COMMUNITY WILDFIRE PROTECTION PLAN
MISSOULA COUNTY, MONTANA

FEBRUARY 2018, Update

Signature Page

ATTEST:

Clerk and Recorder

BOARD OF COUNTY COMMISSIONERS
MISSOULA COUNTY

David Strohmaier, Chair — 5/24/2018 Date

Jean Curtiss, Commissioner — 5/24/2018 Date

Nicole Rowley, Commissioner — 5/24/2018 Date

About the Community Planning Assistance for Wildfire Program

The Community Planning Assistance for Wildfire (CPAW) program works with communities to reduce wildfire risks through improved land use planning. It is supported through grants from the U.S. Forest Service, the LOR Foundation, and other private foundations. It is a program of Headwaters Economics and Wildfire Planning International.

Author Contact Information

This report was written by the following CPAW consultants:

- Molly Mowery, AICP – Wildfire Planning International, LLC
- Kelly Johnston, RPF, FBAN – Wildland Professional Solutions, Inc.

Acknowledgments

Our team would like to thank everyone who contributed their time to this CWPP update, including representatives from Missoula County Office of Emergency Management, Missoula County Board of County Commissioners, Frenchtown Rural Fire District, Montana Department of Natural Resources and Conservation, USDA Forest Service, Bureau of Land Management, Missoula County Community & Planning Services, Missoula County Fire Protection Association, The Nature Conservancy, City of Missoula Development Services, City of Missoula Fire Department, Clearwater Resource Council, Missoula Rural Fire District, Confederated Salish and Kootenai Tribes, and all other participating agencies and community members.

P.O. Box 7059
Bozeman, MT 59771
http://planningforwildfire.org

Cover Photo Credits: Jennifer Hensiek, USFS (top left, bottom left); Erik Warrington, Montana DNRC (top right); Jordan Koppen, Montana DNRC (bottom right)

Table of Contents

❖ List of Figures

❖ List of Tables

❖ List of Acronyms

BCC – Board of County Commissioners (Missoula County)
BLM – Bureau of Land Management (U.S.)
CAPS – Community and Planning Services (Missoula County)
CSKT – Confederated Salish and Kootenai Tribes
CSWG – Cohesive Strategy Working Group
CWPP – Community Wildfire Protection Plan
FAC – Fire Adapted Communities
HIZ – Home Ignition Zone
HFRA – Healthy Forest Restoration Act
IBHS – Insurance Institute for Business and Home Safety

LNF- Lolo National Forest
MCFPA – Missoula County Fire Protection Association
MT DNRC – Montana Department of Natural Resources & Conservation
MT FWP – Montana Fish, Wildlife & Parks
NIST – National Institute of Standards and Technology
NWS- National Weather Service
OEM – Office of Emergency Management (Missoula County)
PDM – Pre-Disaster Mitigation Plan
USFS – United States Forest Service
WUI – Wildland-Urban Interface

Executive Summary

❖ Introduction

In 2017, Montana experienced hundreds of wildfires that collectively burned more than one million acres across the state. Major fires in or near Missoula County—including the Lolo Peak Fire, Sapphire Complex, and Rice Ridge Fire—served as a powerful reminder of fire's role on the landscape. These fires also brought a host of challenges to local communities: residents experienced weeks of poor air quality and evacuations; first responders were on the front lines of protecting property and other community values at risk; and land managers will be dealing with the long-term effects of post-fire landscape restoration for decades. Although wildfire has shaped the region's landscapes for millennia, the 2017 wildfire season underscored the importance of planning, collaboration, and action to address future incidents.

The Lolo Peak Fire burns near the city of Missoula during the summer of 2017. ***Credit: Larry Abramson***

Community Wildfire Protection Plan As a Tool for Risk Reduction

While the wildfire season unfolded, Missoula County had also begun an update to its Community Wildfire Protection Plan (CWPP)—a community-based plan that identifies local wildfire risk, what is at risk, and actions the community must take to address its wildfire risk.

Missoula County adopted its first CWPP in 2005, which was initiated by the Missoula County Office of Emergency Services and incorporated input from numerous stakeholders. Since that time, many changes have occurred across the county, including new housing and roads, fires on the landscape, and forest fuel treatments near communities. These changes affect the way a community plans for fire and prompted the need for revisions.

This CWPP builds on the expertise and information contained in the 2005 CWPP, and provides important updates, including:

- Refined definition of the wildland-urban interface (WUI) for Missoula County;
- An updated risk and hazard assessment;
- New action table and maintenance plan;
- Refreshed content to align with national policy and strategies.

Updated information in this CWPP was gathered through engagement with a multidisciplinary stakeholder group and public comment process.

CWPP Minimum Requirements

CWPPs have been in practice across the country since 2003, when the Healthy Forests Restoration Act (HFRA)[1] was signed into law and gave statutory incentives for the United States Forest Service (USFS) and the Bureau of Land Management (BLM) to consider the priorities of local communities that developed and implemented forest management and hazardous fuel reduction projects.

HFRA requires that CWPPs must meet three minimum requirements:

1. Show collaboration between local and state agencies, in consultation with federal agencies and other interested parties;
2. Identify and prioritize fuel treatments to reduce hazardous fuel areas;
3. Recommend strategies to reduce the ignitability of structures.

Many CWPPs also cover a range of other relevant topics, such as public education and outreach activities, potential mitigation resources, and other local community information. Unlike codes or ordinances, CWPPs are not legally-binding documents. However, given future uncertainties such as national budgets and changing climatic conditions, CWPPs are an effective local tool to help communities plan for unknowns and increase wildfire resilience.

LEARN MORE: WHY DOES MY COMMUNITY NEED A CWPP?

CWPPs are the primary mechanism that communities use to identify local priorities for wildfire risk reduction and resilience. These plans serve as the "glue" that brings together multiple sources of information, activities, and interests into one document.

CWPPs have many economic, social, and environmental benefits, including:

- Reducing the direct and indirect social, economic, and environmental costs of wildfire;
- Coordinating wildfire risk reduction with other community values and priorities;
- Influencing where federal agencies (USFS, BLM) prioritize fuel treatments;
- Bringing together diverse interests to tackle local wildfire challenges and opportunities;
- Identifying potential resources and funding for mitigation activities;
- Increasing community awareness and engagement in risk reduction.

❖ How to Read This Plan

This CWPP is intended for multiple audiences. While every reader is encouraged to read and use the entire plan, specific sections may be of higher interest and relevance. The following overview provides a quick guide to each section:

[1] https://www.fs.fed.us/emc/applit/includes/hfr2003.pdf

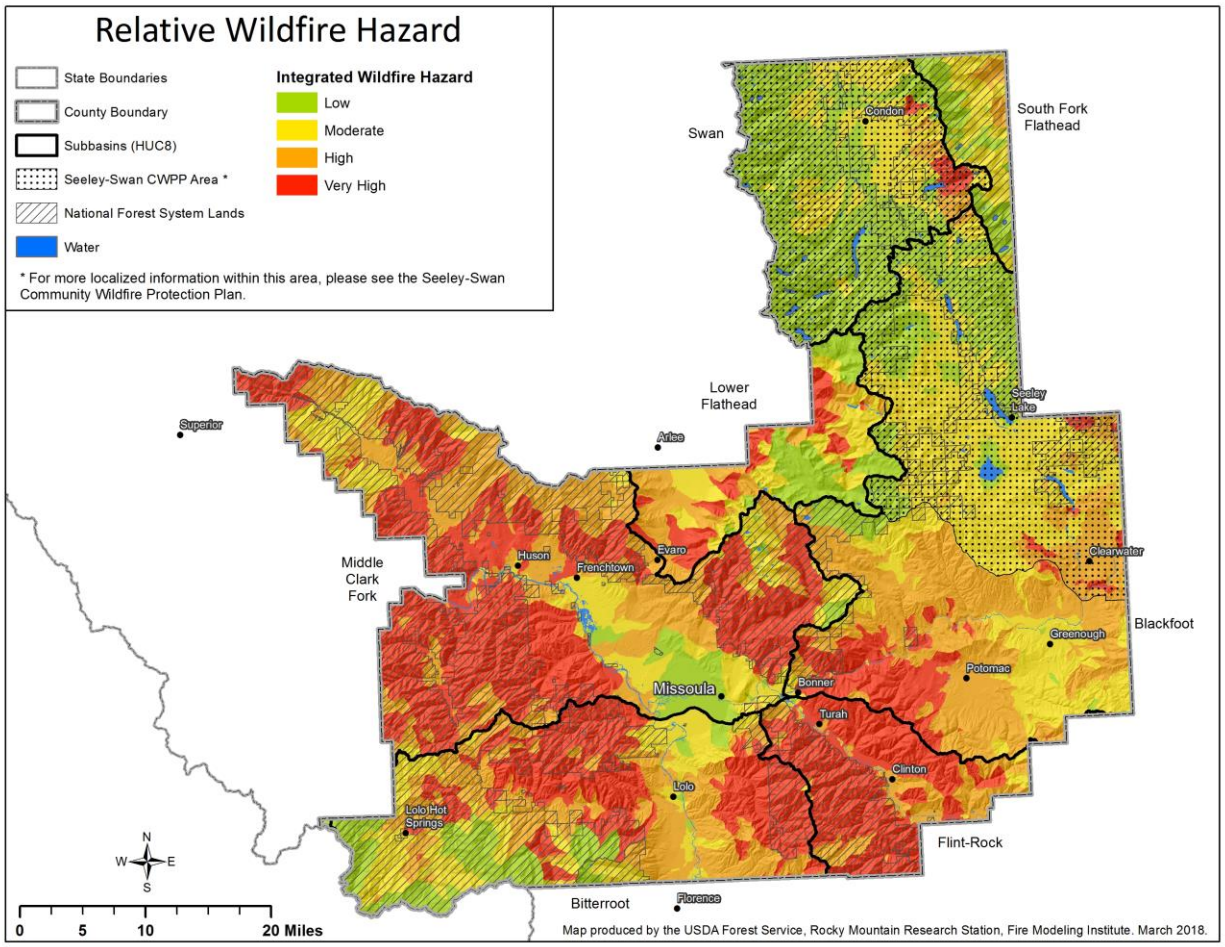
Part 1: Understanding the Local Environment

Part 1 provides an area description of the county with relevant data on topography and climate. It also describes the local environment and ecology, land ownership, and key demographic information. A primary focus of this section is on the fire environment and fire history in Missoula County. Finally, Part 1 also provides both a general definition and specific spatial delineation of the wildland urban interface in Missoula County.

Part 2: Risk Assessment

These components include the relative likelihood of occurrence and potential intensity of wildfire, which together are used to depict wildfire hazard across Missoula County. Part 2 provides a summary of information available to assess these risk components, including maps.

Figure 1. Relative Wildfire Hazard in Missoula County



Part 3: Taking a Cohesive Strategy Approach In Missoula County

Part 3 is organized into three subsections:

- Restoring and Maintaining Resilient Landscapes in Missoula County
- Promoting a Fire Adapted Missoula County
- Increasing Wildfire Response Throughout Missoula County

These subsections align with the National Cohesive Wildland Fire Management Strategy—a multi-phased effort engaging partners from federal, state, local, and tribal governments, non-governmental organizations, and public stakeholders to examine how the nation can plan for its wildfire future. Each subsection also provides local context and information on each topic. In addition, each subsection contains a list of potential strategies to address relevant challenges and opportunities.

Part 4: Putting the CWPP Into Action

Part 4 focuses on implementation. This section provides an action plan to guide stakeholder activities to ensure the CWPP process moves forward in tangible ways that reduce Missoula County's wildfire risk. This section includes guidance on future CWPP updates and an overview of stakeholders associated with this CWPP to promote understanding of roles and responsibilities.

Appendices

- **Appendix A: Primary Plans Related to CWPP Action Table** provides a list of wildfire and/or WUI-related actions from the Missoula County Growth Policy (2016), City of Missoula Growth Policy (2015), and Pre-Disaster Mitigation Plan for Missoula County and City (2017). This appendix serves as a quick reference to help readers see the linkages between this CWPP and other county and city plans.
- **Appendix B: Stakeholder and Public Engagement During CWPP Update** provides an overview of the CWPP update process that began in January 2017 and occurred over the course of sixteen months. During this update process, four separate CWPP drafts were shared with stakeholders for input, including the final draft which was provided to the public during an official public review and comment period.
- **Appendix C: 2005 Missoula County CWPP Fuel Treatment Project Status and Priorities** provides a summary of the fuel treatment status, critical egress areas, and fuel treatment priorities described in the 2005 Missoula County CWPP.
- **Appendix D: 2013 Seeley Swan Fire Plan** provides a localized calibrated CWPP for the northern portion of Missoula County and the communities of Seeley Lake and Condon.

❖ Relationship to Other Plans, Policies, and Regulations

This CWPP relates to many other local plans, policies, and regulations, which are referenced throughout the document. Generally, local plans, policies, and regulations informed the development of this CWPP in multiple ways, including:

- Drawing on existing information to inform sections of this CWPP;

- Supporting or building on relevant wildfire goals and policies previously adopted in other plans, and;
- Leveraging existing regulatory approaches (e.g., subdivision regulations) or exploring new mechanisms (e.g., zoning codes) to move applicable actions forward through this plan.

The most frequently referenced plans are identified below.

Pre-Disaster Mitigation Plan for Missoula County and the City of Missoula

The 2017 update to the Pre-Disaster Mitigation Plan for Missoula County and the City of Missoula provides a community profile, including information on critical facilities and infrastructure, population trends, housing stock, socioeconomic patterns, and land use and future development projections. Wildfire hazard was analyzed in terms of its wildfire history, risk, and vulnerability of the built environment. The Pre-Disaster Mitigation Plan's mitigation strategies include goals and objectives to reduce wildfire risk within the WUI and are further referenced throughout this CWPP.

Growth Policies and Regulations

The Missoula County Growth Policy is a comprehensive update to the 2005 Growth Policy and was adopted in June 2016. The updated policy identifies community challenges and priorities, including the growing wildland-urban interface, and gathers community information to guide planning decisions for the county's future growth. County goals and objectives relevant to this CWPP address development in hazardous areas, promoting resiliency, adapting to climate change, and conserving vital natural resources and environmental functions.

The City of Missoula's Growth Policy 2035 guides growth and development decisions in the City over the next 20 years. Similar to the county, the city's growth policy includes references to wildfire and the wildland-urban interface throughout the document. This includes a section on Wildland-Urban Interface Wildfire Risk Planning.

Other land use regulations, such as the Missoula County Zoning Resolution, the City of Missoula (Title 20) Zoning Ordinance, and Missoula County Subdivision Regulations, provide additional tools that may help future implementation of risk reduction actions discussed in this CWPP.

Locally-Adopted CWPPs

This plan also supports other local CWPPs. Because CWPPs can be effectively implemented at many different scales—neighborhood, fire district, town, city, and county—they can also "overlap" in their boundaries. Each different scale can help address unique concerns. For example, neighborhood CWPPs often contain more detail related to a residential area than a countywide CWPP. If multiple CWPPs exist, they can be designed to complement and strengthen the objectives of other CWPPs' jurisdictions and scales.

The Missoula County CWPP recognizes that the Seeley-Swan Fire Plan has been an effective local plan that addresses wildfire risk in the Seeley Lake and Condon communities-at-risk. Additional CWPPs may be adopted in the future by other fire districts or jurisdictions. The county encourages the development of local CWPPs that provide additional detail not included in this CWPP to further help communities plan for wildfire.

❖ Summary of CWPP Update

The value of a CWPP is in a three-step process of development, adoption, and implementation:

1. During development, stakeholders increase communication among agencies, organizations, and local community representatives to discuss and mutually agree on wildfire risk reduction goals and strategies.
2. The adopted plan provides an informative and action-oriented framework to guide a process of implementation.
3. Through ongoing and long-term actions, stakeholders work to achieve the goals set forth in the CWPP and make adjustments to improve actions, as necessary.

This CWPP update provides essential updates to the county's first CWPP (developed in 2005) in response to changes that have taken place across the county, including new development, wildfires, and fuel treatments. Updated information includes a new science-based hazard assessment, an alignment of information with national planning priorities, and a balanced approach to actions. This update was collaboratively developed by many stakeholders representing different areas of expertise and perspectives. Upon adoption of this CWPP update, stakeholders—including the public—are ready to launch into the critical phase of implementation to ensure that Missoula County increases its capacity for resilient landscapes, fire adapted communities, and efficient response capabilities.

Part 1: Understanding the Local Environment

❖ Overview

Missoula County has diverse landscapes and communities that are shaped by a variety of influences—including geologic, weather, climate, fire, and development patterns. These influences play a role in how the county assesses and plans for future wildfire events. To better understand these influences, Part 1 provides general background information on relevant aspects of the county, such as annual precipitation and temperature ranges, topographic features, and key demographic information.

Smoke columns merge as fires in the Lolo National Forest burn (2017). ***Credit: Lolo National Forest***

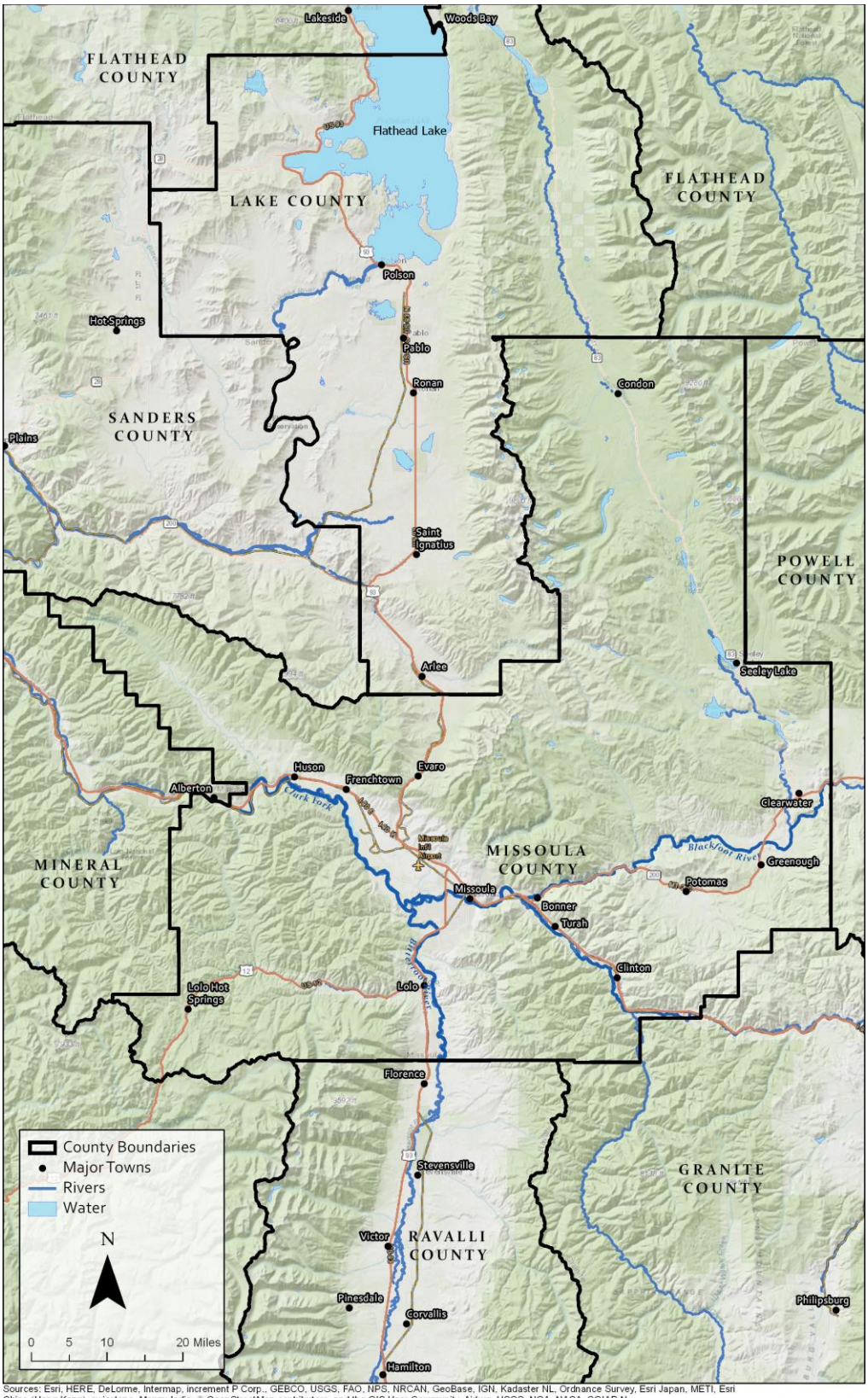
Part 1 also discusses a critical term, the wildland-urban interface (WUI, or "WOO-EE") to help readers understand this concept and how it applies to Missoula County. A countywide Wildfire Hazard Assessment shows where the WUI is located and current wildfire risk and hazard concerns. This information informs Parts 3 and 4 (including the CWPP Action Plan).

❖ Area Description of Missoula County

Location

Missoula County is located within western Montana and is surrounded by Mineral, Sanders, Lake, Flathead, Powell, Granite, and Ravalli counties. It shares its southwestern border with the State of Idaho (Figure 2).

Figure 2. Missoula County Location and Topography

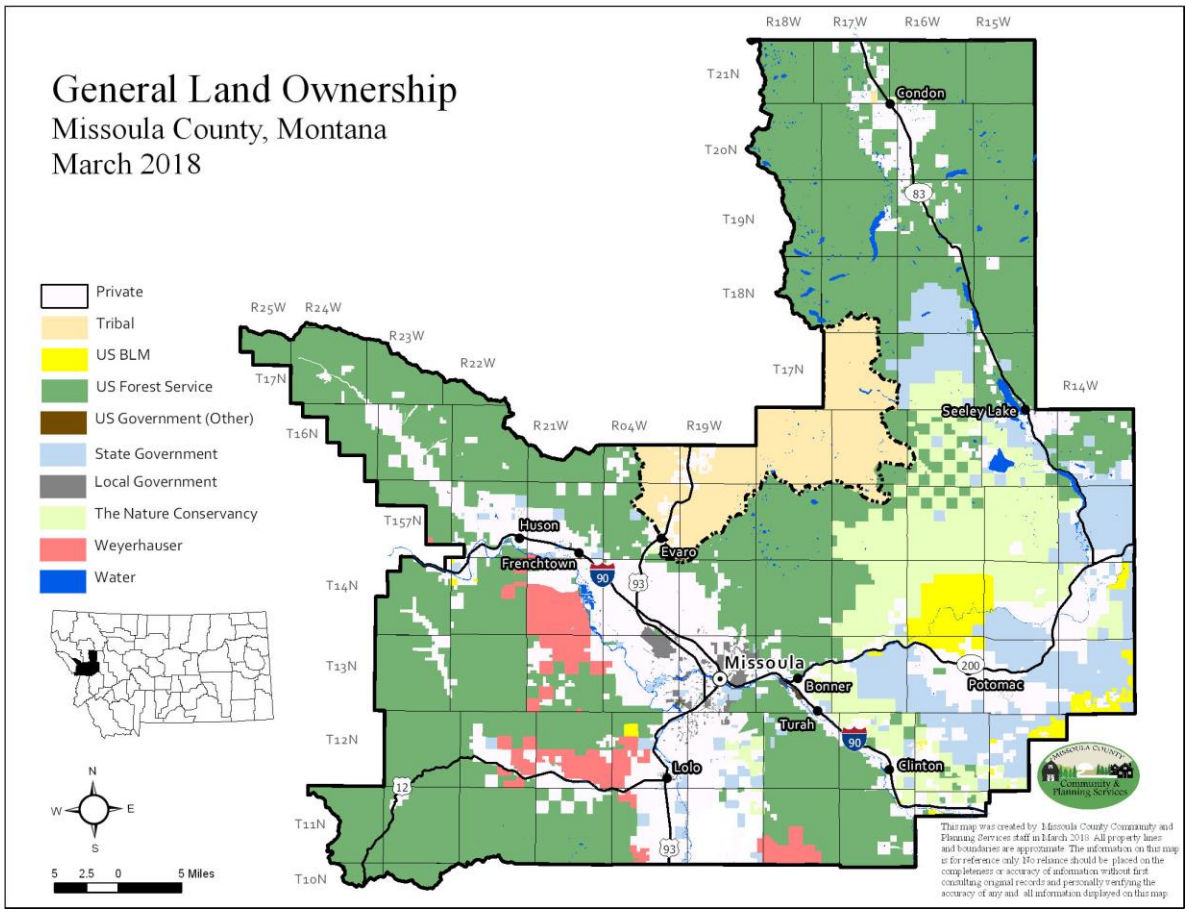


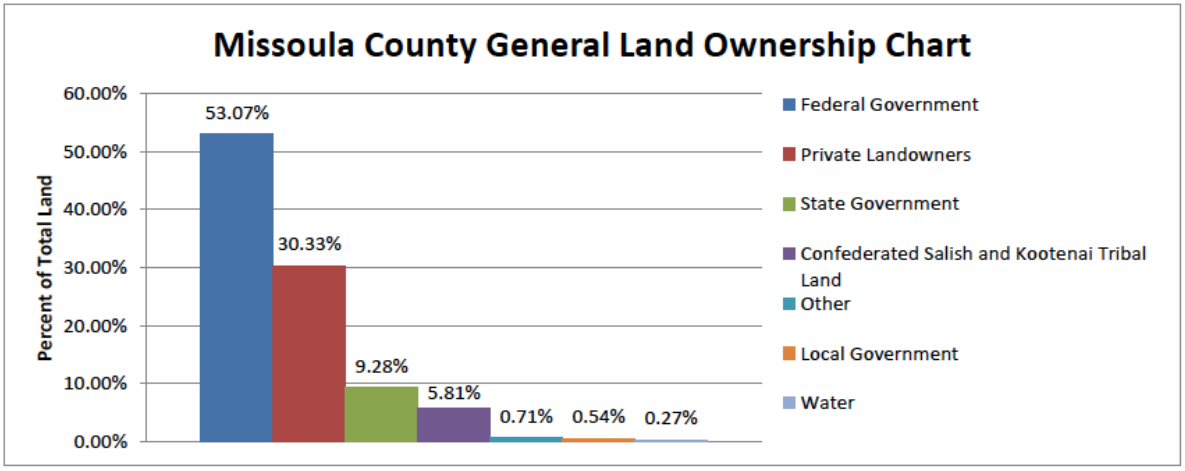
Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community, Airbus, USGS, NGA, NASA, CGIAR,N Robinson,NCEAS,NLS,OS,NMA,Geodatastyrelsen and the GIS User Community, Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors

Local Land Ownership

Missoula County encompasses 1,673,517.72 acres (approximately 2,600 square miles) and ranks 25th for land area among Montana counties. The following Figure 3 displays land ownership of private, state, federal, and tribal entities across the county both spatially and by percentage.

Figure 3. Missoula County Land Ownership (Map and Chart)





❖ Demographics

Missoula County is the second-most populous county within the state, behind Yellowstone County. The county seat and most populated city is Missoula, which is the only incorporated community in the county.

Table 1: Overview of Demographics In Missoula County, MT

Topic	Key Statistic	Notes
Population (2015)	114,181 residents	The county has added 18,003 residents since 2000.[a]
Forecast population (2035)	137,055 residents	Per Missoula County Growth Policy projections.[b]
Population density	43 persons/sq. mile	State average is 6.8 persons/ sq. mile. [b]
Median age	34.8 years	The median age has increased by 2.7% since 2010.[c] By 2035, the population over 65 is expected to comprise 20% of the county's total population.[b]
Total number of housing units	52,321	30,682 housing units are located within the City of Missoula.[b] Nearly 10% of all housing units are for seasonal, recreational, or occasional use.[d]
Median household income	$46,164	National median household income is $53,889.[c]
Workforce employment	59,103	Largest employment industries are management/professional, services, sales/office.[c]
Poverty rate	15.4%t[b]	Missoula County Growth Policy [b]

a. Headwaters Economics Economic Profile System (Socioeconomic Measures): U.S. Department of Commerce. 2016. Bureau of Economic Analysis, Regional Economic Accounts, Washington D.C. Table CA30.

b. Missoula County Growth Policy 2016 update.

c. Headwaters Economics Economic Profile System (Demographics): U.S. Department of Commerce. 2016. American Community Survey Office, Washington, D.C.

d. U.S. Census Bureau. 2010.

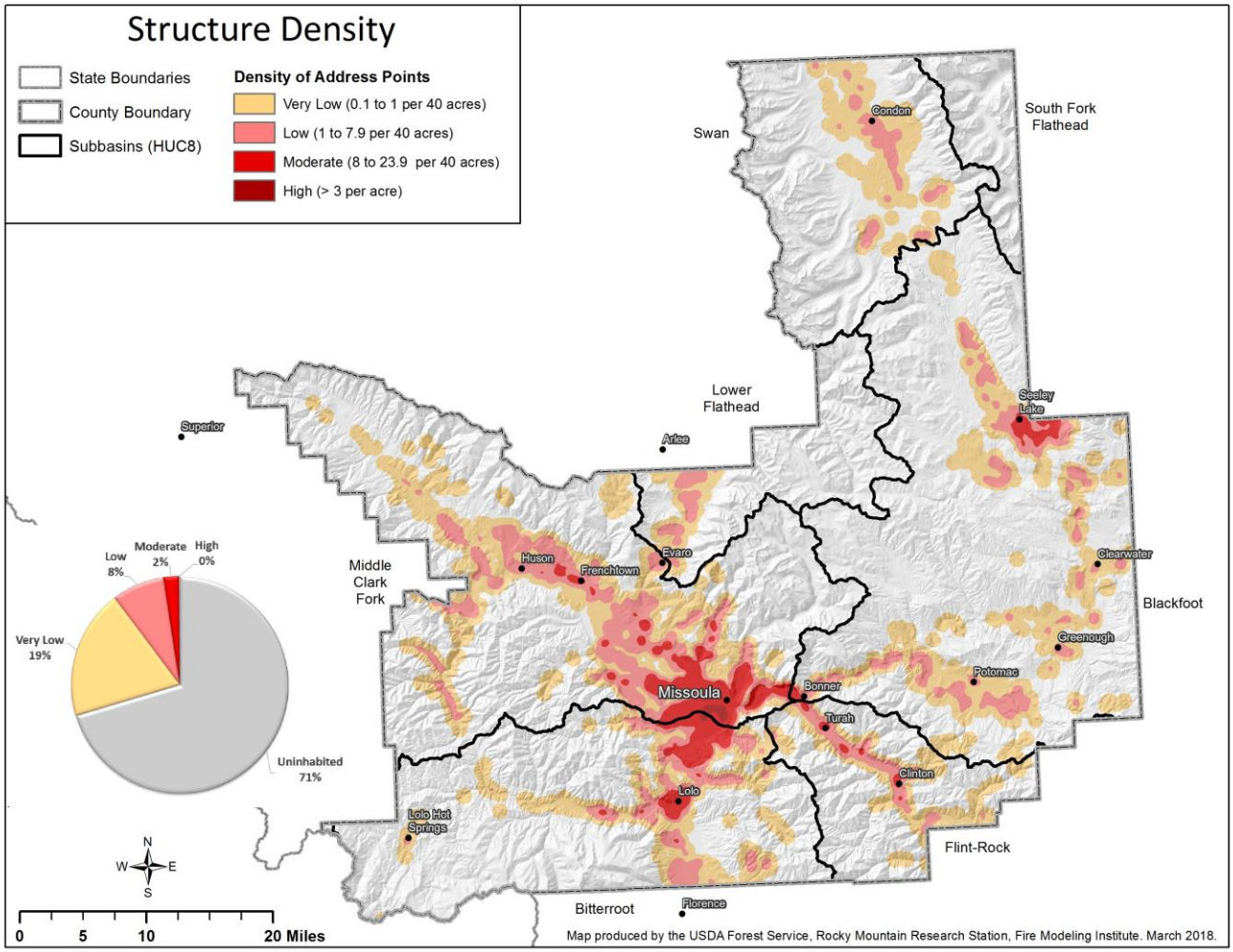
The Missoula County Growth Policy projects the county's population will reach 137,055 in 2035; county planning staff acknowledge that this projection may be conservative. While much of this growth is directed to the city limits, unincorporated areas in Missoula County anticipate an additional 6,300–7,400 new residents over the next 20 years.[2]

[2] Missoula County, MT. Missoula County Growth Policy. 2016. p. 9-30.

Although Missoula County's population density is much higher than the state population density average, it's important to note that the county's population densities are unevenly distributed. The City of Missoula's approximate population density is 2,428 persons per square mile. This density is much higher than areas outside of the city, where the county's approximate population density is 17 persons per square mile.[3] Other populated areas of the county are primarily found along highway corridors, and include Clinton, Condon, Frenchtown, Lolo, and Seeley Lake.

Figure 4 illustrates the distribution of structure density patterns across the county (according to county address point data). This shows that populated areas occupy only approximately 29% of land area in the county, while 71% of land is uninhabited. While the map depicts structure density, it can also be interpreted as population density. Midpoint values of people per square mile in each class are roughly: very low = 13, low = 115, moderate = 1,638, high = 3,395.

Figure 4: Missoula County Structure Density Patterns



[3] Missoula County, MT. Missoula County Growth Policy. 2016. p. 9-1.

❖ Defining the Wildland-Urban Interface

Background

Until now, there has not been a single, unified definition of the WUI used consistently throughout the county. For example:

- The Missoula County Subdivision Regulations (February 15, 2016) define the WUI as "*The line, area or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels."*
- The 2005 Missoula County CWPP defines the WUI generally as "*The area where human development meets natural vegetation and the chance for catastrophic wildfire increases*," and specifically as a 1.5-mile buffer around mapped structures.

One single definition of the WUI is needed to minimize confusion and conflicts. This accepted definition of the WUI should provide a clear understanding of the scope and application to stakeholders and be consistent throughout the CWPP and all related documents.

The formal definition of WUI is rooted in the Federal Register and describes conditions under which vegetation and structures meet or intermix[4]. This definition uses levels of structure density or population density to subdivide WUI into *Interface* and *Intermix* categories. Interface refers to areas where structures directly abut wildland fuels, but there is a clear line of demarcation between developed and wildland areas. Intermix refers to areas where structures are scattered throughout a wildland area. While the Federal Register guidelines for structure density are helpful, the definitions are still fairly vague in terms of geographically defining WUI with a set of mappable criteria.

Missoula County CWPP WUI Definition

This 2018 Missoula County CWPP defines the concept of WUI as:

> ***Any area where the combination of human development and vegetation have a potential to result in negative impacts from wildfire on the community.***

For a specific geographic definition of WUI, this CWPP is generally adopting the approach used by the USDA Forest Service in mapping WUI for the conterminous U.S. from 2010 U.S. Census data.[10] Based on the Federal Register definitions, this approach combines structure density data and landcover data depicting wildland vegetation to map the categories of WUI. To increase the local relevancy of this effort, structure density was derived from county-level address point data, as opposed to structure density numbers at the Census Block polygon level used in the national mapping work. Also, to tie the mapped WUI to fire behavior modeling included in this CWPP, any areas mapped as having burnable wildland fuels for the purposes of modeling were considered to be wildland vegetation for the purposes of WUI.

An important difference between the WUI mapping criteria adopted here and what was used for WUI mapping nationally is the lower structure density threshold used to define WUI. In the Federal Register and the national WUI mapping, areas must have at least 6.18 structures per km^2

[4] Forest Service, USDA, 2001. Urban wildland interface communities within the vicinity of federal lands that are at high risk from wildfire. Thursday, January 4, 2001.Federal Register 66(3): 751-777.

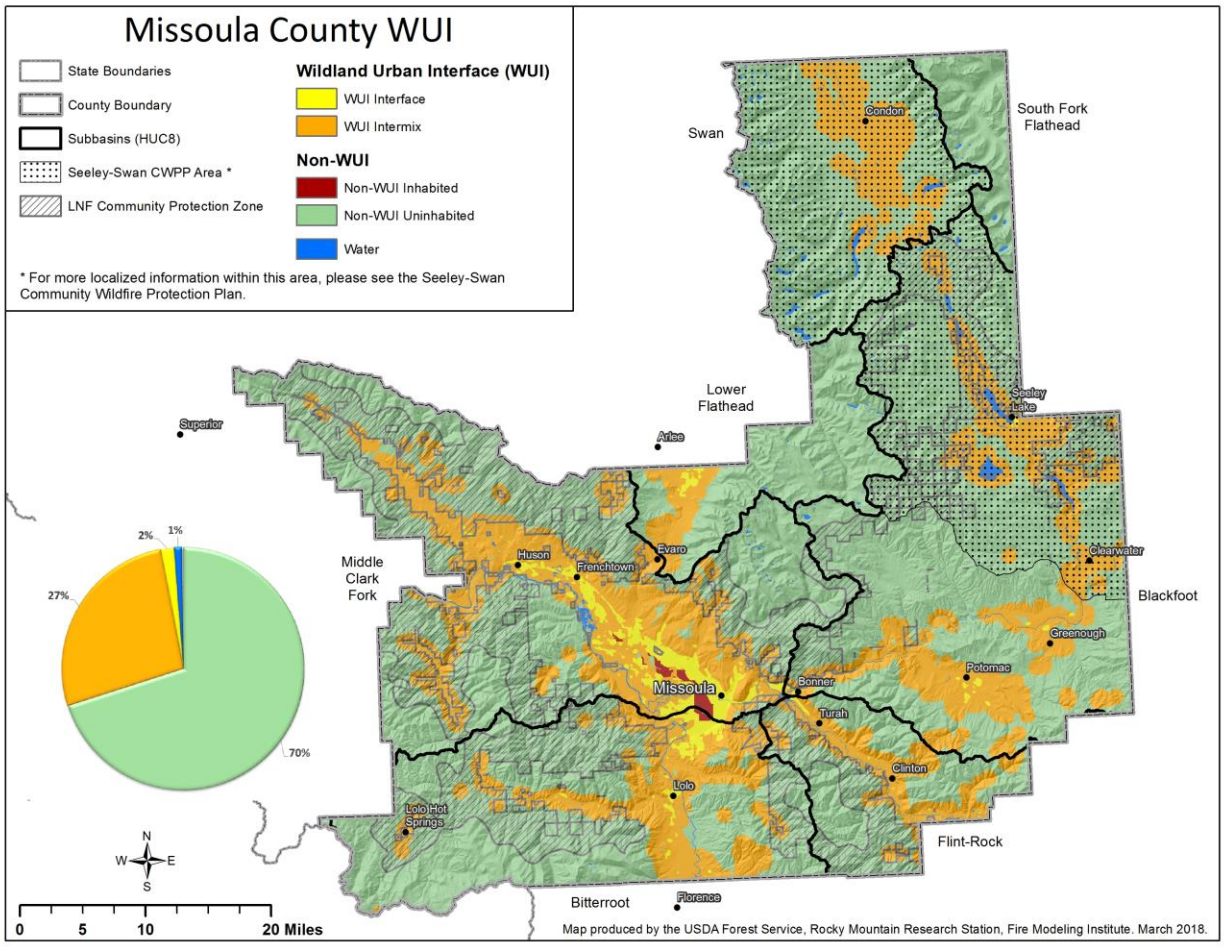
(1 per 40 acres) to be considered WUI. This leaves out sparsely populated areas with less than this density from the defined WUI area. As a conservative approximation of where future development could occur, and recognizing that fire protection efforts are often undertaken for any structure regardless of density, the decision was made to include any area with structure density greater than zero in the spatial definition of WUI for Missoula County.

The spatial criteria for mapping WUI in Missoula County in this CWPP are:

1. **WUI Intermix** = Areas with structure density > 0, and ≥ 50% cover of wildland vegetation within a 40-acre radius. These are places where structures and wildland vegetation are interspersed.
2. **WUI Interface** = Areas with structure density > 0, and < 50% cover of wildland vegetation within a 40-acre radius, located within 1.5 miles of a large, contiguous area of wildland vegetation (i.e., > 1,235 acres with ≥ 75% wildland vegetation). These are developed areas with less cover of natural vegetation, but within a distance where embers from wildfire in adjacent wildlands could cause wildfire impacts.
3. **Non-WUI Inhabited** = Areas with structure density > 0, and < 50% cover of wildland vegetation within a 40-acre radius, located further than 1.5 miles from a large, contiguous area of wildland vegetation. These are developed areas far enough from wildland vegetation that they have reduced likelihood of wildfire impacts.
4. **Non-WUI Uninhabited** = Areas with structure density = 0. These are areas with burnable fuels and no development.

A map of WUI for Missoula County based on these criteria is shown in Figure 5.

Figure 5. The Wildland Urban-Interface (WUI) in Missoula County



Clearly defining the WUI through a general definition, supported by a map that is spatially delineated into WUI categories and cross-referenced with the risk assessments, will provide a community-scale reference regarding potential wildfire exposure. This will aid in implementing future land use policies or regulations that require a tiered application.

