

WILDFIRES

Lessons Learned from Creek Fire Incident, California-2020

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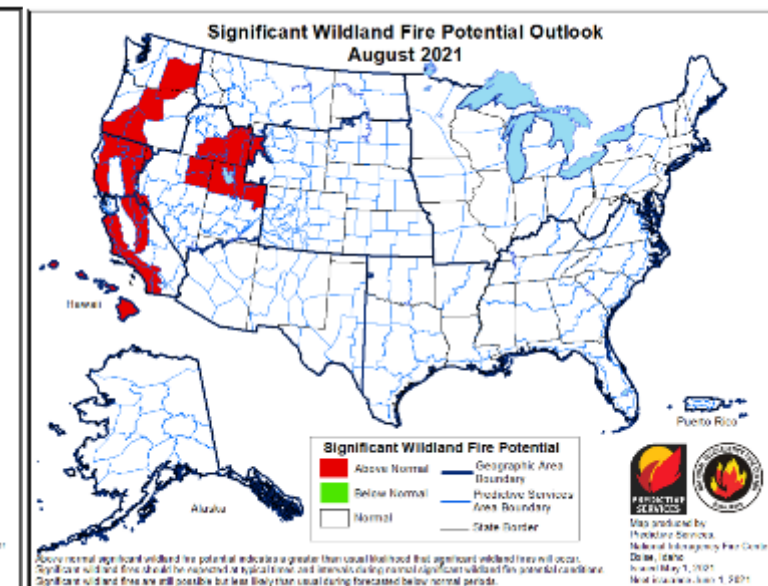
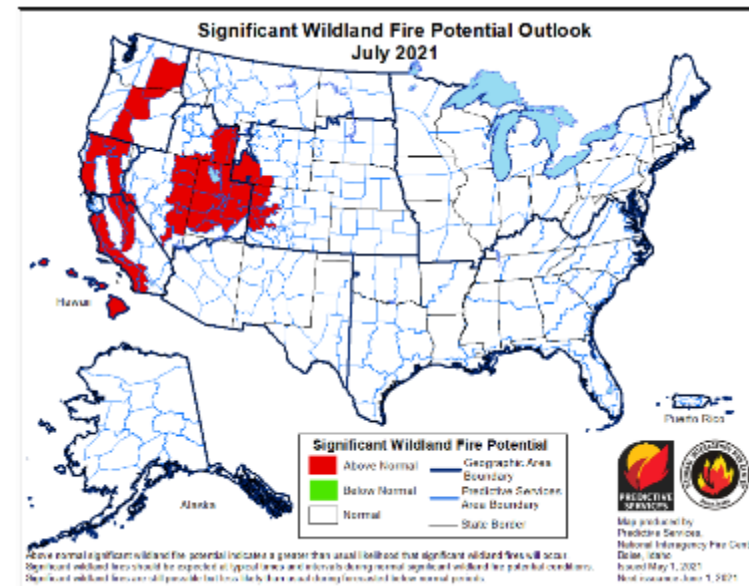
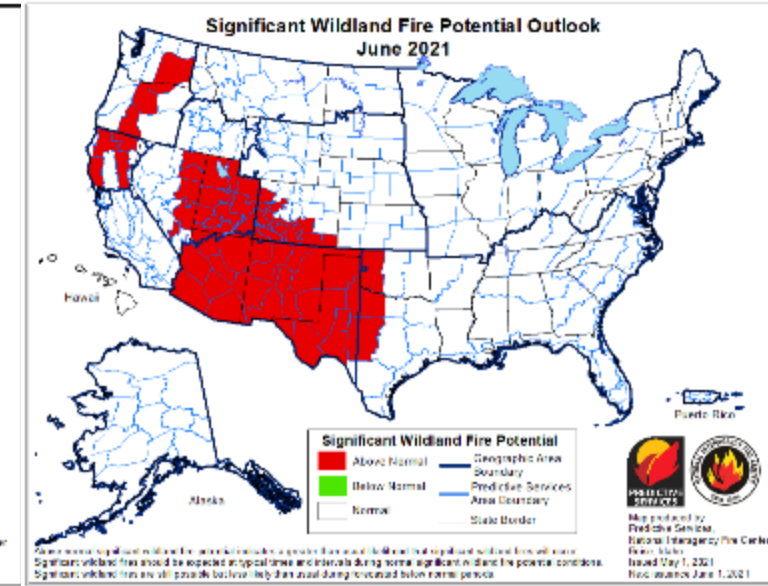
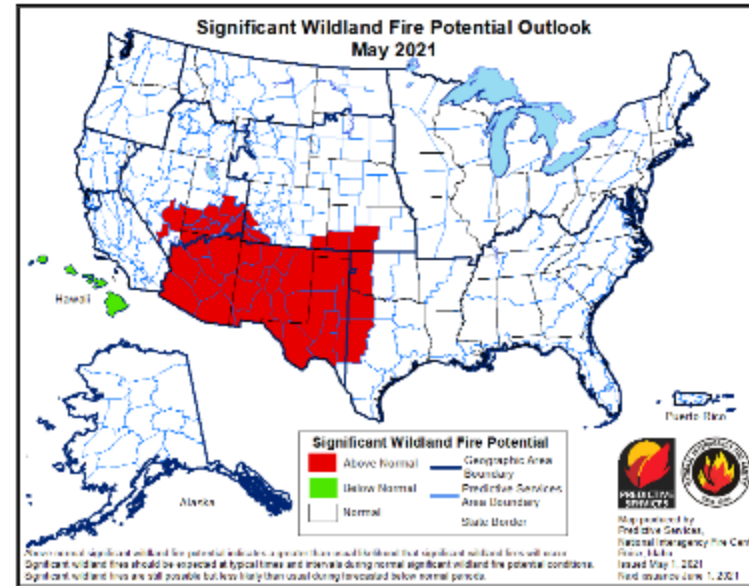
National Center for Environmental Health

