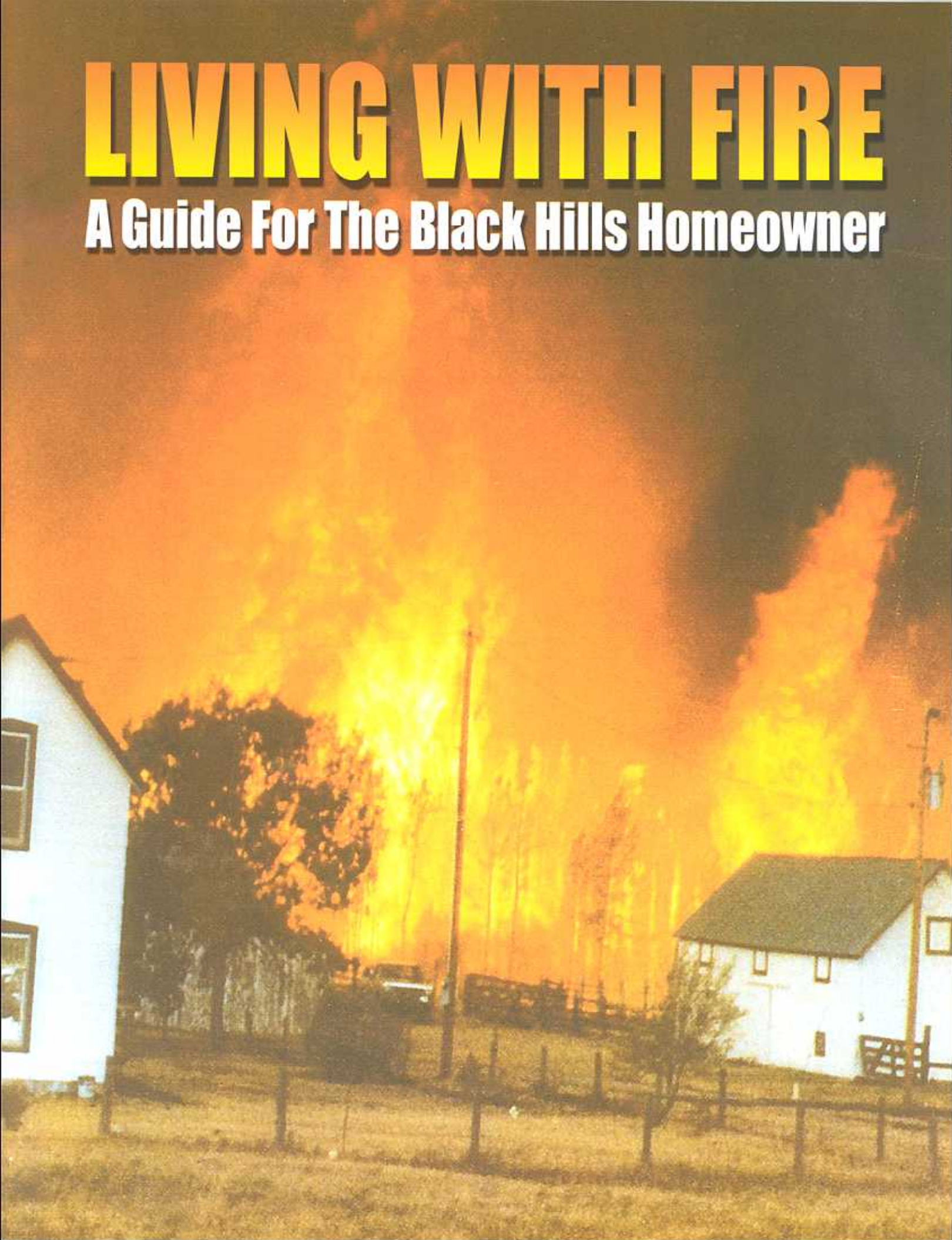


LIVING WITH FIRE

A Guide For The Black Hills Homeowner



LIVING WITH FIRE

Keep South Dakota Green - State of South Dakota Resource Conservation & Forestry Division - South Dakota Wildfire Suppression Division - USDA Forest Service

LIVING IN A NATURAL FIRE ENVIRONMENT

Much of the Black Hills 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 (especially due to the unnatural build up of trees, brush and dead materials).

Within this hazardous environment, there are individual houses, subdivisions and entire communities. Many of these homeowners, however, are ill-prepared 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 survivable space), use of fire resistant building materials, appropriate subdivision design, and forest manageable actions such as mechanical treatment and prescribed fire. Research clearly demonstrates that "pre-fire activities" save lives and property.

The Black Hills Interagency Fire Prevention Cooperators which includes the 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 shown within the Living with Fire Publication.

For more information concerning the FIREWISE Program of 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 Black Hills were burning long before there was a Deadwood, Custer or Rapid City.

+

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 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 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.

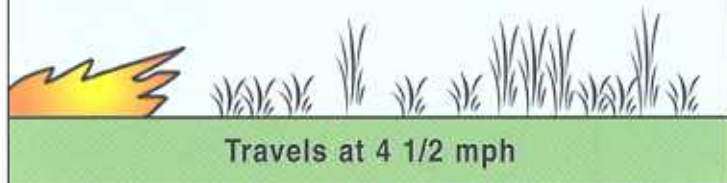
THE HUMAN ENVIRONMENT: When people are living in high-hazard fire environments, the human-built environment becomes an important factor in predicting the loss of life and property. Untreated wood shake and shingle roofs, narrow roads, limited access, lack of fire-wise landscaping, inadequate water supplies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

EXAMPLES OF FIRE BEHAVIOR IN BLACK HILLS FUEL TYPES

Presented below are six types of vegetation common to the Black Hills 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 our area.

