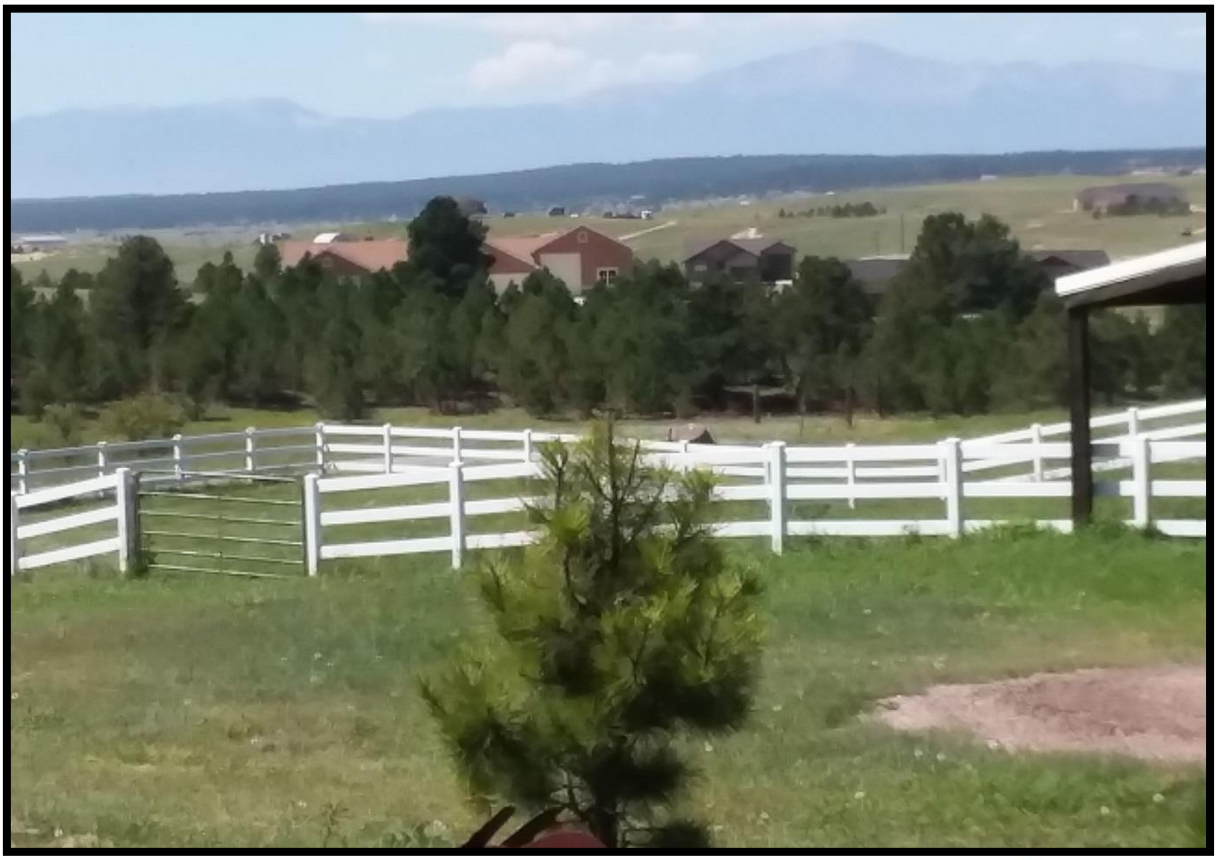
APEX RANCH ESTATES COMMUNITY WILDFIRE PROTECTION PLAN



S22; T12S; R64W; 6th P.M.
El Paso County, Colorado
November, 2018

APEX RANCH

COMMUNITY WILDFIRE PROTECTION PLAN

ACCEPTANCE

This Community Wildfire Protection Plan has been developed in response to the Healthy Forest Restoration Act of 2003, and is a collaborative effort to guide our wildfire protection. The activities recommended in this plan are appropriate to meet our objectives and will benefit the natural resources and reduce the risk from wildland fire. This plan is voluntary, and where possible, we intend to apply the recommended practices, thus improving our community and increasing public safety.

_____	_____	_____	_____
Dan Mersman, President, Apex Ranch HOA	Date	Roger Lund, Secretary, Treasurer, Apex Ranch HOA	Date
_____	_____	_____	_____
Rob Bohenna, Vice President. Apex Ranch HOA	Date	Mike Duncanson, Firewise Co-Resident Leader	Date
_____	_____	_____	_____
Jeffery Turner, Asst. Fire Chief, Peyton Fire Protection District	Date	Lawrence Long, Supervisory Forester Colorado State Forest Service	Date
_____	_____		
Lonnie Inzer Chief of Emergency Management & Emergency Emergency Manager El Paso County	Date		

Preface to the Plan

Apex Ranch, when viewed from a distance, is a community of rolling grassland with narrow bands of ponderosa pine extending from the forest on bluffs to the east. On a summer day the setting is peaceful, not the sort of place one would commonly associate with wildfire, but the Community Assessment reveals there are significant wildfire risks within and surrounding Apex Ranch. The Assessment also reveals opportunities to reduce the risks and enhance the natural environment the homeowners prize.

Mr. Roger Lund contacted the Colorado State Forest Service (CSFS) inquiring about recognition of Apex Ranch as a Firewise USA site. The inquiry led to a meeting on July 11th, between Mr. Lund, Mike Duncanson and Dave Root with the CSFS Woodland Park office to tour the community. During the course of the visit, it was agreed to develop a Community Wildfire Protection Plan to assess the wildfire hazard in Apex Ranch and to guide its hazard reduction for the next ten years. The plan was written in September 2018 with the assistance of Margo Humes, a volunteer for the CSFS, and edited and reviewed by the CSFS Woodland Park Field Office and Peyton Fire Protection District.

The assessment found a moderate to severe wildfire hazard depending on fuel type and terrain. The final determination of wildfire hazard was made by combining the predicted fire intensity of each fuel type with the influence of terrain. Homes in all fuel types have significant risk of ignition, and in some cases manmade hazards increase the risk associated with the native fuels.

The CWPP also includes an evaluation of the area surrounding Apex Ranch where a wildfire would threaten the community, and found that the hazard zone extends three to six miles from Apex Ranch itself. The size of this wildland urban interface boundary, indicates that cooperative fuel reduction among neighboring landowners is as important to the safety of Apex Ranch as is fuel reduction within the community.

Finally, the plan has specific prescriptions for reducing the hazard based on each fuel type, and recommendations that will improve the home's resistance to ignition by windborne embers. The prescription section also recommends some specific management strategies to improve wildlife habitat and maintain forest health. The Firewise Action Plan included in the document provides a list of activities designed to address the recommendations, and to continue Firewise USA recognition.

TABLE OF CONTENTS

I. INTRODUCTION

Apex Ranch Estates takes its name from its location on the high point of the Old Denver and New Orleans Railroad's grade between Denver and Pueblo, and the cattle ranch that was established there. The D&NO's corporate successor, the Colorado & Southern abandoned the railroad after severe flooding damaged the tracks in 1935, but the old roadbed can still be seen snaking around the hills in the area, a reminder of many changes that have taken place over the years.

Long before the railroad and long before Apex Ranch Estates, fire has been part of the landscape. For millennia, Indian tribes burned the area to produce better forage for their horses, hunt game, and to maintain open forest stands. In fact, the pre-settlement forest in Apex Ranch Estates evolved as a creation of men who altered and managed it for their own benefit using the best technology available—prescribed fire.

When European settlers removed the Indians they managed the land with different technologies and for a different set of objectives. The white man's enterprises were destroyed by fire, and wildfire was

Apex Ranch Estates Goals and Values

Protection of human life and safety of residents and firefighters.

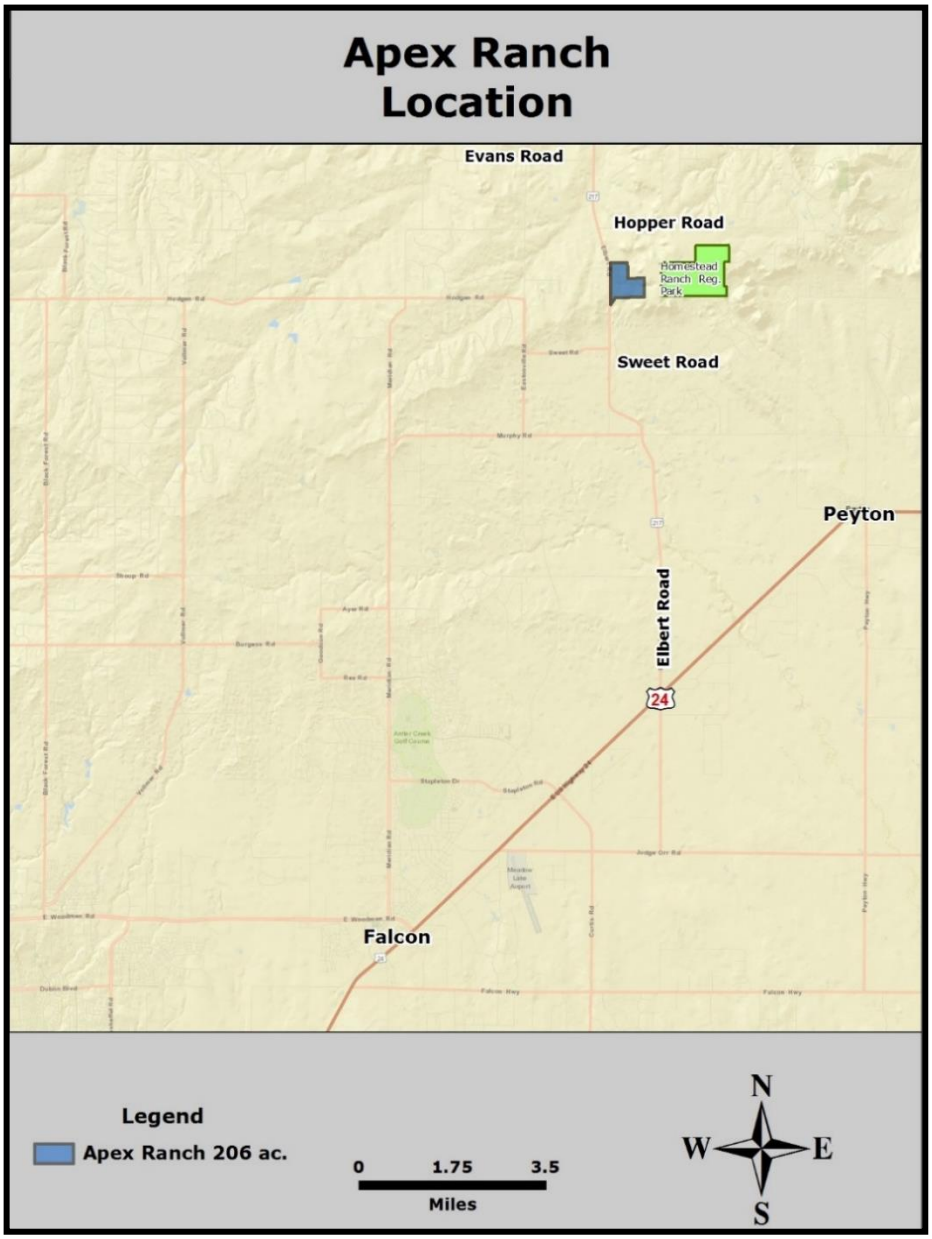
Protection of homes and property values.

As a community, proactively reduce wildfire hazard and improve forest health.

Protection of a rural lifestyle, and the natural setting.

Protection and improvement of wildlife habitat.

suppressed. Wildfire suppression was successful for a time, but as forests became thicker and fuels increased, wildfire suppression has become more and more difficult.