Disclaimer: This presentation does not necessarily represent views of CDC

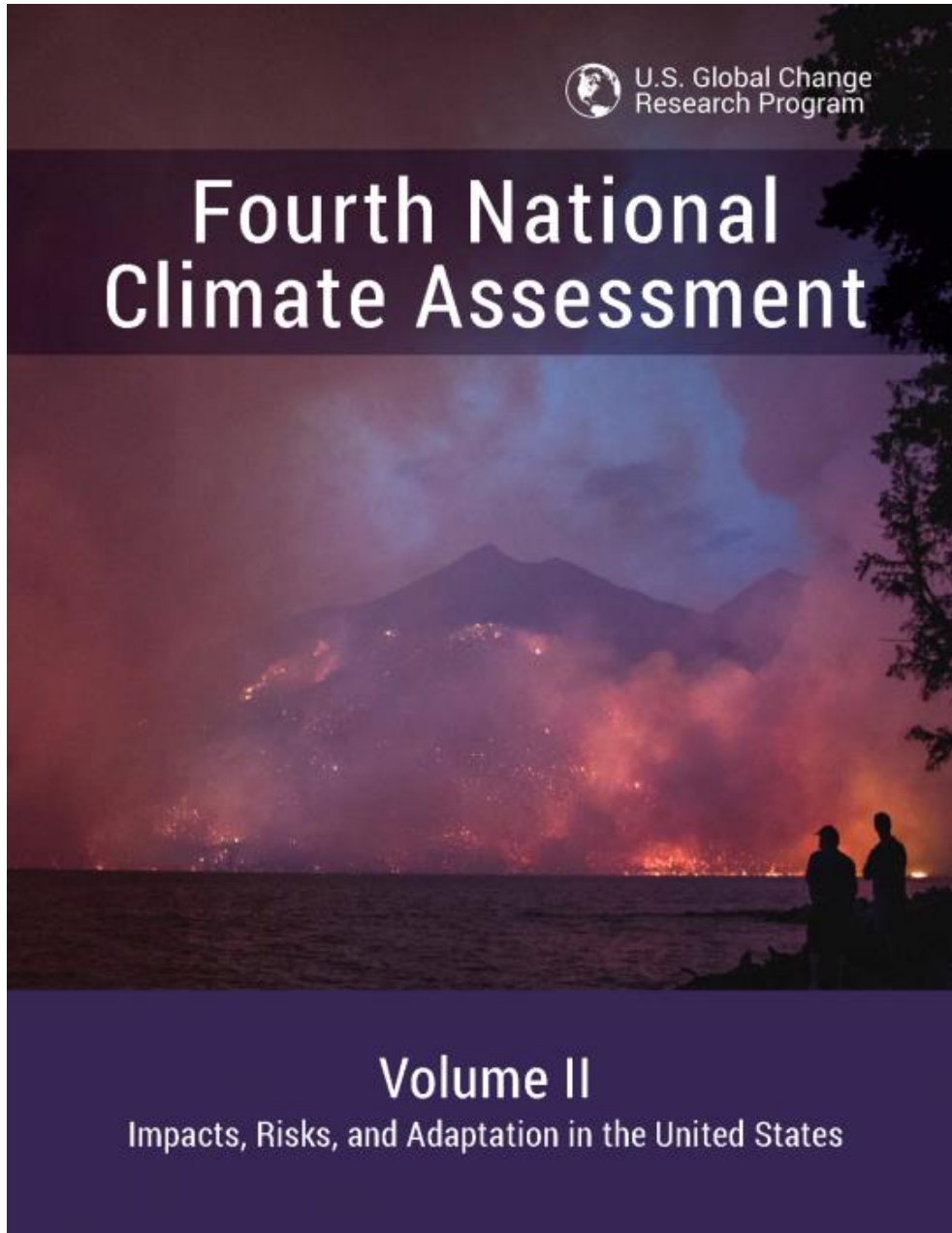


BACKGROUND

Wildfires Happening Now and Potential Fire Outlook ...



Wildfire Episodes and Climate Change



PERSPECTIVE

The changing risk and burden of wildfire in the United States

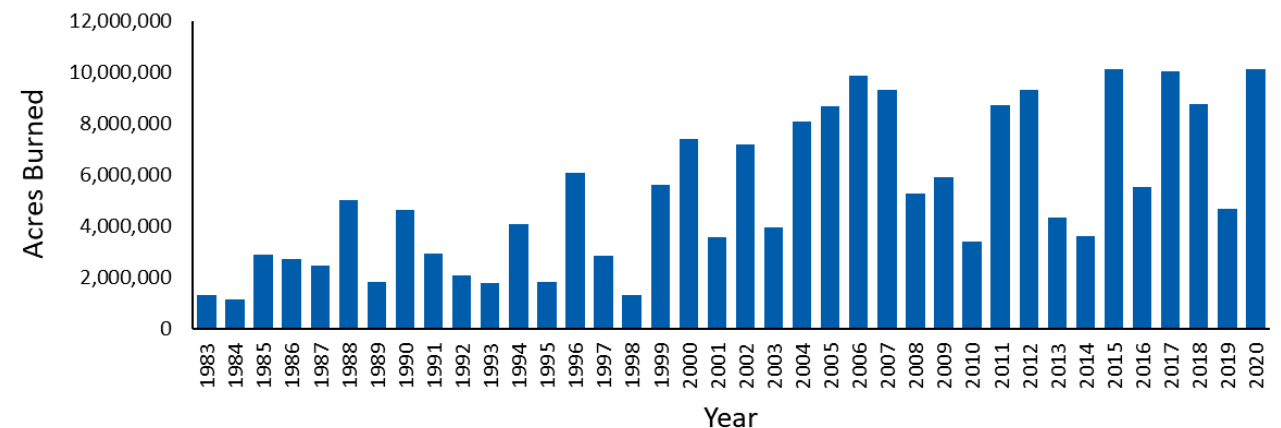
Marshall Burke, Anne Driscoll, Sam Hell-Neal, Jiani Xue, Jennifer Burney, and M...

