

Community Wildfire Protection Plan

Perry Pines and Park Ridge Pines

Douglas County, Colorado



Introduction

This Community Wildfire Protection Plan (CWPP) covers the communities of Perry Pines and Park Ridge Pines, hereinafter referred to as Greater Perry Pines or the Community. The Community is located on the east side of Douglas County 105 (aka Perry Park Road) approximately midway between Wolfensberger Road and Tomah Road, approximately 10 miles southwest of Castle Rock. The Core Team that developed the plan includes representatives from the Colorado State Forest Service, the Douglas County Wildfire Mitigation Staff, the Jackson 105 Fire District, the Perry Pines Homeowners Association, the Park Ridge Pines Homeowners Association, and individual residents of the Community. The CWPP team held its first meeting in February, 2011 and was formed in part due to the assessment that the Community is at very high to extreme exposure to fire risk.

The mission statement of the CWPP team is as follows:

It is the purpose of the Perry Pines/Park Ridge Pines CWPP team to develop a plan to prevent and mitigate wildfires in those communities. The plan will be developed in conjunction with the Colorado State Forest Service, the Douglas County Wildfire Mitigation Staff, and the Jackson 105 Fire Department and will meet the requirements of those organizations. Recognizing that many of the implementation steps will require voluntary participation on the part of community homeowners, a heavy emphasis will be placed on homeowner education and demonstration projects as well as on implementation steps that can be supported by the respective HOA's. It is a further purpose of the plan to position the communities to receive external grant funding in support of plan objectives.

Description of the Communities

The Community's Wildland Urban Interface (WUI) is described in the following section. The WUI boundary is identical to the Community boundary.

Perry Pines is a community of 135 rural residential properties comprising approximately 675 total acres of privately owned land. All but five of the Perry Pines properties have been developed. A typical Perry Pines property consists of a single-family home on five acres. A large proportion of Perry Pines properties have one or more outbuildings such as detached garages, barns, run-in sheds for horses, chicken coops, etc. In addition to a population of approximately 300 people, Perry Pines has a considerable number of pets and livestock including dogs, cats, horses, goats, sheep, chickens, llamas, etc. Perry Pines has a mandatory homeowners association which includes covenants. While the HOA has

influence in the Community, the covenants do not provide the basis for mandating fire mitigation work. The HOA's annual budget is approximately \$7000.

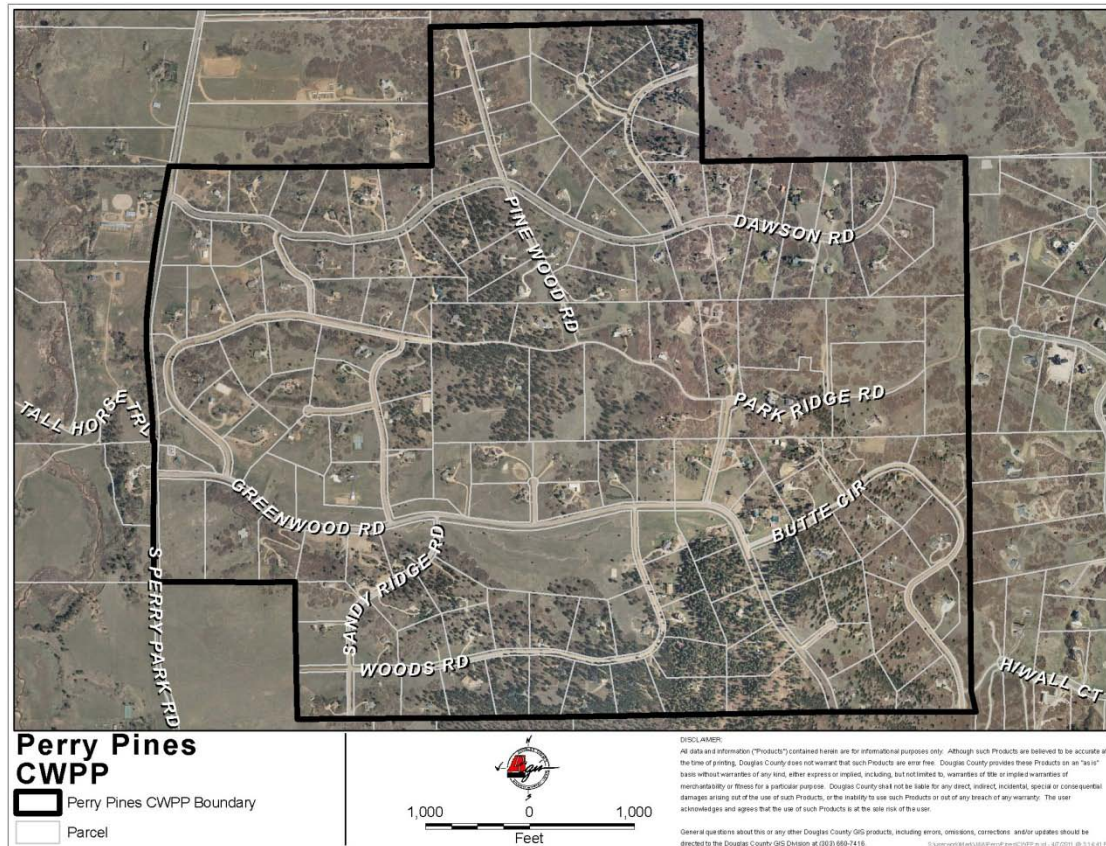
Park Ridge Pines consists of ten rural residential properties comprising approximately 100 total acres of privately owned land. All but three of the Park Ridge Pines properties have been developed. A typical Park Ridge Pines property consists of a single family home on 5 to 13 acres with one or more outbuildings. Park Ridge Pines is surrounded on three sides by Perry Pines. Park Ridge Pines has a mandatory homeowners association with covenants (but nothing to mandate fire mitigation work) and an annual budget of approximately \$1000.

Within the boundaries of the Community are three significant parcels of land owned by Douglas County. The parcels range in size from 5 to 27 (Tract F 16.83, Tract G 5.0, Tract A 26.95) acres. The largest parcel contains a community park which includes a picnic shelter, playground equipment, a volleyball court and a baseball field.

The Community is served by two primary roads (Dawson and Greenwood) that are county maintained and paved through much but not all of their length and a network of county maintained gravel roads that are also in good condition. One section of privately maintained road (Park Ridge between Oak Ridge and Vista View) is poorly maintained with questionable access. Primary evacuation routes are to the west onto DC 105 through Greenwood Road and Dawson Road. Secondary evacuation routes are through locked gates at the east end of Park Ridge and Butte Circle to the east into Keene Ranch and Tomah Road. Secondary evacuation routes for the northern half of the community are compromised, an issue that will be addressed in the plan. A map of the evacuation routes is included in Attachment A.

Please see Exhibit 1 for a map of the Community.

Exhibit 1



The topography and vegetation in the Community vary considerably. A portion of the Community (including a significant part of the County-owned property) consists of relatively flat open grasslands that are frequently used for livestock pasture. Please see Exhibit 2 for a photograph illustrating this type of property. Another large portion of the Community consists of moderately sloping property with a mixture of grasslands, Gambel Oak, and pine. Ponderosa pine is the dominant pine tree species in the Community. In many instances the Gambel Oak is in extensive and unbroken patches with frost killed tops. Frequently there are situations in which Gambel Oak is acting as a ladder fuel beneath ponderosa pines. Please see Exhibits 3 and 4 for pictures illustrating these conditions. A third portion of the Community consists of rather steeply sloping property with dense forest coverage of pines and a mix of pines with understory oak. Exhibit 5 is illustrative of this situation. Exhibit 6 is a map of the Community marked to show the three primary types of topography and vegetation.