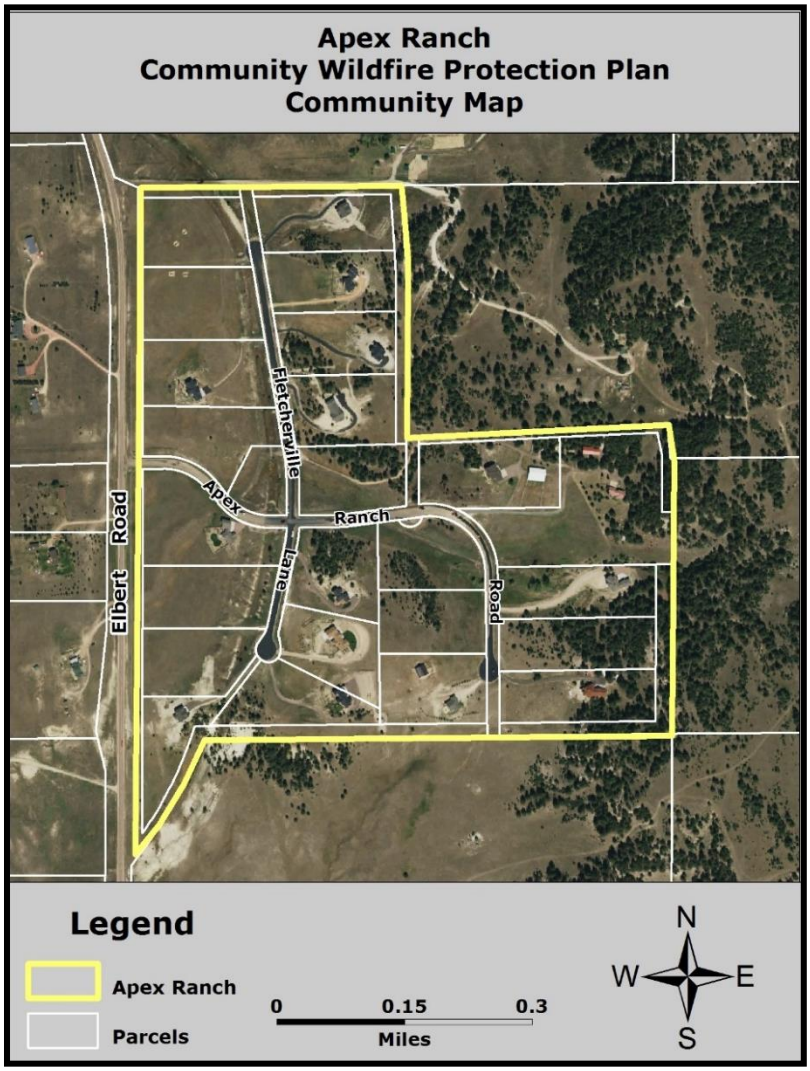


In the present, Indians, ranch and railroad have all been replaced with residential developments, and the homes and people in Apex Ranch are vulnerable to wildfire. Wildfire does not threaten a single landowner in Apex Ranch Estates. It threatens the community.

On behalf of the Apex Ranch Estates Homeowners Association, Roger Lund contacted the Colorado State Forest Service, (CSFS) Woodland Park Field Office to inquire about recognition as a Firewise site. Mr. Lund and Mike Duncanson of the HOA met with Dave Root from the Woodland Park office on July 11th, 2018 to tour and observe the community. A follow up meeting with Mr. Duncanson, Dave Root and Margo Humes took place on August 29th. A core team of Mr. Lund and Mr. Duncanson, representing the community, Margo Humes, and Dave Root wrote the plan. The first draft was reviewed and revised by the Peyton Fire Department.

Apex Ranch Estates is a residential community of 25 lots, 18 homes, and 6 unoccupied lots owned by residents who do not plan to build on them. The average resident age is 50-60-years old, there are just a few children under the age of 18 and one special needs senior citizen. All surrounding lands are privately owned, and Homestead Regional Park (El Paso County) adjoins on the eastern border. One owner maintains two horses on his property

II. Community Description



Apex Ranch is included in El Paso County Wildfire Protection Plan. The county plan is a large scale plan covering large expanses of land and establishes broad goals at the county level. Due to the large scale, no wildfire hazard goals and objectives are specific, to Apex Ranch Estates. This Firewise Assessment is the community's guiding document, and will be considered an addendum to the El Paso plan. These objectives and recommendations are specific to Apex Ranch Estates. At a community meeting the objectives and values of the Apex Ranch Estates residents were determined to be:

- Protection of human life and safety of residents and firefighters.
- Protection of homes and property values.
- As a community, proactively reduce wildfire hazard and improve forest health.
- Protection of a rural lifestyle, and the natural setting.
- Protection and improvement of wildlife habitat. Native wildlife include mule deer, turkeys, foxes bobcats, coyotes and songbirds. Bears and mountain lions are occasional visitors to Apex Ranch Estates.

Apex Ranch Estates is located at an elevation of 7,500 feet on the summit of the Palmer Divide about seven miles NW of Peyton, Colorado, and is in the Peyton Fire Protection District. The Palmer Divide is the high ridge that separates the South Platte and Arkansas River watersheds, and wildfires along the Divide could impact one or both of the watersheds with post fire sedimentation and flooding. Several million Coloradoans depend on these two watersheds for drinking water.

The headwaters of Kiowa Creek, near the western Boundary, mark the lowest elevation of the community, and rolling hills rise gently to the east, giving Apex Ranch Estates a

western aspect. Vegetation is native grass with fingers of ponderosa pine along the north faces of the hills.

Evacuation: Evacuation away from Apex Ranch Estates and firefighter access into Apex Ranch Estates depend on the safety of the local roads. Apex Ranch Estates has one way in and one way out over Apex Ranch Estates Road to Elbert Road. Within the community, are three cul-de-sacs arranged in a crossed pattern, and all three join Apex Ranch Estates road at a single point. From that intersection, Apex Ranch Estates Road continues west for about 0.2 miles to Elbert Road. All residents would use this road to evacuate and all emergency responders would enter or escape Apex Ranch Estates the same way.

Elbert Road is a rural, two lane paved road without shoulders, and in the event of a fire would be overburdened with residents evacuating from Apex Ranch Estates and other area communities. Emergency responders would also use this road to reach the fire, and a dangerous situation would develop.

Elbert Road joins U.S. Highway 24 about six miles south through grass fuels, and there are several sharp curves along this route. To the North Elbert road continues into Elbert County through a mixture of grass and forest fuel types. Several connecter roads lead east and west from Elbert Road that could be potential evacuation routes, but most of these are not direct through

Evacuation Tips:

In Advance of an Evacuation:

- **Know at least two ways out of your neighborhood, and be sure everyone in your family knows it.**
- **Practice an emergency evacuation plan with everyone in your family.**
- **Arrange a safe meeting place for separated family members**
- **Designate a friend or relative as a contact for separated family members**
- **Assemble an emergency supply kit containing important documents, medications, personal I.D. Be prepared to stay away for at least 72 hours.**
- **Know how to shut off natural gas or propane at the meter or tank.**
- **Know of any elderly or disabled persons in your neighborhood who may need assistance.**
- **Arrange with a friend or relative outside the area to care for pets or livestock.**
- **Have a "to go kit" ready for pets.**

When a wildfire threatens:

- **Back the car into the garage with the keys in the ignition, the car door unlocked, and the garage door set for manual operation.**
- **Load your "to go kits' into the car.**
- **Keep pets together in a single room.**
- **Keep the family together and take only one vehicle.**
- **Wear long pants, long sleeves, sturdy shoes, work gloves and a handkerchief to protect your face.**

roads. Residents would need to be familiar with the various turns and roads to avoid being trapped in a dead end.

Fletcherville Lane is built on the old C & S railroad grade, and from the north cul-de-sac an unimproved road follows the old grade north through private land. While this road is navigable for high clearance vehicles, it would not make an adequate escape route.

In the event of an evacuation, the El Paso County Sherriff will determine the safest evacuation route based on the current conditions and expected fire behavior. Residents should follow the Sheriff's instruction without hesitation. If a fire is threatening the area, it is advisable to evacuate early and not wait for an evacuation order.

Information will be relayed to residents by local media and through reverse 911 calls to local phones. Reverse 911 calls are not automatically relayed to wireless phones, so to receive reverse 911 notices, cell phones need to be registered with the El Paso-Teller E911 Authority. The address of the registration webpage is:

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

Landlines are not as common as they were historically and cell phone service may not be available in areas of the community at all times. Landlines can also be registered with the El Paso-Teller E911 Authority.

When the fire weather is severe, homeowners should remember not to leave flammable items outside. This includes rattan doormats, flammable patio furniture, firewood stacked next to the house, or other flammables.

Adjoining Lands: All adjoining lands are privately owned, and are larger parcels or remaining ranches. Further south and east, there are small subdivisions with homes on three to five acre lots. About one-quarter mile east, El Paso County maintains the 450 acre Homestead Regional Park.

The Apex Ranch Estates land developer installed a 33,000 gallon cistern for the community's fire protection water source. Each quarter the local fire department comes out to monitor the integrity of the tank and subsequent plumbing and to fill with water should more be needed.

The cistern along Apex Ranch Estates road is in the foreground, while patches of timber interspersed with the prairie grass are visible in the background.

III Community Response Capability

Peyton Fire Protection District: First response to a wildfire in or near Apex Ranch Estates will come from the Peyton Fire Protection District.

Peyton Fire Protection District (PFPD) is a paid/volunteer fire department. We currently have one paid firefighter/EMT working weekdays Monday- Friday. Weekends and evenings are covered by the 20 volunteer members. The fire station is located in the town of Peyton at 13665 Railroad St. Peyton Co. 80831. PFPD covers 110 square miles and has an ISO rating of an 8B if you are within a five mile radius of the station and 10 anywhere outside of that radius. We currently have 1 engine, 2 tenders, 2 brush trucks, one ambulance and 2 utility vehicles. We respond to all emergencies within our district and have strong mutual aid relationships with all surrounding fire Protection districts.

El Paso County: If a fire exceeds the ability of the Peyton FPD, adjoining districts and El Paso County will provide mutual aid. The process and county response is outlined in the as follows from the *El Paso County Wildfire Protection Plan*.[1]

Inter-jurisdictional Cooperation: "First responders and community leaders recognize that wildland fire does not respect jurisdictional boundaries, and that large fires can only be managed by pooling resources. As a result, El Paso County enjoys general good cooperation among its many firefighting entities.

Standardized Command and Control: "All County fire departments use the Incident Command System (ICS) and National Incident Management System (NIMS) as a tool to manage interagency response operations. ICS/NIMS clarify roles and responsibilities in many common situations, such as when one area belongs to two overlapping jurisdictions, or when an area is not part of a fire protection jurisdiction.

Mutual and Automatic Aid: "County fire departments have executed several agreements to provide mutual and automatic aid to each other upon request. Groups of neighboring departments have also set up local automatic aid agreements, so that all departments in that group are dispatched to any fire in any of their jurisdictions.

"The El Paso County Sheriff's Office participates in the 2013 Annual Wildfire Operating Plan for El Paso County Colorado. The Plan, updated annually, describes how County agencies coordinate wildfire suppression activities with those of the [Department of Public Safety (DPS)], the U. S Forest Service, and the Bureau of Land Management. It outlines rules and procedures for requesting mutual aid, ordering out-of-county resources, radio communications, and air operations. The 2013 AOP is scheduled for update after June 1, 2014.

[1] Russell, Kathy (2011). *Community Wildfire Protection Plan for Unincorporated El Paso County*. El Paso County Sheriff's Office, Emergency Services Division. pp. 46, 47.

An Expanding Hierarchy of Resources: "The responsibility for wildfire suppression initially rests with the jurisdiction where the wildfire starts. The El Paso County Sheriff is responsible for suppression of wildfires that occur on unincorporated, non-federal land that is outside a fire protection district.

"If a wildland fire grows beyond a local fire protection district's ability to control, the Sheriff may appoint an incident management team to provide command and control over the fire response. At that point, the Sheriff also may assume financial responsibility for firefighting expenses, on behalf of El Paso County.

"If the fire exceeds the County's capability to control, the Sheriff can request assistance from the Colorado Department of Public Safety, under terms of the Emergency Fire Fund (EFF) Agreement. When EFF is implemented, DPS assumes responsibility and authority for all suppression activity until the fire has been controlled and management of the fire has been returned to the county.

County Support to Wildfire Responses: "El Paso County has a mature system for mobilizing County and community resources to support a wildfire response.

Public Notification and Warning: "The Sheriff's Office has several methods to notify and warn people who are threatened by an approaching wildfire:

- Automated telephone notification
- Local news media announcements
- When possible door-to-door warnings

Evacuation and Sheltering: "An Incident Commander may request evacuation of specified neighborhoods, or closure of certain roads; the actual evacuation is the responsibility of the Sheriff. "The El Paso County Emergency Operations Center coordinates evacuation and sheltering for displaced persons, as well as their service animals, pets, and livestock."

IV Wildfire Hazard Analysis

The Home Ignition Zone:

Apex Ranch is located in a wildfire environment. Although the land is a mix of grass with Ponderosa pine, it is part of the Prairie Urban Interface. Wildfires will happen--exclusion is not a choice. The variables in a fire scenario are when the fire will occur, and where. This CWPP addresses the wildfire-related characteristics of Apex Ranch Estates. It examines the area's exposure to wildfire as it relates to ignition potential. The assessment does not focus on specific homes, but examines the community as a whole.

