

Home and landscape wildfire defense: lessons learned from the 2017 California wildfire season



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UC Cooperative Extension
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University of California
Agriculture and Natural Resources



Today's presentation

- How homes burn from wildfire
- Near home vegetation and landscaping
- Vulnerabilities in home design
- Resources

Thank Dr. Steve Quarles, UC fire durability expert (emeritus) now with the Insurance Institute for Business and Home Safety (IBHS), and UC Master Gardener volunteers for many of these slides and ideas.

Multiple Fires

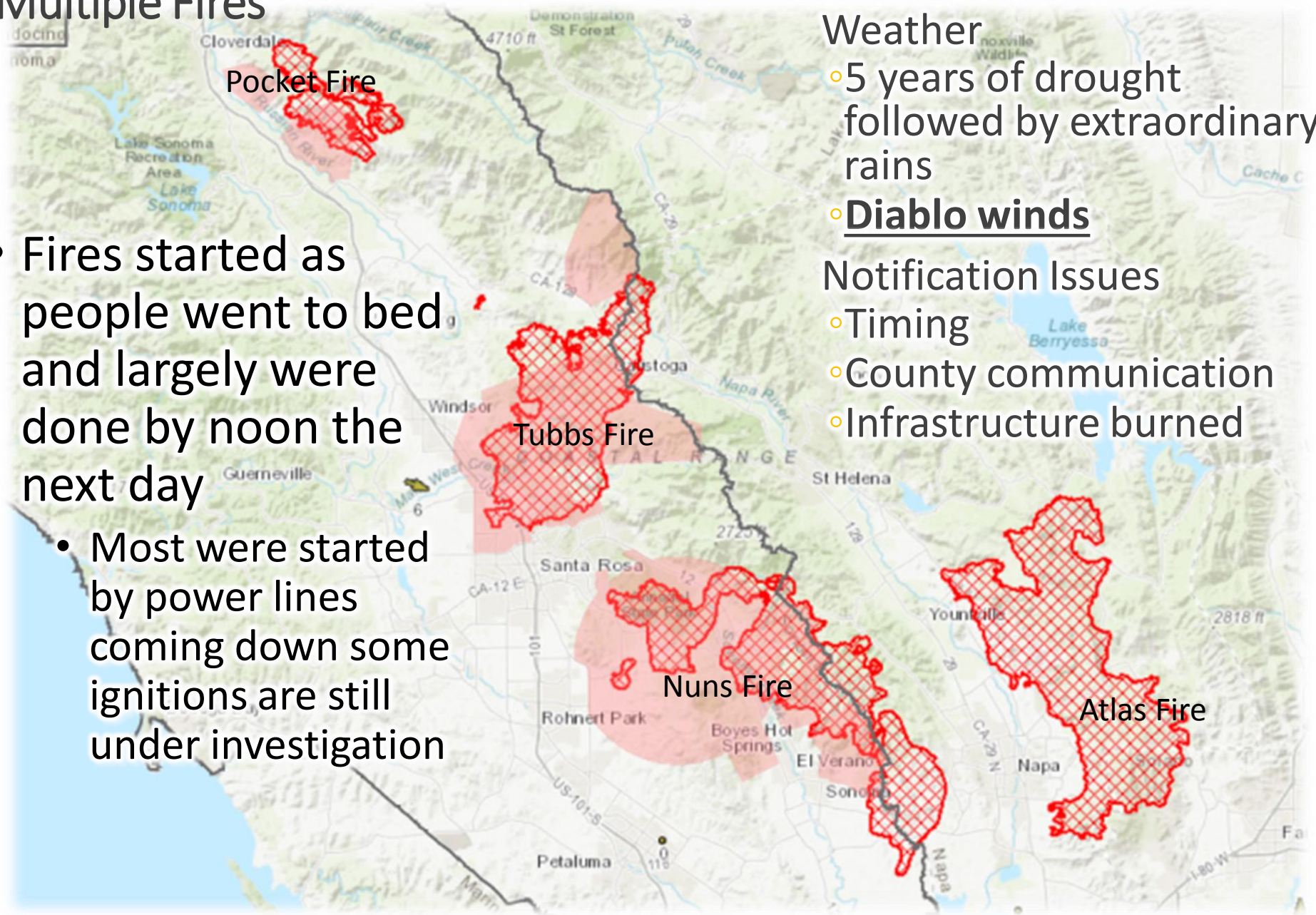
- Fires started as people went to bed and largely were done by noon the next day
 - Most were started by power lines coming down some ignitions are still under investigation

Weather

- 5 years of drought followed by extraordinary rains
- **Diablo winds**

Notification Issues

- Timing
- County communication
- Infrastructure burned



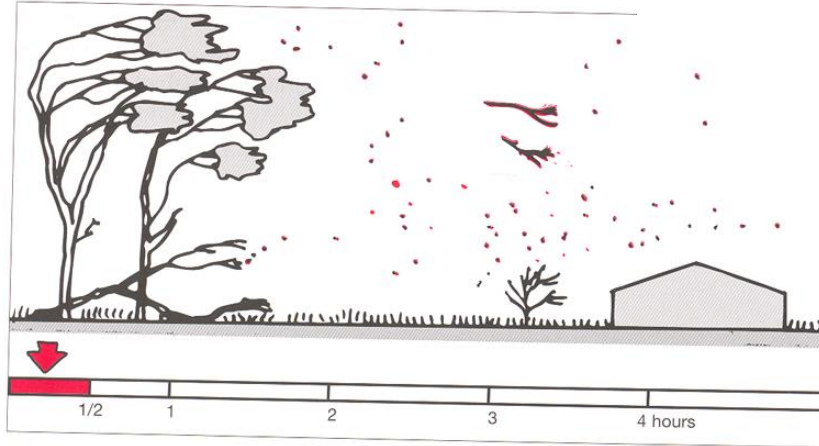
Homes were the most combustible part of the landscape



