



**Community
Wildfire
Protection
Plan
2009**

WOODROCK SUBDIVISION
COMMUNITY WILDFIRE PROTECTION PLAN

2009

Introduction

The community of Woodrock is rated in the Teller County Wildfire Protection Plan as being under extreme risk for both catastrophic crown fire and property loss. The Hayman Fire, along with our very dense forests and other small fires occurring nearby, certainly necessitates the need for a Community Wildfire Protection Plan (CWPP).

Purpose

The purpose of the Woodrock CWPP is to assess risk of wildfire to the properties, forest and wildlife in Woodrock; provide information and encouragement to create defensible space for each home site; encourage community wide fuel mitigation to achieve risk reduction, reduce risk of catastrophic wildfire, and lead to restoration of natural forest ecosystems.

Plan Objectives

Develop a long-term plan that benefits property owners, infrastructure, forest restoration, and wildlife in the community:

1. Assess the risk of wildfire to the community and determine the ability of the community to respond.
2. Raise the awareness of property owners for the need to establish defensible space around their home sites and mitigate wildfire hazards throughout the community.
3. Develop risk mitigation project priorities.
4. Develop interest in biomass reduction in high-risk areas to reduce the risk of crown fires and define alternatives for removal and/or disposal of biomass.
5. Restore the forest to a healthy condition, thus decreasing the risk of catastrophic crown fires, while reducing the threat of pine beetle epidemics and other insect and disease threats.

Community Profile

Woodrock is a gated subdivision established in 1972 and consists of approximately 282 total acres directly south of Mueller State Park (see Figure 1). To the west and south of Woodrock lies the Dome Rock State Wildlife Area managed by the Colorado Division of Wildlife. Entrance to Woodrock is found by driving south on highway 67.

Approximately one mile beyond the entrance to Mueller State Park take the CR 61 (AKA Four Mile Road) split off. The entrance to Woodrock is on the right approximately one mile down CR 61. The eastern boundary of this CWPP is Four Mile Road. Lands across the road are all private holdings.

The Woodrock acreage is further subdivided into 97 lots ranging in size from just over 2 acres to just over 5 acres. In a few cases, a property owner may own as many as two or three adjoining lots. Many of the undeveloped lots are owned by individuals living elsewhere including outside of Colorado. There are currently 43 homes within the community, most of which are occupied by year-round residents. The majority of homes are of new construction, usually stucco, log, or log siding and have class A roofs. All structures are serviced by community utilities of electric and phone services. All homes have private wells and septic systems. There are no businesses in Woodrock. The community has only one way in and one way out with the exception of an emergency fire exit through Mueller State Park. The Park has a fuel mitigation plan in place and has been working toward implementation. It is expected that approximately 500 acres in the Park will be treated in 2009. The secondary evacuation route from Woodrock through the Park is included in these treatments. Like the adjacent state park, Woodrock is very densely forested in mixed conifer and aspen with steep terrain and limited access. The approximate 11 miles of roads within the community can be steep and narrow in spots. Electrical lines cross the main roads several times making egress potentially difficult for evacuation. Most lines leading to private homes are above ground. Driveways can be long and steep, and may have tight curves. Access in some driveways may be difficult with larger structural engines.

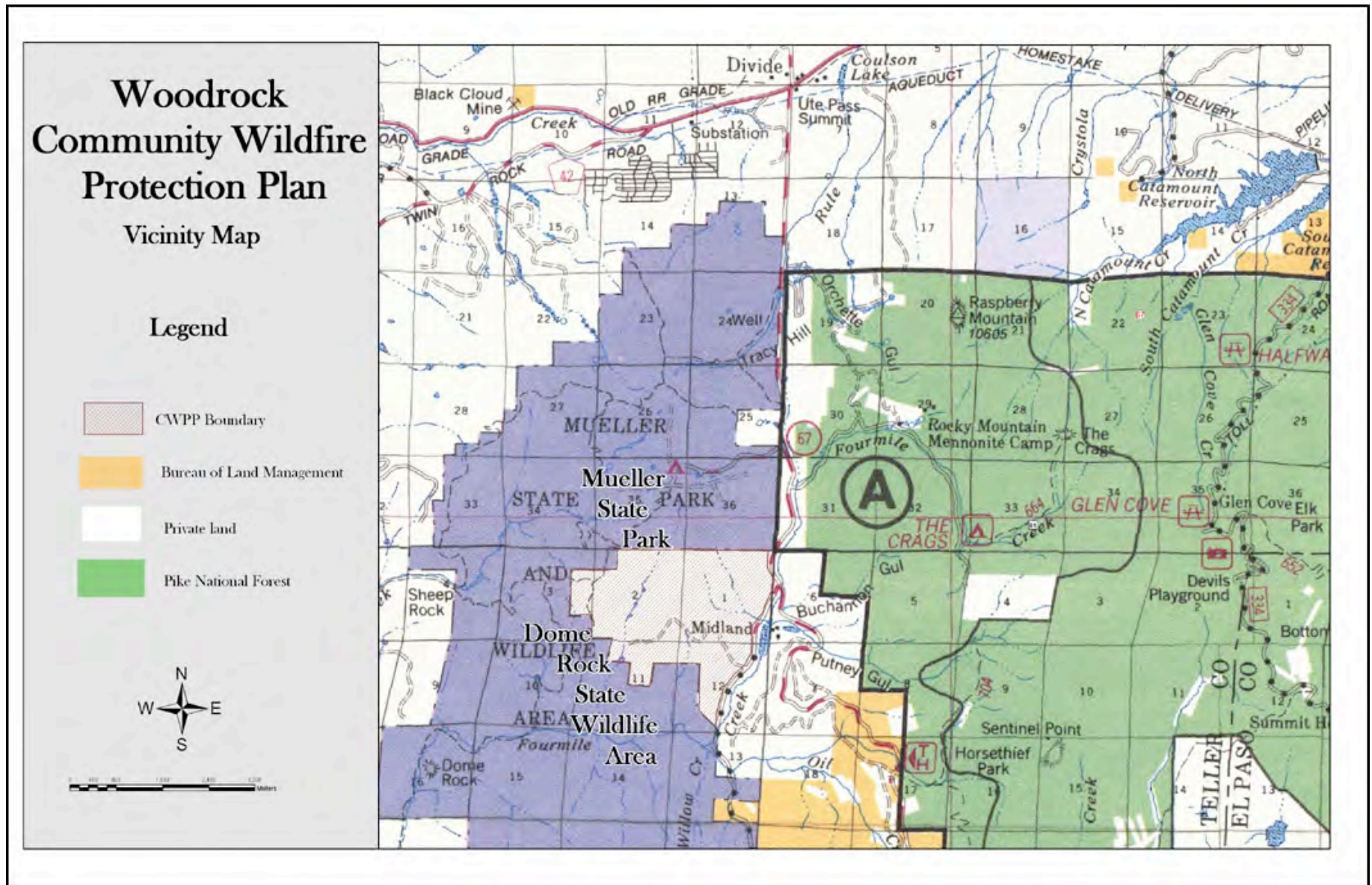


Figure 1: Woodrock and vicinity. The community is bordered by Mueller State Park on the north, and Dome Rock State Wildlife Area on the west and south. Four mile Road (County Road 61) is the eastern boundary.

Actions & Efforts / Past & Present

1. Over the past several years various residents representing the community have attended any number of meetings and seminars hosted by both the Colorado State Forest Service and the Divide Volunteer Fire Department. These residents have always returned with valued information on fire safety, forest treatment, and wildfire fuels mitigation to disseminate throughout the community.
2. Many years ago the community installed a 3000-gallon cistern on Lot 17 (see Figures 3 & 3A) owned by the Property Owners Association. The sole purpose of the cistern is to provide an additional water refill to fire trucks responding to a fire in the community. The Divide Volunteer Fire Dept. has agreed to provide water as necessary to maintain the level on the cistern.
3. At the Woodrock Property Owners Association annual meeting & picnic over the past three years we have had educational speakers from both the State Forest Service and The Coalition for the Upper South Platte (CUSP). Both have answered questions and provided valuable handout literature.
4. Woodrock has developed an extensive Wildfire Action Plan that has been distributed in print to each resident. The plan includes resident responsibility for emergency 911 call notification, fire dept. notification, and notification of all residents. It further outlines evacuation routes, residents responsibility on the fire brigade, gate assignments, water tank /water bladder assignments, and association owned truck assignments. The plan provides considerable information on residential fire prevention measures, creating defensible zones, and recommended steps toward wildfire mitigation.
5. During March of 2008 the Divide Volunteer Fire Dept. performed an assessment of each individual home site in Woodrock. Each homeowner was subsequently given a written list of any recommendations regarding defensible space and property thinning. Property owners were advised the Fire Dept. would return at the earliest possible date to implement Red Zone Software.
6. In March of 2008, as we have done many times in the past, a meeting was conducted with the Park Manager at Mueller State Park. Topics of discussion included coordination of mitigation efforts and the Woodrock emergency escape route through Mueller in the event the community's main entrance/exit is blocked by fire.
7. For each of the past two years Woodrock has received a small Forest Service grant to aid in the costs incurred for establishing residential defensible space and property thinning. While the grant monies only go far enough to reimburse residents for their CUSP chipping fees, this has proven to be an effective motivational tool.

COMMUNITY ASSESSMENT

The overall risk to the community from wildfire is very high (see Figures 2 & 2A). The Teller County CWPP includes assessments of subdivisions in the County. The TCWPP commission summarized hazard ratings for two overall factors, risk of catastrophic fire and subdivision preparedness. **Woodrock was rated high crown fire hazard and high for property loss risk.** Response time by the Divide Volunteer Fire Department is estimated at 16 to 20 minutes.