Flame Length 8 Feet

**3,000 acres can burn
after one hour.**

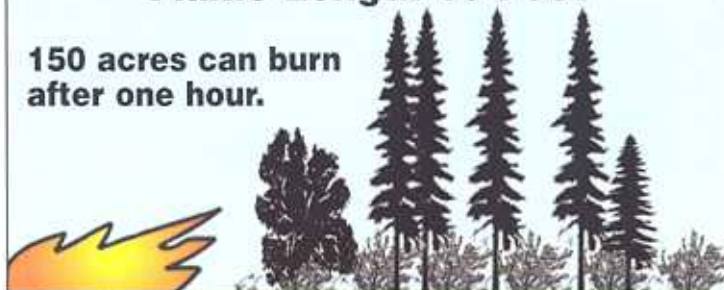


Travels at 4 1/2 mph

GRASS: Represented by uncut or ungrazed meadows.

Flame Length 10 Feet

**150 acres can burn
after one hour.**



Travels at 1 1/2 mph

OPEN PINE FOREST: This type consists of ponderosa pine, often interspersed with white spruce trees. Needles and some grasses occupy the understory.

Flame Length 16 Feet

**830 acres
can burn
after one
hour.**



Travels at 3 mph

PINE JUNIPER WOODLANDS: Pine and juniper mixed with shrubs characterize this vegetation type.

Flame Length 22 Feet

**3,400 acres can burn
after one hour.**



Travels at 6 1/2 mph

SAGEBRUSH: Sagebrush is the dominant shrub in this type and there is an understory of cheatgrass, bunchgrass and wildflowers. This type is found in some of the outlying areas of the Black Hills.

Flame Length 60-80 Feet

**140
acres
can
burn
after
one hour.**



Travels at 1 mph

CLOSED PINE FOREST: This type consists of varied ages of ponderosa pine crowded together and/or storm damaged areas and may have heavy accumulation of pine needles and/or branches.

Flame Length 100 Feet

CROWN FIRES: Crown fires occur when a ladder of vegetation allows fire to climb to the tops of pine, fir or other trees.

Flames can jump 100+ feet high and send burning embers more than a mile away.

THE LIMITATIONS OF WILDLAND FIREFIGHTING

*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.*

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.



Photo/Rapid City Journal

Presented at right are firefighter tactics as they relate to wildfire flame length. Compare this to the flame lengths shown in "Examples Of Fire Behavior In Black Hills Fuel Types" on page 4.

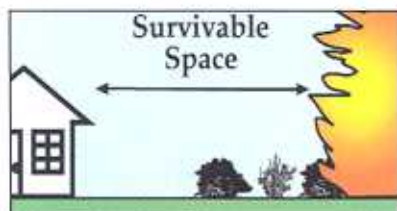
FLAME LENGTH	EFFECTIVE FIRE SUPPRESSION TACTICS
Less than 4 feet	Fireline constructed with hand tools, such as shovels and axes, can be effective at the front of the fire.
4 to 8 feet	Bulldozers and other heavy equipment will be needed to construct an effective fireline. Where bulldozers are not available, 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 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 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 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 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 is 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 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 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 section 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). These conditions give 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 R's of Survivable Space." The section "Creating an Effective Survivable Space" provides detailed information about changing vegetation characteristics of survivable space.

THE THREE R'S 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 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 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 "Survivable Space" 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.



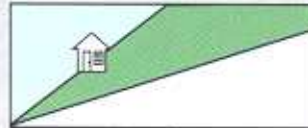
The local assessor's office can provide assistance if the owners of adjacent properties are unknown. Do not work on someone else's property without their permission. Temporarily mark the recom-



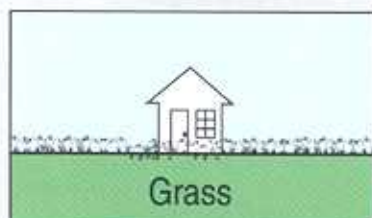
mended distance with flagging or strips of cloth tied to shrubs, trees, or stakes around home. This will be your survivable space area.

SURVIVABLE SPACE

RECOMMENDED DISTANCES - STEEPNESS OF SLOPE

	 Flat to Gently Sloping 0 to 20%	 Moderately Steep 21% to 40%	 Very Steep +40%
Grass	30 feet	100 feet	100 feet
Brush	100 feet	200 feet	200 feet
Trees	30 feet	100 feet	200 feet

VEGETATION TYPE



Wildland grasses (such as cheatgrass), weeds, and widely scattered shrubs with grass understory.



Includes shrub dominant areas such as sagebrush.



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.

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.

TYPES OF DEAD VEGETATION & RECOMMENDED PRACTICE



DEAD FUEL TYPE

STANDING DEAD TREE

RECOMMENDED PRACTICE

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 approximately 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).

