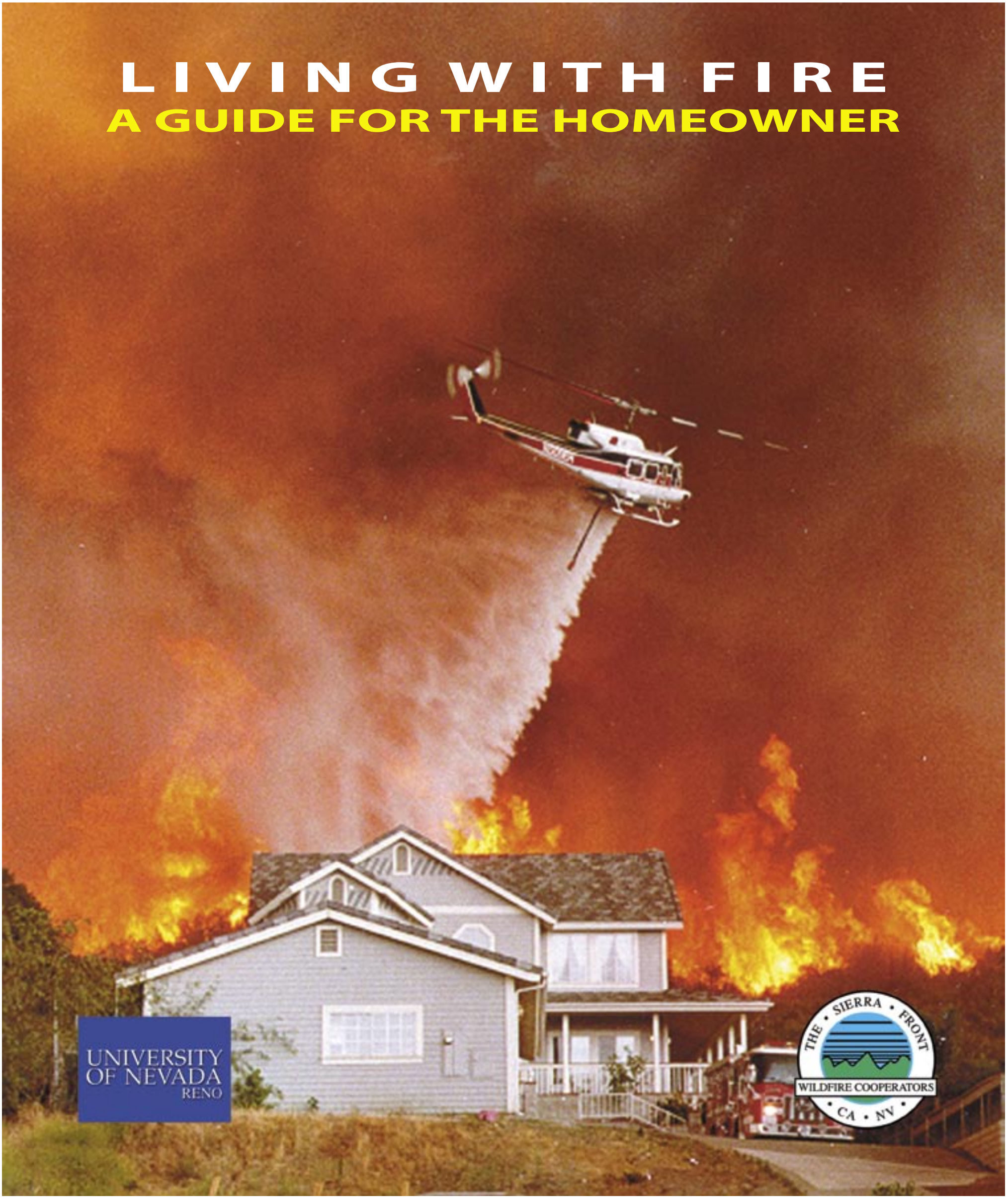
LIVING WITH FIRE

A GUIDE FOR THE HOMEOWNER



UNIVERSITY OF NEVADA RENO

THE SIERRA FRONT WILDFIRE COOPERATORS CA • NV

LIVING WITH FIRE

UNIVERSITY OF NEVADA, RENO AGRICULTURAL EXPERIMENT STATION AND COOPERATIVE EXTENSION • SIERRA FRONT WILDFIRE COOPERATORS

LIVING IN A HIGH HAZARD FIRE ENVIRONMENT

Much of western Nevada and eastern California is considered a high hazard fire environment. Based on past experience, this area possesses all the ingredients necessary to support large, intense, and uncontrollable wildfires.

Within this hazardous environment, there are individual houses, subdivisions, and entire communities. Many homes, however, would be unable to survive an intense wildfire. Since it is not a question of "if" wildfires will occur but "when," they will occur, the likelihood of human life and property loss is great and growing.

Our ability to live more safely in this fire environment greatly depends upon our use of "pre-fire activities." Pre-fire activities are actions taken before a wildfire occurs which improve the survivability of people and homes. They include proper vegetation management around the home (known as defensible space), use of fire resistant building materials, appropriate subdivision design, and other measures. Research clearly demonstrates that pre-fire activities save lives and property.

Last May, the University of Nevada, Reno (Cooperative Extension and Agricultural Experiment Station) and the Sierra Front Wildfire Cooperators initiated a program entitled Living With Fire. Its purpose is to facilitate widespread implementation of pre-fire activities throughout western Nevada and eastern California. This publication is an example of one of the products produced by the program.

The LivingWith Fire program will help us coexist more safely with the threat of wildfire. For more information concerning the Living with Fire program call Ed Smith, UNR Cooperative Extension at (775) 782-9960 or Ronna Hubbard, Sierra Front Wildfire Cooperators at (775) 885-6137.

The Sierra Front Wildfire Cooperators is a coalition of local, state and federal firefighting agencies from western Nevada and eastern California formed to promote the effective response to wildfire.

The pre-fire activities implemented by this homewowner included a green and well maintained landscape, reduction of wildland vegetation around the perimeter of the property, a fire resistant roof, and a good access road with a turnaround area. The charred surroundings of the home show that these pre-fire activities effectively protected

THE "WHY WE'RE WORRIED ABOUT WILDFIRE" EQUATION

Fire is a natural part of our environment. Our forests and rangelands were burning long before there was a Reno, Carson City, Truckee, or South Lake Tahoe.

+

Many homes are built and maintained in this fire environment without regard to wildfire.

+

With more people using our wildlands, there is a greater chance of fire starts.

+

Today's wildfires can burn intensely and be difficult to control.

=

Potential for:

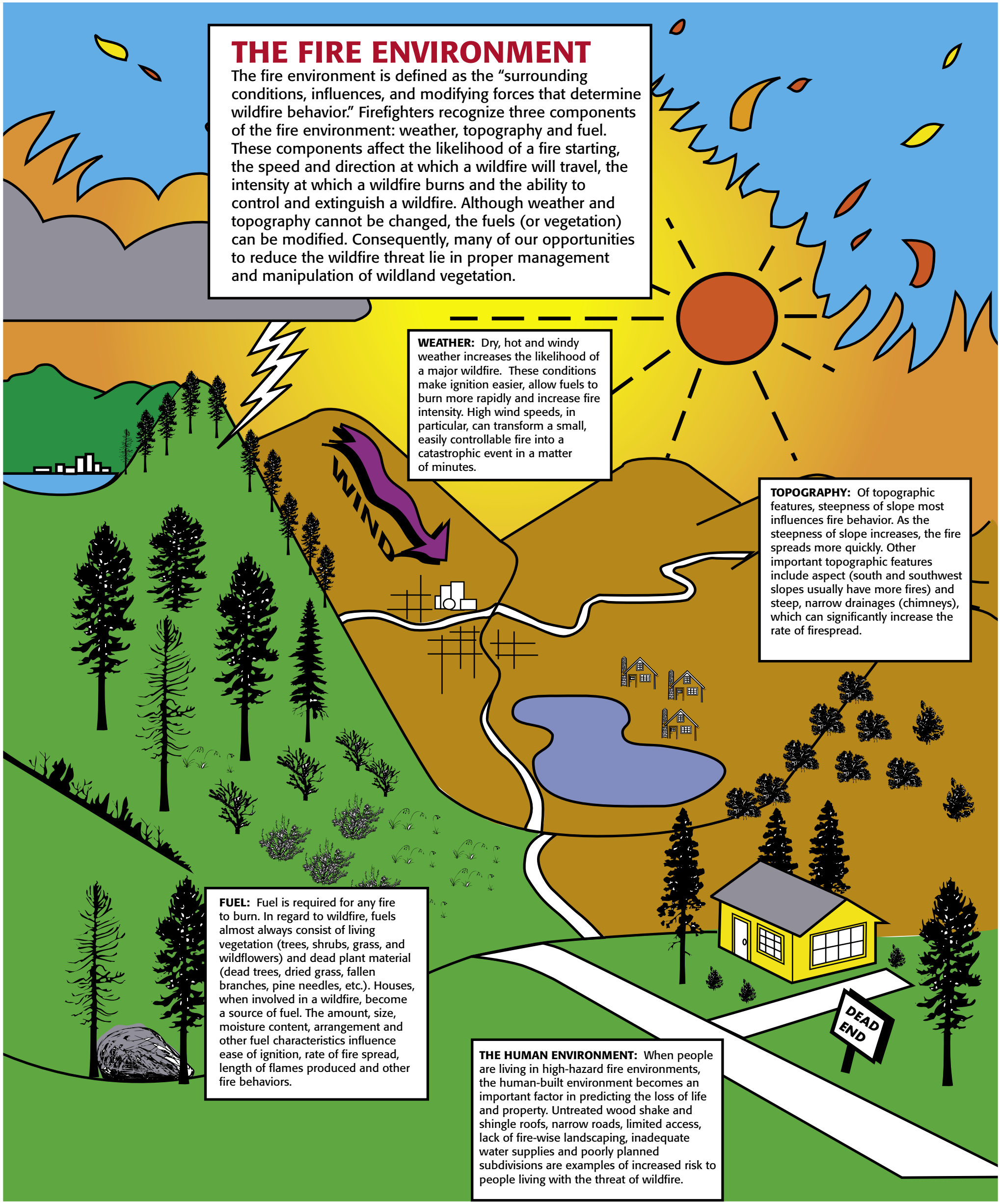
- **Greater loss of life**
- **Increased property losses**
- **More damage to natural resources**
- **More money needed for firefighting.**

Cover photograph courtesy of California Department of Forestry and Fire Protection.