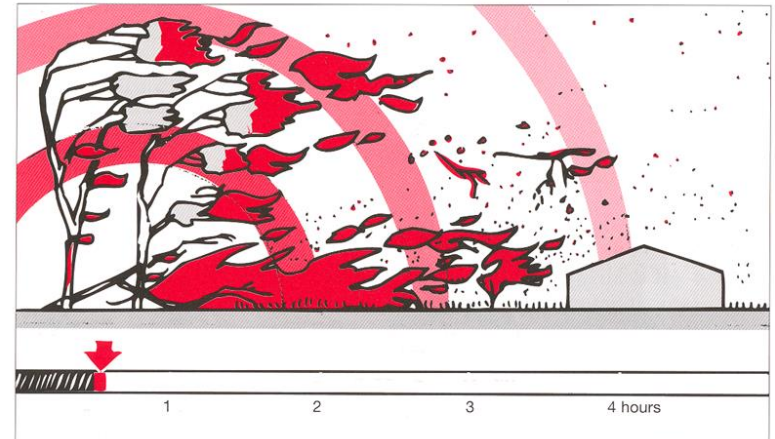
Stages of wildfire

From Ramsay and Rudolph, CSIRO

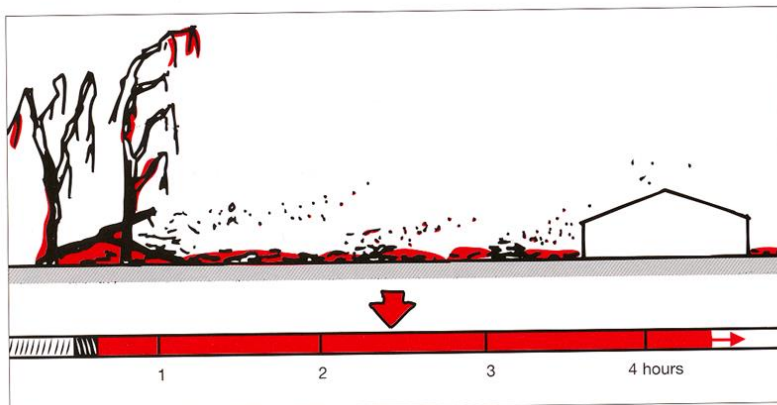
Timescale of attack:
pre fire front



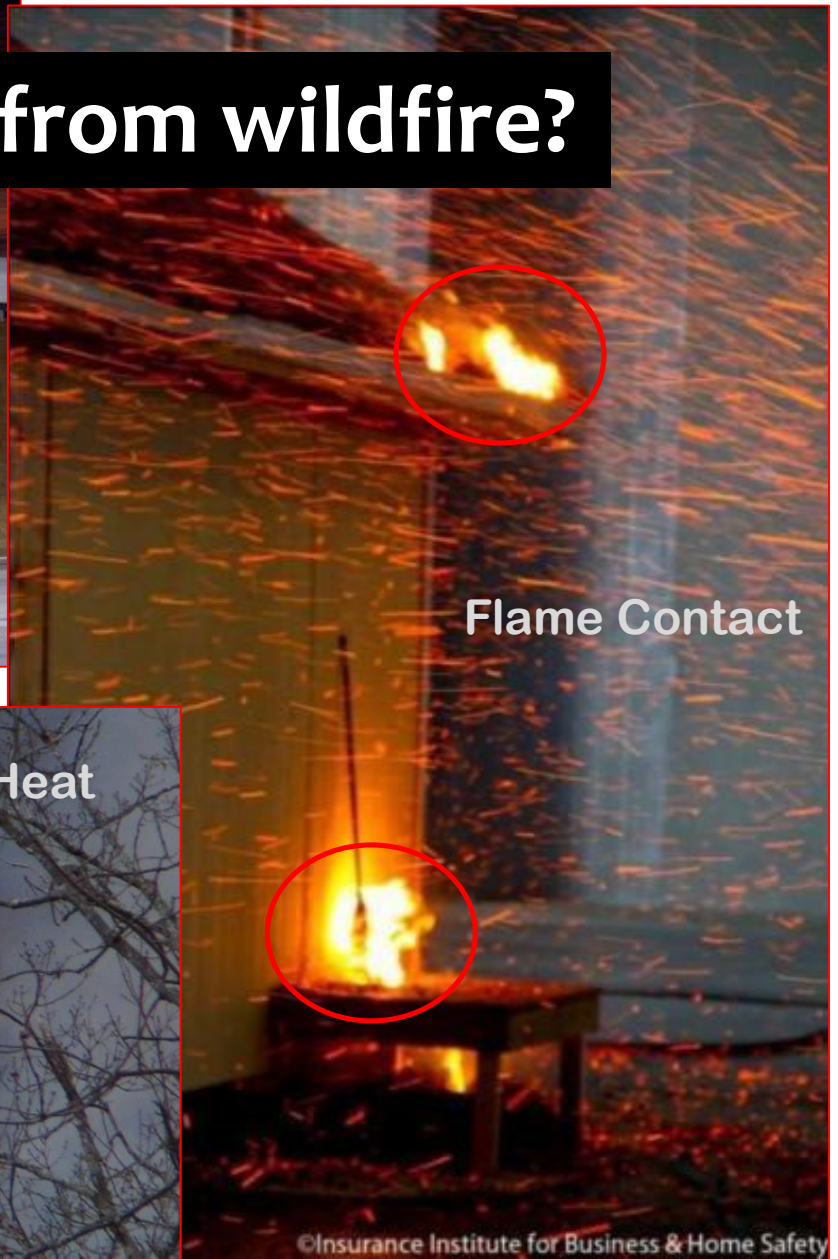
Timescale of attack:
impact of the fire front