Exhibit 2



Exhibit 3



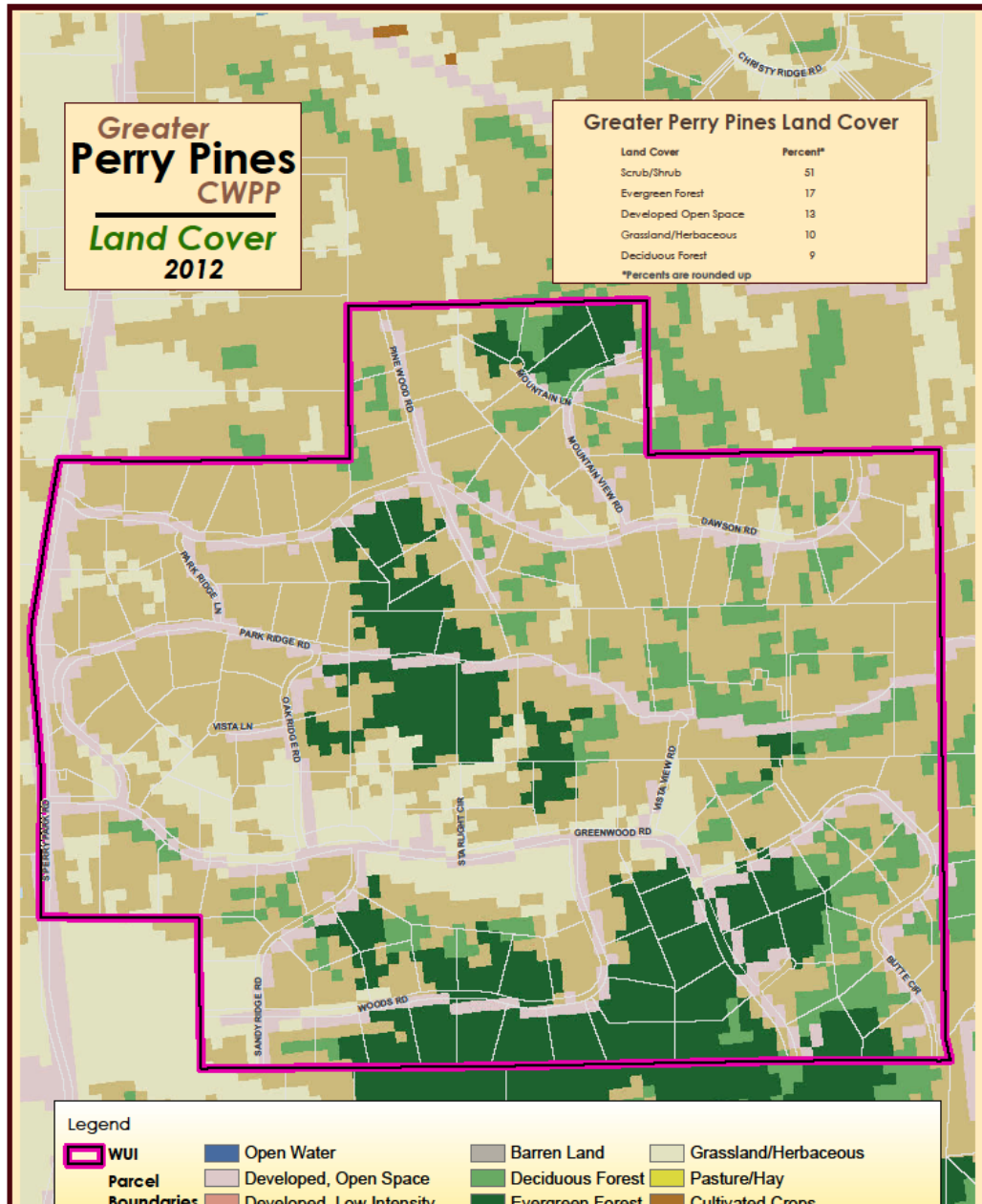
Exhibit 4



Exhibit 5



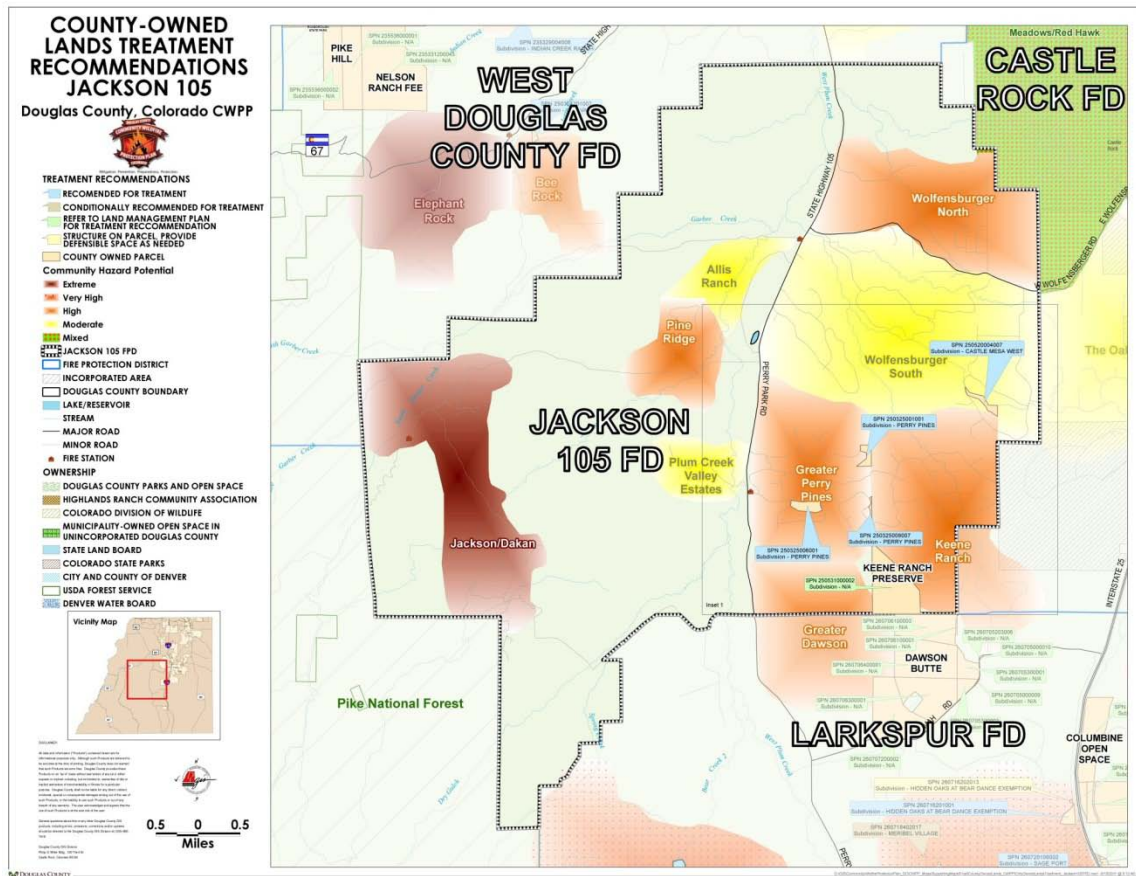
Exhibit 6



Description of the area surrounding the Community

Greater Perry Pines is bordered by Keene Ranch to the east. Immediately to the north and south are large acreage properties. Immediately to the west is Douglas County 105 with more medium to large acreage properties beyond. The properties immediately surrounding the Community contain a range of topographic features and vegetation similar to that described above for Greater Perry Pines. Of particular note and importance is the fact that the Douglas County Dawson Butte Open Space is less than one mile to the south of the boundary of the Community. Dawson Butte is heavily forested through much of its acreage and is quite popular for day-use hiking, bicycling, and horseback riding. In 2009 Douglas County initiated a forest health improvement and hazardous fuels reduction project on 198 of the 863 acres. The project consisted of installing permanent fuel breaks along some property boundaries in the southwestern corner of the property and interior access roads. Work was completed on a thinning unit, storm damage clean up, release of a young stand of trees to promote growth and vigor and seedling establishment, and ladder fuel reduction and thinning from below. Of further note and importance is that the front range of the Rocky Mountains is approximately six miles to the west of the Community boundary. Roughly at that point the Pike National Forest begins with many areas that are extremely steep and heavily forested and with many areas that are quite popular both for day-use and overnight camping. Exhibit 7 is a map of the Community shown in the context of the surrounding area including Dawson Butte Open Space and Pike National Forest.

Exhibit 7



Fire History of the Community

The photograph in Exhibit 8 was taken in Greater Perry Pines during the Buffalo Creek fire in May of 1996. During the Hayman fire in June of 2002, burning debris landed in Greater Perry Pines and communities immediately to the west and south were evacuated. Greater Perry Pines was next on the schedule to go. In the history of Greater Perry Pines there have been five major fires, and four smaller fires within the confines of the Community, all of which were extinguished by the Jackson 105 Fire Department.

Exhibit 8



Preparedness to Respond to Wildland Fires

The Jackson 105 Fire Department is the primary response agency for wildfire suppression within the Community. The district is south of Sedalia, north of Larkspur, west of Castle Rock, east of the Pike National Forest. It covers approximately 45 square miles. Topography within the district mostly consists of rolling hills along the base of the Rampart Range Mountains. Fuels include grass, Gambel oak, and mixed stands of ponderosa pine and Douglas-fir. Elevation varies from 5,300 to 8,000 feet. The department also responds into the Pike National Forest, mainly for medical calls, but has responded to wildland fires and structure fires.

The Jackson 105 Fire Department is a member of United Fire Dispatch Authority which dispatches through the Douglas County Sheriff's Office. The department also utilizes both VHF and 800mhz radio channels.

The department has two part time paid firefighters on duty each day from 8 am until 5 pm. All personnel are trained in wildfire suppression. The National Wildfire Coordinating Group (NWCG) training, S-130 and S-190, have become basic training for

all. Each year about 10 members become red carded. Only a few are available for deployment outside of the district. The department has yearly wildland refresher training. It also participates in training with other fire departments in Douglas County as well as the annual county sponsored wildfire training exercise. Department members also attend the Colorado Wildfire and Incident Management Academy in June and January. The Jackson 105 Fire Department also participates in the Douglas County Wildland Task Force.

The Jackson 105 Fire Department houses the following equipment and apparatus:

- Three type one engines
- Two SCAT type 6 engines
- One Type 6 engine
- Two tenders, 2,500 gallon
- An ambulance

In 2010, the Jackson 105 Fire Department responded to a total of 140 calls. The majority of these calls were emergency medical services (EMS). Nine calls were wildland fires.

The Jackson 105 fire department has an open house each fall, late September where wildfire education is available. The department is also available to speak to private home owners or associations. The department also speaks to individual home owners regarding concerns about wildfire mitigation.

The Jackson 105 Fire Department has three fire stations. The primary station is situated on Douglas County 105 approximately 2.5 to 3 miles north of the Community's primary entrances. A satellite station is located at the west end of Greenwood Road within the boundaries of the community. An additional satellite station is located on Jackson Creek Road.

There are three water reservoirs within Greater Perry Pines available for use in combating fires. Their combined tankage capacity is 42,000 gallons, and two require draw. A picture of the satellite fire station with some of its fire and rescue equipment is included in Exhibit 9. A picture of the semi-buried 30,000 gallon tank near the pictured fire station is included as Exhibit 10.