+ See all authors and affiliations

PNAS January 12, 2021 118 (2): e2011048118; <https://doi.org/10.1073/pnas.2011048118>

Edited by B. L. Turner, Arizona State University, Tempe, AZ, and approved November 24, 2020 (received for review June 30, 2020)

Acres burned by wildfires per year in the United States, 1983–2020



Source: National Interagency Fire Center, <https://www.nifc.gov/fire-information/statistics>

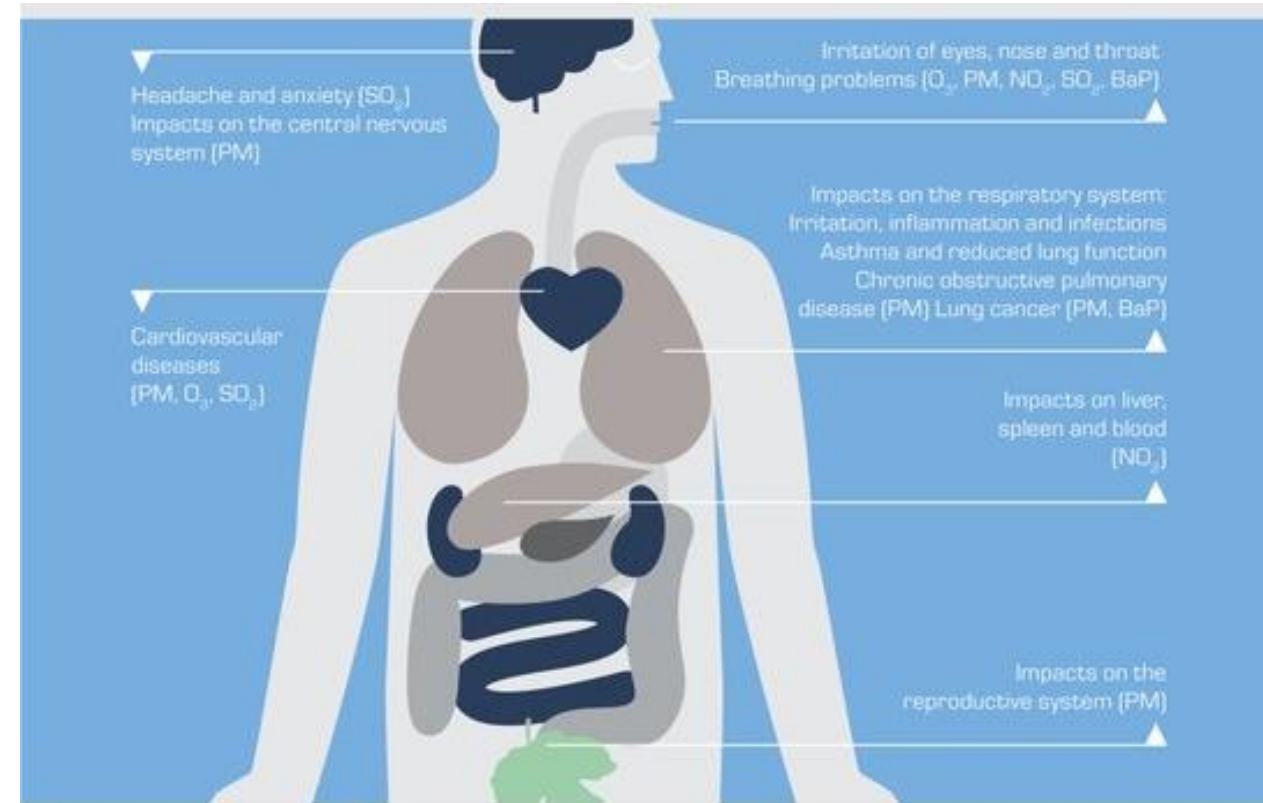
Pollution from Wildfires and Health Impacts

■ Primary Air Pollutants

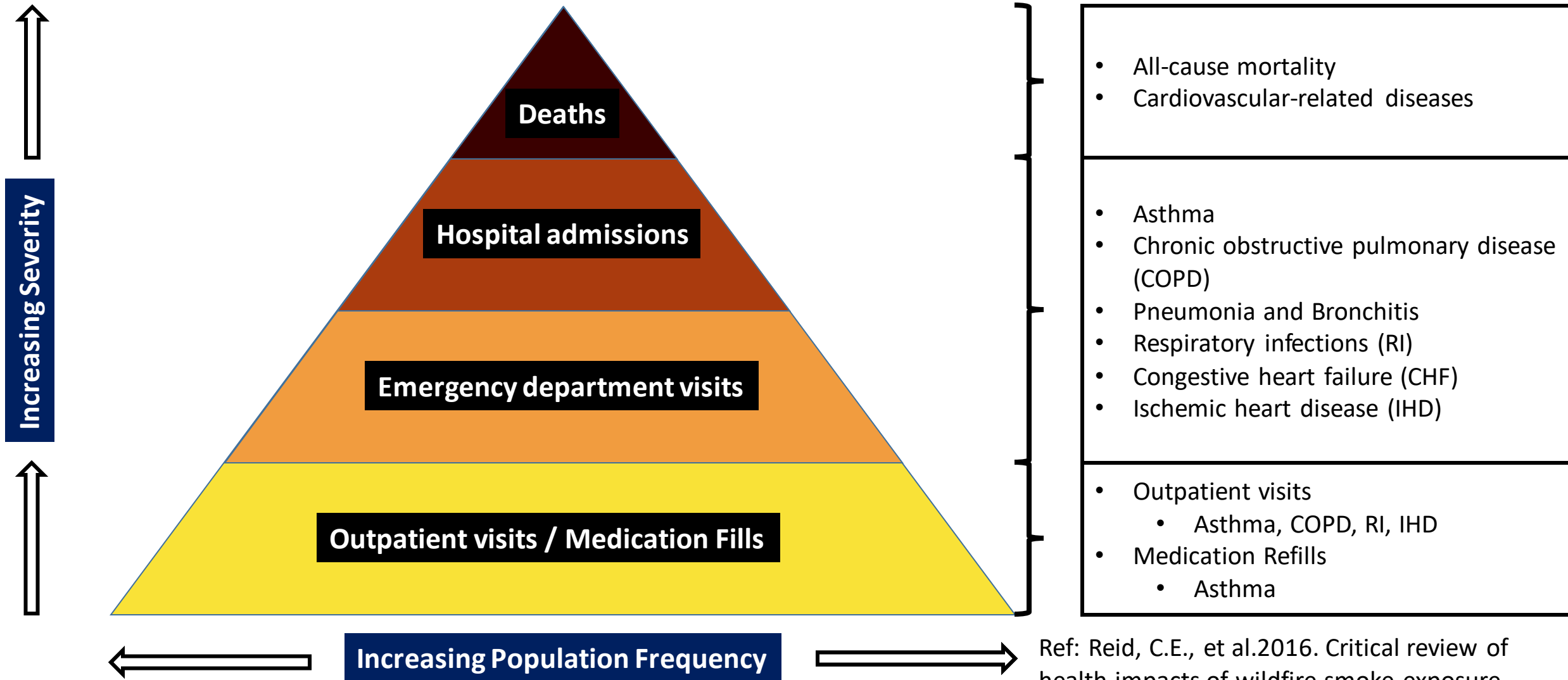
- Carbon Monoxide (CO)
- Oxides of Nitrogen (NO_x)
- Polycyclic Aromatic Hydrocarbons (PAHs)
- Volatile Organic Compounds (VOCs)
- Particulate Matter (PM)