A house burns because of its interrelationship with everything in its surrounding home ignition zone----the house and its immediate surroundings. To avoid a home ignition, a homeowner must eliminate the wildfire's potential relationship with their home. This can be accomplished by interrupting the natural path a fire takes and by reducing fire intensity by removing and altering the arrangement of fuel. Changing a fire's path by clearing a home ignition zone is an easy-to-accomplish task that can result in avoiding home loss. To accomplish this, flammable items such as dead vegetation must be removed from the area immediately around the structure to prevent flames from contacting it. Also, reducing the volume of live vegetation will affect the intensity of the wildfire as it enters the home ignition zone.

There are three ways that a wildfire can transfer itself from natural or landscape vegetation, or from burning homes, to other homes. They are through radiation, convection, and firebrands. Effective reduction of wildfire hazard addresses all three, and protects both homes and the natural environment.

Radiation: Wildfires can spread to a home by radiating 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—the hot air and gasses rising from the flames--may also ignite a home. This will most likely occur when trees, debris or brush near a structure ignite and the flames touch a flammable part of the structure. Well executed fuel reduction reduces the chances that flames will directly contact a home or other structure.

Firebrands: Firebrands are burning embers that are carried on winds from strong convection drafts in the burning zone. In most cases, the flame front passes quickly, but a shower of firebrands, fall on the structure before and after the flame front passes. Firebrands cause of half of the home losses during wildfires, and can be carried long distances – more than a mile – by the winds associated with a wildfire. Many homes in the community are particularly vulnerable to firebrands.

The unburned trees in the background indicate that windblown firebrands, not contact with flames, ignited this home in the Black Forest Fire. Where wind deposits leaves and needles, it will also deposit firebrands.

A 2006 report by Traci Weaver emphasized the danger of home ignitions from burning embers.[2] Multiple wildfires raged across prairie and shrub land in North Central Texas from Dec. 27, 2005 to April 30, 2006. They killed 17 people, burned 1.6 million acres, and destroyed 440 homes. Many of the destroyed homes were made of brick, stone, and had metal roofs. Investigators pin-pointed the main cause of home destruction to burning embers that fell on top of, or were blown under, wooden porches without screening. Other losses were linked to firebrands entering attic vents, eaves and soffits, or radiant heat of burning grass that ignited wood decks.

The 2002 Hayman Fire burned 138,000 acres and 132 homes in 20 days. After Hayman, the homes burned were thoroughly studied to determine the manner in which they were burned. USDA Forest Service scientists Jack Cohen and Rick Stratton reported on the causes of home destruction in the *Hayman Fire Case Study*.[3] Surprisingly, 662 homes within the parameter of the fire were not destroyed. 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

[2] Weaver, Traci, (2006): *Texas Fires Shed New Light on What it Meant to be Firesafe.* Texas Forest Service.
[3] Graham, Russell T., (2003): *Hayman Fire Case Study.* USDA Rock Mountain Research Station, Report RMRS-CTR-114.

that embers or firebrands ignited it. Based on this logic, they concluded that 62 (47%) of the 132 homes destroyed in the Hayman Fire were ignited by surface fires or firebrands.

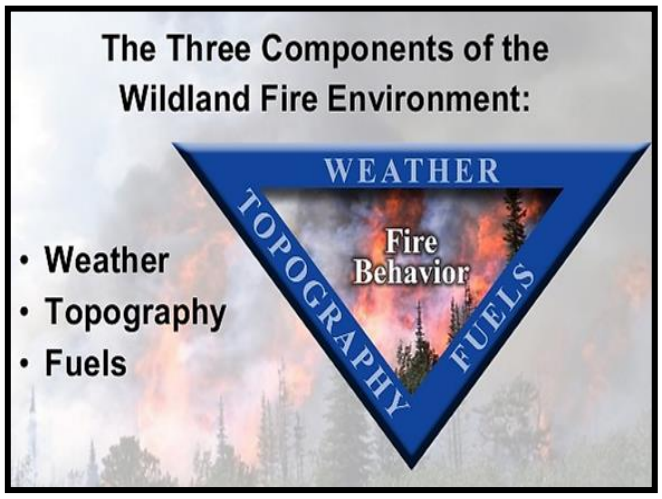
Cohen and Stratton found that home destruction was related more to a house and its site-specific surroundings than to the context of the larger Hayman Fire. If the vegetation around a house allowed high intensity fires to burn near them, they did not survive. If the vegetation permitted only low intensity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

The grass fuels in Apex Ranch Estates would be particularly vulnerable to firebrand ignition from fires burning in the adjacent timber. Dry grass will ignite easily from a single firebrand, and wildfires in grass fuels are wind driven and may move rapidly.

Included in this assessment are observations made while visiting Apex Ranch Estates. The assessment addresses the ease with which home ignitions can occur under severe wildfire conditions and how these ignitions might be avoided within the home ignition zones of residents. Apex Ranch Estates residents can reduce their risk of destruction during a wildfire by taking actions within their home ignition zones. This zone principally determines the potential for home ignitions during a wildland fire; it includes a house and its immediate surroundings within 100 to 150 feet.

Beyond the home ignition zone, grassland and forests are in good health, free of serious insects or disease problems, but good stewardship is necessary to protect and improve them. Property owners should understand that proactive care of the native landscape will further reduce wildfire hazard in Apex Ranch Estates, and enhance other community values. For example, during the assessment some noxious weeds were observed in the grassland, and forests stands away from the home ignition zone were in need of thinning for forest health.

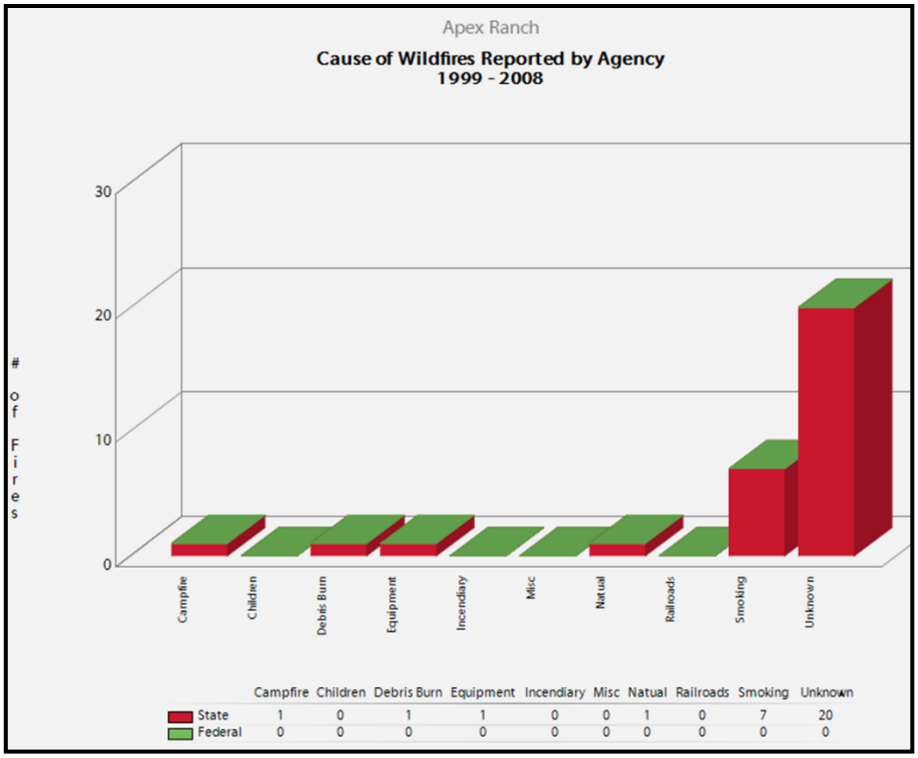
The result of the assessment is that wildfire behavior will be dominated by the residential characteristics of this area. The good news is that by working together the community will substantially reduce their exposure to loss. Relatively small investments of time and effort will reap great rewards in wildfire safety and forest health.



<u>Fire Behavior:</u> Fire intensity, direction of spread and rate of spread rate depend on the fuel type and condition (live/dead), the weather conditions prior and during ignition, and the topography. Generally, the following relationships hold between the fire behavior and the fuel, weather and topography.

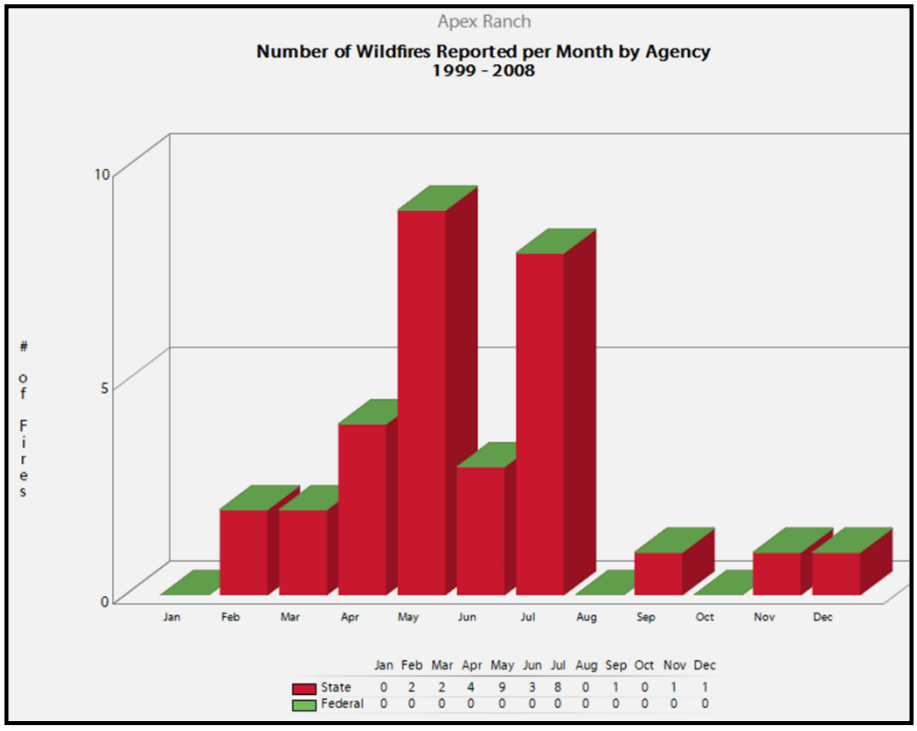
<u>Fuels</u>: Fine fuels, such as grass, ignite more easily and spread faster with higher intensities than larger fuels. For a given

fuel, the more there is and the more continuous it is, the faster the fire spreads and the higher the intensities. Fine fuels take a shorter time to burn out than coarser fuels.



Weather: The weather conditions influence the moisture content of the dead and live vegetative fuels. Dead fine fuel moisture content is highly dependent on the relative humidity and the degree of sun exposure. The lower the relative humidity and the greater the sun exposure, the lower will be the fuel moisture content. Lower fuel moistures produce higher spread rates and fire intensities. Wind speed significantly influences the rate and direction of fire spread and fire intensity. The higher the wind speed, the greater the spread rate and intensity.

Topography: Topography influences fire behavior principally by the steepness of the slope. However, the configuration of the terrain such as any narrow draws, saddles and so forth can influence fire spread and intensity. In general, the steeper the slope, the higher the uphill fire spread and intensity.



