MINERAL COUNTY

COMMUNITY WILDFIRE PROTECTION PLAN

Working together to build fire adapted communities, resilient to wildfire

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ENVIRONMENTAL CONSULTANTS

We would like to formally thank the Core Team and all stakeholders for contributing their time and expertise throughout the planning process. Your participation has contributed to creating resilient landscapes, implementing public education, reducing structural ignitability, and ensuring safe and effective wildfire response.

For additional information, questions, or concerns regarding this project, please contact Project Manager Sam Lashley at sam.lashley@swca.com or Mineral County Emergency Manager Amy Parks at aparks@co.mineral.mt.us

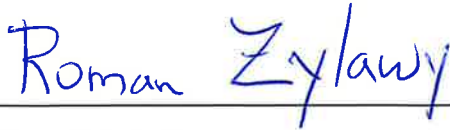For all your planning and implementation needs, please visit www.swca.com.

DISCLAIMER

The entities listed below participated in the development of and/or reviewed the Mineral County Community Wildfire Protection Plan and agree that the CWPP is viable, complete, and realistic in terms of risk reduction and implementation.

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Shawn Smalley

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7-24-25

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Date

County Commissioner

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County Commissioner

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Jerry Dockter

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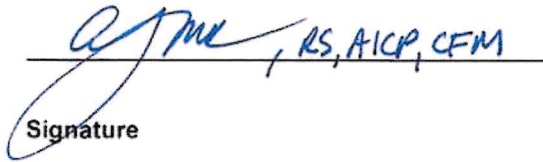
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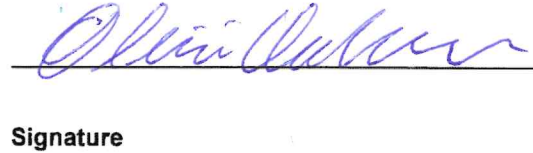
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Andrew J. Short
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Olivia Anderson
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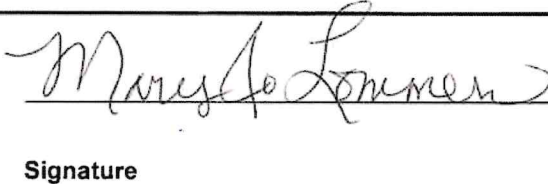
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Mineral County Environmental Health
and Planning Director
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Fire adapted communities
Coordinator, MT DNRC
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Agency/Position (printed)

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Mary Jo Lommen
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Name (printed)

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7/3/2025
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Date

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Date

Mineral Co. Fire Warden
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Agency/Position (printed)

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Agency/Position (printed)

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EXECUTIVE SUMMARY

This community wildfire protection plan (CWPP) serves as an important tool for educating the public, identifying priority areas for mitigation, and guiding local wildfire preparedness efforts. It also helps the county secure funding opportunities for wildfire risk reduction projects. However, it is not a static plan. The Mineral County CWPP should be considered a living document, updated approximately every five years to reflect new data, evolving wildfire conditions, and best practices in mitigation or response. Regular updates will ensure the plan remains relevant and continues to support Mineral County communities in reducing wildfire risk and enhancing public safety.

Homeowners, landowners, and the broader community must take proactive measures to reduce fire risks on their properties. A combination of homeowner responsibility, community awareness, public education, and agency collaboration is essential for creating a more wildfire-resilient Mineral County.

WHAT IS THE GOAL OF A CWPP?

The goal of a CWPP is to enable local communities to improve their wildfire resilience and capacity to adapt to changing wildfire conditions, while developing actions that mitigate risks to human health and safety. This CWPP update aims to provide opportunities for accessing grants and other funding while enhancing public and stakeholder participation by incorporating their input and support. The minimum requirements for a CWPP, as stated in the Healthy Forests Restoration Act (HFRA), are the following (Society of American Foresters [SAF] 2004):

- **Collaboration:** Local and state government representatives, in consultation with federal agencies or other interested groups, must collaboratively develop a CWPP.

- **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 and their essential infrastructures.

- **Reducing Structural Ignitability:** A CWPP must recommend measures that homeowners and communities can take to reduce the ignitability of structures throughout the area addressed by the plan.

WHAT ARE THE KEY ISSUES ADDRESSED?

This CWPP identifies and addresses key wildfire concerns in Mineral County based on the Mineral County CWPP Core Team and county residents' priorities and concerns. The issues addressed in this plan include:

- **Hazardous Fuels Reduction** – Identifying and prioritizing fuel treatments in high-risk areas, particularly in the wildland-urban interface (WUI), to reduce fire intensity and improve firefighter access. This includes both public and private land fuel treatments, leveraging programs such as those associated with the Natural Resources Conservation Service (NRCS) and Bitterroot Resource Conservation and Development (RC&D) to enhance funding and capacity.

- **Improving Evacuation Routes and Emergency Access** – Addressing concerns about ingress and egress routes, including the need for roadside vegetation management and clear evacuation planning.

- **Public Education and Outreach** – Expanding efforts to educate homeowners on defensible space, home hardening, and fire preparedness to increase community-wide resilience.

- **Enhancing Fire Response Capabilities** – Supporting local fire departments with training, equipment, and coordination efforts to improve wildfire response and suppression effectiveness.

- **Strengthening Multiagency Coordination** – Promoting collaboration between local, state, federal, and tribal agencies to implement effective mitigation strategies and emergency response planning.

- **Protecting Critical Infrastructure and Values and assets at Risk** – Managing wildfire risk to protect homes, businesses, essential services, wildlife habitat, and water resources.

- **Addressing Climate-Related Wildfire Challenges** – Considering recent trends in climate conditions, such as prolonged drought and increased fire activity, to inform mitigation efforts.

HOW WAS THE 2025 MINERAL COUNTY CWPP UPDATE DEVELOPED?

A group of multijurisdictional agencies—including federal, state, and local representatives—along with organizations and community members collaborated to update the existing 2018 Mineral County CWPP. The Core Team, consisting of stakeholders with extensive experience in wildfire planning and fire management in the region, played a key role in the development of this CWPP update by ensuring the plan reflects local priorities.

WHAT WAS THE PUBLIC INVOLVEMENT?

The development of the 2025 CWPP also included advertisement of the CWPP and opportunities for the public to be involved, which resulted in community members who were highly engaged in providing input. See Appendix F for details on public outreach and engagement. Various types of public outreach including open house events, a public survey, and informational flyers were provided to increase awareness and collect local input. Additionally, social media and online forums supported CWPP advertisement and furthered public engagement.

The public was invited to provide comments on a draft of the CWPP update from March 17, 2025, to April 7, 2025. By incorporating public and Core Team input into the CWPP and associated recommendations, treatments are tailored specifically for Mineral County.

WHAT IS THE PURPOSE OF THE RISK-HAZARD ASSESSMENT?

The purpose of the risk assessment is to evaluate and provide information pertaining to the risk of wildland fires within the WUI of Mineral County. The Risk-Hazard Assessment uses the Montana Wildfire Risk Assessment to model fire behavior, identify areas of high risk, and analyze threats to highly valued resources and assets (HVRAs). The Core Team reviewed existing data, stakeholder input, and local expertise to ensure that the assessment reflects current wildfire conditions, changing hazards, and new mitigation priorities since the 2018 Mineral County CWPP planning effort.

The risk assessment considers fire behavior modeling, which includes the following:

- Fire history

- Probability of fire occurring

- Fire intensity under various conditions

- Exposure and susceptibility of the WUI and values and assets at risk to wildfire based on their locations

The results of this risk assessment, outlined in Chapter 3, help land managers, fire officials, and community members develop strategic wildfire risk reduction efforts. This includes identifying areas of concern, prioritizing hazardous fuels reduction, improving emergency preparedness, and informing land use and development decisions. Further technical details on the modeling process can be found in the Fire Behavior Modeling and Methodology section of Appendix C.

WHAT ARE THE STRATEGIES TO ADDRESS WILDFIRE HAZARDS?

The National Cohesive Wildland Fire Management Strategy provides a framework for addressing wildfire hazards through three key goals: Resilient Landscapes, Fire-Adapted Communities, and Safe and Effective Wildfire Response. These goals guide the Mineral County CWPP in reducing wildfire risk, improving preparedness, and enhancing coordination between agencies, landowners, and the public.

Goal 1: Restore and Maintain Resilient Landscapes

Landscapes, regardless of jurisdictional boundaries, are resilient to fire, insects, disease, invasive species, and climate change disturbances, in accordance with management objectives. Recommendations to reduce wildfire hazards and improve landscape resilience in Mineral County include**:**

- Conducting road and vegetation maintenance

- Implementing WUI mitigation actions and maintenance

- Managing invasive vegetation

- Establishing strategic fuel breaks

- Expanding the use of prescribed fire and silvicultural treatments

Goal 2: Fire-Adapted Communities

Human populations and infrastructure are prepared to withstand, respond to, and recover from wildland fires through proactive mitigation and education efforts. Strategies for Mineral County include:

- Developing and promoting wildfire education

- Strengthening interagency collaboration on fuel treatments, prescribed fire, and public outreach

- Implementing defensible space and structural hardening improvements

- Hosting community awareness events

Goal 3: Safe and Effective Wildfire Response

All jurisdictions participate in making and implementing safe, effective, and efficient risk-based wildfire management decisions. Recommendations for improving wildfire response capabilities include the following:

- Increasing wildland fire training opportunities for local fire departments

- Providing wildland firefighting equipment to fire protection districts

- Developing a countywide forum for fire training

- Improving water supplies

- Strengthening multiagency coordination for pre-fire planning and incident response

HOW WILL THE PLAN BE IMPLEMENTED?

The CWPP does not require implementation of any of the recommendations, but the message throughout this document is that successful wildfire risk reduction depends on the joint efforts of homeowners, private landowners, local fire departments, land management agencies, and state and federal partners. The most effective mitigation will occur through coordinated actions that address fuel hazards, improve emergency preparedness, and strengthen community resilience.

Recommendations for fuel reduction projects outlined in this plan are general in nature and will require site-specific planning before implementation. Factors such as land ownership, access, topography, soils, fuels, and community priorities will need to be assessed to ensure projects are both effective and feasible. This CWPP identifies the relevant land management agencies, including the U.S. Forest Service (USFS), Bureau of Land Management, Montana Department of Natural Resources and Conservation (Montana DNRC), and private landowners, to help streamline project coordination and funding opportunities.

To support on-the-ground implementation, Mineral County stakeholders will need to develop action plans and secure funding for mitigation projects. This includes leveraging grants, cost-share programs, and agency partnerships to carry out fuel treatments, enhance fire response capabilities, and improve public outreach efforts. Ongoing collaboration between fire managers, landowners, and the community will be essential for tracking progress and ensuring that wildfire mitigation efforts remain a long-term priority.

WHEN DOES THE CWPP NEED TO BE UPDATED?

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 the signing and every 5 years following.

Due to the dynamic nature of wildfire risk, evolving land use patterns, and changing fire behavior, there are several triggers that may warrant an update before the 5-year mark. These include significant wildfire events, major policy or regulatory changes, shifts in community priorities, or new data from fire behavior modeling and risk assessments. CWPPs greater than 10 years old are outdated and will not be prioritized when considered for competitive funding opportunities.

The best practice for Mineral County is to treat the CWPP as a living document, updating it annually with new mitigation projects, funding opportunities, and community engagement efforts. Immediate revisions

should be considered following a major wildfire to incorporate lessons learned, reassess priorities, and refine mitigation strategies.

CORE TEAM

Name	Organization	Title
Amy Parks	Mineral County Disaster and Emergency Services	Disaster and Preparedness Coordinator
Emily Park	Mineral County Economic Development Corporation	Executive Director
Frank Magee	West End Volunteer Fire Department	Fire Chief
Joe Calnan	Frenchtown Rural Fire District	Fire Chief
Scott Dodd	Superior Volunteer Fire Department	Fire Chief
Kat Kittridge	St. Regis Volunteer Fire Department	Assistant Fire Chief
William Peck	Mineral County	Resource Manager
Andy Short	Mineral County Environmental Health and Planning	Land Use Planner
Murphy McGowan	Montana DNRC	Grants Program Specialist
Olivia Anderson	Montana DNRC	Fire Adapted Community Coordinator
Joe Rediske	Montana DNRC	Assistant Fire Management Officer
Kristin Mortenson	Montana DNRC	Fire Prevention Specialist
Lauren Converse	Montana DNRC	Management Forester
Julia Berkey	Montana DNRC	Community Preparedness & Wildfire Prevention Program Manager
Mary Jo Lommen	Mineral County Conservation District	Fire Warden
John Bowe	NRCS and Mineral County Conservation District	District Conservationist
Lorie Cotter	USFS	Fire Management Officer
John Digiando	USFS	Fire Management Officer
Bob Henderson	USFS	Forestry Technician (Prevention)
Liz Bradley	Montana Fish, Wildlife and Parks	Wildlife Biologist
Ryan Klimstra	Montana Fish, Wildlife and Parks	Wildlife Biologist
Lynnee Mailet	Bitterroot RC&D	Community Forester
Angelo Ververis	Idaho Forest Group	Forester
Wayne Turnipseed	Grayback Forestry	Base Manager

For additional information on this project, please contact Project Manager Sam Lashley at Sam.Lashley@swca.com or Mineral County Disaster and Preparedness Coordinator Amy Parks at aparks@co.mineral.mt.us or Mineral County Economic Development Executive Director Emily Park at emily.park@montana.edu

CHAPTER 1 – INTRODUCTION

The United States is facing urgent forest and watershed health concerns. In recent years, wildfires have shown a trend of increasing severity, with the total acres burned and the average acres burned per fire rising significantly over time. Since 2000, there has been a clear increase in the total acreage burned, with particularly high spikes observed in 2007, 2012, 2015, and 2020 (National Oceanic and Atmospheric Administration [NOAA] 2024). From 2013 to 2022 an average of 7.2 million acres were impacted annually due to wildfire, more than doubling the annual average of acres burned in the 1990s (Congressional Research Service [CRS] 2023). The average acres burned per fire have also increased notably in recent years, especially after 2015, reflecting larger and more destructive fires (NOAA 2024). The 2015 fire season had the most acreage impacted in a single year (between 1960 and 2022) at 10.13 million acres. 2020 was the second most extensive year for wildfire with 10.12 million acres burned (CRS 2023). These statistics demonstrate that wildfires are becoming larger and harder to control.

The 2020 Montana Forest Action Plan states that forests in Montana, like other western states, face urgent issues concerning longer fire seasons and uncharacteristic wildfires that threaten the sustainability and ecological function of the state's ecosystems. These issues require analysis of the current gap between existing and necessary wildland fire management strategies. A top priority in Montana is aligning current and future wildland fire management strategies with designated fire and fuel priority areas to effectively direct 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 (Montana Department of Natural Resources and Conservation [Montana DNRC] 2020).

As the severity and extent of wildfires increase, **communities need a plan to help prepare for, reduce the risk of, and adapt to wildland fire events**. Community wildfire protection plans (CWPPs) help accomplish these goals. A CWPP provides recommendations that are intended to reduce, **but not eliminate**, the extreme severity or risk of wildland fire.

The development of the CWPP is rooted in meaningful collaboration among many stakeholders, including local, state, and federal officials. The planning process involves studying past fires and treatment accomplishments and incorporating the knowledge and expertise of the professional fire managers who work for the various agencies and governing entities in the county. 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 2025 Mineral County CWPP identifies potential new priority areas where mitigation measures are needed to protect from wildfire impacts to life, property, and critical infrastructure in the county. However, this CWPP does not attempt to mandate the type and priority for 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.

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, fire suppression, and emergency 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: Local and state government representatives, in consultation with federal agencies or other interested groups, must collaboratively develop a CWPP (Society of American Foresters [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 and their essential infrastructures (SAF 2004).

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

It is the intent of this 2025 CWPP update to provide a countywide scale of wildfire risk and protection needs and bring together all responsible wildfire management and suppression entities in Mineral County to address the identified needs, and to support these entities in planning and implementing the necessary mitigation measures. Additional information on the planning process is available in Appendix B.

ALIGNMENT WITH COHESIVE STRATEGY

The 2025 CWPP update 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: https://www.forestsandrangelands.gov/documents/strategy/natl-cohesive-wildland-fire-mgmt-strategy-addendum-update-2023.pdf

Alignment with these Cohesive Strategy goals is described in more detail in Chapter 4, 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, and the risk that post-fire effects pose to communities (Figure 1.1)

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.

RESILIENT LANDSCAPES

Landscapes, regardless of jurisdictional boundaries are resilient to fire, insect, disease, invasive species and climate change disturbances, in accordance with management objectives.

POST-FIRE RECOVERY

Preparing communities for inevitable fire effects, through pre-fire planning for post-fire response.

Figure 1.1. The CWPP incorporates the three primary goals of the Cohesive Strategy with post-fire recovery to serve as holistic plan for fire prevention and resilience.

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ALIGNMENT WITH PLANS AND AGREEMENTS

For all wildfire hazards that are, or may become, declared emergencies or major disasters under the Stafford Act, the State of Montana (specifically the Montana DNRC) has entered into a cooperative wildland fire management agreement with multiple federal agencies, including the Bureau of Land Management (BLM), U.S. Forest Service (USFS), National Park Service (NPS), U.S. Fish and Wildlife Service (USFWS), and Bureau of Indian Affairs (Montana DNRC 2023b). These agreements aim to enhance wildfire response and management efficiency by coordinating the exchange of equipment, personnel, supplies, services, and funds among the parties involved. These agreements are detailed in the Montana Master Cooperative Wildland Fire Management and Stafford Act Response Agreement, which aim to streamline efforts in prevention, preparedness, communication, education, fuels treatment, hazard mitigation, fire planning, response strategies, suppression, and post-fire rehabilitation, ensuring a unified and effective approach to managing wildland fires and other related emergencies in Montana (Montana DNRC 2023b).

This CWPP is an update of the 2018 Mineral County CWPP and aligns with multiple local, state, and federal planning documents. These documents or agreements are summarized in Appendix B. In addition, fire policy and legislative direction are also summarized in Appendix B.

CORE TEAM

The first step in the CWPP update process was to bring together a broad group of stakeholders representing both agency and private interests to form a Core Team. The Mineral County Resource Coalition, in coordination with the Mineral County Economic Development Corporation, initiated the engagement from adjacent government agencies in the development of this 2025 Mineral County CWPP, forming the "Core Team" and a smaller "Executive Core Team." The Core Team drives the planning process through decision making, data sharing, experience, and communication with community members. The Executive Core Team consisted of a smaller group of members, who throughout the planning process engaged with stakeholders, organized public engagement events, and supported the development of actionable project recommendations. The project was kicked off on April 30, 2024, and the Core Team convened again on June 5, 2024; October 7, 2024; October 29, 2024; November 21, 2024; January 22, 2025; and March 5, 2025. Additional information about Core Team meeting accomplishments, attendees, and schedule are available in Appendix F.

The Core Team has outlined the following goals and objectives for this CWPP update:

- Improve the resilience and adaptation to wildfire of Mineral County communities.

- Develop a CWPP update with broad public and stakeholder input and support.

- Develop a CWPP update that will serve as a source and guide for accessing grant opportunities and funding.

- Identify the risks from wildfire facing Mineral County communities and develop an action plan with stakeholder and community input and priorities, to create recommendations to mitigate those risks.

- Provide resources, information, and actionable planning for conducting fuel mitigation on private and public lands.

- Implement a process to monitor and report project progress in an accessible and easy to understand format.

PLANNING AREA

This CWPP is a countywide plan; therefore, the planning area boundary aligns with the geographic and political boundaries of Mineral County (Figure 1.2). Mineral County spans 1,219.6 square miles with a population of approximately 5,090 people as of 2023, reflecting a 12.3% increase from the 2020 Census population of 4,531 (U.S. Census Bureau 2023). The population density is 3.7 people per square mile, highlighting the county's rural character with a mix of small towns and unincorporated communities. Incorporated towns include Alberton and Superior, while unincorporated areas include Cyr, De Borgia, Haugan, Riverbend, Saltese, Saint Regis, and Tarkio.

The county has 2,579 housing units, with development patterns characterized by low-density subdivisions and isolated home-sites outside of established communities (Montana DNRC 2018; U.S. Census Bureau 2023). Mineral County also features diverse recreational opportunities, including the Lolo National Forest, state parks, BLM wilderness areas, rivers, streams, and other amenities.

The Core Team has identified the following communities as having the highest risk to wildfire: Saltese, Haugan/De Borgia, Cabin City, Sevenmile, St. Regis, Spring Gulch, Superior, Riverbend, Westfall, Tarkio, Cyr, West Mountain, and Alberton.

Additional information on the county profile is provided in Appendix A, Community Background and Resources.

LAND OWNERSHIP

Mineral County encompasses a diverse array of land ownership (Table 1.1; Figure 1.3), which significantly influences wildland fuel dynamics and response strategies due to varied management practices. The USFS manages the largest portion of the county's land, comprising 81.5% of the planning area (642,786 acres) as part of the Lolo National Forest. Private lands, including residential properties, agricultural lands, and small forested parcels, make up 9.6% of the planning area (76,042 acres). State-owned lands, often managed for multiple uses such as timber production, recreation, and wildlife habitat, account for 8.9% of the planning area (69,862 acres). The intermingling of these various land types necessitates a collaborative approach to wildfire management, ensuring that prevention, response, and recovery efforts are cohesive and comprehensive across all ownerships.

Table 1.1. Breakdown of Land Ownership in Mineral County

Land Ownership	Acres	% of Planning Area
U.S. Forest Service (USFS)	642,786	81.5
Private	76,042	9.6
Montana State Department of Natural Resources and Conservation	69,862	8.9
Total	**788,690**	**100**

Additional details regarding land in Mineral County, such as topography and land management direction, are included in Appendix A.
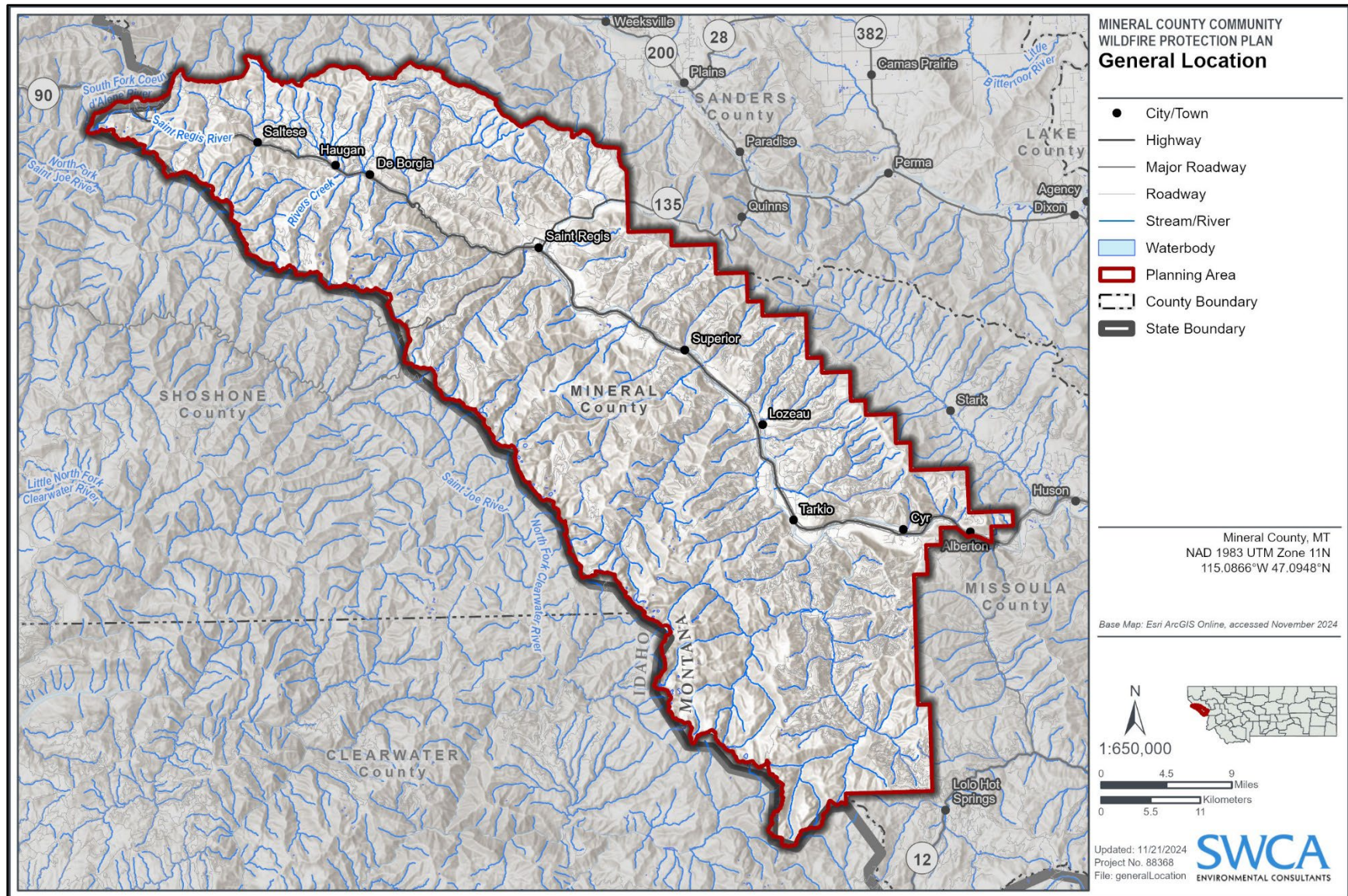
Figure 1.2. Mineral County general location.
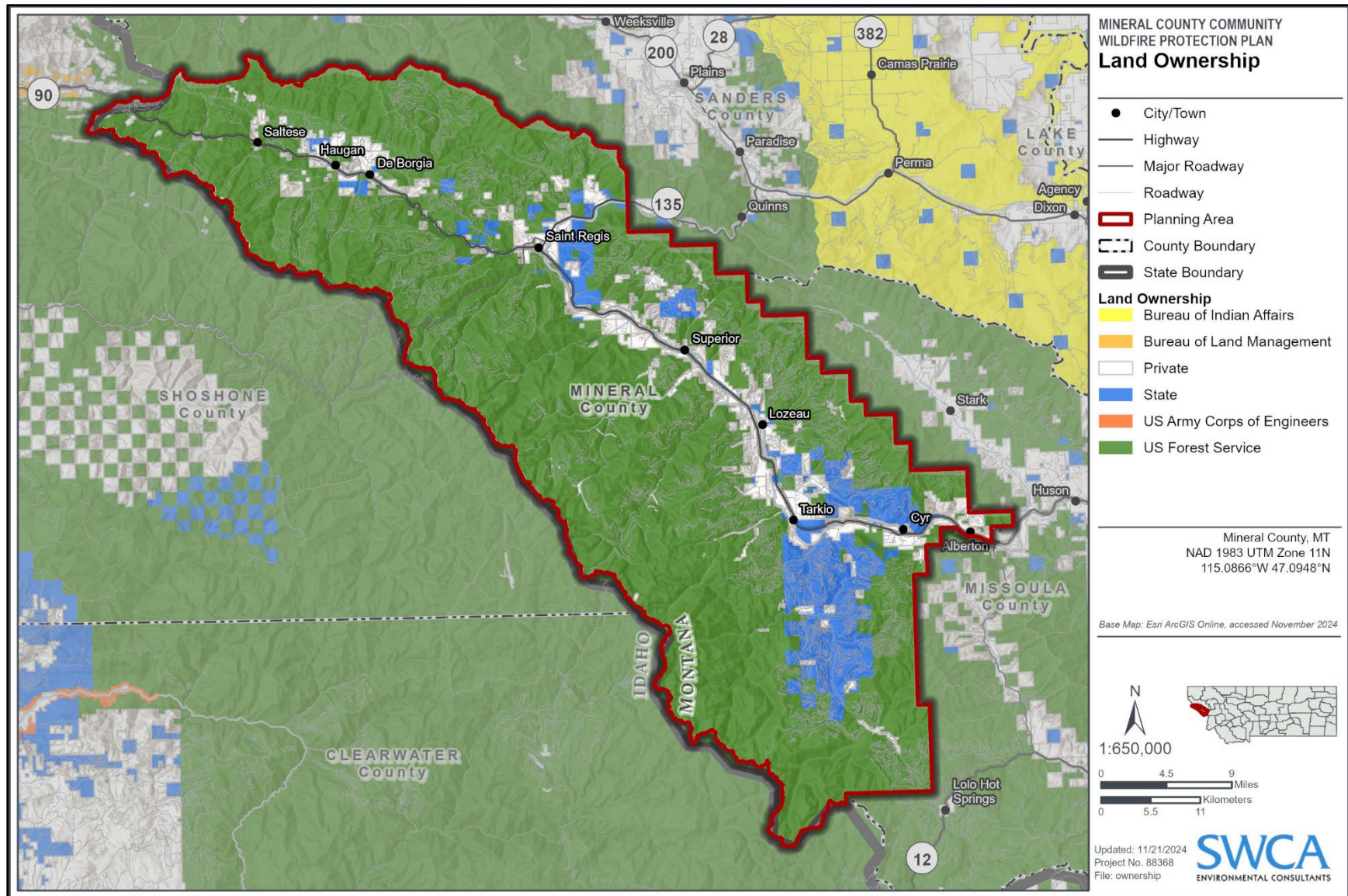
Figure 1.3. Mineral County land ownership.

ACCOMPLISHMENTS SINCE THE 2018 CWPP

One of the key areas of progress in Mineral County has been hazardous fuel reduction. The 2018 CWPP outlines numerous fuel treatment projects around the St. Regis area aimed at reducing fuels around areas of high structure density and improving defensible space around homes. Similar projects have been implemented in the West End communities, focusing on thinning and prescribed burning on both public and private lands. Notably, the Interstate 90 (I-90) corridor community wildfire protection project has treated over 3,000 acres along the interstate, significantly enhancing the region's fire resilience. Additionally, private landowners have utilized cost-share grants for fuel reduction on over 1,000 acres, supported by the Montana DNRC and the County's Title III funds. Furthermore, NRCS has made considerable progress on the Packer Creek Forest Health Targeted Implementation Plan (TIP), which aims to improve forest health and productivity while reducing wildfire hazards and noxious weeds. This project, initiated in 2022 and planned to continue through 2026, engages diverse landowners and partners through grassroots outreach and collaboration in western Mineral County. See Figures 1.4 through 1.7 for completed and planned wildfire mitigation activities in the county.

Mineral County has also made strides toward creating fire-adapted communities through public involvement and education. Efforts have been made to inform private citizens about their role in reducing wildfire risk, including promoting the creation of defensible space around their properties. There have been initiatives to create Firewise USA Communities recognition for Superior, West End, and St. Regis, involving community engagement and educational outreach to raise awareness and encourage proactive measures (Mineral County 2018).
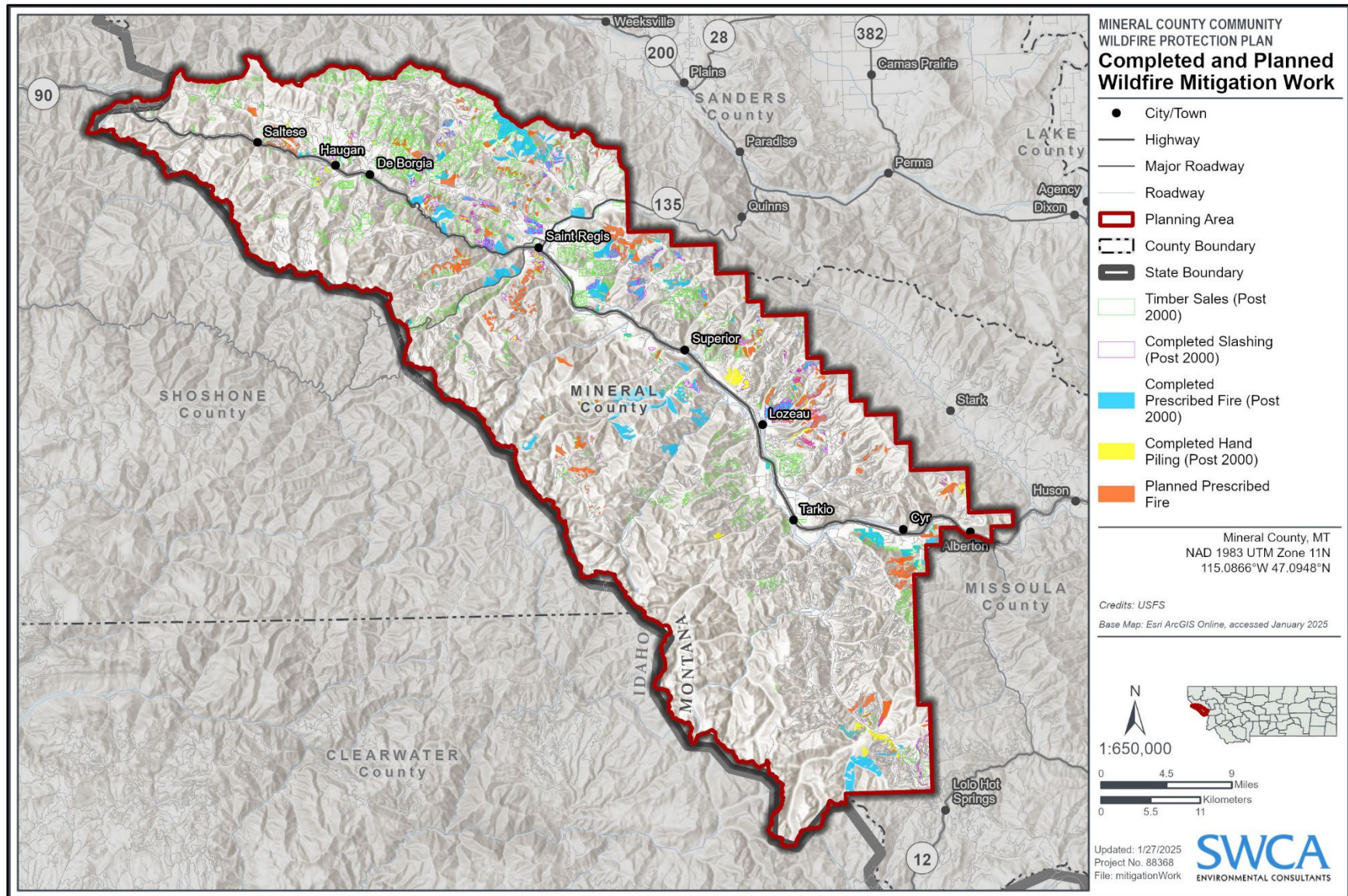
Figure 1.4. Overview of completed and planned wildfire mitigation activities in Mineral County, Montana.
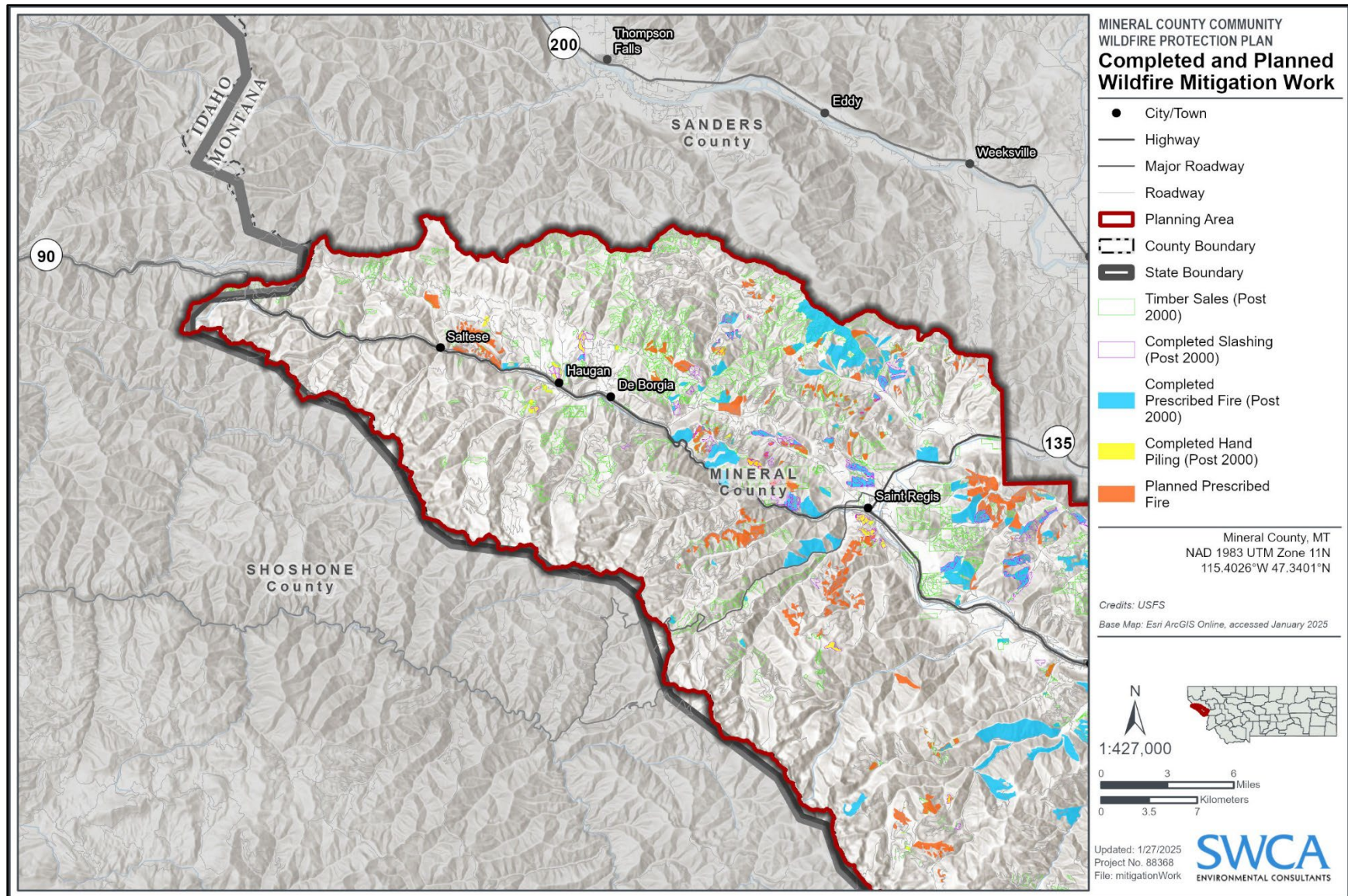
Figure 1.5. Western portion of Mineral County, Montana, showing completed and planned wildfire mitigation activities.
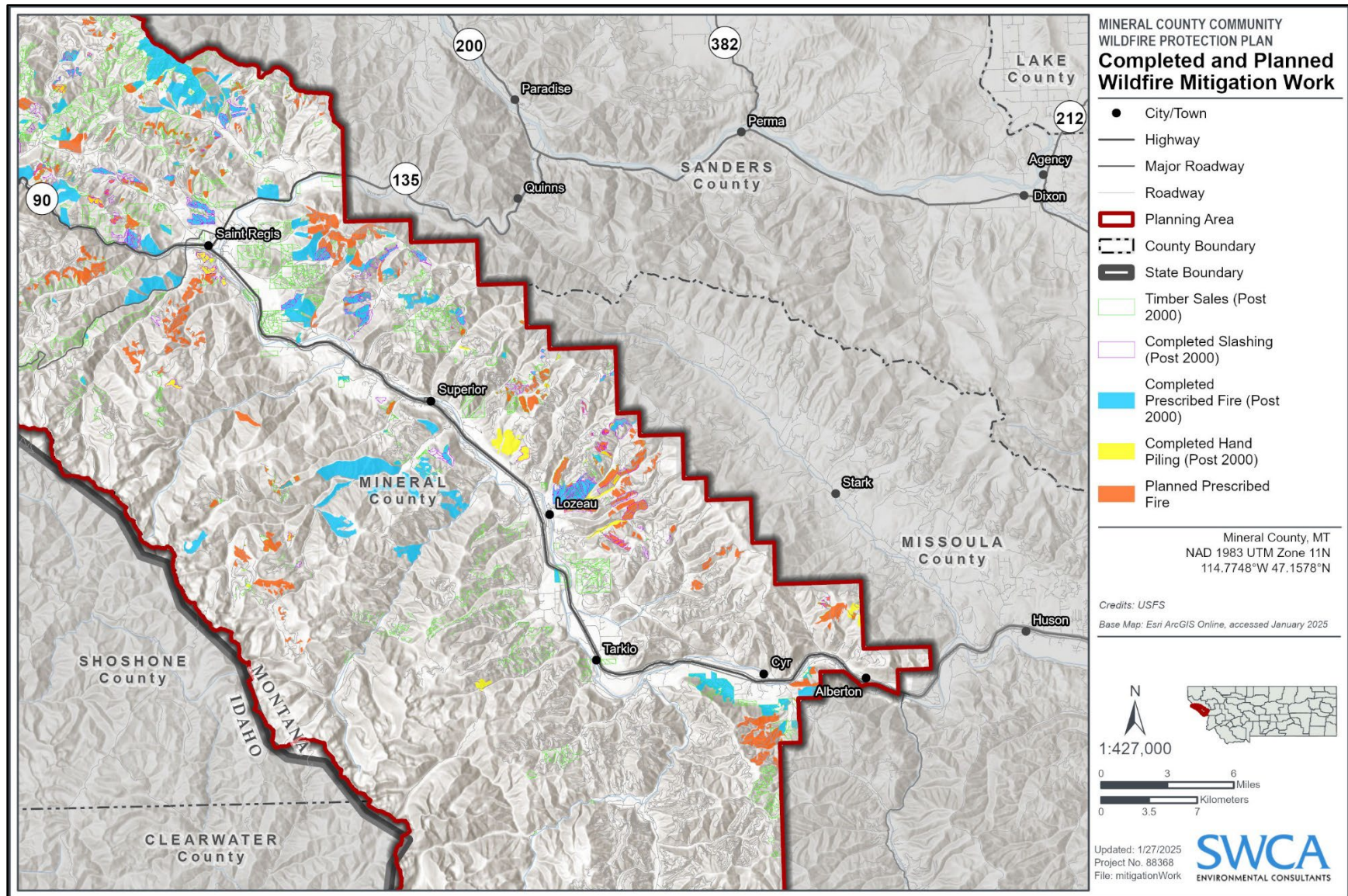
Figure 1.6. Central portion of Mineral County, Montana, showing completed and planned wildfire mitigation activities near Saint Regis, Superior, and Lozeau.
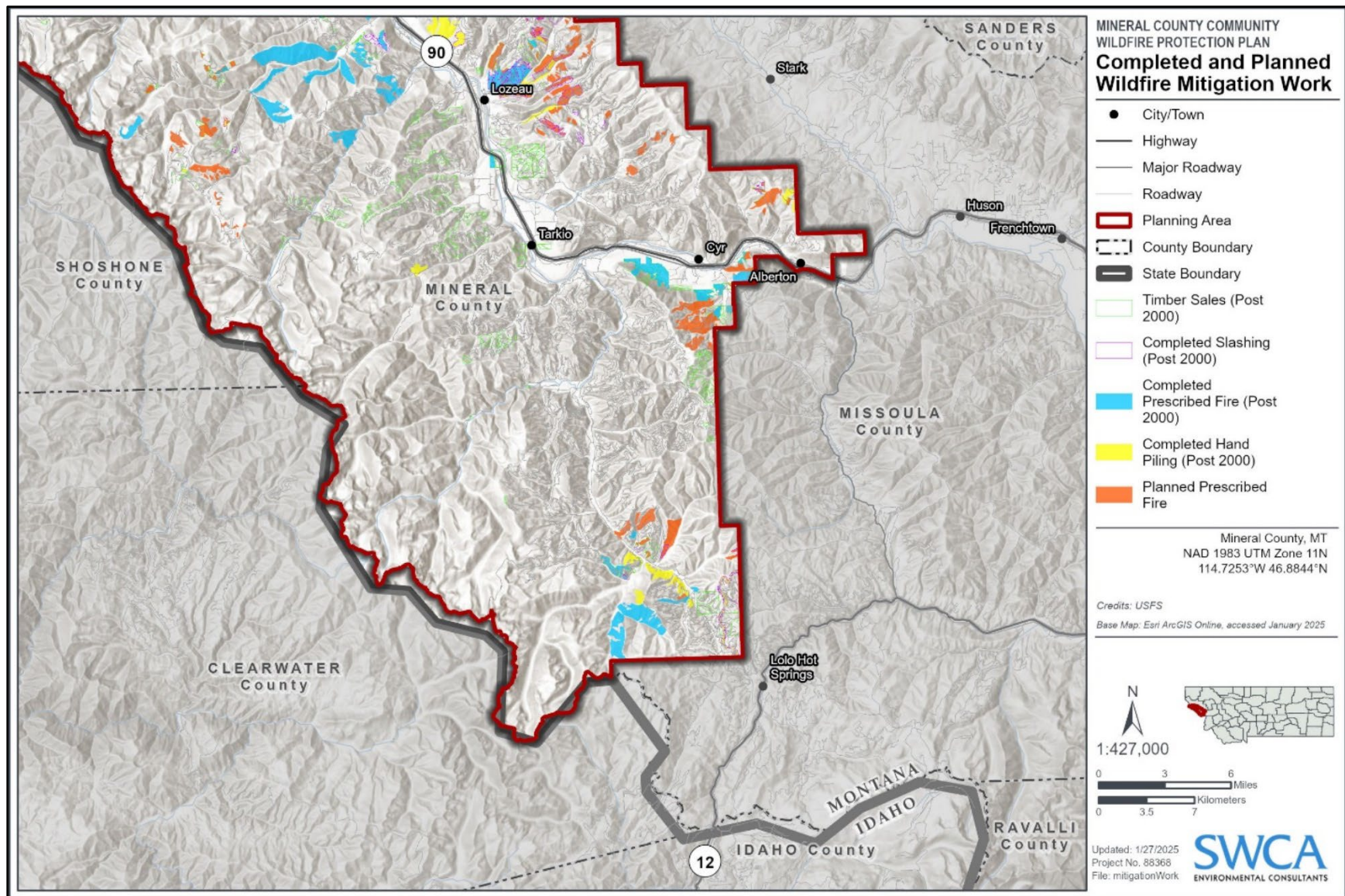
Figure 1.7. Eastern portion of Mineral County, Montana, showing completed and planned wildfire mitigation activities near Tarkio, Cyr, and Alberton.

CHAPTER 2 – FIRE ENVIRONMENT

WILDLAND-URBAN INTERFACE

The wildland-urban interface (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 (NIST 2023). 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. In alignment with this CWPP's scope, the Healthy Forests Restoration Act of 2003 (HFRA) Section 101(16)(B)(ii) is used to support the delineation of WUI areas, which defines the WUI as "(ii) an area within 1½ miles of the boundary of an at-risk community, including any land that—(I) has a sustained steep slope that creates the potential for wildfire behavior endangering the at-risk community; (II) has a geographic feature that aids in creating an effective fire break, such as a road or ridge top" (U.S. Congress 2003, Sec. 101(16)(B)(ii)).

The WUI creates an environment in which fire can move readily between structural and vegetative fuels, increasing the potential for wildland fire ignitions and the corresponding potential loss of life and property. Human encroachment upon wildland ecosystems within recent decades is increasing the extent of the WUI throughout the county (Figure 2.1), which is having a significant influence on wildland fire management practices. The expansion of the WUI into areas with high fire risk, combined with the collective effects of land use patterns, climate change, and insect and disease infestations, 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 and Ruth 2005). Mitigation techniques for fuels and fire management can be strategically planned and implemented in WUI areas (e.g., with the development of defensible space around homes and structures).
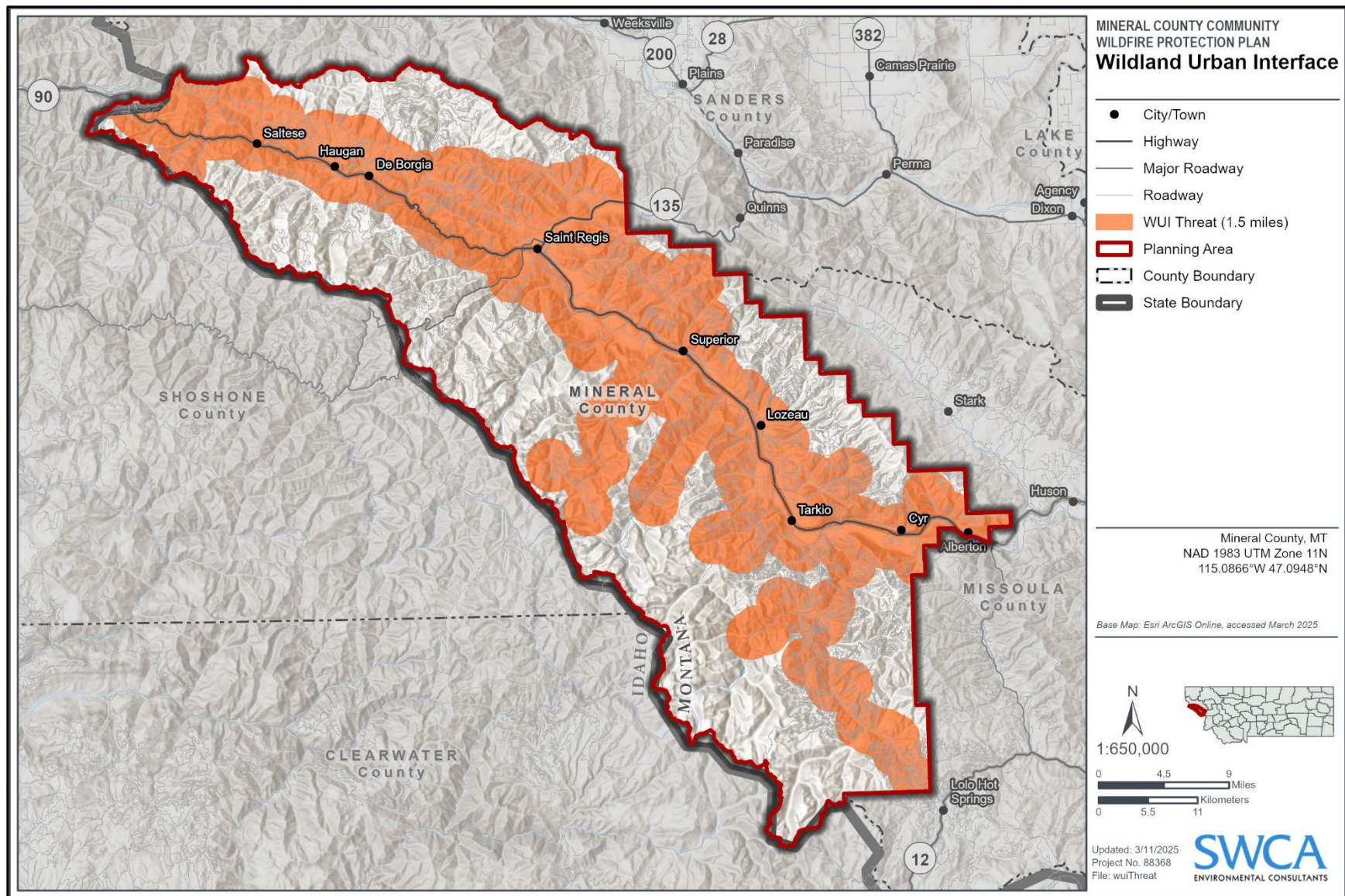
Figure 2.1. Mineral County WUI map (WUI threat = 1.5 miles from structures and key infrastructure).

The Mineral County Core Team and SWCA have collaboratively developed a WUI boundary that extends 1 ½ miles from the individual structures, critical ingress and egress routes, Interstate 90, and key infrastructure such as the Bonneville transmission line. This expanded WUI delineation is consistent with the broader definition of WUI under the HFRA Section 101(16)(B)(ii), which allows for areas within 1 ½ miles of an at-risk community to be included in the WUI if they contain features such as evacuation routes, steep slopes that influence fire behavior, or geographic features that support fuel breaks" (U.S. Congress 2003, Sec. 101(16)(B)(ii)). The 1 ½ mile buffer established in Mineral County reflects the county's specific risk profile (characterized by limited evacuation corridors, widespread development near wildland fuels, and critical infrastructure exposure) and targets mitigation efforts where the risk of fire to life and property is most significant. More information on recommended projects within the WUI can be found in Chapter 4, Mitigation Strategies.

WILDLAND-URBAN INTERFACE LAND USE

Cities and counties are continuously challenged to accommodate both current and future residents in need of safe and affordable housing. Mineral County, like many rural areas in Montana, faces growing challenges related to housing development in WUI zones (Figure 2.2). The county's population growth, combined with the desire for homes in scenic, undeveloped areas, has led to more housing being built near wildfire-prone lands. Between 2010 and 2023, Mineral County experienced a housing growth of approximately 8.5%, with the number of housing units increasing from 2,378 in 2010 to 2,579 in 2023 (U.S. Census Bureau 2023). This growth reflects the broader trend in Montana, where the population increased by nearly 13.7% during a similar period (Headwaters Economics 2020). Today, 99 million people and 46 million residences in 70,000 communities across the United States are at risk for WUI fires (U.S. Fire Administration [USFA] 2023. Wildfire in the WUI is linked to an increased risk of loss of human life, property, natural resources, and economic assets.
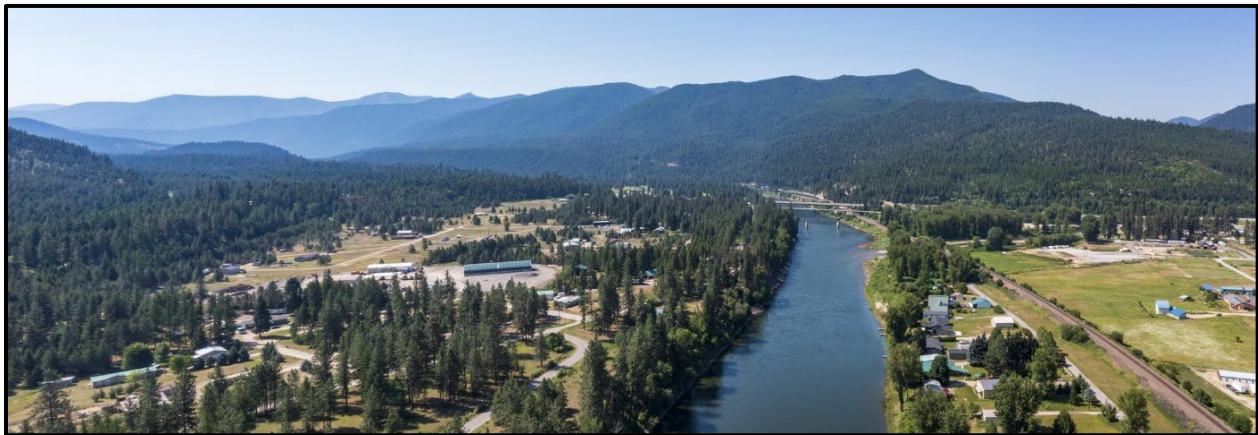
Figure 2.2. Example of the WUI in Mineral County.
Source: Western Montana's Glacier Country (2025).

In the Mineral County Pre-Disaster Mitigation Plan 2012 Update, it is highlighted that all structures in Mineral County are located within the WUI, indicating that every property is at risk of wildfire. Due to the high prevalence of structures near forest lands, extreme impacts to property and infrastructure is likely. In 2012, it was estimated that a significant wildfire causing substantial structure loss could occur approximately every 50 years. This could result in the loss of about 1% of the county's structures, equating to 53 structures with an estimated value of $2.38 million. The annualized wildfire losses are projected to be around $47,600, highlighting the importance of considering WUI land use in wildfire risk management and preparedness efforts in Mineral County (Mineral County 2012). Due to climate change and increased housing costs the potential risk and consequences of devastating fire has only increased since 2012.

VEGETATION AND LAND COVER

Vegetation zones within the county are primarily a function of elevation, slope, aspect, substrate, and associated climatic regimes. Since a broad range in elevation and topography exists across the county, vegetation communities will vary as well (Figure 2.3).

The vegetation in Mineral County is crucial in understanding fire behavior and the natural role of fire within the region's forest ecosystems. The CWPP categorizes the county's vegetation into seven groups based on the existing vegetation type and biophysical settings. Notably, four major vegetation groups dominate the landscape. These classifications help provide insights into how different types of vegetation influence fire dynamics, which is essential for effective wildfire management and prevention strategies.

The dry-moist mixed conifer forests are the most widespread, covering significant portions of Mineral County. These forests mainly consist of Douglas-fir (*Pseudotsuga menziesii*), ponderosa pine (*Pinus ponderosa)*, lodgepole pine (*Pinus contorta*), grand-fir (*Abies grandis*), and Engelmann spruce (*Picea engelmannii*). Historically, these areas experienced frequent, low-intensity fires that maintained open stands of fire-resistant species. However, due to human intervention and fire suppression, these forests now have denser, multi-layered structures with abundant ladder fuels, increasing the risk of high-intensity, stand-replacing fires. These forests are prevalent in low to mid-elevations (3,000–6,000 feet) throughout the county.

Subalpine wet mixed conifer forests, primarily found at higher elevations above 6,000 feet, are another major vegetation group, characterized by Engelmann spruce and subalpine fir (*Abies lasiocarpa*) with scattered lodgepole pine. These forests typically have dense undergrowth that can act as a fire barrier, but during drought conditions, they become susceptible to moderate- to high-intensity fires. Moist mixed conifer forests, covering a significant portion of the land, are dominated by Douglas-fir, western hemlock (*Tsuga heterophylla*), and western redcedar (*Thuja plicata*), with fire return intervals (FRIs) varying greatly.

Riparian areas, found along the Clark Fork River, St. Regis River, and their tributaries consist of deciduous trees and shrubs such as cottonwood (*Populus deltoides*), aspen (*Populus tremuloides*), and Alder (*Alnus* spp.). Riparian areas are usually resistant to fire except under extremely dry conditions.
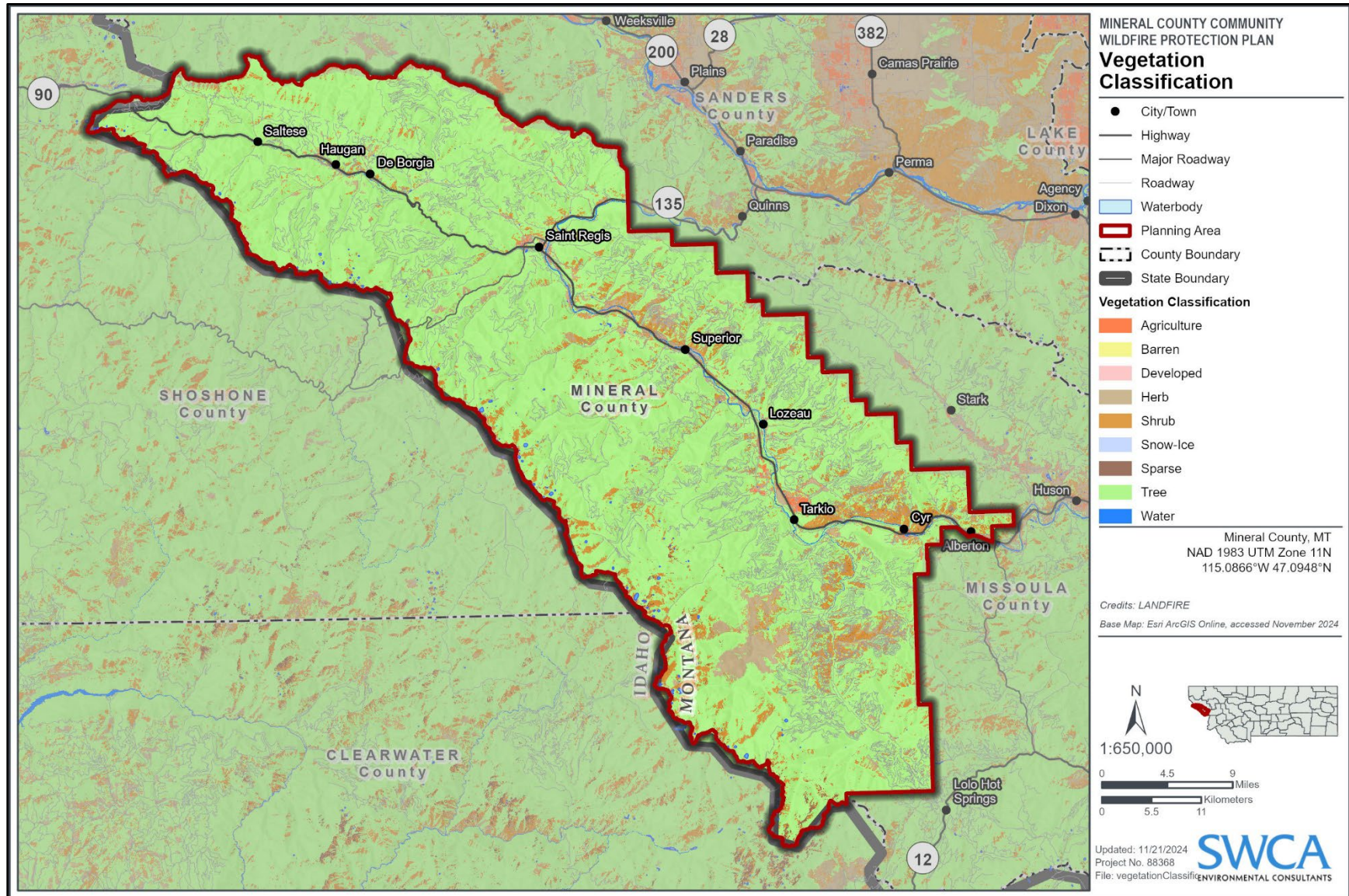
Figure 2.3. Vegetation classifications in Mineral County.

FUELS AND TOPOGRAPHY

Mineral County's diverse topography and vegetative fuels create a complex landscape that significantly influences wildfire behavior, fire regimes, and management strategies. The county is dominated by steep mountain slopes, river valleys, and dense conifer forests, spanning the majority of the landscape under USFS and state management (Mineral County 2018; PeakVisor 2024). The Clark Fork River Valley and I-90 corridor are home to most communities, but the rugged terrain, combined with varied vegetation, can pose significant wildfire risks.

