DOUGLAS COUNTY
COLORADO

Community Wildfire Protection Plan

Developed By

DOUGLAS COUNTY, COLORADO

and

DAHL ENVIRONMENTAL SERVICES & ASSOCIATES LLC

September 12, 2022

DOUGLAS COUNTY

JILL WELLE, SENIOR WILDFIRE MITIGATION SPECIALIST

Douglas County Building Division

100 Third Street

Castle Rock, CO 80104

720 733 6924

COLLABORATING AGENCIES:

Aurora Fire Rescue

Castle Rock Fire and Rescue

Colorado State Forest Service

Douglas County Government

Douglas County Sheriff Office of Emergency Management

Jackson 105 Fire Protection District

Larkspur Fire Protection District

Mountain Communities Fire Protection District

North Fork Fire Protection District

Franktown Fire Protection District

South Metro Fire Rescue

United States Forest Service

West Douglas County Fire Protection District

West Metro Fire Rescue

PROJECT LEADERSHIP TEAM

DAHL ENVIRONMENTAL SERVICES, LLC, AND ASSOCIATES

Bjorn Dahl
Society of American Foresters, Certified Forester; Association of Consulting Foresters
Natural Resource Consultant

Lyle Laverty
Society of American Foresters, Certified Forester; Association of Consulting Foresters
Natural Resource Consultant

Kristian Dahl
Geographic Information Management Manager
Natural Resource Consultant

Cover photos Douglas County wildfires

3890 Genesee Village Road ● Golden, Colorado 80401

Office:303-526-2822 ● Fax: 303-526-5197

Email: bdahl@dahlservices.com ● Website: www.dahlservices.com

2022 CORE LEADERSHIP TEAM

Douglas County Team Leader, Jill Welle, CWMS, Senior Wildfire Mitigation Specialist
jwelle@douglas.co.us **720-733-6924**

Douglas County Fire Chiefs Association, Chief Dave Woodrick
dwoodrick@franktownfire.org **303-688-3811**

Douglas County Sheriff's Office, Office of Emergency Management, Mike Alexander, Emergency Services Manager, malexand@dcsheriff.net / 303-660-7589

Douglas County Engineering, Sean Owens
SOwens@douglas.co.us **303-660-7328**

Colorado State Forest Service, Spencer Weston, Forester, Franktown Field Office, NE Area
Spencer.Weston@colostate.edu 303-660-9625 o

U.S. Forest Service Pike Ranger District, Jennifer DeWoody, PhD, Acting District Ranger
jennifer.dewoody@usda.gov **719-477-4216**

U.S. Forest Service South Platte Ranger District, Brian Banks, District Ranger
brian.banks@usda.gov **719-495-2933**

Douglas County Open Space, Scott McEldowney, Assistant Director
smceldow@douglas.co.us **303-663-6165**

Douglas County Open Space, Andy Hough, Environmental Resource Coordinator
AHough@douglas.co.us 303-660-7460

Douglas County Planning Service, Matt Jakubowski, Chief Planner, AICP Community Development
mjakubow@douglas.co.us **303-814-4324**

Northline GIS (consultant) Karlie Kendall, Karlie.Kendall@imegcorp.com 970-822-8894

DOUGLAS COUNTY WILDFIRE STAKEHOLDERS

- Douglas County Board of County Commissioners: Abe Laydon (or assigned representative)
- U.S. Department of Agriculture Natural Resource Conservation Services (NRCS):
- Douglas County Conservation District
- Denver Water:
- DC Fire Protection Districts (Larkspur, South Metro, West Metro, West Douglas, Franktown, Jackson 105, North Fork, Castle Rock, Mountain Communities)
- DC Firewise Communities (18)-
- Douglas Land Conservancy
- Division of Fire Prevention and Control (DFPC)
- Utilities-Xcel/CORE Electric
- NGO's
- HOA's
- Private Landowners
- Other interested parties

DOUGLAS COUNTY
COMMUNITY WILDFIRE PROTECTION PLAN

September 2022

Plan Approval Document

As required by the Healthy Forest Restoration Act, the undersigned representatives, Chairman of the Douglas County Board of County Commissioners, Sheriff, Fire Chief, and the Colorado State Forest Service acknowledge that they have reviewed and approved the contents of this plan. The following agencies have reviewed and agree to this Community Wildfire Protection Plan.

Douglas County, Chairman of the Board of County Commissioners	Date 9/27/22
Douglas County Sheriff's Office, Office of Emergency Management	Date 9.21.22
Douglas County Fire Chiefs Association, Chief	Date 9/20/2022
Supervisory Forester, Colorado State Forest Service	Date 9/20/2022
Douglas County Wildfire Mitigation Specialist	Date 9-20-22

CONTACT INFORMATION

Colorado State Forest Service: Spencer Weston, Supervisory Forester, Franktown Field Office/NE Area
Spencer.Weston@colostate.edu
Phone: 303-660-9625

USDA Forest Service, Pike-San Isabel National Forests & Cimarron and Comanche National Grasslands, Brian Banks, District Ranger South Platte Ranger District

Douglas County Commissioner
Douglas County Board of County Commissioners: Abe Laydon

Jill Welle, CWMS
Senior Wildfire Mitigation Specialist
Douglas County Building Division
jwelle@Douglas.co.us
720-733-6924

To obtain copies of this plan contact:

Jill Welle, Senior Wildfire Mitigation Specialist

jwelle@douglas.co.us **720 733 6924**

Douglas County Building Division
100 Third Street
Castle Rock, Colorado 80104

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EXECUTIVE SUMMARY

Wildfire is inevitable in the front range of Colorado. In fact, many of Douglas County's native plant and animal species are dependent on the natural disturbance caused by wildfires. Species in Douglas County are fire-adapted and have developed strategies to survive and thrive in the presence of wildfire. However, wildfires become disasters when they threaten lives, burn homes, destroy infrastructure, and damage watersheds. Developing and implementing strategies to make human communities fire-adapted can reduce the severity of such disasters. This Community Wildfire Protection Plan (CWPP) provides strategies that can be implemented by community leaders, residents, fire professionals, and others that will make the Douglas County community better prepared for the next inevitable wildfire.

The Douglas County CWPP is a strategic plan that identifies specific wildland fire hazards and risks facing neighborhoods and the Douglas County community. This is a revised and updated CWPP prepared for the Douglas County community and provides recommendations designed to reduce those hazards and risks. The primary goal of this CWPP through outreach, education, strategic planning, and action, is to protect human life, animals, property, the forest itself, and essential infrastructure and resources.

CWPP GOALS

PROTECT LIVES, PROPERTY, AND RESOURCES. This CWPP provides a framework and recommendations towards an outcome that will save lives and reduce losses of property and community resources.

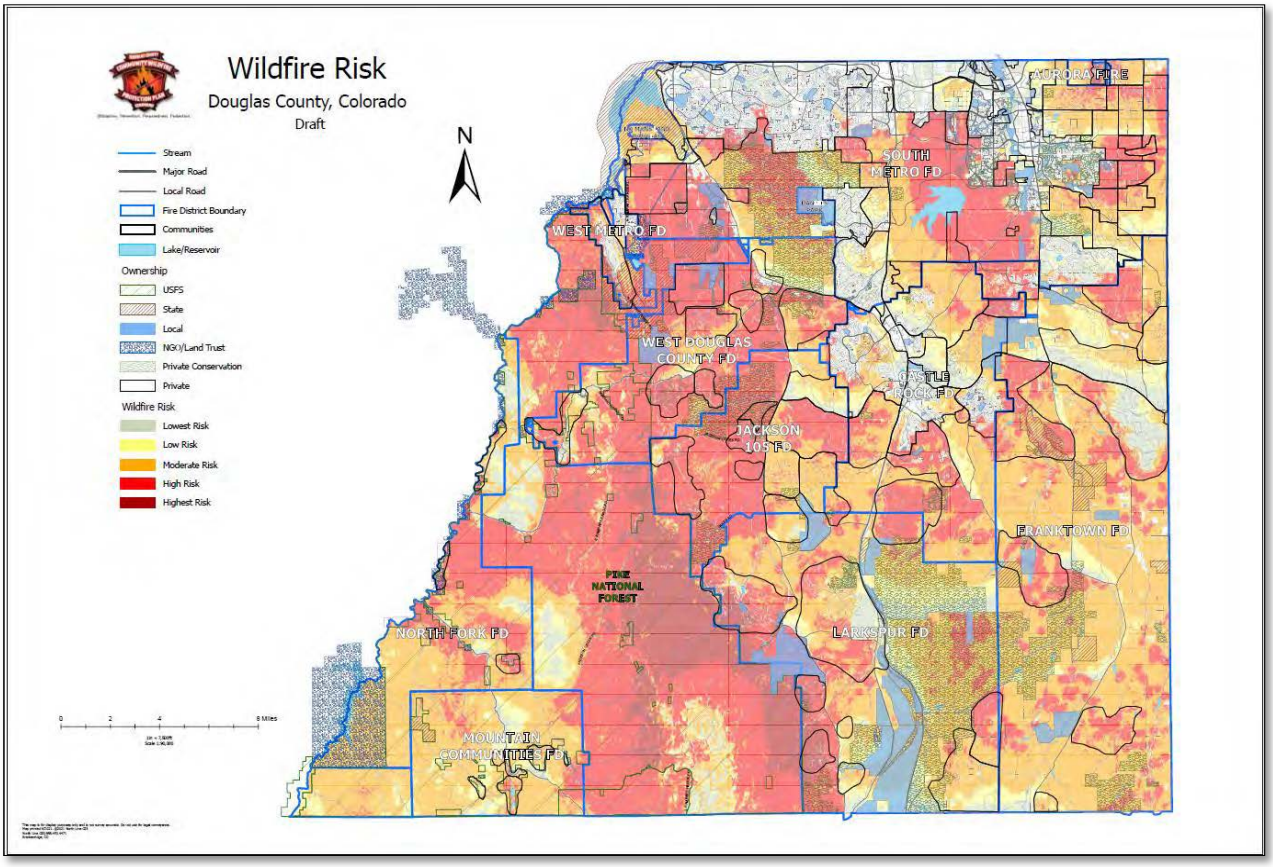
CREATE A FIRE-ADAPTED COMMUNITY. This plan provides mitigation strategies and community-driven action items to help create a community where citizens are engaged and active in preparing for wildfire. The CWPP facilitates interagency cooperation and strengthens communication and support between agencies and the community.

RESTORE & MAINTAIN FIRE-RESILIENT LANDSCAPES. This plan provides prioritized recommendations for fuel reduction treatments to enable the community to effectively address risks to the community and its ecosystems at landscape scale.

PROVIDE EFFECTIVE & EFFICIENT WILDFIRE RESPONSE. This plan provides strategic landscape treatments that will enable safer and more successful fire suppression. It provides a plan for tracking, reporting, and sharing of both fuel reduction accomplishments and homeowner/community initiatives and supports risk-based management decisions and tactical actions.

As was shown during the 2002 Hayman fire, the ignition risk is high throughout the community [refer to the Douglas County Fire Risk Map inserted below]. Physical conditions and development in the wildland-urban interface emphasize the need for extensive and ongoing fuel reduction and fuels management. Many homeowners in the Douglas County community have wisely initiated a number of thinning and defensible space projects. Yet much remains to be done in a coordinated effort to address forest health and community safety objectives, reduce the potential for catastrophic crown fires, and safeguard Douglas County natural resources and the residents who live among them. The greatest pending danger from future wildfire arises from the ashes of the 2002 burnt-over area with standing dead timber in fields of grass. When these dead

trees fall on the ground, they become heavy, large hazardous fuels creating extreme explosive fire behavior capable of running through the community at 3 miles per hour or more.



Homeowners throughout the Douglas County community must be ever diligent and cognizant of creating and maintaining the necessary defensible space around their homes and other structures. The presence of untreated fuels on undeveloped parcels within Douglas County neighborhood boundaries increases the risk of wildland fire. Every effort must be made to encourage property owners to maintain fire-safe vegetative conditions throughout the community. The ongoing need for maintenance of fuel reduction and defensible space treatments must remain a priority for property owners choosing to live in Douglas County.

This plan recommends that the Douglas County CWPP Core Leadership Team move quickly to provide a pathway to reducing hazardous fuel accumulations within the community. To protect against burning embers from wildfires, we recommend that business owners and private landowners with small and large tracts of land minimize wildfire risks around their structures and inside the home ignition zone in a timely manner. Further, we strongly recommend forest treatments be seriously implemented in closed canopy conifer stands adjacent to major evacuation routes and travel ways as identified as high priority work areas in this plan. Additionally, we remind that all lands will need annual ongoing maintenance and retreatment.

With a great sense of urgency, we recommend continuing the strong reforestation program to maintain the ecosystem of the Douglas County community. Further, continue to recognize the work of volunteers in the community and the support of the Douglas County Slash-Mulch Program. Additionally, all citizens should maintain a watchful eye to eliminate dangerous insect and diseases that threaten the forest environment.

It's a basic premise of this plan that in "being prepared", the Douglas County community can minimize or even prevent the more devastating effects of wildfire, and in doing so, better safeguard community and personal property and resources. Evacuation planning before a wildfire is essential. Residents should identify in advance normal and alternate escape routes out of the community and be prepared to **Ready-Set-Go** when danger is near. Landowners with pets and large animals should consider their needs as an integral component of evacuation planning.

Embracing these goals and implementing the strategies and recommendations will make the Douglas County Community better prepared for the next inevitable wildfire. We suggest that a Firewise leader, homeowner in the community be recognized each year for their outstanding achievements.

This CWPP was developed in coordination with the Douglas County Fire Rescue Protection Districts, Colorado State Forest Service (CSFS), U.S. Forest Service (USFS) and the Douglas County communities. Every agency, organization, neighborhood, or individual in Douglas County that might be affected by the next wildfire has a role to play in creating a fire adapted community. This plan provides a common frame of reference for engaging and finding common solutions, implementing actions, and monitoring progress towards the CWPP goals.

ACRONYMNS AND ABBREVIATIONS

ACF	Association of Consulting Foresters of America
AOP	Annual Fire Operating Plan
CO-WRAP	Colorado Wildfire Risk Assessment Portal
CPW	Colorado Parks and Wildlife
CSFS	Colorado State Forest Service
CWPP	Community Wildfire Protection Plan
DBH	diameter at breast height
FM	fuel model
FMU	Fire Management Unit
HFRA	Healthy Forests Restoration Act
HIZ	home ignition zone
HOA	homeowners' association
HRCA	Highlands Ranch Community Association
HRMD	Highlands Ranch Metro District
ISO	Insurance Services Organization
NAS	National Association of State Foresters
NFPA	National Fire Protection Agency
NIFC	National Interagency Fire Center
NFFL	Northern Forest Fire Laboratory
OEM	Douglas County Office of Emergency Management
PSICC	Pike /San Isabel National Forest and Comanche/Cimarron National Grasslands
RAWS	Remote Automated Weather Stations
SAF	Society of American Foresters
SI	Site Index
USFS	United States Forest Service
USPWPRP	Upper South Platte Watershed Protection and Restoration Project
WUI	Wildland-Urban Interface

CHAPTER 1 INTRODUCTION

1.1 Plan Purpose

The Community Wildfire Protection Plan (CWPP) update is a strategic plan that identifies specific wildland hazards and risks facing Douglas County and neighborhoods and provides prioritized mitigation recommendations that are designed to reduce wildfire hazards and risks. This update emphasizes collaboration, and reduction of hazardous fuels and structural ignitability. It gives Douglas County residents "notice" of their wildfire hazards and risks and offers suggestions for actions to address them. Once the CWPP is approved and adopted, it becomes the Douglas County community's responsibility to move forward and implement the action items identified in this plan. This may require further planning at the project level, acquisition of funds, or simply motivating individual homeowners to act.

The purpose of this update is to protect lives, property, and the environment within Douglas County from wildfire by implementing prioritized fuels reduction projects and engaging the public in becoming a Fire Adapted Community. This update serves to identify the Douglas County community risks, identify what constitutes the risk, and develop an action plan to mitigate the risk, thereby providing a vegetative structure for the community that is resilient to the effects of wildland fire.

Crown fire from ladder fuels

Historically, natural wildfire would pass through this area with relative frequency allowing forests, shrub lands, and grasslands to adapt morphology, growth, and reproductive patterns to a periodic cleansing by wildfire. Land management policies centered on fire suppression have altered this cycle and exacerbated the potential for high-intensity wildfire by allowing fuels to build up and facilitating the decline of forest health.

Weather plays a critical role in determining fire frequency and behavior. A dry climate and available fuels in an area prone to strong gusty winds can turn any ignition into a major wildfire in a matter of several minutes.

The Douglas County community is characterized by a combination of a relatively dense population, heavily utilized travel routes, fire-adapted vegetation, and the potential for natural and human ignitions. These factors combine a degree of hazard, ignition risk, and values at risk that require serious evaluation. The need for the CWPP culminates with the protection of the ecosystem combined with environmental esthetics, recreational opportunities, and proximity to a major metropolitan area that make the Douglas County community a desirable location to live and work. However, the community is characterized by several factors that typify a hazardous Wildland-Urban Interface (WUI): human development within fire-adapted ecosystems, uneven topography, frequent natural and human-caused ignitions, presence of hazardous fuels, prolonged drought, and dry, windy weather conditions. Each neighborhood or subdivision represents a distinct area with a unique combination of wildfire fuels, predominant building construction materials, topography, access, available resources, and opportunities for fuels mitigation.

1.2 Planning Area Boundaries

This 2022 CWPP update covers a total of 539,520 acres (843 square miles) of Douglas County, encompassing all the acres and land ownerships within Douglas County. Land ownership in Douglas County is comprised of a mixture of privately and publicly owned lands. Publicly owned lands Include the Pike National Forest, Roxborough State Park, Chatfield State Park, Castlewood Canyon State Park, Woodhouse Property owned by State Parks and Wildlife, State Land Board, Daniels Park, Highlands Ranch Metro District (HRMD), Highlands Ranch Community Association (HRCA), and Douglas County open space deeded to the BOCC. In all, approximately 28% of Douglas County is federally or State owned, about 4% is owned by Douglas County and 68% is privately owned. Many large tracts of land are protected from development through Conservation Easements. The Denver Water Board is a significant private land holder in the western part of the County with lands bordering the Pike National Forest.

Five incorporated municipalities are located within the boundaries of Douglas County: **Castle Pines**, **Castle Rock**, **Larkspur**, **Lone Tree** and **Parker**. Each municipality has its own mayor and provides their own services, many in collaboration with Douglas County.

As part of the County's collaborative work with other communities, the **Partnership of Douglas County Governments** is a notable example. Established in 2002, the Partnership today includes the Towns of Castle Rock, Larkspur and Parker, the Cities of Castle Pines and Lone Tree, Douglas County, the Douglas County School District, Douglas County Libraries, and the Highlands Ranch Metro District. A nationally recognized model of collaborative statesmanship, the Partnership has successfully sidelined individual agendas in the interest of working collaboratively on issues, projects, and programs for the greater good of Douglas County. (Refer, **Douglas.co.us. Our Country – Your Home**).

1.3 Policy and Regulatory Framework

Precipitated by over a century of increasing wildfire activity, spiraling suppression costs, and dramatic losses, the National Fire Plan was developed in 2000. Subsequently, President George W. Bush proposed the Healthy Forests Initiative, which was enacted into law by the Healthy Forests Restoration Act (HFRA) of 2003 (Public Law 108-408). The act helped implement the elements of the National Fire Plan and provided the foundation for wildfire risk

assessment and planning. Communities were encouraged to create CWPPs to collaboratively designate and prioritize areas in the WUI that were the most in need of fuels treatment and thinning at the County and community level. The HFRA refers to this level of planning as the CWPP process. The HFRA provides a framework for hazard evaluation and strategic planning for community action to create resilient communities.

HEALTHY FORESTS RESTORATION ACT

A CWPP must be collaboratively developed by local and state representatives in consultation with other interested parties.

1.3.1 Federal Level Policy

The HFRA defined the minimum requirements for a CWPP. These are:

COLLABORATION. Local and state government representatives, in consultation with federal agencies and other interested parties, must collaboratively develop a CWPP.

PRIORITIZED FUEL REDUCTION. A CWPP must identify and prioritize areas for hazardous fuel reduction treatments and recommend the types and methods of treatment that will protect one or more at-risk communities and essential infrastructure.

TREATMENT OF STRUCTURE IGNITABILITY. A CWPP must recommend measures that homeowners and communities can take to reduce the ignitability of structures throughout the area addressed by the plan.

The Douglas County CWPP is a community-wide assessment of the risks, hazards, and mitigation and prevention opportunities associated with wildfire in the Douglas County community. The development of this 2022 CWPP is specifically tiered to the Douglas County CWPP dated December 2011.

In accordance with the HFRA:

- Encourage thinning
- Improve suppression capabilities
- Increase forest's resistance to destructive insects
- Encourage communities to create CWPPs

The 2014 National Cohesive Wildland Management Strategy formulated these Cohesive Strategy Goals:

- Restore and maintain landscape
- Create fire-adapted communities
- Wildfire response

1.3.2 State Level Policy

SB 09-001

In 2009 the State of Colorado adopted legislation requiring Counties to identify fire hazard areas within the unincorporated areas of the County and develop a CWPP to address wildfire hazards in those areas. Minimum standards are set for the by the State Forester with the latest update in 2022.

1.4 Mission, Goals and Objectives

The mission of the Douglas County CWPP update is to protect lives, property, and the environment within the County from wildfire by implementing prioritized fuel reduction projects and engaging the public in becoming a Fire Adapted Community.

Wildfire is inevitable in the front range of Colorado. In fact, many of Douglas County's native plant and animal species are dependent on the natural disturbance caused by wildfires. Species in Douglas County are fire-adapted and have developed strategies to survive and thrive in the presence of wildfire. However, wildfires become disasters when they threaten lives, burn homes, destroy infrastructure, and damage watersheds. Developing and implementing strategies to make human communities fire-adapted can reduce the severity of such disasters. This CWPP provides strategies that can be implemented by community leaders, residents, fire professionals, and others that will make the Douglas County community better prepared for the next inevitable wildfire.

The following are the CWPP Goals and Objectives developed to meet the challenges of living in a wildfire ecosystem:

GOAL - PROTECT LIVES, PROPERTY & RESOURCES: This CWPP update provides the Douglas County community a framework and recommendations towards an outcome that will save lives, reduce losses of property, and establish Fire-Adapted Communities.

Objective: Develop a comprehensive plan providing a suite of strategies to reduce hazardous fuels, improve communications, education, and awareness to protect lives, property, and Douglas County ecosystems.

GOAL - CREATE A FIRE-ADAPTED COMMUNITY: This plan provides mitigation strategies and community-driven actions to help create communities where citizens are engaged and active in preparing for wildfire. It facilitates interagency cooperation and strengthens communication and support between agencies and the Douglas County communities.

Objective: Increase the ability to prepare, mitigate, and withstand wildfires and suffer minimal impacts to Douglas County communities,

Objective: Increase community understanding of living in a fire prone ecosystem.

WHAT IS A FIRE-ADAPTED COMMUNITY?

A Fire Adapted Community has decided to reduce their vulnerability to destruction by wildfire. Fire Adapted Community members collectively share an understanding of wildfire threat, and the high probability of serious loss. This common understanding results in changes of behavior, and residents take action to mitigate the threat. Fire Adapted Community residents join together to prepare the community, themselves, and their homes for the inevitable occurrence of wildfire.

A Fire Adapted Community can survive a wildfire with little or no assistance from firefighters. These communities are characterized by homes that are built of fire-resistant materials, and where vegetation and flammable items have been reduced around the homes to provide good defensible space. They are buffered by fuel breaks where flammable vegetation has been modified to slow the spread of flames and provide a zone where firefighters can aggressively fight a fire.

GOAL - RESTORE & MAINTAIN FIRE-RESILIENT LANDSCAPES: This plan provides prioritized locations for fuel reduction treatments to enable the Douglas County communities to effectively address risks to the community and its ecosystems.

Objective: Protect against losses to life, property, and natural resources from wildfire at a landscape scale.

Objective: Educate all publics on what a restored landscape looks like, provide a visual model for all publics to understand how a fire will act in a restored landscape, value.

GOAL - PROVIDE EFFECTIVE & EFFICIENT WILDFIRE RESPONSE: This plan provides strategic treatments on the landscape that will facilitate safer and more successful fire suppression.

Objective: Reduce fire suppression costs, enhance suppression operations through effective mitigation

CWPP Development Process

The HFRA designed CWPPs to incorporate a flexible process that can accommodate a wide variety of community needs. This CWPP update is tailored to meet specific goals as identified by the Core Team, following the standardized steps for developing a CWPP as outlined in *Preparing a Community Wildfire Protection Plan: A Handbook for Wildland-Urban Interface Communities* (SAF 2004) and the *Minimum Standards for Community Wildfire Protection Plans* (CSFS 2022). Table 1 outlines the CWPP stepwise development process.

The initial step in developing the Douglas County CWPP was to organize an operating group to serve as the core decision-making team. The Core Leadership Team consists of representatives from local government, local fire authorities, USFS and the CSFS.

Douglas County initiated the collaborative effort with key partners, targeting a cross-jurisdictional, regional approach to best leverage resources and was based on the collaborative process which is a key requirement the Congress established for a CWPP. Collaboration is simply people working together to address a shared problem. One of the significant outcomes of the collaborative process is building trust, working relationships, and partnerships among the community. Effective collaboration ensures that all bases are covered in the planning process and that potential problems are identified.

The resultant document and CWPP products were then referred to a larger stakeholder group consisting of fire protection districts, DFPC, conservation organizations, NGOs, and other interested parties. The Draft CWPP was posted on the Douglas County web site for additional input and consideration.

The CWPP update process for citizen engagement began with a Spring 2022 survey.

Recent fires in Colorado have demonstrated to residents the need for homeowners to take more responsibility to protect and preserve the forest in which they live. A cultural shift of shared responsibility and partnership between fire districts, municipalities, forestry organizations, and homeowners is critical to achieve the common goal of healthy forests and watersheds. This collaboration needs to grow to leverage regional mitigation with limited funding.

1.5 CWPP Methodology

After the establishment of the HFRA, a variety of planning framework models were developed throughout the country by the National Association of State Foresters (NASF), National Association of Counties, SAF, and others. This framework, known as the NASF model, and the CSFS model were chosen for the Douglas County CWPP. Table 1, below, provides a summary of the steps identified in the CWPP development process.

Table 1. CWPP Development Process

Step	Task	Explanation
1	Convene Decision Makers	Form a Core Leadership Team comprised of representatives from local government, BFFR, and the CSFS.
2	Involve Federal Agencies	Engage local representatives of appropriate Federal agencies.
3	Engage Interested Parties	Contact and encourage participation from a broad range of interested organizations and stakeholders.
4	Establish a Community Base Map	Develop a base map of the Douglas County community that provides an understanding of communities, critical infrastructure, and forest/open space at risk.
5	Develop a Community Risk Assessment	Develop a risk assessment that considers fuel hazards, community and commercial infrastructure, resources, and preparedness capability. Rate the level of risk and incorporate into the base map as appropriate.
6	Establish Community Priorities and Recommendations	Use the risk assessment and base map to facilitate a collaborative public discussion that prioritizes fuel treatments and nonfuel mitigation practices to reduce fire risk and structural ignitability.
7	Develop an Action Plan and Assessment Strategy	Develop a detailed implementation strategy and a monitoring plan that will ensure long-term success.
8	Finalize the CWPP	Finalize the Douglas County CWPP and communicate the results to interested parties and stakeholders.

CHAPTER 2 DOUGLAS COUNTY OVERVIEW

Douglas County vegetation is varied as its topography. Pine, spruce, and fir trees cover the mountains of the Pike National Forest. The foothills are home to Gambel oak, mountain mahogany, and choke cherry. The numerous riparian corridors running through the County play host to cottonwood trees, willows, and grasses. The mid-grass prairies prevalent in the County are populated with blue gramma, switch grass, and winter wheat grasses.

Douglas County is home to a diversity of wildlife including mule deer, elk, coyote, mountain lion, fox, hawks, and black bear. Habitat for Preble's jumping mouse, a threatened species, occurs along riparian corridors, and the County also provides nesting areas for the plains sharp-tailed grouse.

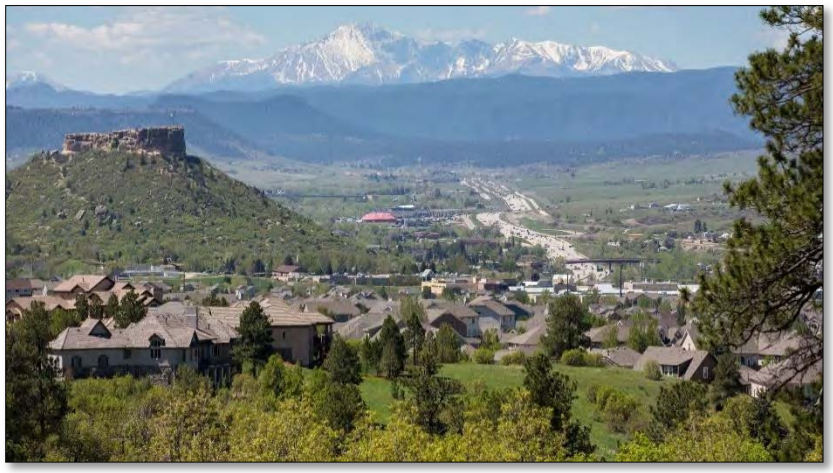
Since the 1990's, Douglas County has been one of the fastest growing counties in the United States. The County's population continues to grow, but not at the same volume or rate as in the past. The County gained nearly 110,000 residents between 2000 and 2010: a 62 percent increase in population (Douglas County 2019).

Douglas County is currently home to 357,978 people (US Census 2020). Demographers project that Douglas County will grow to a population of over 484,000 by 2040 (Douglas County 2019). Between 2010 and 2020, more than 72,000 new residents called Douglas County home. As of 2020, the population density in the County was 339 people per square mile (US Census 2020). With anticipated growth rates, Douglas County population density could exceed 570 people per square mile by 2040.

Douglas County has changed from a rural County with a small population to a mixed urban and non-urban County with a larger population. The remainder of the County is a mix of residential areas, agriculture lands, and business parks. The unincorporated area is 91 percent of the total land area of the County (Douglas County 2019). Over 90 percent of the County's population lives in designated urban areas, which make up less than 20 percent of the County's land area.

2.1 Wildland Urban Interface

Colorado is one of the fastest growing states in the Nation, with much of this growth occurring outside urban boundaries. This increase in population across the state will impact counties and communities that are located within the WUI, or the zone where communities and wildland fuels interface that is the central focus of this CWPP. Every fire season, catastrophic losses from wildfire plague the WUI in our country. Homes are lost, businesses are destroyed, community infrastructure is damaged, and most tragically, lives are lost. Precautionary action taken before a wildfire strikes often makes the difference between saving and losing a home (**Appendix 10.1 WUI Maps**).



84% of the project area population live within the WUI
(CO-WRAP)

Over 84 percent of Douglas County's population (an estimated 282,267 people) lives within the WUI, where infrastructure interfaces with wildland vegetation. With the projected growth, a potential 39,000 homes and associated infrastructure will be located in areas with significant wildfire hazards and risks. Proactive wildland fire management is needed in the WUI to protect lives and other economic and ecological values.

2.2 Values at Risk

Values at risk are the intrinsic values threatened by wildfire that are important to the way of life of residents, businesses, and visitors in Douglas County. Values include human development such as homes, outbuildings, infrastructure, businesses, and recreation facilities but also include natural resources such as forests, watersheds, air quality, and wildlife. These values contribute to residents' feelings about their community and the landscape setting unique to Douglas County. The Douglas County assessor valued the total values at risk at approximately $68.5 billion in 2022.

Additionally, economic, and ecological values are intermixed in Douglas County because of the economic base from tourism and outdoor recreation. The natural resource settings of Douglas County are critical to the outdoor recreation economy. Examples of values at risk from wildfire in within the County include:

- Agriculture lands
- Air quality
- Business and industries
- Community infrastructure
- Communication tower
- County and state parks
- Forests and Grasslands
- Homes and structures
- Human welfare
- Local economies
- Municipal water supplies
- Natural vegetation
- Recreation and tourism
- Source water areas
- Transportation infrastructure
- Viewsheds
- Watershed health and water quality
- Wildlife and aquatic habitats
- Life safety, homes, neighborhoods
- Infrastructure
- Natural resources
- Commercial properties
- Recreational uses

2.2.1 Life Safety

People have been killed by fast moving wildfires. California's Camp Fire in 2020 resulted in 85 fatalities. Closer to home, Colorado's recent Marshall Fire in Boulder resulted in two unfortunate deaths. The

protection of human life is the highest priority for mitigation strategies in this CWPP update, followed by structures, property, economic, and natural resources.

There are numerous life safety issues to consider during a wildfire including evacuation, high density neighborhoods, sheltering in place, vulnerable populations, access/egress, defensible space, and structure vulnerability. The ability to evacuate during a wildfire quickly and safely is a significant concern. The existing road system in Douglas County has several routes that are marginally adequate even under normal conditions. During a fast-moving wildfire, the combination of narrow winding roads, large numbers of people evacuating at the same time, and unnatural fuel conditions can put people at risk of injury and/or death.

During wildfires, residents will often choose not to evacuate and to stay and defend their homes or shelter in place until the fire danger passes. Lacking firefighting knowledge and without fully understanding the implications of their decisions, residents' actions can put their life safety at risk as well as that of firefighters and law enforcement personnel. Individuals who delayed their evacuation intending to defend their homes, shelter in place, or who were slow to leave their homes due to packing personal items have died while fleeing wildfires. Untimely and inadequate evacuation procedures have led to fatalities on fast moving wildfires throughout the west including Colorado.

Threats to life safety include inadequate defensible space around structures and/or ignitable structures (i.e., flammable exterior construction materials and or poor design features). Lack of adequate defensible space can expose residents and firefighters to extreme and potentially fatal temperatures. Structures that are vulnerable to easy ignition due to flammable exterior construction materials and/or poor design can be indefensible during wildfire.

In addition, it is critical to address the special needs vulnerable people well in advance of disasters such as wildfires. There are an unknown number of "vulnerable individuals" in Douglas County, but these populations may be less likely to respond to, cope with, and recover from wildfire, and are less likely to get involved with wildfire mitigation activities. Age, physical, and mental disabilities can restrict mobility making it more difficult to evacuate in a disaster. Lack of financial resources may hinder the ability for low-income populations to invest in emergency preparedness or mitigation measures or recover from loss (Fothergill and Peek 2004). Wildfires disproportionately affect the poor because of factors such as inadequate housing, social exclusion, diminished ability to evacuate or relocate, inadequate property insurance, so these populations bear a greater burden from property damage following wildfires. Language may result in communication barriers to evacuation or support services.