Exhibit 9



Exhibit 10



Community Values

Major factors for Community residents in the choice to live in Greater Perry Pines include the natural beauty of the area and a desire for a rural residential lifestyle. The size of the properties permits privacy without isolation, and a strong sense of community exists. In developing a CWPP, priorities based on community values include:

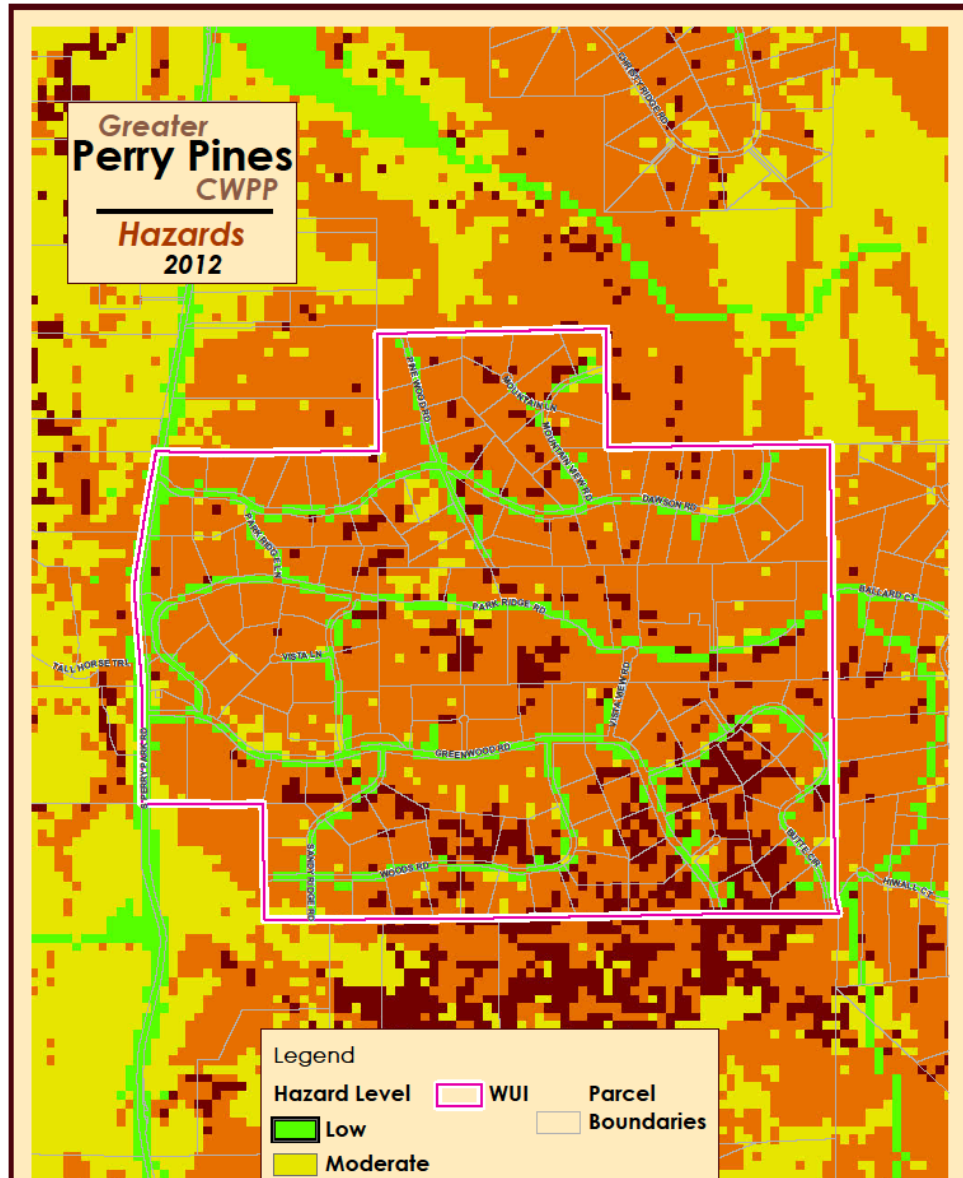
1. Protection of human life;
2. Protection of the lives of pets and livestock;
3. Protection of property and
4. Protection of the environment and associated rural residential lifestyle

Assessment of Fire Risk

The Douglas County Wildfire Risk Assessment map rates Greater Perry Pines at “Very High” risk for wildfire overall with certain areas within the Community rated at “Extreme” risk. The map in Exhibit 11 documents those risk assessments. Factors influencing that assessment include significant stretches of unbroken Gambel Oak; Gambel Oak acting as ladder fuels under large ponderosa pines; dense pine forests in

certain areas combined with steep topography; proximity to Dawson Butte Open Space; and meteorological considerations such as extreme dryness combined with high winds.

Exhibit 11



The community risk analysis began with using the Douglas County wildfire hazard assessment model and was refined with community specifics regarding access, building materials, defensible space and water supply. The model consists of a weighted overlay of hazards, values, and risks of wildfire. For the purpose of the Douglas County model hazard is defined as the composite of resistance to controlling a wildland fire based on flame length and response time, its values and its ignition risk. Communities were then identified around concentrations of address points. The Douglas County model is a birds-eye view and should not be used to make a determination regarding an individual lot. Most of the lots within the community have a combination of fuel types present and differing hazard levels. Additional items such as exterior building materials, and defensible space should be taken into consideration for lot-level assessments.

Values are items to be protected in the event of a wildland fire. They are items that would pose significant consequences especially economic if they were lost or damaged in a wildland fire. Values included items such as structures, major power lines, publicly owned lands, developed infrastructure including major water treatment plants. Ignition risks included items such as roads and trails, lightning strikes, anything that would contribute as an ignition source for a fire.

The wildfire hazard potential map showed an area of “High hazard” with areas of “Extreme hazard” mixed in. The heaviest weighted input to the model is fuel hazard. Fuel hazard is also the item that can be most easily altered in terms of reducing hazards, and ultimately reducing the hazard ranking. It is more difficult to change the composition or location of structures, or the presence of other values that were part of the model.

The homes within the Community are a mixture of both older and newer construction materials. Homes that were built in the 80’s and early 90’s typically have wood siding present. Homes that were built during the late 90’s and 2000s are comprised of more stucco and stone, composite siding and decking materials. Roofing material present in the community is asphalt composition, tile, and wood shake.

There is a differing amount of defensible space present on lots throughout the Community. Some older homes have little or no defensible space present, while newer constructed homes have defensible space.

Current Vegetation Conditions

In low elevation areas (5,500-8,000 feet) along the Front Range ponderosa pine forests have become very dense in comparison to pre-European settlement due to a combination of grazing, logging, and fire exclusion. The increase in dense, homogeneous forests in these areas have resulted in many stands of trees that are approximately the same age and size and are now stressed from competition for resources. These conditions combined with the building of homes and structures in this zone have increased risk from wildfire.

Ponderosa pine historically has grown in open, park like stands with 20-50+ trees per acre. Ponderosa pine is a shade intolerant species, which means that it needs full sun in order to grow successfully. Fire is a natural part of the ecosystem and frequent fires (every 25-50 years) were common in this area. These fires were typically low intensity surface fires that would burn in the understory of the forest consuming grasses, needles, duff, and smaller trees/regeneration. Low intensity surface fires provide a good seedbed for natural regeneration from the mature ponderosa pine overstory.



Open, park like stand of ponderosa pine



Pre-European ponderosa pine stand along Front Range

With the increase in settlement in the area fires have been actively suppressed for over 100 years. In addition, active forest management has not been common place. These two factors have led to natural regeneration and oak growing unchecked and is now in dense, overcrowded stands that are competing for limited resources. These dense stands result in low growth rates, poorly formed trees and poor forest health. Many areas have smaller trees growing up underneath larger trees, bending to gain sunlight, are snowbent, and have branches only on one side of the tree due to limited sunlight from competition. Instead of having 20-50 trees per acre there are areas of 100 trees

per acre. These conditions combined with the building of homes and structures in this area have increased the risk from wildfire.

In addition to the increase in fire risk, trees are more susceptible to insect attacks due to the poor forest health conditions. Trees are stressed due to competition which makes them vulnerable to bark beetle attacks, primarily ips beetle. Ips beetle is not as aggressive as mountain pine beetle and typically attacks smaller diameter trees that are stressed from competition, drought, and poor growing conditions.

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 the suppression of a fire.

Three factors affect wildland fire behavior in the WUI:

1. Fuels: The type, continuity and density of surrounding vegetation and, sometimes, flammable structures, provide fuel to keep the fire burning.
2. Weather: Wind, relative humidity and atmospheric stability all affect potential fire behavior.
3. Topography: The steepness and direction of slopes, and building-site location in relation to topography are features that affect fire behavior.

The only factor that we can have direct influence over is fuel.

Fuels are defined as anything that burns in a fire

Wildland fuels are divided into four categories:

1. Grass
2. Brush or shrubs
3. Timber
4. Woody debris

All plants can burn under extreme conditions, such as drought; 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; and some can burn almost anytime. The amount of moisture in the fuels is the biggest factor affecting flammability.

Grasses: Grass primarily exists in two conditions – green and cured. When grass is green, moisture content is high enough to prevent or decrease fire spread. Firefighters sometimes use green meadows and lawns as safety zones. As the year progresses, plants enter a dormant state and the residual surface vegetation dies. Cured grass has the potential to promote extreme fire rates of spread (ROS); grass fuels have the highest potential ROS of any fuels. Another hazard associated with cured grass is the potential for a rapid decrease in fuel moisture; the ability of air to circulate through standing grass allows the grass to dry rapidly and can result in sudden changes in fire behavior.

Brush: Brush fires spread slower than grass fires, but burn at a higher intensity. The most common flammable brush species in Colorado are oak brush and sagebrush. Brush is least flammable in late spring when new growth occurs.

Timber: Timber burns in two manners – surface fires and crown fires. Surface fires consume fuels on the forest floors without burning trees, although trees may burn individually, which is called torching. Crown fires occur when entire stands of trees are totally consumed. These fires are the most intense, but tend to move less rapidly than other types of fires. Coniferous trees are more susceptible to crown fire than deciduous trees. Torching and crown fires are the major source of ember production, which can start new fires (spot-fires) in vegetation and structures downwind.

