RAVALLI COUNTY COMMUNITY WILDFIRE PROTECTION PLAN

JANUARY 2024

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Document Version History

Issue Date	Version	Comments
February 20, 2024	1	Initial release

Data Product Disclaimer

The Ravalli County Community Wildfire Protection Plan (CWPP) is a living document that is periodically updated as new information becomes available. Updated versions of the 2024 CWPP and associated maps can be found at the Ravalli County CWPP Online Story Map, which is a central location to find the most updated version of all CWPP material. The online story map can be accessed either by following the linked web address or scanning the QR Code below.

Online Story Map
Ravalli County Community Wildfire Protection Plan

Link

https://storymaps.arcgis.com/stories/aa38224061e342f788159d779e1c8529

Acknowledgments

The Ravalli County Community Wildfire Protection Plan Core Team members would like to thank all who contributed their time and expertise towards the development of this critical planning document, including individuals from Ravalli County, the Montana Department of Natural Resources and Conservation, the U.S. Forest Service, and many other engaged stakeholders and members of the public. These contributions were invaluable throughout the process and have created a well-rounded and representative document that will serve Ravalli County for years to come.

List of Acronyms

Acronym	Definition
BRCD	Bitterroot Conservation District
CWPP	Community Wildfire Protection Plan
DOI	Department of the Interior
E.O.	Executive Order
eNVC	Expected Net Value Change
EVT	Existing Vegetation Type
FEIS	Fire Effects Information System
FLAME	Federal Land Management, Assistance and Enhancement Act
FSim	Fire Simulation System
GIS	Geospatial Information Services
HFRA	Healthy Forests Restoration Act of 2003
HIZ	Home Ignition Zone
HUC	Hydrologic Unit Code
HVRA	Highly Valued Resources and Assets
IWUIC	International Wildland Urban Interface Code
MT DNRC	Montana Department of Natural Resources and Conservation
MWRA	Montana Wildfire Risk Assessment
NFP	National Fire Plan
NLCD	National Land Cover Database
NRCS	Natural Resources Conservation Service
NWCG	National Wildfire Coordinating Group
RC&D	Bitterroot Resource Conservation & Development
RPS	Risk to Potential Structure
USC	United States Code
USDA	United States Department of Agriculture
USFS	United States Forest Service
WHP	Wildfire Hazard Potential
WUI	Wildland Urban Interface

Ravalli County Community Wildfire Protection Plan

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Executive Summary

The Healthy Forests Restoration Act of 2003 (HFRA) encourages the development of Community Wildfire Protection Plans (CWPPs) to help communities plan for, respond to, and recover from wildfire events. The 2024 Ravalli County CWPP builds upon the prior CWPP published in 2006, which has since become outdated and no longer serves the needs of Ravalli County.

The Ravalli County CWPP is a community-based plan focused on identifying and addressing the local threat of wildfire. This living document is updated as-needed to utilize the best available information to characterize current conditions, identify resources and assets susceptible to wildfire, and identify and interpret wildfire risk throughout Ravalli County. An online Ravalli County CWPP story map was created to function as a central location for all CWPP information, including subsequent updates and/or revisions.

The successful development of the 2024 CWPP is the result of collaborative effort by an interdisciplinary CWPP "Core Team", the public, and other stakeholders who submitted feedback during public meetings, public engagement opportunities, and a formal public comment process. This feedback has resulted in a comprehensive CWPP that encompasses a wide variety of perspectives and experience.

Notable updates developed for the 2024 CWPP include: an updated definition of the Wildland Urban Interface (WUI), revised WUI mapping, prioritized areas within the WUI, a detailed implementation plan and action table, and recommendations to reduce structural ignitability. These elements of the 2024 CWPP meet regulatory requirements and provide decision-makers and stakeholders with a useful and current tool to address the local risk of wildfire. Updated WUI mapping is also necessary to access grant funding for eligible projects that reduce wildfire risk, increase wildfire response capacity, or provide public education regarding wildfires and associated risk.

The 2024 CWPP also summarizes the regulatory environment surrounding the development of a CWPP along with a characterization of Ravalli County including demographics, government structure, land use, and the fire environment. An overview of the WUI featuring an updated conceptual definition and detailed description of the methodology for defining and mapping the WUI is included along with discussion regarding the integration of wildfire risk into the WUI.

The implementation plan developed for the 2024 CWPP consists of goals, objectives, strategies, and projects that align with federal, state, and local goals while also meeting the unique needs of Ravalli County. This implementation plan interfaces directly with a detailed action plan, consisting of individual projects collaboratively developed by the CWPP Core Team, the public, and stakeholders. The projects within the action plan are subject to prioritization processes that evaluate location, project type, wildfire risk, and other priority elements in order to assign a prioritization value and map priority areas within the WUI for future planning efforts.

The 2024 CWPP is a comprehensive resource that characterizes current conditions and available resources, identifies and interprets wildfire risk, and provides next steps intended to mitigate that risk and provide the public with recommendations to reduce structural ignitability. The updated elements developed throughout this process also facilitate access to a variety of funding opportunities to implement the goals, objectives, and strategies outlined within the 2024 CWPP.

How to Use this Plan

The 2024 CWPP is meant to be read and used by both technical and general audiences and is organized to allow intuitive navigation to sections of particular interest while also maintaining logical flow throughout the document. Formal in-text citations are used for websites that are used in the writing of the CWPP, where footnotes are used for easy access of online resources. The following overview provides a brief summary of the three sections of the CWPP.

Section 1: Introduction and Background

Topics covered within this section relate to the purpose, need, and requirements of a CWPP document, the relationship of the 2024 CWPP to other active plans, policies, and regulations applicable to Ravalli County, public engagement and collaboration, and a summary of updates to the previous 2006 CWPP.

Section 2: Ravalli County Wildland Urban Interface & Risk Assessment

Section 2 contains a summary of baseline information for Ravalli County, including government, land use, and demographics. The fire environment is also characterized, including descriptions of topography, hydrology, climate, vegetation, fuels, and fire history. This section also contains a detailed description of the wildland urban interface (WUI), consisting of Ravalli County's updated WUI definition and analysis methods as well as how wildfire risk was characterized and interpreted throughout Ravalli County. At-risk and underserved communities are also characterized with respect to federal definitions as it relates to the CWPP process.

Section 3: Implementation

This section explains how the 2024 CWPP integrates with the National Cohesive Strategy, outlines various resources for homeowners to reduce structural ignitability, characterizes Ravalli County's current capacity for wildfire response efforts, and provides a detailed action plan outlining applicable goals, objectives, strategies, and projects identified through the CWPP update process.

Virtual CWPP Resources

In addition to the 2024 CWPP report document, Ravalli County has developed an online story map resource, serving as a central location to find all information pertaining to the CWPP. On this website, you can access the most current versions of the CWPP document, maps, events, links to additional resources, contact information[1].

[1] https://storymaps.arcgis.com/stories/aa38224061e342f788159d779e1c8529

Section 1: Introduction and Background

1.1 Community Wildfire Protection Plans

Following decades of fire suppression, changing climate, and increasing frequency of catastrophic wildfire events, lawmakers identified the need to equip individual communities with tools and funding to address the growing risk of wildfire. The Healthy Forests Restoration Act of 2003 (HFRA) outlines a basic process for communities to do this by creating a CWPP. A CWPP is a planning document that assists communities in preparing for and responding to wildfire. CWPPs vary across communities based on local needs and priorities.

Figure 1 Darby, MT volunteer firefighters

In response to HFRA, Ravalli County prepared a CWPP in 2006. The 2006 document served the county for several years but has since become outdated. Recognizing this need, in 2024, Ravalli County published this updated CWPP document, hereafter referred to as the 2024 CWPP. The 2024 CWPP will guide current planners, fire department, citizens, and other stakeholders in preventing, responding to, and living with wildfire. Additionally, an updated CWPP (< 10 years old) is required for Ravalli County to be eligible for federal funding to implement projects that mitigate wildfire risk.

CWPP Requirements

Though the content in CWPPs can vary based on the landscape, needs, and values of a given county, HFRA identifies four basic requirements for counties seeking federal funding. These requirements include:

- Collaboration
- Prioritized Fuel Reduction
- Recommendations to Reduce Structure Ignitability
- Mutual agreement of final CWPP contents by the applicable local government, the local fire departments, and the state entity responsible for forest management

Collaboration

CWPPs should be developed through a collaborative process involving local and state representatives, federal agencies, and other interested parties. Ideally, this collaboration will engage a broad diversity of stakeholders to ensure the CWPP reflects the best local knowledge, receives broad community buy-in, and accounts for ongoing and planned future projects. The 2024 CWPP was developed collaboratively by an interdisciplinary team representing the Ravalli County government and Office of Emergency Management, local fire departments, state and federal agencies, the local wildfire council, and the non-profit resource conservation and development group that specializes in hazardous fuels mitigation, hereafter referred to as the 'Core Team.'

The Core Team

The CWPP Core Team currently consists of a diverse group of individuals representing Ravalli County, the Montana Department of Natural Resources and Conservation (MT DNRC), USDA Forest Service (USFS), Natural Resources Conservation Service (NRCS), Bitter Root Resource Conservation and Development, Ravalli County Fire Warden, and Fire In The Root Council (wildfire council focusing on Ravalli County), with support from environmental consulting firm, DJ&A, P.C. Table 1 provides a list of all CWPP Core Team members and relevant affiliations. Throughout the course of the CWPP update, members of the Core Team met regularly to collaboratively discuss important elements of the plan via virtual and in-person meetings. In addition to consistent virtual Core Team meetings, two in-person meetings with the entire Core Team were held on April 20 and June 26, 2023. Public meetings were held in person on July 18, 19, and 20, 2023 to provide an overview of the CWPP update process and facilitate public discussion regarding the update as well as a presentation of the draft CWPP at a Ravalli County Commissioner meeting on November 21, 2023. The 25-day period of public review occurred between November 6 and December 1, 2023. Each public comment submitted during this period was evaluated by the Core Team and substantive comments were incorporated into the final document. Throughout the CWPP update, the public was informed of opportunities for public engagement via mailings, press releases, social media posts, and consistent updates posted to the Ravalli County public website[2] and public CWPP story map[3].

Table 1 Ravalli County CWPP Update-Core Team Members

Name	Role
Ravalli County	
Andrew Amidon	Forestry Resource Specialist
Jeff Burrows	County Commissioner
Erik Hoover	Director – Office of Emergency Management
Jeff Rodrick	Deputy Emergency Manager – Office of Emergency Management
Stephen Holton	Ravalli County Sheriff
Brad Mohn	County Fire Warden
Montana Department of Natural Resources and Conservation (MT DNRC)	
Kristin Mortenson	Community Preparedness & Fire Prevention Specialist; DNRC-Southwestern Land Office
Thayer Jacques	Hamilton Unit Manager
Jorista Garrie	Ravalli County Fire Adapted Communities Coordinator
USDA Forest Service (USFS)	
Matt Young	Deputy Fire Staff Officer – Bitterroot National Forest
USDA Natural Resources Conservation Service (NRCS)	
Stacy Welling	District Conservationist
Bitter Root Resource Conservation and Development	
Byron Bonney	Lead Forester

[2] https://ravalli.us/668/CWPP
[3] https://storymaps.arcgis.com/stories/aa38224061e342f788159d779e1c8529

Name	Role
Fire In The Root Council	
Ken Brewer	Organizing Member
DJ&A, P.C.	
Rachel Powers	Environmental Specialist
Gibson Hartwell	Project Manager/Environmental Specialist
Travis Benton	GIS Specialist

Prioritized Fuel Reduction

CWPPs must include prioritization of fuel reduction projects by identifying priority areas and treatment methods to protect at-risk communities and essential infrastructure. The best CWPPs consider recent, ongoing, and planned future projects and serve as an implementation plan for years to come. The 2024 CWPP provides spatial priority mapping across the WUI; this process is summarized in the Prioritization Process section and a map showing spatial priority areas is available in Appendix E.

Reduce Structural Ignitability

CWPPs must recommend measures to reduce structural ignitability. These measures can be implemented by organizations and private citizens to prevent loss and damage to property in the event of a wildfire (DNRC 2022). The 2024 CWPP provides an overview of the concepts and recommendations useful for reducing structural ignitability in the Fire-Adapted Communities and Living with Fire sections.

Final Approval

The updated Ravalli County CWPP must be approved and signed by the county commissioners, chiefs of local fire departments, and a MT DNRC representative. To highlight the level and breadth of agreement for the 2024 CWPP, the updated Ravalli County CWPP is approved and signed by additional signatories representing diverse stakeholders. Additional signatories can include representatives from local utilities and federal land management agencies.

Timeline of the Community Wildfire Protection Plan Update Process

An overview of the 2024 CWPP update process is shown in Table 2 below. The update process was initiated in February 2023 and concluded in December of 2023. The 2024 CWPP was signed into effect by all signatories in January of 2024.

Table 2 2024 Community Wildfire Protection Plan Update Timeline

Milestone/Event	Date
2024 CWPP Update Begins	February 2023
Community Base Map and Draft WUI Completed	May 2023
In-Person Public Meetings	July 18, 19, and 20, 2023
Draft 2024 CWPP Completed	September 2023
Final Draft 2024 CWPP Completed	November 2023
Virtual Informational Public Meeting & Presentation of the Draft CWPP	November 2023
Public Review Period for Draft CWPP	November 6, 2023–December 1, 2023
Public Input Incorporated into Final CWPP	December 2023
Final 2024 CWPP Completed	January 2024
2024 CWPP Signed into Effect	January 2024

1.2 Relationship to Other Plans, Policies, and Regulations

Conformance with relevant plans, policies, and regulations at federal, state, and local levels are important components of an effective CWPP. The 2024 CWPP conforms with the following plans, laws, and policies to maintain consistency and standardization.

National

National Fire Plan

Established in 2000, the National Fire Plan (NFP) addresses five key points: firefighting, rehabilitation, hazardous fuels reduction, community assistance, and accountability. In order to implement actions related to these five key points, the NFP seeks to ensure sufficient firefighting resources for the future; rehabilitate and restore fire damaged ecosystems; reduce the amount of flammable fuels in forests, and established the Wildland Fire Leadership Council (DOI and USDA 2023). The National Fire Plan also encourages the creation of a CWPP. The 2024 CWPP aligns with the key points and actions of the NFP by enabling Ravalli County to mitigate the risk of wildfire using resources available as a result of the NFP and in conformance with its key points (DOI and USDA 2023).

