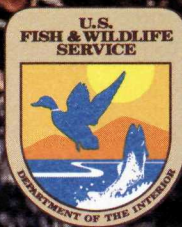


# LIVING WITH FIRE

## A Guide For The Great Plains Homeowner





# LIVING WITH FIRE

US Fish and Wildlife Service • Bureau of Land Management • National Park Service • Bureau of Indian Affairs • USDA Forest Service

## LIVING IN A NATURAL FIRE ENVIRONMENT

The Prairie Grassland Region is an area where fire has always played a prominent role in the natural environment. Long before towns and subdivisions were established across the Great Plains, fires were a natural result of the frequent summer thunderstorms that traveled across the mountains and plains. However, decades of fire suppression have resulted in a large accumulation of fuels that have the potential to create intense wildfires.

Within this natural fire 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 or farm (known as survivable space), use of fire resistant building materials, appropriate subdivision design, and other measures. Research clearly demonstrates that pre-fire activities save lives and property.

The Great Plains fire prevention cooperators, which includes many federal, state and local fire management agencies, are using a program called "FIREWISE". FIREWISE was created to encourage the widespread use of pre-fire activities such as those listed in this and many other publications available to you.

For more information concerning the "FIREWISE" program or wildland fire safety information, contact local land management agencies, local fire departments or visit the websites listed on the back page of this publication.

## "LIVING WITH FIRE" PRE-FIRE ACTIVITIES



*The pre-fire activities implemented by this homeowner 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 it when wildfire hit.*

## THE "WHY WE'RE WORRIED ABOUT WILDFIRE" EQUATION

Fire is a natural part of our environment. Our Great Plains were burning long before there was a Bismarck, Great Bend, Scottsbluff, Aberdeen or Billings.

+

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.

=

All this adds up to potential for:

- Greater loss of life
- Increased property losses
- More damage to natural resources
- More money spent on firefighting



# THE FIRE ENVIRONMENT

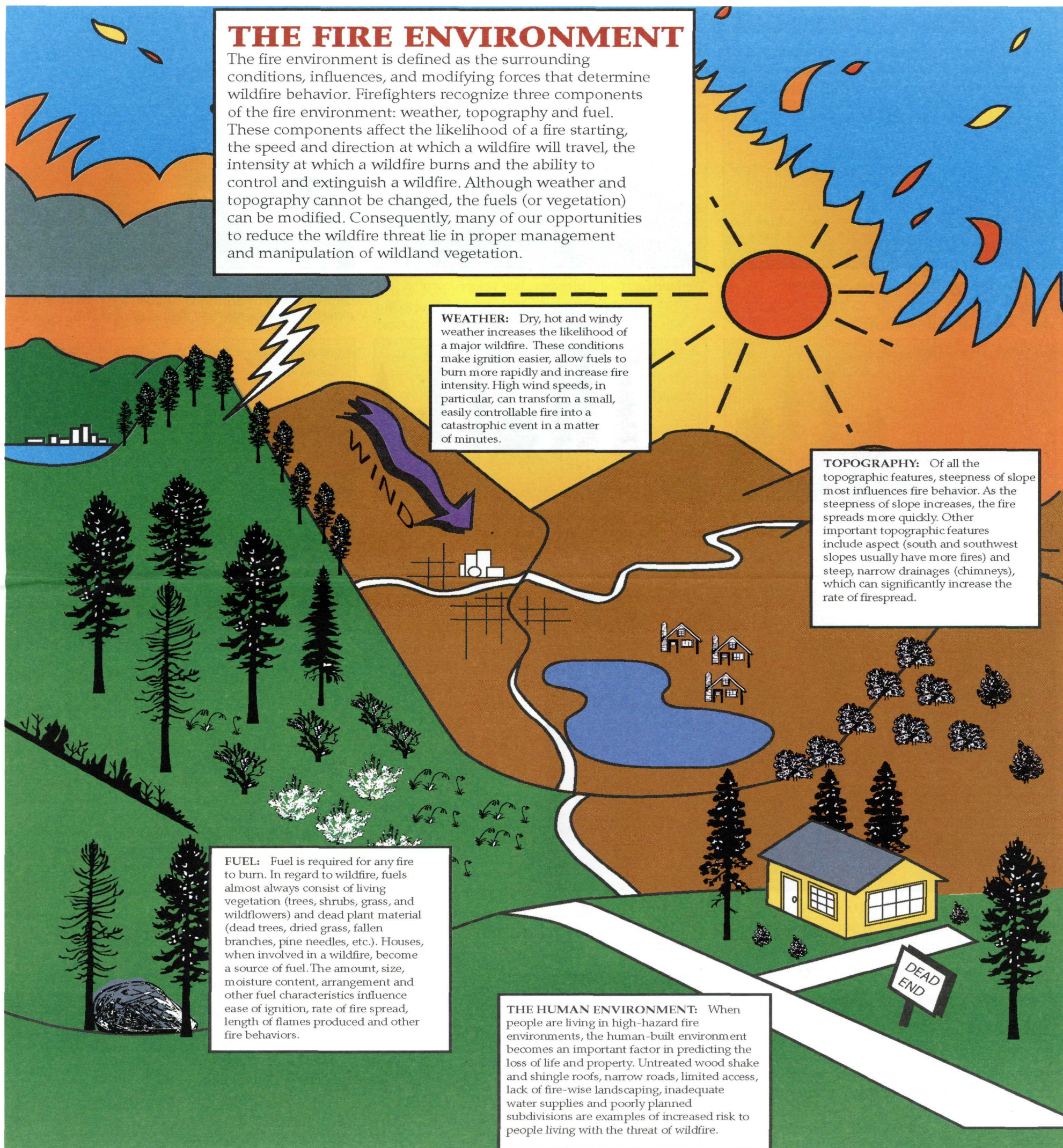
The fire environment is defined as the surrounding conditions, influences, and modifying forces that determine wildfire behavior. Firefighters recognize three components of the fire environment: weather, topography and fuel. These components affect the likelihood of a fire starting, the speed and direction 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 all the 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.

