



Public Health Impact of Wildfire Emissions

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Laboratory***

Office of Research and Development

US EPA

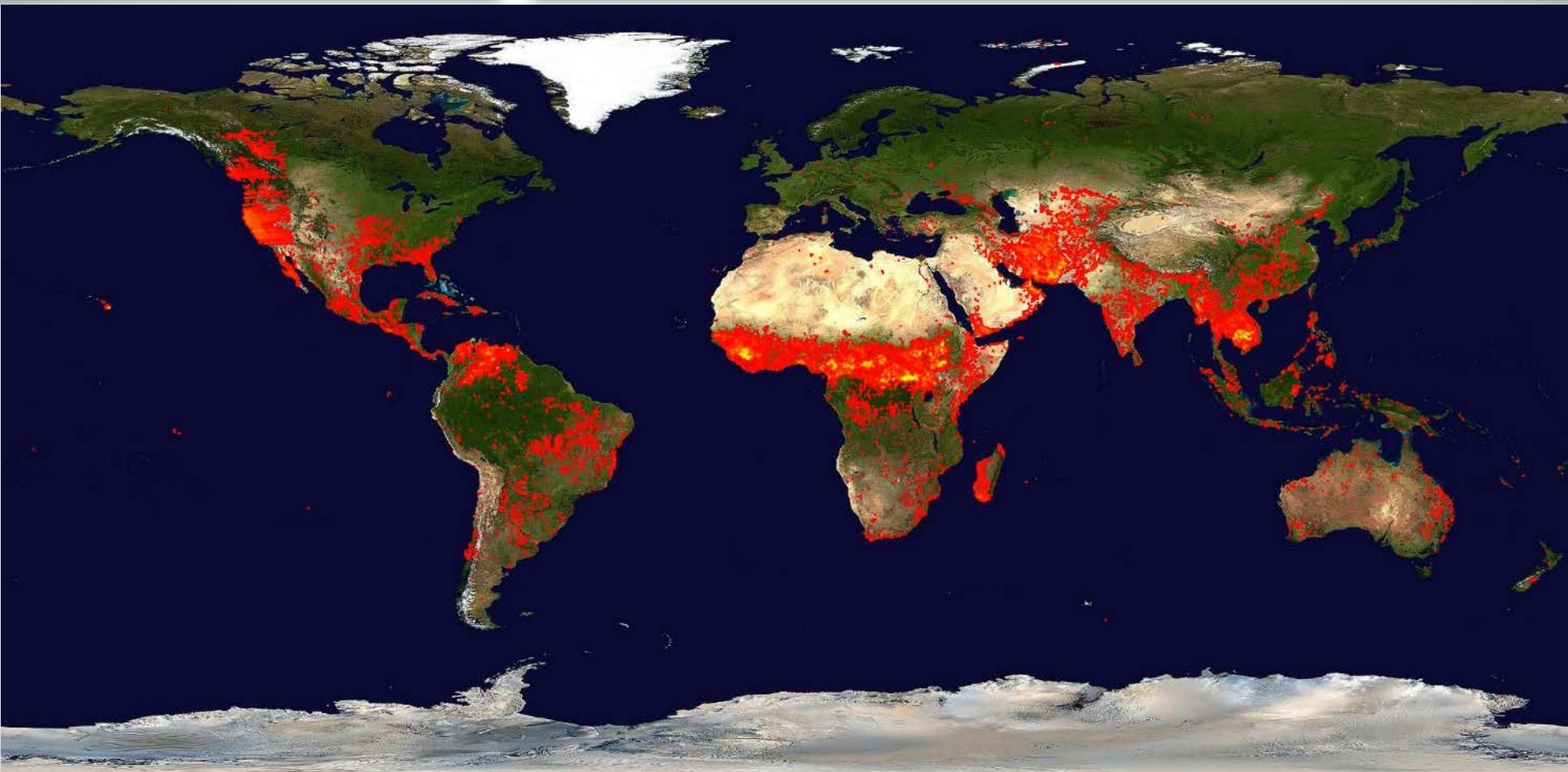
*High Park Wildfire
June 27, 2012, USDA Photo*

*Chapel Hill, NC
March 16, 2016*



Wildland Fires and Emissions

A Global Public Health Issue



Global Fire Map 2/20/2016 – 2/29/2016

URL: lance-modis.eosdis.nasa.gov/cgi-bin/imagery/firemaps.cgi



Wildland Fire Smoke & Populations

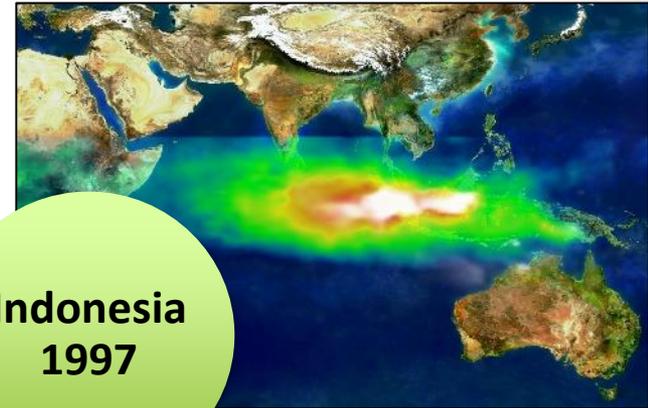
Regional Impacts on At-Risk Populations



**Russia
2010**



**Sydney
Australia
1994**



**Indonesia
1997**



**Victoria
Australia
2009**



**California
2007**

**Canada
2003**



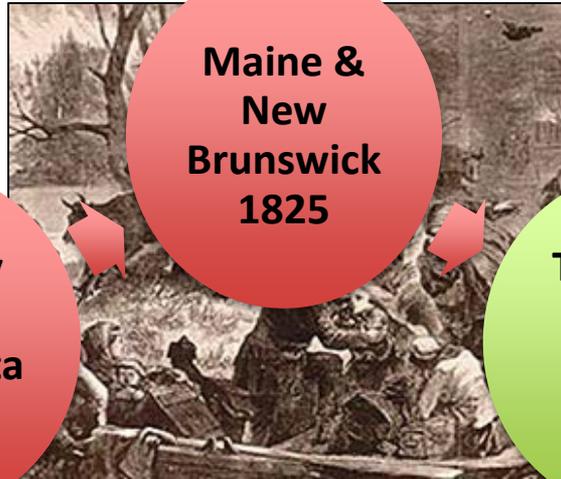


Historical Legacy of Large Wildfires

19th Century Wildland Fires in the U.S.



