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# Wildfires: Community Impact

Presented by:  
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December 11, 2018

**Right** People. **Right** Perspective. **Right** Now.

# Agenda

Environmental

Property

Public Health

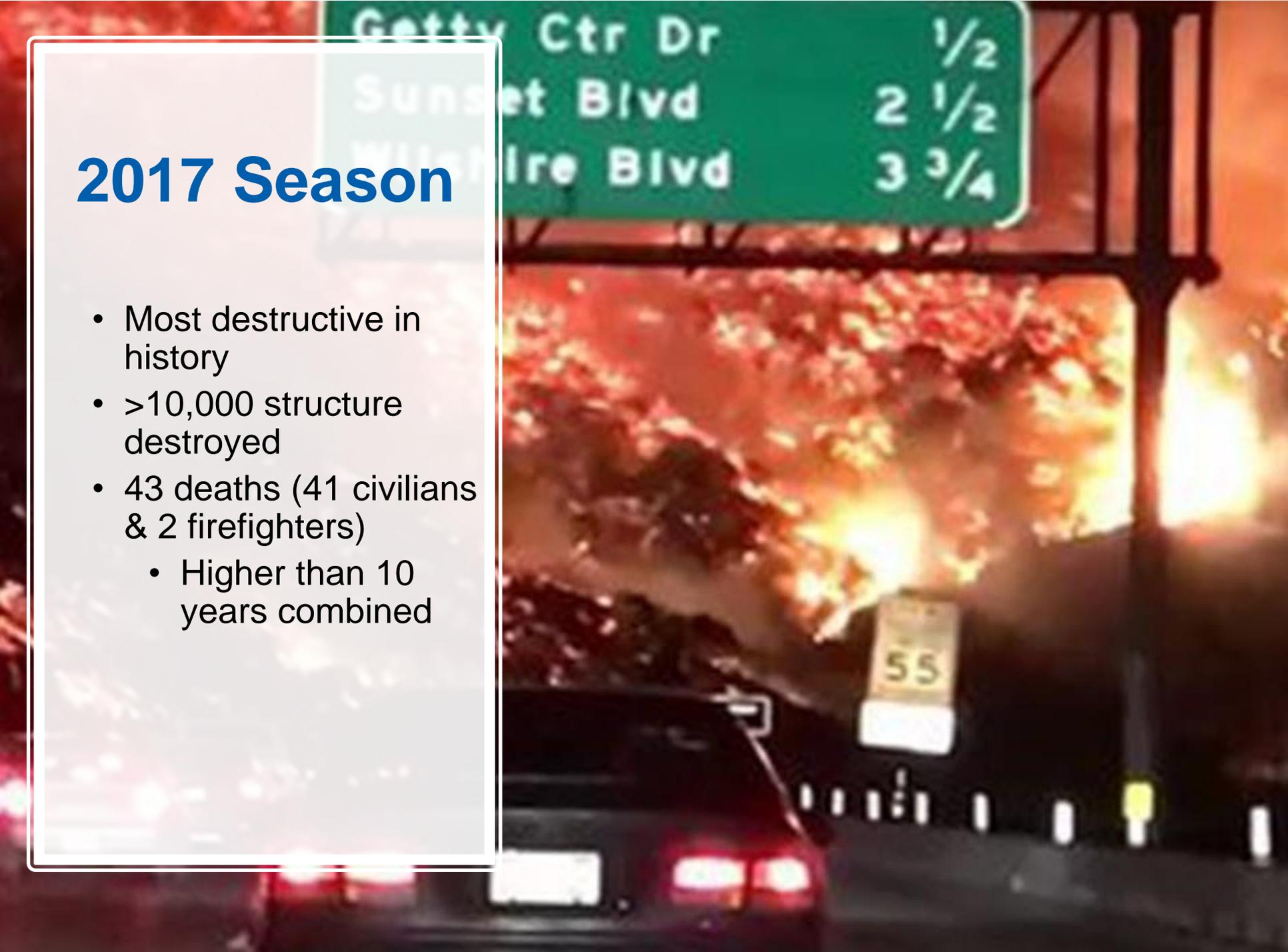
# 2018 Season

- Woolsey Fire
- Camp Fire –  
Now the  
deadliest and  
most  
destructive in  
CA history



# 2017 Season

- Most destructive in history
- >10,000 structure destroyed
- 43 deaths (41 civilians & 2 firefighters)
  - Higher than 10 years combined



Getty Ctr Dr 1/2  
Sunset Blvd 2 1/2  
Wilshire Blvd 3 3/4

55



- Most ***destructive*** in California history
- October 2017
- Northern CA
  - Napa, Sonoma, Lake counties
- Burned >35,000 acres
- 22 people killed

# Tubbs Fire



# Thomas Fire

- **Largest** wildfire in California history
- December 2017
- Southern CA
  - Santa Barbara & Ventura counties
- Burned >280,000 acres
- >2 billion in damage
- >1,000 structure burned