Woody debris: Dead logs, branches and sticks on the ground surface are referred to as woody debris. Debris can be a result of human activity such as thinning, or natural processes such as wind-throw or beetle-killed trees that have fallen to the ground. Fires in these fuels vary greatly, but can produce high-intensity, slow-moving fires that are very difficult to control. Colorado's mountain pine beetle epidemic will result in a major increase in woody debris over large areas.

Complexes: More than one fuel component is present in most wildland areas. Areas containing these fuel complexes are more common than those represented by a single fuel component.

Structures: The effect of a burning structure can significantly impact fire behavior. Structures burn with extreme intensity, often launching large burning embers over long distances.

Perry Pines contains three of the four wildland fuel categories: grass, brush, and timber. Fuel models have been developed for these categories which

describe standard fire behavior and a fuel model map for the CWPP area has been developed that shows the models present for the area. The map and detailed description of the fuel models for the area can be found in Appendix D.

Weather

Weather is the major factor that affects fire behavior and is highly variable in terms of 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, and tends to be the common theme in large fire events. High-velocity, warm, dry, down-slope winds, such as a Chinook, can cause fuels to dry rapidly, resulting in extreme fire behavior.

Relative Humidity (RH): RH 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. RH 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. Firefighters generally monitor RH on an hourly basis when fighting a fire.

Temperature: Before combustion can occur, fuels must reach ignition temperature (approximately 450° F); fuels heat up and reach ignition temperature more quickly on hot days. In addition, when fuels are preheated, fire expends less energy and will burn at a higher intensity.

Topography

Slope: Defined as the angle of the ground relative to the horizon, slope commonly is measured in degrees or as a percent. On calm days, heated air, including flames, rises and preheats the fuels upslope, which causes an increase in fire spread. On gentle slopes, this has little effect on fire behavior, but on steep slopes, the effect can be significant. During summer months, preheating generally causes winds to blow upslope. The combined effect of slope and wind results in rapid fire spread.

Aspect: Aspect is the direction the slope faces. South and southwest aspects are warmer and drier than north and northeast aspects. South, southwest and west aspects generally have lighter fuels and are more susceptible to fast-moving fires. North, northeast and east aspects tend to have heavier fuels and, under normal conditions,

have slow-moving surface fires. Under extreme conditions, these aspects can burn with high intensity and fires can be difficult or impossible to control.

Climate: Fire seasons in Colorado's high country and on the Western Slope tend to last from late spring until mid-autumn. Fire seasons on the Front Range and Eastern Plains tend to be split, with most large fires occurring in the spring or fall. It's important to keep in mind that these are generalizations and that large fires can occur anytime conditions are right.

General Vegetation Treatment Recommendations to Reduce Hazardous Fuel Loads

The main concept in reducing fuel hazard levels is to reduce the density and the continuity of the fuels present. Significant strides can be made in the Community to reduce the fuel hazard levels with a small amount of work. There are existing openings and breaks in the vegetation that can easily be increased and have a significant effect on the fire behavior. Removing the dead material present within the Community will also have a significant effect on potential fire behavior.

To decrease the risk of insect and disease infestations, tree removal and thinning of forest stands is recommended. Thinning will reduce competition and will ultimately increase the overall health of the forest. Fortunately, removing fuels for fire risk reduction and for forest health can often be achieved simultaneously in ponderosa pine systems.

The following recommendations are for areas where the vegetative fuel is contiguous or in large contiguous patches across the lot, parcel or the landscape and outside of the home ignition zone. Although these recommendations are for larger lot owners, the recommendations are applicable across the landscape. Conceptually, the goals should be to reduce the continuity and the density of the fuels across the landscape.

These recommendations are not intended to eliminate the ability of fire to burn across the landscape. They are recommendations that if implemented correctly will slow the rate of spread and the burning intensity of a wildfire, prevent catastrophic loss and aid in the ability of firefighting efforts.

It is important to note that these are general guidelines: topography and the spatial arrangement of fuels across the landscape must be taken into consideration and prescriptions adjusted accordingly. It is suggested large landowners consider meeting with a professional forester to design a long term plan that meets the needs and management goals of the landowner while accomplishing mitigation goals.

Grasses

Grass fuel types can be very dangerous. Fire can spread quickly through dry grass and wind can increase the rate of spread as witnessed in the Burning Tree fire in March 2011. Recommendations for grass fuel types include:

- Mow grasses around structures or any infrastructure that property owners would want to protect in the event of a wildland fire. Recommended grass heights around structures are four inches.

Property owners often mow along property boundaries, especially if the property is adjacent to a road or other hazardous fuel loads. It is more difficult for fire to burn and carry in low grasses.

Gambel Oak

For those areas of contiguous Gambel oak recommendations include reducing the continuity and the density of the oak. With breaks in the oak burning intensity may be reduced.

- Break large clumps into smaller clumps and increase the spacing between clumps. We recommend following the CSFS Guidelines for Oak Management and provide a *minimum* clump spacing of 2 ½ times the height of the clump between clumps on a relatively flat ground. If the clumps are on a hillside spacing should increase based on the topography present. The larger the clump size the larger the spacing required between clumps. Oak clumps can be distributed across the landscape in any pattern or shape or size as long as the spacing guidelines are implemented correctly. The goal is to create a mosaic pattern throughout the stand and not have clumps evenly spaced.



Mosaic clumps in Gambel oak

- Thin stems within the clumps. Stems should be spaced a minimum of three to five feet apart and stems should be pruned a minimum of two to three feet above the ground to eliminate contact with ground fuels.
- Remove concentrations of dead material within clumps.



Thinning within a Gambel oak clump

- Areas where Gambel oak is treated will need to be re-treated every 5-7 years. When Gambel oak is disturbed intense sprouting occurs and the oak must be maintained to prevent the oak from re-establishing in dense levels that were present on the property prior to treatment.

Ponderosa pine or mixed conifer

For a pure ponderosa pine stand or mixed conifer forest recommendations include reducing the density and continuity of the crown fuels (tops of trees) and ladder fuels through thinning and pruning to prevent the spread of crown fire and the potential for catastrophic loss and mortality. Keep in mind Douglas-fir is a shade tolerant species and will grow well on north facing slopes and needs shade for establishment and early growth. Reducing the density and continuity of the crown fuels can be implemented in creative ways that will not leave a uniform appearance. Recommendations for thinning include:

- Creating and maintaining minimum ten-foot crown spacing between trees or small clumps of trees with a minimum twenty-foot crown spacing between clumps of trees on relatively flat ground. Crown spacing should increase with

increasing topography and clumps should be approximately three to five trees based on tree size and distribution across the landscape.

- Remove ladder fuels from underneath residual trees.



Ladder fuel removal



Space between tree crowns

For forest health recommendations include trying to increase and maintain size and age class diversity to promote forest structure diversity and heterogeneity.

Recommendations include the following:

- Favor well-formed regeneration and saplings where they are more open grown and the young trees are not acting as ladder fuels.
- Remove suppressed and poorly formed trees, reducing competition for the healthiest and most vigorous trees as the residual stand is a continuing seed source for future generations of trees.
- Remove concentrations of dead and down material with the exception of two to three snags per acre for wildlife. A few down logs may also be left, the key is to reduce or eliminate any heavy concentrations of fuels.
- Options may also include creating openings of at least an acre for natural regeneration if there is a viable seed source close by or to create some openings for immediate or future plantings.

Forest health and restoration prescriptions in ponderosa pine stands are often described by reducing density based on basal area (BA) targets in addition to crown spacing and age class diversity targets. Recommended BA targets for forest health in Front Range ponderosa pine are an average across the landscape of 40 to 60 BA or approximately 30 to 50 trees per acre for each forested acre. To be a true restoration prescription treatments should be followed by implementing prescribed fire activities in the stand.

Fuelbreaks are often implemented in ponderosa pine or mixed conifer stands. Recommendations for installing fuelbreaks can be found in the CSFS publication *Fuel Break Guidelines for Forested Subdivisions and Communities*. Fuelbreaks are a fire suppression tool often strategically located along ridges, roads, or in many cases property boundaries. Within a fuelbreak the density and continuity of the vegetation is significantly reduced to:

- Drop a crown fire to a ground fire where suppression crews can suppress the fire.
- Drop fire retardant and reinforce the fuelbreak for suppression operations. Trees are spaced far enough apart enough for the fire retardant to drop through the space between tree crowns and land on the ground.
- Suppression crews often perform burnout operations from fuelbreaks, using the fuelbreak as an anchor.

Fuelbreaks are recommended at a minimum width of 300 feet on flat ground. The distance of a fuelbreak should increase with increasing topography (slope).

Gambel oak understory with ponderosa pine

Where Gambel oak is found in the understory with a ponderosa pine overstory component the emphasis should be on reducing the density and the continuity of the fuels. Create openings or breaks in the vegetation large enough to affect the fire behavior and reduce potential for fire to spread. In this fuel type ladder fuel elimination and reduction is key to accomplishing this goal. Eliminating and or reducing the ladder fuels will have the greatest impact on the ability of fire to spread from the ground into the crowns of trees and potentially across the landscape.

With understory and overstory fuels combinations there are several ways to modify the density and the continuity of the fuels loading across the parcel or landscape. The key concepts are to reduce the continuity and density of the fuels.

Clumping-This option includes maintaining an understory and overstory component, for example, oak under pines, and creating openings of significant size between the clumps of oak and pines. With this option the recommendations include:

- Removing concentrations of dead woody material.
- Prune pines to a height approximately ten feet above the ground and thin oak stems to create and maintain a three to five foot stem spacing between stems and limb stems to a height two to three feet above the ground, making stems “tree-like.”
- Remove lower growing oak sprouts.