THE FIRE ENVIRONMENT

The fire environment is defined as the "surrounding conditions, influences, and modifying forces that determine wildfire behavior." Firefighters recognize three components of the fire environment: weather, topography and fuel. These components affect the likelihood of a fire starting, the speed and direction at which a wildfire will travel, the intensity at which a wildfire burns and the ability to control and extinguish a wildfire. Although weather and topography cannot be changed, the fuels (or vegetation) can be modified. Consequently, many of our opportunities to reduce the wildfire threat lie in proper management and manipulation of wildland vegetation.

WEATHER: Dry, hot and windy weather increases the likelihood of a major wildfire. These conditions make ignition easier, allow fuels to burn more rapidly and increase fire intensity. High wind speeds, in particular, can transform a small, easily controllable fire into a catastrophic event in a matter of minutes.



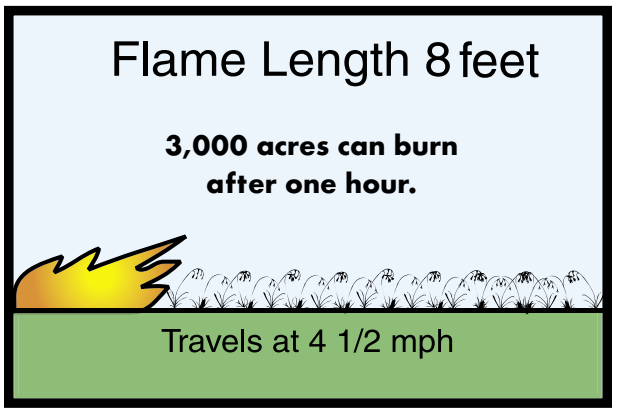
TOPOGRAPHY: Of topographic features, steepness of slope most influences fire behavior. As the steepness of slope increases, the fire spreads more quickly. Other important topographic features include aspect (south and southwest slopes usually have more fires) and steep, narrow drainages (chimneys), which can significantly increase the rate of firespread.

FUEL: Fuel is required for any fire to burn. In regard to wildfire, fuels almost always consist of living vegetation (trees, shrubs, grass, and wildflowers) and dead plant material (dead trees, dried grass, fallen branches, pine needles, etc.). Houses, when involved in a wildfire, become a source of fuel. The amount, size, moisture content, arrangement and other fuel characteristics influence ease of ignition, rate of fire spread, length of flames produced and other fire behaviors.

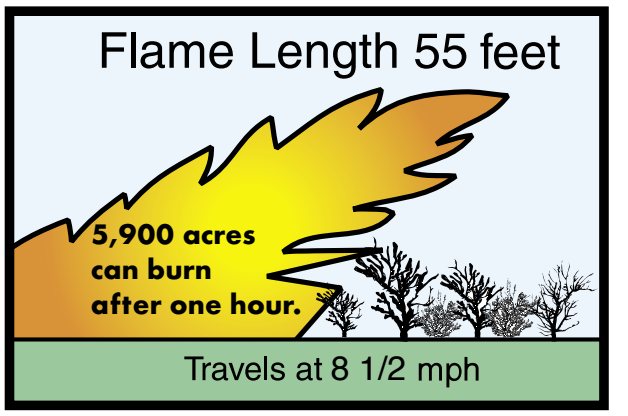
THE HUMAN ENVIRONMENT: When people are living in high-hazard fire environments, the human-built environment becomes an important factor in predicting the loss of life and property. Untreated wood shake and shingle roofs, narrow roads, limited access, lack of fire-wise landscaping, inadequate water supplies and poorly planned subdivisions are examples of increased risk to people living with the threat of wildfire.

EXAMPLES OF LOCAL FIRE BEHAVIOR*

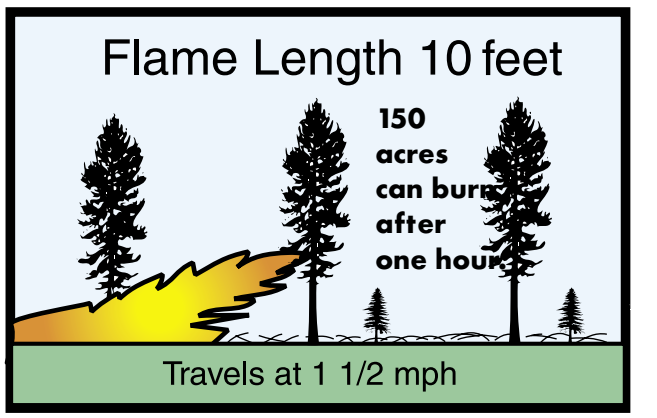
Presented below are five types of vegetation common to our region with computer generated estimates of how they would burn under certain conditions. These predications assume a wind speed of 20 mph, flat terrain, typical moisture contents of living and dead vegetation for summertime, and normal August weather for our area.



CHEATGRASS: Cheatgrass is an invasive annual grass that usually occupies areas formerly vegetated with big sagebrush. It can dominate old burned areas, abandoned pastures, and other disturbed areas.

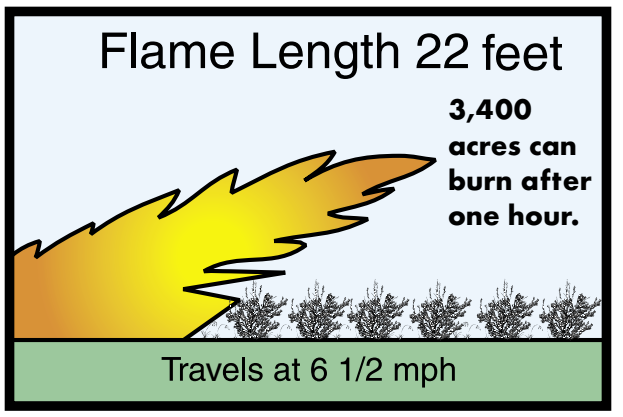


BIG SAGEBRUSH/BITTERBRUSH: This is a heavy brush type consisting of large big sagebrush, bitterbrush, and sometimes mountain mahogany. Usually large amounts of dead woody material are present. It is common along the Sierra Front at the lower edge of the pine forests on the west side of the valleys.

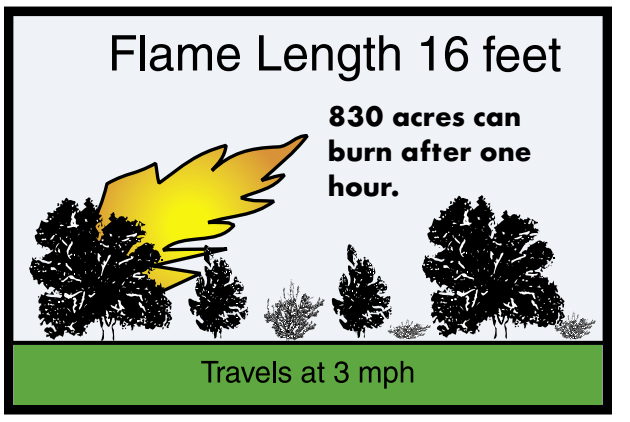


PINE FOREST: This type consists of Jeffrey and/or ponderosa pine, often interspersed with some white fir and other coniferous trees. Pine needles and some young white fir trees occupy the understory.

*Fire behavior estimates were prepared by John Swanson, USDA Forest Service.



BIG SAGEBRUSH: Big sagebrush is the dominant shrub in this type and there is an understory of cheatgrass, bunch grass, and wildflowers. This type is very common in the foothills surrounding the valleys.



PINYON-JUNIPER WOODLANDS: Pinyon pine and Utah juniper mixed with shrubs characterize this vegetation type. It covers the slopes of several mountain ranges east of the Sierra Nevada range.

Photograph courtesy of Ben Hammack.

When wildfire flame lengths exceed 11 feet, direct firefighting efforts are ineffective. Under these conditions firefighters use roads, streams, and other barriers to control the wildfire.

