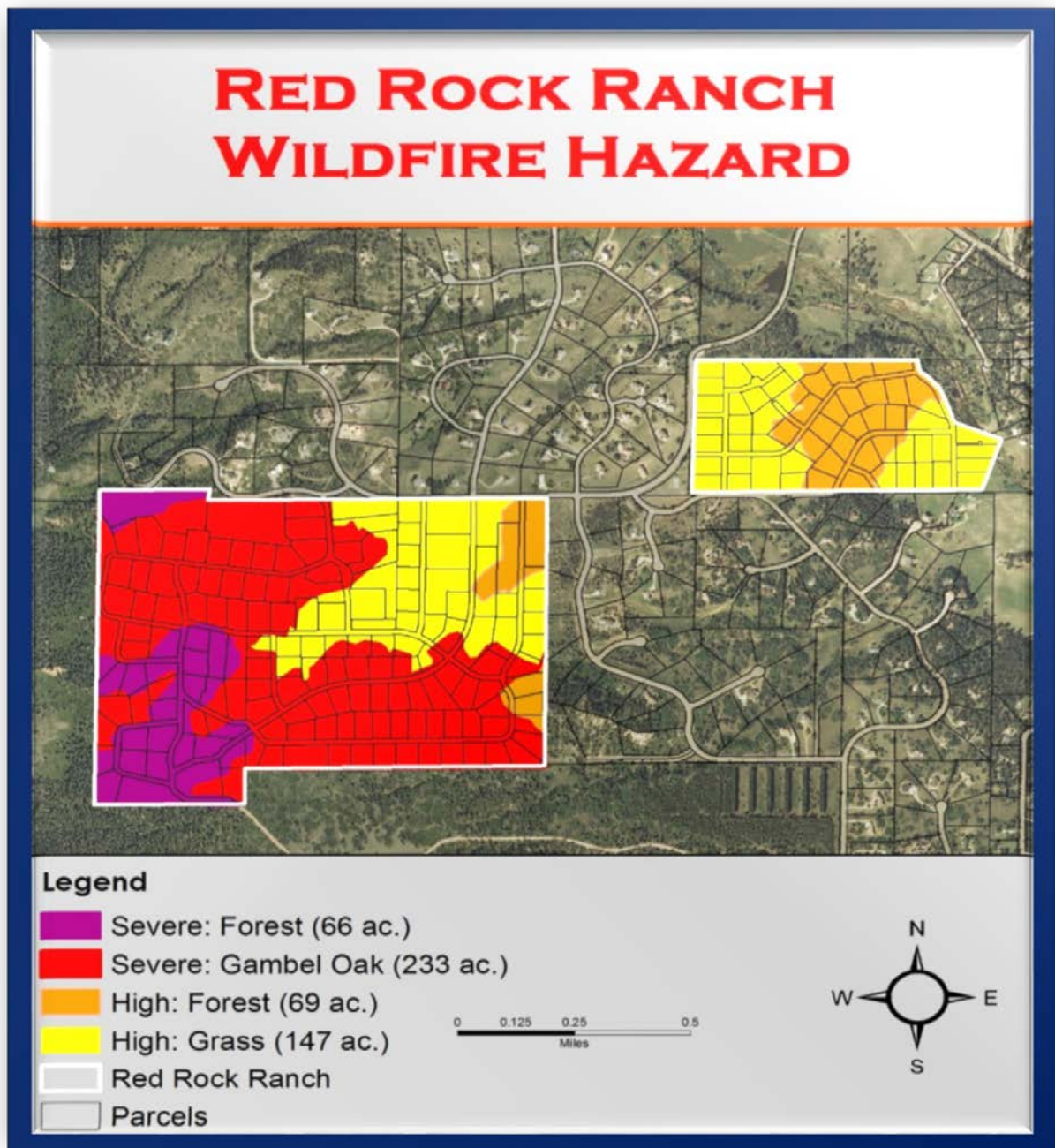


Community Wildfire Protection Plan

Red Rock Ranch HOA

March 2018



ACCEPTANCE


The Red Rock Ranch Community Wildfire Protection Plan (CWPP) was developed in accordance with the guidelines set forth by the Healthy Forests Restoration Act of 2003, and the Colorado State Forest Service's Minimum Standards for CWPP's.

This CWPP is a collaborative effort to guide the community's stewardship management activities, including wildfire protection. The activities recommended in this plan are appropriate to meet the community's objectives, and will benefit the natural resources and reduce the risk from wildland fire. This plan is voluntary, and, where possible, the community intends to apply the recommended practices, thus improving community preparedness, and increasing public safety.

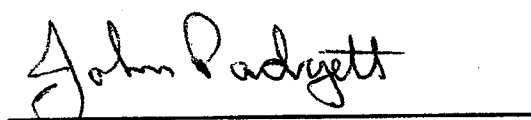
The Red Rock Ranch Community Wildfire Protection Plan has been reviewed and approved by the following:


Betty Lonnquist, RR HOA President

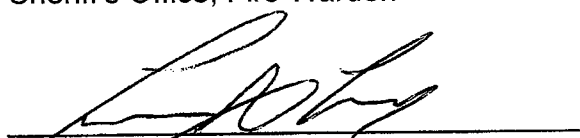
4/10/2018
Date


David Betzler, Firewise Committee Chair

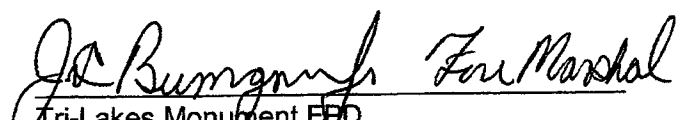
4/10/2018
Date


Sheriff's Office, Fire Warden

4/13/2018
Date


Larry Long, Supervisory Forester
Colorado State Forest Service

4/10/2018
Date


Joe Burroughs, Fire Marshal
Tri-Lakes Monument FFD

4/11/2018
Date

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PREFACE

Acknowledgments

We would like to thank several individuals for their invaluable support during CWPP development and planning, and for their assistance in forest health restoration and fuel hazard mitigation across the southern Front Range.

Dave Root of the *Colorado State Forest Service, Woodland Park District* has met with us and provided valuable technical advice to the HOA, Firewise Committee, and homeowners. We are especially indebted to him for his ready availability and willingness to support CWPP initiation, his dedicated leadership for regional Firewise and healthy forest efforts, and his knowledge and expertise in forest management.

Jamie Bumgarner, *Battalion Chief/Fire Marshal Tri-Lakes Monument Fire Protection District*, has also been instrumental in increasing awareness of the need for active and sustained wildfire mitigation and planning through wildfire presentations for HOA residents/homeowners at our annual picnic. He has also contributed significantly to our planning efforts, including emphasis on the importance of detailed homeowner preparation for the inevitability of wildfires along the Front Range.

This CWPP would not exist were it not for the support and encouragement of these professionals. We are thankful and appreciative of their organizations, and their personal dedication and commitment. They have had, and will continue to have, a tangible and lasting impact on our community and surrounding areas. Along with these professionals, we are committed to the cause of reducing wildfire hazard not only in our community, but across the region. As we move forward with our CWPP and action planning, we are mindful of the need to be available to assist other neighborhoods in their efforts to organize, engage and educate their residents on the urgent need for urban area/wildfire planning and action.

Many of the potential fire behavior elements of this plan are based on outputs from the Colorado Wildfire Risk Assessment Portal (CO-WRAP). CO-WRAP is a geographic information system based program that is used for planning and comparison of hazards over the entire state. It does not predict the actual fire behavior in a certain area on a given day. CO-WRAP uses long

**“MONUMENT, June 17 [1880]—
Just now the leading subject of
conversation here is the terrible
drouth that has prevailed so
long.**

**. . . For several weeks past the
mountains west of town have
been devastated by fires in the
forests inflicting untold damage
to the timber resources of the
country. Scarcely any
punishment would be too severe
for those careless freighters and
hunters who have been the
means of such a wholesale
destruction of timber.”**

**----Colorado Springs Weekly Gazette,
June 19, 1880**

term average weather conditions for analysis, not worst case predictions. Thus, it is not useful for assessing the highest risk situation. The actual fire hazard assessments used in this plan are the result of on site observations made by the Colorado State Forest Service and the Tri-Lakes Fire District Fire Marshall.

Prologue

Throughout Front Range history, Red Rock Ranch and surrounding areas have been directly affected or threatened by wildfires. The Red Rock Ranch/Mt Herman area has experienced and long been threatened by wildfires. The **1989 Berry Fire** started and burned in Mt Herman area, consuming 1,000 acres. **The 2002 Spaatz Fire** burned within one mile of the Mt Herman Estates area immediately adjacent to RRR. This human-caused wildfire had the clear potential to quickly burn through the entire Mt. Herman area, but thanks to the Monument-based U.S. Forest Service Pike Interagency Hotshot crew, air support was called in to contain the flames to 40 acres.

The human-caused **2002 Hayman Fire** started in Teller County, eventually consumed 138,000 acres over the next month, directly threatened neighborhoods in the Monument and Palmer Lake areas including Red Rock Ranch, and had area residents on evacuation standby for multiple days.

These historical wildfire incidents were merely backdrops to the highly publicized **2012 Waldo Canyon** and the **2013 Black Forest Fires** which lasted for days, destroyed hundreds of homes across broad areas, were closely tracked and monitored by area residents, and received widespread regional and even national media attention. Collectively, these two most recent and significant area wildfires, coupled with growing awareness of our area's high risk fire designation, have resulted in heightened resident interest in and action on coordinated urban area/wildfire planning and preparation.



Twenty-nine years after the Berry Fire burned up the side of Mount Herman, the burn scar is still visible above Red Rock Ranch and surrounding communities as if to emphasize their vulnerability to wildfire.

Thus, an initial group of focused and motivated neighbors and residents gathered and formed a CWPP planning committee, self-organized and directed to develop a Red Rock Ranch CWPP. We first met in May 2017 and have held monthly meetings since then for community mitigation planning and to assist in development of this CWPP. Homeowners joined together to analyze wildfire hazards in and beyond the Community, to encourage the creation of defensible space around homes, to harden our homes against fires, and to help ensure personal safety and structure protection through planned egress and evacuation. Our ongoing Firewise efforts are improving lines of communication between neighbors, and are contributing to the identification of wildfire vulnerabilities and recommendations for homeowner mitigation.

Now with the very recent unfolding of the devastating California wildfires, RRR residents are even more committed to the Firewise program and implementation of this CWPP. A wildfire is not a hypothetical intellectual discussion for our community. What we have we learned and what we plan to do is now contained in this CWPP.

Introduction

The forests and grasslands surrounding Red Rock Ranch have burned for millennia. Fire is a necessary part of the environment that removes decadent vegetation and stimulates vigorous new growth. It is only since European settlers established towns, farms and ranches on the land that fire became the enemy. With settlement, came a well-intentioned attempt to extinguish all wildfires, and while it was successful, homes people and commerce were protected.

The unintended consequence of wildfire suppression was that fuels accumulated to unnatural levels. Frequent wildfires reduced accumulated fuels so that fires tended to be low intensity, doing little damage to large trees or soils. Fuels in most forested areas have increased to such level that a fire ignited on a hot, dry and windy day may be unstoppable. As fuels increased so has population. At the time of the Berry Fire in 1989, Red Rock Ranch was pasture land.



This fuel reduction project in Black Forest illustrates the Fire Adapted concept. Fuel Treatment did not prevent the fire from burning the area but the fuel reduction lowered the fire's intensity. On August 2, 2013, about two months after it was burned, the rapid recovery of the forest is evident.

The Red Rock Ranch Community Wildfire Protection Plan adopts the Fire Adapted Community Concept. The community is in a wildfire prone environment, and no plan will change that. History shows that preventing forest fires was an illusion, so the objective of the CWPP is to create a Fire Adapted Community. Simply put, A Fire Adapted Community understands that fire cannot be eliminated, but works to protect itself through fuel reduction, increasing home fire resistance and neighborhood cooperation. Ultimately, a Fire Adapted Community can withstand a wildfire with little damage, and firefighters are able to successfully protect the community.

In response to the wildfire season of 2002, the US Congress passed the *Healthy Forest Restoration Act of 2003* that, among other provisions, encouraged communities to develop plans to reduce their wildfire risk. Subsequently, **Community Wildfire Protection Plans (CWPP)** have become the basic framework and vehicle for communities to assess wildfire risk, and to develop mitigation strategies and projects to reduce that risk. State legislation passed in 2009 by the Colorado General assembly, requires that plans list and prioritize community wildfire mitigation projects.

The Red Rock Ranch CWPP planning team was formed in May 2017, composed of a cadre of concerned, motivated and action-oriented residents (Elizabeth & Keith Lonnquist, HOA President; Tom & Paula Kelly; Dave & Barb Betzler; and Paul & Rosalia McKean) and significantly, Dave Root, Colorado State Forest Service Forester. Monthly summertime meetings largely focused on planning for Firewise USA designation and development of a Red Rock Ranch Community Wildfire Protection Plan/CWPP.

Throughout the summer, committee members reviewed a number of published regional area CWPPs, as well as held committee meetings and a wildfire mitigation presentation for homeowners at the annual RRR HOA picnic. The initial Draft CWPP was completed in October, and following homeowner coordination, should be completed and submitted to CSFS by April 2018.

Firewise™ USA 5 step process

- 1. Obtain wildfire risk assessment from state forestry agency, and update it every five years;**
- 2. Form a committee and create an action plan based on the assessment;**
- 3. Conduct a Firewise Day event;**
- 4. Invest minimum of \$24.14 per dwelling in Firewise actions for the year, and**
- 5. Create a Firewise Portal and submit application to State Firewise liaison.**

Throughout the CWPP, Red Rock Ranch will hereafter be referred to as the *community*. Summertime discussions and meetings have contributed to increased homeowner awareness of wildfire risks and hazards, and growing appreciation of the priority need for action. Additionally, there is increased community recognition of the need to develop defensible spaces around individual homes, to make home less prone to ignition, and to help ensure personal safety and community protection through safer evacuation and access by firefighters. Important CWPP collateral benefits have been the development of expanded networking and communication between neighbors, as well as increased homeowner cooperation and collaboration.

Purpose

Our purpose in creating a CWPP is to develop and implement a plan to help reduce wildfire damage, and to ensure safety and protection of the residents and their property. The plan has been developed in conjunction with the Colorado State Forest Service/CSFS, the Tri-Lakes Monument Fire Department/TLMFPD, and the United States Forest Service (USFS). The plan emphases include homeowner education and demonstration projects, as well as implementation steps and evacuation planning. At a top level, the plan will inform, guide and encourage Red Rock Ranch homeowners to work, individually and collectively to

reduce the wildfire hazard surrounding area homes and to foster a healthy forest. Finally, the CWPP is a dynamic or living document and will be revised and updated as conditions require.

Red Rock Ranch Community Values

Safety and protection of human life;

Protection of pets and livestock;

Safety and protection of property;

Protection of the environment and associated rural residential lifestyle.



This 1871 photo of Palmer Lake by pioneer photographer William H. Jackson illustrates how the density of area forests has increased over the 20th century. The larger amounts of fuel lead to more intense wildfires.

I OBJECTIVES

CWPP objectives are to develop an *actionable long term plan* that benefits property owners, infrastructure, forest restoration, and wildlife in the community. At a top level, the plan is intended to: **assess and prioritize the wildfire hazard** within/adjacent to the Community; **develop actionable recommendations to guide homeowners in wildfire risk reduction** for individual homes and other structures; and **develop a community risk mitigation strategy** as part of the plan to reduce the wildfire hazard while contributing to a healthy forest. Importantly, residents and homeowners are reminded that this is a **collaborative plan**, *not a mandate or directive*. Homeowners and landowners are under no obligation to perform the actions outlined in this plan; however, we are fortunate that most RRR residents recognize the need for individual as well as collective action.

Community Values At Risk

Community residents chose to live here for a variety of reasons including the surrounding natural beauty, desire for a semi-rural lifestyle, and property sizes that allow for privacy without isolation, yet are supportive of a strong sense of community. Following is our prioritized list of community values:

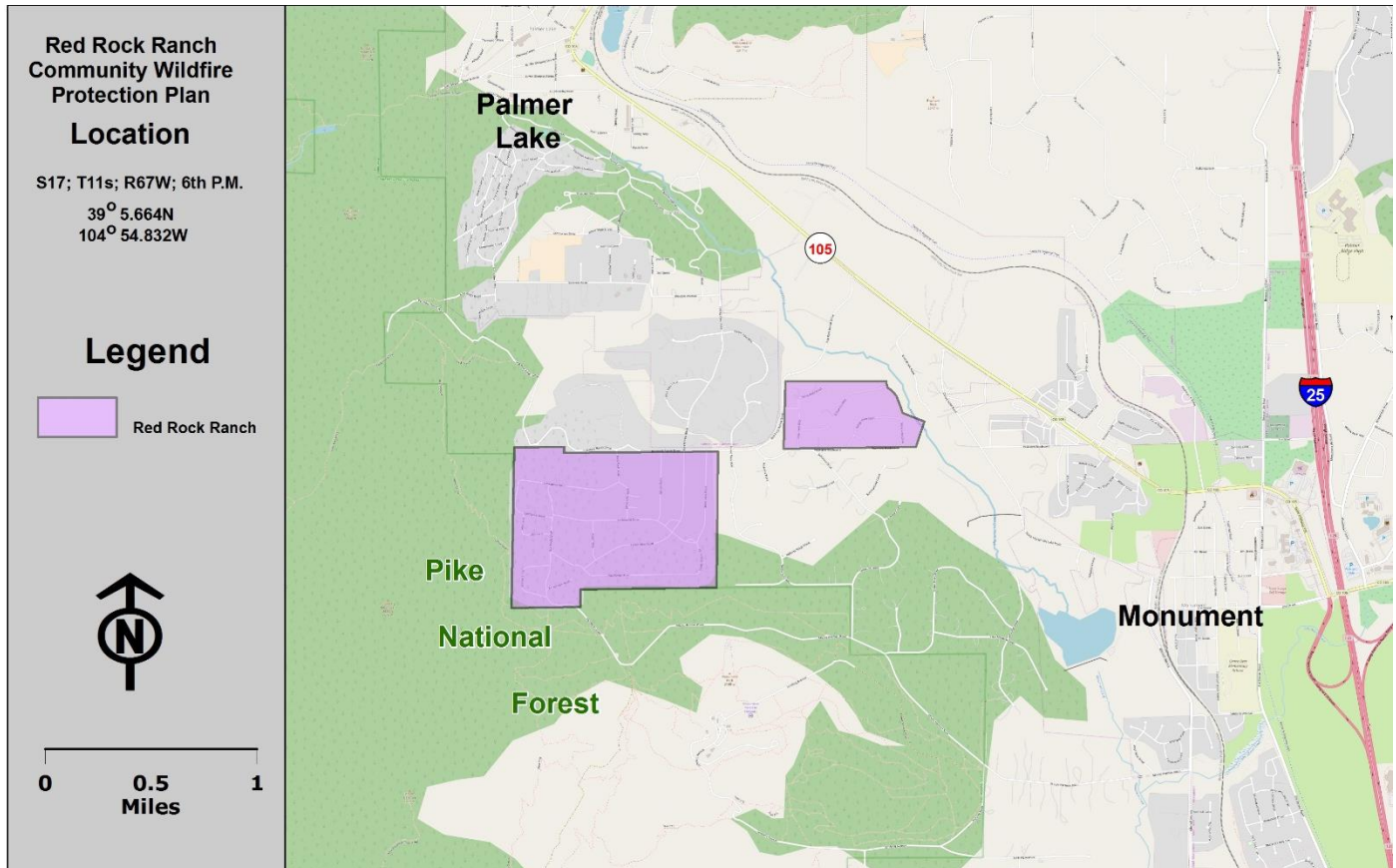
- ***Safety and protection of human life;***
- ***Protection of pets and livestock; safety and protection of property;***
- ***Protection of the environment and associated rural residential lifestyle.***

The CWPP is designed to:

- 1. Assess wildfire risk to properties, forest and wildlife;**
- 2. Provide vital information and encouragement to create defensible space for each home;**
- 3. Advocate for and support community-wide risk reduction and fuel mitigation;**
- 4. Help reduce risk of catastrophic wildfire;**

II RED ROCK RANCH COMMUNITY

Location and Description



Red Rock Ranch is a community of 550 residents located in northern El Paso County, midway between Monument and Palmer Lake and nestled against the Front Range. We are bounded to the north by Forest View Estates HOA, the Town of Palmer Lake and ultimately the Douglas County line/Palmer Divide; Highway 105 and Town of Monument to the east, and Pike National Forest including Raspberry Mountain and Mount Herman to the west and south.

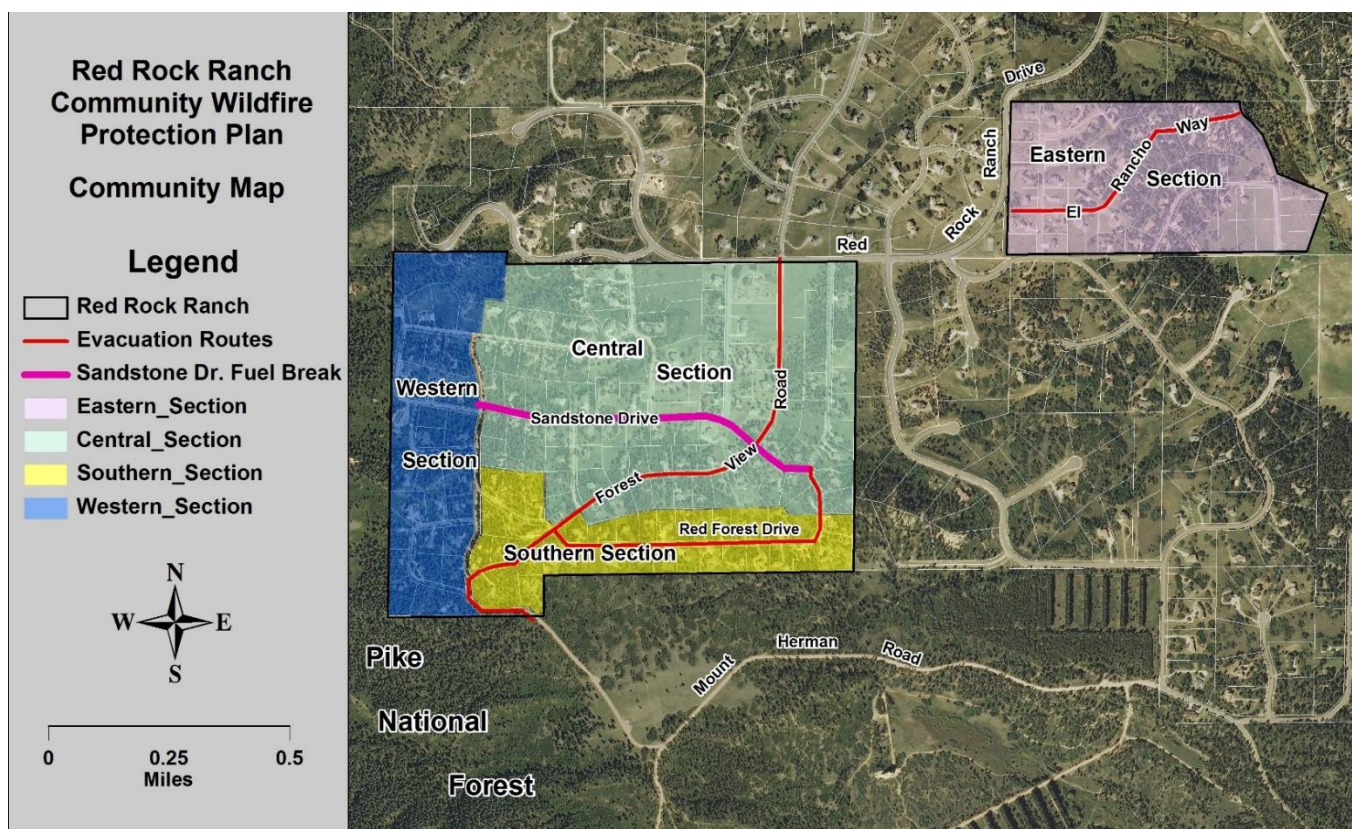
The Pike Forest is heavily used by local residents and in the last few years has witnessed a major traffic increase from new residents as well as regional/statewide visitors. The Community is fortunate to have **two evacuation routes**, *State Highway 105 and El Paso County's Mt Herman Road*. In the event of an evacuation, the official designation of community evacuation will be determined by the El Paso County Sheriff, depending on the expected fire behavior and direction of spread.

