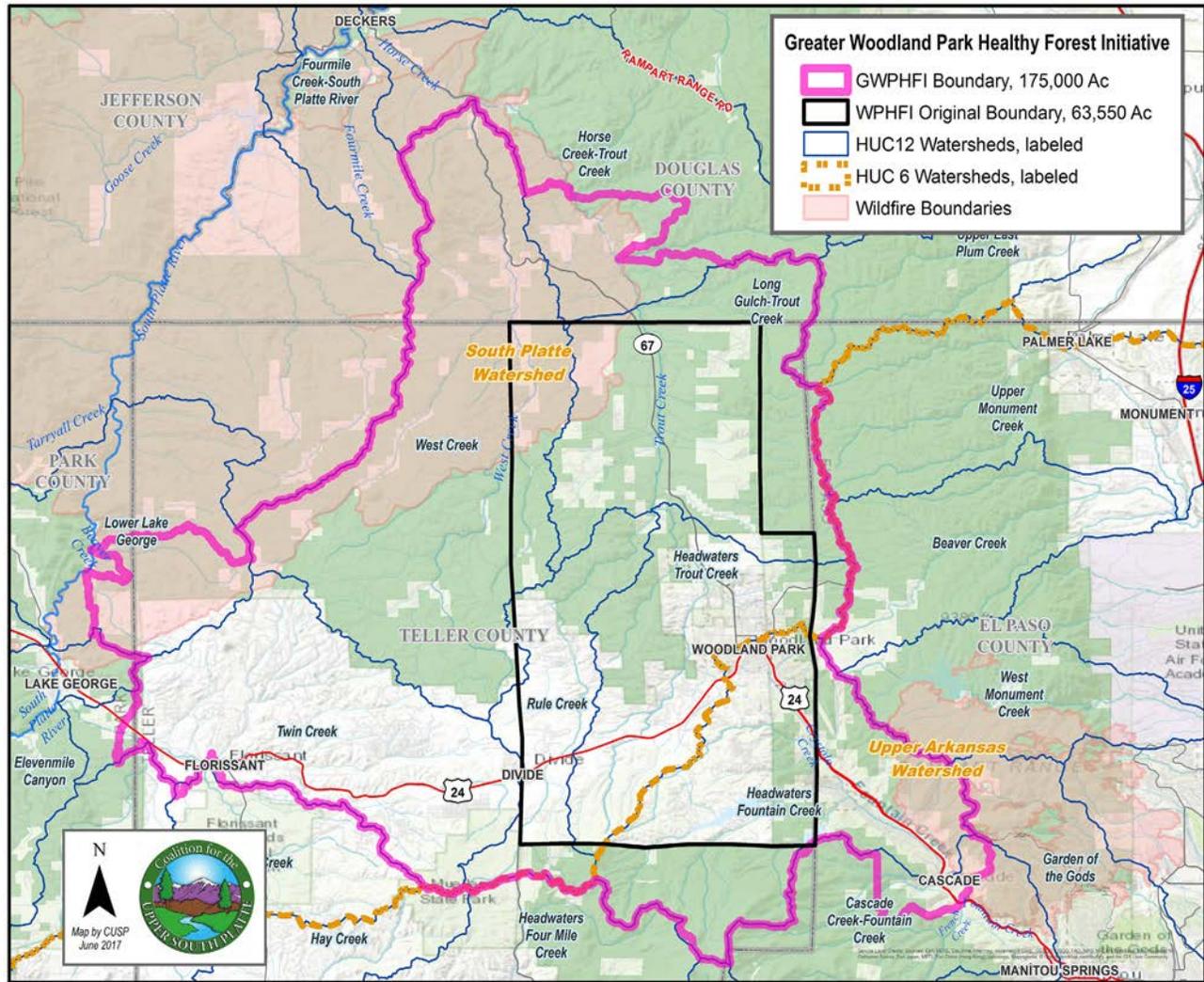


THE GREATER WOODLAND PARK HEALTHY FOREST INITIATIVE COMMUNITY WILDFIRE PROTECTION PLAN 2017



UPDATE TO THE 2010 WPHFI CWPP

The long term vision of the GWPFI CWPP is to restore areas of forest to conditions more consistent with pre-settlement forests as they existed before fire suppression and reduce the impacts associated with wildfire to our communities and our watersheds.

This document has been approved by the following:

Jonathan Bruno, Coalition for the Upper South Platte

Larry Long, Colorado State Forest Service

Meg Halford, Colorado State Forest Service

Teller County

Park County

Douglas County

El Paso County

Chad Bauer, Florrisant Fire

Chuck Buckley, Divide Fire

Lake George Fire

Tyler Lambert, NE Teller Fire

Green Mountain Falls Chipita Park
Fire Protection District

Cascade Fire Protection District

Mountain Communities Fire

City of Woodland Park

Colorado Springs Utilities

United States Forest Service

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EXECUTIVE SUMMARY



In 2010 the Woodland Park Healthy Forest Initiative (WPHFI) Community Wildfire Protection Plan (CWPP) was completed and the work began. Over the past seven years strategically, located fuel reduction projects on public and private lands have significantly reduced risk to our communities. Projects located around the CWPP area and have made a significant difference in the hazardous fuel loading surrounding our communities. In total over 3,500 acres of private land and over 13,000 acres of public lands have been managed.

WHAT'S NEW?

Due to the focused efforts within the original Woodland Park Healthy Forest Initiative (WPHFI) boundary, the WPHFI team has realized significant gains. Based upon these accomplishments and consensus from the WPFHI Update Team, the name has been changed to the Greater Woodland Park Healthy Forest Initiative, to better acknowledge that work needs to occur over an area defined by watersheds and geography rather than section lines on a map. This name changes does not alter much of the existing CWPP, but adds acres and communities into the focused areas of concern. The original WPHFI CWPP acted as the framework for the creation of this update and should be referenced for further understanding of the community at risk. The plan is available [here](#).

CHANGES TO THE PLAN

Since 2010 we have all been witness to devastating Wildland fires within our region's Wildland Urban Interface (WUI) areas. Because of the devastating impacts to nearby communities, the Team has focused on expanding the footprint, and on providing more useful information geared toward homeowners and local businesses. The Team has used a new risk analysis that assesses the original WPHFI CWPP identified risks, while also incorporating a watershed-risk methodology. The changes help us better represent the topographical conditions that impact fire behavior and fire spread, as well as helping to understand post-fire flooding characteristics based on small watershed boundaries.

The new and improved GWPFI CWPP has been digitized, and organized into three distinct sections –

1. Background

Review 2010 Plan Goals
Significant Activities and Progress

2. Values at Risk

Communities and Other Values at Risk
Integrating Values and Wildfire Hazards
Communities and Other Values at Risk
Priority Area Identification
Mitigation Recommendations

3. Goals and Objectives

Fuels Management Goals of the GWPFI CWPP
Mitigation Action Summary

GWPHFI BACKGROUND

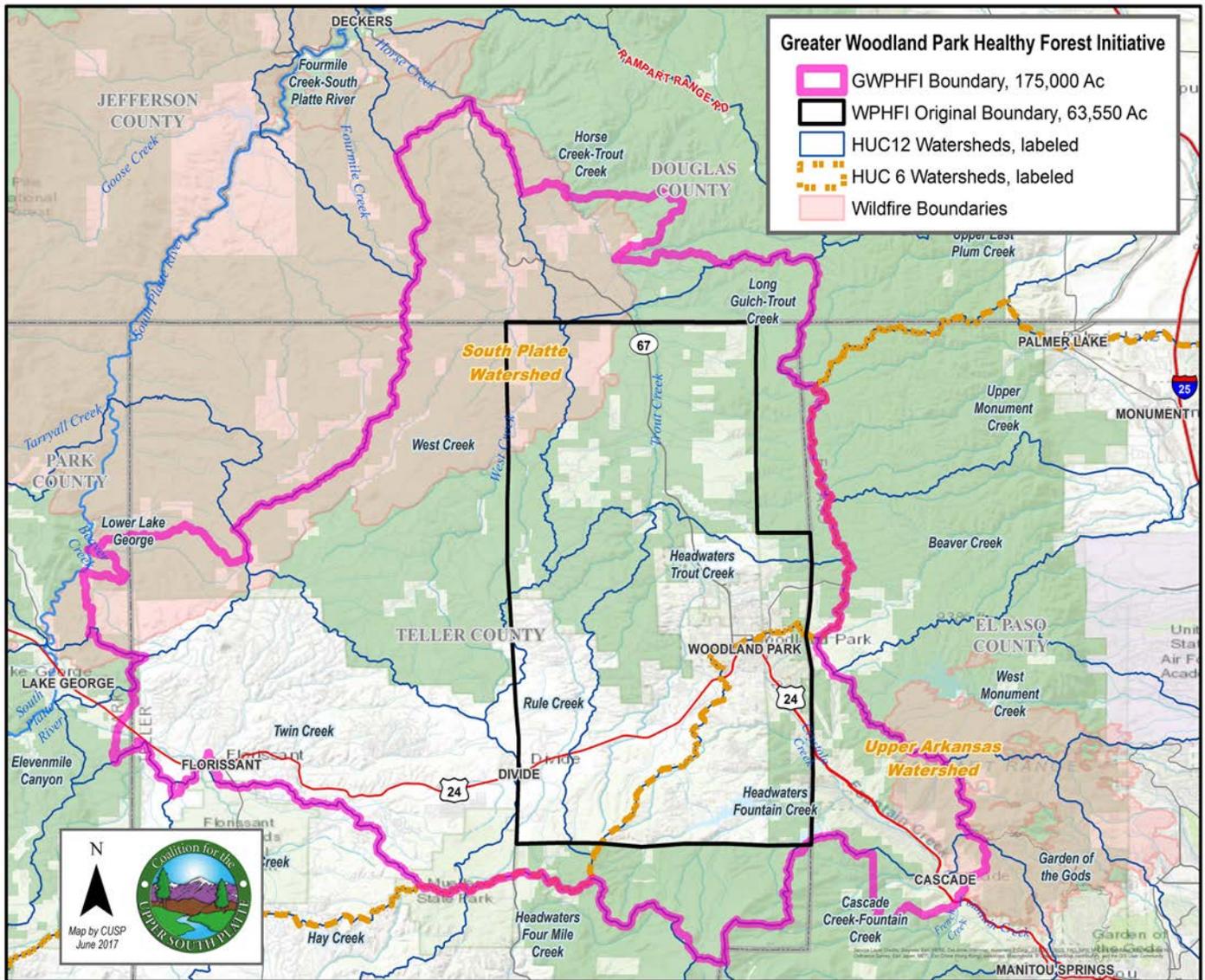


Figure 1 - WPHFI Priority Areas GWPHFI_Overall

The Greater Woodland Park Healthy Forest Initiative (GWPHFI) area comprises approximately 175,000 acres within Teller, Park, El Paso and Douglas Counties. For the purposes of this update the entire GWPHFI area has been classified as the Wildland Urban Interface. The area has 478 subdivisions and includes approximately 27,000 acres of US Forest Service land in the Pike National Forest. The GWPHFI area is generally very densely forested in mixed conifer (primarily Ponderosa Pine and Douglas Fir), with steep terrain and limited access.

THE ORIGINAL WPHFI boundary was designated in 2008 as a Demonstration Project of the Front Range Fuels Treatment Partnership. The Partnership is a consortium of government agencies, landowners and conservation organizations who’s mission is to “reduce wildland fire risk through sustained fuels treatments”. The project was originally designed to foster healthy forests and reduce fire risk through, “... contiguous treatments across jurisdictional boundaries paired with local utilization and processing facilities...” The Demonstration Project was to also foster, “... active participation by local residents.”

WPHFI Non-Federal Land Priority Zones

2010

 WPHFI Boundary
 USFS, Pikes Peak Fuels Treatment Units
 Non-Federal Land Priority Zones
 City of Woodland Park Defensible Space Priority Zone

Miles
 0 0.5 1 2
 1 : 100,000 at 8.5" x 11.0"

Coordinate System: UTM Zone 13 N
 Datum: NAD 83

Background: USFS;
 pike_vismap_highres

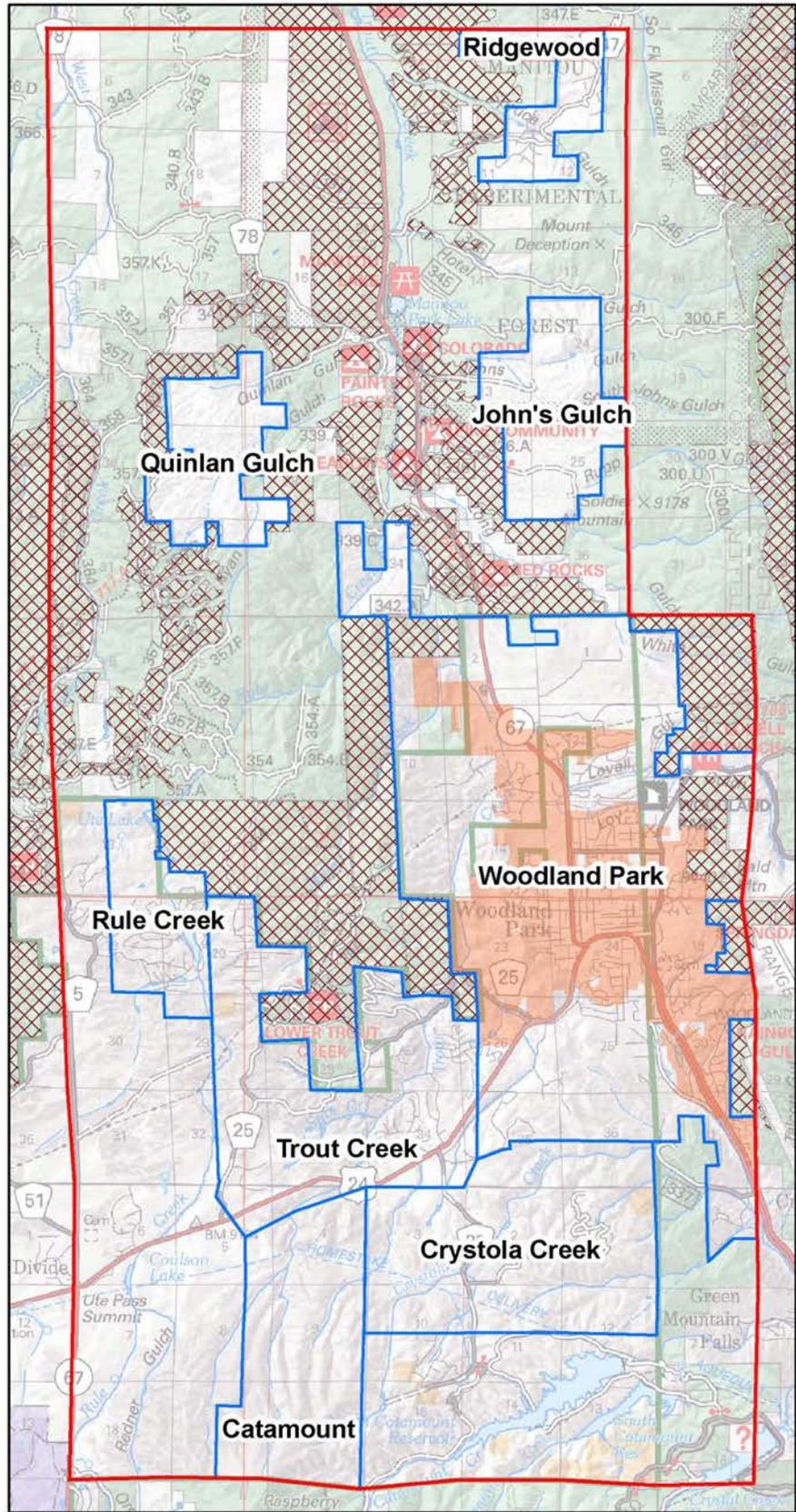



Figure 2 - 2010 WPHFI CWPP Priority Non-Federal Lands

Funding for the original WPHFI CWPP was provided by the Front Range Roundtable. The image above (Figure 2) represents the goals as identified by the Roundtable.