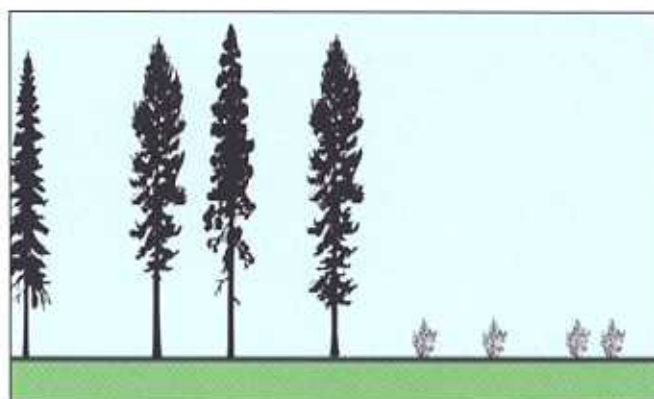
FIREWOOD AND OTHER COMBUSTIBLE DEBRIS

Locate firewood and other combustible debris (wood scraps, grass clippings, leaf piles, etc.) at least 30 feet uphill from the house.

STEP THREE:

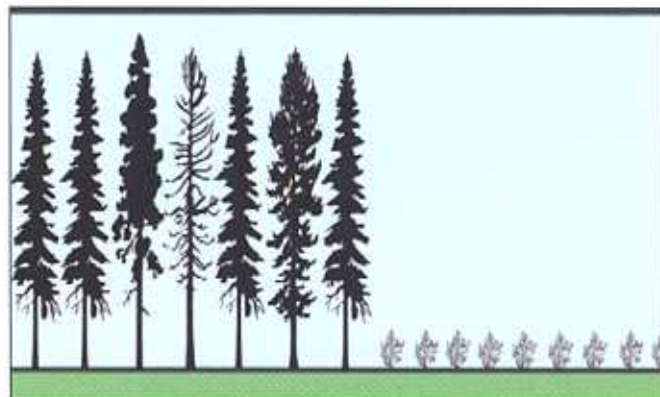
IS THERE A CONTINUOUS DENSE COVER OF SHRUBS OR TREES PRESENT WITHIN THE RECOMMENDED SURVIVABLE SPACE AREA?

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.



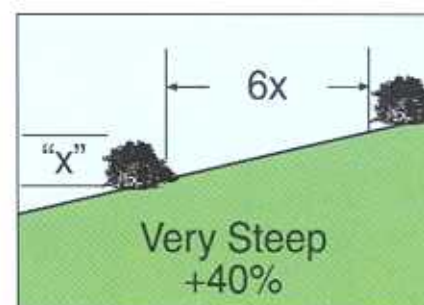
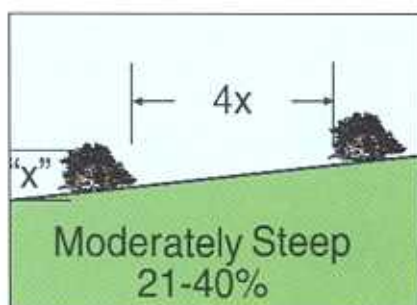
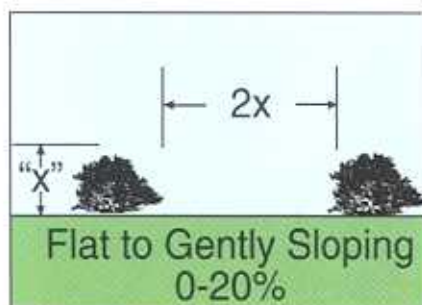
Widely Spaced Vegetation = Lesser Threat

More Dense Vegetation = Greater Threat



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.