Red Rock Ranch Drive leads north and east to State Highway 105. Fuels along this route are variable. Immediately north of the community the road traverses a mixture of Gambel oak and conifer forest for about one half mile. CO-WRAP predicts 4 to 12 foot flame lengths and high fire intensity along this route. The potential for severe fire behavior along the route poses a danger to evacuating residents and firefighters attempting to access the community. Cooperation with landowners along this route to create shaded fuel breaks adjacent to the road

is necessary to make the road safe for evacuation or access. North of the forested area, the road traverses open grassland. Grass fires can block evacuation and hamper access to Red Rock Ranch.

Red Rocks Drive also leads south towards Mount Herman Road. This road has dense stands of Gambel oak along the right of way west and south of the community boundary, and could be blocked by flames. CO-WRAP predicts four to nine for flame lengths and moderate to high intensity fires along the road. Furthermore, Mt. Herman Road east towards Monument also has dense fuel adjacent to the road, and could be blocked by a fire. A cooperative effort with El Paso County and private landowners is necessary to reduce fuels and provide safe ingress and egress for all residents of Red Rock Ranch and adjoining communities.

Influence Areas



The community encompasses approximately 340 acres and contains 212 lots, 204 owners, and 185 dwellings. Lot sizes generally range from 1-3 acres. The open space/common area includes a picnic area and tennis courts and is approximately 25 acres. Most of the common area is grassland, interspersed with a few mature pine trees. To the south and west lies Pike National Forest which encompasses a public hiking/biking/horse trail system, as well as numerous unofficial or 'social' hiking trails.

For the CWPP, **the community is divided into four sections: Central, Southern, Eastern and Western.** This approach provides a logical geographic separation and simultaneously

encourages 'ownership' or buy-in by homeowners for mitigation projects in their proximity or neighborhood.

The Central Section is bounded on north by Red Rock Ranch Drive, on east by Stone View Road, on south by Red Forest Road, and on the west by Red Rocks Drive. The Central area comprises approximately **115 properties/homes** within approximately 175 acres; and consists of multiple stands of conifer, pockets of dense Gambel oak (some continuous), as well as open grassland areas.

The Eastern Section is bounded on the north by Sierra Vista Road / El Rancho Way, on the east by Vista View Drive, by Range View Road/Mesa Verde Road on the south, and on the west by Red Rock Ranch Drive. The section contains **54 properties/homes** within a 55 acre area served by both paved and gravel roads, some with very steep gradients. This section also has a Wide drainage choked with Gambel oak creating a heavy fuel load that in windy conditions could become a funnel for wildfire acceleration and spread. Conifer stands are intermixed with pockets of Gambel oak, some in dense clumps.

Southern Section The southern section of roughly 50 acres and **30 homes** borders Pike National Forest lands, and consists of multiple conifer stands and overstory, and heavy growths of mature Gambel oak (Severe fuel type). The section is bisected by a steep paved road and incised at easternmost end by broad gully choked with Gambel oak creating a heavy fuel load. The effect of wind channeling and fuel loading mark this gully area as a potential wildfire wick or fuse that could readily and rapidly funnel a wildfire from one zone to another.

West Section This roughly 25 acre section contains **28 properties** west of Red Rocks Drive, lies at or above 7400 feet, borders the steeply forested Pike National Forest lands along foot of Raspberry Mountain, and contains a mix of dense conifer stands and over story, surrounded by heavy growth of mature Gambel oak. Its fuel type is rated Severe. Roads are both paved and gravel, include portions of Red Rocks Drive, Abo Circle and Granite Circle.

Topography is best described as rolling with some steep slopes of short distance, but there are a number of drainages or sloping terrain within the area. Due to heat rising up the drainage, drying out fuels above a fire, these drainages would act as natural chimneys and push fire up the drainages. Dense stands of Gambel oak and scattered conifers fill the drainages adding to the hazard, and these should be a *high priority for fuel reduction*. If a severe fire occurs west of the community, the *drainages would be subject to flash flooding* like that seen after the Waldo Canyon Fire. Monument Lake lies at the base of these drainages and would be subject to sedimentation and water quality degradation from post fire flooding. Situated on a high desert plain roughly 7400 feet above sea level on the northern slope of the Palmer Divide (i.e., Monument Hill), the watershed area feeds into Monument Creek, Monument Lake and ultimately Colorado Springs and Pueblo.

III COMMUNITY FIRE RISK ASSESSMENT

On June 13, 2017 CSFS Dave Root met with the Firewise Committee members and conducted a community drive-through and survey in order to assess the fuel and wildfire hazards. All the roads were driven, and fuel conditions and other observations were noted.

The CSFS assessment for Red Rock Ranch addresses the wildfire-related characteristics of the Red Rock Ranch area. It examines the area's exposure to wildfire as it relates to ignition potential. The assessment does not focus on specific homes, but examines the community as a whole. Included in the assessment are observations made while visiting Red Rock Ranch. The assessment addresses the ease with which home ignitions can occur under severe wildfire conditions and how these ignitions might be avoided within the home ignition zones of affected residents. Of note, the assessment highlights that wildfire behavior will be dominated by the residential characteristics of the RRR area. The good news is that by addressing community vulnerabilities, residents will be able to substantially reduce their exposure to loss. Relatively small investments of time and effort will reap great rewards in wildfire safety.

Within the Community, **streets** are up to current subdivision codes, and it is equipped with fire hydrants. A few dead end cul-de-sacs exist, but these are short and have adequate turn around areas. Many landowners have completed fuel reduction along the subdivision streets, but many others have not. Untreated fuels along the streets, will limit the ability of firefighters to protect homes in the community and safely operate and travel through Red Rock Ranch during a fire.



Dense concentrations of fuel along the roads are one of Red Rock Ranch's worst hazards. If the fuel along the road were burning, evacuation and firefighter access would be cut off.

Many homes in the community have good fuel reduction and could be safely defended by firefighters. Those homes where fuels are not reduced would not be safe for firefighters to defend. Homes without proper fuel reduction are sure losses, but also threaten their neighbors. Specific recommendations for hazard reduction are in Sections Five, Six and Seven of the assessment. Homes in open grass areas also have a serious fire risk. Higher winds in open grass areas would push the fires rapidly through the grass and the flaming front would move quickly. Fine fuels such as grass and herbaceous plants dry quickly, often within hours after a rain, and ignite easily. Residents should know that rapidly moving fires in grass can burn and damage homes. Risk reduction in grass fuels is as necessary as in forested areas.

Most homes are wood siding or stucco, and most have a wooden deck attached. All of the homes, except one, had a Class A fire resistant roof. Closer inspections of homes was not possible as the assessment team did not enter private property. Homeowners should read information in Section Five and use that information to closely inspect their homes. Homeowner fire assessment visits are available from the Monument Tri Lakes Fire Protection District or the Colorado State Forest Service.

Fire Behavior

Wildland fires have been studied in great detail to help predict fire behavior. Predicting a fire's intensity, rate of spread, duration, direction and spot-fire production is important for firefighter safety, and is the basis for tactical decisions made during suppression of a fire. *Three factors effect wildland fire behavior:* fuels (type, continuity and density of surrounding vegetation, in addition to flammable structures), weather (wind, relative humidity, temperature and atmospheric stability), and topography (terrain features including steepness and aspect of slopes, gullies and incised channels, etc). The only factor we can have direct influence over is fuel.



Fuels vary through the Community and generally can be divided into *grass, brush or shrubs, timber/forest, or woody debris*. The area has ponderosa pine stands of varying densities as well as open ponderosa with a Gambel oak understory; clumps of brush or shrubs in proximity to structures; woody debris fallen under trees, and open grass areas. All plants can burn under extreme conditions, such as drought. However, plants burn at different intensities and rates of consumption. The amount of moisture in fuels is the biggest factor affecting flammability. The *ponderosa pine and ponderosa/Gambel oak fuel types pose a severe risk of intense crown fires* producing high amounts of heat and danger to residents and firefighters. The amount of heat produced when these fuels burn would be lethal.

Weather is the major, highly variable factor affecting fire behavior (i.e., time, intensity and location).

Wind: Surface winds are the most important element in determining fire direction and rate of spread. Wind pushes flames into adjacent fuels, facilitating rapid ignition. High-velocity, warm, dry, downslope winds such as Chinook winds can cause fuels to dry rapidly, resulting in extreme fire behavior. In the Colorado foothills, winds tend to flow up valleys and slopes in the

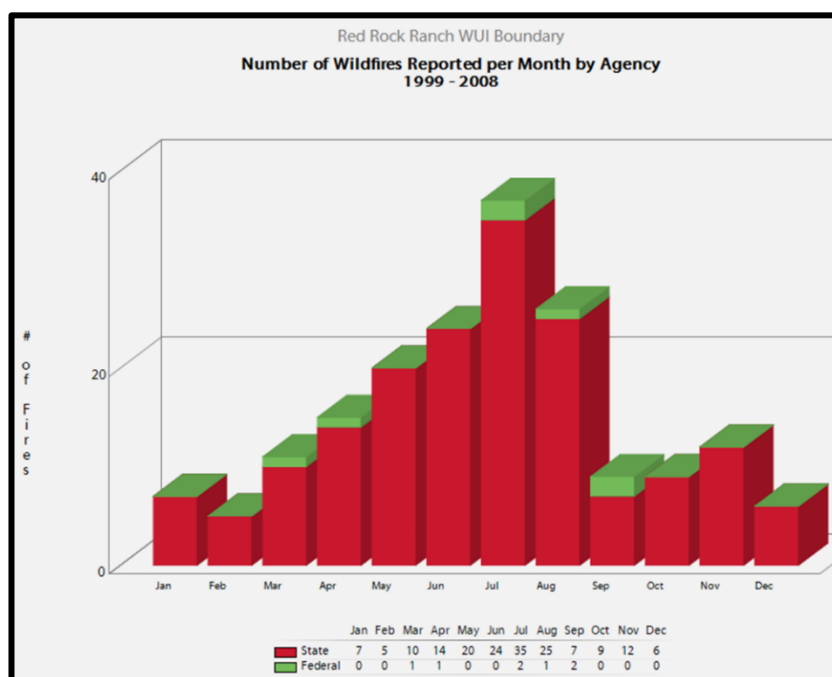
early hours as the east facing hillsides are heated by sunlight. Winds generally shift to downslope and down valley later in the day as the temperature gradient shifts.

Relative Humidity: Relative Humidity is a measure of how much moisture is in the air compared to the maximum amount of moisture the atmosphere can hold at that temperature; and it has a major influence on the moisture content of dead fuels. The smaller the dead fuel, the faster it will react to a change in the RH. Cured grass can dry out in less than 15 minutes when a dry air mass moves into an area.

Temperature: Before combustion can occur, fuels must reach ignition temperature (approximately 450° F). Fuels heat up to ignition temperature more quickly on hot days, and on a steep slope, fuels can be preheated from flames below and will burn at a higher intensity.

Climate: The main fire seasons on the Front Range tend to be split, with most large fires occurring in the late spring or fall; however, large fires can occur anytime conditions are conducive.

The chart at the right is compiled from wildfire reports in Red Rock Ranch and the surrounding area. As expected most fires are reported during the warm months, but wildfires can happen any month of the year. Anytime there is low humidity, warm temperatures and strong winds a wildfire is possible.



Topography *Slope* is defined as the angle of the ground relative to the horizon, commonly measured as the percentage of rise-to-run. On calm days, heated air and flames rise and preheat fuels upslope, which causes an increase in fire spread. Gentle slopes have less effect on fire behavior; steep slopes have a significant impact. Dissected terrain such as incised gullies can cause a chimney effect, increasing potential rate of spread as fire runs up the main channel and sides of the gully. The combined effect of slope and wind can cause extreme fire spread. The community is generally on gentle slopes of less than 15%. Exceptions are for the far western periphery and southern boundary with Pike National Forest where slopes increase to 30%, and along short reaches within drainages.

Aspect is the direction the slope faces. The Community is located primarily on an east aspect, with short-reaching variations in drainages. This east aspect is generally a positive in terms of fire behavior. In general, south/southwest aspects are warmer and drier. Similarly, south/southwest aspects generally have lighter fuels and more sun exposure, and susceptibility to fast-moving fires. North, northeast and east aspects generally have heavier fuels and tend to be susceptible to slower-moving surface fires.

Terrain: Topography influences fire behavior principally by the steepness of the slope. However, the configuration of the terrain such as *narrow draws, drainages*, etc. can influence fire spread and intensity. In general, *the steeper the slope or drainage, the higher and faster the uphill fire spread and intensity*. Drainages, even small ones, act like natural chimneys that draw air up the drainage pushing a fire with it. Homes in drainages or at the top of drainages are especially vulnerable to wildfire.

Fuel Types in Red Rock Ranch

All plants can burn under extreme conditions, however, plants burn at different intensities and rates of consumption. The *type and density of a specific plant determines how it will burn*. Some vegetation rarely burns, while other vegetation burns at different times of the year. Some can burn almost anytime. The *amount of moisture in fuels is the biggest factor affecting flammability*.

Grasslands: Grass primarily exists in two conditions – green and cured. When *green*, moisture content is high enough to prevent or decrease fire spread. Firefighters sometimes use green meadows and lawns as safety zones. *Cured* grass has the potential to promote extreme fire **rates of spread (ROS)**. *Grassy fuels, also termed flashy fuels, have the highest potential ROS of any vegetation type*. Another hazard associated with cured grass is the potential for a rapid decrease in fuel moisture. Grasses that were moistened during a rainy night can become extremely dry within a few hours after sunrise, resulting in sudden changes in fire behavior. *Noxious weeds* can also be flashy fuels with similar characteristics and ROS potential as grasses.

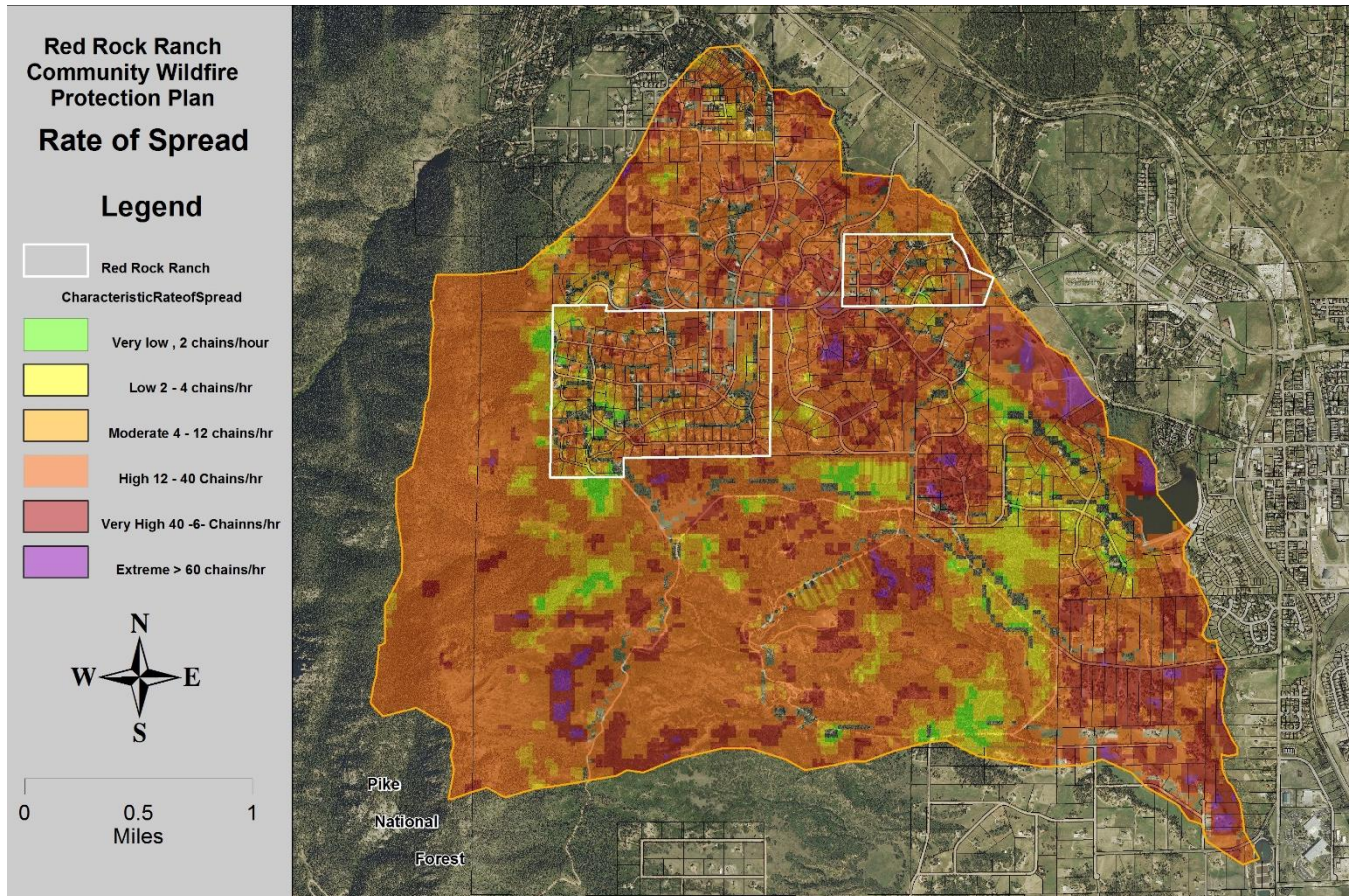
Grassland with scattered trees (i.e., fine fuels): Typically light, flashy fuels with scattered yucca, tri-leaf sumac, mountain mahogany and Gambel oak. Occasional scattered ponderosa pine, Rocky Mountain juniper, pinon pine or Douglas fir. Moderate understory fuels may be present that can contribute to small areas of crowing. Noxious weeds include diffuse knapweed, yellow toadflax, common mullein, Canada thistle, Russian thistle, wild mustard and cheatgrass. The latter in particular can greatly increase wildfire spread. Tumbleweeds (primarily dead knapweed and Russian thistle) pose a serious hazard with the potential of spreading wildfire in wind events.

Brush: *Brush fires spread slower than grass fires, but burn at a much higher intensity.* Gambel oak is extremely flammable, especially before leaf-out in spring and after dormancy in the autumn. Considerable dieback in oak has increased the portion of dead wood, exacerbating the fuel hazard. Brush is least flammable in late spring when new growth occurs. *Surface fires* consume fuels on the forest floors, which may scorch but generally not consume trees. Surface fires were the common type of wildfire in this area before settlement and fire suppression. Individual trees that burn are referred to as *torching*.

Woody Debris: Dead logs, branches, duff, leaves and needles on the ground surface are referred to as *woody debris*. Fires in these fuels vary greatly, but can produce high-intensity, slow-moving fires that are very difficult to control. Some woody debris on the forest floor is desirable as habitat and cover for small wildlife. Isolated down logs are not a serious wildfire threat. Isolated down logs can and should remain in fuel reduction projects. Jackstraw wood and concentrations of woody debris constitute a far more serious hazard, and should be eliminated.

Forest: Broad stands of mature trees (generally coniferous/pine or deciduous/aspen) as well as smaller growths or groups of trees are referred to as forested. Ponderosa pine, Douglas fir, aspen, Russian olive and juniper have varying degrees of ignitability: *Crown fires* occur when entire stands of trees are totally consumed. *These fires are the most intense and devastating.* Coniferous trees are more susceptible to crown fire than deciduous trees. *Torching and crown fires are the major source of ember production* that can start new fires (spot-fires) in vegetation and structures downwind. The Waldo Cañon and Black Forest Fires are examples of crown fires at their most destructive intensities.

Fuel Complexes: *More than one fuel component is present in most wildland areas.* Additionally, the effect of a burning structure can significantly impact fire behavior, as structures burn with extreme intensity, often launching large burning embers over long distances. *The Red Rock Ranch CWPP area contains all four wildland fuel categories: grass, brush, timber and woody debris.* The latter two are combined since most woody debris is present in the forested areas along the west edge of the CWPP area. Fuel Type descriptions for the Community and a Fuel Hazard Map follow in this chapter

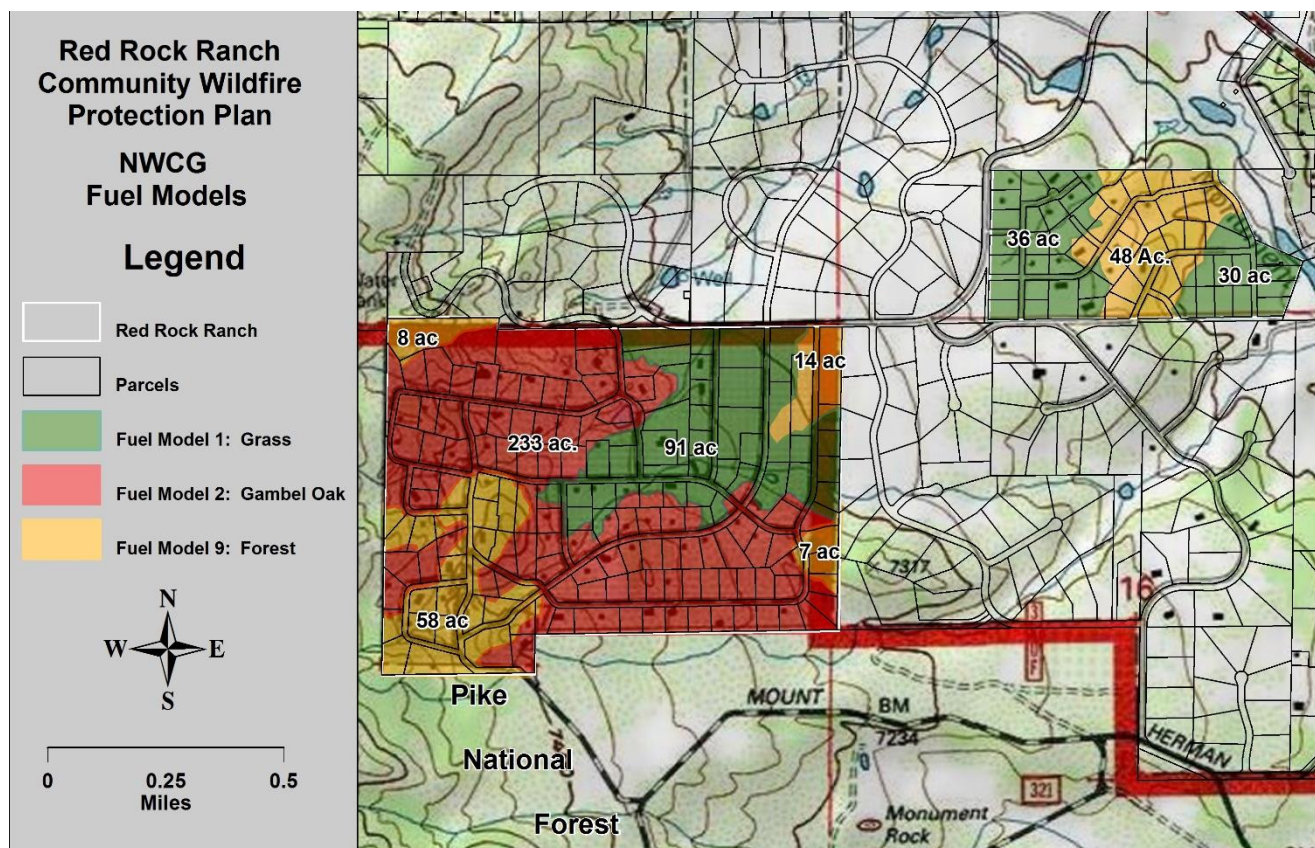


The Predicted rate of fire spread for the Red Rock Ranch area in chains per hour. A chain is 66 feet. The map shows high rates of spread making fire control difficult and dangerous.

Fuel models in Red Rock Ranch

Of the three factors that determine fire behavior only fuels can be manipulated to reduce wildland fire intensity. Thus it is necessary to map the fuel types of Red Rock Ranch, and the potential fire behavior in each type to accurately assess potential fire behavior and to prescribe fuel treatments.

In the wildland, the type and arrangement of vegetation is the fuel that feeds a fire. Any conclusions made about the severity of a wildfire must begin with knowledge of the fuels on the ground. A large body of research shows that, as a fire passes from one fuel type to another, from forest to grass, for example, fire behavior changes in predictable ways. The National Wildfire Coordinating Group (NWCC) has published a list of 13 different fuel models that are used for prediction wildland fire behavior.¹



In populated areas like Red Rock Ranch, there is an extra element that is not considered in the fuel models, and that is the homes themselves. Homes and the fuels associated with them could be considered a fuel type by themselves, and they can contribute to fire intensity and fire spread. This concept will be developed further in other sections of the plan, but, at this point, homeowners must understand the mitigation of the hazards associated with the home is as important as reduction of the wildland fuels.

