2015
Mt Herman
Community Wildfire Protection Plan

Mt Herman Community

El Paso County

Colorado

Acceptance Sheet

The Mt Herman Community Wildfire Protection Plan (CWPP) was developed in accordance with the guidelines set forth by the Healthy Forests Restoration Act of 2003 and the Colorado State Forest Services' Minimum Standards for CWPPs.

This CWPP is a collaborative effort to guide our stewardship management activities, including wildfire protection. The activities recommended in this plan meet our objectives to reduce the risk from wildland fire and benefit forest health. This plan is voluntary, and where possible, we intend to apply the recommended practices to improve our community and enhance public safety.

The Mt Herman CWPP has been reviewed and approved by the following representatives of the Mt Herman CWPP Board, El Paso County, Colorado State Forest Service, U.S. Forest Service, and the Tri-Lakes Monument Fire Protection District.

Mt Herman CWPP Board — Date: 12-25-15

Mt Herman CWPP Board — Date: 21-Jan-2016

Mt Herman CWPP Board — Date: 24 JAN 16

Tri-Lakes Monument Fire Protection District — Date: 1/27/16

El Paso County Representative — Date: 2/3/16

Colorado State Forest Service
Woodland Park District — Date: 12-8-2015

Reviewed by

U. S. Forest Service
Pikes Peak Ranger District — Date: 2/22/16

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Preface

Acknowledgments

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

The **Coalition for the Upper South Platte (CUSP)** has been instrumental in facilitating proactive and sound forest management across a large region, including our Community. **Jonathan Bruno** and **Michelle Connelly** in particular have devoted numerous hours on wildfire education and multiple fuels reduction projects. They were key in facilitating matching grant funding, and in lining out and overseeing the **Juniper Valley Corrections** (aka **SWIFT**) crew in fuels reduction projects on seven properties. More residents look forward to a similar partnership to effect positive change on their properties.

Dave Root of the Colorado State Forest Service has provided technical advice and attended several of our monthly CWPP meetings. His knowledge of forest management, leadership in the CWPP arena, and willingness to participate in our process have been warmly welcomed.

Consultant forester **Keith Worley** has left his mark across a wide area, we are fortunate to have out Community included. He provided instruction in Firewise building materials at a monthly meeting, and also taught a workshop in identifying structural hazards in the home ignition zone (HIZ). Keith's enthusiasm and dedication to spreading the message of wildfire preparedness have been invaluable to us, as well as many others.

Tri-Lakes Monument Fire Protection District Authority, Fire Marshal **John Vincent** has also embraced our planning effort, recognizing the importance of preparing for the inevitability of wildfires along the Front Range. He participated in several monthly meetings, and joined us on our first slash chipping day.

Thanks also go to our local **Home Depot**, for donating a chipper to us for a day.

The hard work and ardor of these individuals and organizations will have a tangible and lasting impact on our Community and surrounding areas. Along with them, we are committed to the cause of reducing wildfire hazard not only in our Community, but in other areas of the southern Front Range. Fire knows no boundaries. Since this is a regional issue, we look forward to lending a hand to other neighborhoods seeking to mobilize residents to understanding and action.

Prologue

21 April – 1989; Turner Road, Mount Herman Estates, Monument Colorado

The Berry Fire of 1989 is a perfect example of major risks which still threaten the Mount Herman Community and the Pike National Forest. The Berry Fire was human-caused. Whether it was arson or accident, it is indicative of a major threat. The fire started on private property at a location which offered the opportunistic conditions for a hidden campfire and under-aged drinking; a practice that has now transferred to locations all along Mt. Herman Road. In 1989 there were only three residences in Mount Herman Estates and the quiet west end of Turner Road was a relatively short distance from Monument, up reasonably maintained dirt roads. The fire that grew and spread north onto the Pike National Forest may have been intentional or it may have been an improperly extinguished campfire (such as the scores of fires that are lit and left burning every season up and down Mt. Herman Road).

Another major risk factor that contributed to this fire was fuel loading. It should be noted that wind was *not* a factor and high daytime temperatures preheating the fuels was also *not* a factor. It was April 21st, early spring, temperatures were mild, no new grasses would sprout for a month and the oak leafing out was still more than a month in the future.

The initial fire began to spread during a clear Friday morning. Smoke was noted and a Type 6 engine (brush truck) responded to the scene and small areas of flame were attacked by the crew, within the areas that they could reach near Turner Road. It was believed that they had taken the upper hand and that the small fire would be contained.

However, as the fire punked out to the north it entered huge areas of Gambel oak which had a forest floor of duff – oak leaves and grasses – which were now preheating from the noonday sun. The fire soon involved large stands of winter dried oak and took off. On a windless day this fire grew, in a stationary location, creating its own wind and starting to spread in all directions, fed by its own intensity. The vertical column of smoke rising past thirty thousand feet was clearly visible from downtown Denver. As the fire grew, one of its edges marched slowly back towards Turner Road. The ten foot tall oak in its path fed a wall of flames fifty feet high. These flames, without wind driving them, were more than the Type 2 engines (now defending the two homes on Turner Road) could contend with and the decision was made to withdraw to safety. Both homes had been built without “defensible space” (a term completely outside the vocabulary of Colorado’s WUI residents of 1989).

The Berry Fire was only a few hours old, but now it was huge and the afternoon winds were starting to rise. Emergency responders understood the growing threat, and plans for evacuating Monument and Palmer Lake were being considered as word of this spread. Unencumbered by today’s bureaucratic barriers, Fort Carson jumped into the fray and sent two CH-47 Chinook helicopters equipped with drop

buckets. They immediately started dipping from Monument Lake and hitting the eastern perimeter of the fire. The minor winds that were rising were initially coming out of the southwest and were slowly driving the fire in a counterclockwise path that was consuming more than one thousand acres of the Pike National Forest Monument Preserve and the east face of Mount Herman. One small benefit of these winds was that the fire changed its direction, within feet of the two homes on Turner Road, and the homes were saved by the engine crews. The fire was left to punk around in the oak and pine on the northern properties of Mount Herman Estates.

Now, in 2015, Red Flag days are a common year-round occurrence. But April 21st, 1989 had only one ingredient that goes into a Red Flag Day calculation; dry fuels. Yet, within a few hours a small fire had turned into an uncontrollable inferno that in retrospect was neither stopped nor mildly impacted by any human effort. The fire's boundaries were almost completely defined by the wind and, in a sense, by the lack of wind. By late afternoon the small winds had died, the temperature was dropping while the humidity was rising, and the fire "laid down". The next morning, slurry drops high on the slope of Mount Herman secured the western boundary of the Berry Fire.

The fire made the news for a few more days; it was an exciting local event – but not nearly as news worthy as the previous year's Yellowstone Fire. And then Colorado forgot about it. But not all of us. Some of us lost our beautiful back yard and part of our dreams that day. Thousands of Coloradans lost a whole lot more to wildfires in the years since then.

A wildfire is *not* a hypothetical discussion for our community. So, what have we learned? After twenty-six years of having wildfire knowledge slowly hammered into our consciousness, *what* we have learned is now contained in this CWPP.

Mt Herman one month after the Berry Fire

Introduction

Since history has been recorded, Mt. Herman Estates and surrounding areas have been threatened by wildfires. In 1989 the Berry Fire started and burned in our own community, consuming 1000 acres. The next closest was the Spaatz Fire in 2002, just weeks before the infamous Hayman Fire. The Spaatz Fire was human-caused and within one mile of the CWPP area. It was contained at approximately 40 acres, but had the potential to quickly burn through the entire Mt. Herman area. We were fortunate that the U.S. Forest Service Pike Interagency Hotshot crew was at their home base in Monument. They quickly called in air support to quell the fast-moving flames. Just over a month later, the human-caused Hayman Fire started in Teller County, raging across 138,000 acres over the next month and threatening numerous neighborhoods in its path. This included the Monument and Palmer Lake areas, where residents were on standby for evacuation for days. Many residents did leave. These incidents, in addition to the 2012 Waldo Canyon Fire, the 2013 Black Forest Fire, and continuing high fire danger conditions, have raised awareness and concern about the need to prepare for another such event.

Thus the Mt Herman CWPP planning team was formed. This group of motivated neighbors opted to name the group the Mt Herman CWPP rather than the Mt Herman Estates CWPP, as several adjacent residences outside of the “Estates” were deemed critical to this planning effort. The CWPP planning area will hereafter be referred to as the “Community”. Homeowners joined together to analyze wildfire hazards in and beyond the Community, to encourage the creation of defensible space around homes, to harden our homes against fires, and to help ensure personal safety and structure protection through planned egress and evacuation. We improved lines of communication between neighbors and identified strategic fuels reduction treatments. The team first met in May 2014, and have held monthly meetings since to develop this Mt. Herman CWPP.

Plan Purpose and Objectives

The purpose of the Mt. Herman CWPP is to assess risk of wildfire to properties, forest, and wildlife; provide information and encouragement to create defensible space for each home site; encourage community-wide fuel mitigation to achieve risk reduction; reduce risk of catastrophic wildfire; and enhance the health of the overall landscape.

It is the purpose of the Mt. Hermann CWPP team to develop a plan to prevent and mitigate wildfires, and to ensure safety and protection of the residents and their property. The plan will be developed in conjunction with the Colorado State Forest Service, the Tri-Lakes Monument Fire Department, and the United States Forest Service (USFS), and will meet the requirements of these organizations. Emphasis will be placed on homeowner education and demonstration projects, as well as implementation steps and evacuation planning. It is a further purpose of the plan to position the Community to receive external grant funding in support of our fuel hazard reduction objectives.

Objectives are to develop a long term plan that benefits property owners, infrastructure, forest restoration, and wildlife in the community:

1. Assess the risk of wildfire to the community and determine the ability of the community to respond.
2. Raise the awareness of property owners for the need to establish defensible space around their home sites and mitigate wildfire hazards throughout the community.
3. Develop risk mitigation project priorities for voluntary action by residents.
4. Coordinate with the USFS to encourage implementation of the highest priority fuels reduction treatments identified in the Upper Monument Creek Landscape Restoration (UMC) proposal in proximity to the Community.
5. Participate in the Tri-Lakes Cohesive Strategy project, and pro-actively support involvement of other communities in this and other regional fuel mitigation plans.
6. Restore the landscape to a healthy condition, thus decreasing the risk of catastrophic fires.

Keep in mind that this is a plan, and not a mandate to landowners. Our landowners are under no obligation to perform the actions outlined in this plan; however we are fortunate that most do.

The Mt Herman Community

Location and Description

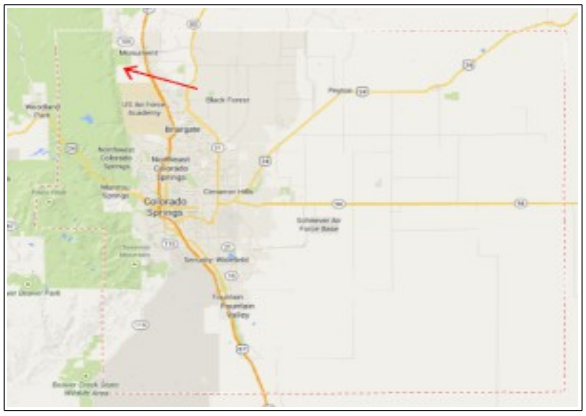
The Mt. Herman Community is located in a Wildland Urban Interface (WUI) zone approximately four miles southwest of Historic Downtown Monument, in the northwest corner of El Paso County. The Community includes 32 parcels, 17 existing homes with 55 residents. Subdivision zoning requires a minimum of 2.5 acres per parcel; many landowners own five acre lots or more. The large lot size and juxtaposition to National Forest land provides considerable solitude and privacy, cherished by residents. Previously used for potato farming, the area was subdivided beginning in the 1950s.

The Community is located on a gentle east slope, with steeper terrain along the west boundary. There are several gullies which start to the east, becoming steeper and more incised the farther west they reach.

We are located in the State of Colorado, just north of Colorado Springs:

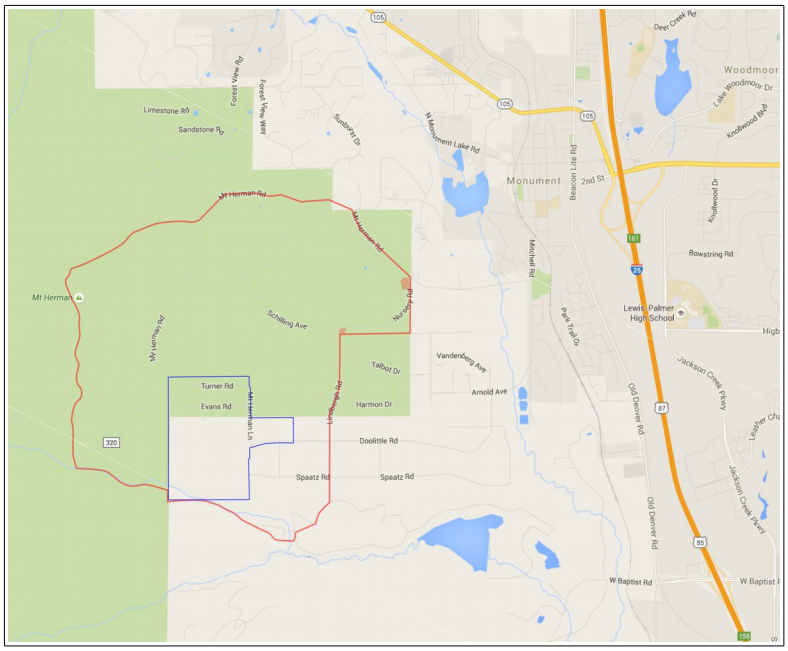
State level

In the northwestern edge of El Paso County:



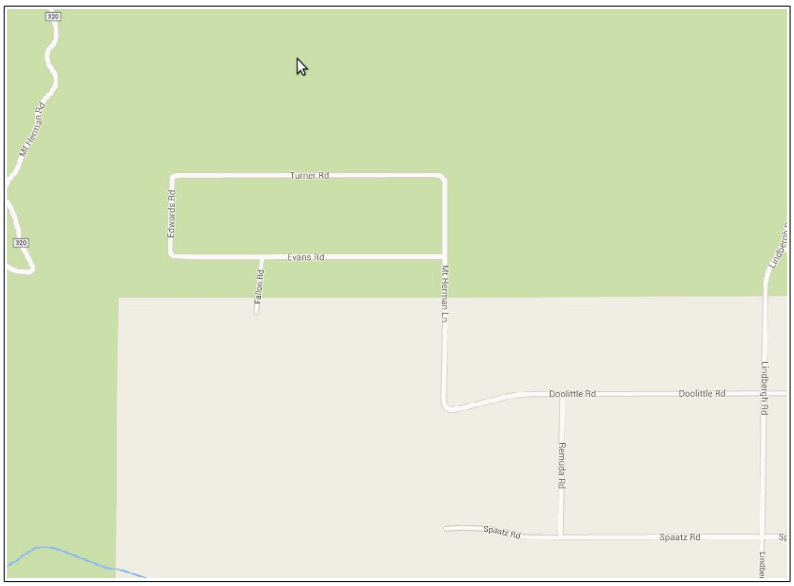
County level

West-southwest of Monument, CO, indicated on the map by the red box below:



Town Level

Primarily Mt Herman Estates residential subdivision, plus some of the neighbors in the immediate vicinity:



Neighborhood level

Boundaries and Areas

There are significant areas, boundaries, and places that have a direct influence to the implementation of this plan. We have indicated areas we have direct control over and classified them as *Areas of Influence*:

- CWPP Boundary
- Neighborhood Flanks

Other areas which have a direct affect on us and this plan, especially during a wildfire emergency require cooperation from agencies, property owners, and government entities in order to affect changes are known as *Areas of Interest*:

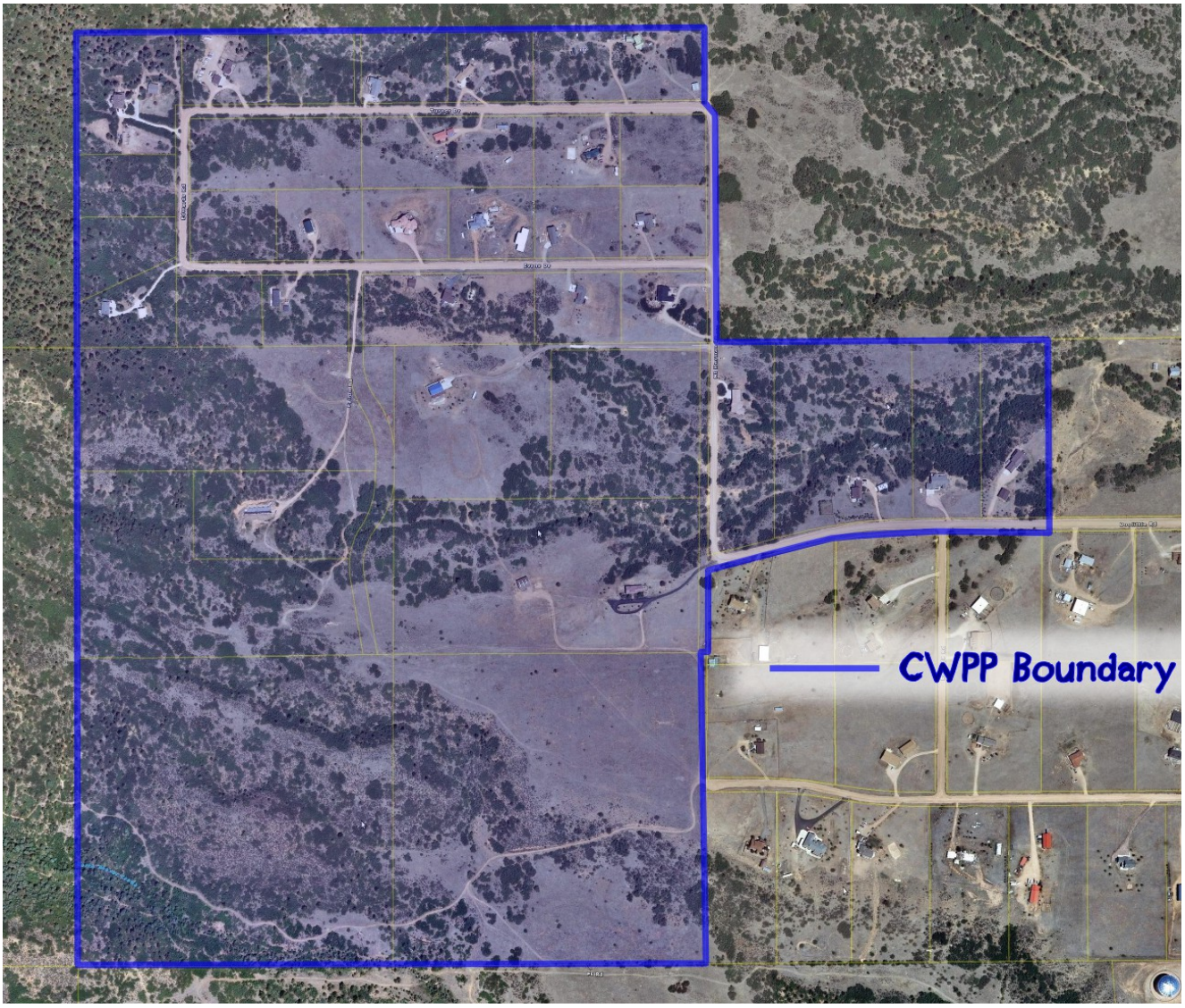
- Wildland/Urban Interface
- Places of Interest
- Points of Concern

Areas of Influence

Our CWPP boundary and neighborhood flanks comprise our areas of influence.