Pets and other domestic animals make up another vulnerable population. Many pets and large animals can face undue loss or suffering due to inadequate disaster preparedness by their human caretakers. During wildfires, animals become frightened and even more difficult to manage. This results in more time to evacuate, even with a strong family disaster plan. During disasters, people risk their lives and the lives of others to save their pets. Frequently homeowners are unwilling to evacuate and enter a safe zone without their animals, which places themselves and emergency responders at risk.

2.2.2 Structures, Businesses, and Infrastructure

Catastrophic fires within the WUI have historically caused significant property, economic, and infrastructure loss throughout the west. The financial and social costs of WUI wildfires demonstrate the

need to urgently reduce their impact on lives and property, as well as reduce the short- and long-term economic consequences of such large-scale fires.

Whether a structure is damaged or destroyed depends primarily on exterior construction materials, the structures design, housing density, placement relative to nearby homes, geographic location, and whether the home has adequate defensible space. Defensible space considers anything near the structure that can burn, which includes native and ornamental vegetation and other nearby structures.

Black Forest Fire 2013
(Courtesy of Smitty)

The density of structures in the cities and communities within Douglas County can range from high density, or structures tightly packed with little spacing between them, to low density where there are large distances between structures. When the distance between structures is large, they are vulnerable to vegetation fires. Defensible space and structure integrity are effective in reducing the chance the structure will ignite unless the geographic location makes it highly vulnerable to extreme fire behavior and convective heat such as that produced within canyons and on steep slopes. When the distance between structures is small, strong winds or steep slopes can cause wildfire to spread from structure to structure similar to how fire burns from shrub to shrub within wildland fuels. Structure fires threaten nearby structures with their long duration, extreme radiant and convective heat, and production of firebrands that are transported in the air to ignite other structures and fuels. In this case, structures themselves have become fuel for the wildfire.

Short- and long-term losses to infrastructure and services can include the loss of day-to-day services within local communities and businesses, destroyed or damaged schools, damaged roads and bridges, communication towers and antennas, depleted and damaged water systems, damaged sewer systems and water treatment plants, and lack of power due to burned power poles and melted power lines. In addition, there may be impacts to seasonal use of facilities, organizational facilities, equine facilities, nursing and rehab facilities, and correctional facilities. It can take days, weeks, months, or years to repair critical infrastructure and restore services.

Douglas County is an area of high property values. Losses or damages to Douglas County's businesses can create long- term economic and financial effects including:

- Loss of economic vitality because of destroyed businesses
- Loss of tax revenue
- Loss of revenue from outdoor recreation and tourism

2.2.3 Natural Resources

Douglas County's natural resources support the quality of life and make the County a great place to live. Additionally, the ecosystem benefits of clean air, water, and recreational settings are enjoyed by millions of Coloradans and visitors from around the country. These resources support local economies that depend on travel, tourism, and outdoor recreation. Douglas County residents and visitors enjoy a variety of outdoor

activities on a year-round basis. More than 392 square miles or 46.6 percent of all the land in Douglas County is public or protected land. Healthy forests support numerous recreation opportunities including hiking, jeeping, hunting, mountain biking, and wildlife viewing, and all of these resources are at risk from catastrophic wildfire.

Water is critical to sustain life. Human water usage has further complicated nature's already complex aquatic systems. Forests receive precipitation, utilize it for their sustenance and growth and influence its storage and/or passage to other parts of the Douglas County environment.

Four major river systems, the Platte, Colorado, Arkansas, and Rio Grande- originate in Colorado and fully drain into one-third of the landmass of the lower 48 states. Mountain snows supply 75 percent of the water in these river systems. Approximately 40 percent of the water comes from the highest 20 percent of the land, most of which lies in national forests. National forests yield large portions of the total water in these river systems. The potential is great for forests to influence the quality and quantity Colorado's water resources (**COWRAP**) positively or negatively

2.2.4 Economics

The potential impact of wildfire on structure loss is significant. The recent Marshall Fire resulted in 1084 homes destroyed. Preliminary estimates by the Boulder County assessor places losses at $513 million, making the Marshall Fire the costliest fire in Colorado's history. With fuel buildup, even with grasslands and new homes built within the WUI, a wildfire of such proportions could have similar results in Douglas County. Additionally, repair and rebuilding infrastructure following such a wildfire would be a significantly costly effort for communities and utilities. Wildfire and post fire closures to local roads and highways can and will impact travel in and out of the County. Temporary closures of businesses and reduced tourism affects local businesses and County tax revenues. Other potential economic impacts associated with wildfires included increased insurance costs for property owners and the potential for dropped policies, and public safety power shutoffs.

2.3 Land Use and Ownership

Land use in Douglas County is primarily residential, agricultural, and recreational. The County is comprised of a mixture of publicly and privately owned lands. Publicly owned lands include Castlewood Canyon State Park, Chatfield State Park, Roxborough State Park, Pike National Forest, Daniels Park, State Land Board, the Woodhouse property owned by the Colorado Parks and Wildlife (CPW), Highlands Ranch Metro District (HRMD), Highlands Ranch Community Association (HRCA), and Douglas County Open Space deeded to the Board of County Commissioners. These publicly owned lands within Douglas County are managed by multiple local, state, and federal agencies.

Most of the County lands (54 percent) are privately owned. Denver Water is a significant private landowner in the western part of the County. Denver Water parcels border a significant amount of U.S. Forest Service managed lands and some private lands. Ownership boundaries are displayed on the Community Base Map (**Appendix 10.1**). The complex pattern of land ownership makes Douglas County a challenging landscape to manage.

2.4 Fire Protection Infrastructure

Douglas County is uniquely positioned to have firefighting resources mobilized to a reported wildfire very quickly. Local fire departments have standards for responding to incidents and are positioned and staffed to arrive in 5 to 12 minutes to provide basic and advanced life support. Ground and aerial firefighting resources have similar response standards for wildfire, but wildfires can be more difficult to access, and arrival time will vary. Wildfire containment objectives are to keep 95 percent of wildfires to a size of less than 10 acres; for the most part, firefighters are successful in meeting this objective. Large wildfires generally make up a small portion of the numerous fires suppressed by firefighting agencies.

Mutual aid agreements between Douglas County Office of Emergency Management (OEM) and federal and state wildland fire departments make it easier to provide equipment and firefighters during the initial attack phase of a wildfire. These agencies work together to send the closest available resources to emergencies regardless of land ownership or jurisdiction. The local fire departments have immediate response policies to access agency owned and leased aerial firefighting equipment. Nevertheless, even with rapid pre-planned response, successful fire suppression still requires good access to structures, an adequate supply of water, defensible space around buildings and structures, structure integrity, and timely evacuations by local residents. Factors including the construction characteristics of developments, road conditions, and access to water sources greatly influence the outcome of all firefighting efforts.

Based on information from Douglas County Fire Protection Districts and OEM, Table 2 summarizes the firefighting resources are available in Douglas County.

Table 2. Firefighting Resources within Douglas County

Fire Protection Authority	Apparatus
Aurora Fire Rescue	17 Type 1 Structural Engines 6 Ladder Trucks 4 Battalion Chiefs 2 stations dedicated to wildland response with minimum Red-Card staffing 1 Type 3 Engine 4 Type 6 Engines 1 Tactical Tender, 1500 gallons
Castle Rock Fire Rescue	• 5 Type 1/2 • 2 Type 3 Brush Truck • 4 Type 6 Brush Truck • 27 NWCG qualified firefighters
Douglas County Office of Emergency Management (OEM)	• Type 6 Brush Truck • PW Heavy Equipment Fire Team (15 person), dozer, grader, water truck • Aviation contracts • 15–20-person hand crew when needed
Franktown Fire Protection District	• 4 Type 1 Engines • 6 Type 6 Engines • 4 Tenders
Jackson Fire Protection District	• 1 Type 6 Brush truck 400 Gal • 2 Type 6 300 gallons • 3 4x4 engines • 1 Tender 2500 gallons • 1 Tender 3000 gallons
Larkspur Fire Protection District	No Response Received
Mountain Communities Volunteer Fire Department	• 4 Brush Trucks • 15 NWCG qualified personnel
North Fork Volunteer Fire Department	• 1 Type 1 Engine • 1 TYPE 3 Tender • 1 Type 6 Engine
South Metro Fire District	• 23 Type 1 Engines • 5 Ladder Trucks • 4 Type 3 • Engines • 11 Type 6 Engines

	• 7 Tenders • 5 Battalion Chiefs • 3 Wildland Team Based Stations
West Douglas County Fire Protection District	• 4 Type 1/3 Engines • 3 Type 6 Brush Trucks • 3 Tenders
West Metro Fire Rescue	• 14 Type 1 Engines • 1 Type1/ 3 Engines • 2 Type 3 Wildland engines cross staffed • 11 Type 4 engines • 4 Type 3 Engines • 6 Type 6 Wildland cross staffed Brush Truck • 3 Aerial Ladder Trucks • 1 Heavy Rescue Pumper • 1 2000 Gallon Tactical Tender on Order, will be crossed staffed

2.5 Colorado State Forest Service Partnership

The Colorado State Forest Service (CSFS) is a service and outreach agency of the Warner College of Natural Resources at CSU and the Division of Forestry under the Colorado DNR. CSFS consists of 17 field offices; Within in 4 areas SW, SE, NE, and NW areas. Franktown Field Office is within the NE Area that includes Golden, Boulder and Fort Collins field offices. Franktown manages and services: Douglas, Arapahoe, Elbert, and Lincoln Counties. CSFS uses an existing foundation of programs currently in place that helps build relationships with landowners, communities, and partners. These programs are the catalyst in identifying, prioritizing, planning, and implementing fuels reduction and forest health projects across the landscape. These programs help the CSFS to continue leveraging resources as we identify and prioritize new opportunities.

CSFS has many Partnerships/Relationships in place including an MOU with Douglas County Open Space to manage forest resources on open space properties. CSFS manages property owned by Denver Water, Colorado Parks and Wildlife, USFS through the GNA, Department of Natural Resources (DNR) as well as seats at the table on multiple collaboratives.
CSFS is the lead agency for forest stewardship/ forest management programs that include wildfire mitigation and fuels treatments and forest health. Many of these efforts are accomplished through landowner assistance grants programs that include:

- Forest Restoration & Wildfire Risk Grant Program (FRWRM)-State
- Denver Water Forest to Faucets (FtF2)- Denver Water
- Environmental Quality Incentive Program (EQIP)-NRCS
- Community Assistance Funds Adjacent to National Forest (CAFA)-Federal
- Adjacent Lands Grant (*New-ALG)-Federal
- State Fire Assistance Grants (SFA)-Federal
- Good Neighbor Agreement (GNA)-USFS

Current CSFS additional programs include Forest Agricultural Tax Program, outreach and education efforts including publications and much information on the CSFS web site. Urban and community forestry programs, other program management and assistance that includes Community Wildfire Protection Plans (CWPP); there are currently roughly 21 CWPPs recorded in Douglas County. CSFS is also the liaison for Firewise USA ® /Fire Adapted Communities. Currently There are 17 Firewise USA ® participant communities in DC. CSFS also manages the Forest Legacy Program with one property in this program, Spruce Mountain Open Space. Forest Health programs across the management area and review and approval of forest management plans for clients in programs as well as developing forest management plans for clients.

Tools used by the CSFS to base management decisions, strategies and priorities include the 2020 updated Forest Action Plan (FAP). This plan aligns with the National Cohesive strategy to: CONSERVE, PROTECT and ENHANCE. The FAP works hand in hand with CSFS 5-year Strategic Plan. Through the Forest Atlas, formerly COWRAP, see (**Appendix 10.2**), CSFS and program users can generate maps and detailed risk summary reports. These different layers can overlay each other to determine wildfire risk, burn probability, rate of spread, vegetation, WUI (density), watersheds, etc. Applications in the Colorado Forest Atlas can be used as decision support tools for developing new projects, writing forestry plans, assessing wildfire risk to communities, evaluating forest conditions and more. These applications will be updated on a

regular basis using the best available science and data. This tool can assist with prioritizing where to focus efforts and funding.
Since 2010 the CSFS has successfully managed projects across Douglas County on approximately 9,200 acres. These programs are across ownership and include Community-Wide projects (~22 different communities). They include:

- DC Open Space projects, large landowner programming including NRCS-EQIP forestry projects.
- Colorado State Parks projects.
- Private landowner projects.
- Forest Agriculture program projects.
- Denver Water Zone of Concern (ZOC) projects on both communities and large acre private lands and projects adjacent to USFS treated acres.

Current target priority areas awarded FRWRM funding for 2022 include:

- Jarre Canyon Corridor, Roxborough Park Foundation and Roxborough Park community.
- Jackson Creek area.
- the Woodmoor Mountain HOA.
- Perry Park Metro District.
- Perry Pines HOA.
- Sandstone Ranch Open Space.
- Dakan Road Area/Rock Estates area.
- Dawson Butte area.
- Northern Black Forest Area.

2.6 Colorado Parks and Wildlife Partnership

https://cpw.state.co.us/
Colorado Parks and Wildlife implements a hazardous fuels reduction program on lands they manage. They often contract with the CSFS for professional and technical expertise and on a special project basis to implement hazardous fuels reduction and forest management activities. Forest management projects have been completed in Roxborough State Park that continue to build on previously treated areas and complement work the Roxborough Park community continues to work on. Previously treated areas of Gambel oak have been maintained. Treatments have also taken place and been maintained in Castlewood Canyon State Park. The USFS has treatments planned on their lands adjoining Roxborough State Park, which will provide a good example of building off adjacent treatments and increasing effectiveness of treatment areas.

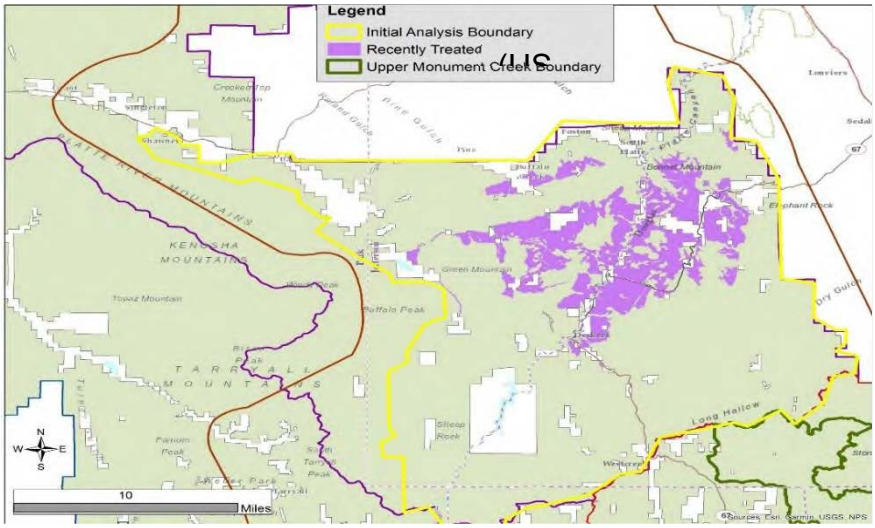
2.8 U.S. Forest Service

The USFS manages approximately 141,000 acres of public land in Douglas County, or about 26% of the total land base. Those lands within the Upper South Platte Watershed have a long history of partnership and collaboration. The Upper South Platte Watershed Protection and Restoration Project (USPWPRP) is a long-term partnership between the U. S. Forest Service,

CSFS, Denver Water Board, and other federal, state, and local stakeholders. The Upper South Platte Partnership (USPP) is a collaboration between government agencies, water providers, nonprofit organizations, and academic institutions which share a vision of sustainable and resilient landscapes, healthy forests, proactive and engaged fire-adapted communities, with safe, effective, and efficient fire response and management in the Upper South Platte watershed.

The goals of the USPWPRP are to protect water quality for all users, reduce risks of large catastrophic wildfires, reduce risks to human life and property, create sustainable forest conditions in the Upper South Platte River basin, and integrate research, monitoring, and management. To date, forest restoration and hazardous fuel reduction treatments have been accomplished on about 15,400 acres of federal lands in Douglas County.

The desired outcomes of the USPP are to restore and maintain resilient landscapes, create fire adapted communities, and ensure a safe and effective wildfire response. The collaboration has a goal of treating 75,000 acres of private and 75,000 acres of federal lands in the next 10 years. To meet those goals, South Platte Ranger District has begun the Lower North-South Environmental Assessment. This collaborative NEPA analysis seeks to alter stand structure to better mimic natural disturbances and create forest conditions that are resilient to drought, wildfire, insects, and disease. The analysis area is approximately 250,000 acres, of which 130,000 acres lie in Douglas County. The planning area will also consider 51,000 acres of roadless treatments. Once completed, the analysis will identify and prioritize federal lands capable of generating landscape level treatments which extend beyond federal boundaries to state and private lands.



With easy access from both Denver and Colorado Springs, the Pike National Forest sees many visitors year-round. The Pike and Rampart Range is extremely popular amongst OHV users. The forest is also a very popular hiking, camping, horseback riding and fishing destination.

Being a Front Range Forest the Pike is at high risk for wildfire. The Pike works collaboratively with Douglas County and the CSFS and other collaboratives for project input. The Regional Rocky Mountain Restoration Initiative (RMRI) encompasses area in the South Platte Ranger District. The Upper South Platte Partnership (USPP) works to prioritize and restore landscapes in the upper South Platte watershed. There are multiple collaborating agencies as part of the ongoing NEPA process. Target analysis concepts include identifying future desired conditions, considering current values at risk, analyzing past treatment effectiveness, identifying priority areas and potential treatments. There are some exciting opportunities happening on the Pike, as the Front Range was recognized in the USFS 10-year wildfire strategy. There is an expectation for agency adjustment to pace or focus of treatments over the coming years, the Lower North-South NEPA is precedent setting.

2.9 Current Program Summaries

2.9.1 Douglas County Wildfire Mitigation Program

The Douglas County wildfire mitigation program consists of several facets. The program is heavily weighted towards regulation in both the building and land use processes. The program also consists of education and outreach and forest management consultation for County-Owned properties. The program is housed in the building division and is currently staffed by one professional forester.

2.9.2 Douglas County Wildfire Mitigation Standards

Last updated in 2007, the Douglas County Wildfire Mitigation Standards are based on 3 model codes and were vetted in a collaborative stakeholder environment. The standards are reflective of Firewise® concepts, access, water supply, building materials, and defensible space. A copy of the standards can be found at https://www.douglas.co.us/building-division/wildfire-mitigation/.
Douglas County has minimum standards for driveway access that relate to width, driving surface, turnouts and turnarounds for emergency vehicles. These standards also contain a maximum allowable grade.

Most building materials for new residential construction are current with industry upgrades and trends including composite decking, rock exterior in combination with some wood siding, but mostly hardy plank siding or stucco. Douglas County requires a minimum Class B roofing material and does not allow shake shingle roofs. There are requirements for vent screening ¼" and placement of propane tanks.

Currently Douglas County requires defensible space on active building permits for residences, accessory structures, and additions where applicable. Permits are referred to the wildfire mitigation specialist for review and assessment. Where hazardous fuels are present a wildfire hazard assessment is issued with the building permit, identifying fuels reduction work that needs to be completed prior to issuance of C.O. The wildfire mitigation standards are adopted into the building code and the program is administered through the Building Division and the Chief Building Official is the AHJ.

Douglas County has adopted water storage regulations for firefighting. The intent of this regulation is to bring water sources to more rural areas of the County and to those areas being developed without municipal water supplies. With the creation of 4 or more parcels, a minimum 30,000 gallons of water is required within 2 road miles of the furthest driveway. Water must flow at 1,000 gpm for 2 hours of firefighting. After installation and testing of the water source, the fire protection district takes over the water source. There is a supporting water use agreement and easement for access for filling. Water storage facilities require a building permit and plan approval. Around the County there are large ponds, lakes and cisterns that fill this niche.

2.9.3 Wildfire Hazard Overlay District

The Wildfire Hazard Overlay District, aka Section 17 of the Douglas County Zoning Resolution, requires developments going through the land use process to be evaluated for wildfire hazards. Based on a wildfire hazard rating, where applicable, the applicant must submit a wildfire mitigation or forest management plan. The plan must be authored by a professional forester with

experience in the Rocky Mountain region and eligibility for professional membership in the Society of American Foresters (SAF). Plans must describe how and to what extent hazardous fuels will be reduced. Plans are reviewed and approved by the wildfire mitigation staff. The approved plan must be implemented and all on the ground requirements complete prior to the development being eligible for building permits. Adopting this regulation into the Zoning Resolution raises awareness to wildfire issues and addresses mitigation needs at the beginning of the development process. A model of hazardous fuels reduction is completed prior to structure development. This regulation is the first step in community protection and community resiliency.

2.9.4 Public Education

Wildfire mitigation staff continues to make efforts towards educating residents on wildfire issues, mostly geared towards the science of home ignition, and living with fire concepts. County offers free property assessments and the website hosts PSA's and short videos that educate residents. There are also links to educational materials produced by multiple agencies. The County, along with partners, has hosted wildfire preparedness and mitigation workshops. Douglas County plans to host home assessment classes for both professionals and residents to increase awareness and help motivate residents to take action to reduce risks.

2.9.5 Forestry/open space consulting

On occasion, wildfire mitigation staff consults with open space to assist with project proposals that include strategies to improve forest health as well as reduce potential negative impacts from fire. Mitigation staff has often applied for grant funding for open space projects and has worked with the CSFS to identify priority project proposals.

2.9.6 Wild-Fire Mitigation App

County leadership wanted to provide Douglas County homeowners and businesses the ability to better prepare for wildfires. The DC GIS team developed an interactive map application by overlaying the Colorado State Forest Service data set on top of existing County maintained layers like towns, parcels, roads, and fire districts. Released to the public on National Wildfire Preparedness Day – May 7th, this application offers citizens timely, updated data to help identify wild-fire risk for their home or business.

Learn more about the application here or view the Wild-Fire Mitigation App here.

More updates on the GIS Modernization Program are available on the program site, CLICK HERE.

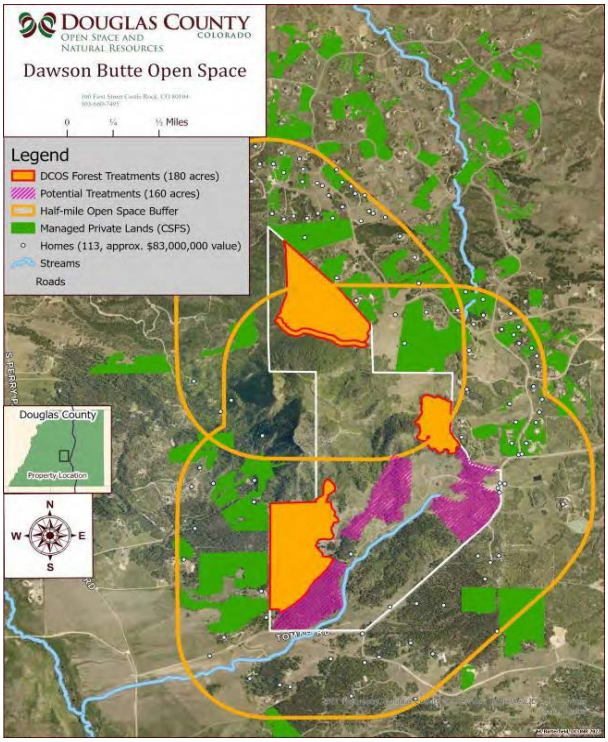
2.9.7 Other Important Douglas County Actions

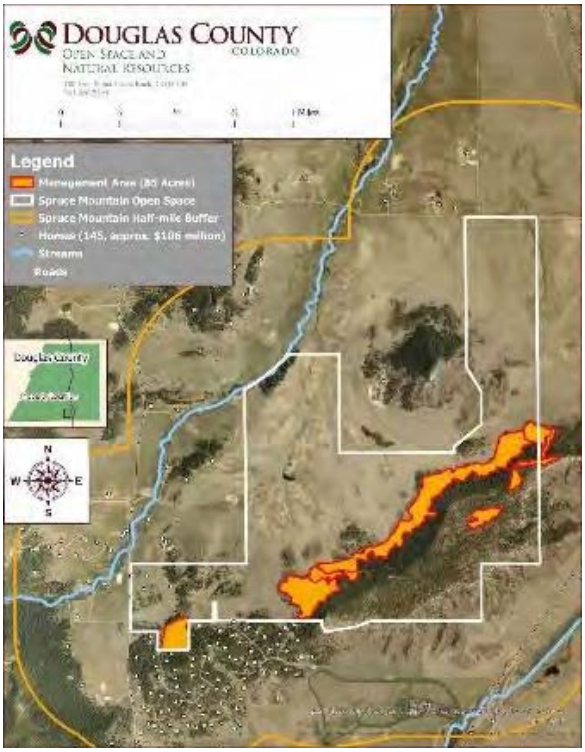
- Douglas County assisted a community with a project completed by Team Rubicon early in the year. Over 140-person hours were donated and work reflecting a $70,000 value.
- Douglas County public relations has proposed to continue to raise awareness amongst residents by delivering a monthly campaign with educational messages around wildfire.
- Douglas County is on track to complete a CWPP update.
- Douglas County is looking to assist residents with wildfire mitigation funding through an ARPA funding program (we are finalizing details) and through support to the CSFS to use to leverage additional funding and acres through CSFS programs
- Douglas County entered an exclusive use contract for 153 days with a Type II helicopter and is hiring a 6-person supporting crew.
- Douglas County has also entered a Call When Needed (CWN) contract with additional (fixed wing) air resources.

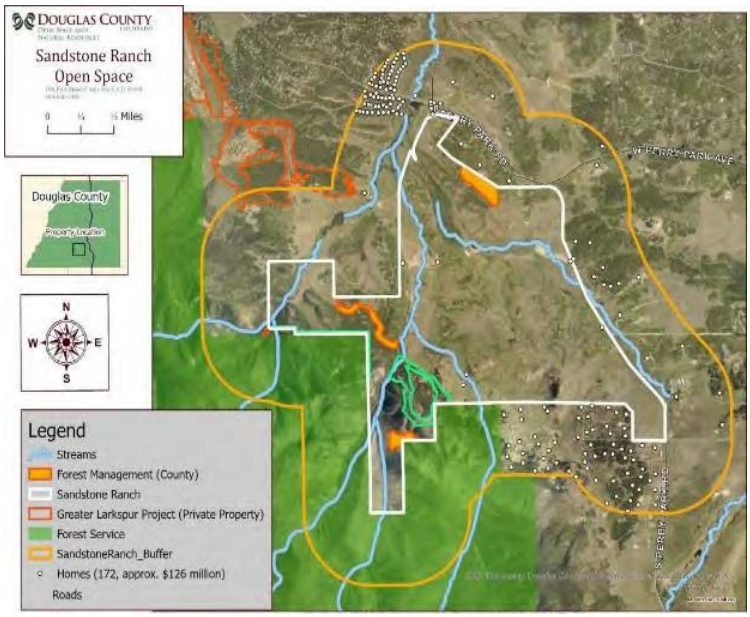
2.9.8 Douglas County Open Space and Natural Resources

Ponderosa pine stand thinned in DC Open Space

Douglas County Open Space and Natural Resources manages lands owned by the BOCC. The County owns several large, forested parcels under active management. These large parcels are high use passive recreation areas that include hiking, biking and horseback riding. These areas are also under conservation easement along with one property enrolled in the Forest Legacy program. To date, with assistance from the CSFS through an MOU for forest management activities, Douglas County has treated and maintains treatment on approximately 260 acres of forested open space. These parcels are located adjacent to res are identified in the respective forest management plans and include goals around forest health, natural regeneration, wildfire, resource, and community protection. Douglas County continues to look for opportunities to expand the management program in strategic areas that protect resources and complement management activities on adjacent properties.

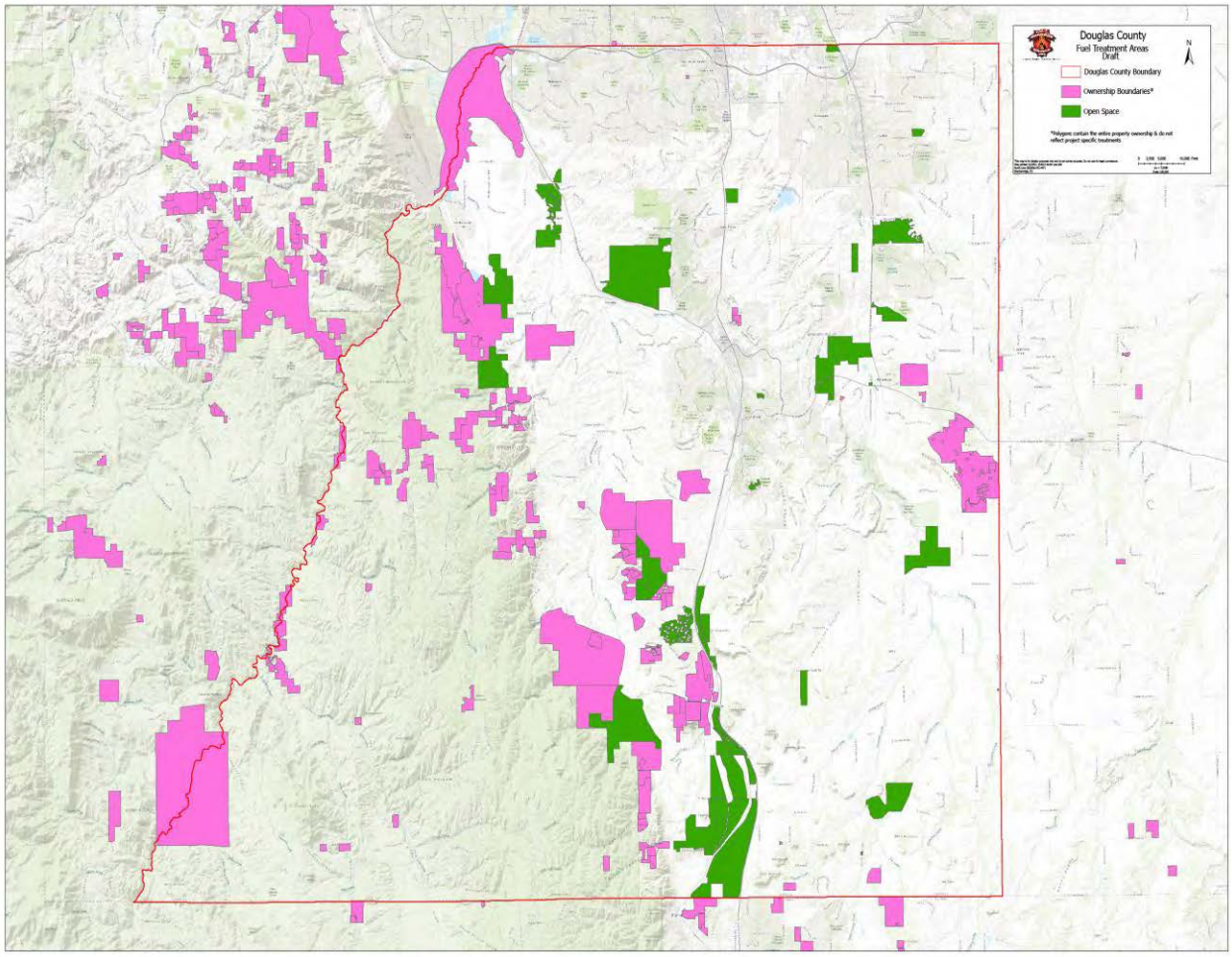






2.9.8 Additional Wildfire Mitigation

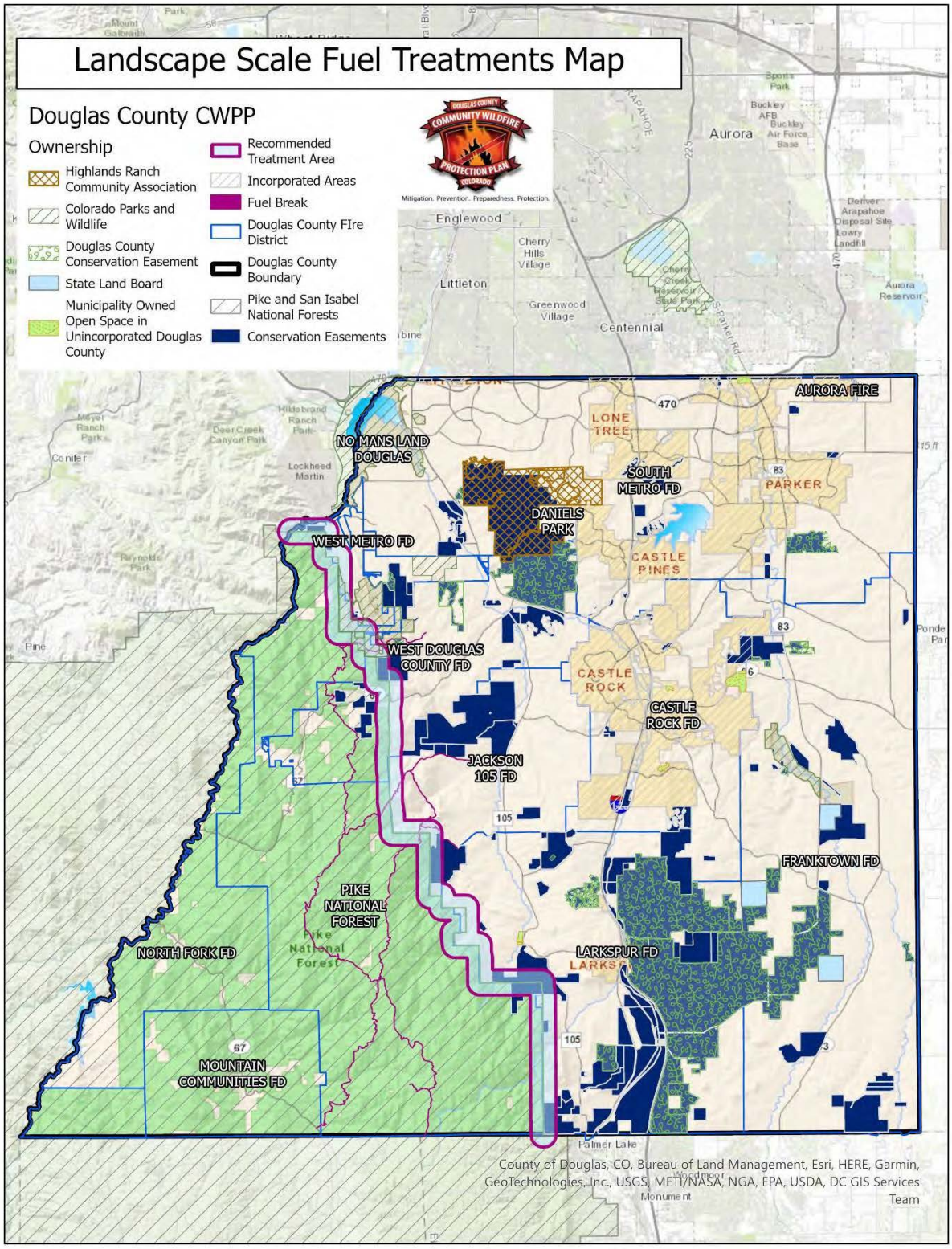
Additional wildfire mitigation efforts are completed on open space properties in subdivisions by the Douglas County Emergency Services Support crew, formerly known as the all hazards mitigation crew. The crew was hired in Douglas County in early 2015 and has worked to mitigate and maintain subdivision open space parcels that were identified as priority parcels for treatment as they lent themselves to demonstration sites and other parcels that could serve to motivate adjacent residents to complete work in surrounding HIZs. Parcels treated include those located in the Pinery, Happy Canyon, Woodhaven, Hidden Oaks at Bear Dance, Daniels Park Rd, Indian Creek, Sage Port and Burning Tree Ranch. The crew has also worked on larger County-Owned open space parcels.