# Carr Fire

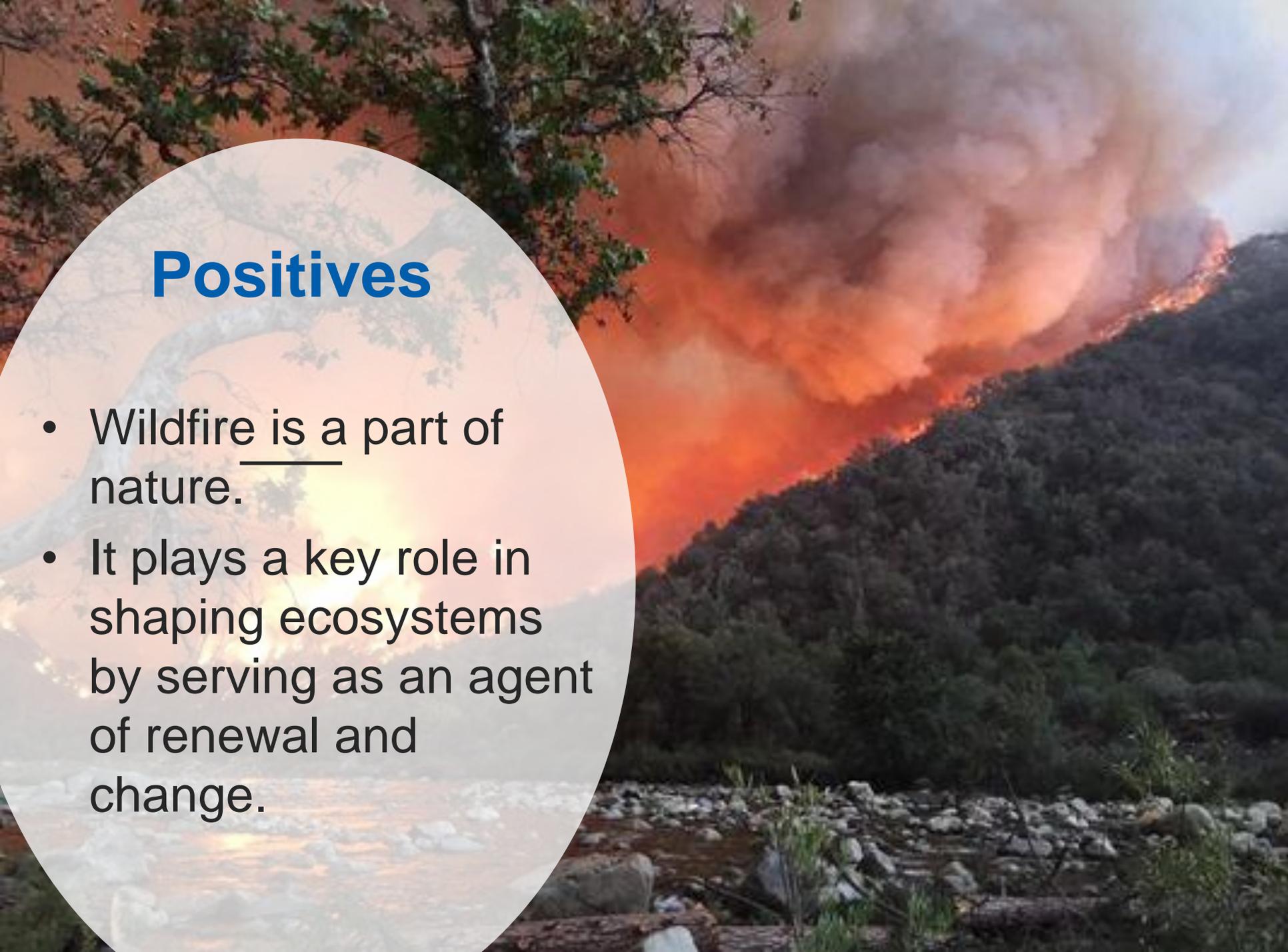
- Northern California
  - Shasta County
- July 2018
- Caused evacuations of >36,000
- 8 deaths

A large, stylized Venn diagram consisting of three overlapping circles in various shades of blue, set against a dark grey background. The circles overlap in the center, creating a complex geometric pattern.

# ENVIRONMENTAL IMPACT

## Positives

- Wildfire is a part of nature.
- It plays a key role in shaping ecosystems by serving as an agent of renewal and change.



## Positives:

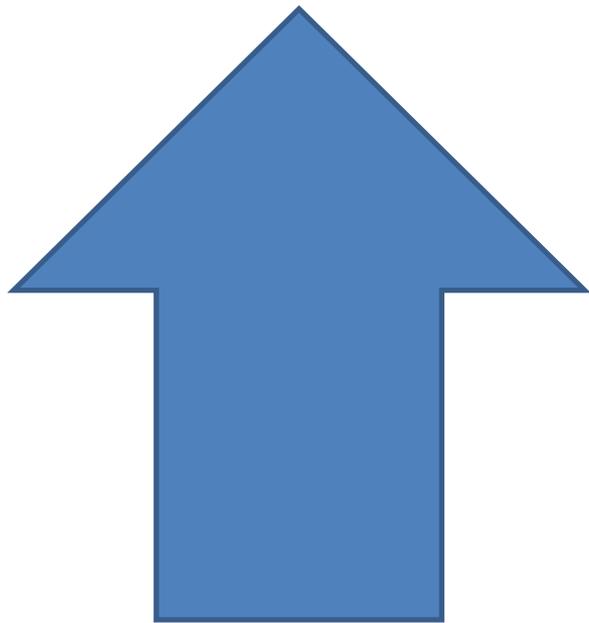
- Cleaning dead and decaying matter
- Maintaining ecosystem balance by removing diseased plants and harmful insects
- Regenerating seeds through increased sunlight