THE WILDLAND URBAN INTERFACE

The WUI is the zone where structures and other human development meet and intermingle with undeveloped wildland or vegetative fuels. The WPHFI worked closely with the Front Range Roundtable to develop a comprehensive plan to treat acres in need of attention, and to establish local capacity to utilize as much of the harvested material as possible. Roundtable assistance includes technical expertise and financial assistance; the goal was to produce a demonstrable success story.

ADHERENCE TO THE HEALTHY FOREST RESTORATION ACT

In fostering the Roundtable and demonstration goals it is necessary to comply with the Healthy Forest Restoration Act (HFRA) of 2003, and develop a Community Wildfire Protection Plan (CWPP). HFRA stipulates a CWPP is a "...plan for an at-risk community that...identifies and prioritizes areas for hazardous fuel reduction treatments and recommends the types and methods of treatment on Federal and non-Federal land...and recommends measures to reduce structural ignitability..." A CWPP is important in encouraging actions to be taken by private land owners in creating defensible space and protecting their homes as well as potential actions by adjacent land management agencies.

The GPHFI CWPP utilizes other documents and projects from recent years to help guide future efforts. It ties together mitigation plans and actions that have been completed and those that are planned for the future. It is consistent with the overall Teller County Wildfire Protection Plan issued by the Teller CWPP Commission in 2004, and updated in 2011. Accordingly, the reader needs to review the Teller CWPP to place the GPHFI in context.



Figure 3 - The City of Woodland Park is a vibrant Front Range Mountain Town

2010 WPHFI PLAN AND THE GOALS

The WPHFI CWPP was developed for the safety of life and protection of property from wildfire emergencies within the boundaries of the WPHFI area while upholding the ecological values of the community. The CWPP addressed the areas of wildfire hazard mitigation and emergency response to the impact of widespread wildfires. The plan has three major focus areas: 1)hazard analysis of private lands and importance of land owner action to create defensible space and structural protection; 2)recommended fuels mitigation projects and priorities for agency action; 3)and other actions to implement better resilience to wildfire. In addition, the plan contains information for implementation and monitoring, and also discusses methods for amending the plan on an ongoing basis as circumstances and changing conditions may require.

Goals and Objectives of the 2010 Plan

1. Fuel Mitigation:

- To identify and categorize wildfire fuels.
- To treat fuels in a manner consistent with restoring forest health and forest resiliency and improving the currently altered wildlife habitat.
- To create a short-term mitigation strategy providing on-the-ground project priorities and implementation.
- To create mechanisms for maintenance of treated areas.
- Through outreach and education, keep the need to manage forests for health and wildland fire risk reduction in residents consciousness.
- To develop a proactive approach to respond to post fire impacts to the community.



The destructive force of the Hayman Fire of 2002 as it burned up the slope of Crystal Peak. Community Wildfire Protection Plans are the means by which Teller County residents can understand the danger posed by unhealthy forests and prevent future tragedies.

2. Emergency Response:

- To identify available services and wildfire response preparedness.
- To outline professional and community volunteer communication linkages and response to widespread wildfire emergencies.
- To evaluate traffic egress/ingress for emergency residential evacuations.
- To evaluate emergency equipment and professional services entry through the objective of updating hazard assessment for all neighborhoods in the G-WPHFI.
- To delineate community and public communication and information systems usage for and during emergency events.
- To identify and build training and professional development opportunities for local response agencies within the area.
- To create neighborhood tactical maps for use by emergency responders during WUI fire events and structure protection assignments.
- To work closely with law enforcement agencies to provide training and personal protective equipment necessary for evacuation assignments.
- To work closely with the local Office of Emergency Management to establish potential evacuation routes, shelters, and promotion of Ready-Set-Go.

3. Private, State and Federal support:

- To influence where and how private, Non-Governmental Organizations, county, state and federal agencies implement fuel reduction by supporting ongoing efforts, and proposing alternative locations and methods for treatment on lands in and adjacent to the CWPP priority zones.
- To help make decisions regarding priorities for acquisition of private, local, state and federal funds for the WPHFI for wildfire hazard mitigation and response related projects.

4. Biomass Utilization:

- As mitigation projects are accomplished, both on private and public lands, a significant amount of biomass product will become available and must be managed for appropriate use or disposal. The importance of proper and effective utilization is recognized and the CWPP team supports action by the WPHFI Leadership Team, Teller County and community business to:
 - Work collectively to assure the largest amount of wood removed from project areas is utilized as value added material.
 - Work with the private sector to better facilitate the establishment of “end use markets” for local wood products.

5. Administration and Plan Maintenance:

- Define implementation plans and schedules.
- Set forth on-going plan maintenance and plan updating strategies.

SIGNIFICANT ACTIVITIES AND PROGRESS

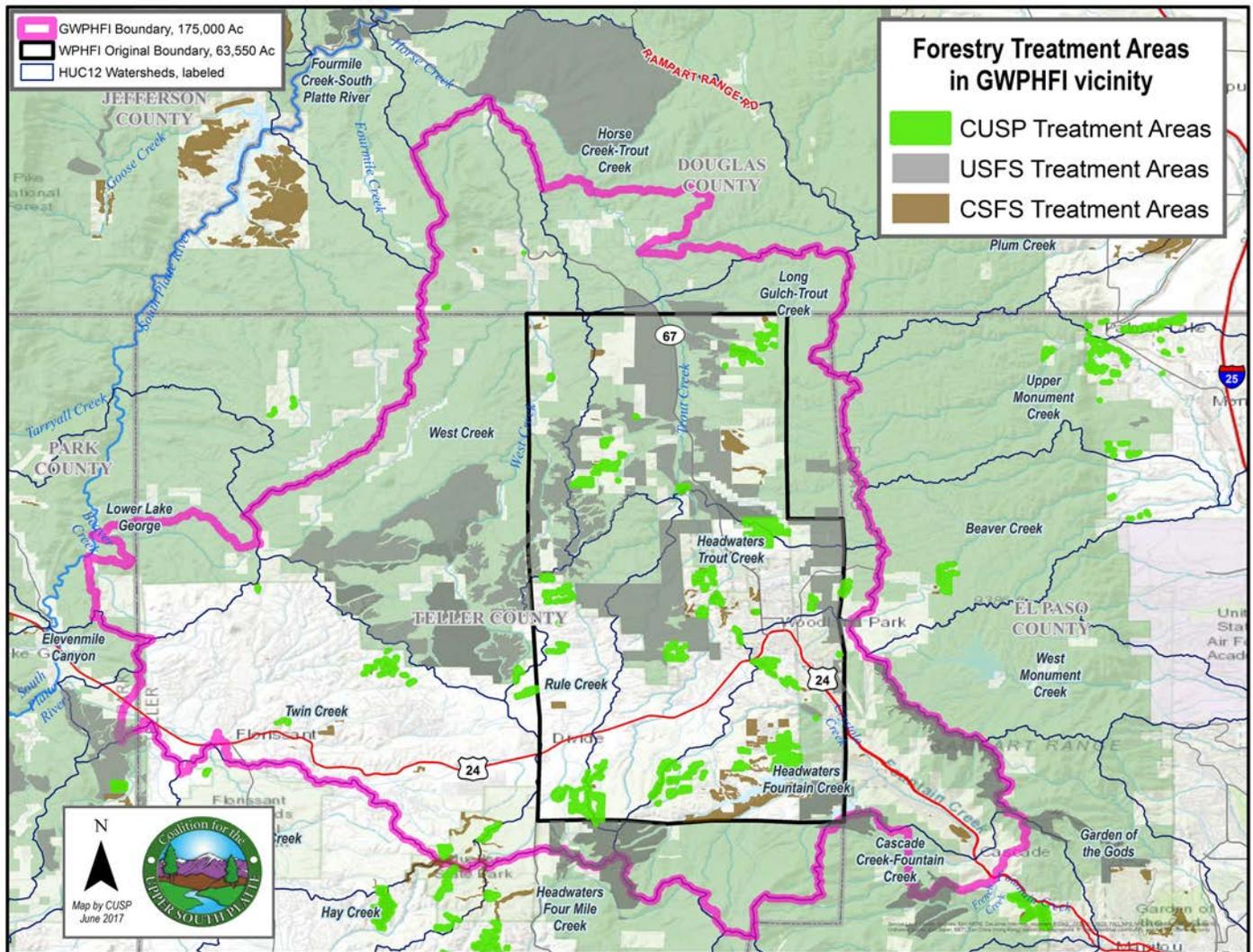


Figure 5 - WPHFI Treatments

1. WPHFI Fuel Mitigation:

Numerous projects led by the United States Forest Service, Colorado State Forest Service and the Coalition for the Upper South Platte have been accomplished specifically within the original WPHFI Boundary over the period. As a result of the outreach activities of the WPHFI partners, some property owners have completed fuel reduction by their own initiative, and these acres are not reported here.

The following acres have been completed:

- Private Lands Treatments - 3,578 acres
- Federal Lands Treatments - 13,385 acres
- Total Acres completed - 16,963 acres

2. Emergency Response: Local fire and response organizations continue to increase community involvement and activities aimed at reducing loss in wildfire events. Several local fire departments have worked to create tactical plans for specific areas within the GWPFI boundaries and have worked to enhance existing communications both internally and externally. Citizens now have numerous ways to received up-to-the-minute information during a disaster. See the next page for more information.

3. Private, State and Federal support:

Over the years since the inception of the WPHFI CWPP, stakeholders have worked collaboratively to

engage private and non-governmental entities to increase the overall outcomes for our community.

4. Biomass Utilization:

Biomass utilization continues to be a major challenge for the area; however, several programs are in place that have made a small difference. The majority of biomass is chipped, masticated, or piled and burned.

- Organizations such as [Help the Needy](#) have played an important role in utilizing materials (firewood) from forest management projects.
- The Fairplay School continues to use wood from local projects to heat the facility.

5. Administration and Plan Maintenance:

This update represents adherence to the need to update and refine the original CWPP. Since its inception, the plan has been used as a guide for partners to prioritize work and complete projects. As we move into the future, the plan will be updated every 5 years. Maps will be updated annually.

HAVE YOU SIGNED UP TO FOR EMERGENCY NOTIFICATIONS?

Park County emergency notifications -

<http://www.parkco.us/97/CodeRED>

Douglas County emergency notifications -

<http://www.dcsheriff.net/emergency-preparedness/be-informed-and-get-updates/>

Teller and El Paso Counties emergency notifications -

<https://member.everbridge.net/index/1772417038942752#/signup>

El Paso County reverse 911

<http://www.elpasoteller911.org/246/Emergency-Notification-System>

Teller County real time emergency notifications -

www.nixle.com

RIDGEWOOD - HARD-WORK PAYS OFF

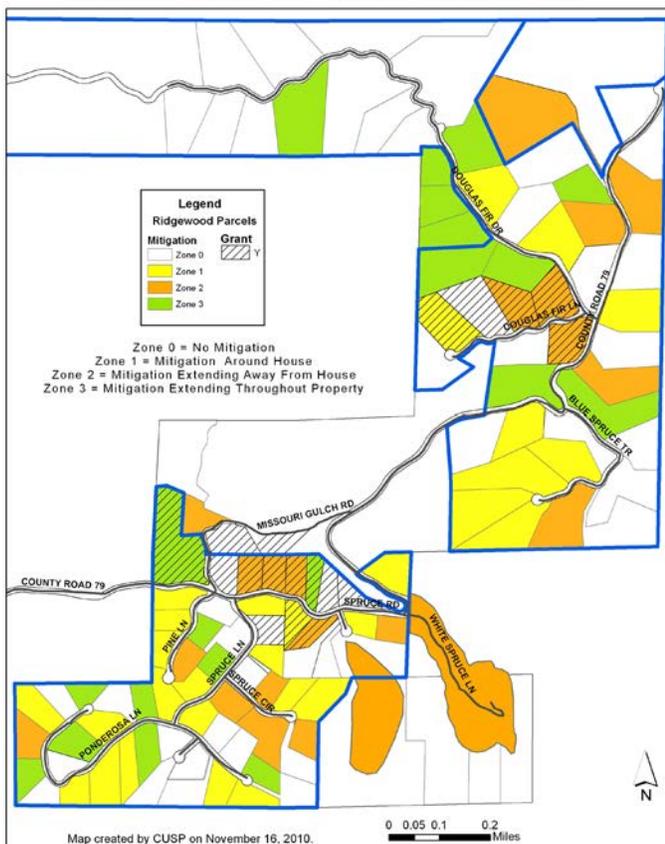
One example of an on-going community protection effort in the Woodland Park area is the Ridgewood community in Teller County. Ridgewood became a nationally recognized Firewise Community/USA® (FWC) in 2010, making them the first FWC in Teller County. Their wildfire mitigation efforts over the last eight years have grown exponentially to where the majority of the Ridgewood subdivision is dedicated to participating in annual efforts that reduce the community's wildfire risk. In 2002, Ridgewood was evacuated for ten days during the Hayman Fire, which spurred the Ridgewood residents to begin making their community safer. Under the leadership of Jean Blaisdell, Ridgewood established the Teller County Slash and Mulch Site. The Ridgewood Community Wildfire Protection Plan (CWPP) was then completed in 2008, and it was one of

the first plans to draw a parallel between fuels reduction and forest stewardship. The Ridgewood community understands that trees stressed by extreme competition for light, nutrients and water are weakened and more susceptible to both insect infestation and potentially damaging diseases, as well as large, damaging wildfire. Ridgewood has taken both of these concerns into account as they plan for the future, and their CWPP has been updated twice since 2008 to keep up with emerging forest threats and documenting risk reduction efforts within the community.