THE LIMITATIONS OF WILDLAND FIREFIGHTING

A lot of people assume that when a wildfire starts, it will be quickly controlled and extinguished. This is an accurate assumption 97% of the time. Firefighters have the ability, equipment, and technology to effectively suppress most wildfires. But 3% of the time wildfires burn so intensely that there is little firefighters can do. Presented at right are firefighter tactics as they relate to wildfire flame length. Compare this to the flame lengths shown in "Examples of Local Fire Behavior."

FLAME LENGTH	EFFECTIVE FIRE SUPPRESSION TACTICS*
Less than 4 feet	Fireline constructed with hand tools, such as shovels and axes, can be effective at the front of the fire.
4 to 8 feet	Bulldozers and other heavy equipment will be needed to construct an effective fireline. Where bulldozers are not available, fire engines with hoses and water will be required to "knock down" the flames before the fire crews with hand tools can be effective. Or fire crews must construct a fireline at a considerable distance from the fire.
8 to 11 feet	Airtankers with fire suppressing retardant or helicopters with water are required to reduce the fire's rate of spread before fireline construction by crews or bulldozers can be effective.
More than 11 feet	Direct fire suppression efforts will be ineffective. Retreat to existing roads, streams and other barriers. Burn out vegetation between the fireline and the advancing fire front to eliminate wildfire fuels.

*Adapted from information provided by John Swanson, USDA Forest Service.

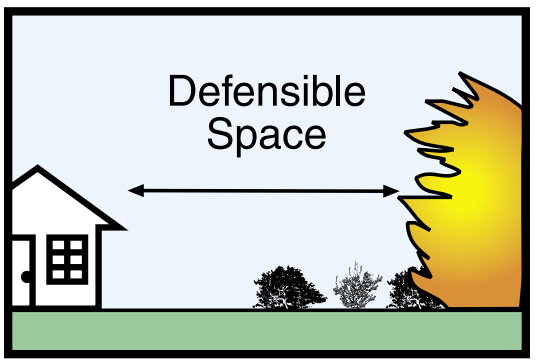
FREQUENTLY ASKED QUESTIONS ABOUT DEFENSIBLE SPACE

Photograph courtesy of Ben Hammack.

More and more homes are being built in high fire hazard environments.

In the 1980's, the term "defensible space" was coined to describe vegetation management practices aimed at reducing the wildfire threat to homes. This article responds to some of the commonly asked questions about defensible space.

WHAT IS DEFENSIBLE SPACE?
Defensible space is the area between a house and an oncoming wildfire where the vegetation has been modified to reduce the wildfire threat and to provide an opportunity for firefighters to effectively defend the house. Sometimes, a defensible space is simply a homeowner's properly maintained backyard.



WHAT IS THE RELATIONSHIP BETWEEN VEGETATION AND WILDFIRE THREAT?
Many people do not view the plants growing on their property as a threat. But in terms of wildfire, the vegetation adjacent to their homes can have considerable influence upon the survivability of their houses. All vegetation, including plants native to the area as well as ornamental plants, is potential wildfire fuel. If vegetation is properly modified and maintained, a wildfire can be slowed, the length of flames shortened, and the amount of heat reduced, all of which assist firefighters to defend the home against an oncoming wildfire.

THE FIRE DEPARTMENT IS SUPPOSED TO PROTECT MY HOUSE, SO WHY BOTHER WITH DEFENSIBLE SPACE?
Some individuals incorrectly assume that a fire engine will be parked in their driveway and firefighters will be actively defending their homes if a wildfire approaches. During a major wildfire, it is unlikely there will be enough firefighting resources available to defend every home. In these instances, firefighters will likely select homes they can most safely and effectively protect. Even with adequate resources, some wildfires may be so intense that there may be little firefighters can do to prevent a house from burning. The key is to reduce fire intensity as wildfire nears the house. This can be accomplished by reducing the amount of flammable vegetation surrounding a home. Consequently, the most important person in protecting a house from wildfire is not a firefighter, but the property owner. And it's the action taken by the owner **before** the wildfire occurs (such as proper landscaping) that is most critical.

DOES DEFENSIBLE SPACE REQUIRE A LOT OF BARE GROUND IN MY LANDSCAPE?
No. Unfortunately, many people have this misconception. While bare ground is certainly effective in reducing the wildfire threat, it is unnecessary and unacceptable due to appearance, soil erosion, and other reasons. Many homes have attractive, well vegetated landscapes that also serve as effective defensible space.

DOES CREATING A DEFENSIBLE SPACE REQUIRE ANY SPECIAL SKILLS OR EQUIPMENT?
No. For the most part, creating a defensible space employs routine gardening and landscape maintenance practices such as pruning, mowing, weeding, plant removal, appropriate plant selection, and irrigation. Equipment needed includes of common tools like a chain saw, pruning saw, pruning shears, loppers, weed-eater, shovel, and a rake. A chipper, compost bin, or a large rented trash dumpster may be useful in disposing of unwanted plant material.

HOW BIG IS AN EFFECTIVE DEFENSIBLE SPACE?
Defensible space size is not the same for everyone, but varies by slope and type of wildland vegetation growing near the house. See the article entitled "Creating An Effective Defensible Space" for specific information.

Photo courtesy of Dave Hill

DOES DEFENSIBLE SPACE MAKE A DIFFERENCE?
Yes. Investigations of homes threatened by wildfire indicate that houses with an effective defensible space are much more likely to survive a wildfire. Furthermore, homes with both an effective defensible space and a nonflammable roof (composition shingles, tile, metal, etc.) are many times more likely to survive a wildfire than those without defensible space and flammable roofs (wood shakes or shingles). These conditions give firefighters the opportunity to effectively and safely defend the home.

DOES HAVING A DEFENSIBLE SPACE GUARANTEE MY HOUSE WILL SURVIVE A WILDFIRE?
No. Under extreme conditions, almost any house can burn. But having a defensible space will significantly improve the odds of your home surviving a wildfire.

WHY DOESN'T EVERYONE LIVING IN A HIGH WILDFIRE HAZARD AREA CREATE A DEFENSIBLE SPACE?
The specific reasons for not creating a defensible space are varied. Some individuals believe "it won't happen to me". Others think the costs (time, money, effort, loss of privacy, etc.) outweigh the benefits. Some fail to implement defensible space practices simply because of lack of knowledge or misconceptions.

HOW DO I CHANGE THE VEGETATION ON MY PROPERTY TO REDUCE THE WILDFIRE THREAT?

The objective of defensible space is to reduce the wildfire threat to a home by changing the characteristics of the adjacent vegetation. Defensible space practices include:

- increasing the moisture content of vegetation.
- decreasing the amount of flammable vegetation.
- shortening plant height.
- altering the arrangement of plants.

This is accomplished through the "Three R's of Defensible Space." The article "Creating An Effective Defensible Space" provides detailed information about changing vegetation characteristics for defensible space.

THE THREE R's OF DEFENSIBLE SPACE

Removal	This technique involves the elimination of entire plants, particularly trees and shrubs, from the site. Examples of removal are cutting down a dead tree or cutting out a flammable shrub.
Reduction	The removal of plant parts, such as branches or leaves, constitute reduction. Examples of reduction are pruning dead wood from a shrub, removing low tree branches, and mowing dried grass.
Replacement	Replacement is substituting less flammable plants for more hazardous vegetation. Removal of a dense stand of flammable shrubs and planting an irrigated, well maintained flower bed is an example of replacement.

CREATING AN EFFECTIVE DEFENSIBLE SPACE*

...A Step-by-Step Guide

Are you worried about the wildfire threat to your home, but aren't sure how to get started in making your home defensible? Follow these six steps to an effective defensible space...

STEP ONE: HOW BIG IS AN EFFECTIVE DEFENSIBLE SPACE?

The size of the defensible space area is usually expressed as a distance extending outward from the sides of the house. This distance varies by the type of wildland vegetation growing near the house and the steepness of the terrain.

On the "Recommended Defensible Space Distance" chart presented below, find the vegetation type and percent slope (see "Homeowners Guide to Calculating Percent Slope") which best describes the area where your house is located. Then find the recommended defensible space distance for your situation.

For example, if your property is surrounded by wildland grasses such as cheatgrass, and is located on flat land, your recommended defensible space distance would extend 30 feet from the sides of the house. If your house is on a 25% slope and the adjacent wildland vegetation is dense tall brush, your recommended defensible space distance would be 200 feet.

If the recommended distance goes beyond your property boundaries, contact the adjacent property owner and work cooperatively on creating a defensible space. The effectiveness of defensible space increases when multiple property owners work together. The local assessor's office can provide assistance if the owners of adjacent properties are unknown. Do not work on someone else's property without their permission.

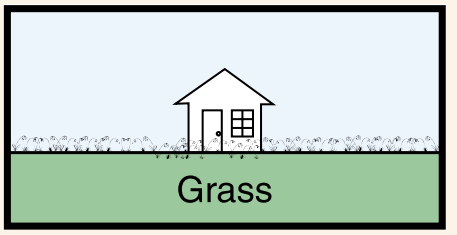
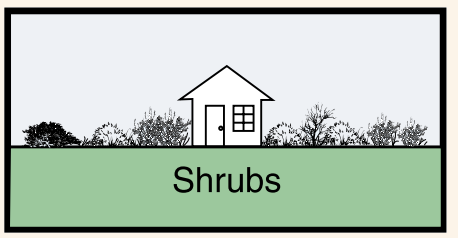
Temporarily mark the recommended distance with flagging or strips of cloth tied to shrubs, trees, or stakes around your home. This will be your defensible space area.