Healthy Forests Restoration Act

The Healthy Forest Restoration Act (HFRA) of 2003 further encourages hazardous fuel management and community participation to reduce the risk of large wildfires. HFRA directs federal land management agencies to prioritize authorized hazardous fuel reduction projects that provide for the protection of at-risk communities that implement CWPPs and their watersheds. HFRA includes a definition for the WUI and provides standards or criteria for designating the WUI. It also provides flexibility for communities (and counties) to delineate the WUI based on their risk and needs. Communities are encouraged to create CWPPs to plan for wildfire mitigation activities and tailor the plans to their unique environment. HFRA requires CWPPs to meet three requirements: collaboration, prioritized fuel reduction, and treatment of structural ignitability (DOI and USDA 2004). Collaboratively developed CWPPs must also be approved by the local government, local fire department, and the state (DOI and USDA 2004). The 2024 CWPP has been prepared in compliance with HFRA requirements and recommendations.

Federal Land Assistance, Management, and Enhancement (FLAME) Act and The National Cohesive Strategy

The Federal Land Assistance, Management, and Enhancement (FLAME) Act of 2009 establishes the need for hazardous fuel reduction funding and community wildfire risk assessments across the nation. The FLAME Act also created the National Cohesive Wildland Fire Management Strategy (National Cohesive Strategy) to manage wildland fire more effectively across the nation. The National Cohesive Strategy outlines three goals to restore and maintain landscapes, create fire adapted communities, and improve wildfire response (Wildland Fire Leadership Council 2023). The 2024 CWPP aligns with the three goals established by the National Cohesive Strategy (see Section 3: Implementation) (Wildland Fire Leadership Council 2023).

Executive Order 13985: Advancing Racial Equity and Support for Underserved Communities Through the Federal Government

Executive Order (E.O.) 13985 seeks to advance equity for communities which have been historically underserved (Biden 2021). This E.O. defined an 'underserved community' as "populations sharing particular characteristics, as well as geographic communities, that have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life." Within Ravalli County, areas with low-income meet the definition of underserved communities (DOT 2023). Low-income, minority, and other underserved populations have historically been excluded from wildfire planning processes and risk mitigation projects across the country and are often disproportionately affected by natural disaster events such as wildfire. Recognizing this, HFRA requires CWPPs to consider these communities during plan development (see Underserved Communities).

State

Montana Forest Action Plan

The Montana Forest Action Plan is a comprehensive plan for Montana's forests that is comprised of an assessment of forest conditions, priority areas for focused attention[4], and goals and strategies for improving forests (Montana Forest Action Advisory Council 2020). The MT Forest Action Plan prioritizes the revision of CWPPs through the "Foster Fire-Adapted Communities" strategy (Montana Forest Action Advisory Council 2020). Priority areas delineated within the forest action plan are also incorporated into spatial prioritization of projects within Ravalli County (see Prioritization Process).

Ravalli County

Comprehensive Emergency Operations Guideline

The Ravalli County Comprehensive Emergency Operations Guideline details the emergency operations protocol for the county, including firefighting operations. Firefighting operations are addressed by Emergency Support Function #4: Firefighting (Ravalli County 2018). Firefighting in Ravalli County is a coordinated effort from county fire resources, rural fire districts, the USFS, and MT DNRC (Ravalli County 2018). Mutual aid agreements are in place between all firefighting entities. This CWPP update supports the preparedness, response, and mitigation responsibilities of Emergency Support Function #4. Collaboratively developed CWPPs are approved by local fire departments, ensuring that wildland fire planning aligns with broader emergency management goals.

2017 Update to Pre-Disaster Mitigation Plan

The 2017 Update to the Ravalli County Pre-Disaster Mitigation Plan identifies wildfire as the most significant hazard in Ravalli County (Tetra Tech 2017). The 2024 CWPP will support current and future wildfire risk mitigation and provides an updated WUI and hazard assessment.

Ravalli County Subdivision Regulations

The Ravalli County Subdivision Regulations include provisions for homes located in high fire hazard areas. The Subdivision Regulations establish standards for access, roadway fuel treatments, and require developers to prepare a high fire hazard area management plan, completed by a professional forester or other person with accreditation (Ravalli County 2012). The 2024 CWPP provides further information on risk mitigation techniques for homeowners.

[4] https://www.montanaforestactionplan.org/pages/priority-areas

Locally-Adopted CWPPs

This plan also supports other local CWPPs. Since CWPPs can be effectively implemented at many different scales—neighborhood, fire district, town, city, and county—they can "overlap" in their boundaries. Each different scale can help address unique concerns. If multiple CWPPs exist, they can be designed to complement and strengthen the objectives of other CWPPs' jurisdictions and scales.

The Ravalli County CWPP acknowledges that the adjacent Missoula County CWPP (2018) as an effective local plan to address wildfire risk. Additionally, the county encourages the development of other local CWPPs that provide additional detail not included in this CWPP to further help communities plan for wildfire.

1.3 Public Engagement and Collaboration

Proactive collaboration and public engagement played a central role in the development of the 2024 CWPP. The CWPP update process began in February 2023 and continued for ten months, consisting of public engagement efforts such as building a representative CWPP Core Team, creating a central online platform for CWPP information, soliciting stakeholder feedback, and providing CWPP information and opportunities for engagement through social media, public meetings, and email and physical mailings. Public engagement efforts provided multiple opportunities for public engagement, both virtually and in-person, to ensure inclusivity of all interested stakeholders. Public engagement efforts included three in-person meetings throughout Ravalli County to reach different populations, as well as releasing the Story Map early in the process to provide an information portal for any interested parties to stay informed and updated. Meeting notes and materials for public meetings were also made available to the public following public events, along with iterative drafts of relevant CWPP materials such as maps, schedule, and content posted to the online story map.

1.4 Summary of Updates to the CWPP

Core features of the Ravalli County 2024 CWPP include an updated WUI boundary and delineation, consideration of new risk assessment data and current conditions throughout Ravalli County, and spatial prioritization mapping. Ravalli County looks very different today than it did 17 years ago during the previous update. In that time, a plethora of tools and resources related to identifying, interpreting, and mitigating wildfire risk have become available. The 2024 CWPP accounts for these changes and opens new doors to access grant funding and implement risk reduction projects that protect lives, property, critical infrastructure, and other high value resources not accounted for by the 2006 WUI.

When updating the WUI and CWPP, the interdisciplinary team used newly available science to inform the decision-making process and prioritize future projects. In 2020, DNRC released the Montana Wildfire Risk Assessment (MWRA) which uses the best available science to evaluate current wildfire risk across the entire state (DNRC 2020a). Importantly, it accounts for developments and changing conditions that occurred since the original CWPP was published in 2006, including increasing residential development within wildland fuels and changing forest conditions. The MWRA also provides information regarding potential wildfire risk for areas that may be developed in the future. The data products generated by the MWRA are an invaluable resource for identifying and interpreting wildfire risk, the susceptibility of resources to fire damage, and more. This tool was integral to the development of a modern and effective CWPP that protects local communities by accurately characterizing wildfire hazard and risk throughout Ravalli County.

The updated WUI and MWRA were used together to prioritize ongoing and proposed fuel reduction projects (see Prioritization Process). This prioritization framework helps unlock federal funding that is

only available to counties with updated CWPPs and prioritized projects. By integrating the best available science, evaluating current conditions, and prioritizing projects, the 2024 CWPP is a user-friendly, informative, and effective planning document for local leaders and communities.

Section 2: Ravalli County Wildland Urban Interface & Risk Assessment

2.1. Wildland Fire and Ravalli County

County Overview

Located in western Montana, Ravalli County is bordered by Missoula County to the north, Granite County to the east, Beaverhead County to the southeast, and Idaho to the south and west. Significant development has occurred throughout portions of the valley, primarily in the main urban areas located along U.S. Hwy 93: Florence, Stevensville, Victor, Hamilton, and Darby, listed here from north to south.

Totaling 2,400 square miles, Ravalli County contains a mix of private and public land ownership, with private lands occurring throughout the floor of the Bitterroot Valley and public lands dominating the Sapphire Mountains to the east and Bitterroot Mountains to the south and west. Privately-owned lands represent 23.9% of the county's area with the remainder consisting of federal and state lands, comprising 73.6%, and 2.6% of the County, respectively (Headwaters Economics 2023c). Of the federal lands within Ravalli County, the vast majority are administered by the USFS.

Demographics

As of 2021, the total population of Ravalli County was 43,790 (Headwaters Economics 2023a), making it the seventh most populous county in Montana (World Population Review 2023). Most of this population is concentrated in the valley bottom in the central and north-central portions of the county. As shown in Table 3, Ravalli County has experienced steady growth over the past decade, attributable primarily to migration from outside the county (Headwaters Economics 2023c). Many residents still work outside of Ravalli County (approximately 23%) and commute to nearby Missoula County via US-93. The poverty rate of Ravalli County falls below the national average.

Table 3 Demographic Overview of Ravalli County

Metric	Value
Total Population (2021)	43,790
Percent Hispanic or Latino (of any race)	3.7%
Percent Not Hispanic or Latino	96.3%
Percent White Alone	90.8%
Percent American Indian Alone	0.8%
Population Percent Change (2010-2021)	9.4%
Population Density (2021)	18.2 people/sq mi
Total Number of Housing Units (2021)	20,914
Median Household Income (2021)	$59,640
Poverty Rate (2021)	10.8%

Land Use

Shifting demographics have had corresponding impacts on land use in Ravalli County. Growth and development have resulted in a patchwork of suburban residential areas and farmland, which historically comprised a much larger proportion of the county. Today, 15.8% of Ravalli County serves as farmland, with an average farm size of 153 acres. Much of this agricultural land is used for grazing and hay production.

Outside the valley floor, much of the land in Ravalli County is owned and managed by the USFS. These lands provide extensive recreational opportunities for residents and non-residents alike. They

also provide leased grazing to local cattle ranching operations and provide a source of commercial timber products.

Fire Environment

Evaluating factors that influence fire behavior and activity is an important component of an effective CWPP. Fire behavior is influenced by physical characteristics that vary across the landscape such as topography, hydrology, climate, and vegetation. These characteristics, combined with ignition sources, constitute the fire environment.

Topography & Hydrology

Physical characteristics such as elevation, topography, and slope angle influence fire behavior on the landscape. A thorough understanding of these components informs effective and proactive fire management and fire suppression.

Ravalli County encompasses substantial portions of the Bitterroot and Sapphire Mountain ranges, separated by the main Bitterroot valley. Elevations range from approximately 3,000 feet in the valley bottoms to over 10,000 feet throughout the mountain ranges. The Bitterroot Mountains located along the western portions of the Bitterroot Valley are steep and feature characteristically deep glacial valleys with few foothills. Steep slopes found throughout this mountain range are conducive to rapid fire growth and spread, which can increase risk to firefighting personnel and reduce opportunities for fuels treatments due to difficulty accessing rugged terrain (NWCG 2021). By comparison, the Sapphire Mountains to the east are characterized by more moderate slopes and foothills, reaching elevations of approximately 7,500 to 9,000 feet.

Ravalli County is characterized by a large single river drainage—the Bitterroot River—which runs north towards neighboring Missoula County. The Bitterroot River is formed by the confluence of the East Fork and West Fork of the Bitterroot River located at the southern end of the valley. These forks are the largest tributaries of the river and flow from rugged mountainous areas near the continental divide and the Bitterroot divide near the Idaho border. Many smaller tributaries flow from the Bitterroot and Sapphire mountains to join the Bitterroot River along its length. Several reservoirs of varying sizes are found throughout the watershed. Noteworthy reservoirs include Lake Como, the largest reservoir in the county, and Painted Rocks Reservoir which regulates streamflow of the West Fork of the Bitterroot River. Ravalli County is a part of the Kootenai-Pend Oreille-Spokane watershed (HUC 1701), as well as the Bitterroot sub-basin (HUC 17010205).

Climate

Annual precipitation at a Hamilton weather station averaged 12.99 inches over the past decade with May, June, and November being the wettest months (AgACIS 2023). Weather systems and prevailing winds generally blow from the west. Fire season in Ravalli County is typically from May to October, with most fire activity occurring in the summer months when fuels are driest. Late season fires are typically extinguished with fall precipitation.

Vegetation

In the context of fire management, vegetation is often referred to as fuels and is influential regarding fire behavior and resultant intensity, and severity. Vegetation in Ravalli County is described using the LANDFIRE Existing Vegetation Type (EVT) model, consisting of groups of existing vegetation communities based on field data, satellite imagery, and modelling (LANDFIRE 2022).

Ravalli County is represented by 64 EVT models, with five models representing the most land area (DOI and USDA 2020a, 2020b, 2022). Existing Vegetation Type models that cover less than 5% of land area, or represent non burnable areas such as rock, scree, and urban pavement are included as "other." The models detailed in Table 4 represent the majority of land cover and burnable fuels within Ravalli County. The 'Rocky Mountain Lodgepole Pine Forest', 'Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland', 'Northern Rocky Mountain Montane-Foothill Deciduous Shrubland', and 'Northern Rocky Mountain Ponderosa Pine Woodland and Savanna' EVTs are the most common in Ravalli County.

Table 4 Existing Vegetation Type within Ravalli County

Existing Vegetation Type (EVT)	Area (acres)	Percentage of Ravalli County
Rocky Mountain Lodgepole Pine Forest	268,636	18
Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland	152,606	10
Northern Rocky Mountain Montane-Foothill Deciduous Shrublands	113,979	7
Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest	109,490	7
Northern Rocky Mountain Ponderosa Pine Woodland and Savanna	104,080	6
Other[1]	786,033	52
Total	**1,534,824**	**100**

[1] Models representing less than 5% of land area or non-burnable fuels are classified as 'Other.'

Rocky Mountain Lodgepole Pine Forest

Rocky Mountain Lodgepole Pine Forests are dominated by lodgepole pine (*Pinus contorta)* with grassy or shrub understories. This EVT comprises 18% of Ravalli County, making it the dominant vegetation type in the county (Table 4). Common understory species include creeping Oregon grape (*Mahonia repens*), Bearberry (*Arctostaphylos uva-ursi*), and mountain huckleberry (*Vaccinium membranaceum)* (NatureServe 2023). Lodgepole pine forests have a unique relationship with fire, thriving after infrequent, stand-replacing fires because of their serotinous cones. Serotinous cones contain seeds that release when subjected to extreme heat during a high severity wildfire (L.K. Vance 2017). This relationship often results in even-aged, dense tree stands. The fire return interval for this EVT is 150–300 years (NatureServe 2023). Contemporary changes in climate and fire suppression policies have influenced the fire regime in lodgepole pine forests, enabling more frequent fires than have historically been present, creating homogeny throughout lodgepole pine forests. Homogeny refers to the process by which two or more spatially distributed ecological communities become increasingly similar over time. A homogenous stand structure increases the forest's susceptibility to mountain pine beetle outbreaks, lodgepole pine dwarf mistletoe infections, and windthrow (L.K. Vance 2017).