Since 2009, Ridgewood has mitigated approximately 200 acres within the community, and the majority of properties within the community have completed risk reduction activities or have completed their mitigation plans, understanding that continuous maintenance of the risk reduction efforts must still occur.

The Ridgewood community has been extremely innovative when it comes to raising funds for mitigation efforts. They have sold cookbooks of Ridgewood resident recipes, and made wreaths and garlands from trees pruned for ladder fuels

RIDGEWOOD SUBDIVISION



during Christmas to be sold all over Teller County to help raise funds for the community's wildfire mitigation efforts. It is these unique, inventive efforts that truly create the strong bonds between the neighbors within the Ridgewood community that lead to dedicated actions to reduce wildfire risk and that exemplify what community protection can be.

Ridgewood is a community of neighbors helping neighbors, creating connections and networks to help them take action to become more fire adapted and resilient for when a wildfire does occur. This community also serves as a reminder that while community protection is urgent, these efforts do not occur overnight. Community wildfire risk reduction is an on-going process that begins with raising awareness, continues through expanding knowledge of the available resources, and grows as communities change their behaviors and take actions to protect their community. Ridgewood's community-wide risk reduction efforts are an example of how a community can develop and achieve long-term goals.

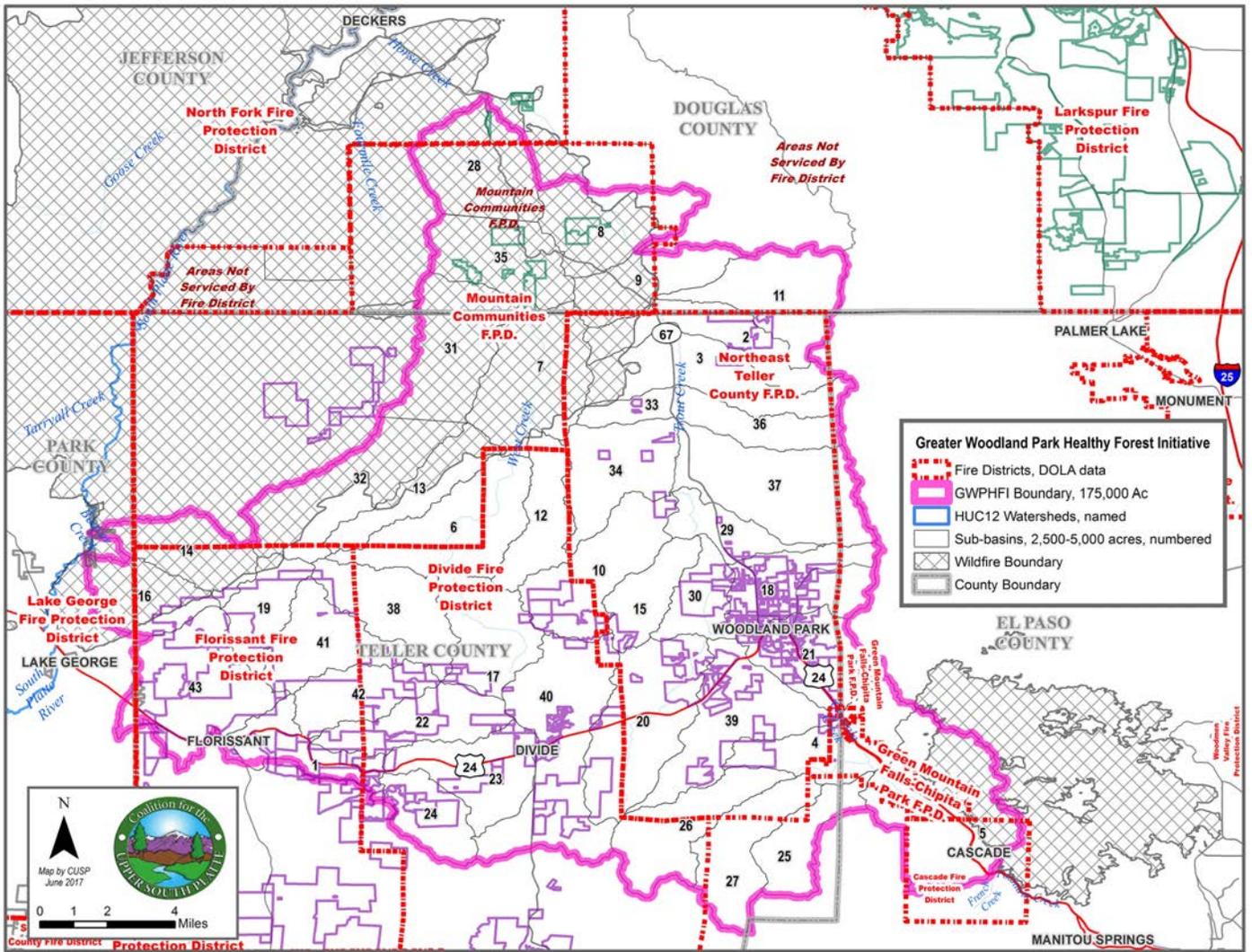


Figure 6 - GWPFI with Fire Districts and sub-watersheds (numbers represent sub-watershed basin identifiers)

MOVING FORWARD

THE NEED FOR THE GREATER WOODLAND PARK COMMUNITY WILDFIRE PROTECTION PLAN

The WPHFI CWPP was a first step in our journey of risk reduction. When the original CWPP was created it was a common practice to use jurisdictional boundaries to designate a focus area. Over the years, since the creation of the original plan, we have all realized that these jurisdictional lines mean little when faced with the wildfire threat. Utilizing a watershed- based approach makes sense and will help us all as we use limited financial resources to make the best management decisions that will benefit the largest majority. When fires burn we are all impacted. Watersheds impacted, structures and lives lost all have been considered in the expansion of the original WPHFI area.

The GWPFI area comprises 175,000 acres which represents an increase of over 111,450 acres from the original 63,550 acres designated. This area ranges in elevation from 7,400 feet in elevation near Cascade to approximately 9,000 feet in the westernmost portions. Vegetation is primarily Ponderosa Pine and grasslands at base elevations, changing over to spruce and fir at higher elevations. The priority areas are mostly Ponderosa Pine woodland, mixed conifer, or subalpine grassland. Lodgepole pine accounts for only 1% of the priority landscape within the GWPFI CWPP. The Initiative area is heavily forested with significant potential for wildland fire due to both forested acreage and the frequency of lightning and human caused ignition. Historically 48.5% of wild fires between 1980 and 2003 were caused by lightning on Pike National Forest lands; however, today fires are often caused by humans.

The area covers parts of Upper South Platte, Upper Fountain Creek and Monument Creek watersheds. Of the total acreage, approximately 74,000 acres are in private ownership, 95,000 acres are US Forest Service land, and the BLM has about 400 acres. The City of Woodland Park comprises 1,400 acres and Teller County manages 1,300 acres.

Woodland Park, Teller County's largest community and commercial center, is quickly becoming a hub of activity. Woodland Park has a population of approximately 7,300 residents and the Highway 24 corridor has a commercial mix of shopping centers, big box retail, hospital, and smaller mom and pop storefronts. The Woodland Park area has approximately 260 businesses within the city limits. The Pike National Forest surrounds the town in its entirety. Teller County's CWPP identified the Woodland Park area as the Teller County's greatest risk to property and life due to the potential of a crown fire and fuel loads. The GWPFI area also includes the towns of Divide, Green Mountain Falls and Florissant.



Figure 7 - Aspen meadows can act as fire breaks

GWPHFI WILDFIRE HAZARDS

One of the most significant and concerning risks faced in the GWPHFI area is a lack of resident activity to protect their homes, property and the surrounding landscape. While some residents have completed work on their property, we are all at increased risk until a larger percentage of residents take action.



Figure 8 - Mountain Pine Beetle killed trees

1. Mortality.

Forest stand mortality can increase the potential for ignition and often creates large amounts of ignitable forest waste. Forest insects and disease are ever increasing in the WPHFI area and forest stand mortality is on the rise.

2. Dense forested areas.

Overcrowded forests are unhealthy forests. The horizontal and vertical continuity of forests can increase the intensity and rate of spread during a wildfire event. The more overcrowded a stand the more likely that a ground fire may become a crown fire.

3. Mixed ownership and management.

Diverse ownership creates numerous challenges as wildfire knows no boundaries. With large and small private properties abutting county, state, and federal lands fire can cross jurisdictional lines. If private and federal landowners do not mitigate forest fuel continuity in collaboration, one area could be fire

resilient while another is overcrowded and ripe for fire spread. Absentee ownership is common in the area; this causes numerous challenges when planning for neighborhood and landscape scale projects.

4. Forest Insect and Disease.

Forest insects and disease problems can seriously increase fire hazard by killing large areas of trees contributing to increased fuel loading in areas. Insect and disease threats also increase after a fire when many of the trees injured by the fire become weakened and more susceptible to attack by insects and pathogens.

Spruce Budworm is currently the most serious pest in the GWPHFI area. These insects defoliate new growth of Douglas-fir, Colorado blue spruce and true firs. Trees can tolerate some defoliation with no permanent damage, but if defoliation continues for up to three years, the tree will be damaged or die. Trees weakened by defoliation become susceptible to attack from Douglas-Fir bark beetles.

Populations of Spruce Beetle are increasing in the GWPHFI area. This bark beetle primarily kills high altitude Engelmann spruce, and is a serious threat in southwestern Colorado. Unlike other bark beetles, Spruce Beetles have a two year life cycle, and trees fade to a straw yellow color and eventually to gray. Symptoms of attack include pitch tubes and sap streamers on the trunk, or boring dust in the bark crevices of the trunk. Managing forests to promote vigorous trees is the best prevention.

The area contains stands of Ponderosa Pines that are susceptible to Mountain Pine Beetle (MPB) and engraver (ips) beetle infestation. MPB is active in the area, although the activity seems to be confined to individual trees or small pockets of trees. The threat of increased activity is always present. Trees on private lots and greenbelt areas should be inspected in late October for any signs of infestation. Although beetles are usually gone from dead trees, large groups of dead trees can contribute to fuel loading in the community and should be removed in a timely manner. No general, area wide preventive spraying program is recommended.

Populations of Douglas-fir beetle are increasing in the area due to defoliation of Douglas-fir from budworm. Some adult Douglas-fir beetles overwinter

in trees and begin infesting new trees in mid April. Infested trees should be treated before the first of April. Symptoms include reddish boring dust in the bark crevices, and sometimes, pitch streamers on the tree trunk. Managing Douglas-fir stands to reduce fuel and promote tree vigor is the best preventative measure.

Severe infections of Dwarf Mistletoe (DMT) are found throughout the WPHFI area. Mistletoe is a parasitic plant that infects pines and Douglas-fir, and results in the slow death of the trees. Often the weakened trees are killed by bark beetles. Trees infected with the parasite can result in increased fire hazards. There are several strategies to control mistletoe infections, and advice from a professional forester should be sought if a landowner has mistletoe infected trees.



Figure 9 - Dwarf Mistletoe

Engraver (ips) beetles are usually a threat to smaller pine trees, but can kill larger trees. They are most often threatening when slash (usually from lot clearing or some forest management activity) is left untreated and infested by large numbers of beetles. Slash should be treated within six weeks of cutting to prevent use by Ips Beetles as brood wood. Ips generally attack trees weakened by lightning strikes, or root damage during construction or transplanting.

Preventative spraying is usually unnecessary unless there is a direct threat of insect attack. The most effective prevention for harmful insects is always a good program of forest management and thinning. Properly thinned trees will be less susceptible to insects, and thinned stands are more likely to survive a

wildfire without serious damage.

5. *Steep slope conditions.*

Steep slopes increase fire intensity and greatly increase rates of fire spread, and create greater challenges to suppression efforts. Drainages and canyons act as natural chimneys and draw fires up the drainage.

6. *Remote / access issues.*

Many of the subdivisions and private residences have limited access with little or no water for firefighting activities. Many subdivisions are accessed by a single road making evacuation and access by emergency responders difficult or impossible. Many roads are crowded by dense stands of trees. In several subdivisions road conditions are poor, so emergency equipment would have a hard time navigating the roads. Where roads are limited or poor, subdivisions received a higher risk ranking.

Private roads and driveways are also hazardous or impossible for emergency equipment to navigate. Many driveways are long and too narrow for emergency vehicles. Steep driveways with tight switchback curves are all too common in the area. Many are inaccessible even for emergency medical equipment. Many driveways are not marked with adequate house numbers. Defensible space often does not include driveways which effectively blocks firefighter access to defend homes.

7. *Winds.*

Strong prevailing winds often come from the west or southwest; however, mountain topography can create localized and unpredictable winds. With significant continuous fuels surrounding communities in the GWPFI, there remains a need to actively address these areas with high hazard ratings. Depending on weather conditions at any given moment, wind can come from any direction, and push a fire any direction.

8. *Significant natural and human ignition potential and contiguous fuels.*

Over the past seven years human caused ignitions have been far too common. Many of the publicly owned lands within the GWPFI are enjoyed by thousands of visitors who camp, hike, shoot, operate vehicles and fish. Recreationists within the area can also raise the potential for human caused ignitions. Fuel loading, or the vertical and horizontal arrangements of fuels

alters the characteristics of wildfire. Many areas within and abutting the GWPFI area are densely forested and contain significant “ladder fuels”. (Ladder fuels are woody materials, living or dead, near the ground that can carry a fire from the ground to the canopy).

9. *Fine fuels.*

Fine fuels, such as grass, spread fire quickly. In conjunction with the heavy woody fuel loading there is the potential that a fine fuels grass fire could ignite woody fuels. Tall grasses around structures are a real danger. Fires burning through tall grass produce intense heat and are capable of igniting homes even in the absence of large woody fuels and are often characterized by rapid spread.