¹ Anderson, Hal E. 1982. *Aids to Determining Fuel Models For Estimating Fire Behavior*. USDA. General Technical Report INT – 122. National Wildfire Coordinating Group.

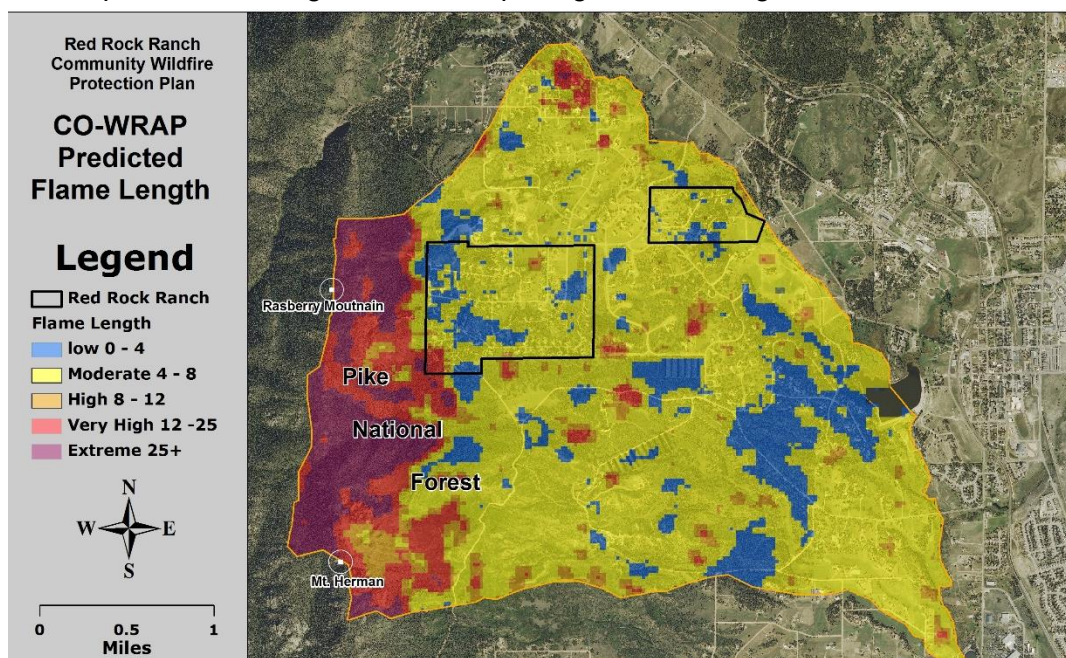
The terms torching, spotting and crowning as used in the descriptions should be defined at this point. Torching (or torching out) refers to a single tree burning in the green needles of individual tree. The fire in this situation does not spread from crown to crown. Crowning refers to a crown fire where all the upper portions of the trees are burning and the fire burns through the upper canopy of the forest. Spotting refers to the process of new fires starting ahead of the main fire as the result of burning embers (firebrands) being transported by the winds associated with the fire.

Three of the NWCG fuel models comprise the fuels in Red Rock Ranch. Following are the models and their NWCC descriptions:

Fuel Model One, Grass: Fire spread is governed by the fine, very porous, and continuous herbaceous fuels that have cured or nearly cured. Fires are surface fires that move rapidly through the cured grass and associated material. Very little shrub or timber is present, generally less than one-third of the area.

Fuel Model Two, Gambel Oak: Fire spread is primarily through the fine herbaceous fuels, either curing or dead. These are surface fires where herbaceous material, in addition to litter and dead-down stemwood from the open shrub or timber overstory, contribute to the fire intensity. Open shrub lands and pine stands or scrub oak stands that cover one-third to two-thirds of the area may generally fit this model; such stands may include clumps of fuels that generate higher intensities and may produce firebrands.

Fuel Model Nine, Forest: Both long-needle conifer stands and hardwood stands . . . are typical. Closed stands of long-needled pine like ponderosa, Jeffrey and red pines or southern pine plantations are grouped in this model. Concentrations of dead-down woody material will contribute to possible torching out of trees spotting and crowning.”

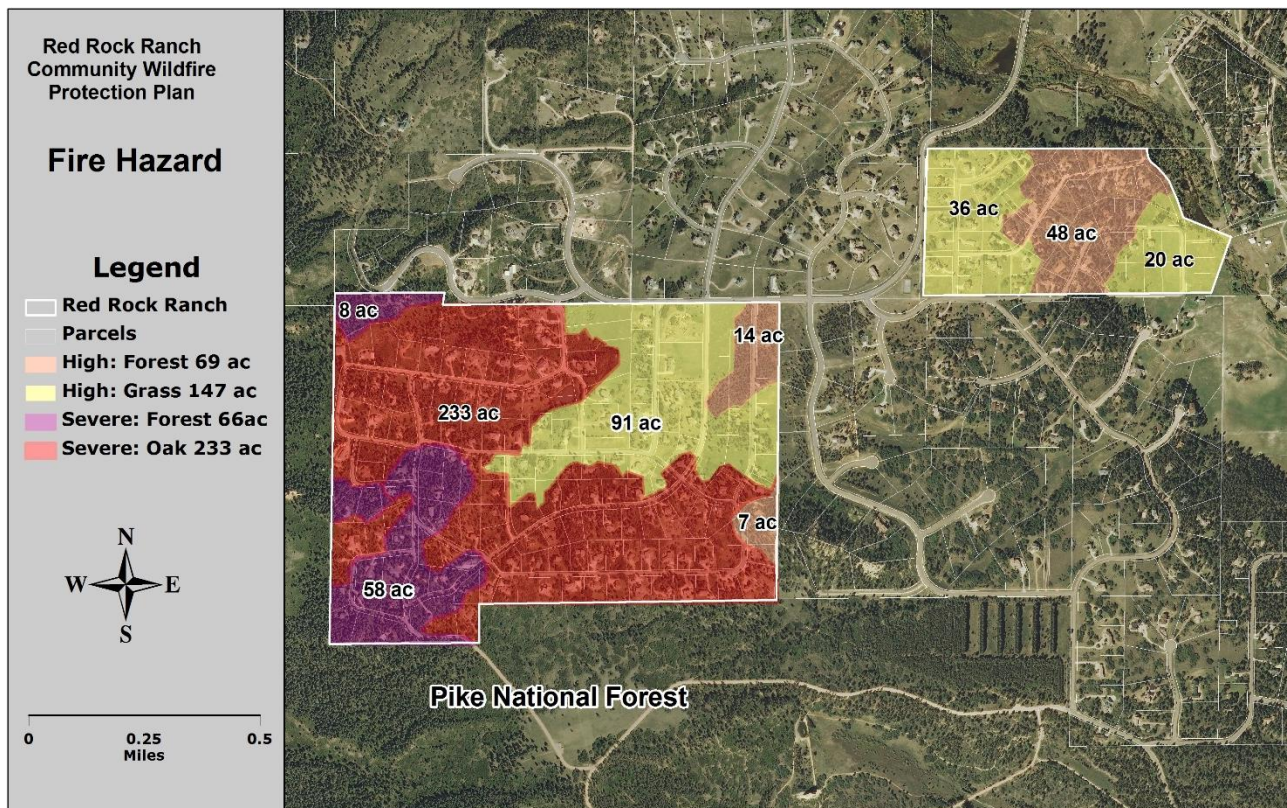


Predicted Flame Lengths in the Red Rock Ranch area. Flame lengths greater than four feet expose firefighters to lethal heat.

IV FIRE HAZARD

Fire hazard as used in this section represents the overall likelihood of a severe damaging fire. For example, High Hazard means that should a fire start in this area there is a high threat to life, property and the environment. As noted in the section on fire behavior, actual fire behavior depends on fuel, topography and weather. Weather at the time of a fire cannot be known in advance, so the *fire hazard ratings* in are based on the fuel model and the topography. Fuel types were mapped using the newest aerial photographs available and subsequent ground truthing.

The fuel models were transposed onto topographic maps to judge the combination of fuels and topography. Another useful indication of fire hazard are Wildfire Hazard Area Maps drawn by the Colorado State Forest Service circa 1976. Although 40 years old, field checking confirmed that these maps were still generally accurate, and the hazard polygons were used as the basis for the CWPP hazard map. Finally, Jamie Bumgarner, Fire Marshall Tri-Lakes Monument Fire Protection District, critiqued the fuel model map and fire hazard maps.



The Fire Marshall recommended that the forested stands in the flat terrain and the grasslands be rated as high hazard, rather than moderate as they were in 1976. The rationale is twofold. First, there has been forty years of fuel accumulation in the forests, increasing the hazard. Second, the land which was open land in 1976, is now a populated community with all of the associated risks to life and property. The grasslands that might have burned without much consequence in 1976, would now threaten homes by firefighter safety. Fires in grasslands can burn homes as completely as fires in other fuel types. *It is sobering to realize the areas rated*

severe in 1976 have seen increased fuel loads and population over the decades as well. The ranking remains severe simply because there is no higher term in the vocabulary.

The hazard polygons are a snapshot at landscape level, and not a lot-by-lot evaluation, and the hazard ratings do not include the effect of homes as fuel. The *Coalition for The Upper South Platte (CUSP)* will assist the Firewise Committee in conducting home assessments in 2018. The results of these evaluations will be available to the homeowner and useful to plan fuel reduction for each individual lot. Many residents, through much expense and hard work, have already successfully reduced the hazards on their own properties. As more owners participate in fuel reduction, the entire community benefits.

The severe rating in forested areas is based on the combination of dense, closed forest canopies coupled with steep terrain that will increase the intensity and rate of spread of a wildfire. Oak brush is rated severe because of the dense covering of oak and the drought and insect induced dieback in the oak. Grass is rated high due to the rapid, wind driven rate of fire spread in the open meadows, and the concerns of the Fire Marshall regarding ingress and egress. The high rating of forests in the eastern portions of Red Rock Ranch reflects the flatter terrain in those areas versus the western parts of the community.

High Hazard: Grass.

Areas of prairie grasses carry the fire. Scattered single trees or small groups of two to three trees may be present in these areas. The open grown trees in the grassy areas tend to retain lower limbs and fire may spread from the grass into the crowns of individual trees with some risk of spotting.

Grass poses the risk of carrying fire into the heavier forest or Gambel oak fuels.



Anticipated Fire Behavior:
flames less than five feet high, higher flare-ups rare and duration of flames

brief; fire spread variable slow to fast at 1-40 acres per hour and fire is driven by wind; spotting rare and short-range; passing through fire front sometimes possible but risky; portions of burned

Un-mowed grass fuels pose the threat of fast moving fires that can be transferred to nearby heavier fuels.

area can be occupied almost immediately after flames pass. *Grassy areas should be kept mowed and irrigated* when close to structures

High Hazard: Forest.

These areas are generally located on flat terrain, but numerous small drainages bisect the area. Fire will tend to follow and be more severe in the drainages. A dense understory of small trees provides ample ladder fuel to take a fire from the ground into the upper canopy of the forest. With light winds, fire behavior would consist of torching in individual trees or small pockets of trees, but with stronger winds a full running crown fire would be expected.



High hazard forests are choked with small trees that would lead a fire from the ground into the upper forest canopy.

Anticipated Fire

Behavior: *Flames* 50-100 feet high; dense ladder fuels will likely bring fire into the forest canopy; *Rate of spread* slow to fast 1-40 acres per hour depending on wind speeds; *Spotting* moderate to high with the possibility of spotting one mile from the fire. Humans cannot pass safely through flames. Burned area not safe to occupy for at least one hour.



Gambel Oak fuels can burn with high flame lengths and rates of spread.

Severe Hazard: Gambel Oak.

Areas with heavy brush (Gambel oak, tri-leaf sumac and mountain mahogany) and scattered trees within incised drainages. Heavier vegetation on north slopes, including thick ladder fuels underneath trees.

South slopes primarily brush with few smaller trees, heavier grass component; erosive soils. The Gambel oak has heavy dead component.

Anticipated Fire Behavior: *flames 10-30 feet high*; brief duration with *very high rate of spread*, over 40 acres per hour. *Chimney effect* due to slopes exacerbates fire behavior. *Mid-range spotting from blown embers is common*. Humans cannot pass safely through flames but may be able to occupy burned area after 15-30 minutes.

Severe Hazard: Forest on slopes. Areas with heavy, dense stands of ponderosa pine and Douglas fir. A heavy layer of overtopped and suppressed trees contributes to ladder fuels, particularly young Douglas-fir. Thick understory poses the risk of channeling a ground fire into the main tree canopy, resulting in a devastating, fast-moving crown fire. *Crown fire potential is high.* Ponderosa pines may be infected with dwarf mistletoe, weakening and predisposing these to bark beetle attack. Considerable recent mortality in pine from mountain pine beetle and Ips pine engraver beetle. Moderate to heavy downed woody fuel component due to dead trees that have fallen over or broken off, increasing overall fuel loading.



Warm air rising preheats fuels on steep slopes creating a severe hazard in dense forests on hillsides like these.

Anticipated Fire Behavior: *flare-ups higher than tree tops* are frequent to continuous; *flame walls of 100 – 300 feet high*; *fire spread rates up to several hundred acres per hour* are possible; *long-range spotting* several hundred yards is common, with spotting beyond one mile possible; burned area not safe to occupy for at least one hour.

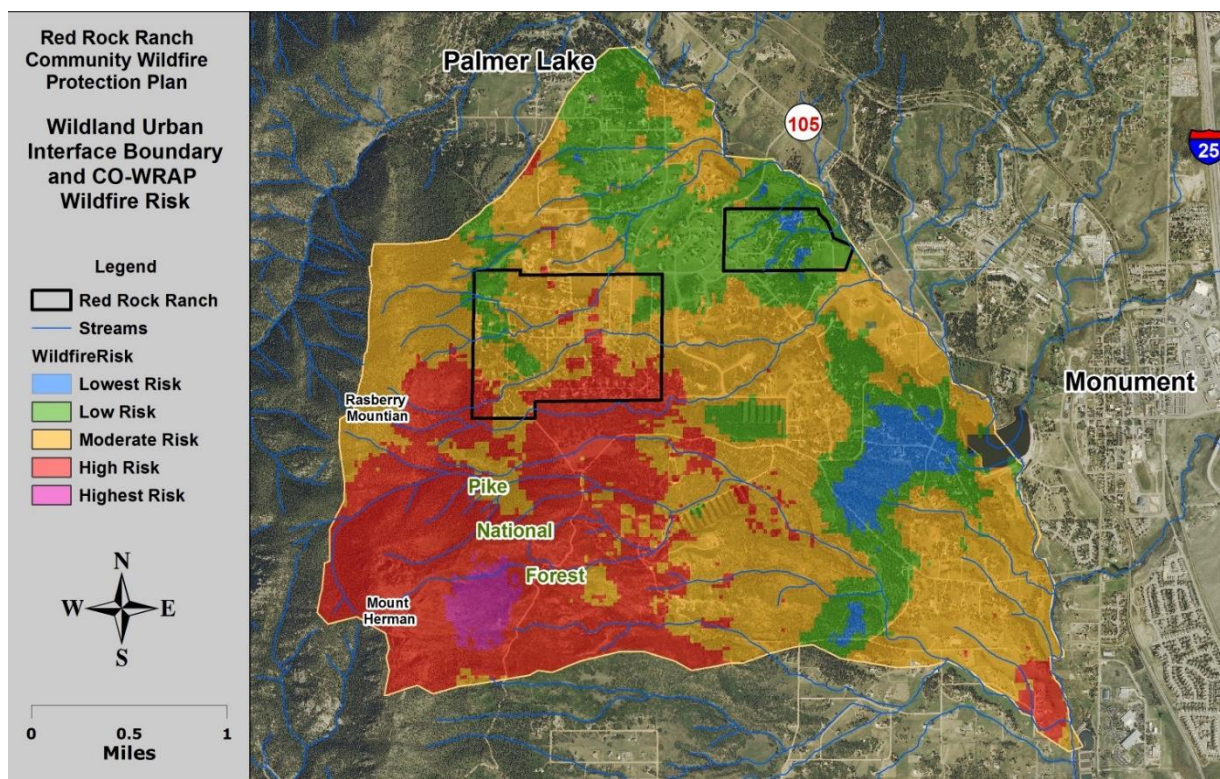
Wildland Urban Interface Boundary

A CWPP must consider the wildfire threats surrounding the community as well as those within the community. During the most severe weather conditions, firebrands may be carried a mile or more from the main fire. Post fire flooding and erosion from wildfires in the surrounding watershed can pose threats as grave as the fire itself. *Wildland urban interface* is the term used to describe areas where homes are located in wildland fire fuels. The Wildland Urban Interface

Boundary denotes the area surrounding communities where a wildland fire would still threaten the community.

Concern with the damage from post fire flooding and erosion played a large part in determining the WUI boundary west of Red Rock Ranch. The boundary follows the summits of Raspberry Mountain and Mt. Herman that separate the streams flowing into Red Rock Ranch from the main Monument Creek drainage. On the south, the boundary follows the ridge that separates intermittent drainages south of the Mt. Herman Road. Fire in these drainages would tend to follow the terrain towards the road, threatening one of the main evacuation routes from the community. On the east and north, the boundary follows Monument Creek.

The Map shows the WUI Boundary with an overlay from the **Colorado Wildfire Risk Assessment (CO-WRAP) program of Wildfire Risk**. The overlay represents the possibility of harm as the result of a wildfire. The reader should understand that CO-WRAP compares the hazard over the landscape. The adjectives Highest, Lowest, etc. compare the risk from one place to another, and are not absolute descriptions of fire behavior. The outputs from CO-WRAP should not be confused with the descriptions of actual fire behavior that were used in the Community assessment. The fire behavior predictions in the community assessment were based on actual observations of the conditions by wildfire professionals.



CO-WRAP generates a wealth of data. The *cause of most fires is undetermined/unknown*. Other causes of fires include equipment use, smoking, campfires, and debris burning. Wildland interface fires (WUI) are those, like the Black Forest and Waldo Cañon fires, which threaten communities situated within wildland fuels. The risk is not defined by subdivision boundaries, and the hazard is regional in scope.

V CREATING DEFENSIBLE SPACES

Hazards In The Home Ignition Zone

In order to identify and understand methods for increasing a structure's ability to survive a wildfire, it is important to first understand how structures burn. Homes in the WUI are fuel; and structures burn when the heat from a wildfire is transferred to the structure.

Heat transfer can be from surrounding burning vegetation to structures, or from burning structures to surrounding vegetation. There are three ways that heat can be transferred: radiation, convection, and firebrands.

Radiation: Wildfires can spread to a home by radiated heat in the same way a radiator heats rooms in the wintertime. During an intense wildfire, radiated heat is capable of igniting combustible materials from a distance of 100 feet.

Convection: Direct contact with flames, or the wildfire's convective heat column, may also ignite a home. This is most likely to occur when trees or brush near a structure ignite and the flames touch a flammable part of the structure.

Firebrands: Firebrands are embers that are blown ahead of a fire on strong updrafts created by the fire. Firebrands can be carried long distances – more than a mile – by the winds associated with a wildfire. Firebrands can ignite structures by landing on flammable materials either on or surrounding a structure. Firebrands are particularly detrimental to structures with flammable building materials, including wood shake roofs.

Accumulations of flammable materials in roof valleys, gutters, or directly adjacent to the structure

can significantly increase a structure's vulnerability. *Roofs and decks are the most vulnerable parts of a structure to fire brands.* Autopsies of many homes lost during wildfires have shown that most were burned when firebrands fell on combustible roofs or decks, not from direct contact with flames



The blizzard of firebrands preceding a flame front have ignited vulnerable parts of this home. Note that the wood garden mulch and plastic gutters are spreading flames to the home.

Building Materials. *The two main factors affecting a structure's ability to survive a wildfire are the exterior building materials and the amount of defensible space within 100 feet to 200 feet of the structure, known as the Home Ignition Zone* (Cohen 2008). The home ignition zone (HIZ) requires property owners to recognize the hazards, take ownership and responsibility of the hazards, and mitigate the hazardous fuels to a level that will increase the survivability of the structure. Many materials available for residential construction are fairly fire resistant, including stucco and stone combination or a cement siding product for exterior construction materials. Roofing materials are typically asphalt composite or concrete tile. El Paso County prohibits wood shake roofs in a wildfire hazard area.

Building Material Recommendations for Homeowners

- Replace shake roofs with those of a higher fire resistant rating including asphalt composite, tile or metal roof
- Replace wood siding with a more fire resistant product including stucco, cement plank siding, stone or masonry
- Screen attic, roof, foundation and eave vent openings with 1/8" metal
- Completely enclose areas under decks
- Use double-pane or tempered glass windows

Defensible Space And The Home Ignition Zone

The **Home Ignition Zone (HIZ)** includes the home and its immediate surroundings within which burning fuels could potentially ignite the structure. This is usually considered to extend out *roughly 100 feet from the home*. The HIZ describes the area in which wildland fuel modification and measures to reduce structural vulnerability should be taken to protect the home.

Defensible space is the area around a structure where vegetative fuels have been modified to slow the rate of spread of a wildfire towards the structure, and away from it if on fire. The primary focus is to reduce the quantity and alter the arrangement of fuels to improve the structure's ability to survive a wildfire in the absence of firefighter intervention. Defensible space also enhances a firefighter's ability to protect a structure during a wildfire event, and will also likely increase the chance that a particular home will



be assessed as one that can be safely protected by firefighters. Defensible space is *an effort to reduce structure ignitability*, but is not a guarantee a structure will survive a wildfire.

With the exception of ensuring adequately treated access and evacuation routes, reducing hazards within home ignition zones (HIZ) are the highest priority for fuel hazard reduction activities. Homes and other

structures *should be treated to a level sufficient to prevent ignition from both flame impingement and aerial firebrands (embers)*. As noted previously, defensible space guidelines and homeowner recommendations are provided in **APPENDIX A**.

**Decks and roofs
are the most
vulnerable part of a
structure. If either
burns, the home
will be lost.**

Reducing structural ignitability and preventing the loss of property in the event of a wildland fire is a high priority in El Paso County. Efforts to reduce threat of home loss can be separated into regulations for home design/development, building materials, and vegetation management (defensible space around structures). The county has taken steps to address residential development in wildfire hazard areas by adopting codes and regulations governing the land use and building processes. Most codes and regulations focus on hazardous fuels reduction, defensible space, and the prohibition of wood shake roofs in a wildfire hazard area. All building permits are subject to new fuel mitigation standards, which are the basic tools that require implementation of defensible space around newly permitted structures. If a wildfire hazard assessment is generated at the time of building permit application, it identifies the minimum defensible space requirements that must be met at the time of final inspection for a Certificate of Occupancy for structures that can be occupied and for accessory structures.

Just as defensible space can increase the survivability of existing structures, modifications to existing structures can make them more resistant to ignition. The construction materials, location and even the shape of a structure influence its vulnerability to wildfire.² The intent here is not to suggest extensive alterations to existing homes. Understanding how home construction affects the vulnerability of the structure to a wildfire helps residents plan defensible space projects to compensate for construction differences. When remodeling or undertaking home improvement projects, plans can be made to reduce the vulnerability of the buildings.

Decks and roofs are the most vulnerable parts of a structure. If either burns, the home will be lost. They are most likely to catch windblown firebrands, and air currents are more likely to form eddies that trap heat and in the irregular surfaces found in roofs and decks.

Fire restive roofs are extremely important. *Wood shake roofs have been the cause of many home losses due to firebrands.* Roof material with a class A rating indicates the best resistance to fire. Many roofing materials are available to homeowners but they vary in cost, weight and

² Bueche, David, Tim Foley, Peter Slack, (2012): *Firewise Construction: Site Design and Building Materials*. Colorado State Forest Service.

longevity. Homeowners should consult with a reputable building contractor to determine which roofing material will best suit their needs.

Even the most fire resistant roofs require maintenance. The most important consideration is to keep the roof—and gutters—free of debris. Combustible debris such as leaves and pine needles may ignite from firebrands and start the home on fire even with a class A roof. Combustible litter is most likely to accumulate in areas where one shape meets another such as gables and dormer windows. Gutters will also accumulate debris and combustible debris should be removed anytime it accumulates. Gutters should be metal since plastic gutters may burn.



Debris collects where shapes meet. If these leaves burn, heat will pass through the shingles to the underlying plywood burning the home.