Clumps must be separated enough that if fire spreads from the ground fuels into the tree crowns of that clump that clump may be lost, but the fire will not spread to another clump.

Understory vegetation treatment-This option includes removing oak under pines past the dripline (the extent of the branches) of the trees a minimum of ten feet on relatively flat ground. Where the ground is steeper, removing oak up to twenty feet past the dripline is recommended. Prune pines to a height approximately ten feet above the ground.

Where oak is not growing under trees but is open grown, small clumps of oak can remain. Spacing recommendations are located in CSFS Guidelines for Oak Management fact sheet. Oak clump thinning and removal of dead material is also recommended.



Clumping of Gambel oak



Gambel oak clumps with residual trees

Overstory component treatment: understory retention-Landowners may want to remove overstory vegetation, such as pines and retain oak. For this type of treatment recommendations include:

- Removing overstory pine component where understory oak is targeted for retention.
- Outside of oak target retention areas follow one of the above desired target prescriptions.

Areas where Gambel oak is treated it will need to be re-treated every 5-7 years. When Gambel oak is disturbed intense sprouting occurs and the oak must be maintained to prevent the oak from re-establishing in dense levels that were present on the property prior to treatment.

Recommendations for Reducing Structural Ignitability

Reducing structural ignitability and preventing the loss of property in the event of a wildland fire is a high priority in Douglas County. Efforts to reduce structural ignitability can be separated into regulations governing development designs, building materials and vegetation management (defensible space around structures). Public education campaigns designed to raise awareness and move those who are aware to action to reduce hazardous fuel loads within the home ignition zones and beyond complement the regulatory efforts. The county has taken steps to address development in wildfire hazard areas by developing and adopting codes and regulations through the land use and building processes. Most of the codes and

regulations focus on hazardous fuels reduction, defensible space, and the prohibition of wood shake roofs in a wildfire hazard area.

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 during a wildland fire. Homes ignite and burn by meeting the parameters for ignition and combustion (Cohen 2008). Homes in the WUI are fuel. Structures may be ignited by firebrands, which are embers that are lofted through the air from a moving flame front or by radiant or convection heating. 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, in gutters, or directly adjacent to the structure can significantly increase a structure's vulnerability.

The two main factors affecting a structures ability to survive a wildfire are the exterior building materials and the amount of defensible space surrounding the structure within 100 feet to 200 feet of the structure, known as the *Home Ignition Zone* (Cohen 2008). The home ignition zone typically is located on private property, which 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.



All building permits are subject to the 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 (C.O.) for occupiable structures and a Certificate of Completion for accessory structures.

Construction materials typically found for new residential construction are fairly fire resistive and include stucco and stone combination or a cement siding product for exterior construction materials. Roofing materials are typically asphalt composition or concrete tile as Douglas County prohibits wood shake roofs in a wildfire hazard area.

Building Materials

- Replace older shake roofs with those of a higher fire resistive rating including asphalt composition, tile or metal roof assembly
- Replace wood siding with a more fire resistive cement product including cement, stucco, cement plank siding, stone or masonry
- Screen attic, roof, foundation and eave vents openings with 1/8" metal screens
- Enclose areas under decks completely
- Windows should be double-paned or tempered glass

For more information visit <http://www.firewise.org>

Defensible Space

Where regulation is not applicable, educational campaigns are encouraged to be in place to raise awareness and encourage homeowners to implement defensible space standards as identified in CSFS fact sheet 6.302 *Creating Wildfire Defensible Zones*. Defensible space should be encouraged around all structures.

Douglas County Wildfire Mitigation Staff, CSFS, fire district representatives, and private consultants offer on-site consultations for wildfire hazard assessments and site specific defensible space recommendations. Defensible space is the area around a structure where the vegetative fuels have been modified to slow the rate of spread of a wildfire towards the structure, and away from the structure if the structure is on fire. The primary purpose of defensible space is to improve the structure's ability to survive a wildfire in the absence of firefighter intervention. Firefighters may use defensible space to work to protect a structure during a wildland fire event. Defensible space is an effort to reduce structure ignitability but is not a guarantee a structure will survive during a wildfire.

Minimum recommendations for defensible space are identified in CSFS fact sheet 6.302 *Creating Wildfire-Defensible Zones*. Minimum defensible space recommended by the CSFS are 70 feet from a structure on a flat lot. Defensible space should increase with increasing topography as fire moves easily uphill preheating vegetative fuels. Defensible space consists of three zones: Zone 1 is closest to the structure and is the most heavily modified zone. Recommendations include but are not limited to:

- Remove all flammable vegetation within 15 feet of the structure

- Remove any tree branches hanging over structures that will drop needles or other debris onto roofs, gutters, or decks
- Do not plant vegetation underneath eaves or roof lines

Zone 2 is where the vegetation is modified to reduce the intensity of an oncoming fire, or create speed bumps through the vegetation approaching the structure.

Recommendations in this zone include but are not limited to:

- Remove all ladder fuels
- Provide a minimum crown spacing between trees of 10 feet between crowns on a flat lot
- Prune trees to a height approximately 10 feet above the ground
- Provide a minimum shrub spacing of 2 ½ times the height of the shrub between shrubs
- Prune shrubs to remove contact with ground fuels
- Keep grasses mowed
- Remove all dead material

Zone 3 is a transition zone toward a more traditional vegetation management style to meet landowner objectives while working with principles of stewardship.

Recommendations include but are not limited to:

- Thinning to remove suppressed and overstocked trees while promoting and maintaining healthy vigorous trees
- Limit vegetation combinations that contain ladder fuels to isolated clumps.
- Reduce shrub densities to promote healthy growth and reduce density and continuity through the zone.
- Snags (dead standing trees) should only remain if they do not pose a safety hazard

Firewood should be stacked along the contour or above the structure, but not below. Firewood should be stacked a minimum of 30 feet from the structure and should be separated from other flammable vegetation. Flammable vegetation and other materials should not be stored under decks. It is also important to reduce hazardous fuels and create defensible space along driveways to improve firefighter access to your home and to maintain your escape route.

Technical Guides

- **6.302** *Creating Wildfire-Defensible Zones*
- **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*
- **6.311** *Gambel oak Management*
- *Fuelbreak Guidelines for Forested Subdivisions and Communities*

Fire Mitigation Activities to Date

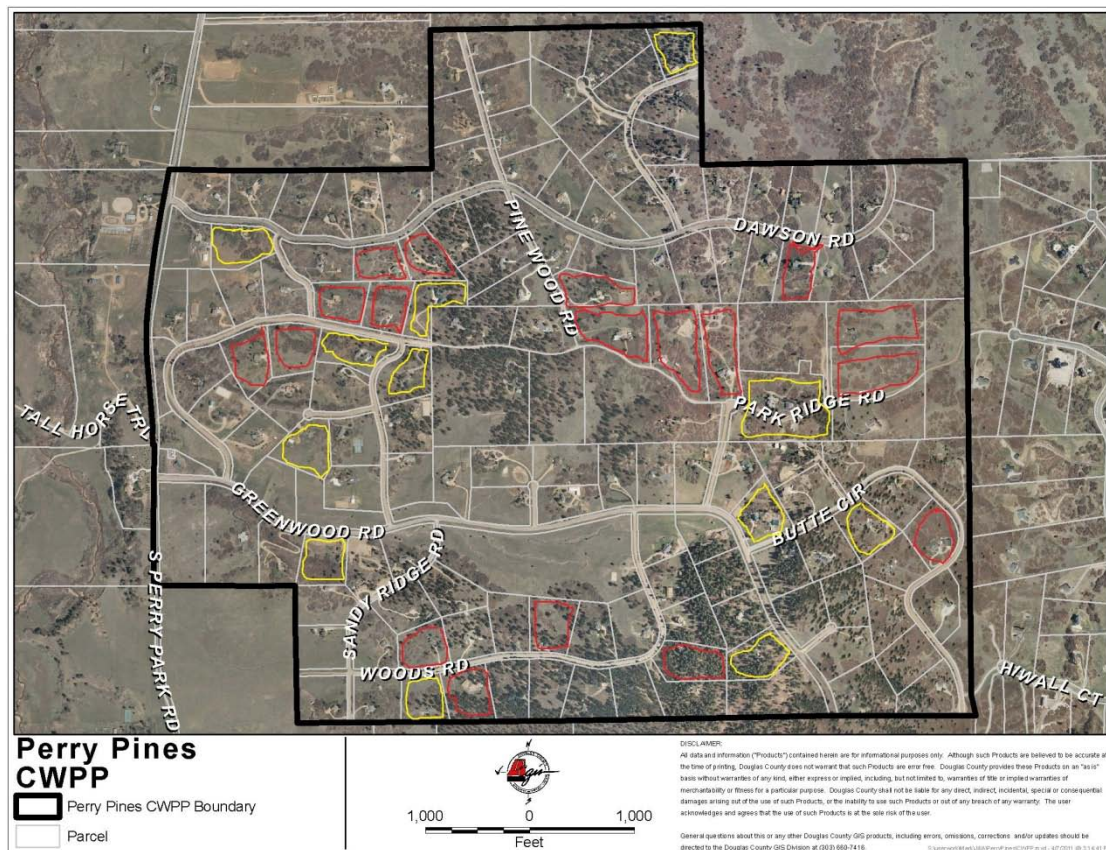
The Jackson 105 Fire Department has been providing educational materials to the Community and responding to fires for years. They have also conducted assessments of individual properties at the owner's request. The CWPP team was formed in February 2011. Recognizing the values placed on human life and that of pets and livestock, an evacuation plan was made an early priority. The evacuation plan included as Appendix A was completed in March 2011 and distributed to all homeowners in the Community. Parts of this plan were copied by the Douglas County Sheriff and distributed county wide.