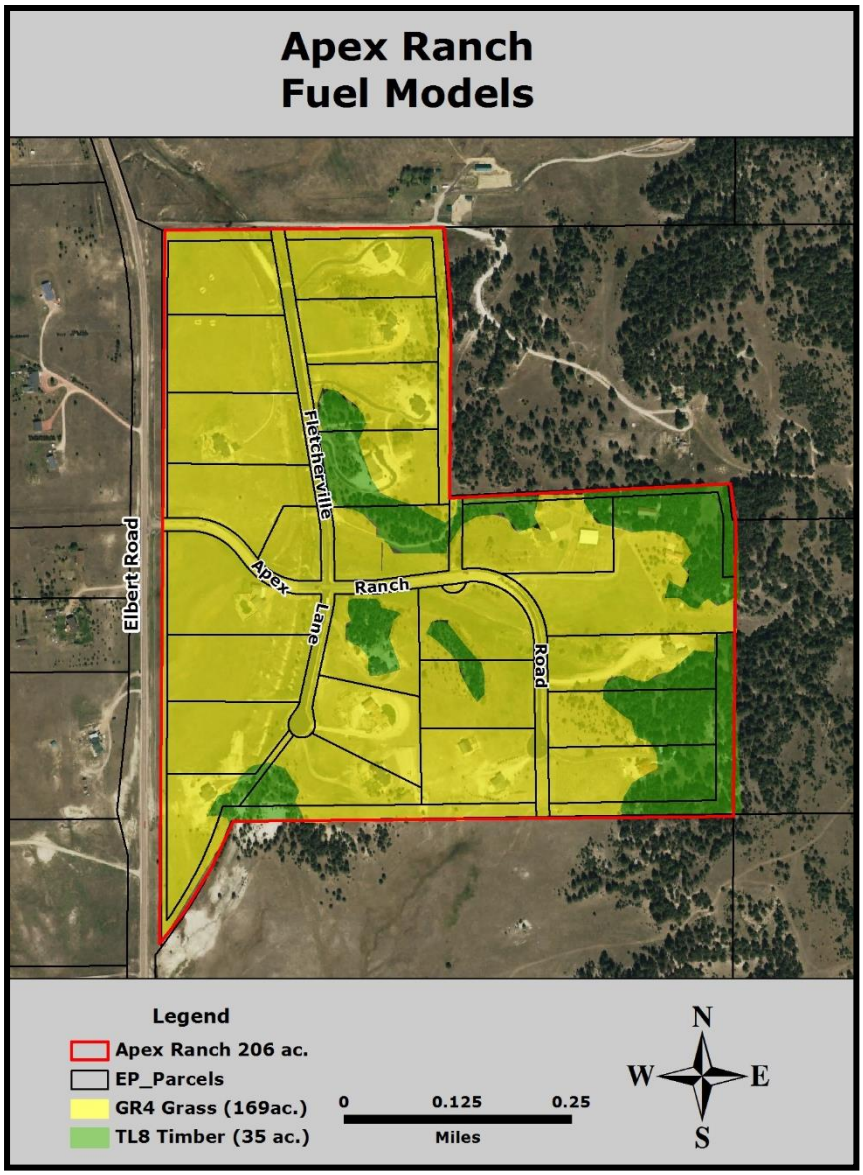
It is important to realize that neither topography nor weather can be altered to influence fire behavior. Only the amount and arrangement of fuels can be changed in advance of a wildfire to protect life and property.

If a spark in or near Apex Ranch Estates becomes a small fire, easily controlled, or a major disaster depends on the weather at that point in time. The most damaging fires have all started on hot dry and windy days.

Fire History: The Colorado Wildfire Risk Assessment Portal (CO-WRAP) is a GIS based program that is useful for making comparisons of wildfire risk across the state. CO-WRAP also generates data about the timing and cause of fires around any community.

Between 1999 and 2008, the most current data available, CO-WRAP shows a total of 31 reported wildfires. 20 fires were of unknown origin, seven were the result of smoking. Debris burning, equipment, campfires and lightning each were the cause of one fire.

CO-WRAP shows that most fires occur in spring, summer and through the fall seasons, but wildfires in Colorado are occurring with great regularity throughout the year, and residents must be cautious year around. The threat of a severe wildfire is always greatest during periods of hot, dry and windy weather or during periods of extended drought. The most damaging wildfires, Hayman (2002), Waldo Cañon (2012) and Black Forest (2013) all burned after dry winters and during periods of hot temperatures, high winds and low relative humidity.



Of the three influences on fire behavior, weather is the wild card, it cannot be known in advance of an ignition. Fuels and topography are easily discernable. In order to reach a conclusion about the fire threat weather is assumed to be the sort that will produce the most intense fire behavior.

Fuel Types: Fuels can be analyzed based on standard fuel models. Fuels of different types, such as grass or dense conifer, can be expected to burn with

predictable intensities under similar weather conditions. Fuel models were determined by on the ground observation and then drawn onto aerial photographs to produce the map on page 12.

The model outputs used here, rate of spread and flame length, serve to illustrate the severity of a wildfire. Rate of spread is straightforward. It is how fast the fire will move across the landscape when the mid-flame wind speed is 20 miles per hour. Flame height requires more explanation. The heat produced by a flame is related to flame length. Longer flames produce more heat. When flame lengths are greater than four feet, lethal amounts of heat are produced, and firefighters cannot dig control lines next to the fire. The firefighting strategy becomes one of indirect attack. Firefighters fall back to a safer area and work to halt the fire when it reaches them. Everything between the control line and the flame front is sacrificed for safety.

The fuel models used here are those developed by Scott and Burgan.[4] Two fuel models were used:

GR4: Moderate load dry climate grass.
(Corresponds to National Wildfire Coordinating Group Fuel Model 2) The fire burns through a continuous fuelbed of grass, and may spread rapidly depending on wind speed. The model predicts that in dry grass fuel and winds speeds greater than 20 MPH, the fire would spread at 6.0 miles per hour. With flames lengths in excess of 25 feet.

Fuel Model GR4 in Apex Ranch Estates is typified by rolling terrain rising from the headwaters of Kiowa Creek.

Fire behavior of grass fuel is greatly affected by long and short term weather. The moisture content of live or dead grass changes rapidly with weather. Dry grass may be able to ignite and burn within hours of a rain or snow shower. The amount of grass fuel present depends on long term weather. Wet springs

[4] Scott, Joe E. and Robert Burgan. 2005. *Standard fire behavior Fuel Models: a comprehensive set for use with Rothermel's surface fire spread model.* General Technical report RMRS-GTR-153. Fort Collins, CO U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

will encourage dense growths of grass, which by fall will cure and create a large amount of dry fuel.

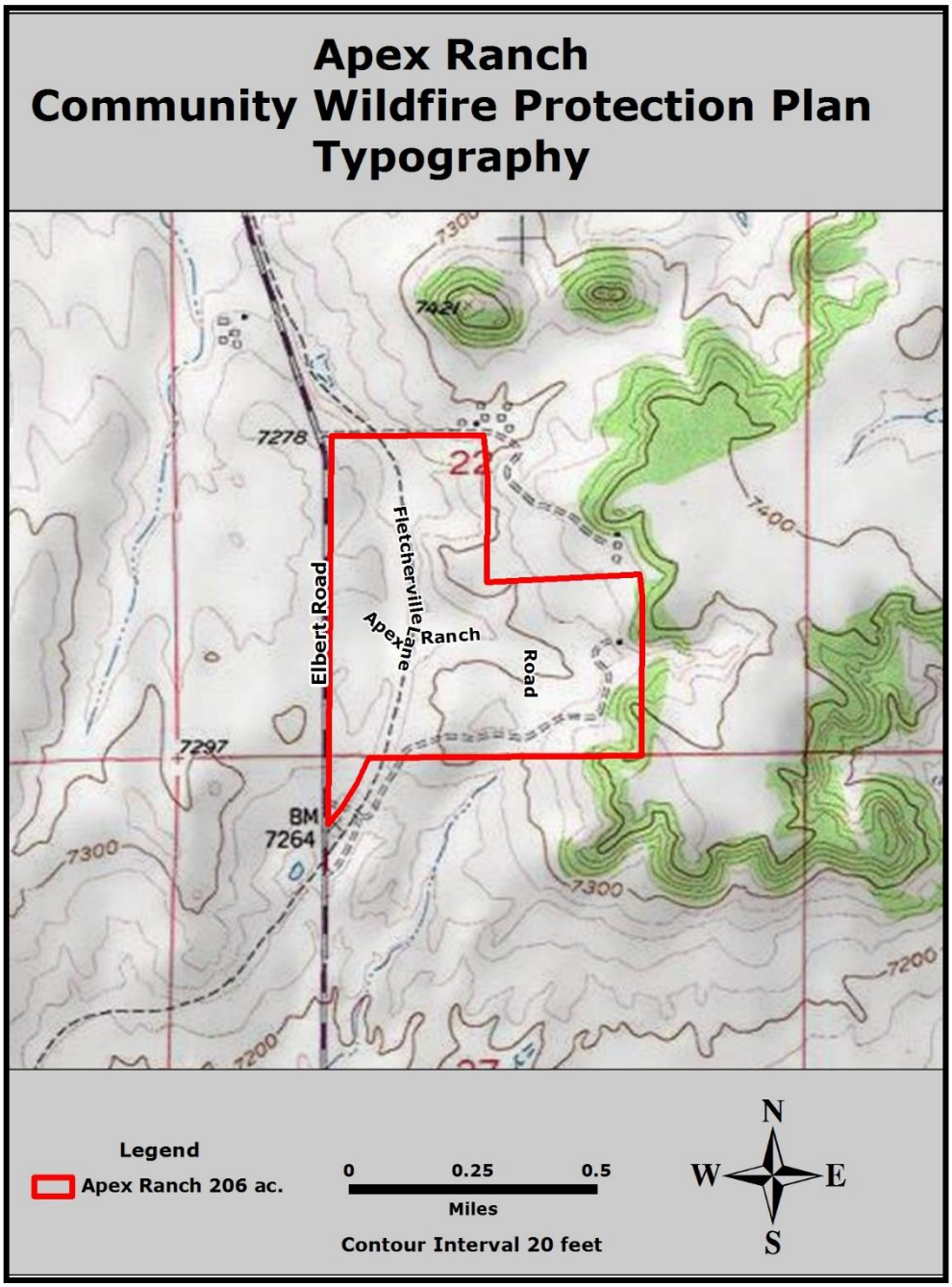
Grass fuels present another hazard not considered by fuel models. Homeowners often assume that grass fuels do not pose as serious a wildfire threat as timber or brush, and become complacent. Grass fires are often wind driven and move with frightening speed, and grass is more likely to burn during fall and winter and early spring. Many homes have been lost to grass fires, and fuel reduction around homes in grass is as necessary as fuel reduction around homes in forested areas.

TL8 Long-Needle Litter
(Corresponds to National Wildfire Coordinating Group model 9) These are the denser forest stands with a closed forest canopy that extend into the grass fuel model. Fire burns through the litter, fallen needles and downed wood, on the forest floor. If the fire stays on the ground with wind speeds of 10 MPH, the model predicts moderate rates of spread at 0.6 MPH, and flame lengths of ten feet.

Fuel Model TL8 is the fingers of ponderosa pine that extend into the grass. Small trees along the edges of the pine fingers indicate that the pine is slowly invading the previously grazed meadows.

But the greatest hazard in this fuel type is that the fire will climb into the canopy and spread through the trees with flame lengths in excess of 60 feet. This forest type has abundant lower limbs that will act as ladder fuels, fuel that allows a ground fire to reach the tree tops. This type of fire, a crown fire, generates large amounts of firebrands that threaten homes far from the fire front and is fire that is the most destructive to property and resources. During severe weather crown fires are unstoppable.

Topography: The final consideration when determining the overall fire hazard in Apex Ranch Estates is the topography. Apex Ranch Estates is a community of rolling hills with some steep slopes and denser trees to the east of the community.



Apex Ranch Estates is at the summit of the Palmer Divide with small streams draining into two major watersheds. In the northern half of the community, water flows to the north into Kiowa Creek and eventually to Cherry Creek and the South Platte River watershed.