The eaves (the extension of the roof over the outside wall) are also vulnerable areas. Open eaves, with the roof joists exposed, are particularly vulnerable because the irregular surfaces can trap hot gasses and fire brands. Enclosure of exposed eaves (called a soffit) helps prevent this. It is best to construct soffits so that the lower edge of the soffit meets the wall at a 90° angle. This reduces the amount of heated air and firebrands that might be trapped.

Vents, in roofs and foundations, are also areas of vulnerability, but are necessary to ventilate attics and crawl spaces to prevent moisture accumulation. During a wildfire, heated gasses and firebrands can enter attics or crawl spaces through vents. All vents should be screened with metal screening with openings of 1/4 inch or less. Soffit vents should be located as close to the edge of the eave as possible. Vegetation around foundation vents can create unintended vulnerability, particularly on the downhill side. Landscaping with stone or rock around crawlspace vents is recommended.



Wooden decks are one of the most vulnerable parts of a structure. Storing firewood or combustible material beneath the deck adds to the danger by creating a fuel bed for firebrands.

In addition to the roof, decks are extremely vulnerable to fire. The deck surface is exposed to firebrands that

can collect underneath decks. Possibly the worst mistake any homeowner can make is to store any combustible material beneath a deck. Countless homes have been lost because of firewood, scrap lumber, even gasoline stored under a deck. Even motorized equipment, when left under a deck, with gas in the tank has caused home losses during fires.

Ideally the underside of decks should be enclosed with a non-combustible material. If that is not possible, covering the area under a deck with stone, concrete or rock mulch will make the deck safer. When decks are rebuilt use fire resistant materials.

Carefully consider the landscaping in the vicinity of decks as well. Avoid planting flammable shrubs, such as junipers, anywhere near decks or foundations. Potted plants or planters on decks may also increase the hazard. Even furniture with cushions or wooden frames may ignite from firebrands. The area of defensible space should be increased near decks, especially on the downhill side.

Fire resistance of windows and doors should be considered. If window glass breaks, firebrands will enter the house. The most fire resistant glass is low emissivity, tempered glass that can withstand the heat of a fire for the longest duration. Double pane windows last longer than single pane when exposed to the heat of a fire.

Window frames are also important. Metal frames offer the best protection. Vinyl frames usually do not burn but can melt when exposed to heat. Wooden frames will burn. Metal screening with on the outside of windows offers additional protection, but most windows are sold with nylon screening that will melt. Solid metal shutters offer the best protection, assuming the homeowner has the opportunity to close them before evacuating.

Wooden doors are obviously able to burn during a fire. The thicker the door the more resistant it will be. Metal doors are far superior, and glass in doors is subject to the same vulnerabilities as window glass. Durable and well-maintained weather stripping in outside doors will help prevent firebrands from entering a home.



This vinyl window frame warped from the heat of the Black Forest Fire, but remained intact enough to prevent firebrands from entering the structure.

VI GENERAL FUELS REDUCTION PRESCRIPTIONS

The defensible space surrounding a home obviously requires removal of some amount of living as well as dead vegetation. Active forest stewardship requires that fuel reduction should also contribute to improved health and resiliency of the forest environment. Fuel reduction projects should consider multiple factors such as current forest condition, insect and disease conditions, and the landowner's objectives.

Foresters manage trees not as individuals but in groups called *stands*. A stand of trees is defined as a group of trees that are similar with respect to age, species composition and other characteristics. Each stand is different from ones nearby, and each landowner may have different management objectives in addition to wildfire mitigation. This description is general in nature and highly simplifies the basic concepts of wildfire mitigation. It provides an idea of how foresters approach the process of prescribing treatments for fire mitigation. When planning private fire hazard mitigation, an initial consultation with a forester is recommended. Specific prescriptions for any forest stand are best developed when the existing conditions and the landowner's objectives are known.

This section provides a general summary of the *basic concepts of wildfire mitigation*. When planning fuel reduction, an initial consultation with a forester is recommended. Specific prescriptions for any forest stand are best developed when the existing forest conditions, insect or disease conditions and the landowner's objectives are known.

Grass Fuels. As noted, there are large areas of Red Rock Ranch where the primary wildland fuel is grass. While grass fuels pose real dangers during wildfires, the good news is that hazard reduction is relatively easy. Adequate fuel reduction requires keeping grasses mowed lower than six inches for a distance of 30 feet around the home. Mowing a wider radius increases the protection. Mowing should also extend along driveways and adjacent to roads for safer evacuation and access by emergency responders.

There is an important precaution to observe when mowing grass. Recall that grass is a fuel that is easily ignited, and that mowing has the risk of creating sparks if mowers should strike rocks or dry grass blows onto the muffler of the mower. Note that in April 2002, mowing dry grass on a



In the Black Forest Fire, the unmowed grass at the left burned, but the fire died from lack of fuel when it reached the mowed grass at the right.

warm, windy day resulted in the Pine Glen Fire. Grass blown onto the muffler resulted in a fire that burned about 70 acres over three days.

It is important to mow grass in the fall so that cured grass does not become a wildfire hazard over the winter and following spring. If it is possible to irrigate grasses within 30 feet of the home during summer dry periods, a significant reduction in wildfire hazard will result. Recall that fine fuels loose moisture quickly after rain.

Grass is best mowed shortly after rain, when the humidity is high and winds are light. Also, mowing grass in the fall reduces wildfire hazard during the winter and following spring.

Forest thinning. Fuel break thinning is most often accomplished with a process called *thinning from below*. Overtopped or suppressed (smaller/stunted) trees are targeted for removal, since they are usually less healthy and can serve as ladder fuels. The primary objective is to retain the healthiest, most dominant trees to the extent possible, to decrease forest density to a level where tree vigor is enhanced, insect and disease risk is lessened, and fires will remain on the ground. It is essential when thinning, to remove ladder fuels and create enough openings in the tree canopy to reduce crown fire risk. Thinning from below is desirable in fuel reduction projects because it leaves the most vigorous trees, creates openings in the forest canopy that inhibit wildfire spread, removes less healthy trees, and eliminates ladder fuels by removing over-topped trees and shrubs. Additionally, pruning of lower limbs of remaining trees will help prevent a fire from reaching the tops of the trees.

Gambel Oak Treatment. *When dangerous, high threat forest and weather conditions exist, Gambel oak tends to burn at extremely high temperatures and high rates of spread, resembling a raging inferno.* Gambel oak will burn readily under conditions such as extended drought, or in fall before leaf-drop or early spring before leaf-out. Late spring frosts that kill the leaves can cause extreme fire behavior later in the summer as the dead leaves have a tendency to cling to the stem and act as dry aerial fuels. See **APPENDIX C Gambel Oak Management** for additional information and recommendations.

Thinning Gambel Oak. This is best accomplished by separating oak into clumps rather than individual stems. Recommended spacing requirement between shrub clumps is 2½ times the height of the vegetation. The maximum recommended diameter of clumps is 2 times the height of the vegetation. Measurements are made from the edges of vegetation crowns. Additionally, the oak understory should be thinned, removing smaller, overtopped brush and stems, especially those that are leaning close to the ground. *This is particularly important within HIZ Zones 1 and 2.* Promoting a more park-like structure and improving aesthetic quality will improve the vigor of the remaining larger oak. Oak re-sprouts quickly after fuel reduction treatments, and sprouts should be mowed at least every second year, if not yearly.

Slash Treatment. Slash treatments are needed to clean up woody residue from forest thinning treatments, primarily because *untreated slash increases the fire hazard*. It can also attract insects such as Ips engraver beetle that prefers freshly downed trees and branches and which poses a threat to pine trees. *Slash treatment may be the most labor intensive and expensive*

part of any fuel mitigation project. There are several options to treat slash including controlled burning, removal to landfill, and chipping.

Chipping is the grinding up of slash into small pieces by mechanized equipment. It is a relatively quick, effective and common means of slash disposal in defensible zones around structures. Many communities have found that an effective way to promote mitigation is to sponsor a community-wide chipping program. Most landowners are more willing to undertake the effort of thinning brush and trees if there is a simple, low cost way to remove the slash. A “drive by” chipping program consists of bringing a chipper to the neighborhood. Residents drag slash to the curb or accessible spot where it will be chipped on-site, with the chips generally blown back onto the property. For 2018, RRR HOA is planning six Chipping Days. The Firewise Committee is working with local organizations (e.g., CUSP, TLMFPD, etc.) that have chipper machines and trained operators to schedule equipment and support for each Firewise Chipping Day.



An alternative to chipping for homeowners is to haul slash to the Black Forest Slash and Mulch Site. For information about cost and days of operation, visit: www.bfslash.org

Fuel Reduction and Wildlife Habitat. Residents have identified the natural environment and wildlife as important values to be preserved in our community. Generally mitigation and fuel reduction projects improve rather than degrade habitat. Different species of wildlife have different habitat requirements, and often a fuel reduction prescription can be adjusted to target a particular species with no great loss of wildfire protection.

Forest thinning benefits wildlife in several ways. First the opening of the canopy increases the abundance of grass and understory plants for increased forage. A variety of wildlife species typically occupy and flourish along edges of habitat type (e.g., treed area adjoining meadow/grassy openings). Thinning for openings in the forest canopy increases the number of edges to support numerous wildlife species.

Creating openings stimulates growth of herbaceous plants where the closed forest canopy had previously shaded them out.

As noted previously, some down wood on the forest floor provides wildlife habitat so long as the downed wood is isolated and not a jackpot of fuel. Large standing dead trees, or snags, provide valuable habitat; however, snags should be removed from zones one and two of defensible spaces due to the fire hazard as well as the risk to people and property when they eventually fall.

VII COMMUNITY PROTECTION RESOURCES & CAPABILITIES

Professional Wildland Fire Response Services

This section of the CWPP details resources available to respond to emergencies associated with wildland fires impacting neighborhood residents and structures. *Professional responders are always the front line in addressing wildfire, rescue, and medical emergencies.*

For wildland fire emergencies endangering residents, the first line of responders is the Tri-Lakes Monument Fire Protection District (TLMFPD). If this responder finds that the fire is beyond their capability to suppress, the Incident Commander on scene will request additional assistance through Automatic Response from both within and outside El Paso County. El Paso County Emergency Services will also provide assistance, and TLMFPD will coordinate these services.

TLMFPD is a member of a mutual aid consortium of eight fire departments. . . Up to 10 trucks and 46 firefighters are initially dispatched to every fire.

Tri-Lakes Monument Fire Protection District Resources

The **TLMFPD** is the first responder to a sighted or reported wildland fire threatening the environs surrounding Red Rock Ranch. TLMFPD has three stations: Station 1 at 18650 Highway 105; Station 2 at 18460 Roller Coaster Road; and Station 3 at 1855 Woodmoor Drive.

The current daily staffing of 12 personnel includes 1 Battalion Chief, 3 Company Officers (Captains or Lieutenants), and 8 Firefighters/Emergency Medical Technicians (EMTs). They are organized into teams, or crews, that operate two Advanced Life Support Ambulances, two Engine Companies, and one Truck Company. In the event of a structure or wildland fire the ambulance crews become members of the Engine, Truck, or Brush truck crews. Fire engine quantities and *National Wildfire Coordinating Group* (NCWG) include: 3 – Type 1 (pumpers) and 4 (Type 6 (brush).

TLMFPD is a member of a mutual aid consortium of eight fire departments in northern El Paso County and southern Douglas County. A fire alarm call to Tri-Lakes automatically goes to these other departments who send at least one truck and crew to the address of the potential fire. Thus, up to 10 trucks and 46 firefighters are initially dispatched to every fire.

TLMFPD Wildfire Strategy: The TLMFPD response time goal for the department is to reach any location in the Tri-Lakes Monument district in 8 minutes or less. The average response time for Red Rock Ranch is close to 5 minutes. If the severity of the fire warrants, additional personnel and equipment can be requested from other fire departments including those from

Colorado Springs, state, and federal agencies.

The El Paso County Sheriff's department would be notified soon after the "Incident Commander" (*officer in charge of the first response team of firefighters*) evaluates the fire situation and determines additional assistance is required. Upon arrival, the sheriff's deputies would receive instructions on which roads should be closed and inform residents to evacuate their homes if recommended by the Incident Commander. Officers from the Monument Police Department, Palmer Lake Police Department, and Woodmoor Public Safety would assist the sheriff's deputies with their duties.

The priorities of the "first responding" firemen are: 1) Insure the safety of the lives of the firefighters and people (residents) in and near the fire ("incident"); 2) Evaluate the fire situation, assign firefighters to specific duties to control and suppress the fire, and notify the sheriff and other agencies on the situation; and 3) Restrict the loss of homes and other property.

TLMFPD Emergency Medical Services: TLMFPD provides first response emergency medical services to the neighborhood. Below is the breakdown of TLMFPD emergency personnel resources and staff.

- 50 firefighters/EMTs/paramedics
- Daily staffing of 13 personnel on call 24/7
- Population served: approximately 24,000 residents over 68 square miles

TLMFPD Water Resources: TLMFPD currently has emergency water supplies located throughout the district. Other supplies may be available if needed through the use of small bodies of water close to or in the district.

Safety Zones/Staging Areas: During emergency situations, it may be necessary for residents and emergency services providers to reach a safe place that is outside of the affected part of the community. TLMFPD, in conjunction with other wildfire authorities, recommends establishment of Civilian Staging areas outside the neighborhood. These can be used as reasonable safe areas or temporary refuge from wildfire threat, and can also serve as staging areas to allow timely and orderly evacuation of residents, as well as for staging areas or fire fighter safety zones for marshaling resources within the community.

Internal Volunteer Services and Communications: Other than staff, TLMFPD does not currently support any volunteer or paid groups that can be used in communication support or augmentation of professionals in the event of a wildfire emergency. It is strongly recommended that the property owners implement operating agreements with TLMFPD that allow for use of properties and facilities during emergency situations. Additionally, TLMFPD recommends development of a community emergency and evacuation plan, including a resident emergency communications tree (phone, email, text).

For residents during a wildfire event, lack of accurate and timely information has proven to be a major concern and frustration. Local media is limited in the type, accuracy and timeliness of emergency related reporting they can provide. Residents may be away from home and community during the emergency, yet be extremely concerned about safety and location of family members and pets. Recommended information sources include El Paso County web sites and the El Paso County Sheriff's Office (EPSO), the latter may have an emergency phone line established for providing information.

For 2019, the Firewise Committee intends to develop an emergency response plan for interaction with emergency services providers. This needs to be developed prior to emergencies and allow access for designated representatives to the Incident Command Center or Outpost. In effect, this representative could provide accurate and timely information for distribution over existing community networks (web site, phone trees, and office staff).

El Paso County Emergency Services

Under the **El Paso County Office of Emergency Management (OEM) Division**, the El Paso County Sheriff's Office provides umbrella incident management and the agency coordination structure for response and recovery from a wildland fire event(s). Every wildland fire emergency incident that occurs in El Paso County utilizes the Incident Command System (ICS) during response and recovery activities, employing multi-agency operational structures.

The OEM mission is to ensure that local governments within El Paso County have the operational capability to survive a disaster, and to manage and conduct essential emergency functions. This capability of managing a survival crisis includes the ability to direct, control, manage, and coordinate emergency operations within jurisdictions in cooperation with other local governments and liaison with the State and Federal government. To accomplish this, OEM maintains and develops a capability built on people (volunteers), communication equipment, and plans.

Emergency Operations Center (EOC): The El Paso - Office of Emergency Management (EP-OEM) has operational responsibility for the EOC, a highly specialized facility with experienced personnel and equipment that is specifically designated for use in emergency situations. The EOC is a vital management resource that serves as: a *command center* with specialized communications equipment; an *operations center* for government officials, volunteers and special agencies; and an *information center* that analyzes and disseminates information. The OEM office develops exercises and scenarios to test staff and communications to ensure the facility and its plans are fully functional.

The Federal Emergency Management Agency

Community Emergency Response Team: (FEMA) has multiple training programs and courses for training local residents in dealing with multiple hazards, such as wildland fires. The voluntary *Community Emergency Response Team* (CERT) program provides life-saving knowledge and valuable emergency skills is highly recommended. CERT training can be organized under TLMFPD and EPC-OEM. These voluntary groups are only used when professional first responders cannot respond, and then can only be activated by authorization of the Emergency Services Manager or the Chief of the local Fire Protection District.

El Paso Sheriff's Office Wildland Fire Crew (EPSOWF)

EPSOWF provides engine crews and Type II hand crews for all ranges of wildland fire suppression from initial attack to mop-up, prescribed burns, and urban interface protection. In addition to fire suppression activities, and as a public service, crews can

also provide training and education. Each fire department is responsible for “red card” and wildland fire training activities for each fire department throughout the county. They also assist the USFS, BLM, CSFS, Department of Defense (Air Force, Army, National Guard), and National Park Service.

Critical Utilities

In the event of a wildland fire that would impact the neighborhood, TLMFPD or EP-OEM Incident Command dispatcher would notify critical utilities for their support. Specifically, utilities emergency involvement would focus on emergency responder safety, and direct support of mitigating the emergency event.

For Emergency Responder Safety: Damaged, destroyed or threatened gas services and electrical distribution facilities can pose significant safety issues to the public and emergency response personnel. Direct intervention for disconnection, reconstruction or rerouting would be directed by:

Natural Gas:	Aquila	800-303-0357
Electrical Power:	Mountain View Electric Association	800-388-9881

For Direct Support: For northern El Paso County residents, water and communication resources in support of an emergency event would be provided or directed by:

Water Districts:

Town of Monument	719-481-2954
Woodmoor Water & Sanitation	719-488-2525
Tri-View Metropolitan	719-488-6868
Forest View Acres	719-487-1412
Donala Water & Sanitation	719-488-3603

Wire-Line Communications

Qwest (CenturyLink)	800-573-1311
Qwest alternate	800-603-6000
Comcast	303-930-2000

Any request for utilities support in an area impacted by an emergency wildfire event must be authorized by the on-scene Incident Command. Any work performed in an impacted area can be requested only by on-scene Incident Command through the Designated Dispatch Center.

Railroads

EP-OEM, through its dispatcher, provides direct contact with the railroad in the event trains should be stopped to allow evacuation of civilians.

Burlington Northern & Santa Fe	800-832-5452
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VIII PROPERTY OWNER RESPONSIBILITIES

This section highlights selected actions and plans for individual homeowners. Additionally, valuable information and recommendations are contained in **APPENDIX D READY – SET- GO; Wildfire Guidelines for Homeowners**, and **APPENDIX E HOUSEHOLD TIPS: Property Mitigation and Protection**.

Address Markers To improve safety of firefighters/emergency responders, as well as residents, property owners should install address markers that are clearly visible from the road -- from both directions of travel.

- All letters and symbols should be *reflectorized and contrasting* with the background of the sign, and a *minimum of 4 inches in height* with a 1/2 inch stroke.
- Address marker signs should be visible from the road and not mounted more than 6-8 feet higher than the roadway surface.
- Signs should be visible from both directions of travel.
- Non-flammable sign materials are recommended.

Homeowner Evacuation Planning

When a major fire threatens, the first *life-protecting option* for residents is evacuation. Consequently, establishing and maintaining safe evacuation routes becomes a top priority. All too frequently, civilian fatalities occur during emergency evacuations. Residents either become trapped by a fast-moving fire, or wait too long to evacuate safely. If smoke and flames are already present, it may already be too late to evacuate. It can be expected that residents attempting to leave the community will clog existing roadways and impede access by emergency service providers.

Given the wildfire risk to the community, residents need to be prepared to evacuate on short notice. Homeowner evacuation planning should be comprehensive, detailed, and actionable; and it should be inclusive for all family members and pets. Refer to **APPENDIX F EVACUATION**.

IX CWPP IMPLEMENTATION ACTION PLAN

Implementation of CWPP actions and initiatives is an ambitious and challenging undertaking. The following overarching goals undergird implementation efforts.

Reduce the wildfire vulnerability of homes and structures by assessment, prioritization and aggressive mitigation of wildfire hazards;

Improve community safety and survivability by clearing and maintaining evacuation routes and firebreaks; and

Improve community wildfire awareness and commitment; and Increase homeowner engagement and participation in Firewise program and activities.

Below is a functional summary chart followed by a more detailed description of implementation actions.

IMPLEMENTATION FUNCTIONAL SUMMARY

Action	Activity Description	Estimated Timeline
A. Community Wildfire Protection Plan/CWPP	<ul style="list-style-type: none"> >CWPP published >Annual review/update >CWPP revision (5 & 10 yr) 	<ul style="list-style-type: none"> >Spring 2018 >annually >2023 and 2028
B. Community Mitigation and Fuels Reduction	<ul style="list-style-type: none"> >Community Chipping Days >Evacuation Route/Firebreaks >Homeowner Defensible spaces >Common area maintenance >Firewise and safety signage 	<ul style="list-style-type: none"> >2018, annually
C. Community Outreach, Education, Communications	<ul style="list-style-type: none"> >Fire prevention/preparedness >Homeowner guidelines, materials, web links >CUSP home assessments >Drone imaging/photos >Scheduled training awareness events and activities >Reflective address markings >Emergency notification/call lists 	<ul style="list-style-type: none"> 2018, annually
D. Firewise Resource Development	<ul style="list-style-type: none"> >State/federal grants >HOA budget line >Program/funding partnerships >Mitigation cost sharing 	<ul style="list-style-type: none"> 2018, annually

Effective CWPP implementation requires individual and community engagement and participation. Community mitigation events, projects, and coordination within the four neighborhood sections (e.g., *Central, Southern, Eastern and Western*) are an important means of building neighborhood cohesion, and generating resident support and engagement.

Development of the CWPP was predicated on the **CSFS Community Assessment for Red Rock Ranch**. The CSFS assessment identified fire safety and preparedness needs and included a number of Observations and Recommendations highlighted below.

- Potentially hazardous access into and out of Red Rock Ranch.
Recommendation: Mitigate/treat fuels along roads to improve evacuation routes.
- Homes often lack adequate address and driveway markings.
Recommendation: Encourage purchase and installation of large reflective address numbers/lettering (4 inch) to improve rapid firefighter/emergency response.
- Increased threat of human caused fires in the adjacent Pike National Forest.
Recommendation: Work with authorities (USFS, CSFS, others) to develop threat reduction strategy.
- Many homes lack adequate defensible space or are compromised by manmade hazards (firewood piles, attached wooden fences).
Recommendation: Educate and assist homeowners with mitigation.
- Landscaping, especially highly flammable juniper bushes, poses significant but removable fire threat.
Recommendation: Encourage homeowner removal of juniper bushes adjacent to structures.
- Priority need is for a detailed, effective community program of fuels reduction.
Recommendation: Publish CWPP and implement Action Plan projects.

Red Rock Ranch Community

Our CWPP actions dovetail with the CSFS Community Assessment and are divided into four subject areas: *homeowner education; fuels treatment; communications, support, and information services; and mitigated areas maintenance/perpetuation.*

Homeowner Education: The major thrust is to provide substantive, practical information and guidelines to homeowners. Firewise education is essential to increase homeowner wildfire knowledge and fire safety awareness, and to focus community efforts on addressing wildfire threat, prevention and preparedness. Annual performance assessment of public training (i.e., quantitative via individual session and annual totals) will be based on homeowner training participation/attendance as well as participant comments and suggestions. For Detailed homeowner information, refer to **APPENDIX E: HOUSHOLD TIPS FOR PROPERTY MITIGATION AND PROTECTION.**

Actions:

- *Develop, schedule, conduct and track homeowner education/training (opportunities, events, activities) – Annual*
- *Maintain and distribute schedule/training materials (newsletter, website) - Quarterly*
- *Review education/training sessions/materials – Semi-annual*
- *Develop/publish Training Summary (website, newsletter, social media) - Annual*

Fuels Treatment: Removal of combustible materials provides quick, safe access for firefighter defensive positions and wildfire suppression, and typically is strongly linked with road systems. Effective fuel treatment improves access for firefighting equipment and emergency support vehicles, and also provides a safe, low risk area for personnel and equipment staging/resupply.

Fuels treatment also involves creation of defensible space around a residence. Fuels treatment by individual homeowners is crucial as it is the collective efforts of homeowners that ultimately lead to a successful community mitigation program. Wildfire treatment areas fall into three groups: road right of way and safety zones; homeowner and landowner properties (developed and undeveloped) and open space lands/common areas.

Actions:

Road Rights of Way and Safety Zones.