2.9.9 Landscape Scale Fuels Treatments

Landscape Scale Fuels Treatments efforts have been progressing with the assistance of the CSFS, willing land owners and multiple funding sources. CSFS has been working with partners on the Greater Larkspur project achieving large acreage accomplishments on private and County-Owned lands along the border of the Pike National Forest. CSFS has also worked with and continues to work with and build on treatments along the Jackson Creek corridor and Jarre Canyon corridor, implementing strategic fuels reduction treatments that complement previously treated areas. Another area of significant accomplishment is the Roxborough area. The Roxborough community and adjacent State Park have worked together to continue to achieve accomplishments in fuels

reduction through treatment of adjacent areas and additional acreages. DC and partners are interested in supporting a sorting yard to accommodate possible wood products that may be removed under potential fuels treatment projects of this scale.



CHAPTER 3 WILDFIRE RISK ASSESSMENT AND ANALYSIS

The Colorado State Forest Service (CSFS) has developed the Colorado Wildfire Risk Assessment Portal (CO-WRAP, (https://co-pub.coloradoforestatlas.org/#/), which provides data for informed decision-making based on treatment priorities to reduce the risk from wildfire for each homeowner as well as the community as a whole. CO-WRAP was used in the development of this CWPP to assess potential fire behavior in Douglas County by incorporating fuel models, topography, and local weather patterns and conditions. The CO-WRAP products included in this report are designed to provide the information needed to support the following key priorities:

- Identify areas that are most prone to wildfire
- Plan and prioritize hazardous fuel treatment programs
- Allow agencies to work together to better define priorities and improve emergency response, particularly across jurisdictional boundaries.
- Increase communication to address community priorities and needs

Reference: Douglas County: CO-WRAP

Wildfire risk represents the possibility of loss or harm occurring from a wildfire. Wildfires are unwanted and unplanned fires that result from natural ignition or unauthorized human-causes. Douglas County actively suppresses all wildfire ignitions within the County.

The wildfire risk assessment for the Douglas County community considers a variety of factors that ultimately result in a hazard rating for the community. Community infrastructure risk is evaluated in terms of emergency response, defensibility, and structural flammability. Analyzing the relationship between expected fire behavior and the built environment in the Douglas County community is the core of an effective community wildfire risk assessment. From this process, mitigation recommendations are developed that directly address the hazards and, that if implemented, will greatly reduce the risk of loss from a wildfire for each homeowner as well as the community as a whole. Values at risk include infrastructure, structures, improvements, and natural resources that are likely to suffer long term damage from the direct impacts of wildfire.

Home not mitigated to wildfire

As part of this assessment, a concerted effort was made to solicit and include input and suggestions from the community, and Douglas County fire professionals. Community meetings were held to explain the CWPP process and to present the findings and recommendations of the CWPP analysis to the community, and to solicit comment for the final CWPP.

3.1 Wildfire Behavior Analysis

Fire behavior characteristics are attributes of wildland fire that pertain to its spread, intensity, and growth. Fire behavior characteristics utilized in the CO-WRAP include fire type, rate of spread, flame length, and fireline intensity (i.e., the Fire Intensity Scale). These metrics are used to determine the potential fire behavior under different weather scenarios. Areas that exhibit moderate to high fire behavior potential can be identified for mitigation treatments, especially if these areas are in close proximity to homes, business, or other assets.

The characteristics of fuels, topography, and weather conditions combine to dictate fire behavior, rate of spread, and intensity. Wildland fuel attributes refer to both dead and live vegetation and include such factors as density, bed depth, continuity, density, vertical arrangement, and moisture content. Structures with flammable materials are also considered a fuel source. Fire behavior is typically modeled at the flaming front of the fire and described most simply in terms of fire line intensity (flame length) and in rate of forward spread. The implications of observed or expected fire behavior are important components of suppression strategies and tactics, particularly in terms of the difficulty of control and effectiveness of various suppression resources.

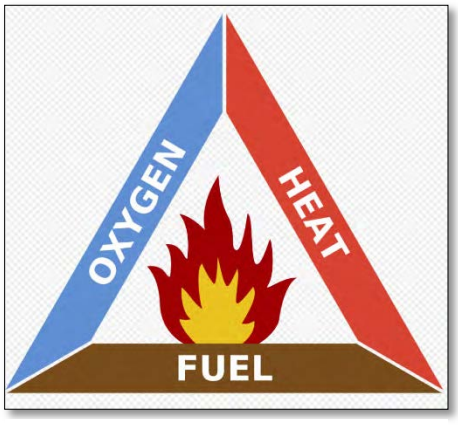
Black Forest 2013 fire viewed from Colorado Springs

3.1.1 Terminology

Fire risk is the probability that wildfire will start from natural or human-caused ignitions. **Fire hazard** is the presence of ignitable fuel coupled with the influences of topography and weather and is directly related to fire behavior. **Fire severity**, on the other hand, refers to the immediate effect a fire has on vegetation and soils.

Wildland fuel attributes refer to both dead and live vegetation and include such factors as density, bed depth, continuity, density, vertical arrangement, and moisture content. Structures with flammable materials are also considered a fuel source.

For fire to spread, materials such as trees, shrubs, or structures in the flame front must meet the conditions of ignitability. The conditions needed are the presence of oxygen, flammable fuel, and heat. Oxygen and heat are implicitly available in a wildland wildfire. However, if the potential fuel does not meet the conditions of combustion, it will not ignite. This explains why some trees, vegetation patches, or structures may survive a



The Fire Triangle

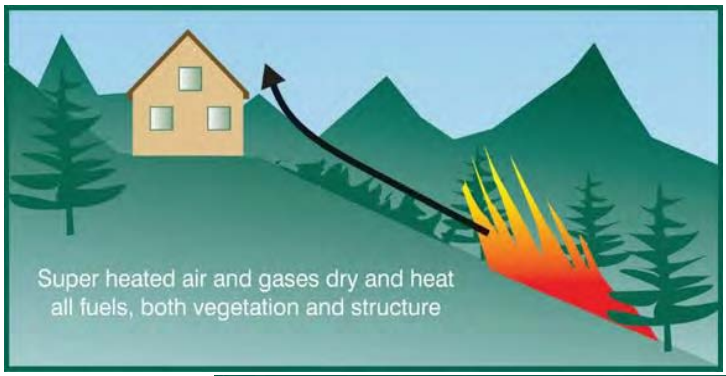
wildland wildfire and others in the near vicinity are completely burned.

Rate of spread indicates the speed with which a fire moves in a horizontal direction across the landscape or community. Like the fire intensity scale, rate of spread is influenced by the three same environmental factors: fuels, weather, and topography. Rate of spread is expressed by the fire community in "chains per hour." A chain is 66 feet, and one chain per hour closely approximates a fire spread of 1.1 feet per minute.

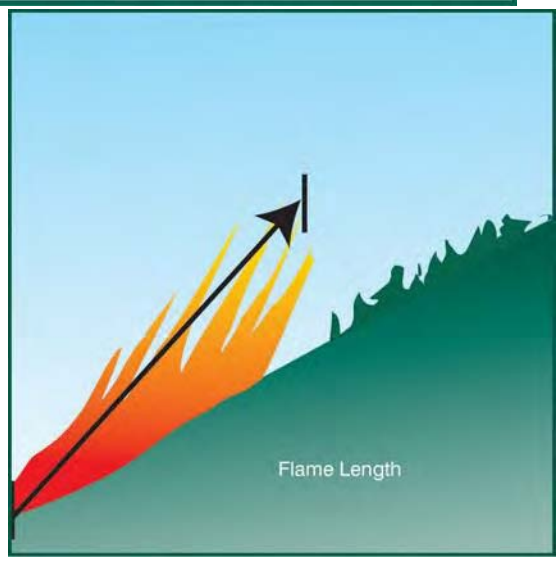
Rate of Spread	Acres	Percent
Non-Burnable	52,636	9.8 %
1 Very Low	1,076	0.2 %
2 Low	15,467	2.9 %
3 Moderate	70,289	13.0 %
4 High	205,824	38.2 %
5 Very High	48,010	8.9 %
6 Extreme	145,942	27.1 %
Total	**539,244**	**100 %**

Approximately 60 percent of the Douglas County community is predicted to have a rate of spread ranging from moderate to extreme, with corresponding rates of spread from approximately 1,200 to 16,500 feet per hour, or approximately 20 to 275 feet per minute (**Appendix 10.1**).

Fire intensity is reflected by the flame length at the flaming front. The flaming front is the zone of a moving fire where the combustion is primarily flaming. Behind this flaming fire zone, combustion is primarily glowing. Light fuels typically have a shallow flaming front, whereas heavy fuels have a deeper front; however, the heat from a fire with a flaming front that has a flame length of four feet or less can be lethal to firefighters, people, and animals.



Flame length is defined as the distance between the flame tip and the midpoint of the flame depth at the base of the flame, which is generally the ground surface. It is an indicator of fire intensity and is often used to estimate how much heat the fire is generating. Flame length is typically measured in feet. Flame length is a fire behavior output, which is influenced by the same three environmental factors: fuels, weather, and topography. Weather is by far the most dynamic variable as it changes frequently. To account for this variability, four percentile weather categories were created from historical weather observations to represent low, moderate, high, and extreme weather days for each weather influence zone in Colorado. A weather influence zone is an area where, for analysis purposes, the weather on any given day is considered uniform (**Slack 2000**).



Flame length is the measure of fire intensity used to generate the Fire Effects outputs for the CO-WRAP risk assessment. Predicted flame lengths vary from 8 feet to 150 feet in length, exhibiting great potential for harm or damage to life and property. In the grass fuel models, predicted flame lengths, with an average 20 mile per hour wind, flame lengths will vary between 14 feet to 25 feet. Flame lengths that are 4 feet or greater are lethal to firefighters, people, and animals.

The flame lengths vary from moderate to extreme on over 83% of the acres Douglas County.

Flame Length	Acres	Percent
Non-Burnable	52,636	9.8 %
1 Very Low (0-1 ft)	1,046	0.2 %
2 Low (1-4 ft)	39,629	7.3 %
3 Moderate (4-8 ft)	273,288	50.7 %
4 High (8-12 ft)	336	0.1 %
5 Very High (12-25 ft)	21,034	3.9 %
6 Extreme (25+ ft)	151,274	28.1 %
Total	**539,244**	**100 %**

Wildland fires may be classified as ground, surface, or crown fires. **Ground fire** refers to burning/smoldering materials beneath the surface including duff, tree or shrub roots, punchy wood, peat, and sawdust that normally support a glowing combustion without flame. **Surface fire** refers to fuels burning on the surface of the ground such as leaves, needles, and small branches, as well as grasses, forbs, low and medium shrubs, tree seedlings, fallen branches, downed timber, and slash. **Crown fire** is a wildland fire that moves rapidly through the crowns of trees or shrubs. When fire burns in the forest understory or through grass, it is generally a surface fire, or a **good fire** as illustrated in the image to the left. When fire burns through the canopy of vegetation, or overstory, it is considered a crown fire or a **bad fire**. The vegetation that spans the gap between the forest floor and tree crowns can allow a surface fire to become a crown fire and is referred to as ladder fuel.

Good Fire: Ponderosa pine survives wildfire after thinning

3.1.2 Fire Intensity

One significant indicator of wildfire concern for Douglas County is the Fire Intensity Scale. Similar to the Richter scale for earthquakes, the Fire Intensity Scale provides a standard scale to measure potential wildfire intensity. The Fire Intensity Scale is a fire behavior output and is influenced by three environmental factors: fuels, weather and topography. Weather conditions such as high ambient temperatures, low relative humidity, and windy conditions favor fire ignition and high-intensity fire behavior. Under no-wind conditions fire burns more rapidly and intensely upslope than on level terrain; however, wind tends to be the driving force in fire behavior in the most destructive WUI wildfires. The warm, dry "chinook" winds common along the Front Range can rapidly drive wildfire downslope (Douglas County CO-WRAP).

2012 Waldo Canyon fire at sunset

The Fire Intensity Scale consist of five classes where the order of magnitude between classes is ten-fold. The minimum class, Class 1, represents very low wildfire intensities and the maximum class, Class 5, represents very high wildfire intensities.

Class 1, Lowest Intensity. Very small, discontinuous flames, usually less than 1 foot in length; very low rate of spread; no spotting. Fires are typically easy to suppress by firefighters with basic training and non-specialized equipment.

Class 2, Low Intensity. Small flames, usually less than two feet long; small amount of very short-range spotting possible. Fires are easy to suppress by trained firefighters with protective equipment and specialized tools.

Class 3, Moderate Intensity. Flames up to 8 feet in length; short-range spotting is possible. Trained firefighters will find these fires difficult to suppress without support from aircraft or engines, but dozer and plows are generally effective. Increasing potential for harm or damage to life and property.

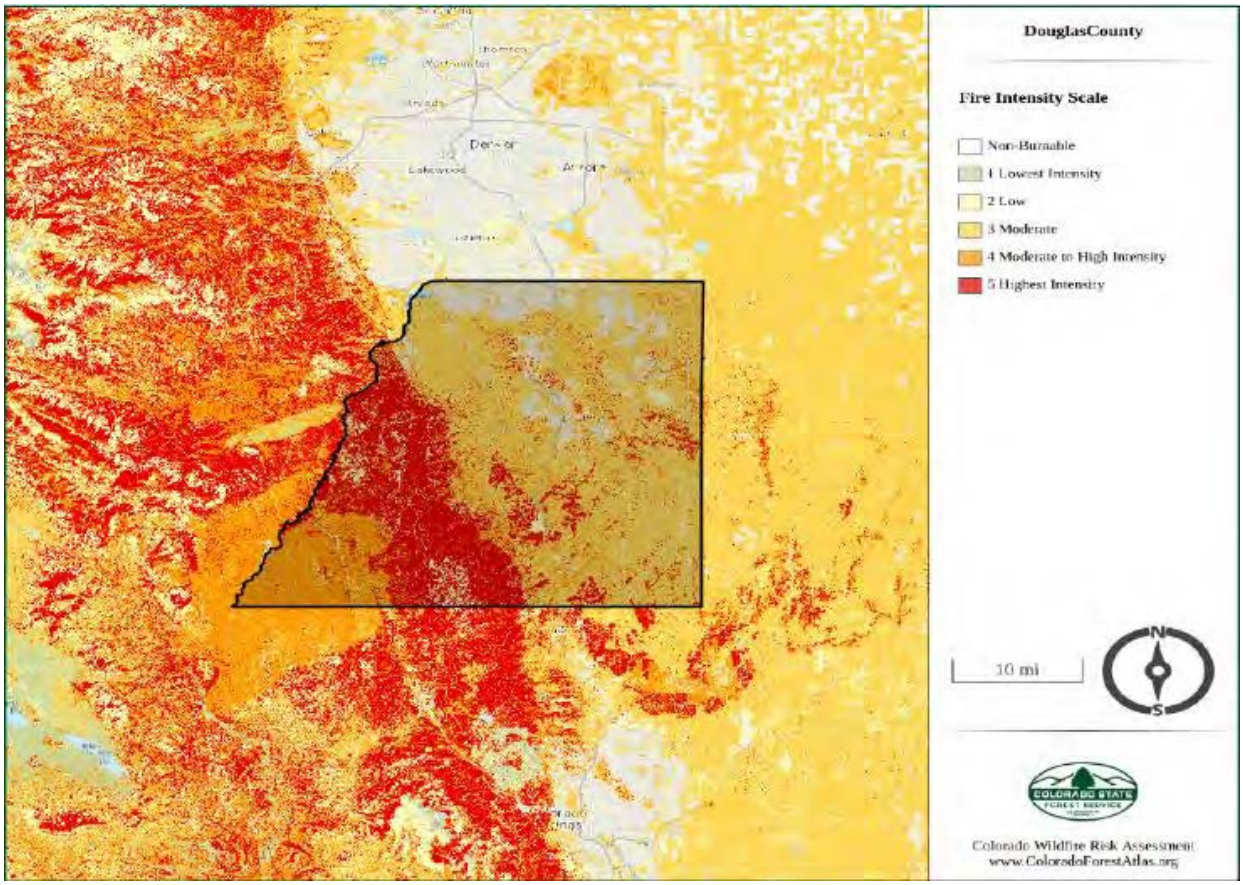
Class 4, High Intensity. Large Flames, up to 30 feet in length; short-range spotting 1. common; medium range spotting possible. Direct attack by trained firefighters, engines, and dozers is generally ineffective, indirect attack may be effective. Significant potential for harm or damage to life and property.

Class 5, Highest Intensity. Very large flames up to 150 feet in length; profuse short-range spotting, frequent long-range spotting; strong fire-induced winds. Indirect attack marginally effective at the head of the fire. Great potential for harm or damage to life and property.

The Fire Intensity Scale does not incorporate historical occurrence information, it only evaluates the potential fire behavior for an area, regardless of if any fires have occurred there in the past. This additional information allows mitigation planners to quickly identify areas where dangerous fire behavior potential exists in relationship to nearby homes or other valued assets.

Nearly 75 percent of Douglas County is rated moderate to high intensity and fire intensity varies from moderate to extreme on over 85% of the land. The current fire regime in the Douglas County community is characterized by moderate to high intensity fires rather than the low intensity fires that historically occurred in the area. Fire intensity assessment reported in the CO-WRAP is supported by the observed 2002 Hayman Fire behavior. With ladder fuels and closed crown canopies, future high intensity fires are predicted to result in high mortality of the forest resources of the Douglas County community and could result in extensive property loss and large amounts of erosion and sedimentation adversely affecting water quality.

FIS Class	Acres	Percent
Non-Burnable	49,993	9.3 %
1 Lowest Intensity	471	0.1 %
2 Low	30,352	5.6 %
3 Moderate	259,311	48.1 %
4 Moderate to High Intensity	77,365	14.3 %
5 Highest Intensity	121,752	22.6 %
Total	**539,244**	**100 %**



Wildfire Intensity Map

3.1.2 Wildfire Types

Potential fire type is based on fuel conditions, extreme percentile weather, and topography. There are two primary fire types: **surface fire** and **canopy fire**. Canopy fire can be further subdivided into passive canopy fire and active canopy fire. Canopy fires are very dangerous, destructive, and difficult to control due to their increased fire intensity. From a planning perspective, it is important to identify where these conditions are likely to occur on the landscape so that special preparedness measures can be taken if necessary. Typically canopy fires occur in extreme weather conditions.

Surface Fire. A fire that spreads through surface fuel without consuming any overlying canopy fuel. Surface fuels include grass, timber litter, shrub/brush, slash and other dead or live vegetation within about 6 feet of the ground.

Passive Canopy Fire. A type of crown fire in which the crowns of individual trees or small groups of trees burn, but solid flaming in the canopy cannot be maintained except for short periods (Scott & Reinhardt 2001).

Active Canopy Fire. A crown fire in which the entire fuel complex (canopy) is involved in flame, but the crowning phase remains dependent on heat released from surface fuel for continued spread (Scott & Reinhardt, 2001).

The CO-WRAP Fire Type - Extreme layer shows the footprint of areas where extreme fire events are most likely to occur. However, it is important to note that canopy fires are not restricted to these areas. The Fire Type - Extreme Weather map is derived at a 30-meter resolution. This scale was chosen to be consistent with the accuracy of the primary surface fuels dataset used in the risk assessment. While not appropriate for site specific analysis, it is appropriate for regional, County, or local planning efforts. Generally, there is potential for surface fire on 67% of the acres within Douglas County, and passive canopy fire potential exists on 25% of the acres.

Fire Type - Extreme Weather	Acres	Percent
Surface Fire	327,085	66.9 %
Passive Canopy Fire	119,951	24.5 %
Active Canopy Fire	42,215	8.6 %
Total	**489,251**	**100 %**

3.2 Community Values at Risk

In any hazard and risk assessment, human life and welfare are the most important values to protect. Homes, infrastructure, and the forested characteristics of Douglas County are important values to the community. In addition to the $57 million of assessed value of property in Douglas County, the damage or loss of the ecosystem could lead to serious erosion of bare soil areas, destruction of habitat, and damage to valuable Douglas County watersheds. Potential loss of aesthetic values and the adverse effect on property values are some other important values at risk within Douglas County communities. Common values at risk in Douglas County include infrastructure, structures and other improvements, and natural resources that are likely to suffer long term damage from the direct impacts of wildfire. Wildland fire may result in a significant decline in property values, resale values, and forested properties within the County. The actions recommended in this CWPP are designed to lower the wildfire risk to neighborhoods, as well as the ecological and economic values in Douglas County.

Wildfires leave severe and long-term impacts on all natural and ecological values that people often take for granted. Wildfires can transform landscapes from conifer forests to grass shrub ecosystems, such has been experienced after the 2002 Hayman Fire.

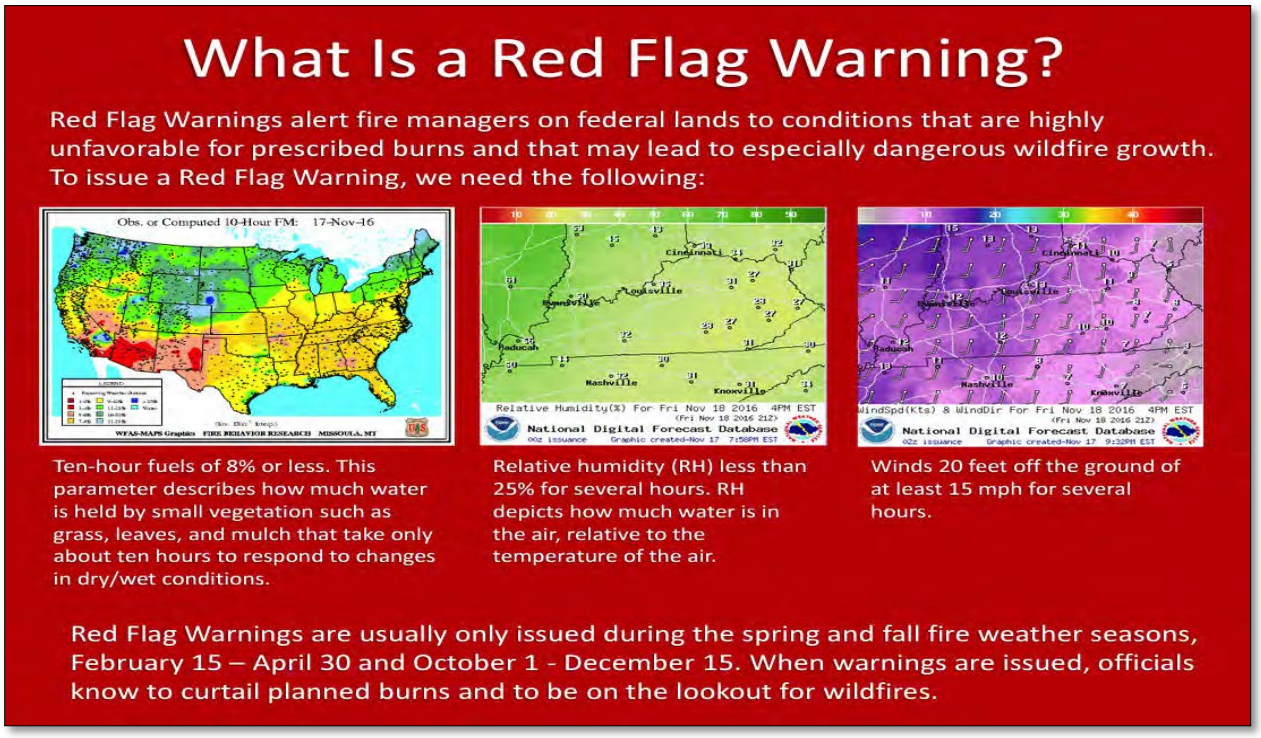
Transformed by the Hayman Fire,
>100,000 acres mixed conifer forest converted to grass fuel type

With this dramatic change in fuel types, wildfire behavior changes as does wildfire risk. Cured grasses and surface fuels demonstrate high rates of spread, even with lower flame lengths, and can create high risks to homes and resources. Rapidly moving grass and surface fuels generate embers just as canopy fires, creating sources of ignition for homes and other structures.

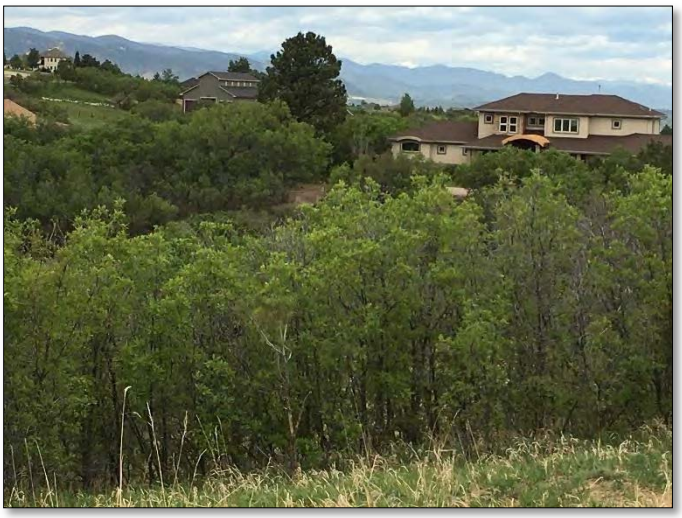
Grass fuels become ladder fuels,
moving quickly from the ground surface into crown fuels

Grass-fueled fires travel much faster than heavy-fueled fires. The changes in fuel structure and fuel type in Douglas County require continued awareness of the potential high risk of a rapidly spreading wildfire in this grass fuel type.

Values at risk can be protected by understanding wildfire weather severity during drought conditions. The National Weather Service issues warnings during high wildfire danger that have been used since the 1960's. These Red Flag Warnings are then broadcast by local television and radio stations. These warnings are important information for early alert to potential catastrophic wildfire weather conditions. All residents of Douglas County communities should become educated and knowledgeable about Red Flag Warnings, refer to Chapter 5.



3.2.1 Wildland Urban Interface Risks



Highest wildfire risk; Homesite in WUI surrounded by Gambel oak and shrub conifer,

The CO-WRAP WUI layer reflects housing density, depicting where humans and their structures meet or intermix with wildland fuels. Colorado is one of the fastest growing states in the U.S., with much of this growth occurring outside urban boundaries. This increase in population across the state will impact counties and communities that are located within the WUI, including Douglas County. The WUI is defined as the zone where communities and wildland fuels interface and is the central focus of this CWPP. Population growth within the WUI substantially increases the risk from wildfire. Every fire season, catastrophic losses from wildfire plague the WUI in our country. Homes are lost, businesses are destroyed, community infrastructure is damaged, and most tragically, lives are lost. Precautionary action taken before a wildfire strikes often makes the difference between saving and losing a home.

For Douglas County, it is estimated that 282,267 people or 84.1 percent of the total project area population (335,448) live within the WUI. The WUI classes are based on the number of houses per acre. The chart on the following page illustrates that over 90% of Douglas County residents are living in subdivisions with a high density of homes. Refer to (**Appendix 10.1 WUI Maps)** for WUI classes and location information.

Housing Density	WUI Population	Percent of WUI Population	WUI Acres	Percent of WUI Acres
Less than 1 house/40 ac	1,067	0.4 %	38,140	21.1 %
1 house/40 ac to 1 house/20 ac	1,880	0.7 %	25,242	13.9 %
1 house/20 ac to 1 house/10 ac	4,911	1.7 %	29,419	16.3 %
1 house/10 ac to 1 house/5 ac	9,395	3.3 %	26,545	14.7 %
1 house/5 ac to 1 house/2 ac	12,081	4.3 %	18,920	10.5 %
1 house/2 ac to 3 houses/ac	120,878	42.8 %	32,961	18.2 %
More than 3 houses/ac	132,055	49.6 %	9,754	5.4 %
Total	**282,267**	**100.0 %**	**180,981**	**100.0 %**

Wildfire risk is a composite risk rating obtained by combining the probability of a fire occurring with the individual values at risk layers. Risk is defined as the possibility of loss or harm occurring from a wildfire. It identifies areas with the greatest potential impacts from a wildfire (i.e., those areas most at risk) and considering all values and assets combined: WUI Risk, Drinking Water Risk, Forest Assets Risk, and Riparian Areas Risk. Douglas County has a 70% rating from moderate to high risk which includes approximately 410,800 acres in this wildfire risk class (**Appendix 10.2 CO-WRAP**).

Wildfire Risk Class	Acres	Percent
Non-Burnable	50,847	9.4 %
Lowest Risk	36,561	6.8 %
Low Risk	41,031	7.6 %
Moderate Risk	204,719	38.0 %
High Risk	174,573	32.4 %
Highest Risk	31,513	5.8 %
Total	**539,244**	**100 %**

The community base map (Appendix 10.1) illustrates important features such as landownership, structures, roads, surface water, fire district boundaries, and major utility corridors. The map illustrates community values from which recommendations concerning wildfire planning can occur.

3.2.2 Roadways and Evacuation Routes

Roads serve both as access routes for emergency vehicles and as escape routes for residents during a fire. Therefore, the network of roadways needs to provide safe, simultaneous access for emergency vehicles and public evacuation. Vegetation management strategies for access routes in Douglas County can serve as effective fuel breaks to provide fire protection, assist in fire suppression efforts, and improve effective evacuation. Many of the rights-of-way need active intervention including removal, reduction, or conversion of on-site fuels. The image inserted at left characterizes very dense pockets of regeneration trees along the roadway that require intervention.

Pre-designated principal evacuation routes should be well marked with easily identifiable signs. Secondary evacuation routes are also important to the safety of Douglas County residents. They may be the only routes to safety in the event the principal evacuation route is blocked by fire, vehicle accidents, or by emergency vehicles. Secondary evacuation routes should be marked, known, and accessible to all residents.

Highway near Franktown

3.2.3 Emergency Roadways

It is recommended evacuation routes be clearly marked in the event of a wildfire emergency.

Adequate Evacuation Routes

3.2.4 Homes and Structures

The goal of vegetation management around homes and other structures is to create a modified fuel area in which flammable vegetation is reduced to creating an environment that will not support high-intensity crown fires. The main objectives of fuel management around homes and structures is to create conditions that will only support surface fires of lower intensity and lower rates of spread, reduce the potential for fire to spread from the vegetation to the structure and vice versa.

Defensible Space at Homesite

3.2.5 Water Resources

Wildfire suppression requires substantial quantities of water from dependable sources. Ponds, other surface water bodies, and municipal drinking water sources can provide valuable resources during interface suppression situations. Many incidences resulting in tragic and costly losses are often the result of inadequate water supply. Water supply for suppression in many communities is often limited to the amount carried on responding emergency vehicles.

Water Impoundment, Rural Douglas County

Municipal water infrastructure facilities become extremely important and should be protected with defensible space as the highest priorities. This water supply can be available with appropriate signed agreements for wildfire suppression and emergencies. Reducing wildfire risk and protecting the Douglas County water infrastructure is a priority. Available water sources should be clearly identified.

HOA Water Resources

3.2.6 Fire Hydrants

Hydrants provide fire service agencies additional wildfire suppression resources. Hydrants should be well marked and maintained annually. Vegetation management should reduce fuel loading to protect hydrant infrastructure and provide safe access to these important suppression resources.

Fire Hydrant

3.2.7 Utilities

Wildfire suppression requires substantial quantities of energy from dependable sources. The capability of responding fire agencies is often limited by the adequacy of the communications, energy, and infrastructure supply. Reducing wildfire risk and protecting Douglas County utilities infrastructure is a huge priority. Energy sources, including electrical and natural gas, should be clearly identified, and protected by defensible space around all utility infrastructure.

Electrical

CORE Electric Cooperative serves more than 165,000 members along the Front Range, including portions of Douglas County. The goal of CORE Electric is to provide safe and reliable service to their customers. CORE Electric maintains a wildfire mitigation plan that includes a vegetation management program. Lines are inspected at regular intervals for vegetation growing into the lines and for hazard trees that may fall onto the lines. Vegetation that is growing into the lines or deemed a hazard is removed. In areas where the lines are determined to be high risk, vegetation is cleared from the utility right of way. CORE facilities are protected to reduce potential as ignition source.

Communication

Natural Gas

3.3 Climate & Weather

Since weather is the driver for wildfire risk, it is important to understand the annual local weather patterns. Douglas County is a semi-arid climate with hot, dry summers, and cold, dry winters. Average moisture records for Castle Rock (the County seat) indicate an average of 17.4 inches of moisture. Most of the moisture comes in the form of rain and most of it falls in May. Although snowfall depth averages 1.0 inches a year, it takes about 10 inches of snow to produce one inch of moisture. January is the coolest month and July is the warmest month. Average maximum temperature is 63.4 °F and the average low temperature is 31.3 °F.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	45.1	46.0	52.4	59.8	69.1	79.3	85.1	83.3	76.7	65.7	53.9	44.9	63.4
Average Min. Temperature (F)	13.3	15.1	21.7	29.6	38.5	46.8	52.5	50.6	42.2	31.3	21.5	13.0	31.3
Average Total Precipitation (in.)	0.48	0.61	1.34	1.93	2.29	2.00	2.56	2.21	1.12	1.14	0.74	0.72	17.14
Average Total SnowFall (in.)	5.9	8.2	11.4	10.4	1.4	0.0	0.0	0.0	0.7	5.7	7.5	9.7	60.8
Average Snow Depth (in.)	2	1	1	0	0	0	0	0	0	0	1	2	1

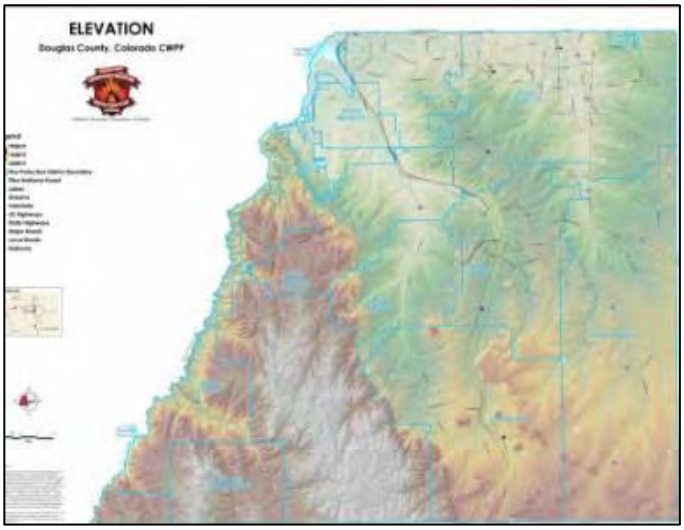
Percent of possible observations for period of record.
Max. Temp.: 69.8% Min. Temp.: 69.6% Precipitation: 75.3% Snowfall: 68% Snow Depth: 56%

Source: Western Regional Climate Center 2016, https://wrcc.dri.edu/

June is a very critical fire weather month for Douglas County in general and for Colorado in particular. You will readily note that many of Colorado's largest, most destructive fires have occurred during the month of June, particularly within the first two weeks. Among other factors, drought due to low rainfall and/or snowpack, low snow water equivalence, high nocturnal temperatures from midnight to 0600, low humidity, strong winds, moderate to high Haines Indices (used to indicate wildfire potential growth by measuring the stability and dryness of the air over a fire), and low fuel moistures have contributed to extreme fire behavior and large fire growth. The lesson learned is that June can be the Red Flag (denotes critical fire danger) month in Colorado. For complete history of Colorado fires from June 2002 to 2022, see (**Appendix 11.8**).

