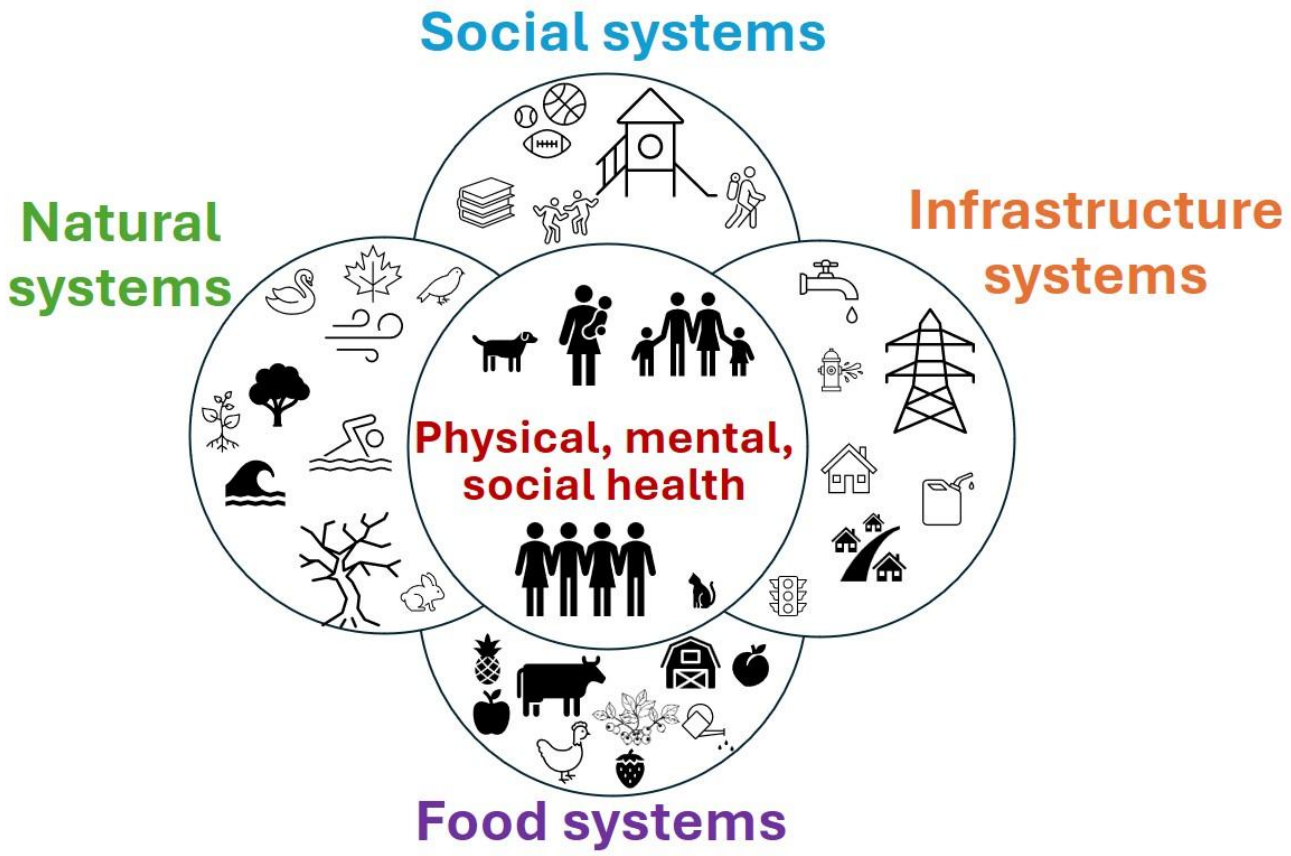
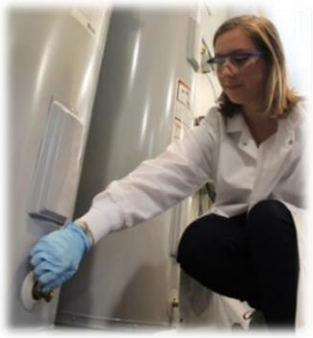
# From Crisis to CONOPS: Building Evidence-Based Frameworks for Post-Wildfire Property Contamination and Recovery