## Destruction of Landscape



# Negatives:

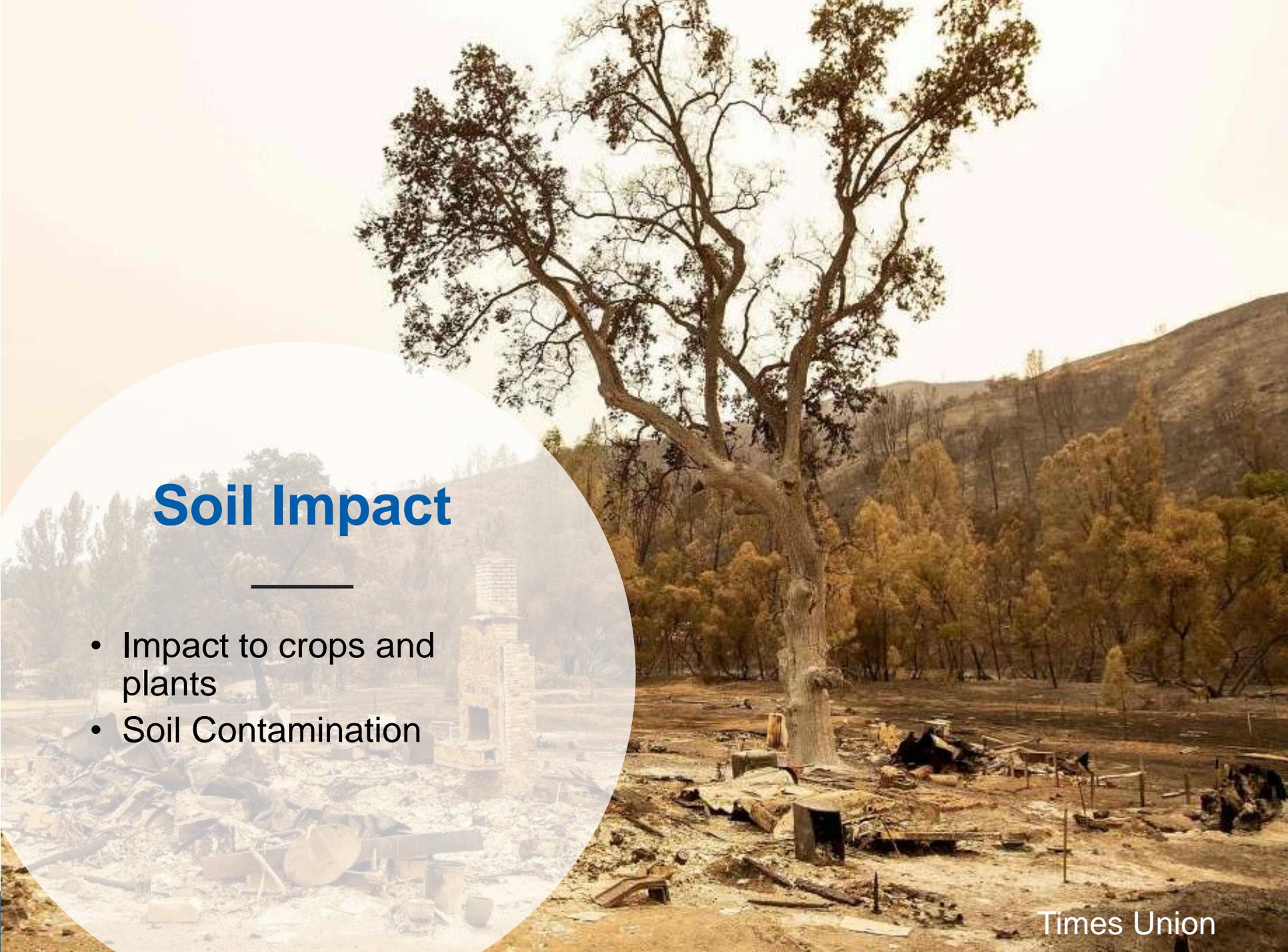


## GHG:

**Carbon Dioxide**

**Methane**

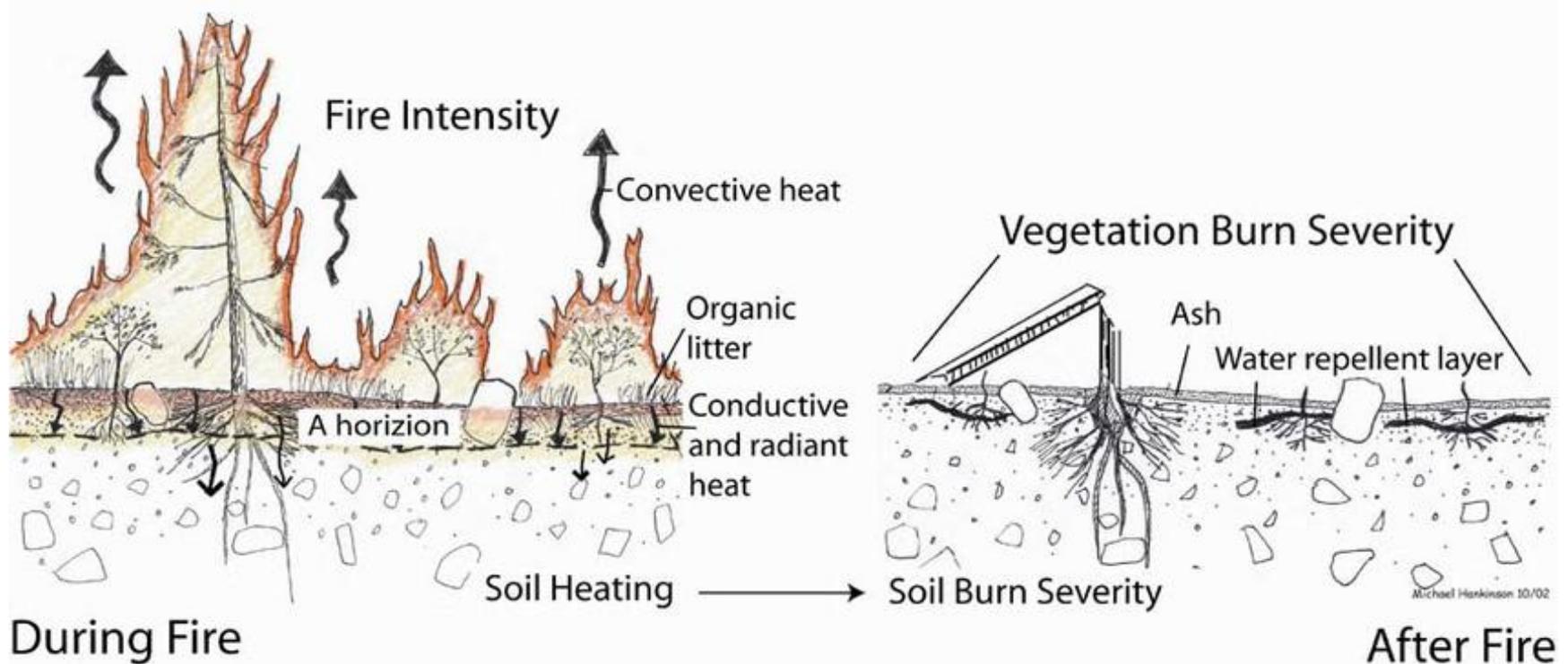
**Nitrogen Dioxide**

A large, gnarled tree stands in the center of a landscape that has been severely affected by a wildfire. The ground is covered in ash and charred debris, including a destroyed brick structure. In the background, other trees are charred and blackened, and a hillside is visible under a hazy, orange-tinted sky. A semi-transparent circular overlay on the left side of the image contains text.

