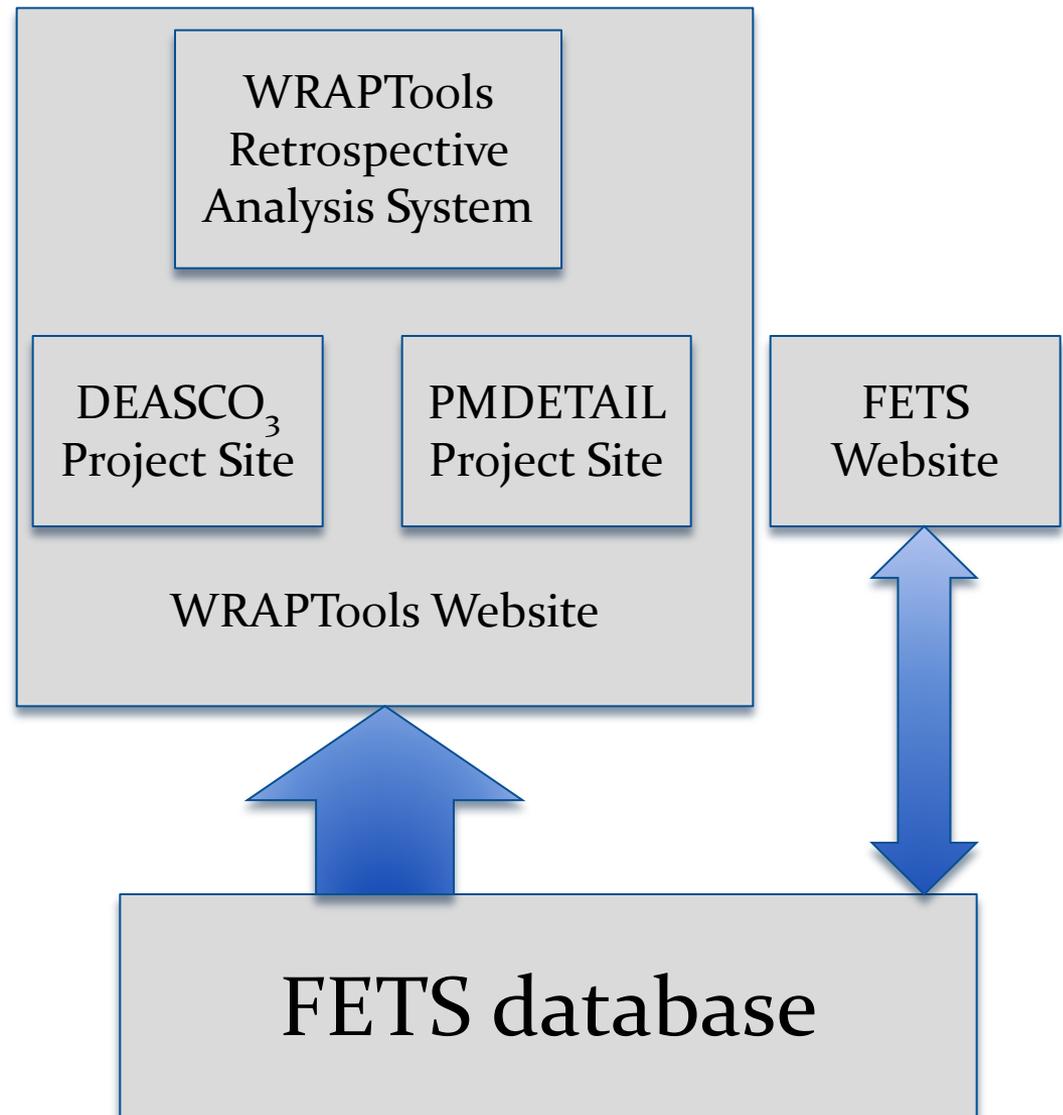
Exceptional Event
applications

2008 WRAP Fire and
NEIv2 Fire data
(USFS collaboration)

PMDETAIL

WRAP Fire Tools Landscape

- Fire Emissions Tracking System
 - Gathering daily WF and S/L/T data
 - QA/QC and reporting tools for activity, emissions, NEI
- DEASCO₃
 - JFSP-funded project
 - DSS for Ozone impacts
 - Temporal analysis, area impacts
- PMDETAIL
 - JFSP-funded project
 - DSS for PM impacts
 - Temporal analysis, vulnerability matrix



WRAPTools Toolbar Approach



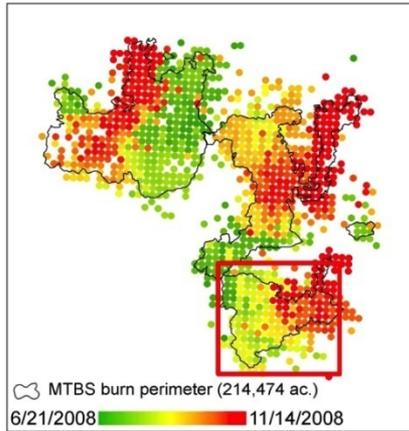
What questions do we need to address to perform retrospective case study analyses?

What data are available to us?

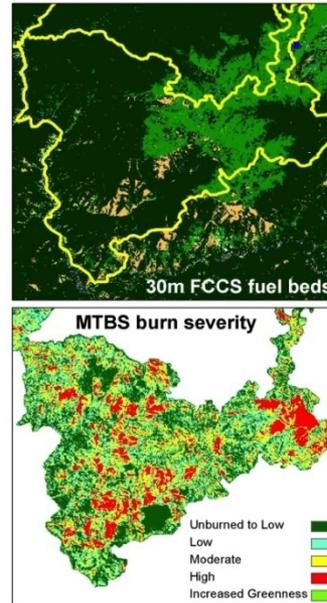
How do we organize results to accommodate differing analysis types?

- Start with basic criteria from user: time, space
- Build a set of modular tools that produce analysis results
- Build a one-page “workspace” and plug in tool results, commentary.

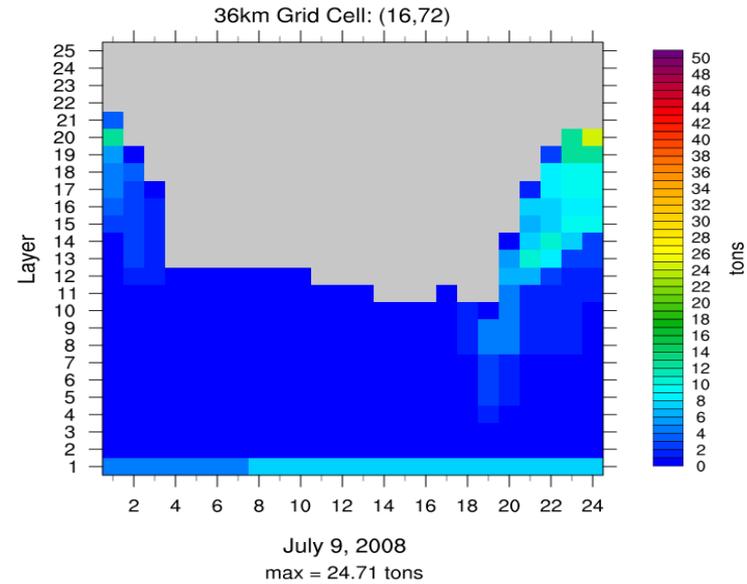
Smoke and Emissions Inventory Research



- Acres constrained by perimeter
- Daily growth & composite fuel loading
- Consumption scaled by severity



DEASCO3 NOx Fire Emissions



Smoke and Populations

Federal Land Manager Database (FED) Sign In | Register

Home | Summaries | Data | Metadata | Resources

Search:

[AQRV Summaries](#)
[Webcams and Photographs](#)
[Data Visualization and Exploration](#)
[Metadata and Reference](#)
[Database Query Wizard](#)
[Web Services and Tools](#)

Glacier National Park

FED Home Page status | Printer friendly view | Contact us

Federal Land Manager Environmental Database (FED)

This website provides access to an extensive database of environmental data and an integrated suite of online tools and resources to help Federal Land Managers assess and analyze the air quality and visibility in Federally-protected lands such as National Parks, National Forests, and Wilderness Areas.

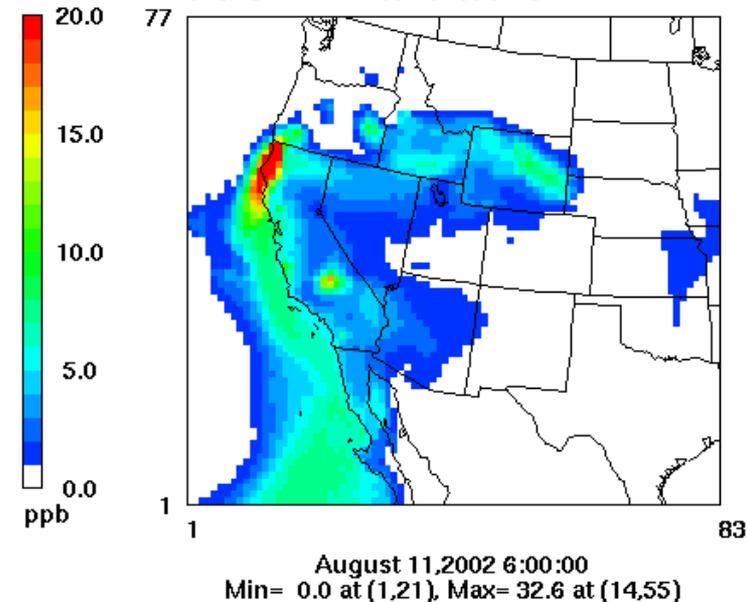
AQRV Summaries
View graphical summaries and reports of the status and trends of air-quality-related values (AQRVs) and other metrics that have been chosen by Federal Land Managers (FLMs) for assessing air quality in protected federal areas.

Webcams and Photographs
See live video from webcams at select rural and urban vistas, and examine sequences of photographs from selected monitoring sites that demonstrate the range of visual conditions at each site over time.

Featured Substance
Ammonium sulfate

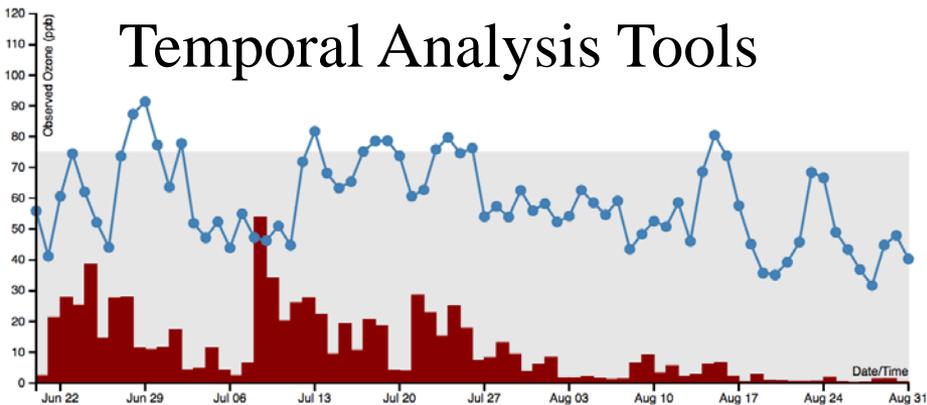
Name:	Ammonium sulfate
FormulaHTML:	H ₄ N ₂ O ₆ S
CASNum:	7783-20-2
ACXNumber:	X1002153-5
Density:	1.769
Comments:	colorless crystals or white granular powder
MolecularWeight:	132.1342
MeltingPoint:	280
WaterSolubility:	soluble

Fire and Smoke Model Evaluation

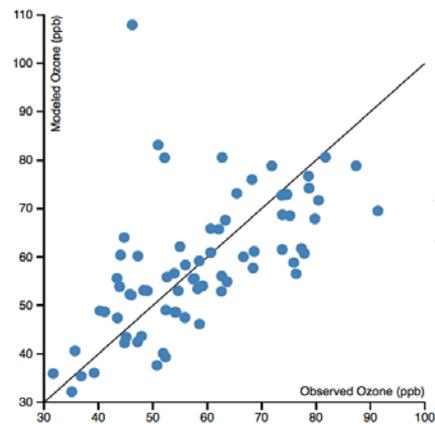


Observed Ozone paired with modeled max 8-hour fire contribution 06/20/2008 to 08/31/2008
Shasta County, CA - 06_089_0007

Temporal Analysis Tools

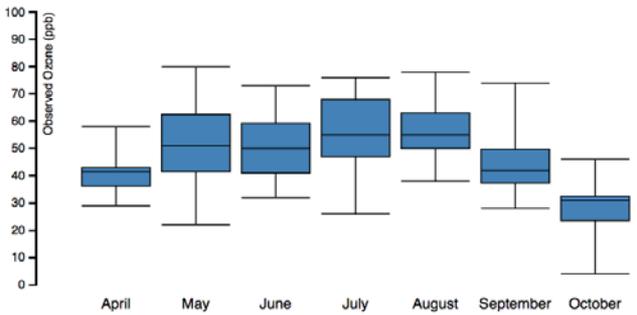


Max 8-hour Ozone, Observed vs. Modeled, 06/20/2008 to 08/31/2008
Shasta County, CA - 06_089_0007