3.4 Topography

Douglas County encompasses several life zone ecological communities including the plains life zone (3,500 feet to 5,500 feet), where grasses are the dominant vegetation, the foothills life zone (5,500 feet to 8,000 feet), which is dominated by Gambel oak and mountain mahogany, and the lower montane life zone (6,000 feet to 9,000 feet) that is dominated by ponderosa pine and Douglas-fir. The elevation map for Douglas County is inserted at right.



Elevation Map

3.5 Vegetation Classes

Vegetation Class	Acres	Percent
Agriculture	2,097	0.4 %
Grassland	90,539	16.8 %
Introduced Riparian	6	0.0 %
Lodgepole Pine	3,373	0.6 %
Mixed Conifer	119,755	22.2 %
Oak Shrubland	81,733	15.2 %
Open Water	2,022	0.4 %
Pinyon-Juniper	1,892	0.4 %
Ponderosa Pine	68,374	12.7 %
Riparian	12,939	2.4 %
Shrubland	80,589	14.9 %
Spruce-Fir	375	0.1 %
Developed	69,156	12.8 %
Sparsely Vegetated	350	0.1 %
Hardwood	1,897	0.4 %
Conifer-Hardwood	3,629	0.7 %
Conifer	8	0.0 %
Barren	510	0.1 %
Total	**539,244**	**100 %**

Douglas County Vegetation Classes

The plant communities found in Douglas County are typical of the Front Range Rocky Mountain Montane ecosystem. Vegetation type and distribution is controlled primarily by available soil moisture, which is closely related to slope aspect. Existing vegetation is a fuel source for wildland fire and has a direct effect on fire behavior. Understanding the fire behavior characteristics of specific fuel types facilitates effective treatment strategies on individual properties and the community landscape. The Douglas County community is dominated by significant areas of grass and shrub communities including Gambel oak. All of these vegetative types can be extremely flammable under certain weather conditions.

3.5.1 Ponderosa Pine

Ponderosa Pine with Gambel Oak

The stand pictured, located in western Douglas County, is representative of a ponderosa pine stand. The stand is dominated by ponderosa pine (*Pinus ponderosa*) with small groups of Gambel oak, interspersed with Douglas-fir (*Pseudotsuga menziesii*), with lesser components of common juniper. The understory growth of Gambel oak varies in age from 10 to 100 years and ranges in height from 2 to 18 feet, growing in the open or scattered throughout the stand. Slope varies between 0% and 40% and the general aspects are south to southwest. Forest condition is generally good to excellent. There is an average of 121 trees per acre, which have a quadratic mean diameter (QMD) of 14 inches and an average height of 50 feet. The oldest trees were estimated at 250 years old. The stand is approximately 10,178 board feet/acre (Scribner) and 2,487 cubic feet/acre. Density (basal area) averages 121 square feet per acre. Approximately 200 established conifer seedlings per acre across the Stand matrix are enough to provide future stocking. The Site Index for ponderosa pine is 50 at a reference age of 100 years.

3.5.2 Mixed Conifer/Aspen

The stand pictured is east of the Rampart range in the foothills of Douglas County, representative of mixed conifer and is comprised of 55% Douglas-fir, 32% ponderosa pine, and 13% Colorado blue spruce. The dominant and co-dominant trees range in age from 120 to 200 years. The stand is generally on west to northwest aspects with slopes varying between 10 and 40%.

Mixed Conifer Stand

There is an average of 290 trees per acre, which have a quadratic mean diameter of 10.0 inches and an average height of 50 feet. Site Index for Douglas-fir is estimated at 40 (100-year base). The stand has approximately 14,233 board feet/acre (Scribner) and 3,794 cubic feet/acre. Average stand density is 166 square feet of basal area per acre.

The understory regeneration consists of scattered blue spruce, ponderosa pine, and aspen ranging from 500 to 2000 seedlings per acre. Understory conditions vary with some areas mostly covered by needles and sparse vegetation while other areas have extensive grasses and shrubs present. Plant species present include mountain mahogany, wax currant, sedges, bunchgrasses, kinnikinnick, snowberry, common juniper and mountain golden banner.

3.5.3 Shrubland/Meadow/Grass Complex

This photo represents the common characteristics of a Douglas County grass/shrub complex. These meadow grass/shrub complexes have a shrub layer that includes Gambel oak and junipers, which pose serious wildfire hazards. The complex pictured is in the prairie-savanna grassland complex of Douglas County and is comprised of 15% shrubland and 15% oak shrubland. Many of the meadows in the County have been created because of past land-uses, occasional wildfire, and dead tree removal, and have had little or no wildfire mitigation. The meadow complex pictured is surrounded by large-scale subdivisions, community infrastructure, shopping centers, electrical facilities, water storage, and pipelines. This vegetation type is mainly found in the eastern portion of the County and consists of mostly native grasses and forbs. Some meadows within the County are currently used for hay production and livestock pasture. There is evidence of grazing, elk, and deer use within the meadow/grass complex.

Grass/Shrub Complex

3.5.4 Gambel Oak/Mixed Conifer

This stand is dominated by Gambel oak with conifers present (ponderosa pine, Douglas-fir, or Rocky Mountain juniper) as isolated individuals or small clumps. The trees are typically stunted in growth as soil moisture is lower and growth is reduced. A timber cruise was not conducted in this stand type, but a visual inventory of three sites indicated an average height of 6 feet and roughly 80% of the ground cover occupied by Gambel oak. Plant species observed include bunchgrasses and scattered cacti.

Gambel Oak and Mixed Conifer

Fuel Model 2 describes the fuel conditions in open shrub lands and pine stands. Such areas may include clumps of fuel that generate higher intensities and that may produce fire-brands. In this fuel model, fire spread is primarily through the fine herbaceous fuels, either curing or dead. Fires are surface fires where the herbaceous material, in addition to litter and dead-down stemwood from the open shrub or timber overstory, contributes to the fire intensity. Dead fuel loads in this fuel model range from 0.5 to 2 tons per acre with an average fuel bed depth of 1 foot or less (Anderson 1982).

3.5.5 Plant Summary List

General Plant List composition for Douglas County:

Shrubs		**Forbs**		**Grasses/Sedge/Fern**	
Common juniper	*Juniperus communis*	Queen's cup*	*Clintonia uniflora*	Arizona fescue	*Festuca Arizonica*
Rocky Mtn Maple*	*Acer glabrum*	False Solomon's seal*	*Mainthemum stellatum*	Rough fescue	*Festuca campestris*
Kinnickinick	*Arctostaphylos uva-ursi*	Northern bedstraw*	*Galium boreale*	Sedges*	*Carex spp.*
				Bromes	*Bromus spp.*
Wax currant	*Ribes cereum*	Wild strawberry*	*Fragaria virginiana*	Bracken fern*	*Pteridium aquilinum*
Wild red raspberry*	*Rubus idaeus*	Western meadowrue	*Thalictrum occidentale*	waxflower	*Jamesia Americana*
Saskatoon	*Amelanchier alnifolia*	Round leaved yellow violet*	*Viola orbiculata*	Bunchgrasses	
Snowberry	*Symphoricarpos albus*	Western yarrow	*Achillea millefolium*	Mountain golden banner	*Thermopsis montana*
Creeping Oregon grape	*Mahonia repens*	Prickly rose	*Rosa acicularis*		
		Wild geranium	*Geranium spp.*		
Three-tip Sagebrush	*Artemesia tripartite*				
Shrubby Cinquefoil	*Pentaphylloides floribunda*				
Rocky Mountain pussytoes	*Antennaria parvifolia*				
Mountain mahogany	*Cercocarpous Montanus*				
choke cherry	*Prunus virginiana*				

Mountain golden banner	*Thermopsis montana*		
Gambel oak	*Quercus gambelii*		
cacti	(*Opuntia spp.*)		

*found mainly on moist sites

3.6 Fuel Models

All surface fuels categories in Douglas County are listed on the adjacent chart from the CO-WRAP. The largest surface fuel is the GS 2, moderate load, dry climate grass shrub which covers 34% of the land in surface Douglas County. Surface fuels, or fire behavior fuel models, as they are technically referred to, contain the parameters required by the Rothermel (1972) surface fire spread model to compute surface fire behavior characteristics, including rate of spread, flame length, fireline intensity and other fire behavior metrics. As the name might suggest, surface fuels account only for surface fire potential. Canopy fire potential is computed through a separate but linked process. The Colorado CO-WRAP accounts for both surface and canopy fire potential in the fire behavior outputs. However, only surface fuels are shown in this risk report. Surface fuels typically are categorized into one of four primary fuel types based on the primary carrier of the surface fire: 1) grass, 2) shrub/brush, 3) timber litter, and 4) slash. Structures can also be a fuel for wildfire (refer to Section 2.2.2).

The CO-WRAP Colorado Surface Fuels were derived by enhancing the baseline LANDFIRE 2014 products with modifications to reflect local conditions and knowledge. A team of fuels and fire behavior experts led by the CSFS conducted a detailed calibration of the LANDFIRE 2014 fuels dataset. This calibration involved correcting LANDFIRE mapping zone seamlines errors; adding recent disturbances from 2013 to 2017 for fires, insect and disease, and treatments; correcting fuels for high elevations; adjusting fuels for oak-shrublands and pinyon-juniper areas; and modifying SH 7 fuel designations. This calibration effort resulted in an accurate and up-to-date surface fuels dataset that is the basis for the fire behavior and risk calculations in the 2017 Colorado Wildfire Risk Assessment Update. A detailed description of the fuels calibration methods and results is provided in the *2017 Fuels Calibration Final Report (July 2018).*

Surface Fuels	Description	Acres	Percent
NB 91	Urban/Developed	45,747	8.5 %
NB 92	Snow/Ice	0	0 %
NB 93	Agriculture	1,354	0.3 %
NB 98	Water	2,022	0.4 %
NB 99	Barren	870	0.2 %
GR 1	Short, sparse, dry climate grass	13,041	2.4 %
GR 2	Low load, dry climate grass	105,360	19.5 %
GR 3	Low load, very coarse, humid climate grass	17	0.0 %
GR 4	Moderate load, dry climate grass	233	0.0 %
GR 1	GT 10,000 ft elevation	0	0 %
GR 2	GT 10,000 ft elevation	0	0 %
GS 1	Low load, dry climate grass-shrub	7,046	1.3 %
GS 2	Moderate load, dry climate grass-shrub	182,646	33.9 %
GS 1	GT 10,000 ft elevation	0	0 %
SH 1	Low load, dry climate shrub	491	0.1 %
SH 2	Moderate load, dry climate shrub	1,870	0.3 %
SH 3	Moderate load, humid climate shrub	0	0 %
SH 5	High load, humid climate shrub	463	0.1 %
SH 7	Very high load, dry climate shrub	4	0.0 %
SH 7	Oak Shrubland without changes	10,556	2.0 %
TU 1	Light load, dry climate timber-grass-shrub	41,065	7.6 %
TU 2	Moderate load, humid climate timber-shrub	0	0 %
TU 5	Very high load, dry climate timber-shrub	70,119	13.0 %
TL 1	Low load, compact conifer litter	984	0.2 %
TL 2	Low load, broadleaf litter	3,996	0.7 %
TL 3	Moderate load, conifer litter	12,827	2.4 %
TL 4	Small downed logs	0	0 %
TL 5	High load, conifer litter	18	0.0 %
TL 6	Moderate load, broadleaf litter	141	0.0 %
TL 7	Large downed logs	0	0 %
TL 8	Long-needle litter	38,375	7.1 %
TL 9	Very high load, broadleaf litter	0	0 %
Total		539,244	100 %

Douglas County Surface Fuels

Estimates of surface fuels are combined with fuel behavior maps to create fuel models (FMs) that are useful for quantifying current stand conditions. The data generated by the FMs are used for rating fire danger and predicting fire behavior (Anderson 1982). There are two main classification systems used in wildland fire management. The most recent system is presented in the USFS General Technical Report RMRS-GTR-153, *Standard Fire Behavior Fuel Models: A Comprehensive Set for Use with Rothermel's Surface Fire Spread Model* (**Scott and Burgan 2005**). The other classification system is published in USFS General Technical Report INT-GTR-122, *Aids to Determining Fuel Models for Estimating Fire Behavior* (**Anderson 1982**). The latter system remains in use because it is somewhat easier to apply and comprehend, making it an effective tool for non-technical applications. A crosswalk table (Scott and Burgan 2005) was applied to the Douglas County CO-WRAP report results so the categories on the FM map can be interpreted based on the Anderson (1982) models. In the sections that follow, the Anderson (1982) model is followed by the Scott and Burgan (2005) model with a brief description of each FM and the total Douglas County acres that fall into each category.

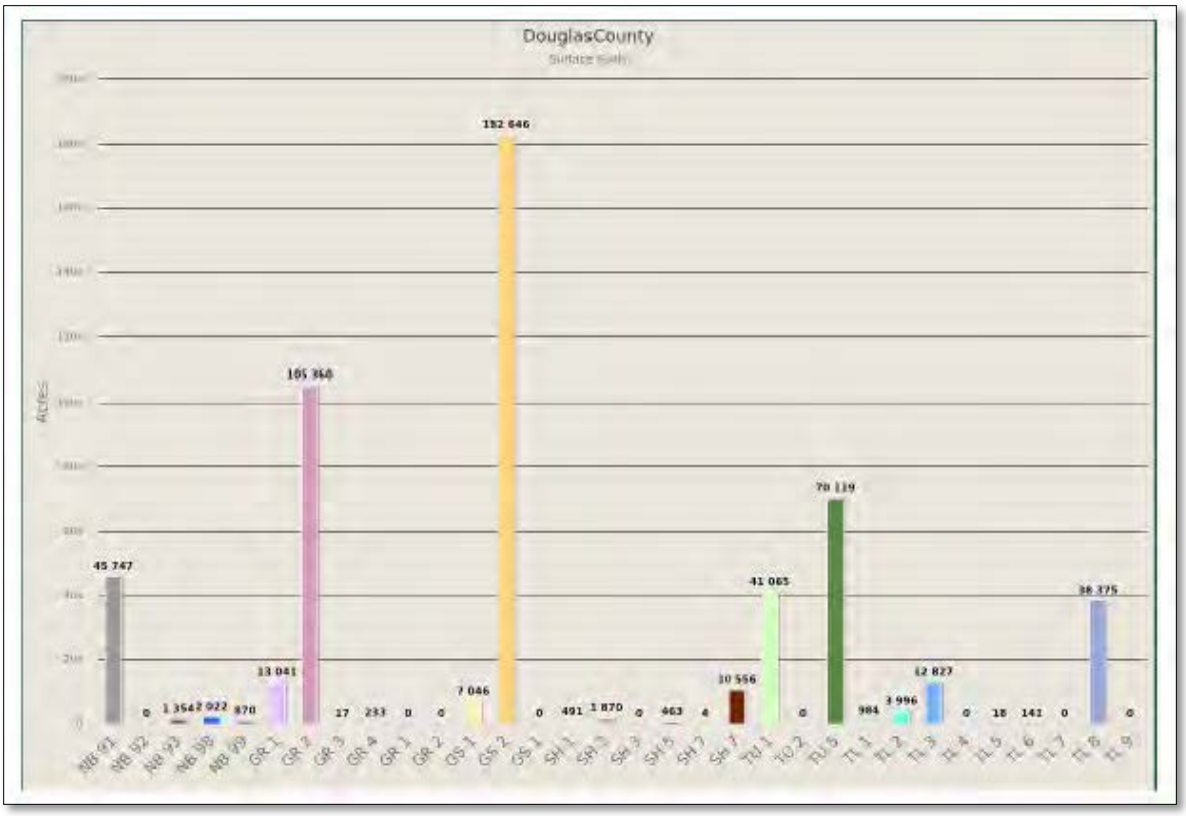
Wildfire FM's are simply a tool for predicting wildfire behavior in different vegetative conditions. Wildland hazardous fuels have been classified into four basic groups: grasses, brush, timber, and slash. The differences in fire behavior among these groups are basically related to the fuel load on the ground environment. Fuel load and depth are significant fuel properties for predicting whether a fire will be ignited, its rate of spread, and its wildfire intensity. Flame lengths in excess of four feet, which is the upper limit at which fires can be attacked with persons using hand tools and at which handline can be expected to hold a fire. Flame lengths greater than four feet increase the chance that equipment may have to be relied on for suppression efforts to be effective (**Andrews 1986**).

Unmanaged forest with dead and downed trees and branches

Slash on the ground indicates that forest management treatments have occurred in this area

The best representative FMs for describing fuel conditions in Douglas County are 1, 2, 8, 9, 10, and NB 91 and/or as described below:

- GR 2 (Low Load, Dry Climate Grass) FM 1
- GS 2 (Timber Grass-Understory; Dry Grass-Shrub), FM 2
- TU 1 (Low Load Dry Climate Timber-Grass-Shrub) FM 8
- TL 8 (Long-Needle Litter) FM 9
- TU 5 (Very High Load, Dry Climate Timber-Shrub) FM 10
- NB 91 (Urban) Urban or suburban development; insufficient wildland fuel to carry wildland fire.



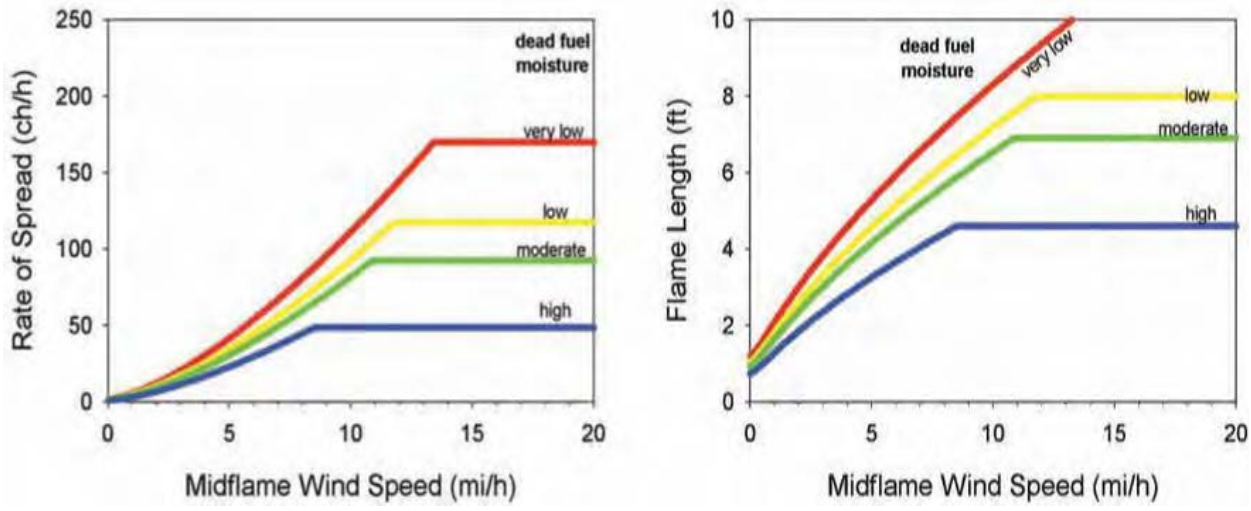
Douglas County Surface Fuel Models

3.6.1 Short-Moderate Grass, Fuel Model 1

GR 2, a dry climate grass-ground cover is the primary carrier of wildfire and is present across meadows. This FM covers about 105,360 acres or about 20% of the Douglas County area. In this model, fire spread is governed by the fine, herbaceous fuels that have cured or are nearly cured. Wildfires are surface fires that move rapidly through cured grass and associated material. Relatively little shrub or timber is present on less than one third of the areas. Annual and perennial grasses are included in this FM.

FM 1, Grass (GR 2)

With very dry moisture in the dead fuels and a mid-flame wind speed of 20 miles per hour (mph), the rate of spread is about 193 feet per minute (175 chains per hour or 11,550 feet per hour, or about 2 mph). Flame length is estimated to be 14 feet. Flame length is one of the factors used to determines the degree of difficulty in suppressing wildfire. The heat from fires with flame lengths of four feet or more can be lethal to firefighters.



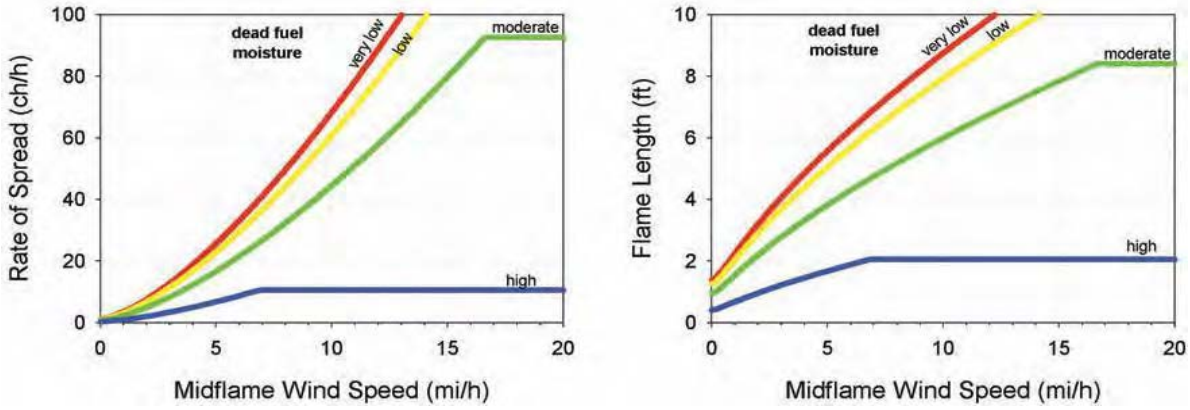
Reproduced from USDA Forest Service Gen. Tech. Rep. RMRS-GTR-153 (Scott and Burgan

3.6.2 Moderate Load, Dry Climate Grass-Shrub, Fuel Model 2

GS 2, timber grass -understory, dry grass-shurb stands, the primary carrier of fire in GS2 is grass and shrubs combined. Shrubs are 1 to 3 feet high; grass load is moderate. Spread rate is high; flame length moderate. Moisture of extinction is low. Fire spread is primarily through the fine herbaceous fuels, either curing or dead. These are surface fires where the herbaceous material, in addition to litter and dead-down stemwood from the open shrub or timber overstory, contribute to the fire intensity. This FM covers about 182,646 acres or about 34% of the Douglas County area. Open shrub lands and pine stands, or scrub oak stands generally fit this model; such stands may include clumps of fuels that generate higher intensities and that may produce firebrands.

Ponderosa Pine with Gambel Oak

With very dry moisture in the dead fuels and a mid-flame wind speed of 20 mph, the rate of spread is about 110 feet per minute (100 chains per hour or 6,600 feet per hour). The flame length is estimated to be 10 feet. The heat from fires with flame lengths of four feet or more can be lethal to firefighters.



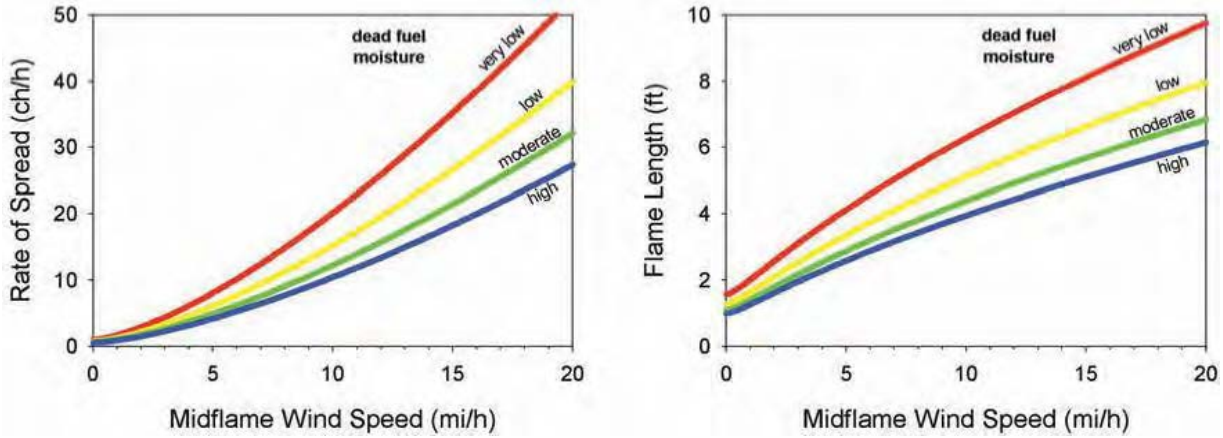
Reproduced from USDA Forest Service Gen. Tech. Rep. RMRS-GTR-153 (Scott and Burgan

3.6.3 Timber-Litter, Fuel Model 8

TU 1, light load, dry climate timber-grass-shrub; the primary carrier of wildfire is a low load of grass and/or shrub with litter. Spread rate is low, flame length low. This fuel model covers about 41,064 acres or 8% of the County area. The effect of live herbaceous moisture content on rate of fire spread and intensity is strong and depends on the relative amount of grass and shrubs in the FM. The primary carrier of fire is the fine herbaceous understory. Litter and dead twigs and branches from the conifer overstory contribute to fire intensity. Tree crown base heights are generally high and ladder fuels (live or dead vegetation in the understory that allows a fire to climb up from the forest floor into the tree canopy) are uncommon, so wildfire risk is low in this model. Fuel loads are usually less than 1.3 tons per acre and less than 12 inches deep.

Gambel Oak and Mixed Conifer

However, when dry fuels are scarce and wind speeds are low, a fire cannot build momentum and intensity, which makes it much easier to control and is more likely to be beneficial to the land.



Reproduced from USDA Forest Service Gen. Tech. Rep. RMRS-GTR-153 (Scott and Burgan

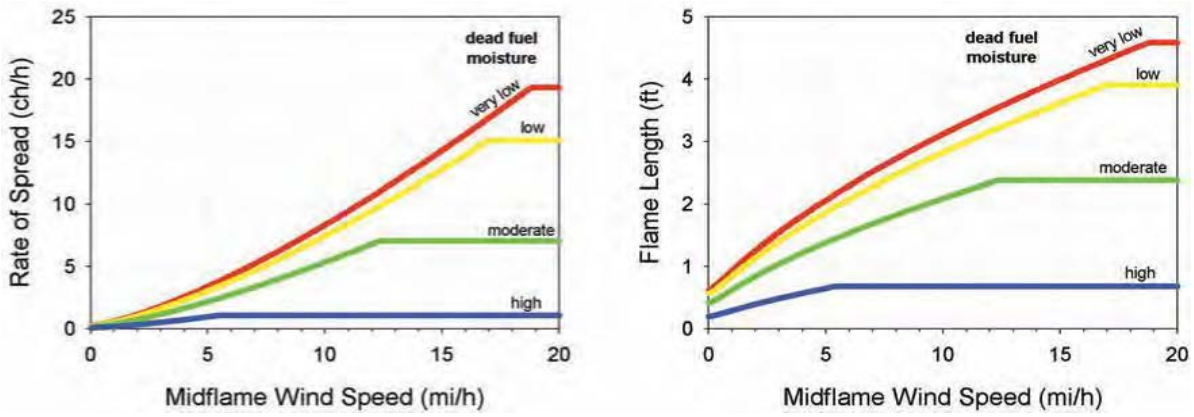
3.6.4 Timber-Litter, Fuel Model 9

TL 8, Long-Needle Litter, The primary carrier of fire in GS2 is grass and shrubs combined. Shrubs are 1 to 3 feet high; grass load is moderate. Spread rate is high; flame length moderate. Moisture of extinction is low. Fires run through the surface litter faster than model 8 and have longer flame height. Both long-needle conifer stands, and hardwood stands, especially the oak-hickory types, are typical. This FM covers about 38,375 acres or about 7 % of the Douglas County area. Fall fires in hardwoods are predictable, but high winds will actually cause higher rates of spread than predicted because of spotting caused by rolling and blowing leaves. Closed stands of long-needled pine such as ponderosa, are grouped in this model. Concentrations of dead-down woody material will contribute to possible torching out of trees, spotting, and crowning.

Grass/Shrub Complex

With very dry moisture in the dead fuels and a mid-flame wind speed of 20 mph, the rate of spread is about 55 feet per minute (50 chains per hour or 3,300 feet per hour). The flame length is estimated to be 10 feet. The heat from fires with flame lengths of four feet or more can be lethal to firefighters.

However, when dry fuels are scarce and wind speeds are low, a fire cannot build momentum and intensity, which makes it much easier to control and is more likely to be beneficial to the land



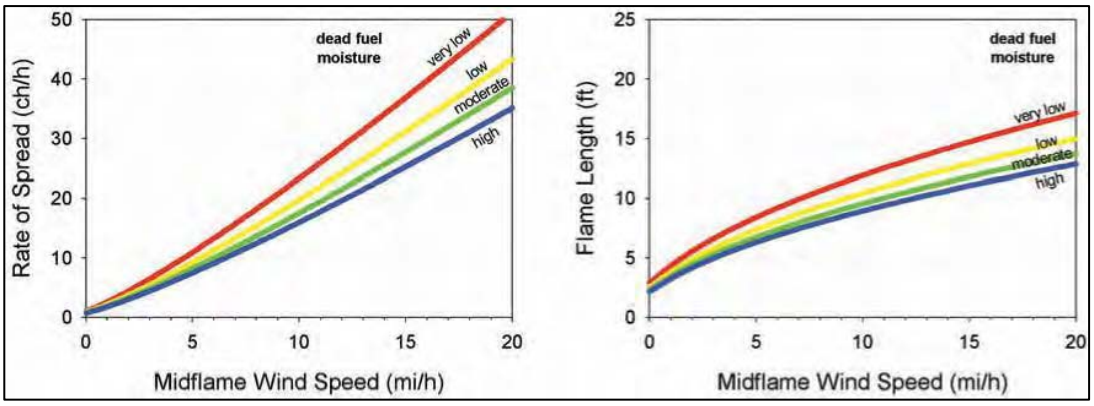
Reproduced from USDA Forest Service Gen. Tech. Rep. RMRS-GTR-153 (Scott and Burgan

3.6.5 Very High Load Dry Climate Timber-Shrub, Fuel Model 10

TU 5 is the primary carrier of fire in heavy forest litter with a shrub or small tree understory. Spread rate is moderate, flame length moderate. This fuel model covers about 70,119 acres or about 13% of the area in Douglas County. The effect of live herbaceous moisture content on rate of fire spread intensity is strong and depends on the relative amount of grass and shrubs in the FM. The primary carrier of fire is the fine herbaceous understory. Litter and dead twigs and branches from the conifer overstory contribute to fire intensity. Tree crown base heights are generally high and ladder fuels are uncommon, so wildfire risk is low in this model. Fuel loads (live and dead) are usually 12 tons per acre and generally 12 inches deep.

With very low dead fuel moisture and a mid-flame wind speed of 20 mph, the rate of spread is about 55 feet per minute (50 chains per hour or 3,300 feet per hour). The flame length is estimated to be over 15 feet. The heat from fires with flame lengths of four feet or more can be lethal to firefighters.

FM 10, Timber Grass-Shrub, near Perry Park, Sandstone Ranch Open Space



Reproduced from USDA Forest Service Gen. Tech. Rep. RMRS-GTR-153 (Scott and Burgan 2005)

Fires such as above in FM 10 are at the upper limit of control by direct attack. More wind or drier conditions could lead to an escaped fire.

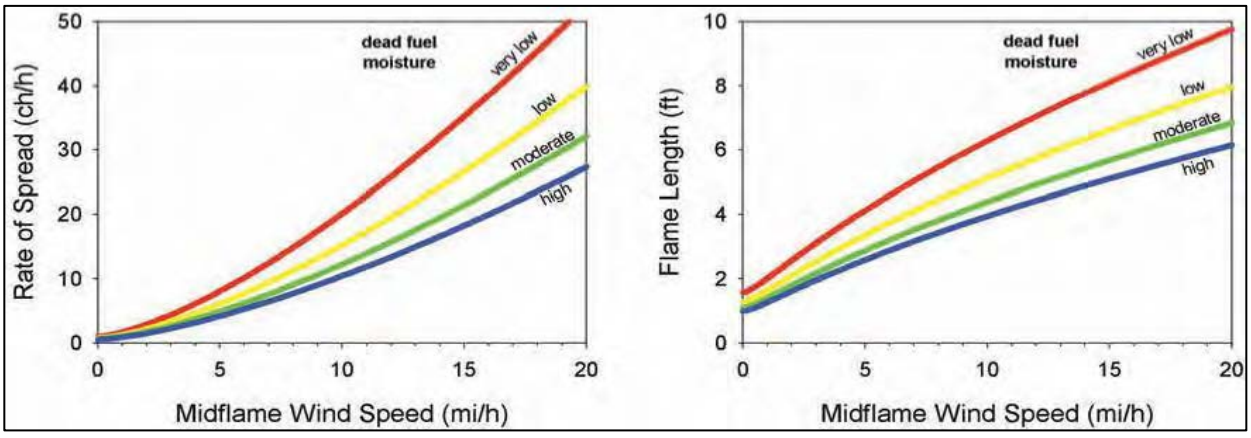
3.6.6 Long-Needled Conifer, Fuel Model 9

FM 9, Conifer Stand

TL 8, the primary carrier of fire in is moderate load, long-needle pine litter, may include small amount of herbaceous load. Spread rate is moderate to high; flame length low. This FM covers about 38,400 acres or about 7 % of the area. Fires generally carry through the surface litter and low brush with low flame lengths. Interlocking tree crowns and the presence of concentrations of fuels coupled with low fuel moisture, low humidity, high temperatures, and moderate to high winds can increase spread rates and intensities and move fire into the tree crowns. The primary carrier of wildfire is forest litter in combination herbaceous and scrub fuels. Spread rate with dead fuel moisture is high. Dead fuel load in this FM is about 3 tons per acre with an average depth of .2 feet. High-level winds greater than 10 mph may move a fire into the tree crowns.

