JANUARY 2025

GILPIN COUNTY

COMMUNITY WILDFIRE PROTECTION PLAN

Working together to build fire adapted communities, resilient to wildfire

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We would like to formally thank the Core Team and all stakeholders for contributing their time and expertise throughout the planning process. Your participation will contribute to creating resilient landscapes, implementing public education, reducing structural ignitability, and ensuring safe and effective wildfire response. We would also like to thank the Gilpin County Board of County Commissioners for authorizing the funds to prepare this plan and the dedication of resources.

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DISCLAIMER

The purpose of the risk assessment contained in this Plan is solely to provide a community- and landscape-level overview of general wildfire risks within the assessment area as of the date hereof, and to provide a potential resource for community pre-fire planning. This risk assessment is premised on various assumptions and models, which include and are based on data, software tools, and other information provided by third parties (collectively, "Third-Party Information and Tools"). SWCA, Incorporated, doing business as SWCA Environmental Consultants ("SWCA"), relied upon various Third-Party Information and Tools in the preparation of this risk assessment, and SWCA shall have no liability to any party in connection with this risk assessment including, without limitation, as a result of incomplete or inaccurate Third-Party Information and Tools used in the preparation hereof. SWCA hereby expressly disclaims any responsibility for the accuracy or reliability of the Third-Party Information and Tools relied upon by SWCA in preparing this risk assessment. SWCA shall have no liability for any damage, loss (including loss of life), injury, property damage, or other damages whatsoever arising from or in connection with this risk assessment. Any reproduction or dissemination of this risk assessment or any portion hereof shall include the entirety of this plan disclaimer.

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EXECUTIVE SUMMARY

WHAT IS THE GOAL OF A COMMUNITY WILDFIRE PROTECTION PLAN?

The purpose of the 2024 Gilpin County Community Wildfire Protection Plan (CWPP) update is to:

1. Provide a countywide scale of wildfire hazard and identify mitigation measures that reduce risk to community and watershed values,
2. Bring together land managers and wildfire management and suppression entities in the planning area to address the identified needs, and
3. Provide a framework for future planning and implementation of necessary mitigation measures.

This plan can be described as a traditional community wildfire protection plan (CWPP) but includes analysis of wildfire risk to watersheds and opportunities to improve watershed resilience and recovery. Thus, the goal of this CWPP is to enable local communities to improve their wildfire-mitigation capacity, while working with government agencies to identify high fire risk areas and prioritize areas for mitigation, fire suppression, and emergency preparedness in such a way that protects communities and watersheds from the harmful effects of wildfire. Another goal of the CWPP is to enhance public awareness by helping residents better understand the natural- and human-caused risks of wildland fires that threaten lives, safety, local economies, and watersheds.

This document combines an assessment of wildfire risk to communities in the county, with an analysis of watershed vulnerability in source watersheds. Because watersheds in the county extend outside of county boundaries and are often headwaters and source watersheds for other counties, Gilpin County, in an effort to be a good neighbor, has extended the watershed planning area to include areas outside of the county itself. As such, the analysis includes portions of watersheds that extend into Jefferson, Boulder, and Clear Creek Counties, and recommendations to alleviate post-fire impacts to watersheds and water infrastructure may require a joint effort and strategy with neighboring counties. Therefore, the primary focus of this plan is lands within the Gilpin County boundary; however, analysis is included for watershed parameters in adjacent counties to inform future landscape-level, cross-boundary treatments.

This 2024 plan was compiled from reports, documents, data, and Core Team and public input. The plan was developed in response to the federal Healthy Forests Restoration Act of 2003 (HFRA) and meets the requirements of the HFRA and Colorado Senate Bill 09-001, Colorado State Forest Service Minimum Standards, by addressing the following:

1. Having been developed collaboratively by multiple agencies at the state and local levels in consultation with federal agencies and other interested parties.
2. Prioritizing and identifying fuel reduction treatments and recommending the types and methods of treatments to protect at-risk communities and pertinent infrastructure.
3. Suggesting multi-party mitigation, monitoring, and outreach.
4. Recommending measures and action items that residents and communities can take to reduce the ignitability of structures.
5. Soliciting input from the public on the draft CWPP.

WHAT ARE THE KEY ISSUES ADDRESSED?

Issues addressed in this CWPP include:

- Raising awareness of the high wildfire hazard and risk facing the county and watersheds located in Gilpin County and adjacent counties.
- Fuel treatment recommendations for land management agencies and homeowners to mitigate hazard and risk.
- Prioritizing hazardous fuels reduction in the wildland-urban interface (WUI) and vulnerable watersheds.
- Raising awareness about the natural role that fire plays in the ecosystem and maintaining resilient landscapes.
- Public education and outreach to homeowners to enable individuals to reduce the risk of fire to their properties and build resilience within their communities.
- Constant and consistent messaging for residents and visitors concerning wildfire risks and mitigation strategies.
- Increasing public access to information through the use of online materials, including the story map created for this CWPP.
- Continuing to address wildfire issues at the landscape level, across multiple jurisdictions.
- Managing fire to protect values and accomplish resource management goals, including protection and enhancement of watersheds, water supply and quality, and forest health.
- Climate change related changes and other forest health concerns that influence the wildland fire environment.
- Wildfire response capacity and opportunities to improve fire response time and resources.
- Individual community risk assessment and risk reduction opportunities.

HOW WAS THE GILPIN COUNTY CWPP UPDATE DEVELOPED?

A group of multijurisdictional agencies (federal, state, and local), organizations, and residents joined together as a Core Team in February 2024 to update and develop this countywide CWPP. The last CWPP update was completed in 2009. Key agencies and groups involved in the plan development process included the U.S. Forest Service, Timberline Fire Protection District, Central City Fire Department, Black Hawk Fire Department, Colorado Parks and Wildlife, Clear Creek Watershed and Forest Health Partnership, Boulder Creek Watershed Collective, and other land management and Gilpin County representatives with knowledge of the community, landscape, and fire environment. Wildfire does not respect borders and boundaries; as such, the Gilpin County CWPP emphasizes the importance of collaboration among multijurisdictional agencies and the public in developing fuels mitigation treatment programs to address wildfire hazards. This plan is designed to be a live document that will evolve and engage additional stakeholders to increase its application over time. This is especially important with

regard to the planning and implementation of watershed and water infrastructure protection measures that may require a multi-county planning approach.

ACCOMPLISHMENTS SINCE THE 2009 CWPP

Gilpin County, county fire departments and protections districts, and land management agencies in the county have made significant efforts since the last CWPP update to reduce wildfire risk in the county, provide avenues for residents to mitigate risk on their property, and improve fire response resources. Since the 2009 CWPP, over 13,000 acres in the county have been treated to reduce fuel loads and the risk of high-severity fires. These efforts have included mechanical removal, hand thinning, prescribed burning, and pile burning completed by Gilpin County, U.S. Forest Service, Colorado State Forest Service (CSFS), Timberline Fire Protection District (FPD), Black Hawk and Central City Fire Departments, and cooperative efforts between these groups and agencies. In 2021, Gilpin County received grant funding to organize chipping events for residents to drop off slash and other woody materials. The county continues to operate a slash drop site that is open seasonally to accommodate slash, small logs, and other small woody materials. The City of Black Hawk has worked to reduce fire hazard around the city by treating over 50 acres since 2020. Timberline FPD began conducting neighborhood roadside thinning and slash removal in planned neighborhoods starting in 2022, treating over 6 miles of roadside vegetation in 2024, and will continue treating roadways and collecting slash from neighborhoods. Additionally, Timberline FPD is available to complete property level defensible space assessments to help residents identify actionable mitigation options on their property. Roadside thinning has also taken place in previously identified high-priority travel routes such as Creekside Trail, Eagles Nest Lane, and Gamble Gulch.

WHERE IS THE PLANNING AREA?

The planning area includes Gilpin County and the extended watersheds with headwaters in the county (Figure ES.1). Watershed boundaries were determined based on the U.S Geological Survey's Hydrologic Unit Code (HUC) system, which hierarchically delineates watersheds from the regional scale (HUC-2) down to the sub-watershed scale (HUC-12). For the purposes of this plan, HUC-12, sub-watersheds were used to identify the watershed planning area. However, as a Gilpin County–led plan, the main focus is on land within the county boundary; analysis of watersheds in adjacent counties is provided to initiate future collaboration with adjacent counties that receive water originating in Gilpin County streams.

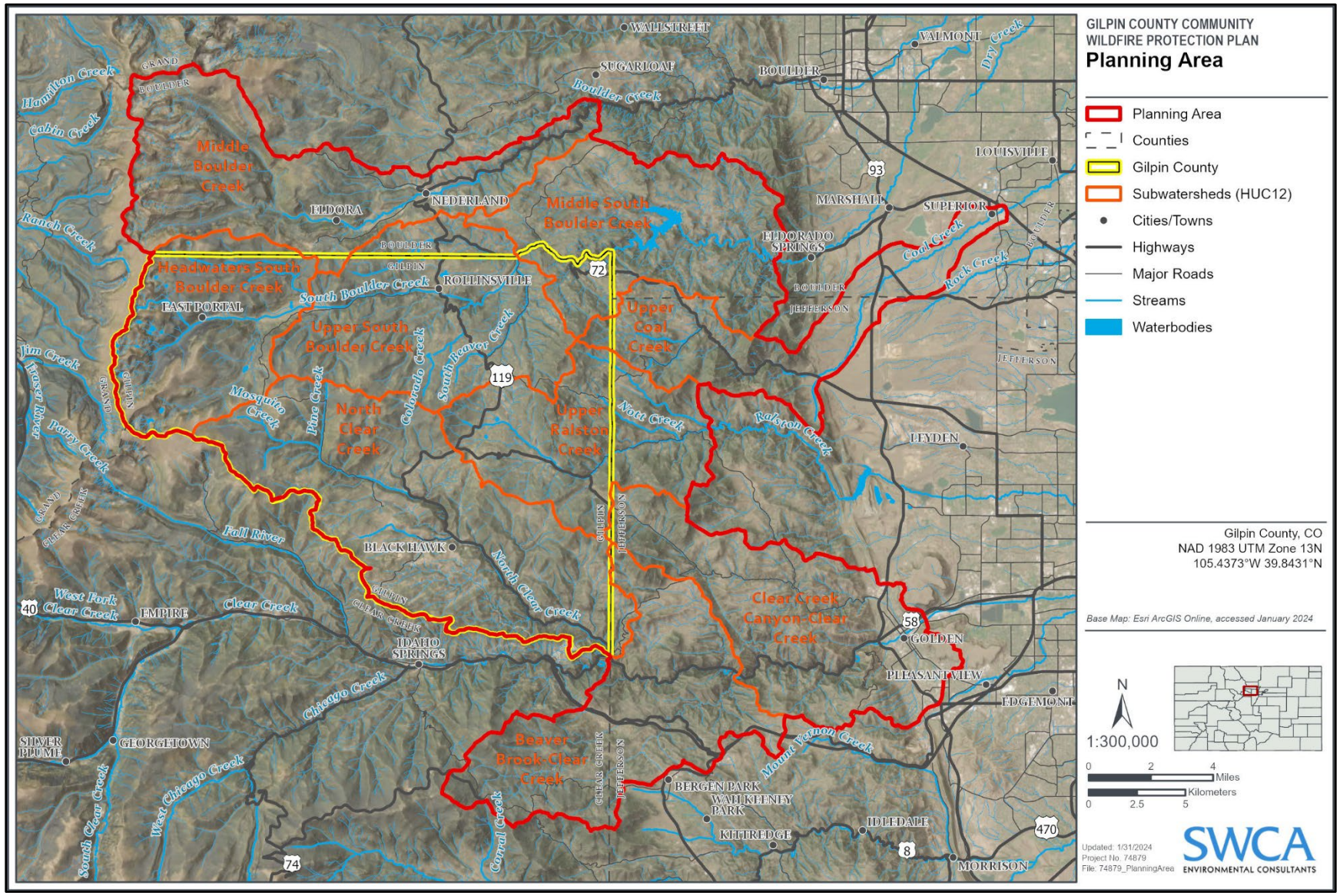

Figure ES.1. Gilpin County CWPP planning area. Shown is the county boundaries and the determined watershed planning area

HOW WAS PUBLIC ENGAGEMENT ACCOMPLISHED?

The Core Team engaged in public outreach using a multimedia approach, including the story map and hub site created for the project, social media posts, press releases, community surveys, public plan review period, and community open house events. Upon completion of the CWPP, additional outreach should be completed by all parties to encourage continued involvement in the plan and public ownership in implementing mitigation measures, especially on private lands.

WHAT IS THE PURPOSE OF THE QUANTITATIVE RISK-HAZARD ASSESSMENT?

The Colorado All Lands (COAL) Quantitative Wildfire Risk Assessment serves as a tool to model, visualize, and assess the risk of wildland fires within the planning area. The Quantitative Risk Assessment is the result of a collaborative effort that used a spatial computer model of wildfire hazard based on calibrated fuel models, severe weather conditions, and topography to map burn probability and other factors (for more information, see Chapter 3). These modeling outputs are utilized alongside data pertaining to highly valued resources and assets (HVRAs) and the WUI, which are established by wildfire professionals across Colorado in conjunction with the Core Team, to create comprehensive wildfire risk products to inform all stakeholders as well as this CWPP's risk reduction recommendations (see Chapter 5).

The COAL quantitative assessment was used to assess wildfire hazard within the WUI and county to determine the most high-risk locations and opportunities to improve community resilience. Based on the results of the assessment, along with input from the Core Team, areas of concern (AOC) were identified where fuel treatment actions would have the highest impact on reducing severe fire risk and improving the likelihood of suppression prior to a fire reaching homes and structures. Twenty AOCs were identified across the county, and treatment recommendations were developed for each. Mapping of the AOCs is shown below in Figure ES.2, and associated project recommendations can be found in Chapter 5.

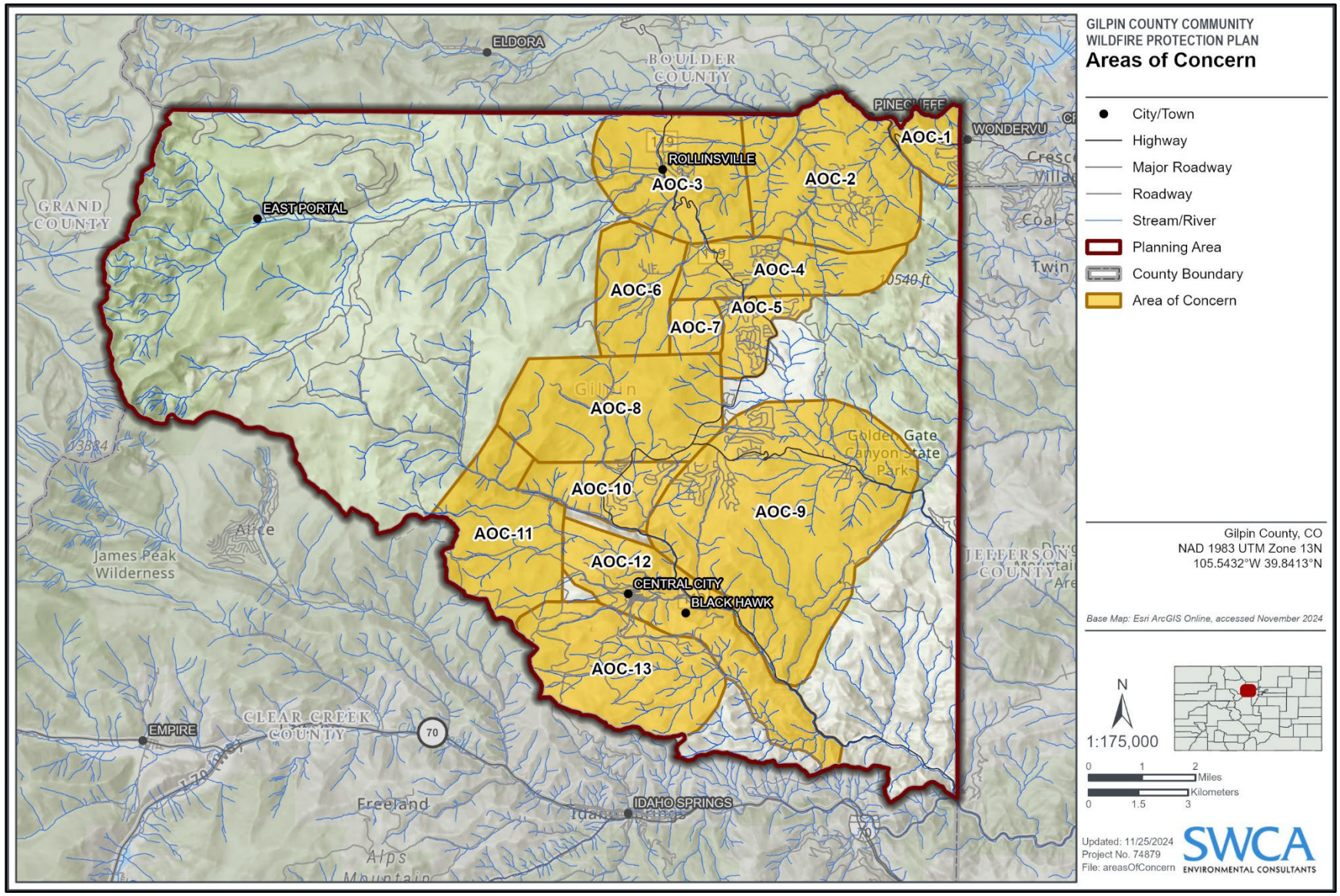

Figure ES.2. Gilpin County areas of concern.

WHAT IS THE PURPOSE OF THE WATERSHED RISK-HAZARD ASSESSMENT?

The Watershed Risk-Hazard Assessment consists of analyzing watershed-related hazards and risks to infrastructure and communities in a post-wildfire landscape. Specifically, hazards and risks posed by post-fire debris flows, sediment yield, and flooding were analyzed in detail. Debris flows are swift landslides that pose severe threats to life and property due to their rapid motion, capacity to damage human structures, and unexpected occurrences. Sediment yields are sediments deposited from watersheds in specified time periods. Sediment yields are typically higher following high-severity wildfires and can damage human infrastructure such as municipal source water intakes, built flowlines, reservoirs, and decreed water rights (especially water diversions). Flooding is defined as a complete or partial inundation of normally dry land and is more likely to occur within defined floodplains. Flooding commonly threatens human structures, roads, and hazardous material sites located in floodplains.

This Watershed Risk-Hazard Assessment primarily considers post-wildfire risk to infrastructure and human life and property. Post-wildfire watershed risk to infrastructure includes the following:

- Reservoirs
- Built flowlines
- Decreed water
- Source water
- Natural aquatic resources (sportfish management waters, aquatic cutthroat trout designated crucial habitat, aquatic species of greatest conservation need)
- Watershed health and preservation of water quality

Post-wildfire watershed risk to life and property includes the following:

- Structures
- Hazardous materials (brownfield sites, composting facilities, municipal landfills, voluntary cleanup sites, institutional control sites, Superfund sites, and abandoned mine lands)
- Waterbody crossings (bridges and culverts)
- Roads and railways

The Composite Watershed Risk-Hazard Assessment analyzes how three post-wildfire hazards—debris flows, sediment yields, and flooding—when combined, put human infrastructure and life and property at risk within a HUC-12 watershed. A low score implies little overall risk to a watershed, and an extreme score implies substantial risk to a watershed. Due to the size of HUC-12 watersheds relative to the county, it was determined that analyzing risk at this scale was insufficient to accurately provide mitigation and resilience recommendations. As such, custom watershed delineations were used that further divided HUC-12s into catchments, allowing the watershed analysis to be completed at a smaller scale (Figure ES.3).

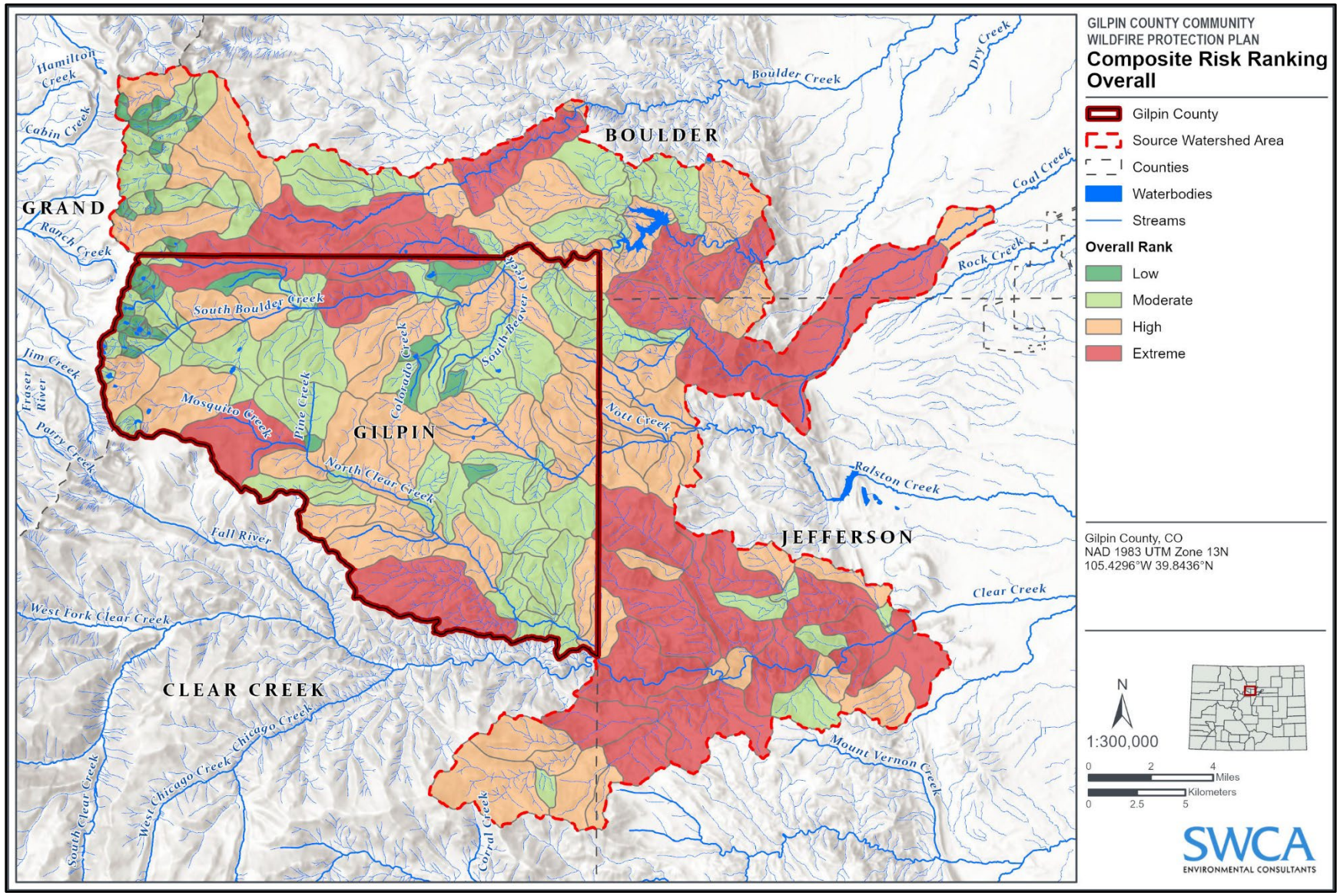

Figure ES.3. Overall composite risk ranking.

HOW DOES THE PLAN ALIGN WITH OTHERS IN THE REGION?

Wherever possible, CWPP Core Teams work collaboratively to align planning efforts with others in surrounding regions. In a region such as the Colorado Front Range, there may be many overlapping CWPPs encompassing a variety of geographic scales. CWPPs serve different operational purposes based on their planning scales. The purpose of the Gilpin County CWPP is to reduce wildfire risk across the landscape by coordinating with local and fire protection district plans to enhance resources, support, and implement measures to address risk. It aims to foster valuable relationships and coordination among federal, state, county, and local fire and emergency management offices. Differing planning scales will cause maps and data throughout this plan to vary from those in other CWPPs covering the same region. The Gilpin County CWPP utilizes the COAL Quantitative Risk Assessment, which differs from the CSFS Colorado Wildfire Risk Assessment. Both assessments are used throughout Colorado, and community members should reach out to local experts with questions and, if presented with conflicting information, err on the side of caution with the goal of preparedness in all possible outcomes. The Gilpin County CWPP serves as a broad overview of risk at the landscape scale, whereas local level (e.g., city, town, fire protection district) plans pinpoint specific areas where risks and hazards will be assessed in more detail. Individual city plans have been developed for both the City of Black Hawk and Central City. It is important to note that the countywide risk assessment outputs for this plan may differ from plans at a more specified planning scale, especially under differing modeling approaches and methodologies. Where appropriate, recommendations for treatment were aligned with recommendations identified in adjacent county plans such as Clear Creek, Boulder, and Grand Counties. The intention of this is to create a mosaic of landscape treatments that can connect or foster a safer wildfire environment across the landscape.

HOW WILL THE PLAN BE IMPLEMENTED AND WHO WILL LEAD IMPLEMENTATION?

Implementation of projects identified in this CWPP will benefit from the collaboration and cooperation of multiple individuals and entities such as community residents, private organizations, Gilpin County, local townships, and state and federal agencies. The CWPP **does not require** implementation of any of the recommendations; however, the most effective fire mitigation is achieved through the joint actions of individual homeowners and land and resource agencies. However, to ensure that projects move forward, the plan will be managed by Gilpin County as a collaborative effort through the Gilpin County Fireshed and their partners. The plan will be kept relevant through the incorporation and consideration of new conditions, projects, and local CWPPs. See Chapter 5 for proposed agencies to lead implementation of recommended projects.

WHEN DOES THE CWPP NEED TO BE UPDATED?

The CWPP should be treated as a living document to be updated annually or immediately following a significant fire event. The plan should continue to be revised to reflect changes, modification, or new information. These elements are essential to the success of mitigating wildfire risk throughout the county and will be critical in maintaining the ideas and priorities of the plan and the communities in the future. In particular, the project recommendation list should consistently be revisited and revised based on

changing priorities and conditions in the county, availability of funding, and completed projects. Chapter 7 of the plan discussed plan maintenance and project tracking in further detail.

WHO PARTICIPATED IN DEVELOPING THE PLAN?

Land managers, government representatives, and local representatives from Black Hawk and Central City participated in this CWPP planning process. Organizations, municipalities, and agencies such as Gilpin County, CSFS, local fire protection districts and departments, U.S. Forest Service (USFS), local townships, and the Gilpin County Office of Emergency Management (OEM) served as the Core Team for this CWPP and drove the decision-making processes. Please refer to Table ES.1 for the Project Core Team list, which outlines the individuals involved in the development of the plan.

Members of the public also participated by providing input and feedback through public meetings, surveys, and public review of the draft plan. The results were used to shape and develop the draft and final versions of the CWPP update.

CORE TEAM

Table ES.1. List of Core Team Members for the Gilpin County CWPP

Name	Organization
Ben Pfohl	CSFS
Kelsey Lesniak	CSFS
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Chad Buser	ARNF Boulder Ranger District (USFS)
Ed Le Blanc	ARNF Boulder Ranger District (USFS)
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Scott Ritter	Colorado Forest Restoration Institute
Erin Fried	Boulder Watershed Collective (BWC)
Kevin Armstrong	Gilpin County Sheriff
Greg Demo	Gilpin County Sheriff's Office
Jennifer Cook	Colorado State University Gilpin Extension
Jamie Boyle	Gilpin County
Kerry Major	Clear Creek Watershed & Forest Health Partnership
Chris Woolley	Black Hawk fire Department Fire Chief
Stephen Cole	City of Black Hawk
Todd Farrow	Colorado Parks and Wildlife (Golden Gate Canyon State Park)
Christina Burri	CSFS
Paul Ondr	Timberline FPD Fire Chief
Andrew Steffe	Timberline FPD

Name	Organization
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Garrett Stephens	Jefferson Conservation District
Robert Kriegbaum	Colorado Division of fire Prevention and Control
Patsy McEntee	U.S. Forest Service District Range
Jack Beard	Central City Fire Department
Daniel Miera	Central City
Lisa Roemhildt	Central City
Melanie Bleyler	Gilpin County
Madelene McDonald	Denver Water
Collin Wassink	CSFS
Ray Rears	Gilpin County
Zoe DeVito	Xcel Energy
Ben Pfohl	CSFS
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Kelsy Lesniak	CSFS

LIST OF PREPARERS

Table ES.2. List of Preparers for the Gilpin County CWPP

Name	Organization
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CHAPTER 1 – INTRODUCTION

The United States is facing urgent forest and watershed health concerns. The number of annual wildfires throughout the United States has been increasing in recent years (58,100 in 2018 and 50,000 in 2019 vs. 59,000 in 2021 and 69,000 in 2022). Similarly, the number of acres burned has been on the rise (Congressional Research Service [CRS] 2023). An average of 7 million acres is burned every year due to wildfire, more than doubling the annual average of acres burned in the 1990s (CRS 2023).

Communities are experiencing the most destructive wildfire seasons in history. The 2015 fire season had the most acreage impacted in a single year since 1960 at 10.13 million acres (CRS 2023). Following closely, 2020 was the second most extensive year for wildfire with 10.12 million acres burned (CRS 2023). The U.S. Forest Service (USFS) and U.S. Department of the Interior (DOI) spent almost twice as much on fire suppression resources in 2021 than in 2020 (approximately $2.3 billion spent in 2020 and approximately $4.4 billion spent in 2021) (National Interagency Fire Center [NIFC] 2022). These statistics demonstrate that wildfires are becoming more severe, increasingly destructive, and harder to control.

Colorado's Forest Action Plan of 2020 states that forests and grasslands in Colorado, like other western states, face urgent issues concerning longer fire seasons and more uncharacteristic wildfires that threaten the sustainability and ecological function of these ecosystems, and expose communities and infrastructure to greater wildfire risk and increased post-fire hazards. Figure 1.1 illustrates how wildfires around the state are burning larger, with the largest wildfires in 2020 burning more combined acreage than the largest fires combined from 2002 to 2016. These issues require an analysis of the current gap between existing and necessary wildland fire management strategies. A top priority in Colorado is coupling current and future wildland fire management strategies with wildland fire and fuel priority areas to guide federal, state, and private program funds toward projects that restore natural forest conditions, help communities live with wildfire, protect watersheds, conserve wildlife, and enhance the public benefits from trees and forests (Colorado State Forest Service [CSFS] 2020).

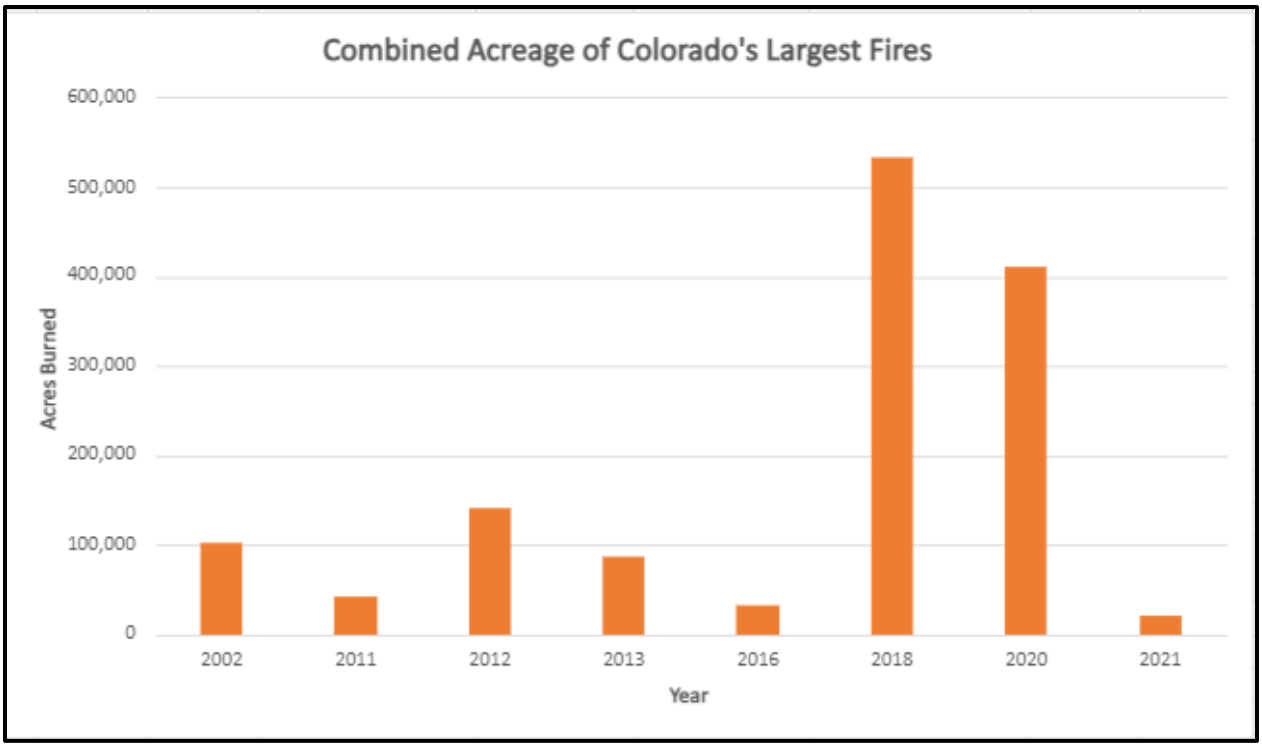


Figure 1.1. Chart of the combined acreage burned by Colorado's largest* wildfires from 2002 to 2021.

Source: Colorado Division of Fire Prevention and Control (DFPC) (n.d.)

*Criteria for a "large" wildfire in the western United States is >1,000 acres burned.

Comprehensive wildland fire and forest management strategies are necessary for adapting to a changing climate and its effects on natural fire regimes. Frequent drought, tree mortality, climate change, and an increase in population and housing density have all worked together to increase wildfire likelihood and community vulnerability to wildfire (CSFS 2020). These factors have interacted to increase the risk of uncharacteristically large and high-severity fires (CSFS 2020). In the past few years, fires have grown to record sizes in Colorado and are burning longer, hotter, and more intensely than they have in the past (CSFS 2021a).

As wildfire severity and extent increases, communities need a plan to help prepare for, reduce the risk of, and adapt to wildland fire events. While wildfire is a natural and necessary phenomenon in this region, it is the unprecedented scale and intensity of recent fires that pose an especially concerning threat. This heightened severity not only strains emergency response resources but also elevates the potential for substantial property damage, and most critically, for injury and/or loss of life (Western Fire Chiefs Association [WFCA] 2024). Community wildfire protection plans (CWPPs) help accomplish these goals. A CWPP provides recommendations that are intended to help reduce, **but not eliminate**, the extreme severity or risk of wildland fire.

See Chapter 2*, Fire Environment*, and the *Environmental Challenges* section in Appendix A to learn more about the effects of climate change and urban development on wildfire.

The planning process involves looking at past fires and treatment accomplishments using the knowledge and expertise of the professional fire managers who work for the various Gilpin County and surrounding agencies and governing entities. From there, the CWPP ultimately identifies the current local wildfire risks

and needs that occur in the county, which is further supported with relevant science and literature from the western region of the United States.

In addition, this 2024 update to the 2012 Gilpin County CWPP reviews and verifies prior recommendations and completed projects, while also identifying potential additional priority areas, outreach strategies, and mitigation measures to protect from wildfire the irreplaceable life, property, and critical infrastructure in the planning area. However, this CWPP does not attempt to mandate the type and priority of treatment projects that will be carried out by the land management agencies and private landowners. The responsibility for implementing wildfire mitigation treatments lies at the discretion of the landowner, resource owner, and land managers; the 2024 Gilpin County CWPP Update will only identify potential treatments and strategies and provide a suggested priority for these projects.

GOAL OF A COMMUNITY WILDFIRE PROTECTION PLAN

The goal of a CWPP is to enable local communities to improve their wildfire-mitigation capacity, while working with government agencies to identify high fire risk areas and prioritize areas for mitigation, forest resilience improvements, and disaster preparedness. Another goal of the CWPP is to enhance public awareness by helping residents better understand the natural and human-caused risk of wildland fires that threaten lives, safety, and the local economy. The minimum requirements for a CWPP, as stated in the Healthy Forests Restoration Act of 2003 (HFRA), are the following:

Collaboration: Town, county, and state government representatives, in consultation with federal agencies or other interested groups, must collaboratively develop a CWPP (SAF 2004).

Prioritized Fuel Reduction: A CWPP must identify and prioritize areas for hazardous fuels reduction and treatments and recommend the types and methods of treatment that will protect one or more communities at risk (CARs) and their essential infrastructures (SAF 2004).

Treatments of Structural Ignitability: A CWPP must recommend measures that local governments, homeowners, and communities can take to reduce the ignitability of structures throughout the area addressed by the plan (SAF 2004).

It is the intent of this 2024 CWPP update to provide a countywide scale of wildfire risk and protection needs and bring together all wildfire management entities and jurisdictions in the Gilpin County area to address the identified needs, and to support these entities in planning and implementing the necessary mitigation measures for the county. Additional information on the planning and policy process is available in Appendix A.

ALIGNMENT WITH THE NATIONAL COHESIVE STRATEGY

This 2024 CWPP is aligned with the Cohesive Strategy and its Phase III Western Regional Action Plan by adhering to the nationwide goal “to safely and effectively extinguish fire, when needed; use fire where allowable; manage our natural resources; and collectively, live with wildland fire” (Forests and Rangelands 2023).

The primary, national goals identified as necessary to achieving the vision are:

- **Resilient Landscapes –** Landscapes, regardless of jurisdictional boundaries are resilient to fire, insect, disease, invasive species and climate change disturbances, in accordance with management objectives.
- **Fire Adapted Communities –** Human populations and infrastructure are as prepared as possible to receive, respond to, and recover from wildland fire.
- **Safe, Effective, Risk-based Wildfire Response –** All jurisdictions participate in making and implementing safe, effective, efficient risk-based wildfire management decisions.

For more information on the Cohesive Strategy, please visit: [National Cohesive Wildland Fire Management Strategy]

Alignment with these Cohesive Strategy goals is described in more detail in **Chapter 5**, *Wildfire Mitigation Strategies*, and **Chapter 6**, *Watershed Mitigation Strategies*.

In addition to aligning with the Cohesive Strategy, the CWPP also incorporates information on post-fire recovery, the significant hazards of a post-fire environment (especially as it relates to watershed impacts and hazards), and the risk that post-fire effects pose to communities (Figure 1.2).

Figure 1.2. The CWPP incorporates the three primary goals of the Cohesive Strategy with post-fire recovery to serve as a holistic plan for fire prevention and resilience.

ALIGNMENT WITH PLANS AND AGREEMENTS

This CWPP is aligned with multiple local, state, and federal planning documents (Table 1.1). These documents or agreements are summarized in Appendix A. In addition, fire policy and legislative direction are also summarized in Appendix A.

Table 1.1. Relevant Plans for Alignment with the Gilpin County CWPP

Plan/Agreement Title	Alignment with 2025 Gilpin County CWPP
2024 City of Black Hawk CWPP	• Prioritizes hazardous fuel reduction projects on evacuation routes and high-risk areas using data-driven assessments. • Promotes community engagement through public surveys, forums, and action plans for creating a Fire Adapted Community. • Focuses on critical infrastructure protection, including casinos, water resources, and public buildings.
2023 Gilpin County Hazard Mitigation Plan (HMP	• Focuses on assessing and mitigating wildfire risks to residents, property, and infrastructure. • Aligns with federal, state, and local agencies to prioritize community and landscape-level wildfire mitigation efforts.
2022 Gilpin County Annual Operating Plan	• Establishes procedures for wildfire protection across jurisdictions, emphasizing cooperative fire suppression. • Highlights the use of unified command during multijurisdictional fires, ensuring coordinated wildfire response and resource sharing.
2022 Gilpin County Mutual Aid Agreement	• Facilitates interagency cooperation for wildfire suppression and resource allocation. • Ensures seamless coordination between local, state, and federal agencies during wildfire incidents.
2020 Gilpin County Comprehensive Plan	• Guides sustainable development in high-risk wildfire areas through land use policies. • Promotes concentrated development in designated village nodes to protect sensitive natural areas and reduce the spread of wildfires. • Supports interagency coordination to address wildfire risks within development areas.
2020 City of Black Hawk Comprehensive Plan	• Prioritizes wildfire risk mitigation through land use planning and development controls. • Identifies critical areas for wildfire risk and proposes zoning and building codes to mitigate risks in the wildland-urban interface (WUI).
2020 Central City Comprehensive Plan	• Integrates wildfire mitigation into land use planning by designating areas of concern for wildfire risk. • Recommends growth management strategies to protect vulnerable infrastructure from wildfire hazards.
2017 Central City Disaster Resiliency & Recovery Master Plan	• Addresses wildfire as a key hazard and includes resilience strategies to improve community preparedness and response. • Collaborates with adjacent communities and state agencies to implement cross-boundary mitigation measures.

Plan/Agreement Title	Alignment with 2025 Gilpin County CWPP
2014 Upper Clear Creek Watershed Plan Update	• Focuses on assessing post-wildfire hazards, such as flooding, debris flows, and soil erosion, particularly in priority sub-basins. • Provides guidance on mitigating wildfire impacts on water quality, drinking water supplies, and aquatic habitats.
2009 Gilpin County CWPP	• Identifies and prioritizes wildfire hazards and mitigation projects across the county, focusing on high-risk areas. • Provides community-specific fuel reduction recommendations and strategies to reduce wildfire risks in WUI.
Northern Colorado Fireshed Collaborative (NCFC) nocofireshed.org	• Collaborative efforts to work strategically across land ownerships to increase the pace and scale of forest restoration. • Integrating using prescribed burning into forest and watershed management. • Increase understanding of wildland fire risk management activities at landscape scale.
Colorado Strategic Wildfire Action Program	• Reducing wildfire risk through collaborative efforts • Opening opportunities for grant funding • Advocating for development of strategic mitigation projects

CORE TEAM

Gilpin County Emergency Management invited engagement in the planning process from a range of subject matter experts, land managers, and key response personnel throughout the development of the plan update. The Core Team was developed at the onset of the planning process to inform key project components including wildland-urban interface (WUI) delineation, project recommendations, and wildfire and watershed risk assessments. The Core Team was composed of representatives from Gilpin County, Central City, Black Hawk, the USFS, CSFS, Colorado Parks and Wildlife, Timberline Fire Protection District (FPD), Central City and Black Hawk fire departments, Gilpin CSU Extension, Denver Water, and other key stakeholders in the county. Additional information on the Core Team and their input on the plan is available in Appendix H.

PUBLIC ENGAGEMENT

Gilpin County completed extensive public outreach throughout the development of this CWPP. Beginning in summer of 2024, the Core Team began various initiatives, including updates on the County website, press releases, flyers, and two open house community engagement events. The County also used an interactive Gilpin County CWPP hub site (Gilpin County CWPP Hub Site) to engage the public throughout the project, providing information on the purpose, project history, scheduled events, community survey, and key resources. The story map includes tabs on fire environment, risk assessment, mitigation strategies, and monitoring and evaluation strategies.

From May 2024 to October 2024, Gilpin County residents provided valuable feedback through a public survey, with 160 responses collected which resulted in adaptations and additions to the CWPP content. Additionally, written public feedback was solicited during open house events, which were held on June 8 at the Gilpin County Community Center and August 8 at the Gilpin County historic courthouse. The responses received from the survey and the open house events were used to inform community concerns

and priorities. See the CWPP Project Outreach section in Appendix H to learn more about how the public contributed to the development of the CWPP.

PLANNING AREA

The following sections provide context for the remainder of the plan by describing the baseline conditions throughout the county.

For the purposes of this CWPP, there are two distinct planning areas: the countywide planning area and the watershed-scale planning area detailed below.

The countywide planning area includes the spatial extent of Gilpin County as delineated by its geographic and political boundaries (Figure 1.3) The countywide planning area encompasses approximately 150 square miles, making it one of the smallest counties by area in Colorado (Colorado Encyclopedia 2017). It is bordered to the north by Boulder County, to the east and south by Jefferson County, to the south by Clear Creek County, and to the west by Grand County. This planning area was used to analyze and describe the wildland fire environment of Gilpin County and its associated risks to the communities within the county. See more detailed descriptions and imagery of the planning area in Appendix A, Community Background and Resources.

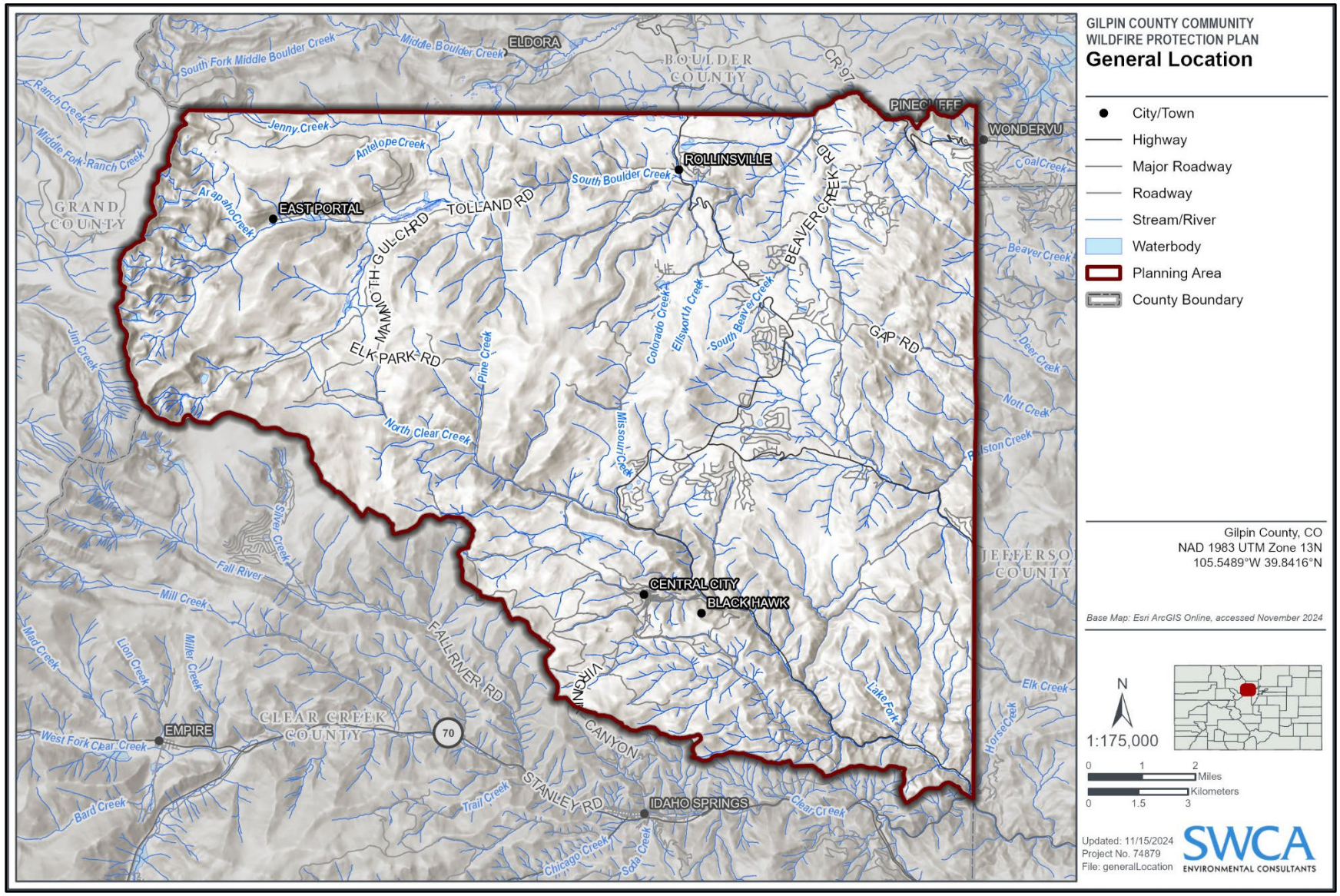


Figure 1.3. CWPP planning area.

WATERSHED PLANNING AREA

The watershed planning area was determined based on USGS delineated hydrologic unit code (HUC) 12 sub-watersheds that are fully or partially present in the county (Figure 1.4). There are nine unique HUC 12 watersheds in the county that influence water resources and processes. These sub-watersheds combine to form four primary watersheds: Clear Creek, South Boulder Creek, Ralston Creek, and Coal Creek. Aside from North Clear Creek, all defined sub-watersheds have boundaries that extend outside of the county and influence hydrologic and geomorphic conditions beyond county boundaries. Due to the county's elevation and topography, the headwaters of three key watersheds, South Boulder Creek, Coal Creek, and Ralston Creek, originate in the county. Additionally, major tributaries and a critical reach of Clear Creek travel through the county before entering Clear Creek County. As such, the defined planning area extends beyond county boundaries to accurately assess potential post-fire watershed conditions and hazard susceptibility not only for Gilpin County but also for downstream communities. A brief overview of the watershed environment for Gilpin County's four major watersheds is provided in Chapter 2.

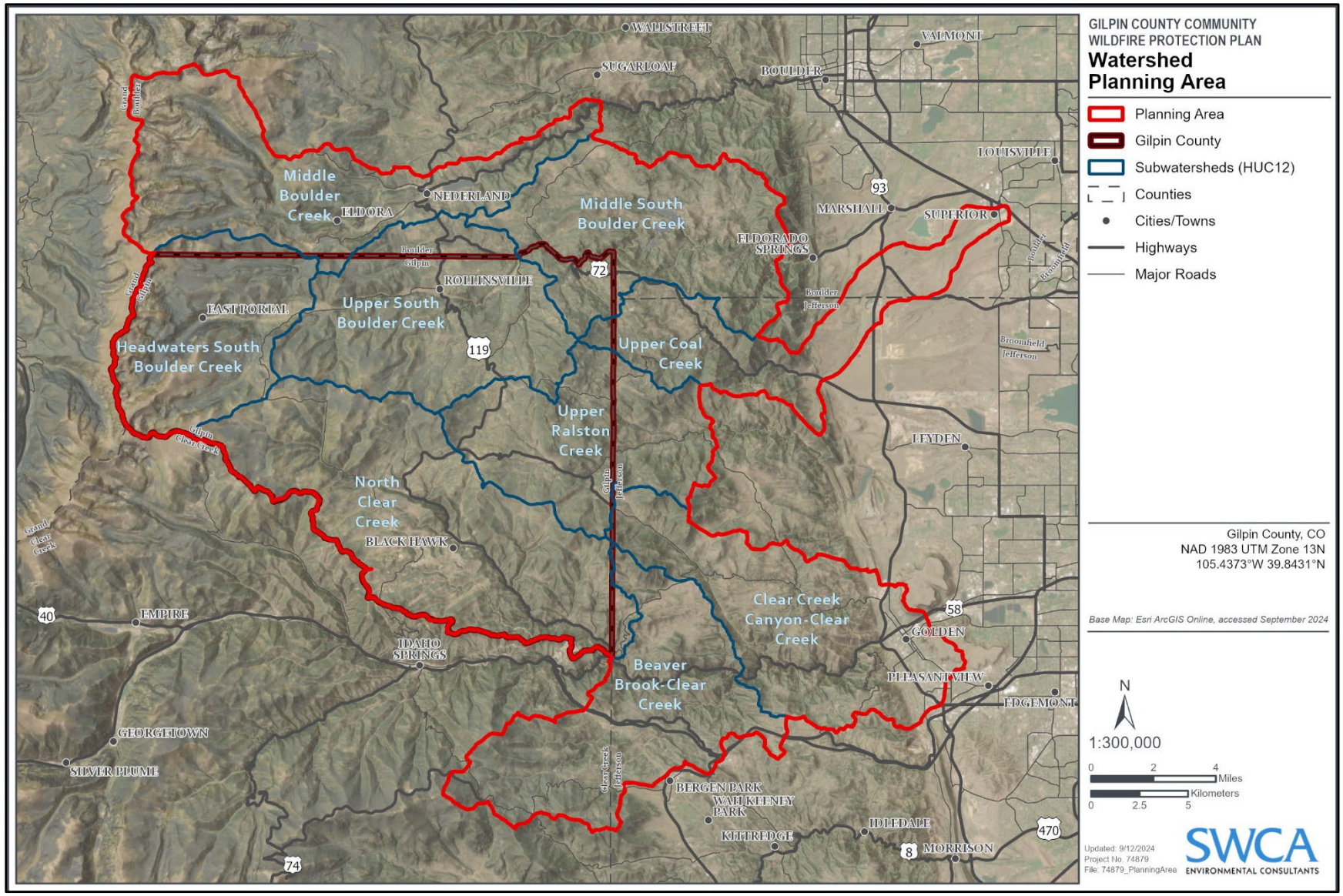


Figure 1.4. Watershed planning area.

LAND OWNERSHIP

Gilpin County features a diverse distribution of land ownership across various entities (Figure 1.5). Private ownership constitutes the largest portion of land, making up approximately 48% (45,352.3 acres) of the total land area. The U.S. Forest Service (USFS) and State government manage a substantial portion, covering over 50,000 acres of the planning area, with the USFS managing approximately 42% (39,992.8 acres) and the State government managing nearly 10% (9,338.8 acres) of the total land area. The USFS primarily owns land in the western portions of the planning area, managing significant parts of the Arapaho and Roosevelt National Forests as well as the James Peak Wilderness areas. These public lands play a crucial role in the region's natural resource conservation and recreational opportunities. Additionally, the state government manages the Golden Gate Canyon State Park, which provides a variety of recreational activities and preserves important natural habitats.

The Bureau of Land Management (BLM) holds just over 1% (1,035.3 acres), while local government in Gilpin County oversees a smaller fraction, less than 0.4% (375.02 acres) made up of various parks, public facilities, and other community resources, providing recreational spaces and essential services to the community. This distribution highlights the varied land management responsibilities within the county, influencing its approach to land use and wildfire mitigation.