FUEL HAZARDS

Dense Engelmann spruce and Limber pine stands cover substantial portions of the subdivision, with occasional Douglas fir and Ponderosa pine. Aspen is interspersed with the conifers in many areas. West facing slopes contain even denser stands and slopes are very steep. Crown cover densities within these stands were rated III, “High Risk”, in the TCWPP. Dead and down trees contribute to ground fuels. Mountain pine beetle, Ips beetle, Fir beetle and mistletoe infestations are not yet present throughout the subdivision. Woodrock scored as “Extreme high risk for crown fire hazard and property loss” in the TCWPP.

Figures 2 & 2A illustrate the general fire hazard within the community. They represent the potential fire behavior that could be expected based on two principle determinants of fire behavior: fuel type and slope. Fuel type influences fire hazard in two ways. First dense forest stands contain large amounts of fuel. As anyone who has built a campfire knows, more fuel increases the intensity of a fire. Second, when the forest canopy is closed, a fire may burn from tree top to tree top. These so called crown fires are the most intense and difficult to control. Fires burning on the ground under open canopies are much less intense and easier to control.

Slope also influences fire intensity. On steep slopes, heat rising from the fire preheats the fuel above increasing the rate at which the fuel ignites. Also warm air rising from a fire pushes the fire uphill. Therefore, steep slopes have a greater risk of severe fire behavior than flat ground.

The other important influence on fire behavior—which cannot be known in advance—is weather. All other things being equal, a fire burning on a cool, calm, and humid day will be less severe than a fire in the same spot on a hot, windy, and dry day.

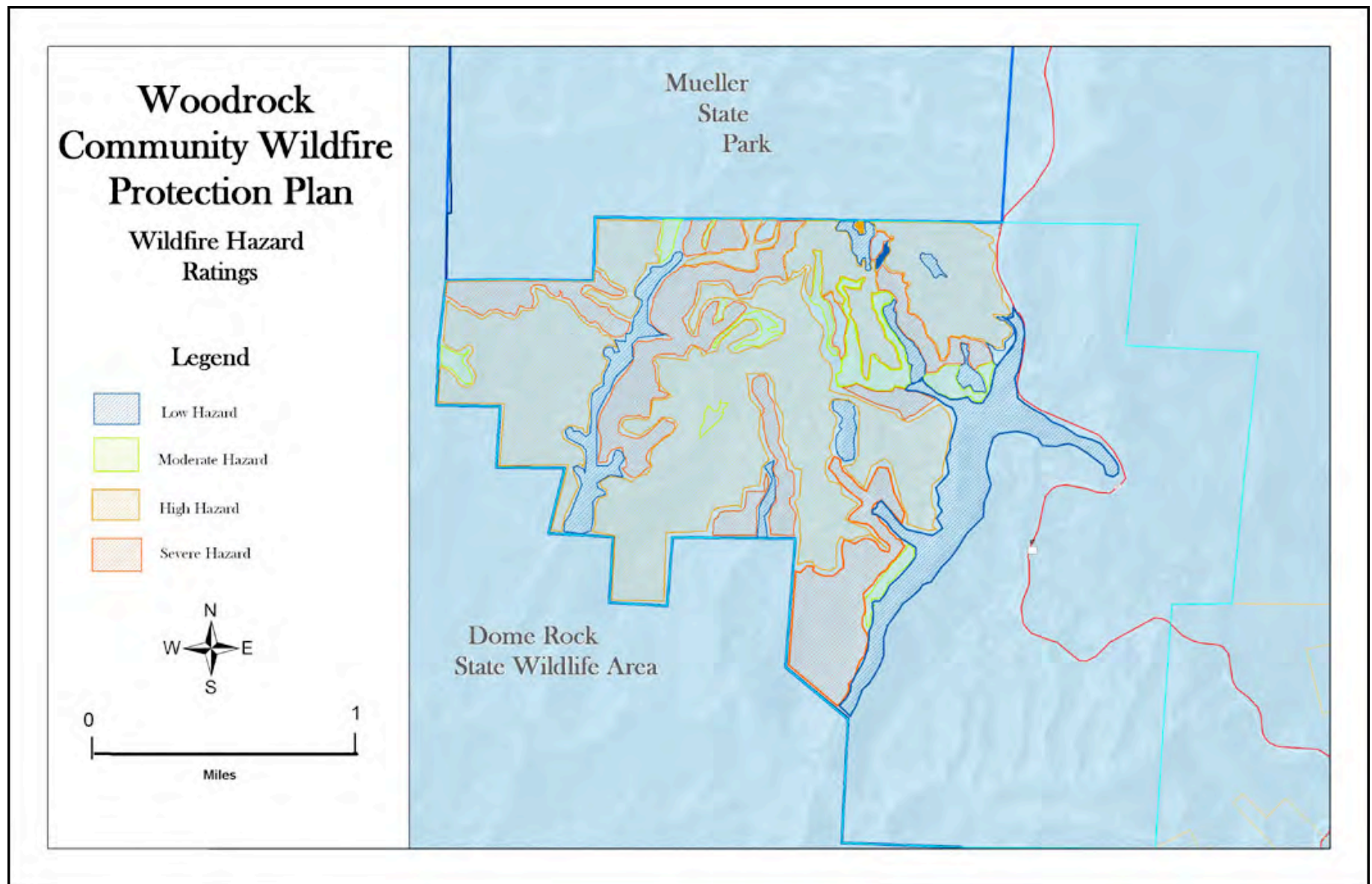


Figure 2: Woodrock wildfire hazard map. The polygons shown here are derived from combining the density and type of trees with the slope. The fire hazard ratings are general over large areas, and some small areas of a different fire hazard may be included within one of the categories.

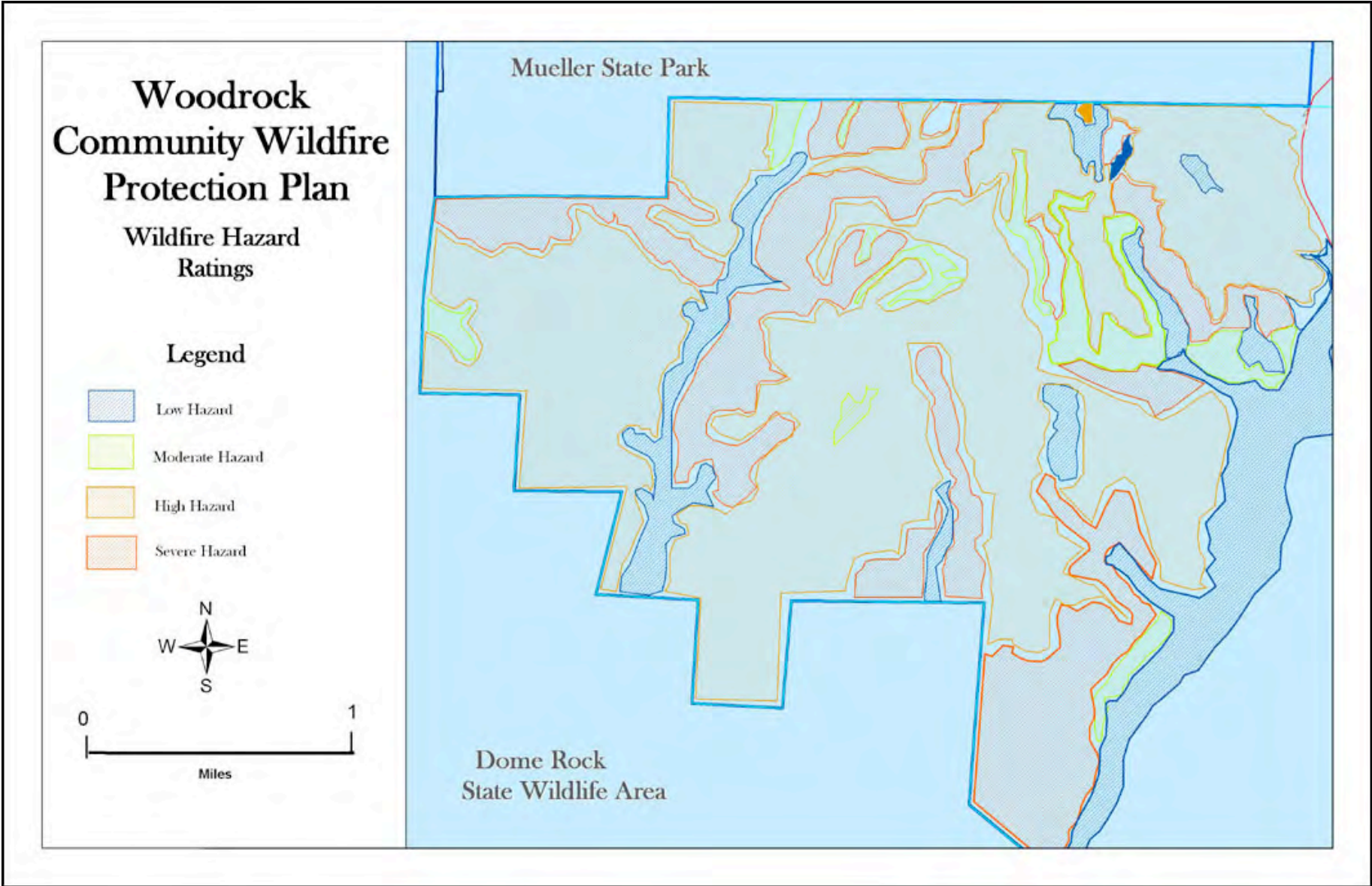


Figure 2A

WATER SUPPLY:

There is no comprehensive community water supply available for fire fighting. All homes have private wells for water supply. If power lines were downed as a result of fire, residential wells would become inoperative. A 3,000-gallon community cistern has been installed and has a dry hydrant, gravity fed connection for fire fighting availability. It is located on Lot 17 at the intersection of Woodrock Way and Homestead Road. Additional water could be drawn from private ponds located to the east and southwest of the community but an agreement would have to be reached between those property owners and county, state, and federal agencies.