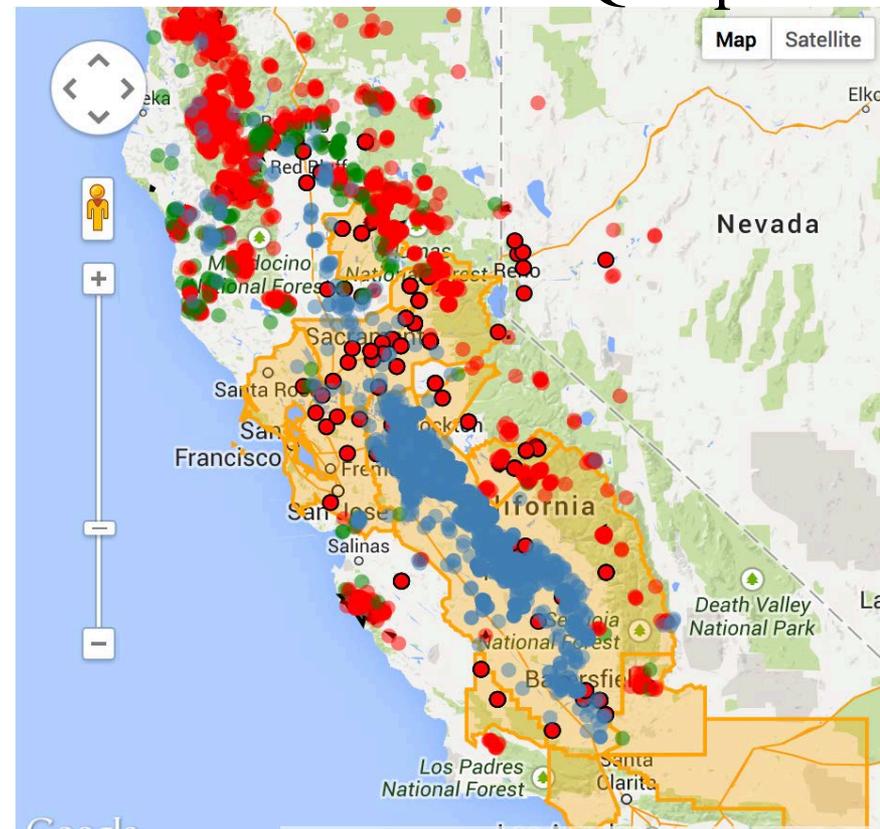
Model Evaluation

Observed Ozone by Month, 04/01/2007 to 10/31/2007
Shasta County, CA - 060890007



Inter-annual Observational Analysis

Fire Contributions to AQ Impacts



Area Impacts Analysis Tool

Number of days where planned fire caused an exceedance of 70ppb -- weight: 10

Number of days where planned fire caused an exceedance of 65ppb -- weight: 0

Number of days where planned fire caused an exceedance of 65ppb NAA ONLY -- weight: 2

Number of days where planned fire caused an exceedance of 70ppb NAA ONLY -- weight: 2

Number of 70+ ppb days where planned fire contributed > 1 ppb -- weight: 1.5

Number of 65+ ppb days where planned fire contributed > 1ppb -- weight: 1.25

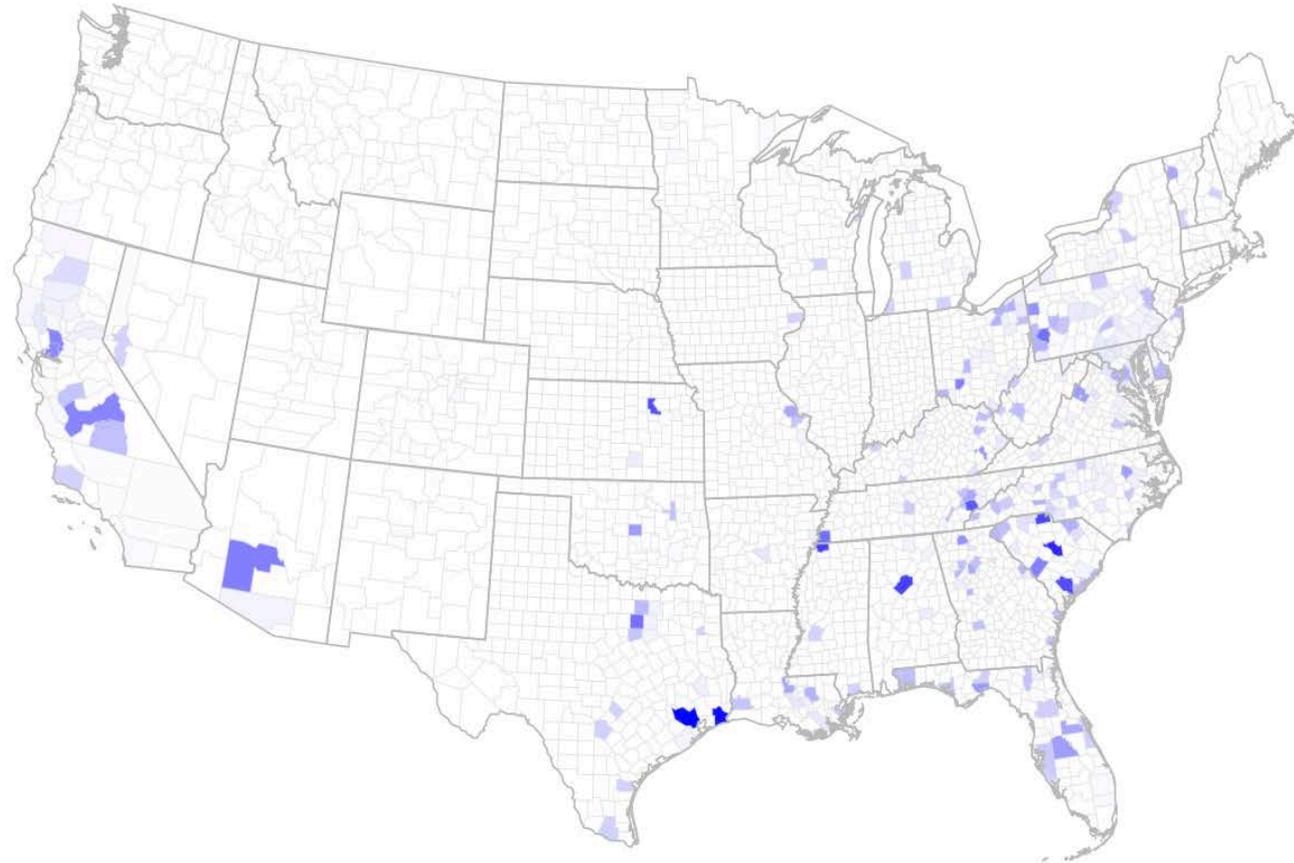
Tons consumed from planned fires near NAA during the ozone season -- weight: 1

Tons consumed from planned fires near NAA during the ozone shoulder season -- weight: 1

Average tons consumed prior to exceedance -- weight: 1

Number of 65+ days -- weight: 0.01

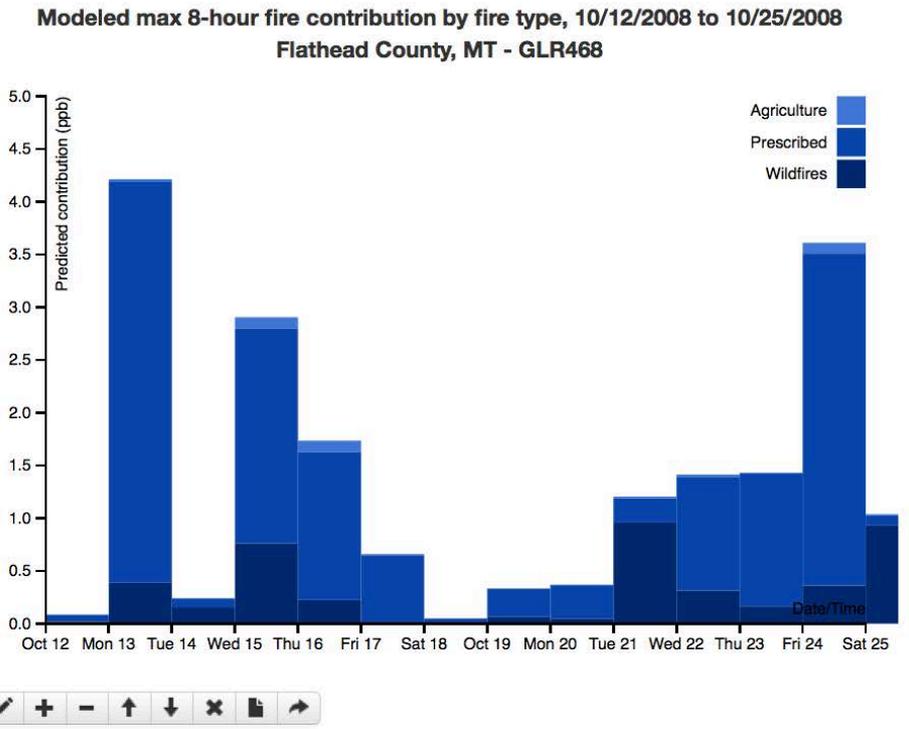
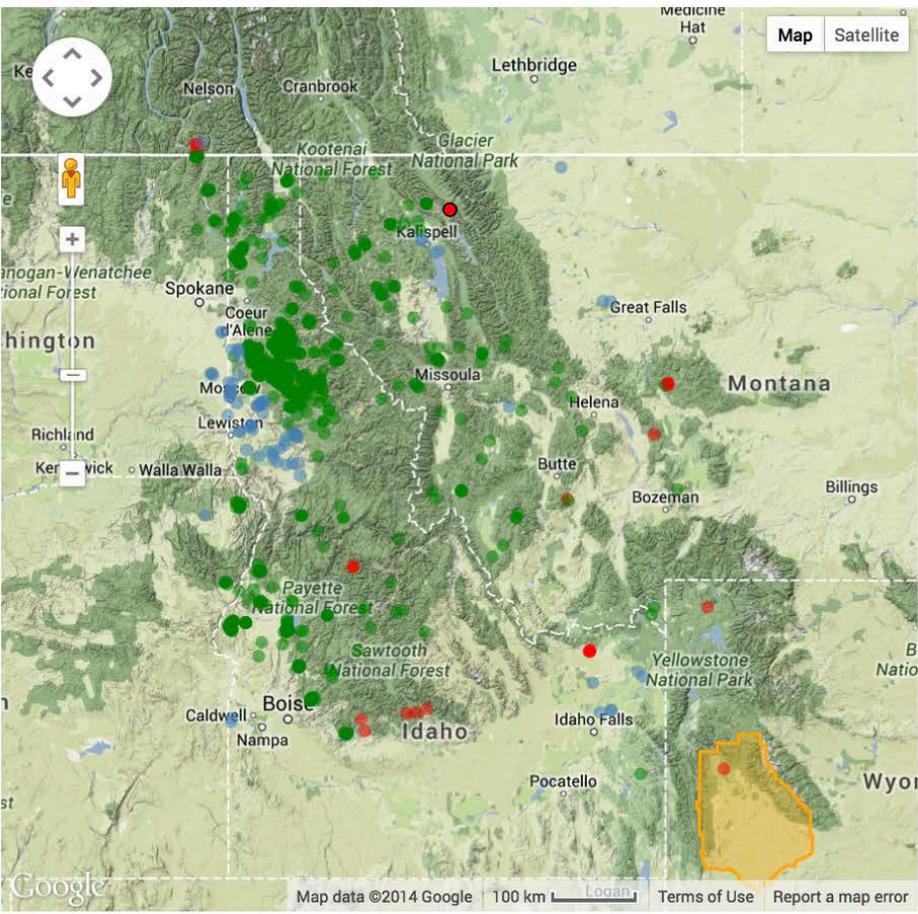
Number of 70+ days -- weight: 0.01



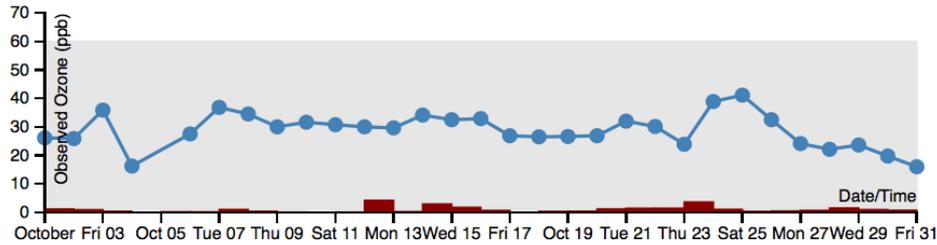
Prescribed fires' influence on ozone formation - MT Case Study

This case study was developed by looking at areas with large amounts of prescribed burning and coincident prescribed fire-caused ozone predicted by CAMx modeling in 2008. Idaho and western Montana have an active prescribed fire season in the fall, as can be seen in the map below that covers a two-week period in October, 2008. One ozone monitor location still active during this time period in 2008 was shown to have a significant amount of predicted ozone formation caused by prescribed fire. However, observed ozone at this site was quite low, and closer examination of the model performance shows consistent over-prediction of total ozone, shown below. Despite the model over-prediction, estimated values with up to 5ppb of prescribed fire-caused ozone are still well below the current or any potential near-term new standard. So, while there is evidence that prescribed burning in this area at this time can influence ozone concentrations, it is not enough to be a concern in the context of fire planning or SIP development.