Topography plays a vital role in fire behavior. Features such as steep slopes and canyons facilitate rapid fire spread, particularly during extreme weather conditions. Northern and western aspects are typically cooler and wetter, supporting denser vegetative communities, while southern and eastern aspects are hotter and drier, with sparser vegetation that experiences more frequent fire. These terrain features also create challenges for wildfire response, as limited access to remote and rugged areas can hinder firefighting efforts, potentially allowing for large fire growth in inaccessible regions.

Vegetative fuels vary across elevations, influencing fire dynamics throughout the county (Tables 2.1 and 2.2; Figure 2.4). At lower elevations, fuels consist primarily of grasslands and grass-shrub mixes, represented by fuel models GR1 and GR2. These areas, such as those near Superior and De Borgia, feature short to moderately coarse grasses that burn with moderate to high spread rates and flame lengths. Foothills and mid-elevation slopes are characterized by shrublands and small trees, represented by fuel models GS2 and SH1, which consist of shrubs with interspersed grasses. At higher elevations, dense forested landscapes dominate, with fuel models TU1 and TU5 describing mixed conifer and timber understory fuels (Scott and Burgan 2005).

The county's 96 named mountains and forested high-elevation regions amplify wildfire challenges due to the likelihood of extreme fire behavior during hot, dry conditions. However, valleys such as the Clark Fork River Valley provide more accessible and flatter areas, where communities are concentrated. Despite this, proximity to dense forests, steep slopes, and connective fuels leaves these areas vulnerable to wildfire (Mineral County 2018; PeakVisor 2024).

For additional information on fuels and fire behavior modeling, see Appendix C, Fire Behavior Modeling/GIS Background and Methodology.

Table 2.1. Most Common Fuel Types in Mineral County

Fuel Type and Definition	Acres of Planning Area	Percent of Planning Area
SH2: Shrub fuels with moderate fuel load (higher than SH1), depth about 1 foot, no grass fuel present. Spread rate low; flame length low.	261,132.59	33.11
TU5: Timber understory, fuel bed high load conifer with shrub understory. Spread rate moderate; flame length moderate.	243,043.05	30.81
TU2: Timber understory, moderate litter load with shrub component. High extinction moisture. Spread rate is moderate; flame length is low.	62,262	7.89
TU1: Low load dry climate timber grass-shrub, low load of grass and/or shrub with litter, spread rate is low and flame length is low.	41,831	5.30
GR2: Grass, moderately coarse continuous grass, average depth about 1 foot. Spread rate high; flame length moderate; fine fuel load (1.10 tons/acre).	38,797	4.92

Fuel Type and Definition	Acres of Planning Area	Percent of Planning Area
GS2: Grass-shrub, shrubs are 1 to 3 feet high, moderate grass load. Spread rate high; flame length moderate; fine fuel load (2.1 tons/acre).	30,466	3.86
TL8: Moderate load and compactness may include small amount of herbaceous load. Spread rate moderate; flame length low.	29,589	3.75
TL5: Timber litter, high load conifer litter; light slash or mortality fuel. Spread rate low; flame length low.	29,255	3.71
SH1: Low shrub fuel load, fuel bed depth about 1 foot; some grass may be present. Spread rate very low; flame length very low.	14,653	1.86
TL3: Moderate load conifer litter. Spread rate very low; flame length low.	13,055	1.66
Other – various fuel types	24,647	3.12

See Table 2.2 for adjective class definitions for predicted fire behavior.

Table 2.2. Adjective Class Definitions for Predicted Fire Behavior

Adjective Class	Rate of Spread (chain*/hour)	Flame Length (feet)
Very Low	0–2	0–1
Low	2–5	1–4
Moderate	5–20	4–8
High	20–50	8–12
Very High	50–150	12–25
Extreme	>150	>25

Source: Scott and Burgan (2005).

* 1 chain is equal to 66 feet.
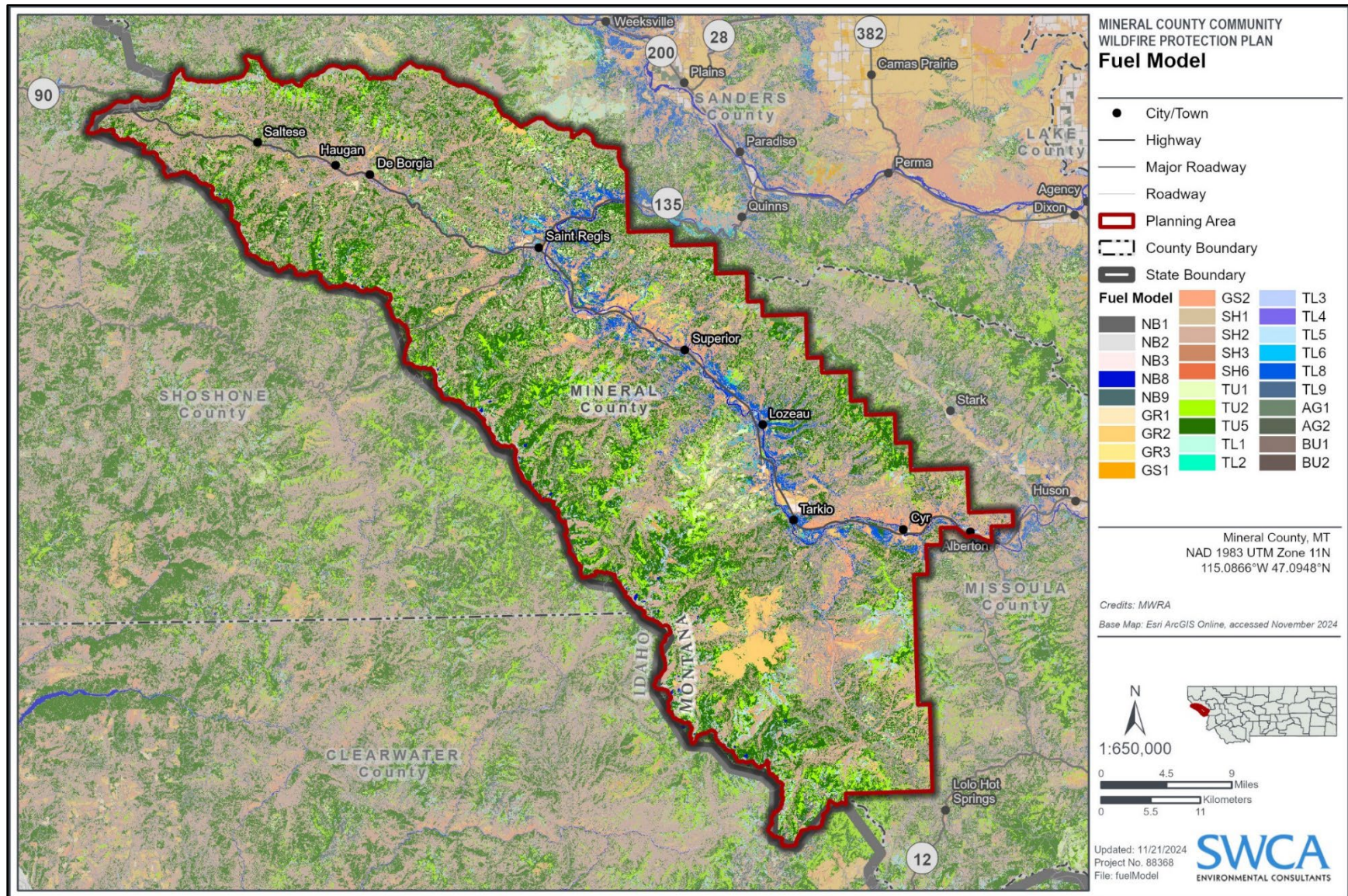
Figure 2.4. Fuel model classes across Mineral County.

FIRE REGIMES

Fire regimes, defined by wildfire characteristics such as intensity, frequency, seasonality, and spatial patterns over time, are intricately tied to vegetation communities. These characteristics form the basis for fire regime delineation and guide fuels treatment planning across fire management regions. Understanding these regimes is critical for prioritizing and implementing restoration activities aimed at reducing wildfire risk and maintaining ecological integrity.

The fire regimes in Mineral County are shaped by the region's diverse topography and varied vegetation types, which range from low-elevation grasslands to high-elevation spruce-fir forests. At lower elevations, Northern Prairie Grasslands dominate, with frequent, low-severity fires occurring every 22 to 50 years. Transitioning to slightly higher elevations, sagebrush shrublands exhibit longer fire return intervals (FRIs), ranging from 40 to 150 years, with fire severity varying between replacement and mixed events (USFS 2005a, 2005b). In mid-elevation zones, ponderosa pine and Douglas-fir forests are prevalent, experiencing frequent surface fires (FRIs of 5 to 30 years for ponderosa pine) and mixed-severity fires (FRIs of 35 to 150 years for Douglas-fir) (USFS 2005c, 2005d). At higher elevations, lodgepole pine forests and spruce-fir forests dominate. Lodgepole pine forests exhibit mixed- and stand-replacement fire regimes with FRIs of 30 to 200 years, while spruce-fir forests experience infrequent but intense stand-replacement fires every 200 to 300 years (USFS 2005e, 2005f).

Similar to other regions in Montana, fire suppression, historical land use changes, and invasive species have disrupted these natural fire cycles, leading to increased fuel loads and shifts in vegetation composition (Mineral County 2018). These changes heighten the risk of high-severity wildfires, particularly in ecosystems furthest from their historical range of variability. Restoring fire as a natural process through prescribed burning, mechanical treatments, and targeted grazing is essential to maintaining the ecological balance and resilience of Mineral County's diverse landscapes (Clark et al. 2023, Montana Forest Collaborative Network 2025).

See Appendix A, Community Background and Resources, for a list of fire regimes occurring in Mineral County.

EMBERS

Canopy characteristics of tree stands, including species, height, and tree trunk size affect the quantity and size of embers produced during a wildfire. Embers from thick-barked species like ponderosa pine and Douglas-fir travel shorter distances compared to those from species with lighter bark like subalpine fir and spruce. Additionally local topography influences where embers may land. Ridges can catch embers, and steep valleys tend to collect embers. A combination of wind, slope angle, and the positioning of structures can all impact ember production and potential ignitions.

Spotting occurs when embers travel in advance of the flaming front; long-range spotting can be miles ahead of the main fire (Figure 2.5).
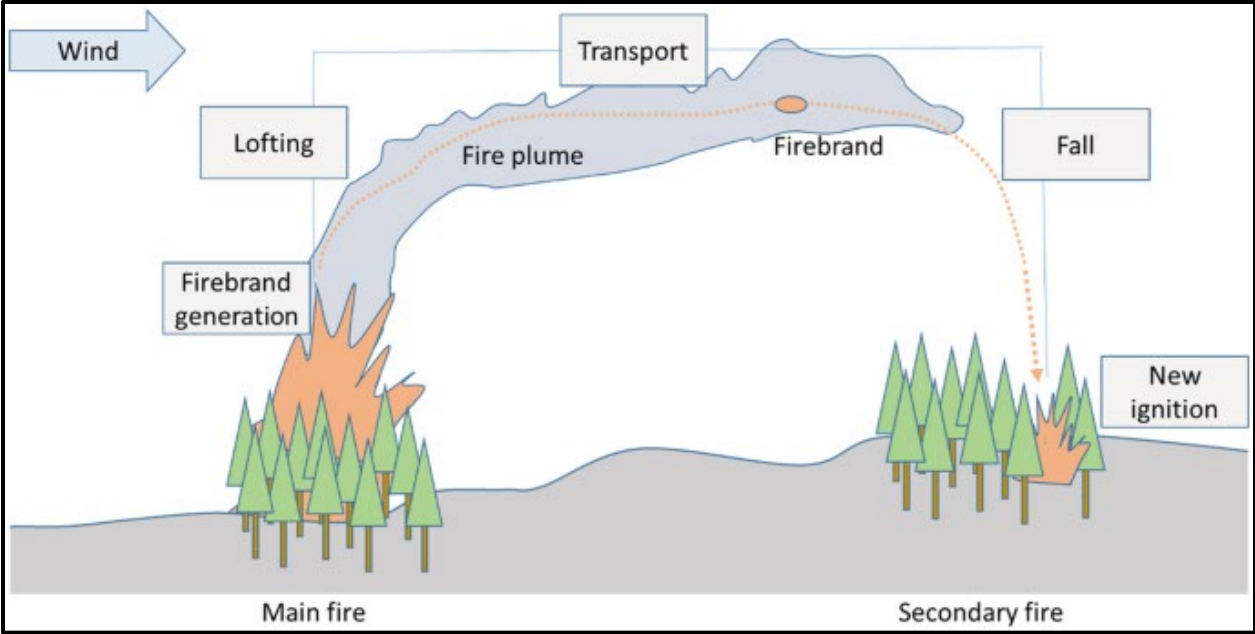
Figure 2.5. Factors associated with embers (firebrands) on the landscape. Vegetation type, wind, and topography all influence ember production and travel distances.
Source: Martin and Hillen (2016).

Grass and shrub embers can play a significant role in wildfire spread, especially under conditions with high dead fuel accumulations. Known for burning at high temperatures and intensities, grasses and shrub fuels can promote spot fires and affect ember production. These embers are capable of igniting surrounding grass or shrub fuels and spreading fires kilometers ahead of the fire front (National Wildfire Coordinating Group [NWCG] 2021).

CLIMATE AND WEATHER PATTERNS

Mineral County exhibits diverse topography and climatic conditions typical of the northern Rocky Mountains. The following section provides an overview of the typical climate and weather patterns of the region. Table 2.3 presents data collected from two local NOAA weather stations within the county, offering a comprehensive look at key meteorological metrics. Additionally, Figures 2.6 and 2.7 visually depict the air temperature and precipitation data, enhancing the understanding of seasonal variations and long-term trends.

Table 2.3. Mean Annual Temperature and Precipitation by Station in Mineral County

Location	Period of Record	Mean Annual Precipitation (Inches)	Mean Annual Temperature (°F)		
			Max	Min	Mean Annual
Superior	1991–2020	16.42	60.9	34.4	47.7
Haugan 1W	1991–2020	36.99	55.2	29.2	42.2

Source: NOAA (2023).
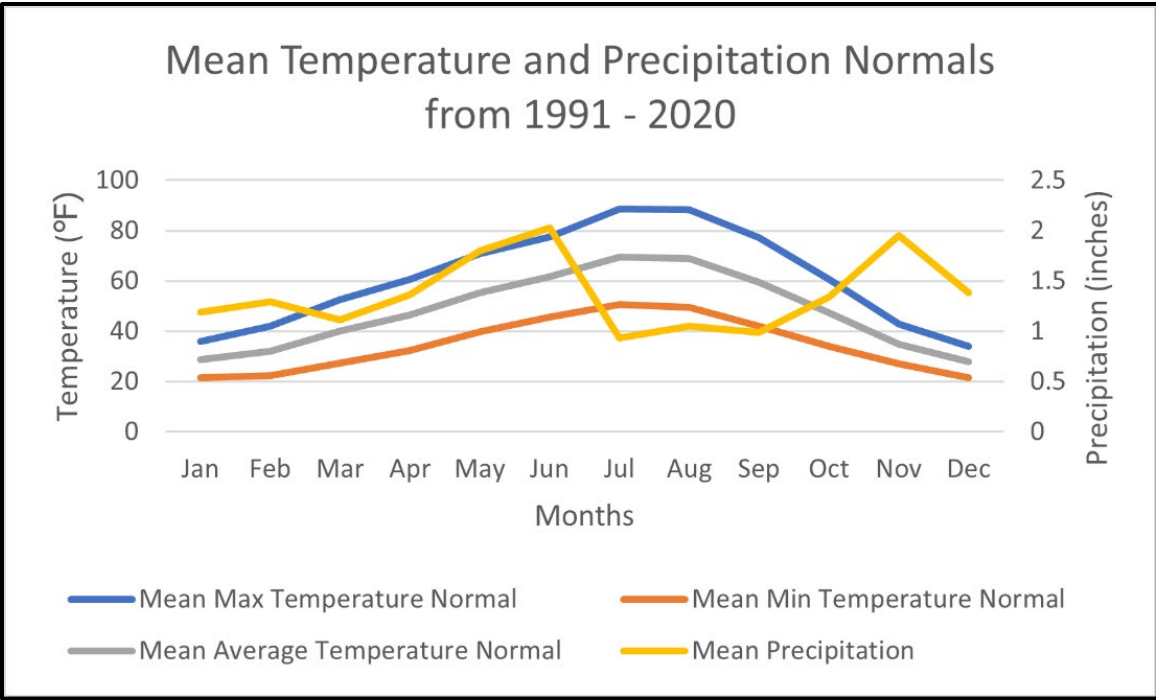
Figure 2.6. Monthly climate averages for the Superior, Montana, area, 1991–2020.
Source: NOAA (2023).
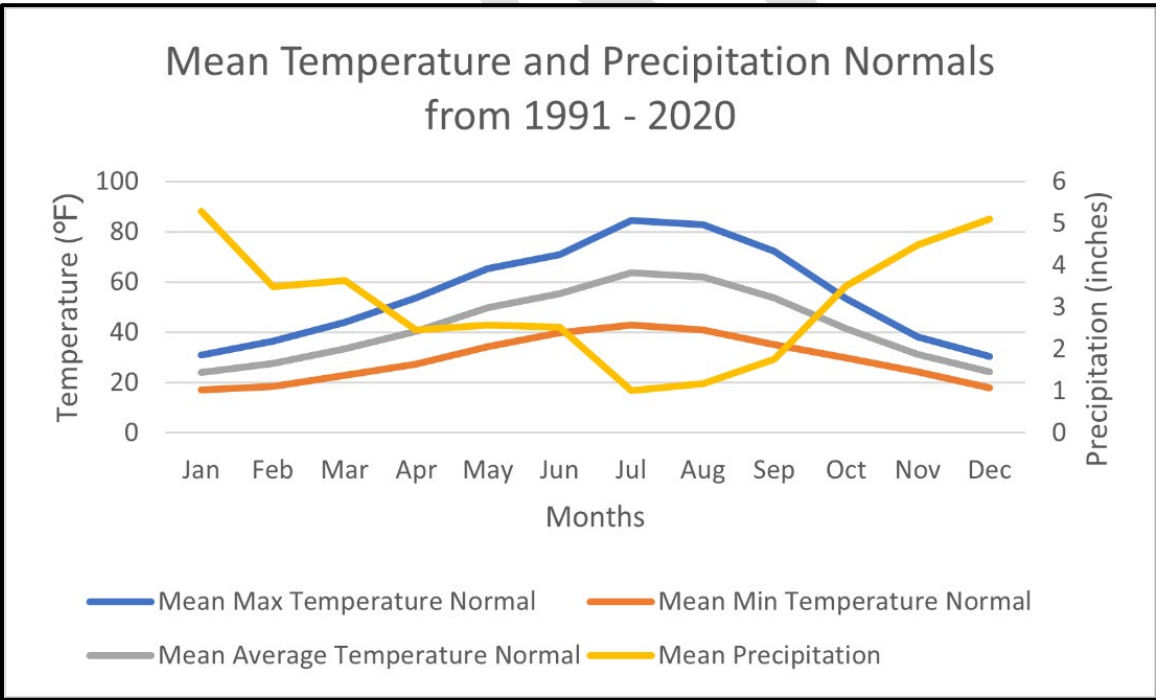
Figure 2.7. Monthly climate averages for the Haugan, Montana, region, 1991–2020.
Source: NOAA (2023).

The county's climate is milder and moister than much of the state, influenced significantly by Pacific maritime weather systems. This influence is particularly pronounced in the western part of the county, where annual precipitation exceeds 30 inches near Haugan (see Figure 2.7), compared to 16 and 18 inches annually in Superior and Alberton, respectively (see Figure 2.6). The county experiences its wettest months during different times of the year depending on elevation. In the higher elevations of the western portion, November through January sees the most precipitation, primarily as snow. Conversely, the lower elevations along the Clark Fork River in the eastern portion receive the most rain in May and June. These climatic variations result in a unique distribution of vegetation and play a crucial role in the area's fire behavior and ecosystem dynamics.

Temperature patterns in Mineral County are consistent with those found throughout western Montana, featuring warm, dry summers with average maximum temperatures in the upper 80s and cold winters with average temperatures well below freezing. This seasonal temperature variation further influences the local environment, contributing to the overall complexity of the region's natural landscape.

FIRE HISTORY

Fire management in Montana and the western United States 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 2017). The NPS and BLM were established in 1916 and 1946, respectively, and adopted similar land management philosophies. In the 1970s, forest management research began to reveal the natural role of wildfire in ecosystems (USFS 2017), and by the turn of the century, complete fire suppression tactics on publicly managed land were mostly replaced with a combination of suppression, containment, and mitigation measures such as fuel treatments and prescribed burning (Forests and Rangelands 2014).

Mineral County's mountainous terrain and extensive forested areas have fostered a history of wildfires, underscoring their recognition of fire as a significant hazard for the community. Notable fires occurring in 2000 and 2003, while severe, were not as catastrophic as the 1910 fire, which devastated the St. Regis Valley, destroying structures in Haugen and De Borgia and resulting in multiple fatalities. The 1910 fire, driven by hurricane-force winds, highlighted the potential for extreme fire behavior in the region. Despite fire being a natural part of western Montana's forests, conditions such as drought, heavy fuel buildup, high winds, and lightning storms can escalate fires into devastating events. Mineral County has faced federal or state disaster declarations for forest fires multiple times, including in the years 1979, 1988, 1991, 1994, 1996, 1998, 2000, 2001, and 2003 (Mineral County 2012).

RECENT FIRE OCCURRENCE

Wildfire has been a recurring event in Mineral County, with the most notable being the Great Burn of 1910, which devastated 3 million acres across Idaho and Montana, over 200,000 of which were in Mineral County. This catastrophic fire prompted significant changes in wildfire management, leading to policies favoring aggressive fire suppression. Historical data from 1910 to 1980 reveals that approximately 330,000 acres burned in Mineral County, with most fires occurring between 1910 and 1920. From 1920 to 1980, fewer and smaller fires were reported, with only about 18,000 acres burning.

The absence of frequent wildfires over much of the twentieth century led to significant fuel buildup in Mineral County's forests, increasing the risk of large, stand-replacing fires. This risk has been exacerbated by disease, insect infestations, and an accumulation of dead and dying trees. Consequently, from 1980 to 2017, wildfires burned about 134,000 acres, with the majority of these fires being over 1,000 acres in size. Particularly since 2000, large fires have become more common, with major incidents such as the West Mullan, West Fork Fish Creek, and Sunrise fires burning nearly 50,000 acres since 2013.

Severe drought conditions in 2000 and 2003 further fueled large wildfires in Mineral County, prompting federal disaster declarations. In 2000, dry conditions led to 70 fires on approximately 12,484 acres of the Lolo National Forest, with 80% of ground lightning strikes igniting fires. In 2003, another drought year, significant fires like the Fish Creek Complex burned extensive areas and threatened numerous structures. The fire season in 2007 arrived early due to rapid snowmelt and extreme dryness, resulting in over 200 reported fires that burned more than 139,000 acres across Mineral, Lolo, and Sanders counties (Mineral County 2012).

Figures 2.8 through 2.15 depict recent fire history in Mineral County.
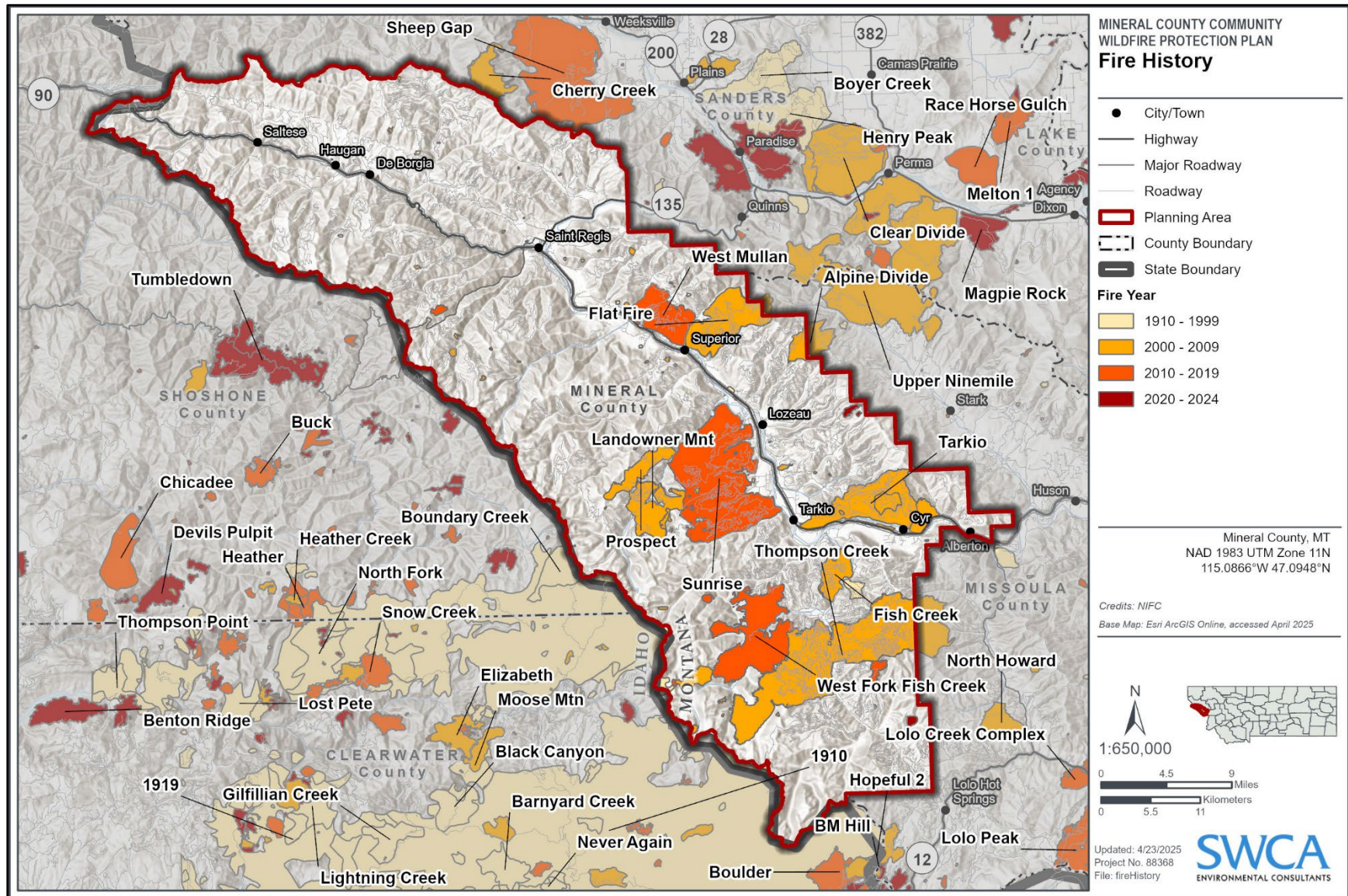
Figure 2.8. Wildfire history in Mineral County from 1910 to 2024.
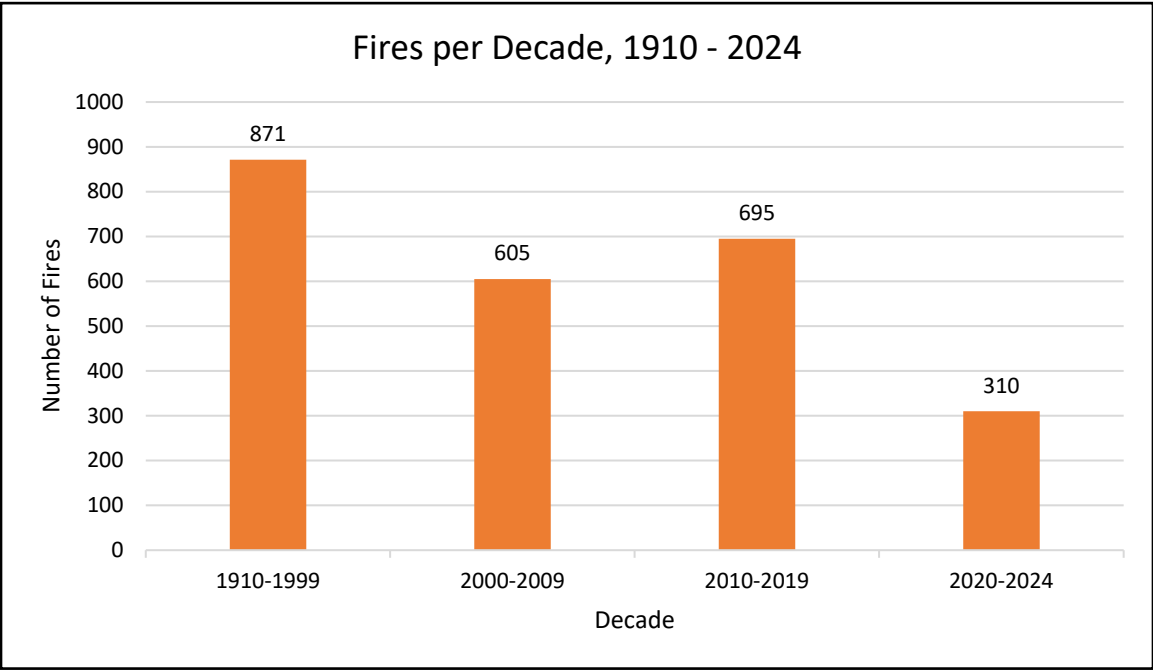
Figure 2.9. Decadal wildfire frequency for Mineral County based on available data from 1910 through 2024.
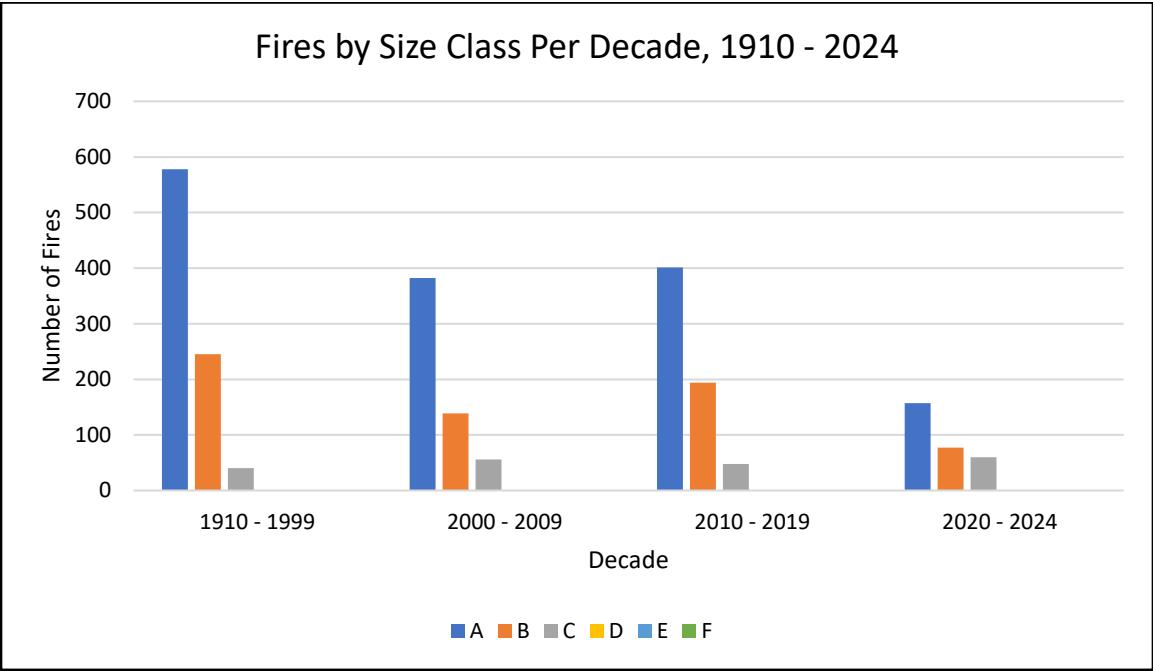
Figure 2.10. Fire size statistics for Mineral County based on fire history data from 1910 through 2024.

Note: Size classifications are as follows: A = 0–0.25 acre, B = 0.25–10 acres, C = 10–100 acres, D = 100–300 acres, E = 300–1,000 acres, F = >1,000 acres.

Acres Burned Per Decade
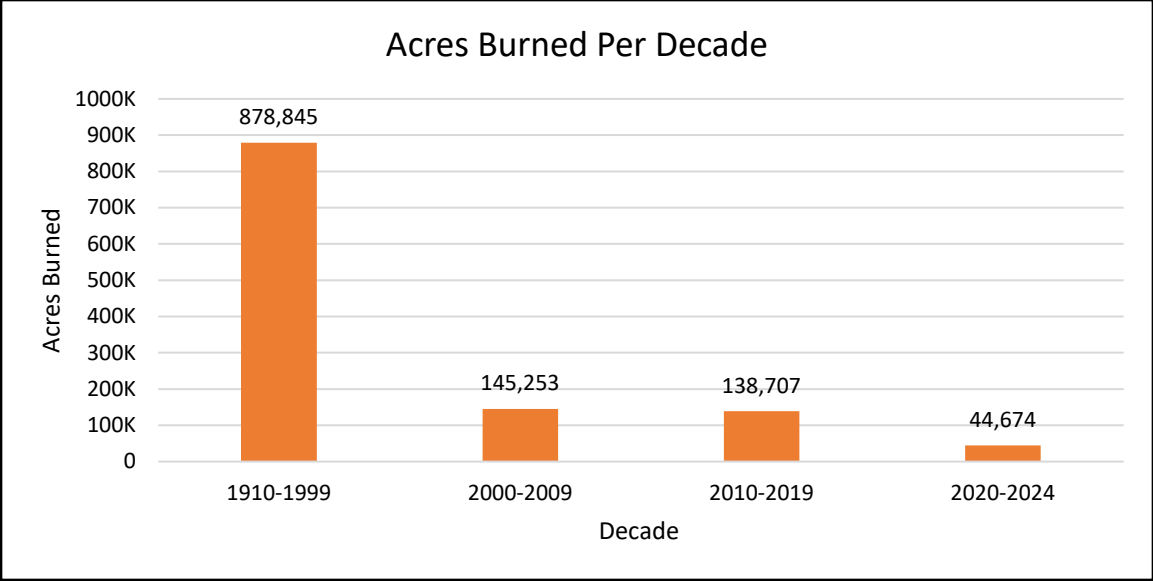
Figure 2.11. Acres burned per decade for Mineral County based on fire history data from 1910 through 2024.

Fires per Month, 1910 - 2024
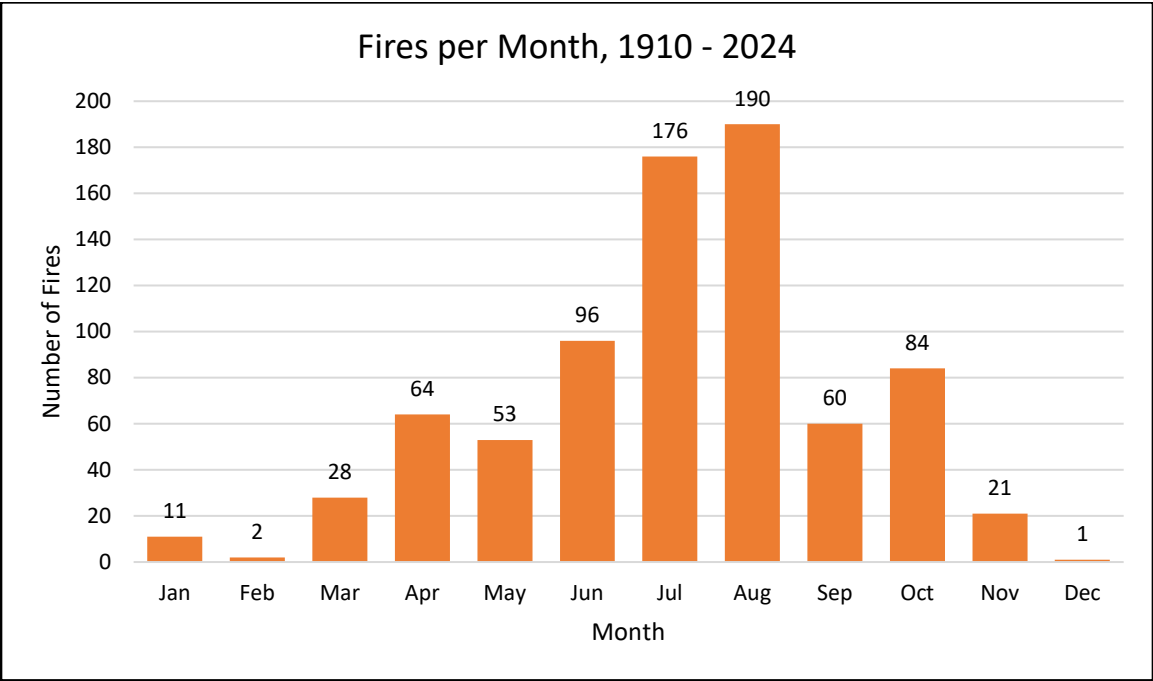
Figure 2.12. Number of recorded fires per month in Mineral County from 1910 through 2024.
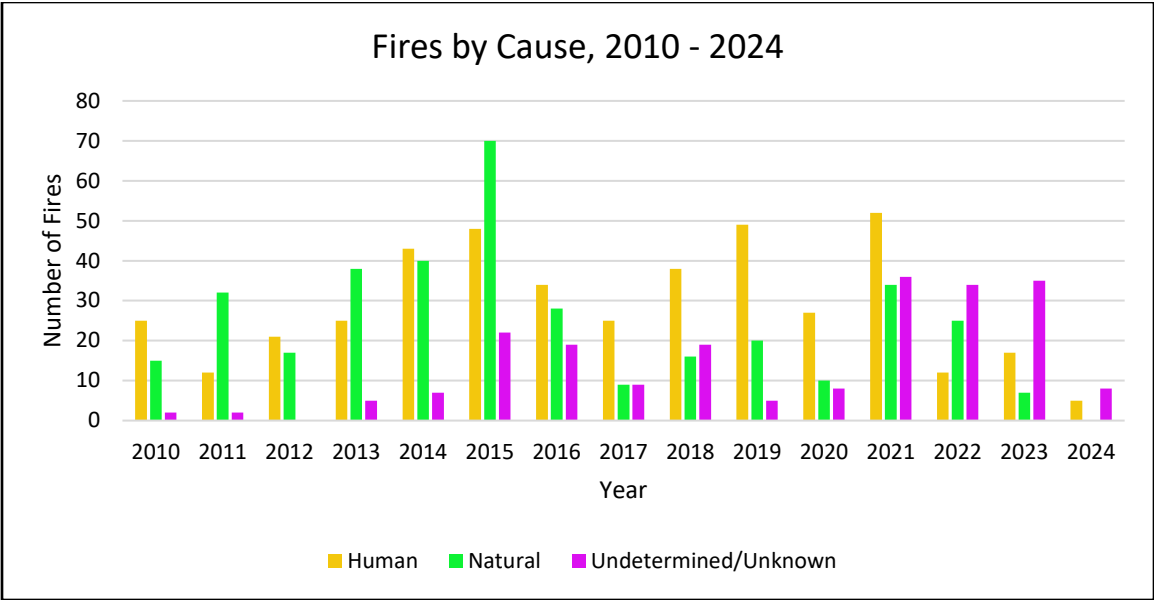
Figure 2.13. Cause of wildfire ignitions in Mineral County from 2010 through 2024.
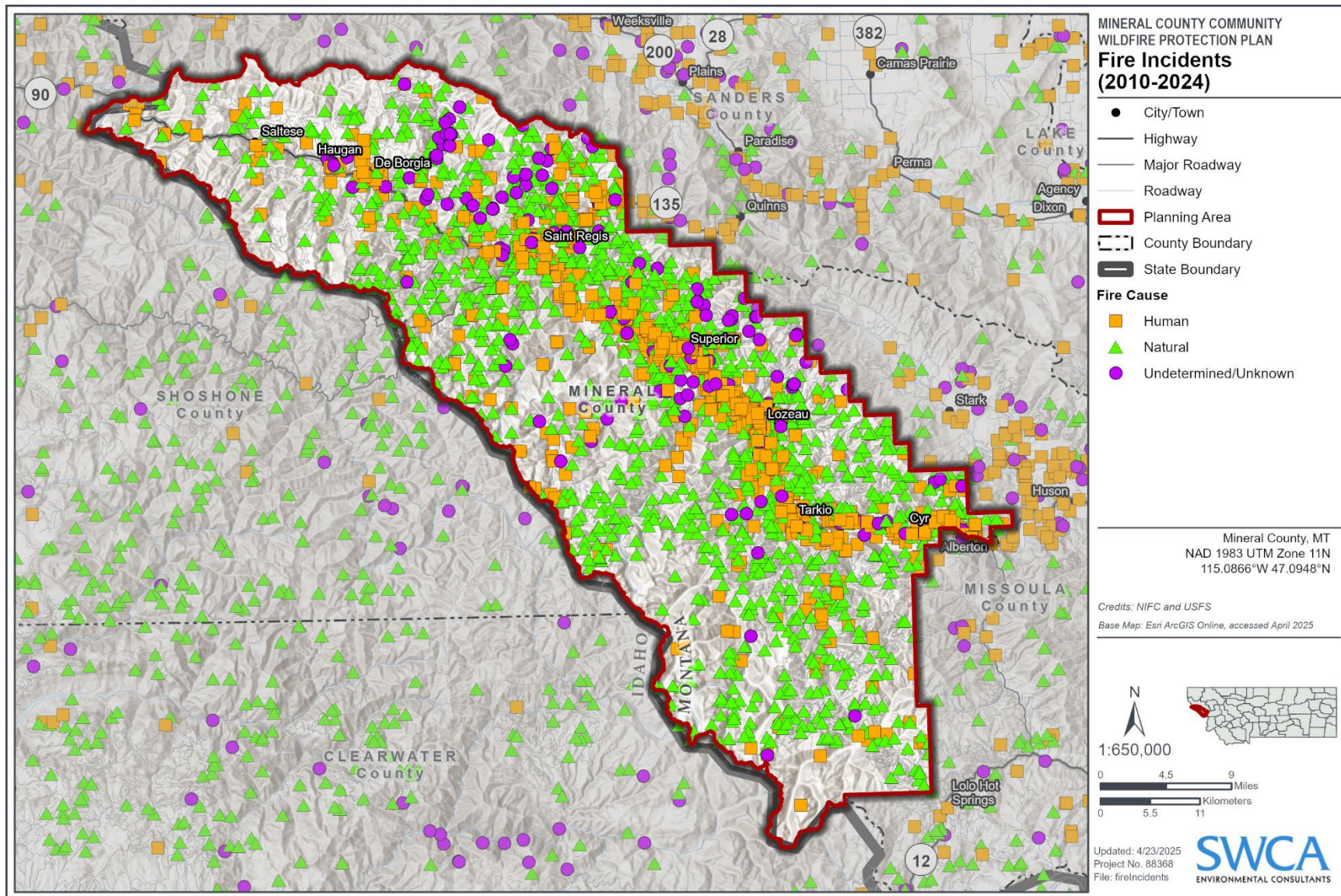
Figure 2.14. Location of wildfire occurrences in Mineral County from 2010 to 2024.
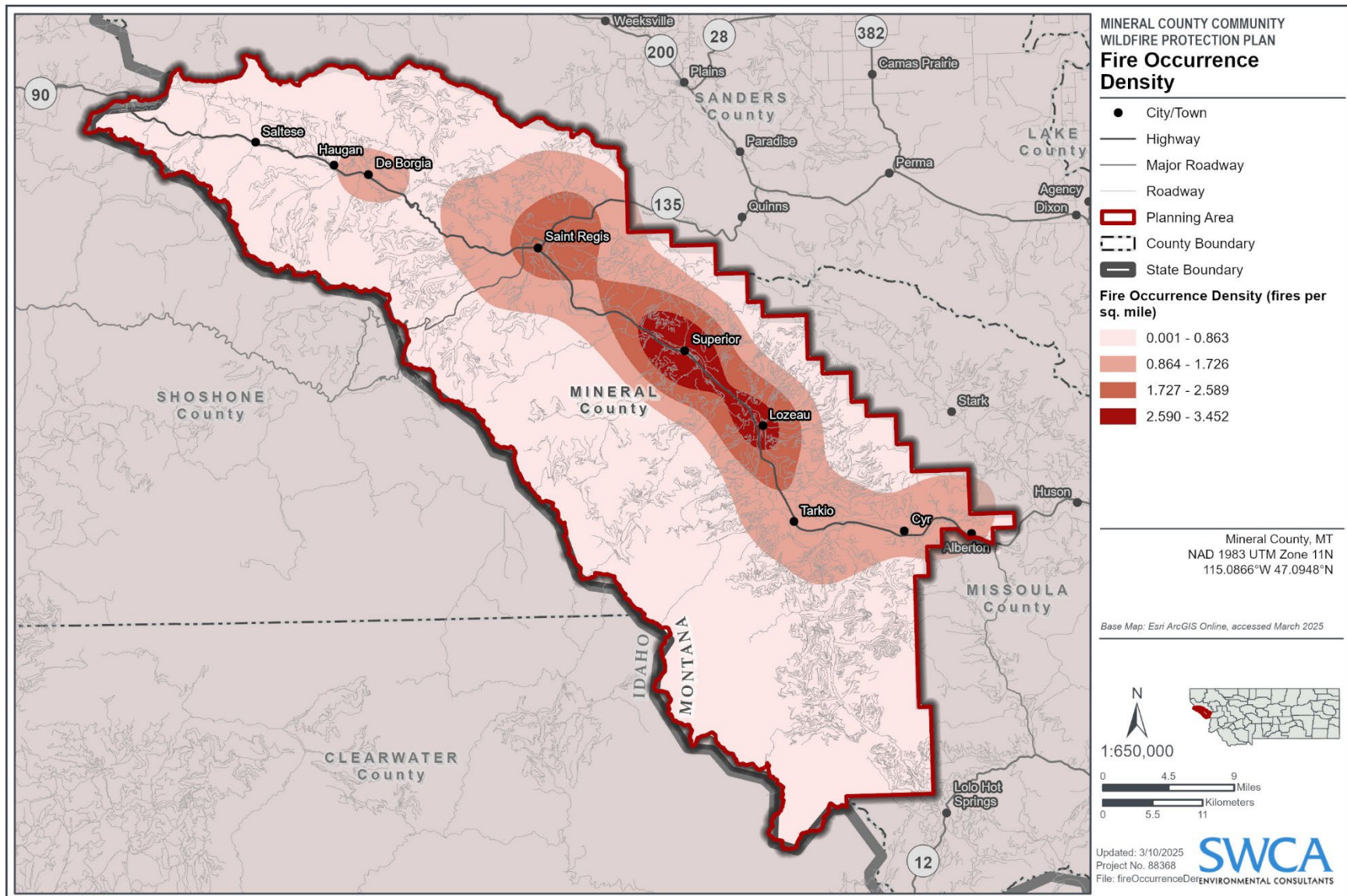
Figure 2.15. Fire occurrence densities in Mineral County.

FIRE RESPONSE CAPABILITIES

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 to ecological processes. Refer to Appendix B to learn more about planning and policy in Mineral County.

Mineral County has instituted the following goal, objectives, and policies per the 2004 Mineral County Resource Use Plan for ensuring the protection of Mineral County citizens and resources (Mineral County 2004).

Goal: Require both fire suppression and the use of fire to support and expand multiple uses and achieve management goals.

Objective 1A: Require fire suppression in areas where fire would endanger human safety and private property, or valuable resources

Objective 1B: Encourage the adoption of the following policies by regulatory entities.

Policy 1: There shall be no "let burn" policy in Mineral County.

Policy 2: Initial attack must be initiated within 15 minutes of receiving a fire report.

Policy 3: When planning prescribed burns, determine the feasibility of marketing renewable resources before burning.

Figure 2.16 illustrates the distribution of fire protection responsibilities within Mineral County. It highlights the various entities and agencies tasked with fire management and response, providing a comprehensive overview of how fire protection efforts are organized across the county.
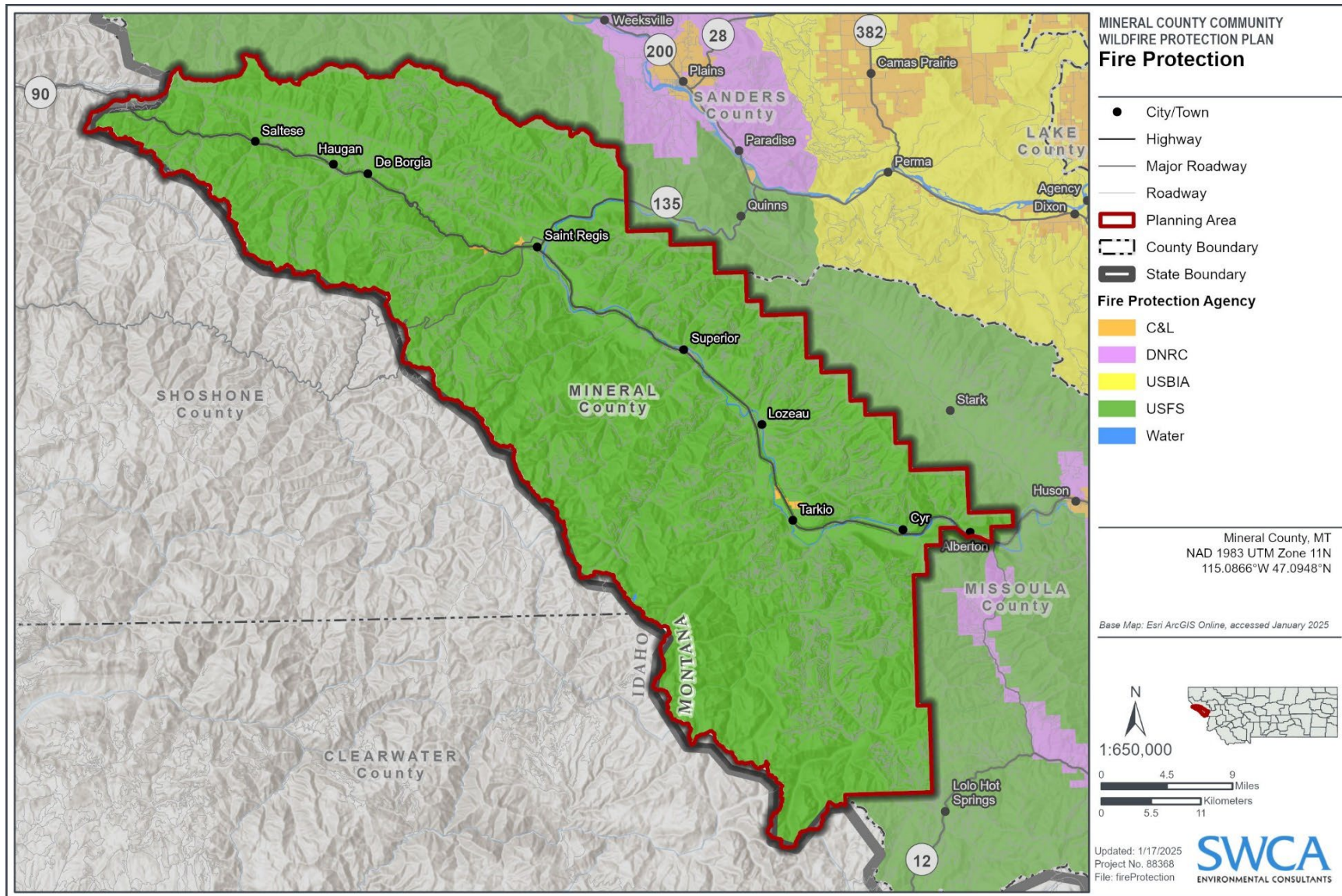
Figure 2.16. Distribution of fire protection responsibility by agency/entity in Mineral County.

REGIONAL FIRE RESPONSE

The following information from this section has been derived from the previous Mineral County 2018 CWPP.

Community fire protection in Mineral County is managed by four rural fire districts and one city department, covering West End, St. Regis, Superior (both rural and city), and Frenchtown, which serves the Alberton area.

Fire districts in Mineral County, face challenges in recruiting and maintaining sufficient staff. Factors contributing to this issue include a limited volunteer pool, an aging population, and working residents unable to volunteer. This is particularly problematic for the West End Rural Fire District. Mineral County needs to collaborate with rural fire districts to develop targeted volunteer recruitment campaigns for both firefighting and outreach roles.

On public and private forest lands, fire suppression responsibilities fall to the Lolo National Forest's Superior and Ninemile Ranger Districts. A Cooperative Fire Management Annual Operating Plan between the USFS, state agencies, and Mineral County fire districts ensures coordinated fire suppression responses in WUI areas (Mineral County 2018). Additionally, the Montana Master Cooperative Wildland Fire Management and Stafford Act Response Agreement outlines the use and reimbursement procedures for resources when responding under the Stafford Act. This agreement ensures collaboration and support between federal, state, and local agencies during emergency responses, emphasizing the shared responsibilities and coordinated efforts essential for effective wildfire management.

CHAPTER 3 – RISK-HAZARD ASSESSMENT
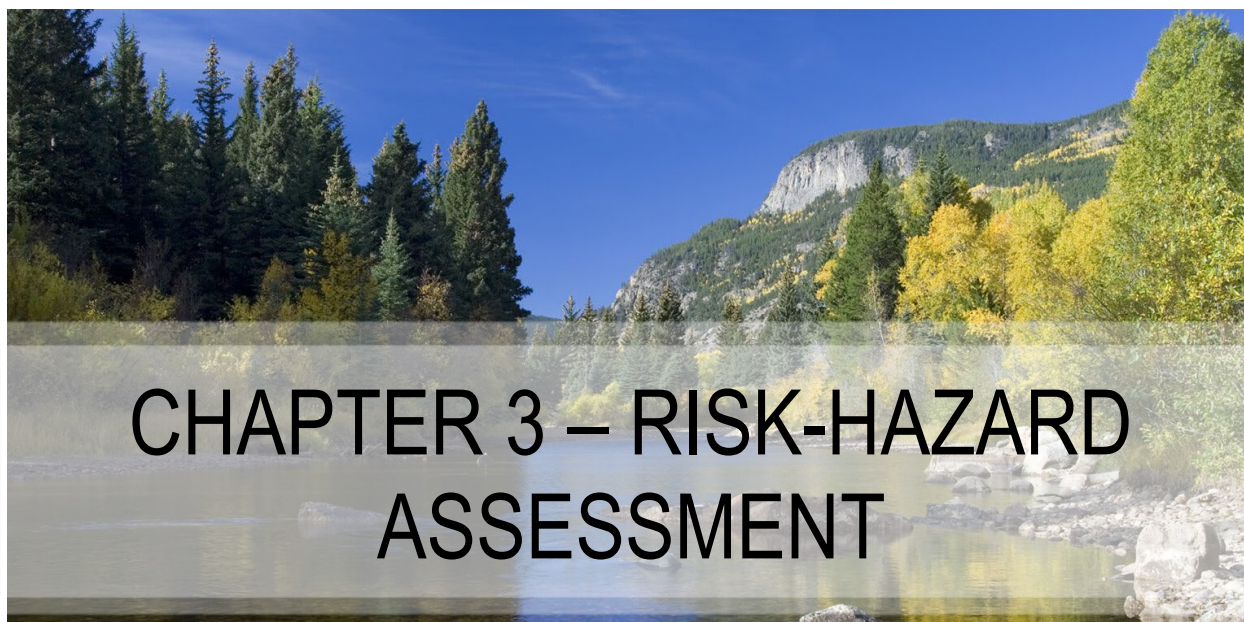
Disclaimer

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 fuels 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 4, Mitigation Strategies.

For this CWPP update, areas of high wildfire hazard and risk are identified using the Montana Wildfire Risk Assessment (MWRA) through the modeling and mapping of fire behavior, analysis of highly valued resources and assets (HVRAs), and incorporation of stakeholder and expert input.

Further details on the modeling process are provided in Appendix C.

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 are available for combustion, the level of risk for those residing in the WUI is heightened.

To assess potential fire behavior, sophisticated spatial wildland fire computer models are used to simulate how a fire would burn in an area under given weather conditions. The calculations, developed by fire experts, incorporated the measured fire activity and behavior of live fires under controlled conditions such as slope, humidity, and wind. Conditions in the real world are much more variable; however, the fire behavior models have been validated and proven as a useful tool in forecasting fire spread. Fire modeling is integral for managers developing strategic plans on active fires and in fuels planning to define areas of high wildfire risk and prioritize mitigation work.

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 are established in ladder fuels and torch or burn individual tree crowns.

If embers are plentiful and/or long range (>0.25 mile), rates of spread and resistance to control can be very high. 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 C for a more detailed description of modeling methodology.

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 that are adjacent to unburned fuels should always be considered (see Figure 3.3). See the Embers and Home Ignition Hazards subsection and Figure 3.4 for a diagram and explanations describing the factors that affect ember production and travel.

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).

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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.
Source: Boulder Fire-Rescue.

EMBERS AND HOME IGNITION HAZARDS

Typical wildland-urban fire patterns indicate that embers are the principal source of structure ignitions (Nazare et al. 2021; Cohen 2023). 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 ember production and travel distance as these directly influence spot fire behavior. Strategic landscape fuel reduction activities such as fuel breaks and thinning can help reduce the likelihood of ember production and spotting. Homeowners should note surrounding vegetation (trees, grasses, shrubs, and vegetation litter or debris) and implement home hardening practices, such as installing ember-resistant vent covers, and removing leaf litter from decks, gutters, roofs, and the base of combustible materials such as wood siding and fences to reduce structural ignitions from falling ember showers. See Figures 3.4 and 3.5 to learn more about ignition hazards. Programs to aid landowners in preventative efforts and cases of wildfire are provided in Chapter 6, Homeowner Actions.

Figure 3.4. An example home in the WUI with ember ignition hazards identified by numbered flames.

Source: University of Nevada (2022).

Figure 3.5. Ember awareness checklist to be used in conjunction with Figure 3.4.
Source: University of Nevada (2022).

MONTANA WILDFIRE RISK ASSESSMENT

The Montana Wildfire Risk Assessment (MWRA), developed by Pyrologix, was produced in collaboration with the Montana DNRC. The purpose of this assessment is to provide communities across Montana with a standardized evaluation of wildfire hazard, vulnerability, and risk by employing state-of-the-art modeling techniques and up-to-date data on existing conditions. This assessment enables land managers and officials to compare wildfire risks across jurisdictional boundaries and implement effective strategies to mitigate wildfire risks in various communities throughout the state.

The MWRA addresses several limitations of previous wildfire risk assessments. Notable improvements include:

- Recalibration of the Montana fuelscape to reflect recent wildfire and other disturbance events.
- Incorporation of custom fuel models to represent the potential for fire spread into agricultural and urban areas.
- Mitigation of data seamlines at the state boundary and across landscapes.
- Utilization of a standardized set of HVRAs across Montana.

The MWRA is a powerful tool designed to assess the wildfire risk to communities within the WUI in Montana. In wildfire risk modeling, risk is understood as a combination of hazard and vulnerability (Figure 3.6). For the purposes of this assessment, risk is defined by four main factors:

Burn probability: The likelihood that a given pixel (30 meters) will burn.

Fire intensity: The amount of energy released during combustion (measured in kilowatts per meter), which describes the heat produced by the active flames.

Exposure: The proximity of HVRAs to wildfire hazards (e.g., homes within the WUI or key watersheds).

Susceptibility: The ease with which an HVRA can be damaged by wildfire.

This robust framework allows decision-makers to prioritize mitigation efforts and ensure better preparedness for wildfire risks in Montana's diverse landscapes. See Figure 3.6 for a diagram of the Quantitative Wildfire Risk Framework used to inform the MWRA.
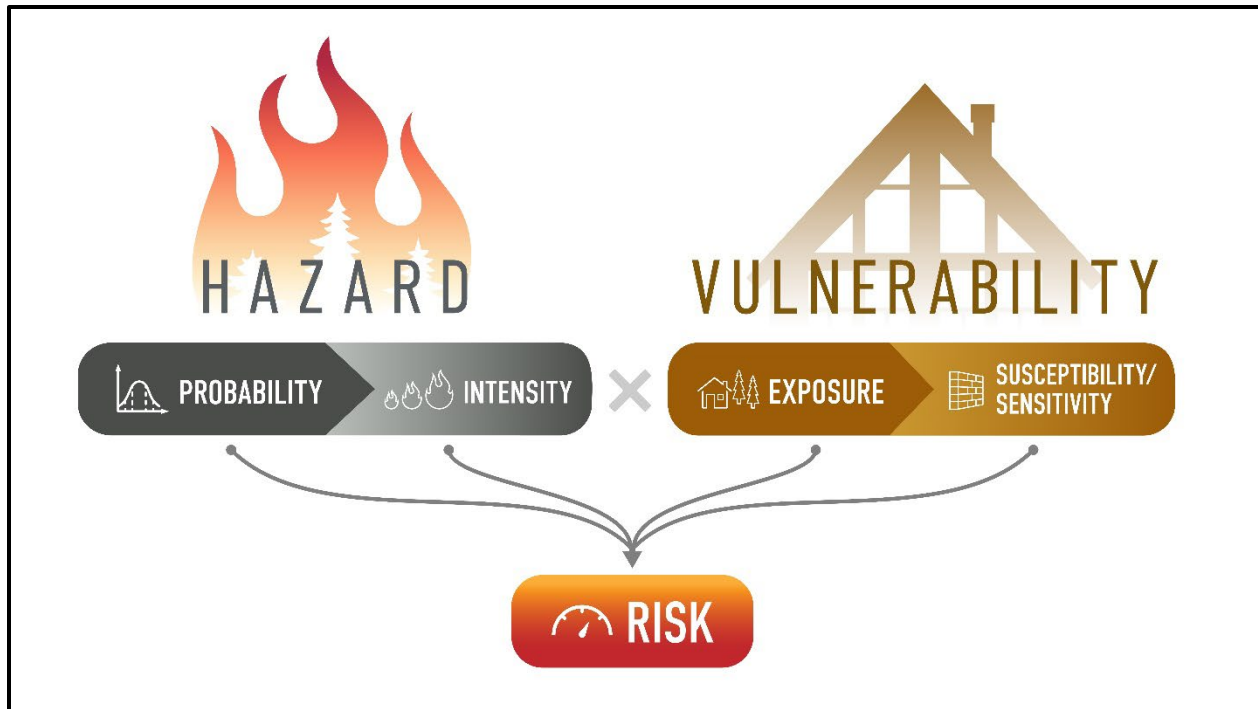
Figure 3.6. Pyrologix's Quantitative Wildfire Risk Framework for the Quantitative Wildfire Risk Assessment, derived from Scott et al. (2013).