With very dry moisture in the dead fuels and a mid-flame wind speed of 20 mph the rate of spread is 55 feet per minute (50 chains per hour or 3,300 feet per hour). The flame length is estimated to be 10 feet. The heat from fires with flame lengths of four feet or more can be lethal to firefighters.

When dry fuels are abundant and wind speeds increase, a fire can be uncontrollable and destructive.



Reproduced from USDA Forest Service Gen. Tech. Rep. RMRS-GTR-153 (Scott and Burgan 2005)

3.6.7 Non-Burnable Urban/Developed, Fuel Model NB 1

NB 1 urban/developed; urban or suburban development; insufficient wildland fuel to carry wildland fire. Fuel model NB 1 consists of land covered by urban and suburban development. To be called NB 1, the area under consideration must not support wildland fire spread. In some cases, areas mapped as NB 1 may experience structural fire losses during a wildland fire incident; however, structure ignition in those cases is either house-to-house or by firebrands, neither of which is directly modeled using fire behavior fuel models. If sufficient fuel vegetation surrounds structures such that wildland fire spread is possible, then choose a FM appropriate for the wildland vegetation rather than NB 1.

This FM is 47,747 acres or about 8.5% of the surface fuels in Douglas County

USDA Forest Service Gen. Tech. Rep. RMRS-GTR-153. 2005

Expected Fire Behavior: No Spread

3.7 Forest Health

Douglas County residents should be encouraged to monitor forest health on their property. The mountain pine beetle (*Dendroctonus ponderosae*) epidemic has gravely impacted much of Colorado's ponderosa and lodgepole pine, and ponderosa pine is a significant component of forest lands in the Douglas County. Other forest pathogens, such as dwarf mistletoe (Jacobi 2002), are observed at endemic levels in some areas of Douglas County.

Mountain Pine Beetle Pitch Tubes

Douglas-fir tussock moth (*Orgyia pseudotsugata*) defoliates Douglas-firs, true firs, and ponderosa pine. During field surveys, epidemic tussock moth kills on Douglas fir and some occasional ponderosa pine were observed. Douglas-fir trees were totally defoliated over several hundred acres of the northern properties. Some cocoons were still visible, however it was difficult to find any live mature Douglas-fir trees. Adult moths emerge from cocoons from late July through November. Outbreaks are cyclic in nature and occur at 7- to 10-year intervals.

In 2014 and 2015, southwestern Douglas County along with other portions of the Front Range experienced a tussock moth outbreak, resulting in mortality rates of Douglas-fir in mixed conifer stands of 80% to 100% in infected areas. The result has been a significant number of acres of standing dead trees on both federal and private lands. With assistance from the CSFS through funding and contract/project management, many acres of standing dead have been removed in the Valley Park neighborhood, in Sandstone Ranch Open Space, Haystack Ranch, and on Perry Park Metro District property. According the CSFS 2015 *Report on the Health of Colorado's Forests 15 Years of Change* , this was the largest single year infestation of tussock moth in the State's history.

Tussock Moth Attack on Ponderosa Pine

Tussock Moth Kill on Douglas-Fir

The last outbreak in Colorado occurred from 2004 to 2008 near Aspen Park and in the northern Rampart Range. Defoliation by Douglas-fir tussock moth over multiple years can cause mortality in impacted trees. In 2014, areas of severe defoliation by this moth were detected on the slopes of Cheyenne Mountain south of Colorado Springs and in the northern Rampart Range. There is currently extensive defoliation of Douglas-fir in the Platte River drainage.

Information regarding the identification, treatment, and prevention of these pest is provided in Appendix 9.6.

CHAPTER 4 WILDFIRE MITIGATION STRATEGIES

Wildfire mitigation can be defined as those actions taken to reduce the likelihood of loss due to wildfire. Effective wildfire mitigation can be accomplished through a variety of methods including reducing hazardous fuels; managing vegetation; creating defensible space around individual homes, structures, and neighborhoods; utilizing fire-resistant building materials; enhancing emergency preparedness; and developing programs that foster community awareness and action. Once implemented, these actions will significantly reduce the risk of loss due to wildfire for an individual home, and on a larger scale, for an entire community.

Mitigation recommendations for the Douglas County community were identified and developed through fuel hazard assessments that evaluated elements such as vegetation and hazardous fuels, predicted fire behavior, topography, and community infrastructure. The vegetation pattern forms a hazardous canopy creating an extreme wildfire hazard risk. In moderate to extreme fire weather conditions, a wildfire ignition has the potential to generate catastrophic losses in the community. Defensible space and strategic fuels treatment recommendations will address the wildfire fuel hazards associated with this area of concern.

In the spring of 2022 Douglas County hosted a questionnaire on the County website. Announcements were sent out County-wide through the Nextdoor App and other social media and citizen awareness avenues, attempting to capture the understanding and perceptions about wildfire resilience, fuel treatments and preparedness for a major wildfire event. A total of 601 people participated in the survey. Sixty-five percent of the respondents felt areas in their community are an extreme fire hazard. Only 25 percent of the respondents felt their community was prepared for a wildfire. The number one question and response was, "What is the biggest barrier to reducing fire hazards on your property"? Top answers were:

- "Don't know what to do"
- "Nowhere to take the branches"
- "Costs too much"

The second most important response was to the survey, "what are the important values that you want to protect in your community"? Top answers were:

- "Lives, Homes, Public Infrastructure"
- "Drinking water"
- "Water Quality"
- Natural Waterways"
- "Natural Scenic Environments"

Additional questions relate to: How great a risk do you think wildfire poses to your community? Most answered, "High Risk "followed by "Moderate Risk" followed by "Extreme Risk". Another area of concern is community access and egress. Despite mostly paved roads throughout the community, in an emergency evacuation scenario residents must know the main routes in and out of their neighborhoods. Only 39% of the respondents indicated they knew the evacuation routes for their community. Fifty seven percent of the respondents indicated they were not aware of any fire education programs in their community. See (**Appendix 11.4**) for complete summary of the questionnaire.

When we consider the wildfire triangle (conditions needed for wildfire are the presence of oxygen, fuel, and heat; see (**Chapter 3.1.1**), fuels are the only thing that can be modified. Most mitigation projects involve some level of vegetation management since wildland fuels are the common hazard to communities

in the WUI. This plan identifies and develops projects that address the wildfire hazards to protect lives and property in the Douglas County community.

All projects are designed to change vegetation conditions to modify fire behavior and reduce the potential for wildfire by altering three primary fuel conditions as necessary: surface fuels, ladder fuels, and overstory crown fuels. This is accomplished through the implementation of a variety of treatments, commonly using more than one treatment type on the same piece of ground to achieve the desired condition. The following discussion describes the most common treatment types that are currently used in similar fuel types such as the Douglas County Gambel oak stands, ponderosa pine, and mixed conifer. It is important to note that the vegetation conditions that pose a fuels hazard today are dynamic, with continued growth, needle cast, litter fall, and new growth of understory vegetation continually occurring. As such, future treatments will need to occur over time on the same area to sustain the benefits of the previous treatment.

Some fuels treatments have been completed, including some projects identified in the 2011 CWPP. Treatments completed to-date have been accomplished by individual landowners taking responsibility to create defensible space and residents working together to reduce hazardous fuels community-wide. Since 2010, the CSFS has led efforts to complete treatments on roughly 9,200 acres across land ownerships in Douglas County.

Strategies for mitigating risk are applied to three scales: County, community, and individual properties. Strategies include methods for fuels reduction, suggestions for interagency cooperation and community engagement, as well as steps that residents can take to ready themselves, their homes, and family for the next wildfire event. Since the 1960s, researchers and fire fighters have analyzed the causes of structure loss in wildland fires. Their work has clearly indicated that, to effectively reduce home loss, residents must treat both the vegetation surrounding their home and structures and the structure itself.

4.1 Defensible Space

Homes constructed in the natural vegetation of Colorado's landscape such as within Douglas County are inherently at risk from a wildfire. Wildfires are a natural part of Colorado's varied forest ecosystems, hence living in the WUI requires Firewise planning to reduce hazards. Defensible space is the natural and landscaped area around a home or other structure that has been modified to reduce fire hazard; defensible space gives your home a fighting chance against an approaching fire. The CSFS (2021) publication, *The Home Ignition Zone; A guide to preparing your home for wildfire and creating defensible space*, serves as a useful guide for homeowners to better understand the defensible space options for their homes and community.

Excellent defensible space around a rural homesite in Douglas County

Defensible space is the area around a home or other structure that has been modified to reduce fire hazard by creating a disconnected fuel load both vertically and horizontally. When done properly, defensible space eliminates many of the causes of structural ignition. Essentially, it is the trimming and/or removal of

potential sources of fuel for fire near the structure, including flammable landscaping, firewood, propane tanks, trees or overhanging limbs, wooden fences, trellises, or other easily ignitable structures or objects. Bare ground is not the objective of defensible space, rather a landscape carefully addressed to turn or remove "ladder fuels" that carry fire from one shrub or tree to the next, and trees or shrubs that present direct risks due to their proximity to structures.

Creating and maintaining a defensible space of at least 100 to 125 feet from a structure is critical for three reasons: to save lives of both residents and firefighters, to keep fires that started in structures from escaping into the wildland, and to prevent a home loss in a wildfire. Reducing vegetation helps protect structures by ensuring that the intense radiant heat from vegetative fuels is far enough away from the sides of a building that the heat does not ignite the structure. Defensible space also ensures that flammable brush does not act like kindling for a structure in direct transmission of flames. For these reasons Douglas County codes require that homeowner in wildland areas create 100 feet of defensible space for new construction, see (**Appendix 11.2**).

The ability of firefighters to protect values at risk depends on many factors. Firefighters arriving on-scene will perform a quick triage to determine whether the structure is defensible. They look for access and ingress/ egress issues, whether the structure has characteristics of vulnerability, hazardous material issues, adequate defensible space, and whether the defensible space provides them a safe place to work and avoids entrapment. Defensible space treatment includes both wildland vegetation as well as ornamental vegetation used in landscaping.

4.1.1 Home Ignition Zone

Two factors have emerged as the primary determinants of a home's ability to survive a wildfire: the quality of the defensible space and a structure's ignitability. Together, these two factors create a concept called the Home Ignition Zone (HIZ), which includes the structure and the space immediately surrounding the structure. The condition of the HIZ principally determines the potential for structure ignitions during a wildfire. Infrastructure burns because of its interrelationships with everything in its surrounding HIZ. To protect a home from wildfire, the primary goal is to reduce or eliminate fuels and ignition sources within the HIZ, CSFS HIZ Guide, (**CSFS 2021, Appendix 10.2**).

The two primary determinants of a home's ability to survive a wildfire are the structure's ignitability and the quality of the surrounding defensible space. Together, these two factors create a concept called the home ignition zone, which includes the structure and the area around it.

To reduce wildfire hazards to your home and property, the most effective actions to take are to minimize the ability of the home to ignite during a wildfire and to reduce or eliminate nearby fuel.

To avoid a structure ignition, the property owner must eliminate a wildfire's potential to ignite anything on or near the structure. This plan recognizes three zones surrounding the structure that make up the HIZ and should be addressed by residents in order to reduce the overall vulnerability of their home. Effective

defensible space consists of a fuel-free zone adjacent to the home, a treated secondary zone that is thinned and cleaned of surface fuels, and if the parcel is large enough, a transitional third zone that is basically a managed wildland area. These components all work together in a proven and predictable manner.

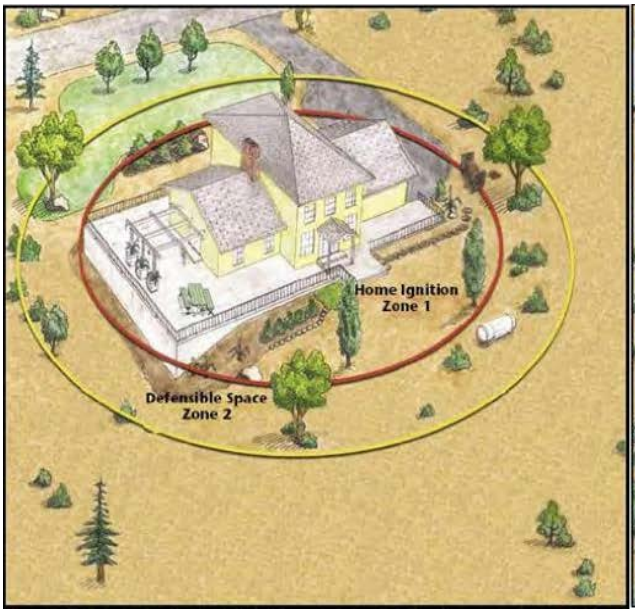
- **ZONE 1** is the area where the greatest vegetation modification will occur. CSFS identifies this zone as 0- to 5-feet from the home or structure. This zone requires the most vigilant work in order to reduce or eliminate ember ignition and direct flame contact with the home or structure. Within this zone, plant nothing within three to five feet of the structure. Increasing the width of Zone 1 will increase the structure's survivability.
- **ZONE 2** is an area of fuel reduction and is the transitional area between Zones 1 and 3. The goal of Zone 2 is to give an approaching fire less fuel, which will help reduce its intensity as it gets near to the home or any structure. This zone, 5 to 30 feet from the home, is an area transitioning away from the home where fuels must be reduced. This requires thinning and removing vegetation. Trees and large shrubs should be thinned so that there are at least 10 feet between the crowns (crown separation is measured from the outermost branch of one tree to the nearest branch of the next tree). On steep slopes, allow more space between tree crowns. Remove all ladder fuels from under the remaining trees. Carefully prune trees to a height of 10 feet. On smaller trees leave at least 2/3 of the crown with green needles (CSFS 2021).

  Locate propane tanks at least 30 feet from any structures preferably on the same elevation as the house; flammable vegetation should be cleared within 10 feet of these tanks. Under no circumstances should propane tanks be screened with shrubs or vegetation. Dispose of limbs, branches, and other woody debris removed from trees and shrubs through hauling material to an appropriate disposal site, or chipping.
- **ZONE 3** is the area from the edge of Zone 2 out an additional 70 feet, depending on the slope. The goal is to enact mitigation that keeps wildfire on the ground, but also provides a space to improve forest health. Efforts in this zone are focused on ways to keep fire on the ground and to get fire that may be active in tree crowns (crown fire) to move to the ground (surface fire) where it will be less intense. Tree crown spacing of 6 to 10 feet is suggested (CSFS 2021).

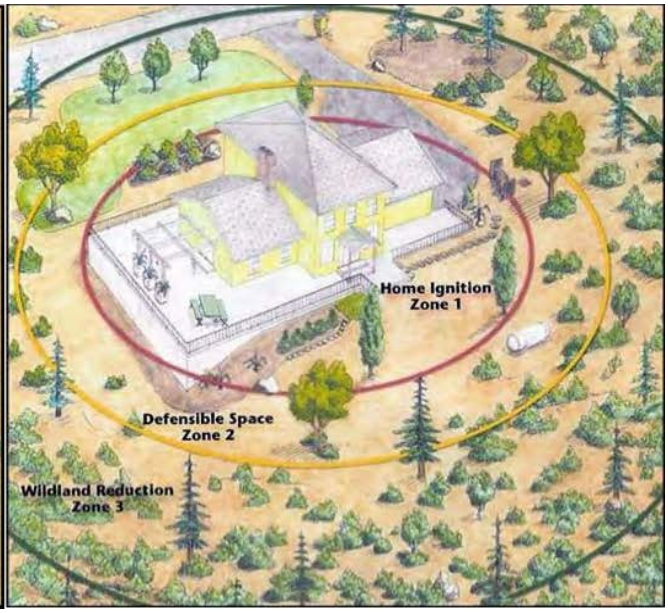
Defensible space provides another important advantage during a fire: increased firefighter safety. Firefighters are trained to protect structures only when the situation is relatively safe for them to do so. They use a process called "structural triage" to determine if it is safe to defend a home from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

If firefighters are unable to directly protect your home during a wildfire, having an effective defensible space will still increase your home's chance of survival. It is important to remember that with wildfire, there are no guarantees. Creating a proper defensible space does not mean that your home is guaranteed to survive a wildfire, but it does significantly improve the odds (CSFS 2012).

The illustrations below show how to effectively implement defensible space inside the home ignition zone with wildfire resistant plants (Appendix10.2) in two types of wildland settings. The first image is of a home site in a grassland setting. The second image is home site located in a forested landscape.



Grassland Landscape



Forested Landscape

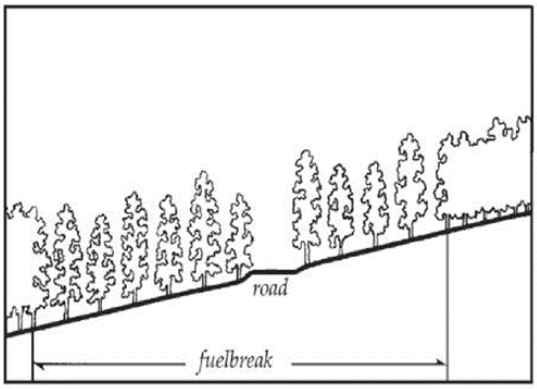
4.1.2 Access

Forested access on CO-67

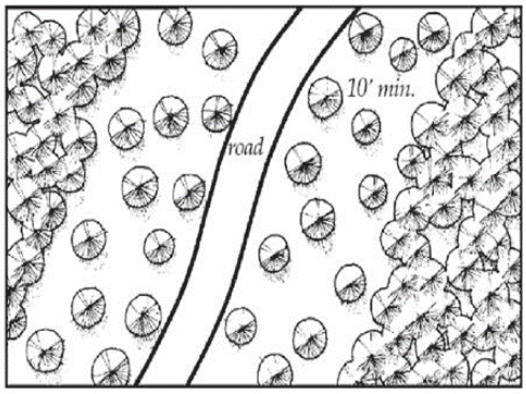
Access is an important component of any community's wildfire hazard and risk profile. Availability of ingress/egress, characteristics of road surface, road layout and design, treatment of dead ends, grade, characteristics of switchbacks, and width all factor into access assessment and emergency scenario and evacuation planning. Road conditions within the County were found to be adequate with paved access generally throughout. Conversely, emergency access onto secondary roads and cul-de-sacs were found to sometimes be restricted with single lanes and limited dead end turn arounds that would hamper emergency access and two-way traffic flow in the event of an evacuation.

4.1.3 Shaded Fuelbreaks

Reducing the forest canopy along access roads enhances the effectiveness of the physical break the road provides, improving firefighter access and resident egress in the case of fire evacuation. This creates a safer emergency ingress/egress scenario while greatly aiding potential tactical suppression efforts. Consult *Fuelbreak Guidelines for Forested Subdivisions &Communities* (Dennis 2005) for further guidance on creating shaded fuelbreaks in subdivisions (**Appendix 11.2**).



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



Plan view of fuelbreak showing minimum distance between tree crowns.

Priority should be given to the forested road margins of primary County roads. Roads should be identified as evacuation routes at intersections and where traffic flow for residents is restricted. Shaded fuelbreak treatment has been identified along the entire Douglas County Road system through the local fire district. Forest treatment reducing fuels along existing roads will create shaded fuelbreaks. Shaded fuelbreak treatments should be modified as seen on the chart where percent of slope extends treatment boundaries according to recommendations.

Fuelbreak Width/Slope

Percent Slope (%)	*Minimum Uphill Distance (ft.)*	*Minimum Downhill Distance (ft.)*	*Total Width of Modified fuels (ft.) **
0	*150*	*150*	*300*
10	*140*	*165*	*303*
20	*130*	*180*	*310*
30	*120*	*195*	*315*
40	*110*	*210*	*320*
50	*100*	*225*	*325*
60	*100*	*243*	*340*

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

Before and After Fuelbreak Treatment

4.1.4 Strategic Community Fuelbreaks

Thinning recommendations may also target stands posing specific wildfire threat to neighborhoods, typically where a steep forested gully or slope runs up into a subdivision. Strategic community fuelbreaks may be designed with shaded fuelbreaks characteristics or as a fuel buffer for more aggressive fuel reduction. Strategic fuelbreaks along neighborhood margins should mutually support adjacent defensible space efforts.

To date, stand treatment in Douglas County has focused primarily on timber units within community-owned private land parcels (e.g., subdivisions), County-owned forested properties, and Pike National Forest. While this strategy has provided streamlined access to critical hazardous timber units, the majority of additional recommended treatments involve private lands. Such treatments may be of critical strategic importance, but will involve more complex hurdles including negotiations with private landowners, public support, presiding agency support, funding, capacity, as well as environmental impact concerns. Coordination with these entities may be necessary to implement strategic community fuelbreaks.

4.2 Fuels Reduction

In addition to defensible space treatments and shaded fuelbreak development, other hazardous fuel treatment projects should be considered to reduce overall wildfire threat to communities, infrastructure, rangelands, watersheds, and other assets. Such projects must comply with all applicable local, state, and federal laws and may occur on private or public land under state or federal jurisdiction. Hazardous fuel treatments may include treatments such as the following:

- **Area treatments**, intended to modify fire behavior by treating hazardous fuels over large areas in strategic locations or historic fire corridors; typically conducted in large expanses of federal, adjacent private lands, large private land holdings often under conservation easement (e.g., strategically placed landscape area treatments).
- **Prescribed burning**, intended to reduce hazardous fuel loads in key locations and reduce overall wildfire intensity and negative smoke impacts while considering vegetation type characteristics and disturbance regimes. Only in areas that have been mechanically treated prior, to restore ecosystem process and function and increase resiliency on the landscape across fuel types in Douglas County.

The fuel treatments proposed in this plan moderate fire behavior, improve access for firefighters, improve evacuation corridors for the public, provide a safer working environment for fire fighters, and protect Douglas County's natural resources. The new reality of extended drought and unprecedented fire behavior makes it critical to encourage and educate residents to become increasingly "fire safe," that is, to do everything they can to save their homes far in advance of wildfire. There are thousands more homes in Douglas County than fire trucks to protect them. In the event of a catastrophic fire, the steps that County residents take to "wildfire safe" their properties – thinning and maintaining vegetation, decreasing ignition potential from windblown embers, supporting active management forested landscapes – have far greater potential to save homes and lives than relying solely on the efforts of firefighters. This has always been true, but never more so as we face a continue increasing potential of catastrophic wildfire here in the Front Range.

Treatment options for wildfire mitigation include thinning, mastication, chipping, and prescribed burns. Mechanical and hand thinning are used to remove ladder fuels and reduce tree densities that contribute to extreme fire behavior. Initial treatment entries generally reduce the density of smaller trees that typically create ladder fuels and can wick fire into the overstory. Overall tree densities are also decreased to reduce the likelihood of crown fire, and to increase overall forest resilience to natural disturbances such as fire or insect infestation.

Depending on the fuel's reduction treatment prescribed and equipment used, very large volumes of limbs and small diameter trees can be generated on site as slash, particularly from an initial entry. It has long been recognized that leaving excessive slash on site substantially increases surface fuels and resultant fire intensity. Therefore, slash must be reduced or reconfigured by mechanical removal, chipping on site, or burning. Slash that can be removed by mechanical means can be transported to a biomass facility where electrical energy, heat, or landscaping material can be produced. Thus, mechanical removal of biomass will also reduce the amount of pile burning and resulting smoke. However, mechanical systems can only be used on slopes with less than a 30 percent grade, and where there is access to a landing or processing site where the biomass and timber can be processed, sorted, and hauled. For some areas of the County, hand thinning and pile burning will need to be employed because of steep slopes and challenging access. Proper thinning produces excellent regeneration for a new future forest.

4.2.1 Hand Thinning

To thin a forest, you remove the smaller, weaker trees to allow the trees you want to keep flourishing. Resources managers say, "you take the worst and leave the best."

Hand thinning immature ponderosa pine
(Courtesy National Park Service)

Hand thinning is conducted with crews of approximately 10 to 30 individuals who cut trees with chainsaws. Hand thinning is generally used to cut smaller trees (less than 10 to 14 inches diameter) on steep slopes where machines cannot operate, or in environmentally sensitive areas where the wrong machine could have a significant environmental impact. Hand thinning is not as effective as

mechanical thinning at restoring tree densities to pre-European colonization conditions because many of the suppressed trees in a stand can be greater than 14 inches in diameter. However, hand thinning is very effective at removing sufficient fuel to modify fire behavior.

Production rates with hand crews vary with fuel type and density. However, in general, a 10-person crew can treat 0.5 to 2 acres daily, depending on the type and amount of material that is removed. Unlike mechanical thinning, hand thinning only describes how the vegetation will be cut and does not address how the material is disposed. Hand thinning may be the appropriate method for vegetation cutting, but some other mechanical means may be necessary for removal of the cut material from the site. One or more of the following disposal treatments must be applied in combination with hand thinning to remove the fuels from the forest.

4.2.2 Mechanical Thinning

Mechanical thinning utilizes equipment with hydraulically driven saws to cut and remove trees (generally under 24 inches in diameter). Mechanical thinning equipment is most effective on slopes less than 30 percent.

Mechanical Thinning
(Courtesy John Deere)

The two major mechanical thinning systems used include cut-to-length systems which carry the logs to the processing site, and whole tree removal systems that typically skid or drag the logs to the processing site. Cut-to-length systems use a harvester to cut trees and to remove the branches before automatically cutting trees into predetermined log lengths. This is known as processing at the stump. The branches from the trees can be distributed across the forest floor or laid to form a path that is used for travel by the cut-to-length equipment depending on soil sensitivity. In either case, the slash must be processed into chip or removed from the site in order to effect real fuels reduction. In cut-to-length systems, the slash is typically masticated on site. The masticator can both treat the slash from the tree falling operations and can also treat dead and down fuels and brush, or other finer fuels on the site. In some cases, where it is preferable to completely remove all of the cut material, whole tree chippers can be used to chip it on site.

4.2.3 Mastication

Machine mastication with skid steer

Mastication uses excavators with purpose-built grinding heads to grind small trees (up to 10 inches DBH), surface fuels, and dead and down wood into chips. Mastication provides a quick and cost-effective method to modify the fuel structure and reduce flame length, and therefore potential fire intensity. Mastication is a very useful tool in brush fields and for thinning small trees and roadside maintenance. Cutting, processing and disposal of material occur in a single action. Chips are left on the ground where decomposition will take place. Like other mechanical methods, rocky sites, sites with heavy downed logs, and sites dominated by large trees are difficult places to operate mastication equipment. Additionally, sparks from mastication heads have the potential to start fires and, when working on public land, these machines are subject to the same activity-level restrictions that apply to most other heavy equipment.

4.2.4 Chipping


Community sponsored chipper

Chipping may be used as an alternative to pile burning for removing cut vegetation. However, its usefulness is greatly reduced because of the necessity to carry material to the chipper. The Douglas County Slash/Mulch Program has been extremely successful in facilitating the disposal of slash and thinning material. The program accepts material up to eight inches in diameter, producing mulch through a tub grinder. Residents are required to unload their own slash at designated drop-off locations.

4.2.5 Prescribed Fire

There are two types of prescribed burning: pile burning and broadcast/understory burning. Pile burning is used where hand thinning is employed for the initial treatment where large volumes of cut debris must be disposed of. Broadcast/under-story burning is intended to thin trees while also consuming surface fuels.

Pile burning is another disposal method for landowners in Douglas County since it provides homeowners an efficient means of disposing thinning and slash debris. During hand thinning projects, crews cut small trees, brush, and surface fuels and stack them into piles that are typically four to eight feet in diameter and height. Piles are allowed to cure, generally at least one year, and then burned when conditions are favorable such as under snow cover or after recent precipitation events. County ordinances are very specific regarding burning conditions. Check with the local fire district before lighting any slash piles or conducting other prescribed fire activities.

Permitted pile burning

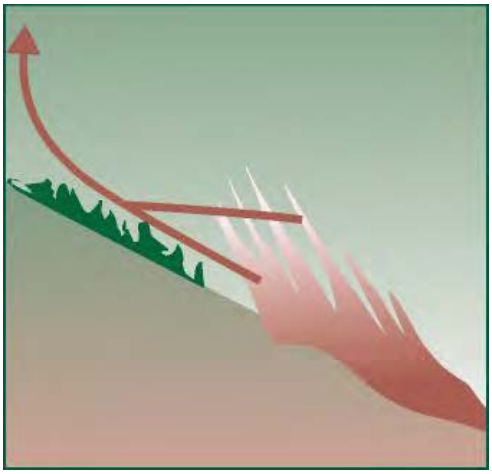
4.3 Ignitability

In the WUI where natural fuels and structural fuels are intermixed, fire behavior is complex and difficult to predict. Based on modeling, observations, and case studies in the WUI, data indicate that the potential for structure ignitions during wildfires, including high intensity fires, depends largely on the structure's characteristics, building material, and its immediate surroundings.

Structures in or near a wildfire event can ignite for a number of reasons, including direct exposure to flame, radiant heat, and impact from falling trees that are burning. But the most significant cause of structural ignition, both direct and indirect effect, is burning embers. In the high winds accompanying and often precipitated by wildfires, embers can be flung up to two miles in advance of the flame front. These embers can ignite grass, brush, landscaping, and firewood piles, and can accumulate on wooden decks or under eaves. When embers land near or on a structure, they can ignite nearby vegetation or accumulated debris on the roof or gutter. Embers can also enter the structure through openings such as an open window or vent and could ignite the interior of the structure or debris in the attic. Wildfire can further ignite structures through direct flame contact and/or radiant heat. For this reason, it is important that structures and property are less prone to ignition by ember dispersion, direct flame contact and radiant heat. (**Cohen 1995, 2000, 2004; Cohen and Butler 1998**).

Douglas County's approach to mitigating structure ignitability is based on the foundation that defensive actions by homeowners can significantly affect fire behavior and reduce structure loss, and that effective fire prevention practices are essential in increasing structure survivability.

Douglas County building codes require FireWise construction for all new buildings and additions to structures in high hazard severity zones. These building standards are required by state law and part of the Colorado building and fire code to which jurisdictions must follow.



Convective and Radiant Energy

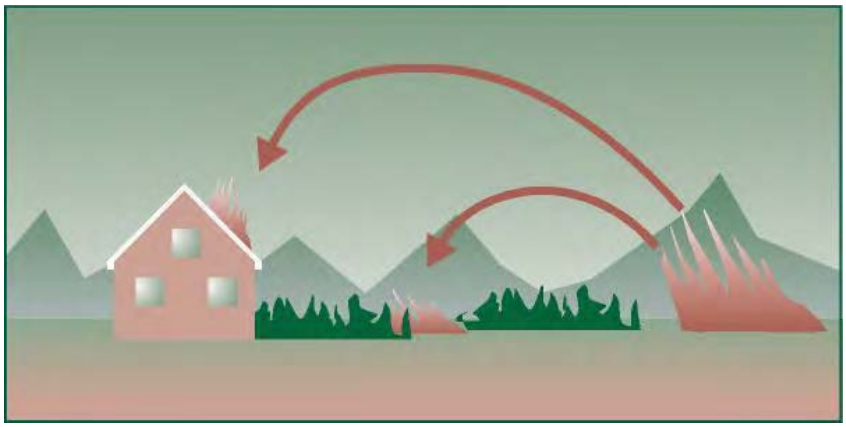
Wildland fire prevention and Firewise programs in the Douglas County community are intended to reduce the chances of home ignition by reducing wildland fuels and reducing opportunities for structure ignition, and by increasing the resilience of the structure. Firebrands from wildfire become a major source for home ignitions. Wildfires can also ignite structures through radiation, convection, or conduction. Wood is very resistant to ignition from radiation. This means that the heat radiated from a fire is unlikely to ignite a home. Convection occurs when heat is carried by air currents. In wildland fire, this is known as pre-heating. Pre-heating can make the home and landscape far more vulnerable to fire, but rarely, by itself, ignites a home. Conduction is the primary ignition source for homes, generally through direct flame impingement, or by the accumulation of burning embers that then ignite a receptive fuel bed around the home and inside the home ignition zone (HIZ).

The risk of a structure's ignition is a direct result of exposure by wildfire from radiation, convection, and/or burning embers and the vulnerability or ignitability of the structure. Structures ignite in three ways:

- **Convection**. The transfer of energy within fluids such as air. Convective heat rises vertically, visually observed as flames and smoke columns. Flames can overwhelm a structure by direct flame encroachment, which is the result of no defensible space.
- **Radiation**. Works in much the same way as a radiator heating a room in winter; flammable objects within 100 feet get so hot that they provide sufficient heat for a structure to ignite. The potential for ignition is generally reduced as space between the structure and fuels is increased. Wildfire can further ignite structures through direct flame contact and/or radiant heat. For this reason, it is important that structures and property are less prone to ignition by ember dispersion, direct flame contact and radiant heat. (**Cohen 1995, 2000, 2004; Cohen and Butler 1998**).
- **Burning Embers**. Burning material such as wood shingles, tree bark, leaves, etc. that detach from the main fire front during strong convection drafts and/or winds in the burning zone. Hundreds to thousands of burning embers can be carried long distances by winds associated with the wildfire and landing on receptive fuels.

Recognizing the methods of home ignition leads to a strategy to protect against structure fire. The approach is three-pronged, and includes building with ignition resistant construction materials, creating defensible space, and reducing fuels within the WUI. All plans for new construction and substantial remodels should be required by Douglas County Fuels Management Specialist and/or Fire Marshal's office to incorporate as much ignition resistance design and materials as possible.

Vulnerable construction elements on the exterior structure are the roofing, siding, venting, windows and decking or attached structures. Gutters can be particularly vulnerable as they can hold light, flashy fuels and can catch embers. Decks, walkways, and fencing that are combustible can act much like a fuse and wick fire to the structure. Building these attached structures with non-combustible or flame-resistant materials can greatly reduce the likelihood of ignition (**Appendix 11.2**).



Firebrands are a major source of home ignitions

4.3.1 Structures

The ability of structures and infrastructure to survive wildfire depends on construction materials, their condition, and the quality of the defensible space surrounding them. Burning embers will find the weak link in a structure and ignite; however, there are measures that can be taken to safeguard structures from wildfire. A structure's vulnerability to ignition can be mitigated. The exterior construction material, structure design, maintenance of the material, and defensible space will contribute to whether a structure will survive or not. Under some circumstances, reducing fire intensity, and therefore the structure ignition risk, may involve modifying the size of the home ignition zone to account for steepness of slope and typical fire weather wind events.

The HFRA stipulates that community wildfire protection plans such as this one, address the means of reducing structural ignitability, in a manner accessible to the public. Creating wildfire adapted homes and structures is one of the efforts to do so. Public education is an essential component to help Douglas County communities become wildfire resilient.