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

Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland forests are made up primarily of Engelmann spruce (*Picea englemanii)* and subalpine fir (*Abies lasiocarpa*). In Ravalli County, 10% of land area is comprised of this EVT (Table 4). The understory is shrubby with few bare patches or open meadows. Understory vegetation commonly includes mountain huckleberry, dwarf bilberry (*Vaccinium myrtillus),* and rusty leaf menziesia (*Menziesia ferruginea*) (L.K. Vance, Luna, and Hart 2017). The understory typically supports a diverse shrub population. This EVT is heavily impacted by winter precipitation, with deep snowpack lasting well into the summer (Reid 2022). Fire in spruce-fir dominated forests is historically high severity and stand-replacing, with a fire return interval of 130 years (L.K. Vance, Luna, and Hart 2017). Engelmann spruce may live up to 500 years, and can

dominate burned sites, creating old growth within this EVT (Reid 2022). Present challenges for this system include insects, drought, blowdown, and more frequent fire.

Northern Rocky Mountain Montane-Foothill Deciduous Shrublands

Northern Rocky Mountain Montane-Foothill Deciduous Shrublands are common in the low elevation foothills of Ravalli County. Within Ravalli County, 7% of the land area is comprised of this EVT (Table 4). This system forms within or adjacent to spruce-fir forests and consists mostly of shrubs, grasses, and herbaceous plants. Common species include common ninebark (*Physocarpus malvaceus*), bittercherry (*Prunus emarginata*), and Idaho fescue (*Festuca idahoensis*) (L.K. Vance and Luna 2017). Fire in montane deciduous shrubland communities is historically mixed to high severity, with a fire return interval of 44–500 years (USDA 2012). Where this EVT occurs in western Montana, fire severity is higher and fires less frequent, with the majority of fires being stand-replacing. Vegetation in this system regenerates quickly, with most shrubs resprouting from root crowns (L.K. Vance and Luna 2017). Climate change and fire exclusion have made shrublands vulnerable to woody encroachment, increasing the size and continuity of fuels, thus contributing to higher severity fires. Frequent high severity fires can also facilitate the spread and establishment of invasive species.

Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest

Northern Rocky Mountain Mixed Conifer Forests are diverse, variable conifer forests. This EVT comprises 7% of Ravalli County (Table 4). These systems are present in western Montana above tree line and are dominated by grand fir (*Abies grandis*), Douglas-fir, lodgepole pine and western larch (*Larix occidentalis*). The understory is primarily grasses and forbs such as bluebunch wheatgrass (*Pseudoroegneria spicata*), and beargrass (*Xerophyllum tenax*) (L.K. Vance and Luna 2017). Mountain huckleberry is also common in the understory, particularly in western Montana and the Bitterroot National Forest (L.K. Vance and Luna 2017). The historic fire regime of this EVT varies due to characteristically variable distribution of species and associated fuels, with fire regime intervals ranging from 35–135 years (L.K. Vance and Luna 2017). Douglas-fir and western larch are fire tolerant species, with thick bark and deep roots that enable them to survive low severity fires, common in the historic fire regime of this EVT. In western Montana, fire return intervals were typically 45 years for low severity fires (L.K. Vance and Luna 2017). Fire suppression and contemporary environmental changes have increased the shrub understory and tree density, creating ladder fuels that facilitate rapid rates of spread. The current fire regime is mixed severity with longer fire return intervals of 100–150 years (L.K. Vance and Luna 2017). Fires are increasing in size and severity, with most recent fires being stand-replacing. Fire exclusion has also created homogeny within the forest structure, increasing vulnerability to pathogens and insects.

Northern Rocky Mountain Ponderosa Pine Woodland and Savanna

Northern Rocky Mountain Ponderosa Pine Woodland and Savanna communities are common throughout Ravalli County and western Montana. This system is predominantly ponderosa pine *(Pinus ponderosa)* and drought tolerant grasses and shrubs (NatureServe 2018). This EVT represents 7% of land area in Ravalli County, including several experimental stands in the Bitterroot National Forest (Table 4)(USDA 2016; DOI and USDA 2020b). Historically, frequent and low severity fire maintained sparse and open understories. The historic fire return interval is three to seven years (NatureServe 2018). Aggressive fire suppression has altered the current fire regime, stand structure, and overall composition of this environment. Douglas-fir and other shade tolerant conifers grow in the understory, increasing available fuel and ladder fuels which can carry fire into the crown where it can spread rapidly (USDA 2016). Ladder fuels, fuel accumulation and denser stand structure compared to the historically open stand structure has increased resulting fire severity within this EVT compared to historic conditions (USDA 2016).

Fuels

In the context of wildland fire, fuels are defined as any combustible wildland vegetative material, and are a primary driver of fire behavior and resulting intensity and severity. Fuel models are a tool used to predict fire behavior based on specific fuelbed characteristics such as size, quantity, density, moisture content, and composition (Scott and Burgan 2005). The USDA Standard Fire Behavior Fuel Models are a comprehensive set of models used to define and quantify fuel types and their impact on fire behavior (Scott and Burgan 2005). Ravalli County has many diverse systems and fuel types, but is mainly composed of TU5, TU2, GS2, and GR2 fuels, representing 53% of the land area in Ravalli County (Table 5) (Ravalli County 2023). The TU5 fuel model is the most common in Ravalli County, and is described as a "very high load, dry climate timber-shrub" environment, with moderate rates of fire spread (Scott and Burgan 2005). The TU5 fuel model is characteristic of the conifer forests in Ravalli County. The TU2 fuel model is described as a "moderate load, humid climate timber-shrub" system, with moderate rates of spread and low flame lengths (Scott and Burgan 2005). It is most common in moist or riparian areas. The GS2 fuel model is a "moderate load, dry climate grass-shrub" system with a high rate of spread and moderate flame length (Scott and Burgan 2005). Within Ravalli County, 18% of the land area contains GS2 fuels, mostly in the deciduous shrublands and foothills (Table 5) (Ravalli County 2023). GR2 fuels are described as "low load, dry climate grass" environments, consisting of fine, grassy fuels with moderate continuity (Scott and Burgan 2005). These fuels are highly influenced by precipitation and have a low moisture of extinction, which is the fuel moisture content at which combustion cannot be sustained independently. GR2 fuels are present in 11% of land area in Ravalli County (Table 5) (Ravalli County 2023).

Table 5 Fuel Model Acreage within Ravalli County

Fuel Model (Scott and Burgan 2005)	Area (acres)	Percentage of Ravalli County
TU5	311,541	20
GS2	282,458	18
GR2	171,188	12
TU2	169,194	11
Other[1]	600,443	39
Total	**1,534,824**	**100**

[1] Models representing less than 10% of land area or non-burnable fuels are classified as other.

Fire History

As a natural and necessary component of the ecosystem, wildfire has a long history within Ravalli County. Human caused ignitions start the majority of wildfires in Ravalli County, especially in the WUI. In 2023, 62% of wildfires in Ravalli County were human caused. The Great Burn of 1910 reached the Bitterroot Valley and before that, significant fire activity occurred from 1880–1889, burning 112,866 acres (Ravalli County 2023). By comparison, 8,013 acres burned from 1890–1899 (Ravalli County 2023). The aggressive fire suppression policies of the 20th century reduced acreage burned for a time but caused a buildup of fuels that has increased fire frequency and severity in modern times. Wildfires in Ravalli County today are increasing in size and intensity. From 2000-2019, over 500,000 acres were burned (Ravalli County 2023). Notable fires include the Roaring Lion Fire (2016; 8,658 acres), the Lolo Peak Fire (2017; 53,801 acres), and the Meyers Complex (2017; 62,034 acres) (DNRC 2020b). The Lolo Peak and Meyers Complex fires ignited in neighboring counties, but crossed into Ravalli County (DNRC 2020b). The 2016 and 2017 fire years were particularly intense fire years for Ravalli County and neighboring counties in western Montana.

Changing climatic conditions and high forest fuel loading are leading to longer fire seasons and higher fire intensity, creating new challenges to communities living with wildfire.

2.2. The Wildland Urban Interface

The concept of the WUI has a variety of definitions ranging widely in detail and extent according to federal, state, and local sources. At its simplest, the WUI has been described as the area where wildland fuels meet human development, representing an area of increased risk to life, property, and infrastructure. However, the definition of the WUI has evolved in various ways to encompass local community characteristics and values. Defining and delineating the WUI serves to ensure that areas with increased risk to life, property, and infrastructure, are appropriately accounted for during decision-making processes. The delineation of the WUI also facilitates access to funding for projects intended to reduce that risk. Per HFRA recommendations, Ravalli County has developed a WUI definition that encompasses the unique needs of the community. The current Ravalli County WUI definition was developed with close consideration of existing, general HFRA WUI definitions in order to maintain consistency across jurisdictions while also ensuring the WUI meets the unique needs of Ravalli County.

Figure 2 Lee Metcalf Barn, Ravalli County (Photo courtesy of Ravalli County Tourism Board)

Ravalli County CWPP WUI Definition

The formal definition of WUI is “where humans and their development meet or intermix with wildland fuel” (Federal Register). Ravalli County has many values that are at risk of wildfire, either directly or indirectly.

Ravalli County has defined its WUI to be reflective of areas that are at risk for wildfire and areas that would be heavily impacted in the event of a wildfire. Each of these areas are described by component and associated characteristics in Table 8 of Appendix D.

This conceptual WUI definition was then translated spatially through the identification and mapping of assets, resources, wildfire risk, and landscape-level data across Ravalli County. These spatially-explicit data are represented by distinct ‘WUI Components’ with associated buffers applied where appropriate to further mitigate wildfire risk. The boundaries of the WUI were created through the collective overlap of the WUI components, which creates a spatially-explicit and reproducible WUI that can be easily updated as new data become available. A detailed description of each WUI component can be found in Appendix D. Maps of the updated WUI and associated WUI components can be found on the Ravalli County CWPP Online Story Map (see Virtual CWPP Resources) (Figure 3, Appendix E).

The following WUI Components comprise Ravalli County’s WUI:

- Structure Density with Vegetation
- Highly Valued Resources and Assets

- Roads: Primary and Secondary Highways
- Roads: Ingress and Egress designated roads
- Communities with Critical Infrastructure
- Utilities and Communication
- Community Protection Zone
- At-Risk Communities (See At-Risk Communities description below)

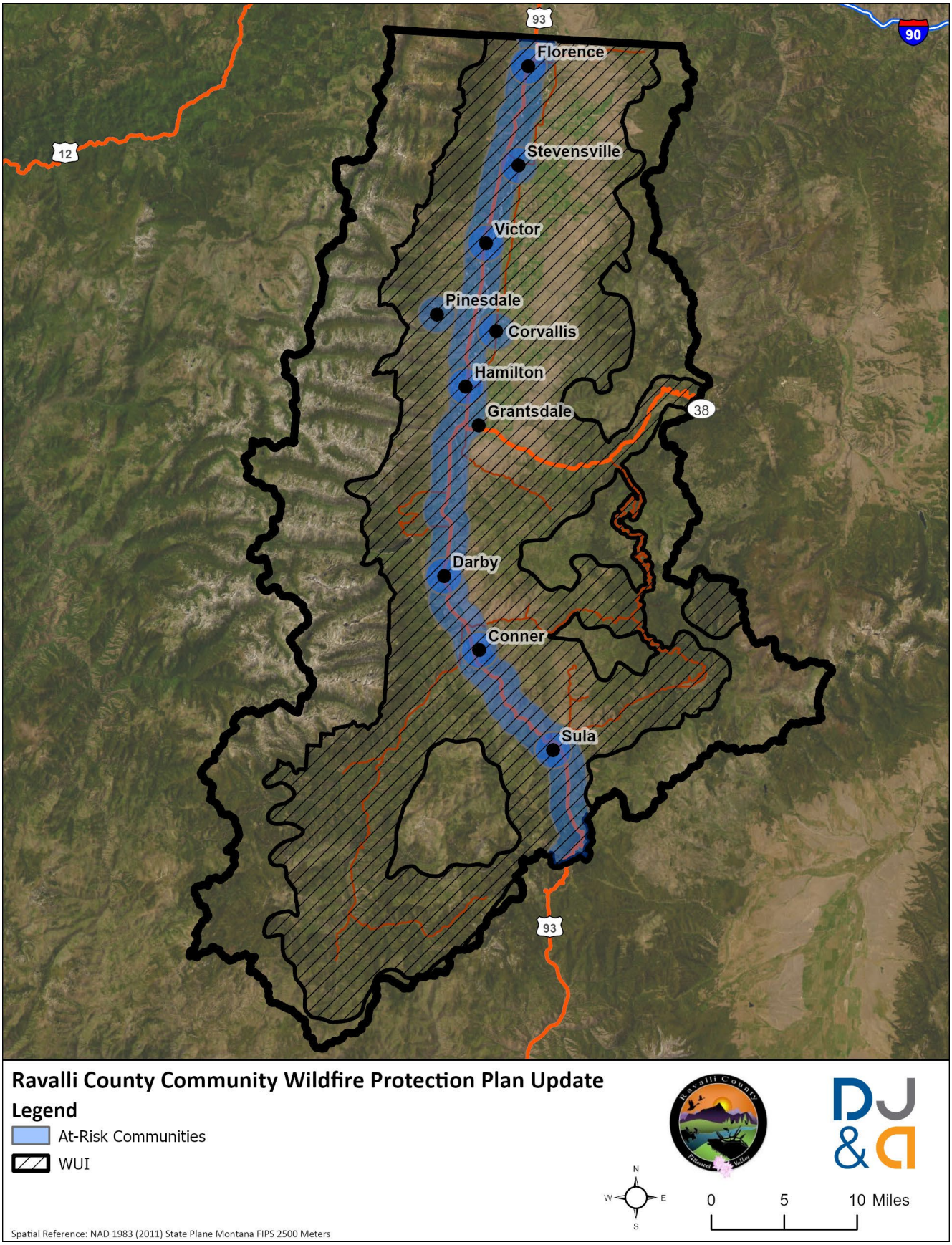


Figure 3 Ravalli County WUI Areas including 'At-Risk Communities'

WUI Components

Structure Density with Vegetation

Any structure with an address point was included within the WUI and assigned a standard buffer. The Federal Register definition of the WUI (65 FR 751) and concurrent nationwide mapping efforts (Radeloff et al. 2023), buffer each structure by 40 acres. However, given that the majority of Ravalli County is situated within a rural setting, a lower population density threshold is justified to ensure that the definition of the WUI serves all County residents and first responders. Any structure with an address point listed within the Montana Structures and Addresses geodatabase (Montana State Library 2023) located within Ravalli County was included within this WUI component and an additional one-mile buffer was applied. This buffer, and those applied to other WUI components, will provide additional protection to structures and adjacent lands with increased fire risk resulting from ember spread due to wind.