Additional details regarding land in Gilpin County, such as topography and land management direction, can be found in Appendix A.

ACCOMPLISHMENTS SINCE THE 2009 CWPP

The previous Gilpin County CWPP, completed in 2009, included project recommendations aimed at reducing wildfire risk and improving community and forest resilience. Several key projects and initiatives have been successfully completed, reflecting the recommendations made in the previous plan. Notably, roadside thinning and fuel reduction projects have been executed across critical areas such as Creekside Trail, Eagles Nest Lane, Highway 119, and Gamble Gulch, all prioritized as very high importance. Emergency access routes like Highpoint Circle and La Chula have been improved to ensure safer evacuations (Gilpin County 2012). Public outreach efforts have been enhanced through the adoption of the "Ready, Set, Go!" program, enhancing community awareness and preparedness for wildfire risks. (Gilpin 2012). Timberline FPD has also taken steps to increase defensible space management by instituting a chipping program where the department brings a chipper through neighborhoods and removes slash that residents have removed from their properties. The department also offers free property inspections to provide residents with actions they can take to improve the fire resilience of their property. The funding of the chipper and chipper truck was authorized by the Board of County Commissioners and purchased in 2023 for use by Timberline FPD.

EXISTING WILDFIRE MITIGATION MEASURES

Table 1.2. Wildfire Mitigation Accomplishment Identified by the Core Team, Occurring between 2008 and 2023

Wildfire Mitigation Accomplishment		
Year(s) Completed	**Entity**	**Project Details**
2021–Present	Gilpin County OEM, Timberline FPD, United Power	In 2021, Gilpin County organizing chipping days, providing residents a way to dispose of woody materials cleared from their property. The establishment of this program was funded by the *Ready, Set, Go!* Funding program
2009–Present	Gilpin County	The county manages a slash drop site which is open seasonally during summer months. Residents can drop off slash, branches, small diameter logs, and 'Hot' logs containing pine beetles.
2022-2025	Boulder Valley and Longmont Conservation District	The Boulder Valley and Longmont Conservation District are working on a 30-40 acre fuels reduction project at Tolland Ranch. The fuels reduction project is planned and funded, but not yet implemented.
2008–Present	USFS, Colorado DFPC	USFS fuels reduction with Lump Gulch NEPA is part of a larger USFS 10-year strategy to address wildfire risks along Colorado's northern Front Range.
2018-Present	Private landowners, CSFS	Private lands fuels reduction work involving vegetation management to reduce wildfire risk and enhance defensible space.
2020-Present	Colorado Division of Parks and Wildlife, CSFS Golden District	Fuel treatment projects in Golden Gate Canyon State Park to reduce fire hazards and improve forest health.
2022–Present	Gilpin County	The county received funding for over 30 N5 remote sensors that were installed across the county. In 2024, funding was received to install 100 more sensors, but specific locations have not yet been determined.
2020-2024	City of Black Hawk	Black Hawk has continuously worked to reduce hazardous fuels in and around the city including along roadways. Between 2020 and 2024, the city treated over 50 acres of forested land and roadways.
2024	Timberline FPD	5 chipping events including in Rollinsville Heights, Dory Lakes, Mountain Meadows/ Wheeler, Missouri lakes 2 & 3, and Lakeview.
2024	Timberline FPD	Roadside thinning in Corona Heights, Aspen Springs, Porter Ranch, and along highway 46. Thinning involved a 25-foot buffer on each side of the road from the center line. 6.15 miles of roadway were treated in 2024.

The tables below highlight the land management accomplishments that have been completed in the county between 2009 and 2024, based on available data.

Table 1.3. Number of Acres Treated by Agency by Treatment Type in Gilpin County since 2009

Number of Acres Treated by Agency			
	Colorado Parks and Wildlife	U.S. Forest Service	Colorado State Forest Service
Prescribed Burn	NA	1,608	NA
Pile Burns	NA	742	367
Chemical Treatment	NA	586	NA
Mechanical Treatment	586	1,910	202
Hand Thinning	193	2,067	564
Total Acres Treated	807	10,685	1,444

Note: This is not an exhaustive list.

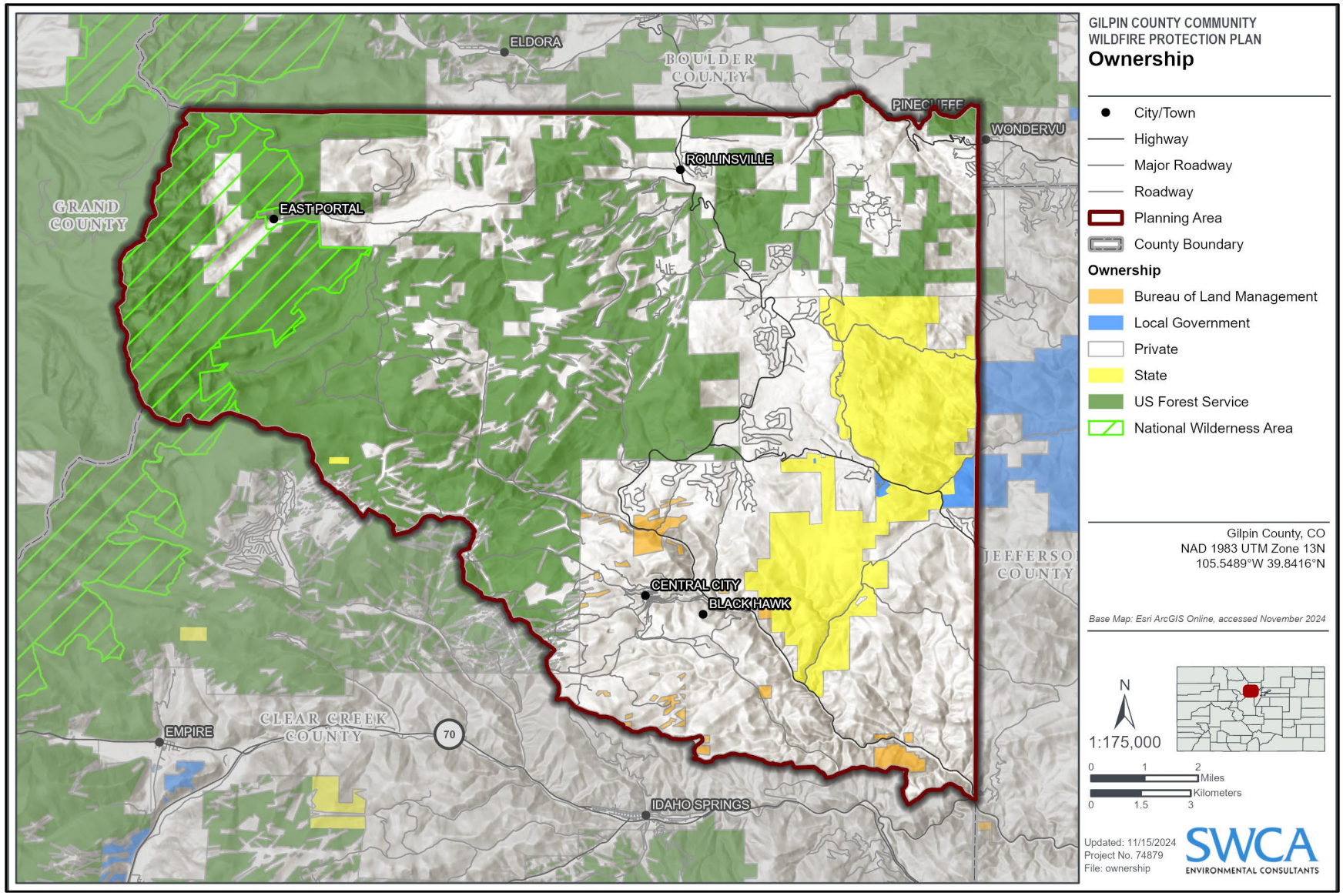
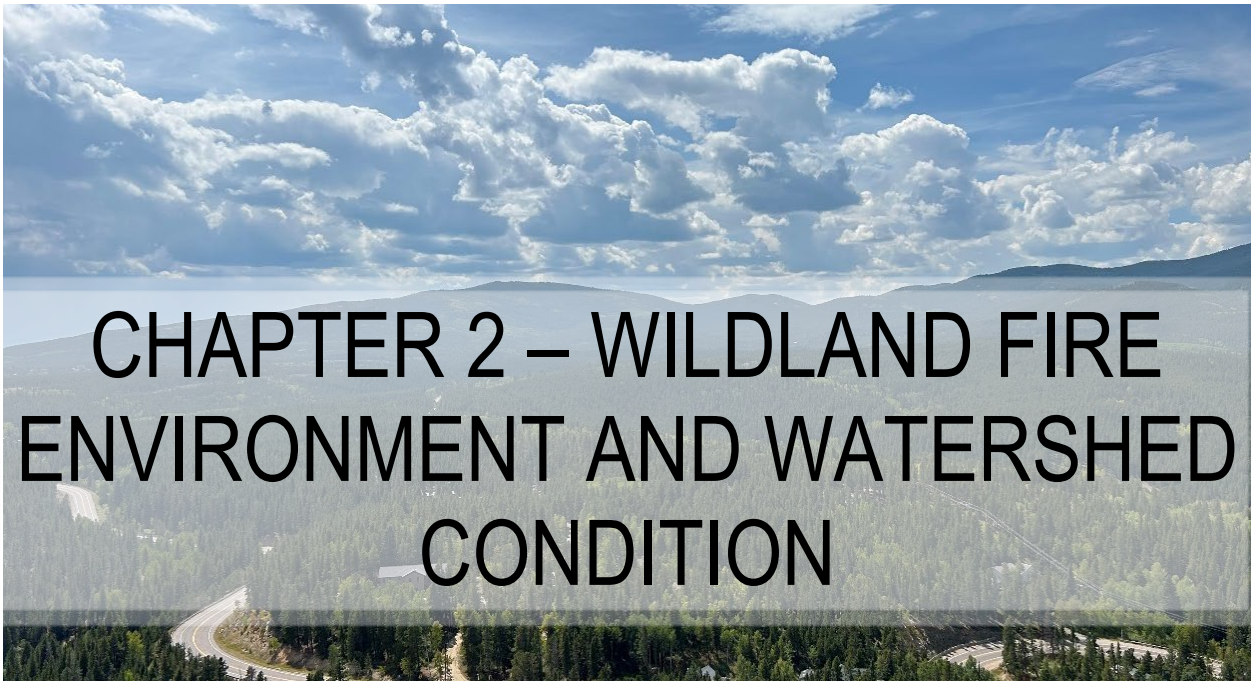


Figure 1.5. Gilpin County land ownership.



CHAPTER 2 – WILDLAND FIRE ENVIRONMENT AND WATERSHED CONDITION

WILDLAND-URBAN INTERFACE

The WUI is composed of both interface and intermix communities and is defined as areas where human habitation and development meet or intermix with wildland fuels (U.S. Department of the Interior and U.S. Department of Agriculture [USDA] 2001:752–753). **Interface areas** include housing developments that meet or are in the vicinity of continuous vegetation. **Intermix areas** are those areas where structures are scattered throughout a wildland area where the cover of continuous vegetation and fuels is often greater than cover by human habitation.

These areas have grown in prevalence as human development progresses into wildland areas, creating an environment where fire can rapidly spread between structural and vegetative fuels. This trend combined with the collective effects of aggressive suppression policies, resource management practices, land use patterns, and ecological stress has created an urgent need to modify fire management practices and policies and to understand and manage fire risk effectively in the WUI (Pyne 2001; Stephens et al. 2005).

A CWPP offers the opportunity for collaboration of land managers to establish a definition and a boundary for the local WUI; to better understand the unique resources, fuels, topography, and climatic and structural characteristics of the area; and to prioritize and plan wildfire mitigation strategies. According to the HFRA, the WUI can be defined by a CWPP. In the previous Gilpin County CWPP (2011), the WUI was delineated by placing a 3-mile buffer around a collection of communities that had been identified as areas of significant concern based on stakeholder input. For the 2024 Gilpin County CWPP update, WUI (Figure 2.1) is defined through a new approach. Data for this plan's WUI boundaries was from two key input layers the; the Colorado All Lands (COAL) "People and Property" layer and the Colorado Wildfire Risk Assessment (COWRA) WUI layer. Both layers were buffered by 1 mile to create a comprehensive WUI boundary that captures areas of potential risk. To ensure the accuracy and reliability of this data, the two layers were cross verified using aerial imagery and building footprint data. Additionally, input from local experts was utilized to fill gaps and establish boundary cutoffs, providing continuous coverage that

accurately reflects human presence and wildfire risk across Gilpin County. Notably, the Core Team determined that it was necessary to extend the WUI beyond the 1-mile buffer in key locations that have the potential to impact wildfire spotting and spread if not treated as part of the WUI. This includes the extension of the WUI in the northwest corner of the county to the James Peak Wilderness boundary, and inclusion of two areas on the southern border of the county that have limited population but include forest characteristics with substantial wildfire risk.

Human encroachment upon wildland ecosystems within recent decades is increasing the extent of the WUI throughout the county (Figures 2.1, 2.2, and 2.3), which is having a significant influence on wildland fire management practices. Combined with the collective effects of aggressive suppression policies, resource management practices, land use patterns, climate change, and insect and disease infestations, the expansion of the WUI into areas with high fire risk has created an urgent need to modify fire management practices and policies and to understand and manage fire risk effectively in the WUI (Pyne 2001; Stephens et al. 2005). Mitigation techniques for fuels and fire management can be strategically planned and implemented in WUI areas, for example, with the development of defensible space around homes and structures.

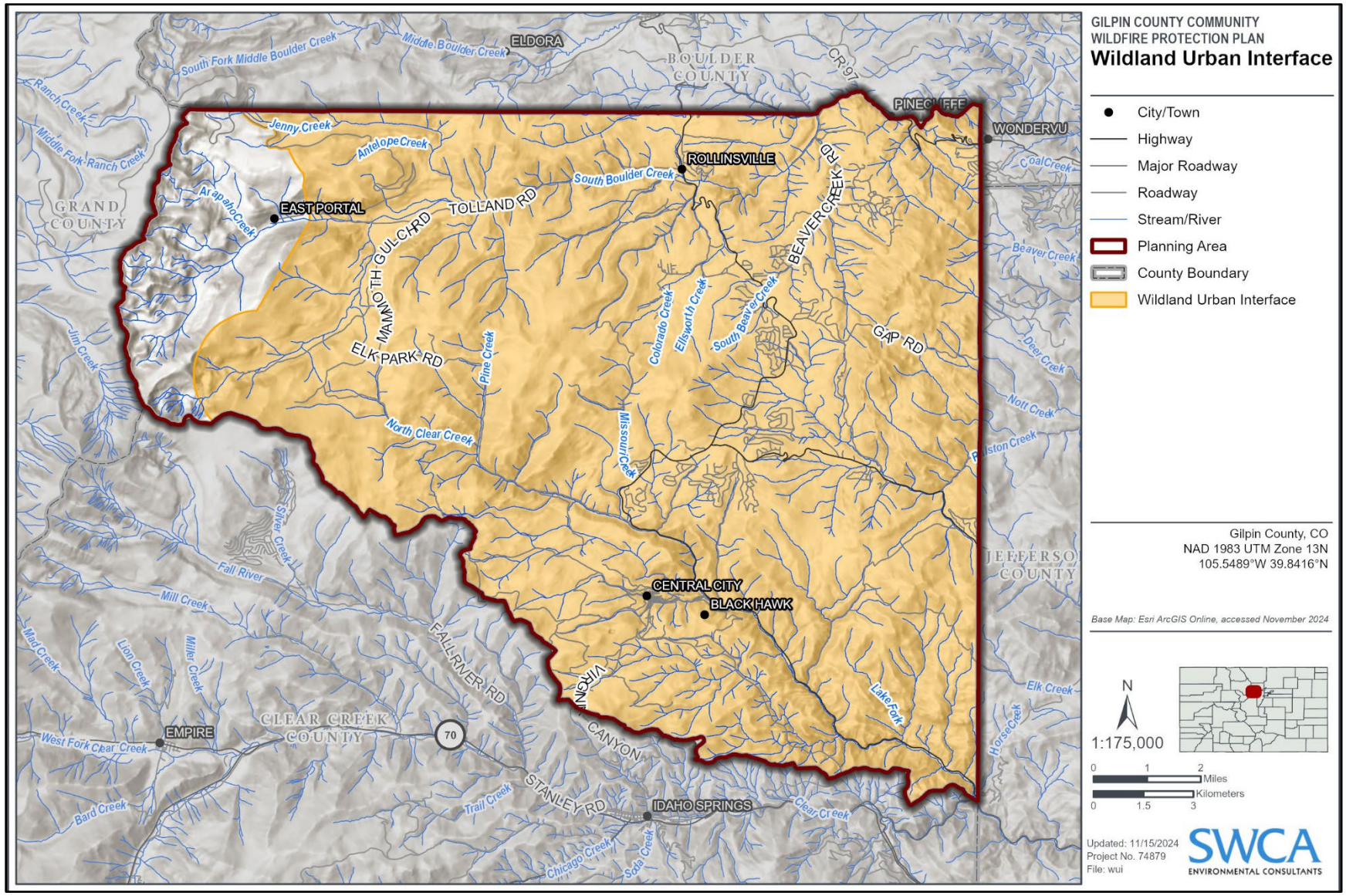


Figure 2.1. WUI map.

WUI LAND USE

Development in the WUI has expanded jointly with the growth of the U.S. population, increasing by 33% to 190 million acres between 1990 and 2010. The U.S. Fire Administration (USFA) estimates that over 46 million homes are situated in WUI environments, with an estimate value of $1.3 trillion (USFS 2022). Colorado's population continues to grow rapidly, particularly in the WUI areas where development faces direct wildfire risks. Recent housing trends in Gilpin County have indicated a shift towards more development in the unincorporated areas that often interface and intermix with wildland fuel. This coupled with a recent population surge in the County has prompted regional planning partners to adopt land use and development strategies that are informed by a broad understanding of natural hazards (Gilpin County 2023). In the past 5 years, the county has experienced notable growth in absentee property owners and the proliferation of short-term rentals, contributing to shifts in the local housing market and community dynamics. The WUI and associated buffer is an area where fuel treatments should be prioritized in order to provide additional protection to the community from potential wildfire spread. Under HFRA, at least 50% of all funds appropriated for projects must be used within the WUI.

Figure 2.2. Example of the WUI in Gilpin County (photo credit: Gilpin County Core Team 2024).

Figure 2.3. Example of the WUI in Gilpin County (photo credit: Gilpin County Core Team 2024)

FIRE BEHAVIOR

VEGETATION AND LAND COVER

Vegetation communities are primarily a function of elevation, slope, aspect, substrate, and associated climatic regimes. Since a broad range in elevation, climate, and topography exists across the county, characteristics in vegetative communities are variable (Figure 2.4). The county's vegetation communities are mapped in Figure 2.5. Vegetation in planning area is largely influenced by the three distinct ecosystems that occur throughout the County as a function of elevation, climate, and other environmental factors. These three ecosystems are as follows: the montane ecosystem, the subalpine ecosystem, and the alpine ecosystem. The montane ecosystem, found between 5,600 and 9,500 feet, features large ponderosa pines on dry slopes and a mix of conifers like Douglas fir and lodgepole pine on moist slopes. The subalpine ecosystem, from 9,000 to 11,000 feet, is dominated by subalpine fir and Engelmann spruce, with lodgepole pine often thriving in disturbed areas. The Alpine ecosystem exists at elevations greater than 11,000 feet, and supports perennial grasses, forbs, willows, and other highly weather-adapted vegetation (Gilpin County 2009).

According to LANDFIRE's 2022 vegetation and landcover update (LANDFIRE) (2022), the dominant vegetation types in the planning area are Rocky Mountain Lodgepole Pine Forest, Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland, Southern Rocky Mountain Ponderosa Pine Woodland, and Rocky Mountain Aspen Forest and Woodland. Dominant vegetation types are described based on a large spatial scale and represent the overall community structure that will play a general role in fire occurrence and behavior. The fire ecology of the dominant vegetation types is described in more detail in the Fire Regimes section (discussed below). Although the vegetation types are outlined for the

county, site-specific evaluations of the vegetative composition and structure in each area of focus should be taken into consideration when planning fuels treatments.

Other types of land cover (e.g., roads and low-density development) also exist in the focus areas and are not described in more detail as they do not play a significant role in fire behavior.

Figure 2.4. Panoramic view of Gilpin County landscape demonstrating common land cover.
Source: Gilpin County Core Team 2024.

FUELS AND TOPOGRAPHY

Fuels comprise dead and live vegetation that ignite and contribute to the spread of wildfire across a landscape. Serving as a key metric for understanding wildfire behavior, fuels are generally classified by type and volume. Common fuels in the county include timber fuels such as needles, leaves, branches, dead fallen or standing trees, and live trees. Light fuels such as grasses and forbs burn rapidly and catalyze wildfire spread. Ladder fuels, or fuels connecting the forest floor to the canopy such as small trees, shrubs, and snags, allow flames to rise into the canopy, leading to intense and uncontrollable blazes referred to as crown fires. Dense vegetation with a high presence of ladder fuels increases wildfire risk, especially in areas where urban and wildland areas intersect (Gilpin County 2009; Gilpin County 2023).

Topography, including slope, aspect, and elevation, has a significant impact on fuel distribution and fire behavior. Gilpin County's diverse landscape ranges from glacially carved valleys in the west to rolling hills and steep canyons in the central and eastern sectors. Major drainages, such as the North Fork of Clear Creek and South Boulder Creek, cut through the county, influencing the location and characteristics of vegetation. This interplay highlights the importance of careful consideration for landscape features and wildland fuels in risk mitigation planning and project implementation in the County.

Fuels in the planning area were estimated using the updated Scott and Burgan (2005) 40 fire behavior fuel model classification (Table 2.1 and Figure 2.5). Most of the planning area is composed predominantly of Timber Litter (TL), Timber Understory (TU), and Grass-Shrub (GS) fuels (see Table 2.1). See Figure 2.5 to understand the distribution of fuel types across Gilpin County. See the Abbreviations and Acronyms list below Chapter 7 for full fuel type names.

Table 2.1. Existing Fuel Types in Gilpin County

Existing Fuel Type	Acres	Percent
TL5	34,492.63	35.89%
TU175*	10,341.87	10.76%
TU1	10,078.08	10.49%
TU5	8,699.93	9.05%
GS2	5,590.59	5.82%
TU2	3,735.03	3.89%
TL3	3,302.29	3.44%
TL8	2,944.39	3.06%
NB2	2,880.11	3.00%
GR111*	2,343.96	2.44%
GS1	2,188.90	2.28%
TL1	2,143.39	2.23%
NB9	1,581.54	1.65%
SH2	1,258.29	1.31%
Other	4,513.18	4.69%
Total	**96,094.18**	**100.00%**

Sources: Scott and Burgan (2005), Pyrologix (2022b)

*Fuel types created from the contemporary wildfire hazard models developed by Pyrologix for the State of Colorado.

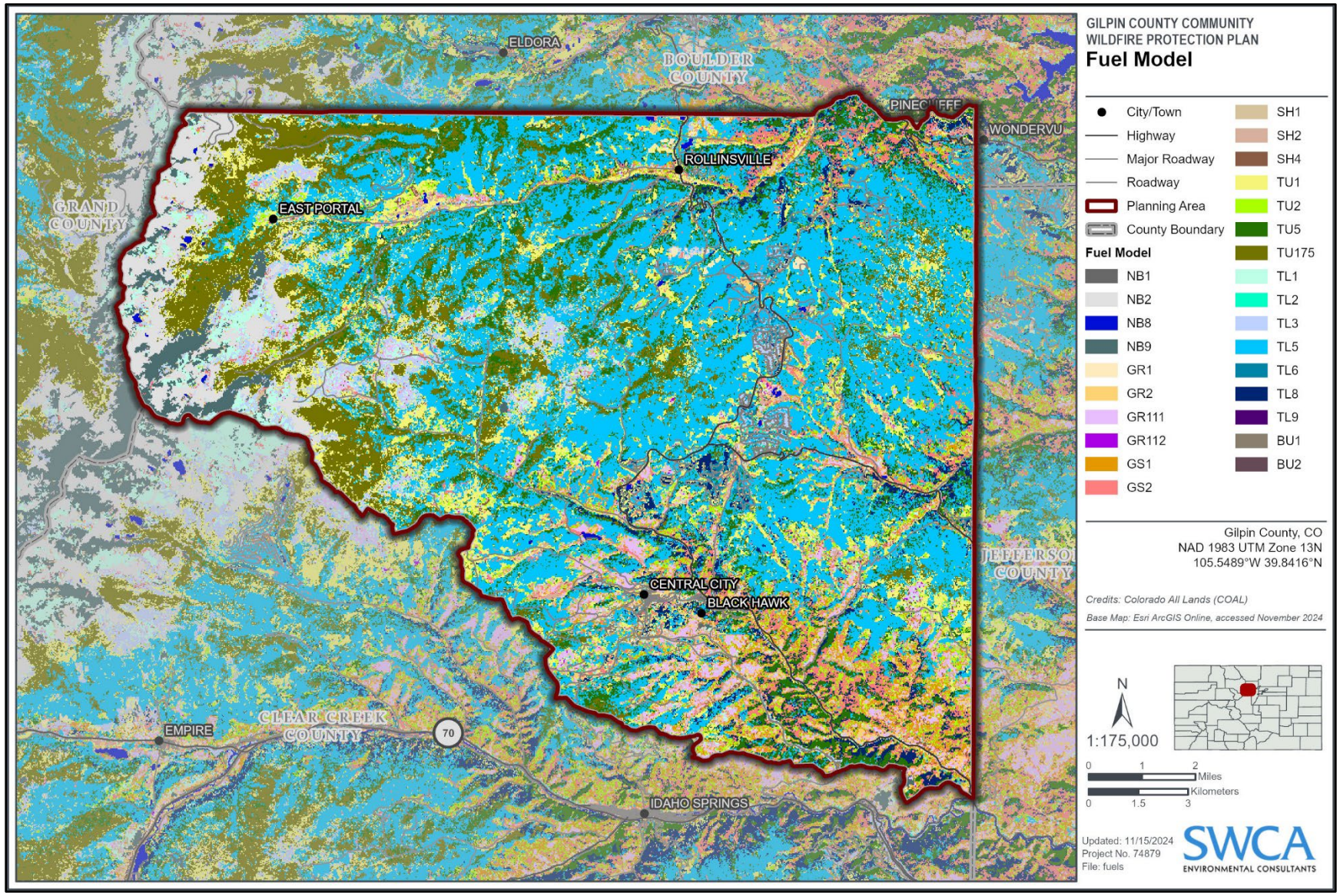


Figure 2.5. Scott and Burgan 40 fire behavior fuel models within Gilpin County. As shown, the TL5 fuel model is the most prominent in the county. This fuel model is found in conifer forests with relatively high fuel loads composed of litter, slash, and dead trees. Spread rate is low and flame length is generally low.

FIRE REGIMES

Fires are characterized by their intensity, the frequency with which they occur, the season in which they occur, their spatial pattern or extent, and their type. Combined, these attributes describe the fire regime.

Gilpin County is home to diverse vegetative communities each supporting varied fire regimes influenced largely by historical management patterns, land use, and ecological conditions.

Rocky Mountain Lodgepole Pine Forests

Rocky Mountain Lodgepole Pine Forests, which occupy the largest portion of the planning area, have fire intervals ranging from 92 to 307 years, with most fires being stand-replacing due to the high flammability of these forests (Figure 2.6). These fires contribute to the maintenance and regeneration of lodgepole pine communities, shaping their structure and composition over time (USFS 2012).

Figure 2.6. Lodgepole pine (*Pinus contorta*) forest.
Photo by Blair Rynearson, CSFS.

Southern Rocky Mountain Ponderosa Pine Woodland

In the Southern Rocky Mountain Ponderosa Pine Woodland, historical fire regimes were characterized by high- to moderate-frequency, low- and mixed-severity fires (Figure 2.7). These fires typically occur in summer to fall during drier than average years, often following 2 to 3 years of wetter conditions. There is notable regional variation, with Front Range sites exhibiting a mean fire return interval of 23 years (USFS 2019).

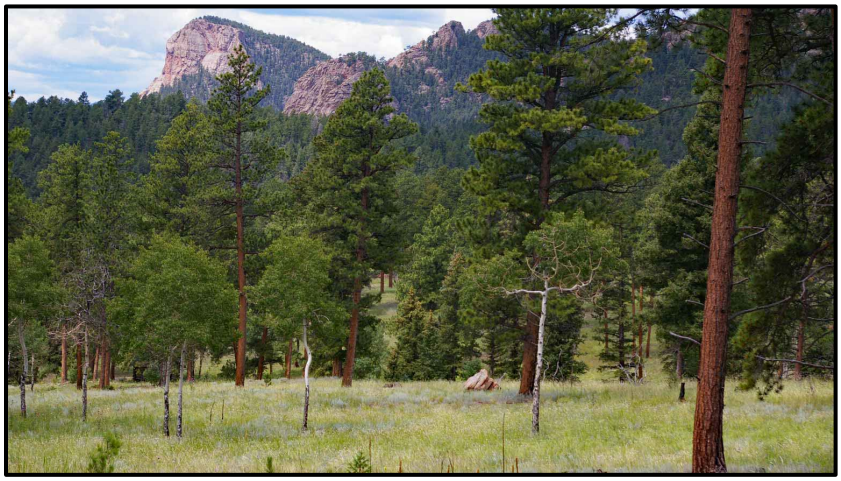


Figure 2.7. Ponderosa pine (*Pinus ponderosa*) forest.
Photo available at: CONPS.org

Rocky Mountain Aspen Forest and Woodland

Rocky Mountain Aspen Forest and Woodland is another fire-adapted vegetative community (Figure 2.8). Aspen stands regenerate prolifically after fire, though they can also persist without it. Fire plays a critical role in maintaining aspen-dominated landscapes, with early successional aspen stands transitioning to greater conifer dominance until fire returns. High-severity fires can significantly increase aspen sprout density and growth rates, although even low-intensity fires can stress surviving trees, making them susceptible to secondary mortality agents (USU Extension 2015).

Figure 2.8. Aspen (*Populus tremuloides*) forest.
Photo available at: CONPS.org

Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland

The Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland typically experiences infrequent, high-severity fires with long return intervals, often spanning several centuries (Figure 2.9). These fires are generally stand-replacing events due to the thin bark and presence of dead lower branches on Engelmann spruce and subalpine fir, which allow fires to easily climb into the crowns and kill the trees. Following such fires, these forests take 300-400 years to regenerate, often starting with fire-adapted species like lodgepole pine and aspen, under which spruce and fir can eventually establish and mature (Colorado Native Plant Society n.d.).

Figure 2.9. Spruce-fir forests in Northern Colorado.
Photo By CSFS: Available at: forestadaptation.org

EMBER IGNITION HAZARDS

Ember exposure from wildland fires can pose a significant threat to homes and other structures in the WUI (Maranghides and Mell 2013). Spotting occurs when embers travel in advance of the flaming front; long-range spotting can be miles ahead of the main fire. Many factors determine whether an ember will result in an ignition (firebrand source and size, wind, receiving materials, exposure duration, etc.). Burning structures and other materials (vehicles and ornamental vegetation) have been identified as another source of embers that can ignite additional combustible materials in the WUI, particularly when there is a low structure separation distance (Maranghides et al. 2022; Suzuki and Manzello 2021).

Land managers and homeowners should take note of vegetation, landscape, and atmospheric conditions that are conducive to firebrand production and travel distance as these directly influence spotting fire behavior. Strategic landscape fuel reduction activities such as fuel breaks and thinning can help reduce the likelihood of firebrand production and spotting. Homeowners should note surrounding tree species and implement home hardening practices, such as installing vent covers, regularly clearing gutters, and sweeping leaf litter from decks and foundation, to reduce structural ignitions from ember wash. Programs to aid landowners in preventative efforts and cases of wildfire are provided in Appendix F, Homeowner Resources.

CLIMATE AND WEATHER PATTERNS

Gilpin County's mountainous terrain and vast topographic variability ranges in elevation from 6,960 feet to 13,294 feet, presenting a challenge in accurately portraying weather conditions for the entire planning area. The weather station at Pickle Gulch, situated at 9,380 feet, provides useful data, though it should be noted that the data is not representative of the County in its entirety. In general, temperature decreases with elevation, dropping about 4°F to 5°F for every 1,000 feet gained. Precipitation tends to increase with elevation, with higher mountain regions receiving significantly more snowfall and rainfall compared to lower valleys and plains. It is important to note, however, that these patterns can also be influenced by the orientation of mountain slopes relative to prevailing winds and the effects of local topography, which can create unique air movements (Colorado Climate Center 2023). Landscapes where weather, wind, and topographic variation interact can result in highly unpredictable and erratic fire behavior. Many communities in Gilpin County are located near geography that can be conducive to hazardous weather patterns, which is important to consider when planning and implementing wildfire mitigation strategies.

Table 2.2. Mean Annual Temperature and Precipitation as recorded by Pickle Gulch Station in Gilpin County

			Mean Annual Temperature (°F)		
Station	**Period of Record**	**Mean Annual Precipitation (Inches)**	**Daily Max**	**Daily Min**	**Mean Annual**
Pickle Gulch, CO RAWS	2000–2024	15.15	52.46	31.06	40.84

Sources: Western Regional Climate Center (2024)

Gilpin County has experienced notable fluctuations in temperature, reflecting its diverse topography and elevation range. The average annual temperature is approximately 40.84°F, with considerable seasonal

variations. Winter months, particularly January and February are the coldest, measuring in at a monthly average of 25.34°F and 24.49°F, respectively. In contrast, the summer temperatures peak in July, with an average of 61.23°F recorded. The average daily maximum temperature (average across all daily maximum temperatures) is 52.46°F, while the daily average minimum temperature (average across all daily maximum temperatures) is 31.06°F.

The County experiences significant variability in precipitation throughout the year, with an average total of approximately 15.15 inches. The wettest months tend to be July and August, with average rainfall of 2.75 and 2.64 inches, respectively. May and June also see higher precipitation levels, averaging around 2.32 and 1.75 inches. Conversely, the winter months, particularly January and December, receive the least amount of precipitation, with averages of 0.24 and 0.22 inches of water, respectively. This is approximately equivalent to 2.88 and 2.64 feet of snow.

In Gilpin County, weather conditions can vary significantly due to the county's diverse topography and elevation differences. While temperature generally decreases and precipitation increases at higher elevations, these patterns are further influenced by the orientation of mountain slopes and prevailing winds. For instance, slopes facing the windward side of prevailing winds tend to receive more precipitation, while leeward slopes may remain drier. Additionally, local air movements, such as cold air pooling in valleys or the development of localized wind patterns along ridges and slopes, can create microclimates. This variation means that while mid-elevation weather stations provide general data, actual conditions may differ across the county, especially in higher or more sheltered areas.

High winds are common in winter months on the leeward, or sheltered from prevailing wind, side of the Rocky Mountains. These are referred to as Chinook Winds. These winds can reach extreme speeds, serving as unpredictable and critical factor in determining fire behavior. Chinook Winds can cause rapid rates of spread, long flame lengths, and intense firelines, significantly hindering suppression efforts and making it nearly impossible to control fast-moving, wind-driven fires. Even moderate winds can create hazardous conditions that prevent aerial resources from providing crucial support.

Figures 2.10 and 2.11 outline climate and weather data for Gilpin County.

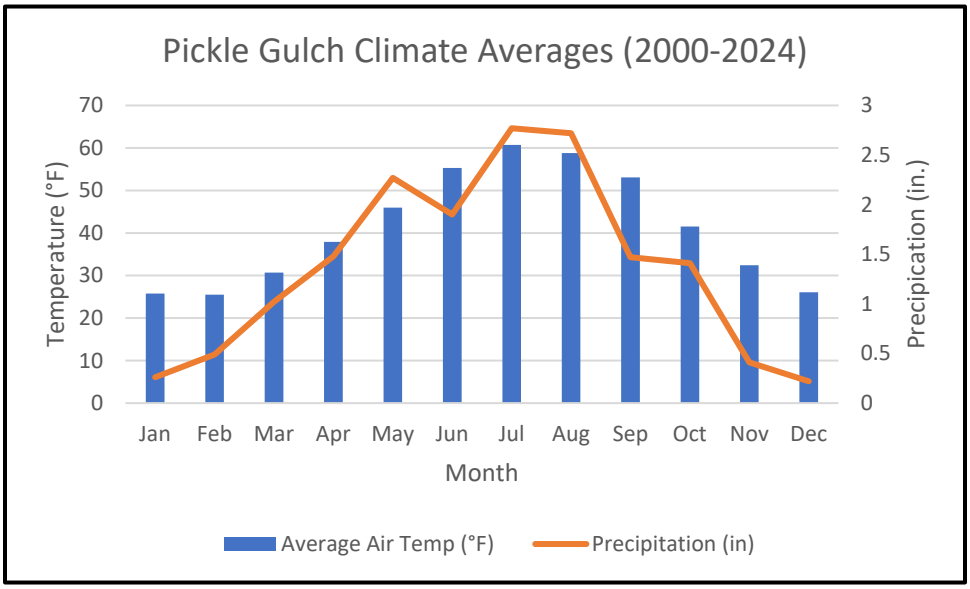


Figure 2.10. Monthly climate average collected from May 2000 to August 2024 at the Pickle Gulch RAWS in Gilpin County, Colorado.

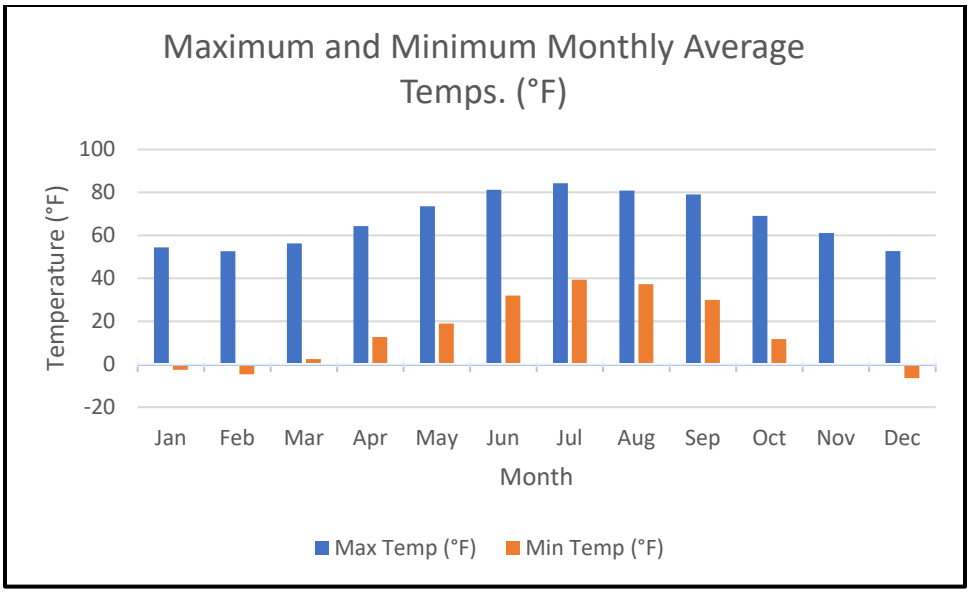


Figure 2.11. Average monthly maximum and minimum temperatures collected at the Pickle Gulch RAWS in Gilpin County, Colorado.

FIRE HISTORY

Fire is a natural part of Colorado's diverse landscapes and is essential to many ecosystems across the state. Almost all of Colorado's ecosystems are fire-dependent or fire-adapted. For centuries, many Colorado Native American tribes recognized this interdependence between fire and ecosystems and used prescribed burning to maintain and restore ecosystem health. However, in the 1800s, a shift in management actions—settlers began enforcing strict fire suppression regimes—led to issues such as dense stand conditions, unhealthy rangelands, and increased ecosystem and community vulnerability to fire.

Fire management in Colorado and the West has adapted over time in response to changing knowledge of forest ecosystems. In 1910, just 5 years after the USFS was established, massive fires burned over 3 million acres of the agency's land in northern Idaho and western Montana, prompting a federal fire suppression policy to protect ecosystem services and timber stands (USFS 2017a). The NPS and BLM were established in 1916 and 1946, respectively, and adopted similar land management philosophies. In the 1970s, western forest management research eventually caught up with traditional ecological knowledge held by native people, and the literature began to acknowledge the true historic and natural role of wildfire in these fire-adapted ecosystems (USFS 2017a). By the turn of the century, complete fire suppression tactics on publicly managed lands were mostly replaced with combinations of suppression, containment, and mitigation measures such as fuel treatments and prescribed burning (Forests and Rangelands 2021).

The 2018 State of Colorado Hazard Mitigation Plan indicated that a century of aggressive fire suppression, coupled with cycles of drought and evolving land management practices, has left many of Colorado's forests, including those in Gilpin County, unnaturally dense and highly susceptible to wildfires (Gilpin County 2023). Despite this, high-elevation lodgepole, spruce-fir, spruce-fir-aspen, dominated regions that are adapted to longer fire return intervals have primarily remained within their historic range of conditions and have not experienced altered fire regimes as a result of twentieth-century anthropogenic factors (BLM 2019; USFS 2021a). Furthermore, nonnative species have expanded in the area and are

often highly flammable and pose a significant threat to homes and other structures in the lower regions of the County and surrounding municipalities (Gilpin County 2023).

Colorado's fire season has been estimated to occur between mid-May and mid-October (Wei et al. 2016). Gilpin County's recent fire history reflects this, as most fires occurred within the period of June to September, which is when high temperatures and drier conditions are more probable across the county (Figure 2.12). Natural factors, and lightning in particular, have been the primary cause of wildfire ignitions; however, human-caused ignitions are also common.

Recent Fire Occurrence

An analysis of Gilpin County's wildland fire history (1932–2023) shows notable changes in wildfire activity over the decades. In the early 20th century, wildfires occurred in fewer numbers but burned larger areas. By the 2000s, the number of wildfires increased, though the areas affected were much smaller and less significant. This trend continued into the early 2020s. The most active month for wildfires has been July, followed by September and August, with fewer incidents during the winter months. The relatively limited fire activity experienced by the County in recent years, particularly in lodgepole pine stands, has led to unregulated fuel accumulation and increased risk of severe wildfire. Stands that naturally rely on periodic fires are currently more vulnerable to large, high-intensity fires that could be devastating to the landscape and the community.

For detailed statistics on the fire history in Gilpin County, please refer to Figures 2.13 through 2.17.

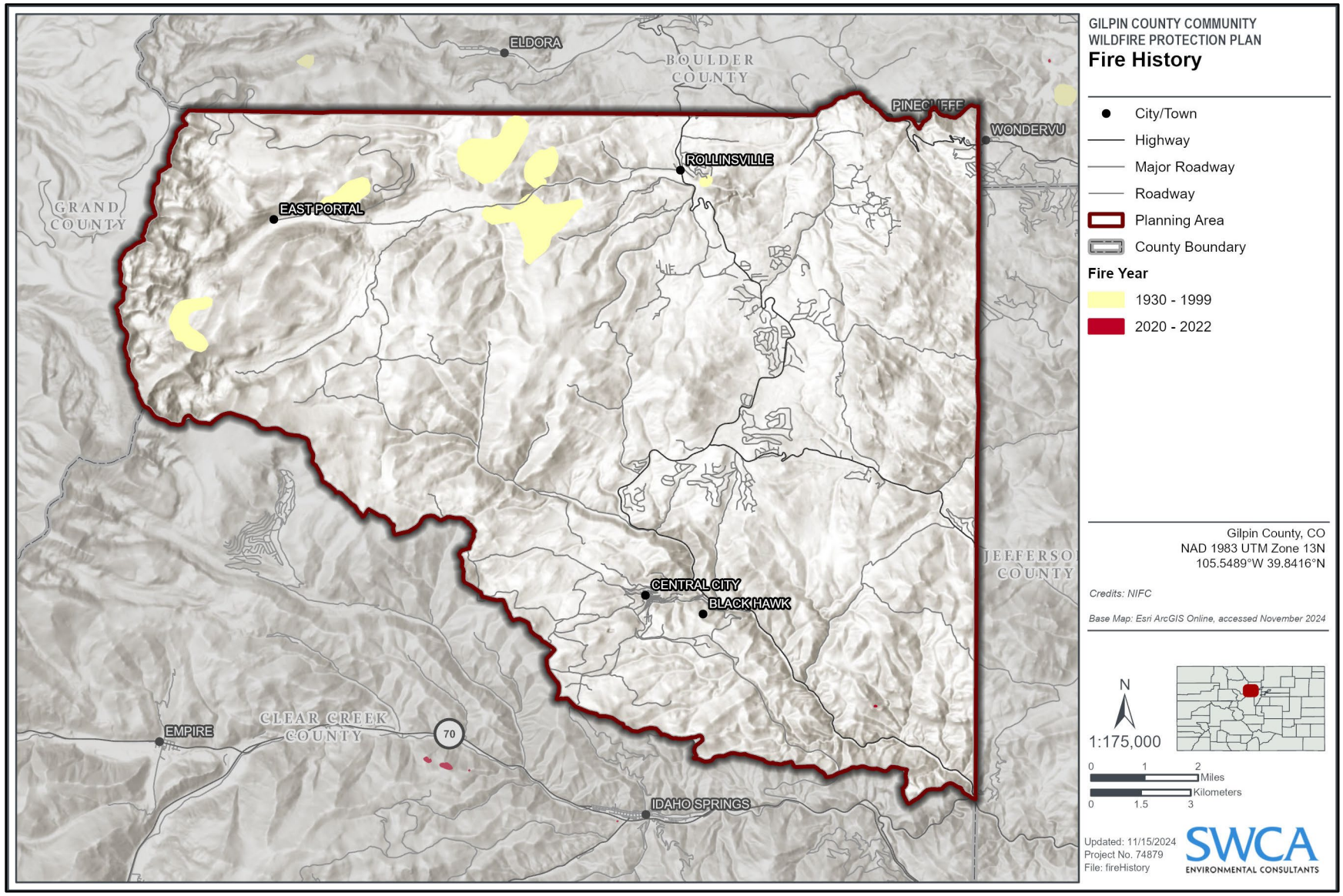


Figure 2.12. Recent wildfire history in Gilpin County.

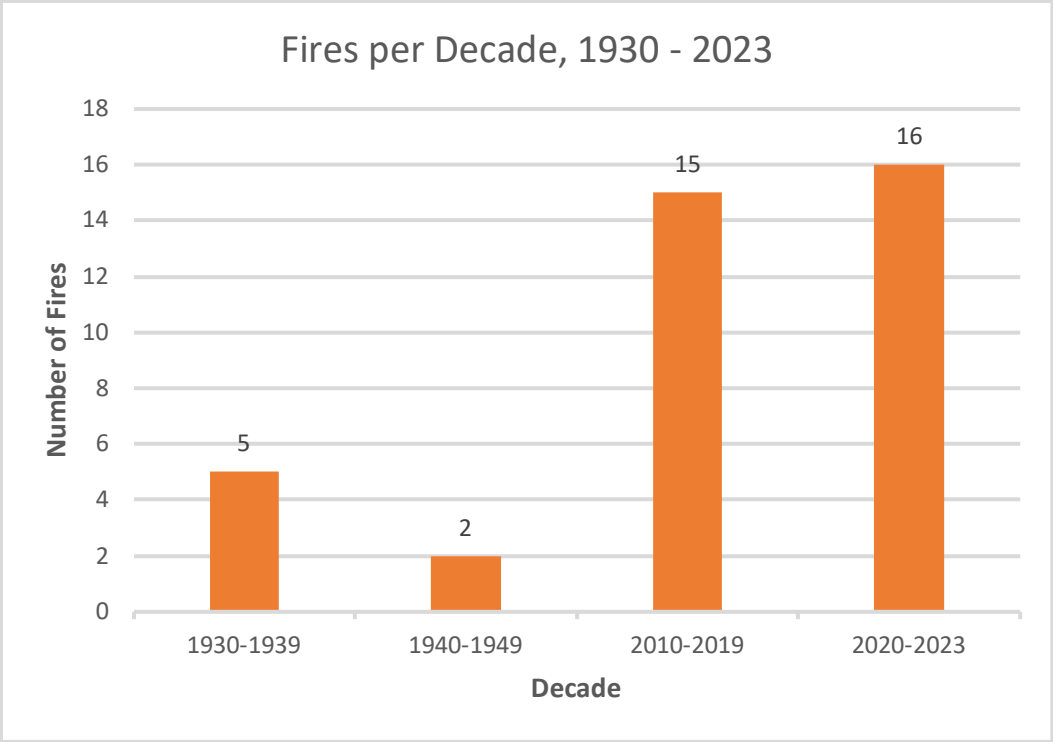


Figure 2.13. Wildfire frequency for Gilpin County based on fire history data from 1932 through 2023.

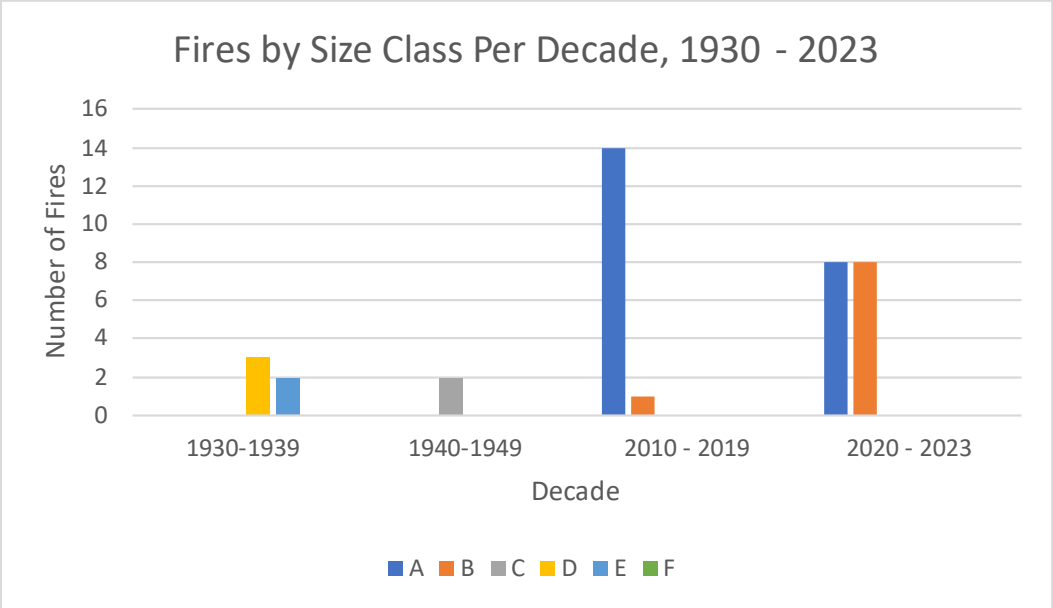


Figure 2.14. Fire size statistics for Gilpin County based on fire history data from 1930 through 2023. A: 0.25 acres or less, B: 0.25 to 10 acres, C: 10 to 100 acres, D: 100 to 1,000 acres, E: 300 to 1,000 acres, F; 1,000 to 5,000 acres.

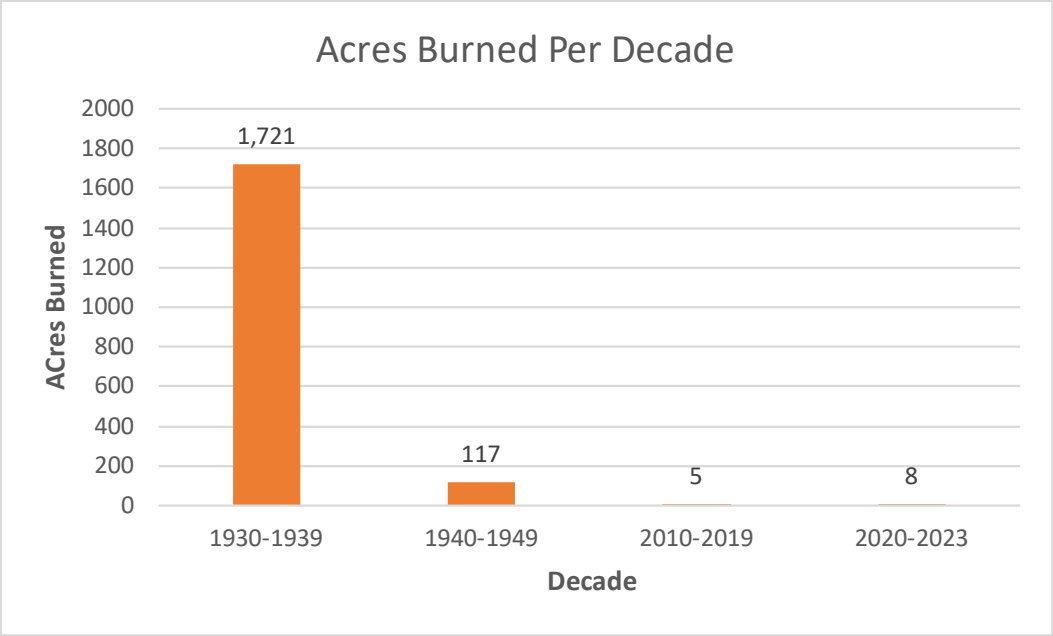


Figure 2.15. Acres burned per decade for Gilpin County based on fire history data from 1932 through 2023.