Timescale of attack:
post fire front



How a house burns from wildfire?



Embers

Wind-blown embers are responsible for the majority of building ignitions



Angora Fire – South Lake Tahoe

Fountain Grove, Santa Rosa 2017





Know the basics of fire:

Fuel + Oxygen + Heat = Fire

Fuel + Weather + Topography = Fire Behavior

➤ What can you control?

Fuel is... anything that will burn

- Dry or dead vegetation
- Wood siding, roofing, fencing
- Trees
- Woody shrubs or perennials
- Landscape mulch

Today's presentation

- How homes burn from wildfire
- **Near home vegetation and landscaping**
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Work from the house out

Defensible Space

Zone 1:

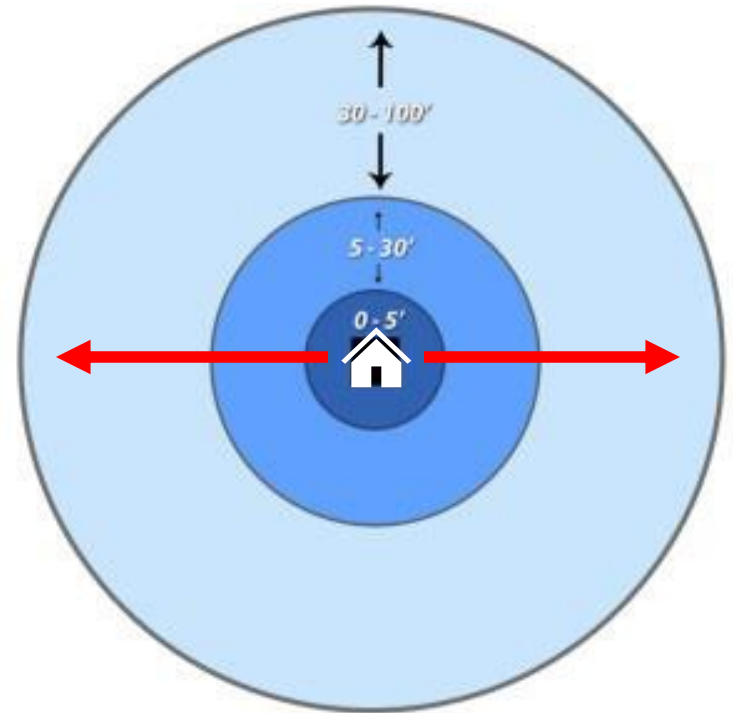
0-5 feet “non-combustible zone”

Zone 2:

5-30 feet “lean and green zone”

Zone 3:

30-100 feet or to the property line “reduced fuel zone”