RISK OF WILDFIRE OCCURANCE

In the early twentieth century, before science understood forest ecology well, fire suppression became the rule. The role of fire mitigation in thinning and maintaining the forests was not completely understood or accepted until the 1970s. Man or nature has not thinned much of the present forest for over 100 years, and forests are outside of their historic range of variability and stressed from lack of water, sunlight and nutrients.

Levels of fuel have built up such that fires could quickly move to the forest canopy and defy control efforts. The Hayman Fire is an example of such a catastrophic wildfire.

The potential for wildfire in Woodrock is extremely high. Below are four scenarios that have the potential to cause fire in Woodrock. These include:

1. Careless tending of campfires in the adjacent recreation and camping areas near Woodrock: The community is bordered on two sides, on the north by Mueller State Park and on the south by the Dome Rock recreation and wildlife area. A fire started in either of these areas could quickly extend into the forest and the subdivision.
2. Structure fire in Woodrock: Fires are a potential hazard in all structures. Homeowners assume the responsibility to make their homes as fire safe as possible. However structure fires do occur regardless of the safeguards in place. The absence of a comprehensive community water system and the response time of the fire department create a potential for a structure fire to extend beyond the initial structure and into the surrounding forest. The fire department's ability to affect rapid suppression at some properties may be further hampered by the storage of campers and vehicles in driveways or next to the residence.
3. Lightning strikes: Colorado is second only to Florida in the number of lightning strikes each year. A lightning strike in the forest could cause a fire that may go unnoticed until it becomes a threat to Woodrock. The dense forest and steep terrain might create a situation where the fire could have a head start in an inaccessible location.

4. Careless disposal of smoking materials along Hwy 67 South: Hwy 67 is the only state paved road south of Divide connecting to the popular gaming community of Cripple Creek. The careless disposal of smoking materials could start a fire that would extend into the grassy meadows or forested slopes that border the highway below Woodrock. The greatest danger to Woodrock is fire that begins in the surrounding forest and expands into the community. Woodrock is in an area that is at risk for large scale high-intensity wildfire.

COMMUNITY HAZARD RECOMMENDATIONS AND MITIGATION PROJECTS PRIORITIES

1. Increase the fire safety, traffic visibility, and overall forest health along the shoulders of community roads by reducing fire ladders and clearing fallen and dead trees. With the exception of the emergency exit up through Paradiso Road and through Mueller State Park, Woodrock has only one recognized road for ingress and egress known as Woodrock Way, the primary evacuation route to Four Mile Road. This road is steep with tight switchback curves in places. In the event of a wildfire, evacuation along this road could be particularly hazardous as residents leaving the neighborhoods encounter emergency vehicles on the road. Fuel conditions along the road range from open grasslands to dense spruce and fir forests. The mitigation along Woodrock Way, Homestead, Paradiso, Eagle and the roads leading into them are a top priority of the Woodrock CWPP. This would be an ongoing project. Landowners adjoining these right-of-ways should be encouraged to mitigate their properties to increase the effectiveness and safety of these routes.

2. Encourage and educate property owners of the need to establish defensible spaces around their home site and take actions to reduce structural ignitability. CSU Extension publication # 6.302 **Creating Wildfire Defensible Zones** by F.C. Dennis, (**Attach. 1**) is a good resource homeowners can use for planning how to reduce wildfire risk through creation of defensible space to meet current Colorado State Forestry standards for Zones One, Two and Three. Divide Volunteer Fire Dept. and other county departments are canvassing properties within their district using a computer software program called Red Zone. This stored data will greatly assist fire departments when responding to alarms. Once Red Zone data is collected by DVFD it will greatly assist property owners to identify fire mitigation actions that would enhance their survivability in case of a wildfire. Defensible space requires maintenance and reevaluation each year. Property owners who have not yet built within Woodrock are encouraged to thin their properties and remove fuel sources.

3. Encourage and educate property owners of the need to have a driveway that is wide enough to accommodate fire equipment and emergency vehicles. Driveways need the minimum of thirteen feet width and twelve-foot overhead clearance. Defensible

space should be established along the driveway by removing stressed, diseased, dead or dying trees and shrubs. Thin and prune the remaining trees and shrubs. Extend thinning all the way to the main access road. This enhances home site safety and the aesthetics of the property. An excellent guide for effective defensible space is, *Creating Wildfire Defensible Zones* by F.C.Dennis, CSFS publication no.6.302. This is available online at the Colorado State Forest website or through the district office in Woodland Park.

4. Reduce wildfire hazards within the community. Identify areas where biomass reduction in high-risk areas is needed to reduce threats to the community and community infrastructure. Introduce the concepts of area wide effective forest thinning and creating fuel breaks (primarily the roads) for fire management planning. “The Buffalo Creek Fire” in Jefferson County (1996) and the “High Meadow Fire” in Park and Jefferson Counties (2000) slowed dramatically wherever forest thinning had been completed.” Woodrock terrain is often steep and rocky and difficult for a large-scale fuels treatment project. There are ridgelines present that could be treated to reduce the risk of crown fires. Further, a healthier forest is more resistant to insects and disease. See attached map indicating prioritized areas requiring thinning. **(Figures 3 & 3A)**

5. Encourage residents to post a clearly visible house address signs (letter height of 4). Visible addresses are extremely important for a number of reasons: In any emergency – fire, police, or medical – the ability of emergency responders to locate a home quickly is critical. In many cases valuable time was lost responding to an emergency because no address was posted at the end of a driveway. Visible addresses indicate that a home is present even when the home is not visible from the street. Many homes have been lost simply because firefighters could not see them from the road and there were no address markers to indicate a driveway.

6. Practice family fire drills and fire evacuation plans. In the event of a fire, evacuation will be determined by the community fire management team. There are some meadows within the subdivision where fire hazard can be considered low. None of these would be adequate safe zones for the community. However, they may be adequate safe zones for firefighters in an emergency situation. Trained fire personnel will make decisions on firefighter safety zones based on conditions at the time of the fire.

6. Protect the integrity of Woodrock s only water system (cistern) by creating defensible space surrounding the cistern area and create a safe area for firefighters to work. Create the defensible space to meet current Colorado State Forestry standards for Zones One, Two and Three. Defensible space should be maintained periodically. The Colorado State Forest Service publication, *Fuel Break Guidelines for Forested Subdivisions and Communities* , by Frank C. Dennis (Attach. 2) is an excellent guideline to use.

7. Coordinate arrangements for a chipping program for slash reduction. The Coalition of the Upper South Platte (CUSP) has been working with residents to chip materials that have been removed in their mitigation efforts. This alternative for property owners who cannot haul away their slash should be continued.

8. Keep a fire danger sign current at the entrance to the subdivision.

9. Continue the Woodrock Emergency Calling Tree for emergency resident notification. The Calling Tree should be updated at least quarterly. Inform homeowners that emergency notification by Reverse 911 will utilize cell phone numbers if registered with the sheriff's office. To register cell phones for Reverse 911 go to www.elpasoteller911.org, click on the Cell Phone/Reverse 911 link.

10. Restore the forest to a healthier condition, thus decreasing the risk of catastrophic crown fires while reducing the threat of bark beetle epidemics and other insect and disease threats.

11. Conduct yearly assessments of the projects accomplished and develop additional goals for the future. The Woodrock Community, DVFD, and the CSFS will make assessments.

