North Fork Fire Protection District
Community Wildfire Protection Plan

Jefferson County, Colorado

Prepared by:
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Jefferson Conservation District

Jefferson County Sheriff Emergency Management

Colorado State Forest Service

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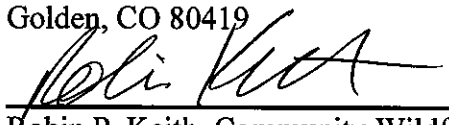
Prepared by: 
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Introduction

This *Community Wildfire Protection Plan* (CWPP) was developed for the North Fork Fire Protection District with guidance and support from Jefferson County Division of Emergency Management, Colorado State Forest Service and the United States Forest Service. The CWPP was developed according to the guidelines set forth by Healthy Forest Restoration Act (2003) and the Colorado State Forest Service - Minimum Standards for Community Wildfire Protection Plans (November, 2004). This CWPP supplements the Jefferson County Annual Operating Plan and the Jefferson County Fire Plan.

Wildfire Prevention and Fire Loss Mitigation

The Jefferson County Division of Emergency Management, the Jefferson County Fire Council, and the North Fork Fire Protection District support and promote Firewise activities as outlined in the Jefferson County Fire Plan.

Protection Capability

Initial response to all fire, medical and associated emergencies is the responsibility of the North Fork Fire Protection District. Wildland fire responsibilities of local fire departments, Jefferson County, Colorado State Forest Service, United States Forest Service, Bureau of Land Management and the U.S. Fish and Wildlife Service are described in the current *Jefferson County Annual Operating Plan.* All mutual aid agreements, training, equipment, and response are the responsibility of the local fire department and the agencies listed above.

The following agencies have reviewed and agree to this Community Wildfire Protection Plan:

Allen Gallamore
Colorado State Forest Service, Golden District

Rocco Snart
Jefferson County Sheriff's Office, Division of Emergency Management

Curt Rogers
North Fork Fire Protection District

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LIST OF ACROYNMS AND ABBREVIATIONS

AFOP	Annual Fire Operating Plan
BLM	Bureau of Land Management
BTU	British Thermal Unit
CAPCD	Colorado Air Pollution Control Division
CDPHE	Colorado Department of Public Health and Environment
CSFS	Colorado State Forest Service
CWPP	Community Wildfire Protection Plans
ERC	Energy Release Component
FBFM	Fire Behavior Fuel Model
FEMA	Federal Emergency Management Agency
NFFPD	North Fork Fire Protection District
FPD	Fire Protection District
GIS	Geographical Information System
HFRA	Healthy Forests Restoration Act
HOA	Homeowners Association
ICT	Incident Command Team
IMT	Incident Management Team
JFDRS	Jefferson County Fire Danger Rating System
JEFFCO	Jefferson County
mph	miles per hour
NAIP	National Agricultural Imagery Program
NEPA	National Environmental Protection Act
NFDRS	National Fire Danger Rating System
NFPA	National Fire Protection Association
NWCG	National Wildfire Coordinating Group
RAWS	Remote Access Weather Station
USFS	US Forest Service
WFU	Wildland Fire Use
WUI	Wildland-Urban Interface

GLOSSARY OF FIRE BEHAVIOR TERMS

Aerial Fuels All live and dead vegetation in the forest canopy or above surface fuels, including tree branches, twigs and cones, snags, moss, and high brush.

Aspect Direction toward which a slope faces.

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.

Chain A unit of linear measurement equal to 66 feet.

Crown Fire The movement of fire through the crowns of trees or shrubs more or less independently of the surface fire.

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

Defensible Space An area around a structure, either natural or manmade, where material capable of causing a fire to spread has been treated, cleared, reduced, or changed to act as a barrier between an advancing wildland fire and the loss to life, property, or resources. In practice, "defensible space" is defined as an area at least 30 feet around a structure that is cleared of flammable brush or vegetation.

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

Fire Danger The broad-scale condition of fuels as influenced by environmental factors.

Fire 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. In ground fires, the fire front may be mainly smoldering combustion.

Fire Hazard The presence of ignitable fuel coupled with the influences of terrain and weather.

Fire Intensity A general term relating to the heat energy released by a fire.

Fire Return Interval	The historic frequency that fire burns in a particular area or fuel type, without human intervention.
Fire Regime	The characterization of fire's role in a particular ecosystem, usually characteristic of particular vegetation, elevation, and climate, and typically a combination of fire return interval and fire intensity (i.e., high frequency low intensity/low frequency high intensity).
Fire Risk	The probability that wildfire will start from natural or human-caused ignitions
Fire Weather	Weather conditions that influence fire ignition, behavior and suppression.
Flaming Front	The zone of a moving fire where 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.
Fuel	Combustible material; includes, vegetation, such as grass, leaves, ground litter, plants, shrubs, and trees that feed a fire. Not all vegetation is acts as available fuel; deciduous vegetation such as aspen can serve as a barrier to fire spread, and many shrubs are only available as fuels when they are dead or drought-stressed.
Fuel Loading	The amount of fuel present expressed quantitatively in terms of weight of fuel per unit area, usually as tons per acre.
Flame Length	The distance from the base to the tip of the flaming front. Flame length is directly correlated with fire intensity.
Fuel Mitigation	Reducing and/or removing live and dead vegetation for the purpose of reducing the severity and/or spread of potential wildfires in those fuels. Sometimes also referred to as fuel management, fuel reduction, or fuel treatment.
Fuel Model	Simulated fuel complex (or combination of vegetation types) for which all fuel descriptors required for the solution of a mathematical rate of spread model have been specified.
Fuel Type	An identifiable association of fuel elements of a distinctive plant species, form, size, arrangement, or other characteristics that will cause a predictable rate of fire spread or difficulty of control under specified weather conditions.

Ground Fuel All combustible materials below the surface litter, including duff, tree or shrub roots, punchy wood, peat, and sawdust that normally support a glowing combustion without flame.

Indirect attack A method of fire suppression where actions are taken some distance from the active edge of the fire due to intensity, terrain, or other factors that make direct attack difficult or undesirable.

Intensity The level of heat radiated from the active flaming front of a fire, measured in BTUs (British Thermal Units) per foot.

Ladder Fuels Fuels which provide vertical continuity between strata, thereby allowing fire to carry from surface fuels into the crowns of trees or shrubs with relative ease. They help initiate and assure the continuation of crowning.

LANDFIRE Landscape Fire and Resource Management Planning Tools; an interagency vegetation, fire, and fuel characteristics mapping program, sponsored by the United States Department of the Interior (DOI) and the United States Department of Agriculture, Forest Service.

Live Fuels Living plants, such as trees, grasses, and shrubs, in which the seasonal moisture content cycle is controlled largely by internal physiological mechanisms, rather than by external weather influences.

National Fire Danger Rating System (NFDRS) A uniform fire danger rating system that focuses on the environmental factors that control the moisture content of fuels.

Prescribed Fire Any fire ignited by management actions under certain, predetermined conditions to meet specific objectives related to hazardous fuels or habitat improvement. A written, approved prescribed fire plan must exist, and National Environmental Protection Act (NEPA) requirements must be met, prior to ignition.

Rate of Spread The relative activity of a fire in extending its horizontal dimensions. It is expressed as a rate of increase of the total perimeter of the fire, as rate of forward spread of the fire front, or as rate of increase in area, depending on the intended use of the information. Usually it is expressed in chains or acres per hour for a specific period in the fire's history. Sometimes it is expressed as feet per minute; one chain per hour is equal to 1.1 feet per minute.

Risk The probability that a fire will start from natural or human-caused ignition.

Shaded Fuel Break An area of forest where trees have been thinned to specific specifications, where some trees remain but thin enough to not contribute to fire spread. Shaded fuel breaks are often strategically placed for optimum benefit to values at risk (such as homes, critical infrastructure, or natural resources)

Surface Fuels Loose surface litter on the soil surface, normally consisting of fallen leaves or needles, twigs, bark, cones, and small branches that have not yet decayed enough to lose their identity; also grasses, forbs, low and medium shrubs, tree seedlings, heavier branchwood, downed logs, and stumps interspersed with or partially replacing the litter.

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.

Wildland Fire Any fire burning in wildland fuels, including prescribed fire, fire use, and wildfire.

Wildfire A wildland fire that is unwanted and unplanned.

EXECUTIVE SUMMARY

The Community Wildfire Protection Plan (CWPP) is a strategic plan that identifies specific wildland fire risks facing communities and neighborhoods and provides prioritized mitigation recommendations designed to reduce those risks. Once the CWPP is finalized and adopted, it is the responsibility of the community or neighborhood to move forward and implement the action items. This may require further planning at the project level, acquisition of funds, or simply motivating individual homeowners.

This CWPP is not a legal document. There is no legal requirement to implement the recommendations herein. However, treatments on private land may require compliance with county land use codes, building codes, and local covenants. Treatments on public lands will be carried out by appropriate agencies and may be subject to federal, state, and county policies and procedures, such as adherence to the Healthy Forest Restoration Act (HFRA) and National Environmental Protection Act (NEPA).

The HFRA of 2003 provides the impetus for local communities to engage in comprehensive forest and wildfire management planning as well as incentive for public land management agencies to consider CWPP treatment recommendations as they develop their own strategic management plans. The HFRA provides communities with a flexible set of assessment procedures and guidelines that facilitate a collaborative, standardized approach to identify wildfire risks and prioritize mitigation actions. The CWPP addresses such factors as:

- Stakeholder collaboration and engagement
- Risk assessment – fuels, historical ignitions, infrastructure, structure ignitability, local resources, and firefighting capability
- Community fire hazard mapping
- Hazard reduction recommendations
- Suggested project prioritization

This CWPP provides wildfire hazard and risk assessments for neighborhoods and subdivisions identified as Wildland-Urban Interface (WUI) and Intermix zones within the NFFPD. WUI is defined as the area where development abuts undeveloped areas. Intermix areas are more sparsely populated and scattered throughout undeveloped areas, but still form cohesive, homogenous communities. Due to highly dispersed housing density and location combined with limited infrastructure adjacent to large and remote wildland areas, there is high potential for loss of life and property from wildfire. WUI and intermix delineations within the NFFPD focus on somewhat homogeneous communities that represent a common emergency response area with similar assets, risks, and hazards. This CWPP builds upon previous plans completed for the Lower North Fork and South Platte areas, which provide specific hazard assessments and recommendations for individual homes within those smaller assessment areas.

The North Fork Fire Protection District (NFFPD) is located at the southwestern edge of the greater Denver metropolitan area, in the Front Range Foothills of Colorado. The NFFPD serves approximately 280 square miles of primarily rural and exurban interface. The North Fork of the South Platte River curves through the area and feeds into Cheesman reservoir, a major water source for the city of Denver. In addition, the district has significant recreational resources and historic sites.

Decades of absence of fire and other natural disturbances coupled with years of persistent drought have resulted in dense and weakened timber stands in some areas. This has also negatively affected other vegetation types besides timber that are present within the district. Shrublands have grown dense and resulted in the accumulation of significant amounts of available hazardous surface fuels. In addition, woody species have encroached on areas that were historically characterized by more grass species, altering natural ecosystems. In some areas these ecosystems have gone unchecked by fire for more than a century. The net result is significant hazardous fuels across various vegetation types within the district and risk of higher than normal fire intensity. Although extensive fire hazard and fuels mitigation work has been completed over thousands of acres throughout the assessment area on lands owned by Denver Water Board and the Pike National Forest, there are still ample opportunities for individual landowners to extend and improve upon existing treatment areas and collaborate with these agencies for planned projects in the future.

Field surveys, public input, and collaboration with the NFFPD and other stakeholders were utilized for data collection, hazard assessments, and formation of treatment recommendations. Jefferson County Division of Emergency Management provides access to the full CWPP report for the public.

Public education, awareness and involvement are important components of any CWPP. Public meetings provide a means to share information about the assessment process and facilitate communication between the Core Team, stakeholders, and other interested parties and provide a collaborative forum through which hazards can be identified, discussed and prioritized. General receptiveness to mitigation recommendations may also be gauged. The first public meetings for the NFFPD were held on June 19, 2010 at the Deckers Community Center and the Buffalo Creek Community Center. The purpose of the first meeting was to introduce the CWPP process and overall project goals and objectives. The second meeting was held on August 27, 2010 at NFFPD Station 1. The purpose of the second meeting was to present the survey results and treatment recommendations and to solicit additional public and stakeholder input for the final report. A final meeting introducing the completed plan to the community will be held in the spring of 2011.

Questionnaires were distributed at both meetings in order to ascertain public opinion concerning the level of wildfire risk in the NFFPD, evaluate values at risk, and assess mitigation practices needed to reduce risk. Safety pamphlets and brochures explaining defensible space, shaded fuelbreaks, proper home construction, and landscaping practices designed to reduce the risk of wildfire loss were also distributed.

The National Fire Protection Association (NFPA) Form 1144, Standard for Protection of Life and Property from Wildfire 2002 Edition, was utilized to assess the level of risk and hazard to individual neighborhoods. Form 1144 provides a means to assess predominant characteristics within individual neighborhood communities as they relate to structural ignitability, fuels, topography, expected fire behavior, emergency response, and ultimately human safety and welfare. Scores are assigned to each element and totaled to determine the overall level of risk. Low, moderate, high, and extreme hazard categories are determined based on the total score. This methodology provides a standardized basis for wildfire hazard assessment and a baseline for future comparative surveys. Seven neighborhoods identified by the NFFPD as areas of concern were surveyed according to NFPA Form 1144 protocols during July of 2010. A summary of the community hazard ratings are provided in Table ES-1.

Table ES-1. Community Hazard Ratings

Community	Hazard Rating	Numerical Rating*
North Rainbow Falls	High	101
Foxton/Longview	High	97
Platte River Road Corridor	High	92
Buffalo Creek	High	88
Pine Grove	High	78
Trumbull/Deckers	Moderate	65
Spring Creek	Moderate	62

*Numerical rating based on calculations derived from the National Fire Protection Agency Standard for Reducing Structure Ignition Hazards from Wildland Fire (NFPA 1144). The complete forms and calculations are located in Appendix C.

In addition to the larger-scale treatments identified in this report, the most effective wildfire hazard reduction depends largely on the efforts of individual landowners making common sense modifications to their own homes and property. The creation of effective defensible space and the utilization of fire resistant construction materials will significantly reduce the risk of life and property loss in the event of a wildfire. When these common sense practices become the predominant model in a neighborhood the entire community benefits.

The predominant wildfire fuels in the NFFPD are pine forests with needle litter, herbaceous plants, and woody shrubs on the forest floor under the tree canopy (timber understory fuel models; see Appendix B). In neighborhood margins that interface with these habitats, effective hazard reduction can be as straight forward as establishing and maintaining a defensible space around the home, and reducing home ignitability. Other priority action items should include:

- Replacing wood shake roofs;
- Utilizing fire resistant building materials for remodels or new construction;
- Implement neighborhood improvement oversight committees; and,
- Fire prevention education.

Familiarization and coordination with the Jefferson County Annual Operating Plan is also recommended. This provides important information concerning county and regional fire operations, policies and procedure definitions. Information may be available through the through the Jefferson County Office of Emergency Management web site.

The following Table ES-2 summarizes the proposed mitigation project schedule for the NFFPD.

Table ES-2. Proposed Wildfire Mitigation Project Schedule

Year	Project	Actions
2011	Annual spring outreach	▪Contact and organize homeowners ▪Hold educational meeting about defensible space
	Annual spring/summer mitigation	▪Clean roofs and gutters ▪Trim limbs and shrubs within 3 to 5 feet of home ▪Rake and mow yard ▪Assist neighbors ▪Organize debris disposal
2012	Annual spring outreach	▪Contact and organize homeowners
	Annual spring/summer mitigation	▪Clean roofs and gutters ▪Rake and mow yard ▪Organize debris disposal
2013	Annual spring outreach	▪Contact and organize homeowners ▪Identify needed improvements to construction features throughout community
	Annual spring/summer mitigation	▪Where possible, coordinate projects between homeowner groups who have created defensible space and open space managed lands ▪Repeat yard maintenance & debris disposal
2014	Annual spring outreach	▪Contact and organize homeowners ▪Follow up with landowners who have not completed defensible space, offer assistance
	Annual spring/summer mitigation	▪Complete any outstanding projects from previous years ▪Begin long-term maintenance (as needed, re-trim shrubs, remove small trees, etc) ▪Initiate construction feature improvements

The CWPP development process facilitates collaboration among community-based organizations, fire protection authorities, local governments, public land management agencies, and private landowners to identify and prioritize measures to reduce wildfire risk. Maintaining the momentum created by this process is critical to successful implementation and ongoing community wildfire hazard reduction. Ownership of this responsibility lies with each community, neighborhood, and homeowner association identified in the CWPP.

NORTH FORK FIRE PROTECTION DISTRICT
COMMUNITY WILDFIRE PROTECTION PLAN

1 INTRODUCTION

1.1 CWPP Purpose

Dramatic natural and human-caused changes to forested areas occurred throughout the 20th century. In many cases, these changes led to a high accumulation of naturally occurring flammable forest fuels. Decades of fire suppression and fire exclusion in fire-adapted ecosystems have removed a critical natural process from the vegetation regeneration cycle. In addition, years of persistent drought have resulted in a weakened forest infrastructure and regional epidemics of disease and insect infestation. At the same time, demographic trends continue to shift the nation's population growth centers to western and southwestern states where fire-adapted forest ecosystems are predominant, resulting in fragmented forested landscapes. The region where human development is pushing into previously undeveloped expanses of wildland is known as the wildland-urban interface (WUI). This is the area where risk of loss to life and property due to wildfire is the greatest. The potential consequences of severe wildfires are devastating and costly, and in recent years spurred Congress to pursue an effective solution.

Precipitated by over a decade of increasing wildfire activity, related losses, and spiraling suppression costs, the National Fire Plan was developed by the federal government in 2000. The Healthy Forests Restoration Act (HFRA) of 2003 provides the impetus for wildfire risk assessment and planning at the county and community level and helps implement the core components of the plan. HFRA refers to this level of planning as the Community Wildfire Protection Plan (CWPP). This empowers the participating community to take advantage of wildland fire and hazardous fuel mitigation opportunities offered under HFRA legislation including a framework for hazard evaluation and strategic planning, prioritized access to federal grant funding supporting identified hazard reduction projects, and a basis for collaboration with local, state, and federal land management agencies.

The CWPP is a strategic plan that identifies specific wildland fire risks facing communities and neighborhoods and provides prioritized mitigation recommendations that are designed to reduce those risks. Once the CWPP is adopted, it is the community's responsibility to move forward and implement the action items. This may require further planning at the project level, acquisition of funds, and motivating individual home owners. This CWPP is not a legal document. There is no legal requirement to implement the recommendations herein. Actions on public lands can be subject to federal, state, and county policies and procedures such as adherence to the HFRA and National Environmental Protection Act (NEPA). Action on private land may require compliance with county land use codes, building codes, and local covenants.

1.2 North Fork Fire Protection District's need for a CWPP

The North Fork Protection District (NFFPD) is located southwest of the greater Denver, Colorado metropolitan area (Map 1, Appendix A). Although the Pike National Forest covers about 100 square miles of NFFPD and is more sparsely populated than the other fire protection districts in Jefferson County, several communities here occur in the wildland-urban interface (WUI) and Intermix. According to the Federal Register, Interface is defined as a community that directly abuts wildland fuels. Intermix communities exist where structures are scattered throughout a wildland area. Both interface and intermix require fire hazard mitigation.

As is typical of Colorado Front Range WUI zones, neighborhoods often extend into foothill valleys, canyons, and mountain slopes with restricted access and limited emergency water supplies. Lacking the existence of a formal municipality or commercial center, the district is characterized by small exurban and rural communities and unaffiliated clusters of homes with a common single ingress/egress. They are common examples of the WUI and each presents emergency responders with unique, identifiable, and addressable hazards and risks. Outlying ranches, homesteads, and individual homes are not addressed by the CWPP process and are best served through individual home hazard and risk assessments. However, improvements to home ignition zones and defensible space apply to all properties, including those not within the delineated community areas.

A particularly important value at risk in this district is the Upper Platte Watershed, which has suffered from severe erosion and sedimentation following past fire events, and could be further compromised by severe fires The Watershed encompasses approximately 1,000 square miles and supplies the Denver metropolitan area with 80 percent of its water. It is well known for its vast recreation opportunities. Cheesman and Strontia Springs Reservoirs, major water sources for the Denver area are also located in NFFPD.

As a result of the 1996 Buffalo Creek Fire post-fire erosion damage the Upper South Platte Watershed Protection and Restoration Project was developed. In 1998, the Colorado State Forest Service (CSFS), Denver Water, US Forest Service (USFS), Rocky Mountain Forest and Range Experiment Station, Environmental Protection Agency, US Geological Survey, Natural Resource Conservation Service, and Coalition for the Upper South Platte formed a steering committee to address forest health issues within the watershed. The US Fish & Wildlife Service became involved during the biological opinion process. The steering committee was dedicated to demonstrating the effectiveness of landscape-scale forest protection and restoration practices. These practices reduce the likelihood of catastrophic wildfires and their associated risks to human life, property, water quality and availability, and air quality.

The group facilitated a landscape scale assessment of 650,000 acres within the watershed to determine high-priority areas for restoration work. Work began on the project in 1999 and continues to this day. Over 25,000 acres have been treated on USFS, Denver Water, State, and private lands within the project area with additional treatments planned.

The district occupies the montane zone, which extends between the grasslands and shrublands of the lower elevations to sub-alpine forests at higher elevations. Much of this region is a fire-dependent ecosystem that historically experienced frequent natural ignitions that maintained an open stand structure and diverse vegetation composition. Natural resource management policies and changing ecological conditions have interacted in ways that resulted in hazardous fuel conditions throughout the district. Continuous rapid expansion of the WUI, coupled with the accumulation of hazardous fuels in a fire-prone region suffering from prolonged drought has set the stage for catastrophic wildfires with significant risk to life and property. Steep topography and narrow dead end roads complicate an already potentially catastrophic scenario. NFFPD has experienced several large fire events in recent history in parts of its district, including the 138,114-acre Hayman Fire in 2002, the 10,761-acre Hi Meadow Fire in 2000, and the 11,853-acre Buffalo Creek Fire in 1996. However, much of NFFPD is still heavily forested and high accumulations of hazardous fuels occur in and near many of the communities in the area.

To date, there have been two CWPP that address USFS, Denver Water, Jefferson County Open Space, and private lands that fall within and/or near the NFFPD, namely, the South Platte CWPP (2004) and the Lower North Fork CWPP (2007). Treatments in both plans primarily focused on USFS and Denver Water lands as they are the major landowners in the area. Approximately 50% of the treatments have been implemented in both plans. Although the existing plans provide thorough hazard assessments and action plans for the areas they cover, there has not been one plan that covers the entire NFFPD.

This document will encompass all WUI and rural intermix communities that lie within the FPD, some of which had not been previously assessed, making them eligible and competitive for federal fuels mitigation grants. In addition, this plan's recommendations are meant to apply to occluded properties that lie outside both the WUI and intermix boundaries.

The CWPP and its development process can be a significant educational tool for people who are interested in improving the environment in and around their homes. It provides a coordinated assessment of neighborhood wildfire risks and hazards. 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. This CWPP addresses fire hazard and makes recommendations to reduce wildfire hazard in the NFFPD in order to make it a safer place to live, work, and play.

1.3 CWPP Process

The HRFA designed the CWPP to be a flexible process that can accommodate a wide variety of community needs. This CWPP 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" (Society of American Foresters 2004) and the Colorado State

Forest Service Minimum Standards for Community Wildfire Protection Plans (CSFS 2009), and as outlined in Table 1.

Table 1. CWPP Development Process

Step	Task	Explanation
One	Convene Decision Makers	Form a Core Team made up of representatives from local governments, fire authorities, and Colorado State Forest Service (CSFS).
Two	Involve Federal Agencies	Engage local representatives of the U.S. Forest Service (USFS) and other land management agencies as appropriate.
Three	Engage Interested Parties	Contact and encourage participation from a broad range of interested organizations and stakeholders.
Four	Establish a Community Base Map	Develop a base map of the district that provides a better understanding of communities, critical infrastructure, and forest/open space at risk.
Five	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.
Six	Establish Community Priorities and Recommendations	Use the risk assessment and base map to facilitate a collaborative public discussion that prioritizes fuel treatments and non-fuel mitigation practices to reduce fire risk and structural ignitability.
Seven	Develop an Action Plan and Assessment Strategy	Develop a detailed implementation strategy and a monitoring plan that will ensure long-term success.
Eight	Finalize the CWPP	Finalize the district CWPP and communicate the results to interested parties and stakeholders.

The Core Team (Table 2) consists of representatives from local government, local fire authorities, and the CSFS. In addition, the Core Team includes relevant land management agencies and active community and homeowner association (HOA) stakeholders. Together these entities guide the development of the CWPP as described in the HFRA and must mutually agree on the plan's final contents. Collaboration between agencies and communities is an important CWPP component because it promotes sharing of perspectives, priorities, and other information that are useful to the planning process. The NFFPD CWPP was concurrently developed with the Douglas County CWPP, so several Core Team members for this plan also served on the Douglas County CWPP Core Team. This allowed a collaborative effort between the two Core Teams, with the County CWPP Core Team providing important technical guidance in the creation of this plan.

Table 2. NFFPD CWPP Core Team Members and Affiliations

Team Member	Organization
Curt Rogers	North Fork Fire Chief
Rocco Snart	Jefferson County Emergency Management
Allen Gallamore	Colorado State Forest Service
Kristin Garrison	Colorado State Forest Service, Denver Water Representative
Matt Schweich	U.S.Forest Service, Pike National Forest
Larry Means	Pine Grove Resident
Robin Keith	Jefferson Conservation District
Jill Alexander	Douglas County Wildfire Mitigation Specialist
Josh Keown	Douglas County Wildfire Mitigation Specialist

The next step is to engage other interested parties and stakeholders through public meetings and community outreach. For the NFFPD CWPP, public meetings were held and a community survey was distributed and posted online. This feedback ensured that the Core Team was adequately addressing fire mitigation questions and concerns unique to the communities in the area.

In step four, geographical information system (GIS) data is used to develop a community base map. The community base map identifies and delineates communities at a scale relevant to the NFFPD. The WUI and Intermix boundaries are meant to encompass a relatively uniform landscape and fuel structure for which a representative hazard rating can be applied. In this CWPP, WUI and Intermix zones were delineated based on overall community homogeneity and population density, which was determined with GIS data layers including topography, vegetation cover, and address points.

Once the community base map is established, a comprehensive risk assessment is conducted at the neighborhood or community level in order to determine relative levels of wildfire risk to better address hazard treatment prioritization. A standardized survey methodology is utilized in order to create an addressable rating benchmark for comparative future assessments and project evaluations.

CWPP fuel treatment recommendations are derived from the risk assessment. In addition, actions recommended in the Lower North Fork and South Platte plans and completed and planned treatment areas addressed by the USFS, CSFS, and Denver Water were also examined and, where applicable, incorporated into this CWPP. Mitigation recommendations are prioritized through an open and collaborative effort with the Core Team and stakeholders. Prioritized treatments target wildfire hazard reduction in these WUI communities and neighborhoods, including reducing structural ignitability and protecting critical supporting infrastructure. An action plan guides treatment implementation for high priority projects over the span of several years.

The finalized CWPP represents a strategic plan with Core Team consensus that provides prioritized wildfire hazard reduction treatment projects, preferred treatment methods, a base map of the WUI, defensible space recommendations, and other information relevant to the scope of the project.

There are several federal legislative acts that set policy and provide guidance to the development of the CWPP for the NFFPD:

- Healthy Forests Restoration Act (HFRA) (2003) – Federal legislation to promote healthy forest and open space management, hazardous fuels reduction on federal land, community wildfire protection planning, and biomass energy production.

- National Fire Plan and 10-year Comprehensive Strategy (2001) – Interagency plan that focuses on firefighting coordination, firefighter safety, post-fire rehabilitation, hazardous fuels reduction, community assistance, and accountability.

- Federal Emergency Management Agency (FEMA) Disaster Mitigation Act (2000) provides criteria for state and local multiple-hazard and mitigation planning.

There are also several sources of information that supports wildfire mitigation and response that provide guidance to the development of the CWPP for the NFFPD:

- The CSFS is a valuable resource that provides education and guidance to communities and individual landowners concerned with the threat of wildfire, as well as forest resource management in the WUI (http://csfs.colostate.edu/).

- The Jefferson County Annual Operation Plan (AOP) provides an intergovernmental mutual aid agreement between all fire districts in the county, including the CSFS and USFS. This pre-plan provides emergency response infrastructure for any large incident support.

- The Douglas County Annual Operation Plan (AOP)

- The Lower North Fork CWPP (http://csfs.colostate.edu/pages/documents/LowerNorthForkCWPP.pdf)

- The South Platte CWPP (http://csfs.colostate.edu/pages/documents/southplatteCWPP.pdf)

1.4 NFFPD CWPP Goals and Objectives

Table 3 provides a brief summary of the primary goals and objectives for the CWPP process.

Table 3. NFFPD CWPP Goals and Objectives

Goals	Objectives
Conduct a wildfire risk assessment	▪ Conduct a district-wide wildfire risk assessment. ▪ Identify areas at risk and contributing factors. ▪ Determine the level of risk to structures that wildfires and contributing factors pose.
Develop a mitigation plan	▪ Identify and prioritize hazardous fuel treatment projects. ▪ Identify and prioritize non-fuels mitigation needs.
Manage hazardous fuels	▪ Identify communities at highest risk and prioritize hazard reduction treatments. ▪ Develop sustainable initiatives at the homeowner HOA level. ▪ Secure funding and assist project implementation.
Facilitate emergency planning	▪ Develop strategies to strengthen emergency management, response, and evacuation capabilities for wildfire. ▪ Build relationships among county government, fire authorities, and communities.
Facilitate public outreach	▪ Develop strategies to increase citizen awareness and action for Firewise practices. ▪ Promote public outreach and cooperation for all fuels reduction projects to solicit community involvement and private landowner cooperation.

As a strategic plan, the real success of any CWPP hinges on effective and long-term implementation of the identified objectives. The public outreach phase of the CWPP development process includes efforts to identify stakeholder groups that can serve as an implementation team, which oversees the execution of prioritized recommendations and maintains the plan as the characteristics of the WUI change over time. Specific projects may be undertaken by individual homeowner associations, while larger scale treatments may require collaboration between multiple homeowner associations, local government, and public land management agencies. Original CWPP Core Team representatives may, but are not required to assist in the implementation of the CWPP action plan. Overall, however, the key to the success of CWPP implementation is community participation. Continued public meetings are recommended as a means to generate additional support and maintain momentum.

2 WILDLAND FIRE MANAGEMENT OVERVIEW

2.1 Wildland Fire Types and Classification

There are two types of fires that burn in wildland fuels: prescribed fire and wildfire. Prescribed fires are planned fires ignited by land managers to accomplish specific natural resource management objectives. Wildfires are unplanned fires that result from natural ignition, human-caused fire, or escaped prescribed fire. Under certain circumstances wildfires can be managed with minimum suppression to achieve multiple objectives, including resource benefits.

Wildland fires are also classified by how they burn in various fuels. *Ground fire* refers to burning/smoldering materials beneath the surface including duff, roots, decomposing wood, peat, and sawdust that normally support a glowing combustion without flame. *Surface fire* refers to loose fuels burning on the surface of the ground, which includes leaves, needles, small branches, as well as grasses, forbs, low and medium shrubs, tree seedlings, fallen branches, downed timber and slash. Depending on the type of surface fuel, surface fires can range from small and slow-moving to intense, fast-moving, and/or prolonged fires. *Passive crown fire* encompasses a wide range of crown fire behavior, from occasional torching of isolated trees or groups of trees to nearly active crown fire. Passive crown fire is often referred to simply as "torching". Torching occurs when the vegetation that spans the gap between the forest floor and tree crowns (ladder fuel) allows a surface fire to travel vertically into flammable tree crowns. *Active crown fire* is a wildland fire that moves rapidly through the crowns of trees or shrubs independently of a surface fire. Active crown fires are intense, destructive, and difficult to suppress.

Wildland fuels comprise both dead and live vegetation, and are described in terms of density, bed depth, continuity, vertical arrangement, and moisture content. For fire to ignite and spread, wildland fuels must meet the conditions of combustion (sufficient heat and oxygen). If the potential fuel does not meet the conditions of combustion, it will not ignite. Conditions of combustion can vary widely across geographic region and among different fuels in an area. This explains why some trees, patches of vegetation or structures may survive a wildland fire and others in the near vicinity are completely burned.

2.2 Wildland Fire Behavior

Fire behavior is a description of the manner in which a fire reacts to the combined influences of fuel, weather and topography. Fire behavior is observed and assessed at the flaming front of the fire and described most simply in terms of fire intensity (in feet of flame length) and in rate of forward spread (Table 4). The implications of observed or expected fire behavior are essential components of suppression strategies and tactics, particularly in terms of the difficulty of control and effectiveness of various suppression resources.

Table 4. Fire Behavior Ratings

Adjective class	Rate of Spread (ch/hr)*	Flame Length (ft)
Very Low	0 - 2	0 - 1
Low	2 - 5	1 - 4
Moderate	5 - 20	4 - 8
High	20 - 50	8 - 12
Very High	50 - 150	12 - 25
Extreme	> 150	> 25

Stubbs T., 2005, Adjective Ratings for Fire Behavior

*ch/hr = chains per hour, where 1 chain = 66 feet; this standard measurement of rate of spread is approximately the same as feet per minute, where 1 chain per hour ~ 1 foot per minute

Potential surface fire behavior may be predicted by classifying vegetation in terms of fire behavior fuel models (FBFM) and using established mathematical models to predict potential fire behavior under specific climatic conditions. In this CWPP, FBFMs were obtained from existing GIS and vegetation data layers of the NFFPD.

In general, fire burns more rapidly and intensely up slopes. Additionally, topographic features such as narrow drainages and box canyons can funnel warm air upslope, further intensifying fire behavior. However, wind tends to be the most significant factor in the most extreme and destructive fires, driving active crown fires and causing long-range spotting ahead of the main fire front. Strong winds common along the Front Range can override topographic effects on fire behavior, even causing wildfire to be driven rapidly down slope.

2.3 History of Wildfire

Lightning-caused fire is a natural component of Front Range ecosystems, and its occurrence is important to maintaining the health of forest and open space ecosystems. Native Americans used fire as a tool for hunting, improving wildlife habitat and land clearing. For example, ponderosa pine woodlands of the montane zone and lower elevation brushlands and grasslands historically experienced relatively frequent fire return intervals. Extensive research has been conducted in Front Range forests in the assessment area. Fire history reconstruction in ponderosa pine forests in the vicinity of Cheesman Reservoir shows evidence that fire occurred in the area every 20 to 50 years between 1531 and 1880 (Huckaby *et al*. 2001). As such, many of the plant species and communities are adapted to recurring fire through phenological, physiological, or anatomical attributes. In addition, the reproduction and persistence of some plant species, such as lodgepole pine and western wheatgrass, require reoccurring fire.

Beginning in the 19th century, Euro-American settlers in western North America altered the natural fire regime in several interrelated ways. The nature of vegetation (fuel) changed because of land use practices such as homesteading, livestock grazing, agriculture, water development, and road construction. Livestock grazing reduced the amount of fine fuels such as grasses and forbs, which carried low-intensity fire across the landscape. Continuous stretches of forest and open space fuels were broken up by land-clearing activities. Additionally, with the significant reduction of naturally occurring fire

after 1880, there has been widespread establishment and persistence of trees since 1880, leading to denser forest stands that can carry more intense, severe wildfires.

Although advances in scientific knowledge and land management techniques have improved the way wildland fire is managed in recent years, land managers and firefighters are faced with many challenges when fires burn in the WUI. Present-day land use changes, particularly residential development, have continued to impact wildland ecosystems and hazardous fuel distribution. Since the 1970's, housing growth within 1-km of national forests and other protected areas has outpaced the rate of growth in urban areas (Radeloff *et al*. 2010). Increasing population density in the WUI makes wildfires more complex and potentially dangerous for firefighters and the general public.

2.4 Fuels Management

Heavy wildland fuel loading and continuity has created hazardous situations for public safety and fire management, especially when found in proximity to communities. These hazardous conditions require an array of mitigation tools, including prescribed fire and mechanical thinning treatments to protect human life, economic values, and ecological values. Objectives of fuels management include (but are not limited to) reducing surface fire intensity, reducing the likelihood of crown fire initiation and spread, and improving forest health. These objectives may be accomplished by various methods of reducing surface fuels and ladder fuels, thinning trees to decrease crown density, and/or retaining larger fire resistant trees. By breaking up vertical and horizontal fuel continuity in a strategic manner, firefighters and other suppression resources are afforded better opportunities to control fire rate of spread and contain wildfires before they become catastrophic.

Prescribed fire is commonly used as a resource management tool under carefully planned conditions by many land management agencies. It includes completing a detailed burn plan with burn parameters (prescriptions), pre-treatment of the fuel load, close monitoring of weather, and use of specific ignition patterns to achieve desired results. When implemented correctly, prescribed fire can improve wildlife habitat, help abate invasive vegetation, reduce excess fuel loads, and lower the severity of future wildfires in the treatment area. Prescribed fires are ignited only under favorable weather conditions, and must meet air quality requirements of the Colorado Department of Public Health and Environment (CDPHE) Air Pollution Control Division (CAPCD) in order to ensure the safety of firefighters and the public. Prescribed fires may be conducted either in a defined area as a broadcast burn, or in localized burn piles. Broadcast burns are used to mimic naturally occurring wildfire within pre-prepared control lines by highly trained fire personnel. Burn piles are utilized to dispose of excess woody material after thinning if other means of disposal are not available or cost-prohibitive. Pile burns do not necessarily need to be conducted by trained professionals, but are subject to local permitting and air quality control guidelines. Acceptable burn days are determined by county government, and are usually limited to high moisture or snowy conditions.

Mechanical thinning is another management tool that can be used to break up fuel continuity in order to reduce fire intensity and spread. This can be accomplished in a variety of ways, but most commonly with chainsaws and/or masticators. Chainsaws and other hand tools have been traditionally used to mitigate fuels on a smaller scale because it is time-and labor-intensive, but affords the most controlled results. Once the forest is thinned, the slash and wood must be removed from the forest, chipped onto the forest floor, or piled and burned. In some cases, slash can be "lopped and scattered", but this can have a negative impact on fire hazard if too much woody debris is left after thinning. Slash removal can be the most costly and time-intensive phase of forest thinning by chainsaws and hand tools. Therefore, masticators have become a widely used management tool in recent years. A masticator head is mounted on a skid steer or tractor and shreds forest fuels, including whole trees, then leaves the shredded/chipped material on the forest floor. Mastication of fuels does not reduce the amount of fuels in a forest stand, but redistributes it in a manner in which it does not contribute to crown fire initiation and spread. Although limited to machine-operable terrain (slopes less than 40%, not rocky, etc.), this method of thinning is generally quicker and more cost-effective than hand-thinning with chainsaws, and large-scale fuel treatments can be completed in a relatively short time.

Land managers often use a combination of these fuel mitigation techniques to achieve management objectives, depending on the vegetation type, terrain, adjacent private lands, or other values at risk. Private landowners should also consider these factors when choosing fuel mitigation tools. Additionally, landowners can improve the effectiveness of their own fuel mitigation treatments by using a combination of tools and using adjacent fuel treatments to their advantage. This topic is discussed in more detail in the action item recommendations.

3 NORTH FORK FIRE PROTECTION DISTRICT PROFILE

3.1 County Setting and Assessment Area

The NFFPD is located west and south of Denver, and comprises approximately 300 square miles, covering the southern third of Jefferson County and a small portion of Douglas County.

Jefferson County, which contains most of the FPD, was established in 1861 as one of the original 17 counties created by the Colorado Territorial Legislature with a land base of 774 square miles. The county has the fourth largest population in the state, currently estimated at 545,290 people with approximately 190,440 people living in the incorporated areas. The southeast corner of the fire protection district lies in Douglas County, south of the Denver Metro area, and follows the Upper South Platte River. The NFFPD portion of Douglas County is rural and relatively sparsely populated. Douglas County has a population about half that of Jefferson County, but is one of the fastest-growing counties in Colorado, continually expanding the WUI.

Land ownership is distributed among Denver Water and private parcels along the South Platte River, along with scattered private parcels in the upper slopes of the communities. The area is generally bounded by the Pike National Forest to the west and south and Jefferson County Open Space and private land to the north.

The local economy is dictated by the proximity and ease of access to the business and employment opportunities in the nearby Denver metro area. Most working residents commute daily to Denver, but several local businesses and tourism are economically important to the area. Numerous getaways on nearby county, state, federal and private lands with world-class hunting, climbing, cycling, camping, and fishing areas abound locally.

The assessment area for this CWPP is defined by the boundaries of the NFFPD. Using GIS data, communities were delineated and designated as WUI or Intermix. Interface (WUI) communities are those with greater than 30 homes in a fairly homogeneous area. Intermix communities are fairly homogeneous, but more sparsely populated communities. In this CWPP, intermix zones also encompass the more sparsely populated areas on the margins of WUI areas. This ensured that communities that would not be considered “WUI” by some definitions could be incorporated into the CWPP. The core team identified seven WUI and Intermix areas based on population distribution, infrastructure, and emergency response. Each community represents a specific response area with unique characteristics and identifiable hazards and risks. The remainder of the district is characterized by larger parcel sizes and lower structural density and would be more accurately assessed using individual home hazard and risk surveys, which are outside the scope of this CWPP.

3.2 Climate

The climate of the area is relatively dry with the majority of precipitation occurring in the spring months and late summer monsoons. However, with over 4,000 feet of vertical relief within the district, average conditions vary greatly from one location to another. In the summer months, thunderstorms can occur almost daily and can produce hundreds of lightning strikes in a single storm. The area receives over 240 days of sunshine per year and an average of 16 inches of annual precipitation. Winter high temperatures are typically in the mid 40s and summer highs tend to remain in the 80s. The low precipitation months are December, January, and February. Seasonal weather patterns over the region and topographic effects from the continental divide can generate high winds year-round. It is not uncommon for this area to experience winds in excess of 50 miles per hour. These conditions are optimum for wildfire ignition and spread. As the climate has warmed and dried over the past century, it is now possible for wildfires to occur 12 months a year in the NFFPD.

Table 5. Average Monthly Climate Summary for NFFPD, Cheesman Climate Station

	Month												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average max temp (ºF)	45	47	51.1	58.2	67.3	78.2	83.4	81.5	75.4	65.3	53.4	46	62.7
Average min temp (ºF)	10.2	11.8	18.7	26.5	34.8	43.3	48.7	47.1	39.5	29.3	19.8	12.6	28.5
Average total precipitation (inches)	0.39	0.56	1.13	1.8	1.85	1.56	2.62	2.5	1.25	1.04	0.68	0.57	15.94
Average snowfall (inches)	5.6	7.3	11.2	10	2.1	0.2	0	0	1.3	4.4	7.2	7.3	56.6

Data obtained from the High Plains Regional Climate Center (http://hprcc.unl.edu).

3.3 Topography

Topography refers to the steepness of slope (expressed in percent or degrees) and aspect (expressed as direction the slope faces). The elevation of the FFPD ranges from 6,000 to 8,200 ft with most of the homes above 7,000 ft. The entire district is comprised of mountainous terrain with slopes ranging from 10 percent to over 50 percent slope. Most homes are in areas exposed to slopes of 20 percent or steeper. Although most of the homes in the WUI and Intermix are on slopes that are less than 30%, almost all of the homes are within 300 feet of steeper slopes. Not only does this affect potentially severe fire behavior, it can limit the type and extent of fuel mitigation that can take place near homes that need it. For example, mechanical fuels reduction with masticators is generally limited to slopes less than 50%, on average. Mitigation with chainsaws is the most feasible method for steep slopes, but in general, the more difficult the terrain is, the more costly and dangerous the work is. Therefore, slopes exceeding 40% are usually omitted from implementation plans in favor of more cost-effective areas on easier terrain.

In this CWPP, topography was assessed with a digital elevation model (DEM) in GIS. Both topography and elevation play an important role in dictating existing vegetation

and, therefore, fuels and fire behavior. The steep slopes, canyons, draws, and ravines throughout the area channel winds and contribute to severe fire behavior. Topography also dictates community infrastructure design, further influencing overall hazard and risk factors.

3.4 Wildland Vegetation and Fuels of the Assessment Area

The vegetation in the district is typical of the Rocky Mountain Montane zone, which ranges from 5,600 to 9,500 feet. The dominant tree species throughout the assessment area are ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*). The distribution and density of vegetation species are driven primarily by available soil moisture, which is closely related to elevation and slope aspect. This variability is known as the topographic-moisture gradient (Whittaker 1967), one of the key concepts in forest science. At lower elevations, drier sites that limit tree growth, and recently burned areas, vegetation types include dry grass and shrublands. Gambel oak (*Quercus gambelii*) is the dominant species, with mountain mahogany (*Cercocarpus montanus*) occasionally co-dominant. Common species of grass in this area include prairie Junegrass (*Koeleria macrantha*), blue grama (*Bouteola gracilis*), western wheatgrass (*Pascopyrum smithii*), little bluestem (*Schizachyrium scoparium*), Timothy (*Phleum pretense*), and cheatgrass (*Bromus tectorum*).