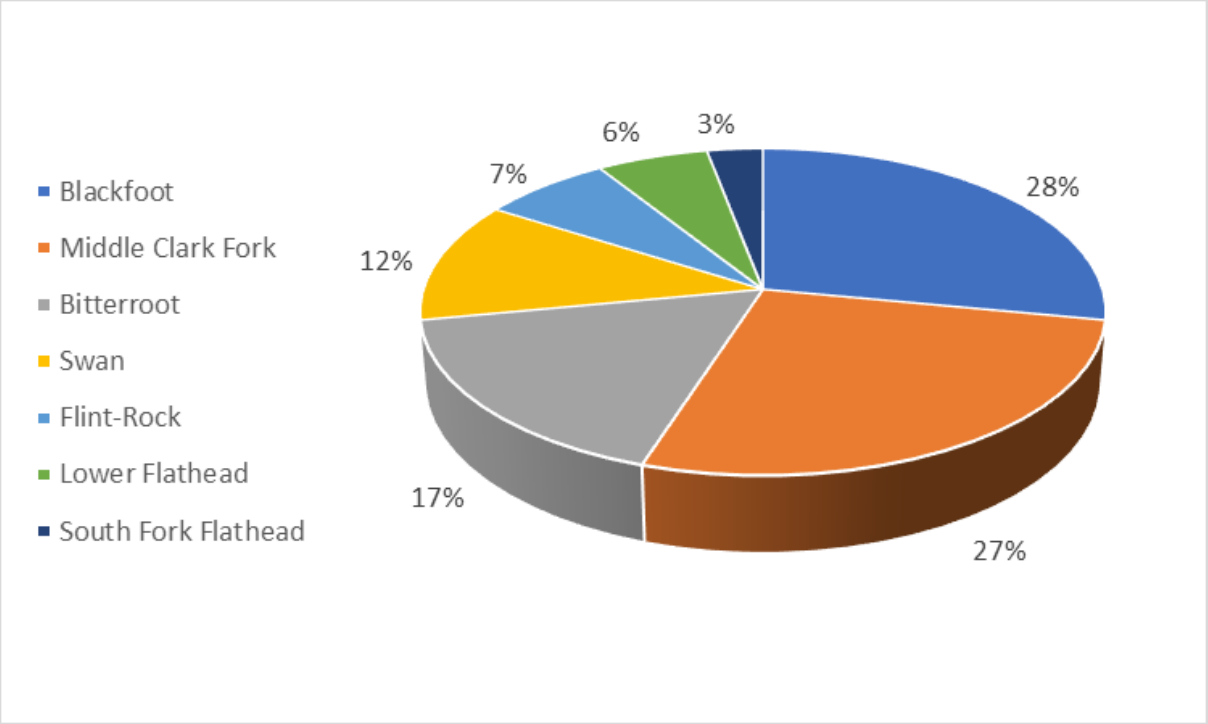
❖ Fire Environment

Assessing the factors that can contribute to wildfires that can potentially threaten homes and communities is an important step in developing a Community Wildfire Protection Plan. Those factors include the topography, vegetation (often referred to as fuels in a fire context), general climate, and specific fire weather patterns. Broadly, these physical characteristics combine to comprise the fire environment. The combination of this physical fire environment with ignition sources (both lightning and human) is responsible for a long history of wildfire activity in Missoula County. This section aims to describe the general characteristics of the fire environment and a summary of recent fire activity, with the goal of providing an understanding of the role of wildfire in the landscapes of Missoula County.

Topography

Missoula County is a mountainous region transected by five major rivers: Blackfoot, Clark Fork, Bitterroot, Swan, and Clearwater. Based on national hierarchical watershed boundaries from the U.S. Geological Survey, parts of seven subbasins (8-digit Hydrologic Unit Codes) fall in Missoula County. In order of land area, they are: Blackfoot (28% of the county), Middle Clark Fork (27%), Bitterroot (17%), Swan (12%), Flint-Rock (7%), Lower Flathead (6%), and South Fork Flathead (3%) (Figures 6 &7). These subbasins provide a useful reference for describing the variation in environmental and population characteristics across the county.

Figure 6. Hydrologic Subbasins Present in Missoula County by Percent Land Cover



Numerous smaller valleys, tributaries, and mountainous terrain features result in a complex mountainous region that ranges from elevations of approximately 3,000 feet at the bottom of the Clark Fork Valley to over 10,000 feet at some of the higher mountain peaks. The majority of land in the county (61%) is at middle elevations between 4,000 and 6,000 feet, with 21% on lower slopes and valley bottoms below 4,000 feet and 18% at elevations above 6,000 feet. The complex topographic characteristics create varying local conditions throughout the county that influence population distributions, vegetation patterns, and local-scale weather and climate.

Slope steepness is another important topographic characteristic that influences the spread of wildfire, as well as the types of fire mitigation strategies a community can consider. Approximately 28% of the county is relatively flat to gentle slopes (<15% slope), predominately in valley bottoms at low to middle elevations. Another 25% of the county has moderate slopes from 15 to 30%, mostly on lower slopes adjacent to valleys. Together, these two slope categories (< 30% slope) represent areas where mitigation strategies involving mechanical removal of trees and other fuels is often considered. The remainder of the county (47%) has slopes > 30%. These

steeper slopes generally result in faster spread of wildfires, and also make any mechanical fuel reduction treatments more difficult.

Vegetation and Fire Ecology

Despite being Montana's second-most populous county, the vast majority of land area in Missoula County remains dominated by native vegetation. Conifer forests cover roughly 80% of the county, followed by 10% in aspen/alder/cottonwood woodlands (mostly riparian), and 6% dominated by grasses and shrubs (Figure 7).

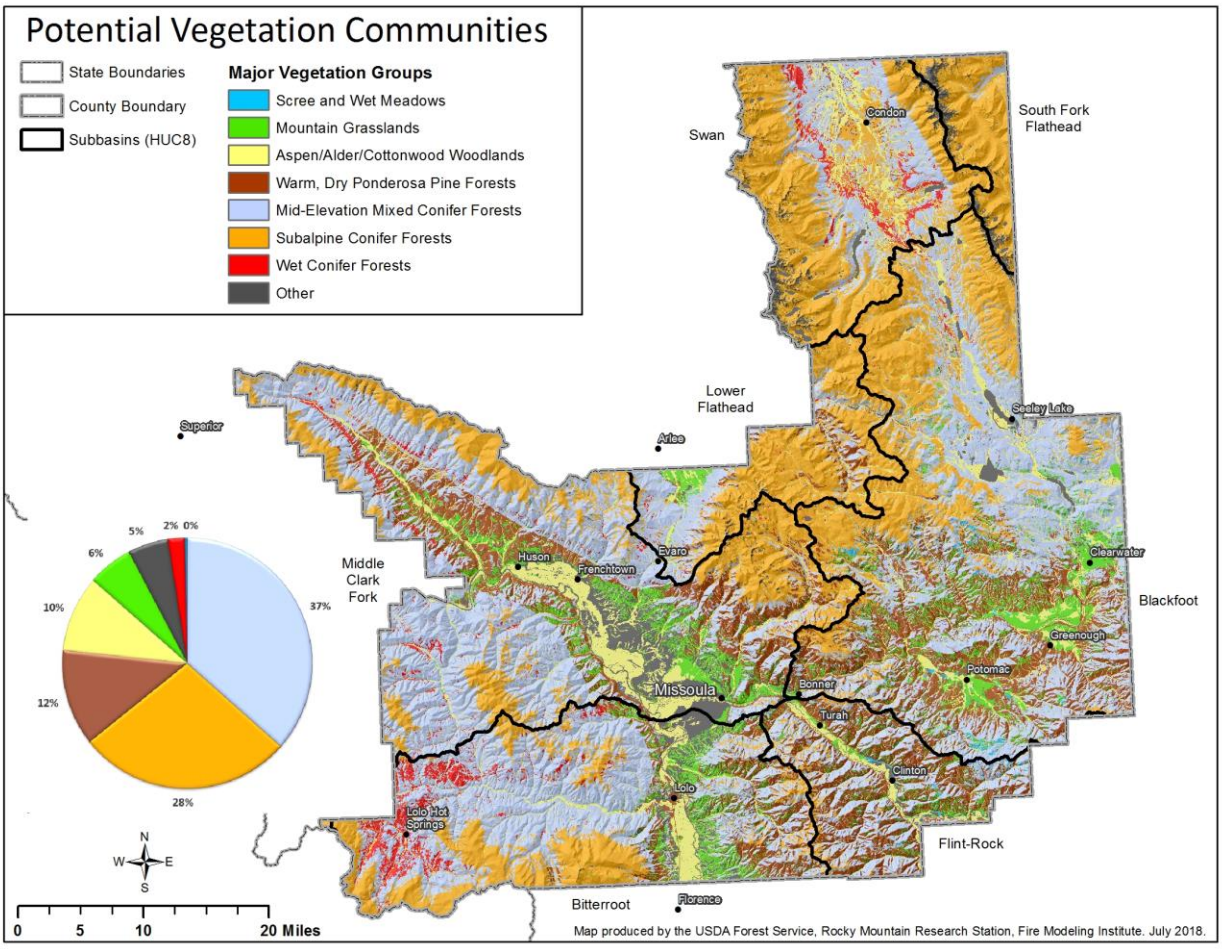
Vegetation can be described in terms of specific cover types based on the current abundance of specific species, or it can be described more broadly in terms of potential vegetation communities or ecosystems that are dynamic over time. For the purposes of describing the fire environment—and specifically the fire ecology—of Missoula County, the broader ecosystem concept is more useful. The Lolo National Forest manages the largest proportion of land in the county, and it describes fire ecology in terms of habitat types or ecosystems assigned to Fire Groups.[5] Ecosystems within a Fire Group have similar fuel characteristics, long-term ecosystem dynamics with respect to fire, and fire management considerations.

In this section, vegetation is described in terms of aggregations of Fire Groups. The aggregations used here were developed through consultation with the Lolo National Forest. These major vegetation groups, as they are referred to here, are mapped based on a national map of potential vegetation communities called Biophysical Settings from the LANDFIRE project[6].

[5] Fischer, W.C. and A.F. Bradley. 1987. Fire Ecology of Western Montana Habitat Types. USDA Forest Service, Intermountain Research Station. General Technical Report GTR-INT-223. 95 pp

[6] https://www.landfire.gov/

Figure 7. Major Vegetation Groups in Missoula County



Scree and Wet Meadows

This group is a subset of the Fischer and Bradley Fire Group 0, and consists of two fairly small ecosystems that do not typically burn. Scree refers to rocky areas that are generally characterized by non-contiguous fuel clusters that can burn but with limited spread and duration. Wet meadows are typically herbaceous forest openings that have a water source and are frequently too wet to burn, although they can carry a low-intensity surface fire under dry conditions in late summer and early fall.

The scree and wet meadows group occupies less than 1% of county land and is not a large factor in the fire ecology.

Mountain Grasslands

This group is also a subset of the Fischer and Bradley Fire Group 0, and includes areas dominated by native grasses and shrubs, ranging from valley bottoms to high elevations. These areas can carry fire in late summer and early fall and were maintained historically by low intensity fire. Historic fire frequency (i.e., time between fires) would have been generally less than 35 years, with some places burning much more frequently. In places where these grasslands

have become invaded by non-native species such as cheatgrass, they can become cured out by early summer and may be susceptible to burning both hotter and earlier in the summer than they would have historically.

Mountain grasslands occupy about 6% of land area in the county and are most abundant in valley bottoms and on lower elevation slopes. They occupy roughly 5% to 10% of the Middle Clark, Blackfoot, Bitterroot, and Flint-Rock subbasins, with a smaller amount in the Lower Flathead subbasin and very little in the Swan and South Fork Flathead subbasins.

Because of its location at lower elevations, the mountain grasslands group represents an important vegetation type in the WUI. Roughly 12% of the WUI Intermix area and 25% of the WUI Interface area across the county is occupied by mountain grasslands. With the close proximity of the grasslands and human developments, maintenance for hazard reduction and biodiversity/ecosystem objectives through frequent prescribed fire or other appropriate treatment applications is both important and challenging.

Aspen/Alder/Cottonwood Woodlands

This group is also a subset of the Fischer and Bradley Fire Group 0, including what they describe as aspen groves and alder glades. These can be either streamside (i.e., riparian) stands of quaking aspen and black cottonwood, or relatively wet openings in conifer forests occupied by alder or aspen. Because they occur on relatively wet sites, they can be resistant to burning and would have burned somewhat infrequently historically. However, under dry conditions they can burn intensely. Recovery after fire is usually more rapid than in conifer forests because aspen, alder, and cottonwood can all re-sprout from underground stems. At riparian sites, these woodlands will typically persist even in the absence of fire because the sites are too wet for conifers. However, where these occupy forest openings they will be replaced by conifers after enough years without fire.

Aspen/alder/cottonwood woodlands occupy about 10% of Missoula County, with much of that in the valley bottoms of the Middle Clark Fork, Blackfoot, Bitterroot, and Swan drainages. Because of their valley bottom location, these woodlands, as with mountain grasslands, are an important component of the WUI. Roughly 20% of WUI Intermix and 29% of WUI Interface across the county is within the aspen/alder/cottonwood vegetation community.

Warm, Dry Ponderosa Pine Forests

This group is a single Fischer and Bradley Fire Group: Warm, Dry Ponderosa Pine (Fire Group 2). These forests are found on relatively low elevation sites throughout the county, occurring on relatively dry sites with grass and dry shrub understories. The main carrier of fire historically was the understory vegetation, downed woody material, and other litter on the forest floor. Historic fire frequency would have generally ranged from 5 to 25 years. Fire intensity would have been mostly low intensity, with occasional patches of moderate to high intensity fire. Density of young trees increases in the absence of fire and increases the potential for more widespread high intensity fires.

Dry ponderosa pine forests occupy about 12% of land in the county. They occupy about 36% of land in the Flint-Rock subbasin and around 15% of land in the Middle Clark Fork and Blackfoot subbasin. Smaller amounts (6% to 8%) exist on dryer sites in the Bitterroot and Lower Flathead subbasins, but there is almost none of this forest type in the wetter Swan and South Fork Flathead subbasins.

These forests are an important vegetation community affecting the fire ecology of the WUI in Missoula County. They make up about 19% of the WUI Intermix area and 40% of the WUI Interface area. Fuel treatments to reduce tree density, particularly of young, small-diameter trees, in these forests can be very effective at reducing fire intensity and the potential for crown fires. These types of treatments, combined with prescribed burning at regular intervals, can move these forests into alignment with their historic fire ecology and reduce the potential for negative impacts to structures in the WUI.

Conifer forests cover roughly 80 percent of Missoula County. ***Credit: Albritton, BLM Missoula Field Office***

Mid-Elevation Mixed Conifer Forests

This group includes a mix of conifer forests found at middle elevations between about 4,000 and 6,000 feet. It is an aggregation of three Fischer and Bradley Fire Groups:

- Warm, Dry Douglas-fir Habitat Types (Fire Group 4);
- Cool, Dry Douglas-fir Habitat Types (Fire Group 5);
- Moist Douglas-fir Habitat Types (Fire Group 6).

Relative moisture at these sites is between the dryer ponderosa pine forests and the wetter, high elevation subalpine forests. Douglas-fir is typically the dominant tree species. Important co-dominant tree species include ponderosa pine on dryer sites and western larch and lodgepole pine on wetter and cooler sites. Dense understories can develop in these forests. Historic fire frequency was highly variable within this group, with fire-free intervals as short as 5 to 25 years on relatively dry sites but over 50 years at wetter sites. Fire of all intensities would have occurred historically, with intensity at any location driven by time since the previous fire and amount of fuel accumulation.

These mid-elevation forests are the most abundant vegetation type in Missoula County, occupying roughly 37% of land in the county. They occupy about 37% to 45% of land in the Middle Clark Fork, Blackfoot, Bitterroot, and Flint-Rock subbasins, about 25% of land in the Swan and Lower Flathead, and less than 5% in the South Fork Flathead.

These forests are also an important vegetation community affecting the fire ecology of the WUI in Missoula County. They make up about 36% of the WUI Intermix area, but given their location at middle elevations, they are further from higher population areas and make up just 2% of the WUI Interface area. As with the dry ponderosa pine group, treatments in these forests that reduce tree density may be effective at reducing fire intensity and the potential for crown fires.

However, treatments on the wetter end of the moisture spectrum in these mid-elevation forests may require more effort because maintaining stands in an open condition may not be in alignment with their ecology (i.e., what they're inclined to do naturally).

Subalpine Conifer Forests

This group is also an aggregate of four Fischer and Bradley Fire Groups:

- Cool Habitat Types Usually Dominated by Lodgepole Pine (Fire Group 7);
- Dry, Lower Subalpine Habitat Types (Fire Group 8);
- Moist, Lower Subalpine Habitat Types (Fire Group 9); and
- Cold, Moist Upper Subalpine and Timberline Habitat Types (Fire Group 10).

These forests are dominated by subalpine fir, Engelmann spruce, lodgepole pine, and whitebark pine. While they are typically found at upper elevations, spruce and fir forests can also occupy drainage bottoms where dense, cold air accumulates. They can have fairly lush and dense undergrowth that resists burning through much of the year but can support high intensity crown fire under dry conditions. Fires were generally less frequent historically than in lower and middle-elevation forests, with fire-free intervals ranging from around 50 to several hundred years.

Subalpine forests occupy 28% of land in the county. Much of this is in the portions of Swan, Lower Flathead, and South Fork Flathead drainages in Missoula County, where they occupy roughly 50%, 56%, and 78% of land area, respectively. Subalpine forests make up about 20 to 25% of land area in the Middle Clark Fork, Blackfoot, and Bitterroot drainages, and about 5% in the Flint-Rock drainage.

These forests are a minor component in the WUI, occupying only 5% of the WUI Intermix area and less than 1% of the WUI interface area. However, although they are typically located further from developed areas than other forest types, many wildfires ignite in high elevation areas and these subalpine forests can be source areas for wildfires that spread and ultimately impact communities.

LEARN MORE: CLIMATE CHANGE

Climate change is affecting multiple components of the wildfire system: fire behavior, ignitions, and vegetation fuels. Annual average temperatures in Montana have increased by 2.0-3.0° Fahrenheit (F) since 1950 and could continue to increase by another 4.5-6.0°F by 2050, while precipitation across the state is projected to decrease during the summer. These climate changes will lead to earlier snowmelt, lower humidity, increased chance of drought, and decreased fuel moisture. As a result, the Missoula Fire Science Laboratory predicts that over the next 95 years the fire season will increase by 17 days (32 percent), fire danger will increase by 15 percent, drought will increase by 16 percent, and fuel moistures will decrease by 16 percent.

Sources: 2017 Update to Pre-Disaster Mitigation Plan – Missoula County; Montana Climate Assessment (2017).

Wet Conifer Forests

The wet conifer forest group represents a single Fischer and Bradley Fire Group: Warm, Moist Grand Fir, Western Redcedar, and Western Hemlock Habitat Types (Fire Group 11). These forests are found on particularly wet topographic settings at lower and middle elevations. They are often dominated by grand fir, western hemlock, and western redcedar, and may have various

amounts of Douglas-fir and subalpine conifer species. These forests typically have a low fire hazard due to their moisture content but can support moderate- to high-intensity fire under drought conditions. Like subalpine forests, the fire-free intervals are typically greater than 100 years.

Wet conifer forests occupy only about 2% of land area in Missoula County. They are concentrated in the western-most portions of the Middle Clark Fork and Bitterroot subbasins, and along drainages and toe slopes in the Swan subbasin. They occupy 5% or less of each of these subbasins.

These forests are a very minor component in the WUI, occupying only 2% of WUI Intermix area and less than 1% of WUI Interface area.

Climate

Because of its location and proximity to the Continental Divide, Missoula County balances between a continental and maritime climate.[7] The county's valleys generally have warmer average annual temperatures than most of Montana, largely because polar, continental air fronts do not often penetrate west of the Continental Divide. Missoula County's climate is also characterized by pressure systems generated in the Pacific Northwest, influencing precipitation trends and weather patterns.

Temperature

According to Missoula International Airport weather records (1981-2010),[8] the annual average temperature in Missoula County is 45.9°F with an annual maximum of 58.1°F and an annual minimum of 33.7° F. Temperatures, at their extremes, vary from well below 0°F in the winter to above 100°F in the summer. Daily averages for maximum temperatures are 33°F (in January) and 86°F (in July).

Precipitation

Average annual rainfall is 14.13 inches, with an average annual snowfall of 37 inches (Table 2). However, there are large variations in precipitation between valleys, mountains, lower valleys, and upper valleys. For example, average annual snowfall for parts of the Bitterroot Range is referenced at approximately 50 to 60 inches. Historically, June has the highest precipitation of the year, averaging 2.09 inches throughout the month. Late summer and early fall are characterized by clear skies and warm days.

Relative Humidity

Average summer relative humidity (i.e., the amount of moisture in the air) can range from 30 to 40% in the daytime (late afternoon) and 75 to 83% overnight (very early morning), based on a 30-year average. In 1994 and 2000 (both severe wildfire seasons locally), the daytime readings

[7] 2010. Federal Emergency Management Agency Flood Insurance Study Missoula County, Montana and Incorporated Areas. Flood Insurance Study Number 30063CV001A.

[8] U.S. Climate Data http://www.usclimatedata.com/climate/missoula/montana/united-states/usmt0231) (accessed February 12, 2018).

for relative humidity in August averaged 19% and evening readings averaged 63%. The average winter daytime and evening readings (for December) are 80% and 86%, respectively.

Wind

Wind speeds during the summer months (at the Missoula Airport) average seven miles per hour (mph) from the northwest. According to the National Weather Service (NWS), typical July winds are often calm during the morning hours (9 am - 12 pm), but due to daytime heating, winds pick up to a sustained six to seven mph until about 9 pm, when they generally calm again. During the Black Mountain Fire of 2003, sustained winds were measured at 20-25 mph with gusts of 40-45 mph.

Table 2. Missoula International Airport Average Monthly Weather[9]

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Average High (°F)	33	39	50	58	67	75	86	85	73	58	42	31
Average Low (°F)	18	21	28	33	40	47	51	50	42	32	25	17
Average Precip. (inches)	0.87	0.71	0.98	1.22	2.01	2.09	0.98	1.18	1.18	0.87	1.02	1.02
Average Snowfall (inches)	8	6	5	1	0	0	0	0	0	1	5	11

❖ Fire Weather

While the climatology above describes the long-term averages for temperature, precipitation, relative humidity, and winds, the behavior of a fire at any specific point in time is largely driven by local conditions in that area at the time of the fire. This is referred to as the fire weather. Fire behavior specialists have special indices that integrate multiple weather factors important to the potential for ignition, spread, and heat release of a wildfire. The Energy Release Component (ERC) is an index related to the potential energy of a fire at the flaming front and is generated from weather and fuels inputs. It is considered a good measure for seasonal dryness trends in large fuels making it a good indicator of seasonal severity and potential fire duration and severity, especially in timbered areas. ERC is influenced by the minimum and maximum relative humidity and temperature, and duration of precipitation during the past 24-hour period. It is also sensitive to precipitation during the preceding weeks and its influence on moisture content in large, downed wood. Conditions are generally favorable for wildfire spread when ERC is above the 80th percentile, with extreme fire danger occurring when ERC is above the 97th percentile.

Figure 8 presents several traces of ERC from April 1 through October 31 that are helpful to describe typical and extreme seasonal severity in Missoula County. This graph was produced with data from the weather station at the Ninemile Ranger Station, which has a long and stable history of observations. These data are from the 20-year period from 1998 to 2017. The solid gray line represents the average across all 20 years. It shows a typical pattern of low ERC values in the spring, rising slightly with snow melt and green-up, then dipping in June due to higher precipitation amounts common in that month. With the onset of dry summer conditions in July,

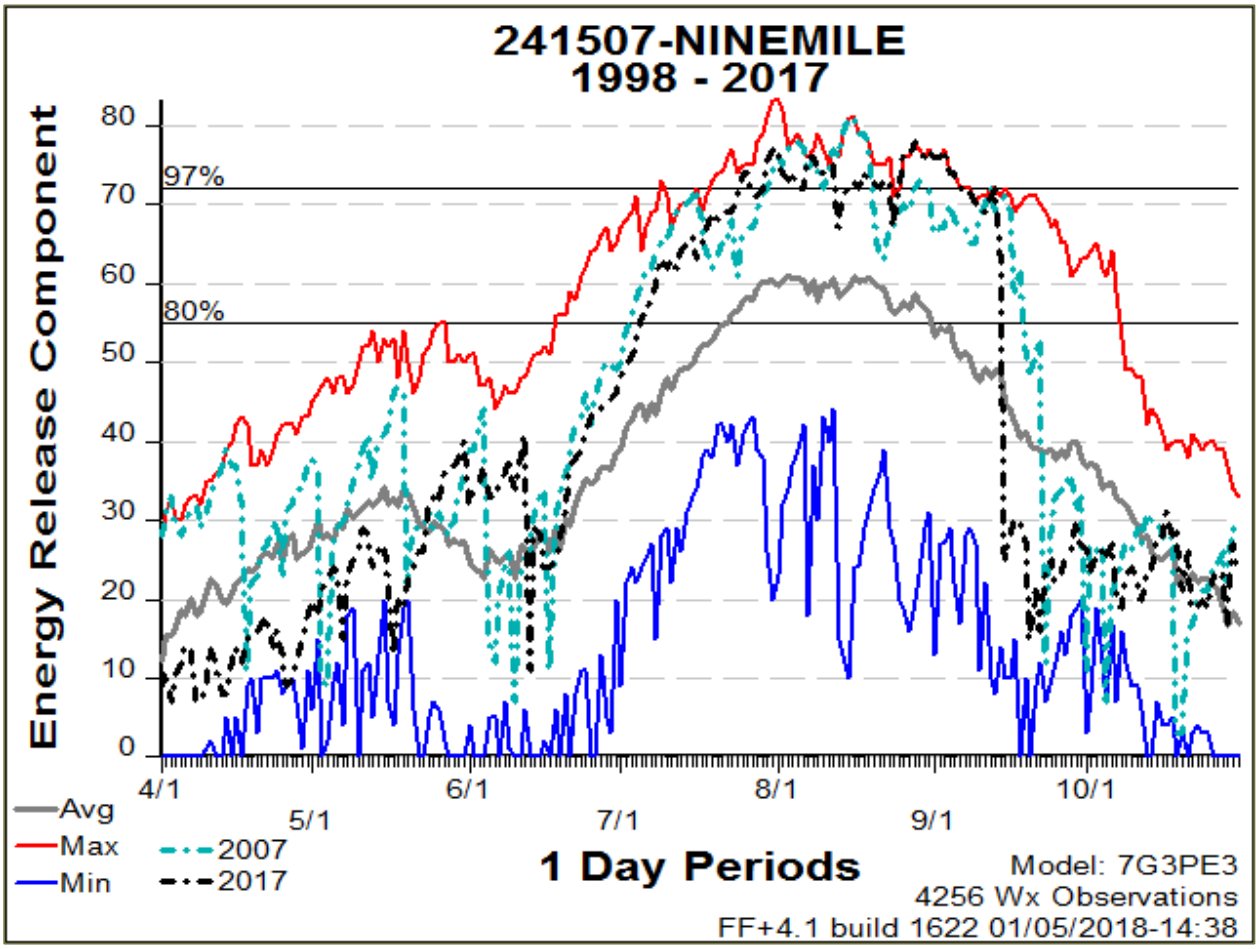
[9] U.S. Climate Data http://www.usclimatedata.com/climate/missoula/montana/united-states/usmt0231 (accessed February 12, 2018).

ERC rises steadily and in an average year it gets above the 80th percentile (i.e., favorable conditions for wildfire) from mid-July through late-August. As periodic moisture occurs in September and October along with steadily decreasing solar insolation, ERC drops steadily, as does the potential for wildfire.

Extremes in seasonal severity are shown as blue (minimum ERC) and red (maximum ERC) lines on the graph. These are the lowest and highest ERC values recorded on any particular date, and the lines don't necessarily reflect specific years. The minimum line reflects that with consistent summer precipitation, it is possible for ERC to never get to the 80th percentile, making wildfire spread unlikely. Conversely, the maximum line shows that it is possible for ERC to reach the 80th percentile as early as May and stay above that threshold into October.

Two particularly significant fire years for Missoula County are shown as dashed lines. More than 50,000 acres burned in 2007 from fires that originated within Missoula County. ERC set new record high values in April of that year and rebounded fairly quickly from each major precipitation event in the spring (dips followed by peaks). Starting in late June it rose rapidly and set new record high values again in mid-July, early August, and mid-September. ERC was above the 80th percentile in 2007 from the beginning of July through mid-September. The most significant fire year in the past two decades in terms of area burned was 2017. In that year, ERC was below average through most of the spring due to significant snowpack and spring moisture. However, starting in mid-June of 2017 the precipitation stopped, temperature remained consistently high, and ERC rose rapidly. By late summer much of western Montana was in what meteorologists called a "flash drought" and ERC was above the 97th percentile for most days between late July and early September. Despite having very different spring conditions, the number of days the ERC remained above the 80th and 97th percentiles was similar for both 2007 and 2017.

Figure 8. A Graph of Energy Release Component (ERC) from the Ninemile Ranger Station, 1998-2017



ERC is an index commonly used to indicate seasonal severity, especially in timbered areas. Solid lines represent the minimum (blue), average (gray), and maximum (red) ERC values recorded for each day over the 20-year period. Dashed lines represent two significant fire years for Missoula County – 2007 (green) and 2017 (black).

❖ Fire History

An analysis of wildfire activity in Missoula County over the past 20 years is also useful for understanding current patterns of wildfire activity (Figures 9 and 10). From 1998 to 2017, there were a total of 3,034 recorded fires that burned 393,036 acres (23% of county land area). The number of fires in any year varied from approximately 50 to 240, with an average of about 150 fires per year. Many of these fires, however, were very small; 72% were under 0.25 acre, and 97% were under 10 acres. Only about 1% of all fires were larger than 1,000 acres. Only five years (2000, 2003, 2007, 2013, 2017) recorded more than 10,000 acres burned. Three of these years (2003, 2007, 2017) had more than 50,000 acres burned. The fire season of 2017 was particularly exceptional, with more than 230,000 acres burned – almost four times more area than the next largest year (2003).

Other useful statistics for wildfire planning and preparedness include seasonality, cause, and daily fire load. Not surprisingly, most fires in Missoula County burn in the summer months. Approximately 65% of wildfires occur in July and August, while an additional 10% occur in September. Of the remaining 25%, most occur in April, May, June, and October. Lightning is the

largest single cause, accounting for 40% of all fires, but all human causes together are responsible for 60% of fire starts. Of these, debris burning (14%) and arson (14%) are the most common specific causes, and 24% fall into the catch-all miscellaneous class. In terms of daily fire load, there were 1,506 days from 1998 to 2017 with at least one wildfire in the county. This equates to an average of 75 fire days per year; 58%% of these days had just one fire, 22% had two fires, 8% had 3 fires, and 5% had 4 fires (93% cumulatively with four or fewer fires). These fire activity statistics are a product of the fuel conditions, weather, ignitions, and fire management practices of the past 20 years and are presented here to provide context for the level of wildfire activity Missoula County may expect in the near future.

Since the early 1900s, a number of significant fire events in and around Missoula County have resulted in losses of life and property. During the Great Fires of 1910, 78 firefighters and an unknown number of citizens died. In addition, five towns and three million acres in Montana and Idaho burned that year, influencing America's wildland fire policies for most of the 20th century. Fires resulting in property losses in and around Missoula County in recent decades include the Pattee Canyon Fire (1977), the Black Mountain Fire (1994), the Bitterroot Fires of 2000, the Black Mountain #2 Fire (2003), the Woodchuck Fire (2006), the Jocko Lakes Fire (2007), the Black Cat Fire (2007), the Lolo Creek Complex (2013), the Roaring Lion Fire (2016), and the Lolo Peak Fire (2017). Ironically, the fire suppression policies put in place after the 1910 fires resulted in a disruption of natural fire cycles in many places, leading to a build-up of fuels. These increased fuel loads, combined with warmer and drier climatic conditions and longer fire seasons in recent decades, as well as increased development in areas adjacent to wildlands, have increased the challenges of mitigating potential negative impacts of wildfire on communities in recent years.

Figure 9. Location and Fire Size Class of Wildfires in Missoula County, 1998-2017

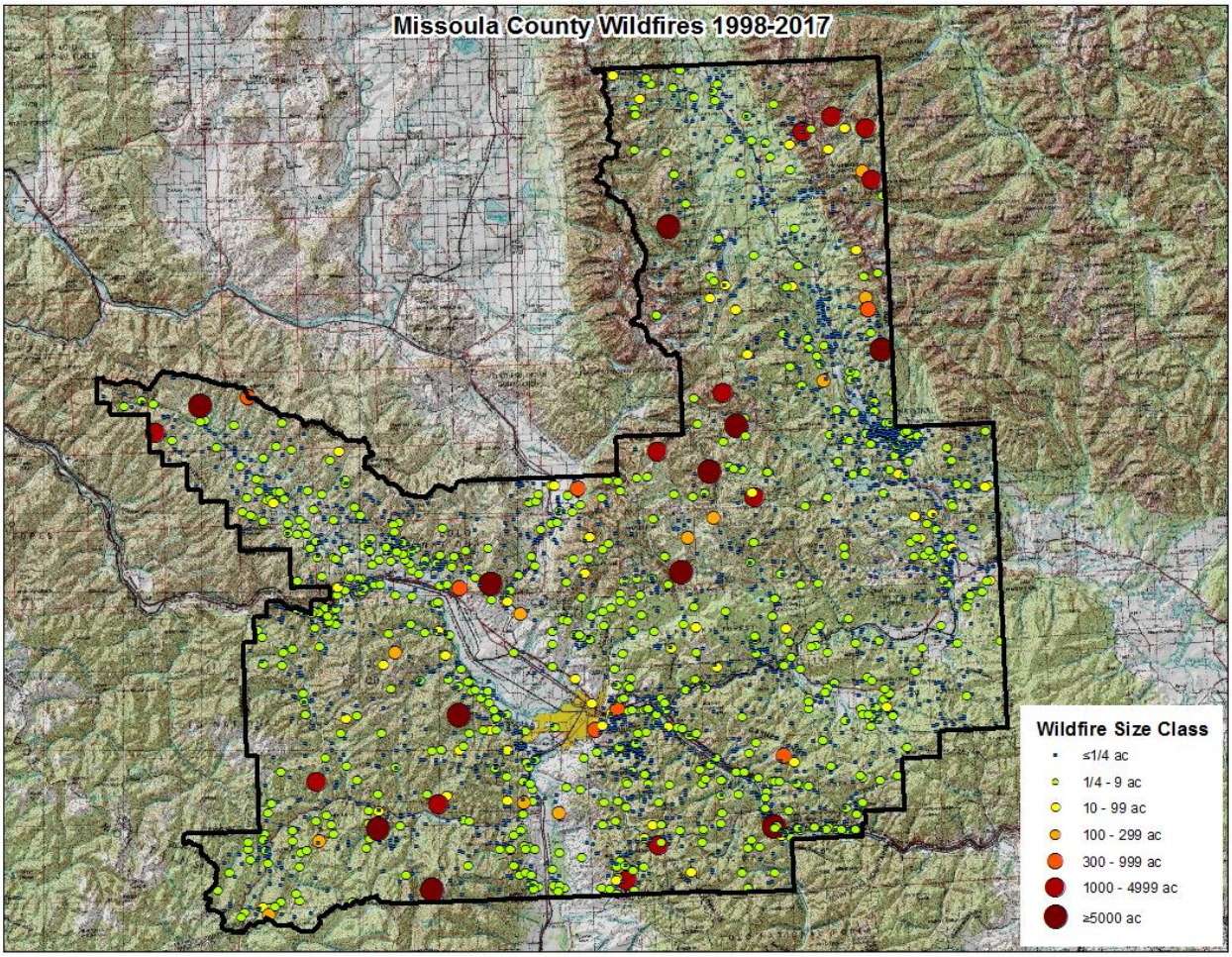
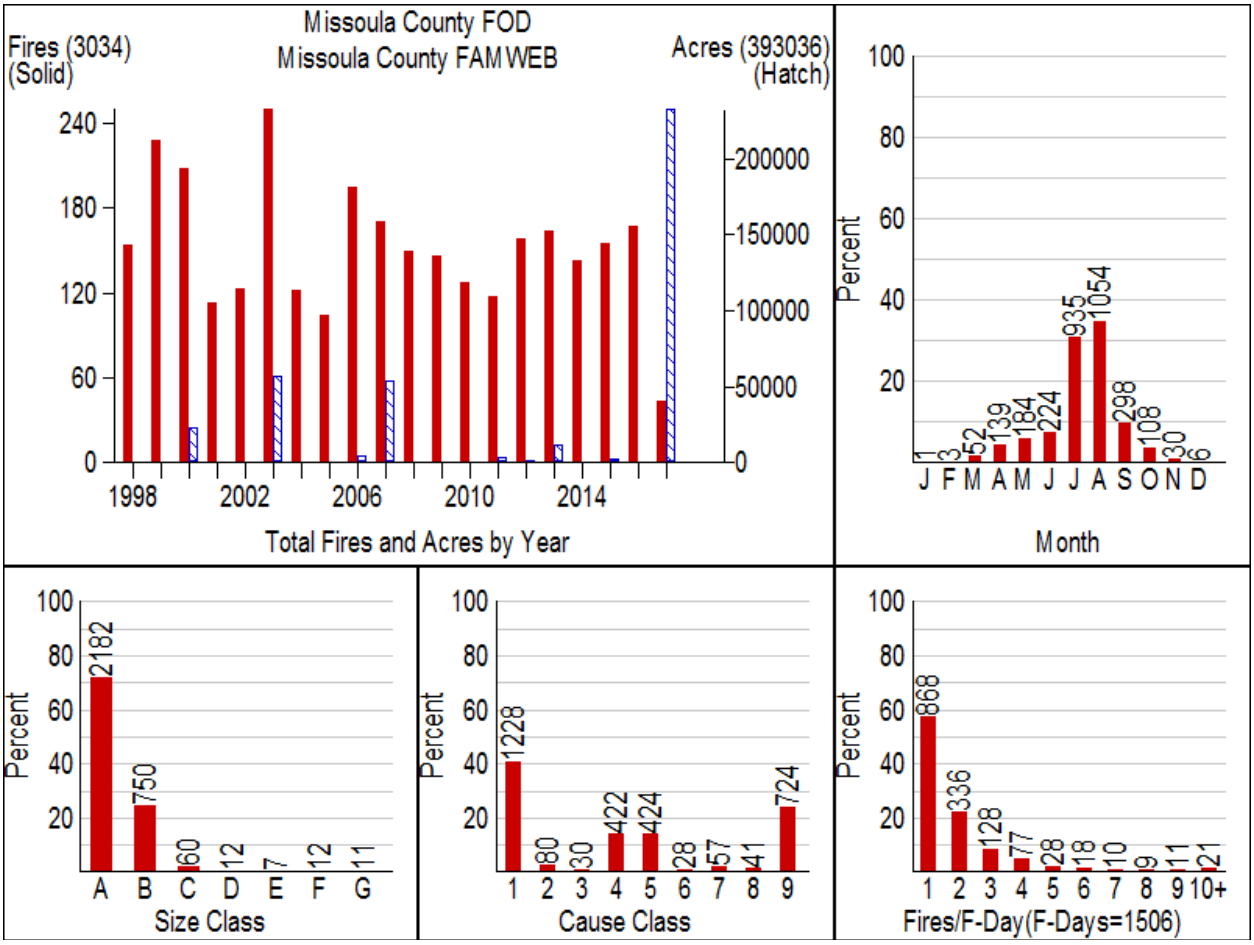


Figure 10. A Fire Summary Graph for Wildfires in Missoula County, 1998 to 2017[10]



Upper left: Annual summary of number of fires (solid bars) and area burned (hatched bars**). Upper right:** Number of fires by month of ignition**. Lower left:** Number of fires by final fire size class (classes: A is < 0.25 acres; B is 0.25 to < 10 acres; C is 10 to < 100 acres; D is 100 to < 300 acres; E is 300 to < 1000 acres; F is 1000 to < 5000 acres; G is ≥ 5000 acres). **Lower center:** Number of fires by cause class (classes: 1 is lightning; 2 is campfire; 3 is smoking; 4 is debris burning; 5 is arson; 6 is equipment use; 7 is railroad; 8 is children; 9 is misc). **Lower right**: Number of fires per fire day (i.e., daily fire load).

[10] Sources: FPA FOD (https://www.fs.usda.gov/rds/archive/Product/RDS-2013-0009.4/) for 1998 to 2015, USFS and Montana DNRC fires from the FAMWEB Data Warehouse for 2016 and 2017, and tribal fires for 2016 and 2017.