CWPP Boundary

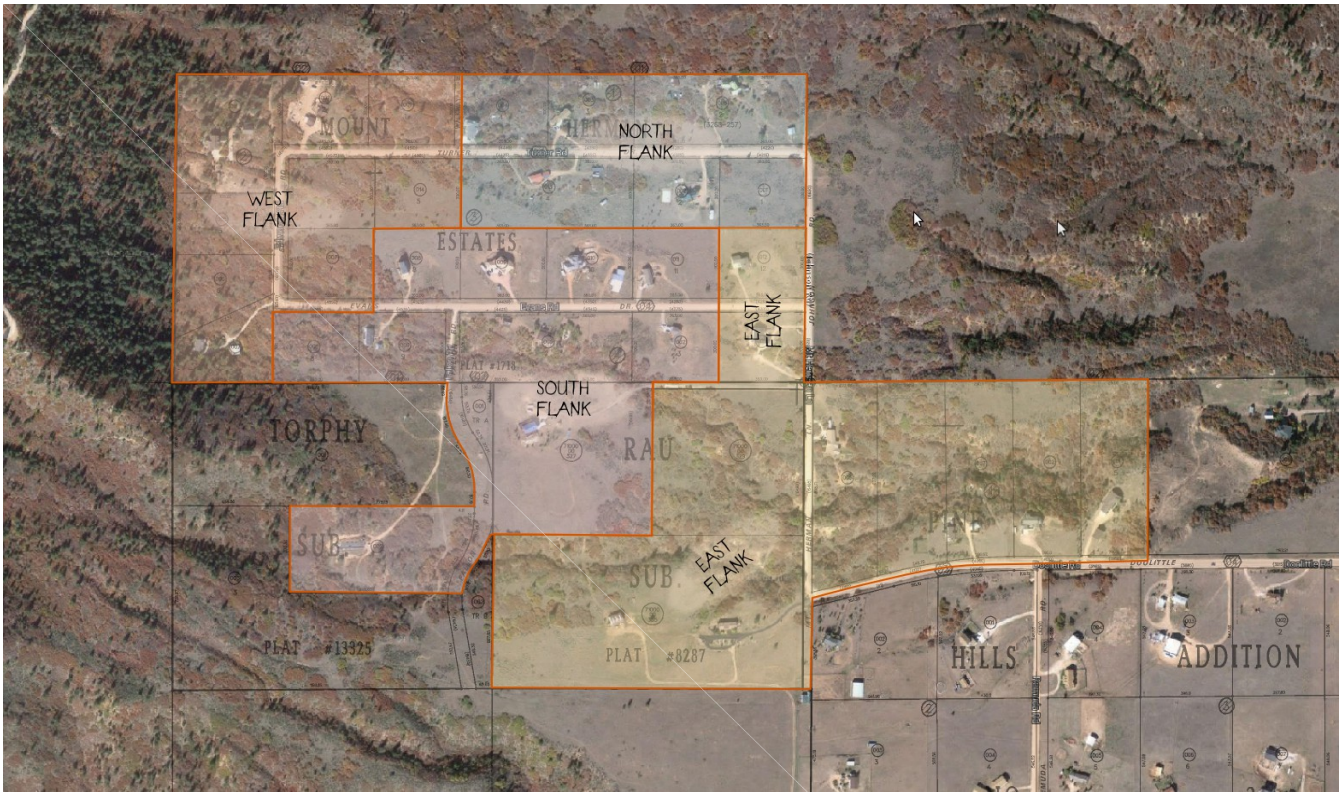
The CWPP boundary is the area encompassed by our properties and the public roadways indicated on the map below:



CWPP Boundary

Neighborhood Flanks

To facilitate the development of this CWPP, we have divided our CWPP boundary area into four "flanks" or quadrants:



Neighborhood Flanks

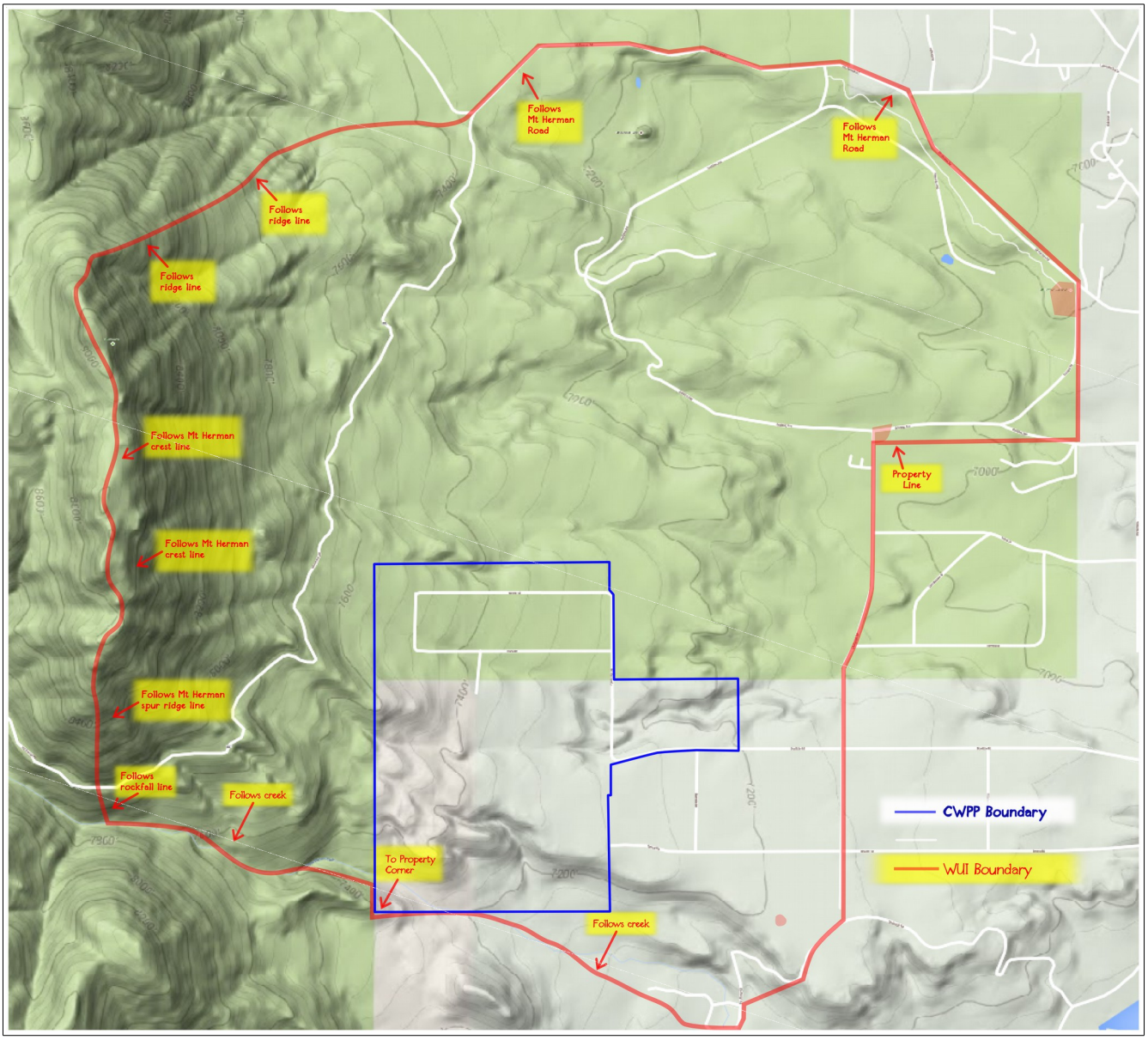
Areas of Interest

Wildland Urban Interface

Wildland urban interface (WUI) is defined as the area where a wildfire would be a threat to the community. This boundary considers the more likely sources of wildfire ignition – both natural and human caused; assets and resources that need additional protection; and defensible and natural firebreak perimeters for firefighting such as streams, open ridges, and roads.

The boundary, shown as a red outlined area on the map below, was set to include areas that could have abutting heavy fuels, or with potential fire behavior concerns based on topography and prevailing winds. The WUI Boundary was designated in consultation with the Colorado State Forest Service. This WUI designation will increase focus by federal, state, local, county and municipal agencies in targeting planning and funding for high-priority areas within this boundary.

Depicted on the following map, the western boundary is the summit and main ridge of Mount Herman. This area was included due to heavy recreational use on Mt Herman, and the possibility of ember showers emanating from a potential wildfire. The eastern boundary is Lindbergh Road. The northern boundary is Mount Herman Road where it runs east-west. The southern boundary runs along Beaver Creek to a meadow, then east back to Lindbergh Road. The WUI area contains approximately 1800 acres.



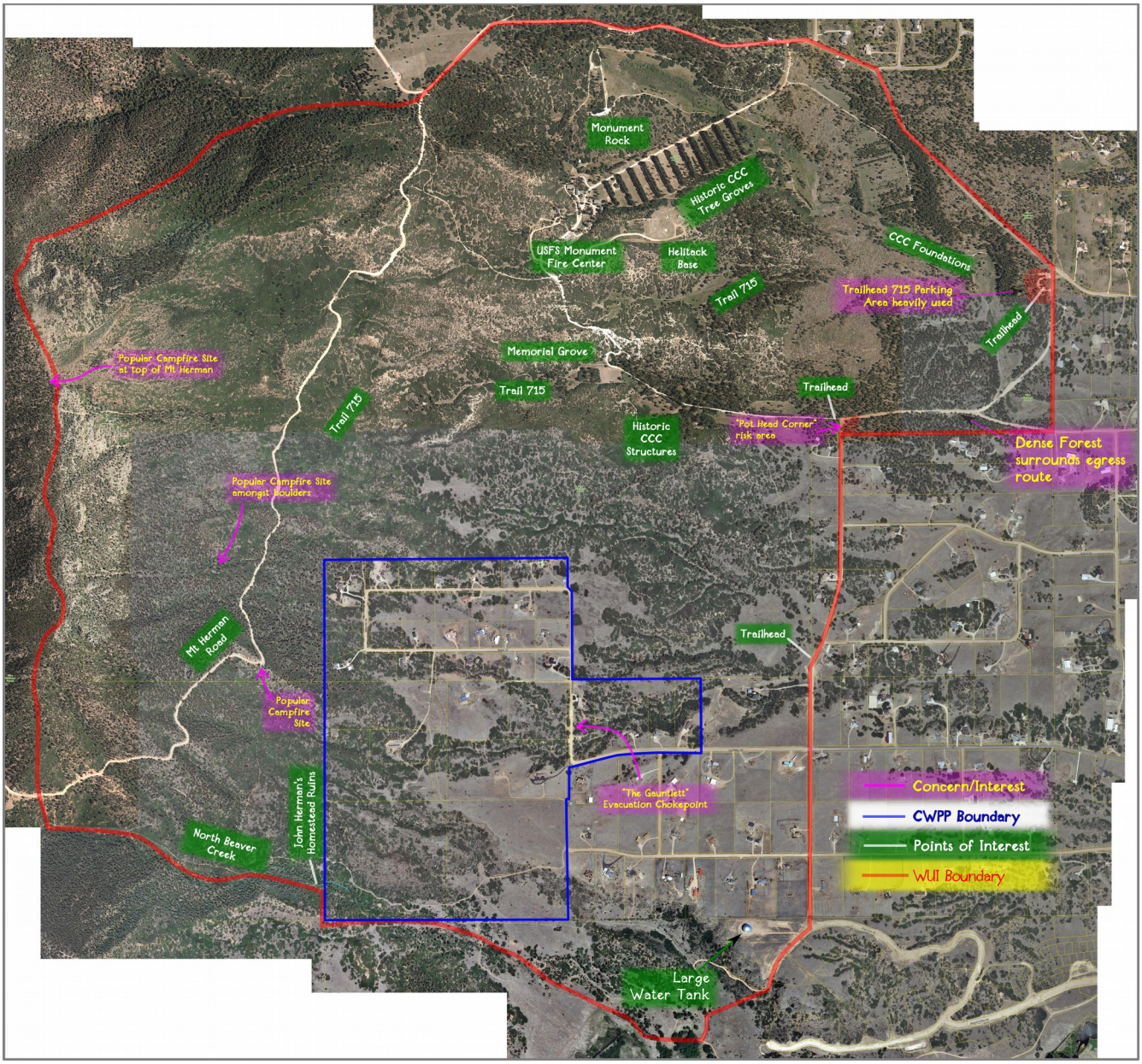
Wildland/Urban Interface Boundary (Red Line)

Places of Interest

We've identified significant community assets which have historical value or the potential for use in firefighting. These are intentionally included in the WUI boundary. *See the green tags on the following map.*

Points of Concern

The WUI boundary also includes points of concern we address as part of this plan. *See the magenta items on the below map.*



Places of Interest and Points of Concern

Community Values at Risk

Community residents chose to live here for a variety of reasons including the surrounding natural beauty and our desire for a rural lifestyle. The property sizes allow for privacy without isolation with a strong sense of community. We ranked our priorities based on our community values:

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

Surrounding Area Description

The Community is surrounded on three sides by the Pike National Forest. The Monument Fire Center is located directly north and is home to important assets like the USFS Helitack Base, Monument Interagency Hotshot Center, a USFS Training facility, and numerous historic structures from the Civilian Conservation Corps.

Outside of the restricted administrative site, this area – known locally as the “Monument Preserve” – provides numerous popular multi-use trails for hiking, horseback riding, and mountain biking. The well-known Memorial Grove is located one-half mile north of the Community, commemorating past U.S. Forest Service employees. There are several historic sites in the surrounding area, a USFS tree nursery that thrived in the early 1900s, house foundations and rows of trees planted by the Civilian Conservation Corps (CCC) in the 1930s make up some of the notable landscape. Unfortunately, these foundations have been attracting vandalism and illegal campfires which create a concern, not only because of the damage to an historic resource, but also because of the serious wildfire hazard posed by irresponsible and reckless visitors. There are also National Forest trails east and west of the Community, providing valued recreation but also increasing the chance of human-caused wildfires.

The Community is within the Tri-Lakes Monument Fire Protection District. Mt. Herman Estates subdivision has one access road for both ingress and egress, Mt. Herman Lane, formerly known as Johnson Road. The roads are wide enough to accommodate passing vehicles, they are well maintained, and can accommodate large structural engines. Steep terrain along a drainage ditch and encroaching Gambel oak at the south end of Mt. Herman Lane could prove dangerous during a wildfire. This could preclude safe access into Mt Herman Estates, and could hamper evacuation efforts. This chokepoint – locally named the Gauntlet – is a key point of concern for the Community. Doolittle Road serves as primary access for the remaining parcels within the Community. Spaatz Road provides access to the

far southwestern residents, and offers a potential alternative route of egress out of Mt. Herman Estates.

The Community has mitigated the primary egress route, and is working to identify and develop alternate routes.

Due to the fact the Mt. Herman Community is surrounded on three sides by National Forest, protection of this landscape is integral and treasured by the Community. The 1989 Berry Fire destroyed over 1,000 acres of native pine and oak inn the Pike National Forest directly north of the Community. The landscape has been slowly recovering. Preserving the health of the surrounding National Forest is key to maintaining the aesthetic quality, recreational opportunities, watershed health, and contiguous wildlife habitat.

We have identified several other key areas and places of interest that could be risks, assets, or liabilities to our plan. There are two trailheads accessing Trail 715 in the Pike National Forest; one off Nursery Road the other at the corner of Lindbergh Road and Nursery Road. The trailhead at the intersection of Lindbergh and Nursery Roads has been particularly problematic in recent years. It is known as a smoking, drinking, and drug use hang out spurring unattended fires, trash, tree damage, and general rambunctiousness. There are several spots where vehicles are able to park along the Mount Herman Road, creating similar concerns. This unwelcome behavior greatly increases the risk of a wildfire, threatening our Community. Although this behavior is not generally an issue with regular recreational use in this area of the National Forest, the concentrated use raises the risk of a wildfire. Lindbergh Road to the east presents an alternate evacuation route, although the section of Nursery Road just east of the Memorial Grove trailhead is heavily choked with Gambel oak and ponderosa pine, exacerbating fuel hazard along this potential route. This area of the National Forest is included in the Upper Monument Creek Landscape Restoration proposal. *See the magenta items on the Places of Interest and Points of Concern map.*

Firewise Communities

By its very nature, a large fire is something that threatens and has to be fought using the resources of an entire community. Likewise, wildfire prevention and mitigation efforts are most effective when addressed by an educated community with common and coordinated goals. The Mt Herman CWPP was launched for just these reasons. Therefore the homeowners could do something in OUR neighborhood, with the help and assistance gained from others concerned about the same issues.

The National Fire Protection Association (NFPA) initiated the Firewise Communities Program to encourage local solutions for fire safety. The program involves homeowners taking individual responsibility for preparing their homes from the risk of wildfire. Firewise is a key component of Fire Adapted Communities – a collaborative approach that connects all those who play a role in wildfire education, planning, and action with comprehensive resources to help reduce risk. This program is co-sponsored by the USDA Forest Service, the US Department of the Interior, and the National Association of State Foresters.

NFPA's Firewise Communities program teaches people how to adapt to living with wildfire. Brush, grass, and forest fires don't have to be disasters. There are roles, tasks, and responsibilities ALL of us need to embrace to protect ourselves and each other from the risk of wildfires. To save lives and property from wildfire, the program encourages neighbors to work together to take action NOW to prevent losses.

We applied for recognition as a Firewise Community on June 1, 2015, and **received our certification on June 12, 2015.**

To learn more about the history of FireWise, visit http://firewise.org/about/history.aspx

Community Fire Risk Assessment

Our community has performed, and continues to update our community risk assessment. We have learned about fire behavior, identified fuel types and fuel loads, learned effective methods to reduce these risks, learned how home ignition occurs, how to harden our homes, and developed individual and community mitigation project lists. We've started working through these projects and continue to update it as needed.

This assessment has given us a good place to start. We've become familiar with how fires can start and spread in our area; what assets are most at risk and why. We include that assessment here, and continue to update it as project work proceeds and conditions change.

We begin with the history of fires in our area; because as we all know, history repeats itself…

Wildfire History

The first and largest recorded fire in the Colorado Front Range area was the Big Burn of 1854. This fire was started on the south flank of Cheyenne Mountain by Arapahoe or Cheyenne tribes to drive the Utes from the area's hunting grounds. Burning uncontrollably into the Rampart Range, it blazed all the way to South Park, leaving severely burned areas throughout the entire Pike National Forest. This fire was followed by the deadly Cheyenne Mountain Fire of January (yes, January) 1950. Spurred by 80 miles-per-hour winds, it burned onto Camp Carson (now Fort Carson), killing nine people.

Since then, numerous smaller fires have occurred within wildland urban interface (WUI) portions of the southern Front Range. Most of these were controlled quickly.

Directly impacting the Mt Herman Community, the April 1989 Berry Fire started along the north side of Turner Road which encompassed over 1,000 acres. It killed many trees and burned hot enough to cause soil damage which impaired natural forest regeneration. The fire scar on the east flank of Mount Herman is still highly visible, with the flatter portions of the burn area now covered with dense thickets of gamble oak. The Berry fire burned portions of several properties along the north edge of Turner Road, resulting in property damage and vegetation loss, but no homes were destroyed.

Due to abundant precipitation and good fortune, the 1990s did not have any notable wildfires in this area, but fuels continued to grow. Under-story vegetation such as oak and young trees flourished, particularly fir. Its full, pendulous crowns make extremely effective "ladder" fuels, easily channeling a ground fire into the main forest canopy, increasing the chance for a catastrophic crown fire in which flames race from one tree canopy to the next. Numerous pines also seeded in, becoming over topped and suppressed, exacerbating the multi-story ladder fuel component. A century of wildfire suppression has contributed to heavy fuel buildups that now burn at higher intensities.

The copious moisture came to an end late in 1999, and has not returned. This set the stage for over a decade of drought and calamitous wildfires.

Several damaging wildfires along the Front Range in 2000 served as a wake-up call. The High Meadows fire in June 2000 near Bailey, CO, burned 10,800 acres, destroying 58 structures. The Bobcat Gulch fire burned at the same time west of Loveland, CO, covering 10,560 acres and destroying 22 structures. Both fires were human caused; one from a cigarette and one from an illegal campfire.

Closer to home, in April 2002, the 64-acre Pine Glen fire started in Black Forest by a spark from a mower in dry grass. Winds blew the flames away from homes. Two days later a fire broke out in the Glen area of Palmer Lake. It was quickly controlled, but could have been a tragedy in a neighborhood characterized by steep terrain and heavy fuel loadings, particularly Gambel oak.