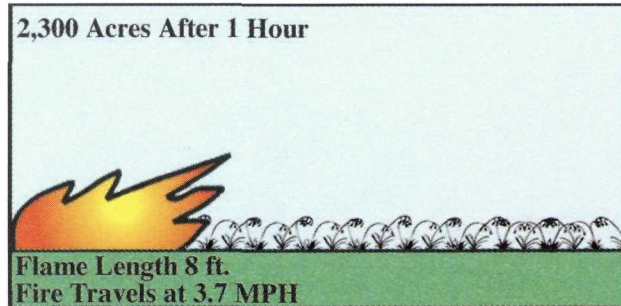
**THE HUMAN ENVIRONMENT:** When people are living in high-hazard fire environments, the human-built environment becomes an important factor in predicting the loss of life and property. Untreated wood shake and shingle roofs, narrow roads, limited access, lack of fire-wise landscaping, inadequate water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



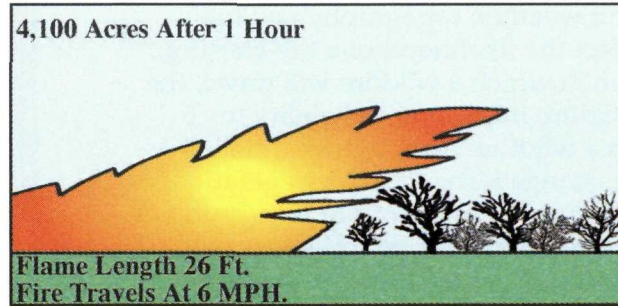


## EXAMPLES OF LOCAL FIRE BEHAVIOR IN GREAT PLAINS FUEL TYPES

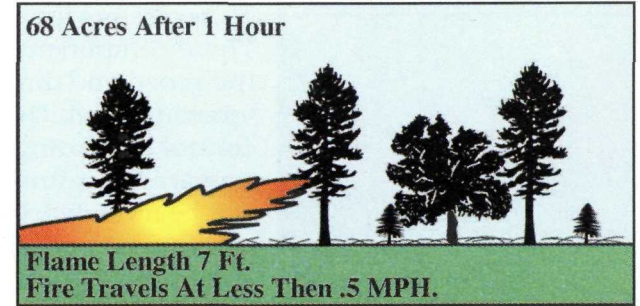
Presented below are several types of vegetation common to our region with computer generated estimates of how they would burn under certain conditions. These predictions assume a wind speed of 20 mph, flat terrain, typical moisture contents of living and dead vegetation for summertime, and normal August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



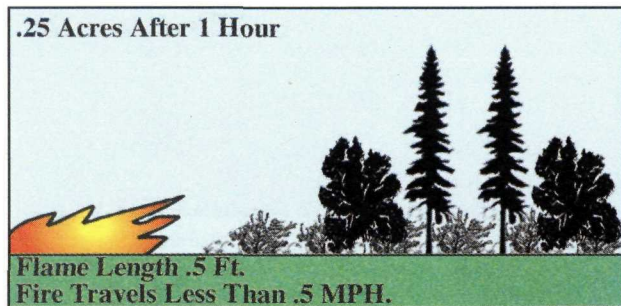
Grasslands: hay, wheat, ungrazed pasture



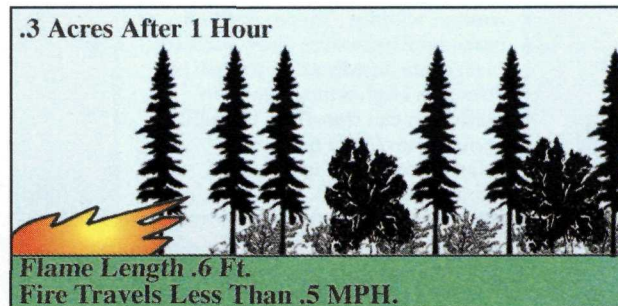
Wetlands: cattails, marshes, late season corn



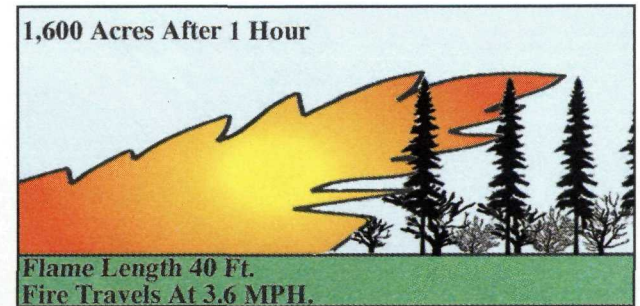
Shelter belts: open canopy with mostly grass, hay, cattails, elm, pines, juniper understory with large elm (like) trees and a few short junipers



Shelter belts: closed canopy mostly elm (like) trees, large pines, little grass



Shelter belts: closed canopy mostly juniper and pines, little grass or elm (like) trees {early summer}



Shelter belts: closed canopy mostly juniper and pines, little grass or elm (like) trees {late summer}

\*Fire behavior estimates prepared by Charles Frohme and Shane Del Grosso USFWS



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 In Great Plains Fuel Types."