A detailed methodology of the MWRA is provided in Appendix C, Fire Behavior Modeling/GIS Background and Methodology.

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. Hazard is derived by calculating the modeled chance of a fire occurring by the expected intensity of the fire if it did occur.

Vulnerability is a function of an asset's exposure, its position on the landscape in relation to wildland fuels, and its susceptibility to direct flames, radiant heat, or embers from a fire.

When the hazard values are multiplied by the weighted vulnerability values, then a quantified risk is produced; a numeric output representing the probability of damage or loss to an asset based on fire intensity and the assets fire resilience (or lack thereof).

WILDFIRE RISK IN MINERAL COUNTY

Quantitative wildfire risk assessments are developed around three primary components: 1) the likelihood of a wildfire occurring, 2) the expected intensity of a wildfire, and 3) the exposure of valuable resources and assets to wildfire hazards. Highly valued resources and assets (HVRAs) are key elements that help identify the key values on the landscape that if impacted by wildfire, would negatively impact the lives, property, and livelihood of the community. The HVRAs for the MWRA were established through a workshop involving statewide experts, where fire effects were discussed in relation to these critical resources and assets.

The MWRA uses nationally available spatial datasets to assess the exposure and vulnerability of HVRAs to wildfire, including people and property, infrastructure, watersheds, and vegetation. Below is a summary of the HVRAs used in the MWRA:

- **Property**: This dataset represents residential, commercial, and critical infrastructure locations, using Montana's "Structures & Addresses Framework," with supplemental data from the Montana DNRC.

- **Infrastructure:**: This includes high- and low-voltage transmission lines and communication sites (e.g., cellular towers and radio transmitters), sourced from the Homeland Infrastructure Foundation-Level Data (HIFLD) program.

- **Watersheds**: Drinking water protection areas were identified using USFS Region 1 data, mapping surface water intakes and watersheds with erosion potential modeled in fire severity scenarios.

To prioritize HVRAs, a relative importance (RI) value was assigned to each asset and resource. This allows HVRAs to be weighed differently in the overall risk calculation based on their importance. For example, the People and Property HVRA received the highest importance, reflecting the potential human and economic losses from wildfires. Infrastructure values, such as a wooden power pole, are important for supplying power to the community. However, their loss typically results in a short-term electrical disturbance with, arguably, a smaller economic and societal impact compared to the loss of a family home. This RI weighting ensures that the community value and societal impact of each HVRA is accurately factored into the overall wildfire risk assessment. Figure 3.7 outlines the RI ratings assigned to each Highly Valued Resource and Asset (HVRA) category used in the risk assessment. "People and Property" was assigned the highest value, followed by "Infrastructure" and "Surface Drinking Water Resources."

OVERALL RELATIVE IMPORTANCE
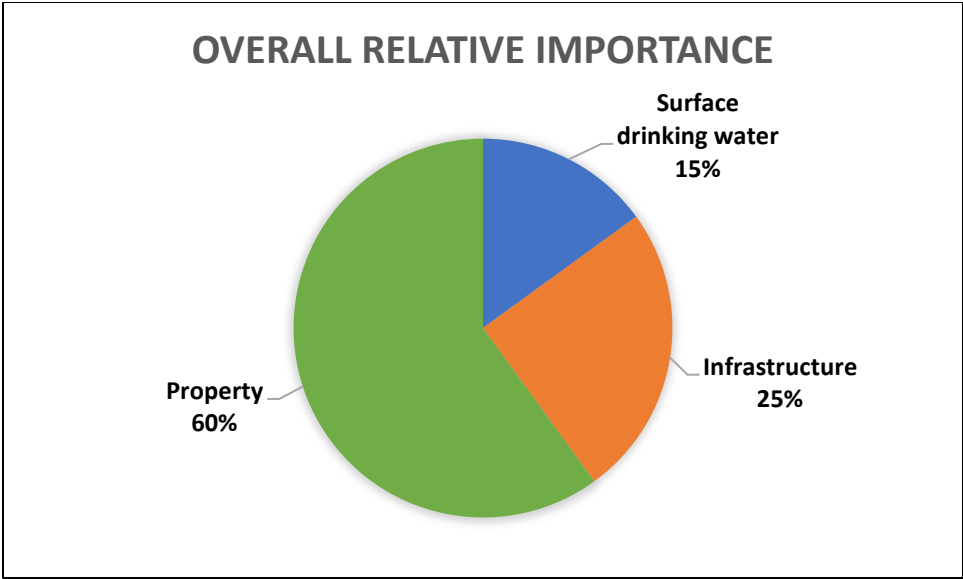
Figure 3.7. Overall RI weighting (ranking) of collaboratively determined HVRAs for the state of Montana.

Source: Pyrologix (2020).

In Figure 3.8, which depicts wildfire risk to assets, the areas where the HVRAs in Mineral County overlap areas of high wildfire hazard (see Figure 3.6) are shown as high risk. This output identifies areas on the landscape that could be prioritized for wildfire risk mitigation activities. See Chapter 4 for project recommendations aimed at reducing wildfire risk by building resilient landscapes.

As depicted in Figure 3.8, fuels, community, development, and fire behavior directly influence wildfire risk to assets. Examples of assets include residential structures, commercial structures, and energy and water infrastructure. Woodlands and grasslands situated along the county's ridges, areas characterized by steep topography, and extensive continuous grasslands along the county's valley floors pose a significant risk to assets located within the planning area.
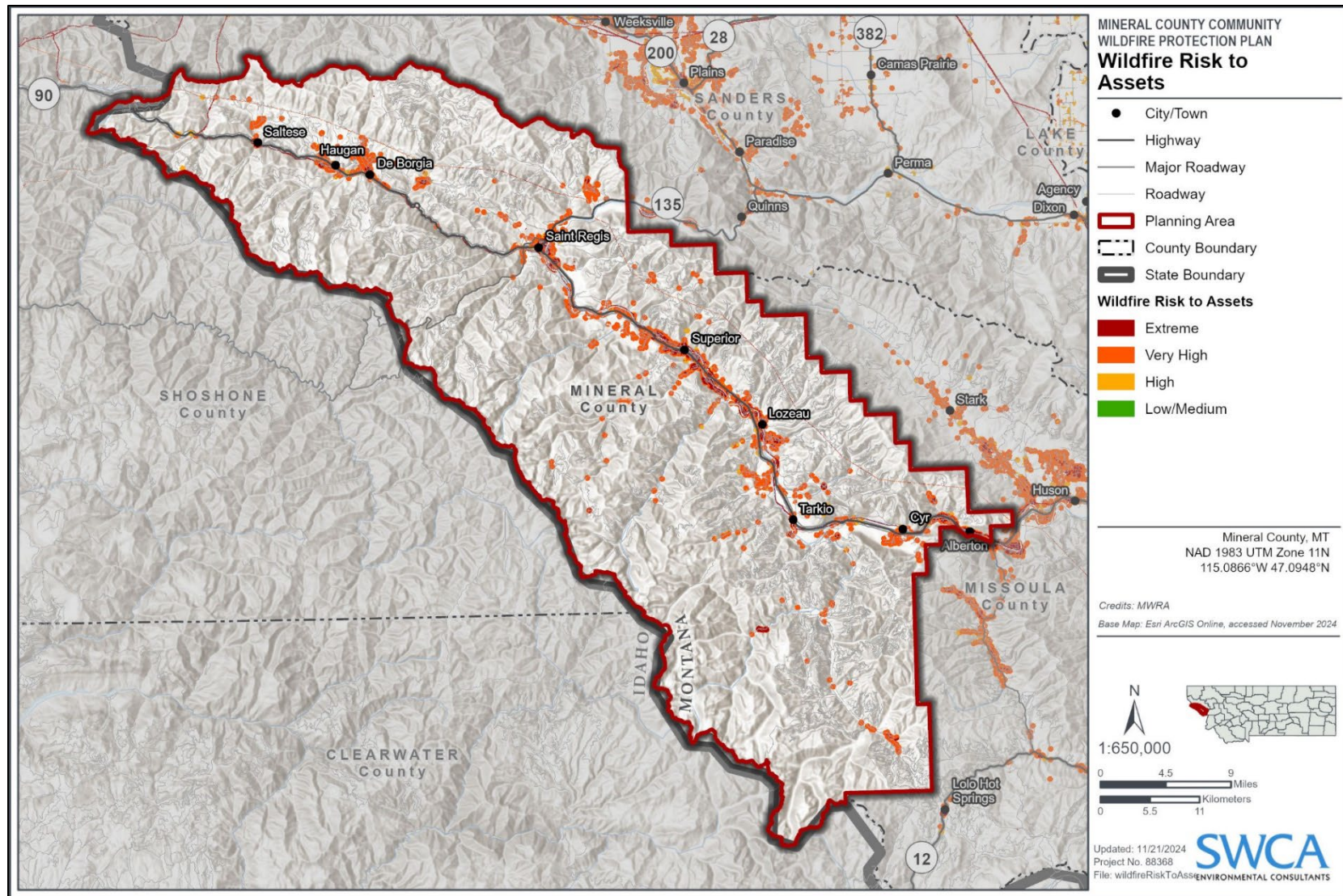
Figure 3.8. Wildfire risk to assets in the Mineral County CWPP planning area.

Note: This map shows areas where structures and critical infrastructure overlap areas that are modeled to have high to extreme wildfire behavior. See Figures 4.2–4.4 for detailed information regarding wildfire risk to assets within areas of concern.

Source: Pyrologix (2020).

While timber fuels produce higher flame lengths, grass-fueled fires can spread rapidly and with intense flames under windy conditions. During extreme weather, often referred to as red flag conditions, fire behavior can escalate unpredictably, posing significant threats to valued resources. It is important to note that this assessment does not fully account for the most extreme fire conditions, meaning areas that may seem to be at lower risk could still face severe wildfire impacts. Therefore, it is critical to implement mitigation measures, such as creating defensible space around properties, establishing effective alert systems, and having clear evacuation protocols, even in regions that do not appear to be at the highest risk.

Recently burned areas, rangelands, and agricultural lands generally have a low to moderate level of wildfire risk. Areas with the lowest wildfire risk are typically situated far from the WUI. These regions may encompass areas that are considered non-burnable, such as bodies of water or high-elevation rocky peaks.

The wildfire risk to assets map is useful when trying to understand wildfire risk to existing HVRAs, such as existing homes across the landscape. However, it is also important to look at wildfire risk comprehensively across the landscape in open space areas as well as developed zones. The Expected Risk to Potential Structures dataset allows this analysis (Figure 3.9).

Flame length is a critical factor in assessing fire behavior and potential impacts on both natural and built environments. It refers to the distance from the base of the flame to its tip, providing insight into the intensity of a fire. Figure 3.10 below illustrates the flame length characteristics in Mineral County. Figure 3.9 allows land managers to compare areas on the landscape that are currently developed to those that are not. The expected risk to potential structures map is created by multiplying flame lengths and probability to determine, for every pixel on the landscape, if structure loss is expected if a structure were to be there. No HVRA data are incorporated into this map except, though denser developed areas can be seen on the maps as "unburnable" due to their lack of wildland fuels. The wildland fire models do not model structure-to-structure spread. Keep in mind that, even in densely urban areas, wildfire risk can be low but is never zero.

High to extreme risk to potential structures dominate the planning area due to continuous wildland fuels and wildfire behavior models basing results on very high fire danger conditions. Under more extreme model parameters such as lower fuel moisture content and high winds, high to extreme risk can be found across wider portions of the planning.

Mineral County is characterized by a diverse landscape with a range of wildfire risk factors present. At higher elevations, timber fuels dominate, while the valley base, where most of the population and infrastructure are located, transitions into shrubland and grassy fuels. These lower-elevation areas with grassy fuels are prone to rapid fire spread, especially during periods of dry conditions and drought. Additionally, the concentration of people and key infrastructure in the valley further elevates the fire risk.

Wind-driven and extreme weather events are a significant concern in Mineral County and can exacerbate wildfire behavior, leading to catastrophic fire scenarios. The valley region, with its shrub and grass fuels, is particularly vulnerable to these extreme conditions, especially during the dry summer months when high temperatures increase the likelihood of ignition and extreme fire behavior.

In the higher elevations, the complex topography and forested areas pose additional challenges for wildfire response. The timber fuels in these areas, particularly in upper and lower montane zones, can lead to elevated crown fire behavior, including intense ember production. Historical wildfire suppression and land management practices have contributed to increased fuel loading and continuity, further increasing fire risk in these regions.
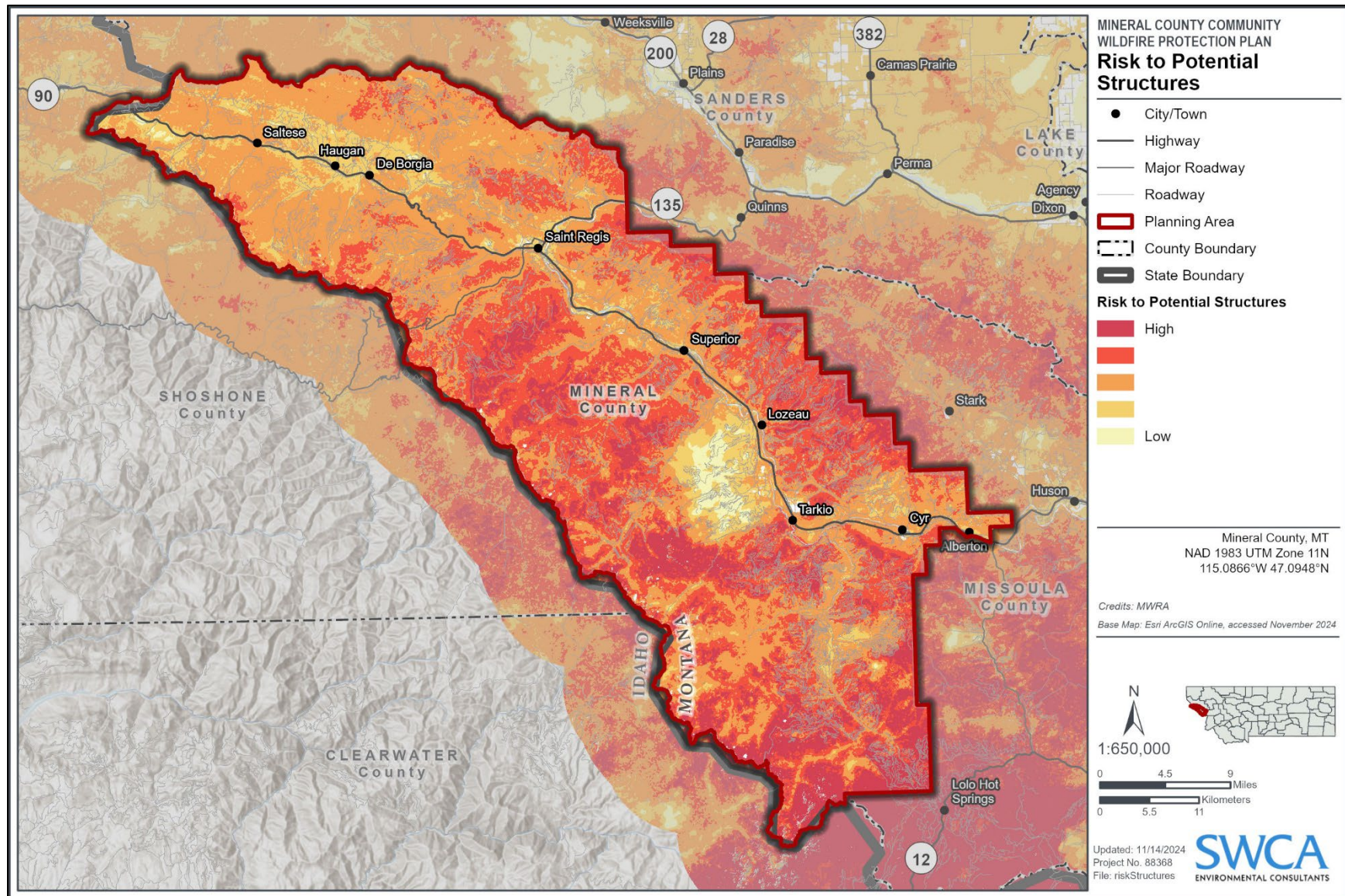
Figure 3.9. Expected risk to potential structures for the planning area.
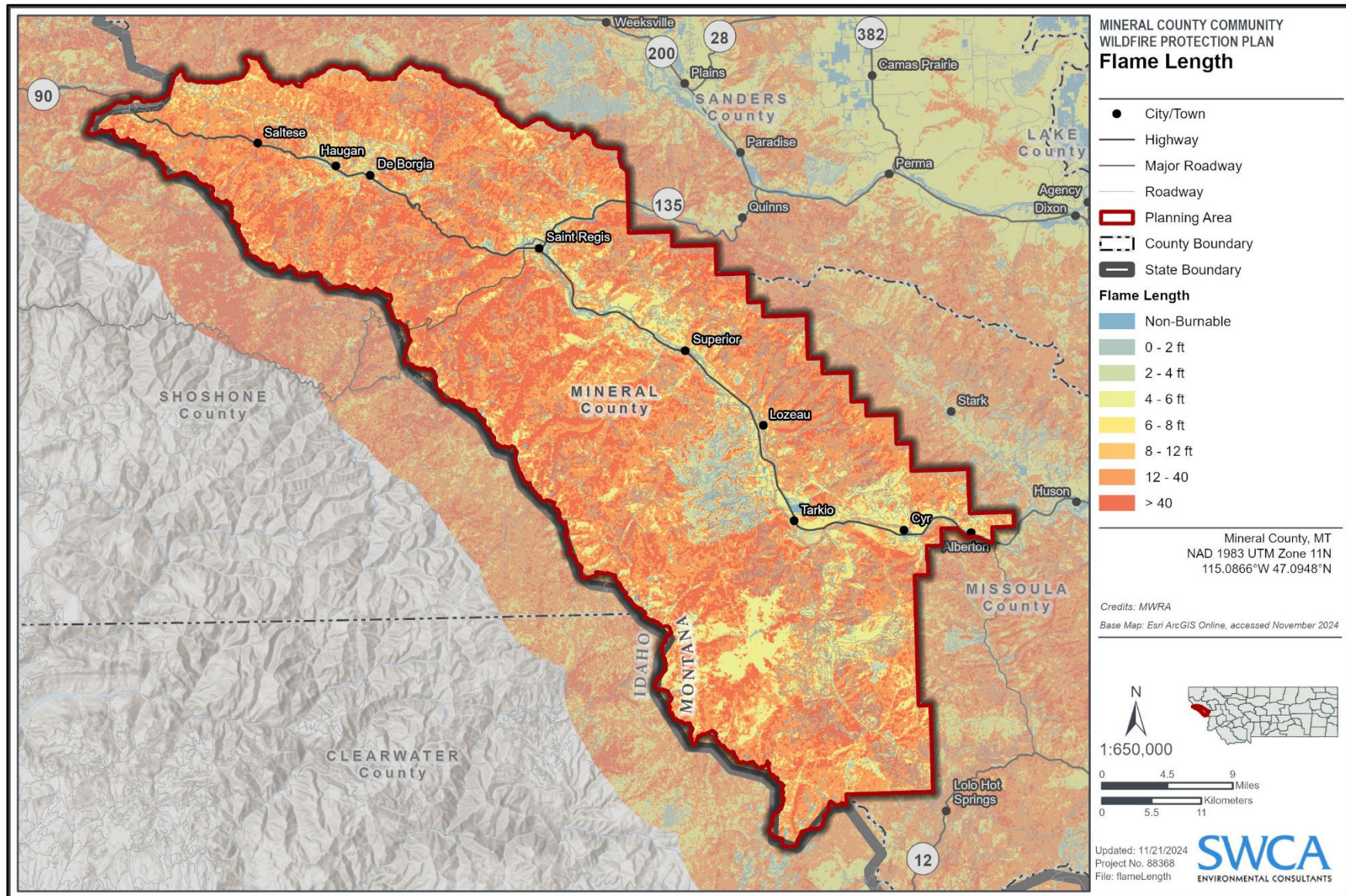
Figure 3.10. Modeled flame length of wildfire for the planning area.

The suppression difficulty index (SDI) measures how challenging it would be to manage or suppress a wildfire, especially under severe fire weather conditions. It evaluates suppression difficulty based on factors such as flame length, terrain/topography, fireline production rates, and proximity to access routes. The SDI is crucial for identifying areas where fires may be particularly difficult to contain or suppress, aiding in the development of effective fire management strategies and resource allocation. See Figure 3.11 for an illustration of the modeled SDI throughout the planning area.
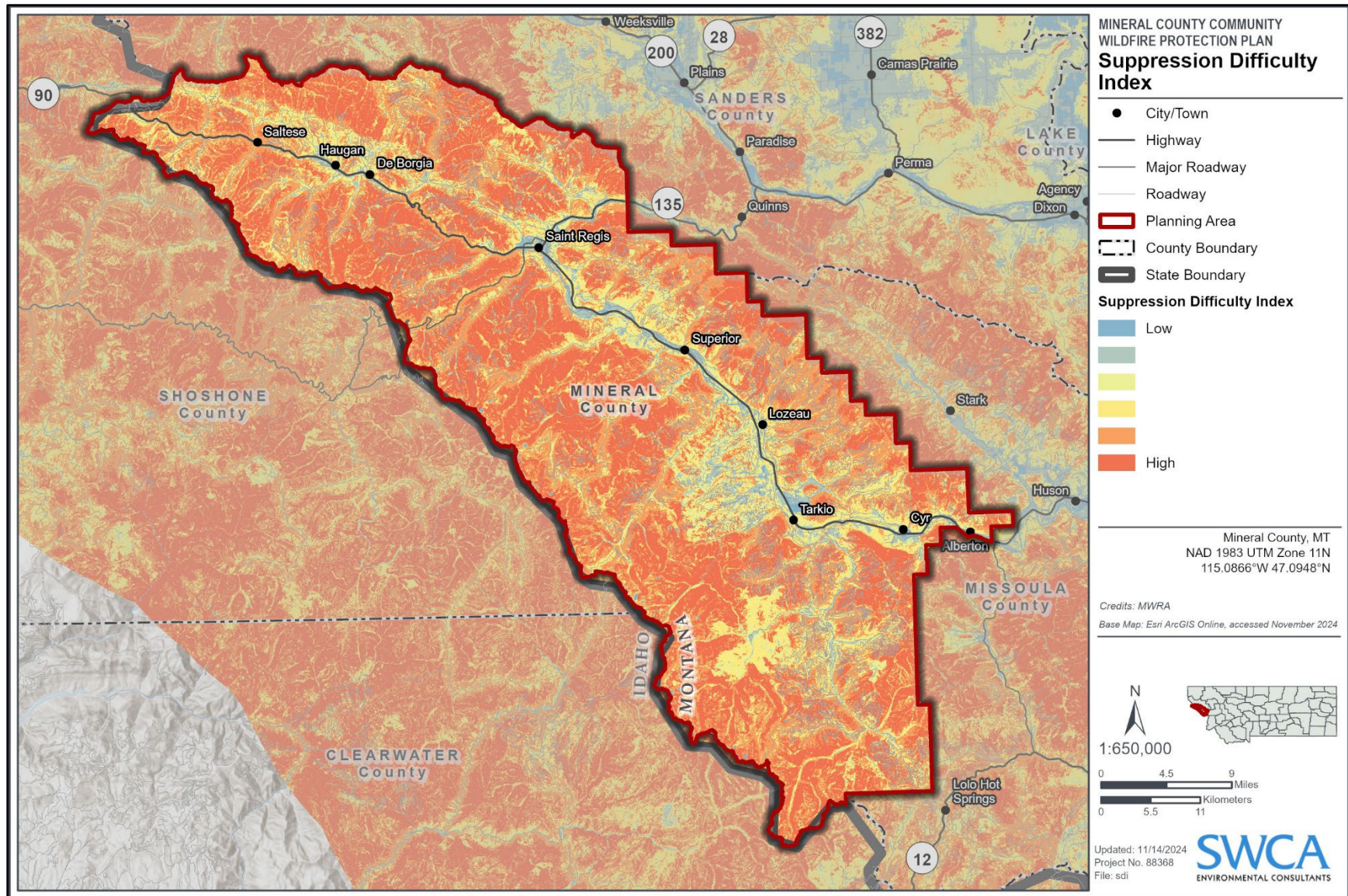
Figure 3.11. Modeled SDI on a 2-point scale from unburnable to extreme difficulty for the planning area.

CHAPTER 4 – MITIGATION STRATEGIES

This chapter provides wildfire mitigation project recommendations, implementation guidance, and potential funding sources for each recommended action. As a non-regulatory document, recommendations in the CWPP are not required to be implemented. Recommendations are put forward to provide suggestions on actions that will mitigate wildland fire risk. It is at the discretion of Mineral County representatives, land managers, homeowners, and stakeholder groups to determine when or if a recommendation will be implemented. Alignment with local planning documents should be considered. Appropriate subject matter experts, lessons learned documentation, and the best available science should be included in decision making regarding project planning, implementation, and maintenance.

This plan has been aligned with the Cohesive Strategy and its Phase III Western Regional Action Plan by adhering to the nationwide vision:

> *"To safely and effectively extinguish fire, when needed; use fire where allowable; manage our natural resources; and collectively, learn to live with wildland fire."* (Forests and Rangelands 2023).

Thus, CWPP recommendations have been structured around the three main goals of the Cohesive Strategy: restoring and maintaining resilient landscapes, fire-adapted communities, and wildfire response. Many of the recommendations listed can be implemented at the homeowner or community level. Projects requiring large-scale support can be prioritized based on the Risk-Hazard Assessment.

Recommendation matrices (Tables 4.1, 4.4, and 4.5) are used throughout this chapter to serve as an action plan for implementation. Recommendations have been aligned with the strategies in the 2020 Montana Forest Action Plan (Montana DNRC 2020a) wherever possible.

Table 4.6 provides key information on various funding sources for mitigation projects, highlighting the applicable Cohesive Strategy goal(s) for each funding source. This allows lead agencies that are seeking funding to better understand which sources are best suited for their projects. Whether the focus is on creating resilient landscapes, fostering fire-adapted communities, or enhancing wildfire response, this resource will help identify the relevant funding opportunities to support initiatives. Additional information on these funding sources is provided in Appendix G.

RESILIENT LANDSCAPES

Landscapes are resilient to fire, insect, and disease disturbances, regardless of jurisdictional boundaries.

GOAL 1: RESILIENT LANDSCAPES

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

With regard to recommendations for hazardous fuels reduction in Mineral County, fuels should be modified with a strategic approach to reduce the threat that high-intensity wildfires pose to lives, property, and other critical assets. Mitigating extreme fire behavior, decreasing structural ignitability, creating defensible space, providing safe evacuation routes, and maintaining roadways for firefighting access are essential components of the fuels management strategy around communities located within the WUI zones. The application of diverse treatment methods often amplifies the effectiveness of fuels management.

Fuels treatments typically occur separately on private and public lands. However, cross-boundary coordinated efforts between landowners and land managers can achieve comprehensive wildfire risk reduction across a landscape encompassing multiple ownership boundaries. Collaboration on fuels reduction strategies, from the wildlands to the home ignition zone (HIZ), will significantly enhance region-wide resilience.

Wildfire is a natural part of the county's ecosystem, shaping the landscape for centuries. Recognizing wildfire as a constant characteristic of the landscape emphasizes the need for preparation. By taking proactive steps in contributing toward healthy and resilient forests, residents, local agencies, and other organizations operating in Mineral County can better protect their homes, assets, values, and communities from future losses due to catastrophic fires.

Table 4.1 lists recommendations for creating resilient landscapes in the county.

FUELS MANAGEMENT

Effective fuels management in the WUI is key to ensuring homes survive wildfire events. Research supports the idea that fuels management alters fire behavior, aiding in suppression efforts and reducing the potential for structure loss. Federal policies, such as the Healthy Forests Restoration Act (HFRA), underscore the importance of this strategy by requiring that at least 50% of federal fuel reduction funding be directed toward WUI projects.

Treating fuels in the WUI can lessen the risk of intense or extreme fire behavior (Martinson and Omi 2013; Safford et al. 2009). Studies and observations of fires burning in areas where fuel treatments have occurred have shown that the fire either remains on or drops to the surface, thus avoiding destructive crown fire, as long as activity fuels are treated or removed (Graham et al. 2004; Pollet and Omi 2002; Prichard et al. 2010; Safford et al. 2012; Waltz et al. 2014). Fuel mitigation efforts should be focused specifically on where these critical conditions could develop in or near communities at risk.

Fuels reduction should begin near structures, focusing on defensible space, and extend outward to community boundaries with fuel breaks and open space cleanup. Beyond the community, forest health and restoration treatments are prioritized to enhance the landscape's resilience to catastrophic wildfires. When applying fuel treatments, every effort should be made to align treatments with the Montana State Forest Action Plan (Montana DNRC 2020a) with consideration of all appropriate best management practices and sound science. In addition, treatments should be strategically located in areas to maximize the effectiveness of other existing and ongoing projects.

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Table 4.1. Recommendations to Create Resilient Landscapes (Fuel Treatments)

Project ID	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements
RL1	**High-Priority Fireshed Projects** Identify and prioritize WUI projects with high-priority fireshed designation.	Mineral County	Mineral County, Montana DNRC, USFS	• Leverage Mineral County CWPP risk assessments and areas of concern to identify high-priority firesheds within the WUI. ○ Use criteria such as fire behavior potential, community vulnerability, economic value, ecological value, priority areas for focused attention from the MT Forest Action Plan, and the Montana Wildfire Risk Assessment tool. ○ Develop a prioritization framework to rank fireshed projects based on risk assessment results. • Develop, plan, and implement projects focused on reducing wildfire risk in these areas. ○ Create integrated project plans that address the specific needs and characteristics of each high-priority fireshed. • Coordinate the implementation of fireshed projects across multiple agencies and landowners.	To reduce wildfire risk in high-priority firesheds within the WUI through targeted projects and collaboration.	Monitor the progress and effectiveness of WUI projects. Conduct follow-up assessments to ensure ongoing risk reduction. Use data to evaluate effectiveness and inform future project planning.
RL2	**Reduce Hazardous Fuels in the Wildland-Urban Interface** Conduct fuel treatment projects using manual and mechanical methods to reduce hazardous fuels in the WUI.	Mineral County WUI	Mineral County Fire Departments, Bitterroot RC&D, Mule Deer Foundation Montana DNRC, USFS	• Collaborate with local partners, local landowners, private stakeholders, and community members to identify and prioritize fuel reduction projects. • Conduct forest thinning projects within the WUI of Mineral County. • Engage with local agency partners to implement projects in priority areas of concern (see Figures 4.1–4.4). • Reduce hazardous fuels in the HIZ.	Reduce the intensity of wildfires and increase community and environmental resilience to wildfires.	Establish a post-treatment monitoring plan to evaluate the long-term impact of fuel reduction projects.
RL3	**Fuel Breaks and Access** Establish and maintain fuel breaks and ensure clear access for emergency and fire suppression vehicles.	Haugan / De Borgia (386 Rd, 1101 Rd), Tamarack Creek / Sevenmile Subdivision, Verde Creek Area	Mineral County, local fire departments, private landowners, local utilities, state projects	• Use the Mineral County WUI boundaries and critical roads, prioritizing areas based on wildfire risk (CWPP risk assessment) and access needs. • Plan fuel breaks to create strategic barriers and control lines that prevent the spread of wildfire. ○ Incorporate natural features and existing infrastructure where possible. ○ Work with local fuel behavior specialists to ensure breaks are wide enough to be effective and safe. • Use mechanical and manual methods to clear vegetation and manage vegetation regrowth. • Work with local fire departments and emergency services to plan access routes. • Create a continuously updated GIS database to include new and maintained fuel breaks.	Establish fuel breaks and ensure clear access for emergency vehicles enhances the safety of the community.	Regularly monitor treated areas to address regrowth, fuel accumulation, and other changes that may obstruct emergency response and fire suppression activities. Schedule regular maintenance to keep fuel breaks clear and functional.
RL4	**Resource Concern Mitigation Projects** Identify and implement projects focused on mitigating resource concerns such as insects and disease, watershed health, and noxious weeds.	Mineral County (Haugan / De Borgia, Lost Marbles Project Area, Tamarack Creek / Sevenmile Subdivision, Verde Creek Area)	Mineral County, timber companies, fire departments, Montana DNRC	• Conduct assessments to identify resource concerns, such as insects and disease, watershed health, and noxious weeds. ○ Prioritize projects based on the severity and impact of resource concerns. • Collaborate with experts and stakeholders, such as timber companies, to assist in treatment area identification and address specific resource concerns. • Implement targeted treatments to mitigate specific resource concerns. • Considerations for mechanical treatments: ○ Use mechanical mastication to break down and reduce vegetation, targeting a basal area of 40 to 50 square feet per acre. • Considerations for prescribed fire: ○ Consider pile burning for logs that cannot be used for timber sale.	Improve ecosystem health and resilience by addressing critical resource concerns.	Regularly monitor treated areas to address regrowth, fuel accumulation, and insect outbreaks. Monitor the progress and effectiveness of mitigation projects. Adjust strategies based on monitoring results and stakeholder feedback.

Project ID	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements
RL5	**Plan Cross-Boundary Landscape Fuel Reduction Projects** Plan landscape-scale fuels mitigation projects focusing particularly on high-risk areas with varied ownership, including federal, state, and private lands.	Mineral County (areas identified as high priority fireshed)	Mineral County Bitterroot RC&D, Mule Deer Foundation Montana DNRC, USFS, NRCS	• Collaborate with local partners, local landowners, private stakeholders, and community members to identify and prioritize fuel reduction projects. • Employ existing potential operational delineations as a risk management tool where applicable. • Tailor treatment strategies to the specific characteristics of each area, ensuring an adaptive and effective response to diverse fuel conditions. • Leverage existing local fuel treatment programs. • Align with past planning of proven strategies, optimizing resource allocation, and building on the successes of prior efforts. • Identify opportunities to align treatment projects with maintaining or increasing forest health, creating suitable habitat for wildfire, and resiliency to insects and disease. • Recognize best management practices for managing fuels on different land ownership. • Utilize thinning techniques such as understory thinning, overstory thinning, precommercial thinning, slashing, mastication, pile and burning, broadcast burning, and biomass removal to reduce the density and continuity of wildland fuels.	Collectively work toward increasing community wildfire resilience and minimizing the potential impacts of wildfires on both lives and property.	Establish a post-treatment monitoring plan to evaluate the long-term impact of fuel reduction projects.
RL6	**NEPA-Cleared Project Identification** Identify projects that have been cleared through the National Environmental Policy Act (NEPA) process for implementation.	Mineral County	Mineral County, Montana DNRC, USFS	• Review NEPA documentation and create a comprehensive database of projects that have been cleared through the NEPA process. • Prioritize and implement NEPA-cleared projects based on risk assessment results and resource availability. • Collaborate with necessary stakeholders so that all relevant stakeholders are aware of the database and its contents. • Ensure compliance with NEPA requirements during project implementation.	Expedite the implementation of wildfire mitigation projects by focusing on NEPA-cleared projects.	Ensure ongoing compliance with NEPA requirements. Establish monitoring protocols to track the progress and outcomes of NEPA-cleared projects.

RL7	**Fuel Treatment Coordination** Foster collaboration among federal, state, and local governments, and nonprofit entities, to streamline fuel reduction initiatives.	Mineral County	Mineral County, Bitterroot RC&D, Mule Deer Foundation, Montana DNRC, USFS, NRCS	• Form a workgroup/task force comprising representatives from collaborating parties, encouraging clear discussion on optimizing strategic fuel treatment implementation.
				  o Define roles and facilitate regular meetings to discuss future and ongoing projects.
				  o Document individual agency objectives, strategies, and priorities for fuel treatment.
				  o Create a collaborative map where each party can share spatial information on ongoing and planned fuels reduction projects.
				• Work to increase capacity to partner and carrying out project in conjunction with local, state, and federal agencies.
				• Use potential operational delineations boundaries to guide planning and resource allocation.
					Create a synergistic approach to fuel treatment priorities by enhancing coordination between agencies.	Periodically assess the frequency and quality of communication.

RL8	**Insect and Disease Mitigation** Reduce stand density to mitigate insect and disease risks in vulnerable areas.	Lost Marbles Project Area, Verde Creek Area	Mineral County, private landowners, local utilities, state projects	• Conduct surveys to identify areas at risk for insect infestations and diseases, prioritizing areas based on severity and potential impact. • Partner with entomologists and forest health experts. • Implement thinning techniques to reduce density. • Ensure thinning is done in a manner that promotes forest health and adheres with environmental compliance. • Work with private landowners to gain access and support for treatments. • Use data to refine and improve future mitigation strategies.	Reduce stand density to help in mitigating the risks associated with insects and diseases.	Conduct regular inspections to detect early signs of infestations or disease.

Project ID	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements
RL9	**Riparian and Ecosystem-Specific Treatments** Treat ground and ladder fuels in riparian zones to reduce fire spread risks while preserving ecological balance.	Creeks and tributaries to the Clark Fork River, including Flat Creek and Quartz Creek	Mineral County, private landowners, state projects	• Conduct surveys to identify areas with high fuel loads, prioritizing areas based on fire risk and proximity to structures and assets. ○ Focus on riparian areas that create connective fuels from the wildland into developed areas of the county. ○ Use mechanical and manual methods to reduce fuel loads. ○ Ensure treatments are ecologically sensitive and preserve habitat. • Collaborate with ecologists and forest health experts. • Ensure treatments comply with environmental permits.	Reduce connective fuels in riparian zones to reduce the likelihood of fire spread to structures.	Conduct regular assessments and ensure that treatments remain effective over time.
RL10	**Prescribed Fire Implementation and Landscape Preparation** Implement prescribed burns with proper landscape preparation and qualified crews to manage wildfire risk and improve ecosystem health.	Mineral County	Mineral County, fire departments, residents	• Identify areas suitable for prescribed burns based on risk assessments and ecological needs. • Develop comprehensive burn plans outlining objectives, methods, required permitting, and safety measures for prescribed burns. ○ Ensure plans are tailored to the specific landscape and ecological goals. ○ Prepare the landscape for prescribed burns by reducing fuel loads, creating fire breaks, and ensuring access routes. ○ Use qualified staff/crews for prescribed burn planning and implementation. ○ Establish cooperative agreements to allow for shared resources and personnel across ownerships. • Conduct prescribed burns under controlled conditions with trained personnel. • Disseminate public notification prior to conducting prescribed burns. • Encourage private landowners to engage with qualified specialists for any private land burning.	Reduce wildfire risk and improve ecosystem health through the strategic use of prescribed burns. Reduce the intensity of wildfires and increase community and environmental resilience to wildfires.	Monitor the effects of thinning or prescribed burns on vegetation and wildfire risk. Conduct follow-up assessments to ensure the effectiveness of prescribed burns.
RL 11	**Strategic Cross-Boundary Restoration through the Good Neighbor Authority** Initiate and expand Good Neighbor Authority (GNA) projects in Mineral County that address hazardous fuels, forest health, and watershed concerns through cross-boundary collaboration.	Mineral County	Montana DNRC, USFS	• Identify opportunities to launch GNA projects in coordination with the USFS and DNRC within high-priority firesheds and cross-boundary areas. • Use CWPP risk assessment outputs and areas of concern to target forested lands with shared management priorities across ownerships. • Apply the GNA to implement fuel reduction, forest health, and watershed restoration projects on federal lands using state contracting capacity. • Ensure projects align with both agency mandates and local wildfire risk reduction goals. • Reinvest GNA timber revenues into continued fuels mitigation and ecological restoration within Mineral County.	Launch collaborative, cross-boundary restoration and fuels mitigation projects on federal lands, improving forest and watershed resilience while streamlining implementation through state–federal partnerships.	Establish outcome-based monitoring protocols in coordination with the Montana DNRC and USFS to evaluate treatment effectiveness. Maintain a shared project database to track project status, treatment acreage, and reinvestment metrics associated with GNA revenue.

AREAS OF CONCERN

Figures 4.1 through 4.4 show collaboratively identified areas of concern. These are areas where land managers are currently considering or should consider employing mitigation measures to protect life, property, and other values. It is recommended that treatment plans be developed to execute mitigation measures in these areas. Treatment types will be site specific but should address a need to slow fire spread or mitigate potential extreme fire behavior parameters, such as high flame lengths or fireline intensity. Wildfire does not stop at jurisdictional boundaries, and therefore, it is crucial that projects are implemented across borders with coordination at all jurisdictional levels.

The areas of concern shown below were delineated by Mineral County's interdisciplinary Core Team using the results of the comprehensive wildfire Risk-Hazard Assessment (Chapter 3), as well as fuel loading and continuity characteristics, structure locations, and local knowledge.

While residents within these areas of concern should prioritize fuel treatments in the HIZ (see Appendix D, Figure D.1), it is advisable to reduce fuels beyond the HIZ for properties within the WUI. See Chapter 6 for a list of homeowner actions.

Table 4.2 provides an assessment of wildfire risk factors by evaluating key variables that influence fire behavior and emergency response challenges: ingress/egress concerns, which identify potential evacuation difficulties; flame length, which indicates fire intensity and suppression challenges; SDI (suppression difficulty index), which measures the challenge associated with fire suppression activities within the areas; density of assets (wildfire risk to assets), which assesses the concentration of structures and infrastructure at risk; and distance from fire response resources, which indicate the proximity of fire suppression resources and potential response times.

In addition to these collaboratively identified areas of concern, publicly identified conceptual hazardous fuel reduction zones were developed through community engagement exercises where residents marked priority areas on interactive maps (Figure 4.5). These community-informed zones and descriptions are included below (Table 4.3) and offer valuable insight into local wildfire concerns, access limitations, and perceived vulnerabilities in Mineral County.
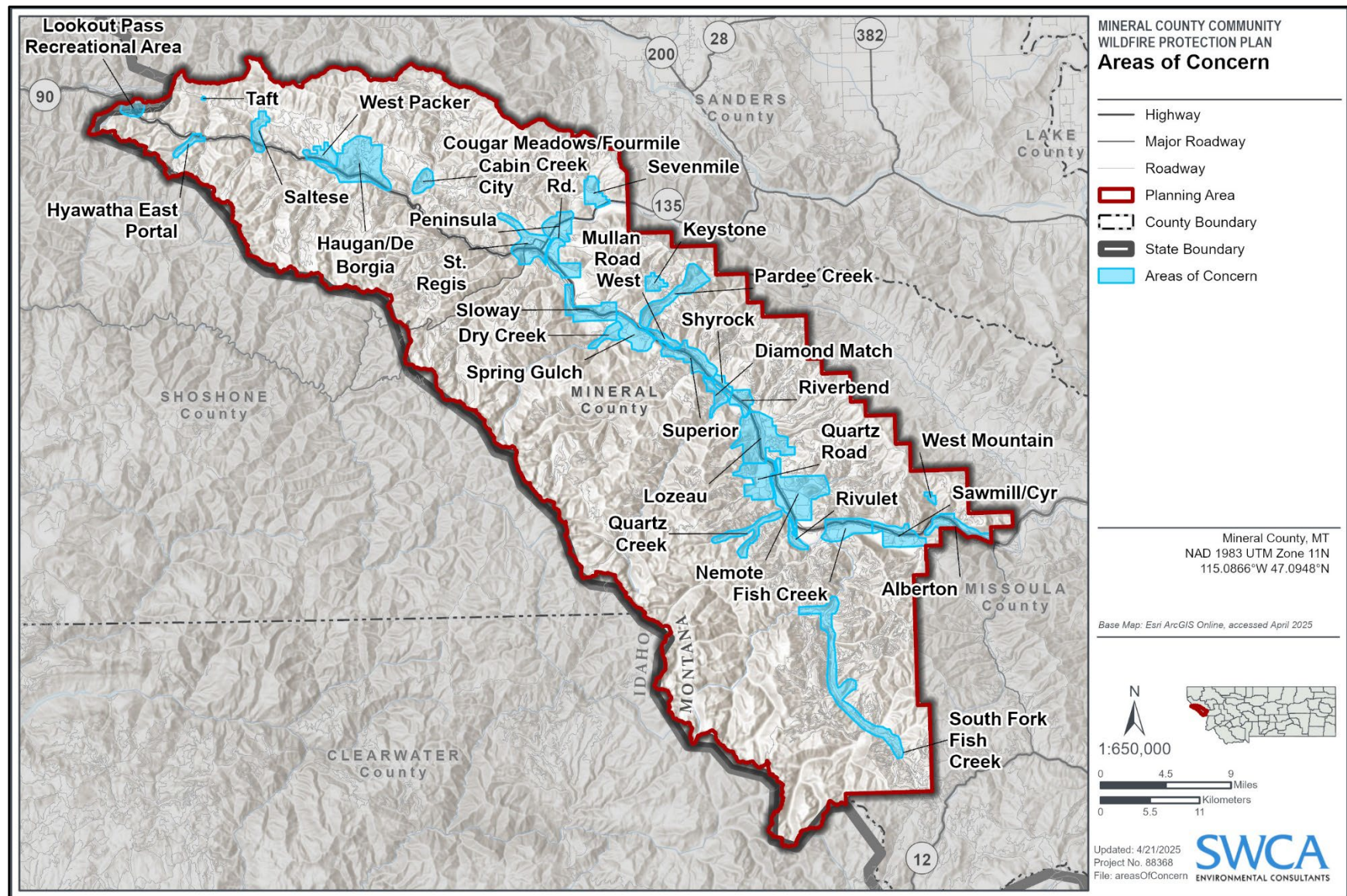
Figure 4.1. Collaboratively identified areas of concern within Mineral County, Montana.
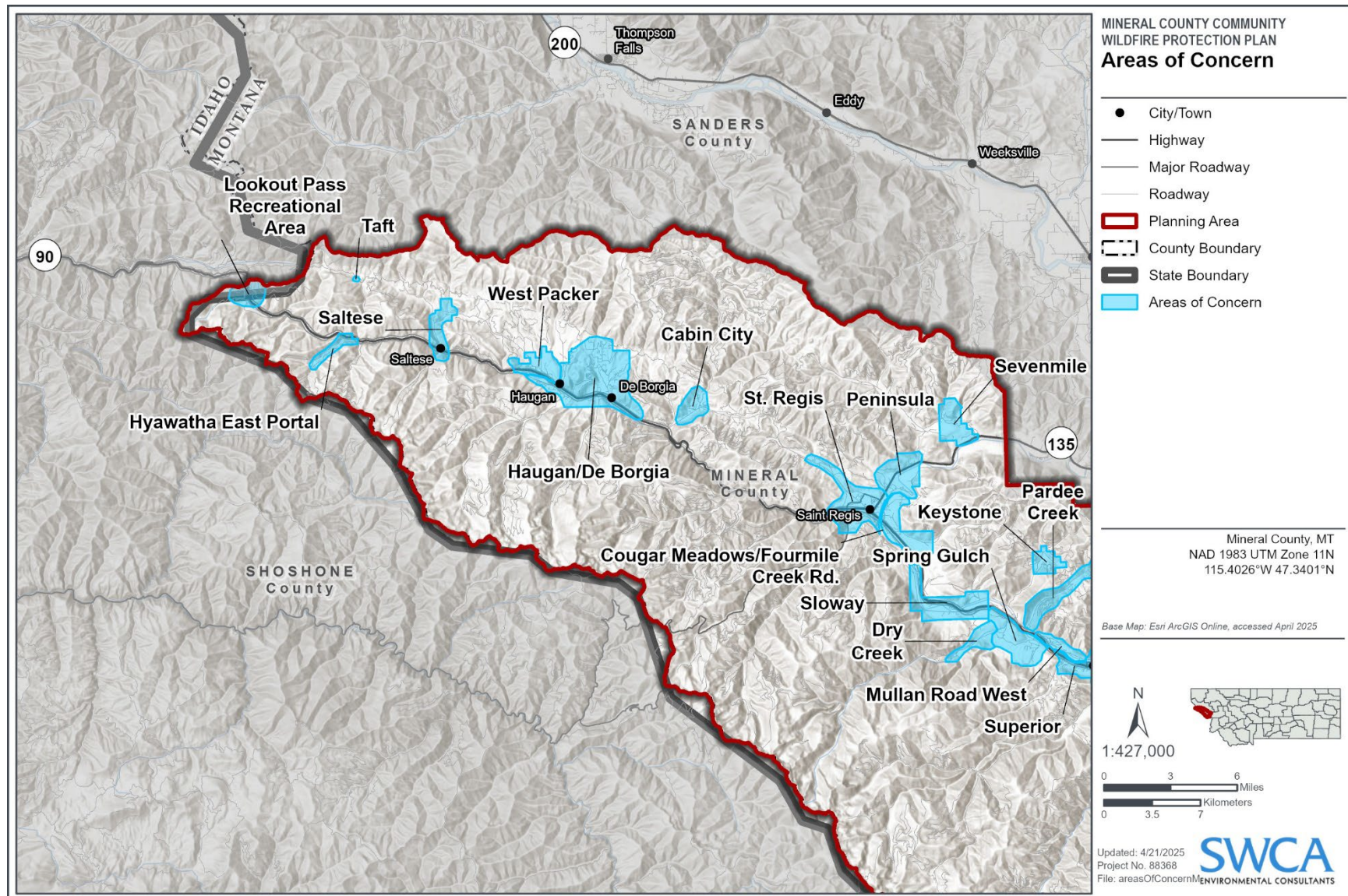
Figure 4.2. Areas of concern in western Mineral County, Montana.
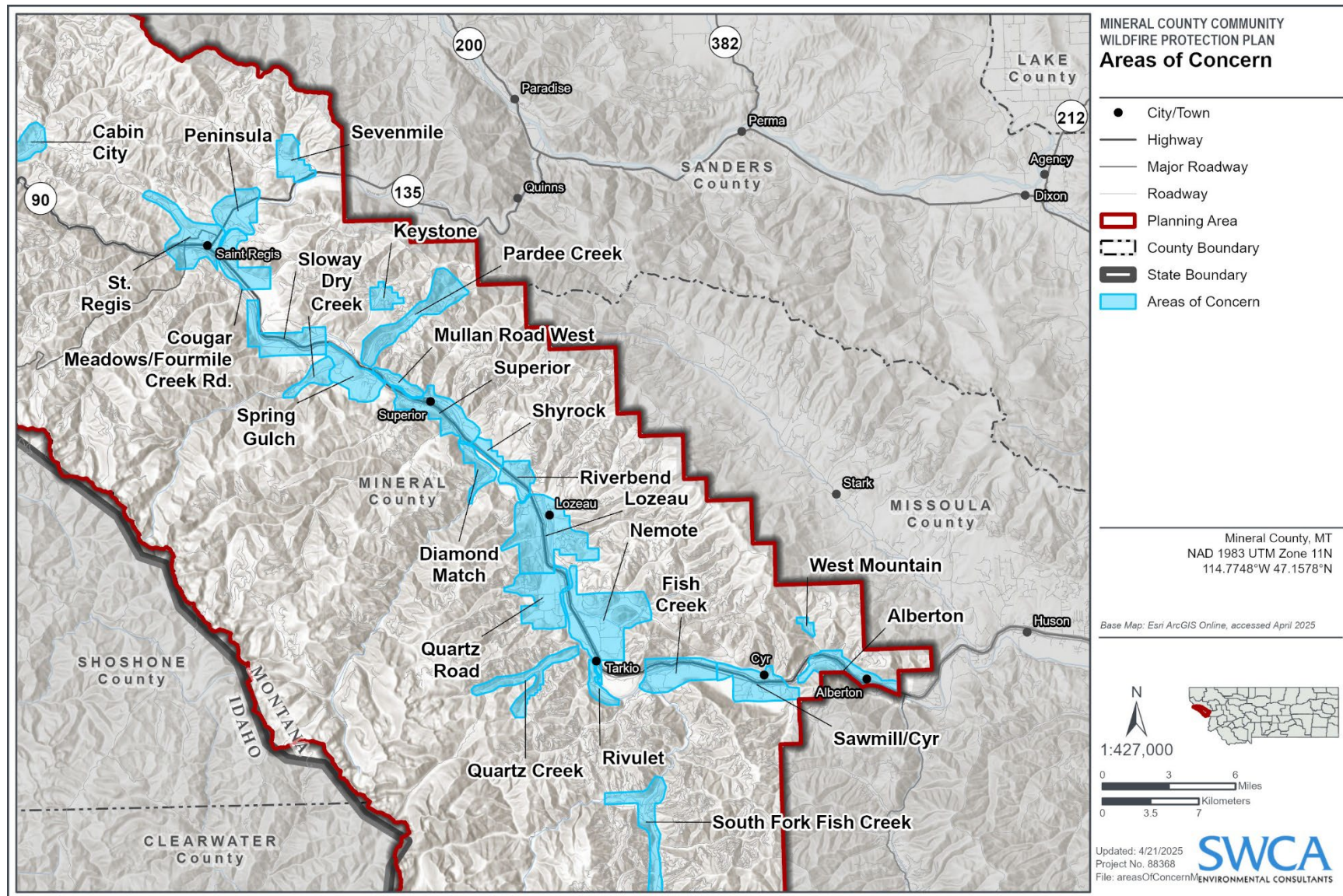
Figure 4.3. Areas of concern in central Mineral County, Montana.
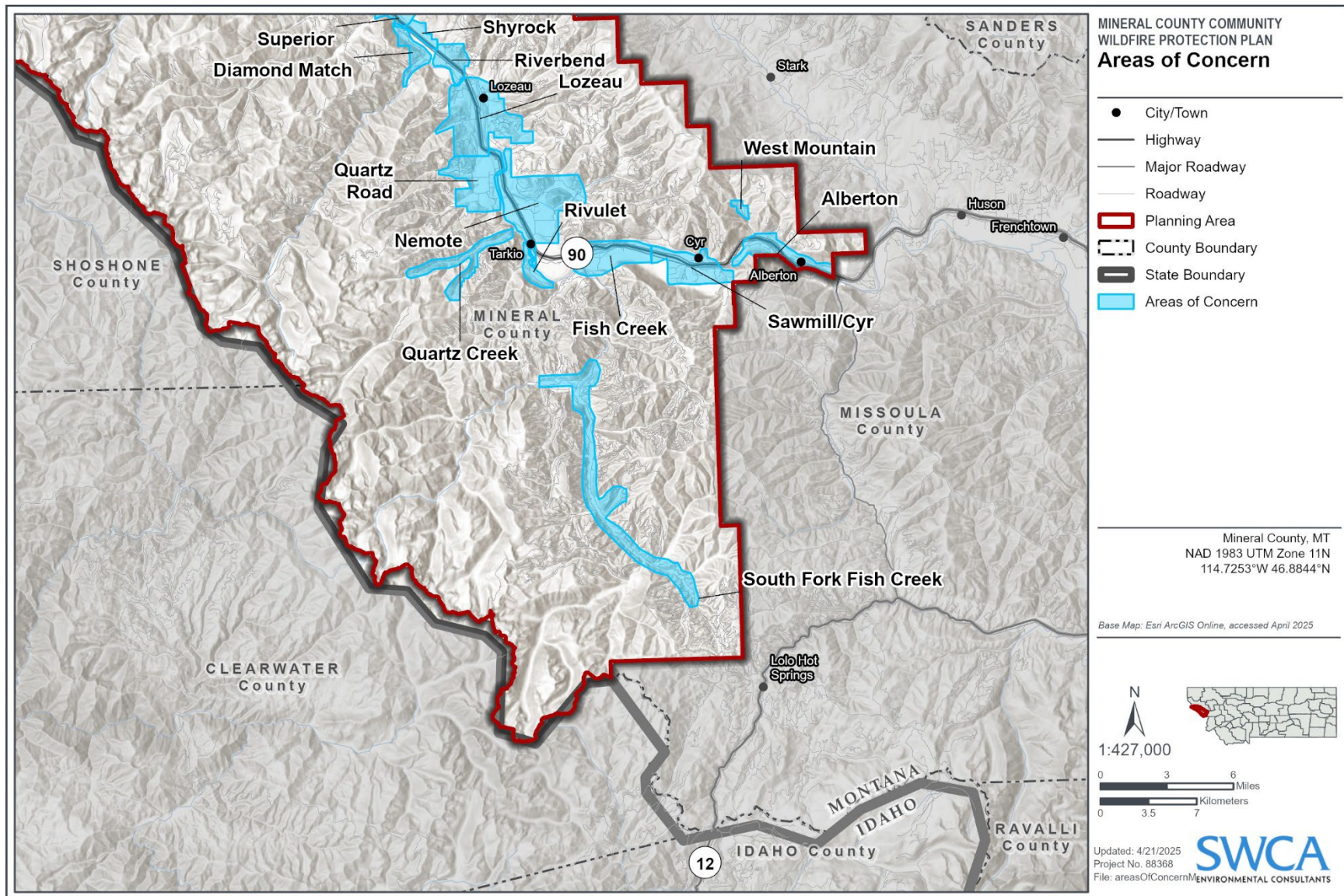
Figure 4.4. Areas of concern in southern Mineral County, Montana.

Table 4.2. Areas of Concern and Associated Risk/Hazard Levels

Area of Concern	Ingress/Egress Concerns	Flame Length	SDI	Density of Assets	Distance from Fire Response Resources
Lookout Pass	Low	Moderate	Moderate	Low	Moderate
Taft	High	Moderate	Moderate	High	High
Hiawatha East Portal	High	Moderate	Moderate	Low	High
Saltese	Moderate	High	High	High	Moderate
West Packer	Moderate	Low	Low	Moderate	Low
Haugan/De Borgia	High	Moderate	Low	Moderate	Low
Cabin City	Moderate	Moderate	Low	High	Moderate
St. Regis	Low	Low	Low	High	Low
Peninsula	Low	Low	Low	Moderate	Low
Sevenmile	High	High	Moderate	Moderate	High
Keystone	High	High	Moderate	Low	High
Dry Creek	High	Moderate	Moderate	Low	Moderate
Spring Gulch	Moderate	Low	Low	Moderate	Moderate
Mullan Road West	Moderate	Low	Low	High	Low
Superior	Low	Low	Low	High	Low
Shyrock	Moderate	Low	Moderate	High	Low
Diamond Match	Moderate	Low	Low	High	Moderate
Riverbend	Moderate	Moderate	Moderate	High	Moderate
Lozeau	High	Moderate	Moderate	Moderate	High
Quartz Road	High	Low	Low	Moderate	High
Nemote	Moderate	Low	Low	Low	High
Rivulet	High	Moderate	Moderate	Moderate	High
Fish Creek	Moderate	Moderate	Moderate	Moderate	High
Sawmill/Cyr	Moderate	Low	Low	Moderate	Moderate
West Mountain	High	High	High	High	High
Alberton	Low	Low	Moderate	High	Low
South Fork Fish Creek	Moderate	High	High	Low	High
Sloway	Low	Moderate	Low	High	Low
Cougar Meadows/Fourmile Creek Rd.	Moderate	Moderate	Moderate	High	Low
Pardee Creek	High	High	High	Moderate	High
Quartz Creek	High	High	High	Moderate	High
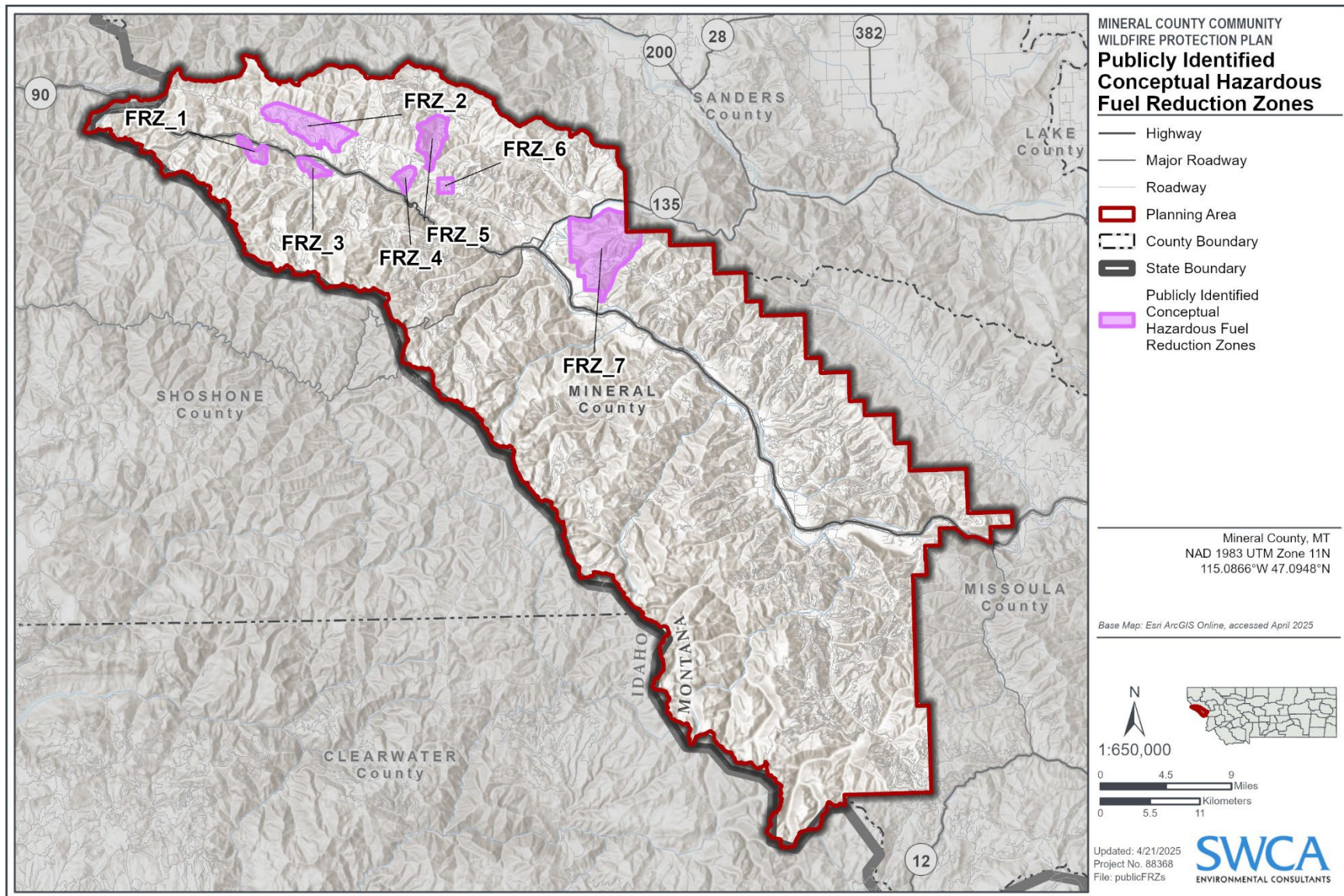
Figure 4.5. Publicly identified conceptual hazardous fuel reduction zones (FRZs).