In May 2002 juveniles playing with matches ignited a fire in oak on the slope south of Spaatz Road. The Spaatz fire spread rapidly in the 25-mph southeast winds, heading directly towards Mt Herman Estates. Quick response and air support from the U.S. Forest Service again prevented a tragedy. Our Community was extremely fortunate that the Pike Hotshot crew was in town to facilitate the response. This particular fire was a direct and ominous threat to our Community.

Several other intense fires in central Colorado colored the months of April and May, 2002. Extreme drought conditions, parched woody fuels, record high temperatures, and wind events set the stage for the monstrous Hayman wildfire. This human-caused 138,000-acre catastrophic fire burned for over six weeks in June and July 2002, with the majority burned at moderate to high severity. This resulted in extensive tree loss and significant soil damage, portending dire flooding consequences for downstream communities for many years. The Mt Herman Community was on standby for evacuation, with several residents opting to vacate preemptively. Fortunately, the Hayman fire did not reach the trigger point of the Rampart Range Road. As such, evacuation was not mandated and watershed integrity directly above the Mt Herman area was not compromised. We were extremely fortunate.

The Waldo Canyon Fire on June 26, 2012 as seen from Mt Herman Estates

Two years of severe drought preceded the tragedy of the human-caused 18,247-acre Waldo Canyon Fire, which ignited in late June 2012 under red flag conditions. The Cedar Heights neighborhood near Garden of the Gods was first threatened, but the creation of fuel breaks and defensible space completed by residents in previous years allowed firefighters to protect this area. On June 26, extreme downslope winds pushed the fire into the Mountain Shadows area. Within several hours, two lives were lost and 346 buildings were destroyed. Portions of the U. S. Air Force Academy were evacuated, and the Mt Herman Community was again on standby for evacuation. The Waldo Canyon Fire reached the southwest corner of the Air Force Academy, with firefighters assisted by recent fuel breaks created in this area by the Academy Natural Resources staff. The fire was held to 147 acres on the installation, curtailing its northward spread towards Mt Herman.

The Black Forest Fire as seen from Mt Herman Estates

The Black Forest Fire of June 2013 was apparently also human-caused. Although only ~14,000 acres, this human-caused fire was unprecedented in Colorado in terms of property damage: 486 homes were destroyed and 37 were damaged. Two lives were also lost. A follow-up assessment conducted by the Pikes Peak Wildfire Prevention Partners (PPWPP) developed several important conclusions[1]:

- Individual property defensible spaces were easily overwhelmed by extreme wildfire behavior due to failure of surrounding owners to reduce fuel volumes.
- Defensible space, as understood by the average Wildland Urban Interface (WUI) dweller, has different meanings and is confusing to the general public.
- Defensible spaces, as defined by CSU Publication Protecting Your Home From Wildfire: Creating Wildfire-Defensible Zones, were not generally implemented in the burn area. This publication can be found on the web at: http://static.colostate.edu/client-files/csfs/pdfs/FIRE2012_1_DspaceQuickGuide.pdf
- Firefighter safety and effectiveness were jeopardized by a lack of understanding and

1 Pikes Peak Wildfire Prevention Partners in Cooperation with the Black Forest Fire and Rescue Department and Falcon Fire Department. 2014. Black Forest Fire Assessment Team Report to the Governor of Colorado. Published at http://www.ppwpp.org

appreciation of the risks firefighters are exposed to during wildland fires.

- Community wide mitigation was found to be most effective in managing wildfire
- Although the Mt Herman Community is not faced with the contiguous forest canopy and home density found in much of the Black Forest area, these concepts still apply. Firefighters will always strive to protect lives and property, but their effectiveness depends on the foresight and preparation of landowners in advance of the fire.

Fire Ecology of the Mount Herman Area

Prior to European settlement, the ponderosa pine forests of Colorado's Front Range experienced fire at approximately 15 to 30 year intervals. These were historically started by lightning strikes, and likely also by Native Americans. These frequent, low-intensity surface fires removed dead debris from the forest floor and rejuvenated the grass and herbaceous under-story. Many thinner-barked seedlings and saplings that had established since the last fire were killed. Some of the younger trees that escaped the fire would grow thicker, more fire-resistant bark before the next event, encouraging the growth of larger, widely spaced trees with an under-story of scattered small trees, grasses, and herbs. Small groups of pine regeneration would establish in the holes left in the canopy from scattered over-story pines that died, often leading to a clumpy mosaic composition. Forests under this natural fire regime perpetuated a more open stand structure with a variety of age and size classes, often described as "park-like."

Park-like ponderosa pine forest representative of historical conditions

Gambel oak was represented in the historic landscape, but not at the high levels seen today. The 1989 Berry Fire burned across a classic ponderosa pine chaparral landscape, killing most of the pine and scattered clumps of mature oak. Twenty-five years later, much of the area is characterized by prolific, impenetrable Gambel oak. This dense brush layer presents a significant wildfire hazard for several reasons. It serves as a ladder fuel under surviving ponderosa pine, posing as a conduit to channel

flames into the tree canopy. Some oak pockets have a high amount of dead wood as a result of the Berry fire, in addition to general oak dieback resulting from drought, frost damage and insect attack. This dead component greatly exacerbates its flammability. Additionally, dense oak stands inhibit movement and accessibility.

In contrast to historic Front Range forests, intensive fire suppression over the past century has resulted in a plurality of densely stocked forests, as found along the western edge of the Mt Herman CWPP area. These unnaturally thick forests tend to have a layer of over-topped and suppressed pines, and a disproportionately high amount of Douglas-fir. While the latter occurs naturally on north slopes, it has proliferated across a broader area under the exclusion of fire. Because its thinner bark is much less fire-adapted than ponderosa pine, Douglas-fir succumbs more easily to fire. Its presence would have been naturally limited due to mortality from periodic fires. Douglas-fir is also more tolerant of shady conditions than ponderosa pine, establishing easily under a forest canopy and thriving in lower sunlight levels than the less shade-tolerant ponderosa pine. Its fuller crown and frequently lower position in the forest provides vertical fuel continuity, often leading to a devastating crown fire in which flames race from tree crown to crown.

While periodic low intensity surface fires were an integral part of the forest ecosystem, the scene has now been set in much of the Front Range ponderosa pine ecosystem for unnaturally catastrophic stand replacement fires. This was evidenced by the 2002 Hayman fire, which burned approximately 138,000 acres, running 19 miles and exploding by nearly 62,000 acres in one day. While extreme drought and weather conditions played a major factor, the devastating fire behavior and nearly unprecedented forest mortality were greatly intensified by excessive fuel loadings of the overstocked forest landscape.

Fire Behavior

Wildland fires have been studied in great detail to help predict fire behavior. Predicting a fire's intensity, rate of spread, duration, direction and spot-fire production is important for firefighter safety, and is the basis for tactical decisions made during suppression of a fire.

Three factors affect wildland fire behavior:

- **Fuels:** the type, continuity and density of surrounding vegetation, in addition to flammable structures
- **Weather:** wind, relative humidity, temperature and atmospheric stability
- **Topography:** terrain features including steepness and aspect of slopes, gullies and incised channels, etc.

The only factor we can have direct influence over is fuel. Fuels are defined as anything that burns in a fire.

Fuels

Fuels are divided into four categories:

- Grass
- Brush or Shrubs
- Timber
- 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. Some can burn almost anytime. The amount of moisture in fuels is the biggest factor affecting flammability.

Grass

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 season progresses, plants approach dormancy and the residual surface vegetation dies. Cured grass has the potential to promote extreme fire rates of spread (ROS). Grassy fuels, also termed flashy fuels, have the highest potential ROS of any vegetation type. Another hazard associated with cured grass is the potential for a rapid decrease in fuel moisture; the ability of air to circulate through standing grass allows it to dry quickly. Grasses that were moistened during a rainy night can become extremely dry within a few hours after sunrise, resulting in sudden changes in fire behavior. Noxious weeds can also be flashy fuels with similar characteristics and ROS potential as grasses, but can be even more hazardous when they die and become tumbleweeds, easily spreading fire when windblown.

Brush

Brush fires spread slower than grass fires, but burn at a much higher intensity. Gambel oak is extremely flammable, especially before leaf-out in spring and after dormancy in the autumn. Considerable dieback in oak has increased the portion of dead wood, exacerbating the fuel hazard. Mountain mahogany is not as flammable as oak, but still impacts overall fire intensity potential. 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, which may scorch but generally not consume trees. Individual trees may burn, referred to as torching. Crown fires occur when entire stands of trees are totally consumed. These fires are the most intense and devastating. Coniferous trees are more susceptible to crown fire than

deciduous trees. Torching and crown fires are the major source of ember production, which can start new fires (spot-fires) in vegetation and structures downwind.

Woody debris

Dead logs, branches, leaves and needles 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.

Fuel 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.

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

The Mount Herman CWPP area contains all four wildland fuel categories: grass, brush, timber and woody debris. The latter two are combined since most woody debris is present in the forested areas along the west edge of the CWPP area. Fuel Type descriptions for the Community and a Fuel Hazard Map follow in this chapter.

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. It is the primary factor in catastrophic fire events. High-velocity, warm, dry, downslope winds such as Chinook winds can cause fuels to dry rapidly, resulting in extreme fire behavior. In the Colorado foothills, winds tend to flow up valleys and slopes in the early hours as the east facing hillsides are heated by sunlight. Winds generally shift to downslope and down valley later in the day as the temperature gradient shifts.
- **Relative Humidity (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 to ignition temperature more quickly on hot days. In addition, when fuels are preheated such as from flames below on a steep slope, fire will burn at a higher intensity.

- **Climate:** The main fire seasons on the Front Range tend to be split, with most large fires occurring in the late spring or fall. The most devastating wildfire over the past decade occurred in June. However, large fires can occur anytime conditions are conducive.

Topography

- **Slope:** Defined as the angle of the ground relative to the horizon, slope is commonly measured as the percentage of rise-to-run. On calm days, heated air and flames rise and preheat fuels upslope, which causes an increase in fire spread. Gentle slopes have little effect on fire behavior; steep slopes have a significant impact. Dissected terrain such as incised gullies can cause a chimney effect, increasing potential ROS as fire runs up the main channel and sides of the gully. The combined effect of slope and wind can cause extreme fire spread. The Community is generally on gentle slopes of less than 15%. The exception is the far western periphery near the USFS boundary where slopes increase to 30%, and along short reaches within drainages. Except for these two scenarios, most of the Community's terrain favors lesser fire behavior.

- **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 more sun exposure, making them more susceptible to fast-moving fires. North, northeast and east aspects tend to have heavier fuels and under normal conditions, have slower-moving surface fires. Under extreme conditions such as high wind events or crown fires, these aspects can burn with great intensity, resulting in fires that are difficult or impossible to control. The Community is located primarily on an east aspect, with short-reaching variations in drainages. This east aspect is generally a positive in terms of fire behavior.

Nearby gullies affecting fire behavior

Current Vegetative Conditions

In the Mt. Herman area, Gambel oak is the most prevalent vegetative species, with continuous coniferous cover confined to primarily the west flank. Gambel oak varies from open-grown mature clumps, and contiguous areas of second-growth dense thickets. Grassy meadows with mountain mahogany and yucca are abundant. Portions of these meadows include populations of noxious weeds such as diffuse knapweed, yellow toadflax, common mullein, leafy spurge and Canada thistle. There are also invasive species such as cheatgrass, smooth brome and Russian thistle. Much of the Community has widely scattered ponderosa pine, including seedlings and saplings planted over the past decade. There are also isolated Douglas fir and Rocky mountain juniper.

The west edge of the Community transitions into a mixed conifer forest of Douglas fir and ponderosa pine. This area has considerable ladder fuels in dense fir regeneration and Gambel oak, in addition to a fair amount of downed woody fuel from past tree mortality. Much of the pine in this stretch is infected with the parasitic plant dwarf mistletoe, weakening these trees and leading to bark beetle infestation from both mountain pine beetle and Ips engraver beetles. The steeper slope lends concern to this more heavily forested area, which is contiguous with the mixed conifer forest to the west on the adjacent Pike National Forest.

Fuel Types in the Community

Three primary fuel types are found within and surrounding the Community, describing the predominant vegetation species relative to wildfire behavior. Numerous detailed fuel models exist for an array of fuel types across the country, addressing potential fire behavior, flame lengths, fire spotting, etc. These are utilized in complex fire behavior calculations and predictions. For the residents of the Community, fuel descriptions are simplified to Grasslands with Scattered Trees; Mature Brush with Scattered Trees; Mature Brush with Scattered Trees in Gullies and Drainages; and Heavy Timber.

> *Note: The rate of spread and flame length information listed below are general figures for fires with no slope and low winds (five miles per hour (mph)). Topography, high winds, fuel moisture and relative humidity will affect the rate of spread and flame length, and may be higher or lower during a wildfire.*

Grassland with Scattered Trees (Low to Moderate Hazard)

Grassland with Scattered Trees

- Typically light, flashy fuels with scattered yucca, tri-leaf sumac, mountain mahogany and Gambel oak. Occasional scattered ponderosa pine, Rocky Mountain juniper, pinon pine or Douglas fir. Moderate understory fuels may be present that can contribute to small areas of crowing. Noxious weeds include diffuse knapweed, yellow toadflax, common mullein, Canada thistle, Russian thistle, wild mustard and cheatgrass. The latter in particular can greatly increase wildfire spread. Tumbleweeds (primarily dead knapweed and Russian thistle) pose a serious hazard with the potential of spreading wildfire in wind events.
- Anticipated Fire Behavior in areas with scattered trees: flames less than five feet high, higher flare-ups rare but possible to heights well above tree tops; duration of high flame lengths brief; fire spread moderate to fast (~1 mile per hour); short and medium range spotting common; passing through a fire front sometimes possible but risky; portions of burned area can be occupied within 15-30 minutes.
- Anticipated Fire Behavior in grassy areas with no trees: flames less than five feet high, higher flare-ups rare and duration of flames brief; fire spread variable: slow to fast at 1-40 acres per hour; spotting rare and short-range; passing through fire front sometimes possible but risky; portions of burned area can be occupied almost immediately after flames pass. Grassy areas should be kept mowed and irrigated when close to structures.

Mature Brush with Scattered Trees (High Hazard)

Mature Brush with Scattered Trees

- Areas with heavy brush (Gambel Oak, tri-leaf sumac and mountain mahogany) and scattered ponderosa pine, Rocky Mountain juniper, pinon pine or Douglas-Fir. Much Gambel oak has heavy dead component from drought kill, bark borer attack, frost damage and fire mortality.
- Anticipated Fire Behavior: flames 5-20 feet high, brief duration and with high rate of spread of at least 40 acres per hour; short range spotting from blown embers is common; humans cannot pass safely through flames but can occupy burned area within 15 to 30 minutes.
- Fire Behavior can be considered Severe in high winds.

Mature Brush with Scattered Trees in Gullies or Drainages (Very High Hazard)

Mature Brush with Scattered Trees in Gullies or Drainages

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

underneath trees. South slopes primarily brush with few smaller trees, heavier grass component. Erosive soils. Gambel oak has heavy dead component.

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

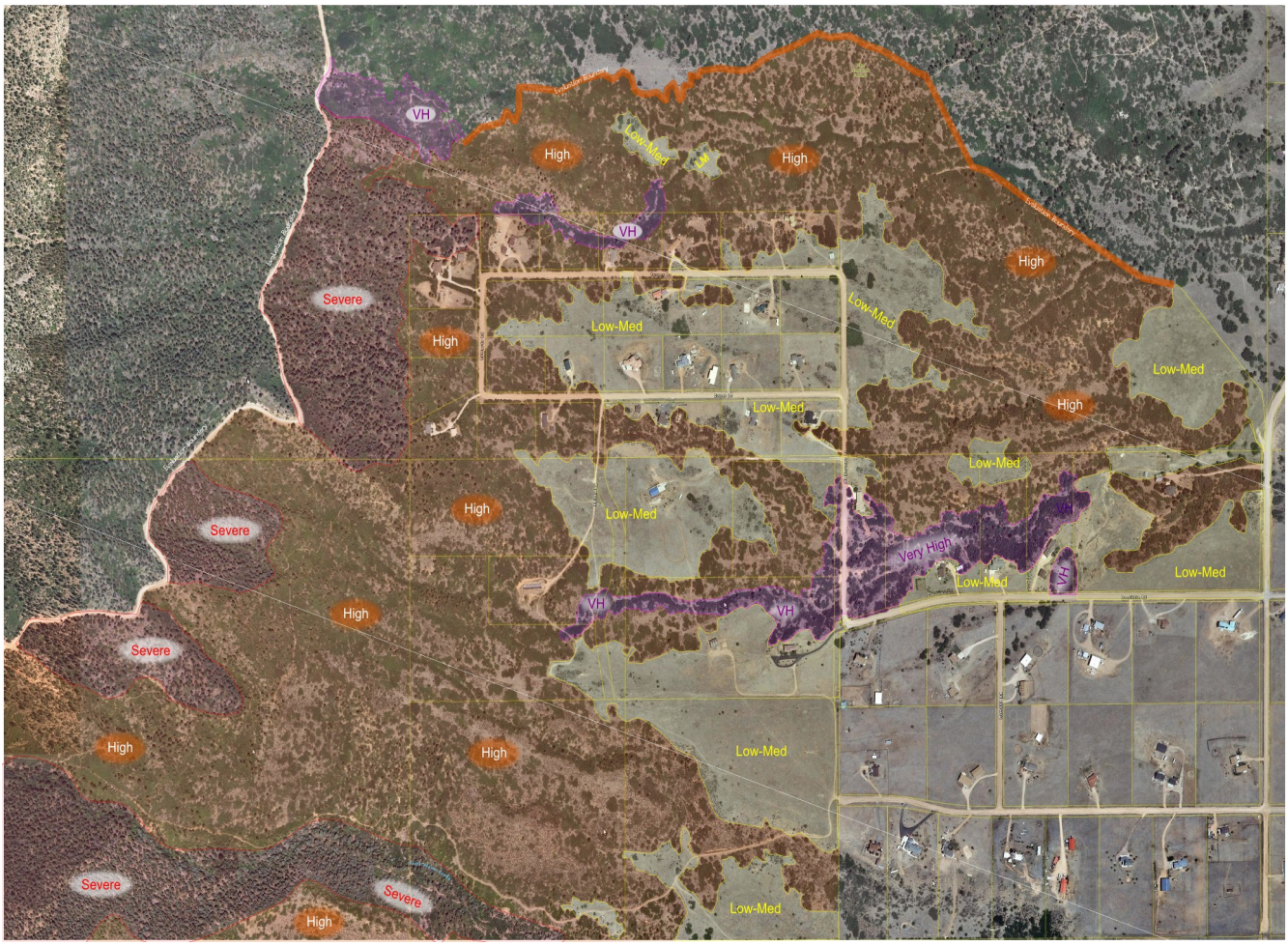
Heavy Timber with Understory Trees on a Slope (Severe Hazard)

Heavy Timber with UnderStory Trees on a Slope

- Areas with heavy, dense stands of ponderosa pine and Douglas fir. A heavy layer of overtopped and suppressed trees contributes to ladder fuels, particularly young Douglas fir. Thick understory poses the risk of channeling a ground fire into the main tree canopy, resulting in a devastating, fast-moving crown fire. Crown fire potential is high.
- Many ponderosa pines are infected with dwarf mistletoe, weakening and predisposing these to bark beetle attack. Considerable recent mortality in pine from mountain pine beetle and Ips pine engraver beetle.
- Moderate to heavy downed woody fuel component due to dead trees that have fallen over or broken off, increasing overall fuel loading.
- Anticipated Fire Behavior: flare-ups higher than tree tops are frequent to continuous; flame walls of 100 – 300 feet high; spread rates up to several hundred acres per hour are possible; long-range spotting several hundred yards is common, with spotting beyond one mile possible; burned area not safe to occupy for at least one hour.