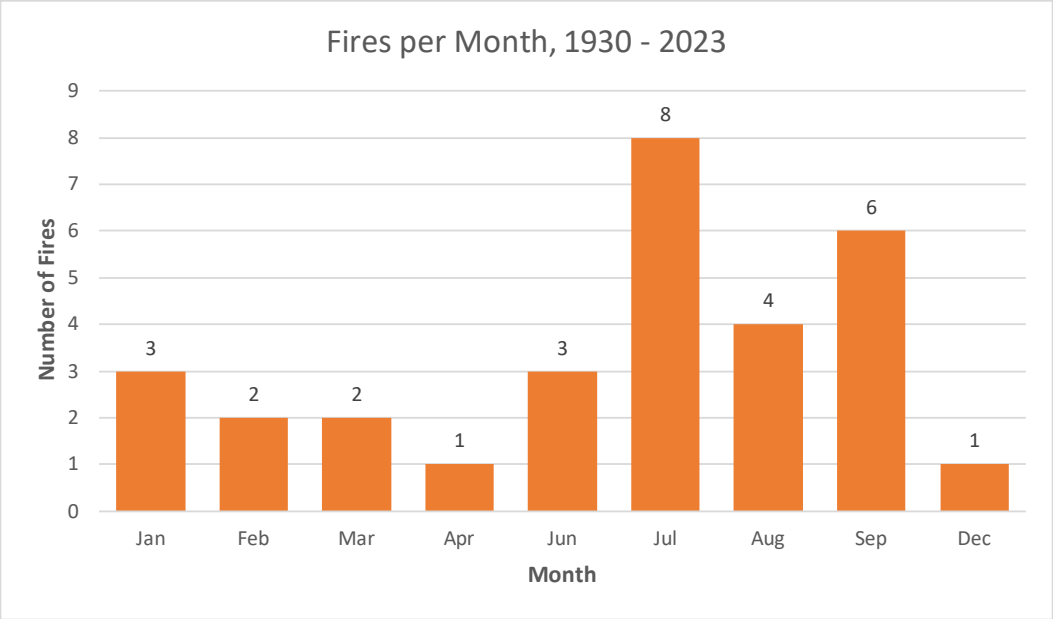


Figure 2.16. Average number of recorded fires per month in Gilpin County from 1930 through 2023.

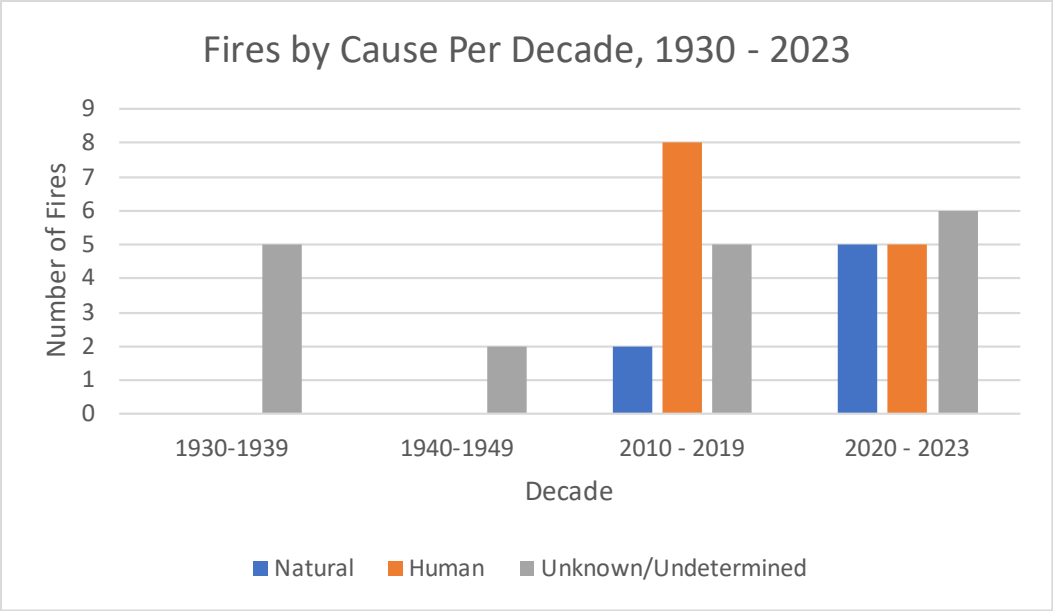


Figure 2.17. Cause of wildfire ignitions in Gilpin County from 1930 through 2023.

FIRE RESPONSE CAPABILITIES

Gilpin County's historic communities are predominantly located on broader valley floors, where access to vital resources such as water and transportation routes is more readily available. These areas have traditionally offered safer living environments with greater connectivity. In contrast, newer subdivisions are increasingly being developed in more remote, forested areas with limited access to water and complicated road networks. This shift in residential patterns heightens the wildfire risk for both community members and emergency responders, as the rugged terrain and isolated locations can significantly delay response times and complicate evacuation efforts (Gilpin County 2023).

The County's wildfire response and fire protection services are primarily provided by Timberline Fire Protection District (TFPD). TFPD covers an area that includes Golden Gate Canyon State Park, National Forest lands, and the southeastern portion of Eldora Mountain Ski Resort. TFPD is a combination of career and volunteer responders, operating from nine stations with over 50 members and two dozen apparatus. As an all-hazards agency, TFPD responds to medical calls, vehicle accidents, structure and wildland fires, and technical rescues. Despite challenges like extreme weather, high altitude, and limited water supply, TFPD maintains NFPA standards and provides mutual aid to neighboring districts and nationwide wildfire incidents (TFPD 2024). The Central City and Black Hawk Fire departments serve the primary economic and population centers of the county, which experience heavy influxes of tourists and visitors throughout the year. The departments are comprised of a mix of paid and volunteer personnel, with Black Hawk Fire being made up fully of career fire fighters. Both departments are bolstered by a pressurized hydrant grid system for water supply (Gilpin County 2009). Coal Creek Canyon FPD and Golden Gate FPD extend their services to portions of Gilpin County and play a crucial role in wildfire response within the region (Coal Creek Canyon FPD 2024; Golden Gate FPD 2024).

Additional information on fire response, including details about Black Hawk and Central City Fire Departments, and agency resources is available in Appendix A.

The Coal Creek Station of the Colorado DFPC is located Gilpin County, covering Adams, Boulder, Gilpin, and Clear Creek Counties. DFPC District and Battalion Chiefs assist local agencies with wildfire preparedness, planning, training, coordination, and response, and provide technical assistance and incident command support during wildfire incidents (DFPC 2024).

Fire response on all federal lands in Gilpin County is coordinated by the Rocky Mountain Area Coordination Center (RMCG) across the NPS, USFS, and BLM. For more information, see Appendix A Federal Response.

Planning Decision and Support

Wildfires have continued to grow in size and severity over the last decade, requiring fire managers to institute more robust pre-fire planning as well as adapt and improve decision-making tools in order to reduce risk to fire responders and the public and assess impacts on ecological processes.

A primary decision tool utilized by fire managers across all agencies is the Wildland Fire Decision Support System (WFDSS), a system that assists fire managers and analysts in making strategic and tactical decisions for fire incidents (WFDSS 2021). WFDSS combines desktop applications for fire modeling into one web-based system. It provides a risk-informed decision process and documentation system for all wildland fires, and it also introduces economic principles into the fire decision process in order to improve efficiencies while also ensuring safe and effective wildfire response.

Fire Resources

Fire management in Colorado is a cooperative interagency partnership among federal, state, and local entities such as the Colorado Division of Fire Prevention and Control. Fire protection in Gilpin County involves multiple agencies, including fire protection districts, volunteer fire departments, the Bureau of Land Management (BLM), and USFS. Emergency services are provided by the Black Hawk Fire Department, the Central City Fire Department, and the Timberline Fire Authority, which was formed by merging the Colorado Sierra Fire District and the High Country Fire District (Figure 2.18).

Wildland fire response is directed and managed by regional interagency fire centers in Colorado. These dispatch centers are part of the larger Rocky Mountain Area Coordination Center. The dispatch centers in Colorado include Fort Collins, Craig, Grand Junction, Montrose, Durango, and Pueblo Interagency Dispatch Centers. Wildfire response in Gilpin County is largely an interagency cooperative effort (Rocky Mountain Area Coordination Center 2022). The Fort Collins Interagency Dispatch Centers serve lands located in Gilpin County (Geographic Area Coordinating Center (GACC) 2024). Additional details regarding fire response resources can be found in Appendix A. Recommendations for improving fire response capabilities can be found in Chapter 5.

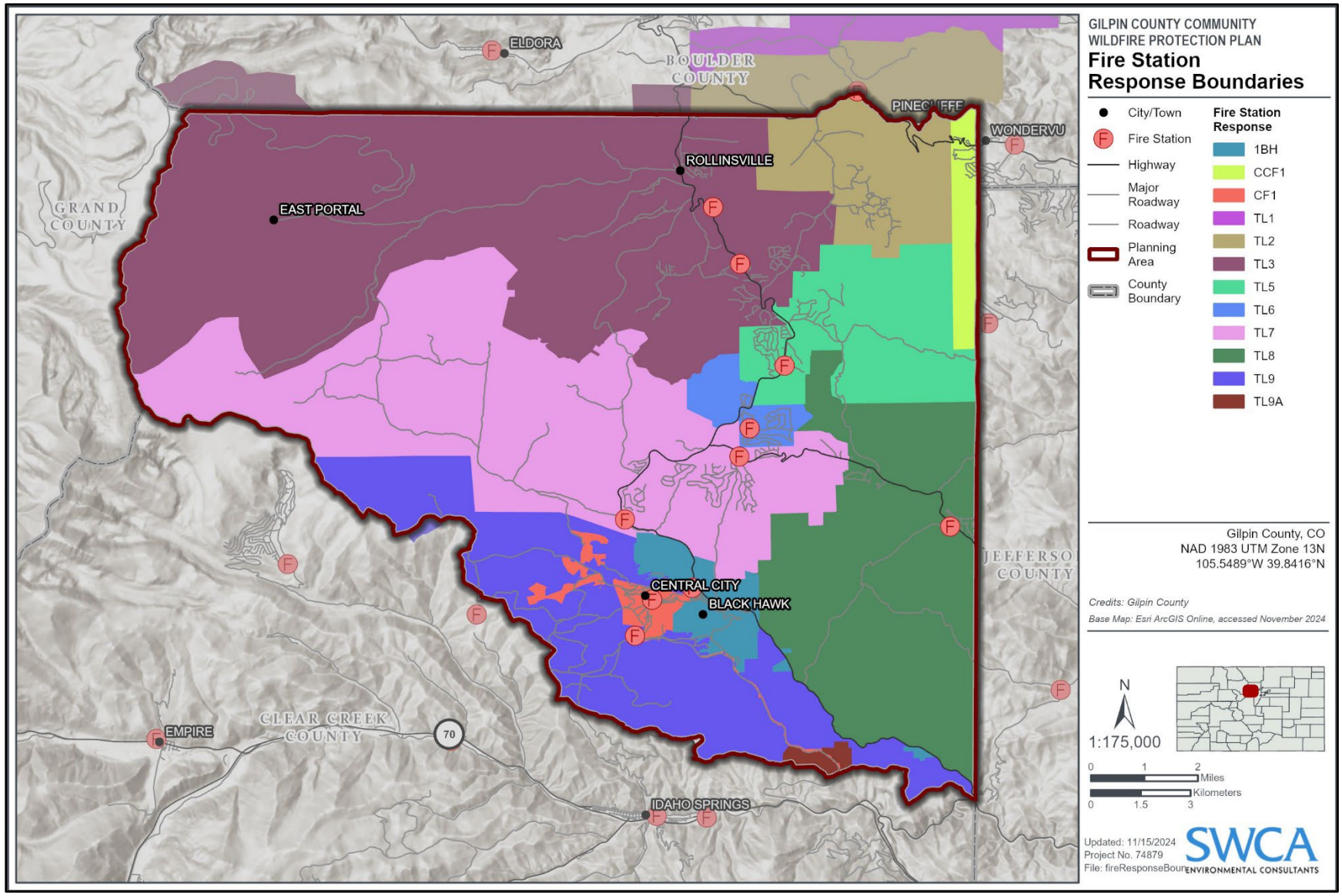


Figure 2.18. Fire station response boundaries in Gilpin County.

WATERSHED ENVIRONMENT

Watersheds vary in scale, but generally they are defined as “an area of land that drains water, sediment and dissolved materials to a common receiving body or outlet” (U.S. Environmental Protection Agency [EPA] 2022a). Watersheds connect landscapes, ecosystems, and societies; in many ways shaping the way communities plan and utilize land and resources. Thus, their health is not only important for the natural world, but also for the communities and industries that rely on them.

Under certain conditions, wildfires can have substantial impacts on the health of a watershed. For instance, if a watershed experiences a large and unnatural high-severity wildfire, watershed health indicators, such as native vegetative land cover, sediment transport, stream flows, and aquatic habitat, may be dramatically altered compared to the pre-fire environment. These changes can result in deleterious impacts to watershed health (Wildfire Ready Watersheds 2023). As such, when considering wildfires in watershed planning, it’s important to consider the current watershed environment’s health and assess the potential impacts from wildfire to it. Gilpin county contains a diverse range of watersheds with varying development, vegetation, course alteration, and water use characteristics. South Boulder Creek and Clear Creek are the primary drainages in the county. Ralston Creek and Coal Creek also have portions of their drainages within the county. It is important to note that none of the watersheds in Gilpin are fully contained in the county which highlights the necessity of cross-county and multijurisdictional planning to ensure cohesive approaches to managing watershed health and resilience as it relates to wildfire risk.

For the purposes of this plan, watershed post-fire risk and susceptibility was assessed at the sub-watershed – catchment level as defined by the USGS. Catchment level delineations do not have a clearly defined numbering system or nomenclature and there are 214 catchments in the planning area. Because of this, risk ranking and recommendations are discussed based on the HUC-12 watershed in which each respective catchment is contained. Catchment level mapping is discussed in further detail with the watershed risk-hazard assessment in Chapter 4. For clarity, this chapter discusses watershed characteristics at the HUC-12 scale. Table 2.3 below provides an overview of the size of each HUC 12, its relation to the county, and land ownership. The watershed descriptions below provide an overview of each watershed where some sub-watersheds have been grouped together where appropriate (Figure 2.19).

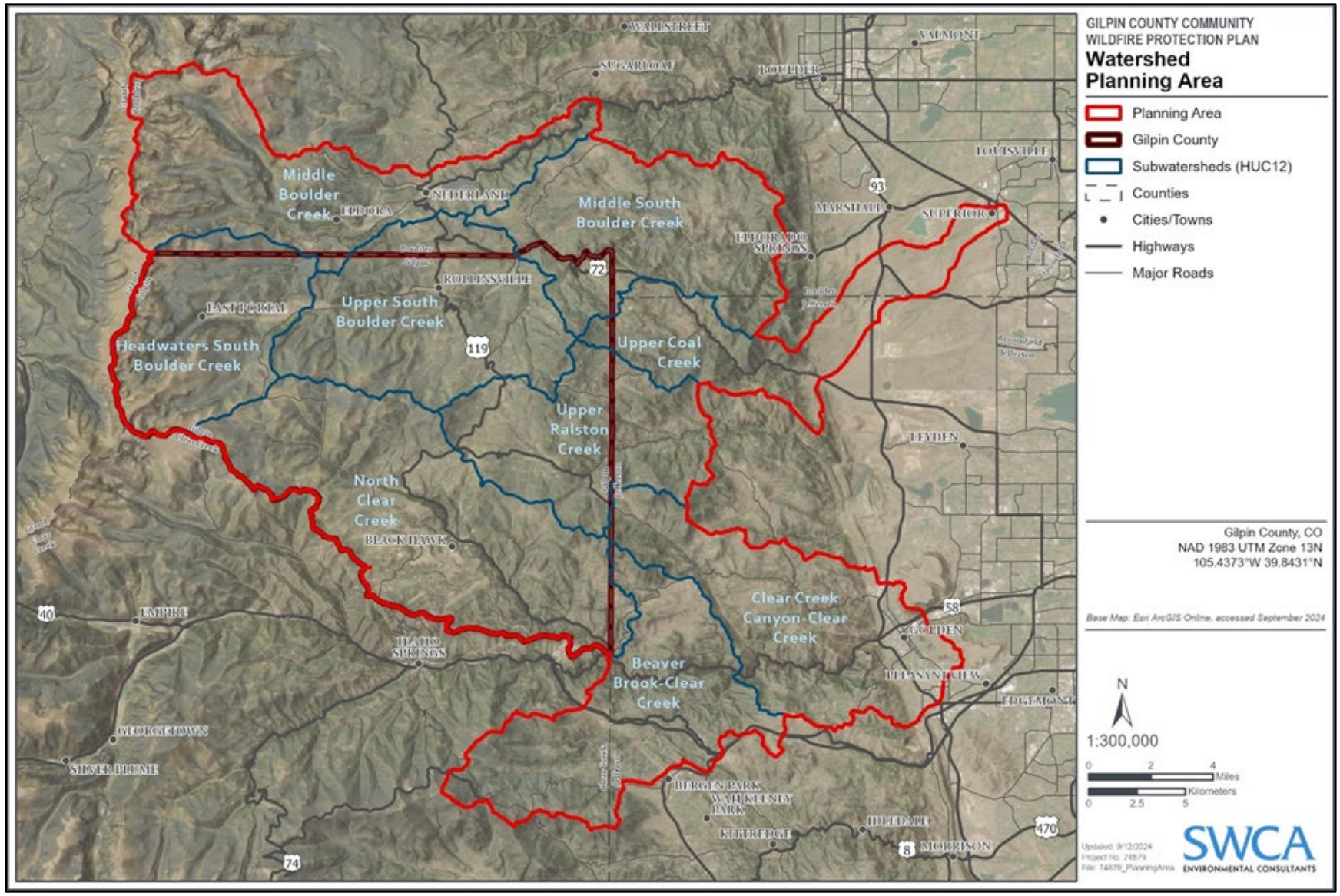


Figure 2.19. Overview of the Gilpin County watershed planning area.

Table 2.3. Watersheds in Gilpin County

Hydrologic Unit Code Name	HUC Acreage	Acreage within Gilpin County	Primary Land Ownership
North Clear Creek	38,491.38	37,541.2	Private: 56.79% USFS: 32.26% BLM: 26.33
Clear Creek Canyon-Clear Creek	26,281.81	71.96	Private: 99.38%
Beaver Brook-Clear Creek	26,222.7	22.04	Private: 86.45% USFS: 10.46%
Upper Ralston Creek	20,615.83	13,444.46	Private: 46.26% State: 38.5% Local Government: 22.58%
Middle Boulder Creek	28,346.42	340.32	USFS: 64.81% Private: 35.19%
Headwaters South Boulder Creek	19,438.35	17,923.54	USFS: 77.24% Private: 22.76%
Upper South Boulder Creek	26,134.88	23,032.67	USFS: 50.66% Private: 46.22%
Middle South Boulder Creek	25,647.47	3,101.65	Private: 52.18% USFS: 25.31% Local Government: 22.18%
Upper Coal Creek	17,407.33	540.21	Private: 92.43% State: 3.1% Local Government: 2.59%

SOUTH BOULDER CREEK

Multiple sections and tributaries of the Boulder Creek watershed pass through Gilpin County including the headwaters of South Boulder Creek, Upper South Boulder Creek, Middle South Boulder Creek, and a small portion of Middle Boulder Creek (Figure 2.20). All waterways in the northern portion of the county fall within the South Boulder Creek Watershed. South Boulder Creek originates just east of the Continental Divide with flows heavily dictated by snowpack and melting, while also receiving water diverted from the western slope through the Moffat Tunnel. Flows generally begin increasing in May, aligning with runoff, peak in June, and begin declining in July. Spring, Summer, and Fall rain events may also influence daily flow rates, causing temporary surges outside of snowmelt influenced increases. After exiting the county along the northeastern boundary, South Boulder Creek flows into Gross Reservoir where water is stored for municipal and agricultural use across the Front Range.

South Boulder Creek and a small portion of Boulder Creek cover over 44,000 acres within Gilpin County. Over 50% of the watershed area falls under the ownership of the USFS, over 38% is privately held, and the remaining approximately 12% is owned by the BLM, local governments, and Colorado Parks and Wildlife. Vegetative cover in the watershed primarily consists of forest lands ranging from lodgepole and limber pine habitat to spruce-fire communities. As the creek and tributaries move east across the county, shrub, forb, and meadow communities become more common along with some developed areas.

However, forested land remains the primary vegetation. High severity burns in any portion of the watershed could result in potential debris flow and high levels of erosion due to the high amount of forested land.

The portion of the South Boulder Creek Watershed under USFS ownership falls within James Peak Wilderness which is the jurisdiction of the Boulder Ranger District. The area is a popular recreation destination drawing visitors for hiking, backpacking, skiing, fishing, and other activities. Four forest Service maintained trails are present in the watershed, most notably the Moffat trailhead west of Tolland which accesses streams and lakes in the Headwaters portion of South Boulder Creek.

Five historic mining sites are present in the watershed all within the Upper South Boulder Creek hydrologic unit. Historic development has been relatively minimal and centered around mining operations and the railroad which parallels South Boulder Creek beginning from Moffat tunnel, continuing eastward, and crossing county lines near Pinecliffe. A portion of the delineated Central City-Clear Creek Superfund site falls within the southeastern portion of the Upper South Boulder Creek HUC-12. The superfund site was established and listed on the national priorities list in 1983 as a result of historic gold mining and processing in Clear Creek and Boulder Creek as well as their many tributaries.

The alpine lakes and the full extent of South Boulder Creek through the county is managed for aquatic sportfishing primarily for native and introduced trout species. An approximately 1 mile stretch of the Headwaters South Boulder Creek near the Moffat tunnel is designated as an aquatic native species conservation area.

See additional mapping in Appendix I.

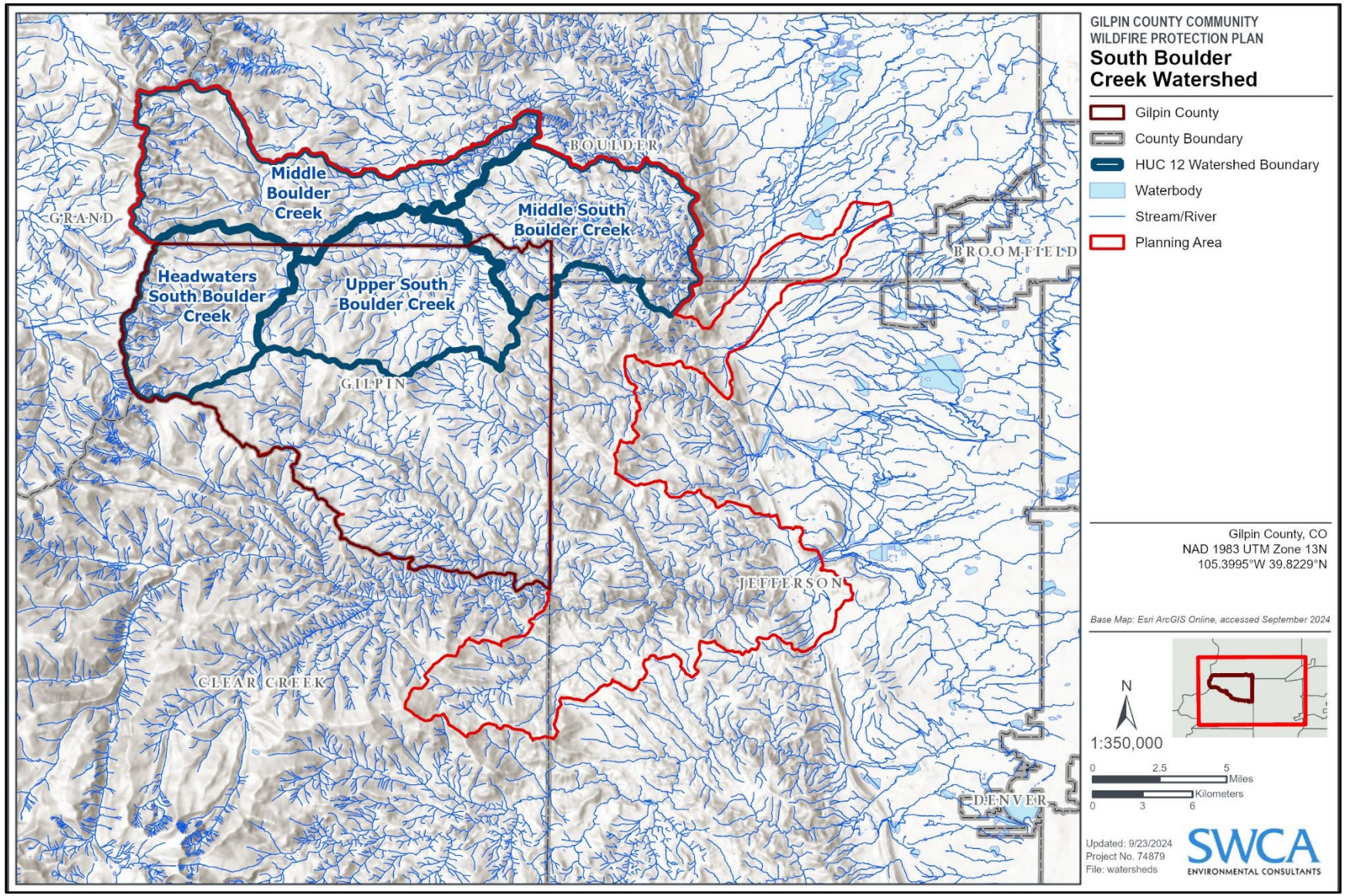


Figure 2.20. South Boulder Creek Watershed within the watershed planning area.

CLEAR CREEK

The Clear Creek Watershed is the second largest in the county behind South Boulder Creek, covering an area of over 37,000 acres (Figure 2.21). Three sub-watersheds are partially or fully in the county: North Clear Creek, Beaver Brook-Clear Creek, and Clear Creek Canyon-Clear Creek. Less than 1% of both the Beaver Brook and Clear Creek Canyon sub-watersheds fall within the county while over 97% of the North Clear Creek sub-watershed is within Gilpin County. Over 50% of the land in the Clear Creek watershed in the county is privately owned including 100% of the Beaver Brook and Clear Creek Canyon sub-watershed. Just over 30% of the North Clear Creek sub-watershed is owned by the USFS and just over 10% is owned by the state and BLM.

The watershed has an extensive history of mining dating back to the 1850's when gold was discovered. The river corridor was soon developed for transport beginning with wagons and soon followed by the Colorado Central Railroad (Gilpin County 2024a). Residential and business development followed a similar pattern of development centered around the river corridor and floodplain. These areas are still heavily developed with an abundance of homes as well as casinos and hotels which line North Clear Creek through Black Hawk. Due to the significant mining history, the EPA listed the entire Clear Creek watershed as part of an EPA National Priorities List Superfund Site intended to remediate heavy metal contamination, acid mine drainage, and mine waste piles and tailings in the watershed. According to the EPA, many of the waste piles have been cleaned up and two water treatment plants have been constructed to treat mine-impacted water (EPA 2024). Remediation and monitoring activities continue to occur in the watershed as part of the priority listing.

Vegetation in the upper portion of the watershed is dominated by lodgepole pine and spruce-fir forests with intermixed alpine meadow and grassland. As Clear Creek travels east, lodgepole forests are still prominent but mix with dryer ponderosa pine woodlands which become the dominant forest type near the eastern edge of the watershed. Grasslands are also much more abundant in the lower watershed, particularly near Black Hawk and Central City. The topography of the watershed is very steep along most of its path in the county especially along the main stem of Clear Creek where, beginning east of the confluence with Missouri Creek, slope angle often exceeds 40º. This puts the lower portion of the watershed at a naturally elevated risk of erosion and debris flows.

The flow regime of Clear Creek is heavily influenced by seasonal snow melt originating in the high-elevation alpine. Peak stream flow generally occurs between May and June when snow melt is highest. The watershed also experiences some flow spikes in the later summer from monsoon rain events (USGS 2024). The North Clear Creek sub-watershed contains five tributary stretches managed for aquatic native species conservation including Mosquito Creek and Silver Creek on National Forest land. Stretches of Pine Creek and North Clear Creek are also managed for aquatic sport fishing.

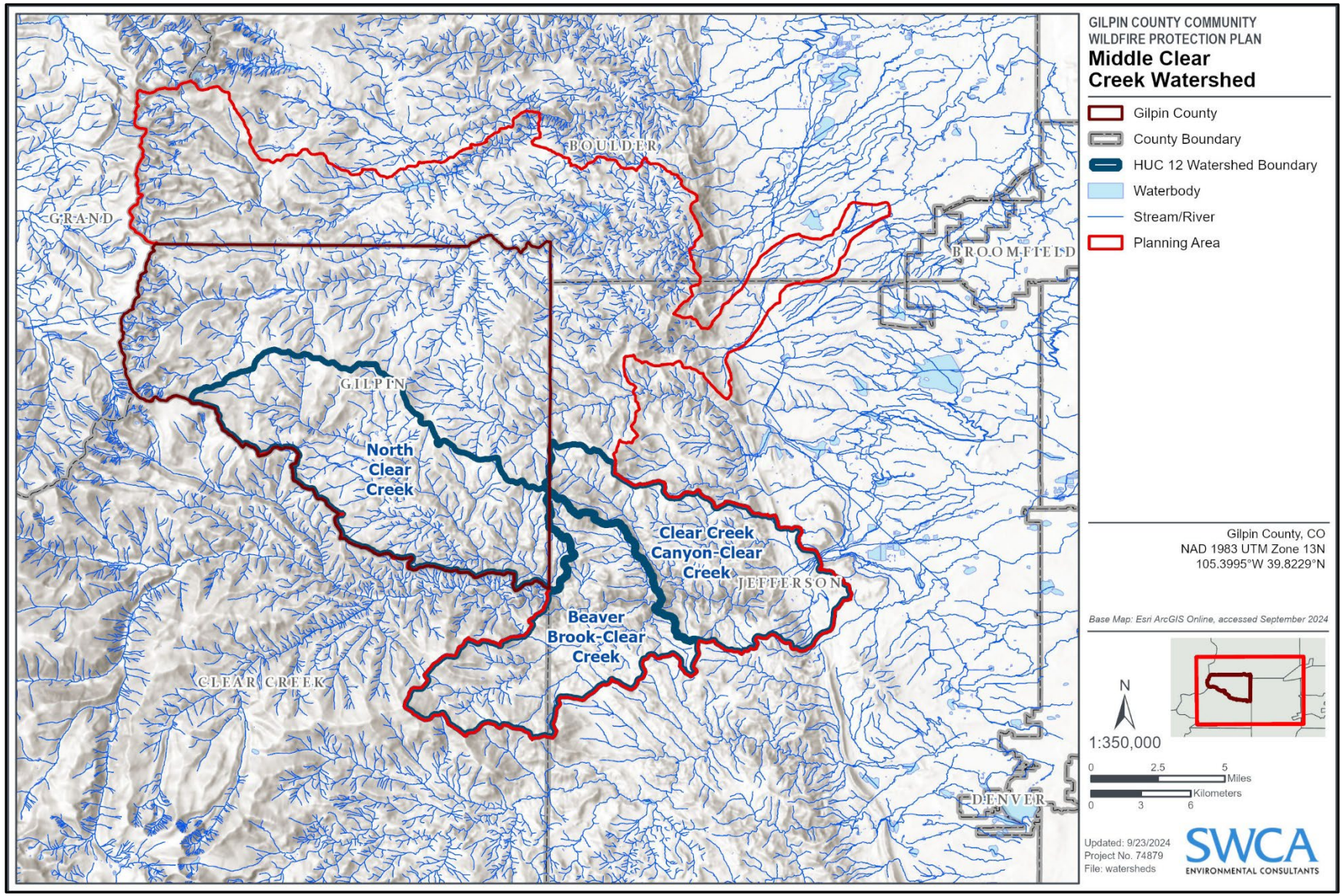


Figure 2.21. Middle Clear Creek Watershed within the watershed planning area.

RALSTON CREEK

The Ralston Creek watershed originates in Gilpin County and flows east, traveling through neighborhoods and a state park before exiting the county (Figure 2.22). The watershed begins draining west of the community of Dory Lakes and is primarily fed by runoff and spring water. Land ownership in the watershed is primarily private with 50% of the land in the county privately held. Another 40% of the watershed in the county is owned by the state as part of Golden Gate Canyon State Park (GGCSP) and Ralston Creek State Wildlife Area (CPW). Elevation in the watershed is relatively moderate. The highest point in the watershed is 3,208 meters (10,525 feet) with the creek exiting the county at an elevation of 2101 meters (6,893 feet). The headwaters of the many tributaries that feed Ralston Creek begin in a mix of lodgepole forests, emergent marshlands, and montane meadow. As the watershed consolidates and travels east, the creek becomes enclosed with dense willows bordered by spruce-fir forests. Much of the watershed is a mesic environment with a mix of coniferous species, intermixed grasslands, and temperate forests. The creek has a high population of introduced brook trout while also being managed for native fish species conservation. The main stem of the creek and the associated retention ponds are popular fishing locations with GGCSP.

The watershed has a long history of disturbance and development. This has included a number of diversions and pond constructions; currently five ponds are present in GGCSP, and county diverts water for municipal building use. Both the pond and municipal use diversions have required water replacement or augmentation plans to account for impacts to downstream water rights. Many of the tributaries were impacted by early mining efforts which still have residual effects on erosion in the watershed. Historical agricultural activities, mainly near Green Ranch, developed irrigation ditches which impacted some meadow habitats. These areas are now recovering to a state similar to their historic conditions.

Two primary travel routes fall within the watershed including Golden Gate Canyon Road and Mountain Base Road. Ralston Creek and its tributaries parallel these roads through much of the watershed and have the potential to impact travel during flood and debris flow events. Given the history of development and current erosion concerns in the watershed, fire mitigation and stream resilience efforts should be a priority in order to reduce the likelihood of high severity burns and post-fire sedimentation and debris flow.

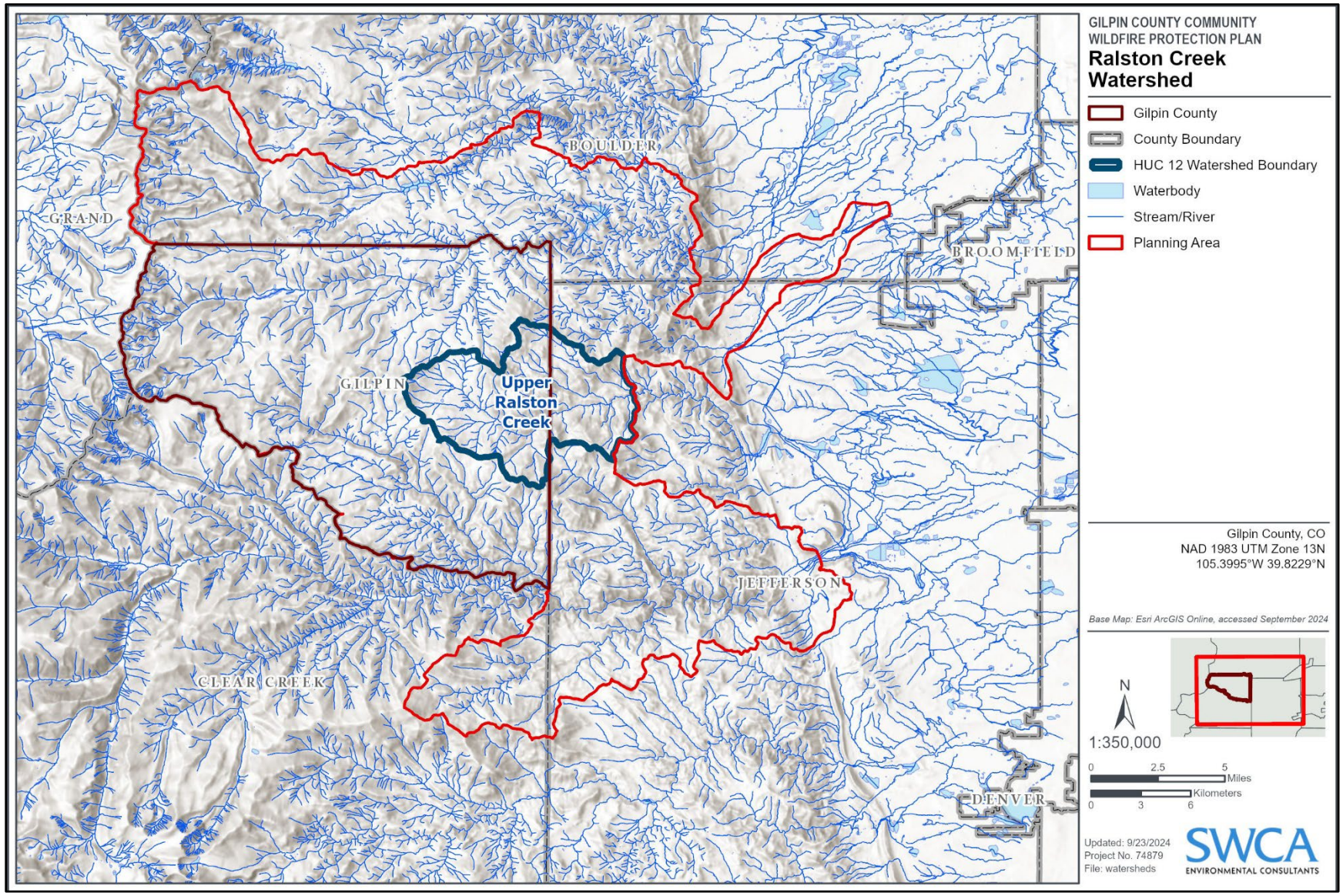


Figure 2.22. Ralston Creek Watershed within the watershed planning area.

COAL CREEK

Coal Creek is the smallest of the watersheds in Gilpin County, covering an area of 540 acres in the county (Figure 2.23). The remaining acreage drains into Boulder and Jefferson Counties to the east. The Beaver Creek headwaters are the only tributary of Coal Creek in the county, located near the northeast corner of the county boundary. Through its reach in the County, the watershed travels across undeveloped land that is primarily privately owned with a small amount of National Forest land intermixed. Vegetation along the creek is primarily lodgepole pine forest with some mixed conifer and riparian woodland. There are also wet meadowlands where the creek flows into small ponds near the county border. Although the watershed has little influence within the county, in lower elevations to the east, the creek becomes an important water source for residential and agricultural use. East of the county, Coal Creek flows into the St. Vrain Creek before connecting with the South Platte River in Weld County. Due to its downstream importance for Front Range communities, managing adjacent forests for fire resilience is key to maintaining this critical water resource. Cross-jurisdictional management efforts will be needed with consideration for the diverse downstream stakeholders invested in the watershed.

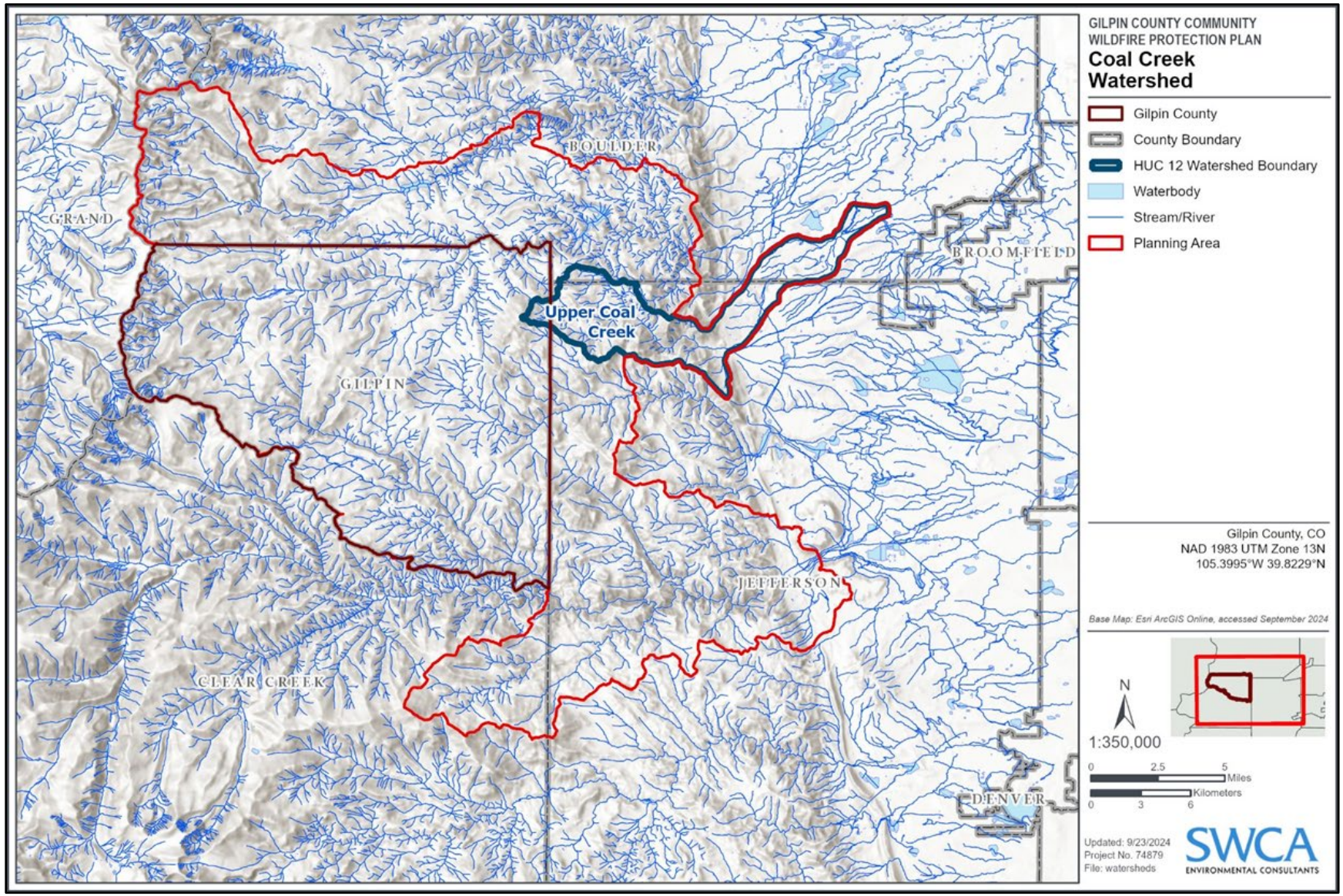


Figure 2.23. Coal Creek Watershed within the watershed planning area.

OVERARCHING IMPORTANCE

Gilpin County's watershed environment is critical not only for the health and well-being of those within Gilpin County, but also for the large portion of the Front Range reliant on water sources that originate or flow through the county. Gilpin County contains multiple headwaters streams which can be more heavily impacted by wildfire events (Mellon 2008). Additionally, given the high reliance of the Front Range on water resources that flow through the county, wildfires in the county have the potential to diminish water quality and supply to adjacent counties. To be a good neighbor to downstream counties and water users, Gilpin County strives to maintain resilient watersheds and prioritize wildfire mitigation actions that reduce potential watershed impacts or post-fire watershed hazards.

Gilpin County has a high number of structures and critical infrastructure that are potentially at risk from post-fire flooding, debris flows, and increased erosion. Particularly in the southern portion of the county, development is somewhat limited to stream adjacent locations due to the steep, canyon topography of the area. Fostering streams and tributaries that are buffered from potential wildfire impacts or resilient to decreased vegetation is important for protecting life and property of residents, economically significant structures, and other critical infrastructure.

Figure 2.24. Alpine lake in Gilpin County; view facing east toward east portal.

CHAPTER 3 – WILDFIRE RISK-HAZARD ASSESSMENT

Disclaimer

The purpose of this risk assessment is solely to provide a community and landscape-level overview of general wildfire risks within the assessment area as of the date hereof, and to provide a potential resource for community pre-fire planning. This risk assessment is premised on various assumptions and models that include and are based on data, software tools, and other information provided by third parties (collectively, "Third-Party Information and Tools"). SWCA, Incorporated, doing business as SWCA Environmental Consultants ("SWCA"), relied on various Third-Party Information and Tools in the preparation of this risk assessment, and SWCA shall have no liability to any party in connection with this risk assessment including, without limitation, as a result of incomplete or inaccurate Third-Party Information and Tools used in the preparation hereof. This risk assessment may not be relied on by any party without the express written consent of SWCA. SWCA hereby expressly disclaims any responsibility for the accuracy or reliability of the Third-Party Information and Tools relied on by SWCA in preparing this risk assessment. SWCA shall have no liability for any damage, loss (including loss of life), injury, property damage, or other damages whatsoever arising from or in connection with this risk assessment, including any person's use or reliance on the information contained in this risk assessment. Any reproduction or dissemination of this risk assessment or any portion hereof shall include the entirety of this plan disclaimer.

PURPOSE

Upon completion of a Quantitative Wildfire Risk Assessment for the planning area, land use managers, fire officials, planners, and others can begin to prepare strategies and methods for reducing the threat of wildfire, as well as work with community members through outreach and education regarding methods for reducing the damaging consequences of fire. A Quantitative Wildfire Risk Assessment can also aid in the identification and prioritization of fuel treatments based on where wildfire risk is greatest. The fuel reduction treatments can be implemented on both private and public land, so community members can actively apply the treatments on their properties, as well as support treatments on public land that they care about. For more information about fuels treatments, see Chapter 5, Wildfire Mitigation Strategies.

Detailed information on the modeling process is provided in Appendix D.

See Appendix E for fuel treatment types and methodologies. Appendix F contains resources for homeowners, and Appendix J provides a list of funding sources.

MODELING THE FIRE ENVIRONMENT

The wildland fire environment consists of three factors that influence the spread of wildfire: fuels, topography, and weather (see Chapter 2). Understanding how these factors interact to produce a range of fire behavior is fundamental to determining treatment strategies and priorities in the WUI. In the wildland environment, vegetation (alive or dead) is synonymous with fuels. When sufficient fuels for continued combustion are present, the level of risk for those residing in the WUI is heightened.

To understand wildfire modeling it is important to be aware of how wildfire spreads. Wildfire spreads via surface fire (Figure 3.1), crown fire (Figure 3.2), and spotting (Figure 3.3) with all three commonly occurring during red flag conditions. Active crown fire is when surface fire "ladders" up into the upper levels of the forest canopy and spreads through the tops (or crowns) independent of, or along with, the surface fire, and is often beyond the capabilities of suppression resources. There are two types of crown fire: active and passive. Active crown fire (see Figure 3.2) is when fire spreads actively from tree to tree. Passive crown fire is when ground fuels establish in ladder fuels and torch or burn individual tree crowns.

Figure 3.1. A low-intensity surface fire. Source: photograph by Brandon Oberhardt, USFS (2016).

Figure 3.2. Active crown fire. Source: photograph by Mike McMillan, USFS (2013).

Figure 3.3. Spotting, in which embers are lifted and carried with the wind ahead of the main fire and ignite receptive fuels, including homes. Photo credit: Boulder Fire-Rescue.

If embers are plentiful and/or long range (>0.5 mile), rates of spread and resistance to control can be very high. Ember load index throughout the planning area is quantified and illustrated in Figure 3.4. An ember load index is a value describing the relative load of embers a pixel on the landscape experiences given landscape burn probability, weather, topography, and fuels. See Appendix D for a more detailed description of modeling methodology.

Surface fires are when the flaming front remains on the ground surface (in grasses, shrubs, small trees, etc.) and control is significantly more manageable than active crown fires.

Active crown fires are extremely difficult to control. Removing ladder fuels and reducing fuel loading near communities before a fire ignites is the best way to limit crown fire and reduce wildfire risk.

Crown fire and spotting activity have been a concern for fire managers, particularly under extreme weather conditions. In areas where homes are situated close to timber fuels and/or denser shrubs and trees, potential spotting from intensely burning fuels to adjacent unburned fuels should always be acknowledged (see Figure 3.3). See the Ember Ignition Hazard subsection and Figure 3.4 for a diagram and explanations describing the factors that affect ember production and travel.

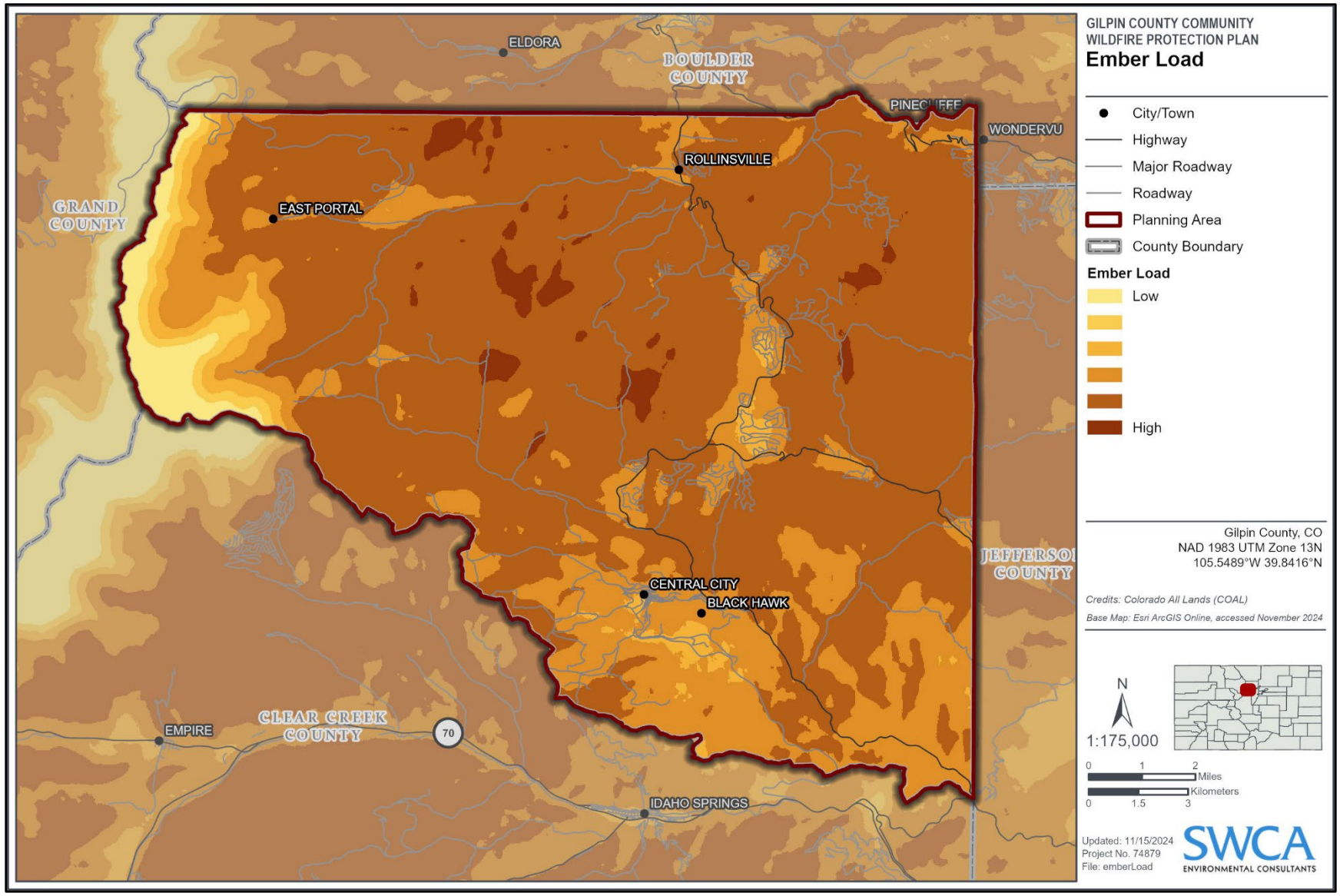


Figure 3.4. Ember load index values for the planning area.

COLORADO ALL LANDS QUANTITATIVE RISK ASSESSMENT

The COAL Quantitative Wildfire Risk Assessment developed by Pyrologix was created collaboratively with CSFS and USFS experts. The purpose for developing this risk assessment was to provide the communities of Colorado with a standardized assessment of hazard, vulnerability, and risk across the landscape using state- of- the- art modeling methods and up- to- date source data on existing conditions. This allows officials and land managers to compare risk across jurisdictional boundaries and apply successful strategies in reducing wildfire risk in multiple communities throughout Colorado. Many of the shortcomings of previous wildfire risk assessments have been addressed and accounted for in the COAL Risk Assessment. Important examples include:

- Recalibrating the Colorado fuelscape to account for past disturbances (wildfires)
- Recalibrating the burnability of urban and agricultural fuels in fire behavior modeling
- Removing data seam lines
- Utilizing a set of collaboratively approved HVRAs standardized across Colorado.

The COAL Quantitative Wildfire Risk Assessment is a unique tool for evaluating the risk of wildland fires to communities within the WUI areas of the county. In the context of wildfire risk modeling, risk is a combination of hazard and vulnerability. Although many definitions for risk exist, for the purpose of this document, risk is a product of four factors defined by the Quantitative Wildfire Risk Framework (Figure 3.5):

Burn probability is the likelihood of 30-square-meter pixel burning.

Intensity is an expression of the rate of energy release (kW/m) and is used to describe heat of combustion, fuel consumed, and linear rate of spread.

Exposure is the proximity of HVRAs to hazards on a landscape (e.g., homes in the WUI or a source watershed in an alpine environment).

Susceptibility is a measure of how easily an HVRA is damaged by wildfire. Resiliency is a common term used to describe the susceptibility of an HVRA.

Figure 3.5. Pyrologix's Quantitative Wildfire Risk Framework for the COAL Quantitative Wildfire Risk Assessment, derived from Scott et al. (2013).

A detailed methodology of the COAL Quantitative Wildfire Risk Assessment can be found in Appendix D, Fire Behavior Modeling/GIS Background and Methodology.

An overview of wildfire **hazards** (frequency and severity) can be found in Figure 3.6. Factors used to determine wildfire hazard include the predicted fire behavior if a wildfire were to occur represented by outputs such as flame length, rate of spread, and fire line intensity. These fire behavior outputs are directly influenced by fuel type, fuel density, and crown height, as well as other landscape characteristics such as slope and aspect. Notice that wildfire hazard is greatest in areas with steep topography and high fuel loading such as the steep forested slopes of the Front Range.

Looking at **vulnerability**, the above equation is a function of the exposure and susceptibility of values on the landscape, based on their position and the intensity of expected fire. Vulnerability for communities in Gilpin County was assessed via Field-Based Community Hazard Assessments, see below.