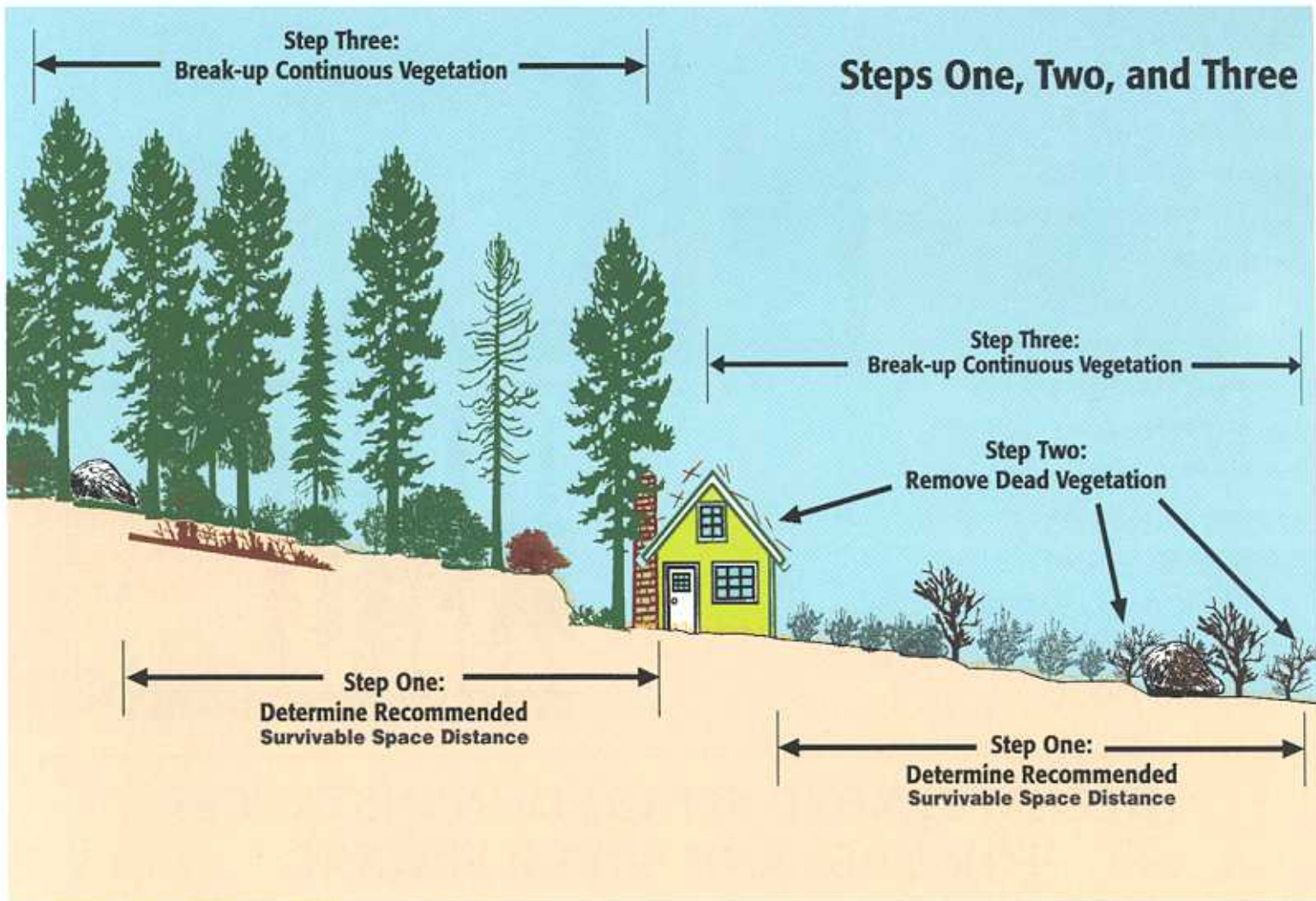


For example, if your home is located on a 10% slope and the brush is four feet tall, the separation distance would be two times the shrub height or eight feet.

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, pruning to reduce height may be the best approach.

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



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.

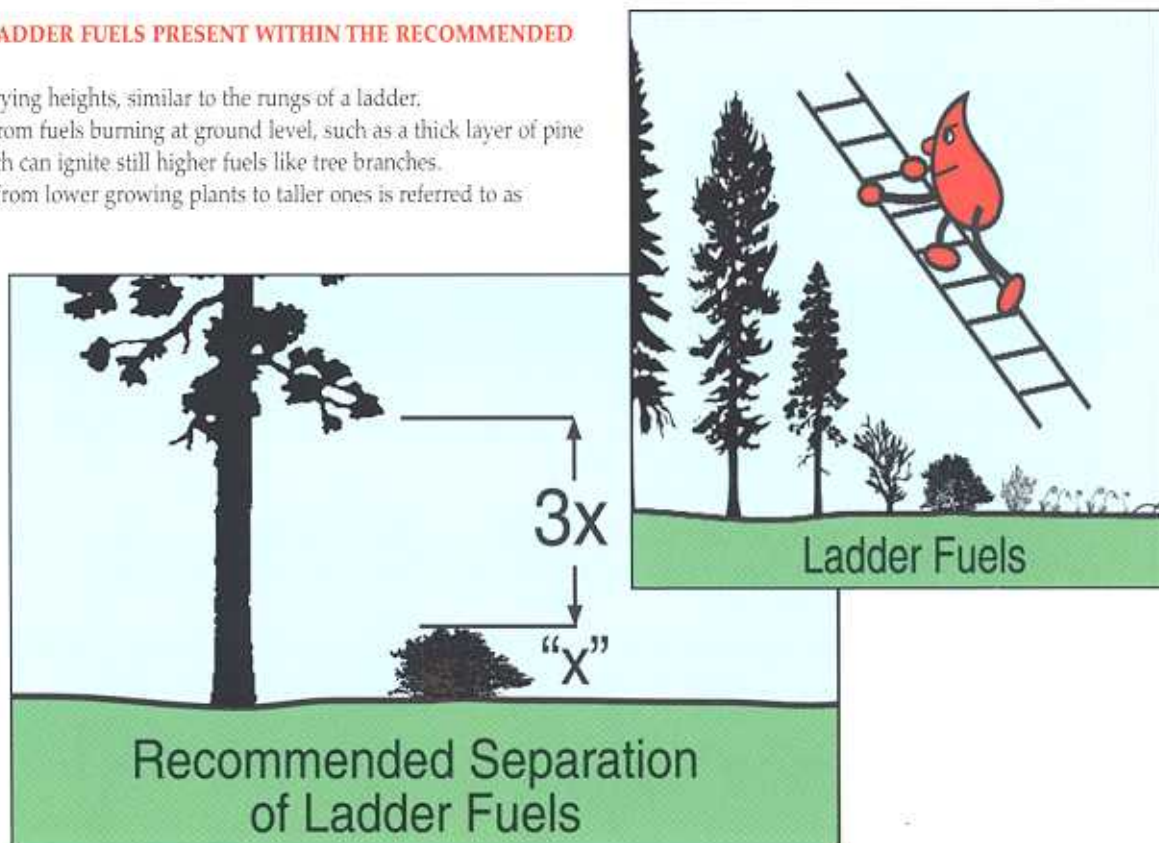
Under these conditions, flames from fuels burning at ground level, such as a thick layer of pine needles, can be carried to shrubs which can ignite still higher fuels like tree branches. Vegetation that allows a fire to move from lower growing plants to taller ones is referred to as "ladder fuel."