Wildland Fuel Hazard Map

Wildfire hazard associated with fuel types described above is depicted spatially on the following map:



Wildland Fuel Hazard Map

COWRAP: Colorado Wildfire Risk Assessment Program

The Colorado State Forest Service has developed an analytical Wildfire Risk Assessment Tool (COWRAP). Summaries based on geographic areas are available upon request. All indices are calculated consistently for all areas in Colorado, allowing for comparison and ordination of areas across the state. This tool provides important information to support the following key priorities:

- Identify areas that are most prone to wildfire
- Plan and prioritize hazardous fuel treatment programs

- Allow agencies to work together to better define priorities and improve emergency response
- Increase communication with local residents and the public to address community priorities and needs
- Identify areas that may require additional tactical planning, specifically related to mitigation projects and Community Wildfire Protection Planning
- Provide the information necessary to justify resource, budget and funding requests
- Plan for response and suppression resource needs

Further information is available at www.ColoradoWildfireRisk.com

Readers should understand that COWRAP bases its fire behavior predictions on average weather recorded over time at adjacent weather stations. As a result COWRAP predicts fire potential on an average day, not the worst case scenario. Any residents who may be in lower fire hazard areas are reminded that fires burning on hot, dry or windy days will be more severe that predicted by COWRAP. The final risk assessment for the community is based on COWRAP data and the judgment of fire professionals.

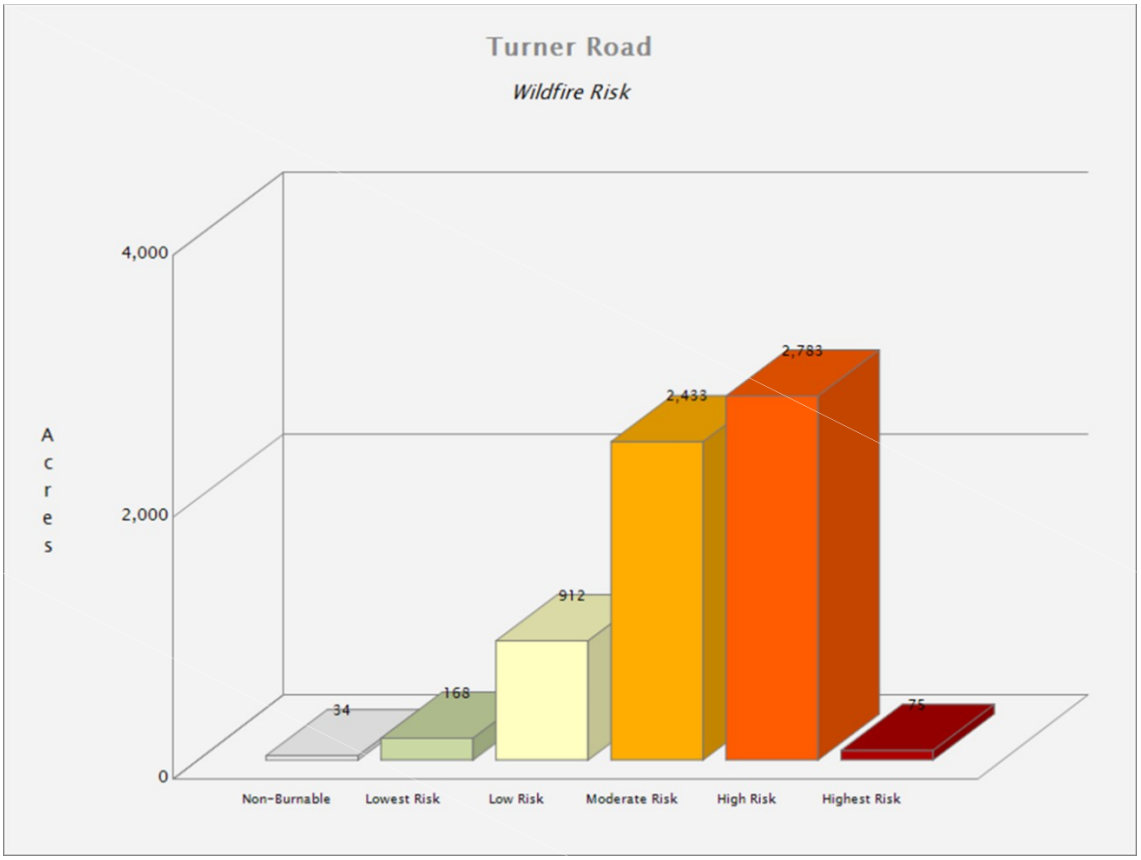
Note: because the Mt Herman CWPP area is relatively small, the following data is depicted graphically rather than spatially. Precise home locations, fuel types, terrain, etc., can easily be mapped at a more accurate scale, as included later in this document.

Wildfire Risk

Wildfire Risk represents the possibility of loss or harm occurring from a wildfire. This is the primary output of the COWRAP. Risk is derived by combining the Wildfire Threat and Fire Effects assessment outputs. It identifies areas with the greatest potential impacts from a wildfire – i.e. those areas most at risk – considering all values and assets combined together.

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 overall measure of wildfire risk. Comprised of several inputs focusing on values and assets at risk, Fire Effects are a key component of Wildfire Risk. The purpose of Fire Effects is to identify those areas that have important values or assets that would be adversely impacted by a wildfire. Fire Effects inputs include Wildland Urban Interface, Forest Assets, Riparian Assets and Drinking Water Importance Areas (watersheds).

To aid in the use of Wildfire Risk for planning activities, the output values are categorized into five classes. These are given general descriptions from Lowest to Highest Risk, categorizing most of the Community as Moderate to High Risk. Acres include the Area of Interest, in addition to a one-mile buffer zone:



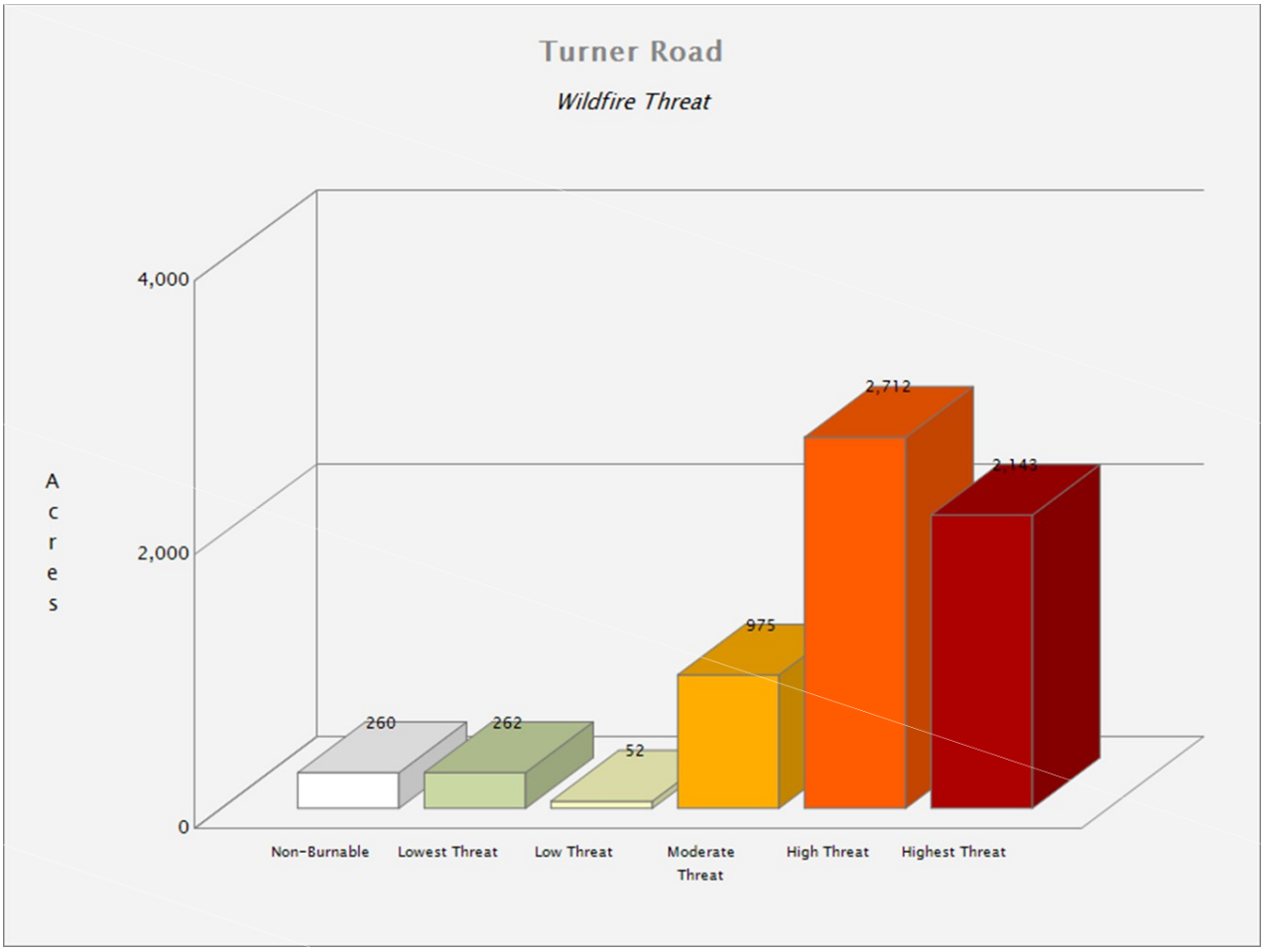
COWRAP Wildfire Risk Chart

Wildfire Threat

Wildfire Threat is the likelihood of an acre burning. The threat is derived by combining a number of landscape characteristics including surface and canopy fuels, resultant fire behavior, historical fire occurrence, percentile weather derived from historical weather observations, and terrain. These inputs are combined using analysis techniques based on established fire science.

The measure of wildfire threat used in the COWRAP is called Fire Threat Index (FTI). FTI combines the probability of an acre igniting (Fire Occurrence) and the expected final fire size based on rate of spread in four weather percentile categories.

To aid in the use of Wildfire Threat for planning activities, the output values are categorized into five classes. These are given general descriptions from Lowest to Highest Threat. The Community rates in the highest two threat categories:



COWRAP Wildfire Threat Chart

Hazards in the Home Ignition Zone (HIZ)

How Structures Catch Fire

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

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 in the WUI are fuel. Structures burn when the heat from a wildfire is transferred to the structure. Heat transfer can be from surrounding burning vegetation to structures or from burning structures to surrounding vegetation. There are three ways that heat can be transferred: radiation, convection, and firebrands.

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

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

Firebrands: Firebrands are embers that are blown ahead of a fire on strong updrafts created by the fire. Firebrands can be carried long distances – more than a mile – by the winds associated with a wildfire. Firebrands can ignite structures by landing on flammable materials either on or surrounding a structure. Firebrands are particularly detrimental to structures with flammable building materials, including wood shake roofs. Accumulations of flammable materials in roof valleys, in gutters, or directly adjacent to the structure can significantly increase a structure's vulnerability. Roofs and decks are the most vulnerable parts of a structure to fire brands. Autopsies of many homes lost during wildfires have shown that the majority were burned when firebrands fell on combustible roofs or decks, not from direct contact with flames.

The *2002 Hayman Fire* burned 132 homes. Surprisingly, 662 homes within the perimeter of the fire were not destroyed. USFS scientists Jack Cohen and Rick Stratton reported on the causes of home destruction in the *Hayman Fire Case Study*[2]. Many of the homes that survived did so without intervention by firefighters. The study objective was to determine if there were common factors among these surviving homes that might be helpful in preventing loss of homes in future wildfires. They found that torching or intense crown fires within 30 feet of a structure destroyed 70 homes. If a house was destroyed but the surrounding trees did not burn, they assumed that embers or firebrands ignited it. Based on this logic, they concluded that 62 of the 132 homes destroyed in the Hayman Fire were ignited by surface fires or firebrands.

Cohen and Stratton concluded that home destruction was related more to a house and its site-specific surroundings than to the context of the larger Hayman Fire. If the vegetation around a house allowed high intensity fires to burn near them, they did not survive. If the vegetation permitted only low intensity fires, the structures had a good probability of surviving. Flammability of roofs, decks, siding materials, and other house construction features raised or lowered the risk of flames igniting homes.

The two main factors affecting a structure's ability to survive a wildfire are the exterior building materials and the amount of defensible space within 100 feet to 200 feet of the structure, known as the Home Ignition Zone (Cohen 2008). The home ignition zone 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.

Many materials available for residential construction are fairly fire resistant, including stucco and stone combination or a cement siding product for exterior construction materials. Roofing materials are typically asphalt composite or concrete tile. El Paso County prohibits wood shake roofs in a wildfire hazard area.

Building Material Recommendations

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

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

2 Full: http://www.fs.fed.us/rm/pubs/rmrs_gtr114.pdf
Summary: http://www.fs.fed.us/rm/pubs/rmrs_gtr114/rmrs_gtr114_001_032.pdf

Creating Wildfire Defensible Zones

The Home Ignition Zone (HIZ) includes the home and its immediate surroundings within which burning fuels could potentially ignite the structure. This is usually considered to extend out roughly 100 feet from the home. The HIZ is often used to describe the area in which fuel modification measures should be taken to protect the home or other structure.

Defensible space is the area around a structure where vegetative fuels have been modified to slow the rate of spread of a wildfire towards the structure, and away from it if on fire. The primary focus of defensible space is to improve the structure's ability to survive a wildfire in the absence of firefighter intervention, and to greatly enhance a firefighter's ability to protect a structure during a wildfire event, and will also likely increase the chance that a particular home will be assessed as having a high change of saving from wildfire. Defensible space is an effort to reduce structure ignitability, but is not a guarantee a structure will survive a wildfire.

With the exception on ensuring adequately treated egress/evacuation routes, reducing hazards within home ignition zones (HIZ) within the Community are the highest priority for fuel hazard reduction activities. Homes and other structures should be treated to a level sufficient to prevent ignition from both flame impingement and aerial firebrands (embers). Detailed guidelines for provided in Appendix C: Protecting Your Home from Wildfire: Creating Wildfire-Defensible Zones.

General Fuels Reduction Prescriptions

Foresters manage trees not as individuals but in groups called stands. A stand of trees is defined as a group of trees that are similar with respect to age, species composition and other characteristics. Each stand is different from ones nearby, and each landowner may have different management objectives in addition to wildfire mitigation.

This information is intended to be a general and highly simplified summary of the basic concepts of wildfire mitigation. It is intended to provide an idea of how foresters approach the process of prescribing treatments for fire mitigation. When planning private fire hazard mitigation, an initial consultation with a forester is recommended. Specific prescriptions for any forest stand are best developed when the existing conditions and the landowner's objectives are known.

Forest Thinning

Foresters use many methods of forest thinning depending on the specific objectives of the landowner. Fuel break thinning is most often accomplished with a process called "thinning from below". Over-topped or suppressed trees are targeted for removal, since they are usually less healthy and can serve as ladder fuels. If these are pines, they are likely the same age as the taller trees. Smaller Douglas firs could indeed be much younger since they can more easily establish under the shade of a tree canopy or in breaks in the forest. The primary objective is to retain the healthiest, dominant trees to the extent possible, to decrease forest density to a level where tree vigor is enhanced, insect and disease risk is lessened, and fires have a better chance of staying on the ground. It is essential when thinning the forest for fuel breaks to remove ladder fuels and create enough openings in the tree canopy to reduce crown fire risk. Thinning from below is desirable in fuel reduction projects because it leaves the most vigorous trees, creates openings in the forest canopy by removing less healthy trees, and eliminates ladder fuels by removing over-topped trees and shrubs. Additionally, pruning of lower limbs of remaining trees will help prevent a fast-spreading crown fire.

Gambel Oak Treatment

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

temperatures and high rates of spread, resembling a raging inferno.

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

Thinning of Gambel oak can often be accomplished by separating clumps rather than individual stems. Recommended spacing requirement between shrub clumps is 2½ times the height of the vegetation. The maximum recommended diameter of clumps is 2 times the height of the vegetation. Measurements are made from the edges of vegetation crowns. Additionally, oak should be thinned, removing smaller, overtopped brush and stems, especially those that are leaning close to the ground. This is particularly important within HIZ Zones 1 and 2. This will enhance vigor of the remaining larger oak, promoting a more park-like structure and likely improving aesthetic quality.

Detailed information on Gambel oak ecology and management is included in Appendix D. This informative CSU Extension Publication #6.311, Gambel Oak Management is also available online at http://extension.colostate.edu/docs/pubs/natres/06311.pdf.

Slash Treatments

Slash treatments are needed to clean up woody residue from forest thinning treatments. Untreated slash will only increase the fire hazard – possibly undoing the positive benefits of thinning. It can also attract undesirable insects to the area, primarily Ips engraver beetles which prefer freshly downed trees and branches, posing a serious problem in ponderosa pine over the past several years. Slash treatment may be the most labor intensive and expensive part of any fuel mitigation project. There are several options to treat slash. The best choice will depend on the situation.

Chipping: Chipping is the grinding up of slash into small pieces by mechanized equipment. Slash is hauled to the chipper, unless it is an expensive mobile chipper. Chipping is quick and effective, with resulting wood pieces usually less than a few inches in diameter. Material can be spread on site to a depth not to exceed three inches, allowing for herbaceous growth and minimizing negative impacts on soil microbes. Chips can also be sprayed into a truck and removed from site if access allows. Chipping is a common method of slash disposal in defensible zones around structures. Large piles of chips should be avoided as they could smolder for a significant amount of time, and attract Ips beetles, which breeding in freshly downed conifer trees and branches (see Appendix E).

Community Chipping Projects: Many communities have found that an effective way to promote mitigation is to sponsor a community chipping program. Most landowners are more willing to undertake the effort of thinning brush and trees if there is a simple, low cost way to remove the slash.

A “drive by” chipping program consists of bringing a chipper to the neighborhood. Residents drag slash to the curb or accessible spot where it will be chipped on-site. The chips are generally blown back onto the property. Neighbors can work together to rent a chipper, or CUSP may be available to provide this service for a very reasonable fee. The Mt Herman Community held four chipper days in 2015, with Home Depot donating a chipper, and CUSP donating a chipper and crew for a large-scale volunteer day in April, 2015. Alternatively, landowners may haul slash to a community slash site to be ground and given away as mulch. Most sites are open on designated days and staffed by volunteers from the sponsoring community. The Black Forest Slash Mulch program has been a strong asset in helping areas communities dispose of woody debris. Information on this is available at http://adm.elpasoco.com/Environmental%20Division/Recycling%20Information/Documents/2015%20Black%20Forest%20Information.pdf

Mastication (Trampling, Crushing, Roller Chopping): This utilizes heavy equipment to run over the slash, breaking it down in both size and height. This is typically performed by a Bobcat or similar equipment with a mulching head, which knocks down brush and small trees and pulverizes it into chunks. These woody pieces are considerably larger than chipped pieces, leaving a messier appearance. It can also crush and break up heavy fuels such as downed logs. Woody debris is broken down and driven into the soil. T his can add nutrients to the soil faster, create small pockets in the soil surface for holding water, and decrease the potential for erosion. Mastication is very effective and cost-efficient, but may be infeasible in very rocky or steep areas.

Lop and Scatter: This treatment uses saws to cut the slash into smaller pieces so the height of the remaining slash is reduced, usually less than eight inches high by 18 inches long. It may be the only practical treatment in areas where chippers are unavailable, prohibitively expensive or in locations hard to access. It is usually the lowest cost treatment since only a chainsaw is required. The treated slash is left to decompose, and until it breaks down it will be unsightly. Over the course of several winters, snow pack pushes the slash down and it decomposes. Decomposition usually requires ten years or longer in this dry climate. It creates an extremely flammable fuel bed until it decomposes, which can be easily ignited and burn with high intensity. Unless conifer slash is scattered widely, it can attract Ips beetles. This method should not be used in visually sensitive areas or adjacent to homes.