STEP TWO: IS THERE ANY DEAD VEGETATION WITHIN THE RECOMMENDED DEFENSIBLE SPACE AREA?

Dead vegetation includes dead trees and shrubs, dead branches lying on the ground or still attached to living plants, dried grass, flowers and weeds, dropped leaves and needles, and firewood stacks. In most instances, dead vegetation should be removed from the recommended defensible space area. A description of the types of dead vegetation you're

DEFENSIBLE SPACE

RECOMMENDED DISTANCES—STEEPNESS OF SLOPE

VEGETATION TYPE	Flat to Gently Sloping 0 to 20%	Moderately Steep 21% to 40%	Very Steep +40%
 Grass Wildland grasses (such as cheatgrass), weeds, and widely scattered shrubs with grass understory.	30feet	100feet	100feet
 Shrubs Includes shrub dominant areas (such as sagebrush, bitterbrush, manzanita) and pinyon-juniper.	100feet	200feet	200feet
Trees Includes forested areas. If substantial grass or shrub understory is present, use those values shown above.	30feet	100feet	200feet

1) **Find the percent slope which best describes your property.**
2) **Find the type of vegetation which best describes the wildland plants growing on or near your property.**
3) **Locate the number in feet corresponding to your slope and vegetation. This is your recommended defensible space distance.**

***Please note the recommendations presented in this article are suggestions made by local firefighters experienced in protecting homes from wildfire. They are not requirements nor do they take precedence over local ordinances.**

STEP THREE: IS THERE A CONTINUOUS DENSE COVER OF SHRUBS OR TREES PRESENT WITHIN THE RECOMMENDED DEFENSIBLE SPACE AREA?

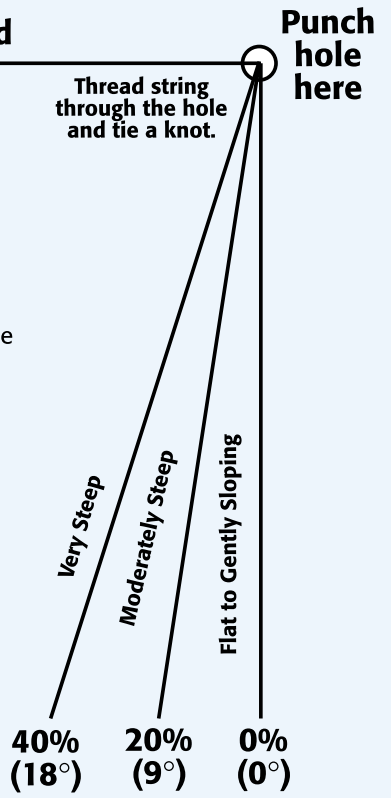
Sometimes wildland plants can occur as an uninterrupted layer of vegetation as opposed to being patchy or widely spaced individual plants. The more continuous and dense the vegetation, the greater the wildfire threat. If this situation is present within your defensible space area, you should "break-it-up" by providing a separation between plants or small groups of plants.

Not only are steep slopes often considered high wildfire areas, they are also highly erodable. When removing shrubs and trees from steep slopes, keep soil disturbance to a minimum. Also, it may be necessary to replace flammable vegetation with other plant materials to prevent excessive soil erosion.

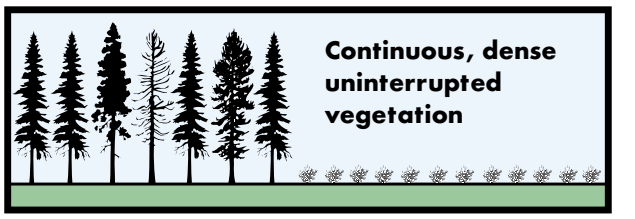
Homeowner's Guide to Calculating Percent Slope

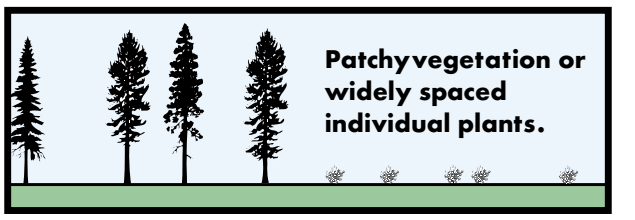
INSTRUCTIONS:

1. Enlarge this diagram using a photocopying machine.
2. Mount photocopy on a piece of cardboard.
3. Punch a hole through photocopy and cardboard at the designated spot.
4. Thread a 12 inch piece of string through the the hole and tie a knot in the end of the string on the backside of the cardboard.
5. Tie a one inch or larger washer to weight the other end of the string.
6. Hold the designated line parallel to the ground, sighting up slope along the edge of the cardboard.
7. The weighted string will indicate the percent of slope steepness. For convenience, steepness of slope in degrees is presented in parenthesis.



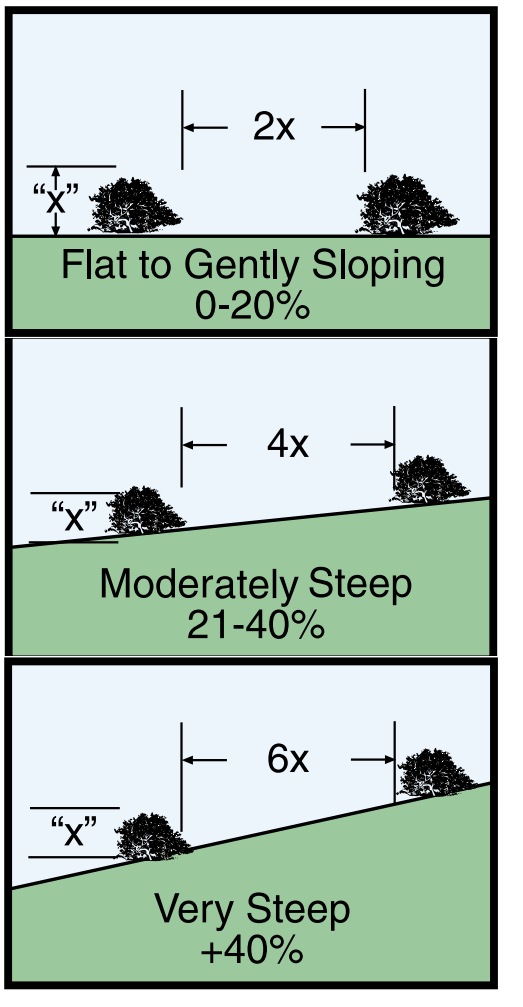
TYPES OF DEAD VEGETATION AND RECOMMENDED PRACTICE	
DEAD FUEL TYPE	**RECOMMENDED PRACTICE**
STANDING DEAD TREE	Remove all standing dead trees from within the defensible space area.
DOWN DEAD TREE	Remove all down dead trees within the defensible space area if they have recently fallen and are not yet embedded into the ground. Downed trees that are embedded into soil and which cannot be removed without soil disturbance should be left in place. Remove all exposed branches from an embedded downed dead tree.
DEAD SHRUBS	Remove all dead shrubs from within the defensible space area.
DRIED GRASSES AND WILDFLOWERS	Once grasses and wildflowers have dried out or "cured," cut down and remove from the defensible space area.
DEAD NEEDLES, LEAVES, BRANCHES, CONES (ON THE GROUND)	Reduce thick layers of pine needles to a depth of two inches. Do not remove all needles. Take care not to disturb the "duff" layer (dark area at the ground surface where needles are decomposing) if present. Remove dead leaves, twigs, cones, and branches.
DEAD NEEDLES, LEAVES, BRANCHES, AND TWIGS (OTHER THAN ON THE GROUND)	Remove all dead leaves, branches, twigs, and needles still attached to living trees and shrubs to height of 15 feet above ground. Remove all debris that accumulates on the roof and in rain gutters on a routine basis (at least once annually).
FIREWOOD AND OTHER COMBUSTIBLE DEBRIS	Locate firewood and other combustible debris (wood scraps, grass clippings, leaf piles, etc.) at least 30 feet uphill from the house.