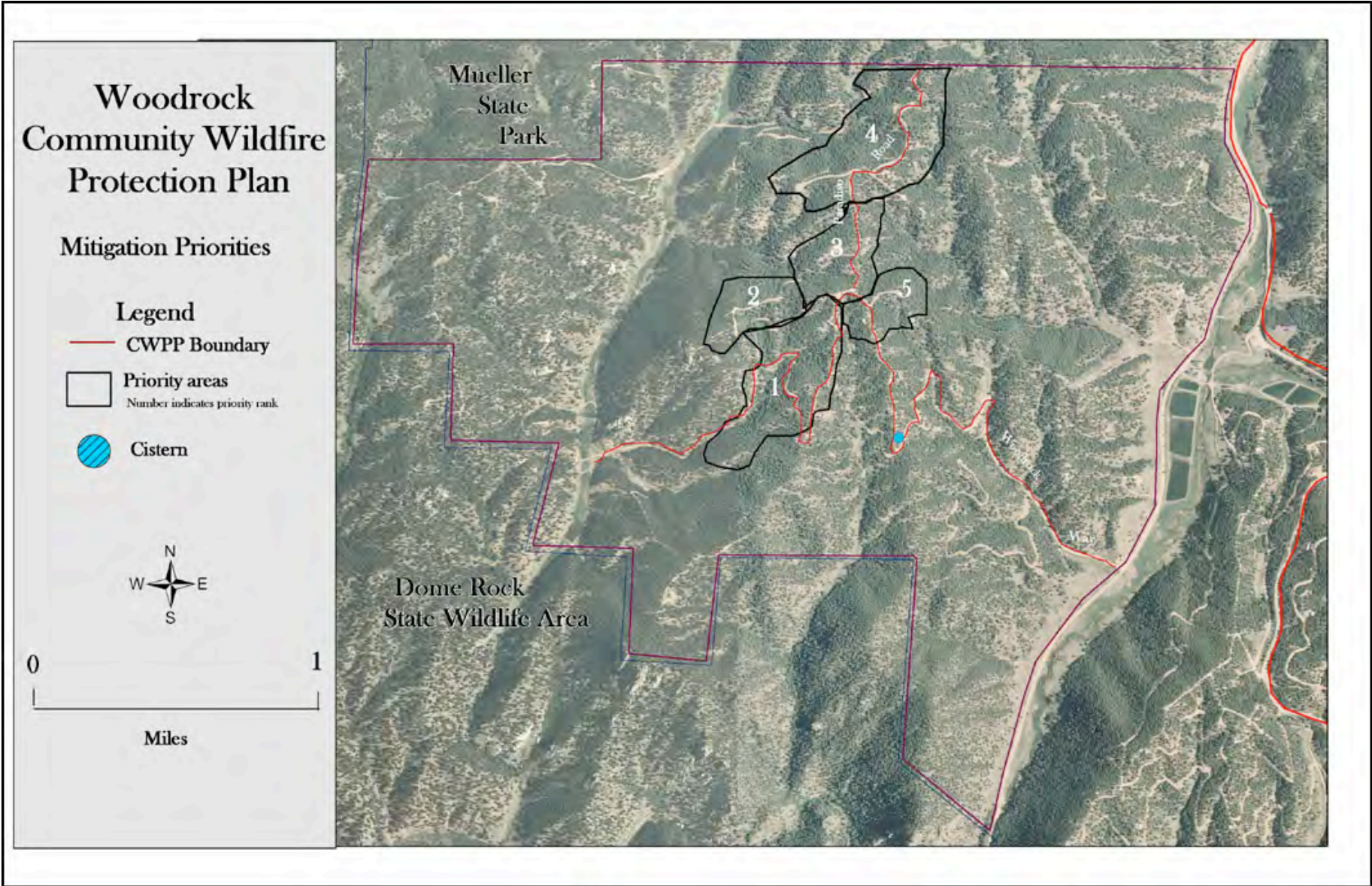


Figure 3: Woodrock Mitigation Priorities

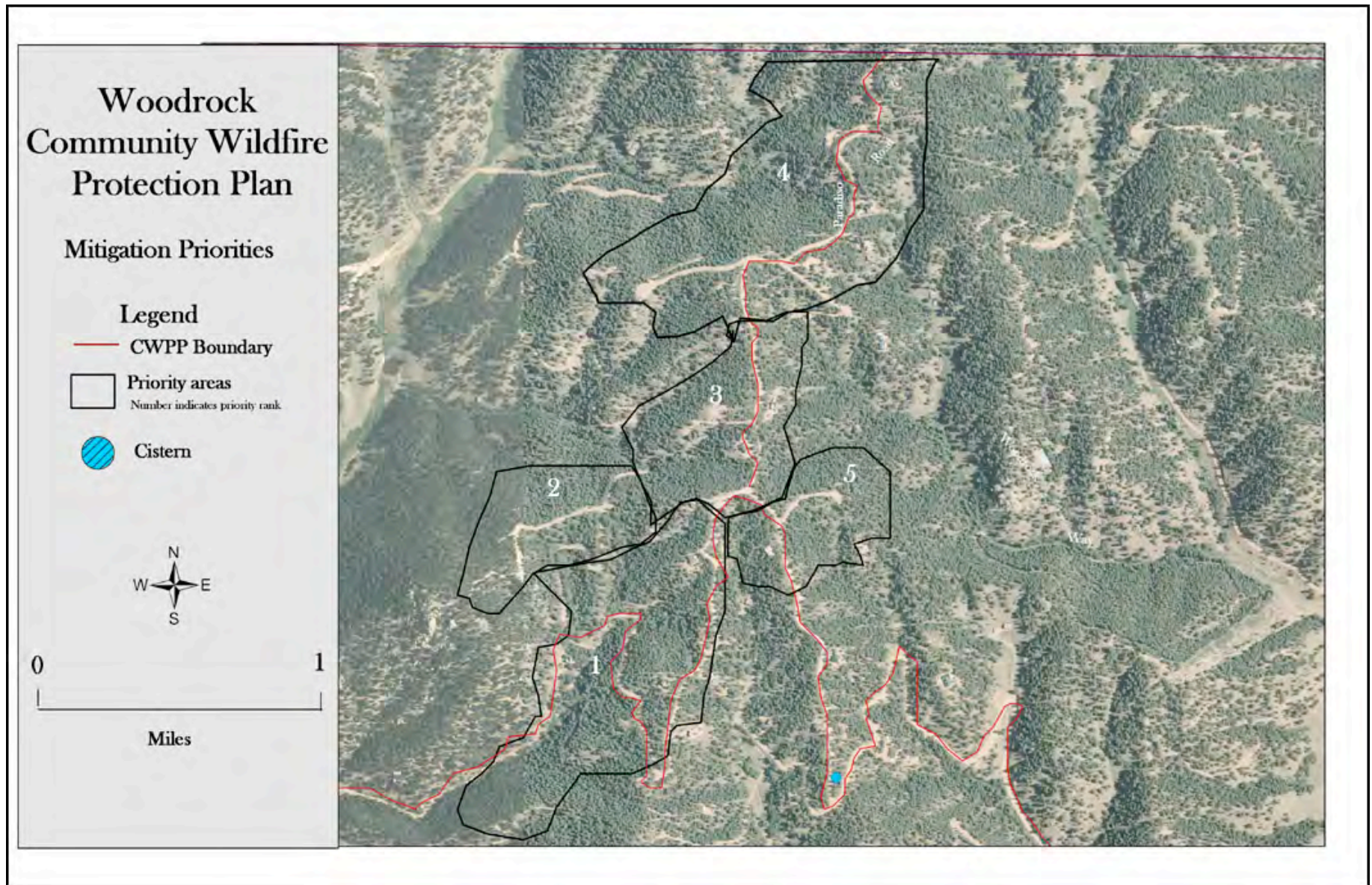


Figure 3A: Woodrock mitigation priorities are based on topography and forest density.

ACTION PLAN

- Continue to support the community chipping program – yearly.
- Apply for grants – yearly.
- Establish a subcommittee of the Woodrock POA to implement the CWPP.
- Continue to work with Mueller State Park to enhance and maintain safety of evacuation routes – yearly.
- Update the CWPP – every 5 years.
- Continue educational programs in newsletters, association events, etc. - ongoing.
- Improvement of evacuation routes – complete within eight years.



FORESTRY

Creating Wildfire-Defensible Zones **no. 6.302**

by F.C. Dennis ¹

Quick Facts...

Wildfire will find the weakest links in the defense measures you have taken on your property.

The primary determinants of a home's ability to survive wildfire are its roofing material and the quality of the "defensible space" surrounding it.

Even small steps to protect your home and property will make them more able to withstand fire.

Consider these measures for all areas of your property, not just the immediate vicinity of the house.

Fire is capricious. It can find the weak link in your home's fire protection scheme and gain the upper hand because of a small, overlooked or seemingly inconsequential factor. While you may not be able to accomplish all measures below (and there are no guarantees), each will increase your home's, and possibly your family's, safety and survival during a wildfire.

Start with the easiest and least expensive actions. Begin your work closest to your house and move outward. Keep working on the more difficult items until you have completed your entire project.

Defensible Space

Two factors have emerged as the primary determinants of a home's ability to survive wildfire. These are the home's roofing material and the quality of the "defensible space" surrounding it.

Use fire-resistive materials (Class C or better rating), not wood or shake shingles, to roof homes in or near forests and grasslands. When your roof needs significant repairs or replacement, do so with a fire-resistant roofing material. Check with your county building department. Some counties now restrict wood roofs or require specific classifications of roofing material.

Defensible space is an area around a structure where fuels and vegetation are treated, cleared or reduced to slow the spread of wildfire towards the structure. It also reduces the chance of a structure fire moving from the building to the surrounding forest. Defensible space provides *room for firefighters to do their jobs*. Your house is more likely to withstand a wildfire if grasses, brush, trees and other common forest fuels are managed to reduce a fire's intensity.

The measure of fuel hazard refers to its continuity, both horizontal (across the ground) and vertical (from the ground up into the vegetation crown). Fuels with a high degree of both vertical and horizontal continuity are the most hazardous, particularly when they occur on slopes. Heavier fuels (brush and trees) are more hazardous (i.e. produce a more intense fire) than light fuels such as grass.

Mitigation of wildfire hazards focuses on breaking up the continuity of horizontal and vertical fuels. Additional distance between fuels is required on slopes.

Creating an effective defensible space involves developing a series of management zones in which different treatment techniques are used. See Figure 1 for a general view of the relationships among these management zones. Develop defensible space around each building on your property. Include detached garages, storage buildings, barns and other structures in your plan.

The actual design and development of your defensible space depends on several factors: size and shape of buildings, materials used in their construction, the slope of the ground on which the structures are built, surrounding topography,

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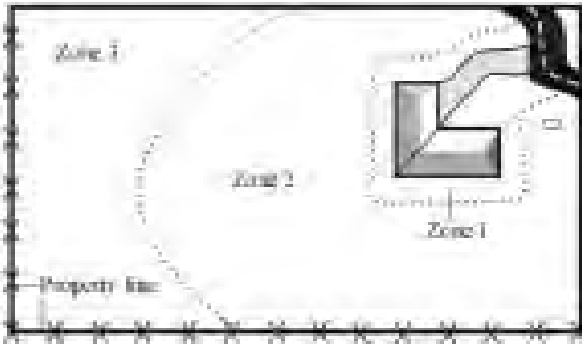


Figure 1: Forested property showing the three fire-defensible zones around a home or other structure.