- *Conduct priority mitigation/chipping on Forest View Road & Red Forest Road. – 2018*
Forest View Road and Red Forest Road are vital for community evacuation to State Highway 105, the primary evacuation route for Red Rock Ranch residents. The Firewise Committee will work with County Department of Transportation to identify and plan for mid/longer term mitigation along that major highway.
- *Conduct firebreak mitigation on Sandstone Drive (Fire Marshal designated north/south community firebreak). – 2018*
- *Conduct firebreak mitigation on Sierra Vista Road/Pike View Way/El Rancho Way - Annual*



Dense fuels along roads in the Waldo Cañon Fire. The fire may jump across the road, and the danger to firefighters is clear in this photo.

Homeowner / Private Properties (developed and undeveloped)

- *Develop/distribute guidelines* (Refer to **APPENDIX A** and **APPENDIX B**) - Annual
- *Schedule and conduct Firewise property assessments* (CUSP tool) - Annual
- *Schedule/conduct community education/training* (handouts, website; etc.) - Annual
- *Track/report successful mitigation efforts* (homeowners, Firewise). - Annual
- *Schedule periodic slash removal and community chipping days* - Annual
- *Publicize homeowner cost-sharing opportunities* (HOA newsletter) – Annual
- *For undeveloped parcels, assess potential mitigation efforts* - Annual

Open Space Lands/Common Areas Mitigated common areas and vacant parcels must be maintained to ensure safe emergency staging and resupply areas, as well as rest/recovery areas for emergency personnel.

- *Conduct regular fuels treatment (mowing) of community open space/common areas. – Annual*

Communication, Support, Information Services: The community outreach focus is on raising homeowner awareness of the wildfire threat and risks, increasing community mitigation efforts,

and increasing community safety and preparedness. Efforts are targeted on providing preventive and protection/fire suppression support and recognizing efforts that have and will be taken relative to wildfire fuel mitigation.

Actions:

- *Publish/distribute wildfire prevention and preparedness materials* (newsletters website, social media, flyers/mailers) - Annual
- *-identify/publicize mitigation accomplishments* (homeowners, neighborhoods) - Annual
- *Develop emergency notification list for community residents* - 2019
- *Obtain and install evacuation route signage* - 2018

Mitigated Areas Perpetuation: The community must be able to sustain the Firewise program and homeowner mitigation efforts. Successful fuel treatments and mitigated properties need to be maintained in order to be effective. (Refer to **APPENDIX A**).

Actions:

- *Monitor and assist homeowner maintenance of mitigated property* – Annual
- *Use CUSP IPAD/smart phone assessment app for maintenance efforts* – Periodic
- *Publish/distribute mitigation progress reports* - Annual

Firewise Program Sustainment: Maintenance of a viable Firewise USA program requires continued focus and commitment by the Firewise Committee, HOA and residents.

Actions:

- *Establish HOA budget category for Firewise mitigation* – 2018
- *Schedule, develop and submit grant applications* - Annual
- *Monitor/track status of grant-funded Firewise efforts* - Annual
- *Coordinate, sponsor and conduct wildfire prevention training* - Annual
- *Provide community updates on completed and planned work* - Annual
- *Develop and maintain 5-10 year schedule of mitigation projects* - 2019
- *Evaluate Firewise projects for effectiveness and update CWPP* - Annual
- *Maintain Firewise USA recognition* - Annual

Legacy & Future Projects: To be effective, an action plan must outline or sketch a vision for the future, topics for research and potential implementation. The following is a list for consideration within the CWPP ten-year horizon.

Actions;

- *Explore/pursue collaborative grant funding* (CUSP, TLMFPD, other)
- *Coordinate with TLMFPD/EI Paso County) and explore potential for wildfire field/tabletop exercise*
- *Collaborate with CUSP/EI Paso County/others on regional/Front Range planning* (e.g., Cohesive Strategy Fuels Reduction projects, etc.)



QUICK GUIDE SERIES

FIRE 2012-1

Protecting Your Home from Wildfire: Creating Wildfire-Defensible Zones

Formerly CSU Extension Factsheet 6.302

If your home is located in the natural vegetation of Colorado's grasslands, shrublands, foothills or mountains, you live in the **wildland-urban interface (WUI)** and are inherently at risk from a wildfire. The WUI is any area where structures and other human developments meet or intermingle with wildland vegetative fuels. In many vegetation types, it is not a matter of *if* a wildfire will impact your home, but *when*.

Wildfires are a natural part of Colorado's varied forest ecosystems. Many rural communities are located in areas historically prone to frequent natural wildfires. Living in the wildland requires more self-reliance than living in urban areas. It may take longer for a fire engine to reach your area, and a small fire department can easily become overwhelmed during an escalating wildfire. Planning ahead and taking actions to reduce fire hazards can increase your safety and help protect your property. As more people choose to live in areas prone to wildfire, additional homes and lives are potentially threatened every year. Firefighters always do their best to protect rural residents, but ultimately, **it is YOUR responsibility to protect your life, family, animals and property from wildfire.**

The information contained in this document is for use by individual landowners to help reduce wildfire risk on their property. In order to effectively protect subdivisions and communities, all

landowners must work together to reduce fire hazards within and adjacent to communities. This includes treating individual home sites and common areas within communities, and creating fuelbreaks within and adjoining the community where feasible. This document will focus on actions individual landowners can take to reduce wildfire hazards on their property. For additional information on broader community protection, go to www.csfs.colostate.edu.



Figure 2: Colorado's grasslands, shrublands, foothills and mountains all have areas in the wildland-urban interface where human development meets wildland vegetative fuels. Photo: CSFS

In this guide, you'll read about steps you can take to protect your property from wildfire. These steps focus on beginning work closest to your house and moving outward. Also, remember that keeping your home safe is not a one-time effort – it requires ongoing maintenance. It may be necessary to perform some actions, such as removing pine needles from gutters and mowing grasses and weeds several times a year, while other actions may only need to be addressed once a year. While



Figure 1: Firefighters will do their best to protect homes, but ultimately it is the homeowner's responsibility to plan ahead and take actions to reduce fire hazards around structures. Photo: National Interagency Fire Center

This quick guide was produced by the Colorado State Forest Service to promote knowledge transfer.

October 2012
www.csfs.colostate.edu

you may not be able to accomplish ALL of the actions described in this document to prepare your home for wildfire, each completed activity will increase the safety of your home, and possibly your family, during a wildfire.

(Note: These guidelines are adapted for ponderosa pine, Douglas-fir and mixed-conifer ecosystems below 9,500 feet. See page 9 for guidelines adapted to other forest ecosystems.)

This guide primarily will help design your defensible space. **Defensible space** is the natural and landscaped area around a home or other structure that has been modified to reduce fire hazard. Defensible space gives your home a fighting chance against an approaching wildfire. Creating defensible space also reduces the chance of a structure fire spreading to the surrounding forest and other homes.

Three factors determine wildfire behavior: **fuels, weather** and **topography**. We cannot alter weather or topography, so we must concentrate on altering fuels. Fuels include vegetation, such as trees, brush and grass; near homes, fuels also include

such things as propane tanks, wood piles, sheds and even homes themselves. Some plant species are more flammable than others, and the flammability of vegetative fuels changes depending on the season, recent weather events, and other factors such as drought. Fuel continuity and density also play an important role in wildfire.

Wildfire often creates its own weather conditions. Hot rising air and associated winds can carry embers and other burning materials into the atmosphere for long distances, where they can ignite vegetation and structures up to several miles away. Embers have caused the loss of many homes during wildfires.

As you think about protecting your home and property from wildfire, consider how you can manage fuels on your property to prevent fire from spreading to your home and other structures.

For more information on wildfire behavior, please see [FireWise Construction: Site Design and Building Materials](#) at www.csfs.colostate.edu.

Fuel Arrangement and Types

When fuels are abundant, a fire can be uncontrollable and destructive. But when fuels are scarce, a fire cannot build momentum and intensity, which makes it much easier to control and is more likely to be beneficial to the land.

The more dense and continuous the fuels, the bigger the threat they pose to your home. The measure of fuel hazard refers to its continuity, both horizontal and vertical. Horizontal continuity refers to fuels across the ground, while vertical continuity refers to fuels extending from the ground up into the crowns of trees and shrubs. Fuels with a high degree of both vertical and horizontal continuity are the most hazardous, particularly when they occur on slopes. Mitigation of wildfire hazards focuses on breaking up the continuity of horizontal and vertical fuels.

Heavier fuels, such as brush and trees, produce a more intense fire than light fuels, such as grass. However, grass-fueled fires travel much faster than heavy-fueled fires. Some heavier surface fuels, such as logs and wood chips, are potentially hazardous heavy fuels and also should be addressed.



Figure 3: Burning embers can be carried long distances by wind. Embers ignite structures when they land in gaps, crevices and other combustible places around the home. Photo: CSFS

Remember...

- **Reducing fuels around a home will increase the chances for survival in a wildfire, but there is no guarantee.**
- **This quick guide provides minimum guidelines. The more fuels you remove, the greater the chance your home will survive.**
- **Working with your neighbors and community will increase the effectiveness of your home's defensible space.**

Vertical/Ladder Fuels

Ladder fuels are defined as smaller trees and brush that provide vertical continuity, which allows a fire to burn from the ground level up into the branches and crowns of larger trees. Lower branches on large trees also can act as ladder fuels. These fuels are potentially very hazardous, but are easy to mitigate. The hazards from ladder fuels near homes are especially important to address. Prune all tree branches from ground level up to a height of 10 feet above ground or up to $\frac{1}{3}$ the height of the tree, whichever is less. Do not prune further up because it could jeopardize the health of the tree. Shrubs should be pruned based on specifications recommended for the species. Dead branches should be removed whenever possible.

Surface Fuels

Logs/Branches/Slash/Wood Chips

Naturally occurring woody material on the ground and debris from cutting down trees (also known as slash) may increase the intensity of fires. Increased fire intensity makes a fire harder to control and increases the likelihood of surface fires transitioning to crown fires. Dispose of any heavy accumulation of logs, branches and slash by chipping, hauling to a disposal site or piling for burning later. Always contact your county sheriff's office or local fire department first for information about burning slash piles. Another alternative is to lop and scatter slash by cutting it into very small pieces and distributing it widely over the ground. If chipping logs and/or slash, it's essential to avoid creating continuous areas of wood chips on the ground. Break up the layer of wood chips by adding nonflammable material, or allow for wide gaps (at least 3 feet) between chip accumulations. Also, avoid heavy accumulation of slash by spreading it closer to the ground to speed decomposition. If desired, two or three small, widely spaced brush piles may be left for wildlife habitat. Locate these well away from your home (NOT in Zones 1 or 2; see page 5-8 for zone descriptions).

Pine Needles/Duff Layers

Due to decades of fire suppression, decomposing layers of pine needles, twigs and other organic debris—called duff—is deeper under many large trees today than it would have been a century ago. This is especially true in ponderosa pine forests where frequent and naturally occurring fires have been absent. These large trees often are lost when fires occur, because flames burning in the duff layer can pre-heat live vegetation and ignite the trees, or the tree's roots can be damaged from the intense heat of the smoldering duff, killing the tree. It is important to rake needle or duff layers deeper than 2 inches at least 3 feet away from the base of large trees. This should be done annually, and the additional duff also should be removed from the area.

Grasses

Grasses are perhaps the most pervasive and abundant surface fuel in Colorado. Mow grasses and weeds as often as needed throughout the growing season to keep them shorter than 6 inches. This applies to irrigated lawns and wild or native grasses. This is critical in the fall, when grasses dry out, and in the spring, after the snow is gone but before plants green-up.

Be especially careful when mowing in areas with rocks. Mower blades can hit rocks and create sparks, causing fires in dry grass. Consider mowing only on days with high humidity or after recent moisture to reduce the risk of starting an unwanted fire.

When mowing around trees, be sure to avoid damaging the root system and tree trunk by using a higher blade setting on the mower and trimming grass that grows against the trunk only by hand.

Crown Fuels

An intense fire burning in surface fuels can transition into the upper portion of the tree canopies and become a crown fire. Crown fires are dangerous because they are very intense and can burn large areas. Crown fire hazard can be reduced by thinning trees to decrease crown fuels, reducing surface fuels under the remaining trees, and eliminating vertical fuel continuity from the surface into the crowns. Specific recommendations are provided in the Defensible Space Management Zones, pages 5-8.



Figure 4: Ladder fuels are shrubs and low branches that allow a wildfire to climb from the ground into the tree canopy. Photo: CSFS



Figure 5: Surface fuels include logs, branches, wood chips, pine needles, duff and grasses. Photo: CSFS



Figure 6: Tree canopies offer fuel for intense crown fires. Photo: Paul Mintier

The Home Ignition Zone



Figure 7: Addressing both components of the Home Ignition Zone will provide the best protection for your home. Credit: CSFS

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

Structural Ignitability

The ideal time to address home ignition risk is when the structure is in the design phase. However, you can still take steps to reduce ignitability to an existing home.

The **roof** has a significant impact on a structure's ignitability because of its extensive surface area. When your roof needs significant repairs or replacement, use only fire-resistant roofing materials. Also, check with your county building department – some counties now have restrictions against using wood shingles for roof replacement or require specific classifications of roofing material. Wood and shake-shingle roofs are discouraged because they are highly flammable, and are prohibited in some areas of the state. Asphalt shingles, metal sheets and shingles, tile, clay tile, concrete and slate shingles are all recommended roofing materials.

The extension of the roof beyond the exterior structure wall is the eave. This architectural feature is particularly prone to ignition. As fire approaches the building, the exterior wall deflects hot air and gasses up into the eave. If the exterior wall isn't ignition-resistant, this effect is amplified.

Most **decks** are highly combustible. Their shape traps hot gasses, making them the ultimate heat traps. Conventional wooden decks are so combustible that when a wildfire approaches, the deck often ignites before the fire reaches the house.

The **exterior walls** of a home or other structure are affected most by radiant heat from the fire and, if defensible space is not adequate, by direct contact with flames from the fire.

Windows are one of the weakest parts of a building with regard to wildfire. They usually fail before the building ignites, providing a direct path for flames and airborne embers to reach the building's interior.

Burning embers are produced when trees and structures are consumed by wildfire. These embers sometimes can travel more than a mile. Flammable horizontal or nearly horizontal surfaces, such as wooden decks or shake-shingle roofs, are especially at risk for ignition from burning embers. Since airborne embers have caused the loss of many homes in the WUI, addressing structural ignitability is critical, even if the area surrounding a home is not conducive to fire spread.

This guide provides only basic information about structural ignitability. For more information on fire-resistant building designs and materials, refer to the CSFS *FireWise Construction: Site Design and Building Materials* publication at www.csfs.colostate.edu.



Figure 8: (above) Wood shingle roofs are highly flammable and not recommended. Photo: CSFS

Figure 9: (above right) Class A roofing materials including tile, clay, concrete, slate and asphalt shingles are fire-resistant options. Photo: CSFS



Figure 10: Decks, exterior walls and windows are important areas to examine when addressing structure ignitability. Photo: CSFS

Defensible Space

Defensible space is the area around a home or other structure that has been modified to reduce fire hazard. In this area, natural and manmade fuels are treated, cleared or reduced to slow the spread of wildfire. Creating defensible space also works in the reverse, and reduces the chance of a structure fire spreading to neighboring homes or the surrounding forest. Defensible space gives your home a fighting chance against an approaching wildfire.

Creating an effective defensible space involves a series of management zones in which different treatment techniques are used. Develop these zones around each building on your property, including detached garages, storage buildings, barns and other structures.

The actual design and development of your defensible space depends on several factors: size and shape of building(s), construction materials, slope of the ground, surrounding topography, and sizes and types of vegetation on your property. You may want to request additional guidance from your local Colorado State Forest Service forester, fire department or a consulting forester as you plan a defensible space for your property.

Defensible space provides another important advantage during a fire: increased firefighter safety. Firefighters are trained to protect structures only when the situation is relatively safe for them to do so. They use a process called “structural triage” to determine if it is safe to defend a home from an approaching wildfire. The presence or absence of defensible space around a structure is a significant determining factor used in the structural triage process, as defensible space gives firefighters an opportunity to do their job more safely. In turn, this increases their ability to protect your home.

If firefighters are unable to directly protect your home during a wildfire, having an effective defensible space will still increase your home's chance of survival. It is important to remember that with wildfire, there are no guarantees. Creating a proper defensible space does not mean that your home is guaranteed to survive a wildfire, but it does significantly improve the odds.

Defensible Space Management Zones

Three zones need to be addressed when creating defensible space:

Zone 1 is the area nearest the home and other structures. This zone requires maximum hazard reduction.

Zone 2 is a transitional area of fuels reduction between Zones 1 and 3.

Zone 3 is the area farthest from the home. It extends from the edge of Zone 2 to your property boundaries.



Figure 11: Homesite before defensible space. Photo: CSFS



Figure 12: Homesite after creating a defensible space. Photo: CSFS

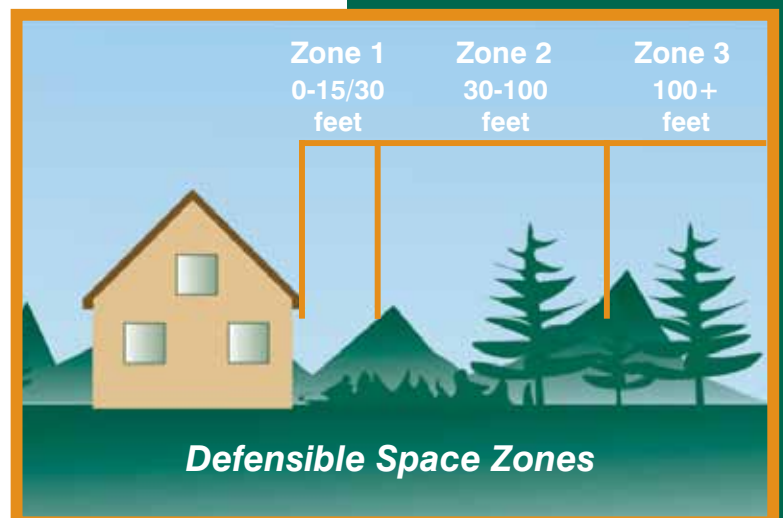


Figure 13: Defensible space management zones. Credit: CSFS

Zone 1

The width of Zone 1 extends a minimum distance of 15-30 feet outward from a structure, depending on property size. Most flammable vegetation is removed in this zone, with the possible exception of a few low-growing shrubs or fire-resistant plants. Avoid landscaping with common ground junipers, which are highly flammable.

Increasing the width of Zone 1 will increase the structure's survivability. This distance should be increased 5 feet or more in areas downhill from a structure. The distance should be measured from the outside edge of the home's eaves and any attached structures, such as decks. Several specific treatments are recommended within this zone:

- Install nonflammable ground cover and plant nothing within the first 5 feet of the house and deck. This critical step will help prevent flames from coming into direct contact with the structure. This is particularly important if a building is sided with wood, logs or other flammable materials. Decorative rock creates an attractive, easily maintained, nonflammable ground cover.
- If a structure has noncombustible siding (i.e., stucco, synthetic stucco, concrete, stone or brick), widely spaced foundation plantings of low-growing shrubs or other fire-resistant plant materials are acceptable. However, do not plant directly under windows or next to foundation vents, and be sure areas of continuous grass are not adjacent to plantings. Information on fire-resistant plants is available on the CSFS website at www.csfs.colostate.edu.
- Prune and maintain any plants in Zone 1 to prevent excessive growth. Also, remove all dead branches, stems and leaves within and below the plant.
- Irrigate grass and other vegetation during the growing season. Also, keep wild grasses mowed to a height of 6 inches or less.
- Do not store firewood or other combustible materials anywhere in this zone. Keep firewood at least 30 feet away from structures, and uphill if possible.
- Enclose or screen decks with $\frac{1}{8}$ -inch or smaller metal mesh screening ($\frac{1}{16}$ -inch mesh is preferable). Do not use areas under decks for storage.
- Ideally, remove all trees from Zone 1 to reduce fire hazards. The more trees you remove, the safer your home will be.
- If you do keep any trees in this zone, consider them part of the structure and extend the distance of the entire defensible space accordingly.
- Remove any branches that overhang or touch the roof, and remove all fuels within 10 feet of the chimney.
- Remove all pine needles and other debris from the roof, deck and gutters.
- Rake pine needles and other organic debris at least 10 feet away from all decks and structures.
- Remove slash, wood chips and other woody debris from Zone 1.

Zone 2

Zone 2 is an area of fuels reduction designed to diminish the intensity of a fire approaching your home. The width of Zone 2 depends on the slope of the ground where the structure is built. Typically, the defensible space in Zone 2 should extend at least 100 feet from all structures. If this distance stretches beyond your property lines, try to work with the adjoining property owners to complete an appropriate defensible space.



Figure 14: *This homeowner worked hard to create a defensible space around the home. Notice that all fuel has been removed within the first 5 feet of the home, which survived the Waldo Canyon Fire in the summer of 2012. Photo: Christina Randall, Colorado Springs Fire Department*



Figure 15: *Clearing pine needles and other debris from the roof and gutters is an easy task that should be done at least once a year. Photo: CSFS*



Figure 16: *Enclosing decks with metal screens can prevent embers from igniting a house. Photo: Marilyn Brown, La Plata County*

The following actions help reduce continuous fuels surrounding a structure, while enhancing home safety and the aesthetics of the property. They also will provide a safer environment for firefighters to protect your home.

Tree Thinning and Pruning

- Remove stressed, diseased, dead or dying trees and shrubs. This reduces the amount of vegetation available to burn, and makes the forest healthier.
- Remove enough trees and large shrubs to create at least 10 feet between crowns. Crown separation is measured from the outermost branch of one tree to the nearest branch on the next tree. On steep slopes, increase the distance between tree crowns even more.
- Remove all ladder fuels from under remaining trees. Prune tree branches off the trunk to a height of 10 feet from the ground or $\frac{1}{3}$ the height of the tree, whichever is less.
- If your driveway extends more than 100 feet from your home, thin out trees within a 30 foot buffer along both sides of your driveway, all the way to the main access road. Again, thin all trees to create 10-foot spacing between tree crowns.
- Small groups of two or three trees may be left in some areas of Zone 2, but leave a minimum of 30 feet between the crowns of these clumps and surrounding trees.
- Because Zone 2 forms an aesthetic buffer and provides a transition between zones, it is necessary to blend the requirements for Zones 1 and 3. For example, if you have a tree in Zone 2 with branches extending into Zone 1, the tree can be retained if there is proper crown spacing.
- Limit the number of dead trees (snags) to one or two per acre. Be sure snags cannot fall onto the house, power lines, roads or driveways.
- As in Zone 1, the more trees and shrubs removed, the more likely your house will survive a wildfire.

Shrub Thinning/Pruning and Surface Fuels

- Isolated shrubs may be retained in Zone 2, provided they are not growing under trees.
- Keep shrubs at least 10 feet away from the edge of tree branches. This will prevent the shrubs from becoming ladder fuels.
- Minimum spacing recommendations between clumps of shrubs is $2\frac{1}{2}$ times the mature height of the vegetation. The maximum diameter of the clumps themselves should be twice the mature height of the vegetation. As with tree-crown spacing, all measurements are made from the edge of vegetation crowns.
- Example – For shrubs 6 feet high, spacing between shrub clumps should be 15 feet or more (measured from the edge of the crowns of vegetation clumps). The diameter of these shrub clumps should not exceed 12 feet.
- Periodically prune and maintain shrubs to prevent excessive growth, and remove dead stems from shrubs annually. Common ground junipers should be removed whenever possible because they are highly flammable and tend to hold a layer of duff beneath them.
- Mow or trim wild grasses to a maximum height of 6 inches. This is especially critical in the fall, when grasses dry out.
- Avoid accumulations of surface fuels, such as logs, branches, slash and wood chips greater than 4 inches deep.

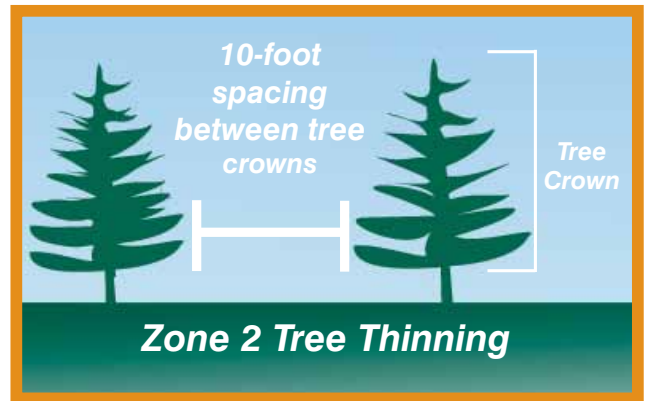


Figure 17: In Zone 2, make sure there is at least a 10-foot spacing between tree crowns. Credit: CSFS



Figure 18: Pruning trees will help prevent a wildfire from climbing from the ground to the tree crowns. Credit: CSFS

Firewood

- Stack firewood uphill from or on the same elevation as any structures, and at least 30 feet away.
- Clear all flammable vegetation within 10 feet of woodpiles.
- Do not stack wood against your home or on/under your deck, even in the winter. Many homes have burned as a result of a woodpile that ignited first.