As elevation and moisture availability increase, ponderosa pine (*Pinus ponderosa*) and mixed conifer woodlands with herbaceous and shrub understory are common. North-facing slopes throughout the district are characterized by denser stands of ponderosa and mixed conifer forests dominated by Douglas-fir (*Pseudotsuga menziesii*). In the upper montane zone, lodgepole pine (*Pinus contorta*) is prevalent. Quaking aspen (*Populus tremuloides*) occurs intermittently where micro-site conditions provide enough moisture for them to thrive in either persistent or seral stands.

Deciduous riparian zones along rivers and creek beds are present throughout the area, with occasional stands of cottonwood (*Populus* spp.) and willow (*Salix* spp.). The vegetation in these riparian zones are generally not significant carriers of fire, and therefore do not usually require extensive mitigation.

The type of vegetation coupled with disturbance regimes determines the amount and distribution of wildland fuels. For example, dead and down timber and needle litter can be heavy in timber stands and woodlands where disturbance has been absent for many decades. Conversely, grasslands and that lack woody species and can burn more frequently have very low fuel loads. Predicting the potential behavior and effects of wildland fire in different fuels is an essential task in fire management. Mathematical surface fire behavior models and prediction systems are driven in part by fuelbed inputs such as load, bulk density, fuel particle size, heat content, and moisture of extinction.

To facilitate use in models and systems, fuel inputs have been formulated into fire behavior fuel models (FBFM). The FBFM concept was developed in 1972 by Rothermel, and Albini (1976) refined the original 11 fuel models based on a series of fire behavior calculations derived from 13 discrete fuel and vegetation types. Scott and

Burgan refined the 13 FBFM system in 2005 to create 40 FBFM, which are now widely used in fire management and considered more accurate than the original 13 fuel model system.

This CWPP utilizes the Scott and Burgan 40 FBFM methodology in order to accurately represent the current fire hazards and risks in the NFFPD. The forty FBFMs are divided into seven general fuel groups; grass, grass-shrub, shrub, timber-understory, timber litter, slash-blowdown, and non-burnable. Each group comprises four or more fuel models. Of these 40 fuel models, thirteen occur in the NFFPD in six fuel categories (Table 6). Appendix E contains information about each FBFM in the NFFPD, and can be used as a pull-out reference section.

Table 6. Fuel Models in the District

Fuel Group	Code	Description	% Cover of Area
Grass	GR1	Short sparse dry climate grass	8
Grass	GR2	Low load dry climate grass	2
Grass-shrub	GS1	Low load dry climate grass-shrub	7
Grass-shrub	GS2	Moderate load dry climate grass-shrub	11
Shrub	SH1	Low load dry climate shrub	7
Shrub	SH2	Moderate load dry climate shrub	<1
Shrub	SH5	High load dry climate shrub	<1
Shrub	SH7	Very high load dry climate shrub	2
Timber understory	TU1	Low load dry climate timber-grass-shrub	18
Timber understory	TU5	Very high load dry climate timber-shrub	15
Timber Litter	TL1	Low load compact conifer litter	1
Timber Litter	TL3	Moderate load conifer litter	16
Timber Litter	TL8	Long needle litter	2
Non-burnable	NB	Non-burnable (open water, urban, agricultural, snow, bare ground)	10

Grass; FBFM GR1 and GR2

In these fuel models, grass is the primary carrier of fire. Grass is either naturally sparse, or heavily grazed. For both, flame lengths and rate of fire spread is quite low, and therefore do not significantly contribute to extreme fire behavior. The grass species present are common in open short grass prairie, meadows, or alpine tundra. Historically, at lower elevations, relatively frequent disturbance by wildfire removes dried biomass and woody shrub and tree species before it becomes excessive surface fuels. In fast-moving or low-intensity fires, the underground portions of plants are rarely killed, and vegetation (particularly grasses) can resprout quickly. These fuel types cover about 10% of the assessment area.

Grass-Shrub; FBFM GS1 and GS2
The primary carriers of fire in these fuel models are grasses and shrubs combined. Within the NFFPD, shrubs in these fuel models are mostly 1-3 feet in height, mixed with short grass. Shrub and grass species in this fuel type requires disturbance such as fire to reproduce, either by seed or root crown sprouting. Rate of spread is high due to the size and continuity of fuels, and flame lengths are moderate. These fuel types cover 18% of the assessment area.

Shrub; FBFM SH 1, SH2, SH5, and SH7

The primary carriers in this fuel groups are shrubs and shrub litter. Vegetation cover may be multi-layered, with short shrub and herb species in the understory of dominant overstory shrubs. In some cases, Gambel oak can reach small tree size. Rate of spread is moderate to high, and flame lengths are generally moderate. These fuel types cover about 9% of the assessment area.

Timber Understory; TU1, TU5
The primary carriers of fire in these fuel types are forest litter, grass, shrub, and small tree understory. Spread rate is low to moderate; flame length is low to high. Fire usually does not ladder into tree canopies unless the surface fuels reach vertically to tree crowns. However, active crown fire could spread from adjacent areas to TU fuel types if the forest canopy is continuous. Common species in the TU fuel types in this area include ground juniper, Gambel oak, Rocky Mountain juniper, ponderosa pine, and Douglas-fir. These fuel types cover 33% of the assessment area, with TU5 (very high load timber understory) representing 18% of the assessment area.

Timber Litter; TL1, TL3, TL8

The lower foothill slopes on the western margin of the district support some stands of ponderosa (*Pinus ponderosa)* on saddles and north and west facing slopes. Further west at slightly higher elevation ponderosa stands dominate north facing slopes and typically are dense with some mixed Douglas-fir (*Pseudotsuga menziesii).* Here dead and down woody surface fuels intermingle with the grass and shrub understory. In higher elevation stands on the western side of the district, surface fuels are influenced by long needle timber litter (TL8). These fuel types cover about 19% of the assessment area.

Non-burnable; NB

Non-burnable fuel types include a variety of substrate cover. These include open water, agricultural, bare ground, and urban. Each non-burnable fuel type has its own code and characteristics, but they are combined in this CWPP for simplicity. Non-burnable areas cover less than 10% of the assessment area.

3.5 Fire Protection Authority and Water Resources

Emergency fire, medical, and rescue services for the district are primarily provided by the North Fork Volunteer Fire Department. There are three fire stations in the district. They are located in Buffalo Creek, Pine Grove, and Trumbull, but only Station 1 in Buffalo Creek is staffed full-time. North Fork utilizes three type I engines carrying 1000 gallons of water each, three engine-tenders carrying 2000 gallons of water each and one type three tender. There are also three type 6 engines (brush units) for wildland operations. In addition, the US Forest Service at Buffalo Creek has two Type-6 wildland fire engines in service during the summer fire season.

Due to the district's rural location, there are no pressurized hydrant systems. Suppression resources move water using techniques called "drafting" and the "water shuttle system." This involves using atmospheric and negative pressures to take water directly from a river, stream or lake and using Tender trucks to shuttle the water to the scene of the fire. The Tenders then release their tanks into fold-out portable tanks next to an attacking engine (or a supplying engine, if driveways or narrow roads restrict access), essentially creating a pond where ever it is needed. This cycle continues through the duration of the fire. There are several drafting points along the South Platte River, which serves as a primary emergency water source for the homes along South Platte River Road. Small retention ponds located in Buffalo Creek and North Rainbow Falls can also provide water for drafting.

Figure 1. Drafting point (dry hydrant) near Longview

Figure 2. Pond and emergency fire equipment in North Rainbow Falls

3.6 Values at Risk

In any hazard and risk assessment, human life and welfare are the most important resources to protect. Homes, businesses, aesthetics, cultural, and ecological resources are all important factors and certainly influence any recommendation, but the safety and welfare of residents and emergency responders remains the top priority. The WUI and intermix communities in the assessment area have inherent risks: residential and commercial development in areas historically prone to fire, hazardous fuels, and limited access. These risks contribute to fires that have high resistance to control. Catastrophic wildfire has a severe and long-term impact on all natural resource and ecological values that we have come to take for granted. The actions recommended in this CWPP are geared towards lowering the wildfire risk to neighborhoods, as well as economic and ecological resources.

Homes

About 650 homes are located in the NFFPD, with approximately 2000 permanent and seasonal residents. The majority of homes in the area have a "high" fire hazard rating due to expected fire behavior and surrounding wildland fuels. Additionally, damage from severe flooding following severe wildfires threatens the many homes that are located on the banks of the South Platte River and its tributaries, such as Buffalo Creek. Therefore, mitigating the severity of wildfires in the area reduces multiple risks.

Watersheds

Another significant resource at risk is area watersheds, which are a critical part of the NFFPD and the great Denver-metropolitan area. The Upper South Platte River and its lower north fork run through the populated area of the district, and feeds into Strontia Springs and Cheesman Reservoirs, the main municipal water supply to 1.3 million residents of Denver and its outlying areas. The area is dominated by highly erosive, decomposed granitic soils. When the dense, continuous vegetation is completely burned away, there can be devastating circumstances, because severe wildfires reduce the erosion threshold of watersheds.

Following the Buffalo Creek fire in 1996, severe flooding caused by heavy thunderstorms washed out County Road 126, destroyed the town's utilities and infrastructure, and claimed the lives of two Buffalo Creek residents. The Buffalo Creek flood also caused heavy sedimentation of Strontia Springs reservoir, reducing its capacity by 93%. As of August 2010, there was still 625,000 cubic yards of sediment that needed to be dredged from the reservoir. Heavy rains and resultant flooding after the Hayman fire caused severe erosion along several miles of the upper South Platte River basin, which choked the river and its tributaries with sediment and other debris, led to heavy sedimentation in Cheesman Reservoir, and damaged infrastructure and private property. Similar severe flood damage has affected the area as recently as July of 2009.

Figure 3. Alluvial Fan. The Buffalo Creek Fire lowered the erosion threshold of the watershed. As a consequence of this wildfire, a 100-year rainstorm in July 1996 caused erosion upstream and deposition of this alluvial fan at the mouth of a tributary to Buffalo Creek. Buffalo Creek is flowing to the right at the bottom of the photograph. Photo by R. H. Meade, USGS.

Local Economy

Much of the district's economy relies on recreation and tourism. Data compiled by the Census Bureau show that in Colorado more people are involved, and spend more money, in wildlife related activities than any other state in the nation. A few small businesses are located in Pine Grove and Deckers, which are patronized by visitors to the many nearby recreation areas as well as many local residents. The loss of scenic vegetation and river access that draw tourists would severely impact the local economy. Due to the abundance of natural resources in the district, both hunting and fishing are major draws to the area. Not only are these outdoor sports a culturally significant aspect of life in the area, they support the economies of the small communities here.

Historic Sites

The NFFPD has a rich cultural and historic legacy. Native Americans, river transportation, a rail line and roadway connecting Denver to mountain and mining communities, early tourist activity, and ranches contribute to the story. The North Fork National Historic District follows 13 miles of the South Platte River, along County Roads 96 and 126, from Pine Grove south to Buffalo Creek, and east to Foxton. Historical resources foster connection to and an understanding of our past, and serve as an inspiration for future generations. These communities therefore have identified several

high-value sites that contribute to the historical significance of the area, such as the Foxton Post Office, Green Mercantile, and Baehr Lodge.

Figure 4. Baehr Lodge in Pine Grove

Natural Ecosystems and Habitat

The NFFPD is home to numerous native wildlife species, such as elk, mule deer, red fox, songbirds, raptors, and threatened species such as Mexican spotted owl, Preble's meadow jumping mouse and the Pawnee montane skipper butterfly. Bald eagles are occasionally sighted along the river and near Cheesman reservoir, but in fewer numbers since the Hayman fire in 2002. Although all endemic species have endured for thousands of years with the occurrence of wildfire, loss of habitat due to exurban development results in higher negative impacts from wildfires. Effects from flooding and severe runoff after severe fires also damages aquatic and riparian habitat, which takes many years to recover.

4 WILDFIRE HAZARD ASSESSMENT METHODS

4.1 Components of Wildfire Hazard Analysis

Wildfire hazard assessment takes into account a variety of factors that ultimately result in a representative hazard ranking of the neighborhoods and subdivisions that have been collaboratively identified within the assessment area by the core team. Hazard rankings provide quantifiable guidance in the determination of mitigation treatment project prioritization.

Factors that contribute to wildfire hazard assessment are fire behavior, community infrastructure, and ignition potential. Elements that influence fire behavior include topography, weather conditions, and the type, density and configuration of vegetation and other fuels. Community infrastructure is evaluated in terms of emergency response, defensibility, and structural flammability. Ignition potential is influenced by population density, proximity to roads and other infrastructure. Overall, the relationship between expected fire behavior in wildlands and the placement and design of neighborhoods in wildland areas is at the core of an effective community wildfire hazard assessment. From this process, targeted mitigation recommendations are developed that directly address the identified hazards and, if implemented, will reduce the risk of loss from a wildfire for each homeowner as well as the community as a whole.

As part of the assessment, a concerted effort was made to solicit and include input from the public. Public meetings were convened twice during the summer of 2010 in Buffalo Creek and Deckers. The purpose of the first meeting was to introduce the CWPP concept and overall project goals and objectives. The meeting also introduced the CWPP Core Team and provided an opportunity for the public to participate in the process, review the community interface and intermix boundaries, and comment on their specific mitigation concerns. The purpose of the second meeting was to present the results of the community hazard assessment and to further solicit public input for the final report.

In addition, a questionnaire (Appendix D) was posted online and distributed at several community events and public meetings to obtain public opinion information concerning the perceived level of wildfire risk in the NFFPD, understand public values at risk, and assess attitudes about mitigation practices that may be recommended to reduce risk. WUI safety pamphlets and brochures that explained home construction and landscaping practices designed to reduce the risk of wildfire loss were also distributed. The survey was general in its scope, and response was limited. The responses do not represent a statistical sample of North Fork residents. The results of the survey can, however, give a broad picture of the overall perception of fire risk and mitigation efforts in the district. Follow-up surveys could target individual communities and/or address specific planned projects.

A total of 39 surveys were completed and returned. The majority of the respondents were from Buffalo Creek, and the second largest group of respondents was from Trumbull. Over 75% rated the fire hazard as “high” or “extreme” in their own community, and rated other areas in the NFFPD as “extreme”. Nonetheless, nearly half of respondents stated

they would not leave or were unlikely to leave in the event of a wildfire. When asked which methods were the best for mitigating fire risk, most respondents selected several choices, the most common being "defensible space by private landowners" and "increasing firefighting volunteers". Relatively few chose "prescribed burns". The majority of respondents strongly support further fuel mitigation projects in their communities, and none opposed them. Based on the responses of the survey and the feedback received at community meetings, the residents of NFFPD recognize the responsibility they have in maintaining their own defensible space, but are frustrated with the lack of options for slash removal. Appendix D shows the questionnaire responses in graph form, but do not imply statistical significance.

While fires originating in or near communities are the most immediate concern, wildfires that ignite well beyond the boundaries of the planning area can have profound effects upon the communities and ecosystems in the NFFPD. The possibility for rapid rates of spread and long-distance spotting are high for typical fires in this area.

4.2 Fire Behavior Analysis

Fire behavior, as previously stated in section 2.2, is defined as the manner in which a fire reacts to the influences of fuel, weather, and topography. Two key measures of this behavior are the rate of spread and fire intensity. In fire management, rate of spread is expressed in chains per hour. A chain is 66 ft, and one chain per hour closely approximates a spread rate of 1 foot per minute. Fireline intensity is defined as the rate of heat energy released per unit time per unit length of fire front, regardless of the depth of the flame zone. It is calculated as the product of available fuel energy and the fires rate of advance.

Using weather data from local remote automated weather stations (RAWS) and GIS data obtained from Landfire, we created a maps that illustrate potential flame lengths in the assessment area for average (50^{th} percentile) and extreme (90^{th} percentile) weather conditions. Fire moving through the forest canopy (active crowning) and other types of extreme fire behavior are not represented in this analysis.

Fire Weather

Average and severe case weather and fuel moisture conditions were determined using records from local remote access weather stations (RAWS) during the summer wildfire season of June through August. Data from the Bailey, Cheesman, and Polhemus stations were used to best represent the climate of the assessment area. Percentile refers to historic occurrences of specified conditions. For example, 50^{th} percentile is considered average conditions, with half the records exceeding recorded conditions and half the records below recorded conditions. Severe weather conditions are expressed as 90^{th} percentile conditions, meaning that within the weather data examined from the RAWS stations, only 10 percent of the days had more extreme conditions. Weather was calculated for the typical summer fire season of June through August based on data from 1979 through 2009. Mid-flame wind speeds of 4 and 8 mph were used for the modeling of 50^{th} and 90^{th} percentile conditions, respectively.

Table 7. Average and Severe Case Fire Weather and Fuel Moisture Conditions

RAWS Station	Percentile	Max Temp ºF	Relative Humidity %	1-Hour Fuel Moisture %	10-Hour Fuel Moisture %	100-Hour Fuel Moisture %	Herbaceous Fuel Moisture %	Woody Fuel Moisture %
Cheesman	50th	81	24	5	7	10	54	94
1987-2009	90th	90	11	2	3	6	29	59
Bailey	50th	78	32	6	9	13	84	119
1979-2009	90th	87	12	3	4	7	29	60
Polhemus	50th	79	25	5	6	10	57	99
2004-2009	90th	88	10	2	3	6	36	63

Additional important fire- and weather-related resources include:

- Fort Collins Interagency Wildfire Dispatch Center Web index for Fire Intelligence, Fire Weather, Fire Danger/Severity, RAWS – http://www.fs.fed.us/r2/arnf/fire/fire.html
- RAWS index for the Rocky Mountain Geographic Coordinating Area – http://raws.wrh.noaa.gov/cgi-bin/roman/raws_ca_monitor.cgi?state=RMCC&rawsflag=2
- National Fire Weather Page – http://fire.boi.noaa.gov/

Potential Fire Behavior

Fire behavior simulations were conducted for average (50th percentile) and severe (90th percentile) conditions for the critical months of the fire season, June through August (Table 11). Slope steepness was set to 20 percent.

BehavePlus software was used to generally illustrate the potential surface fire behavior given the prevailing fuel types, local topography, and local weather conditions. While any number of variables and assumptions will affect the modeled outputs, there are several significant general principles to focus on:

- The differences in surface fire behavior under 50th and 90th percentile conditions (drier fuels, windier conditions) are most pronounced in brush and grass fuels.
- This increase in fire behavior is approximately two times for flame length and three to four times for rate of spread.
- Fire behavior for most fuel types under 90th percentile conditions exceeds the 4-foot flame lengths generally considered appropriate for direct line construction with hand crews.
- If XX converts into the denser XX, the increase in fire behavior is pronounced and conducive to the initiation of crown fire.

Table 8. BehavePlus Predictions of Fire Behavior on 20 Percent Slope*

FBFM	Flame Length (ft), average conditions[1]	Rate of Spread (chains/hr)**, average conditions	Flame Length (ft), severe conditions[2]	Rate of Spread (chains/hr), severe conditions
GR1	2	10	3	38
GR2	4	20	10	153
GS1	1	3	6	42
GS2	2	4	9	58
SH1	1	1	1	4
SH2	1	1	7	15
SH5	9	24	20	115
SH7	8	16	19	74
TU1	1	1	3	6
TU5	5	5	11	19
TL1	1	1	1	2
TL3	1	2	2	5
TL8	3	6	6	17

[1] 50th percentile weather conditions: average midflame widspeed = 4mph; fuel moisture percentages: 1-hour=5%, 10-hour = 8%, 100-hour = 10%; Live herbaceous fuel moisture = 75%; live woody fuel moisture = 200%.
[2] 90th percentile weather conditions: severe midflame widspeed = 8mph; fuel moisture percentages: 1-hour=2%, 10-hour = 3%, 100-hour = 6%; Live herbaceous fuel moisture = 30%; live woody fuel moisture = 100%.
*All calculations were completed using 20% slope.
**Chains per hour ≈ feet per minute, where 1 chain = 66 feet.

4.3 Community Hazard Assessment Methods

Community hazard rating was calculated using the NFPA 1144 assessment form. In order to expedite the overall community assessments, we developed a tally method. For each major street in a community, a small representative handful of homes were assessed individually on the same form. For example, in Buffalo Creek, we assessed approximately 20% of the homes. Rating factors such as defensible space, driveway access, and building setback from steep slopes were somewhat variable throughout the community, while factors such as severe weather potential, overall topography and road widths were consistent. If 10 homes were assessed overall, and six had defensible space <30 feet (25 points), three with 31-70 feet (10 points), and one with >100 feet (1 point), these ten homes were tallied as such on the 1144 form. Given that the majority of homes in the tally had less than 30 ft of defensible space, the score of 25 was given the most weight. However, we would assign an overall score of 20 to account for the few representative homes in the community with more defensible space, thereby reducing the hazard score by 5 points. Although the average scores can be calculated using a weighted average formula in Excel, we found that determining the score qualitatively from the tally produced similar results more quickly.

We found this method to be efficient and repeatable, and accurately reflected the overall hazard conditions in a community. This method could also be used in more populated areas to evaluate communities quickly and effectively.

5 WILDFIRE MITIGATION PLAN

5.1 Mitigation Planning

Wildfire mitigation can be defined as those actions taken to reduce the likelihood of loss of life and property due to wildfire. The intent of mitigation is not to completely eliminate the risk of loss nor does it reduce the risk of a wildfire occurring. Effective wildfire mitigation enables residents to evacuate safely, homes to withstand the occurrence of wildfire, and firefighters to defend structures and suppress fires where possible. This can be accomplished through a variety of methods, including reducing hazardous fuels, creating defensible space around individual homes and subdivisions, utilizing fire-resistant building materials, enhancing emergency preparedness and response capabilities, upgrading current infrastructure, and developing programs that foster community awareness and neighborhood activism. Once implemented, these actions can significantly reduce the risk of loss due from wildfire to an individual home, and on a larger implementation scale, for an entire community. Most importantly, it makes WUI communities safer places to live and work, and in the event of a wildfire, enhances the safety of residents and emergency personnel.

Specific mitigation treatment recommendations for the NFFPD were identified through detailed community wildfire assessment surveys. These surveys evaluated parameters such as wildland fuels, predicted fire behavior, infrastructure, emergency response resources, and structure ignitability. The mitigation recommendations also pull from the two previous plans completed for the Lower North Fork and South Platte areas. All recommendations were reviewed and approved by the core team and other community stakeholders. Project prioritization was based on public input, practicality of implementation, and proximity to existing planned and completed mitigation projects.

Communities should seek out and take advantage of opportunities to partner with local agencies or organizations. Working cooperatively can provide communities with a higher level of technical assistance and project management. An example of a prospective partnership of this kind is a recent effort by Denver Water Board, NRCS, and local government agencies to work cooperatively with private landowners in the Strontia Springs watershed management area. As funding and new opportunities become available in the future,

5.2 Recommended Actions

Action items include a variety of specific recommendations that reduce ignitability of structures, make ingress and egress safer for residents and emergency personnel, remove hazardous wildland fuels from around homes, and reduce the amount of fuels in strategic locations. Many recommended action items do not involve drastic changes to the forest; simple structural maintenance and pruning are basic, but essential components to effective mitigation.

While the NFFPD, USFS, and CSFS have worked hard to promote defensible space and land management, private landowners must accept responsibility for completing work on their own lands. Table 9 lists the recommended action items by category and they are discussed in further detail below.

Table 9. Action Items

Category	Action Items
Public Outreach and Education	• Encourage stakeholder participation in community meetings • Distribute Firewise and other informational materials • Assess individual homes
Building Improvements	• Replace shake roofs with fire-resistant roofing materials • Implement Firewise construction principals for new construction and remodels • Cover vents and chimneys with metal screens • Enclose exposed decks and gables, and/or use fire-resistant construction materials
Defensible Space	• Establish a fuel-free zone around homes • Establish a treated second zone that is thinned, pruned, and cleared of excess surface fuels • Extend thinning treatments to property boundary to reduce hazardous fuels • Employ defensible space practices around resources such as cisterns, draft sites, or community safety zones
Access and Egress Improvements	• Where not present, clearly mark roads and addresses with metal, reflective signs • Thin trees along main roads to avoid blockage • Create or widen turnarounds • Widen or improve narrow switchbacks • Create secondary evacuation routes where needed
Shaded Fuelbreaks	• Thin in strategic areas, such as along evacuation routes and utility right-of ways • Coordinate with adjacent public land management agencies • Identify existing breaks in vegetation to expand fuelbreak areas • Remove or treat slash by chipping, burning in piles, or hauling to collection site • Perform periodic maintenance where necessary • Incorporate additional management goals where appropriate (such as bark beetle infestation control)
Fire Department Preparedness	• Own and update district GIS • Update and distribute run books • Verify community water sources • Conduct pre-suppression planning • Conduct ongoing recruitment, training, and certification • Coordinate mutual aid strategic planning • Upgrade apparatus, facilities, and personal protective equipment when appropriate
Supporting Actions	• Explore and support grant funding opportunities • Involve Jefferson County in evacuation route improvements • Revise county statutes addressing defensible space requirements for home sales • Coordinate with land management agency forest management plans

5.2.1. Public Outreach and Education

The most effective means of initiating local action is through community education and public outreach. Given the significant fire events in NFFPD in recent years, most local residents are well-informed of the inherent fire risk in the area, but as more people move to the area, it is necessary to maintain and improve the community's knowledge of the basic principles behind wildland fire, and the actions they can implement to increase their personal safety and that of their home. Through education, homeowners are empowered to take action on their own properties, and coordinate efforts with their neighbors to maximize the efficacy of individual treatments.

Action Item: Conduct annual community meetings each spring. Community meetings held in the spring, just prior to the main fire season, can spur action by individuals and neighborhoods and allow for coordination of cleanup efforts within the community. This can also serve as a forum for presentations by experts in the field who can answer questions, provide technical guidance, and inform community members of available resources.

Action Item: Firewise materials and CSFS publications should be made available to the public at each fire station, post office, HOA, and library on a regular basis.

5.2.2. Building Improvements

The purpose of building improvements is to reduce structural ignitability. Structural ignitability is defined as the flammability of the home and its immediate surroundings. This separates the problem of WUI structure fire loss from other landscape-scale fire management issues, because highly ignitable homes can be destroyed during lower-intensity wildfires, whereas homes with low structural ignitability can survive high intensity wildfires. Structural ignitability, rather than wildland fuels, is the principal cause of structural losses during wildland/urban interface fires. While reducing hazardous fuels around a structure is very important to prevent fire loss, recent studies indicate that building materials have a significant influence on whether a structure will survive a wildfire.

Key structural components that increase ignitability are flammable roofing materials (e.g. cedar shingles), flammable decks and/or siding, and the presence of burnable vegetation (e.g. ornamental trees, shrubs, wood piles) immediately adjacent to homes. The area around the home, 100-200 feet, is called the home ignition zone and is the most critical area to prepare and maintain to prevent loss from fire. Investing in building improvements to decrease the structural ignitability of the home is just as important as forest management and fuels thinning on the property.

Studies of home survivability in wildfire incidents also indicate that homes with noncombustible roofs and a minimum of 30 feet of defensible space had an 85 percent survival rate. Conversely, homes with wood shake roofs and less than 30 feet of defensible space had a 15 percent survival rate. This evidence suggests that investing in building improvements to decrease the structural ignitability of the home is just as important as forest management and fuels thinning on the property. In areas where tree

removal is not desirable or possible, homeowners can still mitigate fire hazard in this way.

Action Item: All homeowners should continually keep roofs and gutters clear of leaves and pine needles. Embers from a wildfire can become windborne and travel long distances before settling, and even small amounts fine fuels on a structure can ignite and put a home at risk. Defensible space becomes inconsequential if embers cause ignition on the roof, deck, or in eaves. Clear combustible material such as firewood, trash, or woody debris from the side of the home and underneath exposed decks.

Action Item: Cover openings around the home, such as gutters, attic vents, chimneys, and areas under decks with screens to prevent the accumulation of fuels where embers can ignite the structure.

Action Item: Addresses should be clearly marked and visible from the road, preferably with reflective, durable, fire-resistant materials.

Action Item: Where possible, propane tanks adjacent or downhill from home should be relocated to a location uphill or at least 30 feet from the home (outside the home ignition zone).

Action Item: Replace wood-shake (cedar shingle) roofing with noncombustible roofing materials. Roofing materials rated as "Class A" include materials that are non-burnable or can withstand a high amount of radiant heat, and are therefore the most appropriate for homes in the assessment area. Jefferson County requires all new and replacement roofs in the WUI to be fire-resistant. In both Jefferson and Douglas Counties, Minimum Class "B" roofing material is required in a wildfire hazard area. Prior to receiving a Certificate of Occupancy (CO) for homes and structures with living quarters, and prior to final building inspection for accessory structures, all structures are required to meet the minimum defensible space requirements identified in the on-site assessment at the time of permitting. Minimum requirements for driveway access are permitted and enforced to obtain safe and reasonable access for every day vehicular use and ingress/egress of emergency vehicles.

5.2.3. Defensible Space

Precautionary action taken before a wildfire strikes often makes the difference between saving and losing a home. Creating a defensible space around a home is a vital component in wildfire hazard reduction. These efforts are typically concentrated within 0 to 75 feet of the home to increase the chance for structure survival and create an area for firefighters to work safely in the event of a wildfire.

Homes and neighborhoods with defensible space are much more likely to be assigned structure defense crews than those without. In general, structures that do not have defensible space do not provide adequate area for firefighters and firefighting apparatus to work efficiently and safely. The risk to human life outweighs any possible benefit of trying to defend an unsafe property. Appendix I shows the Jefferson County Structure Triage Form, which enables firefighters to quickly prioritize structure defense in a

wildfire. If a structure has a score greater than 13, it is considered a "last priority" over properties with more clearance, lighter vegetation, and better access.

It is recommended that defensible space be created following the CSFS guidelines set forth in *Creating Wildfire Defensible Space Zones,* Bulletin Number 6.302 (Dennis 2003). Refer to Appendix G for the complete CSFS guidelines and treatment area size recommendations.

Action Item: Implement defensible space around all homes and structures in the assessment area. Create a fuel-free zone approximately 15 feet wide directly adjacent to the structure, which reduces structural ignitability and reduces direct flame impingement on the structure. In a secondary zone farther out from the structure, complete pruning of ladder fuels, stand thinning, and removal of dead, dying, or diseased trees for overall stand improvement. Where possible, extend forest treatments out to property line to reduce fuel loading and enhance overall forest health.

before *after*

Figure 6. A home and surrounding property before and after the completion of defensible space action items. Photos from CSFS.

Table 10 outlines a phased 4-year implementation schedule communities can use to complete this action item.

Table 10. Community Defensible Space Implementation Schedule

Year	Project	Actions
1	Annual spring outreach	▪Contact and organize homeowners ▪Hold educational meeting about defensible space
	Annual spring/summer mitigation	▪Clean roofs and gutters ▪Trim limbs and shrubs within 3 to 5 feet of home ▪Rake and mow yard ▪Assist neighbors ▪Organize debris disposal
2	Annual spring outreach	▪Contact and organize homeowners
	Annual spring/summer mitigation	▪Clean roofs and gutters ▪Rake and mow yard ▪Organize debris disposal
3	Annual spring outreach	▪Contact and organize homeowners ▪Identify needed improvements to construction features throughout community
	Annual spring/summer mitigation	▪Where possible, coordinate projects between homeowner groups who have created defensible space and open space managed lands ▪Repeat yard maintenance & debris disposal
4	Annual spring outreach	▪Contact and organize homeowners ▪Follow up with landowners who have not completed defensible space, offer assistance
	Annual spring/summer mitigation	▪Complete any outstanding projects from previous years ▪Begin long-term maintenance (as needed, re-trim shrubs, remove small trees, etc) ▪Initiate construction feature improvements

5.2.4. Access & Egress Improvements

In addition to defensible space, it is essential for communities to have adequate access and egress. Not only does this allow for emergency personnel to access and escape properties in a wildfire, residents are also able evacuate quickly and safely when necessary. Many driveways, dead-ends, and switchbacks in the assessment area do not have adequate turnaround space for fire trucks, compromising emergency response to these properties. The North Fork Volunteer Fire Department (NFVFD) adopted the 2009 International Urban-Wildland Interface Code, which details the specifications for driveways, turnouts, turnarounds, and access roads.

Another important improvement that should be made to access roads is adequate signage. Road signs should be clearly displayed, reflective, and preferably metal. When fires become large and/or highly complex, national management teams and fire crews from out of state are dispatched to replace local resources, and will not have knowledge of the area. Clear signage for roads and addresses enable firefighters to navigate through communities they may be seeing for the first time.

5.2.5. Shaded Fuelbreaks

Shaded fuelbreaks are strategically located areas where fuels have been reduced in a prescribed manner in locations that can affect fire behavior on a landscape scale. Fuelbreaks are generally strategically placed where they can be as continuous as possible. To this end, they can be placed contiguously with other fuelbreaks, larger area treatments, along roads, or adjacent to natural breaks in vegetation (such as meadows or bodies of water). When defensible space, fuelbreaks, and area treatments are coordinated, the community and the adjacent natural resources are afforded an enhanced level of protection from wildfire. Fuelbreaks have been completed on several USFS and Denver Water parcels within the plan area, and several more are planned for future treatment.

The CSFS provides guidelines on how to determine the width and prescription for fuelbreaks based up the type of fuel and topography. Fuelbreaks need to be tailored to the terrain, fuels, historic fire regimes and expected weather conditions of the landscape in which they are placed. Improperly implemented fuel treatments can have negative impacts in terms of forest health and fire behavior. Aggressively thinning forest stands in wind-prone areas may result in subsequent wind damage to some species of trees. Thinning can also increase the amount of surface fuels and sun and wind exposure on the forest floor. This may increase surface fire intensity if post-treatment debris disposal and monitoring are not properly conducted. When fuelbreaks are not thinned enough to create sufficient canopy openings, the risk of crown fire is not reduced, and the fuelbreak does not meet its intended objective. The overall benefits of properly constructed fuelbreaks are however, well documented. An area near the Hayman fire that had been recently thinned successfully stopped fire from moving through the tree canopy, which significantly reduced tree mortality in that stand. Untreated areas adjacent to the treatment area burned severely, and had nearly 100% tree mortality.

Figure 6. A WUI neighborhood and forest stand affected by the Hayman fire. The green trees in the foreground with greater canopy spacing were largely unburned, while the denser forest in the background burned more severely. Photo from USFS.

Action item: All access roads flanked by heavy vegetation in WUI and Intermix communities should be targeted for thinning or seasonal mowing. Treatments may be coordinated with property owners along private roads and with county and state transportation departments for public roads. Conifer regeneration along road margins should be controlled. A qualified forester or fire professional should evaluate the effectiveness and periodic maintenance of roadside mitigation.

Action item: In this CWPP, a strategic shaded fuelbreak has been carefully planned for each WUI and intermix community. These fuelbreaks take into account expected fire behavior, workable terrain, and existing road access. When implemented, these landscape-scale fuelbreaks are meant to protect the community as a whole by reducing potential fire behavior under most weather conditions. Where possible, these fuelbreaks were placed adjacent to completed mitigation projects on properties managed by the Forest Service and Denver Water.

before *after*

Figure 7. A montane forest stand in Jefferson County before and after completion of a shaded fuelbreak. Note the tree on the right side of the picture with orange flagging to compare the change in the stand structure. Photo from Jefferson County Emergency Management.

Action item: Natural resource managers for public lands should take into account fire hazard for adjacent WUI and intermix communities when developing or updating forest management plans.

Action item: An ecological evaluation of the status of vegetation community recovery and rehabilitation is recommended for areas affected by fires in recent years. Monitoring should focus on the presence of noxious weeds and other invasive non-native species. Reducing the presence of invasive species such as knapweed (*Centaurea* sp.) and Dalmatian toadflax (*Linaria dalmatica)* maintains natural biodiversity. In some cases, it can help maintain historic fire regimes, especially in grasslands and shrublands.

5.3 Treatment Options

Each of the recommended fuel mitigation projects can be achieved by a variety of methods. Selecting the most appropriate, cost effective option is an important planning step. The brief synopsis of treatment options and cost estimates in Table 11 is provided to assist in this process. Cost estimates for treatments should be considered as general guidelines. Costs can vary tremendously based on a variety of factors, including but not limited to:

- Acreage of project
- Proximity to structures
- Fuel costs & other equipment needs
- Treatment techniques used
- Density and type of vegetation
- Steepness of slope
- Area accessibility

Table 11. Treatment Methods

Treatment	Approximate Cost*	Comments
Machine Mowing	$90 - $200 per acre	▪Appropriate for large, flat, grassy areas on relatively flat terrain ▪Usually requires yearly treatment
Prescribed Fire	$100 - $200 per day	▪Cost-effective for larger acreage ▪Implementation requires trained professionals ▪Ecologically beneficial ▪Provides training opportunities for firefighters ▪Inherent risk of escape may be unacceptable in some areas ▪Unpredictable scheduling due to weather and smoke management constraints
Brush Mastication	$300 - $500 per acre	▪Some brush (shrub) species, such as Gambel oak, resprout vigorously after mechanical treatment ▪Follow-up treatment with herbicides, prescribed fire, grazing, or repeat mechanical treatments are typically necessary ▪Less expensive and faster than manual treatment ▪No need to dispose of slash
Timber Mastication	$600 - $1000 per acre	▪Large diameter trees can be felled quickly over large areas ▪Less expensive and faster than manual treatment ▪No need to dispose of slash ▪Machinery usually limited to slopes <35% ▪Rough, unattractive appearance for first year post-treatment
Manual thinning and felling	$400-$700 per acre	▪Not limited to slopes <35% ▪More control of specific trees removed/left ▪Allows for removal of merchantable/usable wood products, such as firewood ▪Slash must be chipped, hauled away, or burned in piles
Feller Buncher	$600 and up per acre	▪Appropriate for steep slopes with larger-diameter trees ▪Allows for removal of merchantable/usable wood products, such as firewood ▪Generally more expensive than mastication

*Costs per acre are based upon various area contractors' rates for work in the Colorado Front Range and are subject to change.

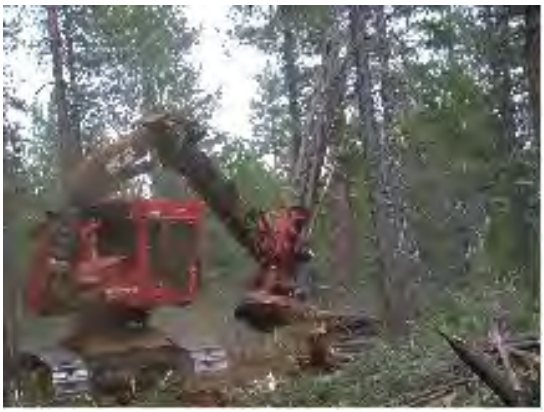

Figure 8. A feller buncher machine thinning a forest. Photo from USFS.

5.4 Project Support

Several of the recommended actions will require cooperation of various agencies that operate within the FPD. Studies, monitoring, and determination of legal jurisdictions are integral to many action items recommended in this CWPP. Although this may add complexity to implementation, it should not discourage communities from pursuing these projects.

Funding and Grants: Due to the high cost of large-scale forestry projects, many landowners and communities are unable to complete complex projects such as shaded fuelbreaks. Grant support may be able to accelerate implementation of treatments. The Jefferson County Office of Emergency Management is an excellent resource for information about available grants. The website *http://www.rockymountainwildlandfire.info/grants.htm* is a grants clearing house with a searchable grants database, as well as other helpful information about wildfire. Information about funding sources and applicant responsibilities are located on this site.

Access/Egress Improvements: The proposed work on roadways may require further study to address engineering and environmental issues, and may be subject to the consent of adjacent landowners. Tenable escape routes are essential to community wildfire safety, and therefore should be considered high-priority action items when recommended.

Public Land Planning: The United States Forest Service, Denver Water Board, Jefferson County Open Space, and Denver Mountain Parks all manage forested wildlands in and around NFFPD. The CWPP development process is designed to facilitate dialog with these agencies and coordinate public and private wildfire and forest management strategies. As the CWPP strategic plan is implemented, dialog and collaboration should be maintained with these agencies in order to coordinate strategies and treatments, and make adjustments if necessary. Where possible, strategic fuelbreak recommendations should be coordinated with completed or planned treatment areas managed by the USFS and Denver Water Board.

Regulatory Support: One of the major issues confronting defensible space and hazardous fuels mitigation is the need for on-going maintenance of treatment areas and defensible space. County statutes require creation and long-term maintenance of defensible space for new construction and remodels exceeding 400 square feet. However, there is no retroactive regulation for existing structures. Additionally, there is no provision or current process within county government to enforce or support long-term maintenance of fuels mitigation projects. For defensible space treatments to remain effective, some regulatory impetus may be necessary. Jefferson County should examine the possibility of requiring periodic maintenance of defensible space. This could be associated with the sale of an existing home or on a period of time since initial treatment. Communities with local statutes or covenants should consider similar regulation as an interim step to help drive the initiative from the bottom up.

Douglas County adopted and enforces wildfire mitigation standards for new construction and development in a wildfire hazard area. The *Douglas County Wildfire Mitigation Standards* contain minimum standards for access, water supply, building materials, and defensible space. The wildfire mitigation standards are adopted as an Appendix Chapter to the International Building code (IBC) and the program is administered by the Building Division and the Chief Building Official (CBO) is the Authority Having Jurisdiction.

Douglas County has also adopted Appendix Chapter 59 of the IBC, *Standard for Water Supplies for Rural Fire Fighting* and the *Wildfire Hazard Overlay District, Section 17 of the Douglas County Zoning Resolution* for developing in a wildfire hazard area. More information can be found at http://www.douglas.co.us/building/wildfire/index.html

6 EMERGENCY OPERATIONS

6.1 Response

North Fork FPD maintains one fully equipped station and two equipped unstaffed stations that are centrally located in the FPD. There are 30 volunteer firefighters, one career chief, and one part-time employee. In addition, the USFS has a workstation with a seasonal wildland engine crew in Buffalo Creek. Most residences in NFFPD are located less than five miles from a fire station, and there are currently sufficient VFD personnel to respond to the relatively small number of emergency calls they receive each year. In wildland areas outside of the WUI and intermix zones in the district, response time could be considerably longer due to rugged terrain and lack of road access. However, there is currently adequate staff and equipment to effectively handle the majority of fire and medical emergencies. Jefferson County maintains a certified Type 3 Incident Management Team for overhead support in the event of a multiple-day fire event. Should a complex fire event extend past 36 hours, a Type 2 or Type 1 IMT would need to be brought to the district. NFFPD has developed a 5-year plan (2009-2013) that addresses current response capabilities, equipment, operational goals and objectives, and future needs.

- Station 1; 19384 Highway 126, Buffalo Creek
  - Engine 1231
  - Tender 1271
  - Brush 1251
  - Rescue 1280
  - Ambulance 1282
  - Ambulance 1287
  - Command 120
- Station 2; 16675 Highway 126, Pine
  - Engine 1232
  - Tender 1272
  - Brush 1252
  - Ambulance 1289
- Station 3; 7883 S. County Highway 67, Trumbull
  - Engine 1233
  - Tender 1274
  - Brush 1253

Mutual Aid

NFFPD is part of the 1993 Intergovernmental Agreement for Mutual Aid between Fire Departments. In the event of a major structure or wildland fire, NFFPD may require additional assistance from other fire departments and government agencies. The complete definitions and limitations of local mutual aid agreements are located in the Jefferson County Annual Fire Operating Plan.

Training and National Wildfire Coordinating Group Positions
Given the relatively small number of emergency calls received in the district, NFVFD relies extensively on a broad range of training exercises to maintain and improve firefighters' skills. NFVFD is currently considering a requirement that all volunteers maintain a minimum of Firefighter Type I (FFT1) qualification. Maintaining or increasing the level of fireline leadership requires considerable commitment from the department and its volunteers. Completion of taskbooks for wildland firefighter/incident management positions is subject to availability of wildfire assignments. North Fork firefighter participation in prescribed fires managed by the USFS and CSFS provide excellent opportunities for fireline training and maintenance of qualifications and skills. The NWCG standards may be challenging to obtain in a timely manner, but can be used as a general guideline for training targets.

Example of NWCG positions & training targets:

- Year 1: Officers initiate FFT1/ICT5 taskbook. Classes: S-131, S-133
- Year 2: Officers complete FFT1/ICT5 taskbook. Engineers initiate FFT1/ICT5 taskbook.
- Year 3: Officers initiate ENGB taskbook. Engineers complete FFT1/ICT5 taskbook and classes S-290, S-230
- Year 4: Officers complete ENGB taskbook and begin working towards engine strike team leader (STEN) and ICT4. Classes: S-200, S-330. Engineers work towards ENGB as able.
- Additional courses that are not required, but recommended: S-290, S-230 (for ICT5), S- 215 (for ENGB).

Performance Standards
Firefighters that have an NWCG wildfire qualification of Firefighter Type 2 (FFT2) or higher must complete a yearly refresher training that includes a simulated deployment of a fire shelter and pass an arduous-level physical fitness test.

On wildfire incidents, the NFVFD adheres to standard Incident Command Structure (ICS), always providing for firefighter safety by following the 10 standard Fire Orders, the 18 Situations that Shout Watch Out, and LCES. These are listed in Appendix xx, along with fireline production rates under average weather conditions.

6.2 Emergency Procedures and Evacuation Routes

In the event that the County Sheriff orders a community to evacuate because of threatening wildfire, residents should leave in an orderly manner. The Sheriff would proclaim the preferred evacuation routes and safe sites. However, the need for evacuation can occur without notice when a wildfire is imminent. Homeowners should be prepared to evacuate without formal notice.