FRZs were developed through community engagement exercises with the public in Mineral County during the development of the 2025 Mineral County CWPP. These areas are not proposed actions but represent publicly identified areas to be considered for fuel reduction projects in the future.

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Table 4.3. Publicly Identified Conceptual Hazardous Fuel Reduction Zones in Mineral County

Publicly Identified Conceptual Hazardous Fuel Reduction Zones (FRZs)	Description
FRZ 1	The area immediately south of Saltese. Reducing hazardous fuels in FRZ 1 would decrease wildfire risk to the Interstate 90 corridor and the community of Saltese.
FRZ 2	The area south of the Bonneville transmission line between Saltese and Haugan/De Borgia. FRZ 2 would benefit from reducing hazardous fuels. Suggestions were made to link treatments in this area to existing fuels work being completed under a blanket purchase agreement with the USFS.
FRZ 3	The area immediately southwest of Haugan/De Borgia. Reducing hazardous fuels in FRZ 3 would decrease wildfire risk to the Interstate 90 corridor and the communities of West Packer and Haugan/De Borgia.
FRZ 4	The area immediately west of Cabin City. Reducing hazardous fuels in FRZ 4 would decrease wildfire risk to nearby communities in Cabin City and Haugan.
FRZ 5	The area north of Cabin City along 12 Mile Road and Flat Rock Creek. Reducing hazardous fuels in FRZ 5 would decrease wildfire risk to nearby communities in Cabin City and Haugan.
FRZ 6	A state land parcel located immediately east of Cabin City. FRZ 6 would benefit from reducing hazardous fuels and may be a good candidate for future Good Neighbor Authority (GNA)-funded projects.
FRZ 7	The Fourmile area grazing lease consists of federal and state land. Residents have identified this area as potentially benefiting from hazardous fuels reduction and prescribed fire for the purpose of reducing wildfire risk and improving grass forage for livestock. The continued use of the area for grazing can help manage the buildup of fuels.

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 wildfire loss, so do human hazards. While many residents in the WUI understand the dangers posed by wildfires, it is crucial to continually engage the community as partners in wildfire mitigation efforts across different land ownerships. Wildfire is a natural part of the county's fire-dependent ecosystem, shaping the landscape for centuries. Long before permanent settlements, fires regularly moved through the region. Recognizing wildfire as an expected occurrence underscores the importance of preparation. By taking proactive steps, residents can better protect their homes, properties, and communities from the inevitable reality of future fires.

The Mineral County CWPP recognizes the importance of increasing community involvement in wildfire prevention and mitigation. Public education methods could include enhancing awareness about the local fire department's needs, offering workshops on Firewise landscaping techniques, organizing community cleanups for vegetation management, and promoting government programs that provide financial assistance for treatments on private lands. Crucially, building trust and improving communication between homeowners and land management agencies is vital for ensuring the maintenance of existing fuel treatments and the implementation of new ones in the WUI.

While some residents are aware of the Firewise Communities program, many others would benefit from increased exposure. Workshops explaining the Firewise principles and their application to home protection from wildfire are encouraged to foster greater understanding. Mineral County aspires to have more communities achieve Firewise Community status, setting an example for fire prevention in Montana. Further public education methods could involve installing fire danger level signs in highly visible areas, developing community evacuation plans, and increasing awareness of fire department response capabilities.

During fire season, it is critical to communicate fire danger ratings, restrictions, and ignition prevention measures to the public. This can be achieved through clear signage, timely social media updates, and public meetings. Collaborating with local fire departments, government agencies, and community organizations ensures a consistent message. These strategies enhance public awareness and help prevent wildfires.

Improving communication between homeowners and local land management agencies will be crucial in building trust and ensuring more effective fire mitigation practices across public and private lands.

Please see Chapter 6 for a comprehensive list of local, statewide, and national educational resources.

Table 4.4 lists public education recommendations to be implemented in the county.

RECOMMENDATIONS FOR REDUCING STRUCTURAL IGNITABILITY

Table 4.4 provides a list of community-based recommendations to reduce structural ignitability that should be implemented throughout the Mineral County CWPP planning area. Reduction of structural ignitability depends largely on public education that provides homeowners 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; 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 firebrands that travel independently of the flaming front have been known to destroy houses that had not been impacted by direct flame impingement. Additionally, once fire is established in urban structure fuels, it can be extremely difficult to extinguish and has a high potential to spread to other nearby structures.

Hardening the home to ignition from embers, including maintaining vent coverings and other openings, is critical 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. Adjacent structures such as those comprised of combustible materials can also impact home ignitability (e.g., garages, sheds, and wooden fences).

Some structural ignitability hazards are related to homes being in disrepair, vacant or abandoned lots, and minimal yard maintenance. In order to influence change in homeowner behavior, county ordinances may be needed.

Table 4.4. Recommendations for Creating Fire-Adapted Communities (Public Education and Reducing Structural Ignitability)

Project ID	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements

FAC1	**Homeowner Funding and Incentives**
	Establish funding pathway for homeowners, with a focus on underserved and vulnerable populations.
		Mineral County	Mineral County Sheriff's Office, Mineral County Department of Health	• 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 the incentives.
					Encourage greater participation in public education events and workshops on wildfire preparedness and evacuation among homeowners.
					Protect life and property of the 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.

FAC2	**Human Ignitions Reduction**
	Reduce potential for human-caused wildfire ignitions in urban environments and along recreational trails.
		Mineral County	Mineral 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).
				• Inform and educate the public about methods to reduce human-caused wildfire ignitions.
				• Conduct community training courses and workshops.
					Reduce human-caused wildfire ignitions.
					Improve public knowledge about wildfire risk for their surrounding environment.
						Regularly monitor recreational trail conditions.
						Conduct regular public outreach.

FAC3	**Firewise Communities Expansion** Expand the number of Firewise communities to enhance wildfire preparedness and resilience.	Mineral County	Mineral County, residents	• Identify and target communities at high risk for wildfires for inclusion in the Firewise program. • Conduct informational meetings to explain the benefits and requirements of becoming a Firewise community. • Offer training sessions for community leaders and residents on Firewise principles and wildfire mitigation techniques. • Encourage and support community-led projects, such as fuel reduction, fuel break creation, and emergency preparedness drills.	Increase community resilience to wildfires by expanding the number of Firewise communities and promoting best practices for wildfire mitigation.	Monitor the progress of neighborhoods working toward Firewise recognition. Conduct annual reviews of Firewise communities to ensure ongoing compliance and improvement.

FAC4	**Enhanced Community Engagement Meetings**
	Increase the frequency and scope of community meetings to improve wildfire preparedness and response.
		Mineral County	Mineral County, fire department, Montana Disaster and Emergency Services (MT DES), private landowners
			Mineral County Economic Development Corporation and Mineral County Resource Coalition
				• Establish a consistent schedule for community engagement meetings, ensuring they are held frequently and at convenient times.
				• Use various formats, such as in-person, virtual, and hybrid meetings, to accommodate different preferences.
				  ○ Invite experts and stakeholders to present on relevant topics.
				  ○ Partner with local agencies, organizations, and experts to enhance the quality and relevance of meeting content.
				• Ensure awareness of fire danger levels and fuel conditions
				• Actively solicit input from community members on their concerns, needs, and ideas for improving wildfire preparedness.
				• Promote codes and ordinances on land use and hazard mitigation planning.
					Improve community awareness and preparedness for wildfires through increased engagement and information sharing.	Track attendance and feedback from community meetings.
						Adjust meeting topics and formats based on community needs and feedback.

Project ID	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements
FAC5	**Educational Resources and Outreach** Use brochures and information from Montana DNRC and NRCS to educate the public on wildfire mitigation.	Mineral County (with a focus on WUI and high-risk residential areas)	Mineral County, Montana DNRC, NRCS	• Distribute DNRC pamphlets and other educational materials o Use community liaison efforts to distribute materials. • Leverage social media platforms. • Organize public meetings for direct outreach. • Focus on programs that emphasize creating defensible space around homes. • Educate residents on the importance of wildfire mitigation for insurance purposes. • Partner with local organizations(e.g., Mineral County Community Foundation) to broaden outreach efforts.	Educate the community on wildfire risks and mitigation strategies. Encourage residents to take steps to protect their properties.	Annually monitor the effectiveness of different outreach methods. Conduct review ensure information is current and relevant.
FAC6	**Community Preparedness and Evacuation Planning** Raise awareness about evacuation procedures and improve community preparedness.	Mineral County	Mineral County, local fire departments, MT DES	• Develop an evacuation plan and disperse educational materials regarding evacuation procedures. • Explore the viability of establishing a text-based alert system for evacuation notices. • Organize regular community-wide evacuation drills to practice and refine evacuation procedures. • Involve local emergency services and agencies to ensure coordination and effective outcomes. • Simulate different emergency scenarios to test preparedness.	Ensure residents know evacuation procedures and are ready to act in the event. Increase safety for first responders and residents by creating more efficient evacuations.	Adapt plan based on feedback and new information gathered from emergency incidents.

FAC7	**Public Meetings and Field Demonstrations**
	
	 Increase community engagement and preparedness through public meetings and field demonstrations.
		Mineral County (with a focus on WUI and high-risk residential areas)	Mineral County, local fire departments, MT DES, community organizations	• Organize meetings to discuss wildfire risks and mitigation strategies.
				   o Provide updates on ongoing projects and initiatives.
				 • Construct (or identify existing structure) demonstration sites to showcase treatment results
				   o Create sites that demonstrate various wildfire mitigation techniques.
				   o Include examples of shaded fuel breaks, defensible space, and untreated areas.
				 • Take community members to sites where treatments have been implemented.
				   o Highlight the benefits and outcomes of different mitigation strategies.
				 • Invite experts to present at meetings and field demonstrations.
				 • Foster a collaborative environment for sharing knowledge and experiences.
					Educate residents on wildfire risks and mitigation strategies.
					
					 Encourage residents to take steps to protect their properties.
						Monitor engagement levels and adjust outreach efforts as needed.
						
						 Use feedback to improve future meetings and demonstrations.

FAC8	**Community Chipper and Mitigation Crews**
	
	 Promote community participation in wildfire mitigation efforts by providing convenient and organized chipping and mitigation services.
		Mineral County residential areas	St. Regis, Superior, and West End Volunteer Fire Departments, fire council, Mineral County Resource Coalition, residents	• Promote the availability of chipping and mitigation services through community newsletters, social media, and local media
				 • Identify interested neighborhoods and schedule regular chipper days.
				   o Develop a scheduling system for residents to request mitigation services.
				   o Provide residents with assistance and instructions on preparing vegetation for chipping.
				   o Deploy chippers and crews to designated neighborhoods on scheduled days.
				 • Provide targeted assistance for vulnerable residents (e.g., elderly, disabled).
				 • Apply for funding opportunities to assist in the efforts (Montana Watershed Coordination Council).
				 • Ensure proper disposal of chipped material, such as composting or mulching.
				 • Form dedicated residential mitigation crews trained in vegetation management and wildfire mitigation techniques.
				 • Collaborate with local fire departments, environmental agencies, and community organizations to enhance the effectiveness of mitigation efforts.
					Promote community participation in wildfire mitigation efforts by providing convenient and organized chipping services.	Track the volume of material chipped and monitor the effectiveness of fuel reduction.
						
						 Conduct follow-up assessments to ensure ongoing vegetation management.
						
						 Collect feedback from residents to make improvements and plan future services.

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Project ID	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements
FAC9	**Mineral County Home Assessment Program** Promote home wildfire risk assessments and increase training capacity for home assessment teams.	Mineral County	Mineral County; fire department, residents, DNRC	• Develop a comprehensive home assessment program and training curriculum. • Ensure the program is accessible to all homeowners. • Recruit and train additional personnel to conduct home assessments. ○ Establish a certification process for home assessors to ensure high standards and credibility. • Launch a community outreach campaign to encourage residents to request home assessments. • Offer follow-up support to homeowners after assessments, including recommendations for mitigation measures and assistance with implementation. • The NRCS Home Assessment structure and approach can serve as a valuable model for shaping the development of the Mineral County Home Assessment Program.	Reduce wildfire risk at the individual property level by providing thorough home assessments and increasing the capacity for trained assessors.	Track the number of home assessments conducted and follow up on recommendations. Evaluate the effectiveness of the training program and adjust as needed.
FAC10	**Signage and Community Awareness** Install signs to inform residents and visitors about fire risks and evacuation routes.	Mineral County	Mineral County local fire departments, community organizations	• Identify key locations for signage, including campgrounds and high-traffic areas. • Design signs to clearly communicate fire risks and evacuation routes. • Use signage to inform the public about ongoing and completed treatments. • Highlight the benefits of proactive wildfire mitigation. • Install signs that promote safe practices for campers and visitors. • Provide information on fire safety and prevention. • Work with local fire departments and community groups to design and install signs. • Ensure signs are maintained and updated as needed.	Inform residents and visitors about fire risks and mitigation efforts. Encourage safe practices and responsible recreation in high-risk areas.	Track public response and awareness levels and adjust signage strategies based on feedback and observations.
FAC11	**Firewise USA Program Reengagement** Reinstate Firewise USA recognition in the communities of Superior, West End, and St. Regis.	Superior, West End, and St. Regis	Mineral County, local fire departments, DNRC	• Reconnect with community leaders in previously recognized Firewise sites to assess interest and readiness for reapplication. • Coordinate with the DNRC Firewise liaison to guide communities through the reapplication process. • Host community outreach meetings to reintroduce Firewise principles, responsibilities, and long-term benefits. • Provide technical assistance and updated templates for community wildfire risk assessments and action plans. • Encourage collaborative, community-led fuel reduction projects as part of the recognition process.	Rebuild participation in the Firewise USA program to improve wildfire preparedness and increase access to mitigation support and funding opportunities.	Track annual progress of each participating community toward renewed Firewise USA recognition. Monitor implementation of action plans, conduct annual compliance check-ins, and provide ongoing technical support.

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GOAL 3: SAFE, EFFECTIVE, RISK-BASED WILDFIRE RESPONSE

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

RECOMMENDATIONS FOR IMPROVING FIRE RESPONSE CAPABILITIES

Mineral County is home to four fire protection districts and one volunteer fire department that play a critical role in the region's wildfire response. These districts have demonstrated proactive efforts in securing funding and improving their services. The effectiveness of wildfire response in Mineral County hinges on measures such as enhancing preparedness, promoting interagency coordination, acquiring essential resources, and engaging in community education initiatives.

Public education on emergency notifications and fire response protocols is vital for minimizing the community's reliance on fire departments during emergencies. This is particularly significant in rural areas with longer emergency service response times compared to more densely populated municipal zones. Strengthening community preparedness through education is a key component of bolstering local fire departments' response capabilities. By fostering collaboration between fire departments, local organizations, and residents, the community can play a supportive role in fire mitigation and response efforts. It is recommended that fire chiefs share insights on funding successes and best practices to enable collective learning and continuous improvement across all districts.

Table 4.5 provides recommendations for improving firefighting capabilities. Many of these recommendations are general in nature.

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Table 4.5. Recommendations for Safe and Effective Wildfire Response

Project ID	Project Description	Location	Land Ownership/ Agency	Lead	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements
WR1	**Pre-Season Wildfire Response Coordination Meetings** Conduct annual pre-season meetings to coordinate wildfire response strategies and resources.	Mineral County	Mineral County fire departments, Montana DNRC, Superior Ranger District, Ninemile Ranger District		• Conduct annual pre-season meetings to align wildfire response strategies and resource allocation. 　○ Involve all relevant stakeholders, including fire departments, emergency management agencies, and community leaders. • Review and update response plans based on lessons learned from previous wildfire seasons. • Establish clear communication protocols and roles for all participating agencies. • Coordinate the availability and deployment of mutual aid resources and equipment.	Ensure a coordinated and effective wildfire response by conducting pre-season planning and strategy meetings.	Document the outcomes and action items from each pre-season meeting. Follow up on action items to ensure implementation before the wildfire season.
WR2	**Staffing** Work toward increased staffing.	Mineral County	Superior Ranger District, Ninemile Ranger District		• Prioritize efforts to increase staffing and retain permanent and seasonal firefighters. • Ensure funding is available for onboarding seasonal staff in March and April to provide adequate support for prescribed burning and fuel treatment operations. • Ensure funding is available for retaining seasonal staff until November and December to provide adequate support for late-season wildfires, cross-regional support, and prescribed burning operations.	Ensure adequate federal fire response support for suppressing wildfires, conducting prescribed burning, and implementing fuel treatments.	Submit annual staff reports including staffing needs to the Forest Supervisor for Lolo National Forest.
WR3	**Evacuation Services for Vulnerable Populations** Enhance evacuation services for elderly, individuals with disabilities, and those with specific needs during wildfire events.	Mineral County	Mineral 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. • Train emergency responders and volunteers on assisting vulnerable populations during evacuations. • Conduct regular drills and simulations to ensure preparedness and efficiency.	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.
WR4	**First Responder Safety and Safe Zones Initiative** Enhance the safety of first responders by identifying potential safety zones and staging areas during wildfire incidents.	Mineral County	Mineral County, fire departments, USFS, mutual aid agencies		• Identify potential predetermined safe zones and forward staging areas for first responders during wildfire incidents. • Conduct an interagency review of potential safety zones during the annual fire refresher week. • Conduct training on properly identifying safety zones and forward staging areas and differentiating between the two. • Regularly review and update safe zone locations based on changing wildfire risks and conditions. • Ensure safe zones and forward staging areas are easily accessible during emergencies.	Improve the safety of first responders during wildfire incidents.	Regularly review and update the list of potential safety zones and forward staging areas. Conduct drills to ensure first responders are familiar with safe zone locations and protocols.
WR5	**Enhanced Communication Systems for Wildfire Response** Improve communication systems for wildfire response to ensure effective coordination and safety.	Mineral County	Mineral County, fire departments, USFS, mutual aid agencies		• Upgrade all radios to BK GPH5102X (portable) and B/K GMH (mobile). 　○ Ensure coordination between agencies regarding frequency channels and repeater locations. • Provide training for emergency responders on the use of new communication frequencies, tools, and protocols. • Establish redundant (backup) communication systems to maintain connectivity during infrastructure failures. • Conduct regular tests and drills to ensure personnel are using communication systems correctly and that they are functioning effectively.	Ensure effective coordination and safety during wildfire response through improved communication systems.	Regularly test and maintain communication systems. Conduct periodic training sessions to ensure first responders are proficient in using the systems.

Project ID	Project Description	Location	Land Ownership/ Agency	Lead	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements
WR6	**Satellite Fire Stations** Fund the development of additional fire satellite stations in growing communities to reduce wildfire risk and improve response times.	Mineral County	Mineral County		• Select locations based on response time improvement and coverage needs o Assess growing communities and areas with high wildfire risk. • Coordinate with County leadership. • Secure funding for station development: through funding opportunities or allocate county resources to support station construction and maintenance. • Ensure stations are stocked with necessary supplies for initial response. • Encourage private landowner support.	Build community resilience through improved response times and reduce wildfire spread and damage.	Track response times and incident outcomes. Ensure equipment is in working order and supplies are replenished. Gather feedback and input from staff members.

WR7	**Volunteer Recruitment and Training** Increase recruitment efforts and volunteer retention and provide training and certification programs for community volunteers.	Mineral County	Mineral County, local fire departments		• Engage community members during active wildfire incidents.
					  o Highlight the importance of volunteer support in fire response.
					• Provide training and certification programs:
					  o Offer Red Card and fire-specific certification courses.
					  o Prioritize certifications for individuals in forestry and related industries.
					• Work with fire departments to design and implement training programs.
					• Ensure training aligns with local needs and standards.
					• Evaluate the impact of training programs on fire response capabilities.
						Enhance community fire response and promote community involvement.	Regularly review and update training programs and materials. Track volunteer participation and performance. Garner feedback and recommendations from staff and trainees.

WR8	**Centralized Evacuation and Staging Information Hub** Create a centralized hub or website for local evacuation and staging location information.	Mineral County	Mineral County Office of Emergency Management, fire departments		• Create a centralized online hub or website for local evacuation and staging location information.
					  o Ensure the hub is easily accessible and regularly updated with real-time information.
					  o Include maps, routes, and resources for evacuees, such as shelter locations and contact numbers.
					• Promote the hub to residents and encourage them to use it as a primary source of information during emergencies.
					• Collaborate with local agencies to ensure the accuracy and reliability of the information provided and make sure information does not contradict notifications provided during an active incident.
						Improve community preparedness and response by providing a centralized source of accurate and timely evacuation and staging information.	Regularly update the hub with current information. Monitor usage and feedback to improve the hub's functionality and effectiveness.

WR9	**Collaboration with Fire Chiefs** Conduct regular follow-ups with fire chiefs to identify equipment and resource needs for improved wildfire response.	Mineral County	Mineral County, local fire departments		• Schedule regular (e.g., quarterly) meetings with fire chiefs to discuss ongoing needs and challenges. • Identify gaps and areas for improvement based on recent wildfire response experiences. • Develop a systematic approach for identifying specific equipment and resource needs.	Enhance emergency response coordination and response capabilities.	Track the impact of new equipment and training programs. Use feedback to adjust resource allocation and improve outcomes.
WR10	**High-Capacity External Sprinkler Systems Implementation** Support the installation and implementation of high-capacity external sprinkler systems in strategic neighborhood locations to enhance wildfire suppression capabilities.	Mineral County strategic locations	Mineral County; fire department, residents		• Explore the viability of high-capacity sprinkler implementation to protect structures and support wildfire response efforts. • Secure funding and resources for the implementation and maintenance of sprinkler systems. • Train community members and local fire departments on the operation and maintenance of sprinkler systems. • Conduct regular tests and maintenance to ensure systems are functional and effective.	Enhance wildfire suppression capabilities and protect critical areas through the strategic installation of high-capacity external sprinkler systems.	Monitor and evaluate the impact of sprinkler systems on wildfire suppression efforts. Regularly inspect and maintain sprinkler systems to ensure functionality. Conduct periodic drills to test the systems and ensure readiness.

Project ID	Project Description	Location	Land Ownership/ Agency Lead	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements
WR11	**Comprehensive Water Source Mapping for Wildfire Response and Maintenance** Develop and maintain a countywide geospatial database of water sources used in wildfire suppression to support pre-incident planning and real-time decision making.	Mineral County	Mineral County GIS Department, local fire departments, Montana DNRC	• Use GIS tools to comprehensively map all water sources, including: o Rivers, streams, ponds, wells, hydrants, water tanks, fire ponds, and draft sites. • Classify each source by: o Accessibility, seasonality, volume, and suitability for firefighting. • Identify gaps in coverage and potential new draft site locations. • Make maps available in digital and hardcopy formats for use by fire departments and incident commanders. • Integrate water source maps into pre-plans and training exercises.	Support wildfire suppression effectiveness and tactical response planning by providing accurate, up-to-date mapping of water sources, ensuring these sources are consistently maintained, accessible, and integrated into operational planning.	Update GIS layers and source attributes annually or after major changes (e.g., drought, land development). Validate data through field verification with local responders. Distribute updated maps before each fire season.
WR12	**Water Availability and Fill Stations** Improve water availability for wildfire response through the installation and maintenance of gravity tanks, seasonal pumpkins, draft sites, hydrants, and fire ponds	Mineral County Communities near rivers, streams, and other water sources Prioritize areas with the greatest need for water access due to fire risk.	Mineral County, local fire departments	• Conduct a water availability assessment to identify gaps and needs. o Engage local fire chiefs to identify equipment and resource needs. o Map out rivers, streams, and other water sources and assess accessibility and suitability for firefighting use. • Install fill stations at strategic locations near identified water sources. • Install and maintain gravity tanks, seasonal pumpkins, draft sites, hydrants, and fire ponds in strategic locations. • Train fire response teams on the proper and effective use and maintenance of these water sources.	Improve firefighting capabilities and enhance community safety.	Track the use and performance of fill stations during fire incidents. Adjust locations and resources based on feedback and data.
WR13	**Ingress and Egress Improvements** Identify and mitigate areas that restrict access or increase entrapment risks during wildfires.	Mineral County Focus on hazardous evacuation route areas.	Mineral County Office of Emergency Management, fire departments, USFS	• Conduct assessments to identify areas with restricted access or high entrapment risks during wildfires. • Develop and implement plans to improve ingress and egress routes, including road widening and vegetation clearance. • Collaborate with local government and transportation agencies to address infrastructure needs. • Install clear signage and provide maps to guide residents and emergency responders. • Conduct regular drills to ensure familiarity with updated routes and procedures.	Enhance the safety and effectiveness of emergency response by improving ingress and egress routes and reducing entrapment risks.	Regularly inspect and maintain ingress and egress routes. Conduct drills to test the effectiveness of improvements.
WR14	**Cross-Agency Wildfire Response Training** Facilitate cross-agency training sessions to improve coordination and effectiveness of wildfire response.	Mineral County	Mineral County, fire departments, USFS	• Organize cross-agency training sessions to enhance coordination and effectiveness during wildfire response. o Develop standardized training materials and protocols for all participating agencies. o Conduct joint simulations and drills to practice coordinated response efforts. • Use outcomes from incident response to evaluate training outcomes and identify areas for improvement. • Foster a culture of collaboration and mutual support among different agencies.	Improve interagency coordination and effectiveness in wildfire response through regular joint training sessions.	Evaluate the effectiveness of training sessions through post-training after action reviews. Adjust training scenarios and formats based on feedback and lessons learned.

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FUNDING SOURCES

Table 4.6. Funding Sources

Funding Source	Agency/ Organization	Summary	Applicable Cohesive Strategy Category		
			Resilient Landscapes (RL)	Fire Adapted Communities (FAC)	Wildfire Response (WR)
Action, Implementation, and Mitigation Grant (AIM)	Coalitions and Collaboratives/USFS	Supports wildfire risk reduction projects and planning in communities with moderate to high wildfire risk. Grants range from 10,000to10,000to75,000 and require a 100% match.	RL	FAC	WR
Funding for Fire Departments and First Responders	Department of Homeland Security (DHS), U.S. Fire Administration	Includes grants and financial assistance for fire departments and first responders, such as the Assistance to Firefighters Grant Program and National Fire Academy Training Assistance.			WR
Building Resilient Infrastructure and Communities Grant Program (BRIC)	Federal Emergency Management Agency (FEMA)	Supports hazard mitigation projects to reduce risks from disasters and natural hazards, focusing on capability- and capacity-building, innovation, partnerships, and large projects.	RL		WR
Emergency Management Performance Grant (EMPG)	Federal Emergency Management Agency (FEMA)	Provides funding to state, local, tribal, and territorial emergency management agencies to create a safe and resilient nation, focusing on closing capability gaps and building or sustaining high-priority capabilities.			WR
Fire Management Assistance Grant (FMAG)	Federal Emergency Management Agency (FEMA)	Provides financial aid to states, local, and tribal governments for mitigating, managing, and controlling fires on public or private forests and grasslands that pose a threat of major disaster.			WR
Fire Prevention and Safety Grants (FP&S)	Federal Emergency Management Agency (FEMA)	Supports projects that enhance the safety of the public and firefighters, targeting high-risk populations and mitigating high incidences of death and injury through education campaigns and prevention programs.		FAC	WR
Flood Mitigation Assistance Grant (FMA)	Federal Emergency Management Agency (FEMA)	Funds projects to reduce or eliminate the risk of repetitive flood damage to buildings insured by the National Flood Insurance Program.	RL		
Hazard Mitigation Grant Program (HMGP)	Federal Emergency Management Agency (FEMA)	Provides funding to state, local, tribal, or territorial governments to rebuild with the intention to mitigate future losses due to potential disasters, available after a presidentially declared disaster.		FAC	WR
Noxious Weed Trust Fund Grant	Montana Department of Agriculture (MDA)	Provides funding to combat the spread of noxious weeds, which threaten ecosystems by displacing native species, increasing soil erosion, and diminishing wildlife habitats.	RL		

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Funding Source	Agency/ Organization	Summary	Applicable Cohesive Strategy Category		
			Resilient Landscapes (RL)	Fire Adapted Communities (FAC)	Wildfire Response (WR)
Montana Energy Infrastructure Resilience Grant Program	Montana Department of Environmental Quality (Montana DEQ)	Provides annual grants to enhance the reliability and resilience of electrical grids, focusing on mitigating wildfire risks through fire-resistant technologies, fire prevention systems, and vegetation management.	RL		WR
Forest Pest Management	Montana Department of Natural Resources and Conservation (Montana DNRC)	Supports forest treatments that reduce susceptibility to bark beetle infestations, typically involving thinning and slash treatment to improve forest health and resilience.	RL		
Conservation District Grants	Montana Department of Natural Resources and Conservation (Montana DNRC)	Offers state-funded grants to Montana's 58 conservation districts to conserve natural resources through locally led efforts, supporting on-the-ground projects, educational programming, and innovative conservation practices.	RL	FAC	
Volunteer Fire Capacity (VFC) Program	Montana Department of Natural Resources and Conservation (Montana DNRC)	Provides cost-share grants to rural volunteer fire departments to improve training, acquire wildland personal protective equipment, enhance radio communications, and support the establishment of new fire districts.			WR
Montana Sage Grouse Initiative	Montana Department of Natural Resources and Conservation (Montana DNRC)	Supports private landowners in enhancing sage-grouse habitats while promoting the long-term viability of working farms and ranches, addressing key threats to rangeland health.	RL	FAC	
Cooperative Fire Protection Capacity Grants	Montana Department of Natural Resources and Conservation (Montana DNRC)	Enhances fire suppression capabilities of local governments in Montana, supporting local firefighters in their initial wildland fire attacks.			WR
MACD Communications Assistance	Montana Department of Natural Resources and Conservation (Montana DNRC)	Provides support services to Montana's conservation districts to enhance their communication efforts, including low-cost WordPress websites, professional design services, and technology assistance.	RL	FAC	
Local Government Assistance (LGA)	Montana State Appropriation	Promotes engagement with federal agencies and increases county capacity to reduce wildfire risk and improve forest health, including funding for planning, coordination, and implementation of wildfire mitigation projects.			WR
County Coop Fire Protection Assistance (CCFPA)	Montana State Appropriation & State Fire Suppression Account Transfer	Increases local fire leadership, preparedness, and fire response capabilities, primarily enhancing county capacity or purchasing supplies and systems for effective local wildland fire response.			WR

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Funding Source	Agency/ Organization	Summary	Applicable Cohesive Strategy Category		
			Resilient Landscapes (RL)	Fire Adapted Communities (FAC)	Wildfire Response (WR)
Community Wildfire Protection Plan Grant (CWPP Grant)	Montana State Fire Suppression Fund Account Transfer	Supports the creation or update of a countywide CWPP, enhancing community preparedness and wildfire response strategies.	RL	FAC	WR
Community Catalyst Fund	Montana Watershed Coordination Council (MWCC)	Offers $335,000 in grants to advance conservation and land stewardship efforts, emphasizing partnerships rooted in community collaboration and elevating Indigenous voices.	RL	FAC	
Habitat Restoration and Enhancement Funding	National Fish and Wildlife Foundation	Funds projects to protect fish, wildlife, and plant species and restore habitats, aiming to enhance and restore critical habitats and improve biodiversity.	RL		
Conservation Innovation Grants (CIG)	Natural Resources Conservation Service (NRCS)	Stimulates the development and adoption of innovative conservation approaches and technologies on private lands, leveraging federal investment in environmental enhancement and protection.	RL		
Emergency Watershed Protection Program (EWP)	Natural Resources Conservation Service (NRCS)	Provides technical and financial assistance to help communities address immediate threats to life and property caused by natural disasters such as floods, wildfires, and windstorms.	RL		
Environmental Quality Incentives Program (EQIP)	Natural Resources Conservation Service (NRCS)	Helps producers install measures to protect natural resources while ensuring sustainable production on their farms, ranches, and working forest lands.	RL		
Montana Forest Action Plan Grant Program (MFAP Grant)	Montana State Fire Suppression Account Transfer	Implements cross-boundary innovative projects that align with priority areas identified in the Montana Forest Action Plan, Statewide Wildfire Risk Assessment, or local CWPP.	RL		
Mission West	Town of Superior	Collaborates with local, state, and federal agencies to provide community development tools and financial resources to Lake, Mineral, and Sanders counties, focusing on sustainable economic development and honoring regional culture and history.	RL	FAC	WR
Forest Legacy Program (FLP)	U.S. Forest Service (USFS)	Conserves environmentally and economically significant forested areas through conservation easements or land purchases, protecting forest lands from conversion to non-forest uses.	RL		
Volunteer Fire Assistance Grant (VFA)	U.S. Forest Service (USFS)	Provides funding for rural fire departments and fire councils for radio communications equipment, wildland personal protective equipment, wildland equipment and water handling, wildland training, and fire department organization and planning.			WR
Volunteer Fire Capacity (VFC)	U.S. Forest Service (USFS)	Similar to VFA, this grant provides funding for rural fire departments and fire councils for radio communications equipment, wildland personal protective equipment, wildland equipment and water			WR

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Funding Source	Agency/ Organization	Summary	Applicable Cohesive Strategy Category		
			Resilient Landscapes (RL)	Fire Adapted Communities (FAC)	Wildfire Response (WR)
		handling, wildland training, and fire department organization and planning.			
Western States Wildland Urban Interface Grant Program (WUI Grant)	U.S. Forest Service (USFS)	Protects communities within the WUI through outcome-driven, cross-boundary, innovative projects that align with priority areas identified in the Montana Statewide Wildfire Risk Assessment.	RL	FAC	
Landscape Scale Restoration (LSR)	U.S. Forest Service (USFS)	Supports restoration projects that reduce the risk of uncharacteristic wildfires, improve fish and wildlife habitats, improve water quality and watershed function, and mitigate invasive species.	RL		
Community Wildfire Defense Grant - CWPP (CWDG Program)	U.S. Forest Service (USFS)	Supports the creation or update of a countywide CWPP if the CWPP is more than 5 years old, helping communities develop comprehensive wildfire preparedness and response plans.	RL	FAC	WR
Community Wildfire Defense Grant Implementation (CWDG Implementation)	U.S. Forest Service (USFS)	Protects communities through the implementation of outcome-driven, cross-boundary, innovative projects that align with priority areas identified in the Montana Statewide Wildfire Risk Assessment and are outlined in a current CWPP.	RL	FAC	
Hazardous Fuels	U.S. Forest Service (USFS)	Focuses on hazardous fuels treatments in high-priority areas adjacent to National Forest System lands, aiming to reduce wildfire risk and enhance firefighter safety.	RL	FAC	
Community Wildfire Defense Grant (CWDG)	U.S. Forest Service (USFS)	Helps communities plan and implement wildfire protection strategies, providing grants to develop or revise CWPPs and carry out projects described within those plans.	RL	FAC	WR
Emergency Conservation Program (ECP)	USDA Farm Service Agency	Assists farmers and ranchers in repairing damage to farmlands caused by natural disasters and installing methods for water conservation during severe drought.	RL		
Emergency Forest Restoration Program (EFRP)	USDA Farm Service Agency	Provides financial assistance to non-industrial private forest owners to help restore forest health after natural disasters, supporting activities like debris removal, tree planting, and erosion control.	RL		

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CHAPTER 5 – MONITORING AND EVALUATION

An essential step in implementing the Mineral County CWPP is to develop an action plan and assessment strategy that outlines roles, responsibilities, funding needs, and timelines for completing priority projects. Chapter 5 provides tentative timelines and monitoring protocols for these projects, detailed below.

In Montana, effective wildfire risk reduction requires more than initiating projects—it necessitates a commitment to continuous monitoring and improvement (Montana DNRC 2022). For Mineral County, implementing the CWPP will be an iterative, learning-centered process. As projects are carried out, the CWPP team and partners will assess progress, adapt to challenges, and identify new priorities based on changing community needs. The ongoing cycle of cooperative planning, action, and reflection will ensure the CWPP remains relevant and responsive. Feedback from the community, including success and challenges, will be essential to inform the future direction of this plan, fostering resilience over time.

The CWPP uses the ArcGIS Hub platform for digital mapping, which includes a project tracking tool and a public-facing dashboard. This system makes it easier for Mineral County to monitor progress of CWPP goals, improve transparency, and streamline data management. Local agencies, such as Montana DNRC and FireSafe Montana, can continue to provide technical assistance or guidance in maintaining and optimizing these digital tools (FireSafe Montana 2009, Montana DNRC 2022). Designating a representative from the County or Core Team to serve as map coordinator to manage updates, ensure data accuracy, and oversee accessibility for practitioners, policymakers, and the public is an important step for effective CWPP implementation and tracking. For additional information reference the Hub Site and Project Tracking Application section below.

Strong local collaboration has been key to successful wildfire mitigation efforts across Montana (Montana DNRC 2022). Mineral County's CWPP would benefit from forming a collaborative, community-based monitoring group, such as a fire safe council. Examples of similar groups include FireSafe Flathead and the Missoula Area CWPP Working Group, where community members, local agencies, and interest groups come together to share expertise, address challenges, and leverage resources for CWPP implementation (Montana DNRC 2022). Engaging diverse stakeholders—such as landowners, conservation groups, emergency management, and local businesses—ensures that community knowledge and priorities are central to monitoring and adapting CWPP efforts (Montana DNRC 2022).

In Mineral County, an annual review process involving community members and key stakeholders will provide a regular forum for discussing CWPP progress, reviewing lessons learned, and adapting priorities (Montana DNRC 2022). This review will include both quantitative measures, such as acres treated or numbers of homes protected, and qualitative assessments of community resilience and preparedness levels (Montana DNRC 2022). Regular feedback from local partners and residents (Figure 5.1) will allow the CWPP team to refine approaches, making the CWPP a living document that evolves with the community's needs and resources.

Table 5.1 outlines monitoring strategies assessing the progress of various CWPP goals, including measures for wildfire risk reduction, community outreach, economic impacts, and ecosystem resilience. These strategies incorporate both locally relevant quantitative metrics—such as acres treated by fuel type or the number of HIZs established—and qualitative observations that track progress in community education, agency collaboration, and emergency preparedness.

Table 5.1. Recommended Monitoring Strategies

Strategy	Task/Tool	Lead	Remarks
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	Core Team member	Relatively low 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	Core Team member	Evaluating costs, potential fire behavior
Number of HIZs/defensible space treated to reduce structural ignitability	GPS	Homeowner	Structure protection
Number of residents/citizens participating in any CWPP projects and events	Meetings, media interviews, articles	Core Team member	Evaluate shifts in community attitudes and engagement Annual lessons learned review encouraged among stakeholders
Number of homes assessed for wildfire risk	Montanan DNRC tracking tool	Montana DNRC	Evaluate objectives Annual lessons learned review encouraged among stakeholders
Number of jobs created, contracts, grants	Census data and county records	Core Team member	Evaluate local job growth
Education outreach: number, kinds of involvement	Workshops, classes, field trips, signage	Core Team member	Evaluate objectives Annual lessons learned review encouraged among stakeholders
Emergency management: changes in agency response capacity	Collaboration, grants to fund fire department needs such as new personnel and equipment	Agency representative	Evaluate mutual aid Annual review
Codes and policy changes affecting CWPP	Qualitative	Core Team	CWPP changes
Number of stakeholders	Added or dropped	Core Team	CWPP changes

Strategy	Task/Tool	Lead	Remarks
Wildfire acres burned, human injuries/fatalities, infrastructure loss, environmental damage, suppression, and rehabilitation costs	Wildfire records	Core Team	Compare with 5- or 10-year averages

Figure 5.1. Mineral County stakeholders and forest professionals assessing a recently completed fuels treatment project.

Source: Mineral County Resource Coalition (n.d.).

FUELS TREATMENT MONITORING

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 work? Items to consider include soil movement and/or invasive species encroachment post-treatment. Relatively cost-effective monitoring may help reduce long-term costs and consequences.

- Vegetation will grow back. Thus, fuel break maintenance and fuels modification both in the HIZ 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. Adaptive management is a term that refers to adjusting future management based on the

effects of past management. Monitoring is required to gather the information necessary to inform future management decisions. Economic and legal questions may also be addressed through monitoring. In addition, monitoring activities can provide valuable educational opportunities for students.

The monitoring of each fuels reduction project would be site specific, and decisions regarding the timeline for monitoring and the type of monitoring to be used would be determined by the project. Monitoring schedules will be developed utilizing knowledge of past projects that employed best practices to achieve similar goals. These schedules may also be adjusted to accommodate special requirements for the targeted landscape as well as the responsible party. The most important part of choosing a fuels project monitoring program is selecting a method appropriate to the people, place, and type of project. Several levels of monitoring activities meet different objectives, have different levels of time intensity, and are appropriate for different groups of people. They include the following:

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

Appropriate for many individual homeowners who conduct fuels reduction projects on their properties.

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 the level of detail needed to analyze the management objectives. This method is appropriate for foresters or other personnel monitoring fuel treatments on forested land.

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.

HUB SITE AND PROJECT TRACKING APPLICATION

Within the Mineral County CWPP hub site, https://mineral-county-cwpp-hub-site-mineralcoehp.hub.arcgis.com/, an interactive web-based tool serves as a central platform for the Core Team and stakeholders to access and share project updates, timelines, and homeowner resources. The Mineral County Project Tracking Application, housed on the CWPP hub site is designed to be used by local land managers to collaboratively track and manage project progress in a streamlined and efficient manner. It supports both planned and implemented projects while providing real-time updates to the public and facilitating multiagency coordination.

The tracking system is designed for internal use by the Core Team and partner agencies, with a public-facing dashboard that enhances transparency. The system offers 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 may contain project information such as acres treated, dollars spent, homes assessed, and public outreach events conducted. The monitoring strategies outlined in Table 5.1 can be applied to complete and proposed mitigation projects in conjunction with the project tracking application.

IMPLEMENTATION

The 2025 Mineral County CWPP makes recommendations for prioritized fuels reduction projects, measures to reduce structural ignitability, and methods with which to carry out public education and outreach. Implementation projects need to be tailored to the specific project and will be unique to the location depending on available resources and regulations. As aforementioned, on-the-ground implementation of the recommendations in the 2025 Mineral County CWPP planning area will require development of an action plan and assessment strategy for completing each project. This step will identify the roles and responsibilities of the people and agencies involved, as well as funding needs and timetables for completing the highest-priority projects (SAF 2004). Information pertaining to funding is provided in Appendix G.

CWPP EVALUATION

CWPPs are intended to reduce the risk from wildfire for a community and surrounding environment. However, over time, communities change and expand, vegetation grows back, and forests and wildlands evolve. As such, the risk of wildfire to communities is constantly changing. The plans and methods to reduce risk must be dynamic to keep pace with the changing environment. An evaluation of the CWPP will gather information and identify whether the plans and strategies are on course to meet the desired outcomes or if modifications are needed to meet expectations.

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SWCA® ENVIRONMENTAL CONSULTANTS | STEPS TO EVALUATE A CWPP

1 IDENTIFY OBJECTIVES:
What are the goals identified in the plan?
How are they reached? Is the plan performing as intended?

- Structural ignitability
- Fuel treatments (landscape and home ignition zone)
- Public education and outreach
- Multi-agency collaboration
- Emergency notifications/response

2 ASSESS THE CHANGING ENVIRONMENT:
How have population characteristics and the wildfire environment changed?

Population change
- Increase or decrease
- Visitor levels
- Demographics

Population settlement patterns
- Distribution
- Expansion into the WUI

Vegetation
- Fuel quantity and type
- Drought and disease impacts

3 REVIEW ACTION ITEMS:
Are actions consistent with the plan's objectives?

- Check for status, i.e., completed/started/not started
- Identify completed work and accomplishments
- Identify lessons learned, challenges, and best practices
- Identify next steps congruent with other hazard mitigation planning efforts

4 ASSESS RESULTS:
What are the outcomes of the action items?

Multi-agency collaboration
- Who was involved in the development of the CWPP?
- Have partners involved in the development process remained involved in the implementation?
- How has the planning process promoted implementation of the CWPP?
- Have CWPP partnerships and collaboration had a beneficial impact to the community?

Risk-hazard assessment
- How is the risk-hazard assessment utilized to make decisions about fuel treatment priorities?
- Have there been new wildfire-related regulations?
- Are at-risk communities involved in mitigating wildfire risk?

Hazardous fuels
- How many acres have been treated?
- How many projects are cross-boundary?
- How many residents have participated in creating defensible space?

Structural ignitability
- Have there been updates to fire codes and ordinances?
- How many structures have been lost to wildfire?
- Has the CWPP increased public implementation of structural ignitability and hazard reduction strategies?

Public education and outreach
- Has public awareness of wildfire and mitigation strategies increased?
- Have residents, visitors, and second homeowners been involved in wildfire mitigation activities?
- Has there been public involvement?
- Have vulnerable populations been involved?

Emergency response
- Has the CWPP been integrated into relevant plans (e.g., hazard mitigation or emergency operations)?
- Is the CWPP congruent with other hazard mitigation planning efforts?
- Has availability and capacity of local fire departments changed since the CWPP was developed?
- Have egress routes been publicized and mitigated?

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, there are several triggers that may warrant a plan update before the 5-year mark. Among these triggers are extensive wildfire or other disaster event, changes to the local planning outlook (e.g., significant update to the Hazard Mitigation Plan), and local adoption of the international WUI code. The Core Team members are encouraged to meet on an annual basis to review the project list, discuss project successes, strategize regarding project implementation funding, and determine whether there is a need for plan revision.

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CHAPTER 6 – HOMEOWNER ACTIONS
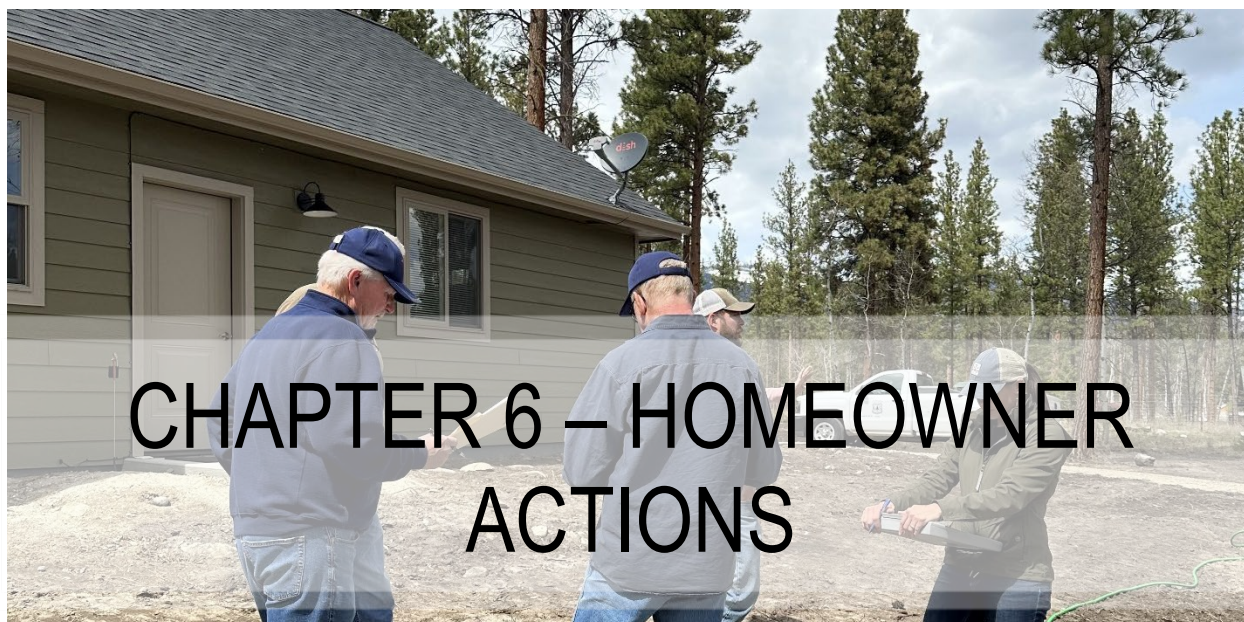
Community wildfire resilience begins at home, where homeowners and occupants can take proactive steps in safeguarding their properties, and protecting the lives of residents, emergency responders, and the other valued resources. Homeowners are capable of significantly reducing the risk of wildfire damage through practical measures such as home hardening, which aims to reduce a home's ignitability, and by creating defensible space throughout the property and within the home ignition zone (HIZ), preventing the likelihood of flames and embers reaching and igniting structures.

The following includes comprehensive guidance on creating defensible space, utilizing local, state, and national resources, and preparing the household for potential evacuation. Financial constraints and the complexity of mitigation can often pose significant obstacles for homeowners, so included are several resources and recommendations at varying levels of effort designed to support these actions. By taking these actions, one can not only protect their own property but also contribute to the broader effort of ensuring community safety and resilience in the face of wildfire threats.

Various financial assistance options are available to Mineral County and Montana homeowners, including cost-sharing programs, grants, and technical assistance. These programs are designed to alleviate the financial burden of implementing wildfire mitigation practices, making it more feasible for property owners to take proactive measures.

DEFENSIBLE SPACE

Defensible space is perhaps the fastest, most cost-effective, and most reliable means of reducing the risk of loss of life and property. Although fire agencies can be valuable in providing guidance and assistance, creating defensible space is the responsibility of the individual homeowner.

Effective defensible space consists of creating an essentially fuel-free zone adjacent to the home, a treated secondary zone that is thinned and cleaned of surface fuels, and (if the parcel is large enough) a transitional third zone that connects to wildland areas (Figure 6.1). These components work together in a proven and predictable manner. Zone 1, the immediate zone, (0–5 feet from main structure) keeps fire from burning directly to the home; Zone 2, the intermediate zone (5–30 feet from main structure) reduces the adjacent fire intensity and the likelihood of torching, crown fire, and ember production; and Zone 3,

the extended zone (30–100 feet from main structure) does the same at a broader scale, reducing fire momentum by maintaining a more natural, historic condition (see Figure 6.1). Defensible space actions are described as general recommendations for homeowners. However, residents are encouraged to seek out site-specific recommendations from local wildfire experts. Experts can assess homes on an individual basis to maximize the quantity of native vegetation maintained and preserved in an area while still creating an area of defensible space for fire mitigation. The Montana DNRC provides free home risk assessments, See "State Resources" below for more information.

For a more in-depth description of each HIZ (immediate, intermediate, and extended), including the purpose and treatment recommendations for each HIZ, please refer Table 6.1 below.

> The Casualty Actuarial Society 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" (Casual Actuarial Society 2022).
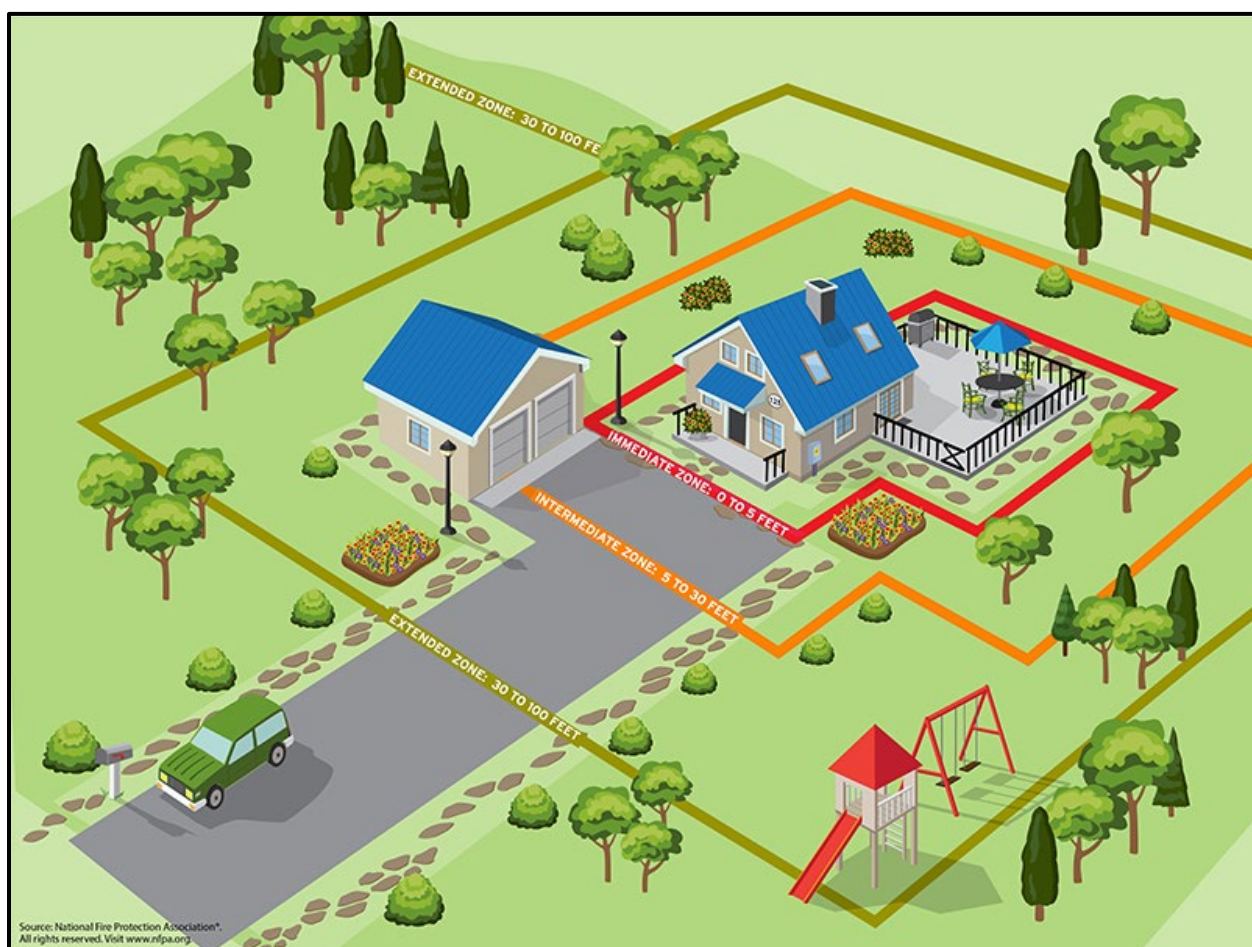
Figure 6.1. Defensible space zones providing clearance between a structure and adjacent woodland or forest fuels.

Source: NFPA (2022)

Table 6.1. Description and Treatment Recommendations for each Home Ignition Zone

Zone	Distance from Structure	Primary Objective	Purpose of Treatment	Key Recommendations
Immediate Zone (Zone 1)	0–5 feet	Prevent direct flames and embers from reaching the home	Minimize the chance of flames or embers igniting the home by reducing all nearby flammable materials	• Use fire-resistant materials like gravel, stone, or concrete in this zone. • Remove all flammable vegetation, mulch, and debris from around the home's perimeter. • Regularly clean pine needles, leaves, and debris from roofs, gutters, and decks. • Store firewood, propane tanks, and other combustibles well outside this area. • Prune tree branches that overhang the roof or are within 10 feet of the chimney.
Intermediate Zone (Zone 2)	5–30 feet	Reduce fire intensity as it approaches the home	Create breaks in vegetation to slow down the fire's spread and reduce its strength before it reaches the house	• Mow grasses to keep them under 4 inches tall. • Thin trees to ensure at least 10 feet of space between their outer branches. • Remove smaller plants beneath trees to prevent fire from spreading upward into the canopy. • Prune lower branches to 6–10 feet from the ground, or one-third of the tree's height. • Remove dead or dying trees and highly flammable shrubs, like juniper, to prevent them from fueling the fire.
Extended Zone (Zone 3)	30–100 feet	Maintain lower fire intensity and improve forest health	Thin trees and manage forested areas to keep fires from intensifying and promote a healthier, more resilient landscape	• Keep at least 6–10 feet of space between tree crowns to slow the fire's spread. • Prune lower branches and remove ladder fuels to prevent fire from climbing into the treetops. • Use slash treatment methods like piling and burning, mulching, or removing to manage dead vegetation. • Thin trees and vegetation to create natural openings, helping to slow the fire's movement. • Collaborate with neighbors to create defensible space beyond your property line if needed.

HOME HARDENING

To safeguard your home from embers during wildfires, it is crucial to recognize that exterior vegetation is not the sole source of fuel for these embers. Wildfires can spread between structures and wildland vegetation or from structure to structure. Property owners with structures that are close together may find that hardening their home is the most effective option if there aren't options to manage exterior vegetation. Fortifying or retrofitting your home serves as a strong defense against ember intrusion. Beginning protection measures by starting from the house and moving outward is an excellent strategy for maximizing the value of mitigation actions. Use fire-resistant building materials, conduct regular maintenance, and address issues that may ignite the home due to embers to begin effectively mitigating

the home from wildfire (Sustainable Defensible Space 2024). Table 6.2 provides examples of different home hardening investments.

Table 6.2. Homeowner Actions for Reducing Structural Ignitability

Limited Investment
Check fire extinguishers and have a 100-foot hose ready.
Maintain defensible space; work with neighbors on fuel mitigation.
Ensure house numbers are clearly visible from the street.
Keep wood fences free of combustibles; use noncombustible connectors.
Store propane, grills, and firewood away from structures.
Keep a 5-foot perimeter around the home clear of combustibles.
Remove debris from under decks; enclose when possible.
Stack firewood at least 30 feet from the house.
Prioritize mitigation starting on the windward side of your property.
Keep gutters clear of debris to prevent ember collection.
Maintain and repair roofs to close gaps and replace damaged shingles.
Use a NOAA weather alert radio for fire weather updates.

Moderate Investment
Choose noncombustible landscaping materials and keep flammable plants trimmed and spaced.
Limb trees 6 feet from the ground and maintain 18-foot crown spacing in the HIZ.
Clear vegetation around sheds, garages, and outbuildings to prevent ignition.
Maintain clear, accessible driveways for evacuation and emergency response.
Add a gravel turnaround for fire response vehicles.
Install a roof irrigation system.

High Investment
Install fire-resistant xeriscaping.
Screen vents with 1/8–1/16 inch noncombustible mesh.
Enclose open spaces under manufactured homes with noncombustible skirting.
Build a noncombustible barrier between the home and wildland fuels.
Install fire-resistant soffits and under-eave vents.
Upgrade exterior windows and skylights to tempered or multi-layered glass.
Replace the roof with Class A fire-resistant materials.
Upgrade exterior walls with fire-resistant materials.
Relocate propane tanks underground.

Note that the level of investment and average costs will vary by action item based on a multitude of factors including location, structure complexity, quality of materials, and local building codes and regulations, as well as preferences and scope of work.

For more information and additional components surrounding home hardening activities for increasing wildfire resilience, reducing structural ignitability, and preparing for wildfires, please visit: https://wildfireprepared.org/.

For an example of a 5-year phased approach to mitigating home ignitability for Mineral County residents, please refer to the Home Ignition Zones and Defensible Space section in Appendix D.

Upgrading Components to Reduce Structural Ignitability

Roof

The roof is identified as the most vulnerable component during wildfires as it is most likely to ignite due to embers. Roofs with complex designs—such as those with multiple ridges, valleys, dormers, or intersecting sections—are particularly exposed to risk due to their increased surface area and numerous pockets where embers can accumulate. Evaluating the vulnerability of the roof is important for new homes or remodeling projects, and proper maintenance—such as clearing debris from gutters and valleys—further reduces ignition risk (Sustainable Defensible Space 2024).