Oct 12 - 25, 2008



Observed Ozone paired with modeled max 8-hour fire contribution 10/01/2008 to 10/31/2008
Flathead County, MT - GLR468



FETS Summary Fire Statistics 10/12/2008 to 10/25/2008

Emissions Totals Tons

Total NO_x: 1,478.1

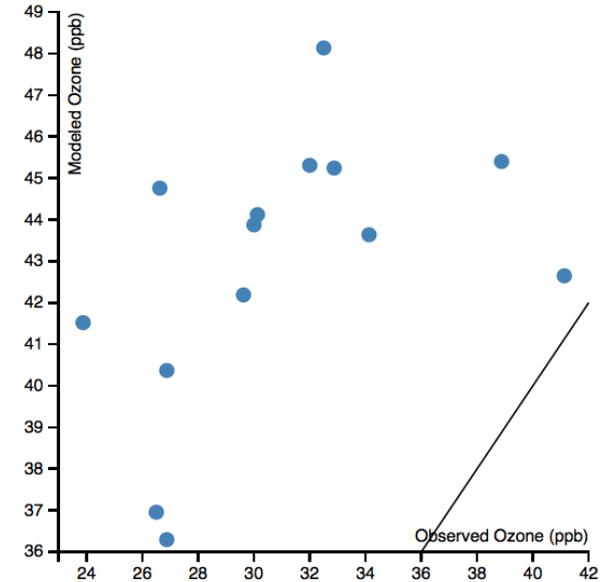
Total VOC: 1,745.4

Total PM_{2.5}: 4,217.0

	Tons Consumed	Acres Burned	Tons NO _x	Tons PM _{2.5}
Wildfire	16,419	1,180	51.0	141.8
Prescribed Fire	453,523	18,703	1,407.5	4,032.5
Agricultural Fire	6,344	3,428	19.7	42.8

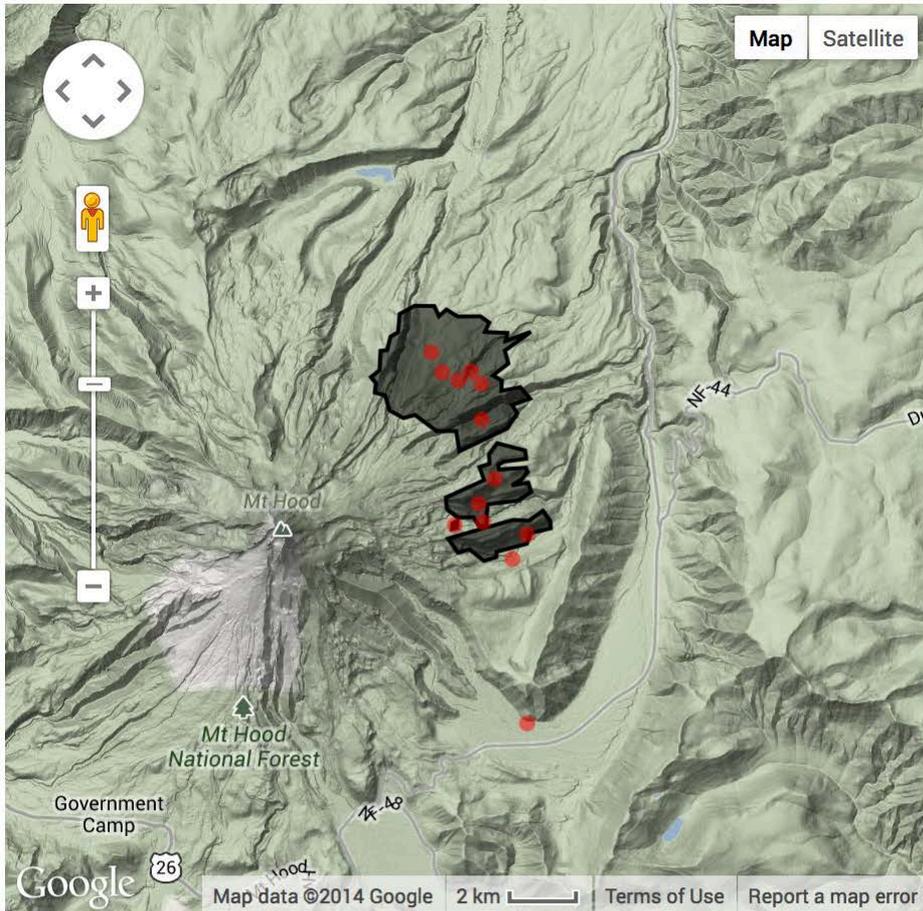


Max 8-hour Ozone, Observed vs. Modeled, 10/12/2008 to 10/25/2008
Flathead County, MT - GLR468



Gnarl Ridge Report

Gnarl Ridge Fire 2008



Ozone monitor locations with max 8-hr observed ozone between 40 and 75 ppb, with a modeled fire contribution of at least 6 ppb, from 2008-08-01 to 2008-09-30. Ozone and predicted fire contribution from the FINN model. Non-attainment areas are shown as orange polygons and MTBS areas as red polygons. Ozone stations are shown in red with a black border; fire activity is shown in blue (agriculture), green (prescribed) and red (wildfires).

FETS Summary Fire Statistics 08/01/2008 to 09/30/2008

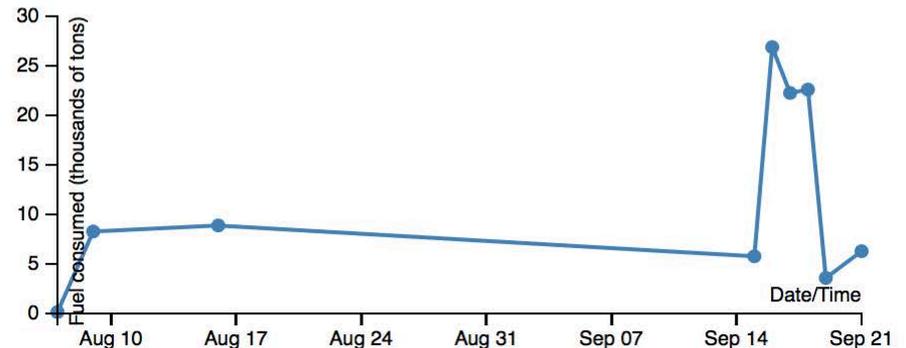
Emissions Totals Tons

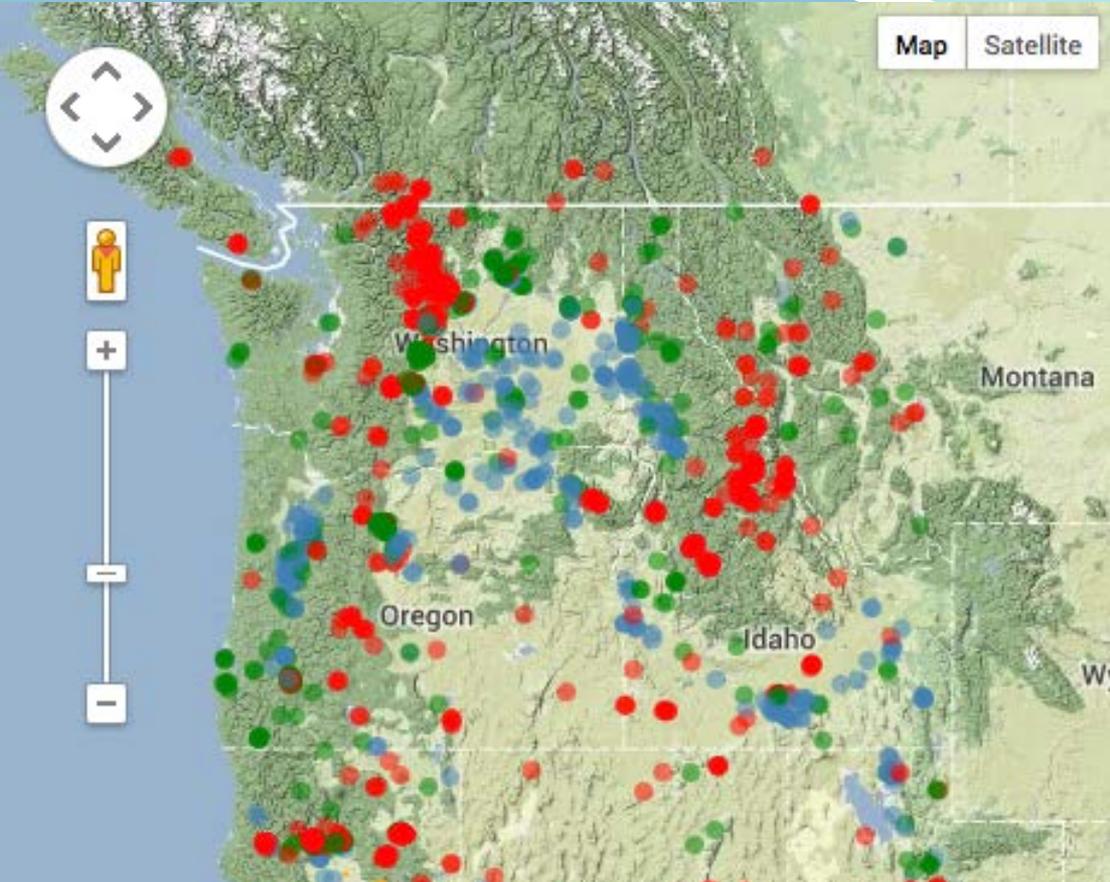
Total NO_x: 325.0 Total VOC: 375.2 Total PM_{2.5}: 865.5

	Tons Consumed	Acres Burned	Tons NO _x	Tons PM _{2.5}
Wildfire	104,711	3,417	325.0	865.5



FETS estimated fuel consumed for all fire types 08/01/2008 to 09/30/2008 limited by geographic bounding box



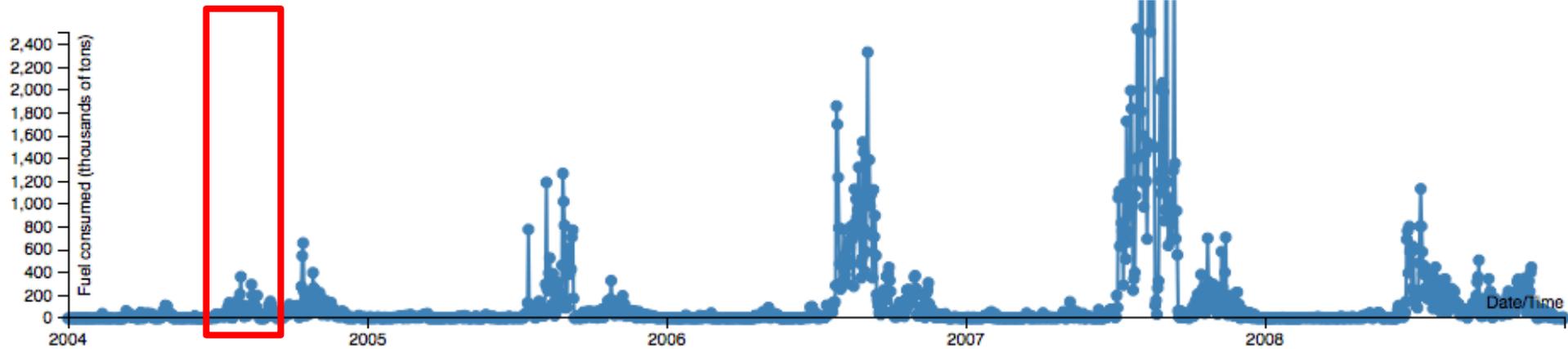


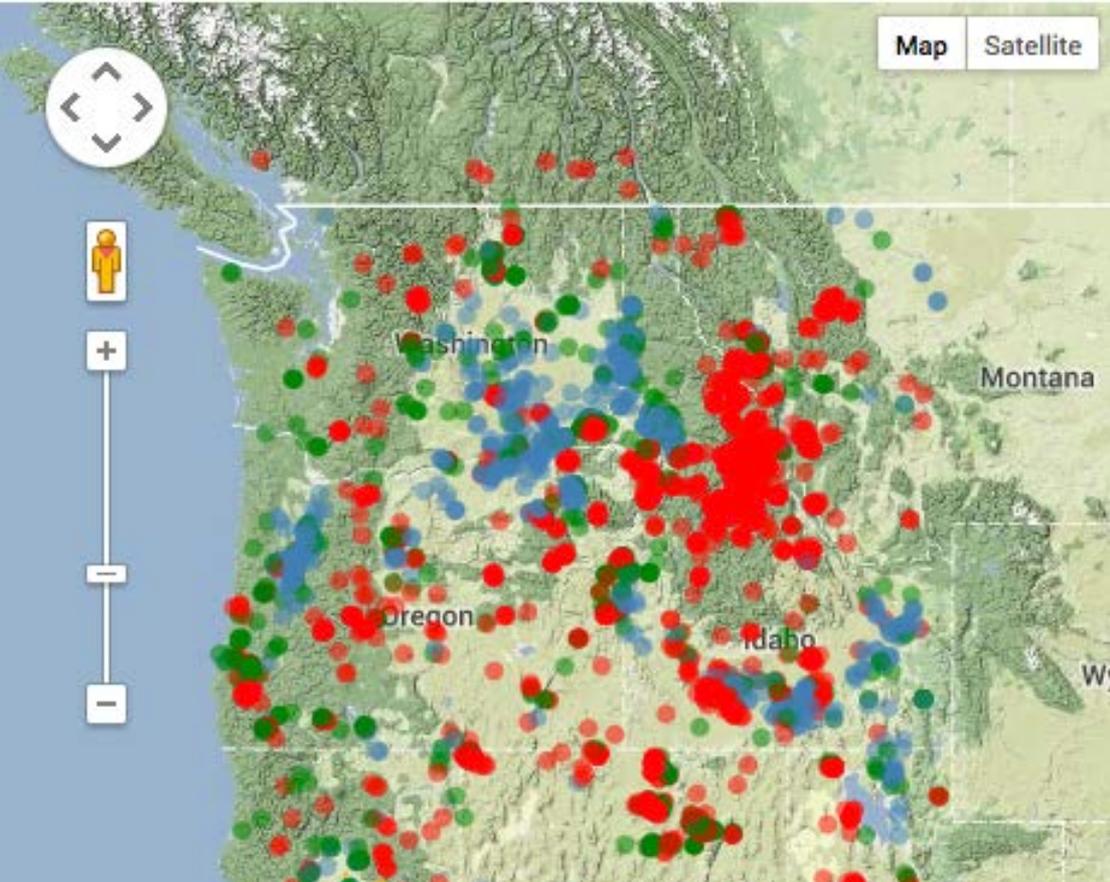
2004

6/20 – 8/31

Limited by bounding box

FETS estimated fuel consumed for all fire types 01/01/2004 to 12/31/2008
limited by geographic bounding box



