

*Bruce Benninghoff*

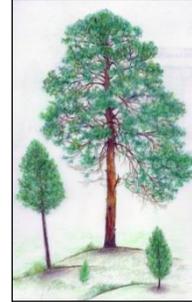
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**HOME  
IGNITION  
ZONE  
HAZARD  
ASSESSMENT  
Seminar**

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## What Is The HOME IGNITION ZONE?

The **home ignition zone** includes the home and an area surrounding the home within 100 to 200 feet. The potential for ignition depends on the home's exterior materials and design and the amount of heat transferred to the home from the flames within the home ignition zone. Firebrand ignitions also depend on the home ignition zone either by igniting the home directly or igniting adjacent materials that heat the home to ignition.

{Wildland-Urban Fire—A different approach, Jack D. Cohen; [www.firelab.org](http://www.firelab.org)}

## What Is Mitigation in the HIZ?

Ignition of the home can occur in three different ways:

- Radiant heat from a flaming front – such as a crown fire
- Contact with flame from burning surface fuels close to the structure
- Firebrands (embers) delivered by wind that ignite fine fuels in or around the structure

The only variable in the fire triangle of heat, oxygen and fuel that we can control to any significant degree is fuel.

Mitigation is the act of

- Reducing fuel volume,
- Disrupting fuel continuity - horizontally and/or vertically,
- Changing fuel composition and structure.
- BEFORE IGNITION OCCURRS!
- Doing these things after ignition is called fire control or fire fighting. It is much more difficult, dangerous and expensive to modify fuel after ignition.

## Reduce the ignition potential of the structures.

As the FireWise ad says:

A firebrand can originate from a fire more than a mile away.

We can't control where the firebrand will land.

We can control what happens after it lands.

Example - A single firebrand from a fire a mile away can ignite the pine needles under your stairs, which ignites the stairs and then the deck, which is attached to the house.

The home is lost due to lack of maintenance that would have cost nothing.

**We can deprive the firebrands of the fine fuel that they can ignite.**

## Reduce the fuel around the structures.

A crown fire running up a hill in thick conifers can produce enough radiant heat to ignite wood siding 10 meters away. The solution is to eliminate ladder fuels and thin the forest near the home so that it will not initiate or support a crown fire.

**We can deprive the crown fire of the continuous canopy of fuel it needs to sustain itself.**

A surface fire can burn right up to the same stairway, ignite the needles underneath and burn the house. The solution is to keep the first 5 feet around the structure fuel free.

**We can deprive the surface fire of the continuous fuel it needs to reach the house.**

## Balance

The more fuel that is kept in the immediate vicinity of the structure, the more fire resistant the materials should be.

If you want a pine tree 10 meters from a window, prune the tree and use tempered glass in the double pane window.

If you want one or two pine trees 10 meters from a wall, use stucco instead of plywood.

If you have to have a fence attached to the structure, make the section near the house from metal.

## The Role of Firebrands in Fire Behavior

Wallow fire (Eastern AZ 2012) progression

- June 2, day 4, it grew by 36,000 acres
- June 3, day 5, it grew by 60,000 acres
- June 4, day 6, it grew by 43,000 acres

What is an acre? – 43,560 ft<sup>2</sup>, or a square 209 ft on a side.

How many acres in Blue Mtn Estates watershed? (~571).

60,000 acres = 105 Blue Mtn watersheds.

Hayman Fire advanced 17 miles in 12 hours.

Firebrands cause spot fires which facilitate this kind of fire growth.

## The Role of Firebrands in Home Ignition

IBHS Research Center Ember Storm video.

Radiant Heat vs Firebrands video

## Does Mitigation Make A Difference?

An analysis by the San Diego County Department of Planning and Land Use of homes in the unincorporated areas at risk of wildfire, and the numbers of homes burned following the 2003 and 2007 wildfires, provided the following statistics:

### October 2003 Wildfires •

Of 15,000 total structures within the fire perimeter, 17 percent were damaged or destroyed. •

Of the 400 structures built using the 2001 building codes, only 4 percent were damaged or destroyed.

### October 2007 Wildfires •

Of 8,300 structures within the fire perimeter, 13 percent were damaged or destroyed. •

Of 789 structures built using the 2001 building codes, 3 percent were damaged or destroyed. •

Of the 1,218 structures built using the 2004 building codes, only 2 percent were damaged or destroyed.

