

# CCST EXPERT BRIEFING SERIES

## Environmental Impacts of Wildfires in California



For more details about this briefing:  
[ccst.us/expert-briefings](http://ccst.us/expert-briefings)



Photo: Camp Fire from Lake Oroville, Nov. 8, 2018 by Ken James / CA Dept. of Water Resources

### BACKGROUND

- Wildfires are a common and natural occurrence in many of California's ecosystems.
- In recent years, the severity and frequency of wildfires in California has increased as a result of a combination of many factors including prolonged drought, historic fire management practices, and a massive tree die-off following a bark beetle infestation.
- The 2018 California wildfire season was the most destructive on record.
- More than 1.8 million acres burned, causing tens of billions of dollars in damages, destroying more than 24,000 structures, and resulting in the deaths of over 100 civilians and emergency responders.
- Climate change models predict that the risk of large, destructive wildfires in California will continue to increase in the future.
- Researchers from many fields are studying the impacts of wildfires on environmental quality and public health.

### ENVIRONMENTAL IMPACTS OF WILDFIRES

Large wildfires can cause significant environmental impacts and hazardous conditions both locally and for hundreds of miles beyond the burned area.

High concentrations of smoke, ash, and debris created by wildfires can have far-reaching and long lasting impacts that can persist for months or even years after the fire is contained.

Wildfires can release toxic contaminants into the environment, increase levels of air pollutants, increase sediment loads in waterways, and change water chemistry.

Burned hillsides increase the risk of mudslides, which can create hazardous conditions for down slope communities, infrastructure such as reservoirs, and aquatic ecosystems.

### EXAMPLES OF IMPACTS (SEE BACK FOR DETAILS)

- 1. Release of contaminants** from burned biomass and synthetic or manufactured materials.
- 2. Increased air pollution** from particulate matter and toxic gases both near and downwind from the fire.
- 3. Impacts on water quality** from ash, debris, and post-fire erosion affecting water supplies.

Recent wildfires have been unprecedented in both the number of acres burned and the number of structures destroyed. Researchers are partnering with local, state, and federal partners to understand the environmental impacts from these never before experienced conditions.



**CCST**  
CALIFORNIA COUNCIL ON  
SCIENCE & TECHNOLOGY

### SELECT EXPERTS

THE FOLLOWING EXPERTS CAN ADVISE ON ENVIRONMENTAL IMPACTS:

#### MICHELLE NEWCOMER, PhD

Research Scientist  
Climate & Ecosystem Sciences  
Lawrence Berkeley National Lab  
[mnewcomer@lbl.gov](mailto:mnewcomer@lbl.gov)  
Office: (510) 486-7057

*EXPERTISE: WILDFIRE IMPACTS ON WATERSHED WATER QUALITY AND QUANTITY*

#### MARY PRUNICKI, PhD, MD

Instructor  
Sean N. Parker Center for Allergy  
Research at Stanford University  
Stanford University School of  
Medicine  
[prunicki@stanford.edu](mailto:prunicki@stanford.edu)  
Office: (408) 483-6082

*EXPERTISE: IMPACTS OF AIR POLLUTION FROM FIRES ON HEALTH AND THE IMMUNE SYSTEM*

#### JACKSON WEBSTER, PhD

Assistant Professor  
Civil Engineering  
California State University, Chico  
[jwebster13@csuchico.edu](mailto:jwebster13@csuchico.edu)  
Office: (530) 898-6539

*EXPERTISE: EFFECTS OF WILDFIRE ON WATER QUALITY AND DRINKING WATER TREATMENT*

### MODERATED BY:

#### SUSAN HUBBARD, PhD

CCST Council Member  
Associate Lab Director  
Earth & Environmental Sciences Area  
Lawrence Berkeley National Lab  
[sshubbard@lbl.gov](mailto:sshubbard@lbl.gov)  
Office: (510) 486-5266

*EXPERTISE: WATERSHED SCIENCE, CARBON CYCLING, CONTAMINANT REMEDIATION, AND ECOSYSTEM CHARACTERIZATION METHODS*

CCST Contact: [sarah.bradley@ccst.us](mailto:sarah.bradley@ccst.us)

Download this Document



[ccst.us/expert-briefings](http://ccst.us/expert-briefings)