Using National Land Cover Data (NLCD), Ravalli County identified wildland fuels as any vegetation with potential to ignite, including forests, grasslands, shrubs, wetlands, pastures, agricultural lands, and any undeveloped lands without a structure (Multi-Resolution Land Characteristics Consortium 2021). These vegetation types were considered to be 'burnable' vegetation, whereas all other 'non-burnable' land cover was excluded. No additional buffers were applied for these areas. The following NLCD land cover types represent 'wildland fuels' for the 2024 CWPP:

- Deciduous Forest
- Evergreen Forest
- Mixed Forest
- Shrub/Scrub
- Herbaceous
- Hay/Pasture
- Cultivated Crops
- Woody Wetlands
- Emergent Herbaceous Wetlands

Ravalli County has determined that high density urban areas with less flammable fuels and more unburnable areas will be included in the WUI boundary but will be of reduced priority for fuel reduction projects due to lower risk from wildfire.

Highly Valued Resources and Assets

Highly Valued Resources and Assets (HVRAs) Areas represent spatially distinct resources or assets of value to Ravalli County. These are areas with moderate to high recreation use with various buffers dependent on use type and include a refined list of hot springs, ski resorts, recreation corridors, historical and/or cultural sites. Various buffers were used based on use type and topography.

Roads: Primary and Secondary Highways

Primary and secondary highways are included within the Ravalli County WUI. Primary roads were identified by selecting interstates, highways, and major arterial roads. Secondary roads consisted of all roads within the database that were not designated as 'primary' or 'egress', with these roads often connecting structures and associated 'egress' roads to 'primary' roads. All eligible roads were buffered by one mile.

Roads: Ingress and Egress

Ingress and egress roads are included within the Ravalli County WUI. Egress roads were identified by locating any roads connecting structures with address points to the nearest primary or secondary roads. Egress roads represent the most likely route in the event of evacuation or access for fire suppression resources. All eligible roads were buffered by one mile.

Communities with Critical Infrastructure

Communities with critical infrastructure were identified through coordination with the Core Team and includes communication sites, electrical substations, fire stations, schools, nursing homes, post offices, hospitals, fire stations, and facilities related to the municipal water supply and buffered by one mile.

Utilities and Communication

High-voltage power lines, substations, and communication sites to maintain integrity and protection of important services to the public were included and buffered by one mile.

Community Protection Zone

As part of a Wildfire Risk Assessment completed for the Bitterroot National Forest in 2019, a Fire Simulation System (FSim) model was used. This model simulates the growth and behavior of fire events across landscapes using geospatial data on historical fire occurrence, weather, terrain, and fuel conditions. Using locally calibrated LANDFIRE Data, the Bitterroot National Forest modeled 50,000 fire ignitions and corresponding fire spread across the landscape over a period of one year. The fire simulations included fires that burned during moderate conditions as well as extreme events under severe conditions. This simulation modeling created a Community Protection ignition density geospatial layer where areas were classified based on the probability that fire ignitions originating in those areas would reach identified values (communities, infrastructure, habitat, etc.). The Community Protection ignition density layer spatially displays percentile classes across the Bitterroot National Forest and Ravalli County that, if a fire were to start in those areas, have a certain probability, or percentage, of reaching structures located on private land within Ravalli County valley communities or forest inholdings. The data is broken into 10 classes based on probability percentiles (1–10, 11–20, 21–30, etc.).

For the purposes of the 2024 CWPP, the Core Team concluded that the Ravalli County WUI should include the Community Protection Zone of the five highest percentile ranges to fully address the risk of fire spread in the county. This will include areas where 50–100% of the fire starts would reach a private structure if suppression actions were not successful, based on FSim modeling.

At-Risk Communities

Low-income, minority, and rural communities have historically been excluded from wildfire planning processes and risk mitigation projects across the country and are often disproportionately affected by natural disaster events such as wildfire. Recognizing this, HFRA requires CWPPs to consider these communities in all essential aspects of the plan. Defined in the Act as “at-risk communities,” these communities have the following characteristics:

- A group of homes and other structures with basic infrastructure and services;
- Located within or adjacent to federal lands with conditions conducive to large-scale wildfire;
- Wildfire poses a significant threat to human life or property (16 USC § 6511, Sec. 101(1)).

The Ravalli County communities of West Fork and Painted Rocks have been acknowledged as "at-risk communities" by the county. These communities meet the characteristics listed above and are included in the WUI boundary, though they are not currently acknowledged by HFRA as "at-risk."

Per HFRA, all CWPPs must engage at-risk communities throughout the planning process, prioritize fuel projects around these communities, and recommend measures to reduce structure ignitability in these communities. The 2024 CWPP meets these requirements for the nine at-risk communities identified in 65 FR 751, 'Urban Wildland Interface Communities Within the Vicinity of Federal Lands That Are At High Risk From Wildfire':

- Hamilton
- Stevensville
- Darby
- Corvallis
- Victor
- Florence
- Sula
- Conner
- Pinesdale
- Highway 93 Corridor

Underserved Communities

Underserved communities are not explicitly defined within the HFRA, though federal and state guidance offers several metrics which can be implemented to determine if a community is underserved. E.O. 13985 refers to "underserved communities" as "…populations sharing particular characteristics as well as geographic communities, that have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life…". The Community Wildfire Defense Grant Program further highlights areas of "low income" or areas with a social vulnerability score of 0.75 or higher as being qualified for "underserved community" status (Wildfire Risk to Communities Project 2022), with the definition of "low income" in Montana being a household income that is 80% of the state median household income. At the time of analysis, the state median household income was $50,331 and the median household income for Ravalli County was $59,640 (Headwaters Economics 2023b). Though these communities were considered, they were not explicitly included as a separate WUI component as they were already included in other resource buffers. Future updates of the CWPP will continue to consider these communities and incorporate, if necessary.

After identifying the extent of overlapping WUI Components within Ravalli County, "holes" within the WUI were refined according to the following criteria in order to create a continuous WUI boundary that can be easily interpreted and implemented. "Holes" (non-WUI areas) located inside the larger WUI polygon will be included if they are less than eight square miles (5,120 acres).

2.3. Wildfire Risk

Wildfire risk is made up of several components that together characterize the total risk posed to a structure, community, or resource. According to MT DNRC, wildfire risk is "the combination of likelihood and intensity (together called "hazard") and exposure and susceptibility (together called

"vulnerability")" (DNRC 2023b). The relationships of these interrelated concepts are illustrated by Figure 4 below.

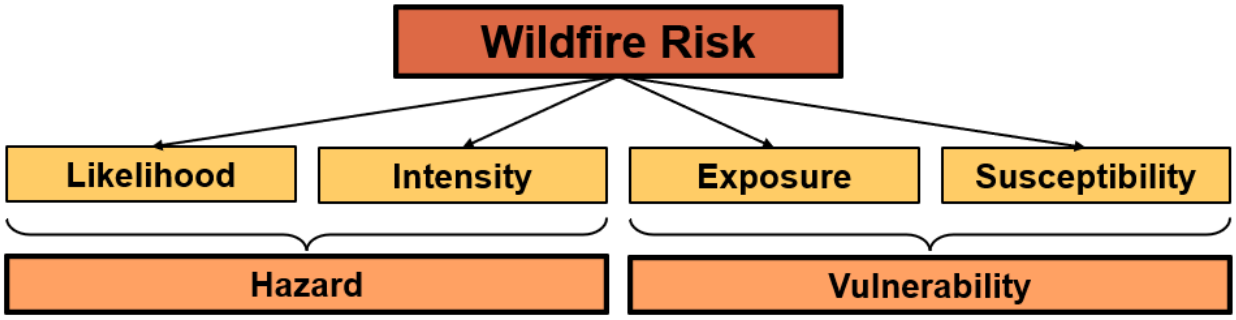


Figure 4 Components of Wildfire Risk

The concept of wildfire hazard is focused on wildlands themselves. Wildfire likelihood is driven by factors such as topography, weather conditions, and potential ignition sources. Wildfire intensity is a measure of the energy expected from a wildfire and is predicted based on total fuel types, fuel load, and topography. Together, likelihood and intensity represent wildfire hazard.

The concept of wildfire vulnerability is focused on the communities and structures located within or adjacent to wildlands. Homes and communities located in areas where direct or indirect wildfire impacts may occur are considered to have wildfire exposure. The characteristics and materials of the structures themselves, however, determine the likelihood of damage when exposed to wildfire, known as wildfire susceptibility. Together, wildfire exposure and susceptibility characterize the total vulnerability of communities and associated life and property when a wildfire does occur (DNRC 2023b).

As a composite of several discrete but interrelated concepts, wildfire risk provides a single key metric for understanding the real-world threat of wildfire to homes, communities, and resources. The Montana Wildfire Risk Assessment (DNRC 2020a) used recent LANDFIRE data, historical wildfire occurrence and weather patterns, and wildfire simulations to provide an updated picture of wildfire risk across the state (DNRC 2020a). Since its completion, this assessment has been instrumental for counties updating their CWPPs.

Risk Assessment & Community Base Map

Using the best available data and local knowledge and input, the CWPP Core Team developed a community base map including the boundaries of Ravalli County representing the total area to which the CWPP applies (Appendix E). Wildfire risk within the Community Base Map was evaluated using data and findings from the Montana Wildfire Risk Assessment (DNRC 2020a).

Risk Assessment

The Montana Wildfire Risk Assessment (MWRA) was completed in 2020 by Pyrologix for the MT DNRC (Gilbertson-Day et al. 2020). This detailed quantitative analysis of wildfire risk across the state of Montana serves as an integral resource for understanding and interpreting wildfire risk throughout Ravalli County. The MWRA considers various components that contribute to wildfire risk including: likelihood of a fire burning, the intensity of a fire if one should occur, exposure of assets and resources based on their locations, and the susceptibility of those

assets and resources to wildfire. Data outputs related to the MWRA consist of spatially-explicit maps and data layers including: risk to homes, wildfire threat, wildfire risk, wildfire potential impacts, and fire model inputs and fuelscape, along with numerous supporting data layers. For the purposes of the 2024 CWPP, the CWPP Core Team identified two data sources most relevant and appropriate for characterizing and interpreting wildfire risk within Ravalli County. These data sources include total wildfire risk (expected net value change (eNVC)) and risk to potential structures. These data layers serve to characterize wildfire risk of both current and potential assets and resources throughout Ravalli County. More information regarding the MWRA along with online maps and resources can be found at the MT DNRC website[5].

Wildfire Risk (eNVC)

Total wildfire risk within the MWRA was evaluated through an effects analysis that quantifies wildfire risk as the expected value of net response or eNVC. To evaluate wildfire risk, the MWRA characterized anticipated response of identified, mapped HVRAs should they be exposed to wildfire. The anticipated response was then translated into a measure of total wildfire risk across Ravalli County as it relates to these identified HVRAs.

Risk to Potential Structures (RPS)

Risk to potential structures is also referred to as 'Hazard in Context' within the MWRA and represents an integration of wildfire likelihood and intensity with generalized consequences or responses to a home everywhere on the landscape should a fire occur. This metric is useful as it can "predict" the risk of both future and current homes by evaluating the wildfire risk if a home were to occur at any point across the landscape. Response of these hypothetical homes to wildfire is assumed to be negative with the degree of damage correlated with increasing wildfire intensity.

[5] https://mwra-mtdnrc.hub.arcgis.com/

Section 3: Implementation

3.1. Integrating the National Cohesive Strategy

The FLAME Act aimed to provide improved resources and funding opportunities for wildfire suppression on federal lands (43 USC § 1748). As part of this effort, Congress required the development of a cohesive strategy to ensure nationwide consistency of wildfire management on federal, state, local, and tribal lands. Known simply as "the National Strategy", it was developed cooperatively by a wide variety of governments and land management agencies, wildfire experts, and public stakeholders. The National Strategy guides wildfire planning efforts by establishing core guidelines to be used when developing CWPPs and emergency responses, prioritizing projects, and educating and equipping the public to protect their property from wildfire (DOI and USDA 2014).

The National Strategy focuses on three priorities, listed below:

- Restoring and Maintaining Landscapes
- Fire-Adapted Communities
- Response to Wildfires

The interdisciplinary team incorporated each of these national priorities when preparing the 2024 CWPP, thereby ensuring consistency with the National Strategy. The result is a CWPP which prioritizes healthy, functioning ecosystems through treatment activities; equips property owners with the knowledge and resources to protect their homes against wildfire; and identifies wildfire response capacity.

Restore and Maintain Landscapes

Though a natural and essential component of the ecosystem, the role of wildland fire has been altered through fire suppression, changing climatic conditions, declining forest health, increasing human activity, and human development and alteration of the landscape. These changes have resulted in conditions that have reduced landscape resiliency to changes, increasing the potential for increased wildfire activity and severity. Landscape restoration through proactive management serves to reinstate resiliency and promote natural fire activity across the landscape to maintain the beneficial impacts of wildfire while mitigating risk. Once restored, ongoing maintenance through management is essential to perpetuate healthy, resilient landscapes.

Restoration and maintenance on the landscape can be achieved through various management actions related to vegetation and fuels, including: prescribed fire; managing wildfire for resource objectives; and mechanical, biological, and chemical fuels treatments. Mechanical, biological, and chemical fuels treatments include: thinning, commercial harvest, slash and underburning, slash and pile burning, herbicide application, reseeding, replanting, and more. Given the scale of fuels treatments needed to restore resilient landscapes, prioritization is critical to allocate resources effectively. These various treatment types can be implemented in priority areas where feasible and sustainable to reduce wildfire risk, improve ecological conditions, and achieve fire-adapted and resilient landscapes.

Fire-Adapted Communities

The National Wildfire Coordinating Group (NWCG) defines a fire-adapted community as a community that "takes mitigation actions so they can live with wildfire without harm and without extensive wildfire suppression efforts" (USFS 2023). Promoting fire-adapted communities focuses on adaptation through fire mitigation strategies, public education and applicable policies and regulations. Fire mitigation strategies may include using fuel treatments and individual

homeowner action to help protect life and property during a wildfire event. Public education and outreach about wildfire preparedness can help the public understand their role in promoting fire-adapted communities and protecting private property. Updating policies and regulations like building and subdivision codes can ensure fire resilience for future development.