■ Secondary Air Pollutants

- Particulate Matter (PM)
- Ozone (O₃)



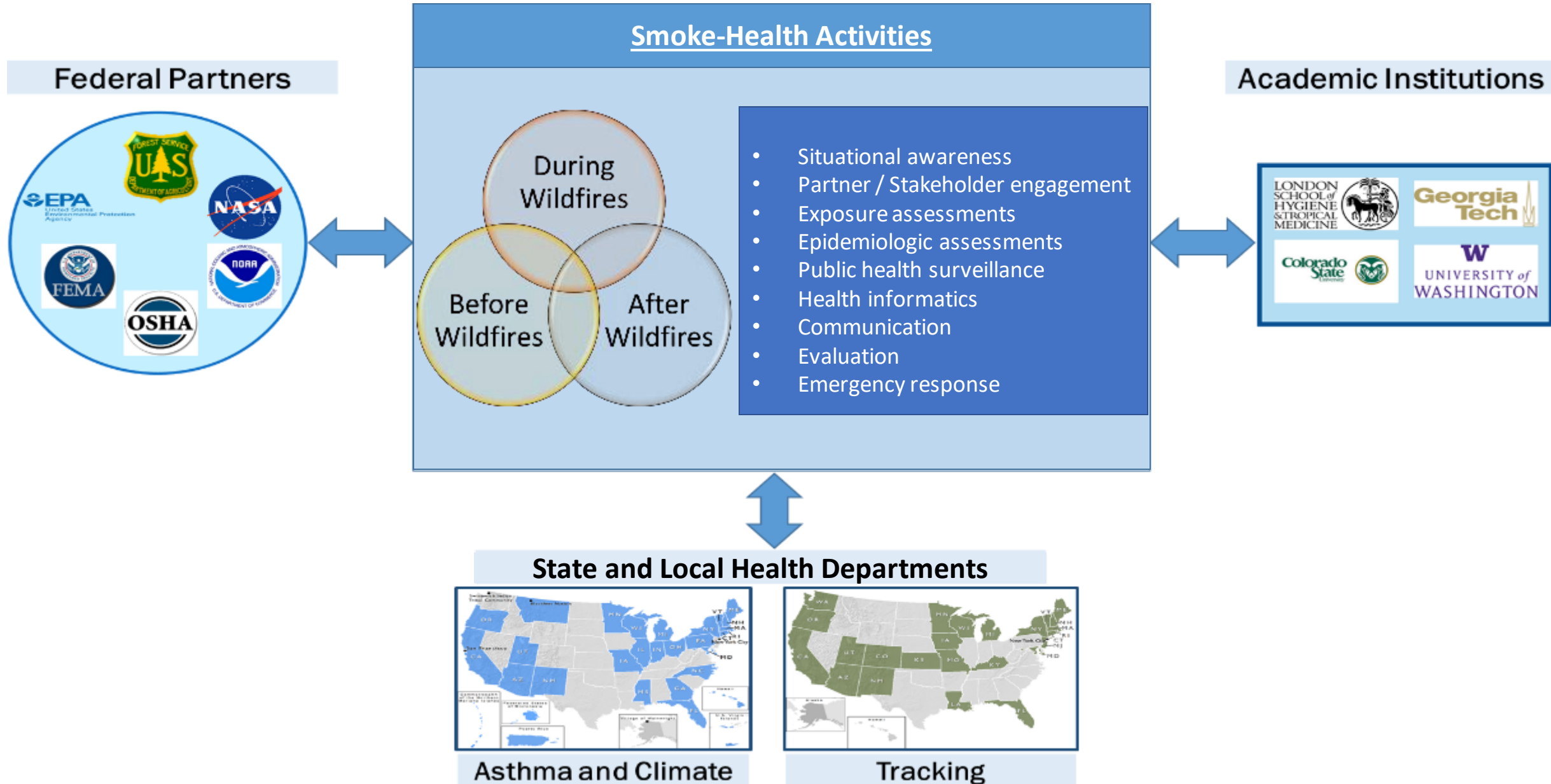
Adverse Health Outcomes



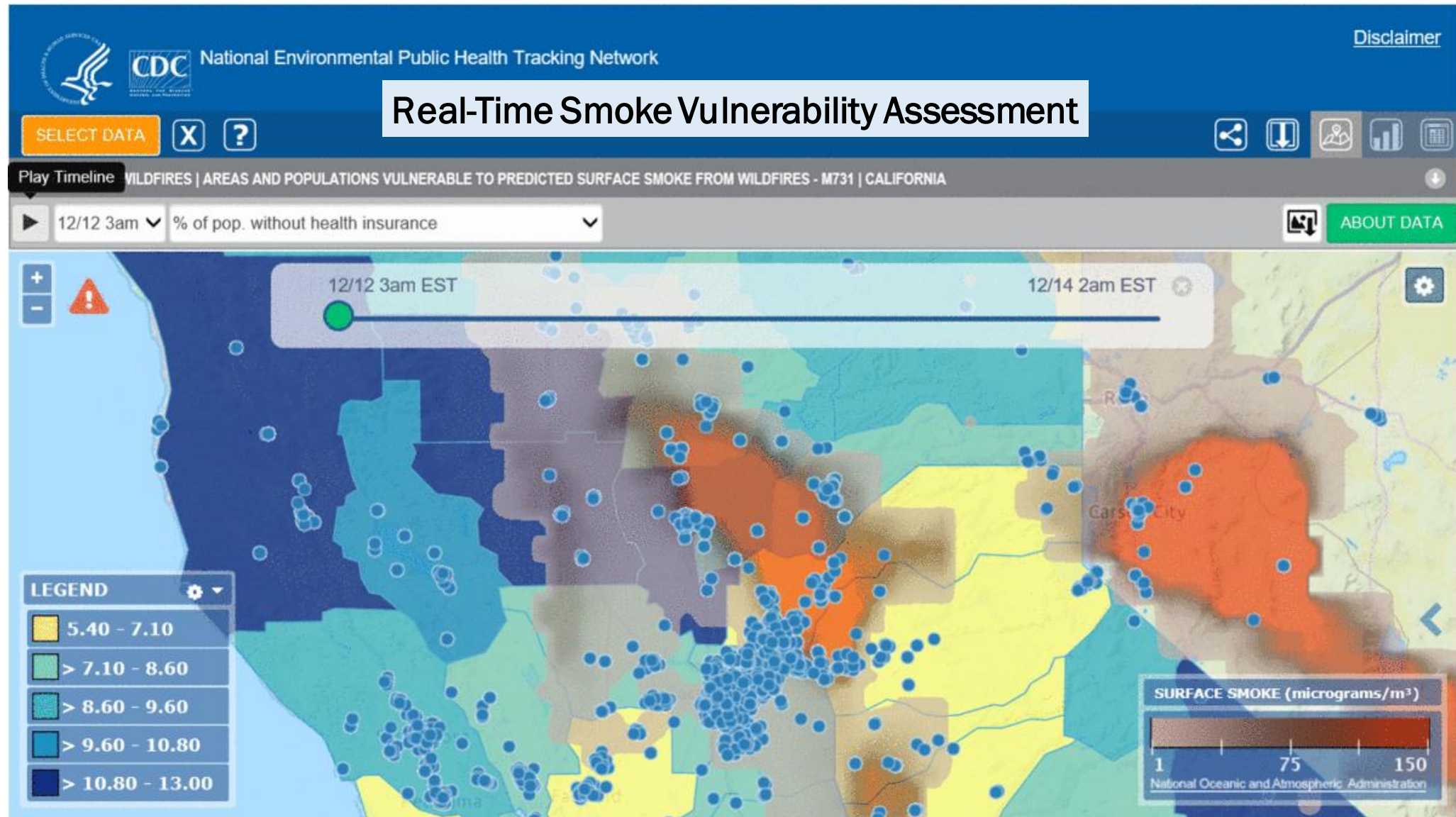
Ref: Reid, C.E., et al.2016. Critical review of health impacts of wildfire smoke exposure. Environmental Health Perspectives, 124(9), pp.1334-1343.

WILDFIRE ACTIVITIES & AVAILABLE CDC RESOURCES

CDC's Wildfire Activities



Wildfire Activities: Tools

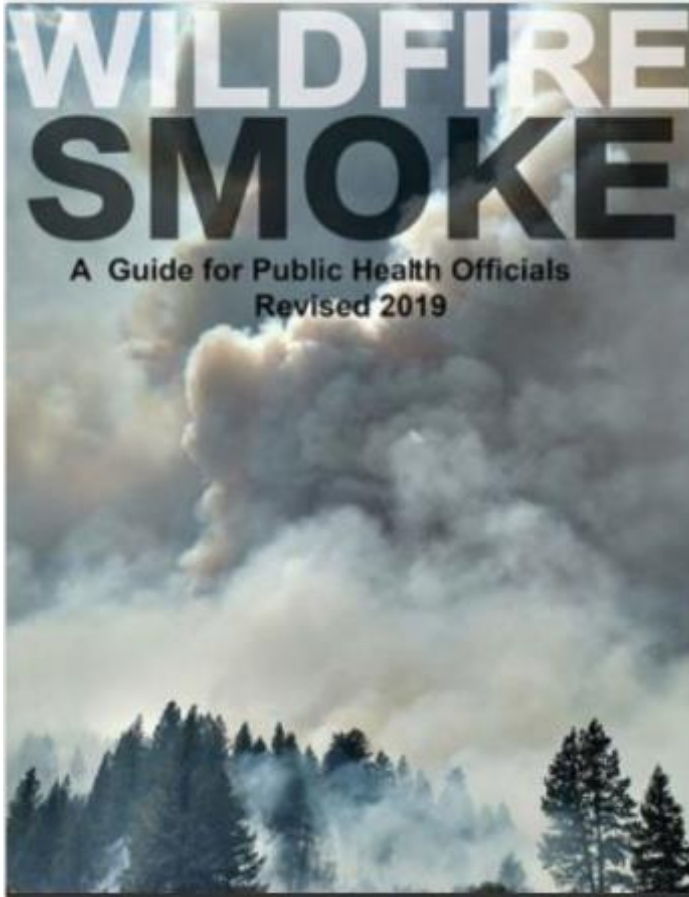


Vaidyanathan A, et al.. Developing an online tool for identifying at-risk populations to wildfire smoke hazards. STOTEN, 619, pp.376-383.

[https:// ephtracking.cdc.gov](https://ephtracking.cdc.gov)

Wildfire Activities: Web Content

Web-Content/ Resources for Public Health Professionals



<https://www.airnow.gov>

Wildfire Smoke and Your Patients' Health

Learn about the health effects associated with wildfire smoke and actions for patients to take before and during a wildfire to reduce exposure.



- [Start the Course](#)
- [Obtain Continuing Education Credits](#)

<https://www.epa.gov/wildfire-smoke-course>

This course is intended for physicians, registered nurses, asthma educators and others involved in clinical or health education.

Wildfire Smoke and COVID-19 Resources

- **Considerations for clean air shelters and spaces**