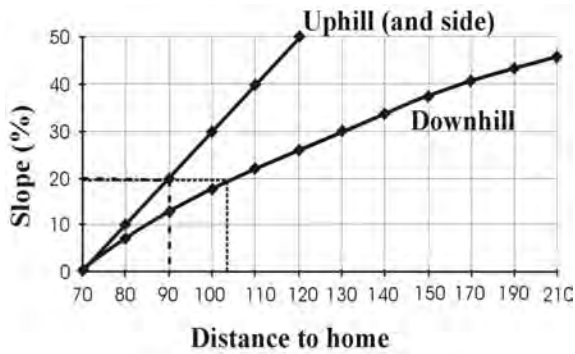


Figure 2: This chart indicates the *minimum recommended* dimensions for defensible space from the home to the outer edge of Zone 2. For example, if your home is situated on a 20 percent slope, the minimum defensible space dimensions would be 90 feet uphill and to the sides of the home and 104 feet downhill from the home.

and sizes and types of vegetation on your property. These factors all affect your design. You may want to request additional guidance from your local Colorado State Forest Service (CSFS) forester or fire department. (See the Special Recommendations section of this fact sheet for shrubs, lodgepole pine, Engelmann spruce, and aspen.)

Defensible Space Management Zones

Zone 1 is the area of maximum modification and treatment. It consists of an area of 15 feet around the structure in which all flammable vegetation is removed. This 15 feet is measured from the outside edge of the home’s eaves and any attached structures, such as decks.

Zone 2 is an area of fuel reduction. It is a transitional area between Zones 1 and 3. The size of Zone 2 depends on the slope of the ground where the structure is built. Typically, the defensible space should extend *at least* 75 to 125 feet from the structure. See Figure 2 for the appropriate distance for your home’s defensible space. Within this zone, the continuity and arrangement of vegetation is modified. Remove stressed, diseased, dead or dying trees and shrubs. Thin and prune the remaining larger trees and shrubs. Be sure to extend thinning along either side of your driveway all the way to your main access road. These actions help eliminate the continuous fuel surrounding a structure while enhancing homesite safety and the aesthetics of the property.

Zone 3 is an area of traditional forest management and is of no particular size. It extends from the edge of your defensible space to your property boundaries.

Prescriptions

Zone 1

The size of Zone 1 is 15 feet, measured from the edges of the structure. Within this zone, several specific treatments are recommended.

Plant nothing within 3 to 5 feet of the structure, particularly if the building is sided with wood, logs or other flammable materials. Decorative rock, for example, creates an attractive, easily maintained, nonflammable ground cover.

If the house has noncombustible siding, widely spaced foundation plantings of low growing shrubs or other “fire wise” plants are acceptable. Do not plant directly beneath windows or next to foundation vents. Be sure there are no areas of continuous grass adjacent to plantings in this area.

Frequently prune and maintain plants in this zone to ensure vigorous growth and a low growth habit. Remove dead branches, stems and leaves.

Do not store firewood or other combustible materials in this area. Enclose or screen decks with metal screening. Extend the gravel coverage under the decks. Do not use areas under decks for storage.

Ideally, remove all trees from Zone 1 to reduce fire hazards. If you do keep a tree, consider it part of the structure and extend the distance of the entire defensible space accordingly. Isolate the tree from any other surrounding trees. Prune it to at least 10 feet above the ground. Remove any branches that interfere with the roof or are within 10 feet of the chimney. Remove all “ladder fuels” from beneath the tree. Ladder fuels are vegetation with vertical continuity that allows fire to burn from ground level up into the branches and crowns of trees. Ladder fuels are potentially very hazardous but are easy to mitigate. No ladder fuels can be allowed under tree canopies. In all other areas, prune all branches of shrubs or trees up to a height of 10 feet above ground (or 1/2 the height, whichever is the least).

Zone 2

Zone 2 is an area of fuel reduction designed to reduce the intensity of any fire approaching your home. Follow these recommended management steps.

Thin trees and large shrubs so there is at least 10 feet between crowns. Crown separation is measured from the furthest branch of one tree to the nearest branch on the next tree (Figure 3). On steep slopes, allow more space between tree crowns. (See Figure 4 for *minimum recommended* spacing for trees on steep slopes.) Remove all ladder fuels from under these remaining trees. Carefully prune trees to a height of at least 10 feet.

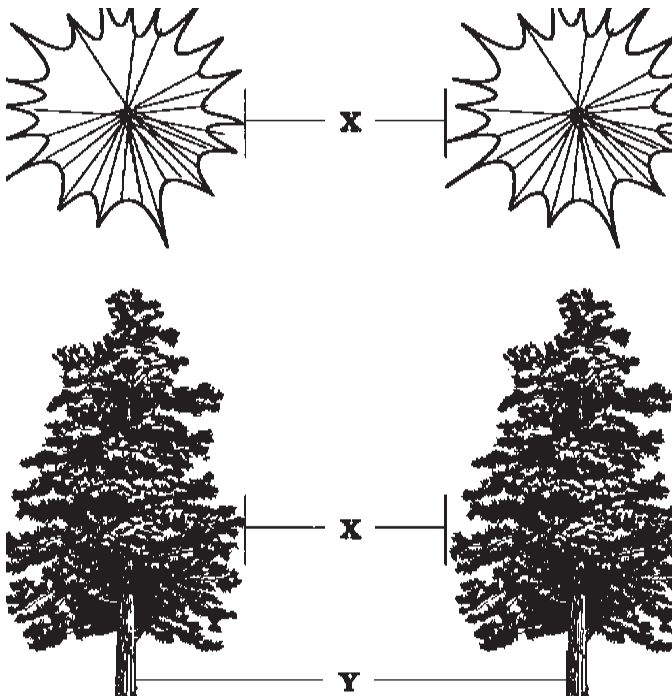


Figure 3: X = crown spacing; Y = stem spacing. Do not measure between stems for crown — measure between the edges of tree crowns.

Small clumps of 2 to 3 trees may be occasionally left in Zone 2. Leave more space 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. Thin the portions of Zone 3 adjacent to Zone 2 more heavily than the outer portions.

Isolated shrubs may remain, provided they are not under tree crowns. Prune and maintain these plants periodically to maintain vigorous growth. Remove dead stems from trees and shrubs annually. Where shrubs are the primary fuel in Zone 2, refer to the Special Recommendations section of this fact sheet.

Limit the number of dead trees (snags) retained in this area. Wildlife needs only one or two snags per acre. Be sure any snags left for wildlife cannot fall onto the house or block access roads or driveways.

Mow grasses (or remove them with a weed trimmer) as needed through the growing season to keep them low, a maximum of 6 to 8 inches. This is extremely critical in the fall when grasses dry out and cure or in the spring after the snow is gone but before the plants green up.

Stack firewood and woodpiles uphill or on the same elevation as the structure but at least 30 feet away. Clear and keep away flammable vegetation within 10 feet of these woodpiles. Do not stack wood against your house or on or under your deck, even in winter. Many homes have burned from a woodpile that ignited as the fire passed. Wildfires can burn at almost any time in Colorado.

Locate propane tanks at least 30 feet from any structures, preferably on the same elevation as the house. You don't want the LP container below your house — if it ignites, the fire would tend to burn uphill. On the other hand, if the tank is above your house and it develops a leak, LP gas will flow downhill into your home. Clear and keep away flammable vegetation within 10 feet of these tanks. Do not screen propane tanks with shrubs or vegetation.

Dispose of slash (limbs, branches and other woody debris) from your trees and shrubs through chipping or by piling and burning. Contact your local CSFS office or county sheriff's office for information about burning slash piles. If neither of these alternatives is possible, lop and scatter slash by cutting it into very small pieces and distributing it over the ground. Avoid heavy accumulations

% slope	Tree Crown Spacing	Brush and Shrub Clump Spacing
0 -10 %	10'	2 1/2 x shrub height
11 - 20%	15'	3 x shrub height
21 - 40%	20'	4 x shrub height
> 40%	30'	6 x shrub height

Figure 4: Minimum tree crown and shrub clump spacing.

Tree Diameter (in inches)	Average Stem Spacing Between Trees (in feet)
3	10
4	11
5	12
6	13
7	14
8	15
9	16
10	17
11	19
12	21
13	23
14	24
15	26
16	28
17	29
18	31
19	33
20	35
21	36
22	38
23	40
24	42

Figure 5: Minimum tree spacing for Zone 3.

of slash. Lay it close to the ground to speed decomposition. If desired, no more than two or three small, widely spaced brush piles may be left for wildlife purposes. Locate these towards the outer portions of your defensible space.

Zone 3

This zone is of no specified size. It extends from the edge of your defensible space to your property lines. A gradual transition into this zone from defensible space standards to other management objectives you may have is suggested. Typical management objectives for areas surrounding homesites or subdivisions are: provide optimum recreational opportunities; enhance aesthetics; maintain tree health and vigor; provide barriers for wind, noise, dust and visual intrusions; support limited production of firewood, fence posts and other forest commodities; or grow Christmas trees or trees for transplanting.

Specific requirements will be dictated by your objectives for your land and the kinds of trees present. See Figure 5 for the *minimum* suggested spacing between “leave” trees. Forest management in Zone 3 is an opportunity for you to increase the health and growth rate of the forest in this zone. Keep in mind that root competition for available moisture limits tree growth and ultimately the health of the forest.

A high canopy forest reduces the chance of a surface fire climbing into the tops of the trees and might be a priority for you if this zone slopes steeply. The healthiest forest is one that has multiple ages, sizes, and species of trees where adequate growing room is maintained over time. Remember to consider the hazards of ladder fuels. Multiple sizes and ages of trees might increase the fire hazard from Zone 3 into Zone 2, particularly on steep slopes.

A greater number of wildlife trees can remain in Zone 3. Make sure that dead trees pose no threat to power lines or fire access roads.

While 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 fire 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 the tree stand, thus enhancing wildfire safety.

Mowing is not necessary in Zone 3.

Any approved method of slash treatment is acceptable for this zone, including piling and burning, chipping or lop-and-scatter.