Propane Tanks and Natural Gas Meters

- Locate propane tanks and natural gas meters at least 30 feet from any structures, preferably on the same elevation as the house.
- The tank should not be located below your house because if it ignites, the fire would tend to burn uphill. Conversely, if the tank or meter is located above your house and it develops a leak, gas will flow downhill into your home.
- Clear all flammable vegetation within 10 feet of all tanks and meters.
- Do not visibly screen propane tanks or natural gas meters with shrubs, vegetation or flammable fencing. Instead, install 5 feet of nonflammable ground cover around the tank or meter.



Figure 19: Keep firewood, propane tanks and natural gas meters at least 30 feet away from structures. Photo: CSFS



Figure 20: This ponderosa pine forest has been thinned, which will not only help reduce the wildfire hazard, but also increase tree health and vigor. Photo: CSFS

Zone 3

Zone 3 has no specified width. It should provide a gradual transition from Zone 2 to areas farther from the home that have other forest management objectives. Your local Colorado State Forest Service forester can help you with this zone.

This zone provides an opportunity for you to improve the health of the forest through proper management. With an assortment of stewardship options, you can proactively manage your forest to reduce wildfire intensity, protect water quality, improve wildlife habitat, boost the health and growth rate of your trees, and increase tree survivability during a wildfire.

In addition, properly managed forests can provide income, help protect trees against insects and diseases, and even increase the value of your property. Typical forest management objectives for areas surrounding home sites or subdivisions provide optimum recreational opportunities; enhance aesthetics; improve tree health and vigor; provide barriers against wind, noise, dust and visual intrusions; support production of firewood, fence posts and other forest commodities; or cultivate Christmas trees or trees for transplanting.

Consider the following when deciding forest management objectives in Zone 3:

- The healthiest forest is one that includes trees of multiple ages, sizes and species, and where adequate growing room is maintained over time.
- Remember to consider the hazards associated with ladder fuels. A forest with a higher canopy reduces the chance of a surface fire climbing into the tops of the trees, and might be a priority if this zone has steep slopes.
- A greater number of snags – two or three per acre, standing or fallen – can be retained in Zone 3 to provide wildlife habitat. These trees should have a minimum diameter of 8 inches. Make sure that snags pose no threat to power lines or firefighter access roads.
- While tree pruning generally is not necessary in Zone 3, it may be a good idea from the standpoint of personal safety to prune trees along trails and firefighter access roads. Or, if you prefer the aesthetics of a well-manicured forest, you might prune the entire area. In any case, pruning helps reduce ladder fuels within tree stands, thus reducing the risk of crown fire.
- Mowing grasses is not necessary in Zone 3.
- Any approved method of slash treatment is acceptable, including piling and burning, chipping or lop-and-scatter.

Other Recommendations

Windthrow

In Colorado, some tree species, including lodgepole pine, Engelmann spruce and Douglas-fir, are especially susceptible to damage and uprooting by high winds or windthrow. If you see evidence of this problem in or near your home, consider making adjustments to the defensible space guidelines. It is highly recommended that you contact a professional forester to help design your defensible space, especially if you have windthrow concerns.

Water Supply

If possible, make sure that an on-site water source is readily available for firefighters to use, or that other water sources are close by. Lakes, ponds, swimming pools and hot tubs are all possible options. If there are no nearby water sources, consider installing a well-marked dry hydrant or cistern. If your primary water source operates on electricity, be sure to plan for a secondary water source. During wildfires, structures often are cut off from electricity. For more information on how to improve the accessibility of your water source, contact your local fire department.

Recommendations for Specific Forest Types

The above recommendations refer primarily to ponderosa pine, Douglas-fir and mixed-conifer ecosystems. For other forest types, please refer to the additional recommendations below:

Aspen

Tree spacing and ladder fuel guidelines do not apply to mature stands of aspen trees. Generally, no thinning is recommended in aspen forests, regardless of tree size, because the thin bark is easily damaged, making the tree easily susceptible to fungal infections. However, in older stands, numerous dead trees may be on the ground and require removal. Conifer trees often start growing in older aspen stands. A buildup of these trees eventually will increase the fire hazard of the stand, so you should remove the young conifers. Brush also can increase the fire hazard and should be thinned to reduce flammability.

Lodgepole Pine

Lodgepole pine management in the WUI is much different than that for lodgepole pine forests located away from homes, communities and other developments. Normally, it is best to develop fuels management and wildfire mitigation strategies that are informed and guided by the ecology of the tree species. This is not the case with lodgepole pine.

Older lodgepole pine stands generally do not respond well to selective thinning, but instead respond better to the removal of all trees over a defined area to allow healthy forest regeneration. Selectively thinning lodgepole can open the stand to severe windthrow and stem breakage. However, if your home is located within a lodgepole pine forest, you may prefer selective thinning to the removal of all standing trees.

To ensure a positive response to thinning throughout the life of a lodgepole pine stand, trees must be thinned early in their lives – no later than 20 to 30 years after germination. Thinning lodgepole pine forests to achieve low densities can best be



Figure 21: During high winds, these lodgepole pine trees fell onto the house. Lodgepole pine is highly susceptible to windthrow. Photo: CSFS



Figure 22: Mature aspen stands can contain many young conifers, dead trees and other organic debris. This can become a fire hazard. Photo: CSFS



Figure 23: A young lodgepole pine stand. Thinning lodgepole pines early on in their lives will help reduce the wildfire hazard in the future. Photo: CSFS

The defensible space guidelines in this quick guide are predominantly for ponderosa pine and mixed-conifer forests. These guidelines will vary with other forest types.



Figure 24: Piñon-juniper forests are often composed of continuous fuels. Creating clumps of trees with large spaces in between clumps will break up the continuity. Photo: CSFS



Figure 25: Gambel oak needs to be treated in a defensible space at least every 5-7 years because of its vigorous growing habits. Photo: CSFS

accomplished by beginning when trees are small saplings, and maintaining those densities through time as the trees mature.

Thinning older stands of lodgepole pine to the extent recommended for defensible space may take several thinning operations spaced over a decade or more. When thinning mature stands of lodgepole pine, do not remove more than 30 percent of the trees in each thinning operation. Extensive thinning of dense, pole-sized and larger lodgepole pine often results in windthrow of the remaining trees. Focus on removing trees that are obviously lower in height or suppressed in the forest canopy. Leaving the tallest trees will make the remaining trees less susceptible to windthrow.

Another option is leaving clumps of 30-50 trees. Clumps are less susceptible to windthrow than solitary trees. Allow a minimum of 30-50 feet between tree crowns on the clump perimeter and any adjacent trees or clumps of trees. Wildfire tends to travel in the crowns of lodgepole pine. By separating clumps of trees with large spaces between crowns, the fire is less likely to sustain a crown fire.

Piñon-Juniper

Many piñon-juniper (PJ) forests are composed of continuous fuel that is highly flammable. Fire in PJ forests tend to burn intensely in the crowns of trees. Try to create a mosaic pattern when you thin these trees, with a mixture of individual trees and clumps of three to five trees. The size of each clump will depend on the size, health and location of the trees. The minimum spacing between individual trees should be 10 feet between tree crowns, with increasing space for larger trees, clumps, and stands on steeper slopes.

Tree pruning for defensible space is not as critical in PJ forests as in pine or fir forests. Instead, it is more important to space the trees so that it is difficult for the fire to move from one tree clump to the next. Trees should only be pruned to remove dead branches or branches that are touching the ground. However, if desired, live branches can be pruned to a height of 3 feet above the ground. Removing shrubs that are growing beneath PJ canopies is recommended to reduce the overall fuel load that is available to a fire.

It is NOT recommended to prune live branches or remove PJ trees between April and October, when the piñon ips beetle is active in western Colorado. Any thinning activity that creates the flow of sap in the summer months can attract these beetles to healthy trees on your property. However, it is acceptable to remove dead trees and dead branches during the summer months.

For more information, please refer to the CSFS [Piñon-Juniper Management Quick Guide](http://www.csfs.colostate.edu) at www.csfs.colostate.edu.

Gambel Oak

Maintaining Gambel oak forests that remain resistant to the spread of wildfire can be a challenge because of their vigorous growing habits. Gambel oak trees grow in clumps or groves, and the stems in each clump originate from the same root system. Most reproduction occurs through vegetative sprouts from this deep, extensive root system. You may need to treat Gambel oak near your home every five to seven years. Sprouts also should be mowed at least once every year in Zones 1 and 2. Herbicides can be used to supplement mowing efforts for controlling regrowth.

For more information, please refer to the CSFS [Gambel Oak Management](http://www.csfs.colostate.edu) publication at www.csfs.colostate.edu.

Note: This publication does not address high-elevation spruce-fir forests. For information on this forest type, please contact your local CSFS district office.

Maintaining Your Defensible Space

Your home is located in a dynamic environment that is always changing. Trees, grasses and shrubs continue to grow, die or are damaged, and drop their leaves and needles each season. Just like your home, the defensible space around it requires regular, ongoing maintenance to be effective. Use the following checklists to build and maintain your defensible space.

Defensible Space: Initial Projects

- ☐ Properly thin and prune trees and shrubs within Zones 1 and 2.
- ☐ Dispose of slash from tree/shrub thinning.
- ☐ Screen attic, roof, eaves and foundation vents, and periodically check them to ensure that they are in good condition.
- ☐ Screen or wall-in stilt foundations and decks; screens should be 1/8-inch or smaller metal mesh (1/16-inch mesh is best).
- ☐ Post signs at the end of the driveway with your last name and house number that are noncombustible, reflective and easily visible to emergency responders.
- ☐ Make sure that the driveway is wide enough for fire trucks to enter and exit, and that trees and branches are adequately cleared for access by fire and emergency equipment. Contact your local fire department or check the CSFS website for information specific to access.
- ☐ Take pictures of your completed defensible space for comparison of forest growth over time.



Figure 26: Keeping the forest properly thinned and pruned in a defensible space will reduce the chances of a home burning during a wildfire. Photo: CSFS

Defensible Space Tasks: Annual Requirements

- ☐ Clear roof, deck and gutters of pine needles and other debris. *
- ☐ Mow grass and weeds to a height of 6 inches or less. *
- ☐ Rake all pine needles and other flammable debris away from the foundation of your home and deck. *
- ☐ Remove trash and debris accumulations from the defensible space.*
- ☐ Check fire extinguishers to ensure that they have not expired and are in good working condition.
- ☐ Check chimney screens to make sure they are in place and in good condition.
- ☐ Remove branches that overhang the roof and chimney.
- ☐ Check regrowth of trees and shrubs by reviewing photos of your original defensible space; properly thin and prune trees and shrubs within Zones 1 and 2.
- ☐ Dispose of slash from tree/shrub thinning. *

*Address more than once per year, as needed.



Figure 27: Sharing information and working with your neighbors and community will give your home and surrounding areas a better chance of surviving a wildfire. Photo: CSFS

Be Prepared

- ☐ Complete a checklist of fire safety needs inside your home (these should be available at your local fire department). Examples include having an evacuation plan and maintaining smoke detectors and fire extinguishers.
- ☐ Develop your fire evacuation plan and practice family fire drills. Ensure that all family members are aware of and understand escape routes, meeting points and other emergency details.
- ☐ Contact your county sheriff's office and ensure that your home telephone number and any other important phone numbers appear in the county's Reverse 911 or other emergency notification database.
- ☐ Prepare a "grab and go" disaster supply kit that will last at least three days, containing your family's and pets' necessary items, such as cash, water, clothing, food, first aid and prescription medicines.
- ☐ Ensure that an outdoor water supply is available. If it is safe to do so, make a hose and nozzle available for responding firefighters. The hose should be long enough to reach all parts of the house.

Preparing your home and property from wildfire is a necessity if you live in the wildland-urban interface. It is important to adequately modify the fuels in your home ignition zone. Remember, every task you complete around your home and property will make your home more defensible during a wildfire.

Always remember that creating and maintaining an effective defensible space in the home ignition zone is not a one-time endeavor – it requires an ongoing, long-term commitment.

If you have questions, please contact your local CSFS district office. Contact information can be found at www.csfs.colostate.edu.

List of Additional Resources

- The Colorado State Forest Service, <http://www.csfs.colostate.edu>
- CSFS wildfire-related publications, <http://csfs.colostate.edu/pages/wf-publications.html>
- Community Wildfire Protection Planning, <http://csfs.colostate.edu/pages/community-wf-protection-planning.html>
- Colorado's "Are You FireWise?" information, <http://csfs.colostate.edu/pages/wf-protection.html>
- National Fire Protection Association's Firewise Communities USA, <http://www.firewise.org>
- Fire Adapted Communities, <http://fireadapted.org/>
- Ready, Set, Go!, <http://wildlandfirersg.org/>



Figure 28: *This house has a high risk of burning during an approaching wildfire. Modifying the fuels around a home is critical to reduce the risk of losing structures during a wildfire. Photo: CSFS*



Figure 29: *This house survived the Fourmile Canyon Fire in 2010. Photo: CSFS*



Figure 30: *Firefighters were able to save this house during the 2012 Weber Fire because the homeowners had a good defensible space. Photo: Dan Bender, La Plata County*

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Top 10 Ways to Protect Your Home from Wildfire



Learn more at DisasterSafety.org/Wildfire





FORESTRY

Gambel Oak Management

no. 6.311

by N. Jester, K. Rogers, and F.C. Dennis¹

Quick Facts...

Gambel oak is commonly found throughout western Colorado between 6,000 and 9,000 feet in elevation.

Recurring fires often cause oak stands to develop into large thickets; younger thickets created in this way can become exceptionally dense and almost impenetrable for livestock and wildlife.

Control, or eradication, of Gambel oak requires physically removing the stem and as much of the root system as possible.

Gambel Oak Ecology

Gambel oak (*Quercus gambelii*), commonly found throughout western Colorado between 6,000 and 9,000 feet in elevation, generally dominates the region between the lower piñon-juniper zone and the aspen or ponderosa pine zone above. This shrub can be found throughout southern Colorado and along the Front Range almost to Denver. Gambel oak is usually found in conjunction with serviceberry (*Amelanchier alnifolia*), snowberry (*Symphoricarpos oreophilus*), mountain mahogany (*Cercocarpus montanus*), chokecherry (*Prunus virginiana*) and a variety of forbs and grasses. In south-central Colorado, oak brush is often associated with sumac and New Mexico locust.



Figure 1. Typical oak brush growth in Colorado.

Gambel oak rarely reproduces from acorns; most reproduction is vegetative with sprouts occurring from a deep, extensive root system. Clones of oak brush spread slowly but stubbornly persist in previously colonized areas.



Figure 2. Oak brush sprouting after fire.

Recurring fires often cause oak stands to develop into large thickets; younger thickets created in this way can become exceptionally dense and almost impenetrable for livestock and wildlife. Older stands tend to form clumps with a lush understory of grass and forbs, often attaining tree-like form with heights up to 20 feet.

Oak brush provides cover and nesting habitat for many forms of wildlife (birds, mammals, amphibians, etc.). The foliage and acorns offer valuable food for many of these wildlife species, such as wild turkey, mule deer, and black bear. Acorns produced by the larger stands of oak brush are critical for turkey.

Although not highly palatable, the availability and abundance of Gambel oak, particularly on winter ranges, make this an important wildlife plant. Oak brush is especially important to mule deer; on some summer ranges it reportedly provides more deer forage than all other species combined. Elk generally rely on

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Extension

Gambel oak during the spring and winter. Acorns of Gambel oak are an important mast crop in many areas, particularly for black bears in the fall.

Oak brush makes excellent firewood and is used extensively for this purpose. Occasionally, this species is used for fence posts but, as a rule, does not grow to the size necessary to produce sawn wood products.

Standard Treatment Methods for Oak Brush

Various treatment methods have been used to control oak brush in western Colorado, including herbicide, mechanical treatment, and prescribed burning. In many cases, the objective of these treatments is to increase available forage for wildlife or livestock. Managed grazing of goats is also an effective treatment to reduce or eradicate oak.

Appropriate treatment is tied directly to land management objectives. As a general rule, a diversity (mosaic) of brush species, size, and densities can often accomplish multiple objectives (i.e., reducing wildfire hazards, enhancing aesthetics, screening, stabilizing soil and watershed outputs, increasing forage production, and enhancing various elements of wildlife habitat, food, cover, etc.).

Control, or eradication, of Gambel oak requires either physically removing the stem and as much of the root system as possible (typically not practical or desired) or continued top-killing of the plant so that stored energy in the root system is depleted to a greater degree than energy is restored through photosynthesis. The second option requires commitment and persistence.

Chemical Treatment

Most studies using herbicides report significant above-ground stem kill, but subsequent sprouting. In recent years, applications with Garlon have shown to be effective at completely killing oak brush when applied as either a foliar spray or as a stump treatment. For greatest effectiveness, stump treatments must be applied before the wood dries, usually within one hour of cutting.

Mechanical Treatment

Thinning oak brush by hand can be time consuming and labor-intensive due to the density of the vegetation. Prolific sprouting follows cutting unless herbicides are applied to the cut stumps. Mechanical treatments such as chaining, root plowing, dozing, and roller-chopping are somewhat expensive and cannot be used on steep slopes. Various forms of mastication equipment can also be used on oak brush such as a Hydroaxes®, Bull Hog® mowers, timberaxes, or Fecon® rotary cutting heads. Sprouting also follows these mechanical treatments even when the overstory is completely removed and additional action is needed if oak control is desired. Mechanical treatment can also make the site susceptible to weed invasion.



Figure 3. Mechanical treatment using a Hydroaxe®.



Figure 4. Mechanical treatment using a timberaxe.



Figure 5. Oak brush resprouting after fire.

Prescribed Burning

Fire readily kills the above-ground portions of oak brush. However, intense sprouting follows almost immediately and usually causes the stands to become even denser. With prescribed burning, a commitment to repeated burning on the same site is necessary to effectively reduce the oak brush over the long term.

However, prescribed fire also can be an effective tool to produce younger plants that are more palatable to wildlife.

Treating Gambel Oak for Wildfire Safety

Gambel oak does not burn readily except under favorable conditions such as during continued drought or in the fall or early spring when vegetation dries out. Late spring frosts that kill the leaves can cause extreme fire behavior later in the summer; the dead leaves have a tendency to cling to the stem and act as dry aerial fuels. Under certain conditions, fires in oak brush can spread quickly and fire behavior can be similar to fuel models in southern California (e.g., the Battlement Creek and South Canyon fires in western Colorado where a number of firefighter fatalities occurred in the oak brush fuel type).

Fuel Hazards

Fuel hazard measures refer to the **continuity**, both horizontal (across the ground) and vertical (from the ground up into the vegetation crown). Fuels with a high degree of vertical and horizontal continuity are the most hazardous, particularly when they occur on slopes. Heavier fuels (brush and trees) are more hazardous, producing more intense fires than light fuels (grass). Mitigation of wildfire fuel hazards focuses on breaking up the continuity of fuels. Increasing distances between fuels is necessary on slopes.

Standards for Fuel Mitigation

Trees: woody perennials, usually having one dominant vertical trunk and a height greater than 15 feet at maturity. Spacing requirements between trees are a *minimum* of 10 feet from the edges of the crowns. (This does not apply to mature stands of aspen trees where ladder fuels have been removed as described below. Follow the spacing requirements in areas with young aspen.)

Brush and Shrubs: woody plants, smaller than trees, often formed by a number of vertical or semi-upright branches arising close to the ground. Brush is smaller than shrubs and can be either woody or herbaceous vegetation. Thinning of brush and shrubs can often be accomplished by separating clumps rather than individual stems. *Spacing requirements* between clumps of brush and/or shrubs are 2½ times (2½X) the height of the vegetation. The maximum diameter of clumps is 2 times (2X) the height of the vegetation. (Make all measurements from the edges of vegetation crowns.)

Example: Spacing between shrub clumps 6 feet in height is 15 feet or more. The diameter of shrub clumps is less than 12 feet (measured from the edges of the crowns). Branches are pruned to a height of 3 feet. Certain brush species, such as Gambel oak, serviceberry, and snowberry re-sprout vigorously following cutting. Applying herbicide to stumps immediately following cutting may be necessary to effectively reduce long-term fire hazards. An alternative to herbicide treatment is to mow sprouts annually.

Ladder Fuels: vegetative materials with a vertical continuity that allows fire to burn from ground level up into the branches and crowns of trees. While potentially very hazardous, ladder fuels are relatively easy to mitigate. The first step in fuel mitigation is to remove all ladder fuels *beneath* tree canopies. In the remaining areas, prune all branches of shrubs or trees up to a height of 10 feet above ground (or one-half the height of the plant, whichever is least). Lastly, chip and/or remove pruned material from the site.

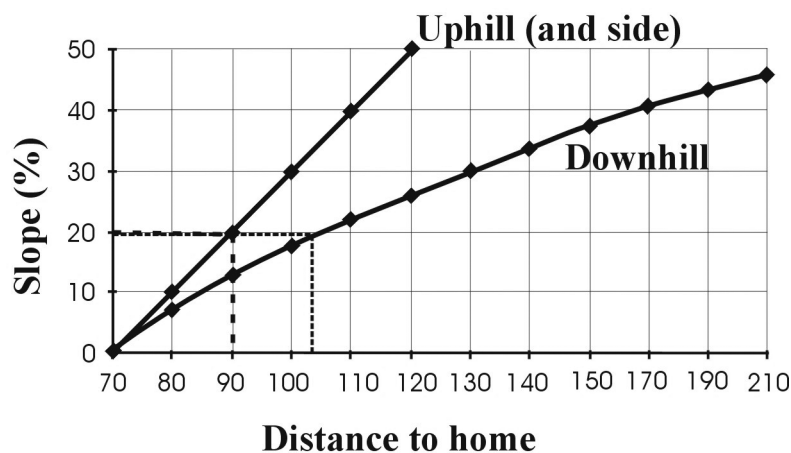
For More Information

From Colorado State Forest Service,
Colorado State University, Fort Collins,
CO 80523-5060; (970) 491-6303; csfs.colostate.edu:

- FireWise Construction - Design and Materials
- Home Fire Protection in the Wildland Urban Interface
- Landowner Guide to Thinning

From Colorado State University
Extension, 115 General Services
Building, Fort Collins, CO 80523-
4061; (970) 491-6198; E-mail:
resourcecenter@ucm.colostate.edu:

- 6.303, Fire-Resistant Landscaping
- 6.304, Forest Home Fire Safety
- 6.305, FireWise Plant Materials
- 6.306, Grass Seed Mixes to Reduce Wildfire Hazard



Grasses: mow dead, dry grass to a height of less than 6 inches.

Slope Adjustment Factors

The minimum distance from a structure for brush, shrub, and tree fuel treatment is **75 feet on level ground**. (Where only grasses exist and no additional vegetative landscaping is planned, the minimum distance is 30 feet.)

On slopes *downhill* from structures, complete defensible space thinning according to the distances in Table 1. Uphill and side distances remain 75 feet, unless the property slopes in multiple directions.

Table 1. Defensible space thinning guidelines.

1 percent to 20 percent slopes =

Brush/shrubs	75' from structure; 3X height separation distance between vegetation.
Trees	75' from structure; 10-foot crown separation distance between trees.
Grass	30' from structure; mow dead, dry grass to 6 inches or less in height.

21 percent to 40 percent slopes =

Brush/shrubs	150' from structure; 4X height separation distance between vegetation.
Trees	150' from structure; 20-foot crown separation distance between trees.
Grass	50' from structure; mow dead, dry grass to 6 inches or less in height.

Greater than 40 percent slopes =

Brush/shrubs	200' from structure; 6X height separation distance between vegetation.
Trees	200' from structure; 30-foot crown separation distance between trees.
Grass	75' from structure; mow dead, dry grass to 6 inches or less in height.

For more information or professional assistance in managing your forest, contact your local Colorado State Forest Service district office.



This fact sheet was produced in cooperation with the Colorado State Forest Service.

¹Colorado State Forest Service foresters.

Colorado State University, U.S. Department of Agriculture, and Colorado counties cooperating. CSU Extension programs are available to all without discrimination. No endorsement of products mentioned is intended nor is criticism implied of products not mentioned.