Hinckley Fire
Minnesota
1894



Maine & New Brunswick
1825



The Great Fire
Oregon
1845



Peshtigo
Wisconsin
1871



Silverton Fire
Oregon
1865



Yaquina Fire
Oregon
1853

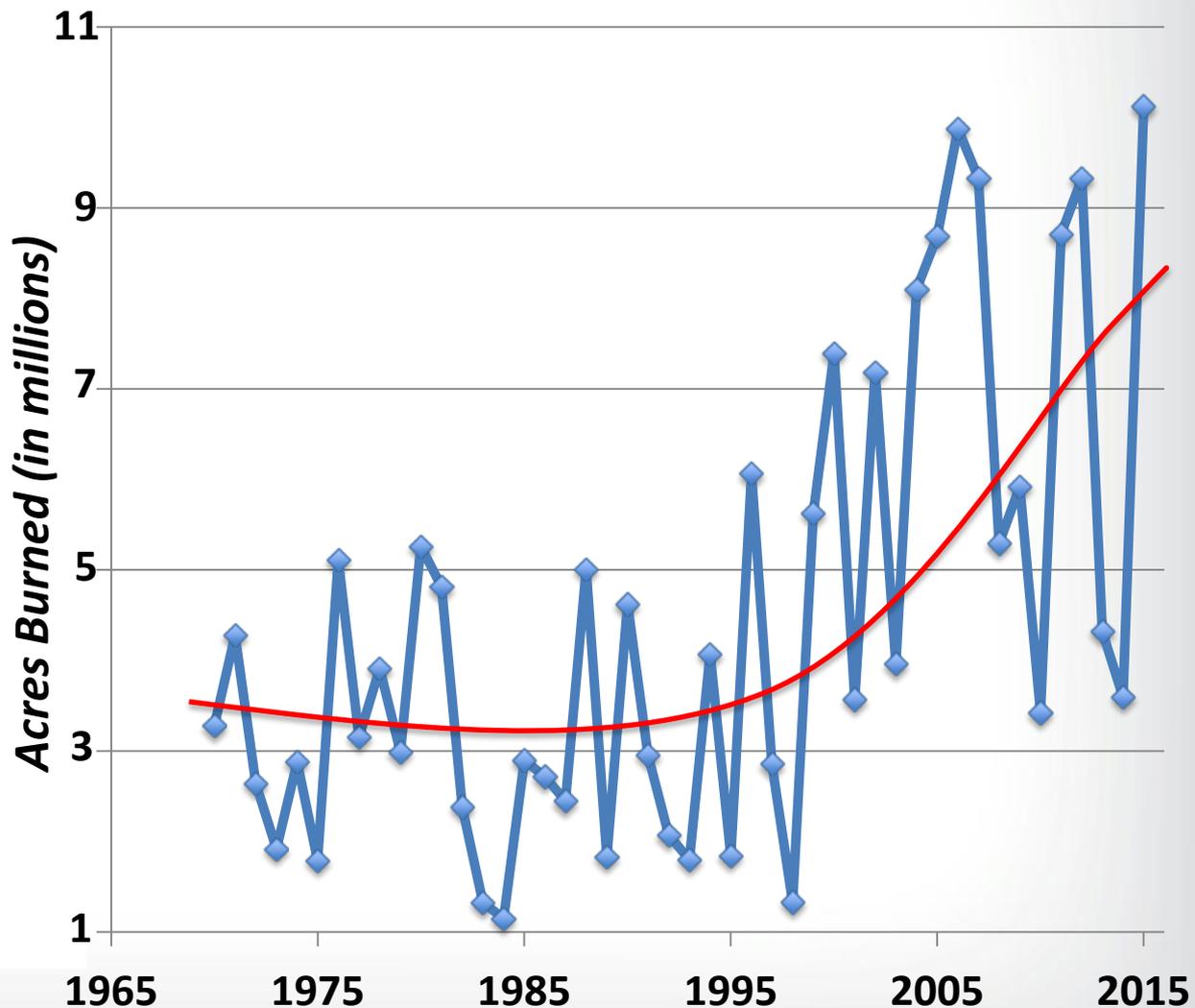


Wildfire in the U.S.

Acres Burned in the U.S. Annually

Present Concerns

- ✧ *Increasing acreage burned*
 - ✧ *increased vulnerability of populations*
 - ✧ *Increasing impact on urban areas*
 - *10% of all land with housing are situated in the wildland-urban interface*
 - *38.5% of U.S. housing units*
- (Radeloff et al. 2005)*





Why is Wildfire Important to the EPA

Protecting Public Health & Environment

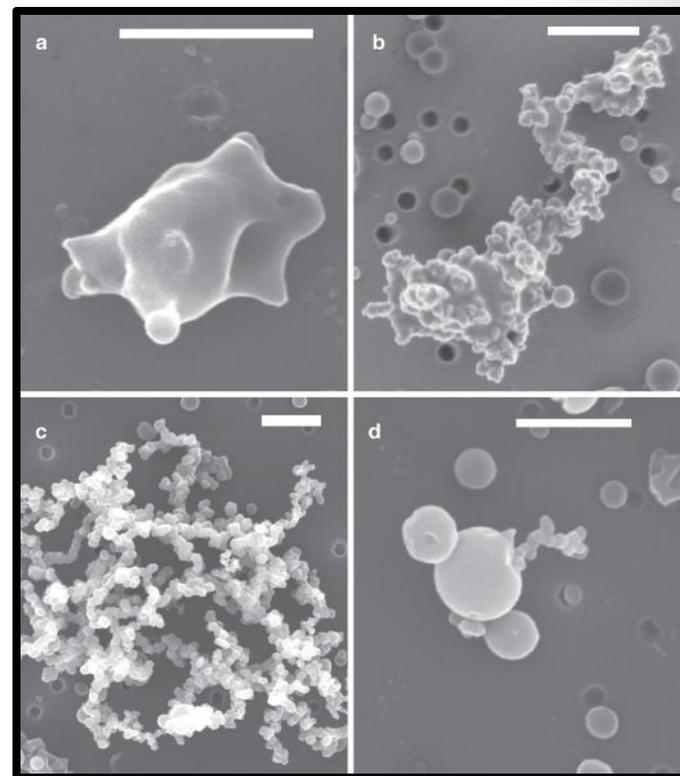
- ✧ Increasing Fire Size & Intensity
- ✧ Community & Fire Fighter Health
 - PM, Toxics
 - Susceptible Subpopulations
- ✧ Ambient Air Quality
 - PM, O₃, NO_x, NH₃, CO, VOCs
- ✧ Global Climate
 - CO₂, CH₄, Black & Brown carbon vs Blue carbon, Organic Aerosols, NO_x, N₂O





Cascade Complex, Idaho, 2007

- Particulate matter
- CO
- Ozone
- VOCs
- Trace gases
- Air toxics
- Hg



China S, et al. Nat Commun 4,
No.: 2122
doi:10.1038/ncomms3122



Health Effects of Wildfire Smoke

Recent Review & Case Controlled Study

Environmental Research 136 (2015) 120–132

Contents lists available at ScienceDirect

Environmental Research

journal homepage: www.elsevier.com/locate/envres



ELSEVIER



Review

A systematic review of the physical health impacts from non-occupational exposure to wildfire smoke

Jia C. Liu^{a,*}, Gavin Pereira^b, Sarah A. Uhl^a, Mercedes A. Bravo^a, Michelle L. Bell^a

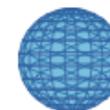
^a School of Forestry and Environmental Studies, Yale University, 195 Prospect Street, New Haven, CT 06511, USA

^b Center for Perinatal Pediatric and Environmental Epidemiology, School of Medicine, Yale University, New Haven, CT 06511, USA



[Environ Res.](#) 2015
Jan;136:120-32. doi:
10.1016/j.envres.2014.10.015.

Johnston *et al. Environmental Health* 2014, **13**:105
<http://www.ehjournal.net/content/13/1/105>



ENVIRONMENTAL HEALTH

RESEARCH

Open Access

Air pollution events from forest fires and emergency department attendances in Sydney, Australia 1996–2007: a case-crossover analysis

Fay H Johnston^{1*}, Stuart Purdie², Bin Jalaludin^{3,4}, Kara L Martin^{5,6}, Sarah B Henderson⁷ and Geoffrey G Morgan^{8,9}

[Environ Health.](#)

2014 Dec

10;13:105. doi:

10.1186/1476-

069X-13-105.

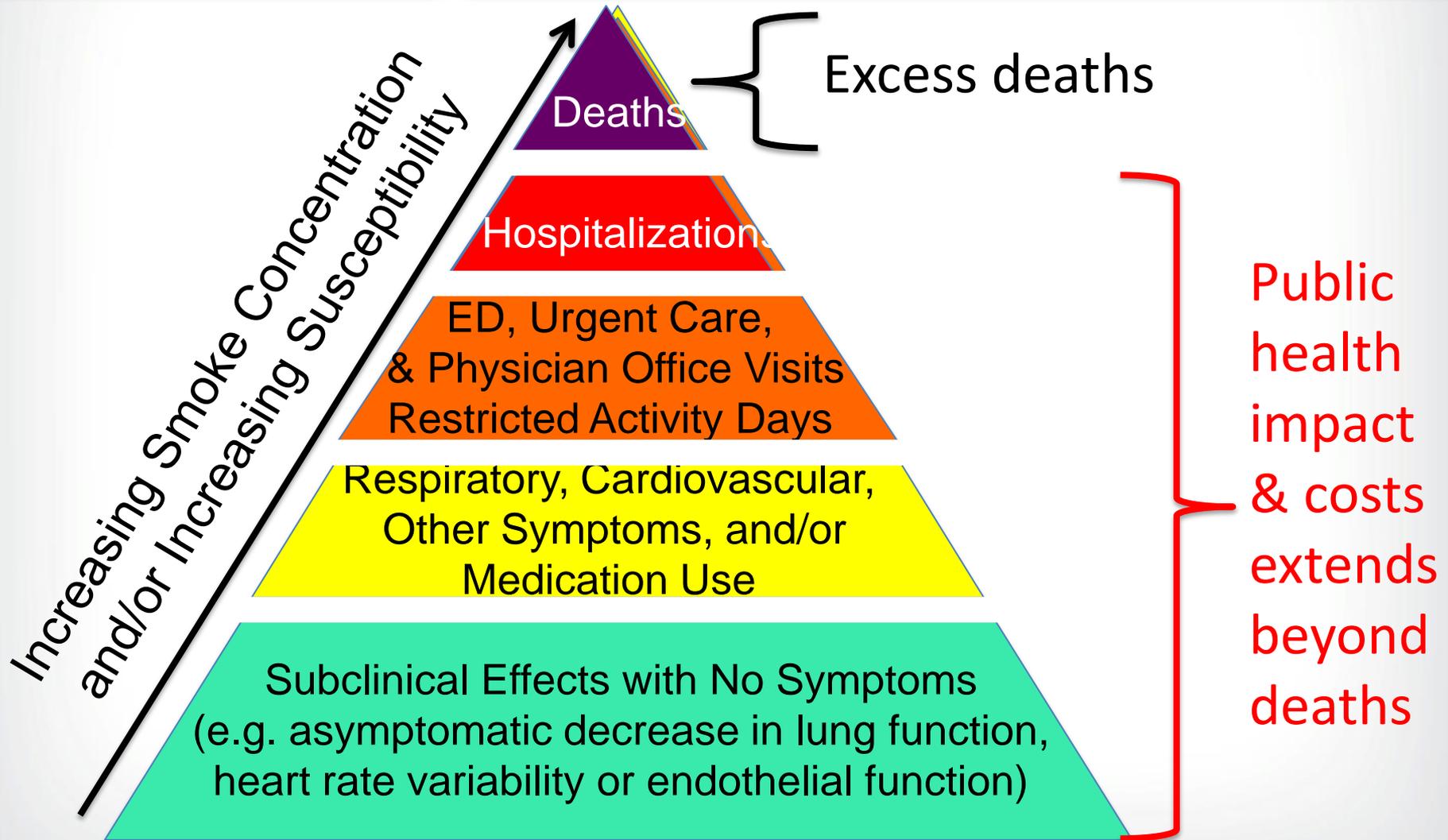
Health effects known or suspected to be caused by wildfire smoke:

- All-cause mortality
- Asthma & COPD exacerbations
- Bronchitis & pneumonia
- Childhood respiratory disease
- Cardiovascular outcomes
- Adverse birth outcomes
- Anxiety
- Symptoms such as: eye irritation, sore throat, wheeze, cough, & chest pain





Air Pollution and Health Effects



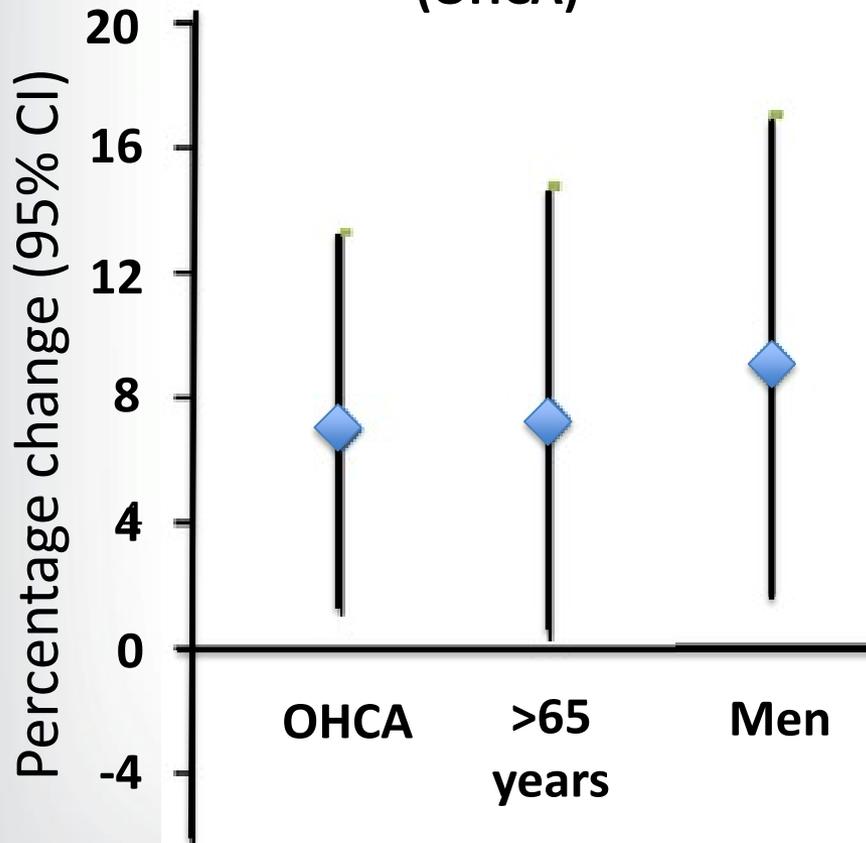


Cardiovascular Health Effects

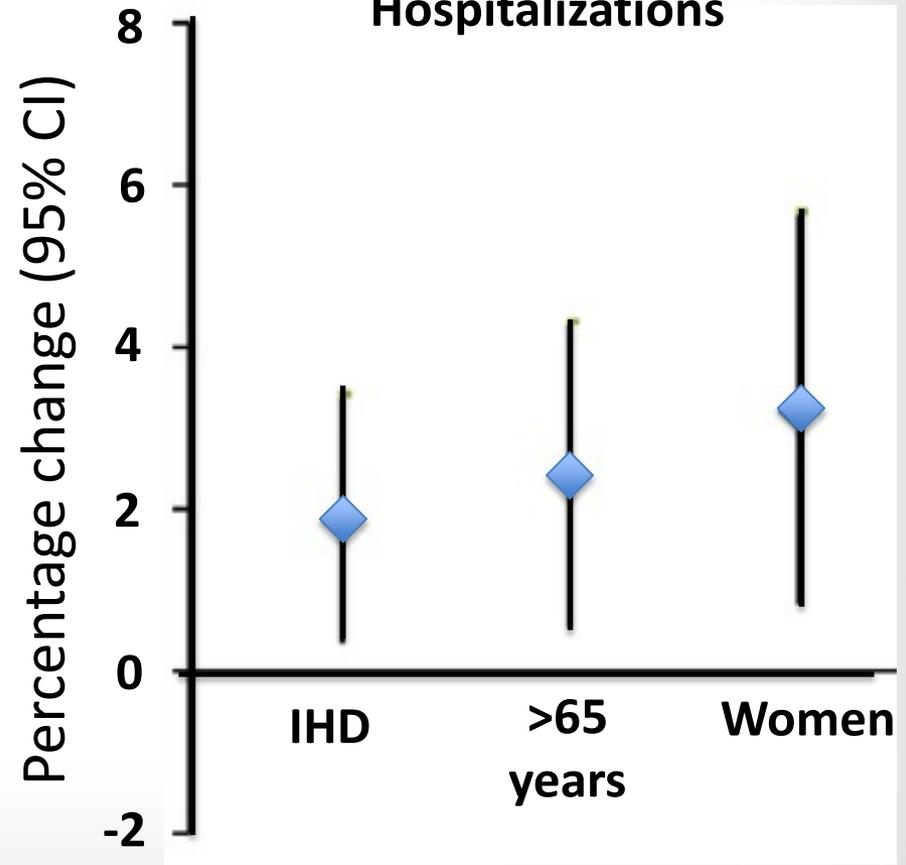
Australian Wildfire Smoke Health Effects

Victoria, Australia - December 1, 2006, to January 31, 2007

Out-of-Hospital Cardiac Arrest (OHCA)



Ischemic Heart Disease Hospitalizations





Who is at Risk from Wildfire Smoke

NHANES 2007-2010, N=10,898

Susceptible category	N	Percent (95% CI)
None	7135	73.0 (71.4, 74.6)
Respiratory only	642	6.4 (5.5, 7.2)
Cardiovascular only	319	2.6 (2.3, 2.9)
>65 years only	1713	10.9 (10.1, 11.8)
Respiratory and cardiovascular	136	1.0 (0.7, 1.3)
Respiratory and >65 years	220	1.6 (1.3, 1.8)
Cardiovascular and >65 years	608	3.8 (3.3, 4.3)
All three groups	125	0.7 (0.5, 0.9)

NHANES = National Health and Nutrition Education Survey



Who is at Risk from Wildfire Smoke

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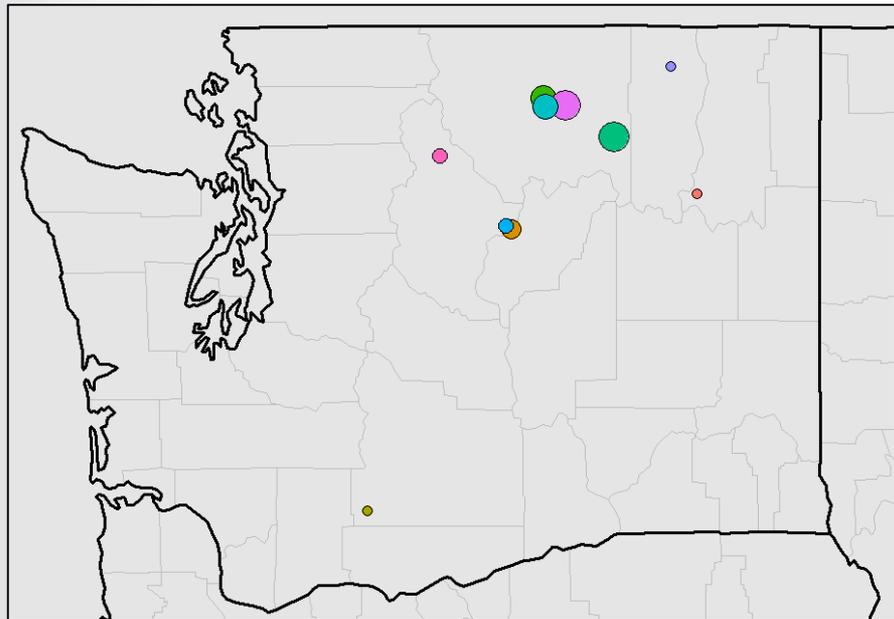
27% fall into at least one susceptible group category!