Special Recommendations

Tree spacing guidelines do not apply to *mature* stands of aspen trees where the recommendations for ladder fuels have been complied with. In areas of aspen regeneration and young trees, the spacing guidelines should be followed.

Brush and shrubs

Brush and shrubs are 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.

On nearly level ground, minimum spacing recommendations between clumps of brush and/or shrubs is 2 1/2 times the height of the vegetation. Maximum diameter of clumps should be 2 times the height of the vegetation. As with tree crown spacing, all measurements are made from the edges of vegetation crowns (Figure 3).

For example: For shrubs 6 feet high, spacing between shrub clumps should be 15 feet or more apart (measured from the edges of the crowns of vegetation clumps). The diameter of shrub clumps should not exceed 12 feet (measured from the edges of the crowns). Branches should be pruned to a height of 3 feet.

Grasses

Keep dead, dry or curing grasses mowed to less than 6 inches. Defensible space size where grass is the predominant fuel can be reduced (Figure 5) when applying this practice.

Windthrow

In Colorado, certain locations and tree species, including lodgepole pine and Engelmann spruce, are especially susceptible to damage and uprooting by high winds (windthrow). If you see evidence of this problem in or near your forest, or have these tree species, consider the following adjustments to the defensible space guidelines. It is highly recommended that you contact a professional forester to help design your defensible space.

Adjustments: If your trees or homesite are susceptible to windthrow and the trees have never been thinned, use a stem spacing of diameter plus five instead of the guides listed in the Zone 3 section. Over time (every 3 to 5 years) *gradually* remove additional trees. The time between cutting cycles allows trees to “firm up” by expanding their root systems. Continue this periodic thinning until the desired spacing is reached.

Also consider leaving small clumps of trees and creating small openings on their lee side (opposite of the predominant wind direction). Again, a professional forester can help you design the best situation for your specific homesite and tree species. Remember, with species such as lodgepole pine and Engelmann spruce, the likelihood of a wildfire running through the tree tops or crowns (crowning) is closely related to the overabundance of fuels on the forest floor. Be sure to remove downed logs, branches and *excess* brush and needle buildup.

Maintaining Your Defensible Space

Your home is located in a forest that is dynamic, always changing. Trees and shrubs continue to grow, plants die or are damaged, new plants begin to grow, and plants drop their leaves and needles. Like other parts of your home, defensible space requires maintenance. Use the following checklist each year to determine if additional work or maintenance is necessary.

% slope	D-space size (uphill, downhill, sidehill)
0 - 20 %	30'
21 - 40%	50'
> 40%	70'

Figure 6: Minimum defensible space size for grass fuels.

Defensible Space and FireWise Annual Checklist

- Trees and shrubs are properly thinned and pruned within the defensible space. Slash from the thinning is disposed of.
- Roof and gutters are clear of debris.
- Branches overhanging the roof and chimney are removed.
- Chimney screens are in place and in good condition.
- Grass and weeds are mowed to a low height.
- An outdoor water supply is available, complete with a hose and nozzle that can reach all parts of the house.
- Fire extinguishers are checked and in working condition.
- The driveway is wide enough. The clearance of trees and branches is adequate for fire and emergency equipment. (Check with your local fire department.)
- Road signs and your name and house number are posted and easily visible.
- There is an easily accessible tool storage area with rakes, hoes, axes and shovels for use in case of fire.
- You have practiced family fire drills and your fire evacuation plan.
- Your escape routes, meeting points and other details are known and understood by all family members.
- Attic, roof, eaves and foundation vents are screened and in good condition.



FIREWISE is a multi-agency program that encourages the development of defensible space and the prevention of catastrophic wildfire.

Stilt foundations and decks are enclosed, screened or walled up.

- Trash and debris accumulations are removed from the defensible space.
- A checklist for fire safety needs inside the home also has been completed.

This is available from your local fire department.

References

Colorado State Forest Service, Colorado State University, Fort Collins, CO 80523-5060; (970) 491-6303:

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

Colorado State University Cooperative Extension, 115 General Services Bldg., 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*
- 7.205, *Pruning Evergreens*
- 7.206, *Pruning Shrubs*
- 7.207, *Pruning Deciduous Trees*

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

¹Wildfire Hazard Mitigation Coordinator,
Colorado State Forest Service.

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Fuelbreak Guidelines for Forested Subdivisions & Communities

By

Frank C. Dennis



Knowledge to Go Places

This publication was developed for use by foresters, planners, developers, homeowners' associations and others. Implementation of these measures cannot *guarantee* safety from all wildfires, but will greatly increase the probability of containing them at more manageable levels.



Inadequate fire planning can result in loss of life or property and costly suppression activities.



Colorado's forested lands are experiencing severe impacts from continuing population increases and peoples' desire to escape urban pressures. Subdivisions and developments are opening new areas for homesite construction at an alarming rate, especially along the Front Range and around recreational areas such as Dillon, Vail, and Steamboat Springs.

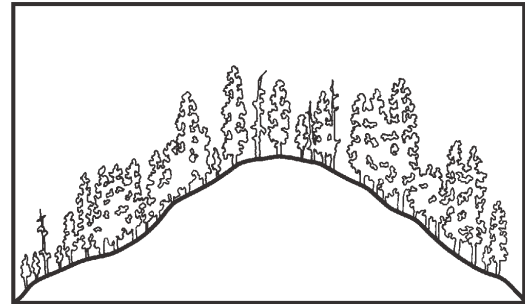
But with development inevitably comes a higher risk of wildfire as well as an ever-increasing potential for loss of life and property. Methods of fire suppression, pre-suppression needs, and homeowner and fire crew safety must all be considered in the planning and review of new developments as well as for the "retrofitting" of existing, older subdivisions.

Fuelbreaks should be considered in fire management planning for subdivisions and developments; however, the following are guidelines **only**. They should be customized to local areas by professional foresters experienced in Rocky Mountain wildfire behavior and suppression tactics.

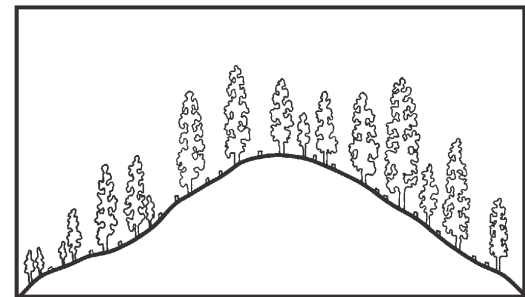
Fuelbreak vs Firebreak

Although the term fuelbreak is widely used in Colorado, it is often confused with firebreak. The two are entirely separate, and aesthetically different, forms of forest fuel modification and treatment.

- A firebreak is strip of land, 20 to 30 feet wide (or more), in which all vegetation is removed down to bare, mineral soil each year prior to fire season.



Above, cross section of mixed conifer stand before fuelbreak modification. Below, after modification.



- A fuelbreak (or shaded fuelbreak) is an easily accessible strip of land of varying width (depending on fuel and terrain), in which fuel density is reduced, thus improving fire control opportunities. The stand is thinned, and remaining trees are pruned to remove ladder fuels. Brush, heavy ground fuels, snags, and dead trees are disposed of and an open, park-like appearance is established.

The following is a discussion of the uses, limitations, and specifications of fuelbreaks in wildfire control and fuels management.

Fuelbreak Limitations

Fuelbreaks provide quick access for wildfire suppression. Control activities can be conducted more safely due to low fuel volumes. Strategically located, they break up large, continuous tracts of dense timber, thus limiting uncontrolled spread of wildfire.

Fuelbreaks can aid firefighters greatly by slowing fire spread under normal burning conditions. However, under extreme conditions, even the best fuelbreaks stand little chance of arresting a large



Before and after photos of a forest stand thinned to reduce fuel loads.

fire, regardless of firefighting efforts. Such fires, in a phenomenon called “spotting,” can drop firebrands 1/8-mile or more ahead of the main fire, causing very rapid fire spread. These types of large fires may continue until there is a major change in weather conditions, topography, or fuel type.

It is critical to understand: A fuelbreak is the line of defense. The area (including any homes and developments) between it and the fire may remain vulnerable.

In spite of these somewhat gloomy limitations, fuelbreaks have proven themselves effective in Colorado. During the 1980 Crystal Lakes Subdivision Fire near Fort Collins, crown fires were stopped in areas with fuelbreak thinnings, while other areas of dense lodgepole pine burned completely. A fire at O’Fallon Park in Jefferson County was successfully stopped and controlled at a fuelbreak. The Buffalo Creek Fire in Jefferson County (1996) and the High Meadow Fire in Park and Jefferson Counties (2000) slowed dramatically wherever intense forest thinnings had been completed. During the 2002 Hayman Fire, Denver Water’s entire complex of offices, shops and caretakers’ homes at Cheesman Reservoir were saved by a fuelbreak with no firefighting intervention by a fuelbreak.



Burned area near Cheesman Reservoir as a result of the Hayman Fire. Note the unburned green trees in the middle right of the photo, a treated fuelbreak.

The Need For A Fuelbreak

Several factors determine the need for fuelbreaks in forested subdivisions, including: (1) potential problem indicators; (2) wildfire hazard areas; (3) slope; (4) topography; (5) crowning potential; and (6) ignition sources.

Potential Problem Indicator

The table below explains potential problem indicators for various hazards and characteristics common to Colorado’s forest types. All major forest types, except aspen, indicate a high potential for wildfire hazard.