❖ Local Environment Summary

Wildfire has been a natural process shaping the landscapes of Missoula County for thousands of years, but it has the potential to cause significant damage to human developments. The native vegetation communities described above have all developed adaptations to wildfire and receive long-term ecological benefits from fires at most intensities. Ignitions from lightning will occur, and in most summers there will be weeks or months during which wildfire will readily spread.

Prescribed fire is one of the tools land managers use to manage and restore the natural fire environment. ***Credit: Albritton, BLM Missoula Field Office.***

Missoula County is not only the second most populous county in Montana, but has a widely variable population density that is expected to grow significantly over the next few decades. The fire environment combined with increased growth will likely exacerbate the potential for damage to human developments if left unchecked by appropriate mitigative strategies.

Eliminating wildfire from Missoula County is not possible or desirable. However, by understanding the fire environment, reducing the number of unwanted human ignitions, using prescribed fire as a tool when appropriate, and taking other measures to reduce wildfire spread and intensity around developed areas, it is possible to eliminate or reduce the loss of life and property from the wildfires that will burn in Missoula County.

Part 2. Risk Assessment

❖ Overview

Wildfire risk is a measure of both the probability and consequences of uncertain future wildfire events.[11] For any location within Missoula County, wildfire risk depends on the chances of a fire occurring there, the likely intensity of the fire, and the vulnerability of something of value at that location. Scientists describe these three components of risk using a triangle where the sides are likelihood, intensity, and susceptibility (Figure 11).[12] These three factors, and the resultant wildfire risk, vary across the county. In this section, we describe tools currently available to assess this risk in Missoula County. This provides spatial context for where different wildfire management and mitigation strategies will be most effective.

Figure 11. The Wildfire Risk Triangle

By understanding the components that contribute to wildfire risk and engaging in a coordinated and collaborative planning effort, the county can take steps to influence each side of the risk triangle in different ways. For example, prevention measures that reduce human-caused fires can reduce the likelihood of fire occurrence, particularly in areas of human activity. Vegetation treatments focused on reducing fuel loads can reduce the intensity of fires that do occur, and efforts to reduce the flammability of building materials and increase defensible space around structures and communities can reduce susceptibility of homes and other structures to wildfire.

[11] Thompson, M.P., T. Zimmerman, D. Mindar, and M. Taber. 2016. Risk Terminology Primer: Basic Principles and a Glossary for the Wildland Fire Management Community. Fort Collins, CO: USDA Forest Service Rocky Mountain Research Station. Gen. Tech. Rep. RMRS-GTR-349. https://www.fs.usda.gov/treesearch/pubs/50912

[12] Scott, J.H., M.P. Thompson, and D.E. Calkin. 2013. A wildfire risk assessment framework for land and resource management. Fort Collins, CO: USDA Forest Service Rocky Mountain Research Station. Gen. Tech. Rep. RMRS-GTR-315. https://www.fs.fed.us/rmrs/publications/wildfire-risk-assessment-framework-land-and-resource-management

Mapping Wildfire Likelihood, Intensity, and Hazard

Computer simulation modeling of hypothetical wildfires provides a robust and defensible means of mapping wildfire likelihood and potential intensity. Fire models use weather data from long-term stations in the county (like that presented in the Fire Environment section of this document), along with detailed spatial data depicting topography and aspects of vegetation that characterize wildland fuels to simulate fire spread across the landscape from semi-random ignition points.[13] Simulations can be run for a specific set of weather conditions over a single burning period (i.e., a day) using a model called FlamMap.[14] Results from these types of simulations can provide insight into fire intensities that could be expected under "typical" or "near worst-case" conditions during fire season. Simulations can also be run for an entire suite of statistically possible weather scenarios across thousands of iterations of a whole fire season using a model called FSim.[15] The outputs from FSim include maps of the annual probability of fire occurrence and the most likely intensity for every pixel in the modeled landscape.

LEARN MORE: UNDERSTANDING RISK

Risk assessments delineate risk into classes (e.g., low, moderate, and high) based on a number of inputs. Community stakeholders, including first responders, policymakers, elected officials, and neighborhood groups, use this information to inform their activities.

It's important to keep in mind that classifications such as "low" and "moderate" risk do not mean that there is *no* risk. Many wildfires occur in areas other than "high" or "extreme" risk areas, and can have negative consequences. For this reason, communities should consider all risk when discussing potential wildfire impacts.

Ultimately, a community must determine what level of risk is acceptable, and make appropriate risk reduction decisions.

Fortunately for Missoula County, simulations from both FlamMap and FSim that cover the entire county were completed in 2016. The FlamMap modeling was done by the Anchor Point Group as part of the Community Planning Assistance for Wildfire effort for the county. This work used 90th percentile weather conditions to reflect fire behavior during a typical day during the fire season. The FSim modeling covering the county was done by the U.S. Forest Service Rocky Mountain Research Station (RMRS) as part of a wildfire risk assessment for the Lolo National Forest. Both efforts used input data representing landscape fuel conditions as of 2015, and weather data from Remote Automated Weather Stations (RAWS) in and around Missoula County. Additional details about the two projects are described in a comparison report mutually produced by Headwaters Economics and RMRS.[16]

[13] Location of ignition points is computer-generated but informed by the generalized spatial pattern of actual ignitions in recent decades.

[14] https:/www.firelab.org/project/flammap

[15] Finney, M.A., C.W. McHugh, I.C. Grenfell, K.L Riley, and K.C. Short. 2011. A simulation of probabilistic wildfire risk components for the continental United States. Stochastic Environmental Research and Risk Assessment 25: 973-1000. https://www.fs.usda.gov/treesearch/pubs/39312

[16] Headwaters Economics. 2016. A Comparison of Two Wildfire Risk Modeling Approaches in Missoula County, Montana. Bozeman, MT.

The outputs from both modeling efforts are integrated and summarized here to provide an overview picture of spatial variation in wildfire risk components in Missoula County. The raw outputs from modeling are raster, or pixel-based, datasets that divide the landscape into evenly-sized square cells. For the FlamMap modeling, these cells were 30m (97ft) on a side. The increased complexity of FSim modeling required larger cells, each 180m (583ft) on a side. Summarizing these pixel-based datasets into larger polygon areas is important because any one spot on the landscape is inevitably impacted by the values of its neighbors. Displaying results by summary polygons makes them more easily interpretable, and allows for broad-scale patterns to emerge that may not be immediately visible in the pixel datasets. Therefore, outputs of wildfire likelihood and intensity are summarized below using fine-scale watershed polygons, referred to as catchments.[17] There are 2,751 catchment polygons that intersect Missoula County, ranging in size from about 40 to 9,900 acres (average = 697 acres). We calculated the average likelihood and intensity values for each catchment, as well as the integrated wildfire hazard, which combines likelihood and intensity into a single index.

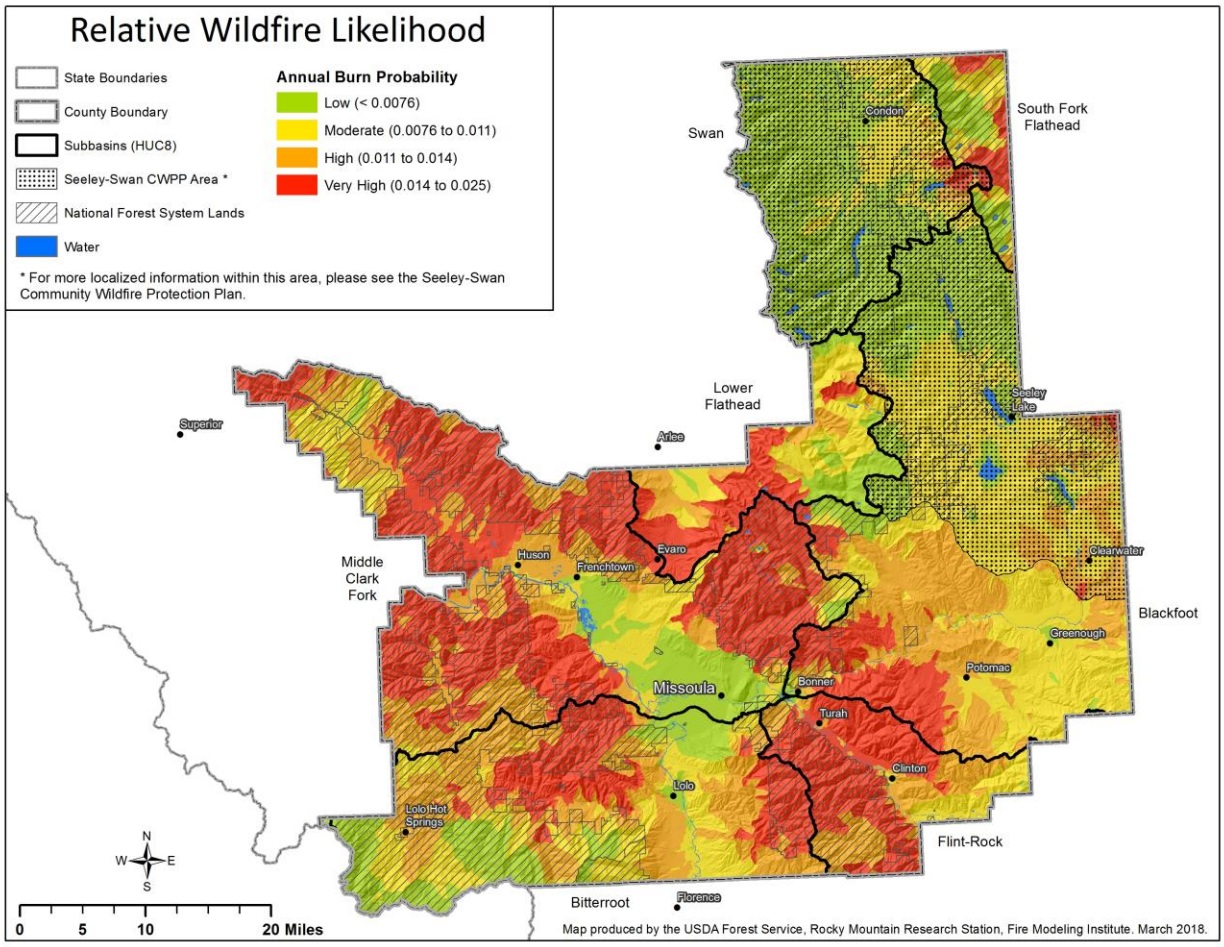
Likelihood

The best data product available to represent wildfire likelihood in Missoula County is the burn probability (BP) output from the FSim modeling done for the Lolo National Forest risk assessment. It represents a true annual burn probability that considers all possible weather scenarios. This provides a long-term perspective on the relative likelihood of fire for any location in the county in any given year.

To produce a map of relative likelihood for the county, the average BP for each catchment was calculated, and those averages were classified those into four classes of low, moderate, high and very high (Figure 12). The classes are relative to the distribution of catchment averages only within Missoula County, and are based on quartiles. Therefore, the high and very high classes represent all catchments with an average BP value above the county median. The average BPs for watersheds range from 0 to 0.025, with a mean of 0.01. This means, on average, any *specific location* (i.e., 180-m pixel) has about a 1 in 100 chance of burning in any given year.

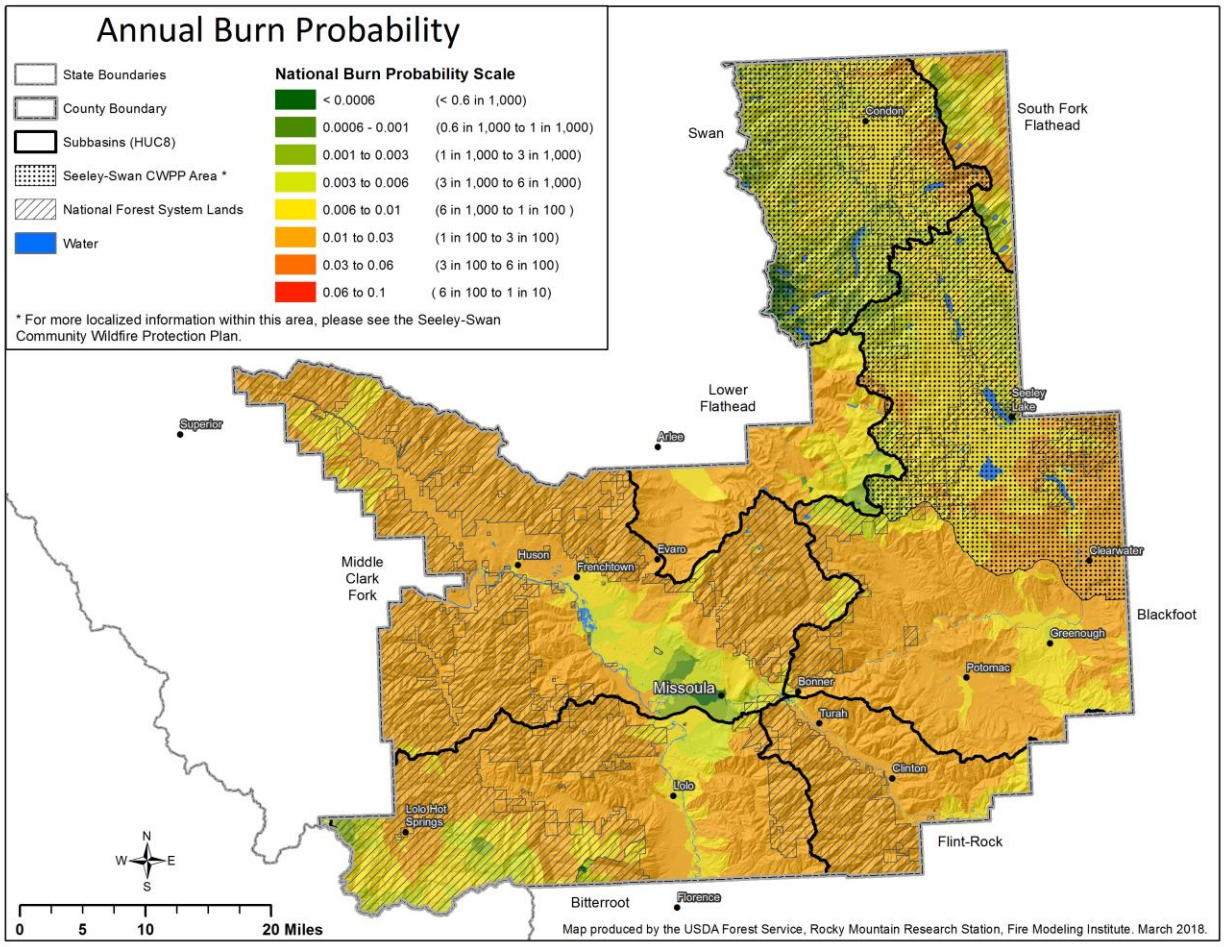
[17] Source: US EPA and USGS National Hydrography Dataset Plus v2. https://www.epa.gov/waterdata/nhdplus-national-hydrography-dataset-plus. Catchment polygons smaller than 40 acres were merged into adjacent polygons.

Figure 12. Relative Likelihood of Wildfire in Missoula County



In general, wildfire likelihood is highest on forested, middle- to upper-elevation sites in the western and southern parts of the county. While there is some high to very high likelihood in the southern portion of the Blackfoot subbasin, the Blackfoot and Swan subbasins have mostly lower burn probability than the rest of the county. Areas of particularly low likelihood include the Mission Mountains on the west side of the Swan subbasin, the northern portion of the Blackfoot subbasin, and the heart of the Missoula Valley. However, it is important to stress again that the four likelihood classes shown here are just a relative distribution within the county. When mapped on a standard national scale for burn probability (Figure 13), it is clear that most of the county is in the moderate to high range of burn probability. Indeed, the average of annual burn probability for the county (0.01) is quite high compared to many other areas of the country.

Figure 13. Annual Burn Probability in Missoula County

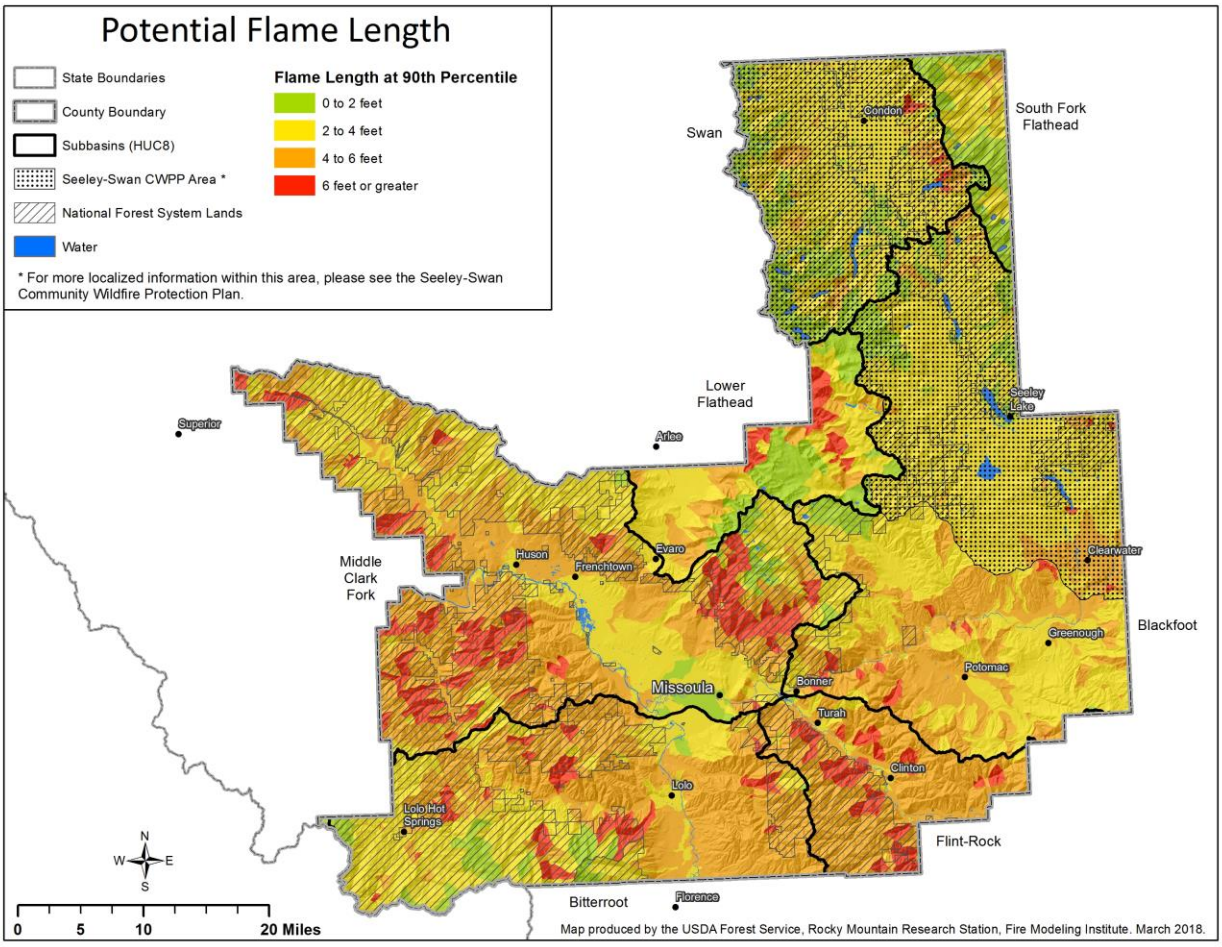


Intensity

The datasets available to represent potential wildfire intensity include the flame length modeled for a typical fire day (90th percentile) using FlamMap, and the conditional flame length from FSim that represents the average intensity for each pixel from many simulated fires. The two products are fairly similar, but the intensity from FlamMap may be more appropriate for the purposes of the CWPP. The fact that FSim intensities are averaged across many fires representing a range of conditions causes less variation from one catchment to another and fewer catchments showing potential for higher intensity fire. Therefore, the flame length map from FlamMap is presented here.

The map of relative wildfire intensity for the county was created by calculating the average 90th percentile flame length for each catchment and grouping those into four classes (Figure 14). In this case, the classes are based on standard flame length categories of 0 to 2 feet, 2 to 4 feet, 4 to 6 feet, and 6 feet and greater. The average flame lengths for catchments range from 0.01 to 14, with a mean of 3.8 feet.

Figure 14. Potential Flame Length for a Typical Fire Day in Missoula County



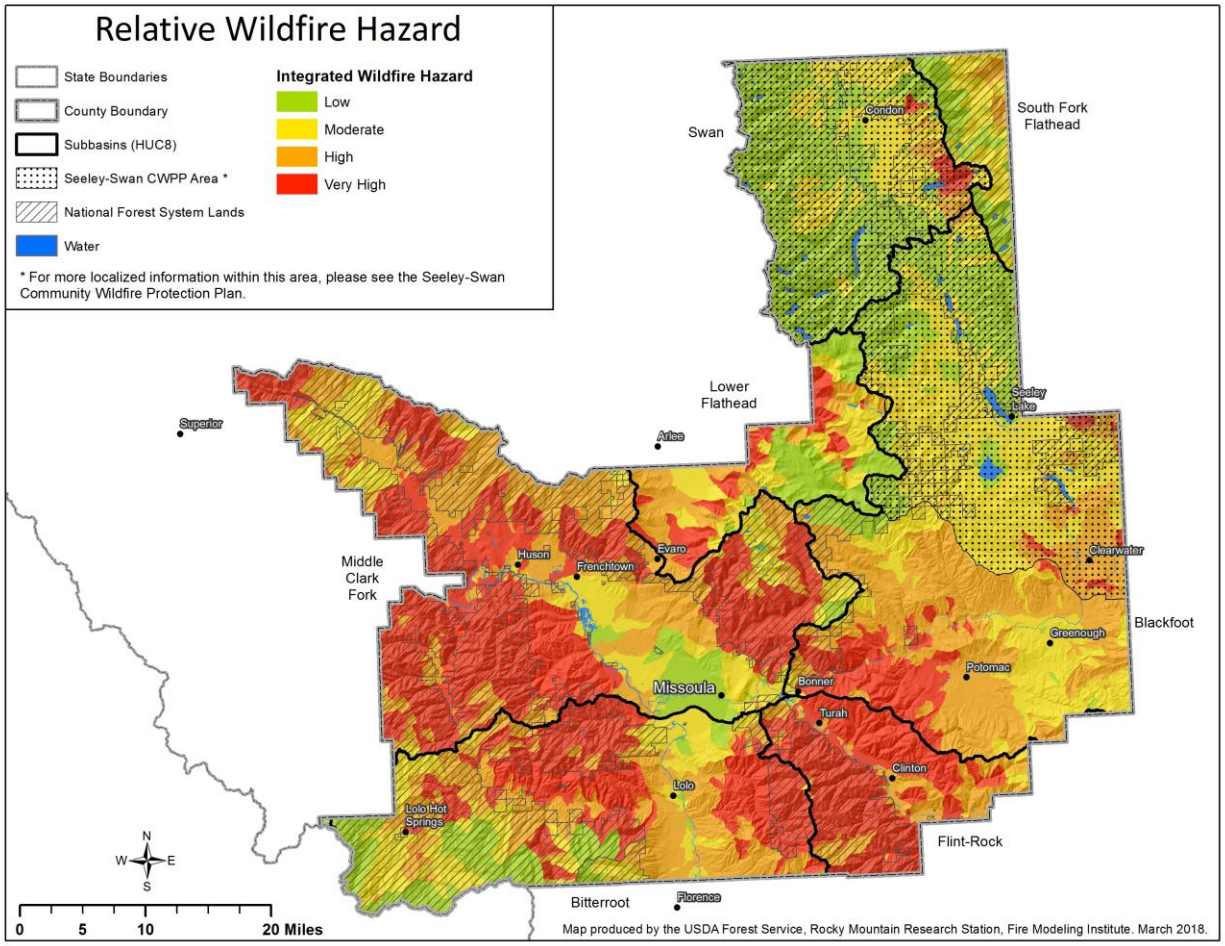
Areas with the highest potential fire intensity are mostly middle-elevation watersheds, likely with higher fuel loads, while the lowest intensity areas are generally at higher elevations that retain moisture longer into the summer and may have more sparse fuels. The majority of the county has low to moderate potential flame lengths under the modeled 90th percentile conditions.

Hazard

Taken together, the likelihood and intensity sides of the wildfire risk triangle represent wildfire hazard. An index of hazard, therefore, can be calculated by multiplying burn probability by the expected flame length. We did this at the pixel level by multiplying the burn probability from FSim by the 90th percentile flame length values modeled by FlamMap. The result represents the relative degree of wildfire hazard for each pixel under 90th percentile weather conditions. The average of this hazard index within each catchment polygon is presented here (Figure 15). As with likelihood, the average hazard values for catchments were grouped into four classes based on quartiles of the distribution across the county. The actual numeric values of hazard are less directly interpretable than BP or flame length, but they do provide a relative depiction of hazard across a landscape.

In comparing all three maps, the contributions of likelihood and intensity are both apparent in the hazard map. As with likelihood, the areas of highest hazard are in the western and southern portions of Missoula County, but there are pockets of high to very high hazard in each subbasin.

Figure 15. Relative Wildfire Hazard in Missoula County



Susceptibility and Risk

Information about susceptibility (or vulnerability) of specific assets is more difficult to map. Neither the Anchor Point nor the RMRS work in Missoula County provides enough information to adequately represent the susceptibility of communities to wildfire. While the Anchor Point analysis included some datasets that could address community-level susceptibility (e.g., distance to roads, fire stations, water sources, golf courses, etc.), their assessment did not integrate this information with likelihood and intensity data into standard, accepted metrics of risk. The RMRS analysis for the Lolo National Forest did develop abstract estimates of susceptibility (known as response functions) for a variety of natural resources and built assets, but the focus of that assessment was on setting land management and wildfire management priorities on National Forest lands. The response function for communities developed in that analysis estimated negative impacts to communities at all levels of fire intensity, but these impacts are vaguely defined and not specific for different types of structures. While information from both

assessments provides some insights into wildfire risk, neither facilitates a thorough mapping of risk across the county.

Moving forward, susceptibility could be evaluated in a few different ways to facilitate calculation of wildfire risk metrics in and around developed areas in the county. At a community or neighborhood scale, factors similar to those used in the Anchor Point assessment could be used to develop community-level susceptibility ratings. The rating areas could be watersheds, like the catchments used here, but may be more meaningful if they represent specific community or neighborhood boundaries used for planning and fire response purposes. Within each rating area, factors such as ingress/egress, distance to nearest fire station (or average response time), local water supply (e.g., streams, lakes, cisterns, etc.), and structure density could inform integrated ratings of community susceptibility to wildfire of different intensities.

At the parcel level, assessments of invidiual structures that evaluate factors such as building materials, defensible space, and fuel loads on the property can inform susceptibility at a much finer scale. The Missoula County Fire Protection Association and some individual fire districts are currently undertaking such assessments. The Montana Department of Natural Resources and Conservation (DNRC) has also developed a program using software developed for the state of Montana by the Intterra Group (Situation Analyst)[18] which may be useful to fire districts in supporting this task. As with the community scale, susceptibility ratings at the parcel scale should consider wildfire of different intensity levels.

Combined with susceptibility information at either of the scales described above, the likelihood and intensity data presented here could be used to calculate relative wildfire risk to either communities or individual parcels. With spatial data for all three sides of the wildfire risk triangle, a metric called Net Value Change (NVC) can be calculated that accounts for the risk posed by wildfire at different intensities for any location on the landscape. At the community or landscape scale, the NVC metric, and the component information used to calculate it, can support the prioritization and planning of specific community-level mitigation through vegetation management and local land use planning and policy. At the parcel scale, the same information can support landowners in making the right decisions to make their property fire safe.

Firesheds

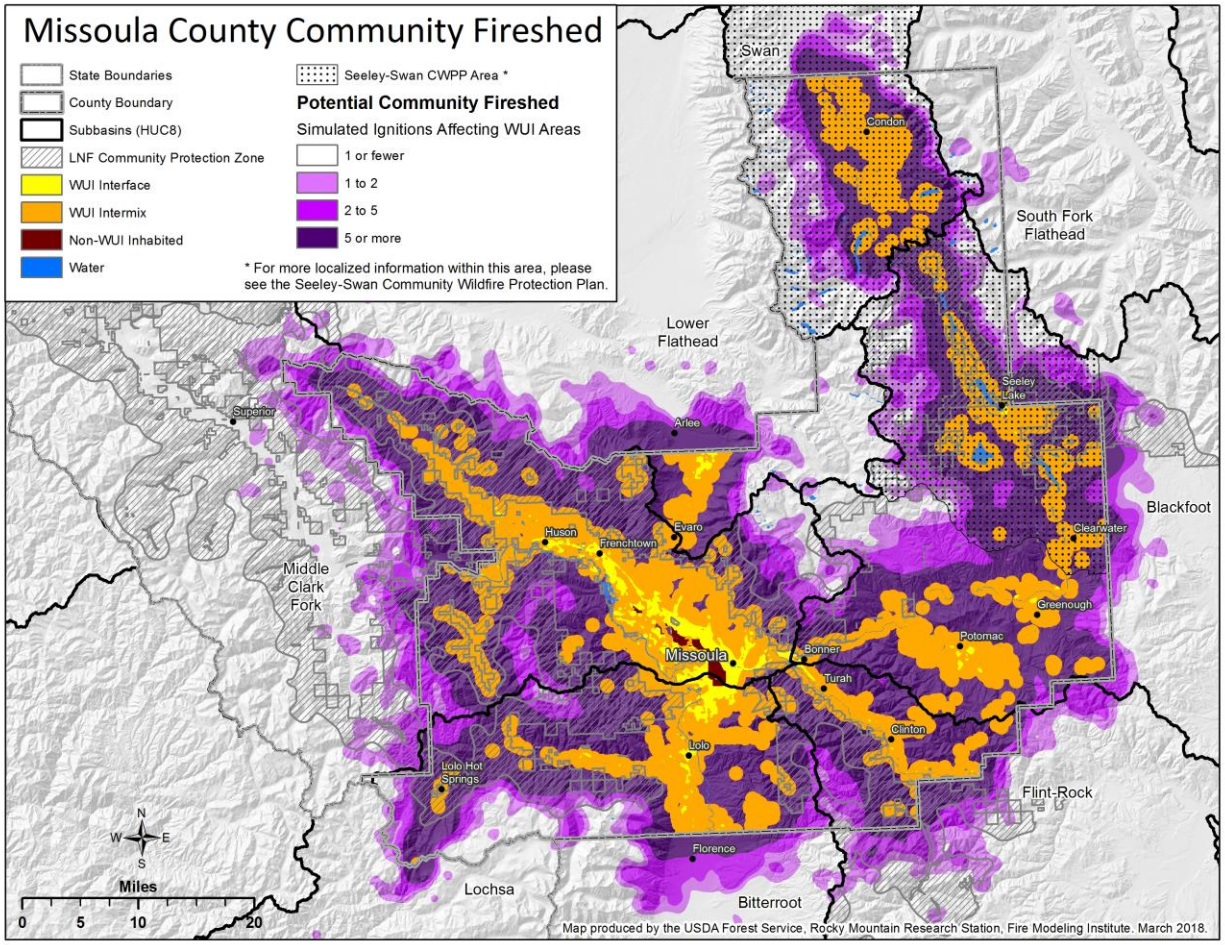
Wildfire is inherently a process that operates on the landscape independently of ownership, jurisdictional, or other municipal boundaries. For that reason, it is important for communities to look beyond their boundaries and consider the contributing area from which wildfires might impact areas within the community. Just like a watershed is the land area from which water may drain to a specific point, line, or area, a "fireshed" is a potential source area for wildfires that could impact a particular location.[19]

[18] http://dnrc.mt.gov/divisions/forestry/fire-and-aviation/fire-prevention-and-preparedness/home-fire-risk
[19] Scott, Joe H.; Thompson, Matthew P. 2015. Emerging concepts in wildfire risk assessment and management. https://www.fs.usda.gov/treesearch/pubs/49444

Firesheds can be spatially defined using data generated by a simulation model like FSim. In addition to the pixel-based outputs depicting burn probability and intensity, FSim also generates a polygon outline and associated ignition point location for each of the tens of thousands of simulated fires. These data make it possible to identify all simulated fires that reach an area of interest and where they came from.

For the purposes of this CWPP, all fires from FSim modeling that intersected areas with structure density greater than zero were used to generate a *community fireshed*. The ignition point locations for those fires can be used to create a map of ignition density; looking at different thresholds in this ignition density then provides a way to visualize the potential community fireshed (Figure 16). Again, these firesheds represent areas with the greatest potential for wildfire ignitions, under the right conditions for fire growth, to result in direct impacts to structures in Missoula County.

Figure 16. Community Fireshed in Missoula County



Similar fireshed concepts were used by the Lolo National Forest in their wildfire risk assessment completed in 2016. Using the same FSim data used here, they delineated a "Community Protection Zone" from the ignition density of simulated wildfires impacting communities and other lands neighboring National Forest System lands. Figures 5 and 16 show this Community Protection Zone and how it relates to both WUI and the community fireshed for the county. The Community Protection Zone is one of four strategic fire management zones delineated on the Lolo National Forest as a result of their risk assessment.[20]

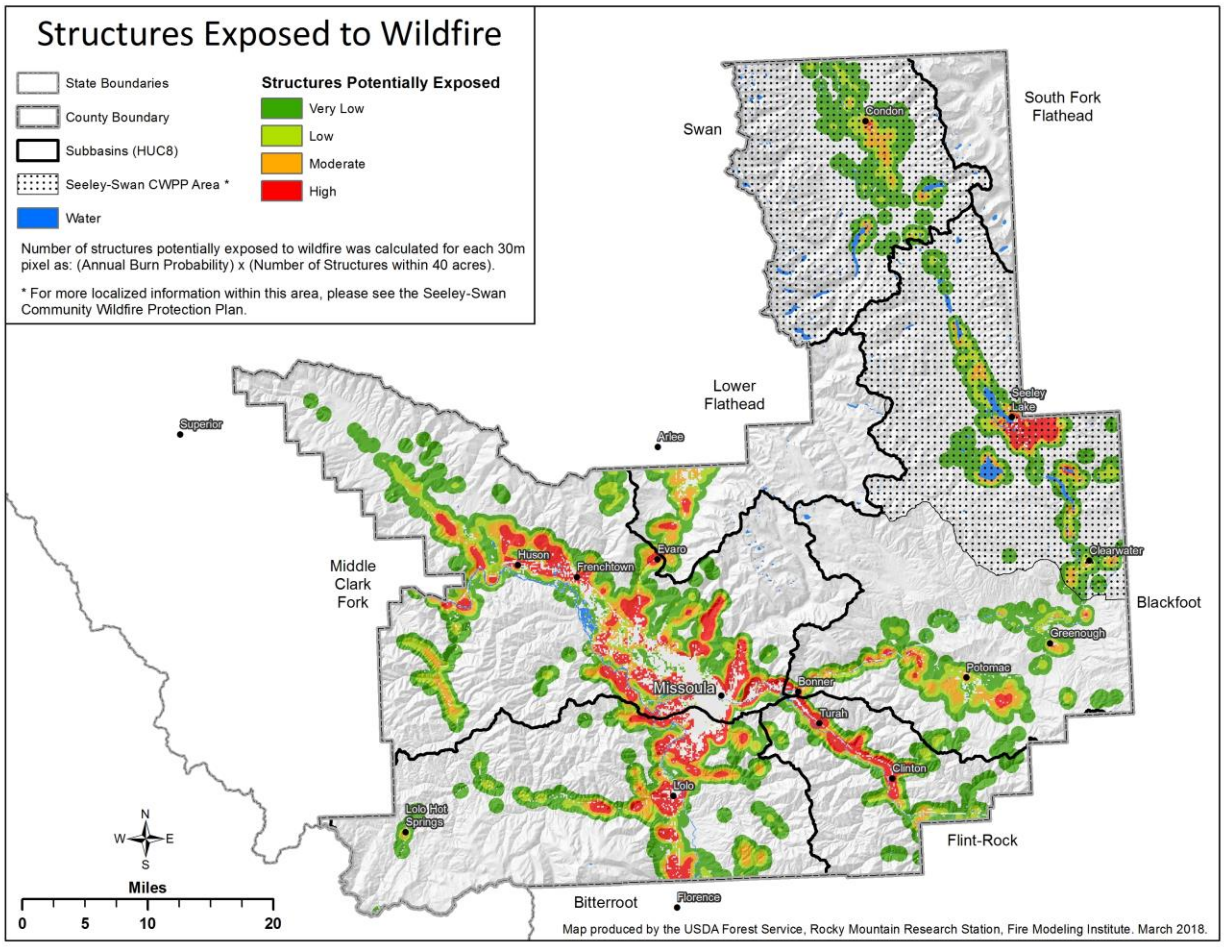
Exposure

Another metric related to risk is wildfire exposure, which refers to the spatial intersection of wildfire likelihood and intensity with something of value. In the case of this community assessment, we can measure the potential structures exposed to wildfire as well as the source areas that result in wildfire exposure to structures.

To evaluate potential structures to wildfire, the annual burn probability from FSim can be multiplied by the structure density per pixel (Figure 17). The result looks very much like the structure density map (Figure 4), except that areas that do not have wildland fuels (i.e., core developed areas) have a burn probability of zero and therefore do not show structure exposure. This map highlights areas where direct flame contact with structures is possible.

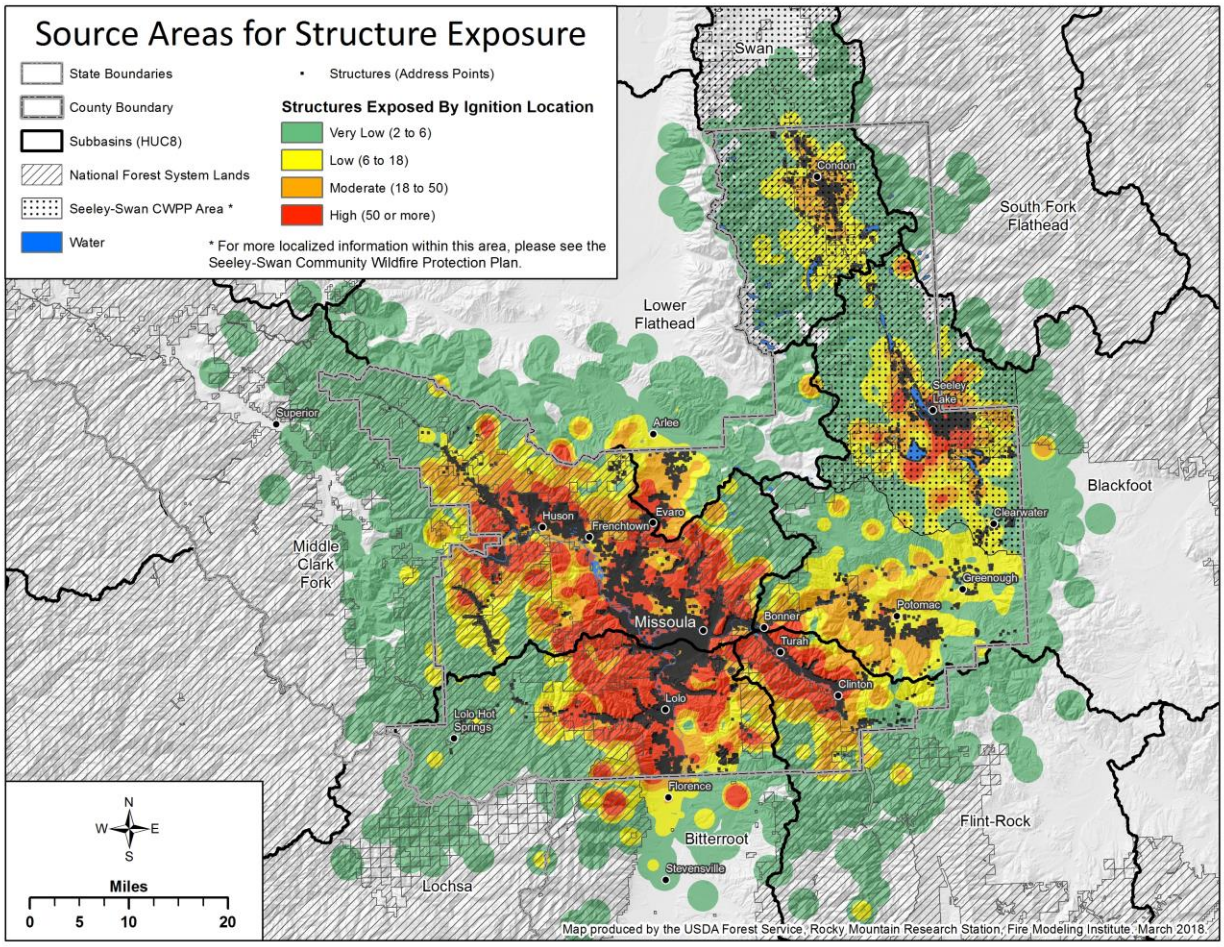
[20] More information about how the Lolo National Forest is prioritizing fuel treatments and fire management activities in the Community Protection Zone is available in an interactive online story map.
https://usfs.maps.arcgis.com/apps/MapJournal/index.html?appid=115847256eec4ad7b9371beb2d34d1b3

Figure 17. Structures Exposed to Wildfire



To identify source areas that could result in structure exposure, we used the same data used to generate the community fireshed – polygon and ignition point data from fires simulated with FSim. Using the structure density data, it is possible to calculate the total number of structures impacted by each simulated fire. An ignition density map can then be produced that shows the number of structures potentially exposed by wildfires starting in any particular location (Figure 18). This map is similar to the community fireshed map (Figure 16), but includes all possible ignition locations that could cause structure exposure. It also highlights two common patterns of structure exposure: 1) that fires starting close to areas of high structure density generally have the potential to expose the highest number of structures; and 2) that even fires starting quite far away from structures, and outside of the county, have potential to impact structures in Missoula County.