10. *Homes.*

Woodland Park is the epitome of a WUI community, where the WUI is defined as areas where large populations are located within and adjacent to wildland fuels. The potential for a structure for to ignite a wildland fire is all to real, and Woodland Park has thousands of homes commingled in the forest.

11. *Defensible-space is sparse*

While some homeowners have taken aggressive action to create defensible space surrounding their homes this effort needs to increase significantly. Defensible space, does not stop a fire, nor does it eliminate the potential that a fire will start in the future, but defensible space does allow for safe fire fighting and increased probability that a home or structure will survive a fire. The creation of one defensible space in a neighborhood of hundreds of homes is not enough; neighbors must work together to reduce their collective wildfire risk.

12. *Home and structure vulnerability.*

Items such as wooden shake shingle roofs and wooden decks increase a homes vulnerability. Cleaning leaves, duff, and needles from around foundations or from gutters is vital to reduce potential structure loss, but many homeowners do not do this type of “spring cleaning”. In this updated CWPP, we have identified structures and their construction materials as a significant wildland fire hazard in the area. Preparing for a fire means that we all must do everything we can to reduce our risk. Fuels treatments must be incorporated into community wide defensible space, and structure risk reduction techniques.

WEATHER

Predictability of weather can be a challenge in mountainous areas. Summers are cooler compared to other portions of the country. Droughts are common. The Pikes Peak region ranks second in the United States for lightning strikes, however portions of the area receive less than 15” of precipitation annually. Teller County receives over 5,700 cloud-to-ground lightning strikes each year.



Figure 10 - The Waldo Canyon Fire burns above the Mountain Shadows area. Strong thunderstorms north of the area pushed the fire downslope into the neighborhood taking two lives and destroying 346 homes.

The weather systems along the Colorado Front Range beginning in 1998 brought below-normal precipitation and unseasonably dry air masses. These conditions occurred approximately the same time as the phenomenon known as La Nina began forming in the eastern Pacific Ocean. The winter of 2001 and 2002 saw a marked worsening of drought conditions. The predominantly Ponderosa pine and Douglas-fir forests throughout the region became drier with each passing season, and by the spring conditions were often severe.

Drought is common. Drought has many definitions, even within the State of Colorado. They include:

- A prolonged period without adequate precipitation
- A natural yet unpredictable occurrence in Colorado; an extended period of dry weather. One injurious to crops
- A period of insufficient snow pack and reservoir storage to provide adequate water to urban and rural areas
- Meteorological: based on degree of dryness; actual precipitation is less than expected average

or normal amount. Hydrologic: based on precipitation shortfall effects on stream flows and reservoir, lake and ground water levels.

- Socioeconomic: occurs when the demand for water is greater than the supply due to a weather-related supply shortfall

The GWPFI has experienced multi-year droughts since the late 1800's, with the most pronounced being in 2000 and 2002. A brief wet period occurred in 2003, 2016-2017. Based on historical data, Colorado has experienced 6 significant droughts in the past 110 years. This equates to a recurrence interval of experiencing a drought every 18.3 years which lasts, on average, for 6.3 years.

TOPOGRAPHY

Topography, or the lay of the land, plays a major part in how fast a wildfire spreads. Steep slopes are the greatest topographical influence on fire behavior. As the steepness of slope increases, fire spreads more quickly. In a wildfire, a home at the top of a fuel-covered slope is in greater jeopardy than one on flat ground or at the base of the slope. South and southwest facing slopes usually have more intense fires. Slot canyons and chimney shaped canyons can also be very dangerous locations due to the intense fire behavior that can occur.

FUEL

The amount, size, moisture content, arrangement, and other characteristics of forest fuels influence the ease of ignition, rate of fire spread, length of flames, and other fire behaviors.

GWPFI VALUES AT RISK

In development of a CWPP the Healthy Forest Restoration Act directs planners to assess the Wildland Urban Interface (WUI) of the plan as to its values at risk and wildfire risks. The CWPP team has identified the following community values at risk:

- Life and property
- Economic losses
- Utility systems
- Watersheds and water delivery infrastructure
- Recreation opportunities
- Soils and post fire erosion
- Transportation
- Wildlife and habitat
- Biological setting (plants and animals and the natural setting)
- Historical sites

GWPHFI WATER RESOURCES & POST FIRE WATERSHED IMPACTS

The importance of source water, water infrastructure and watershed function can not be understated. The recent fires on the Front Range have taught our communities many hard lessons. Post-fire flooding, caused by fire denuded landscapes impacts everyone. This update, focused greatly on the essential water systems and watershed functions.

The GWPHFI CWPP is located across the Hayden Divide that divides the headwaters of the South Platte River from the headwaters of the Arkansas River. Fountain Creek is the primary tributary to the Arkansas, and West Creek is the primary tributary to the South Platte. Wildfires can cause severe degradation to watershed resources due to increased sedimentation, pollution and associated impacts. Those streams feeding into West Creek and the South Platte are:

- Rule Creek
- Blue Springs Creek
- Trout Creek
- Mule Creek
- Lovell Gulch
- Long Gulch
- Rupp Gulch
- South Johns Gulch
- Johns Gulch
- Hotel Gulch
- White Spruce Gulch
- South Fork Missouri Gulch
- Ryan Gulch
- Quinlan Gulch

Those rivers / streams feeding into Fountain Creek and the Arkansas River are:

- Crystola Creek
- Catamount Creek

Several reservoirs, lakes and ponds are located in the CWPP area which provide drinking water resources and are values of concern. These reservoirs include:

- Manitou Park Lake
- Rule Creek Res.
- Burgess Res.

- Woodland Park Res.
- Colorado Springs Utilities Reservoirs Including
 - North Catamount Reservoir
 - South Catamount Reservoir
 - Crystal Creek Reservoir

Woodland Park Utilities Water System



Figure 11 - The Northfield Water Treatment Plant, while outside of the GWPHFI focus area, filled with debris after the Waldo Canyon Fire

Woodland Park's water comes from a number of sources including both local and imported water. Local water is supplied from the immediate vicinity and makes up about two-thirds of the City's total supply. It consists of both surface and groundwater. Surface water is collected locally in the Loy Gulch area northeast of Woodland Park. Groundwater comes from thirteen City-owned wells in the Loy Gulch and the golf course areas. Additional wells in Westwood Lakes are jointly owned by the City and the Westwood Lakes District. Imported water from Twin Lakes Reservoir near the Continental Divide makes up about a third of the City's water. All homes within the City limits have municipal water. Homes outside the City limits have domestic wells.

Colorado Springs Utilities Water System

The North Slope Watershed is a critical component of Colorado Springs Utilities' raw water collection system. Both the North Catamount and South Catamount reservoirs and a portion of Crystal reservoir fall within the GWPHEFI boundary, as well as a significant amount of water transmission infrastructure and other assets. These reservoirs function to collect and store the Utilities' local water rights off of the respective North Catamount, South Catamount, and Crystal Creek drainages at an average yield of 3,700 acre/feet per year. The North Catamount and South Catamount reservoirs also serve a critical role in the operation of the Blue River Collection systems as all waters collected from the Blue River near Hoosier Pass are transferred to these two reservoirs via pipeline from Montgomery reservoir directly to North Slope. The Blue River system provides an average annual supply of 13,000 acre/feet per year.

The waters collected and stored in North and South Catamount serve as the primary water supply to the Ute Pass Treatment Plant which is the sole water source for Green Mountain Falls, Chipita Park, and Cascade. North Catamount, South Catamount, and Crystal reservoirs also serve as primary supplies to the Mesa Water Treatment Plant that serve an extensive service area within the City of Colorado Springs.

North Slope waters collected and delivered down the Old North Slope Pipeline in conjunction with waters diverted from French and Cascade Creeks serve to supply two hydroelectric generation facilities. These hydrogeneration operations are an important component of Springs Utilities electric generation portfolio in order to comply with state renewable energy mandates.

Watershed Infrastructure and Resources:

- North Catamount Reservoir Capacity = 3.9 Billion Gallons
- South Catamount Reservoir Capacity = 8.5 Billion Gallons
- Crystal Reservoir Capacity = 1.5 Billion Gallons

The waters delivered from North Slope to the Ute Pass and Mesa Treatment Plants are piped through over 18 miles of pipelines, tunnels, and associated pressure regulating valves and structures. There are also various data collection platforms and other communication

equipment throughout the watershed. In the event of a catastrophic wildfire, the aforementioned reservoirs, delivery system, and other facilities would be at risk to damage resulting from post-fire flooding and sedimentation. The North Slope Watershed Operator lives onsite, and this dwelling is a valued asset at risk to a wildfire incident.



Figure 12 - Post Hayman Fire flooding in the Westcreek Area. Flooding and erosion continues even today, years after the flames were extinguished. The cost of flooding exceeded the cost of fire suppression.

Colorado Springs Utilities continues to be an active partner working with the USFS, CSFS, and CUSP to complete numerous forest management projects within the GWPHEFI on federal, Utility managed watersheds and private lands. Participation from water utilities, such as Colorado Springs Utilities, is an essential component of any mitigation strategy.

THE WALDO CANYON FIRE

The Waldo Canyon Fire started the afternoon of June 23, 2012 near Colorado Springs, Colorado. In the early hours of June 24th, the fire threatened the Cedar Heights community. Proactive fuel reduction allowed firefighters to keep the fire out of the community, and no homes were lost. Two days later, the fire entered the Mountain Shadows neighborhood, where 346 homes were eventually destroyed on June 26.

Considered the worst fire in Colorado state history, the Waldo Canyon Fire forced more than 30,000 people to evacuate, scorched 18,247 acres, killed two residents, and took firefighters 18 days to fully contain. The fire burned through brush, mountain shrub, grass, and trees including oak, Pinyon-juniper, ponderosa pine, Douglas-fir, spruce and limber pine. In addition to disrupting thousands of lives and destroying hundreds of properties, the wildfire left the scarred landscapes vulnerable to flooding and debris slides that have and will continue to pose long-term problems.

Although all fires in the West result in post-fire flooding, this fire is expected to see more severe flood events due to its location, and those flood events will have drastic impacts because this is the ultimate wildland-urban-interface burn.

The fire burned through an area of excessively tight and steep canyons, which typically yield increases in flows that are orders of magnitude above their pre-fire flow regime. The U.S. Forest Service identified 25 pour points, or watershed drainage areas that feed Fountain Creek and Monument Creek along the perimeter and at several critical subwatershed areas within the burn scar. Mitigating risks before a fire can reduce the intensity and severity of post fire impacts. The Waldo Canyon fire should act as a lesson for us all - The time to prepare for wildfires is now!



Figure 13 - Colorado Springs water line exposed by the July 30, 2012 storm event. Before the fire and the July 30th flood, this was a road. The pipelines carry water to Colorado Springs' main water plant. If this plant is lost the utility will not be able to supply water to 400,000 citizens and the U.S. Air Force Academy. They estimate a rebuild cost of around a billion dollars, and it would take years to rebuild.



Figure 14 - Waldo Canyon fire Area

WHAT IS A FIRE ADAPTED COMMUNITY?

New approaches must be pursued to achieve greater resiliency in the face of future wildfires within the GWPFI area. As the risk becomes greater, it is important that we all seek new opportunities and approaches to find mitigation solutions for the risks presented in this plan. One such approach that takes a holistic view to living with fire is fire adapted communities.

A fire adapted community is a knowledgeable and engaged community in which the awareness and actions of residents regarding infrastructure, buildings, landscaping, and the surrounding ecosystem lessens the need for extensive protection actions and enables the community to safely accept fire as a part of the

surrounding landscape. A fire adapted community is one which the citizens collaboratively take action to safely co-exist with wildland fire.

In a fire adapted community the public understands:

- The role of fire on the surrounding landscape
- Fire authorities may not save all homes
- Community mitigation actions reduce the impacts of wildfire



What does a fire adapted community look like?

Fire is a natural part of our environment. As we choose to live in areas where wildfires occur, we must adapt the way we design, build and live within these areas to prepare our communities for wildfire. A fire adapted community understands its risks and takes actions that minimize harm to residents, homes, businesses, parks, and other

community assets. These collective actions empower all community members to be safer in their environment. To learn more about making your community fire adapted, visit www.fireadapted.org



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WHAT IS A FIRE ADAPTED COMMUNITY?

A Fire Adapted Community takes actions to:

- Create a collaborative group to develop or maintain a CWPP
- Develop and maintain a mitigation education program including prevention
- Support and enhance local fire protection capacity
- Prepare structures for wildfire via Firewise, Living With Fire or similar principles
- Build with fire resistant materials and site structures in low risk landscapes
- Develop evacuation plans
- Create safety zones in the community and fuel buffers at its edge
- Use codes and ordinances to legislate mitigation requirements
- Work with public and private landowners to treat hazardous fuels
- Maintain cooperative agreements with partners
- Increase and maintain risk reduction efforts over time

To learn more visit fireadapted.org



MITIGATION RECOMMENDATIONS

An important and required part of a Community Wildfire Protection Plan is the recommendation of mitigation projects detailing actions that should be undertaken by both landowners and adjacent land management agencies (community, county, state and/or federal). Public land projects, when combined with homeowner defensible space and structural protection, provide area-wide protection. Wildfire mitigation is defined as the reduction of the probability and negative impacts of wildfire. Mitigation can be accomplished through fuels management, making structures more resilient to fire, and public outreach. Results are often most effective when these three approaches are pursued by governmental entities, citizen groups and individuals working together. When working to mitigate wildfire risk the entire community must come together to achieve results. One acre treated, or a single defensible space created will not change the outcomes from a wildfire.

Following analysis of the data collected during development of the Teller County CWPP, WPHFI CWPP and this plan, the team is recommending a number of projects for initial action consistent with the stated goals of all relevant CWPPs in the area. Team input included representatives of the Coalition for The Upper South Platte the City of Woodland Park, Teller County, Douglas County, NE Teller Fire Protection District, Divide Fire Protection District, Florissant Volunteer Fire Department, Mountain Communities Fire Department, Colorado State Forest Service, and the US Forest Service. The following pages contain maps depicting mitigation projects recommended by the Greater Woodland Park Community Wildfire Protection Plan team. They are collaborative in nature as to priority projects and areas in which to carry out work.