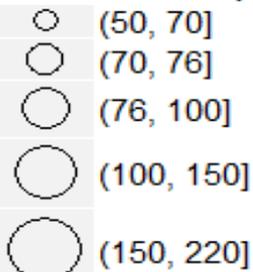
Wildfire Smoke Information

Public Interest in AirNow

Locations for Fires > 50,000 Acres
Washington State for 2015



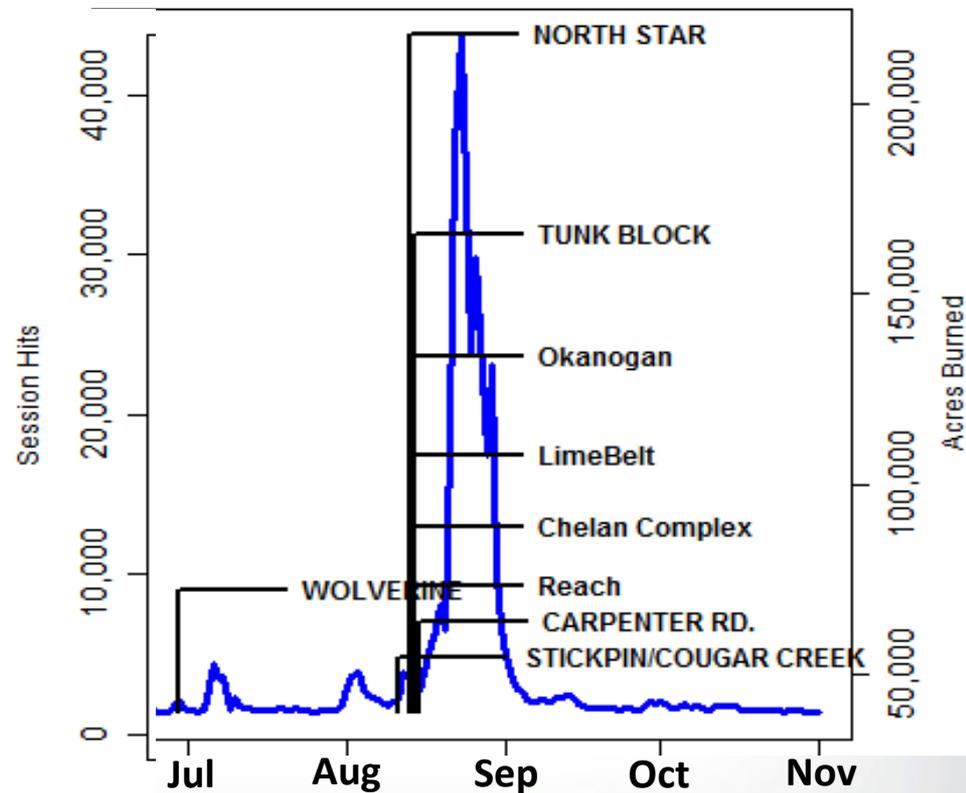
Acres Burned (thousands)



Fires



AirNow Sessions Hits in Washington State 2015
With Fires Burning >50,000 Acres



Courtesy of:
Ana Rappold NHEERL/ORD/US EPA



Odds Ratio for Changing Activity due to Poor Air Quality

Susceptible category	Unadjusted	Adjusted
None (referent)		
Respiratory only	2.64 (2.06, 3.37)	2.61 (2.03, 3.35)
Cardiovascular only	1.16 (0.76, 1.77)	1.33 (0.86, 2.04)
>65 years only	1.20 (0.93, 1.54)	1.22 (0.95, 1.57)
Respiratory and cardiovascular	4.06 (2.31, 7.15)	4.36 (2.47, 7.69)
Respiratory and >65 years	3.64 (2.35, 5.64)	3.83 (2.47, 5.96)
Cardiovascular and >65 years	1.23 (0.78, 1.91)	1.38 (0.89, 2.13)
All three groups	2.80 (1.94, 4.04)	3.52 (2.33, 5.32)

NHANES 2007–2010, N = 10,898.

Wells EM, Dearborn DG, Jackson LW (2012). *PLoS ONE* 7(11): e50526



Odds Ratio for Changing Activity due to Poor Air Quality

Susceptible category	Unadjusted	Adjusted
None (referent)		
Respiratory only	2.64 (2.06, 3.37)	2.61 (2.03, 3.35)
Cardiovascular only	1.86 (0.86, 2.04)	1.86 (0.86, 2.04)
>65 years only	1.32 (0.54, 1.54)	1.32 (0.95, 1.57)
Respiratory and cardiovascular	4.06 (2.31, 7.15)	4.36 (2.47, 7.69)
Respiratory and >65 years	2.54 (1.25, 5.14)	2.54 (1.25, 5.14)
Cardiovascular and >65 years	1.25 (0.75, 1.91)	1.38 (0.89, 2.13)
All three groups	2.80 (1.94, 4.04)	3.52 (2.33, 5.32)

• *12% of the study population changed activities due to bad air quality*

• *25% of those with a respiratory condition changed activities*

NHANES 2007–2010, N = 10,898.

Wells EM, Dearborn DG, Jackson LW (2012). PLoS ONE 7(11): e50526



Reproducibility of Health Effects *Eastern NC Pocosin (Peat) Wildfires*

2008 Pocosin Lakes National Wildlife Refuge

Peat Bog Wildfire Smoke Exposure in Rural North Carolina is Associated with Cardiopulmonary Emergency Department Visits Assessed through Syndromic Surveillance

Ana G. Rappold, Susan L. Stone, Wayne E. Cascio, Lucas M. Neas, Vasu J Kilaru, Martha Sue Carraway, James J. Szykman, Amy Ising, William E. Cleve, John T. Meredith, Heather Vaughan-Batten, Lana Deyneka, and Robert B. Devlin

Environmental Health Perspective 119:1425, 2011

Total costs of the 45 day fire was:

- \$20 million to suppress the fire
- \$48 million in economic costs

2008

Heart failure, COPD, asthma, pneumonia, bronchitis

- Increased regional focus on health effects of wildfire smoke
- State sponsored public health messaging

2011 Pains Bay

Tinling et al. *Environmental Health* (2016) 15:12
DOI 10.1186/s12940-016-0093-4

Environmental Health

RESEARCH

Open Access



Repeating cardiopulmonary health effects in rural North Carolina population during a second large peat wildfire

Melissa A. Tinling¹, J. Jason West², Wayne E. Cascio³, Vasu Kilaru⁴ and Ana G. Rappold^{3*}

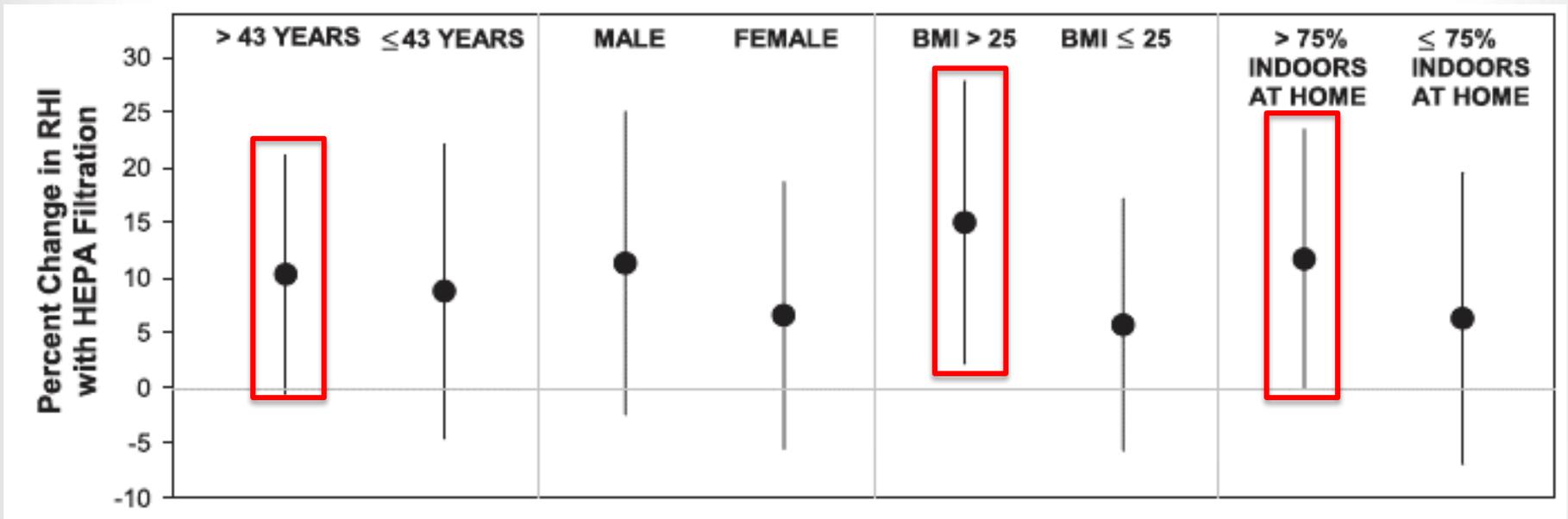
2011

Respiratory symptoms, upper respiratory infection, hypertension



HEPA Filters & Vascular Function

HEPA Filtration Improves Vascular Function Wood smoke impacted community - British Columbia