Before residents leave, they should take every precaution to reduce the chance of structure loss if time allows. Windows and doors should be closed but not locked. Other openings should be covered. A ladder should be placed for roof access by firefighters. A fully charged hose that reaches around the house should also be available for firefighter

use. Porch lights should be left on to allow firefighters to find homes at night. Additional actions could include thoroughly irrigating the defensible space, watering down the roof, or removing patio furniture. However, human safety is the number one concern in an evacuation; staying too long could compromise a safe escape.
Families should have pre-planned meeting locations and phone numbers to call in case family members are separated. Families should take with them important papers, documents, pets, food, water, and other essential items.

Evacuation procedures vary according to subdivision. The NFFPD should ensure that every resident is familiar with these procedures, including primary and secondary routes, and the location of any designated community safety zone. Pre-plans should also outline available evacuation centers and the procedures needed to activate them. These procedures should be addressed in public or HOA meetings with information eventually being distributed door to door.

Upon returning to the home, the exterior of the house should be monitored for smoke for several days. Embers may lodge in small cracks and crevices and smolder for several hours or days before flaming.

Given that many residents of the NFFPD own horses and other livestock, large animal evacuation centers also need to be identified prior to emergencies. The Jefferson County Horse Evacuation Assistance Team (Jeffco HEAT) is a team of highly trained volunteers that operates in the area to provide large animal evacuations in wildfires and other natural disasters. Information can be found at *http://jeffcoheat.org/.* Douglas County Animal Response Team (CART) provides this service for those in need within Douglas County. More information about CART can be obtained from Cherie Abbot at *http://www.dcsheriff.net/emergencymanagement/Staff.html.*

7 CWPP MONITORING AND EVALUATION

7.1 CWPP Adoption

The final draft of the NFFPD CWPP was presented to the Core Team. All comments and edits were consolidated and incorporated into the document were applicable.

The HFRA and FEMA Disaster - Mitigation Act of 2000 requires that the CWPP be formally adopted by the Core Team. After plan adoption, Jefferson County, NFFPD, and the local communities within the FPD will receive additional consideration on future grant applications that can help implement the recommendations in the CWPP. While not required, an adopted CWPP may be a criterion for favorable ranking and/or a grant prerequisite of their applications.

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 hazards. Maintaining this cooperation is a long-term effort that requires the commitment of all parties involved. The CWPP shows that citizens must take an active role in identifying needs, developing strategies, and implementing solutions to address hazards, and participating in fire prevention and mitigation activities.

7.2 Sustaining CWPP Efforts

Implementing and sustaining the CWPP is the key to its success. The CWPP process encourages citizens to take an active role as fuel treatment strategies continue to be developed and prioritized. Maintaining the momentum created by this process is critical to successful implementation and ongoing efforts. The NFFPD is committed to supporting fire protection and emergency services within the district and surrounding areas. It is important that the district continue to provide support in maintaining hazard assessment information and emergency management coordination. Stakeholders will implement recommended actions by working with fire authorities, community organizations, private landowners, and public agencies.

7.3 CWPP Oversight, Monitoring, and Evaluation

As wildfire hazard reduction efforts are implemented over time and the characteristics of WUI zones change, neighborhoods may wish to reassess particular areas and update the findings of the original CWPP. All CWPPs are meant to be living documents that change in response to the changing conditions and needs of the communities. With these changes, action items may be re-prioritized or added.

NFFPD and communities should be responsible for periodic CWPP monitoring and evaluation. This can be accomplished through regular meetings, public involvement, coordination with other district partners and stakeholders. Evaluation will include analysis of the effectiveness of past mitigation projects as well as recent wildfire suppression efforts. This ongoing effort helps determine whether the CWPP goals and

objectives are being met. Table 12 provides a concise schedule and explanation of monitoring and evaluation tasks. Ultimately, the responsibility lies with the community given the USFS nor the CSFS mandates completion of mitigation on private property. It is in the best interest of these local stakeholders to follow through and help implement the CWPP for the benefit to their communities.

Table 12. Monitoring and Evaluation Tasks

Objective	Tasks	Timeline
Risk & Hazard Assessment	▪Use reliable data that is compatible among partner agencies	Ongoing
	▪Update CWPP as new information becomes available	As needed
	▪Periodically assess wildfire risks and hazards in communities	Biennial
Fuels Reduction	▪Identify and prioritize fuels treatment projects on public land through development of a 5-year plan	As needed
	▪Track fuels reduction and defensible space projects on private land	Annual
	▪Monitor fuels redution projects along evacuation routes	Annual
	▪Track grants and other funding sources and submit appropriate applications	Ongoing
Emergency Management	▪Provide training opportunities for firefighters	Annual
	▪Review suitability and need for additional fuels reduction	Biennial
Public Outreach	▪Plan and hold Firewise education week	Annual
	▪ProvideFirewise pamphlets at public events	Ongoing
	▪Evaluate techniques used to motivate and educate private landowners	Annual

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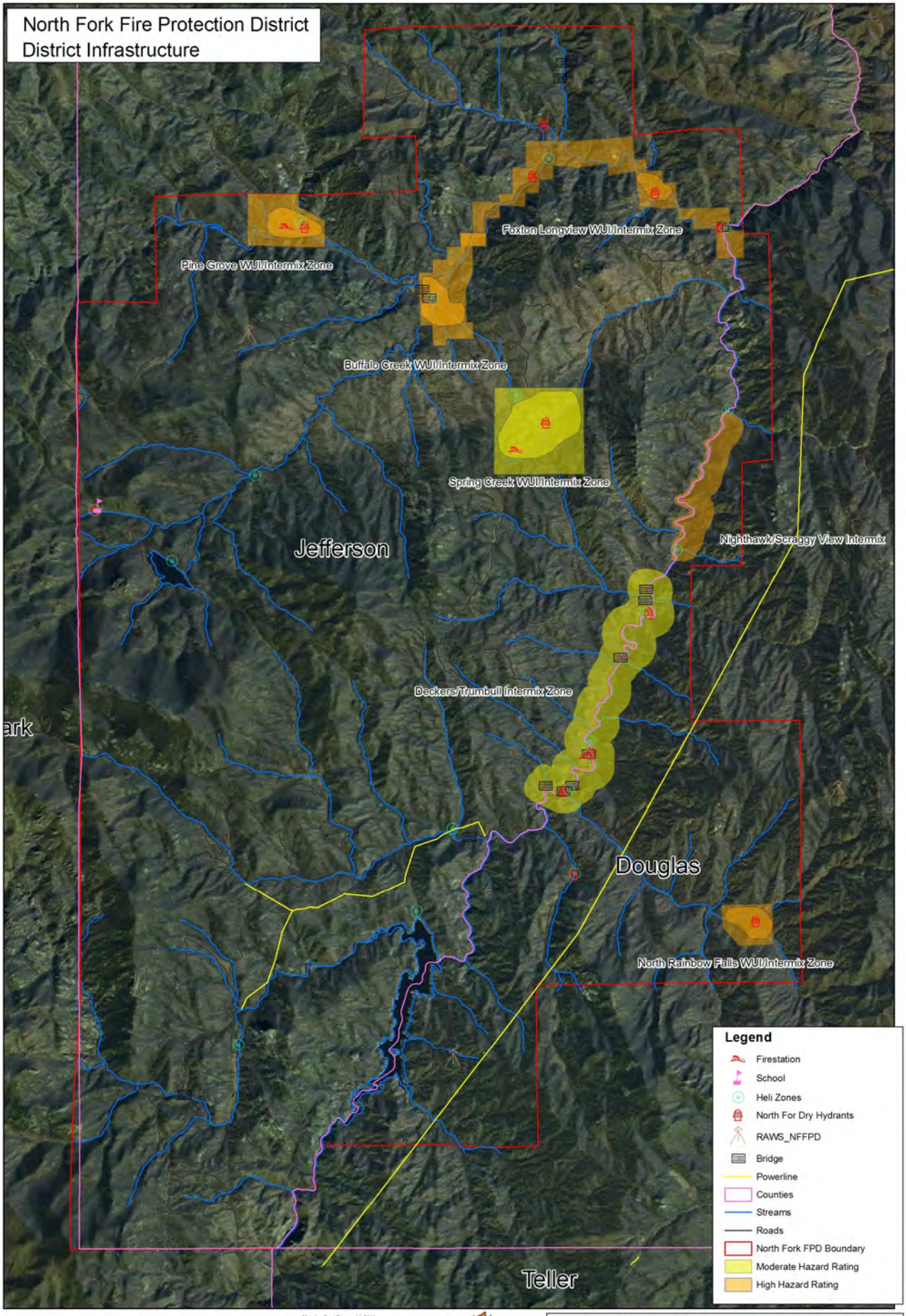
APPENDIX A

PROJECT MAPS

Map 1. Community Base Map and District Infrastructure
Map 2. Significant Fires In and Around the Assessment Area
Map 3. Managed Lands and Fuel Treatment Areas
Map 4. Fuel Treatment Areas – Planned and Completed
Map 5. Slope Percent of Assessment Area
Map 6. Elevation of Assessment Area
Map 7. Fire Behavior Fuel Models of Assessment Area

for planning only



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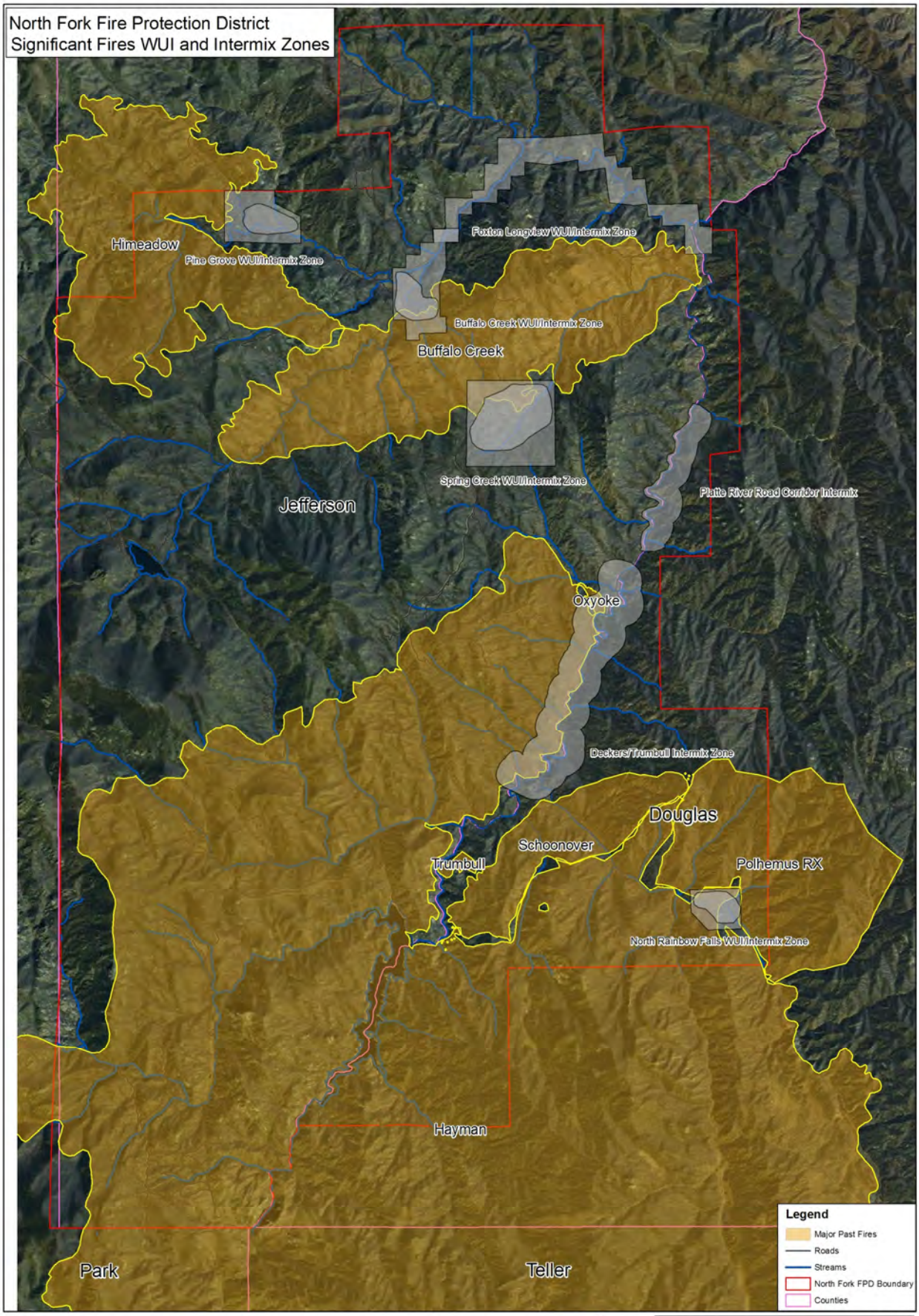

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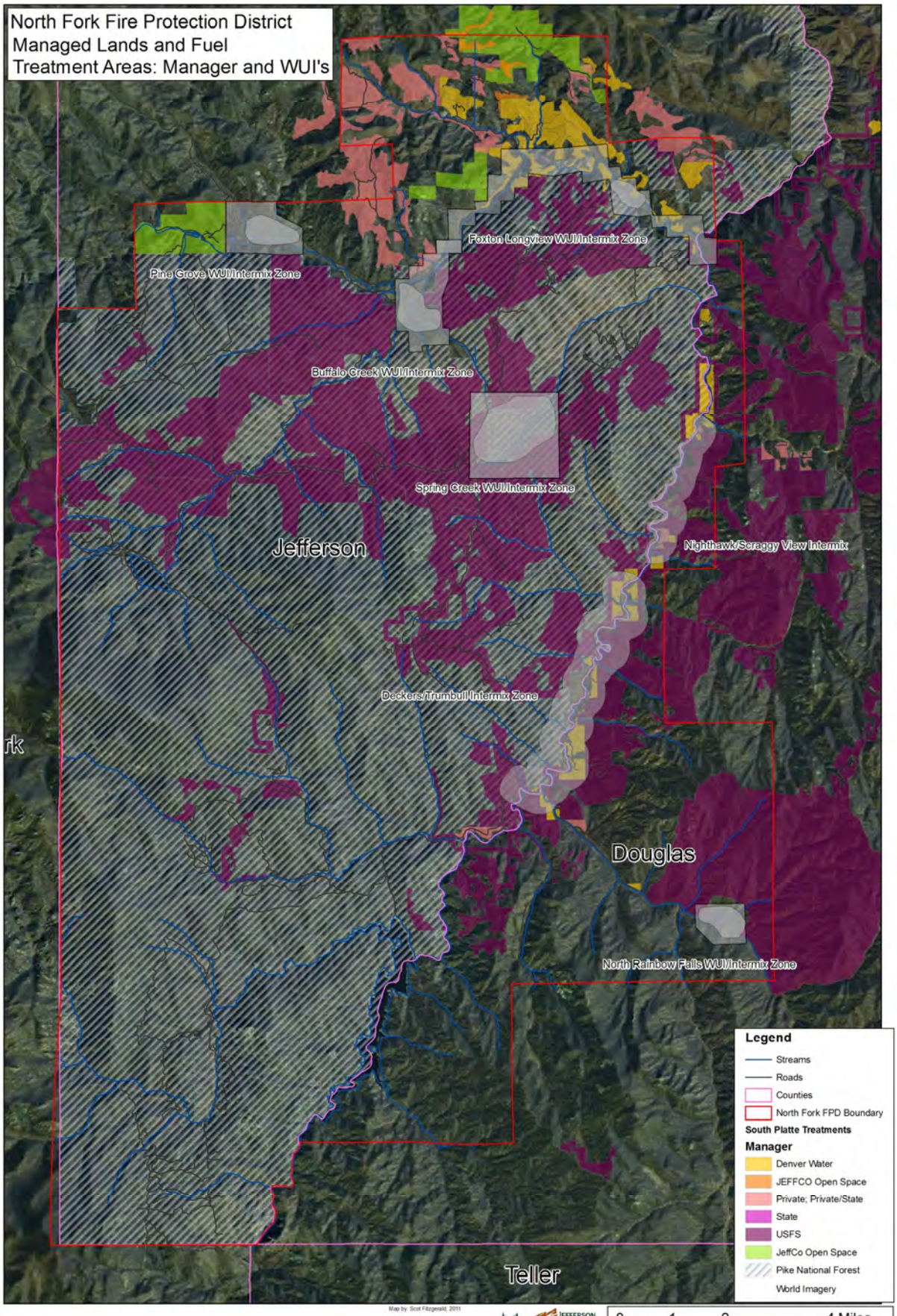

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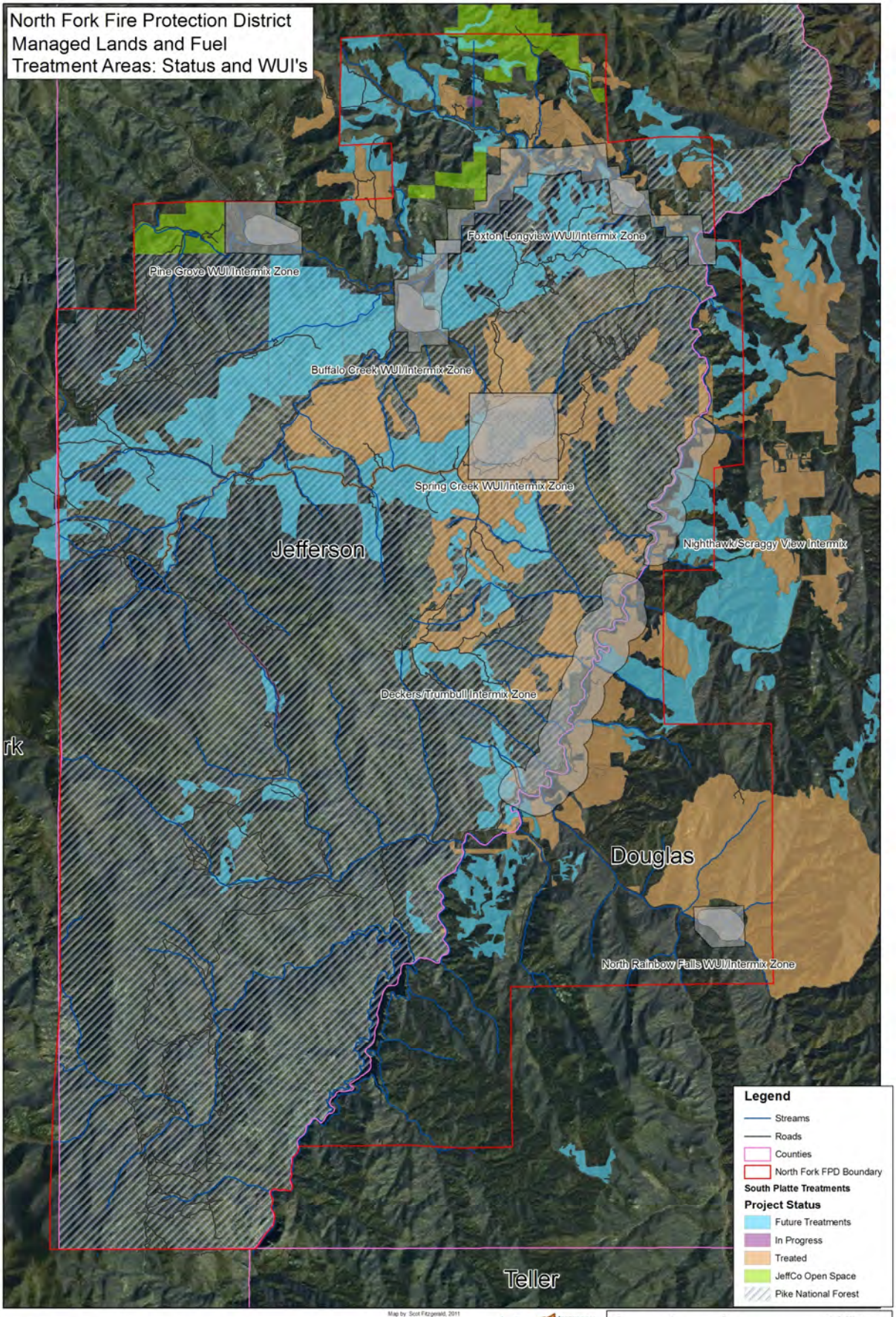

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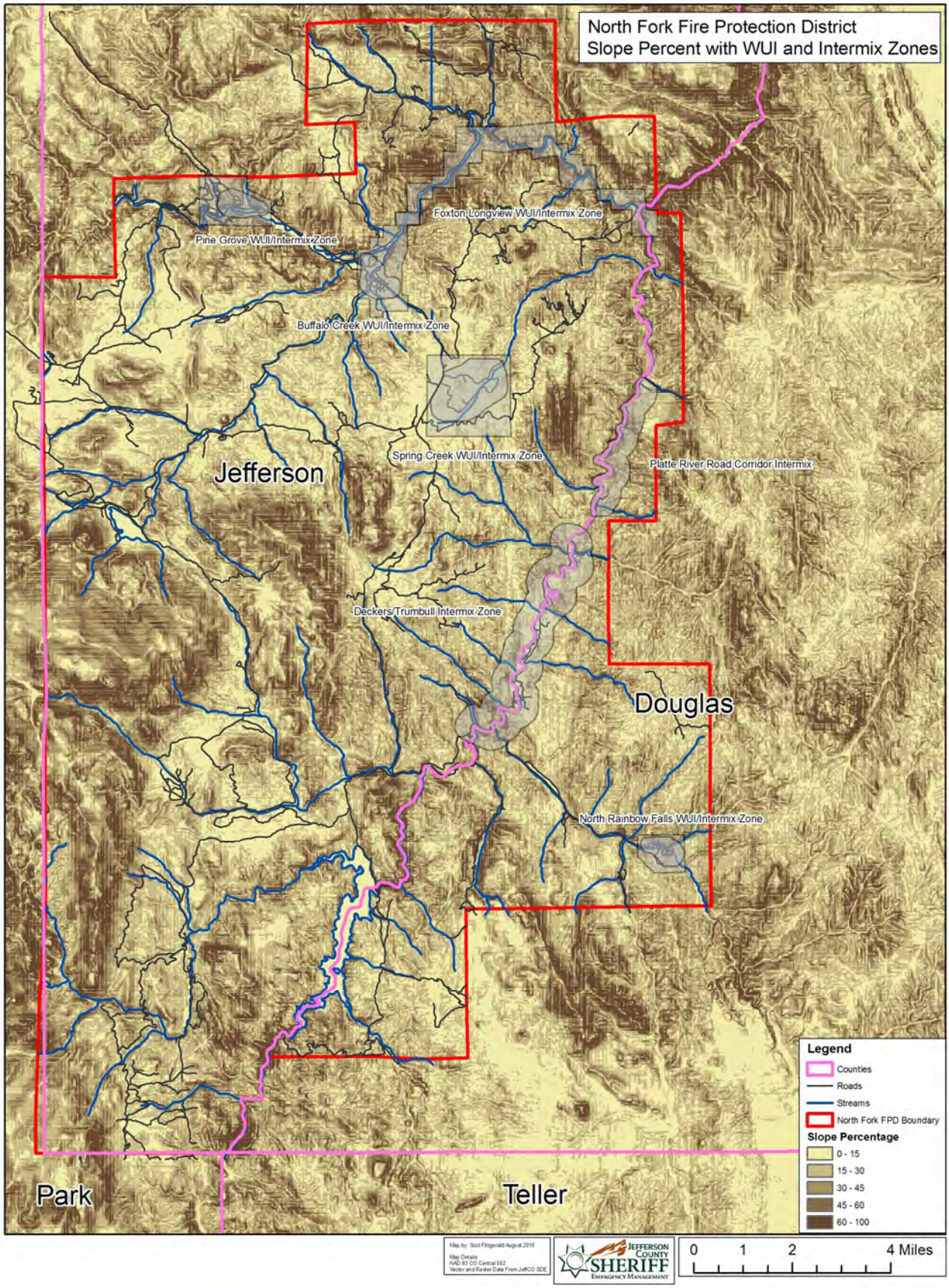

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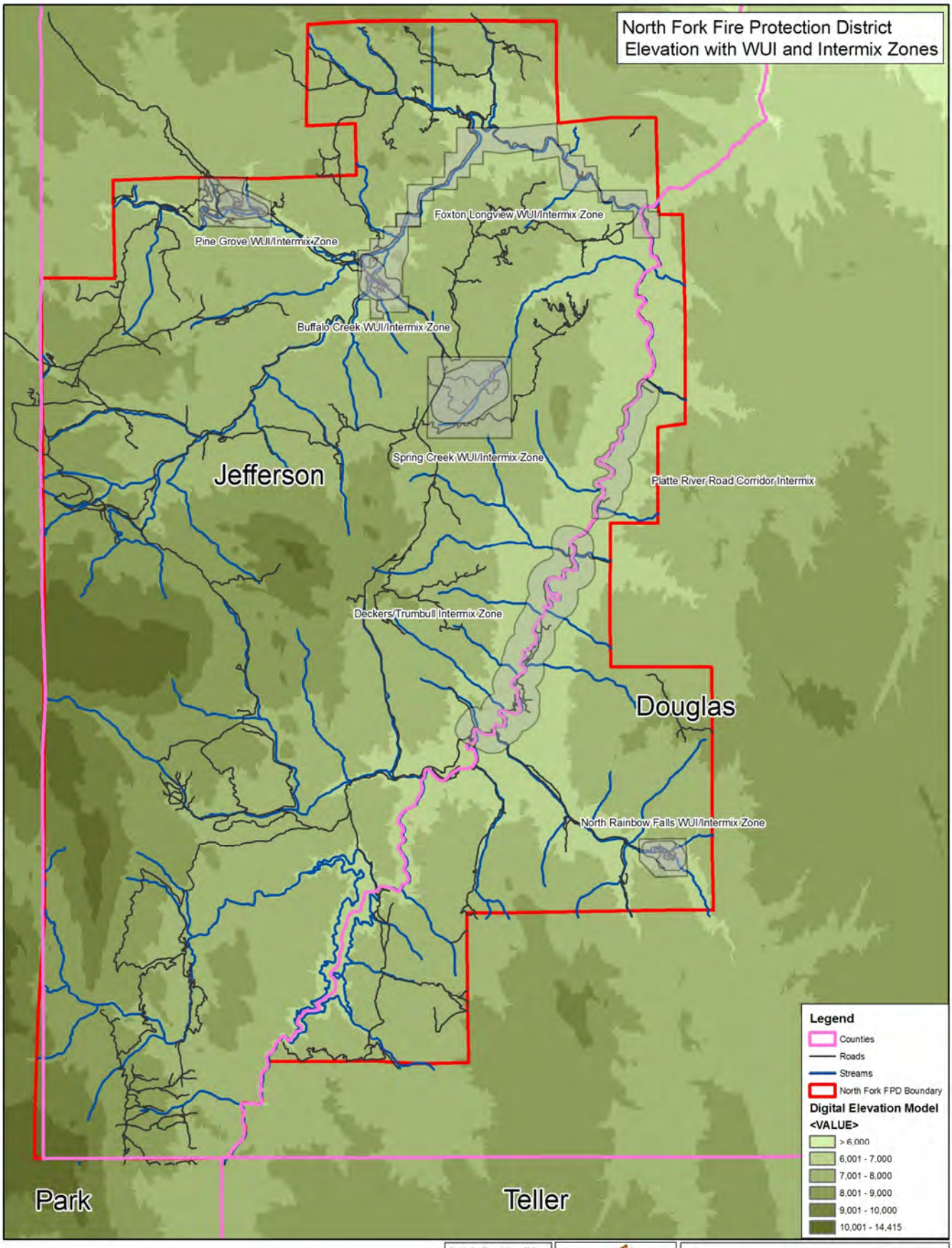

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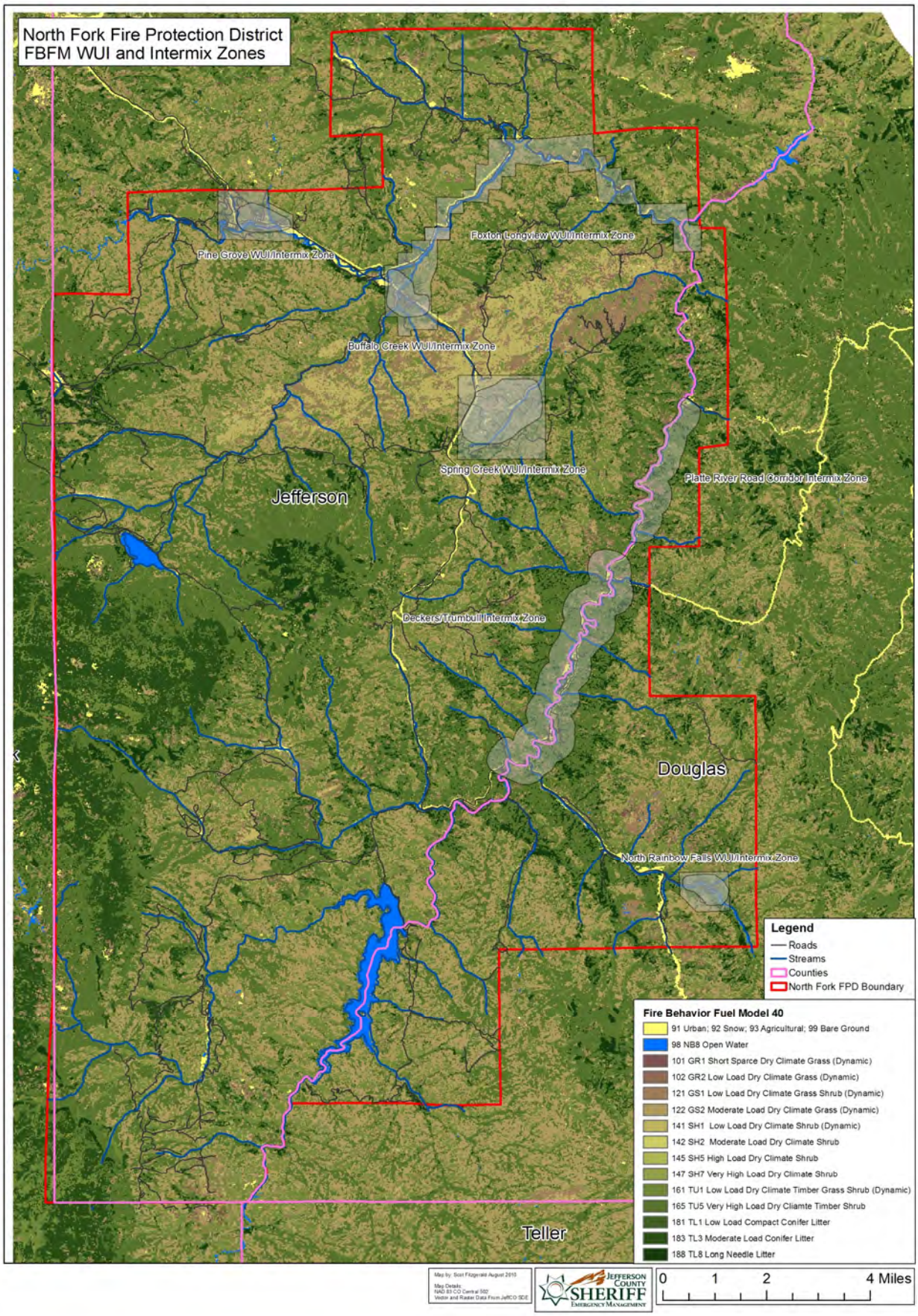


APPENDIX B

FIRE BEHAVIOR FUEL MODELS

version 1.0 (September 2005)

The following pages detail the FBFMs observed in the NFFPD, their unique characteristics and expected fire behavior (Scott and Burgan 2005). These pages can be used as a pull-out section for field reference.

Adjective class definitions for expected/predicted fire behavior

Adjective class	Rate of Spread (ch/hr)	Flame Length (ft)
Very Low	0 - 2	0 - 1
Low	2 - 5	1 - 4
Moderate	5 - 20	4 - 8
High	20 - 50	8 - 12
Very High	50 - 150	12 - 25
Extreme	> 150	> 25

Non-burnable fuel type models (NB)

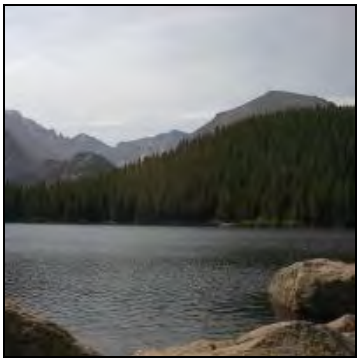
Description:
These non-burnable "fuel models" are included to provide consistency in how the non-burnable portions of the landscape are displayed on a fuel model map. In all NB fuel models there is no fuel load -- wildland fire will not spread. The gap in the NB numbering sequence is to retain fuel model numbers 98 as open water and 99 as "rock", as has been convention in the FARSITE system.

Expected fire behavior:
no fire spread

NB1 (91)
urban/developed

NB2 (92)
snow/ice

NB8 (98)
open water



GR1 (101) Short, sparse dry climate grass (dynamic)


Description:
The primary carrier of fire in GR1 is sparse grass, though small amounts of fine dead fuel may be present. The grass in GR1 is generally short, either naturally or by heavy grazing, and may be sparse or discontinuous. The moisture of extinction of GR1 is indicative of a dry climate fuelbed, but GR1 may also be applied in high-extinction moisture fuelbeds because in both cases predicted spread rate and flame length are very low (compared to other GR fuel models).

Fine fuel load (t/ac): 0.40
Characteristic SAV (1/ft): 2054
Packing ratio (dimensionless): 0.00143
Extinction moisture content (percent): 15

Expected fire behavior:
Very low to low

GR2 (102) Low load, dry climate grass (dynamic)


Description:
The primary carrier of fire in GR2 is grass, though small amounts of fine dead fuel may be present. Load is greater than GR1, and fuelbed may be more continuous. Shrubs, if present, do not affect fire behavior.

Fine fuel load (t/ac): 1.10
Characteristic SAV (1/ft): 1820
Packing ratio (dimensionless): 0.00158
Extinction moisture content (percent): 15

Expected fire behavior:
Low to moderate

GS1 (121) Low load, dry climate grass-shrub (dynamic)


Description:
The primary carrier of fire in GS1 is grass and shrubs combined. Shrubs are about 1 foot high, grass load is low. Spread rate is high; flame length moderate. Moisture of extinction is low.

Fine fuel load (t/ac): 1.35
Characteristic SAV (1/ft): 1832
Packing ratio (dimensionless): 0.00215
Extinction moisture content (percent): 15

Expected fire behavior:
Moderate to high

GS2 (122) Moderate load, dry climate grass-shrub (dynamic)


Description:
The primary carrier of fire in GS2 is grass and shrubs combined. Shrubs are 1-3 feet high, grass load is moderate. Spread rate is high; flame length moderate. Moisture of extinction is low.

Fine fuel load (t/ac): 2.1
Characteristic SAV (1/ft): 1827
Packing ratio (dimensionless): 0.00249
Extinction moisture content (percent): 15

Expected fire behavior:
Moderate to high

SH1 (141) Low load dry climate shrub (dynamic)


Description:
The primary carrier of fire in SH1 is woody shrubs and shrub litter. Low shrub fuel load, fuelbed depth about 1 foot; some grass may be present. Spread rate is high; flame length moderate.

Fine fuel load (t/ac): 1.7
Characteristic SAV (1/ft): 1674
Packing ratio (dimensionless): 0.00280
Extinction moisture content (percent): 15

Expected fire behavior:
Moderate to high

SH2 (142) Moderate load dry climate shrub


Description:
The primary carrier of fire in SH2 is woody shrubs and shrub litter. Moderate fuel load (higher than SH1), depth about 1 foot, no grass fuel present. Spread rate is moderate; flame length moderate.

Fine fuel load (t/ac): 5.2
Characteristic SAV (1/ft): 1672
Packing ratio (dimensionless): 0.01198
Extinction moisture content (percent): 15

Expected fire behavior:
Moderate

SH5 (145) High load dry climate shrub


Description:
The primary carrier of fire in SH5 is woody shrubs and shrub litter. Heavy shrub load, depth 4-6 feet. Spread rate is very high; flame length very high.

Fine fuel load (t/ac): 6.5
Characteristic SAV (1/ft): 1252
Packing ratio (dimensionless): 0.00206
Extinction moisture content (percent): 15

Expected fire behavior:
Very high

SH7 (147) Very high load dry climate shrub


Description:
The primary carrier of fire in SH7 is woody shrubs and shrub litter. Very heavy shrub load, depth 4-6 feet. Spread rate lower than SH5, but flame length similar. Spread rate is very high; flame length very high.

Fine fuel load (t/ac): 6.9
Characteristic SAV (1/ft): 1233
Packing ratio (dimensionless): 0.00344
Extinction moisture content (percent): 15

Expected fire behavior:
Very high

TU1 (161) Low load dry climate timber-grass-shrub


Description:
The primary carrier of fire in TU1 is low load of grass and/or shrub with litter. Spread rate is low; flame length low.

Fine fuel load (t/ac): 1.3
Characteristic SAV (1/ft): 1606
Packing ratio (dimensionless): 0.00885
Extinction moisture content (percent): 20

Expected fire behavior:
Low

TU5 (165) Very high load dry climate timber-shrub


Description:
The primary carrier of fire in TU5 is heavy forest litter with a shrub or small tree understory. Spread rate is moderate; flame length high.

Fine fuel load (t/ac): 7.0
Characteristic SAV (1/ft): 1224
Packing ratio (dimensionless): 0.02009
Extinction moisture content (percent): 25

Expected fire behavior:
Moderate to high

TL1 (181) Low load compact conifer litter


Description:
The primary carrier of fire in TL1 is compact forest litter. Light to moderate load, fuels 1-2 inches deep. Spread rate is very low; flame length very low. May be used to represent a recently burned forest.

Fine fuel load (t/ac): 1.0
Characteristic SAV (1/ft): 1716
Packing ratio (dimensionless): 0.04878
Extinction moisture content (percent): 30

Expected fire behavior:
Very low

TL3 (183) Moderate load conifer litter


Description:
The primary carrier of fire in TL3 is moderate load conifer litter, light load of coarse fuels. Spread rate is very low; flame length very low.

Fine fuel load (t/ac): 0.50
Characteristic SAV (1/ft): 1532
Packing ratio (dimensionless): 0.02630
Extinction moisture content (percent): 20

Expected fire behavior:
Very low

TL8 (188) Long-needle litter


Description:

The primary carrier of fire in TL8 is moderate load long-needle pine litter, may include small amount of herbaceous load. Spread rate is moderate; flame length low.

Fine fuel load (t/ac): 5.8
Characteristic SAV (1/ft): 1770
Packing ratio (dimensionless): 0.03969
Extinction moisture content (percent): 35

Expected fire behavior:
Low to moderate

APPENDIX C

NFPA WILDLAND FIRE RISK AND HAZARD SEVERITY ASSESSMENT FORM 1144

AND

WILDLAND-URBAN INTERFACE AND INTERMIX ZONE HAZARD ASSESSMENTS

WILDLAND FIRE RISK AND HAZARD SEVERITY ASSESSMENT FORM

Assign a value to the most appropriate element in each category and place the number of points in the column on the right.

Element	Points	
A. Means of Access		
1. Ingress and egress		
a. Two or more roads in/out	0	
b. One road in/out	7	
2. Road width		
a. ≥7.3 m (24 ft)	0	
b. ≥6.1 m (20 ft) and <7.3 m (24 ft)	2	
c. <6.1 m (20 ft)	4	
3. All-season road condition		
a. Surfaced road, grade <5%	0	
b. Surfaced road, grade >5%	2	
c. Non-surfaced road, grade <5%	2	
d. Non-surfaced road, grade >5%	5	
e. Other than all-season	7	
4. Fire Service Access		
a. ≤91.4 m (300 ft) with turnaround	0	
b. >91.4 m (300 ft) with turnaround	2	
c. <91.4 m (300 ft) with no turnaround	4	
d. ≥91.4 m (300 ft) with no turnaround	5	
5. Street signs		
a. Present [10.2 cm (4 in.) in size and reflectorized]	0	
b. Not present	5	
B. Vegetation (Fuel Models)		
1. Characteristics of predominate vegetation within 91.4 m (300 ft)		
a. Light (e.g., grasses, forbs, sawgrasses, and tundra) NFDRS Fuel Models A, C, L, N, S, and T	5	
b. Medium (e.g., light brush and small trees) NFDRS Fuel Models D, E, F, H, P, Q, and U	10	
c. Heavy (e.g., dense brush, timber, and hardwoods) NFDRS Fuel Models B, G, and O	20	
d. Slash (e.g., timber harvesting residue) NFDRS Fuel Models J, K, and L	25	
2. Defensible space		
a. More than 30.48 m (100 ft) of vegetation treatment from the structure(s)	1	
b. 21.6 m to 30.48 m (71 ft to 100 ft) of vegetation treatment from the structure(s)	3	
c. 9.14 m to 21.3 m (30 ft to 70 ft) of vegetation treatment from the structure(s)	10	
d. <9.14 m (30 ft) of vegetation treatment from the structure(s)	25	
C. Topography Within 91.4 m (300 ft) of Structure(s)		
1. Slope <9%	1	
2. Slope 10% to 20%	4	
3. Slope 21% to 30%	7	
4. Slope 31% to 40%	8	
5. Slope >41%	10	

Element	Points	
D. Additional Rating Factors (rate all that apply)		
1. Topographical features that adversely affect wildland fire behavior	0–5	
2. Areas with a history of higher fire occurrence than surrounding areas due to special situations (e.g., heavy lightning, railroads, escaped debris burning, and arson)	0–5	
3. Areas that are periodically exposed to unusually severe fire weather and strong dry winds	0–5	
4. Separation of adjacent structures that can contribute to fire spread	0–5	
E. Roofing Assembly		
1. Class A roof	0	
2. Class B roof	3	
3. Class C roof	15	
4. Nonrated	25	
F. Building Construction		
1. Materials (predominate)		
a. Noncombustible/fire-resistive siding, eaves, and deck (*see Chapter 8*)	0	
b. Noncombustible/fire-resistive siding and combustible deck	5	
c. Combustible siding and deck	10	
2. Building setback relative to slopes of 30% or more		
a. ≥9.14 m (30 ft) to slope	1	
b. <9.14 m (30 ft) to slope	5	
G. Available Fire Protection		
1. Water source availability		
a. Pressurized water source availability		
1892.7 L/min (500 gpm) hydrants ≤304.8 m (1000 ft) apart	0	
946.4 L/min (250 gpm) hydrants ≤304.8 m (1000 ft) apart	1	
b. Nonpressurized water source availability (off site)		
≥946.4 L/min (250 gpm) continuous for 2 hours	3	
<946.4 L/min (250 gpm) continuous for 2 hours	5	
c. Water unavailable	10	
2. Organized response resources		
a. Station ≤8 km (5 mi.) from structure	1	
b. Station >8 km (5 mi.) from structure	3	
3. Fixed fire protection		
a. NFPA 13, 13R, 13D sprinkler system	0	
b. None	5	
H. Placement of Gas and Electric Utilities		
1. Both underground	0	
2. One underground, one aboveground	3	
3. Both aboveground	5	
I. Totals for Home or Subdivision (Total of all points)		

Hazard Assessment	Total Points
Low hazard	<40
Moderate hazard	40–69
High hazard	70–112
Extreme hazard	>112

1144 Field Form Example (left blank):

Wildfire Risk and Hazard Severity Form NFPA 1144			
Community Name:	**Overall Rating:**		
A. Means of Access		Value	Points Assigned
1. Ingress and Egress			
2 or more roads in & out		0	
One road in & out		7	
2. Road Width			
> 24 ft		0	
≥ 20 - 24 ft		2	
< 20 ft		4	
3. All-Season Road Condition			
Surfaced Road, grade <5%		0	
Surfaced Road, grade >5%		2	
Non-Surfaced Road, grade <5%		2	
Non-Surfaced Road, grade >5%		5	
Other than all-season		7	
4. Fire Service Access			
≤ 300 ft with turnaround		0	
> 300 ft with turnaround		2	
≤ 300 ft with no turnaround		4	
> 300 ft with no turnaround		5	
5. Street signs			
Present (at least 4" and reflective)		0	
Present (small or non-reflective)		3	
Not Present		5	
B. Vegetation (Fuel Models)			
1. Characteristics of predominant vegetation within 300 ft			
Light; 1,2,3		5	
Medium; 5,6,7,8,9		10	
Heavy; 4, 10		20	
Slash; 11, 12, 13		25	
2. Defensible Space (vegetation treatment from the structure)			
> 100 ft		1	
71 - 100 ft		3	
31 - 70 ft		10	
≤ 30 ft		25	
C. Topography within 300 ft of Structures			
1. Slope			
< 9%		1	
10 - 20%		4	
21 - 30%		7	
31 - 40%		8	
> 41%		10	
D. Additional Rating Factors (rate all that apply)			
1. Additional factors			
Topographic features adversely affect fire behavior		0 - 5	
Areas with a history of high fire occurrence (high ignition potential)		0 - 5	
Severe fire weather potential		0 - 5	
Separation of adjacent structures contributing to fire spread		0 - 5	

E. Roofing Assembly	Value	Points Assigned
Roofing Materials		
Class A (asphalt, clay, concrete, slate, metal)	0	
Class B (Fire-resistance rating that indicates roofing materials are able to withstand *moderate* exposure to fire originating from sources outside the building.)	3	
Class C (Fire-resistance rating that indicates roofing materials are able to withstand *light* exposure to fire originating from sources outside the building.)	15	
Nonrated	25	
F. Building Construction		
1. Materials		
Noncombustible/fire-resistant siding, eaves, and deck	0	
Noncombustible/fire-resistant siding only	5	
Combustible siding and deck	10	
2. Building setback from slope of ≥30%		
≥ 30 ft to slope	1	
< 30 ft to slope	5	
G. Available Fire Protection		
1. Water Source Availability		
Pressurized hydrants		
500 gpm hydrants ≤1000 ft apart	0	
250 gpm hydrants ≤1000 ft apart	1	
Nonpressurized water sources (off site)		
≥ 250 gpm continuous for 2 hours	3	
≤ 250 gpm continuous for 2 hours	5	
Water Unavailable	10	
2. Organized Response Resources		
Station 5 miles or less from structure	1	
Station >5 miles from structure	3	
3. Fixed Fire Protection		
NFPA 13, 13R, 13D sprinkler system	0	
None	5	
H. Placement of Gas and Electric Utilities		
1. aboveground/underground		
Both underground	0	
One underground, one aboveground	3	
Both aboveground	5	
I. Point total for home or subdivision		

<40 = LOW	>40 = MODERATE	>70 = HIGH	>112 = EXTREME

Notes:

Pine Grove

Hazard Rating: 78, *High*

Description: WUI area, 282 acres; intermix area, 819 acres; 6720 to 7100 feet elevation. Historic community comprising small lots and houses located close to one another. Small lot sizes limit defensible space, which varies widely within the intermix boundary. Vegetation near most of the houses is light or has already been thinned. Many houses are located near the treeless riparian zone of the South Platte River. Many roads are in poor condition, which may hinder emergency access. Older seasonal cabins are interspersed within the WUI, and are a concern to year-round residents.