Hazardous fuels and non-fuels mitigation projects were identified based on the Teller County CWPP, the findings of field surveys, input from CO State Forest Service, USFS, and personnel from all fire protection districts. Fuels mitigation projects were identified and prioritized based on proximity to communities assessed as having high wildfire hazard, demonstrated ability and interest, hazardous fuel load and terrain.



Figure 15 - Property on the right has been treated. Neighboring property, untreated highlighting pre-treatment condition

HOW DID WE ASSESS RISK AND CREATE PRIORITIES?

The process used to assess risk was completed in five steps.

1. The Team used the United States Geological Survey (USGS) Stream-Stats tool to create the sub-watershed focus areas and assess pre-fire overland water movement. The USGS Stream-Stats tool incorporates drainage basin characteristics, such as elevation variation and vegetation characteristics, and assumes natural flow conditions to model anticipated precipitation flow. The 2-year Peak (precipitation) Flow predicts a 50% chance in any given year of a rain storm's intensity and duration reaching that predicted flow rate in a 1-hour event. The 10-Year Peak Flow predicts a 10% chance in any given year of a rain event's intensity and duration reaching that predicted flow rate in a 1-hour event.

2. We then utilized existing forest and fire data from the Colorado Wildfire Risk Assessment Portal to create Fire Intensity & Wildfire Risk layers.

Fire intensity scale is a fire behavior output, which is influenced by three environmental factors - fuels, weather, and topography.

Wildfire Risk represents the possibility of loss or harm occurring from a wildfire.

3. We created a composite of two and ten year peak flows, wildfire risk and intensity into one map, creating our composite ranking.

4. The Team then assessed subdivisions risk using the Subdivision Wildfire Hazard Rating Form (Page. 33) which numerically categorizes a subdivision's Crown Fire Hazard and Property Loss Risk.

Crown Fire Risk represents the potential for a fire to reach the tops of trees and spread rapidly. Crown Fire Risk is a composite of lot size, slope and forest cover.

Property Loss Risk represents the sum of all attributes: (ingress and egress, road width and conditions, accessibility, road terminus, lots size, street signage, fuel density, defensible space present, slope, response time, water sources, home building materials, and utilities).

5. Finally the Team created a composite ranking of all of the associated risks to create the GWPHEFI priority area list. In this update we used the terminology, "Tier 1, Tier 2, and Tier 3" to designate priorities. Below are definitions of each:

Tier 1 - Extreme potential for loss, extreme risk of high intensity fire and wildfire risk, with extreme post fire flooding.

Tier 2 - High potential for loss, risk of high intensity fire and wildfire, and post fire flooding.

Tier 3 - Moderate potential for loss, risk of moderate intensity fire and wildfire risk, and post fire flooding.

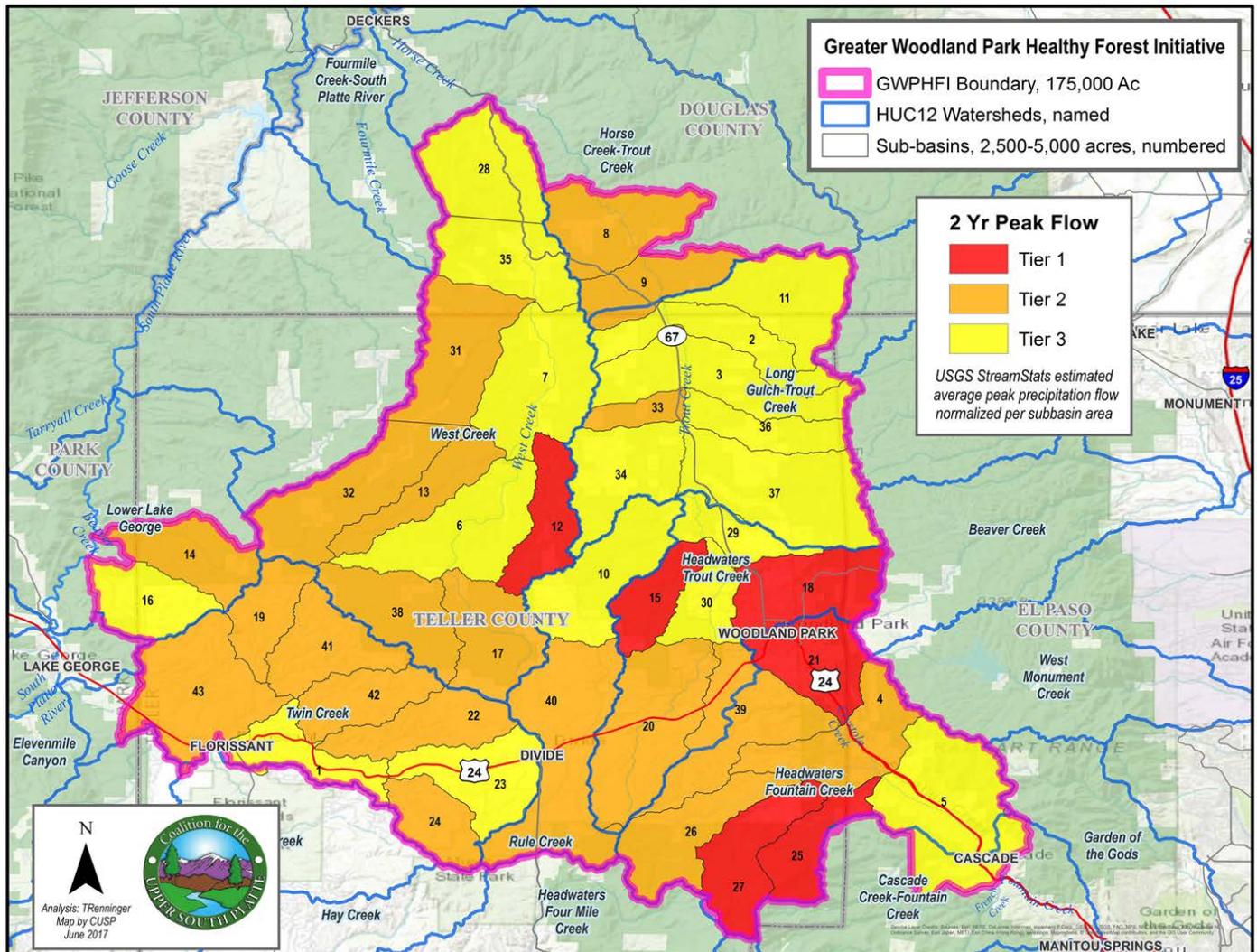
While we have prioritized each sub-watershed based on this methodology, it is important to understand that each individual subdivision within the GWPHEFI is at risk. Ongoing activities must be undertaken to reduce risk as we all live in a fire prone environment. The priority list is only a guide to help land managers and officials when making decisions regarding risk reduction activities.

Large version maps are provided at the end of this document

PRIORITIES - 2 YEAR PEAK FLOW

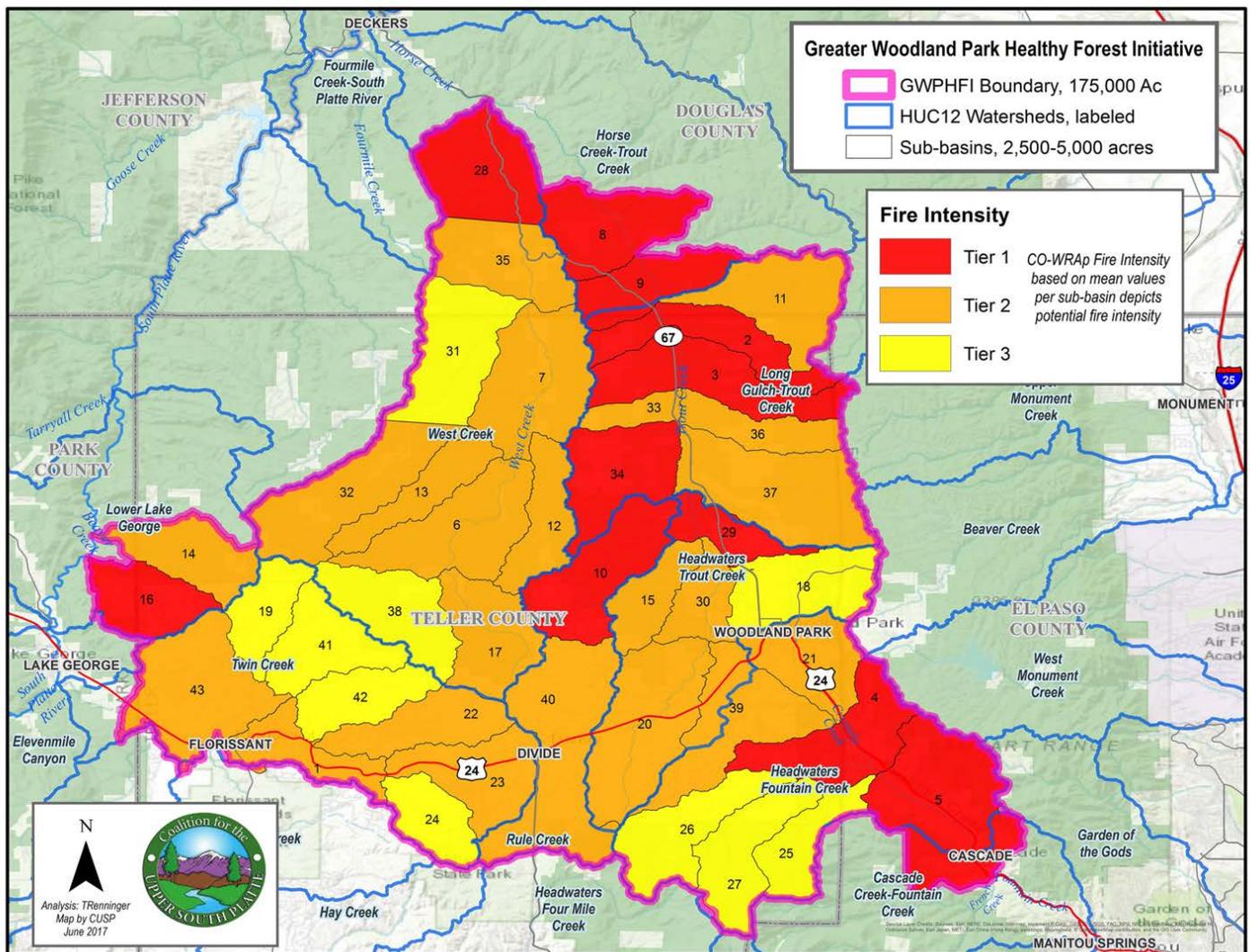
Two-year sub-watershed priorities were developed by defining a drainage boundary, utilizing regression analysis of two or more variables, including precipitation volume and elevation characteristics, to estimate streamflows for various storm events. Estimates provided assume natural flow conditions pre-fire; however, this analysis will help us assess post-fire runoff characteristics, due the understanding that drainages that have higher pre-fire flows will be orders of magnitude higher in post-fire conditions. The regression analysis for ungaged sites is based on th e methodology discussed in “Regional Regression Equations for Estimation of Natural Streamflow Statistics in Colorado” (citation below).

[Capesius, J.P., and Stephens, V. C.,2009, Regional Regression Equations for Estimation of Natural Streamflow Statistics in Colorado: U. S. Geological Survey Scientific Investigations Report 2009-5136, 32 p.](#)



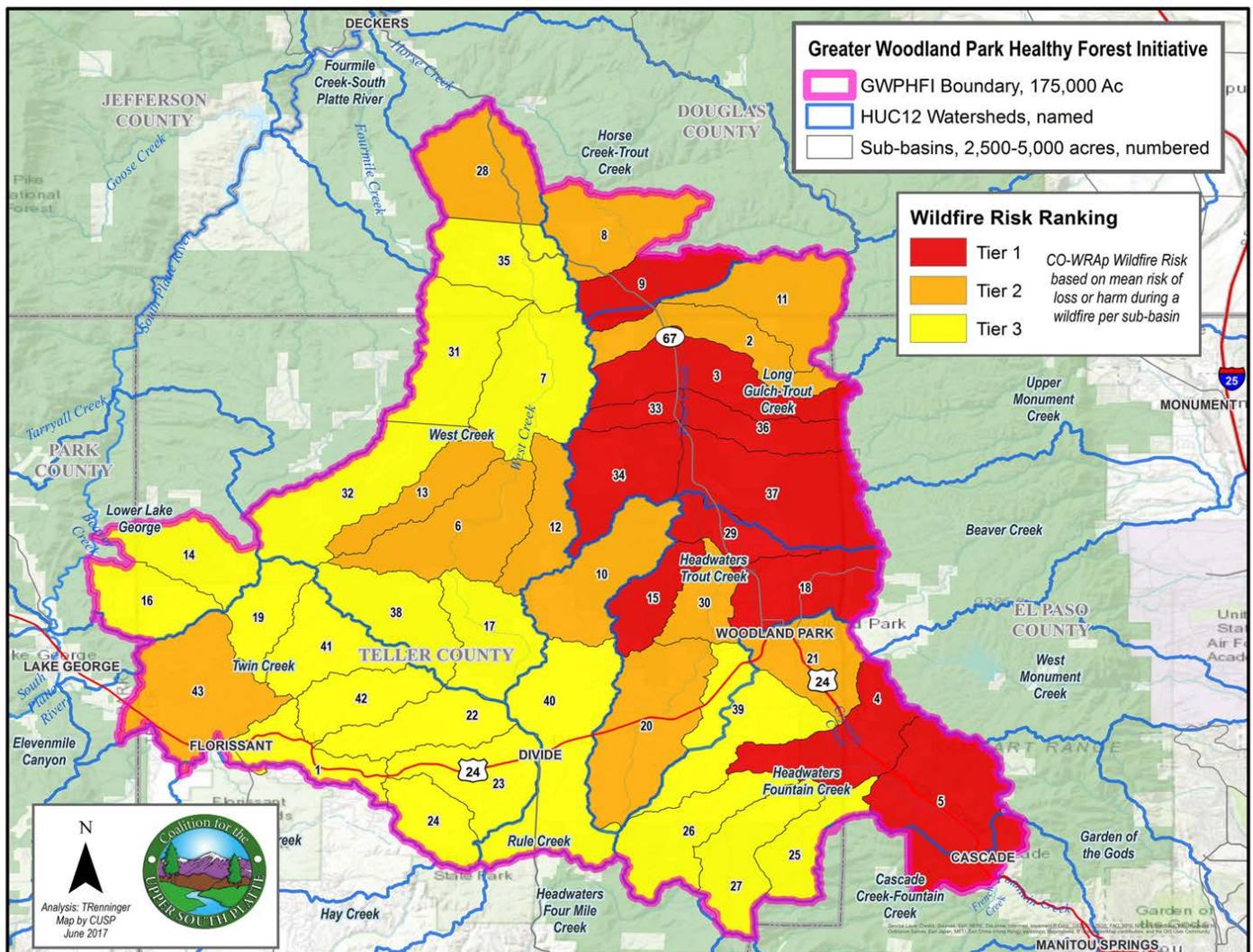
PRIORITIES – FIRE INTENSITY

Fire intensity scale (FIS) is a fire behavior output, which is influenced by three environmental factors - fuels, weather, and topography. Weather is by far the most dynamic variable as it changes frequently. To account for this variability, four percentile weather categories were created from historical weather observations to represent low, moderate, high, and extreme weather days for each weather influence zone in Colorado. A weather influence zone is an area where, for analysis purposes, the weather on any given day is considered uniform. There are 11 weather influence zones in Colorado. The FIS represents the weighted average for all four weather percentiles.