Your Personal **Wildland Fire ACTION GUIDE**



☒ *Ready*



☒ *Set*



☒ *Go!*



7th Edition

Ready, Set, Go!



Saving Lives and Property through Advance Planning

This publication was prepared by the International Association of Fire Chiefs' RSG! Program and the USDA Forest Service, U.S. Department of the Interior, and the U.S. Fire Administration.

To learn more about the Ready, Set, Go! Program and its partners, visit www.wildlandfireRSG.org.

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The fire season is a year-round reality, requiring firefighters and residents to be prepared for the threat of wildland fire.

Each year, wildland fires consume hundreds of homes in the Wildland-Urban Interface (WUI) – a high-risk wildfire area containing natural fuels where houses are built. Studies show as many as 80 percent of the homes lost to wildland fires could have been saved if their owners had followed simple fire-safe practices. In addition, wildland fire related deaths occur because people wait too long to leave their homes.

Your fire department takes every precaution to help protect you and your property from wildland fire. However, in a major wildland fire event, there simply may not be enough fire resources or firefighters to defend every home.

Successfully preparing for a wildland fire enables you to take personal responsibility to protect yourself, your family, and your property. In this Action Guide, we provide tips and tools you need to prepare for a wildland fire threat; to have situational awareness when a fire starts; and to act early as directed by local officials.

The Ready, Set, Go (RSG)! Program works in collaboration with existing wildland fire public education efforts. RSG is brought to you in partnership with the fire service, and amplifies the common goal we all share for wildland fire preparedness. Visit us at www.wildlandfireRSG.org to learn more about becoming prepared.

The IAFC's Wildland Fire Programs offer guidance, insight, and resources that support your local fire department in their outreach, mitigation, and response efforts. Visit www.iafc.org/wildland to learn more about wildland fire risk reduction and to access our resources.

You are a key leader to creating change. You and the members of your community can take simple steps to increase your wildland fire preparedness. Your knowledge and actions may empower others to follow your lead, increasing their safety and potentially decreasing property loss and damage. Being prepared for a wildland fire is vital, as responder resources can be spread thin. Taking advanced personal action can result in improved safety for all involved.

Fire is, and always has been, a natural occurrence. Hills, canyons, and forests burned periodically long before homes were built. Wildland fires are fueled by a build-up of dry vegetation and driven by seasonal hot and dry winds, which are extremely dangerous and difficult to control. Many people have built homes in the WUI without fully understanding the impact a fire may have on their lives. Few have adequately prepared their families and homes for a timely evacuation in the event of a wildland fire.

It is not a question of if, but when, the next major wildland fire will occur. Through advanced planning, understanding, and preparation we can all be partners in the wildland fire solution. The tips on the following pages are designed to help create awareness and a safer environment for you, your family, and fire personnel.



Defensible space around property



Buffer zone



Ember damage, but home saved

Living in the Wildland-Urban Interface and Ember Zone

Ready, Set, Go!

begins with a house that firefighters can defend.

Defensible Space Works

If you live next to a dense vegetation area, the Wildland-Urban Interface (WUI), you should provide firefighters with the defensible space they need to protect your home. Create a buffer zone by removing weeds, brush, and other vegetation. This helps keep the fire away from your home and reduces the risk from flying embers. Fire preparedness education programs provide valuable guidance on property enhancements.

Homes on the Wildland Boundary are at Risk too

A home within one mile of a natural area is considered a part of an ember zone, where wind-driven embers can be a risk to your property. You and your home must be prepared well before a fire occurs. Ember fires can destroy homes or neighborhoods far from the actual front of the fire. Prepare your home with the tips from the following pages.

Consider This

Unmanaged vegetation between and around homes increases the risk of wildland fire spreading throughout the community, and endangering lives and property. Pre-fire planning, fuels management, and sufficient fuel breaks allow firefighters the space they need to keep fire from entering the community.

“Fire preparedness education programs provide valuable guidance on property enhancements.” - Nick Harrison, Texas A&M Forest Service

Create Defensible Space

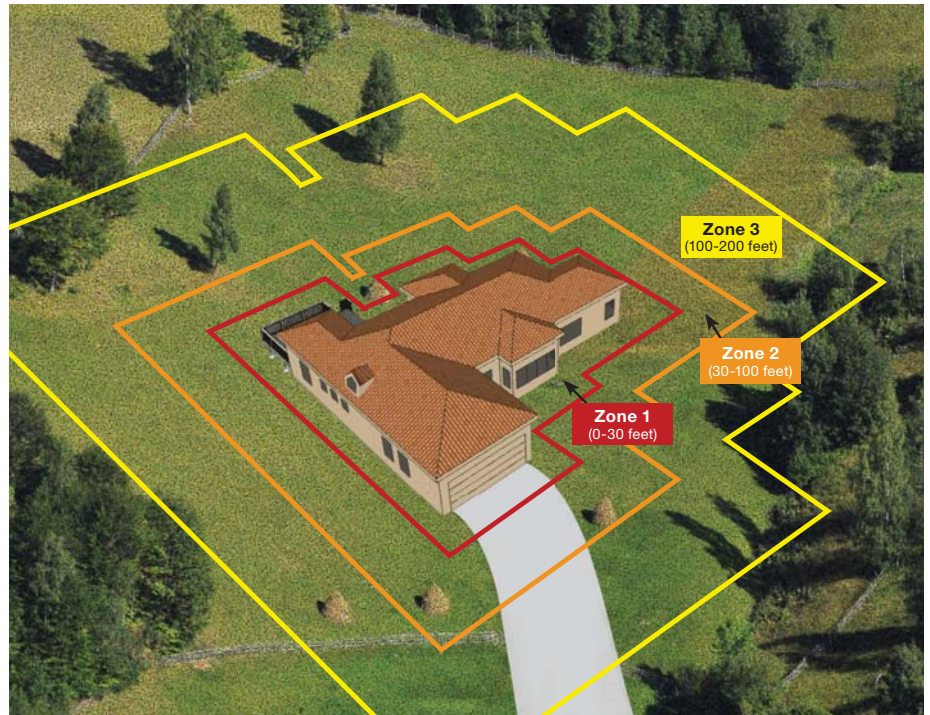
Defensible space is the space between a structure and the wildland area that creates a sufficient buffer to slow or halt the spread of fire to a structure.

It protects the home from igniting due to direct flame or radiant heat. Defensible space is essential to help protect a structure during a wildland fire.

You can create defensible space by removing weeds, brush, and other vegetation from around your property.

Defensible space is made up of three zones around your home; Zone 1: 0-30ft, Zone 2: 30-100ft, and Zone 3: 100-200ft.

Follow the advice under each zone to help protect your home.



ZONE 1

0-30 feet around your home or to property line

- Use hard surfaces such as concrete or noncombustible rock mulch 0-5 feet around home.
- Use non-wood, low-growing herbaceous vegetation. Succulent plants and ground covers are good choices.
- Store firewood and other combustible materials at least 30 feet away from your home, garage, or attached deck.
- Trim back touching or overhanging branches from the roof to a distance of at least 10 feet.

ZONE 2

30-100 feet around your home or to property line

- Create vegetation groups, "islands," to break up continuous fuels around your home.
- Remove ladder fuels to create a separation between low-level vegetation and tree branches to keep fire from climbing trees.
- Remove leaf and needle debris from the yard.
- Keep grass and wildflowers under 8 inches in height.

ZONE 3

100-200 feet around your home or to property line

- Create and maintain a minimum of 10 feet between the tops of trees.
- Remove ladder fuels, creating a separation between low-level vegetation and tree branches to keep fire from climbing up trees.
- Remove dead trees and shrubs.

Ladder Fuels

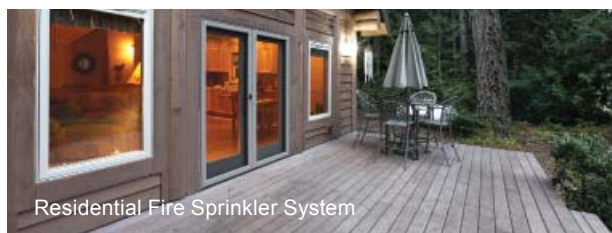
Ladder fuels allow the fire to climb from the surface fuels into the upper portion of the tree. They can be eliminated by increasing horizontal and vertical separation between vegetation.



Making Your Home Fire Resistant – Harden Your Home

Construction materials and the quality of the defensible space surrounding the structure are what increases the chance of survival in a wildland fire. Embers from a wildland fire will find the weak spot in your home's fire protection scheme and can easily catch because of small, overlooked, or seemingly inconsequential factors. Below are some measures you can take to safeguard your home.

Home Improvements



Residential Fire Sprinkler System



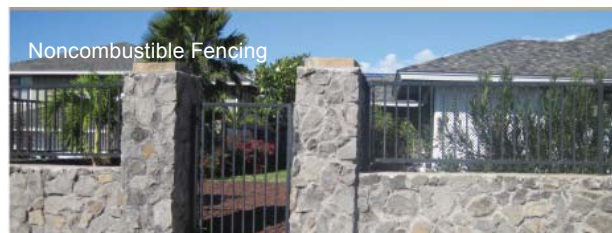
Gutter Guards or Screens



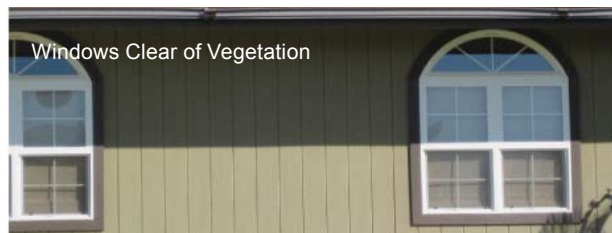
Enclosed Eaves



Screened Vents



Noncombustible Fencing



Windows Clear of Vegetation

BALCONIES and DECKS

Embers can collect in or on combustible surfaces, or beneath decks and balconies, igniting the material and entering the home through walls or windows.

To harden your home even further, consider protecting your home with a residential fire sprinkler system. In addition to extinguishing a fire started by an ember that enters your home, a sprinkler system can help protect you and your family year-round from any home fire.

ROOFS

Roofs are the most vulnerable surface where embers land because they become lodged and can start a fire. Roof valleys, open ends of barrel tiles, and rain gutters are all points of entry.

EAVES

Embers can gather under open eaves and ignite combustible material.

VENTS

Embers can enter the attic or other concealed spaces and ignite combustible materials. Vents in eaves and cornices are particularly vulnerable, as are any unscreened vents.

WALLS and FENCING

Combustible siding or other combustible/overlapping materials provide surfaces and crevices for embers to nestle and ignite. Combustible fencing can become engulfed, and if attached to the home's sidings can carry the fire right to the home.

WINDOWS and DOORS

Embers can enter gaps in doors, including garage doors. Plants or combustible storage near windows can be ignited from embers and generate heat that can break windows and/or melt combustible frames.

Tour a Wildland Fire Prepared Home

Home Site and Yard: Ensure all vegetation within 100 feet around your home or to your property line is well-managed. This area may need to be enlarged in severe fire hazard areas. This may mean considering the impact a common slope or neighbor's yard may have on your property during a wildland fire. Remember the importance of routine maintenance. Keep woodpiles, propane tanks, and combustible materials away from your home and other structures such as detached garages, barns, and sheds. Ensure trees are away from power lines.

Inside: Keep working fire extinguishers on hand. Install smoke alarms on each level of your home and near bedrooms. Test them monthly and change the batteries twice a year.

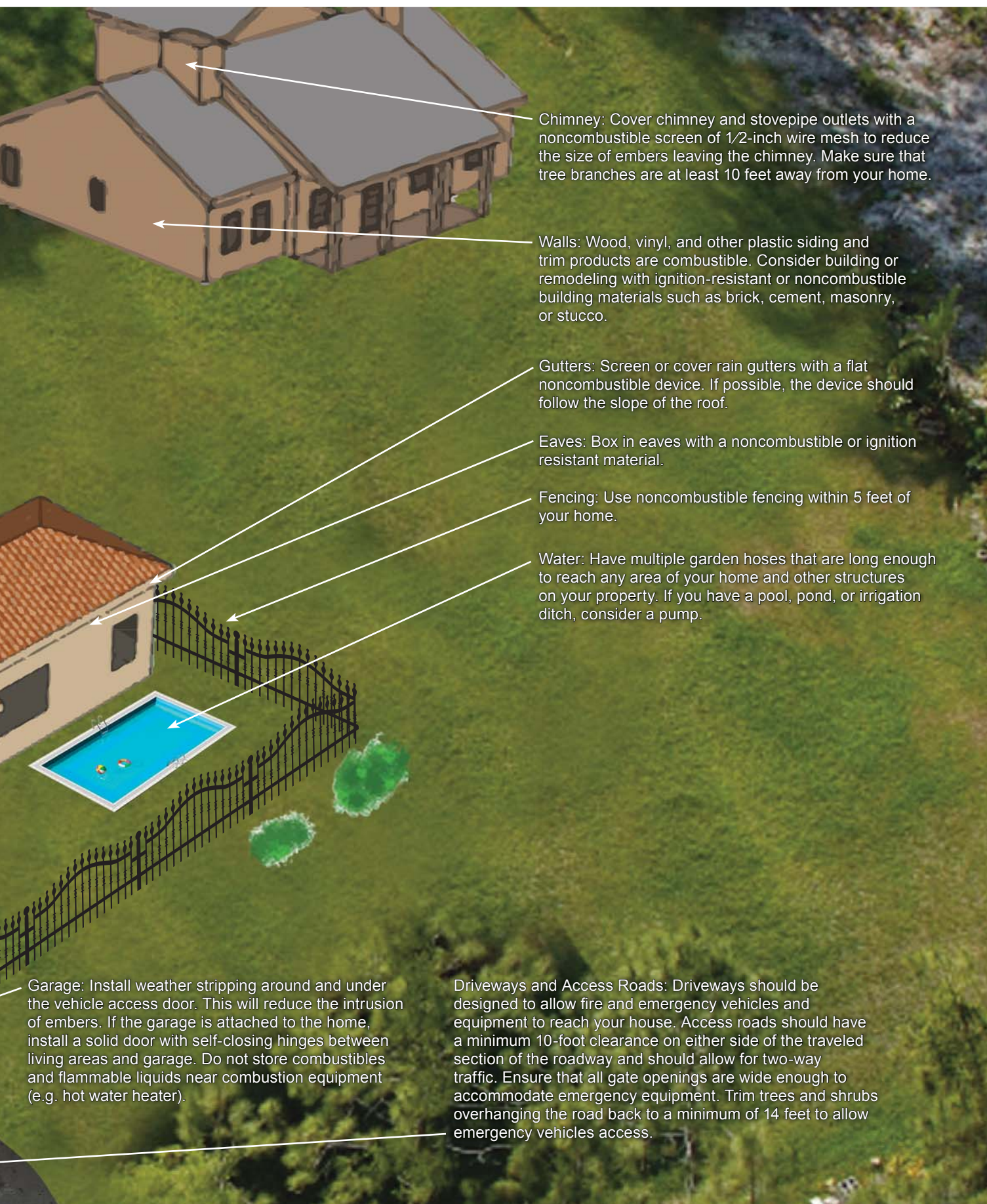
Address: Make sure your address is clearly visible from the road and constructed of noncombustible materials. Reflective numbering is recommended.

Roof: Use a Class A fire-rated roof covering, such as composition shingles, metal, or tile, when roofing or re-roofing. Block any spaces between roof decking and covering to minimize ember intrusion. Clear pine needles, leaves, and other debris from your roof and gutters. Prune tree branches within 10 feet of your roof.

Deck/Patio Cover: Use heavy timber or noncombustible construction material for decks. Enclose the underside of balconies and decks with fire-resistant materials to prevent embers from blowing underneath. Keep your deck clear of combustible items, such as baskets, flower arrangements, and other material.

Vents: At a minimum, all vent openings should be covered with 1/8-inch corrosion resistant metal mesh.

Windows: Radiant heat from burning vegetation or a nearby structure can cause the glass in windows to break. This will allow embers to enter and start internal fires. Single-pane and large picture windows are particularly vulnerable to glass breakage. Install dual-paned windows with a minimum of one pane being tempered glass to reduce the chance of breakage during a fire. Limit the size and number of windows in your home that face large areas of vegetation.



Chimney: Cover chimney and stovepipe outlets with a noncombustible screen of 1/2-inch wire mesh to reduce the size of embers leaving the chimney. Make sure that tree branches are at least 10 feet away from your home.

Walls: Wood, vinyl, and other plastic siding and trim products are combustible. Consider building or remodeling with ignition-resistant or noncombustible building materials such as brick, cement, masonry, or stucco.

Gutters: Screen or cover rain gutters with a flat noncombustible device. If possible, the device should follow the slope of the roof.

Eaves: Box in eaves with a noncombustible or ignition resistant material.

Fencing: Use noncombustible fencing within 5 feet of your home.

Water: Have multiple garden hoses that are long enough to reach any area of your home and other structures on your property. If you have a pool, pond, or irrigation ditch, consider a pump.

Garage: Install weather stripping around and under the vehicle access door. This will reduce the intrusion of embers. If the garage is attached to the home, install a solid door with self-closing hinges between living areas and garage. Do not store combustibles and flammable liquids near combustion equipment (e.g. hot water heater).

Driveways and Access Roads: Driveways should be designed to allow fire and emergency vehicles and equipment to reach your house. Access roads should have a minimum 10-foot clearance on either side of the traveled section of the roadway and should allow for two-way traffic. Ensure that all gate openings are wide enough to accommodate emergency equipment. Trim trees and shrubs overhanging the road back to a minimum of 14 feet to allow emergency vehicles access.

Ready, Set, Go!

Create Your Own Action Guide

Now that you have done everything you can to prepare your home, it is time to prepare your family.

Your Wildland Fire Action Guide must be prepared with all members of your household well in advance of a fire. Use these checklists to help you prepare and gain situational awareness in the threat of wildland fire.

Ready – Get Ready

- ☐ Create a Family Disaster Plan that includes meeting locations and communication plans and rehearse it regularly. Include the evacuation of large animals such as horses in your plan.
- ☐ Have fire extinguishers on hand and teach your family how to use them.
- ☐ Ensure that your family knows where your gas, electric, and water main shut-off controls are and how to use them.
- ☐ Plan and practice several different evacuation routes.
- ☐ Designate an emergency meeting location outside the fire hazard area.
- ☐ Assemble an emergency supply kit as recommended by the American Red Cross. Keep an extra kit in your vehicle.
- ☐ Appoint an out-of-area friend or relative as a point of contact so you can communicate with family members.
- ☐ Maintain a list of emergency contact numbers in your emergency supply kit.
- ☐ Have a portable radio or scanner so you can stay updated on the fire and weather emergency announcements.



Set – Be Prepared

- ☐ Monitor fire weather conditions and fire status. See www.inciweb.nwcg.gov. Stay tuned to your TV or local radio stations for updates.
- ☐ Evacuate as soon as you are 'set!'
- ☐ Alert family and neighbors.
- ☐ Dress in appropriate clothing (i.e., clothing made from natural fibers, such as cotton, and work boots). Have goggles and a dry bandana or particle mask handy.
- ☐ Ensure that you have your emergency supply kit on hand that includes all necessary items, such as a battery powered radio, spare batteries, emergency contact numbers, and a lot of drinking water.
- ☐ Remain close to your house, drink plenty of water, and ensure your family and pets are accounted for until you are ready to leave.

INSIDE CHECKLIST, IF TIME ALLOWS

- ☐ Close all windows and doors, leaving them unlocked.
- ☐ Remove all shades and curtains from windows.
- ☐ Move furniture to the center of the room, away from windows and doors.
- ☐ Turn off pilot lights and air conditioning.
- ☐ Leave your lights on so firefighters can see your house under smoky conditions.

OUTSIDE CHECKLIST, IF TIME ALLOWS

- ☐ Bring combustible items from the exterior of the house inside (e.g., patio furniture, children's toys, door mats, etc.) If you have a pool, place combustible items in the water.
- ☐ Turn off propane tanks and other gas at the meter.
- ☐ Don't leave sprinklers on or water running. They can effect critical water pressure.
- ☐ Leave exterior lights on.

- ☐ Back your car into the driveway to facilitate a quick departure. Shut doors and roll up windows.
- ☐ Have a ladder available.
- ☐ Patrol your property and extinguish all small fires until you leave.
- ☐ Cover attic and ground vents with pre-cut plywood or commercial seals if time permits.

IF YOU ARE TRAPPED: SURVIVAL TIPS

- ☐ Stay in your home until the fire passes. Shelter away from outside walls.
- ☐ Bring garden hoses inside house so embers and flames do not destroy them.
- ☐ Look for spot fires and extinguish if found inside house.
- ☐ Wear long sleeves and long pants made of natural fibers such as cotton.
- ☐ Stay hydrated.
- ☐ Ensure you can exit the home if it catches fire (remember if it's hot inside the house, it is four to five times hotter outside).
- ☐ Fill sinks and tubs for an emergency water supply.
- ☐ Place wet towels under doors to keep smoke and embers out.
- ☐ After the fire has passed, check your roof and extinguish any fires, sparks or embers. Check the attic as well.
- ☐ If there are fires that you cannot extinguish, call 9-1-1.

Go! – Act Early

By leaving early, you give your family the best chance of surviving a wildland fire. You also help firefighters by keeping roads clear of congestion, enabling them to move more freely and do their job in a safer environment.

WHEN TO LEAVE

Do not wait to be advised to leave if there is a possible threat to your home or evacuation route. Leave early enough to avoid being caught in fire, smoke, or road congestion. If you are advised to leave by local authorities, do not hesitate!

WHERE TO GO

Leave to a predetermined location (it should be a low-risk area, such as a well-prepared neighbor or relative's house, a Red Cross shelter or evacuation center, motel, etc.)

HOW TO GET THERE

Have several travel routes in case one route is blocked by the fire or by emergency vehicles. Choose the safest route away from the fire.

WHAT TO TAKE

Take your emergency supply kit containing your family and pet's necessary items.

EMERGENCY SUPPLIES LIST

The American Red Cross recommends every family have an emergency supply kit assembled long before a wildland fire or other emergency occurs. Use the checklist below to help assemble yours. For more information on emergency supplies visit www.redcross.org/get-help.

- ☐ Three-day supply of water (one gallon per person, per day) and non-perishable food for family (3 day supply).
- ☐ First aid kit and sanitation supplies.
- ☐ Flashlight, battery-powered radio, and extra batteries.
- ☐ An extra set of car keys, credit cards, cash, or traveler's checks.
- ☐ Extra eyeglasses, contact lenses, prescriptions, and medications.
- ☐ Important family documents and contact numbers, including insurance documents.
- ☐ Map marked with evacuation routes.
- ☐ Easily carried valuables and irreplaceable items.
- ☐ Personal electronic devices and chargers.
- ☐ Note: Keep a pair of old shoes and a flashlight handy in case of a sudden evacuation at night.



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To file a complaint alleging discrimination, write USDA, Director, Office of Civil Rights, 1400 Independence Avenue, SW, Washington DC 20250-9410 or call toll free voice (866) 632-9992, TDD (800) 877-8339, or voice relay (866) 377-8642. USDA is an equal opportunity provider and employer.

My Personal Wildland Fire ACTION PLAN

Write up your Wildland Fire Action Plan and post it in a location where every member of your family can see it. Rehearse it with your family.

During high-fire-danger days in your area, monitor your local media for information and be ready to implement your plan. Hot, dry, and windy conditions create the perfect environment for a wildland fire.

IMPORTANT PHONE NUMBERS

Out-of-Area Contact _____ Phone: _____

Work _____

School _____

Other _____

EVACUATION ROUTES

1 _____

2 _____

3 _____

WHERE TO GO

LOCATION OF EMERGENCY SUPPLY KIT(S)

NOTES

Contact your local fire department for more tips to prepare before a wildland fire.



My Personal Wildland Fire ACTION PLAN

Residential Safety Checklist

Tips To Improve Family and Property Survival During A Wildland Fire

Ready

Get ready

- ☒ Dispose of or relocate combustible material from around your home.
- ☒ Trim trees & bushes allowing ample space between your home & landscape vegetation.

Set

Be prepared

- ☒ Arrange your 'Go-Kit' with prescription medication, emergency supplies, important documents, and other essential items.
- ☒ Create your own action plan; involve your family & practice exit plans from the home & neighborhood frequently.
- ☒ Be sure you're familiar with local emergency notification systems & evacuation systems.

Go!

