USDA United States Department of Agriculture

Fire, Smoke and Air Quality

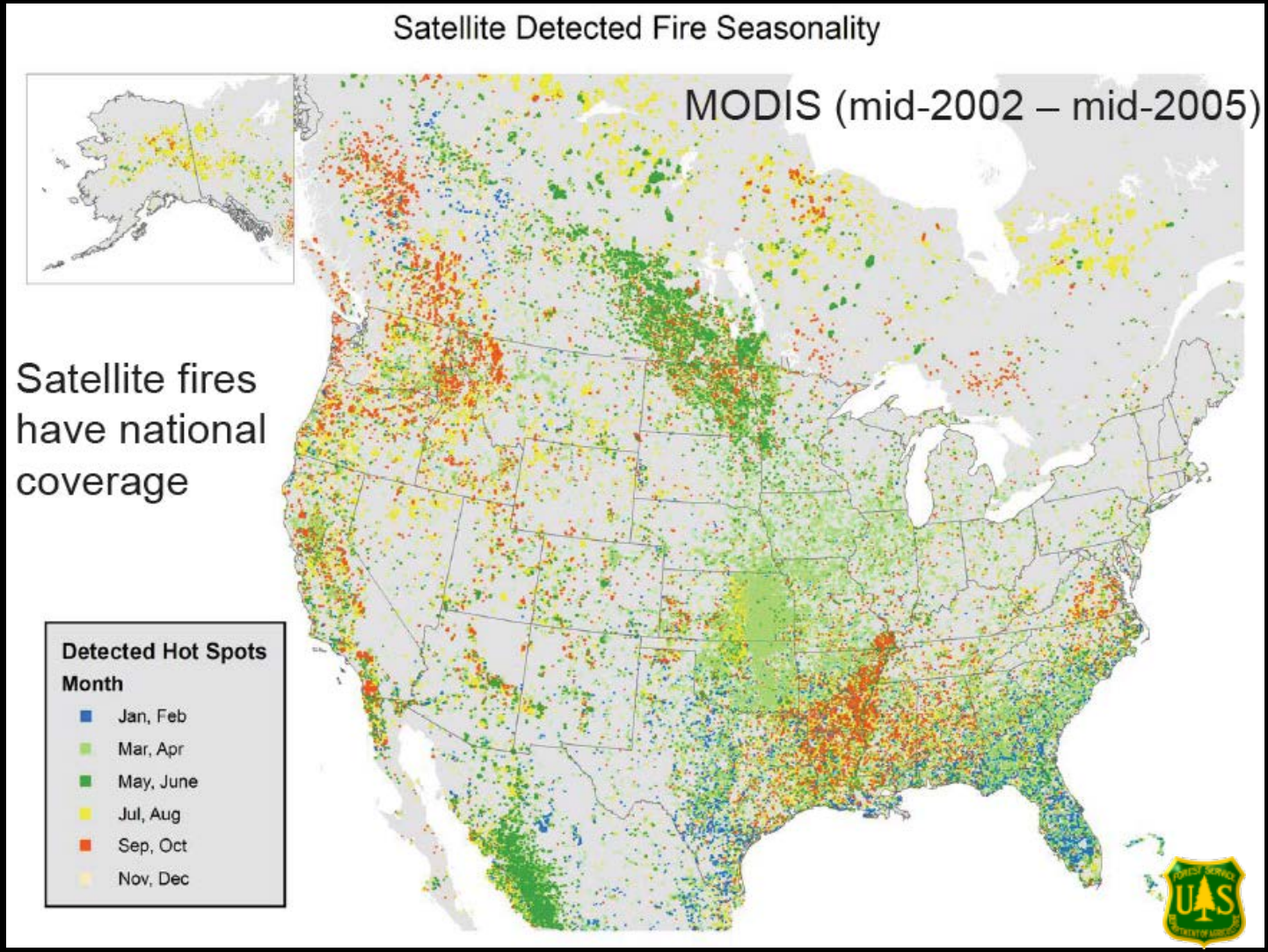
April 23, 2018

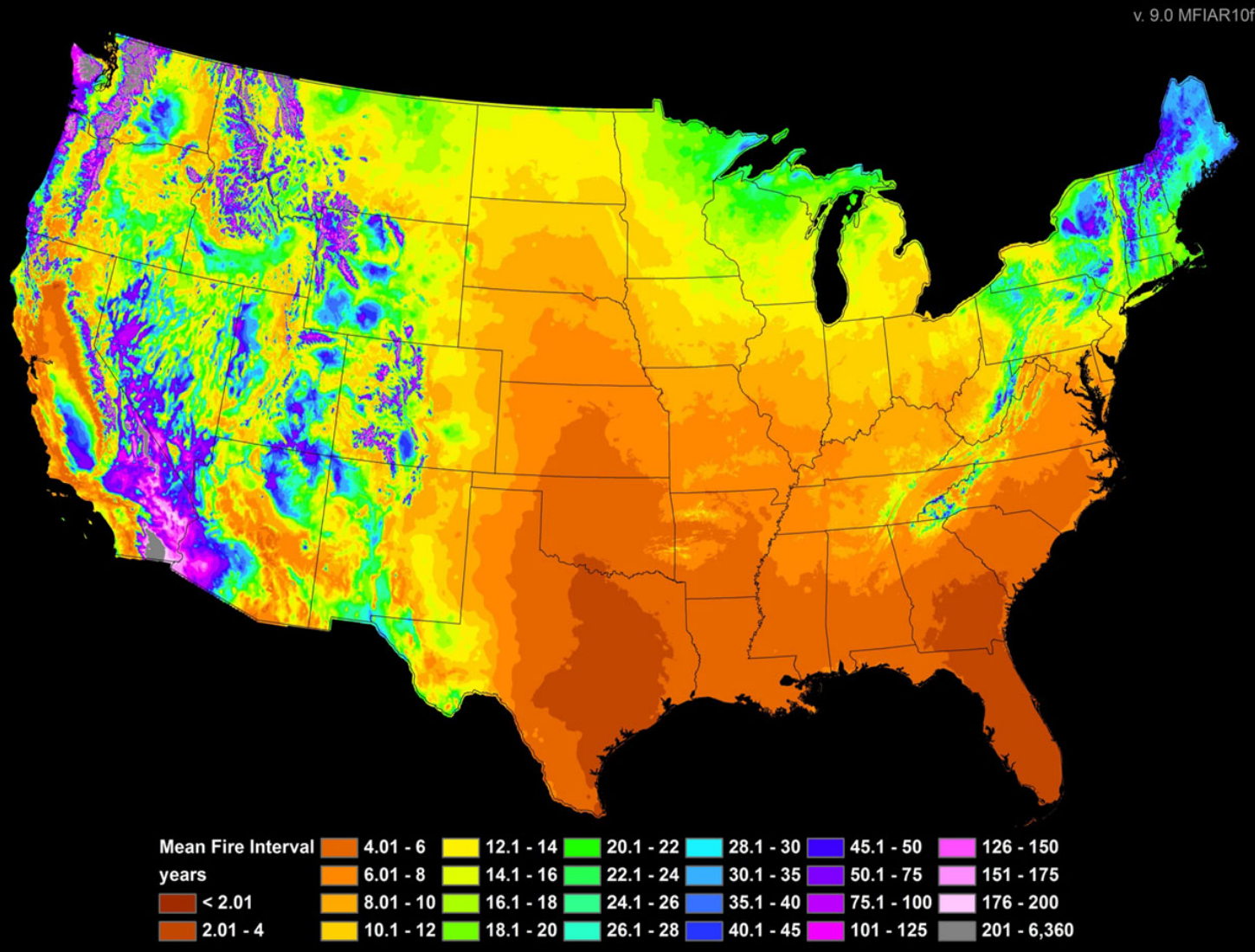
Greg Johnson, Team Leader
NRCS National Air Quality & Atmospheric Change Team
West National Technology Support Center, Portland

Topics Today

- Fire, Smoke and Emissions
- Why Do We Care About Smoke?
- Air Quality Regulations and Monitoring
- What Can We Do About Smoke?
- Smoke Management
- Basic Smoke Management Practices (BSMPs)
  - Weather and Smoke
  - Modeling Smoke and Air Quality
  - Communications
    - Air Resource Advisor Program

... Fire Happens



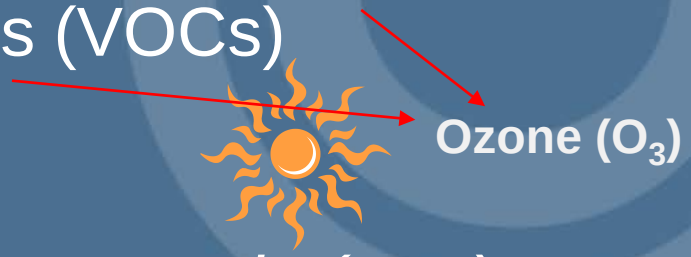


From Guyette et al. 2012

Emissions from Fire—What's in that Smoke?

- Complete Combustion
  - Carbon Dioxide (CO_2)
  - Water (H_2O)
- Incomplete Combustion
  - Carbon Monoxide (CO)
  - Particulate Matter (PM)
  - Volatile Organic Compounds (VOCs)
  - Oxides of Nitrogen (NOx)

  - *And many others, including Ammonia (NH_3)*



Emissions from Fire—What's in that Smoke?

- Hot Fire (Flaming)
  - Most emissions ($PM_{2.5}$, CO, CH_4) much less than smoldering phase
  - NO_x is the exception: Nearly 3x greater than smoldering phase
- Smoldering
  - 2 to 3 times as much fine PM as flaming
- CO_2 emissions about the same

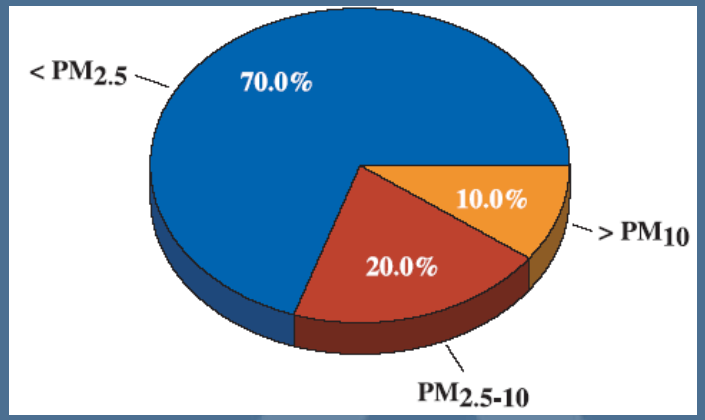
Fire Emissions Most Affected By:

- Structure and arrangement of fuels
- Fuel chemistry
- Fuel condition (growth stage, moisture, and soundness of woody material)
- Meteorology

Urbanski 2014

Particulate Emissions

- Particulate Matter (PM)—Direct (Primary)
- Secondary PM physically and chemically formed in the Atmosphere. Examples:
  - Ammonium Nitrate
  - Ammonium Sulfate
- Grouped by size: Fine ($PM_{2.5}$), Coarse (PM_{10})
- Most smoke particles are ultrafine (just 0.1 to 0.7 µm)—same as visible wavelengths!
- Over 85% of smoke particles scatter light; others absorb
- It takes about 35 days for a particle between 0.1 and 1.0 µm to drop 1000 ft. (in still, dry air), and they can reside in the atmosphere for weeks



Wildland fire smoke is primarily made up of elemental (black) carbon and organic carbon (particulate matter)

Nitrogen Dioxide (NO_2)

- NO_2 is most effective at absorbing visible wavelength light in the blue range. Therefore, with moderate to high concentrations of NO_2 the atmosphere will take on a reddish-brown appearance (Smog)
- This sometimes can become a factor in visibility reduction associated with fire

Why Do We Care About Smoke?