4.3.2 Construction Materials and Methods

How the home is constructed is also as important as the products used in construction. Common features where construction methods should be evaluated include the gables, gutters, eaves, and venting. These areas of the home can either resist fire intrusion or funnel heat and embers into the building envelope. An example is the gable end of a structure and the vents used. The eave overhanging the gable can trap heat and wick embers and heat into the attic. Inside corners are also particularly vulnerable to fire, as winds tend to swirl in the corner, effectively creating a vortex of fire that can reach beyond the roofline. Some resources that provide excellent information on protecting the HIZ and Firewise construction methods include: *static.colostate.edu/client-files/csfs/pdfs/firewise-construction2012.pdf* (CSFS 2012), Headwater:https://headwaterseconomics.org/wildfire/homes-risk/building-costs-codes/Economics 2018), and the Firewise USA® Research Fact Sheet Series on construction materials and method**,** refer to **(Appendix 11.2**). Additional information regarding defensible space and for implementing Firewise USA® and Fire Adapted Communities is available on the following links:

https://www.nfpa.org/Publi-Education/Fire-causes-and-risks/Wildfire/Firewise-USA/Firewise-USA-Resources/Research-Fact-Sheet-Series

https://csfs.colostate.edu/wildfire-mitigation/protect-your-home-property-from-wildfire/ and https://www.nfpa.org/Public-Education/Fire-causes-and-risks/Wildfire/Preparing-homes-for-wildfire

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The most vulnerable parts of a structure that can lead to loss or damage in a wildfire include:

- **Roofing**. Roofing has been the key factor in most structure fires. Roofing material and condition, construction details, and whether the roof is clear of burnable material (such as pine needles and other debris) all play a role.
- **Garages**. Garages are typically not well-sealed and gaps at the top and bottom edge of the doors can allow burning embers to enter, and often times garages contain flammable materials. Garages usually have vents at various locations, especially if they contain gas furnaces or hot water heaters. These vents are easy entry points for embers.
- **Siding**. Flammable siding can provide a pathway for flames to reach vulnerable portions of a structure such as the eaves or windows. Siding needs a source of ignition, which in many cases

includes vegetation in close proximity to a structure, wood decks and/or fences, and stacked firewood or other flammable materials.

- **Vents**. Soffit vents in the eaves are easy entry points for wind-driven embers during a wildfire. These fires often start in an attic, which is not easily detected from the outside. Structures have been lost when fire personnel have left the scene unaware that a fire is burning in the attic. Recommendations are to screen vents with 1/8" wire mesh to reduce ember penetration potential.
- **Windows**. Unprotected and inadequate windows can be another major entry point for fire. Windows can be broken by airborne materials or cracked by thermal expansion, thus igniting materials in the structure through radiation, convection, and/or burning embers.
- **Nooks and Crannies**. Small grooves, inside corners, and roof valleys all become areas where flammable debris (such as pine needles and bird's nests) collects over time, where burning embers can land, igniting the debris.
- **Crawlspace Vents**. These areas, not just under a structure, but under decks and other attachments, are difficult to protect if they are not adequately screened. Much like vents in the attic, burning embers can be carried to flammable material underneath a structure via such vents.
- **Wood Fences**. Firefighters have observed that wood fences, when ignited, function as a fuel source that carries fire closer to a structure. Many fences are either attached to a home or close enough to present a problem.
- **Wood Decks**. Decks function as a source of fuel that is attached or directly adjacent to structures. When ignited by wildfire, the radiant and convective heat output from wood decks can ignite structures. In addition, most decks are adjacent to large windows or glass sliders. The heat from a deck fire can cause the glass to fail, allowing the wildfire to enter a structure.
- **Flammable Landscape Vegetation and Debris**. Items such as shrubs, tall grasses, wood or other flammable debris piled in close proximity to the house can result in structures being exposed to significant radiant and convective heat and burning embers, making structures more susceptible to ignition.

4.3.3 Opportunities to Reduce Structure Ignitability

While Douglas County has been aggressive in its approach to reduce structure ignitability, there are opportunities to expand awareness, and actions that property owners can take to improve and enhance structure survivability.

Increase Education About Structural Ignitability And Defensible Space

This can be accomplished by reaching out to developers, contractors, and vendors of building materials to provide educational material for consumers during all phases of construction planning. These educational materials should be consistent and uniform in look and content and explain the rationale for using fire resistive construction materials for structure.

These materials should include but not be limited to:

- Easy to understand WUI maps to help homeowners identify if their project is in a WUI area
- Hyperlinks within this CWPP to appropriate fire and building authorities

- Pamphlets with photos, brief explanations, and links to websites and videos for additional information

Community Design

Ideally, all efforts to protect communities in high fire hazard areas, discussed in Chapter 2.6.2, should begin with appropriate community design and layout. In Douglas County today, with the existing stage of community development, it is not likely that many new communities will be built where contemporary design features can be employed. More likely, given the current trend toward the redevelopment of existing properties, it is possible to incorporate some elements of safe community design into the Douglas County community.

Encourage Individual Preparation for Each Structure within the Community

Design guidelines required by neighborhood associations can be stricter than applicable state defensible space laws. Require ignition resistant landscapes and building materials/methods.

Prevent Wildfire Intrusion into the Community

Design a reduced fuel zone around the community that will be maintained to prevent extreme fire behavior and to provide a safe zone for firefighters to engage an approaching wildfire.

Facilitate Evacuation

Design the community with at least two access roads and provide adequate space to turn large equipment. Some older platted subdivisions and older land splits in more mountainous areas have long, difficult egress routes.

Facilitate Emergency Response

Fire engines are typically greater than 30 feet in length and 10 feet in width. An engine must be able to enter the community, quickly turn, and prepare to retreat to a safe zone and then begin operations. Turnarounds provide engine crews with the ability to safely maneuver equipment and allow them to maintain access to escape routes.

Wildfire is everyone's responsibility. Every year thousands of wildfires burn millions of acres across the United States. It is not if, but when the next wildfire will threaten your community. The Fire Adapted Communities website offers information and specific actions you can take, no matter what your role, to reduce your risk from the next wildfire.

4.4 Outreach & Public Education

There is an ongoing need to continually inform landowners and community members regarding the risks posed by wildfire, and to educate them about strategies for living safely in the WUI, preventing fire, minimizing risk, protecting structures and resources, and participating in evacuation procedures. Both Douglas County and local fire departments provide educational information and programs to the Douglas County community. Additionally, the CSFS, Douglas County Wildfire Mitigation and the Douglas County Sheriff's Office OEM provide prevention, education, and land stewardship programs and information. These organizations are recognized for their effective leadership in community education, and for collaborating to achieve results within the Douglas County community.

The most effective means to initiate local action is through community education and public outreach. Community education may target a number of goals and objectives including:

- Identify wildfire hazards and risks
- Introduce the benefits of defensible space and Firewise construction materials
- Urge homeowners to act on their own property and influence neighbors, friends, and HOAs
- Increase awareness of current forest conditions and how direct management practices can help restore forest health and reduce wildfire risk
- Create awareness of the historical role fire has played in the regional ecosystem and forest and rangeland health.
- Create an education campaign on this to reduce potential for loss, reduce potential negative fire and post fire impacts

Some parcels within subdivisions may be undeveloped and/or owned by absentee owners. A lack of fuels management on these lots can impact the entire community. An effort should be made to contact these landowners and determine how to address their concerns and overcome potential obstacles to conducting hazard fuel mitigation on their land.

4.4.1 Fuels and Vegetation Management

- Partnering with HOAs and fire districts on residential chipper programs
- Evacuation routes fuels reduction projects
- Establish and maintain fuelbreaks
- Create modified fuel zones in transition areas between developed residential areas and open space areas
- Continue to manage open space to include hazardous fuels reduction as a management priority and maintenance of treated areas

4.4.2 Defensible Space and Public Information

- Annual public education course on defensible space in communities
- Partnering with HOAs to become Firewise Communities
- Provide signage to identify the property addresses
- Create and distribute a defensible space mailer, which provides a checklist of recommendations to be completed by the property owner by the start of fire season (include mailer in property tax bill)

4.4.3 Firewise Community

The Firewise USA® Program is managed by the National Fire Protection Agency (NFPA) and co-sponsored by the USFS and the National Association of State Foresters. CSFS provides a liaison role. The program encourages local solutions for safety by involving homeowners in taking individual responsibility for preparing their homes from the risk of wildfire. Firewise is a key component of Fire Adapted Communities, a collaborative approach that connects all those who play a role in wildfire education, planning, and action with comprehensive resources to help reduce risk. The Firewise USA program teaches people how to adapt to living with wildfire and encourages neighbors to take action to prevent losses. The Firewise USA® motto is, “Residents reducing risks.” Currently there are 18 communities participating in the Firewise USA program within Douglas County.

4.5 Evacuation

Safe and proper evacuation of people (residents, workers, and visitors), pets, and livestock is a very critical component of wildfires. Confusing road networks without good signage, narrow roads that do not allow two-way traffic, and dead-end roads have contributed to injuries and fatalities of public and responders during wildfires.

Evacuation is the responsibility of the Douglas County Sheriff. During an emergency, this jurisdictional authority will order all people to evacuate from defined areas because of a threatening fire. The evacuation order will identify evacuation routes and evacuation centers if any are established. The need for evacuation can occur with little notice during rapidly evolving fires, with the public receiving little lead time to execute the evacuation order.

To provide local citizens with as much lead time as possible in the event of an evacuation order, mass emergency notification programs for all residents in Douglas County have been established. This notification program, commonly referred to as "CodeRED" or Reverse 911, enables local governments to call residents in the case of an emergency in their community. Residents are strongly encouraged to register both their home and their cellular phone numbers with their specific Reverse 911 provider at the Register Now for CodeRED link. To facilitate an orderly evacuation, home disaster kits and preparedness plans are also recommended for all residents of Douglas County. By having established such kits and plans, much of the stress associated with a pending evacuation can be alleviated. Refer to "Have a plan and build a kit" at the Douglas County Sheriff's Office website. Information on preparedness planning is available in the following on the *Douglas County Disaster Preparedness Guide.*

Douglas County has adopted the "Ready-Set-Go" strategy to prepare residents for the possibility of an evacuation. Ready-Set-Go involves three steps; making homes resistant to wildfires, getting families ready to leave when an evacuation order is issued and finally, leaving a home, timely and safely, using safe travel routes to designated evacuation centers or other personal options outside the evacuation area. While law enforcement cannot force a resident from their private property, law enforcement can preclude a resident from entering a designated restricted evacuation area. Anyone on public lands may be compelled to leave in the event of an evacuation order. Also refer to the *Douglas County Disaster Preparedness Guide*.

4.5.1 Vulnerable Population

Vulnerable populations have special needs that are critical to address during disasters such as wildfire. These populations may be less likely to respond to, cope with, and recover from wildfire, and are less likely to get involved in wildfire mitigation activities. Age, physical, and mental limitations can restrict mobility making it more difficult to evacuate in a disaster. Language issues can result in communication barriers to evacuation or support services. Carless populations, schools, rest homes, or other non-ambulatory facilities may require significant assistance in evacuation; planning to accommodate these facilities is crucial.

Many special needs populations are easily upset and stressed by sudden and or frightening changes. Plans should ensure that a caregiver or trusted family member is able to stay with such persons at all times during an evacuation. It is imperative that caregivers for persons with special needs have preparedness plans for evacuation and proper care during a wildfire. Preparedness plans should include information on:

- Needs for medications, equipment, and special dietary needs
- Documentation about insurance and medical conditions should also accompany the person
- Pre-plan safe sites for these individuals for short and potential long-term stays

The need for caregivers and special vehicles moving into the area to help with evacuation may further complicate evacuation or emergency vehicle access and /or place additional people at risk without the proper education or training in what to do during a wildfire. Transportation available to the general public during emergency evacuation may not be suitable for family members with special needs.

4.5.2 Pets

As pets have become widely accepted as part of the extended family, the development of preparedness plans for pets' life safety should be considered by residents of Douglas County. Items to consider include:

- Plan to take animals as part of the evacuation and do not turn them loose
- Make sure dogs and cats wear properly fitted collars with identification, vaccination, microchip, and license tags
- Pet evacuation plans should include routes, transportation needs, and host sites; share this plan with trusted neighbors
- Exchange veterinary information with neighbors and file a permission slip with the veterinarian authorizing emergency care for animals if necessary
- Make sure pet carriers needed for evacuation are serviced and ready to be used
- Assemble a pet to-go bag with a supply of food, non-spill food and water bowls, cat litter box, etc.; additional items may include newspaper, paper towels, plastic bags, a permanent marker, water bucket.
- Often residents have a plan if they will not be home for a neighbor to complete the pet rescue

Review the Douglas County Sheriff's Office Pets and Disaster webpage for more information.

4.5.3 Large Animal / Horse Evacuations

There are a large number of horse properties and equine facilities throughout Douglas County. Emergency preparedness is important for all animals, but preparedness can be more difficult for large animals because of their size and special transportation needs. A key for large animal evacuation is to allow sufficient time to execute the evacuation. Evacuation of horses should occur as soon as an evacuation warning is issued. Planning ahead is critical when moving large animals. Where possible, allow for extra time to secure trailers, load the stock, and then safely transport the animals out of the evacuation area. The Douglas – Elbert County Horse Council and the Douglas County Animal Response Team provide more information on coordinating animal sheltering during an emergency.

Local large animal evacuation facilities will be announced on local radio stations and the OEM website during an emergency requiring evacuation. The primary shelter location is at the Douglas County Fairgrounds, 500 Fairgrounds Drive, Castle Rock, CO 80104.

CHAPTER 5 COMMUNITY PREPAREDNESS

5.1 Wildfire Preparedness

Each jurisdictional agency is responsible for fire suppression on its own lands. Fire protection districts respond to fires within their jurisdiction and are dispatched through mutual aid agreements. The Sheriff's Office is responsible for wildland fire suppression in unincorporated areas of Douglas County outside of a fire protection district, or for a fire that exceeds the capabilities of a fire protection district subject to the limitation's requirements under Colorado Revised Statute CRS 29-22.5-103. DFPC works to support local agencies with resources, technical expertise and support and fire management when an incident surpasses local capabilities.

Agencies within Douglas County work diligently to prepare for wildfire events on their own and through other coordinated efforts. Douglas County often coordinates County-Wide, multiple jurisdictional exercises. The exercises are part of ongoing wildland fire training focusing on the wildland fire interface environment because wildland fire is identified as the number one hazard in Douglas County and a critical issue along the Colorado Front Range. The ability to work together effectively in a multi-jurisdictional environment is essential. Cooperative exercises afford opportunities for skills enhancement to Douglas County agencies as well as mutual aid partners outside the County. Local fire departments also participate in wildland fire training through nationally recognized coursework. Often departments respond to fires outside of Douglas County to improve their skills in fire suppression and incident management.

5.2 Annual Fire Operating Plan

The Annual Fire Operating Plan (AOP) is a formal agreement between the Douglas County Sheriff's Office, the Board of County Commissioners, the USFS Pike /San Isabel National Forest and Comanche/Cimarron National Grasslands (PSICC), and DFPC. The plan identifies standard procedures and responsibilities, including fiscal responsibilities, which each agency has agreed to for cooperative wildfire protection on all lands in Douglas County. The AOP also contains supporting cooperative agreements as attachments that enable the County to access federal wildland firefighting resources and state resources and reimbursement for fire funding. The plan must be signed annually by all parties involved and must be approved by the Board of County Commissioners at a business meeting.

5.3 Remote Automated Weather Stations

There are nearly 2,200 interagency Remote Automated Weather Stations (RAWS) strategically located throughout the United States. These stations monitor the weather and provide weather data that assists fire departments, emergency managers, and land management agencies with a variety of projects such as air quality monitoring, fire danger rating, and providing information for research applications.

Douglas County owns a RAWS unit that is located in Franktown and also monitors stations owned by the USFS in the Pike National Forest. RAWS units collect, store, and forward data to a computer system at the National Interagency Fire Center (NIFC). Fire managers, including Douglas County OEM and fire protection districts, use this data to predict fire behavior and monitor fuels. The data allows agencies to plan for appropriate responses to wildland fires based upon daily readings from the weather station. RAWS data is also used as part of the decision-making process to determine when to implement fire restrictions. Locations and data from RAWS stations can be searched online at www.wfas.net.

5.4 Division Of Fire Prevention And Control

The Division of Fire Prevention and Control (DFPC) is located within the Department of Public Safety. The DFPC model is an enhanced state assistance model with proactive early detection of fire and aggressive initial attack. DFPC supports and assists local resources with the use of technologies to make informed decisions. DFPC supports local incidents with staffing and technical assistance, aviation resources, hand crews and engines and modules. DFPC research shows only 9%-11% of a fire's total cost is related to suppression costs. Aggressive initial attack will help to suppress fires quickly and reduce potential negative fire and post fire impacts and rehabilitation and recovery costs. DFPC houses the Center of Excellence for Advanced Technology Aerial Firefighting (CoE). The Center was created out of SB 14-164 and its research arm aimed at determining the efficacy of aerial firefighting. The mission of the CoE is to drive technological advancements to improve firefighting practices and influence innovation across the public safety community.

5.5 Douglas County Resources

- Douglas County Sheriff's Office Emergency Services Unit (5 full time equivalents)
- OEM-20 Type 6 brush truck
- Sheriff's Office Wildland Fire Hand crew (up to 15 members, collateral duty Special Team within the Sheriff's Office)
- Public Works Heavy Equipment Fire Team (up to 15 members trained in basic wildland fire; utilize bulldozers, graders, and water trucks to support large fires in Douglas County)
- Aviation contracts (called when needed and exclusive use contracts with fixed-wing and rotor-wing companies to provide aerial fire suppression services)

5.6 Improving Response Capability

Continued assessments of emergency preparedness should be conducted annually. These assessments should include a current inventory of existing emergency apparatus, incident response protocol, and mutual aid agreements.

Enhancements to existing preparedness resources:

- Regularly update all water resource maps
- Develop and distribute community incident pre-plans
- Continue community outreach and education
- Continue recruitment, training, and certification
- Continue mutual aid strategic planning
- Continue apparatus, facility, and personal protective equipment (PPE) upgrades
- Increase interagency wildland fire training to share expertise in wildland firefighting strategies, tactics, communications, and equipment.
- Maintain and regularly update existing wildland fire pre-attack, firefighting safety zones, and escape routes mapping and preplan High Hazard Areas using Geographic Information Systems.

5.7 Notification and Emergency Alerts

Mass notification systems are available to all residents of Douglas County. Law enforcement, fire protection districts, and related agencies have a well-rehearsed process for communication among

first responders. CodeRed, a Reverse 911 service, is provided to call residents in the case of an emergency in their community. Further information on how to enroll in this program can be found at the following: https://public.coderedweb.com/CNE/en-US/84B13CCD6B41

5.8 Evacuation Planning and Operations

The highest priority recommended actions focus on safety and welfare of the area residents. In the event the Douglas County Sheriff orders a community to evacuate because of threatening wildfire, residents should leave in an orderly and timely manner. The Sheriff would proclaim the preferred evacuation routes and safe destination site. The need to evacuate may be communicated by telephone, media, and/or direct contact with emergency personnel. Securing identified evacuation routes for WUI subdivisions is a critical component of a community's strategic emergency plan. Douglas County continues to assess access, plan, and implement evacuation drills with WUI communities. Douglas County also works cooperatively to acquire land and build emergency access routes where possible in critical neighborhoods. Douglas County has and continues to preplan evacuation across the county.

Individual community assessments should identify recommended primary routes that should be capable of supporting two-way traffic flow and emergency apparatus access However, the need for evacuation can occur without notice when wildfire conditions become extreme. Homeowners should be prepared in advance to evacuate without formal notice. Human safety is the number one concern in an evacuation.

Before residents leave, they should take every precaution to reduce the chance of structure loss as time allows. Actions could include thoroughly irrigating the defensible space, watering down the roof, and removing debris from rain gutters. Families should have meeting locations in place and phone numbers to call in case family members are separated. Every family should have their "Go Box" of important papers, documents, and other essential items available all year.

CHAPTER 6 RECOMMENDATIONS

6.1 Plan Recommendations

This CWPP is intended to provide a foundation for -and to facilitate – continued multi-agency collaboration and cooperation for fire protection planning efforts in Douglas County. This is considered a living document which will be reviewed and revised periodically as needed. The following recommendations were developed based on the goals and objectives of Douglas County's stakeholders for reducing wildland fire hazard and stakeholder input. The following recommendations are focused on achieving six key goals:

6.1.1 Continue To Identify And Evaluate Wildland Fire Hazards

- Continue to collect, analyze, and maintain multi-agency hazard and resource GIS data
- Maintain an accessible online GIS portal to store and share the multi-agency maps and data developed through this CWPP process.
- Use this CWPP for pre fire planning and to collaboratively develop priorities for projects throughout Douglas County.

6.1.2 Promote Land Use Planning Related To Fire Risk

- Continue to promote the concept of land use planning as it relates to fire risk and hazard reduction and landowner responsibilities.
- Identify the key minimum elements necessary to achieve a FireWise community and incorporate these elements into community outreach materials and programs.
- Continue to implement the structural ignitability activities
- Develop outreach materials.
- Continue to coordinate with county and local governments staff to integrate FireWise approaches into planning documents and ordinances.
- Continue to secure funding opportunities for dedicated staff for home and community assessments.
- Continue to support community chipper and hauling programs to encourage compliance with defensible space and vegetation management requirements.
- Increase and seek out opportunities to assist land owners with green waste disposal.
- Continue the structure ignitability efforts currently in place.
- Consider how to make the tree removal process less cumbersome and less expensive.
- Work with partners to maximize economic efficiency and utilization of removed woody material.

6.1.3 Support And Participate In Development of CWPP's

- Work collaboratively with county, local, regional agencies, and land owners to develop fuel reduction priorities and strategies based on this CWPP, local CWPP's, and or other regional plans.
- Support the development and implementation of local scale CWPP's.

- Provide a collaboration mechanism between private property owners (and homeowner associations) and large land owners (Douglas County Open Space, CP&W, CSFS, U S Forest Service).

6.1.4 Increase Awareness, Knowledge, and Actions

- Continue to implement the defensible space and outreach activities to support landowner efforts.
- Develop online outreach materials.
- Continue interagency coordination and other partners to maintain a community presence and to develop and distribute public information regarding fuel reduction efforts throughout the county.
- Educate land owners, residents, and business owners about the risk and personal responsibilities of living in the WUI, including the natural fire regime, prevention measures, and pre planning activities.
- Promote living with fire education efforts in neighborhoods located within WUI areas to educate them on becoming a Fire Adapted or Firewise USA® community.
- All fire agencies continue to educate and prepare communities through an emphasis on Ready Set Go! and the Firewise community programs and create and support venues in which individual community members can be actively involved in.
- Support community emergency response teams and other community-based efforts in order to develop readiness plans, and educate land owners to mitigate the risks and effects of wildland fire.
- Continue to increase education and awareness about structural ignitability and defensible space, develop and distribute educational materials to vendors and contractors who sell or install fire resistant materials, and make these materials available local home improvement stores.
- Develop and formalize a program for providing defensible space assistance (labor or financial) for vulnerable populations without the capacity and means to perform defensible space work.
- Improve outreach efforts to educate absentee landowners on wildfire hazards and risk reduction.
- Promote and distribute information about fire resistant landscaping to HOAs' property management companies, and any agency with authority over implementation of landscaping choices.
- Encourage families to know the routes out of their neighborhood and to practice their family evacuation plan.
- Continue to implement the vegetation management and fuel reduction activities
- Fire agencies continue working with land managers on strategic fuel treatment planning and implementation. Continue to implement and maintain vegetation slash fuel management projects along regularly traveled roadways and access points into all public lands in order to minimize ignitions.
- Response agencies plan and implement annual community level drills for evacuation preparedness.

- Partner with local appropriate county public works agencies to consider vegetation/fuel reduction from roadways that are key evacuation routes into or out of a particular neighborhoods or communities.
- Continue to create, extend, or enhance vegetation/fuels management along all identified key evacuation routes from developed residential and open space areas.
- Identify and implement vegetation management practices in priority WUI communities throughout the county.
- Work to reduce regulatory barriers that limit hazardous fuel reduction activities, for example tree removal process.
- Use published science on fire ecology to assess cost, benefits, and best implementation tools for different fuel reduction and vegetation management strategies that are intended to reduce fire risk to lives and property.
- Continue to develop strategic partnerships and funding opportunities with local industries to support fuel reduction projects.

6.1.5 Public Education

Establish a year -round wildfire education campaign that includes key topics:

- Living with fire concepts through educational webinars, print material distribution, public workshops, web site articles, HOA meetings.
- Natural fire regime and natural role of fire
- Science of home ignition
- Risk reduction practices in the Home Ignition Zone, see, (Appendix 10.2)
- Firewise landscaping
- Host a wildfire preparedness and mitigation public workshop at regular intervals
- Host resident risk reduction best practices classes

Work with communities to increase education and capacity for hazardous fuels reduction efforts on both individual properties and community owned properties:

- Increase funding for cost share efforts
- Increase opportunity and funding for community related slash disposal
- Create an easily accessible brochure related to home hardening for posting with building permit submittal information

6.1.6 Fuels Reduction

- Continue to support CSFS efforts to collaborate with large landowners and communities towards accomplishing landscape scale and community-wide mitigation and restoration efforts
- Collaborate with partners to identify opportunities for cross jurisdictional mitigation efforts.
- Collaborate with partners to leverage funding for large scale, cross boundary mitigation opportunities

- Continue to support DCOSN fuels reduction/forest restoration work on open space properties
- Work with partners to maximize economic efficiency and utilization of removed woody material

CHAPTER 7 MONITORING AND EVALUATION

7.1 CWPP Adoption

The Douglas County CWPP is a strategic planning document that is developed and approved by the Core Team. An important component of the development process includes building a stakeholder group that will move the plan forward, implement mitigation recommendations, and maintain the CWPP as the characteristics of Douglas County's WUI change overtime. Implementation of the plan is essential for converting the CWPP from a strategic plan into action. This team will oversee the implementation and maintenance of the CWPP by working with fire authorities, community organizations, private landowners, and public agencies to coordinate and implement hazardous fuels treatment projects management and other mitigation projects. It is recommended semi-annual core team meetings occur to move the CWPP forward. Building partnerships among neighborhood-based organizations, fire protection authorities, local governments, public land management agencies, and private landowners is necessary in identifying and prioritizing measures to reduce wildfire risk. Maintaining this cooperation is a long-term effort that requires the commitment of all partners involved.

The CWPP encourages communities, home-owner associations, and citizens to take an active role in identifying needs, developing strategies, and implementing solutions to address wildfire hazards and risks by assisting with the development of local community wildfire plans and participating in County-wide fire prevention activities.

The Douglas County CWPP is a valuable resource that provides the foundation for understanding wildfire risks and hazards, and presents attainable milestones designed to reduce potential losses from wildfire. Communities, individual neighborhoods, home-owner associations, and fire protection districts can take further action by developing their own CWPPs, which would tier to this Countywide CWPP.

The HFRA authority for the CWPP requires adoption of this plan, as does the FEMA Disaster Mitigation Act of 2000. With formal adoption by the Core Team, participating agencies and WUI neighborhoods will be competitive for available hazardous fuels and non-fuels mitigation funding that may assist with plan implementation. Furthermore, adoption of this plan highlights a collaborative planning and development process between Douglas County, local governments, public agencies, and neighborhood organizations.

7.2 Sustaining Community Wildfire Protection Plan Efforts

The Douglas County CWPP serves as the foundation to develop safer and healthier WUIs through hazard assessments and strategic planning focusing on reducing the threat of wildfire. The mitigation strategies outlined in this plan will greatly reduce wildfire risk, but only if implemented. Converting strategy into action is the key to achieving this important goal.

Communities can be made safer by reducing the risk of wildfire loss, and this CWPP has outlined and presents realistic measures to achieve this goal. The CWPP process encourages homeowners to take an active role as fuel treatment strategies are developed and prioritized around their communities. Ownership of CWPP implementation at that same local level is the most effective means to achieving successful results and sustaining the effort from year to year.

Proactive neighborhoods, communities, and homeowners can seek support and guidance through a variety of local, state, and federal resources identified in this plan including local fire protection districts, CSFS, Douglas County OEM, USFS, and conservation districts.

7.3 CWPP Oversight, Monitoring, and Evaluation

Maintaining the momentum created by this process is critical to successful implementation and ongoing community wildfire hazard reduction. Monitoring is a critical component of all natural resource programs. Monitoring provides information on whether a program is meeting its goals and objectives. Adaptive management allows for program changes to occur if they are warranted. The purpose of this monitoring strategy is to track implementation of planned activities and evaluate how the goals of the CWPP are being met over time. The data gathered will help determine if the objectives of the plan are being met, if updates need to be made, and if the plan is useful and being implemented as envisioned. It is recommended that CWPP monitoring progress be recorded by Douglas County wildfire mitigation.

As wildfire hazard reduction efforts are implemented over time and the characteristics of particular WUIs change, neighborhoods may wish to reassess particular areas and update the findings of the original CWPP. Monitoring the progress of project implementation and evaluating the effectiveness of treatments are important components of CWPP oversight and maintenance.

The assessment methodology utilized in this plan is a standardized, well-documented hazard and risk survey approach that is designed to provide a benchmark against which future assessments can be compared. Successes, challenges, and new concerns should be noted and subsequently guide any modifications to the CWPP that better accommodate the changing landscape.

Evaluation includes analysis of the effectiveness of past fuels reduction and non-fuels mitigation projects, as well as recent wildfire suppression efforts. As the CWPP evolves over time, there will be a need to track changes in policy, codes, requirements, stakeholder changes and levels of preparedness. These can be significant for any future revisions and addendums to the CWPP. Monitoring and evaluation measures should progress over time in a way that will determine whether the CWPP goals and objectives are being attained. Each functional element of the CWPP provides monitoring tasks for recommended actions. Table 3 provides a summary of monitoring tasks for each objective area. Evaluations should be conducted on an annual basis.

Table 3. Monitoring and Evaluation Tasks

Objective	Tasks
Risk Assessment	•Use reliable data that is compatible among partner agencies •Update the CWPP as new information becomes available •Continue to assess wildfire risks to communities and private landowners
Fuels Reduction	•Identify and prioritize fuel treatment projects •Track total acres of treatment on public and private land •Track defensible space projects on private lands •Monitor fuels reduction projects on evacuation routes •Identify and prioritize fuel treatment projects on public lands •Track grants and other funding sources and make appropriate application •Maintain open space treatments in subdivisions
FPD Capacity Improvements	•Track progress on water supply improvements and mapping •Review mutual aid resources and agreements •Review suitability and the need for fuels reduction along evacuation routes •Maintain compliance with County EOP processes
Public Outreach	•Plan and hold Firewise education week •Provide Firewise material at public events •Evaluate techniques used to motivate and educate private landowners •Hold bi-annual wildfire mitigation and preparedness workshops •Hold HIZ training courses as needed
Landscape scale Fuels Treatment	• Continue to work towards accomplishments at boundary fuel break/proposed landscape scale fuels treatment project •Work towards community-wide defensible space and community-wide fuel breaks/thinning as willingness allows •Maintain and increase opportunities for open space treatments

A primary purpose of the CWPP review and update will be to engage additional parties and stakeholders in the CWPP planning process. Many stakeholders may not have been identified during this iteration of the Douglas County CWPP update. Annual reviews and updates provide for engagement of additional entities so that the document can serve a wide network of agencies and provide opportunities for increased collaboration across the County. The CWPP Core Team should continue outreach to interested stakeholders and invite them to become active participants in the CWPP planning and monitoring.

A formal revision to this CWPP should be made on the fifth anniversary of the signing of this document and every 5 years thereafter.

Table 4. Community List

Fire Protection District	Community	Treatment Proposal
Aurora	Rocking Horse	
Castle Rock	Greater Plum Creek	DS, CT
	Founders Village/Castlewood Ranch	DS
	Meadows/Red Hawk	DS, CT
	Metzler Ranch	DS
	Cobblestone	DS,CT
	The Oaks	DS,CT/FB
	Bell Mountain Ranch	DS, CT/FB
	Castle Ridge East	DS

	Castle Oaks	DS, CT/FB
	Greater Crowfoot	DS, CT
	Greater Crystal Valley	DS, CT/FB
	Keene Ranch	DS, CT/FB
	Woodlands and Escavera	DS, CT
Franktown	Castlewood Canyon	DS, CT/FB
	Jones Road	DS, CT
	Northeast Franktown	DS, CT
	Pinery West	DS, CT/FB
	South Lake Gulch	DS, CT/FB
	El Dorado Acres	DS, CT/FB
	Flintwood Hills	DS, CT, CT/FB
	North of Highway 86	DS, CT/FB
	Russellville/Deerfield	DS, CT/FB
Jackson 105	Allis Ranch	DS, CT,
	Plum Creek Valley Estates	DS, CT/FB
	Wolfensburger South	DS, CT/FB
	Greater Dawson	DS, CT/FB
	Greater Perry Pines	DS, TH, CT/FB
	Keene Ranch	DS, CT/FB
	Pine Ridge	DS, TH, CT/FB
	Wolfensburger North	DS, CT
	Jackson/Dakan	DS, TH
Larkspur	Mesa Grande	DS
	Bald Mountain	DS, TH, CT/FB
	Bell Mountain Ranch	DS, CT/FB
	Greater Dawson	DS, CT/FB
	Greenland Acres	DS,TH, CT/FB
	Keene Ranch	DS, CT/FB
	Valley Park	DS, TH, CT/FB
	Woodmoor Mountain	DS, TH, CT/FB
	Greater Larkspur	DS, CT/FB
	Perry Park	DS, CT/FB
	Spruce Mountain Estates	DS,TH, CT/FB
Mountain Communities	Freedonia Ranch	DS, CT
	Highway 67 Corridor	DS, CT/FB
	Thunder Butte	DS, CT/FB
	Rainbow Falls Fishing Club	DS, CT
	Trout Creek	DS, CT/FB
North Fork	Deckers/Trumbull	DS, CT/FB
	Scraggy View/Nighthawk	DS, CT/FB
	North Rainbow Falls	DS,CTFB

South Metro	Inverness/Meridian	DS
	Stonegate	DS
	Parker North	DS
	Chatfield	DS, CMDS, CT, CM
	Cherokee Ridge Estates	DS, CM
	Cherry Creek Highlands	DS, CM
	Colorado Golf Club	DS, CM/FB
	Crown Point	DS
	Greater Delbert	DS, CT, CM
	Meridian Village	DS
	Plum Valley Heights	DS,CM
	Ponderosa East	DS, CT
	Richlawn Hills	DS
	Spirit Ridge	DS
	Summit Ridge	DS
	Titan Road	DS, CM
	Black Forest	DS, CT/FB
	Castle Pines North	DS,
	Charter Oaks	DS, CT/FB
	Corson/Scenic Ridge	DS, TH, CT/FB
	Grandview Estates	DS, CM
	Greater Castle Pines Village	DS, CT/FB
	Happy Canyon Ranches	DS
	Hidden Village	DS,CT/FB
	Highlands Ranch	DS, CM
	Homestead Hills	DS, CT, CM
	Johnson Road	DS, CT/FB
	Lemon Gulch	DS, CT/FB
	Livengood Hills Estates	DS, CT/FB
	Louviers	DS, CT/FB
	McArthur Ranch	DS, CT/FB
	Parker East	DS, CT
	Parker View Estates	DS, CT/FB
	Ponderosa Hills	DS, CT/FB
	Sterling Ranch	DS, CM
	Surrey Ridge	DS, CT/FB
	The Pinery	DS, CT/FB
	Tomahawk	DS, CT/FB
	Windy Hills	DS, TH, CM
	Happy Canyon	DS, CT/FB
West Douglas County	East Highway 105	DS, CT/FB
	The Ranches	DS, CM
	Sprucewood/Moonridge	DS,CT/FB
	Elephant Rock	DS, CT/FB
	Heir Valley	DS, CT/FB

	Sedalia	DS, CT/FB
	Bee Rock	CT/FB
West Metro	Roxborough Village	DS, CT/FB
	Greater Roxborough	DS, CT/FB

*Treatment Proposal Code
DS, Defensible Space
CT, Community Thinning
FB, Fuel break
CM, Community mow

CHAPTER 8 GLOSSARY

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

Acre: an area of land containing 43,560 square feet. A square acre would be about 209 feet by 209 feet. A circular acre would have a radius of 117.75 feet.