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 vertical 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 also 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.

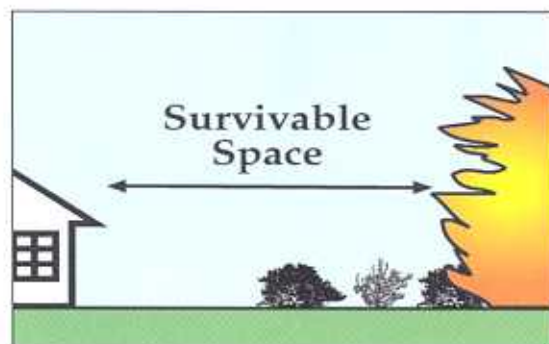
The "Lean, Clean and Green Zone Checklist" will help you evaluate the immediately adjacent to your house.

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.

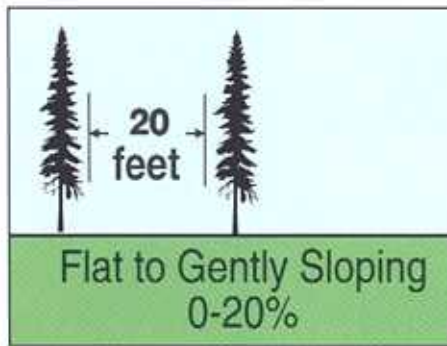
An effective survivable space can be quickly diminished through neglect.



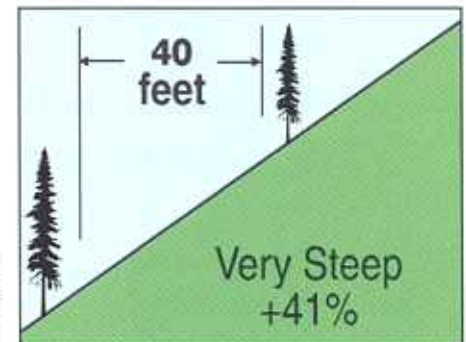
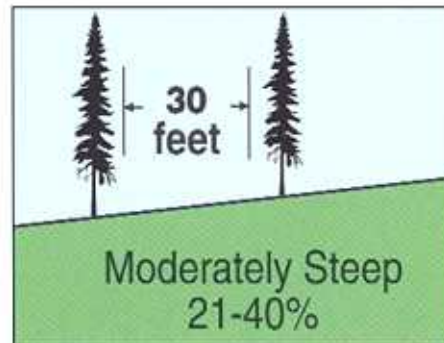
THE LEAN, CLEAN AND GREEN ZONE CHECKLIST

- 1** ✓ 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.
- 2** ✓ Emphasize use of mulches, rock, and noncombustible hard surfaces (concrete sidewalks, brick patios, and asphalt driveways).
- 3** ✓ 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.
- 4** ✓ Minimize the use of ornamental coniferous shrubs and trees (such as juniper, arborvitae, and mugo pine) and tall exotic grasses (such as pampas grass).
- 5** ✓ Where permitted, most wildland shrubs and trees should be removed from the zone and replaced with more desirable alternatives (see first check). 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.
- 6** ✓ 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.
- 7** ✓ Tree limbs within 15 feet of a chimney, encroaching on power lines, or touching the house should be removed.