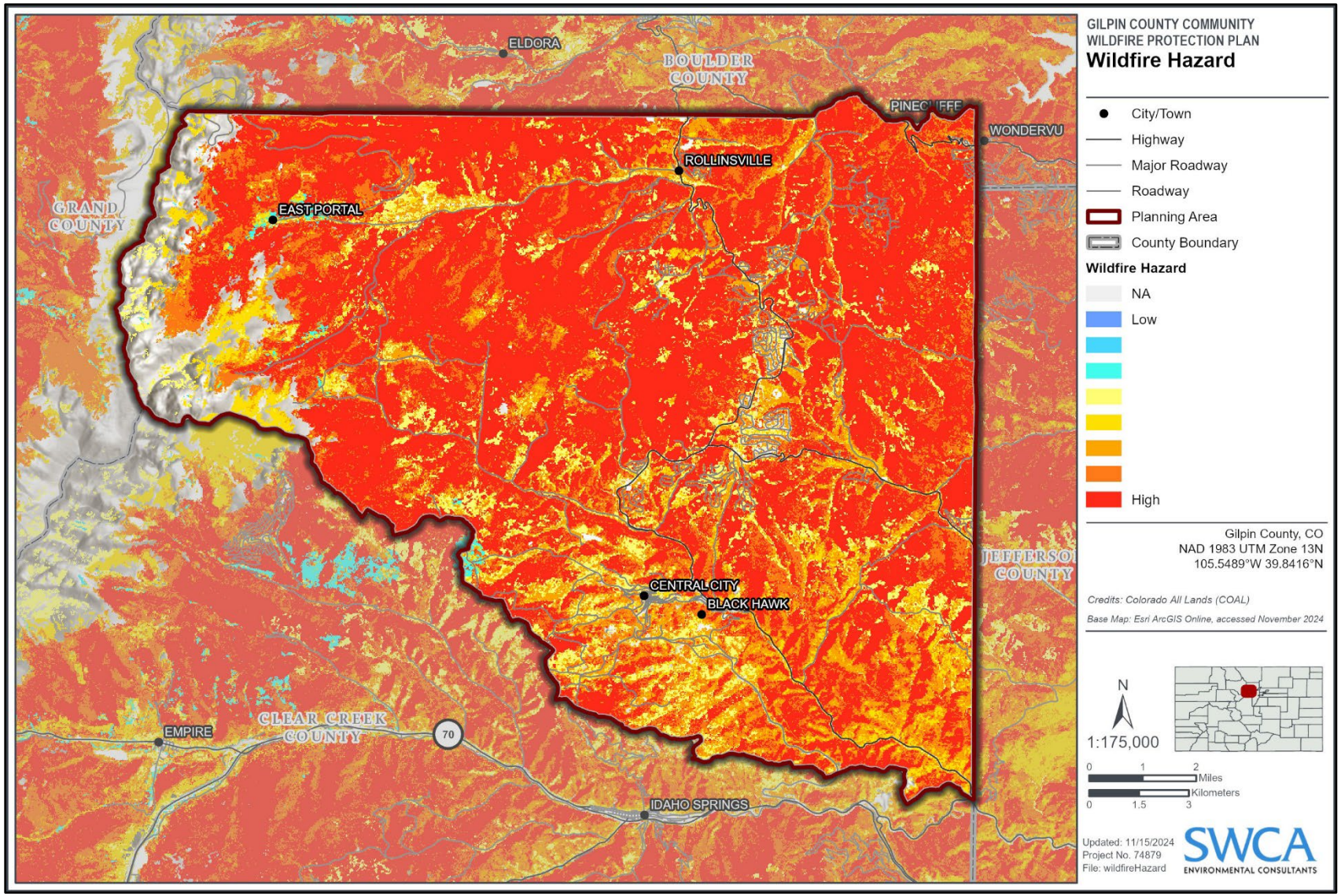


Figure 3.6. Wildfire hazard across the Gilpin County CWPP planning area. Wildfire hazard is modeled from the probability of the landscape burning and the predicted fire behavior when it does. See Appendix D for a detailed modeling methodology.

Source: COAL Quantitative Wildfire Risk Assessment (Pyrologix 2022a).

WILDFIRE RISK IN GILPIN COUNTY

Wildfire risk in Gilpin County is quantified using the COAL Quantitative Wildfire Risk Assessment and is further defined through field-based community hazard assessments, see below. Wildfire risk in Gilpin County is most influenced by modeled wildfire behavior, burn probability, and proximity of structures to wildland fuels. Wildfire behavior is a direct result of wildfire hazard, which is quantified in Figure 3.6 and is a composite dataset comprised of modeled wildfire behavior metrics such as flame length and rate of spread. Burn probability is quantified in Figure 3.7 and is the result of simulating thousands of wildfires in the county and measuring how many times any given location burned. The distance of structures to wildland fuels, also known as exposure, is represented in Figure 3.8 as wildfire risk to assets. In Figure 3.9 assets include structures, infrastructure such as communication sites and powerlines, and drinking water watersheds. In Figure 3.9 high wildfire risk occurs where assets overlap high wildfire hazard and burn probability.

Additionally, included in Figure 3.9 is a map showing wildfire risk across the landscape in Gilpin County. Figure 3.9 displays expected wildfire risk to potential structures and answers the question: “What would the wildfire risk be if a structure were to occur there?” This map is useful when determining the wildfire risk of new developments and understanding wildfire risk on a broader landscape scale.

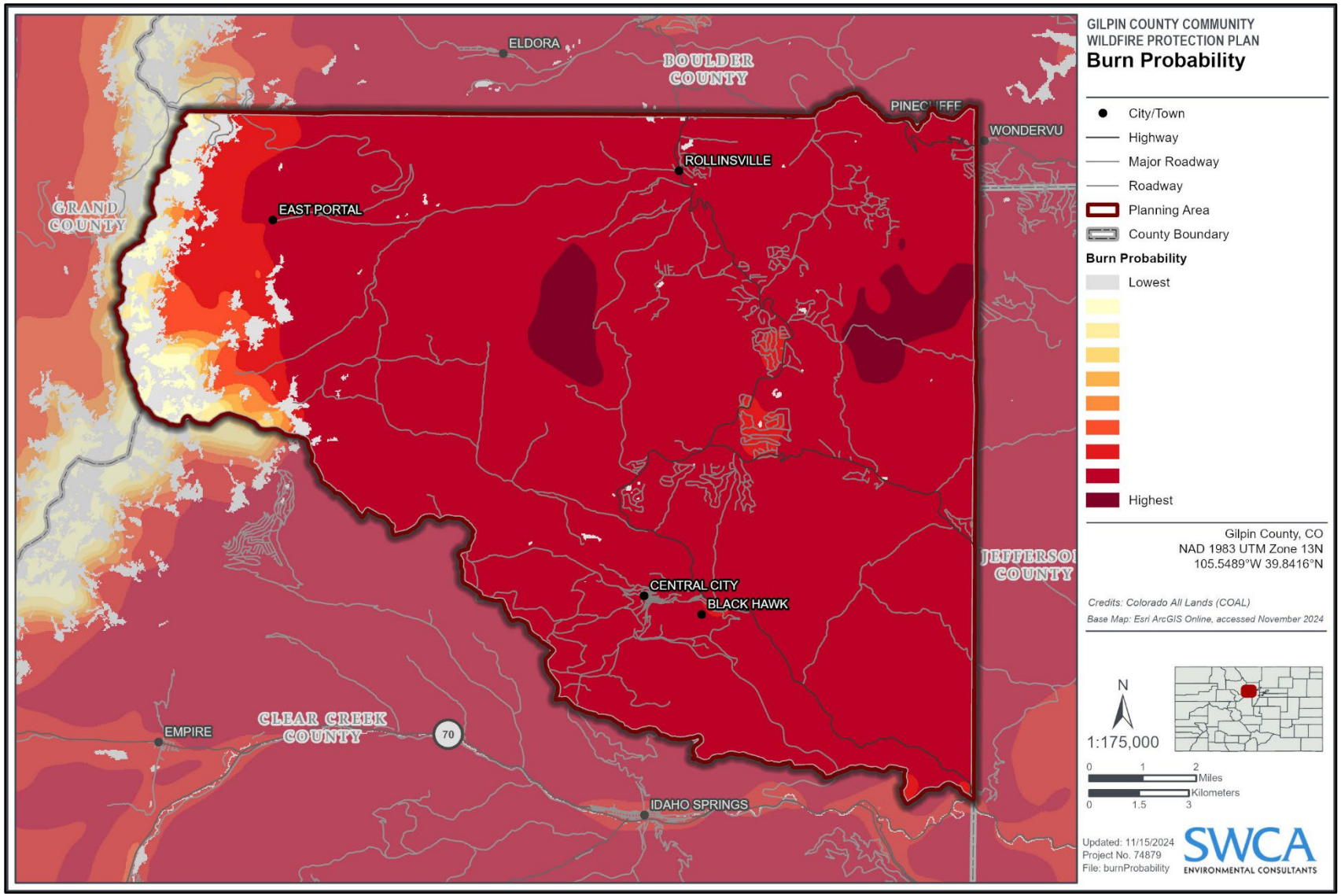


Figure 3.7. Burn probability across Gilpin County. Burn probability is calculated through simulating thousands of fires and summarizing how many times a given area burned. See Appendix D for a detailed modeling methodology.

Source: COAL Quantitative Wildfire Risk Assessment (Pyrologix 2022a).

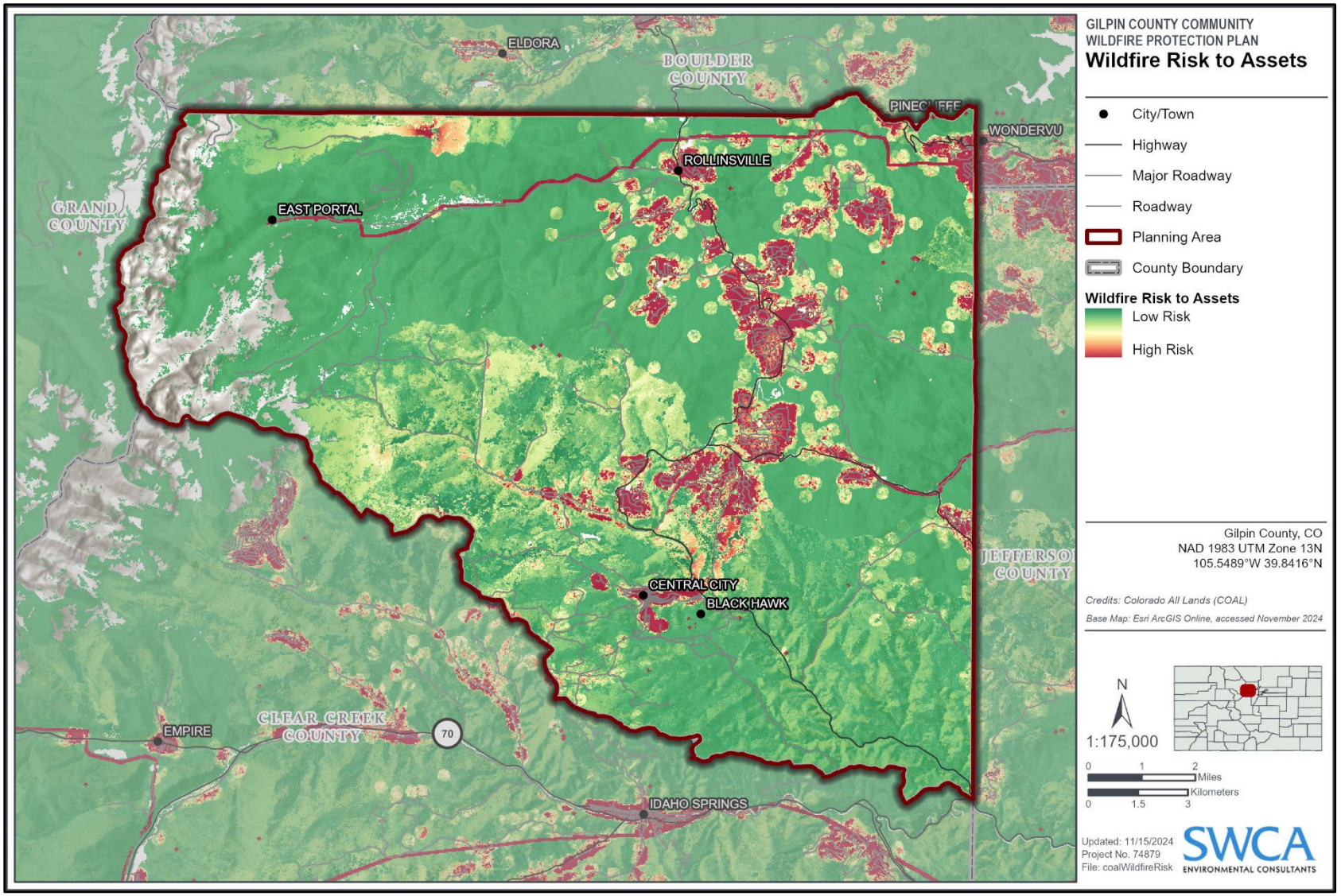


Figure 3.8. Wildfire risk to assets across Gilpin County. This map shows the modeled wildfire risk of existing assets which include structures, infrastructure, and important municipal watersheds. See Appendix D for a detailed modeling methodology.

Source: COAL Quantitative Wildfire Risk Assessment (Pyrologix 2022a).

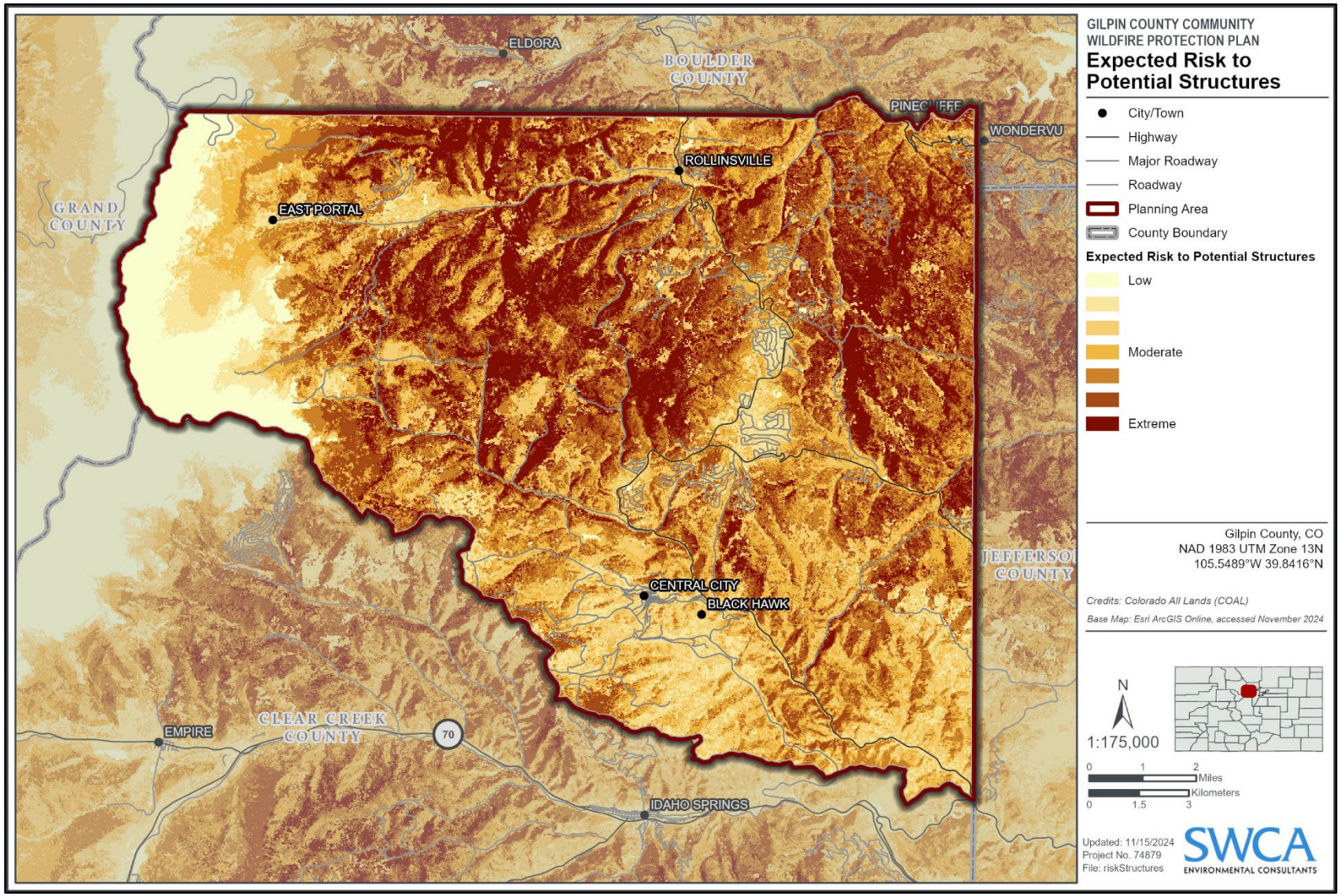


Figure 3.9. Expected Risk to Potential Structures across Gilpin County. This map shows what wildfire risk for a structure would be if it were to occur in any given location. See Appendix D for a detailed modeling methodology.

Source: COAL Quantitative Wildfire Risk Assessment (Pyrologix 2022a).

EVACUATION CAPABILITIES

The Gilpin County Office of Emergency Management is dedicated to ensuring the safety and preparedness of its residents and visitors in the face of wildfires. This mission involves effective preparation, efficient response, and thorough recovery from wildfire incidents. The office also ensures that safety plans are in place for large events within the county, providing a secure environment for all attendees (Gilpin County Emergency Management 2024).

Given the frequent occurrence of wildfires in the Front Range, evacuations have become increasingly common. The adage "when in doubt, get out" is heavily promoted, as rapidly changing fire conditions can sometimes prevent formal evacuation notifications. Personal vigilance and preparedness are crucial. (Gilpin County Emergency Management 2024).

- **Shelter in Place**: In certain wildfire scenarios, remaining indoors might be safer than attempting to evacuate, especially when evacuation could increase danger due to hazardous conditions. Shelter in place should only be used as a last resort if evacuation is not possible.
- **Pre-Evacuation**: This phase involves being ready to leave on short notice. Residents should prepare emergency kits, secure transportation, and make arrangements for pets and livestock.
- **Mandatory Evacuation**: When ordered, residents must evacuate immediately. Following provided escape routes and instructions ensures safety, as other routes might be impassable due to fire.

For residents needing special assistance, the Gilpin County Sheriff's Office offers support (call 303-582-5500). In emergencies, always dial 911.

Gilpin County has upgraded its emergency notification system to better serve residents during wildfire emergencies (Gilpin County 2024b). The new system, Hyper-Reach, is a high-speed telephone emergency notification service that allows county officials to deliver pre-recorded information to targeted areas or the entire county (Gilpin County 2024b). This system is crucial in situations such as wildfires, where residents need to be quickly informed to take appropriate actions to safeguard life and property.

Residents can register for emergency alerts here: Hyper-Reach Signup Page for Gilpin County

The 2020 Gilpin County Comprehensive Plan identifies key evacuation routes and corridors critical during wildfires, including CO 119, CO 72, CO 46, Gap Road, and S Beaver Creek (Gilpin County 2020). These routes are crucial for safe and efficient travel during wildfire emergencies. The plan also specifies "time until fire arrival" for several key roads, helping to prioritize evacuation and safety measures (Gilpin County 2020). Residents should familiarize themselves with these routes and the associated timelines to better prepare for potential evacuations. The 2020 Gilpin County Comprehensive Plan also stresses the importance of ensuring adequate evacuation routes, conducting roadside thinning, and improving emergency preparedness and response capabilities (Gilpin County 2020). Coordination among local fire departments and agencies is crucial for effective emergency management.

The safe and efficient evacuation of people from wildfire requires several factors including evacuation routes, emergency notification methods, preplanning, public awareness, and a community emergency response team. Gilpin County has established evacuation zones that will be used by county OEM, sheriff's department, and fire response personnel to coordinate and direct evacuation during an emergency. Figure 3.10 below illustrates the evacuation zones. SWCA has outlined several resources and recommendations for evacuation planning and procedures in the Evacuation Resources section of

Appendix A. **Current evacuation orders should always be adhered to and supersede all information presented in the CWPP.**

Evacuation Route Risk and Road Entrapment Analysis

Open and operational roads are vital components of efficient and successful evacuation not only during wildfire incidents but any disaster necessitating the egress of many people from a location.

Excess fuel loads along escape routes may create challenges for evacuation in the planning area in the event of a wildfire. In addition, road grade, curvature (sinuosity), length, surface material (e.g., paved vs. unpaved), connectivity (e.g., local access road vs. main transportation corridor), stability (e.g., bridged vs. unbridged), and adjacent structure density contribute to potential evacuation complications.
The evacuation route analysis as shown in Figure 3.11 involves assessing road features, including road curvature, grade, length, surface material, connectivity, stability (bridged vs. unbridged), and adjacent structure density to estimate the potential risk that the road may pose during an evacuation. It should also be noted that analysis outputs were adjusted based on Core Team input.

The results shown in these maps contribute to understanding the overall risk to evacuation routes but do not provide recommendations for specific ingress or egress routes and should not be considered an evacuation map. Instead, this analysis highlights areas that may require roadside vegetation management and other mitigation efforts to improve safety during an evacuation scenario. Refer to the 2020 Gilpin County Comprehensive Plan for pre-identified key evacuation routes and travel corridors.

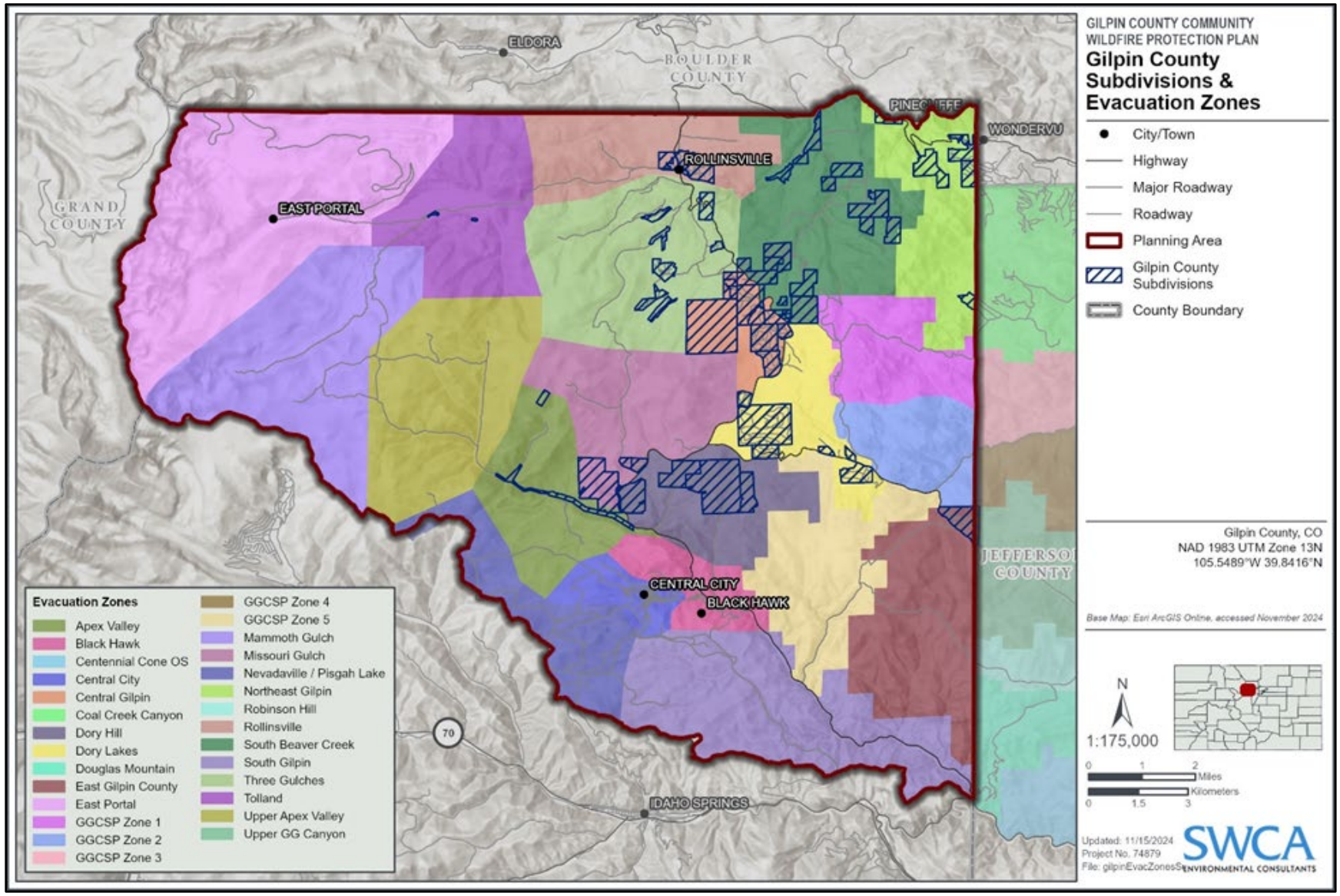


Figure 3.10. Gilpin County evacuation zones shown with major subdivisions.

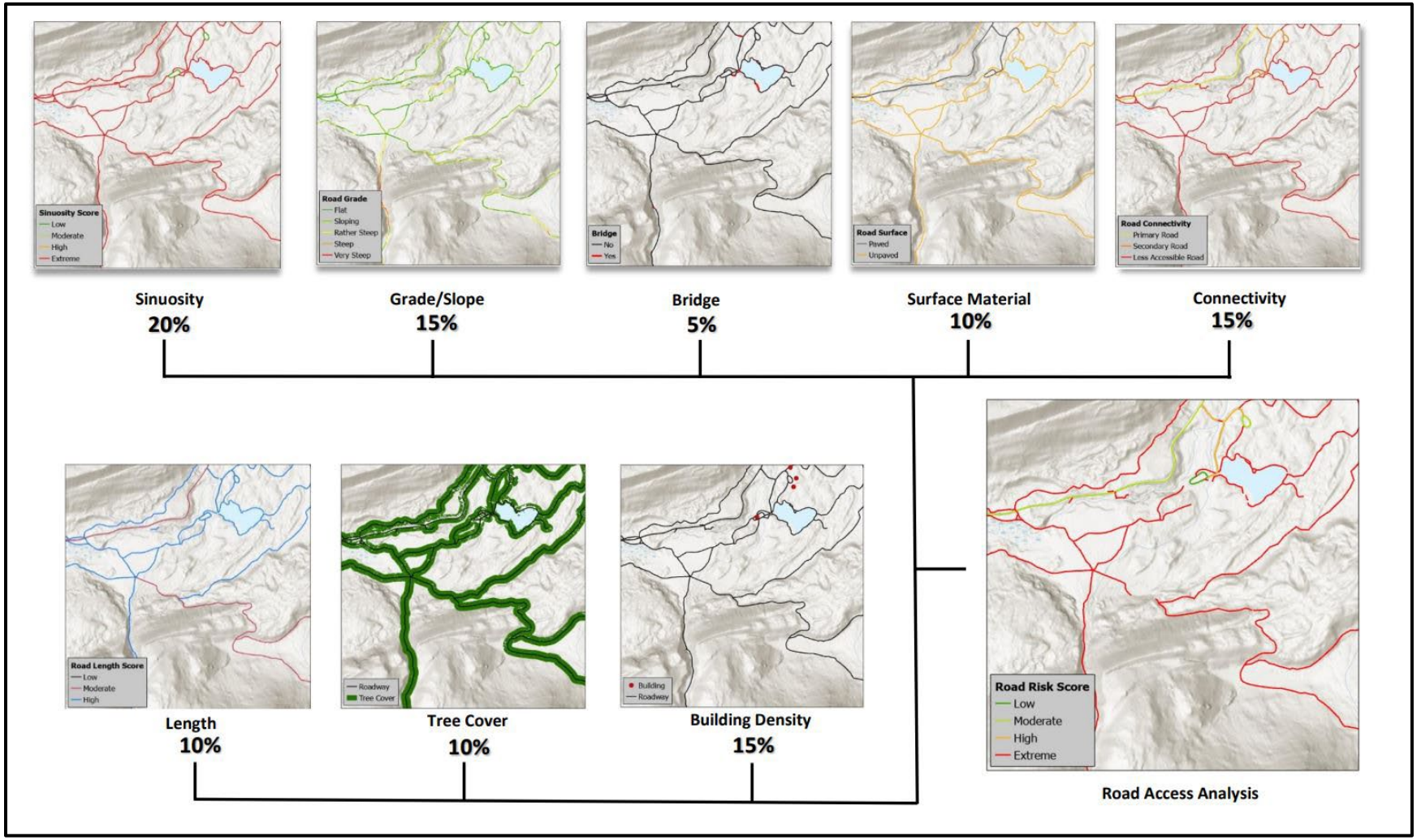


Figure 3.11. Shown are the eight critical inputs used to assess road access and potential evacuation risks during a wildfire, including sinuosity, grade/slope, bridge presence, surface material, connectivity, length, tree cover, and building density.

Route Risk Analysis

The results of SWCA's evacuation route analysis are shown in Figures 3.12 through 3.15. This analysis does not consider evacuation scenarios or modeling of traffic flows and should not be used to inform an active evacuation. The analysis is designed to inform and prioritize vegetation treatments alongside key roadways or identify roadways that could benefit from maintenance to facilitate safer evacuation.

Our results show that 60% (468 miles) of the roads in Gilpin County are at high to extreme risk of impeding evacuation. The main transportation corridors, such as Colorado State Highway 119, Colorado Highway 46, Apex Valley Road, and Tolland Road mostly received overall low risk ratings; however, specific parts of these roads received medium, high, or even extreme risk ratings. Generally, the higher risk areas on these major roads are typically in areas where the road is steep and surrounded by forests or where structure density is high close to the road.

Many of the smaller roads in the county received high and extreme risk ratings. These roads are generally unpaved County or USFS roads and are likely of minor concern (unless they are popular with recreators). However, some of these high and extreme risk roads are residential and exurban roads. Of note are the roads surrounding Fourmile Gulch, Russell Gulch, Lump Gulch, Gamble Gulch, Nevadaville, Rollinsville and the many roads connecting communities to the main transportation corridors. These roads are typically narrow, steep, frequently unpaved, and surrounded by overhanging trees. These roads could create high risk for effective evacuation in the event of wildfire.

It should be noted that the transportation routes connecting Tolland to Apex Valley Road should be assessed for potential entrapment and risk. It is important to reduce risk to routes connecting populus parts of the county, allowing for multiple egress routes or a secondary route in the event primary routes are obstructed. Another example of a secondary route that should be considered for risk reduction is Smith Hill Road in the eastern part of the county connecting highway 119 to highway 46.

Detailed information regarding additional wildfire risk products is provided in Appendix D, Fire Behavior Modeling/GIS Background and Methodology.

This analysis was completed to identify road routes with elevated risk of entrapment or routes that may be dangerous to use during a wildfire event due to high levels of roadside vegetation, complex road systems, or other risk factors. During a wildfire, always follow the evacuation guidance of emergency responders and county officials as evacuation routes may change depending on the location and movement of a wildfire.

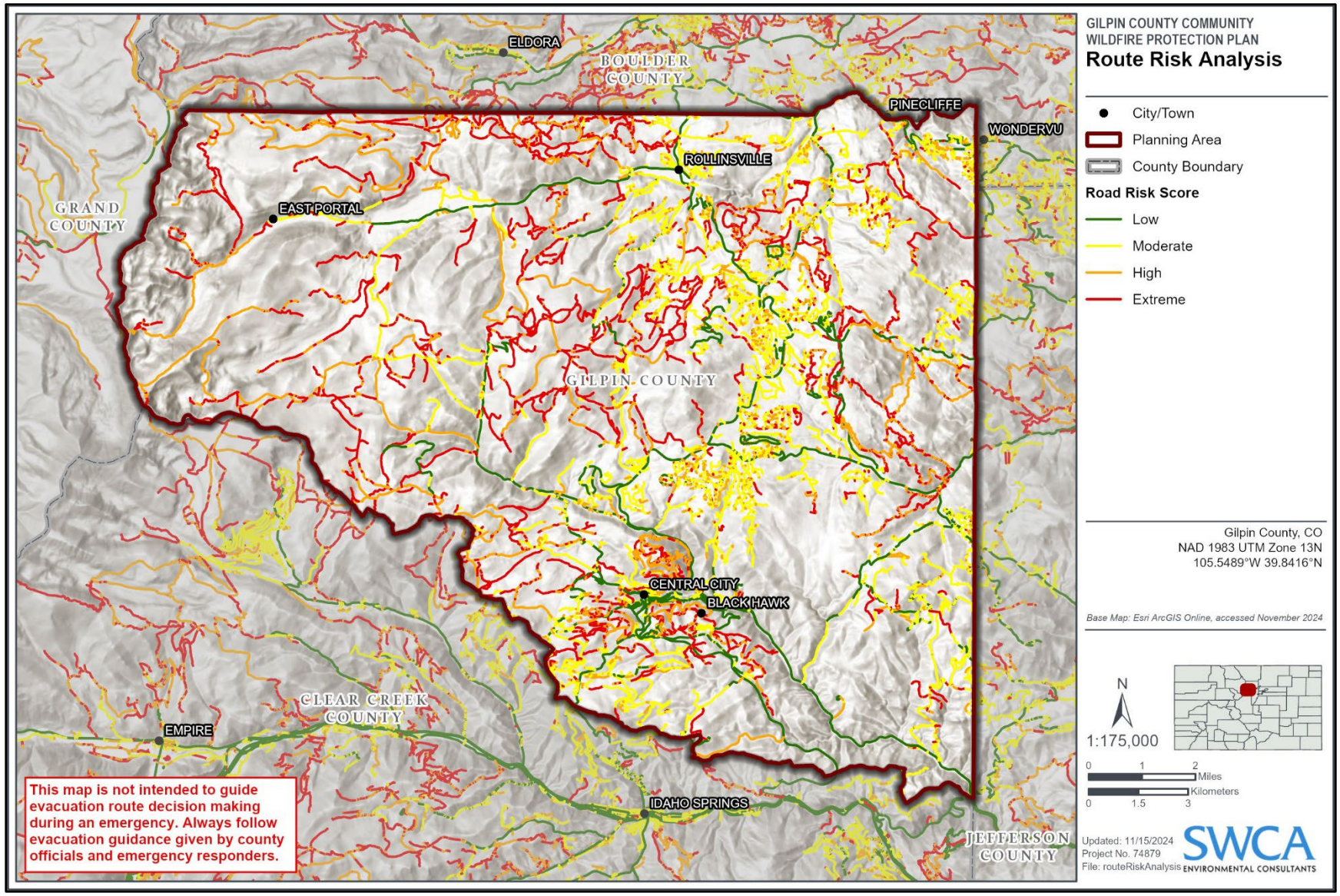


Figure 3.12. Route risk analysis of Gilpin County color-coded to indicate varying levels of evacuation risk, considering factors such as road curvature, grade, surface material, and adjacent structure density.

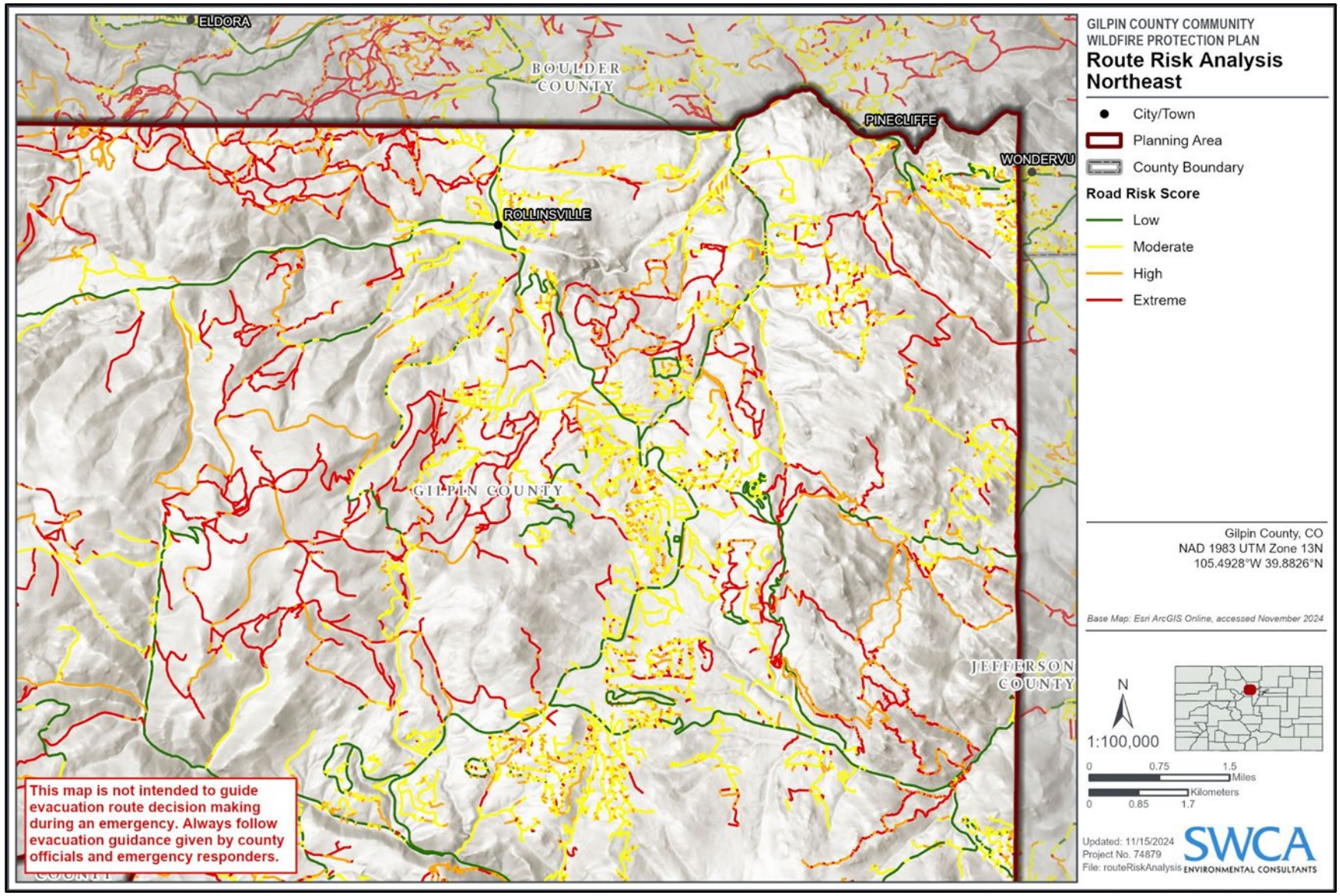


Figure 3.13. Route risk analysis of Gilpin County—Northeast.

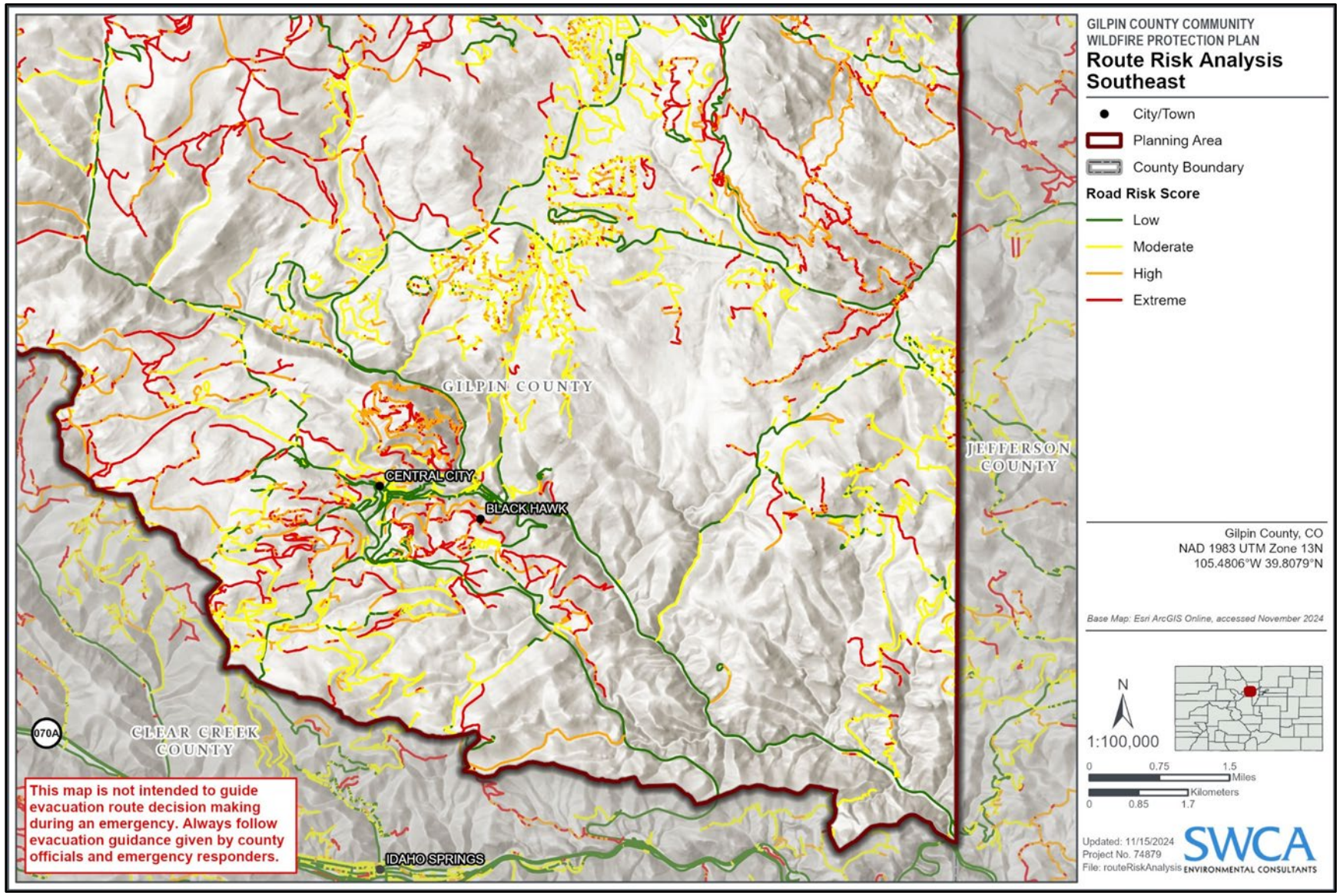


Figure 3.14. Route risk analysis of Gilpin County—Southeast.

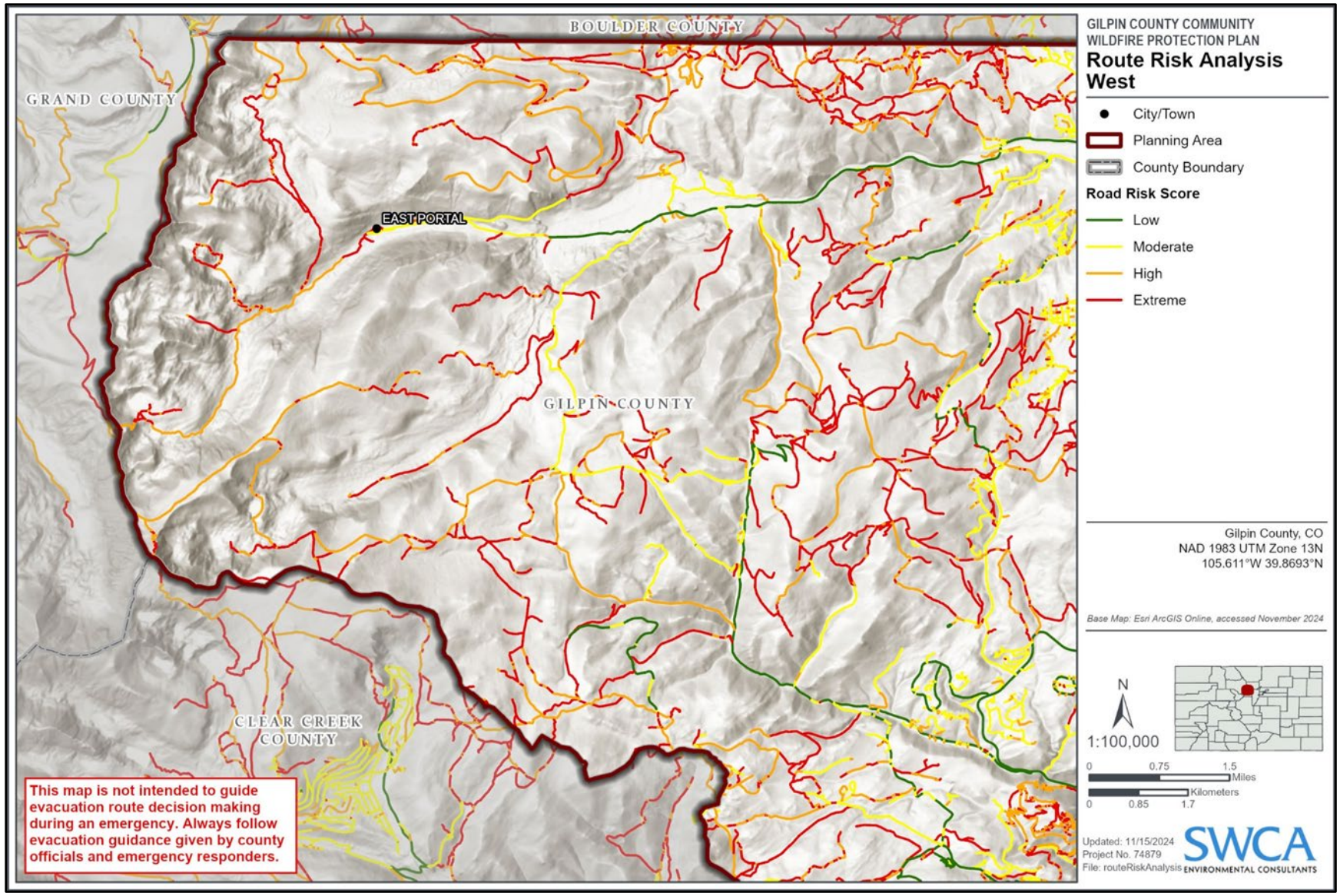


Figure 3.15. Route risk analysis of Gilpin County—West.

ROAD ENTRAPMENT ANALYSIS

The results of SWCA's road entrapment analysis are shown in Figures 3.16 through 3.19. Extreme fire behavior can create hazardous conditions along roadsides and potentially entrap vehicles and communities and prevent effective evacuation. Overall, 785 miles of roadway within Gilpin County were analyzed, of which 44.6% (350.6 miles) were identified as likely to jeopardize evacuation activities and/or cause entrapment. Overall, the majority of the main transportation corridors, such as Colorado State Highway 119, Colorado Highway 46, Apex Valley Road, Central City Parkway, and Tolland Road, would not create entrapment issues. However, portions of these roads, especially in areas where the road is surrounded by steep forests, have the potential for entrapment. The areas along the main transportation corridors that have been identified as high risk of entrapment should be prioritized for mitigation work such as fuel reduction and removal and creation of defensible space. While many of the minor roads in the county have the potential for entrapment, the roads of greatest concern are the smaller residential roads interconnecting communities in the gulches that connect to the major roadways and population centers. Many of these roads are steep, narrow, and/or surrounded by forest conditions. Local land managers and residents in these areas should be proactive (e.g., practice fuel reduction treatments on their properties) in reducing the risk of entrapment during a wildfire for their roads.

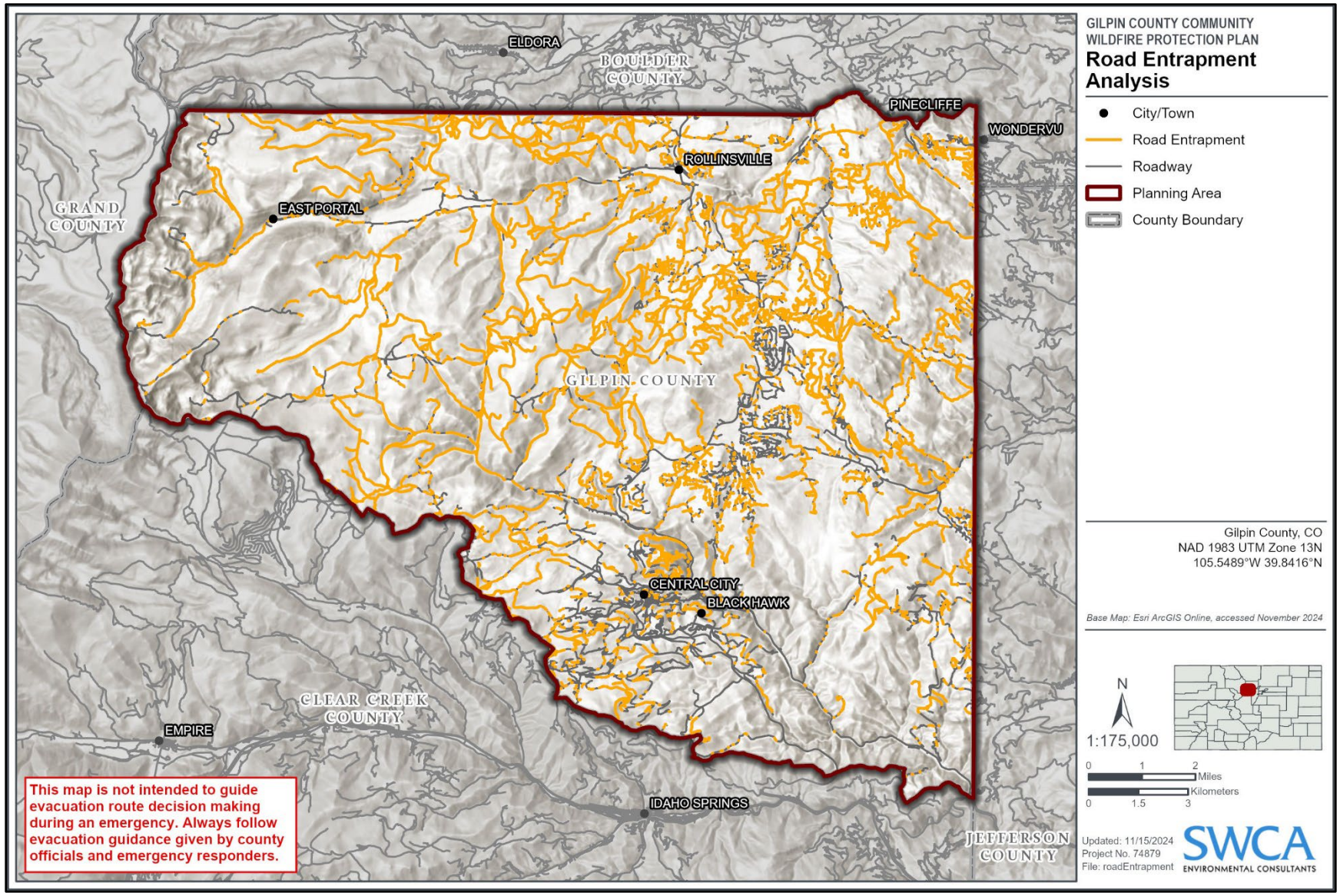


Figure 3.16. Road entrapment analysis in Gilpin County highlighting roads identified as high risk for entrapment during evacuation due to factors like steep grades, poor connectivity, and adjacent structure density.

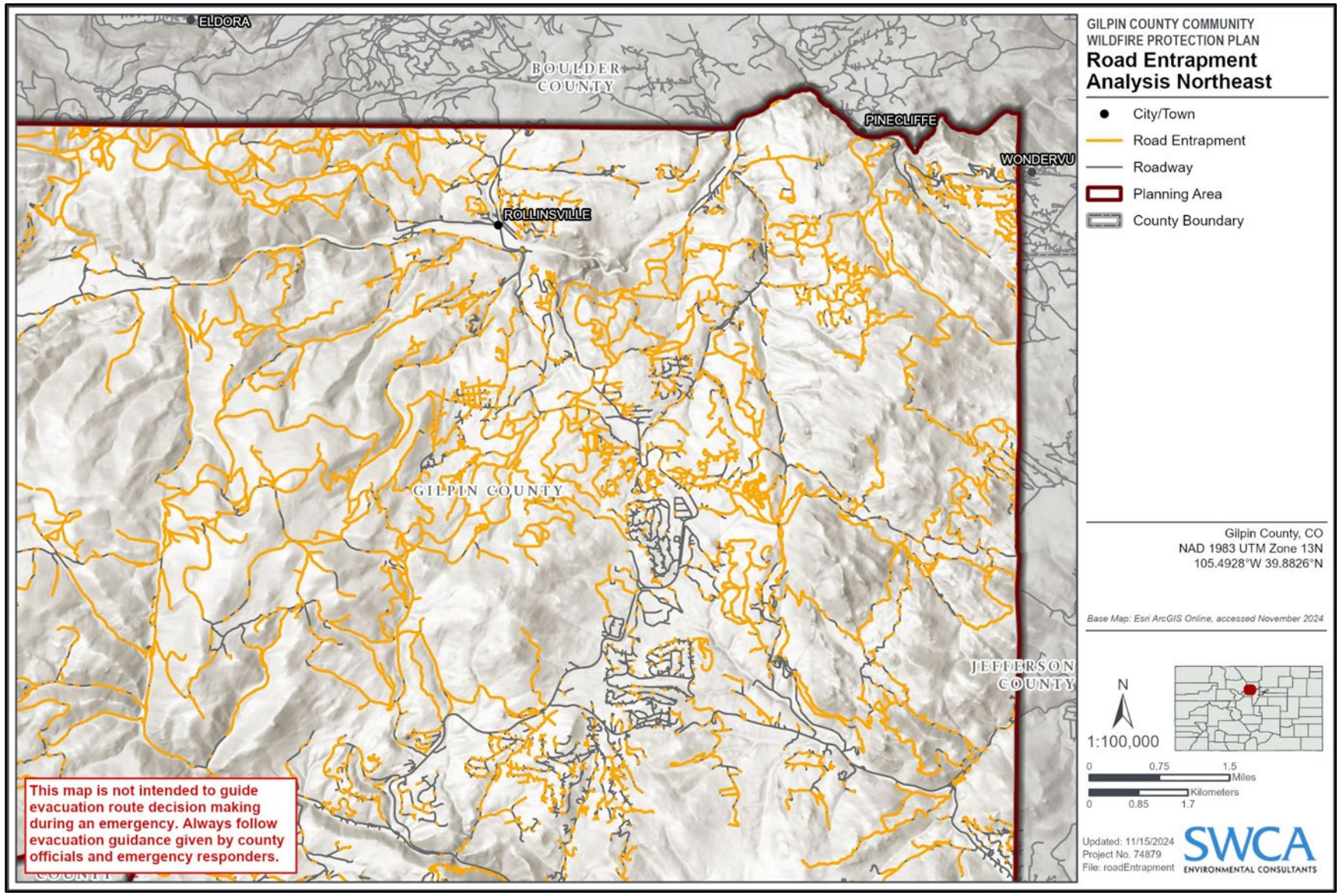


Figure 3.17. Road entrapment analysis in Gilpin County—Northeast.