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# Fires can destroy structures and spread contamination




Camp Fire, CA, 2018
(Credit: SFGate)




Marshall Fire, CO, 2022
(Credit: Hart Van Denburg/ CPR, AP Pool)




Lahaina Fire, HI, 2023
(Credit: Max Whittaker/ NYT)



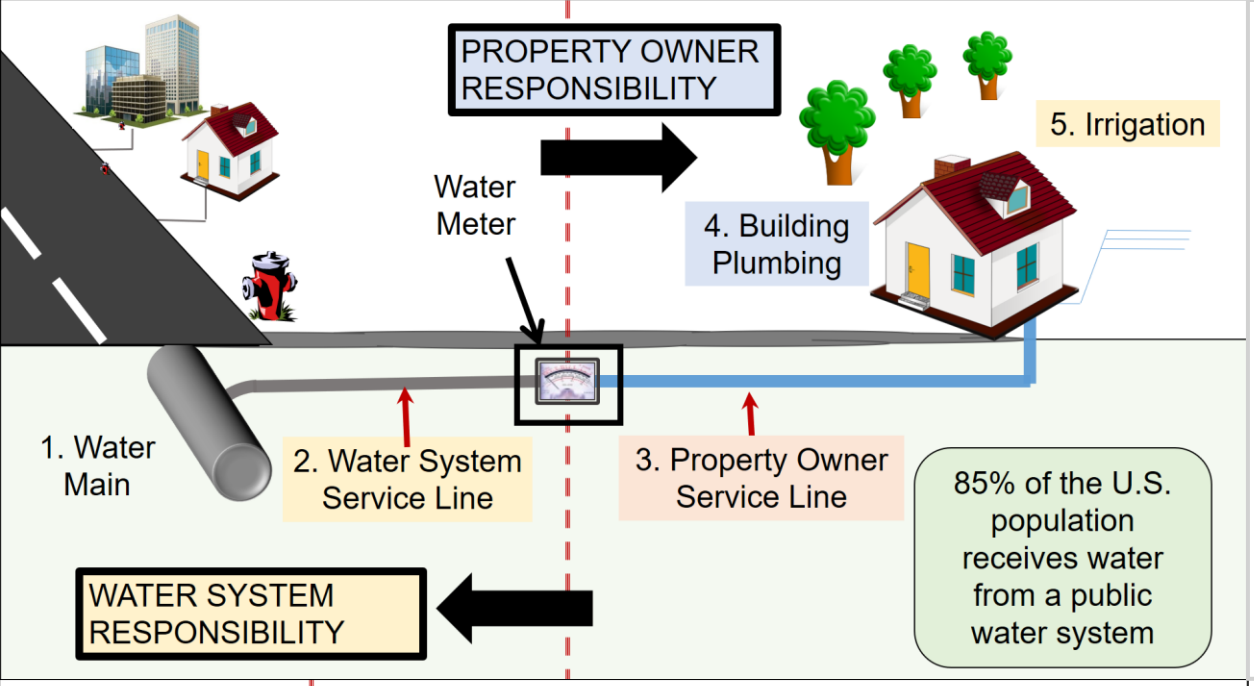

Palisades Fire, CA, 2025
(Credit: Brian van der Brug/ LA Times)

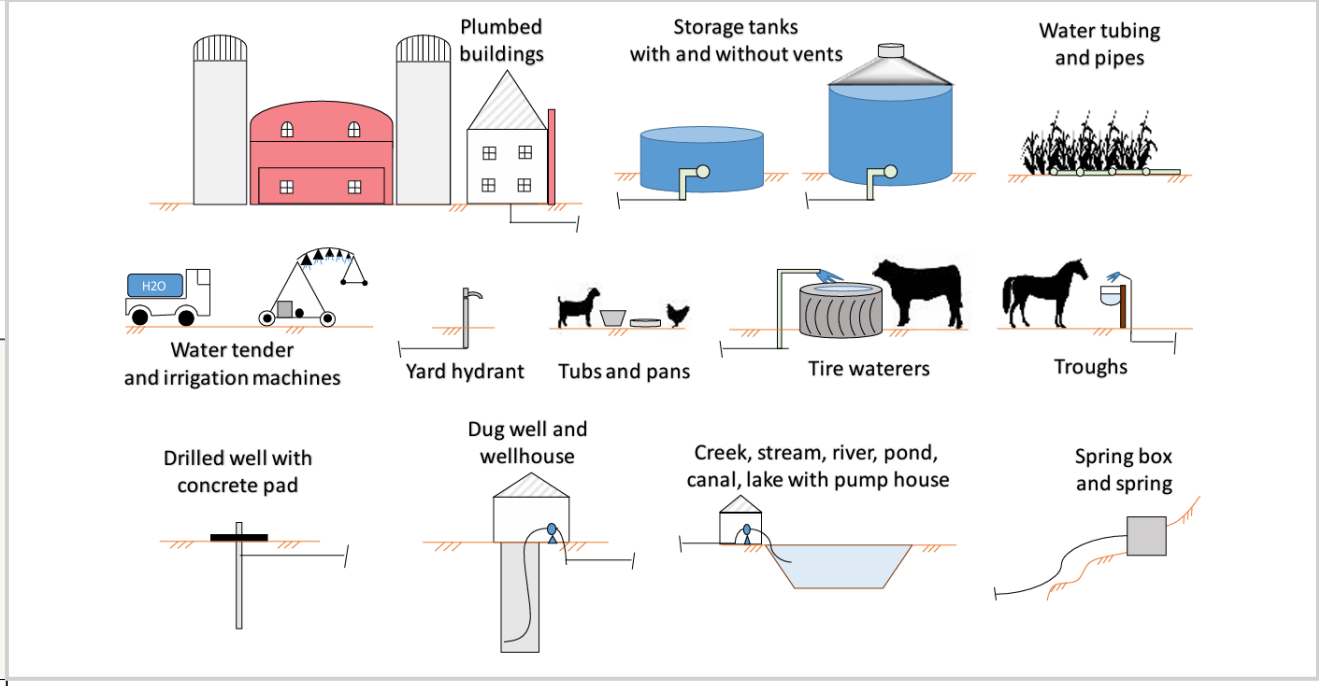


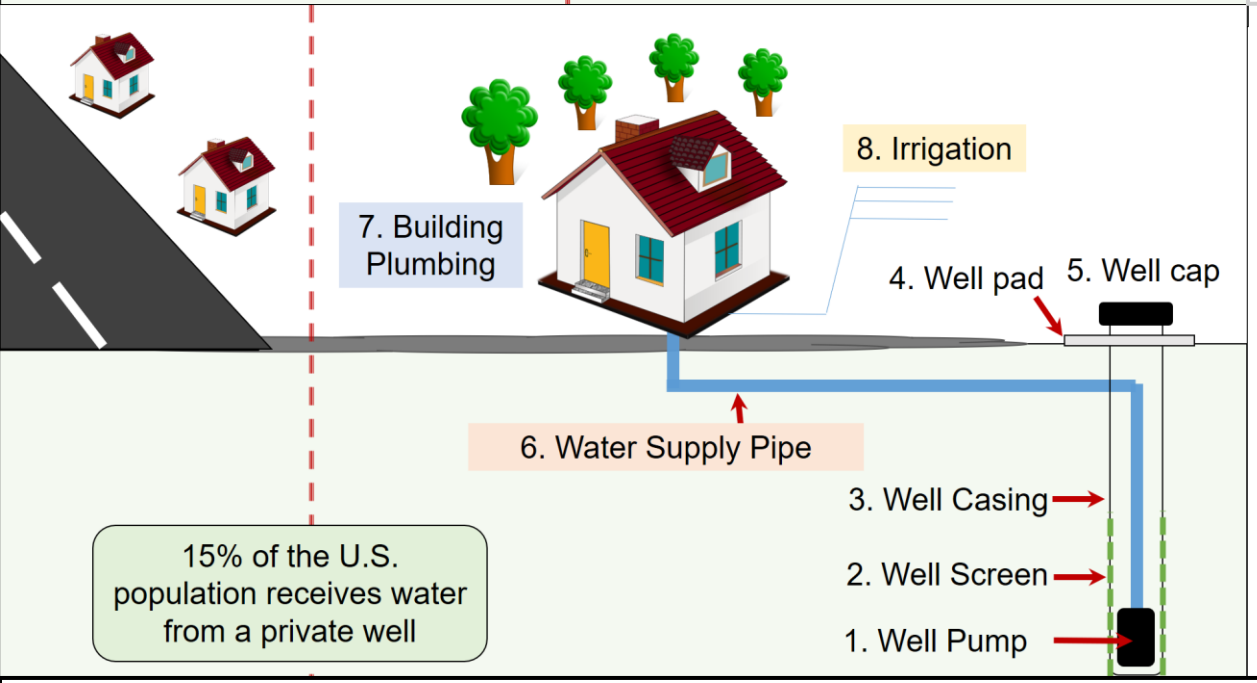

Eaton Fire, CA, 2025
(Credit: Philip Cheung/ NYT)




Spokane Fire, WA, 2026
(Credit: David Ryder/ Reuters)




**Safe water is critical health, safety, and economic security**













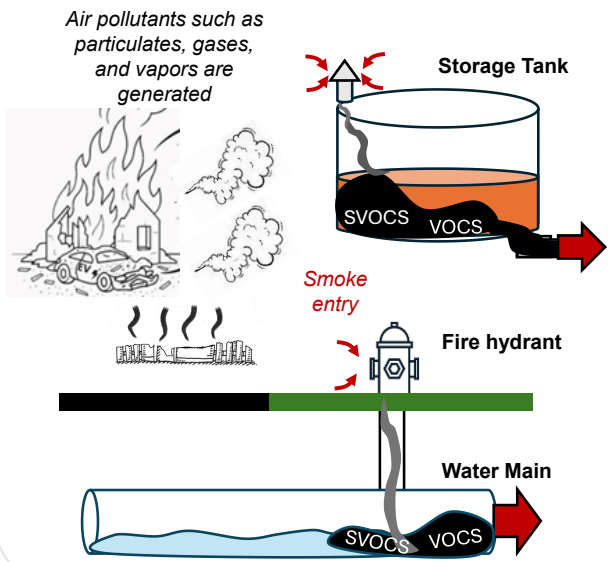




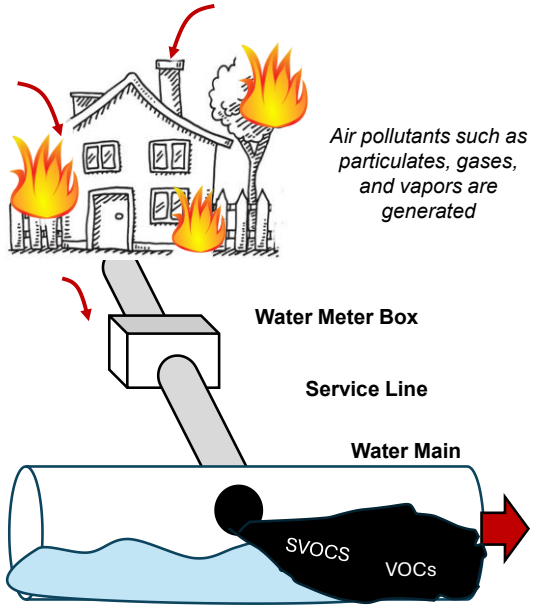
California · Colorado · Hawai'i · New Mexico · Oregon : 2017 Tubbs Fire · 2018 Camp Fire · 2020 Bear Fire · 2020 Oregon Fires · 2021 Marshall Fire · 2021 Lytton Fire · 2022 CC/HP Fire · 2023 Maui Wildfires · 2025 Los Angeles Fires

# **Major Fire Impacts:** Power loss, pressure loss, and extreme contamination rendering infrastructure and water unsafe to use

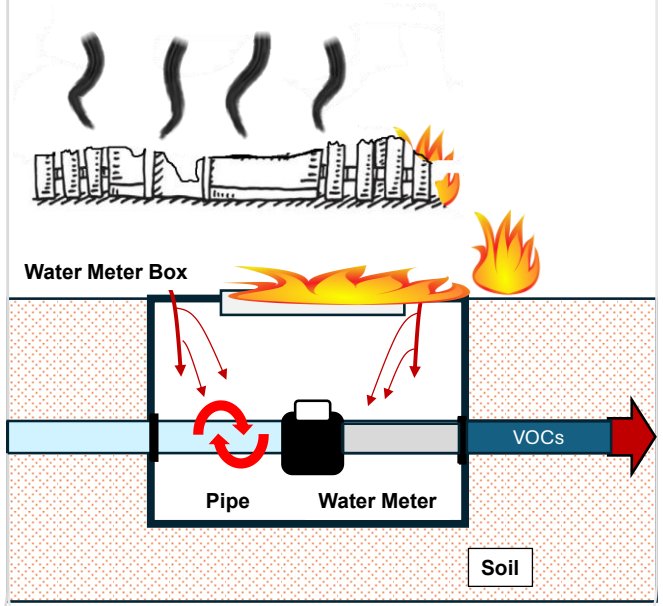
(a) Burning or smoldering vegetation and other materials nearby traveling in ambient air



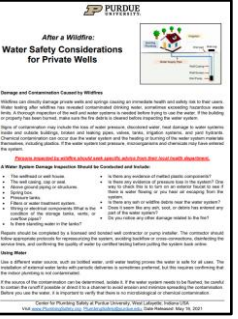

(b) Burning or smoldering of structures traveling through the water service line




(c) In-situ thermally degraded plastics due to fire effects

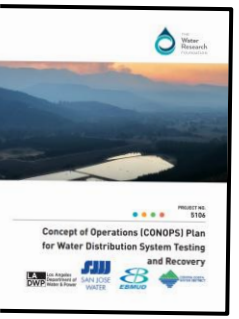



Zavodny & Whelton. 2026. Water utilities damaged by wildfire: Recovery lessons, mitigation, and research needs. *Utilities Policy.* (Forthcoming: https://www.doi.org/10.1016/j.jup.2026.102245)













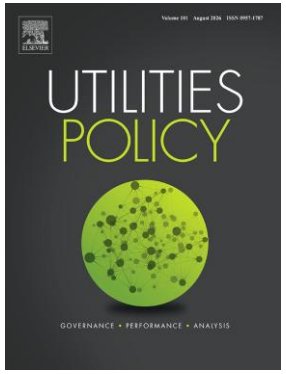
# *Solutions:* CONOPS and more…

Focus on hazard identification, extent of damage, sources and pathways of contamination, exposure

Support rapid decisions to lessen impacts: Water utilities, Purdue University, Oregon State University, UC Davis, private consulting companies, Deakin Univ., Melbourne Univ.

## SOLUTIONS

- **Concept of Operations Plan (CONOPS)** for reducing impacts…. *Adopted by 12 utilities after 2025 L.A. Fires and 2026 Spokane Fires.*
- Guidance for private wells and springs
- Guidance for impacted plumbing
- Guidance for agricultural water systems




## *(2026) Water utilities damaged by wildfires: Recovery lessons, mitigation & research recommendations*

**GOAL:** Identify mitigation strategies to reduce fire impacts on water utilities and policies that can accelerate recovery.

Focus on U.S. utilities (infrastructure defense, workforce, rebuilding, finances), with comparison to Canadian and Australian experiences.

**RESULTS:** Mitigation actions are available to improve pre-fire system operations, system design, adoption of new technologies

- ✓ Enable continued firefighting
- ✓ Lessen water loss
- ✓ Lessen potential for system contamination
- ✓ Lessen the possibility of chemical exposure
- ✓ Lessen recovery time and cost
- ✓ Identify actions to expedite rebuilding and recovery

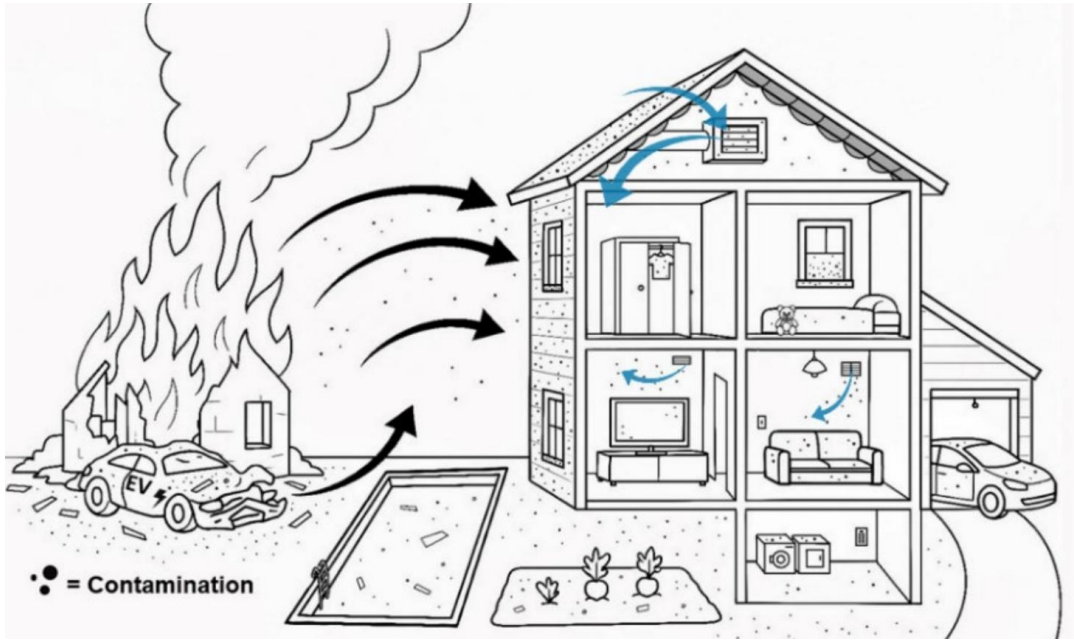
Get a copy of the CONOPS

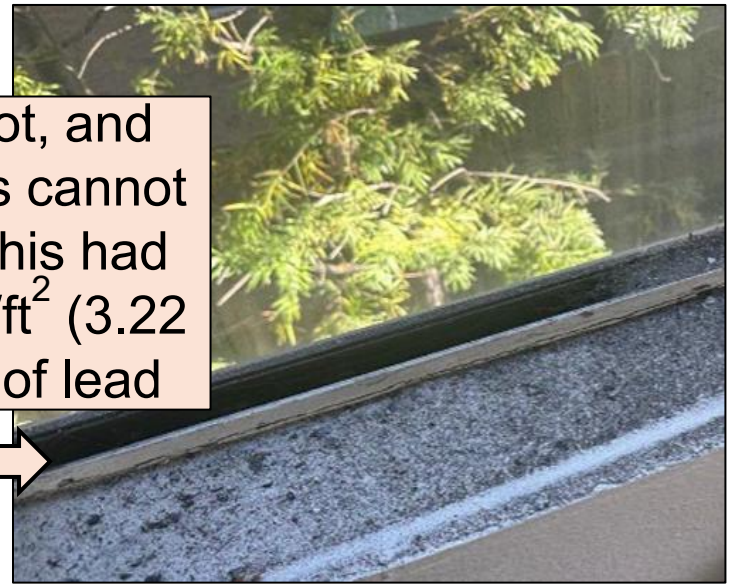
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https://doi.org/10.1016/j.jup.2026.102245

# Actionable opportunities abound to better response and recover from disasters

~~Drinking water systems~~
Debris and soil
Indoor building environments
Swimming pools
Gardens
Agriculture
Public wastewater systems
Public stormwater systems
Public spaces – Parks, beaches
Outdoor air



Ash, soot, and char tests cannot tell you this had 3,000 ug/ft$^2$ (3.22 ug/cm$^2$) of lead



Whelton, A.J., Bollens, E., Ferrarezzi, C. After a Wildfire: Considerations for Building Environmental Testing. September 2025. West Lafayette, Indiana USA. https://www.doi.org/10.5703/1288284317911

# Some ongoing work:
# Systems coordination, research, and recovery innovation

1. **The HEART Study: Health-based Environmental Assessment and Re-Occupancy Testing** – Evidence-based practices for safely restoring homes after a fire.
2. **The ASHES Study: Fire Ash and Soil History Evaluation** – Evidence-based practices for safely returning property soil to pre-fire condition.
3. **The REBUILD Survey: Recovery Efforts By Uniting Individuals, Listening, and Discovery** – Opportunities to improve household experiences with evacuation, housing, environmental testing, chemical exposures, insurance, and rebuilding.
4. **The L.A. Pools Study** – Evidence-based practices for restoring wildfire impacted swimming pools.
5. **The CRIBS Study: Chemical Risk In Baby Product Sorption** – Evidence-based guidance on handling baby products exposed to contaminated drinking water.
6. **Mitigation Actions to Improve Water Utility Fire Resilience** – Evidence-based practices and technologies to reduce impacts and expedite recovery.
7. **FIRE-NET** – Network to address critical science, technology, and practice gaps in engineering and health

**Collaborators and Partners:**

*Community groups*

*Property owners*

*Parents*

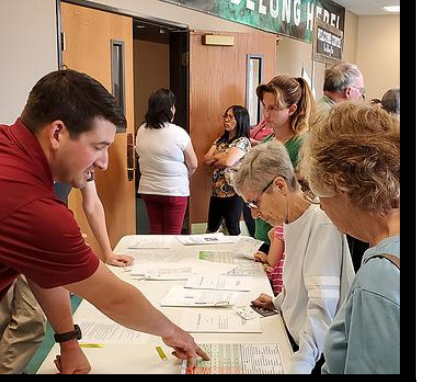
*Water utilities*

*Universities*

*Companies*

*Foundations*

*Other efforts in the works*














# Evidence-based decision making guides

## *Our After the Fires Webinar Series*

Practical, science-backed steps for recovery



LIGHTBOX

Warm Springs Foundation

The Spanicciati Family

A. Whelton's Wallet

THE Water Research FOUNDATION

Rotary Club of Paradise, California

NSF ....

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Download copies of the evidence-based recovery guides

August 31, 2026 …

The Calif. Legislature passed the 1st in the nation smoke damage outdoor and indoor contamination testing standards



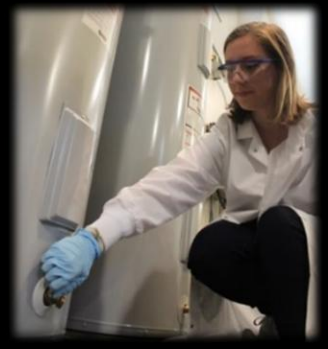
September 14, 2026…

Calif. Governor Newsom signed it into law.

*This law was partly shaped by the data we have in peer-review.*

*AB 1642 (Harabedian) creates the scientific, health standards*
*AB 1795 (Gipson) requires insurance companies to follow them*

# Thank you




***Special thanks to…***

Paradise Irrigation District · City of Louisville, Colorado · Since 1878 · County of Maui, State of Hawaii · Boulder County · EBMUD · LA DWP Los Angeles Department of Water & Power · Contra Costa Water District · San Jose Water Company · Medford Water Commission · EWEB · City of Napa · City of Santa Rosa

Anonymous donors · The Spanicciati Family · Lightbox

***Support from…***

Rotary Club of Paradise, California · NSF · United States Environmental Protection Agency · The Water Research Foundation

Warm Springs Foundation · R&S Kayne Foundation · Andrew Whelton's Wallet

Visit our wildfire response and recovery resources page at www.PlumbingSafety.org

- ✓ Post-fire chemicals to test for
- ✓ Brief videos for emergency managers and health officials
- ✓ Guidance for private well owners
- ✓ Guidance for building owners
- ✓ Government agency resources
- ✓ Guidance for consultants
- ✓ Utility decision CONOPS
- ✓ FEMA mitigation guidance
- ✓ Other training resources

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