- **Health Impacts**
- **Public Safety and Nuisance**
- **Visibility – Regional Haze Rule**
- **We are a Conservation Agency – Air Quality is a resource concern**

NRCS AQ Resource Concerns

- Emissions of Particulate Matter (PM) and PM Precursors
- Emissions of Ozone Precursors
- Objectionable Odors
- Emissions of Greenhouse Gases
- Emissions of Airborne Reactive Nitrogen

The Register-Guard

121st Year, Number 286 | Eugene, Oregon, Thursday, August 4, 1988 | ★ 25 Cents

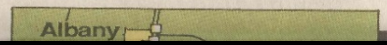
Smoke triggers chain-reaction pileup; 7 killed, 37 injured in freeway tragedy

staff photo by Joe Wilkins III

Burned-out shell is all that remains of one car that burst into flames in the I-5 pileup

I-5 accident near Albany worst in state in 17 years

ALBANY — Blinding smoke from a field burn caused a fiery, 23-vehicle pileup Wednes-



The Register-Guard

st Year, Number 287 | Eugene, Oregon, Friday, August 5, 1988 | ★ 25 Cents

staff photo by Paul Petersen

A crane from AA Towing lifts the charred remains of a semi trailer's cab onto a flatbed truck loaded with other wrecked and burned vehicles from Wednesday's chain-reaction collision on Interstate 5. Seven people died.

-5 tragedy brings halt to field burning

USDA United States Department of Agriculture

Air Quality Regulations and Monitoring

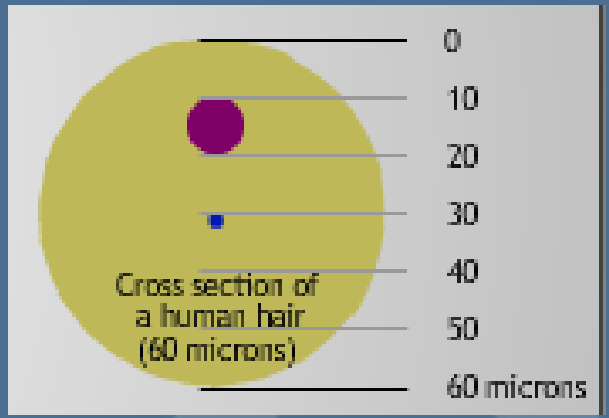
The Regulatory Process

- Principal Driver is the Clean Air Act (CAA; 1970; 1990)
- National Ambient Air Quality Standards (NAAQS)
  - 6 Criteria Pollutants
    - Particulate Matter (PM)
    - Ozone (O_3)
    - Nitrogen Dioxide (NO_2)
    - Sulfur Dioxide (SO_2)
    - Carbon Monoxide (CO)
    - Lead (Pb)
  - Five year review cycle
  - Nonattainment Areas (NAA) Designated
  - State Implementation Plans (SIP)
  - **http://www.epa.gov/ttn/naaqs/**
- Regional Haze Rule--1999 (“Class 1 Areas”)
- Exceptional Events Rule (EER; updated for wildfires and ozone in 2016)

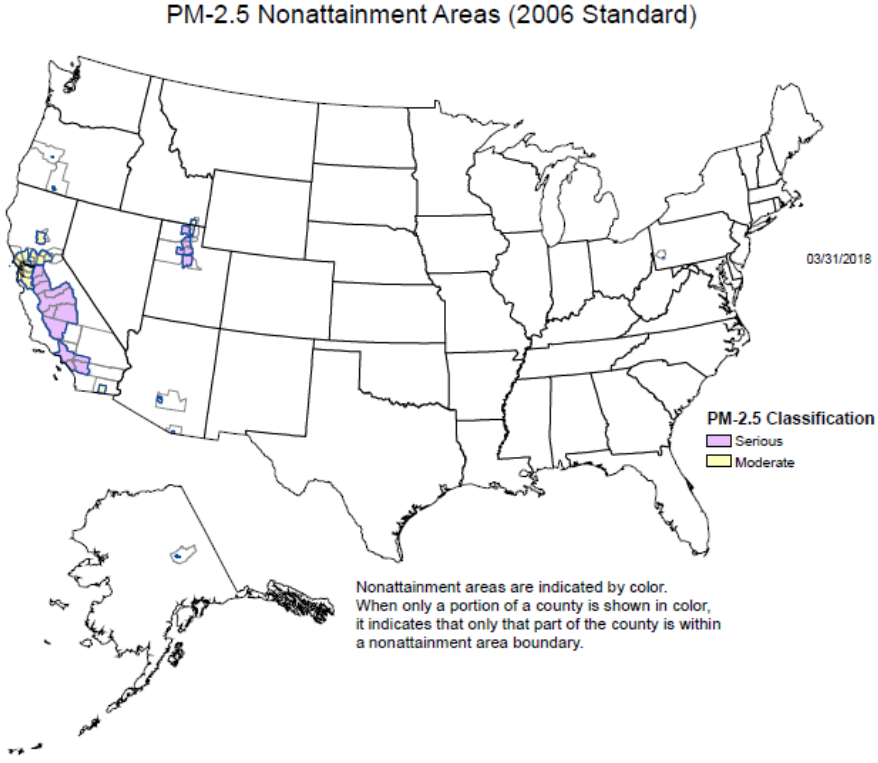
National Ambient Air Quality Standards (NAAQS)

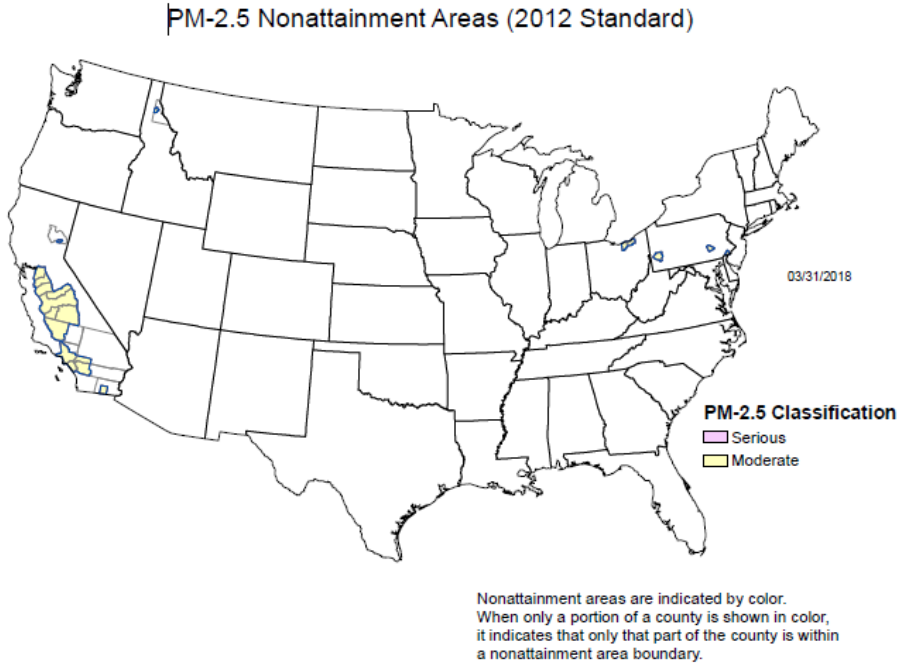
- $PM_{2.5}$ Standard Revised 2012
  - 24-hr Standard = **35 µg/m^3**
  - Annual Primary Standard = **12 µg/m^3**
  - Annual Secondary Standard = **15 µg/m^3**
- PM_{10} 24-hr Standard = **150 µg/m^3**
- Ozone Standard Revised 2015
  - 8-hr Primary & Secondary Standard = **0.070 ppm**

NAAQS typically reviewed every 5 years

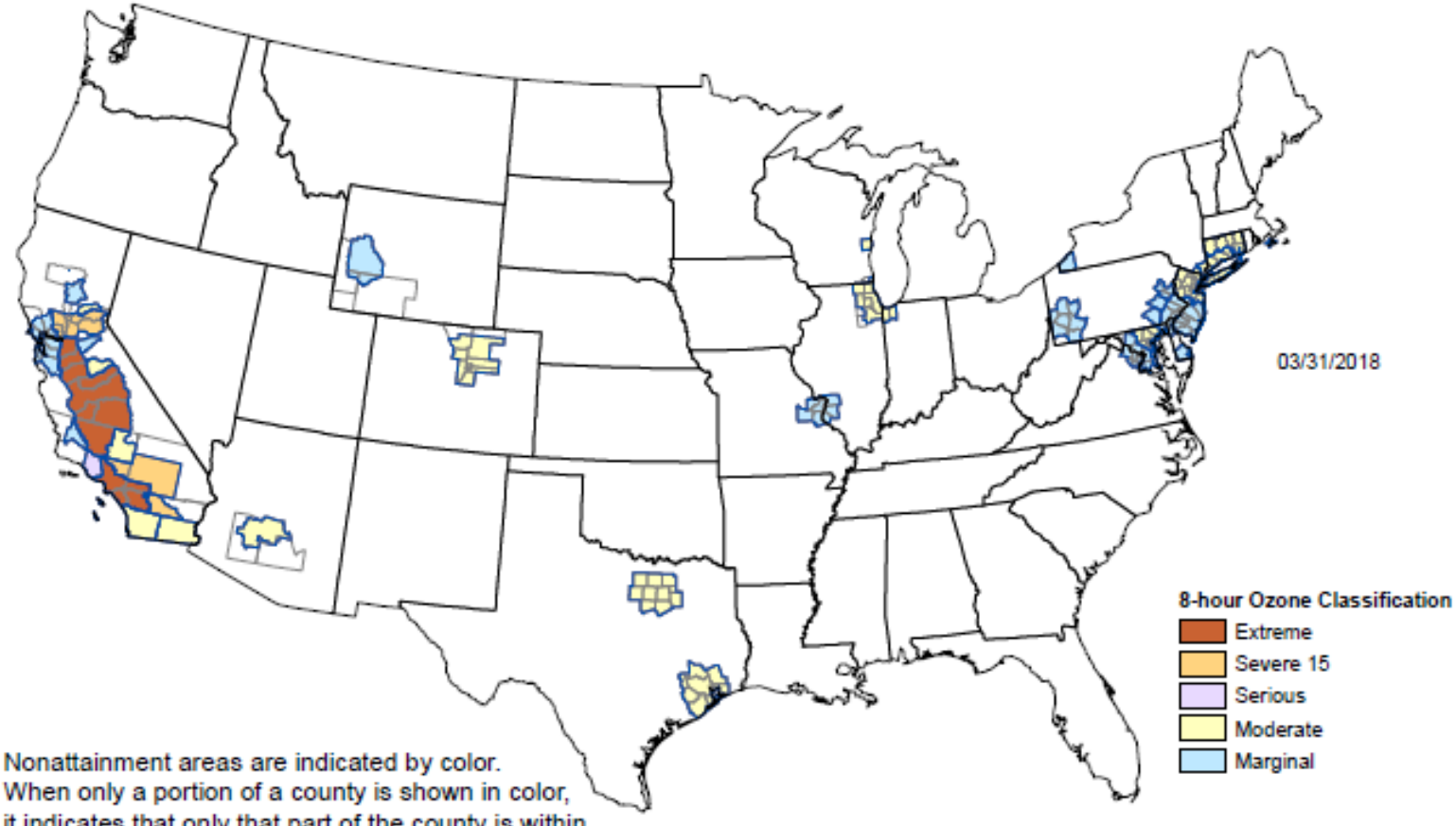


$PM_{2.5}$ Nonattainment Areas





8-Hour Ozone Nonattainment Areas (2008 Standard)