## Soil Impact

- Impact to crops and plants
- Soil Contamination

# Soil Impact:

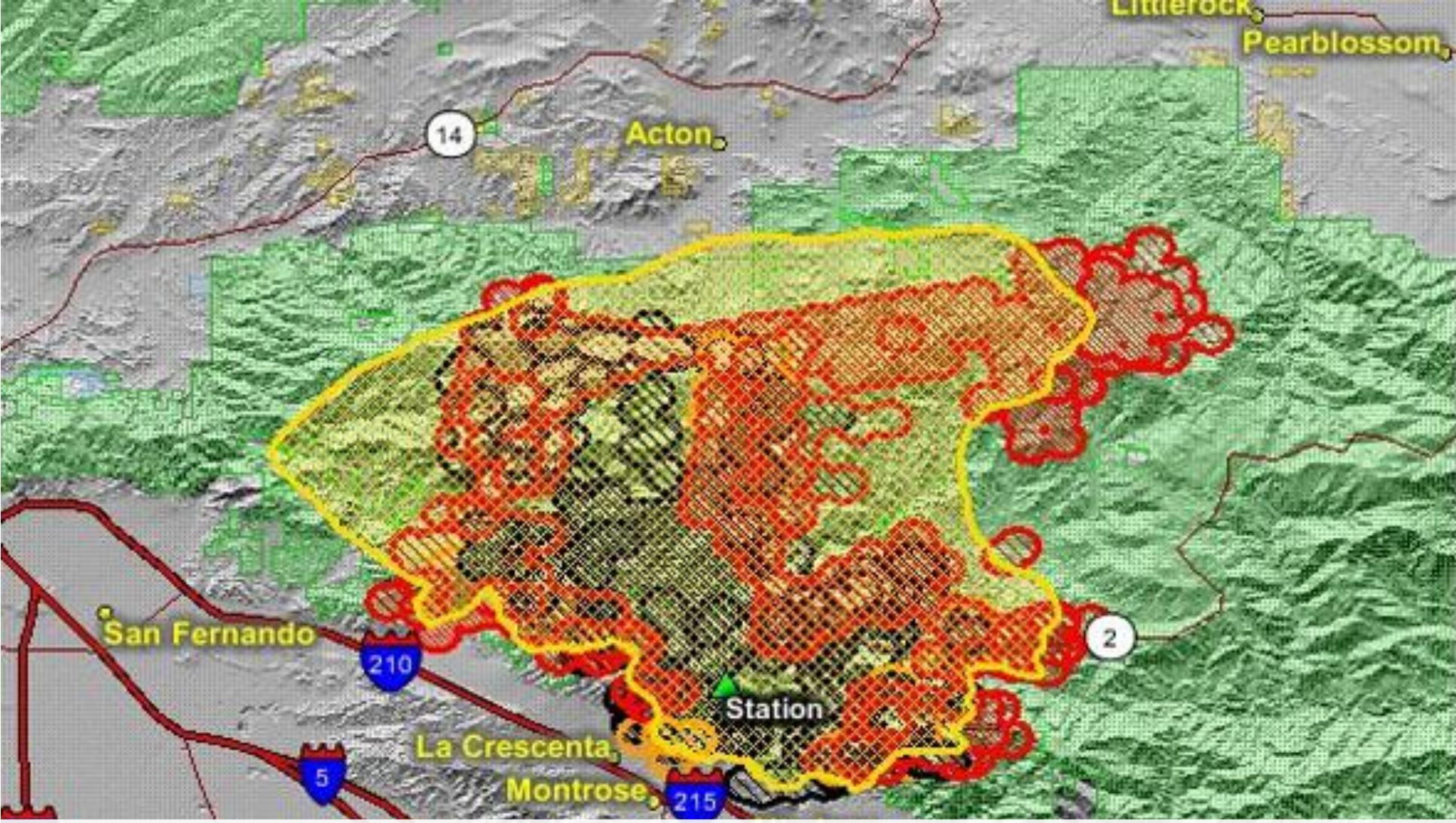


# Ventura and Santa Barbara Mudslides

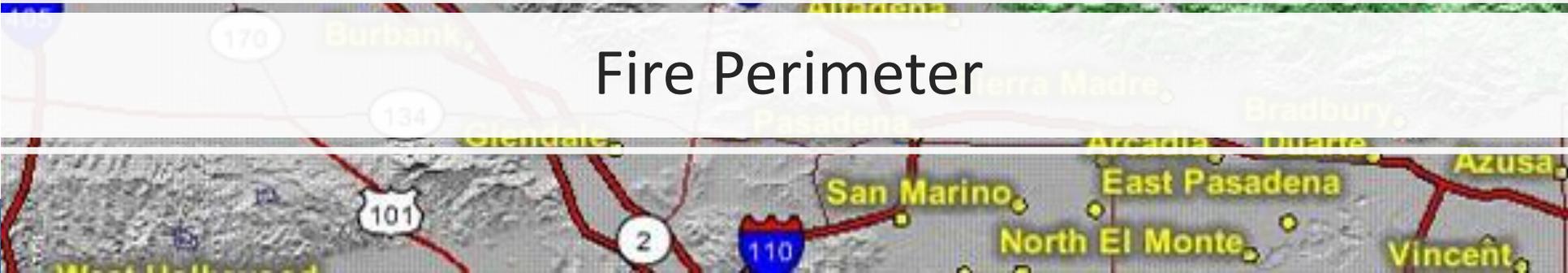


A large, stylized Venn diagram consisting of three overlapping circles in various shades of blue, centered behind a horizontal white band. The circles overlap in the center, creating a central intersection point.

# PROPERTY IMPACT



Fire Perimeter



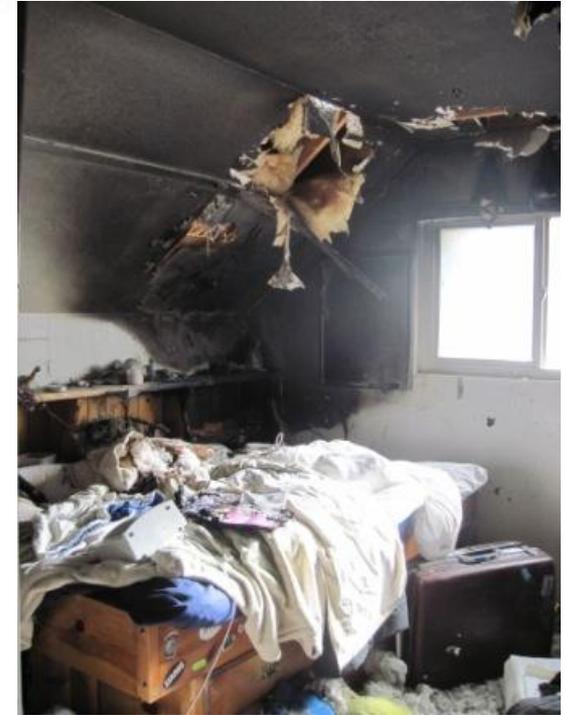
# Wildfire versus Structure Fire

- **Wildfire**

- Minimal or no thermal damage
- Burning of mostly bio/wood material
- Typically not corrosive
- Most cases, minimal odors present
- More char and ash present; colors range from dark black to white

- **Structure Fire**

- Thermal Shock/Heat damage
- Burning of plastics and other materials that will produce toxins
- More likely to be corrosive
- Fire damaged materials
- Heavy odors
- More black carbon (i.e., soot), dark colored particulate



# Structure Fire Assessment

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# Wildfire Property Assessment



## Woolsey Fire

# Property Impact

- Treat each house special
- Insurance Claims
- Public Adjusters/  
Lawyers
- Limitations





# Wildfire Property Assessment

- History/  
Background
- Sensory  
Observations
- Sampling

# Property Impact

- What Constitutes “Damage”
- Level of Impact



# Other Sources

- Interior Sources
  - Burning candles
  - Gas stoves
  - Fireplaces
  - Smoking devices
  - And many more...