RECOMMENDED SEPARATION DISTANCES BETWEEN TREE CANOPIES

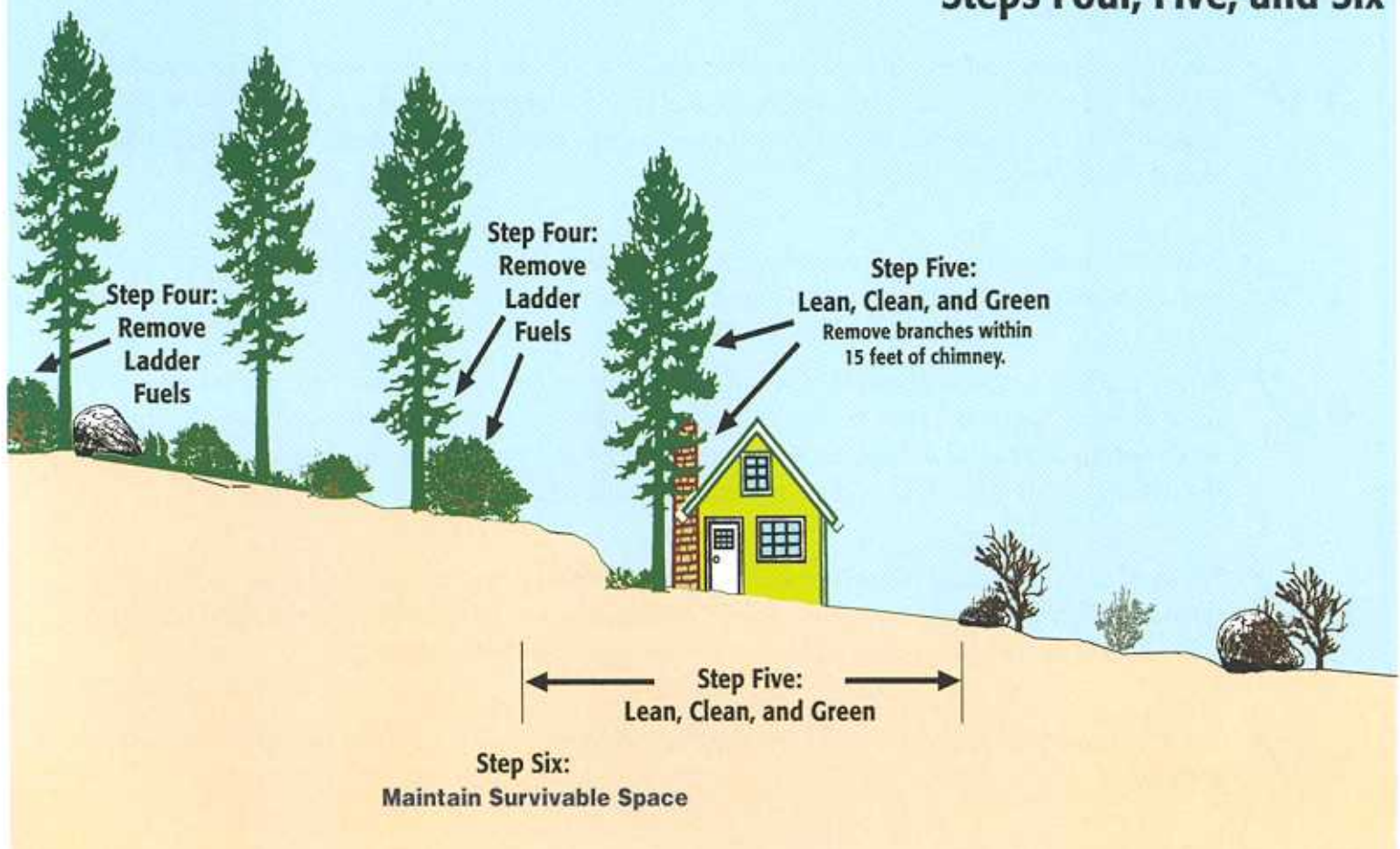


For forested areas, the recommended amount of separation between tree canopies is determined by steepness of slope. The specific recommendations are presented here. Separation distances are measured between canopies (outer most branches) and not between trunks.



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

Steps Four, Five, and Six





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 become firebrands, be lifted from

the burning roof, carried blocks away, and land in receptive fuel beds such as other combustible roofs.

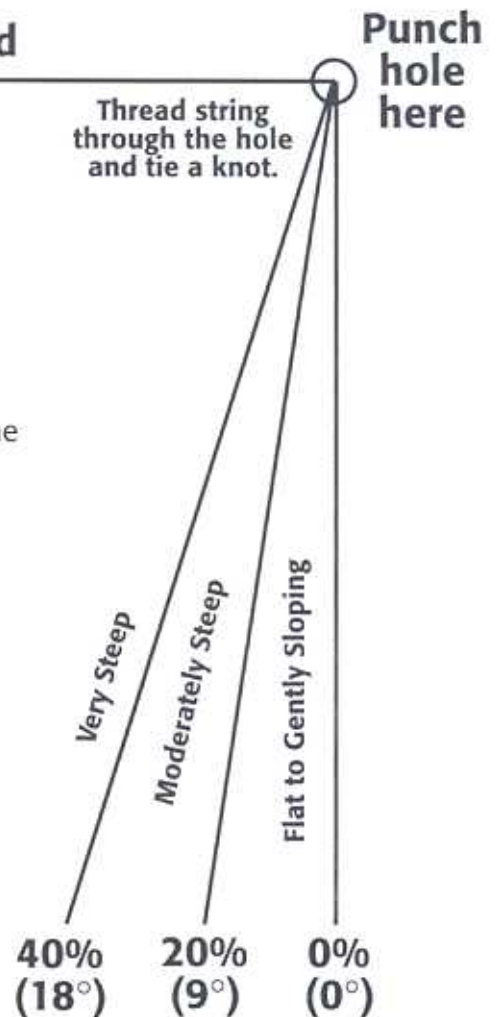
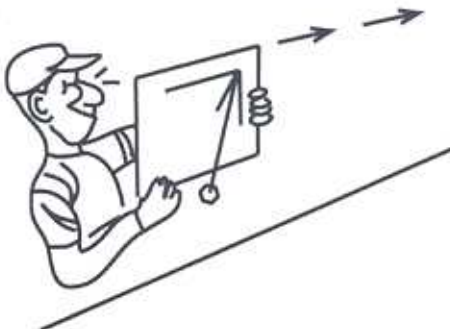
Unfortunately for homeowners with existing combustible roofs, there are no long-term reliable measures available to reduce roof vulnerability to wildfire other than re-roofing with fire resistant materials.

Homeowner's Guide to Calculating Percent Slope

Hold this line parallel to the ground

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.



FIRESCAPE: FIREWISE LANDSCAPE DESIGN

"When a wildfire comes through your neighborhood, could your house survive on it's 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 makes these plants burn with great intensity. Use ornamental grasses and berries sparingly



Lawn can be an effective landscape feature in a firescape

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 also 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 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 situation on a flat lot with little vegetation around it.

Boulders, sand, 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 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.

Firewise Plant Material for the Black Hills

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.