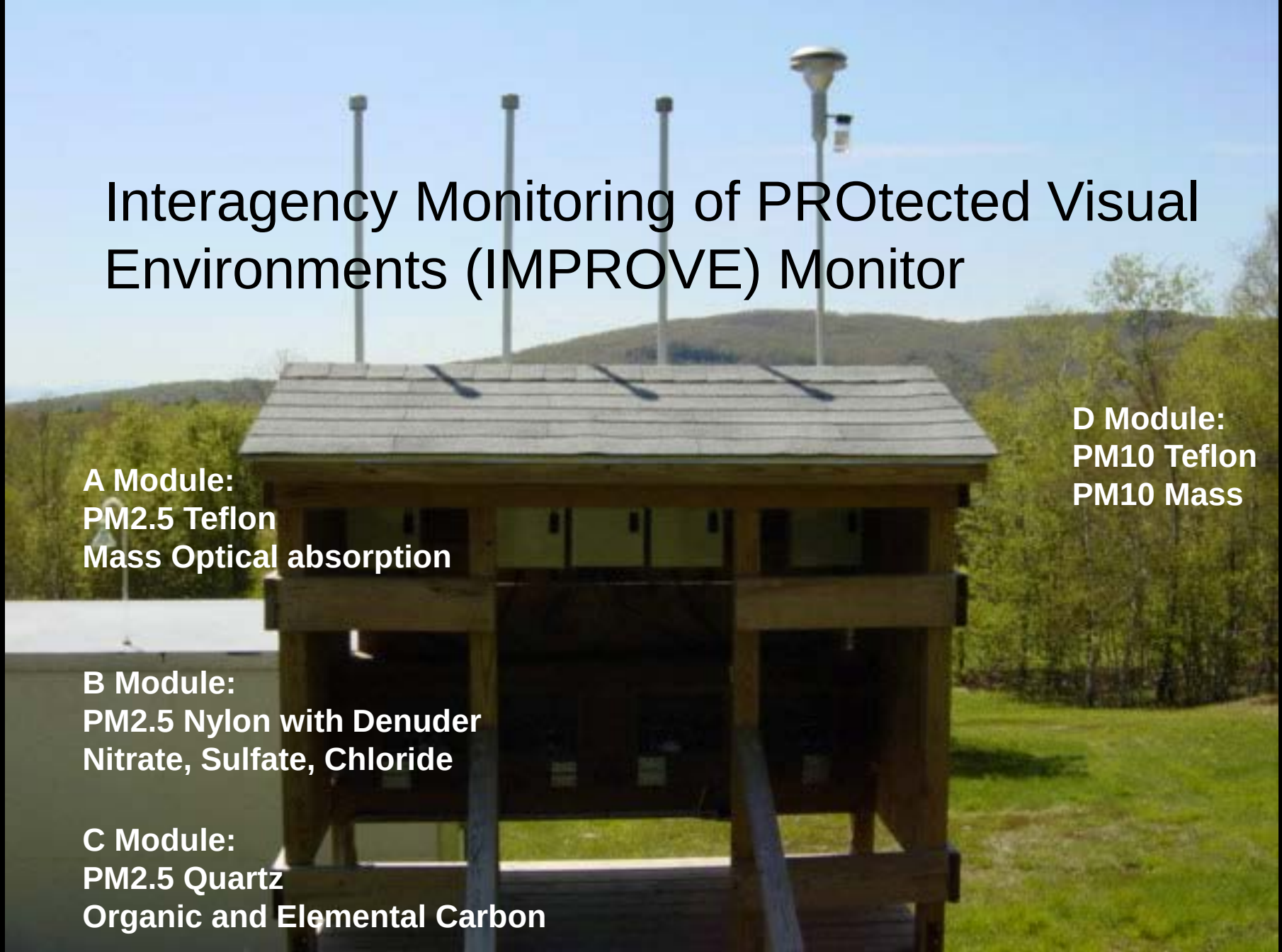
Nonattainment areas are indicated by color.
When only a portion of a county is shown in color,
it indicates that only that part of the county is within
a nonattainment area boundary.

For the Ozone-8Hr (2008) St. Louis-St. Charles-Farmington, MO-IL nonattainment area,
the Illinois portion was redesignated on March 1, 2018.
The Missouri portion has not been redesignated.
The entire area is not considered in maintenance until all states in a multi-state area are redesignated.

National Visibility Goals

- The 1977 amendments to the Clean Air Act established a national goal of “the prevention of any future, and remedying of any existing impairment of visibility in mandatory Class I Federal areas from man made pollution”
- States are required to develop implementation plans that make “reasonable progress” toward the national visibility goal
- The 1999 Regional Haze Rule clarified goals for federal agencies and states regarding visibility in these Class I areas. The first state plans were made in 2007. Revisions to plans due in 2021, 2028, 2038, etc.


Mandatory Class I Areas
North Cascades
Pasayten
Olympic
Glacier Peak
Cabinet Mountains
Glacier
Alpine Lakes
Mount Rainier
Goat Rocks
Mount Adams
Mission Mountains
Bob Marshall
Scapegoat
Medicine Lake
Lostwood
UL Bend
Voyageurs
Isle Royale
Boundary Waters Canoe Area
Mount Hood
Hells Canyon
Gates of the Mountains
Theodore Roosevelt
Mount Jefferson
Mount Washington
Three Sisters
Eagle Cap
Anaconda Pintler
Selway-Bitterroot
Rainbow Lake
Seney
Diamond Peak
Crater Lake
Strawberry Mountain
Yellowstone
North Absaroka
Red Rock Lakes
Kalmiopsis
Mountain Lakes
Gearhart Mountain
Sawtooth
Washakie
Grand Teton
Teton
Marble Mountain
Redwood
Lava Beds
Craters of the Moon
Fitzpatrick
Wind Cave
Badlands
South Warner
Bridger
Thousand Lakes
Caribou
Jarbidge
Yolla Bolly-Middle Eel
Lassen Volcanic
Desolation
Mokelumne
Mount Zirkel
Rawah
Rocky Mountain
Point Reyes
Emigrant
Hoover
Yosemite
Ansel Adams
Flat Tops
Capitol Reef
Arches
Eagles Nest
Maroon Bells - Snowmass
Pinnacles
Kaiser
John Muir
Bryce Canyon
West Elk
Black Canyon
Ventana
Sequoia / Kings Canyon
Zion
Canyonlands
La Garita
Great Sand Dunes
Domeland
Grand Canyon
Mesa Verde
Weminuche
San Rafael
Wheeler Peak
Sycamore Canyon
San Pedro Parks
San Gabriel
Cucamonga
San Gorgonio
Bandelier
Pecos
San Jacinto
Pine Mountain
Petrified Forest
Agua Tibia
Joshua Tree
Mazatzal
Sierra Ancha
Mount Baldy
Bosque del Apache
Wichita Mountains
Superstition
Salt Creek
Galiuro
Gila
White Mountain
Saguaro
Chiricahua
Carlsbad Caverns
Guadalupe Mountains
Big Bend
Hercules-Glades
Mingo
Upper Buffalo
Caney Creek
Sipsey Wilderness
Mammoth Cave
Great Smoky Mtns
Joyce Kilmer-Slickrock
Cohutta
Shining Rock
Linville Gorge
Swanquarter
Cape Romain
Wolf Island
Okefenokee
Bradwell Bay
Saint Marks
Breton
Chassahowitzka
Everglades
Otter Creek
Dolly Sods
Shenandoah
James River Face
Brigantine Wilderness
Lye Brook
Great Gulf
Presidential Range-Dry River
Acadia
Moosehorn
Roosevelt Campobello
Denali
Bering Sea
Tuxedni
Simeonof
Haleakala
Hawaii Volcanoes
Virgin Islands
0 125 250 500 Kilometers
NPS Unit
USFS Unit
FWS Unit
1/2007
Produced by NPS Air Resources Division