# Other Sources

- Exterior Sources
  - External heaters
  - Barbeques
  - Fire pits
  - Smoking devices
  - And many more...



A large, stylized Venn diagram consisting of three overlapping circles in shades of blue, centered behind a white horizontal band. The circles overlap in the center, creating a central intersection point.

# PUBLIC HEALTH IMPACT

# Public Health

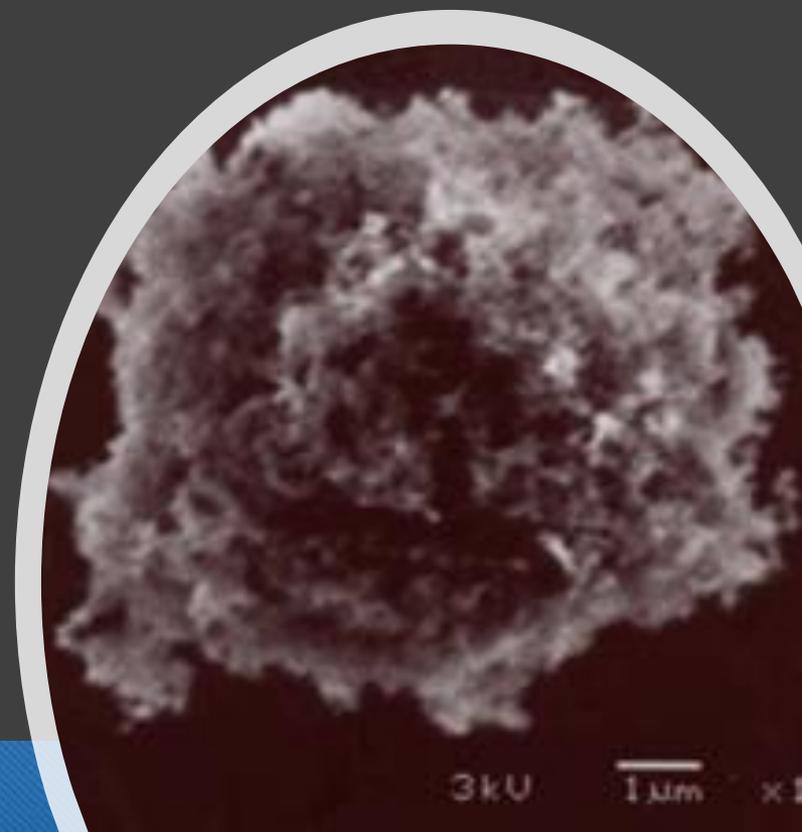
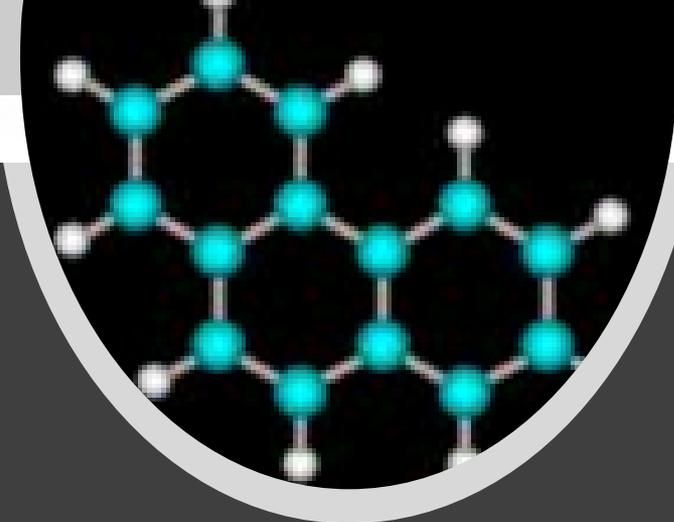
During the  
Wildfire

Following  
the Wildfire

Sensitive  
Population

# Public Health Impact During the Fire

- Contaminants of wildfire smoke can include:
  - VOC
  - aldehydes (e.g. formaldehyde)
  - carbon monoxide
  - hydrocarbons, PAH
  - nitrogen oxides
  - acids
  - PAHs
  - alcohols
  - and more...



# Public Health Impact – During the Fire

- From a public health perspective, airborne particulate matter is the primary pollutant of concern over a short-term exposure period (e.g., days to weeks).
  - U.S. EPA. July 2008. Wildfire Smoke, A guide for Public Health Officials.
- PM2.5 and PM10
- Smoke can irritate your eyes and your respiratory system and worsen chronic heart and lung diseases.
- Potential carcinogens

# Public Health Impact – During the Fire

- Acute & Chronic health effects
  - Respiratory system irritation
  - Inflammatory response
  - Asthma triggers
  - COPD
- When assessing human health risk posed by wildfire residue, the role of the investigator is to identify potential exposure pathways and evaluate the level of exposure to a sensitive receptor.