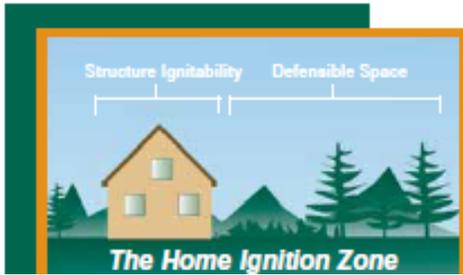
Loss of structures within Black Forest Fire was 15%.

These figures provide a solid foundation for the success of building codes, when combined with the vegetation modification requirements, in reducing property losses in wildfires.

{Mega Fires the Case for Mitigation; [http://www.disastersafety.org/wp-content/uploads/wildfire\\_megafires\\_full.pdf](http://www.disastersafety.org/wp-content/uploads/wildfire_megafires_full.pdf) }

## State Forest Service

See [http://csfs.colostate.edu/pdfs/FIRE2012\\_1\\_DspaceQuickGuide.pdf](http://csfs.colostate.edu/pdfs/FIRE2012_1_DspaceQuickGuide.pdf)



## The Home Ignition Zone

Two factors have emerged as the primary determinants of a home's ability to survive a wildfire – the quality of the defensible space and a structure's ignitability. Together, these two factors create a concept called the **Home Ignition Zone (HIZ)**, which includes the structure and the space immediately surrounding the structure. To protect a home from wildfire, the primary goal is to reduce or eliminate fuels and ignition sources within the HIZ.

In Zone 2:

“Prune tree branches off the trunk to a height of 10 feet from the ground or 1/3 the height of the tree, whichever is less.” Page 7.

“Remove enough trees and large shrubs to create at least 10 feet between crowns.” Page 7.

“Small groups of two or three trees may be left in some areas of Zone 2, but leave a minimum of 30 feet between the crowns of these clumps and surrounding trees.” Page 7.

Obviously, not all the trees need to be removed within 100 feet of the structure.

“Avoid accumulations of surface fuels, such as logs, branches, slash, and wood chips greater than 4 inches deep.” Page 7.

## COMMON VULNERABILITIES

### Roofs

Class A roofing material offers the best protection, **HOWEVER:**  
The most important factor is simply keeping combustible debris off the roof and out of the gutters



Complex roofs can reduce the protection offered by Class A shingles by allowing firebrands to accumulate at the intersection of the roofing and siding

Some non-combustible roofing, such as clay tiles still have openings that invite bird nests and firebrands to get underneath



Now what?  
How do we get water under the tiles?

## Decks

Wooden decks are usually the most vulnerable points on mountain homes. The construction materials are typically combustible; scrap lumber, firewood, needles, twigs and cones tend to collect under them. This situation is an open invitation to ignition by firebrands.



Then there are decks with vegetation growing up through them or along side.



There are almost always stairs involved.



Firebrands will tend to land here just as fuel does. Bad combination.

When changes are contemplated refer to the California fire marshal lists of tested construction materials for use in the Wildland-Urban-Interface (WUI).

Decks and stairways should be enclosed with solid walls or metal screen ( $\frac{1}{8}$ "") to keep fuel and firebrands from getting underneath the deck. Decks that hang out over steep slopes can benefit from deflector walls.

## Windows

Window glass breaks and plastic frames melt allowing the window to fall out. Plastic skylights melt.



Do not allow fuel close to the structure, especially under a window.

Tempered glass is better than annealed glass.  
Several small panes are better than one large pane.  
Dual and triple pane windows are better than single panes.

Metal screens in front of windows help reduce the radiant heat applied to the glass.

## Vents

All vents should be protected with  $\frac{1}{8}$ " metal screen to minimize firebrand entry. Gable end and soffit vents are the most vulnerable.

Flapper type vents are common on dryers. These are OK if they are kept in operating condition.

I suggest that you view this video produced by the Insurance Institute for Business and Home Safety.  
[www.youtube.com/watch?v=IvbNOPSYyys](http://www.youtube.com/watch?v=IvbNOPSYyys)

This displays the threat that firebrands (embers) pose to structures. Note that the size and volume of embers passing through the  $\frac{1}{8}$ " screen would only result in ignition if there is a fine fuel to be ignited.

Also note that the fiberglass screen melted.