Upgrading an existing structure's roof with Class A rated fire-resistant material such as metal is recommended. Blocking spaces between roof decking (Figure 6.2) and covering chimneys with noncombustible screens are good steps to reduce ignitability. Lastly, regular maintenance and professional inspections ensure a home's resilience to ember intrusion and wildfire exposures (Sustainable Defensible Space 2024).
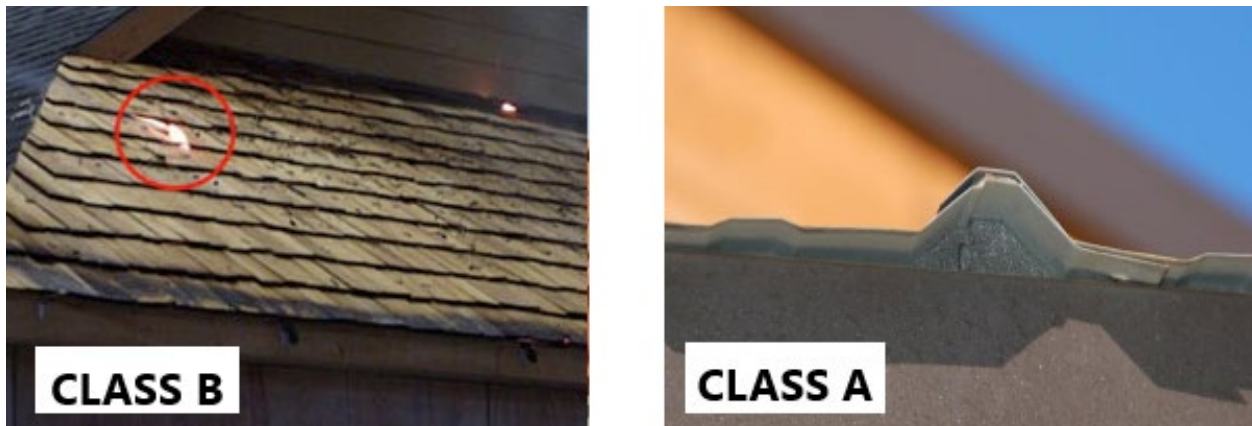
Figure 6.2. Examples of an untreated wood shake roof (Class B) that can accumulate flammable debris (left) and a less-ignitable metal roof filled with noncombustible insulation (Class A) (right).
Source: IBHS (2024).

Gutters

Dry debris left in gutters, when ignited by embers, can lead to flames reaching the roof edge and adjacent siding. Installing noncombustible leaf guards over gutters, using noncombustible materials for gutters and downspouts (such as galvanized steel, copper, and aluminum), and incorporating a drip edge are all recommended actions to minimize ignitability (Figure 6.3). The drip edge serves the dual purpose of protecting the roof edge from flaming exposures and minimizing ember entry into roof undersides by blocking gaps between the roof sheathing and the top of the fascia. If upgrades to the gutter system are

not possible then cleaning gutters annually is still effective in reducing wildfire ignitions (Sustainable Defensible Space 2024).

Figure 6.3. Examples of an uncovered gutter at risk of ignition (left) due to flammable tree debris, and a less-ignitable gutter (right) with a noncombustible gutter guard.
Source: IBHS (2024)

Vents

Roof vents, vital for attic air circulation and moisture control, are highly vulnerable to flames and embers. While shutters and metal screens help prevent ember entry, they don't fully protect against wildfire-generated hot gases. Additional protection involves considering fire dampers in HVAC ducts, which automatically close in high heat. Addressing vent vulnerabilities is crucial for fire resistance in new construction. For existing construction, reducing vulnerability to wildfires and embers requires retrofitting the structure with ember-resistant vents (Sustainable Defensible Space 2024). Standard ember-resistant vents are 1/8-inch screens of noncombustible, corrosion-resistant metal (Figure 6.4) (Wildfire Partners 2024).

Figure 6.4. Examples of a bad vent (left) with 1/4-inch mesh that is ineffective at preventing ember incursion, and a good vent (right) that has 1/8-that mesh to help prevent embers from entering the home.
Source: Wildfire Partners (2024)

Walls, Sidings, and Coatings

Exterior walls are vulnerable to direct flames, conductive heat, and radiant heat. Solid wood and wood composite wall coverings can ignite, leading to fire potentially spreading to other components and causing substantial damage (Figure 6.5). Windborne embers and firebrands are common ignition sources trapped in wall cracks. Recommended materials include concrete, fiber-cement panels, pressure-impregnated fire-retardant treated wood, traditional stucco, masonry, and metals. Materials to avoid are non-treated wood siding and vinyl siding. Creating a 6-inch noncombustible area at the siding base minimizes ignition risk. For upgraded construction, using nonflammable materials to replace current coverings, and removing combustible debris in proximity to exterior walls on a regular basis are both recommended (Sustainable Defensible Space 2024).

Figure 6.5. A two-sided wall showing a wood-composite siding material (left side) and a noncombustible fiber-cement product (right side). A burning brand was used to ignite both sides; the right side made of noncombustible material did not incur significant damage from the flames.
Source: Quarles et al. (2010).

Windows

Windows, sliding glass doors, and skylights play a crucial role in preventing the ignition of a home's interior due to windborne embers, hot gases, and radiant heat. The recommendations for new constructions include using tempered glass with low-e coatings or proprietary reflective coatings, insulated glazing units (IGU), and solid metal frames. Exterior window shutters are advised for added protection, particularly solid metal shutters. Dome skylights are preferred for low-slope roofs, while flat skylights on steep-slope roofs should feature dual-pane systems. When upgrading existing construction, it is essential to replace susceptible windows, door vision panels sliding glass doors, and skylights with fire-resistant materials in accordance with the previously mentioned recommendations (Sustainable Defensible Space 2024).

Doors

Safeguarding exterior doors, including garage doors, against ember intrusion or radiant heat is crucial in wildfire zones. Fire-rated doors with a solid, noncombustible mineral core are recommended. Installing adjustable weatherstripping and an automatic door bottom or threshold weatherstripping enhances

protection. Insulated, metal garage doors with tested weatherstripping and noncombustible exterior trim further fortify the structure (Sustainable Defensible Space 2024).

When upgrading existing construction, reinforcing existing doors, adding weatherstripping, replacing vision panels, upgrading sliding glass doors and replacing wooden garage doors, it is recommended to increase the resilience of the home's openings and reduce heat transmission (Sustainable Defensible Space 2024).

Fences and Decks

Fences and decks pose varying fire risks and play a crucial role due to their proximity to house siding, windows and sliding doors. Wooden fences and decks can ignite and spread fire to the home. A metal plate at the fence-wall connection is suggested, but long-term moisture-related issues may arise. Considerations for increased fire safety include keeping combustible components at a distance and avoiding fences with gaps; careful vegetation selection and regular maintenance are emphasized. Additionally, back-to-back fencing should be avoided because it can trap debris and cause embers to ignite both fences, creating a more intense fire if the fuels around them ignite (Figure 6.6). It is also crucial to avoid storing combustible materials beneath the deck. For upgrading construction, ensure that precautions are made, following the above recommendations, and ensure that materials used adhere to up-to-date building codes (Sustainable Defensible Space 2024).

Figure 6.6. Example of combustible back-to-back fencing ignited by the fuels between and around them.
Source: IBHS (2024)

Specific recommendations should be based on the hazards adjacent to a structure such as slope steepness and fuel type. Firewise guidelines are excellent resources but creating defensible space does not have to be an overwhelming process. The National Fire Protection Association (NFPA) offers a free Community Wildfire Risk Assessment Tutorial and an online learning module: Understanding the Wildfire Threat to Homes. Both tools are great resources for learning about, and implementing, defensible space.

LOCAL RESOURCES

NORTHWEST MONTANA HAZARDOUS FUELS PROGRAM

The Northwest Montana Hazardous Fuels Program provides significant financial assistance to homeowners for wildfire mitigation efforts (FireSafe Montana 2024). By participating in this cost-share program, landowners can receive support to implement Firewise practices, create defensible space, and treat hazardous fuels on their properties (FireSafe Montana 2024). The process begins with contacting the program office, after which a Community Forester will visit the property, recommend treatments, and estimate costs. Homeowners can then proceed with the recommended treatments, which generally involve thinning and pruning trees, as well as disposing of woody fuels. The program covers a portion of these costs, allowing homeowners to meet their cost-share requirements through cash payments or in-kind contributions, such as their labor. Once the work is completed and inspected, homeowners receive reimbursement for their expenses (FireSafe Montana 2024).

This program not only helps reduce the risk of wildfire but also increases the effectiveness of emergency fire response personnel in protecting lives and properties.

For more information and to check eligibility, homeowners can contact the Northwest Montana Hazardous Fuels office or fill out an application form here: https://firesafemt.org/northwest-montana-hazardous-fuels-program.

HAZARDOUS FUELS REDUCTION GRANT

The Bitter Root Resource Conservation and Development Area, Inc. (Bitter Root RC&D) is a 501(c)(3) nonprofit organization that offers a Hazardous Fuels Reduction Grant to assist private landowners in Mineral, Missoula, and Ravalli Counties in reducing wildfire risks on their forested properties. This program provides financial assistance for projects such as thinning, pruning, and creating defensible space around homes, enhancing forest health, and mitigating the potential for severe wildfires (Bitter Root RC&D 2024). In Mineral County, the grant features a 75:25 cost-share if the landowner hires a contractor to perform the work, meaning the grant covers 75% of the contractor costs. If the landowner elects to complete the work independently, the cost-share is 50:50, ensuring flexibility while maintaining significant financial support (Bitter Root RC&D 2024).

Applications are accepted year-round and evaluated based on criteria such as proximity to National Forest land, location within high-risk wildfire areas, and collaborative efforts among landowners or communities. Interested individuals can access application forms and additional information on eligibility at www.bitterrootrcd.org/hazardous-fuels-reduction (Bitter Root RC&D 2024).

For further inquiries or assistance with the application process, contact the Mineral County Community Forester at https://www.bitterrootrcd.org/ (Bitter Root RC&D 2024).

SUPERIOR RANGER DISTRICT FIRE PREVENTION

The Superior Ranger District Fire Prevention Program provides comprehensive local fire information and support for residents in Mineral County. The district provides an online system for obtaining and managing burn permits, making it easier and safer for residents to conduct outdoor burning. Additionally,

free home assessments are available to help homeowners enhance their resilience to wildfire (Town of Superior 2022).

For more information visit Superior's Fire Information page here: https://townofsuperiormontana.org/fire-information/.

Mineral County residents can also contact the local Superior Ranger District at 406-822-4322, or the Superior dispatch office at 406-822-3555.

STATE RESOURCES

MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION HOME WILDFIRE RISK ASSESSMENT

The Montana DNRC offers free home wildfire risk assessments to help Montana residents prepare their properties for the threat of wildfires. These assessments are conducted by local fire professionals who visit homes to evaluate the immediate surroundings and provide specific recommendations on reducing wildfire risk (Montana DNRC 2024a). Homeowners receive actionable advice on creating defensible space, reducing flammable materials, and planning for potential evacuations (Montana DNRC 2024a).

To schedule a home wildfire risk assessment, homeowners need to fill out a request form available on the Montana DNRC website. During the visit, the fire professional will address any questions homeowners may have about living with wildfire risks in Montana. Information from these assessments is kept confidential and shared only with the homeowner and emergency responders to ensure privacy and safety (Montana DNRC 2024a).

For additional information on the Montana DNRC's free home wildfire risk assessments and request forms, please visit: https://dnrc.mt.gov/Forestry/Resources/request-a-site-visit

NATIONAL RESOURCES

ENVIRONMENTAL QUALITY INCENTIVES PROGRAM

The Environmental Quality Incentives Program (EQIP), administered by the NRCS, supports homeowners with financial and technical assistance to mitigate wildfire risks through a "Focused Conservation" strategy (USDA 2024a). This approach utilizes TIPs tailored to local county plans, ensuring effective implementation of conservation practices. Key initiatives include the Conservation Incentive Contracts, Community Agriculture Initiative, Joint Chiefs' Landscape Restoration Partnership Projects, and various wildlife and water quality improvement projects (USDA 2024a). Homeowners can apply continuously, with specific ranking dates for funding evaluations, to implement practices like creating defensible space and reducing hazardous fuels around their properties.

For additional information on Montana's programs funded by EQIP and upcoming application dates, please visit: https://www.nrcs.usda.gov/conservation-basics/conservation-by-state/montana/montana-programs-and-application-dates.

FOREST HEALTH TARGETED IMPLEMENTATION PLAN

The Forest Health Targeted Implementation Plan (TIP) is an initiative aimed at enhancing forest health and productivity while reducing wildfire hazards in Mineral County (Natural Resources Conservation Service [NRCS] 2021). Scheduled from fiscal year 2022 through 2026, this plan addresses critical resource concerns related to plant productivity and health (NRCS 2024). By implementing a robust set of conservation practices, the TIP aims to mitigate wildfire risks and control noxious weeds, thereby bolstering community resilience against wildfires (NRCS 2021).

Currently, the NRCS is implementing the Packer Creek TIP. The Packer Creek TIP complements the USFS's Cruzane Mountain Project and engages a diverse group of landowners and partners through grassroots outreach and collaborative efforts (NRCS 2021). By participating in the Packer Creek Forest Health TIP, Mineral County residents can proactively improve the health and productivity of their forested lands while reducing wildfire hazards. The financial assistance and technical guidance provided through this program empower homeowners to take vital actions that contribute to a safer and more resilient community, protecting both lives and properties from the devastating effects of wildfires.

Applications are accepted on a rolling basis, with the NRCS setting specific ranking dates to evaluate and prioritize projects, ensuring that those with the highest potential impact receive the necessary funding and support. For more information on NRCS TIP programs, conservation practices offered, when to apply, and local ranking questions, please visit: https://www.nrcs.usda.gov/programs-initiatives/eqip-environmental-quality-incentives/montana/packer-creek-forest-health-tip

CONSERVATION STEWARDSHIP PROGRAM

The Conservation Stewardship Program (CSP) offers valuable resources and financial support to homeowners looking to implement defensible space and HIZ treatments. Administered by the NRCS, CSP helps landowners develop tailored conservation plans that not only enhance property productivity but also contribute to wildfire mitigation efforts. Participants earn CSP payments based on their conservation performance, with higher performance yielding higher payments. Homeowners can select from a list of core climate-smart mitigation activities and supporting enhancements tailored to their specific needs (USDA 2024b).

For more information on eligible practices, enhancements, and applications, please visit: https://www.nrcs.usda.gov/programs-initiatives/csp-conservation-stewardship-program/montana/conservation-stewardship-program.

U.S. FIRE ADMINISTRATION WUI TOOLKIT

The U.S. Fire Administration (USFA) is an entity of the U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) that aids in the preparation for and response to fire. Their WUI toolkit consists of a list of websites and other information regarding risk assessments, public outreach, and community training. Find the toolkit here: https://www.usfa.fema.gov/wui/.

SWCA

NATIONAL FIRE PROTECTION ASSOCIATION/ INSURANCE INSTITUTE FOR BUSINESS AND HOME SAFETY RESOURCES

National Fire Protection Association

The NFPA is a global nonprofit organization devoted to eliminating death, injury, property, and economic loss due to fire, electrical, and related hazards. Its 300 codes and standards are designed to minimize the risk and effects of fire by establishing criteria for building, processing, design, service, and installation around the world.

The NFPA develops easy-to-use educational programs, tools, and resources for all ages and audiences, including Fire Prevention Week, an annual campaign that addresses a specific fire safety theme. The NFPA's Firewise Communities program (www.firewise.org) encourages local solutions for wildfire safety by involving homeowners, community leaders, planners, developers, firefighters, and others in the effort to protect people and property from wildfire risks (NFPA 2023).

The NFPA is a premier resource for fire data analysis, research, and analysis. The Fire Analysis and Research Division conducts investigations of fire incidents and produces a wide range of annual reports and special studies on all aspects of the nation's fire problem.

Evacuation Guide for People with Disabilities: https://www.nfpa.org/downloadable-resources/guides-and-manuals/evacuation-guide-pdf.

Insurance Institute for Business and Home Safety

Protect Your Home

- Critical Home Preparation: https://ibhs.org/wildfireready/.

- Exterior Home Upgrades: https://ibhs.org/wildfirereadyhomeupgrades/.

- Create a Wildfire Resistant Yard: https://ibhs.org/wildfirereadyhomedefensiblespace/.

- Home Preparation Checklist: https://wildfireprepared.org/wp-content/uploads/WPH-How-To-Prepare-My-Home-Checklist.pdf.

- Wildfire Prepared Home (free online assessment): https://wildfireprepared.org/wildfire-prepared-home-base-assessment/.

- Homeowner Articles and Testimonies: https://wildfireprepared.org/homeowner-articles/.

- Applications for Wildfire Prepared Certifications: https://wildfireprepared.org/get-started/.

Prepare for Evacuation

- Prepare Your Home for Evacuation: https://ibhs.org/ibhs-in-the-news/prepare-your-home-for-evacuation-from-wildfire/.

- Home Evacuation Steps: https://ibhs.org/wildfirereadyhomeevacuation/.

MISCELLANEOUS

- Wildfire Evacuation Checklist: https://www.usfa.fema.gov/downloads/pdf/publications/wildfire-evacuation-checklist.pdf.

- The following resources may also provide helpful information for funding opportunities:

  o Western Forestry Leadership Coalition: https://www.thewflc.org/.

  o USDA Information Center: https://www.nal.usda.gov/main/information-centers.

  o USFS Fire Management website: https://www.fs.usda.gov/science-technology/fire.

  o National Fire Protection Association: http://www.nfpa.org.

  o National Interagency Fire Center, Fire Prevention, Education, and Mitigation: https://www.nifc.gov/fire-information/fire-prevention-education-mitigation.

  o U.S. Fire Administration: https://www.usfa.fema.gov/index.html.

  o Infrastructure Investment and Jobs Act Resources: https://www.gfoa.org/the-infrastructure-investment-and-jobs-act-iija-was.

ABBREVIATIONS AND ACRONYMS

°F	degrees Fahrenheit
BAER	Burned Area Emergency Response
Bitter Root RC&D	Bitter Root Resource Conservation and Development Area, Inc.
BLM	Bureau of Land Management
CIG	Conservation Innovation Grants
Cohesive Strategy	National Cohesive Wildland Fire Management Strategy
county	Mineral County
CRS	Congressional Research Service
CSP	Conservation Stewardship Program
CWPP	community wildfire protection plan
DES	Disaster and Emergency Services
DEQ	Department of Environmental Quality
DNRC	Department of Natural Resources and Conservation
EAS	Emergency Alert System
EPA	U.S. Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
ERC	Energy Release Component
ESRI	Environmental Systems Research Institute
EWP	Emergency Watershed Protection
FEMA	Federal Emergency Management Agency
FIREMON	Fire Effects Monitoring and Inventory System
FP&S	Fire Prevention and Safety
FPD	fire protection district
FRI	fire return interval
GIS	geographic information system
GNA	Good Neighbor Authority
HFRA	Healthy Forests Restoration Act of 2003
HIZ	home ignition zone
HVRA	highly valued resource or asset
I-90	Interstate 90
IBHS	Insurance Institute for Business and Home Safety
LEPC	Local Emergency Planning Committee
MT DES	Montana Disaster and Emergency Services

MWRA	Montana Wildfire Risk Assessment
NEPA	National Environmental Policy Act
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
RAWS	remote automated weather station
SAF	Society of American Foresters
SAFER	Staffing for Adequate Fire and Emergency Response
SDI	suppression difficulty index
SWCA	SWCA Environmental Consultants
TIP	Targeted Implementation Plan
ULI	Urban Land Institute
USDA	U.S. Department of Agriculture
USFA	U.S. Fire Administration
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
VFD	volunteer fire department
WFDSS	Wildland Fire Decision Support System
WUI	wildland-urban interface

GLOSSARY

Aspect: Cardinal direction toward which a slope faces in relation to the sun (NWCG 2024).

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).

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).

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 (multi-layered) 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) (NWCG 2024).

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 containment 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).

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 (NWCG 2024).

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 (NWCG 2024).

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) (NWCG 2024).

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

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 (NWCG 2024).

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 (FAC 2024).

Fire Behavior: The manner in which fuel ignites, flame develops, and fire spreads and exhibits other related phenomena as determined by the interaction of fuels, weather, and topography (NWCG 2024)

Fire Brand: A burning ember that detaches from burning vegetation during a wildfire and is lofted into the air by wind and convective forces (NWCG 2024).

Fire Break: Areas where vegetation and organic matter are removed down to mineral soil (NWCG 2024).

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 (NWCG 2024).

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 (NWCG 2024).

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 (NWCG 2024).

Fire Intensity: A general term relating to the heat energy released in a fire (NWCG 2024).

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 (NWCG 2024).

Fire Prevention: Activities such as public education, community outreach, planning, building code enforcement, engineering (construction standards), and reduction of fuel hazards that are intended to reduce the incidence of unwanted human-caused wildfires and the risks they pose to life, property, or resources (NWCG 2024).

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 (NWCG 2024).

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 (FRI): Number of years (interval) between two successive fires in a designated area (NWCG 2024).

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 (NWCG 2024).

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 (NWCG 2024).

Flammability: The relative ease with which fuels ignite and burn regardless of the quantity of the fuels (NWCG 2024).

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).

Forest Fire: Uncontrolled burning of a woodland area (NWCG 2024).

Fuel Break: A natural or human-made change in fuel characteristics that affects fire behavior so that fires burning into them can be more readily controlled (NWCG 2024).

Fuel Condition: Relative flammability of fuel as determined by fuel type and environmental conditions (NWCG 2024).

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 (NWCG 2024).

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" (NWCG 2024).

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%. 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 (NWCG 2024).

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 2024). Synonymous with fuel modification.

Grazing: There are two types of grazing: traditional grazing and 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 (Clark et al. 2023).

Ground Fire: Fire that burns organic matter in the soil, or humus; usually does not appear at the surface (NWCG 2024).

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 (NWCG 2024).

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 (NWCG 2024).

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 2024).

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 (NWCG 2024).

Highly Valued Resources and Assets (HVRAs): Landscape features that are influenced positively and/or negatively by fire. Resources are naturally occurring, while assets are human-made (IFTDSS 2024).

Ignition: The action of setting something on fire or starting to burn (NWCG 2024).

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 2024).

Initial Attack: The actions taken by the first resources to arrive at a wildfire to protect lives and property and to prevent the expansion of the fire (NWCG 2024).

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 (U.S. Geological Survey 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 (NWCG 2024).

Litter: Recently fallen plant material that is only partially decomposed and is still discernible (NWCG 2024).

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 areas of concern. 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 (NWCG 2024).

Montana Wildfire Risk Assessment (MWRA): Online application providing wildfire risk assessment products for the state of Montana. The MWRA considers several risk components including wildfire probability, hazard, exposure, and susceptibility. The application also includes county-specific information regarding wildfire risk and hazard (Pyrologix 2020).

Mutual Aid: Assistance in firefighting or investigation by fire agencies, irrespective of jurisdictional boundaries (NWCG 2024).

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 2023).

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 (NWCG 2024).

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 (NWCG 2024).

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 2024).

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 (NWCG 2024).

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 (NWCG 2024).

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 (NWCG 2024).

Soil 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).

Suppression: The most aggressive fire protection strategy, it leads to the total extinguishment of a fire (NWCG 2024).

Surface Fire: fire that typically burns only surface litter and undergrowth (NWCG 2024).

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 (NWCG 2024).

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: 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 manmade) – such as homes, specific structures, water supply, power grids, natural and cultural resources, community infrastructure-- as well as other economic, environmental, and social values (IFTDSS 2024).

Vulnerable Community: Vulnerable communities experience heightened risk and increased sensitivity to natural hazards 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 wildland-urban interface (WUI) (NWCG 2024).

Wildland: Those unincorporated areas covered wholly or in part by trees, brush, grass, or other flammable vegetation (NWCG 2024).

Wildland Fire: Fire that occurs in the wildland as the result of an unplanned ignition (NWCG 2024).

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 2024):

- 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 2021. In the absence of a CWPP, Section 101 (16) of the HFRA defines the wildland-urban interface 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 wildland-urban interface (USFA 2020).

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APPENDIX A:

Community Background and Resources

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COUNTY PROFILE

Mineral County, located in northwestern Montana on the Montana–Idaho border, encompasses rural agricultural and ranching communities, small towns, and forested lands. The largest city and county seat is Superior. The county covers 1,223 square miles, with 81.5% being USFS land, 9.6% private, and 8.9% owned by the State of Montana (U.S. Census Bureau 2023. The topography is diverse, with the Clark Fork and St. Regis Rivers creating a valley through the middle of the county, flanked by forested mountains. Elevations range from 1,936 to 7,703 feet. Key features include the Clark Fork River, the St. Regis River, and numerous mountain streams. All towns are located along the valley bottom, with Lolo National Forest to the north and south (Mineral County 2018.

ROADS AND TRANSPORTATION

There is only one major roadway in the county, I-90, which serves as the primary ingress and egress for the county. Montana Highway 135 connects St. Regis to I-90 and connects the county to neighboring communities outside of the county. Petty Creek, Fish Creek, Trout Creek, and Little Joe Roads all travel southbound from I-90 connecting to Highways 3, 11, and 12 in Idaho. Additional roadways serve to allow access to communities or recreation areas within the county. Other major roadways are present throughout the county, which provide transport through a variety of rural and/or less trafficked areas. Access to other county lands consists of narrow, winding roads, including maintained two-lane roads, some one-lane gravel roads, numerous four wheel-drive dirt/off-highway vehicle (OHV) roads, and multiple dead-end roads.

RECREATION

Mineral County is known for its outdoor activities and attracts hundreds of tourists throughout the year. Therefore, recreational activities and recreational infrastructure (Figure A.1) are of high financial value to the county and should be protected from the potential damages of wildfire.

Lolo National Forest and Fish Creek State Park provide ample recreation opportunities for the residents of Mineral County. These lands offer visitors and residents a plethora of activities including mountaineering, fishing, hunting, hiking, camping, climbing, equestrian sports, and mountain biking. Mineral County contains many rivers and streams that attract summer visitors to raft, kayak, and fish as is common on the St. Regis and Clark Fork Rivers. Winter sports such as snowshoeing, cross-country skiing, backcountry skiing, and snowmobiling are also widely available in the surrounding public lands. Lookout Pass Ski and Recreation Area is located just over the Idaho border from Mineral County and provides many winter recreation activities.

A large portion of the Lolo National Forest is located in Mineral County and is managed by the Superior Ranger District. Fish Creek State Park is managed by Montana Fish, Wildlife and Parks; consists of 5,603 acres; and is the largest state park in western Montana. This region is a stronghold for bull trout and west lope cutthroat trout, as well as wild populations of rainbow and brown trout.

During peak seasons and large events, a significant number of people can congregate in relatively small areas, which results in large populations potentially needing to evacuate should an emergency occur.

Figure A.1. A sign and campground representing recreation infrastructure in Mineral County.

THREATENED SPECIES AND ENDANGERED SPECIES

Several federally and state threatened and endangered species reside in and around Mineral County in the forested regions. Federal animal species include Canada lynx (*Lynx canadensis*), grizzly bear (*Ursus arctos horribilis*), North American wolverine (*Gulo gulo luscus*), yellow-billed cuckoo (*Coccyzus americanus*), and bull trout (*Salvelinus confluentus*) (USFWS 2024). The monarch butterfly (*Danaus plexippus*), a migratory butterfly, is currently a candidate for listing. Mineral County is also home to one listed plant species, whitebark pine (*Pinus albicaulis*) (USFWS 2024). Montana also has several state-listed threatened species—bull trout, Canada lynx, grizzly bear, piping plover (*Charadrius melodus*)—and state-listed endangered species—black-footed ferret (*Mustela nigripes*), least tern (*Sternula antillarum*), northern long-eared bat (*Myotis septentrionalis*), pallid sturgeon (*Scaphirhynchus albus*), white sturgeon (*Acipenser transmontanus*), and whooping crane (*Grus americana*).

Mineral County has critical habitat listed for bull trout and whitebark pine. Therefore, it is important that wildlife specialists from state and federal agencies be consulted before any large-scale fuel reduction projects are carried forward.

WATERSHEDS AND WATER RESOURCES

Watersheds are defined as an "area of land that drains water, sediment, and dissolved materials to a common receiving body" (U.S. Environmental Protection Agency [EPA] 2022). They connect landscapes, ecosystems, and societies, making their health crucial for both nature and human dependence. A healthy watershed consists of natural land cover that supports hydrologic and geomorphic processes, as well as the habitat requirements for native ecological communities (EPA 2022). Key components include headwater streams, floodplains, riparian corridors, biotic refugia, instream habitat, biotic communities, and natural vegetation. Healthy watersheds provide essential ecosystem services like clean drinking water, reliable water supplies, recreation opportunities, and increased property values (EPA 2022). The county's water supply is primarily sourced from the Clark Fork and St. Regis Rivers, with several outlying sources coming from smaller creeks and streams in the county.

Bull trout can be found in the Clark Fork River and its tributary, the St. Regis River, as well as Fish Creek, Trout Creek, Cedar Creek, Oregon Gulch, Little Joe Creek, North Fork Little Joe Creek, Twelvemile Creek, and Ward Creek in Mineral County.

FIRE REGIMES

The following sections detail the fire regimes of the county's dominant vegetation types, highlighting their historical fire dynamics and current management challenges.

NORTHERN PRAIRIE GRASSLANDS

Northern prairie grasslands in Mineral County are characterized by open, herbaceous ecosystems dominated by species such as western wheatgrass (*Pascopyrum smithii*), needle-and-thread grass (*Hesperostipa comata*), and bluebunch wheatgrass (*Pseudoroegneria spicata*) (Figure A.2). These grasslands historically experienced frequent, low-severity fires with FRIs ranging from 22 to 50 years (USFS 2005a). These fires primarily consumed aboveground biomass while leaving the root systems intact, allowing for rapid regeneration and maintaining the ecosystem's structural and compositional integrity (Montana Forest Collaborative Network 2025; USFS 2005a). Fire suppression has disrupted these natural fire cycles, leading to an accumulation of fine fuels from dead grasses, which increases the likelihood of smoldering, and high-intensity fires that can damage root systems and reduce productivity. Additionally, invasive species like cheatgrass (*Bromus tectorum*) have heightened fire frequency in some areas, shortening FRIs and altering the natural fire regime. Restoration efforts, including prescribed burning and targeted grazing, aim to reduce fuel loads and restore fire as a key ecological process, enhancing the resilience of northern prairie grasslands to wildfire and other disturbances (Mineral County 2018; Montana Forest Collaborative Network 2025).

Figure A.2. Example of northern prairie grassland ecosystem.
Source: USFS (https://www.fs.usda.gov/wildflowers/regions/northern/).

SAGEBRUSH SHRUBLANDS

Sagebrush shrublands in Mineral County occur at lower to mid-elevations on well-drained soils, dominated by species such as basin big sagebrush (*Artemisia tridentata*), Wyoming big sagebrush (*Artemisia tridentata ssp. wyomingensis*), and rabbitbrush (*Chrysothamnus spp.*) (Figure A.3) (USFS 2005b). Historically, these ecosystems experienced FRIs ranging from 40 to 150 years, with fire severity varying between replacement and mixed-severity events (USFS 2005b). Replacement fires often consumed the entire sagebrush canopy, resetting the ecosystem, while mixed-severity fires created mosaics of burned and unburned patches, enhancing habitat heterogeneity (Mineral County 2018; Montana Forest Collaborative Network 2025). The disruption of natural fire regimes due to suppression and invasive species, such as cheatgrass, has significantly altered the dynamics of sagebrush shrublands (Montana Forest Collaborative Network 2025). Cheatgrass increases fine fuel continuity and promotes more frequent, high-severity fires, which can outpace the natural regeneration of sagebrush (Harrison et al. 2024). Restoration efforts focus on reintroducing fire through prescribed burns and implementing targeted mechanical treatments to reduce hazardous fuels and restore these ecosystems to their historical fire intervals (Harrison et al. 2024). These strategies are critical for maintaining the ecological balance and resilience of sagebrush shrublands in Mineral County (Montana Forest Collaborative Network 2025).

Figure A.3. Example of sagebrush shrubland in Montana.
Source: S.V. Cooper (https://fieldguide.mt.gov/displayES_Detail.aspx?ES=5454).

PONDEROSA PINE WOODLANDS

Ponderosa pine woodlands in Mineral County are primarily located on warm, dry ridgelines and south- and west-facing slopes at lower elevations (Figure A.4). These ecosystems historically experienced frequent, low-severity surface fires, with FRIs ranging from 5 to 30 years (USFS 2005c). Such fires maintained an open canopy structure, reduced understory vegetation, and minimized fuel accumulation. Mixed-severity fires were less frequent but introduced variability in stand structure and fire intensity across the landscape, reflecting the diverse composition of these forests, which often include Douglas-fir (*Pseudotsuga menziesii*) and western larch (*Larix occidentalis*) (Montana Forest Collaborative Network 2025). The suppression of natural fire regimes, combined with historical timber management, has significantly altered these woodlands, leading to dense pole-sized thickets, heavy fuel loads, and increased encroachment by fire-sensitive species like Douglas-fir (Mineral County 2018). Restoration efforts such as prescribed burning and mechanical thinning are particularly appropriate for these forest types, aiming to reestablish natural fire intervals, reduce wildfire risk, and restore ecological resilience (Montana Forest Collaborative Network 2025).

Figure A.4. Example of a ponderosa pine woodland, visibly impacted by low-severity fire.

Source: USFS (https://www.fs.usda.gov/database/feis/fire_regimes/Northern_RM_ponderosa_pine/all.html)

DOUGLAS-FIR FORESTS

Douglas-fir forests in Mineral County are widespread at mid-elevations, often occurring alongside ponderosa pine (*Pinus ponderosa*) and western larch (Figures A.5 and A.6). Historically, these forests experienced a mixed-severity fire regime, with FRIs ranging from 35 to 150 years (USFS 2005d). Frequent low- to moderate-severity surface fires reduced understory fuels and maintained open canopy structures, while occasional high-severity fires created patches of structural diversity, supporting regeneration and promoting biodiversity (Mineral County 2018). Site conditions, such as aspect, elevation, and fuel continuity, strongly influenced fire severity and frequency (Montana Forest Collaborative Network 2025). Fire suppression and historical timber harvesting have led to denser understories, increased fuel loads, and shifts in stand structure, making these forests more susceptible to high-severity wildfires (Montana Forest Collaborative Network 2025). Restoration efforts, such as prescribed burning and mechanical thinning, aim to reduce hazardous fuels, reintroduce historical fire intervals, and enhance the ecological resilience of Douglas-fir forests (Montana Forest Collaborative Network 2025).

Figure A.5. Example of Douglas-fir–mixed-conifer forest in the Rocky Mountain region.

Source: Charlie McDonald (https://www.fs.usda.gov/wildflowers/beauty/Sky_Islands/communities/douglasfir-mixedconifer.shtml).

Figure A.6. Example of Douglas-fir–mixed-conifer forest in the Rocky Mountain region.
Source: Charlie McDonald
(https://www.fs.usda.gov/wildflowers/beauty/Sky_Islands/communities/douglasfir-mixedconifer.shtml).

LODGEPOLE PINE FORESTS

Lodgepole pine (*Pinus contorta*) forests in Mineral County are predominantly found in mid- to high-elevation zones, where they form dense stands often interspersed with Douglas-fir and subalpine fir (*Abies lasiocarpa*) (Figure A.7) (USFS 2005e). These forests historically experienced mixed-severity and stand-replacement fire regimes, with FRIs ranging from 30 to 200 years (USFS 2005e). Mixed-severity fires, occurring on shorter intervals, created mosaics of burned and unburned patches, promoting age and structural diversity (Mineral County 2018; USFS 2005e). Stand-replacement fires, occurring approximately every 100 to 200 years, played a significant role in regenerating lodgepole pine forests by creating conditions favorable for serotinous cone release (Mineral County 2018; Montana Forest Collaborative Network 2025). In the absence of fire, these ecosystems accumulate dense fuels, increasing the potential for high-intensity wildfires. Additionally, outbreaks of mountain pine beetle (*Dendroctonus ponderosae*) have contributed to increased tree mortality, adding to fuel loads (Mineral County 2018; USFS 2005e). Restoration efforts focus on using prescribed burning and selective thinning to reduce hazardous fuels and reintroduce natural fire processes (Montana Forest Collaborative Network 2025).

Figure A.7. Example of a lodgepole pine forest ecosystem.
Source: National Park Service, Jacob W. Frank (https://www.nps.gov/places/000/lodgepole-pines.htm).

SPRUCE-FIR FORESTS

Spruce-fir forests in Mineral County, characterized by Engelmann spruce (*Picea engelmannii*) and subalpine fir, are typically found at high elevations in cool, moist environments (Figure A.8) (Mineral County 2018; USFS 2005f). These forests historically experienced infrequent but high-severity stand-replacement fires, with FRIs ranging from 200 to 300 years (USFS 2005f). The long intervals between fires allowed these forests to accumulate significant amounts of live and dead fuels, which contributed to intense, large-scale fires when conditions were favorable (Montana Forest Collaborative Network 2025). The dense structure and slow decomposition rates of spruce-fir forests create a fuel-rich environment prone to catastrophic fires during extended periods of drought or beetle outbreaks (Mineral County 2018; USFS 2005f). While these forests are relatively close to their natural range of variability, the increasing frequency of extreme fire weather due to climate change poses new challenges. Restoration efforts in spruce-fir forests typically focus on monitoring and minimizing fuel loads near values at risk, rather than extensive interventions, to preserve the ecological integrity of these systems (Montana Forest Collaborative Network 2025).

Figure A.8. Example of a spruce-fir ecosystem in the Rocky Mountain region.
Source: Dave Powell, USFS (retired) (Bugwood.org).

IMPACTS FROM CHEATGRASS

Cheatgrass is an invasive annual grass that poses challenges in many regions of the western United States due to its impacts to native ecosystems and fire regimes (Montana Outdoors 2021). In Mineral County cheatgrass presence is primarily linked to drier, low-elevation areas, including grasslands and shrub-steppe ecosystems (Montana Outdoors 2021). In invaded ecosystems, cheatgrass can promote unnatural fine fuel growth (BLM 2023 and, at times, dominate the post-fire landscape, which can increase the potential for and recurrence of future wildfire (Zouhar 2003). In areas with significant cheatgrass invasion, the FRI can decrease dramatically, often to intervals of less than 10 years. These unnaturally short intervals hinder the recovery of native vegetation and perpetuate a cycle of fire and cheatgrass dominance. However, Mineral County's wetter climate and forested landscapes generally offer some resilience against widespread cheatgrass dominance compared to the dry plains further west (Mineral County 2018). In Mineral County, ongoing wildfire risk reduction strategies, including fuels treatment projects such as thinning, prescribed burning, and invasive species management, are critical in preventing cheatgrass from establishing dominance (Mineral County 2018). Proactive management, including monitoring areas of disturbance and supporting native vegetation restoration, will help mitigate cheatgrass-related fire risks and maintain an ecological balance.

FOREST HEALTH CONSIDERATIONS

Native insect and disease epidemics within plant communities are often cyclic in nature and are usually followed by the natural succession of vegetation over time. Of primary interest are those that attack tree species because of the implications for fire management. Present-day insect epidemics in forests are more extensive than they have been in the past (Kurz et al. 2008). This may be a result of drought-related stress and/or faster completion of insect life cycles due to warmer climate regimes. Stands of trees that

have been killed by insects have varying degrees of associated fire danger depending on the time lapse following an insect attack and the structure of the dead fuels that remain. However, forests with a large degree of mortality following an insect attack may have the potential to experience extremely high fire danger, especially if a large degree of needle cover remains in the canopy. Wildfire has been identified as the highest priority hazard in the county, with forest health directly affecting the wildfire danger posed to the county (Mineral County 2012).

INSECTS

Insect outbreaks are typically influenced by disturbances in the landscape, such as hailstorms, windthrow, drought, and extreme temperature changes, which can trigger pest outbreaks and lead to tree mortality (Montana DNRC 2023a). Similarly, the absence of natural disturbance can also lead to insect outbreaks, as have been seen in forested areas that have experienced fire suppression and are now overgrown and stressed (Montana DNRC 2023a). The underlying stressor is most often moisture availability, causing reduced tree vigor and a decrease in the ability to deter insect outbreaks (Montana DNRC 2023a).

In Mineral County tree mortality is correlated to a decrease in health and vigor of forested land in the county cause by stress due to overcrowding, resulting in slowing growing rates and increased length of time to maturity (Montana DNRC 2023a). Pre-existing tree stress due to overcrowding is then exacerbated by various inset attacks, such as, moderate to severe Western spruce budworm and Douglas-fir tussock moth (Montana DNRC 2023a). Poor tree vigor provides opportunities for insects such as Mountain pine beetle and Douglas-fir beetle to establish and spread (Montana DNRC 2023a).

Problematic insects impacting the county's forest and woodland regions commonly include, but are not limited to (Montana DNRC 2023a):

- Douglas-fir Beetle (*Dendroctonus pseudotsugae*)
- Douglas-fir Tussock Mouth (*Orgyia pseudotsugata*)
- Fir Engraver (*Scolytus ventralis*)
- Mountain Pine Beetle (*Dendroctonus ponderosae*)
- Pine Engraver Beetle- Ips (*Ips pini*)
- Red Turpentine Beetle (*Dendroctonus valens*)
- Western spruce budworm (*Choristoneura freemani*)

DISEASES

Diseases of trees caused by parasitic plants, fungi, and bacteria can also affect forests in the Mineral County CWPP planning area. These diseases impact forest systems by degrading the productivity and health of the forest. Trees that are killed by disease have the similar potential to increase fire hazards. Mineral County is on the eastern range of the western white pine, which is a prized timber species, and suffers from the introduced white pine blister rust, which had risen to epidemic levels in Mineral County by the 1940s, resulting in mass morality and a significant shift in species present in forested lands (Montana DNRC 2024b). Diseases that are having more significant impacts on the Mineral County planning area's forests and woodlands are listed below (Montana DNRC 2024b).

- Balsam Wooly Adelgid (*Adelges piceae*)

- Dwarf Mistletoe (*Arceuthobium pusillum, Arceuthobium douglasii, Arceuthobium laricis, Arceuthobium cyanocarpum*)

- Diplodia Shoot and Tip Blight (*Sphaeropsis sapinea*)

- Elytroderma Needle Cast (*Elytroderma deformans*)

- Larch Needle Cast (*Hypodermella laricis*)

- Lophodermella Needle Cast of Pines (*Ascomycota Rhytismatales*)

- Root Disease (*Inonotus tomentosus, Armillaria solidipes, Heterobasidion annosum*)

- Subalpine Fir Decline

- White Pine Blister Rust (*Cronartium ribicola*)

Treatments on federal land would be subject to the National Environmental Policy Act (NEPA) and associated analysis of impacts to these species. Treatments in areas that may impact threatened and endangered species would require application of certain mitigation measures to prevent degradation to habitat.

ENVIRONMENTAL CHALLENGES

DROUGHT AND CLIMATE

In the past century Montana has warmed about 2 degrees Fahrenheit (°F), with heat waves becoming more common, snow melting earlier, and recent droughts, which have contributed to an increasing risk of forest fires as well as enabling outbreaks of forest insects and diseases (EPA 2016). These factors have interacted to increase the risk of uncharacteristically large high-severity fires. Higher temperatures and drought are likely to increase the severity, frequency, and extent of wildfires in the state (EPA 2016).

According to the National Interagency Fire Center (NIFC), the occurrence of catastrophic wildfires in the western United States has greatly increased over the last 20 years. Westerling et al. (2016) found that the frequency of large wildfires has continued to increase with each decade since 1970.

The shifting climate, particularly rising temperatures, changing wind patterns, and increasing temporal and spatial variability of water availability, are considerably escalating wildfire risk across the state. Since 1990, mean annual temperatures in Montana have increased by almost 2.5 °F (NOAA 2022). The first 21 years of this century have been the warmest period on record for Montana (NOAA 2022). Future droughts in Montana are projected to be more intense, and increasing temperatures will raise the snow line and result in earlier melting of the snowpack, as well as increase winter and spring precipitation (NOAA 2022). Since the 1950s, the snowpack in Montana has been decreasing, with several glaciers likely to disappear by 2030 if current trends continue (EPA 2016).

During the summer months, Montana experiences frequent thunderstorms that can produce hail, lightning, and strong winds, which not only start wildfires but can also cause increased fire behavior in already burning fires (NOAA 2022). Montana has been no stranger to catastrophic wildfire in recent years. In 2012, the state experienced the driest July through September period in historical record, resulting in more than 2,000 wildfires burning more than 1.2 million acres (NOAA 2022).

It is important to note that fire is a natural part of Montana's diverse landscapes and is essential to many ecosystems across the state. Many of Montana's diverse ecosystems are fire-dependent or fire-adapted. Wildfire, when not directly or indirectly intensified by human actions, has historically worked to balance ecosystems and restore their natural functions.

TREE MORTALITY

Widespread tree mortality due to rising temperatures, droughts, extreme wildfires, and insect outbreaks is a natural process in forest ecosystems. However, if these occur at a higher frequency due to compound disturbances, forest health may be negatively affected. In addition to disrupting ecosystem functions, widespread tree mortality near developed or recreational areas may present hazards as trees can fall and potentially endanger the public and infrastructure.

During periods of extreme drought, physiological stress can inhibit plant and tree defenses (due to the limits on photosynthates being mobilized for defense) and make trees more susceptible to disease pests and pathogens. Furthermore, extreme water stress in trees, combined with insect- and disease-related mortality, can also make forests more prone to extreme fire events. Tree mortality throughout Montana is strongly correlated with a lack of moisture as an underlying stressor to forested landscapes, which are subsequently more prone to insect or disease outbreaks (Montana DNRC 2023a). The 2021 heat wave, combined with prolonged drought, triggered a noticeable tree decline across the region that continued into 2023 (Montana DNRC 2023a). Forests with a large degree of mortality following an insect attack may have the potential to experience extremely high fire danger, especially if a large degree of needle cover remains in the canopy (USFS 2022. Considering that deceased trees can pose an increased risk of intense wildfire, fuel reduction treatments, such as thinning and prescribed fire, not only reduce the risk of catastrophic wildfire but can also reduce the severity of future bark beetle outbreaks (Goodwin et al. 2020).

Mineral County has experienced a decrease in western white pine since the 1940s, due to white pine blister rust, resulting in mass mortality and stand preplacement by Douglas-fir, true firs, and hemlock species. White pine is more resistant to top root disease compared to Douglas-fir, true firs, and hemlock species that have replaced the former white pine stands.

Specific to Mineral County, DNRC surveys of the region have shown that the county's forests have experienced tree mortality or defoliation from numerous diseases and insects (Montana DNRC 2023a). The county is primarily impacted by subalpine fir decline, pine beetle, and Douglas-fir beetle. The resulting tree mortality due to insect and disease tree mortality has resulted in a heightened wildfire risk in Mineral County.

ECOSYSTEM SERVICES

Ecosystem services are the benefits humans derive from natural resources. Mineral County offers a wide variety of ecosystem services via healthy fire, forest ecosystems, and watersheds.

Historical low-intensity surface fires maintained open grasslands, improved landscape resilience, and fostered forest succession and biodiversity. Fire-adapted ecosystems support wildlife habitats, timber industry, and eco-tourism while controlling forest insects and diseases such as dwarf mistletoe and spruce budworm (BLM 2023).

Mineral County's mixed-conifer forest, subalpine spruce-fir forest, lodgepole pine forest, shrubland and grassland environments provide ecosystem services enjoyed by residents and visitors. Mining, agriculture, timber harvesting, and farming have become the backbone of Mineral County, with tourism supplementing the economy as visitors seek outdoor recreation opportunities. The county's ecosystems also supply clean water downstream and play roles in carbon sequestration, clean air, and material production. Uncharacteristic wildfires pose threats to these crucial services, impacting quality of life and the county's economy. In addition to direct damage, high-severity wildfires deteriorate air quality, pollute waterways, displace native species, and increase carbon dioxide emissions.

FIRE PROTECTION RESOURCES

MUTUAL AID

A critical component of Montana's wildfire response is the mutual aid agreements among fire response agencies. These agreements enable seamless cooperation and resource sharing across different jurisdictions, regardless of land ownership (Montana Disaster and Emergency Services [MT DES] 2022). This collaborative approach ensures that all available resources are used effectively, enhancing the state's ability to manage wildfires and minimize their impact to communities and natural resources. By leveraging mutual aid agreements, Montana can deploy firefighting resources quickly and efficiently, providing a robust response to wildfire emergencies (MT DES 2022). The Stafford Act significantly influences wildfire response in Montana by providing the legal framework for federal disaster and emergency assistance. When state and local resources are insufficient to manage a major wildfire, the Stafford Act allows the state to request federal support. This support, coordinated through the Federal Emergency Management Agency (FEMA), includes additional personnel, equipment, and funding to bolster state and local efforts (MT DES 2022). The Stafford Act ensures that Montana can access necessary federal resources during large-scale wildfire incidents, facilitating a comprehensive and effective response. This federal assistance is crucial for mitigating the impacts of severe wildfires; protecting lives, property, and natural resources; and ensuring that state and local agencies have the support they need to manage and recover from wildfire disasters.

LOCAL RESPONSE

Fire Protection Districts

The county has four fire protection districts (FPDs), composed mostly of volunteer fire departments (VFDs), that provide initial attack response on lands within their districts (Figure A.9). As stated in Montana's 2023–2027 Wildland Fire Operating Plan, fire chiefs hold primary suppression authority, while

county sheriffs are responsible for wildfire protection on state and private lands outside FPDs, though they often rely on FPDs or other county resources for suppression efforts (Montana DNRC 2023b). Wildfire does not respect jurisdictional boundaries and often threatens a multitude of resources and communities across the landscape. One such resource is municipal watersheds that provide drinking water resources to multiple communities. To ensure the safety of the watershed areas and to address perceived inequities in the current fire protection system, county FPDs should explore the opportunity for increased intergovernmental cooperation. Tables A.1 through A.3 list the local county fire response entities.

St. Regis Volunteer Fire Department

Table A.1. Fire Department Resource Statistics for St. Regis VFD

St. Regis Volunteer Fire Department Statistics:		
Fire Protection District: St. Regis VFD		
Communities Served: Mile Marker 0 to Mile Marker 42 along Interstate 90.		
Full-time Firefighters: 0	**Red-Carded Firefighters:** 19	**Volunteer Firefighters:** 22
ISO Rating: 8		
NWCG Qualification		
Firefighter Type 1: 13	**Incident Commanders**	
Certified Sawyers (FAL 1,2,3): 3	Type 1-3: 1 Type 4-5: 3	
Port-A-Tanks: 7	**Portable Pumps:** 5	**Fire Shelters:** 28
Water Tender:		**Wildland Engines**
Type 1: 0	**Total Number:**	4WD/AWD: Brush Breaker:
Type 2: 2	Type 3: 0	
Type 3:	Type 4: 0	
Structure Engines:	Type 5: 0	
Type 1: 2	Type 6: 4	
Type 2: 0	Type 7: 0	

West End Volunteer Fire Department

Table A.2. Fire Department Resource Statistics for West End VFD

West End Volunteer Fire Department Statistics:		
Fire Protection District: West End Volunteer Fire and Rescue		
Communities Served: De Borgia, Haugan, Saltese		
Full-time Firefighters: 0	**Red-Carded Firefighters:** 4	**Volunteer Firefighters:** 12
ISO Rating: 8.5		
NWCG Qualification		
Firefighter Type 1: 1	**Incident Commanders**	
Certified Sawyers (FAL 1,2,3): 0	Type 1-3: 1 Type 4-5: 1	
Port-A-Tanks: 2	**Portable Pumps:** 1	**Fire Shelters:**
Water Tender:		**Wildland Engines**
Type 1: 1	**Total Number:**	4WD/AWD: Brush Breaker:
Type 2: 0	Type 3: 0	
Type 3: 0	Type 4: 0	
Structure Engines:	Type 5: 0	
Type 1: 1	Type 6: 2	2
Type 2: 0	Type 7: 0	

Superior Rural and Municipal Volunteer Fire Department

Table A.3. Fire Department Resource Statistics for Superior Rural and Municipal VFD

Superior Rural and Municipal Volunteer Fire Department Statistics:		
Fire Protection District: Superior Rural and Municipal		
Communities Served: Communities from Tarkio to Lookout Pass		
Full-time Firefighters: 13	**Red-Carded Firefighters:** 20	**Volunteer Firefighters:** 0
ISO Rating: N/A		
NWCG Qualification		
Firefighter Type 1: 13	**Incident Commanders**	
Certified Sawyers (FAL 1,2,3): 16	Type 1-3: 1 Type 4-5: 13	
Port-A-Tanks: 15	**Portable Pumps:** 10	**Fire Shelters:** 40
Water Tender:		**Wildland Engines**
Type 1: 0	**Total Number:**	4WD/AWD: 1 Brush Breaker: 0
Type 2: 1	Type 3: 0	
Type 3: 0	Type 4: 1	
Structure Engines:	Type 5: 0	
Type 1: 0	Type 6: 1	
Type 2: 0	Type 7: 0	
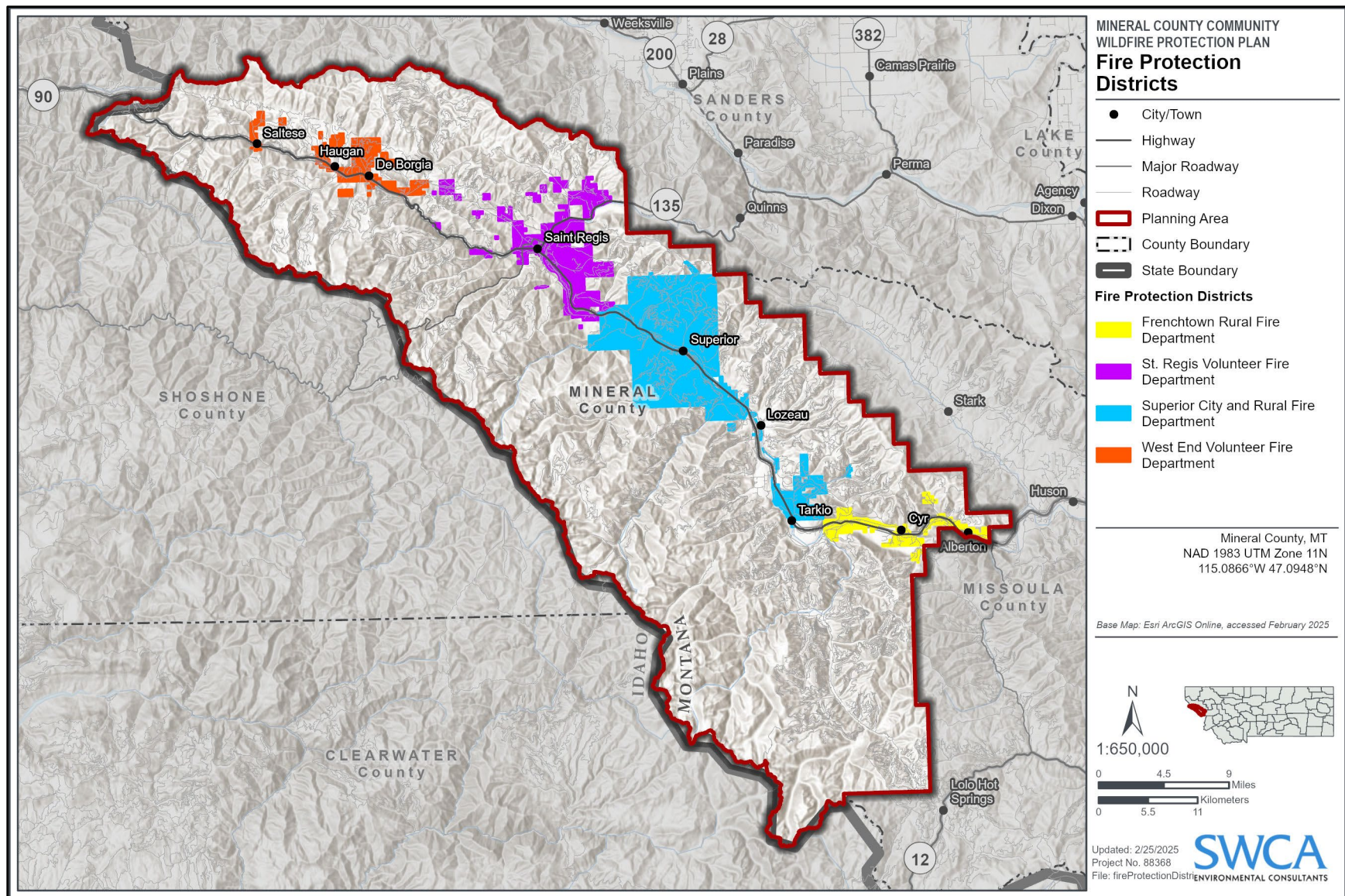
Figure A.9. Fire protection districts and fire station locations.

Members of the local FPDs are required to undergo rigorous training for wildfire response. For fires on private lands, resources used for fire mitigation efforts must meet the qualification standards set by local agencies. Personnel assigned to fires on federal lands must have completed National Wildfire Coordinating Group (NWCG) Wildland Fire Qualifications and be "red carded," meaning they have also completed a fitness test before engaging in fire suppression activities. Many members of the local FPDs hold these NWCG qualifications and the BLM, the USFS, and the NPS provide on-the-job-training for local agency personnel seeking wildfire training.

BNSF Railway

The BNSF Railway operates in Mineral County with stations in Superior and St. Regis. The BNSF operates a firefighting train in Missoula and works with wildland firefighting contractors in Washington and Montana. In the event of a fire, the BNSF prioritizes the protection of bridges, cell towers, and other structures within its right-of-way.

Wildland fire response resources must contact the BNSF any time personnel are within the right-of-way or if a wildfire incident may impact the right-of-way. The BNSF can be contacted at 1 (800) 832-5452.

Mineral County Sheriff

The Mineral County Sheriff serves as the primary local law enforcement agency in Mineral County, overseeing critical services such as E-911 dispatch, managing emergency responses, and County Search and Rescue operations (Mineral County 2024). During disasters, the Sheriff's responsibilities extend to establishing evacuation routes, identifying safe areas, and coordinating transportation and shelter logistics (Mineral County 2024). This involves working closely with the Local Emergency Planning Committee (LEPC) and the Montana Disaster and Emergency Services (MT DES) to implement comprehensive evacuation plans and ensure efficient communication through Emergency Alert Systems (EAS). The Sheriff's Office also aids in traffic control, law enforcement, and securing impacted areas, collaborating with agencies such as the DNRC and local fire departments to protect the population before, during, and after emergencies (Mineral County 2024).

Fire Warden

If the County Fire Warden and DNRC have determined that Mineral County's capacity for suppressing wildfire has been exceeded, the DNRC will approve state assistance based on the assessment of capacity and availability of funds. If state assistance is approved, the fire becomes a state responsibility, and DNRC assumes cost and management responsibility, along with ongoing involvement from local and county partners (MT DES 2022).

Mineral County Department of Emergency Services

Mineral County Department of Emergency Services is the lead agency coordinating comprehensive emergency management in Mineral County. During emergencies, the Emergency Manager acts as the principal advisor to the chief executives on emergency operations and provides coordination and logistical support to the various government and nongovernmental agencies performing emergency tasks and responsibilities. The Mineral County Department of Emergency Services is also responsible for oversight of the Mineral County Dispatch Center (Mineral County DES).

STATE RESPONSE

Montana Disaster and Emergency Services

Montana Disaster and Emergency Services (MT DES) is the lead agency coordinating comprehensive emergency management in Montana. Mineral County has a Department of Emergency Services that coordinates with MT DES to build, sustain, and improve the ability to prepare for, protect against, respond to, recover from, and mitigate hazards (MT DES 2022).

MT DES is organizationally situated within the Montana Department of Military Affairs. The Federal Emergency Management Agency (FEMA) of the Department of Homeland Security (DHS) provides guidance and grant oversight (MT DES 2022).

Montana Department of Natural Resources and Conservation

The DNRC, as the lead state agency for fire management in Montana, has a mission to "provide for the protection of natural resources and human lives through fire prevention, preparedness, suppression, and other fire management activities" (MT DES 2022). The Forestry Division is responsible for wildland fire management on state and private lands and aids in the coordination of wildfire management across local, state, and federal agencies (MT DES 2022). See Table A.4 for a summary of the Montana DNRC Missoula Unit fire response resources.

On non-federal lands, wildfire management follows a hierarchy of local jurisdiction, to County Fire Warden, and, finally, to the State of Montana. The chief of a local FPD is responsible for fires that occur within the boundaries of their district. If a fire exceeds the chief's ability to manage, then it is the duty of the County Fire Warden to coordinate fire suppression efforts and request assistance from the DNRC. The County Fire Warden is also responsible for coordinating fire suppression efforts in unincorporated areas of the county.

Montana falls in the Northern Rockies Coordination Group area. The Northern Rockies Coordination Center is responsible for dispatching the initial attack resources of state responsibility areas in Montana (MT DES 2022).

In Montana, the state can either provide assistance for fighting fires or can be responsible for fighting fires. State assistance and responsibility for fires can provide the following management resources and operational aid.

State assistance for fire management can be initiated under (MT DES 2022):

- **Rapid Initial Attack:** DNRC supports rapid initial attack actions to minimize the size, duration, costs, and impacts of wildfires. This includes providing personnel and resources to assist local agencies.

- **Personnel Support**: Additional personnel are provided to enable local agencies to respond to subsequent incidents and allow volunteer firefighters to return to their regular jobs.

- **Funding and Resources:** Available for local and county responsibility fires, even if the fire does not exceed the capacity of the fire department or county. This includes funding and reimbursement for aviation and hand crew resources during the initial attack phase of fires on non-federal lands. Resources are allocated based on the "Closest Forces" concept, regardless of whether they are state or federal agency resources, to reduce response times.

- **Resource Support:** Includes DNRC engines, modules, overhead resources, and technical assistance from DNRC Fire Management staff.

State responsibilities for wildfire can be initiated under (Montana DNRC 2022):

- **County Request:** The county requests assistance from the Montana DNRC.

- **Capacity Assessment:** An assessment by the DNRC and the County Fire Warden determines that the county's capacity has been exceeded.

- **Director Approval:** The DNRC Director approves the state's responsibility based on the assessment of capacity and availability of funds.

- **State Management:** If approved for state responsibility, DNRC assumes cost and management responsibility, with ongoing involvement from local and county partners.