Act early

- ☒ Get your 'Go-Kit' and leave well before the threat approaches following a planned accessible route.
- ☒ Stay aware of the situation and follow your plan.
- ☒ Cooperate with local authorities during evacuation & re-entry processes.

Ready, Set, Go!

www.wildlandfireRSG.org



FEMA



APPENDIX E HOUSEHOLD TIPS

HOUSEHOLD TIPS for PROPERTY MITIGATION and PROTECTION

- . Keep a clearing of at least 30 feet around your house for fire fighting equipment.
- . Space the trees you plant carefully.
- . Remove "ladder fuels". They link the grasses and the tree tops.
- . Create "fuel break" - - - driveways, gravel walkways, or lawns.
- . Maintain your irrigation system regularly.
- . Prune tree limbs so the lowest is between 6' - 10' from the ground.
- . Remove leaf clutter from your roof and yard.
- . Mow regularly.
- . Remove dead or overhanging branches.
- . Store firewood away from your house.
- . Refuel garden equipment carefully.
- . Maintain garden equipment regularly.
- . If you smoke, use your ashtray.
- . Store and use flammable liquids properly.
- . Dispose of cuttings and debris promptly, according to local regulations.
- . Observe local regulations for vegetative clearances and fire safety equipment requirements.
- . Check your generator and/or hose to be sure it is in good repair.
- . Don't keep combustible materials under decks or elevated porches.
- . Make trellises of non-flammable metal.
- . Have at least two ground-level doors as safety exits.
- . Keep at least two means of escape (either a door/window) in each room.
- . Mark your driveway and access roads clearly.
- . Keep ample turnaround space near your house for fire equipment.
- . When possible, use construction materials that are fire-resistant or non-combustible.
- . Prevent sparks from entering your house by covering vents with 1/8" wire mesh.

APPENDIX F EVACUATION

When a major fire threatens, the first *life-protecting option* for residents is evacuation, and the primary *life-safety concern* for firefighters is an escape route. Consequently, establishing and maintaining safe evacuation routes becomes a top priority. All too frequently, civilian fatalities occur during emergency evacuations. Residents either become trapped by a fast-moving fire, or wait too long to evacuate safely. If smoke and flames are already present, it may already be too late to evacuate. It can be expected that residents attempting to leave the community will clog existing roadways and impede access by emergency service providers.

This Appendix points homeowners toward answers to five important questions:

- 1. In the event of an emergency that required evacuation, how would you be notified?*
- 2. What are the primary evacuation routes?*
- 3. In the event that our primary evacuation route was blocked or impassable, what would you do?*
- 4. If an evacuation were ordered, what can you do to ensure the safety of your pets?*
- 5. If you have to evacuate, what should you take with you?*

Notification In the event of an actual wildfire impacting the community, updated residential wildfire event information should be posted periodically on *El Paso County and TLMFD websites*. Updated information is generally available on recorded messages and made available on *event-established, dial-up telephone line(s)* by the El Paso County Sheriff's Office. Phone lines are established for each event, with numbers announced to the public via printed or announced public broadcast mediums. Periodic updates regarding emergency events are also generally broadcast via *AM radio* on the official, emergency public broadcast radio stations serving El Paso County.

The *El Paso County Sheriff has an Emergency Management Staff that would be responsible for coordinating notification*. While they use multiple means of getting alerts to all local media, the fastest and most assured way to be alerted is through the ***El Paso County Citizen Alert System, commonly called Reverse 911***. In order to be assured of receiving an evacuation message, residents are strongly encouraged to **register (now!) with the County via this link: <http://www.elpasoteller911.org>**. If you are not comfortable using the computer, please contact another Community member who can help sign you up. This system allows you to register multiple phone numbers (landline, cell phones, work numbers, as well as pagers enabling receipt of an alerting email or text message. You could easily be contacted, even if not at home. The system also permits registration of family members with restricted mobility or special needs, as well as frail seniors. Residents could also receive emergency house-to-house notification by El Paso County Sheriff personnel; however, that is only a possibility and should not be expected. To repeat, **Reverse 911** registration is simple, and it can be a lifesaver: residents should register today. As a reminder, please note that the fatalities in both the Waldo Canyon and Black Forest wildfires were residents who did not evacuate in time.

Evacuation In the event of a fire and based on the expected wildfire behavior, the ***El Paso County Sheriff personal will determine the optimum community evacuation routes and***

procedures. For planning purposes, the **main evacuation route for the RRR community is via Red Rock Ranch Drive to Highway 105, or alternatively, Red Rocks Drive to Mount Herman Road.** Community roads are county-maintained, and the majority of roads are paved and kept in good condition. Road widths are generally sufficient to allow two full lanes of travel in each direction. Within the community, priority mitigation efforts and clearing of road Right of Way (ROW) are focused on *Forest View Road, Red Forest Road, Sandstone Drive, and El Rancho Way* as they serve as critical feeder routes for resident evacuation.

Residents should plan in advance for the possibility that the expected primary evacuation route is blocked or unusable. Homeowners are strongly encouraged to familiarize themselves with all Red Rock Ranch roads and to develop a plan for using alternate emergency egress routes.

Community residents should heed and follow all evacuation instructions given by County Sheriff officials. If a fire is threatening the area, it is not necessary to wait for an actual evacuation order. The *International Association of Fire Chiefs* has developed a national **three-phase model for wildfire evacuation** education called **Ready, Set, Go program** can be found at <http://rsg.epcsheriff.com>, and is also provided in **APPENDIX D.**

A **Community Phone Chain** is an essential element in safe and timely emergency evacuation. The Firewise Committee is soliciting and developing a *neighborhood contact roster* to be used in the event of a community emergency. This roster will list the voice telephone numbers, textable numbers, and email addresses for residents. Neighbors in each area should contact each other during an emergency notification, and to offer assistance.

Pets Planning for pet safety and potential evacuation, like planning for your family, should begin far in advance of an emergency. Assemble a *pet evacuation kit* including crates, pet food, leashes, bowls, medications, and veterinary records. Make plans in advance for sheltering your pets by identifying friends or family outside the area, and locate pet-friendly motels or boarding kennels in advance.

What to Take Emergency plans should include taking all personal medications with you. It is also a good idea to take important documents with you including photos and/or video of your home to help with an insurance claim. It may be advisable to keep them offsite in a safe deposit box. It is recommended to have a workable family plan detailing where all family members will meet if your home is no longer accessible. Additionally, homeowner plans should include advance registration with the Sheriff 's Office for family members with special needs. It is vitally important that residents are prepared to evacuate long before a fire or other disaster. Just as fire mitigation should be complete long before a fire threatens, *a personal plan for evacuation* should be prepared before it is needed. As soon as a "red flag" watch or warning has been issued, make sure you are prepared! *A personal evacuation plan* should consider the following:

☐ *Papers, photos, computer drives, prescriptions and other important items that are stored - all available and ready to take at moment's notice.*

☐ *Change of clothes and personal items - packed and ready in a "go bag".*

☐ *A complete inventory, including photos of your home contents, and for items stored in a safe location. This will be very helpful for insurance claims.*

- Be sure your insurance coverage is adequate. Note: check insurance policies to ensure the basement and foundation are covered.

☐ *A realistic, and workable plan to shelter pets.*

☐ *A communication plan for all members of your family to maintain contact, including an agreed upon emergency meeting place, such as a friend's home, for family members in case you separate.*

Further Information

Websites:

Cost Share Assistance Database: <http://nrdb.csfs.colostate.edu/>
Colorado State Forest Service: <http://www.csfs.colostate.edu/>
CSFS, Woodland Field Office: <http://csfs.colostate.edu/pages/woodlandparkdist.html>
Colorado Division of Parks & Wildlife: <http://cpw.state.co.us/>
Firewise™ USA: <http://www.firewise.org/>
El Paso County: <http://www.elpasoco.com/Pages/default.aspx>
Park County: <http://www.parkco.us/>
Teller County: <http://www.co.teller.co.us/>
Colorado State University Extension: <http://www.extension.colostate.edu/chaffee/>
Pike National Forest: <http://www.fs.usda.gov/psicc>
Bureau of Land Management, Royal Gorge Field Office: <http://www.blm.gov/co/st/en/fo/rgfo.html>
Natural Resources Conservation Service: <http://www.co.nrcs.usda.gov/>
Colorado Tree Farmers: <http://csfs.colostate.edu/tree-farm/>
National Woodland Owners Association: <http://woodlandowners.org/>
Pikes Peak Wildfire Prevention Partners: <http://ppwpp.org/>
Fire Adapted Communities: <http://www.fireadapted.org/>
Ready, Set, Go: <http://www.wildlandfirersg.org/>

Publications:

Community Wildfire Protection Planning

How to evaluate a community Wildfire Protection Plan: http://csfs.colostate.edu/pdfs/eval_9-8-08_web.pdf
All Colorado CWPPs: <http://csfs.colostate.edu/pages/CommunityWildfireProtectionPlans.html>

Wildfire Mitigation

CO Dept. of Revenue Tax

Subtraction: <http://www.colorado.gov/cs/Satellite?blobcol=urldata&blobheader=application%2Fpdf&blobkey=id&blobtable=MungoBlobs&blobwhere=1251915899901&ssbinary=true>

Fuel Break Guidelines for Forested Communities: http://csfs.colostate.edu/pdfs/fuelbreak_guidellines.pdf

Protecting Your Home from Wildfire: Creating Wildfire Defensible Zones:
http://csfs.colostate.edu/pdfs/FIRE2012_1_DspaceQuickGuide.pdf

Firewise Landscaping: <http://csfs.colostate.edu/pdfs/06303.pdf>

Firewise Plant Materials: <http://csfs.colostate.edu/pdfs/06305.pdf>

Forest Home Fire Safety: <http://csfs.colostate.edu/pdfs/06304.pdf>

Grass Seed Mixtures to Reduce Wildfire Hazard: <http://csfs.colostate.edu/pdfs/06306.pdf>

Living With Fire: A guide to the Homeowner: <http://csfs.colostate.edu/pdfs/LWF51303.pdf>

Firewise Construction: Site Design and Building Materials:
<http://csfs.colostate.edu/pdfs/firewise-construction2012.pdf>

Forest Health and Management

Gambel Oak Management: <http://csfs.colostate.edu/pdfs/06311.pdf>

Landowner's Guide to Thinning: http://csfs.colostate.edu/pdfs/landowner_g4thin_scr.pdf

Landowner's Guide to Living With Bark Beetles: http://csfs.colostate.edu/pdfs/MPB_Newspaper_Insert_Final.pdf

Landowner Assistance Programs in Colorado:
<http://csfs.colostate.edu/pdfs/Landowner-Assistance-Programs-rev112610.pdf>

Forest Insect and Disease Information

Dwarf Mistletoe Management: <http://csfs.colostate.edu/pdfs/DMT.pdf>

Mountain Pine Beetle: <http://csfs.colostate.edu/pdfs/MPB.pdf>

Solar Treatment for Mountain Pine Beetle:

http://csfs.colostate.edu/pages/documents/Solar_Treatment_for_Mountain_Pine_Beetle_April_2009.pdf

Products used to Prevent Mountain Pine

Beetle: http://csfs.colostate.edu/pdfs/Web_Revision_June6_MPB_Prev_Products_QG.pdf

Ips Beetles: <http://csfs.colostate.edu/pdfs/Ips.pdf>

Western Spruce Budworm: <http://csfs.colostate.edu/pdfs/05543.pdf>

Firewood and House Log Insects: http://csfs.colostate.edu/pages/documents/firewood_insects.pdf

Protecting Trees During Construction: <http://csfs.colostate.edu/pdfs/construction.pdf>

Post Wildfire Recovery:

Insects and Disease Associated with Forest Fires: <http://csfs.colostate.edu/pdfs/06309.pdf>

Vegetative Recovery after Wildfire: <http://csfs.colostate.edu/pdfs/06307.pdf>

Soil Erosion Control After Wildfire: <http://csfs.colostate.edu/pdfs/06308.pdf>

Replanting in Burned Areas: Tips for Safety & Success:

<http://csfs.colostate.edu/pdfs/FINAL-Post-FireReplanting-andSafetyTips-2013Feb11.pdf>

Aspen Survival After Wildfire: <http://csfs.colostate.edu/pages/documents/How-to-Aspen.pdf>

Douglas-fir Survival After Wildfire: <http://csfs.colostate.edu/pages/documents/How-to-Aspen.pdf>

Gambel Oak and Serviceberry Survival After Wildfire:

<http://csfs.colostate.edu/pages/documents/How-to-gambel-oak-and-serviceberry.pdf>

Piñon Pine and Juniper Survival After Wildfire: <http://csfs.colostate.edu/pages/documents/How-to-PJ.pdf>

Ponderosa Pine & Lodgepole Survival After Wildfire:

<http://csfs.colostate.edu/pages/documents/How-to-Ponderosa-and-lodgepole.pdf>

Glossary of Forestry Terms

Abiotic Factors: The non-living components of the environment, such as air, rocks, soil, water, peat, and plant litter.

Afforestation: The establishment of trees on an area that has lacked forest cover for a very long time, or has never been forested.

Aerial fuels: Standing and supported live and dead combustibles not in direct contact with the ground and consisting mainly of foliage, twigs, branches, stems, cones, bark, and vines: typically used in reference to the crowns of trees.

Cambium: A single layer of cells between the woody part of the tree and the bark. Division of these cells result in diameter growth of the tree through formation of wood cells (xylem) and inner bark (phloem).

Canopy: The forest cover of branches and foliage formed by tree crowns.

Chain: A measuring tape, often nylon, 50 meters or 75 meters in length, used to measure distances. This term is derived from an old unit of measurement (80 Chains = 1 mile).

Chimney: A topographical feature such as a narrow drainage on a hillside or the upper end of a box canyon that could channel wind, smoke or flames up the slope; acting as a fireplace chimney would to draw smoke and heat upward.

Class A Roof: Effective against severe fire test exposures, as classified by the Universal Building Code (UBC). Under such exposures, roof coverings of this class are not readily flammable, afford a fairly high degree of fire protection to the roof deck, do not slip from position, and are not expected to produce flying brands.

Class B Roof: Effective against moderate fire test exposures, as classified by the Universal Building Code (UBC). Under such exposures, roof coverings of this class are not readily flammable, afford a moderate degree of fire protection to the roof deck, do not slip from position, and are not expected to produce flying brands.

Class C Roof: Effective against light fire test exposure, as classified by the Universal Building Code (UBC). Under such exposures, roof coverings of this class are not readily flammable, afford a measurable degree of fire protection to the roof deck, do not slip from position, and are not expected to produce flying brands.

Clearcut: An area of forest land from which all merchantable trees have recently been harvested.

Climax Forest: A forest community that represents the final stage of natural forest succession for its locality, i.e. for its environment.

Coarse Woody Debris (CWD): Sound and rotting logs and stumps that provide habitat for plants, animals, and insects, and a source of nutrients for soil development.

Colorado Champion Tree: The largest known tree of its species in the state. Trees are ranked by a point system based on three measurements: trunk circumference in inches at 4.5 feet above the ground, tree height in feet, and the average crown spread in feet.

Commercial Thinning: A silviculture treatment that "thins" out an overstocked stand by removing trees that are large enough to be sold as poles or fence posts. It is carried out to improve the health and growth rate of the remaining crop trees.

Competing Vegetation: Vegetation that seeks and uses the limited common resources (space, light, water, and nutrients) of a forest site needed by preferred trees for survival and growth.

Conifer: Cone-bearing trees having needles or scale-like leaves, usually evergreen, and producing wood known commercially as "softwoods."

Conservation: Management of the human use of the biosphere so that it may yield the greatest sustainable benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations. It includes the preservation, maintenance, sustainable utilization, restoration, and enhancement of the environment.

Crown fire / Crowning: A form of extreme wildland fire behavior consisting of fire that advances from top to top of trees or shrubs more or less independent of a surface fire. Crown fires are sometimes classed as running or dependent to distinguish the degree of independence from the surface fire.

Deciduous: Perennial plants that are normally leafless for some time during the year.

Defensible Space: An area within the perimeter of a parcel, development, neighborhood, or community where basic wildland fire protection practices and measures are implemented, providing the key point of defense from an approaching wildfire or defense against encroaching wildfires or escaping structure fires. The perimeter as used herein is the area encompassing the parcel or parcels proposed for construction and/or development, excluding the physical structure itself. The area is characterized by the establishment and maintenance of emergency vehicle access, emergency water reserves, street names and building identification, and fuel modification measures. In simplest terms, it is adequate space between structures and flammable vegetation which allows firefighters a safe working area from which they can attack an oncoming wildfire. Defensible Space is the best element of fire protection for individual property owners.

Defoliator: An agent that damages trees by destroying leaves or needles.

Dripline: The outer most leaves on a tree defines its dripline and the ground within the dripline is known as the drip zone; also defined as the area defined by the outermost circumference of a tree canopy.

Deforestation: The removal of a forest stand where the land is put to a non forest use.

Eave Opening: A vent located in an eave or soffit which allows airflow into the attic and/or walls of a structure.

Ecosystem: A functional unit consisting of all the living organisms (plants, animals, microbes) in a given area, and all the non-living physical and chemical factors of their environment, linked together through nutrient cycling and energy flow. An ecosystem can be of any size a log, pond, field, forest, or the earth's biosphere but

it always functions as a whole unit. Ecosystems are commonly described according to the major type of vegetation; for example, forest ecosystem, old-growth ecosystem, or range ecosystem.

Escape route: A preplanned and understood route firefighters take to retreat from an unsafe or fire-threatened area and move to a safety zone or other low-risk area.

Extreme fire behavior: A level of fire behavior that ordinarily precludes firefighting methods involving direct attack on the fire. One or more of the following is usually involved: high rate of spread, prolific crowning and/or spotting, presence of fire whirls, strong convection column. Predictability is difficult because such fires often exercise some degree of influence on their environment and behave erratically, sometimes dangerously.

Felling: The cutting down of trees.

Firebrands: Flaming or glowing fuels lofted into the air during intense burning by strong upward convection currents. Also referred to as airborne embers.

Fire break: A natural or constructed fuel-free barrier used to stop or check fires that may occur, or to provide a control line from which to work.

Fire front / Flame front: The part of a fire within which continuous flaming combustion is taking place. Unless otherwise specified, the fire front is assumed to be the leading edge of the fire perimeter.

Fire Dependent: Requiring one or more fires of varying frequency, timing, severity, and size in order to achieve optimal conditions for population survival or growth.

Fire Hazard Mitigation: Various methods by which existing fire hazards can be reduced in a certain area, such as fuel breaks, non-combustible roofing, spark arresters, etc.

Fire Management: The activities concerned with the protection of people, property, and forest areas from wildfire and the use of prescribed burning for the attainment of forest management and other land use objectives, all conducted in a manner that considers environmental, social, and economic criteria.

Fire Suppression: All activities concerned with controlling and extinguishing a fire following its detection.

Firewise: A National Fire Protection Association's (NFPA) program encouraging local solutions for wildfire safety by involving homeowners, community leaders, planners, developers, firefighters, and others in the effort to protect people and property from wildfire risks.

Forest Fire: Any wildfire or prescribed burn that is burning in forest, grass, alpine, or tundra vegetation types.

Forest Type: A group of forested areas or stands of similar composition (species, age, height, and stocking) which differentiates it from other such groups.

Fuel: Any living or dead material that will burn.

Fuel break: An existing barrier or change in fuel type (to one that is less flammable than that surrounding it) or a wide strip of land on which the native vegetation has been modified or cleared, that acts as a buffer to fire spread so that fires burning into them can be more readily controlled. Often selected or constructed to protect a high value area from fire.

Fuel Management: The act or practice of controlling flammability and reducing resistance to control of wildland fuels through mechanical, chemical, biological, or manual means, or by fire in support of land management objectives.

Fuel reduction zone: An area similar to a fuel break but not necessarily linear, in which fuels have been reduced or modified to reduce the likelihood of ignition and/or to reduce fire intensity thereby lessening potential damage and resistance to control.

Germination: The development of a seedling from a seed.

Home Ignition Zone (HIZ): An area including the home and its immediate surroundings within which burning fuels could potentially ignite the structure; usually considered to be an area extending out roughly 100 feet from the home. The HIZ is often used to describe the area in which fuel modification measures should be taken to protect the home.

Ladder Fuels: Fuels that provide vertical continuity between the surface fuels and crown fuels in a forest stand, thus contributing to crown fires.

Lines of Effort: Tasks sets or sets of actions that are linked or coordinated with other task sets to accomplish a larger mission or reach a desired end state. Lines of effort allow leaders and decision makers to direct a variety of separate actions toward a unified result.

Maximum Density: The maximum allowable stand density above which stands must be spaced to a target density of well-spaced, acceptable stems to achieve free-growing status.

National Fire Protection Association (NFPA): A private, non-profit organization dedicated to reducing fire hazards and improving fire service.

Phloem: A layer of tree tissue just inside the bark that conducts food from the leaves to the stem and roots.

Pitch Tubes: A tubular mass of resin that forms on bark surface at bark-beetle entrance holes.

Prescribed Burning: Controlled application of fire to wildland fuels, in either their natural or modified state, under certain conditions of weather, fuel moisture, soil moisture, etc. as to allow the fire to be confined to a predetermined area and at the same time to produce results to meet planned land management objective.

Ready, Set, Go (RSG): A program, managed by the [International Association of Fire Chiefs \(IAFC\)](#), seeking to develop and improve the dialogue between fire departments and residents. The program helps fire departments teach individuals who live in high-risk wildfire areas how to best prepare themselves and their properties against fire threats.

Regeneration: The act of renewing tree cover by establishing young trees, naturally or artificially. Regeneration usually maintains the same forest type and is done promptly after the previous stand or forest was removed.

Saddle: A depression, dip or pass in a ridgeline; significant in wildland firefighting because winds may be funneled through a saddle, causing an increase in wind speed.

Safety zone: An area essentially cleared of flammable materials, used by firefighters to escape unsafe or threatening fire conditions. Safety zones are greatly enlarged areas in which firefighters can distance themselves from threatening fire behavior without having to take extraordinary measure to shield themselves from fire/heat.

Sapwood: The light-colored wood that appears on the outer portion of a cross-section of a tree.

Shaded fuel break: A fuel break built in a timbered area where the trees within the break are thinned and limbed up to reduce crown fire potential, yet retain enough crown canopy to provide shade, thereby making a less favorable microclimate for surface fires.

Silviculture: The art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands. Silviculture entails the manipulation of forest and woodland vegetation in stands and on landscapes to meet the diverse needs and values of landowners and society on a sustainable basis.

Snag: A standing dead tree or part of a dead tree from which at least the smaller branches have fallen.

Stand: A continuous group of trees sufficiently uniform in age-class distribution, composition, and structure, and growing on a site of sufficiently uniform quality, to be a distinguishable unit.

Spot Fire / Spotting: Fires ignited beyond control lines or outside the perimeter of a fire by firebrands landing on/among flammable material. Spot fires/spotting are a form of extreme fire behavior typically resulting from high wind conditions.

Structure protection: A defensive strategy in wildland firefighting in which firefighters are assigned to evaluate, prepare and, when possible, defend structures/homes that may be threatened by a wildfire.

Structure triage: Evaluating and sorting structures/homes into categories based on their relative likelihood of surviving a wildland fire threat (*defensibility*). Triage decisions are based multiple factors and conditions occurring during an actual fire - weather, fire behavior, home ignition potential, defensible space, presence of escape routes, and availability of firefighting resources, among others - with the goal of doing the most good with the resources available.

Succession (or Ecological Succession): The replacement of one plant and/or animal species over time by another in progressive development toward climax vegetation.

Surface fuels: Fuels lying on or near the surface of the ground, consisting of leaf and needle litter, dead branch material, downed logs, bark, tree cones, and low-lying live vegetation.

Thinning: A cutting made in an immature crop or stand primarily to accelerate diameter increment, but also, by suitable selection, to improve the average form of the tree that remain.

Torching: The burning of the foliage of a single tree or a small group of trees, from the bottom up. Sometimes, also called candling. Torching is an extreme form of fire behavior, similar to but less extreme than crowning in that crowning affects larger numbers, even entire stands of trees.

USDAFS: United States Department of Agriculture - Forest Service, what is commonly known as just "The Forest Service"

Windbreak: A strip of trees or shrubs maintained mainly to alter wind flow and microclimates in the sheltered zone, usually farm buildings.

Wildland-Urban Interface or Wildland-Urban Intermix (WUI): The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. Although *Interface* is the more general, more commonly used term; it technically refers specifically to the area where development and wildlands meet. *Intermix* indicates the presence of wildland vegetation/fuels intermingled throughout the developed area.