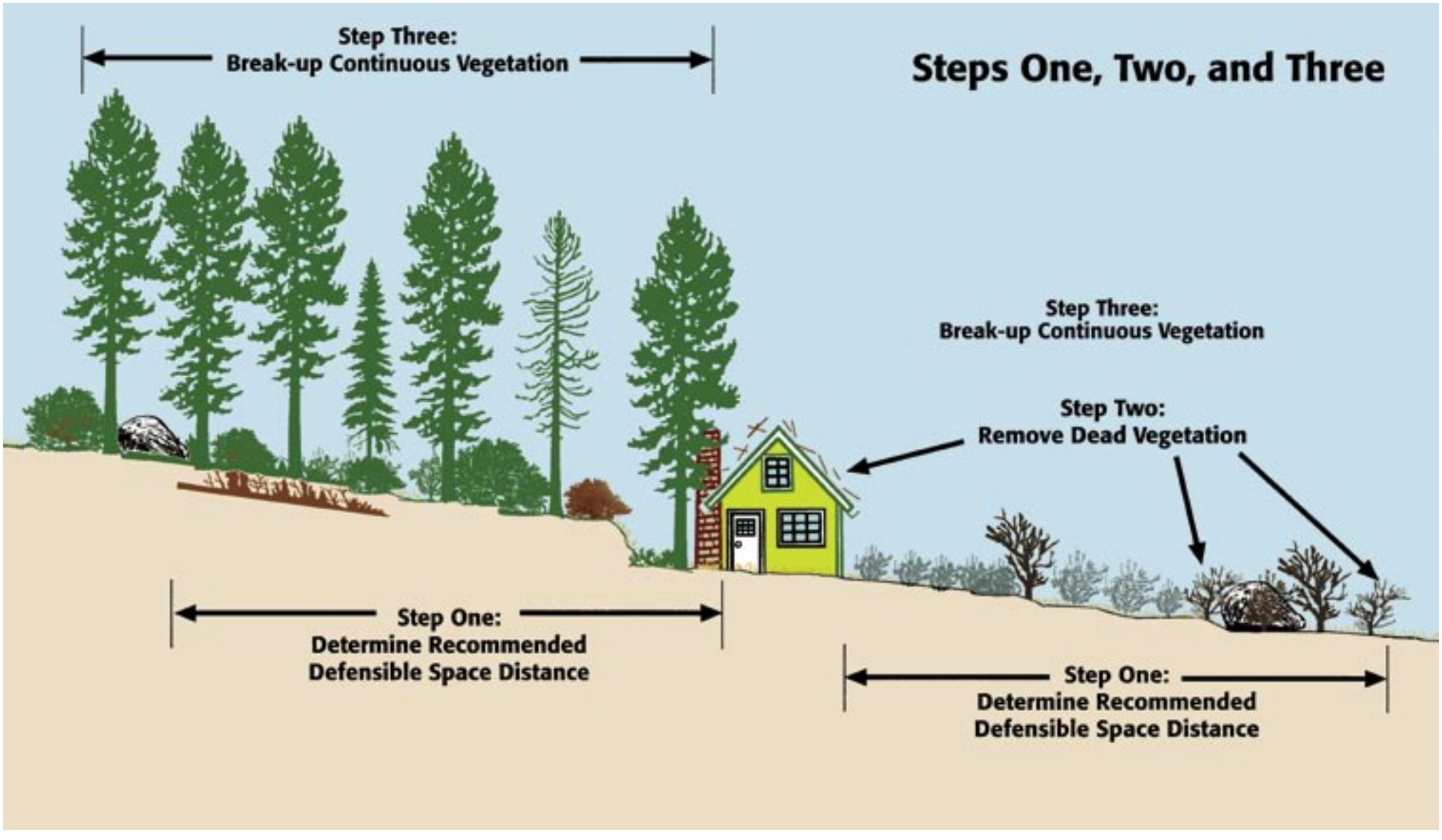
Recommended Separation Distances for Shrubs, Pinyon and Juniper

For areas with dense brush or thick pinyon and juniper trees, the recommended separation distance is dependant upon shrub height and steepness of slope. Specific recommendations are presented below.

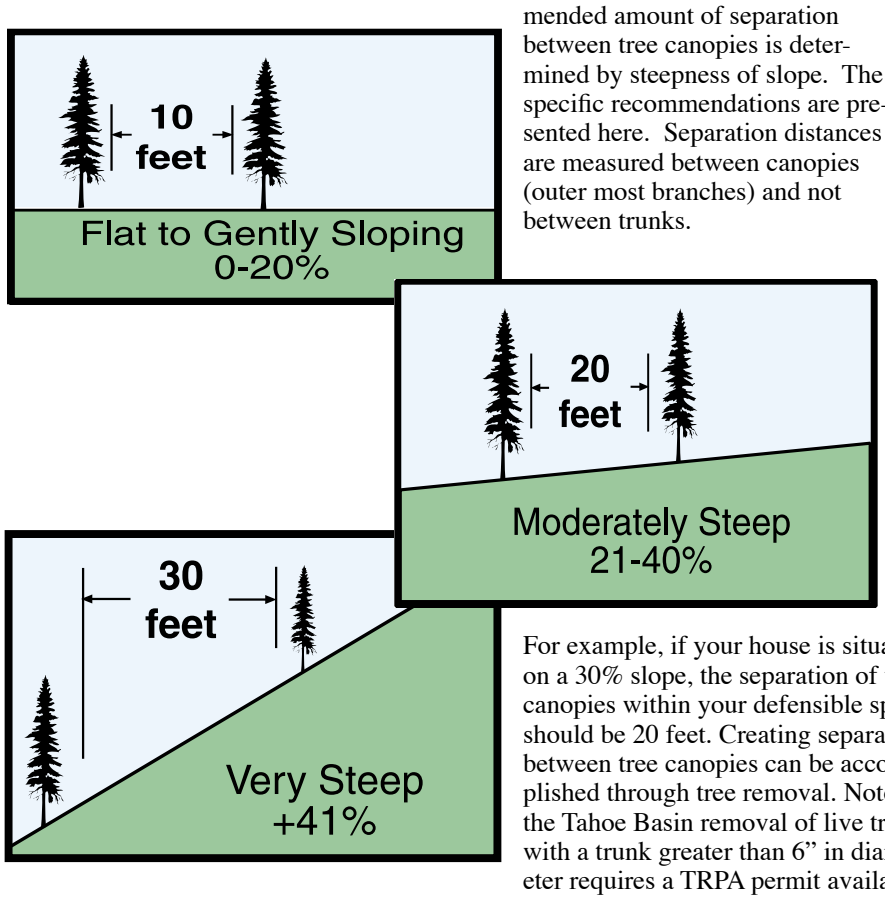


Note: Separation distances are measured between canopies (outermost branches) and not between trunks.

For example, if your home is located on a 10% slope and the brush is four feet tall, the separation distance would be two times the shrub height or eight feet. The recommended separation distance can be accomplished by removing plants or through pruning that reduces the diameter or height of shrubs (shorter height means less separation is needed). Removal works best for sagebrush. For shrubs which readily resprout, such as greenleaf manzanita and snowbrush, pruning to reduce height may be the best approach.



Recommended Separation Distances Between Tree Canopies



For forested areas, the recommended amount of separation between tree canopies is determined by steepness of slope. The specific recommendations are presented here. Separation distances are measured between canopies (outer most branches) and not between trunks.

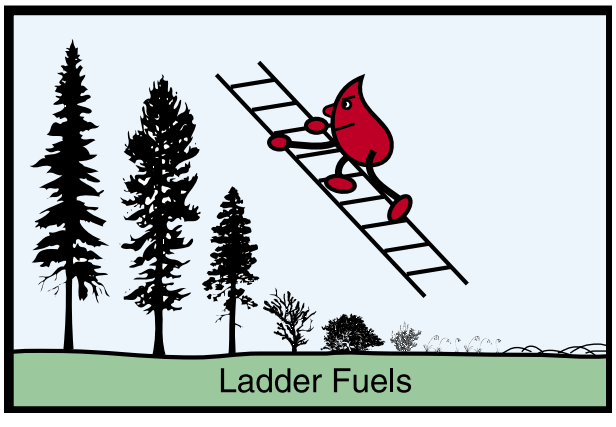
For example, if your house is situated on a 30% slope, the separation of tree canopies within your defensible space should be 20 feet. Creating separation between tree canopies can be accomplished through tree removal. Note: In the Tahoe Basin removal of live trees with a trunk greater than 6" in diameter requires a TRPA permit available through Nevada Division of Forestry or California Department of Forestry and Fire Protection.

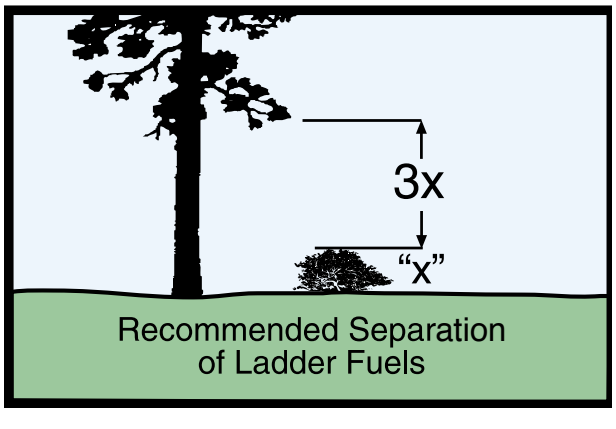
STEP FOUR: ARE THERE LADDER FUELS PRESENT WITHIN THE RECOMMENDED DEFENSIBLE SPACE AREA?

Vegetation is often present at varying heights, similar to the rungs of a ladder. Under these conditions, flames from fuels burning at ground level, such as a thick layer of pine needles, can be carried to shrubs which can ignite still higher fuels like tree branches. Vegetation that allows a fire to move from lower growing plants to taller ones is referred to as "ladder fuel." The ladder fuel problem can be corrected by providing a separation between the vegetation layers.

Within the defensible space area, a vertical separation of three times the height of the lower fuel layer is recommended.