Pile Burning: Piling slash for subsequent burning is an option for slash removal, albeit more risky. Piles take up to a year to cure, elevating wildfire hazard in the interim. Any form of open burning requires a permit. The sheriff in each county is by law the county fire marshal, but often the authority to issue burn permits is delegated to the local fire protection district. Anyone contemplating pile burning should check with the sheriff’s office in the early planning stages to determine the proper procedure to obtain a burn permit. Further permission must be secured immediately prior to ignition to assess weather conditions and potential wildfire risk. In El Paso County, private land burning is also regulated through the State Department of Public Health and Environment, and requires a smoke permit. The open burning page of the DOPHE website for the department is https://www.colorado.gov/pacific/cdphe/categories/services-and-nformation/environment/air-

quality/outdoor-burning . Additional information on pile burning is available at http://www.nachi.org/slash-piles.htm. El Paso County recently enacted policies for slash pile burning. Pile burn regulations can be accessed at: http://news.elpasoco.com/Documents/EPC%20Open%20Burning%20Ordinance.pdf

For most landowners, slash piles are burned when conditions are safe, usually with several inches of snow on the ground that will persist for a couple days. This will depend on what type of material is contained in the pile. Material greater than five inches will take longer to burn and will hold heat for more time. Piles burn best when they are relatively compact, contain material less than one inch in diameter, with pile height greater than diameter. This arrangement promotes hotter burning and less smoke.

Community Protection Resources and Capability

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

Professional Wildland Fire Response Services

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

El Paso County Emergency Services will also provide assistance; TLMFPD will coordinate these services.

Tri-Lakes Monument Fire Protection District

Tri-Lakes Monument Fire Protection District (TLMFPD) is the first responder to a sighted or reported wildland fire threatening the environs surrounding and the Mt. Herman neighborhood. TLMFPD has three stations:

Station 1: 18650 Highway 105

Station 2: 18460 Roller Coaster Raod

Station 3: 1855 Woodmoor Drive

Fire engine quantities and NWCG types:

3 - Type 1 (pumpers)

4 - Type 6 (brush)

Emergency Medical Services

TLMFPD provides first response emergency medical services to the neighborhood. The list below is the breakdown of TLMFPD emergency personnel resources and staff.

- 50 firefighters/EMTs/paramedics

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

Water Resources

TLMFPD currently has emergency water supplies located throughout the district. Other supplies may be available if needed through the use of small bodies of water close to or in the district. A map of water storage facilities will be added upon update of the CWPP.

Safety Zones/Staging Areas

During emergency situations, it may be necessary for residents and emergency services providers to reach a safe place that is outside of the affected part of the community. TLMFPD, in conjunction with other wildfire authorities, recommends establishment of Civilian Staging areas outside the neighborhood. These can be used as reasonable safe areas where little or no wildfire risk exists in close proximity to either natural (vegetation) or man-made (homes) fuels. These may serve two purposes. The first is as refuge from any wildfire threat. The second is as staging areas to allow timely and orderly evacuation of residents. It should be noted that many of the civilian fatalities from wildfires are caused during evacuations in which residents become trapped and overrun by fire. Once residents are evacuate, these Civilian Staging Areas may be used by firefighters for staging areas or fire fighter safety zones for marshalling resources within the community.

Internal Volunteer Services and Communications

TLMFPD does not currently support any volunteer and paid groups, other than staff, that can be used in communication support or augmentation of professional first-responders within neighborhoods in the event of a wildfire emergency. It is strongly recommended that the property owners implement operating agreements with TLMFPD that allow for use of properties and facilities during emergency situations.

The most frustrating issue for residents during wildfire events is a lack of information. Local media cannot always be relied on for timely and accurate information. Residents may be away from the community at the outbreak of an emergency and require information necessary to protect family members and pets still at home. Possible information sources are El Paso County web sites.
The El Paso County Sheriff's Office (EPSO) may also have an emergency phone line set up to provide information.

The Mt. Herman CWPP will develop an emergency response plan for interaction with emergency services providers. This needs to be developed prior to emergencies and allow access designated

representatives to the Incident Command Center or Outpost. In effect, this representative could provide accurate and timely information for distribution over existing community networks (web site, phone trees, and office staff).

El Paso County Emergency Services

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

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

Emergency Operations Center

An Emergency Operations Center (EOC) is one of the jurisdiction's specialized facilities to include personnel and equipment that is specifically designated for use in emergency situations. It is a public resource that serves as:

- A command center with communications equipment.
- An operations center for government officials, volunteers and special agencies.
- An information center that analyzes and disseminates information.

The county office responsible for the EOC's operations is the Office of Emergency Management (OEM). This office develops exercises to test staff and communications to ensure the facility and its plans are functional.

Community Emergency Response Team

FEMA has established programs for training of local residents in dealing with multiple hazards, such as wildland fires. This program – CERT (Community Emergency Response Team) – is recommended and can be set up and organized under TLMFPD and EPC-OEM. These voluntary groups are only used when professional first responders cannot respond, and then can only be activated by authorization of the Emergency Services Manager or the Chief of the local Fire Protection District.

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

EPSOWF provides engine crews and Type II hand crews for all ranges of wildland fire suppression from initial attack to mop-up, prescribed burns, and urban interface protection. In addition to fire suppression activities, the crews provide public services in the form of training and education. Each fire department is responsible for "red card" and wildland fire training activities for each fire department throughout the county. They also assist the USFS, BLM, CSFS, Department of Defense (DOD, Air Force, Army), and National Park Service.

Critical Utilities

In the event of a wildland fire that would impact the neighborhood, TLMFPD or EP-OEM Incident Command dispatcher would notify critical utilities for their support. Specifically, emergency involvement of utility support would focus on two areas: 1) Emergency responder safety and 2) Direct support of mitigating the emergency event.

For Emergency Responder Safety

Beyond the direct emergency event, damaged or threatened gas services and electrical distribution facilities can pose significant safety issues to the public and emergency response personnel. Direct intervention for disconnection, reconstruction or rerouting would be directed by:

Natural Gas Services:

Aquila.....800-303-0357

Electrical Power Services:

Mountain View Electric Association.....800-388-9881

For Direct Support

Direct support for water and communication resources in support of an emergency event would be directly provided or directed by:

Water Districts:

Town of Monument.....719-481-2954

Woodmoor Water & Sanitation.....719-488-2525

Tri-View Metropolitan District.....719-488-6868

Forest View Acres Water District.....719-487-1412

Donala Water & Sanitation.....719-488-3603

Wire-Line Communications:

QWest (Centurylink) Communications.....800-573-1311
Qwest alternate.....800-603-6000

Comcast.....303-930-2000

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

Railroads

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

Burlington Northern Santa Fe.....800-832-5452

Property Owner Responsibilities

Property owners should install address markers that are clearly visible from the road:

- All letters and symbols should be a minimum of 4 inches in height with a ½ inch stroke, and should be reflectorized and contrasting with the background of the sign.
- Signs should be visible from the road and not mounted more than 6-8 feet higher than the roadway surface.
- Signs should be visible from both directions of travel.
- Non-flammable sign materials are recommended.

Community Resources

Water Storage and Supplies

There are few producing water wells in the area. On-site water sources are limited, as is typical of rural areas. Fortunately, many residents have on-site water storage cisterns that can be accessed for firefighting. Existing static storage in the neighborhood exceeds 17,500 gallons.

Cisterns in the Mt. Herman community

16470 Fallon Rd.....2 x 5,000 gal. cisterns

4580 Turner Rd.....3,000 gal. cistern and 4000 gal. truck

4700 Turner Rd.....1,500 gal. cistern and 500 gal. truck

16540 Edwards Rd.....3,000 gal. cistern and 600 gal. truck

4595 Evans Rd.....450 gal. storage

4355 Turner Rd.....200 gal. storage

4520 Evans Rd.....450 gal. storage

Future Goal: Establish water reserves in the form of much larger storage tanks on personal property sites with easy access.

Water Tender Fleet (Hose Monkeys)

In addition to our on-site water storage, the community has an organized water tender fleet (water trucks) that can bring water into the area for firefighting and other emergency needs. Six trucks can transport over 6000 gallons per trip cycle; with a cycle time of 15 to 30 minutes depending upon the water source. In addition to the truck and drivers, the fleet includes communications and dispatchers to work with on-site incident command.

Power Generators

About a half dozen resident-owned portable power generators are available in the community for emergency use.

Heavy Equipment

Several area residents also own heavy equipment – loaders, bulldozers, and backhoes – that can be used during firefighting operations.

Priority Projects and Prescriptions

This is our Community Mitigation plan.

To allow for a logical separation of projects, (along the lines of dominant fuel types), the community is broken out into four areas - represented by the cardinal directions. The North flank contains properties on both sides of Turner Road and its northern boundary is adjacent to Forest Service property. The East flank contains properties on both sides of Mt. Herman Lane and also includes three properties on the north side of the west end of Doolittle Road. Its eastern boundary is adjacent to Forest Service property. The South flank contains properties on both sides of Evans Road and its southern boundary is open to private property, predominantly level grasslands. The West flank contains properties on both sides of Edwards Road and its western boundary is adjacent to Forest Service property.

Adjacent Forest Service lands influence all of the planned projects since it is clear that Public activities may cause a wildfire that could quickly threaten the community. Likewise, it is also recognized that any human caused wildfire that might originate within this community must be prevented from spreading onto these Federal lands. Aside from "defensible space" around each of the residences, the major theme of all of these projects is to create "fuel breaks" along roads and driveways and between sections of significant continuous fuels.

Projects have been scoped within each of these four units. Grouping residences within units has also simplified notification call lists for both group activities and emergencies.

For project planning, defensible space is calculated per CSU Fire 2012-1. Zone 1 is 30 feet out from a structures edge. Zone 2 is the next 70 feet out and away from Zone 1. Zone 3 is defined as the remainder of a person's private property, outside of Zones 1&2. Since some properties may have considerable acreage, Zone 3 areas may be identified by each land owner as areas adequately sized and treated to reinforce the inner defensible spaces by weakening any approaching wildfire. Zone 1 has been calculated as approximately 0.15 acres around a home. Zone 2 is approximately 1.0 acre of land surrounding a home and its Zone 1 landscape. Zone 3 sizing will vary with the conditions presented by each residence's terrain and flora.

All roads within the Mount Herman CWPP are county roads with a Right of Way (ROW) sixty feet in width. These roads are unpaved and are thirty feet wide, from ditch-to-ditch center line. Approximately 12 to 15 feet of vegetation lies between the ditch and the abutting property. During 2015 the County has added to and upgraded the signage throughout the community. To date, all projects worked within the road's ROW have been accomplished under Road Work Permits obtained from the El Paso county transportation office. This work was necessitated since Tri-Lakes Monument Fire deemed the overgrown roads to be of the highest priority for firefighter safety and ingress and egress.

The original platting of the community in 1958 called for 12 foot wide utility easements at the back of

the properties. However, to date, all utilities have been placed in the county road's ROW. Generally, Mountain View Electric's 20' power poles, transformers and lines are located at the back of the road ROW, directly abutting the private property line. Black Hills Energy's gas lines and meters are located behind the ditch, in the road's ROW on the other side of the road, along with the old phone lines. No other utilities are located within the community. Gas utilities have no requirement or need to clear vegetation above their buried facilities and therefore will not be working in the ROW. Likewise, Mountain View Electric has a low priority for clearing the ROW beneath and around their lines since this is a tail end-single feed system vs. a transmission line. Also, the Gambel oak vegetation is not a threat to their assets from the perspective of trees falling onto the power lines during high winds or an ice storm.

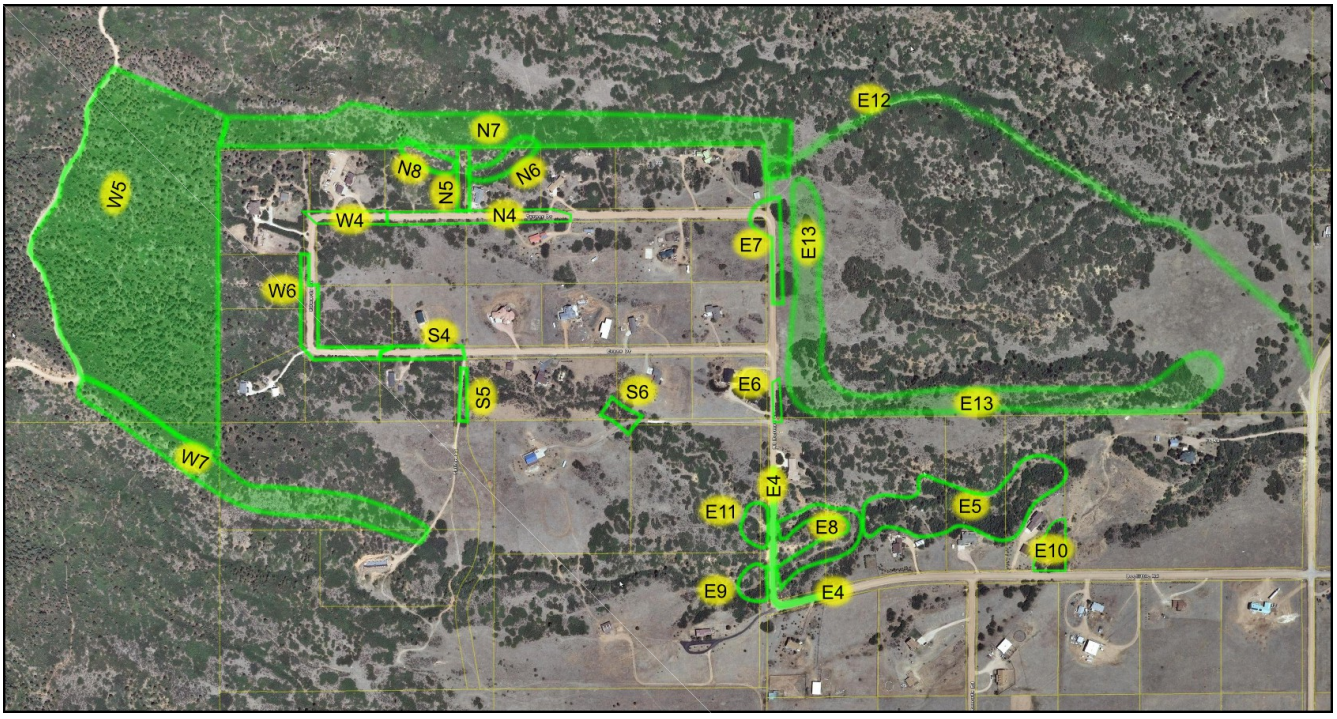
The dominant fuel throughout the community is Gambel oak and the fuel treatments that are being put into affect are per CSU no. 6.311 *Gambel Oak Management*. The most significant "lesson learned" is that based on the re-growth and required annual maintenance work load, extra effort must be placed on stump and rock removal. This will compliment the ease of mowing operations in treated areas. Mowing could be effective once per year using commercial grade mowers. But using residential sized mowers will require twice per year mowing, due to stem sizes. Note: Due to oak regrowth, even as this project list is reduced the next year's maintenance work load increases.

Gullies are the dominant terrain feature in this community. Gullies will exacerbate fire behavior by causing winds to (channel) flow up drainages. Many projects are proposed for these gullies and are derived to stop or mitigate this fire channeling affect. All of the gullies that impact this community originate on Forest Service land to the east. For clarity in project planning these gullies will be numbered (from south to north) and as they branch they will be called out by north and south forks, etc. For example; project E-9 is proposed to treat the south slope of the south fork of G-1, beneath a residence.

Fuel breaks are the theme of many of the projects outlined below. This CWPP recognizes the many values of a fuel break; not just to slow down a moving wildfire, but also to provide an obvious location for aerial assets to drop water and slurry in order to complement the efforts of fire crews on the ground. This was a notable success for the Cedar Heights Community during the Waldo Canyon Fire. This CWPP also understands that fuel breaks must be routed and constructed in a manner that will facilitate future maintenance, i.e. mowing or mastication.

The private property within this CWPP is less than a quarter section, 150 acres, surrounded on three sides by thousands of Forest Service acres. There are currently twenty four residences (with one new residence in the planning stage) and three remaining 2.5 acre lots that have the potential to be built on in the future. Support or cooperation with the CWPP process is high among the 25 present residents.

Prioritized Projects



Community Project Map

Each of the four flanks prepared a list of tasks within their area. At several meetings these tasks were presented to the overall group and eventually this work was broken out into specific projects. The project list reached a total of 34; 8 from the north flank, 13 from the east flank, 6 from the south flank, and 7 from the west flank. Some projects were outside of our area of influence and some projects were left to the control of individual property owners. Putting those aside, 18 of the 34 projects were viewed as community efforts. The groups then ranked their "community type" projects into an order of importance for their own flank. This list of 18 projects was reviewed and the ten most relevant and attainable were pulled out. Some of the "nearly complete" projects were grouped together and finally, each was ranked as a Priority 1, 2, or 3.

This "top 10" list of projects will be used for planning work during 2016.

Following the summary table below is a compilation of all 34 projects which have been identified at this time. The community worked on many of these projects during 2014 and 2015 and the write-ups reflect their current status. Whenever a project has not been assigned a Flank Ranking or a Community Priority, it is signified by the symbol (*).

Top Ten Projects

Project	Description	Treatment
Priority 1		
E-4	"the Gauntlet"	Maintenance & widening
S-4 & S-5	County road fuel breaks	Maintenance & widening
E-5	Zone 2&3 for 3 residences, fuel break in G-1	Community effort on private properties; Zone 2 thinning
Priority 2		
W-6	"Choked" ROW through absentee landowners	Clear the county road ROW
N-5	County's ROW	“Feathered” clear-cut
N-6	Zone 2&3 for 2 residences, fuel break in G-3	Community effort on private properties; Zone 2 thinning
Priority 3		
E-6 & E-10	ROW projects that lay at the head of two gullies	Maintenance & widening
W-4	County road fuel break	Maintenance & widening
E-7	Potential Fire Dept. staging area	Clear the ROW on a Forest Service section
E-8	Suppress G-1's thread to “the Gauntlet”	Break up fuels into clumps in G-1

North Flank

Homes are intermixed with pockets of Gambel oak. Some widely dispersed ponderosa pines are also present on private properties. Portions of Gambel oak are continuous and need to be broken into clumps. Forest Service lands along the north property lines are unbroken Gambel oak with widely dispersed conifers. The fuel types are either Low to Moderate (on the south side of Turner Rd.) or Very High (on the north side of the road).

This flank covers 23 privately owned acres and has 5 residences. There are no future building sites.

*Project Code.....**N-1***
*Flank Ranking.....**
*Community Priority.....**
Size.....0.75 acres
Fuel Type(s).....Low Moderate

This project prepares a Zone 1 defensible space around all 5 residences in the North flank. All 5 residents had completed much of this work prior to the May 2014 initiation

of this CWPP and that is why the fuel type is deemed Low Moderate. During the ensuing year most of this project has been completed. This project is considered 90% done and will be completed after a review process is prepared and implemented.

*Project Code.....**N-2***
*Flank Ranking.....**
*Community Priority.....**
Size.....4 acres
Fuel Type(s).....High

This project prepares a Zone 2 defensible space around all 5 residences in the North flank. Some of this work had been completed prior to the May 2014 initiation of this CWPP. During the ensuing year most of this project has been completed. This project is considered 90% done and will be completed after a review process is prepared and implemented.

*Project Code.....**N-3***
*Flank Ranking.....**
*Community Priority.....**
Size.....6 acres
Fuel Type(s).....High

This project is to prepare a Zone 3 defensible space around all 5 residences in the North flank. Very little of this work had been completed prior to the May 2014 initiation of this CWPP. During the ensuing year most of this project has been completed, due to residents utilizing the SWIFT crew. This project is considered 90% done and will be completed after a review process is prepared and implemented.

*Project Code.....**N-4***
Flank Ranking.....4
*Community Priority.....**
Size.....0.66 acres
Fuel Type(s).....High

This project is designated to remove fuels from the ROW portion of Turner Road to allow safe passage during a fire event and to make Turner Road into a substantial fire break between N-S moving wildfires. Portions of this project have been worked during three community chipper days and it is deemed 40% complete.