A grant application for \$21,000 was submitted and awarded in April 2011 (please see Appendix B). The grant was awarded by the Front Range Fuels Treatment Partnership with the process coordinated by the Colorado State Forest Service. The funds were used to subsidize (50% of cost) fire mitigation work in the community. This work took two forms. The bulk of the funds were spent on complete mitigation work on twelve properties in the community. This work consisted of creating defensible space around the homes and outbuildings, eliminating ladder fuels (typically understory oak beneath ponderosa pines), and thinning oak into clumps with fire breaks between the clumps. The work was all performed to Colorado State Forest Service Standards. The remainder of the funds were expended on a slash to mulch conversion project. This entailed picking up large slash piles on a total of eighteen properties and feeding them into a large grinder which converted them to mulch. A total of 31 acres were treated, 62.25 volunteer hours contributed to slash to mulch project, and approximately 2900 cubic feet of slash mulched.

For 2012 an additional 18 property owners (56 acres) have been identified who are committed to full mitigation work on their property. Additionally several additional homeowners have expressed hope that we would be grinding their slash piles again this

year. Another grant application was submitted in February 2012 and was subsequently approved for \$29,750 (please see Appendix C). Planning work is underway to implement the grant projects. Exhibit 12 shows the treatments that were completed in 2011 (yellow) and treatments planned for 2012 (red).

Exhibit 12



Fuel Treatment Priorities

The top two priorities for future fuel treatments will focus on private landowners reducing hazardous fuels on their property and continuation of the community wide slash to mulch program. Treatment recommendations for private landowners include: reducing ladder fuels, creating defensible space, breaking up stands of contiguous Gambel oak, and thinning dense stands of ponderosa pine trees to increase spacing between tree crowns (min 10 feet) and reduce competition between trees. Methods of treatment will include hand thinning, mastication, chipping, and pruning.

With all treatments maintenance is an ongoing need especially when treating Gambel oak due to the vigorous resprouting. When the oak starts to resprout new shoots are tender and removable with lawn mowers and weed eaters. It's important to take care of that before they become big and sturdy and have to be removed expensively again with a masticator. Based on what has been seen in other areas if you cut off the early shoots for two or three years, the roots die and the scrub oak stops coming up.

The next priority will be treatments on Douglas County Open Space property.

Open Space Recommendations

The Douglas County CWPP identified three parcels in the Perry Pines subdivision and Perry Pines and Park Ridge Pines CWPP WUI boundary for potential treatment. The first parcel, roughly a 27 acre parcel is located on Greenwood Rd and contains the park, a large grassy meadow with a drainage and a social trail located in some oak brush along the base of the hill. The oak brush will be the target of any treatment on this parcel. Recommendations include complementing existing mitigation work that has been completed and to protect values at risk. Oak is proposed to be clumped and broken up, and/or thinned in these small patches via mechanical mastication and handwork. The intent is to reduce the density and continuity of the oak in these areas, especially towards the property lines.



In the past this parcel has been used to temporarily house and chip/tub grind material generated from mitigation activities. Douglas County Open Space and Natural Resources would be agreeable to using a specifically identified and agreed upon piece of this parcel in that capacity again.

The second parcel is a five acre parcel off of Butte Circle. The parcel contains contiguous and patchy Gambel oak, and a few scattered pines in the northern portion of the parcel. Oak under the pines is very dense. This parcel abuts the equestrian trail/easement at Keene Ranch.



Recommendations for this parcel include creating a demonstration on the north end of the parcel, removing oak under trees past the dripline, breaking up contiguous oak in this area and towards the property line around the structure to protect any values at risk. Treatment methods include machine work via mastication, hand thinning, and chipping.

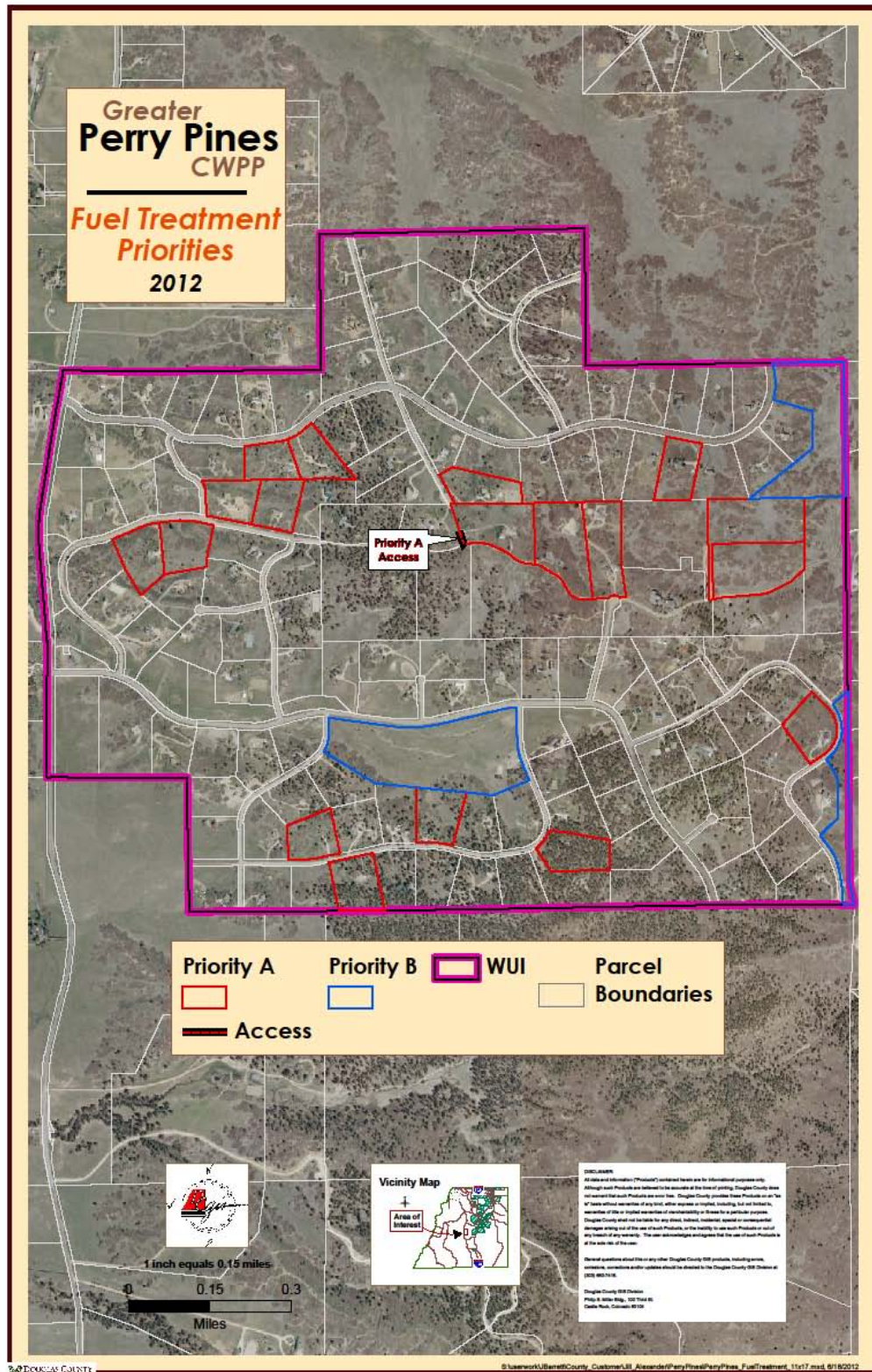
The third parcel is roughly a 16 acre parcel located off of Dawson Rd. The parcel contains Gambel oak that is both contiguous and clumpy with existing openings. The parcel was originally identified a potential demonstration site for oak modification in the contiguous stands of oak located adjacent to a private property also containing contiguous Gambel oak, and to increase the separation of existing oak clumps where needed. After consultation with the current property owner it has been determined the current property owner would not favor treating any of the county open space at this time and due to the limited nature of the existing hazard treating this parcel has become a lower priority at this time.



To whatever extent the open space parcels are treated all proposed treatment will go through the county process and consider stakeholder input for proposed projects, including citizens of the Perry Pines community.

Fuel treatments are shown on the map in Exhibit 13. Priority A treatments on private lands are part of the 2012 grant. An evacuation route is also part of the priority projects. Priority B treatments are on Douglas County Open Space property.

Exhibit 13



Community Outreach

In addition to the core team meetings and evacuation plan development outreach efforts consisted of keeping the Community informed of the CWPP process and fire mitigation projects via email and at monthly HOA meetings. One of the HOA representatives attended a CWPP meeting in Frisco in May to network with other communities who were developing and implementing CWPPs. In November 2011 wildfire mitigation and pine beetle information was presented at the annual Perry Pines HOA meeting. The Community also had an opportunity to review the draft plan and make comments/changes before it was approved by the HOA, CSFS, and Jackson 105 Fire Protection District.

Ongoing outreach efforts will include wildfire mitigation information included at HOA meetings and in community email communications, presentations for the community on various topics related to wildfire mitigation and forest health, and annual update/review of CWPP.