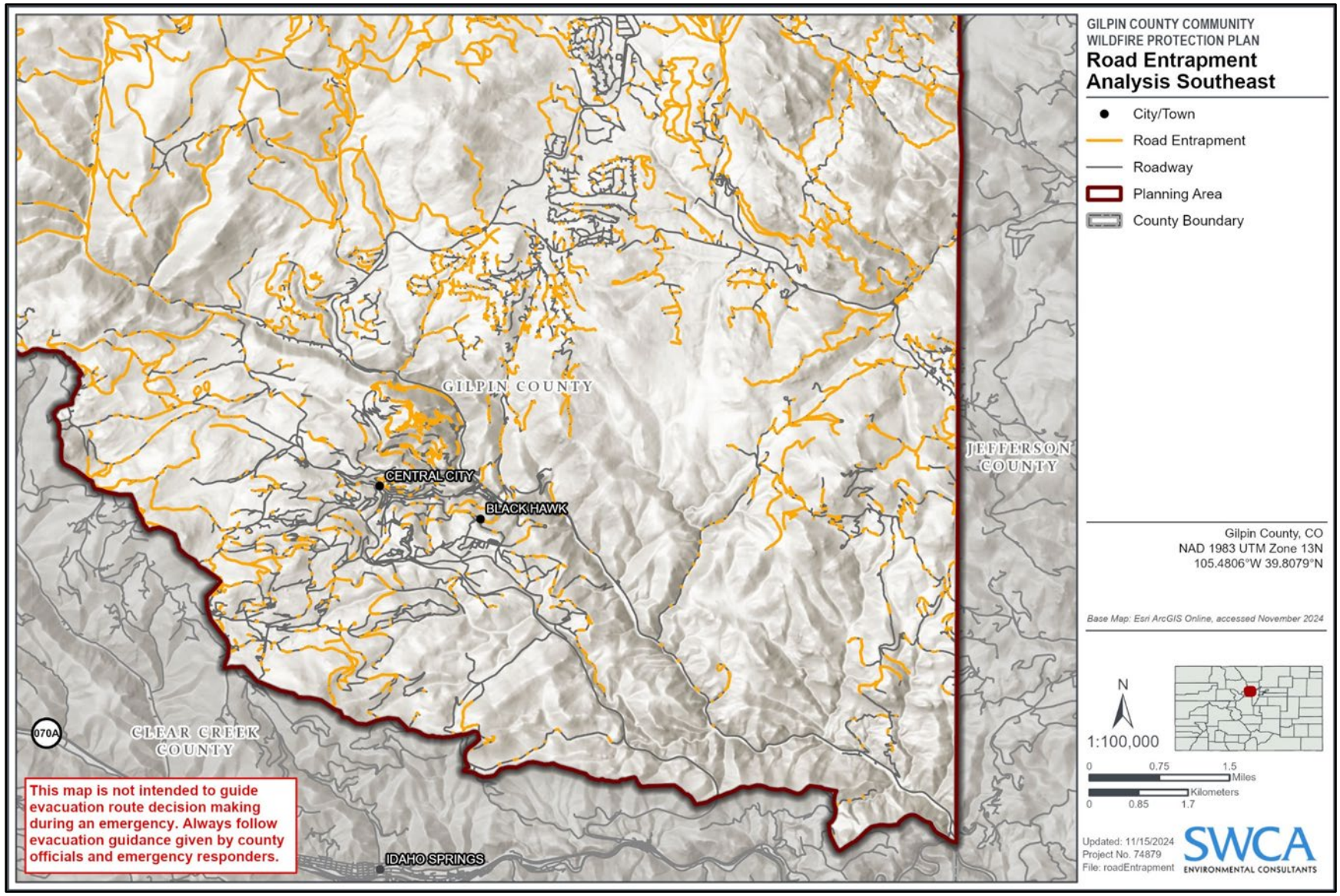


Figure 3.18. Road entrapment analysis in Gilpin County—Southeast.

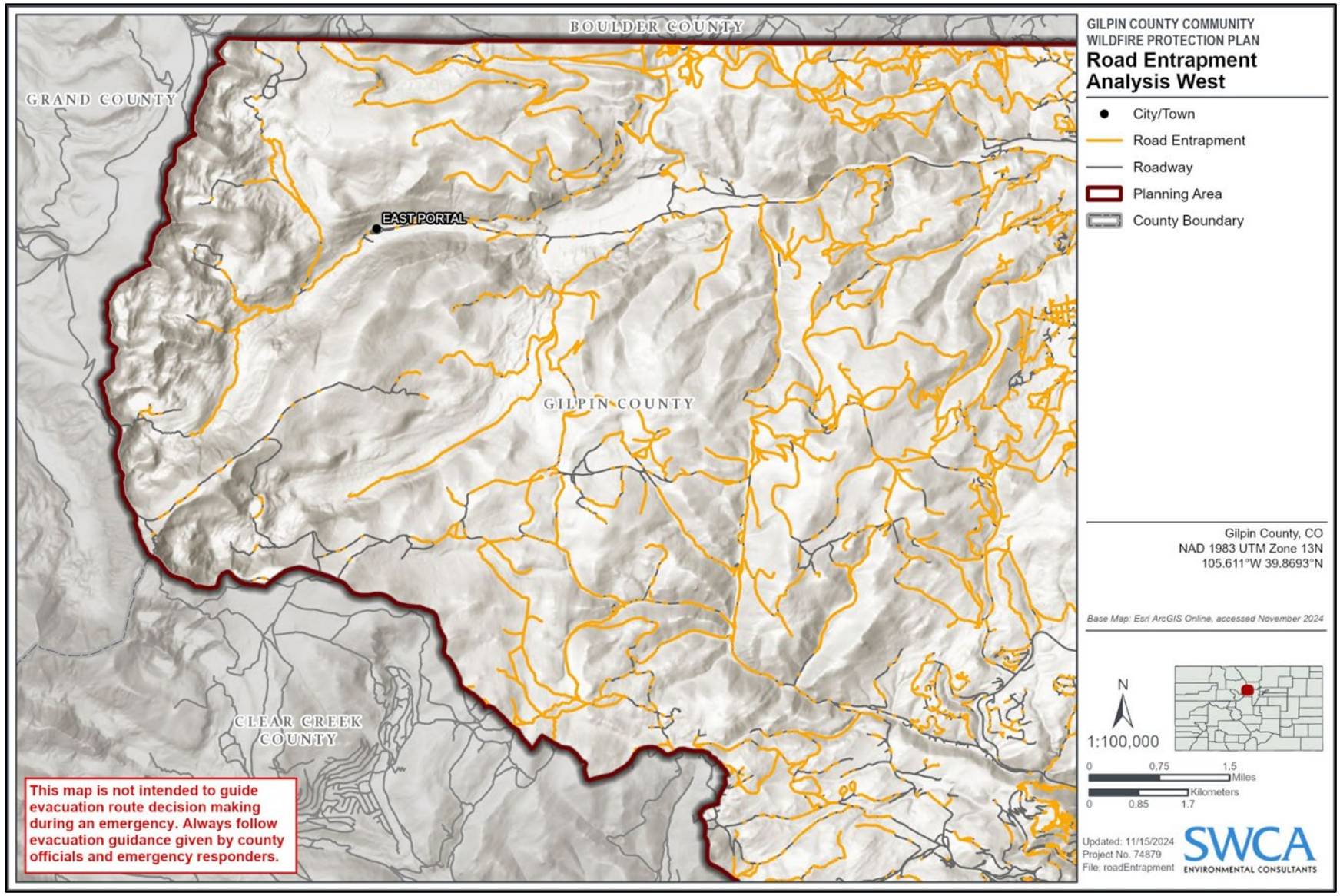


Figure 3.19. Road entrapment analysis in Gilpin County—West.

VALUES EXPOSED TO WILDFIRE HAZARD

Earlier compilation of the critical infrastructure in the planning area, coupled with the community assessments and Core Team input, has helped in the development of a list of values potentially exposed to wildland fire hazards.

Community values include natural, socioeconomic, and cultural resources (Figures 3.20–3.23). It is important to note that although the identification of community values can inform treatment recommendations, a number of factors must be considered in order to fully prioritize areas for treatment; these factors include treatment type, land ownership constraints, land access, available funding priorities, local risk rating, and other physical, social, or ecological factors.

The CWPP does not specifically identify every value that may be impacted by wildfire. Rather, areas at elevated risk from wildfire are identified and action in high-risk areas is further prioritized based on the presence of high value resources or areas with a high number of values potentially at risk.

NATURAL RESOURCES

The CWPP planning area has a variety of natural resources of particular concern to land managers, such as the natural and scenic waterways found in Mammoth Basin (Figure 3.20). Examples of natural values identified by the public and the Core Team include the following:

- Protected public lands Golden Gate Canyon State Park
- Portions of the Arapaho and Roosevelt National Forest and Pawnee National Grassland
- James Peak Wilderness area
- Local parks and recreational areas
- Trailheads and campgrounds
  - Moffat Tunnel East Portal Trailhead
  - Reverend's Ridge Campground
  - Cold Spring Campground
- Threatened and endangered species critical wildlife habitat
  - Preble's meadow jumping mouse
- Agricultural lands and livestock
- Scenic viewsheds
- Lakes, rivers, and other waterbodies
  - Clear Creek
  - South Boulder Creek
  - Golden Gate Canyon State Park Lakes
  - North Clear Creek
  - Apex Reservoir
- Watersheds and preservation of water quality
  - Clear Creek Watershed
  - South Boulder Creek Watershed
  - James Peak Watershed
  - St. Vrain Creek Watershed

Figure 3.20. Example of a natural value; Mammoth Basin (photo credit: Gilpin County Core Team 2024).

SOCIOECONOMIC RESOURCES

Social values include population, recreation, infrastructure, and the built environment (Figure 3.21). Infrastructure related to water use is important within the county as multiple critical watersheds traverse the county, influencing economic activity not only in the county, but also for bordering counties. Gilpin County's gambling industry, centered around its numerous casinos, represents a significant socioeconomic resource that could face substantial economic and operational risks from the impacts of wildfire. Other examples include the following:

- Communication infrastructure (e.g., cell phone and radio towers)
- Tourism values (casinos, hotel/motels, lodging, fair/exhibition/fairgrounds)
    - Central City/ Black Hawk Historic District
- Public safety infrastructure (e.g., power plants, dams, landfills, transmission lines, service towers, substations and public safety facilities (Police stations, fire stations, EMS stations, and hospitals)
- Transportation (highways, railroads, bridges, and tunnels)
- Post office
- Campgrounds and mobile homes
- Schools
- Mines and natural gas pipelines,
- Farms and ranches
- Care homes, senior housing, day care, and other group homes
- Water storage
- Water Intakes
- Water diversions
- Water treatment sites
- Recreation sites (e.g., trails, river access sites, parks)

Figure 3.21. Example of a socioeconomic VAR, the Union Pacific Railroad bypassing Rollinsville, Colorado, near receptive fuels and adjacent structures (Source: Gilpin County 2020).

CULTURAL RESOURCES

Many cultural resources and historical landmarks are scattered throughout the county (Figures 3.22 and 3.23). The following cultural values have been identified by the Core Team in the CWPP planning area:

- Central City Opera House
- Cemeteries
- Central City-Black Hawk Historic District
- Museums
- Historical landmarks
  - The Martin Foundry
  - Historic City Hall
  - Thomas Belcher House
  - Argo Gold Mine
  - Coeur d'Alene Mine
  - Historic Tallman Homestead
- Places of worship
- Schools
- Parks (Golden Gate Canyon State Park)
- Recreation sites (local parks, trails, river access sites)
- Peak to Peak Scenic Byway (Highway 119)

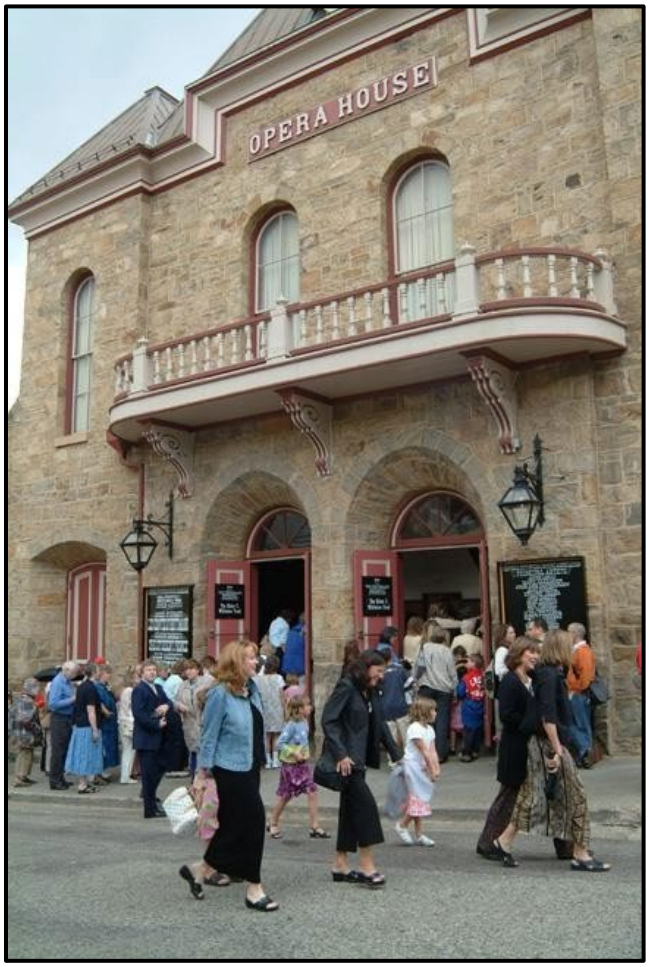


Figure 3.22. Example of a cultural VAR, the Central City Opera House built in 1878. (source: Advisory Council on Historic Preservation [ACHP] n.d.)

Figure 3.23. Example of a cultural VAR, Coeur d'Alene Mine. (source: Gilpin Historical Society n.d.)

SOCIAL VULNERABILITY

To create an equitable CWPP for Gilpin County, the planning process must include recognizing and incorporating the unique needs of socially vulnerable communities. The Federal Emergency Management Agency (FEMA) defines social vulnerability as the susceptibility of social groups to the negative impacts of natural hazards (e.g., wildfire), which include disproportionate death, injury, loss, or disruption of livelihood (FEMA 2022). A sole hazard occurrence can bring about considerably different impacts for distinct individuals, even if the magnitude of the hazard was the same for the entire community. Socially vulnerable communities include those that have specific circumstances, such as but not limited to, poverty, difficulty with English for this geographic area, people without homes or vehicles, people with disabilities, and or older adults (Reilley 2022). Wildfire can disproportionately affect socially vulnerable populations due to factors such as inadequate housing, social exclusion, lack of property, and inability to evacuate effectively (Fothergill and Peek 2004).

This CWPP uses Social Vulnerability Index (SVI) data acquired from the Centers for Disease Control and Prevention (CDC) and the Agency for Toxic Substances and Disease Registry (ATSDR). These data are derived from the U.S. Census Bureau's 2020 American Community Survey 5-year estimates (CDC 2023). Such populations can be assessed using an SVI that approximates the social vulnerability of a location based on multiple indicators.

Socially vulnerable populations were considered while drafting this plan through public engagement and outreach; however, this CWPP does not attempt to identify all the socially vulnerable populations in the planning area (see Table 3.1).

Additional information on how wildfire may affect socially vulnerable populations can be found at Wildfire Risk to Communities.

Table 3.1. Estimated Socially Vulnerable Populations at Risk from Wildfire in Gilpin County

Population at Risk	Percent of County Population	Percent of Colorado Population
People in poverty	9.3% ± 5.2%	9.3% ± 0.4%
People with disabilities	12% ± 3.8%	11.7% ± 0.3%
People over 65 years	15.9% ± 3.2%	16.1% ± 0.1%
Households with English as a second language	9.9%	16.2%

Source: U.S. Census Bureau (2023)

FIELD-BASED COMMUNITY HAZARD ASSESSMENTS

Community Hazard Assessments were conducted using the NFPA Wildland Fire Risk and Hazard Severity Form 1144 (see Appendix C). This form is based on the NFPA Standard for Reducing Structure Ignition Hazards from Wildland Fire 2013 Edition. The NFPA standard focuses on individual structure hazards and requires a spatial approach to assessing and mitigating wildfire hazards around existing structures. It also includes ignition-resistant requirements for new construction and is used by planners and developers in areas that are threatened by wildfire and is commonly applied in the development of Firewise Communities (for more information, see Firewise-USA).

The purpose of the Community Hazard Assessment and subsequent ratings is to identify fire hazards and risks at a community scale and prioritize areas requiring mitigation and more detailed planning. The Community Hazard Assessment helps to drive the recommendations for mitigation of structural ignitability, community preparedness, and public education. Each area was rated based on conditions within the community and immediately surrounding structures, including access, adjacent vegetation (fuels), defensible space, adjacent topography, roof and building characteristics, available fire protection, and placement of utilities. Where a range of conditions was less easily parsed out, a range of values was assigned on a single assessment form. Each score was given a corresponding adjective rating of low, moderate, high, or extreme.

Community Hazard Assessments for Gilpin County were conducted during Summer 2024. Please note that some communities and subdivisions were grouped together based on similar topography, home age and construction, and other like factors. Please reference Figure 3.24, which shows the grouped neighborhoods, and the naming used for each. The community at risk (CAR) hazard ratings from the Community Hazard Assessment are provided in Table 3.2. This table also includes a summary of the positive and negative attributes of a community as they relate to wildfire risk. Full CAR descriptions are provided in Appendix C.

Community Hazard Assessments were completed by a group of staff representing Gilpin County, Timberline FPD, Central City and Black Hawk Fire Departments, CSU Extension, and Clear Creek Watershed and Forest Health Partnership. The group received one full day of training on the 1144 protocol and worksheet which included classroom instruction and field practice. This training increased Gilpin County‘s capacity to conduct neighborhood level assessments in future years and track progress of neighborhood risk reduction over time.

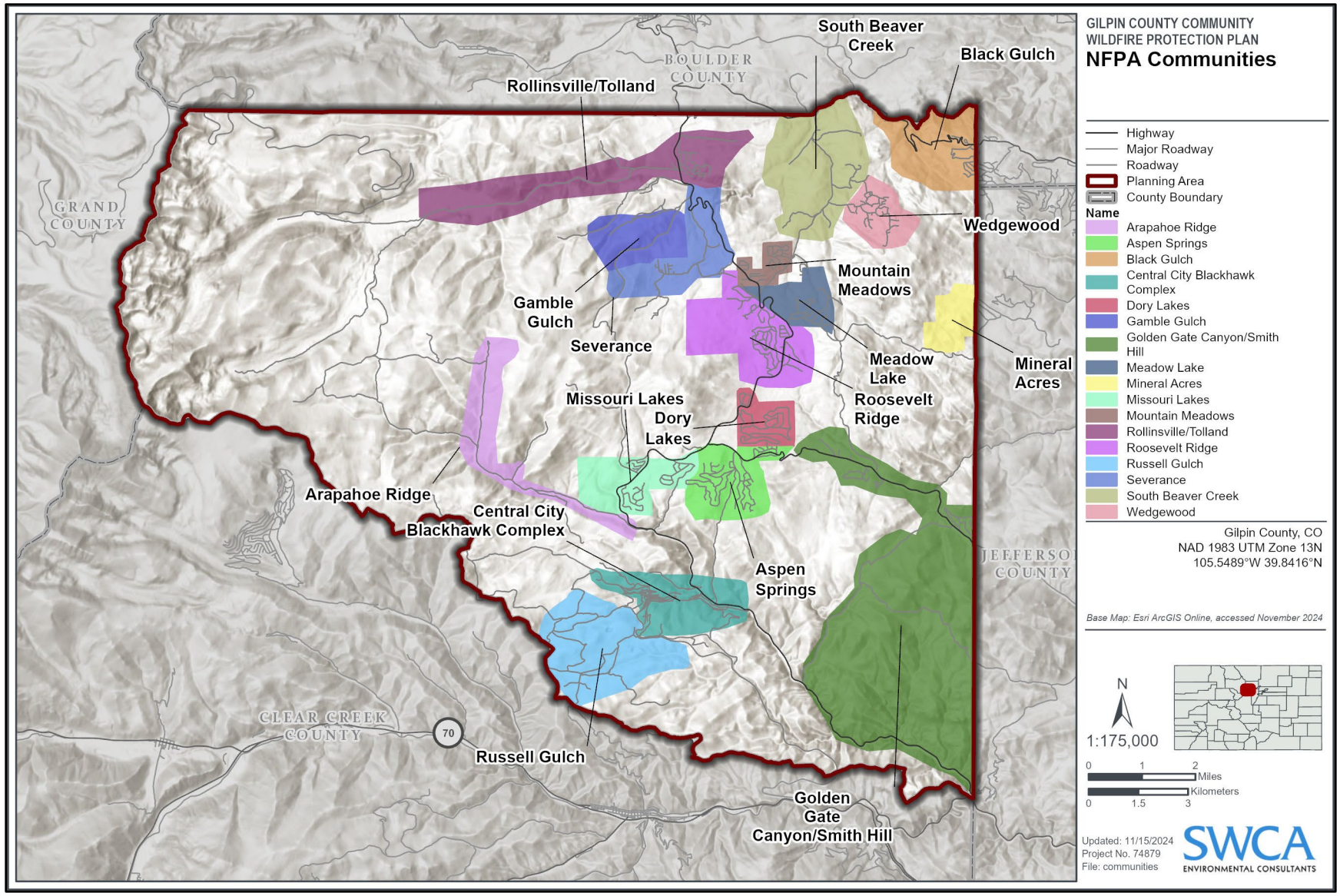


Figure 3.24. Community polygons created for NFPA assessments.

Table 3.2. Communities at Risk Ratings with Community Hazard Assessment Summary (See Appendix C for additional information).

Community	Risk Rating	Positives	Negatives
Arapahoe Ridge	**Extreme**	• Two or more roads in and out • Availability of water sources • Fire station within 5 miles	• Timber with slash understory • <30 feet of defensible space • Steep slopes • Aboveground utilities
Aspen Springs	**Extreme**	• Fire station within 5 miles • Adequate separation between structures	• Non-surfaced steep roads • Timber-Litter vegetation • <30 feet of defensible space • No water sources available
Black Gulch	**Extreme**	• Low history of fire occurrence	• One road in/out • Steep slopes • Timber-Litter vegetation • <30 feet of defensible space • No water sources
Central City/Black Hawk	**High**	• Fire-resistant roofing materials • Hydrants available	• Narrow roads • Steep slopes • Limited defensible space
Dory Lakes	**High**	• Two roads in/out • Reflective street signs • Water sources available	• Timber with grass or shrub understory • Combustible siding and decks • Closely spaced structures
Gamble Gulch	**Extreme**	• Manageable road conditions • Structures setback from steep slopes	• One road in/out • Narrow roads • <30 feet of defensible space • No water sources
Golden Gate Canyon/Smith Hill	**Extreme**	• Multiple roads in/out • Water sources available	• Timber-Litter vegetation • <30 feet of defensible space • Combustible siding and decks
Meadow Lakes	**High**	• Two roads in/out • Water sources available	• Timber with slash understory • Combustible siding and decks

Community	Risk Rating	Positives	Negatives
Mineral Acres	**Extreme**	• Low history of fire occurrence • Well maintained roads with minimal slope	• One road in/out • <30 feet of defensible space • Combustible siding and decks • No water sources
Missouri Lakes	**High**	• Water sources available • Gentle slopes	• One road in/out • Timber with slash understory • Combustible siding and decks
Mountain Meadows	**Extreme**	• Water sources available • Fire station nearby	• One road in/out • Narrow, steep roads • <30 feet of defensible space • Combustible siding and decks
Rollinsville/Tolland	**Extreme**	• Multiple roads in/out • Water sources available	• Timber-Litter vegetation • <30 feet of defensible space • Steep slopes
Roosevelt Ridge	**Extreme**	• Water sources available • Fire station nearby	• One road in/out • Timber-Litter vegetation • <30 feet of defensible space • Combustible siding and decks
Russell Gulch	**Extreme**	• Two roads in/out • Low history of fire occurrence	• Narrow roads • No water sources • <30 feet of defensible space • Steep slopes
Severance	**Extreme**	• Water sources available • Fire station nearby	• One road in/out • Timber with slash understory • <30 feet of defensible space • Aboveground utilities
South Beaver Creek	**Extreme**	• Water sources available • Fire station nearby	• One road in/out • Narrow, steep roads • <30 feet of defensible space

Community	Risk Rating	Positives	Negatives
Wedgewood	**Extreme**	• Fire station nearby • Many homes with metal roofs	• One road in/out • Narrow roads • Timber-Litter vegetation • No water sources

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CHAPTER 4 – WATERSHED RISK-HAZARD ASSESSMENT

PURPOSE

The Watershed Risk-Hazard Assessment consists of analyzing watershed-related hazards and risks to infrastructure and communities in a post-wildfire landscape. Specifically, hazards and risks posed by post-fire debris flows, sediment yield, and flooding were analyzed in detail. Regarding these hazards, this document uses the following definitions:

Debris flows are “fast-moving landslides that are particularly dangerous to life and property because they move quickly, destroy objects in their paths, and often strike without warning” (U.S. Geological Survey [USGS] 2023a).

Sediment yield is “the amount of sediment per unit area removed from a watershed by flowing water during a specified period of time” (USGS 2006).

Flooding, as defined by FEMA, is a “a general and temporary condition of partial or complete inundation of 2 or more acres of normally dry land area or of 2 or more properties (at least 1 of which is the policyholder's property) from:

1. Overflow of inland or tidal waters; or
2. Unusual and rapid accumulation or runoff of surface waters from any source; or
3. Mudslides (i.e., mudflows) which are proximately caused by flooding and are akin to a river of liquid and flowing mud on the surfaces of normally dry land areas, as when earth is carried by a current of water and deposited along the path of the current.; or
4. Collapse or subsidence of land along the shore of a lake or similar body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels that result in a flood as defined above.

A flood inundates a floodplain. Most floods fall into three major categories: riverine flooding, coastal flooding, and shallow flooding. Alluvial fan flooding is another type of flooding more common in the mountainous western states” (FEMA 2020).

It is important to note that these hazards are not mutually exclusive; debris flows, elevated sediment yields, and flooding can occur concurrently and, due to the interconnectivity of watersheds, hazards that occur in one watershed can have a detrimental impact to downstream water resources infrastructure. Emergency planners should plan accordingly for multiple hazards in the post-fire landscape.

The purpose of developing the Composite Watershed Risk-Hazard Assessment described here is to create a unique tool for evaluating the risk to watersheds and associated infrastructure from post-wildfire effects within the Gilpin County CWPP watershed planning area. Although many definitions exist for risk and hazard, the definitions used in this document follow those used by FEMA:

> **Risk** is defined as a function of the nature and magnitude of a threat, the vulnerabilities to that threat, and the consequences that could result (FEMA 2022).
>
> **Hazard** is a source of potential danger or adverse condition that has the potential to cause fatalities, injuries, property damage, infrastructure damage, agricultural loss, damage to the environment, interruption of business, or other types of harm or loss (FEMA 2018).

The Composite Watershed Risk-Hazard Assessment combines the findings from a Desktop Risk-Hazard Assessment with Core Team input.

From these assessments, land managers, fire officials, emergency planners, and others can begin to prepare strategies and methods for reducing their risk exposure to post-wildfire watershed hazards, as well as work with community members to educate them about minimizing their risk exposure to post-wildfire watershed hazards. Because various treatments to reduce watershed-related risks can be implemented on both private and public land, community members can actively apply the treatments on their properties as well as recommend treatments on public lands that have a high value to the community and require protection.

VALUES EXPOSED TO WATERSHED HAZARDS

SWCA compiled a list of water infrastructure, life and property, and other values exposed to watershed-related hazards based on infrastructure data and Core Team and community input. The development of the values exposed to post-wildfire watershed hazard list was a compilation of water infrastructure, such as reservoirs, built flowlines, source water, and aquatic resources in the planning area, coupled with the community assessments, public outreach, and Core Team input. The lists of the watershed VARs are provided below.

WATER QUALITY AND WATER INFRASTRUCTURE

Water is a critical resource and value in the watershed planning area which is likely to be at an elevated risk following a fire on the surrounding landscape. As such, preventing water quality impairments and watershed degradation should be a priority of risk mitigation. Currently, the CWPP watershed planning area has a variety of water infrastructure exposed to post-fire watershed-related hazards. As discussed above, a list of infrastructure and values was developed based on publicly available data and input from the Core Team. If these infrastructure and resources are damaged in a post-wildfire setting, the region's water supply and quality of water could be threatened. To capture how water quality and supply could be threatened, the Core Team identified the following types of water infrastructure and resources to include in the watershed risk analysis:

Infrastructure

- Reservoirs
- Built flowlines
- Water treatment plants

Values

- Source water
- Natural aquatic resources (sportfish management waters, aquatic cutthroat trout designated crucial habitat, aquatic species of greatest conservation need)
- Watershed health and preservation of water quality

LIFE AND PROPERTY

Life and property within the watershed planning area can also be threatened by post-wildfire watershed -related hazards. A large portion of the watershed planning area has life and property that could be exposed to adverse watershed-related hazard in a post-wildfire environment including residential homes, critical infrastructure, and economically important structures. Other examples of values, resources, and concern sites include the following:

- Structures
- Hazardous materials (brownfield sites, composting facilities, municipal landfills, voluntary cleanup sites, institutional control sites, Superfund sites, historic mining sites, mine openings, and abandoned mine lands)
- Waterbody crossings (bridges and culverts)
- Roads and railways
- Recreational values (trailheads, campgrounds, etc.)

COMPOSITE WATERSHED RISK-HAZARD ASSESSMENT

DESKTOP ANALYSIS

Watershed Desktop Analysis

SWCA has estimated the watershed risk for Gilpin County and its adjacent source watersheds to help support the development of recommendations that could be applied before or after a wildfire to mitigate wildfire impacts to vulnerable watershed areas. To do this, SWCA created a final Watershed Risk-Hazard Assessment that combined watershed risks to water infrastructure and life and property from several hazards, which include flooding, sediment yields, and debris flows. Watershed risks were calculated at the watershed catchment scale. Catchments were delineated based on areas with similar topography, interconnected drainages and tributaries, and other landscape factors that allow for grouping similar areas. The final risk value (i.e., colors) reflects the average watershed risk calculation for each catchment in the watershed. Because there is not a naming system for the catchments, watershed recommendations (Chapter 6) reference watershed names and specific locations where applicable. Detailed information on the Composite Watershed Risk-Hazard Assessment is provided in Appendix D.

Watershed Modeling

SWCA determined the Watershed Risk-Hazard Assessment scores for each sub-watershed based on flooding risk, sediment yield risk, and debris flow risk. A brief overview of these individual modeling efforts is described below. We utilized a modified methodology described in the Colorado statewide post-fire susceptibility analysis prepared by Colorado Wildfire Ready Watersheds.

Flooding Risk-Hazard Analysis

To assess flooding risk, SWCA assumed that the 100-year floodplain was equivalent to the 10-year post-wildfire flooding risk in the source watershed planning area. At the watershed catchment scale, we then analyzed flooding risk to water infrastructure and flooding risk to life and property. Then to create the final flooding risk assessment, we combined the flooding risk to water infrastructure with flooding risk to life and property. This approach created a flooding risk scoring system (low, moderate, high, and extreme risk) for each watershed catchment, where a low score implies little flooding risk, and an extreme score implies substantial flooding risk (Figure 4.1). For more in-depth methods for flooding risk, refer to Appendix D.

Results

Flooding hazard in the planning area is highest in the North Clear Creek, Clear Creek Canyon, and Upper Coal Creek sub-watersheds. Both the Upper Coal Creek and Clear Creek Canyon watersheds lie almost entirely outside of Gilpin County, meaning flood risk in these watersheds would be most heightened for communities and infrastructure in Jefferson County.

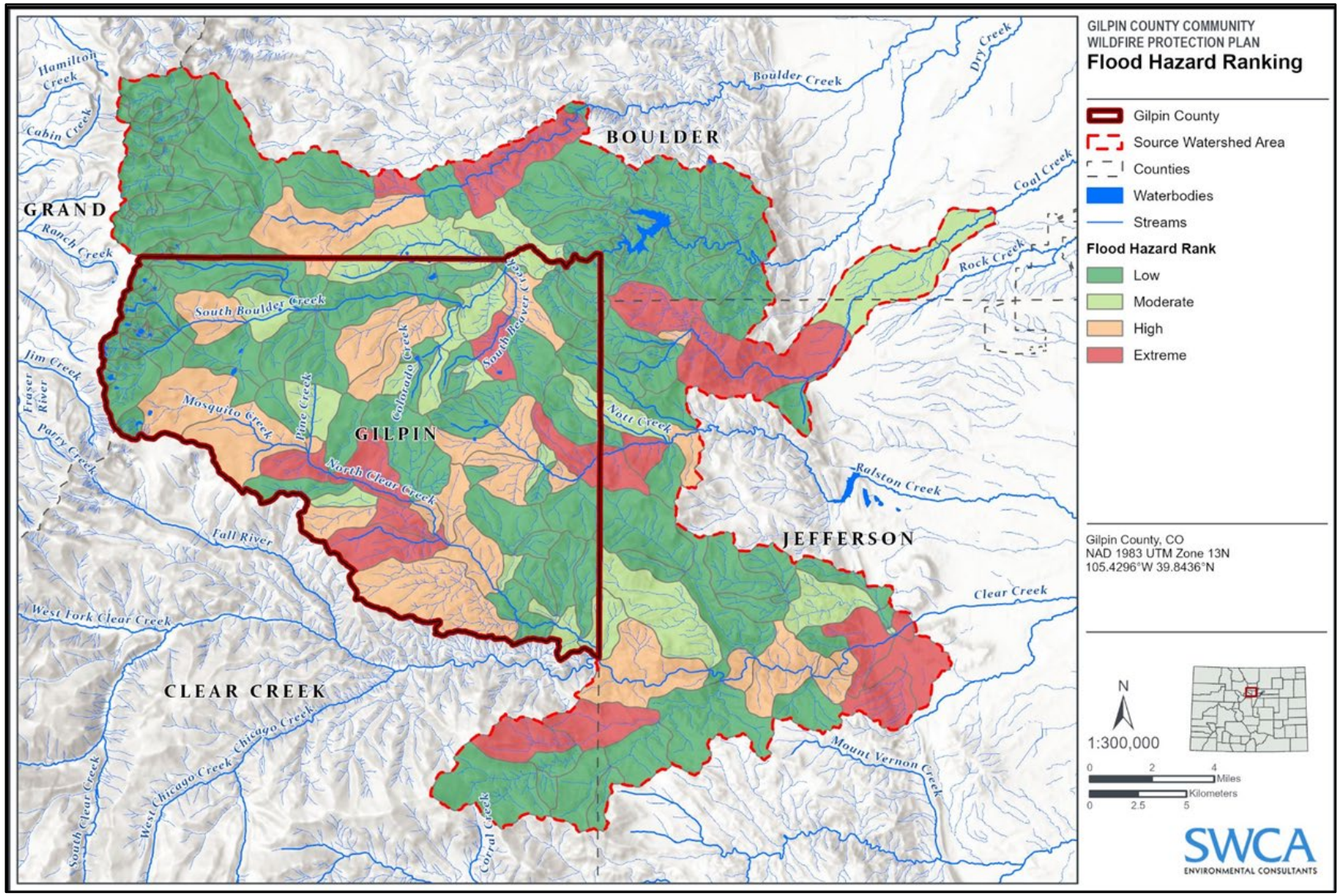

Figure 4.1. Flooding Risk-Hazard Ranking.

Within Gilpin County, flood risk is most heightened in the North Clear Creek watershed along the mainstem of North Clear Creek. Flood inundation would impact infrastructure and properties at the highest rate in Central City and Black Hawk where historic development is concentrated along North Clear Creek, Chase Gulch, Eureka Gulch, and Gregory Gulch. Highway 119, southeast of Black Hawk, is also at an elevated risk from flooding. North Clear Creek parallels the road and multiple tributaries, including Smith Hill Gulch and Cottonwood Creek, feed into North Clear Creek after passing under Hwy 119, posing a potential risk to road travel. The eastern portion of Upper South Boulder Creek, where south Beaver Creek parallels South Beaver Creek Road is also anticipated to be at an elevated flood risk following a fire. Impacts would likely be highest on road infrastructure especially local travel routes.

Debris Flow Risk-Hazard Analysis

To assess debris flow risk, we first estimated the debris flow hazard to water infrastructure and the debris flow hazard to life and property at the watershed catchment scale. For the final debris flow risk assessment, we combined the debris flow risk to water infrastructure with the debris flow risk to life and property to create a scoring system (low, moderate, high, and extreme risk) for each watershed catchment, where a low score implies little debris flow risk, and an extreme score implies substantial debris flow risk (Figure 4.2). The debris flows are based on changes to a watershed after a moderate- or high-severity fire has impacted the watershed. For more in-depth methods for debris flow risk, refer to Appendix D.

Large portions of the watershed planning area are at risk of debris flows following moderate and high severity- fires. Typically, watersheds with steeper slopes and erodible soils display the higher risk. However, vegetative cover and predicted burn severity are also important factors to consider when assessing debris flow risk, volume, and probability.

Results

- The northeast and east central part of the county, including portions of Middle South Boulder Creek, Upper South Boulder Creek, Upper Coal Creek, and Upper Ralston Creek indicate elevated risk of debris flow.
- Catchments that show an extreme risk of debris flows include South Beaver Creek, Beaver Creek, Nott Creek, and tributaries of South Boulder Creek. The communities of Wedgewood and Black Gulch would be the most likely to be impacted by this elevated post-fire risk.
- Tributaries of South Boulder Creek north of Tolland are also likely to see extreme debris flow risk following a fire. This includes Jenny Creek and Beaver Creek along Forest Service Road 1091.
- Debris flow impacts in these areas should also be considered cross-jurisdictionally as many of these drainages eventually lead into Gross Reservoir, a key water resource for Boulder County and other Front Range communities.

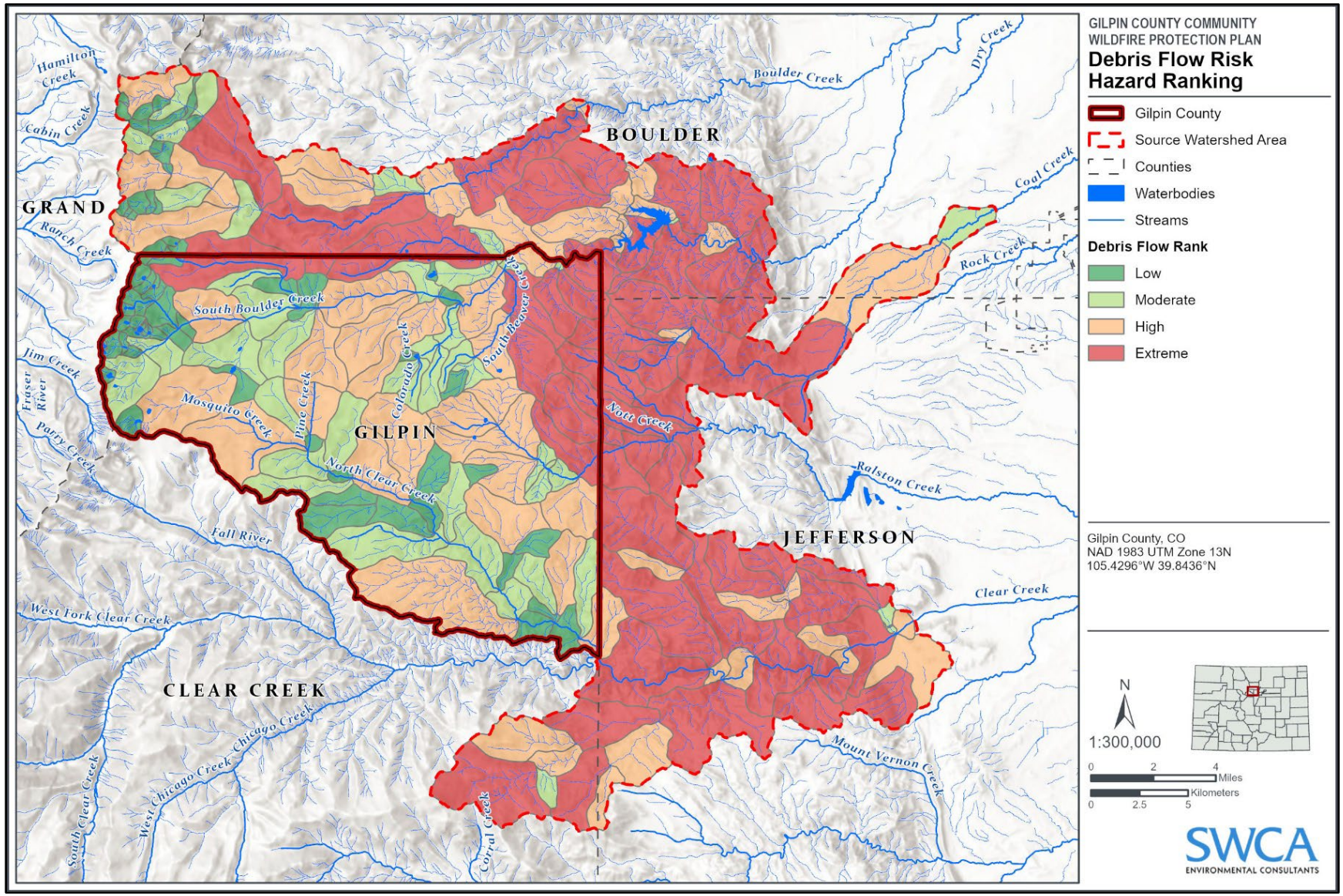

Figure 4.2. Debris Flow Risk-Hazard Ranking.

Sediment Yield Risk-Hazard Analysis

To assess sediment yield risk, we examined the annual sediment yield risk to water infrastructure and risk to life and property at the watershed catchment scale. Then to create the final sediment yield risk assessment, we combined the risk from sediment yields to water infrastructure with the sediment yield risk to life and property to create a scoring system (low, moderate, high, and extreme risk) for each catchment. A low-risk score implies little sediment yield risk, and an extreme score implies substantial sediment yield risk (Figure 4.3). Please note that sediment yield risk does not factor in post-wildfire conditions. Sediment risk is only based on the current conditions in the county. For more in-depth methods for sediment yield risk please refer to Appendix D.

Watersheds with steeper slopes and less vegetive cover will result in a greater sedimentation risk. Sediment yield differs from debris flow in that it often occurs over a longer time frame while debris flows are often a single, large occurrence of sediment movement. Sedimentation is a natural process on any landscape but often occurs at an elevated rate following a wildfire which poses a risk to water resources and infrastructure as it accumulates and overwhelms natural and human-made systems. These impacts can continue for years after a fire has occurred. Following a wildfire, it's essential that burned areas are assessed for severity to accurately determine the potential for sedimentation and debris flow. The results of the sediment yield analysis show that headwaters portions of multiple watersheds are at risk following a fire which could have far reaching implications in lower reaches.

Of particular concern for increased sediment yield risk for the county is the southern portion of the Headwaters of South Boulder Creek and the western portion of North Clear Creek. This area is unique in that it contains high alpine habitat that transitions into heavily forested areas and is primarily within USFS jurisdiction. As you move southeast in the Clear Creek watershed, the catchments containing Central City and Black Hawk as well as the inhabited areas to the south of these municipalities are also at an elevated risk of sedimentation. This area also contains a number of historic and reclaimed mine sites that could further impact soil and water quality if sedimentation is exacerbated following a wildfire.

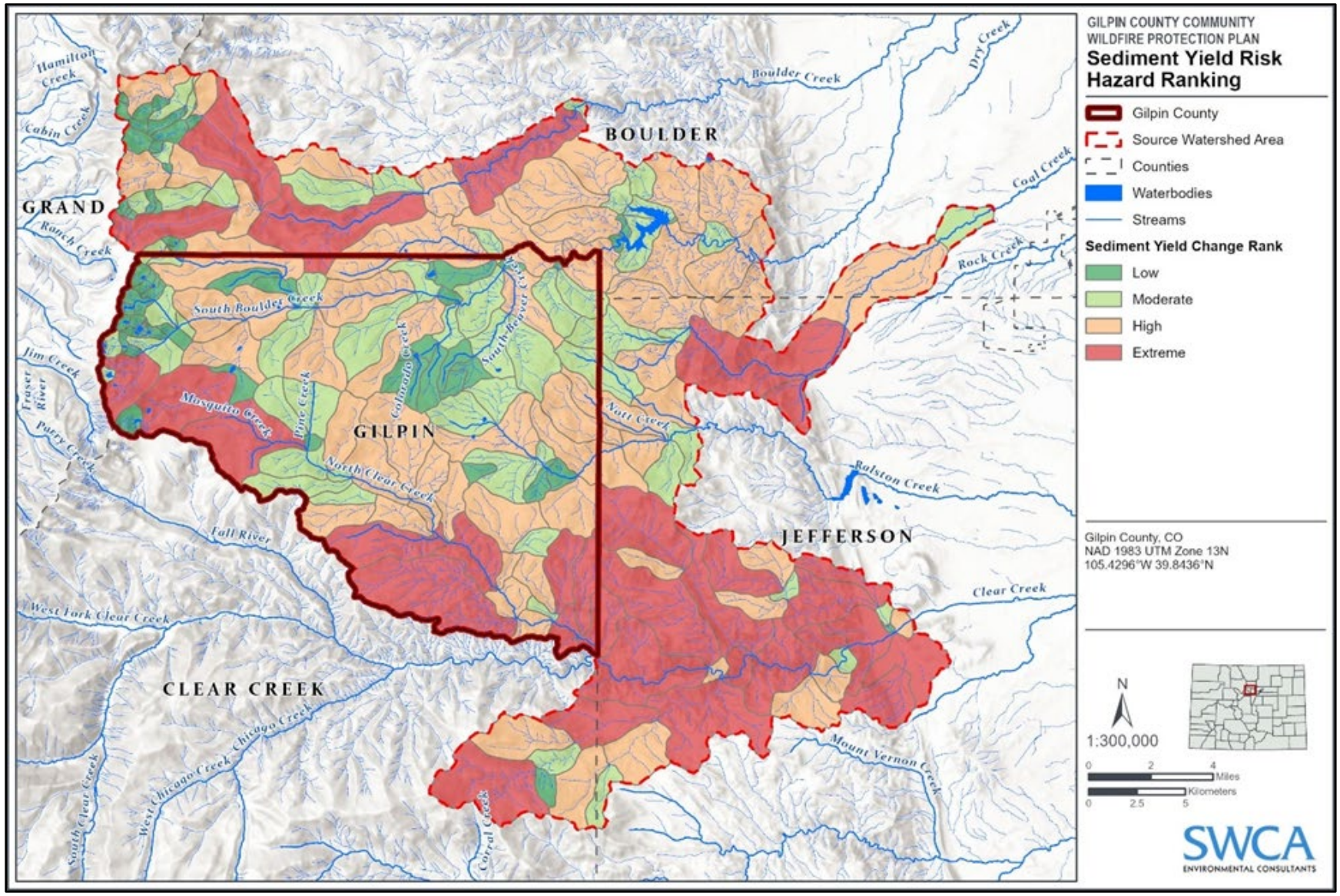

Figure 4.3. Sediment Yield Risk-Hazard Ranking.

COMPOSITE WATERSHED RISK-HAZARD ASSESSMENT RESULTS

To create our final watershed risk assessment we weighted flooding risk, sediment yield risk, and debris flow risk equally and combined all risk assessments to create a scoring system (low, moderate, high, and extreme risk) for each watershed catchment (Figure 4.4). This scoring incorporates the quantity and significance of values and infrastructure present in each catchment. This results in catchment level scores that not only consider the likelihood and susceptibility of a catchment to experience the hazard, but also weights the composite score based on values present. A low score implies little overall risk to a watershed and an extreme score implies substantial risk to a watershed. Final risk-hazard scores factor in presence and quantity of critical infrastructure, life and property, and other community values that could be at risk. More in-depth discussion on methods for our final watershed risk assessment is provided in Appendix D.

The final composite score represents all three risks, but certain areas stand out as being at high risk from all three hazards. These include the Mosquito Creek and Russel Gulch catchments in the North Clear Creek watershed, the Jenny Creek catchment in the Headwaters South Boulder Creek watershed, the Tolland and Beaver Creek catchments in the Upper South Boulder Creek watershed, and the Eldora catchment of the Middle Boulder Creek watershed which primarily falls within Boulder County.
As previously discussed, the watershed planning area extends outside of the county. Watershed catchments with extreme risk that fall outside of Gilpin County but within the planning area include the Barker Reservoir tailwater catchment of Middle Boulder Creek (Boulder County), the Crescent Village catchment of the Middle South Boulder Creek watershed (Boulder County), the Coal Creek catchment of the Upper Coal Creek watershed (Boulder and Jefferson Counties), the Coal Creek Canyon and Eggleston Reservoir catchments of the Upper Coal Creek watershed (Boulder and Jefferson Counties), nine catchment regions of the Clear Creek Canyon-Clear Creek watershed, and five catchment regions of the Beaver Brook-Clear Creek watershed.

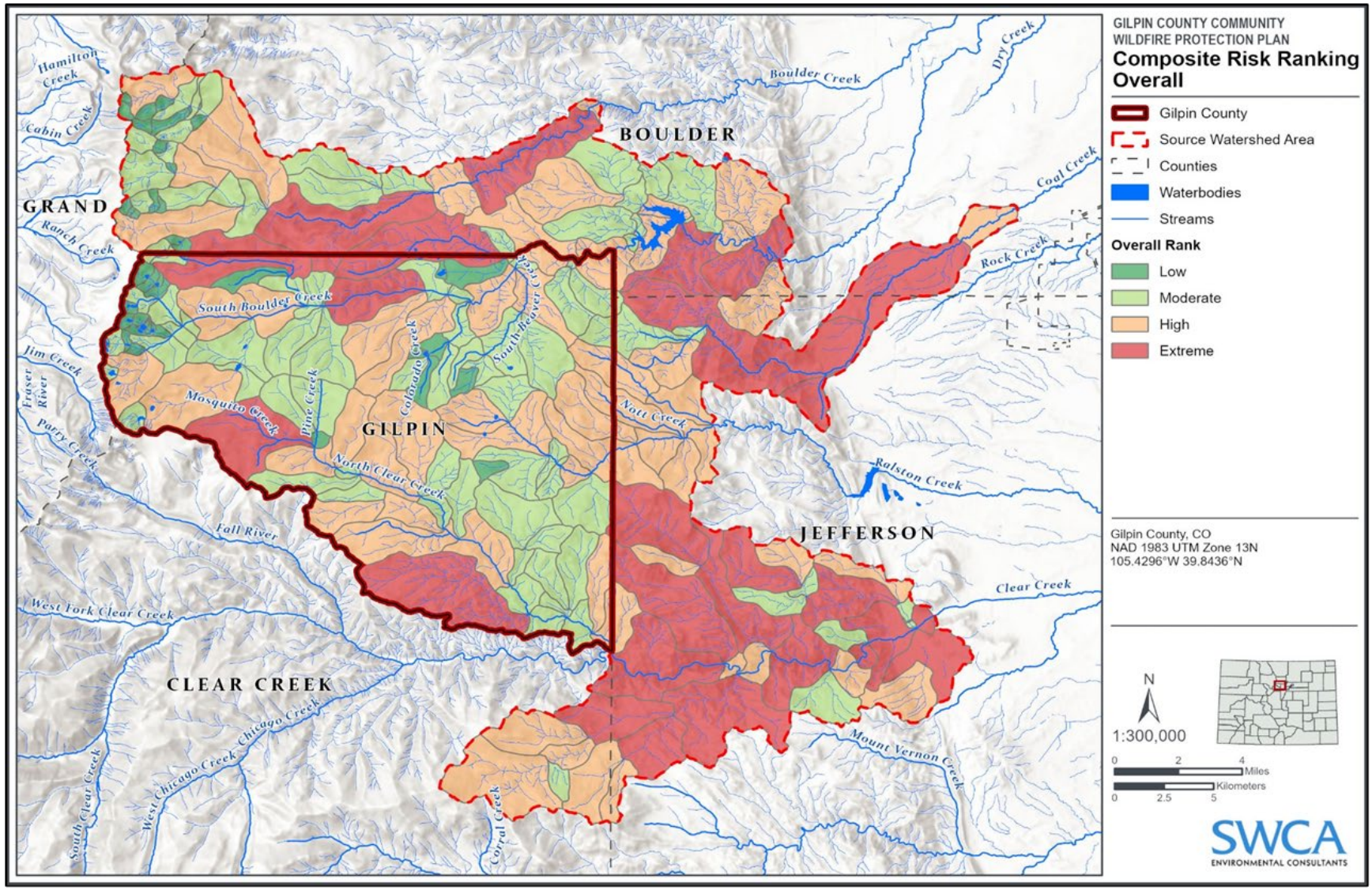

Figure 4.4. Composite Watershed Risk-Hazard Assessment.