Living with Fire

Building fire-adapted communities is a constantly evolving process that includes taking actions to reduce the risk of wildfire, educating residents about becoming fire-adapted, and designing tools that support the community. Fire is a natural part of the ecosystem, but communities at risk can take steps to reduce negative impacts when a wildfire does occur.

Steps that homeowners can take to become more fire adapted include reducing the ignition potential of their home and the 100-200 feet of area surrounding it. This is known as the Home Ignition Zone (HIZ) and is a crucial area of focus for wildfire mitigation. This involves home hardening (using ignition resistant construction materials and techniques) and maintaining adequate defensible space within the HIZ through management of vegetation and other combustible materials on the property. An ignition resistant HIZ reduces the risk of loss by creating a home and property that is better able to defend itself from wildfire. The National Fire Protection Association's Firewise Program provides guidelines that help inform homeowners about specific actions for home hardening and HIZ treatments. The MT DNRC provides free wildfire risk home assessments to all Montana homeowners that include a wildfire risk rating as well as recommendations for specific actions homeowners can take to reduce their vulnerability to wildfire. Additionally, The Fire in the Root council helps promote fire adapted communities throughout Ravalli County by facilitating community outreach and promoting effective fire mitigation strategies, such as Home Ignition Zone Clearing.

Recommendations to Reduce Structural Ignitibility

Resource managers reduce the risk of wildfire damage to private property through fuel reduction projects on state and federal lands, establishing fuel breaks and buffers, wildfire suppression, and rapid response. However, property owners are responsible for helping create fire-adapted communities by reducing the structural ignitability of their own property. In many cases, these efforts incorporate the same techniques used by local, state, and federal resource managers.

Measures to reduce structural ignitability vary from property to property depending on parcel size, the location of structures within the parcel, building age, construction and materials, existing vegetation and fuel loads, access to water, and more. Despite property-level variation, the same basic concepts apply in all cases. Fire propagation requires fuel. Reducing the ignition potential within the HIZ, with priority given to the home/structure and the first five feet surrounding it, is the most effective way for structures to withstand a wildfire. Up to 90% of home losses due to wildfire are caused by embers. Embers can directly ignite a structure by landing on flammable exterior materials, or indirectly by igniting flammable vegetation or materials located close to the home, resulting in direct flame contact or radiant heat exposure to the home. Creating ignition resistant homes and properties, collectively, saves homes and creates fire adapted communities. Common techniques for reducing structural ignitability include:

- Building or retrofitting structures with ignition resistant materials and techniques (Class A roofing, ignition resistant siding, boxed eaves, metal gutters kept clear of debris, screened vents, etc.)
- Maintaining a non-combustible zone within the first five feet surrounding the home by removing all flammable materials and vegetation, using ignition resistant ground cover

(e.g., decorative rock instead of wood mulch), and sparsely placed fire adapted plants if vegetation is desired.

- Keep the area 5–30 feet from the home lean, clean, and green by providing adequate spacing between trees, removing ladder fuels and ground litter, keeping vegetation healthy and hydrated, and using walkways, patios, or driveways to create fuel breaks.
- Pruning trees 6–10 ft up from the base of the tree and keeping lawns well-watered and mowed.
- Clearing flammable materials away from propane tanks and firewood stacks and ensuring that propane tanks and firewood stacks are located at least 30 ft away from the home.

Homeowner Resources

Because each property is unique, organizations such as Firewise/USA[6], Ready, Set, Go![7], Keep Montana Green[8], and the Fire Adapted Learning Network[9] offer resources to help residents determine the best options for reducing structural ignitibility. These resources include further reading and recommendations, illustrations, step-by-step guides, evacuation checklists, and more that can be used when planning, completing projects, or discussing wildfire preparedness within a community.

Additionally, MT DNRC Community Preparedness Specialists are available to conduct free wildfire home risk assessments and site visits for property owners[10]. The MT DNRC also provides guidance for homeowners interested in mitigating wildfire risk within their communities including suggestions for home hardening, evacuation planning, and reducing ignition potential. More information can be found on MT DNRC webpages[11,12].

Grants and Funding

There are several opportunities for grants and funding available to communities and organizations to promote fire adapted communities. Although there is not currently a grant program available to assist individual homeowners with home hardening, local governments can utilize grant funds to support the development of programs that serve this purpose in addition to providing funding for projects that mitigate wildfire risk in adjacent federal and state lands. Grant funding is available to private landowners for fuels reduction through the DNRC Hazardous Fuels Reduction Grant[13]. Additionally, there are several grants available through the MT DNRC to local governments to increase fire response capacity, such as the Cooperative Fire Protection Capacity grant and the Rural Fire Capacity Grant. Having an updated CWPP allows Ravalli County to access more funding sources, including the Community Wildfire Defense Grant, to increase wildfire preparedness and mitigate wildfire risk (DNRC 2023a).

Education and Outreach

Wildfire mitigation strategies are most effective when there is robust participation from all stakeholders. It is important to engage the community through education and outreach to mitigate the

[6] https://www.nfpa.org/Public-Education/Fire-causes-and-risks/Wildfire/Firewise-USA
[7] https://www.wildlandfirersg.org/s/?language=en_US
[8] https://www.keepmontanagreen.com/
[9] https://fireadaptedmontana.org/
[10] https://dnrc.mt.gov/Forestry/Resources/request-a-site-visit
[11] https://dnrc.mt.gov/Forestry/Wildfire/fire-prevention-and-preparedness
[12] https://www.mtfireinfo.org/pages/prevention
[13] https://dnrc.mt.gov/Grants-and-Loans/

human hazards of wildfire. Public education campaigns such as Ready, Set, Go! and Firewise/USA bring communities together to prepare for wildfire. Becoming a Firewise/USA community gives residents access to resources, funding, and community support (Firewise USA 2022). There are currently no Firewise/USA communities in Ravalli County, but residents can take action to organize a Firewise community at any time (Firewise USA 2022). Many education and outreach efforts are already underway in Ravalli County, led by the cooperative Fire In The Root council. The council helps facilitate outreach events, home risk assessments, community workdays, and more. Statewide, the MT DNRC also conducts public outreach and education through the Montana Fire Information Dashboard.

Wildfire Response

One of the most important roles of a CWPP is to identify wildfire response capacity and processes. The interdisciplinary team that developed the 2024 CWPP included members of the Ravalli County Office of Emergency Management, community preparedness and wildfire prevention specialists, and both federal and local fire department representatives. As a result, the 2024 CWPP has identified specific strategies to increase wildfire response capacity and improve communication across various resource groups (Appendix A).

Figure 5 A Three Mile Fire Department engine

Resources & Capacity

Ravalli County is comprised of 14 fire districts served by volunteer (primary), rural, and paid fire departments (though rare). Additional seasonal wildland firefighters are available through the USFS and MT DNRC. These local firefighting resources are skilled, trained, and equipped to respond to WUI wildfire incidents and often work closely with federal wildland firefighting resources supplied by the USFS and MT DNRC. Mutual aid agreements are also in place among local fire departments and federal agencies throughout Ravalli County as well as adjacent counties. Fire resources in Ravalli County are currently meeting suppression needs but increased capacity is essential to ensure that wildfire response can effectively respond to, confine, and manage wildfire incidents. The 2024 CWPP includes detailed strategies and projects that support increased fire response capacity in Ravalli County (see Appendix A and Table 6).

Preparation & Prevention

In Ravalli County, fire preparedness and prevention activities are led by the USDA Forest Service, MT DNRC, and the Fire in the Root Council, a collaborative group working to help Ravalli County become fire adapted. Fire preparedness actions may include home hardening, clearing of the home ignition zone or planning for evacuation. Although fire is a natural part of the ecosystem, some fires may pose a threat to human life or property. Wildfire prevention is an essential component of fire management, as it focuses on reducing human caused fires. The 2016 Roaring Lion fire, ignited by an escaped campfire, burned over 8,000 acres, 16 homes, and numerous outbuildings in Ravalli County (Valadez 2018).

Mobilization

When a wildfire is discovered in Ravalli County, a response crew is mobilized. Response crews are mobilized based on several factors, including the location of the fire and available resources. City and

rural fire departments are mobilized through the Ravalli County 911 center. Wildfires occurring on federal lands are led by the Bitterroot Interagency Dispatch Center (MTBRC). Both dispatch centers are committed to interagency communication and cooperation during wildfires. Mutual aid agreements are in place between all firefighting entities in Ravalli County.

Emergency Management

The Ravalli County Comprehensive Emergency Operations Guideline provides a detailed overview of how Ravalli County has planned to respond to emergencies ranging from flood to wildfire (The City and County of Butte-Silver Bow Montana 2018). Within the guideline, an evacuation strategy is outlined which includes evacuations from a defined area, such as would apply in the case of a wildfire event. Multi-agency coordination of firefighting, emergency medical services, and technical rescue activities in the event of an emergency such as wildfire is also outlined within the guideline. The Ravalli County Office of Emergency Management's website[14] also provides resources to help individuals throughout Ravalli County learn more about available resources and proactively plan for emergency events.

Post-Fire

Recovering from a wildfire is a difficult task for the community. Homes, businesses, and other community assets may have been lost or damaged during the fire. Residents returning to their homes may face significant property damage, even if the home did not burn. Soil in burned areas is unstable, often causing flash flooding and slides. Post-fire recovery planning helps mitigate safety hazards to the community and identifies resources to help residents recover from wildfire. Although Ravalli County does not currently have a post-fire recovery plan, the 2024 CWPP promotes the development of a plan, along with other public education and wildfire response strategies. To aid communities following a disaster, Montana Disaster and Emergency Services has compiled a list of resources to assist individuals dealing with the aftermath of a disaster event[15].

3.2. Implementation

The 2024 CWPP implementation plan (Appendix A) and associated action table (Table 6) was developed to clearly outline roles, responsibilities, and timelines for various projects to implement and achieve the goals, objectives, and strategies outlined within the 2024 CWPP. The CWPP defines goals, objectives, and strategies as follows:

Goal: A broad, long-term desired result

> **Objective**: A measurable, specific action that serves to achieve a Goal
>
> > **Strategy**: A method to achieve specific Objectives. Multiple Projects can be related to a given Strategy.

The action plan consists of various projects with assigned types, responsibilities, and timeframes. Each strategy involves at least one stakeholder but often requires the collaborative efforts of multiple interested stakeholders from Ravalli County, Fire Departments, MT DNRC, and the USFS. Other stakeholder groups may be integrated into the action plan as new strategies are developed in the coming years and roles are further defined. Wherever possible, timelines to complete each strategy are included within the action table in order to best capture the overarching timeline to facilitate achievement of larger goals and objectives set forth within the CWPP.

[14]https://ravalli.us/241/Emergency-Management
[15] https://des.mt.gov/Recovery/Recovery-Program

Prioritization Process

This CWPP identifies and prioritizes areas for hazardous fuel reduction treatments and recommends the types of treatments that will protect one or more at-risk communities and essential infrastructure. A combination of risk layers (Risk to People, Property, and Critical Infrastructure (eNVC), and Risk to Potential Structures) were intersected with WUI components to form a composite matrix that assigns "weight" or "points" to aid prioritization. A spatial layer has been developed to show prioritization across the WUI. This spatial mapping of priorities will allow Ravalli County to interpret which areas should be prioritized and which management actions are appropriate. Priority levels are shown as low, moderate, high, and very high based on the WUI and Risk Assessment intersections (Figure 6).

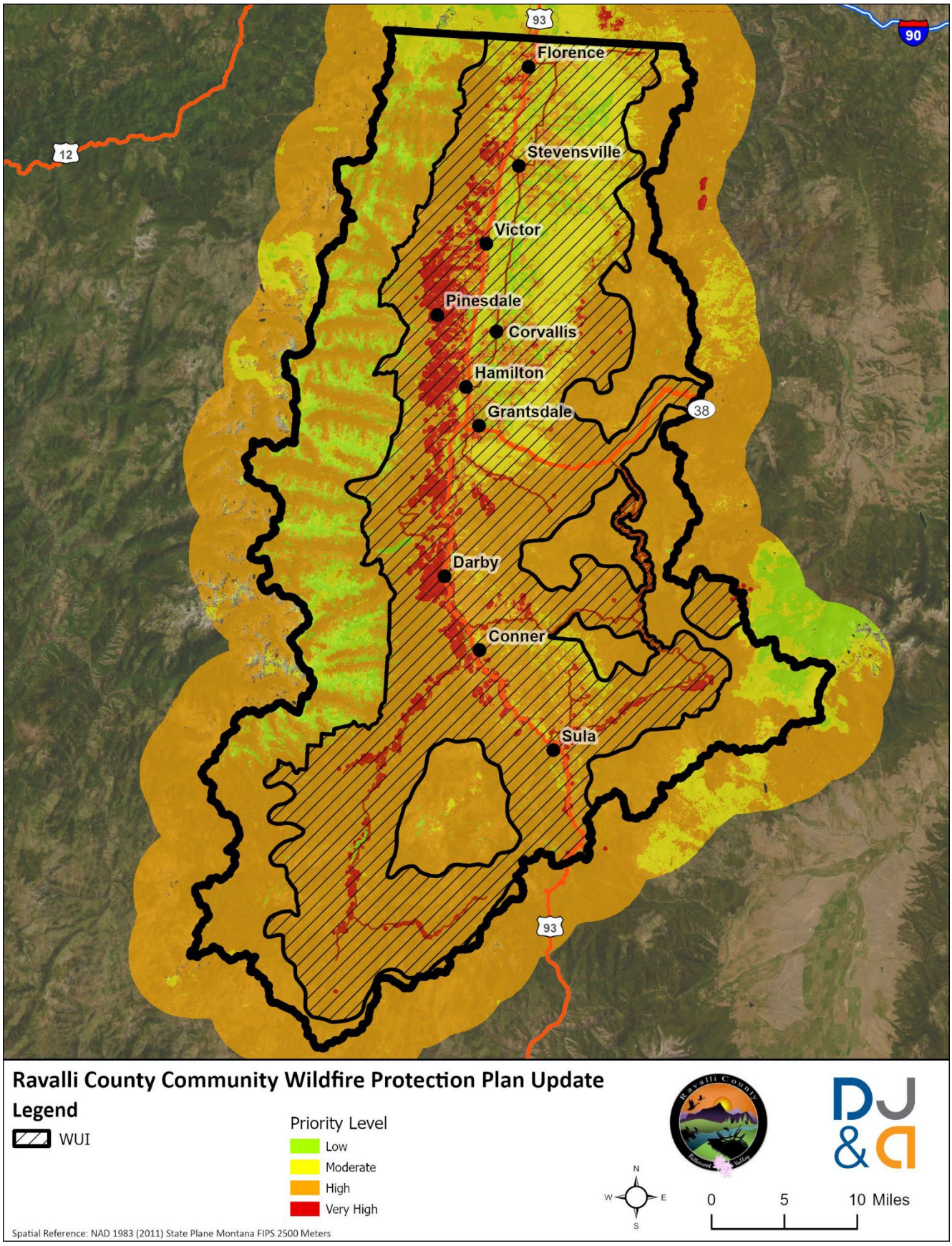


Figure 6 Ravalli County Prioritization Areas and WUI

3.3. Future Actions

The 2024 CWPP is designed to function as a living document with updates occurring as-needed, with an annual review and a full update every five years, as described below. It is anticipated that additional goals, objectives, and strategies will be added as conditions and needs change for Ravalli County, and that the format of the action plan will facilitate easy integration of these elements.