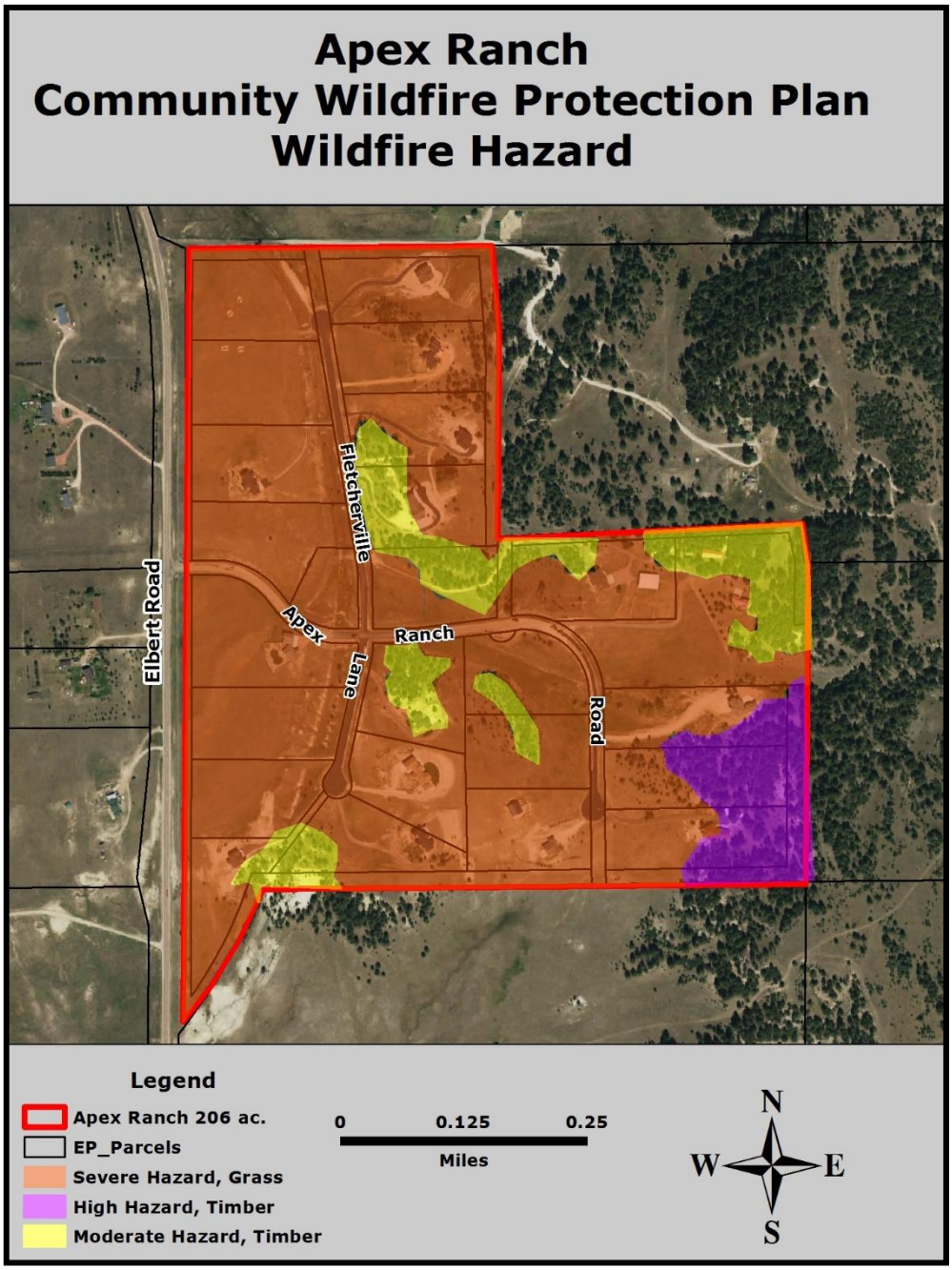
The southern half of Apex Ranch Estates is drained by Black Squirrel Creek on the Arkansas River watershed. Fires on either side of the Palmer Divide could burn up the drainages toward the community. Below ground the Dawson Aquifer is a vital source water to southern Colorado.

Situated at the top of the Palmer Divide, Apex Ranch Estates has a small risk of flash flooding from post fire erosion. There is always a hazard of erosion from within the community after a fire, however, the Natural Resources Conservation Service Soil Survey shows a low potential for post fire damage to soils in Apex Ranch Estates and the surrounding area.[5]

[5] USDA, Natural Resources Conservation Service. *Soil Survey for El Paso County Colorado.*

V. Fire Hazard in Apex Ranch Estates

Fuels and topography are the observable factors of final fire hazard ratings in Apex Ranch Estates, but weather must be assumed. For purposes of the final ratings, weather was assumed to be hot with low humidity and strong to moderate winds. These were the weather conditions common to all of the catastrophic fires of the last decade. The CO-WRAP fire intensity output was also use to arrive at the final wildfire hazard conclusion.



Severe Hazard, Grass. The most common fuel type in Apex Ranch Estates, approximately 169 acres, is prairie grass, and, as the fuel models indicate, can exhibit severe fire behavior. Grass usually burns for a short duration as the flame front passes quickly, but the intensity of the flames threaten homes and safety within the community.

The severe hazard in grass is based on the high rates of spread and high flame lengths during hot, dry and windy weather. Fine fuels, especially cured grass, lose moisture quickly after precipitation, and can be dry enough to ignite within hours of a rain storm. During the fall, winter and early spring cured grass will ignite and burn during high

winds, making a 12 month hazard. In years with high precipitation during the growing season, tall grass is particularly hazardous after it cures in the fall.

Moderate Hazard, Timber. The small pockets of timber scattered through the grass are considered a moderate hazard. The timber stands are small, and separated by wide distances. The larger diameter trees and logs would be less likely to ignite than grass in similar weather conditions, but the fire would burn for a longer period. Within the forest stands, small trees and low limbs are abundant ladder fuels, and the forest canopy has few openings that would slow fire spread through the tree tops. Fires in the timber will produce firebrands that will ignite dry grass. The final consideration for the moderate rating is the rolling terrain without steep slopes that would increase a fire's intensity.

High Hazard Timber. The forest in the southeast corner of Apex Ranch Estates were rated as a high hazard. The volume and arrangement of the fuel is nearly identical to the moderate hazard forest, but the terrain becomes steeper in this area, increasing the hazard.

The difference between the high hazard and moderate hazard timber is the terrain. Warm air rising from the fire will push the fire uphill and dry fuels ahead of the fire on the hill.

During severe fire weather the entire community is at risk, and reduction of the risk should be a community endeavor. The Black Forest Fire serves as an example of a worst-case scenario, and how severe weather greatly influences fire behavior. Winds were gusting to 40 miles per hour, temperatures were above 100 degrees and humidity was below 10%. The fire spread over eight miles in one afternoon, and killed nearly every tree in its path.

In spite of the extreme fire intensity, some neighborhoods, such as Cathedral Pines and Black Forest Reserve, were spared major damage. Post fire evaluation by wildfire

experts of the Pikes Peak Wildfire Prevention Partners found that the common thread in the areas that suffered minimal damage was fuel reduction.[6]

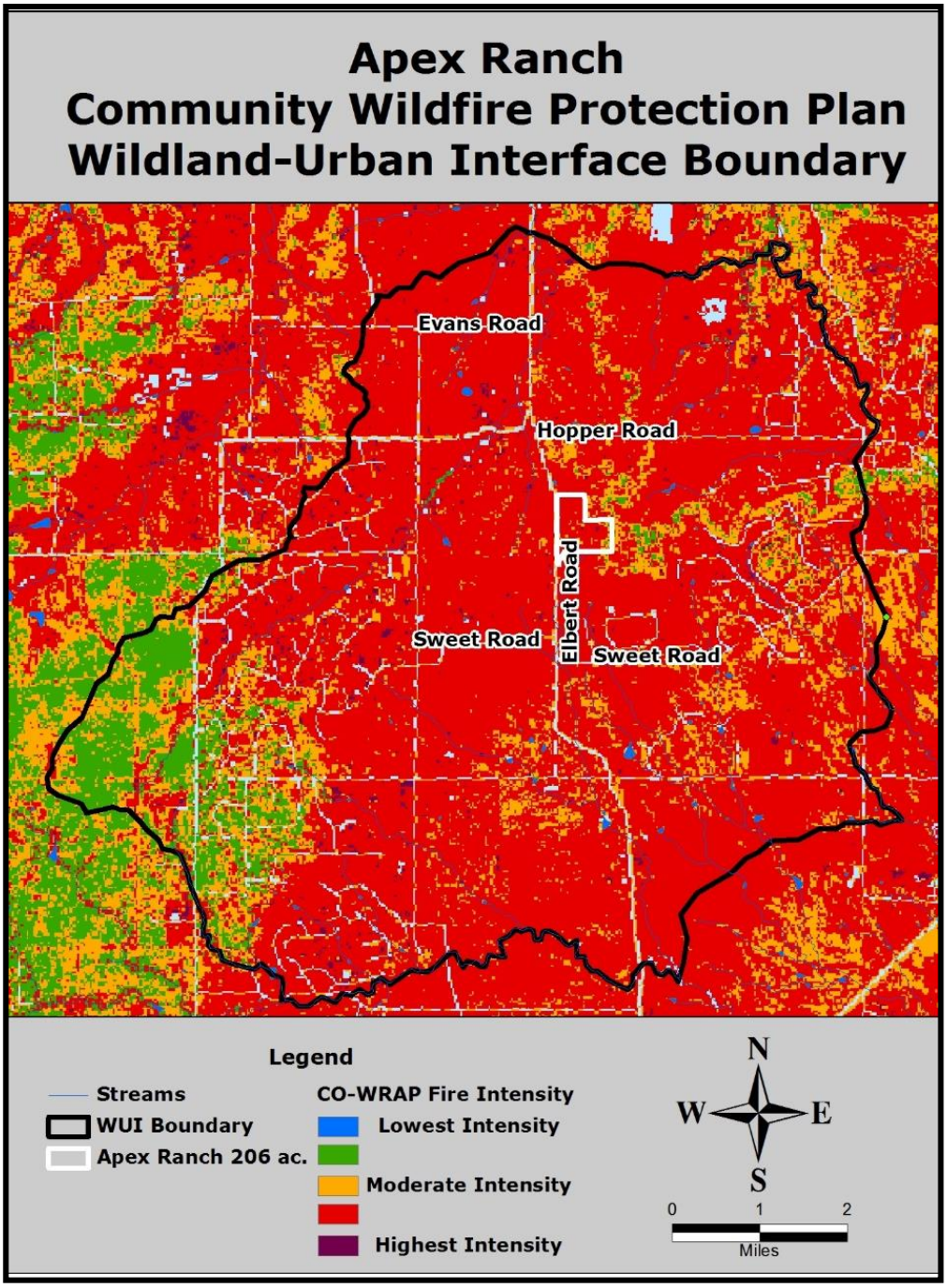
> "Community wide mitigation was found to be most effective in managing wildfire; even during extreme burning conditions. . . The fire burned through two-thirds of [Cathedral Pines] and resulted in one home loss. This home loss resulted the day following (initial ignition) and was a low creeping fire that made its way to the foundation of the home through unmitigated grasses and mulch. In areas where ladder fuels were pruned and tree stands thinned, tree losses were minimized. Wide roadways with roadside areas free of trees served as fire breaks and helped keep the fire on the ground and out of tree crowns. Tree losses were heaviest in areas amidst and abutting un-thinned forests. Firefighters were able to safely defend structures as the fire swept through the community."

The final element of a fire hazard assessment is the homes themselves. One firefighter described homes as, "just another log on the fire". Homes in the community vary in their construction, but exhibit good resistance to ignition. The average age of the homes in this community are 5 years or less. Nearly all the homes are built using wood/steel frame construction with stucco exterior. Only the original Apex Ranch Estates home is cedar siding. Home values in Apex Ranch Estates average in the $500,000 range**.** All homes have buried propane tanks and non-combustible roofing (composition shingles or tile.) Some of the homes are multi-story while others are ranch style. Each property is 3-5 acres but not every lot has a home on it. Some homeowners purchased adjoining lots. Only 17 homes have been built in the community at the time of this assessment. The prescriptions section addresses ways in which homeowners can reduce the ignitability of their homes.

Wildland Urban Interface Boundary. Wildfires far beyond the boundaries of Apex Ranch Estates can have detrimental effects on the community. Firebrands can travel on wind currents for a mile or more from the flaming front. Smoke may cause irritation or serious health problems for many people. The frustration over insurance claims for smoke damage to homes can be equal to that of home replacement. Flash flooding and erosion degrade drinking water, fisheries and damage property for years after a severe fire, and property values can plummet. Fires do not end when the flames are gone and the smoke clears.

The concept of the Wildland Urban Interface Boundary, or WUI Boundary, is used to define the area beyond the community's boundary where a wildfire poses a threat. Determination of the WUI Boundary follows the same process used to determine Apex Ranch Estates' fire hazard. Fuels, topography and weather were considered. In this case though, data from the CO-WRAP program was used due to the large scale which precluded use of manual fuel typing on aerial photographs. As CO-WRAP is primarily a tool to compare hazard across the landscape, it uses average weather over time for the output, and represents an average hazard, not the worst case.

[6] Pikes Peak Wildfire Prevention Partners. 2014. *Black Forest Fire Assessment Team Report to the Governor of Colorado*. WWW.ppwpp.org



The fuel surrounding Apex Ranch Estates is mostly grass, subject to fast moving high intensity fires as reflected in the CO-WRAP fire intensity map at the right. Prevailing southwesterly winds would tend push fires southwest of Apex Ranch Estates toward the community, hence, the WUI boundary extends into the timber as far as Cantrell Creek to the southwest and Black Squirrel Creek on the south. From the northwest the boundary follows the ridge between West Kiowa Creek and Kiowa Creek.