Fuel Type	Characteristics			Hazards			
	Aesthetics	Wildlife	Soil	Wildfire	Avalanche	Flood	Climate
Aspen	2	3	3	2	4	3	2
Douglas-fir	2	2	3	5	2	2	3
Greasewood-Saltbrush	4	2	2	2	1	3	3
Limber-Bristlecone Pine	3	2	4	3	4	2	5
Lodgepole Pine	2	2	3	5	4	2	4
Meadow	5	4	4	2	3	4	3
Mixed Conifer	2	1	1	5	3	1	3
Mountain Grassland	5	3	4	3	3	2	4
Mountain Shrub	3	5	4	4	2	2	3
Piñon-Juniper	2	3	4	4	2	3	2
Ponderosa Pine	2	3	1	5	2	2	3
Sagebrush	4	4	3	3	3	2	3
Spruce-Fir	2	3	3	4	5	3	4

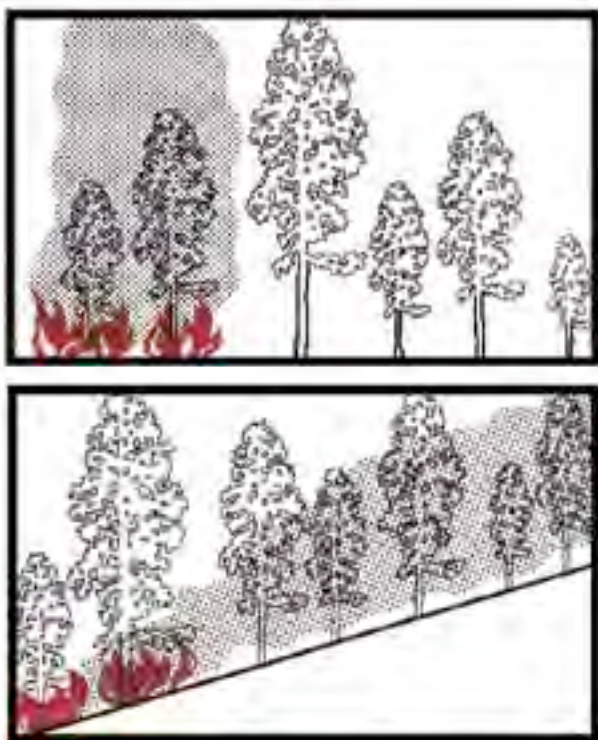
Legend: 5 – Problem may be crucial; 4 – Problem very likely; 3 – Exercise caution; 2 – Problem usually limited; 1 – No rating possible

Wildfire Hazard Maps

The Colorado State Forest Service (CSFS), numerous counties and some National Forests have completed wildfire hazard mapping for many areas within Colorado, particularly along the Front Range. These maps typically consider areas with 30 percent or greater slope; hazardous fuel types; and hazardous topographic features such as fire chimneys. Wildfire Hazard Ratings may be depicted in several ways. Whatever system is used, areas rated moderate or higher should be considered for fuel modification work.

Slope

Rate of fire spread increases as the slope of the land increases. Fuels are preheated by the rising smoke column or they may even come into contact with the flames themselves.



Fire effects, flat vs steep terrain. Note preheating of fuels on steep ground from passage of smoke column.

At 30 percent slope, rate of fire spread doubles compared to rates at level ground, drastically reducing firefighting effectiveness. **Areas near 30 percent or greater slopes are critical and must be reviewed carefully.**

Topography

Certain topographic features influence fire spread and should be evaluated. Included are fire chimneys, saddles, and V-shaped canyons. They are usually recognized by reviewing standard U.S.G.S. quad maps.

- Chimneys are densely vegetated drainages on slopes greater than 30 percent. Wind, as well as air pre-heated by a fire, tends to funnel up these drainages, rapidly spreading fire upslope.



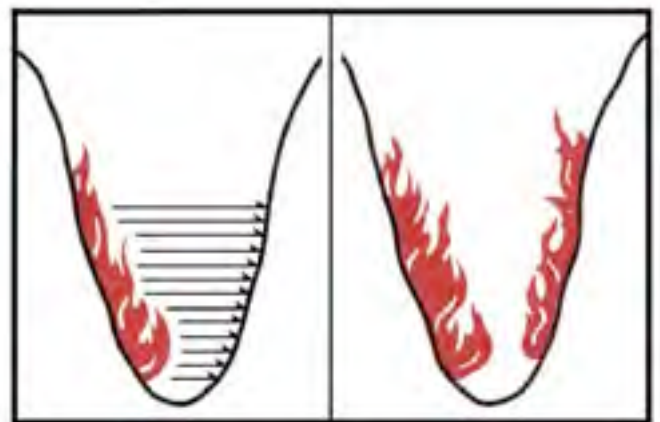
Chimney.

- Saddles are low points along a main ridge or between two high points. Like chimneys, they also funnel winds to create a natural fire path during a fire's uphill run. Saddles act as corridors to spread fire into adjacent valleys or drainages.



Saddle.

- Narrow, V-shaped valleys or canyons can ignite easily due to heat radiating from one side to the other. For example, a fire burning on one side of a narrow valley dries and preheats fuels on the opposite side until the fire "flashes over." The natural effect of slope on fire then takes over and fire spreads rapidly up drainage and uphill along both sides of the valley.



Flashover in V-shaped valley.

Crowning Potential

An on-site visit is required to accurately assess crowning potential. A key, below, helps determine this rating. Fuel modification is usually unnecessary if an area has a rating of 3 or less.

Crowning Potential Key

	Rating
A. Foliage present, trees living or dead — B	
B. Foliage living — C	
C. Leaves deciduous or, if evergreen, usually soft, pliant, and moist; never oily, waxy, or resinous.	0
CC. Leaves evergreen, not as above — D	
D. Foliage resinous, waxy, or oily — E	
E. Foliage dense — F	
F. Ladder fuels plentiful — G	
G. Crown closure > 75 percent	9
GG. Crown closure < 75 percent	7
FF. Ladder fuels sparse or absent — H	
H. Crown closure > 75 percent	7
HH. Crown closure < 75 percent	5
EE. Foliage open — I	
I. Ladder fuel plentiful	4
II. Ladder fuel sparse or absent	2
DD. Foliage not resinous, waxy, or oily — J	
J. Foliage dense — K	
K. Ladder fuels plentiful — L	
L. Crown closure > 75 percent	7
LL. Crown closure < 75 percent	4
KK. Ladder fuels sparse or absent — M	
M. Crown closure > 75 percent	5
MM. Crown closure < 75 percent	3
JJ. Foliage open — N	
N. Ladder fuels plentiful	3
NN. Ladder fuels sparse or absent	1
BB. Foliage dead	0

The majority of dead trees within the fuelbreak should be removed. Occasionally, large, dead trees (14 inches or larger in diameter at 4 1/2 feet above ground level) may be retained as wildlife trees. If retained, all ladder fuels must be cleared from around the tree's trunk.

Ignition Sources

Possible ignition sources, which may threaten planned or existing developments, must be investigated thoroughly. Included are other developments and homes, major roads, recreation sites, railroads, and other possible sources. These might be distant from the proposed development,

yet still able to channel fire into the area due to slope, continuous fuels, or other topographic features.

Fuelbreak Locations

In fire suppression, an effective fire line is connected, or "anchored," to natural or artificial fire barriers. Such anchor points might be rivers, creeks, large rock outcrops, wet meadows, or a less flammable timber type such as aspen. Similarly, properly designed and constructed fuelbreaks take advantage of these same barriers to eliminate "fuel bridges." (Fire often escapes control because of fuel bridges that carry the fire across control lines.)

Since fuelbreaks should normally provide quick, safer access to defensive positions, they are necessarily linked with road systems. Connected with county-specified roads within subdivisions, they provide good access and defensive positions for firefighting equipment and support vehicles. Cut-and fill slopes of roads are an integral part of a fuelbreak as they add to the effective width of modified fuels.

Fuelbreaks without an associated road system, such as those located along strategic ridge lines, are still useful in fire suppression. Here, they are often strengthened and held using aerial retardant drops until fire crews can walk in or be ferried in by helicopter.

Preferably, fuelbreaks are located along ridge tops to help arrest fires at the end of their runs. However, due to homesite locations and resource values, they can also be effective when established at the base of slopes. Mid-slope fuelbreaks are least desirable, but under certain circumstances and with modifications, these too, may be valuable.

Fuelbreaks are located so that the area under management is broken into small, manageable units. Thus, when a wildfire reaches modified fuels, defensive action is more easily taken, helping to keep the fire small. For example, a plan for a subdivision might recommend that fuelbreaks break up continuous forest fuels into units of 10 acres or less. This is an excellent plan, especially if defensible space thinning is completed around homes and structures, and thinning for forest management and forest health are combined with the fuelbreak.

When located along ridge tops, continuous length as well as width are critical elements. Extensive long-range planning is essential in positioning these types of fuelbreaks.

Aesthetics

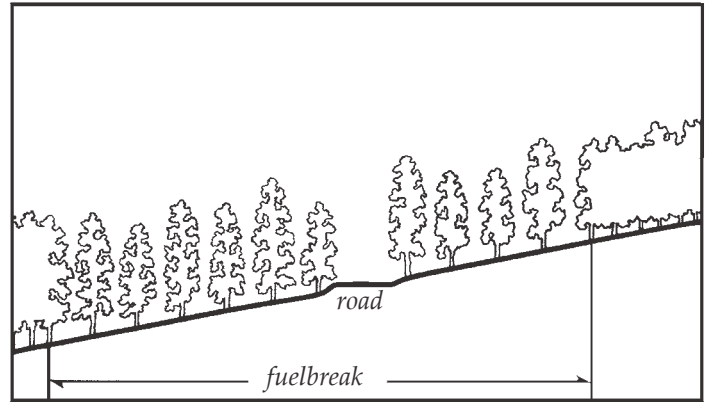
Improperly planned fuelbreaks can adversely impact an area's aesthetic qualities. Careful construction is necessary when combining mid-slope fuelbreaks with roads involving excessive cut-and-fill.