RHI = Reactive hyperemia index, a measure of an artery's capacity to respond to low O₂

HEPA filtration improved blood vessel function in people older than 43 years, having BMIs >25, and spending more than 75% of their time indoors

HEPA filtration improved biomarkers of inflammation in men and in people having BMIs >25



Health Effects of Inhaled PM

Proposed Mechanisms

Circulating Constituents

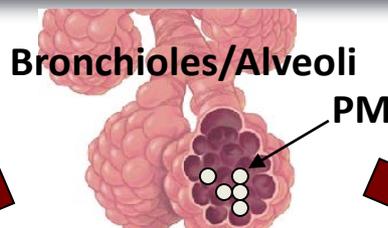
Blood



PM or constituents
in the circulation

3

PM and/or constituents
transmitted into blood



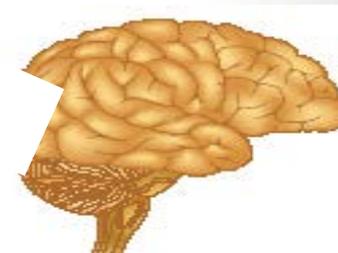
Pulmonary oxidative
stress & inflammation

2

Activation of lung
ANS reflex arcs

Neural Response

ANS



ANS imbalance

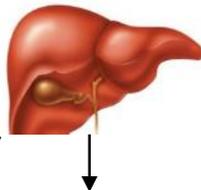
1

SYSTEMIC
"SPILL-OVER"

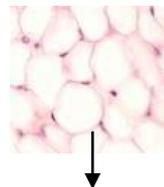
Systemic Oxidative stress and Inflammation

Acute phase response
↑ Clotting factors
Fibrinogen, CRP

Activated or
Inflamed liver



Direct actions



↑ Adipokines
(PAI-1)

Activated or
Inflamed fat

ACUTE: Endothelial dysfunction, Vasoconstriction, Plaque instability, Coagulation, Thrombosis, Arrhythmias

CHRONIC: LV hypertrophy, Atherosclerosis, Arterial Stiffness, Metabolic Syndrome: HTN, Insulin resistance, Dyslipidemia



Protecting the Health of the Public

Interagency Cooperation

➤ National Interagency Fire Center (NIFC)

- ❖ Coordination of Federal Agencies Efforts on National Fire Planning and Operations
- ❖ USFS, BLM, NWS, NPS, BIA, FWS, NOAA, NBC, NASF, FEMA – U.S. Fire Administration

➤ Department of Agriculture

- ❖ U.S. Forest Service
 - Fire Research – Pacific Northwest, Pacific Southwest, Rocky Mountain, Northern, & Southern Stations
 - BlueSky – Wildland Fire Emissions and Smoke Forecasting Model, Emission Factors, Fuel Research
 - Fire Management - Suppression, Fuels Management, Predictive Services
 - Burned Area Emergency Response – After Fire Support

➤ National Oceanic and Atmospheric Administration (NOAA)

- ❖ National Weather Service
 - Fire Weather Planning Tools

➤ Department of Interior

- ❖ National Park Service
 - Fire Management - Suppression, Fuels Management
- ❖ Bureau of Land Management
 - Fire and Aviation Program – Suppression, Fuels Management, Predictive Services
- ❖ U.S. Geological Survey
 - Data Management - National Mapping Facilities, Maintains Satellite Land Remote Sensing Data

➤ National Aeronautics and Space Administration (NASA)

- ❖ Satellite Products (Aqua, Aura, MODIS, Fire Information for Resource Management System)

➤ Centers for Disease Control & Prevention (CDC)

➤ Environmental Protection Agency

- ❖ National Ambient Air Pollution Regulations
- ❖ Fire Research & Human Health Assessment



➤ EPA Expertise - Linking Air Pollution to Health Effects

❖ Source Emission to Exposure (NRMRL & NERL)

- Emission Characterization
- Ambient Monitoring Methods
- Atmospheric Chemistry
- Human Exposure

❖ Health Effects (NHEERL)

- Mechanistic Toxicological Effects
- Epidemiological Modeling

❖ Multi-pollutant Context (NHEERL)

- Human & Animal Models

❖ Model Development & Assessment (NERL)

- Deterministic Modeling (CMAQ)
- Receptor Modeling (PMF, Unmix, CMB)

➤ EPA Expertise - Climate Change & Health Risk Assessment

❖ Data Integration & Analysis

❖ Health Communication (AQI, *Healthy Heart*)

Aerial Sampling



- Onboard Computer with Data Transmission
- User-set CO₂ Triggering of Samplers
- GPS, CO₂, CO
- Semi-Volatile Organic Compounds (SVOCs)
- Volatile Organic Compounds (VOCs)
- Black Carbon (BC)
- Brown Carbon
- PM by Filter (PM_{2.5}, PM₁₀)
- Continuous PM_{2.5}, PM₁₀
- 3D-anemometer

Terrestrial Sampling





ORD -Quantifying Smoke Toxicity

JFSP Research Plan FY 2015-2017

Research Goals:

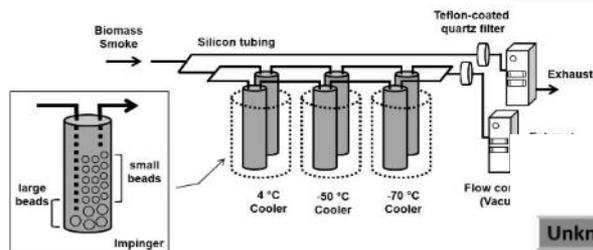
- 1) Compare the relative cardiopulmonary toxicity and mutagenicity of PM emissions from different fuel types (e.g., pine, oak, peat, chaparral) and burning conditions (e.g., flaming, smoldering)
- 2) Provide a potency ranking matrix

Combustion

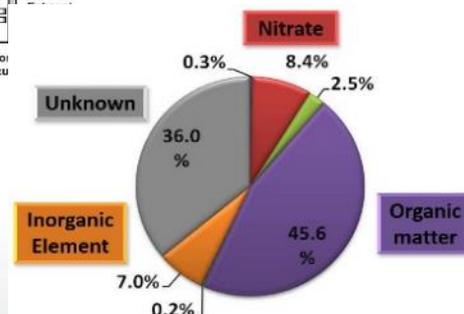


Fire Emissions

Collection/ Analysis



Particle and Gas Phase Chemistry & Mass Balance



Toxicity Test

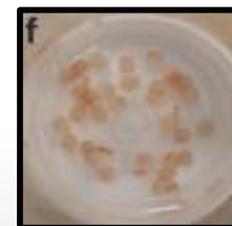
WT & K/O Mice



Toxicity Ranking Matrix

5	5	10	15	20	25
4	4	8	12	16	20
3	3	6	9	12	15
2	2	4	6	8	10
1	1	2	3	4	5
	1	2	3	4	5

Cells, Tissue Slices





Local Air Quality Conditions

Zip Code:

State :



[National Summary](#)

[Forecast](#)