# EXAMPLES OF ENVIRONMENTAL CONTAMINATION

1

## RELEASE OF CONTAMINANTS

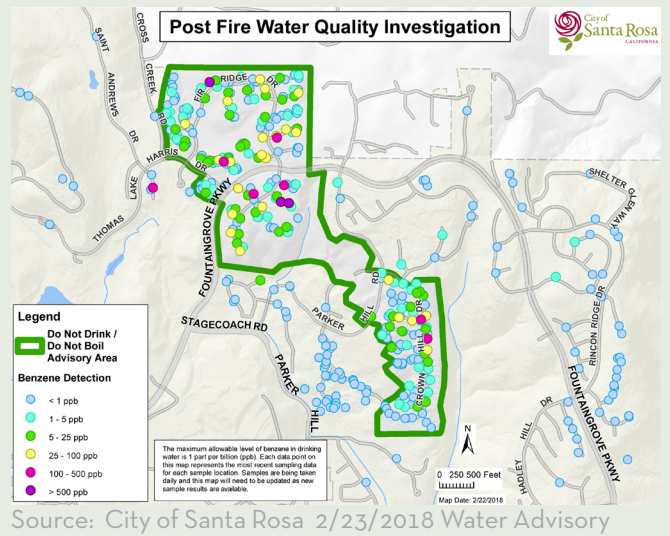
The combustion of biomass and manmade materials during wildfires can release contaminants into the environment.

### Mercury

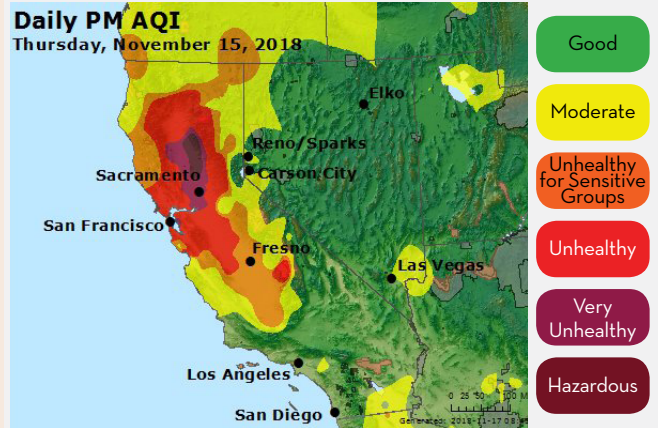
- Mercury contamination from industry emissions and historic mining practices accumulates in biomass such as soils and vegetation.
- When this biomass is burned during a wildfire, mercury is released in the smoke and ash.
- Mercury is a potent neurotoxin to both humans and wildlife.

### Figure: Benzene contamination of water supply

- Plastic piping melted during the 2017 Tubbs Fire in Santa Rosa (figure) and during the 2018 Camp Fire in Paradise resulted in benzene contamination of the drinking water supply.
- Benzene is toxic and long term exposure can cause cancer.



2



## INCREASED AIR POLLUTION

Wildfires produce air pollutants including particulate matter and toxic gases that reduce the air quality both near and downwind of the fire.

### Examples:

- Smoke from the 2018 Camp Fire exposed millions of people in the Central Valley and Bay Area to unhealthy levels of air pollution (figure).
- Wildfire smoke can affect the respiratory, cardiovascular, and immune systems leading to increased risk of disease and death.
- Vulnerable populations including infants and children, the elderly, and outdoor workers are at greatest risk.

3

## WATER QUALITY IMPACTS

Ash, debris, and post-fire erosion can increase sediments and impact the quality of domestic, agricultural, and ecosystem water supplies.

### Examples:

- Debris from wildfires can increase the levels of dissolved organic carbon in water supplies.
- Ash leachate infiltration into groundwater supplies can lead to groundwater contamination lasting for years.
- When chlorine is used to disinfect drinking water, it can chemically react with dissolved organic carbon leading to increased levels of carcinogenic byproducts that are regulated by the EPA.

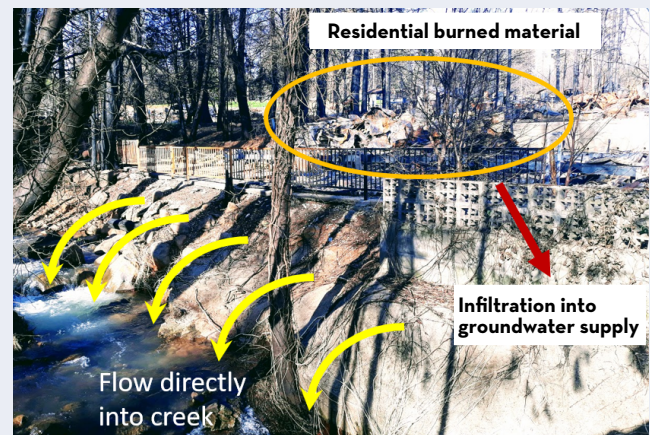


Photo: Michelle Newcomer, Paradise, CA, March 2019



CCST is a nonpartisan, nonprofit organization established in 1988 via ACR 162.

Learn more: [www.ccst.us](http://www.ccst.us)

Follow us:

