

# Assessing wildfire influence on indoor and outdoor chemical concentrations and diffusive flux between soils and air of PAHs in the Western United States

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Current public health messaging recommends individuals stay indoors and close all windows. However, these recommendations are often based on risks to particulate matter and do not take into consideration chemicals present in the vapor phase.

Exposure to vapor-phase polycyclic aromatic hydrocarbons (PAHs) has been shown to account for up to 86% of the cancer-risk from inhalation exposure.<sup>1-4</sup> Understanding the distributions of vapor-phase PAHs in relation to wildfire events is important for improving public health recommendations.

1. Tsai, P.J., et al., *Journal of Hazardous Materials*, 2002. **91**(1-3), 25-42.  
2. Liu, Y.N., et al., *Chemosphere*, 2007. **66**(10), 1922-8.  
3. Ramirez, N., et al., *Environmental Health Perspectives*, 2011. **119**(8), 1110-6.  
4. Samburova, V., B. Zielinska, and A. Khlystov, *Toxics*, 2017. **5**(3).

## Wildfires

### Trends

- Wildfires resulted in over ten million acres burned across the United States in 2017
- Some of the biggest sources statewide were California, Oregon, Idaho and Washington
- The number of large wildfires (>1000 acres) have increased by a rate of seven fires per year

### Smoke

- Wildfire smoke contains many chemicals that may impact health, but these exposures are largely unknown

### Community-Engaged Research

- Passive samplers, due to their biomimic nature, ease of implementation, low cost and low maintenance in the field are an ideal approach for community-engaged research
- Each participant received a kit containing the passive samplers, an instruction packet and a survey
- At each site, volunteers placed samplers in a room inside their home and outside their home during the wildfire season

## Objectives and Hypotheses

1. Assess PAHs and other contaminant levels in paired indoor and outdoor samplers
2. Assess changes in PAH concentration and movement before, during, after a wildfire impact

**H<sub>1-null</sub>:** C<sub>air-vapor</sub> PAHs are at higher concentrations during a wildfire than before or after

**H<sub>2-null</sub>:** C<sub>air-vapor</sub> PAHs at paired wildfire air sites are significantly higher outdoors than indoors

**H<sub>3a-null</sub>:** Flux of C<sub>air-vapor</sub> PAHs are in deposition during wildfires

**H<sub>3b-null</sub>:** Flux of C<sub>air-vapor</sub> PAHs volatilize from the same soils after wildfires

Passive sampling devices were deployed across Washington, Idaho, California and Oregon from September to October of 2018. Repeat measures were collected from September to October of 2019.

Forensic source identification of PAHs indicate that, in general, indoor air is mixed or petrogenic in source while outdoor air is pyrogenic in source.

PAH air concentrations were higher indoors than outdoors.