From the southeast, tributaries to Black Squirrel Creek would act as natural chimneys that a fire may follow toward the community. Similarly from the north, fires would tend to follow tributaries of Kiowa Creek towards Apex Ranch Estates.

The WUI boundary illustrates the principle that the specter of wildfire is not limited by property or even community boundaries. Fuel reduction by communities is far better than by single properties, but fuel reduction across the entire landscape is better.

VI OBSERVATIONS AND RECOMMENDATIONS

Defensible Space: The residents of Apex Ranch have made good progress establishing defensible space around their homes, and continue to practice fuel reduction. Most homes have completed zones one and two and many are extending work into zone three. Any barns, outbuildings or sheds should have defensible space as well.

The width of zones one and two depends on the slope around the house. As slope increases, extend the width of the zones. This is particularly important on the downhill side as rising air will dry fuels above the fire to compensate for easier ignition and greater fire intensity.

Zone one: This is the closest zone to the structure, and extends 30 feet from the outer most edge of the eaves and decks. The management goal is to reduce or eliminate most large trees or shrubs within this zone so that the convective or radiant heat will not ignite the structure.

More than any other zone, zone one is most likely to contain manmade fuel as well as natural fuels. The home itself is a manmade fuel. When adequately prepared, a house can likely withstand a wildfire without the intervention of the fire service. Further, a house and its surrounding community can be both Firewise and compatible with the area's ecosystem. The Firewise USA® program is designed to enable communities to achieve a high level of protection against WUI fire loss even as a sustainable ecosystem balance is maintained.

A homeowner and community must focus attention on the home ignition zone and eliminate the fire's potential relationship with the house. This can be accomplished by disconnecting the house from high and/or low-intensity fire that could occur around it.

The construction materials, location and even the shape of a structure influence its vulnerability to wildfire.[7] It is not the intent of this CWPP to suggest extensive alterations to homes that already exist in the community. Understanding how home construction affects the vulnerability of the structure to a wildfire helps residents plan defensible space projects to compensate for construction differences. When remodeling or home improvement projects are done plans can be made to reduce the ignitability of the buildings.

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

Homes can burn when a low intensity fire creeps up to the foundation through vegetation or combustible mulch next to the foundation. Stucco homes, like most of those in Apex Ranch Estates, are vulnerable. Stucco walls have small weep vents built into the wall where the stucco meets the foundation, and firebrands from burning ornamental plants or combustible mulch may get into the inner wall through them. Landscaping around the foundation, deck and beneath decks with five feet bare dirt or rock mulch will prevent this.

This barrier should not be compromised by landscape plantings, especially woody shrubs. Succulent plants or perennial flowers are acceptable, if they are well watered. Never plant highly flammable plants, such as junipers (pfitzers) in zone one. Avoid any plantings, especially shrubs, beneath windows since heat from a burning landscape plant may crack the glass allowing firebrands into the interior. Avoid planting near foundation and dryer vents as well.

Decks and roofs are the most vulnerable parts of a structure. If either burns, the home will be lost. They are most likely to catch windblown firebrands, and air currents are more likely to form eddies that trap heat within the irregular surfaces found in roof structures and decking. Never store any combustible material beneath a deck. Many homes have been lost because firewood, scrap lumber or gasoline has been stored beneath a deck.

New research has determined that decks are often ignited when firebrands land on accumulated in the cracks between deck boards where the board crosses a joist. Flammable debris tends to collect in this area. Periodically removing the accumulated debris from the cracks may save the home.

If a deck burns, the home will burn with it. Keep the underside of decks clear of any combustible material.

The National Fire Protection Association also recommends that replacing the wood deck boards next to the house with flame resistant cement boards will increase the ignition resistance of the home without the major expense of replacing the entire deck.

Fire resistant roofs are extremely important. *Wood shake roofs have been the cause of many home losses due to firebrands.* Roof material with a class A rating indicates the best resistance to fire. Many roofing materials are available to homeowners but they vary in cost, weight and longevity. Homeowners should consult with a reputable building contractor to determine which roofing material will best suit their needs.

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

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

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

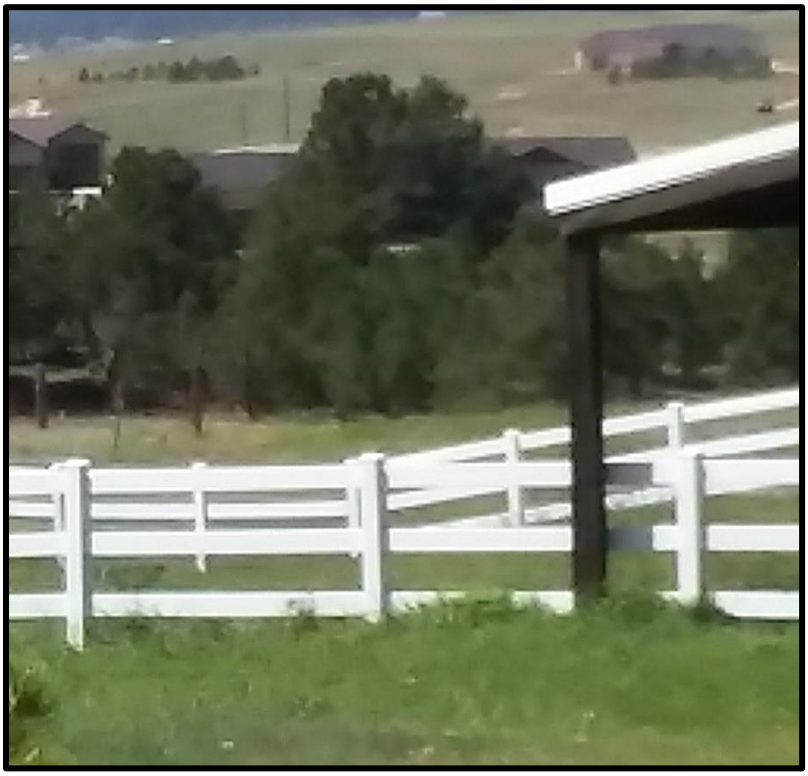
Window frames are also important. Metal frames offer the best protection. Vinyl frames usually do not burn but can warp when exposed to heat. Wooden frames will burn. Metal screening with on the outside of windows offers additional protection, but most windows are sold with nylon screening that will melt. Solid metal shutters offer the best protection, assuming the homeowner has the opportunity to close them before evacuating. Woody shrubs planted beneath windows are dangerous. Heat from a burning shrub may crack the glass and permit firebrands to enter the home.

The vinyl window frame on this home melted and warped in the Black Forest Fire, but not enough to allow firebrands inside the home.

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

Some homes have wooden fences that connect directly to the house or outbuildings. In a wildfire, wood fences become wicks that bring flames in direct contact to a structure. Fortunately, it is not necessary to tear down the entire fence, but separating the fence from a structure with a four-foot metal gate would adequately mitigate the danger

Homeowners store firewood, scrap lumber or other combustibles beneath the the ponderosa pines. Wood piles often catch firebrands, and when they burn harbor hot embers that can smolder for days. Wood underneath trees is a source of ladder fuels to the tree canopy. A few have firewood piles within zone one of their defensible space. Firewood should be stored at least 30 feet away, and uphill from any structure.



During a wildfire, fences become wicks that fire may follow from vegetation to a structure. A four foot wide metal gate between the structure and the fence will keep the flames away from the home.

Other evergreen varieties in landscaping include Colorado blue spruce, Douglas-fir and a few piñon pine. All were planted in the community by property owners. Landscaping mistakes can often negate all the good done by a superb defensible space. Guides for landscaping in defensible space are available from the Colorado State Forest Service, Colorado State University Extension or online at the websites later in Appendix B.

Forest Fuels. Within 15 feet of the eves, or deck all coniferous trees should be removed. A high value conifer tree may be left within 15 feet if the lowest branches are pruned so that they are well above a fire-resistant roof. It is best to limit this to one or two trees, widely separated, near a structure. Treat such trees as part of the structure and create at least 15 feet of space beyond the tree away from the structure.

In the remainder of zone one, trees should have an average spacing ten feet of space between the branches. Trees left in defensible spaces, or any forest management project, should always be healthy, and healthy trees do not always occur on a convenient spacing. If two desirable trees are left on a closer spacing, increase the space around the clump.

Ladder fuels should be removed from defensible spaces. Remove all shrubs and low-hanging branches that will permit a ground fire to reach the upper crown of the tree. Trees greater than 30 feet tall should be pruned eight feet from the ground. Smaller trees should always have at least two-thirds of the green branches/needles remaining.

Grass Fuels: As noted previously, the open meadows pose a significant risk of wildfire, especially when the grass is cured. Fortunately, risk reduction is a fairly simple proposition: keep the grass mowed to six inches or less within a minimum 30 feet of any structure. A greater the radius of mowed grass surrounding a structure will increase the safety. It is particularly important to mow grass in the fall to prevent dry grass from burning during the next winter or spring. Homeowners living in the grass fuels should heed the recommendations for decks, woodpiles, landscaping and other man-made hazards.

The mowed grass on the left effectively halted the spread of the Black Forest Fire.

Grass fuels adjoin all of the roads within Apex Ranch Estates, and could threaten safe evacuation or first responder access during a fire. Rights of way should be mowed along the subdivision roads. Safety will greatly increase if adjoining landowners also mow for a distance of fifty feet along the right of way. In addition mowing for fifty feet around the cistern will increase the safety around this important water source.

Mowing grass when weather is hot dry and windy can be dangerous. In April of 2002, the Pine Glen Fire in Black Forest was started when a homeowner tried to mow grass, ironically to reduce the fire hazard, on just such a day. The mower sparked the grasses and the ensuing fire burned about 70 acres on the Pineries Ranch (now the Pineries Open Space) over the next two days. Grass should only be mowed when the humidity is high and the wind is light.

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

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

Zone Three: When forest thinning reaches zone three, more than 100 feet from the home, the primary objective is to manage for a healthy forest. Simply thinning weak and stressed trees will remove significant amounts of fuel. As observed during the assessment Apex Ranch Estates' forest were generally insect and disease free, but crowded with more trees that the available water, sunlight and nutrients can sustain. Apex Ranch Estates has an opportunity to create a healthy and resilient forest.

The guideline for zone three is to thin the forest to improve forest health. Spacing is less critical in this area but some spaces should be made in the canopy. Removing poor trees from the edges of existing openings is the easiest way to enlarge them.

Regardless of the zone, the trees remaining should be the most healthy and vigorous. Trees removed should be those with the poorest vigor.

Ponderosa pine are intolerant of shade, meaning that the trees do not sprout or survive in the shade of other trees. When trees are intolerant of shade it follows that they sprout and grow after a disturbance kills the existing trees. Thus, ponderosa tend to grow in stands where all the trees are approximately the same age.

As the new trees grow, the most vigorous outgrow and overtop their siblings. The

The ponderosa sections in this photo illustrate how tree diameter is not a reliable indicator of age. The center section is 100 years old; section 2 is 99; section 3 is 101; section 4 is 90; section 5 is 85; section 6 is 130; section 7 is 81. (Sculpture by Bill Wallace. Photo by Bill Buckman, courtesy of the Black Forest Slash & Mulch Program)

weaker trees remain, overtopped by the dominant trees, and smaller in diameter. Smaller diameter does not indicate a younger tree. Thus, barring insects, disease or drought, the largest tree in a group is usually the most vigorous.

Other good indicators of tree vigor are a straight non-forked trunk, more than half of the tree contains green branches and dense growth of green needles. Poor trees are overtopped, have few green branches or sparse needles. Trees left in the forest should be those that exhibit traits of good vigor. Very few trees are perfect, so leave the best trees available to achieve the objectives. It is perfectly acceptable to leave trees with interesting shapes or unique form as character trees, but only occasionally.

Maintenance: Defensible space, fuel break thinning, or any type of forest/grassland management, does not end when the initial project is finished. Continual maintenance is an essential part of any forest/land management program. Even in well managed forests trees will die, storms and wind will damage trees, and new trees will germinate.

Trees should be inspected every spring for any sign of damage from winter or spring snows or wind. Prune any broken branches if they are not too high in the tree, and trees bent by heavy winter snows should be removed. Check for any signs of insect activity or disease.

Late October is the best time to inspect trees for attack by mountain pine beetles. Beetles have finished attacking trees at this time, and there is adequate time to cut and treat the tree before the adult beetles fly the next July.

At five years check the canopy closure, especially in zones one and two. Remove any trees necessary to maintain openings in the canopy. Do any additional pruning or removal of trees and shrubs to eliminate ladder fuels.