CWPP Monitoring Progress

In order to accurately and consistently monitor progress towards the goals, objectives, and strategies outlined within the CWPP, an annual review of the action plan will be conducted during which any completed strategies will be updated, and any pending additions or revisions to the CWPP document or the associated CWPP story map will be implemented. The annual review will also consider substantive changes to other plans, policies, and regulations identified in section 1.2 (e.g., updates to the Montana Forest Action Plan) and/or substantive changes to data used to develop the WUI and risk assessment for this CWPP identified in section 2. In order to remain relevant and useful, CWPPs should be fully updated once every five years; the next CWPP update would occur in 2029 (DNRC 2022).

Appendices

Appendix A: Implementation – Goals, Objectives, and Strategies

Goal 1: Restore and Maintain Landscapes

Objective 1.1 Reduce fuel loading by supporting and implementing fuels treatments

Strategy 1.1.1 Implement the following fuels treatments to accomplish resource objectives: thinning, prescribed fire, commercial harvest, slashing, underburning, pile burning, chipping, thinning, and prescribed/targeted grazing on both publicly and privately owned land.

Objective 1.2 Promote characteristic wildfire activity appropriate to natural fire regimes and resource objectives

Strategy 1.2.1 Identify strategic locations for new fuel breaks and buffers

Strategy 1.2.2 Improve and maintain existing fuel breaks and buffers

Strategy 1.2.3 Identify, improve, and maintain road buffers

Strategy 1.2.4 Facilitate and maintain cross-boundary collaboration to implement fuels reduction projects across multiple jurisdictions including privately-held lands

Strategy 1.2.5 Implement prescribed fire to promote characteristic wildfire activity on the landscape

Objective 1.3 Implement post-fire recovery activities

Strategy 1.3.1 Support the implementation of reforestation and tree planting following wildfire events

Strategy 1.3.2 Support the development and implementation of a Ravalli County Post-Fire Recovery Plan that provides a framework for efficient and effective allocation of resources after a wildfire event

Strategy 1.3.3 Increase local capacity for post-fire response personnel and resources

Objective 1.4 Reduce insect and disease outbreaks and spread

Strategy 1.4.1 Support and implement projects that use approved methods to control insect and disease such as: micronutrients, pesticides, attractants, aggregants, anti-aggregants, and pheromones

Strategy 1.4.2 Fuels thinning to prevents spread of insects and disease outbreaks

Strategy 1.4.3 Monitor Aerial Surveys to detect trends in outbreaks

Objective 1.5 Use the best available science to inform CWPP goals, objectives, and strategies

Strategy 1.5.1 Facilitate the collection and/or analysis of updated data such as aerial imagery, surveys, etc. that would improve the implementation of projects associated with this CWPP

Goal 2: Fire-adapted Communities

Objective 2.1 Improve and maintain public education to reduce wildfire risk and structural ignitability

Strategy 2.1.1 Improve public access to existing educational resources

Strategy 2.1.2 Develop new educational opportunities/programs for residents

Strategy 2.1.3 Support and implement efforts to increase capacity for additional personnel, groups, or programs to implement and coordinate services that support fire-adapted communities within Ravalli County.

Strategy 2.1.4 Provide an updated platform for public access to CWPP resources that integrates with existing resources

Strategy 2.1.5 Establish a CWPP Monitoring Committee to ensure that the CWPP remains updated, relevant, and is communicated effectively among stakeholders

Objective 2.2 Support and implement mitigation treatments within priority areas within the WUI

Strategy 2.2.1 Develop projects within high-priority areas within the WUI

Objective 2.3 Reduce human-caused ignitions.

Strategy 2.3.1 Work with utility companies to reduce ignition risk and identify opportunities for mitigation

Strategy 2.3.2 Improve and maintain public communication to reduce human-caused ignitions

Strategy 2.3.3 Provide training and resources for utilizing prescribed fire on private lands

Goal 3: Wildfire Response

Objective 3.1 Increase/improve water supply for fire suppression

Strategy 3.1.1 Identify alternate water resources

Strategy 3.1.2 Support the implementation of design alternatives that improve fire suppression and response capabilities within subdivision planning documents

Strategy 3.1.3 Construct additional water resources for fire suppression

Objective 3.2 Improve emergency notification and information communications

Strategy 3.2.1 Identify methods to increase communication efficacy and accessibility in the event of a wildfire

Strategy 3.2.2 Ensure communication and notification methods are inclusive of vulnerable populations

Strategy 3.2.3 Support the development of mitigation actions and planning related to wildfire smoke public health issues

Objective 3.3 Facilitate and maintain cross-boundary collaboration to improve wildfire response efforts.

Strategy 3.3.1 Coordinate with neighboring agencies and landowners to identify potential opportunities for collaboration

Strategy 3.4.2 Establish a Ravalli Wildfire Response Working Group to improve communications and collaborative response efforts across groups and jurisdictions

Objective 3.4 Improve emergency response and mobilization efforts

Strategy 3.4.1 Develop an evacuation plan that identifies evacuation routes, reception/distribution areas, shelter locations, staging areas, and access control points.

Objective 3.5 Increase response capacity

Strategy 3.5.1 Obtain funding for additional personnel, training, and equipment to improve wildfire response capacity and efficacy

Appendix B: Implementation – Action Table

Table 6 Ravalli County Community Wildfire Protection Plan Update Action Plan

Project Name	Project Type	Responsible Entity	CWPP Strategy	Estimated Date of Completion	Notes
Ongoing Projects					
Bitterroot Front Project	Public Education / Fuels Reduction	USFS	1.1.1 2.1.5	2028	The Bitterroot Front Project encompasses Lolo to Conner and has a phased, 5-year implementation. This project will treat over 140,000 acres on the eastern face of the Bitterroot mountains.
Eastside Fuels Treatment	Fuels Reduction	USFS	1.1.1	2029	Hazardous fuels reduction and prescribed burning.
Emergency Response Upgrade	Wildfire Response	Ravalli County	3.2.1 3.6.1	July 2024	911 and communication towers
Fire In The Root Council Outreach Program	Public Education	Fire In the Root / DNRC / USFS	2.1.1 2.1.2 2.1.3 2.1.5	Ongoing	Support current Outreach Program and encourage its use as a hub for local wildfire preparedness and prevention education and information. This includes maintaining the FireintheRoot.org website and Facebook page, resource contact lists, highlighting agency resources and services available, prevention and preparedness outreach at local events, etc.
Fuels Reduction Coordination	Fuels Reduction	Ravalli County Fuels Coordination Group	3.3.1 1.2.4	Initiated 2022 - Ongoing	Continue current group coordination that monitors consistency and supports cross-boundary fuels work. Currently, Ravalli County Fuels Coordination group meets monthly at the Bitterroot National Forest Supervisor's Office. The group is composed of all agencies and entities that work in fuels reduction in Ravalli County. The program could expand to increase capacity for fuels reduction and treatment coordination on private land.

Project Name	Project Type	Responsible Entity	CWPP Strategy	Estimated Date of Completion	Notes
Grant Coordination	Public Education	Ravalli County	3.6.1	Ongoing	Grant finding – monitor consistency / coordination personnel. Specificity of projects in CWPP will help in acquiring grants.
Ingress/Egress Road Condition Assessment and Improvement	Fuels Reduction / Wildfire Response	Ravalli County	3.5.1	Ongoing	Identify and assess critical ingress/egress routes in coordination with Ravalli County road and bridge department.
Land Management Resource Services Outreach	Public Education / Fuels Reduction	DNRC - Hamilton Unit Service Forester, Ravalli County Forester	2.1.1 2.3.3 2.1.5	Ongoing	Informational program to direct residents to resources and services available for land management assistance. DNRC Service Forester and Ravalli County Forester are available to assist with structure ignition potential assessments, HIZ and private forest management plans.
Mud Creek Fuels Treatment	Fuels Reduction	USFS, DNRC	1.1.1	2029	Stand alone hazardous fuels reduction project on the West Fork Ranger District. Good Neighbor Authority partnership with MT DNRC.
Multi-Agency Outreach Coordination	Public Education / Wildfire Response	DNRC, USFS	3.3.1 1.2.4	Ongoing	Continued support of local area operating plan (LAOP) between USFS and DNRC
Private Lands Fuels Programs	Fuels reduction	Bitterroot RC&D	1.1.1 1.2.4	Ongoing	Funding assistance and increased capacity for private lands fuels programs.
Ravalli CWPP Online Story Map	Public Education	Ravalli County	2.1.1 2.1.4	Summer 2023 - Ongoing	Maintaining and updating Story Map with CWPP updates and resources.
Robbins Gulch Forest Health Targeted Implementation Plan	Fuels Reduction	NRCS	1.2.4	TBD	Provides financial assistance for forest thinning treatments on private land, cross boundary fuels reduction and cooperative treatment coordination.

Project Name	Project Type	Responsible Entity	CWPP Strategy	Estimated Date of Completion	Notes
Structured Ignition Risk Potential Assessment Program	Public Education	Fire In the Root Council, DNRC, USFS, Ravalli County, and VFDs. Enhance VFD involvement where possible.	2.1.2 2.1.5 2.1.3	Ongoing	Continued coordination and enhanced support needed for this program. Expand current program to include added capacity, training, and incentives for participating partners. Promote and provide community assessments and guidance for being more fire adapted, as well as establish a formal tracking and monitoring process to optimize the program and determine actualization of wildfire risk reduction.
Proposed Projects					
Communication Equipment	Wildfire Response	All fire departments, DNRC, and USFS	3.2.1	Initiated 2023, completion date is funding dependent	Assessment and procurement of communication equipment needs (radios, tower, etc.), ensuring interoperability of new and existing equipment.
County-Wide Social Assessment	Public Education	Fire in the Root, Ravalli County	2.1.1	2025, completion date is funding dependent	County-wide social assessment of Ravalli County residents to determine wildfire risk awareness, educational needs, barriers and pathways for mitigation action, community values and ideas, etc. This will be used to better understand the county's views, values and needs in designing outreach, educational, and mitigation projects specific for the community.
CWPP Progress Report	Public Education / Fuels Reduction	Multiple Agencies would contribute, Ravalli County serve as Coordinator	2.1.5	Annually on CWPP sign date	Would include annual monitoring and updating of CWPP Action Table, and reporting accomplishments and successes. Coordination and leadership by Ravalli County to ensure completion.

Project Name	Project Type	Responsible Entity	CWPP Strategy	Estimated Date of Completion	Notes
Fire Adapted Communities Coordination	Public Education / Fuels Reduction	Fire in the Root Council, all fire departments, DNRC, NRCS, Bitterroot RC&D, USFS, Ravalli County	2.1.5 2.1.3	Ongoing	Capacity and operational support to provide enhanced coordination of mitigation and outreach activities throughout the County. Needs include long-term administrative support for the Fire in the Root Council and its programs. Capacity also needed for administrative support of fuels group coordination, structural ignition potential assessment program coordination and program enhancement, post fire recovery planning, and CWPP project tracking and reporting.

Fire in the Root Council Public Engagement Programs	Public Education/ Fuels Reduction	Fire in the Root Council and all partners	1.1.1 2.1.2	2023 – Ongoing, including public education workshops and lecture series in 2024 and 2025	Implement education and outreach programs intended to further engage and educate Ravalli County citizens on reducing wildfire risk and increasing adaptation to wildfire. Programs could include: • Citizen Scientist Program to provide residents with tools to monitor areas that received fuels treatment and collect basic data. • Home Hardening & HIZ Incentive Program to incentivize reduction of structural ignitability and creation of defensible space. Include local businesses (landscapers, builders, etc.). An example could be a Fire-Wise Home Construction Award for annual Bitterroot Building Industry Association Home Show Tour. • Wildfire Smoke Management Outreach Program that develops and provides educational materials and information to all County residents, and air filtration devices for underserved and/or high-risk residents and facilities. • Evacuation Planning Assessment & Outreach Program that helps communities with evacuation planning and community wildfire/emergency preparedness. • Neighborhood Ambassador Program that supports community “spark plugs” energizing community wildfire risk reduction action

Project Name	Project Type	Responsible Entity	CWPP Strategy	Estimated Date of Completion	Notes
					focusing on the HIZ. • K-12 Wildfire Educational Program implemented in schools throughout the County. Emphasizes wildfire history, current landscape conditions, wildfire prevention and wildfire preparedness. • Community Chipper Days to encourage homeowner mitigation and slash disposal. • Fire-Wise Landscaping Program that would include workshops/training for local professional landscapers as well as residents, emphasizing landscape strategies and materials to reduce wildfire risk. Public Workshop Series emphasizing mitigation skills (chainsaw safety, etc.), wildfire and ecological science, debris/pile burning safety, evacuation planning, etc.
Home Ignition Zone Mitigation and Slash Disposal Program	Public Education/ Fuels Reduction	Ravalli County, All County Fire Council/Fire departments, and/or Fire in the Root Council, with DNRC support	1.1.1 2.1.2	Spring 2025 - Ongoing	Set up and administer fuels mitigation program providing services focusing on the HIZ (out to 200 ft. around home) as well as slash disposal in the WUI. Work would complement, not duplicate, the work in the extended zone that BRCD does. This would also provide assessments for the Structure Ignition Risk Potential Assessment Program. Part of program could include developing cost-share or grant-based support to help homeowners with home hardening and HIZ treatments.