*Project Code.....**N-5***
Flank Ranking.....1
Community Priority.....2
Size.....0.22 acres
Fuel Type(s).....Very High

This is a community project to clear the 30 foot wide county ROW that extends north from Turner Road to the USFS boundary. This would be a mix of clear cutting and thinning in order to keep the edges feathered and natural in appearance. The corridor will provide a fuel break between the community's N and W units and it could potentially tie-in to the USFS fuel break (N-7). It will also provide a work pathway for projects N-6 and N-8.

*Project Code.....**N-6***
Flank Ranking.....2
Community Priority.....2
Size.....1.5 acres
Fuel Type(s).....Very High

This project proposes to treat the south slope of the middle fork of G-3, east of N-5. This slope is directly beneath the Zones 1 & 2 areas of two residences and is contained on private property. Because of the steep slope this is Zone 2 type treatment. Substantial work has been completed by the land owners and this project is considered 50% complete.

*Project Code.....**N-7***
Flank Ranking.....5
*Community Priority.....**
Size.....10 acres
Fuel Type(s).....Very High

This is the north portion of the USFS proposed fuel break and fuels reduction. It's estimated to be 100' wide (varying by terrain) and 4200' long, running from the Northeast corner of Mt. Herman Estates, west to Mt. Herman Road. This CWPP group will provide input and comments to the USFS Plan.

*Project Code.....**N-8***
Flank Ranking.....4
*Community Priority.....**
Size.....1.5 acres
Fuel Type(s).....Very High

This project proposes to treat the south slope of the south fork of G-3, west of N-5. This slope is directly beneath the Zones 1 & 2 areas of a single residence and is contained on private property. Because of the steep slope this is Zone 2 type treatment.

East Flank

Homes are intermixed with pockets of Gambel oak. The slopes of G-1 contain considerable conifers mixed with the oak, all on private properties. Portions of the Gambel oak are continuous and need to be broken into clumps. USFS lands along the north property lines of the properties along Doolittle Rd. are unbroken Gambel oak with widely dispersed conifers. The fuel types are either Low to Moderate (along the north section of Mt. Herman Lane) or Very High (the remainder/bulk of the unit).

This unit covers 60 privately owned acres and has 6 residences. A seventh residence will be built in the near future and its construction will comply with the goals of this CWPP. There are no other future building sites.

*Project Code.....**E-1***
*Flank Ranking.....**
*Community Priority.....**
Size.....0.9 acres
Fuel Type(s).....High and Moderate

This project is to prepare a Zone 1 defensible space around all 6 residences in the East flank. All 6 residents had completed much of this work prior to the May 2014 initiation of this CWPP. During the ensuing year more of this project has been completed. This project is considered 60% done and will be completed after a review process is prepared and implemented.

*Project Code.....**E-2***
*Flank Ranking.....**
*Community Priority.....**
Size.....4.5 acres
Fuel Type(s).....High

This project is to prepare a Zone 2 defensible space around all 6 residences in the East

flank. Some of this work had been completed prior to the May 2014 initiation of this CWPP. This project is considered 50% done.

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*Project Code.....**E-3***
*Flank Ranking.....**
*Community Priority.....**
Size.....6 acres
Fuel Type(s).....Very High

This project prepares a Zone 3 defensible space around all 6 residences in the East flank. Little to no work has been completed in this Zone. However, nearly all of the Zone 3 spaces will be covered by other East flank projects which address dangerous slopes and fuel loadings in gullies G-1 and G-2. This project code status will be updated as the related projects are worked.

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*Project Code.....**E-4***
Flank Ranking.....1
Community Priority.....1
Size.....0.5 acres
Fuel Type(s).....Very High

This project received the name "the Gauntlet" even before the first CWPP meeting, based on the fire department's determination that they would not enter Mt Herman Estates if the Waldo Canyon fire reached this location. This was because of the multiple overgrown gullies crossing this singular ingress/egress route. During 2015 this 1000 foot long ROW project was hit hard by the community and is considered 100% complete; but requiring ongoing maintenance. The fire department has reviewed and approved the condition of "the Gauntlet".

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*Project Code.....**E-5***
Flank Ranking.....2
Community Priority.....1
Size.....4 acres
Fuel Type(s).....Very High

Gully G-1 passes through private property, just north of three residences. Its south slope leads directly up to the structures. The slope constitutes Zones 1, 2 and 3 for these residences. The gully is deep and offers no simple route to remove slash for chipping. Treatment for this slope may require that slash will be cut, dragged, and stacked for winter burning.

*Project Code.....**E-6***
Flank Ranking.....3 (along with E-7 & E-10)
Community Priority.....3
Size.....100 sq. ft.
Fuel Type(s).....Very High

This is a ROW project on USFS land. This patch of oak is at the head of the south fork of G-2 and it is a Zone 3 area for a residence on the other side of Mt. Herman Lane. This project was started by the community and is 90% complete.

*Project Code.....**E-7***
Flank Ranking.....3 (along with E-6 & E-10)
Community Priority.....3
Size.....0.5 acres
Fuel Type(s).....Very High

This is a ROW project on USFS land and private land. These patches of oak are a threat to the "safe zone" that the fire department has requested for staging equipment along Mt. Herman Lane. This project was started by the community and is 60% complete. The oak clumps should be clear cut from the ROW and thinned to Zone 2 conditions beyond the ROW.

*Project Code.....**E-8***
Flank Ranking.....4
Community Priority.....3
Size.....2 acres
Fuel Type(s).....Very High

This project proposes to thin the south fork and the north fork of G-1 as it approaches "the Gauntlet", in order to suppress the intensity of a wildfire channeling up the gully. This would protect "the Gauntlet" and reinforce Mt. Herman Lane as a N-S substantial fuel break. Like E-5, the treatment for these gullies may require that slash will be cut, dragged, and stacked for winter burning.

*Project Code.....**E-9***
Flank Ranking.....5
*Community Priority.....**
Size.....2 acres
Fuel Type(s).....Very High

This project would thin the south fork of gully G-1, on the west side of Mt. Herman

Lane. This project has two purposes; to protect a residence that is at the crest of the south face of the gully (this steep slope is Zone 3 for the residence) and to suppress the intensity of a wildfire channeling through the gully (in order to reinforce Mt. Herman Lane as a N-S substantial fuel break).

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*Project Code.....**E-10***
Flank Ranking.....3 (along with E-6 and E-7)
Community Priority.....3
Size.....1000 sq. ft.
Fuel Type(s).....High

This ROW project addresses heavy growth at the head of a gully crossing Doolittle Road. If this gully were fully involved during a wildfire it would impede the progress of fire equipment into the community and it would block the preferred evacuation route to the east. Clear the ROW and thin away from the ROW to reduce fire intensity approaching the road.

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*Project Code.....**E-11***
Flank Ranking.....6
*Community Priority.....**
Size.....2 acres
Fuel Type(s).....Very High

Mitigate oak and brush on the steep slopes of the north fork of G-1 on the west side of Mt. Herman Lane to suppress fire behavior through the gully. This reinforces the road as a fuel break and protects "the Gauntlet" as an ingress/egress route.

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*Project Code.....**E-12***
Flank Ranking.....7
*Community Priority.....**
Size.....1 acres
Fuel Type(s).....Very High

Establish an evacuation route through the USFS land, NE and east from the community. This route follows a two-track that was used during the years that USFS lands were leased for grazing, until the Berry Fire in 1989. The route descends through the south fork of G-3, 1800 feet until it enters a meadow, for the last 700 feet to a gate in the USFS fence at Lindbergh Road. Discuss this project with USFS personnel, as a possible fuel break or equipment route for their Upper Monument Creek project.

*Project Code.....**E-13***
Flank Ranking.....8
*Community Priority.....**
Size.....3 acres
Fuel Type(s).....Very High

This is the east portion of the USFS proposed fuel break. It's estimated to be 100' wide and 1500' long, running from the meadow along Lindbergh, west to a meadow that lies to the north of our Doolittle Road properties, and then NW across G-2 to the meadow just east of Mt. Herman Lane. The CWPP group will provide input and comments to the USFS Plan.

South Flank

The south flank of the CWPP is open grassland except where it is incised across its full width by the south fork of G-1, and again by the north fork of G-1. These gullies are choked with Gambel oak and projects in this unit attempt to break the East-West continuity of these fuels. The affect of wind channeling and these heavy fuel loads make these two gullies into wicks or fuses that would feed a wildfire from one zone to another. And, in the case of the north fork, the fuse goes right through two residences.

This zone covers approximately sixty three privately owned acres and has 9 residences built on it. No future building sites are currently identified, but due to the larger acreages, some owners could potentially subdivide and sell lots.

*Project Code.....**S-1***
*Flank Ranking.....**
*Community Priority.....**
Size.....1.35 acres
Fuel Type(s).....Low and Moderate

This project is to prepare a Zone 1 defensible space around all 9 residences in the South unit. All 9 residents had completed much of this work prior to the May 2014 initiation of this CWPP. During the ensuing year more of this project has been completed. This project is considered 90% done and will be completed after a review process is prepared and implemented.

*Project Code.....**S-2***
*Flank Ranking.....**
*Community Priority.....**
Size.....9 acres
Fuel Type(s).....Low and High

This project is to prepare a Zone 2 defensible space around all 9 residences in the South unit. Much of this work had been completed prior to the May 2014 initiation of this CWPP. This project is considered 80% done.

*Project Code.....**S-3***
*Flank Ranking.....**
*Community Priority.....**
Size.....3 acres
Fuel Type(s).....Low and High

This project is to prepare a Zone 3 defensible space around all 9 residences in the South unit. Like Zones 1 and 2, six of the 9 residences are in open grasslands and two of the three remaining have completed their Zone 3 mitigation. This project is 90% complete.

*Project Code.....**S-4***
Flank Ranking.....2
Community Priority.....1
Size.....0.27 acres
Fuel Type(s).....Moderate

This is a community project to clear all brush from the ROW of Evans Road. This project is 90% complete and all that remains is to revisit the area for stump and rock removal to facilitate future maintenance (mowing).

*Project Code.....**S-5***
Flank Ranking.....3
Community Priority.....1
Size.....0.17 acres
Fuel Type(s).....Moderate

This is a community project to clear all brush from the ROW of Fallon Road. This project is 90% complete and all that remains is to revisit the area for stump and rock removal to facilitate future maintenance (mowing). Fallon Road is a portion of a proposed/potential escape route from the community.

*Project Code.....**S-6***
Flank Ranking.....1
*Community Priority.....**
Size.....0.25 acres
Fuel Type(s).....High

This project is planned to treat the north fork of G-1 to create a fuel break in the gully at a location downhill from where the gully enters the residences built along the south side of Evans Road.

West Flank

The West flank of the CWPP is on the highest ground and it contains a mix of conifer stands surrounded by heavy growth of mature Gambel oak. Its fuel type is rated Severe. There are four residences built in this unit and none have producing water wells.

There are approximately 37 privately owned acres here, with a large amount of the acreage held by absentee owners who do not participate in the CWPP effort. Being that these vacant properties are held for investment purposes, their owners are not active in mitigation and these heavily overgrown properties are a wildfire threat to the adjacent landowners (including the USFS lands along the western boundary) and to the CWPP community as a whole.

*Project Code.....**W-1***
*Flank Ranking.....**
*Community Priority.....**
Size.....0.6 acres
Fuel Type(s).....Severe

This project is to prepare a Zone 1 defensible space around all four residences in the West flank. These residents had completed much of this work prior to the May 2014 initiation of this CWPP. During the ensuing year most of this project has been completed. This project is considered 90% done and will be completed after a review process is prepared and implemented.

*Project Code.....**W-2***
*Flank Ranking.....**
*Community Priority.....**
Size.....4 acres
Fuel Type(s).....Severe

This project is to prepare a Zone 2 defensible space around all four residences in the West flank. Much of this work had been completed prior to the May 2014 initiation of

this CWPP. Property owners, contracting with the SWIFT crew, completed most of this work in late 2014. This project is considered 90% done.

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*Project Code.....**W-3***
*Flank Ranking.....**
*Community Priority.....**
Size.....8 acres
Fuel Type(s).....Severe

This project is to prepare a Zone 3 defensible space around all four residences in the West flank. Little of this work had been completed prior to the May 2014 initiation of this CWPP. Property owners, contracting with the SWIFT crew, completed some of this work in late 2014. This project is considered 40% done.

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*Project Code.....**W-4***
Flank Ranking.....1
Community Priority.....3
Size.....0.55 acres
Fuel Type(s).....Very High

This project clears the ROW vegetation that is abutting the properties of "resident" landowners. During community work days this area was 90% completed - mitigated. However, some portions were thinned rather than clear cut. These sections may be revisited and totally cleared to facilitate future maintenance (mowing). This ROW area is 1600 feet long by 15 feet deep; 0.55 acres.

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*Project Code.....**W-5***
*Flank Ranking.....**
*Community Priority.....**
Size.....8 acres
Fuel Type(s).....Severe

This is the Forest Service shaded fuels reduction through the lands west of the CWPP. It is envisioned to be 100 ft wide (but varying by terrain) by 3500 feet long; 8 acres. This CWPP suggests to the Forest Service that the fuels reduction should tie-in to the north Forest Service fuel break (N-7), run south along the east side of Mt. Herman Road to the overlook corner on the road, and from there it should continue southeast down the ridgeline towards the west side of the South unit meadow – near the end of Fallon Road. This CWPP group will provide input and comments to the Forest Service Plan.

*Project Code.....**W-6***
Flank Ranking.....2
Community Priority.....2
Size.....0.33 acres
Fuel Type(s).....Very High

This project clears the ROW vegetation that is abutting the properties of "absent" landowners. The area of this project is 100 lineal feet by 15 feet deep; 0.33 acres.

*Project Code.....**W-7***
Flank Ranking.....3
*Community Priority.....**
Size.....0.62 acres
Fuel Type(s).....Very High and Severe

This project seeks to build a fuel break across private land to tie the Forest Service fuel break (W-5) in to the meadow at the south end of Fallon Road. This section would be approximately 900 feet long by 30 feet wide, 0.62 acres. This project, combined with W-5, N-7 and E-14 would build a continuous fuel break around the three wooded sides of this CWPP community. These fuel breaks would also stand as a significant portion of the East-West line of defense against any wildfire moving up or down the forested WUI of the Rampart Range.

Future Projects

Future projects under consideration, but not high enough in priority (yet), include:

- Develop the alternative egress route from Fallon Rd
- Get emergency access to the large water tank located south of Spaatz Road, north of Forest View Estates, for our water tender fleet
- Explore potential grant funding for water tanks at Rowley's and Steve and Cathy's places
- Coordinate with Tri-Lakes Monument Fire and other agencies to hold a Hose Monkey tabletop exercise, and field exercise if feasible
- Coordinate with the USFS during implementation of the Upper Monument Creek project, to encourage fuels reduction in proximity to the Community, and to explore potential egress routes across USFS land
- Participate on planning team for the Tri-Lakes Air Force Academy Cohesive Strategy Fuels Reduction project, with objectives as stated above
- Contact absentee landowners to encourage fuels reduction
- Host at least two slash chipping days
- Apply for Firewise renewal by June 1, 2016
- Consider establishing a Firewise committee
- Hold Community meetings every three to four months to plan projects, review accomplishments, discuss issues, and collaborate

Appendix A: Mount Herman CWPP Evacuation Plan

These photographs were taken from Turner Road during the June 26, 2012 blowup of the Waldo Canyon fire. We were on the edge of being evacuated. Our Community was evacuated during the 1989 Mount Herman (Berry) fire, while the rapid spread of the 2002 Spaatz fire precluded evacuation. While we were on standby for evacuation during both the Waldo Canyon and Hayman fires, some residents left voluntarily. Good fortune with winds and excellent fire suppression efforts elsewhere contributed to our ability to stay in place.

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

This appendix answers five important questions:

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

Notification

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

The El Paso 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 through this link: http://www.elpasoteller911.org/ .

If you are not comfortable using the computer, please contact another Community member who can help sign you up. This system allows you to register 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. You could easily be contacted, even if not 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 has a disability.

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

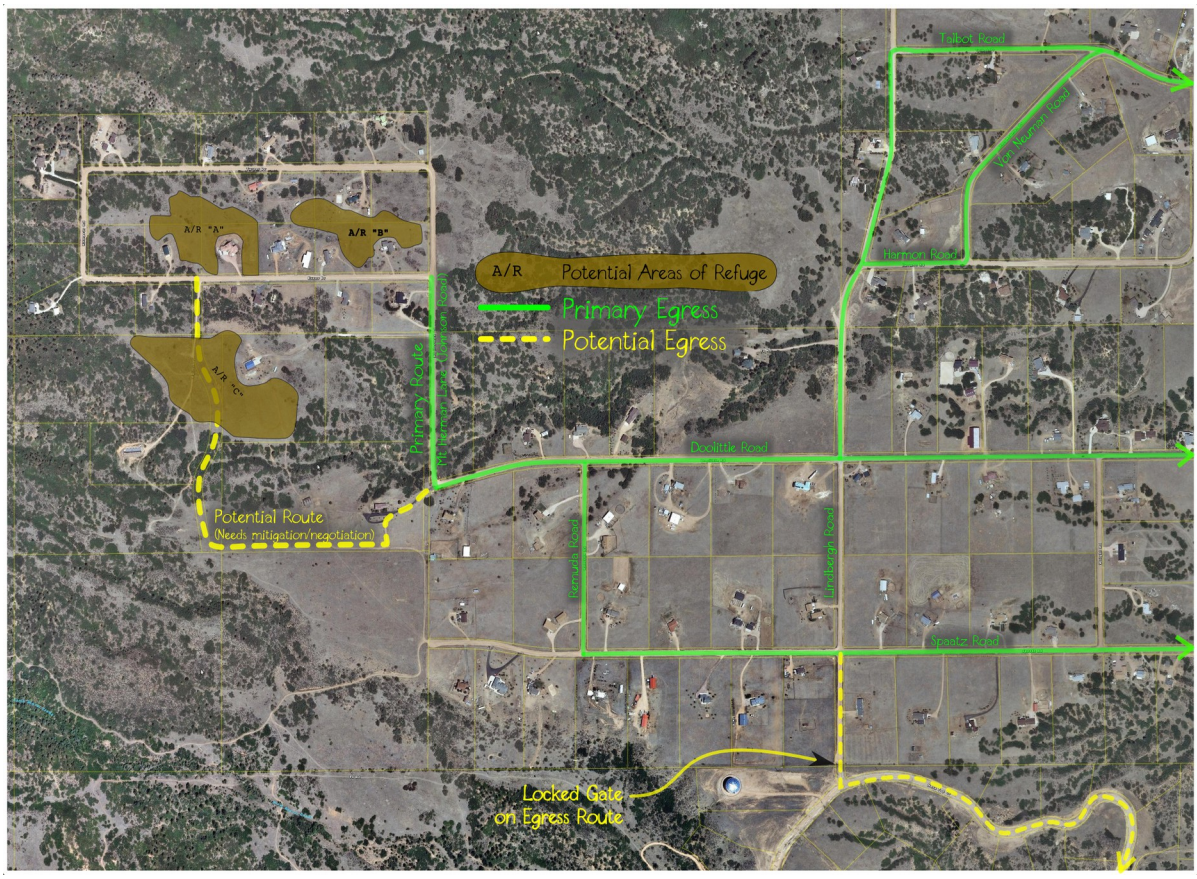
It is important to note that the fatalities in both the Waldo Canyon and Black Forest fires were of residents who did not evacuate in time. In the event of a fire, the El Paso County Sheriff will determine the best evacuation routes and procedures based on expected fire behavior. Residents should heed the evacuations instructions given by the Sheriff without delay! If a fire is threatening the area, it is not necessary to wait for an evacuation order to leave.

The International Association of Fire Chiefs has developed a national three-phase model for wildfire evacuation education called "Ready, Set, Go". Information on this program can be found at http://rsg.epcsheriff.com/.

Community Phone Chain

This CWPP group maintains a neighborhood contact roster, to be used in the event of a community emergency. This roster lists the voice telephone numbers, text-able numbers, and email addresses for residents. Neighbors in each “flank” will contact each other during an emergency for notification, and to offer assistance. Flank leads will cross-coordinate overall flank status with each other.