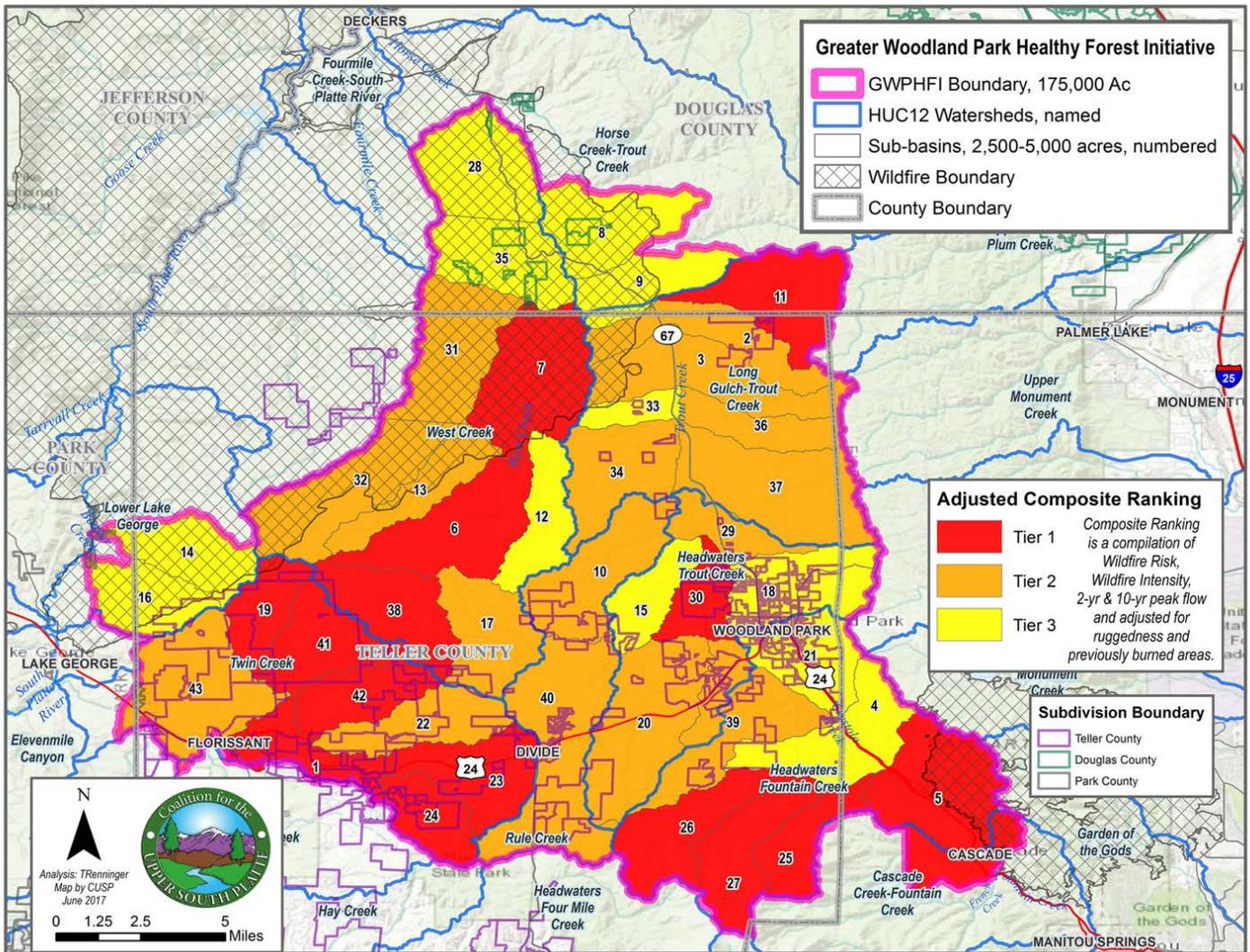
PRIORITIES – WILDFIRE RISK

Wildfire Risk represents the possibility of loss or harm occurring from a wildfire. It is the primary output of the Colorado Wildfire Risk Assessment. Risk is derived by combining the Wildfire Threat and the Fire Effects assessment outputs. It identifies areas with the greatest potential impacts from a wildfire – i.e., those areas most at risk. Wildfire Risk combines the likelihood of a fire occurring (threat), with those areas of most concern that are adversely impacted by fire (fire effects), to derive a single measure of wildfire risk. Since all areas in Colorado have risk calculated consistently, it allows for comparison and ordination of areas across the entire state. For example, a high risk area in Southern Colorado is equivalent to a high risk area in Northern Colorado.



PRIORITIES – COMPOSITE RANKING

Composite Ranking represents the composite risk of the peak flow, wildfire risk and the wildfire intensity analysis. This analysis is solely based on these factors and does not consider subdivision or private property risk. The Composite Risk rating table located on page 34 identifies and prioritizes the watersheds in tabular form.



COMPOSITE RISK & PRIORITIES

On Page 34 we have compiled the GWPHFI priority areas for work. First, we identify the subwatersheds (Basins) where fire will cause the highest level of post fire impact and second, the subdivisions with the highest risk within the identified basins. Below is the Subdivision Wildfire Hazard Rating form used to assess community risk. The higher the total output, the higher at risk a neighborhood is.

SUBDIVISION WILDFIRE HAZARD RATING FORM

Fire District:

Subdivision:

# Lots in Subdivision:	Rated By _____	Date of Rating: ___/___/2004
------------------------	----------------	------------------------------

A. SUBDIVISION DESIGN

1. Ingress/Egress:

- Two or more roads, primary route	0	
- One road, primary route, plus alternative	2	
- One way in/out	3	

2. Primary Road Widths:

- Minimum 24 ft.	1	
- Less than 24 ft.	3	

3. Accessibility:

- Smooth road, grade less than 5%	1	
- Rough road, grade less than 5%	3	
- Other	5	

4. Secondary Road Terminus:

- Loop road or cul-de-sacs w/turn-around radius greater than 45 ft.	1	
- Cul-de-sac turnaround radius less than 45 ft	2	
- Dead-end roads less than 200' length	3	
- Dead-end roads over 200' length	5	

5. Average Lot Size:

- More than 10 acres	3	
- Between 1 and 10 acres	2	
- Less than 1 acre	1	

6. Street Signs:

- Present	0	
- Not Present	2	

B. VEGETATION

1. Fuels/Density (General):

- Grass w/scattered trees or oak brush	1	
- "Thinned" Conifers (10 ft. or more between trees)	3	
- Sagebrush/willow	5	
- Moderately dense conifers or oak brush	7	
- Dense, continuous conifers and/or thick oak brush	10	

2. Defensible Spaces Completed:

- More than 70% of improved sites	1	
- Between 30 – 70% of improved sites	5	
- Less than 30% of improved sites	10	

C. TOPOGRAPHY

1. Slope (Predominant):

- Less than 8%	1	
- Between 9 – 20%	4	
- Between 21 – 30%	7	

D. FIRE PROTECTION

1. Response Time:

- Within 15 minutes	1	
- Within 16 – 30 minutes	2	
- Greater than 31 minutes	3	

2. Hydrants:

- 500 gpm hydrants: less than 1,000' spacing	0	
- Hydrants, but less than above or pump-site available on-site.	1	
- No hydrants or pump-site	1	

3. Draft Sources: (Complete only if no hydrants or pump-site)

- Sources w/in 20 min round trip	0	
- Sources w/in 21-45 min round trip	1	
- Sources greater than 46 min round-trip	3	

E. STRUCTURE HAZARD

1. Materials (Predominant):

- Roof and siding materials non-wood	1	
- Flammable siding/non-flammable roof (includes mobile home)	3	
- Flammable roof	5	

F. UTILITIES (Gas and/or Electric)

1. Placement:

- All underground	0	
- One underground, one above ground	1	
- All aboveground	1	

Comments (continue on back)

PRIORITIES

The following charts identify the top priorities for work under the GWPFI. Chart # 1 represents the subwatershed priorities without subdivision risk considered as a factor. Chart 2 identifies priorities as a composite of all factors including subdivision risk. All Basin_IDs are referenced on the included maps. It is our recommendation that Tier 1, and Tier 2 projects be prioritized for funding and implementation as the opportunity arises.

Chart 1

Tier 1 Basin Priorities		Tier 2 Basin Priorities		Tier 3 Basin Priorities	
Basin_Id	Basin_Tier	Basin_Id	Basin_Tier	Basin_Id	Basin_Tier
1	1	2	2	4	3
5	1	3	2	8	3
6	1	10	2	9	3
7	1	13	2	12	3
11	1	17	2	14	3
19	1	20	2	15	3
23	1	22	2	16	3
24	1	29	2	18	3
25	1	32	2	21	3
26	1	34	2	28	3
27	1	36	2	35	3
30	1	37	2		
38	1	39	2		
41	1	40	2		
42	1	43	2		

Chart 2

Tier 1 Basin priorities (over 5 acres)					
SUBD_NAME	CrFireHaz	PlossHaz	BASIN_TIER	Basin_ID	Subd_ACRES
COUGAR CANYON	20	39	1	1	202.19
FENWAY PARK SUB	20	25	1	5	6.92
GARYK SUB	20	25	1	5	6.45
GREEN MOUNTAIN FALLS RESUB OF PORTION OF	20	25	1	5	12.22
GREEN MOUNTAIN FALLS SIXTH ADD	20	25	1	5	13.73
SANTAS WORKSHOP NORTH POLE	20	25	1	5	28.52
UTE PASS LAND CO SUB NO 3	20	25	1	5	12.54
UTE PASS LAND CO SUB NO 4	20	25	1	5	19.09
UTE PASS LAND CO SUB NO 5	20	25	1	5	13.86
UTE PASS LAND CO SUB NO 6	20	25	1	5	23.61
Tier 2 Basin priorities (over 5 acres)					
SKYCREST	20	37	2	10	144.20
HARMON'S	20	28	2	34	40.48
DEER MEADOW	20	28	2	34	47.78
RASPBERRY MTN	19	41	2	40	149.56
SHADOW LAKE	19	37	2	40	80.79
ASPEN HILLS	17	30	2	20	171.38
SUN FOREST	17	28	2	20	55.92
EAGLE POINT	17	28	2	10	159.12
ASPEN MOORS	16	37	2	10	106.99
MELODY ACRES	16	33	2	40	9.46
Tier 3 Basin priorities (over 5 acres)					
GREEN MOUNTAIN FALLS ADD NUMBER ONE	20	25	3	4	15.18
GREEN MOUNTAIN FALLS ADD NUMBER TWO	20	25	3	4	8.10
GREEN MOUNTAIN FALLS FIFTH ADD	20	25	3	4	55.68
GREEN MOUNTAIN FALLS THIRD ADD	20	25	3	4	35.45
GREEN MOUNTAIN FALLS	20	37	3	4	27.13
GREEN MOUNTAIN FALLS FOURTH ADD	19	24	3	4	10.84
COLUMBINE CANYON SUB NO 1	16	34	3	4	125.98
COLUMBINE CANYON SUB NO 2	16	34	3	4	10.58
CRYSTOLA	16	34	3	4	27.90

HOMEOWNER RECOMMENDATIONS

ACTIONS YOU CAN AND SHOULD TAKE NEAR YOUR HOUSE

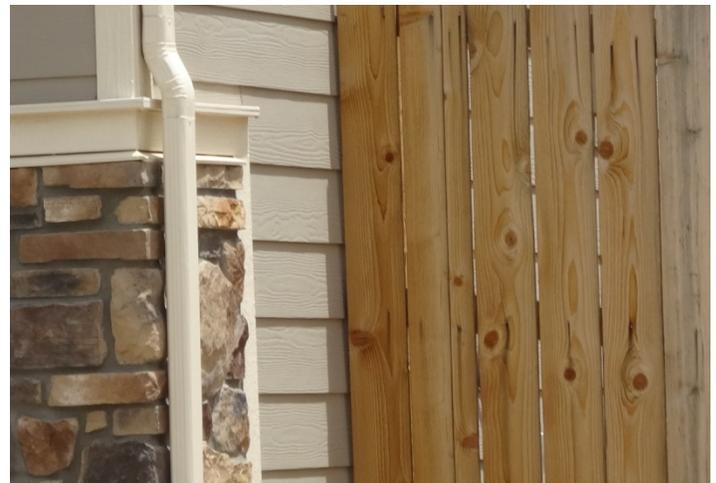
ACTION 1 - APPLY D-SPACE PRINCIPLES to your house. Defensible space, gives firefighters room to work around your house. Start first nearest the house, then build the area of treatment and reduced fuels out - for more information please visit - Firewise.org

ACTION 2 - REPLACE AGING DECKS WITH NON-COMBUSTIBLE PATIOS. Decks spell death to a house. The dry lumber ignites much faster than a live tree. There is a lot of discussion around the country about banning decks on all new construction in favor of noncombustible patios. During the Hayman Fire homeowners were extremely lucky that the fire crews had chainsaws. They saved homes by cutting decks off.

ACTION 3- ENSURE VENTS ARE SCREENED WITH 1/8" OR SMALLER METAL MESH. Soffit vents, and other exhaust vents can allow embers to enter a home, a fact we did not know 10 years ago. Embers can enter your home by passing through vents. You don't want to be the one to come home to a burned house with all the trees and landscaping intact.



ACTION 4 - REPLACE WOODEN FENCES WITH NONCOMBUSTIBLE MATERIALS. Wooden fences, especially cedar fences, are another source of home ignition. When the fence connects directly to your home the risk increased. Consider installing noncombustible fencing nearest your home.