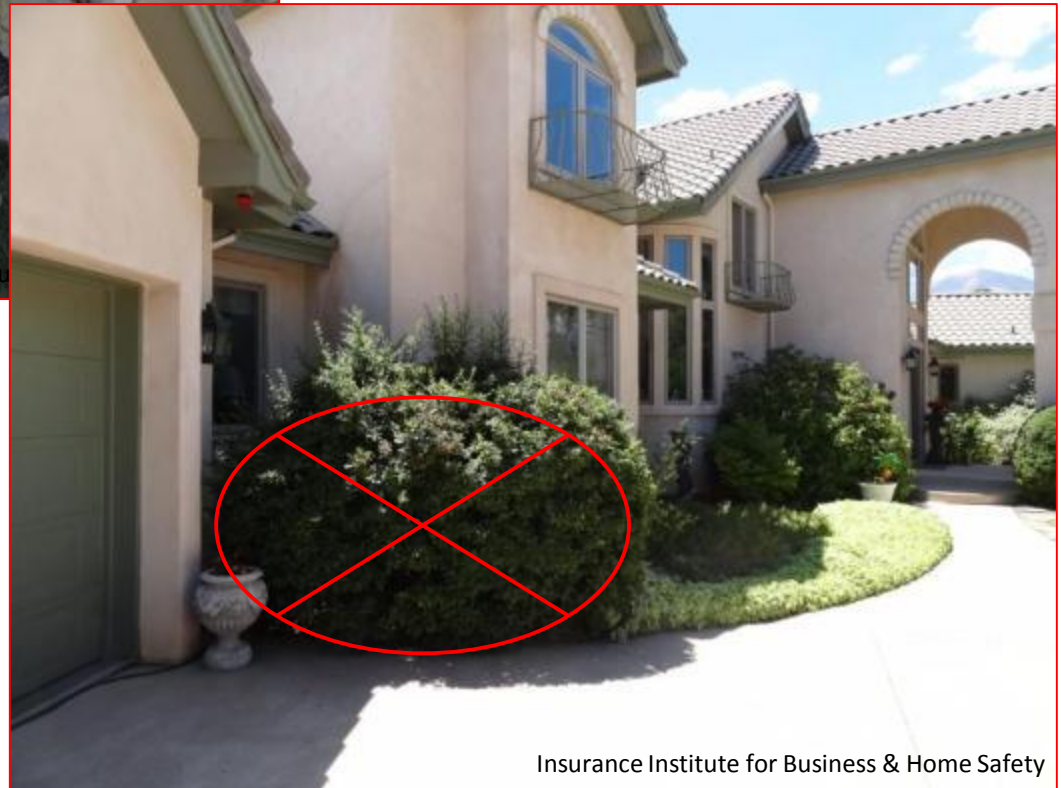


0-5 ft “noncombustible zone” to reduce chance of flame contact exposure



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Effective defensible space must be present on all sides of the home



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Separate the vegetation from the house



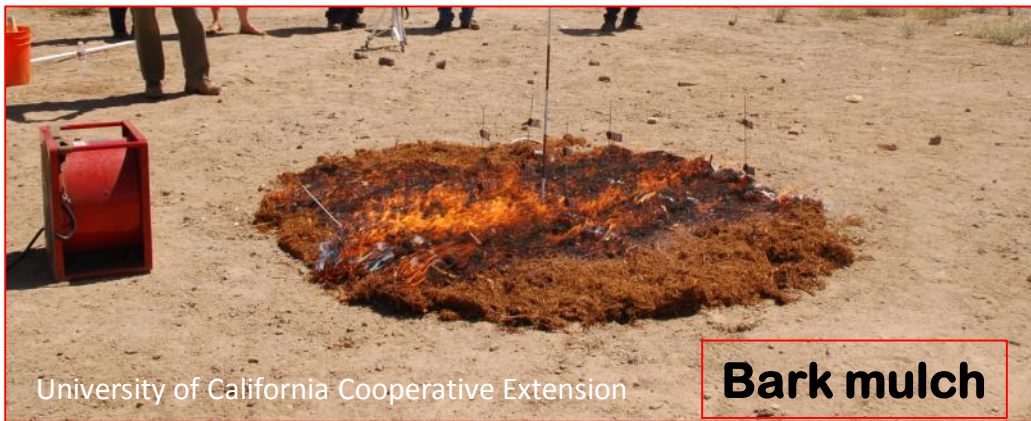
~~Fire resistant~~ plant lists?

- All plants can burn regardless of how they are marketed
- Fire safe landscaping requires maintenance (pruning, irrigation, clean-up)
- Select low growing, open structured, less resinous, higher moisture content plants
- Native and drought tolerant can be options, if maintained well



Tubbs Fire, Rich Casale, NRCS





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Bark mulch

- Mulch helps plants retain moisture, but it will burn too!
- Use hardscape, rock mulch or lawns <5 feet from the home.



