



Research Brief for Resource Managers

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Preventing Disaster: Home Ignitability in the WUI

Cohen, J. D. 2000. Preventing Disaster - Home Ignitability in the Wildland-Urban Interface. *Journal of Forestry* 98(3):15-21.
http://www.fs.fed.us/rm/pubs_other/rmrs_2000_cohen_j002.pdf

Increasing residential development near fire-prone wildlands has increased both agency costs and residential losses from wildfires in the wildland-urban interface (WUI). Fire protection capabilities are often overwhelmed during large WUI fires, resulting in unprotected residences.

Therefore, reducing home ignitability, even in the absence of active suppression activities, is paramount in reducing residential fire losses. Through modeling, field experiments, and case studies, the author demonstrated that home ignitability is largely dependent on a structure's exterior materials and design combined with its exposure to flames and firebrands.

The author modeled structural ignition with the Structure Ignition Assessment Model (SIAM), showing that even high-intensity crown fires are largely unable to ignite wood surfaces greater than 40 meters (130 feet) away. At that distance, a minimum of 10 minutes was required to ignite a vertical wood surface (e.g., an exterior wall); however, the small-diameter vegetative fuels that dominate fire spread generally can only support intense burning for a few minutes at a given point before they burn out.

The author also carried out field experiments, which exposed wood walls to a high-intensity crown fire at various distances from the fire. He

Management Implications

- Modeling, experiments, and case studies demonstrated that distances of 10-40 m between houses and wildfires are needed to deter structural ignition.
- Flammable roofs are extremely susceptible to ignition via lofted embers, and should be avoided in the WUI.
- Home ignitions depend on the structure's exterior materials and design and its immediate surroundings, and are thus largely independent of wildland fuel management tactics.
- Residents in the WUI must therefore take primary responsibility for ensuring that their home has low ignitability.

found that 10 meters (33 feet) was a sufficient distance to preclude wall ignition so long as direct flame contact did not occur (Figure 1).

Case studies of previous large WUI fires indicated that, again, home ignitions depended largely on the characteristics of the structure and its immediate surroundings. Specifically, the presence of wood roofs, which exposed the structure to direct contact of low intensity (but long duration) embers, substantially increased the likelihood of structural ignition and subsequent home loss.

The author concluded that because home ignitions are not likely unless flames and ember ignitions occur within 40 meters of the structure,

WUI home losses can be most reduced by focusing mitigation efforts on homes and their immediate surroundings rather than on landscape-scale fuel management activities. Because agencies that manage fire can only modify adjacent wildlands, WUI residents must therefore take primary responsibility for ensuring that their homes have sufficiently low home ignitability.

Suggestions for further reading:

Alexander, M.E., B.J. Stocks, B.M.
Wotton, M.D. Flannigan, J.B. Todd. 1998. The International Crown Fire Modelling Experiment: An overview and progress report. Pgs. 21-23 In Proceedings of the Second Symposium on Fire and Forest Meteorology, 20-23. Boston: American Metrological Society.

Davis, J.B. 1990. The wildland-urban interface: Paradise or battleground? *Journal of Forestry* 88(1):26-31.

Foote, E.I.D. 1994. Structure survival on the 1990 Santa Barbara "Paint" fire: A retrospective study of urban-wildland interface fire hazard mitigation factors. MS thesis, University of California at Berkeley.

Tran, H.C., J.D. Cohen, and R.A. Chase. 1992. Modeling ignition of structures in wildland/urban interface fires. In Proceedings of the First International Fire and Material Conference, 253-62. London: Inter Science Communications Limited.



Figure 1. Field experiments demonstrated that radiant heat from a high-intensity forest fire (left pane), which caused substantial scorch, was not sufficient to ignite a vertical wood wall (right pane) located 10 meters (33 feet) away so long as direct flame and ember contact was avoided. Note the lack of wall scorch under the eave because of the radiation "shading" from the eave.