ACTION 5 - LEARN AS MUCH AS YOU CAN ABOUT YOUR RISK AND WHAT YOU CAN DO TO MINIMIZE IT.

Please visit the websites provided at the end of this document. CUSP and the Colorado State Forest Service provide home assessments for a nominal fee.



Photo courtesy of IBHS

WHAT IS DEFENSIBLE SPACE?

Defensible space is an area around structure(s) where fuels and vegetation are treated, cleared or reduced to slow the spread and reduce the heat of wildfire. 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 survive a wildfire if grasses, brush, trees and other common forest fuels are managed to reduce a fire's intensity.

Defensible space can be created in an aesthetically pleasing manner that maintains privacy, the natural character of the community, and restores forest health.

ACTION 1 - MANAGE YOUR FOREST LIKE YOU WOULD TEND YOUR GARDEN. Forests are living, breathing entities. They provide shelter from the wind and sun. They provide for the numerous animals and birds. Forests purify the water and hold the soil, but they also provide fuel to the fire. A properly managed forested tract can be beautiful, productive and safe for you and your community. Just like a garden, a forest must be continually maintained to keep the plants healthy. Here are some quick ideas of where to start.

ACTION 2 - CUT CONIFER TREES OUT OF YOUR ASPEN GROVES. Aspen stands (groves) are naturally fire resistant. Live aspen holds so much water that they can drastically alter fire behavior and intensity. Aspen are relatively short lived; living for approximately 80 - 100 years. Because aspen has been on the decline in the west for several years due to disease and insects, cutting out all conifers not only helps to reduce your fire risk, but also can help to regenerate new aspen trees. You should consider your desires for your property when planning for any type of forest management; such as, wildlife habitat, unique topographical influences, aesthetics and living privacy barriers. For a very detailed analysis of aspen and management ideas please visit - http://www.fs.fed.us/rm/pubs_rm/rm_gtr119.pdf

ACTION 3 - REMOVE LADDER FUELS. Young coniferous trees and shrubs, low branches and even tall grasses can act as a ladder, carrying a relatively low intensity surface fire into the trees. By removing these from your forest you are limiting the

chance that a fire will climb into the crowns. Small diameter trees, shrubs and grasses are only a problem if they create a ladder to the larger trees. Often small trees and shrubs can be maintained when in open areas or away from other trees or structures to maintain forest diversity and resiliency.

ACTION 4 - REMOVE "JACKPOTS".

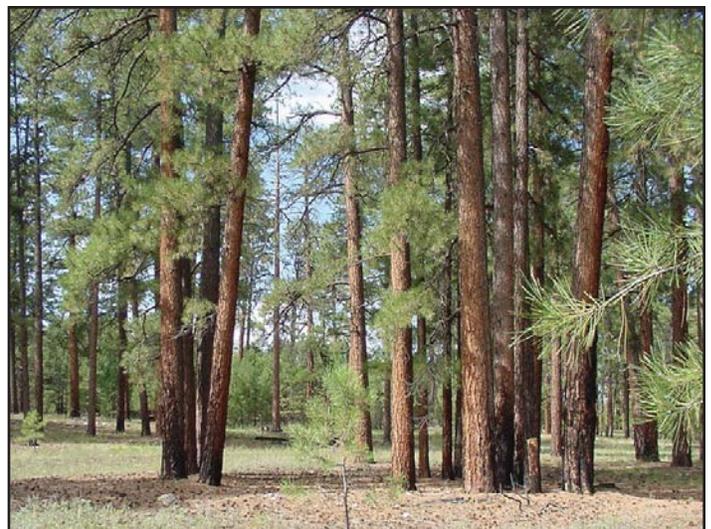
Remove accumulated woody materials or jackpots, such as piles of tree branches and logs near your structures. Isolated down logs or standing dead trees further than 100 feet from a structure are wildlife habitat and can remain.

ACTION 5 - CREATE FUEL FREE ZONES.

Consider the installation of driveways, gravel or stone patios and walkways, irrigated lawns and other low combustible design elements into your landscaping. These features are both attractive and create fuel free zones around your home. It is extremely important to maintain a noncombustible buffer, such as rock mulch or bare dirt, five feet wide from your foundation and deck.

ACTION 6 - CREATE SPACE BETWEEN SINGLE AND GROUPS OF TREES

Give trees room to grow. Closely spaced trees are starved for water, nutrients and sunlight. Consider that flame length is often estimate at 1.5 - 2.5 times the height of a tree. If a tree or group is 100' tall the ideal spacing would be approximately 150' - 250' between groups or single trees. Please be aware that topography, such as steep slopes may dictate larger spacing.



THE HOME IGNITION ZONE

Modification of vegetation around a structure to reduce fire intensity is called defensible space. The term “home ignition zone” (HIZ) is defined as a structure and the surrounding vegetation. A structure’s vulnerability to wildfire depends on the surrounding vegetation, including landscaping, and the structure itself.

Zone 1 (Home Ignition Zone): This is the closest zone to a structure, and extends from 0-30 feet from the outermost edge of a structure including any decks. Within the first five feet of the structure it is recommended that ALL combustible materials are removed. This means that flammable mulches, pine needles shrubs and trees be removed. Outside of this zone, the most intense fuels management should be undertaken. Most trees within 15 feet of the edge of the home should be removed. Trees further away should have ten feet of separation between their branches. Ladder fuels should be removed, and grass should be mowed to less than four inches in height.

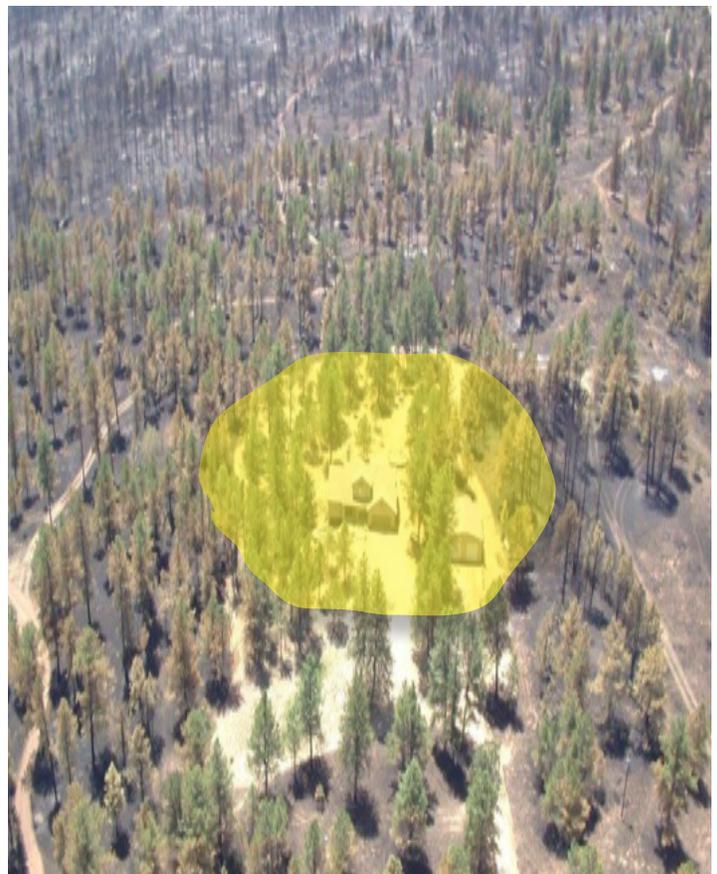


ZONE 1

Zone 2 (30'-100') - The width of zone two depends on the slope around the house. If the average slope angle is less than 5%, zone 2 extends out 70 feet from zone 1 (100 feet total distance around the house). As slopes increase, increase the width of zone 2 on the downhill side of the house, and increase the spacing between tree crowns.

The main fuels reduction guideline for zone 2 is to thin the trees to an average spacing of 10-foot crown separation. Clumps of two or three trees may be retained in this zone if the space between the clump and the adjoining trees is at least 30 feet. All ladder fuels under trees should be removed. The branches of large trees should be pruned to a height of 8 feet above ground, but small trees should have at least two-thirds of the green needles remaining.

Firefighters must be able to escape quickly if conditions suddenly deteriorate. Zone 2 should extend along both sides of driveways for a width of 50 feet from each edge of the drive. This is important to allow safe access and egress for emergency vehicles. Adequate clearance should be maintained to allow access for large structural fire trucks. Twelve feet of horizontal clearance and 13 feet of vertical clearance should be maintained. At the end of driveways, adequate room for a large fire engine to turn around should be maintained.



ZONE 2

While it is necessary to remove combustible material in zone 1 within five feet of foundations and under decks, it is not necessary to do so elsewhere. Needles on the forest floor act as mulch retaining moisture in the soil, reduce erosion, and add organic matter to the soil as they decay. If regeneration of new trees is an objective, however, it is desirable to expose some bare soil since this will promote seed germination and establishment. Raking up pine needles is not a substitute for thinning and ladder fuel removal.

Zone 3 (100' or more): The guideline for zone three is to thin the forest primarily to improve forest health from current densely forested conditions. Spacing is less critical in this area but spaces should be made in the canopy. A useful rule of thumb is that a tree should receive sunlight from all four sides. If you are on a roll - don't stop, the more distance your structure is from forest fuels the better.



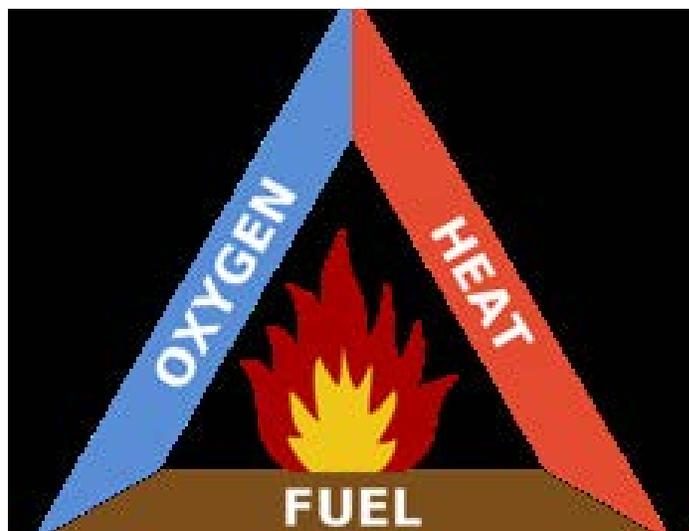
ZONE 3

WILDFIRES TRANSFER HEAT TO STRUCTURES IN 3 WAYS

Radiation – Like the heat given off by a campfire.

Convection – Direct flame contact with the structure. Accumulated firebrands are like the hot coals from a campfire.

Conduction – Transfer of heat within a solid material.



A fire triangle is used as a model for conveying the components of a fire. The fire triangle's three sides illustrate the three elements of fire, which are heat, fuel, and oxygen. The three elements must be combined in the right proportions for a fire to occur. If any of the three elements are removed, the fire is extinguished. Conversely if one of the elements is in surplus conditions could be more extreme. As an example; if the wind conditions are strong (more oxygen available) fire behavior may intensify. This would also hold true for increase fuel loadings.

HOME CONSTRUCTION

The construction materials, location and even the shape of a structure influence its vulnerability to wildfire. It is not the intent of this CWPP to suggest extensive alterations to homes that already exist in the community. Understanding how home construction affects the vulnerability of the structure to a wildfire helps residents plan defensible space projects to compensate for construction differences. When remodeling or home improvement projects are done plans can be made to reduce the ignitability of the buildings.

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

Fire restive roofs are extremely important. Wood shake roofs have been the cause of many home losses due to firebrands. Roof material with a class A rating indicates the best resistance to fire. Many roofing materials are available to homeowners but they vary in cost, weight and longevity. Homeowners should consult with a reputable building contractor to determine which roofing material will best suit their needs. Even the most fire resistant roofs require maintenance. The most important item is to keep the roof and gutters free of debris. Combustible debris such as leaves and pine needles may ignite from firebrands and start the home on fire even with a class A roof. Combustible litter is most likely to accumulate in areas where one shape meets another such as gables and dormer windows.



Gutters on homes in the WUI should be metal since plastic gutters will burn. Gutters will also accumulate debris. These same areas are most likely to accumulate firebrands because of eddies in wind currents during a wildfire. Combustible debris should be removed anytime it accumulates. Remember - keep areas where fuels accumulate clear. Often, by reducing your fire risk through the reduction of trees using the defensible space principles, your maintenance times will lessen - less trees in zone 1, less pine needles!

Many homes in the area have Class A rated composite asphalt shingle or metal roofs. Home autopsies have shown that the small ridges in metal roofs where one panel over lays another can be openings where fire brands may collect directly on the plywood sub roof, leading to ignition of the plywood. The holes underneath such ridges should be plugged with caulking or a similar material.



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

Vents, in roofs and foundations, are also areas of vulnerability, but are necessary to ventilate attics and crawl spaces to prevent moisture accumulation. During a wildfire, heated gasses and firebrands can enter attics or crawl spaces through vents. All vents should be screened with metal screening with openings of 1/8 inch or less. Soffit vents should be located as close to the edge of the eave as possible. Vegetation around

HOME CONSTRUCTION

foundation vents can create unintended vulnerability, particularly on the downhill side. All shrubs and vegetation should be removed from the proximity of vents.



Remove all combustible material from underneath decks. Do not store firewood or other combustible materials underneath decks, porches or overhangs. Consider sealing the deck in using Hardie board or other noncombustible siding - this will reduce the potential for heat and or firebrands to ignite anything under your deck.



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

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

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

EVACUATION

Plan different ways to get out of the wildland fire area. It is impossible to know the location, intensity, direction of spread and density of smoke in advance of a fire. Write your plan down and put it in all of your vehicles, by the door and on your electronic devices. A good plan will include:

- A designated emergency meeting location outside the fire or hazard area. This is critical to determine who has safely evacuated from the affected area.
- The Sheriff will determine the evacuation routes based on current and expected conditions. Tune into local media for the proper evacuation route.
- Know several different escape routes from your home and community. Practice these often so everyone in your family is familiar in case of emergency.
- Have an evacuation plan for pets and large animals such as horses and other livestock.
- A communications plan that designates an out-of-area friend or relative as a point of contact to act as a single source of communication among family members in case of separation. (It is easier to call or message one person and let them contact others than to try and call everyone when phone, cell, and internet systems can be overloaded or limited during a disaster.)
- Assemble an emergency supply kit for each person, as recommended by the American Red Cross - learn more at: www.ready.gov.
- Register your cell phones with reverse 911.
- Maintain a list of emergency contact numbers posted near your phone and in your emergency supply kit.
- If you must leave a pet or livestock behind, make sure they are not locked in. Ensure that they have identification; microchip, tags, brands, etc.