# Air Quality Index - <https://airnow.gov>

PM10  
 PM2.5  
 Nitrogen Dioxide  
 Ozone  
 Carbon Monoxide  
 Carbon Dioxide

Current AQI
Forecast
AQI Loop
More Maps

### Current AQI (Combined PM and O<sub>3</sub>)

Tuesday, March 13, 2018 7:00 AM PDT

**Current Conditions**

Air Quality Index (AQI)  
 observed at 7:00 PDT

**72 Moderate**

**Health Message:** Unusually sensitive people should consider reducing prolonged or heavy exertion.  
Max. Index above 300 are considered beyond the AQI. Follow recommendations for the Maximum category. Additional information on reducing exposure to ambient Air's levels of particulate pollution is available [here](#).

**AQI - Pollutant Details**

Ozone	3	<a href="#">Good</a>
Particles (PM2.5)	72	<a href="#">Moderate</a>

**Air Quality Forecast**

Today	Tomorrow
Air Quality Index (AQI) 53 <b>Moderate</b>	Data Not Available
<b>Health Message:</b> Unusually sensitive people should consider reducing prolonged or heavy exertion.	

**AQI - Pollutant Details**

		Data Not Available
Carbon Monoxide	15	<a href="#">Good</a>
Nitrogen Dioxide	20	<a href="#">Good</a>
Ozone	37	<a href="#">Good</a>
Particles (PM10)	29	<a href="#">Good</a>
Particles (PM2.5)	53	<a href="#">Moderate</a>

**Past Air Quality Maps and Data**

[Yesterday's Maps and Data](#)  
[Air Quality Maps Archiving \(by region\)](#)

**E-Mail Notification**

EnviroFlash provides air quality information such as forecasts and action day notifications via email for your area of interest. [Sign Up](#)

# Public Health Impact – During the Fire

- Stay indoors
- Keep windows and doors closed
- Avoid vigorous outdoor activities
- Reduce the amount of time spent in the smoky area
- Drink plenty of water

# Public Health Impact – During the Fire

- HVAC & outdoor air dampers
  - Home vs. commercial
- Use a high- efficiency particulate air (HEPA) filter to reduce indoor air pollution
- Avoid using additional combustion sources
- Respiratory protection???

# Public Health – Following the Fire

- *While the health effects of wood smoke inhalation have been well-documented, there is very little research directly addressing the short or long-term health effects of exposure to settled wildfire particles and organic and inorganic residues that may have infiltrated into a structure following a wildfire.*
- Evidence Review: Wildfire smoke and public health risk  
March 31, 2014. BC Centre for Disease Control

# Public Health – Following the Fire

- Electrical Safety
- Structural Issues
- Roadways
- Indoor Air Quality
- When and What to Clean?

# Sensitive Population

Includes, but is not limited to:

- Infants and young children
- Individuals with chronic or preexisting respiratory medical conditions
- Pregnant women
- The elderly
- Those with immunocompromised conditions

# Sensitive Buildings & Settings

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Daycare centers

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Hospitals

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Schools

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Nursing homes

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Senior centers

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Shelters



# Worker Safety and Health in Wildfire Regions

- *Smoke from wildfires contains chemicals, gases and fine particles that can harm health. Hazards continue even after fires have been extinguished and cleanup work begins. Proper protective equipment and training is required for worker safety in wildfire regions.*
  - *Cal/OSHA*
    - *Control of Harmful Exposure to Employees (Title 8 section 5141)*
    - *Respiratory (Title 8 section 5144) Protection*

# Cal/OSHA Worker Safety

## Worker Safety and Health in Wildfire Regions

[▶ en Español](#)



Wildfire smoke and cleanup presents hazards that employers and workers in affected regions must understand. Smoke from wildfires contains chemicals, gases and fine particles that can harm health. Hazards continue even after fires have been extinguished and cleanup work begins. Proper protective equipment and training is required for worker safety in wildfire regions.

Cal/OSHA encourages employers and workers to review the following pages with information and resources on protecting workers exposed to smoke from wildfires and worker safety during cleanup:

- [Protecting Outdoor Workers Exposed to Smoke from Wildfires](#)
  - **NEW** [Employer Notice: Worker Safety in Wildfire Regions and Distribution Locations for N95 Masks](#)
  - [N95 Mask Commonly Asked Questions](#) 
  - [Using Disposable Respirators](#)  (in English and Spanish)
- [Protecting Indoor Workplaces from Wildfire Smoke with Building Ventilation Systems](#)
- [Worker Safety and Health During Fire Cleanup](#)
  - [Respiratory Protection During Fire Cleanup](#)
  - [Personal Protective Equipment During Fire Cleanup](#)
  - [General Contractor and Subcontractor Duties](#) 
- [Safety and Health of Workers Rebuilding after Wildfires](#)
  - [Cal/OSHA Guidance for Construction Employers](#) 

### Cal/OSHA

#### Quick Links

- ▶ [File a workplace safety complaint](#)
- ▶ [Obtain a free consultation](#)
- ▶ [Important Cal/OSHA updates](#)
- ▶ [Public records requests](#)

#### Cal/OSHA Branches & Units

##### Branches

- ▶ [Enforcement](#)
- ▶ [Consultation Services](#)

##### Units

- ▶ [Amusement Ride and Tramway](#)
- ▶ [Asbestos and Carcinogen](#)
- ▶ [Census of Fatal Occupational Injuries](#)
- ▶ [Crane](#)
- ▶ [Elevator](#)
- ▶ [Heat and Agriculture Coordination Program](#)
- ▶ [High Hazard](#)
- ▶ [Labor Enforcement Task Force](#)

