



UNIVERSITY TRANSPORTATION CENTER

RESEARCH BRIEF

Mitigating Wildfire Impacts on Mobility using GIS, Fire Simulation, and Operations Modeling

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Background

In 2020, wildfires resulted in the deaths of 11 people and destruction of thousands of homes, exposing the vulnerability of Oregon's logging towns. These fires have highlighted the need for preparedness by transportation agencies, particularly relating to its maintenance of rural roadway networks, to serve the twin purposes of enabling rapid evacuation of affected populations and enabling access to affected areas by first responders and firefighters. However, the spread of the fire can significantly impact the roadway network through the damage of infrastructure, the accumulation of debris on roadways, and presence of "hazard trees" that threaten to block roadways, and low visibility due to smoke. These impacts on roadway infrastructure severely affect the mobility of travelers and first responders. While current knowledge enables decision-makers to simulate the spread of wildfires, and separately establish the impact of closed roads on mobility, what is currently unknown is the impact of wildfires on transportation infrastructure and methods to mitigate its impact. This research will thus fill this gap in transportation by using a simulation-based approach to model the impact of wildfires on road networks; with the goal of enabling decision making regarding the allocation of debris clearance, firefighting, and recovery equipment to mitigate the impact of the wildfires and enable speedy recovery of affected communities.



Research Project

This research contributes to PacTrans' mission by ensuring transportation mobility for rural communities for evacuation, rescue, and recovery; as well as the safety of communities by enabling first responders have access to them. Specifically, this project proposes the use of wildfire simulation, geospatial analysis, and discrete event simulation to enable transportation agencies to evaluate the impact of wildfires on roadway networks and thereby enable the optimal allocation of resources to enable speedy recovery of roadway assets. The major outcome of this proposed project will be a comprehensive road map for studying the impact of fires on transportation networks with the goal of mitigating their adverse impacts. Specifically, this research is expected to create new knowledge in the following aspects of wildfire impact on roadways: (1) Quantification of the impact of wildfires on road networks; (2) Quantification of the impact of reduced capacity networks on travel times; (3) Evaluation of recovery times to clear and repair roadways. These results will be synthesized in a geospatial and simulation tool that enables decision making for transportation planning and logistics in the aftermath of wildfires.

ABOUT THE AUTHORS

The research team consisted of Joseph Louis and Yelda Turkan of Oregon State University.

ABOUT THE FUNDERS

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EXPECTED DATE OF COMPLETION

March 2022

FOR MORE INFORMATION

<https://depts.washington.edu/pactrans/research/projects/mitigating-wildfire-impacts-on-mobility-using-gis-fire-simulation-and-operations-modeling/>