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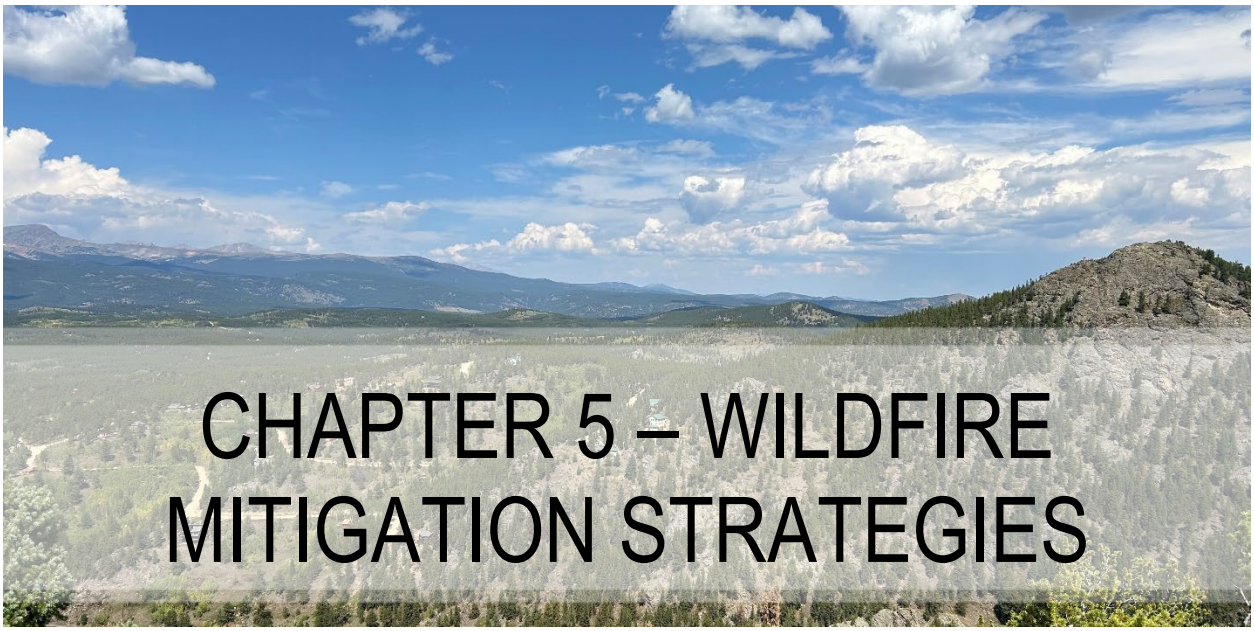

CHAPTER 5 – WILDFIRE MITIGATION STRATEGIES

This chapter provides project recommendations, implementation guidance, and conceptual fuel treatment recommendations. A comprehensive mitigation strategy not only includes recommendations to mitigate wildfire hazards but also actions to improve preparedness and resiliency. This well-rounded approach involves being prepared both pre- and post-fire. Past planning efforts can be found in Appendix B, and post-fire response and rehabilitation information can be found at the end of this chapter and in Appendix G.

CWPP recommendations have been structured around the three main goals of the Cohesive Strategy:

- Resilient landscapes
- Fire-adapted communities
- Safe, effective, risk-based wildfire response

Many of the recommendations listed can be implemented by a homeowner or at a community level (a detailed explanation of fuel treatment types and methods can be found in Appendix E). Projects requiring large-scale support can be prioritized based on the Quantitative Risk Assessment (detailed in Appendix D). Funding resources are summarized in Appendix J. Additionally, the county is in the process of establishing the Gilpin Wildfire Council. The council will be composed of representatives from the county and land management agencies in the county who will collaborate on project implementation across jurisdictional boundaries, ensuring momentum continues from the CWPP.

This chapter includes recommendation matrixes that serve as an action plan for implementation. Recommendations adhere to the minimum requirements for CWPPs established by the CSFS (2022) and are aligned with the strategies in the 2020 Colorado Forest Action Plan (CSFS 2020), wherever possible.

GOAL 1: RESTORE AND MAINTAIN LANDSCAPES

In this CWPP, recommendations to restore and maintain landscapes focus on vegetation management and hazardous fuel reduction.

Resilient landscapes refer to ecosystems that are healthy, diverse, and capable of withstanding and recovering from various disturbances, such as wildfires, climate change, invasive species, and insect infestations. Project recommendations aimed at creating more resilient landscapes in the planning area can be found in Table 5.1.

Ongoing, Planned, and Completed Fuels Treatments

This region has been home to an active and committed fuel treatment program by land managers for many years. In recent history, numerous fuel treatments have been put in place within the county by private entities, local and state governments, and federal agencies. Figure 5.1 shows existing fuel treatments that have been completed or planned in and around the planning area. This information is derived from CPW, CFRI, and USFS. Fuel treatments have concentrated on reducing wildfire hazards close to communities and along key roadways. The treatment momentum already observed surrounding the planning area should be built upon to increase fuel treatment effectiveness across the landscape. The results of these treatments should be reviewed so the most effective treatments relative to resource management goals can be implemented.

The Colorado Interagency Fuel Treatment Database compiles 20 years of spatial data on forest restoration and fuel treatment projects, aiding in tracking activities and impacts at various scales to inform adaptive management and cross-boundary initiatives for more information, access the following report: Colorado Interagency Fuel Treatment Database.

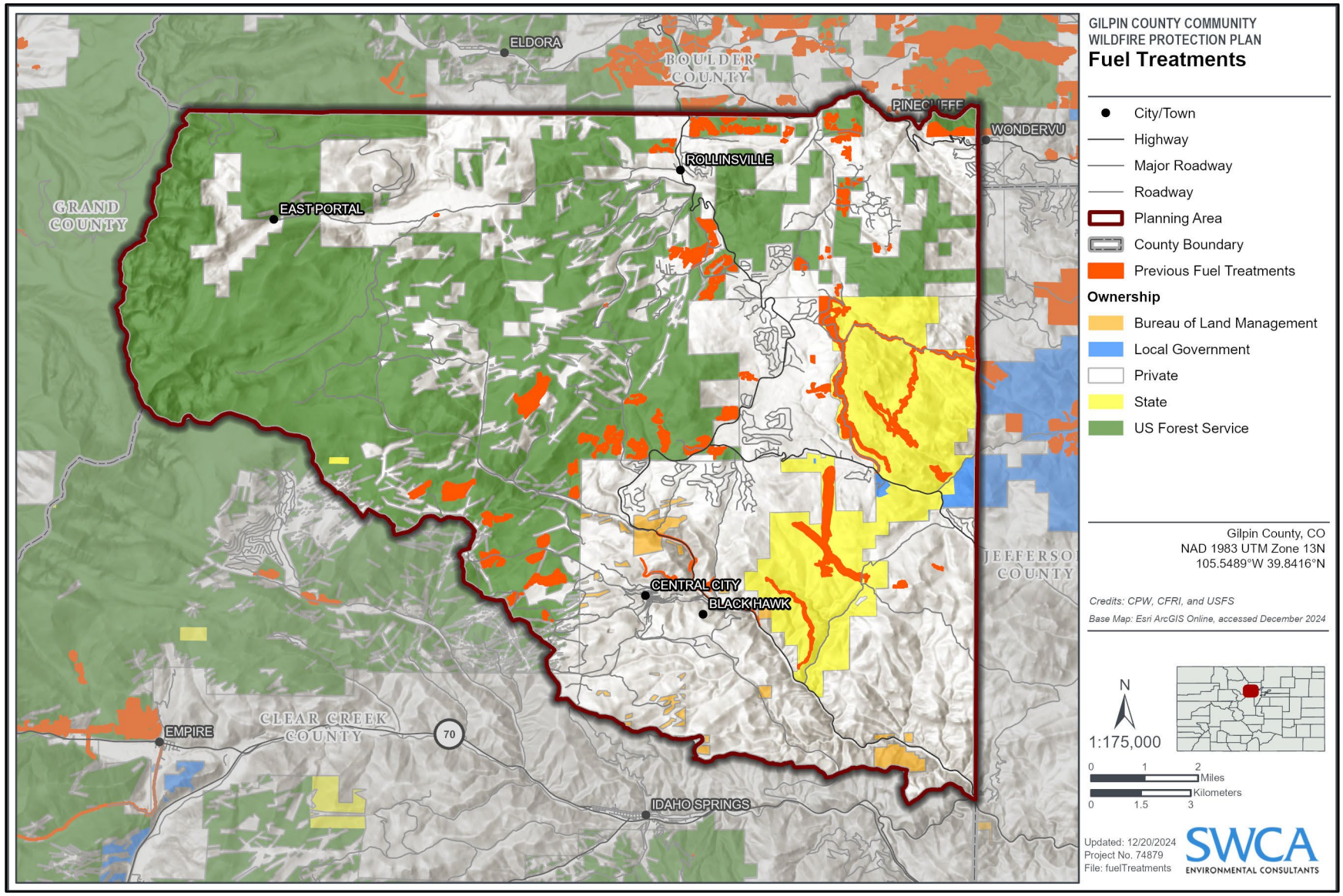

Figure 5.1. Major completed fuel treatments across all jurisdictions with Gilpin County.

RECOMMENDATIONS FOR RESILIENT LANDSCAPES

Recommendations for resilient landscapes are included in Table 5.1 and Table 5.2. All recommendations were created through extensive collaboration with Core Team members and the public. These efforts consisted of the compilation of information on past and planned fuel treatments and prioritizing areas for future treatment projects. The CWPP Core Team also used their expertise, public input, and the COAL Quantitative Wildfire Risk Assessment to identify areas of concern (Figure 5.2). Areas of concern provide spatial context and priority for the recommended projects outlined in Table 5.1. See Table 5.2 for a list of proposed actions for each area of concern.

Fuels management on public and private land in the WUI is key to the survival of homes during a wildfire event, as well as the means to meet the criteria of Goal 1. Research has shown how fuel treatments in the WUI can change fire behavior to support suppression activities and protect homes (Evans et al. 2015). The importance of fuels management is reflected in policy at the federal level, with the HFRA requiring that federal land management agencies spend at least 50% of their fuels reduction funds on projects in the WUI.

Fuels should be modified with a strategic approach to reduce the threat that high-intensity wildfires pose to lives, property, and other values. This section provides information on fuel treatment projects that can be applied to protect structures (defensible space) and reduce fuels near community boundaries (fuel breaks, cleanup of adjacent open spaces) and in the wildlands beyond community boundaries (larger-scale forest health and restoration treatments). Methods of fuel treatment are unique to fuel type and project goals. Proximate to structures, recommended actions focus on reducing fire intensity consistent with Firewise USA and International Fire Code standards. Further into open space areas, treatments tend to emphasize forest health and increasing resiliency to catastrophic wildfire and other disturbances.

When applying fuel treatments, every effort should be made to align treatments with the current Colorado Forest Action Plan with consideration of all appropriate best management practices and sound science. In addition, treatments should be strategically located in areas to maximize effectiveness of other existing and ongoing projects (see Figure 5.1 and Figure 5.2). Detailed descriptions of fuels treatment types and methods, including defensible space practices and larger-scale projects, is housed in Appendix E. Defensible space information and recommended actions for homeowners can be found in Appendix F. Information on the fire environment including fuel types and fire regimes present in the planning area is located in Chapter 2.

Table 5.1. Recommendations to Create Resilient Landscapes (Fuel Treatments)

Project ID	Status	Priority (H,M,L)	Timeline for Action	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements	Funding Sources
RL1		H	1-3 years	**Fuel Treatment Dataset** Develop comprehensive fuel treatment dataset for Gilpin County	Countywide	Gilpin County, fire departments, land management agencies, private landowners	• Collect and verify existing fuel treatment records from local, state, and federal agencies, including maps, reports, surveys and datasets. • Integrate collected data and metadata into an accessible and interactive Geographic Information System platform • Utilize platform in conjunction with the Gilpin County CWPP and other local CWPPs to identify fuel treatment needs and guide future actions. • Enhance coordination between Gilpin County GIS, CFRI and CSFS to ensure involvement in Colorado Interagency Fuel Treatment Database, with regular updates to ensure prolonged alignment with treatment objectives.	Enhance its wildfire mitigation efforts through better cross-boundary awareness and coordination. Facilitate better planning, resource allocation, and collaboration in the county's management actions.	Hold meetings with all stakeholders to review progress, discuss challenges, and share insights. Develop an online portal to provide public access to the dataset. Monitor changes in vegetation and fuel loads in both treated and untreated areas.	• RCP grants (FEMA) • CWDG (USFS) • EPA Multipurpose Grant • Collaborative Capacity Program

RL2		H	2-5 years	**North Gilpin County Fuels Projects**
				implement and maintain comprehensive fuel reduction strategies in areas of North Gilpin County, leveraging partnerships with a multitude of stakeholders
					North Gilpin County
					AOC 1
					AOC 2
					AOC 3
					AOC 4
					AOC 5
					AOC 6
						USFS, CSFS, United Power, OEM, Axe & Snax, Xcel Energy, Boulder Watershed Collective, Jefferson Cons Dist. Railroad company (Amtrak, Burlington Northern, Santa Fe).	• Engage with key stakeholders to coordinate efforts and resources.
							  ○ Hold regular meetings with stakeholders to discuss progress, challenges, and opportunities for additional funding (e.g., CWDG, Joint Chiefs, Wildfire Crisis funding).
							  ○ Collaborate with Denver Water, leveraging their involvement in the Forsyth project and seeking additional funding for expanded treatments.
							  ○ Work with OEM to roll out communication and outreach events, emphasizing the importance of defensible space and community involvement.
							• Obtain and analyze shapefiles for targeted treatment areas and conduct field assessments to identify maintenance strategies.
							• Consider the continuation of existing or past management strategies that have been effective (e.g., patch thinning, broadcast burning).
							• Establish required environmental compliance through engagement with federal partners. Initiate compliance.
							• Work with private landowners through initiatives such as Axe & Snax to implement similar fuel reduction techniques on their properties
								Reduce wildfire risk and enhance community safety.
								Create continuity in fuel mitigation to form effective fuel breaks that protect communities and key resources.
									Establish regular inspection and maintenance schedules for treated lands.
									Prepare progress reports for all stakeholders, highlighting accomplishments, ongoing activities, and future plans.
										• Wildfire Mitigation Incentives for Local Government (CSFS)
										• CWDG (USFS)
										• NOCO Fireshed
										• Forest Restoration and Wildfire Risk Reduction
										• WUI Grant (USFS)

Project ID	Status	Priority (H,M,L)	Timeline for Action	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements	Funding Sources

RL3		H	1-5 years	**Mid County Fuels Project**
				Implement and maintain comprehensive fuel reduction strategies in areas of central Gilpin County, leveraging partnerships with a multitude of stakeholders
					Countywide
					AOC 5
					AOC 7
					AOC 8
					AOC 9
						Timberline FPD, Clear Creek Watershed Partnership, USFS, City of Black Hawk, Boulder Watershed Collective, federal partners	• Engage with key stakeholders to coordinate efforts and resources.
							  ○ Hold regular meetings with stakeholders to discuss progress, challenges, and opportunities for additional funding (e.g., CWDG, Joint Chiefs, Wildfire Crisis funding).
							  ○ Partner with local recreational clubs to protect and maintain recreational areas, ensuring their continued use and safety
							• Establish required environmental compliance through engagement with federal partners. Initiate compliance.
							• Integrate the Fairburn Fuels Project with existing initiatives to create a contiguous network of fuel treatments
							• Establish linear fuel breaks along Forest Service roads using Categorical Exclusion to expedite implementation.
							• Collaborate with the Rocky Mountain Elk Foundation to enhance aspen habitats, which serve as natural firebreaks and improve wildlife habitat
							• Work with the City of Black Hawk and other stakeholders to implement treatments on properties critical for water protection
							• Extend fuel treatments to protect private properties and subdivisions along the Peak to Peak Highway, such as Colorado Sierra
							• Collaborate with the Northern Colorado Fireshed Collaborative to identify opportunities for funding, hiring and workforce
								Reduce wildfire risk and enhance community safety.
								Create continuity in fuel mitigation to form effective fuel breaks that protect communities and key resources.
									Establish regular inspection and maintenance schedules for treated lands.
									Prepare progress reports for all stakeholders, highlighting accomplishments, ongoing activities, and future plans.
										• Wildfire Mitigation Incentives for Local Government (CSFS)
										• CWDG (USFS)
										• NOCO Fireshed
										• Forest Restoration and Wildfire Risk Reduction
										• WUI Grant (USFS)
										• COCO Action, Implementation, Mitigation Program

Project ID	Status	Priority (H,M,L)	Timeline for Action	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements	Funding Sources

RL4		H	1-5 years	**State Park Fuel Treatments**
				Mitigate wildfire fuels to reduce risk and enhance safety in Golden Gate Canyon State Park, a highly used recreational area.
					State Park lands within the county
					AOC 9
						Gilpin County, Colorado Parks and Wildlife, CSFS	• Conduct a detailed assessment, utilizing the CWPP risk assessment, to identify areas most at risk for wildfire and suitable for treatment.
							• Work closely with CPW, CSFS and other relevant stakeholders to plan and coordinate treatment activities.
							• Establish required environmental compliance through engagement with state and federal partners. Initiate compliance.
							• Employ a diverse array of treatment methods tailored to the specific terrain and treatment area objectives.
							  ○ Manually cut down dense vegetation and pile it for prescribed burning or removal.
							  ○ Conduct prescribed broadcast burning in selected areas of accumulated fuel loads.
							  ○ Establish a fuel break along the western edge of the park to provide a barrier to the spread of wildfires.
							• Inform the public about the planned treatments and any temporary restrictions on park access to ensure safety during active fuel management operations.
							  ○ Aim to minimize disruptions to park visitors through treatment scheduling.
							• Collaborate with the Northern Colorado Fireshed Collaborative to identify opportunities for funding, hiring and workforce
								Reduce the risk of potential wildfires, providing a safer environment for park visitors and safeguarding the park's ecological integrity.	Conduct pre-treatment and post-treatment surveys to document fuel treatment effectiveness, fuel load changes, and overall forest health.
									Schedule regular inspections of treated areas to ensure that fuel loads remain low and that the fuel break is maintained.
										• Landscape Scale Restoration Grant
										• Wildfire Mitigation Incentives for Local Government (CSFS)
										• Wildfire Mitigation Resources & Best Practices (CSFS)
										• RCP grants (FEMA)
										• CWDG (USFS)
										• Wildland Urban Interface Grant
										• COCO AIM Grant

RL5		H	1-3 years	**Fuel Treatment Communications Strategy** Improve public awareness and understanding of ongoing and planned fuel treatment efforts in Gilpin County	Countywide AOC 12	Clear Creek Watershed & Forest Health Partnership, USFS, CSFS	• Issue press releases to inform the media and public about significant milestones, project launches, and funding announcements. • Direct resident to online CFRI Fuel Treatment Dataset's interactive online platform (once established) to explore fuel treatment in their neighborhood/community. • Develop and maintain active social media profiles on platforms to share updates, educational content, and interactive posts about fuel treatments and funding opportunities for residents. • Consider establishing programs where community leaders and volunteers engage directly with their neighbors. • Outreach through the CWPP project tracker and dashboard. • Consider identifying treatment topics of concern and developing informational media to provide residents with the scientific basis for treatment.	Foster greater community engagement and support for fuel treatment projects. Help residents understand the objectives, methods, and anticipated outcomes for fuel treatment projects.	Track the number and reach of newspaper articles, press releases, and other media mentions. Monitor social media engagement metrics. Provide easy-to-access feedback forms for residents to share their thoughts and concerns	• Landscape Scale Restoration Grant • Wildfire Mitigation Incentives for Local Government (CSFS) • Wildfire Mitigation Resources & Best Practices (CSFS) • RCP grants (FEMA) • CWDG (USFS) • Wildland Urban Interface Grant • COCO AIM Grant

Project ID	Status	Priority (H,M,L)	Timeline for Action	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements	Funding Sources
RL6		M	2-5 years	**Biomass removal** Identify and implement sustainable disposal methods within the community.	Gilpin County	County Government, TFPD, CPW, USFS	• Review existing literature and case studies on sustainable biomass disposal methods and model the approach after existing successes in other communities. • Engage with county officials and residents involved with previous biomass removal efforts for lessons learned and opportunities to improve community involvement. • Develop guidelines, creating and distributing educational materials to inform residents about the importance of proper wood log and slash disposal. • Work with local government officials to update codes and policies to standardize community development practices related to wood log and slash management. • Purchase and utilize an air curtain for biomass removal to efficiently reduce waste material ○ Conduct a pilot study on the use of an air curtain for biomass removal to evaluate its effectiveness and determine the feasibility of purchasing additional units.	Reduce wildfire hazards by establishing a structured approach to managing wood logs and slash.	Track the development and implementation of new disposal strategies. Collect feedback from residents and assess need for updates Monitor compliance with updated codes and policies	• NOCO Fireshed Grant • COCO AIM Grant • Innovative Finance Program • CSFS programs • Collaborative Capacity Program (NFF) • Wildfire Mitigation Incentives for Local Government (CSFS) • Conservation Innovation Grant

RL7		M	2-8 years	**Prescribed Burning**
				Utilize prescribed burning techniques strategically across the landscape to reduce accumulated flammable vegetation.
					Gilpin County	Fire Protection Districts, state and federal partners, nonprofit groups	• Implement carefully executed prescribed fires under prescribed conditions to reduce excessive fuel loads.
							  ○ Develop and execute well-defined prescribed burn plans that align with community and ecological objectives.
							  ○ Conduct public education campaign to educate residents on the benefits of prescribed fire and ways to mitigate smoke impacts.
							  ○ Continuously monitor weather conditions and air quality to identify suitable windows for prescribed burns, prioritizing days with favorable conditions to minimize smoke impacts.
								Improve ecological condition and function.
								Reduce hazardous fuel loads within communities and create resilient landscapes.
									Conduct post-burn monitoring to assess the effectiveness of fuel reduction efforts, evaluate ecological impacts, and make necessary adjustments for future prescribed fires.
									Maintain detailed records of all activities, project outcomes, and lessons learned. Communicate these with community members and other stakeholders.
										• Wildfire Mitigation Incentives for Local Government (CSFS)
										• Wildfire Mitigation Resources & Best Practices (CSFS)
										• Firewise grants (various agencies)
										• CWDG (USFS)
										• Conservation Innovation Grant
										• Landscape Scale Restoration Grant
										• NFWF Grants (ATBC, RESTORE)

RL8		M	3-10 years	**Buffer Zones** Develop and maintain buffer zones to protect the gaming cities of Central City and Black Hawk from potential wildfires.	West of Central City and Black Hawk AOC 10 AOC 11 AOC 12	Central City/ Black Hawk FPD	• Conduct comprehensive assessment of the areas west of Central City and Black Hawk to identify high-risk zones. • Collaborate with local authorities and landowners to designate specific buffer zones • Implement fuel reduction measures in accordance with best approach/practice for the treated landscape • Regularly monitor and maintain buffer zones to ensure they remain effective	Protect infrastructure and socioeconomic values of gamming city by reducing probability of fire encroachment	Schedule regular inspections and maintenance activities of treated landscapes (use ground inspections and satellite imagery as necessary)	• Wildfire Mitigation Incentives for Local Government (CSFS) • Wildfire Mitigation Resources & Best Practices (CSFS) • Firewise grants (various agencies) • CWDG (USFS) • Conservation Innovation Grant • Landscape Scale Restoration Grant • NFWF Grants (ATBC, RESTORE)
RL9		M	2-5 years	**Mitigation Along County Roadways** Implement fuel reduction initiatives along county roadways	Gilpin County, County roadways AOC 10, 12, 13 CO 119 CO 72 CO 46 Gap Road South Beaver Creek Road	Public ownership, County Roads Dept, Gilpin County, FPDs	• Identify County roadways that are at high risk of wildfire and prioritize them for fuel reduction efforts • Implement fuel reduction measures in accordance with best approach/practice for the treated landscape (e.g., thinning, mowing, prescribed burns, etc.). • Collaborate with public land managers and private landowners to ensure coordinated efforts.	Reduce the likelihood of roadside ignitions and improve the safety and accessibility	Conduct regular roadside inspections and maintain reduced vegetation	• Wildfire Mitigation Incentives for Local Government (CSFS) • CWDG (USFS) • NOCO Fireshed • Forest Restoration and Wildfire Risk Reduction • WUI Grant (USFS) • COCO Action, Implementation, Mitigation Program

Project ID	Status	Priority (H,M,L)	Timeline for Action	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements	Funding Sources
RL10		M	2-5 years	**Egress Route Treatment** Implement strategic fuel reduction treatments along key egress routes.	Gilpin County: Highway 46 Justice Center to Eastern Countyline, Highway 119 from Highway 46 south to County Line AOC 8 AOC 9 AOC 12 AOC 13	Appropriate jurisdiction with authority	• Identify critical egress routes in high-risk wildfire areas. • Conduct assessments to determine the specific fuel reduction needs along these routes. • Establish required environmental compliance through engagement with federal partners. Initiate compliance. • Implement treatments such as mechanical thinning, prescribed burns, and vegetation removal to create defensible spaces. • Coordinate with local and state transportation and emergency management agencies to ensure treatments align with evacuation plans.	Improve the safety and accessibility of evacuation routes to allow for safe emergency response	Conduct regular inspections of linear fuel breaks to assess their condition and effectiveness. Perform maintenance treatments on a scheduled basis to manage regrowth and ensure fuel breaks remain functional.	• Wildfire Mitigation Incentives for Local Government (CSFS) • CWDG (USFS) • NOCO Fireshed • Forest Restoration and Wildfire Risk Reduction • WUI Grant (USFS) • COCO AIM Grant • Innovative Finance Grant
RL11		M	2-5 years	**Linear Fuel Breaks** Create and maintain strategically placed linear fuel breaks to slow the spread of wildfire	Gilpin County, all lands AOC 8 AOC 9 AOC 11	Appropriate jurisdiction with authority	• Identify strategic locations for linear fuel breaks based on fire behavior modeling, topography, and land use patterns. ○ Assess past fuel treatment efforts to identify opportunities to connect fuel break projects • Collaborate with landowners, fire agencies, and other stakeholders to plan and implement fuel breaks. • Establish required environmental compliance through engagement with federal partners. Initiate compliance. • Use a combination of methods, including mechanical thinning, prescribed burns, and herbicide application, to create and maintain fuel breaks. • Ensure fuel breaks are wide enough to be effective and regularly maintained to prevent regrowth.	Provide a buffer zone that protects communities and resources while aiding firefighting efforts. Slow the spread of wildfires and protect communities, infrastructure, and natural resources.	Conduct regular inspections of linear fuel breaks to assess their condition and effectiveness. Perform maintenance treatments on a scheduled basis to manage regrowth and ensure fuel breaks remain functional.	• Wildfire Mitigation Incentives for Local Government (CSFS) • Wildfire Mitigation Resources & Best Practices (CSFS) • Firewise grants (various agencies) • CWDG (USFS) • Conservation Innovation Grant • Landscape Scale Restoration Grant • NFWF Grants (ATBC, RESTORE)
RL12		L	3-10 years	**Dedicated Funding Source** Develop a sustainable funding mechanism to support ongoing fuel reduction initiatives.	Gilpin County, all lands	Gilpin County, fire districts	• Identify potential funding sources, including grants, local taxes, and public-private partnerships. • Create a dedicated fund specifically for fuel reduction projects and wildfire mitigation. • Develop a transparent process for allocating funds to high-priority projects and initiatives.	Ensure continuous financial support for fuel reduction efforts	Regularly review and report on the financial status of dedicated fund. Monitor changes and updates in funding sources and requirements.	• Wildfire Mitigation Incentives for Local Government (CSFS) • Wildfire Mitigation Resources & Best Practices (CSFS) • NOCO Fireshed • Collaborative Capacity Building • Forest Stewardship Program

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Areas of Concern

To better prioritize resilient landscape recommendations (Table 5.1), the CWPP Core Team delineated countywide areas of concern (Figure 5.2) using a variety of mapping products including wildfire risk to assets, expected risk to structures, WUI, wildfire hazards, fuel loading and continuity, PODs (Figure 5.3), topographical maps, and aerial imagery. In addition to modeling tools, the Core Team leveraged local expert knowledge and public input gathered during in-person and virtual events, as well as a public survey, to guide the delineation of these areas.

Areas of concern provide a spatial delineation for the implementation of resilient landscape projects. AOCs include regions of high concentrations of values such as homes and infrastructure that overlap with high wildfire risk areas and/or areas where land management agencies have ongoing vegetation management treatments that could be enhanced by adjacent projects. The Gilpin County Core Team elected to further prioritize AOCs to inform implementation prioritization by completing a prioritization analysis. The analysis considered previous treatment areas, population density, community assessment scores, infrastructure counts, and anticipated post-fire watershed impacts in each AOC. The result is an AOC map which highlights the priority for treatment in each.

While residents in these areas should prioritize fuel treatments in the home ignition zone (see Appendix E, Figure E.1), it is always advisable to reduce the fuel around properties when living in the WUI. See Appendix F for a list of homeowner resources and Appendix C for additional details on wildfire risk for specific communities across Gilpin County.

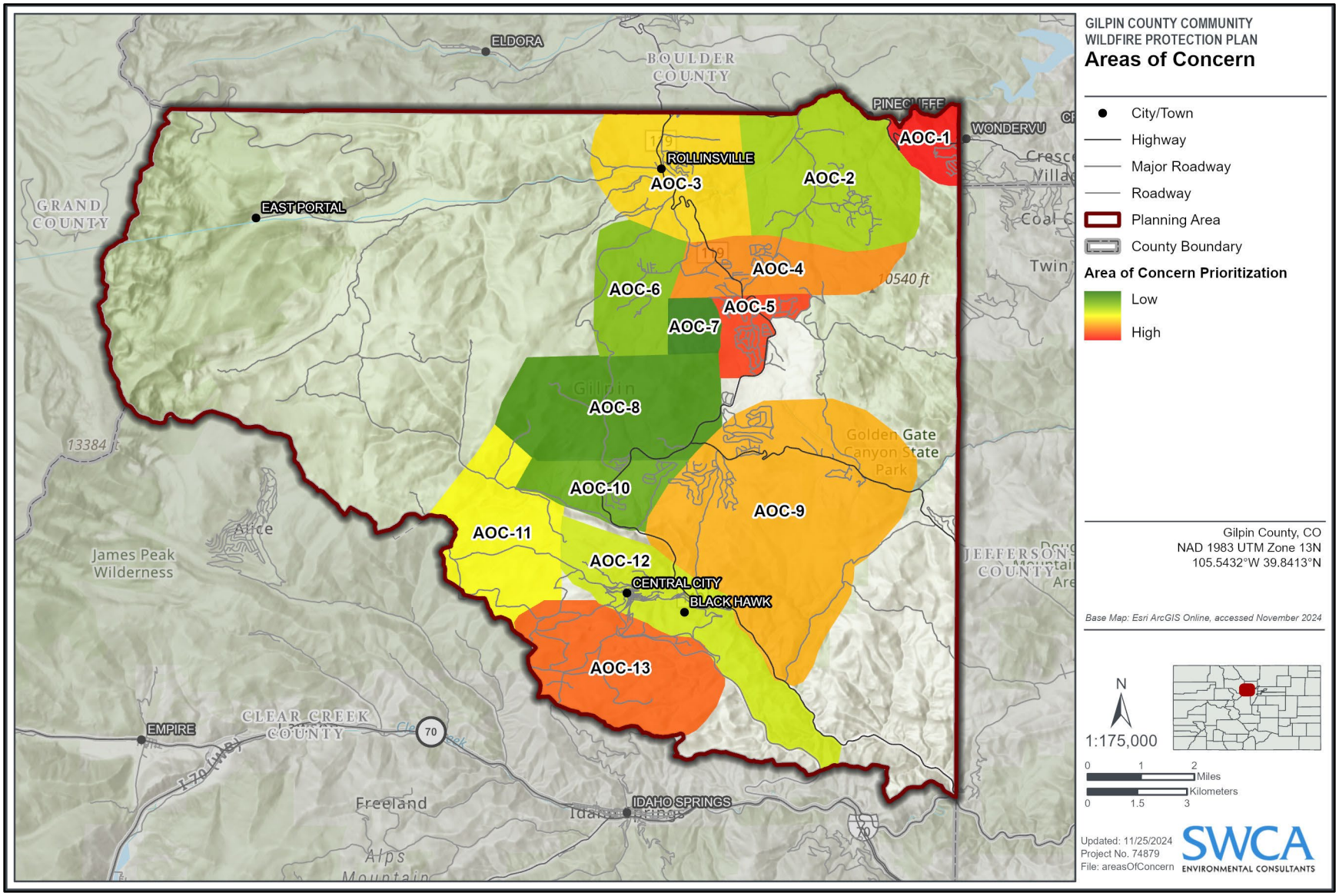

Figure 5.2. Gilpin County CWPP Core Team delineated areas of concern and prioritization rating.

Table 5.2. Gilpin County CWPP Areas of Concern Goals and Recommended Actions

Area of Concern ID	Goals and/or Recommended Actions
AOC - 1	• Remove dead trees and create a vegetation buffer along CO Highway 72. • Implement defensible space on private lands. • Identify roads and driveways at high risk of entrapment.
AOC - 2	• Conduct interagency fuel treatment projects along roadways. • Identify specific ingress/egress issues and entrapment risks. • Conduct forest stand treatments in stands with high density and high dead fuel loads.
AOC - 3	• Enhance ingress/egress operability. • Implement defensible space on private lands. • Determine the potential growth of the WUI in the next ~5 years.
AOC - 4	• Build upon existing USFS treatment projects. • Enhance ingress/egress safety along South Beaver Creek Road. • Promote defensible space actions on private lands. • This area is a priority due to its overlap with Xcel Energy's regions identified as having the highest wildfire risk concerns.
AOC - 5	• Address ingress/egress issues due to limited access. • Coordinate with the USFS for conducting roadside vegetation management and forest stand treatments to reduce wildfire hazard. • This area is a priority due to its overlap with Xcel Energy's regions identified as having the highest wildfire risk concerns.
AOC - 6	• Implement defensible space on private lands. • Create vegetation buffers along roads.
AOC - 7	• Identify issues contributing to difficult access and long fire response times. • Coordinate with landowners to reduce hazardous fuels along roadways and between parcels. • This area is a priority due to its overlap with Xcel Energy's regions identified as having the highest wildfire risk concerns.
AOC - 8	• Build upon existing USFS treatment projects. • Collaborate with Black Hawk and federal agencies to conduct fuel treatments and implement a maintenance schedule. • Create fuel breaks along USFS roads.
AOC - 9	• Enhance ingress/egress operability. • Address ingress/egress issues due to limited access. • Create vegetation buffers along Smith Hill Gulch Road to reduce the risk of entrapment and provide additional evacuation routes. • Implement defensible space on private lands. • Determine the efficacy of using Dory Hill Road and Smith Road as containment lines.
AOC - 10	• Implement defensible space around infrastructure and on private lands.
AOC - 11	• Coordinate with the USFS to design and implement landscape-scale fuel treatments. • Reduce the potential of wildfire from spreading east to west across Pecks Gulch towards Black Hawk. • Maintain existing fuel treatment units.

Area of Concern ID	Goals and/or Recommended Actions
AOC - 12	• Enhance ingress/egress operability. • Create vegetation buffers along Apex Valley Road to reduce the risk of entrapment. a. Promote the creation of defensible space on private lands through the use of education and outreach programs. • Consider strategies to incentivize home ignition zone treatments and home hardening upgrades. • Implement fuel treatment projects to reduce hazardous fuels around Chase Reservoir. • Reduce the risk of wildfire impacting the municipal water supply for Central City.
AOC - 13	• Improve existing fuel treatments and create a strategic fuel break. • Create vegetation buffers along roads. • Implement defensible space on private lands. • Protect above ground water lines that supply water to Black Hawk.

Potential Operational Delineations (PODs)

The USFS has mapped out potential operational delineations (PODs) throughout its land in Gilpin County. As defined by the USFS, PODs are "spatial units or containers defined by potential control features, such as roads and ridge tops, within which relevant information on forest conditions, ecology, and fire potential can be summarized. PODs combine local fire knowledge with advanced spatial analytics to help managers develop a common understanding of risks, management opportunities, and desired outcomes to determine fire management objectives" (USFS 2023a). The PODs are displayed in Figure 5.3.
The county and private landowners should partner with the USFS to create and reinforce fuel breaks along the POD and land ownership boundaries to prevent wildfire spread between adjacent landowners. Fuel breaks along POD borders should be prioritized along key evacuation routes and where they border private land, such as the communities of Black Hawk and Central City.

For more information and background on PODs, visit the following webpage: USFS Potential Operational Delineations (PODs).

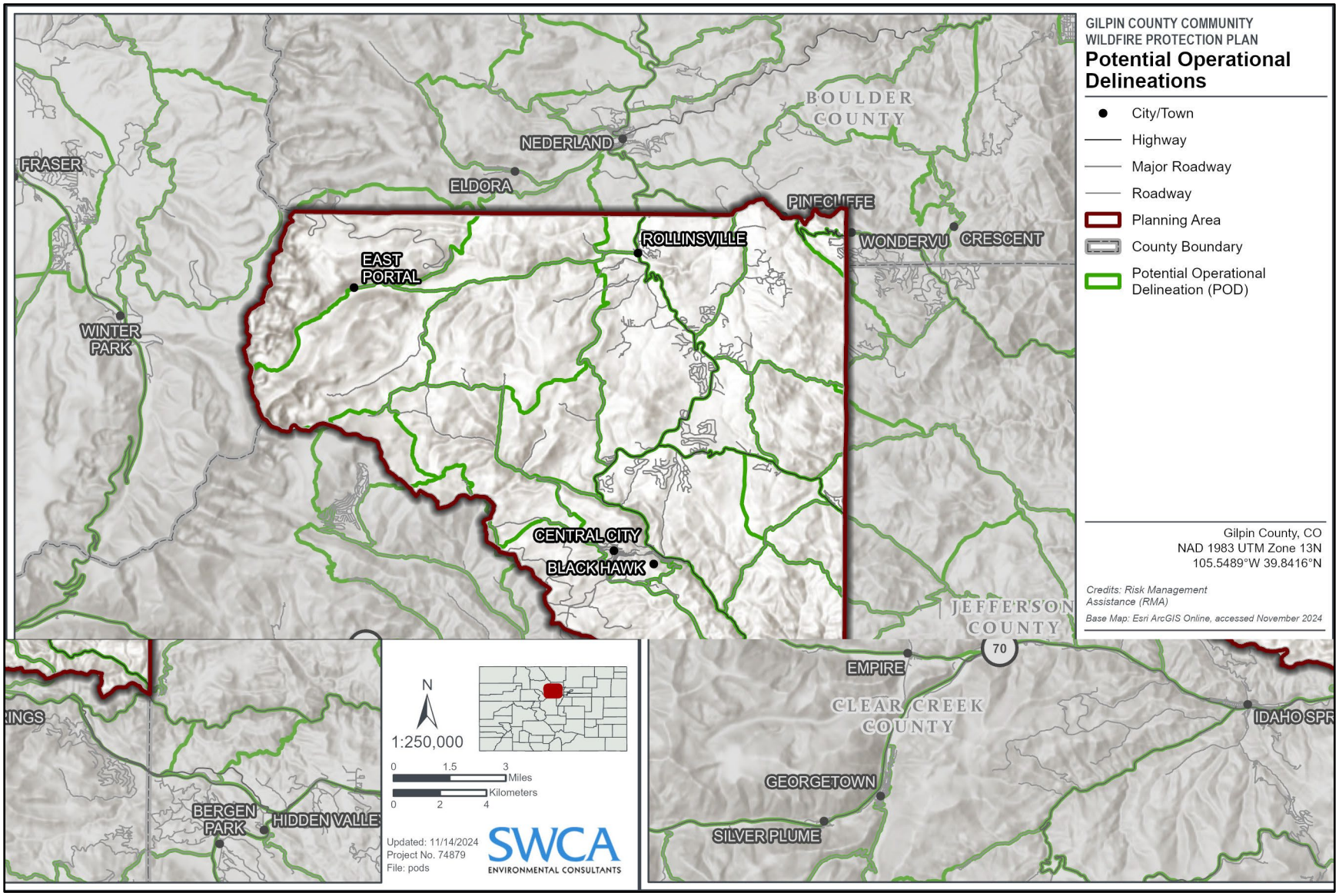

Figure 5.3. USFS-delineated potential operational delineations (POD) boundaries in Gilpin County.

GOAL 2: FIRE-ADAPTED COMMUNITIES

In this CWPP, recommendations for fire-adapted communities include public education and outreach actions and actions to reduce structural ignitability.

RECOMMENDATIONS FOR PUBLIC EDUCATION AND OUTREACH

Just as environmental hazards need to be mitigated to reduce the risk of fire loss, so do human hazards. Lack of knowledge, lack of positive actions (e.g., failing to create adequate defensible space), and negative actions (e.g., keeping leaf litter and exposed propane tanks close to structures) all contribute to increased risk of loss in the WUI.

Methods to enhance public education could include increasing awareness about fire department response and resource needs; providing workshops at demonstration sites showing Firewise landscaping techniques or fuels treatment projects; organizing community cleanups to remove green waste; publicizing availability of government funds for treatments on private land; and, most importantly, improving communication between homeowners and local land management agencies to improve and build trust, particularly since the implementation of fuel treatments and better maintenance of existing treatments needs to occur in the interface between public and private land.

Please see Appendix F for information regarding local, state, and federal public education and outreach programs, including free mitigation risk site visit assessments and a vegetation management cost-share program. Please see Appendix F for a list of homeowner resources.

Table 5.3 lists public education recommendations to be implemented in the county.

RECOMMENDATIONS FOR REDUCING STRUCTURAL IGNITABILITY

Table 5.3 also provides a list of community-based recommendations to reduce structural ignitability that should be implemented throughout Gilpin County. Reducing structural ignitability starts with providing homeowners with the information they need to take responsibility for protecting their own properties. A list of action items that individual homeowners can follow is provided below. Carrying out fuels reduction treatments on public land may only be effective in reducing fire risk to some communities. The Casualty Actuarial Society (CAS) compared the impact of individual and community-level mitigation on individual homeowner risks. They found that “the model indicates that all mitigation measures reduce the individual risk, but individual home mitigation – which individual homeowners' control – can have a bigger impact than any community mitigation alone” (CAS 2023). If homeowners have failed to provide mitigation efforts on their own land, the risk of home ignition remains high, and firefighter lives are put at risk when they carry out structural defense.

Preparing for wildland fire by creating defensible space around the home is an effective strategy for reducing structural ignitability as discussed under Cohesive Strategy Goal 1: Resilient Landscapes.

Studies have shown that burning vegetation beyond 120 feet of a structure is unlikely to ignite that property through radiant heat (Butler and Cohen 1996), but fire bands that travel independently of the flaming front have been known to destroy houses that had not been impacted by direct flame impingement. Hardening the home to ignition from embers, including installing and maintaining vent coverings and other openings with 1/8-inch metal screening, is also strongly advised to protect a home from structural ignitability. Managing the landscape around a structure by removing weeds and debris within a 30-foot radius and keeping the roof and gutters of a home clean are two maintenance measures proven to limit combustible materials that could provide an ember bed and ignite the structure.
In essence, reducing structural ignitability and creating defensible space are key for protecting from potential loss and damage from wildfires. Detailed information regarding defensible space practices, as well as a list of actions for reducing structural ignitability, can be found in Appendix E and Appendix F. See Table 5.3 below for a list of recommended homeowner actions organized by relative cost.

Pertinent information regarding strategies and standards related to Goal 2 of the Cohesive Strategy is provided in Table 5.4.

Action Items for Homeowners to Reduce Structural Ignitability

Table 5.3. Recommended Homeowner Actions to Reduce the Risk of Structural Ignitability

Limited Investment
Regularly check fire extinguishers and have a 100-foot hose available to wet perimeter of home.
Maintain defensible space around home. Collaborate with neighbors to provide adequate fuels mitigation in the event of overlapping property boundaries.
Ensure that house numbers are easily readable from the street.
Keep wood perimeter fences free of combustible materials. If possible, non-combustible material should link the house and fence.
Store combustible materials (propane, grills, firewood) away from the house.
Remove flammable material from around propane tanks.
Maintain a 5-foot perimeter around the home clear of any combustible materials.
Clear out materials from under decks and near structures. Enclose the area underneath the deck when feasible.
Stack firewood at least 30 feet from homes.
Prioritize your workload by considering local weather conditions. First, consider mitigating hazards on the side of your property that faces the prevailing wind direction, then work around to cover the entire property.
Keep gutters free of combustible material. Gutters can act as collection points for embers.
Maintain roofs by installing flashing, fixing holes, replacing shingles, and closing gaps.
Purchase or use a NOAA weather alert radio to hear fire weather announcements.

Moderate Investment
When landscaping in the HIZ (approximately 5 to 30 feet around the property), select non-combustible plants, lawn furniture, and landscaping material. Combustible plant material like junipers and ornamental conifers should be pruned and kept away from siding with regular maintenance. If possible, trees should be planted in groups and no closer than 10 feet to the house. Tree crowns should have a spacing of at least 18 feet when within the HIZ. Vegetation at the greatest distance from the structure and closest to wildland fuels should be carefully trimmed and pruned to reduce ladder fuels, and density should be reduced with approximately 6-foot spacing between trees and crowns. See Appendix E for additional defensible space and landscaping guidance.
Work on mitigating hazards on adjoining structures like sheds, garages, barns, etc. These can act as ignition points to your home.
Clear and thin vegetation along driveways and access roads so they can act as a safe evacuation route and allow emergency responders access to the home.
Construct a gravel turnaround in your driveway to improve access and mobilization of fire responders.
Install a roof irrigation system.
High Investment
Install an environmentally friendly and fire-resistant xeriscape yard.
Install screen vents with non-combustible meshing. Mesh openings should not exceed a nominal 1/8 to 1/16inch size.
Enclose open space underneath permanently located manufactured homes using non-combustible skirting.
Construct a non-combustible wall or barrier between your property and wildland fuels. This could be particularly effective at mitigating the effect of radiant heat and fire spread where 30 feet of defensible space is not available around the structure.
Install fire-resistant soffits and under-eave vents to protect your home from heat and embers that can be trapped beneath roof overhangs.
Replace exterior windows and skylights with tempered glass or multilayered glazed panels.
Update your roof to a non-combustible construction. Look for materials that have been treated and given a fire-resistant roof classification of Class A.
Upgrade exterior walls with fire-resistant materials.
Relocate propane tanks underground.