Next Steps

The next steps for fire mitigation work in the Community include the following activities that are divided into Priority A and Priority B activities:

Priority A

1. Implement the 2012 grant. This will involve full mitigation work on 18 properties (56 acres) in the Community and another year of slash to mulch conversion. The scope of this work is likely to consume the balance of 2012. This is an "A" Priority project with primary responsibility falling on the PPHOA supported by the CSFS Franktown office.
2. Improve the emergency evacuation routes for the northern half of the Community. This will involve negotiating an easement across private property and installing a new emergency gate. Timing should be in 2012. This is also an "A" priority project with primary responsibility falling on the PPHOA. The property owner involved has preliminarily agreed to the gate and access across the property as of 6/1/2012.
3. The Jackson 105 Fire Department submitted a tax increase to voters in the fall of 2011. It was turned down with the result that Jackson 105 Fire District is now consuming financial reserves to maintain preparedness. The HOA's will work with the fire district to educate voters on the importance of approving the rate increase. Timing will be spring, 2012. This has now been successfully completed.

4. Establish a permanent committee chair for fire mitigation in the Perry Pines Homeowners Association. This individual will be responsible for maintaining awareness of the need for fire mitigation, providing community education, and developing and implementing future projects. Timing will be 2013. This is an “A” priority project with responsibility falling to the PPHOA.
5. Continue focused mitigation work on homeowner properties. Assuming the grant is approved, approximately 20-25% of the acreage in the Community will have been treated by the end of 2012. More remains to be done. The fact that a significant portion of the Community will have been treated should increase the acceptance of the work and put subtle pressure on homeowners with high risk properties to mitigate. Under the direction of the fire mitigation committee chair, homeowners with high-risk properties will be targeted for education to hopefully secure their commitment to mitigation work. Grant funding will be sought if available to continue this work. Timing will be 2013 and beyond. This is an “A” priority project with responsibility falling to the PPHOA.
6. In conjunction with the Jackson 105 Fire District and county resources, conduct an evacuation drill which includes livestock removal. Timing will be fall, 2012. This is an “A” priority project to be spearheaded by the PPHOA but with heavy support from several county agencies.

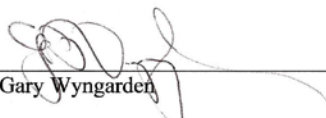
Priority B


1. Make the slash to mulch conversion a perennial activity and build it into the PPHOA budget so it can be continued even if grant money is not available. Timing will be 2013 and beyond. This is a “B” priority project with responsibility falling to the PPHOA.
2. Under the direction of the fire mitigation committee chair, continuing education on fire mitigation with an emphasis on maintenance will be provided through HOA meetings, website and emails. Timing will be summer 2012 and beyond. This is a “B” priority project with responsibility falling to the PPHOA.
3. Complete mitigation treatment on the county-owned parcel that contains the park in 2012 and the remaining parcels in future years depending on funds availability. This is a “B” priority project with responsibility falling to Douglas County Open Space Management.

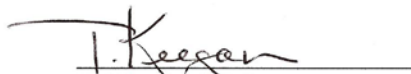
The Perry Pines and Park Ridge Pines Community Wildfire Protection Plan was collaboratively developed. Interested parties, including Perry Pines and Park Ridge Pines homeowners, Jackson 105 Fire Protection District, Douglas County Wildfire Mitigation Staff, Douglas County Open Space and Natural Resources, and the Colorado State Forest Service, participated and provided input to the process.

The CWPP identifies and prioritizes areas for hazardous fuel reduction treatments and recommends the types and methods of treatment that will protect Perry Pines and Park Ridge Pines. It also recommends measures to reduce the ignitability of structures throughout the area.

The following community representatives/agencies have reviewed and support this Community Wildfire Protection Plan.


Gary Wyngarden
Perry Pines HOA President


Don Bellum
Park Ridge Pines HOA President


Tad Keegan, Chief
Jackson 105 Fire Protection District

 7-13-12
Kristin Garrison, District Forester
Colorado State Forest Service
Franktown District

Appendix A

Perry Pines/Park Ridge Pines Evacuation Plan

Yes, it can happen here! The photograph below was taken in Perry Pines during the Buffalo Creek fire in May of 1996. During the Hayman fire in June of 2002, burning debris landed here and communities immediately West and South of us were evacuated. We were next on the schedule to go. In the history of Perry Pines there have been five major fires, and four smaller fires within the confines of the community, all of which were extinguished through quick work by our fire department. **The information in this document could save your life—please read on.**



As previously communicated, the Homeowners Associations of Perry Pines and Park Ridge Pines (aka Bellum Pines) in concert with state and county resources and our local fire district are developing a Community Wildfire Protection Plan (CWPP). This document is a next step in the development of that plan and will answer four important questions:

1. In the event of an emergency that required evacuation, how would you be notified?
2. In the event that the Dawson and Greenwood Road exits (or DC 105) were blocked or impassable, how would you get out?
3. If an evacuation were ordered, what can you do to assure the safety of your livestock and/or pets?
4. If you have to evacuate, what should you be sure to take with you?

How would you be notified of a need to evacuate?

The Douglas County Sheriff has an Emergency Management Staff that would be responsible for coordinating notification. While they use many avenues to inform the public such as alerts to the media, the fastest and most assured way to be alerted is through the County's Citizen Alert System (aka Reverse 911). In order to be sure you receive an evacuation communication, you should register with the County on this system. This can be done easily through the following link:

https://ww2.everbridge.net/citizen/EverbridgeGateway.action?body=home&gis_alias_id=170711

If you are not comfortable using the computer, please contact your HOA, and we will help you get signed up. This system allows you to register not only your primary phone number, but also a cell phone number, a work number, a pager, or to receive an email or text message to an iPhone or a Blackberry. Thus you could easily be contacted even if you weren't at home. The system also permits you to register someone in your home who might have special needs, e.g. an elderly person who is not mobile or someone with a disability.

You might also be contacted via a house-to-house search by Douglas County Sheriff personnel. However, that might occur later than you would want it to happen. Register on the system today.

If the Dawson and Greenwood Road exits (or DC 105) were blocked or impassable, how would you get out?

There are two emergency exits from Perry Pines and Park Ridge Pines. One is at the extreme East end of Park Ridge Road. The other is at the extreme East End of Butte Circle. Both emergency exits are closed by locked gates which will be opened by fire department personnel in the event of an emergency. Both emergency exits lead into Keene Ranch. Once in Keene Ranch head South to Tomah Road and then East to I-25. The emergency exits are identified on

the attached map. We have also asked the county to post signs directing people to the emergency exits and will follow up to make sure this is completed.

If an evacuation were ordered, what can you do to assure the safety of your livestock and/or pets?

So you evacuate and stay with family, friends, or a motel for a few days. What do you do with your dogs, cats, horses, goats, sheep, chickens, or llamas? Douglas County has a program called their Animal Response Team or CART to provide shelter for animals in emergencies. Their motto per their brochure is “Any animal, any disaster, anywhere in Douglas County.” They have a network of private individuals who will provide shelter for animals on an emergency basis. This is backed up by the County Fairgrounds in an emergency. They can be contacted through the Douglas County Sheriff dispatch at 303-660-7505 or at 303-660-7589. Many of us with livestock have a trailering capability, but they can also arrange transportation when necessary.

While we’re on this topic, the CART program is heavily dependent on volunteer support and contributions of either money or animal related care items. Why not contact Cherie Abbott (303-660-7589) at CART and offer to help?

If you have to evacuate, what should you make sure you take with you? What other considerations should you be concerned about?

Be sure to take your 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 or keep them in a safe deposit box off site. Have a plan in advance where you will meet up with family members if your home is not accessible, and be sure to register anyone with special needs with the Sheriff so they can be assisted in an evacuation.

Conclusion

Please act on this information now as appropriate and keep this document in an accessible place for future reference. It will also be available on the Perry Pines website (perrypines.com). As our Community Wildfire Protection Plan develops, we will send you additional information.

Appendix B
Financial Assistance Program
Cooperative Match Project
SCOPE OF WORK

Project Number: **2011 FRFTP-1**

Cooperator: **Perry Pines HOA**

Work to be completed:

The slash to mulch project will consist of rented equipment (skidsteer with grapppler, chipper and/or grinder, and trucks to move the equipment) and volunteer labor. This team will move to an estimated 50 properties to turn the slash into mulch. Estimated rental costs will be \$5000. An estimated 150 hours of volunteer time will be required which is valued at a little over \$3000 and will be a significant source of matching share funds for this part of the project. The mitigation work on the eight demonstration projects will be performed by contractors to CSFS standards (6.302 for defensible space and Gambel Oak treatment). Thus grant funds will be spent on contractor fees. Matching funds will be paid by individual homeowners for this part of the project. Almost all of the matching funds will be cash though a small amount of in-kind match may be involved. The work to be performed will mostly be treatment of Gambel Oak and Gambel Oak understory to Ponderosa Pine overstory and will involve ladder fuels elimination and thinning and other treatment beyond the home ignition zone. The eight sites will be used for homeowner education in the rest of the communities.

Milestone dates: Organization of slash to mulch project: Complete by 6/21/11. Completion of work over six weekend days: 10/15/11. Request for proposals from at least three contractors for demonstration sites: Complete by 6/30/11. Award contracts for work: 7/15/11. Work to be completed for demonstration sites: 9/15/11. Maintenance: ongoing

Standards or Guidelines: Will meet CSFS guidelines appropriate for treatment.

Project Period: April 27, 2011-September 1, 2012

Funded Amount: \$21,000.00

Minimum cooperator match: \$21,000.00

Deliverables: 8 demonstration sites (28 acres). Chipping: 50 properites (100 acres).

Project Types: Fuels reduction

All work completed under this project must be certified as meeting minimum Colorado State Forest Service standards prior to any reimbursement being made to the cooperator. Attachment B to the project entitled "Attachment B, Grant Report/ Reimbursement Request, WSFM Competitive Grants" will be the document used to both request reimbursement and to certify that work has been completed to minimum standards.