Vegetation:
The area is mostly covered by forests dominated by ponderosa pine. On north-facing slopes, forest is denser and has a larger percentage of Douglas-fir. Understory in forest stands is generally sparse. North-facing slopes can have large amounts of dead and down trees, contributing to heavy fuel loads. The north fork of the South Platte River runs through the middle of the WUI/intermix, so large riparian meadows and horse pastures are a conspicuous feature in the landscape.

Recommendations:
- For all homes, make improvements within the home ignition zone to reduce structure ignitability. Reduce percentage of combustible siding and decking on homes.
- Improve or expand defensible space by limbing and/or thinning trees, mowing seasonally, and disposing of slash.
- Initiate community effort to reach seasonal residents for fuels mitigation
- Complete ½-mile long shaded fuelbreak along Crystal Ridge Road
- Thin trees along Park Ave.from S. Elk Creek Rd. to Pine Valley Rd.
- Complete shaded fuelbreak/roadside thinning between the east side of Pine Valley Rd. (Hwy 126) and the private access roads within the rural intermix boundary south of Eagle's Gate Rd to Crystal Lake Rd.
- Improve/grade unsurfaced roads, such as 6th and 7th Streets

Wildfire Risk and Hazard Severity Form NFPA 1144

Community Name:	Pine Grove	**Overall Rating:**	78	High

A. Means of Access	Value	Points Assigned
1. Ingress and Egress		
2 or more roads in & out	0	2
One road in & out	7	
2. Road Width		
> 24 ft	0	
≥ 20 - 24 ft	2	
< 20 ft	4	3
3. All-Season Road Condition		
Surfaced Road, grade <5%	0	
Surfaced Road, grade >5%	2	
Non-Surfaced Road, grade <5%	2	
Non-Surfaced Road, grade >5%	5	4
Other than all-season	7	
4. Fire Service Access		
≤ 300 ft with turnaround	0	
> 300 ft with turnaround	2	
≤ 300 ft with no turnaround	4	4
> 300 ft with no turnaround	5	
5. Street signs		
Present (at least 4" and reflective)	0	
Present (small or non-reflective)	3	3
Not Present	5	
B. Vegetation (Fuel Models)		
1. Characteristics of predominant vegetation within 300 ft		
Light; 1,2,3	5	
Medium; 5,6,7,8,9	10	8
Heavy; 4, 10	20	
Slash; 11, 12, 13	25	
2. Defensible Space (vegetation treatment from the structure)		
> 100 ft	1	
71 - 100 ft	3	
31 - 70 ft	10	10
≤ 30 ft	25	
C. Topography within 300 ft of Structures		
1. Slope		
< 9%	1	
10 - 20%	4	4
21 - 30%	7	
31 - 40%	8	
> 41%	10	
D. Additional Rating Factors (rate all that apply)		
1. Additional factors		
Topographic features adversely affect fire behavior	0 - 5	3
Areas with a history of high fire occurrence (high ignition potential)	0 - 5	4
Severe fire weather potential	0 - 5	4
Separation of adjacent structures contributing to fire spread	0 - 5	4

E. Roofing Assembly	Value	Points Assigned
Roofing Materials		
Class A (asphalt, clay, concrete, slate, metal)	0	1
Class B (Fire-resistance rating that indicates roofing materials are able to withstand *moderate* exposure to fire originating from sources outside the building.)	3	
Class C (Fire-resistance rating that indicates roofing materials are able to withstand *light* exposure to fire originating from sources outside the building.)	15	
Nonrated	25	
F. Building Construction		
1. Materials		
Noncombustible/fire-resistant siding, eaves, and deck	0	
Noncombustible/fire-resistant siding only	5	
Combustible siding and deck	10	9
2. Building setback from slope of ≥30%		
≥ 30 ft to slope	1	2
< 30 ft to slope	5	
G. Available Fire Protection		
1. Water Source Availability		
Pressurized hydrants		
500 gpm hydrants ≤1000 ft apart	0	
250 gpm hydrants ≤1000 ft apart	1	
Nonpressurized water sources (off site)		
≥ 250 gpm continuous for 2 hours	3	3
≤ 250 gpm continuous for 2 hours	5	
Water Unavailable	10	
2. Organized Response Resources		
Station 5 miles or less from structure	1	1
Station >5 miles from structure	3	
3. Fixed Fire Protection		
NFPA 13, 13R, 13D sprinkler system	0	
None	5	5
H. Placement of Gas and Electric Utilities		
1. aboveground/underground		
Both underground	0	
One underground, one aboveground	3	
Both aboveground	5	5
I. Point total for home or subdivision		79

<40 = LOW	>40 = MODERATE	>70 = HIGH	>112 = EXTREME

Buffalo Creek

Hazard Rating: 88, *High*

Description: WUI area, 332 acres; intermix area, 1023 acres; 6620 to 7100 feet elevation. The small community of Riverview is included within the rural intermix zone boundary. Although the fuel type varies from light to medium, tree canopies are fairly continuous throughout the neighborhoods. Defensible space is minimal or non-existent. Small lot sizes and the large number of seasonal cabins may be limiting factors in community-wide mitigation. Several seasonal residences lack regular upkeep, such as having needle litter cleared off roofs and decks. Some streets are not well-maintained and lack signage. The USFS has completed extensive fuel reduction treatments in this area.

Vegetation: This area is predominantly covered by ponderosa pine forests, with small riparian meadow areas along the South Platte River and Buffalo Creek. Understory vegetation is sparse, and ladder fuels have been extensively treated on many private properties. Forest canopy is mostly continuous. The southernmost portion of intermix area was severely burned in the Buffalo Creek fire, and therefore contains sparse grasslands and shrublands.

Recommendations:

- For all homes, make improvements within the home ignition zone to reduce structure ignitability. Reduce percentage of combustible siding and decking on homes.
- Improve or expand defensible space by limbing and/or thinning trees, mowing seasonally, and disposing of slash.
- Initiate community effort to reach seasonal residents for fuels mitigation
- Maintain private roads in passable condition
- Install reflective, fire-resistant street signs and house numbers
- Complete shaded fuelbreaks west of Buffalo Creek Rd. and south of Logan Ave.; connect these fuelbreaks with those completed by USFS.
- Thin trees and remove hazard trees from along Hilltop Rd., tie-in to USFS treatments where possible
- Complete chaded fuelbreaks north of Platte River Rd., tie into planned USFS treatment areas and private roads.

Wildfire Risk and Hazard Severity Form NFPA 1144

Community Name:	Buffalo Creek	**Overall Rating:**	88	High

A. Means of Access	Value	Points Assigned
1. Ingress and Egress		
2 or more roads in & out	0	
One road in & out	7	4
2. Road Width		
> 24 ft	0	
≥ 20 - 24 ft	2	
< 20 ft	4	4
3. All-Season Road Condition		
Surfaced Road, grade <5%	0	
Surfaced Road, grade >5%	2	
Non-Surfaced Road, grade <5%	2	
Non-Surfaced Road, grade >5%	5	5
Other than all-season	7	
4. Fire Service Access		
≤ 300 ft with turnaround	0	
> 300 ft with turnaround	2	
≤ 300 ft with no turnaround	4	4
> 300 ft with no turnaround	5	
5. Street signs		
Present (at least 4" and reflective)	0	
Present (small or non-reflective)	3	3
Not Present	5	
B. Vegetation (Fuel Models)		
1. Characteristics of predominant vegetation within 300 ft		
Light; 1,2,3	5	
Medium; 5,6,7,8,9	10	10
Heavy; 4, 10	20	
Slash; 11, 12, 13	25	
2. Defensible Space (vegetation treatment from the structure)		
> 100 ft	1	
71 - 100 ft	3	
31 - 70 ft	10	15
≤ 30 ft	25	
C. Topography within 300 ft of Structures		
1. Slope		
< 9%	1	
10 - 20%	4	
21 - 30%	7	6
31 - 40%	8	
> 41%	10	
D. Additional Rating Factors (rate all that apply)		
1. Additional factors		
Topographic features adversely affect fire behavior	0 - 5	3
Areas with a history of high fire occurrence (high ignition potential)	0 - 5	4
Severe fire weather potential	0 - 5	4
Separation of adjacent structures contributing to fire spread	0 - 5	2

E. Roofing Assembly	Value	Points Assigned
Roofing Materials		
Class A (asphalt, caly, concrete, slate, metal)	0	0
Class B (Fire-resistance rating that indicates roofing materials are able to withstand *moderate* exposure to fire originating from sources outside the building.)	3	
Class C (Fire-resistance rating that indicates roofing materials are able to withstand *light* exposure to fire originating from sources outside the building.)	15	
Nonrated	25	
F. Building Construction		
1. Materials		
Noncombustible/fire-resistant siding, eaves, and deck	0	
Noncombustible/fire-resistant siding only	5	
Combustible siding and deck	10	10
2. Building setback from slope of ≥30%		
≥ 30 ft to slope	1	
< 30 ft to slope	5	
G. Available Fire Protection		
1. Water Source Availability		
Pressurized hydrants		
500 gpm hydrants ≤1000 ft apart	0	
250 gpm hydrants ≤1000 ft apart	1	
Nonpressurized water sources (off site)		
≥ 250 gpm continuous for 2 hours	3	3
≤ 250 gpm continuous for 2 hours	5	
Water Unavailable	10	
2. Organized Response Resources		
Station 5 miles or less from structure	1	1
Station >5 miles from structure	3	
3. Fixed Fire Protection		
NFPA 13, 13R, 13D sprinkler system	0	
None	5	5
H. Placement of Gas and Electric Utilities		
1. aboveground/underground		
Both underground	0	
One underground, one aboveground	3	
Both aboveground	5	5
I. Point total for home or subdivision		88

<40 = LOW	>40 = MODERATE	>70 = HIGH	>112 = EXTREME

Spring Creek

Hazard Rating: 62, *Moderate*

Description: WUI area, 956 acres; intermix area, 1795 acres; 7330 to 7600 feet elevation. Most of community lies within large meadows or open ponderosa woodland with short grass but well-marked and with adequate turnarounds. Defensible space meets or exceeds minimum guidelines. Fuel reduction was completed by USFS in 2003 and 2004 along the east side of Hwy 126 and south of the intermix area. There are some areas of dense forest east of the community off of Spring Creek Trail. In these areas, occasionally near homes, there is heavy ingrowth, sub-canopy juniper, and overtopped aspen. This does not affect the fire hazard for most of the homes in the area.

Vegetation: Ponderosa pine forests and open woodlands are the dominant vegetation type in the WUI and intermix. The northwest corner of intermix area was severely burned in the Buffalo Creek fire, and therefore contains sparse grasslands and shrublands. A large portion of the WUI area is open meadows and pastures with a mix of native and agricultural grasses.

Recommendations:

- For all homes, make improvements within the home ignition zone to reduce structure ignitability. Reduce percentage of combustible siding and decking on homes.
- Improve or expand defensible space by limbing and/or thinning trees, mowing seasonally, and disposing of slash.
- Complete shaded fuelbreak along the Spreek Creek Trail, on the southern portion of the loop, where fuels are denser. Where possible, tie treatments on private property to completed USFS mastication treatments.
- Complete planned USFS fuel break on west side of Hwy 126, parallel to completed fuelbreak on other side of road.
- Maintain fuel reduction treatments on east side of Hwy 126 and along FS Road 530

Wildfire Risk and Hazard Severity Form NFPA 1144

Community Name:	Spring Creek	**Overall Rating:**	62	Moderate

A. Means of Access	Value	Points Assigned
1. Ingress and Egress		
2 or more roads in & out	0	0
One road in & out	7	
2. Road Width		
> 24 ft	0	
≥ 20 - 24 ft	2	2
< 20 ft	4	
3. All-Season Road Condition		
Surfaced Road, grade <5%	0	
Surfaced Road, grade >5%	2	
Non-Surfaced Road, grade <5%	2	2
Non-Surfaced Road, grade >5%	5	
Other than all-season	7	
4. Fire Service Access		
≤ 300 ft with turnaround	0	
> 300 ft with turnaround	2	2
≤ 300 ft with no turnaround	4	
> 300 ft with no turnaround	5	
5. Street signs		
Present (at least 4" and reflective)	0	0
Present (small or non-reflective)	3	
Not Present	5	
B. Vegetation (Fuel Models)		
1. Characteristics of predominant vegetation within 300 ft		
Light; 1,2,3	5	
Medium; 5,6,7,8,9	10	10
Heavy; 4, 10	20	
Slash; 11, 12, 13	25	
2. Defensible Space (vegetation treatment from the structure)		
> 100 ft	1	
71 - 100 ft	3	5
31 - 70 ft	10	
≤ 30 ft	25	
C. Topography within 300 ft of Structures		
1. Slope		
< 9%	1	
10 - 20%	4	4
21 - 30%	7	
31 - 40%	8	
> 41%	10	
D. Additional Rating Factors (rate all that apply)		
1. Additional factors		
Topographic features adversely affect fire behavior	0 - 5	2
Areas with a history of high fire occurrence (high ignition potential)	0 - 5	4
Severe fire weather potential	0 - 5	4
Separation of adjacent structures contributing to fire spread	0 - 5	0

E. Roofing Assembly	Value	Points Assigned
Roofing Materials		
Class A (asphalt, clay, concrete, slate, metal)	0	0
Class B (Fire-resistance rating that indicates roofing materials are able to withstand *moderate* exposure to fire originating from sources outside the building.)	3	
Class C (Fire-resistance rating that indicates roofing materials are able to withstand *light* exposure to fire originating from sources outside the building.)	15	
Nonrated	25	
F. Building Construction		
1. Materials		
Noncombustible/fire-resistant siding, eaves, and deck	0	
Noncombustible/fire-resistant siding only	5	
Combustible siding and deck	10	10
2. Building setback from slope of ≥30%		
≥ 30 ft to slope	1	1
< 30 ft to slope	5	
G. Available Fire Protection		
1. Water Source Availability		
Pressurized hydrants		
500 gpm hydrants ≤1000 ft apart	0	
250 gpm hydrants ≤1000 ft apart	1	
Nonpressurized water sources (off site)		
≥ 250 gpm continuous for 2 hours	3	
≤ 250 gpm continuous for 2 hours	5	5
Water Unavailable	10	
2. Organized Response Resources		
Station 5 miles or less from structure	1	1
Station >5 miles from structure	3	
3. Fixed Fire Protection		
NFPA 13, 13R, 13D sprinkler system	0	
None	5	5
H. Placement of Gas and Electric Utilities		
1. aboveground/underground		
Both underground	0	
One underground, one aboveground	3	
Both aboveground	5	5
I. Point total for home or subdivision		62

<40 = LOW	>40 = MODERATE	>70 = HIGH	>112 = EXTREME

Foxton/Longview

Hazard Rating: , *High*

Foot bridge to Ferndale

Foxton

Longveiw

South Platte

Description: Intermix area, 1750 acres; 6200 to 7000 feet elevation. Overall, this is a sparsely populated area with small communities and individual homes located along the South Platte River. The communities of Ferndale, Foxton, Longview, and South Platte are included in this large intermix area. Due to the low population, this is classified as a rural intermix zone. Most homes are located close to the river with steep narrow driveways or private roads with little or no all-season access. At Ferndale, a narrow bridge spans river to access houses, and would not be passable for heavy emergency vehicles. In communities on the north side of the road, on south aspects vegetation is lighter, and therefore defensible space is generally larger. On north aspects, there are continuous dense trees up to and over-hanging houses, and there is no defensible space. All homes tend to be located on or near steep slopes. Many seasonal cabins are interspersed with a few year-round residences. Most of the surrounding area is part of Denver Water and the Pike National Forest. Defensible space has been completed around all Denver Water structures in Foxton, Longview, and South Platte. Extensive fuel reduction and forest restoration treatments have been completed on Denver Water lands adjoining Foxton (along the road and across the river) and Longview, including the installation of permanent firebreaks and fuelbreaks.

Vegetation:
The area is mostly covered by forests dominated by ponderosa pine. On north-facing slopes, forest is denser and has a larger percentage of Douglas-fir and Colorado blue spruce. On drier, more exposed south-facing slopes, trees are sparser, and Rocky Mountain juniper occurs with ponderosa pine. North-facing slopes can have large amounts of dead and down trees, contributing to heavy fuel loads. The South Platte River runs through this intermix zone, and small areas of woody riparian species such as willow and cottonwood are present.

Recommendations:
- For all homes, make improvements within the home ignition zone to reduce structure ignitability. Reduce percentage of combustible siding and decking on homes.
- Improve or expand defensible space by limbing and/or thinning trees, mowing seasonally, and disposing of slash.
- Initiate community effort to reach seasonal residents for fuels mitigation
- Install reflective, fire-resistant address signs on structures and on Platte River Rd.
- Maintain previously thinned areas north of Riverview and Foxton
- Complete shaded fuelbreak planned by USFS on south side of Platte River Rd. at Riverview

Wildfire Risk and Hazard Severity Form NFPA 1144			
Community Name: Foxton/Longview intermix	**Overall Rating:**	97	High
A. Means of Access		Value	Points Assigned
1. Ingress and Egress			
2 or more roads in & out		0	3
One road in & out		7	
2. Road Width			
> 24 ft		0	
≥ 20 - 24 ft		2	2
< 20 ft		4	
3. All-Season Road Condition			
Surfaced Road, grade <5%		0	
Surfaced Road, grade >5%		2	
Non-Surfaced Road, grade <5%		2	3
Non-Surfaced Road, grade >5%		5	
Other than all-season		7	
4. Fire Service Access			
≤ 300 ft with turnaround		0	
> 300 ft with turnaround		2	
≤ 300 ft with no turnaround		4	4
> 300 ft with no turnaround		5	
5. Street signs			
Present (at least 4" and reflective)		0	
Present (small or non-reflective)		3	
Not Present		5	5
B. Vegetation (Fuel Models)			
1. Characteristics of predominant vegetation within 300 ft			
Light; 1,2,3		5	
Medium; 5,6,7,8,9		10	10
Heavy; 4, 10		20	
Slash; 11, 12, 13		25	
2. Defensible Space (vegetation treatment from the structure)			
> 100 ft		1	
71 - 100 ft		3	
31 - 70 ft		10	
≤ 30 ft		25	20
C. Topography within 300 ft of Structures			
1. Slope			
< 9%		1	
10 - 20%		4	
21 - 30%		7	7
31 - 40%		8	
> 41%		10	
D. Additional Rating Factors (rate all that apply)			
1. Additional factors			
Topographic features adversely affect fire behavior		0 - 5	4
Areas with a history of high fire occurrence (high ignition potential)		0 - 5	3
Severe fire weather potential		0 - 5	4
Separation of adjacent structures contributing to fire spread		0 - 5	2

E. Roofing Assembly	Value	Points Assigned
Roofing Materials		
Class A (asphalt, clay, concrete, slate, metal)	0	
Class B (Fire-resistance rating that indicates roofing materials are able to withstand *moderate* exposure to fire originating from sources outside the building.)	3	3
Class C (Fire-resistance rating that indicates roofing materials are able to withstand *light* exposure to fire originating from sources outside the building.)	15	
Nonrated	25	
F. Building Construction		
1. Materials		
Noncombustible/fire-resistant siding, eaves, and deck	0	
Noncombustible/fire-resistant siding only	5	
Combustible siding and deck	10	10
2. Building setback from slope of ≥30%		
≥ 30 ft to slope	1	2
< 30 ft to slope	5	
G. Available Fire Protection		
1. Water Source Availability		
Pressurized hydrants		
500 gpm hydrants ≤1000 ft apart	0	
250 gpm hydrants ≤1000 ft apart	1	
Nonpressurized water sources (off site)		
≥ 250 gpm continuous for 2 hours	3	3
≤ 250 gpm continuous for 2 hours	5	
Water Unavailable	10	
2. Organized Response Resources		
Station 5 miles or less from structure	1	2
Station >5 miles from structure	3	
3. Fixed Fire Protection		
NFPA 13, 13R, 13D sprinkler system	0	
None	5	5
H. Placement of Gas and Electric Utilities		
1. aboveground/underground		
Both underground	0	
One underground, one aboveground	3	
Both aboveground	5	5
I. Point total for home or subdivision		97

<40 = LOW	>40 = MODERATE	>70 = HIGH	>112 = EXTREME

Platte River Road Corridor

Hazard Rating: 92, *High*

Nighthawk


Scraggy View

Description: Intermix area, 950 acres; 6200 to 7000 feet elevation. Overall, this is a sparsely populated area with small communities and individual homes located along the South Platte River. This area includes the communities of Nighthawk and Scraggy View. There are several popular recreational sites along the river for fishing and picnicking. Defensible space has been completed around all Denver Water structures in this area. Defensible space has also been completed around some private homes in Nighthawk, Scraggy View, and Swayback. Extensive fuel reduction and forest restoration treatments have been completed in and around these communities.

Vegetation:
The area is mostly covered by forests dominated by ponderosa pine. On north-facing slopes, forest is denser and has a larger percentage of Douglas-fir. On drier, more exposed south-facing slopes, trees are sparser, and Rocky Mountain juniper occurs with ponderosa pine. North-facing slopes can have large amounts of dead and down trees, contributing to heavy fuel loads. The South Platte River runs through this intermix zone, and small areas of woody riparian species such as willow and cottonwood are present.

Recommendations:
- For all homes, make improvements within the home ignition zone to reduce structure ignitability
- Improve or expand defensible space by limbing and/or thinning trees, mowing seasonally, and disposing of slash. Where possible, extend treatments on private property to Denver Water thinning treatments surrounding the communities.
- Install reflective address signs at community entrances and driveways where applicable
- Display and update wildfire education materials at USFS information kiosks to educate tourists

Wildfire Risk and Hazard Severity Form NFPA 1144			
Community Name: Platte River Road Corridor	**Overall Rating:**	92	High
A. Means of Access		Value	Points Assigned
1. Ingress and Egress			
2 or more roads in & out		0	
One road in & out		7	5
2. Road Width			
> 24 ft		0	
≥ 20 - 24 ft		2	
< 20 ft		4	3
3. All-Season Road Condition			
Surfaced Road, grade <5%		0	
Surfaced Road, grade >5%		2	
Non-Surfaced Road, grade <5%		2	2
Non-Surfaced Road, grade >5%		5	
Other than all-season		7	
4. Fire Service Access			
≤ 300 ft with turnaround		0	
> 300 ft with turnaround		2	
≤ 300 ft with no turnaround		4	4
> 300 ft with no turnaround		5	
5. Street signs			
Present (at least 4" and reflective)		0	
Present (small or non-reflective)		3	4
Not Present		5	
B. Vegetation (Fuel Models)			
1. Characteristics of predominant vegetation within 300 ft			
Light; 1,2,3		5	
Medium; 5,6,7,8,9		10	8
Heavy; 4, 10		20	
Slash; 11, 12, 13		25	
2. Defensible Space (vegetation treatment from the structure)			
> 100 ft		1	
71 - 100 ft		3	
31 - 70 ft		10	
≤ 30 ft		25	20
C. Topography within 300 ft of Structures			
1. Slope			
< 9%		1	
10 - 20%		4	
21 - 30%		7	6
31 - 40%		8	
> 41%		10	

D. Additional Rating Factors (rate all that apply)		
1. Additional factors		
Topographic features adversely affect fire behavior	0 - 5	4
Areas with a history of high fire occurrence (high ignition potential)	0 - 5	4
Severe fire weather potential	0 - 5	4
Separation of adjacent structures contributing to fire spread	0 - 5	1

E. Roofing Assembly	Value	Points Assigned
Roofing Materials		
Class A (asphalt, clay, concrete, slate, metal)	0	0
Class B (Fire-resistance rating that indicates roofing materials are able to withstand *moderate* exposure to fire originating from sources outside the building.)	3	
Class C (Fire-resistance rating that indicates roofing materials are able to withstand *light* exposure to fire originating from sources outside the building.)	15	
Nonrated	25	
F. Building Construction		
1. Materials		
Noncombustible/fire-resistant siding, eaves, and deck	0	
Noncombustible/fire-resistant siding only	5	
Combustible siding and deck	10	10
2. Building setback from slope of ≥30%		
≥ 30 ft to slope	1	1
< 30 ft to slope	5	
G. Available Fire Protection		
1. Water Source Availability		
Pressurized hydrants		
500 gpm hydrants ≤1000 ft apart	0	
250 gpm hydrants ≤1000 ft apart	1	
Nonpressurized water sources (off site)		
≥ 250 gpm continuous for 2 hours	3	3
≤ 250 gpm continuous for 2 hours	5	
Water Unavailable	10	
2. Organized Response Resources		
Station 5 miles or less from structure	1	
Station >5 miles from structure	3	3
3. Fixed Fire Protection		
NFPA 13, 13R, 13D sprinkler system	0	
None	5	5
H. Placement of Gas and Electric Utilities		
1. aboveground/underground		
Both underground	0	
One underground, one aboveground	3	
Both aboveground	5	5
I. Point total for home or subdivision		92

<40 = LOW	>40 = MODERATE	>70 = HIGH	>112 = EXTREME

Trumbull/Deckers

Hazard Rating: 65, *Moderate*

Trumbull

Deckers

Swayback Ranch

Description: Intermix area, 3006 acres; 6300 to 6600 feet elevation. This area includes the communities of Deckers, Trumbull, Swayback Ranch, and Oxyoke. The majority of the homes are located in Trumbull, although Deckers is a well-known geographic landmark of the district due to the intersection of highways 129 and 67. The area is heavily travelled by tourists, who use the recreation areas along the South Platte River. Homes are located predominately in or near open meadows. Although the majority of the homes in this area have already completed defensible space, communities should maintain this work periodically and complete yearly activities such as mowing, cleaning rooftops and gutters, and moving firewood away from homes during fire season. Areas burned by the Hayman fire are directly adjacent to Deckers, and the area has seen extensive mitigation on Denver Water and USFS lands.

Vegetation:
The area is mostly covered by forests dominated by ponderosa pine, although most of the homes are located in open meadows and in light vegetation. On drier, more exposed south-facing slopes, trees are sparser, and Rocky Mountain juniper occurs with ponderosa pine. Gambel oak is also common throughout this intermix area. The South Platte River runs through this intermix zone, and areas of woody riparian species such as willow and cottonwood are present.

Recommendations:

- For all homes, make improvements within the home ignition zone to reduce structure ignitability
- Improve or expand defensible space by limbing and/or thinning trees, mowing seasonally, and disposing of slash.
- Install reflective address signs at community entrances and driveways where applicable
- Display and update wildfire education materials at USFS information kiosks to educate tourists

Wildfire Risk and Hazard Severity Form NFPA 1144			
Community Name: Trumbull/Deckers	**Overall Rating:**	65	Moderate
A. Means of Access		Value	Points Assigned
1. Ingress and Egress			
2 or more roads in & out		0	0
One road in & out		7	
2. Road Width			
> 24 ft		0	
≥ 20 - 24 ft		2	2
< 20 ft		4	
3. All-Season Road Condition			
Surfaced Road, grade <5%		0	
Surfaced Road, grade >5%		2	
Non-Surfaced Road, grade <5%		2	2
Non-Surfaced Road, grade >5%		5	
Other than all-season		7	
4. Fire Service Access			
≤ 300 ft with turnaround		0	
> 300 ft with turnaround		2	2
≤ 300 ft with no turnaround		4	
> 300 ft with no turnaround		5	
5. Street signs			
Present (at least 4" and reflective)		0	
Present (small or non-reflective)		3	3
Not Present		5	
B. Vegetation (Fuel Models)			
1. Characteristics of predominant vegetation within 300 ft			
Light; 1,2,3		5	5
Medium; 5,6,7,8,9		10	
Heavy; 4, 10		20	
Slash; 11, 12, 13		25	
2. Defensible Space (vegetation treatment from the structure)			
> 100 ft		1	
71 - 100 ft		3	
31 - 70 ft		10	6
≤ 30 ft		25	

C. Topography within 300 ft of Structures		
1. Slope		
< 9%	1	
10 - 20%	4	6
21 - 30%	7	
31 - 40%	8	
> 41%	10	
D. Additional Rating Factors (rate all that apply)		
1. Additional factors		
Topographic features adversely affect fire behavior	0 - 5	3
Areas with a history of high fire occurrence (high ignition potential)	0 - 5	5
Severe fire weather potential	0 - 5	4
Separation of adjacent structures contributing to fire spread	0 - 5	1

E. Roofing Assembly	Value	Points Assigned
Roofing Materials		
Class A (asphalt, caly, concrete, slate, metal)	0	0
Class B (Fire-resistance rating that indicates roofing materials are able to withstand *moderate* exposure to fire originating from sources outside the building.)	3	
Class C (Fire-resistance rating that indicates roofing materials are able to withstand *light* exposure to fire originating from sources outside the building.)	15	
Nonrated	25	
F. Building Construction		
1. Materials		
Noncombustible/fire-resistant siding, eaves, and deck	0	
Noncombustible/fire-resistant siding only	5	
Combustible siding and deck	10	10
2. Building setback from slope of ≥30%		
≥ 30 ft to slope	1	2
< 30 ft to slope	5	
G. Available Fire Protection		
1. Water Source Availability		
Pressurized hydrants		
500 gpm hydrants ≤1000 ft apart	0	
250 gpm hydrants ≤1000 ft apart	1	
Nonpressurized water sources (off site)		
≥ 250 gpm continuous for 2 hours	3	3
≤ 250 gpm continuous for 2 hours	5	
Water Unavailable	10	
2. Organized Response Resources		
Station 5 miles or less from structure	1	1
Station >5 miles from structure	3	
3. Fixed Fire Protection		
NFPA 13, 13R, 13D sprinkler system	0	
None	5	5
H. Placement of Gas and Electric Utilities		
1. aboveground/underground		
Both underground	0	
One underground, one aboveground	3	
Both aboveground	5	5
I. Point total for home or subdivision		65

<40 = LOW	>40 = MODERATE	>70 = HIGH	>112 = EXTREME

North Rainbow Falls

Hazard Rating: 101, *High*

Description: WUI area, 247 acres; intermix area, 441 acres; 6700 to 6900 feet elevation. This is a small rural community in Douglas County. There is a one-lane, mile-long road that is the only access/egress route for the community. Many homes are located on or near slopes >30%. Driveways and portions of Overlook Road have tight turns that would make access for emergency vehicles difficult. Areas burned in the Hayman fire and the Polhemus prescribed fire are directly adjacent to the intermix boundary, but no landscape-scale mitigation has been completed within the WUI boundary. Defensible spaces are minimal or lacking for most structures.

Vegetation:
The area is mostly covered by forests dominated by ponderosa pine. On north-facing slopes, the forests are denser and have a higher percentage of Douglas-fir. Tall shrubs are present in the understory in some stands, which can contribute to intense fire behavior. A small pond and riparian area are located in the center of the community that provides a small natural fuelbreak.

Recommendations:
- For all homes, make improvements within the home ignition zone to reduce structure ignitability
- Improve or expand defensible space by limbing and/or thinning trees, mowing seasonally, and disposing of slash appropriately
- Remove large slash pile from downhill side of Rainbow Falls Rd. by scattering, chipping, or burning in piles.
- Complete additional thinning along Rainbow Falls Rd, at the edge of the prescribed burn area, to the eastern boundary of the WUI zone.
- Complete shaded fuelbreak between Skyline Dr. and Canon Dr.
- Complete shaded fuelbreak along Overlook Rd.

Wildfire Risk and Hazard Severity Form NFPA 1144

Community Name:	North Rainbow Falls	**Overall Rating:**	101	High

A. Means of Access	Value	Points Assigned
1. Ingress and Egress		
2 or more roads in & out	0	
One road in & out	7	7
2. Road Width		
> 24 ft	0	
≥ 20 - 24 ft	2	
< 20 ft	4	4
3. All-Season Road Condition		
Surfaced Road, grade <5%	0	
Surfaced Road, grade >5%	2	
Non-Surfaced Road, grade <5%	2	
Non-Surfaced Road, grade >5%	5	6
Other than all-season	7	
4. Fire Service Access		
≤ 300 ft with turnaround	0	
> 300 ft with turnaround	2	
≤ 300 ft with no turnaround	4	4
> 300 ft with no turnaround	5	
5. Street signs		
Present (at least 4" and reflective)	0	
Present (small or non-reflective)	3	3
Not Present	5	
B. Vegetation (Fuel Models)		
1. Characteristics of predominant vegetation within 300 ft		
Light; 1,2,3	5	
Medium; 5,6,7,8,9	10	10
Heavy; 4, 10	20	
Slash; 11, 12, 13	25	
2. Defensible Space (vegetation treatment from the structure)		
> 100 ft	1	
71 - 100 ft	3	
31 - 70 ft	10	15
≤ 30 ft	25	
C. Topography within 300 ft of Structures		
1. Slope		
< 9%	1	
10 - 20%	4	
21 - 30%	7	
31 - 40%	8	8
> 41%	10	
D. Additional Rating Factors (rate all that apply)		
1. Additional factors		
Topographic features adversely affect fire behavior	0 - 5	4
Areas with a history of high fire occurrence (high ignition potential)	0 - 5	5
Severe fire weather potential	0 - 5	4
Separation of adjacent structures contributing to fire spread	0 - 5	0

E. Roofing Assembly	Value	Points Assigned
Roofing Materials		
Class A (asphalt, clay, concrete, slate, metal)	0	0
Class B (Fire-resistance rating that indicates roofing materials are able to withstand *moderate* exposure to fire originating from sources outside the building.)	3	
Class C (Fire-resistance rating that indicates roofing materials are able to withstand *light* exposure to fire originating from sources outside the building.)	15	
Nonrated	25	
F. Building Construction		
1. Materials		
Noncombustible/fire-resistant siding, eaves, and deck	0	
Noncombustible/fire-resistant siding only	5	
Combustible siding and deck	10	10
2. Building setback from slope of ≥30%		
≥ 30 ft to slope	1	
< 30 ft to slope	5	5
G. Available Fire Protection		
1. Water Source Availability		
Pressurized hydrants		
500 gpm hydrants ≤1000 ft apart	0	
250 gpm hydrants ≤1000 ft apart	1	
Nonpressurized water sources (off site)		
≥ 250 gpm continuous for 2 hours	3	3
≤ 250 gpm continuous for 2 hours	5	
Water Unavailable	10	
2. Organized Response Resources		
Station 5 miles or less from structure	1	
Station >5 miles from structure	3	3
3. Fixed Fire Protection		
NFPA 13, 13R, 13D sprinkler system	0	
None	5	5
H. Placement of Gas and Electric Utilities		
1. aboveground/underground		
Both underground	0	
One underground, one aboveground	3	
Both aboveground	5	5
I. Point total for home or subdivision		101

<40 = LOW	>40 = MODERATE	>70 = HIGH	>112 = EXTREME

APPENDIX C

NFPA WILDLAND FIRE RISK AND HAZARD SEVERITY ASSESSMENT FORM 1144

AND

WILDLAND-URBAN INTERFACE AND INTERMIX ZONE HAZARD ASSESSMENTS

WILDLAND FIRE RISK AND HAZARD SEVERITY ASSESSMENT FORM

Assign a value to the most appropriate element in each category and place the number of points in the column on the right.

Element	Points	
A. Means of Access		
1. Ingress and egress		
a. Two or more roads in/out	0	
b. One road in/out	7	
2. Road width		
a. ≥7.3 m (24 ft)	0	
b. ≥6.1 m (20 ft) and <7.3 m (24 ft)	2	
c. <6.1 m (20 ft)	4	
3. All-season road condition		
a. Surfaced road, grade <5%	0	
b. Surfaced road, grade >5%	2	
c. Non-surfaced road, grade <5%	2	
d. Non-surfaced road, grade >5%	5	
e. Other than all-season	7	
4. Fire Service Access		
a. ≤91.4 m (300 ft) with turnaround	0	
b. >91.4 m (300 ft) with turnaround	2	
c. <91.4 m (300 ft) with no turnaround	4	
d. ≥91.4 m (300 ft) with no turnaround	5	
5. Street signs		
a. Present [10.2 cm (4 in.) in size and reflectorized]	0	
b. Not present	5	
B. Vegetation (Fuel Models)		
1. Characteristics of predominate vegetation within 91.4 m (300 ft)		
a. Light (e.g., grasses, forbs, sawgrasses, and tundra) NFDRS Fuel Models A, C, L, N, S, and T	5	
b. Medium (e.g., light brush and small trees) NFDRS Fuel Models D, E, F, H, P, Q, and U	10	
c. Heavy (e.g., dense brush, timber, and hardwoods) NFDRS Fuel Models B, G, and O	20	
d. Slash (e.g., timber harvesting residue) NFDRS Fuel Models J, K, and L	25	
2. Defensible space		
a. More than 30.48 m (100 ft) of vegetation treatment from the structure(s)	1	
b. 21.6 m to 30.48 m (71 ft to 100 ft) of vegetation treatment from the structure(s)	3	
c. 9.14 m to 21.3 m (30 ft to 70 ft) of vegetation treatment from the structure(s)	10	
d. <9.14 m (30 ft) of vegetation treatment from the structure(s)	25	
C. Topography Within 91.4 m (300 ft) of Structure(s)		
1. Slope <9%	1	
2. Slope 10% to 20%	4	
3. Slope 21% to 30%	7	
4. Slope 31% to 40%	8	
5. Slope >41%	10	

Element	Points	
D. Additional Rating Factors (rate all that apply)		
1. Topographical features that adversely affect wildland fire behavior	0–5	
2. Areas with a history of higher fire occurrence than surrounding areas due to special situations (e.g., heavy lightning, railroads, escaped debris burning, and arson)	0–5	
3. Areas that are periodically exposed to unusually severe fire weather and strong dry winds	0–5	
4. Separation of adjacent structures that can contribute to fire spread	0–5	
E. Roofing Assembly		
1. Class A roof	0	
2. Class B roof	3	
3. Class C roof	15	
4. Nonrated	25	
F. Building Construction		
1. Materials (predominate)		
a. Noncombustible/fire-resistive siding, eaves, and deck (*see Chapter 8*)	0	
b. Noncombustible/fire-resistive siding and combustible deck	5	
c. Combustible siding and deck	10	
2. Building setback relative to slopes of 30% or more		
a. ≥9.14 m (30 ft) to slope	1	
b. <9.14 m (30 ft) to slope	5	
G. Available Fire Protection		
1. Water source availability		
a. Pressurized water source availability		
1892.7 L/min (500 gpm) hydrants ≤304.8 m (1000 ft) apart	0	
946.4 L/min (250 gpm) hydrants ≤304.8 m (1000 ft) apart	1	
b. Nonpressurized water source availability (off site)		
≥946.4 L/min (250 gpm) continuous for 2 hours	3	
<946.4 L/min (250 gpm) continuous for 2 hours	5	
c. Water unavailable	10	
2. Organized response resources		
a. Station ≤8 km (5 mi.) from structure	1	
b. Station >8 km (5 mi.) from structure	3	
3. Fixed fire protection		
a. NFPA 13, 13R, 13D sprinkler system	0	
b. None	5	
H. Placement of Gas and Electric Utilities		
1. Both underground	0	
2. One underground, one aboveground	3	
3. Both aboveground	5	
I. Totals for Home or Subdivision (Total of all points)		

Hazard Assessment	Total Points
Low hazard	<40
Moderate hazard	40–69
High hazard	70–112
Extreme hazard	>112

1144 Field Form Example (left blank):

Wildfire Risk and Hazard Severity Form NFPA 1144			
Community Name:	**Overall Rating:**		
A. Means of Access		Value	Points Assigned
1. Ingress and Egress			
2 or more roads in & out		0	
One road in & out		7	
2. Road Width			
> 24 ft		0	
≥ 20 - 24 ft		2	
< 20 ft		4	
3. All-Season Road Condition			
Surfaced Road, grade <5%		0	
Surfaced Road, grade >5%		2	
Non-Surfaced Road, grade <5%		2	
Non-Surfaced Road, grade >5%		5	
Other than all-season		7	
4. Fire Service Access			
≤ 300 ft with turnaround		0	
> 300 ft with turnaround		2	
≤ 300 ft with no turnaround		4	
> 300 ft with no turnaround		5	
5. Street signs			
Present (at least 4" and reflective)		0	
Present (small or non-reflective)		3	
Not Present		5	
B. Vegetation (Fuel Models)			
1. Characteristics of predominant vegetation within 300 ft			
Light; 1,2,3		5	
Medium; 5,6,7,8,9		10	
Heavy; 4, 10		20	
Slash; 11, 12, 13		25	
2. Defensible Space (vegetation treatment from the structure)			
> 100 ft		1	
71 - 100 ft		3	
31 - 70 ft		10	
≤ 30 ft		25	
C. Topography within 300 ft of Structures			
1. Slope			
< 9%		1	
10 - 20%		4	
21 - 30%		7	
31 - 40%		8	
> 41%		10	
D. Additional Rating Factors (rate all that apply)			
1. Additional factors			
Topographic features adversely affect fire behavior		0 - 5	
Areas with a history of high fire occurrence (high ignition potential)		0 - 5	
Severe fire weather potential		0 - 5	
Separation of adjacent structures contributing to fire spread		0 - 5	

E. Roofing Assembly	Value	Points Assigned
Roofing Materials		
Class A (asphalt, clay, concrete, slate, metal)	0	
Class B (Fire-resistance rating that indicates roofing materials are able to withstand *moderate* exposure to fire originating from sources outside the building.)	3	
Class C (Fire-resistance rating that indicates roofing materials are able to withstand *light* exposure to fire originating from sources outside the building.)	15	
Nonrated	25	
F. Building Construction		
1. Materials		
Noncombustible/fire-resistant siding, eaves, and deck	0	
Noncombustible/fire-resistant siding only	5	
Combustible siding and deck	10	
2. Building setback from slope of ≥30%		
≥ 30 ft to slope	1	
< 30 ft to slope	5	
G. Available Fire Protection		
1. Water Source Availability		
Pressurized hydrants		
500 gpm hydrants ≤1000 ft apart	0	
250 gpm hydrants ≤1000 ft apart	1	
Nonpressurized water sources (off site)		
≥ 250 gpm continuous for 2 hours	3	
≤ 250 gpm continuous for 2 hours	5	
Water Unavailable	10	
2. Organized Response Resources		
Station 5 miles or less from structure	1	
Station >5 miles from structure	3	
3. Fixed Fire Protection		
NFPA 13, 13R, 13D sprinkler system	0	
None	5	
H. Placement of Gas and Electric Utilities		
1. aboveground/underground		
Both underground	0	
One underground, one aboveground	3	
Both aboveground	5	
I. Point total for home or subdivision		

<40 = LOW	>40 = MODERATE	>70 = HIGH	>112 = EXTREME

Notes:

Pine Grove

Hazard Rating: 78, *High*

Description: WUI area, 282 acres; intermix area, 819 acres; 6720 to 7100 feet elevation. Historic community comprising small lots and houses located close to one another. Small lot sizes limit defensible space, which varies widely within the intermix boundary. Vegetation near most of the houses is light or has already been thinned. Many houses are located near the treeless riparian zone of the South Platte River. Many roads are in poor condition, which may hinder emergency access. Older seasonal cabins are interspersed within the WUI, and are a concern to year-round residents.

Vegetation:
The area is mostly covered by forests dominated by ponderosa pine. On north-facing slopes, forest is denser and has a larger percentage of Douglas-fir. Understory in forest stands is generally sparse. North-facing slopes can have large amounts of dead and down trees, contributing to heavy fuel loads. The north fork of the South Platte River runs through the middle of the WUI/intermix, so large riparian meadows and horse pastures are a conspicuous feature in the landscape.