www.cdc.gov/coronavirus/2019-ncov/php/cleaner-air-shelters.html

- **Public health strategies to reduce wildfire smoke exposure during the COVID-19 pandemic**

www.cdc.gov/coronavirus/2019-ncov/php/cleaner-air-shelters.html

- **Wildfire smoke and COVID-19**

https://www.cdc.gov/disasters/covid-19/wildfire_smoke_covid-19.html

- **Frequently asked questions for Air Resource Advisors and other environmental health professionals**

www.cdc.gov/coronavirus/2019-ncov/php/smoke-faq.html

AIR RESOURCE ADVISOR (ARA) RESPONSE

Creek Fire Incident Summary

Fire Perimeter



Communities Impacted by Smoke

Broader Air Quality Impact Area	Communities	Potential Population Exposed to Smoke
Great Basin Air Pollution Control District	Bishop	3,746
	Lee Vining	89
	Mammoth Lakes	8,127
Mariposa Air Pollution Control District	Mariposa	1,351
	Ponderosa Basin	790
San Joaquin Air Pollution Control District	Millerton	548
	North Fork	2,960
	Oakhurst	3,424
	Prather	1,569
Yosemite National Park	El Portal and Wawona	2,550
	Yosemite Valley	1,035
	Visitors to YNP (transient population)	15,000 – 20,000
All areas combined		41,689 – 46,689

- On Friday September 04th, 2020 (approx. 06:00 PM), a wildfire incident occurred in the Sierra National Forest and has since consumed 377,693 Acres; currently, the wildfire is 70% contained.