Appendix C
Financial Assistance Program
Cooperative Match Project
SCOPE OF WORK

Project Number: **2012 FRFTP-1**
Cooperator: **Perry Pines HOA**

Work to be completed:

The project has two dimensions. One part of the project includes grinding of slash piles on an estimated 15 properties/75 acres into mulch. The slash piles will be lifted by a grapple attached to a skidsteer and dumped into the tray of a large capacity grinder which will render them into mulch. This will require \$1500 of the requested funds which will be paid to a contractor for use of the equipment. The second part of the project involves creating complete mitigation demonstration sites on an additional 18 properties/56 acres of treatment. These properties have been identified and the homeowners are committed to the work and the matching funds.

Upon approval of the grant, the CSFS Forester, Franktown will visit each property to develop a prescription and treatment map to CSFS Standards. A contractor will be engaged to perform the work. Most of the mitigation work will be done by machine using a masticator attached to a skidsteer. Where conditions require, hand work will be performed to supplement machine work. Upon completion of the contractor's work, the CSFS Forester, Franktown will inspect the properties for compliance with standards. This phase of the project will require \$28,250 of grant funds which will be used to pay the contractor.

Milestone dates: Completion of prescriptions and treatment maps—4/17/12. Contractor bids secured and awarded—5/17/12. Completion of work and inspections by CSFS Forester, Franktown—10/1/12.

Standards or Guidelines: Will meet CSFS guidelines appropriate for treatment.

Project Period: April 25, 2012-September 1, 2013

Funded Amount: \$29,750.00

Minimum cooperator match: \$29,750.00

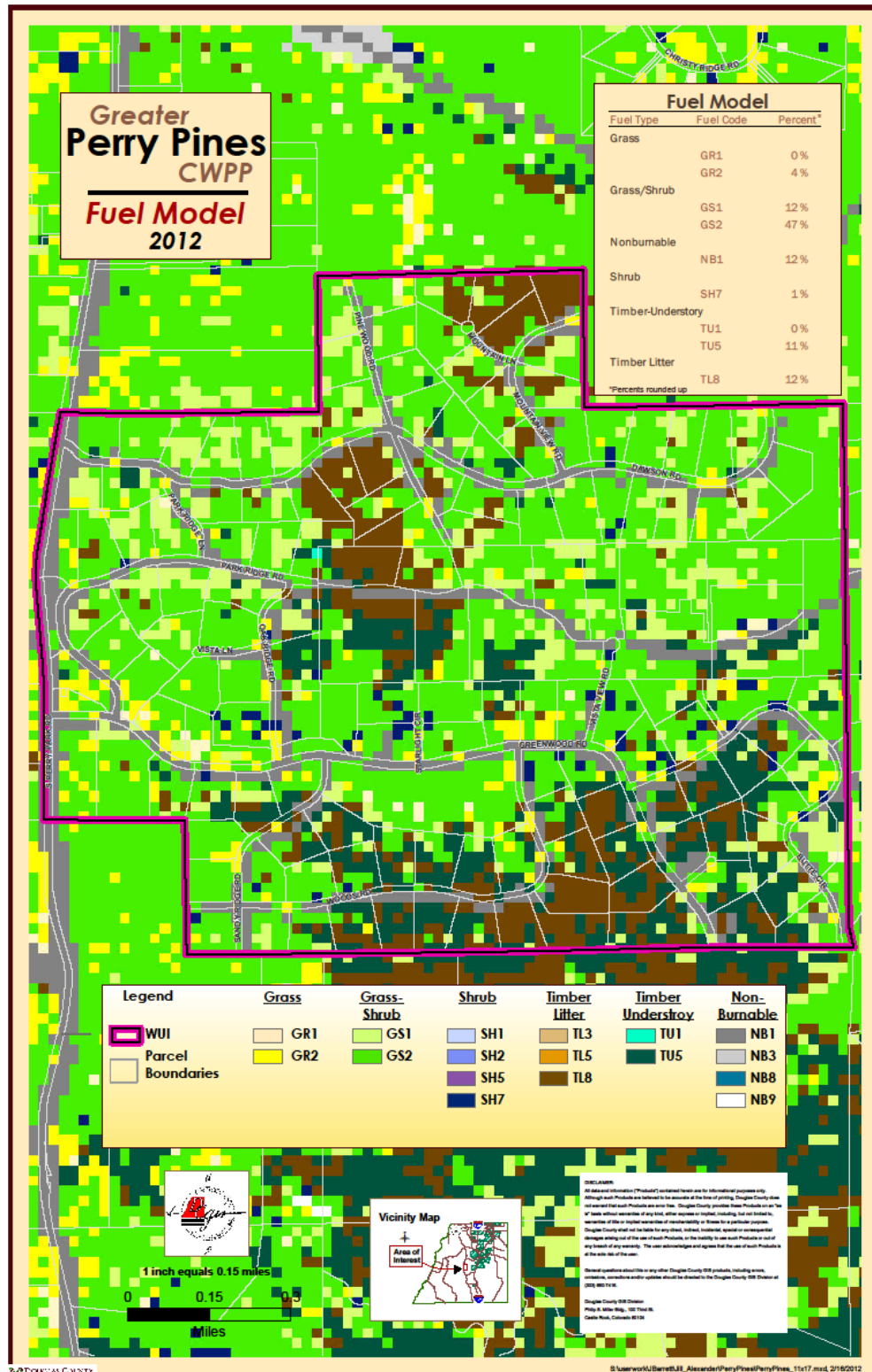
Deliverables: 18 demonstration sites (56 acres). Chipping: 15 properties (75 acres).

Project Types: Fuels reduction

All work completed under this project must be certified as meeting minimum Colorado State Forest Service standards prior to any reimbursement being made to the cooperator. Attachment B to the project entitled "Attachment B, Grant Report/ Reimbursement Request, WSFM Competitive Grants" will be the document used to both request reimbursement and to certify that work has been completed to minimum standards.

Appendix D

Perry Pines/Park Ridge Pines Fuel Model Map/Description



Fuel Model Map Information

The Fuel Model Map breaks the vegetation down into standard fire behavior models that are then used with Rothermel's (1972) surface fire spread model. These are surface fire spread models, the vegetation that will carry a surface fire and not a crown fire. The fire behavior model is broken into Grass, Grass-Shrub, Shrub, Timber Litter, and Timber- Understory. These categories are then further broken down by increasing complexity.

Grass models are for an arid to semiarid climate that is rainfall deficient in the summer and the extinction moisture content (dead moisture content) is 15 percent. Grasses are dynamic as their moisture contents change during the season and they can exhibit different fire behavior.

Fire moves quickly through grass and can easily spread to adjacent more complex fuel types making suppression operations more difficult and complex.

GR1 - Grass is short, patchy, and possibly heavily grazed. Spread rate is moderate; flame length low. Grasses in this category may not carry a fire as rapidly as grasses in the other grass models.

GR2 - Moderately coarse continuous grass, average depth about 1 foot. Spread rate high; flame length moderate. In this type of grass fuel model fire will move more quickly and burn more intensely.

The **Grass-Shrub** category is a mixture of grass and shrubs up to 50 percent shrub cover. The models are for an arid to semiarid climate that is rainfall deficient in the summer and carries an extinction moisture content of 15 percent. In this case it is the grass-shrub model combined that contributes to fire spread. Grass-Shrub fuel models are dynamic with the function of moisture content.

Fire may burn quickly through the Grass-Shrub models with varying intensity and increase spreading, making suppression operations more complex. This type of model contributes to fire spreading into ladder fuels, and adjacent to a significant amount of crown fuels (trees) in the communities modeled.

GS1- Shrubs are about a foot high, low grass load, Spread rate moderate; flame length low.

GS2- Shrubs are 1-3 feet high, moderate grass load. Spread rate high; flame length moderate.

For the **Shrub** category shrubs cover at least 50 percent of the site; grasses are sparse to nonexistent. The models are for an arid to semiarid climate that is rainfall deficient in the summer with an extinction moisture content of 15 percent.

SH1 - Low shrub fuel load, fuelbed depth about 1 foot; some grass may be present. Spread rate very low; flame length very low.

SH2- Moderate fuel load (higher than SH1), depth about 1 foot, no grass fuel present. Spread rate low; flame length low.

SH5- Heavy shrub load, depth 4 to 6 feet. Spread rate very high; flame length very high.

SH7- Very heavy shrub load, depth 4 to 6 feet. Spread rate lower than SH5, but flame length similar. Spread rate high; flame length very high.

Areas of heavier shrub loads may tend to experience higher burning intensities and may be more difficult to control.

Timber Litter can be described as dead and down woody fuel (litter) beneath the forest canopy.

TL3- Moderate load conifer litter. Spread rate very low; flame length low. The fuel bed is not composed of broadleaf or long-needle pine litter and does not include coarse fuels.

TL5- High load conifer litter, light slash or mortality fuel. Spread rate low; flame length low. The fuelbed is not composed of broadleaf or long-needle pine litter and does not include coarse fuels.

TL8- Moderate load and compactness may include small amounts of herbaceous load. Spread rate moderate; flame length low. The fuelbed is composed of long needle pine litter.

Timber Understory can be described as grass or shrub mixed with litter from the forest canopy.

Models are for a semiarid to subhumid climate with a moisture extinction of 20 percent.

Timber Understory models are those that pose a significant threat of a ground fire spreading to a crown fire.

TU1- Fuelbed is low load of grass and/or shrub with litter. Spread rate low; flame length low.

TU5- Fuelbed is high load conifer litter with shrub understory. Spread rate moderate; flame length moderate.

Nonburnable areas are those that are insufficient to carry wildland fire under any condition.

NB1- Urban or suburban development; insufficient wildland fuel to carry wildland fire.

NB3- Agricultural field, maintained in nonburnable condition.

NB8- Open water

NB9-Bare ground

Nonburnable areas can serve as potential anchors for fuel breaks.