Montana Department of Natural Resources and Conservation Missoula Unit

Table A.4. Fire Department Resource Statistics for Montana DNRC Missoula Unit Fire Department

Montana DNRC Missoula Unit Fire Department Statistics:		
Fire Protection District: Montana DNRC Missoula Unit		
Communities Served: Missoula, Florence, Alberton, Frenchtown, Potomac, Clinton, Turah, Lolo		
Full-time Firefighters: 2	**Red-Carded Firefighters:** 25	**Volunteer Firefighters:** 0
ISO Rating: N/A **NWCG Qualification**		
Firefighter Type 1: 14	**Incident Commanders**	
Certified Sawyers (FAL 1,2,3): 25	Type 1-3: 1 Type 4-5: 14	
Port-A-Tanks: 3	**Portable Pumps:** 2	**Fire Shelters:** 35
Water Tender:	**Wildland Engines**	
Type 1: 0	**Total Number:**	4WD/AWD: Brush Breaker:
Type 2: 0	Type 3: 0	
Type 3: 0	Type 4: 0	
Structure Engines:	Type 5: 8	
Type 1: 0	Type 6:	
Type 2: 0	Type 7: 0	

FEDERAL RESPONSE

Lolo National Forest

The Lolo National Forest, which includes a portion within Mineral County, encompasses over 2 million acres and operates out of five district offices: Missoula, Ninemile, Plains/Thompson Falls, Seeley Lake, and Superior (USFS 2024a). These offices strategically deploy engines and crews to ensure rapid and effective fire response across the forest. Fire management on the Lolo National Forest covers a broad range of activities, including fuels management, prescribed burning, prevention, and suppression when deemed necessary (USFS 2024a). All fire management efforts are guided by approved Fire Management and Land and Resource Management Plans, which integrate natural disturbance processes essential for ecological health (USFS 2024a). See Tables A.5 and A.6 for summaries of the fire response resources for each ranger district.

The Superior and Ninemile Ranger Districts adhere to the National Forest Wildland Fire Response Principles set forth in the 2025 Interagency Standards for Fire and Fire Aviation Operations (NIFC 2025).

- Response to wildland fire is based on the ecological, social, and legal consequences of fire. The circumstances under which a fire occurs, and the likely consequences to firefighter and public safety and welfare, natural and cultural resources, and values to be protected dictate the appropriate management response to fire.

- Success is achieving reasonable objectives with the least firefighter risk necessary while enhancing stakeholder support for our management efforts.

Superior Ranger District

Table A.5. Fire Department Resource Statistics for Superior Ranger District

Superior Ranger District Fire Department Statistics:		
Fire Protection District: Superior Ranger District		
Communities Served: Tarkio, Quartz, Lozeau, Riverbend, Spring Gulch, Foraker, Drexel		
Full-time Firefighters: 13 (7 temporary)	**Red-Carded Firefighters:** 20	**Volunteer Firefighters:** 0
ISO Rating: N/A		
NWCG Qualification		
Firefighter Type 1: 13	**Incident Commanders**	
Certified Sawyers (FAL 1,2,3): 16	Type 1-3: 1 Type 4-5: 13	
Port-A-Tanks: 15	**Portable Pumps:** 10	**Fire Shelters:** 40
Water Tender:		**Wildland Engines**
Type 1: 0	**Total Number:**	4WD/AWD: Brush Breaker:
Type 2: 1	Type 3: 0	
Type 3: 0	Type 4: 1	
Structure Engines:	Type 5: 0	
Type 1: 0	Type 6: 1	1 1
Type 2: 0	Type 7: 0	

Ninemile Ranger District

Table A.6. Fire Department Resource Statistics for Ninemile Ranger District

Ninemile RD, Lolo NF Fire Department Statistics:		
Fire Protection District: Ninemile RD, Lolo NF		
Communities Served: Frenchtown, Ninemile, Alberton, Tarkio, Rivulet, Quartz		
Full-time Firefighters: 20	**Red-Carded Firefighters:** 20	**Volunteer Firefighters:** 0
ISO Rating: N/A		
NWCG Qualification		
Firefighter Type 1: 25	**Incident Commanders**	
Certified Sawyers (FAL 1,2,3): 20	Type 1-3: 1 Type 4-5: 12	
Port-A-Tanks: 10	**Portable Pumps:** 8	**Fire Shelters:** 20
Water Tender:		**Wildland Engines**
Type 1: 0	**Total Number:**	4WD/AWD: Brush Breaker:
Type 2: 1	Type 3: 0	
Type 3: 1	Type 4: 0	
Structure Engines:	Type 5: 0	
Type 1: 0	Type 6: 2	
Type 2: 0	Type 7: 0	

Bureau of Land Management (BLM) – Missoula Field Office

The Missoula Field Office of the Bureau of Land Management (BLM) oversees BLM lands within Mineral County. Fire management for these lands falls under the Upper Columbia River Fire Management Unit. The Missoula Interagency Dispatch Center is responsible for coordinating fire response activities, including the deployment of necessary firefighting resources (Mineral County DES 2024). The BLM focuses on both prevention activities the suppression of fire incidents posing a threat to valued resources, aiming to minimize wildfire impacts on public lands and adjacent properties (Mineral County DES 2024).

Interagency Collaboration

Mineral County benefits from robust interagency collaboration, involving the DNRC, USFS, and BLM. Mineral County's LEPC plays a crucial role in maintaining preparedness and coordinating responses to wildfire emergencies (Mineral County DES 2024). Regular meetings and joint training exercises help ensure that all agencies are ready to respond effectively to wildfires, protecting both people and property in Mineral County (Mineral County DES 2024).

EVACUATION RESOURCES

Evacuation planning and execution in Mineral County rely on collaborative efforts between local, state, and federal agencies, as well as the preparedness and cooperation of residents. The Mineral County Disaster and Emergency Services (DES) and MT DES play critical roles in coordinating evacuation efforts and providing necessary resources and information to the community, highlighted in the Mineral County Emergency Operations Plan (Mineral County DES 2016) and the Montana Hazard Mitigation Plan.

Mineral County 2016 Emergency Operations Plan: https://co.mineral.mt.us/wp-content/uploads/2015/12/Emergency-Operations-Plan-12-2016.compressed.pdf . The 2016 Mineral County Emergency Operations Plan was updated in 2024 but is not available online as of March 2025.

Montana 2023 Multi Hazard Mitigation Plan: https://des.mt.gov/Mitigation/FINAL_2023_MT_MHMP_20231003.pdf

The Mineral County DES has a Disaster and Emergency page with local resources and contacts, including the LEPC here: https://co.mineral.mt.us/departments/disaster-emergency/

The public should follow the latest guidance from trusted sources, such as official government agencies, regarding evacuation orders. Current evacuation orders should always be adhered to and supersede all information presented in the Mineral County CWPP.

Road Systems

In Mineral County, road systems play a critical role in wildfire evacuation and emergency response. However, the county faces significant challenges due to the varied terrain and limited access routes, which can impede both the safe evacuation of residents and the efficient response of firefighting resources (Montana DNRC 2018). Many residential areas in Mineral County have only one way in and one way out. This single access route poses a risk during wildfires, as these roads can become blocked or unsafe for travel, hindering both evacuation and emergency response efforts (Montana Fire 2024). High fuel loads along roadways leading to and from residential areas are common in Mineral County, increasing the risk of intense fires that can compromise evacuation routes (Montana DNRC 2018). Concerted efforts are needed to reduce these fuel loads to maintain safe evacuation corridors and ensure that emergency responders can access these areas without delay.

Animals and Livestock

In the event of a wildfire, it is important that residents and fire responders within Mineral County have a plan for evacuation of pets and livestock. The loading of horses and the transport of stock vehicles down narrow roads, for example, can be very difficult during evacuations. Ensuring the safety of animals requires advance planning and coordination among residents, emergency services, and supporting agencies.

Residents are encouraged to have an evacuation plan for their pets and livestock. This includes knowing how to transport animals, having necessary supplies ready, and identifying shelters or locations where animals can be taken quickly and safely during an evacuation. For livestock, this may involve coordinating with neighbors or local facilities that can accommodate animals during emergencies.

The Montana Department of Livestock assists with the evacuation and traffic control of impacted areas in coordination with local authorities. They also provide for road closures as needed during emergency operations, which is essential for facilitating the safe movement of livestock and other large animals.

The Montana State University Extension provides resources on livestock evacuation, which can be accessed here: https://apps.msuextension.org/publications/pub.html?sku=4448-1

However, additional public education could emphasize the need for individuals to have a plan for the evacuation of pets and horses in addition to their family, ensuring a lack of planning doesn't slow or prevent evacuation.

Emergency Notification Methods

Mineral County uses Smart 911 to provide essential information quickly during an emergency. The Smart 911 system utilizes reverse 911 notifications to send emergency alerts to all enabled cell phones and landlines within a specific geographic area, ensuring that both residents and visitors receive important alerts (Mineral County DES 2024). The Mineral County DES Facebook page also provides forest wide and wildfire information updates here: https://www.facebook.com/people/Mineral-County-MT-DES/100070649463561/?paipv=0&eav=AfbBk1q85bQBZ7h9P7DvJOAaCz4z2LFONjoxGAAdaU0KOJqcF9XBVbrGWlVxXo_xmjA&_rdr.

Visit the Montana Travel Information provided by the Montana Department of Transportation to find travel alerts and road conditions: https://www.mdt.mt.gov/travinfo/alerts.aspx.

Visit the National Weather Service Radio Station provided by National Oceanic and Atmospheric Administration (NOAA) for a nationwide network of radio stations broadcasting continuous weather information directly from the nearest National Weather Service office. NOAA Weather Radio broadcasts 24 hours per day, 7 days per week, with information about:

- Official weather warnings
- Watches
- Forecasts
- Hazard information

Beyond alert systems utilized by Mineral County, word of mouth also plays a role in emergency notification, especially in more rural areas where residents may not be subscribers to EAS partner content. When safe to do so, residents should call or text friends, neighbors, and contacts to ensure that they are aware of active alerts.

It is important to note that temporary residents or tourists may not be signed up for emergency alert notifications. It is recommended the county work with short-term rental owners and hotels to ensure the applicable emergency notification sign up resources are provided to all who rent a property within the county.

WATER AVAILABILITY AND SUPPLY

Effective wildfire response in Mineral County relies on the availability and accessibility of water sources, which can vary significantly depending on terrain, seasonal water levels, and road infrastructure (Mineral County 2018). While multiple natural water sources exist, limitations in accessibility (particularly in remote areas with sparse road networks) can increase response times and complicate suppression efforts. To assess local fire protection water resources, the Mineral County CWPP Fire Protection Resources Survey was distributed to fire response agencies within the county. Responses were received from Montana DNRC Missoula Unit, Superior Ranger District, Ninemile Ranger District, St. Regis VFD, and West End

VFD. Through the survey, the fire protection entities were asked to describe their water availability, provide a rating, and offer potential improvements.

The Montana DNRC Missoula Unit, relying on the Blackfoot and Clark Fork Rivers and their tributaries, rated their water sources at 4 stars, citing easy access in lower elevations but limited availability in remote locations. Superior Ranger District, with abundant rivers and creeks, rated their water sources 5 stars. Ninemile Ranger District, which primarily drafts water from streams and rivers, gave a 2-star rating due to limited flexibility and accessibility. St. Regis VFD, supported by two artesian wells, multiple drafting areas, and well-equipped apparatus, rated their water sources 5 stars, as did West End VFD, which benefits from two high-capacity wells and a river running through the area. The districts also provided suggestions for improving water availability, including installing additional hydrants, expanding water storage capacity, collaborating with private landowners to access water sources, and maintaining or upgrading equipment. These district-proposed improvements aim to strengthen fire suppression capabilities and ensure more consistent water access across all service areas.

It is recommended that response personnel clean fire response apparatus and take several precautions when utilizing water delivery systems. When using water for firefighting, apparatus should be filled from hydrants, water tenders, or dedicated pumps. Spraying untreated water into local water bodies, especially from a different watershed, should be avoided. Leakage, overflow, and the relocating of water from one site to another should be avoided at all stages of the water delivery and equipment cleaning process. To decontaminate ground equipment before transitioning to a new water source, three methods are suggested: hot waterpower washing, sun drying, or using chemical disinfectants. Spare clean equipment can be carried for replacement when decontamination is not practical (NWCG 2023.

Ensuring cistern compatibility with fire apparatus connections and clearing vegetation for apparatus access are common water supply issues. Access to water supply and roads wide enough for fire apparatus transportation is crucial for effective wildfire suppression and structure protection.

PUBLIC EDUCATION AND OUTREACH PROGRAMS

Public education and outreach programs are a common factor in virtually every agency and organization involved with wildfire.

LOCAL AND STATE PROGRAMS

FireSafe Montana

FireSafe Montana is a private, nonprofit organization dedicated to reducing wildfire risks and impacts through public education and outreach. They coordinate a statewide coalition of diverse stakeholders to promote fire safety in homes, neighborhoods, and communities across Montana. The organization supports the formation of local fire safe councils, which play a key role in raising awareness and providing resources for wildfire prevention and preparedness.

- **Ignition Resistant Construction Guide:** A guide on building practices to make structures more resistant to fire.

- **Living with Fire**: Educational material on how to coexist safely with wildfire risks.

- **Citizen Evacuation Guide:** Instructions for safely evacuating during a wildfire.

- **Enough is Enough Campaign:** Editorials, public service announcements, and news articles focusing on wildland fire issues in the urban interface.

- **Fire Prevention and Preparedness Programs:** Initiatives aimed at reducing human-caused wildfires and educating homeowners on protecting their properties.

- **Partnerships with Fire Safety Campaigns:** Collaborations with initiatives like Keep Montana Green, Firewise Communities, and Ready, Set, Go! to promote wildfire safety practices.

To view FireSafe Montana's online resources, please visit: https://firesafemt.org/home-and-landowners

Fire Adapted Montana

Fire Adapted Montana is a collaborative network committed to bolstering the resilience of communities against wildfires. Their primary mission is to connect and support individuals and communities across Montana in living more safely with the constant threat of wildfires. By promoting collaboration, sharing innovative strategies, and developing new ideas, they work tirelessly to foster the creation of fire-adapted communities. Fire Adapted Montana offers a wide array of invaluable resources aimed at improving wildfire preparedness and response. Their comprehensive website serves as a hub for information on wildfire restrictions, current wildfire conditions, preparedness tips, guides, and prevention strategies.

To view Fire Adapted Montana's Resource Library, please visit: https://fireadaptedmontana.org/resources.

Montana Department of Natural Resources and Conservation

The Montana Department of Natural Resources and Conservation (DNRC) plays a critical role in wildfire protection, forest management, and enhancing community resilience in Montana (Montana DNRC 2021a). By partnering with local governments, federal agencies, and various stakeholders, the DNRC implements comprehensive programs to manage wildfire risks, promote sustainable forestry practices, and support urban forestry initiatives. The DNRC provides critical resources, funding, and technical assistance to ensure effective local fire response and forest management, aiming to protect Montana's vast natural landscapes and communities.

- **County Cooperative Program:** Ensures wildland fire protection for over 55 million acres through cooperative agreements with all 56 counties. Local fire forces handle initial attacks, with DNRC providing technical assistance, equipment, and training, and mobilizing additional resources when needed. To learn more, please visit: https://dnrc.mt.gov/Forestry/Community-Local-Government/county-coop-program.

- **Good Neighbor Authority (GNA):** Partners with the USFS and BLM to enhance forest health and reduce wildfire threats. Uses state procedures and personnel to manage federal lands, with revenue from timber sales reinvested into future projects (Montana DNRC 2024c). To learn more, please visit: https://dnrc.mt.gov/Forestry/Forest-Management/good-neighbor-authority.

- **Urban and Community Forestry Program:** Supports the development and maintenance of urban forestry programs. Provides technical and financial assistance, public education, and volunteer coordination, along with grants to improve urban forests and tribal community projects. To learn more, please visit: https://dnrc.mt.gov/Forestry/Community-Local-Government/urban-and-community-forestry.

- **Forest Stewardship Program:** Assists private forest landowners in managing nearly 25% of Montana's forested areas. Offers resources for sustainable forest management, local partner programs, grant funding, and educational opportunities through workshops and webinars. To learn more, please visit: https://dnrc.mt.gov/Forestry/Resources/forest-stewardship.

- **Fire Protection Assessments:** The DNRC offers free wildland fire risk home assessments (Figure A.10.) To learn more, please visit: https://dnrc.mt.gov/Forestry/Resources/fire-protection-assessments.

Mineral County Fire Protection Districts

Most of Mineral County's FPD maintain websites or Facebook pages that are designed to increase community wildfire awareness and preparedness. These pages provide residents with a wealth of up-to-date knowledge on living with the current wildland fire risks and the appropriate actions for mitigating dangers. The links below point users towards information on active burn bans, emergency preparedness, evacuation procedures, maintaining home ignition zones, responsibly recreating in fire-prone forests, and accessing state and federal planning guidelines. The FPD website pages can be accessed here:

- Superior VFD: https://townofsuperiormontana.org/departments/fire-department/

- St. Regis VFD: https://www.facebook.com/p/St-Regis-Volunteer-Fire-Dept-100073682852337/

- West End Volunteer Fire and Rescue: http://wevfd.org/index.html

- Frenchtown Rural Fire District: https://www.frenchtownfire.org/

Figure A.10. Photos taken during Mineral County Home Assessment offered throughout the county aiming to reduce hazardous fuels in the HIZ surrounding structures.

Source: Mineral County Core Team.

NATIONAL PROGRAMS AND RESOURCES

Ready, Set, Go!

The Ready, Set, Go! Program, managed by the International Association of Fire Chiefs, was launched in 2011 at the National WUI conference. The program seeks to develop and improve the dialogue between fire departments and residents, educating residents who live in high-risk wildfire areas on how to best prepare themselves and their properties for wildfire.

The tenets of Ready, Set, Go! as included on their website (http://www.wildlandfirersg.org) are:

Ready – Take personal responsibility and prepare long before the threat of a wildland fire so your home is ready in case of a fire. Create defensible space by clearing brush away from your home. Use fire-resistant landscaping and harden your home with fire-safe construction measures. Assemble emergency supplies and belongings in a safe place. Plan escape routes and ensure all those residing within the home know the plan of action.

Set – Pack your emergency items. Stay aware of the latest news and information on the fire from local media, your local fire department, and public safety.

Go – Follow your personal wildland fire action plan. Doing so will not only support your safety but will allow firefighters to best maneuver resources to combat the fire.

Federal Emergency Management Agency

FEMA provides a number of educational resources, funding programs, research, and other tools to help communities understand wildfire better and increase actions that improve resilience. Resources are categorized into before, during, and after an event and include information on evacuation preparations, insurance, alerts, warnings, sheltering, post-burn flooding, debris flow, and recovery first steps. Available funding programs are related to both preparations and recovery. To view all FEMA resources, please follow the link: https://community.fema.gov/ProtectiveActions/s/article/Wildfire.

U.S. Environmental Protection Agency

The EPA maintains wildfire resources that can help communities better prepare for an recover from a disaster. The EPA is a particularly good resource for smoke and air quality related research and guidance. The agency manages a local air quality search tool, has guides on dealing with wildfire smoke, and information on the health effects of smoke. A full list of EPA resources and research is available at the agency website link: https://www.epa.gov/natural-disasters/wildfires.

Ready.Gov

Ready.Gov is a program developed by the Department of Homeland Security intended to provide disaster and emergency information and preparation resources. Similar to FEMA resources, documents and information are categorized by before, during, and after an emergency. The site provides guides, educational documents, and other resources to help citizens harden their homes and foster defensible space, plan for a wildfire, stay safe during an event, and safely return home or rebuild following a wildfire. The full list of resources is available here: https://www.ready.gov/wildfires.

National Fire Protection Association Firewise USA

The NFPA is a global nonprofit organization devoted to eliminating death, injury, and economic loss due to fire. Its 300 codes and standards are designed to minimize the risk and effects of fire by establishing criteria for building, processing, design, service, and installation around the world.

The NFPA develops easy-to-use educational programs, tools, and resources for all ages and audiences, including Fire Prevention Week, an annual campaign that addresses a specific fire safety theme. The NFPA's Firewise USA program (www.firewise.org) encourages local solutions for wildfire safety by involving homeowners, community leaders, planners, developers, firefighters, and others in an effort to protect people and property from wildfire risks.

The NFPA is a premier resource for fire data analysis, research, and analysis. The Fire Analysis and Research division conducts investigations of fire incidents and produces a wide range of annual reports and special studies pertaining to fire hazards.

Evacuation Guide for People with Disabilities: https://www.nfpa.org/downloadable-resources/guides-and-manuals/evacuation-guide-pdf.

National Interagency Fire Center

The National Interagency Fire Center (NIFC) provides a wide array of fire resources and services. The National Interagency Coordination Center offers communication assistance to over 32,000 firefighters and 50 major events at one given time (NIFC 2024). The Predictive Services Group creates wildfire forecasts and predictions from fuel and weather data. The NIFC has a Remote Automated Weather Base with over 2,000 weather stations which help inform the Predictive Services Group.

The National Wildfire Coordinating Group (NWCG), which is nested under the NIFC, provides operational coordination to federal, state, local, tribal, and territorial partners (NWCG 2022). The NIFC also has a training branch where training curriculums are developed to be used across the nation. For those too young to participate in the standard trainings, the NIFC offers FireWorks, an educational program designed for kids K-12. The program teaches children topics such as wildland fire science, ecosystem fluctuations, human interaction on the environment, and other environmental science topics. The NIFC also provides public education resources:

- Wildfire Readiness – Home
- Wildfire Readiness – Business
- Wildfire Readiness – Farm and Ranch
- Weekend Wildfire Preparedness
- What to Do if a Wildfire is Approaching
- Wildfire Risk – Community
- Prepare and Protect Your Home
- Prepare Your Community
- One Less Spark, One Less Wildfire
- Only You Can Prevent Wildfires

U.S. Fire Administration's WUI Toolkit

The U.S. Fire Administration (USFA) is an entity of the U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) that aids in the preparation for and response to fire. Their WUI toolkit consists of websites and other information regarding risk assessments, public outreach, and community training. Find the toolkit here: https://www.usfa.fema.gov/wui/.

Wildfire Research Center (WiRē)

Wildfire Research Center (WiRē) is a nonprofit organization that works with local wildfire services to highlight community-tailored pathways to reduce risk to wildfire while simultaneously promoting pathways to fire adaptation. WiRē's mission states that fire adaptation is "about living with fire," while "creating safe and resilient communities that reduce wildfire risk on their properties before a fire, and supporting effective response when fires threaten a community." WiRē states that wildfire is an integral component of many ecosystems, and that safe fire must be allowed to ensure healthy forests.

To achieve its goals and serve communities, WiRē typically assesses factors contributing to wildfire risks; factors include building materials, vegetation near homes, background fuels, local topography, and access to emergency fire services. Additionally, they conduct social surveys to gauge residents' perceptions about wildfire, wildfire risk, risk mitigation behavior, and assess their willingness to take action in reducing wildfire risks.

For more information, please visit https://wildfireresearchcenter.org/.

Community Navigators

The Community Navigators Program supports historically underserved communities in collaboration with the USFS and connects communities to appropriate resources for building climate resilience such as access funding and partnership support. The program aims to create mutually beneficial relationships between local communities, the USFS, and other federal agencies that contribute to community and ecosystem resilience. Through their website, community leaders can request a navigator; resources are available in Spanish and English and accessibility accommodations are available.

For more information, please visit: https://communitynavigators.net/.

American Red Cross

The American Red Cross is a leading disaster response and recovery agency primed to provide disaster relief. Additionally, the Red Cross provides a number of preparation guides and resources for individuals and families and empower community members to assist in relief and recovery efforts. Following the Marshall Fire, the Red Cross had over 100 volunteers assisting victims in recovery. For the full list of Red Cross resources and trainings, follow the link: https://www.redcross.org/get-help/how-to-prepare-for-emergencies/types-of-emergencies/wildfire.html.

MISCELLANEOUS RESOURCES

Fire Adapted Communities Pathways Interactive Tool

This tool helps community members properly identify the most beneficial adaptation methods for their local environment: https://facpath.fireadaptednetwork.org/.

Climate Mapping for Resilience and Adaptation portal

Provides a live dashboard to help communities see extreme weather and other hazards from climate change: https://resilience.climate.gov/#real-time-data.

Community Planning for Wildfire Assistance Program

Assists communities with wildfire risk-reduction communications, increasing land use planning capacity, and collaborating with agencies to identify overlap in scopes of work: https://cpaw.headwaterseconomics.org/

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APPENDIX B:

Planning and Policy Background

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PLANNING PROCESS

The SAF, in collaboration with the National Association of Counties and the National Association of State Foresters, developed a guide entitled *Preparing a Community Wildfire Protection Plan: A Handbook for Wildland-Urban Interface Communities* (SAF 2004) to provide communities with a clear process in developing a CWPP. The guide outlines eight steps for developing a CWPP, which have been followed in preparing the Mineral County CWPP:

Step One: Convene Decision-makers. Form a Core Team made up of representatives from the appropriate local governments, local fire authorities, and state agencies responsible for forest management.

Step Two: Involve Federal Agencies. Identify and engage local federal representatives and contact and involve other land management agencies as appropriate.

Step Three: Engage Interested Parties. Contact and encourage active involvement in plan development from a broad range of interested organizations and stakeholders.

Step Four: Establish a Community Base Map. Work with partners to establish a base map(s) defining the community's WUI and showing inhabited areas at risk, wildland areas that contain critical human infrastructure, and wildland areas at risk for large-scale fire disturbance.

Step Five: Develop a Community Risk-Hazard Assessment. Work with partners to develop a community Risk-Hazard Assessment that considers fuel hazards; risk of wildfire occurrence; homes, businesses, and essential infrastructure at risk; other values at risk; and local preparedness capability. Rate the level of risk for each factor and incorporate this information into the base map as appropriate.

Step Six: Establish Community Priorities and Recommendations. Use the base map and community Risk-Hazard Assessment to facilitate a collaborative community discussion that leads to the identification of local priorities for treating fuels, reducing structural ignitability and other issues of interest, such as improving fire response capability. Clearly indicate whether priority projects are directly related to the protection of communities and essential infrastructure or to reducing wildfire risks to other community values.

Step Seven: Develop an Action Plan and Assessment Strategy. Consider developing a detailed implementation strategy to accompany the CWPP as well as a monitoring plan that will ensure its long-term success.

Step Eight: Finalize Community Wildfire Protection Plan. Finalize the CWPP and communicate the results to community and key partners.

FIRE MANAGEMENT POLICY

The primary responsibility for WUI fire prevention and protection lies with property owners and state and local governments. Property owners must comply with existing state statutes and local regulations. These primary responsibilities should be carried out in partnership with the federal government and the private sector. The current federal fire policy states that protection priorities are 1) life, 2) property, and 3) natural resources. These priorities often limit flexibility in the decision-making process, especially when a wildland fire occurs within the WUI.

LEGISLATIVE DIRECTION

County Direction

Subdivision Regulations

Mineral County's subdivision regulations govern development in the county and the towns of Superior and Alberton, focusing on minimizing wildfire risks. These regulations ensure that new subdivisions are planned, designed, and maintained to reduce fire risks and allow effective fire suppression. Requirements include placing structures to minimize flame spread, providing adequate firefighting facilities and water supply, ensuring access for emergency vehicles, and including a second emergency exit. For subdivisions in high fire hazard areas, additional standards are required, such as a Fire Prevention and Control Plan, multiple entrances/exits, cleared road rights-of-way, and water supplies sufficient for fire control (Mineral County 2018).

To learn more about the Mineral County subdivision regulation and how they pertain to fire protection, please visit Environmental Health and Planning page on the Mineral County website: https://co.mineral.mt.us/wp-content/uploads/2015/12/FINAL-WebsiteCopyMinCoSubRegsformatted-by-Land-Solutions-LLC-7-12-11.pdf

Building Code

In Montana, cities and counties can adopt and enforce building codes approved by the Montana Department of Labor and Industry (DLI), including the Uniform Building Code, International Building Code, International Residential Code, and the WUI Code. The WUI Code focuses on fire-resistant construction materials and includes guidelines on vegetation management and land use practices. Where local building codes are not adopted, DLI oversees building codes for commercial structures, plumbing and electrical permits, and construction standards for residential buildings with five or more units. However, DLI does not regulate fire-related construction for single-family homes, which comprise much of the development in the WUI. Mineral County does not have, and is not expected to adopt, local building codes (Mineral County 2018).

More information regarding the Montana DLI and it's adopted codes can be found on the following webpage: https://bsd.dli.mt.gov/building-codes-permits/current-codes

Growth Policy

Adopted in 2016, Mineral County's growth policy also encompasses the towns of Alberton and Superior, serving as a long-range comprehensive plan for the area. While local governments in Montana are not mandated to adopt growth policies, state law requires these policies to include an assessment of fire and wildland fire potential, and to consider the need for delineating the WUI and adopting additional regulations. Mineral County's growth policy identifies a generalized WUI covering a significant portion of the county, emphasizing the importance of fuels reduction on private lands. It prioritizes projects adjacent to USFS lands, specifically highlighting fuels reduction around Alberton's water supply as a key project (Mineral County 2016).

State Direction

State Fire Policy (76-13-115): The Montana State Fire Policy prioritizes public and firefighter safety in wildfire suppression, emphasizing aggressive initial attacks to minimize property loss and taxpayer

expenses. The policy promotes interagency cooperation and highlight fire prevention, hazard reduction, and loss mitigation. All property in Montana must have wildfire protection, with property owners and land management agencies responsible for fire prevention. The policy underscores the benefits of sound forest management and the need for fire protection guidelines in wildland-urban interface areas to enhance safety and reduce risks. It also warns that inadequate federal land management could jeopardize the right to a clean and healthful environment (Montana State Legislature 2023a).

Duty Of Landowner To Protect Against Fire (76-13-212): Landowners in the state of Montana are required to protect their land from the start or spread of fire and must suppress any existing fires, following the rules and standards set by the department. Fore land classifies as forest land within a wildland fire protection district (FPD), specific provisions apply. If a landowner does not provide adequate fire protection and suppression, they may request the department to provide these services (Montana State Legislature 2023b).

Fire Suppression Account Fund Transfer (HB 883): House Bill 883 revises state finance regulations concerning the Fire Suppression Account in Montana, allowing for the transfer of funds from other accounts to support fire suppression, fuel reduction, forest restoration, fire suppression equipment grants, forest management projects on federal land, and fire preparedness. The bill also establishes reporting requirements for the DNRC, mandating annual reports on expenditures. Additionally, it includes provisions for transferring surplus general fund money to the Fire Suppression Account under specific conditions (Montana State Legislature 2023c)

Wildfire Suppression Law Revisions (SB 219): Senate Bill 219 revises several wildfire suppression laws, incorporating definitions related to unmanned aerial vehicles and their use in wildfire suppression activities. It amended sections of the Montana Code Annotated to redefine terms such as "wildfire," "wildland," and "wildfire season," and established penalties for obstructing aerial wildfire suppression efforts, including specific provisions for UAVs. The bill aims to enhance the efficiency of wildfire suppression by clarifying legal definitions and updating penalties for interference (Montana State Legislature 2023d).

Insurance Refusals and Wildfire Risks (Section 33-18-210(7)): Section 33-18-210(7) prohibits insurers from unfairly discriminating between individuals or risk of the same class by refusing to issue, renew, cancel, or limit insurance coverage based on geographic location unless it is for a valid business reason or required by law. This ensures that property and casualty insurance decision are made fairly and based on actual risk rather than pretext.

Montana Local County Weed Act (Ordinance No. 216): The Montana Local County Weed Act of 2013 establishes a framework for managing noxious weeds within the state counties. Each county much form a weed management district, governed by a district weed board appointed by the county commissioners. The act defines noxious weeds as exotic plants species that threaten agriculture, forestry, livestock, or native plant communities and mandate that landowners must not allow these weeds to propagate (Montana Department of Agriculture 2013).

Federal Direction

The National Fire Plan (NFP) was established after the 2000 fire season to foster collaboration between state, federal, and tribal agencies, ensuring preparedness for severe wildland fires. It was followed by a 2001 report, and was updated in 2002 and 2006, which emphasized restoring fire-adapted ecosystems, reducing hazardous fuels, and improving fire prevention. The 2006 update introduced a landscape-level vision for restoration, continued improvements in collaboration, and the importance of using fire as a

management tool. Annual reports track progress in community fire prevention efforts (Forests and Rangelands 2024).

In 2003, the Healthy Forests Restoration Act (HFRA) was enacted to expedite hazardous fuels reduction on federal lands, encouraging collaboration between agencies and communities. Revised in 2009, it introduced new funding provisions and refocused on wildfire mitigation. A key feature of the HFRA is the development of community wildfire protection plans (CWPPs), which allow communities to define their wildland-urban interface (WUI) and prioritize treatment areas for funding and hazard reduction projects (H.R. 4233 - Healthy Forest Restoration Amendments Act of 2009).

In 2023, the Wildfire Leadership Council updated the National Cohesive Wildland Fire Management Strategy through an Addendum Update. This update highlighted new emphasis areas, including climate change, workforce capacity, community resilience, and environmental justice. The updated strategy also outlined management options and addressed challenges faced by the 2014 framework (Forests and Rangelands 2023).

In 2024, the U.S. House of Representatives passed the Fix Our Forests Act (H.R. 8790), which aims to improve forest management practices and protect communities in wildland-urban areas (Healthy Forests. It simplifies environmental review processes, improves collaboration among land management agencies, and supports science-based forest restoration practices (Healthy Forests 2025). The Fix Our Forests Act also strengthens the Good Neighbor Authority, fostering cooperative projects between federal and non-federal land managers (Healthy Forests 2025).

PAST PLANNING EFFORTS

Local

Mineral County Pre-Disaster Mitigation Plan: Adopted in 2012, Mineral County's Pre-Disaster Mitigation Plan is designed to assess and prioritize projects for reducing disaster damage and casualties. The plan emphasizes wildfire as the highest priority hazard due to its significant potential impact on the community, referencing the 2005 CWPP for detailed strategies. The Pre-Disaster Mitigation Plan outlines several mitigation projects to reduce wildfire risk, including providing public education on wildfire risks, mapping structures within the wildland-urban interface (WUI), offering financial incentives for fuels reduction around homes, supporting mitigation projects on federal lands, implementing CWPP-designated projects, and developing safe access routes for homes in the WUI (Mineral County 2018)

Mineral County Emergency Operations Plan: The 2024 Mineral County Emergency Operations Plan provides a comprehensive framework for responding and recovering to emergencies in Montana, outlining the responsibilities for action and the coordination mechanisms among state, local and federal agencies. The Plan emphasizes preparedness, response, rapid recovery, and mitigation activities aimed at preventing or reducing the impacts of emergency event impacts where possible. Wildfire is identified within the plan as a hazard of both high occurrence and high risk due to the close proximity of communities to wildland fuels, historic wildfire suppression activities, and numerous forest health and climate challenges (Mineral County 2024).

Mineral County 2018 CWPP: The 2018 Mineral County CWPP (now updated with the 2025 Mineral County CWPP) was designed to help the county prepare for and mitigate the impacts of wildfires. Developed collaboratively with local, state, and federal agencies, the plan was aligned with the National Cohesive Strategy, focusing of resilient landscapes, fire-adapted communities, and effective fire response. The Plan includes a comprehensive risk assessment using mapping form the Lolo National Forest and input from local experts, identifying at-risk communities and outlining actions to enhance

coordination, educate the public, and implement forest treatments. Also outlined within the plan were strategies for reducing wildfire risk, such as creating defensible space, updating regulation, and ensuring adequate firefighting resource (Mineral County 2018).

Mineral County 2004 Resource Use Plan: The 2004 Mineral County Resource Use Plan, amended in 2025, sets forth goals and objectives for fire management in Mineral County. Utilizing fire and suppressing fire is required to support and expand multiple uses and achieve management goals. The plan sets forth policies for managing fire in Mineral County and utilizing an integrated forest management program to protect valued assets in Mineral County (Mineral County 2004).

State

Montana Forest Action Plan: Updated in 2020, the Montana Forest Action Plan aims to address significant forest health issues and wildfire risks across the state. Convened by the Montana Department of Natural Resources and Conservation, the plan emphasizes collaborative cross-boundary forest management and restoration efforts, involving agencies, tribal nations, and various partners. It identifies priority areas needing attention using geospatial data, highlights key findings on forest health and wildfire risks, and recommends goals and strategies to improve resilience, reduce wildfire risks, support biodiversity, and enhance human and community health. The plan also focuses on fostering fire-adapted communities and promoting sustainable forest economies while acknowledging the historical and ongoing contributions of Indigenous people to forest stewardship (Montana DNRC 2020a).

Sustainable Forest Lands Management Plan: The Sustainable Forest Lands Management Plan outlines strategies for managing Montana's state forest lands to balance ecological, economic, and social objectives. The plan emphasizes sustainable timber harvesting, biodiversity conservation, and habitat protection, particularly for threatened and endangered species. It incorporates public input and scientific research to guide decision-making, aiming to maintain healthy forest ecosystems while generating revenue for trust beneficiaries (Montana DNRC 1996).

Administrative Rules for Forest Management: The 2021 Administrative Rules for Forest Management outline policies and procedures for managing Montana's state trust forest lands, focusing on sustainable practices and biodiversity conservation. The rules establish guidelines for accountable parties, road management, watershed protection, and silvicultural systems. They emphasize the use of best management practices to minimize environmental impacts, promote biodiversity through coarse and fine filter approaches, and manage specific habitats, such as those for grizzly bears and Canada lynx. The document also details procedures for timber harvesting, old-growth management, and habitat conservation while ensuring compliance with environmental regulations and fiduciary responsibilities (Montana DNRC 2021a).

Montana Habitat Conservation Plan: The 2010 Habitat Conservation Plan by the Montana DNRC outlines strategies to manage state trust lands in compliance with the Endangered Species Act. The Habitat Conservation Plan details conservation commitments, including habitat protection and restoration measures, and incorporates monitoring and adaptive management strategies. It also establishes a framework for obtaining an incidental take permit, allowing the DNRC to continue lawful activities while ensuring the protection of listed species. The plan emphasizes the balance between conservation goals and the DNRC's fiduciary responsibilities to generate revenue from trust lands (Montana DNRC 2010).

Federal

National Fire Plan: The National Fire Plan (Managing the Impact of Wildfires on Communities and the Environment) was implemented by the U.S. Department of the Interior and the USFS in 2000. The Plan was established to develop a collaborative approach among various governmental agencies to actively respond to severe wildland fires and ensure sufficient firefighting capacity for the future. Focuses of the Plan are on firefighting preparedness and accountability, forest restoration, hazardous fuels reduction, community assistance, and research (Forests and Rangelands 2024).

A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: A 10-year Implementation Strategy: This Plan was most recently updated in 2006 and focuses on using a collaborative framework for restoring fire-adapted ecosystems, reducing hazardous fuels, mitigating risks to communities, providing economic benefits, and improving fire prevention and suppression strategies. The Plan also emphasizes information sharing and monitoring of accomplishments and forest conditions, a long-term commitment to maintaining the essential resources for implementation, a landscape-level vision for restoration of fire-adapted ecosystems, the importance of using fire as a management tool, and continued improvements to collaboration efforts (Forests and Rangelands 2024).

The National Cohesive Wildland Fire Management Strategy: The Cohesive Strategy outlines a holistic approach to the future of wildfire management, with the goal of managing forests to coexist with wildland fire but containing incidents when necessary. The Cohesive Strategy maintains that this goal will be achieved by restoring and maintaining landscapes, developing fire-adapted communities, and maintaining sufficient wildfire response capabilities (Forests and Rangelands 2014).

PUBLIC LAND MANAGEMENT

LAND MANAGEMENT STRATEGIES

Local and State Land

In Montana, the 2021 wildfire season was one of the most destructive in recent years, burning nearly 940,000 acres across the state, with suppression costs exceeding $47.5 million (Montana Free Press 2021). Mineral County experienced one of the worst fires in county history, including the Sunrise Fire in 2017, which burned over 26,000 acres and threatened both communities and critical infrastructure (Mineral County 2018).

Mineral County, in collaboration with the Montana DNRC, has been actively identifying high-risk areas for wildfire and implementing fuel reduction treatments (Mineral County 2018). These efforts focus on creating defensible space and reducing hazardous fuels in priority areas, such as the Cedar Creek Drainage and Thompson Creek. Crews have been working to remove dead vegetation and perform thinning projects to help reduce wildfire risk and protect local communities (Montana DNRC 2020a).

Montana has invested over $145 million into wildfire mitigation and restoration efforts, including $44 million dedicated to protecting critical watersheds like the Clark Fork River in Mineral County from post-wildfire erosion and sedimentation (MT DES 2022). Additionally, the federal government has invested $185 million in national wildfire mitigation efforts through the Bipartisan Infrastructure Law, with $8.4 million going directly to Montana in 2023 to support wildland fire management (U.S. Department of the Interior 2023). These funds are supporting collaborative projects, such as those within the Blackfoot-Clark Fork Restoration Area, where efforts focus on reducing hazardous fuels and enhancing the resilience of communities in fire-prone areas (U.S. Department of the Interior 2023).

The Montana DNRC plays a crucial role in wildfire preparedness through key planning efforts, including the Montana Statewide Operating Plan and the Fire Protection Strategic Plan. The Montana Statewide Operating Plan, developed as part of the Cooperative Fire Management and Stafford Act Response Agreement, establishes operational procedures and resource-sharing frameworks to coordinate wildfire management across the state. Complementing this, the Fire Protection Strategic Plan provides a unified approach to guiding the state's fire protection program, emphasizing the importance of adapting to changing environmental conditions and strategically allocating resources.

Mineral County participates in partnerships and agreements with agencies such as the USFS and BLM to coordinate wildfire response and share resources during fire events. These agreements allow for joint efforts in fuel reduction and wildfire risk mitigation, ensuring that critical areas receive focused attention (Mineral County 2018).

Federal Land

Lolo National Forest

The Lolo National Forest covers over 2 million acres across western Montana, including Mineral County (USFS 2023). The forest is known for its diverse ecosystems, ranging from valley bottoms with riparian systems to high-elevation forests that include critical habitats for species such as grizzly bears and Canada lynx (USFS 2023). The forest provides a wide range of recreation opportunities, such as hiking, camping, and wildlife viewing, and it supports local economies through timber, grazing, and tourism activities. Wildfire plays a vital role in shaping the Lolo's ecosystems, and its management strategies focus on both wildfire suppression and the use of prescribed burns (USFS 2023). The Lolo National Forest follows a land management plan that emphasizes reducing hazardous fuels, enhancing community protection, and promoting ecological resilience. According to the most recent forest assessment, fire management actions are used not only to suppress wildfires but also to allow natural fire processes to promote healthier forests (USFS 2023).

The Lolo National Forest is primarily managed by the USFS under the guidelines of the Land Management Plan that is currently under revision. The original plan from 1986 is being updated in accordance with the 2012 Planning Rule to address modern challenges and integrate new scientific data (USFS 2024a). The plan focuses on forest health, fire management, ecological resilience, and accommodating recreational and economic uses while preserving critical natural resources. Some of the key management strategies revolve around wildfire risk reduction through the use of prescribed burns and mechanical thinning to manage hazardous fuels, particularly in WUI where human settlements are most vulnerable (USFS 2024a).

STEWARDSHIP AGREEMENTS

For all wildfire hazards that are, or may become, declared emergencies or major disasters under the Stafford Act, the state of Montana (specifically the Montana DNRC) has entered into a cooperative wildland fire management agreement with multiple federal agencies (e.g., BLM, USFS, NPS, USFWS, and Bureau of Indian Affairs). The purpose of this agreement is to improve wildfire response and management efficiency by facilitating the coordination and exchange of equipment, personnel, supplies, services, and funds among the parties in the agreement. The details of this agreement are described in the Montana Master Cooperative Wildland Fire Management and Stafford Act Response Agreement.

In addition, Montana implements the Shared Stewardship Strategy, first launched in 2018 by the USFS (MT DES 2022). This strategy's primary goals are to identify management needs at the state level, ensure

active land management in priority areas, and use available tools to reduce wildfire risk and enhance forest health (MT DES 2022). The Shared Stewardship Agreement was formalized in Montana in 2019, with the DNRC and federal agencies working together to target high-risk areas, such as the WUI, where human habitation and forest lands intersect, increasing wildfire risks (Montana DNRC 2020a). These efforts are designed to improve cross-boundary collaboration and ensure that the most critical landscapes are prioritized for fuel reduction treatments, prescribed burns, and community protection efforts (Montana DNRC 2020a).

Stream Permitting and Riparian Protection Measures

310 Permitting Requirements

Montana's Natural Streambed and Land Preservation Act, commonly known as the 310 Law, requires private individuals or entities to obtain a 310 permit prior to starting any project that would physically alter the bed or banks of a stream with continuous flow (perennial stream) (Montana DNRC 2021b). These permits are reviewed and issued by local conservation districts, with the goal of maintaining the stability and function of natural watercourses, including minimizing erosion and safeguarding aquatic habitat.

Projects that typically require a 310 permit include culvert installations, bridge construction, bank stabilization work, or channel reshaping. Even work in intermittent or ephemeral streams may fall under review if the work is likely to impact downstream perennial systems (Montana DNRC 2021b). The process includes site inspections, review by team members, and decisions based on local and state criteria.

Application materials and instructions are available through the Montana DNRC's stream permitting portal: https://dnrc.mt.gov/licenses-and-permits/stream-permitting/. Completed applications must be submitted to the local conservation district, which will review and issue a decision to approve, modify, or deny the permit.

Streamside Management Zone Law and Rules

The Streamside Management Zone (SMZ) law and rules, established by the Montana Legislature in 1991 and implemented through a formal rule set in 2006, provides protective buffer requirements around streams, lakes, and other water bodies where forest practices could impact water quality (Montana DNRC 2006). The SMZ extends a minimum of 50 feet from the ordinary high water mark and may be widened to 100 feet on slopes greater than 35%, or where adjacent wetlands are present (Montana DNRC 2006). Within SMZs, forest practices are subject to strict limitations. Activities such as broadcast burning, construction of new roads (unless needed to cross a stream), clear-cutting, and side-casting of road material are prohibited. Additional practices (such as equipment use, chemical handling, or tree felling) must be modified to avoid damaging water resources or riparian function (Montana DNRC 2006).

Good Neighbor Authority

The Good Neighbor Authority (GNA) allows the Montana DNRC to collaborate with the USFS to carry out forest, rangeland, and watershed restoration projects on federal lands (Montana DNRC 2020a). Authorized under the 2014 Farm Bill, GNA enables state agencies to use their personnel, procedures, and contracts to perform activities such as hazardous fuel reduction, timber harvesting, and habitat improvements on federal lands (MT DES 2024). A key benefit of GNA is that revenue generated from timber sales on federal lands is reinvested into additional forest management and restoration efforts, making the program self-sustaining (Montana DNRC 2024c). In Mineral County, these efforts are

particularly important for maintaining forest health in the Lolo National Forest and mitigating wildfire risks in the WUI, where communities are most vulnerable to wildfire (MT DES 2024).

As of 2023, GNA projects in Montana have treated over 54,558 acres, conducted 58 timber sales, and generated $16.6 million in revenue, all of which has been reinvested into further restoration work and wildfire risk reduction projects (Montana DNRC 2024c). This partnership enhances the ability to reduce wildfire risks, restore ecosystems, and support local economies through sustainable timber management.

For additional information, please visit Montana DNRC's Good Neighbor Authority page.

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APPENDIX C:

Fire Behavior Modeling/GIS Background and Methodology

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FIRE BEHAVIOR MODELING AND METHODOLOGY

MONTANA WILDFIRE RISK ASSESSMENT

The fire behavior models for the Montana Wildfire Risk Assessment (MWRA) were developed using methodologies consistent with national standards and informed by local conditions. The MWRA framework builds on the established methods of wildfire risk analysis by utilizing the Fire Simulation (FSim) system and custom tools like Flame-Length Exceedance Probability Generator (FLEP-Gen) to assess wildfire likelihood and intensity across Montana. The MWRA was initiated by the Montana Department of Natural Resources and Conservation in 2019 and was completed in 2020, with contributions from Pyrologix LLC (Pyrologix 2020). The assessment incorporates a collaboratively defined set of highly valued resources and assets (HVRAs) and applies standardized quantitative modeling to enhance local land management strategies (Pyrologix 2020).

The MWRA improves upon earlier assessments by refining the burnable fuel classifications and calibrating fire behavior models to Montana's specific fire environment. Significant updates include recalibrating agricultural and developed land fuels to ensure accurate representation of fire spread across landscapes previously categorized as non-burnable. Both stochastic and deterministic models are applied to model fire behavior and predict burn probabilities and integrated hazards. Stochastic simulations, such as those run by FSim, utilize multiple simulated fire events to estimate burn probabilities, while deterministic models like FLEP-Gen generate fire intensity outputs under a set range of weather conditions. The MWRA incorporates conditional and probabilistic outputs, providing users with data on modeled fire behavior under specific conditions (conditional outputs) and estimated wildfire risk over time (probabilistic outputs).

CONDITIONAL VS. PROBABILISTIC OUTPUTS

The MWRA utilizes a combination of conditional and probabilistic model outputs to assess wildfire hazard and risk. Conditional outputs assume that any location on the landscape could burn and show potential fire behavior based on current conditions. These outputs are particularly useful for fire operations and incident response. In contrast, probabilistic outputs combine conditional results with historical burn probabilities to offer a more comprehensive view of wildfire risk, useful for planning and mitigation efforts. Each 30-meter grid cell in the MWRA landscape is evaluated for potential fire behavior, suppression difficulty, and risk to structures, creating a detailed risk profile across the state.

FIRE BEHAVIOR MODELS

LANDFIRE

LANDFIRE is a nationally recognized database providing critical inputs for wildfire modeling, including fuel types, topography, and vegetation characteristics. For the MWRA, the 2016 LANDFIRE remap served as the foundation for the statewide fuelscape. Pyrologix made additional adjustments to ensure the fuelscape accurately represented Montana's diverse fire environments. This included updating non-burnable areas, such as urban and agricultural lands, and recalibrating canopy characteristics in areas affected by insect and disease disturbances (Pyrologix 2020).

FSim

FSim (Large Fire Simulator) is the primary tool used in the MWRA for estimating burn probability and fire intensity. Developed by the USFS Fire Sciences Laboratory, FSim runs thousands of stochastic simulations to predict the likelihood and extent of large wildfire events under various conditions. The MWRA used FSim to produce a spatially explicit representation of burn probability across the landscape, enabling detailed risk assessments for both assets and resources (Pyrologix 2020).

FLEP-GEN

Recognizing the limitations of stochastic models in areas with low fire occurrence, Pyrologix developed the FLEP-Gen (Fireline Exceedance Probability Generation) model to provide more accurate fire intensity estimates. FLEP-Gen uses a deterministic approach, evaluating multiple weather scenarios to calculate flame lengths and fireline intensity. This model is especially useful in areas like western Montana, where wildfire events are less frequent but still pose significant risk (Pyrologix 2020).

FIRE BEHAVIOR MODEL INPUTS

The MWRA fuelscape was derived from LANDFIRE's 2016 remap and updated to reflect more recent changes in vegetation and land cover, including the impacts of major wildfires and other disturbances. Satellite imagery from 2021 was also used to further refine vegetation cover and height classifications. Continuous updates to the fuelscape are essential for maintaining the accuracy of fire behavior predictions, and the MWRA emphasizes the need for ongoing monitoring and recalibration.

An in-depth overview of the MWRA's methodologies can be found in the project's final report.

The following is a list of fuel characteristic inputs used in the creation of the MWRA fuelscape:

- Surface Fuel Model (FM40)
- Canopy Cover (CC)
- Canopy Height (CH)
- Canopy Bulk Density (CBD)
- Canopy Base Height (CBH)
- Topography characteristics (slope, aspect, elevation)

TOPOGRAPHY

Topography plays a crucial role in determining wildfire behavior and is an essential input for fire behavior models like FSim and WildEST. The steepness of slopes, aspect (the direction a slope faces), elevation, and other landscape features influence the distribution of fuels and local weather, which, in turn, impact fire behavior (Figure C.1). The rugged terrain in Mineral County, with its steep canyons and mountainous regions, can channel winds and affect local temperatures, intensifying wildfire behavior. Southwest-to-northeast weather patterns in the county further drive the direction of fire spread, often pushing fires out of canyons with prevailing wind (Mineral County 2018; Pyrologix 2020).
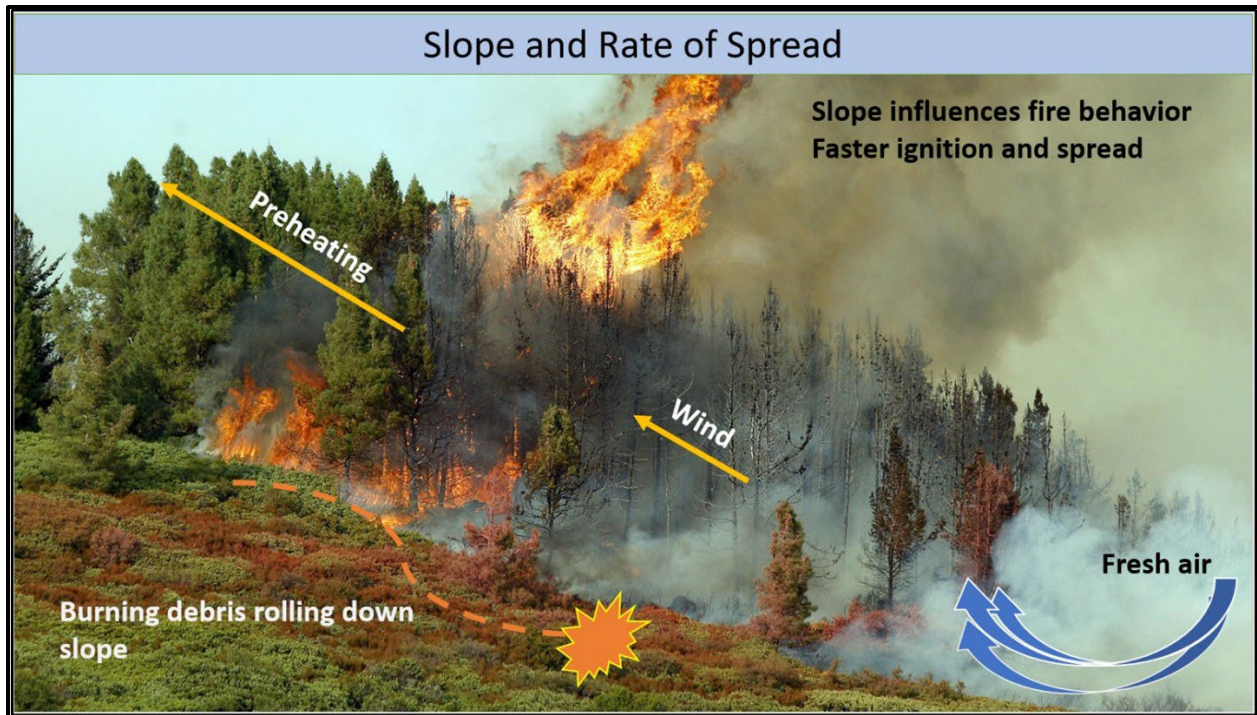
Figure C.1. Effect of topography on fire behavior.

More detailed information regarding topography in the planning area can be found in Chapter 2.

HISTORICAL WILDFIRE OCCURRENCE

Historical wildfire occurrence data from 1992 to 2017 was used to develop model inputs and ignition density grids. These inputs were used to calibrate fire models like FSim, allowing for a spatial representation of large fire occurrences across the county. Similar methodologies were applied in the MWRA, where historical fire data informs burn probability and risk assessments (Pyrologix 2020).

Fire Occurrence Density

FSim uses a geospatial layer, the Ignition Density Grid (IDG), to account for the spatial variability of historical large-fire occurrences across the landscape. During simulations, FSim stochastically places fires based on this density grid, with more ignitions occurring in areas previously prone to large-fire development. The IDG is generated using a combination of the Kernel Density and Point Density tools in ArcGIS, incorporating fires larger than 247 acres. It is refined to exclude non-burnable areas, such as urban zones and small patches under 50 acres. This grid allows FSim to simulate large-fire patterns consistent with historical data.

HISTORICAL WEATHER

Weather is one of the most variable and influential factors affecting fire behavior. In Mineral County, prevailing winds typically push fires to the northeast, while drought conditions intensify wildfire risks. Fire models like FSim incorporate weather inputs—such as wind speed, direction, live and dead fuel moisture, and the Energy Release Component (ERC)—to predict fire behavior and burn probabilities. FSim relies

on two primary data sources for these inputs. Wind data is gathered from remote automated weather stations (RAWS), with a preference for stations that have long-term, consistent records and moderate wind activity to ensure reliable simulations. ERC values are drawn from Dr. Matt Jolly's gridded dataset, covering 1992-2017, which ensures accuracy even during periods when RAWS stations were inactive. Local fire experts reviewed the selected RAWS stations and ERC sample sites during a fuel calibration workshop in 2019 (Pyrologix 2020). Additionally, Pyrologix utilized FSim to generate stochastic fire ignitions based on historical relationships between large fires and ERC. This was then used to determine burn probabilities.

FIRE BEHAVIOR MODEL OUTPUTS

BURN PROBABILTY

Burn probability (Figure C.2) was estimated using the FSim large-fire simulator, which accounts for wildfire occurrence and growth patterns under various weather conditions. Burn probability is the likelihood of a fire starting and spreading at a specific location. FSim modeled thousands of years of simulations to estimate the probability of large fires across the landscape. Burn probability was then spatially resolved at a 120-meter pixel scale and downscaled to 30 meters for more refined analysis. This allowed land and fire managers to assess which areas are more likely to experience wildfires, guiding prevention and mitigation strategies (Pyrologix 2020).

FLAME LENGTH

Flame length (Figure C.3) was a critical component in determining fire intensity and suppression difficulty. FLEP-Gen was used to model flame length probabilities, using seven different wind speeds and three moisture scenarios. Flame lengths were calculated for six classes (0–2 feet, 2–4 feet, 4–6 feet, 6–8 feet, 8–12 feet, 12–40 feet, and >40 feet). By analyzing how fire conditions could generate longer flame lengths, the MWRA identified areas where high fire intensity would pose greater challenges to suppression and firefighting efforts (Pyrologix 2020).
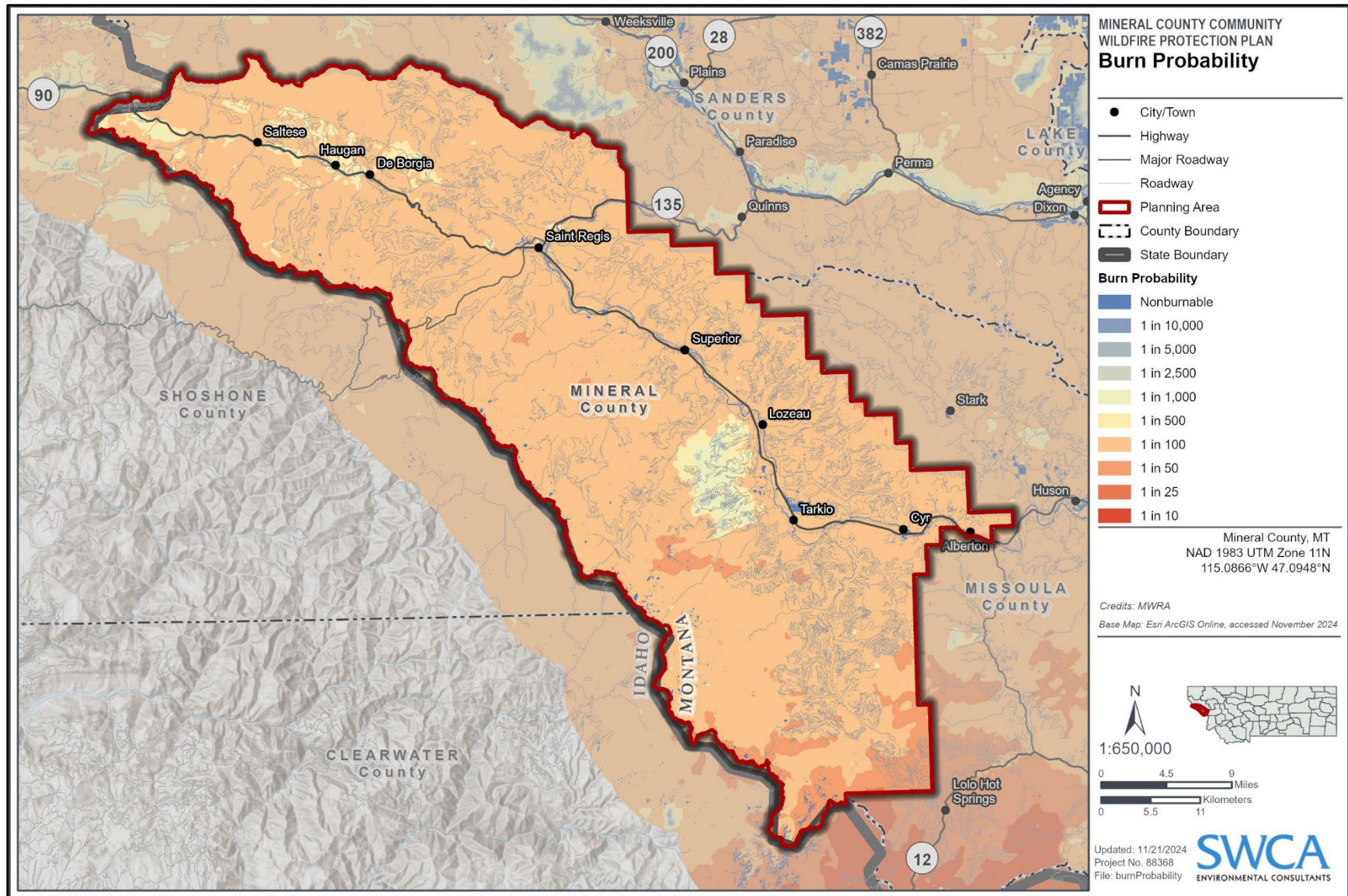
Figure C.2. Burn probability showing the likelihood of a wildfire burning on the landscape from lowest to highest probability.
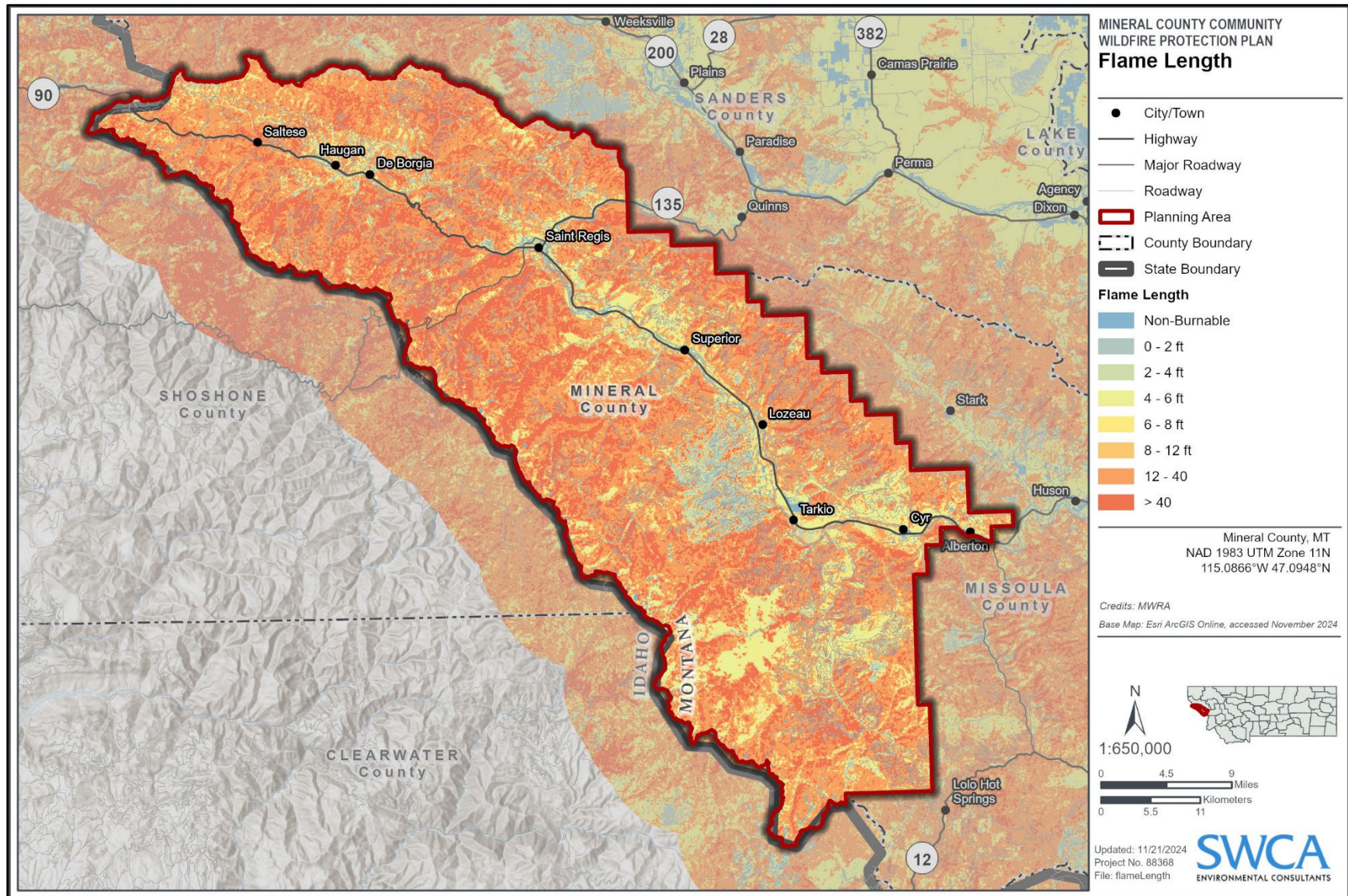
Figure C.3. Modeled flame length of wildfire for the planning area.