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.

Basal area: the cross-sectional area of a single stem, including the bark, measured at breast height (4.5 feet).

Blowdown: trees or trees felled or broken off by wind.

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: The cutting of essentially all trees, producing fully exposed microclimate for the development of a new age class. 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.

Dead fuels: Fuels with no living tissue in which moisture content is governed almost entirely by atmospheric moisture (relative humidity segmentation), dry-bulb temperature, and solar radiation.

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

Defensible space: An area around a structure where fuels and vegetation are treated, cleared or reduced to slow the spread of wildfire towards the structure. 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.

Direct attack: A method of fire suppression where actions are taken directly along the fire's edge. In direct attack, burning fuel is treated directly, such as by wetting, smothering, or chemically quenching the fire or by physically separating burning from unburned fuel.

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.

Engineering: Engineering is a fire mitigation strategy used to remove or reduce ignition sources from what can ignite or readily burn.

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 behavior: The manner in which a fire reacts to the influences of fuel, weather and topography.

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 danger: The broad-scale condition of the rules as influenced by environmental factors.

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: The presence of ignitable fuel coupled with the influence of terrain and weather.

Fire intensity: A general term relating to the heat released by fire.

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.

Flame Height: The average maximum vertical extension of flames at the leading edge of the fire front. Occasional flashes that rise above the general level of flames are not considered. This distance is less than the flame length if flames are tilted due to wind or slope.

Flame Length: The distance between the flame tip and the midpoint of the flame depth at the base of the flame (generally the ground surface); an indicator of fire intensity.

Flaming Front: The zone of a moving fire where the combustion is primarily flaming. Behind this flaming zone combustion is primarily glowing. Light fuels typically have a shallow flaming front, whereas heavy fuels have a deeper front. Also called fire front.

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.

Fuelbreak: 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.

Quadratic Mean Diameter (QMD): The mean diameter of a tree corresponding to the average basal area of the stand (total Basal Area per acre divided by the number of trees per acre).

Improvement cutting: the removal of less desirable trees of any species in a stand of poles or larger trees, primarily to improve composition and quality.

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. Vegetative materials with vertical continuity that allows fire to burn from the ground level up to the branches and crowns of trees (Dennis 1999).

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.

Litter: the surface layer of a forest floor that is not in an advanced stage of decomposition, usually consisting of freshly fallen leaves, needles, twigs, stems, bark, and fruits.

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.

Mid flame wind speed (MFWS): is defined as the velocity winds, in miles per hour taken at the mid-height of the flame length.

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

Noxious weed: a plant specified by law as being especially undesirable, troublesome, and difficult to control.

Patch: a small part of a stand or forest.

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.

Red Flag Warning means warm temperatures, very low humidity, and stronger winds are expected to combine to produce an increased risk of fire danger, according to National Weather Service.

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.

Riparian area: related to, living, or located in conjunction with a wetland, on the bank of a river or stream but also at the edge of a lake or tidewater.

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 fuelbreak: A fuelbreak 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.

Topography: Also referred to as "terrain." The physical parameters of the "lay of the land" that influence fire behavior and spread. Key elements are slope (in percent), aspect (the direction a slope faces), elevation, and specific terrain features such as canyons, saddles, "chimneys," and chutes.

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.

USDA FS: 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.

Windfirm: trees able to withstand strong winds and resist windthrow.

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.

[Source: Helms, J. A., 1998, Jeffco CWPP 2011, Falcon CWPP 2016 and CSFS 2012]
www.fs.fed.us/nwacfire/home/terminology.html

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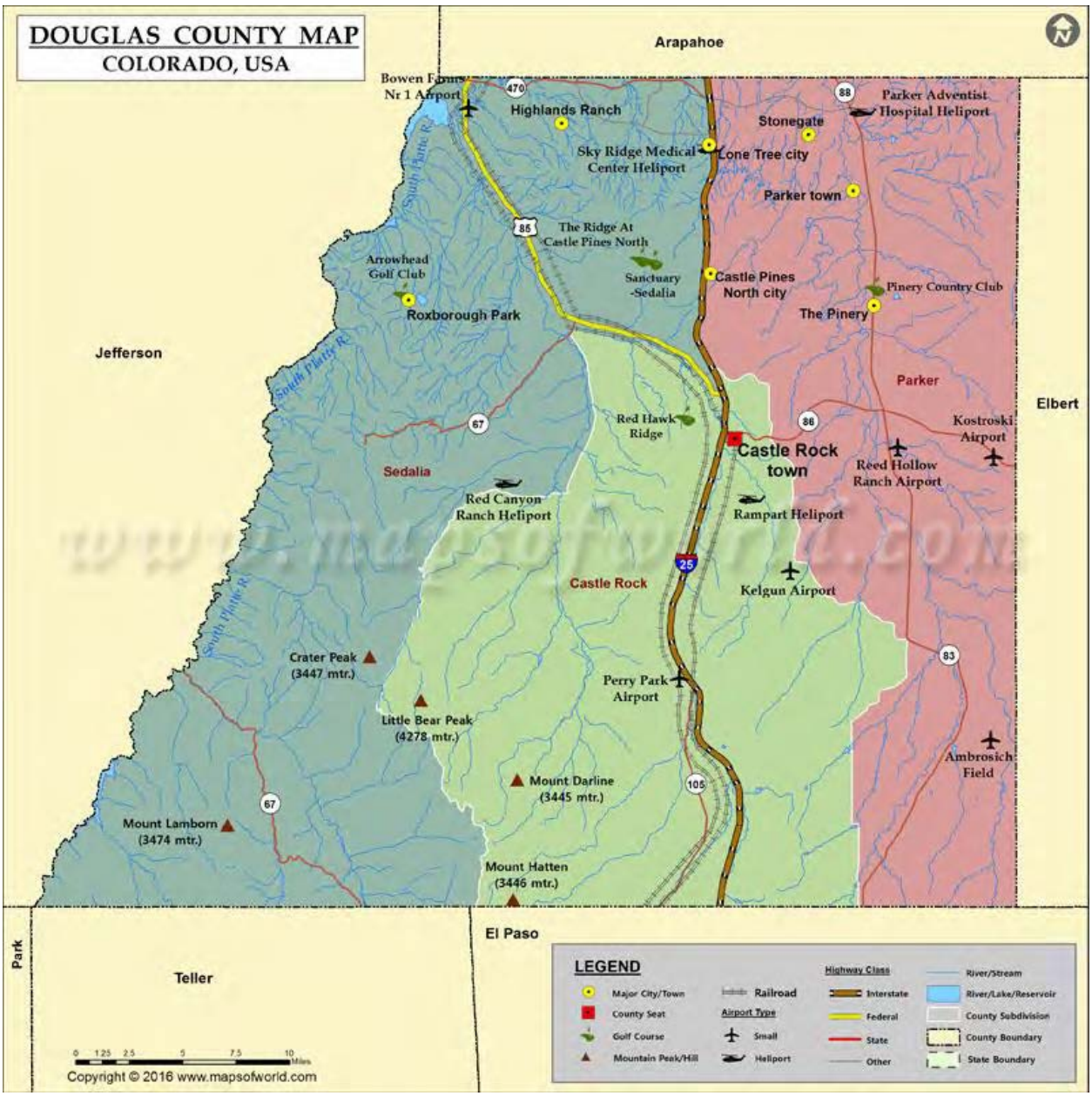
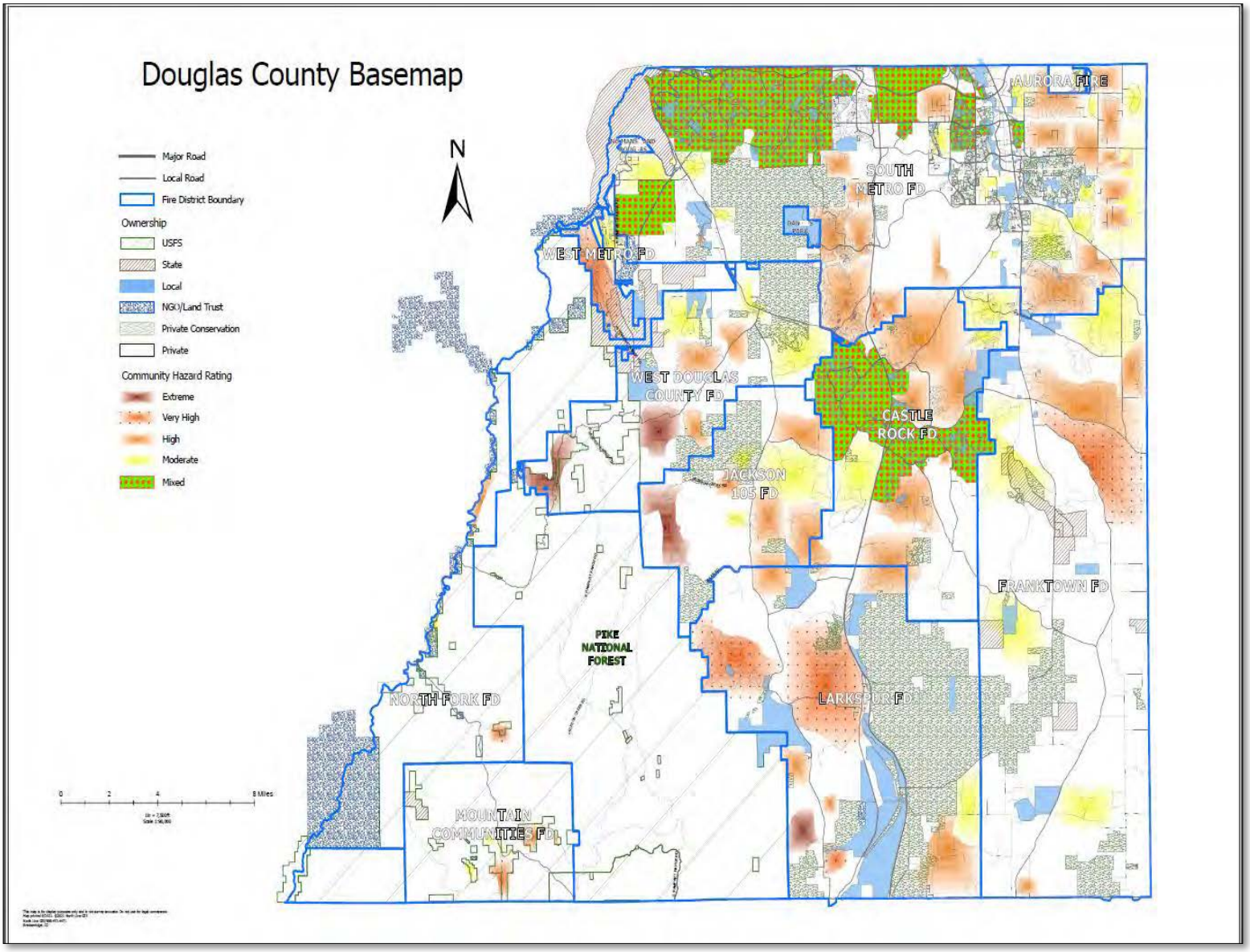
APPENDIX 10

10.1 Maps

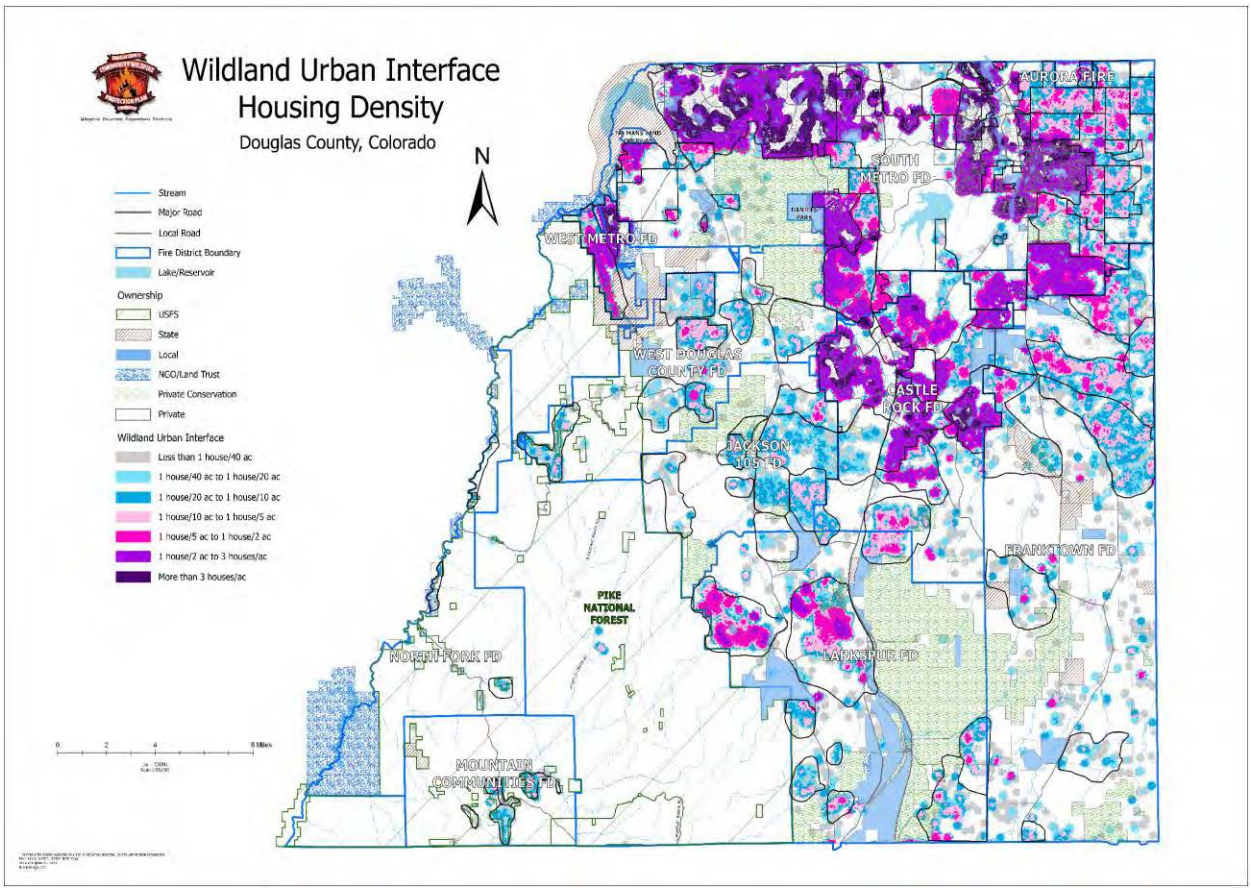
- Map 1. Location



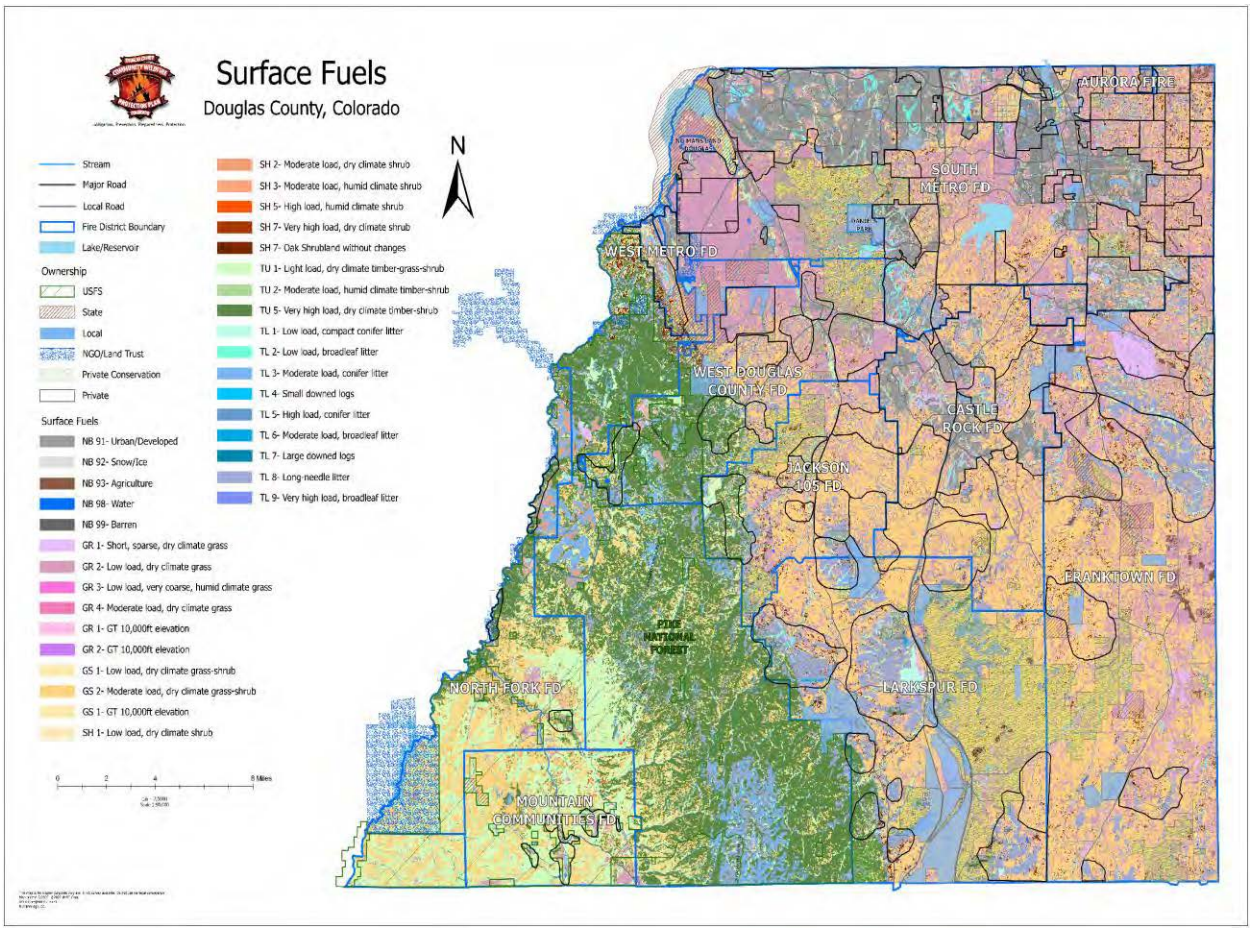
- Map 2. Douglas County Community Base Map



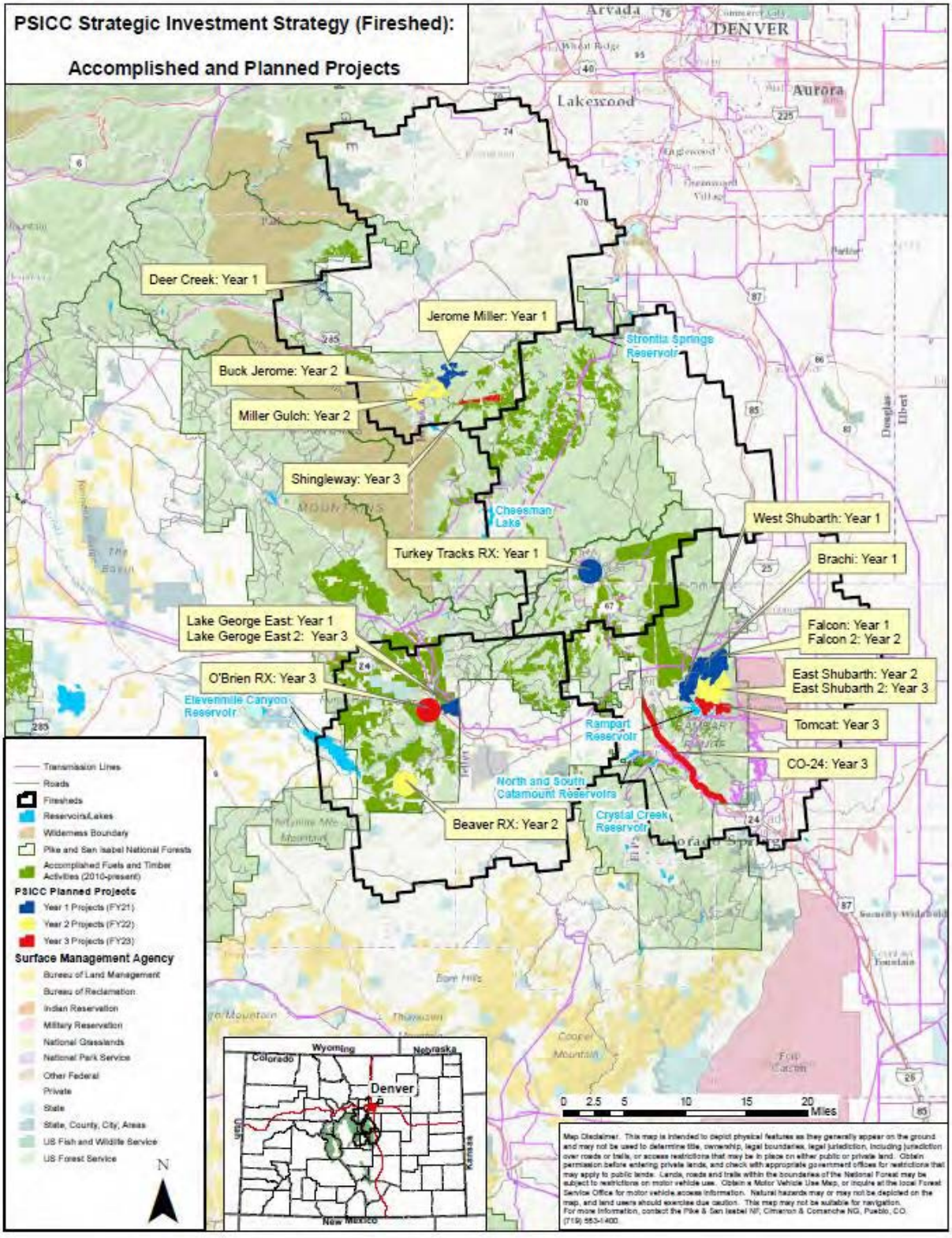
- Map 3. WUI



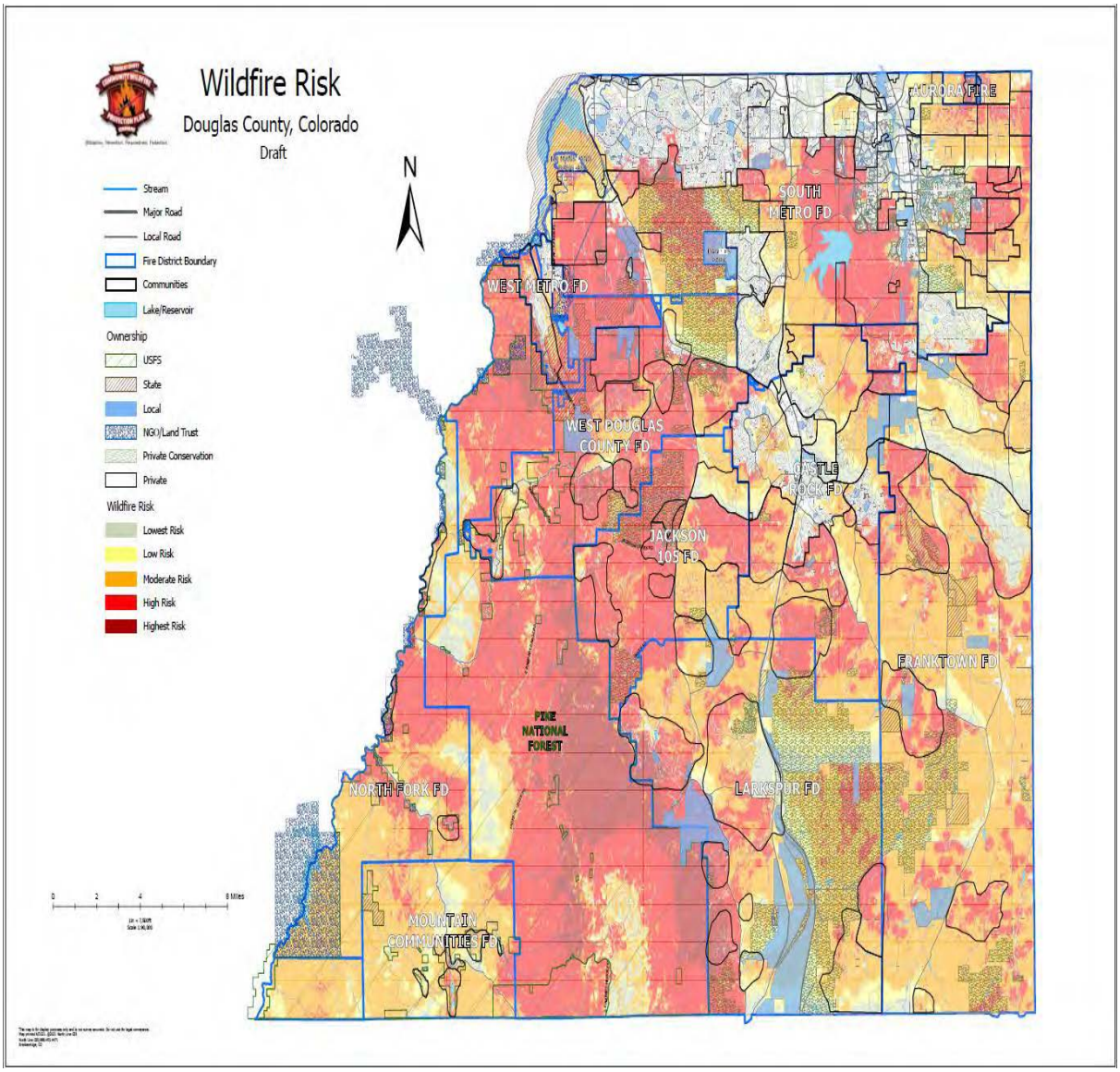
- Map 4. Fuel Models



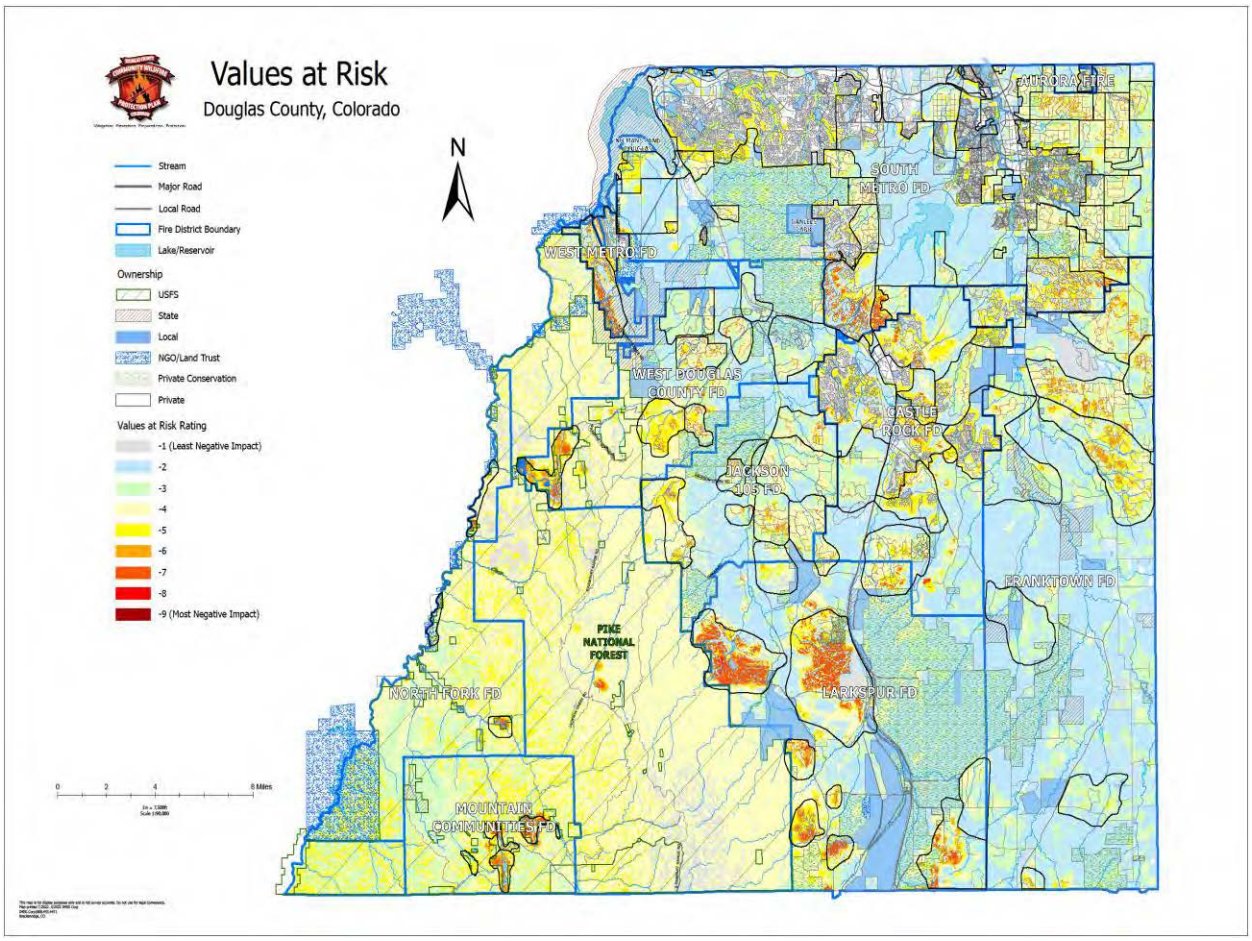
- Map 5. USFS



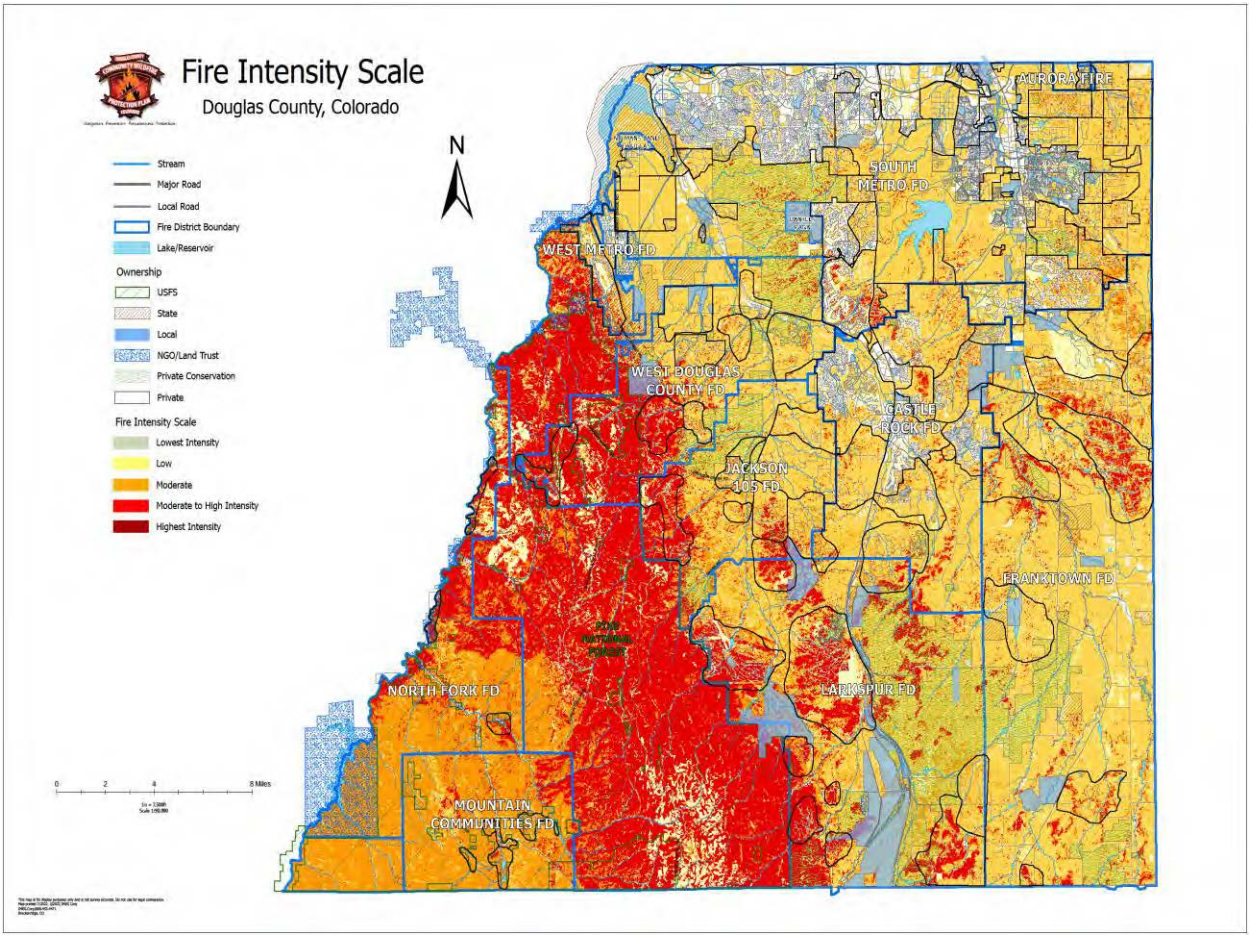
- Map 6. Wildfire Risk (from CO-WRAP)