Primary Evacuation Routes



Mt Herman Community Egress Routes

The Community is served by several primary roads that are county-maintained, including Doolittle Road, Mount Herman Lane, Evans Road, Edwards Road, and Turner Road. All are dirt roads, with the exception of the eastern portion of Doolittle Road, which is paved. All of these roads are kept in good condition, with regular grading and dust abatement. Road widths are sufficient to allow two full lanes of travel in each direction. Additionally, Fallon Road is a dirt road that is not maintained by the county, but does provide access to one residence and a large land parcel. The main egress route for the Community is via Mount Herman Lane and Doolittle Road. An additional paved evacuation route will soon be available, leading south from Spaatz Road down into and through the new Forest Lakes development area, crossing the railroad tracks at the new Baptist Road bridge leading to Old Denver

Road and I-25. Another possible route extends from Fallon Road to the south and east towards the southern portion of Lindbergh Road and Spaatz Road, but this would require some hardening and further exploration and negotiation with adjacent landowners. This has been identified as a future project for consideration.

Once out of the Mt Herman Estates Community, the primary evacuation route is east along Doolittle Road. In the event that this is closed, alternatives include Lindbergh Road to Harmon Road or Talbot Road. Nursery Road was considered, although it has heavy fuel loadings and may well be ill-advised for egress until the adjacent forest and brush are thinned by the USFS (included in the existing Upper Monument Creek proposal being considered by the USFS). Spaatz Road could also be utilized, with numerous smaller roads accessing Spaatz from Doolittle. One other option warranting further consideration is egress to the south into the Beaver Creek area through a locked gate at the south end of Lindbergh Drive.

Options across USFS land to the northwest towards the Mount Herman Road and to the east along an old roadbed towards Lindbergh Road were discussed, but considered infeasible at this time. The ground is very rocky in places, substantial vegetation would require clearing, grading and other improvements would be necessary. Due to the rough terrain of these routes, safety would be questionable at best. Additionally, gaining approval to pursue designation, clearing and maintenance of such egress routes on USFS land is highly unlikely due to extensive environmental planning requirements.

While Doolittle Road is flanked by relatively low fuel loadings, its intersection with Mt Herman Lane and the southern end of the latter have been a source of great concern. The “Gauntlet” along Mt Herman Lane is flanked by heavy brush from both the east and west. Several steep pitches exacerbate this fuel hazard, particularly from the downslope side. Recent brush removal and chipping projects have reduced this risk, but further clearing and maintenance remain high priority. Because wind-driven flame lengths can reach well beyond the height of the fuel, even vegetation that is some distance from the road may pose a threat. Even if flames do not present a direct threat to traffic, smoke can reduce visibility to the point that vehicle accidents can become the main hazard. Because of the importance of a safe, secure road for protecting the lives of residents, the majority of recent fuels reduction work has focused on this road. Unless new information dictates a different approach, Mt Herman Lane should remain the top priority for fuel reduction efforts.

This route will be adequate if there is timely warning of an approaching wildfire, or if a fire within the Community does not restrict use of any roads. On the other hand, because the consequences of fire compromising travel on Mt Herman Lane or other interior roads, exploring the feasibility of alternative routes or options should be a priority.

We have identified evacuation routes. Note that potential alternate routes will be evaluated in the near future; the work to make these routes ready is part of this plan. See the egress route map above.

Escape Plan In-Lieu of Mount Herman Lane

In the absence of a secondary route, the best alternative is to shelter in place until the flames have moved past this intersection. The timeframe would depend on fire behavior, which is largely influenced by wind speed and fuel moisture, but the fire would likely pass by within 5-10 minutes. Sheltering in place and active homeowner defense could become very important in this situation.

There are also small "Areas of Refuge" that are staging areas that allow residents to remain temporarily when emergency services may be trying to enter the neighborhood; these are around some of the more open residences in the interior of the Community.

Safety of Pets & Livestock?

Planning for pet and livestock evacuations, like planning for your family, should begin far in advance of an emergency. Assemble a pet evacuation kit including crates, pet food, leashes, bowls, medications, and veterinary records. Insure your livestock is branded and tagged. Have trailers readily available for livestock. Make plans in advance for sheltering your pets by identifying friends or family outside the area that are able to care for your pets. Identify alternate pasture and barn space for your livestock. Locate pet-friendly motels or boarding kennels in advance.

In the case of a major incident, El Paso County has access to a program called the Community Animal Response Team (CART) to help in emergency situations. According to their website (https://www.hsppr.org/springs/cart), the group's vision is "a community prepared to support animals in a disaster". Working in consort with the Humane Society of the Pikes Peak Region, this group of dedicated volunteers cared for 1,200 animals during the Black Forest Fire. The CART program is heavily dependent on volunteer support and contributions of either money or animal-related care items. Please consider helping this worthwhile organization.

What to Take?

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. It may be advisable to keep them offsite in a safe deposit box. 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.

It is vitally important that residents are prepared to evacuate long before a fire or other disaster. Just as fire mitigation should be complete long before a fire threatens, a personal plan for evacuation should be prepared before it is needed. As soon as a "Red Flag" watch or warning has been issued, make sure you are prepared! A personal evacuation plan should consider the following:

- Papers, photos computer drives, prescriptions and other important items should be stored and

ready to take a moment’s notice.

- Be sure to have a bag with a change of clothes and personal items packed and ready.
- Keep a complete inventory, including photos of your home contents, of items in the home stored in a safe location. This will be very helpful for insurance claims. Be sure your insurance coverage is adequate.
- Have a plan to shelter pets and livestock.
- Have a communication plan for all members of your family to stay in contact. Have an agreed upon meeting place, such as a friend’s home, for family members in case you separate.

Appendix B: Recent Mitigation and Education Activities

Since the beginning of our CWPP planning process, numerous members of the Community have rallied together to reduce fuel loadings around homes and along road rights-of-way, and to increase awareness of fire behavior and preparedness.

Approximately ten landowners have reduced fuels within Zones 1 and 2 (within 100' of their home). Some have extended beyond into Zone 3, reducing fuel density while also enhancing overall forest health. Aesthetic quality improvement has been a beneficial side benefit.

Pre-treatment on a slope directly below a residence

Following fuels reduction treatment on the same slope

Thinned oak clump approximately 30' from residence

Thinned oak on private property, next to untreated USFS land

The Coalition for the Upper South Platte (CUSP) provided invaluable support through matching grant funding and facilitating work through the Juniper Valley Corrections crew (aka SWIFT crew). The crew enthusiastically embraced this labor intensive and important work opportunity. Seven landowners took advantage of this opportunity, which took place primarily between December 2014 and March 2015.

We held three chipper days in 2015 that focused primarily on ROW zones along oak-choked road stretches, particularly the Gauntlet. The first chipper event was preceded by a day of brush cutting by a CUSP saw crew. Several neighbors also assisted with brush cutting along ROWs and on private properties in preparation for this event. The entire U.S. Air Force Academy football team, five CUSP staff and fifteen Community residents volunteered on a Saturday in April, 2015 to assist with this important effort. In all, over 50 adults, eight kids and one dog helped with this event. The primary objective was to improve safety along Mount Herman Lane (aka the Gauntlet), the primary route into and out of the Community.

Energized by this initial neighborhood project, approximately ten Community members participated in a subsequent chipper day later in April, to clear remaining slash piles:

“the Gauntlet” before and after initial clearing in April 2015:

Before

After

Before

After

Our third chipper day was during the heat of July 2015. Home Depot donated a chipper in support of our efforts, and residents came out in shifts throughout the day.

Chipper Day – July 2015

Keith Worley of ForestTree Development gave an informative workshop in October 2015 on Hazards in the Home Ignition Zone, focusing on structural improvements to reduce ember penetration. Called “Ember Defense”, this event had approximately fifteen neighborhood participants. Keith also volunteered his time to present information on Firewise building materials and defensible space concepts at a monthly CWPP meeting.

Ember Defense workshop in October, 2015 – hosted by Keith Worley

Our neighborhood cohesion has grown significantly through these events, and we plan to continue working together on fuel mitigation projects and educational endeavors. Teamwork is magnificent; community priceless.

Appendix C: Defensible Space

This appendix is a copy of the defensible space guide available at:

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

QUICK GUIDE SERIES FIRE 2012-1

Protecting Your Home from Wildfire:

Creating Wildfire-Defensible Zones

Formerly CSU Extension Factsheet 6.302

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

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

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

The information contained in this document is for use by individual landowners to help reduce wildfire risk on their property. In order to effectively protect subdivisions and communities, all landowners must work together to reduce fire hazards within and adjacent to communities. This includes treating individual home sites and common areas within communities, and creating fuelbreaks within and adjoining the community where feasible. This document will focus on actions individual landowners can take to reduce wildfire hazards on their property. For additional information on broader community protection, go to www.csfs.colostate.edu.

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

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

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

October 2012
www.csfs.colostate.edu

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

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

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

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

Three factors determine wildfire behavior: **fuels, weather** and **topography**. We cannot alter weather or topography, so we must concentrate on altering fuels. Fuels include vegetation, such as trees, brush and grass; near homes, fuels also include such things as propane tanks, wood piles, sheds and even homes themselves. Some plant species are more flammable than others, and the flammability of vegetative fuels changes depending on the season, recent weather events, and other factors such as drought. Fuel continuity and density also play an important role in wildfire.

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

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

For more information on wildfire behavior, please see *FireWise Construction: Site Design and Building Materials* at www.csfs.colostate.edu.

Remember...

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

Fuel Arrangement and Types

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

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

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

Vertical/Ladder Fuels

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

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

Surface Fuels

Logs/Branches/Slash/Wood Chips

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

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

Pine Needles/Duff Layers

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

Grasses

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

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

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

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

Crown Fuels

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

The Home Ignition Zone

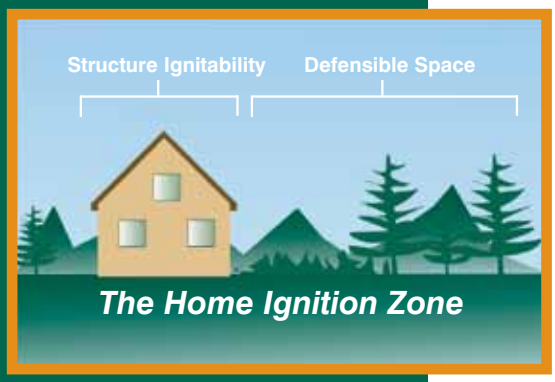


Figure 7: ***Addressing both components of the Home Ignition Zone will provide the best protection for your home. Credit: CSFS***

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

Structural Ignitability

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

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

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

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

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

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

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

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

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

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

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

Defensible Space

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

Figure 11: ***Homesite before defensible space. Photo: CSFS***

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

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

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

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

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

Defensible Space Management Zones

Three zones need to be addressed when creating defensible space:

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

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

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

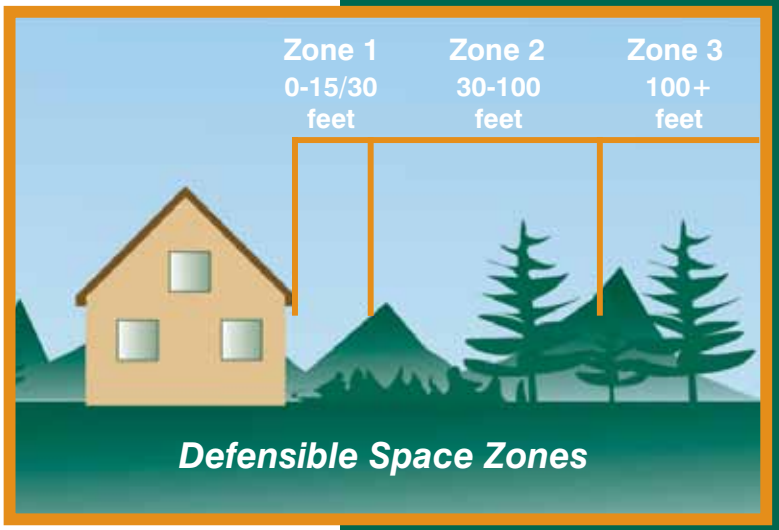


Figure 13: ***Defensible space management zones. Credit: CSFS***

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

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

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

Zone 1

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

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

- Install nonflammable ground cover and plant nothing within the first 5 feet of the house and deck. This critical step will help prevent flames from coming into direct contact with the structure. This is particularly important if a building is sided with wood, logs or other flammable materials. Decorative rock creates an attractive, easily maintained, nonflammable ground cover.
- If a structure has noncombustible siding (i.e., stucco, synthetic stucco, concrete, stone or brick), widely spaced foundation plantings of low-growing shrubs or other fire-resistant plant materials are acceptable. However, do not plant directly under windows or next to foundation vents, and be sure areas of continuous grass are not adjacent to plantings. Information on fire-resistant plants is available on the CSFS website at www.csfs.colostate.edu.
- Prune and maintain any plants in Zone 1 to prevent excessive growth. Also, remove all dead branches, stems and leaves within and below the plant.
- Irrigate grass and other vegetation during the growing season. Also, keep wild grasses mowed to a height of 6 inches or less.
- Do not store firewood or other combustible materials anywhere in this zone. Keep firewood at least 30 feet away from structures, and uphill if possible.
- Enclose or screen decks with $^1/_8$-inch or smaller metal mesh screening ($^1/_{16}$-inch mesh is preferable). Do not use areas under decks for storage.
- Ideally, remove all trees from Zone 1 to reduce fire hazards. The more trees you remove, the safer your home will be.
- If you do keep any trees in this zone, consider them part of the structure and extend the distance of the entire defensible space accordingly.
- Remove any branches that overhang or touch the roof, and remove all fuels within 10 feet of the chimney.
- Remove all pine needles and other debris from the roof, deck and gutters.
- Rake pine needles and other organic debris at least 10 feet away from all decks and structures.
- Remove slash, wood chips and other woody debris from Zone 1.

Zone 2

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

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

Tree Thinning and Pruning

- Remove stressed, diseased, dead or dying trees and shrubs. This reduces the amount of vegetation available to burn, and makes the forest healthier.
- Remove enough trees and large shrubs to create at least 10 feet between crowns. Crown separation is measured from the outermost branch of one tree to the nearest branch on the next tree. On steep slopes, increase the distance between tree crowns even more.
- Remove all ladder fuels from under remaining trees. Prune tree branches off the trunk to a height of 10 feet from the ground or 1/3 the height of the tree, whichever is less.

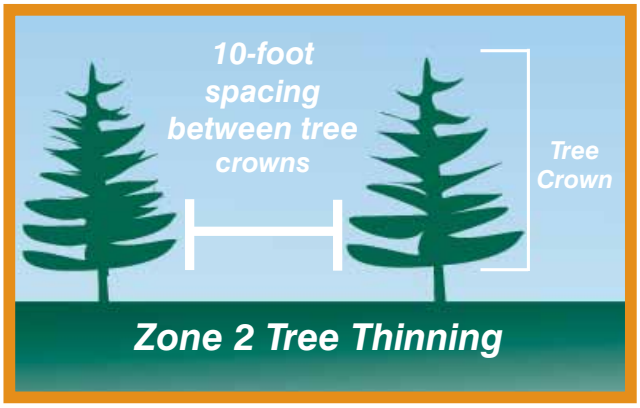


Figure 17: *In Zone 2, make sure there is at least a 10-foot spacing between tree crowns. Credit: CSFS*

- If your driveway extends more than 100 feet from your home, thin out trees within a 30 foot buffer along both sides of your driveway, all the way to the main access road. Again, thin all trees to create 10-foot spacing between tree crowns.
- Small groups of two or three trees may be left in some areas of Zone 2, but leave a minimum of 30 feet between the crowns of these clumps and surrounding trees.
- Because Zone 2 forms an aesthetic buffer and provides a transition between zones, it is necessary to blend the requirements for Zones 1 and 3. For example, if you have a tree in Zone 2 with branches extending into Zone 1, the tree can be retained if there is proper crown spacing.
- Limit the number of dead trees (snags) to one or two per acre. Be sure snags cannot fall onto the house, power lines, roads or driveways.
- As in Zone 1, the more trees and shrubs removed, the more likely your house will survive a wildfire.

Shrub Thinning/Pruning and Surface Fuels

- Isolated shrubs may be retained in Zone 2, provided they are not growing under trees.
- Keep shrubs at least 10 feet away from the edge of tree branches. This will prevent the shrubs from becoming ladder fuels.
- Minimum spacing recommendations between clumps of shrubs is 2 1/2 times the mature height of the vegetation. The maximum diameter of the clumps themselves should be twice the mature height of the vegetation. As with tree-crown spacing, all measurements are made from the edge of vegetation crowns.

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

- Example – For shrubs 6 feet high, spacing between shrub clumps should be 15 feet or more (measured from the edge of the crowns of vegetation clumps). The diameter of these shrub clumps should not exceed 12 feet.
- Periodically prune and maintain shrubs to prevent excessive growth, and remove dead stems from shrubs annually. Common ground junipers should be removed whenever possible because they are highly flammable and tend to hold a layer of duff beneath them.
- Mow or trim wild grasses to a maximum height of 6 inches. This is especially critical in the fall, when grasses dry out.
- Avoid accumulations of surface fuels, such as logs, branches, slash and wood chips greater than 4 inches deep.

Firewood

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

Propane Tanks and Natural Gas Meters

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

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

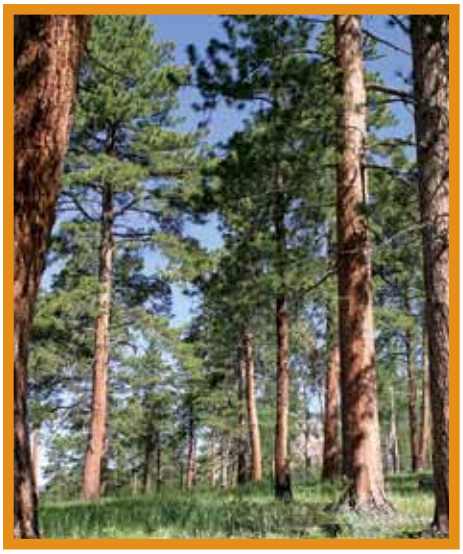


Figure 20: *This ponderosa pine forest has been thinned, which will not only help reduce the wildfire hazard, but also increase tree health and vigor. Photo: CSFS*

Zone 3

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

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

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

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

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

Other Recommendations

Windthrow

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

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

Water Supply

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

Recommendations for Specific Forest Types

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

Aspen

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

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

Lodgepole Pine

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

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

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

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

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

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

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

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

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

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

Piñon-Juniper

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

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

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

For more information, please refer to the CSFS *Piñon-Juniper Management Quick Guide* at www.csfs.colostate.edu.

Gambel Oak

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

For more information, please refer to the CSFS *Gambel Oak Management* publication at www.csfs.colostate.edu.

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

Maintaining Your Defensible Space

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

Defensible Space: Initial Projects

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

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

Defensible Space Tasks: Annual Requirements

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

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

**Address more than once per year, as needed.*

Be Prepared

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

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

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

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

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

List of Additional Resources

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

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

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

Colorado State Forest Service

www.csfs.colostate.edu

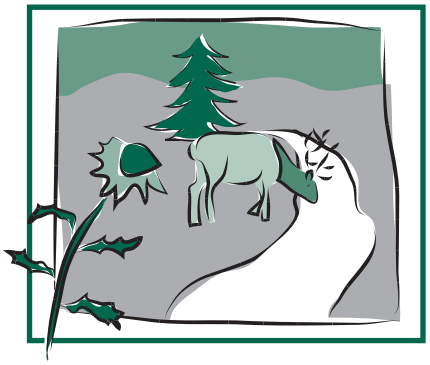
This quick guide was produced by the Colorado State Forest Service (CSFS). CSFS programs are available to all without discrimination. No endorsement of products or services is intended, nor is criticism implied of products not mentioned.