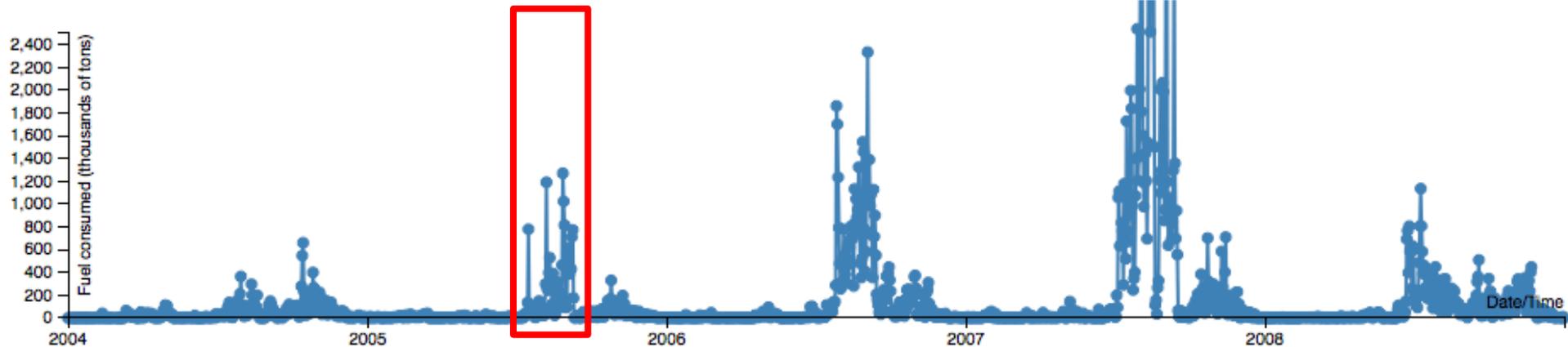


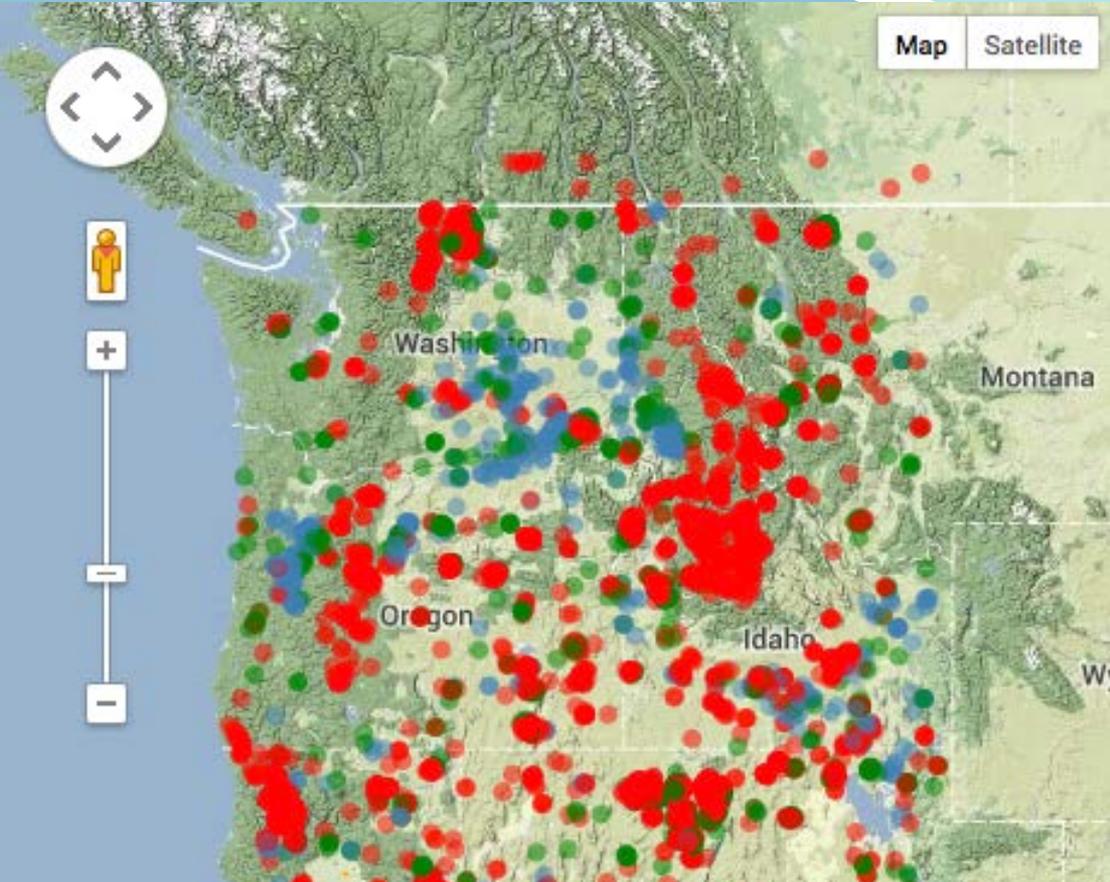
2005

6/20 – 8/31

Limited by bounding box

FETS estimated fuel consumed for all fire types 01/01/2004 to 12/31/2008
limited by geographic bounding box



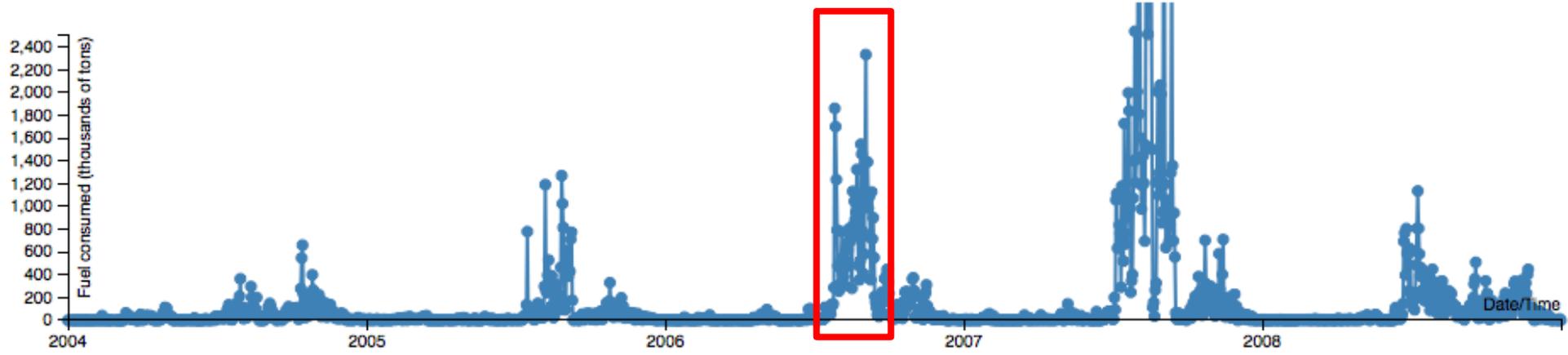


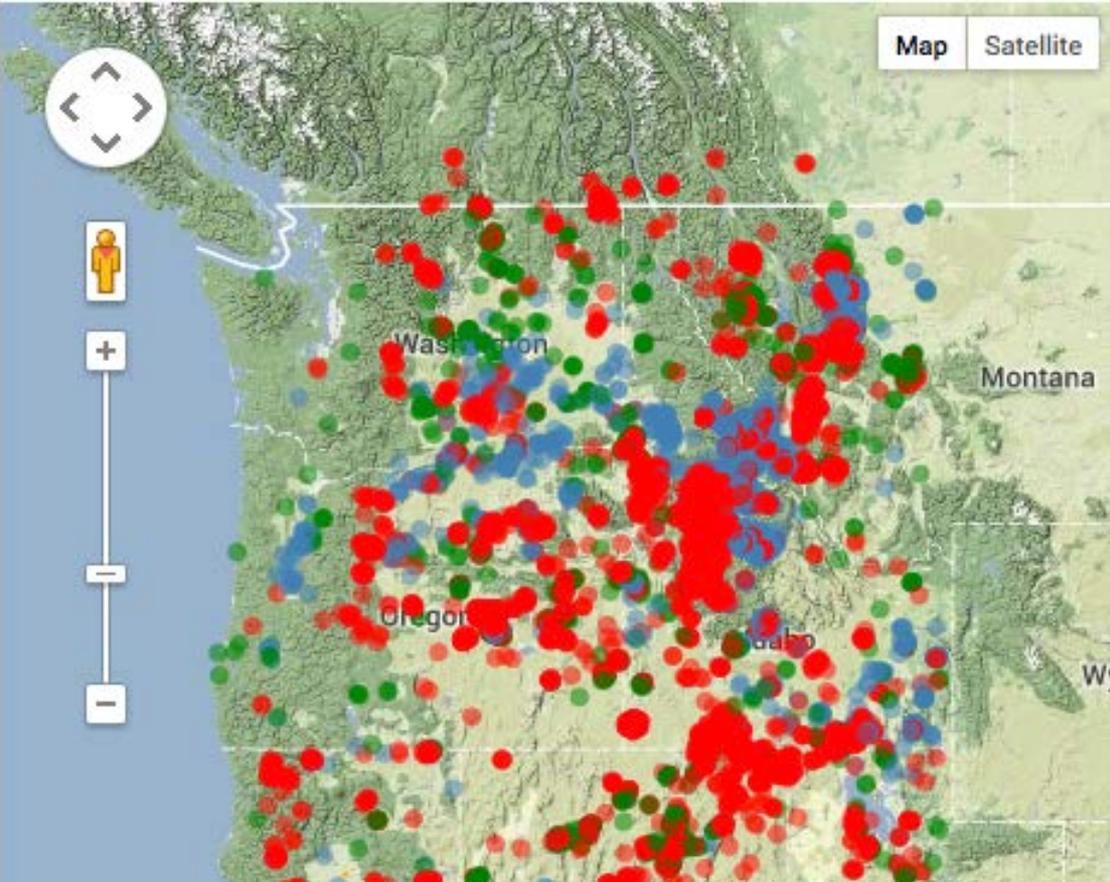
2006

6/20 – 8/31

Limited by bounding box

FETS estimated fuel consumed for all fire types 01/01/2004 to 12/31/2008
limited by geographic bounding box