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.

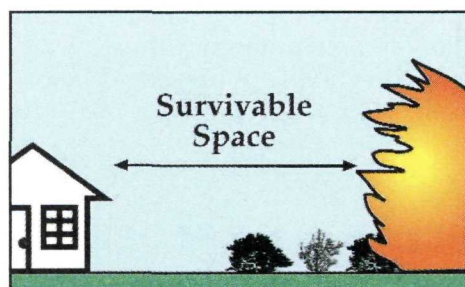


# FREQUENTLY ASKED QUESTIONS ABOUT SURVIVABLE SPACE



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

In 2000, the term “survivable 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 survivable space.



## WHAT IS SURVIVABLE SPACE?

Survivable 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 survivable space is simply a homeowner’s properly maintained yard.

## 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 their survivability. 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 SURVIVABLE 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 fire fighting 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 the 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. It is the action taken by the owner before the wildfire occurs (such as proper landscaping) that is most critical.

## DOES SURVIVABLE 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 may be unnecessary and unacceptable due to appearance, soil erosion, and other reasons. Many homes have attractive, well vegetated landscapes that also serve as effective survivable space.

## DOES CREATING A SURVIVABLE SPACE REQUIRE ANY SPECIAL SKILLS OR EQUIPMENT?

No. For the most part, creating a survivable space employs routine gardening and landscape maintenance practices, such as: pruning, mowing, weeding, plant removal, appropriate plant selection, and irrigation. Equipment needed includes common tools

such as: chain saw, pruning saw, pruning shear, lopper, weed-eater, shovel and 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 SURVIVABLE SPACE?

Survivable 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 Survivable Space” for specific information.

## DOES SURVIVABLE SPACE MAKE A DIFFERENCE?

Yes. Investigations of homes threatened by wildfire indicate that houses with an effective survivable space are much more likely to survive a wildfire. Furthermore, homes with both an effective survivable space and a nonflammable roof (composition shingles, tile, metal, etc.) are many times more likely to survive a wildfire than those without survivable space and flammable roofs (wood shakes or shingles). Survivable space gives firefighters the opportunity to effectively and safely defend the home.

## DOES HAVING A SURVIVABLE SPACE GUARANTEE MY HOUSE WILL SURVIVE A WILDFIRE?

No. Under extreme conditions, almost any house can burn. But having a survivable 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 SURVIVABLE SPACE?

The specific reasons for not creating a survivable 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 survivable space practices simply because of lack of knowledge or misconceptions.

HOW DO I CHANGE THE VEGETATION ON MY PROPERTY OR REDUCE THE WILDFIRE THREAT? The objective of survivable space is to reduce the wildfire threat to a home by changing the characteristics of the adjacent vegetation.

Survivable 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 Rs of Survivable Space.” The article “Creating an Effective Survivable Space” provides detailed information about changing vegetation characteristics of survivable space.

## THE THREE Rs OF SURVIVABLE 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, constitutes reduction. Examples of reduction are pruning dead wood from a shrub, removing low tree branches, and mowing dried grass.

### Replacement

Replacement is substituting hazardous vegetation with less flammable plants. Removal of a dense stand of flammable shrubs and planting an irrigated, well maintained flower bed is an example of replacement.



# CREATING AN EFFECTIVE SURVIVABLE SPACE\*

## ...A Step-by-Step Guide

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

### STEP ONE: HOW BIG IS AN EFFECTIVE SURVIVABLE SPACE?

The size of the survivable space 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 Survivable Space Distance" chart presented below, find the vegetation types and percent slope which best describes the area where your house is located. Then find the recommended survivable 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 survivable 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 bush, your recommended survivable space distance would be 200 feet.