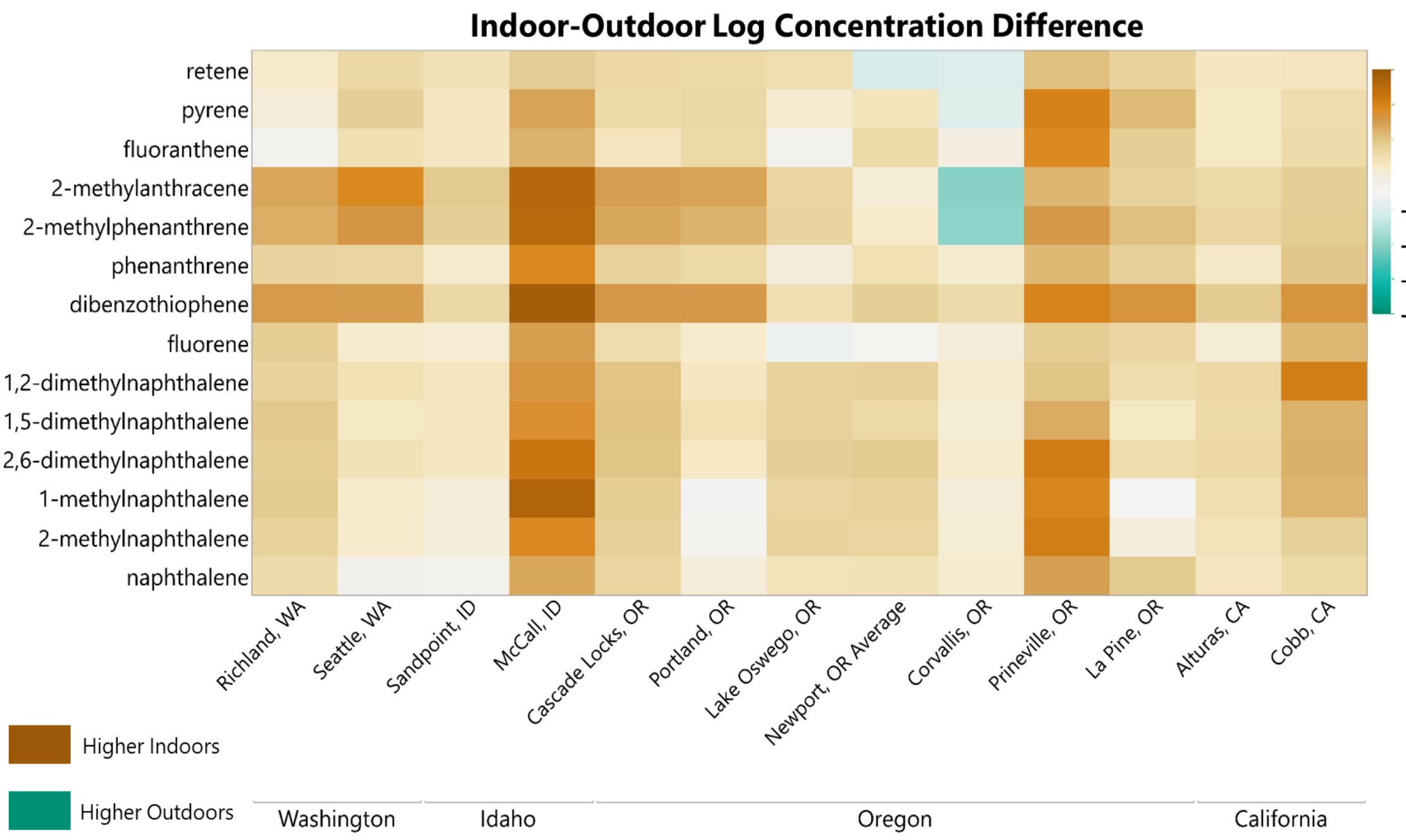
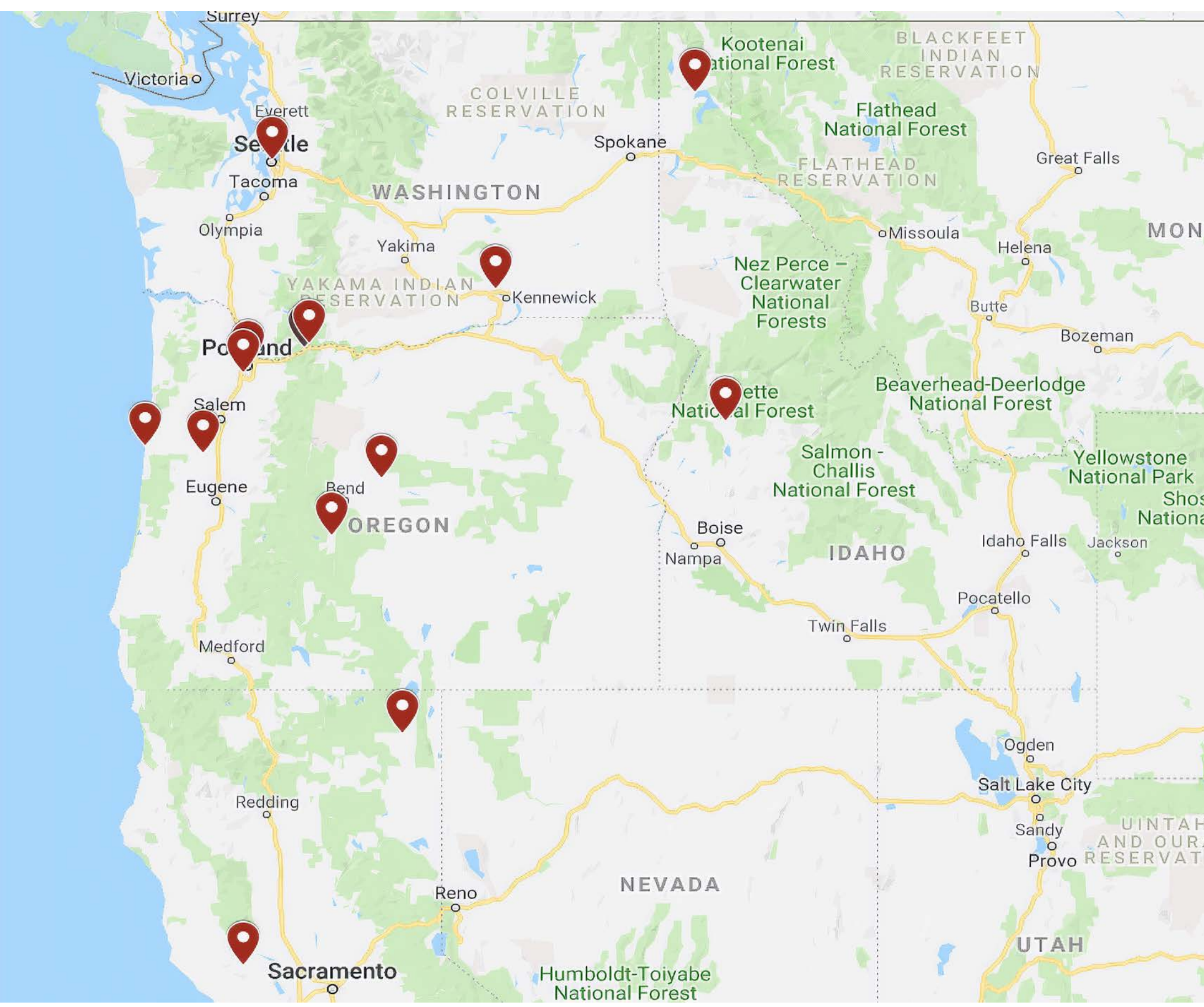
Individual data sets were returned to study participants. Reports included PAH concentrations, overall study conclusions, common sources of PAHs and ways to reduce exposure.

This is the first FSES study to incorporate community-engaged research and environmental passive samplers without face-to-face training.

Returning data to participants can empower individuals to take action to reduce exposure to wildfires and other PAH sources.



Take a picture to download more information



**1. SET UP SAMPLER**  

Write the DATE & TIME you set up the sampler.

**2. SAMPLE FOR 21 DAYS**  

S	M	T	W	R	F	Sa
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

**3. MAIL IT BACK**  

Write the DATE & TIME you remove the sampler. Put everything back in the box and use the provided label to mail it back!