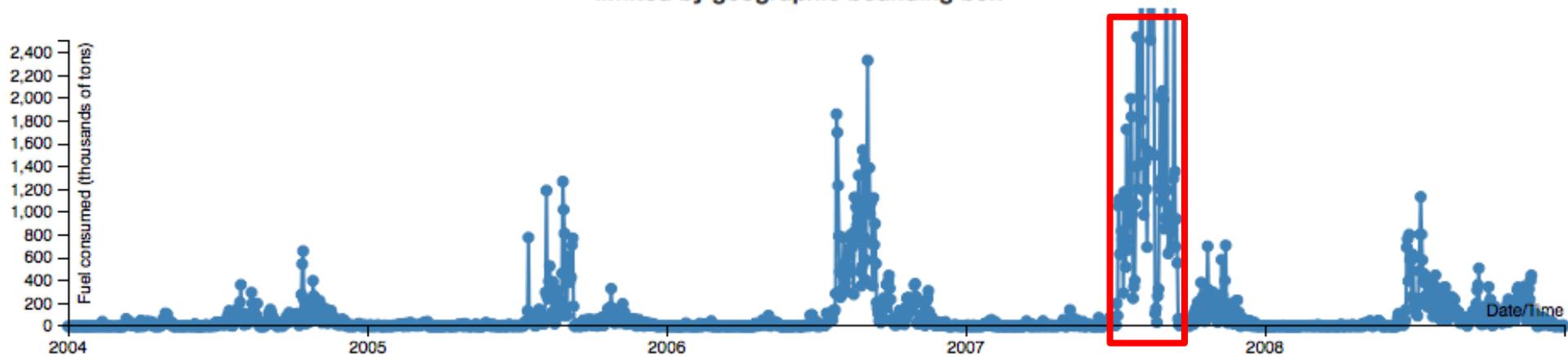


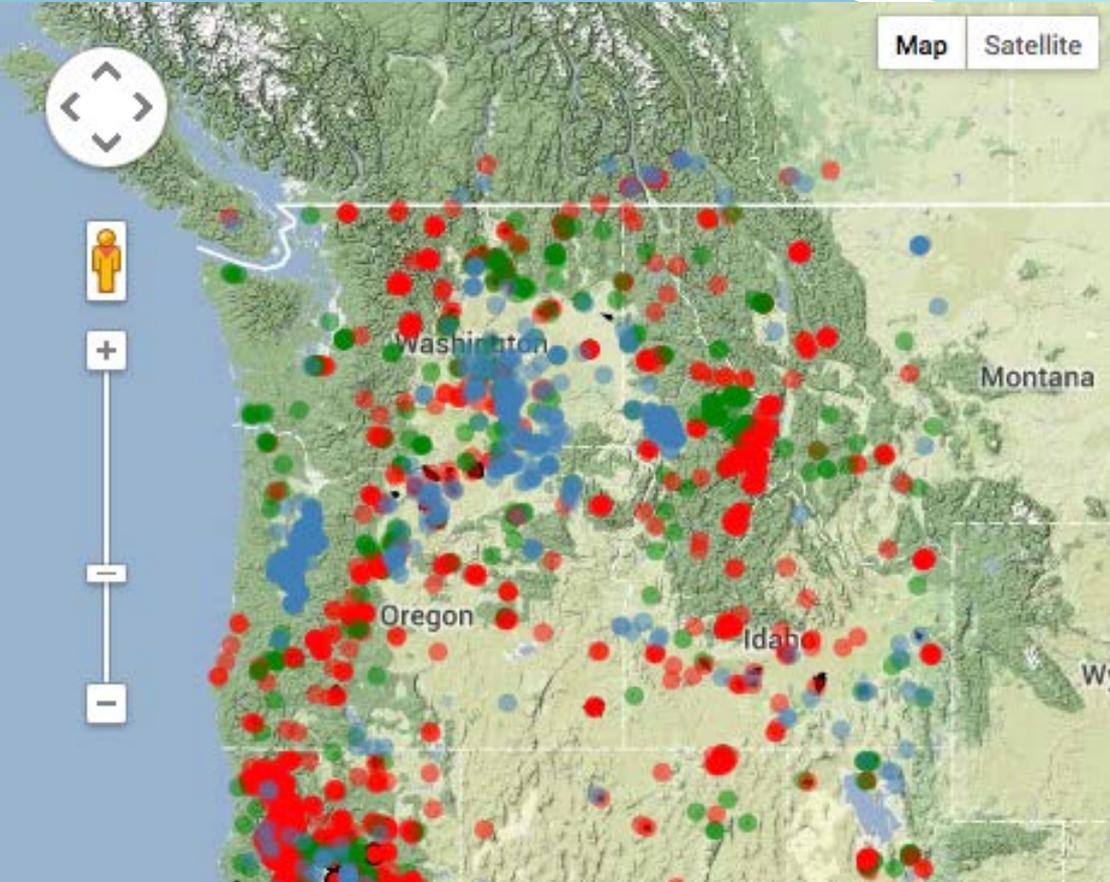
2007

6/20 – 8/31

Limited by bounding box

FETS estimated fuel consumed for all fire types 01/01/2004 to 12/31/2008
limited by geographic bounding box



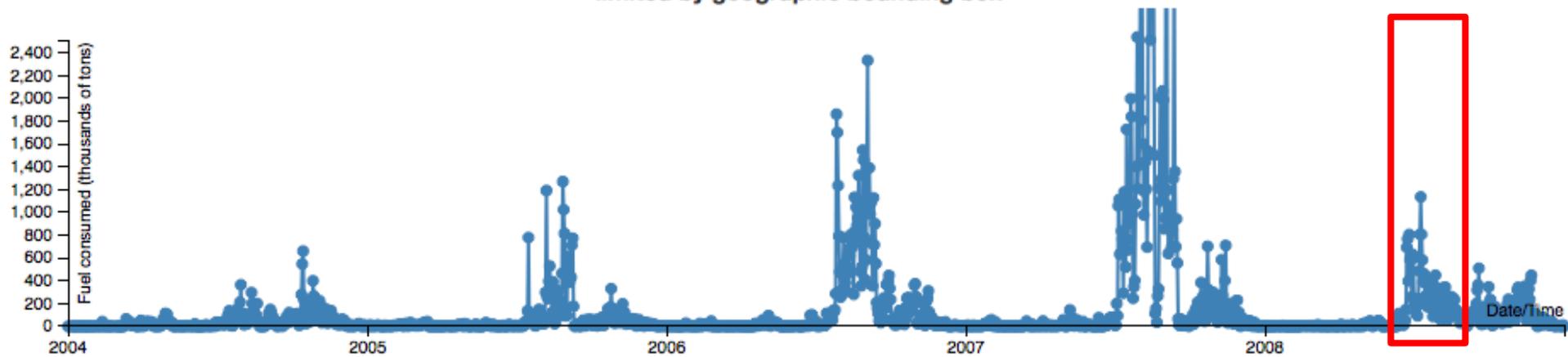


2008

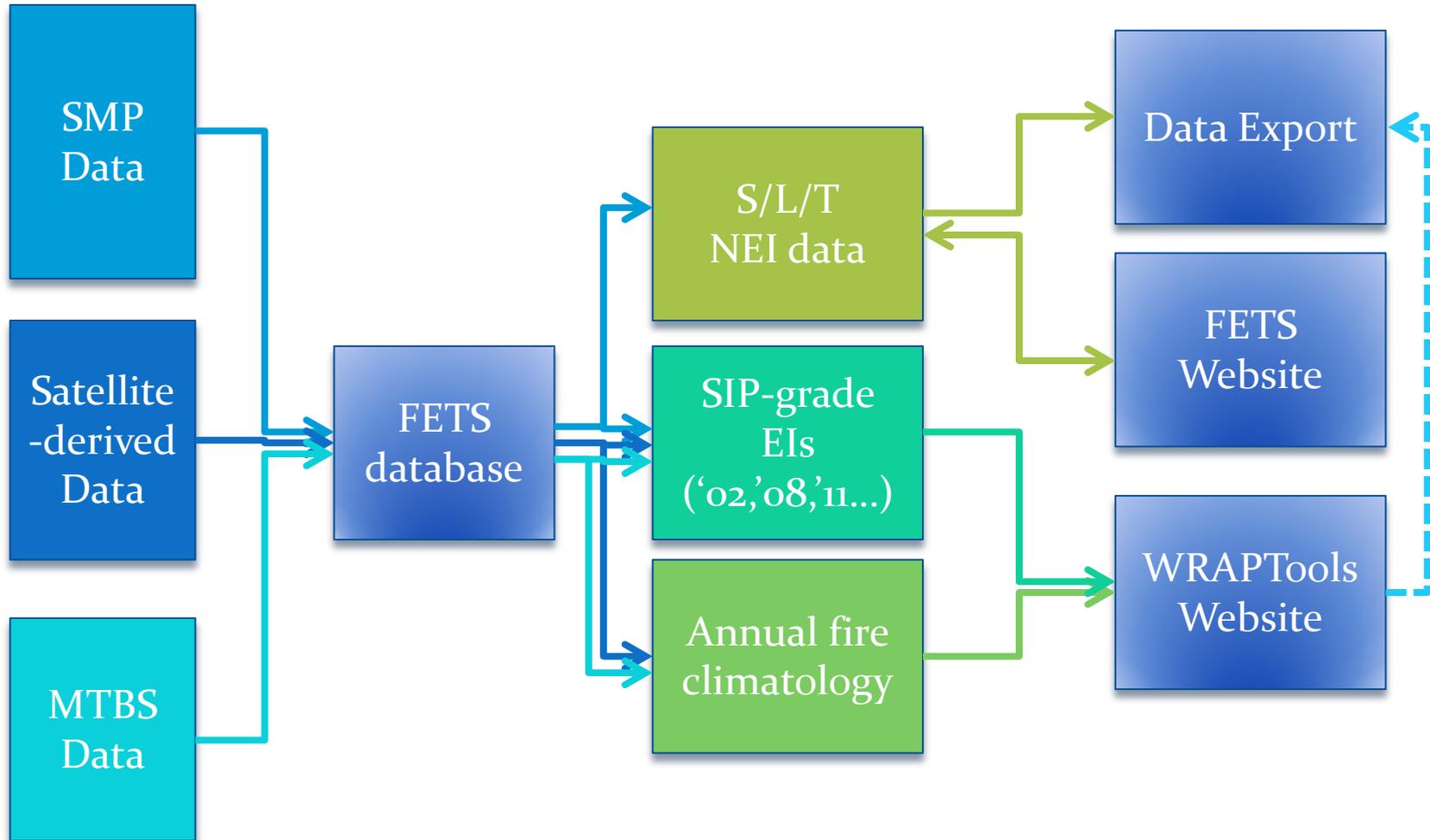
6/20 – 8/31

Limited by bounding box

**FETS estimated fuel consumed for all fire types 01/01/2004 to 12/31/2008
limited by geographic bounding box**

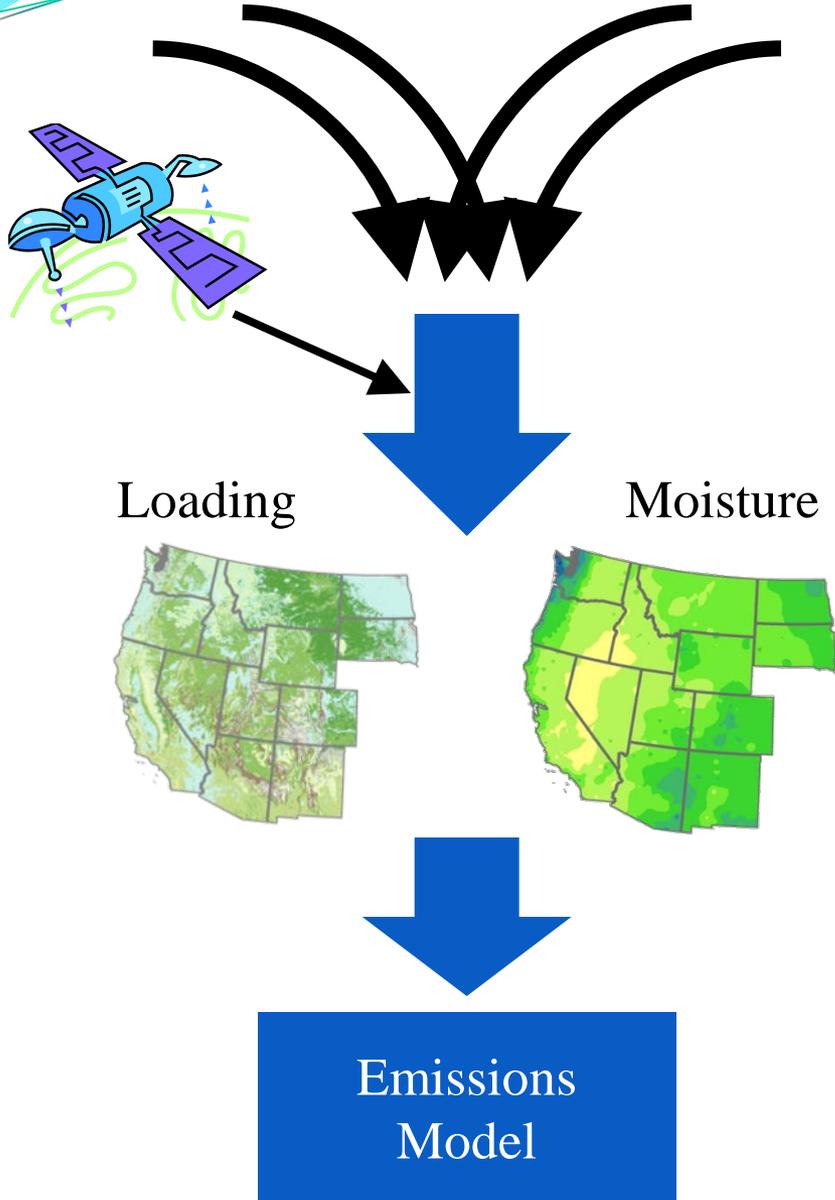


Where do your data go, how are they used?



User-supplied data maintain their identity throughout the system

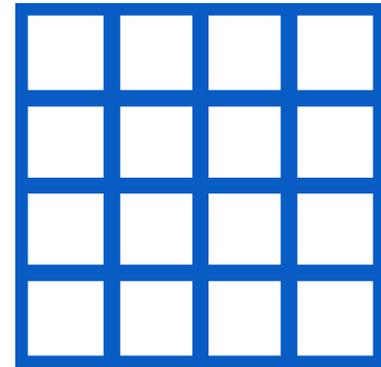
Fire Activity Data (acres/day)



FETS

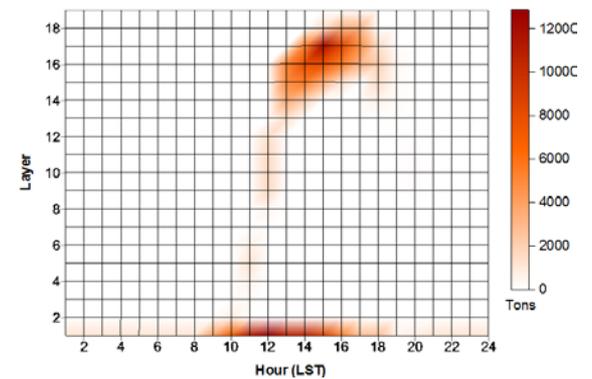
DEASCO₃ & PMDETAIL

distribute emissions



Chemical Profiles

loft emissions



Completed DEASCO₃ project - purpose & goals

- Assess fire's impact on elevated ozone episodes with retrospective studies
 - Studies of fire and ozone in 2002 through 2008
 - Tools and data at: <http://deasco3.wraptools.org/>
- Outcomes
 - Support future collaborative FLM-state ozone air quality planning
 - Developed “lessons learned”, basic analysis rules for fire-ozone episodes, and online tools for FLM-state air quality planning
 - Through WRAP FETS, prepared and implemented planning-grade fire emissions inventories in FETS suitable for SIP work by states & FLMs
 - Published data and analysis results in transparent and reproducible formats
 - Collaboration involved EPA western RO and FLM staff, leverages WestJumpAQMS
 - Products for FLMs and states to use in SIP process and Exceptional Events demonstrations