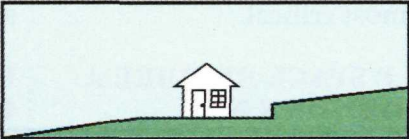

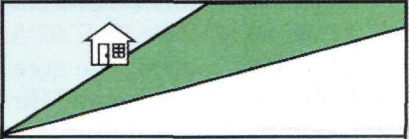
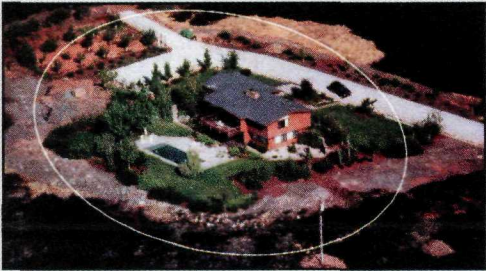
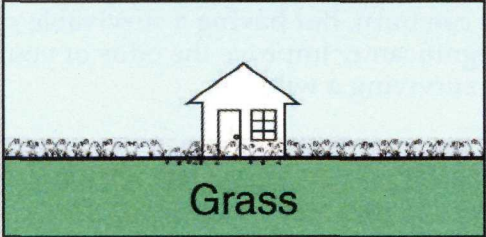
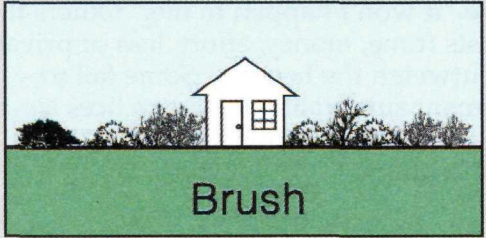
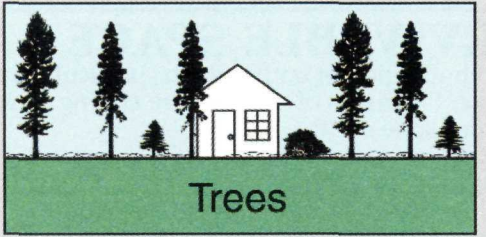
If the recommended distance goes beyond your property boundaries, contact the adjacent property owner and work cooperatively on creating a survivable space. The effectiveness of survivable space increases when multiple property owners work together. The local assessor's office can provide assistance 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 home. This will be your survivable space area.

### STEP TWO: IS THERE ANY DEAD VEGETATION WITHIN THE RECOMMENDED SURVIVABLE 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 survivable space area. A description of the types of dead vegetation you're likely to encounter and the recommended actions are presented below on the next page.

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

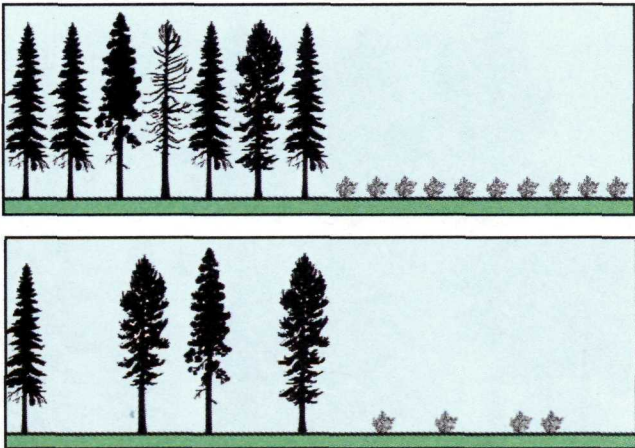
- 1) Find the percent slope which best describes your property.
  - 2) Find the type of vegetation which best describes the wildland plants growing on or near your property.
  - 3) Locate the number in feet corresponding to your slope and vegetation. This is your recommended survivable space distance.
- \* Please note the recommendations presented in this article are suggestions made by local firefighters experienced in protecting homes from wildfires. They are not requirements nor do they take precedence over local ordinances.



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

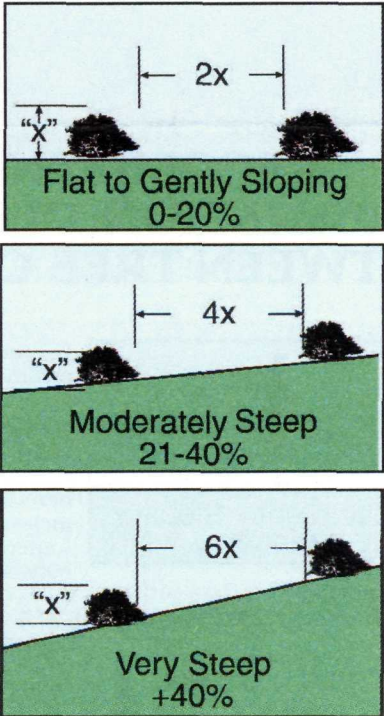
Sometimes wildland plants can occur as an uninterrupted layer of vegetation as opposed

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 survivable space area, you should “break-it-up” by providing a separation between plants or small groups of plants. Don’t forget to reduce the density of shelter belts located within the survivable area.