Interagency Monitoring of PROtected Visual Environments (IMPROVE) Monitor

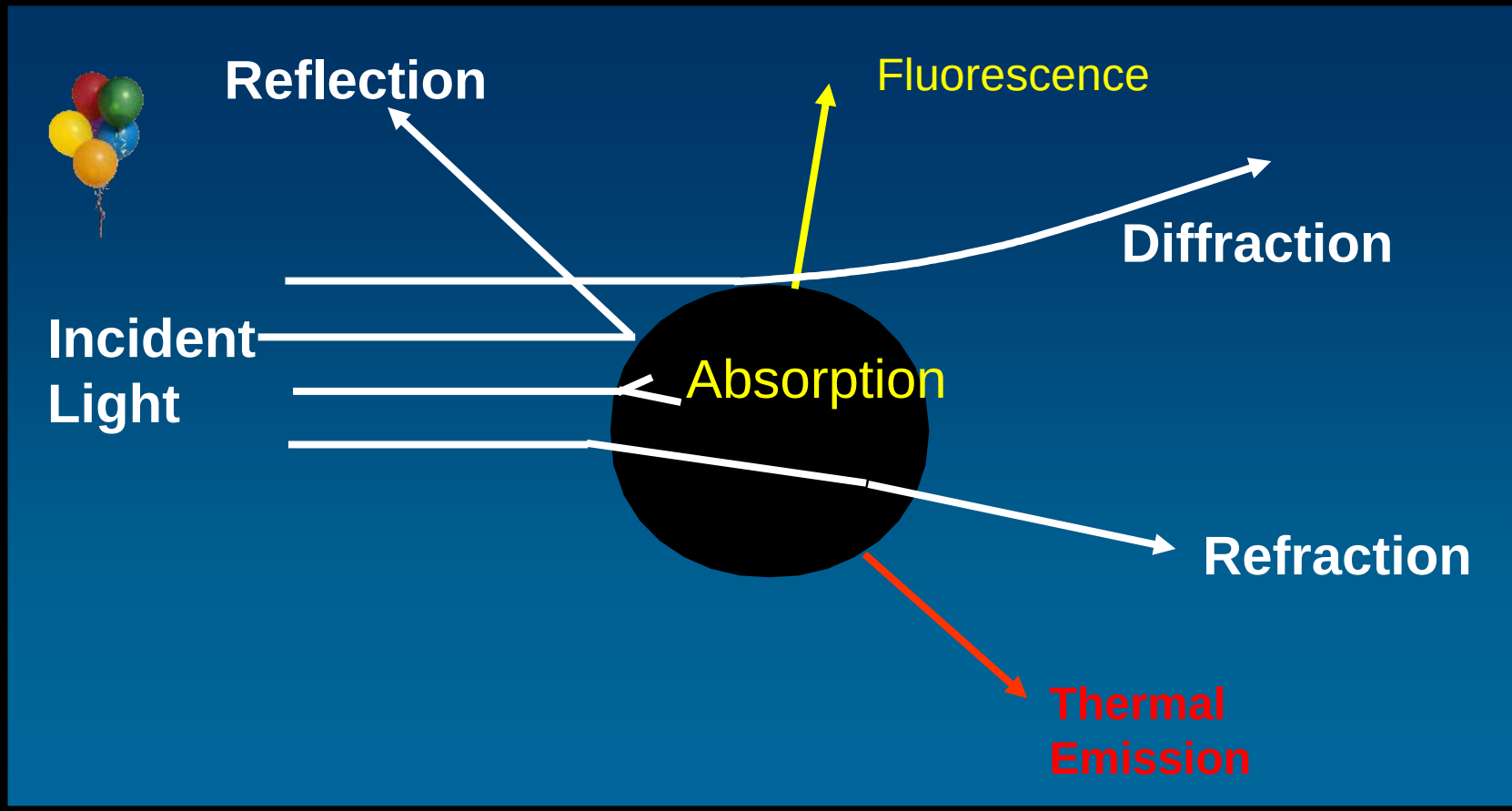
A Module:
PM2.5 Teflon
Mass Optical absorption

B Module:
PM2.5 Nylon with Denuder
Nitrate, Sulfate, Chloride

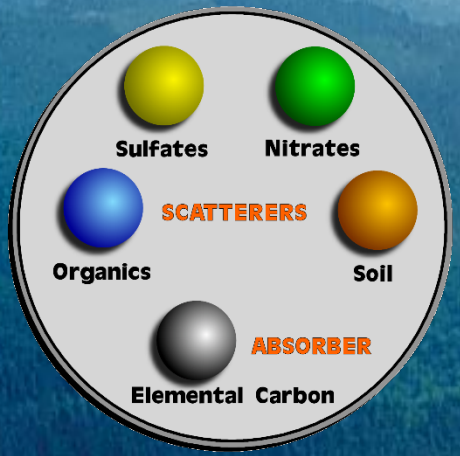
C Module:
PM2.5 Quartz
Organic and Elemental Carbon

D Module:
PM10 Teflon
PM10 Mass

Atmospheric visibility is influenced by scattering and absorption of light particles and gases



- Fine particles most responsible for visibility impairments are sulfates, nitrates, soil dust, organic carbon, and elemental carbon
  - Sulfates, nitrates, soil, organic carbon, and soil dust scatter light
  - Elemental carbon absorbs light



Visibility impairment can be classified into 3 general categories:

Layered Haze

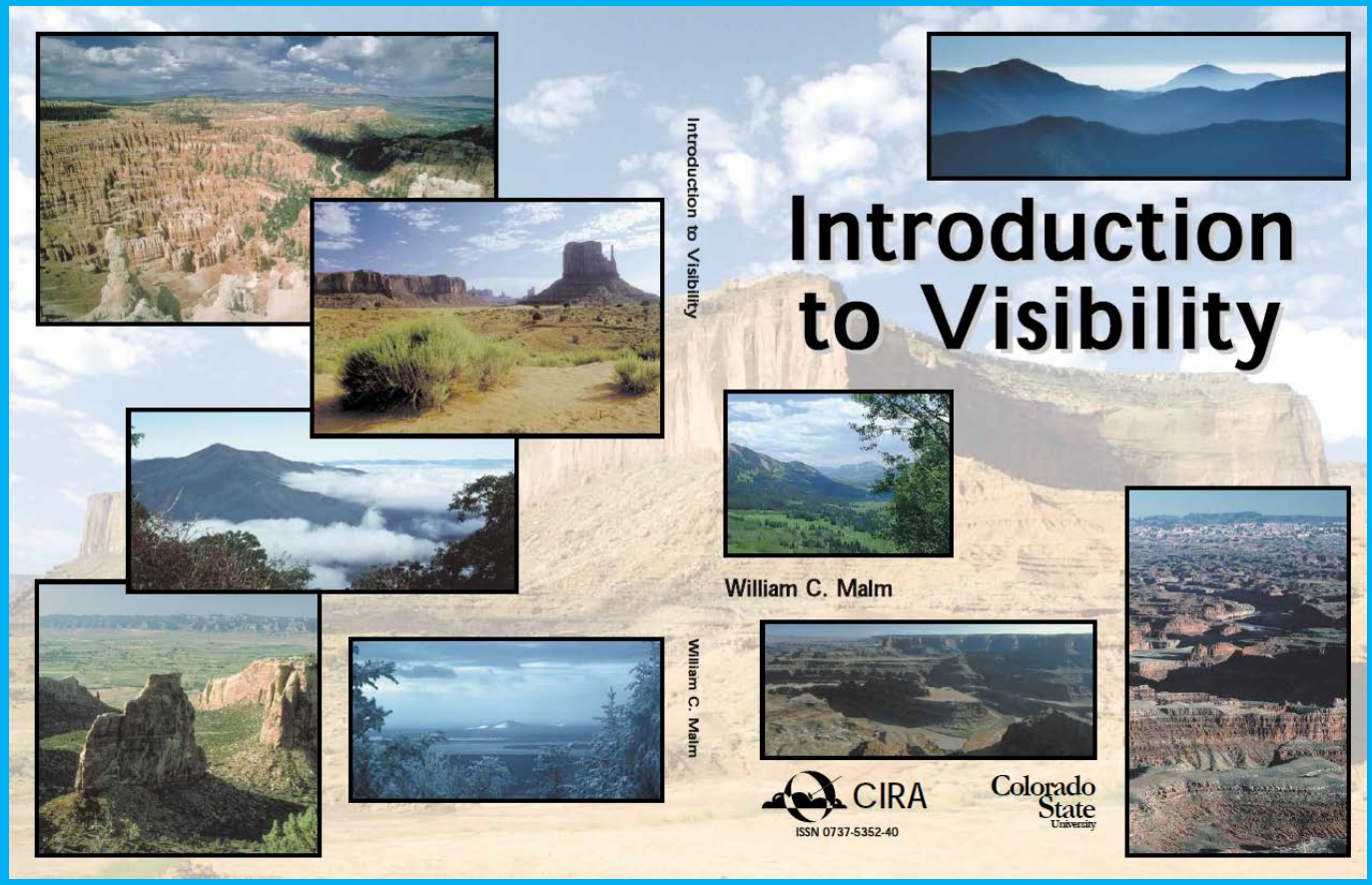
Plume Haze

Uniform Haze

Water Vapor and Smoke

- Fire releases water vapor, and also in some regions/seasons water vapor is abundant
- As temperatures decrease in the evening and especially early morning hours, the water vapor will condense out of the atmosphere onto the fine particulate matter released from the fire. This can quickly create a thick white-out fog (“superfog”) that pools in low-lying areas reducing visibility to near zero
- Superfog:
  - Supersaturated air condenses in the presence of smoke

Excellent resource for understanding visibility: Malm 1999



What can we do about Smoke?

NRCS Conservation Practices

- Conservation practices are not control technologies, but can include application of control technologies
- Nearly 170 existing, official conservation practice standards
  - About 50 have a specific AQ-related purpose
- Several fire and air quality-related practices:
  - Prescribed Burning (CPS 338)
  - Brush Management (CPS 314)
  - Firebreak (CPS 394)
  - Forest Stand Improvement (CPS 666)
  - Fuel Break (CPS 383)
  - Woody Residue Treatment (CPS 384)

Prescribed Fire

- "Controlled fire applied to a predetermined area"
  - Can include Woody Residue Pile Burning
- A variety of purposes, including…
  - Reducing wildfire hazards
  - Controlling undesirable vegetation
  - Improving wildlife habitat
  - Restoring and maintaining ecological sites
- Applied on millions of acres of private and public land
- Applicable on any land use
- NRCS-approved woody residue pile burns on any land except active cropland