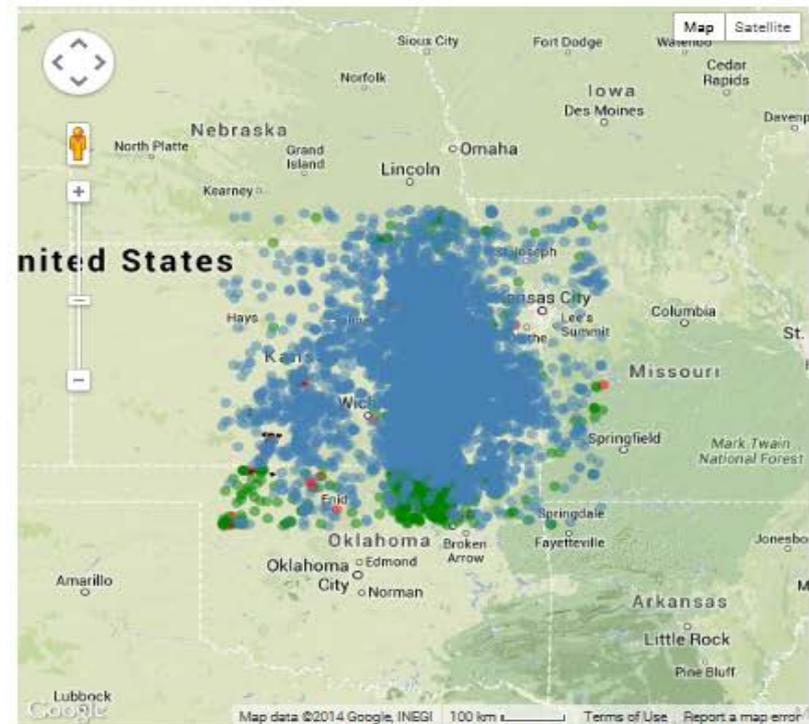
Flint Hills Case Study

Each year in April, thousands of acres of agricultural land are burned in the Flint Hills region of Kansas. April is generally considered a "shoulder" season for ozone formation, and this annual event was chosen as a Case Study to examine its effect on ozone formation throughout the region. Observed ozone data in the vicinity was examined for the month of April, and compared with CAMx model results to show the estimated impact of fire on observed values. Fire emissions data for non-model years were summarized to demonstrate the persistent nature of burning in this region each year.

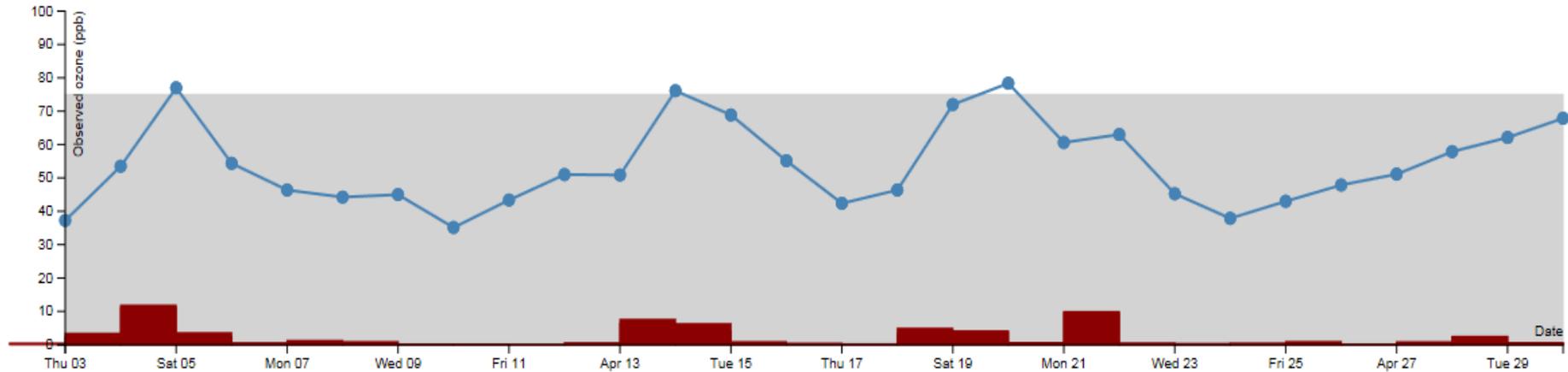
April 2008

[2](#)[3](#)[EE](#)[FP](#)[SS](#)

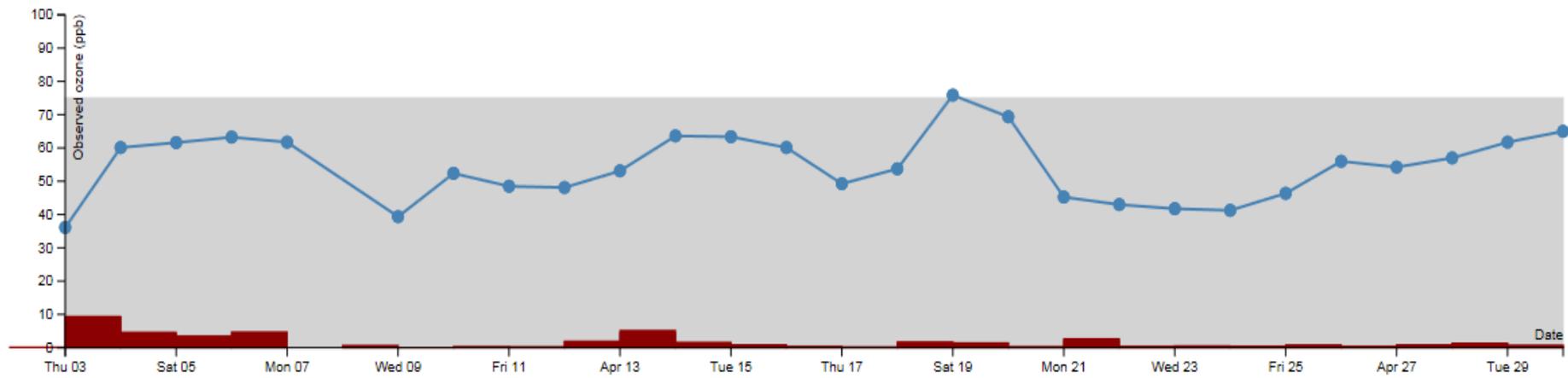
Add paired maps and fire stats for each time period (multiple years)



Ozone monitor locations with max 8-hr observed ozone between 40 and 75 ppb, with a modeled fire contribution of at least 6 ppb, from 2008-04-01 to 2008-04-30. Ozone and predicted fire contribution from the DEASCO₃ model. Non-attainment areas are shown as orange polygons and MTBS areas as red polygons. Ozone stations are shown in red with a black border, fire activity is shown in blue (agriculture), green (prescribed) and red (wildfires).



Max 8-hr observed ozone in Kansas (station KNZ184) for the month of April, 2008. The peaks on 4/5, 4/14, and 4/20 all had an estimated contribution by fire of ≥ 5ppb based on CAMx Base08b modeling results.



Max 8-hr observed ozone in Oklahoma (station 40_037_0144) in April 2008. The peak (75.9 ppb) on 4/19 had an estimated contributed by fire of 2 ppb.



FETS Summary Fire Statistics 2008-04-18 to 2008-04-20

Emissions Totals Tons

Total NO _x : 251.6	Total VOC: 652.8	Total PM _{2.5} : 773.5
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Area of interest for fire activity. Time period shown is 4/18 - 4/20. [image source](#)

Exceptional Events Support

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

Particulate Matter Deterministic & Empirical Tagging & Assessment of Impacts on Levels (PMDETAIL)

- <https://pmdetail.wraptools.org/>
- 3-year project, JFSP-funded
 - Completion target Sept. 2015
 - Team = WESTAR/WRAP, Air Sciences, ENVIRON, CMU, and CSU
- Study Objectives
 - Quantify the impact of prescribed and other fire sources on particulate matter (characterized as $PM_{2.5}$ and PM_{10}) levels across the continental U.S.
 - Develop new fire emissions inventories and computational modules for chemical transport models to simulate the atmospheric transformations of these emissions
 - CAMx and PMCAMx models and inventories will be evaluated against field measurements for 2002, 2008, and 2011.
 - CAMx is a publicly available chemical transport model (CTM) used for regulatory purposes, while PMCAMx is its research version developed by the CMU team.
 - Based on leveraging and significant extending emission inventory development and CAMx modeling from the Deterministic and Empirical Assessment of Smoke's Contribution to Ozone (DEASCO₃) study completed in 2013.

FETS, Present and Future

- Developed and on-line in 2007
- Continuing processing / addition of each year's data from SMPs
 - Continuing to add new SMPs
 - Exploring additional sources of daily wildfire incidence data
- Leveraged JFSP projects have covered very limited FETS maintenance support
- Datasets from JFSP projects and ongoing FETS data collection converging on WRAPTools (<https://wraptools.org/>)
- High-priority, critical infrastructure maintenance tasks underway
- Outreach process to WRAP region SMPs to assess needs for additional functionality and identify collaboration activities

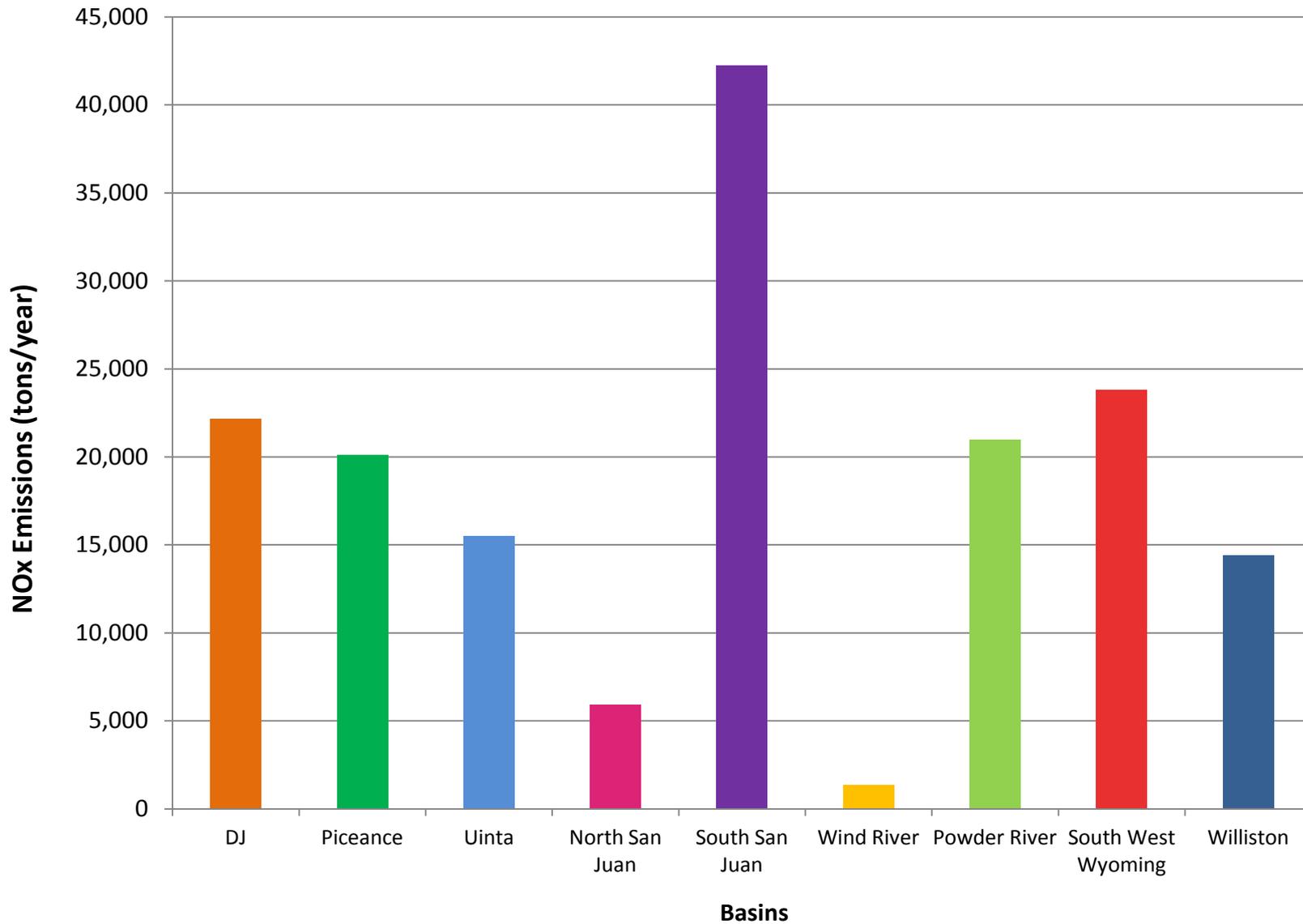
Regional Haze: Reasonable Progress Reports

- WRAP produced a comprehensive, regionally-consistent technical report – completed Summer 2013
 - Regional, state, and Class I area reports
 - Technical analyses required by Regional Haze Rule
 - Western states will use as a common basis in preparing individual SIP revisions
 - SIP revisions are due in the 2013-15 timeframe
- WRAP providing western 2008 emissions data
 - Leveraged from WestJumpAQMS
 - States will use to evaluate changes in monitored visibility
- Project reports at: <http://www.wrapair2.org/reghaze.aspx>