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Pine needle mulch



Tubbs Fire

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Today's presentation

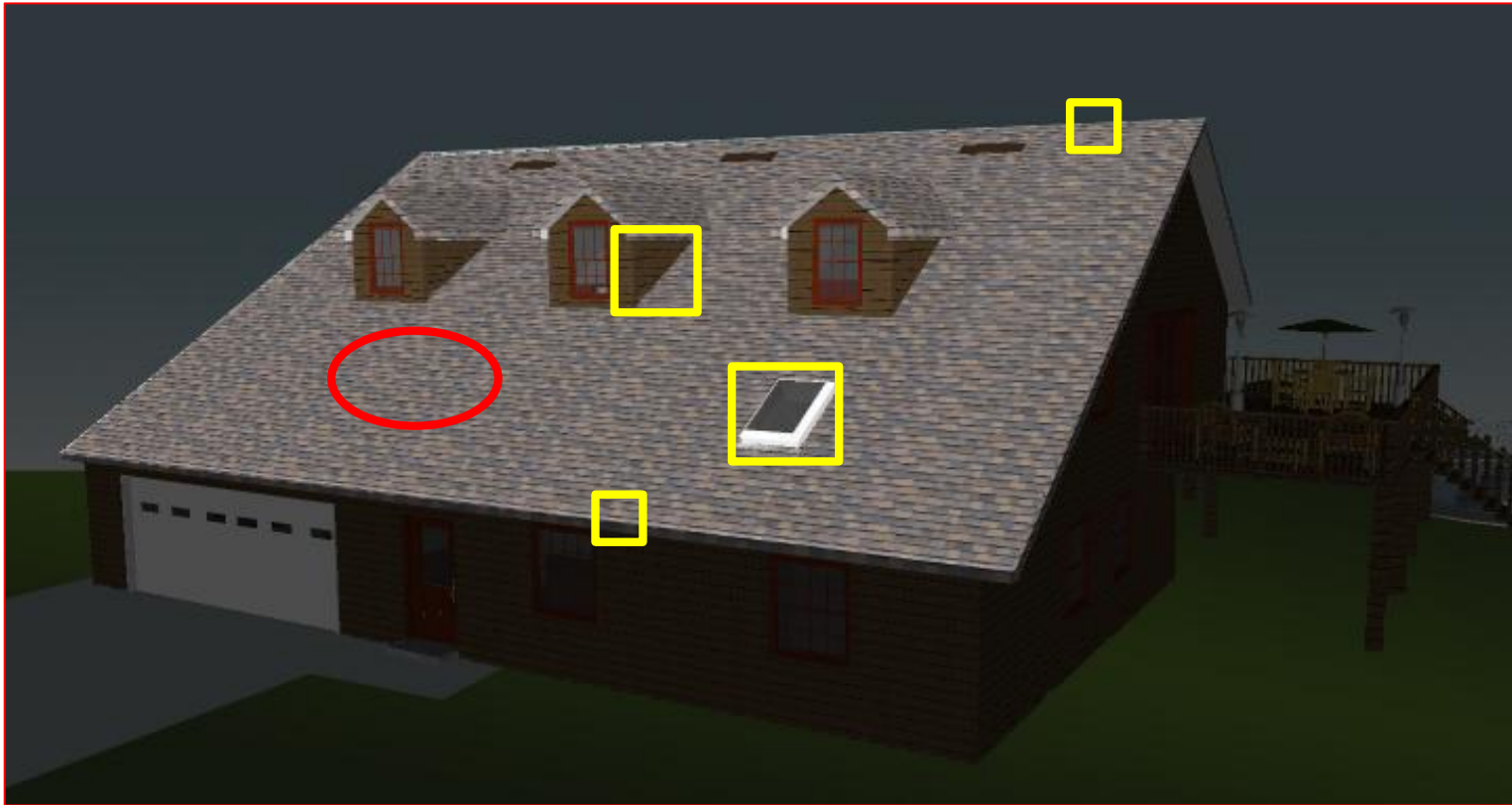
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Simulated embers exposure on a house

Roof (Priority #1)



Roof Edge





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Litter accumulation creates exposure to the wall unit (not protected with roofing).



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Plastic gutter vs metal gutter