Recommendations:
- For all homes, make improvements within the home ignition zone to reduce structure ignitability. Reduce percentage of combustible siding and decking on homes.
- Improve or expand defensible space by limbing and/or thinning trees, mowing seasonally, and disposing of slash.
- Initiate community effort to reach seasonal residents for fuels mitigation
- Complete ½-mile long shaded fuelbreak along Crystal Ridge Road
- Thin trees along Park Ave.from S. Elk Creek Rd. to Pine Valley Rd.
- Complete shaded fuelbreak/roadside thinning between the east side of Pine Valley Rd. (Hwy 126) and the private access roads within the rural intermix boundary south of Eagle's Gate Rd to Crystal Lake Rd.
- Improve/grade unsurfaced roads, such as 6th and 7th Streets

Wildfire Risk and Hazard Severity Form NFPA 1144

Community Name:	Pine Grove	**Overall Rating:**	78	High

A. Means of Access	Value	Points Assigned
1. Ingress and Egress		
2 or more roads in & out	0	2
One road in & out	7	
2. Road Width		
> 24 ft	0	
≥ 20 - 24 ft	2	
< 20 ft	4	3
3. All-Season Road Condition		
Surfaced Road, grade <5%	0	
Surfaced Road, grade >5%	2	
Non-Surfaced Road, grade <5%	2	
Non-Surfaced Road, grade >5%	5	4
Other than all-season	7	
4. Fire Service Access		
≤ 300 ft with turnaround	0	
> 300 ft with turnaround	2	
≤ 300 ft with no turnaround	4	4
> 300 ft with no turnaround	5	
5. Street signs		
Present (at least 4" and reflective)	0	
Present (small or non-reflective)	3	3
Not Present	5	
B. Vegetation (Fuel Models)		
1. Characteristics of predominant vegetation within 300 ft		
Light; 1,2,3	5	
Medium; 5,6,7,8,9	10	8
Heavy; 4, 10	20	
Slash; 11, 12, 13	25	
2. Defensible Space (vegetation treatment from the structure)		
> 100 ft	1	
71 - 100 ft	3	
31 - 70 ft	10	10
≤ 30 ft	25	
C. Topography within 300 ft of Structures		
1. Slope		
< 9%	1	
10 - 20%	4	4
21 - 30%	7	
31 - 40%	8	
> 41%	10	
D. Additional Rating Factors (rate all that apply)		
1. Additional factors		
Topographic features adversely affect fire behavior	0 - 5	3
Areas with a history of high fire occurrence (high ignition potential)	0 - 5	4
Severe fire weather potential	0 - 5	4
Separation of adjacent structures contributing to fire spread	0 - 5	4

E. Roofing Assembly	Value	Points Assigned
Roofing Materials		
Class A (asphalt, clay, concrete, slate, metal)	0	1
Class B (Fire-resistance rating that indicates roofing materials are able to withstand *moderate* exposure to fire originating from sources outside the building.)	3	
Class C (Fire-resistance rating that indicates roofing materials are able to withstand *light* exposure to fire originating from sources outside the building.)	15	
Nonrated	25	
F. Building Construction		
1. Materials		
Noncombustible/fire-resistant siding, eaves, and deck	0	
Noncombustible/fire-resistant siding only	5	
Combustible siding and deck	10	9
2. Building setback from slope of ≥30%		
≥ 30 ft to slope	1	2
< 30 ft to slope	5	
G. Available Fire Protection		
1. Water Source Availability		
Pressurized hydrants		
500 gpm hydrants ≤1000 ft apart	0	
250 gpm hydrants ≤1000 ft apart	1	
Nonpressurized water sources (off site)		
≥ 250 gpm continuous for 2 hours	3	3
≤ 250 gpm continuous for 2 hours	5	
Water Unavailable	10	
2. Organized Response Resources		
Station 5 miles or less from structure	1	1
Station >5 miles from structure	3	
3. Fixed Fire Protection		
NFPA 13, 13R, 13D sprinkler system	0	
None	5	5
H. Placement of Gas and Electric Utilities		
1. aboveground/underground		
Both underground	0	
One underground, one aboveground	3	
Both aboveground	5	5
I. Point total for home or subdivision		79

<40 = LOW	>40 = MODERATE	>70 = HIGH	>112 = EXTREME

Buffalo Creek

Hazard Rating: 88, *High*

Description: WUI area, 332 acres; intermix area, 1023 acres; 6620 to 7100 feet elevation. The small community of Riverview is included within the rural intermix zone boundary. Although the fuel type varies from light to medium, tree canopies are fairly continuous throughout the neighborhoods. Defensible space is minimal or non-existent. Small lot sizes and the large number of seasonal cabins may be limiting factors in community-wide mitigation. Several seasonal residences lack regular upkeep, such as having needle litter cleared off roofs and decks. Some streets are not well-maintained and lack signage. The USFS has completed extensive fuel reduction treatments in this area.

Vegetation: This area is predominantly covered by ponderosa pine forests, with small riparian meadow areas along the South Platte River and Buffalo Creek. Understory vegetation is sparse, and ladder fuels have been extensively treated on many private properties. Forest canopy is mostly continuous. The southernmost portion of intermix area was severely burned in the Buffalo Creek fire, and therefore contains sparse grasslands and shrublands.

Recommendations:

- For all homes, make improvements within the home ignition zone to reduce structure ignitability. Reduce percentage of combustible siding and decking on homes.
- Improve or expand defensible space by limbing and/or thinning trees, mowing seasonally, and disposing of slash.
- Initiate community effort to reach seasonal residents for fuels mitigation
- Maintain private roads in passable condition
- Install reflective, fire-resistant street signs and house numbers
- Complete shaded fuelbreaks west of Buffalo Creek Rd. and south of Logan Ave.; connect these fuelbreaks with those completed by USFS.
- Thin trees and remove hazard trees from along Hilltop Rd., tie-in to USFS treatments where possible
- Complete chaded fuelbreaks north of Platte River Rd., tie into planned USFS treatment areas and private roads.

Wildfire Risk and Hazard Severity Form NFPA 1144

Community Name:	Buffalo Creek	**Overall Rating:**	88	High

A. Means of Access	Value	Points Assigned
1. Ingress and Egress		
2 or more roads in & out	0	
One road in & out	7	4
2. Road Width		
> 24 ft	0	
≥ 20 - 24 ft	2	
< 20 ft	4	4
3. All-Season Road Condition		
Surfaced Road, grade <5%	0	
Surfaced Road, grade >5%	2	
Non-Surfaced Road, grade <5%	2	
Non-Surfaced Road, grade >5%	5	5
Other than all-season	7	
4. Fire Service Access		
≤ 300 ft with turnaround	0	
> 300 ft with turnaround	2	
≤ 300 ft with no turnaround	4	4
> 300 ft with no turnaround	5	
5. Street signs		
Present (at least 4" and reflective)	0	
Present (small or non-reflective)	3	3
Not Present	5	
B. Vegetation (Fuel Models)		
1. Characteristics of predominant vegetation within 300 ft		
Light; 1,2,3	5	
Medium; 5,6,7,8,9	10	10
Heavy; 4, 10	20	
Slash; 11, 12, 13	25	
2. Defensible Space (vegetation treatment from the structure)		
> 100 ft	1	
71 - 100 ft	3	
31 - 70 ft	10	15
≤ 30 ft	25	
C. Topography within 300 ft of Structures		
1. Slope		
< 9%	1	
10 - 20%	4	
21 - 30%	7	6
31 - 40%	8	
> 41%	10	
D. Additional Rating Factors (rate all that apply)		
1. Additional factors		
Topographic features adversely affect fire behavior	0 - 5	3
Areas with a history of high fire occurrence (high ignition potential)	0 - 5	4
Severe fire weather potential	0 - 5	4
Separation of adjacent structures contributing to fire spread	0 - 5	2

E. Roofing Assembly	Value	Points Assigned
Roofing Materials		
Class A (asphalt, caly, concrete, slate, metal)	0	0
Class B (Fire-resistance rating that indicates roofing materials are able to withstand *moderate* exposure to fire originating from sources outside the building.)	3	
Class C (Fire-resistance rating that indicates roofing materials are able to withstand *light* exposure to fire originating from sources outside the building.)	15	
Nonrated	25	
F. Building Construction		
1. Materials		
Noncombustible/fire-resistant siding, eaves, and deck	0	
Noncombustible/fire-resistant siding only	5	
Combustible siding and deck	10	10
2. Building setback from slope of ≥30%		
≥ 30 ft to slope	1	
< 30 ft to slope	5	
G. Available Fire Protection		
1. Water Source Availability		
Pressurized hydrants		
500 gpm hydrants ≤1000 ft apart	0	
250 gpm hydrants ≤1000 ft apart	1	
Nonpressurized water sources (off site)		
≥ 250 gpm continuous for 2 hours	3	3
≤ 250 gpm continuous for 2 hours	5	
Water Unavailable	10	
2. Organized Response Resources		
Station 5 miles or less from structure	1	1
Station >5 miles from structure	3	
3. Fixed Fire Protection		
NFPA 13, 13R, 13D sprinkler system	0	
None	5	5
H. Placement of Gas and Electric Utilities		
1. aboveground/underground		
Both underground	0	
One underground, one aboveground	3	
Both aboveground	5	5
I. Point total for home or subdivision		88

<40 = LOW	>40 = MODERATE	>70 = HIGH	>112 = EXTREME

Spring Creek

Hazard Rating: 62, *Moderate*

Description: WUI area, 956 acres; intermix area, 1795 acres; 7330 to 7600 feet elevation. Most of community lies within large meadows or open ponderosa woodland with short grass but well-marked and with adequate turnarounds. Defensible space meets or exceeds minimum guidelines. Fuel reduction was completed by USFS in 2003 and 2004 along the east side of Hwy 126 and south of the intermix area. There are some areas of dense forest east of the community off of Spring Creek Trail. In these areas, occasionally near homes, there is heavy ingrowth, sub-canopy juniper, and overtopped aspen. This does not affect the fire hazard for most of the homes in the area.

Vegetation: Ponderosa pine forests and open woodlands are the dominant vegetation type in the WUI and intermix. The northwest corner of intermix area was severely burned in the Buffalo Creek fire, and therefore contains sparse grasslands and shrublands. A large portion of the WUI area is open meadows and pastures with a mix of native and agricultural grasses.

Recommendations:

- For all homes, make improvements within the home ignition zone to reduce structure ignitability. Reduce percentage of combustible siding and decking on homes.
- Improve or expand defensible space by limbing and/or thinning trees, mowing seasonally, and disposing of slash.
- Complete shaded fuelbreak along the Spreek Creek Trail, on the southern portion of the loop, where fuels are denser. Where possible, tie treatments on private property to completed USFS mastication treatments.
- Complete planned USFS fuel break on west side of Hwy 126, parallel to completed fuelbreak on other side of road.
- Maintain fuel reduction treatments on east side of Hwy 126 and along FS Road 530

Wildfire Risk and Hazard Severity Form NFPA 1144

Community Name:	Spring Creek	**Overall Rating:**	62	Moderate

A. Means of Access	Value	Points Assigned
1. Ingress and Egress		
2 or more roads in & out	0	0
One road in & out	7	
2. Road Width		
> 24 ft	0	
≥ 20 - 24 ft	2	2
< 20 ft	4	
3. All-Season Road Condition		
Surfaced Road, grade <5%	0	
Surfaced Road, grade >5%	2	
Non-Surfaced Road, grade <5%	2	2
Non-Surfaced Road, grade >5%	5	
Other than all-season	7	
4. Fire Service Access		
≤ 300 ft with turnaround	0	
> 300 ft with turnaround	2	2
≤ 300 ft with no turnaround	4	
> 300 ft with no turnaround	5	
5. Street signs		
Present (at least 4" and reflective)	0	0
Present (small or non-reflective)	3	
Not Present	5	
B. Vegetation (Fuel Models)		
1. Characteristics of predominant vegetation within 300 ft		
Light; 1,2,3	5	
Medium; 5,6,7,8,9	10	10
Heavy; 4, 10	20	
Slash; 11, 12, 13	25	
2. Defensible Space (vegetation treatment from the structure)		
> 100 ft	1	
71 - 100 ft	3	5
31 - 70 ft	10	
≤ 30 ft	25	
C. Topography within 300 ft of Structures		
1. Slope		
< 9%	1	
10 - 20%	4	4
21 - 30%	7	
31 - 40%	8	
> 41%	10	
D. Additional Rating Factors (rate all that apply)		
1. Additional factors		
Topographic features adversely affect fire behavior	0 - 5	2
Areas with a history of high fire occurrence (high ignition potential)	0 - 5	4
Severe fire weather potential	0 - 5	4
Separation of adjacent structures contributing to fire spread	0 - 5	0

E. Roofing Assembly	Value	Points Assigned
Roofing Materials		
Class A (asphalt, clay, concrete, slate, metal)	0	0
Class B (Fire-resistance rating that indicates roofing materials are able to withstand *moderate* exposure to fire originating from sources outside the building.)	3	
Class C (Fire-resistance rating that indicates roofing materials are able to withstand *light* exposure to fire originating from sources outside the building.)	15	
Nonrated	25	
F. Building Construction		
1. Materials		
Noncombustible/fire-resistant siding, eaves, and deck	0	
Noncombustible/fire-resistant siding only	5	
Combustible siding and deck	10	10
2. Building setback from slope of ≥30%		
≥ 30 ft to slope	1	1
< 30 ft to slope	5	
G. Available Fire Protection		
1. Water Source Availability		
Pressurized hydrants		
500 gpm hydrants ≤1000 ft apart	0	
250 gpm hydrants ≤1000 ft apart	1	
Nonpressurized water sources (off site)		
≥ 250 gpm continuous for 2 hours	3	
≤ 250 gpm continuous for 2 hours	5	5
Water Unavailable	10	
2. Organized Response Resources		
Station 5 miles or less from structure	1	1
Station >5 miles from structure	3	
3. Fixed Fire Protection		
NFPA 13, 13R, 13D sprinkler system	0	
None	5	5
H. Placement of Gas and Electric Utilities		
1. aboveground/underground		
Both underground	0	
One underground, one aboveground	3	
Both aboveground	5	5
I. Point total for home or subdivision		62

<40 = LOW	>40 = MODERATE	>70 = HIGH	>112 = EXTREME

Foxton/Longview

Hazard Rating: , *High*

Foot bridge to Ferndale

Foxton

Longveiw

South Platte

Description: Intermix area, 1750 acres; 6200 to 7000 feet elevation. Overall, this is a sparsely populated area with small communities and individual homes located along the South Platte River. The communities of Ferndale, Foxton, Longview, and South Platte are included in this large intermix area. Due to the low population, this is classified as a rural intermix zone. Most homes are located close to the river with steep narrow driveways or private roads with little or no all-season access. At Ferndale, a narrow bridge spans river to access houses, and would not be passable for heavy emergency vehicles. In communities on the north side of the road, on south aspects vegetation is lighter, and therefore defensible space is generally larger. On north aspects, there are continuous dense trees up to and over-hanging houses, and there is no defensible space. All homes tend to be located on or near steep slopes. Many seasonal cabins are interspersed with a few year-round residences. Most of the surrounding area is part of Denver Water and the Pike National Forest. Defensible space has been completed around all Denver Water structures in Foxton, Longview, and South Platte. Extensive fuel reduction and forest restoration treatments have been completed on Denver Water lands adjoining Foxton (along the road and across the river) and Longview, including the installation of permanent firebreaks and fuelbreaks.

Vegetation:
The area is mostly covered by forests dominated by ponderosa pine. On north-facing slopes, forest is denser and has a larger percentage of Douglas-fir and Colorado blue spruce. On drier, more exposed south-facing slopes, trees are sparser, and Rocky Mountain juniper occurs with ponderosa pine. North-facing slopes can have large amounts of dead and down trees, contributing to heavy fuel loads. The South Platte River runs through this intermix zone, and small areas of woody riparian species such as willow and cottonwood are present.

Recommendations:
- For all homes, make improvements within the home ignition zone to reduce structure ignitability. Reduce percentage of combustible siding and decking on homes.
- Improve or expand defensible space by limbing and/or thinning trees, mowing seasonally, and disposing of slash.
- Initiate community effort to reach seasonal residents for fuels mitigation
- Install reflective, fire-resistant address signs on structures and on Platte River Rd.
- Maintain previously thinned areas north of Riverview and Foxton
- Complete shaded fuelbreak planned by USFS on south side of Platte River Rd. at Riverview

Wildfire Risk and Hazard Severity Form NFPA 1144			
Community Name: Foxton/Longview intermix	**Overall Rating:**	97	High
A. Means of Access		Value	Points Assigned
1. Ingress and Egress			
2 or more roads in & out		0	3
One road in & out		7	
2. Road Width			
> 24 ft		0	
≥ 20 - 24 ft		2	2
< 20 ft		4	
3. All-Season Road Condition			
Surfaced Road, grade <5%		0	
Surfaced Road, grade >5%		2	
Non-Surfaced Road, grade <5%		2	3
Non-Surfaced Road, grade >5%		5	
Other than all-season		7	
4. Fire Service Access			
≤ 300 ft with turnaround		0	
> 300 ft with turnaround		2	
≤ 300 ft with no turnaround		4	4
> 300 ft with no turnaround		5	
5. Street signs			
Present (at least 4" and reflective)		0	
Present (small or non-reflective)		3	
Not Present		5	5
B. Vegetation (Fuel Models)			
1. Characteristics of predominant vegetation within 300 ft			
Light; 1,2,3		5	
Medium; 5,6,7,8,9		10	10
Heavy; 4, 10		20	
Slash; 11, 12, 13		25	
2. Defensible Space (vegetation treatment from the structure)			
> 100 ft		1	
71 - 100 ft		3	
31 - 70 ft		10	
≤ 30 ft		25	20
C. Topography within 300 ft of Structures			
1. Slope			
< 9%		1	
10 - 20%		4	
21 - 30%		7	7
31 - 40%		8	
> 41%		10	
D. Additional Rating Factors (rate all that apply)			
1. Additional factors			
Topographic features adversely affect fire behavior		0 - 5	4
Areas with a history of high fire occurrence (high ignition potential)		0 - 5	3
Severe fire weather potential		0 - 5	4
Separation of adjacent structures contributing to fire spread		0 - 5	2

E. Roofing Assembly	Value	Points Assigned
Roofing Materials		
Class A (asphalt, clay, concrete, slate, metal)	0	
Class B (Fire-resistance rating that indicates roofing materials are able to withstand *moderate* exposure to fire originating from sources outside the building.)	3	3
Class C (Fire-resistance rating that indicates roofing materials are able to withstand *light* exposure to fire originating from sources outside the building.)	15	
Nonrated	25	
F. Building Construction		
1. Materials		
Noncombustible/fire-resistant siding, eaves, and deck	0	
Noncombustible/fire-resistant siding only	5	
Combustible siding and deck	10	10
2. Building setback from slope of ≥30%		
≥ 30 ft to slope	1	2
< 30 ft to slope	5	
G. Available Fire Protection		
1. Water Source Availability		
Pressurized hydrants		
500 gpm hydrants ≤1000 ft apart	0	
250 gpm hydrants ≤1000 ft apart	1	
Nonpressurized water sources (off site)		
≥ 250 gpm continuous for 2 hours	3	3
≤ 250 gpm continuous for 2 hours	5	
Water Unavailable	10	
2. Organized Response Resources		
Station 5 miles or less from structure	1	2
Station >5 miles from structure	3	
3. Fixed Fire Protection		
NFPA 13, 13R, 13D sprinkler system	0	
None	5	5
H. Placement of Gas and Electric Utilities		
1. aboveground/underground		
Both underground	0	
One underground, one aboveground	3	
Both aboveground	5	5
I. Point total for home or subdivision		97

<40 = LOW	>40 = MODERATE	>70 = HIGH	>112 = EXTREME

Platte River Road Corridor

Hazard Rating: 92, *High*

Nighthawk


Scraggy View

Description: Intermix area, 950 acres; 6200 to 7000 feet elevation. Overall, this is a sparsely populated area with small communities and individual homes located along the South Platte River. This area includes the communities of Nighthawk and Scraggy View. There are several popular recreational sites along the river for fishing and picnicking. Defensible space has been completed around all Denver Water structures in this area. Defensible space has also been completed around some private homes in Nighthawk, Scraggy View, and Swayback. Extensive fuel reduction and forest restoration treatments have been completed in and around these communities.

Vegetation:
The area is mostly covered by forests dominated by ponderosa pine. On north-facing slopes, forest is denser and has a larger percentage of Douglas-fir. On drier, more exposed south-facing slopes, trees are sparser, and Rocky Mountain juniper occurs with ponderosa pine. North-facing slopes can have large amounts of dead and down trees, contributing to heavy fuel loads. The South Platte River runs through this intermix zone, and small areas of woody riparian species such as willow and cottonwood are present.

Recommendations:
- For all homes, make improvements within the home ignition zone to reduce structure ignitability
- Improve or expand defensible space by limbing and/or thinning trees, mowing seasonally, and disposing of slash. Where possible, extend treatments on private property to Denver Water thinning treatments surrounding the communities.
- Install reflective address signs at community entrances and driveways where applicable
- Display and update wildfire education materials at USFS information kiosks to educate tourists

Wildfire Risk and Hazard Severity Form NFPA 1144			
Community Name: Platte River Road Corridor	**Overall Rating:**	92	High
A. Means of Access		Value	Points Assigned
1. Ingress and Egress			
2 or more roads in & out		0	
One road in & out		7	5
2. Road Width			
> 24 ft		0	
≥ 20 - 24 ft		2	
< 20 ft		4	3
3. All-Season Road Condition			
Surfaced Road, grade <5%		0	
Surfaced Road, grade >5%		2	
Non-Surfaced Road, grade <5%		2	2
Non-Surfaced Road, grade >5%		5	
Other than all-season		7	
4. Fire Service Access			
≤ 300 ft with turnaround		0	
> 300 ft with turnaround		2	
≤ 300 ft with no turnaround		4	4
> 300 ft with no turnaround		5	
5. Street signs			
Present (at least 4" and reflective)		0	
Present (small or non-reflective)		3	4
Not Present		5	
B. Vegetation (Fuel Models)			
1. Characteristics of predominant vegetation within 300 ft			
Light; 1,2,3		5	
Medium; 5,6,7,8,9		10	8
Heavy; 4, 10		20	
Slash; 11, 12, 13		25	
2. Defensible Space (vegetation treatment from the structure)			
> 100 ft		1	
71 - 100 ft		3	
31 - 70 ft		10	
≤ 30 ft		25	20
C. Topography within 300 ft of Structures			
1. Slope			
< 9%		1	
10 - 20%		4	
21 - 30%		7	6
31 - 40%		8	
> 41%		10	

D. Additional Rating Factors (rate all that apply)		
1. Additional factors		
Topographic features adversely affect fire behavior	0 - 5	4
Areas with a history of high fire occurrence (high ignition potential)	0 - 5	4
Severe fire weather potential	0 - 5	4
Separation of adjacent structures contributing to fire spread	0 - 5	1

E. Roofing Assembly	Value	Points Assigned
Roofing Materials		
Class A (asphalt, clay, concrete, slate, metal)	0	0
Class B (Fire-resistance rating that indicates roofing materials are able to withstand *moderate* exposure to fire originating from sources outside the building.)	3	
Class C (Fire-resistance rating that indicates roofing materials are able to withstand *light* exposure to fire originating from sources outside the building.)	15	
Nonrated	25	
F. Building Construction		
1. Materials		
Noncombustible/fire-resistant siding, eaves, and deck	0	
Noncombustible/fire-resistant siding only	5	
Combustible siding and deck	10	10
2. Building setback from slope of ≥30%		
≥ 30 ft to slope	1	1
< 30 ft to slope	5	
G. Available Fire Protection		
1. Water Source Availability		
Pressurized hydrants		
500 gpm hydrants ≤1000 ft apart	0	
250 gpm hydrants ≤1000 ft apart	1	
Nonpressurized water sources (off site)		
≥ 250 gpm continuous for 2 hours	3	3
≤ 250 gpm continuous for 2 hours	5	
Water Unavailable	10	
2. Organized Response Resources		
Station 5 miles or less from structure	1	
Station >5 miles from structure	3	3
3. Fixed Fire Protection		
NFPA 13, 13R, 13D sprinkler system	0	
None	5	5
H. Placement of Gas and Electric Utilities		
1. aboveground/underground		
Both underground	0	
One underground, one aboveground	3	
Both aboveground	5	5
I. Point total for home or subdivision		92

<40 = LOW	>40 = MODERATE	>70 = HIGH	>112 = EXTREME

Trumbull/Deckers

Hazard Rating: 65, *Moderate*

Trumbull

Deckers

Swayback Ranch

Description: Intermix area, 3006 acres; 6300 to 6600 feet elevation. This area includes the communities of Deckers, Trumbull, Swayback Ranch, and Oxyoke. The majority of the homes are located in Trumbull, although Deckers is a well-known geographic landmark of the district due to the intersection of highways 129 and 67. The area is heavily travelled by tourists, who use the recreation areas along the South Platte River. Homes are located predominately in or near open meadows. Although the majority of the homes in this area have already completed defensible space, communities should maintain this work periodically and complete yearly activities such as mowing, cleaning rooftops and gutters, and moving firewood away from homes during fire season. Areas burned by the Hayman fire are directly adjacent to Deckers, and the area has seen extensive mitigation on Denver Water and USFS lands.

Vegetation:
The area is mostly covered by forests dominated by ponderosa pine, although most of the homes are located in open meadows and in light vegetation. On drier, more exposed south-facing slopes, trees are sparser, and Rocky Mountain juniper occurs with ponderosa pine. Gambel oak is also common throughout this intermix area. The South Platte River runs through this intermix zone, and areas of woody riparian species such as willow and cottonwood are present.

Recommendations:

- For all homes, make improvements within the home ignition zone to reduce structure ignitability
- Improve or expand defensible space by limbing and/or thinning trees, mowing seasonally, and disposing of slash.
- Install reflective address signs at community entrances and driveways where applicable
- Display and update wildfire education materials at USFS information kiosks to educate tourists

Wildfire Risk and Hazard Severity Form NFPA 1144			
Community Name: Trumbull/Deckers	**Overall Rating:**	65	Moderate
A. Means of Access		Value	Points Assigned
1. Ingress and Egress			
2 or more roads in & out		0	0
One road in & out		7	
2. Road Width			
> 24 ft		0	
≥ 20 - 24 ft		2	2
< 20 ft		4	
3. All-Season Road Condition			
Surfaced Road, grade <5%		0	
Surfaced Road, grade >5%		2	
Non-Surfaced Road, grade <5%		2	2
Non-Surfaced Road, grade >5%		5	
Other than all-season		7	
4. Fire Service Access			
≤ 300 ft with turnaround		0	
> 300 ft with turnaround		2	2
≤ 300 ft with no turnaround		4	
> 300 ft with no turnaround		5	
5. Street signs			
Present (at least 4" and reflective)		0	
Present (small or non-reflective)		3	3
Not Present		5	
B. Vegetation (Fuel Models)			
1. Characteristics of predominant vegetation within 300 ft			
Light; 1,2,3		5	5
Medium; 5,6,7,8,9		10	
Heavy; 4, 10		20	
Slash; 11, 12, 13		25	
2. Defensible Space (vegetation treatment from the structure)			
> 100 ft		1	
71 - 100 ft		3	
31 - 70 ft		10	6
≤ 30 ft		25	

C. Topography within 300 ft of Structures		
1. Slope		
< 9%	1	
10 - 20%	4	6
21 - 30%	7	
31 - 40%	8	
> 41%	10	
D. Additional Rating Factors (rate all that apply)		
1. Additional factors		
Topographic features adversely affect fire behavior	0 - 5	3
Areas with a history of high fire occurrence (high ignition potential)	0 - 5	5
Severe fire weather potential	0 - 5	4
Separation of adjacent structures contributing to fire spread	0 - 5	1

E. Roofing Assembly	Value	Points Assigned
Roofing Materials		
Class A (asphalt, caly, concrete, slate, metal)	0	0
Class B (Fire-resistance rating that indicates roofing materials are able to withstand *moderate* exposure to fire originating from sources outside the building.)	3	
Class C (Fire-resistance rating that indicates roofing materials are able to withstand *light* exposure to fire originating from sources outside the building.)	15	
Nonrated	25	
F. Building Construction		
1. Materials		
Noncombustible/fire-resistant siding, eaves, and deck	0	
Noncombustible/fire-resistant siding only	5	
Combustible siding and deck	10	10
2. Building setback from slope of ≥30%		
≥ 30 ft to slope	1	2
< 30 ft to slope	5	
G. Available Fire Protection		
1. Water Source Availability		
Pressurized hydrants		
500 gpm hydrants ≤1000 ft apart	0	
250 gpm hydrants ≤1000 ft apart	1	
Nonpressurized water sources (off site)		
≥ 250 gpm continuous for 2 hours	3	3
≤ 250 gpm continuous for 2 hours	5	
Water Unavailable	10	
2. Organized Response Resources		
Station 5 miles or less from structure	1	1
Station >5 miles from structure	3	
3. Fixed Fire Protection		
NFPA 13, 13R, 13D sprinkler system	0	
None	5	5
H. Placement of Gas and Electric Utilities		
1. aboveground/underground		
Both underground	0	
One underground, one aboveground	3	
Both aboveground	5	5
I. Point total for home or subdivision		65

<40 = LOW	>40 = MODERATE	>70 = HIGH	>112 = EXTREME

North Rainbow Falls

Hazard Rating: 101, *High*

Description: WUI area, 247 acres; intermix area, 441 acres; 6700 to 6900 feet elevation. This is a small rural community in Douglas County. There is a one-lane, mile-long road that is the only access/egress route for the community. Many homes are located on or near slopes >30%. Driveways and portions of Overlook Road have tight turns that would make access for emergency vehicles difficult. Areas burned in the Hayman fire and the Polhemus prescribed fire are directly adjacent to the intermix boundary, but no landscape-scale mitigation has been completed within the WUI boundary. Defensible spaces are minimal or lacking for most structures.

Vegetation:
The area is mostly covered by forests dominated by ponderosa pine. On north-facing slopes, the forests are denser and have a higher percentage of Douglas-fir. Tall shrubs are present in the understory in some stands, which can contribute to intense fire behavior. A small pond and riparian area are located in the center of the community that provides a small natural fuelbreak.

Recommendations:
- For all homes, make improvements within the home ignition zone to reduce structure ignitability
- Improve or expand defensible space by limbing and/or thinning trees, mowing seasonally, and disposing of slash appropriately
- Remove large slash pile from downhill side of Rainbow Falls Rd. by scattering, chipping, or burning in piles.
- Complete additional thinning along Rainbow Falls Rd, at the edge of the prescribed burn area, to the eastern boundary of the WUI zone.
- Complete shaded fuelbreak between Skyline Dr. and Canon Dr.
- Complete shaded fuelbreak along Overlook Rd.

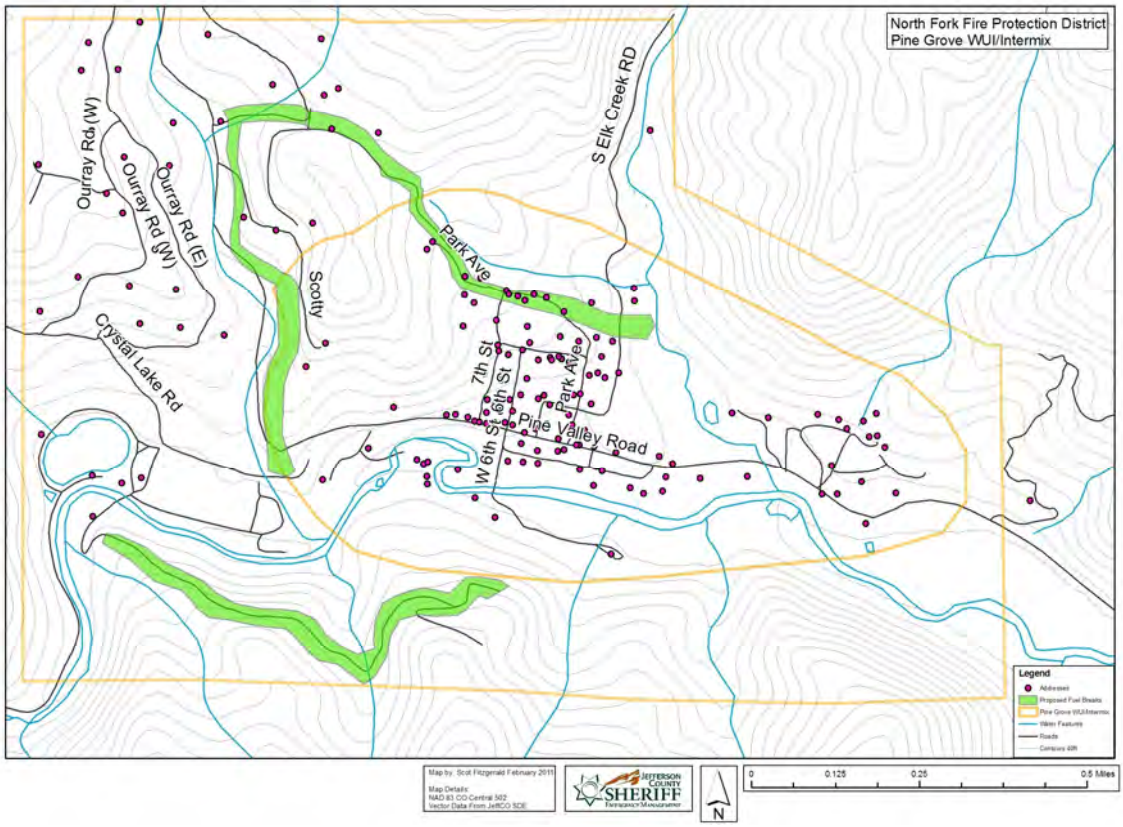
Wildfire Risk and Hazard Severity Form NFPA 1144

Community Name:	North Rainbow Falls	**Overall Rating:**	101	High

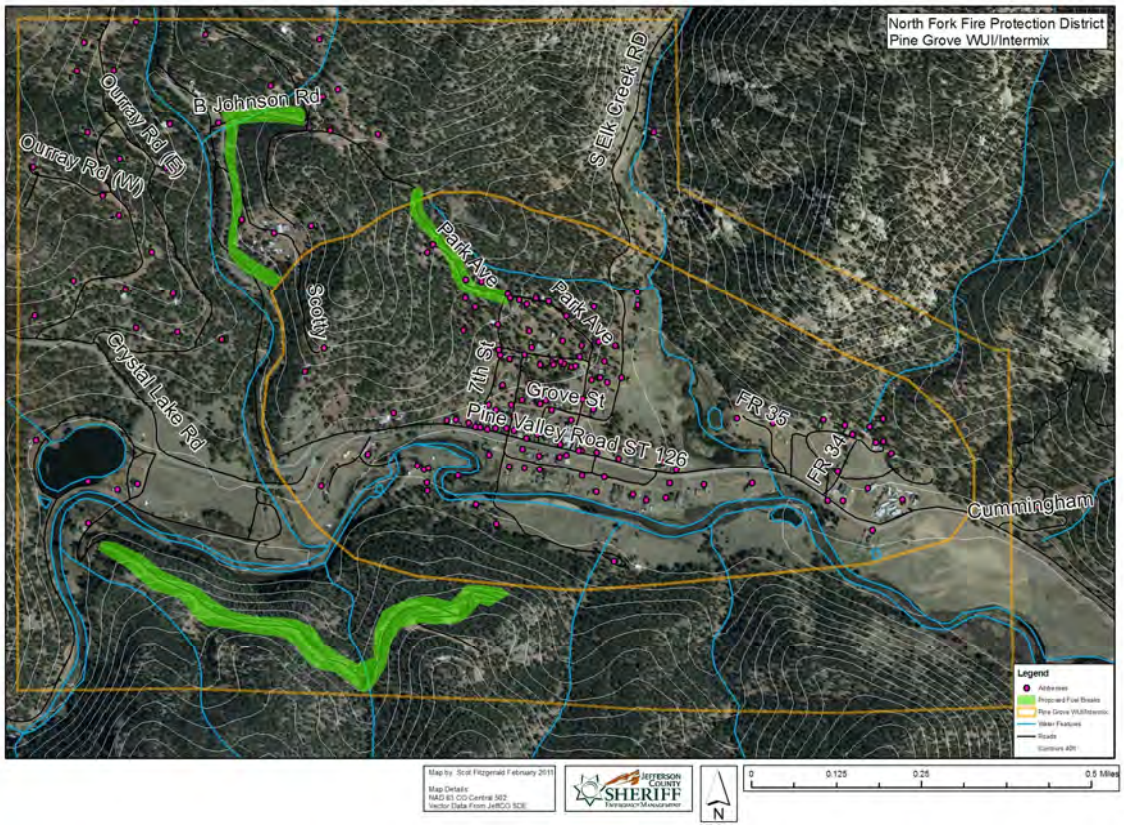
A. Means of Access	Value	Points Assigned
1. Ingress and Egress		
2 or more roads in & out	0	
One road in & out	7	7
2. Road Width		
> 24 ft	0	
≥ 20 - 24 ft	2	
< 20 ft	4	4
3. All-Season Road Condition		
Surfaced Road, grade <5%	0	
Surfaced Road, grade >5%	2	
Non-Surfaced Road, grade <5%	2	
Non-Surfaced Road, grade >5%	5	6
Other than all-season	7	
4. Fire Service Access		
≤ 300 ft with turnaround	0	
> 300 ft with turnaround	2	
≤ 300 ft with no turnaround	4	4
> 300 ft with no turnaround	5	
5. Street signs		
Present (at least 4" and reflective)	0	
Present (small or non-reflective)	3	3
Not Present	5	
B. Vegetation (Fuel Models)		
1. Characteristics of predominant vegetation within 300 ft		
Light; 1,2,3	5	
Medium; 5,6,7,8,9	10	10
Heavy; 4, 10	20	
Slash; 11, 12, 13	25	
2. Defensible Space (vegetation treatment from the structure)		
> 100 ft	1	
71 - 100 ft	3	
31 - 70 ft	10	15
≤ 30 ft	25	
C. Topography within 300 ft of Structures		
1. Slope		
< 9%	1	
10 - 20%	4	
21 - 30%	7	
31 - 40%	8	8
> 41%	10	
D. Additional Rating Factors (rate all that apply)		
1. Additional factors		
Topographic features adversely affect fire behavior	0 - 5	4
Areas with a history of high fire occurrence (high ignition potential)	0 - 5	5
Severe fire weather potential	0 - 5	4
Separation of adjacent structures contributing to fire spread	0 - 5	0

E. Roofing Assembly	Value	Points Assigned
Roofing Materials		
Class A (asphalt, clay, concrete, slate, metal)	0	0
Class B (Fire-resistance rating that indicates roofing materials are able to withstand *moderate* exposure to fire originating from sources outside the building.)	3	
Class C (Fire-resistance rating that indicates roofing materials are able to withstand *light* exposure to fire originating from sources outside the building.)	15	
Nonrated	25	
F. Building Construction		
1. Materials		
Noncombustible/fire-resistant siding, eaves, and deck	0	
Noncombustible/fire-resistant siding only	5	
Combustible siding and deck	10	10
2. Building setback from slope of ≥30%		
≥ 30 ft to slope	1	
< 30 ft to slope	5	5
G. Available Fire Protection		
1. Water Source Availability		
Pressurized hydrants		
500 gpm hydrants ≤1000 ft apart	0	
250 gpm hydrants ≤1000 ft apart	1	
Nonpressurized water sources (off site)		
≥ 250 gpm continuous for 2 hours	3	3
≤ 250 gpm continuous for 2 hours	5	
Water Unavailable	10	
2. Organized Response Resources		
Station 5 miles or less from structure	1	
Station >5 miles from structure	3	3
3. Fixed Fire Protection		
NFPA 13, 13R, 13D sprinkler system	0	
None	5	5
H. Placement of Gas and Electric Utilities		
1. aboveground/underground		
Both underground	0	
One underground, one aboveground	3	
Both aboveground	5	5
I. Point total for home or subdivision		101