**RECOMMENDED SEPARATION DISTANCES FOR TREE AND SHRUB SPACING**

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



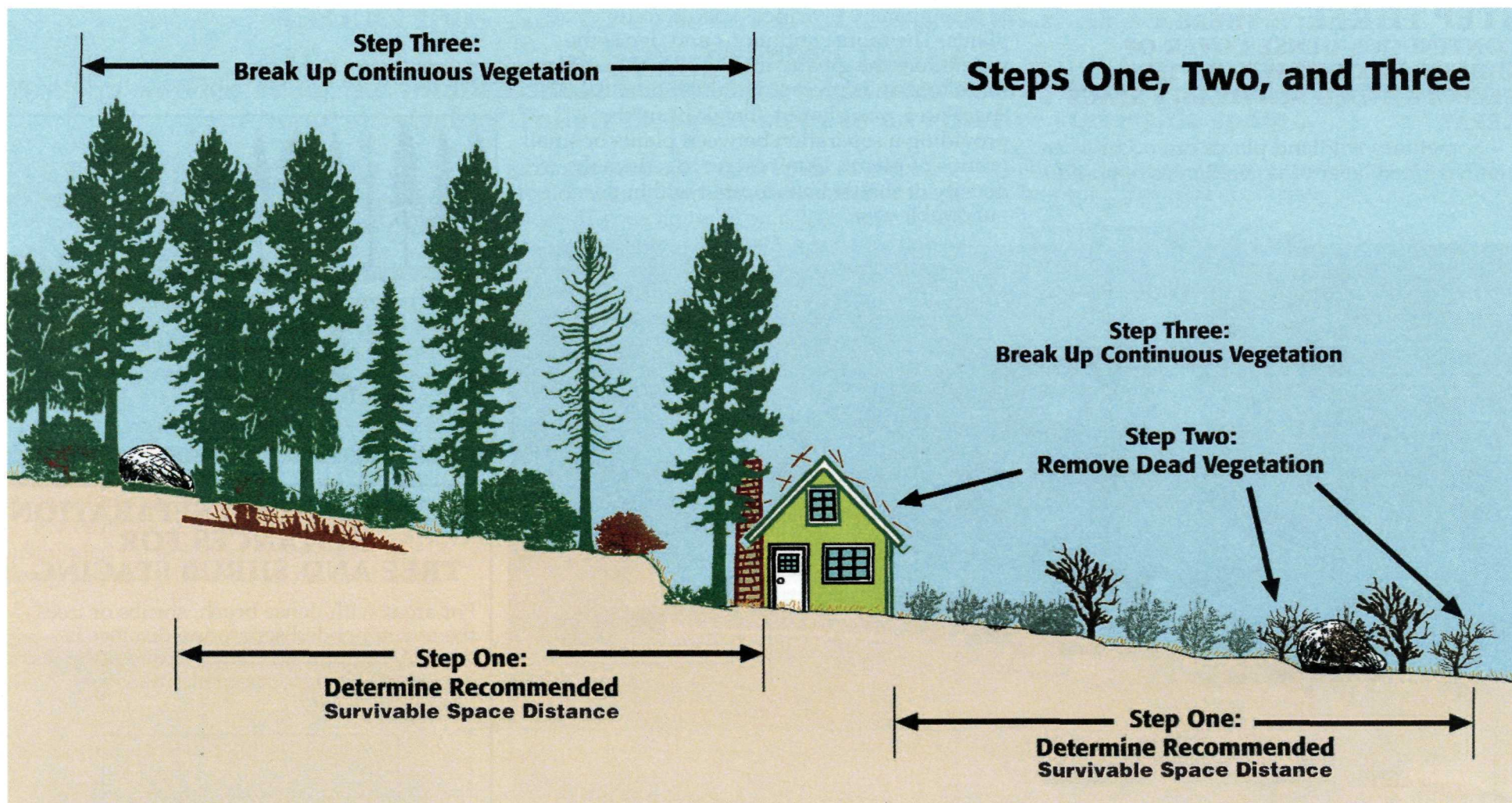
*Note: Separation distances are measured between canopies (outermost branches) and not between trunks.*

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). For shrubs which readily resprout, pruning to reduce height may be the best approach.

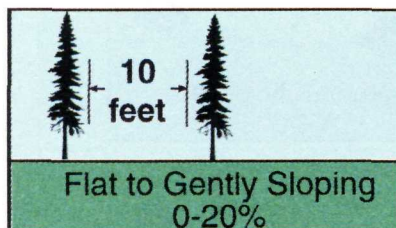
**TYPES OF DEAD VEGETATION AND RECOMMENDED PRACTICE**

DEAD FUEL TYPE	RECOMMENDED PRACTICE
STANDING DEAD TREE	Remove all standing dead trees from within the survivable space area.
DOWN DEAD TREE	Remove all down dead trees within the survivable 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 survivable space area.
DRIED GRASSES AND WILDFLOWERS	Once grasses and wildflowers have dried out or “cured,” cut down and remove from the survivable space.
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.

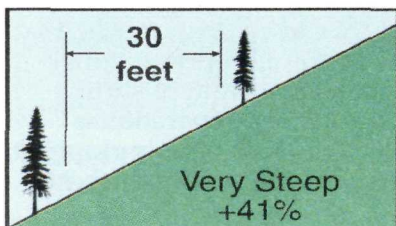
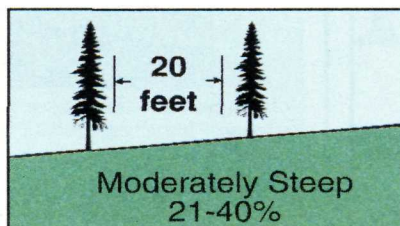




## RECOMMENDED SEPARATION DISTANCES BETWEEN TREE CANOPIES



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 (outermost branches) and not between trunks.