Embers can ignite litter in rain gutters



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Roof - Skylights

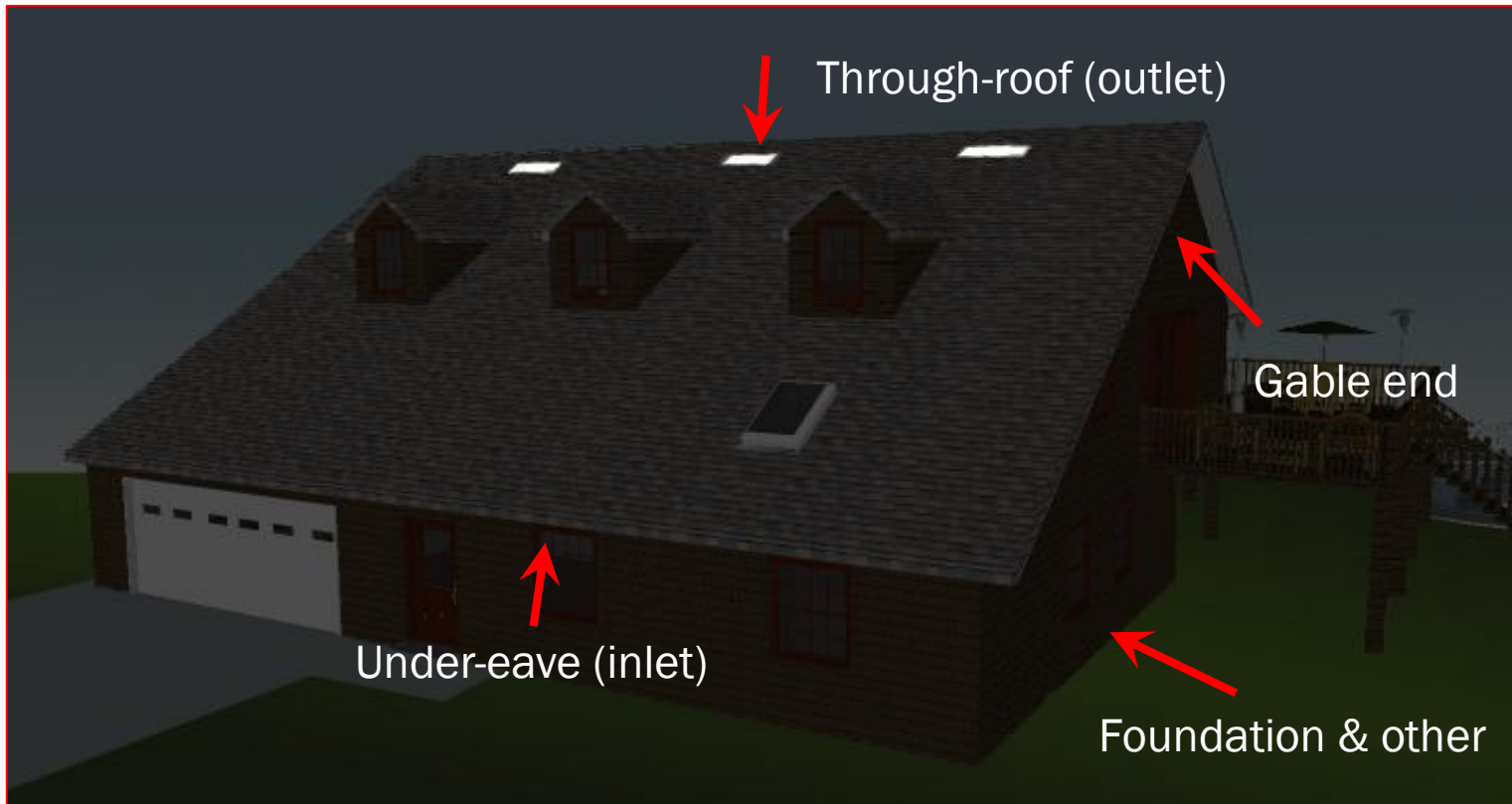


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Vents (Priority #2)

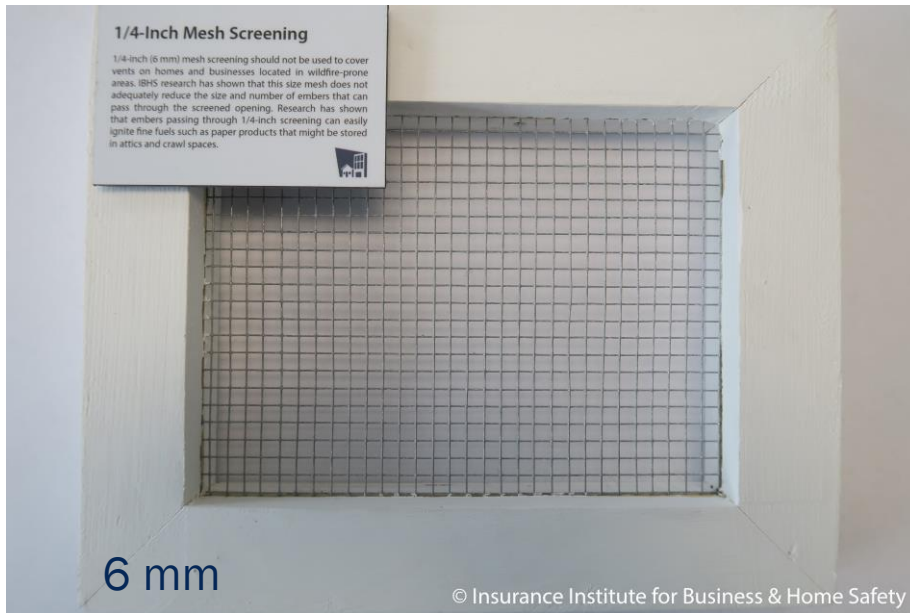


Vents – Ember Entry



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Vents – Mesh Size Use 1/8 inch or smaller



Vents – California's Chapter 7A



A = screening (embers) and intumescent honeycomb mesh (flame)
B = steel wool mesh (embers and flame); C = screening and baffles (embers and flame); D = screening and steel wool mesh (embers and flame)