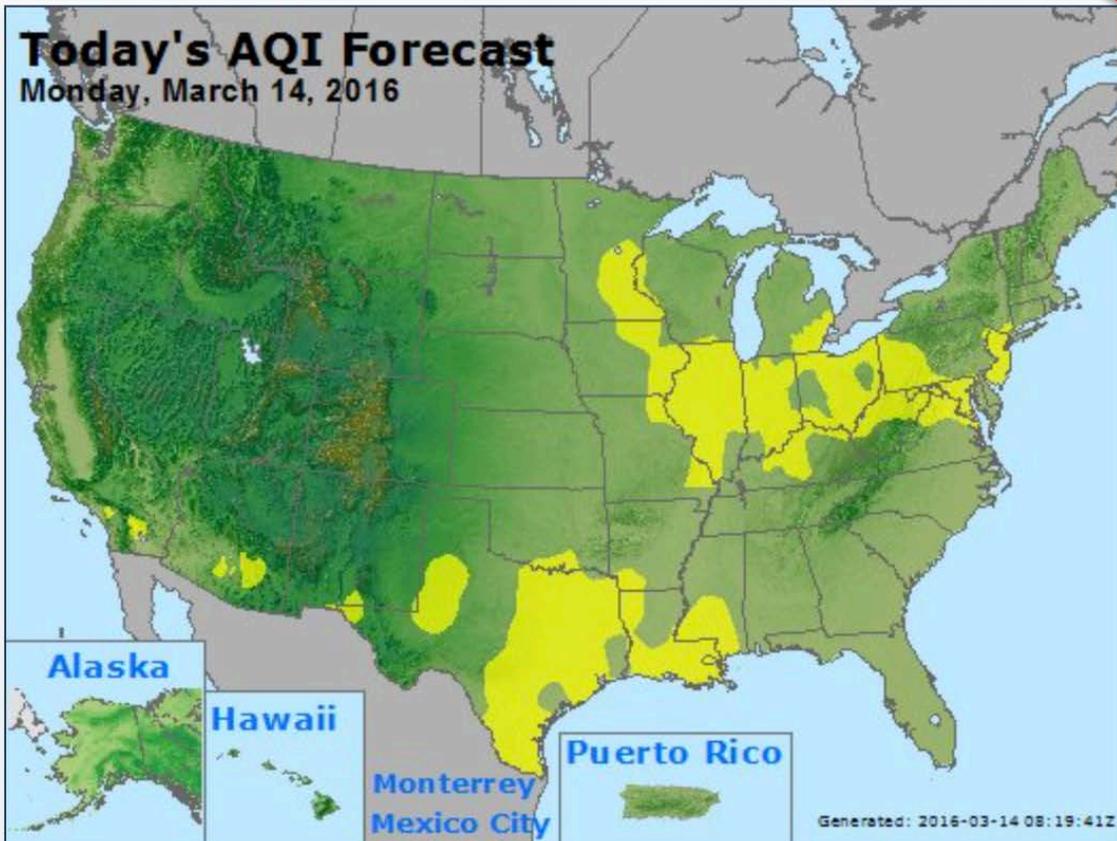
[Current AQI](#)

[AQI Loop](#)

[More Maps](#)

Today's AQI Forecast

Monday, March 14, 2016



Fires: Current Conditions

[Click to see map](#)



U.S. Embassies and Consulates

Data from air quality monitors at select U.S. embassies and consulates around the world

Announcements

3/9/16: NEW: [Spanish-language website](#) for Air Quality Flag Program - NEUVO: [En español—El sitio web](#) de la programa de banderines sobre la calidad del aire

03/03/16: Now available! Heart Disease, Stroke, and Outdoor Air Pollution (en Español) - [Enfermedades del corazón, ataques cerebrales y contaminación del aire](#)

[more announcements](#)

Air Quality Basics

[Air Quality Index](#) | [Ozone](#) | [Particle Pollution](#) | [Smoke from fires](#) | [What You Can Do](#)

[Health](#)

[Learning Center](#)

Good

Moderate

USG

Unhealthy

Very Unhealthy

Hazardous

Action Day



EnviroFlash Email

Local Air Quality Conditions

Zip Code:

Go

State : Alabama



Go

[National Summary](#)

- [Forecast](#)
- [Current AQI](#)
- [AQI Loop](#)
- [More Maps](#)

Fires: Current Conditions

[Click to see map](#)

[U.S. Embassies and Consulates](#)

Today's AQI Forecast Monday

Fires: Current Conditions

[Click to see map](#)



[corazón, ataques cerebrales y contaminación del aire](#)

[more announcements](#)

Air Quality Basics

[Air Quality Index](#) | [Ozone](#) | [Particle Pollution](#) | [Smoke from fires](#) | [What You Can Do](#)

[Health](#)

[Learning Center](#)

- Good**
- Moderate**
- USG**
- Unhealthy**
- Very Unhealthy**
- Hazardous**
- Action Day**