For example, if a shrub growing adjacent to a large pine tree is three feet tall, the recommended separation distance would be nine feet. This could be accomplished by removing the lower tree branches, reducing the height of the shrub, or both. The shrub could also be removed.





STEP FIVE: IS THERE AN AREA AT LEAST 30 FEET WIDE SURROUNDING YOUR HOUSE THAT IS "LEAN, CLEAN, AND GREEN"?

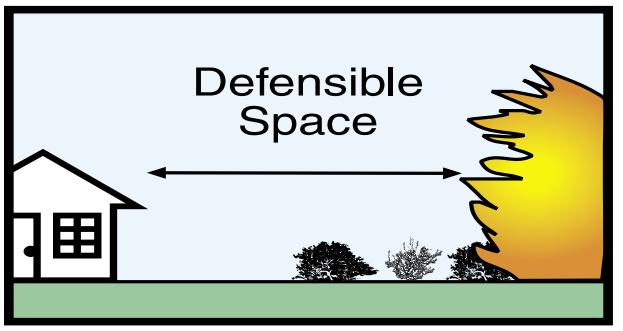
The area immediately adjacent to your house is particularly important in terms of an effective defensible space. It is also the area that is usually landscaped. Within an area extending **at least** 30 feet from the house, the vegetation should be kept....

- Lean—small amounts of flammable vegetation,
- Clean—no accumulation of dead vegetation or other flammable debris, and
- Green—plants are healthy and green during the fire season.

The "Lean, Clean, and Green Zone Checklist" will help you evaluate the area immediately adjacent to your house.

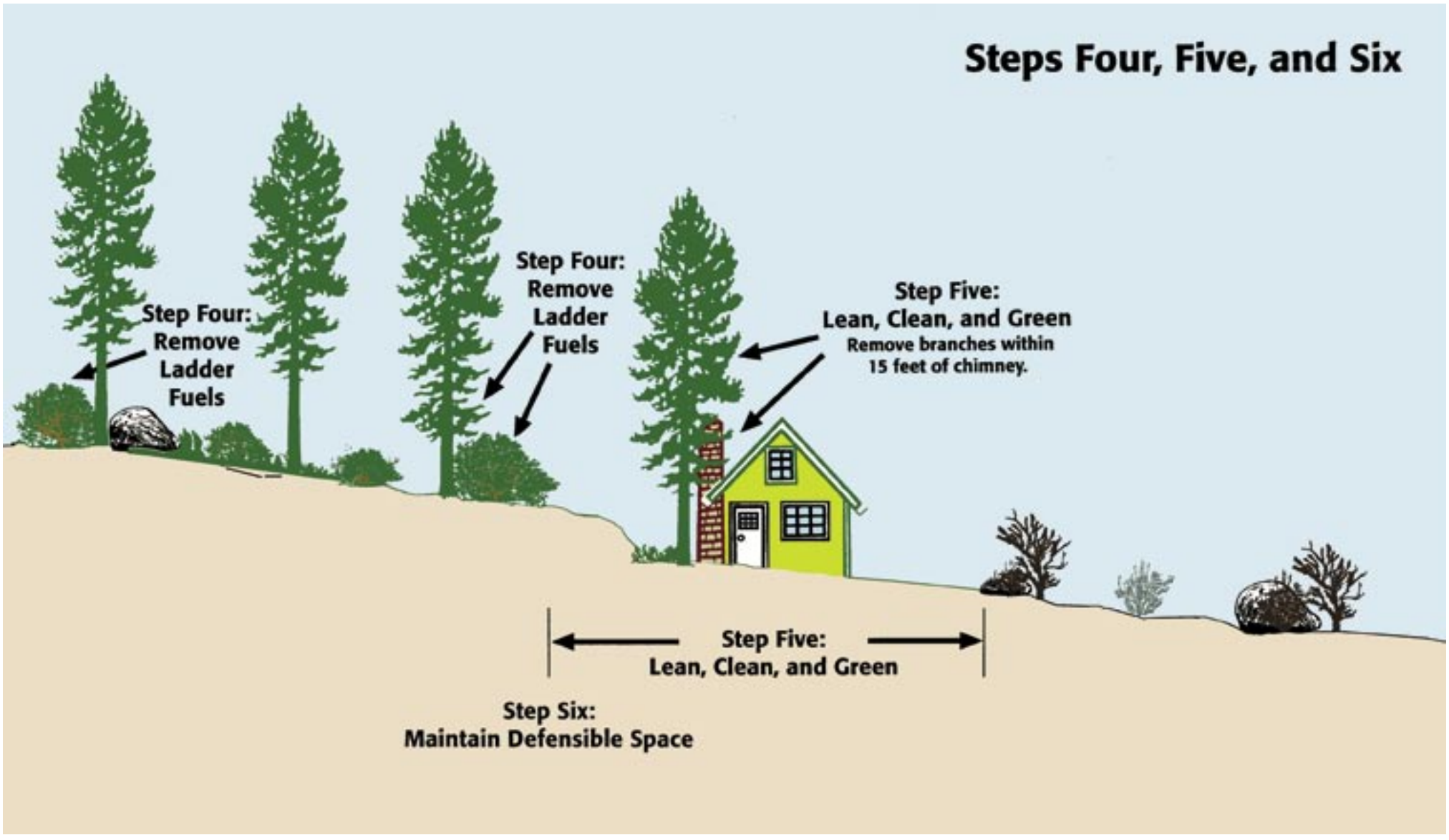
STEP SIX: IS THE VEGETATION WITHIN THE RECOMMENDED DEFENSIBLE SPACE AREA MAINTAINED ON A REGULAR BASIS?

Keeping your defensible space effective is a continual process. At least annually, review these defensible space steps and take action accordingly. An effective defensible space can be quickly diminished through neglect.



THE LEAN, CLEAN, AND GREEN CHECKLIST

- ✔ Emphasize the use of low growing herbaceous (non-woody) plants that are kept green during the fire season through irrigation if necessary. Herbaceous plants include lawn, clover, a variety of groundcovers, bedding plants, bulbs, perennial flowers, and conservation grasses.
- ✔ Emphasize use of mulches, rock, and non-combustible hard surfaces (concrete sidewalks, brick patios, and asphalt driveways). Note: In the Tahoe Basin, land coverage standards may apply and TRPA permits may be required.
- ✔ Deciduous ornamental trees and shrubs are acceptable if they are kept green and free of dead plant material, ladder fuels are removed, and individual plants or groups of plants are arranged so that adjacent wildland vegetation cannot convey a fire through them to the structure. Shorter deciduous shrubs are preferred.
- ✔ Minimize the use of ornamental coniferous shrubs and trees (such as juniper, arborvitae, and mugo pine) and tall exotic grasses (such as pampas grass).
- ✔ Where permitted, most wildland shrubs and trees should be removed from this zone and replaced with more desirable alternatives (see first box). Individual specimens or small groups of wildland shrubs and trees can be retained so long as they are kept healthy and free of dead wood, are pruned to reduce the amount of fuel and height, and ladder fuels are removed.
- ✔ For some areas substantial removal of wildland vegetation may not be allowed. In these instances, wildland vegetation should conform to the recommendations presented in steps 2 through 4. Please become familiar with local requirements before removal of wildland vegetation.
- ✔ Tree limbs within 15 feet of a chimney, encroaching on powerlines, or touching the house should be removed.



FIRESCAPE — FIRE SAFE LANDSCAPE DESIGN

"When a wildfire comes through your neighborhood, could your house survive on its own?" A dramatic question, but one we need to consider when living in an environment where wildfire is a common occurrence. Firescaping is landscape design that reduces house and property vulnerability to wildfire. The goal is to develop a landscape with a design and choice of plants that offers the best fire protection and enhances the property. The ideal is to surround the house with things that are less likely to burn. It is imperative when building homes in wildfire-prone areas that fire safety be a major factor in landscape design. Appropriate manipulation of the landscape can make a significant contribution toward wildfire survival.

Firescape integrates traditional landscape functions and a design that reduces the threat from wildfire. It does not need to look much different than a traditional design. In addition to meeting a homeowner's aesthetic desires and functional needs such as entertaining, playing, storage and erosion control — firescape also includes vegetation modification techniques, planting for fire safety, defensible space principles and use of fire safety zones.

Through proper plant selection, placement and maintenance, we can diminish the possibility of ignition, lower fire intensity, and reduce how quickly a fire spreads, increasing a home's survivability.

In firescaping, plant selection is primarily determined by a plant's ability to reduce the wildfire threat. Other considerations may be important such as appearance, ability to hold the soil in place, and wildlife habitat value. The traditional foundation planting of junipers is not a viable solution in a firescape design. Minimize use of evergreen shrubs and trees within 30 feet of a structure, because junipers, other conifers and broadleaf evergreens contain oils, resins and waxes that make these plants burn with great intensity. Use ornamental grasses and berries sparingly because they also can be highly flammable. Choose "fire smart" plants. These are plants with a high moisture content. They are low growing. Their stems and leaves are not resinous, oily or waxy. Deciduous trees are generally more fire resistant than evergreens because they have a higher moisture content when in leaf, but a lower fuel volume when dormant.

Placement and maintenance of trees and shrubs is as important as actual plant selection. When planning tree placement in the landscape, remember their size at maturity. Keep tree limbs at least 15 feet from chimneys, power lines and structures. Specimen trees can be used near a structure if pruned properly and well irrigated.