EFFECTS ANALYSIS RESULTS

Risk to Assets (Total Expected Net Value Change)

In the Montana Wildfire Risk Assessment (MWRA), the concept of "Risk to Assets" is derived from the Expected Net Value Change (eNVC) metric. This metric evaluates the potential impact of wildfire across various HVRAs. Similar to the approach used in the CWPP, the MWRA uses fire behavior models and burn probability calculations to quantify risk. The Conditional Net Value Change (cNVC) is first calculated by combining fire intensity measures (such as flame length probabilities from the FSim model) with HVRA response functions and their relative importance per pixel (RIPP). This value represents the potential impact of a fire, should it occur.

Total Conditional Net Value Change (TcNVC) is then calculated by summing cNVC values across the landscape for each HVRA. The Expected Net Value Change (eNVC), representing the "Risk to Assets," is derived by multiplying the TcNVC with the probability of a wildfire occurring in each area. The result is a comprehensive assessment of wildfire risk that integrates fire behavior, burn probability, and the importance of each asset (Figure C.4).

Risk to Potential Structures

The Risk to Potential Structures dataset (Figure C.5) integrates wildfire likelihood and intensity with generalized consequences to a hypothetical home anywhere on the landscape. It helps answer the question, "What would be the relative risk to a house if one existed here?", regardless of whether a home currently exists at that location. This allows for comparing risk in existing and potential new construction areas within and between communities across the state. Developed using methods similar to the People and Property HVRA, the Risk to Potential Structures dataset incorporates response functions by modeled wildfire intensity and is weighted by wildfire likelihood. Unlike the People and Property HVRA, Risk to Potential Structures does not map the current location or importance of structures; it only considers the likelihood and intensity of simulated wildfire. Risk to Potential Structures assumes that all homes encountering wildfire will be damaged, with the degree of damage directly related to wildfire intensity and does not account for localized fuel reduction efforts or the susceptibility of homes based on construction materials and design.

Suppression Difficulty Index

In the MWRA, the suppression difficulty index (SDI) (Figure C.6) provides a key measure of how challenging it would be to manage or suppress a wildfire, especially under severe fire weather conditions. This metric evaluates suppression difficulty based on several factors, including flame length, terrain/topography, fireline production rates, and the proximity to access routes such as roads and trails. The SDI does not account for burn probability but instead focuses on how challenging it would be for firefighting resources to respond to a fire in specific areas of the landscape.

The SDI is most useful for identifying areas where fires may be particularly difficult to contain or suppress due to environmental factors. It should not be used to directly assess the risk to structures but rather to understand areas where fire control efforts may face significant challenges. This tool helps inform fire management strategies and allocate resources effectively during wildfire events.
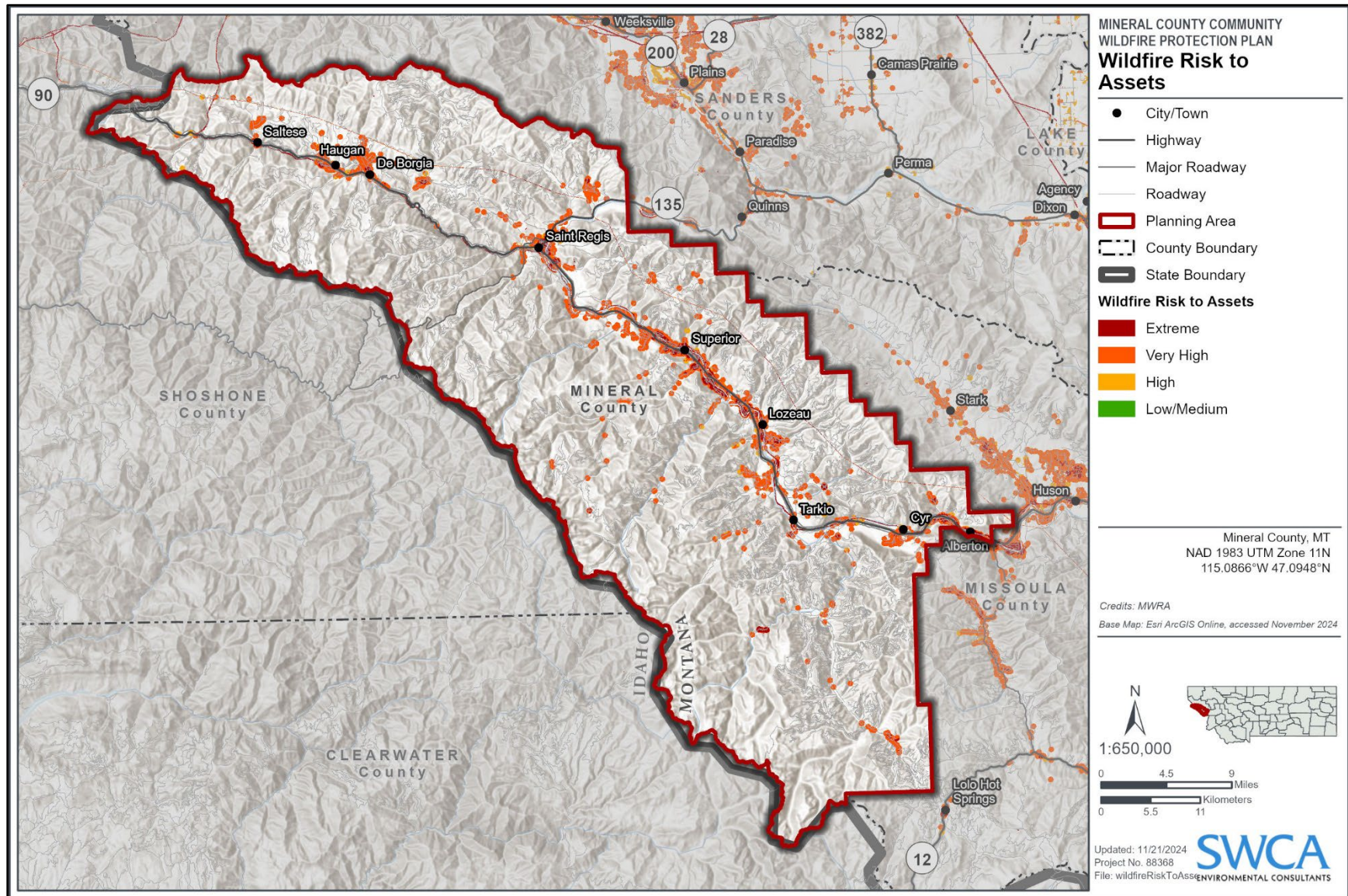
Figure C.4. Wildfire risk to assets on a 4-point low/medium-to-extreme scale sourced from the MWRA.
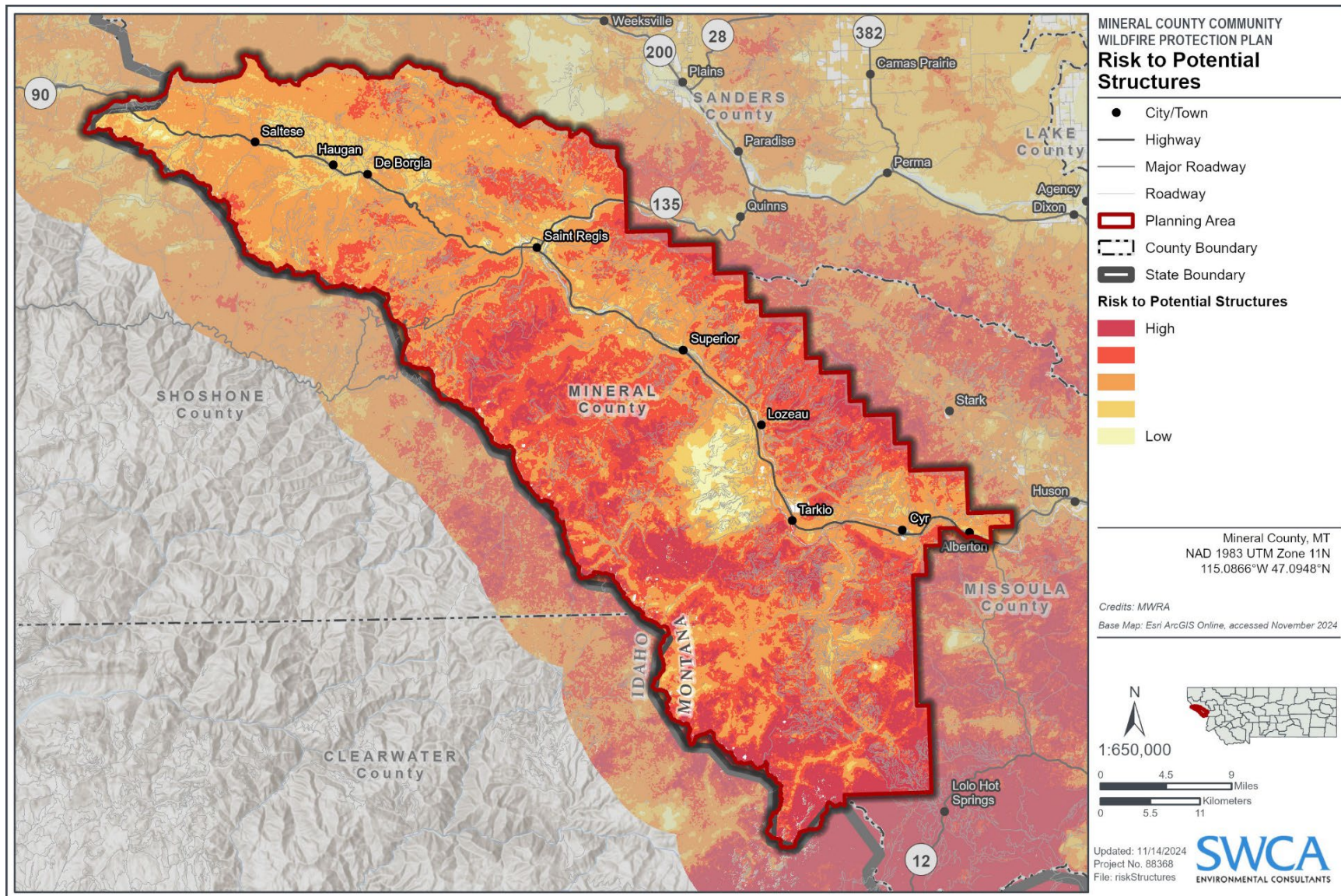
Figure C.5. Modeled risk to structures on a 5-point low-to-high scale for the planning area.
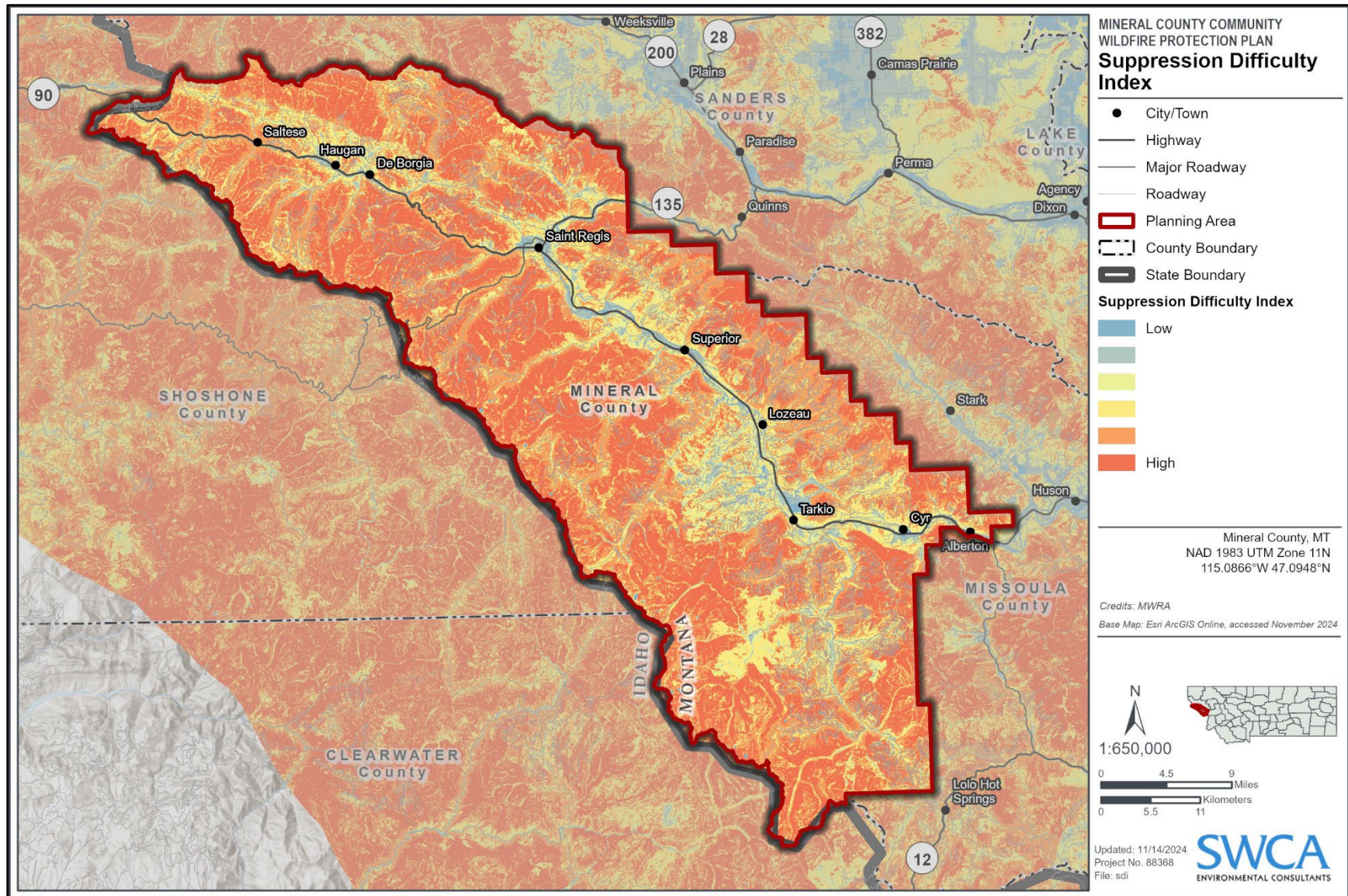
Figure C.6. Modeled SDI on a 2-point scale from unburnable to little to extreme difficulty for the planning area.

APPENDIX D:

Fuel Treatment Types and Methods

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FUELS TREATMENT

This appendix focuses first on treatments that can be performed in the home ignition zone (HIZ) and then describes the importance of and considerations for treatments beyond structures. After these discussions, additional information is provided regarding individual methods for fuels treatment types that can be applied across the landscape.

HOME IGNITION ZONES AND DEFENSIBLE SPACE

Defensible space within the HIZ is perhaps the fastest, most cost-effective, and most efficacious means of reducing the risk of loss of life and property. Although fire agencies can be valuable in providing guidance and assistance, creating defensible space is the responsibility of the individual homeowner (Figure D.1).
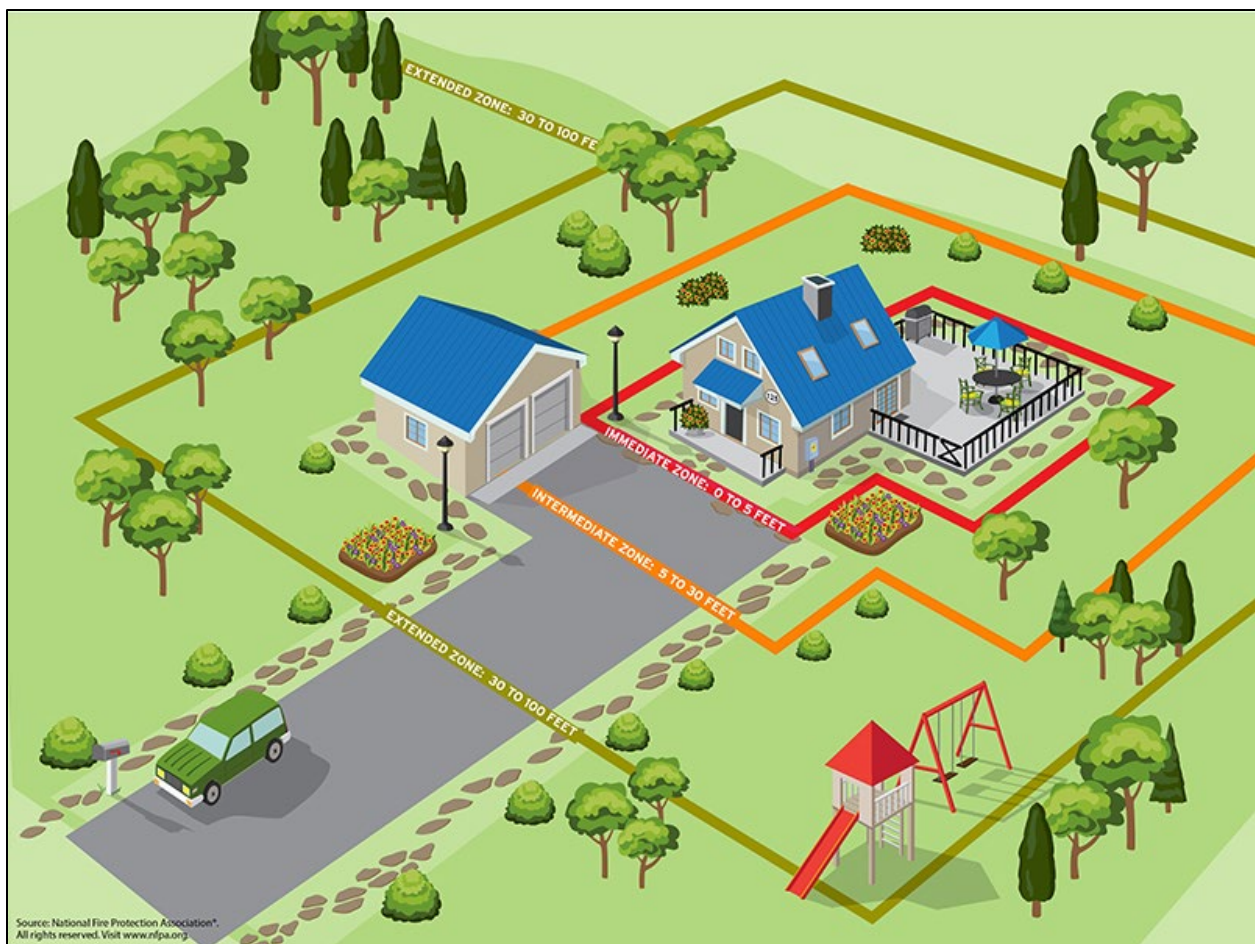
Figure D.1. HIZs providing clearance between a structure and adjacent woodland or forest fuels.

Source: NFPA (2022).

Effective defensible space consists of creating an essentially fire-free zone adjacent to the home, a treated secondary zone that is thinned and cleaned of surface fuels, and (if the parcel is large enough) a transitional third zone that is basically a managed forest area (see Figure D.1). These components work together in a proven and predictable manner. Zone 1 keeps fire from burning directly to the home; Zone 2

reduces the adjacent fire intensity and the likelihood of torching, crown fire, and ember production; and Zone 3 does the same at a broader scale, keeping the fire intensity lower by maintaining a more natural, historic condition. The HIZs and priorities for each zone are described below in Table D.1.

Table D.1. Key Focus of Each Home Ignition Zone

Zone	Distance from Structure	Key Focus
Immediate Zone (Zone 1)	0–5 feet	Remove all flammable materials; use fire-resistant materials; clean roofs, gutters, and decks.
Intermediate Zone (Zone 2)	5–30 feet	Thin vegetation, prune trees, and remove ladder fuels to reduce fire intensity before it reaches the home.
Extended Zone (Zone 3)	30–100 feet	Manage forested areas to reduce fire spread, create natural openings, and promote forest health.

Source: NFPA (2022).

Please see the figures below for a visual representation of the recommended tree spacing (Figure D.2), minimum vertical clearance (Figure D.3), as well as spacing on slopes (Figure D.4).
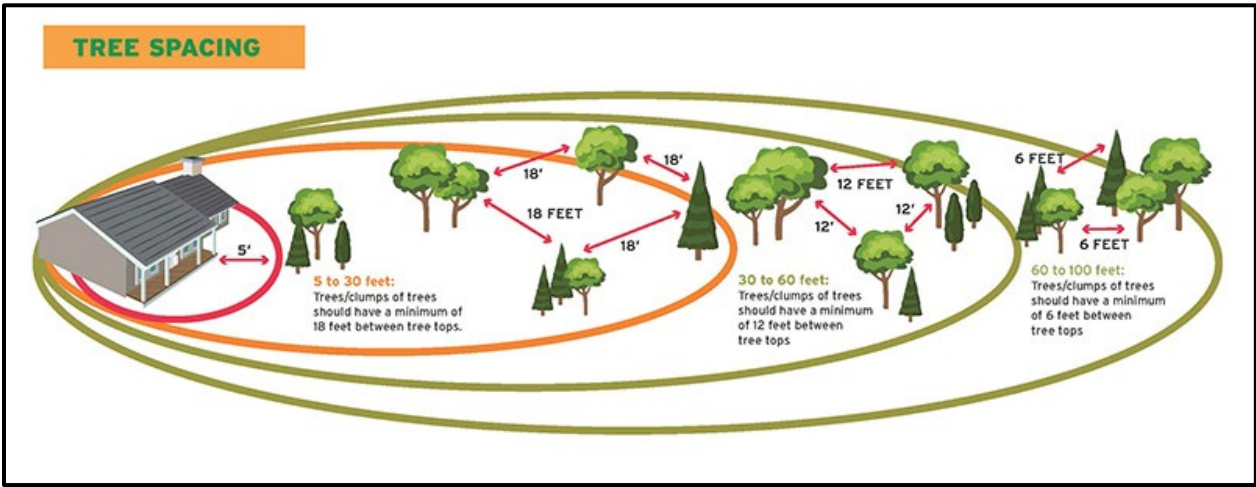
Figure D.2. Recommended tree spacing.
Source: NFPA (2022).

Figure D.3. Recommended minimal vertical clearance.

Source: CAL FIRE (2022).

Figure D.4. Recommended minimal horizontal clearance.
Source: CAL FIRE (2022).

Specific recommendations should be based on the hazards adjacent to a structure such as slope steepness and fuel type. Wildfire Partners offers valuable risk reduction recommendations to help homeowners prepare their homes and HIZ for wildfires: https://assets-partners.bouldercounty.gov/wp-content/uploads/sites/5/2023/12/nfpa-firewise-how-to-prepare-your-home-for-wildfires.pdf.
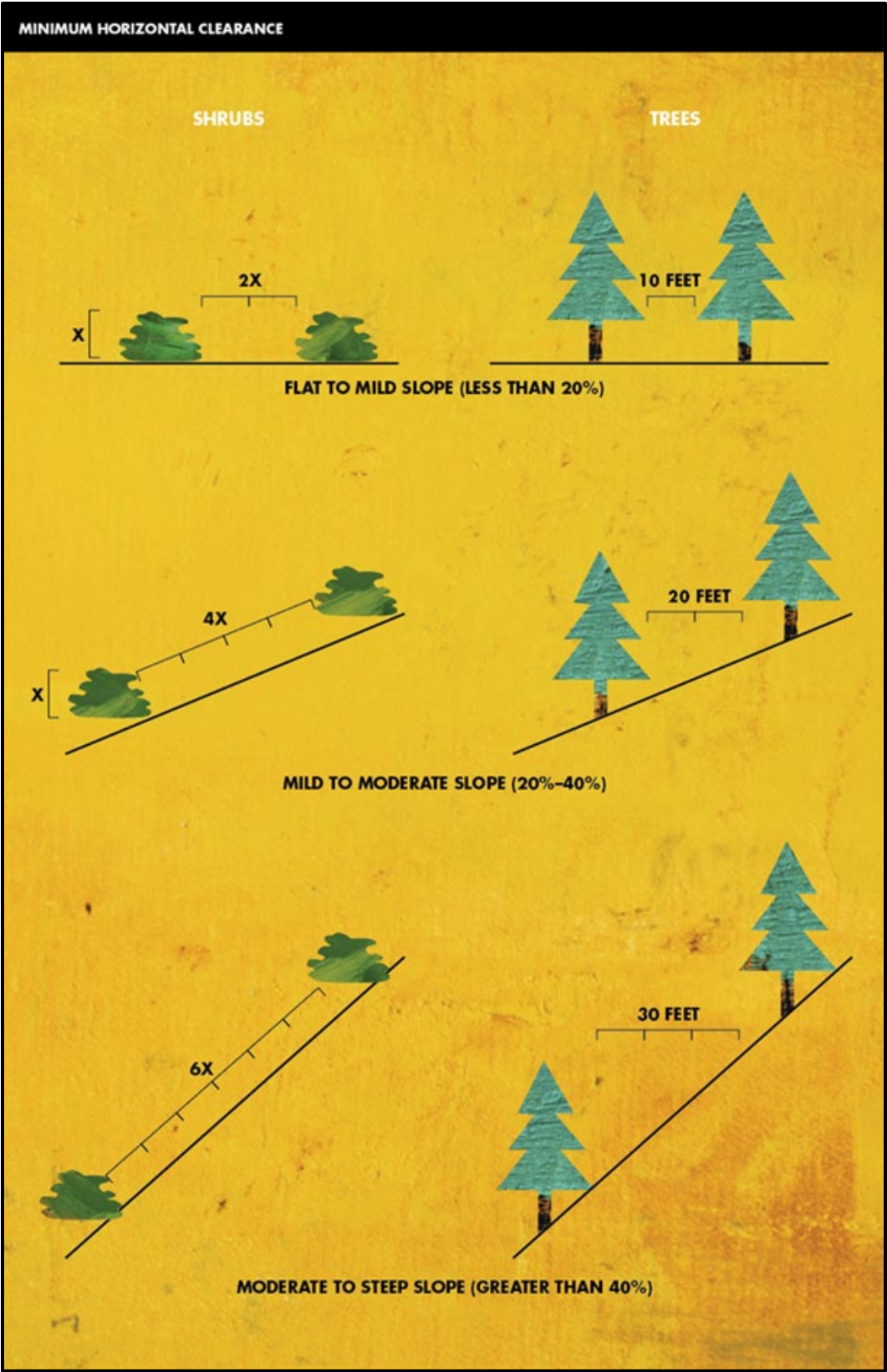
In addition to their guidance, FireSafe Montana's *Living with Fire: Homeowner's Firesafe Guide for Montana* (FireSafe Montana 2009) and *Ignition Resistant Construction Guide* (FireSafe Montana n.d.) serve as additional essential resources for homeowners seeking to protect their properties:

- Living With Fire: Homeowner's Firesafe Guide for Montana: https://firesafemt.org/img/LivingwFireFSM20091.pdf

- Ignition Resistant Construction Guide: https://firesafemt.org/img/Ignition-Resistant-Construction-Guide-FINAL.pdf

Assisting neighbors may be essential in many cases. Homeowners should consider assisting the elderly, sharing ladders for gutter cleaning, and assisting neighbors with large fuels thinning needs. Homeowner actions have been found to also motivate neighbors to act, increasing the scope of the wildfire mitigation across a community (Evans et al. 2015).

For additional information on defensible space, upgrading components to reduce structural ignitability, homeowner actions, as well as local, state, and national resources available to Mineral County Residents to provide technical assistance and alleviate the costs associated with fuels treatments and wildfire mitigation, please refer to Chapter 6, Homeowner Actions.

FUEL BREAKS AND OPEN SPACE TREATMENTS

The next location priority for fuels treatments should be where the community meets wildland. This may be the outer margins of a town or an area adjacent to occluded open spaces such as a park. Fuel breaks (also known as shaded fuel breaks) are strips of land where fuel (for example, living trees and brush, grasses, dead branches, leaves, or downed logs) has been modified or reduced to limit the fire's ability to spread rapidly. Fuel breaks should not be confused with firebreaks, which are areas where vegetation and organic matter are removed down to mineral soil. Shaded fuel breaks may be created to enhance prescribed fire opportunities and provide access for mitigation resources and firefighters, as well as enhancing the safety of evacuation routes.

Wildfires frequently burn across jurisdictional boundaries, sometimes on landscape scales. As such, these larger treatments need to be coordinated on a strategic level. This requires coordination between projects and jurisdictions. Farther away from WUI communities, the emphasis of treatments often becomes broader recognizing the unique challenges posed by the open landscapes. While reducing the buildup of hazardous fuels remains important, other objectives are often included, such as promoting ecosystem health, enhancing resiliency to catastrophic wildfires, and addressing the impacts of climate change.

Monitoring early-season moisture levels is also vital, and incorporating mid- to late-summer grazing can help reduce vegetation biomass, decreasing potential fuel loads as fall approaches (Clark et al. 2023). Additionally, reestablishing native vegetation in these areas offers long-term benefits, as native plants generally retain higher moisture content during the hotter, drier months of August and September, thereby reducing fire risk. Incorporating low-growing native vegetation in buffer zones can further enhance the effectiveness of fuel breaks, creating a more resilient landscape that supports both wildfire mitigation and ecological health.

FUEL TREATMENT METHODS

Several treatment methods are commonly used for hazardous fuels reduction, including manual treatments, mechanized treatments, prescribed fire, and grazing (Table D.2). Due to the variability of the planning area's topography, vegetation type, and distribution, certain treatments will be appropriate for specific landscapes. **Specific information on fuel treatment recommendations for each vegetation type found in the county is provided in Chapter 4 along with a map of recommended fuel treatment locations and approach**. This brief synopsis of treatment options is provided for general knowledge; specific projects will require further planning. The appropriate treatment method and cost will vary depending on factors such as the following:

- Average size/diameter class of material
- Proximity to structures
- Project objectives
- Scale of the treatment project (number of acres, stand maturity, fuel loading).
- Wildfire mitigation goals (fuel break, fire break, reduced fuel loading)
- Alignment with nearby fuel treatment efforts and future planned treatments
- Ecological restoration goals
- Availability of resources and personnel
- Transportation fuel costs
- Steepness of slope
- Access for product transportation
- Volume of biomass

It is imperative that long-term monitoring and maintenance of all treatments is implemented. Post-treatment rehabilitation such as seeding with native plants and erosion control may be necessary. In addition, post-treatment fuel cleanup is a must as neglected piles of vegetation may result in increased fire risk.

Table D.2. Summary of Fuels Treatment Methods

Treatment	Comments
Machine mowing	Appropriate for large, flat, grassy areas on relatively flat terrain.
Manual treatment with chipping or pile burning	Requires chipping, hauling, and pile burning of slash in cases where lop and scatter is inappropriate.
	Slash tree limbs to 6 feet from ground or max of 1/3 of tree height
	Remove ladder fuels below / near trees.
	Pile burning must comply with smoke management policy. Permits are administered on behalf of the state by Mineral County.

Treatment	Comments
Brush mastication	Brush species tend to re-sprout vigorously after mechanical treatment. Frequent maintenance of treatments is typically necessary. Mastication tends to be less expensive than manual (chainsaw) treatment and eliminates disposal issues.
Timber mastication	Effective on materials up to 6 inches in diameter, slopes up to 30%, and in combination with tree thinning treatments. Removing smaller-diameter trees that act as ladder fuels enhances the effectiveness of mastication. Mastication of treetops and slash can significantly reduce fuel loads. Reduces disposal issues of smaller-diameter fuels. Environmental impact of residue being left on-site is still being studied.
Prescribed fire	Can be very cost effective for public land, with location considerations and constraints. Ecologically beneficial. Can be used as training opportunities for firefighters. May require manual or mechanical pretreatment. Carries risk of escape. Unreliable scheduling due to weather and smoke management constraints.
Mechanical	Mechanical treatments using feller bunchers, skidgines, and cut-to-length hot saw machines can be conducted on slopes less than 40%. Steeper slopes require tracked machines, while more gradual inclines can be operated on with wheeled machines. Slopes greater than 40% require arial logging operations such as a skyline.
Grazing	Can be cost effective depending on species utilized. Ecologically beneficial. Can be applied on steep slopes and shrubby and flashy fuels. Requires close management.

MANUAL TREATMENT

Manual treatment refers to crew-implemented cutting with chainsaws and other hand tools. Although it can be more expensive than mechanized treatment, crews can access many areas that are too steep or otherwise inaccessible with machines. Treatments can often be implemented with more precision than prescribed fire or mechanized methods allow. Merchantable materials and firewood can be removed while non-merchantable materials are often lopped and scattered, chipped, or piled and burned on-site, as shown in Figure D.5. Care should be exercised to not increase the fire hazard by failing to remove or treat discarded material in a site-appropriate manner. Additional information on specific manual fuel treatments is included below.

Hand Felling and Piling

Hand felling is generally used for smaller-diameter trees and understory ladder fuels (shrubs, low limbs downed branches). This method is appropriate on smaller sites or where precise thinning is needed such as near homes and structures and in environmentally sensitive areas. Vegetation that is removed by hand is then piled in mounds to be dried and burned during cold, moist months.

Figure D.5. Slash piles created after mosaic thinning treatments in Mineral County.
Source: Mineral County Core Team.

Hand Felling and Lop and Scatter

Similar to hand felling with piling, felling and lop and scatter is an appropriate treatment method for smaller treatment areas and where it may not be feasible to burn piles later or when trying to improve soil organic matter content. With this treatment method, small trees, shrubs, and ladder fuels are cut by hand then masticated to reduce their size. The slashed material is then spread across the forest floor to reduce fuel volume and height. Care should be taken when utilizing this method near homes to ensure defensible space zone standards are maintained.

Mosaic Thinning

Mosaic thinning may be a cost-intensive method for treating forested lands (Figure D.6). With this treatment, selective thinning with chainsaws and hand tools occurs under the guidance of a forester or mitigation expert. Exact treatment intensity and methodology will vary from site to site depending on need and present species.

Figure D.6. Before (top) and after (bottom) photos of mosaic thinning conducted in Mineral County.

Source: Mineral County Core Team.

Pruning and Limbing

With this treatment method, branches are removed from mature trees to reduce ladder fuels and potential fire intensity (Figure D.7). Trees are treated based on branch height and distance from neighboring trees. This method is most effective for maintaining defensible space as outlined above.

Figure D.7. Example of pruning and limbing in conjunction with mosaic thinning in Mineral County.
Source: Mineral County Core Team.

MECHANIZED TREATMENTS

Mechanized treatments include mowing, mastication (shredding timber), and whole tree felling (Figures D.8 and D.9), and mechanized cut to length logging, offer a powerful tool for managing large, high-fuel-load areas efficiently. These methods are especially well-suited to landscapes where rapid fuel reduction is necessary across expansive tracts of land (USFS 2024b). While mechanized methods can significantly reduce fire risk, their true value lies in pairing them with complementary treatments. When integrated with prescribed fire, post-treatment monitoring, and ecological restoration practices, mechanized treatments help to create a balanced approach to land management that supports both wildfire mitigation and long-term forest health (USFS 2024b). They are often used in combination with other methods to achieve specific goals—whether reducing ladder fuels, creating fire breaks, or improving habitat conditions. The flexibility of mechanized treatments also makes them adaptable to a variety of terrain types, especially when paired with aerial systems for difficult-to-reach areas.

Each treatment project requires a tailored approach, and mechanized treatments should be part of a larger, holistic strategy that addresses not only immediate fuel reduction but also long-term sustainability, biodiversity, and resource management.

Figure D.8. Example of mechanical thinning in Mineral County.

Source: Mineral County Core Team.

Figure D.9. Example of mechanical thinning in Mineral County.

Source: Mineral County Core Team.

Mowing

Mowing can effectively reduce grass and brush fuels adjacent to structures and along highway rights-of-way and fence lines. For heavier fuels, several different masticating machines can be used, including drum- or blade-type masticating heads mounted on machines and ranging in size from a small skid-steer to large front-end loaders. Mowing and mastication do not reduce the amount of on-site biomass but alter the fuel arrangement to a less combustible profile.

In extreme risk areas more intensive fuels treatments may be necessary to keep the fire on the ground surface and reduce flame lengths. Within the fuel break, shrubs should be removed, and tree branches should be pruned 5 to 6 feet from the ground and with space between the trees. Specific height and spacing recommendations can be found in Wildfire Partners guides, including information on Wildfire Partners program, Ready, Set, Mow.

Mastication

Mastication, also known as mulching, is the process of chopping, grinding, or shredding woody biomass to decrease fuel volume on a site and reducing vertical fuel. The process involves utilizing an attachment on a tractor or heavy machinery that chips shrubs and trees without manually felling trees. The wood is spread across the forest floor, which reduces crown fire potential and fireline intensity.

Mechanical feller buncher/processors are used for whole tree removal and processing. The processed logs are typically utilized for a variety of low-value products, while the slash (tops and limbs) is of negative value and disposed of by chipping, grinding, or burning on-site.

Chipping

Chipping is an effective way to reduce large woody slash that is collected from manual mitigation efforts. It involves using a chipping machine that shreds the large wood into 3-inch or smaller chips that can be spread across the forest floor, used as mulch or disposed of. Wildfire Partners manages an annual chipping program where county residents can sign up to have a chipper brought to their neighborhood or house; the wood chips are then donated to local farms.

GRAZING

Grazing can be an effective and beneficial fuel treatment method to reduce the risk of severe wildfires, while enhancing habitat for numerous native grassland plants and animals and reducing invasive plant species (Montana DNRC 2020a). By strategically managing livestock to consume and modify vegetation, grazing can be used to reduce the amount, height, and continuity of vegetation (Montana DNRC 2020a). Grazing is a dynamic fuel management tool and its success relies on sufficient understanding of critical control points such as the species of livestock being grazed (cattle tend to herd around water sources), goat (goat saliva contains compounds which allow them to consume tannins within plants, damaging to other animals), sheep, or combination), targeted plant species (annual vs perennial), the time of year (varying plant nutrition content), animal grazing concentration (intensity), the duration of grazing, plant palatability, and animal age and nutritional needs (Surviving Wildfire 2020).

For more information on the BLM Montana and Dakotas Grazing Standards and Guidelines visit: https://www.blm.gov/sites/blm.gov/files/Lewistown%20MT%20standards%20for%20rangeland%20health%20and%20guidelines%20for%20grazing.pdf.

PRESCRIBED BURNING

Prescribed burning is an important tool for reducing the risk of extreme fire behavior by removing excessive standing plant material, litter, and woody debris while limiting the encroachment of shrubby vegetation (Table D.3) (Davis et al. 2024). All prescribed fire operations should be conducted in accordance with federal and state laws and regulations.

Table D.3. Types of Prescribed Fire Treatments

Treatment	Comments
Broadcast Burning	Consists of burning larger areas of land that have been prepped for prescribed burning operations. Preparation includes fuel reduction, fuel rearrangement, containment line construction, smoke abatement, and contingency planning. Broadcast burns can be implemented in various fire-adapted fuel types such as lodgepole pine, ponderosa pine, and annual grasslands. Monitoring of broadcast burn units is important for achieving desired results and mitigating ecological consequences such as high tree mortality.
Ditch Burning	Consists of burning built up fuels along and in irrigation ditches. Burning is contained to the ditch and area immediately surrounding the ditch. Due available moisture, vegetation within the ditch can grow quickly but can also be efficiently managed with fire.
Pile Burning	Consists of burning piles of cut, gathered, and stacked vegetation. Pile burning is often simpler to implement than broadcast burning and can be conducted in the winter when wildfire risk is low. Pile burning is effective in removing fuels from a landscape but can have consequences to soil health due to the intense heat of piles scorching the ground.
Agricultural Burning	Consists of burning agricultural lands such as hay fields and wheat stubble to remove vegetation, improve soil health, increase productivity, and reduce wildfire risk. Agricultural burning is conducted during key times of the year that are conducive to the growing season of desired crops.
Cultural Burning	See "Cultural Burning" below to learn more.

Public safety is the primary consideration in the design of any prescribed burn plan. Use of prescribed fire on public land should be carried out within the confines of the agency's fire management planning documents and requires individual prescribed burn plans that are developed for specific burn units and consider smoke management concerns and sensitive receptors within the WUI. Smoke monitors should be placed in areas where smoke concerns have been raised in the past.

Following any type of fuels reduction treatment, post-treatment monitoring should continue to ensure that management actions continue to be effective throughout the fire season. The vegetation within this ecosystem can change rapidly in response to drought or moisture from year to year and during the course of the season, so fuels treatments should be adjusted accordingly. To learn more about firing techniques, visit the EFIRE Fire Techniques webpage: https://efire.cnr.ncsu.edu/efire/fire-techniques/.

The Montana Department of Environmental Quality (DEQ) provides resources with safety tips and instructions for burning. It is also recommended that residents and land managers consider reasonable alternatives to burning if the primary purpose is material disposal. Several burns may be needed to meet full resource management objectives, so a maintenance plan is needed to ensure success.

For more information on restrictions and requirements for burning, please visit: https://deq.mt.gov/News/pressrelease-folder/news-article108#:~:text=Follow%20these%20steps%20to%20burn%20September%20through%20November%3A,your%20burn%2C%20activate%20your%20county%20permit.%20More%20items.

Agricultural burning of field and ditches is a common practice among agricultural areas of Mineral County. The process typically functions to clear land, fertilize soil, or prepare for planting of new crops. Awareness of smoke dispersal, obtainment of proper permits, and alerting proper personnel prior to burn operations are critical components of agricultural burning. Historically, wildfire risks associated with agricultural burning have been low in Mineral County but escape occasionally occurs.

Cultural Burning

Across the American West, fire has historically been a means of forest management and restoration by Indigenous communities for thousands of years (Carter et al. 2021; Roos et al. 2021). Research shows that use of wildfire by Indigenous communities prior to European settlement frequently served to reduce fuel loads, maintain wildlife habitat, and reduce wildfire severity (Carter et al. 2021). In many areas, cultural burning took a hiatus during the era of fire suppression in the twentieth century due to land management agencies' enforcement of differing practices. However, this has been changing over the past few decades, and cultural burning is again becoming an accepted practice for land management in some areas.

> "Cultural burning by Native Americans interconnected them not only to the land but to their animal, reptile, bird and plant spiritual relatives. Therefore, conducting a cultural burn relates to what they burned, how they burned it, and why they burned it."
> – Ron W. Goode, Tribal Chair, North Fork Mono Tribe

Utilizing traditional Indigenous wildfire management practices can help create and maintain fire-resilient WUI communities. Integrating cultural practices into prescribed burning also broadens participation and can increase support for burning activities. Tribally led prescribed burns highlight the historical use of fire on the landscape and can initiate conversations and educational opportunities around the role and history of fire on the landscape.

Although cultural burning is included under the umbrella of prescribed burns, it holds a different meaning and has more purposes than a typical prescribed burn (Fire Adapted Communities New Mexico 2021). Cultural burns are "pertinent and substantial to the cultural livelihood" with over 70 identified purposes (Fire Adapted Communities New Mexico 2021).

Rather than focusing solely on fuel reduction, or as a means of wildfire mitigation, cultural burning is done with a more holistic view, under the philosophy of "reciprocal restoration," meaning, as stewardship responsibilities to the land are fulfilled, those actions will in turn benefit the peoples who depend on those ecosystems (Long et al. 2021). Cultural burning is typically performed with a variety of objectives, such as landscape management, ecosystem and species biodiversity and health, transmission of environmental and cultural knowledge, ceremonies and spiritual wellbeing, a sense of place, and material services (i.e., food, medicine, plan materials, etc.). Extensive site preparation is typically done before a burn, and post-burn monitoring and additional cultural practices are a common factor of the land stewardship tradition (Long et al. 2021).

> According to Frank Kanawha Lake, a research ecologist with the USFS and a wildland firefighter of Karuk descent, "[Cultural burning] links back to the tribal philosophy of fire as medicine. When you prescribe it, you're getting the right dose to maintain the abundance of productivity of all ecosystem services to support the ecology in your culture" (Roos et al. 2021).

In recent years, efforts to revive traditional burning practices have gained momentum. The Confederated Salish, Kootenai, and Pend d'Oreille Tribes are reintroducing fire as a tool for landscape management on the Flathead Indian Reservation (Confederated Salish & Kootenai Tribes 2024). Through their Division of Fire, they have developed a forest management plan that prioritizes the use of prescribed burns to restore ecosystems, protect vital resources, and honor their cultural heritage. These efforts also include

public education and outreach, emphasizing the historical and ecological importance of fire in shaping the region's landscapes.

Impacts of Prescribed Fire to Communities

Prescribed fires can have impacts on air quality that may impact local communities. Impacts on a regional scale are typically only acute when many acres are burned on the same day, which is uncommon in this region. Local problems are occasionally acute due to the large quantities of smoke that can be produced in a given area during a short period of time. Residents with respiratory problems may be impacted during these burning periods since smoke consists of small particles of ash, partly consumed fuel, and liquid droplets that are considered air pollutants.

Other combustion products include invisible gases such as carbon monoxide, carbon dioxide, hydrocarbons, and small quantities of nitrogen oxides. In general, prescribed fires produce inconsequential amounts of these gases compared to wildfires.

Effective smoke management is a vital component of planning and conducting prescribed fires as smoke has the potential to exceed air quality and pollution standards regulated by the EPA and the state of Montana (Montana DEQ 2024). It is important to note the differences in air quality effects produced by a large wildfire versus a prescribed fire (Figure D.10). The Montana DEQ has smoke management guidelines that protect the health and welfare of Montana residents from the impacts of smoke. To view Montana DEQ's smoke management guidelines, please visit: https://deq.mt.gov/air/Programs/planandrule.

In addition, the NWCG released the NWCG Smoke Management Guide for Prescribed Fire in 2020 (NWCG 2020). This plan is designed to act as a guide to all those who use prescribed fire. Smoke management techniques, air quality regulations, public perception of prescribed fire, foundational science behind prescribed fire, modeling, smoke tools, air quality impacts, and more are all discussed in this plan. The document is meant to pair with NWCG's Interagency Prescribed Fire Planning and Implementation Procedures Guide for planning and addressing smoke when prescribed fire is used (NWCG 2020). To view the plan, please visit: https://www.nwcg.gov/publications/pms420-3.

Effects of smoke can be managed by burning on days when smoke will blow away from smoke-sensitive areas. Precautions are taken when burning near populated areas, highways, airports, and other smoke-sensitive areas. Any smoke impact downwind is considered before lighting a fire. Smoke management is a significant component of all prescribed burn plans.

Other mitigating actions include alerting the public of upcoming burning activities, including the purpose, best conditions for ensuring good smoke dispersal, duration, size, and location of projects. Local radio, newspapers, social media, and TV can provide broad coverage for alerts. Land management agencies in the planning area consistently work with concerned citizens regarding smoke management and attempt to provide solutions such as the placement of smoke monitors at sensitive sites.

Prescribed fire is a key action to reduce hazardous fuels in the county and across the broader landscape (Figure D.11). Current fuel loads far exceed healthy levels and are unable to be addressed solely with hand and mechanical treatments. Public acceptance and support are critical to implementing prescribed burning projects. As such, federal, state, and county representatives must coordinate education efforts related to burning activities to reduce resistance to planned actions. This can include information on the rational for the prescribed fire, precautions and resources related to smoke, and risk information to ease homeowner concerns.
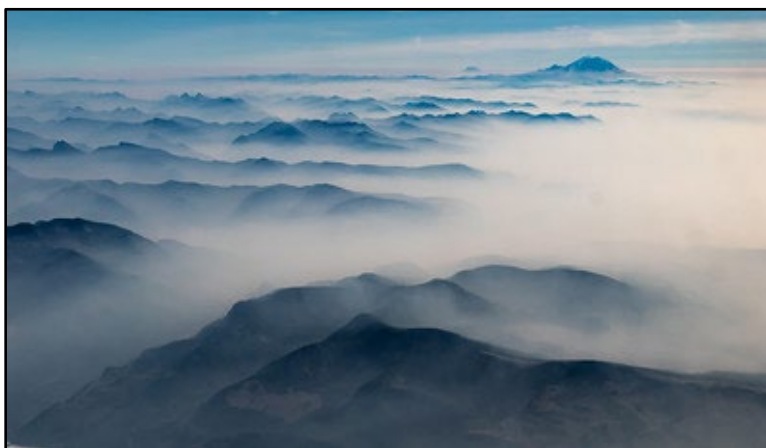
Figure D.10. Top: An example of the light dispersed smoke released during a Montana DNRC prescribed burn in Mill Gulch. Middle and Bottom: Examples of darker, widespread, and more concentrated smoke that can be released during wildfires and cover large areas.

Source: Top: Montana DNRC (https://www.flickr.com/photos/195457200@N04/albums/72177720322420523/)**. Middle and Bottom: USFS flickr** (https://www.flickr.com/photos/usforestservice/)**.**

Figure D.11. Photograph showing a prescribed burn in Crazy Canyon near Missoula, Montana.

Source: Montana Public Radio (2023) (https://www.mtpr.org/montana-news/2023-03-29/u-s-forest-service-earmarks-9-million-for-wildfire-mitigation-projects-in-montana).

Thinning and Prescribed Fire Combined

Combining thinning and prescribed fire can be the most effective treatment (Graham et al. 2004). In ecosystems where fire exclusion or disease has created a buildup of hazardous fuels, prescribed fire cannot be safely applied, and pre-burn thinning is required. The subsequent use of fire can further reduce residual fuels and reintroduce this ecologically imperative process. The National Association of Forest Service Retirees (2021) published a paper on "America's Forest Management Crisis – A National Catastrophe," in which they stated the effectiveness of pairing thinning treatments with prescribed fire (Figure D.12).

Figure D.12. Photograph taken after the 2021 Bootleg Fire in Oregon highlighting the effectiveness of forest thinning and prescribed fire compared to just thinning treatments or no treatment.
Source: National Association of Forest Service Retirees (2021).

MANAGEMENT OF NON-NATIVE PLANTS

The USDA maintains a list of introduced, invasive, and noxious plants by state (USDA 2022). Fuel treatment approaches should always consider the potential for introduction or proliferation of invasive non-native species as a result of management actions. Invasive species, particularly winter annual invasive grasses, have been shown to increase fire frequency, temperature, flame length, and rate of spread. Removal of these species can be beneficial and help reduce wildfire impacts (Figure D.13). For example, species like Russian thistle (*Salsola tragus*), kochia (*Bassia scoparia*), and diffuse knapweed (*Centaurea diffusa*) form tumbleweeds that can ignite and move across the landscape, spreading fire rapidly.

Efforts to remove invasive species that contribute to wildfire risk are crucial. These plants often create dense, continuous fuel beds that are easily ignited and burn intensely. By removing invasive species, fire behavior can be mitigated, reducing the likelihood of high-intensity fires. Additionally, the removal of invasive plants allows native vegetation to reestablish, which typically maintains higher moisture levels and is less flammable, thereby creating a more fire-resilient ecosystem. The benefits of removing invasive species extend beyond fire risk reduction, contributing to the overall health and biodiversity of the ecosystem.

For more resources on non-native plant identification, visit:
https://fieldguide.mt.gov/displayInv.aspx?id=NOX.

Winter Annual Invasive Grasses (Cheat Grass)

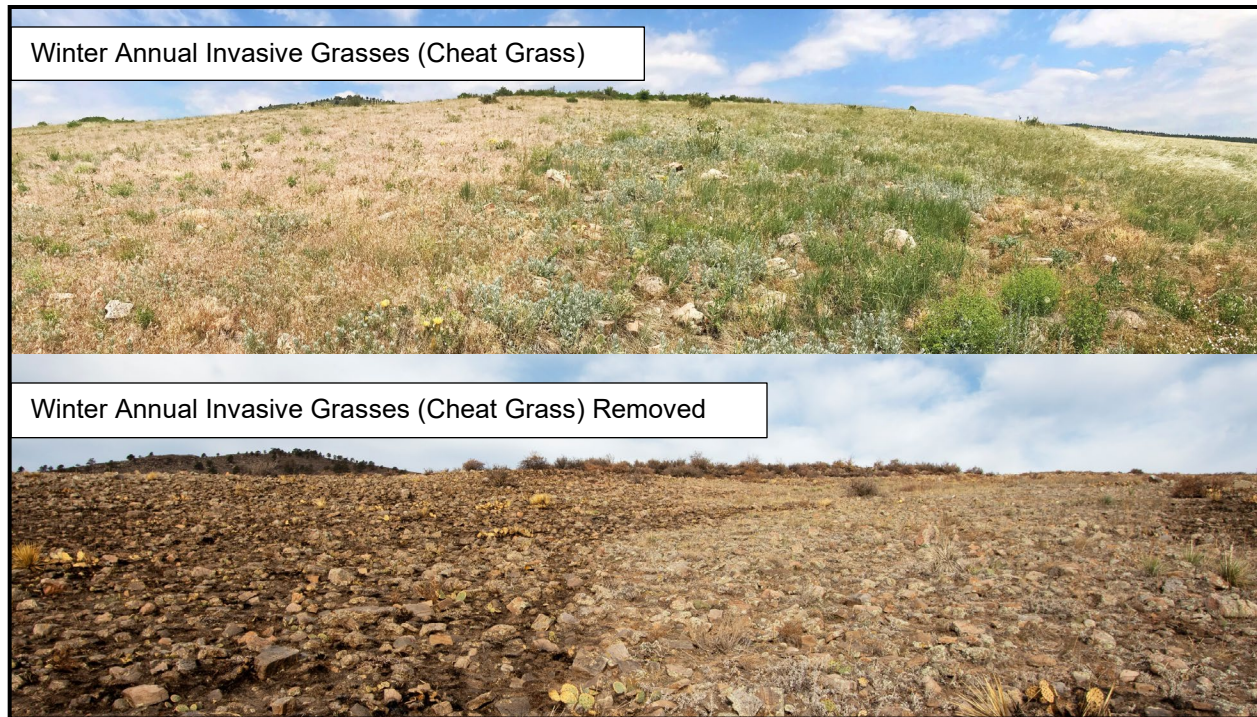Winter Annual Invasive Grasses (Cheat Grass) Removed

Figure D.13. Pre-treatment and post-treatment photographs of invasive grass control.

Source: Boulder County Invasive Weeds Management.

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APPENDIX E:

Post-Fire Recovery and Restoration

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POST-FIRE RESPONSE AND REHABILITATION

The increase in severe wildfires across Montana has emphasized the complexities of post-fire response. High-severity burn areas in Montana can produce erosion and runoff rates 5 to 10 times higher than those from moderate-severity burns (USFS 2021). After a wildfire, heavy rains may lead to flash floods that carry sediment, debris, and even large trees and rocks downstream, potentially causing damage to communities, farmlands, and critical infrastructure, particularly in rural counties. Waterways, such as the Yellowstone River and its tributaries, face a high risk of contamination from post-fire debris, ash, and sediment, which can harm aquatic ecosystems and water processing facilities (USFS 2021).

Mineral County's fire-prone environment can experience fire incidents that burn at high severities, destabilize slopes and cause debris flows on the steep terrain adjacent to local roadways, infrastructure, or other valued resources. This presents a risk to rural and agricultural communities, which depend on stable, accessible routes for transportation and emergency services. Further, many residents in the county depend on single roads for exiting their neighborhood during emergencies. Landslides and debris flows, while less common in the more arid regions of the county, are still recognized as critical hazards post-fire (Montana DNRC 2024d).

Areas that experienced high-severity fire face increased risks of soil erosion and water repellency, particularly in forested regions. Soil cover is dramatically reduced in areas with moderate soil burn severity, leading to increased water repellency and runoff. By contrast, soil cover is nearly nonexistent in areas experiencing high soil burn severity and the surface mineral soil has been burned to fine powder. Exposed, granular mineral soil is readily transported during rain events resulting in elevated soil erosion and sediment loading in streams, creeks, and rivers (USFS 2021).

The USFS's post-fire emergency stabilization program is called the Burned Area Emergency Response (BAER) program. The goal of the BAER program is to discover post-wildfire threats to human life and safety, property, and critical natural or cultural resources on USFS lands and take appropriate actions to mitigate unacceptable risks (USFS 2021). BAER teams are composed of trained professionals in different fields: soil scientists, engineers, hydrologists, biologists, botanists, archaeologists, and others who quickly assess the burned area and advise emergency stabilization treatments (USFS 2021).

There are many facets to post-fire recovery, including but not limited to:

- Ensuring public health and safety—prompt removal of downed and hazard trees, addressing watershed damage, and mitigating potential flooding.

- Rebuilding communities and assessing economic needs—securing the financial resources necessary for communities to rebuild homes, business, and infrastructure.

- Restoring the damaged landscape—restoration of watersheds, soil stabilization, and tree planting.

- Reducing fire risk in the future—identifying hazard areas and implementing mitigation.

- Prioritizing the needs of vulnerable and disadvantaged communities during response and disaster recovery efforts.

- Reducing post-fire recovery time by replanting native species.

- Ensuring fire protection measures enhance sustainability of restoration projects e.g., introducing prescribed fire to a fire-dependent ecosystem where fire had previously been excluded.

- Retaining downed logs for erosion control and habitat maintenance.

- Evaluating and updating disaster recovery plans every 5 years to respond to changing needs and characteristics of the community.

- Coordinating with planning, housing, health and human services, and other local, regional or state agencies to develop contingency plans for meeting short-term, temporary housing needs of those displaced during a catastrophic wildfire event.

- Incorporating forecasted impacts from climate change intro trends and projections of future risk and consideration of policies to address identified risks.

- Updating codes and ordinances to specify procedures and standards for planning and permitting the reconstruction of buildings destroyed by wildfire.

The USFS and Montana DNRC provide science-based frameworks to guide post-fire restoration efforts in State Forest lands of Montana. This guidance outlines methods of ecological management and a step-by-step framework for agencies to follow in post-fire planning (Montana DNRC 2024d). A list of resources to guide post-wildfire rehabilitation is available at: https://www.nrcs.usda.gov/resources/guides-and-instructions/fire-recovery-montana-resources

COMMUNITY RESPONSE AND RECOVERY

Assessments of the burned landscape are often well-coordinated using interagency crews who are mobilized immediately after a fire to assess the post-fire environment and make recommendations for rehabilitation efforts. For the communities affected by fire, returning home and recovering from a wildfire can be a fragmented and challenging process unless pre-fire planning is thorough, and the responsibilities of various entities are clearly defined (CDC 2024). Residents impacted by the fire need assistance making insurance claims; finding temporary accommodation for themselves, pets, and livestock; rebuilding or repairing damaged property; removing debris and burned trees; stabilizing the land for construction; mitigating potential flood damage; repairing infrastructure; reconnecting to utilities; and mitigating impacts to health. Oftentimes, physical impacts can be mitigated over time, but emotional impacts of the loss and change to surroundings are long-lasting and require a supportive community network (CDC 2024).