Fire Types and Smoke

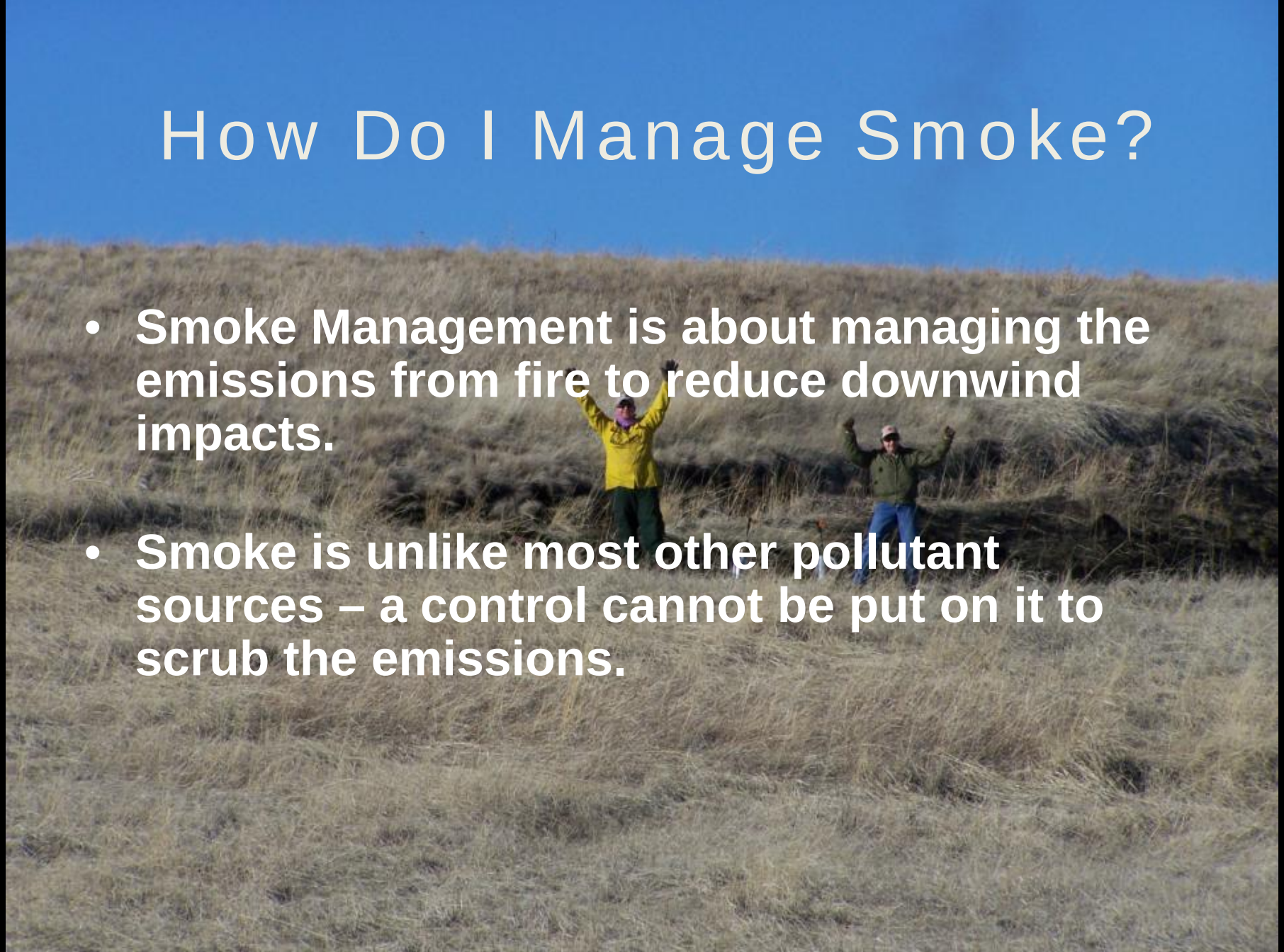
- Wildland Wildfire
  - Emissions can be catastrophic, and are at best not easily managed
  - 2x to 4x more fuel consumed in wildfire than prescribed fire, and thus most emissions are much greater
- Wildland Prescribed Fire
  - Wise smoke management can minimize and manage emissions
- Agricultural burning
  - Crop residue, orchard/vineyard-related burning
  - Not covered under NRCS prescribed burning

*****Prescribed Burning Manages Emissions and helps Prevent Catastrophic Wildfires and their Emissions!!***

Smoke Management

- Wisely use prescribed burning
- Utilize Basic Smoke Management Practices (BSMPs)

How Do I Manage Smoke?



- **Smoke Management is about managing the emissions from fire to reduce downwind impacts.**
- **Smoke is unlike most other pollutant sources – a control cannot be put on it to scrub the emissions.**

A publication of the
National Wildfire
Coordinating Group

NWCG Smoke Management Guide for Prescribed Fire

PMS 420-2 February 2018

NFES 001279

National Smoke Management Website (NIFC)

http://www.nifc.gov/smoke/

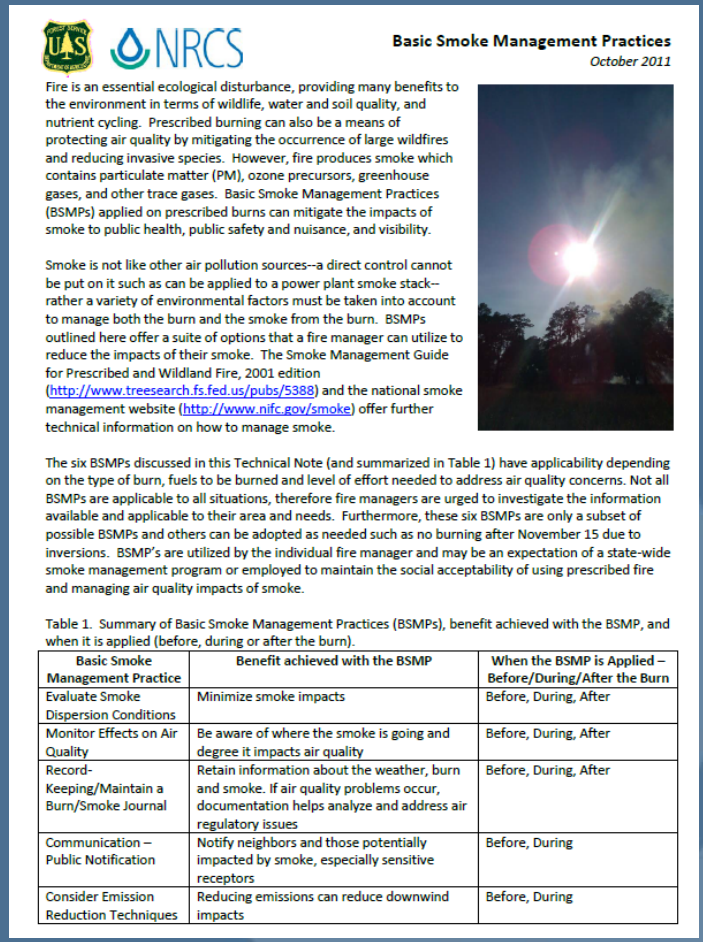
- Tools
  - Smoke/Weather Forecasts
  - Smoke Modeling
  - Smoke Monitoring
  - Remotely Sensed Data
  - After Action Review
  - NEPA
- Regulations and Policies
- Emissions
- Training
- Publications
- Links

Basic Smoke Management Practices

Six Basic Smoke Management Practices (BSMPs)

NRCS Smoke and Air Quality Priorities

- Smoke and associated PM and ozone mitigation
  - Prescribed fire and smoke management
  - Wildfire mitigation and smoke management
- Basic Smoke Management Practices
  - 2011 Document issued jointly between NRCS and FS
  - 6 BSMPs described



NRCS

Basic Smoke Management Practices

October 2011

Fire is an essential ecological disturbance, providing many benefits to the environment in terms of wildlife, water and soil quality, and nutrient cycling. Prescribed burning can also be a means of protecting air quality by mitigating the occurrence of large wildfires and reducing invasive species. However, fire produces smoke which contains particulate matter (PM), ozone precursors, greenhouse gases, and other trace gases. Basic Smoke Management Practices (BSMPs) applied on prescribed burns can mitigate the impacts of smoke to public health, public safety and nuisance, and visibility.

Smoke is not like other air pollution sources--a direct control cannot be put on it such as can be applied to a power plant smoke stack--rather a variety of environmental factors must be taken into account to manage both the burn and the smoke from the burn. BSMPs outlined here offer a suite of options that a fire manager can utilize to reduce the impacts of their smoke. The Smoke Management Guide for Prescribed and Wildland Fire, 2001 edition (http://www.treesearch.fs.fed.us/pubs/5388) and the national smoke management website (http://www.nifc.gov/smoke) offer further technical information on how to manage smoke.

The six BSMPs discussed in this Technical Note (and summarized in Table 1) have applicability depending on the type of burn, fuels to be burned and level of effort needed to address air quality concerns. Not all BSMPs are applicable to all situations, therefore fire managers are urged to investigate the information available and applicable to their area and needs. Furthermore, these six BSMPs are only a subset of possible BSMPs and others can be adopted as needed such as no burning after November 15 due to inversions. BSMP's are utilized by the individual fire manager and may be an expectation of a state-wide smoke management program or employed to maintain the social acceptability of using prescribed fire and managing air quality impacts of smoke.

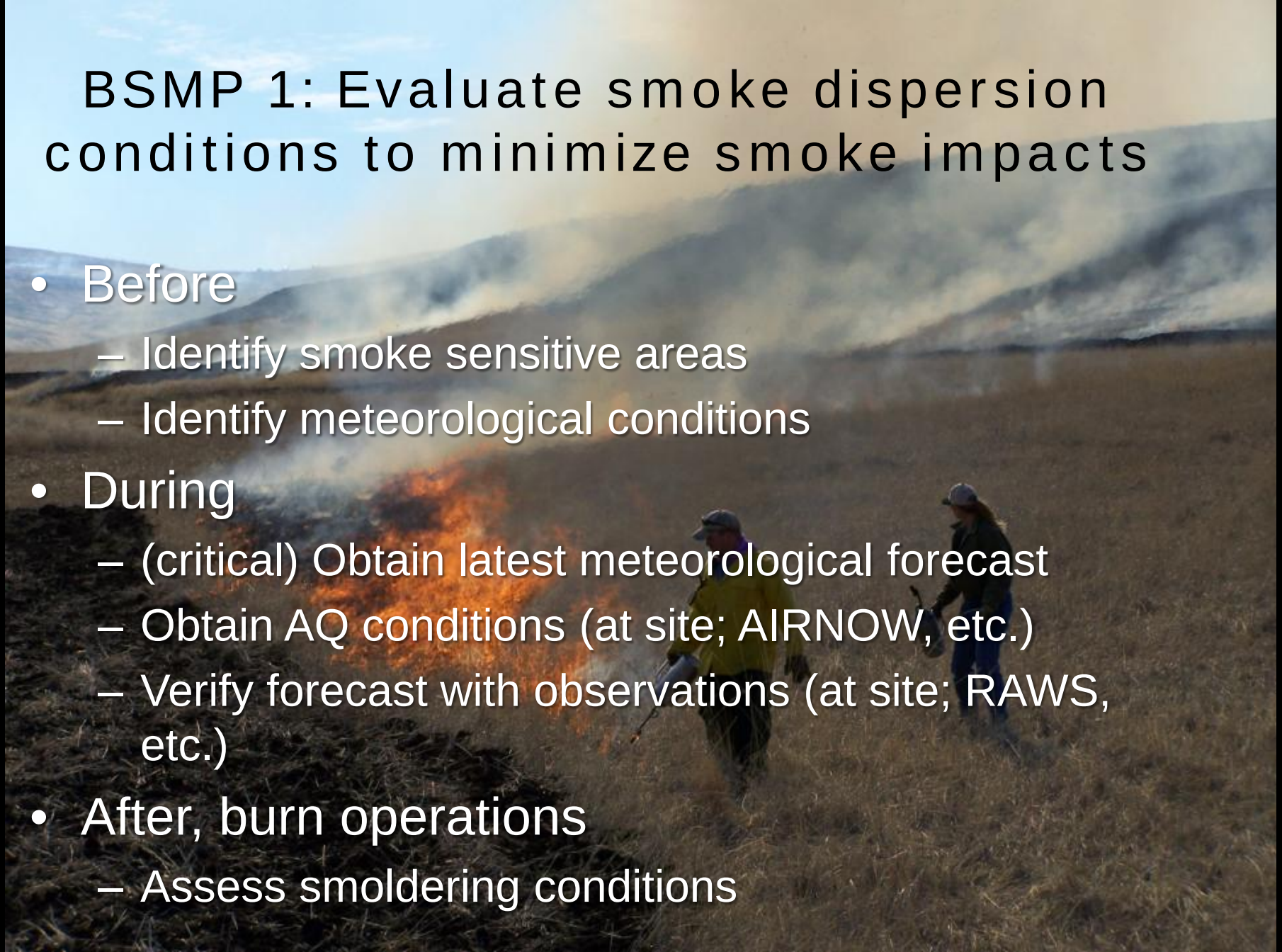
Table 1. Summary of Basic Smoke Management Practices (BSMPs), benefit achieved with the BSMP, and when it is applied (before, during or after the burn).