Firescape design uses driveways, lawns, walkways, patios, parking areas, areas with inorganic mulches, and fences constructed of nonflammable materials such as rock, brick, or cement to reduce fuel loads and create fuel breaks. Fuel breaks are a vital component in every firescape design. Water features, pools, ponds or streams can also be fuel breaks. Areas where wildland vegetation has been thinned or replaced with less flammable plants are the traditional fuelbreak. Remember, while bare ground is an effective fuel break, it is not recommended as a firescape element due to aesthetic, soil erosion, and other concerns.

A home located on a brushy site above a south or west facing slope will require more extensive wildfire safety landscape planning than a house situated on a flat lot with little vegetation around it. Boulders and rocks become fire retardant elements in a design. Whether or not a site can be irrigated will greatly influence location of hardscape (concrete, asphalt, wood decks, etc.), plant selection and placement. Prevailing winds, seasonal weather, local fire history, and characteristics of native vegetation surrounding the site are additional important considerations.

The 30 feet closest to a structure will be the highest water use area in the fire safe landscape. This is an area where highly flammable fuels are kept to a minimum and plants are kept green throughout the fire season. Use well-irrigated perennials here. Another choice is low growing or non-woody deciduous plants. Lawn is soothing visually, and is also practical as a wildfire safety feature. But extensive areas of turfgrass may not be right for everyone. Some good alternatives include clover, groundcovers, and conservation grasses that are kept green during the fire season through irrigation. Rock mulches are good choices. Patios, masonry or rock planters are excellent fuel breaks and increase wildfire safety. Be creative with boulders, riprap, dry streambeds and sculptural inorganic elements.

When designing a landscape for fire safety remember less is better. Simplify visual lines and groupings. A firesafe landscape lets plants and garden elements reveal their innate beauty by leaving space between plants and groups of plants. In firescaping, the open spaces are more important than the plants.

EXAMPLES OF SOME PLANTS FOR WILDFIRE SAFETY

TREES	common name	height	erosion control	maximum elevation	remarks
Cercis occidentalis	Western redbud	10-18'	good	all	great for dry banks
Fraxinus pennsylvanica	Green ash	30-60'	good	8500'	rapid growth
Gleditisia triacanthos	Honeylocust	35-70'	excellent	6500'	fast growth, dappled shade
Malus spp.	Crabapple	12-25'	good	varies	hardy, flowers, fruit
Prunus maackii	Amur chokecherry	25-30'		6500'	bark of interest
Prunus padus	Bird cherry	40'		7000'	suckers
Quercus bicolor	Swamp white oak	50-60'		6000'	drought tolerant
Quercus rubra	Northern red oak	40-100'		6000'	fall color
Salix spp.	Willow	varies	excellent	varies	invasive roots

SHRUBS	common name	height	erosion control	maximum elevation	remarks
Agave utahensis	Utah agave	8'		low	needs good drainage
Amelanchier alnifolia	Serviceberry	1-20'	good	10,000'	
Berberis spp.	Barberry	4-6'	fair	7500'	red color
Cornus sericea	Red osier dogwood	3-19'	good	all	red twigs, white flowers
Cotoneaster dammeri	Cotoneaster	6" - 10"	good	7500'	not on south face, fireblight
Euonymus alata'Compacta'	Burning bush	6'		7500'	red fall color
Forsythia x intermedia	Forsythia	10'		8000'	yellow spring flowers
Hibiscus syriacus	Rose-of-Sharon	5-15'		6000'	
Mahonia aquifolium	Oregon grape	3-6'		6500'	yellow flowers, edible fruit
Parthenocissus quiniquifolia	Virginia creeper	35' spread	excellent	all	brilliant red fall color
Perovskia atriplicifolia	Russian sage	3-4'		8500'	lavender flowers, heat toleran
Potentilla fruticosa	Cinquefoil	2-3'		10,000'	hardy
Prunus besseyi	Sand cherry	3-6'	fair	9000'	heat/cold/drought tolerant
Rhus trilobata	Skunkbush sumac	2-8'	fair	9000'	hardy, needs good drainage
Rosa woodsii	Wood's rose	1-6'	fair	10,000'	hardy
Sambucus spp.	Elderberry	8-10'	excellent	all	attracts birds, edible fruit
Syringa spp.	Lilac	15-30'	fair	8500'	fragrant

PERENNIALS /GROUNDCOVERS	common name	height x spread	erosion control	maximum elevation	remarks
Armeria maritima	Common thrift	6 x 12"	all		white to rose flowers
Cerastium tomentosum	Snow in summer	6 x 24"	good	10,000'	ht/cld tolerant, silver foliage
Coreopsis auriculata	Coreopsis	5 x 24"		7000'	orange yellow flower
Duchesnea indica	Mock Strawberry	6 x 18"	good	9000'	invasive
Erysimum kotschyanum	Wallflower	2 x 6"	poor	8000'	fragrant
Fragaria chiloensis	Wild strawberry	6 x 18"	up to 30%	10,000'	annual mowing
Hemerocallis spp.	Daylily	12 x 24"	up to 30%	8-10,000'	tough
Linum perenne	Blue flax	8 x 14"		8500'	seeds profusely
Kniphofia uvaria	Red hot poker	3 x 6'	poor	8000'	heat tolerant
Phlox subulata	Moss pink	6 x 24"		7500'	good rock garden plant
Thymus praecox	Creeping thyme	6 x 12"	excellent	8500'	fragrant, edible,
Vinca major	Periwinkle	15 x 36"	excellent	6500'	light to partial shade, invasive

Photo courtesy of Ben Hammock

Lawn can be an effective landscape feature in a Firescape.

OTHER CONSIDERATIONS IN MAKING YOUR HOME DEFENSIBLE

How a house is designed, where it is built, materials used in its construction and landscape, and access to the home all influence survivability during wildfire. Presented below are recommendations and an illustration modified from California Department of Forestry and Fire Protection's publication "How to Make Your Home Fire Safe." These recommendations will make a home much easier to defend and will improve its chances of surviving a wildfire.

1. ROOF

- Remove dead branches hanging over your roof.
- Remove any branches within 15 feet of your chimney.
- Clean all dead leaves and needles from your roof and gutters. Install a roof that meets the fire resistance classification of "Class C" or better. Local jurisdictions may require a higher fire resistance rating. Check with your fire marshal.
- Cover your chimney outlet and stovepipe with a non-flammable screen of one-half inch or smaller mesh.

2. CONSTRUCTION

- Build your home away from ridge tops, canyons and areas between high points on a ridge.
- Build your home at least 30 feet from your property line .
- Use fire resistant building materials.
- Enclose the underside of balconies and above-ground decks with fire resistant materials.
- Limit the size and number of windows in your home that face large areas of vegetation.
- Install only dual-paned or triple-paned windows.
- Consider sprinkler systems within the house. They may protect your home while you're away or prevent a house fire from spreading into the wildlands.

3. LANDSCAPE

- See "Creating An Effective Defensible Space" and "Firescape - Fire Safe Landscape Design."

4. YARD

- Stack woodpiles at least 30 feet from all structures and clear away flammable vegetation within 10 feet of woodpiles.
- Locate LPG tanks (butane and propane) at least 30 feet from any structure and surround them with 10 feet of clearance.
- Remove all stacks of construction materials, pine needles, leaves and other debris from your yard.
- Contact your local fire department to see if open burning is allowed in your area; if so, obtain a permit before burning debris.
- Where burn barrels are allowed, clear flammable materials at least 10 feet around the barrel; cover the open top with a non-flammable screen with mesh no larger than one-quarter inch.

5. EMERGENCY WATER SUPPLY

- Maintain an emergency water supply that meets fire department standards through one of the following:
  - — a community water/hydrant system
  - — a cooperative emergency storage tank with neighbors
  - — a minimum storage supply of 2,500 gallons on your property
- Clearly mark all emergency water sources and notify your local fire department of their existence.
- Create easy firefighter access to your closest emergency water source.
- If your water comes from a well, consider an emergency generator to operate the pump during a power failure.

6. ACCESS

- Identify at least two exit routes from your neighborhood.
- Construct roads that allow two way traffic.
- Design road width, grade and curves to allow access for large emergency vehicles.
- Construct driveways to allow large emergency equipment to reach your house.
- Design bridges to carry heavy emergency vehicles, including bulldozers carried on large trucks.
- Post clear road signs to show traffic restrictions such as dead-end roads, and weight and height limitations.
- Make sure dead-end roads and long driveways have turnaround areas wide enough for emergency vehicles. Construct turnouts along one-way roads.
- Clear flammable vegetation at least 10 feet from roads and five feet from driveways.
- Cut back overhanging tree branches above roads.
- Construct fire barriers, such as greenbelts, parks, golf courses and athletic fields.
- Make sure that your street is named or numbered, and a sign is visibly posted at each street intersection.
- Make sure that your street name and house number are not duplicated elsewhere in the county.
- Post your house address at the beginning of your driveway, or on your house if it is easily visible from the road.

7. OUTSIDE

- Designate an emergency meeting place outside your home.
- Practice emergency exit drills regularly.
- Make sure that electric service lines, fuse boxes and circuit breaker panels are installed and maintained as prescribed by code.
- Contact qualified individuals to perform electrical maintenance and repairs.