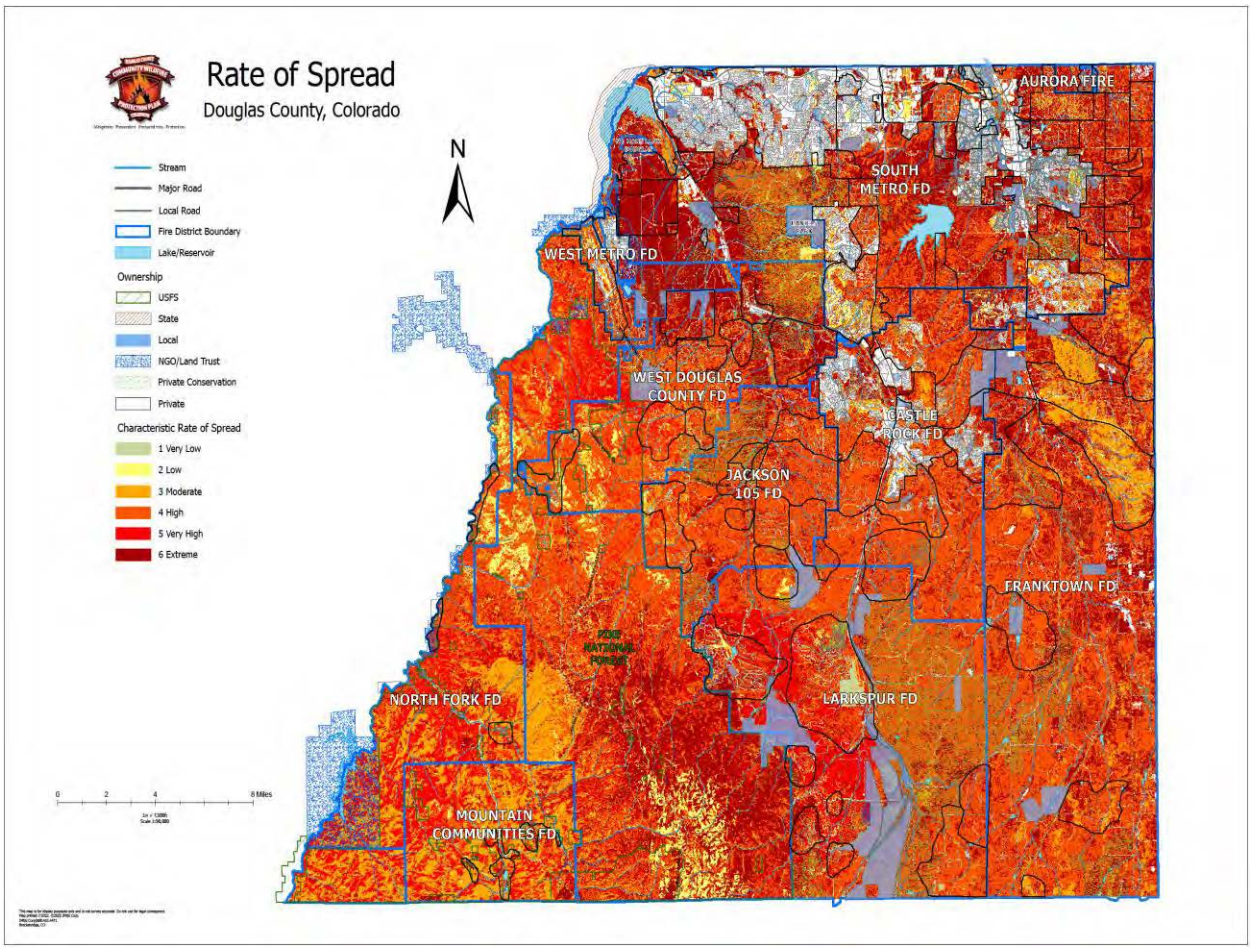
- Map 7. Values at Risk



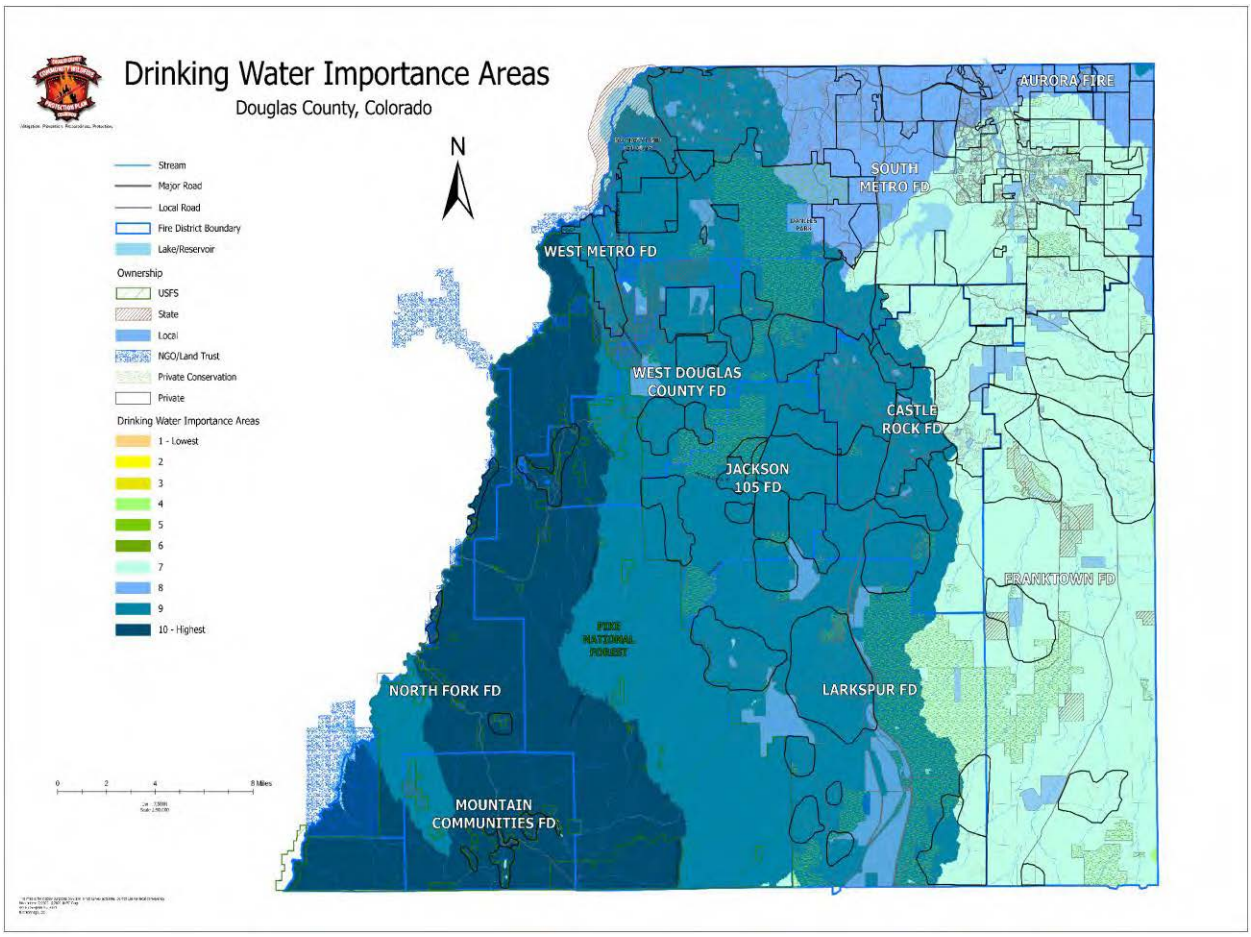
- Map 8. Fire Intensity Scale



- Map 9. Rate of Spread (from CO-WRAP)



- Map 10. Important Drinking Water Areas (from CO-WRAP)



10.2 Wildfire Management Resources

- Colorado Wildfire Risk Assessment Report: CO-WRAP
- Creating Wildfire-Defensible Zones Quick Guide
- CSFS HIZ Guide
- Fire-Resistant Landscaping
- FireWise Plant Materials
- Fuelbreak Guidelines for Forested Subdivisions & Communities
- Forest Home Fire Safety
- Colorado Fire Adapted Communities
- Colorado Firewise USA®
- Firewise USA® Research Fact Sheet Series
- Headwater Economics, Building a Wildfire-Resistant Home: Codes and Costs
- Wildfire & Insurance
- Firewise construction.
- Public-Education/Fire-causes-and-risks/Wildfire/Firewise-USA/Firewise-USA-Resources/Research-Fact-Sheet-Series

10.3 USFS Research on Saving Homes from Wildfire

Dr. Jack Cohen, Fire Science Researcher with the U.S. Forest Service, explains current research about how homes ignite during wildfires, and the actions that homeowners can take to help their home survive the impacts of flames and embers.

This video was produced by the National Fire Prevention Association.

10.4 Local WildFire Websites

Douglas County
Douglas County Fire Protection Districts
Local tips for preparing for wildfire. View the video "Wildfires Happen. Are you Ready?"
Firewise USA®
A wealth of wildfire information, defensible space advice, and preparation tips.
Colorado State Forest Service Resources for Homeowners & Landowners
Protect Your Home & Property from Wildfire; Grants & Funding Assistance
Rocky Mountain Area Coordination Center
U.S. Drought Monitor
The Fire Weather and Intelligence Portal
A real-time monitoring tool for weather and fire risk information.
USFS Observed Fire Danger Class
Daily 7-Day Weather / Fire Potential Outlook Discussion
National Weather Service Fire Weather Forecast

CSFS FireWise Construction: Site Design & Building Materials

10.5 Douglas County Wildfire Community Survey

Douglas County Wildfire Community Survey Questions
Spring 2022

1. What is the biggest barrier to reducing fire hazards on your property?
2. What are the values that you want protected in your community?
3. What are the greatest values at risk from wildfire in your community?
4. Do you have an evacuation plan for your family?
5. Do you have an emergency evacuation kit?
6. Do you know the evacuation routes for your community?
7. How great a risk do you think wildfire poses to your community?
8. Do you think any areas in your community are an extreme fire hazard? If yes, what areas?
9. How likely are you to leave your home under a voluntary evacuation?
10. How likely are you to leave your home under a mandatory evacuation?
11. Do you think your community is prepared for a wildfire? If no, why not?
12. How prepared are you for a wildfire?
13. What types of landscapes in your community do you think pose a fire risk to homes or property?
14. How confident are you that you can easily receive information about a local wildfire?
15. Are you registered for CodeRED emergency notifications? If no, why not?
16. What do you think are the best ways to mitigate or reduce wildfire risks?
17. What actions have been taken to reduce the risk of wildfire in your community?
18. What fire education programs have occurred in your community?
19. Which fire education programs have you personally participated in?
20. How supportive are you of projects to treat and reduce hazardous vegetation in your community?
21. How willing are you to treat and reduce hazardous vegetation on your own property?

Summary Survey Responses:
What are the most important questions you'd like to know the answers to:

1. What is the biggest barrier to reducing fire hazards on your property? The number one answer was "Don't know what to do" followed by Nowhere to take the branches" followed by "Costs too much"
2. What are the values that you want protected in your community? Top answer was "Natural Waterways, Drinking water/Water Quality, Natural Scenic Environments, Lives, Homes, Public Infrastructure"
3. What are the greatest values at risk from wildfire in your community?
4. Do you have an evacuation plan for your family? (53% said yes)
5. Do you have an emergency evacuation kit? (26% said yes)
6. Do you know the evacuation routes for your community? (39% said yes)
7. How great a risk do you think wildfire poses to your community? Most answered "High Risk "followed by "Moderate Risk" followed by "Extreme Risk"
8. Do you think any areas in your community are an extreme fire hazard? (65% said yes) If yes, what areas?
9. How likely are you to leave your home under a voluntary evacuation? 68% "Will evacuate" and 28% said "More likely to stay"

10. How likely are you to leave your home under a mandatory evacuation? 95% said "Will evacuate"
11. Do you think your community is prepared for a wildfire? (25% said yes) If no, why not?
12. How prepared are you for a wildfire? 40% said "Unprepared" and 33% said "Prepared" and 12% said "Very unprepared"
13. What types of landscapes in your community do you think pose a fire risk to homes or property? 38% said "Meadows and grasses, Shrubs and brush" and 24% said Forests, Meadows and grasses, Shrubs and brush"
14. How confident are you that you can easily receive information about a local wildfire? 84% answered either "Somewhat" or "Very"
15. Are you registered for CodeRED emergency notifications? (69% said yes) If no, why not?
16. What do you think are the best ways to mitigate or reduce wildfire risks?
17. What actions have been taken to reduce the risk of wildfire in your community? 50% answered "None that I am aware of"
18. What fire education programs have occurred in your community? 57% said "None that I am aware of"
19. Which fire education programs have you personally participated in? 65% said "None that I am aware of"
20. How supportive are you of projects to treat and reduce hazardous vegetation in your community? 63% said "Strongly supportive" and 24% said "Somewhat supportive"
21. How willing are you to treat and reduce hazardous vegetation on your own property? 69% said "Very willing" and 19% said "Somewhat willing"

10.6 Collaboration Events

Douglas County Community Wildfire Protect Plan

January 8, 2022
Core leadership Team

January 8, 2022

Hello Core Leadership Team,

Douglas County Wildfire Mitigation has partnered with Dahl Environmental Services (DES) to lead the completion of the *Douglas County Community Wildfire Protection Plan (CWPP) update*. CWPPs were authorized under the *Healthy Forest Restoration Act (HFRA) in 2003*. In 2009 the Colorado General Assembly passed SB 09-001 requiring counties to complete a Community Wildfire Protection Plan (CWPP) for identified fire hazard areas within unincorporated areas of the County and must meet minimum standards established by the Colorado State Forester. CWPPs provide opportunity to influence how and where federal monies are spent to protect at risk watersheds and communities. The CWPP process is a collaborative process that brings together a diverse group of stakeholder to identify strategies for the protection of life, property, and critical infrastructure in the Wildland Urban Interface (WUI).

Like the original plan the update will be science-based document but contain a more strategic focus on our Goals for community resiliency and sustainability across Douglas County. The update will draw on our Goals and the pillars of the Cohesive Strategy:

- Protect Lives, Property And Resources.
- Create A Fire Adapted Community.
- *Restore And Maintain Fire Resilient Landscapes.*
- Provide Safe Effective And Efficient Wildfire Response.

You have been selected to serve on the Core Leadership Team to help guide involvement and participation necessary to meet or exceed the minimum strategic CWPP Standards. The update will then move to a larger stakeholder group for consideration and participation.

We are excited to launch this update process. Please join us for a kick off meeting January 28, 2022 at Douglas County Fairgrounds.

Best regards,

Jill

Douglas County CWPP
Project Briefing

January 10, 2022
1:00 pm Via TEAMS

US Forest Service Pikes Peak Ranger District
Jennifer DeWoody, Acting District Ranger
Purpose

- Brief on Douglas County planned CWPP Update
- Overview of CWPP and US Forest Service important role

Background

- Healthy Forest Restoration Act
- 2009 Colorado General Assembly (SB 09-001)
- Original CWPP 2011

Minimum requirements

- Collaboration
- Prioritized fuel reduction areas
- Address Treatment of Structural Ignitability

Goals

- Protect against loss of life and property
- Continue to strengthen partnerships in active mitigation and suppression of wildfire
- Increase public understanding of living in fire prone ecosystems
- Reduce hazardous fuels
- Provide for a community that is more resilient to the effects of wildland fire

Steering Committee

Foundation Questions/Information

- Community risk assessment
- Completed fuel projects
- Planned fuel projects
- Future Participation ongoing

Plus:

- WUI Big changes
- Landscape scale work
- Communities follow thru.
- Boundaries work fuel treatments
- Grants opportunities
- Roadless Issues on the Berry park Sandstone.
- Values at Risk.
- CFRI Jeffco.
- CWPP work time line
- Infrastructure bill unknown

Douglas County CWPP
Briefing and Interview
Location, South Platte District Office, Conifer, CO

January 20, 2022
10 AM to 12 Noon

US Forest Service South Platte Ranger District
Brian Banks, District Ranger

Purpose

- Brief on Douglas County planned CWPP Update.
- Overview of CWPP and US Forest Service role.
- Discuss current districtwide program of work on forest management.
- Forest Service involvement with the 2020 CWPP.

Background

- Healthy Forest Restoration Act 2014.
- 2009 Colorado General Assembly (SB 09-001).
- Original CWPP 2011.

Discuss Current situation and development of 2022 CWPP:

- Provide core team membership and collaboration.
- Reviewed FS current landscapes assessments and progress of work.
- we need information on hazardous fuel reduction program and areas for thinning and prescribed fire.
- Prioritized fuel reduction areas.
- Address Treatment of Structural Ignitability.

Reviewed and discussed Forest Service 2022 programs:

- Protect against loss of life and property and working with communities bordering national forest lands.
- Managing the Rampart Range, recreation opportunities and forest wide, thinning's.
- Continue to strengthen partnerships in active mitigation and suppression of wildfire.
- Increase public understanding of living in fire prone ecosystems.
- Reduce hazardous fuels on targeted areas.
- Provide interaction with communities incorporate thinning and is more resilient to the effects of wildland fire.
- Provided targeting treatment for insect and disease areas i.e. Perry Park community.
- Developing strategic Potential Operational Delineations (PODs) (fire mgmt., units) for wildfire and suppression.
- Use other scientific tools, like potential operational delineations (PODs), fire behavior models, and information on ecological integrity for specific forest types will guide treatment placement and design.
- District Rangers will incorporate emerging data and technology into project design, along with a knowledge of historical stand conditions and structure.
- Reviewed values at risk, i.e., drinking water, watershed.

- Maps for thinning treatments and field treatments, pile and burn preparation for prescribed burning areas.
- Selecting high priority areas strategically located for prescribed fire.
- Eastern Forest mountains from Rampart Range that are Inventoried Roadless Areas in need of active forest management, adjacent to communities and private property.
- The same communities next to national forest land need to seriously consider thinning and becoming an adaptive fire community incorporating Firewise principles.
- Mutual aid and initial attack coordination.
- Consider Countywide Rads Analysis with CFRI.
- Introduce to new Fire and Fuels Management Officer, Mateo, Pachico

Steering Committee: TBD
Remaining Questions:

- Community risk assessment
- Completed fuel projects
- Planned fuel projects

Regards, Lyle and Bjorn

10.7 Fire History

Colorado's Largest Fires by Acreage

Rank	Fire	Acres	Year
1	Cameron Peak	208,913	2020
2	East Troublesome	193,812	2020
3	Pine Gulch	139,007	2020
4	Hayman	137,760	2002
5	Spring Creek	108,045	2018
6	High Park	87,284	2012
7	Missionary Ridge	70,285	2002
8	West Fork	58,570	2013
9	416	54,129	2018
10	Papoose	49,628	2013
11	Bridger	25,800	2008
12	Last Chance	45,000	2012
13	Bear Springs	44,662	2001
14	MM 117	42,795	2018
15	Beaver Creek	28,380	2016
16	Bull Draw	36,549	2018
17	Badger Hole*	33,421	2018
18	Grizzly Creek	32,631	2020
19	Logan	32,546	2020
20	Burn Canyon	31,300	2002

**Note: Fires that burned in multiple states*

Reference: http://dfpc.colorado.gov/wildfire-information-center/historical-wildfire-information

2000	16,000 acres (6,500 ha)	Kiowa County fire	Kiowa County, Colorado.	
2000	11,021 acres (4,460 ha)	Hi Meadow fire	Pine, Colorado	Burned 58 structures and caused more than $15 million in damages. Ignited by a cigarette.[16]
2000	10,599 acres (4,289 ha)[17]	Bobcat Gulch fire	West of Loveland, Colorado, Roosevelt National Forest	Caused by a campfire in the Bobcat Gulch on June 12, 2000 and caused the loss of 22 structures.[18]
2000	23,607 acres (9,553 ha)	Bircher fire	Mesa Verde National Park, Colorado	Largest fire in Mesa Verde National Park history.
2000	11,033 acres (4,465 ha)	Buster Flats fire	Northwestern Moffat County, Colorado.	
2002	10,000 acres (4,000 ha)	Lincoln County Complex fire	Lincoln County, Colorado	
2002	137,760 acres (55,750 ha)	Hayman Fire	Pike National Forest, Colorado	Fifth largest fire in Colorado history[6] by area. 5 firefighter deaths, 133 homes lost, 600 total structures destroyed, more than $42 million in damages. Caused by arson.[19]
2002	71,739 acres (29,032 ha)	Missionary Ridge Fire	Durango, Colorado	Started June 9, 2002. Firefighting cost $40 million; one firefighter death after tree fall. Burned for 39 days and destroyed 46 houses and cabins.
2002	12,209 acres (4,941 ha)	Coal-seam fire	Glenwood Springs, Colorado	Caused by a coal seam fire that initially ignited in 1910 and burned underground for decades. 43 structures were destroyed.
2002	27,084 acres (10,961 ha)	Trinidad Complex fire	Las Animas County, Colorado	Spring and Fisher fires. The Spring fire began in New Mexico and crossed into Colorado.
2002	4,413 acres (1,786 ha)	Big Elk fire	Estes Park, Colorado	3 firefighters killed in plane crash.
2002	4,439 acres (1,796 ha)	Iron Mountain fire	Southwest of Cañon City, Colorado.	Destroyed 201 structures, including over 100 homes.
2002	30,573 acres (12,372 ha)	Burn Canyon fire	Norwood, Colorado	
2002	13,490 acres (5,460 ha)	Spring Creek Complex fire	North of Glenwood Springs, Colorado	Spring Creek and East Meadow Creek fires
2002	17,273 acres (6,990 ha)	Big Fish fire	Trappers Lake in the Flat Tops Wilderness	
2002	31,016 acres (12,552 ha)	Mt. Zirkel Complex fire	Mount Zirkel Wilderness	Consisted of the Burn Ridge and Hinman fires.
2003	3,705 acres (1,499 ha)	Overland fire	Jamestown, Colorado	Caused by downed power lines. Destroyed 62 structures.
2004	9,014 acres (3,648 ha)	Picnic Rock fire	Northwest of Fort Collins, Colorado	

2004	4,188 acres (1,695 ha)	Campbell Fire	11 miles north of Nucla, Colorado	BLM and Uncompahgre National Forest.
2005	11,357 acres (4,596 ha)	Mason fire	Beulah, Colorado	
2006	15,400 acres (6,200 ha)	Yuma County fire	Yuma County, Colorado	
2006	13,820 acres (5,590 ha)	Mato Vega fire	La Veta Pass, Colorado	
2008	8,900 acres (3,600 ha)	Ordway fire	Ordway, Colorado	Killed 2 firefighters and burned 44 structures.
2008	9,000 acres (3,600 ha)	TA-25 fire	Fort Carson, Colorado	Pilot killed when his plane crashed.
2008	46,612 acres (18,863 ha)	Bridger fire	Piñon Canyon Maneuver Site, Colorado	
2008	25,385 acres (10,273 ha)	Mayberry fire	Maybell, Colorado	
2010	6,181 acres (2,501 ha)	Fourmile Canyon fire	West of Boulder, Colorado	Caused by an extinguished fire pit that reignited.[20] Destroyed 172 structures and was the most destructive Colorado wildfire at the time.
2011	12,310 acres (4,980 ha)	Fort Lyons fire	John Martin Reservoir, Bent County, Colorado	
2011	46,257 acres (18,720 ha)	Bear Springs Complex fire	Piñon Canyon Maneuver Site, Colorado	Consisted of the Bear Springs and Callie Marie fires.
2011	14,651 acres (5,929 ha)	Shell Complex fire	Las Animas County, Colorado	Consisted of the Shell and Brice fires.
2011	3,200 acres (1,300 ha)[21]	Crystal fire	Roosevelt National Forest, West of Loveland/Fort Collins, Colorado	15 primary structures burned[22]
2012	7,685 acres (3,110 ha)[23]	Hewlett Gulch fire	Arapaho National Forest & Roosevelt National Forest, West of Fort Collins, Colorado	
2012	20,000 acres (8,100 ha)	Heartstrong fire	Yuma, Colorado	
2012	3,217 acres (1,302 ha)	Lower North Fork fire	Foxton, Colorado	Caused by an escaped prescribed fire. Burned 23 homes and killed 3 people. Deadliest Colorado wildfire in terms of civilian lives lost.
2012	24,931 acres (10,089 ha)[24]	Little Sand fire	San Juan National Forest, north of Pagosa Springs, Colorado	[*citation needed*]
2012	87,284 acres (35,323 ha)	High Park Fire	Roosevelt National Forest, West of Fort Collins	Started by lightning. Eighth largest wildfire in Colorado state history by area. Killed one person and destroyed at least 248 homes, making it the most destructive fire in state history until Waldo Canyon Fire a few days later.[*citation needed*]
2012	18,247 acres (7,384 ha)	Waldo Canyon Fire	Colorado Springs area	Located near Pikes Peak, northwest of Colorado Springs in the Waldo Canyon - origin currently unknown - first reported the afternoon of Saturday, June 23. Destroyed 346

				homes; the most destructive fire until the Black Forest Fire of 2013. Two fatalities.[citation needed]
2012	45,000 acres (18,000 ha)[25]	Last Chance fire	Last Chance, Colorado	Began south of Last Chance, Colorado, by sparks from a tire blowout. Burned 11 structures.[26]
2012	10,147 acres (4,106 ha)	Weber fire	Mancos, Colorado	[citation needed]
2012	13,863 acres (5,610 ha)	Pine Ridge fire	West of De Beque, Colorado	[citation needed]
2012	3,500 acres (1,400 ha)	Fern Lake fire	Rocky Mountain National Park	[citation needed]
2013	14,280 acres (5,780 ha)[27]	Black Forest Fire	Black Forest, near Colorado Springs	The most destructive fire in Colorado state history until 2020. Destroyed 511 homes, left 28 homes partially damaged, and claimed the lives of two people.[28] Cause: natural causes eliminated.
2013	3,800 acres (1,500 ha)[29]	Royal Gorge Fire	Royal Gorge	Started June 11, 2013; jumped Royal Gorge and damaged the Royal Gorge Bridge.
2013	13,572 acres (5,492 ha)[30][31]	East Peak Fire	East Spanish Peak	Started June 19, 2013; put the entire town of Walsenburg, Colorado, under pre-evacuation status. Cause: Lightning.
2013	110,405 acres (44,679 ha)[31][32][33][34]	West Fork Fire Complex	Wolf Creek Pass	Started June 20, 2013; forced evacuation of entire town of South Fork, Colorado. The fire is composed of three subsidiary fires that merged: West Fork fire, Papoose fire and Windy Pass fire. Cause: Lightning.
2014	19,569 acres (7,919 ha)	Alkali fire	Moffat County near Maybell, Colorado	
2015	11,699 acres (4,734 ha)	Gutterson Ranch fire	U.S. 34 north of Keenesburg, Colorado	
2016	38,380 acres (15,530 ha)	Beaver Creek fire	Northwestern Jackson County, Colorado, Routt National Forest	Burned from June until October on the Colorado-Wyoming state line.
2016	16,574 acres (6,707 ha)	Hayden Pass fire	San Isabel National Forest southwest of Coaldale, Colorado	
2016	5,232 acres (2,117 ha)	Beulah Hill fire	Beulah, Colorado	Destroyed 14 structures.[citation needed]
2016	18,761 acres (7,592 ha)	Junkins fire	San Isabel National Forest west of Beulah, Colorado	Destroyed 26 structures.[citation needed]
2016	205 acres (83 ha)	Chatridge Fire	Highlands Ranch, Colorado	Caused by faulty utility pole operated by Xcel Energy. Highway 85 was closed down for a couple hours and more than 850 homes were evacuated.

2017	32,564 acres (13,178 ha)	Logan fire	Logan County, Colorado	Fanned by strong winds, the fire killed hundreds of cattle and destroyed 15 structures.[citation needed]
2017	12,839 acres (5,196 ha)	Peekaboo fire	Northwest Moffat County, Colorado	Cause: Lightning/natural.[citation needed]
2017	18,804 acres (7,610 ha)	Dead Dog fire	Rangely, Colorado	[citation needed]
2017	84 acres (34 ha)	Peak 2 fire	Breckenridge, Colorado	Although small, this fire was forced the evacuation of 463 homes near Breckenridge, Colorado.
2018	10,330 acres (4,180 ha)	Stateline fire	Las Animas County, Colorado and Union County, New Mexico	Started in New Mexico and burned into Colorado. Blackened over 28,000 acres.
2018	42,795 acres (17,319 ha)	MM 117 fire	El Paso County, Colorado	23 homes destroyed[35]
2018	33,609 acres (13,601 ha)	Badger Hole fire	Walsh, Colorado	Burned a total of 50,815 acres in Colorado and Kansas. Destroyed 24 structures.
2018	54,129 acres (21,905 ha)	416 & Burro Fire Complex	Durango, Colorado	The fire started June 1, 2018 about 10 miles north of Durango, Colorado.[citation needed]
2018	108,045 acres (43,724 ha)	Spring Creek Fire	Fort Garland, Colorado / La Veta, Colorado / Sangre de Cristo Mountains	The fire started June 27, 2018 about 9 miles NE of Ft. Garland, CO. The fire reached 108,045 acres of burned area. It was declared 100% contained on September 10, 2018.[36] More than 140 homes were lost to the fire.[37] At least 120 others have been damaged. The fire was human caused and the suspect faces 141 counts of first-degree arson — one count for each home destroyed by the fire.[38]
2018	13,023 acres (5,270 ha)	Weston Pass Fire	Fairplay, Colorado	
2018	19,955 acres (8,076 ha)	Divide fire	Moffat County, Colorado	
2018	20,120 acres (8,140 ha)	Silver Creek fire	Northwest of Kremmling, Colorado	
2018	12,588 acres (5,094 ha)	Lake Christine Fire	Basalt, Colorado[citation needed]	
2018	19,634 acres (7,946 ha)	Plateau fire	McPhee Reservoir[citation needed]	
2018	36,520 acres (14,780 ha)	Bull Draw fire	North of Nucla, Colorado[citation needed]	
2019	8,959 acres (3,626 ha)	Decker fire	Rio Grande National Forest and San Isabel National Forest south of Salida, Colorado	Caused by lightning in early September and was allowed to burn while being supervised in the Sangre de Cristo Wilderness. Fire flared up jumping Methodist Mt. threatening homes south of Salida.[citation needed]

2020	11,818 acres (4,783 ha)	Cherry Canyon Fire	37º 22' 3" -103º 27' 1"	Caused by lightning, Sunday, May 27.[39]
2020	2,905 acres (1,176 ha)	East Canyon Fire	19 Miles East of Cortez, Colorado	Caused by lightning, initial attack on Sunday, June 14 at 12:41pm.[40] The pre-positioned Durango Interagency Type 3 team responded to the initial attack and managed the fire until the Rocky Mountain Type 2 Blue Team assumed command of the fire on Tuesday June 16, 2020. The fire transitioned back to a local Type 3 organization on Wednesday, June 24 at 6:00 a.m.
2020	139,007 acres (56,254 ha)	Pine Gulch fire	18 Miles North of Grand Junction	Caused by lightning, initial attack on Friday, July 31, after 5 PM.[41] On 27 Aug 2020, Pine Gulch wildfire became the largest fire in Colorado history, only to be surpassed two months later by the Cameron Peak Fire.[6] Suppression costs are $35,000,000.[42]
2020	3,226 acres (1,306 ha)	Fawn Creek Fire	39º 45' 44", 108º 25' 7"	Caused by lightning, July 13, 2020. Suppression costs are $2,285,000.[42]
2020	461 acres (187 ha)	Chatridge 2 Fire	Highlands Ranch, Colorado	Started due to a faulty utility pole operated by Xcel Energy. Large tankers operating out of Rocky Mountain Metropolitan Airport(KBJC) assisted in firefighting operations.
2020	32,431 acres (13,124 ha)	Grizzly Creek fire	Glenwood Canyon	Started along Interstate 70 in Glenwood Canyon.[43] Structures destroyed: 3. Suppression costs: $36,000,000.[42]
2020	208,663 acres (84,443 ha)[44]	Cameron Peak Fire	6 miles North of Cameron Pass (Colorado),[45] Roosevelt National Forest	Started August 13, cause under investigation. On 14 Oct 2020 the fire became the largest wildfire in Colorado history.[46] Structures destroyed: 461. Suppression costs: $134 million.[47]
2020	14,577 acres (5,899 ha)	Williams Fork fire	Williams Fork Drainage in the Arapaho National Forest, southwest of Fraser.[48]	Started August 14, human-caused. (Size as of 13 October 2020). Suppression costs: $22,470,000.(costs as of October 14, 2020)[42]
2020	165 acres (67 ha)	Lewstone Fire	Lewstone Creek between Highway 14 and Rist Canyon[49]	Started on August 22 and was 100% contained on August 25.[50]
2020	20,433 acres (8,269 ha)	Middle Fork Fire	Routt National Forest	Caused by lightning, started in Routt National Forest.[48] (Size as of 25 October 2020) Suppression

				costs: $5,819,235.00.(costs as of October 14, 2020)[42]
2020	176,878 acres (71,580 ha)	Mullen fire*	Medicine Bow National Forest	This fire originated in Wyoming on September 17, and burned into Colorado on October 1.[51][52] Most of the acreage of this fire is located in Wyoming. Size as of 17 October 2020. Structures destroyed: 66. Suppression costs: $34,599,924.(costs and structures destroyed as of October 15, 2020)[42]
2020	192,560 acres (77,930 ha)[53]	East Troublesome Fire	Arapaho National Forest	Began on 10/14/2020 at 4:00 pm North of Parshall, Colorado causing the deaths of at least 2 elderly people. Cause under investigation. Colorado's second largest wildfire and the most destructive wildfire in Colorado history until the Marshal Fire of 2021, with estimated insured losses totaled $543 million ($560 in 2021 dollars) resulting from approximately 1,602 homeowner and auto insurance claims filed.[54]
2020	10,095 acres (4,085 ha)[55]	Calwood Fire		Reported at noon on 10/17/2020, North of Jamestown, Colorado. .
2020	460 acres (190 ha)[56]	Lefthand Canyon Fire		Discovered 12:41:00 p.m. 10/18/2020, Near Ward, Colorado.[57]
2021	1,600 acres (650 ha)	Marshall Fire	Boulder, Colorado	Reported approximately 10:30 am on 12/30/2021 near Marshall, Colorado. High winds swept the grass fire eastward through the towns of Superior and Louisville, Colorado, causing the evacuation of more than 30,000 people and a loss of $513,212,589 in under six hours. There were 1084 residential structures destroyed and 149 residential structures damaged.[58][59][60][61]
2022	190 acres (78 ha)	NCAR Fire	Boulder, Colorado	Reported around 2:00 pm Saturday, March 26th.