Figure 18. Missoula County Structures Exposed to Wildfire Based on Ignition Location



This information can be used to support the planning and prioritization of prescribed fire and other fuel treatments targeted at limiting the fire spread and intensity around communities and reducing the potential exposure.

Improve Risk Assessment Information

Specific CWPP actions to improve risk assessment information are:

1. **Update the Missoula County risk assessment and include WUI identification map.** Resulting landscape changes from the 2017 wildfire season should be incorporated into an updated wildfire risk assessment. This will require extensive field work and data analysis.

2. **Compile parcel-level assessment data to inform and complete risk assessment, increase first responder information, encourage public engagement.** Parcel-level assessment data will not only provide the susceptibility information required for a complete risk assessment, but will also provide valuable information for fire districts and residents to guide private property mitigation efforts.

❖ Risk Assessment Summary

The 2017 wildfire season was one of the worst fire seasons in Montana history both for acres burned and cost of suppression. Wildfires burning in and around Missoula County during the 2017 season resulted in over 300,000 acres burned; these fires have likely altered the local landscape significantly that are not yet fully understood. The 2016 wildfire risk assessments currently available to the county will require updating to reflect the changed landscape. This will require field data collection, fuels mapping, and an updated analysis of the risk based on this new information. Once this initiative is undertaken, it will take several months to complete. To continue the forward momentum of this CWPP update, the plan will be completed ahead of the new risk assessment and mapping. The 2016 analysis will be included in this CWPP and the updated risk assessment will be added later.

Part 3: Taking a Cohesive Strategy Approach In Missoula County

❖ Overview

The Federal Land Assistance, Management, and Enhancement Act of 2009 (known as the FLAME Act of 2009) directed the Secretary of the Interior and the Secretary of Agriculture to jointly submit a report to Congress which contained a cohesive wildfire management strategy. This led to the development of a National Cohesive Wildland Fire Management Strategy ("Cohesive Strategy")—a multi-phased effort engaging partners from federal, state, local, and tribal governments, non-governmental organizations, and public stakeholders to examine how the nation can plan for its wildfire future.

The Cohesive Strategy is centered around three goals to achieve its vision:[21]

- **Restore and maintain landscapes**: Landscapes across all jurisdictions are resilient to fire-related disturbances in accordance with management objectives.
- **Fire adapted communities**: Human populations and infrastructure can withstand a wildfire without loss of life and property.
- **Wildfire response**: All jurisdictions participate in making and implementing safe, effective, efficient, risk-based wildfire management decisions.

LEARN MORE: COHESIVE STRATEGY

The Cohesive Strategy's Vision for the next century is *to safely and effectively extinguish fire, when needed; use fire where allowable; manage our natural resources; and as a Nation, live with wildland fire.*

Three Regional Strategy Committees (Northeast, Southeast, West) were established in 2011 to support and facilitate implementation of the Cohesive Strategy.

Montana is part of the Western Regional Committee. More information about the Western Region's Cohesive Strategy activities, including success stories, can be found online at wildfireinthewest.blogspot.com

In an effort to align with the Cohesive Strategy, Missoula County stakeholders expressed an interest in organizing this CWPP update to address each goal at a local level. This alignment reinforces the importance of collaboration among all local, state, and federal partners, and helps organize the multi-faceted nature of wildfire topics and mitigation strategies under the most appropriate goal.

Each of the following sections provides an overview of the topic, local information, and strategies and resources to address this goal. Specific actions are located in the Action Table (Part 4).

[21] The National Strategy – *The Final Phase in the Development of the National Cohesive Wildland Fire Management Strategy.* Accessed May 3, 2017: https://www.forestsandrangelands.gov/strategy/documents/strategy/CSPhaseIIINationalStrategyApr2014.pdf

❖ Restoring and Maintaining Resilient Landscapes in Missoula County

Through fire suppression, human development, and the changing climate, the terrestrial ecosystem and the role of wildland fire have been significantly altered over time. Restoring landscapes to a resilient state and promoting fire's natural role in ecosystems where appropriate must be an integral part of increasing the county's resilience to wildfire and becoming fire adapted. To achieve this, an ecosystem-based approach to fire management that incorporates prescribed fire in overall land management planning objectives is important in achieving the desired fire effects and mitigating undesirable fire effects on the ecosystem and the public. Finally, post wildfire recovery is an important component in resiliency to ensure that any negative fire effects that impact the ecosystem and the community can be addressed to minimize their impact. With the diverse ownership of land, restorative land management will require a collaborative effort among multiple stakeholders.

Restoration and Maintenance Strategies

Restoration and maintenance strategies should align with the National Cohesive Strategy, as outlined below.

Ecology/Ecosystem-Based Fire Management

- Where allowed and feasible, manage wildfire for resource objectives and ecological purposes to restore and maintain fire-adapted ecosystems and achieve fire-resilient landscapes, including the importance of the high-intensity fire regime component.
- Restore forest processes that are currently under-represented in the landscape, compared to historical conditions, including low- and mixed-severity fire regimes.
- Maintain and promote the growth of specific large tree species component, which are also under-represented, across the landscape.
- Control and eradicate invasive and noxious weeds.

Insect outbreaks, such as the Mountain Pine Beetle (top), require strategies such as mechanical fuels treatment to harvest insect-affected areas (bottom). ***Credit: Hancock (top), Albritton (bottom), BLM Missoula Field Office***

Fuel Treatments for Landscapes (Public and Private)

The 2005 Missoula County CWWP identified priority fuel treatment areas across the county and within specific fire districts, as well as projects that were completed, or ongoing at the time (Appendix C). The plan also provided public communications on the following possible treatment options for these areas and did not receive any significant indication of preference or opposition from the public:

- Slashing and Underburning
- Slashing and Pile Burning
- Commercial Harvest with Ground Based Systems and Under burning
- Commercial Harvest with Ground Based Systems and Chipping
- Commercial Harvest with Ground Based Systems and Pile Burning
- Commercial Harvest with Ground Based Systems and No Fuel Treatment
- Thinning (pre-commercial or commercial)

A prescribed burn at Blue Mountain achieves multiple ecological and risk reduction goals. *Credit: Hensiek, US Forest Service.*

Moving forward, the following general fuel treatment guidance should be followed:

- Continue to design and prioritize fuel treatments (prescribed fire and mechanical treatments) to reduce fire intensity, structure ignition, and negative wildfire impacts to values.
- Where feasible, implement strategically placed fuel treatments to interrupt fire spread across landscapes.
- Use and expand fuel treatments involving mechanical, biological, or chemical methods where economically feasible and sustainable, and where they align with landowner objectives.
- Reduce the risk of wildfire by removing fuels, especially small-diameter trees, while maintaining forest structure to protect ecosystem components.

Prescribed Fire

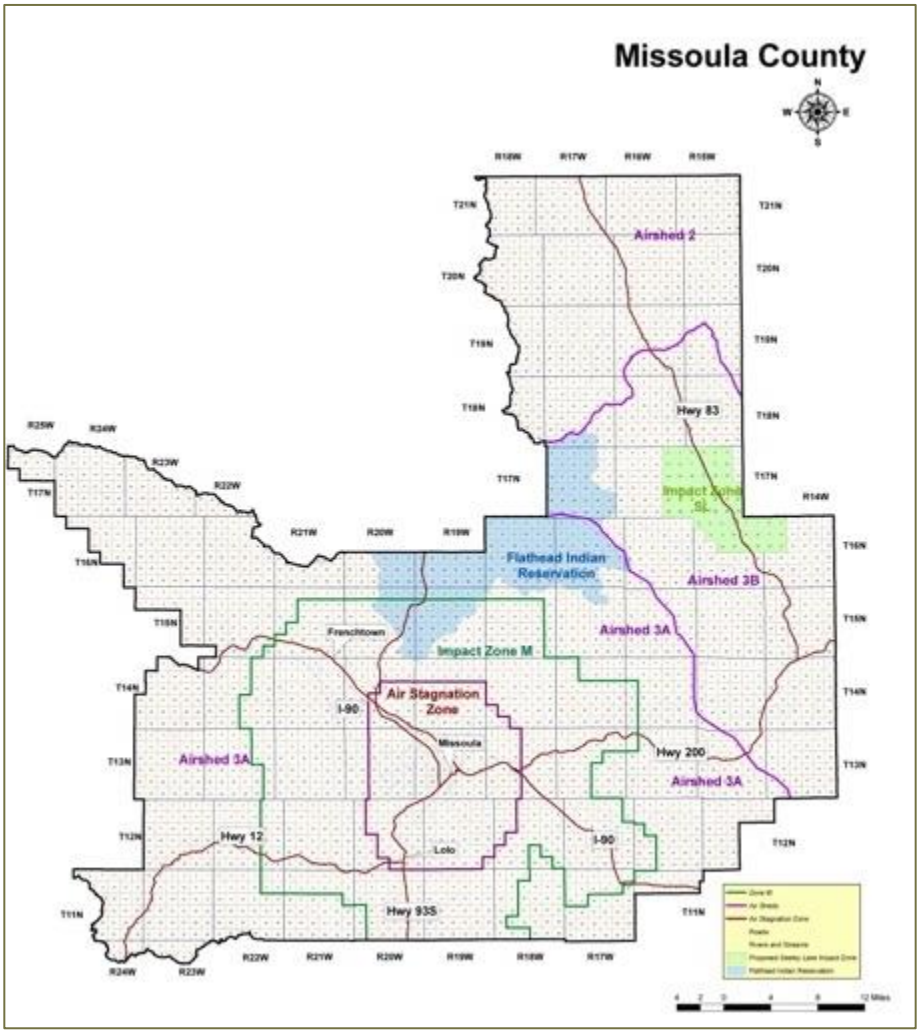
Prescribed fire continues to be recognized as an important fuel treatment and ecological restoration tool, where appropriate; therefore, stakeholders should:

- Continue and expand the use of prescribed fire to meet landscape objectives, improve ecological conditions, and mitigate negative wildfire impacts on human development.
- Ensure that prescribed fire planning includes the management of smoke in accordance with the Clean Air Act and the regulations and policies of the Environmental Protection

Agency (EPA) with specific reference to the Missoula County Airsheds and Smoke Impact Zones map (Figure 19).

- Ensure that prescribed fire planning follows state and local regulations.

Figure 19. Missoula County Airsheds and Smoke Impact Zones Map

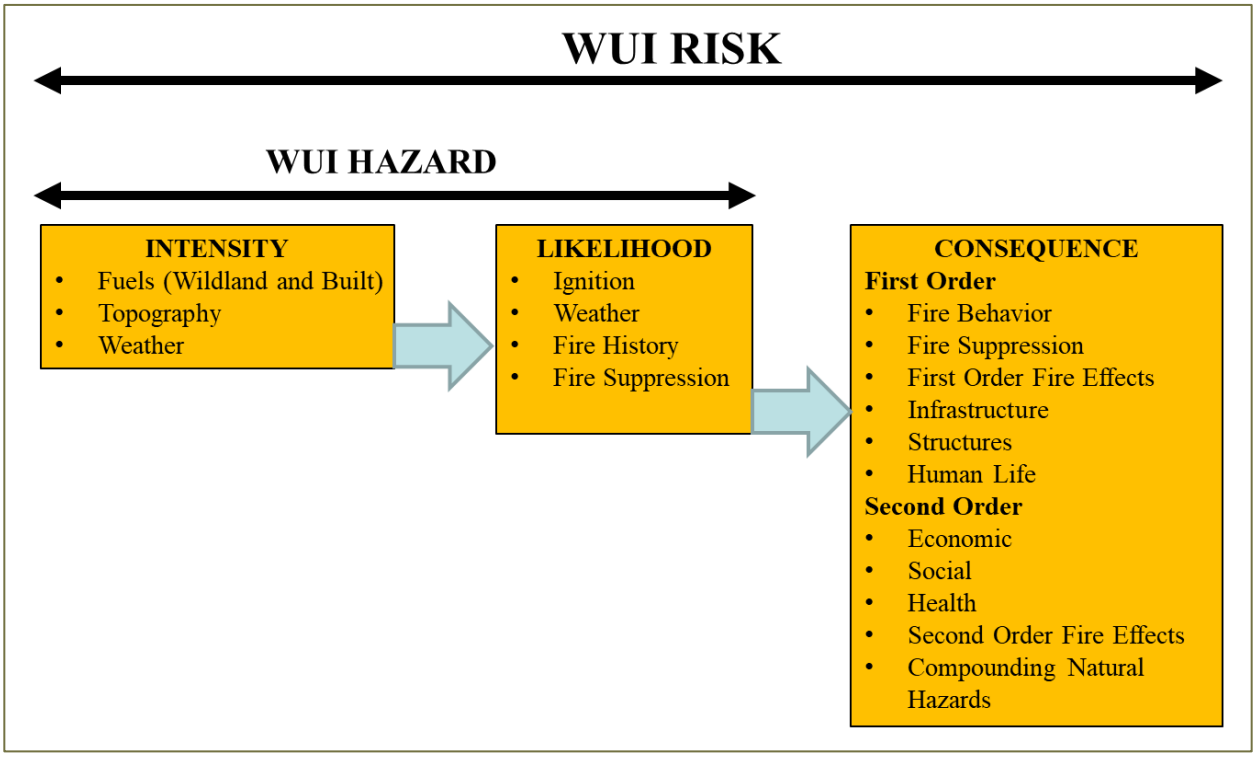


Post-Fire Effects and Recovery

A number of post-fire effects can result from either wildfire or prescribed fire occurrence. Prescribed fire planning goals and objectives are typically driven by desired ecosystem, or hazard reduction outcomes. These goals and objectives should be clearly stated in the prescribed fire plan and a monitoring program should be in place to measure the post-fire effects.

Wildfire events can result in significant post-fire impacts—both positive and negative. Risk assessments can provide guidance in anticipating post-wildfire impacts (Figure 20), mitigating these impacts before a fire occurs and reducing recovery efforts. The development of a post-wildfire recovery plan, based on the anticipated impacts, can help the communities affected become more resilient to wildfire.

Figure 20. Using a Wildfire Risk Assessment to Anticipate Post-Fire Effects



Land Management Planning (State and National Forest)

Collaborative planning efforts between county stakeholders, state, and national forest land managers should be ongoing. Actions resulting from the update of the Missoula County CWPP should be incorporated into both state and national forest land management plans.

Increasing Resiliency of Landscapes

Increasing resiliency of the landscapes within the county involves and requires an integrated approach.

Specific CWPP actions to increase resiliency of landscapes are:

1. **Review and identify priority landscapes and potential treatments options.**

   The 2005 CWPP priorities should be reviewed for relevance, and new potential priorities considered based on the updated hazard assessment information. Appropriate treatments (e.g. commercial thinning, hand thinning, prescribed fire) should also be determined and undertaken.

2. **Advance prescribed fire activities.**

   Prescribed fire use should be advanced in areas where it is determined to be the appropriate treatment for achieving ecological restoration or hazard reduction goals and objectives.

3. Implement post-fire recovery activities.

The post-fire recovery activities resulting from the 2017 wildfire season are currently underway and should take priority. As a result of these activities, there may be opportunities to leverage long-term post-fire planning that can support future wildfire and prescribed fire activity.

❖ Promoting a Fire Adapted Missoula County

Overview

Promoting fire adapted communities focuses on preventing, preparing for, and protecting lives and properties during wildfire events and ensuring a full recovery. A fire adapted community considers all aspects of its built environment, including homes, businesses, infrastructure, main streets, critical facilities, cultural sites, hospitals, and more.

There are many paths to becoming fire adapted, such as through education, mitigation, policies, and regulations. Fire adapted communities may implement established national programs, such as Firewise Communities/USA and Ready, Set, Go!, develop a CWPP, enhance local capacity, conduct fuel reduction and forest management activities, and utilize codes and ordinances to regulate development in fire-prone areas. The more actions a community takes, the more fire adapted it becomes (Figure 21). Because communities have limited resources, however, strategic identification of actions is necessary to best leverage fire adaptation at the local level. Promoting a fire adapted Missoula County also requires alignment with activities for restoring resilient landscapes and improving wildfire response.

Figure 21. Examples of Community Actions to Become Fire Adapted

Community Values

Missoula County has many community values that could be at risk to wildfire. It's important to consider these values at risk when locally planning for fire adapted communities, which broadly include:

Missoula County has a diverse set of values land uses that are considered when planning for wildfire. ***Credit: kenterphotography.com***

- Homes, businesses, and commercial areas;
- Communication and power transmission lines;
- Airports and transportation corridors;
- Watersheds, creeks, rivers, lakes, forests, and open space;
- Wildlife, fisheries, and biodiversity;
- Air quality, public health, and safety;
- Local, state, federal, and tribal recreational lands;
- Historic sites, historic districts, cultural and sacred areas;
- Critical infrastructure and facilities, such as hazardous-material facilities, hospitals, public shelters, and schools;
- Timber and wood products industries.

LEARN MORE: MISSOULA COUNTY'S VALUES AT RISK

Missoula County's values at risk are further detailed in other local plans, including:

- The **Pre-Disaster Mitigation Plan** for Missoula County and the City of Missoula (2017 update), which provides a detailed description of critical facilities and infrastructure, and provides a vulnerability analysis of the number of residences, commercial/industrial/ agricultural properties, critical facilities, and persons at risk to wildfire.

- Both **Growth Policies** for Missoula County and City of Missoula, which discuss local values and amenities, including public infrastructure, parks, trails, wildfire, fisheries, and cultural resources.

Trends in Community Development and Growth

Missoula County is experiencing growth and change in terms of its population, land use, ownership, and development patterns. The county estimates that unincorporated Missoula County alone will require between 2,740 and 3,220 new housing units by 2035 to meet growing population needs.[22] To address current and anticipated changes, the county must consider how wildfire can be further integrated into planning and development decisions. For example:

- Conversion of agricultural, forest and riparian lands to developed lands is contributing to the expansion of the wildland-urban interface. Building activity is also on the rise as the county continues to recover from the housing recession. The updated wildfire hazard assessment (see Part 2) can be consulted to help evaluate proposed new developments; developments that are proposed in hazardous areas should incorporate strategies that reduce risk to the built environment and increase firefighter and public safety.
- Some populations living in wildfire-prone areas, such as the elderly and those with fixed and low incomes, may have difficulty in performing or paying for mitigation, or require additional planning for evacuations. Coordinating with emergency managers and fire districts when planning for vulnerable populations can help address unique needs.
- Continued growth in seasonal and second-homeowner markets—particularly in amenity-driven areas, such as Seeley Lake, Nine Mile, Condon and areas east of Missoula—can affect how stakeholders plan for local response needs and resources. Community outreach and engagement with part-time residents and visitors must accommodate unique considerations such as seasonal schedules, changes in population, or varying levels of awareness regarding local wildfire concerns.

LEARN MORE: REDUCING STRUCTURAL IGNITABILITY

Too often, structures and properties are not prepared for wildfire conditions. However, research from the USFS Rocky Mountain Research Station Fire Sciences Lab, Insurance Institute for Business and Home Safety (IBHS), and the National Institute of Standards and Technology (NIST) shows that proper structure ignition measures can increase their survivability during a wildfire by decreasing their susceptibility to flames, radiant heat, and embers.

Several strategies in this CWPP therefore promote policies, regulations, education, and outreach programs that focus on addressing the structure ignition zone. These strategies aim to reduce home, business, and other property losses during a wildfire. To help achieve this, strategies may also be required in local codes.

For additional tips on reducing structural vulnerability, visit the FireSafe Montana Ignition Resistant Construction Guide (available on Firesafemt.org)

Increasing Community Fire Adaptation & Reducing Structural Ignitability

Recent and future population and development changes, combined with an increase in wildfire risk, highlight the need for Missoula County to develop strategies to plan for and adapt to wildfire. Strategies must consider a range of current and future community values, including

[22] Missoula County, MT. 2016. Missoula County Growth Policy. p. 9-7, 9-37.

existing and new homes, vulnerable populations, local amenities, critical facilities and infrastructure, and businesses. Strategies can be in the form of new policies and regulations, education and outreach initiatives, and other programmatic activities that help community members prepare for, and adapt to, future wildfire events.

Strategies below are focused on leveraging existing county activities to increase their impact across the county. Actions listed below are also captured in the Action Table (Part 4).

Promote Implementation of WUI Policies and Regulations

Several key county and city plans already incorporate wildfire topics into their goals and actions, including the Missoula County Growth Policy, City of Missoula Growth Policy, and County and City Pre-Disaster Mitigation Plan. For example:

- The Missoula County Growth Policy Goal #11 aims to reduce the safety risks and costs associated with wildland fire, flooding, and other hazards. Implementation objectives aim to discourage development in hazard areas and take appropriate measures to limit safety risks and ensure sufficient response resources. The Growth Policy describes how planning mechanisms, such as subdivision regulations, can address future development features including defensible space, access, and water supply. Local codes also provide improved opportunities for public health, first-responder and community safety, and welfare.
- The Pre-Disaster Mitigation Plan contains a goal to reduce wildland fire risk within the WUI. Several objectives and corresponding actions focus on encouraging the use of fire-resistant materials/design of non-combustible homes in future developments and encouraging the review of subdivision regulations for coordination with the update of this CWPP.

This CWPP leverages existing plan goals to advance risk reduction by providing more detailed implementation guidance. In other words, CWPP actions build on current WUI community actions in the Growth Policies and Pre-Disaster Mitigation Plan.

Specific CWPP actions to address development are:

1. **Update County Growth Policy land use map and local area plans, as needed and appropriate, using wildfire hazard area information to steer growth away from more hazardous areas.**
    a. Using tools such as the WUI map and wildfire hazard assessment during policy updates and implementation ensures consistency of information among plans and informs future policy decisions.
1. **Implement land use map updates using zoning to guide growth to more appropriate areas and away from more hazardous areas.**

    Using proactive strategies to guiding growth to appropriate locations helps reduce risk to future neighborhoods and homes.
2. **Utilize land conservation tools such as the open space bond to buffer developed areas from wildfire.**

Creating land buffers between development and the natural environment makes it easier to manage vegetation near homes and neighborhoods and protect these homes during future wildfire events.

3. **Adopt development regulations that require best possible hazard mitigation to protect communities, neighborhoods, fire professionals, and properties/structures in the event of a wildfire. Propose updated development regulations that incorporate best practices, including changes to building code, zoning code, and subdivision regulations.**

   Evaluating the effectiveness of regulatory tools, such as the building code, subdivision regulations, and zoning regulations, helps determine whether additional fire protection measures are necessary at each applicable scale. This could include exploring the adoption of a wildland-urban interface code. The county risk assessment can be used to further inform this action.

Promote WUI Public Education & Outreach

Mitigation strategies are often most accepted when the public and stakeholders understand their effectiveness. For example, scientific tests on building construction identify which types of materials are most effective during ember storms. When the public understands this information, they are more likely to see the value in supporting building codes that include ignition-resistant construction requirements.

Mitigation strategies are also effective in addressing existing development through education and outreach activities to help increase awareness and motivate voluntary actions. Activities can target residents and landowners, youth, industry professionals, and elected officials.

Many education and outreach efforts are already underway by local, state, and federal stakeholders. For example, the agencies that make up the Missoula County Fire Protection Association (MCFPA) implement wildfire outreach activities, which include:

- Conducting free property assessments to help residents identify hazards;
- Promoting participation in the national Firewise Communities /USA program to encourage neighborhood activities and local recognition;
- Delivering Ready, Set, Go! program messages to residents to help them prepare for wildfires and evacuations;
- Working with local schools on youth education programs;
- Offering informational meetings on wildfire to the public during open houses and public meetings.

An Elk Meadows Community Burn Day with the Frenchtown Rural Fire District. ***Credit: Koppen, MT DNRC***

Similar to the first strategy, both the Pre-Disaster Mitigation Plan and Growth Policy also encourage and promote the use of education materials to residents and landowners in hazardous areas.

Specific CWPP actions to enhance outreach and education are:

1. **Engage with industry professionals on mitigation programs, activities, and opportunities to improve public education and outreach across neighborhoods and communities.**

   Many industry professionals, including insurance agents, realtors, developers, and builders, can play a critical part in understanding their role and educating other audiences in community fire adaptations. Working with this group by providing specific resources and messaging materials can accelerate local efforts to reduce wildfire risk.

2. **Update county and MCFPA websites with wildfire education resources and materials.**

   Missoula County and other partners, including the Missoula County Fire Protection Association, can add additional website resources in the form of informational brochures, interactive maps that highlight local risk, educational videos, or other guides to help the public learn more about wildfire. Topics may include home construction and landscaping techniques, evacuation planning and preparedness, and parcel-level risk assessments.

3. **Promote having neighborhoods and communities develop mitigation activities and evacuation plans through programs such as Firewise Communities/ USA and Ready, Set, Go!**

   Risk reduction happens at multiple scales. Neighborhoods are encouraged to engage in mitigation planning. This can be through participation in national programs, such as Firewise Communities/USA program or Ready, Set, Go! (supported through local agencies), and the development of local CWPPs or similar fire plans.

❖ Increasing Wildfire Response Throughout Missoula County

The multiple agencies responsible for fire suppression have developed an excellent network of interagency support and cooperation. Generally, suppression resources have been able to respond to wildland fire occurrences with adequate resources using this system. However, some concern is expressed over the ability of this system to sustain itself in the face of climate change and the current trend of decreasing volunteer capacity, aging firefighters, and decreasing budgets.

Fire managers making a plan during the Lolo Complex Fire in Missoula County (2013). ***Credit: Seidlitz, Meagher County Fire*.**

Primary Stakeholders and Response Areas

Most Missoula County communities are within the jurisdictions of one of the ten legally recognized, community-based rural fire districts, fire service areas, or a municipal fire department (Table 3). According to the database of all addressed structures (not including outbuildings) within Missoula County, there are very few known structures located outside the response areas of these fire protection districts.

Table 3. Overview of Community-Based Fire Response Agencies in Missoula County, MT

Community-based Fire Response Agency	Communities Served	Response Area (sq. mi)
Arlee Rural Fire District	• South of Arlee	152
Clinton Rural Fire District	• Clinton • Lower Rock Creek	8
East Missoula Rural Fire District	• East Missoula	.98
Florence Rural Fire District	• North of Florence	7
Frenchtown Rural Fire District	• Evaro • Frenchtown • Huson/Ninemile • Petty Creek • The Wye • Alberton- Mineral • Southside Road	125
Greenough/Potomac Fire Service Area	• Greenough • Potomac	201
Missoula Rural Fire District	• Blackfoot/Turah • Grant Creek/Rattlesnake • Pattee Canyon • Lolo/Miller Creek • Target Range/Big Flat	84.5
Missoula City Fire Department	• Missoula	25
Seeley Lake Rural Fire District*	• Seeley Lake	60
Swan Valley Fire Service Area*	• Condon	139
*Covered by Seeley/Swan Fire Plan		

Of the ten fire protection districts, only the Missoula City Fire Department has an all-paid staff. Missoula and Frenchtown rural fire districts (together covering more than 200 square miles) have a mix of paid and volunteer firefighters. The other districts rely completely on citizen volunteers to respond to structure fires, wildland fires, and other emergencies such as medical calls and vehicle accidents on the interstate or secondary roads within each jurisdiction.

Additional Stakeholders

In addition to fire suppression resources available within the fire protection districts, seasonal wildland firefighters are available through the Forest Service (USFS), the Montana Department of Natural Resources and Conservation (DNRC), and the Confederated Salish and Kootenai Tribes (CSKT). These resources are trained and equipped to fight wildland fire only; unlike the

fire protection district resources, they are not trained or equipped to fight a structure fire. The USFS and DNRC also offer access to national incident and area command teams and resources, when required.

Crews at the Sapphire Complex Fire (2017). *Credit: Lolo National Forest*.

Missoula County Fire Protection Association

All of Missoula County's fire agencies belong to the Missoula County Fire Protection Association (MCFPA), which serves as a collaborative discussion group on fire prevention and other fire-related needs. The MCFPA website offers a contact list for local jurisdictions as well as a link to the 2005 Community Wildfire Protection Plan (www.mcfpa.org).

Suppression Responsibilities

When an unwanted wildland fire (wildfire) is discovered in Missoula County, a fire response crew from a local fire response jurisdiction, a USFS ranger district, and/or DNRC fire unit may respond, depending on its location. The Missoula City/County 911 Center and the Missoula Interagency Dispatch Center use the "closest forces" concept in wildland fire dispatch.

This allows for the closest suppression resource to be sent, regardless of boundaries or jurisdictional responsibilities. This arrangement is particularly helpful at either end of the federally recognized fire season (typically mid-June through mid-September). When wildfires start early, as they did in 2000 (the first wildfire occurred on March 15), federal fire crews are not yet employed so it is the community-based firefighter who is often first on scene.

Interagency Agreements

Through pre-established mutual aid agreements, all fire suppression resources in Missoula County are authorized to leave their jurisdictional boundaries to aid a requesting agency partner. In addition, Montana statute allows these resources to assist throughout the state when needed/possible. This is primarily accomplished through the Southwest Montana Zone Multi-Agency Coordinating Group within the Northern Rockies Coordinating Group, which allows all responsible jurisdictional agencies to coordinate resources and priorities throughout the Southwest zone during fire season. The Southwest Zone Multi Agency Coordination (MAC) Group consists of representatives from:

- Lolo National Forest;
- Bitterroot National Forest;

- County Fire Wardens Association;
- Confederated Salish and Kootenai Tribes;
- Montana DNRC;
- Bureau of Land Management;
- U.S. Fisk and Wildlife Service;
- Missoula County DES.

Automatic aid agreements are also utilized between most Missoula County agencies sharing boundaries. These agreements are triggered by verbal request, typically at the time of first dispatch.

Emergency Preparedness/Evacuation

Emergency evacuation procedures are the responsibility of the Missoula County Sheriff s Office. During a wildfire, the Incident Commander (in coordination and with the approval of the agencies having jurisdiction) will recommend evacuation. Routes and locations of shelters/centers depend on fire location and numbers of affected individuals, and so must be made on a case-by-case basis at the time of the incident. Missoula County has an Evacuation Plan. For more information about it, contact the Missoula County Sheriff s Office.

Current Suppression Challenges and Limitations

Areas Without Organized Fire Response

There are approximately 22,000 acres of private land in Missoula County without an organized fire-response system. Under the terms of a cooperative agreement between the county commissioners and the State of Montana, the county has assumed fire suppression responsibility in these areas from the State. The County Fire Warden and Rural Fire Chief (one-and-the-same) is responsible for coordinating response to wildland fires that occur within these areas and has historically relied on mutual aid from adjacent fire districts and/or MT DNRC, through the County Cooperator program. Development of formal mutual aid agreements for protection of these lands is ongoing. Lands without fire protection are located throughout Missoula County. Some of the larger examples include the following areas: Upper Miller Creek, Holloman Saddle, Ninemile Prairie, and Upper Lolo Creek. There is also some unprotected land near the Missoula Airport and the Eight-Mile area near Florence.

Volunteer Firefighter Capacity

The current national trend of a decreasing and aging pool of volunteer firefighters has been expressed as an increasing local concern for most departments that rely on volunteer responders.

LEARN MORE: VOLUNTEER FIRE SERVICE

- Volunteer firefighters are called to a variety of emergencies, including fires, emergency medical incidents, natural disasters, terrorist incidents, water rescue emergencies, and more. Volunteers spend an enormous amount of time training to prepare for responding to these emergencies.
- Volunteers comprise 70 percent of firefighters in the United States. Of the total estimated 1,160,450 firefighters across the country, 814,850 are volunteer.
- The majority of fire departments in the United States are volunteer.
- The number of volunteer firefighters in the U.S. reached a low in 2011, and many local volunteer fire departments are struggling to meet staffing needs. Challenges includes increased time demands and rigorous training requirements.
- Learn more at the National Volunteer Fire Council (nvfc.org)

Source: *National Volunteer Fire Council Fact Sheet*. 2017

Most departments can currently function adequately when faced with in-district emergencies However, as county and regional wildland fires grow in frequency and size—increasing the need for solid mutual and automatic aid support—and compounded with the demand of other year-round response commitments (medical calls, structure fires, rescues, motor vehicle accidents)—the majority of these departments are unable to provide support to the desired level.

Climate Change

A changing climate, resulting in fires of increased intensity and extended shoulder seasons, will require increased resources. This adds an additional stressor on volunteer firefighter capacity.

Response Area Commitment

Many of the local fire districts are responsible for significant response areas—some extending into neighboring counties and many with multiple communities or values at risk. There is some concern regarding the capacity during a heavy multiple fire load scenario that these resources that are relied upon for mutual aid will be over-committed.

Improving Response

Specific CWPP actions to improve wildfire response capabilities are:

1. **Promote and support fire departments to increase capacity and funding.** Stakeholders and all levels of government should work together in developing a coordinated approach to increasing fire department capacity and funding with respect to wildfire response.
2. **Establish wildland fire response agreements between the county and fire districts.** The county and local fire districts should continue to work together in establishing formalized agreements that include fire protection for lands within the county that are not currently protected.

❖ Cohesive Strategy Section Summary

Missoula County has a diverse set of community and ecological values at risk, requiring a comprehensive approach to mitigation. Ecological health challenges, increased development pressures, local fire response capacity challenges, and climate change all increase the complexity and emphasize the need for this approach. The county anticipates future growth and must plan where and how development should occur to avoid increasing wildfire risk to lives and properties. Accordingly, the natural landscape must also be managed with the combined appropriate combination of vegetation management (mechanical, chemical, and prescribed fire) and response. Wildfire mitigation actions must consider both existing and future development to increase community fire adaptation. Actions listed in this section and summarized in the CWPP Action Plan (Part 4) advance the goals of the county and city Growth Policies and Pre-Disaster Mitigation Plan, as well as increase the wildfire response capacity and overall wildfire resiliency. Actions take a wide-ranging approach to address multiple scales and stakeholders and to provide voluntary and regulatory options.

Part 4: Putting the CWPP Into Action

❖ Overview

Part 4 focuses on putting the CWPP into action. The first section provides an overview of stakeholders associated with this CWPP to promote understanding of roles and responsibilities. The second section provides an action plan to guide stakeholder implementation activities. This ensures the CWPP process moves forward in tangible ways. Finally, additional guidance on plan maintenance outlines key considerations to ensure this plan stays timely and relevant in the future.

❖ Stakeholder Roles

The success of this CWPP requires the participation of all stakeholders to engage in understanding their role and taking appropriate actions. The following table shares roles that community members at local, state, and federal levels play in Missoula County's wildfire resilience and risk reduction.

Table 4. Overview of CWPP Stakeholder Roles

Stakeholder Group	Overview of Roles
City, County, and Local Partners	
Elected Officials	• Board of County Commissioners (BCC) has jurisdiction and power to represent the county and has care of the county property, management, and business concerns. • Missoula County Sheriff is an elected position that has responsibility for the enforcement of state and county laws and statutes. • The Missoula City Council and Mayor of Missoula are elected to represent citizens of Missoula.
Missoula County Community and Planning Services	• Responsible for developing and administering plans and regulations, including zoning and subdivision, growth policy, regional plans. • Includes Parks, Trails and Open Lands Section, which manages county park lands and trails, and supports landscape conservation projects on public and private land. • Includes Grants Division, which administers grants program to enhance access to state, federal, and private dollars.
Fire Departments and Rural Fire Districts	• Responsible for community fire response and protection services for areas across Missoula County.
Missoula County Fire Protection Association	• Nonprofit association with members from city, county, rural, state, and federal agencies, including fire departments and

Stakeholder Group	Overview of Roles
	districts, Missoula County Office of Emergency Management, Montana Department of Natural Resources and Conservation, USDA Forest Service, and other organizations • Coordinates on fire prevention and response activities.
Missoula County Office of Emergency Management (OEM)	• Coordinates emergency response components in Missoula County and the City of Missoula. • Comprises Missoula's 9-1-1 Center and Missoula County Disaster and Emergency Services (DES).
Missoula City-County Health Department	• Responsible for air quality monitoring and burning permits.
City of Missoula Development Services	• Responsible for planning, permitting and land use, building, engineering, and transportation services for the city of Missoula.
Missoula County and City Residents, Private Landowners, and Community Councils	• Responsible for personal property and engaging in community projects. • Seven community councils participate in planning process by facilitating communication between communities and local government. • Includes private landowners, such as citizens and entities with large landholdings (e.g., The Nature Conservancy, Weyerhaeuser).
Non-Governmental Stakeholders	• Includes stakeholders from Missoula Building Industry Association, Missoula Organization of REALTORS and other industry professionals. • Volunteer organizations, Resource Conservation and Development Councils, Chamber of Commerce, utilities, university partners, and other businesses.
State Partners	
Montana Department of Natural Resources	• State agency providing fire resources and information, including WUI maps, air quality updates, current fire restrictions, and historical fire information.
FireSafe Montana	• Private, nonprofit organization coordinates and supports a statewide coalition of diverse interests working together to help Montanans make their homes, neighborhoods, and communities fire safe.
Federal and Tribal Partners	
USDA Forest Service	• Manages Lolo National Forest, Flathead National Forest. • Local support and resources also include Rocky Mountain Research Station.
Confederated Salish and Kootenai Tribes	• Manages Flathead Indian Reservation. • Maintains a culturally sensitive site inventory for lands on and off the Reservation.

Stakeholder Group	Overview of Roles
Bureau of Land Management	• Manages public lands out of the Missoula Field Office.
U.S. Fish and Wildlife Service	• Administers environmental stewardship programs and services to guide conservation, development and management of national fish and wildlife resources. • Issues permits under various wildlife laws and treaties.

❖ Action Plan

The following action plan (Table 5) captures actions listed throughout this CWPP. Each action has a proposed lead(s) responsible for advancing the action, a priority level for implementation, a desired timeframe for completion, and any additional notes relevant to support the action. Many actions may relate to one another.

Table 5. Missoula County CWPP Action Plan

Action	Lead(s)	Priority	Timeframe	Notes
Risk Assessment				
1. Update the Missoula County risk assessment and include WUI identification map.	USFS, County, CAPS	High	Summer 2018	• See pages 28-39 for more information
2. Compile parcel-level assessment data to inform and complete risk assessment, increase first-responder information, encourage public engagement.	Fire Districts, County	High	2019/ Ongoing	• See pages 28-39 for more information
3. Continue Cohesive Strategy Working Group (CSWG).	MCFPA, USFS, DNRC, CSKT, BLM, County	High	Spring 2018	• See page 41 for more information
Resilient Landscapes				
4. Review and identify priority landscapes and potential treatment options.	CSWG	High	Summer 2018	• See pages 42-45 for more information
5. Advance prescribed fire activities.	CSWG	Medium	Ongoing	• See pages 42-45 for more information

Action	Lead(s)	Priority	Timeframe	Notes
6. Implement post-fire recovery activities.	CSWG	High	Ongoing	• See pages 42-45 for more information
Fire Adapted Communities				
7. Update County Growth Policy land use map and local area plans, as needed and appropriate, using wildfire hazard area information to steer growth away from more hazardous areas.	CAPS	High	Update for urban areas: 2019 Update for rural areas: 2021	• Updates should be triggered by development patterns, and tied to update of WUI identification map and risk assessment • See pages 46-51 for more information
8. Implement land use map updates using zoning to guide growth to more appropriate areas and away from more hazardous areas.	CAPS	Medium	Occurs in conjunction with land use mapping updates	• See pages 46-51 for more information
9. Utilize land conservation tools such as the open space bond to buffer developed areas from wildfire.	CAPS	High	Ongoing (dependent upon open space bond approval)	• See pages 46-51 for more information
10. Adopt development regulations that require best possible hazard mitigation to protect communities, neighborhoods, fire professionals, and properties/structures in the event of a wildfire. Propose updated development regulations that incorporate best practices, including changes to building code, zoning code, subdivision regulations.	CAPS	Medium	Timeframe based on future growth and development patterns.	• Action will consider other possibilities, such as adopting a stand-alone WUI code • See pages 46-51 for more information • Additional resources available from Community Planning Assistance for Wildfire (planningforwildfire.org)
11. Engage with industry professionals on mitigation programs, activities, and opportunities to improve public	CAPS, CSWG, MCFPA	High	Ongoing	• Engagement includes realtors, insurers, developers, and builders • See pages 46-51 for more information

Action	Lead(s)	Priority	Timeframe	Notes
education and outreach across neighborhoods and communities.				
12. Update county and MCFPA websites with wildfire education resources and materials.	OEM, CAPS, MCFPA, City Planning	High	Summer 2018/ ongoing	• See pages 46-51 for more information
13. Promote having neighborhoods and communities develop mitigation activities and evacuation plans through programs such as Firewise Communities/ USA and Ready, Set, Go!	OEM, MCFPA CSWG	High	Ongoing	• See pages 46-51 for more information • Additional resources available from FireSafe Montana (firesafetmt.org)
Improved Response				
14. Promote and support fire departments to increase capacity, funding opportunities.	OEM, BLM, MCFPA, USFS, BLM, DNRC	High	Ongoing	• See pages 51-55 for more information
15. Establish wildland fire response agreements between the county and local fire districts.	OEM, Local Fire Districts	Medium	Summer 2018	• See pages 51-55 for more information

❖ Plan Updates and Maintenance

The continuous nature of implementing the Action Plan makes this CWPP a living document. Different stakeholders will be meeting at various times to discuss and implement applicable actions—some of which may take months or years to complete, while others could be ongoing.