FIRE BRANDS AND THE WOOD SHAKE ROOF HAZARD

Firebrands are burning embers produced by wildfire which are lifted high into the air and carried beyond the fire front. Firebrands are one of the major causes of homes burned due to wildfire.

Typical firebrand materials include pine cones, bark, and if houses are involved, wood shakes and shingles. Depending on wind speed and size of materials, firebrands can be carried more than one-half mile ahead of the fire front.

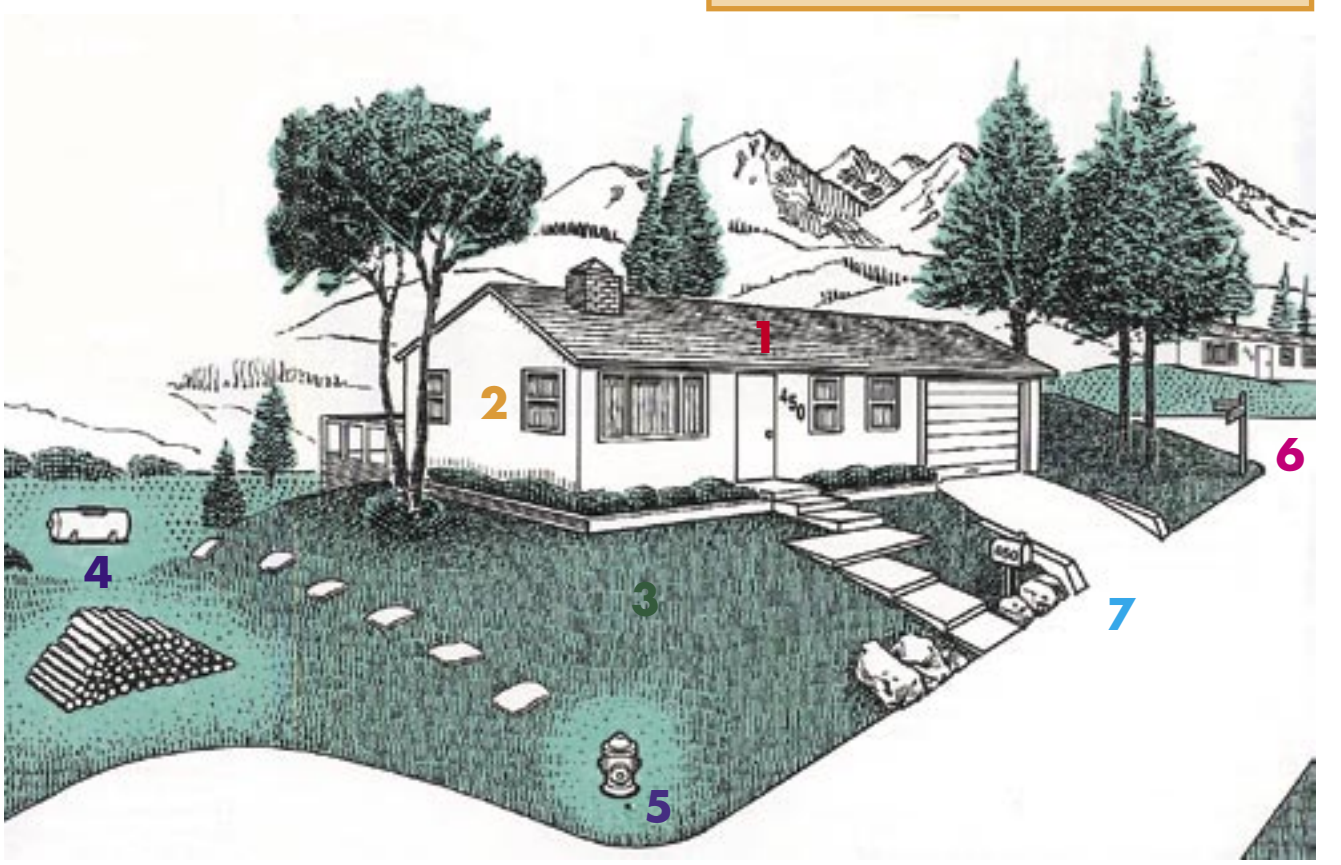
A shower of thousands of firebrands can be produced during a major wildfire event. If these firebrands land in areas with easily ignited fuels, numerous spot fires can start. Homes located blocks away from the main fire front can be threatened.

A house can be threatened by a wildfire in three ways: direct exposure from flames, radiated heat, and airborne firebrands. Of these, firebrands account for the majority of homes burned by wildfire. The roof of the house is the most vulnerable to firebrands.

Because of its angle, the roof can catch and trap firebrands. If the roof is constructed of combustible materials such as untreated wood shakes and shingles, the house is in jeopardy of igniting and burning.

Not only are combustible roofing materials a hazard to the structure on which they are installed, but they also pose a threat to other houses in the vicinity. Burning wood shakes can become firebrands, be lifted from the burning roof, and carried blocks away, and land in receptive fuel beds such as other combustible roofs.

Unfortunately for homeowners with existing combustible roofs, there are no long-term reliable measures available to reduce roof vulnerability to wildfire other than re-roofing with fire resistant materials.



WHEN WILDFIRE APPROACHES

Should homes be threatened by wildfire, occupants may be advised to evacuate to protect them from life-threatening situations. Homeowners, however, do have the right to stay on their properties if they so desire and so long as their activities do not hinder fire fighting efforts. If occupants are not contacted in time to evacuate or if owners decide to stay with their homes, these suggestions will help them protect their properties and families.

- ❏ Evacuate, if possible, all family members not essential to protecting the house. Evacuate pets as well.
- ❏ Contact a friend or relative and relay your plans.
- ❏ Make sure family members are aware of a prearranged meeting place.
- ❏ Tune into a local radio station and listen for instructions.
- ❏ Place vehicles in the garage, have them pointing out, and roll up windows.
- ❏ Place valuable papers and momentos in the car.
- ❏ Close the garage door, but leave it unlocked. If applicable, disconnect the electric garage door opener so that the door can be opened manually.
- ❏ Place combustible patio furniture in the house or garage.
- ❏ Shut off propane at the tank or natural gas at the meter.
- ❏ Wear only cotton or wool clothes. Proper attire includes long pants, long sleeved shirt or jacket, and boots. Carry gloves, a handkerchief to cover face, water to drink, and goggles.
- ❏ Close all exterior vents.
- ❏ Prop a ladder against the house so firefighters have easy access to the roof.
- ❏ Make sure that all garden hoses are connected to faucets and attach a nozzle set on "spray."
- ❏ Soak rags, towels, or small rugs with water to use in beating out embers or small fires.
- ❏ Inside, fill bathtubs, sinks, and other containers with water. Outside, do the same with garbage cans and buckets. Remember that the water heater and toilet tank are available sources of water.
- ❏ Close all exterior doors and windows.

Photo courtesy of Jim Linardos

- ❏ Close all interior doors.
- ❏ Open the fireplace damper, but place the screen over the hearth to prevent sparks and embers from entering the house.
- ❏ Leave a light on in each room.
- ❏ Remove lightweight and/or non-fire resistant curtains and other combustible materials from around windows.
- ❏ If available, close fire resistant drapes, shutters, or venetian blinds. Attach pre-cut plywood panels to the exterior of windows and glass doors.
- ❏ Turn off all pilot lights.
- ❏ Move overstuffed furniture (e.g. couches, easy chairs, etc.) to the center of the room.
- ❏ Keep wood shake or shingle roofs moist by spraying water. Do not waste water. Consider placing a lawn sprinkler on the roof if water pressure is adequate. Do not turn on until burning embers begin to fall on the roof.
- ❏ Continually check the roof and attic for embers, smoke, or fire.

If a fire should occur within the house, contact the fire department immediately. Continue to inspect your house and property for embers and smoke.

Most importantly, STAY CALM!

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Check out the Living with Fire website at www.extension.unr.edu/FIRE.Frontpage.html

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COMMON WILDLAND PLANTS THAT FUEL WILDFIRES

CHEATGRASS
Short annual grass; may dominate disturbed areas; extremely flammable when dried.

BIG SAGEBRUSH
Very common gray-green shrub; does not resprout; considered a flammable plant.

BITTERBRUSH
Often growing with big sagebrush; dark green three-tipped leaves, growth form and size variable; tall and dense stands burn very intensely.

SNOWBRUSH
Shiny, three veined, green leaves; re-sprouts; common in the Sierras above 6,000 feet elevation.

GREENLEAF MANZANITA
Leathery green leaves; smooth cinnamon colored bark; common Sierra shrub; re-sprouts; flammable.

HUCKLEBERRY OAK
Scrubby oak; gray-green leaves; flexible branches that are gray in color; re-sprouts; very flammable.

PINYON PINE
Small pine tree; one needle per bundle; can form thick stands.

UTAH JUNIPER
Shrubby juniper tree; may grow in association with pinyon pine.

JEFFREY PINE
Common pine tree along eastern Sierra Front; three needles per bundle; beehive shaped cone.

WHITE FIR
Common tree of the Sierras; has a "Christmas tree" appearance; single, flat, blunt needles.