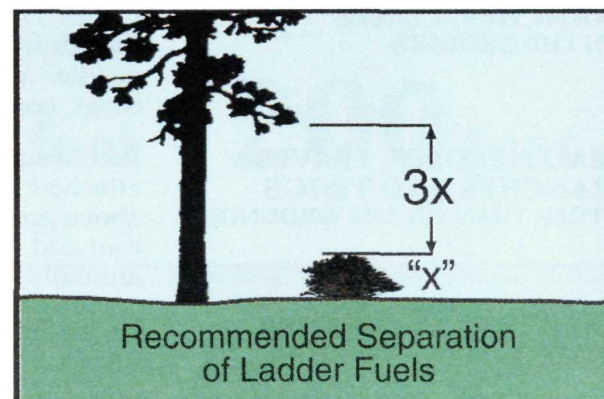
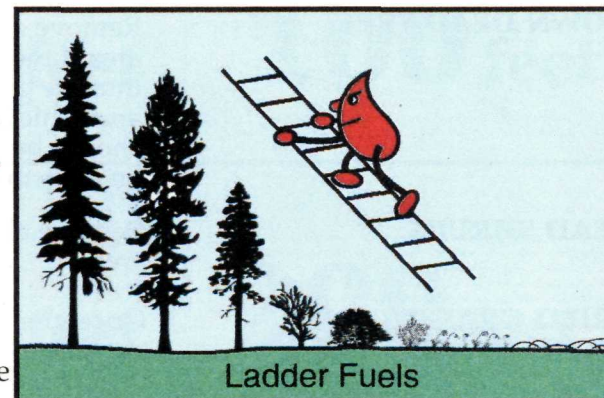
For example, if your house is situated on a 30% slope, the separation of tree canopies within your survivable space should be 20 feet. Creating separation between tree canopies can be accomplished through tree removal.

## STEP FOUR: ARE THERE LADDER FUELS PRESENT WITHIN THE RECOMMENDED SURVIVABLE 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 survivable 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"?**

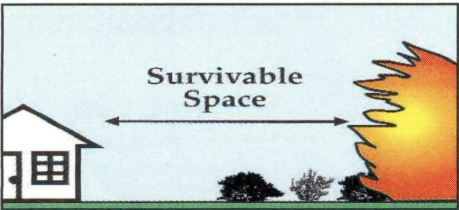
The area immediately adjacent to your house is particularly important in terms of an effective survivable space. It is also the area that is usually landscaped. Within an area extending at least 30 feet from the house, the vegetation should be kept...

- 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 SURVIVABLE SPACE AREA MAINTAINED ON A REGULAR BASIS?**

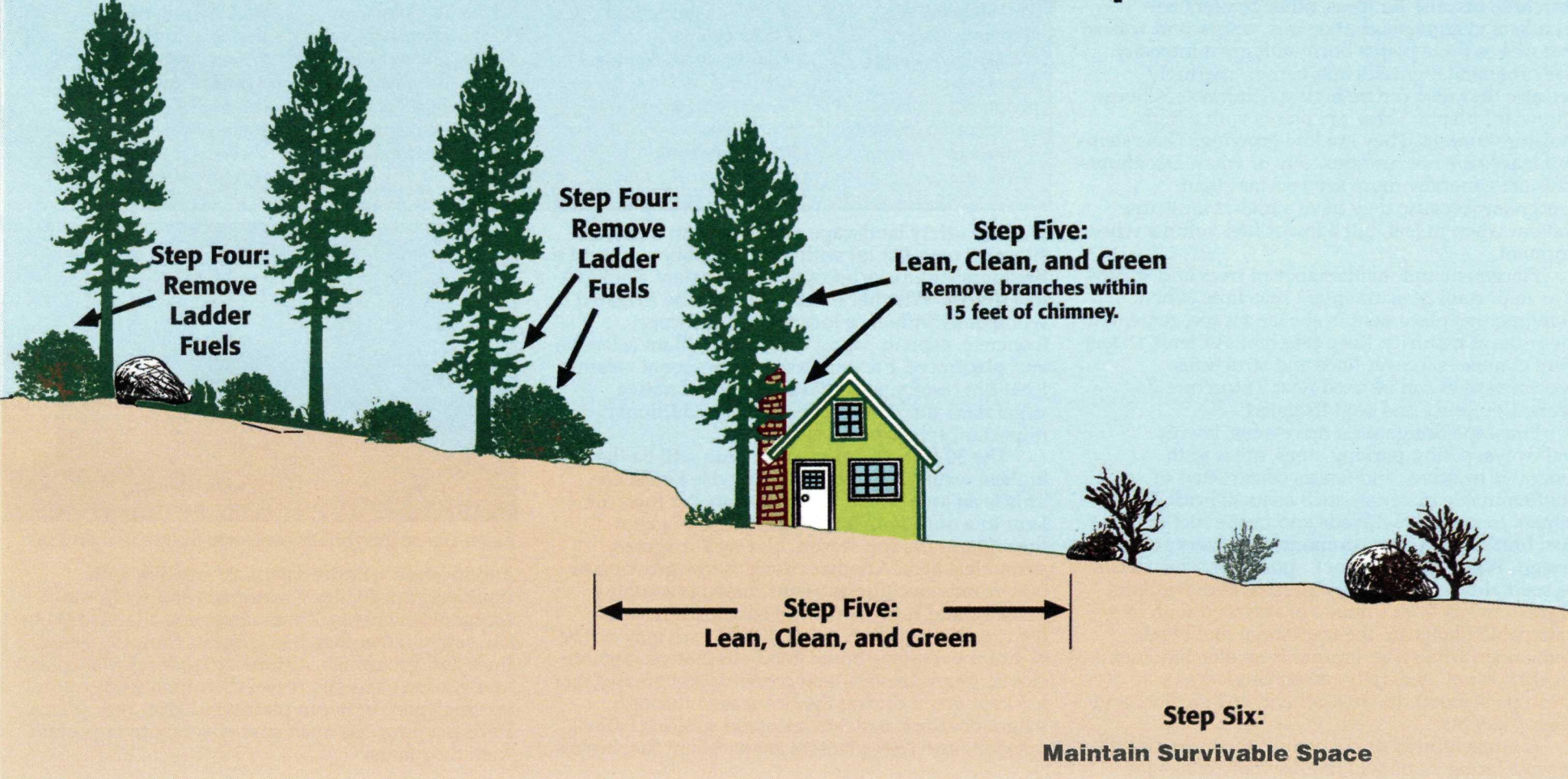
Keeping your survivable space effective is a continual process. At least annually, review these survivable space steps and take action accordingly. An effective survivable space can be quickly diminished through neglect.