Project Name	Project Type	Responsible Entity	CWPP Strategy	Estimated Date of Completion	Notes
Inter-Agency Prescribed Fire Program	Fuels Reduction	U.S.F.S., DNRC and VFDs	1.2.5 2.3.3 1.2.4	Ongoing	Continued support of LAOP prescribed fire program. Create a program to implement prescribed fire on private lands.
Post-Fire Recovery Plan	Public Education / Wildfire Response	Ravalli County (and other relevant agencies)	1.3.2	2024 - Ongoing	Establish a Post Fire Recovery Team that will create and maintain a post fire resource and action plan.
Rye Creek Fuel Break	Fuels Reduction	USFS	1.1.1 3.5.1	2025	Hazardous fuels reduction project on the Darby/Sula Ranger District
Sleeping Child Fuel Break	Fuels Reduction	USFS	1.1.1 3.5.1	2025	Hazardous fuels reduction project on the Darby/Sula Ranger District
Soda Baker Fuel Break	Fuels Reduction	USFS	1.1.1 3.5.1	2025	Hazardous fuels reduction project on the West Fork Ranger District
VFD Equipment and Training	Wildfire Response	VFDs	3.6.2	Funding dependent	Analysis of wildland fire response / equipment needs / training (cross training)

Appendix C: Glossary of Terms

Table 7 Glossary of Relevant Terms and Definitions

Term	Definition	Source
At-risk community	The term "at-risk community" means an area— (A) that is comprised of— (i) an interface community as defined in the notice entitled "Wildland Urban Interface Communities Within the Vicinity of Federal Lands That Are at High Risk From Wildfire" issued by the Secretary of Agriculture and the Secretary of the Interior in accordance with title IV of the Department of the Interior and Related Agencies Appropriations Act, 2001 (114 Stat. 1009) (66 Fed. Reg. 753, January 4, 2001); or (ii) a group of homes and other structures with basic infrastructure and services (such as utilities and collectively maintained transportation routes) within or adjacent to Federal land; (B) in which conditions are conducive to a large-scale wildland fire disturbance event; and (C) for which a significant threat to human life or property exists as a result of a wildland fire disturbance event.	Healthy Forest Restoration Act of 2003 (P.L. 108-148)
Community Wildfire Protection Plan	(3) COMMUNITY WILDFIRE PROTECTION PLAN.—The term ''community wildfire protection plan'' means a plan for an at risk community that— (A) is developed within the context of the collaborative agreements and the guidance established by the Wildland Fire Leadership Council and agreed to by the applicable local government, local fire department, and State agency responsible for forest management, in consultation with interested parties and the Federal land management agencies managing land in the vicinity of the at-risk community; (B) identifies and prioritizes areas for hazardous fuel reduction treatments and recommends the types and methods of treatment on Federal and non-Federal land that will protect 1 or more at-risk communities and essential infrastructure; and (C) recommends measures to reduce structural ignitability throughout the at-risk community.	Healthy Forest Restoration Act of 2003 (P.L. 108-148)
Fire Behavior	The manner in which a fire reacts to the influences of fuel, weather, and topography.	(NWCG 2023b)
Fire Intensity	A general term relating to the heat energy released in a fire.	(USDA 2023)
Fire Management	All activities related to the management of wildland fires, including fire prevention, fire suppression, and use of prescribed fire.	(NWCG 2023b)
Fire Regime	Fire regimes describe and categorize patterns of fire ignition, seasonality, frequency, type (crown, surface, or ground fire), severity, intensity, and spatial continuity (pattern and size) that occur in a particular area or ecosystem	(USDA 2023)
Fire Return Interval	Number of years between two successive fires in a specified area. Often used to designate an average of intervals (i.e., mean fire interval).	(USDA 2023)
Fire Severity	Degree to which a site has been altered or disrupted by fire; loosely, a product of fire intensity and residence time.	(NWCG 2021)
Flame Length	The length of flames in a fire front measure along the slant of a flame, from the midpoint of its base to its tip. Flame length is mathematically related to fireline intensity and tree crown scorch height.	(USDA 2023)

Term	Definition	Source
Fuel	Any combustible material, especially petroleum-based products and wildland fuels	(NWCG 2021)
Fuel Loading	The amount of fuel present expressed quantitatively in terms of weight of fuel per unit area. This may be available fuel (consumable fuel) or total fuel and is usually dry weight.	(NWCG 2021)
Fuel Reduction	Manipulation, including combustion, or removal of fuels to reduce the likelihood of ignition and/or to lessen potential damage and resistance to control.	(NWCG 2021)
Prescribed Fire	Any fire intentionally ignited by management in accordance with applicable laws, policies, and regulations to meet specific objectives. Also called a controlled burn or prescribed burn.	(USDA 2023)
Rate of Spread (ROS)	The rate of spread is in chains per hour (ch/h) and is defined as the speed with which the fire is moving away from the site of origin. Wind, moisture, and slope drive the fire. The flaming zone, or fire head, moves away from the origin quickly with great intensity.	(NWCG 2023a)

Appendix D: Wildland Urban Interface Summary Table

Table 8 Ravalli County WUI Components and Descriptions

WUI Component	Definition	Buffer

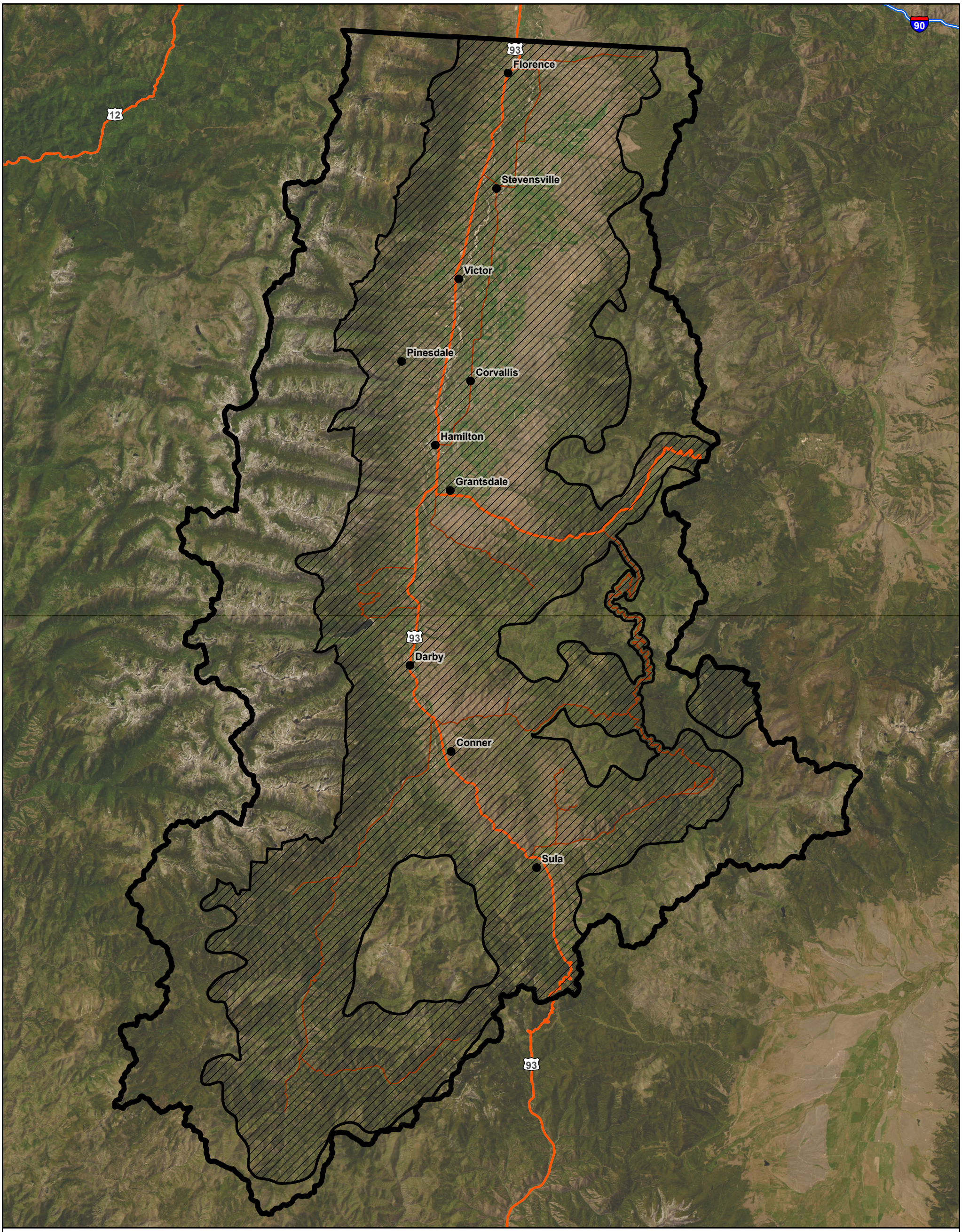
Structure Density with Vegetation	Structures with an address point listed within the Montana Structures and Addresses geodatabase (Montana State Library 2023) located within Ravalli County.
	
	Structure Density / Vegetation Definition:
	• Site Structures with >50% vegetative fuel cover with potential to ignite, represented by the following National Land Cover Data (NLCD) cover types:
	  ○ Deciduous Forest
	  ○ Evergreen Forest
	  ○ Mixed Forest
	  ○ Shrub/Scrub
	  ○ Herbaceous
	  ○ Hay/Pasture
	  ○ Cultivated Crops
	  ○ Woody Wetlands
	  ○ Emergent Herbaceous Wetlands
		1 mile

Highly Valued Resources and Assets	Areas with moderate to high recreation use with various buffers dependent on topography and use type.
	
	• Key water sources (0.5-mile buffer)
	  ○ Lake Como
	  ○ Painted Rocks
	• Ski Resorts – Lost Trail (0.5-mile buffer)
	• Hot Springs – (0.5-mile buffer)
	• Rye Creek Road (0.25-mile buffer)
	• Three Mile Rd. (0.25-mile buffer)
	• FS Road 429 (0.5-mile buffer)
	• FS Road 429F (0.5-mile buffer)
	• FS Road 5605 (0.5-mile buffer)
	• FS Road 5621 (0.5-mile buffer)
	• FS Road 712 (0.5-mile buffer)
	• Skalkaho-Rye and Paint Creek Roads (0.25 mile buffer)
		0.25 to 0.5 miles

Roads: Primary and Secondary Highways	Primary and secondary highways as identified within the Montana Transportation Network database (Montana State Library 2017) to maintain critical access and transportation corridors for the public and emergency vehicles. **Primary Road**: Major arterial roads including highways and interstates. **Secondary Road**: Roads within the database not defined as 'primary' or 'egress'; often serving to connect structures to primary roads	1 mile
Roads: Ingress and Egress	Roads that are crucial to maintain ingress and egress to structures and areas of moderate to high public concentration or use. • Hughes Creek Rd. • Nez Perce Rd. • French Basin Rd. • Pasture Draw	1 mile

WUI Component	Definition	Buffer
	• Lowman Creek Rd. • Rye Creek Rd. • North Fork Rye Creek Rd. • Sleeping Child Rd. • Eight Mile Creek Rd.	
Communities with Critical Infrastructure	Communities that have critical service infrastructure such as hospitals, fire stations, labs, search and rescue, etc. that are critical to provide emergency support during a wildfire.	1 mile
Utilities and Communication	High-voltage power lines, substations, and communication sites to maintain integrity and protection of important services to the public.	1 mile
Community Protection Zone	The percentile classes that range from 50–100% of the Ignition Density layer created by the FSim model.	N/A
'At-Risk Communities'	As identified in 66 FR 751, 'Urban Wildland Interface Communities Within the Vicinity of Federal Lands That Are At High Risk From Wildfire' including Hamilton, Stevensville, Darby, Corvallis, Victor, Florence, Sula, Conner, Pinesdale, and the Highway 93 Corridor within Ravalli County.	1.5 miles