<40 = LOW	>40 = MODERATE	>70 = HIGH	>112 = EXTREME


North Fork Fire Protection District
Pine Grove WUI/Intermix
Ourray Rd (W)
Ourray Rd (W)
Ourray Rd (E)
Crystal Lake Rd
Scotty
S Elk Creek RD
Park Ave
7th St
W 6th St
W 6th St
Park Ave
Pine Valley Road
Legend
Addresses
Proposed Fuel Breaks
Pine Grove WUI/Intermix
Water Features
Roads
Contours 40ft
Map by: Scot Fitzgerald February 2011
Map Details:
NAD 83 CO Central 502
Vector Data From JeffCO SDE
JEFFERSON COUNTY SHERIFF
Emergency Management
N
0
0.125
0.25
0.5 Miles

for planning purposes



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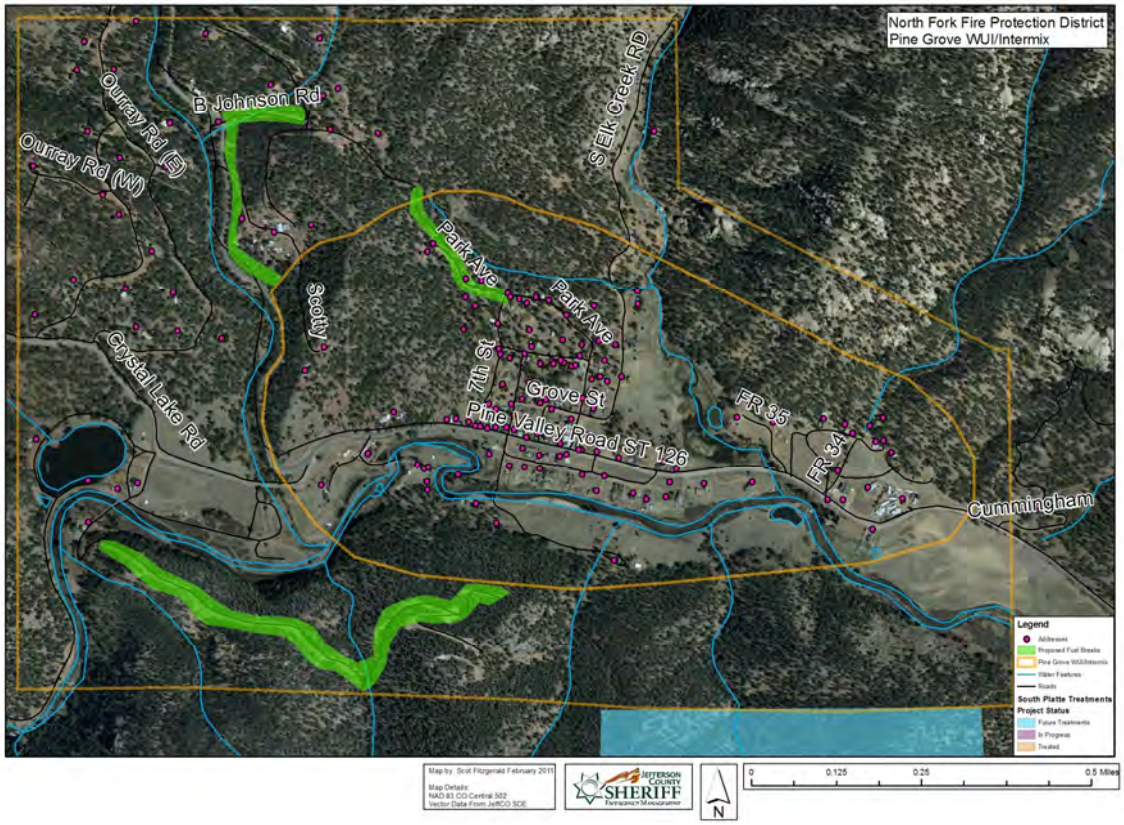
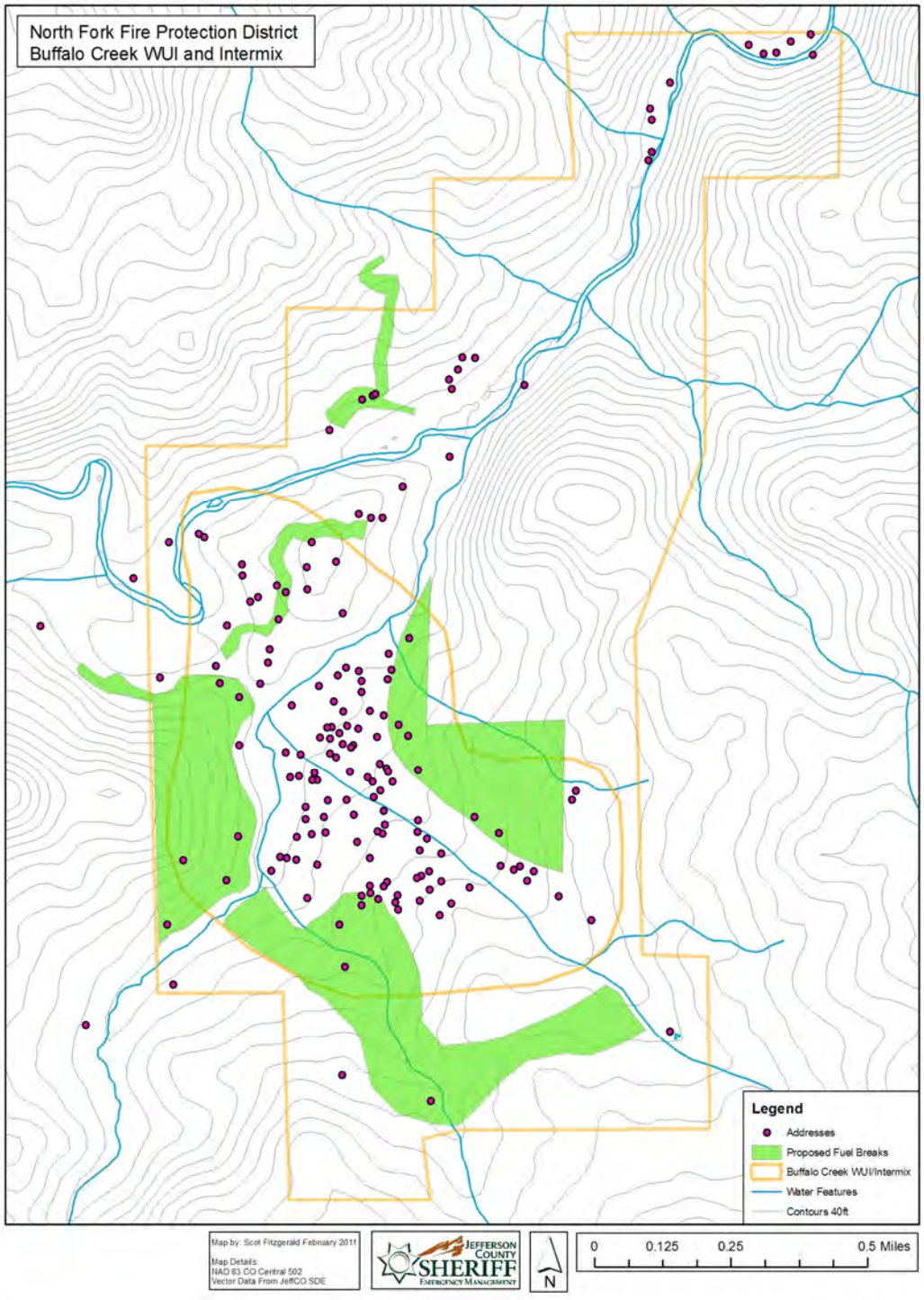
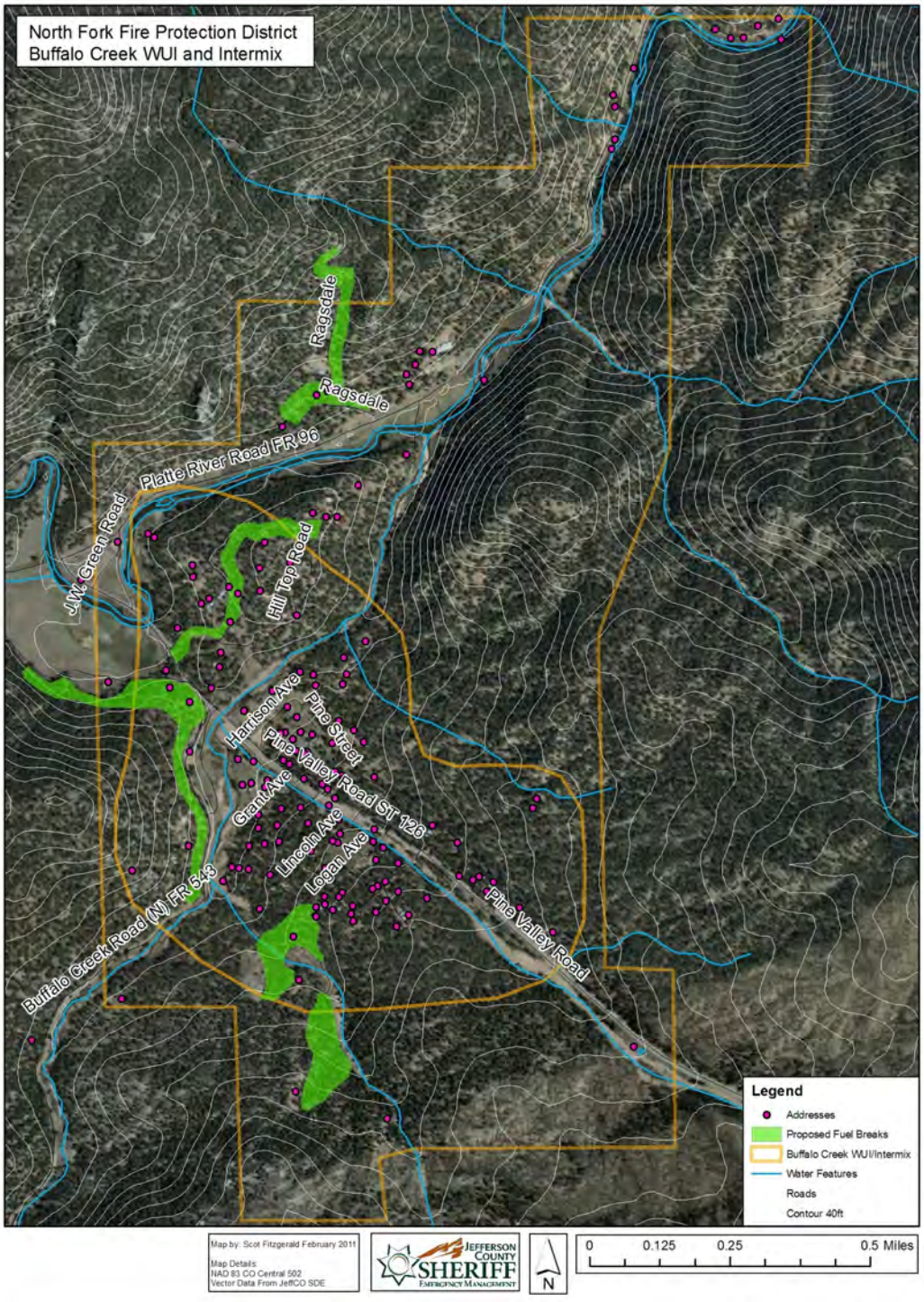



North Fork Fire Protection District
Buffalo Creek WUI and Intermix
Legend
Addresses
Proposed Fuel Breaks
Buffalo Creek WUI/Intermix
Water Features
Contours 40ft
Map by: Scot Fitzgerald February 2011
Map Details:
NAD 83 CO Central 502
Vector Data From JeffCO SDE
JEFFERSON COUNTY SHERIFF
EMERGENCY MANAGEMENT
N
0
0.125
0.25
0.5 Miles

for planning purposes



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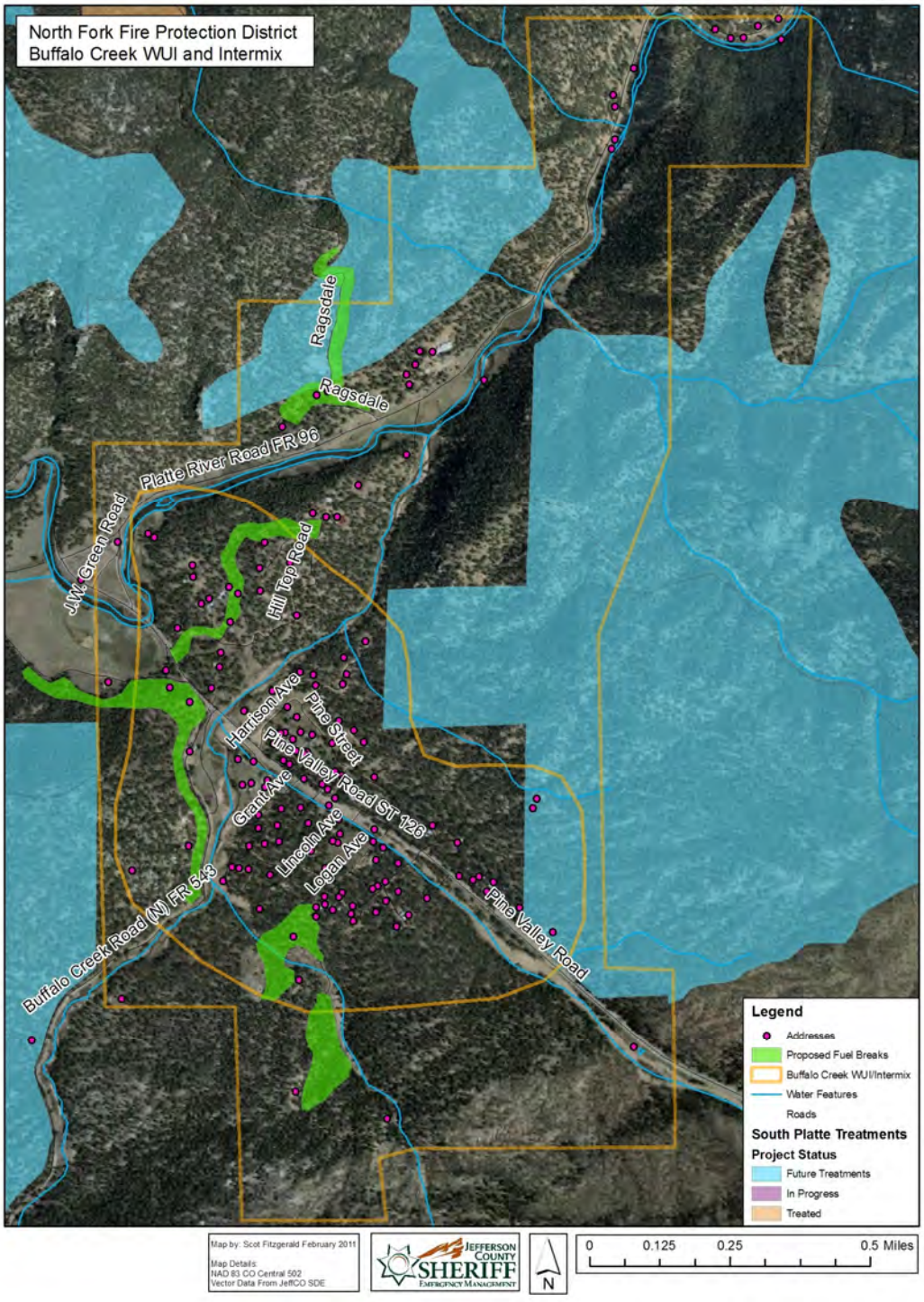

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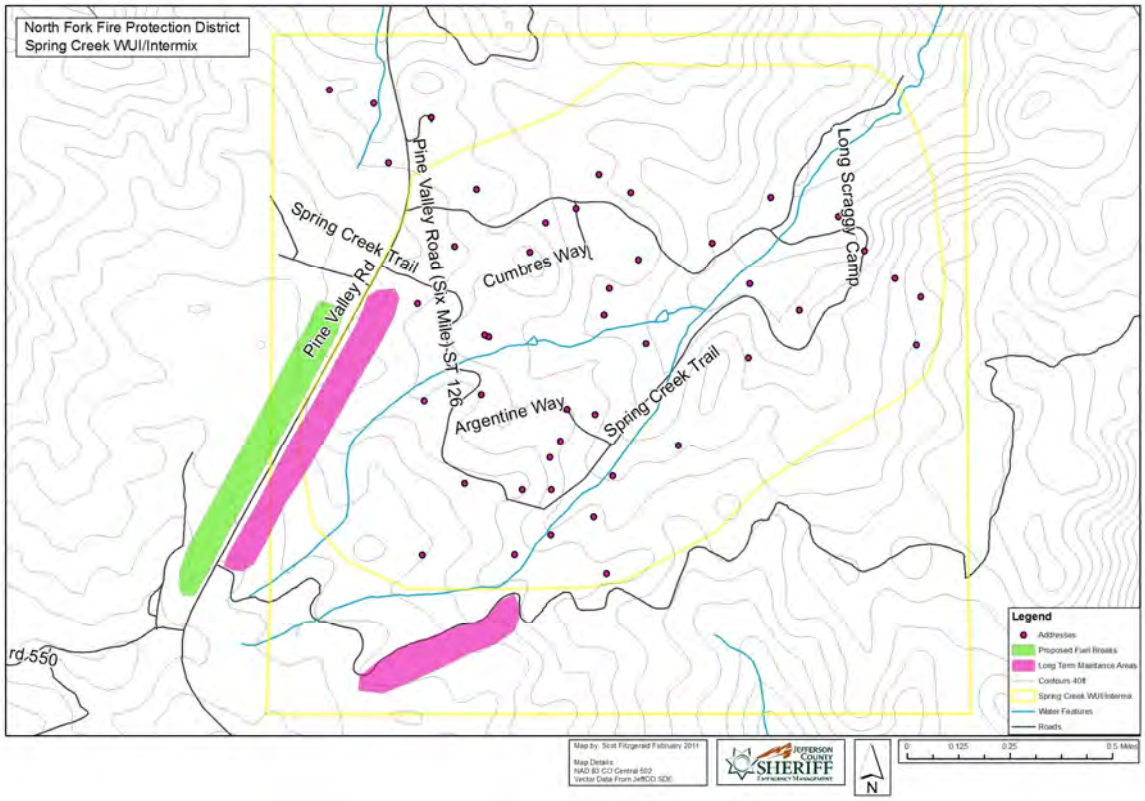

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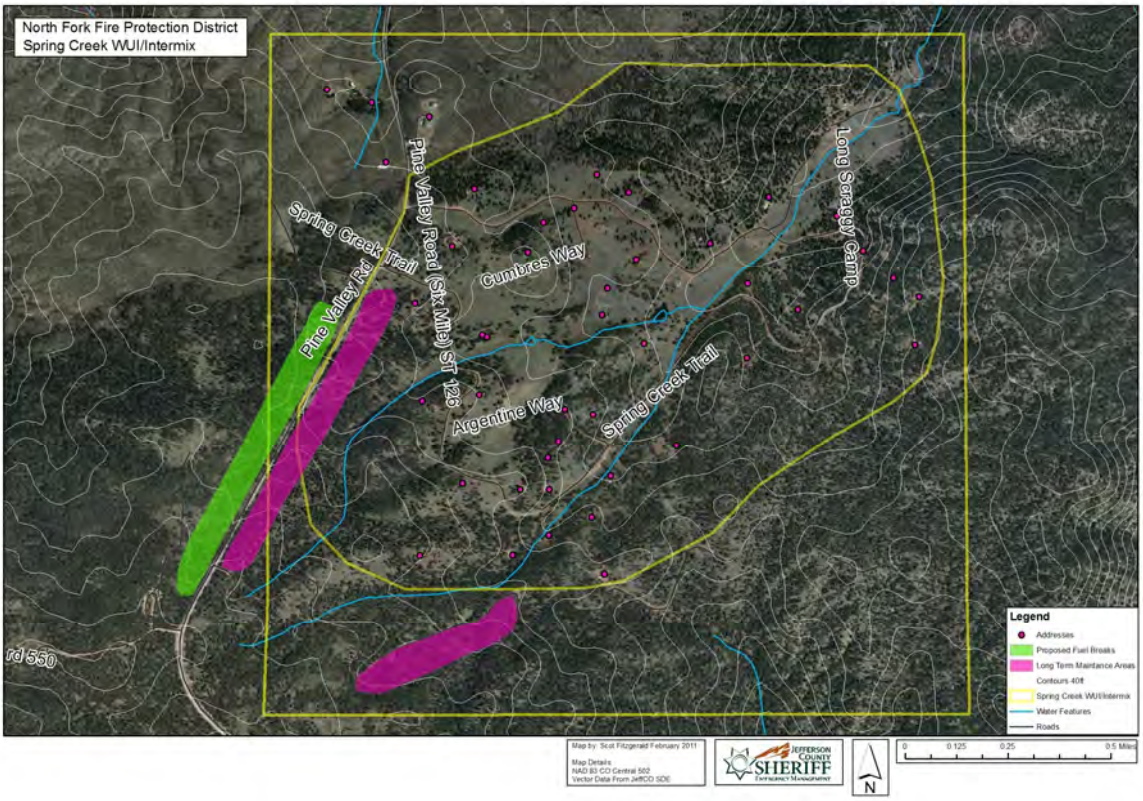

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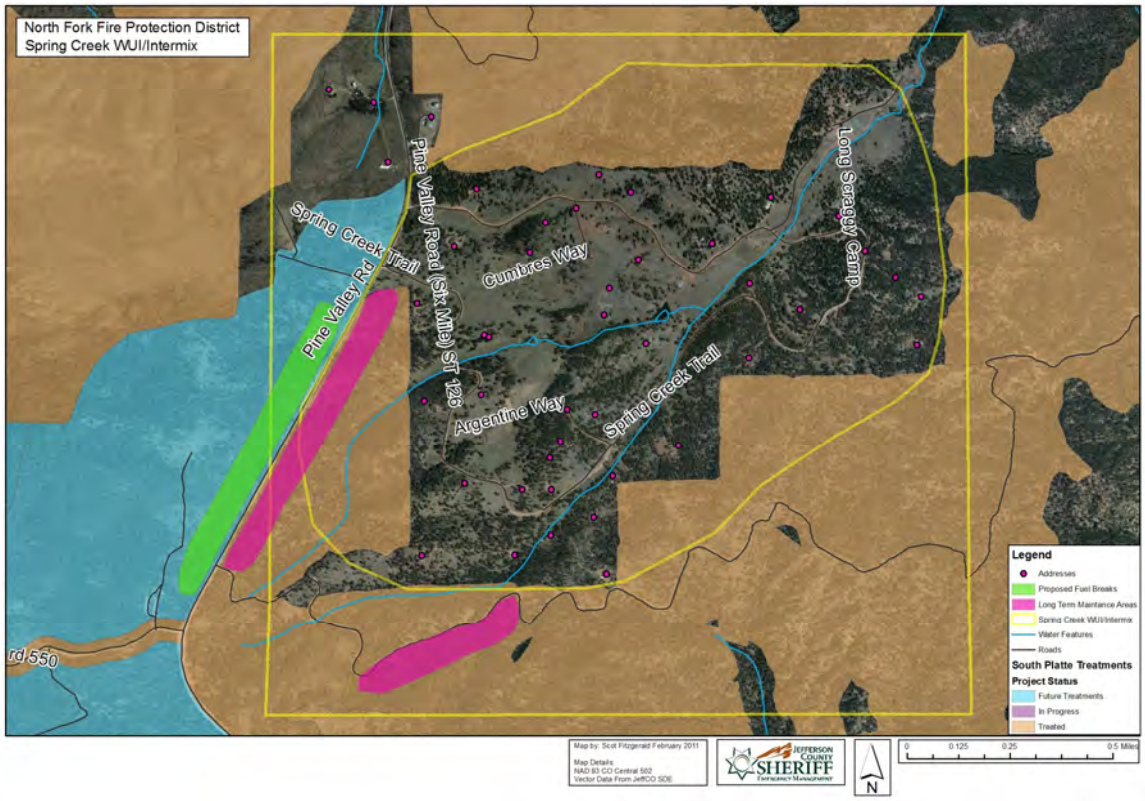

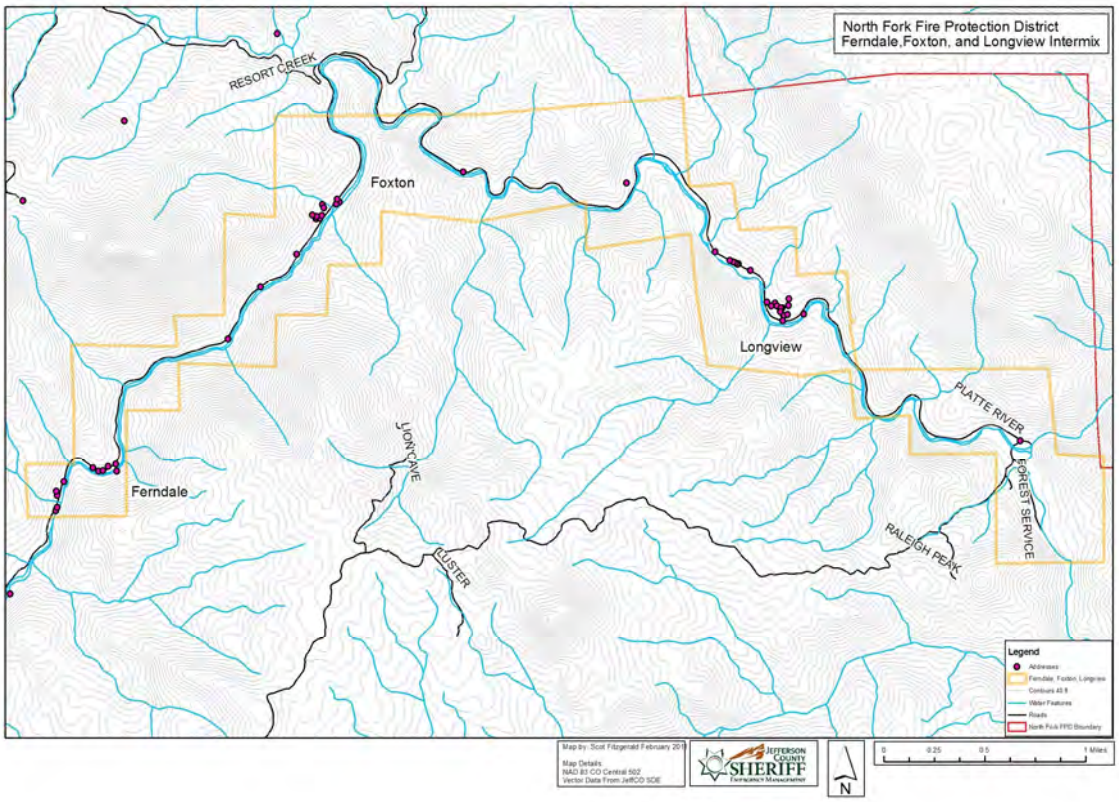
North Fork Fire Protection District
Ferndale,Foxton, and Longview Intermix
RESORT CREEK
Foxton
Longview
PLATTE RIVER
FOREST SERVICE
RALEIGH PEAK
LYON CAVE
CLUSTER
Ferndale
Legend
Addresses
Ferndale, Foxton, Longview
Contours 40 ft
Water Features
Roads
North Fork FPD Boundary
Map by: Scot Fitzgerald February 2019
Map Details:
NAD 83 CO Central 502
Vector Data From JeffCO SDE
JEFFERSON COUNTY SHERIFF
Emergency Management
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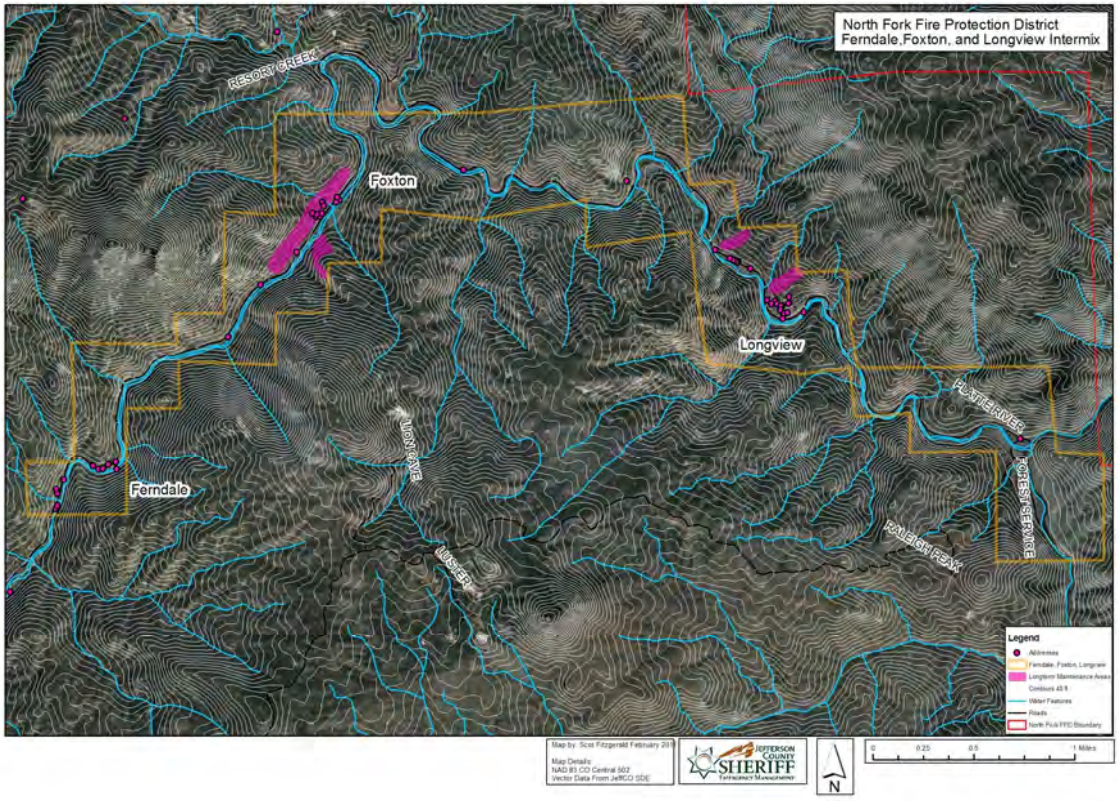
1 Miles

for planning purposes



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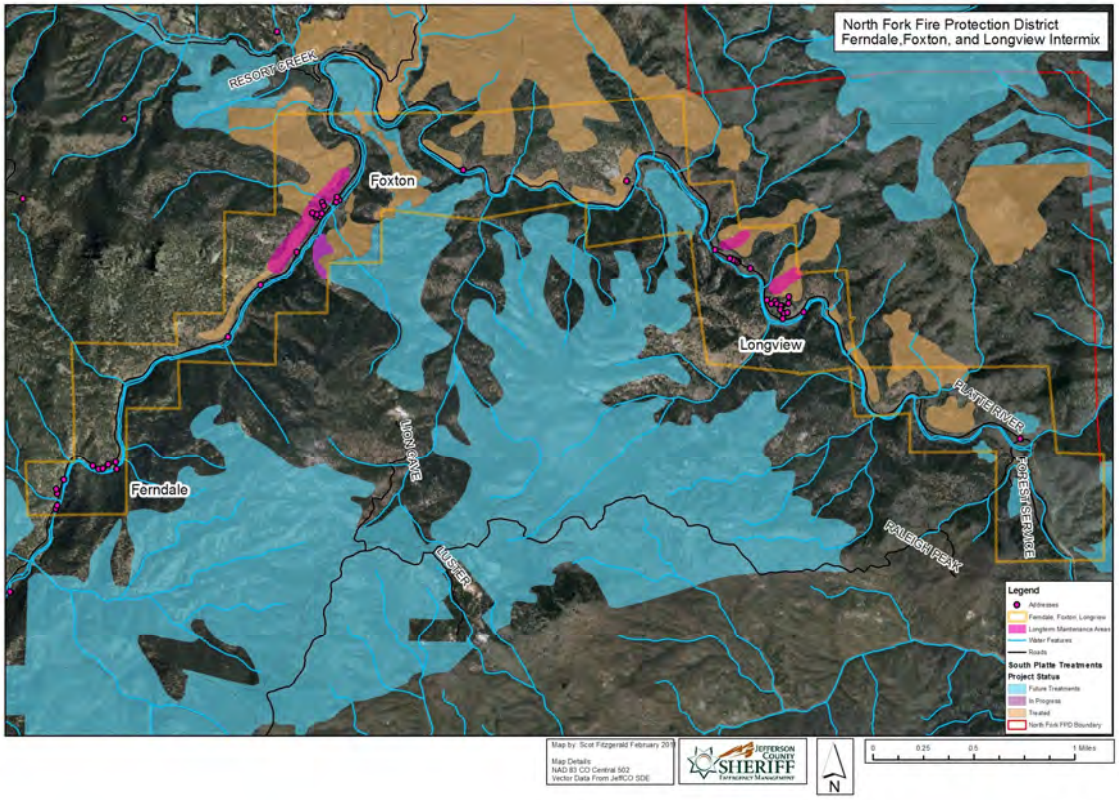

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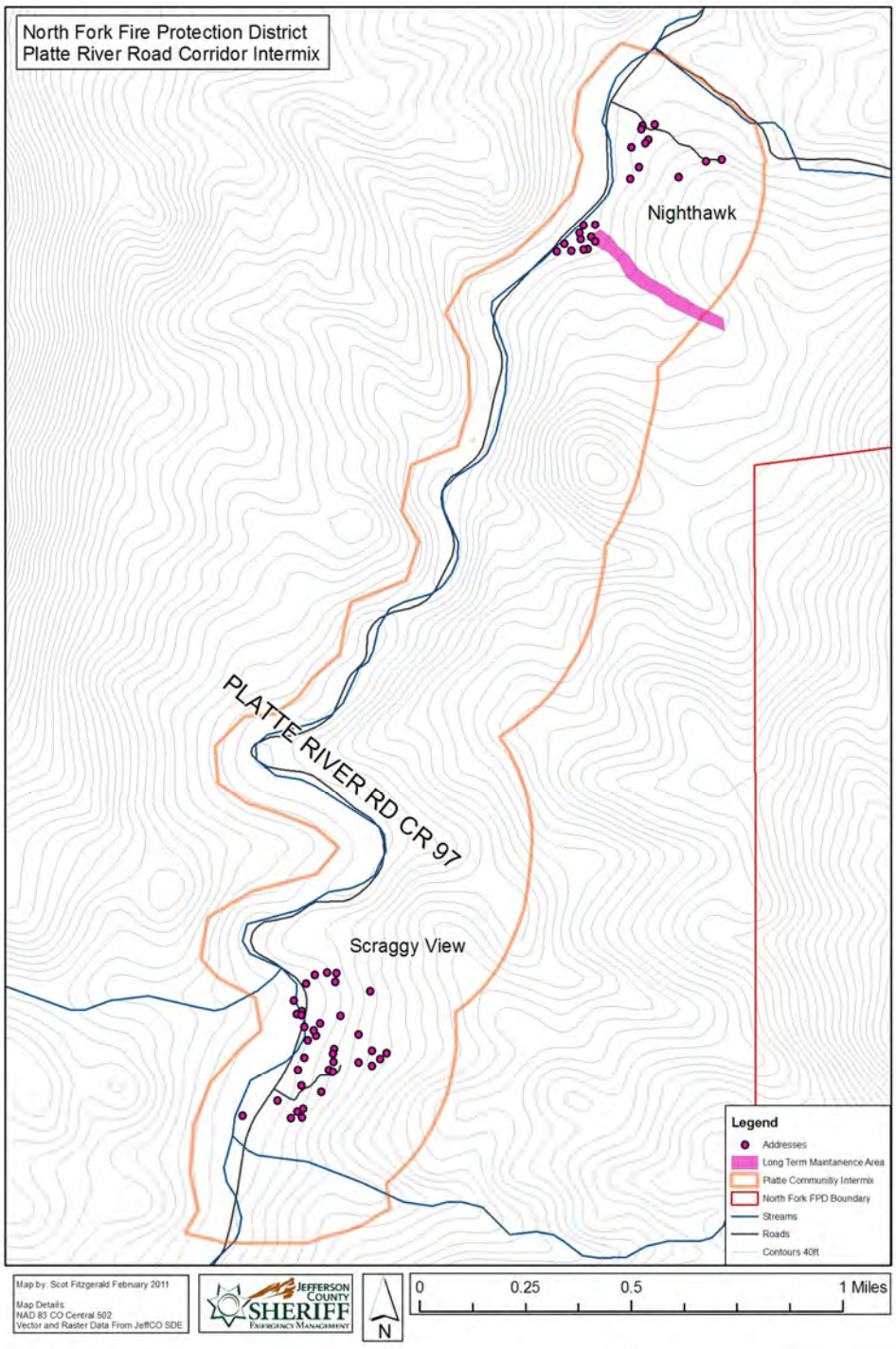

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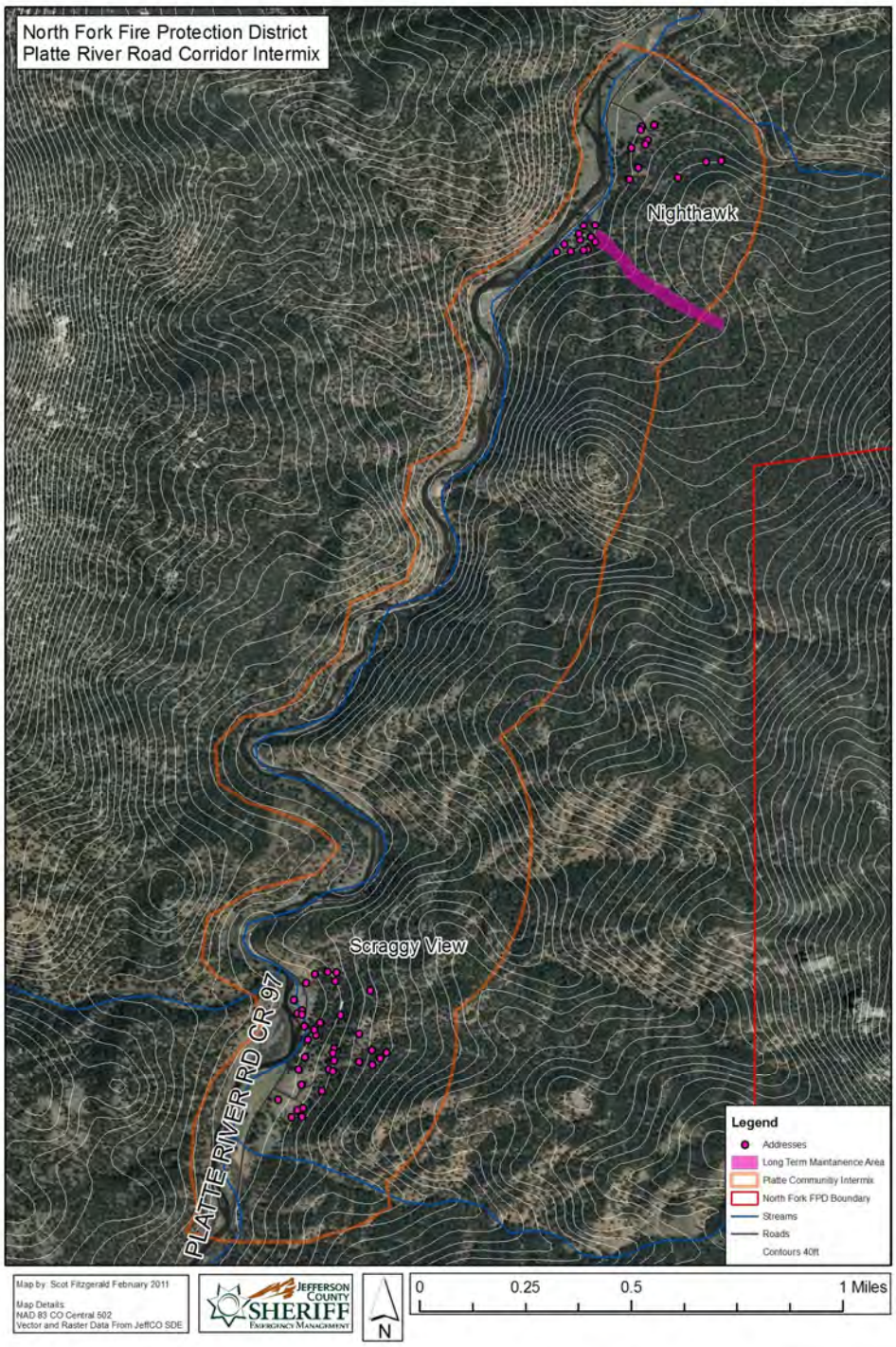

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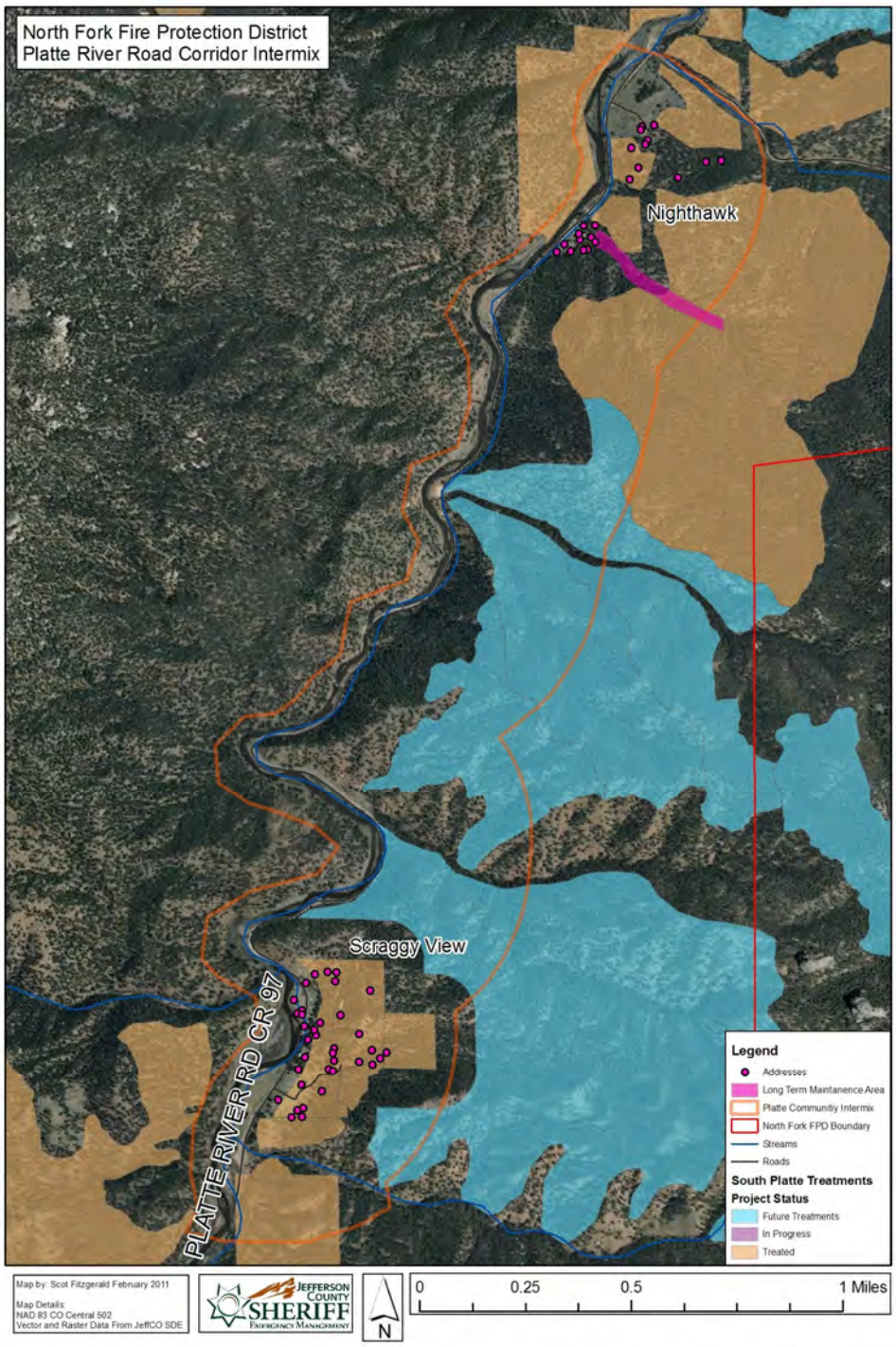

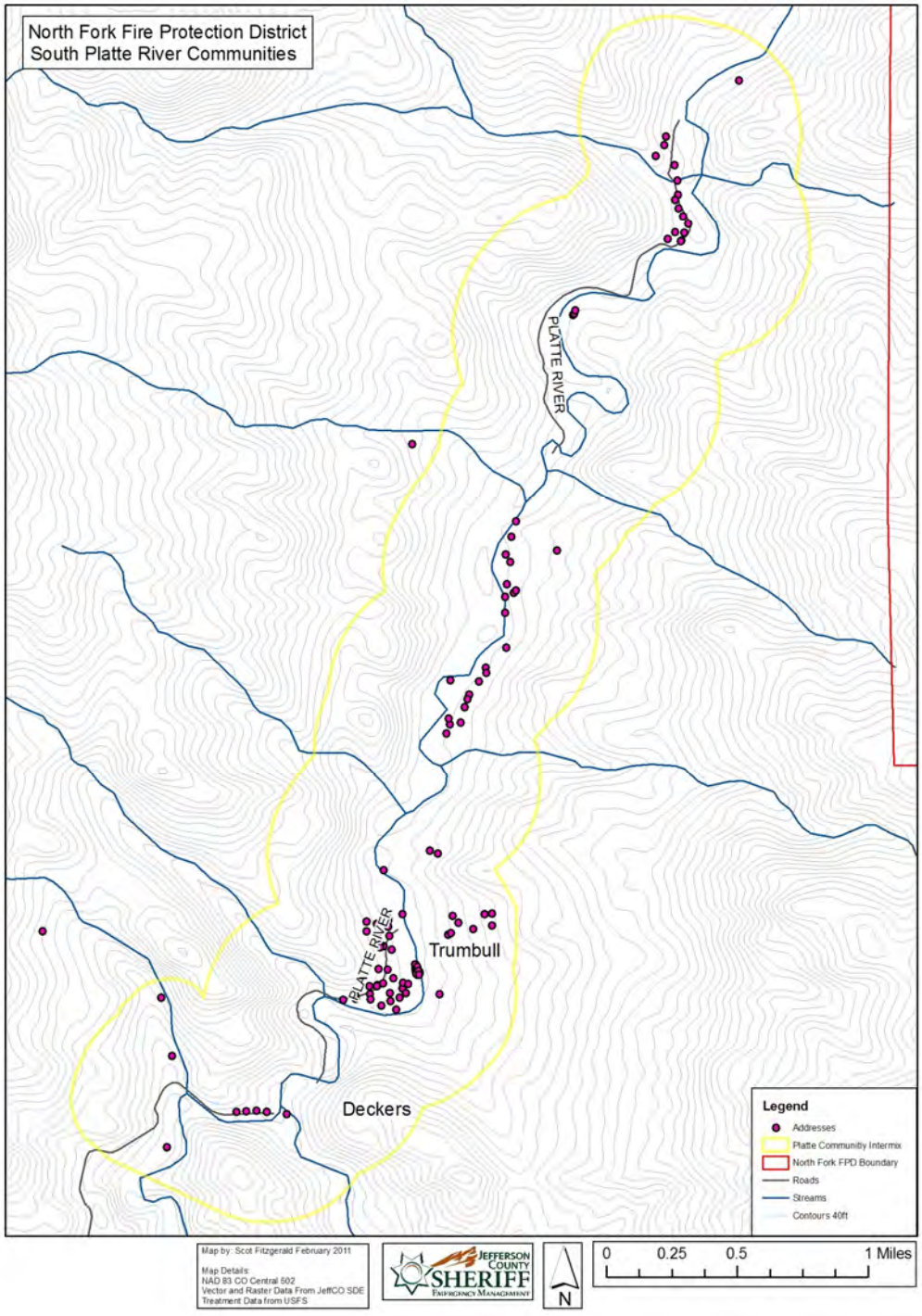
North Fork Fire Protection District
South Platte River Communities
PLATTE RIVER
PLATTE RIVER
Trumbull
Deckers
Legend
Addresses
Platte Community Intermix
North Fork FPD Boundary
Roads
Streams
Contours 40ft
Map by: Scot Fitzgerald February 2011
Map Details:
NAD 83 CO Central 502
Vector and Raster Data From JeffCO SDE
Treatment Data from USFS
JEFFERSON COUNTY SHERIFF
EMERGENCY MANAGEMENT
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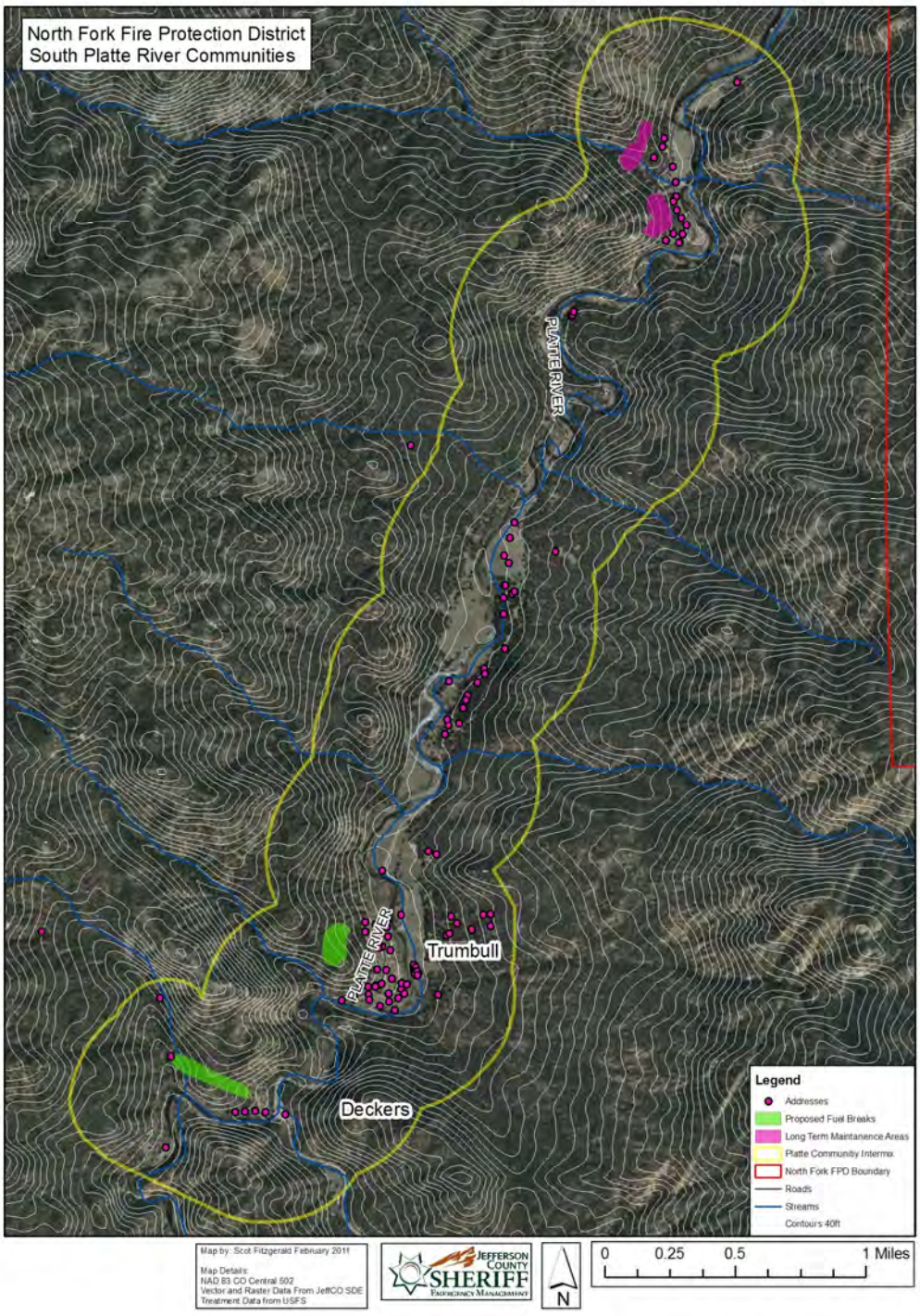
0 0.25 0.5 1 Miles

for planning only



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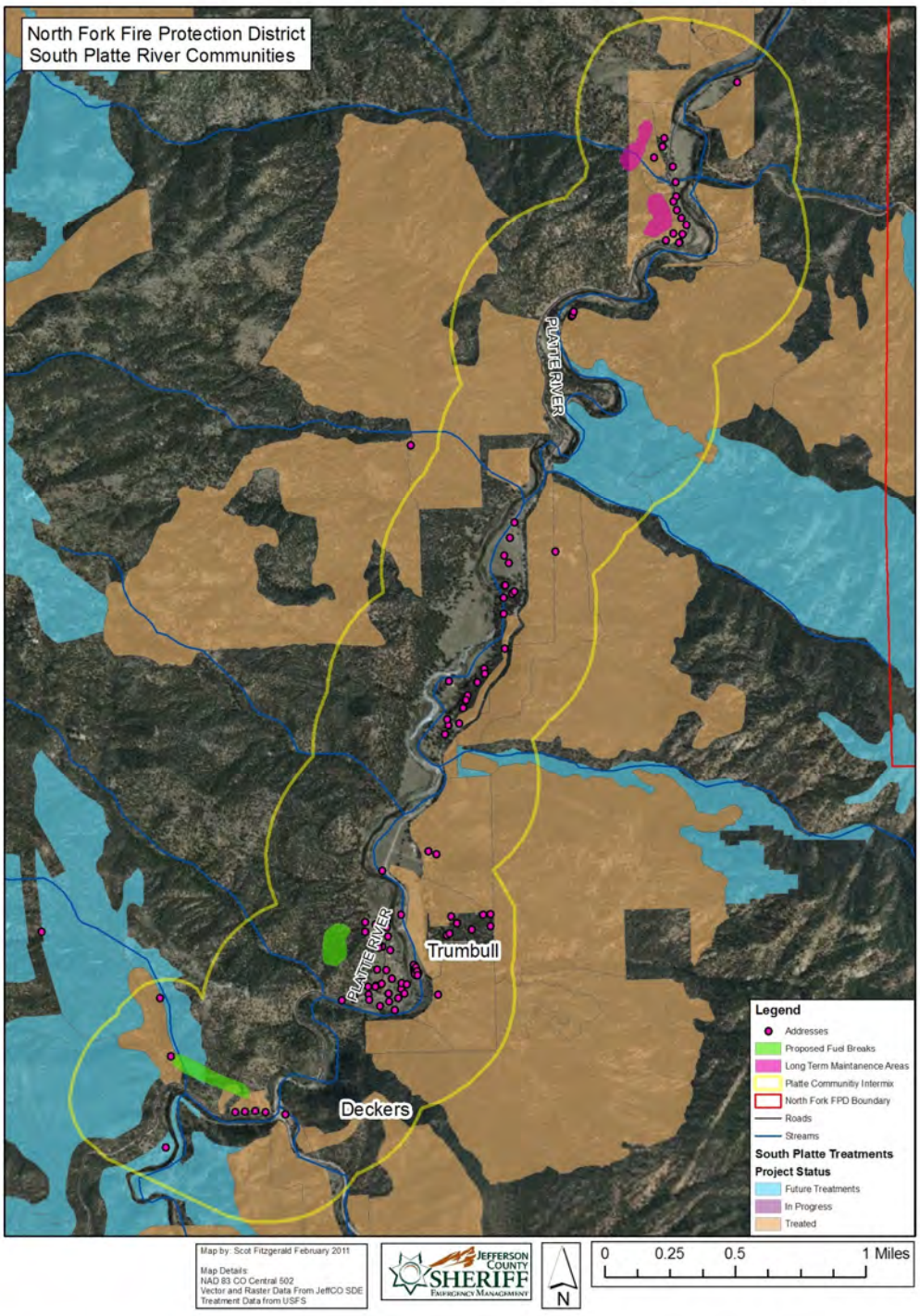