**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 ground covers, bedding plants, bulbs, perennial flowers, and conservation grasses.
- ☒ Emphasize use of mulches, rock, and noncombustible hard surfaces (concrete sidewalks, brick patios, and asphalt driveways).
- ☒ 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 the 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 power lines, or touching the house should be removed.

**Steps Four, Five, and Six**





# FIRESCAPE - FIREWISE 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, thereby 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 makes these plants burn with great intensity. Use ornamental grasses and berries sparingly because they also can be highly flammable. Choose "firewise" 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 be used also as fuel breaks. Areas where wildland vegetation has been thinned or replaced with less flammable plants are the traditional fuel break. Remember, while bare ground is an effective fuel break, it is not generally 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

## Firewise Plant Material for the Great Plains

Although there are no plants that will not burn at all, the following is a list of some fire resistive plants that can be used in landscaping. Landscape maintenance is far more important to fire prevention than the selection of plant materials. When planning your landscape, use the characteristics of fire resistive plants along with site characteristics such as slope, aspect, hardiness zone and amount of precipitation to choose plant material suitable for your site.

TREES		PERENNIALS	
<b>Conifers:</b>	<b>common name</b>		<b>common name</b>
Calocedrus decurrens	Incense cedar	Achillea spp.	Yarrow
Thuja plicata	Western red cedar	Allium schoenoprasum	Chives
		Bergenia spp.	Bergenia
		Brodiaea spp.	Lilies
		Coreopsis spp.	Coreopsis
<b>Deciduous:</b>		Erysimum linifolium	Wall flower
Acer spp.	Maple	Eschscholzia spp.	California poppy
Alnus spp.	Alder	Fragaria sp.	Wild Strawberries
Catalpa speciosa	Northern catapla	Geranium spp.	Geranium
Cornus florida	Flowering dogwood	Hemerocallis hybrids	Daylillies
Fagus spp.	Beech	Heuchera spp.	Coral bells
Fraxinus spp.	Ash	Iris spp.	Iris
Gleditsia tricanthos	Honeylocust	Kniphofia uvaria	Red hot poker
Malus spp.	Apple	Lupinus spp.	Lupine
Populus spp.	Aspen, cottonwood, poplar	Oenothera spp.	Evening primrose
Prunus spp.	Cherry	Penstemon spp.	Beard tongue
Quercus spp.	Oak (white, burr or red)	Solidago spp.	Goldenrod
Robinia pseudoacacia	Black locust	Strachys bysantina	Lamb's ear
Salix spp.	Willow		
		<b>GROUNDCOVERS common name</b>	
<b>SHRUBS</b>	<b>common name</b>	<b>Succulents:</b>	
Amelanchier spp.	Serviceberry	Delospema nubigenum	Hardest ice plant
Atriplex canescens	Four wing saltbrush	Echeveria spp.	Hens & Chicks
Buddelia davidi	Butterfly bush	Sedum spp.	Stone crops
Caryopteris x clandonensis	Blue-mist spirea		
Cornus sericea	Red osier dogwood	<b>Non-succulents:</b>	
Cotoneaster spp.	Cotoneaster	Achillea tomentosa	Wolly yarrow
Liqustrum spp.	Privet	Ajuga reptans	Carpet bugle
Mahonia spp.	Creeping grape holly	Arctostaphylos uva-ursi	Kinnikinnick
Pachistima canbyi	Dwarf mountain lover	Armeria merittima	Sea pink; thrift
Philadelphus spp.	Mock orange; syringa	Cerastium tomentosa	Snow in summer
Rhamnus fragula	Buckthorn	Cotoneaster dammeri	Bearberry cotoneaster
Rhododendron spp.	Azaleas, rhododendrons	Euonymus fortunei	Winter creeper
Ribes spp.	Currant	Potentilla tabernaemontani	Spring cinquefoil
Sheperdia argentea	Silver buffaloberry	Senecio cineraria	Dusty miller
Symphoricarpos albus	Snowberry	Thymus praecox articus	Mother of thyme
Viburnum trilobum	Cranberry bush	Verbenia bipinnatifida	Verbenia
Yucca spp.	Yucca		

wildfire safety landscape planning than a house situation 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 firewise 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 and rock planters are excellent fuel breaks



Lawn can be an effective landscape feature in a firescape

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 firewise 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.