<i>Scientific Name</i>	<i>Common Name</i>		
SHRUBS...		Prunus americana	American wild plum
Arctostaphylos uva-ursi	Kinnikinnick,	Prunus virginiana	Western chokecherry
bearberry		melanocarpa	
Cornus sericea	Redosier dogwood	Salix amygdaloides	Peachleaf willow
Psycarpus monogynus	Mountain ninebark	Shepherdia argentea	Silver buffaloberry
Prunus besseyi	Western sand cherry	Sorbus scopulina	Western mountain ash
Ribes aureum	Golden currant		
Rhus sp.	Sumac		
Rosa woodsii	Woods or		
	native wild rose		
Shepherdia canadensis	Russet buffaloberry		
Symphoricarpos	Snowberry,		
	coral berry		
Viburnum edule	Highbush cranberry		
Yucca glauca	Great plains yucca		
LARGE SHRUBS & TREES...		FLOWERS & GROUNDCOVERS...	
Acer ginnala	Amur maple, Ginnala	Allium georgii	Geyer onion
	maple	Aquilegia coerulea	Colorado blue
Amelanchier alnifolia	Saskatoon alder-leaf	columbine	
	serviceberry	Arabis sp.	Rockcress
Betula papyrifera	paper birch	Artemisia frigida	Fringed sage
Celtis occidentalis	hackberry	Aster laevis	Smooth aster
Corylus cornuta	Filbert, beaked	Claytonia lanceolata	Spring beauty
hazelnut		Delphinium spp.	Delphinium
Crataegus spp.	Hawthorn	Epilobium	Fireweed
	(several native)	Erriogonum umbellatum	Sulphur flower
Fraxinus pennsylvanica	Green ash	Gaillardia aristata	Blanket flower
Gleditsia triacanthos	Honeylocust	Helianthella quinquenervis	Aspen Sunflower
Malus ssp.	Crabapple	Heuchera spp.	Coral bells
Populus tremuloides	Aspen	Ipomopsis aggregata	Scarlet gilia
		Leucocrinum montanum	Sand lily
		Linum lewisii	Wild blue flax
		Martensia lanceolata	Narrow-leaved
			chiming bells
		Oenothera caespitosa	White stemless
			evening primrose
		Pentstemon caespitosus	Mat penstemon
		Potentilla fruticosa	Leafy potentilla
		Scutellaria brittonii	Skullcap
		Sedum lanceolatum	Yellow stonecrop
		Thalictrum fendleri	Fendler meadowtrue

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 a wildfire.

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 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 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.

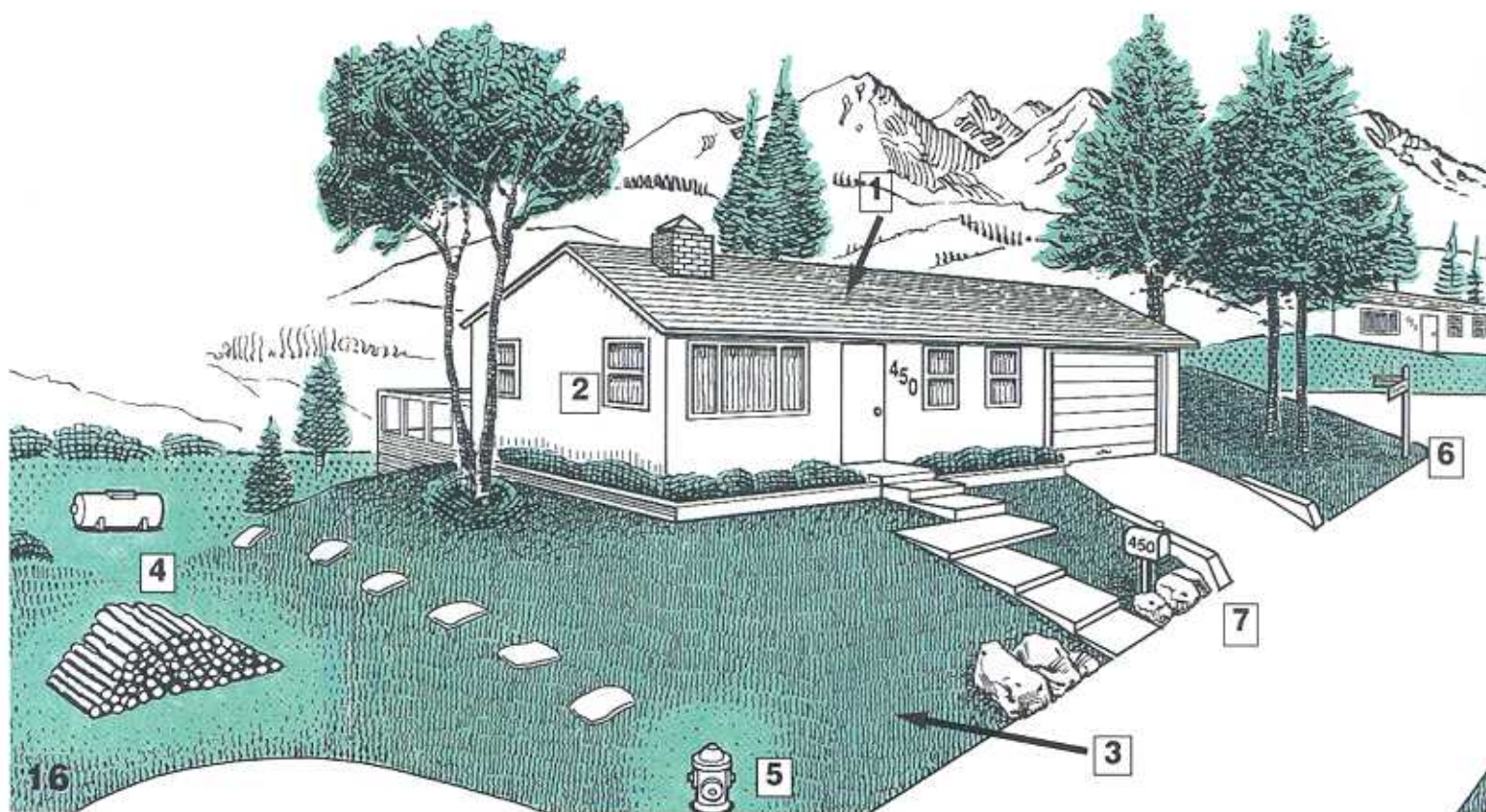
- Install only dual-paned or triple-paned windows.
- Consider sprinkler systems within the house. They may prevent a house fire from spreading into the wildlands.