Appendix E: Maps



Ravalli County WUI

Ravalli County Community Wildfire Protection Plan Update

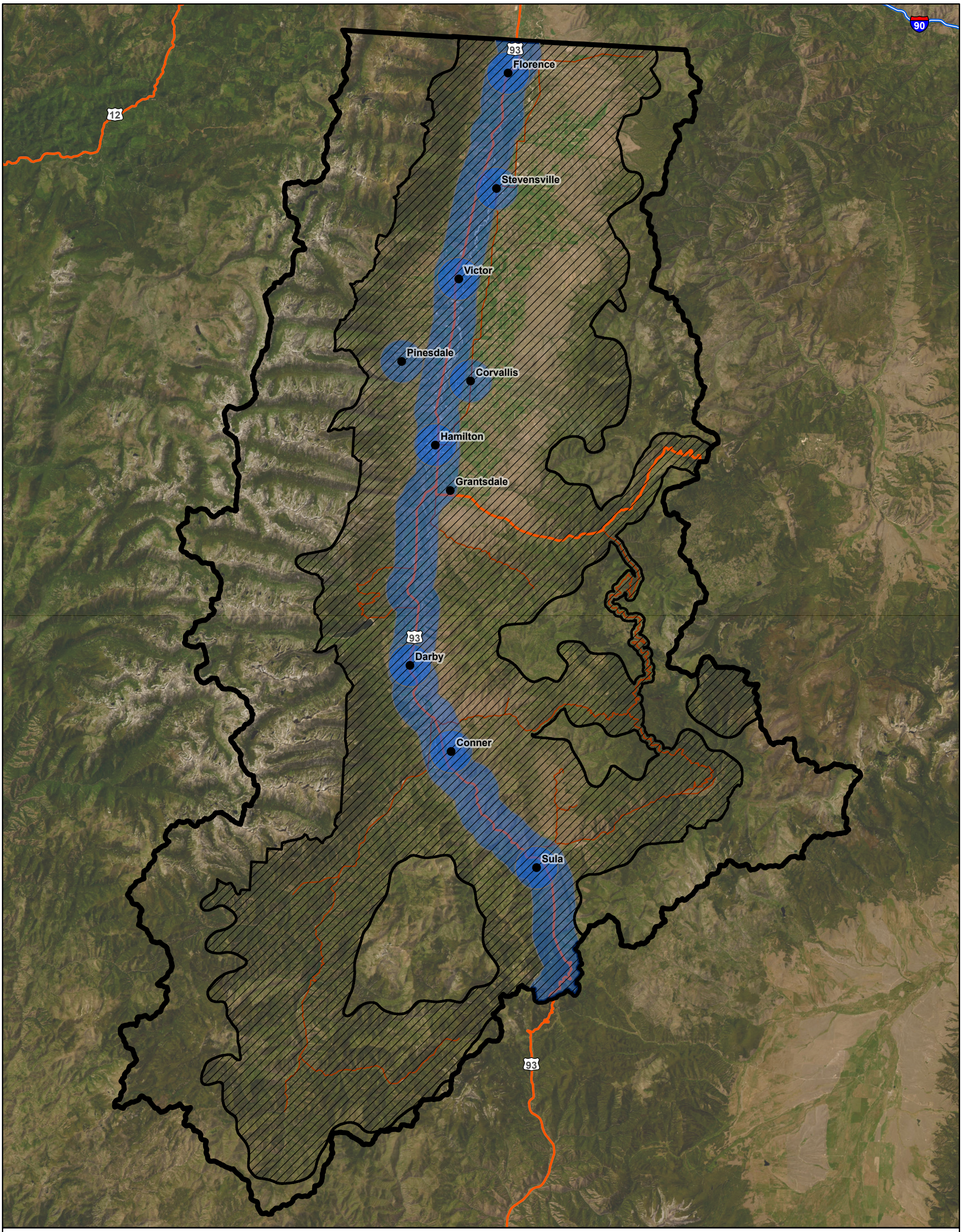
Legend

- Cities
- Highways
- WUI

N
W E
S

0 5 10 Miles

Spatial Reference
NAD 1983 (2011) State Plane Montana FIPS 2500 Meters



Ravalli County At-Risk Communities & WUI

Ravalli County Community Wildfire Protection Plan Update

Legend

- Cities
- Highways
- WUI
- At-Risk Communities

N
W E
S

0 5 10 Miles

Spatial Reference
NAD 1983 (2011) State Plane Montana FIPS 2500 Meters

Ravalli County Risk to People, Property, and Infrastructure

Ravalli County Community Wildfire Protection Plan Update

Legend

- Cities
- Highways
- WUI

Risk to People, Property, and Infrastructure

- Very High
- ---
- High
- ---
- Moderate
- ---
- Low
- None

Spatial Reference
NAD 1983 (2011) State Plane Montana FIPS 2500 Meters

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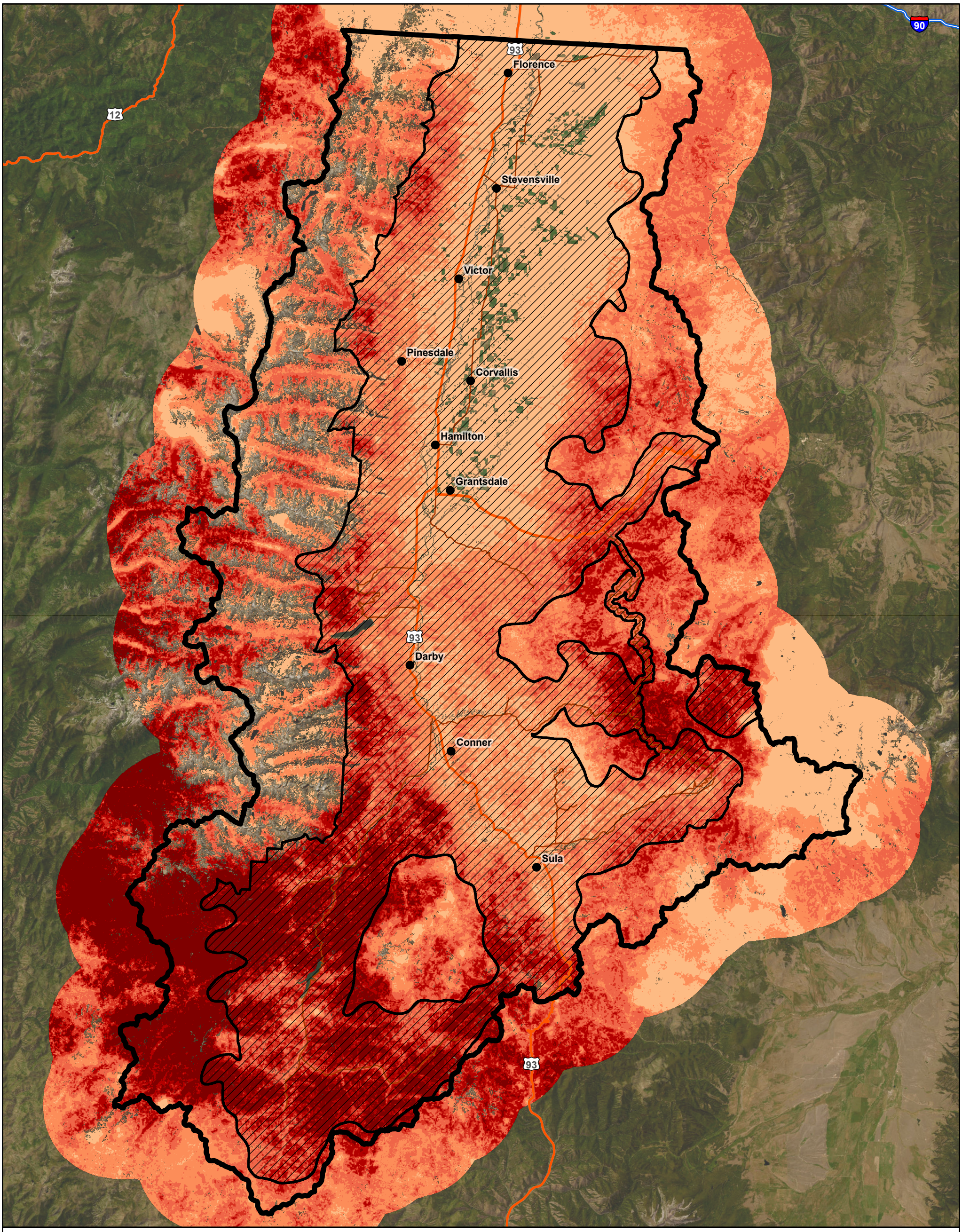
0 5 10 Miles



Ravalli County Risk to Potential Structures

Ravalli County Community Wildfire Protection Plan Update

Legend

- Cities
- Highways
- WUI

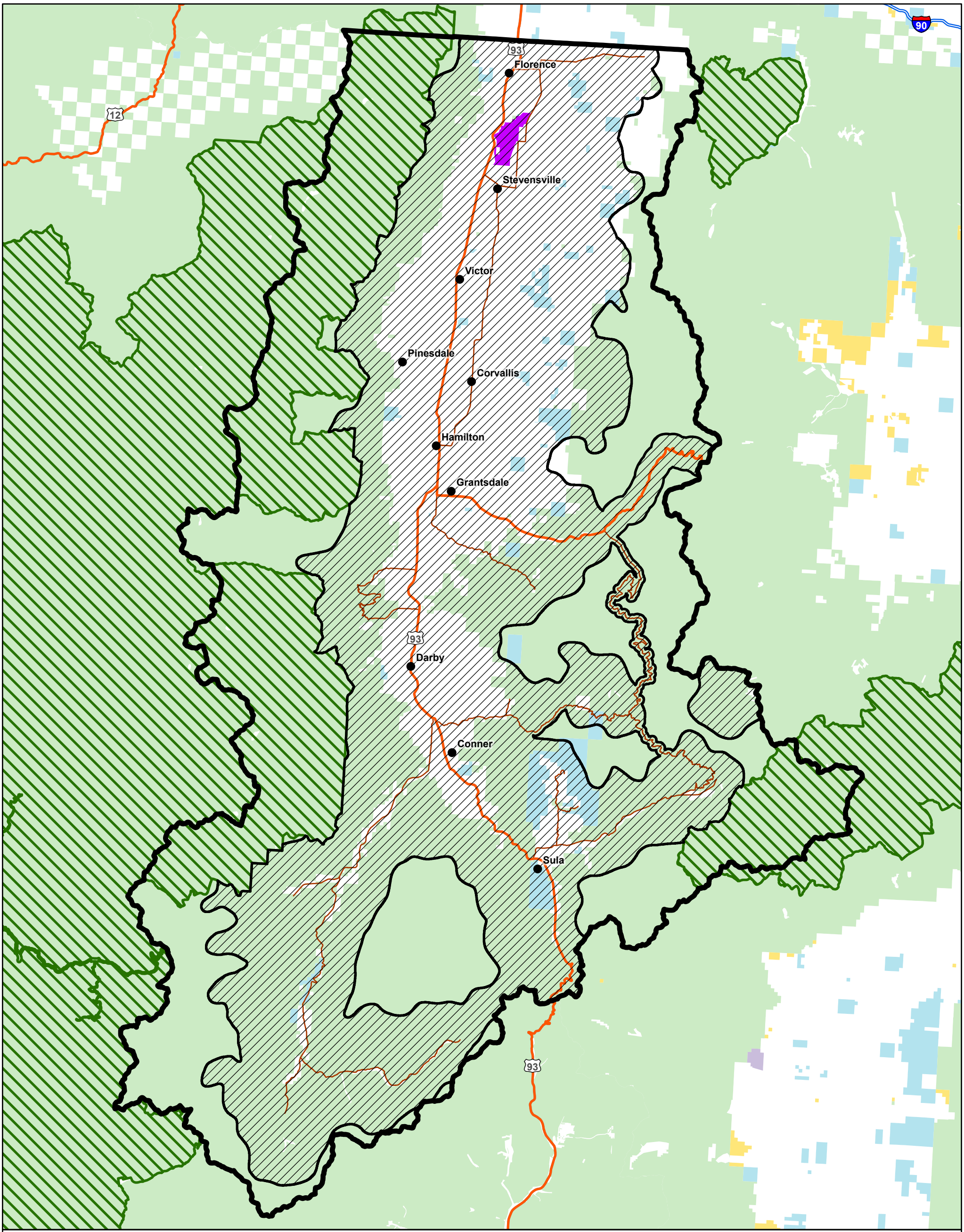
Risk to Potential Structures

- Very High
- ---
- High
- ---
- Moderate
- ---
- Low
- No Color — None

N
W E
S

0 5 10 Miles

Spatial Reference
NAD 1983 (2011) State Plane Montana FIPS 2500 Meters



Ravalli County Ownership, Wilderness, and WUI

Ravalli County Community Wildfire Protection Plan Update

Legend

- Cities
- Highways
- WUI
- Wilderness

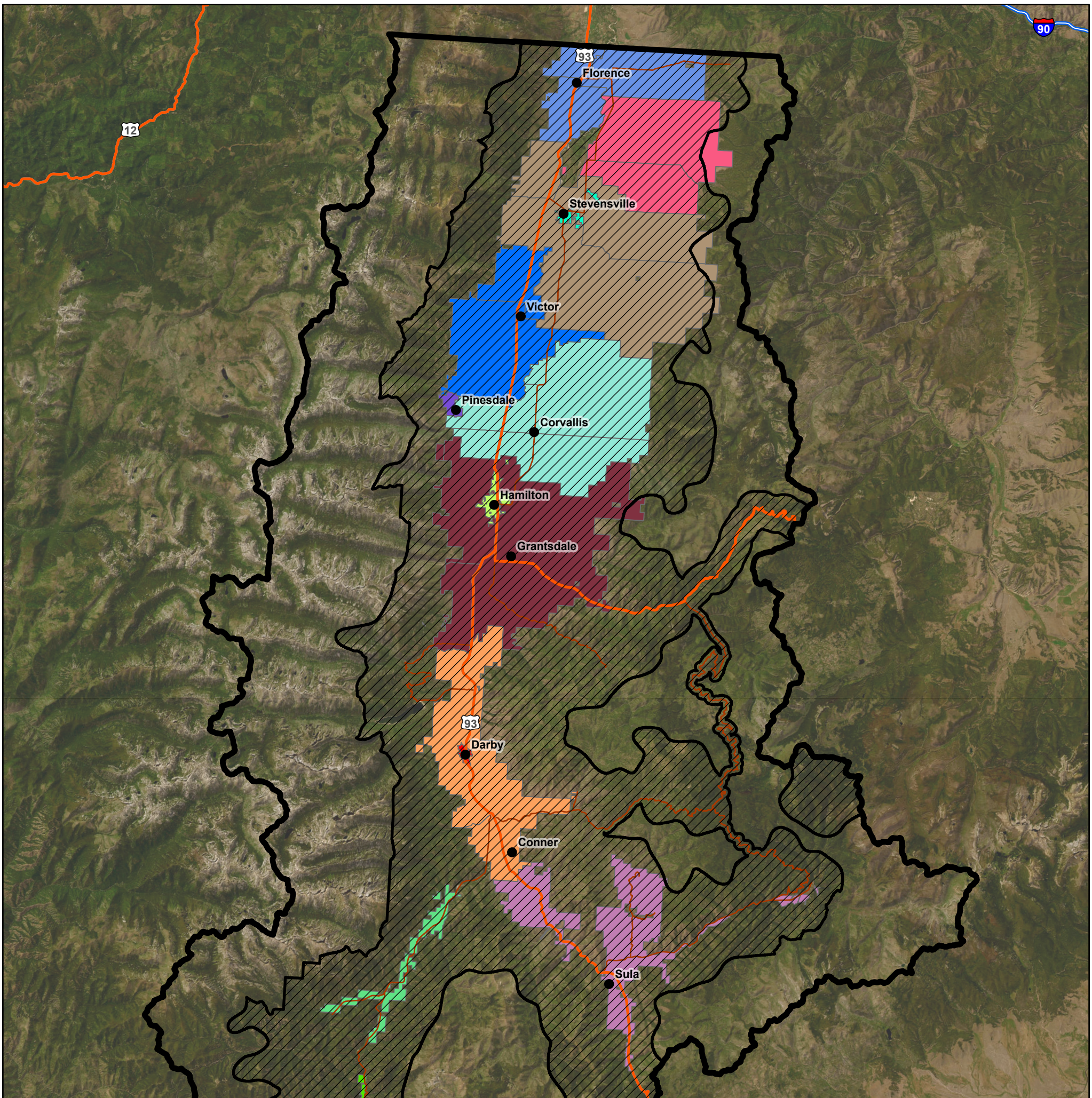
Ownership

- Bureau of Land Management (BLM)
- National Park Service (NPS)
- US Forest Service (USFS)
- US Fish and Wildlife (USFW)
- State
- Private or Unknown

N
W E
S

0 5 10 Miles

Spatial Reference
NAD 1983 (2011) State Plane Montana FIPS 2500 Meters



Ravalli County Fire Districts and WUI

Ravalli County Community Wildfire Protection Plan Update

Legend

- Cities
- Highways
- WUI

Fire Districts

- CORVALLIS RURAL FIRE
- DARBY CITY FIRE
- DARBY RURAL FIRE
- FLORENCE RURAL FIRE
- HAMILTON CITY FIRE
- HAMILTON RURAL FIRE
- PAINTED ROCKS RURAL FIRE
- PINESDALE CITY FIRE
- STEVENSVILLE CITY FIRE
- STEVENSVILLE RURAL FIRE
- SULA RURAL FIRE
- THREE MILE RURAL FIRE
- VICTOR RURAL FIRE
- WEST FORK RURAL FIRE

N
W E
S

0 5 10 Miles

Spatial Reference
NAD 1983 (2011) State Plane Montana FIPS 2500 Meters

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