Creek Fire Response: Air Resource Advisor

- **Assignment**

- Deployed as an Air Resource Advisor (ARA) to support Interagency Wildland Fire Air Quality Response Program (IWFAQRP)
 - ARAs work wildfire incident management teams

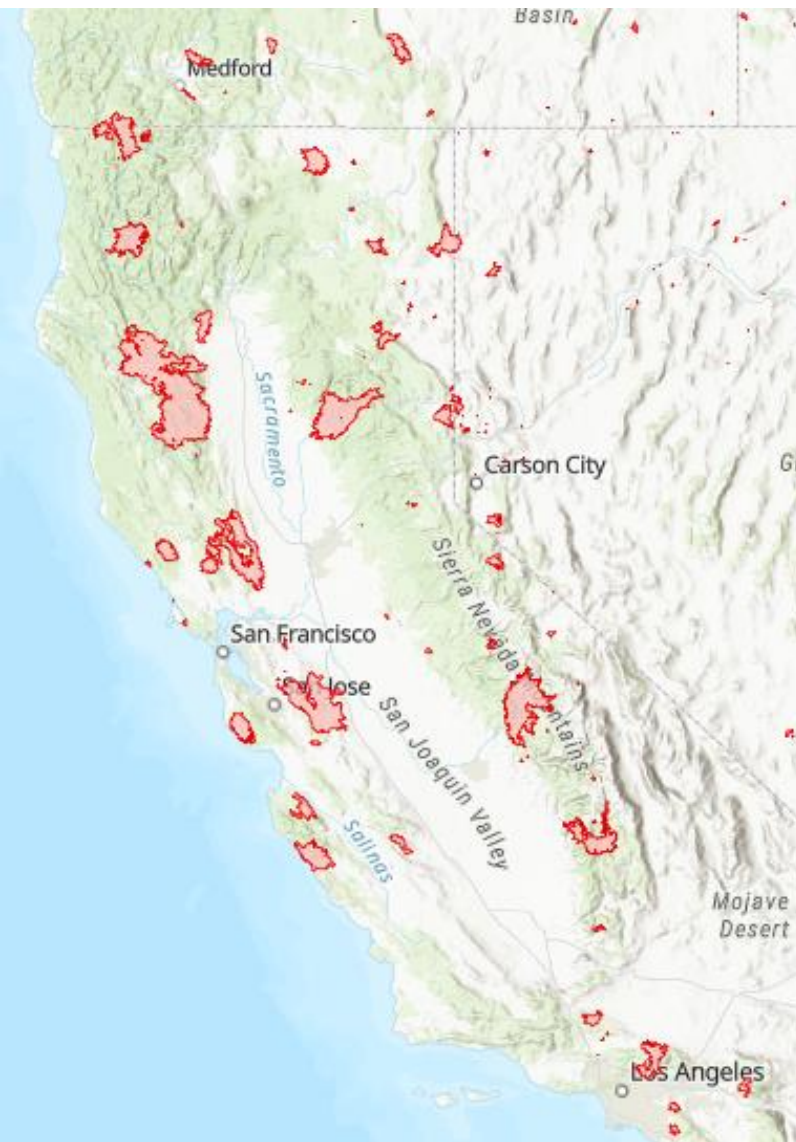
- **Primary Duties**

- Provided technical assistance on wildland fire smoke issues, including air quality monitoring, exposure assessment and evaluating public health impacts
- Other public health response related tasks (e.g., COVID, CO monitoring in fire camps, compounding hazards due to extreme heat)