After ten years, dense thickets of young trees (regeneration) may have become established, and these will need to be thinned. Not all regeneration should be cut since trees of various ages are important for forest diversity. Young trees in openings with adequate room to grow should remain. Regeneration that is likely to become ladder fuel or crowded by other trees should be cut. Depending on their objectives, landowners may want to consider removing some of the larger trees to make room for the younger ones.

In the pastures, several species of noxious weeds were observed. Noxious weeds are non-native plants that have become established in native ecosystems. Because they have no natural predators or diseases, they displace the native plants, and control is needed to prevent loss of native vegetation. Many noxious weed species are more fire prone than native plants. More information is available for the Colorado State University Extension.

Two noxious weeds were seen at Apex Ranch Estates. Mullen (left) is recognized by its tall flowering head with small yellow flowers. One flowering stalk may produce 10,000 seeds.

Butter and eggs (right) is a low plant with yellow flowers that look like snapdragons. Information about noxious weeds is available from the Colorado State University Extension Service

Education: Before residents take any action, they must understand the nature and extent of the problem, and actions that will effectively address it. Many WUI homeowners, as recent arrivals from urban areas, do not understand the risk or how to deal with it. A common misconception among urban emigrants is that the forest and grassland as they now find it is "natural" or that it developed apart from human activity, and should not be altered. As noted in the beginning paragraphs, for millennia open parklike forest were maintained by Native American prescribed burning, and the forest and wildlife evolved and adapted to this constant human intervention.

Community education in Apex Ranch Estates should emphasize the age old interactions between humans and the forest, and the beneficial relationship between fuel reduction and forest health.

This Community Wildfire Protection Plan and the literature available from Firewise/USA Communities® are excellent devices to teach residents about the hazards and responsibilities that come with living in a forested area. The annual Firewise activity will bring residents together and unite them in a common cause. The Colorado State Forest Service and the Peyton Fire Protection District can assist the community with advice about hazard reduction and forest stewardship.

Fuel Reduction and Wildlife Habitat. Apex Ranch homeowners have identified wildlife as one of the values that should be protected from wildfire. Mule deer, turkeys, and foxes are commonly observed in the area. Less common wildlife include bear, mountain lions and coyotes. Fuel reduction is compatible with improved wildlife habitat

when done properly. Forest management for wildlife is best suited to zone three of fuel reduction projects where there is more latitude for variable spacing in trees and there is the opportunity to create clumps and openings in the forest. A forest structure of clumps and openings creates a diversity of habitat types that in turn attracts diverse wildlife.

A common mistake made by many homeowners during fuel reduction is the desire to remove every dead standing tree and every down log, but this is not necessary, or desirable, outside zone one or two. Jackstraw piles of wood are hazardous and should be broken up or removed, but standing dead trees (snags) and isolated down logs do not significantly increase wildfire hazard. Both are important habitat requirements for wildlife.

Standing dead trees, or snags, and down logs are important habitat for wildlife, and should be retained from zone three of fuel reduction projects.

No more than five widely scattered snags per acre should be retained. Large dead trees greater than ten inches in diameter will be most useful for animals. Down logs in various stages of decay provide food and cover for small mammals that are prey species for raptors, and other mammals. Foxes, for example prefer to hunt along edges of forest openings where prey species are more abundant.

Provide some clumps of five to ten trees with the lower branches intact to provide hiding and thermal cover for deer and elk. Some clumps of the smaller trees should remain for turkey nesting sites. If the clumps are far from structures, the slight increase in wildfire hazard can be mitigated by thinning surrounding trees to a wider spacing. Openings with grasses and forbes are important sources of food for turkeys and other species.

Firewise USA Recognition. The Apex Ranch Estates Firewise Board in cooperation with the Colorado State Forest Service Intends to seek recognition as a Firewise USA site.

Assuming the assessment area seeks to achieve national Firewise Communities/USA® recognition status, it will integrate the following standards into its Community Wildfire Protection Plan:

- Sponsor a local Firewise board, task force, committee, commission or department that maintains the Firewise Community program and status.
- Develop the CWPP as the Firewise Community assessment and Action Plan.
- Invest a minimum of $24.14 annually per dwelling in its Firewise Communities/USA® program. (Work done by municipal employees or volunteers, using municipal or other equipment, can be included, as can state/federal grants dedicated to that purpose.)
- Observe a Firewise Communities/USA® Day each spring that is dedicated to a community Firewise project.
- Submit an annual report to Firewise Communities/USA. This report documents continuing participation in the program.

APEX RANCH ESTATES, CO
Firewise© Action Plan
October 2018

The following are the Firewise Committee for the Apex Ranch:

Co-Resident Leaders:
Roger Lund
Mike Duncanson

Firewise Committee Members:

COMMUNITY FIREWISE ACTIVITY LOG

Action	Description	Estimated Timeline
Community Planning	Complete Draft CWPP	October 2018
Public Outreach and Comment	Present CWPP at Annual HOA Meeting	Dec. 5, 2018
Community Planning	Appoint FW Committee	Dec. 5, 2018
Planning	Finalize CWPP	December 2018
Hazard Reduction	Mow Roads and Cistern	Dec 31,2018
Education and Hazard Reduction	Annual Firewise Activity	Yearly in spring.
Hazard Reduction	Mow Roads and Cistern	As needed
Planning	Update CWPP & Action Plan	December 2021

APPENDIX A

INSECT AND DISEASE CONDITIONS

Literally thousands of insect and diseases are present in the forests surrounding the community--or any other forested area. Fortunately, like the common cold, most do no serious or lasting damage. But when in poor health, trees, like humans, are more prone to infection from other causes; the concept of preventive medicine applies to forests, as well. Maintaining forests in good health will prevent problems in the future. For the most part, forest insect and disease issues are typical for the region.

Well maintained forests have a multitude of benefits. They are resistant to catastrophic fires, insect and disease, sustain wildlife populations and are pleasant places to be. Colorado State Forest Service Photo by Dave Root

Based on the limited observations made during the community assessment, no serious insect or disease problems were noted. The two most threatening forest health threats in the Palmer Divide region are dwarf mistletoe and mountain pine beetle. Residents should be familiar with these so that any outbreaks can be spotted and dealt with early, before they become serious threats.

Every summer, insect and disease specialists from the USDA Forest Service and Colorado State Forest Service (CSFS) survey Colorado's forests from the air to monitor insect and disease outbreaks. These flights are an excellent means of finding new areas of insect and disease activity and monitoring trends in existing outbreaks. Maps of the previous year's findings are published in January and can be found on the CSFS website at http://csfs.colostate.edu/pages/common-insects.html.This link also contains more detailed information on the insect and disease issues presented here.

The unnaturally dense forest conditions that cause the potential for hazardous fire also create the potential for cyclical insect and disease outbreaks. Trees weakened by overcrowding and severe competition for water and sunlight are susceptible to invasion by insects and disease. When planning wildfire hazard mitigation projects, it is important to address current insect or disease issues and prevent those that are likely to become a problem. Following is information on some of the common forest insect and disease problems that have been identified in the region.

DWARF MISTLETOE

Dwarf mistletoe is a parasitic plant that robs moisture and nutrients from the host tree. Over many years, it causes the tree to decline in vigor and eventually may cause death. More commonly, the tree declines to the point where bark beetles attack and kill it.

Three common species of dwarf mistletoe are found in the region, each named after its principle host – ponderosa pine, lodgepole pine and Douglas-fir. Locally, ponderosa and lodgepole varieties grow on any pine species, but Douglas-fir dwarf mistletoe is exclusive to Douglas-fir trees. Spruce, true firs and deciduous trees are immune to all three species of dwarf mistletoe.

The most obvious symptom of dwarf mistletoe infection is the dense, distorted growth of the branches, called witch's brooms because they appear to be twisted or tied in knots. The shoots of ponderosa and lodgepole dwarf mistletoe are visible on the branch as thick fingerlike growths extending out of the branch or trunk. The shoots of ponderosa and lodgepole dwarf mistletoe are long and obvious to casual observation, but Douglas-fir dwarf mistletoe shoots are shorter than the needles and are not easy to see.

A ponderosa pine with advanced dwarf mistletoe infection. Note the heavy contorted "witch's brooms" in the lower branches. After long periods of infection, the needles at the top of the tree become sparse and shorter. Colorado State Forest Service photo by Dave Root.

Mistletoe shoots are only reproductive structures with no photosynthetic function. Removing the shoots from a branch does not control dwarf mistletoe, except to temporarily halt seed production. Structures called sinkers, (analogous to roots in plants) embedded in the wood cause the damage, and the mistletoe plant continues to absorb the host tree's water and nutrients. Shoots that are removed grow back in two or three years.

During the growing season, dwarf mistletoe shoots develop berries containing a seed. In August, the berries fill with water and explode, shooting the seed as far as 40 feet. Most seeds strike branches of the host tree and do not travel the full 40 feet, so the expansion of dwarf mistletoe pockets averages two feet per year. When the seed strikes a branch, it germinates and the sinkers penetrate the bark into the tree's conductive tissues. The growing mistletoe begins to steal the tree's food and water. The first visible symptom of infection is swelling in the branch at the site of the growing mistletoe plant, but nubs of the emerging shoots won't be visible for three years and a shoot won't bear its first seeds until seven years after. As seeds spread, all susceptible trees in the vicinity may become infected; it is extremely rare to find an isolated infected tree in the forest.

The tendency of mistletoe to infect all trees in a stand makes eradication difficult. No effective chemical treatment exists for mistletoe, and the only way to kill the parasite is to kill the host. In stands where only the susceptible species of tree exists, total eradication of the mistletoe would require a clearcut, which is unacceptable to most landowners.

Fortunately, mistletoe kills trees slowly, so it is not necessary to eradicate the parasite. The disease can be controlled by a program of thinning to increase tree vigor. Pruning the more heavily infected branches also helps, even if not all the mistletoe is eliminated. The final step in the process is to replant with non-susceptible species so that new trees will grow before the mistletoe kills the remaining trees.

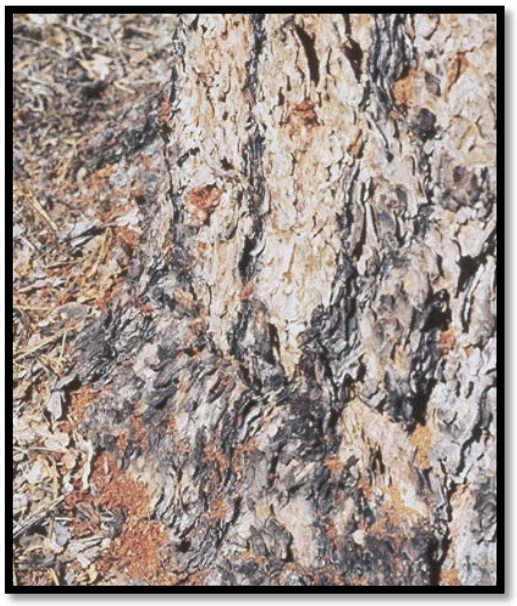
The spread of mistletoe can be halted by a minimum 40-foot buffer zone between infected and non-infected trees. In this situation, cut 20 feet into non-infected trees to remove any mistletoe that is not yet visible; cut the remaining 20 feet into the infected stand. Non-infected trees outside the buffer should be checked each spring for mistletoe and any infected branches should be immediately pruned before seeds develop.

In forest stands with mixed tree species, it may be possible to eliminate all mistletoe by retaining only non-susceptible trees if they are in good health.

Dwarf mistletoe treatment is a complicated process that depends on the site conditions and the landowner's tolerance for cutting trees. In most cases, a combination of treatment methods will best suit the landowner's objectives. Consultation with a qualified forester is recommended to develop an effective and acceptable treatment plan.

MOUNTAIN PINE BEETLE

Due to the massive mountain pine beetle (MPB) epidemic in the western United States and Canada, MPB is the most feared insect in the forest. Unlike the Western Slope, mountain pine beetle is at normal levels in the area. The beetles have crossed the Continental Divide in northern Park County and northern Larimer County, and activity currently is confined mostly to higher altitude lodgepole pine. It presently is not known if or when the beetles will reach into the lower-elevation ponderosa forests, but where they have reached ponderosa, heavy mortality has occurred.



Boring dust on a ponderosa pine after bark beetle attack. The reddish brown sawdust at the base of the tree and in the bark crevasses is a strong indication of successful beetle attack. Colorado State Forest Service photo by David Leatherman.