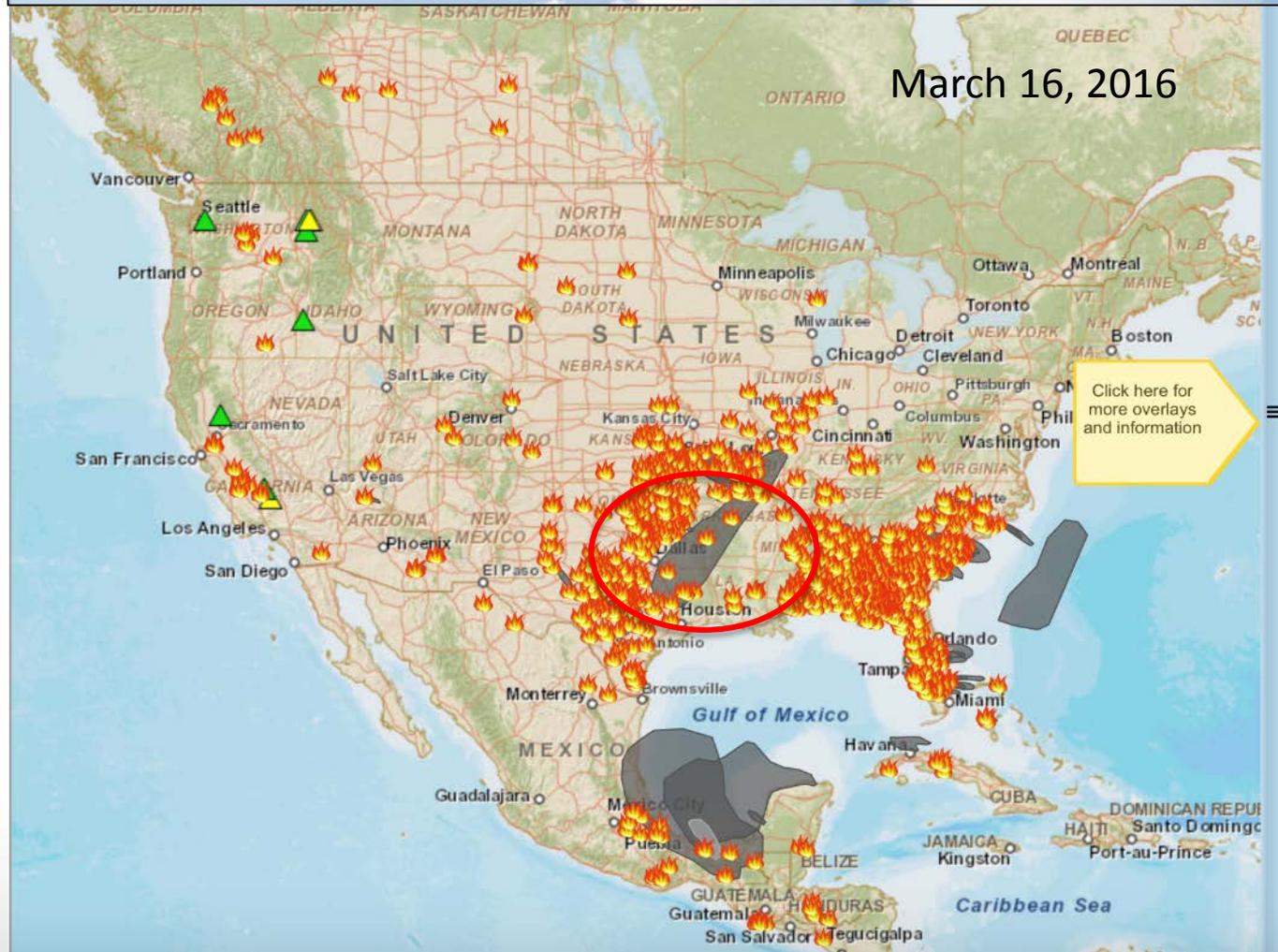




AirNow

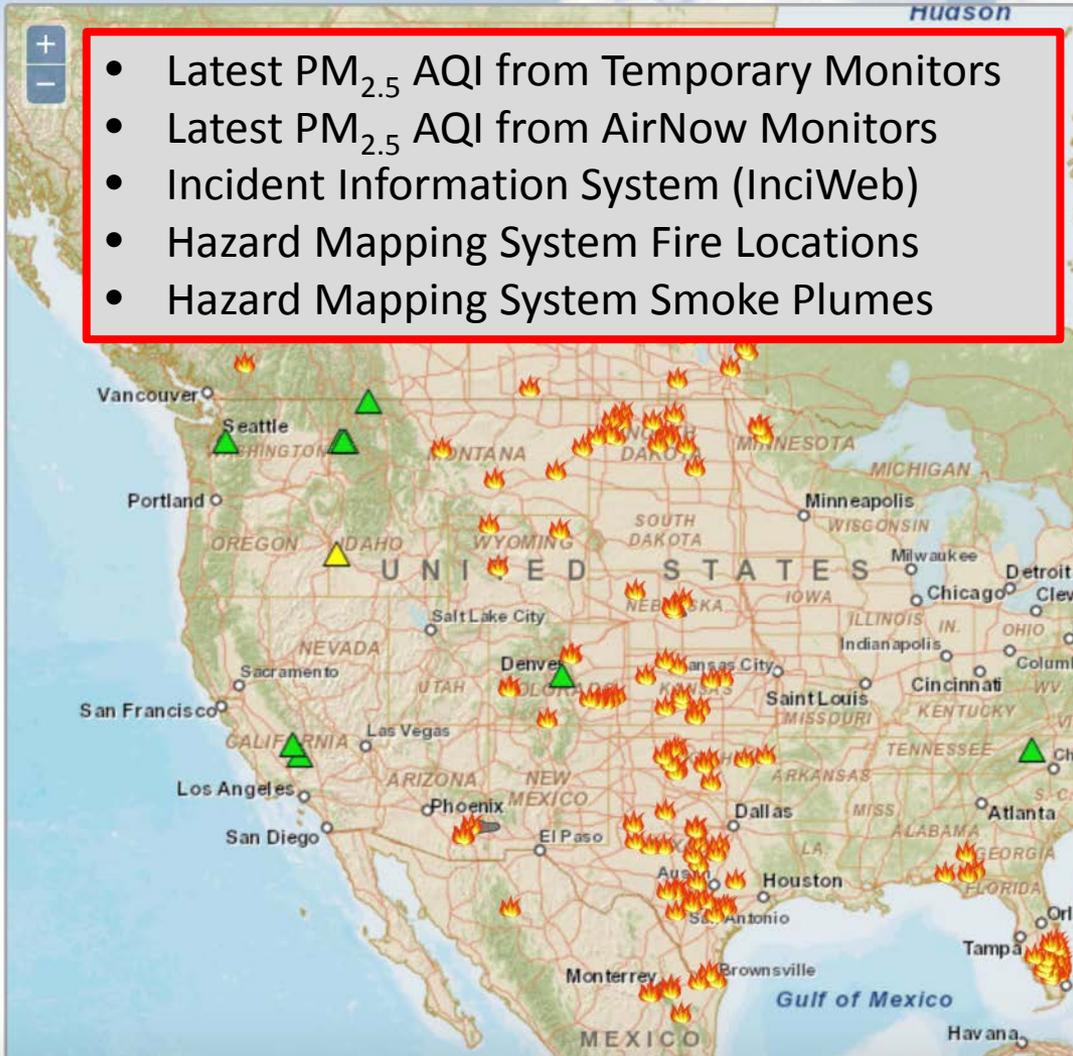
Current Fire Conditions

Fires: Current Conditions



Fires: Current Conditions

- Latest PM_{2.5} AQI from Temporary Monitors
- Latest PM_{2.5} AQI from AirNow Monitors
- Incident Information System (InciWeb)
- Hazard Mapping System Fire Locations
- Hazard Mapping System Smoke Plumes



Please click boxes to display map layers

- Latest PM_{2.5} AQI from Temporary Monitors
- Latest PM_{2.5} AQI from AirNow Monitors
- Incident Information System (InciWeb)
- Hazard Mapping System Fire Locations
- Hazard Mapping System Smoke Plumes

Explanation of Map Layers

- **Latest PM_{2.5} AQI from Temporary Monitors** shows particle pollution observed at portable, temporary PM2.5 monitors near large, active wildfires. These monitors are deployed by US Forest Service and state and local agencies for measuring air quality during wildfires. They may be moved based on wildfire locations. Data are not fully verified and only intended for real-time air quality reporting.
- **Latest PM_{2.5} AQI from AirNow Monitors** shows particle pollution observed at monitors operated by state, tribal, or local monitoring agencies using federal reference or equivalent monitoring techniques. Data are considered preliminary and non-regulatory.
- **Incident Information System (InciWeb)** shows the locations of active wildfires from the InciWeb [website](#). Chrome and Firefox only.
- **Hazard Mapping System Fire Locations** are fire locations detected by satellites operated by the National Oceanic and Atmospheric Administration (NOAA) [Hazard Mapping System](#).
- **Hazard Mapping System Smoke Plumes** are smoke plumes analyzed by the National Oceanic and Atmospheric Administration (NOAA) [Hazard Mapping System](#). Darker colors indicate denser smoke concentrations. The plumes may be at ground-level or high up in the atmosphere.

Zoom to



AirNow Advisories, Fires & Health, CDC's Guidance



Current Advisories

Fires and Health

Before, During, and
After a Wildfire

More Fire Tools

- [NOAA Smoke Forecast Tool](#) - Maps of surface and vertical smoke can be found under "Additional Air Quality Forecast Guidance."
- [NOAA's Fire Weather Outlook](#) - This tool maps fire watches and warnings.
- [GEOMAC Wildland Fire Support](#) - Access maps of current fire locations using this tool from the Geospatial Multi-Agency Coordination Group (GEOMAC).
- [MODIS Active Fire Mapping](#) - This site from the USDA Forest Service Remote Sensing Applications Center (RSAC) maps active fires.



AirNow

Current Advisories



Local Air Quality Conditions

Zip Code:

State :

[National Summary](#)

[AirNow Home](#) >> [Headline](#)

Smoke Advisories and Forecasts

[Fires and Your Health](#)

[Fires: Current Conditions](#)

Advisories and Forecasts

United States

Alaska

[Alaska DEC Wildfire Information](#)

Arizona

[Arizona Wildfire Information](#)

California

[Butte County Air Quality Management District](#)

[Northern Sierra Air Management District](#)

[Shasta County Air Quality Management District](#)

[Shasta County \(Redding\) Air Quality Webcam](#)

[South Coast Air Quality Management District](#)

[Ventura County Air Pollution Control District](#)

Colorado

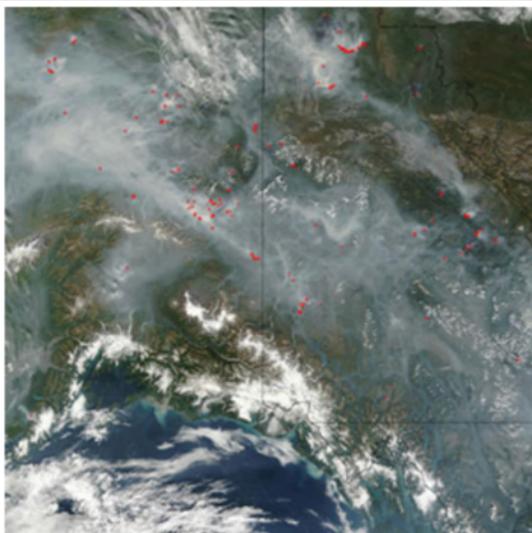
[Colorado Wildfire Smoke Health Advisories](#)



Fires and Your Health

Smoke is made up of a complex mixture of gases and fine particles produced when wood and other organic materials burn. The biggest health threat from smoke is from fine particles. These microscopic particles can get into your eyes and respiratory system, where they can cause health problems such as burning eyes, runny nose, and illnesses such as bronchitis. Fine particles also can aggravate chronic heart and lung diseases - and even are linked to premature deaths in people with these conditions.

If you are healthy, you're usually not at a major risk from short-term exposures to smoke. Still, it's a good idea to avoid breathing smoke if you can help it. Everyone should take the steps below when wildfires are present.



Fires and smoke across Alaska and Northern Canada
[Archive Image courtesy of NASA Modis](#)

Use common sense. If it looks smoky outside, it's probably not a good time to mow the lawn or go for a run. And it's probably not a good time for your children to play outdoors.

Pay attention to local air quality reports. Stay alert to smoke-related news coverage or health warnings.

Visit [AirNow](#) to find out the Air Quality Index in your area. As smoke gets worse, the amount of particles in the air changes - and so do the steps you should take to protect yourself. AirNow recommends precautions you can take to protect your health when air pollution gets bad.

If you are advised to stay indoors, take steps to keep indoor air as clean as possible. When smoke levels are high, try to avoid using anything that burns, such as wood fireplaces, gas logs, gas stoves - and even candles! Don't vacuum. That stirs up particles already inside your home. And don't smoke. That puts even more pollution in your lungs, and in the lungs of people around you.

If you have asthma or other lung disease, make sure you follow your doctor's directions about taking your medicines and following your asthma management plan. Call your doctor if your symptoms worsen.