Ridge vents – Vulnerable to debris accumulation

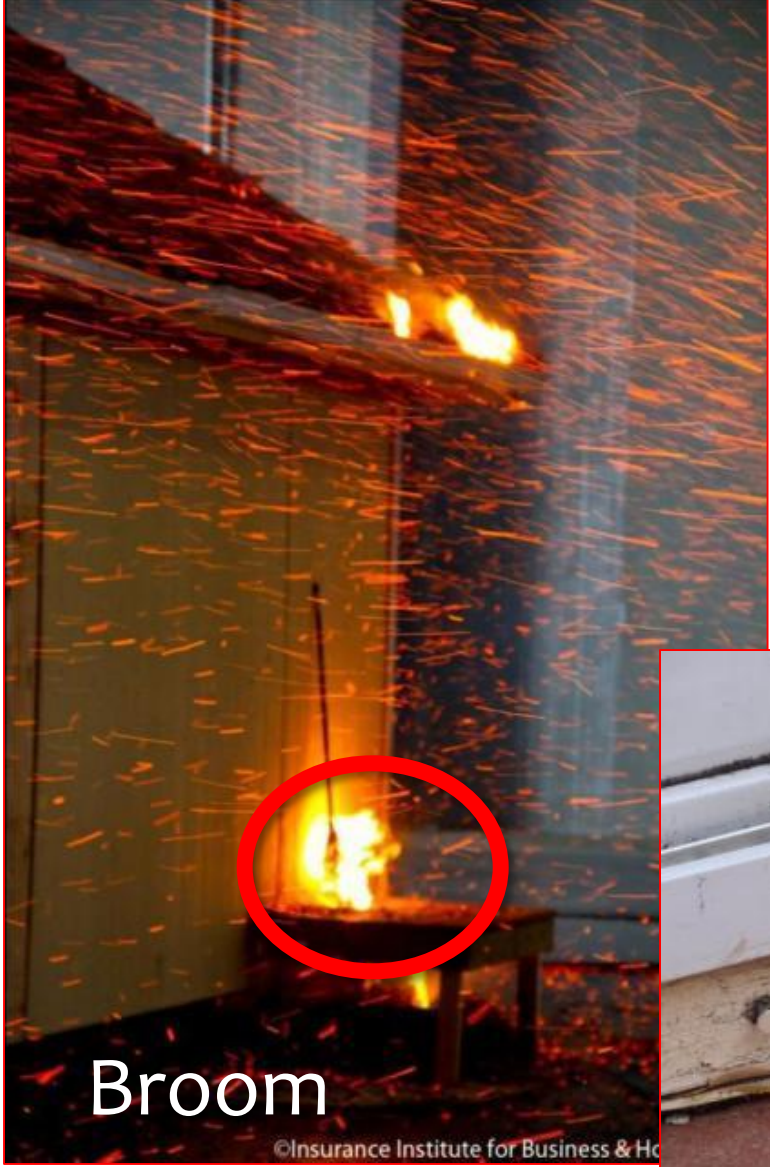


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Exterior Walls – Vertical non-combustible zone



**Best to have both
horizontal and
vertical non-
combustible zone**



Broom

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Firewood under a deck

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Stored building materials under a deck creates vulnerabilities

Fence Vulnerability



Fence to house

Coffee Park October 2017



Photo: Tom Welch

Fence: Guidance



A metal gate can help prevent spread to home via a fence ignition.

**A neighbor's house could
be in the 5-30 ft zone-
their condition can affect
your survival**



Recommendations

- 1. Roof:** install and maintain a Class A rated roof covering. Install a metal drip edge and address other edge of roof vulnerabilities
- 2. Vents:** upgrade to flame resistant and ember resistant
- 3. Non-combustible zone** should include the area 5' near the house, under the entire foot print of the deck, and 6-inches vertically upward from the ground to the start of your siding

- **CA Building Code Chapter 7A WUI construction:**
http://www.fire.ca.gov/fire_prevention/fire_prevention_wildland_codes
- <http://osfm.fire.ca.gov/codedevelopment/wildfireprotectionbuildingconstruction>
- **Home design, maintenance, and construction** can be more important than any individual fire resistant building product when addressing ember ignition. Poor installation and maintenance can increase the vulnerability of a given product to an ember exposure.
- **Good practices:** remove stored fuels, debris, clean gutters



Recommendations

- **Fire safe landscape** is possible that includes beauty, safety, privacy and saves water
- Selection and placement of vegetation is key, maintenance is essential
 - 0-5' (non-combustible materials only)
 - 5-30' (lean, green and clean)
 - 30-100' (reduced fuel zone)



For more information visit:

- <http://ucanr.edu/sites/forestry/Wildfire>
- http://disastersafety.org/wpcontent/uploads/2017/03/WF_California_IBHS.pdf
- <https://disastersafety.org/ibhs/ibhs-nfpa-wildfire-research-fact-sheets/>



UNIVERSITY OF CALIFORNIA
Division of Agriculture
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<http://anrcatalog.ucdavis.edu>

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Home Landscaping for Fire

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More than 1,445 structures are destroyed by wildfire each year just within the jurisdiction of California's Department of Forestry and Fire Protection (CAL FIRE). However, many homes are also saved as a result of the owners' careful pruning and landscaping techniques that minimize ignition of vegetation and spread of fire to their homes (CAL FIRE 2005).

Incorporating fire safe concepts into the residential landscape is one of the most important ways you can help your home survive a wildfire. When conditions are dry and windy, the grasses, brush, trees, or other vegetation surrounding your home become a dangerous fuel source. Creating an area of defensible space (or area of reduced fuel) between your home and flammable vegetation reduces the risk of home ignition. When the vegetation is removed, pruned, or otherwise modified, the chance that its ignition will pose a serious threat to your home during a wildfire diminishes. Your home may be the most valuable investment you ever make. If you live in a high-risk fire hazard area, protect against the chance of losing that investment by implementing the recommendations in this publication.

Creating an area of defensible space does not mean you need a ring of bare dirt around your home. Through proper planning, you can have both a beautiful landscape and a fire safe home. The general concept is that trees should be kept furthest from your house, shrubs can be closer, and bedding plants and lawns may be nearest the house.

VEGETATION ARRANGEMENT

From a wildfire fuel standpoint, vegetation is often described in terms of its vertical and horizontal arrangement. Sometimes the arrangement is described in terms of vertical or horizontal fuel continuity. Vertical fuel continuity is also referred to as 'ladder fuels' (Fig. 1).

Fire climbs neighboring trees like a ladder. To reduce the chance of fire climbing a tree, remove lower tree limbs 6 to 15 feet from the ground (or the lower third of branches on smaller trees).



Figure 1. Eliminate ladder fuels to minimize the movement of ground fire into the crown of a tree. Source: Riverside County Fire.



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<http://anrcatalog.ucdavis.edu> Publication 8393 | May 2010

Home Survival in Wildfire-Prone Areas: Building Materials and Design Considerations

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Introduction

Embers are the most important cause of home ignition. Recent research indicates that two out of every three homes destroyed during the 2007 Witch Creek fire in San Diego County were ignited either directly or indirectly by wind-dispersed, wildfire-generated, burning or glowing embers (Maranghides and Mell 2009) and not from the actual flames of the fire. These embers are capable of igniting and burning your home in several ways. In order to have a wildfire-safe home, two equally important factors must be implemented: 1) the wise selection of building materials and designs that will help the home resist the wildfire; and 2) the home must have adequate defensible space, based on the wise selection, placement, and maintenance of near-home vegetation.