Appendix D: Gambel Oak Management

This appendix is a copy of the gambel oak management guide available at:

http://extension.colostate.edu/topic-areas/natural-resources/gambel-oak-management-6-311/

Colorado State University
Extension



Gambel Oak Management

Fact Sheet No. **6.311** Natural Resources Series | **Forestry**

by N. Jester, K. Rogers, and F.C. Dennis*

Gambel Oak Ecology

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

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

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

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

Although not highly palatable, the availability and abundance of Gambel oak, particularly on winter ranges, make this an important wildlife plant. Oak brush is especially important to mule deer; on some summer ranges it reportedly provides more deer forage than all other species combined. Elk generally rely on Gambel oak during the spring and winter. Acorns of Gambel oak are an important mast crop in many areas, particularly for black bears in the fall.

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

Standard Treatment Methods for Oak Brush

Various treatment methods have been used to control oak brush in western Colorado, including herbicide, mechanical treatment, and prescribed burning. In many cases, the objective of these treatments is

Figure 1: Typical oak brush growth in Colorado.

Figure 2: Oak brush sprouting after fire.

*Colorado State Forest Service foresters. 6/2012

Quick Facts

- Gambel oak is commonly found throughout western Colorado between 6,000 and 9,000 feet in elevation.
- Recurring fires often cause oak stands to develop into large thickets; younger thickets created in this way can become exceptionally dense and almost impenetrable for livestock and wildlife.
- Control, or eradication, of Gambel oak requires physically removing the stem and as much of the root system as possible.

www.ext.colostate.edu

Figure 3: Mechanical treatment using a Hydroaxe .

Figure 4: Mechanical treatment using a timberaxe.

Figure 5: Oak brush resprouting after fire.

to increase available forage for wildlife or livestock. Managed grazing of goats is also an effective treatment to reduce or eradicate oak.

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

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

Chemical Treatment

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

Mechanical Treatment

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

Prescribed Burning

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

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

Treating Gambel Oak for Wildfire Safety

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

Fuel Hazards

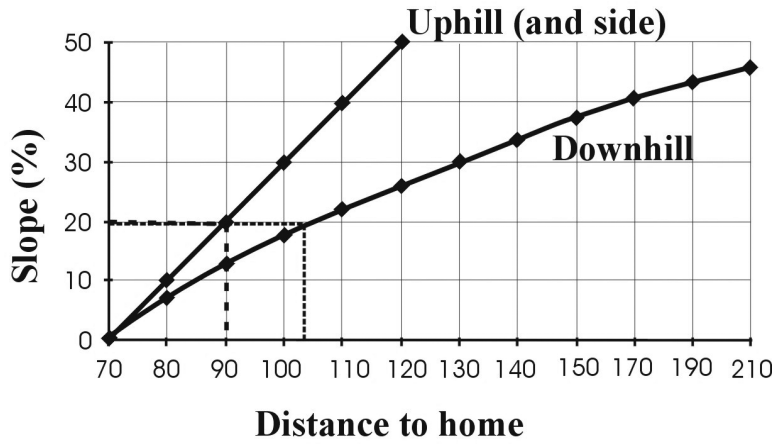
Fuel hazard measures refer to the **continuity**, both horizontal (across the ground) and vertical (from the ground up into the vegetation crown). Fuels with a high degree of vertical and horizontal continuity are the most hazardous, particularly when they occur on slopes. Heavier fuels (brush and trees)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

Standards for Fuel Mitigation

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

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

Example: Spacing between shrub clumps 6 feet in height is 15 feet or more. The diameter of shrub clumps is less than 12 feet (measured from the edges of the crowns). Branches are pruned to



a height of 3 feet. Certain brush species, such as Gambel oak, serviceberry, and snowberry re-sprout vigorously following cutting. Applying herbicide to stumps immediately following cutting may be necessary to effectively reduce long-term fire hazards. An alternative to herbicide treatment is to mow sprouts annually.

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

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

Slope Adjustment Factors

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

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

Table 1. Defensible space thinning guidelines.

1 percent to 20 percent slopes =	
Brush/shrubs	75' from structure; 3X height separation distance between vegetation.
Trees	75' from structure; 10-foot crown separation distance between trees.
Grass	30' from structure; mow dead, dry grass to 6 inches or less in height.
21 percent to 40 percent slopes =	
Brush/shrubs	150' from structure; 4X height separation distance between vegetation.
Trees	150' from structure; 20-foot crown separation distance between trees.
Grass	50' from structure; mow dead, dry grass to 6 inches or less in height.
Greater than 40 percent slopes =	
Brush/shrubs	200' from structure; 6X height separation distance between vegetation.
Trees	200' from structure; 30-foot crown separation distance between trees.
Grass	75' from structure; mow dead, dry grass to 6 inches or less in height.

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

For More Information

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

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

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

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

Colorado State FOREST SERVICE

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

Appendix E: Forest Insects and Diseases

Numerous insects and diseases are present in the forests surrounding the Community. Most do not cause serious or lasting damage. But when in poor health, trees are more prone to attack and mortality. Maintaining forests in good health will minimize future problems. Enhancing tree vigor by removing infected or infested trees and reducing overstocking are key to preserving forest resiliency and longevity. This minimizes risk of insect attack, and reduces the chance of widespread, intense wildfire.

Recently thinned ponderosa pine forest

The most prevalent insect and disease agents in the Mt Herman Community include Ips engraver beetles and dwarf mistletoe. A description of these follows.

Ips Beetle

Ips beetles (Ips species), also known as engraver beetles, have caused significant damage and tree mortality across the southern Front Range over the past decade. There are four species of Ips in Colorado that target ponderosa pine. Ips beetles are extremely difficult to manage, since they produce up to four generations annually. Adults can emerge as early as March and remain active as late as November, with population peak around mid-summer. Ips beetles attack a range of tree sizes, from very small trees to large trees and branches. Damage is often found in conjunction with twig beetles, which focus on smaller branches up to three inches in diameter. Most Ips damage is found on trees in the open or on the edge of forests, while mountain pine beetle (MPB) tends to attack trees in a more contiguous forest environment.

In addition to girdling the tree or branch, Ips beetles introduce a blue-stain fungus which clogs the tree’s vascular tissue, contributing to its death. Ips beetles are most attracted to recently downed green trees and fresh slash. They also attack standing trees that are weak, injured, or stressed by drought or dwarf mistletoe. The recent prolonged drought resulted in prolific Ips populations and tree mortality in

the area. Trees under severe environmental stress such as recently transplanted trees are particularly attractive to Ips beetles. Preventative spraying and deep watering (including in dry winter periods when the ground is not frozen) of recently transplanted trees are recommended for at least 2-3 years following transplanting, or longer in periods of drought.

The most visible sign of Ips attacks is red boring dust at the base of the tree, in bark crevices, or on the bark of downed trees. Removal of the bark shows larvae galleries that have a “Y” or “H” shaped pattern. Prompt removal of infested trees is critical to minimize additional insect spread. Trees must have bark removed, or be wrapped tightly in plastic in a sunny location to kill the developing brood. High value, surrounding pines can be sprayed with Carbaryl (Sevin) or Permethrin (Astro) to reduce chances of beetle attack.

Ips galleries and developing brood

Ips-killed trees east of Mt Herman Lane

Beetle frass indicating recent attack

Pitch tubes elicited by beetle attack

Additional information on Ips beetles is available at http://www.ext.colostate.edu/pubs/insect/05558.html.

Dwarf Mistletoe

Dwarf mistletoe (Arceuthobium spp.) is a parasitic plant that spreads by forcibly ejected seeds. It robs host trees of water and nutrients, resulting in decreased tree vigor and growth and causing swollen distorted branches, sometime called “witches brooms”. Mistletoe can severely weaken trees, often predisposing them to other damaging agents such as bark beetles. It can also cause premature death, especially in smaller trees on poor sites.

Mistletoe seeds are ejected in late summer. They can travel up to 40 feet at rates of up to 60 mph, and can also be dispersed by birds. Their sticky surface adheres easily. If a seed reaches a susceptible tree, the parasite produces root-like structures called sinkers which penetrate through the bark into the tree’s conductive tissues, to usurp its food and water. The first visible symptom of infection is swelling in the branch at the site of the growing mistletoe plant, but the emerging shoots won’t be visible for three years. As seeds spread, all susceptible trees in the vicinity may become infected. It is very rare to find an isolated infected tree in the forest.

Control measures include removing infected trees or pruning infected limbs if the infection has not yet reached the main tree stem. In a lightly infected area, thinning which discriminates against infected trees may limit spread, although subsequent monitoring is important, as mistletoe shoots take several years to appear after infecting a new branch. Creating buffer zones between infected and uninfected areas is also an option to contain mistletoe to an area, but is not failsafe.

Mistletoe is host-specific, so ponderosa mistletoe will not infect fir. Ponderosa pine, Douglas for and white fir can all be affected by mistletoe, but pines are the hardest hit in the Mt. Herman area.

Mistletoe shoots

Pruning infected limbs

Misteltoe “witches brooms”

Additional information on mistletoe is available at http://www.ext.colostate.edu/pubs/garden/02925.html.

Mountain Pine Beetle

The Mountain Pine Beetle (MPB, Dendroctonus ponderosae) has caused significant mortality across millions of acres in central and northern Colorado. Populations were relatively high in the southern Front Range in the mid-to-late 2000s, but have decreased since. MPB is not currently a serious concern in this area, but certainly warrants monitoring.

Additional information on MPB is available at http://www.ext.colostate.edu/pubs/insect/05528.html

Oak borer

The flat-headed oak borer (Agriius spp.) worked in consort with drought stress and a late heavy frost in the early 2000s to cause widespread Gambel oak dieback along the southern Front Range. While this insect is not usually very aggressive, the prolonged drought stressed these oaks sufficiently to succumb to the beetle in large numbers. Numerous oak clumps have resprouted from the base or had prolific epicormic sprouting from the main trunk, but many oak tops died. The amount of dead woody material across the landscape from this mass dieback greatly exacerbates the wildland fire fuel hazard.

Although there is no practical treatment, mortality and dieback from the oak borer has declined and should remain low unless environmental stressors create a similar scenario again.

Gambel oak dieback

Additional information on the oak borer can be found at http://www.ext.colostate.edu/ptlk/1477.html.

Douglas Fir Tussock Moth and Western Spruce Budworm

The Douglas-fir tussock moth (Orgyia pseudotsugata) and western spruce budworm (Choristoneura occidentalis) are a potential threat to Douglas-fir, white fir and spruce. There are existing major outbreaks of tussock moth on the east face of Cheyenne Mountain, south of Colorado Springs, and on the east face of the Rampart Range north of Larkspur. This defoliator could be a serious threat to mixed conifer forests in the western portion of the Mount Herman CWPP area, and to the adjacent national forest. Fortunately, the Cheyenne Mountain population appears ready to collapse due to the presence of the nucleopolyhedrosis (NPV) virus found in larval samples.

Tussock moth larvae rapidly defoliate trees from the top down. The moths produce no webbing; this is the easiest way to differentiate between the two insects. Unlike the western spruce budworm, tussock moths feed on older and new needles, and may cause death of the tree a single season. After several seasons of defoliation, the tree may be killed. Often trees severely defoliated may be attacked by Douglas-fir bark beetles.

Tussock moth eggs typically hatch in late May. Young caterpillars have two tufts of hair at the head and rear of their dark bodies. The hairs cause rashes when touched, and some people can develop severe rashes from contact with the larvae. Caterpillars first feed on the tender new needles, moving next to older needles, feeding from the top down in the tree. Wind often blows larvae to other trees, spreading the infestation.

Later in the summer, tussock moth larvae pupate, and the adult moths emerge in late July through mid-August. Pupal cases may be found on trees, rocks or even on buildings. Adult moths emerge from the pupal cases about after about one week. Males are rust colored moths with a wing span of about one inch. Females are flightless with small wings. Moths mate and the female lays up to 350 eggs near the pupal case. The moths overwinter as eggs nearby.

Several natural controls including viruses, predation by birds and cold fall weather may end outbreaks. The naturally occurring NPV often attacks tussock moth populations, resulting in rapid death. Also known as wilt disease, the virus may cause sudden ends to epidemics. The infected caterpillars hang head down from branches with a wilted appearance.

Western spruce budworm populations have also been on the increase throughout southern Colorado. This insect can be the most destructive defoliator of coniferous forests in western North America, but populations across the southern Front Range have remained at low to moderate levels over the past several years, with only minimal tree mortality.

Damage to a fir from Douglas-fir tussock moth. Larvae begin feeding at the top of the tree at about the time of bud break and defoliate the tree from the top down.

Western spruce budworm adults are small, mottled, rusty-brown moths, but color can vary from tan to almost black. In Colorado, they are present from late June to early August. After mating, females lay masses of 25 to 40 overlapping green eggs on the undersides of needles. These hatch in about 10 days. The young larvae do not feed but move to crevices under bark scales or lichens where they spin silken shelters called hibernaculae. There they remain dormant throughout the winter.

In late April or May, budworm larvae migrate to the foliage, where they mine old needles or feed on host tree flowers. In a week or two, they enter developing buds, the habit that gives them their name. As the new needles lengthen, the rapidly growing larvae continue to feed, which is when the most serious damage occurs. They web the new foliage together loosely and feed inside, where they are somewhat protected from predators and other enemies. In the late larval stages budworms have brownish heads and brownish-olive bodies. Each body segment has two conspicuous pairs of white spots. About 40 days after feeding begins in the spring, usually about the end of June, the larvae pupate inside feeding webs or on foliage. Adults emerge a week or so later and the cycle is complete. There is one generation per year.

An adult male western spruce budworm moth and the empty pupal case from which he has just emerged

The budworm also seriously affects fir understory trees which are especially vulnerable when growing beneath mature trees, since larvae disperse from the overstory and feed on the small trees below. Coniferous seedlings have relatively few needles and shoots and can be seriously deformed or killed by only a few larvae. Removing these overtopped firs will not only decrease fuel hazard, but will also reduce spread of this important insect. Since budworm larvae descend on silken strands, the absence of smaller firs increases the likelihood that many larvae will reach the forest floor and be eaten by insects and small mammal predators.

Chemical controls need to be timed to the larval stage and targeted to the top of the tree when high value ornamental trees are sprayed. Spraying generally coincides with bud break (late May into early June). Aerial spraying of Bacillus thurengiensis (BT), an insecticide that is derived from a common soil bacteria, is often used to control insects over widespread areas. When sprayed with BT, larvae discontinue feeding and die of starvation.

Both of these defoliators are best managed by maintaining healthy, diverse forest stands. Forest stands composed of mixtures of ponderosa pine and aspen tend to be resistant to tussock moth outbreaks and offer greater wildfire resistance than pure stands of Douglas fir and white fir.

Additional information on the Douglas fir tussock moth can be found at
http://csfs.colostate.edu/media/sites/22/2014/02/Douglas-Fir-Tussock-Moth-QG-2015-FINAL.pdf

Additional information on the Western Spruce Budworm can be found at
http://static.colostate.edu/client-files/csfs/pdfs/05543.pdff

Other Forest Insects and Diseases

There are a wide variety of other insects and diseases that cause damage to trees in the Mount Herman area. At endemic levels, damage may not be obvious. When environmental stresses such as drought increase, trees become more susceptible to insects and diseases. The twig beetle (Pityophthorus spp.) has been active for years, killing individual branches and sometimes entire tops of trees. This insect is often found on smaller branches of trees already infested with Ips beetles. The southwestern pine tip moth (Rhyacionia neomexicana) has been active recently in young ponderosa pine. The larvae mine into the new, expanding shoots, often killing the buds and seriously reducing terminal growth. The Douglas-fir tussock moth (Orgyia pseudotsugata) and western spruce budworm (Choristoneura occidentalis) are a potential threat to Douglas-fir and white fir, although they have not been active in recent years in the immediate area. There is an existing outbreak of Douglas fir tussock moth in Cheyenne State Park, south of Colorado Springs. This could be a serious threat to mixed conifer forests in the western portion of the Mount Herman CWPP area, and to the adjacent national forest.

Appendix F: Further Information

Websites

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

Cost Share Assistance Database: http://nrdb.csfs.colostate.edu/

Colorado Wildfire Risk Assessment Portal: http://csfs.colostate.edu/wildfire-mitigation/cowrap/

Colorado State Forest Service (CSFS): http://www.csfs.colostate.edu/

CSFS Wildfire Mitigation Information: http://csfs.colostate.edu/wildfire-mitigation/

CSFS Community Wildfire Protection Plans: http://csfs.colostate.edu/wildfire-mitigation/community-wildfire-protection-plans/

Colorado State University Extension: http://www.extension.colostate.edu

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

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

Ready Set Go Program (International Association of Fire Chiefs): http://www.wildlandfirersg.org/

Publications

Cheatgrass and Wildfire: http://extension.colostate.edu/topic-areas/natural-resources/cheatgrass-and-wildfire-6-310/

CO Wildfire Mitigation Tax Subtraction: https://www.colorado.gov/pacific/sites/default/files/Income65.pdf

Creating Wildfire Defensible Zones: http://static.colostate.edu/client-files/csfs/pdfs/FIRE2012_1_DspaceQuickGuide.pdf

Fire Resistant Landscaping: http://extension.colostate.edu/topic-areas/natural-resources/fire-resistant-landscaping-6-303/

Firewise Construction: Site Design and Building Materials: http://static.colostate.edu/client-files/csfs/pdfs/firewise-construction2012.pdf

Firewise Plant Materials: http://extension.colostate.edu/topic-areas/natural-resources/firewise-plant-materials-6-305

Forest Home Fire Safety: http://extension.colostate.edu/topic-areas/natural-resources/forest-home-fire-

safety-6-304/

Living With Fire: A guide to the Homeowner: http://static.colostate.edu/client-files/csfs/pdfs/LWF51303.pdf

Wildfire Defensible Space Checklists: http://csfs.colostate.edu/wildfire-mitigation/wildfire-defensible-space-checklist/

Wildfire Preparedness for Horse Owners: http://extension.colostate.edu/topic-areas/agriculture/wildfire-preparedness-for-horse-owners-1-817/

WUI Home Ignition Research: http://firewise.org/wildfire-preparedness/wui-home-ignition-research.aspx

Appendix G: Glossary of Forestry and Wildfire Terms

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

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

Chain: A measure of distance equaling 66 feet. This term is commonly used in forestry, and is derived from an old unit of measurement (80 Chains = 1 mile).

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

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

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

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

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

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

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

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

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

Defensible Space: The natural and landscaped area around a home or other structure that has been modified to reduce fire hazard. Defensible space gives your home a fighting chance against an approaching wildfire. Creating defensible space also reduces the chance of a structure fire spreading to the surrounding forest and other homes.

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

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

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

Ecosystem: A functional unit consisting of all the living organisms (plants, animals, microbes) in a given area, and all the non-living physical and chemical factors of their environment, linked together through nutrient cycling and energy flow. Ecosystems are commonly described according to the major type of vegetation; for example, forest ecosystem, old-growth ecosystem, or range ecosystem.

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

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

Felling: The cutting down of trees.

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

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

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

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

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

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

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

Forest Fire: Any wildfire or prescribed burn that is burning in vegetation.

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

Fuel: Any living or dead material that will burn.

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

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

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

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

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

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

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

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

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

Regeneration: The act of renewing tree cover by establishing young trees, naturally or artificially.

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

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

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

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

Snag: A standing dead tree, generally very valuable for wildlife habitat.

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

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

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

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

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

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

Survivable space: A term typically used to describe the area around a home or other structure indicating that fuels in the area have been reduced sufficiently that there is little or no serious fire threat to the structure; the structure has a high probability of surviving a wildland fire without active fire

protection.

Thinning: A cutting made in a forest stand to enhance tree health and growth, or to modify forest composition and structure by retaining trees of desired species and size.

Torching: Burning of foliage of a single tree or a small group of trees, from the bottom up. Sometimes referred to as “candling”. Torching fire behavior is similar to crowing, but less extreme in that crowning affects larger numbers, even entire stands of trees.

USDA FS: United States Department of Agriculture Forest Service, commonly known as the Forest Service

Wildland Urban Interface (WUI): The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels; the area where development and wildlands meet.