Adult beetles fly from midsummer through the first frost, although the vast majority fly between mid-July through the middle of September. Females seek a large, weak tree in which to mate and lay eggs. Vigorous trees generate enough pitch to prevent the female from burrowing through the bark, and this attempt by the tree to prevent entry creates the pitch tubes symptomatic of beetle attack. Pitch tubes are **not** a particularly reliable indicator of a successful attack. If pitch tubes are seen, check for reddish boring dust (fine sawdust) at the base of the tree and in the bark crevices. Boring dust is a more reliable indicator of successful attack.

Once a female penetrates the bark, she hollows out a circular mating chamber between the bark and the wood, releasing a pheromone (scent) to attract a mate. The pheromone also attracts additional females to the tree and the tree is attacked en masse. After mating, the female burrows up the trunk between the bark and wood laying eggs. She inoculates the tree with spores of bluestain fungus, which provides food for the larvae. The fungus clogs the tissues that conduct water throughout the tree, leading to death within a few weeks.

Eggs hatch within a few days. The developing larvae feed horizontally from the maternal gallery over winter. The vertical maternal gallery and horizontal larval galleries are characteristic of the mountain pine beetle. The feeding larvae spread the bluestain fungus horizontally through the tree, and it becomes visible in the wood around February. The presence of bluestain is absolute confirmation that beetles have successfully attacked a tree.

Mountain pine beetle galleries under the bark. The maternal beetle burrowed straight up the tree, creating the darker central gallery. Larval beetles feed horizontally, creating the smaller galleries. A larva is in the upper right and pupae in the lower left. Note the bluestain in the wood. Colorado State Forest Service photo by David Leatherman.

Woodpeckers feed on the larvae through the fall and winter. The holes made by the woodpeckers are a visual clue to an infested tree. Untrained observers often are confused by the holes woodpeckers make when they feed on beetle larvae and sapsuckers feed on the sap. Woodpecker feeding is characterized by random holes about one-half inch in diameter that make it appear as though the tree was peppered with a shotgun. Sapsuckers, on the other hand, make a small hole about one-eighth inch in diameter, and the holes are in straight lines or a grid pattern. Sapsuckers do not indicate the presence of beetles in the tree.

Although the tree is dead within a few weeks of successful attack, needles remain green until the following spring. Within the space of a few weeks, in late May or early June the tree will turn straw-yellow and then reddish-brown. Once beetles invade a tree, nothing can be done to save it; the tree must be cut and disposed of in a way that will kill the beetles. No insecticide is available to kill beetles under the bark; thus, some sort of mechanical treatment is necessary. Any wood greater than four inches in diameter may harbor beetles and must be treated.

Following are treatment options for beetle-infested trees:

- Cut the tree and move all wood greater than four inches in diameter to a designated mountain pine beetle-safe site – usually an area at least one mile away from the nearest pine tree.
- Move all wood to a landfill or bury it under at least eight inches of dirt.
- Completely debark any wood that is larger than four inches in diameter.
- Chip the tree. Many tree services have chippers capable of chipping large diameter trees. The beetles are killed when the wood is chipped.
- Cover wood with at least six-mill clear plastic. This method, known as solar treatment, warms the wood to lethal temperatures and increases moisture, encouraging mold growth in the logs, which kills the beetles. Treat the wood properly for successful control. Cut into firewood lengths and stack no more than two logs high. Be sure there

are no exposed stubs or sharp edges that might tear the plastic. Trench around the pile and, if possible, wet down the pile to encourage mold growth. Cover the pile with plastic, push the edges of the plastic into the trenches, and seal the edges with dirt. Check periodically to be sure the plastic has not torn. If torn, it can be repaired with duct tape.

It is best to check for infested trees in October of each year – remember that infested trees, although dead, are still green at this time. Pitch tubes and boring dust will be the most obvious clues. If infested trees are located early, there is adequate time to treat them.

Solar treatment of beetle infested trees is effective only if the logs are placed in a sunny area, and the 6 mil clear plastic is sealed with dirt at the edges to create a greenhouse. CSFS photo.

While no insecticide effectively treats infested trees, spraying with insecticides such as carbaryl or permethrine prevents attack. Preventive sprays will not kill beetles under the bark. Spray trees between May 1st and July 1st each year for maximum effectiveness. It is not practical to spray every tree on a large tract of land, so choosing which trees to spray depends on the landowner's budget and the value of individual trees to the landowner. It is advisable to solicit bids from several different spray companies, as prices can vary widely. It also is wise to request and check references.

Thinning forests for increased health and vigor by far is the best preventive measure for mountain pine beetle. Because trees require several years to respond to thinning, it is best done before beetles reach epidemic levels. Follow thinning guidelines for wildfire mitigation to reduce susceptibility to MPB.

IPS (ENGRAVER) BEETLES

There are several species of these small bark beetles that may infest ponderosa pine piñon pine or spruce. Piñon ips is active along the Highway 115 corridor south of Colorado Springs. The other species are always present in the forest, but are not currently at epidemic levels. Ips beetles usually attack trees less than four inches in diameter and, in such circumstances, may be useful in thinning dense stands of young trees. Thus, it usually is not considered as threatening as its larger cousin. Ips will attack larger trees if they are severely weakened by disease (most often dwarf mistletoe), or are damaged by construction, lightning strikes or in horse corrals where soil compaction injures the roots. Like the mountain pine beetle, ips burrow beneath the bark and inoculate the tree with bluestain fungus, often following mountain pine beetles into larger trees.

The differences between mountain pine beetle and ips are significant to anyone implementing a forest management program. In contrast to MPB, which produce one generation per year, ips may produce up to four. Ips become active in spring when the weather exceeds 50 degrees F, developing from egg to adult within eight weeks. They continue to attack trees until the first fall frosts. For this reason, preventive spraying should be done with permethrin or carbaryl in April and repeated in July. When spraying preventively for ips, it is important to spray the branches, as well as the trunk.

The reddish-brown sawdust on this freshly cut ponderosa pine slash indicates it has been invaded by ips beetles. Adult beetles will emerge in eight weeks if the slash is not properly treated. Colorado State Forest Service photo by Dave Root.

Ips attack causes no pitch tubes to form on live trees, so the only visual clue is boring dust or woodpecker holes in the trunk. Smaller trees quickly turn reddish-brown, but when they attack larger trees, ips often infest only the upper portion of the tree. The first symptom is browning of the top, but subsequent generations emerge and continue down the tree.

Ips will infest green slash and downed logs from forest management projects. If slash is not promptly treated, ips will emerge to attack living trees; treat slash within four to six weeks after cutting. If weather conditions permit, thinning trees in winter when ips are dormant will prevent problems with beetles in slash. However, slash cut after March 1 may still be green enough to attract ips when the weather warms.

Chipping slash will kill ips beetles. Lopping and scattering slash into lengths less than 24 inches promotes rapid drying and prevents infestation. Slash cut late in fall that is subsequently infested can be treated or piled and burned over the winter, but untreated slash left over the winter will produce live broods the following April. Due to their short lifecycle, solar treatment of ips-infested logs is ineffective. Bucking larger diameter logs and promptly splitting them into firewood accelerates the drying process and usually is effective in preventing ips infestations. Many high value trees have been lost as a result of the common, and ultimately costly, practice of stacking firewood against green trees. Ips beetles will burrow out of infested firewood directly into standing trees.

References

Colorado State Forest Service, Colorado Department of Natural Resources, Warner College of Natural Resources. (2016) *2016 Report on the Health of Colorado's Forests.* Colorado State Forest Service.

Cranshaw, Whitney, David Leatherman, Boris Kondratieff, Paul Opler, and Casey Sclar. Nd. *Insects and Diseases of Woody Plants of the Central Rockies.* Bulletin 506A, Colorado State University Cooperative Extension.

Johnson, Warren T., and Lyon, Howard H. 1991. *Insects that Feed on Trees and Shrubs.* Comstock Publishing Associates, Cornell University Press.

Appendix B

Further Information

Websites:

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

Publications:

Community Wildfire Protection Planning

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

Wildfire Mitigation

CO Dept. of Revenue Tax Subtraction: http://www.colorado.gov/cs/Satellite?blobcol=urldata&blobheader=application%2Fpdf&blobkey=id&blobtable=MungoBlobs&blobwhere=1251915899901&ssbinary=true
Fuel Break Guidelines for Forested Communities: http://csfs.colostate.edu/pdfs/fuelbreak_guidellines.pdf
Protecting Your Home from Wildfire: Creating Wildfire Defensible Zones: http://csfs.colostate.edu/pdfs/FIRE2012_1_DspaceQuickGuide.pdf
Firewise Landscaping: http://csfs.colostate.edu/pdfs/06303.pdf
Firewise Plant Materials: http://csfs.colostate.edu/pdfs/06305.pdf
Forest Home Fire Safety: http://csfs.colostate.edu/pdfs/06304.pdf
Grass Seed Mixtures to Reduce Wildfire Hazard: http://csfs.colostate.edu/pdfs/06306.pdf
Living With Fire: A guide to the Homeowner: http://csfs.colostate.edu/pdfs/LWF51303.pdf
Firewise Construction: Site Design and Building Materials: http://csfs.colostate.edu/pdfs/firewise-construction2012.pdf

Forest Health and Management

Gambel Oak Management: http://csfs.colostate.edu/pdfs/06311.pdf
Landowner's Guide to Thinning: http://csfs.colostate.edu/pdfs/landowner_g4thin_scr.pdf
Landowner's Guide to Living With Bark Beetles: http://csfs.colostate.edu/pdfs/MPB_Newspaper_Insert_Final.pdf
Landowner Assistance Programs in Colorado: http://csfs.colostate.edu/pdfs/Landowner-Assistance-Programs-rev112610.pdf

Forest Insect and Disease Information

Dwarf Mistletoe Management: http://csfs.colostate.edu/pdfs/DMT.pdf
Mountain Pine Beetle: http://csfs.colostate.edu/pdfs/MPB.pdf
Solar Treatment for Mountain Pine Beetle:
http://csfs.colostate.edu/pages/documents/Solar_Treatment_for_Mountain_Pine_Beetle_April_2009.pdf
Products used to Prevent Mountain Pine Beetle: http://csfs.colostate.edu/pdfs/Web__Revision_June6_MPB_Prev_Products_QG.pdf
Ips Beetles: http://csfs.colostate.edu/pdfs/Ips.pdf
Western Spruce Budworm: http://csfs.colostate.edu/pdfs/05543.pdf
Firewood and House Log Insects: http://csfs.colostate.edu/pages/documents/firewood_insects.pdf
Protecting Trees During Construction: http://csfs.colostate.edu/pdfs/construction.pdf

Post Wildfire Recovery:

Insects and Disease Associated with Forest Fires: http://csfs.colostate.edu/pdfs/06309.pdf
Vegetative Recovery after Wildfire: http://csfs.colostate.edu/pdfs/06307.pdf
Soil Erosion Control After Wildfire: http://csfs.colostate.edu/pdfs/06308.pdf
Replanting in Burned Areas: Tips for Safety & Success:
http://csfs.colostate.edu/pdfs/FINAL-Post-FireReplanting-andSafetyTips-2013Feb11.pdf
Aspen Survival After Wildfire: http://csfs.colostate.edu/pages/documents/How-to-Aspen.pdf
Douglas-fir Survival After Wildfire: http://csfs.colostate.edu/pages/documents/How-to-Aspen.pdf
Gambel Oak and Serviceberry Survival After Wildfire:
http://csfs.colostate.edu/pages/documents/How-to-gambel-oak-and-serviceberry.pdf
Piñon Pine and Juniper Survival After Wildfire: http://csfs.colostate.edu/pages/documents/How-to-PJ.pdf
Ponderosa Pine & Lodgepole Survival After Wildfire:
http://csfs.colostate.edu/pages/documents/How-to-Ponderosa-and-lodgepole.pdf

Selecting a Contractor: https://csfs.colostate.edu/media/sites/22/2015/03/Choosingaforestrycontractor.pdf

Appendix C

Glossary of Forestry Terms

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Felling: The cutting down of trees.

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

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

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

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

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

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

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

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

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

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

Fuel: Any living or dead material that will burn.

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

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

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

Germination: The development of a seedling from a seed.

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

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

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

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

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

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

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

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

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

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

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

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

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

Serotinous: Pertaining to fruit or cones that remain on a tree without opening for one or more years note in some species cones open and seeds are shed when heat is provided by fires or hot and dry conditions.

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

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

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

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

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

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

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

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

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

Survivable space: A term typically used to describe the area around a structure/home indicating that fuels in the area have been reduced to the point that there is little or no serious fire threat to the structure; the structure has a high probability of surviving a wildland fire without anyone on scene providing active protection.

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

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

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

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

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