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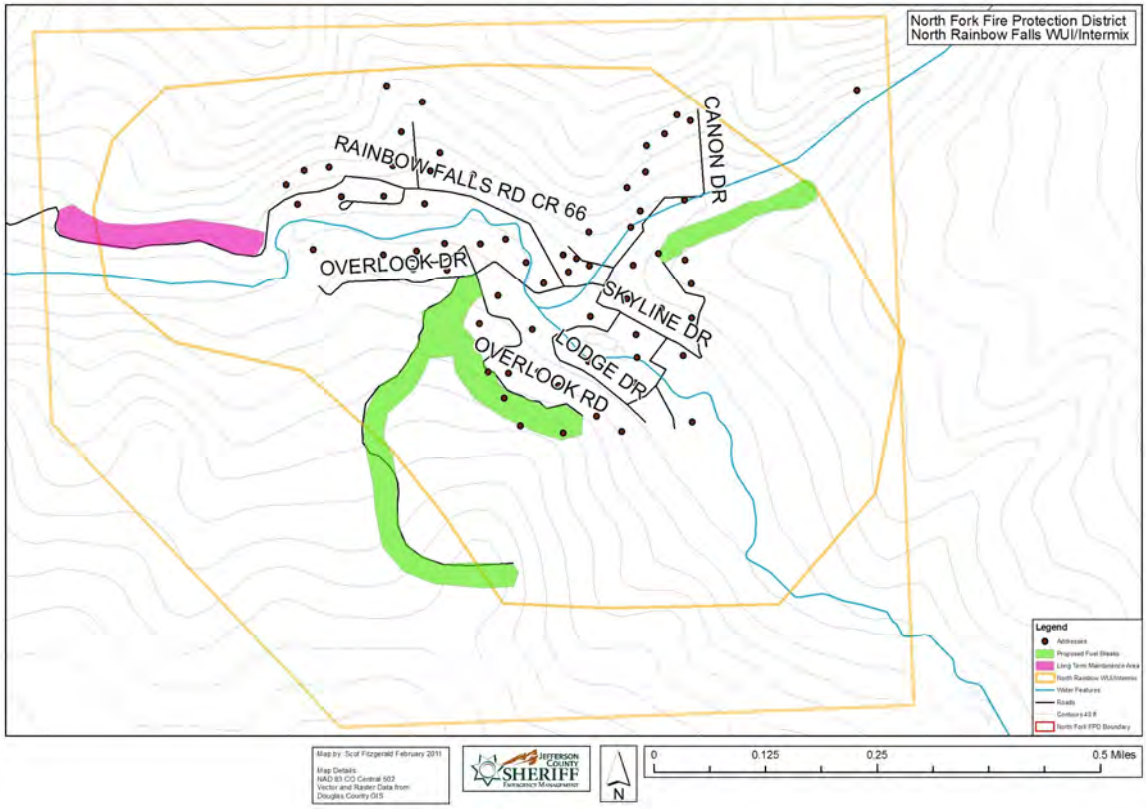

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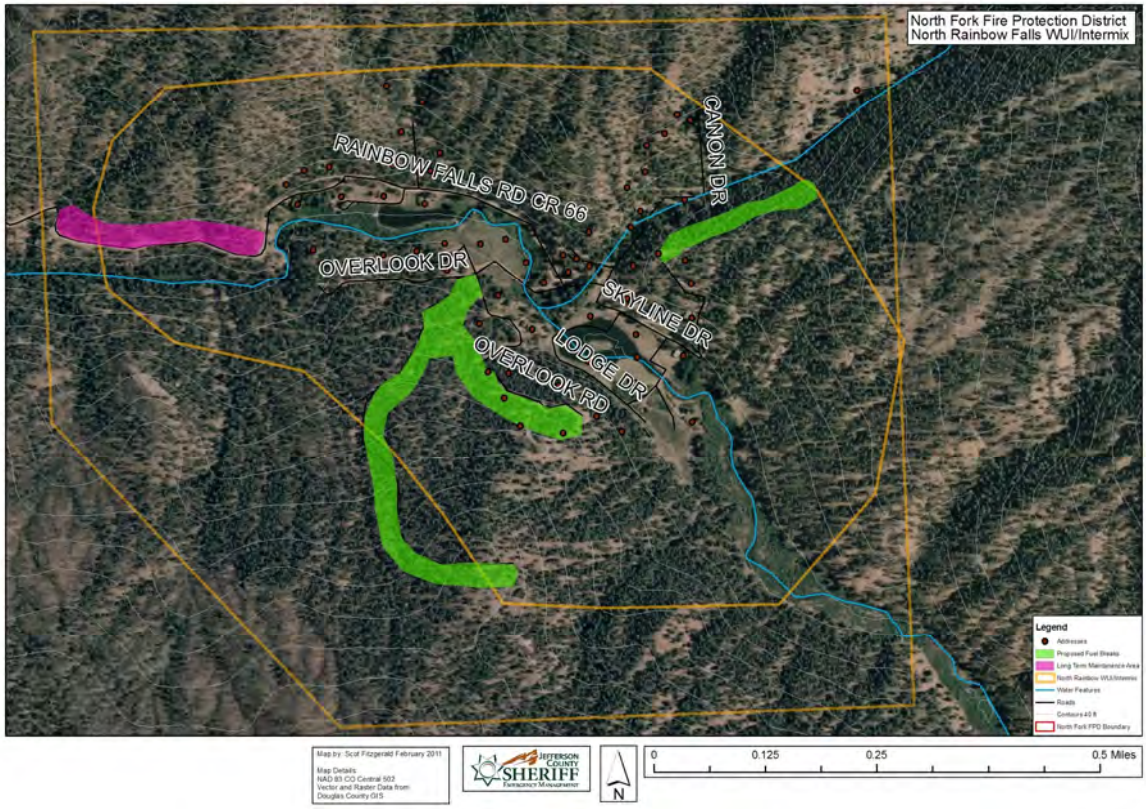

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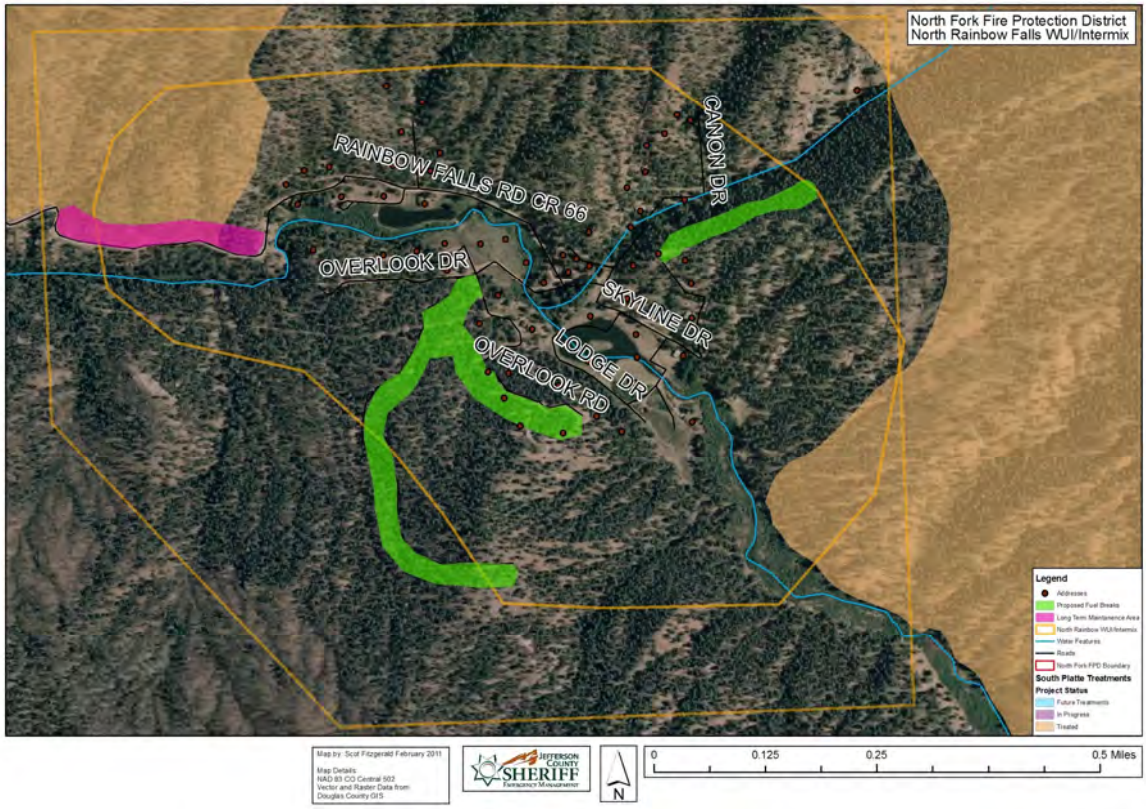


APPENDIX D
North Fork Fire Protection District
Community Wildfire Protection Plan Survey
2010

Jefferson County Division of Emergency Management, in partnership with Jefferson Conservation District, is preparing a Community Wildfire Protection Plan for **North Fork Fire Protection District**. This includes assessing the risk of wildfire in your community and identifying actions to reduce these risks. Your input on this very important topic is needed to create an effective plan. You can help by providing the following information by August 31, 2010:

1. What community do you live in or closest to?
   - ❑Pine Grove
   - ❑Foxton/Longview
   - ❑Buffalo Creek
   - ❑Spring Creek
   - ❑Oxyoke/Scraggy View
   - ❑Trumbull
   - ❑Deckers
   - ❑North Rainbow Falls

2. Are you a year-round resident or a seasonal resident?
   - ❑ Year-round
   - ❑ Seasonal

3. How great of a risk do you think wildfire poses to your community?
   ❑Extreme Risk ❑High Risk ❑Moderate Risk ❑Low Risk ❑No Risk

4. Do you think any areas in North Fork Fire Protection District are an extreme fire hazard?
   ❑ No. ❑ Yes, this (these) area(s): _____

5. How likely are you to leave your home if it is imminently threatened by fire?
   ❑Will not leave ❑More likely to stay ❑More likely to evacuate ❑Will evacuate

6. Do you think your community is currently prepared for a wildfire?
   ❑ No ❑ Yes ❑ I don't know

7. What types of areas in your community do you think pose a fire risk to homes or property?
   ❑Forests ❑Meadows and Grasses ❑Shrubs and Bushes

8. What do you think are the best ways to mitigate or reduce wildfire risks? (Choose all that apply.)
   - ❑ Reduce vegetation (grasses, trees, etc.) on public land by controlled burns.
   - ❑ Reduce vegetation (grasses, trees, etc.) on public land by mechanical treatments
   - ❑ Develop shaded fuel breaks along roads and strategic locations.
   - ❑ Increase firefighting equipment (more trucks, water tenders, etc.)
   - ❑ Increase number of fire department volunteers.
   - ❑ Increase water availability.
   - ❑ Encourage private landowners to develop defensible spaces around structures.
   - ❑ Conduct community outreach and education programs.
   - ❑ Other_____

OVER→

9. Have actions been taken to reduce the risk of wildfire in your community? (Choose all that apply)
   - ❑ Not that I am aware of.
   - ❑ Individual homeowners working on defensible space
   - ❑ Community work days to reduce hazardous fuels
   - ❑ Community slash collection days
   - ❑ Shaded fuelbreaks created on private property in the community
   - ❑ Shaded fuelbreaks created on public lands (County Open Space, National Forest lands, Denver Water Board, etc) adjacent to the community
   - ❑ Other_____

10. Have fire education programs occurred in your community? (Choose all that apply)
   - ❑ Not that I am aware of.
   - ❑ Firewise Community outreach
   - ❑ Colorado State Forest Service programs
   - ❑ Local Fire Department programs
   - ❑ Other_____

11. Many fuels mitigation projects have been completed in North Fork Fire Protection District. Do you think these projects are effectively reducing wildfire risk in your community?
   - ❑ Very effective
   - ❑ Somewhat effective
   - ❑ Somewhat ineffective
   - ❑ Not at all effective
   - ❑ I don't know / No opinion

12. Additional fuels mitigation projects have been planned in the North Fork Fire Protection District for the next 1-10 years. Do you support additional fuel mitigation projects in your community?
   - ❑ Yes, strongly support
   - ❑ Yes, somewhat support
   - ❑ Neither support nor oppose
   - ❑ No, somewhat oppose
   - ❑ No, strongly oppose

13. If you are performing fuels mitigation on your property, which methods best describe how you dispose of the slash and debris generated? (Choose all that apply)
   - ❑ Chipping onto forest floor
   - ❑ Chipping into piles
   - ❑ Lop and scatter
   - ❑ Burning in piles
   - ❑ Haul to slash collection site
   - ❑ Other_____
   - ❑ I am not currently performing fuels mitigation on my property

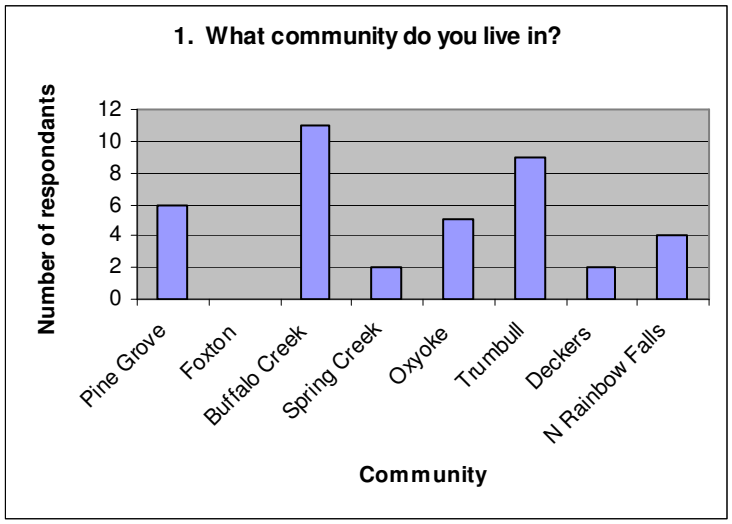
14. Use this space to provide any additional comments or feedback (optional):

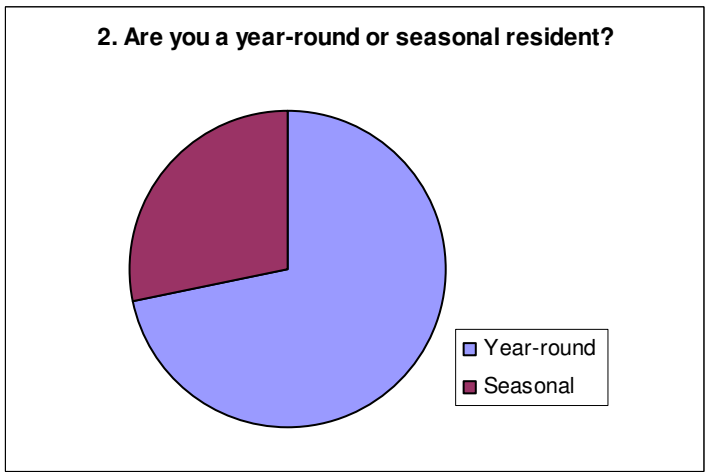
Please provide contact information if you wish to receive more information about this CWPP and/or fuels mitigation projects (optional):

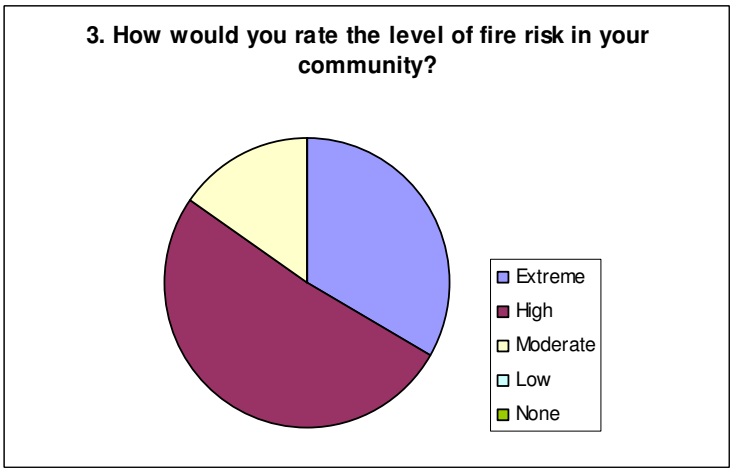
Name_____ _____ Email _____

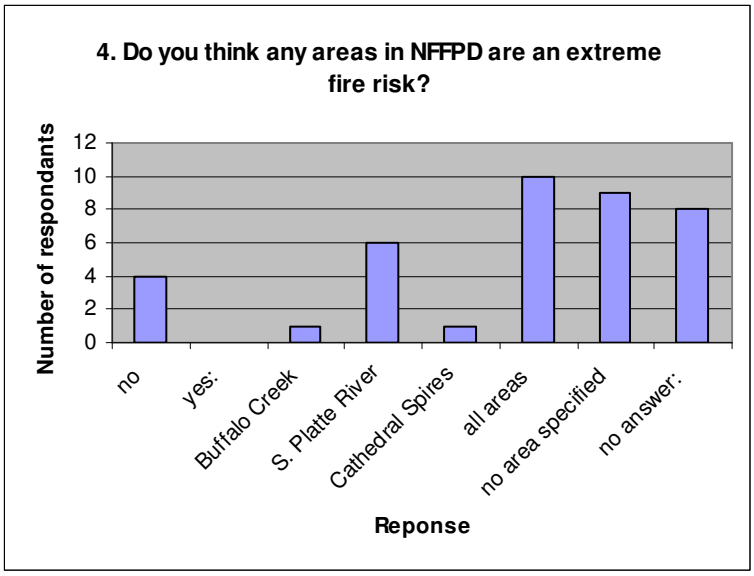
Address _____ _____ Phone_____

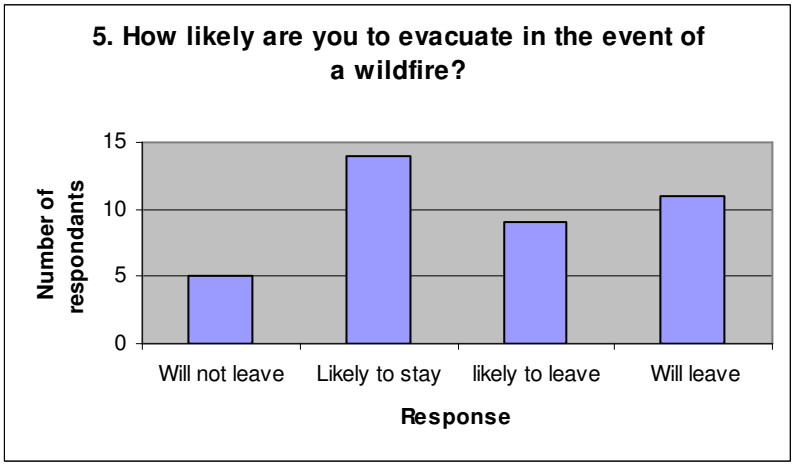
SURVEY RESPONSES

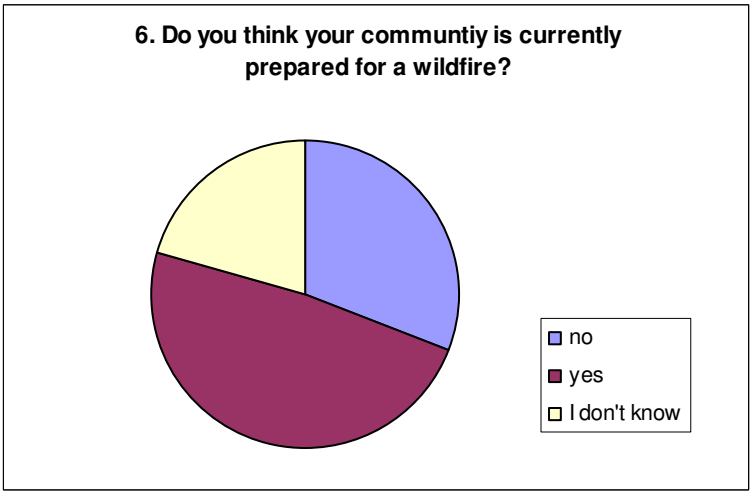


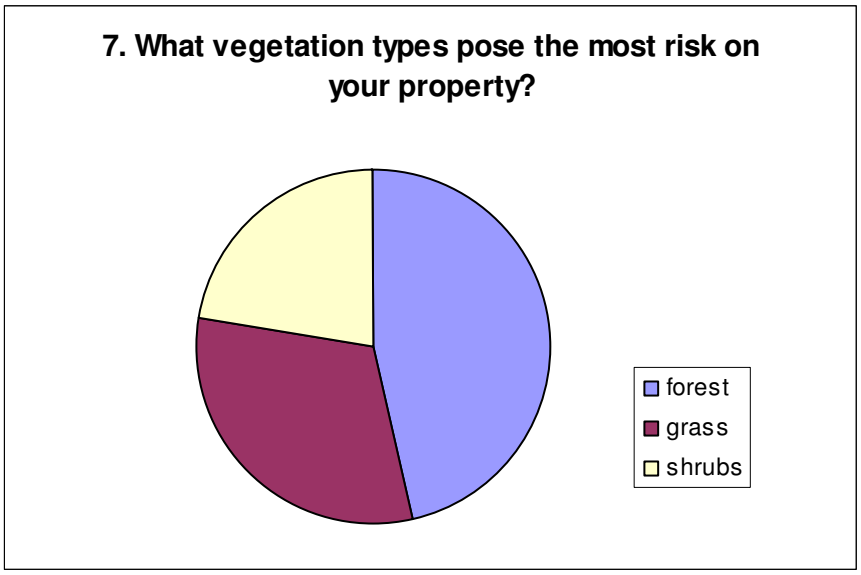


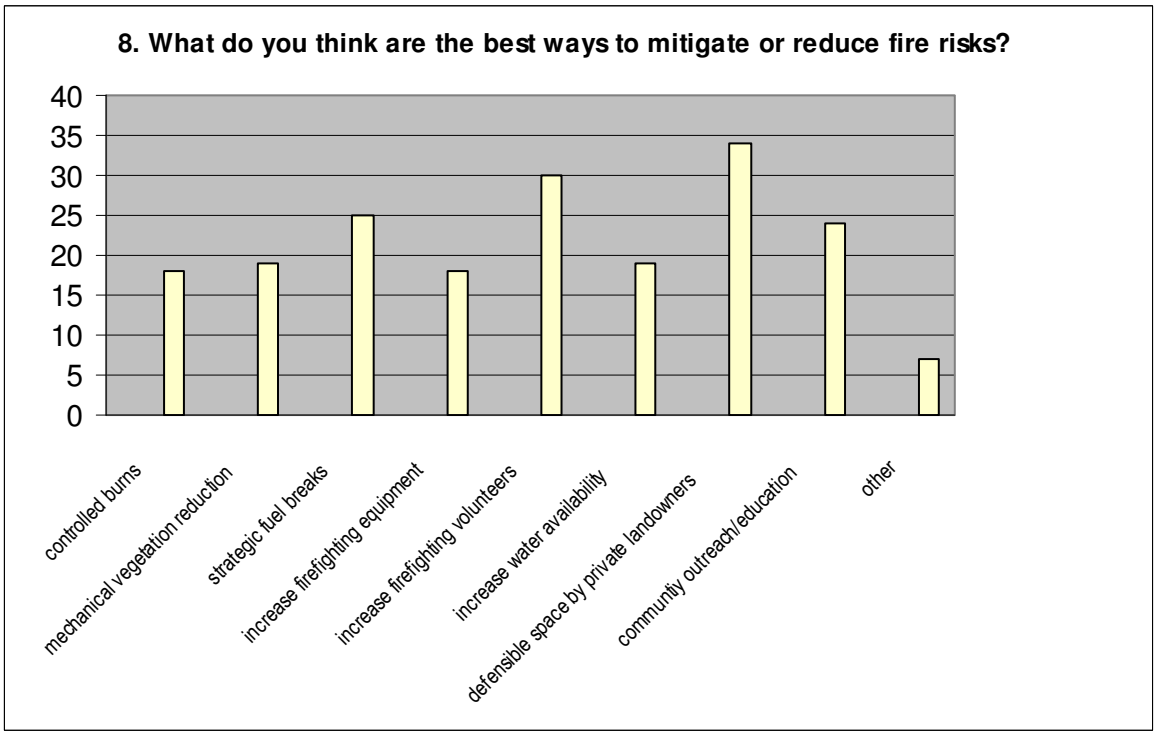


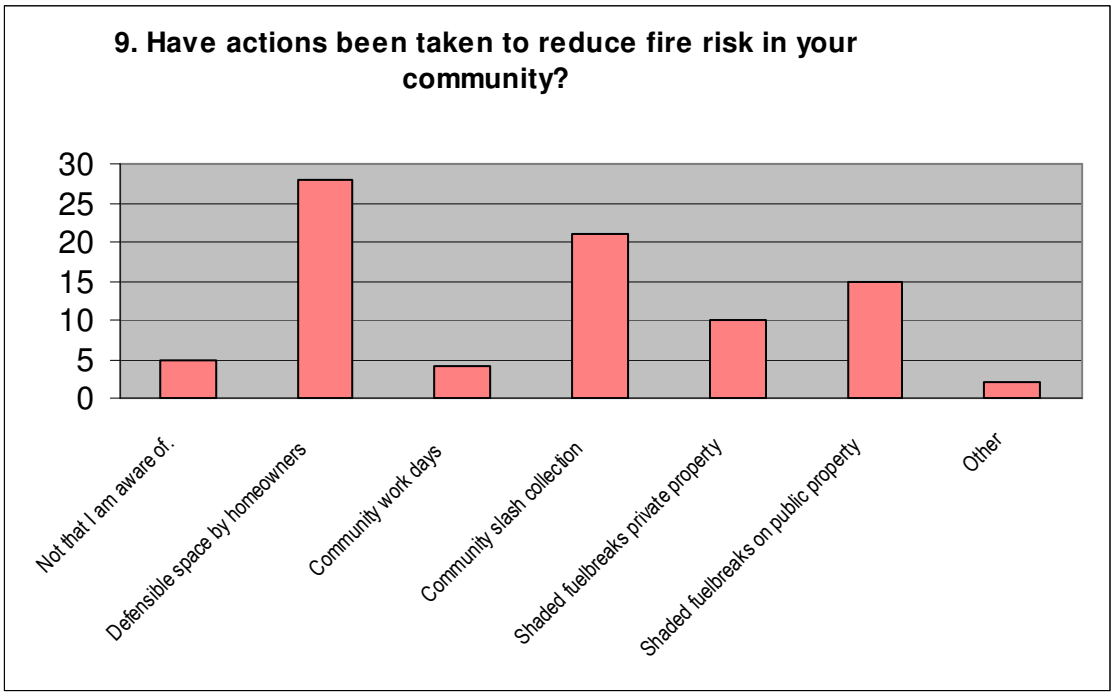

4. Do you think any areas in NFFPD are an extreme fire risk?
Number of respondants
12
10
8
6
4
2
0
no
yes:
Buffalo Creek
S. Platte River
Cathedral Spires
all areas
no area specified
no answer:
Reponse

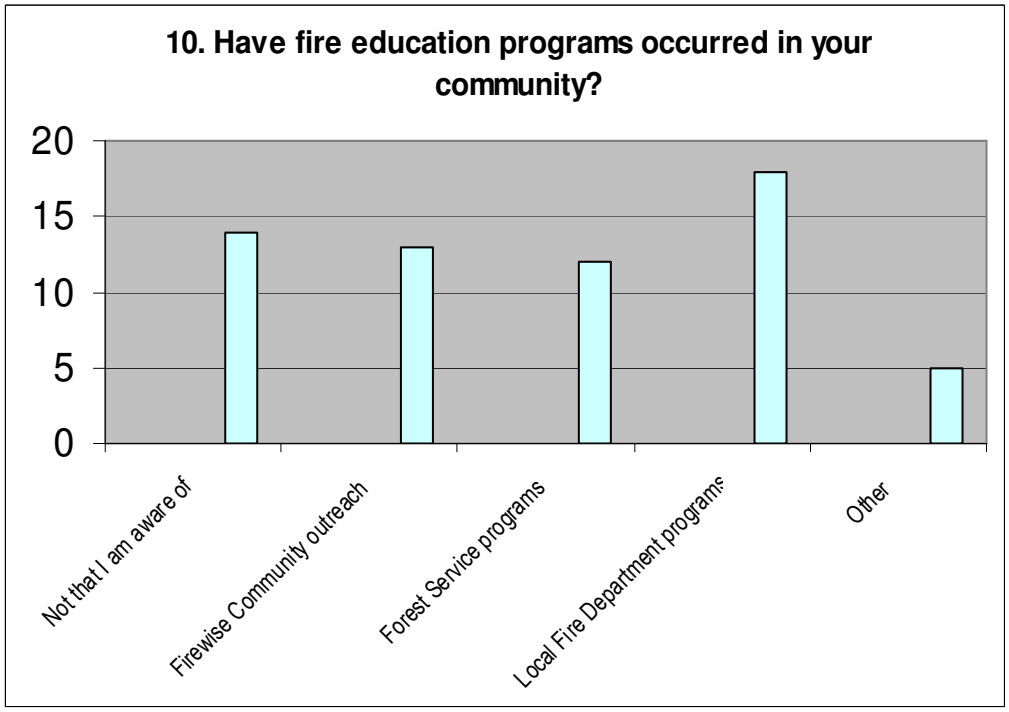

5. How likely are you to evacuate in the event of a wildfire?
Number of respondants
15
10
5
0
Will not leave
Likely to stay
likely to leave
Will leave
Response


6. Do you think your communtiy is currently prepared for a wildfire?
no
yes
I don't know

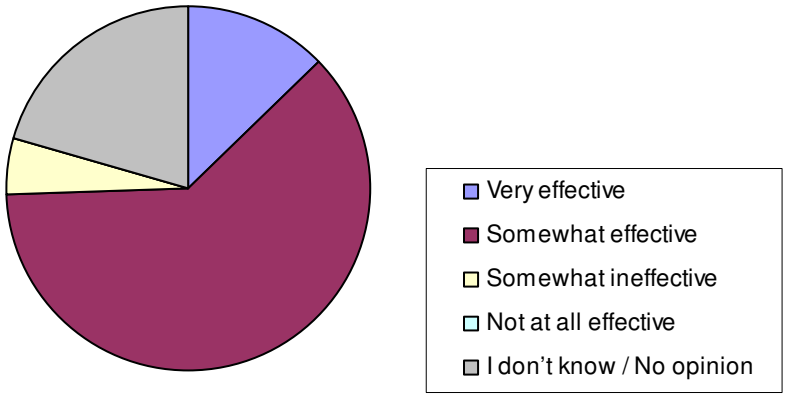

7. What vegetation types pose the most risk on your property?
forest
grass
shrubs


8. What do you think are the best ways to mitigate or reduce fire risks?
40
35
30
25
20
15
10
5
0
controlled burns
mechanical vegetation reduction
strategic fuel breaks
increase firefighting equipment
increase firefighting volunteers
increase water availability
defensible space by private landowners
community outreach/education
other

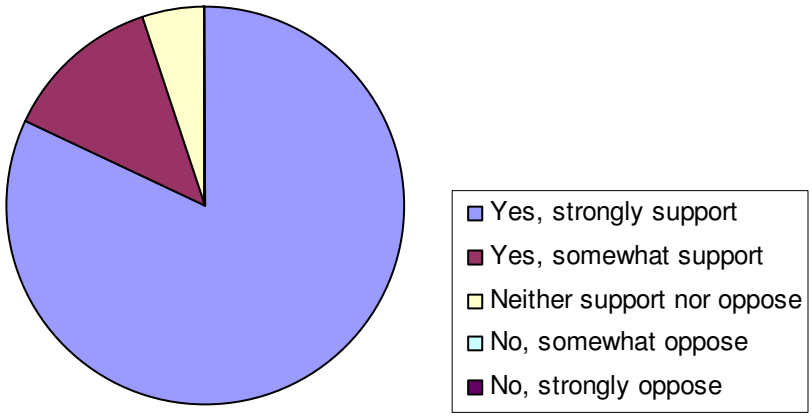

9. Have actions been taken to reduce fire risk in your community?
30
25
20
15
10
5
0
Not that I am aware of.
Defensible space by homeowners
Community work days
Community slash collection
Shaded fuelbreaks private property
Shaded fuelbreaks on public property
Other


10. Have fire education programs occurred in your community?
20
15
10
5
0
Not that I am aware of
Firewise Community outreach
Forest Service programs
Local Fire Department programs
Other

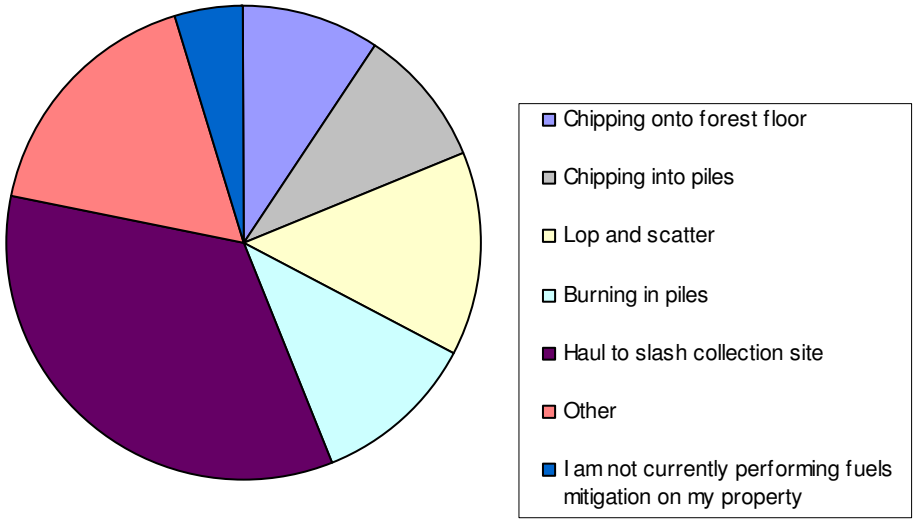
11. Do you think the fuels mitigation projects completed in the NFFPD have been effective in reducing wildfire risk in your communtiy?



12. Do you support additoinal fuel mitigation projects in your community?



13. Which methods best describe how you dispose of the slash and debris generated by your fuels mitigation activities?



Survey Raw Data:

1 **What community do you live in?**

Pine Grove	6
Foxton	0
Buffalo Creek	11
Spring Creek	2
Oxyoke	5
Trumbull	9
Deckers	2
N Rainbow Falls	4

2 **Are you a year-round or seasonal resident?**

Year-round	28
Seasonal	11

3 **Level of risk in your community?**

Extreme	13
High	20
Moderate	6
Low	0
None	0

4 **Do you think any areas in NFFPD are an extreme risk?**

no	4
yes:	
Buffalo Creek	1
S. Platte River	6
Cathedral Spires	1
all areas	10
no area specified	9
no answer:	8

5 **How likely are you to evacuate in a wildfire?**

Will not leave	5
Likely to stay	14
likely to leave	9
Will leave	11

6 **Do you think your community is currently prepared for wildfire?**

no	12
yes	19
I don't know	8

7 **What types of vegetation pose the most risk on your property?**

forest	33
grass	22
shrubs	16

8 **What do you think are the best ways to mitigate or reduce fire risks?**

Reduce vegetation (grasses, trees, etc.) on public land by controlled burns.	18
Reduce vegetation (grasses, trees, etc.) on public land by mechanical treatments	19
Develop shaded fuel breaks along roads and strategic locations.	25
Increase firefighting equipment (more trucks, water tenders, etc.)	18
Increase number of fire department volunteers.	30
Increase water availability.	19
Encourage private landowners to develop defensible spaces around structures.	34
Conduct community outreach and education programs	24
Other	7

9 **Have actions been taken to reduce fire risk in your community?**

Not that I am aware of.	5
Individual homeowners working on defensible space	28
Community work days to reduce hazardous fuels	4
Community slash collection days	21
Shaded fuelbreaks created on private property in the community	10
Shaded fuelbreaks created on public property in the community	15
Other	2

10 **Have fire education programs occurred in your community?**

Not that I am aware of	14
Firewise Community outreach	13
Colorado State Forest Service programs	12
Local Fire Department programs	18
Other	5

11 **Many fuels mitigation projects have been completed in North Fork Fire Protection District. Do you think these projects are effectively reducing wildfire risk in your community?**

Very effective	5
Somewhat effective	24
Somewhat ineffective	2
Not at all effective	0
I don't know / No opinion	8

12 **Do you support additional fuel mitigation projects in your community?**

Yes, strongly support	32
Yes, somewhat support	5
Neither support nor oppose	2
No, somewhat oppose	0
No, strongly oppose	0

13 **If you are performing fuels mitigation on your property, which methods best describe how you dispose of the slash and debris generated?**

Chipping onto forest floor	6
Chipping into piles	6
Lop and scatter	9
Burning in piles	7
Haul to slash collection site	22
Other (mowing, etc)	11
I am not currently performing fuels mitigation on my property	3

Fuelbreak Guidelines for Forested Subdivisions & Communities

By

Frank C. Dennis

Colorado State Forest Service

Knowledge to Go Places

This publication was developed for use by foresters, planners, developers, homeowners' associations and others. Implementation of these measures cannot *guarantee* safety from all wildfires, but will greatly increase the probability of containing them at more manageable levels.

Inadequate fire planning can result in loss of life or property and costly suppression activities.

Colorado's forested lands are experiencing severe impacts from continuing population increases and peoples' desire to escape urban pressures. Subdivisions and developments are opening new areas for homesite construction at an alarming rate, especially along the Front Range and around recreational areas such as Dillon, Vail, and Steamboat Springs.

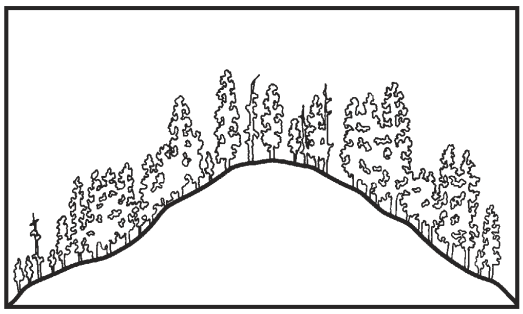
But with development inevitably comes a higher risk of wildfire as well as an ever-increasing potential for loss of life and property. Methods of fire suppression, pre-suppression needs, and homeowner and fire crew safety must all be considered in the planning and review of new developments as well as for the "retrofitting" of existing, older subdivisions.

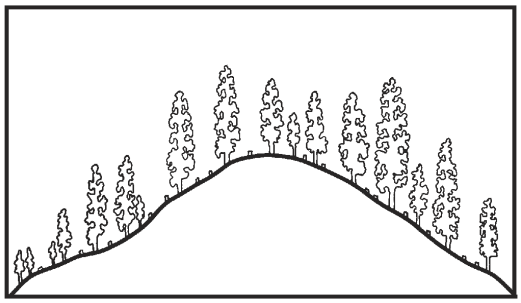
Fuelbreaks should be considered in fire management planning for subdivisions and developments; however, the following are guidelines **only**. They should be customized to local areas by professional foresters experienced in Rocky Mountain wildfire behavior and suppression tactics.

Fuelbreak vs Firebreak

Although the term fuelbreak is widely used in Colorado, it is often confused with firebreak. The two are entirely separate, and aesthetically different, forms of forest fuel modification and treatment.

• A firebreak is strip of land, 20 to 30 feet wide (or more), in which all vegetation is removed down to bare, mineral soil each year prior to fire season.





Above, cross section of mixed conifer stand before fuelbreak modification. Below, after modification.

• A fuelbreak (or shaded fuelbreak) is an easily accessible strip of land of varying width (depending on fuel and terrain), in which fuel density is reduced, thus improving fire control opportunities. The stand is thinned, and remaining trees are pruned to remove ladder fuels. Brush, heavy ground fuels, snags, and dead trees are disposed of and an open, park-like appearance is established.