An annual review of the action plan with lead stakeholders, as identified in the Action Plan, will help further coordinate and re-evaluate the status of actions. More significate updates should occur on an as-needed basis, such as following significant fire seasons.

A major update to this CWPP should be anticipated on a five-year cycle to coincide with the next Pre-Disaster Mitigation Plan update. This increases the efficiency of stakeholder participation and further links content between both plans. The major CWPP update will include:

- Review of all content to confirm accuracy of information, such as recent wildfire history, changes to demographics and land ownership, relevance of Cohesive Strategy themes, fire response areas, and more.

- Re-assessment of risk inputs based on changes to the local environment.
- Confirmation of participating stakeholders, stakeholder roles, and signatories.
- Updated Action Plan based on revised content, updated risk assessment, and stakeholder interests.

Importantly, keeping the plan updated also helps share successes with other stakeholders and community members as Missoula County increases its capacity for resilient landscapes, fire adapted communities, and efficient response capabilities.

❖ Action Plan & Stakeholder Summary

The CWPP Action Plan builds on the information provided in Parts 1-3 of this CWPP and was collaboratively developed by stakeholders representing different areas of expertise and perspectives. Upon adoption of this CWPP update, stakeholders—including the public—are ready to move forward with implementing actions that prepare Missoula County for future wildfire seasons. As implementation occurs, lead stakeholders (as outlined in the CWPP Action Plan) will continue to coordinate activities and evaluate outcomes to ensure actions remain timely, relevant, and successfully achieve the desired results.

Appendix A: Primary Plans Related to CWPP Action Table

To support the development of the CWPP Action Plan, several county and city plans were referenced to understand existing goals, objectives, and/or actions to address wildfire risk reduction and the wildland-urban interface, primarily including:

- Missoula County Growth Policy (2016)
- City of Missoula Growth Policy (2015)
- Pre-Disaster Mitigation Plan for Missoula County and City (2017 Update)

The following list of wildfire and/or WUI-related actions serves as a quick reference to help readers see the linkages between this CWPP and other county and city plans. These references are not exhaustive in naming all actions that could support wildfire risk reduction. Primary documents should be consulted for additional details and any future updates.

Missoula County Growth Policy (2016)

Goal 7: Sustain and promote the land- and resource-based industries of agriculture, timber, restoration, and recreation that are part of the local economy and heritage.

Objectives	Actions	Timeframe	Lead Partners
Objective 7.3 – Support efforts of public and private sectors to restore and maintain healthy forests, including harvesting timber, while meeting other resources management goals.	7.3.1 Engage in the Southwest Crown of the Continent Collaborative and other initiatives as opportunities arise.	Ongoing	BCC, CAPS, USFS
	7.3.2 Encourage forest restoration projects that result in economic activity, fuels reduction and improvements to wildlife habitat.	Immediate	OEM, USFS, PTOL
	7.3.3 Support legislation that enables collaborative efforts to restore and maintain healthy forests and reduce wildfire risks.	Ongoing	BCC

Goal 11: Reduce the safety risks and costs associated with wildland fire, flooding, and other hazards

Objectives	Actions	Timeframe	Lead Partners
Objective 11.1 – Discourage development in hazardous areas and areas where public and emergency	11.1.1 Identify hazardous areas, including mapping of wildfire and floodplain risks.	Immediate, ongoing (complete)	OEM, CAPS, DNRC, USFS, fire districts, fire service fee areas
	11.1.2 Provide mapping and other information to the public about local hazards in an easily accessible format.	Immediate	CAPS, OEM, other partners

responder safety is compromised.	11.1.3 Explore zoning regulations to guide growth to appropriate locations (outside of hazard areas).	Mid-term	CAPS, OEM
Objective 11.2 – When development in hazardous areas does occur, take appropriate measures to limit safety risks and ensure emergency personnel have sufficient resources to respond safely and effectively.	11.2.1 Work with public safety and resource agencies to identify and mitigate risks and provide appropriate resources for public and responder safety.	Ongoing	OEM, CAPS, GCP, fire districts, fire service areas
	11.2.2 Adopt development regulations that require the best possible hazardous mitigation techniques, including Firewise construction, multiple accesses, etc.	Ongoing	OEM, CAPS, PW, DNRC, fire districts, fire service areas
	11.2.3 Provide information to landowners regarding development in hazardous areas (evacuation plans, Firewise development practices, etc.). Explore the possibility of providing risk disclosure statements.	Ongoing	OEM, CAPS, fire districts
	11.2.4 Support efforts such as cost sharing to help landowners reduce fuels and take measures to make their properties more resilient to hazards.	Ongoing	OEM, GCP

City of Missoula Growth Policy (2015)

Goal SW10: Ensure the security of Missoulians through the development of well-prepared and responsive emergency and disaster services and infrastructure.

Objectives:

1. Encourage development of a collaborative, community-wide emergency preparedness system to help preserve and maintain public safety including crime, wildfire, flooding, avalanche, disease, wildlife, transportation incidents, and hazardous material spills.
2. Support personal and community emergency preparedness for all Missoulians.
3. Encourage a land use pattern that facilitates provision of emergency services.
4. Support efforts to facilitate and expand inter-jurisdictional cooperation between public safety agencies.

(Relates to implementation actions 1.16, 2.3, 2.12, 3.4, 3.20, 4.8, 4.11, 7.9, 7.16, 8.9, 8.30, 9.25, 10.8 listed in Chapter 9.)

Pre-Disaster Mitigation Plan for Missoula County and City (2017)

Goal 1: Reduce Wildland Fire Risk within WUI

Objective	*Project*	*Jurisdiction*	*Benefit-Cost Ranking Score*	*County Priority*

Objective 1.1 – Conduct mapping/ analysis/ planning projects to reduce impacts from wildfires	1.1.1 Continue to work with cooperating agencies to develop population protection plans.	County, City	High/18	High
	1.1.2 Update CWPP based on new fire data.	County, City	High/18	High
	1.1.3 Assist fire jurisdictions/community groups with messaging.	County, City	High/18	Medium
Objective 1.2 – Perform property protection projects to reduce impacts from wildfire	1.2.1. Continue to look for funding opportunities for fuel mitigation on private land.	County, City	High/18	Medium
	1.2.2. Implement FireWise principles and upgrade county facilities with non-combustible materials in Seeley Lake area.	County	Medium/14	Low
	1.2.3. Apply for federal competitive grant to sustain fuel mitigation on private land for 10 year period.	County, City	High/18	Medium
	1.2.4. Track complete fuel-reduction projects to update vulnerability and support future grants.	County, City	High/18	Medium
Objective 1.3 – Implement public awareness and education projects to reduce impacts from wildfires	1.3.1. Update education materials targeting high priority areas	County, City	High/18	High
Objective 1.4 – Encourage projects to prevent impacts from wildfire	1.4.1. Encourage use of fire-resistant materials/design of non-combustible homes in future developments.	County, City	Medium/16	Medium
	1.4.2. Encourage review of subdivision regulations for coordination with the updated CWPP.	County, City	Medium/16	High
Objective 1.5 – Upgrade emergency service capabilities to reduce impacts from wildfires	1.5.1 Continue to enhance availability of water supply for firefighting in urban and rural locations.	County, City	High/18	High
	1.5.2 Formalize agreements for fire response in unprotected County lands.	County	Medium/16	High
	1.5.3 Obtain mobile air quality monitors to determine unhealthy wildfire smoke conditions.	County, City	Medium/14	Medium

Appendix B: Stakeholder and Public Engagement During CWPP Update Process

The CWPP update began in January 2017 and occurred over the course of 16 months. During this update process, four separate CWPP drafts were shared with stakeholders for input, including the final draft which was provided to the public during an official public review and comment period. The process was coordinated by a consulting team who worked closely with the Missoula County Office of Emergency Management and other local stakeholders. This appendix provides an overview of the CWPP engagement process.

Stakeholder Outreach and Survey (February 2017)

An initial set of 38 stakeholders was contacted to inform them about the CWPP update and invite their participation in the update process. Stakeholders represented county and city departments, local elected offices, federal and state agencies, fire departments and districts, and nonprofit organizations.

Twenty-eight of these stakeholders responded to an initial online questionnaire to provide guidance and direction on CWPP content updates. Questionnaire results indicated that the majority of the stakeholders thought the 2005 CWPP was due for a significant re-write. Stakeholders also shared that they wanted a CWPP that reflected current science and data, was well-aligned with national planning priorities while retaining relevance and detail for local application, and was user-friendly for multiple audiences to read. Finally, stakeholders emphasized taking an action-oriented approach by including an action plan with adequate detail for implementation.

Stakeholder Kick-Off Meeting (February 16, 2017)

Stakeholders had the opportunity to meet face-to-face for a kick-off meeting in Missoula on February 16, 2017. The purpose of the meeting was to initiate discussions on the CWPP update through large and small group conversations. Specific discussions focused on the value of CWPPs and their local application, existing limitations to the current CWPP, ideas for improvement, and local wildfire concerns that should be addressed in the CWPP update. Approximately 24 stakeholders were in attendance.

Stakeholder Meeting (July 12, 2017)

A follow-up stakeholder meeting occurred on July 12, 2017. The purpose of the meeting was to discuss the CWPP Draft #2 and provide initial input on CWPP actions. Ten stakeholders were in attendance. Turnout was lower due to the timing of recent wildfires. As a result, many CWPP stakeholder engagement activities were put on hold until stakeholder availability increased in late fall following the end of fire season.

Stakeholder Calls and Emails

Stakeholder calls were coordinated throughout the process to provide stakeholders the ability to discuss CWPP drafts and provide feedback. In addition, stakeholders were invited to provide written comments on CWPP drafts.

Public Open House (March 22, 2018)[23]

A core component of the development process includes public engagement and feedback. A public open house is scheduled for March 22, 2018 and provides the public with an opportunity to engage with stakeholders to answer questions, highlight outcomes, and discuss any CWPP concerns.

Public Review and Comment Period (March-April 2018)

Members of the public are also invited to review and comment on the CWPP during the public review period which is scheduled for March 8 - April 12. Details about the public comment and review period are available on the Missoula County website.

Additional Resources

To assist the public's understanding of the CWPP, several outreach resources were created:

- CWPP Outreach Handout distributed by stakeholders to help the public understand the purpose of a CWPP, benefits of having a CWPP in place, and reasons for updating the Missoula County CWPP.
- Missoula County also created a local CWPP Story Map to coincide with the public comment and review period. This Story Map shares information about the CWPP in an online, user-friendly format and is hosted by the county.

[23] NOTE: Public Open House and Public Review and Comment Period content will be updated by the county following these events prior to CWPP adoption.

Appendix C: Missoula County CWPP Fuel Treatment Project Status and Priorities

The 2005 Missoula County Community Wildfire Protection Plan provided the following status of current and completed federal fuel reduction projects and identified the following critical egress areas and fuel treatment priorities; the priorities of the 2005 CWPP have not substantially changed for this update

❖ Current/Completed Federal Fuel Reduction Projects

USDA Forest Service Missoula Ranger District

Projects that are done:

- Northside Fuels Units
- Blue Mountain PCT
- Deep Gilman EMB
- Iris Point EMB
- Johnson EMB
- Northside EMB
- O'Keefe EMB

Ongoing Projects:

- Pattee Blue Fuels Units - Pattee Canyon & Blue Mtn
- Pattee PCT

Not Sure of Status:

- Rattlesnake EMB's
- Rattlesnake Proposed EMB's

USDA Forest Service Ninemile Ranger District

Projects that are done:

- Kennedy Creek PCT/Burning
- Southside Fuels Reduction
- Sawmill/Cyr Project
- Starkhorse Project
- Petty Rock Project

Ongoing Projects:

- Frenchtown Face
- Rennic-Stark Project
- Barrette Fuels Reduction
- Ninemile Thinning
- Small Tree Thinning
- Upper Madison Fuels
- Petty Creek WUI Fuels Reduction
- Petty Creek Big Game EMB

Projects in NEPA process

- Ninemile Divide EMB's

Soldier-Butler Project

USDI Bureau of Land Management (BLM)

Projects that are done:

- Five Mile Subdivision Timber Sale
- Bear Creek Flats Stewardship
- Bear Creek Flats RX
- Messina Subdivision Stewardship
- Lower Blackfoot Timber Sale and RX

Ongoing Projects:

- Lower Blackfoot Corridor Ecosystem maintenance, Forest Restoration, and Fuels Reduction
- Dunnigan Gulch Stewardship

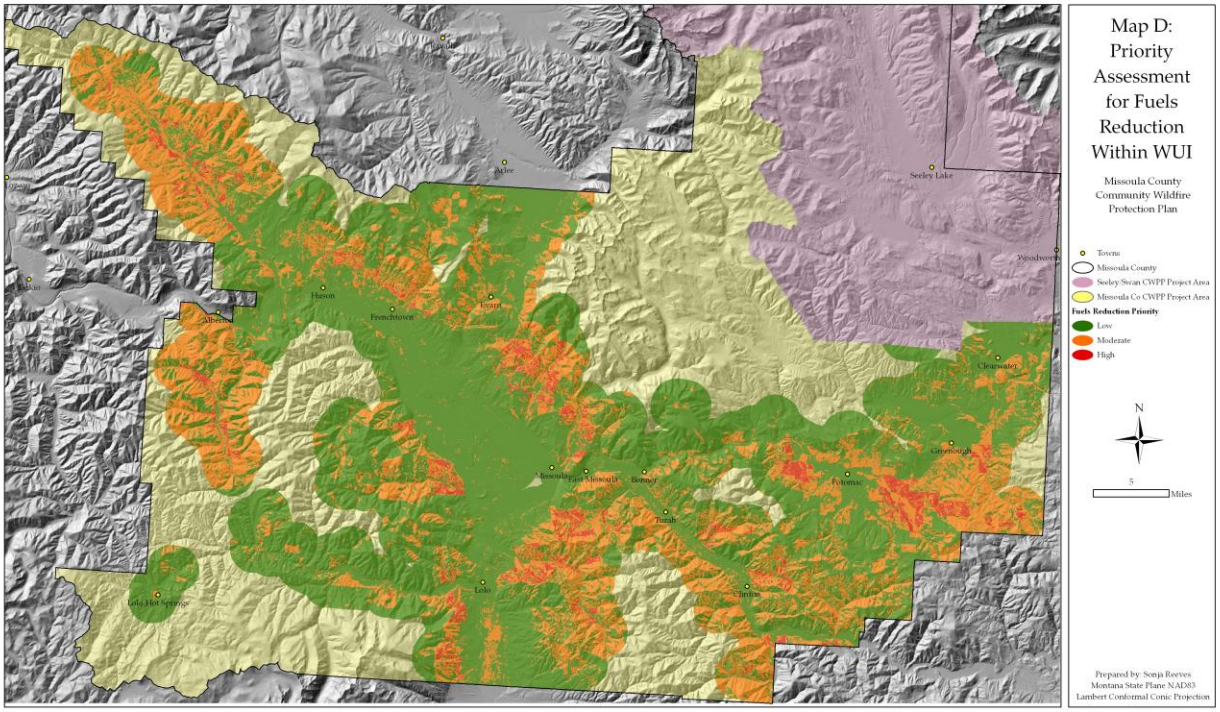
Confederated Salish & Kootenai Tribes (CSKT)

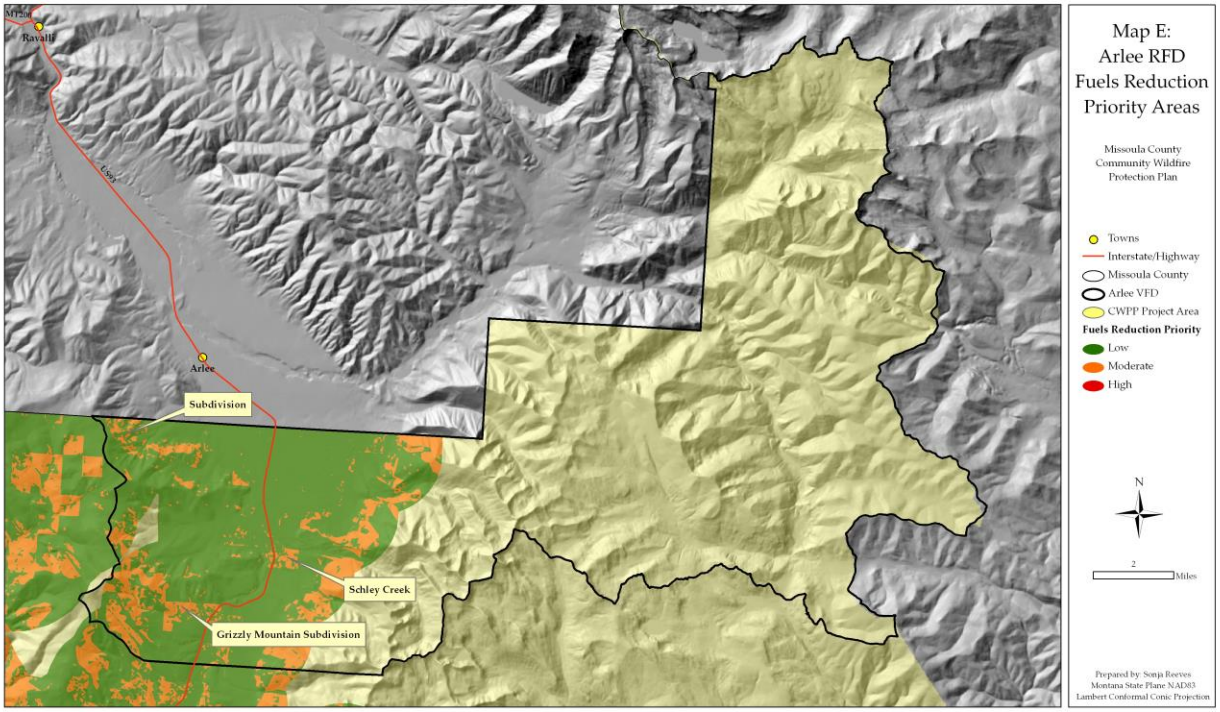
The Confederated Salish & Kootenai Tribe has a few fuels-reduction projects going as well.

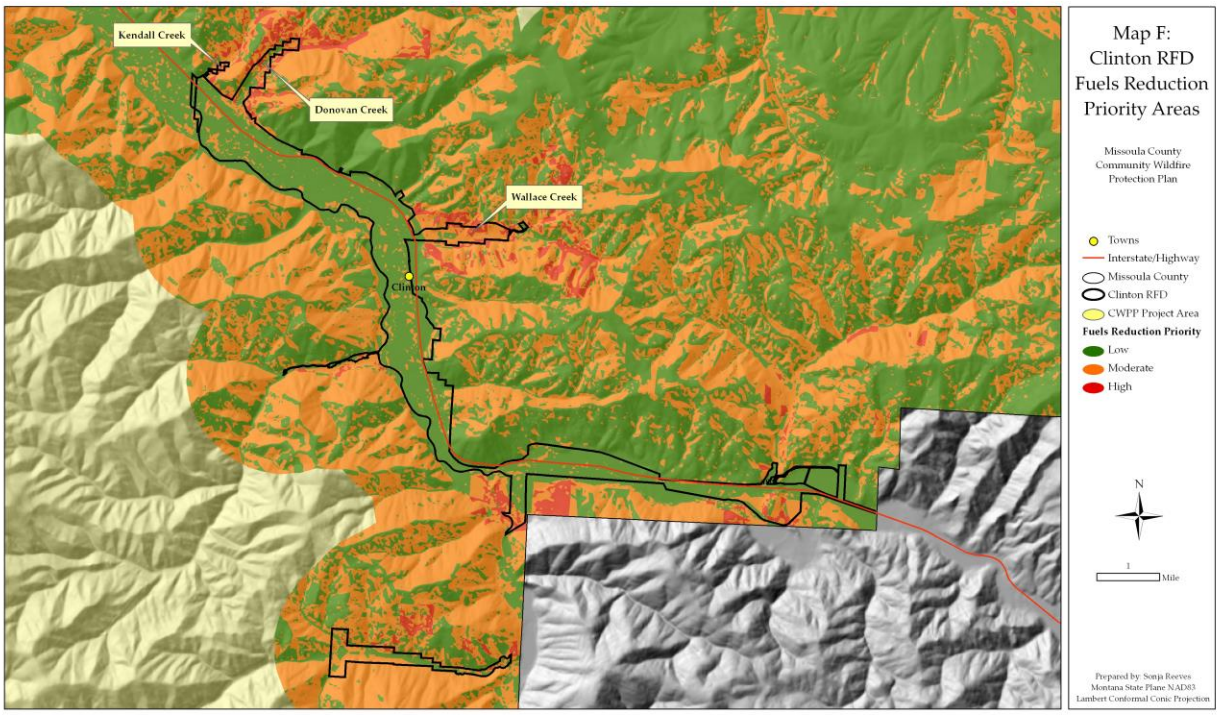
❖ Missoula County Critical Egress Areas

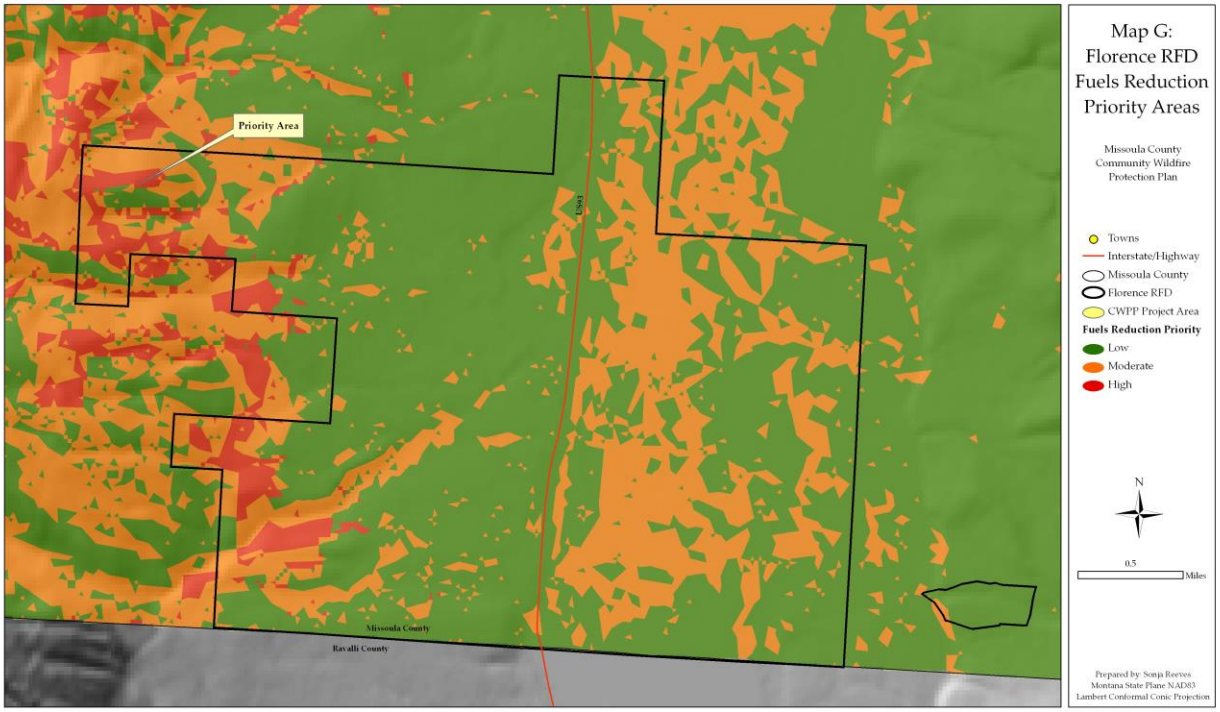
- Glacier Drive (Condon)
- Guest Ranch Road
- Rumble Creek
- Crescent Meadows
- Double Arrow
- Placid Lake
- Kramer Creek
- Beavertail Hill
- West Of Rock Creek
- Schwartz Creek
- Wallace Creek
- Kendall Creek
- Donovan Creek
- Hole In The Wall (Potomac)
- Marco Flats (Private)
- Trout Lane (Blackfoot)
- Bear Creek
- Ninemile
- Sixmile
- Houle Creek
- Sorrel Springs
- Mill Creek (Frenchtown)
- Butler Creek
- Grant Creek
- Rattlesnake Valley
- Sherman Gulch
- Horseback Ridge
- O'brien Creek
- Pattee Canyon
- Miller Creek
- Mill Creek (Lolo)
- Sleeman Gulch
- Balsamroot
- Mormon Creek
- Bitterroot Valley S of Lolo
- Petty Creek
- Deer Creek

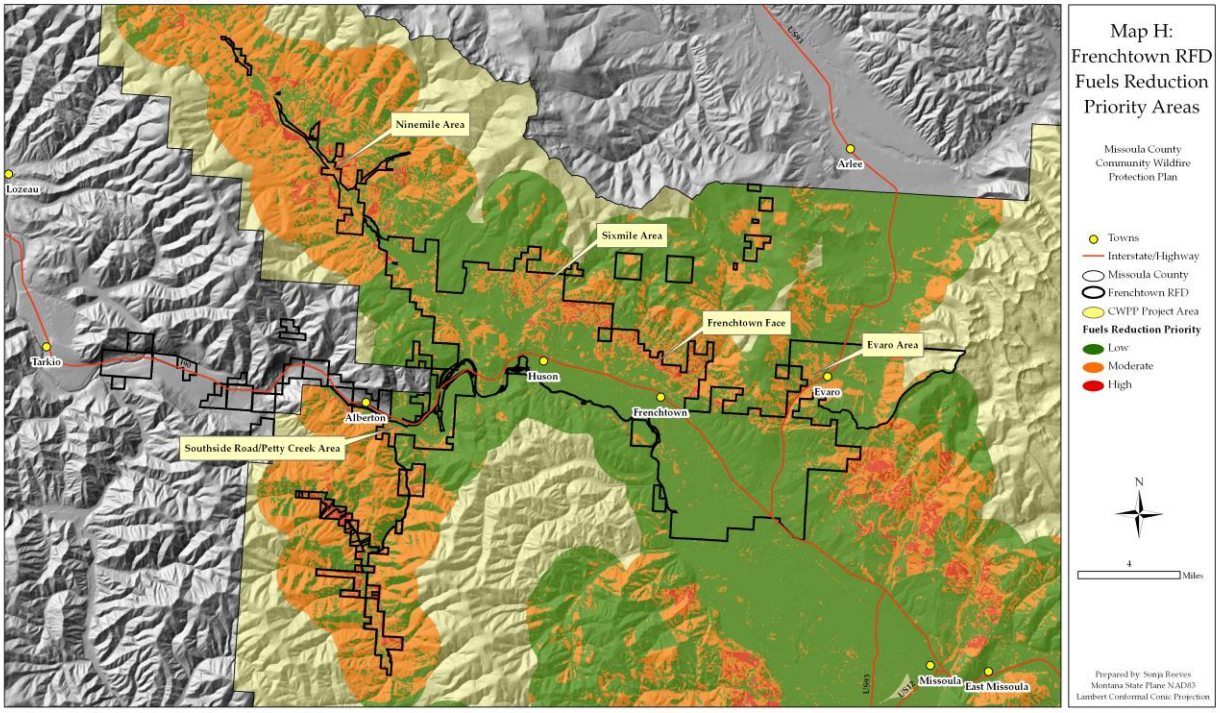
❖ Fuel Treatment Priorities (Maps)

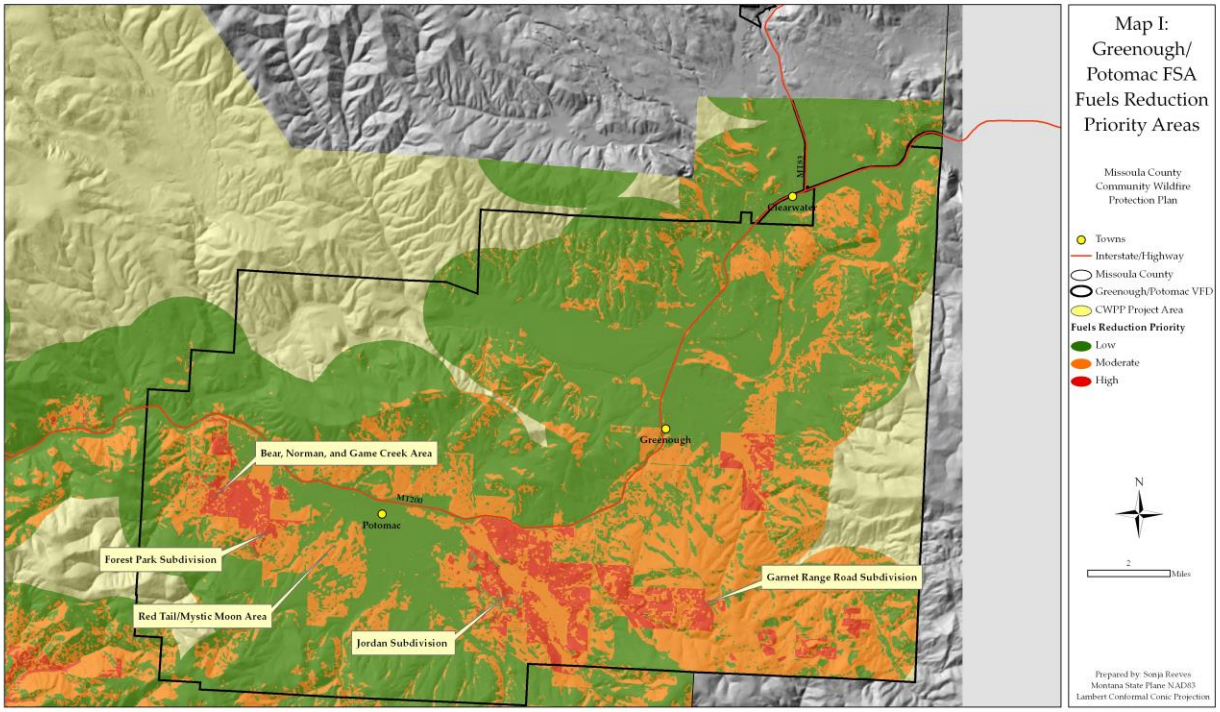


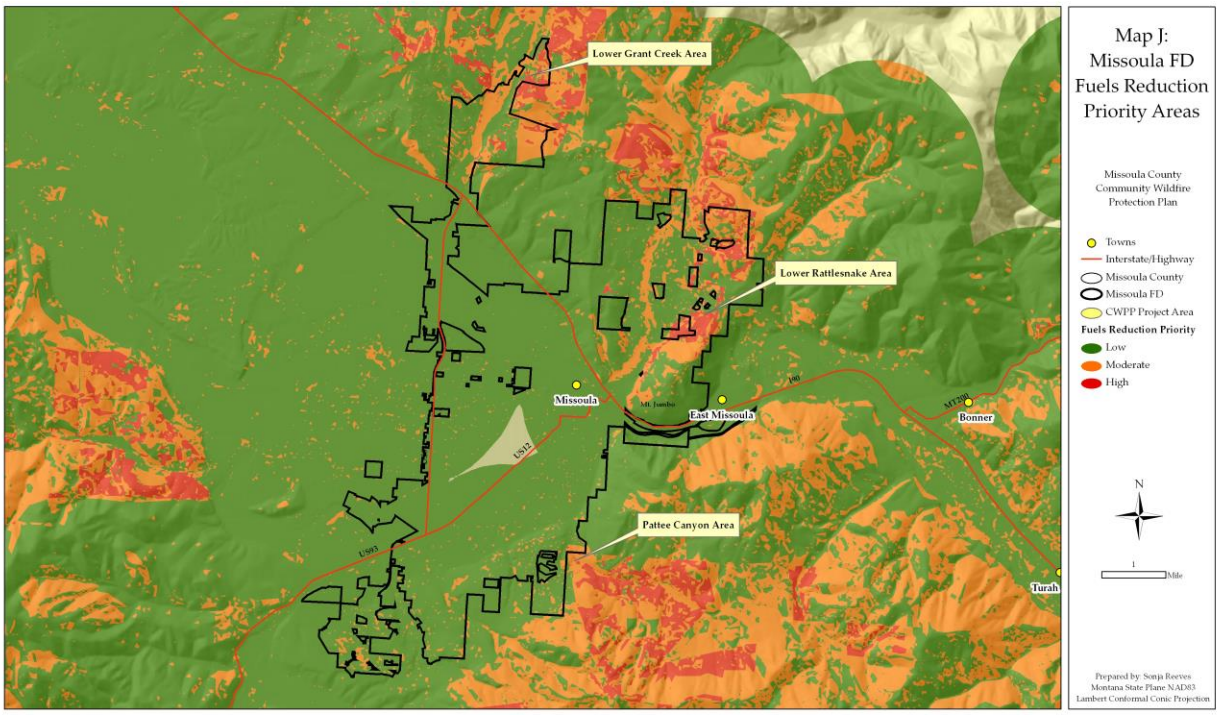


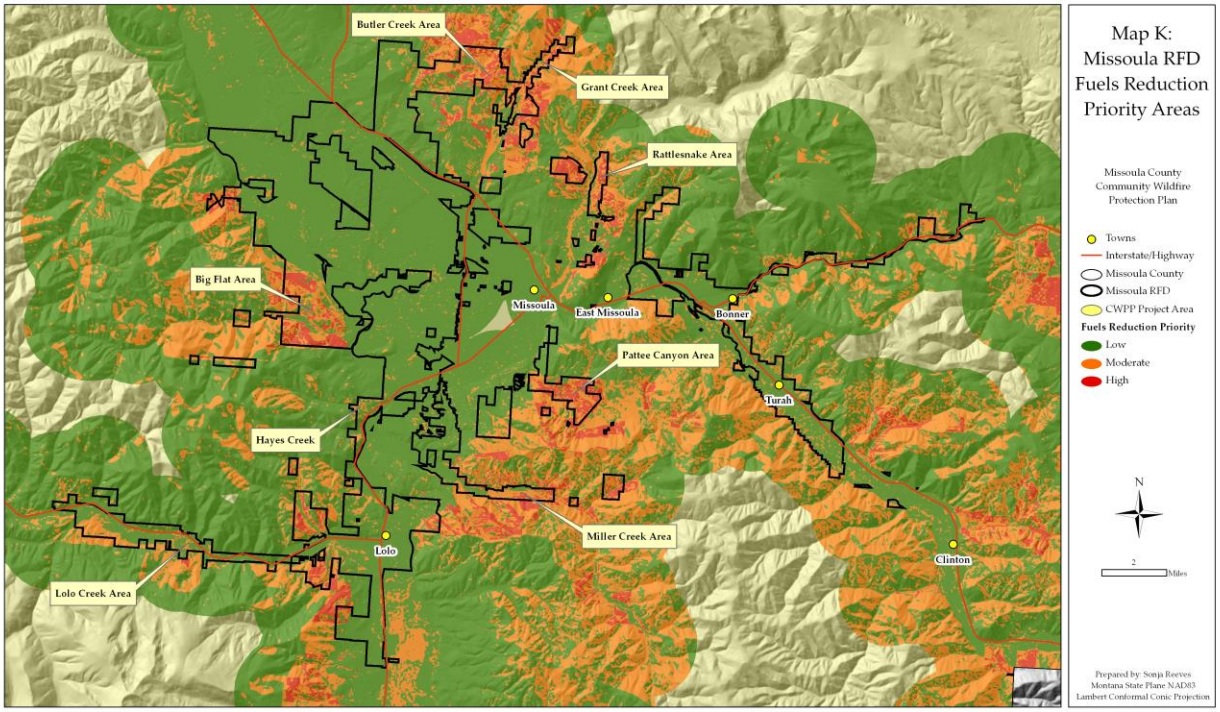

Kendall Creek
Donovan Creek
Wallace Creek
Clinton
Map F:
Clinton RFD
Fuels Reduction
Priority Areas
Missoula County
Community Wildfire
Protection Plan
Towns
Interstate/Highway
Missoula County
Clinton RFD
CWPP Project Area
Fuels Reduction Priority
Low
Moderate
High
N
1
Mile
Prepared by: Sonja Reeves
Montana State Plane NAD83
Lambert Conformal Conic Projection


Priority Area
Missoula County
Ravalli County
Map G:
Florence RFD
Fuels Reduction
Priority Areas
Missoula County
Community Wildfire
Protection Plan
Towns
Interstate/Highway
Missoula County
Florence RFD
CWPP Project Area
Fuels Reduction Priority
Low
Moderate
High
N
0.5
Miles
Prepared by: Sonja Reeves
Montana State Plane NAD83
Lambert Conformal Conic Projection


Ninemile Area
Lozeau
Arlee
Sixmile Area
Frenchtown Face
Evaro Area
Tarkio
Huson
Evaro
Alberton
Frenchtown
Southside Road/Petty Creek Area
Missoula
East Missoula
Map H:
Frenchtown RFD
Fuels Reduction
Priority Areas
Missoula County
Community Wildfire
Protection Plan
Towns
Interstate/Highway
Missoula County
Frenchtown RFD
CWPP Project Area
Fuels Reduction Priority
Low
Moderate
High
N
4
Miles
Prepared by: Sonja Reeves
Montana State Plane NAD83
Lambert Conformal Conic Projection

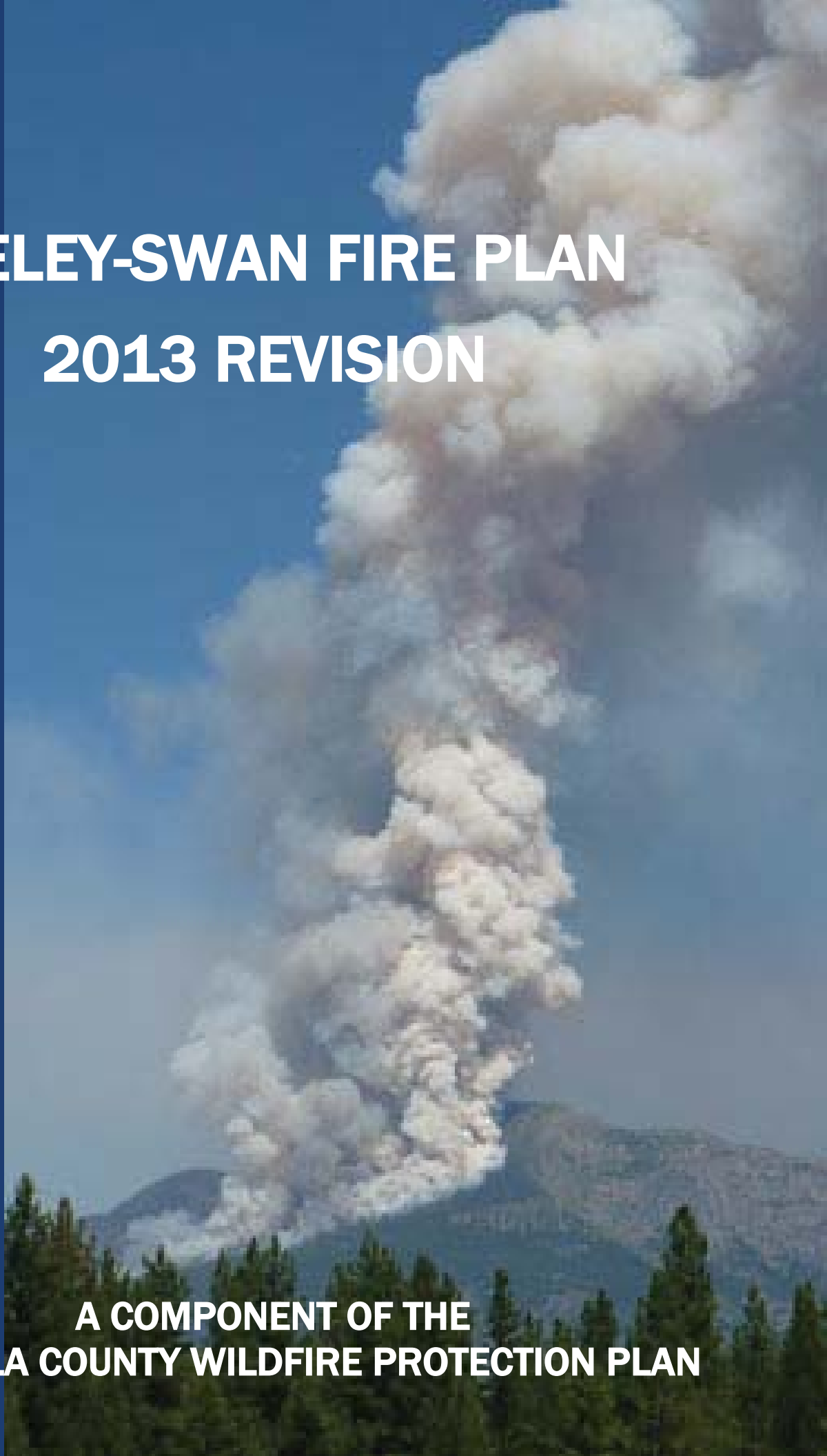

Clearwater
Greenough
Bear, Norman, and Game Creek Area
Potomac
Forest Park Subdivision
Red Tail/Mystic Moon Area
Jordan Subdivision
Garnet Range Road Subdivision
Map I:
Greenough/
Potomac FSA
Fuels Reduction
Priority Areas
Missoula County
Community Wildfire
Protection Plan
Towns
Interstate/Highway
Missoula County
Greenough/Potomac VFD
CWPP Project Area
Fuels Reduction Priority
Low
Moderate
High
N
2
Miles
Prepared by: Sonja Reeves
Montana State Plane NAD83
Lambert Conformal Conic Projection


Lower Grant Creek Area
Lower Rattlesnake Area
Missoula
Mt. Jumbo
East Missoula
Bonner
MT200
90
US12
US93
Pattee Canyon Area
Turah
Map J:
Missoula FD
Fuels Reduction
Priority Areas
Missoula County
Community Wildfire
Protection Plan
Towns
Interstate/Highway
Missoula County
Missoula FD
CWPP Project Area
Fuels Reduction Priority
Low
Moderate
High
N
1
Mile
Prepared by: Sonja Reeves
Montana State Plane NAD83
Lambert Conformal Conic Projection


Butler Creek Area
Grant Creek Area
Rattlesnake Area
Big Flat Area
Missoula
East Missoula
Bonner
Pattee Canyon Area
Turah
Hayes Creek
Lolo
Miller Creek Area
Clinton
Lolo Creek Area
Map K:
Missoula RFD
Fuels Reduction
Priority Areas
Missoula County
Community Wildfire
Protection Plan
Towns
Interstate/Highway
Missoula County
Missoula RFD
CWPP Project Area
Fuels Reduction Priority
Low
Moderate
High
N
2
Miles
Prepared by: Sonja Reeves
Montana State Plane NAD83
Lambert Conformal Conic Projection

Appendix D: 2013 Seeley Swan Fire Plan

SEELEY-SWAN FIRE PLAN
2013 REVISION



A COMPONENT OF THE
MISSOULA COUNTY WILDFIRE PROTECTION PLAN

Executive Summary

Problem Overview

The fire seasons of 2000, 2001, 2003, 2006, 2007, and 2012 had both direct and indirect impacts on the safety and well-being of the Seeley Lake and Condon, Montana communities. While wildfire hazard cannot be eliminated in this region, some of the risk and effects can be mitigated, particularly in the wildland/urban interface (WUI). The Seeley Lake Rural Fire District, working in conjunction with the Montana Department of Natural Resources and Conservation, the U.S. Forest Service, and the Swan Valley Fire Service Area, prepared the first Seeley-Swan Fire Plan in 2004 to help guide and focus wildfire mitigation activities in the WUI. As per the performance measures identified in this plan, the 2004 Fire Plan was updated in 2008, and has been more substantially revised in 2013, with the results of that effort presented in this report. The goals of these updates and revisions are to incorporate new information and record progress toward the objectives of this Plan, such as:

- Mapping completed fuel mitigation projects
- Mapping areas affected by fire during this time period
- Updating contacts and related resources, and
- Updating important base-line data such as the fuels layer that are used to assess fire hazards in the area.