# OTHER CONSIDERATIONS IN MAKING YOUR HOME SURVIVABLE

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. These recommendations will make a home much easier to defend and will improve its chances of surviving a wildfire.

## 1. 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 double-paned or triple-paned windows.
- Consider sprinkler systems within the house. They may prevent a house fire from spreading into the wildlands.

## 2. 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 your county regulations or with your local fire department.
- Cover your chimney outlet and stovepipe with a nonflammable screen of one-half inch or smaller screen.

## 3. LANDSCAPE

- See "Creating an Effective Survivable Space" and "Firescape - Firewise Landscape Design."

## 4. YARD

- Stack woodpiles at least 30 feet from all structures and clean away flammable vegetation within 10 feet of woodpiles.
- Located 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, clean flammable materials at least 10 feet around the barrel; cover the opening with a nonflammable screen with screen no longer 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.
- Clean 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.

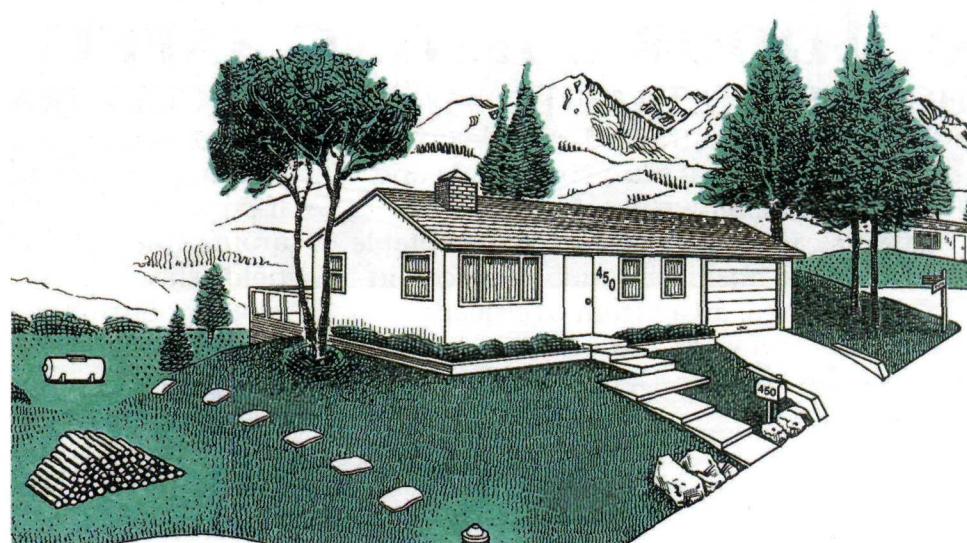
## THE WOOD SHAKE AND SHINGLE ROOF HAZARD

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 most vulnerable part of a house to firebrands is the roof.

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 also to other houses in the vicinity. Burning wood shakes, for example, can be lifted from the burning roof, 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 the windows.
- 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.
- 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 the windows.
- If available, close fire resistant drapes, shutters, or venetian blinds. Attach precut 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!**

## OUTDOOR BURNING SAFETY TIPS

### HOUSEHOLD TRASH

- If you must burn trash, don't pile on it ground. It will not burn completely and will easily be blown around. Local fire officials can recommend a safe receptable for burning trash. It should be placed in a cleared area, away from overhead branches and wires.
- Check the weather. Don't burn on dry, windy days.

### AGRICULTURAL

- Be sure you are fully prepared before burning off your fields or garden spot.
- If possible, a fire line should be plowed around the area to be burned. Large fields should be separated into small plots for burning one at a time.
- Be sure to stay with your fire until it is out.
- Before doing any burning, please contact your local fire officials.
- Check the weather. Don't burn on dry, windy days.

## CHECK OUT THESE WEBSITES FOR FURTHER INFORMATION:

FIREWISE COMMUNITIES  
[www.firewise.org/communities/usa](http://www.firewise.org/communities/usa)

US DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT  
[www.fire.blm.gov](http://www.fire.blm.gov)

BUREAU OF INDIAN AFFAIRS  
[www.doi.gov/bia](http://www.doi.gov/bia)

FISH & WILDLIFE SERVICE  
[www.fws.gov/fire](http://www.fws.gov/fire)

NATIONAL PARK SERVICE  
[www.nps.gov/fire](http://www.nps.gov/fire)

NATIONAL ASSOCIATION  
OF STATE FORESTERS  
[www.stateforesters.org](http://www.stateforesters.org)

USDA FOREST SERVICE  
[www.fs.fed.us](http://www.fs.fed.us)

NATIONAL FIRE PROTECTION  
ASSOCIATION  
[www.nfpa.gov](http://www.nfpa.gov)

US FIRE ADMINISTRATION  
[www.usfa.fema.gov](http://www.usfa.fema.gov)

FEDERAL EMERGENCY  
MANAGEMENT AGENCY  
[www.fema.gov](http://www.fema.gov)

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**Remember, a little extra  
care takes only a few  
minutes of your time and  
it could prevent a wildfire.**