After the Fire

Rebuilding and recovery from wildfire can vary greatly across income levels and demographics. Therefore, many of these areas take more time to recover than those with greater access to resources. According to After the Flames, "counties, tribes, municipalities, and water providers are typically the entities most directly and immediately impacted by wildfire and port-erosion flooding" (After the Flames 2021). Recovery can take anywhere from months to several years to complete rebuilding and restoration efforts. It is important to note that the impact of disaster events and recovery efforts differs between various communities and organizations.

Returning Home

Returning home after a fire can be a daunting and emotional experience for residents and may pose hazard threats depending on the impact of the fire. Residents should always follow the advice and recommendations of emergency management agencies, fire departments, utility companies, and local aid organizations regarding activities following the wildfire. Evacuate your home as early as possible and do

not linger once evacuation orders have been given. The more quickly neighborhoods can evacuate, the sooner wildfire response and emergency resources can ingress to begin suppression activities (NFPA 2024). Additionally, to ensure personal safety, do not attempt to return to your home until fire personnel have deemed it safe to do so.

When driving, watch for trees, brush, and rock which may have been weakened or loosened by the fire. Be aware of any damage or debris on roads and driveways. Use extreme caution around trees, power poles, and any other tall objects that may have been weakened by the fire (CDC 2024).

Even if the fire did not damage your house, do not anticipate an immediate return to normal routine. Instead, look for damaged utility infrastructure and necessary repairs. When you return home, check for hazards, such as gas, water leaks, and electrical shorts. Turn off damaged utilities if you did not do so previously. Request that the fire department or utility companies turn the utilities back on once the area is secured. Similarly, water supply systems may have been damaged; do not drink from the tap until you have been advised that it is safe to do so. Finally, keep a "fire watch"; look for smoke or sparks in houses and other buildings. Once at home, check for the following (CDC 2024):

- Check the roof and exterior areas for sparks or embers.

- Check grounds for hot spots, smoldering stumps, and vegetation.

- Check for fire damage to your home, turn off all appliances and make sure the meter is not damaged before turning on the main circuit breaker.

- Check the attic and throughout your house for any hidden burning sparks or embers.

- Do not drink water from the faucet until emergency officials say it is okay, water supply systems can be damaged and become polluted during wildfires.

- Discard any food that has been exposed to heat, smoke, flood water, or soot.

- If you have a propane tank or natural gas, leave valves closed until the supplier or utilities can inspect your system.

- If you have a solar electrical system, this system should be inspected by a licensed technician to verify that the solar panels and electrical wiring are safe for continued operation.

- Consult local experts on the best way to restore and plant your land with fire-safe landscaping.

- Contact 911 if any danger is perceived.

- Ash contains toxic substances and may be irritating to the eyes, nose, throat, and skin. Ash is harmful to inhale and may trigger asthma attacks. Follow these tips to reduce your exposure to ash:

  o Do not allow children to play in the ash and sanitize children's toys before they are played with

  o Immediately wash any part of your body that touches ash to avoid irritation

  o Wash fruits and vegetables from your garden thoroughly before eating them

  o Keep pets out of ashy areas

  o Frequently clean indoor surfaces by wet mopping

  o Wear protective clothing and a respirator when working outside

Insurance Claims

Your insurance agent is the best source of information for submitting a claim. It is recommended you take photos of your home, of both the inside and outside, in preparation for an emergency. Keep the photos in a safe place as this will make the insurance claim process easier. Most expenses incurred during the time you are forced to live elsewhere may be reimbursed, so be sure to keep all receipts. Additional items that may be covered are extra transportation costs to and from work or school, telephone installation, furniture rental, extra food costs, and water damage. Montana homeowners should review their insurance policies annually to ensure they have adequate coverage, especially for wildfire risks. Understanding your "loss of use" provision is crucial, as this section of your policy typically covers living expenses when your home becomes uninhabitable due to fire or smoke. For any questions or guidance, Montana residents can contact the Office of the Montana State Auditor for further assistance in dealing with insurers and the claims process (Montana Commissioner of Securities and Insurance 2023). Natural disasters aren't always predictable, but there are steps homeowners can take to better prepare for an emergency.

- Review your insurance policy annually to determine whether your home is adequately insured

- Know your "loss of use" section – this covers living expenses should your home become unlivable due to fire, smoke, or otherwise

You can view a guide on creating a home inventory here: https://www.iii.org/article/how-create-home-inventory

MOBILIZING YOUR COMMUNITY

Wildfires that produce extensive damage require a community-scale response for recovery efforts. The local Emergency Manager will collaborate with state and federal partners to manage disaster response and urgent needs. Still, mobilizing a response and recovery team or a group of teams in a community can function as a vital part of the recovery procedure. Coordinated and informed direction throughout community-level volunteers and all levels of government are necessary for successful recovery (MT DES 2022).

As opposed to wildfire response, post-fire response is not typically managed by a unified state or federal team. Rather, each organization and each tier of government acts on its own authority. This produces a greater demand for coordination at the local level and the sharing of information between organizations to coordinate recovery efforts. The local Emergency Manager as well as the state Department of Emergency Services will generally coordinate response efforts and facilitate recovery resources (Montana DNRC 2023b).

The recovery coordinator should become familiar with representatives from local, state, and government agencies that will be helping with coordination or funding of post-fire recovery. Any large wildfire will also involve an Incident Command System (ICS), an appropriately sized team assigned to aid in post-fire recovery.

To learn more, visit: https://www.nps.gov/articles/wildland-fire-incident-command-system-levels.htm.

COMMUNICATION

After a team is assembled and immediate tasks are identified, find the best way to spread information in your community. You may distribute flyers, set up a voicemail box, work to find pets or livestock that have

been displaced, develop a mailing list for property owners, hold regular public meetings, etc. It is important that a long-term communications plan is developed (MT DES 2022). Applying the following steps can aid in successful communication (Western Fire Chiefs Association 2024):

- **Communicate through familiar and trusted messengers.** If recipients are to be receptive and take risk communication seriously, then the information must come from a credible source. Risk communicators must be viewed as legitimate and trustworthy sources of information.

- **Provide clear, actionable information.** Risk communicators should create messages that are designed and tested to ensure they are clear, consistent, and comprehensible. Messages should include actionable guidance, so people know exactly how to appropriately respond.

- **Tailor messages and information pathways for target audiences.** Know your audience. A one-size fits all risk communication approach will be ineffective because communities are all different. Some populations will require variations in the way information is received.

Community Safety: Post-Fire Floods and Debris Flows

There are numerous natural hazards after a wildfire. Perhaps most dangerous are potential flash floods and landslides following rainfall in a burned area upstream of a community. Wildfires increase risk of flooding because burned soil is unable to absorb rainfall and it becomes hydrophobic. Factors that contribute to flooding and debris flows are steep slopes, heavy rainfall, weak or loose rock and soil, and improper construction and grading. Even small rainfall can cause a flash flood, transporting debris and damaging homes and other structures. Following a wildfire, burned areas are susceptible to debris flows for 5 to 10 years, leaving downhill residents in danger. It is crucial to be aware of your surroundings and take note of steep, unstable slopes that could require hasty evacuation when rainfalls (National Weather Service 2024). Develop an evacuation plan with your family and stay away from waterways, storm channels, and arroyos. Be aware of your risk, pay attention to weather forecasts, listen to local authorities, and have a household inventory with copies of critical documents (National Weather Service 2024). The Western Fire Chiefs Association (2024b) lists the following tips for staying safe from debris flow and flooding:

- **Stay Informed:** Tune into local radio, news, and phone notifications. Watch weather forecasts and be aware of flood warnings.

- **Travel Cautiously:** Assume roads and highways on the downhill side of recently burned slopes are at risk and avoid taking those routes when possible.

- **Stay out of Floodwater:** Do not walk, bike, or drive in flooded areas. Water may be contaminated and even 1 foot of water can generate enough power to move a car.

- **Watch for Changes in Water Level:** Watch for sudden increases or decreases in flow or sudden discoloration as this may indicate incoming flooding or debris movement.

- **Find High Ground:** If you are caught in an unsafe situation, seek high ground immediately to avoid being trapped or caught in flows.

POST-FIRE REHABILITATION AND RESOURCES

Wildfires that cause extensive damage necessitate dedicated efforts to avert long-term landscape degradation. Following a fire, the primary priority is emergency stabilization to prevent additional damage to life, property, or natural resources. The soil stabilization work starts immediately and may proceed for

many years after a fire deepening on the need and difficulty of revegetation. For the most part, rehabilitation efforts focus on the lands not likely to recover naturally from wildfire damage (USFS 2006).

The recent increase in severe fires has highlighted the numerous complexities of post-fire response. Research indicates that high-severity burn areas may produce erosion and runoff rates 5 to 10 times higher than the rates produced by moderate-severity burn areas (Sierra Nevada Conservancy 2021). Following a fire, heavy rains may result in widespread floods carrying trees, boulders, and soil through canyons, gulleys, and ephemeral stream channels, ultimately damaging communities and critical infrastructure.

Soil cover is dramatically reduced in areas with moderate soil burn severity with minimal surface litter retained and some topsoil present. The loss of vegetative soil support will lead to decreased soil stability and higher erosion rates. By contrast, soil cover is nearly nonexistent in areas experiencing high soil burn severity as the surface soil has been burned to a fine, hydrophobic powder. Exposed, granular mineral soil is readily transported during rain events resulting in elevated soil erosion and surface runoff which creates sediment loading in streams, creeks, and rivers (InciWeb 2022).

Burned Area Emergency Response Program

Following a wildfire which impacts National Forest lands and other federally managed land, Burned Area Emergency Response (BAER) teams will be deployed if the fire is over 500 acres or poses a threat to human life and property or critical resources. BAER teams are composed of experts in hydrology, engineering, vegetation, fire ecology, and other specializations. They are deployed to assess the immediate impact on the land and determine if emergency rehabilitation actions are warranted. If fire severity warrants emergency action, BAER teams will work to implement emergency actions such as channel stabilization, seeding and mulching, erosion and water control structures, blockading recovery areas, and other actions to address immediate post-fire watershed hazards. These actions are not intended to provide long-term fixes but rather bridge the gap between emergency safety concerns and long-term recovery (USFS 2006).

Emergency Watershed Protection Program

As another example, the Natural Resource Conservation Service's (NRCS's) Emergency Watershed Protection (EWP) Program provides technical and financial services for watershed repair on public (state and local) and private land. The goal is to reduce flood risk through funding and expert advice on land treatments. The EWP Program can provide up to 75% of funds and remaining funds are often paid with in-kind volunteer labor (NRCS 2023). This funding is used by the State Emergency Rehabilitation Team (a multi-agency group assembled by the NRCS) to develop specific recovery and treatment plans.

Examples of potential treatments include (Long et al. 2014):

- Hillside stabilization (for example, placing bundles of straw parallel to the slope to slow erosion)

- Hazard tree cutting/ salvage logging

- Felling trees perpendicular to the slope contour to reduce runoff

- Mulching areas seeded with native vegetation

- Stream enhancements and construction of catchments to control erosion, runoff, and debris flows

- Planting or seeding native species to limit spread of invasive species

Specific Treatment Details

Hillslope Treatments

Cover Applications:

Dry mulch: provides immediate ground cover with mulch to reduce erosion and downstream flow.

Wet mulch (hydromulch): provides immediate cover to hold moisture and seeds on slopes using a combination of organic fibers, glue, suspension agents, and seeds (most effective on inaccessible slopes).

Slash scattering: provides ground cover to reduce erosion by felling trees in burned areas.

Seeding: reduces soil erosion over time with an application of native seed mixtures (most successful in combination with mulching). Breaking up and loosening topsoil to break down the hydrophobic layer on top of the soil is also effective.

Erosion Barrier Applications:

Erosion control mat: organic mats staked on the soil surface to provide stability for vegetation establishment.

Log erosion barrier: trees felled perpendicular to the hillslope to slow runoff.

Fiber rolls (wattles): rolls placed perpendicular to the hillslope to reduce surface flows and reduce erosion.

Silt fencing: permeable fabric fencing installed parallel to the slope contour to trap sediment as water flows down the hillslope.

Channel Treatments

Check dam: small dams built to trap and store sediment in stream channels.

In-channel tree felling: felling trees in a staggered pattern in a channel to trap debris and sediment.

Grade stabilizer: structures made of natural materials placed in ephemeral channels for stabilization.

Stream bank armoring: reinforcing streambanks with natural materials to reduce bank cutting during stream flow.

Channel deflector: an engineered structure to direct flow away from unstable banks or nearby roads.

Debris basin: constructed to store large amounts of sediment moving in a stream channel.

Road and Trail Treatments

Outsloping and rolling dips (water bars): alter the road shape or template to disperse water and reduce erosion.

Overflow structures: protect the road by controlling runoff and diverting stream flow to constructed channels.

Low water stream crossing: culverts replaced by natural fords to prevent stream diversion and keep water in the natural channel.

Culvert modification: upgrading culvert size to prevent road damage.

Debris rack and deflectors: structure placed in a stream channel to collect debris before reaching a culvert.

Riser pipes: filter out debris and allow the passage of water in stream channels.

Catchment-basin cleanout: using machinery to clean debris and sediment out of stream channels and catchment basins.

Trail stabilization: constructing water bars and spillways to provide drainage away from the trail surface.

For more information about how to install and build treatments, see the NRCS's Montana Wildfire Recovery Guides and Publications: https://www.nrcs.usda.gov/resources/guides-and-instructions/fire-recovery-montana-resources

Timber Salvage

Many private landowners may decide to harvest trees killed in the fire, a decision that can be controversial. Trees remaining post-fire can be instrumental for soil and wildlife habitat recovery, but dead standing trees may also pose safety concerns and fuel loadings may still be conducive to future high-intensity wildfires. Burned soils are especially susceptible to soil compaction and erosion so it is recommended to have professionals perform the timber salvage. Several programs assist landowners with timber salvage, including the NRCS Environmental Quality Incentives Program (EQIP).

Invasive Species Management and Native Revegetation

Wildfire provides opportunity for many invasive species to dominate the landscape because many of these species thrive on recently burned landscapes. It is imperative that landowners prevent invasive establishment by eradicating weeds early, planting native species, and limiting invasive seed dispersal (Montana State University 2019).

Planting native seeds is an economical way to restore a disturbed landscape. Vegetation provides protection against erosion and stabilizes exposed soils. In order to be successful, seeds must be planted during the proper time of year and using correct techniques. Use a native seed mixture with a diversity of species and consider the species' ability to compete with invasive species. Before planting, the seedbed must be prepared with topsoil and by raking to break up the hydrophobic soil layer. If you choose to transplant or plant native species, consider whether the landscape has made a sufficient recovery to ensure the safety of the individuals (Montana State University 2019).

Long-Term Community Recovery

On non-federal land, recovery efforts are the responsibility of local governments and private landowners. Challenges associated with long-term recovery include homes that were severely damaged or were saved but are located in high-severity burn areas. Furthermore, homes saved but located on unstable slopes or in areas in danger of flooding or landslides present a more complicated challenge. Economically, essential businesses that were burned or were otherwise forced to close pose a challenge to communities of all sizes. Given these complications, rebuilding and recovery efforts can last for years, with invasive species control and ecosystem restoration lasting even longer (Montana State University

2019). It is critical that a long-term plan is in place and there is sufficient funding and support for all necessary ecosystem and community recovery.

To learn about more post-fire recovery resources, visit the After the Flames website here: https://aftertheflames.com/resources/.

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APPENDIX F:

Public Outreach

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2024 COMMUNITY OUTREACH

Table F.1 presents examples of the public outreach completed as part of the CWPP development. To maximize audience reached, online resources were used to provide information to the public and solicit feedback. Figures F.1 through F.8 show examples of community outreach and online posts. Community survey results are summarized below.

Table F.1. Public Outreach Resources

Resource Description	Location	URL	Date
Mineral County Community Public Survey Link (Figure F.3)	Distributed via multiple sources	https://forms.microsoft.com/Pages/ResponsePage.aspx?id=9rCYT_sm0EGp-Jso45xj3jc07BV17hhGj6qL59nVst5UOEJIRUNHVzJCWjBOOEg4TDRHVjRCN0FXMy4u	June 18, 2024
Mineral Independent reported on the upcoming Mineral County CWPP	Mineral Independent News Website	https://vp-mi.com/news/2024/aug/07/mineral-county-solicits-survey-on-wildfire-plan/	August 7, 2024
Hagadone News Network published an article about getting stakeholders involved in Mineral County's CWPP update and public survey	Hagadone News Network		

Figure F.1. CWPP flyer, page 1.

ORIGIN OF COMMUNITY WILDFIRE PROTECTION PLANS

CWPPs were established as part of the Healthy Forest Restoration Act 2003. This Act provided communities with the opportunity to influence how and where federal agencies implement fuel reduction projects on federal lands and how additional funds may be distributed for projects on non-federal lands. A CWPP is the means through which citizens can provide their voices in fuels management and fire protection planning for their communities. This 2025 CWPP update will identify fire hazards and community values at risk within Mineral County and provide recommendations to reduce the threat of wildfire to life and property.

The Goals and Objectives of the Mineral County CWPP Are:

1. **Wildfire Resilience:** Improve wildfire resilience and adaptation of the County.
2. **Public and Stakeholder Input:** Develop a CWPP update with broad public and stakeholder input and support.
3. **Grant Opportunities:** Develop a CWPP update that will serve as a source and guide for accessing grant opportunities and funding.
4. **Risk Mitigation:** Collaboratively develop a prioritized action plan to mitigate risks to people and property.
5. **Fuel Mitigation Resources:** Provide resources, information, and actionable planning for conducting fuel mitigation on private and public lands.
6. **Project Tracking:** Implement a process to implement and track project progress in an accessible and easy to understand format.

PROJECT CONTACT SAM.LASHLEY@SWCA.COM

Figure F.2. CWPP flyer, page 2.

Figure F.3. QR code linking community members to a survey about the upcoming CWPP.

2025 Mineral County Community Wildfire Protection Plan (CWPP) Public Survey

Thank you for choosing to take this survey! Your answers will help improve wildfire safety in Mineral County. This survey will help us better identify how to plan to lower the risk and damage caused by wildfires to people, nature, and buildings. If you have any questions or want to get involved with the Community Wildfire Protection Plan (CWPP), please email Sam Lashley at sam.lashley@swca.com

Figure F.4. A screen shot of the introductory text to the community survey.

Figure F.5. A screen shot of an article about Mineral County's CWPP update and Public Survey from the Mineral Independent.

Figure F.6. A screen shot of an article about Mineral County's CWPP update and public survey from the Hagadone News Network.

Figure F.7. Post from the Global Fire Monitoring and United Nations Office for Disaster Risk Reduction site highlighting Mineral County's CWPP Update and referencing the Mineral Independent's article.
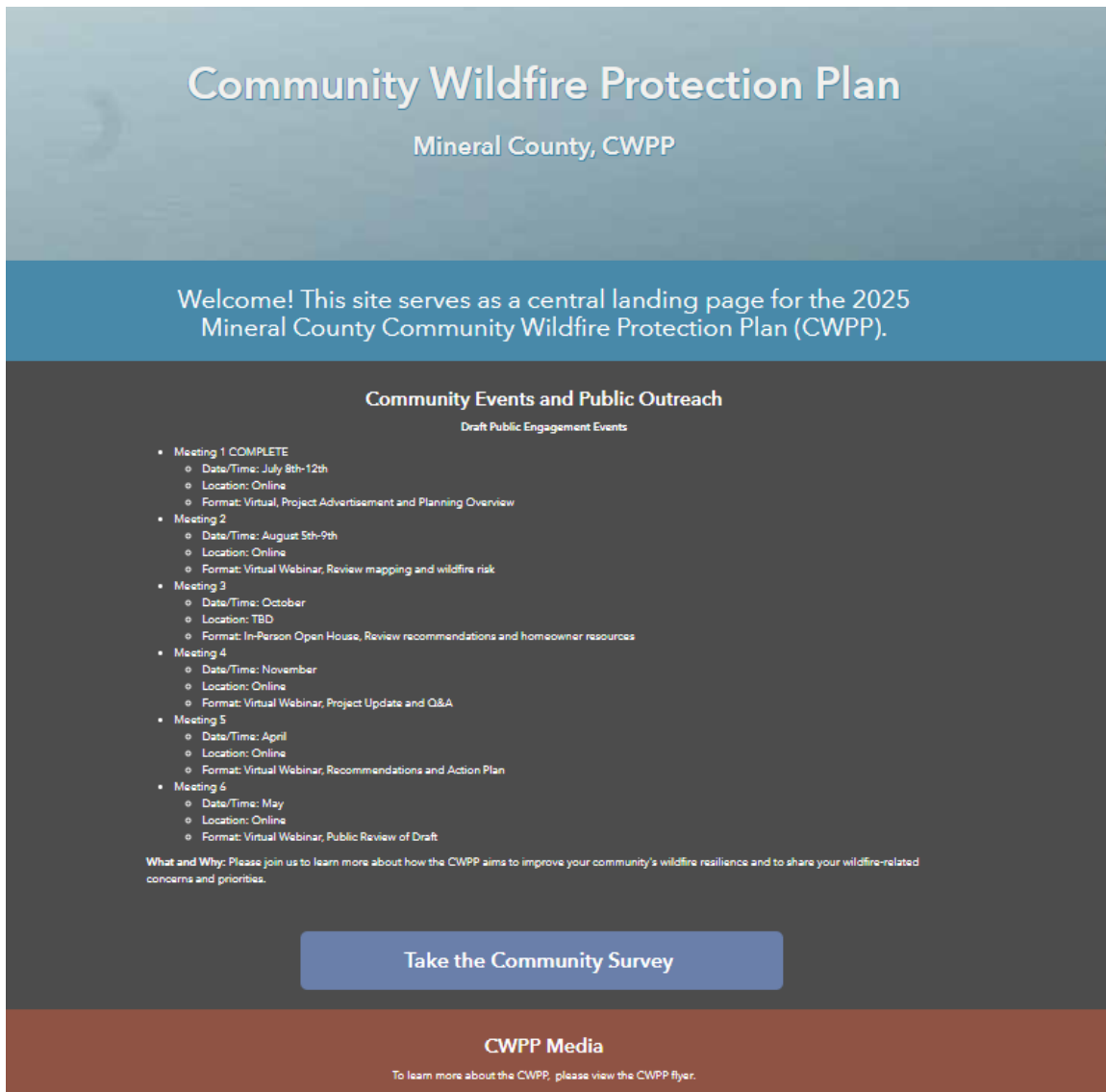
Figure F.8. A screenshot from the Mineral County CWPP public hub site listing community events, ongoing and future public outreach, as well as links to the community survey and additional contact information.

PUBLIC COMMENT PERIOD

During the public comment period of the CWPP process, respondents provided feedback and information on various aspects related to wildfire preparedness in their community. This included information and feedback about assessments of community preparedness and property risks, concerns about wildfire vulnerability, prioritization of wildfire preparedness actions, challenges to making homes fire-safe, funding priorities, prescribed fire usage, evacuation planning, emergency kits, knowledge of evacuation routes, willingness to evacuate under different circumstances, familiarity with emergency notifications, and registration for local emergency notifications. This feedback was incorporated into the plan's content generally and into the project recommendations (see Chapter 4).

COMMUNITY SURVEY RESULTS

The public survey period was open from June 18, 2024 to April 7, 2025, with 45 responses received. Toward the end of the CWPP planning process, concerns raised during this feedback process will be addressed through diligent adaptions, edits, and additions to the plan's content and mitigative project recommendations. (Response percentages below will be inserted then.)

1. **What is your level of familiarity or knowledge about wildfire behavior in Mineral County?**

Level of Preparation	Number of Responses	Percent
Not at all familiar	4	9%
Somewhat familiar	11	24%
Familiar	16	36%
Very familiar	13	29%
Expert	1	2%
Grand Total	45	100%

2. **How concerned/worried are you about the risk of wildfire where you live and the threat wildfire poses to your primary residence?**

Level of Risk	Number of Responses	Percent
Very concerned	19	42%
Concerned	13	29%
Somewhat concerned	7	16%
Not concerned	6	13%
Unsure	0	0
Grand Total	45	100%

3. **Compared to five years ago, how would you describe your level of concern/worry regarding your safety from wildfires and the safety of your family, home, and assets?**

Level of Risk	Number of Responses	Percent
Much less concerned	2	4%
Less concerned	3	7%
No change	12	27%
More concerned	13	29%
Much more concerned	3	7%
Not sure	0	0%
Other	12	27%
Grand Total	45	100%

4. **How many times have you evacuated from your residence because of wildfire or threat of wildfire in the last 10 years (mandatory or voluntary)?**

Level of Risk	Number of Responses	Percent
0	39	87%
1	5	11%
2	1	1%
3	0	0%
4	0	0%
5 or more	0	0%
Grand Total	45	100%

5. **Do you believe you would know how to safely evacuate in the event of a wildfire?**

Level of Risk	Number of Responses	Percent
Yes	32	73%
No	3	7%
Unsure	9	20%
Grand Total	44	100%

6. **Are you familiar with where to get updates and information regarding evacuations or incidents?**

Level of Risk	Number of Responses	Percent
Not at all familiar	7	16%
Somewhat familiar	12	27%
Familiar	14	37%
Very familiar	11	24%
Expert	1	2%
Grand Total	45	100%

7. **Where do you currently get most of your updates and information regarding evacuations or incidents?**

Respondents reported receiving wildfire and evacuation updates from a variety of sources, with social media and online platforms playing a significant role. Facebook groups, incident pages, and apps such as Watch Duty were commonly cited as sources of information. Many residents also relied on official agencies, including the USFS, the Mineral County Sheriff's Office, and the Montana Department of Emergency Services. Community bulletin boards, post office notices, and local grocery stores were frequently mentioned as physical sources of information. Some respondents stated they received updates through direct communication with neighbors, phone calls, and text alerts. A few individuals indicated that they did not have a primary source of information, highlighting a potential gap in outreach efforts.

8. **In your opinion, whose primary responsibility is it to make sure Mineral County residents are prepared for wildfires? Select all that apply.**

Level of Risk	Number of Responses	Percent
Individuals	36	24%
Communities (HOAs, community groups, etc.)	13	9%
Local fire protection districts/departments	33	22%
Local government (towns, cities, counties)	28	19%
State government	16	11%
Federal government land management agencies	21	14%
Other	1	1%
Grand Total	45	100%

9. **What are the values/assets that you want protected in the immediate area around your residence (~1 mile)? Select your top 3.**

Level of Risk	Number of Responses	Percent
Human lives	42	30%
Animal lives	26	19%
Homes	38	28%
Public infrastructure	10	7%
Drinking water/water quality	13	9%
Natural scenic environments (forests, grasslands, waterways, etc.)	5	4%
Historic structures/cultural resources	3	2%
Grand Total	441	100%

10. **What are the greatest concerns that you have about the risk from wildfire? Please rank these in order with 1 being the greatest concern, 2 being the next highest concern, etc.**

Based on the survey responses, losing one's home was the most frequently ranked top concern, followed closely by losing one's life. These two concerns were consistently rated as the highest priorities among respondents. Losing family members was also a significant concern, with many ranking it among their top three worries. Losing pets and financial devastation were also commonly ranked concerns, though generally lower than life and home loss. Environmental impacts, such as the loss of forests, watersheds, and other natural assets, were frequently ranked in the middle range of concern, while losing critical infrastructure (e.g., utilities, communications) was a lower-priority issue for most respondents. The "Other" category saw a small number of responses, with most ranking it as the least concerning. Overall, the data suggests that personal safety and property protection are the dominant concerns among residents, with environmental and economic impacts considered important but secondary to immediate life and home loss.

11. **What do you think your current insurance would cover in the event of a wildfire? Select all that apply.**

Answer	Number of Responses	Percent
Rebuild my home in the same place	27	37%
Rebuild any out-buildings in the same place	16	22%
Provide funds to partially restore damages	13	18%
Provide funds to purchase another home	4	5%
Not sure	11	15%
I don't have insurance	2	3%
Grand Total	45	100%

12. **Defensible space is the 100 feet between your property and the surrounding area. Which of the following defensible space activities have you completed? Select all that apply.**

Answer	Number of Responses	Percent
Removed vegetation within 5 feet of structures	15	16%
Removed wood mulch throughout the property	14	15%
Established defensible space 5-30 feet from structures	19	20%
Established defensible space more than 30 feet from structures	19	20%
Thinned trees more than 100 feet from structures	24	25%
Other	4	4%
Grand Total	35	100%

13. **Home hardening is the concept of implementing fire-resistant upgrades to your home. Are you familiar with "home hardening" concepts and how they pertain to residential property (i.e., the physical structure itself, including mesh vents, siding, roof types, eves, windows, chimneys, fences, etc.)?**

Answer	Number of Responses	Percentage
Not at all familiar	9	20%
Somewhat familiar	16	36%
Familiar	12	27%
Very familiar	7	16%
Expert	0	0%
Grand Total	44	100%

14. Which of the following home hardening activities have you completed? Select all that apply.

Answer	Number of Responses	Percent
Placed mesh or screen on open vents	16	19%
Installed a Class A fire-resistant roof	20	24%
Installed fire-resistant siding	15	18%
Installed double-paned windows	23	27%
None	9	11%
Other	2	2%
Grand Total	42	100%

15. Are you interested in learning about and implementing "home hardening" on your own residential property?

Answer	Number of Responses	Percent
Not at all	3	7%
Slightly	6	14%
Moderately	22	50%
Very	9	20%
Extremely	2	5%
Unsure	2	5%
Grand Total	44	100%

16. Are there any obstacles preventing you from implementing defensible space and home hardening measures on your home? Select all that apply.

Answer	Number of Responses	Percent
These activities are too expensive	11	14%
These activities take too much time	5	7%
Unsure of what to do	11	14%
Can't find help	7	9%
Physically unable to complete these tasks on my own	10	13%
I don't like the way these measures make yards and homes look	2	3%
I'm not motivated to implement these measures	4	5%
I'm not concerned about implementing these measures	2	3%
There are no obstacles, I'm already implementing these measures	19	25%
I'm a long-term renter and landscaping and home improvements are done by the landlord	4	5%
Other	1	1%100%
Grand Total	42	

17. **If a cost-share grant or incentive program were available, would you participate in it to better prepare your home and property from wildfire risk?**

Answer	Number of Responses	Percent
Yes	21	50%
No	3	7%
Unsure – depends on the program and associated costs	16	38%
Other	2	5%
Grand Total	42	100%

18. **Have you participated in Community Wildfire Protection Plan (CWPP) efforts in the last 10 years?**

Answer	Number of Responses	Percent
Yes	13	30%
No	25	57%
Unsure	6	14%
Grand Total	44	100%

19. **How familiar are you with the current CWPP?**

Answer	Number of Responses	Percent
I do not know/I do not know if one exists	17	39%
I have heard about it but have not read it	12	27%
I have read a portion of the plan	9	20%
I am very familiar with the plan	5	11%
I helped develop the Community Wildfire Protection Plan (CWPP)	1	2%
Grand Total	44	100%

20. **What do you think are the most effective ways for residents and the community to become more aware of wildfire risks and hazards? (Select all that apply)**

Answer	Number of Responses	Percent
Workshops	25	16%
Publications (fliers, newsletters, etc.)	30	19%
Grants and incentive programs	23	15%
Home assessments	23	15%
Public meetings	21	14%
Public webinars	11	7%
Educational social media posts	19	12%
None of the above	0	0%

Answer	Number of Responses	Percent
Other	2	1%
Grand Total	44	100%

21. Do community officials or members of your community discuss wildfire risk in any of the following settings or platforms? (Select all that apply)

Answer	Number of Responses	Percent
Formal meetings	10	13%
Informal meetings	7	9%
Neighborhood discussions	6	8%
News articles	9	12%
Social media	11	14%
One-on-one discussions between neighbors	8	10%
No discussion	5	6%
Not sure	20	26%
Other	1	1%
Grand Total	44	100%

22. Do you think your community could do better to prepare for and prevent wildfires?

Answer	Number of Responses	Percent
Yes	32	73%
No	3	7%
Not sure	9	20%
Grand Total	44	100%

23. If you answered yes above, how do you think your community could do better to prepare for and prevent wildfires?

When asked how the community could better prepare for and prevent wildfires, respondents suggested a combination of education, proactive mitigation, and improved agency coordination. Many emphasized the need for better public education on why mitigation efforts are necessary, with some suggesting that enforcement measures, such as higher property taxes, be used to encourage participation. Others stressed the importance of identifying at-risk individuals, including elderly and disabled residents, to ensure they receive assistance during evacuations. Recommendations also included increased hazard reduction efforts, such as home assessments, inspections by fire officials, and targeted fuel reduction in the WUI, regardless of federal land designations. Several responses called for improved public outreach, including informational forums, better communication from agencies, and transparency in USFS activities. Access to funding and resources for property owners to implement mitigation measures was also identified as a critical need.

24. Where do you get information about local wildfires?

Answer	Number of Responses	Percent
Social media (Facebook, Next Door, X)	20	20%
Agency websites (www.MTFireInfo.org)	29	28%
Friends/family	26	25%
TV News	17	17%
Printed News	1	1%
Local radio	4	4%
Other	5	5%
Grand Total	43	100%

25. Would you like to see more projects in your community that treat and reduce hazardous vegetation?

Answer	Number of Responses	Percent
Yes	35	80%
No	1	2%
Unsure	8	18%
Grand Total	44	100%

26. What is your age?

Answer	Number of Responses	Percent
18-24	3	7%
25-34	0	0%
35-44	5	11%
45-54	3	7%
55-64	5	11%
65-74	16	36%
75 and older	13	29%
Grand Total	45	100%

27. Please select the location of your PRIMARY residence

Answer	Number of Responses	Percent
Alberton	2	4%
De Borgia	0	0%
Haugan	2	4%
St. Regis	2	4%
Saltese	0	0%
Superior	32	71%

Answer	Number of Responses	Percent
Other	7	16%
Grand Total	45	100%

28. How long have you lived at this residence

Answer	Number of Responses	Percent
0-1 years		
1-3 years		
3-5 years		
5-7 years		
7-9 years		
10+ years		
Grand Total		

29. Do you rent or own a home?

Answer	Number of Responses	Percent
Rent	5	11%
Own	39	87%
Rent the lot, own the home	1	2%
Other	0	0%
Grand Total	45	100%

30. Do you identify as a person with a disability as defined by the Americans with Disabilities Act (ADA)? [If yes, go to question 31. If no, skip to question 32]

Answer	Number of Responses	Percent
Yes	6	14%
No	38	86%
Grand Total	44	100%

31. If you replied "yes" to Question 30, what sort of access and functional needs do you require? Please select all that apply.

Hearing aids

Wheelchair access

Transportation support

Visual aids

Other

Answer	Number of Responses	Percent
Hearing aids	7	70%
Wheelchair access	1	10%
Transportation support	1	10%
Visual aids	1	10%
Grand Total	45	100%

Are there any specific comments or concerns that you have regarding wildfire risk in Mineral County that you would like to see addressed in the Community Wildfire Protection Plan?

Residents expressed a range of concerns regarding wildfire risk in Mineral County. Some respondents highlighted a lack of urgency in addressing fire risk, acknowledging that firsthand exposure to wildfire damage might increase their motivation to take action. Others emphasized the need for better emergency planning, particularly evacuation plans for elderly residents and those living outside fire taxing districts. Concerns were also raised about fire protection agencies not conducting sufficient pre-planning for suppression efforts. Multiple responses urged increased fuel reduction and logging, regardless of land management designations, to mitigate wildfire risk in the WUI. Some respondents pointed to unaddressed fuel hazards, such as debris from past fires, as an ongoing danger.

APPENDIX G:

Funding Sources

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FUNDING SOURCES

The following section provides information on federal, state, and local funding opportunities for conducting wildfire mitigation, community education, and emergency response improvement projects. The priorities and application requirements of individual funding programs often change from year to year. Please follow the links provided to find the most up-to-date information on each funding opportunity. It should be noted that matched funding can be an excellent funding strategy, when possible.

FEDERAL FUNDING INFORMATION

Source: **2022 Infrastructure Investments and Jobs Act**

Agency: **Multiple**

Website: https://www.congress.gov/bill/117th-congress/house-bill/3684

Description: The Infrastructure Investments and Jobs act allocated funding through various departments for infrastructure projects including, but not limited to roads, bridges, and major projects; passenger and freight rail; highway and pedestrian safety; public transit; broadband; ports and waterways; airports; water infrastructure; power and grid reliability and resiliency; resiliency, including funding for coastal resiliency, ecosystem restoration, and weatherization; clean school buses and ferries; electric vehicle charging; addressing legacy pollution by cleaning up Brownfield and Superfund sites and reclaiming abandoned mines; and Western Water Infrastructure.

Specifically, the Community Wildfire Defense Grant Program is a $1 billion program where the Department of Agriculture will provide grants to communities at risk from wildfire to develop or revise their Community Wildfire Protection Plans (CWPPs) and carry out projects described within those plans. Section 40803 addresses wildfire risk reduction, section 40804 deals with ecosystem restoration, section 40806 handles the establishment of fuel breaks in forests and other wildland vegetation, and section 70302 addresses reforestation. To learn more about the Community Wildfire Defense Grant, please visit: https://www.fs.usda.gov/managing-land/fire/grants.

Source: **Tribal Lands Landscape Scale Restoration Grants**

Agency: First Nations Development Institute

Website: https://www.firstnations.org/projects/landscape-scale-restoration/

Description: For more than 41 years, First Nations Development Institute (First Nations), a Native-led 501(c)(3) nonprofit organization, has worked to strengthen American Indian economies to support healthy Native communities by investing in and creating innovative institutions and models that strengthen asset control and support economic development for American Indian people and their communities. First Nations supports a series of grants focused on controlling and protecting food systems, water, languages, traditional ecological knowledge, and land. They support landscape restoration grants funded through the USFS to support priority forest landscapes at a high wildfire risk. You can find more information about this grant here: https://www.firstnations.org/grantmaking/#grant-opps.

Source: **Building Resilient Infrastructure and Communities (BRIC) Grant Program**

Agency: Department of Homeland Security Federal Emergency Management Agency (FEMA)

Website: https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities

Description: BRIC will support states, local communities, tribes, and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards. The BRIC program guiding principles are supporting communities through capability- and capacity-building; encouraging and enabling innovation; promoting partnerships; enabling large projects; maintaining flexibility; and providing consistency. You can find more information on the BRIC program here: https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities/about.

Source: **Hazard Mitigation Grant Program (HMGP)**

Agency: FEMA

Website: https://www.fema.gov/grants/mitigation/hazard-mitigation

Description: The HMGP provides funding to state, local, tribal, or territorial governments (and individuals or businesses if the community applies on their behalf) to rebuild with the intentions to mitigate future losses due to potential disasters. This grant program is available after a presidentially declared disaster.

Source: **Hazard Mitigation Grant Program (HMGP) – Post Fire**

Agency: FEMA

Website: https://www.fema.gov/grants/mitigation/post-fire

Description: The HMGP Post Fire grant program provides assistance to communities for the purpose of implementing hazard mitigation measures following a wildfire. Mitigation measures may include:

- Soil stabilization
- Flood diversion
- Reforestation

Source: **Fire Management Assistance Grant (FMAG)**

Agency: FEMA

Website: https://www.fema.gov/assistance/public/fire-management-assistance

Description: The Fire Management Assistance Grant (FMAG) Program provides financial aid to states, local, and tribal governments for mitigating, managing, and controlling fires on public or private forests and grasslands that pose a threat of major disaster. The program covers 75% of the actual costs, with the state responsible for the remaining 25%. The declaration process is rapid, with FEMA responding within hours once a state requests assistance and demonstrates that fire costs meet or exceed specific thresholds.

Source: **Emergency Management Performance Grant (EMPG)**

Agency: FEMA

Website: https://www.fema.gov/grants/preparedness/emergency-management-performance

Description: The EMPG program provides funding to state, local, tribal, and territorial emergency management agencies with the overall goal of creating a safe and resilient nation. The two main

objectives of the program are 1) closing capability gaps that are identified in the state or territory's most recent Stakeholder Preparedness Review (SPR); and 2) building or sustaining those capabilities that are identified as high priority through the Threat and Hazard Identification and Risk Assessment (THIRA)/SPR process and other relevant information sources. The grant recipient and Regional Administrator must come to an agreement on program priorities, which are crafted based on National, State, and regional priorities.

Source: **Regional Catastrophic Preparedness Grants**

Agency: FEMA

Website: https://www.fema.gov/grants/preparedness/regional-catastrophic

Description: The Regional Catastrophic Preparedness Grant program provides funding to increase collaboration and capacity in regard to catastrophic incident response and preparation.

Source: **The Fire Prevention and Safety Grants (FP&S)**

Agency: FEMA

Website: https://www.fema.gov/grants/preparedness/firefighters/safety-awards#:~:text=Awards%20%20%20%20Organization%20%20%20,%20%20%241%2C499%2C957%20%2016%20more%20rows%20

Description: FP&S offers support to projects that enhance the safety of the public and firefighters who may be exposed to fire and related hazards. The primary goal is to target high-risk populations and mitigate high incidences of death and injury. Examples of the types of projects supported by FP&S include fire-prevention and public-safety education campaigns, juvenile fire-setter interventions, media campaigns, and arson prevention and awareness programs. In fiscal year 2005, Congress reauthorized funding for FP&S and expanded the eligible uses of funds to include firefighter safety research and development.

Source: **Staffing for Adequate Fire and Emergency Response (SAFER)**

Agency: FEMA

Website: https://www.fema.gov/grants/preparedness/firefighters/safer

Description: The purpose of SAFER grants is to help fire departments increase the number of frontline firefighters. The goal is for fire departments to increase their staffing and deployment capabilities and ultimately attain 24-hour staffing, thus ensuring that their communities have adequate protection from fire and fire-related hazards. The SAFER grants support two specific activities: (1) hiring of firefighters and (2) recruitment and retention of volunteer firefighters. The hiring of firefighters activity provides grants to pay for part of the salaries of newly hired firefighters over the five-year program.

Source: **The Fire Prevention and Safety Grants (FP&S)**

Agency: FEMA

Website: https://www.fema.gov/grants/preparedness/firefighters/safety-awards#:~:text=Awards%20%20%20%20Organization%20%20%20,%20%20%241%2C499%2C957%20%2016%20more%20rows%20

Source: **Assistance to Firefighters Grants (AFG)**

Agency: FEMA

Website: https://www.fema.gov/grants/preparedness/firefighters.

Description: The AFG program provides resources to assist fire departments in attaining critical resources such as training and equipment.

Source: **America the Beautiful Challenge**

Agency: National Fish and Wildlife Foundation

Website: https://www.nfwf.org/programs/america-beautiful-challenge

Description: The America the Beautiful Challenge is an annual initiative to streamline funding for conservation and restoration work to build watershed and forest resilience. The program emphasizes restoration of rivers, coasts, wetlands, grasslands, and forests to protect from drought, flooding, and wildfire. The America the Beautiful Challenge encourages public-private partnerships to benefit landscape scale conservation and resilience efforts.

Source: **Emergency Forest Restoration Program (EFRP)**

Agency: USDA Farm Service Agency (FSA)

Website: https://www.fsa.usda.gov/programs-and-services/disaster-assistance-program/emergency-forest-restoration/index

Description: The Emergency Forest Restoration Program (EFRP) provides financial assistance to non-industrial private forest owners to help restore forest health after natural disasters. The program supports activities such as debris removal, tree planting, erosion control, and repairs to forest roads, fire breaks, and other critical infrastructure. To qualify, land must have had tree cover prior to the disaster and be privately owned by individuals, groups, or entities without commercial forestry operations. EFRP can cover up to 75% of restoration costs, with funding decisions managed by local FSA offices and larger projects requiring state or national approval. Landowners should contact their local FSA office for application details following a disaster.

Source: **Emergency Conservation Program (ECP)**

Agency: USDA Farm Service Agency (FSA)

Website: https://www.fsa.usda.gov/programs-and-services/conservation-programs/emergency-conservation/index

Description: The Emergency Conservation Program (ECP) helps farmers and ranchers to repair damage to farmlands caused by natural disasters and to help put in place methods for water conservation during severe drought. The ECP does this by giving ranchers and farmers funding and assistance to repair the damaged farmland or to install methods for water conservation. The grant could be used for restoring conservation structures (waterways, diversion ditches, buried irrigation mainlines, and permanently installed ditching system).

Source: **Environmental Quality Incentives Program (EQIP)**

Agency: National Resource Conservation Service (NRCS)

Website: https://www.nrcs.usda.gov/programs-initiatives/eqip-environmental-quality-incentives

Description: The Environmental Quality Incentives Program (EQIP) is a voluntary program authorized under the Agricultural Act of 2014 (2014 Farm Bill) that helps producers install measures to protect soil, water, plant, wildlife, and other natural resources while ensuring sustainable production on their farms, ranches, and working forest lands.

Source: **Emergency Watershed Protection (EWP) Program**

Agency: National Resource Conservation Service (NRCS)

Website: https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/ewpp/

Description: The Emergency Watershed Protection (EWP) Program, managed by NRCS, provides technical and financial assistance to help communities address immediate threats to life and property caused by natural disasters such as floods, wildfires, and windstorms. Assistance can be initiated without a federal or state disaster declaration if the NRCS State Conservationist identifies an emergency. Eligible sponsors include local governments, conservation districts, and federally recognized tribes, while public and private landowners can apply through these sponsors. EWP-funded projects may involve removing debris from waterways, stabilizing eroded streambanks, repairing drainage infrastructure, restoring vegetation on damaged lands, and fixing levees or conservation structures.

Source: **Conservation Innovation Grants (CIG)**

Agency: National Resource Conservation Service

Website: https://www.nrcs.usda.gov/programs-initiatives/cig-conservation-innovation-grants

Description: CIG State Component. CIG is a voluntary program intended to stimulate the development and adoption of innovative conservation approaches and technologies on private lands, while leveraging federal investment in environmental enhancement and protection, in conjunction with agricultural production. Under CIG, Environmental Quality Incentives Program (EQIP) funds are used to award competitive grants to non-federal governmental or nongovernmental organizations, tribes, or individuals. CIG enables the Natural Resources Conservation Service (NRCS) to work with other public and private entities to accelerate technology transfer and adoption of promising technologies and approaches to address some of the nation's most pressing natural resource concerns. The CIG requires a 50/50 match between the agency and the applicant. The CIG has two funding components: national and state.

Source: **Funding for Fire Departments and First Responders**

Agency: Department of Homeland Security, U.S. Fire Administration

Website: https://www.fema.gov/grants/preparedness/firefighters/assistance-grants

Description: Includes grants and general information on financial assistance for fire departments and first responders. Programs include the Assistance to Firefighters Grant Program, Reimbursement for Firefighting on Federal Property, State Fire Training Systems Grants, and National Fire Academy Training Assistance.

Source: **Specific EPA Grant Programs**

Agency: EPA

Website: https://www.epa.gov/grants/grants-your-region-information-specific-epa-region-8

Description: Various grant programs are listed under this site. Listed below are examples of grants offered:

- Multipurpose Grants to States and Tribes: https://www.epa.gov/grants/multipurpose-grants-states-and-tribes

- Environmental Education Grants: https://www.epa.gov/education/grants

- Environmental Justice Grants: https://www.epa.gov/environmentaljustice/environmental-justice-grants-funding-and-technical-assistance

Source: **Urban and Community Forestry Program, National Urban and Community Forestry Challenge Cost Share Grant Program**

Agency: U.S. Forest Service (USFS)

Website: https://www.fs.usda.gov/managing-land/urban-forests/ucf

Description: USFS funding will provide for Urban and Community Forestry Programs that work with local communities to establish climate-resilient tree species to promote long-term forest health. The other initiative behind this program is to promote and carry out disaster risk mitigation activities, with priority given to environmental justice communities. For more information, contact a Forest Service Regional Program Manager.

Source: **Catalog of Federal Funding Sources; Land Resources**

Agency: Multiple

Website: https://ordspub.epa.gov/ords/wfc/f?p=165:512:16627993499812:::512::

Description: The Land Finance Clearing House is a catalog of federal funding sources for all things land related.

Examples of the types of grants found at this site are:

- Forest and Woodlands Resource Management Grant: https://sam.gov/fal/a798ad78cac749639b48270db3e86fdc/view?index=cfda&page=2&organization_id=100011100

- Public Assistance Grant Program: https://www.fema.gov/assistance/public

- Hazard Mitigation Grant: https://www.fema.gov/grants/mitigation/hazard-mitigation

Source: **Firewise Communities**

Agency: Multiple

Website: https://www.nfpa.org/about-nfpa/awards

Description: Many different Firewise Communities activities are available to help homes and whole neighborhoods become safer from wildfire without significant expense. Community cleanup days, awareness events, and other cooperative activities can often be successfully accomplished through partnerships among neighbors, local businesses, and local fire departments at little or no cost.

The kind of help you need will depend on who you are, where you are, and what you want to do. Among the different activities that individuals and neighborhoods can undertake, the following often benefit from seed funding or additional assistance from an outside source:

- Thinning/pruning/tree removal/clearing on private property—particularly on very large, densely wooded properties

- Retrofit of home roofing or siding to noncombustible materials

- Managing private forest

- Community slash pickup or chipping

- Creation or improvement of access/egress roads

- Improvement of water supply for firefighting

- Public education activities throughout the community or region

Source: **The National Fire Plan (NFP)**

Agency: U.S. Department of Interior and USDA

Website: http://www.forestsandrangelands.gov/

Description: Many states are using funds from the NFP to provide funds through a cost-share with residents to help them reduce the wildfire risk to their private property. These actions are usually in the form of thinning or pruning trees, shrubs, and other vegetation and/or clearing the slash and debris from this kind of work. Opportunities are available for rural, state, and volunteer fire assistance.

Source: **GSA-Federal Excess Personal Property**

Agency: USFS

Website: https://www.gsa.gov/

Description: The Federal Excess Personal Property (FEPP) program refers to USFS-owned property that is on loan to State Foresters for the purpose of wildland and rural firefighting. Most of the property originally belonged to the Department of Defense. Once acquired by the USFS, it is loaned to State Cooperators for firefighting purposes. The property is then loaned to the State Forester, who may then place it with local departments to improve local fire programs. State Foresters and the USFS have mutually participated in the FEPP program since 1956.

Source: **Wildland Urban Interface Grant Program**

Agency: Council of Western State Foresters/USFS

Website: https://www.westernforesters.org/wui-grants

Description: The Wildland Urban Interface (WUI) Grant Program funds state and Pacific Island government agencies/organizations to mitigate wildfire hazards in areas where wildlands meet human development. Eligible projects include fuel reduction and vegetation treatments such as fuel breaks, thinning, and prescribed burning to reduce wildfire threats to communities. These treatments can cross jurisdictional boundaries and include private lands, aiming to enhance public and firefighter safety and protect property. Additionally, the program supports prevention and education initiatives like Firewise programs, fire safety codes, and community fire safe councils. Applicants must submit proposals through

their state or Pacific Island government agencies, addressing all necessary permits and success measures for implementation.

Source: **Action, Implementation, & Mitigation (AIM) Grant**

Agency: Coalitions and Collaboratives/USFS

Website: https://co-co.org/get-involved/grants/aim-grant/

Description: The AIM Program by Coalitions and Collaboratives Inc. (COCO) funds fire adaptation and wildfire risk reduction projects across the U.S., aiming to enhance community resilience and restore fire-adapted ecosystems. Grants range from $10,000 to $75,000 for one-year projects, requiring a 100% match (cash or in-kind). Eligible applicants include 501(c)(3) nonprofits, conservation districts, fire councils, fire departments, tribal authorities, and local governments. Projects must fit into broader community wildfire strategies and coordinate with federal partners.

Source: **U.S. Endowment for Forestry and Communities**

Agency: EPA, NRCS, USFS, U.S. Department of Defense, U.S. Economic Development Agency

Website: https://www.usendowment.org/

Description: The Action, Implementation, and Mitigation (AIM) initiative funds efforts to enhance fire adaptation and reduce wildfire risk across the United States, with grants ranging from $10,000 to $75,000 for one-year projects requiring a 100% match (cash or in-kind). Eligible applicants include nonprofits, conservation districts, fire councils, fire departments, tribal authorities, and local governments, focusing on high-risk communities near public lands and pre-fire mitigation activities. Proposals must align with community wildfire strategies and coordinate with federal partners. Applications must be invited or submitted via Requests for Proposals (RFPs).

LOCAL/STATE FUNDING INFORMATION

Source: **Mission West**

Agency: Town of Superior

Website: https://townofsuperiormontana.org/volunteers/

Description: The Town of Superior's Mission West program collaborates with local, state, and federal agencies to provide community development tools and financial resources to Lake, Mineral, and Sanders counties. The Mission West program focuses on advocating for communities, accessing government grants and loans, supporting downtown and agricultural initiatives, and fostering sustainable economic development. It also aims to honor regional culture and history, assess regional needs, and identify redevelopment investment opportunities.

Source: **Community Catalyst Fund**

Agency: Montana Watershed Coordination Council

Website: https://www.mtwatersheds.org/funding-opportunity/community-catalyst-fund/

Description: The Community Catalyst Fund offers $335,000 in grant opportunities to advance conservation and land stewardship efforts. Supported by the Doris Duke and William and Flora Hewlett Foundations, the program is designed to strengthen partnerships rooted in community collaboration, with an emphasis on elevating Indigenous voices. Organizations eligible to apply include tribal governments,

local agencies, conservation groups, nonprofits, fire-related entities, and academic institutions focused on supporting underserved populations and promoting climate resilience. Grant recipients will also engage in a two-year collaborative learning initiative to exchange ideas and build on project successes.

Source: **Various Funding Sources**

Agency: Montana Department of Agriculture

Website: https://agr.mt.gov/Noxious-Weeds

Description: The Montana Department of Agriculture offers several programs to combat the spread of noxious weeds, which threaten the state's ecosystems by displacing native species, increasing soil erosion, and diminishing wildlife habitats. These programs include:

- **The Noxious Weed Trust Fund Grant:** https://agr.mt.gov/News/NWTF-Grant-Applications-Now-Available-FY2024

- **Early Detection Rapid Response:** https://agr.mt.gov/Noxious-Weed-Task-Force-Program

Source: **Forest Pest Management**

Agency: Montana DNRC

Website: https://dnrc.mt.gov/Forestry/Grants/OtherGrants/Forest-Pest-Management

Description: The Montana DNRC's Forest Pest Management Program provides sub-awards from the USFS's Western Bark Beetle Initiative to support forest treatments that reduce susceptibility to bark beetle infestations. Eligible applicants include non-federal public lands, city and county governments, and state agencies. Funded projects typically involve thinning and slash treatment to improve forest health and resilience. Funding amounts vary, with awards often around $150,000. For more information, interested parties should contact the Montana DNRC Conservation Specialist.

Source: **Conservation District Grants**

Agency: Montana DNRC

Website: https://dnrc.mt.gov/Conservation/Grant-and-Loan-Programs/Conservation-District-Grants

Description: The Montana DNRC offers state-funded grants to Montana's 58 conservation districts. These grants aim to conserve natural resources through locally led efforts, supporting on-the-ground projects, educational programming, innovative conservation practices, and district operations. Eligibility requires districts to levy the maximum county mills, demonstrate a need for additional funds, and work towards a conservation activity outlined in an annual work plan, watershed restoration plan, or strategic plan.

Source: **Volunteer Fire Capacity Program**

Agency: Montana DNRC

Website: https://dnrc.mt.gov/Forestry/Grants/FireGrants/Volunteer-Fire-Assistance

Description: The Volunteer Fire Capacity Program, administered by the Montana DNRC and funded by the USFS, offers cost-share grants to rural volunteer fire departments. These grants aim to improve training, acquire wildland personal protective equipment, enhance radio communications, and support the establishment of new fire districts. To be eligible, departments must serve communities with populations under 10,000 and consist of at least 80% volunteer personnel. The program provides a 50% cost-share, requiring recipients to match the remaining 50% with non-federal funds.

Source: **Cooperative Fire Protection Capacity Grants**

Agency: Montana DNRC

Website: https://dnrc.mt.gov/Forestry/Grants/FireGrants/Cooperative-Fire-Protection-Capacity-Grant

Description: The Cooperative Fire Protection Capacity Grants aim to enhance the fire suppression capabilities of local governments in Montana. Administered by the DNRC, these grants support local firefighters in their initial wildland fire attacks, minimizing the need for large-scale DNRC or federal intervention. This program builds on over 50 years of successful fire protection through strong statewide partnerships. Eligible applicants include Montana counties with a current Cooperative Fire Protection Agreement with the state. Grants typically range from $10,000 to $30,000 per fiscal year, with the possibility of multi-year applications for up to 2 years, depending on funding availability and application quality.

Source: **Montana Energy Infrastructure Resilience Grant Program**

Agency: Montana Department of Environmental Quality (Montana DEQ)

Website: https://www.deq.mt.gov/energy/Programs/grid

Description: The Montana Energy Infrastructure Resilience Grant Program, funded by the Bipartisan Infrastructure Law, provides annual grants to enhance the reliability and resilience of electrical grids from 2022 to 2026. Focused on mitigating wildfire risks, eligible projects include fire-resistant technologies, fire prevention systems, undergrounding electrical equipment, utility pole management, vegetation and fuel-load management, and adaptive protection technologies. Sub-grants are available to eligible entities, with a required cost share based on electricity sales and a 15% federal award match.

Source: **Montana Association of Conservation Districts (MACD) Communications Assistance**

Agency: Montana DNRC

Website: https://macdnet.org/programs/communications-assistance/

Description: The MACD Communications Assistance Program, offered in partnership with the Montana DNRC, provides a range of support services to Montana's conservation districts to enhance their communication efforts. Managed by MACD's communications staff, the program offers low-cost WordPress websites through a multisite network, along with website support for districts outside this network. Districts can access professional design services for their communication materials, receive help with technology needs like cloud storage, email, and document sharing, and utilize a variety of communications resources developed in collaboration with the MACD communications committee and partners.

PRIVATE FUNDING INFORMATION

Source: **State Farm Good Neighbor Citizenship Grants**

Agency: State Farm

Website: https://www.statefarm.com/about-us/corporate-responsibility/community-grants/good-neighbor-citizenship-grants

Description: State Farm funding is directed at:

- Auto and roadway safety

- Teen Driver Education

- Home safety and fire prevention

- Disaster preparedness

- Disaster recovery

Source: **The Urban Land Institute (ULI)**

Website: http://www.uli.org

Description: ULI is a 501(c)(3) nonprofit research and education organization supported by its members. The institute has more than 22,000 members worldwide, representing the entire spectrum of land use and real estate development disciplines, working in private enterprise and public service. The mission of the ULI is to provide responsible leadership in the use of land to enhance the total environment. ULI and the ULI Foundation have instituted Community Action Grants that could be used for Firewise Communities activities. Applicants must be ULI members or part of a ULI District Council. Contact actiongrants@uli.org or review the web page to find your District Council and the application information.

Source: **Environmental Systems Research Institute (ESRI)**

Website: http://www.esri.com/grants

Description: ESRI is a privately held firm and the world's largest research and development organization dedicated to geographic information systems. ESRI provides free software, hardware, and training bundles under ESRI-sponsored Grants that include such activities as conservation, education, and sustainable development, and posts related non-ESRI grant opportunities under such categories as agriculture, education, environment, fire, public safety, and more. You can register on the website to receive updates on grant opportunities.

Source: **National Forest Foundation; Innovative Finance for National Forests (IFNF) Grant Program**

Website: https://www.nationalforests.org/grant-programs/innovative-finance-for-national-forests-grant-program

Description: The Innovative Finance for National Forests (IFNF) Grant Program aims to bring in non-USFS funds to increase forest resilience. There are three main topics for funding: wildfire resilience and recovery, sustainable recreation access and infrastructure, and watershed health. In addition, three types of projects are funded: pilot programs with on-the-ground implementation, scaling projects to deliver backlogs of unfunded work, and research and development to provide to new forest information.

Source: **Matching Awards Program**

Agency: National Forest Foundation

Website: https://www.nationalforests.org/grant-programs/map

Description: The National Forest Foundation is soliciting proposals for its Matching Awards Program (MAP) to provide funds for direct on-the-ground projects benefitting America's National Forests and Grasslands. By pairing federal funds provided through a cooperative agreement with the USFS with non-federal dollars raised by award recipients, MAP measurably multiplies the resources available to implement stewardship projects that benefit the National Forest System.

Source: **Patagonia Environmental Grants and Support**

Agency: Patagonia

Website: https://www.patagonia.com/how-we-fund/

Description: Patagonia supports innovative work that addresses the root causes of the environmental crisis and seeks to protect both the environment and affected communities. Patagonia focuses on places where they have built connections through outdoor recreation and through their network of retail stores, nationally and internationally.

Source: **Leonardo DiCaprio Foundation Grants**

Agency: Leonardo DiCaprio Foundation

Website: https://www.rewild.org/

Description: The foundation supports projects around the world that build climate resiliency, protect vulnerable wildlife, and restore balance to threatened ecosystems and communities.

Source: **U.S. Endowment for Forestry and Communities**

Agency: EPA, NRCS, USFS, U.S. Department of Defense, U.S. Economic Development Agency

Website: https://www.usendowment.org/

Description: As the nation's largest public charity dedicated to keeping our working forests working and ensuring their bounty for current and future generations, the Endowment deploys the creativity and power of markets to advance their mission: The Endowment works collaboratively with partners in the public and private sectors to advance systemic, transformative and sustainable change for the health and vitality of the nation's working forests and forest-reliant communities.