Basic Smoke Management Practice	Benefit achieved with the BSMP	When the BSMP is Applied – Before/During/After the Burn
Evaluate Smoke Dispersion Conditions	Minimize smoke impacts	Before, During, After
Monitor Effects on Air Quality	Be aware of where the smoke is going and degree it impacts air quality	Before, During, After
Record-Keeping/Maintain a Burn/Smoke Journal	Retain information about the weather, burn and smoke. If air quality problems occur, documentation helps analyze and address air regulatory issues	Before, During, After
Communication – Public Notification	Notify neighbors and those potentially impacted by smoke, especially sensitive receptors	Before, During
Consider Emission Reduction Techniques	Reducing emissions can reduce downwind impacts	Before, During

Six BSMPS!

1: Evaluate smoke dispersion conditions to minimize smoke impacts
2: Monitor the effects of the fire on air quality
3: Record-keeping
4: Communication – Public Notification
5: Consider use of emission reduction techniques (ERTs)
6: Share the Airshed – Coordination of Area Burning

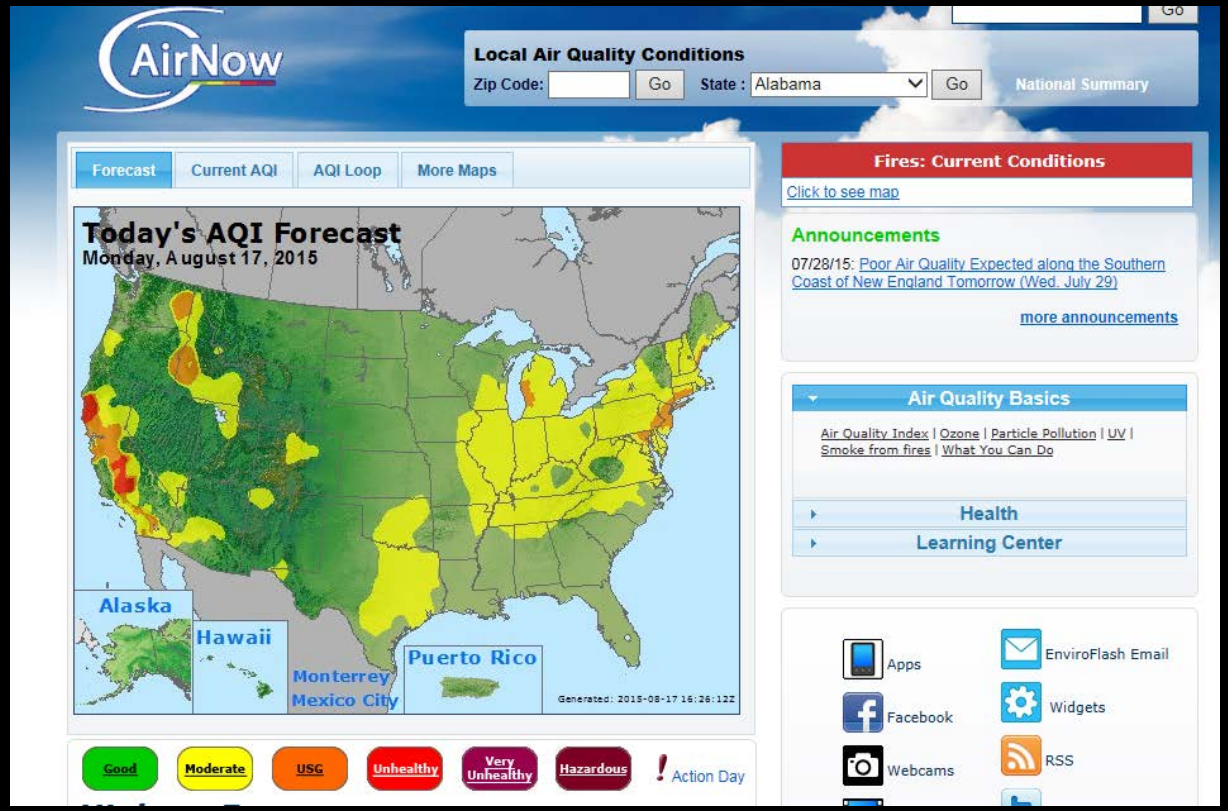
BSMP 1: Evaluate smoke dispersion conditions to minimize smoke impacts



- Before
  - Identify smoke sensitive areas
  - Identify meteorological conditions
- During
  - (critical) Obtain latest meteorological forecast
  - Obtain AQ conditions (at site; AIRNOW, etc.)
  - Verify forecast with observations (at site; RAWS, etc.)
- After, burn operations
  - Assess smoldering conditions

Current Air Quality Conditions

- Air Quality Index
  www.airnow.gov



National Ambient Air Quality Standards (NAAQS), Air Quality Index (AQI)

	Low AQI	High AQI	Low PM2.5	High PM2.5
GOOD	0	50	0	12
MODERATE	51	100	12.1	35.4
UNHEALTHY FOR SENSITIVE GROUPS (USG)	101	150	35.5	55.4
UNHEALTHY	151	200	55.5	150.4
VERY UNHEALTHY	201	300	150.5	250.4
HAZARDOUS	301		250.5	

- NAAQS PM2.5 = 35 micrograms/m3 (24-hr average)
- AQI – Translates PM2.5 concentrations (24-hr average) to health impacts
- Note: PM2.5 measurements are typically 1-hr measurements

Weather and Smoke

- Wildfire Weather Conditions
- Prescribed Fire Weather Conditions
- Weather Basics

Wildfire Weather

- Prime pre-fire and wildfire growth weather is typically associated antecedent dry weather, along with current conditions featuring low relative humidities, sunshine, moderate winds, and mild to warm temperatures
- High pressure aloft (ridging) typically associated with these conditions—resulting in subsidence, dry air, etc.
- Downslope and/or offshore winds can also contribute to prime conditions
- Preceding and current dry conditions lower fuel moisture
- Afternoons are usually most critical—can see fire “explosions”

Prescribed Fire Weather

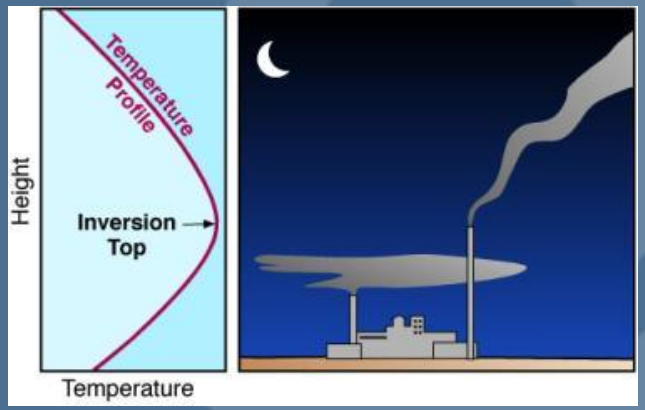
- Ideal conditions for prescribed fire are NOT typically those associated with active wildfires
- Want control with minimized opportunities for fire escape, explosion
- In FL alone in 2017 over 2 million acres of prescribed burning occurred
  - 81,174 fires, and only 78 had any escape!
- Need some wind! 10-20 mph (max); don't want calm conditions
- Temperatures <70 F
- RH 25-60%
- Dead fuel moisture 5-20%
- Recent precipitation
- Neutral to slightly unstable atmosphere

Weather Basics

- Look at the Forest ***and*** the Trees!
- Examine the big picture first
  - What is the pattern aloft (10K to 35K feet; 700 mb up to 300 mb)?
  - How has it changed recently, if at all?
  - What is it forecast to do?
- Then look at the surface
  - What has happened the last few days?
  - What are current conditions?
  - How is it different or similar to aloft?
  - What are surface forecasts indicating?

Wind Speed and Direction

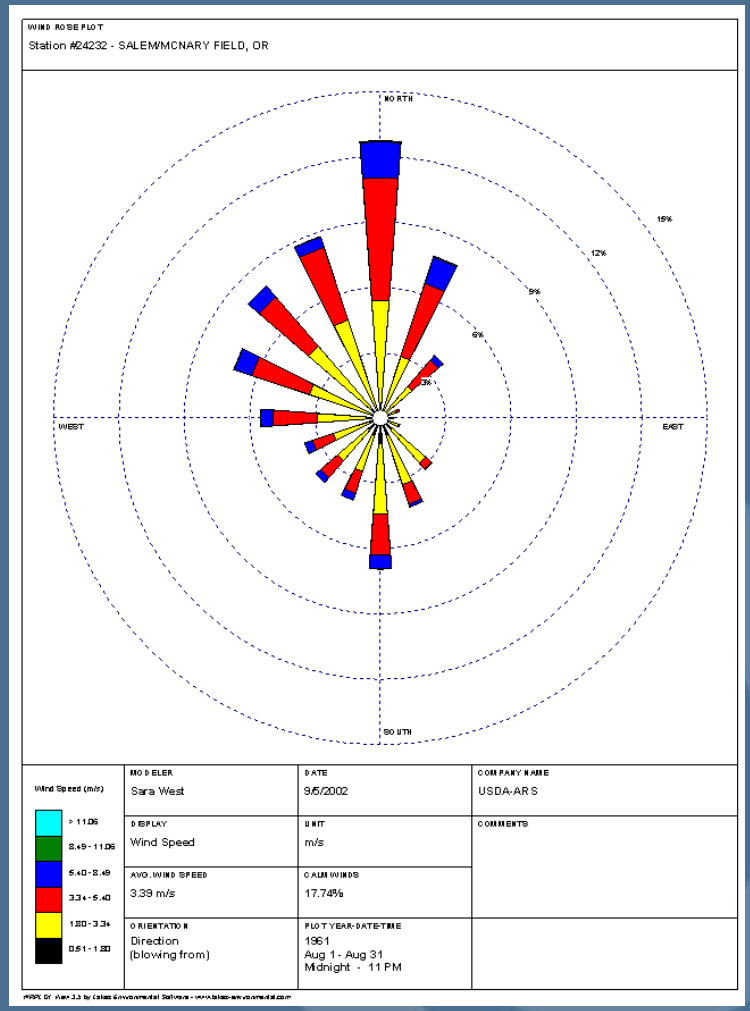
- Wind disperses smoke
- Strong surface winds
  - plume lay-down near the surface
  - inhibit vertical dispersion
- Vertical wind profile
  - Surface drag reduces winds at the surface
  - Wind speed gradually increases with height
  - Smoke disperses slower at the surface than aloft
- Wind direction at the surface can be (and often is) different than wind direction aloft!