WHAT TO EXPECT WHEN YOU ARE EVACUATED

- Plan places where your family will meet, both within and outside of your immediate neighborhood. Use your escape plan to decide these locations before a disaster.
- If you have a car, keep a full tank of gas in it if an evacuation seems likely. Keep a half tank of gas in it at all times in case of an unexpected need to evacuate. Gas stations may be closed during emergencies and unable to pump gas during power outages. Plan to take one car per family to reduce congestion and delay.
- Become familiar with alternate routes and other means of transportation out of your area. Choose several destinations in different directions so you have options in an emergency.
- Leave early - it is not necessary to wait for an evacuation order to leave.
- Follow recommended evacuation routes. Do not take shortcuts; they may be blocked.
- Be alert for road hazards such as washed-out roads or bridges and downed power lines. Do not drive into flooded areas.
- If you do not have a car, plan how you will leave if you have to. Make arrangements with family, friends or your local government.
- Take your emergency supply kit unless you have reason to believe it has been contaminated.
- Follow local evacuation instructions.
- Take your pets with you, but understand that only service animals may be permitted in public shelters. [Plan in advance how you will care for your pets in an emergency.](#)
- Find the evacuation center, even if you have another place to spend the night - often this center will have information and updates available.

FLOODING RISK

Wildland fire denudes the surface of the forest, often times increasing the potential for flooding and debris flows long after the fire is over. Know the risk and be prepared.

Did you know that just a few inches of water from a flood can cause tens of thousands of dollars in damage and that flash floods often bring walls of water 10 to 15 feet high, or that a car can easily be carried away by just two feet of rushing water? Flooding and debris flows after a fire are very common.



To prepare please follow these guidelines. For more information, visit - www.ready.gov.

- Listen to the radio or television for information.
- Be aware that flash flooding can occur. If there is any possibility of a flash flood, move immediately to higher ground. Do not wait!
- Be aware of stream, drainage channels, canyons and other areas known to flood suddenly. Many small drainages, that have never seen a drop of water pre-fire can turn into torrents after.
- If you must prepare to evacuate, you should do the following:
 - Secure your home. Move essential items to an upper floor.
 - Turn off utilities at the main switches or valves if instructed to do so. Disconnect electrical appliances. Do not touch electrical equipment if you are wet or standing in water.

If you have to leave your home, remember these evacuation tips:

- Do not walk through moving water. Six inches of moving water can make you fall.
- Do not drive into flooded areas. If floodwaters rise around your car, abandon the car and move to higher ground, when water is not moving or not more than a few inches deep. You and the vehicle can be swept away quickly. If your vehicle is trapped in rapidly moving water, stay in the vehicle. If the water is rising inside the vehicle, seek refuge on the roof.
- Do not camp or park your vehicle along streams, rivers or creeks, particularly during threatening conditions. If you are located in a flood prone area you may have to even consider parking away from your home.
- Our area is susceptible to frequent and fast approaching storms. That blue bird morning can quickly turn into a sudden and extreme thunderstorm.
- Know the weather forecast.

WILDFIRE PREPAREDNESS CHECKLIST

- Clear roofs and gutters of debris as often as they accumulate. Inspect the roof for any gaps or openings that would allow firebrands to penetrate the roof.
- Cover exterior vents with 1/8 metal screening.
- Remove lint from the outside of dryer vents weekly.
- Remove vegetation and all other materials from under decks.
- Remove firewood to at least 30 feet from any structures. Never store firewood on a deck or porch, even in winter.
- Complete defensible space zones one and two.
- Enclose soffits to prevent eddies.
- Have an evacuation plan in place and practice it every spring.
- Keep grasses in your defensible space mowed to four inches or less. Irrigate grasses if you are able.
- Post reflective metal house numbers at the intersection of your driveway and the public road.
- Landscape within five feet of foundations and beneath decks with noncombustible mulch or bare dirt.
- Inspect your forested property in spring and fall for any needed maintenance, or forest health problems.
- Register all your cell phone numbers with reverse 911 system.
- Inspect and maintain your landscaping to protect your home from wildfire. Landscape with firewise plants.
- Be aware of the weather and fire hazard ratings every day.
- Keep apprised of any burn restrictions.
- Work within your neighbors to mitigate fire hazard on a community wide basis.

GOALS & OBJECTIVES

MITIGATION ACTION SUMMARY

Goals and Objectives of the 2017 Plan

1. Fuel Mitigation:

- Increase fuels mitigation in the GWPHFI area, both for post fire impacts and community protection. Use prioritized areas to make management decisions.
- Treat fuels in a manner consistent with restoring forest health and forest resiliency and improving the currently altered wildlife habitat.
- Create mechanisms for maintenance of treated areas.
- Increase the use of prescribed fire as a mechanism to maintain treated areas.
- Develop a proactive approach to respond to post fire impacts to the community.

2. Emergency Response:

- Create local egress/ingress plans for emergency residential evacuations and emergency equipment and professional services entry.
- Increase awareness and adoption of community and public communication and information systems' usage for and during emergency events.
- Build training and professional development opportunities for local response agencies within the area.
- Create neighborhood tactical maps for use by emergency responders during WUI fire events and structure protection assignments

3. Private, State and Federal support:

- Increase collaborative implementation of fuels reduction and forest restoration projects by supporting ongoing efforts and proposing alternative locations and methods for treatment on lands in and adjacent to the CWPP priority zones.
- Increase diverse funding availability for priority areas.

4. Biomass Utilization:

- As mitigation projects are accomplished, both on private and public lands, a significant amount of biomass product will become available and must be managed for appropriate use or disposal. The importance of proper and effective utilization is recognized and the CWPP team supports action to:
 - Work collectively to assure the largest amount of wood removed from project areas is utilized as value added material.
 - Work with the private sector to better facilitate the establishment of "end use markets" for local wood products.

5. Community and Homeowner Involvement:

- Increase home hardening and defensible space within the priority areas.
- Increase understanding and adoption of Fire Adapted Communities concepts and techniques.
- Empower residents to take action on their own.
- Through outreach and education, keep the need to manage forests for health and wildland fire risk reduction in residents consciousness.

6. Watersheds and Water Supplies:

- Work with local water providers to include their values at risk in the Wildfire Decision Support System.
- Review Tier 1 sub-watersheds for flood-risk mitigation (e.g. review small dams and ponds, culverts, infrastructure, etc.) and siting for potential post-fire structures such as debris basins.

7. Administration and Plan Maintenance:

- Define implementation plans and schedules.
- Set forth on-going plan maintenance and plan updating strategies.

WEBSITES AND RESOURCES

WEBSITES (ORGS & ENTITIES)

Cost Share Assistance Database:

<http://nrdb.csfs.colostate.edu/>

Colorado State Forest Service:

<http://www.csfs.colostate.edu/>

CSFS, Woodland Park District:

<http://csfs.colostate.edu/districts/woodland-park-district/>

Coalition for the Upper South Platte: <http://cusp.ws/>

Fire adapted Colorado: Fireadaptedco.org

Firewise Communities: <http://www.firewise.org/>

Ready Set Go: <http://www.wildlandfirersg.org/>

El Paso County: <http://www.elpasoco.com/Pages/default.aspx>

Teller County: <http://www.co.teller.co.us/>

Pike National Forest: <http://www.fs.usda.gov/psicc>

Bureau of Land Management, Royal Gorge Field Office: <https://www.blm.gov/office/royal-gorge-field-office>

Natural Resources Conservation Service:

<http://www.co.nrcs.usda.gov/>

Nature Conservancy, Colorado: <https://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/colorado/index.htm?redirect=https-301&sitelinks=ColoradoTNC&src=sea.AWP&gclid=CITRyJj04NQCFQ-4wAod52wBig>

Fire Adapted Communities:

<http://www.fireadapted.org/>

Colorado Forestry Association:

<http://www.coloradoforestry.org/>

Colorado Tree Farmers: <http://www.treefarmer.com/>

Colorado Department of Natural Resources:

<https://cdnr.us/#/start>

Fire Learning Networks:

<https://www.conservationgateway.org/ConservationPractices/FireLandscapes/FireLearningNetwork/Pages/fire-learning-network.aspx>

Black Forest Together:

<http://www.blackforesttogether.org/>

Front Range Roundtable:

http://frontrangeroundtable.org/Home_Page.php

Healthy Forest Restoration Act – official website:

<http://www.forestsandrangelands.gov/>

PUBLICATIONS

Community Wildfire Protection Planning

How to evaluate a community Wildfire Protection Plan: http://static.colostate.edu/client-files/csfs/pdfs/eval_9-8-08_web.pdf

All Colorado CWPPs:

<http://csfs.colostate.edu/wildfire-mitigation/colorado-community-wildfire-protection-plans/>

Wildfire and Insurance:

http://www.rmiia.org/catastrophes_and_statistics/Wildfire_and_insurance.asp

WILDFIRE MITIGATION

CO Dept. of Revenue Tax Subtraction:

<https://www.colorado.gov/pacific/sites/default/files/Income65.pdf>

Fuel Break Guidelines for Forested Communities:

http://static.colostate.edu/client-files/csfs/pdfs/fuelbreak_guidelines.pdf

Protecting Your Home from Wildfire:

Creating Wildfire Defensible Zones:

http://static.colostate.edu/client-files/csfs/pdfs/FIRE2012_1_DspaceQuickGuide.pdf

FIREWISE LANDSCAPING

<http://www.firewise.org/wildfire-preparedness/be-firewise/home-and-landscape.aspx>

Firewise Plant Materials:

<http://static.colostate.edu/client-files/csfs/pdfs/06305.pdf>

Forest Home Fire Safety:

<http://static.colostate.edu/client-files/csfs/pdfs/06304.pdf>

Grass Seed Mixtures to Reduce Wildfire Hazard:

<http://static.colostate.edu/client-files/csfs/pdfs/06306.pdf>

Living With Fire: A guide to the Homeowner:

<http://static.colostate.edu/client-files/csfs/pdfs/LWF51303.pdf>

Firewise Construction: Site Design and Building Materials:

<http://static.colostate.edu/client-files/csfs/pdfs/firewise-construction2012.pdf>

FOREST HEALTH AND MANAGEMENT

Gambel Oak Management: <http://static.colostate.edu/client-files/csfs/pdfs/06311.pdf>

Landowner's Guide to Thinning:

http://static.colostate.edu/client-files/csfs/pdfs/landowner_g4thin_scr.pdf

Landowner Assistance Programs in Colorado:

<http://csfs.colostate.edu/forest-management/programs-for-homeowners-landowners/>

FOREST INSECT AND DISEASE INFORMATION

Landowner's Guide to Living With Bark Beetles:

http://static.colostate.edu/client-files/csfs/pdfs/MPB_Newspaper_Insert_Final.pdf

Dwarf Mistletoe Management:

<http://static.colostate.edu/client-files/csfs/pdfs/DMT.pdf>

Mountain Pine Beetle:

<http://static.colostate.edu/client-files/csfs/pdfs/MPB.pdf>

Solar Treatment for Mountain Pine Beetle:

<http://static.colostate.edu/client-files/csfs/pdfs/mpbsolar.pdf>

Products used to Prevent Mountain Pine Beetle:

http://static.colostate.edu/client-files/csfs/pdfs/Web_Revision_June6_MPB_Prev_Products_QG.pdf

Ips Beetles: <http://static.colostate.edu/client-files/csfs/pdfs/Ips.pdf>

Western Spruce Budworm:

<http://csfs.colostate.edu/forest-management/common-forest-insects-diseases/western-spruce-budworm/>

Douglas-fir Tussock Moths: <http://csfs.colostate.edu/forest-management/douglas-fir-tussock-moth/>

POST WILDFIRE RECOVERY

Insects and Disease Associated with Forest Fires:

<http://static.colostate.edu/client-files/csfs/pdfs/06309.pdf>

Vegetative Recovery after Wildfire:

<http://static.colostate.edu/client-files/csfs/pdfs/06307.pdf>

Soil Erosion Control After Wildfire:

<http://static.colostate.edu/client-files/csfs/pdfs/06308.pdf>

Wildfire Restoration Guide:

http://cusp.ws/wp-content/uploads/2014/05/Fire-Restoration-HandbookDraft5.7_FINAL.compressed.pdf

After the Fire Toolkit:

<https://afterthefirewa.org/2014/07/11/after-the-fire-toolkit-now-available/>

Community Wildfire Desk Guide:

http://www.nacdn.org/wp-content/uploads/2016/06/Wildfire_Desk_Guide_and_Toolkit.pdf

Phoenix Guide to Wildfire Recovery:

http://wildfires.wsu.edu/wp-content/uploads/sites/18/2015/08/phoenix_guide-wildfire-recovery.pdf

Replanting in Burned Areas: Tips for Safety & Success:

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

Aspen Survival After Wildfire:

<http://static.colostate.edu/client-files/csfs/documents/How-to-Aspen.pdf>

Douglas-fir Survival After Wildfire: <http://static.colostate.edu/client-files/csfs/documents/How-to-Dougfir.pdf>

Gambel Oak and Serviceberry Survival After Wildfire:

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

Ponderosa Pine & Lodgepole Survival After Wildfire:

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

GENERAL RESOURCES

Wildfire Policy:

https://dspace.library.colostate.edu/bitstream/handle/10217/44451/Wildfire_Policy_in_Transition_Where_Theres_Smoke.pdf?sequence=1&isAllowed=y

Wildfire Policy in Transition:

https://dspace.library.colostate.edu/bitstream/handle/10217/44452/Presentation_on_Wildfire_Policy_in_Transition.pdf?sequence=1&isAllowed=y

WATERSHEDS AND WILDFIRE

Fire Effects on Watersheds

http://www.swhydro.arizona.edu/archive/V8_N2/feature5.pdf

Effects of wildfire on water quality and soil erosion

<http://www.uwyo.edu/barnbackyard/files/documents/resources/wildfire2013/waterqualityerosion2013wywildfire.pdf>

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The GWPHFI CWPP and large format maps are available on the web at - WPHFI.org

Questions or concerns?
Coalition for the Upper South Platte
www.cusp.ws
719-748-0033
jonathan@cusp.ws