Table 5.4. Recommendations for Creating Fire-Adapted Communities (Public Education and Reducing Structural Ignitability)

Project ID	Status	Priority (H,M,L)	Timeline for Action	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements	Funding Sources

FAC1		H	1-4 years	**Homeowner Funding and Incentives**
				Establish funding pathway for underserved homeowners and vulnerable populations.
					Gilpin County private lands	Gilpin County	• Offer financial assistance to underserved homeowners who may require additional support to mitigate home hazards and evacuate during a wildfire.
							  ○ Identify vulnerable populations (e.g. elderly, disabled individuals, low-income households).
							  ○ Pursue grant opportunities to secure funding for assistance programs.
							• Offer incentives, such as financial rewards or discounts on mitigation materials, to homeowners who attend public education events and workshops on wildfire preparedness and evacuation.
							  ○ Organize a structured rewards program that provides financial assistance or other incentives.
							• Collaborate with local organizations and stakeholders to identify opportunities and secure funding for incentives.
								Encourage greater participation in public education events and workshops on wildfire preparedness and evacuation among homeowners.
								Protect life and property of underserved and at-risk populations.
									Complete an annual review of the number of actions taken to address vulnerable populations and underserved homeowners.
									Track attendance and participation rates at public education events and workshops to assess the effectiveness of the incentives program.
									Gather feedback from homeowners to evaluate the impact of incentives on their engagement.
										• National Fire Plan
										• IRA landowner assistance
										• CSFS private lands grants
										• BRIC
										• Forest Stewardship Program

FAC2		H	1-2 years	**Human Ignitions Reduction**
				Reduce potential for human-caused wildfire ignitions in urban environments and along recreational trails.
					Gilpin County, all lands	Gilpin County	• Increase public awareness of the human causes of ignitions in the surrounding environment:
							  ○ Consider targeted restrictions (e.g., use of gates) on recreational trail use during periods of heightened wildfire risk, especially on backcountry trails with high fuel loads.
							  ○ Communicate heightened wildfire ignition risk when motorized vehicles travel near dry fuels during warmer periods of the year (e.g., use flyers).
							  ○ Communicate ignition hazard from firearm discharge and shooting range options in county.
							  ○ Install signs to highlight wildfire ignition potential (either static at trail heads and along road segments with high ignition history, or electronic signs installed during periods of peak risk).
							• Highlight hazardous conditions surrounding homes/structures (e.g., exposed propane tanks, electrical hazards, hazard trees, limited defensible place).
							• Use temporary and/or permanent trail closures in high-to-extreme fire risk areas.
							• Inform and educate the public about methods to reduce human-caused wildfire ignitions.
							• Educate about sources of human-caused wildfire ignitions (e.g., target practice, cigarette butts, fireworks).
							  ○ Provide materials with resources for the public to understand how and with what funding they can take action to reduce risks.
							• Conduct community training courses and workshops.
							• Collaborate with the Northern Colorado Fireshed Collaborative to identify opportunities for funding, hiring and workforce
								Reduce human-caused wildfire ignitions.
								Improve public knowledge about wildfire risk for their surrounding environment.
									Regular monitoring of recreational trail conditions.
									Regular public outreach.
										• USFS Community Wildfire Defense Grants
										• Wildfire Mitigation Incentive for Local Government (CSFS)
										• Wildfire Mitigation Outreach Program
										• Regional Catastrophic Preparedness Grant (RCP)
										• CSFS grants

Project ID	Status	Priority (H,M,L)	Timeline for Action	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements	Funding Sources
FAC3		H	1–3 years	**HOA and Subdivision covenants** Create a framework for changing covenants within HOAs and subdivisions	Gilpin County, HOA communities	HOAs (prioritized by risk rating of community)	• Develop a structure for altering covenants in HOAs and residential subdivisions to best suit a cohesive planning approach within the County. • Identify potential planning vulnerabilities within HOAs and subdivisions (e.g., proximity to wildland areas, vegetation management planning, and evacuation capabilities). • Engage with community members (e.g., surveys, town hall meetings, and workshops). • Collaborate with fire safety experts, urban planners, and other land managers to build a framework for changing covenants within HOAs and addressing conflicts hindering cohesive planning. • Ensure changes to covenants comply with local jurisdictional ordinances. • Provide residents with knowledge and resources to prioritize fire prevention and response in their community.	Reduce wildfire risk and loss of structures through effective regulation. Facilitate sustainable and cohesive urban development.	Assess and improve communication between HOAs and wildfire managers. Complete an annual review for effectiveness. Perform frequent public outreach.	• Community Wildfire Defense Grants • EPA Environmental Education Grant • EPA Multipurpose Grants • Building Resilient Infrastructure and Communities (BRIC)
FAC4		H	1–2 years	**Community Outreach Education Campaign (Community Engagement Plan)** Develop and implement a comprehensive community outreach education campaign	Gilpin County, private lands	CSU Extension, Gilpin County OEM	• Conduct a demographic analysis to identify isolated, mobility-impaired, and financially limited populations within Gilpin County. • Focus on isolated/mobility-impaired and financially limited populations • Identify novel ways of identifying and engaging with harder to reach residents such as through food banks and other community services. • Develop targeted communication strategies for each group based on their specific needs • Create a variety of educational materials, including brochures, flyers, videos, and online resources, to convey key messages about wildfire preparedness and risk reduction. • Organize community meetings, workshops, and informational sessions • Collaborate with the Northern Colorado Fireshed Collaborative to identify opportunities for funding, hiring and workforce	Enhance community awareness and preparedness for wildfires.	Monitor attendance and participation rates at community meetings Evaluate the reach and impact of the campaign	• USFS Community Wildfire Defense Grants • Wildfire Mitigation Incentive for Local Government (CSFS) • Wildfire Mitigation Outreach Program • Regional Catastrophic Preparedness Grant (RCP)

FAC5		H	1–4 years	**Community Ambassador Program**
				Establishment of a Community Ambassador Program to enhance communication and information sharing
					Gilpin County, private lands	Gilpin County OEM in coordination with HOA/ neighborhood representatives	• Identify and recruit residents who are willing to serve as community ambassadors.
							• Collaborate with community ambassadors to create a formal communication plan.
							  ○ Maintain continuous coordination between county OEM, fire departments, CSU extension, and other knowledgeable groups.
							• Identify lessons learned from county community volunteer program
							• Schedule regular neighborhood meetings to foster community relationships and share information about emergency preparedness
							  ○ Encourage residents to participate actively and share their experiences and concerns.
							• Establish a neighborhood communication network (e.g., email list, social media group) to share meeting outcomes and updates.
								Build a resilient and well-prepared community by fostering regular interactions among neighbors and wildfire manager	Maintain a record of attendance at each meeting to gauge community involvement.
									Document the discussions, decisions, and action items from each meeting.
									Conduct surveys or informal feedback sessions to gather feedback or make adjustments
										• COCO Action implementation and Mitigation (AIM)
										• Wildfire Mitigation Incentive for Local Government (CSFS)
										• Wildfire Mitigation Outreach Program
										• GOCO Planning Grant

Project ID	Status	Priority (H,M,L)	Timeline for Action	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements	Funding Sources
FAC6		H	1–3 years	**Increase Capacity of County Slash Management and Sort Yard Operations** Enhance the capacity of county slash management and sort yard operations to handle increased vegetation debris from mitigation activities.	Gilpin County neighborhoods	Gilpin County Public Works, BoCC, Timberline FPD, DFPC	• Invest in additional equipment and staffing for sort yard operations to increase throughput capacity. • Explore partnerships with local utilities and biomass facilities to use chipped material for energy production. • Coordinate with the Department of Fire Prevention and Control (DFPC) to host certified burner classes and utilize air curtain burners for debris management. • Explore opportunities to include collection of larger woody materials and bark beetle logs.	Reduce the need for hauling slash to landfills by exploring alternative disposal methods, such as on-site burning and biomass utilization	Monitor sort yard usage and slash management efficiency through regular capacity assessments. Evaluate the effectiveness of new disposal methods and adjust operations based on performance metrics.	• CSFS grants • Forest Health management on Cooperative Lands • Wildfire Mitigation Incentives For Local Governments • Northern Colorado Fireshed grants
FAC7		H	1–2 years	**Wildfire Mitigation for Short-Term Rental Properties** Encourage owners of short-term rental properties to implement effective wildfire mitigation measures.	Gilpin County, short-term rentals	Gilpin County fire departments, County Manager, Community Development	• Develop incentive programs to motivate short-term rental property owners to undertake wildfire mitigation measures • Integrate wildfire mitigation requirements into the county's permitting process for short-term rentals • Provide property owners with resources, such as checklists, guidelines, and access to professional services • Develop targeted campaigns to raise wildfire awareness among tourists, including informational brochures, signage at rental properties, and digital content on booking platforms.	Reduce wildfire risk on short-term rental properties and educate tourists on wildfire safety.	Implement a system to track compliance among rental owners Prepare annual reports detailing the progress, challenges, and successes	• National Urban and Community Forest Program • Wildfire Mitigation Incentives For Local Governments • COCO AIM • Wildland Urban Interface Grant
FAC8		M	1–3 years	**Partnership Development for Wildfire Mitigation and Community Support** Establish and strengthen partnerships with local organizations and agencies to support wildfire mitigation projects, community outreach efforts, and defensible space initiatives.	Gilpin County, all lands	Local wildfire mitigation agencies, organizations, and groups	• Formalize partnership agreements with Timberline FPD and Axe & Snax to collaborate on community-wide mitigation and outreach efforts. • Identify specific roles and contributions for each partner, including project funding, materials provision, and community education. • Coordinate joint community events and initiatives that focus on defensible space and wildfire preparedness.	Enhance resource availability, increase project scope, and provide opportunities for leveraging funding.	Track partnership contributions and project outcomes annually. Evaluate the effectiveness of partnership-driven initiatives in expanding defensible space and community awareness.	• Forest Health Management on Cooperative Lands • Community Wildfire Defense Grants • NOCO Fireshed • Landscape Scale Restoration Program • National Fish and Wildlife grants

Project ID	Status	Priority (H,M,L)	Timeline for Action	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements	Funding Sources

FAC9		M	2–5 years	**Smoke-Ready Communities**
				Create smoke-ready communities through facilitating smoke education and providing educational resources.
					Gilpin County, all lands	Gilpin County, Gilpin Public Health, CSU Extension	• Develop and implement smoke education programs to increase awareness and understanding of the health risks associated with smoke exposure during wildfires.
							  ○ Target smoke-prone regions and socioeconomically disadvantaged communities that are most vulnerable to the impacts of smoke.
							  ○ Distribute information on best practices for creating indoor clean air spaces and using air filtration devices to reduce smoke infiltration.
							  ○ Collaborate with local health departments, air quality agencies, and community organizations.
							• Integrate wildfire smoke education into the school curriculum integration.
							• Provide resources (e.g., air cleaners, filtration systems) to vulnerable and at-risk communities.
							• Explore opportunities for a smoke notification sign-up or opportunities to utilize county emergency notification system for smoke notices.
							• Disseminate educational information through various channels, including:
							  ○ Social media
							  ○ Public events
							  ○ In-person training and workshops
								Enhance community resilience to smoke events by equipping residents with the knowledge and resources needed to mitigate health risks.
								Provide the community with knowledge and strategies to reduce health impacts associated with smoke from wildfires.
									Annual program evaluation and updates as necessary.
									Annual lessons learned review.
										• Community Wildfire Defense Grants
										• EPA Environmental Education Grant
										• EPA Multipurpose Grants
										• Building Resilient Infrastructure and Communities (BRIC)
										• Matching Awards Program

FAC10		M	3–5 years	**Countywide Mitigation Mapping and Gap Analysis** Create a comprehensive map of homes and properties that have undergone wildfire mitigation, in coordination with Timberline FPD and other local partners.	Gilpin County, all lands	Gilpin County GIS	• Work with homeowners, renters, local mitigation providers and fire departments to collect data on properties that have completed mitigation activities. • Develop a GIS-based map that shows mitigation status, project locations, and areas that require additional focus. • Share the map with county planners, fire agencies, and the public to increase transparency and support strategic planning. • Identify opportunities for mitigation records to support retention of home insurance policies.	Identify gaps in mitigation efforts and target future projects to areas with high vulnerability.	Update the map annually with new data from mitigation projects and partner contributions. Use the map to guide future funding applications and project planning.	• ESRI • RCP • EPA Multipurpose • GOCO Planning • Wildfire Mitigation Outreach Program
FAC11		M	2–5 years	**NEPA Planning (Community Engagement Plan)** Collaborative approach to large-scale NEPA planning in Gilpin County	Gilpin County, all lands	Federal agencies	• Form a working group that includes representatives from federal agencies, county staff, state agencies, and NGOs. • Use multiple engagement strategies to involve the public in the NEPA planning and scoping process (e.g.-public meetings, workshops, online forums) • Collaborate with partners to develop large-scale NEPA plans that address wildfire management, environmental protection, and community safety. ○ Ensure plans are consistent with local, state, and federal goals and regulations	Enhance wildfire management and risk reduction by balancing environmental protection with wildfire mitigation.	Assess development of NEPA documents Assess status of compliance process	• GOCO Planning • Forest Restoration and Wildfire Risk Reduction • Collaborative Capacity Program (NFF • NOCO Fireshed

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Project ID	Status	Priority (H,M,L)	Timeline for Action	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements	Funding Sources

FAC12		L	1–10 years	**Wildfire Risk Communication Improvements**
				Improve existing wildfire risk signage.
				Explore additional means of disseminating wildfire warnings and information (social media, local news outlets, etc.).
					Gilpin County, all lands	Gilpin County Transportation Department, Colorado Department of Transportation	• Communicate wildfire risk using various social media and local news outlets, tracking community engagement, and encouraging dialogue between the County and members of the community.
							• Communicate wildfire risk using strategically placed signage and other materials.
							  ○ Spread seasonally adjusted flyers and prevention messages along highways and in public open space areas to reduce human ignitions and promote defensible space.
							  ○ Continue the use of existing electronic signs at firehouses and other locales to display fire prevention information, safety messages, and fire danger ratings linked to safety actions.
							  ○ Utilize social media to disseminate information about risk changes and burn restrictions.
							  ○ Engage with diverse communities to identify specific needs and preferences for wildfire signage and communication.
							  ○ Develop materials specifically addressing the unique vulnerabilities and needs of mobile home park residents.
								Reduce wildfire risk through public education and outreach and improved situational awareness.
								Reduce threats to life and property
									Assess the current situation and determine where signage can be improved (e.g., increasingly popular recreation areas).
									Provide information on pertinent County webpages and webpages of local businesses.
									Assess and use current popular information sources (Nextdoor, social media, Twitter, etc.)
										• COCO Action implementation and Mitigation (AIM)
										• Wildfire Mitigation Incentive for Local Government (CSFS)
										• Wildfire Mitigation Outreach Program
										• GOCO Planning Grant

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GOAL 3: WILDFIRE RESPONSE

This section provides recommended actions that jurisdictions could undertake to improve wildfire response.

RECOMMENDATIONS FOR IMPROVING FIRE RESPONSE CAPABILITIES

Equipping the public with information to encourage wildfire preparedness, so they can reduce dependence on fire departments is essential because these resources are often stretched thin due to limited personnel. Education to enhance community preparedness is a key factor in supporting local fire departments in fire response, particularly educating residents about emergency notifications and evacuation protocols so that residents are able to safely evacuate an area while emergency responders prepare to protect life and property.

Table 5.5 provides recommendations for improving firefighting capabilities. Many of these recommendations are general in nature.

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Table 5.5. Recommendations for Safe and Effective Wildfire Response

Project ID	Status	Priority (H,M,L)	Timeline for Action	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements	Funding Sources

WR1		H	1–3 years	**Increase Staffing**
				Address staffing limitations within the County
					Gilpin County	County in conjunction with DFPC	• Conduct a comprehensive assessment of the current staffing levels and allocate resources strategically, ensuring that staffing levels are a proper reflection of the scale of wildfire risk and current wildfire season.
							  ○ Explore and establish collaborative partnerships with neighboring jurisdictions, firefighting agencies, and relevant private entities.
							• Increase the number of firefighting jobs and volunteer firefighting opportunities.
							  ○ Improve collaboration/cooperation capabilities between firefighting agencies.
							  ○ Train physically capable workers from other departments to fight fire on fire lines (e.g., roads, train workers from vegetation, wildlife, and weed crews).
							• Achieve funding through fundraising/grant applications (e.g., federal, state, local, and independent grants and private donations).
								Improve local ability and self-reliance of Gilpin County fire managers to address its wildfire concerns, effectively leaning on partnerships where necessary.
								Reduce risk of loss of life and property from wildfire.
								Provide career growth opportunities for personnel and support succession planning.
									Establish a regular review process to assess the effectiveness of staffing solutions and wildfire management strategies.
									Adapt staffing levels and approaches based on evolving wildfire risk.
									Provide annual online and in-person wildfire training classes/refresher courses.
										• SAFER
										• National fire Plan
										• State Fire Assistance Program
										• Colorado Division of Fire Prevention and Control
										• DHS funding for fire departments

WR2		H	1-3 years	**Timberline FPD Property Assessments**
				Standardize and enhance capacity for property vegetation management assessments.
					Gilpin County	Timberline FPD, Gilpin County	• Continue to provide parcel-level (property-level) vegetation management assessments to the public.
							• Develop a standardized assessment protocol using an adapted NFPA 1144 form, ensuring consistent and comprehensive evaluations of properties.
							  ○ Provide training for FD personnel and volunteers on the standardized assessment protocol.
							  ○ Work with neighborhood ambassadors as key personnel for assessments.
							  ○ Create a database to organize and manage assessment data, track progress, and share information with homeowners.
							• Utilize online data management tools (e.g., Survey 123) to streamline the assessment process.
							  ○ Catalog assessment results to show progress over time
							• Hire additional staff to increase the FD's capacity to perform assessments and vegetation management work.
							  ○ Conduct needs assessment to understand the required level of staffing increase.
							  ○ Consider developing a training program to offer volunteers.
								Enhance the Timberline FPD's ability to conduct parcel-level vegetation management assessments.
								Increasing participation in wildfire mitigation and building community-wide wildfire resilience.
									Implement regular quality control checks to ensure assessments are carried out .
									Monitor the functionality and effectiveness of standardized process, making changes as needed.
									Collect feedback from homeowners on the assessment process and quality of the vegetation treatment
										• EMPG (FEMA)
										• RCP grants (FEMA)
										• Wildfire Mitigation Incentives for Local Government (CSFS)
										• Wildfire Mitigation Resources & Best Practices (CSFS)
										• Collaborative Capacity Program (NFF)
										• Matching Awards Program (NFF)
										• State Fire Assistance Program

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Project ID	Status	Priority (H,M,L)	Timeline for Action	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements	Funding Sources
WR3		H	1-2 years	**Strategic Incident Command Post (ICP) Pre-Identification and Land Use (LU) Agreements** Pre-identify suitable locations for staging areas and ICP throughout the county. Establishing LU agreements with public and private landowners.	Gilpin County	County OEM, Timberline FPD, USFS, Private Landowners	• Conduct a geographic assessment to identify potential ICP and staging areas based on access, topography, proximity to high-risk fire zones, and availability of resources. • Engage with landowners and government agencies to establish pre-approved Land Use Agreements for selected sites. • Develop a database of pre-identified sites with detailed maps, access points, and site-specific logistical considerations.	Support effective deployment and coordination of resources during Type 3 and above incidents. Ensure that command and logistical operations are strategically positioned for efficiency and safety	Update the ICP and staging site database annually and review during the Annual Operating Plan (AOP) update process. Conduct site inspections and readiness assessments annually before fire season. Hold review meetings post-incident to evaluate the effectiveness of pre-identified sites.	• EMPG (FEMA) • SAFER • National fire Plan • State Fire Assistance Program • Colorado Division of Fire Prevention and Control • DHS funding for fire departments • EPA Multipurpose Grant
WR4		H	1-4 years	**Temporary Refuge Areas** Establish Temporary Refuge Areas (TRAs) throughout the County.	Gilpin County, all lands	Gilpin County Emergency Management	• Create a working group to identify and evaluate potential TRAs. • Once identified, create a naming or numbering convention. • Decide how to map, advertise, communicate these TRAs and educate the public on how to use them (see next project below). • Coordinate with county sheriff to determine when to use TRAs and how to direct residents to them during an emergency if needed. • The intent of TRAs is not to replace evacuation during a fire, but to create options in the event that evacuation routes are not useable. Evacuation of residents should always be the first option during an incident.	Provide locations for residents to seek refuge during wildfire events (during a last case scenario), reducing the risk of injury or loss of life.	Regular monitoring of TRA locations ensures they are strategically placed throughout the community and are easily accessible to residents. Gather feedback from residents regarding the effectiveness and usability of TRAs through surveys, public meetings, or focus groups to identify areas for improvement and address any concerns.	• BRIC • Community Wildfire Defense Grants • EPA Multi-Purpose Grant • Colorado Strategic Wildfire Action Program • Matching Awards Program (NFF)
WR5		H	1-2 years	**Countywide Wildfire Authority** Create a countywide wildfire authority to oversee and coordinate wildfire mitigation and response efforts across the County.	Gilpin County	Gilpin County Emergency Management, County fire departments, neighborhood ambassadors	• Form a governing body comprising representatives from Gilpin County, TLFPD, and other local fire agencies. • Build off recommendations in this CWPP to refine priority actions, identify specific action areas, and facilitate mitigation projects in coordination with land managers. ○ Continually reassess mitigation priorities and project progress. • Work with neighborhood ambassadors to align mitigation priorities, approach, and education. • Facilitate regular meetings and communication between all involved agencies to ensure coordinated efforts.	Improve the efficiency and effectiveness of wildfire mitigation and response efforts through unified oversight and coordination	Regularly evaluate the performance and impact of the wildfire authority through after-action reports and feedback from stakeholders.	• BRIC • Community Wildfire Defense Grants • EPA Multi-Purpose Grant • Colorado Strategic Wildfire Action Program • Matching Awards Program (NFF)Community Wildfire Defense Grants

Project ID	Status	Priority (H,M,L)	Timeline for Action	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements	Funding Sources

WR6		H	1-2 years	**Water Supply Needs and Access Rights**
				Address water supply shortages in the northern region of the county by developing additional water resources and infrastructure.
					Gilpin County, especially northern portion of the county.	County Government, TFPD	• Identify water needs for wildfire suppression efforts
							  ○ Conduct an assessment to identify the specific water supply needs for firefighting
							  ○ Determine the most effective methods for securing water rights and/or developing infrastructure
							  ○ Conduct inspection and test capacity of cisterns in county. maintain record or cistern testing dates and results to inform water planning.
							• Advocate for support in securing water rights and funding infrastructure improvements.
							  ○ Identify private lakes and ponds that could be utilized for firefighting purposes.
							  ○ Explore feasibility of designing or constructing water sources
							  ○ Negotiate mutual aid agreements with private landowners to ensure access to water sources during wildfire events.
							  ○ Establish lease agreements where necessary to secure long-term access to critical water supplies.
							  ○ Implement a field effort to map and document water infrastructure.
								Increase the firefighting capacity by ensuring an adequate water supply.
								Increase fire response capabilities in more remote areas of the County.
									Monitor the allocation and use of funds for securing water rights and infrastructure development.	• COCO AIM Grant
										• Community Wildfire Defense Grant
										• Fire Prevention & Safety
										• SAFER Grant
										• Emergency Management and Performance Grant

WR7		H	1–5 years	**Wildland Fire Response Training, Interagency Incident Training and Scenario Planning**
				Refining the budget allocation for wildland fire preparedness and threat mitigation, ensuring uniformity across local districts, and integrating CWPP and emergency operation plan (EOP) guidelines into spending decisions.
				Facilitate collaborative training and scenario-based planning exercises for Type 3 and above incidents.
					Gilpin County	Gilpin County, Timberline FPD, USFS, Local Law Enforcement, County OEM	• Enhance local responses to wildfires by standardizing training protocols, addressing gaps in response strategies, and ensuring appropriate funding allocation.
							  ○ Conduct a comprehensive assessment of wildland training requirements for local districts, considering factors such as terrain, vegetation, and historical wildfire incidents.
							  ○ Develop a standardized training curriculum tailored to address the identified needs, incorporating best practices and lessons learned from past incidents.
							• Establish clear roles and responsibilities, including scenario-specific action plans.
							• Develop a structured training and certification program to support fire prevention, suppression, and emergency response activities.
							• Analyze the budget allocation for wildland training to ensure adequacy and effectiveness in meeting training goals.
								Ensure proper usage of the emergency management budget and effective spending of taxpayer dollars.
								Build interagency coordination skills, establishing unified command procedures, and test communication systems through simulated wildfire scenarios
									Evaluate training effectiveness through after-action reports and feedback surveys
									Ensure specificity in funding allocation for response training and other key efforts, aligning expenditure with CWPP and EOP priorities.
										• EMPG (FEMA)
										• RCP grants (FEMA)
										• Forest Restoration & Wildfire Risk Mitigation (CSFS)
										• Wildfire Mitigation Incentives for Local Government (CSFS)
										• Wildfire Mitigation Resources & Best Practices (CSFS)
										• Fire Assistance Grant

WR8		H	1–2 years	**Enhanced Dispatch and Law Enforcement Coordination** Build capacity for dispatch capabilities and strengthening coordination between dispatch centers, law enforcement agencies, and fire response teams to improve	Gilpin County	County Dispatch Center, Local law enforcement, Timberline FPD, Emergency Management	• Assess current dispatch capabilities to identify staffing, training, and technology gaps that could hinder response efficiency during wildfire incidents. • Organize quarterly meetings and joint planning sessions with dispatch centers, fire agencies, and law enforcement. • Develop specific dispatch procedures for initiating emergency alerts. • Provide training for dispatch staff on wildland fire operations, including scenario-based exercises that integrate fire and law enforcement operations.	Ensure a unified approach to emergency response and public safety	Conduct annual reviews of dispatch capacity and response times during wildfire incidents. Measure the effectiveness of coordination and communication through post-incident evaluations and dispatch center debriefs.	• SAFER • National fire Plan • State Fire Assistance Program • Colorado Division of Fire Prevention and Control • DHS funding for fire departments

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Project ID	Status	Priority (H,M,L)	Timeline for Action	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements	Funding Sources
WR9		H	1–2 years	**Enhance Grant Administration Capacity** Increased capacity for grant administration and management to effectively apply for and administer funds for fuels treatment and other mitigation projects.	Gilpin County	Gilpin County	• Conduct a thorough assessment to identify specific needs and gaps in grant administration capabilities. • Hire or train personnel specifically for grant management. ○ Develop and implement training programs for grant writing, administration, and compliance so other county and fire staff can assist. • Collaborate with experienced Grant-writers to develop training and/or provide grant writing support for specific initiatives that exceed County capacity.	Build and sustain a robust grant administration infrastructure within to acquire wildfire mitigation grant funding	Conduct regular reviews of grant administration processes and outcomes. Produce annual reports detailing the progress and impact of enhanced grant administration capacity	• EMPG (FEMA) • RCP grants (FEMA) • SAFER • National fire Plan • State Fire Assistance Program • Colorado Division of Fire Prevention and Control • DHS funding for fire departments
WR10		H	1–2 years	**Evacuation Services for Vulnerable Populations** Enhance evacuation services for elderly, disabled individuals, and those with specific needs during wildfire events.	Gilpin County		• Improve evacuation assistance for seniors, people with disabilities, and individuals requiring specialized support during wildfire incidents • Identify evacuation support processes for vulnerable individuals (e.g., elderly, disabled people, unhoused people). • Enhance signage with more information to improve evacuation awareness and preparedness among the unhoused population. • Partner with nonprofit group to provide transportation to underserved groups • Implement registry for vulnerable residents who wish to be included in specific outreach and transport assistance.	Improve the safety and well-being of vulnerable individuals during wildfire evacuations by addressing their unique needs and challenges.	Establish channels for feedback from residents, emergency responders, and community organizations to continuously refine and adapt evacuation services.	• Wildfire Mitigation Incentives for Local Government (CSFS) • BRIC • Community Wildfire Defense Grants • EPA Multi-Purpose Grant • Colorado Strategic Wildfire Action Program • Matching Awards Program (NFF)Community Wildfire Defense Grants • FP&S grants (FEMA) • Northern Colorado Fireshed Fund • Strategic Wildfire Action Program (CODNR)
WR11		M	1–5 years	**Pre-Season Planning and Annual Operating Plan (AOP) Integration** Integrate pre-season planning activities into the AOP update process to enhance readiness and interagency coordination before fire season	Gilpin County	County OEM	• Host a pre-season planning workshop involving all relevant agencies to review the AOP and update protocols based on recent learnings and changing conditions. • Incorporate inputs from wildfire scenario planning, equipment needs assessments, and water resource development projects into the AOP.	Ensure that all partners are aligned on operational priorities, resource allocation, and strategic objectives.	Review and document updates to the AOP annually. Conduct follow-up meetings post-fire season to discuss lessons learned and inform the next AOP update. Track the implementation of AOP recommendations and measure impact on wildfire response efficiency	• EMPG (FEMA) • RCP grants (FEMA) • BRIC grants (FEMA) • Wildfire Mitigation Incentives for Local Government (CSFS) • Wildfire Mitigation Resources & Best Practices (CSFS)
WR12		H	1–3 years	**Strategic Placement of N5 Smoke and Chemical Sensors for Early Detection** Deploy N5 smoke and chemical sensors at key locations along major transportation corridors to enhance wildfire detection and monitoring capabilities.	Gilpin County transportation corridors (e.g. such as Highway 6, I-70, and the East Portal)	County OEM	• Coordinate with local fire departments, transportation agencies, and emergency management to select strategic sensor placement sites. ○ Install N5 smoke and chemical sensors at identified locations, ensuring each sensor is GPS-tagged and documented with photographic evidence for accurate mapping and monitoring.	Mitigate fire spread risks and support rapid response efforts, safeguarding critical infrastructure and public safety	Establish a monitoring schedule to evaluate sensor reliability and effectiveness in detecting smoke and chemical emissions. Conduct frequent reviews of sensor performance and data accuracy.	• EMPG (FEMA) • RCP grants (FEMA) • BRIC grants (FEMA) • Wildfire Mitigation Incentives for Local Government (CSFS) • Wildfire Mitigation Resources & Best Practices (CSFS)

Project ID	Status	Priority (H,M,L)	Timeline for Action	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements	Funding Sources

WR13		M	2–5 years	**Response/Suppression Plan**
				Create a tactical and operational fire response and suppression plan, with a focus on preventing wildland fire escalations into urban conflagration.
					Gilpin County countywide	Gilpin County emergency management	• Establish a formalized interagency coordination framework involving local fire departments, emergency services, and relevant governmental bodies.
							  ○ Develop comprehensive tactical and operational interagency standard operating procedures.
							  ○ Facilitate regular joint training exercises to ensure seamless integration of resources and personnel.
							  ○ Identify weaknesses and strengthen mutual aid agreements with neighboring jurisdictions and FPDs to ensure a rapid and coordinated response.
							  ○ Evaluate and establish shared response goals and responsibilities between entities.
							• Design a suppression and control protocol that uses predetermined control features (e.g., fuel breaks) to strategically manage and contain wildfires.
							• Create multiple contingency plans to address various fire behavior conditions.
							• Provide land managers with a formal process for developing landscape-scale wildfire response options in wildland areas before fires start (similar to PODs).
							  ○ Define spatial units and summarize relevant information and local knowledge on fuel conditions, ecology, and fire behavior potential.
							• Facilitate collaborative pre-planning and address potential cross-boundary issues.
								Improve preparedness and capacity for local FPDs to respond to and slow the spread of WUI fires.	Conduct a routine evaluation process to assess the effectiveness of the response and suppression integration measures.
									Use feedback from wildfire incidents to continuously improve coordination.
										• EMPG (FEMA)
										• SAFER
										• National fire Plan
										• State Fire Assistance Program
										• Colorado Division of Fire Prevention and Control
										• DHS funding for fire departments
										• EPA Multipurpose Grant

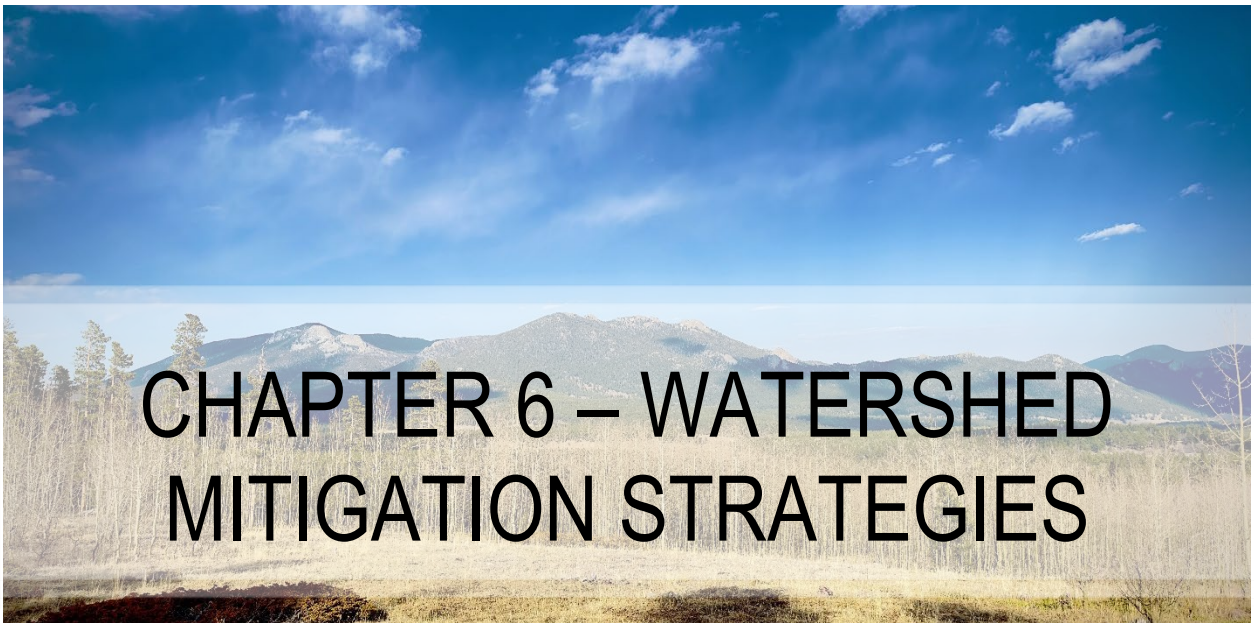
WR14		M	2–5 years	**Evacuation Route Planning** Identify and establish primary and alternative evacuation routes	Gilpin County with focus on communities located in high-risk wildfire areas.	Gilpin County Emergency Management, USFS, CDOT, Timberline Fire Protection District	• Collaborate with local public planning and transportation agencies to assess and map potential evacuation routes. ○ Evacuation analysis may be used as basis for assessing route risk • Develop and publish a comprehensive evacuation route guide for the public, including contingency routes and communication plans. • Conduct community workshops and drills to educate residents on evacuation procedures. • Secure funding and resources to implement necessary infrastructure and maintenance along these routes. • Develop and distribute educational materials and resources for residents with pets and large animals to enhance preparedness and evacuation planning in the event of a wildfire.	Enhance the safety and efficiency of evacuation routes during wildfires.	Conduct regular reviews and updates of POD boundaries and egress routes using the latest data and technology. Perform annual drills and simulations to test effectiveness.	• BRIC • Community Development Block Grants • Firewise grants • National Urban and Community Forest Program • Challenge Cost Share Grant Program • Community Wildfire Defense Grants

Project ID	Status	Priority (H,M,L)	Timeline for Action	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements	Funding Sources

WR15		M	2–5 years	**Collaboration with Fire Agencies**
				Strengthen partnerships and coordination with local, state, and federal fire agencies to improve wildfire response in cross-boundary scenarios
					Gilpin County	All Fire Response Agencies	• Establish regular communication channels and joint training exercises with fire agencies to enhance mutual understanding and cooperation.
							  ○ Create a formal interagency working group to address wildfire-related issues, share resources, and develop joint strategies.
							  ○ Develop communication plans that account for a variety of cross-boundary incident response scenarios
							• Implement joint wildfire prevention and mitigation projects, leveraging the expertise and resources of each agency.
							• Develop and maintain a shared database of resources, personnel, and equipment to ensure efficient and effective deployment during wildfire incidents.
								Improve the effectiveness of wildfire response operations across all agencies in the County through enhanced collaboration and resource/information sharing	Conduct regular meetings and workshops to review progress, share experiences, and update strategies.
									Collect feedback from participating agencies
										• BRIC
										• Community Development Block Grants
										• National Urban and Community Forest Program
										• Challenge Cost Share Grant Program
										• Community Wildfire Defense Grants

WR16		M	1–5 years	**Address Visibility**
				Enhance Address Visibility for First Responders in Gilpin County
					Gilpin County, Prioritizing areas with higher wildfire risk and historically poor visibility.	Gilpin County Emergency Management, FPDs	• Launch a public awareness campaign to educate residents and business owners on the importance of clear and visible address signage.
							  ○ Provide guidelines on how to properly display addresses.
							• Work with the Community Development Department to update local codes and policies to standardize signage.
							  ○ Ensure new developments comply with the updated standards.
							• Seek funding through grants, local taxes, or public-private partnerships.
							• Provide resources and support for socially vulnerable populations that may need assistance.
								Reduce response times and improve the effectiveness of emergency services	Conduct periodic inspections to ensure compliance.
									Track response times and feedback.
										• BRIC
										• Community Development Block Grants
										• National Urban and Community Forest Program
										• Challenge Cost Share Grant Program
										• Community Wildfire Defense Grants

WR17		M	1–5 years	**Communication system**
				Establish a common communication channel for the County.
					Gilpin County	Gilpin County Emergency Management	• Establish a system through which the department will communicate using common practices and pre-built frequencies.
							  ○ Identify specific communication needs within the County.
							  ○ Develop a centralized system of standardized communication.
							  ○ Implement training programs to educate County Emergency response members on appropriate and effective use of the communication system.
								Enhance emergency response communications and capabilities within the County.	Assess the annual effectiveness of the communication system.
									Establish a feedback mechanism to gather input from County members regarding the communication system.
										• BRIC
										• Community Development Block Grants
										• National Urban and Community Forest Program
										• Challenge Cost Share Grant Program
										• Community Wildfire Defense Grants



CHAPTER 6 – WATERSHED MITIGATION STRATEGIES

Healthy watersheds consist of the natural land cover that supports and facilitates naturally occurring hydrologic and geomorphic processes (EPA 2022a, 2022b) and promote the physical and chemical conditions necessary to support the habitat requirements of its native ecological communities. Healthy watersheds typically consist of functioning headwater streams, floodplains, riparian corridors, biotic refugia, instream habitat, biotic communities, and the natural vegetation of the landscape. These healthy watershed components should support hydrology, sediment transport, fluvial geomorphology, and disturbance regimes that are required to maintain a healthy aquatic ecosystem (EPA 2022b). Healthy watersheds provide invaluable ecosystem services to communities living along them such as clean drinking water, predictable water supplies, and protection from flooding, debris flows, and sediment yields. Additionally, they also provide invaluable recreation opportunities and can heighten property values if adjacent watersheds are healthy (EPA 2022b). While wildfire plays an important part in maintaining healthy watersheds, uncharacteristically large and severe wildfires can jeopardize the health of watersheds and put communities and infrastructure at risk of hazards.

This chapter provides watershed-related project recommendations and implementation guidance to mitigate potential wildfire impacts to watersheds. Taking action before a fire occurs can vastly reduce the immediate impacts of a wildfire on a watershed as well as reduce the time a watershed needs to recover from fire impacts. It is important to note, however, that watershed resilience building projects alone will likely not eliminate the potential of post-fire hazards. Forest health projects, such as those discussed in Chapter 5, are equally important in maintain watershed health in a post-fire landscape as these actions work to reduce the severity of fire in the watershed, limiting the potential and severity of post-fire hazards. This chapter also discusses actions that can be taken following a fire to reduce immediate and long-term impacts to watershed health and hazards.

This section provides guidance to local planners, land management agencies, water providers, and local landowners about the type and appropriate locations of treatments that will be necessary to reduce post-wildfire watershed hazard and mitigate watershed risk exposure. This section will prioritize protection to water infrastructure, life, and property (see Appendix D for descriptions of water infrastructure and life and property). Many of the recommendations listed can be implemented at the homeowner or community level; however, due to the interconnectivity of watersheds, many projects will require substantial

coordination between private, local, and federal stakeholders. Projects requiring large-scale support can be prioritized based on the Watershed Composite Risk-Hazard Assessment.

Similar to the Wildfire Cohesive Strategies, watershed mitigation strategies have been aligned with three primary goals:

1. Restore and/or maintain healthy watersheds
2. Create disaster-resilient communities
3. Effectively implement post-wildfire watershed rehabilitation and response

These goals are synergistic, where, for example, restoring and/or maintaining healthy watersheds would subsequently reduce community risk exposure to post-wildfire watersheds hazards (i.e., improve disaster-resilient communities). The recommendation matrix at the end of the chapter serves as an action plan for implementing watershed treatments.

GOAL 1: RESTORE AND MAINTAIN HEALTHY WATERSHEDS

Effective fuels and aquatic resource management on public and private land is important to mitigating damaging and hazardous post-wildfire impacts on watersheds. Research has demonstrated that diverse and healthy forest, riparian, and aquatic systems lead to healthy watersheds, which yield a lower risk for watershed hazards and risk exposure (CSFS 2023).

In this CWPP, recommendations to restore and maintain healthy watersheds focus on wildfire severity reduction and watershed restoration. These recommendations are meant to be collaborative in nature and should include feedback and planning recommendations from local water suppliers and water users.

WILDFIRE SEVERITY REDUCTION

Fuels should be modified with a strategic approach to reduce the threat that high-severity wildfires pose to watershed health. Fuel treatments can be aligned with the fuel treatment approach discussed in Chapter 5; however, to protect watershed health and to mitigate post-wildfire hazards (sediment yields, debris flows, and flooding) fuel treatments should be prioritized in watersheds that have a higher risk of sediment yields and debris flows and in watersheds upstream from regions that are susceptible to flooding. A wide breadth of treatments can be used to reduce future wildfire severity and include, but are not limited to, prescribed fire, invasive plant management, mechanical removal, timber thinning, targeted grazing, and fuel break creation and/or maintenance. Wildland fuel treatments that can be utilized are discussed in detail in Appendix E. Treatments should consider fire ecology, annual probability/potential size of high-severity fire, potential post-wildfire watershed risks, access to areas that need treatment, primary resource objectives (e.g., wilderness, recreation areas, and land use), and economic feasibility relative to the desired conditions.

When possible, simultaneously planning for the management of multiple resources while reducing fuels, especially watershed resources, will ensure that the land remains viable for multiple uses in the long term and will increase the success of grant funding applications by illustrating multiple benefits on the landscape. The effectiveness of any fuel reduction and its resulting impact of watershed risk reduction depends on the degree of maintenance and monitoring that is employed. Monitoring will also ensure that objectives are being met in a cost-effective manner.

The treatment list is by no means exhaustive and should be considered purely a sample of potential projects for the future management of the planning area. Many projects may be eligible for grant funds available from federal and/or state sources. Wildfire severity reduction efforts can also be a complimentary component of watershed restoration improvements, which are discussed below. For a list of funding sources, please refer to Appendix K.

WATERSHED RESTORATION, IMPROVEMENT, AND CONSERVATION

Watershed treatments that prioritize the improvement and restoration of forests, rangelands, aquatic resources, and green spaces (e.g., municipal parks) will also help mitigate post-wildfire watershed risks. Additionally, conservation efforts should be considered in non-protected areas that contain healthy forests, rangelands, and aquatic resources, as healthy, functioning systems are typically more resilient to deleterious wildfire impacts on watersheds (e.g., flooding, sediment yields, and debris flows) than degraded or altered systems. Projects implemented will not only improve current water quality but will also increase the resilience of watershed in response to wildfire events. Any implemented action will require collaboration between local stakeholders and pre-existing land and resource management goals and objectives. The following treatment methods are not exhaustive. The degree of implementation will depend on funding and resource goals.

Forest Health

Forest health improvement efforts should be aligned with wildfire severity reduction efforts where appropriate; however, efforts should also prioritize restoring degraded forest. Successful restoration efforts would also boost the ecological resilience of forests when responding to high-severity wildfire events. Potential options for forest health improvements are discussed below.

Forest-associated risks in the watershed planning area primarily stem from invasive species, tree mortality from insect infestation, and tree density (Figure 6.1). The effects of climate change have also impacted forest health in the region by altering historic precipitation patterns and increasing the presence and persistence of drought. Forest hydrological processes experience substantial impacts when there is a high degree of mortality. Exacerbated tree mortality is often a result of overcrowding in stands, competition with nonnative species, and insects which directly contributes to elevated fuel loads. Specifically, tree mortality, while also increasing the potential for high-severity fire, also decreases the evapotranspiration potential of the forest, which results in greater amounts of runoff. The increased runoff can subsequently increase flooding and sediment yield risks (Vose et al. 2017).

Restoration efforts should prioritize degraded and unhealthy forests situated in high-risk watersheds, especially those on steep slopes adjacent to stream channels. Improvement efforts should focus on stand density and composition efforts that can foster a more diverse forest structure. In lodgepole stands, fuel reduction efforts should be focused on priority and high-risk areas as this species often forms monoculture stands where maintaining spacing and reducing ladder fuels is the most productive approach. Conservation efforts should be focused around transitional and riparian zones. These areas can serve as valuable fuel breaks during a wildfire while also providing crucial erosion prevention, sediment retention, and flood attenuation benefits post-wildfire.

Figure 6.1. Invasive cheatgrass (*Bromus tectorum*) can be identified in the grasslands of this photograph by its soft-drooping awns with hues that vary from dull red to buff-tan. Cheatgrass is a noxious weed and highly flammable.

Aquatic Resource Improvements

Aquatic resources can experience substantial damage following high-severity wildfires. For instance, loss of canopy vegetation and changes in soil chemistry and property can result in higher amounts of runoff, which can lead to flooding, erosion, higher sediment yields, ash and pollutant contamination to water, and debris inputs (from debris flows) to surface waters. These can all result in substantial impacts to water quality, reservoir storage capacity, and stream/creek/river habitat quality (USGS 2023b). However, utilizing practices that restore the health of aquatic resources, particularly streams, creeks, and rivers, can mitigate post-wildfire watershed risks (USFS 2023b) (Figure 6.2). These practices and methods are discussed below.

Stream bank stabilization and riparian restoration: These protect against sedimentation and debris impacts to aquatic resources. Restoration efforts should be implemented in degraded streams, creeks, and rivers in watersheds that are at high risk from flooding, sediment yields, and debris flows. The appropriate method will depend on resource goals and funding. More complicated methods can include grade stabilization, in-channel tree felling, media lunas, one rock dams, rock mulch rundowns, stream bank armoring, and Zuni bowls (see “In Channel Treatments” in Appendix G for detailed methodology) (USFS 2006). One of the simpler and cheaper solutions is to restore and/or maintain natural riparian areas. The dense vegetation in the riparian zone absorbs and slows down excessive water during high flows, which reduces flooding risk. Additionally, vegetation also reduces sedimentation and debris flow risk by acting as a physical barrier that intercepts and traps debris and sedimentation (Shannon et al. 2019).

Figure 6.2. Example of a low-gradient, unconfined stream system in a forested wet meadow in Gilpin County (Boulder Watershed Collective 2024).

Maintain and/or restore heathy, heterogeneous riverine systems: Stream, creek, and river morphology in western ecosystems is highly diverse. Natural heterogeneity can create a mosaic of bends, fast-moving water, deep reaches, and a patchwork of various riparian and wetland plant communities. This natural variation can mitigate wildfire impacts and post-wildfire impacts to watersheds. Deep reaches of a stream, for instance, can serve as a natural sedimentation basin. Beaver dams and other natural features (e.g., fallen trees) in streams can stop or slow down surface debris. Beaver ponds can also function as debris and sediment basins (Puttock et al. 2018). Complex wetlands associated with beaver habitat has been shown to provide natural fire resistance, as vegetation and soil is heavily saturated and does not burn easily; the areas also protect water quality for community and species by providing “traps” for ash, debris, and other fire related contaminates that can harm aquatic species and impact water quality (Whitecomb 2022). Figure 6.3 shows an example of a beaver dam supporting a river system in Colorado.

Figure 6.3. A beaver dam that supports the watershed in North Fork Crystal, Colorado. (Jackson 2022)

Healthy wetlands and riparian areas can also absorb more water during large precipitation or runoff events, which would mitigate potential flooding. Additionally, healthy vegetation in these areas would also help trap sedimentation. Restoration and/or conservation efforts should be implemented in a manner that restores or protects the natural structure and function of streams and rivers (USFS 2023b). Efforts should prioritize wetland and riparian area protection and restoration. In addition to focusing efforts in watersheds identified as high risk of post-fire hazards, restoration should take place in watershed reaches that are heavily channelized, disconnected from their historic flood plain, and homogenous in form as these reaches are likely to be less resilient to fire disturbance and post-fire impacts on the landscape.

Maintain and/or restore floodplain connectivity: Floodplains play a significant role in mitigating post-fire flood, sedimentation, and debris flow hazards. Floodplains provide additional space for water to spread out during high flow events, which can increase the overall capacity of the river system and reduce the pressure on the main channel. Floodplains also act as natural reservoirs by storing floodwaters and allowing them to slowly infiltrate into the ground or be absorbed by vegetation, thereby regulating the flow of water, mitigating the risk of sudden surges, and minimizing flood damage downstream (FEMA 2024). Floodplains provide a broad, low-velocity area that allows sediment and debris to settle out of the water and accumulate, preventing excessive sedimentation in the main channel. Furthermore, vegetation in the floodplains can also help trap debris and sedimentation (Shannon et al. 2019). These features help maintain the capacity and efficiency of the river system, reducing the potential for sediment- and debris-related problems.

Methods for conserving floodplain extent and function are diverse and include maintaining floodplains as natural areas, reconnecting floodplains to their associated stream channel, restoring woody debris in channel, improving hyporheic connections between channels and floodplains, and restoring natural floodplain conditions including vegetation communities.

Road and trail restoration: Road and trail restoration entails rebuilding roads situated near vulnerable streams to enhance drainage and minimize sediment buildup. Larger measures may include road and trail decommissioning, which involves stabilizing and restoring unnecessary roads or trails and returning them to a more natural condition through revegetation and recontouring. These efforts aim to lessen the negative effects on watersheds resulting from past development activities. Primary objectives include reducing erosion from road/trail surfaces and slopes, reducing sedimentation of streams, reducing the risk of mass failures and subsequent impacts to streams, Reducing contaminant runoff to streams, restoring natural surface and subsurface drainage patterns, restoring vegetation and site productivity, and restoring

stream channels at road/trail crossings and where roads/trails run adjacent to channels (USFS 2023b). Roads and trail restoration should be prioritized at damaged/eroded trails in forests and rangelands with predicted high wildfire severity, as erosion from these will likely become substantially worse following a wildfire.

Culvert upgrades and replacement is another restoration approach that can benefit watershed and community safety and function. Many culverts across the country were originally installed too small to maintain the natural stream flow and progression of a site. Undersized culverts may also present a hazard in post-fire environments where they can more easily become blocked with sediment, exacerbate stream incision, and create flood hazards that can impact roadways (U.S. Department of Transportation 2023). Beyond that, aging culverts often limit channel migration and become fish passage barriers as the dynamic stream develops around the static structure. Following a wildfire, it may be necessary to upgrade culverts and other crossing structures to allow for altered flow and sediment regimes. Instillation of additional culverts may also be necessary as new gulleys and drainage points can develop on hill slopes, inundating roadways with water and sediment (U.S. Department of Transportation 2023). The handbook at the following link provides details on the importance of maintaining crossings and culverts: Resilient Crossings Handbook

GOAL 2: DISASTER-RESISTANT COMMUNITIES

Making communities more resistant to watershed risks should be a top priority. There are various options that will allow communities and individuals to be more resistant to watershed risks, but in this CWPP primary efforts will fall under two primary categories: public education and safety, and infrastructure improvements.

PUBLIC EDUCATION AND SAFETY

Public education and safety are important for mitigating post-wildfire watershed-related risks and hazards. The following strategies that will be discussed should be considered concurrently with the “Cohesive Strategy Goal 2: Fire-Adapted Communities” strategies that are discussed in Chapter 5 due to the heightened watershed-related risk following a wildfire.

Communication Systems, Evacuation Planning, and Emergency Preparation

The Gilpin County Office of Emergency Management (OEM) strategizes, organizes, and facilitates a diverse array of initiatives aimed at readiness, emergency response, and recovery from disasters and significant emergencies. The OEM uses an emergency notification system called Hyper-Reach (GCOEM 2021). Emergency notification is done by high-speed telephone notification which requires registration.

Registration for alerts can be found at: Hyper-Reach Signup for Gilpin County

The Gilpin County OEM website (link provided below) provides a number of resources to aid residents in preparing for an emergency and evacuation such as checklists, animal welfare preparation, and evacuation guidance. Gilpin County should assess evacuation capabilities as they pertain to flooding and debris flow risk. Roads that are situated in high-risk flooding (e.g., floodplains) or debris flow zones may become inundated or washed out during peak snowmelt or intense rainfall events, which could put potential evacuees at risk. These areas should be identified so warning signs can be installed or

emergency closures can be enacted when necessary. Flood zones within towns and high-risk areas throughout the watershed planning area should be assessed for the risk they pose to evacuation capabilities.

Gilpin County Office of Emergency Management

INFRASTRUCTURE IMPROVEMENTS

Infrastructure improvements will also be important for improving Gilpin County's resilience to post-wildfire watershed-related hazards. The watershed risk assessment (see Chapter 4) prioritized analyzing risk to various infrastructure throughout the watershed planning area. This included road crossings, reservoirs, built flowlines, hazardous material sites, roads structures, and surface water intakes. The watershed risk assessment demonstrated that substantial amounts of infrastructure in the watershed planning area are at risk. Improvements to the infrastructure may mitigate risk.

Aquatic Infrastructure

Surface Water Intakes

Surface water intakes draw water from rivers or lakes to supply the public with drinking water. Surface water intake protection areas can be designated within the watershed to manage risk or potential sources of contamination.

Forebay Capacity Improvements

Forebays are typically excavated below grade and can be composed of earthen sides and a stone check dam. Forebays are designed to slow stormwater runoff, allow sediment to settle out, and function as a buffer during flooding or storm surges. Increased forebay capacity allows for an increased volume of water and sediment to be held from stormwater flows.

Dam Repairs/Reinforcements

Dam infrastructure can be improved and reinforced to ensure the reservoir components have the capacity and structural integrity to withstand this additional pressure or impacts from debris or sediment. Improvements may include gates or bypass structures that allow sediment or debris to flush or circumvent the dam's structural components.

Levee Repairs/Reinforcements

Levees can be repaired and/or reinforced to account for expected increases in debris and sediment from a post-wildfire environment. Repairs or improvements can increase the stability of the levee and its ability to protect against flooding or damage from large debris. Improvements may include flattening the levee slope, raising or widening the levee, and/or reconstructing the berm where damage has occurred.

Hazardous Materials

Hazardous Material Removal

Identify and remove any hazardous materials created or exposed by a fire to reduce the risk of hazardous materials entering the waterways or presenting any other risks to public health and safety. Legacy mining sites should be assessed for impacts following a fire and monitored for any erosion or runoff. Mining sites are a primary source of potential water contamination in the county following a fire.

Protective Barriers and Flood Prevention

Deflection Berms

Deflection berms are earthen berms designed to direct debris flows toward alluvial fans or other low-risk areas.

Stormwater Retention Ponds

Stormwater retention ponds are designed to collect stormwater or runoff to prevent flooding and erosion.

Roadway and Trail Improvements

Road Embankment Improvements/Reinforcement

Road embankments are composed of compacted soil and other materials to help raise a road elevation above the elevation of an adjacent channel. Potential improvements include armoring the embankment or using materials that have an increased ability to withstand fluctuation in channel flows or impacts from debris.

Outsloping/Rolling Dips

These are commonly referred to as water bars. They typically involve an alteration to the road or trail shape to disperse water and/or reduce erosion.

Low Water Crossings

Low water crossings are natural fords established at road crossings as an alternative to culverts. They help to prevent stream diversion and keep flows within the natural channel.

Road and trail improvement methods are described in Appendix H.

REGULATIONS

Regulatory oversight currently targets floodplains in Gilpin County and involves the implementation and enforcement of rules, regulations, and policies to manage and mitigate the risks associated with flooding. Its goal is to balance development and land use with the need to protect lives, property, and the natural environment in flood-prone areas. Enforcing regulations in floodplains can prevent the loss of lives and property and mitigate debris flow and sediment impacts associated with flooding. Gilpin County is subject

to federal, state, and local floodplain regulations. Adherence to these regulations will mitigate risk exposure from post-wildfire watershed hazards.

Federal

The National Flood Insurance Program (NFIP): This is a federal initiative aimed at providing insurance coverage for properties located in flood-prone areas across the United States. The program is administered by FEMA and offers flood insurance policies to homeowners, renters, and businesses. Its primary objective is to encourage communities to adopt floodplain management practices that reduce the risk and impact of flooding.

Gilpin County entered the NFIP in 2022. FEMA has conducted a comprehensive flood insurance study for Gilpin County, which includes water surface elevations for different flood magnitudes, such as the 1% annual chance flood (100-year flood) and the 0.2% annual chance flood (500-year flood). Flood Insurance Rate Maps (FIRMs) depict the boundaries of the 100- and 500-year floodplains, along with base flood elevations. FIRMs serve as the primary tool to identify and assess flood hazards, offering detailed and consistent data. They also play a vital role in floodplain management programs by defining the minimum area of oversight for many communities (Gilpin County 2023).

State

The Colorado Water Conservation Board (CWCB) has floodplain rules and regulations that help ensure reduced flood losses across the state and provide for an increase in public safety. The Rules for Regulatory Floodplains are of statewide importance as they aim to prevent flooding, minimize the adverse effects of floods, and safeguard public health, safety, welfare, and property by controlling development within floodplains. In January 2022, the CWCB released updated floodplain rules and regulations to provide additional clarity and make them consistent with FEMA floodplain mapping procedures (CWCB 2022). The overall purpose of these regulations is to establish consistent standards for regulatory floodplains in Colorado and provide guidelines for activities that may affect these floodplains. These regulations can be found here: CWCB Floodplain Rules and Regulations.

Local

Gilpin County also enforces its own regulations regarding floodplains. Specifically, Flood Damage Prevention Ordinance #13-01 regulates new construction and improvements of pre-existing residential structures in designated special flood hazard areas (Gilpin County 2013). The provisions encompass both broad and detailed criteria for various aspects, such as general standards and specific requirements pertaining to manufactured homes, recreational vehicles, subdivisions, areas prone to shallow flooding, and floodways.

GOAL 3: POST-WILDFIRE WATERSHED RESPONSE AND REHABILITATION

Post-wildfire response should assess the size and severity of a fire to determine the need for post-fire response and rehabilitation. Small, low-severity fires may not require implementation of rehabilitation efforts as vegetation loss is likely not significant enough to heavily impact erosion and infiltration rates. However, large and severe wildfires can create hazardous post-wildfire conditions. For instance, loss of

vegetation exposes soil to erosion, which can subsequently increase sediment yield, flooding, and debris flow risks in the watershed. Effective post-wildfire emergency treatments can mitigate these risks.

If a high-severity fire impacts federally owned land in the county, a Burned Area Emergency Response (BAER) team will likely be deployed to assess the extent and severity of the fire, determine the potential impacts on life, property, infrastructure, and ecosystems, and implement emergency stabilization and or treatment actions if necessary. BAER teams are interdisciplinary U.S. Forest Service teams tasked with addressing emergency land management concerns following a wildfire. Additional information on BAER teams is available in Appendix G.

Rehabilitation of watersheds following a wildfire is often costly and can take many years for systems to regain their historic composition, diversity, and resilience (Robichaud 2000). Treatment options, especially those that rely on revegetation to reduce sedimentation and erosion, can take years to stabilize soils effectively during which time, temporary sediment management techniques will be necessary to avoid sedimentation in stream channels and storm water infrastructure. Table 6.1 provides general recommendations for critical watershed protection from wildfire.