These photos, far- and near- views of the same site, illustrate that forest can be thinned without impacting aesthetics.

Care must also be taken in areas that are not thinned throughout for fuel hazard reduction. In such cases the fuelbreak visually sticks out like a "sore thumb" due to contrasting thinned and unthinned portions of the forest. (Especially noticeable are those portions of the fuelbreak above road cuts).

These guidelines are designed to minimize aesthetic impacts. However, some situations may require extensive thinning and, thus, result in a major visual change to an area. Additional thinning beyond the fuelbreak may be necessary to create an irregular edge and to "feather," or blend, the fuelbreak thinning into the unthinned portions of the forest. Any thinning beyond the fuelbreak improves its effectiveness and is highly recommended.



Cross-section of a typical fuelbreak built in conjunction with a road.

Constructing the Fuelbreak

Fuelbreak Width and Slope Adjustments

Note: Since road systems are so important to fuelbreak construction, the following measurements are from the toe of the fill for downslope distances, and above the edge of the cut for uphill distances.

The minimum recommended fuelbreak width is approximately 300 feet for level ground. Since fire activity intensifies as slope increases, the overall fuelbreak width must also increase. However, to minimize aesthetic impacts and to maximize fire crew safety, the majority of the increases should be made at the bottom of the fuelbreak, below the road cut.

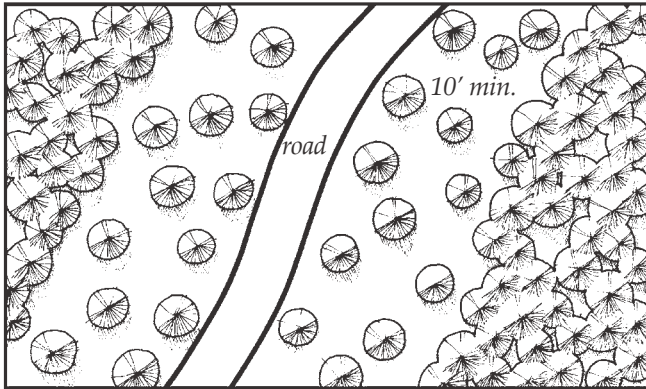
Widths are also increased when severe topographic conditions are encountered. Guidelines for fuelbreak widths on slopes are given below:

Fuelbreak Width/Slope			
Percent Slope (%)	Minimum Uphill Distance (ft)	Minimum Downhill Distance (ft)	Total Width of Modified fuels (ft)*
0	150	150	300
10	140	165	303
20	130	180	310
30	120	195	315
40	110	210	320
50	100	225	325
60	100	240	340

*As slope increases, total distance for cut-and-fill for road construction rapidly increases, improving fuelbreak effective width.

Stand Densities

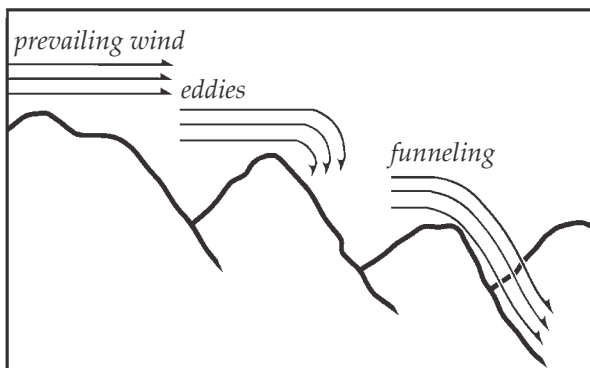
Crown separation is a more critical factor for fuelbreaks than a fixed tree density level. A *minimum* 10-foot spacing between the edges of tree crowns is recommended on level ground. As slope increases, crown spacing should also increase. However, small, isolated groups of trees may be retained for visual diversity. Increase crown spacing around any groups of trees left for aesthetic reasons and to reduce fire intensities and torching potential.



Plan view of fuelbreak showing minimum distance between tree crowns.

In technical terms, a fuelbreak thinning is classified as a heavy “sanitation and improvement cut, from below.” Within fuelbreaks, trees that are suppressed, diseased, deformed, damaged, or of low vigor are removed along with all ladder fuels. Remaining trees are the largest, healthiest, most wind-firm trees from the dominant and co-dominant species of the stand.

Because such a thinning is quite heavy for an initial entry into a stand, prevailing winds, eddy effects, and wind funneling must be carefully evaluated to minimize the possibility of windthrow. It may be necessary to develop the fuelbreak over several years to allow the timber stand to “firm-up” — this especially applies to lodgepole pine and Engelmann spruce stands.



Topography affects wind behavior – an important consideration during fuelbreak construction.

Area-wide forest thinnings are recommended for any subdivisions. Such thinning is not as severe as a fuelbreak thinning, but generally should be completed to fuelbreak specifications along the roads (as outlined on page 6.) In addition, “defensible space thinnings” are highly recommended around all structures (see CSU Coop. Extension Fact sheet 6.302, *Creating Wildfire-Defensible Zones*).

Debris Removal

Limbs and branches left from thinning (slash) can add significant volumes of fuel to the forest floor, especially in lodgepole pine, mixed-conifer, or spruce/fir timber types. These materials can accumulate and serve as ladder fuels, or can become “jackpots,” increasing the difficulty of defending the fuelbreak during a wildfire. **Slash decomposes very slowly in Colorado and proper disposal is essential.** Proper treatment reduces fire hazard, improves access for humans and livestock, encourages establishment of grasses and other vegetation, and improves aesthetics.

Three treatment methods are commonly used. These are lopping-and-scattering, piling and burning, and chipping. Mulching of small trees and slash using equipment similar to Hydro-axes or Timbcos equipped with mulching heads are becoming a popular method of treatment. Size, amount, and location of slash dictates the method used, in addition to cost and the final desired appearance. The method chosen will also depend on how soon an effective fuelbreak is needed prior to construction in new developments.



Lop and scatter: slash should be no deeper than 12” above ground surface.



Chipping is the most desirable, but also the most expensive method of slash disposal.



Piled slash can be burned but only during certain conditions, such as after a snowfall.

Fuelbreak Maintenance

Following initial thinning, trees continue to grow (usually at a faster rate). The increased light on the forest floor encourages heavy grass and brush growth where, in many cases, where little grew before. The site disturbance and exposed mineral soil created during fuelbreak development is a perfect seed bed for new trees that, in turn, create new ladder fuels. Thus, in the absence of maintenance, fuelbreak effectiveness will decrease over time.



Fuelbreak maintenance is essential. Ingrowth, shown above, will minimize the effectiveness of this fuelbreak within a few years.

Fuelbreak maintenance problems are most often the result of time and neglect. Misplaced records, lack of follow-up and funding, and apathy caused by a lack of fire events are some of the major obstacles. In addition, the responsibility for fuelbreak maintenance projects is often unclear. For example, control of a fuelbreak completed by a developer passes to a homeowner's association, usually with limited funds and authority to maintain fuelbreaks.

If fuelbreak maintenance is not planned and completed as scheduled, consider carefully whether the fuelbreak should be constructed. An un-maintained fuelbreak may lead to a false sense of security among residents and fire suppression personnel.

Conclusion

An image of well-designed communities for Colorado includes:

- Forested subdivisions where the total forest cover is well-managed through carefully planned, designed, and maintained thinnings. This contributes to reduced wildfire hazards and a much healthier forest — one that is more resistant to insects and disease.
- A system of roads and driveways with their associated fuelbreaks that break up the continuity of the forest cover and fuels. These help keep fires small, while also providing safer locations from which to mount fire suppression activities. In addition to allowing fire personnel in, they will allow residents to evacuate if necessary.
- Individual homes that all have defensible space around them, making them much easier to defend and protect from wildfire, while also protecting the surrounding forest from structure fires.

Creation of such communities is entirely feasible if recognition of the fire risks, a spirit of cooperation, an attitude of shared responsibility, and the political will exists.

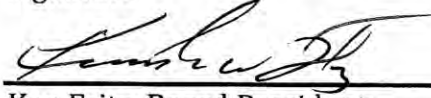
*Colorado's mountains comprise diverse slopes, fuel types, aspects, and topographic features. This variety makes it impossible to develop general fuelbreak prescriptions for all locations. **The previous recommendations are guidelines only.** A professional forester with fire suppression expertise should be consulted to "customize" fuelbreaks for particular areas.*

Declaration Of Agreement

The following signatures are those of the Woodrock Board of Directors and attest to our agreement and collaboration on the contents of this document.

Signature

Date



1-27-09

Ken Fritz, Board President



1-27-09

Les Jones, Board Treasurer



1-27-09

Carol Thomas, Board Secretary



1-27-09

Edward Kelsay, Roads



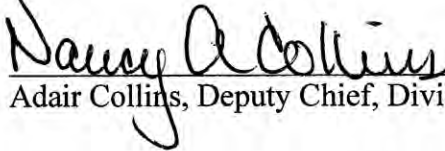
1-27-09

Keith Sheldon, Member At Large

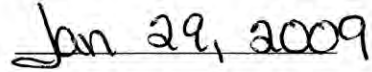
The HFRA requires the signatures of local officials indication their approval and support of the Woodrock CWPP.

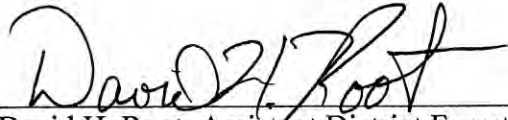
Signature

Date

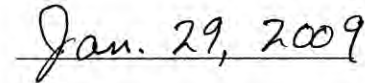



Adair Collins, Deputy Chief, Divide FPD





David H. Root, Assistant District Forester,
Colorado State Forest Service





Sheryl Decker, Administrator, Teller County