There is a direct link between home survival, the vegetation management required in developing adequate defensible space around the home, and the building materials and design used to construct the home. The area where your vegetation should be managed (i.e., your defensible space) will depend on the particular topography and siting of the home on the property. Information included in this publication is focused on the home and is intended to provide information to help you make "fire wise" decisions regarding material choices and design decisions, whether you are building a new home or retrofitting your existing house. A considerable amount of information has been published in recent years on defensible space and vegetation management. Check with your local cooperative extension office or fire department for information appropriate to your area.

Ignition of Homes in Wildfire-Prone Areas

Wildfires spread by a combination of a moving fire front and airborne burning and glowing embers. Building loss during wildfires occurs as a result of some part of the building igniting from one or more of the three basic wildfire exposures, which include 1) embers (also called *firebrands*), 2) radiant heat, and 3) direct flame contact. Embers are light enough to be blown through the air, and can result in the rapid spread of wildfire by *spotting* (in which embers are blown ahead of the main fire, starting other fires). Should these embers land on or near your house, they could just as

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The Combustibility of Landscape Mulches

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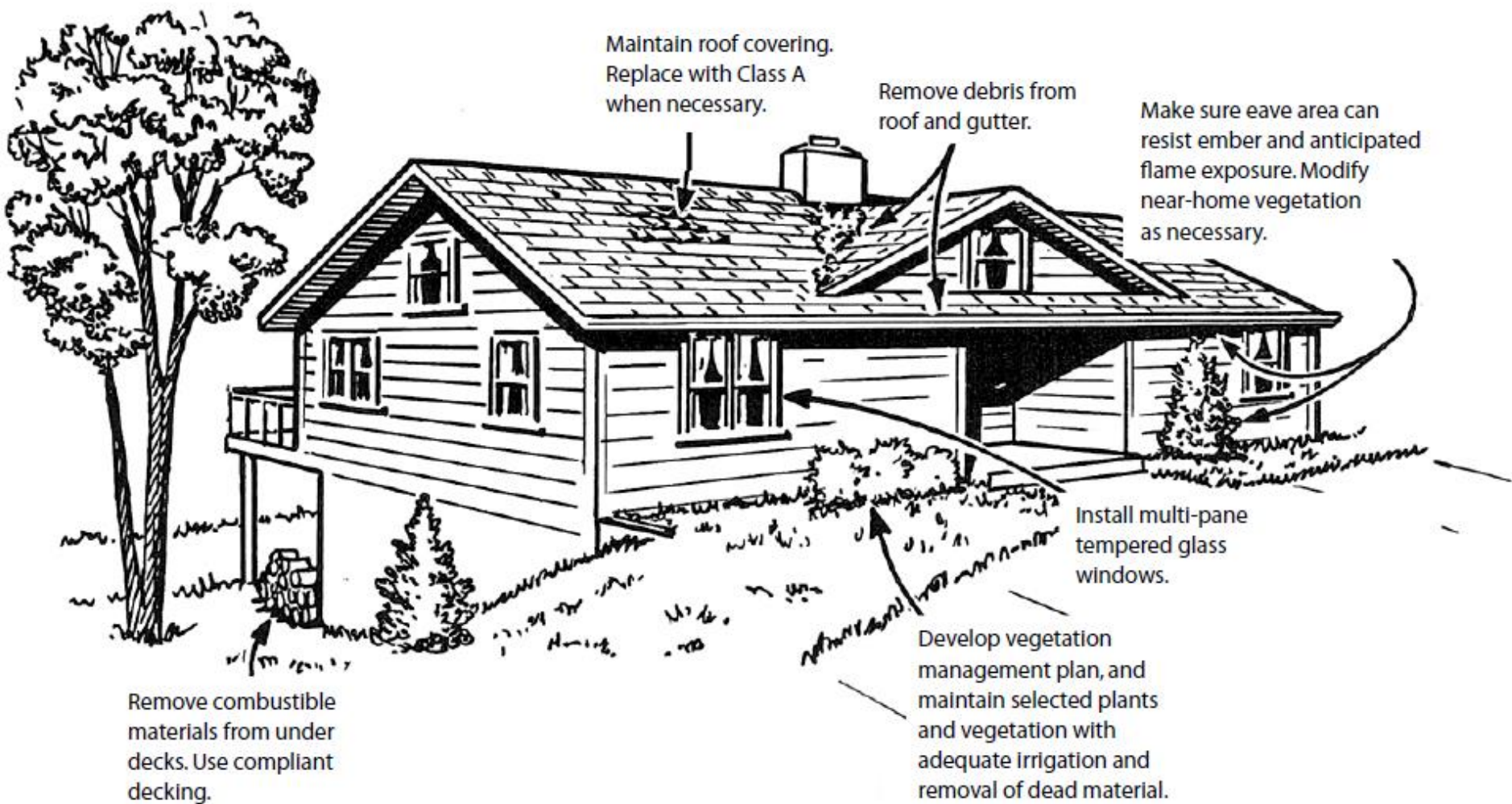


Figure 19. Important guidelines for creating and maintaining a home and landscape that can survive a wildfire threat.
Source: Stephen L. Quarles.