The area of the Fire Plan was also expanded in the 2008 update to include the entire Clearwater River watershed and expanded further north in the Swan River watershed. The WUI boundaries have also been adjusted with this 2013 update to conform to State law. All of these changes have resulted in changes to acreage estimates in the fire risk categories.

This Fire Plan identifies significant wildfire risks to the communities and outlines an action plan to reduce or eliminate fire impacts. The Fire Plan compiles available information of use in responding to fires or in reducing the risk of fires, furthering the existing coordination and cooperation of firefighting units in the Seeley-Swan Valley, and developing action steps for addressing fire risks and firefighting capabilities in the Valley. The Seeley-Swan Fire Plan includes resources and information to assist county residents, public and private organizations, local government, and others interested in planning for wildfire risk reduction, including a list of action steps that will assist both communities in reducing and preventing loss from future wildfire events.

Process Overview

Information for the 2013 Seeley-Swan Fire Plan Revision was gathered during monthly meetings conducted from January 2012 to April 2013 and developed using existing public and private information. Participants in the Fire Plan Revision included personnel from the Seeley Lake Rural Fire District, Swan

Valley Volunteer Fire Department, U.S. Forest Service, Montana Department of Natural Resources and Conservation, and technical support was provided by the Ecosystem Management Research Institute. All Fire Plan revisions have been undertaken by the Seeley Lake Fuels Mitigation Task Force, a cooperative group including representatives of the Clearwater Resource Council, Seeley Lake Rural Fire District, U.S. Forest Service, Montana Department of Natural Resources and Conservation (DNRC), Swan Ecosystem Center, and Bitter Root RC&D. This Task Force was formed to implement the objectives of the Fire Plan, and has functioned effectively for the past nine years. The Task Force was provided technical assistance from the Ecosystem Management Research Institute in completing previous versions of the plan as well as this update and revision.

Overall Goal

The goal of this document is to develop a cooperative and coordinated Fire Plan for the Seeley Lake and Condon communities-at-risk to wildfire. The objectives to accomplish this goal include:

1) Facilitate community planning and outline strategies for protecting community values,
2) Identify existing information and conduct a wildland-urban interface (WUI) risk assessment for the entire project area,
3) Identify pre-fire management risk/reduction actions and programs,
4) Develop a community Fire Plan that can be integrated with local comprehensive growth and development plans as well as broader landscape plans to ensure social, economic and ecological concerns are addressed at all levels, and
5) Develop a framework to ensure wildfire policy, prevention, suppression, and funding efforts are coordinated locally among stakeholders that include local communities, as well as private and public organizations.

This document will serve as a template and should be evaluated and updated on an annual basis or as new information is gathered or developed.

Methodology

The Seeley-Swan Fire Plan was developed with 3 primary steps required to complete the overall process. Step 1 included the development of a GIS and Database Support System. Available information to support fire planning or response within the Fire Plan region was compiled and entered in a GIS and database system. Some examples of pertinent information include roads, utilities, ownership, location of structures (partial), water drafting sites, communication facilities, historical fires, and forest conditions. Step 2 included using the information gathered in step 1 to conduct a risk assessment for the wildland/urban interface. The risk assessment used information on forest fuel loadings, slope, structure densities, and evacuation routes to identify areas of high, moderate, low, and very low risk to wildfire. Step 3 used the information obtained in Step 1 and 2 to develop the Seeley-Swan Fire Plan that

represents a cooperative and coordinated Fire Plan for the Seeley Lake and Condon communities-at-risk to wildfire.

Specific Recommendations

The plan identifies the importance of maintaining the effective, cooperative working relationship among the different fire agencies in the plan area. It also identifies the importance in maintaining and improving public communication and educational programs. The plan compiled considerable data and maps to facilitate fire suppression activities and also identified high and moderate risk acres within the WUI of the Seeley and Swan Valleys. A goal of treating 80% of the treatable high-risk areas and additional moderate risk areas was identified. This will require obtaining additional resources to accomplish these goals. Frequent meetings of the cooperators through the Seeley Lake Fuels Mitigation Task Force have occurred and should continue to ensure effective and efficient suppression and pre-suppression coordination.

Monitoring and Progress Review

The data and maps compiled for the plan should be examined and updated annually. Specific measures of plan accomplishments are identified, and will be collected and compiled by the cooperating agencies annually. A complete review of the plan should be conducted no later than 5 years from the date of acceptance of this plan.

Information is summarized and provided for fuel treatments occurring in the Fire Plan region since the initiation of the 2004 Seeley-Swan Fire Plan.

Additional Information Needs

The plan identifies two remaining information needs that should be addressed as soon as practical. These remaining information needs are:

- Determining the accuracy of the LANDFIRE fuels map for the Swan and Clearwater Valleys,
- Determining policies and guidelines for incorporating additional ecological considerations, particularly as they relate to threatened and endangered species or species of concern, for fuel thinning within the WUI.

1.0 Introduction

A wildfire is defined as an unplanned fire be it human-caused or from natural origins, originating or spreading outside of the urban environment. For the past four decades, the intensity of wildfires has been increasing throughout the western United States. In addition, the frequency of fires has been high due to the effects of several drought cycles, leading to dramatic increases in major fire incidents. Since 1970, over 10,000 homes and 20,000 structures have been lost to wildfire throughout the West. The number of wildfires exceeding 1,000 acres has doubled during this same time period. Increasing frequency and intensity of wildfires has been observed in the Seeley-Swan Fire Plan region as well. Recent fire seasons have posed considerable threat to the Seeley Lake and Condon communities. In 2000, severe drought conditions lead to level III fire restrictions that closed state and federal forests. In addition to the fear and tension within the communities, the resulting loss of tourism and recreational income impacted many area businesses. In 2001, severe drought conditions resulted in 30 fire ignitions, with 2 major fire occurrences within the Fire Plan area. In 2003, severe drought and weather conditions contributed to 57 fire starts within the Fire Plan area, with 2 of those becoming major fire incidents that required considerable resources and money to overcome. In 2001, 2003, and 2007 the communities of Seeley Lake and Condon were impacted by Stage II fire restrictions as well as air quality problems resulting from smoke, and loss of income to some local businesses. In 2007, the Jocko Lakes Fire threatened the community of Seeley Lake, and resulted in the evacuation of large parts of the community for up to 2 weeks. Access to the community was restricted to local residents for a number of days, resulting in sizable losses to recreation-supported businesses. The fire history of the Seeley/Swan Valley coupled with severe weather patterns and current forest conditions suggest that future wildfire events are inevitable and could result in considerable loss of property and natural resources, as well as threaten the lives and safety of firefighters and residents alike.

1.1 Background

The first version of the Seeley-Swan Fire Plan was completed in 2004 with funding from a grant received by the Seeley Lake Rural Fire District using U.S. Forest Service National Fire Plan funds and administered by the Montana Department of Commerce. Since that time, the Fire Plan has undergone an update in 2008 and a revision, this document, in 2013. The goals of these updates and revisions are to incorporate new information and record progress toward the objectives of this Plan, such as:

- Mapping completed fuel mitigation projects
- Mapping areas affected by fire during this time period
- Updating contacts and related resources, and
- Updating important base-line data such as the fuels layer that are used to assess fire hazards in the area.

The area of the Fire Plan was also expanded to include the entire Clearwater River watershed and expanded further north in the Swan River watershed. The WUI boundaries have also been adjusted. All of these changes resulted in changes to acreage estimates in the fire risk categories.

For the most part, the organizations and individuals that have been involved in developing the Fire Plan have been consistent and dedicated to the objectives identified in the Plan, as well as ensuring the accuracy of the information. See Appendix A for a list of individuals involved in the process for all three versions of the Plan.

1.2 Current Relevant Fire Policies

1.2.1 Federal Fire Policies

1.2.1.1 NATIONAL FIRE PLAN

The National Fire Plan was initiated as a result of the 2001 Interior and Related Agencies Appropriations Act (P.L. 106-291) and is a long-term investment that will help protect communities and natural resources, the lives of firefighters, and the public. It is a commitment based on cooperation and communication among federal agencies, states, local governments, tribes and interested publics. The federal wildfire management agencies worked closely with these partners to prepare a 10-year Comprehensive Strategy, completed in August 2001. The primary goals of the 10-Year Comprehensive Strategy were: 1) improve fire prevention and suppression, 2) reduce hazardous fuels, 3) restore fire-adapted ecosystems, and 4) promote community assistance. In May 2002, the Secretaries of Interior and Agriculture worked with the Western Governors to develop "A Collaborative Approach for Reducing Wildfire Risks to Communities and the Environment – 10-Year Comprehensive Strategy Implementation Plan". See Western Governor's section below, for a discussion of the Implementation Plan.

The National Fire Plan recognized the important role of state and local fire organizations, and of communities and individuals, in meeting the challenges of fire management across the landscape. The National Fire Plan includes a suite of programs that enable better fire planning and prevention, reducing fire risk in forests adjacent to communities, and strengthening state and local capabilities to supplement Federal fire management efforts. The following provides a brief discussion of these programs:

- Through Cooperative Fire Protection, State Fire Assistance and Volunteer Fire Assistance programs at the State and local level, the National Fire Plan provides resources to enhance local firefighting capabilities, improve preparedness of state and volunteer firefighting organizations, and streamline communication and coordination across organizational boundaries to prevent, manage, and put out fire more effectively.
- Through the Community and Private Land Fire Assistance programs, the National Fire Plan promotes local action in impacted areas by increasing public understanding and providing tools to enhance local and individual responsibility and actions to reduce fire risk and prevent the outbreak of fire around homes and communities.

- Through Economic Action Programs, the National Fire Plan supports technology development and market expansion to stimulate local economies by diversifying jobs and business activities. The emphasis is on products generated from woody material removed from dense forest stands.
- These programs provide training, information, technical assistance and financial support to States, communities and local organizations, and individual landowners. Over the long-term, the National Fire Plan will reduce fire risk to communities and people, while offering economic growth opportunities that enable them to maintain their rural character and ties to the land.

1.2.1.2 SAFETY

The following safety policies are accepted and endorsed by the Secretaries of Agriculture and Interior. They provide consistent fire management practices among federal wildfire management agencies fire operations.

- Firefighter and public safety is the first priority. All Fire Management Plans (FMPs) and activities must reflect this commitment.
- All fire personnel will meet appropriate training, experience, and qualifications requirements for incident assignments *(See NWCG 310-1, DOI Incident Qualification and Certification System, and FSH 5109-17.)*
- All fire personnel will be equipped with approved personal protective equipment (PPE) appropriate to their position.
- All agency personnel assigned to fireline duties will complete annual refresher training.
- All wildfire entrapments and fatalities will be reported using the current National Wildfire Coordinating Group (NWCG) initial entrapment/fatality report form.
- All wildfire serious accidents will be investigated using the agency serious accident investigation procedures and interagency agreements as appropriate.
- Follow all safety policies, standards, and guidelines identified within the *Interagency Incident Business Management Handbook (IIBMH), Fireline Handbook, Interagency Helicopter Operations Guide (IHOG), Interagency Standards for Fire and Aviation Operations,* and *Incident Response Pocket Guide.*

1.2.1.3 DISASTER MITIGATION ACT 2000

The Disaster Mitigation Act (DMA) of 2000 requires all local governments to have an approved pre-disaster mitigation plan (PDMP) in place to be eligible to receive Hazard Mitigation Grant Program project funding. Missoula County completed its Pre-Disaster Mitigation Plan in October 2004 (http://www.co.missoula.mt.us/oes/plans/MSOCountyPDMFinal.pdf). The Seeley-Swan Fire Plan was incorporated as a component of the Missoula County Community Wildfire Protection Plan that was developed in 2005 as an appendix to the County Pre-Disaster Mitigation Plan, with the Seeley/Swan Fire Plan being the Community Wildfire Protection Plan (CWPP) for these two areas of Missoula County (http://www.co.missoula.mt.us/oes/plans/CWPP/CWPPIntro.pdf). The State Hazard Mitigation Officer submitted the county PMDF's with its CWPP appendix to the Federal Emergency Management Agency which accepted the Plan and made the Seeley-Swan region eligible for local wildfire mitigation project grants and post-disaster hazard mitigation grant projects.

DMA 2000 facilitates cooperation between state and local authorities, prompting them to work together. It encourages and rewards local and state pre-disaster planning, and promotes sustainability as a strategy for disaster resistance. This enhanced planning network will better enable local and state governments to articulate accurate needs for mitigation, resulting in faster allocation of funding and more effective risk reduction projects.

To implement the new DMA 2000 requirements, FEMA prepared an Interim Final Rule, published in the Federal Register on February 26, 2002, at CFR Parts 201 and 206, which established planning and funding criteria for states and local communities.

1.2.1.4 HEALTHY FOREST RESTORATION ACT 2003

The Healthy Forests Restoration Act (HFRA) was signed into law in December 2003. The legislation is intended to reduce the threat of destructive wildfires while upholding environmental standards and encouraging public input early in the planning process. The HFRA strengthens public participation in developing high priority areas, uses the best science available to actively manage public lands, allows for a pre-decisional objections process that encourages public participation early in the planning and issues clear guidance for court actions challenging HFRA projects. Language in the act regarding purposes is as follows:

"The purposes of this act are—

1. to reduce wildfire risk to communities, municipal water supplies, and other at-risk Federal land through a collaborative process of planning, prioritizing, and implementing hazardous fuel reduction projects;
2. to authorize grant programs to improve the commercial value of forest biomass (that otherwise contributes to the risk of catastrophic fire or insect or disease infestation) for producing electric energy, useful heat, transportation fuel, and petroleum based product substitutes, and for other commercial purposes;
3. to enhance efforts to protect watersheds and address threats to forest and rangeland health, including catastrophic wildfire, across the landscape;
4. to promote systematic gathering of information to address the impact of insect and disease infestations and other damaging agents on forest and rangeland health;
5. to improve the capacity to detect insect and disease infestations at an early stage, particularly with respect to hardwood forests; and
6. to protect, restore, and enhance forest ecosystem components—
   (A) to promote the recovery of threatened and endangered species;
   (B) to improve biological diversity; and
   (C) to enhance productivity and carbon sequestration."

The entire Act H.R.1904 can be viewed at http://www.gpo.gov/fdsys/pkg/BILLS-108hr1904enr/pdf/BILLS-108hr1904enr.pdf

The HFRA focuses primarily on expedited hazardous-fuel treatment on some NFS and BLM lands at risk of wildland fire and insect or disease epidemics. These lands include areas where vegetation treatment will provide long-term benefits to threatened and endangered species. The act encourages Federal agencies to involve State and local governments and citizens when developing plans and projects for vegetation treatment on Federal and adjacent non-Federal lands. The HFRA is consistent with community-based wildland fire planning, watershed planning, and related ongoing efforts under the *National Fire Plan* (http://www.fireplan.gov) and *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10-Year Comprehensive Strategy Implementation Plan* (May 2002, (http://www.fireplan.gov/reports/11-23-en.pdf). The HFRA does not duplicate or replace these ongoing efforts.

Hazardous-fuel reduction projects on NFS and BLM lands in one or more of the following areas qualify for expedited NEPA review under the HFRA:

- WUIs of at-risk communities
- Municipal watersheds that are at risk from wildland fire
- Areas where wind throw, blowdown, ice storm damage, or the existence or imminent risk of an insect or disease epidemic significantly threatens ecosystem components or resource values
- Areas where wildland fire poses a threat to, and where the natural fire regimes are important for, threatened and endangered species or their habitat

The types of lands listed above define where the authorities of the HFRA can be used to expedite vegetation treatment, such as mechanical thinning or prescribed fire, on NFS and BLM lands.
The HFRA requires authorized projects to be planned and conducted consistent with resource management plans and other relevant administrative policies and decisions that apply to the Federal lands covered by the project (Section 102(b)). The HFRA also prohibits authorized projects in wilderness areas, formal wilderness study areas, and Federal lands where an act of Congress or Presidential proclamation prohibits or restricts removal of vegetation (Section 102(d)).

Wildland-Urban Interfaces (WUIs) Within or Adjacent to At-Risk Communities

The HFRA provides improved administrative procedures for hazardous-fuel-reduction projects on NFS and BLM lands in the WUIs of at-risk communities. The act encourages the development of Community Wildfire Protection Plans under which communities will designate their WUIs, where HFRA projects may take place. The HFRA will greatly accelerate the interest of listed at-risk communities (FR 66 160 Aug. 17, 2001; http://www.fireplan.gov/content/reports) in preparing wildland fire protection plans and designating their WUIs, as well as the interest of other communities in becoming listed as at-risk communities. Federal agencies and their State and local cooperators must be prepared to provide information and services to support these communities.

1.2.1.5 The FLAME Act

Faced with increasing numbers of catastrophic, emergency wildland fires, the U.S. enacted the Federal Land Assistance, Management and Enhancement Act (FLAME) Act in 2008 to establish a new federal fund to cover the growing costs associated with fighting these fires.

Western Region

The FLAME Act also required a cohesive wildland fire management strategy. To achieve this, the U.S. was divided into three zones: west, southeast and northeast. Representatives from agencies, governments and other stakeholders in the 16 western states are working towards a cohesive strategy that will enable them to plan for and respond to wildland fires efficiently and strategically by restoring and maintaining resilient landscapes, creating fire adapted communities and encouraging jurisdictional collaboration.

Similar efforts have been underway for the last decade; however, the Secretaries of Interior and Agriculture directed this to be the most all-inclusive effort ever attempted to develop a national wildfire management cohesive strategy.

The complete Western Region Cohesive Strategy Risk Assessment and Collaborative efforts can be found at: http://sites.nemac.org/westcohesivefire/updates/

1.2.1.6 WESTERN GOVERNOR'S ASSOCIATION

Improving forest health and reducing the risk of wildfires were identified as top priorities for the Western Governors' Association (WGA). To that end, the WGA engaged in a multi-year effort working with regional stakeholders and the federal Wildfire Leadership Council to implement the 10-Year Comprehensive Strategy for Reducing Wildfire Risks. The Comprehensive Strategy utilized a community-based approach that recognizes that key decisions in setting restoration and fire and fuel management project priorities should be made at the local level. The Implementation Plan identifies the desired outcome to be achieved by each goal, measuring progress toward achieving the goals, and the specific steps that must be taken to realize measurable progress.

1.2.1.7 LOCAL IMPLEMENTATION OF FEDERAL FIRE POLICIES

The Lolo and Flathead National Forests derive their fire management direction from multiple plan and policy documents including each forest's respective Land Management Plan (1986), the Forest Service Manual 5100, the Federal Wildland and Prescribed Fire Management Policy (1995), the Thirtymile Hazard Abatement Plan (2003), the Fire and Aviation Operations Management 2003 Operations Action Plan and the Interagency Standards for Fire and Aviation Operations (2003). Each of the National Forests has a Forest Fire Management Team that establishes the annual program priorities based on National, Geographic, and Forest direction. In general, however, fire suppression actions are initiated on all unplanned ignitions. The appropriate response to each wildfire is commensurate with seasonal fire activity, resource availability, cost of suppression actions versus the potential environmental loss, and Land Management Plan direction. The appropriate response and subsequent suppression actions focus on the following priorities:

- Protection of human life, and firefighter, aviation, and public safety;
- Property, and natural and cultural resource protection decisions based on the cost investment, commensurate with benefits and values-to-be-protected; and
- Effectiveness and timeliness of planned actions to meet resource objectives.

Wildland fire is a general term describing any non-structure fire that occurs in vegetation and/or natural fuels including both prescribed fire and wildfire. They are categorized into two types - unplanned ignitions and planned ignitions. Response to wildland fire will be coordinated with all effected agencies/cooperators regardless of the jurisdiction at the ignition point. Fire as a critical natural process, will be integrated into land and resource management plans and activities on a landscape scale, and across agency boundaries. Management response to wildland fire on federal land is based on objectives established in the applicable land and resource management plan and fire management plan. A wildfire may be concurrently managed for more than one objective. Unplanned natural ignitions may be managed to achieve land and resource management plan and fire management plan objectives when risk is within acceptable limits. Initial response to human-caused fires will be to suppress the fire at the lowest cost with the fewest negative consequences with respect to firefighter and public safety. Response to wildland fire is based on ecological, social, and legal consequences of the fire. The appropriate response to the fire is dictated by: the circumstances under which the fire occurs, the likely consequences to firefighter/public safety and welfare, the natural/cultural resources values to be protected. http://www.nifc.gov/PUBLICATIONS/redbook/2013/Chapter09.pdf

Prescribed fire may be used to enhance resource values and reduce hazardous fuel accumulation. Fire Use also may be implemented, where there is an on-site specific plan, to enhance designated resource values and to allow fire to assume its natural ecological role." (Flathead National Forest LRMP narrative, chapter III)

The Western Community Fire Management Assessment describes how communities and their partners in the West are working to better live with wildland fire. The full report, “Living with Wildfire: The State of Practice in Western Communities” is at: http://sites.nemac.org/westcohesivefire/updates/

1.2.2 State Fire Policies

A primary mission of the Montana Department of Natural Resources and Conservation (DNRC) is the protection of the State’s natural resources from wildfire. State fire Policy is defined in 76-13-115, which was updated in 2007 by the 2006 Montana legislature.

76-13-115. State Fire Policy. The legislature finds and declares that:

(1) the safety of the public and of firefighters is paramount in all wildfire suppression activities;
(2) it is a priority to minimize property and resource loss resulting from wildfire and to minimize expense to Montana taxpayers, which is generally accomplished through an aggressive and rapid initial attack effort;

(3) interagency cooperation and coordination among local, state, and federal agencies are intended and encouraged, including cooperation when restricting activity or closing areas to access becomes necessary;
(4) fire prevention, hazard reduction, and loss mitigation are fundamental components of this policy;
(5) all property in Montana has wildfire protection from a recognized fire protection entity;
(6) all private property owners and federal and state public land management agencies have a responsibility to manage resources, mitigate fire hazards, and otherwise prevent fires on their property;
(7) sound forest management activities to reduce fire risk, such as thinning, prescribed burning, and insect and disease treatments, improve the overall diversity and vigor of forested landscapes and improve the condition of related water, wildlife, recreation, and aesthetic resources; and
(8) development of fire protection guidelines for the wildland-urban interface (WUI) is critical to improving public safety and for reducing risk and loss.

Part 6 of the new State Fire Policy states that: "(6) all private property owners and federal and state public land management agencies have a responsibility to manage resources, mitigate fire hazards, and otherwise prevent fires on their property:

"Wildland fire protection is defined in 76-13-102(14):

"Wildland fire protection" means the work of prevention, detection, and suppression of wildland fires and includes training required to perform those functions. In addition, Montana State law requires that all privately owned forested lands in the State be provided with wildfire protection (76-13-201 MCA).

It is also the responsibility of the landowner to mitigate hazardous fuel conditions on their property by 76-13-212 - Duty of landowner to protect against fire:

(1) An owner of land shall protect against the starting or existence of fire and shall suppress the spread of fire on that land. This protection and suppression must be in conformity with reasonable rules and standards for adequate fire protection adopted by the department.
(2)(a) The provisions of 76-13-201 apply to an owner of land that is classified as forest land under 76-13-107 and that is within a wildland fire protection district.
(b) If an owner of land does not provide for protection against the starting or existence of fire and for fire suppression and the land does not meet the criteria in subsection (2)(a), the owner may request that the department provide protection as provided in 76-13-105.

This is accomplished through DNRC's Division of Forestry and includes those State and private classified forestlands lying within the protection boundaries, as well as areas not classified as forestland where agreements are in place. Large tracts of federal lands, within protection boundaries, are also being protected through contract or offset. The DNRC's current program direction is to take suppression actions that are both offensive and defensive on farm, range, forest, watershed, or other uncultivated lands in private and public ownership. DNRC accomplishes its mission of protecting these private and

public lands through a combination of three primary methods. These methods are labeled as direct, contract, and State/County cooperative fire protection. These methods are outlined as follows:

1. Direct Protection: This type of protection occurs within a Forest Fire Protection District or an Affidavit Unit, which are generally referred to as direct protection areas. Within these areas there is only one recognized agency assigned wildfire protection, usually the DNRC, USFS, BLM, or Salish and Kootenai Tribe. These are defined as forested lands and they are provided this protection based on an assessment for services rendered, paid through the county tax rolls to the State. Prevention, pre-suppression and suppression work is all considered DNRC direct fire protection responsibility. DNRC hires personnel and purchases equipment necessary to fulfill wildfire protection responsibilities for assigned lands. Assigned lands are within established wildfire protection districts or units.

2. Contract Protection: This is another type of direct protection provided to state, private and federal lands. A federal agency that has been recognized by the DNRC can protect state and private lands. Recognized federal fire protection agencies are required to provide protection at the same or higher level as they do on their own lands. DNRC may provide direct protection to federal lands. An offset acreage protection program exists within Montana to provide uniform fire protection areas and to avoid payments from one agency to another. Contracting by the offset method (the State provides fire protection on an approximately equal area of federal land) is how we currently operate in Montana. Contract protection may be by direct payment to the federal agency for their services or to the state for protection of federal acres.

3. State-County Cooperative Protection: The State and county cooperative fire program is a lower intensity fire protection than that of direct or contract protection but fully meets the legal requirements for protecting natural resources. The county provides the basic level of fire protection through a system of volunteers, county personnel, rural fire districts, etc. The county may be supported by the State in matters of organization, planning, prevention, equipment, training, and fire suppression. If a county reaches the point that it can no longer handle a wildfire situation it can call the DNRC for assistance. DNRC will then provide expertise and resources to handle the wildfire situation.

Also, Montana Code Annotated section 76-13-104(8) requires that the Montana Department of Natural Resources and Conservation (DNRC) adopt administrative rules that address development within the wildland-urban interface (WUI). Specifically this includes, but is not limited to:

"best practices for development within the WUI and criteria for providing grant and loan assistance to local government entities to encourage them to adopt those practices."

Guidelines were developed in 2009 (dnrc.mt.gov/forestry/Fire/WUI/Documents/GuidelinesFINAL.pdf) to address this requirement. The purpose of these guidelines are identified as:

"These Guidelines may be used by local government entities, fire protection agencies, planners, developers, and homeowners to improve protection of life, property, and resources from wildland fire.....Developments in science and technology, along with the adoption of new rules by the state of Montana and its counties governing construction and fuels mitigation in the WUI will present new ideas and direction for homeowners and other residents of the WUI."

1.2.3 Local Fire Policies

The next level of wildfire protection occurs at the local or county level. Within the Fire Plan area there are two types of rural fire protection that include Rural Fire Districts (RFD) and Fire Service Areas (FSA). The Seeley Lake Rural Fire District is responsible for all fires occurring within their boundaries. There is no distinction in the law regarding what type of fire so all fires are included (structural, vehicle, and wildland). This applies regardless of the vegetative cover on the land so forested lands are also included even if these lands are already protected by a Recognized Wildland Protection Agency. It is these forested lands, lying within established rural fire districts that are referred to as having "overlapping jurisdiction." (7-33-2202 MCA). Rural Fire Districts are supported through taxes paid on all property within their district. The Seeley Lake RFD has been in place since 1984.

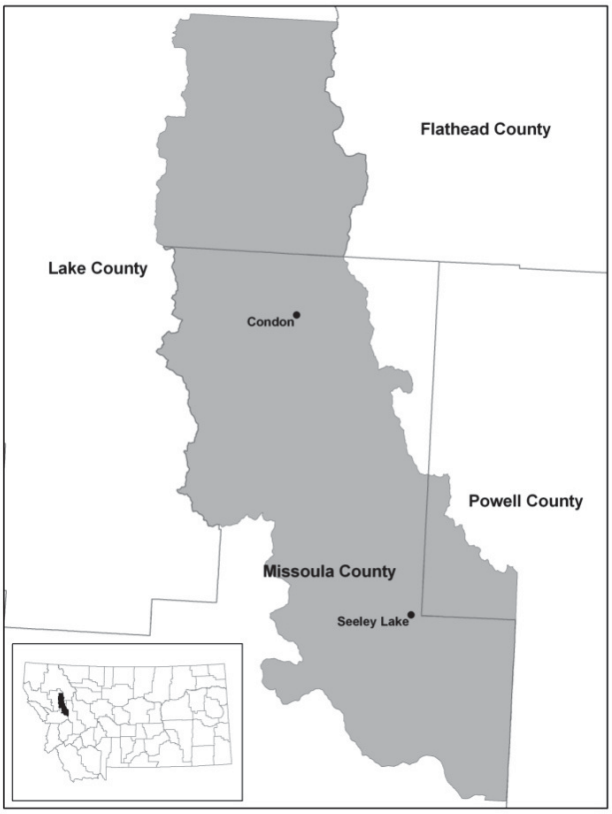


Figure 1. Location of Seeley-Swan Fire Plan boundary within northwest Montana.

The Swan Valley and Greenough/Potomac Fire Departments are organized as Fire Service Areas as defined in 7-33-2401 MCA. In Fire Service Areas, a fixed fee is established for residential and commercial structures within a designated area. Greenough/Potomac and Swan Valley Fire Departments are only responsible for those structures and have no legal responsibility for wildland fire protection. Because of this, both FSA's maintain agreements with DNRC to compensate the FSA when the district resources are utilized in wildland fire situations. These agreements can be found at either the Swan or Clearwater DNRC offices. The Greenough/Potomac Fire Service area was established in 1993 and the Swan Valley VFD was instituted in 2003.

1.3 Planning Area Boundaries

The Seeley-Swan Valley is located in northwest Montana and represents a land area of approximately 645,848 acres. The Fire Plan boundary spans 65 miles from north to south and 30 miles from east to

west. Figure 1 identifies the actual boundary of the Fire Plan within Missoula, Lake and Powell Counties. Two primary communities lie within the Seeley-Swan Fire Plan region; Seeley Lake in the south half of the project area and Condon in the north half. The northern boundary of the planning area coincides with the northern boundary of the Swan Unit DNRC fire protection area.

1.4 Community Legal Structure

The Seeley-Swan Fire Plan boundary encompasses the rural communities of Seeley Lake and Condon, Montana. These communities are unincorporated and reside within Missoula County. Missoula County is governed by the Board of County Commissioners. All legislative, executive and administrative powers and duties of the local government not specifically reserved by law or ordinance to other elected officials reside in the Commission (MCA-7-3-401). The Board of County Commissioners has jurisdiction and power to represent the County and has care of the County property and the management of the business and concerns of the County. However, the Seeley Lake Community Council and Condon Community Council, while not legally recognized governing bodies, were established, in part, to advance and promote the interests and welfare of the residents of Seeley Lake and Condon. They inform the Missoula County Commissioners and other County departments about issues within the Seeley Lake and Condon planning areas. The Councils work with permanent and part-time residents, state and federal agencies, property owners, and visitors to assist local government in making decisions that benefit the Seeley Lake and Condon areas.

1.5 Jurisdictional Boundaries

The primary wildfire protection system utilized in the Fire Plan area is the Forest Fire District. A Forest Fire District is an area authorized and established under 76-13-204 MCA, and administered by the Montana Department of Natural Resources and Conservation for the protection of classified forestland from fire. Protection within a District is the most intensive form of forest fire protection provided within the state. District boundaries are established through a vote of the landowners. The DNRC assigns the protection for the state and private lands within the district to a recognized protection agency. All classified forestlands, whether state, private, or federal, within the district boundaries are normally under the protection of one recognized agency. Payment for protection is made by the private landowners through annual

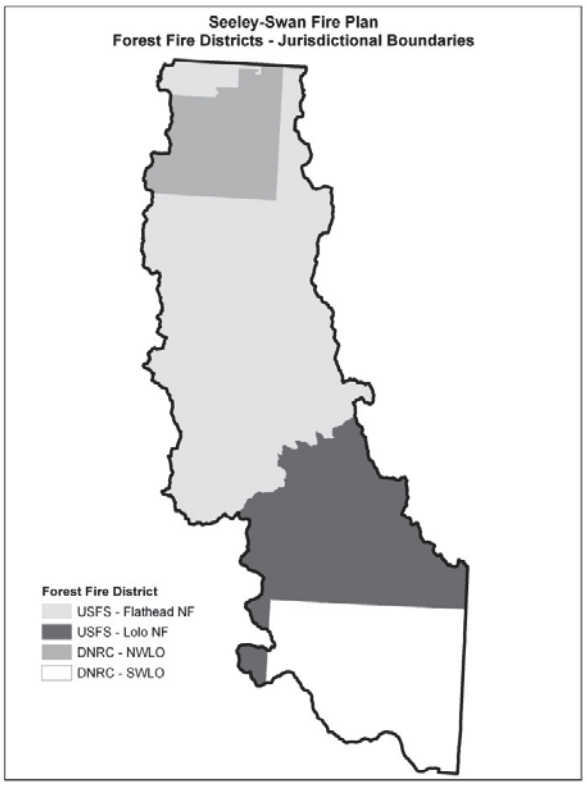


Figure 2. Forest Fire Districts – jurisdictional boundaries.

assessments which are charged up to the maximum as provided by law, based upon actual costs of protection. Payment for protection of another agency's lands within a district is handled on a direct billing basis. Fire prevention, detection, and suppression services are provided through the state in all districts. Most of the National Forests or certain portions have been formed into protection districts. All of the lands lying within the boundaries of the Lolo and Flathead National Forests are in a Forest Fire District.

Figure 2 identifies the Forest Fire Districts and responsible agencies within the Seeley-Swan Fire Plan area. The DNRC is the primary agency responsible for wildfire protection to state and private lands in the Fire Plan area. The Lolo and Flathead National Forests are the primary agencies responsible for wildfire protection on federal land. However, some jurisdictional boundaries have been delineated to maximize time and resource efficiencies and therefore may result in cross-responsibilities among agencies. Consequently, a fire originating within a designated forest fire district will be responded to by the agency identified in Figure 3.

It is important to note that the Seeley Lake Rural Fire District, along with the Greenough/Potomac and Swan Valley Fire Service Area's have lead responsibilities for structural fire and emergency services within their respective jurisdictional zones (Figure 4). These fire departments within the Fire Plan area

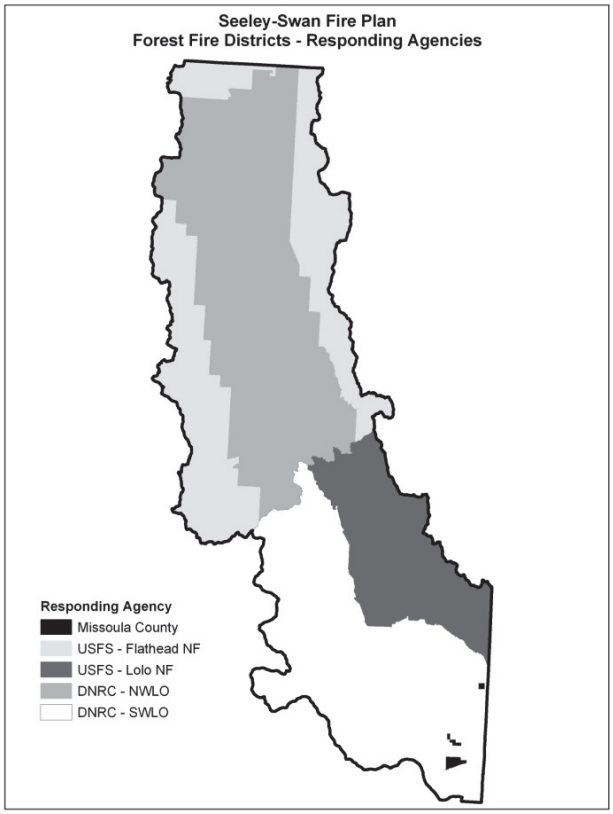


Figure 4. Forest fire – responding agency jurisdictional boundaries.