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 mesh 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.

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.

The *Keep South Dakota Green* Association

The Keep South Dakota Green Association (KSDG) is a non-profit group founded in 1952.



The original thrust of the association was to deal with the increasing problem of man-caused forest and range fires.

Today KSDG promotes both fire prevention and prescribed fire, along with sustained yield, multiple use management of our natural resources.

Some of the activities sponsored by KSDG are:

- Project Learning Tree – an award winning environmental education program designed to teach teachers and other educators how to prepare their students to make wise decisions about conservation practices and natural resource use.
- South Dakota Tree Farm Committee – forest landowners, farmers and ranchers are encouraged to plant and grow stands of timber and shelterbelts to help protect our soil, conserve energy, provide wildlife habitat, provide useful products, and beautify our state.
- Outstanding Fire Service Award – Each year KSDG and the Rapid City Journal recognize a South Dakota fire department which has demonstrated exemplary conduct, made significant accomplishments in forest and/or range fire prevention, and made outstanding contributions to the community.
- Arbor Day – Each year KSDG encourages the citizens of the state to celebrate Arbor Day. Each year KSDG makes thousands of honey locust tree seed cards available to teachers and students free of charge.
- America's Holiday Trees – KSDG provided the Holiday Tree for the nation's capitol in Washington DC in 1955, 1970, 1997.

BURNING PERMIT INFORMATION

A burning permit is required for any open fire within the Black Hills Forest Fire Protection District (South Dakota Codified Law 34-35-16). Burning permits may be obtained by calling the toll-free burning permit hotline at 1-800-275-4955 for this information. Burning within the Black Hills Forest Fire Protection District without a burning permit is a class 1 misdemeanor. A class 1 misdemeanor is punishable by up to one year in jail or \$1,000 fine or both.



CHECK OUT THESE WEBSITES FOR FURTHER INFORMATION:



South Dakota Wildland Fire Suppression
www.state.sd.us/doa/wildland_fire



South Dakota Resource Conservation & Forestry
www.state.sd.us/doa/forestry/index2.htm



Keep South Dakota Green Association
www.state.sd.us/doa/fire/sd_green_association.htm



USDA Forest Service / Black Hills National Forest
www.fs.fed.us/r2/blackhills/



National Interagency Fire Center
www.nifc.gov



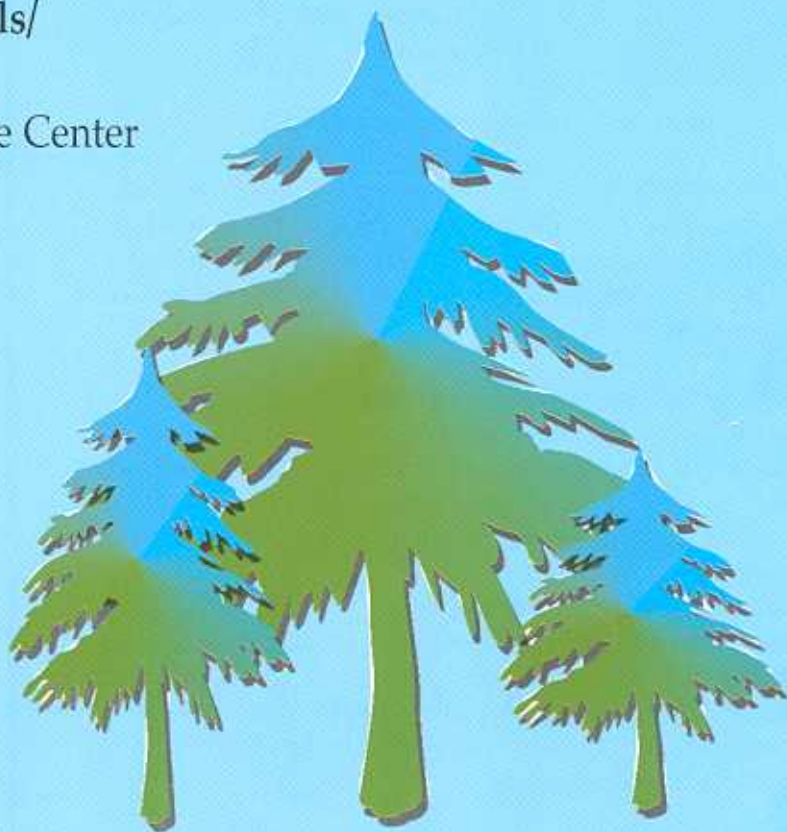
Smokey Bear
www.smokeybear.com



FIREWISE
www.firewise.org



FEMA
www.fema.gov



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