NRCS National Water and Climate Center Windroses

https://www.wcc.nrcs.usda.gov/climate/windrose.html

Salem Oregon
August



Oregon Topography

Courtesy Fine Art America

Topography and Weather

- Topography can significantly alter many atmospheric characteristics
- “Channeling” occurs when wind flow becomes altered at the surface to follow ridge/valley orientations (esp. when pressure gradient is aligned with a valley)
- Under persistently stagnant conditions topographic factors can become even more significant, though more predictable
- Surface winds will often be down-valley during the late afternoon-evening and switch to up-valley from early morning to early afternoon, in the absence of other forcing factors

Valley Flows


Photo by Roger Ottmar.

- Winds may flow along a valley near the surface but be different aloft (away from the topographical influences)
- Surface heating/cooling:
  - Surface cooling creates downslope flows, advecting smoke into drainage areas where most people and roads are located
  - Stagnant conditions may cause smoke to pool in valleys creating hazardous air quality
  - Surface heating in the morning creates upslope flows, lofting smoke

Mixing Height

- Height of the atmosphere above the ground which is well mixed due either to mechanical turbulence or convective turbulence
- Smoke has the potential to disperse vertically in the atmosphere up to the height of the mixing height

- ***A low mixing height can limit how the smoke disperses and can lead to greater smoke concentrations near the ground***

Ventilation Index

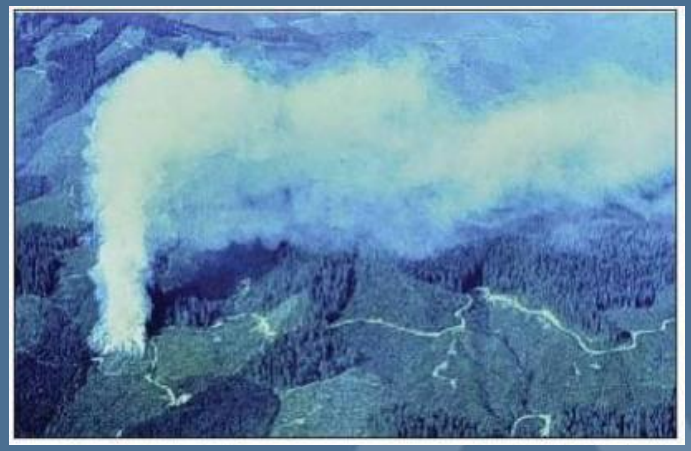
- Ventilation Index (VENT) = *mixing height x transport winds*
- Transport Winds - average wind speed through the mixing layer
- Dispersive capability of the atmosphere given in a single number
- Caveats:
  - High transport winds & low mixing height - smoke will be kept close to the ground
  - Low transport winds & high mixing height - smoke will loft high into the atmosphere (good dispersion) BUT fire behavior could be erratic

Atmospheric Stability

Measure of the atmosphere's tendency to encourage or deter vertical motion

Unstable Atmosphere
- Vertical Mixing
- Smoke not at surface
- Erratic fire behavior possible

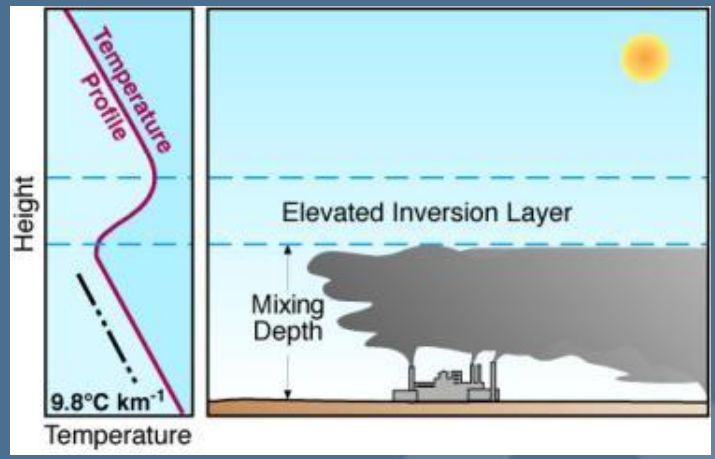
Stable Atmosphere
- Vertical Mixing limited
- Smoke at surface

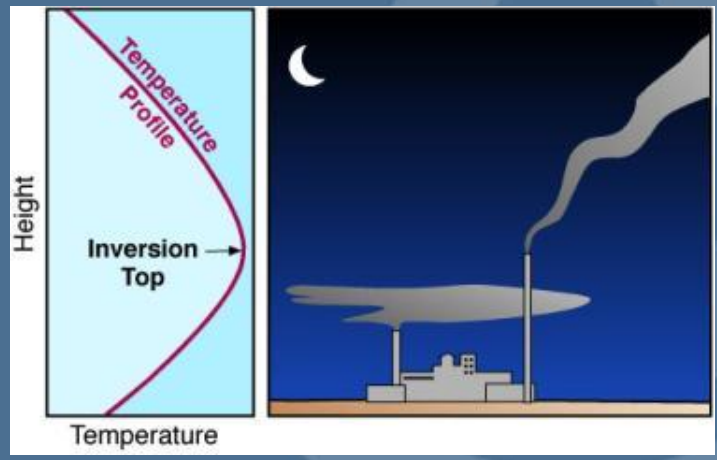


(photos by Roger Ottmar, USFS)

Inversions

- Opposite or the “inverse” of typical conditions in which temperature decreases with height
- If smoke is emitted into surface inversions or is transported and trapped in the inversion then this can lead to poor air quality conditions
- In complex terrain, burning on slopes above an inversion can keep the smoke aloft
- Persistent (multiple-day) inversions can create poor air quality conditions and burning is not recommended





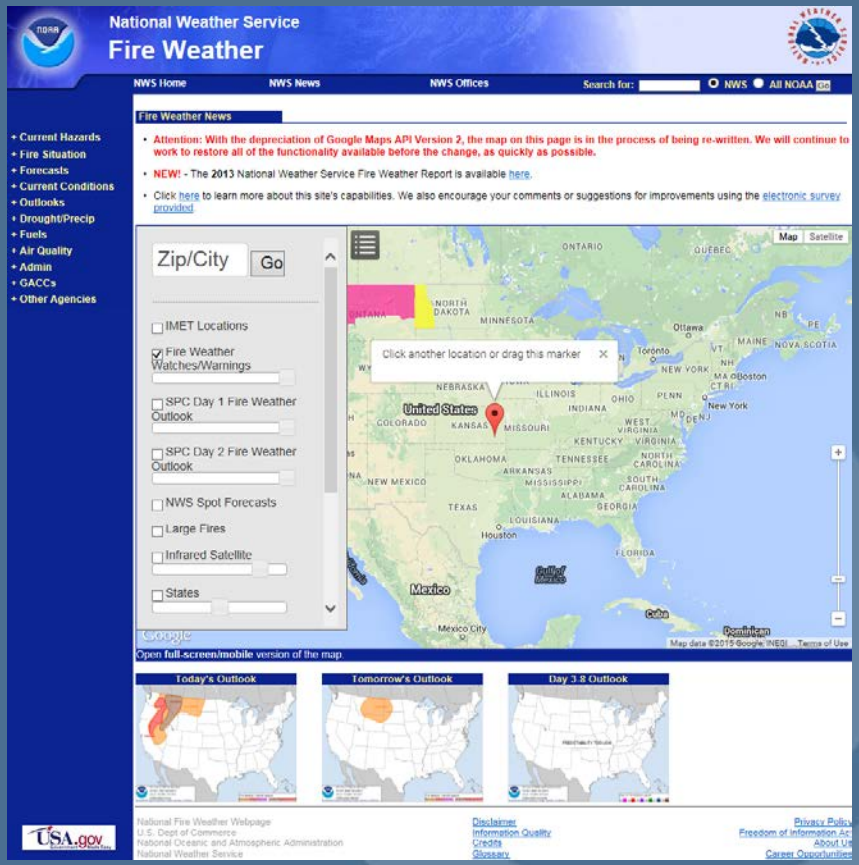
Figures used by permission from Whiteman (2000)

Sources of Weather Information for Smoke Management

Many!

NWS Fire Weather Webpage

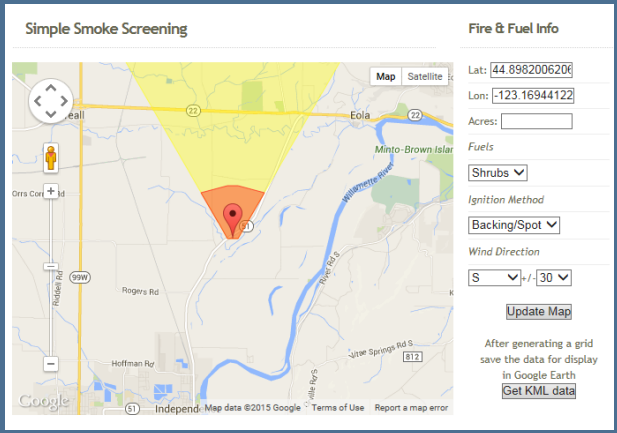
- Fire Weather Forecast
- Weather Planner
- Request a spot forecast
- Observational data

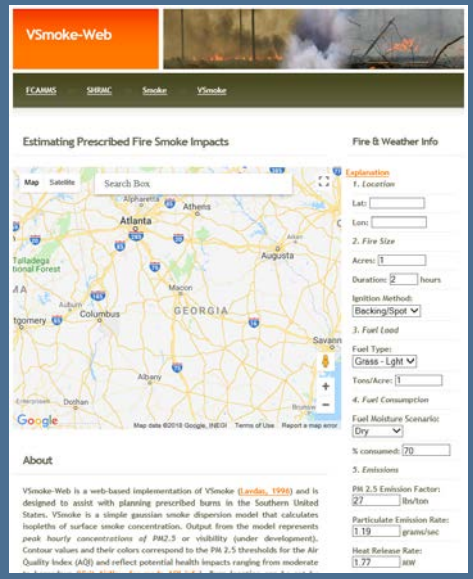


Modeling Smoke and Air Quality

- Many different models and websites
- Some are relatively simple (Simple Smoke Screening Tool, V-Smoke), and others are more complex and comprehensive
- Some estimate emissions, transport, dispersion and concentrations

Simple Smoke Screening Tool and V-Smoke





- SSS Tool http://southernfireexchange.org/Models_Tools/Simple-Smoke/simple-smoke.html
  - Zoom-in
  - View Smoke Sensitive Areas
- Enter Location, Acres, Fuel type, ignition method, wind direction

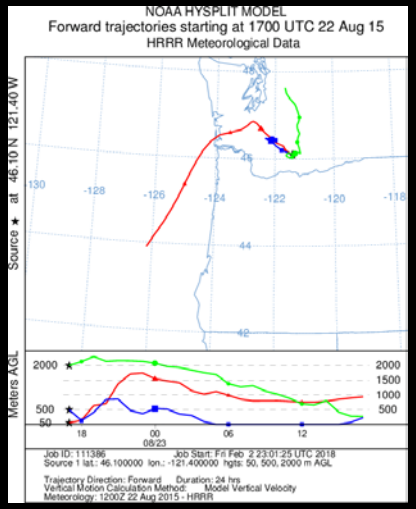
- V-Smoke http://weather.gfc.state.ga.us/GoogleVsmoke/vsmoke-Good2.html
- Estimating potential smoke impacts from prescribed burns
- Focused on SE US, but applicable elsewhere
- Output includes PM2.5 emissions

