Exploring the Potential Impacts of Wildfire on Residential Water Rates in the Western U.S.

Charlotte Wachter, Department of Agricultural and Resource Economics, Colorado State University, crw41@colostate.edu

Selected Poster prepared for presentation at the 2025 AAEA & WAEA Joint Annual Meeting in Denver, CO: July 27-29, 2025

Exploring the Potential Impacts of Wildfire on Residential Water Rates in the Western U.S.

Charlotte Wachter[1], Jordan Suter[1], Jesse Burkhardt[1], Sonja Kolstoe[2]

[1] Department of Agricultural and Resource Economics, Colorado State University

[2] Pacific Northwest Research Station, USDA Forest Service

Background

- Wildfires in the western U.S. are increasing in size and severity
- Wildfires may impact downstream **community water systems (CWSs)** by degrading source water and affecting finished water quality (Hohner et al., 2016; Pennino et al., 2022)
- These impacts to CWSs may increase water treatment costs and utility system infrastructure investments, costs that may be passed on to ratepayers

Black water on the Poudre River near the City of Fort Collins raw water intake on June 28, 2021.
Source: Jared Heath, Watershed Specialist, City of Fort Collins

Objective

Investigate the potential relationship between wildfire events and residential water rates in the western U.S.

Data

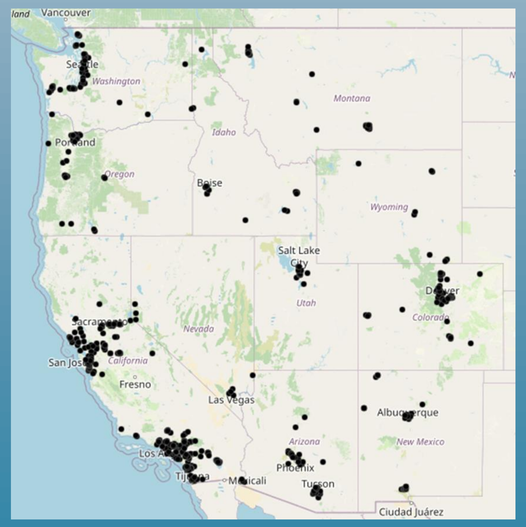
- American Water Works Association (AWWA) / Raftelis Water and Wastewater Rate Survey for 12 years from 2000 to 2022
- Wildfire burn perimeters and intensities from the Monitoring Trends in Burn Severity Program
- CWS service area boundaries from the EPA's Office of Research and Development

Methods

- We estimate how wildfire events in upstream watersheds have impacted the price of a fixed quantity of water (e.g. 1000 cf) paid by residential ratepayers
- This price reflects the fixed and variable costs of water treatment that account for both past and recent impacts of wildfire on treatment costs

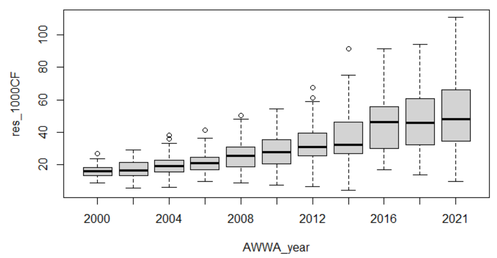
$$P_{it} = \beta_0 F_{it} + X_{it}^{'}\gamma + \eta_i + \tau_i + \epsilon_{it}$$

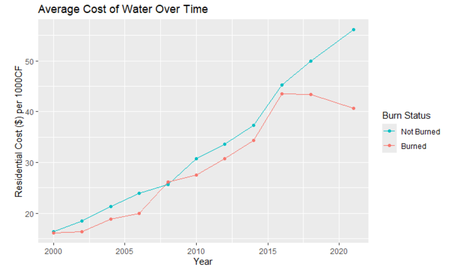
- P_{it} is the price of a fixed quantity of water for CWS i in year t
- F_{it} is wildfire, which we model as the percentage of the upstream watershed area burned by wildfire and can include both spatial and temporal lags, such as:
  - The percentage of area burned within just the intake watershed (excluding upstream watersheds)
  - The percentage of area burned one year, two years, three years, etc., prior
- In alternative specifications, we also model F_{it} as the percentage of high severity burn area
- X_{it}' is a vector of variables that can impact water supply and costs, such as
  - Population density in CWS service area
  - Number of source water intakes
  - Precipitation (mean annual precipitation watershed area upstream of CWS i in water year t)
- η_i and τ_i are CWS and year fixed effects, respectively

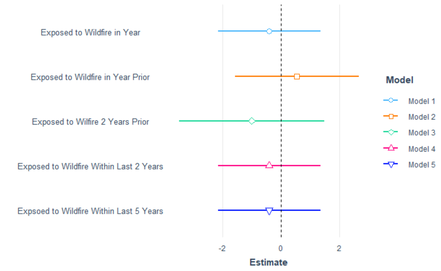


Spatial Extent of AWWA CWSs

Results







Conclusion

- Preliminary results suggest that wildfires do not have a significant impact on residential water rates
- This may be due to CWSs receiving external funding for post-wildfire mitigation projects from state and federal grants
- We are supplementing our analysis with measures of external funding to better understand how CWSs that share source watersheds at risk of wildfire may collaborate on watershed recovery projects

References

Hohner, A.K., Rhoades, C.C., Wilkerson, P., Rosario-Ortiz, F.L., 2019. Wildfires alter forest watersheds and threaten drinking water quality. Accounts of Chemical Research, 52 (5), 1234-1244.

Pennino, M. J., Leibowitz, S. G., Compton, J. E., Beyene, M. T., & LeDuc, S. D. 2022. Wildfires can increase regulated nitrate, arsenic, and disinfection byproduct violations and concentrations in public drinking water supplies. Science of the Total Environment, 804, 149890.

Acknowledgements

This work was funded through a joint venture agreement 22-JV-11261975-092 with the USDA Forest Service.