

Wildland-Urban Fire: Beware the Home Ignition Zone

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Wildland-urban fire occurs when a fire burning in vegetation fuels gets close enough with its flames and/or firebrands (lofted burning embers) to potentially create ignitions of residential fuels. Residential fire destruction is the principal problem during wildland-urban fires, but homes that do not ignite do not burn. Recognizing the potential for wildland-urban home ignitions and preventing home ignitions is the principal challenge.

Understanding how homes ignite during wildland-urban fires provides the basis for appropriately assessing the potential for home ignition and thereby effectively mitigating wildland-urban fire ignitions.

Fires do not spread by flowing over the landscape, and high intensity fires do not engulf objects, as do avalanches and tsunamis. All fires spread by meeting the requirements for combustion—that is, a sufficiency of fuel, heat, and oxygen. In the context of severe wildland-urban fires, oxygen is not a limiting factor so this type of fire spreads according to a sufficiency of fuel and heat. Homes are the fuel and the heat comes from the flames and/or firebrands of the surrounding fires. How close flames are to the home and whether or not firebrands contact the home determines how much heat the home receives.

Home ignition research over the last several years has exposed wall sections to crown fires. Wall sections were placed at 33, 66, and 98 feet from the forest edge. Ignition of the 33 ft. wall section occurred during 3 out of 7 crown fires. No ignitions or significant scorch occurred on wall sections at 66 ft. and 98 ft. during any crown fire. Recent research indicates that the potential for home ignitions during wildfires, including those of high intensity, principally depends on a home's fuel characteristics and the heat sources within 100-200 feet adjacent to a home (reference wildland-urban fire research at www.firelab.org). This relatively limited area that determines home ignition potential can be called the *home ignition zone*.

During a wildland-urban fire a home ignites from two possible sources: directly from flames (radiation and convection heating) and/or from firebrands accumulating directly on the home. Even the large flames of high intensity crown fires do not directly ignite homes at distances beyond 200 feet. Given that fires adjacent to a home do not ignite it, firebrands can only ignite a home through contact. Thus, the home ignition zone

becomes the focus for activities to reduce potential wildland-urban fire destruction. This has implications for reducing home ignition potential before a wildfire as well as implications for emergency wildland-urban fire response strategy and tactics.

One might argue that preventing the occurrence of wildfires would prevent wildland-urban fire destruction. However, our current understanding indicates that wildland fire is an intrinsic process in nearly all North American ecosystems. Wildland fire will always occur in the forest and rangeland landscapes and will always have an impact on people, property and resources.

Thus, it is not reasonable to form agency and public expectations for the non-occurrence of wildfires. This implies that communities will be impacted by wildfire; that is, we must assume that wildfires will continue to encroach on communities. This suggests an approach that minimizes the impacts, not one that necessarily eliminates the impacts. This implies an approach of community compatibility with wildland fire and the previously mentioned research substantiates the possibility for such an approach.

Wildland-urban fire emergency strategy and tactics differ from either the standard wildland or the standard urban fire suppression practices. Wildland fire suppression largely attempts to keep a fire from spreading beyond its current location. That is, keeping the wildfire away from a valued area protects the values at risk. Urban fire suppression initially addresses life safety (principally building occupants) and then fire containment within a portion of the structure and/or prevents adjacent structure involvement. Neither of the wildland or the urban suppression practices typically provide for home ignition potential reduction given an encroaching wildfire.

Wildland-urban strategy and tactics assume the wildfire may pass through the residential area without wildfire containment. The wildland-urban strategy and tactics principally focus on preparing the home for the wildfire by reducing the potential for home ignition within the home ignition zone. Because of time constraints, most preparation should occur before a wildfire occurs. Major changes to the home ignition zone (the home and its immediate surroundings) such as replacing a flammable roof and removal of vegetation -- such as forest thinning -- cannot occur during the approach of a wildfire. Removal of firewood piles, dead leaves, conifer needles, dead grass, etc. from on and next to the home should also occur seasonally before severe fire conditions.

The ignition potential of the home ignition zone largely influences the effectiveness of protection during a wildfire. Given low ignition potential and enough time, homeowners and/or wildland-urban suppression resources can make significant reductions in the little things that influence ignition potential before wildfire encroachment. Then, if possible, homeowners and/or wildland-urban firefighting resources can suppress small fires that threaten the structure during and after the wildfire approach.

Agencies need to recognize that wildland-urban fire strategy and tactics are fundamentally different from their traditional tasks. The principal efforts for reducing ignitions focus on the home ignition zone before the wildfire occurrence. Since

homeowners largely own and control the home ignition zone, agencies must function as partners and facilitators for implementing wildland-urban mitigations. During the wildfire, wildland-urban protection activities continue to focus on the home ignition zone for the prevention of home ignitions.

Even with ignition resistant homes, protection effectiveness relies on an understanding of how homes ignite during wildland fires, along with recognizing operational and logistical fire suppression limitations. These differences suggest the need for wildland-urban fire specialists both before a wildfire and during a wildfire. Before the wildfire, the wildland-urban fire specialist uses home ignition expertise to identify vulnerable residential areas and facilitate community efforts to reduce home ignitability. During wildfires, the specialists work with homeowners and multi-agency wildland-urban fire protection teams to identify and implement effective actions for reducing home destruction during wildfires.

About the Author

Cohen has been involved in fire management and fire research since 1972. His current research involves understanding and modeling structure ignitions during wildland fires, and he is developing the Structure Ignition Assessment Model (SIAM), a method for assessing wildland fire threat to homes. He has developed or had a hand in developing the National Fire Danger Rating System, the hand-held Fire Danger/Fire Behavior Calculator (TI-59), and the FIRECAST interactive wildland fire behavior information system. He is one of the principal scientists involved in the International Crown Fire Modeling Experiment, NWT, Canada, where he is investigating the thermal characteristics of crown fires related to structure ignitions and fire spread.

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