# Cal/OSHA Worker Safety

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Protecting Outdoor Workers  
Exposed to Smoke from  
Wildfires

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Protecting Indoor Workplaces  
from Wildfire Smoke with  
Building Ventilation Systems

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Worker Safety and Health  
During Fire Cleanup

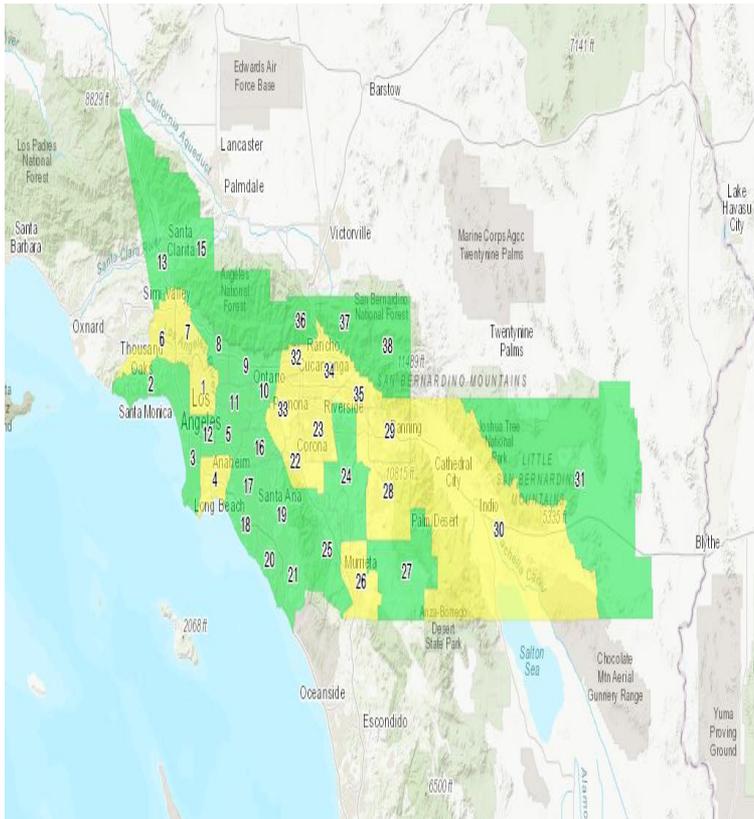
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Safety and Health of Workers  
Rebuilding after Wildfires

# Outdoor Workers

- For those who work in locations where wildfire smoke can travel (does not include fire fighters). Factors to consider:
  - Local air quality districts data
  - How long workers are outside
  - Level of physical exertion
  - Symptoms consistent with exposure to wildfire smoke, such as those listed above
  - Pre-existing medical conditions

# Air Quality Websites



<a href="#">Current AQI</a>   <a href="#">Forecast</a>   <a href="#">AQI Loop</a>   <a href="#">More Maps</a>	
<b>Current AQI (Combined PM and O<sub>3</sub>)</b> Monday, December 10, 2018 9:00 AM PST	
Air Quality Index (AQI) observed at 9:00 PST <div style="display: flex; align-items: center; justify-content: center;"> <span style="font-size: 2em; margin-right: 5px;">76</span> <span style="font-weight: bold; font-size: 1.2em;">Moderate</span> </div> <p>Health Message: Unusually sensitive people should consider reducing prolonged or heavy exertion.</p> <p><small>Note: Values above 500 are considered Beyond the AQI. Follow recommendations for the Hazardous category. Additional information on reducing exposure to extremely high levels of particle pollution is available <a href="#">here</a>.</small></p>	
<b>AQI - Pollutant Details</b>	
Ozone	<span style="font-size: 1.5em; color: green;">10</span> <a href="#">Good</a>
Particles (PM <sub>2.5</sub> )	<span style="font-size: 1.5em; color: yellow;">76</span> <a href="#">Moderate</a>
<b>Air Quality Forecast</b>	
<b>Today</b>	<b>Tomorrow</b>
Air Quality Index (AQI) <div style="display: flex; align-items: center; justify-content: center;"> <span style="font-size: 2em; color: green; margin-right: 5px;">50</span> <span style="font-weight: bold; font-size: 1.2em;">Good</span> </div> Health Message: None	Data Not Available
<b>AQI - Pollutant Details</b>	
Data Not Available	

# Outdoor Workers



- Implement controls
- Engineering
- Administrative
- Respiratory

# Indoor Workers

- Ventilation
- Restrict exits/entries
- Air Scrubbers
- Relocation

# Worker Safety and Health - Cleanup

- Safety Issues
  - Electrical Safety
  - Structural Issues
  - Excavation
- Health Issues
  - Carbon Monoxide
  - Smoke related particulates
  - Asbestos
  - Heat Illness
  - Others...

# Worker Safety and Health - Rebuilding

- Rebuilding residences and structures after wildfires can begin when all hazardous materials have been removed and debris cleanup hazards have been corrected. The following information covers some of requirements for rebuilding safely.

# Challenges

- Myriad of contaminants
- No exemplars
- Standards?
  - During
  - After
- Indoor Air Quality
- Sensitive Population



# Thank You

Forensic Analytical Consulting Services, Inc.

Right People  
Right Perspective  
Right Now