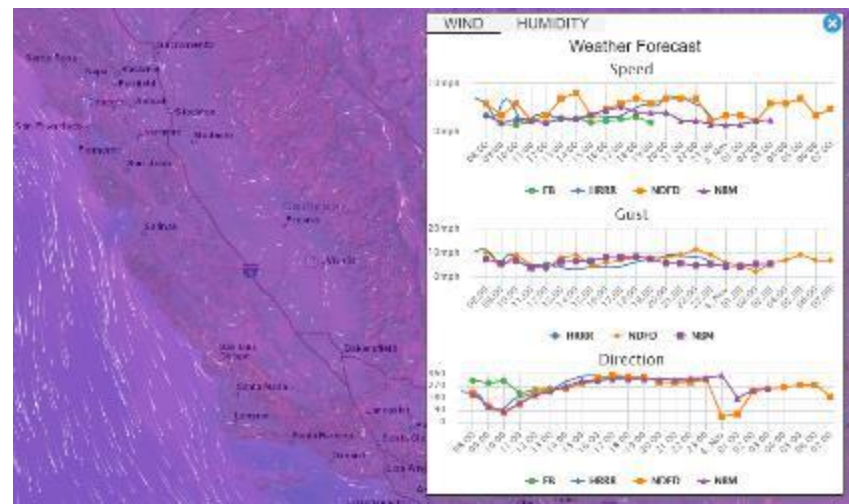


Smoke Exposure Assessment Using Various Data Sources

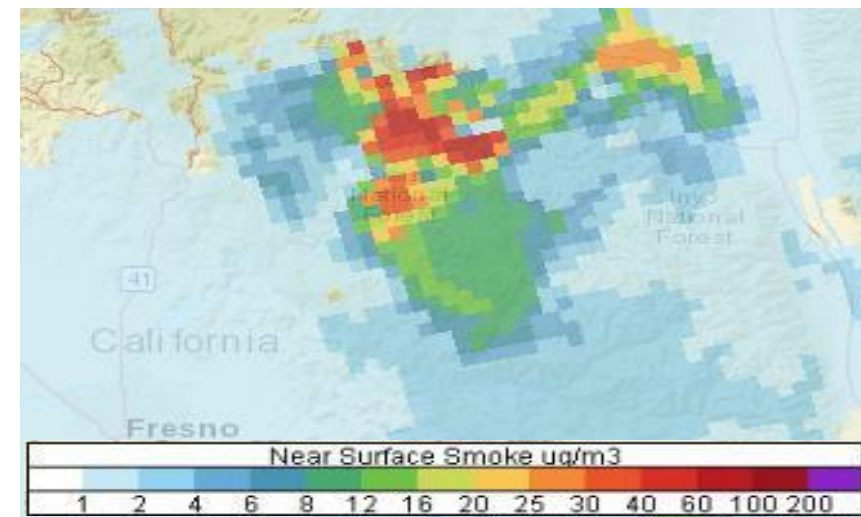
Active Fires / Hot Spots



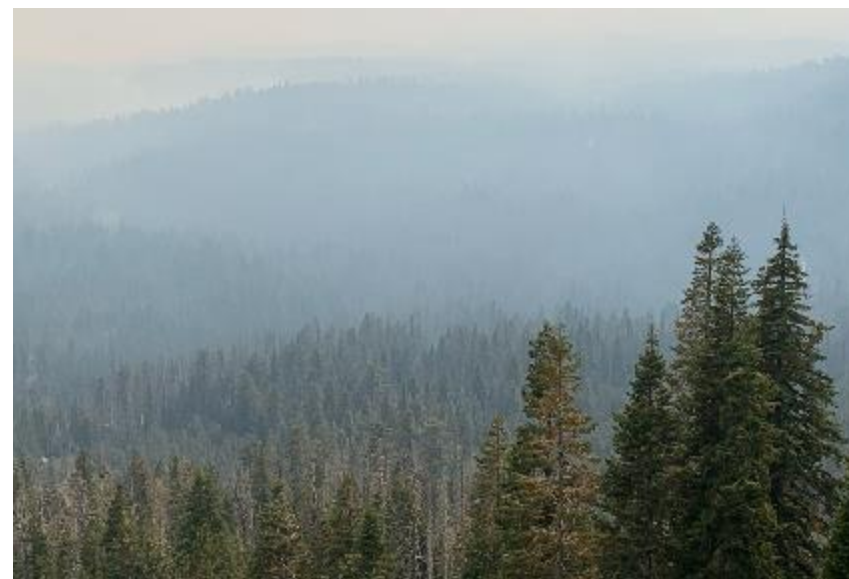
Weather Patterns / Forecasts



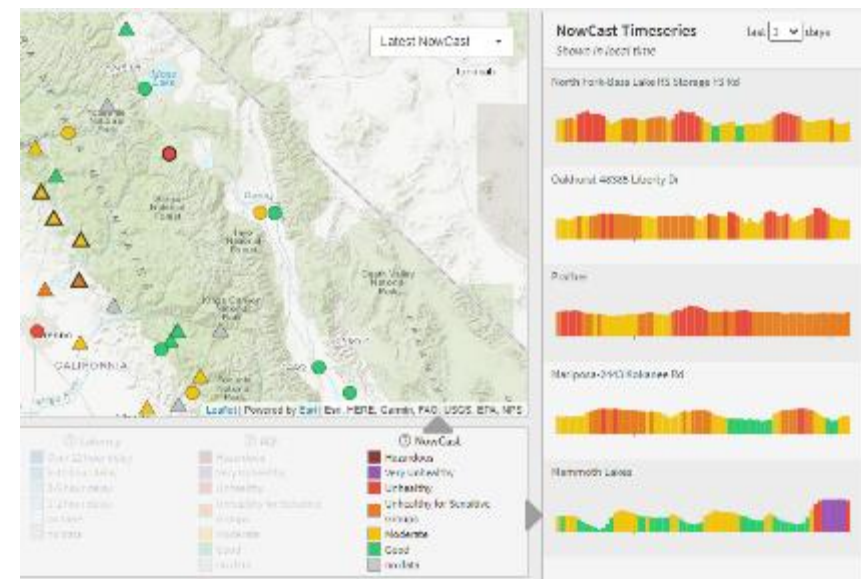
High-Res. Smoke Models



Real-time Smoke Images (Webcams)



Overnight AQI observations



Air Quality Impacts Summary

Communities	AIR QUALITY INDEX (AQI, 24-hr Average) values by day, for communities impacted by the CREEK FIRE, 2020																					
Bishop																						
Lee Vining																						
Mammoth Lakes																						
Yosemite Valley																						
El Portal																						
Wawona																						
Mariposa																						
Ponderosa Basin																						
Oakhurst																						
North Fork																						
Prather																						
Millerton																						
DATE	9/14	9/15	9/16	9/17	9/18	9/19	9/20	9/21	9/22	9/23	9/24	9/25	9/26	9/27	9/28	9/29	9/30	10/1	10/2	10/3	10/4	10/5

Air Quality Index

- Good
- Moderate
- USG
- Unhealthy
- Very Unhealthy
- Hazardous
- No data

Actions to Protect Yourself

- None
- Unusually sensitive individuals should consider limiting prolonged or heavy exertion.
- People within Sensitive Groups* should **reduce** prolonged or heavy outdoor exertion.
- People within Sensitive Groups* should **avoid all** physical outdoor activity.
- Everyone should avoid prolonged or heavy exertion.
- Everyone should avoid any outdoor activity.

These communities experienced high PM_{2.5} levels from wildfire smoke, resulting in “Unhealthy” to “Hazardous” AQI conditions

Key Takeaways

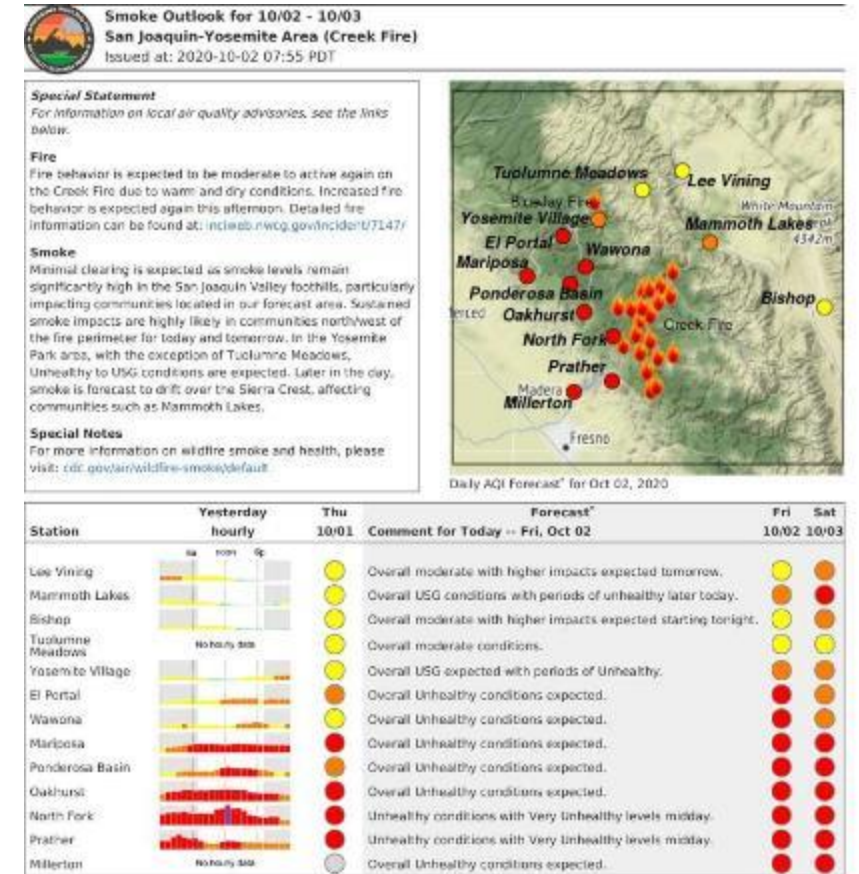
■ Highlights

- Provided smoke outlooks for communities impacted by smoke daily
- Collaborated with Air Pollution Control Districts and alerted them on smoke impacts daily
- Fielded public inquiries regarding potential smoke exposure during visits to Yosemite National Park
- Assisted in decisions regarding Incident Command Post (ICP) staff and fire crew safety and health with smoke, and sharing cleared CDC resources on COVID and CO exposure with ICP medical staff
- Created a process flow to set-up CO monitors at various fire camps and to download / visualize data

■ Challenges

- Mountain meteorology is complex
- Quantifying smoke impacts from planned firing operations
- Smoke drifting from other fires
- Other environmental hazards

Example of a Smoke Outlook



Outlooks for other fires:

<https://tools.airfire.org/ara/deployments/>

California Smoke Blog:

<https://californiasmokeinfo.blogspot.com/>

https://twitter.com/CASmokeBlog?ref_src=twsrc%5Egoogle%7Ctwcamp%5Eserp%7Ctwgr%5Eauthor

Summary / Next Steps

- Observations made during this deployment reiterate the need for public health resources during fire incidents
- Lessons learned from this deployment can inform future fire response efforts and highlight the importance of coordination between public health and land management agencies
- CDC continues to address public health needs associated with wildfire events by:
 - Responding to needs of state, territorial, local, and tribal health authorities
 - Improving communication and consistency of messages before, during, and after wildfire events
 - Developing online tools and technical documents to improve emergency preparedness and situational awareness capabilities



MMWR
Morbidity and Mortality Weekly Report



Notes from the Field

Understanding Smoke Exposure in Communities and Fire Camps Affected by Wildfires — California and Oregon, 2020
Kathleen Navarro, PhD¹; Anbarath Vaidyanathan, PhD²

During 2020, the United States has experienced unseasonably higher fire activity than in past years, resulting in >7.8 million burned acres; as of December 3, 2020, the fire had consumed 379,895 acres.¹

During these two deployments, several public health concerns came to light. Of note, although smoke from wildfires drifted long distances and affected downwind communities, the brunt of poor air quality was observed in communities adjacent to wildfire incidents. For example, communities located near the fire perimeter of wildfire incidents in California and Oregon experienced high concentrations of PM_{2.5}, as measured by air quality monitors, resulting in “Unhealthy” to “Hazardous” conditions, as defined by the U.S. Environmental Protection Agency Air Quality Index^{2,3} (Figure). Fire personnel who camped and rested between work shifts at nearby fire camps⁴ (North Fork, California and Sisters, Oregon) were also exposed to poor air quality levels. These fire camp exposures contribute to higher overall cumulative smoke exposure and, along with other occupational risk factors such as fatigue and stress, could limit recovery that is much needed for fire personnel while away from the active fire perimeter. In addition, environmental hazards such as extreme heat and higher concentrations of ambient carbon monoxide^{5,6} were prevalent during days with heavy smoke and after extreme fire growth days; these hazards added a layer of complexity to fire response efforts and might have limited fire personnel recovery⁷ between work shifts.

High smoke levels and other hazards present during wildfires reinforce the need for professionals such as air resource advisors, who are trained in smoke-health issues and related public health topics, to be included on wildfire incident teams. Observations made by CDC staff members, as well as other air resource advisors, on environmental and occupational risk factors and their public health consequences on nearby communities and fire camps can inform future wildfire response efforts. Coordination among public health and land management agencies at multiple levels before, during, and after wildfire incidents can help mitigate adverse health effects. CDC continues to collaborate with federal land management agencies, which manage and support wildfire incidents, to understand the adverse health impacts of smoke exposure on communities and wildland firefighters.

¹ <https://www.fishbase.org/record/1147>.
² <https://www.airnow.gov/aqi/aqi-basics/>.
³ Fire camps typically provide logistical support to the wildfire suppression operation by providing firefighters and incident personnel sleeping locations (camping), morning and evening meals, work areas, and administrative services.
⁴ <https://www.nasa.gov/feature/jpl/nasa-monitors-carbon-monoxide-from-california-wildfires>.
⁵ <https://www.nifc.gov/PUBLICATIONS/redbook/2020/Chapter07.pdf>.

⁶ <https://www.cdc.gov/air/wildfire-smoke/default.htm>.
⁷ <https://wildlandfiremonitors.net>.
⁸ <https://tools.airnow.org/air/wildfire-deployment/>.

US Department of Health and Human Services/Centers for Disease Control and Prevention

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Questions or comments?
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