Run your air conditioner if you have one. Keep the fresh air intake closed and the filter clean to prevent bringing additional smoke inside. Note: If you don't have an air conditioner, staying inside with the windows closed may be dangerous in extremely hot weather. In these cases, seek alternative shelter.

Health Resources

- [How Smoke from Fires Can Affect Your Health](#) - Learn steps you can take to protect your health.
- [Particle Pollution and Your Health](#) - Find out if you are at risk from exposure to particle pollution, and what health effects can be caused by particles. (PDF, 2 pp, 280KB, [about PDF](#)),

Educational Resources

- [CDC Wildfire Fact Sheet](#) - Information on emergency preparedness and response.
- [California Air Resources Board SMP Public Outreach Protocol - Tools and Materials](#)

[EXIT AIRNOW ▶](#)

- [Wildfire Guide for Health Officials](#)

[EXIT AIRNOW ▶](#)

- FOR KIDS- Follow [Smoky Bear's advice](#) when wildfires are in your area!



AirNow's Link to CDC CDC's Emergency Preparedness & Response

CDC Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

CDC A-Z INDEX ▾

Emergency Preparedness and Response

Natural Disasters and Severe Weather

- Earthquakes +
- Extreme Heat +
- Floods +
- Hurricanes +
- Landslides & Mudslides
- Lightning +
- Tornadoes +
- Tsunamis +
- Volcanoes +
- Wildfires -**
- Before a Wildfire

[Information on Specific Types of Emergencies](#) > [Natural Disasters and Severe Weather](#) > [Wildfires](#)

Wildfires



Language: English ▾

More and more people make their homes in areas that are prone to wildfires. You can take steps to be ready for a wildfire and prepare your home and landscaping to reduce your risk. Learn how to protect yourself and your family from a wildfire, evacuate safely during a wildfire, and how to stay healthy when you return home.



Before a Wildfire

- [Wildfire...Are You Prepared?](#)
- [Is your home Firewise?](#)
- [Make a Plan](#)

More >

During a Wildfire



Wildfire Smoke
A Guide for Public Health Officials
Revised July 2008
(With 2012 AQI Values)



Wildfire Guide developed in 2001

- Response to 1999 fires on Hoopa reservation
- Meetings in 2000 (CA OEHHA) and 2001 (Univ. of Washington) initiated its development
- Recommendation based on limited health or air quality information
- The Guide - developed by EPA, CA and WA without any agency taking ownership. It was widely used by state/local agencies.

Revised in 2008

- Better information about health effects of PM & more continuous monitoring data was incorporated.
- Same partners made revisions. The guide is still widely used.



Wildfire Smoke:

A Guide for Public Health Officials

Wildfire Smoke

A Guide for Public Health Officials
Revised July 2008
(With 2012 AQI Values)



- Composition of smoke
- Characteristics of wildfire smoke
- Health effects of smoke
- Sensitive populations
- Specific strategies to reduce smoke exposure
- Estimating particulate matter levels
- Recommendations for public health actions
 - Preseason public service announcements
 - Public advisories and protective measures
- Bibliography



Public Health Recommendations

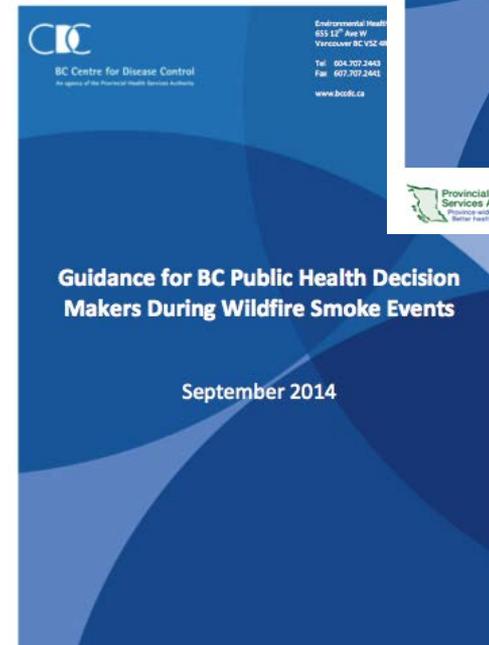
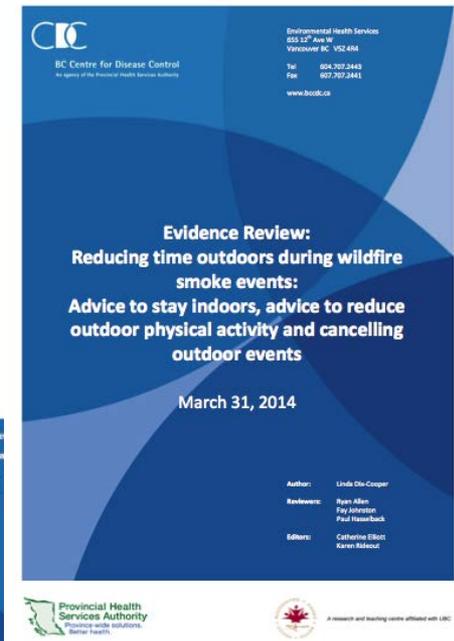
Exposure Reduction Measures

An individual can be advised to:

- Stay indoors
- Reduce outdoor physical activity
- Respirators (e.g., N-95) can help in the short-term
- Activate asthma/COPD action plans
- Use a home clean air shelter

A community can be advised to:

- Cancel outdoor events
- Provide community clean air shelters
- Increase air filtration in institutions
- Evacuate



Elliott CT. Guidance for BC Public Health Decision Makers During Wildfire Smoke Events. 2014



Wildfire Smoke Guide: *Anticipated Upgrades*

Why Revise It Now

- ✧ Stronger evidence base is available.
- ✧ Federal partners are now making revisions with input from state and local partners.

Writing Team Partners

- ✧ EPA Office of Air & Radiation (Lead)
(Office of Air Quality Planning and Standards)
- ✧ EPA Office of Research & Development (National Health & Environmental Effects Research Lab)
- ✧ CDC – Natl Center for Environmental Health
- ✧ CDC - Pediatric Environmental Health Specialty Units
- ✧ US Forest Service

Anticipated Upgrades

- ✧ Better defined health effects
- ✧ Children's health

Wildfire Smoke **A Guide for Public Health Officials** Revised July 2008 (With 2012 AQI Values)





Expected Products and Timeline

Draft and Final Wildfire Guide

2016

- Early March Writing of revision with partners underway
- Late March Complete initial revision
- Early May State comments provided to EPA as written comments
- End of May First Draft Revised Guide
- Jun, Jul, Aug Deliver Draft Revised Guide for use during 2016 fire season
- Late Sept EPA summarizes comments from States' from wildfire season experience and needs into further revision

2016-2017

- Winter EPA and writing team work to finalize the document based on state input
- Winter Work with partners to develop communication and outreach strategy for the Final Guide

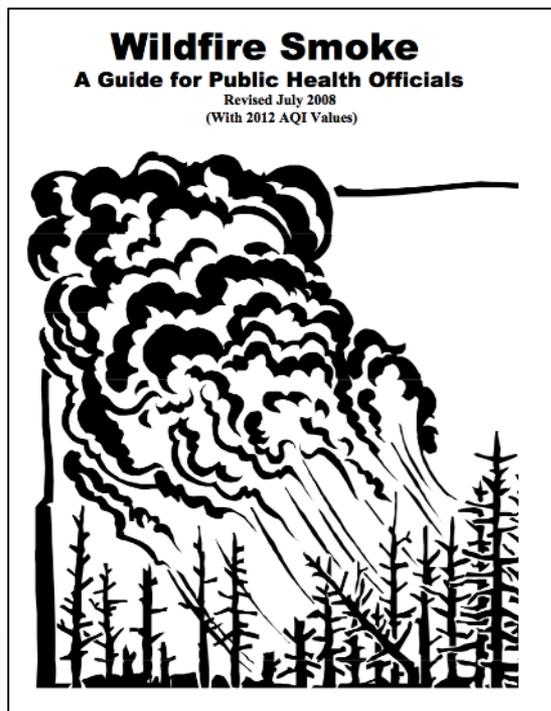
2017

- Release Final Guide prior to 2017 fire season



For More Information Visit

WILDFIRE GUIDE - A GUIDE FOR PUBLIC HEALTH OFFICIALS, UPDATED JUNE 2013



http://oehha.ca.gov/air/risk_assess/wildfire.html

Contact information: Wayne Cascio, MD
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- www.airnow.gov
 - EPA AirNow
- www.usfs.gov
 - U.S. Forest Service
- www.cdc.gov
 - Wildfire
- www.nasa.gov
 - Satellite imaging
- www.noaa.gov
 - Forecasting
- www.nifc.gov
 - National Interagency Fire Center
- www.firescience.gov
 - Joint Fire Science Program



Thank you

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