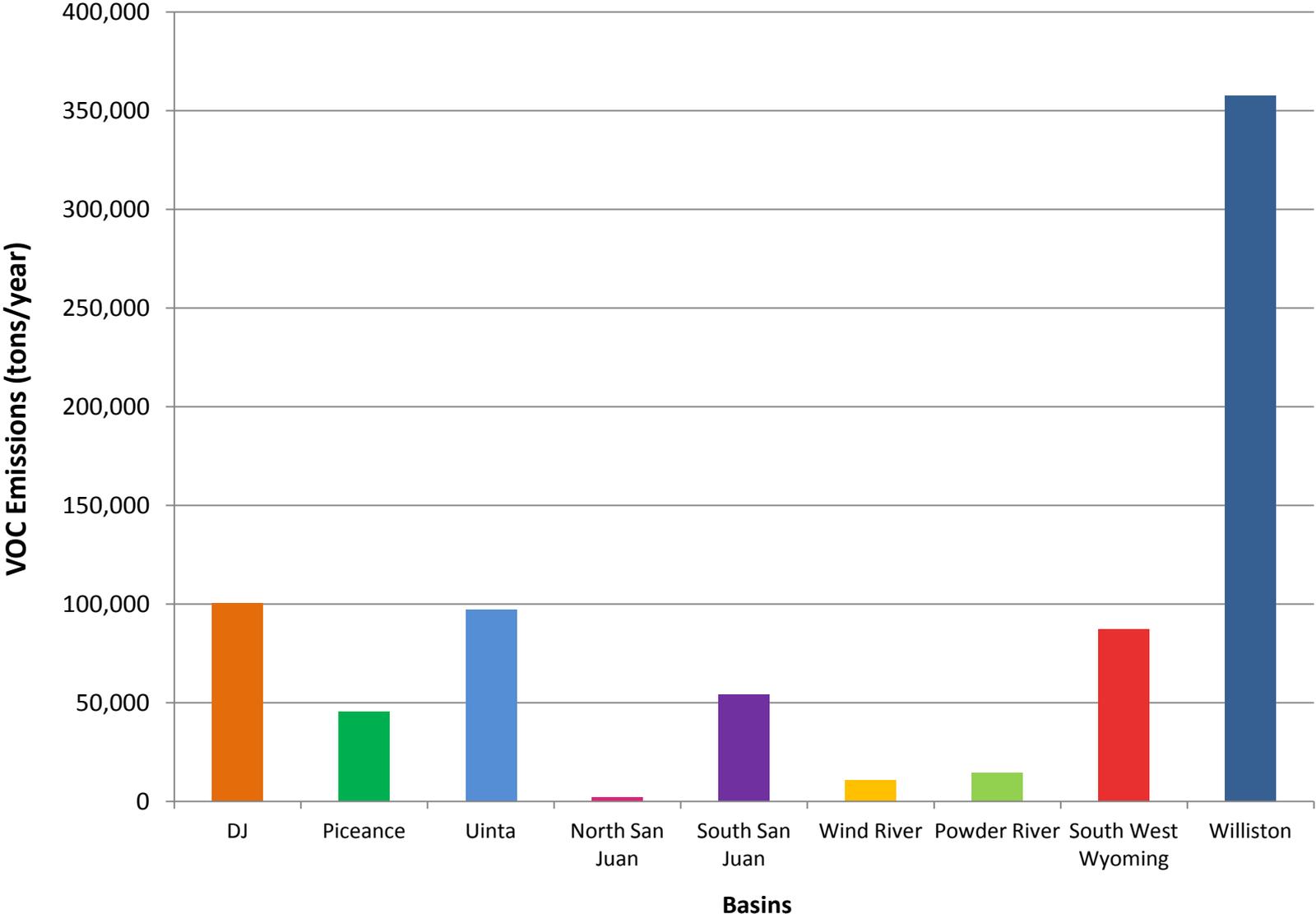
Oil & Gas: Emissions Inventories and Control Analysis

- Key source for Ozone / PM standards, & Regional Haze
- Exploration and production activity continue to increase
- Data in use current OAQPS national & western modeling work
 - Significant funding and involvement by industry
 - Open review and discussion process with all interested stakeholders
- Linkages
 - WestJumpAQMS
 - 3-State Air Quality Study
 - O&G EI project funded by BLM MT-Dakotas office
 - 2011 base & projection years' EI for Williston & Montana Great Plains Basins

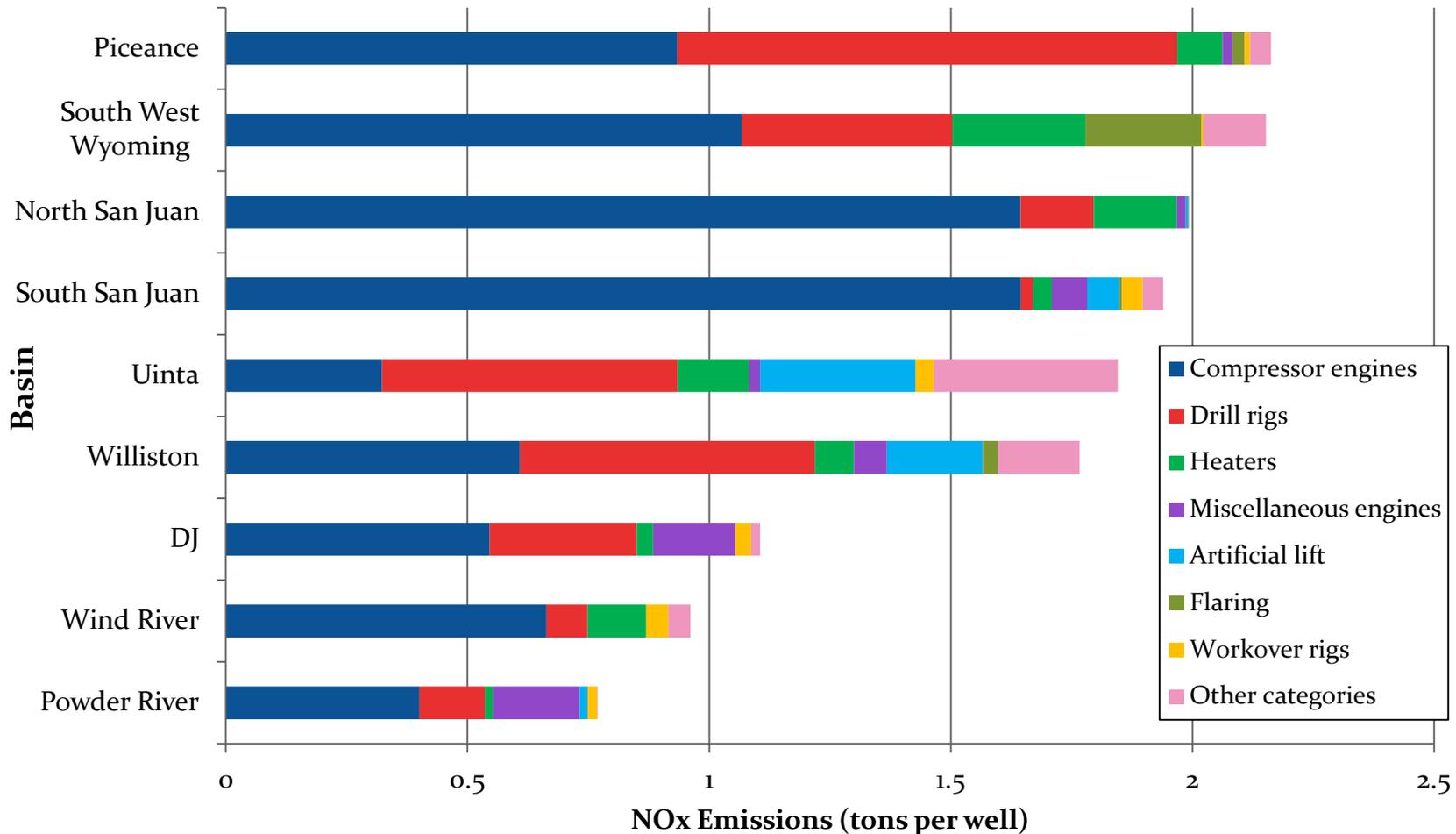
Cross-Basin – NO_x Emissions



Cross-Basin – VOC Emissions

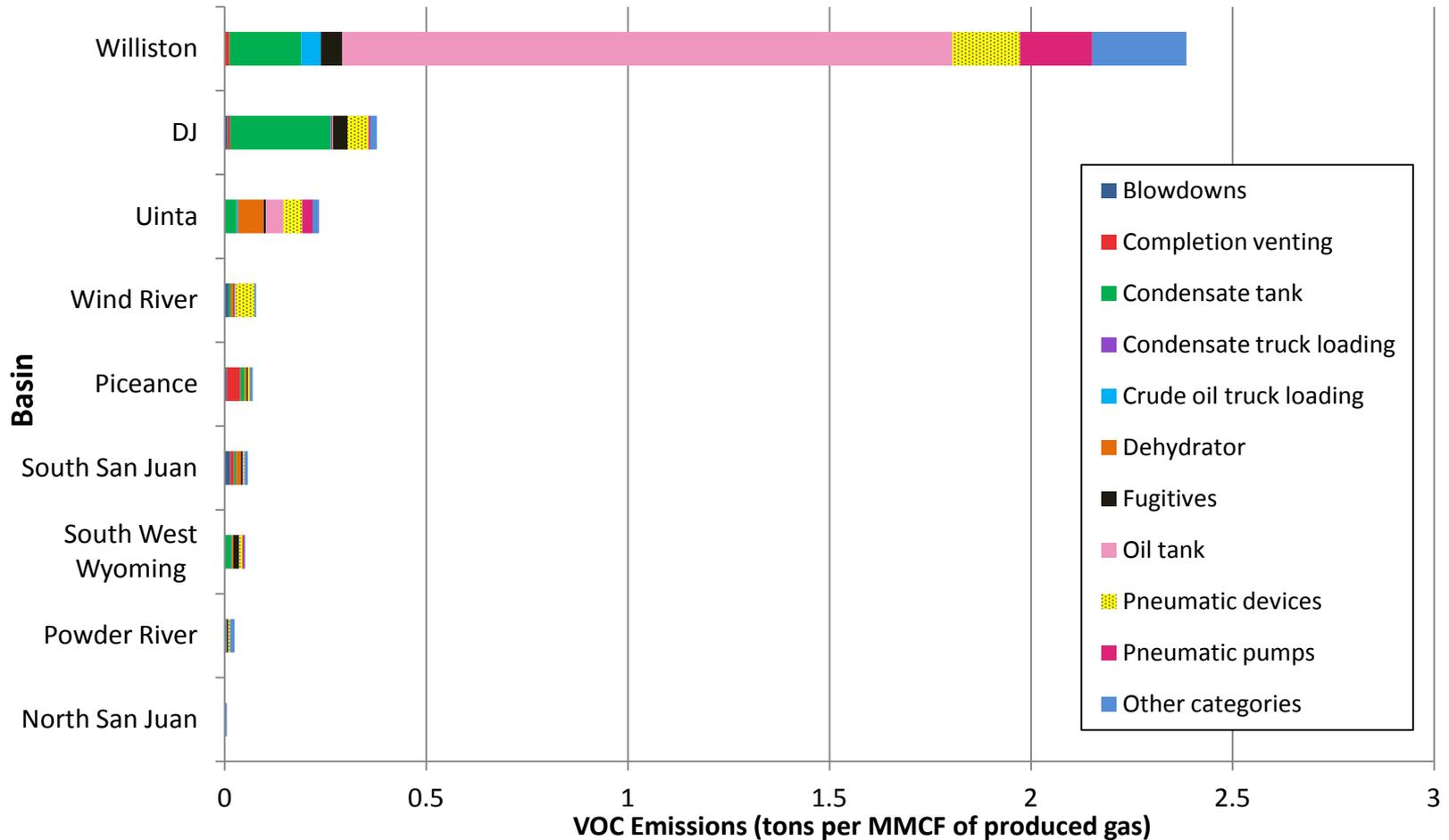


Cross-Basin – Per-Well NOx Emissions



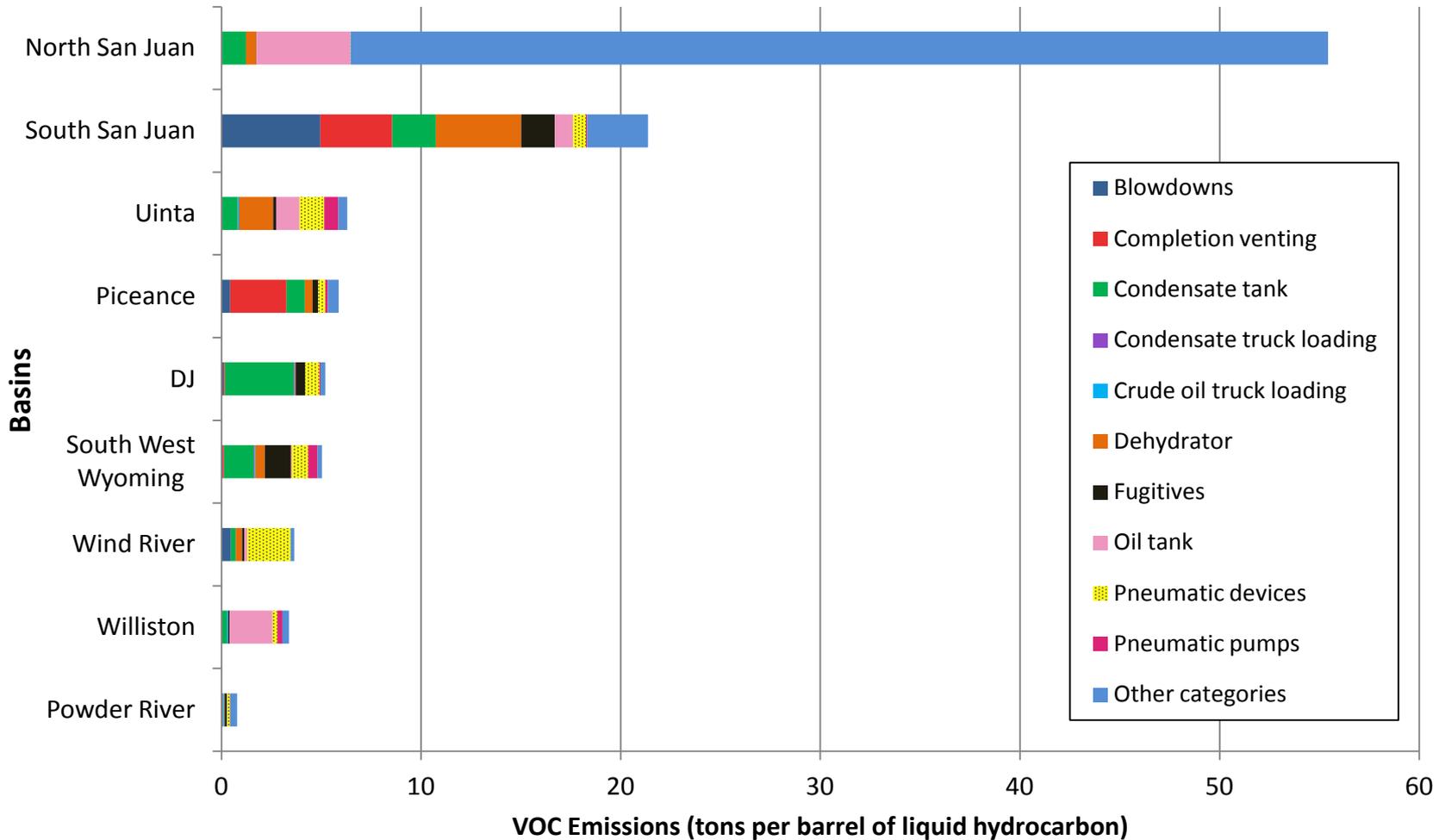
Per well NOx emissions relatively consistent across basins – differences mainly due to usage of compression and centralized vs. wellhead compression