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WATERSHED RESILIENCE AND POST-FIRE HAZARD MITIGATION RECOMMENDATIONS

Table 6.1. Recommendations for Critical Watershed Protection and Recovery from Wildfire

Project ID	Status	Priority (H,M,L)	Timeline for Action	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements	Funding Sources
WP1		H	1-3 years	Repair or replace Tolland Road Bridge over South Boulder Creek	Tolland Road Bridge	County, CDOT	• The need for this project was also identified in the 2024 county HMP • Conduct assessment of bridge to determine if repairs or replacement is more cost effective • Seek federal and or state funding to complete construction	Increase resiliency of travel routes and stream crossing Reduce chance of bridge failure Improve interaction of stream and bridge infrastructure	Ongoing design, planning, and implementation of project is necessary	• Watershed and Flood Prevention Operations Program • Colorado Healthy Rivers Fund • Project Bill Grants (CWCB)
WP2		H	3-5 years	Middle and lower North Clear Creek Watershed – Sediment Yield and Debris Flow Risk Reduction	North Clear Creek Watershed	Collaborative approach between BLM, USFS, local planners, and private landowners	• Wildfire severity reduction in Lodgepole and ponderosa woodlands (emphasis on fuel reduction treatments to slow/stop spread of wildfire) • Install slope stabilization measures or revegetation on steep grades adjacent to channels b. Tree thinning and buffer creation along major roadways paralleling streams – includes Highway 119, Chase Gulch Road, Apex Valley Road	Increase watershed resilience to wildfire Decrease potential for destructive wildfires Improve local water quality Improve ecological health	Collaborative project design Private landowner outreach Assessment of on-the-ground conditions Ongoing monitoring once projects are implemented	• Colorado Wetland Wildlife Conservation Program • Colorado Watershed Restoration Program • Colorado Water Plan Grant • America The Beautiful Program
WP3		H	3-5 years	Prioritize fuel reduction and discontinuity to reduce burn severity and post-fire debris flow risk	Headwaters South Boulder Creek Watershed Ephemeral drainages identified as high burn severity	USFS, Private Land, County	• Work with USFS and private landowners to plan cross-boundary fuel treatments • Reduce density and continuity of spruce-fir forests adjacent to critical water resources • Prioritize fuel reduction on north facing slopes greater than 60% grade along South Boulder Creek • Identify drainages and ephemeral streams identified as high burn severity • Prioritize action in dense lodge pole stands to reduce likelihood of high-intensity, stand-replacing fires • Connect treatment activities with POD boundaries where feasible • Connect treatment areas with wet meadows where feasible • Carefully consider legacy mining locations and potential soil contamination ○ Avoid aggressive treatment/ ground disturbance in these areas	Reduce probability and severity of wildfires near critical headwaters stream and popular tourism areas Reduce crown fire activity Improve resilience of forest and wetlands Improve hydrologic process of forest-wetland systems	Agency and landowner coordination around treatment locations and extent Identify high burn severity locations Tracking of acres treated	• Colorado Healthy Rivers Fund • BRIC • Forest Restoration & Wildfire Risk Mitigation (CSFS) • Colorado Strategic Wildfire Action Program • Forest Restoration & Wildfire Risk Mitigation (CSFS)

Project ID	Status	Priority (H,M,L)	Timeline for Action	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements	Funding Sources
WP4		H	As needed – post-fire action	Mitigate post-fire sediment and flooding risk in drainages feeding North Clear Creek	Tributaries and drainages feeding North Clear Creek upstream and within Central City and Black Hawk Russel Gulch Eureka Gulch Gregory Gulch	Local, state, and USFS, BLM, NRCS, Clear Creek County, CCWFHP	• Limit additional development in floodplains of gulches and drainages • Conserve wet meadow and ephemeral wetlands and streams in drainages leading to North Clear Creek • Utilize Colorado wetland inventory potential conservation areas • Identify opportunities to expand wet meadows and ephemeral wetlands upstream of Central City and Black Hawk • Explore opportunities to daylight undergrounded portions of North Clear Creek tributaries or implement sediment traps upstream of undergrounded sections • Implement sediment retention measures following a wildfire upstream on NCC and its tributaries (contour felling, check dams, Media Luna, etc.) • Identify potential location of mine-impacted soils • Implement retention measures to capture potentially contaminated sediment	Protect infrastructure and water resources from potential flood and sediment damage Reduce extent of post-fire sedimentation in North Clear Creek Protect critical transportation routes from flood and sediment damage	Identify potential wetland restoration locations in drainages feeding North Clear Creek Zoning and/or code adjustments to limit floodplain development Monitor and track acres of protected or restored wetland and stream	• Emergency Watershed Protection (EWP) Program • BRIC • Regional Catastrophic Preparedness (RCP) grants • Colorado Water Plan Grant

WP5		H	1-3 years	Conserve and improve the functionality of wetlands, wet meadows, and retention ponds in the South Boulder Creek Watershed	South Boulder Creek Watershed downstream of Tolland and Rollinsville	County, USFS, CDOT, private landowners, Denver Water, neighborhood groups, Boulder County	• Identify high functioning wetlands and wet meadows based on previous studies and on the ground assessments
							  ○ Implement conservation measures to preserve function
							• Identify impaired wetlands and wet meadows based on previous studies and on the ground assessments
							  ○ Prioritize restoration based on catchment flood and sedimentation rating
							• Utilize Colorado wetland inventory potential conservation areas
							• WP7Coordinate with Denver Water to monitor SBC water quality following a fire
							• Identify post-fire measures necessary to maintain water quality (retention ponds, erosion protection, catchment basins, etc.)
								Protect critical road and rail systems
								Improve watershed resilience to post-fire flooding and sedimentation
								Reduce flood and debris flow risk to life and property
								Protect water quality post-fire
								Provide natural fuel breaks
									Ongoing design, planning, implementation, and monitoring of projects is necessary; stakeholder engagement is also essential	• Watershed and Flood Prevention Operations Program
										• Colorado Healthy Rivers Fund
										• Environmental Quality Incentives Program
										• RESTORE Colorado

WP6		M	5-10 years	Improve channel complexity and lateral migration opportunities for North Clear Creek	North Clear Creek east of Black Hawk	Gilpin County, CDOT, private landowners, NRCS, neighborhood groups	• Identify opportunities to improve stream diversity and complexity • Develop project opportunities that increase sediment capture capacity in stream reach • Planning and coordination will be needed with private landowners • Coordinate project development with CDOT to ensure design protects road WP4infrastructure and stream and wetlaWP5nd ecological health	Reduce impacts of increase sedimentation in post-fire landscape Increase flood water attenuation potential of North Clear Creek Protect highway 119 from potential post-fire impacts Maintain water quality and transport to downstream users	Identify and monitor restoration/ improvement opportunities Design stream restoration projects that increase channel complexity and meander opportunity	• Watershed and Flood Prevention Operations Program • Colorado Watershed Restoration Program • Project Bill Grants (CWCB) • America The Beautiful (NFWF) • Environmental Quality Incentive Program (NRCS)

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Project ID	Status	Priority (H,M,L)	Timeline for Action	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements	Funding Sources
WP7		M	3-5 years	Develop incident management dashboard to streamline prioritization of post-fire stabilization and hazard mitigation actions	Countywide	County, state, federal, and municipal incident management, neighborhood groups	• Research potential dashboard software options • Collaboratively identify emergency stabilization and post-fire hazard mitigation needs and AOCs • Map AOCs, emergency hazard areas, and high burn severity areas in dashboard; integrating BAER and other emergency assessment data • Collaboratively prioritize mitigation actions based on HVRA and community risk, burn severity, and other determined weighting factors	Streamline prioritization of mitigation actions in watersheds following a fire Strategically implement post-fire stabilization and watershed hazard mitigation	Determine and implement the most appropriate dashboard system with county, state, and federal partners Ensure emergency management and recovery personnel are trained on utilizing dashboard Integrate all post-fire mitigation needs into dashboard following a fire	• Colorado Watershed Restoration Grants • Regional Catastrophic Preparedness (RCP) grants • Environmental Quality Incentives Program • RESTORE Colorado
WP8		M	3-5 years	Conserve wetlands and ponds in Dory Lakes and Missouri Lakes	Dory Lakes Missouri Lakes	County, neighborhood groups, USFS, Municipalities	• Restrict additional development and encroachment of wetlands and ponds in dory Lakes community • Identify opportunities to restore or improve condition of existing wetlands and wet meadow systems • Work with neighborhood groups to develop conservation measures and improvement opportunities • Preserve shoreline riparian buffers • Preserve wet meadow habitat adjacent to Paradise Valley Parkway (Missouri Lakes)	Improve watershed resilience to post-fire hazards Provide natural fuel break Protect adjacent communities and travel routes from flooding and sedimentation	Development restrictions/ wetland and pond conservation measures Continued project identification, design, and implementation	• Watershed and Flood Prevention Operations Program • Colorado Healthy Rivers Fund • Environmental Quality Incentives Program • RESTORE Colorado • America The Beautiful Program
WP9		M	3-5 years	Pursue funding for remote water quality sensors	Countywide	County, USFS, Municipalities, Denver Water	• Pursue funding opportunities related to water quality and watershed health monitoring and improvement • Identify strategic monitoring locations • Collaborate with land and water managers to install and track water data • Closely monitor water quality changes following a wildfire for comparison with baseline metrics • Identify water quality impairment thresholds • Implement emergency mitigation measures if thresholds are crossed	Provide a streamlined means for tracking water quality and implementing emergency actions post-fire Increase transparency of watershed health and improvement needs	Grant applications submitted Monitoring stations implemented Training for county staff on technology use	• Colorado Watershed Restoration Program • Colorado Water Plan Grant • Regional Catastrophic Preparedness Grant
WP10		M	5-7 years	Pursue wetland or riparian habitat enhancement that aligns with CPW's Wetlands Program Strategic Plan	Wetlands and riparian corridors	Public land management agencies or private landowners	• Enhance and develop wetlands and riparian areas To obtain funding: • Specific Priority Wetland Species for the project must be identified	Improve watershed health and habitat for priority species	Ongoing design, planning, and implementation of projects is necessary	• Colorado Wetland Wildlife Conservation Program • Colorado Watershed Restoration Program • Colorado Water Plan Grant • America The Beautiful Program
WP11		M	3-5 years	Identify opportunities for and implement floodplain reconnection	Historically altered and disconnected stream reaches South Boulder Creek Jenny Creek Ralston Creek	County, USFS, private landowners, Jefferson County	• Assess flood plain discontinuity based on previous studies and known AOCs • Consider mapping stream reaches to more accurately identify restoration needs and prioritization ○ SBC, Jenny Creek, and Ralston creek previously identified as disconnected in reaches • Seek funding for flood plain restoration/ reconnection projects • Design and implement restoration projects	Improve watershed health and water conveyance Improve stream resilience Increase flood and sediment attenuation potential	Stream reach mapping and prioritization Grant applications Design and implement projects	• Watershed and Flood Prevention Operations Program • Colorado Watershed Restoration Program • Project Bill Grants (CWCB) • America The Beautiful (NFWF) • Environmental Quality Incentive Program (NRCS)

Project ID	Status	Priority (H,M,L)	Timeline for Action	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements	Funding Sources
WP12		M	3-5 years	Stabilize stream and tributary adjacent slopes	North Clear Creek Watershed	County, USFS, neighborhood groups	• Identify steep and or eroded stream banks based on mapping and field visits • Implement stabilization measures such as willow planting, erosion matting, log cross-veins, etc., where needed to reduce bank loss • Chase Gulch and Missouri Gulch identified as having high potential for sediment movement	Reduce erosion rates Stabilize stream banks and improve their resilience to increased sedimentation and flow rates Improve watershed resilience in post-fire environment Increase stream and riparian habitat complexity	Monitor stabilization measures	• Colorado Watershed Restoration Program • Colorado Healthy Rivers Fund • Environmental Quality Incentives Program • RESTORE Colorado • Watershed and Flood Prevention Operations Program
WP13		M	3-5 years	Middle and lower North Clear Creek Watershed – Flooding Risk Reduction	North Clear Creek Watershed	Collaborative approach between USFS, Gilpin County, BLM	• Wildfire severity reduction in Lodgepole and Ponderosa woodlands. (emphasis on fuel reduction treatments to slow/stop spread of wildfire) • Expand inundation zone of wetlands and wet meadows upstream of Central City and Black Hawk ○ Specifically targeting upstream inundation zones in Eureka Gulch and North Clear Creek	Increase watershed resilience Reduce potential burn severity in the watershed Reduce flood hazard to communities and structures Reduce strain on water treatment facilities following a fire	Collaborative project design Private landowner outreach Assessment of on-the-ground conditions Ongoing monitoring once projects are implemented	• Watershed and Flood Prevention Operations Program • Colorado Watershed Restoration Program • Project Bill Grants (CWCB) • America The Beautiful (NFWF) • Environmental Quality Incentive Program (NRCS)
WP14		L	5-10 years	Identify aging bridges and culverts and repair or replace as needed	Countywide	County, Municipalities, CDOT, USFS	• Conduct survey of county bridges and culverts to identify aging infrastructure and undersized passages • Identify problem bridges and culverts on primary travel or evacuation routes c. Prioritize repair and replacement based on road significance, passage quality/ age, and sub-watershed flood and sedimentation risk rating	Improve flood water and sediment transport in channel Improve aquatic habitat Improve road system resilience	Complete bridge and culvert assessments Prioritize repair needs Pursue repair or replacement funding	• Watershed and Flood Prevention Operations Program • Colorado Healthy Rivers Fund • Project Bill Grants (CWCB)
WP15		L	5-10 years	Coordinate with private landowners to explore opportunities for stream corridor easement designations	Impaired floodplains Stream corridor locations with critical flood and sediment retention capacity	County coordination with private landowners, watershed groups	• Additional fluvial hazard zone mapping and assessments may be needed to identify impaired stream reaches and stream corridor locations that are valuable for flood attenuation and sediment catchment • Identify priority reaches based on known areas of concern and additional assessments • Coordinate with local watershed and land trust groups to develop process for establishing easements • Advertise corridor easement option to landowners ○ Specifically contact residents with ownership of priority corridor locations	Protect critical stream corridors and floodplains Restore stream function on privately owned reaches Improve flood attenuation and sediment retention capacity Improve stream and flood plain connectivity and function	Stream corridor assessments Methodology for establishing easements Track the number of easements established along with individual easement restoration metrics	• Watershed and Flood Prevention Operations Program • Colorado Watershed Restoration Program • Project Bill Grants (CWCB) • America The Beautiful (NFWF) • Environmental Quality Incentive Program (NRCS) • RESTORE Colorado

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CHAPTER 7 – MONITORING AND EVALUATION

All stakeholders and signatories to this CWPP desire worthwhile outcomes. It is also known that risk reduction work on the ground, for the most part, is often not attainable in a few months—or even years. The amount of money and effort invested in implementing a plan such as this requires that there be a means to describe, quantitatively and/or qualitatively, if the goals and objectives in this plan are being accomplished according to expectations.

Monitoring and reporting contribute to the long-term evaluation of ecosystem change, and the knowledge concerning how natural resource management decisions affect both the environment and the people who live in it. It is important that monitoring protocols are developed with specific regions and project types in mind to maintain the accuracy and effectiveness of monitoring data. Although the HFRA does not include specified requirements for CWPP project tracking, it is important that project outcomes are monitored and evaluated regularly. Furthermore, as the CWPP evolves over time, there may be a need to track changes in policy, requirements, stakeholder changes, and levels of preparedness. These can be significant for any future revisions and/or addendums to the CWPP.

Included below is the description of the 2024 Gilpin County CWPP Project Tracking Application, housed on the CWPP Hub Site. The system is designed to be used by local land managers as a collaborative effort to track project progress for both planned and implemented projects. In addition, the tracking system will be able to provide quick stats such as acres treated, or dollars spent for community members to follow.

MONITORING STRATEGIES

It is recommended that project monitoring be a collaborative effort. There are many resources for designing and implementing community-based, multiparty monitoring that could support and further inform a basic monitoring program for the CWPP (Egan 2013). Multiparty monitoring involves a diverse group consisting of community members, community-based groups, regional and national interest groups, and public agencies. Using this multiparty approach increases community understanding of the effects of restoration efforts and trust among restoration partners.

Table 7.1 identifies monitoring strategies for various aspects of all categories of CWPP recommendations and the effects of their implementation, both quantifiable and non-quantifiable, for assessing the progress of the CWPP and increasing the sustainability of projects. It must be emphasized that these strategies are 1) not exhaustive and 2) dependent on available funds and personnel to implement them. When possible, other relevant plans should be used as guidance for monitoring, especially when projects overlap with planning objectives.

Local and regional partner agencies and organizations should be teamed up with and relied on to support monitoring efforts. Due to the nature of a county-level CWPP, there may be other CWPPs within Gilpin County that are specific to municipalities for fire protection districts. It is recommended that the implementation leaders of other, more specific CWPPs coordinate annually with the CWPP implementation leader for Gilpin County to ensure alignment and efficiency when enacting risk reduction projects.

The Colorado Forest Restoration Institute (CFRI) Monitoring Handbook for Evaluating Forest Management Outcomes is a comprehensive resource designed to guide the development and implementation of effective forest monitoring plans. It's clear guidance and modular structure make it particularly useful for establishing robust, scalable monitoring protocols tailored to specific project goals. To learn more, view the CFRI's full Monitoring Handbook for Evaluating Forest Management Outcomes.

PROJECT TRACKER

Within the project's home page, an interactive web-based tool has been designed to communicate CWPP projects within a project tracking application (Link Will be Inserted for Final Document). The application is designed to provide real-time updates to the public and facilitate multiagency coordination and collaboration. The tracking system is available for internal use with a public-facing dashboard and the following features:

- Project database
- Project entries and sub-entries into the database
- Funding tracking
- Milestone and goal tracking
- Project constraint/opportunity tracking
- Project progress tracking
- Agency delegation
- Ability to attach images or other files to project records
- Spatially delineated project locations/working areas

Externally, the project tracker will display relevant information to the public in an easy-to-navigate dashboard. The dashboard will contain project information such as acres treated, dollars spent, homes assessed, and public outreach events conducted. The monitoring strategies outlined in Table 7.1 can be applied to complete and proposed mitigation projects in conjunction with the project tracking application.

Table 7.1. Recommended Monitoring Strategies

Strategy	Task/Tool	Remarks
Project tracking system	Online tracking tool *to track risk reduction projects spatially.*	Interactive tool is easily updated and identify areas that require additional efforts, update monthly if possible
Photographic record (documents pre- and post-fuels reduction work, evacuation routes, workshops, classes, field trips, changes in open space, treatment type, etc.)	*Establish field GPS location; photo points of cardinal directions; keep photos protected in archival location*	Moderate cost, repeatable over time; used for programs and tracking objectives
Number of acres treated (by fuel type, treatment method)	GPS/GIS/fire behavior prediction system – this can be monitored within the project tracking system	Evaluating costs, potential fire behavior
Number and acres of home ignition zones/defensible space treated to reduce fuels Number and cost of home treatments to reduce ignitability	GPS – This can be monitored within the Project Tracking System	Fuels reduction Structure protection
Number of residents/citizens participating in any CWPP projects and events	Meetings, media interviews, articles	Evaluate culture change objective Annual lessons learned review encouraged among stakeholders
Number of homeowner contacts (brochures, flyers, posters, etc.)	Visits, phone	Evaluate objective Annual lessons learned review encouraged among stakeholders
Number of jobs created, contracts, grants	Project Tracking System	Evaluate local job growth
Education outreach: number, kinds of involvement	Workshops, classes, field trips, signage; project tracking system	Evaluate objectives Annual lessons learned review encouraged among stakeholders
Fire Response: changes in agency response capacity	Collaboration, grants to fund fire department needs such as new personnel and equipment	Evaluate mutual aid Annual review
Codes and policy changes affecting CWPP	Qualitative	CWPP changes
Number of home assessments completed and completing a comprehensive summary of risk to homes.	Web-based mapping, field surveys	Evaluate existing home risk assessment data
Number of curbside risk assessments completed and completing a comprehensive summary of risk.	Web-based mapping, field surveys	Align risk assessment data with Wildfire Partners
Number of medical incidents attached to wildfire suppression incidents.	After-action reviews, meetings, record of medical incident reports	Determine causes and possible mitigation actions
Number of structures lost per wildfire incident accompanied by weather and fire behavior data.	National Weather Service, field surveys, public input	Establish trends and correlations before, during, and after wildfire disasters.

FUELS TREATMENT MONITORING

Monitoring fuel treatment projects is necessary for assessing the efficacy of proposed actions and evaluating how projects support environmental sustainability and wildfire resiliency. Establishing

monitoring protocols can help project managers better understand how well the proposed treatment methods and prioritized actions fulfill planned goals and objectives. Recording and sharing monitoring results is crucial for establishing benchmarks and determining long-term fuel treatment strategies.

Additionally, cataloging fuel treatment projects in conjunction with monitoring results in a web-based mapping system is a good strategy for organizing geospatially referenced data that can be easily shared. The monitoring of projects with differing treatment methodologies and/or vegetation, topography, and human communities can skew results and prevent the selection of appropriate treatment methods. Therefore, it is important to standardize monitoring protocols and sampling intervals across similar treatment types and for projects within similar regions within Gilpin County.

Resources and strategies regarding post-fire recovery and restoration can be found in Appendix G. Fuel treatment methodologies can be found in Appendix E.

It is important to evaluate whether fuel treatments have accomplished their defined objectives and whether any unexpected outcomes have occurred.

The strategies outlined in this section consider several variables:

- Do the priorities identified for treatment reflect the goals stated in the plan? Monitoring protocols can help address this question.
- Can there be ecological consequences associated with fuels or watershed work? Items to consider include soil movement, invasive species encroachment, water rights impacts, and impacts to adjacent infrastructure. Relatively cost-effective monitoring may help reduce long-term costs and consequences.
- Vegetation will grow back. Thus, fuel break maintenance and fuels modification in both the home ignition zone and at the landscape scale require periodic assessment. Monitoring these changes can help decision-makers identify appropriate treatment intervals.
- Monitoring for all types of fuels treatment is recommended. For example, in addition to monitoring mechanical treatments, it is important to carry out comprehensive monitoring of burned areas to establish the success of pre-fire fuels reduction treatments on fire behavior, as well as monitoring for ecological impacts, repercussions of burning on wildlife, and effects on soil chemistry and physics.

IMPLEMENTATION

Fuel treatment monitoring protocols can be implemented at various levels of effort depending on the type of project, region, and involved communities. Several levels of monitoring activities meet different objectives, establish different monitoring interval intensities, and are appropriate for different management groups and communities. They include the following:

Minimum – Level 1: Pre- and Post-project Photographs

Appropriate for many individual homeowners who conduct fuel reduction projects on their properties. Good for a visual record of data.

Moderate – Level 2: Multiple Permanent Photo Points

Permanent photo locations are established using rebar or wood posts, GPS-recorded locations, and photographs taken on a regular basis. Ideally, this process would continue over several years. This

approach might be appropriate for more enthusiastic homeowners or for agencies conducting small-scale, general treatments.

High – Level 3: Basic Vegetation Plots

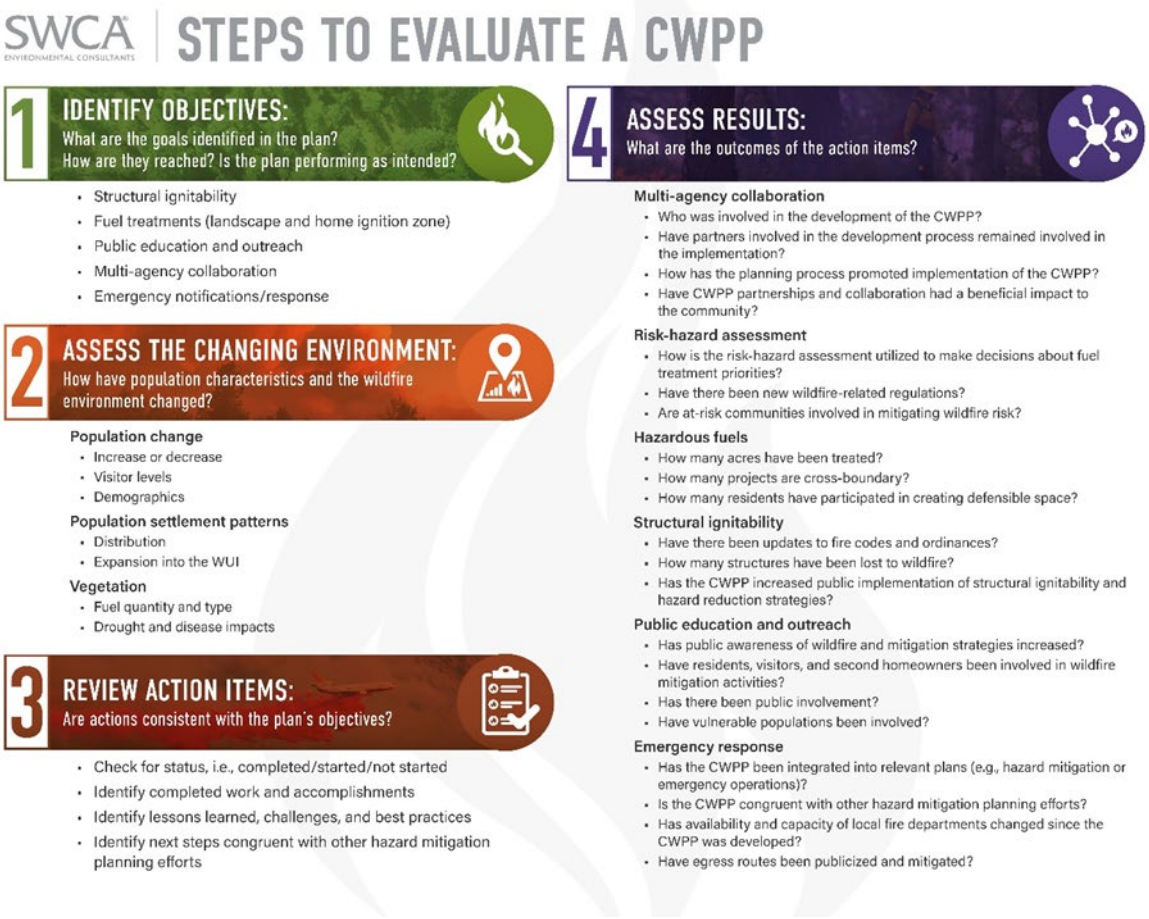
A series of plots can allow monitors to evaluate vegetation characteristics such as species composition, percentage of cover, and frequency. Monitors then can record site characteristics such as slope, aspect, and elevation. Parameters would be assessed pre- and post-treatment.
The monitoring agency should establish plot protocols based on the types of vegetation present and level of detail needed to analyze the management objectives. This method is appropriate for wildfire specialists, City and Town planners, foresters, and other personnel monitoring fuel treatments on forested land and grasslands.

Intense – Level 4: Basic Vegetation Plus Dead and Downed Fuels Inventory

The protocol for this level would include the vegetation plots described above but would add more details regarding fuel loading. Crown height or canopy closure might be included for live fuels. Dead and downed fuels could be assessed using other methods, such as Brown's transects (Brown 1974), an appropriate photo series (Ottmar et al. 2000), or fire monitoring (Fire Effects Monitoring and Inventory System [FIREMON]) plots. This method is ideal for foresters or university researchers tracking vegetation changes in forested lands. For grasslands this would involve a gap intercept to interpret the size and distribution of exposed ground, soil stability tests to define the soil's susceptibility to water erosion, as well as a species inventory to measure the overall biodiversity (USDA 2016).

CWPP EVALUATION

CWPP are intended to provide information, guidance, and recommendations to reduce the risk of wildfire damaging a community and the environment. However, as communities change through development and vegetation communities evolve, so does the risk of wildfire. The recommendations and methods to reduce risk must be dynamic to keep pace with changes in the WUI and the fire environment; therefore, consistent evaluations of the CWPP are imperative. Additionally, recently published research and case studies regarding wildfire risk should be considered when evaluating the CWPP.



TIMELINE FOR UPDATING THE CWPP

The HFRA allows for maximum flexibility in the CWPP planning process, permitting the Core Team to determine the time frame for updating the CWPP. However, it is suggested that a formal revision be made on the fifth anniversary of signing and every 5 years following. Furthermore, due to the dynamic nature of wildfire litigation and the natural landscape, several triggers may warrant a CWPP update before the 5-year mark. Among these triggers are extensive wildfire or another disaster event, changes to the local planning outlook (e.g., significant update to the hazard mitigation plan), and local adoption of new wildfire-related codes and ordinances. The Core Team members are encouraged to meet annually to review the project list, discuss project successes, strategize regarding project implementation funding, and determine whether a plan revision is needed.

ABBREVIATIONS AND ACRONYMS

°F	degrees Fahrenheit
AMMs	avoidance and minimization measures
AOC	area of concern
ATV	all-terrain vehicle
BAER	Burned Area Emergency Rehabilitation
BLM	Bureau of Land Management
BMP	best management practice
Btu/ft/sec	British thermal units per foot per second
CAL FIRE	California Department of Forestry and Fire Protection
CAR	community at risk
CAS	Casualty Actuarial Society
CDFPC	Colorado Division of Fire Prevention and Control
CDNR	Colorado Department of Natural Resources
CDPHE	Colorado Department of Public Health and Environment
CE	categorical exemption
ch/hr	chains per hour
CIG	Conservation Innovation Grants
Cohesive Strategy	National Cohesive Wildland Fire Management Strategy
County	Gilpin County
CRS	Congressional Research Service
CSFS	Colorado State Forest Service
CWA	Clean Water Act
CWCB	Colorado Water Conservation Board
CWPP	community wildfire protection plan
DEM	digital elevation model
DHS	Department of Homeland Security
EAS	Emergency Alert System
EIR	Environmental Impact Report
EMS	Emergency Management System
EPA	U.S. Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
ESRI	Environmental Systems Research Institute
FAC	fire-adapted community
FEMA	Federal Emergency Management Agency

FLAME	Federal Land Assistance, Management and Enhancement Act
FP&S	Fire Prevention and Safety
FRA	Federal Responsibility Area
FRI	fire return interval
GAID	Geographic Area Interagency Division
GIS	geographic information system
GPS	Global Positioning System
GR111*	Grass, Custom (specific to project area or study)
GS1	Grass-Shrub, Low Load
HFRA	Healthy Forests Restoration Act of 2003
HIZ	home ignition zone
HMP	hazard mitigation plan
HUC	hydrologic unit code
HVRA	highly valued resource or asset
ICC	International Code Council
IFTDSS	Interagency Fuel Treatment Decision Support System
ISO	Insurance Services Office
JPA	Joint Powers Agreement
MFI	mean fire interval
NB2	Non-Burnable, Urban or Developed Areas
NB9	Non-Burnable, Water Bodies
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NFP	National Fire Plan
NFPA	National Fire Protection Association
NIFC	National Interagency Fire Center
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NWCG	National Wildfire Coordinating Group
OEM	Gilpin County Office of Emergency Management
OES	Gilpin County Office of Emergency Services
PERI	Public Entity Risk Institute
POD	potential operational delineation
PPE	personal protective equipment

RAWS	remote automated weather station
RFA	Rural Fire Assistance
RL	Resilient Landscapes
SAF	Society of American Foresters
SAFER	Staffing for Adequate Fire and Emergency Response
SH2	Shrub, Moderate Load
SHPO	State Historic Preservation Office
SUFHER	South Uncompahgre Forest Health & Ecological Resilience
SWCA	SWCA Environmental Consultants
SWReGAP	Southwest Regional Gap Analysis Project
TL1	Timber Litter, Low Load
TL3	Timber Litter, Moderate Load
TL5	Timber Litter, High Load
TL8	Timber Litter, Long Needle Pine
TU1	Timber Understory, Low Load
TU2	Timber Understory, Moderate Load
TU5	Timber Understory, High Load
TU175*	Timber Understory, Custom (specific to project area or study)
ULI	Urban Land Institute
USDA	U.S. Department of Agriculture
USDOI	U.S. Department of the Interior
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VAR	value at risk
VCC	Vegetation Condition Class
VDEP	Vegetation Departure
WFDSS	Wildland Fire Decision Support System
WP	Watershed Protection
WR	Wildfire Response
WUI	wildland-urban interface

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GLOSSARY

Aspect: Cardinal direction toward which a slope faces in relation to the sun (NWCG 2021b).

Active Crown Fire: A crown fire in which the entire fuel complex is involved in flame, but the crowning phase remains dependent on heat released from surface fuel for continued spread. An active crown fire presents a solid wall of flame from the surface through the canopy fuel layers. Flames appear to emanate from the canopy as a whole rather than from individual trees within the canopy. Active crown fire is one of several types of crown fire and is contrasted with **passive crown fires**, which are less vigorous types of crown fire that do not emit continuous, solid flames from the canopy (SWCA).

Available Canopy Fuel: The mass of canopy fuel per unit area consumed in a crown fire. There is no post-frontal combustion in canopy fuels, so only fine canopy fuels are consumed. We assume that only the foliage and a small fraction of the branchwood is available (Wooten 2021).

Available Fuel: The total mass of ground, surface and canopy fuel per unit area available fuel consumed by a fire, including fuels consumed in postfrontal combustion of duff, organic soils, and large woody fuels (Wooten 2021).

Backfiring: Intentionally setting fire to fuels inside a control line to contain a fire (Wooten 2021).

Biomass: Organic material. Also refers to the weight of organic material (e. g. biomass roots, branches, needles, and leaves) within a given ecosystem (Wooten 2021).

Burn Severity: A qualitative assessment of the heat pulse directed toward the ground during a fire. Burn severity relates to soil heating, large fuel and duff consumption, consumption of the litter and organic layer beneath trees and isolated shrubs, and mortality of buried plant parts (SWCA).

Canopy: The more or less continuous cover of branches and foliage formed collectively by adjacent trees and other woody species in a forest stand. Where significant height differences occur between trees within a stand, formation of a multiple canopy (multilayered) condition can result (SWCA).

Chain: Unit of measure in land survey, equal to 66 feet (20 m) (80 chains equal 1 mile). Commonly used to report fire perimeters and other fireline distances. Popular in fire management because of its convenience in calculating acreage (example: 10 square chains equal one acre) (New Mexico Future Farmers of America 2010).

Climate adaptation: Adaptation is an adjustment in natural or human systems to a new or changing environment. Adaptation to climate change refers to adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. (CA GOPR 2020).

Climate Change: A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere, and which is in addition to natural climate variability observed over comparable time periods (CA GOPR 2020).

Community Assessment: An analysis designed to identify factors that increase the potential and/or severity of undesirable fire outcomes in WUI communities (SWCA).

Communities at Risk: Defined by the HFRA as “Wildland-Urban Interface Communities within the vicinity of federal lands that are at high risk from wildfire.”

Community Emergency Response Team (CERT): The CERT program educates volunteers about disaster preparedness for the hazards that may impact their area and trains them in basic disaster response skills, such as fire safety, light search and rescue, team organization, and disaster medical operations. CERT offers a consistent, nationwide approach to volunteer training and organization that professional responders can rely on during disaster situations, allowing them to focus on more complex tasks (Ready 2021).

Community Wildfire Protection Plan (CWPP): A planning document that seeks to reduce the threat to life and property from wildfire by identifying and mitigating wildfire hazards to communities and infrastructure located in the WUI. Developed from the HFRA, a CWPP addresses issues such as wildfire response, hazard mitigation, community preparedness, or structure protection (SWCA).

Conditional Surface Fire: A potential type of fire in which conditions for sustained conditional surface fire active crown fire spread are met but conditions for crown fire initiation are not. If the fire begins as a surface fire, then it is expected to remain so. If it begins as an active crown fire in an adjacent stand, then it may continue to spread as an active crown fire (Wooten 2021).

Contain: A tactical point at which a fire's spread is stopped by and within specific contain features, constructed or natural; also, the result of stopping a fire's spread so that no further spread is expected under foreseeable conditions. For reporting purposes, the time and date of containment. This term no longer has a strategic meaning in federal wildland fire policy (Wooten 2021).

Control: To construct fireline or use natural features to surround a fire and any control spot fires therefrom and reduce its burning potential to a point that it no longer threatens further spread or resource damage under foreseeable conditions. For reporting purposes, the time and date of control. This term no longer has a strategic meaning in federal wildland fire policy (Wooten 2021).

Cover type: The type of vegetation (or lack of it) growing on an area, based on cover type minimum and maximum percent cover of the dominant species, species group or non-living land cover (such as water, rock, etc.). The cover type defines both a qualitative aspect (the dominant cover type) as well as a quantitative aspect (the abundance of the predominant features of that cover type; Wooten 2021).

Creeping Fire: A low-intensity fire with a negligible rate of spread (Wooten 2021).

Crown Fire: A fire that advances at great speed from crown to crown in tree canopies, often well in advance of the fire on the ground (National Geographic 2021).

Debris Flows: “Fast-moving landslides that are particularly dangerous to life and property because they move quickly, destroy objects in their paths, and often strike without warning” (USGS 2023a).

Defensible Space: An area around a structure where fuels and vegetation are modified, cleared, or reduced to slow the spread of wildfire toward or from a structure. The design and distance of the defensible space is based on fuels, topography, and the design/materials used in the construction of the structure (SWCA).

Duff: The layer of decomposing organic materials lying below the litter layer of freshly fallen twigs, needles, and leaves and immediately above the mineral soil (SWCA).

Ecosystem: An interacting natural system including all the component organisms together with the abiotic environment and processes affecting them (SWCA).

Environmental Conditions: That part of the fire environment that undergoes short-term changes: weather, which is most commonly manifest as windspeed, and dead fuel moisture content (Wooten 2021).

Escape Route: A preplanned and understood route firefighters take to move to a safety zone or other low-risk area. When escape routes deviate from a defined physical path, they should be clearly marked (flagged; SWCA).

Evacuation: The temporary movement of people and their possessions from locations threatened by wildfire (SWCA).

Fire-Adapted Community: A fire-adapted community collaborates to identify its wildfire risk and works collectively on actionable steps to reduce its risk of loss. This work protects property and increases the safety of firefighters and residents (USFA 2021b).

Fire Behavior: The manner in which fuel ignites, flames develop, and fire spreads and exhibits other related phenomena as determined by the interaction of fuels, weather, and topography (Fire Research and Management Exchange System 2021).

Fire Break: Areas where vegetation and organic matter are removed down to mineral soil (SWCA).

Fire Environment: The characteristics of a site that influence fire behavior. In fire modeling the fire environment is described by surface and canopy fuel characteristics, windspeed and direction, relative humidity, and slope steepness (Wooten 2021).

Fire Frequency: A broad measure of the rate of fire occurrence in a particular area. For historical analyses, fire frequency is often expressed using the fire return interval calculation. For modern-era analyses, where data on timing and size of fires are recorded, fire frequency is often best expressed using fire rotation (SWCA).

Fire Hazard: Fire hazard is the potential fire behavior or fire intensity in an area, given the type(s) of fuel present – including both the natural and built environment – and their combustibility (CA GOPR 2020).

Fire History: The chronological record of the occurrence of fire in an ecosystem or at a specific site. The fire history of an area may inform planners and residents about the level of wildfire hazard in that area (SWCA).

Fire Intensity: A general term relating to the heat energy released in a fire (SWCA).

Fireline Intensity: Amount of heat release per unit time per unit length of fire front. Numerically, the product of the heat of combustion, quantity of fuel consumed per unit area in the fire front, and the rate of spread of a fire, expressed in kilowatts per minute (SWCA). This expression is commonly used to describe the power of wildland fires, but it does not necessarily follow that the severity, defined as the vegetation mortality, will be correspondingly high (Wooten 2021).

Fire Prevention: Activities such as public education, community outreach, planning, building code enforcement, engineering (construction standards), and reduction of fuel hazards that is intended to reduce the incidence of unwanted human-caused wildfires and the risks they pose to life, property or resources (CA GOPR 2020).

Fire Regime: A measure of the general pattern of fire frequency and severity typical to a particular area or type of landscape: The regime can include other metrics of the fire, including seasonality and typical fire size, as well as a measure of the pattern of variability in characteristics (SWCA).

Fire Regime Condition Class: Condition classes are a function of the degree of fire regime condition class departure from historical fire regimes resulting in alterations of key ecosystem components such as composition structural stage, stand age, and canopy closure (Wooten 2021).

Fire Return Interval: Number of years (interval) between two successive fires in a designated area (SWCA).

Fire Severity: A qualitative measure of the immediate effects of fire on the fire severity ecosystem. It relates to the extent of mortality and survival of plant and animal life both aboveground and belowground and to loss of organic matter. It is determined by heat released aboveground and belowground. Fire Severity is dependent on intensity and residence dependent of the burn. For trees, severity is often measured as percentage of basal area removed. An intense fire may not necessarily be severe (Wooten 2021).

Fire Risk: "Risk" takes into account the intensity and likelihood of a fire event to occur as well as the chance, whether high or low, that a hazard such as a wildfire will cause harm. Fire risk can be determined by identifying the susceptibility of a value or asset to the potential direct or indirect impacts of wildfire hazard events (CA GOPR 2020).

Flammability: The relative ease with which fuels ignite and burn regardless of the quantity of the fuels (SWCA).

Flame Length: The length of flames in the propagating fire front measured along the slant of the flame from the midpoint of its base to its tip. It is mathematically related to fireline intensity and tree crown scorch height (Wooten 2021).

Flooding: An overflowing of water onto land that is normally dry (NSSL 2023).

Foliar Moisture content: Moisture content (dry weight basis) of live foliage, foliar moisture content expressed as a percentage. Effective foliar moisture content incorporates the moisture content of other canopy fuels such as lichen, dead foliage, and live and dead branchwood (Wooten 2021).

Forest Fire: uncontrolled burning of a woodland area (National Geographic 2021).

Fuel Break: A natural or human-made change in fuel characteristics which affects fire behavior so that fires burning into them can be more readily controlled (NWCG 2021c).

Fuel Complex: The combination of ground, surface, and canopy fuel strata (Wooten 2021).

Fuel Condition: Relative flammability of fuel as determined by fuel type and environmental conditions (SWCA).

Fuel Continuity: A qualitative description of the distribution of fuel both horizontally and vertically. Continuous fuels readily support fire spread. The larger the fuel discontinuity, the greater the fire intensity required for fire spread (Wooten 2021).

Fuel Loading: The volume of fuel in a given area generally expressed in tons per acre (SWCA). Dead woody fuel loadings are commonly described for small material in diameter classes of 0 to 0.25, 0.25 to 1, and 1 to 3 inches and for large material greater than 3 inches (Wooten 2021).

Fuel Management/Fuel Reduction: Manipulation or removal of fuels to reduce the likelihood of ignition and to reduce potential damage in case of a wildfire. Fuel reduction methods include prescribed fire, mechanical treatments (mowing, chopping), herbicides, biomass removal (thinning or harvesting or

trees, harvesting of pine straw), and grazing. Fuel management techniques may sometimes be combined for greater effect (SWCA).

Fuel Model: A set of surface fuel bed characteristics (load and surface-area-to- fuel model volume-ratio by size class, heat content, and depth) organized for input to a fire model (Wooten 2021).

Fuel Modification: The manipulation or removal of fuels (i.e., combustible biomass such as wood, leaves, grass, or other vegetation) to reduce the likelihood of igniting and to reduce fire intensity. Fuel modification activities may include lopping, chipping, crushing, piling and burning, including prescribed burning. These activities may be performed using mechanical treatments or by hand crews. Herbicides and prescribed herbivory (grazing) may also be used in some cases. Fuel modification may also sometimes be referred to as "vegetation treatment" (CA GOPR 2020).

Fuel Moisture Content: This is expressed as a percent or fraction of oven dry fuel moisture content weight of fuel. It is the most important fuel property controlling flammability. In living plants, it is physiologically bound. Its daily fluctuations vary considerably by species but are usually above 80 to 100 percent. As plants mature, moisture content decreases. When herbaceous plants cure, their moisture content responds as dead fuel moisture content, which fluctuates according to changes in temperature, humidity, and precipitation (Wooten 2021).

Fuel Treatment: The manipulation or removal of fuels to minimize the probability of ignition and/or to reduce potential damage and resistance to fire suppression activities (NWCG 2021d). Synonymous with fuel modification.

Grazing: There are two types of grazing: 1) traditional grazing, and 2) targeted grazing. Traditional grazing refers to cattle that are managed in extensive pastures to produce meat. Targeted grazing involves having livestock graze at a specific density for a given period of time for the purpose of managing vegetation. Even though both kinds of grazing manage fuel loading in range- and forested lands, targeted grazing is different in that its sole purpose is to manage fuels. Targeted grazing is done by a variety of livestock species such as sheep, goats, or cows (UCANR 2019).

Ground Fire: Fire that burns organic matter in the soil, or humus; usually does not appear at the surface (National Geographic 2021).

Ground Fuels: Fuels that lie beneath surface fuels, such as organic soils, duff, decomposing litter, buried logs, roots, and the below-surface portion of stumps (Wooten 2021).

Hazard: A "hazard" can be defined generally as an event that could cause harm or damage to human health, safety, or property (CA GOPR 2020).

Hazardous Areas: Those wildland areas where the combination of vegetation, topography, weather, and the threat of fire to life and property create difficult and dangerous problems (SWCA).

Hazardous Fuels: A fuel complex defined by type, arrangement, volume, condition, and location that poses a threat of ignition and resistance to fire suppression (NWCG 2021e).

Hazardous Fuels Reduction: Any strategy that reduces the amount of flammable material in a fire-prone ecosystem. Two common strategies are mechanical thinning and prescribed burning (Wooten 2021).

Hazard Reduction: Any treatment that reduces the threat of ignition and spread of fire (SWCA).

Highly Valued Resources and Assets: Landscape features that are influenced positively and/or negatively by fire. Resources are naturally occurring, while assets are human made (IFTDSS 2021).

Ignition: The action of setting something on fire or starting to burn (SWCA).

Incident: An occurrence or event, either natural or person-caused, which requires an emergency response to prevent loss of life or damage to property or natural resources (Wooten 2021).

Influence Zone: An area that, with respect to wildland and urban fire, has a set of conditions that facilitate the opportunity for fire to burn from wildland fuels to the home and or structure ignition zone (NWCG 2021a).

Initial Attack: The actions taken by the first resources to arrive at a wildfire to protect lives and property and prevent further extension of the fire (SWCA).

Invasive Species: An introduced, nonnative organism (disease, parasite, plant, or animal) that begins to spread or expand its range from the site of its original introduction and that has the potential to cause harm to the environment, the economy, or to human health (USGS 2021).

Ladder Fuels: Fuels that provide vertical continuity allowing fire to carry from surface fuels into the crowns of trees or shrubs with relative ease (SWCA).

Linear Fuel Break: "bands" or "strips" of land where trees or fire prone vegetation is removed to fragment fuel continuity to reduce the intensity of fire spread and provide control lines for responders. These stretches of treated lands are often preplanned to connect networks of fuel breaks developed around the topography and predicted fire behavior of the area (Belavenutti 2022).

Litter: Recently fallen plant material that is only partially decomposed and is still discernible (SWCA).

Manual Treatments: Felling and piling of fuels done by hand. The volume of material generated from a manual fuel treatment is typically too small to warrant a biomass sale therefore collected material is disposed of by burning or chipping. The work can be performed by either a single individual or a large, organized crew with powered equipment (UCANR 2021a).

Mechanized Treatments: Mechanical treatments pulverize large continuous patches of fuel to reduce the volume and continuity of material. Mechanical treatments can be applied as either mastication or chipping treatments. Both treatments shred woody material, but mastication leaves residue on-site while chipping collects the particles for transportation off site. Similar to hand treatments, mechanical treatments can target specific areas and vegetation while excluding AOCs. In addition, mechanical treatment is easily scalable to large areas (>30 acres) with little added cost (UCANR 2021b).

Mitigation: Action that moderates the severity of a fire hazard or risk (SWCA).

Mutual Aid: Assistance in firefighting or investigation by fire agencies, irrespective of jurisdictional boundaries (NWCG 2021f).

Native Revegetation: The process of replanting and rebuilding the soil of disturbed land (e.g., burned) with native plant species (USDA 2005).

Native Species: A species that evolved naturally in the habitat, ecosystem, or region as determined by climate, soil, and biotic factors (USDA 2005).

National Cohesive Strategy: The National Cohesive Wildland Fire Management Strategy is a strategic push to work collaboratively among all stakeholders and across all landscapes, using best science, to make meaningful progress toward three goals:

- Resilient Landscapes

- Fire-Adapted Communities
- Safe and Effective Wildfire Response

Vision: To safely and effectively extinguish fire when needed; use fire where allowable; manage our natural resources; and as a nation, to live with wildland fire (Forests and Rangelands 2021).

Overstory: That portion of the trees in a forest which forms the upper or uppermost layer (SWCA).

Passive Crown Fire: A type of crown fire in which the crowns of individual trees or small groups of trees burn, but solid flaming in the canopy cannot be maintained except for short periods. Passive crown fire encompasses a wide range of crown fire behavior, from occasional torching of isolated trees to nearly active crown fire. Passive crown fire is also called torching or candling. A fire in the crowns of the trees in which trees or groups of trees torch, ignited by the passing front of the fire. The torching trees reinforce the spread rate, but these fires are not basically different from surface (SWCA).

Prescribed Burning: Any fire ignited by management actions under specific, predetermined conditions to meet specific objectives related to hazardous fuels or habitat improvement. Usually, a written, approved prescribed fire plan must exist, and 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 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 (NWCG 2021g).

Resilience: Resilience is the capacity of any entity – an individual, a community, an organization, or a natural system – to prepare for disruptions, to recover from shocks and stresses, and to adapt and grow from a disruptive experience (CA GOPR 2020).

Response: Movement of an individual firefighting resource from its assigned standby location to another location or to an incident in reaction to dispatch orders or to a reported alarm (SWCA).

Safety Element: One of the seven mandatory elements of a local general plan (a county plan that forms the foundation for future development), the safety element must identify hazards and hazard abatement provisions to guide local decisions related to zoning, subdivisions, and entitlement permits. The element should contain general hazard and risk reduction strategies and policies supporting hazard mitigation measures (CA GOPR 2020).

Sediment Yield: “The amount of sediment per unit area removed from a watershed by flowing water during a specified period of time” (USGS 2006).

Shapefile: A nontopological format for storing geometric location and attribute information for geographic features.

Slash: Debris left after logging, pruning, thinning, or brush cutting. Slash includes logs, chips, bark, branches, stumps, and broken trees or brush that may be fuel for a wildfire (SWCA).

Slope Percent: The ratio between the amount of vertical rise of a slope and horizontal distance expressed as a percentage; 100 feet of rise to 100 feet of horizontal distance equals 100% (NWCG 2021h).

Suppression: The most aggressive fire protection strategy, it leads to the total extinguishment of a fire (SWCA).

Surface Fire: Fire that typically burns only surface litter and undergrowth (National Geographic 2021).

Surface Fuel: Fuels lying on or near the surface of the ground, consisting of leaf and needle litter, dead branch material, downed logs, bark, tree cones, and low stature living plants (SWCA).

Structural Ignitability: The ability of structures (such as homes or fences) to catch fire (SWCA).

Topography: The arrangement of the natural and artificial physical features of an area (SWCA).

Total Fuel Load: The mass of fuel per unit area that could possibly be consumed in a hypothetical fire of the highest intensity in the driest fuels (Wooten 2021).

Tree Crown: The primary and secondary branches growing out from the main stem, together with twigs and foliage (SWCA).

Understory: Low-growing vegetation (herbaceous, brush or reproduction) growing under a stand of trees. Also, that portion of trees in a forest stand below the overstory (SWCA).

Understory Fire: A fire burning in the understory, more intense than a surface fire with flame lengths of 1 to 3 m (Wooten 2021).

Values and Assets at Risk (VAR): The elements of a community or natural area considered valuable by an individual or community that could be negatively impacted by a wildfire or wildfire operations. These values can vary by community and can include public and private assets (natural and human-made) -- such as homes, specific structures, water supply, power grids, natural and cultural resources, community infrastructure-- as well as other economic, environmental, and social values (CA GOPR 2020).

Vulnerable Community: Vulnerable communities experience heightened risk and increased sensitivity to natural hazard and climate change impacts and have less capacity and fewer resources to cope with, adapt to, or recover from the impacts of natural hazards and increasingly severe hazard events because of climate change. These disproportionate effects are caused by physical (built and environmental), social, political, and/ or economic factor(s), which are exacerbated by climate impacts. These factors include, but are not limited to, race, class, sexual orientation and identification, national origin, and income inequality (CA GOPR 2020).

Wildfire: A “wildfire” can be generally defined as any unplanned fire in a “wildland” area or in the WUI (CA GOPR 2020).

Wildfire Exposure: During fire suppression activities, an exposure is any area/property that is threatened by the initial fire, but in National Fire Incident Reporting System (NFIRS) a reportable exposure is any fire that is caused by another fire, i.e., a fire resulting from another fire outside that building, structure, or vehicle, or a fire that extends to an outside property from a building, structure, or vehicle (USFA 2020).

Wildfire Influence Zone: A wildland area with susceptible vegetation up to 1.5 miles from the interface or intermix WUI (CA GOPR 2020).

Wildland: Those unincorporated areas covered wholly or in part by trees, brush, grass, or other flammable vegetation (CA GOPR 2020).

Wildland Fire: Fire that occurs in the wildland as the result of an unplanned ignition (CA GOPR 2020).

Wildland Fuels (aka fuels): Fuel is the material that is burning. It can be any kind of combustible material, especially petroleum-based products, and wildland fuels. For wildland fire, it is usually live, or dead plant material, but can also include artificial materials such as houses, sheds, fences, pipelines, and trash piles. In terms of vegetation, there are six wildland fuel types (Fuel Type: An identifiable association of fuel elements of distinctive species, form, size, arrangement, or other characteristics that will cause a

predictable rate of spread or resistance to control under specified weather conditions.) The six wildland fuel types are (NWCG 2021i):

- Grass
- Shrub
- Grass-Shrub
- Timber Litter
- Timber-Understory
- Slash-Blowdown

Wildland-Urban Interface (WUI): The WUI is the zone of transition between unoccupied land and human development. It is the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels (USFA 2021a). In the absence of a CWPP, Section 101 (16) of the Healthy Forests Restoration Act defines the WUI as "(I) an area extending ½ mile from the boundary of an at-risk community; (II) an area within 1 ½ miles of the boundary of an at-risk community, including any land that (1) has a sustained steep slope that creates the potential for wildfire behavior endangering the at-risk community; (2) has a geographic feature that aids in creating an effective fire break, such as a road or ridge top; or (3) is in condition class 3, as documented by the Secretary in the project-specific environmental analysis; (III) an area that is adjacent to an evacuation route for an at-risk community that the Secretary determines, in cooperation with the at-risk community, requires hazardous fuels reduction to provide safer evacuation from the at-risk community." A CWPP offers the opportunity to establish a localized definition and boundary for the WUI (USFA 2020).

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