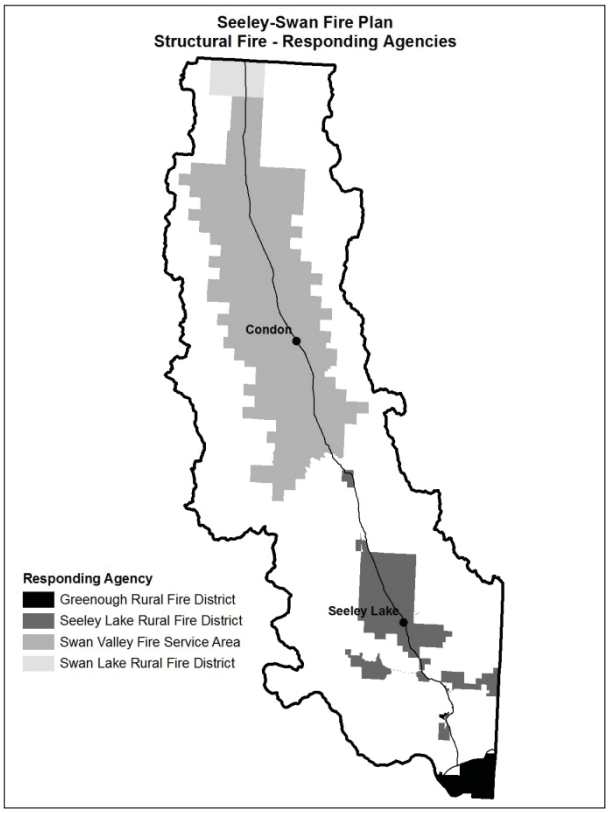


Figure 4. Structural fire – responding agency jurisdictional boundaries.

primarily provide initial attack wildfire suppression assistance within their jurisdictional zone due to limited resources and personnel. The RFD's and FSA's will coordinate with the appropriate state and federal agencies to ensure a timely response and adequate resources are applied to a wildfire within their jurisdictional zones. Fire Service Areas are not responsible for wildland fires within their districts but may be called to assist in accordance with operating agreements with DNRC. Human safety and structure protection will be their primary responsibility within their jurisdictional zone. Structures located outside the Seeley Lake Fire District or the Greenough/Potomac and Swan Valley Fire Service Areas are not protected. In the event of wildfire, state and federal agencies will attempt, where practical, to stop fires from reaching these structures. Wildfire firefighters are not trained for interior structural fire suppression.

1.6 Strategic Goals

The goal of this document is to develop a cooperative and coordinated fire management plan for the Seeley Lake and Condon communities-at-risk to wildfire. This plan includes five strategic objectives:

1. Facilitate community planning and outline strategies for protecting community values,
2. Identify existing information and conduct a risk assessment for the entire project area,
3. Identify pre-fire management risk/reduction actions and programs,
4. Develop a community Fire Plan that can be integrated with local comprehensive growth and development plans as well as broader landscape plans to ensure social, economic and ecological concerns are addressed at all levels, and
5. Develop a framework to ensure wildfire policy, prevention, attack, and funding efforts are coordinated locally among stakeholders that include local communities, as well as private and public organizations.

2.0 Community Description

2.1 Population, Demographics

Table 1 represents the estimated population of the Fire Plan area according to data acquired by the U.S. Census Bureau in 2010. While the census area boundaries did not precisely represent the Fire Plan boundaries, the data presented are believed to generally reflect the population estimates. Additional information is provided on housing units and types of occupancy to illustrate the level of seasonal, recreational, or occasional use within the planning area.

The Fire Plan area represents 645,848 acres. Figure 5 represents the primary ownership distribution within the Fire Plan area. Federal ownership comprises 62.5% of the land area, state of Montana ownership comprises 17.9%, Plum Creek Timber Company comprises 8.8%, and other private ownership comprises 9.2%. Lakes within the region comprise 1.5% of the total Fire Plan area.

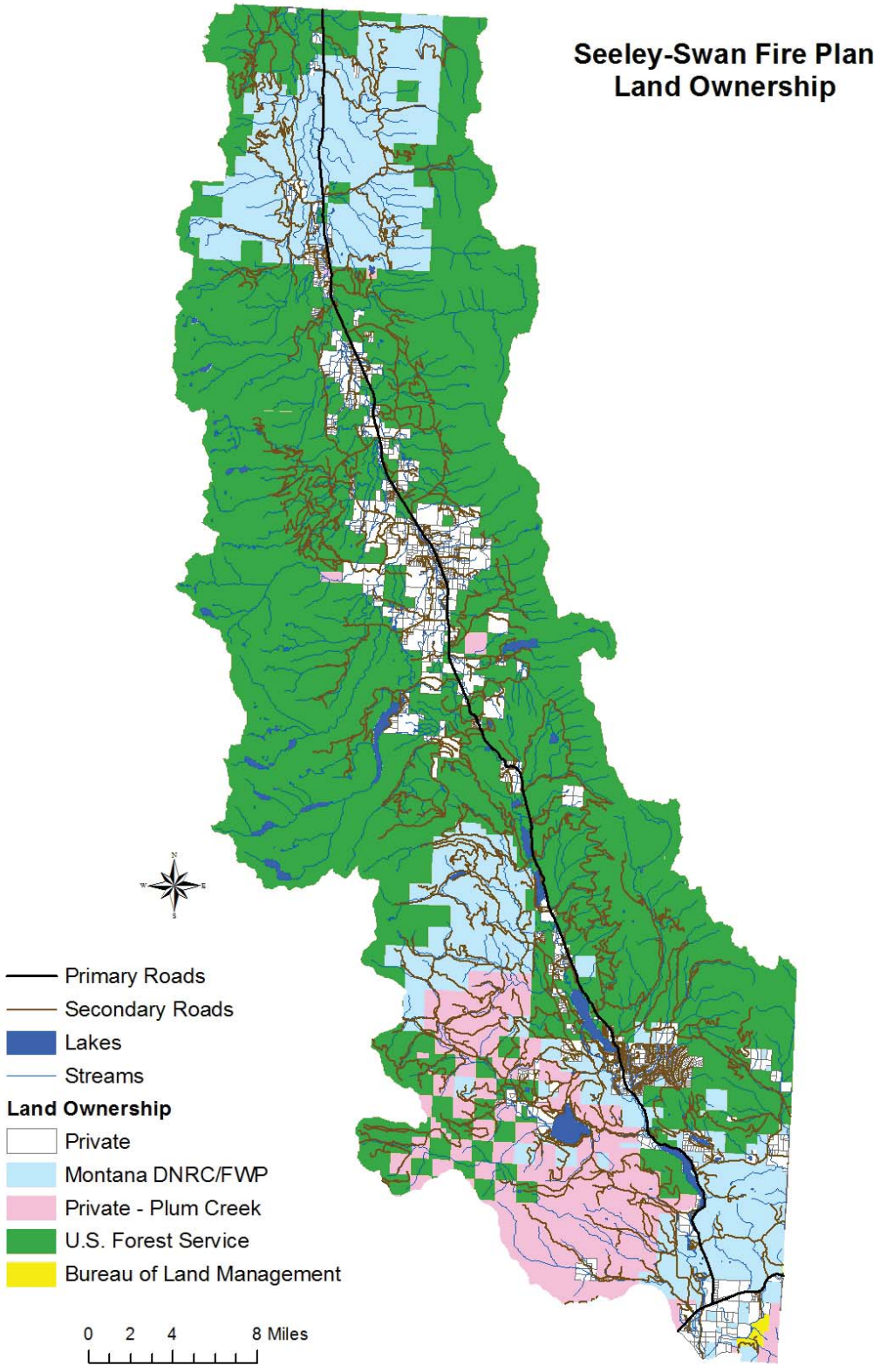


Figure 5. Land ownership, maintained roads, primary lakes, and streams in the Seeley-Swan Fire Plan region.

Table 1. Estimated population of the Fire Plan area (Source: U.S. Census Bureau, 2010).

	Seeley Lake (59868)	Condon (59826)
Population		
Year-round occupants	1659	343
Total Housing Units		
Occupied year-round	751	169
Seasonal, recreational or occasional use	445	138
Vacant	66	9
Total	**1262**	**316**

2.2 Non-governmental Organizations, Homeowners' Associations

Several non-governmental organizations and homeowner's associations are present in the Fire Plan area that could provide support to fire planning and on-the-ground efforts to prepare for wildfire.

Non-governmental organizations include:

- Swan Ecosystem Center – Condon
- Blackfoot Challenge – Ovando
- The Nature Conservancy – Ovando
- Clearwater Resource Council – Seeley Lake
- Northwest Connections – Condon
- Ecosystem Management Research Institute – Seeley Lake

Homeowner's Associations include:

- Double Arrow
- Placid Lake
- Lindbergh Lake
- Lake Inez
- Eagle Point Ranch
- Salmon Lake
- Big Sky Lake
- Crescent Meadow
- Seeley-Swan Forest Service Leaseholders

2.3 Emergency Services

2.3.1 Rural Fire Services

The Seeley Lake Rural Fire District, along with the Greenough/Potomac and Swan Valley Fire Service Areas represent three of the six Rural Fire District within the overall Missoula (County) Rural Fire District. The Seeley Lake RFD, Greenough/Potomac and Swan Valley FSA's provide fire protection, emergency medical services, auto extrication, and special rescue response to the communities of Seeley Lake, Condon, and the surrounding areas. The Swan Valley FSA also provides emergency services in Lake County. The Seeley Lake RFD emergency services are provided by 35 volunteers, as well as 2 full-time employees and 1 part-time employee. The Swan Valley and Greenough/Potomac FSA's emergency services are provided by 24 volunteers.

Contacts:	Seeley Lake Rural Fire District	406-677-2400 (non-emergency) 911 (emergency)
	Swan Valley Volunteer Fire Service Area	406-754-2870 (non-emergency) 911 (emergency)
	Greenough/Potomac Fire Service Area	406-244-5796 (non-emergency) 911 (emergency)

2.3.2 Disaster Emergency Services

The Montana Department of Disaster Emergency Services (DES) deals with "emergency management" which applies science, technology, planning, and management to deal with extreme events that can injure or kill large numbers of people, do extensive damage to property, and disrupt community life. DES uses a variety of resources, techniques, and skills to reduce the probability and impact of extreme events and should a disaster occur, to ensure responsibility, authority, and channels of communication are clearly delineated. DES is also responsible for cleanup and removal of hazardous materials that result from accidental spills. In Lake County the Office of Emergency Management serves the same role.

Contacts:	Missoula County DES	406-258-4469 (non-emergency) 911 (emergency)
	Lake County OEM	406-883-7253 (non-emergency/emergency)

2.4 Infrastructure

2.4.1 Roads

The primary public road for ingress and egress to the Fire Plan area is Highway 83, which runs north and south through the center of the region. Highway 83 is maintained by the Montana Department of Transportation (MDT). Other secondary public roads identified as important for evacuation during the fire season include the Woodworth to Cottonwood Lakes loop, Placid Lake/Jocko Road, and the road to the Morrell Creek Trailhead. These secondary roads are maintained by the Missoula County Road Department except for the Morrell Creek road, which is maintained by the U.S. Forest Service.

Figure 5 also identifies the existing road system in terms of primary and secondary roads. Additional forest roads occur in the plan area, particularly on industrial forest lands. Many of these forest roads are maintained by individual agencies or landowners such as the U.S. Forest Service, DNRC, or Plum Creek Timber Company. These additional forest roads are not shown on this map as many are not actively maintained, and others have been gated or bermed to obstruct vehicle access or to meet the land management objectives of the individual landowner or agency.

Contacts:	State Highways - Montana Department of Transportation	406-677-2599
	County Roads – Missoula County Road Department	406-677-2222
	Montana Department of Natural Resources and Conservation	

Clearwater Office	406-244-5857
Swan River State Forest	406-754-2301
U.S. Forest Service	
Seeley Lake Ranger District	406-677-2233
Condon Work Center	406-754-2295
Swan Lake Ranger District	406-837-7500
Plum Creek Timber Company	406-892-6200
The Nature Conservancy	406-793-0038

2.5 Critical Facilities

Critical facilities are defined as facilities critical to government response and recovery before, during or after a wildfire. Critical facilities for the Seeley Lake and Condon areas include emergency operations centers, fire stations, public works facilities, medical centers, and shelters. Critical facilities also include those that are essential to the continued delivery of community services such as the U.S. Postal Service facilities and public and private schools. In addition, the propane distribution facilities and the Condon Formulary contain hazardous materials that could jeopardize public safety in the event of a wildfire and therefore qualify as critical facilities.

2.5.1 911 and Emergency Operations Centers

Residents who wish to report a wildfire should call 911. The Clearwater Dispatch functions as an initial attack communication center for the DNRC Clearwater Unit. Wildfires occurring within the Seeley Lake RFD jurisdiction or Swan Valley Fire Service Area jurisdiction are dispatched through the Missoula 911 system. The Missoula Interagency Dispatch Center in Missoula or the Kalispell Interagency Dispatch Center (KIC) currently dispatches U.S. Forest Service and DNRC Swan Unit resources, depending on the location of a wildfire within the Fire Plan area.

Operationally, Clearwater Dispatch handles radio communication for initial attack fires, and supports firefighting agencies by ordering resources requested by the Incident Commanders. Clearwater Dispatch also cooperates and coordinates with other volunteer fire departments around the area and coordinates to assist with initial attack support and resources sharing. If local resources are unavailable, the Missoula or Kalispell Interagency Dispatch Centers are contacted for additional support.

In addition to Clearwater Dispatch, the Swan Valley FSA fire station serves as an emergency operations center during a wildfire event and the Seeley Lake Ranger District in Seeley Lake and the Swan Valley Work Center in Condon, serve as emergency operations centers for U.S. Forest Service and DNRC personnel. Swan Valley FSA also has a fire station in Salmon Prairie for Lake County fire protection. The Swan River State Forest also serves as an emergency operation center for the north end of the fire plan area.

2.5.2 Utilities

Most residences in the Fire Plan area use electric and/or propane to heat and operate their homes. Missoula Electric Cooperative is the only source of electricity to the area. It has a major distribution facility at the south end of Seeley Lake. Propane distribution facilities are maintained in the Seeley Lake and Condon communities by the vendors listed below. Energy Partners, LLC. has prepared a Disaster and Emergency Plan that contains contact and general information that would be useful to firefighting agencies in the event of a wildfire. The plan is on file with the Seeley Lake RFD.

Contacts:	Electric – Missoula Electric Cooperative	800-352-5200
	Propane – Energy Partners, LLC. (Cenex) – Seeley Lake/Condon	406-677-3656
	Amerigas	406-543-3598

2.5.3 Communications

Telephone services are the primary means of communication within the Fire Plan area. Blackfoot Telephone Company operates the landline communication grid as well as provides cellular and internet service to the area. Verizon Wireless and Alltel also provide cellular service to the region through towers near Placid Lake and Double Arrow Lookout, respectively. Most of the Condon area is without cell phone coverage. The location of critical communication equipment and radio towers are maintained in a Geographic Information System (GIS) and available to firefighting agencies in the event of a wildfire emergency.

Contacts:	Blackfoot Telephone Company	406-541-5000
	Verizon Wireless – cellular service	866-396-0403
	AT&T – cellular service	800-331-0500

2.5.4 Water Services

Water services are provided to the central infrastructure of Seeley Lake through the Seeley Lake Water District. The Water District maintains a number of fire hydrants. The locations of the water district facility, existing fire hydrants and water draw sites are maintained in a GIS and available to firefighting agencies in the event of a wildfire emergency.

Contact: Seeley Lake Water District 406-677-2039

2.5.5 Public and Private Schools

Four public schools operate within the Fire Plan area. Two elementary schools are located in each of the Seeley Lake and Condon communities and an additional elementary school is located in Salmon Prairie. The Seeley-Swan High School is located in Seeley Lake and includes students from both the Seeley Lake and Condon communities. Enrollment numbers are from the 2011-2012 school year.

Contacts:

Seeley Lake Elementary – enrollment: 191	406-677-2672
Swan Valley Elementary – enrollment: 32	406-754-2320
Seeley-Swan High School – enrollment: 110	406-677-2224
Salmon Prairie School – enrollment: 3	406-754-2245

2.5.6 Community Medical Center

Medical care within the Fire Plan area is provided by the Seeley-Swan Medical Center located on Highway 83 at the south end of Seeley Lake. This health clinic is under the umbrella of Providence Health & Services which also operates St. Patrick's Hospital in Missoula. The medical center also has a helipad site that is serviced by Life Flight, Care Flight, and Alert Air Ambulance.

Contact: Seeley-Swan Medical Center 406-677-2277

2.5.7 Local Airports/Helipad Sites

Two fixed-wing airstrips are located within the Fire Plan area. The Seeley Lake Airstrip is located on Airport Road on the northeast side of Seeley Lake. The Condon Airstrip is located across from the USFS Condon Work Center on the eastside of Highway 83 at mile marker 42.7.

Currently, the Lolo National Forest, Montana Department of Natural Resources and Conservation, and the Montana Department of Transportation maintain an operating plan for the Seeley Lake Airstrip. Any incident requiring the use of this facility should consult this plan to ensure the consistent and safe management of aircraft during natural resource agency operations. Copies of this plan are available from either DNRC or the USFS.

Helipad sites used for emergency rescue and medical calls or by firefighting efforts are located and maintained throughout the Fire Plan area. Helipad locations continue to be identified and added each year. During a wildfire response, helipads are used to drop off the firefighting crew and deploy the water bucket to assist the initial attack crew with water. Because of the remoteness and limited road access this is an extremely valuable tool for firefighters. The locations of helipad sites are maintained in a GIS and available to firefighting agencies in the event of a wildfire.

2.6 Insurance Ratings

Insurance Services Office, Inc. (ISO) identified the following criteria for determining fire insurance classification for calculation of property insurance premiums in the Seeley Lake RFD jurisdictional area:

> "Class 7 applies to properties within 1,000 feet of a public hydrant, five (5) road miles or less of the responding fire station and with a needed water flow of 3,500 gpm or less. Class 8 applies to all dwelling properties within five (5) road miles of the responding fire station but beyond 1,000 feet of a fire hydrant. Class 9 applies to all other properties within five (5) miles of the responding fire

station but beyond 1,000 feet of a fire hydrant. Class 10 applies to properties beyond five (5) road miles of a fire station. The private and public protection at properties with larger needed water flows, are individually evaluated, and may vary from the district classification."

The ISO rating for fire insurance classification in the Swan Valley FSA jurisdictional area is Class 9.

2.7 Land Use/Development Trends

Land uses of the Seeley Lake and Condon communities have historically been closely linked and very dependent upon the abundant natural resources of the Seeley-Swan Valley such as timber resources in the surrounding forests, summer cabins on the abundant lakes and streams, and hunting, fishing and other recreational opportunities in the Valley and adjacent National Forests and Wilderness Areas.

In 2008, The Nature Conservancy and The Trust for Public Lands initiated the Montana Legacy Project that consisted of purchasing 310,000 acres of Plum Creek Timber Company lands in northwestern Montana. Over the course of 3 years, these lands were transferred to primarily public ownership. Within the Seeley-Swan Fire Plan region, approximately 97,500 acres of Plum Creek Timber Company lands were transferred to federal, state, and private ownership; 66,000 acres occurring in the Swan Valley and 31,500 acres occurring in the Clearwater Valley. While this eliminated a great deal of the public vs. private checkerboard pattern in the Swan Valley and the northern half of the Clearwater Valley, the southern half of the Clearwater Valley still presents land management challenges due to the continuing checkerboard patterns.

The Seeley Lake region has seen an increase in seasonal tourists and year-round residential development resulting from relocating retirees and work-at-home professionals, which has extended the need for wildfire protection from outside the historical Seeley Lake downtown area and the characteristic development bands surrounding the lake margins.

3.0 General Environmental Conditions

3.1 Topography, Slope, Aspect, Elevation

The Seeley-Swan valley was formed by continental glaciation when the Cordillerian ice sheet advanced through northern Montana. Smaller mountain glaciers formed in the Mission and Swan Mountain Ranges and moved along the Swan and Clearwater Valleys, as well. The Swan Mountain Range borders the east side of the plan area and the Mission Mountain Range borders the west side. Topography within the area is highly variable, ranging from relatively flat in the valley bottom to steep on the surrounding slopes. Elevation within the Fire Plan area ranges from 2,770 feet in the valley bottom to 9,795 feet on the surrounding peaks. Slopes within the plan area range from 0 to 76 degrees, with 43% of the area represented by slopes of 0 to 10 degrees, 28% by slopes of 10 to 20 degrees, 17% by slopes of 20 to 30 degrees, 9% by slopes of 30 to 40 degrees, and 3% by slopes of greater than 40 degrees.

Approximately 0.5% of the plan area has 0 degree aspect or is flat. The remaining 99.5% of the plan area is nearly evenly distributed among north (23%), east (28%), south (23%) and west (25%) aspects.

3.2 Climate

The climate of the Seeley-Swan Fire Plan area is characterized as cool and temperate with minor maritime influences. However, large day-to-day temperature variations are not uncommon. Summers are dry with temperatures averaging between 42^{o} F and 78^{o} F. Winter temperatures average from 12^{o} F to 33^{o} F. Arctic air intrusions can also occur in winter. Precipitation ranges from 12 to 31 inches with most of the precipitation in fall, winter, and spring occurring as snow. Average rainfall in July and August is less than 2 inches. A snow pack of greater than 3 feet is typical for the area in winter. There is also a slight climatic gradient in the Fire Plan area with the middle of the Fire Plan area being slightly moister than the north or south ends due to the position of prevailing storm tracks and the rain shadow effect of the Mission Mountain range.

3.3 Ecological Sites

Ecological sites are a type of landscape classification system that identifies the different bio-physical conditions (e.g., soils, aspect, elevation, temperature, moisture, etc.) that influence disturbance patterns and the potential plant communities that can occur on a site. Nine terrestrial forested ecological sites have been identified for the Fire Plan area and are functionally similar to the habitat type groups currently being used by Region 1 of the US Forest Service. The methods used to map the ecological sites within the project area and a crosswalk to the USFS habitat type groups are provided in Mehl et al. (2012, Appendix 1). Figure 6 represents the map of ecological sites in the Fire Plan area. Table 2 identifies the number of acres for each the nine forested ecological sites in addition to riparian-wetland and grass-shrub ecological sites and water in the form of lakes. Note a small portion of the Fire Plan area (southern tip), did not overlap with the Southwestern Crown of the Continent project boundary, so ecological sites were not available for this area.

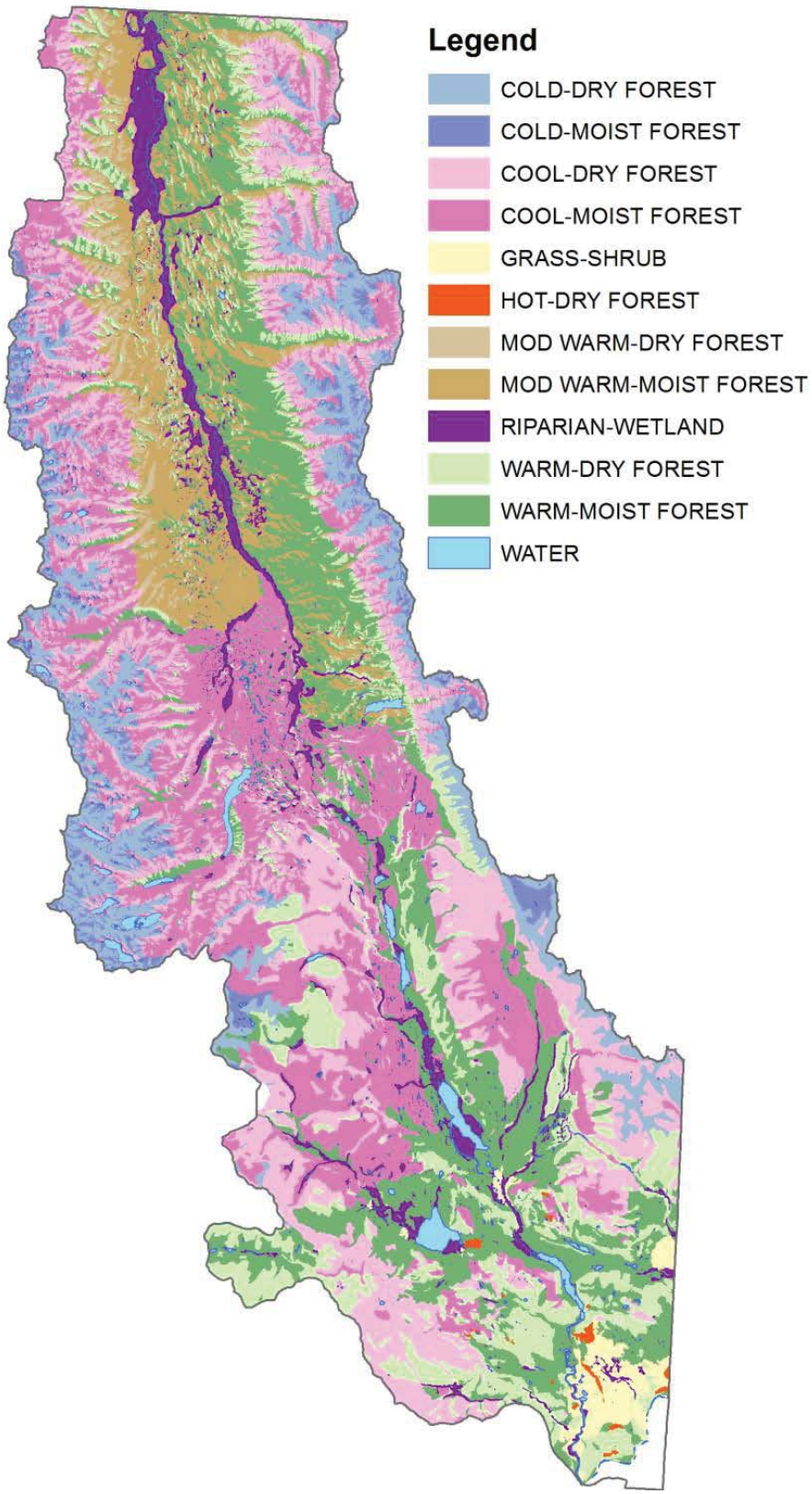


Figure 6. Forested ecological sites of the Seeley-Swan Fire Plan region (adapted from Mehl et al. 2012).

Table 2. Number of acres representing forested ecological sites and other systems within the Seeley-Swan Fire Plan region.

ECOLOGICAL SITE	ACRES
Hot, Dry Forest	1,118
Warm, Dry Forest	74,508
Warm, Moist Forest	125,957
Moderately, Warm Dry Forest	17,391
Moderately, Warm Moist Forest	53,518
Cool, Dry Forest	121,242
Cool, Moist Forest	125,546
Cold, Dry Forest	55,243
Cold, Moist Forest	16,153
Grasslands/Shrublands	9,057
Riparian/Wetland Systems	27,219
Water	12,372
TOTAL	**639,324**

3.4 Local Fire Ecology and Historic Forest Conditions

The following description of local fire ecology and historical disturbance regimes (Section 3.3.1) and historic forest ecological site and vegetation conditions (Section 3.3.2) are summarized from the recently completed Southwestern Crown (SW Crown) of the Continent Landscape Assessment (Mehl et al. 2012) that includes the Fire Plan area. This information is included to provide consistency in terminology and ecological site/forest descriptions between the Fire Plan and forest management collaborative efforts for ecological restoration. Please refer to the original report (www.emri.org) for more information on the landscape assessment. References were not included in this summary but are available in the original report.

3.4.1 Historical Disturbance Regimes

Prior to Euro-American settlement, the primary historical disturbance regimes occurring in the SW Crown project area that had a profound influence on the species composition, structure, and processes of terrestrial forest communities, was fire. Native Americans also interacted and influenced ecosystem diversity for thousands of years in the SW Crown project area. Typically their influence included using naturally occurring disturbance processes to benefit their subsistence strategies, such as using fire to create better wildlife habitat for hunted species or to open travel corridors. The influences of naturally

occurring disturbance processes and their use by Native Americans on historical ecosystem diversity are incorporated in what is known as the historical reference.

Historical references are utilized in landscape assessments to help identify, describe and quantify the native ecosystem diversity that occurred in a region. For the purpose of this assessment, an historical reference is defined as the ecosystem diversity that resulted from both historical disturbance (i.e., fire, grazing, etc.) and human-influenced disturbance (i.e., Native American) that created the dynamic conditions that plant and animal species were adapted to and dependent upon. It is based on the assumption that native species evolved within a limited range of conditions that resulted from the natural and human-influenced disturbance regimes and processes operating in that landscape. Historical disturbance regimes are the patterns of frequency and intensity that can be quantified using ecological evidence. For example, fire regimes are frequently described relative to frequency of occurrence and relative intensity. The historical reference incorporates the influence of climate extremes for the time period of reference. Future climate change scenarios can be evaluated against the historical reference to better understand the implications of future projections and their influence on native ecosystem diversity and associated wildlife.

Another term often used in relation to historical reference is the historical range of variability. Historical range of variability is an important concept because it emphasizes that many ecosystems varied in amounts, compositions, and structures due to the interaction of site characteristics, climate, and random events that influenced historical disturbance regimes. For the purpose of evaluating today's ecosystem and habitat changes that have occurred in a given landscape, historical references are usually confined to a period less than 1000 years prior to Euro-American settlement, as these reflect the habitat conditions most relevant to the plant and animal species that are present today. Native ecosystems were not static during any defined reference period. Species distributions were changing, disturbance regimes were changing, and species themselves were adjusting, usually slowly, to these changes through behavioral and genetic adaptations. However, developing an understanding of the ecosystem diversity that occurred during an identified timeframe prior to Euro-American settlement provides critical reference information for defining and quantifying a baseline of what should be considered "natural", "native", or "resilient" for an area, and is critical for ecological restoration efforts.

Relative to terrestrial ecosystems of the Northern Rockies, that includes the SW Crown project area, fire was the primary disturbance agent directly influencing terrestrial plant species composition, structure, and spatial distribution. While insects and disease were and continue to be important disturbance agents as well, their influences often precede and contribute to the occurrence and severity of fire as the end result. For the purposes of describing native ecosystem diversity in this landscape, we use fire as the primary historical driving force of large-scale disturbance and vegetation characteristics within this landscape.

Fire was a natural part of the Northern Rockies landscape for thousands of years and many species of plants and animals have become fire-adapted or even fire-dependent over time. Based on historical accounts and recent fire-scar studies, fire in the SW Crown project area was a relatively frequent

disturbance event prior to Euro-American settlement. Many anecdotal and scientific reports have documented the widespread occurrence of fire throughout the region while the causes of these fires were both natural (i.e., lightning) and human-initiated (i.e., Native Americans). Fire-adapted plant species such as ponderosa pine and western larch have developed physical adaptations such as thick bark to protect larger trees from low severity fires. Fire-dependent species have developed life cycle strategies to take advantage of fire events such as the serotinous cones of lodgepole pine or rapid growth rates in western white pine.

The term "fire regime" is often used to describe the different ways that fire interacts with the land to influence the structure and species composition of vegetation, as well as vegetation patterns on the landscape. The term "fire severity" is used to refer to the degree of impact that fire has on vegetation species composition and structure, and is frequently described using the degree of overstory tree mortality in forested ecosystems. Fire regimes incorporate the various levels of fire severity and intensity across similar sites and their effects on the dominant vegetation. In the planning region, forest ecologists frequently describe the effects of fire using three broad classes of fire regimes: non-lethal, mixed-severity, and lethal. Primary factors that can influence fire regimes include climate, ecological site, and vegetation conditions. Trends in historical fire frequency and extent are related to climatic trends in temperature and precipitation with temperature trends affecting fire frequency and precipitation trends affecting fire extent. In general, more frequent fires occur on warmer sites and less frequent fires occur on cooler sites. Similarly, larger burn patches occur under dry conditions and smaller burn patches occur under moist conditions. In the planning region, non-lethal fire regimes are usually associated with low to moderate elevation warmer and drier sites, mixed-severity fire regimes are usually associated with mid- to high elevation warmer and moister sites as well as cooler and drier sites, and lethal fire regimes are usually associated with mid-to high elevation cooler and moister sites. Sites that are influenced by the non-lethal and mixed-severity fire regimes are also frequently less steep (<20% slope) than those sites influenced by the lethal fire regime, except where rock formations may actually slow the spread of fire and contribute to mixed-severity conditions such as at high elevations. While these site characteristics are the more common drivers of fire regimes in this landscape, additional site influences such as frost pockets and proximity to adjacent fire regimes, can create exceptions to these general rules.

3.4.1.1 NON-LETHAL FIRE REGIME

The non-lethal fire regime is usually described as having relatively frequent, low to moderate severity fires that burn along the surface of the ground and remain within the forest understory, thereby being relatively non-lethal to the older trees in the overstory. Mean fire return intervals for non-lethal fire regimes are usually less than 25 years for forests in the western United States. The frequency of these fires influence both the species composition and vegetation structure within these forests. Fire-adapted tree species become dominant in the overstory and bunchgrasses become dominant in the understory. Under drought conditions, fires can occur over larger areas but still are unlikely to kill more than a few overstory trees. The potential for insect or disease events are low and usually occur in small patches. The non-lethal fire regime contributes to the persistence of a multi-age stand, which in some cases may be composed of patches of even-aged groups. A wide range of age classes can occur, from saplings to

old growth trees, but with relatively low numbers of trees per acre. However, when viewed at the stand level, forests influenced by a non-lethal regime typically have a clear presence of larger, older, fire-adapted trees in the overstory, even if their numbers are relatively low per acre (i.e., 8 to 30 tpa). For this reason, historical references to these forests often describe them as relatively "open and park-like". Stand history studies conducted within forests historically influenced by the non-lethal fire regime demonstrate that they had relatively predictable species composition and structure as this fire regime appears to act as an agent of ecosystem stability. The result is a fairly uniform forest pattern at both the landscape (i.e., 100's to 1000's of acres) and stand levels (i.e., roughly 50 acres).

3.4.1.2 LETHAL FIRE REGIME

The lethal fire regime is characterized by infrequent, high-severity fire that consumes most of the forest understory and overstory as it moves through a forest stand and across the landscape. Lethal fire regimes result in a stand replacing effect on forest conditions, in contrast to the persistent, yet less obvious effects of the non-lethal fire regime. The result of this impact is to set the forest back to an early seral stage and release fire-dependent species stimulated by severe fire events such as lodgepole pine. Mean fire return intervals under the lethal fire regime are frequently described as greater than 100 years for forests in the western United States. The forest then proceeds along an undisturbed successional trajectory for many years, depending on the ecological site. Tree densities are high and early seral conditions are usually dominated by single age-classes. Tree species that are susceptible to fire are a common component of the forest, particularly at late seral stages. Due to the higher densities of trees, the potential for insect and disease events is high. The resulting forest patterns are large patches of variable age-classes and seral stages at the landscape level but relatively uniform age-classes and conditions at the stand level.

3.4.1.3 MIXED-SEVERITY FIRE REGIME

The mixed severity fire regime produces highly diverse forest conditions with elements of the non-lethal and lethal fire regimes occurring at a finer scale. It is described as having a complex mosaic of varying patch sizes of both the low severity and high severity fire effects. Some of these patches underburned as with a low severity fire and some had their overstory tree canopy mostly or completely killed as with a high severity fire. Within sites influenced by the mixed-severity fire regime, the amount of the low severity condition versus the high-severity condition is likely dependent on the site. Warmer and drier sites exhibit a higher percentage of low severity conditions while cooler and moister sites would exhibit a higher percentage of high severity conditions. Steeper sites exhibit the greatest fine-scale spatial variation in patchiness and age structures. Less steep sites exhibit less variation in patch sizes and age structures. Mean fire return intervals for mixed-severity fire regimes are frequently described as ranging from 25 to 100 years for forests of the western United States. The potential for insect or disease events are variable depending on tree densities. The resulting forest patterns are relatively uniform and stable at the landscape level but highly variable at the stand level.

A fire regime classification that is based on fire effects attempts to incorporate the physical attributes of the site and fire as well as the fire tolerance of the vegetation. While recognizing that fire severities, and thereby fire regimes, occur along an environmental gradient and may not be stable over space and time,

a classification system can help to communicate and quantify the potential influences of different fire regimes on a landscape. To capture some of these influences and reduce some of the variability in the mixed-severity fire regimes of the planning region, we have further divided the mixed-severity fire regime into 2 classes; mixed-severity A and mixed-severity B. Figure 7 defines the resulting fire regime classification system relative to overstory tree mortality as used in this assessment.

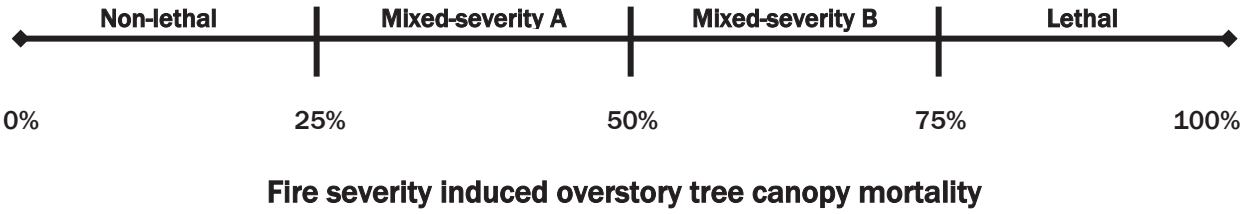


Figure 7. Fire regime classes identified for the SW Crown project area relative to the gradient of average fire severity induced overstory tree canopy mortality.

In addition, relative to forest patterns, the mixed-severity A fire regime is differentiated from the mixed-severity B fire regime by the pattern of low to moderate severity fire conditions versus high severity conditions occurring at the stand level. The mixed-severity A fire regime is dominated by a matrix of low to moderate severity fire conditions and smaller inclusions of the high severity fire conditions. Whereas the mixed-severity B fire regime is dominated by a matrix of high severity fire conditions and smaller inclusions of low to moderate severity fire conditions. Figure 8 provides a visualization of the average fire severity patterns expected for each of the four fire regime classes as well as the expected percent composition of low to moderate (for simplicity, future reference to this condition will be condensed to low severity versus high severity fire influenced conditions occurring in the SW Crown project area, with the understanding that future references to low severity fire also include a range of low to moderate severity fire.

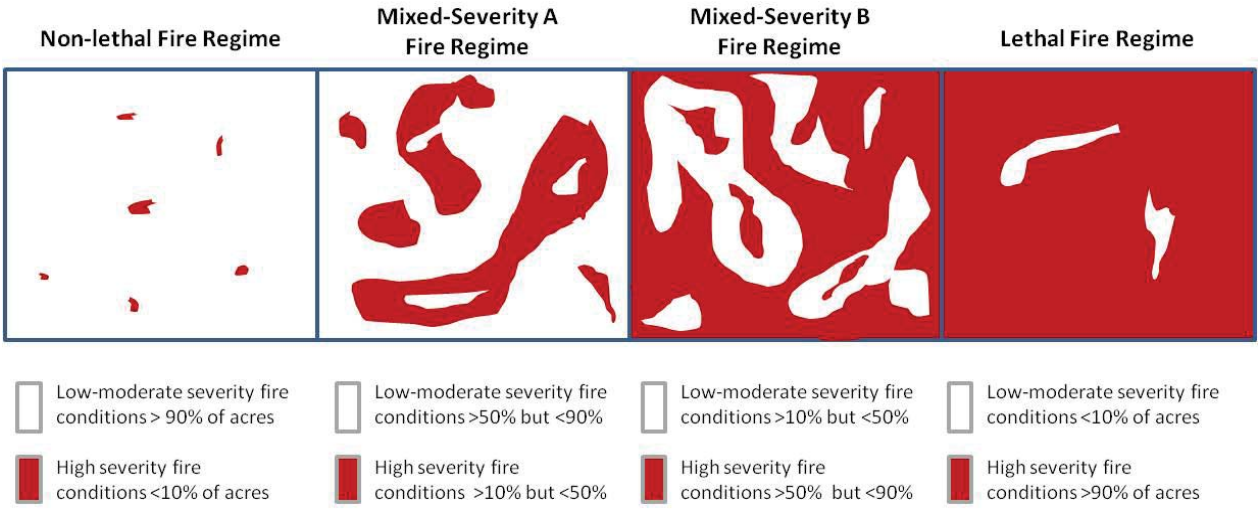


Figure 8. The average fire severity patterns expected to characterize the four fire regime classes of the SW Crown project area for stands of approximately 50 acres in size.

Since Euro-American settlement, many human activities and land uses have functionally suppressed, eliminated or changed many of the historical disturbance regimes throughout North America. The result has been changes to many native ecosystems and their associated biodiversity. For forest ecosystems in the SW Crown project area, the primary influence in this regard has been the harvest of timber and the reduced role of fire regimes for nearly 100 years. Land use and land management programs and policies that have functionally suppressed fire in the landscape have had profound effects on native ecosystem diversity, forest structures and patterns, ecosystem processes and resiliency, and the biodiversity dependent on the fire-influenced native condition. Understanding and quantifying these changes is critical to the success of ecosystem restoration programs that will ultimately benefit and support native biodiversity, as well as understanding and mitigating the future potential impact of climate change.

3.4.2 Historical Forest Conditions

The following sections summarize the information developed for nine terrestrial forest ecological sites and their disturbance states for the Fire Plan region using information developed for the SW Crown Landscape Assessment (Mehl et al. 2012). For more detailed descriptions, please see the original document.

The following sections provide information on the expected distribution of these ecological sites relative to topographic and elevational positions in the landscape. Table 3 further summarizes the information on historical disturbance regimes for each of the ecological sites in terms of expected fire severity patterns, tree species, and historical stand structures. For more detailed discussions of the historical conditions on these ecological sites, please see the original SW Crown Landscape Assessment document.