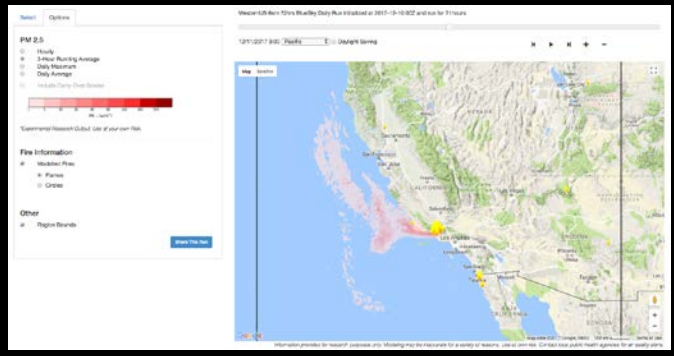
Other Models/Tools:

Hysplit (esp. for trajectories)
https://ready.arl.noaa.gov/HYSPLIT.php

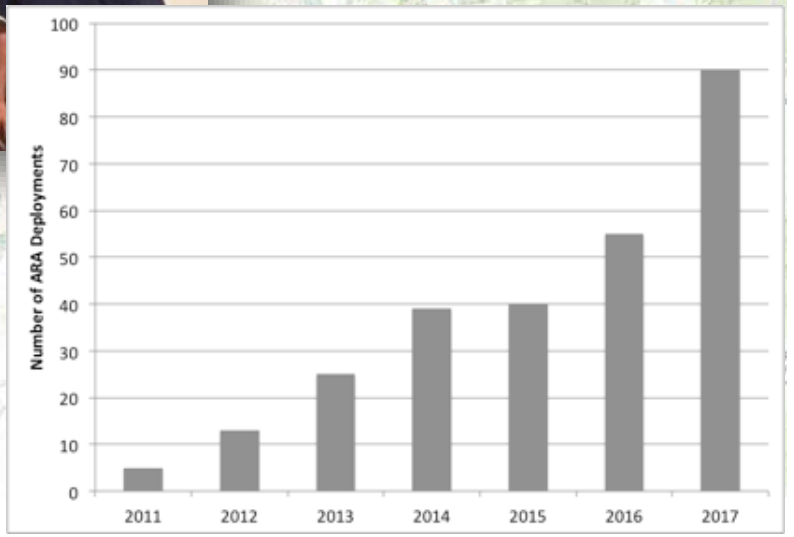
BlueSky
https://tools.airfire.org/

See Handout of Review of Models (courtesy Susan O'Neill)



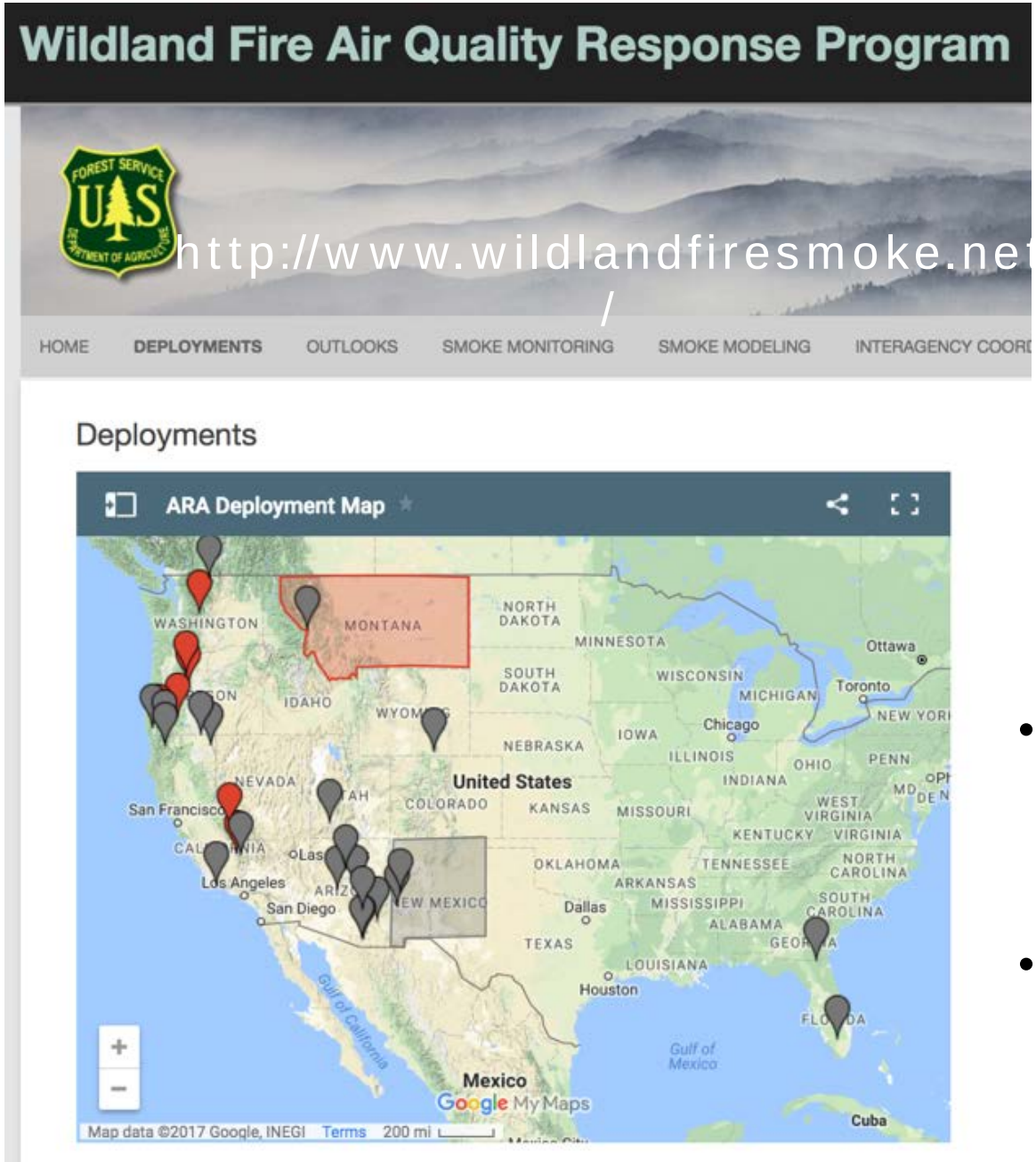


Air Resource Advisors



Air Resource Advisor (ARA) Program

- Providing air quality support for wildfire/smoke incidents
- More than 100 ARA deployments in 2017
- More than 1100 daily smoke outlooks issued in 2017
- Deployed nearly 200 temporary AQ monitors in 2017
- Providing interface between fire incident(s)/team(s) and the general public regarding smoke (public health, visibility, etc.)
- Currently 3 ARAs from the NRCS



- Air Resource Advisors
- Deployed to Incident Management Teams & Geographic Area Coordination Centers
- Modeling, Monitoring, Messaging

- Smoke Monitoring Cache:
  20 E-Samplers
  6 EBAMS
  Carbon Monoxide
- Trainings: 2013 – 2018

Pete Lahm, USFS WO, Coordinator

ARA Smoke outlook for next 2 days

1-2 pages

Aimed for public dissemination/posting:

- Smokeblogs
- Public Meetings
- Public bulletin boards
- AQ/Health agencies email lists & daily coordination calls

Outlook for Pier Fire

Smoke: Today's weather will be characterized by instability in the atmosphere providing good dispersion conditions. Smoke from today's planned aerial ignitions is expected to loft high and move north. Bishop may see impacts this afternoon with possible Moderate conditions through tonight. Communities along western foothills should generally see clearing this evening.

Fire: Aerial firing is expected to begin generally south of the Black Mountain/Solo Peak ridge line today. Fuels in that area range from dense forests with dead standing trees at the higher elevations to brush and grass at the lower elevations. Weather will moderate today's fire activity elsewhere.

Other: Forecasts reflect particulate matter only - not ozone. For information on real time air quality conditions related to smoke see: https://tinyurl.com/yd7ngvd8

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CA Smoke Blog: http://californiasmokeinfo.blogspot.com

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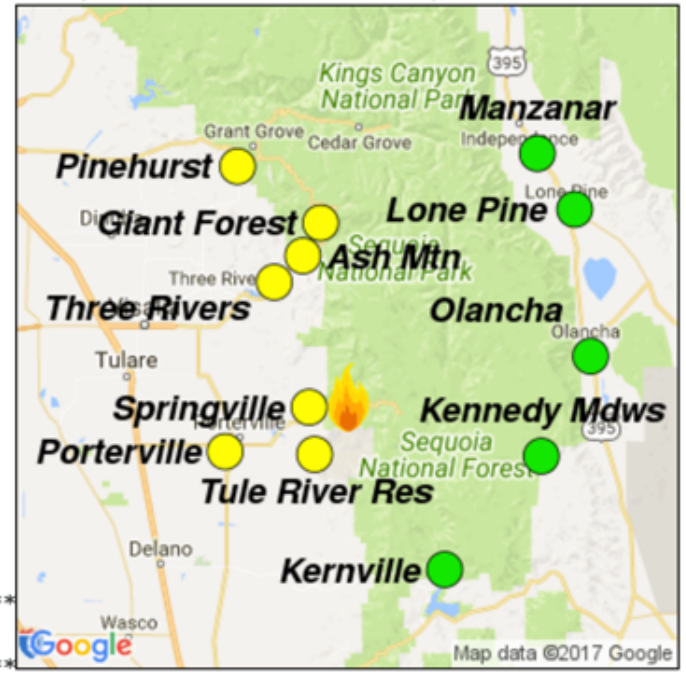
Protect Yourself from Wildfire Smoke: https://www.cdc.gov/features/wildfires/index.html

Daily AQI Forecast for Sep 12, 2017



Station	Yesterday hourly (6a noon 6p)	Mon 9/11	Forecast Comment for Today -- Tue, Sep 12	Tue 9/12	Wed 9/13
Springville			Concentrations will rise into Unhealthy range this morning, clearing after noon		
Tule River Reservation			Concentrations will rise into USG this morning, clearing after noon		
Porterville			Mostly Moderate.		
Three Rivers			Concentrations may rise to USG this morning, clearing afternoon		
Ash Mtn			Concentrations may rise to USG this morning, clearing after noon		
Giant Forest			Concentrations may rise to USG this morning, moving to Moderate in afternoon		
Pinehurst			Mostly Moderate this morning, clearing this afternoon		
Manzanar			Good air quality		
Lone Pine			Good air quality		

Questions?

Greg Johnson
Team Leader
Leader, NRCS National Air Quality and Atmospheric Change Team
(503) 273-2424
greg.johnson@por.usda.gov

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