Cross-Basin – Per-Unit-Gas-Production VOC Emissions



Per unit gas production VOC emissions vary widely across basins – differences due to levels of liquid hydrocarbon production (oil and condensate) and VOC content of produced gas

Cross-Basin – Per-Unit-Liquid-Production VOC Emissions



Per unit gas production VOC emissions vary widely across basins – differences due to levels of liquid hydrocarbon production (oil and condensate) and VOC content of produced gas

Issues – Missing Categories

Produced water (evaporation) ponds



- **Emission factors uncertain and highly dependent on composition, production type**
- **Seasonal/diurnal variations**
- **See for example Utah State University work to characterize emissions in Uinta Basin**

Issues – Missing Categories

Field gathering pipelines



- **Lack of data on extent of pipeline infrastructure within fields**
- **Pipeline companies historically not part of the inventory process**

Issues – Missing Categories

Midstream sources



- **Midstream sources not always captured in inventories – state reporting thresholds**
- **Midstream sources on tribal lands**
- **Midstream companies historically not part of the inventory process**

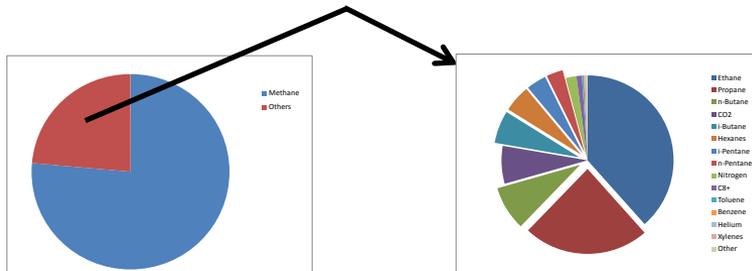
Issues / New Concepts – Non-routine events, Skewness

- Pipeline blowdowns
- Spills/upsets
- Maintenance activities

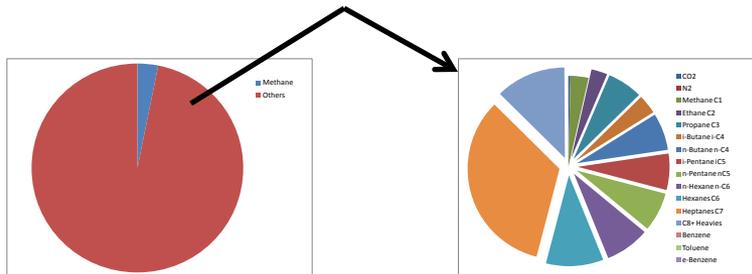


- Poorly performing and “non-average” sources could have significantly higher emissions than estimated in inventories
- Analogous to “smoking vehicles” in mobile source inventories
- Statistical sampling/monitoring of sources needed to develop methods to represent this in inventories
- See for example NOAA monitoring in Uinta Basin and CDPHE capture efficiency adjustments

Issues and New Concepts – Gas Compositions



Conventional Gas
(Vented/Fugitive Sources)



Flash Gas
(Condensate and Oil Tanks)

- Gas compositions in Phase III use a basin-average approach
- Variability within a basin by production type (field to field)
- Variability within the production/gathering system
- More data needed – field or formation level approach for basins?

Issues and New Concepts – Factors and Uncertainty

New factor data

- **Fugitive emissions**
- **Venting from well completions**
- **Water tanks / evap ponds**

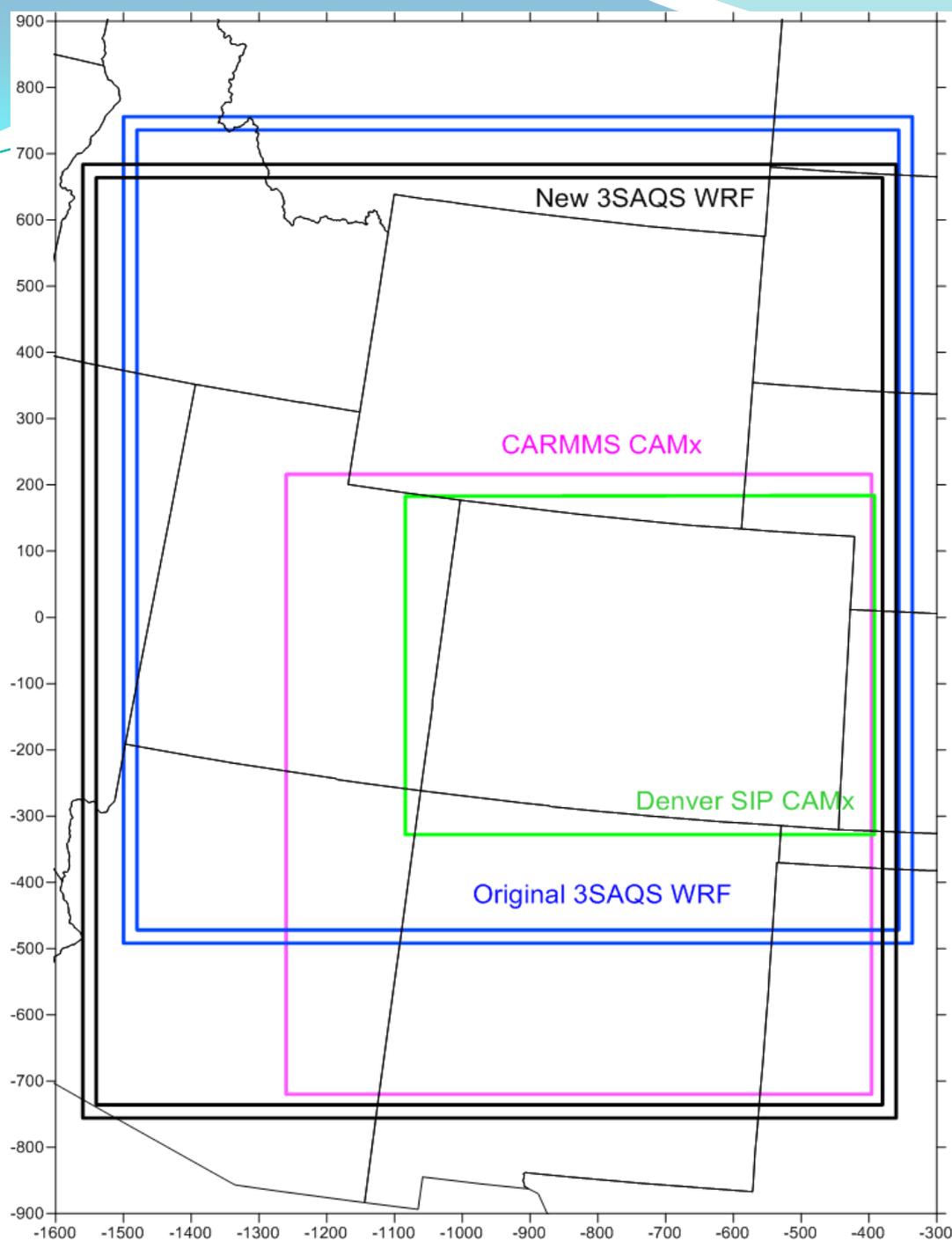
Uncertainty

- **Uncertainties not quantitatively estimated in most inventories**
- **Large data sets needed to estimate uncertainty**
- **Helpful in identifying poorly-characterized sources, and estimating uncertainty in AQ modeling**



Federal Leadership Forum / 3-State Air Quality Study (funded by BLM, USFS, EPA, others in-kind)

- Steering committee of WY, CO, UT, EPA, BLM, NPS, and USFS
- Implementation of 3-State and national MOUs' objectives
- Planning for air quality impacts of energy development
 - Ozone focus, additional rural monitoring stations in oil & gas basins
 - Wintertime ozone nonattainment areas
 - Integrates results from WestJumpAQMS and Oil & Gas projects
 - Data warehouse to support future air quality modeling and other analyses



3SAQS 4km Modeling Domain – discussed and recommended at Oct. 31- Nov. 1 Technical Committee Workshop

3-State Air Quality Study - Objectives

- Facilitate more complete and consistent AQ Analysis for NEPA and other AQ decisions
- Improve timeliness and collaboration
- Reduce duplication of AQ analysis resulting in lower costs
- Improvements include or will include:
 - Six new monitoring sites
 - More region-specific modeled emissions
 - More current base case and better future case air quality modeling
 - A data warehouse to contain all this improved information and future data for access by agencies and those they approve to use it

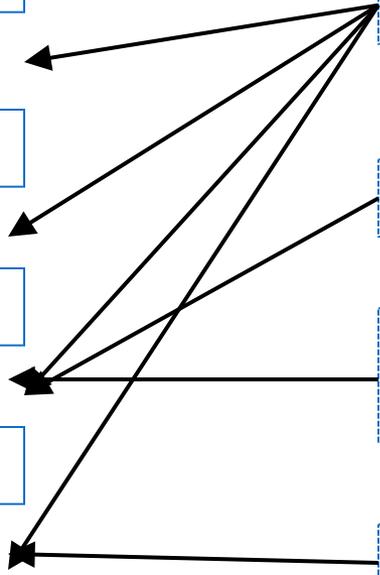
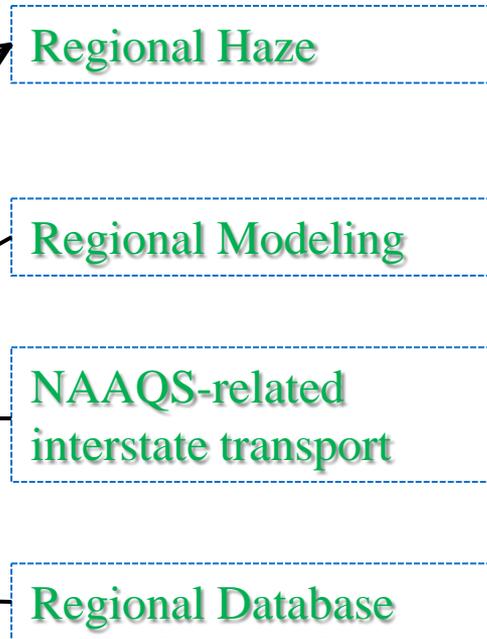
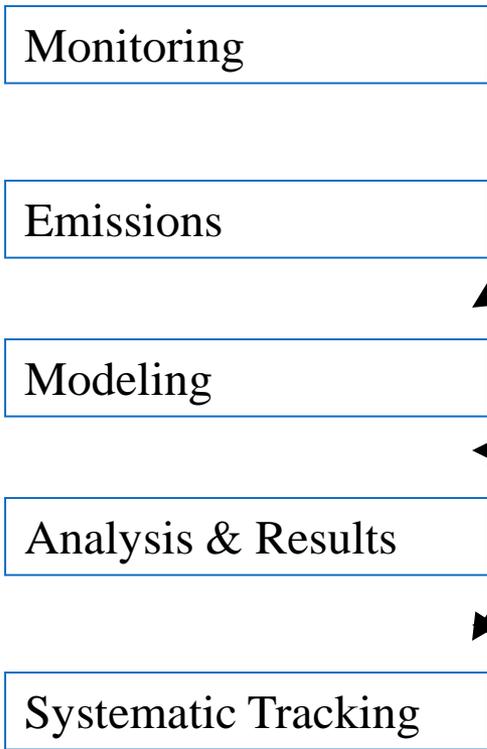
Opportunities for Data Warehouse and Applying Regional Modeling Results from Western Regional Technical Studies

- 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
- Next Step – develop Western Air Quality Modeling Framework concept paper

3-State Data Warehouse

Western Regional Modeling Framework (future)

3-State Data Warehouse



Western Regional Modeling Framework



Thanks –

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Western Regional Air Partnership | www.wrapair2.org