The following is a discussion of the uses, limitations, and specifications of fuelbreaks in wildfire control and fuels management.

Fuelbreak Limitations

Fuelbreaks provide quick access for wildfire suppression. Control activities can be conducted more safely due to low fuel volumes. Strategically located, they break up large, continuous tracts of dense timber, thus limiting uncontrolled spread of wildfire.

Fuelbreaks can aid firefighters greatly by slowing fire spread under normal burning conditions. However, under extreme conditions, even the best fuelbreaks stand little chance of arresting a large

Before and after photos of a forest stand thinned to reduce fuel loads.

fire, regardless of firefighting efforts. Such fires, in a phenomenon called "spotting," can drop firebrands 1/8-mile or more ahead of the main fire, causing very rapid fire spread. These types of large fires may continue until there is a major change in weather conditions, topography, or fuel type.

It is critical to understand: A fuelbreak is the line of defense. The area (including any homes and developments) between it and the fire may remain vulnerable.

In spite of these somewhat gloomy limitations, fuelbreaks have proven themselves effective in Colorado. During the 1980 Crystal Lakes Subdivision Fire near Fort Collins, crown fires were stopped in areas with fuelbreak thinnings, while other areas of dense lodgepole pine burned completely. A fire at O'Fallon Park in Jefferson County was successfully stopped and controlled at a fuelbreak. The Buffalo Creek Fire in Jefferson County (1996) and the High Meadow Fire in Park and Jefferson Counties (2000) slowed dramatically wherever intense forest thinnings had been completed. During the 2002 Hayman Fire, Denver Water's entire complex of offices, shops and caretakers' homes at Cheesman Reservoir were saved by a fuelbreak with no firefighting intervention by a fuelbreak.

Burned area near Cheesman Reservoir as a result of the Hayman Fire. Note the unburned green trees in the middle right of the photo, a treated fuelbreak.

The Need For A Fuelbreak

Several factors determine the need for fuelbreaks in forested subdivisions, including: (1) potential problem indicators; (2) wildfire hazard areas; (3) slope; (4) topography; (5) crowning potential; and (6) ignition sources.

Potential Problem Indicator

The table below explains potential problem indicators for various hazards and characteristics common to Colorado's forest types. All major forest types, except aspen, indicate a high potential for wildfire hazard.

Fuel Type	Characteristics			Hazards			
	Aesthetics	Wildlife	Soil	**Wildfire**	Avalanche	Flood	Climate
Aspen	2	3	3	**2**	4	3	2
Douglas-fir	2	2	3	**5**	2	2	3
Greasewood-Saltbrush	4	2	2	**2**	1	3	3
Limber-Bristlecone Pine	3	2	4	**3**	4	2	5
Lodgepole Pine	2	2	3	**5**	4	2	4
Meadow	5	4	4	**2**	3	4	3
Mixed Conifer	2	1	1	**5**	3	1	3
Mountain Grassland	5	3	4	**3**	3	2	4
Mountain Shrub	3	5	4	**4**	2	2	3
Piñon-Juniper	2	3	4	**4**	2	3	2
Ponderosa Pine	2	3	1	**5**	2	2	3
Sagebrush	4	4	3	**3**	3	2	3
Spruce-Fir	2	3	3	**4**	5	**3**	4

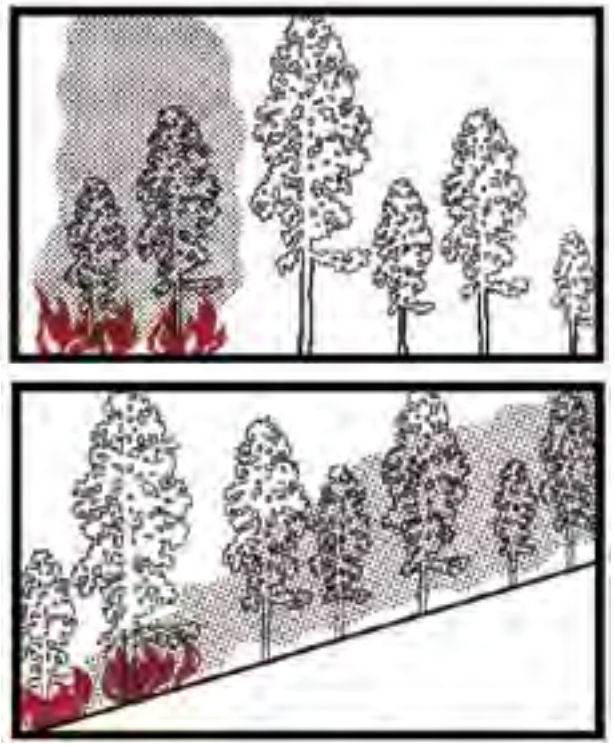
Legend: 5 – Problem may be crucial; 4 – Problem very likely;
3 – Exercise caution; 2 – Problem usually limited;
1 – No rating possible

Wildfire Hazard Maps

The Colorado State Forest Service (CSFS), numerous counties and some National Forests have completed wildfire hazard mapping for many areas within Colorado, particularly along the Front Range. These maps typically consider areas with 30 percent or greater slope; hazardous fuel types; and hazardous topographic features such as fire chimneys. Wildfire Hazard Ratings may be depicted in several ways. Whatever system is used, areas rated moderate or higher should be considered for fuel modification work.

Slope

Rate of fire spread increases as the slope of the land increases. Fuels are preheated by the rising smoke column or they may even come into contact with the flames themselves.



Fire effects, flat vs steep terrain. Note preheating of fuels on steep ground from passage of smoke column.

At 30 percent slope, rate of fire spread doubles compared to rates at level ground, drastically reducing firefighting effectiveness. **Areas near 30 percent or greater slopes are critical and must be reviewed carefully.**

Topography

Certain topographic features influence fire spread and should be evaluated. Included are fire chimneys, saddles, and V-shaped canyons. They are usually recognized by reviewing standard U.S.G.S. quad maps.

• Chimneys are densely vegetated drainages on slopes greater than 30 percent. Wind, as well as air pre-heated by a fire, tends to funnel up these drainages, rapidly spreading fire upslope.

• Saddles are low points along a main ridge or between two high points. Like chimneys, they also funnel winds to create a natural fire path during a fire's uphill run. Saddles act as corridors to spread fire into adjacent valleys or drainages.

Chimney.

Saddle.

• Narrow, V-shaped valleys or canyons can ignite easily due to heat radiating from one side to the other. For example, a fire burning on one side of a narrow valley dries and preheats fuels on the opposite side until the fire "flashes over." The natural effect of slope on fire then takes over and fire spreads rapidly up drainage and uphill along both sides of the valley.

Flashover in V-shaped valley.

Crowning Potential

An on-site visit is required to accurately assess crowning potential. A key, below, helps determine this rating. Fuel modification is usually unnecessary if an area has a rating of 3 or less.

Crowning Potential Key

	Rating
A. Foliage present, trees living or dead — B	
B. Foliage living — C	
C. Leaves deciduous or, if evergreen, usually soft, pliant, and moist; never oily, waxy, or resinous.	0
CC. Leaves evergreen, not as above — D	
D. Foliage resinous, waxy, or oily — E	
E. Foliage dense — F	
F. Ladder fuels plentiful — G	
G. Crown closure > 75 percent	9
GG. Crown closure < 75 percent	7
FF. Ladder fuels sparse or absent — H	
H. Crown closure > 75 percent	7
HH. Crown closure < 75 percent	5
EE. Foliage open — I	
I. Ladder fuel plentiful	4
II. Ladder fuel sparse or absent	2
DD. Foliage not resinous, waxy, or oily — J	
J. Foliage dense — K	
K. Ladder fuels plentiful — L	
L. Crown closure > 75 percent	7
LL. Crown closure < 75 percent	4
KK. Ladder fuels sparse or absent — M	
M. Crown closure > 75 percent	5
MM. Crown closure < 75 percent	3
JJ. Foliage open — N	
N. Ladder fuels plentiful	3
NN. Ladder fuels sparse or absent	1
BB. Foliage dead	0

The majority of dead trees within the fuelbreak should be removed. Occasionally, large, dead trees (14 inches or larger in diameter at 4 1/2 feet above ground level) may be retained as wildlife trees. If retained, all ladder fuels must be cleared from around the tree's trunk.

Ignition Sources

Possible ignition sources, which may threaten planned or existing developments, must be investigated thoroughly. Included are other developments and homes, major roads, recreation sites, railroads, and other possible sources. These might be distant from the proposed development, yet still able to channel fire into the area due to slope, continuous fuels, or other topographic features.

Fuelbreak Locations

In fire suppression, an effective fire line is connected, or "anchored," to natural or artificial fire barriers. Such anchor points might be rivers, creeks, large rock outcrops, wet meadows, or a less flammable timber type such as aspen. Similarly, properly designed and constructed fuelbreaks take advantage of these same barriers to eliminate "fuel bridges." (Fire often escapes control because of fuel bridges that carry the fire across control lines.)

Since fuelbreaks should normally provide quick, safer access to defensive positions, they are necessarily linked with road systems. Connected with county-specified roads within subdivisions, they provide good access and defensive positions for firefighting equipment and support vehicles. Cut-and fill slopes of roads are an integral part of a fuelbreak as they add to the effective width of modified fuels.

Fuelbreaks without an associated road system, such as those located along strategic ridge lines, are still useful in fire suppression. Here, they are often strengthened and held using aerial retardant drops until fire crews can walk in or be ferried in by helicopter.

Preferably, fuelbreaks are located along ridge tops to help arrest fires at the end of their runs. However, due to homesite locations and resource values, they can also be effective when established at the base of slopes. Mid-slope fuelbreaks are least desirable, but under certain circumstances and with modifications, these too, may be valuable.

Fuelbreaks are located so that the area under management is broken into small, manageable units. Thus, when a wildfire reaches modified fuels, defensive action is more easily taken, helping to keep the fire small. For example, a plan for a subdivision might recommend that fuelbreaks break up continuous forest fuels into units of 10 acres or less. This is an excellent plan, especially if defensible space thinnings are completed around homes and structures, and thinning for forest management and forest health are combined with the fuelbreak.

When located along ridge tops, continuous length as well as width are critical elements. Extensive long-range planning is essential in positioning these types of fuelbreaks.

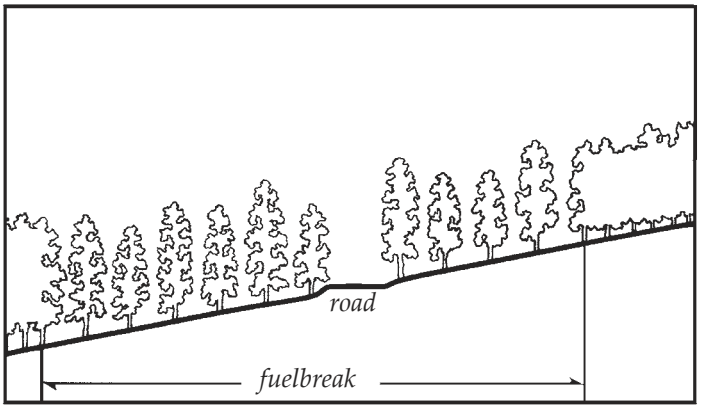
Aesthetics

Improperly planned fuelbreaks can adversely impact an area's aesthetic qualities. Careful construction is necessary when combining mid-slope fuelbreaks with roads involving excessive cut-and-fill.

These photos, far- and near- views of the same site, illustrate that forest can be thinned without impacting aesthetics.

Care must also be taken in areas that are not thinned throughout for fuel hazard reduction. In such cases the fuelbreak visually sticks out like a "sore thumb" due to contrasting thinned and unthinned portions of the forest. (Especially noticeable are those portions of the fuelbreak above road cuts).

These guidelines are designed to minimize aesthetic impacts. However, some situations may require extensive thinning and, thus, result in a major visual change to an area. Additional thinning beyond the fuelbreak may be necessary to create an irregular edge and to "feather," or blend, the fuelbreak thinning into the unthinned portions of the forest. Any thinning beyond the fuelbreak improves its effectiveness and is highly recommended.



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

Constructing the Fuelbreak

Fuelbreak Width and Slope Adjustments

Note: Since road systems are so important to fuelbreak construction, the following measurements are from the toe of the fill for downslope distances, and above the edge of the cut for uphill distances.

The minimum recommended fuelbreak width is approximately 300 feet for level ground. Since fire activity intensifies as slope increases, the overall fuelbreak width must also increase. However, to minimize aesthetic impacts and to maximize fire crew safety, the majority of the increases should be made at the bottom of the fuelbreak, below the road cut.

Widths are also increased when severe topographic conditions are encountered. Guidelines for fuelbreak widths on slopes are given below:

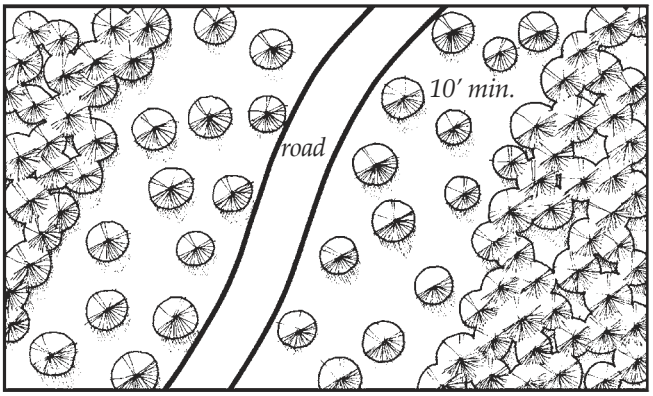
Fuelbreak Width/Slope

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	240	340

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

Stand Densities

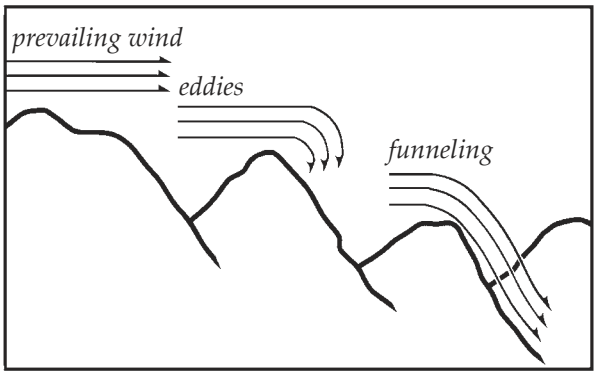
Crown separation is a more critical factor for fuelbreaks than a fixed tree density level. A *minimum* 10-foot spacing between the edges of tree crowns is recommended on level ground. As slope increases, crown spacing should also increase. However, small, isolated groups of trees may be retained for visual diversity. Increase crown spacing around any groups of trees left for aesthetic reasons and to reduce fire intensities and torching potential.



Plan view of fuelbreak showing minimum distance between tree crowns.

In technical terms, a fuelbreak thinning is classified as a heavy "sanitation and improvement cut, from below." Within fuelbreaks, trees that are suppressed, diseased, deformed, damaged, or of low vigor are removed along with all ladder fuels. Remaining trees are the largest, healthiest, most wind-firm trees from the dominant and co-dominant species of the stand.

Because such a thinning is quite heavy for an initial entry into a stand, prevailing winds, eddy effects, and wind funneling must be carefully evaluated to minimize the possibility of windthrow. It may be necessary to develop the fuelbreak over several years to allow the timber stand to "firm-up" — this especially applies to lodgepole pine and Engelmann spruce stands.



Topography affects wind behavior – an important consideration during fuelbreak construction.

Area-wide forest thinnings are recommended for any subdivisions. Such thinning is not as severe as a fuelbreak thinning, but generally should be completed to fuelbreak specifications along the roads (as outlined on page 6.) In addition, "defensible space thinnings" are highly recommended around all structures (see CSU Coop. Extension Fact sheet 6.302, *Creating Wildfire-Defensible Zones*).

Debris Removal

Limbs and branches left from thinning (slash) can add significant volumes of fuel to the forest floor, especially in lodgepole pine, mixed-conifer, or spruce/fir timber types. These materials can accumulate and serve as ladder fuels, or can become "jackpots," increasing the difficulty of defending the fuelbreak during a wildfire. **Slash decomposes very slowly in Colorado and proper disposal is essential.** Proper treatment reduces fire hazard, improves access for humans and livestock, encourages establishment of grasses and other vegetation, and improves aesthetics.

Three treatment methods are commonly used. These are lopping-and-scattering, piling and burning, and chipping. Mulching of small trees and slash using equipment similar to Hydro-axes or Timbcos equipped with mulching heads are becoming a popular method of treatment. Size, amount, and location of slash dictates the method used, in addition to cost and the final desired appearance. The method chosen will also depend on how soon an effective fuelbreak is needed prior to construction in new developments.

Lop and scatter: slash should be no deeper than 12'' above ground surface.

Chipping is the most desirable, but also the most expensive method of slash disposal.

Piled slash can be burned but only during certain conditions, such as after a snowfall.

Fuelbreak Maintenance

Following initial thinning, trees continue to grow (usually at a faster rate). The increased light on the forest floor encourages heavy grass and brush growth where, in many cases, where little grew before. The site disturbance and exposed mineral soil created during fuelbreak development is a perfect seed bed for new trees that, in turn, create new ladder fuels. Thus, in the absence of maintenance, fuelbreak effectiveness will decrease over time.

Fuelbreak maintenance is essential. Ingrowth, shown above, will minimize the effectiveness of this fuelbreak within a few years.

Fuelbreak maintenance problems are most often the result of time and neglect. Misplaced records, lack of follow-up and funding, and apathy caused by a lack of fire events are some of the major obstacles. In addition, the responsibility for fuelbreak maintenance projects is often unclear. For example, control of a fuelbreak completed by a developer passes to a homeowner's association, usually with limited funds and authority to maintain fuelbreaks.

If fuelbreak maintenance is not planned and completed as scheduled, consider carefully whether the fuelbreak should be constructed. An un-maintained fuelbreak may lead to a false sense of security among residents and fire suppression personnel.

Conclusion

An image of well-designed communities for Colorado includes:

• Forested subdivisions where the total forest cover is well-managed through carefully planned, designed, and maintained thinnings. This contributes to reduced wildfire hazards and a much healthier forest — one that is more resistant to insects and disease.

• A system of roads and driveways with their associated fuelbreaks that break up the continuity of the forest cover and fuels. These help keep fires small, while also providing safer locations from which to mount fire suppression activities. In addition to allowing fire personnel in, they will allow residents to evacuate if necessary.

• Individual homes that all have defensible space around them, making them much easier to defend and protect from wildfire, while also protecting the surrounding forest from structure fires.

Creation of such communities is entirely feasible if recognition of the fire risks, a spirit of cooperation, an attitude of shared responsibility, and the political will exists.

Colorado's mountains comprise diverse slopes, fuel types, aspects, and topographic features. This variety makes it impossible to develop general fuelbreak prescriptions for all locations. ***The previous recommendations are guidelines only.*** *A professional forester with fire suppression expertise should be consulted to "customize" fuelbreaks for particular areas.*

FORESTRY

Creating Wildfire-Defensible Zones no. 6.302

by F.C. Dennis [1]

Quick Facts...

Wildfire will find the weakest links in the defense measures you have taken on your property.

The primary determinants of a home's ability to survive wildfire are its roofing material and the quality of the "defensible space" surrounding it.

Even small steps to protect your home and property will make them more able to withstand fire.

Consider these measures for all areas of your property, not just the immediate vicinity of the house.

Fire is capricious. It can find the weak link in your home's fire protection scheme and gain the upper hand because of a small, overlooked or seemingly inconsequential factor. While you may not be able to accomplish all measures below (and there are no guarantees), each will increase your home's, and possibly your family's, safety and survival during a wildfire.

Start with the easiest and least expensive actions. Begin your work closest to your house and move outward. Keep working on the more difficult items until you have completed your entire project.

Defensible Space

Two factors have emerged as the primary determinants of a home's ability to survive wildfire. These are the home's roofing material and the quality of the "defensible space" surrounding it.

Use fire-resistive materials (Class C or better rating), not wood or shake shingles, to roof homes in or near forests and grasslands. When your roof needs significant repairs or replacement, do so with a fire-resistant roofing material. Check with your county building department. Some counties now restrict wood roofs or require specific classifications of roofing material.

Defensible space is an area around a structure where fuels and vegetation are treated, cleared or reduced to slow the spread of wildfire towards the structure. It also reduces the chance of a structure fire moving from the building to the surrounding forest. Defensible space provides *room for firefighters to do their jobs.* Your house is more likely to withstand a wildfire if grasses, brush, trees and other common forest fuels are managed to reduce a fire's intensity.

The measure of fuel hazard refers to its continuity, both horizontal (across the ground) and vertical (from the ground up into the vegetation crown). Fuels with a high degree of both vertical and horizontal continuity are the most hazardous, particularly when they occur on slopes. Heavier fuels (brush and trees) are more hazardous (i.e. produce a more intense fire) than light fuels such as grass.

Mitigation of wildfire hazards focuses on breaking up the continuity of horizontal and vertical fuels. Additional distance between fuels is required on slopes.

Creating an effective defensible space involves developing a series of management zones in which different treatment techniques are used. See Figure 1 for a general view of the relationships among these management zones. Develop defensible space around each building on your property. Include detached garages, storage buildings, barns and other structures in your plan.

The actual design and development of your defensible space depends on several factors: size and shape of buildings, materials used in their construction, the slope of the ground on which the structures are built, surrounding topography,

Colorado State University Cooperative Extension

Putting Knowledge to Work

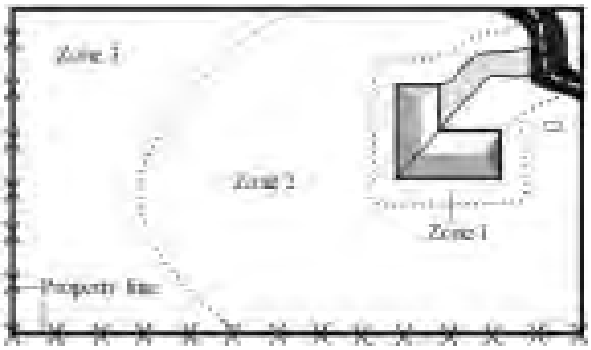


Figure 1: Forested property showing the three fire-defensible zones around a home or other structure.

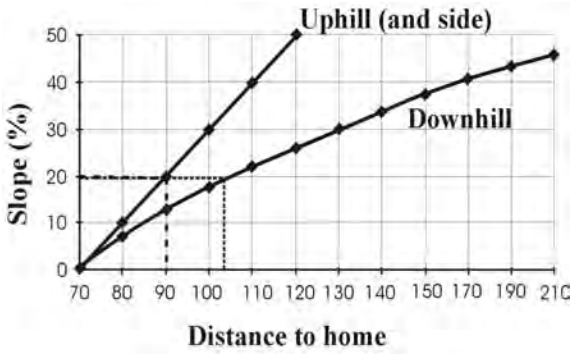


Figure 2: This chart indicates the *minimum recommended* dimensions for defensible space from the home to the outer edge of Zone 2. For example, if your home is situated on a 20 percent slope, the minimum defensible space dimensions would be 90 feet uphill and to the sides of the home and 104 feet downhill from the home.

and sizes and types of vegetation on your property. These factors all affect your design. You may want to request additional guidance from your local Colorado State Forest Service (CSFS) forester or fire department. (See the Special Recommendations section of this fact sheet for shrubs, lodgepole pine, Engelmann spruce, and aspen.)

Defensible Space Management Zones

Zone 1 is the area of maximum modification and treatment. It consists of an area of 15 feet around the structure in which all flammable vegetation is removed. This 15 feet is measured from the outside edge of the home's eaves and any attached structures, such as decks.

Zone 2 is an area of fuel reduction. It is a transitional area between Zones 1 and 3. The size of Zone 2 depends on the slope of the ground where the structure is built. Typically, the defensible space should extend *at least* 75 to 125 feet from the structure. See Figure 2 for the appropriate distance for your home's defensible space. Within this zone, the continuity and arrangement of vegetation is modified. Remove stressed, diseased, dead or dying trees and shrubs. Thin and prune the remaining larger trees and shrubs. Be sure to extend thinning along either side of your driveway all the way to your main access road. These actions help eliminate the continuous fuel surrounding a structure while enhancing homesite safety and the aesthetics of the property.

Zone 3 is an area of traditional forest management and is of no particular size. It extends from the edge of your defensible space to your property boundaries.

Prescriptions

Zone 1

The size of Zone 1 is 15 feet, measured from the edges of the structure. Within this zone, several specific treatments are recommended.

Plant nothing within 3 to 5 feet of the structure, particularly if the building is sided with wood, logs or other flammable materials. Decorative rock, for example, creates an attractive, easily maintained, nonflammable ground cover.

If the house has noncombustible siding, widely spaced foundation plantings of low growing shrubs or other "fire wise" plants are acceptable. Do not plant directly beneath windows or next to foundation vents. Be sure there are no areas of continuous grass adjacent to plantings in this area.

Frequently prune and maintain plants in this zone to ensure vigorous growth and a low growth habit. Remove dead branches, stems and leaves.

Do not store firewood or other combustible materials in this area. Enclose or screen decks with metal screening. Extend the gravel coverage under the decks. Do not use areas under decks for storage.

Ideally, remove all trees from Zone 1 to reduce fire hazards. If you do keep a tree, consider it part of the structure and extend the distance of the entire defensible space accordingly. Isolate the tree from any other surrounding trees. Prune it to at least 10 feet above the ground. Remove any branches that interfere with the roof or are within 10 feet of the chimney. Remove all "ladder fuels" from beneath the tree. Ladder fuels are vegetation with vertical continuity that allows fire to burn from ground level up into the branches and crowns of trees. Ladder fuels are potentially very hazardous but are easy to mitigate. No ladder fuels can be allowed under tree canopies. In all other areas, prune all branches of shrubs or trees up to a height of 10 feet above ground (or 1/2 the height, whichever is the least).

Zone 2

Zone 2 is an area of fuel reduction designed to reduce the intensity of any fire approaching your home. Follow these recommended management steps.

Thin trees and large shrubs so there is at least 10 feet between crowns. Crown separation is measured from the furthest branch of one tree to the nearest branch on the next tree (Figure 3). On steep slopes, allow more space between tree crowns. (See Figure 4 for *minimum recommended* spacing for trees on steep slopes.) Remove all ladder fuels from under these remaining trees. Carefully prune trees to a height of at least 10 feet.

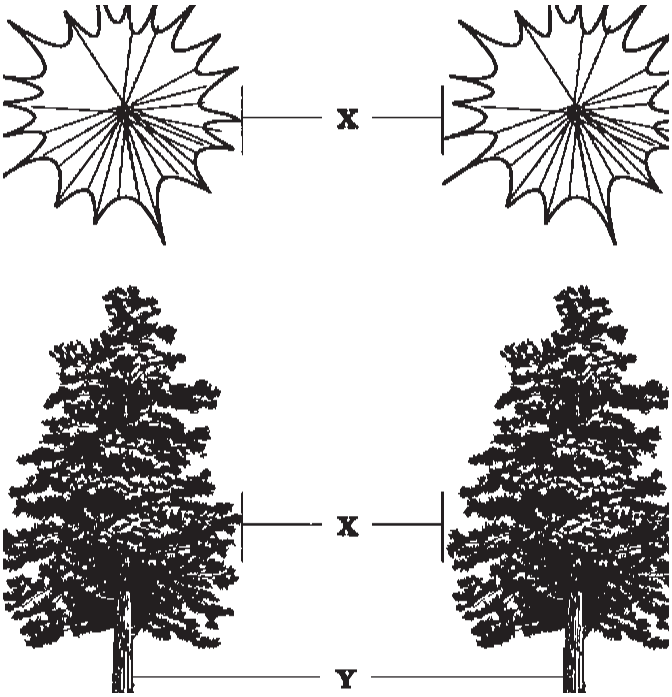


Figure 3: X = crown spacing; Y = stem spacing. Do not measure between stems for crown — measure between the edges of tree crowns.

Small clumps of 2 to 3 trees may be occasionally left in Zone 2. Leave more space between the crowns of these clumps and surrounding trees.

Because Zone 2 forms an aesthetic buffer and provides a transition between zones, it is necessary to blend the requirements for Zones 1 and 3. Thin the portions of Zone 3 adjacent to Zone 2 more heavily than the outer portions.

Isolated shrubs may remain, provided they are not under tree crowns. Prune and maintain these plants periodically to maintain vigorous growth. Remove dead stems from trees and shrubs annually. Where shrubs are the primary fuel in Zone 2, refer to the Special Recommendations section of this fact sheet.

Limit the number of dead trees (snags) retained in this area. Wildlife needs only one or two snags per acre. Be sure any snags left for wildlife cannot fall onto the house or block access roads or driveways.

Mow grasses (or remove them with a weed trimmer) as needed through the growing season to keep them low, a maximum of 6 to 8 inches. This is extremely critical in the fall when grasses dry out and cure or in the spring after the snow is gone but before the plants green up.

Stack firewood and woodpiles uphill or on the same elevation as the structure but at least 30 feet away. Clear and keep away flammable vegetation within 10 feet of these woodpiles. Do not stack wood against your house or on or under your deck, even in winter. Many homes have burned from a woodpile that ignited as the fire passed. Wildfires can burn at almost any time in Colorado.

Locate propane tanks at least 30 feet from any structures, preferably on the same elevation as the house. You don't want the LP container below your house — if it ignites, the fire would tend to burn uphill. On the other hand, if the tank is above your house and it develops a leak, LP gas will flow downhill into your home. Clear and keep away flammable vegetation within 10 feet of these tanks. Do not screen propane tanks with shrubs or vegetation.

Dispose of slash (limbs, branches and other woody debris) from your trees and shrubs through chipping or by piling and burning. Contact your local CSFS office or county sheriff's office for information about burning slash piles. If neither of these alternatives is possible, lop and scatter slash by cutting it into very small pieces and distributing it over the ground. Avoid heavy accumulations

% slope	Tree Crown Spacing	Brush and Shrub Clump Spacing
0 -10 %	10´	2 1/2 x shrub height
11 - 20%	15´	3 x shrub height
21 - 40%	20´	4 x shrub height
> 40%	30´	6 x shrub height

Figure 4: Minimum tree crown and shrub clump spacing.

Tree Diameter (in inches)	Average Stem Spacing Between Trees (in feet)
3	10
4	11
5	12
6	13
7	14
8	15
9	16
10	17
11	19
12	21
13	23
14	24
15	26
16	28
17	29
18	31
19	33
20	35
21	36
22	38
23	40
24	42

Figure 5: Minimum tree spacing for Zone 3.

of slash. Lay it close to the ground to speed decomposition. If desired, no more than two or three small, widely spaced brush piles may be left for wildlife purposes. Locate these towards the outer portions of your defensible space.

Zone 3

This zone is of no specified size. It extends from the edge of your defensible space to your property lines. A gradual transition into this zone from defensible space standards to other management objectives you may have is suggested. Typical management objectives for areas surrounding homesites or subdivisions are: provide optimum recreational opportunities; enhance aesthetics; maintain tree health and vigor; provide barriers for wind, noise, dust and visual intrusions; support limited production of firewood, fence posts and other forest commodities; or grow Christmas trees or trees for transplanting.

Specific requirements will be dictated by your objectives for your land and the kinds of trees present. See Figure 5 for the *minimum* suggested spacing between “leave” trees. Forest management in Zone 3 is an opportunity for you to increase the health and growth rate of the forest in this zone. Keep in mind that root competition for available moisture limits tree growth and ultimately the health of the forest.

A high canopy forest reduces the chance of a surface fire climbing into the tops of the trees and might be a priority for you if this zone slopes steeply. The healthiest forest is one that has multiple ages, sizes, and species of trees where adequate growing room is maintained over time. Remember to consider the hazards of ladder fuels. Multiple sizes and ages of trees might increase the fire hazard from Zone 3 into Zone 2, particularly on steep slopes.

A greater number of wildlife trees can remain in Zone 3. Make sure that dead trees pose no threat to power lines or fire access roads.

While pruning generally is not necessary in Zone 3, it may be a good idea from the standpoint of personal safety to prune trees along trails and fire access roads. Or, if you prefer the aesthetics of a well-manicured forest, you might prune the entire area. In any case, pruning helps reduce ladder fuels within the tree stand, thus enhancing wildfire safety.

Mowing is not necessary in Zone 3.

Any approved method of slash treatment is acceptable for this zone, including piling and burning, chipping or lop-and-scatter.

Special Recommendations

Tree spacing guidelines do not apply to *mature* stands of aspen trees where the recommendations for ladder fuels have been complied with. In areas of aspen regeneration and young trees, the spacing guidelines should be followed.

Brush and shrubs

Brush and shrubs are woody plants, smaller than trees, often formed by a number of vertical or semi-upright branches arising close to the ground. Brush is smaller than shrubs and can be either woody or herbaceous vegetation.

On nearly level ground, minimum spacing recommendations between clumps of brush and/or shrubs is 2 1/2 times the height of the vegetation. Maximum diameter of clumps should be 2 times the height of the vegetation. As with tree crown spacing, all measurements are made from the edges of vegetation crowns (Figure 3).

For example: For shrubs 6 feet high, spacing between shrub clumps should be 15 feet or more apart (measured from the edges of the crowns of vegetation clumps). The diameter of shrub clumps should not exceed 12 feet (measured from the edges of the crowns). Branches should be pruned to a height of 3 feet.

Grasses

Keep dead, dry or curing grasses mowed to less than 6 inches. Defensible space size where grass is the predominant fuel can be reduced (Figure 5) when applying this practice.

Windthrow

In Colorado, certain locations and tree species, including lodgepole pine and Engelmann spruce, are especially susceptible to damage and uprooting by high winds (windthrow). If you see evidence of this problem in or near your forest, or have these tree species, consider the following adjustments to the defensible space guidelines. It is highly recommended that you contact a professional forester to help design your defensible space.

Adjustments: If your trees or homesite are susceptible to windthrow and the trees have never been thinned, use a stem spacing of diameter plus five instead of the guides listed in the Zone 3 section. Over time (every 3 to 5 years) *gradually* remove additional trees. The time between cutting cycles allows trees to "firm up" by expanding their root systems. Continue this periodic thinning until the desired spacing is reached.

Also consider leaving small clumps of trees and creating small openings on their lee side (opposite of the predominant wind direction). Again, a professional forester can help you design the best situation for your specific homesite and tree species. Remember, with species such as lodgepole pine and Engelmann spruce, the likelihood of a wildfire running through the tree tops or crowns (crowning) is closely related to the overabundance of fuels on the forest floor. Be sure to remove downed logs, branches and *excess* brush and needle buildup.

Maintaining Your Defensible Space

Your home is located in a forest that is dynamic, always changing. Trees and shrubs continue to grow, plants die or are damaged, new plants begin to grow, and plants drop their leaves and needles. Like other parts of your home, defensible space requires maintenance. Use the following checklist each year to determine if additional work or maintenance is necessary.

% slope	D-space size (uphill, downhill, sidehill)
0 - 20 %	30'
21 - 40%	50'
> 40%	70'

Figure 6: Minimum defensible space size for grass fuels.

Defensible Space and FireWise Annual Checklist

- □ Trees and shrubs are properly thinned and pruned within the defensible space. Slash from the thinning is disposed of.
- □ Roof and gutters are clear of debris.
- □ Branches overhanging the roof and chimney are removed.
- □ Chimney screens are in place and in good condition.
- □ Grass and weeds are mowed to a low height.
- □ An outdoor water supply is available, complete with a hose and nozzle that can reach all parts of the house.
- □ Fire extinguishers are checked and in working condition.
- □ The driveway is wide enough. The clearance of trees and branches is adequate for fire and emergency equipment. (Check with your local fire department.)
- □ Road signs and your name and house number are posted and easily visible.
- □ There is an easily accessible tool storage area with rakes, hoes, axes and shovels for use in case of fire.
- □ You have practiced family fire drills and your fire evacuation plan.
- □ Your escape routes, meeting points and other details are known and understood by all family members.
- □ Attic, roof, eaves and foundation vents are screened and in good condition.

Stilt foundations and decks are enclosed, screened or walled up.

□ Trash and debris accumulations are removed from the defensible space.

□ A checklist for fire safety needs inside the home also has been completed. This is available from your local fire department.

References

Colorado State Forest Service, Colorado State University, Fort Collins, CO 80523-5060; (970) 491-6303:

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

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

- 6.303, *Fire-Resistant Landscaping*
- 6.304, *Forest Home Fire Safety*
- 6.305, *FireWise Plant Materials*
- 6.306, *Grass Seed Mixes to Reduce Wildfire Hazard*
- 7.205, *Pruning Evergreens*
- 7.206, *Pruning Shrubs*
- 7.207, *Pruning Deciduous Trees*

FIREWISE Community Fire Prevention Partnership ©1999 CSFS

FIREWISE is a multi-agency program that encourages the development of defensible space and the prevention of catastrophic wildfire.

Colorado State FOREST SERVICE

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

[1]*Wildfire Hazard Mitigation Coordinator, Colorado State Forest Service.*

APPENDIX G
PRESCRIBED FIRE PILE BURNING GUIDLINES
GOLDEN DISTRICT

Colorado State FOREST SERVICE

PRESCRIBED FIRE-PILE BURNING GUIDELINES

This handout is designed to be used by forest landowners, land managers, and fire department personnel in planning and conducting safe and effective burning of piled forest debris ("slash") - called "pile burns". These guidelines cannot guarantee safety against accidents, unforeseen circumstances, changing burning conditions, or negligent actions of the individuals conducting the prescribed fire. By following the intent of these guidelines and using common sense, the landowner or forest manager can reduce slash accumulations, improve the appearance of their forest land, and reduce wildfire risk on their property. The reader should contact a local office of the Colorado State Forest Service (CSFS) or their local fire authority for updated versions of this publication and current requirements about the use of open fires.

DEFINITIONS:

Slash: The accumulation of vegetative materials such as tops, limbs, branches, brush, and miscellaneous residue resulting from forest management activities such as thinning, pruning, timber harvesting, and wildfire hazard mitigation.

Pile Burning: The treatment of slash by arranging limbs and tops into manageable piles. Piles are burned during safe burning conditions, generally during the winter following cutting.

Chunking-In: The process of moving unburned materials from the outside perimeter into the center of the still burning piles. This is done after the pile has initially burned down and is safe to approach, but before the hot coals in the center have cooled. Chunking-in allows greater consumption of the piled slash.

Mop-up: The final check of the fire to identify and extinguish any still-burning embers or materials. This is accomplished by mixing snow, water, or soil with the burning materials.

MATERIALS TO BE INCLUDED IN PILES:

All limbs, tops, brush, and miscellaneous materials recently cut in the area, no greater than 3 inches in diameter and from 1 to 8 feet in length. Older branches can be used; as long as they still have needles/foliage attached or have not started decaying. Materials greater than 3 inches in diameter do not significant help a fire spread rapidly, will generally burn longer and require more chunking-in or mopping-up than is cost-effective, produce greater amounts of smoke, and should be used for sawtimber, posts & poles, firewood, or left for wildlife habitat. **Do not place garbage or debris in the piles**.

LOCATION OF PILES:

Piles should be located in forest openings or between remaining trees, in unused logging roads and landings, meadows, and rock outcrops. Piles should be preferably at least 10 feet from the trunk of any overhead trees. In denser stands of trees, piles can be located closer to the trees and even under the overhanging branches, but these piles should be smaller in size and burned when snow or moisture is present in the tree crowns. Piles should NOT be located on active road surfaces, in ditches, near structures or poles, under or around power lines, or on top of logs or stumps that may catch fire and continue smoldering.

CONSTRUCTION OF PILES:

Piles should be constructed by hand whenever possible, but if constructed by machine they should clean of dirt and debris. Piles should be started with a core of kindling-like materials such as needles, small branches, or paper in the bottom of the pile. Pile slash soon after cutting (while still green) and before winter snowfall. Do not include wood products such as firewood and logs. Pile branches and tops with the butt ends towards the outside of the pile, and with the branches overlapping so as to form a series of dense layers piled upon each other. The piles should be compact, packed down during construction, and with no long branches that will not burn from sticking out into the surrounding snow. Piles should be up to 8 feet in diameter, and at least 4 to 6 feet high. These measures prevent snow and moisture from filtering down into the piles and extinguishing the fire before it gets going. If the fuels do not have sufficient needles or fine fuels to carry the fire or kept moisture out (such as oak brush or very old conifer branches), then you should cover the piles with 6 mil plastic to keep them dry until the day of the burn, and then remove it.

PLANNING YOUR BURNING EFFORT:

Individuals should check with the local CSFS office or fire authority for the current requirements on open fires. Generally, you must complete one or more of the following steps before burning slash:

1. Complete and have an approved open burning permit from the local (county) Health Department.
2. Obtain authorization from the legally constituted fire authority for your area. This may be part of the health department's permit process.
3. Land management agencies must complete and have approval of an open burning permit from the Colorado Department of Health - Air Pollution Control Division.

Copies of all permits should be available on-site during the burning operation. Burning activities should also include plans for safety, supplemental water sources, and extra assistance from the local fire authority or the landowner. The individual(s) planning the burning operation should notify the following entities on the day of a burn: the local fire authority; county sheriff's department; and adjacent landowners who may be affected by smoke. Notification should include the date, times, and exact location of the burn. Pile burning must be conducted under suitable weather conditions. Periods of snow or light rain, with steady, light winds (for smoke dispersal), and sufficiently snow cover (6-12 inch depths) are ideal. Do not burn during periods of high winds, low humidity or drying conditions, temperature inversions (especially "Red Air Quality" days in metropolitan areas), with a lack of snow cover or these conditions are expected to develop after starting the burn. Persons burning slash piles should have the following: leather gloves; shovels; suitable footwear; masks for covering the mouth and nose; and proper eye protection.

BURNING SLASH PILES:

Piles may be ignited by several means. If the needles and fine fuels within the pile have dried though the summer, ignition can be easily started with matches and a large ball of newspaper placed within the bottom of the pile. If fuels are still partially green, or the pile is wet from rain or melting snow, then a hotter and longer burning source may be necessary. Drip torches (a specially designed gas can used by foresters for igniting fires) or sawdust soaked with diesel fuel can be used to ignite the pile. Flares used for highway emergencies can also be utilized to ignite the piles. **Do not use gasoline for this purpose.**

One test pile should be ignited to see if it burns and at what rate, prior to igniting other piles. If suitable burning conditions exist, then additional piles may be started. Ignite only those piles that can be controlled by the available manpower and resources until they have burned down. You can slow the rate of burning (and possible scorching of adjacent trees) by shoveling snow or spraying water into the pile and cooling the fire down. Depending upon weather conditions, pile size, and moisture content of the fuels, piles should burn down in 30-60 minutes. As a general rule, one person can manage 3-6 closely situated piles.

After the piles have burned down, chunk-in any unburned slash and wood into the hot coals in the center of the pile. As much as 95% of the original slash can be consumed by aggressive chunking-in. Do not start any new piles on fire after 2:00 pm, as they may continue burning into the evening and will not burn as completely due to lower temperatures and higher relative humidity. Smoke inversions may be a problem for piles still burning after sunset. At all times, piles may need to be actively mopped-up if the weather conditions will not extinguish the fire, or if the fires could escape. If high winds or melting snow increases this risk, then all burning materials must be mopped-up.

ADDITIONAL ASSISTANCE:

If landowners have questions about burning slash, they should contact a local CSFS office (http://csfs.colostate.edu/). CSFS can assist landowners with planning or conducting prescribed fire activities such as pile burning or broadcast (area) burning.

Local, state, and fire department authorities may require a burn plan, smoke management plan, and weather monitoring for complex burning operations.

APPENDIX H

Jefferson County Structure Triage Form. The structure is tagged with the completed form so that emergency personnel know which structures have priority for defense in an advancing wildfire.

Jefferson County Structure Triage Form

Subdivision:

Address:

Unit ID:

Date: **Time:**

	Roof										
	1/4 Involved in Fire							**YES**		**NO**	
	If YES consider structure lost and move on										
	Safety			**Static**				**Attack**			
Column Totals	**FF Safety**	**Civilian Safety**	**Hazmat**	**Fuels**	**Topography**	**Clearance**	**Construction**	**Access**	**Water**	**Radio Coverage**	
	No Safety Zones	Mandatory Evacuation	Bulk LPG, Fuels, Chemicals	Heavy or Dead Trees / Brush	Steep Slopes or Box Canyons >40%	30 Feet or less	Combustible Shake Roofs / Exterior	Long Narrow Driveway, Steep, Heavy Fuel Load	No Water Sources	Overall Poor Radio or Cell Coverage	
	4		2	2	2	2	4	4	2	4	26
	Marginal Safety Zone	Evacuate If Time Permits	Hazards In Barns & Storage Sheds	Moderate brush	Medium Slopes 20-40%	30 To 70 Feet	Some Combustible Asphalt Roofs / Exteriors	Adequate width/Turn Arounds/Moderate grade	Ponds, Pools,Low Flow Hydrants	Radio Coverage OK, Some Weak Spots	
	2		1	1	1	1	2	2	1	2	13
	Adequate Safety Zone	Shelter In Place	None	Light Flashy	Flat 0-20%	More Than 70 Feet	Non Combustible Roof / Exteriors	Short Wide Driveway, Flat, Light Fuel Load	Good Hydrants	Good Radio and Cell Coverage	
	0		0	0	0	0	0	0	0	0	
	Comments:										

Score 14 - 26	**Last Priority**
Score 7 - 13	**Threatened**
Score 0 -6	**Not Threatened**