3.4.2.1 HOT-DRY ECOLOGICAL SITE

Distribution: This ecological site represents the hot and dry extreme of forest environments in the project area and typically represents the lower timberline conditions where they transition to grass-shrub ecosystems. Soils are typically characterized by droughty and shallow conditions. Grassy openings are frequently intermixed with the clumpy but relatively open distribution of trees. They occur most frequently on south and westerly aspects but may extend to mid-elevations on steep, warm, and very arid sites. Geology and terrain appear to be limiting factors only to the extent of retaining sufficient soil moisture, which is the controlling influence.

3.4.2.2 WARM-MOIST ECOLOGICAL SITE

Distribution: This ecological site represents the warm and dry forest environments in the project area. It is a common forest ecological site occurring in the Fire Plan region. It occurs most commonly at low to mid-elevations. It is often intermixed with grassy openings and the forest canopy is often clumpy but with a relatively open distribution of trees. This ecological site frequently occurs at low elevations of the forest zone on warm-dry aspects.

3.4.2.3 MODERATELY WARM-DRY ECOLOGICAL SITE

Distribution: This ecological site represents the moderately warm and dry forest environments. It is limited to the northern portion of the project area where the moderating effect of the Pacific-Maritime climate reaches its eastern limit in the inland Northwest. It is most common to the lower slopes benches and valley bottoms, where it occurs in the project area.

3.4.2.4 MODERATELY WARM-MOIST ECOLOGICAL SITE

Distribution: This ecological site represents the moderately warm and moist forest environments. It is limited to the northern portion of the project area where the moderating effect of the Pacific-Maritime climate reaches its eastern limit in the inland Northwest. It is most common to the lower benches and valley bottoms on northerly aspects, where it occurs in the project area.

3.4.2.5 COOL-DRY ECOLOGICAL SITE

Distribution: This ecological site represents the cool and dry forests in the project area. They are most common to the mid-elevation zone but at their lower limits may occur mainly on steep, northerly or easterly aspects but shift to southerly and westerly aspects at their upper limits.

3.4.2.6 COOL-MOIST ECOLOGICAL SITE

Distribution: This ecological site represents the cool and moist forest environments in the planning region. They are most common to the mid-elevation zone but are most common to northwest and east facing slopes and moist frost pockets at lower elevations.

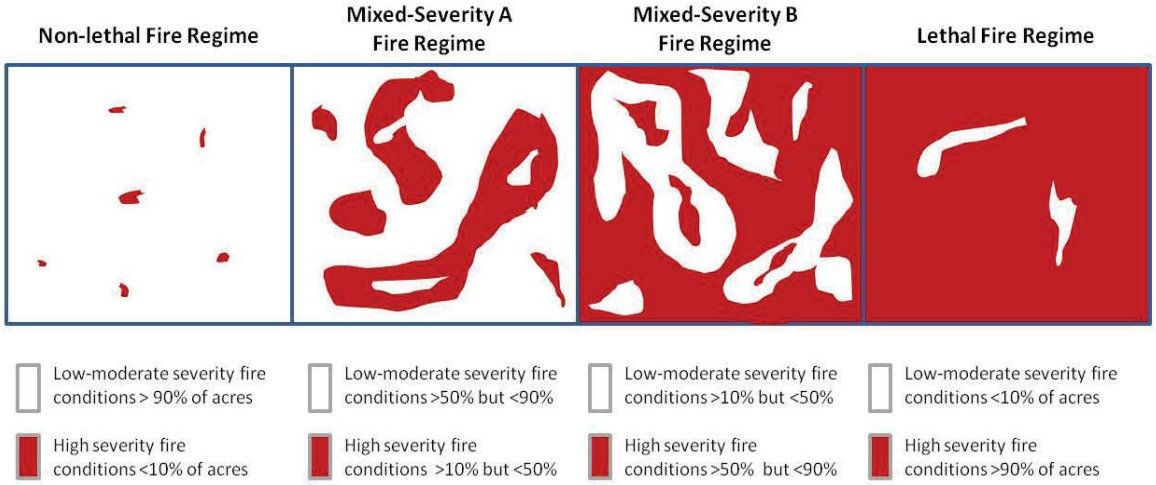
3.4.2.7 COLD-DRY ECOLOGICAL SITE

Distribution: This ecological site represents the cold and dry forest environments in the project area. They are most common to the upper-elevation zone and are often transitional between the forest and the Krummholz or alpine communities. The climate is characterized by a short growing season with early summer frosts. Soils are frequently shallow and have limited soil moisture.

3.4.2.8 COLD-MOIST ECOLOGICAL SITE

Distribution: This ecological site represents the cold and moist forest environments. They are most common to the upper-elevation zone and are often transitional between the forest and the Krummholz or alpine communities. The climate is characterized by a short growing season with early summer frosts. Soils are frequently shallow and have limited soil moisture.

Table 3. Summary information on historical forest conditions and fire regime patterns for nine ecological sites within the Seeley-Swan Fire Plan region.



Ecosite	Fire Regimes	Fire Severity	Tree Species	Historic Stand Structure - Description	Historic Stand Structure - Mean Values
WARM-DRY	Non-Lethal and MS-A	Low Severity Fire	Ponderosa Pine Douglas-fir *Western larch*	*Disturbance State* - Late seral (oldest cohort >170 years) *Overstory* - clear dominance by large diameter, fire adapted trees; low density of trees overall; several age and sizeclasses *Understory* - open, park-like, dominated by bunchgrasses	Overstory trees = 15 - 30 trees per acre Basal Area = 60 - 100 sq. ft. per acre Snags(>20"dbh) = 0.8 snags per acre CWD = 5 to 9 tons per acre
		High Severity Fire	Ponderosa Pine Douglas-fir *Western larch*	*Disturbance State(s)* - Early seral (oldest cohort<50-100 yrs) *Variable* - ranges from regeneration post-fire to early seral (NL) or mid-seral (MSA); typically even-aged or single-storied *Understory* - mod dense; small trees, shrubs, forbs, grasses	Trees = usually high densities Basal Area = 0 - 200 sq. ft. per acre Snags = high post-fire, low densities later CWD = variable, depending on seral stage
WARM-MOIST	Non-Lethal, MS-A, and MS-B	Low Severity Fire	Ponderosa Pine Douglas-fir *Western larch*	*Disturbance State* - Late seral (oldest cohort >170 years) *Overstory* - clear dominance by large diameter, fire apated trees; low density of trees overall; several age and sizeclasses *Understory* - open, park-like, bunchgrasses and some small shrubs	Overstory trees = 15 - 30 trees per acre Basal Area = 80 - 120 sq. ft. per acre Snags(>20"dbh) = 0.8 snags per acre CWD = 10 to 20 tons per acre
		High Severity Fire	Ponderosa Pine Douglas-fir *Western larch*	*Disturbance State(s)* - Early/mid-seral (oldest cohort<50-150 yrs) *Variable* - ranges from regeneration post-fire to early seral (NL) or mid-seral (MSA/B); typically even-aged or single-storied *Understory* - mod dense; small trees, shrubs, forbs, grasses	Trees = usually high densities Basal Area = 0 - 250 sq. ft. per acre Snags = high post-fire, low densities later CWD = variable, depending on seral stage

Table 3. Continued

Ecosite	Fire Regimes	Fire Severity	Tree Species	Historic Stand Structure - Description	Historic Stand Structure - Mean Values
MOD WARM-DRY	MS-A, MS-B, and Lethal	Low Severity Fire	Western larch Douglas-fir *Western white pine*	*Disturbance State* - Late seral (oldest cohort >180 years) *Overstory* - clear dominance by large diameter, fire adapted trees; low-mod density of trees overall; several age and sizeclasses *Understory* - open with grasses and some shrubs/small trees	Overstory trees = 30 - 50 trees per acre Basal Area = 150 - 200 sq. ft. per acre Snags(>20"dbh) = 2.4 snags per acre CWD = 15 to 30 tons per acre
		High Severity Fire	Lodgepole pine Douglas-fir Western larch Western red cedar Western hemlock *Western white pine* Engelmann spruce Grand fir *Ponderosa pine*	*Disturbance State(s)* - All *Variable* - ranges from regeneration post-fire to late seral; typically even-aged or single-storied; high density of trees overall; shade-intolerant dominate in early stages and intolerant spp in later stages; lodgepole pine can dominate to late seral state of 200 yrs or more on colder sites *Understory* - dense; small trees, shrubs, forbs, grasses	Trees = usually high densities Basal Area = 0 - >250 sq. ft. per acre Snags = high post-fire, low densities later CWD = variable, depending on seral stage
MOD WARM-MOIST	MS-A, MS-B, and Lethal	Low Severity Fire	Western larch Douglas-fir *Western white pine*	*Disturbance State* - Late seral (oldest cohort >180 years) *Overstory* - clear dominance by large diameter, fire adapted trees; low-mod density of trees overall; several age and sizeclasses *Understory* - open with grasses and some shrubs/small trees	Overstory trees = 30 - 50 trees per acre Basal Area = 150 - 200 sq. ft. per acre Snags(>20"dbh) = 1.3 snags per acre CWD = 15 to 32 tons per acre
		High Severity Fire	Lodgepole pine Douglas-fir Western larch Western red cedar Western hemlock *Western white pine* Engelmann spruce Grand fir *Ponderosa pine*	*Disturbance State(s)*- All *Variable* - ranges from regeneration post-fire to late seral; typically even-aged or single-storied; high density of trees overall; shade-intolerant dominate in early stages and intolerant spp in later stages; lodgepole pine can dominate to late seral state of 200 yrs or more on colder sites *Understory* - dense; small trees, shrubs, forbs, grasses	Trees = usually high densities Basal Area = 0 - >250 sq. ft. per acre Snags = high post-fire, low densities later CWD = variable, depending on seral stage

Table 3. Continued.

Ecosite	Fire Regimes	Fire Severity	Tree Species	Historic Stand Structure - Description	Historic Stand Structure - Mean Values
COOL-DRY	MS-A, MS-B, and Lethal	Low Severity Fire	Western larch Douglas-fir *Western white pine*	*Disturbance State* - Late seral (oldest cohort >180 years) *Overstory* - clear dominance by large diameter, fire adapted trees; low-mod density of trees overall; several age and sizeclasses *Understory* - open with grasses and some shrubs/small trees	Overstory trees = 30 - 50 trees per acre Basal Area = 80 - 120 sq. ft. per acre Snags(>20"dbh) = 0.8 snags per acre CWD = 7 to 25 tons per acre
		High Severity Fire	Lodgepole pine Douglas-fir Western larch *Western white pine* *Ponderosa pine* Engelmann Spruce Subalpine fir	*Disturbance State(s)* - All *Variable* - ranges from regeneration post-fire to late seral; typically even-aged or single-storied; high density of trees overall; shade-intolerant dominate in early stages and intolerant spp in later stages; lodgepole pine can dominate to late seral state of 200 yrs or more on cold sites *Understory* - dense; small trees, shrubs, forbs, grasses	Trees = usually high densities Basal Area = 0 - >200 sq. ft. per acre Snags = high post-fire, low densities later CWD = variable, depending on seral stage
COOL-MOIST	MS-A, MS-B, and Lethal	Low Severity Fire	Western larch Douglas-fir *Western white pine*	*Disturbance State* - Late seral (oldest cohort >180 years) *Overstory* - clear dominance by large diameter, fire adapted trees; low-mod density of trees overall; several age and sizeclasses *Understory* - open with grasses and some shrubs/small trees	Overstory trees = 30 - 50 trees per acre Basal Area = 80 - 120 sq. ft. per acre Snags(>20"dbh) = 1.2 snags per acre CWD = 7 to 25 tons per acre
		High Severity Fire	Lodgepole pine Douglas-fir Western larch *Western white pine* *Ponderosa pine* Engelmann Spruce Subalpine fir	*Disturbance State(s)* - All *Overstory* - variable, ranges from regeneration post-fire to late seral; typically even-aged or single-storied; high density of trees overall; shade-intolerant dominate in early stages and intolerant spp in later stages; lodgepole pine can dominate to late seral state of 200 yrs or more on cold sites Understory - dense; small trees, shrubs, forbs, grasses	Trees = usually high densities Basal Area = 0 - >200 sq. ft. per acre Snags = high post-fire, low densities later CWD = variable, depending on seral stage

Table 3. Continued

Ecosite	Fire Regimes	Fire Severity	Tree Species	Historic Stand Structure - Description	Historic Stand Structure - Mean Values
COLD-DRY	MS-A, MS-B, and Lethal	Low Severity Fire	Whitebark pine Alpine larch	*Disturbance State* - Late seral (oldest cohort >180 years) *Overstory* - clear dominance by larger diameter, fire adapted trees; low-mod density of trees overall; several age and sizeclasses *Understory* - open with grasses and small shrubs	Overstory trees = unavailable Basal Area = unavailable Snags(>20"dbh) = 0.8 snags per acre CWD = 11 tons per acre
		High Severity Fire	Whitebark pine Lodgepole pine Subalpine fir *Alpine larch* Engelmann Spruce	*Disturbance State(s)*- All *Overstory* - variable, ranges from regeneration post-fire to late seral; typically even-aged or single-storied; high density of trees overall; shade-intolerants dominate in early stages and intolerant spp in later stages *Understory* -moderately dense with grasses and small shrubs	Trees = usually high densities Basal Area = unavailable Snags = high post-fire, low densities later CWD = variable, depending on seral stage
COLD-MOIST	MS-A, MS-B, and Lethal	Low Severity Fire	Whitebark pine Alpine larch	*Disturbance State* - Late seral (oldest cohort >180 years) *Overstory* - clear dominance by larger diameter, fire adapted trees; low-mod density of trees overall; several age and sizeclasses *Understory* - open with grasses and small shrubs	Overstory trees = unavailable Basal Area = unavailable Snags(>20"dbh) = 0.8 snags per acre CWD = 11 tons per acre
		High Severity Fire	Whitebark pine Lodgepole pine Subalpine fir *Alpine larch* Engelmann Spruce	*Disturbance State(s)* - All *Overstory* - *variable*, ranges from regeneration post-fire to late seral; typically even-aged or single-storied; high density of trees overall; shade-intolerant dominate in early stages and intolerant spp in later stages *Understory* - moderately dense with grasses and small shrubs	Trees = usually high densities Basal Area = unavailable Snags = high post-fire, low densities later CWD = variable, depending on seral stage

4.0 General Fire Conditions

4.1 Fire Weather

Critical fire weather is defined as conditions whose effects on fire behavior make control difficult and threaten firefighter and community safety. Weather patterns common to the Fire Plan area that contribute to critical fire weather include high afternoon temperatures (mid-80's to high-90's) coupled with low relative humidity (10 to 30%). If high temperatures and low relative humidity are further combined with afternoon and evening winds of 10 miles per hour or greater and if this weather pattern persists for several days or more, most forests will rapidly transition from moist fuel conditions to drought-like fuel conditions. During periods of unusually high temperatures, it is also not uncommon to experience thunderstorms that roll through the area with associated lightning and high winds, but very little rain.

4.2 Hazardous Fuels

4.2.1 Forest Cover Types and Fuels

The map of forest cover types for the Fire Plan area was developed from satellite imagery landscape classification coverage obtained from LANDFIRE. This cover was based on Landsat imagery from 2002 and 2003. The coverage was classified by LANDFIRE using a fuel model classification used by all Fire Managers The fuel models for calculating fire behavior are those used by Albini (1976) to develop the nomograms published in hispaper, "Estimating Wildfire Behavior Effects." There are 13 models, including 11 developed by Anderson and Brown and published by Rothermel (1972), a model for dead brush developed at the suggestion of Von Johnson, and a model for southern rough developed by Albini. These are called the "NFFL fuel models"; or "fire behavior models. Each fuel model was given the following rating: FM 1=1, FM 2=3, FM 4=6, FM 5=7, FM 6=8, FM 7=4, FM 8=8, FM 9=7, FM 10=10. This information was used to develop a fuel hazard map for the Seeley-Swan Fire Plan region (Figure 10).

There are limitations with using satellite imagery for fuel hazard ranking that must be identified. Because satellite imagery classification is based primarily on the overstory vegetation, it is less dependable for identifying structure and understory conditions that heavily influence fuel hazard rankings. For this reason, classification of fuel model categories 8 and 10 were particularly difficult in the Fire Plan area. In addition, logging history was not available therefore fuel model categories 11, 12 and 13 were not included in the fuel hazard ranking for the Seeley-Swan Fire Plan region. Future efforts to map fuel hazards should strive to overcome these limitation and deficiencies in existing data.

4.2.2 Natural Firebreaks

The occurrence of several large lakes represents the primary natural firebreaks within the Fire Plan area. The Clearwater and Swan Rivers and Highway 83 may also act as firebreaks during mild to moderate weather conditions. However, it is important to note that under more extreme or critical weather

conditions (i.e., high temperatures, low humidity, and moderate to high winds), burning embers can be carried long distances and ignite fires on the other side of natural firebreaks such as large lakes. During the Jocko Lakes fire of 2007, fire starts from wind carried embers were noted greater than 1 mile in front of the primary line of fire.

4.3 Fire History

Information on fire history for the Fire Plan area was obtained from the Flathead and Lolo National Forest. Figure 11 identifies the approximate boundaries and years of the historical fires in the region based on field surveys and local knowledge. The largest annual burn extent occurred in 1919 at nearly 135,000 acres, followed by 1910 with approximately 53,000 acres. It is interesting to note the pattern of recurrence of fire in many of the previously burned areas.

More recently, table 4 identifies the number of acres by landowner impacted by wildland fire since the release of the initial 2004 Fire Plan.

Table 4. Number of acres impacted by wildland fire for primary landowner groups in the Seeley-Swan Fire Plan region from 2004 to 2012.

Landowner	Wildland Fires
Private	589
Plum Creek	16126
MT DNRC-Swan Unit	69
US Forest Service-Swan Lake RD	18839
MT Fish, Wildlife, and Parks	4137
US Forest Service-Seeley Lake RD	12902
MT DNRC-Clearwater Unit	2175
Other Landowners	4
Missoula County	0
TOTAL	**54842**

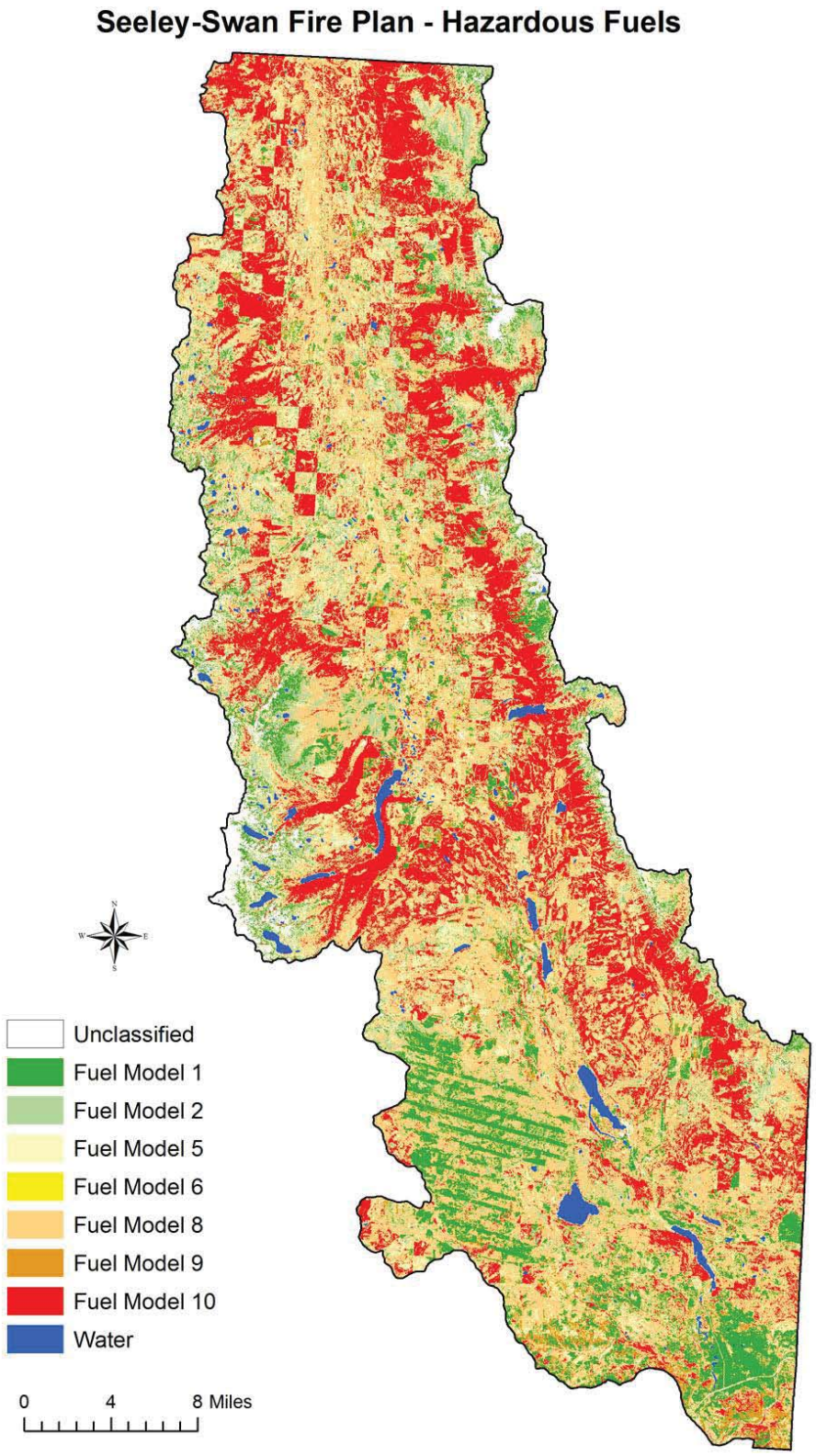


Figure 10. Hazardous fuels in the Seeley-Swan Fire Plan region, as classified using the 13 Anderson Fire Behavior Fuel Models.

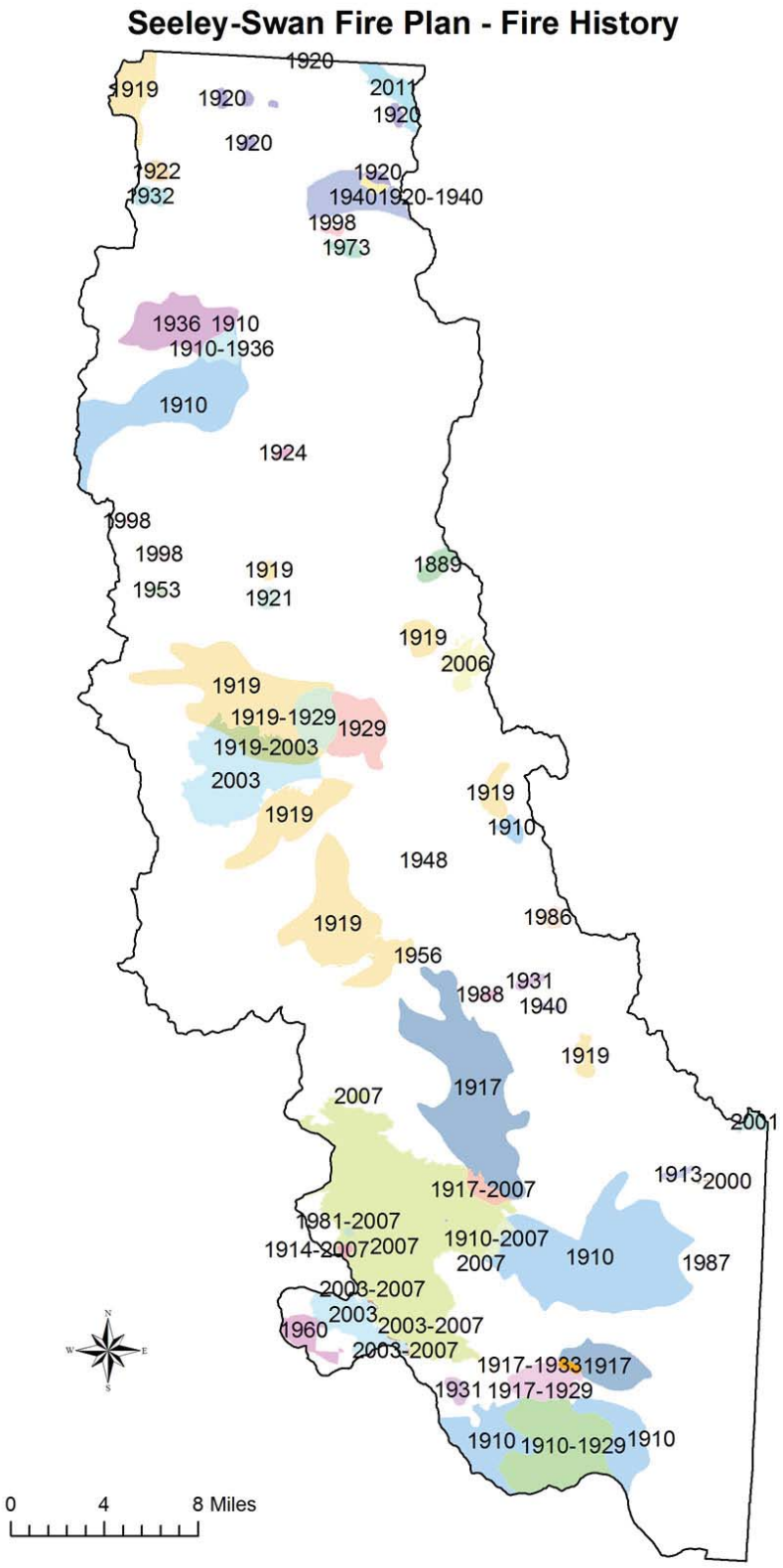


Figure 11. The approximate date and extent of historical fires in the Seeley-Swan Fire Plan region.
Source: U.S. Forest Service

4.4 Fire Ignition History

Over 3000 wildfires were recorded in the Fire Plan area to date (Source: Lolo and Flathead National Forest records). Of these 3000 fires, 83% were lightning caused fires and 17% were human-caused fires. Of the 733 fires recorded by the Flathead National Forest, table 5 represents the percentage of fires occurring by month.

Table 5. Percentage of fires occurring by month in the Fire Plan area.

Month	% of Fires Occurring by Month
April	<1%
May	2%
June	8%
July	31%
August	45%
September	9%
October	4%
November	<1%

Patterns of historical fire ignition densities indicate that most of the human-caused fires originated near the most densely populated areas and near high-use recreational areas. Lightning strikes occurred throughout the Fire Plan region.

5.0 Identifying Assets at Risk

Assessing risk requires an understanding of the importance of those assets that the community values. While the following sections provide a discussion of the assets identified as important to the community, for the purpose of the risk assessment only human safety and property were considered.

5.1 Structures/Density

Over 2100 housing units, both permanent and seasonal, are present in the Fire Plan area according to Missoula, Lake, and Powell county records. Figure 12 represents a map of structure densities for the Fire Plan area that was developed using county cadastral information from Missoula, Lake, and Powell counties. As evidenced by the density map, the majority of structures within the Fire Plan area are located near the communities of Seeley Lake and Condon as well as adjacent to the Highway 83 corridor and surrounding several of the major lakes within the region.

Using county tax information from 2012, the estimated taxable value of structures in the Fire Plan area was calculated at approximately $465,209,821. The estimated value of private land without structures was $968,443,935. In total, the value of privately held assets in the Fire Plan area was approximately $1,433,653,756. This figure does not include the value of contents or intangibles that could also be lost to wildfire.

5.2 Businesses/Commercial

Local economic impacts from catastrophic wildfires include disruptions to both sale and production of local goods and services. Immediate effects may include decreased recreation/tourism and timber harvest in the fire region, as well as disruptions from evacuations and transportation delays. Increased use of local goods and services for fire protection also impacts local economies. Other effects include direct property losses (in the form of buildings, timber, livestock, and other capital), damage to human health, and possible changes in the long-term structure of the local economy.

Most businesses and commercial operations are clustered in the two communities of Seeley Lake and Condon. A few additional businesses and commercial operations occur in the plan, primarily at locations along Route 83. The Seeley/Swan Valley forest resources support a number of forest products companies in the region including Plum Creek Timber Company, Pyramid Mountain Lumber, Round Wood West, and Boise Inc. These companies provide a demand for timber or fiber that can help support fuel thinning programs in the Fire Plan region.

5.3 Ecosystems and Biological Diversity

The Fire Plan region has a conservation status that is among the highest in the U.S. The Fire Plan area lies within the southernmost portion of the Northern Continental Divide Ecoregion. This ecoregion contains some of the largest blocks of protected land in the U.S. The planning area supports a rich biodiversity of both plants and animals. This area has been identified as bioregionally outstanding, supporting some 2,203 terrestrial species including an estimated 48 endemics. It is particularly noted for its rich diversity of coniferous forest ecosystems. It also contains some of the most intact watersheds and aquatic ecosystems in the lower 48 states. The area is noteworthy for its populations of large carnivores including wolves, grizzly bears, wolverines, cougar, marten, fisher, and lynx, and is one of the few remaining strongholds for the threatened bull trout and the sensitive west-slope cutthroat trout.

Much of the biological distinctiveness of this region is due to the presence of protected lands. This region maintains populations of a number of species extirpated in most of their former ranges including the above-mentioned carnivores. This landscape also maintains healthy populations of a long list of additional plant and animal species. These species are supported by an array of terrestrial and aquatic ecosystems that still maintain most of their historical ecological processes. This region provides a unique opportunity to maintain the full range of ecosystems and biodiversity that historically occurred in the area.

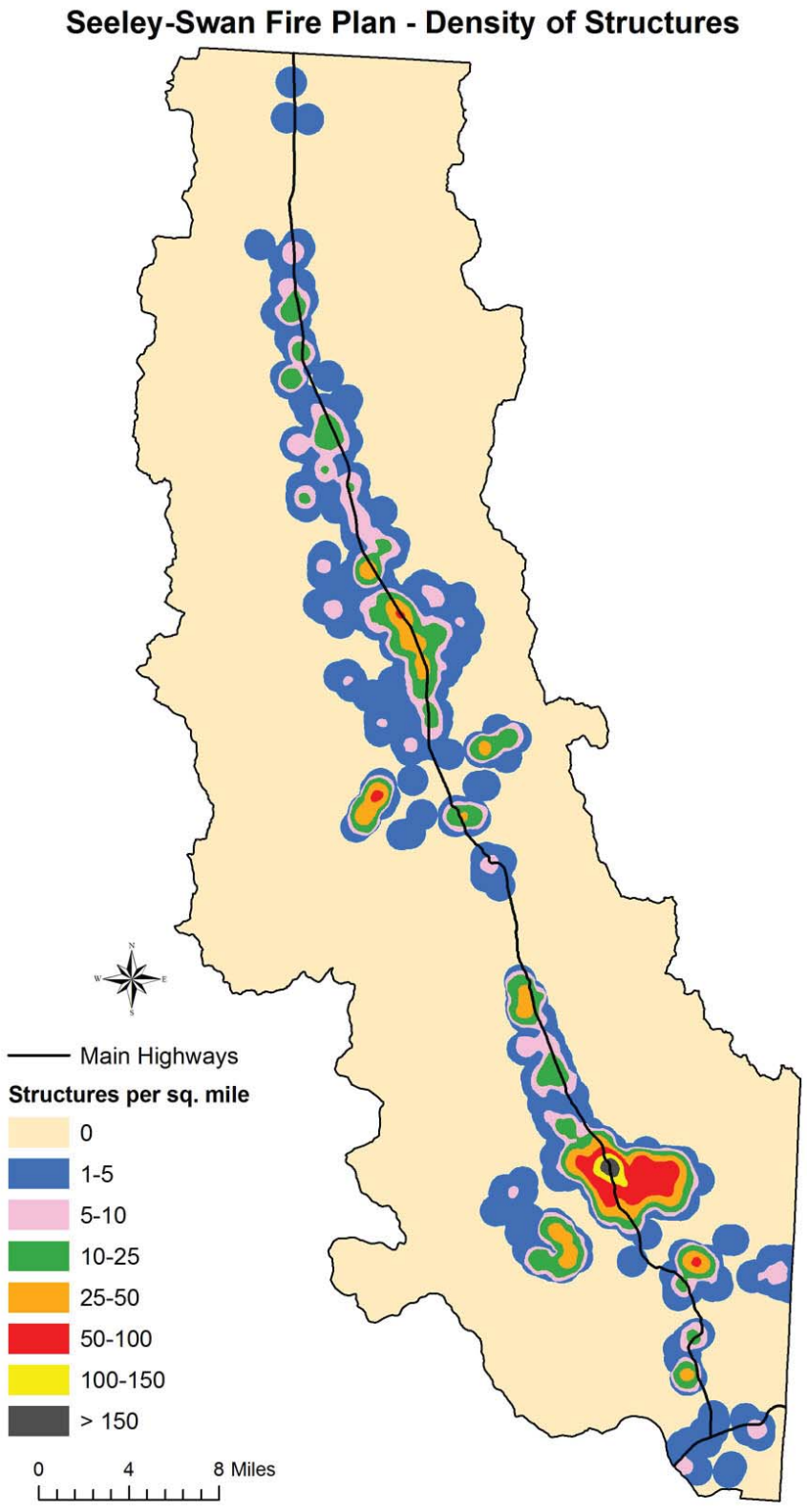


Figure 12. Density of residences per square mile in the Seeley-Swan Fire Plan region.

In addition, this region has maintained relatively high landscape connectivity, which is a primary reason the populations of large carnivores still occur. Developing strategies to reduce the threat and impacts of wildfire on local communities while maintaining ecosystem integrity and biological diversity in this landscape will be critical to the persistence of grizzly bears, lynx, wolverines, and bull trout, as well as the functional ecosystems on which they depend.

The Southwestern Crown of the Continent Landscape Assessment (Mehl et al. 2012) also identified the following concerns relative to native ecosystem diversity and wildfire for the Fire Plan region:

> *"Substantial changes in fire regimes were noted in comparisons of historical conditions to current conditions, with very large increases in lethal fire regimes occurring today. Historically common non-lethal and mixed-severity fire regimes have been greatly reduced in this landscape. Substantial shifts in forest disturbance states were also reported, however the limitations of the available data to describe current forest conditions were noted.*
>
> *Of particular concern is the future representation and persistence of the low severity, fire maintained, late seral disturbance state in the SW Crown project area. The past targeted removal of the fire-adapted, large tree component has reduced this structure in the landscape relative to historical conditions. Where these fire-adapted, large trees still occur, they are now at increased risk to unprecedented high severity fires that may kill many of the overstory trees and further reduce their occurrence in the landscape. Past and current labeling by managers of "old-growth" conditions has exacerbated this problem by not differentiating the low severity versus high severity fire influenced late seral condition relative to species compositions, structures, and fire regime patterns for each ecological site. This, coupled with public concerns about past timber management practices that targeted the large trees has now resulted in a "do not touch" approach for the remaining old growth conditions that is prohibiting their restoration and future protection in the landscape. Reversing the continued loss of these historically common forest conditions will require the immediate reassessment of ecological restoration priorities and their associated restoration treatments, as well as developing public education programs to gain an understanding and appreciation of the variable "old growth" conditions produced under historical fire regimes and to garner public support for protecting these endangered native ecosystems."*

5.4 Water Quality and Watersheds

The Fire Plan area represents two primary watersheds: the Clearwater River Basin in the south and the Swan River Basin in the north. The Clearwater River drains from north to south and is a tributary of the Blackfoot River system that flows southwest of the Fire Plan boundary. The north half of the Fire Plan area is the headwaters of the Swan River. It is a tributary of the Flathead River system. The Swan River begins in the Mission Mountains Wilderness and flows north into Swan Lake before flowing into Flathead Lake at Bigfork, Montana. The Mission Mountains cast a rain shadow making the upper valley somewhat drier than the lower valley.

The effects of wildfire on water quality and the watershed within the plan area will depend on several factors including the severity/intensity of the fire, post-fire precipitation, actions taken to control or suppress the fire, and the condition of the watershed pre-fire. Wildfire usually results in the loss of vegetation as well as the reduced capacity for soils to soak up rainwater and snow melt. The result is increased runoff and a greater volume of water reaching streams and lakes in a shorter period of time. Flash flooding is often a major concern following a significant wildfire event within a watershed. In addition, the loss of vegetation can result in increased sediment transport to streams and lakes due to soil erosion, reduced soil infiltration, and increased water volumes and overland flow rates. Water quality impacts frequently observed post-wildfire include increased transport of organic materials, nutrients and chemicals (i.e., fertilizers, herbicides) to surface waters, as well as increased turbidity (i.e., suspended particles) and water temperatures.

5.5 Air Quality

Wildfires are considered a natural source of air pollution and can sometimes cause severe short-term smoke impacts. These smoke impacts can pose a major health risk for some individuals. Symptoms from short-term smoke exposure range from stinging eyes, scratchy throat, cough, irritated sinuses, headaches, and runny nose. Individuals with pre-existing health conditions such as asthma, emphysema, congestive heart disease and other conditions can have serious reactions. The elderly and young children are considered high-risk groups for health complications due to smoke.

5.6 Recreation

In 2000 and 2003, closure of forest lands severely limited recreational activities in the Seeley/Swan Valleys. In 2003, closure of Plum Creek lands limited some recreational activities, while smoke and the threat of fire turned hundreds of campers and hikers away. In 2007, the entire area was closed for a number of days during the Jocko Lakes Fire to all non-residents and residents were limited to certain areas in the valley. In addition, several lakes were closed to use because of firefighting needs. Campgrounds were also closed during this time and recreational use of the area was stopped or reduced for most of August. In 2012, backcountry fires also resulted in trail and area closures. In general, severe fire seasons and fire risks can have a negative impact on recreational activities in the Fire Plan area.

5.7 Natural Resource Management

The Fire Plan area is predominantly managed as wildlands by the three public agencies (U.S. Forest Service, Montana Fish, Wildlife and Parks, and Montana Department of Natural Resources and Conservation). Plum Creek Timber Company formerly managed its lands in the area primarily as working forest lands, but a large percentage of their lands have been conveyed into public ownership through the Montana Legacy Project, as previously discussed in section 5.7. The remaining lands in the Valley are primarily residential, although a few ranches that maintain horses or cattle are present. The U.S.

Forest Service lands are administered in the Clearwater River Basin by the Seeley Lake Ranger District of the Lolo National Forest, and in the Swan River Basin by the Swan Lake Ranger District of the Flathead National Forest. These lands include substantial areas of designated wilderness, where management activities are very limited and primarily involve trail maintenance. Other areas of the National Forests are managed for multiple uses, and a substantial amount of timber and fuels management has occurred in the Swan River Basin in the last 10 years. State lands within the Clearwater River Basin are primarily managed by the Clearwater Unit of the Montana DNRC. Lands within the Blackfoot-Clearwater Wildlife Management Area are primarily managed by Montana Fish, Wildlife, and Parks. State lands within the Swan River Basin are managed by the Swan Unit of the Montana DNRC. Montana DNRC manages its lands for timber production to produce income under its school trust responsibilities. The Blackfoot-Clearwater Wildlife Management Area is primarily managed to maintain its value as big game winter range. Plum Creek Timber Company manages its remaining lands to produce financial returns to the company. This has historically been through forestry operations, but a recent shift has increased emphasis on management for real estate values. Current efforts to develop and implement land use plans by the Seeley Lake Community Council and Swan Valley Community Council have identified the importance of minimizing the expansion of the wildland/urban interface. The Seeley-Swan Fire Plan will provide critical information for this and other land use planning efforts.

5.8 Cultural Resources

The Seeley/Swan Valley supported considerable use by Native Americans prior to Euro-American settlement in the late 1800's-early 1900's. In fact, understanding historical fire regimes in the Valley is also a function of understanding how Native Americans used fire to "manage" their environment for travel and hunting. No map of cultural sites was produced as part of this Fire Plan.

6.0 Risk Evaluation: Identifying Areas of Greatest Threat

A risk assessment was conducted to evaluate the risk of wildand fire to the communities of Seeley Lake and Condon, Montana. The goal of the risk assessment process is to determine what areas are cumulatively the most vulnerable to wildfire hazards. The risk assessment approach applied in this Fire Plan uses a Geographic Information System (GIS) and the relevant landscape data to evaluate the vulnerability of people, structures and community assets to potential wildfire. This type of analysis is dependent on the accuracy of the data used. To expedite completion of the plan and reduce overall costs, existing data were used to conduct the risk assessment. Accuracy assessments were not conducted on the existing data, including the new fuels layer developed from the LANDFIRE coverage.

6.1 Fuels and Slope

The fuel hazard ratings results discussed in Section 4.2.1 were further combined with 5 weighted categories of slope (0 to 10^{o}=1, 10 to 20^{o}=2, 20 to 30^{o}=3, 30 to 40^{o}=5, and greater than 40^{o}=10) to assess

the overall fuel hazard within the Fire Plan region. The overall fuel hazard rating was calculated by adding fuel hazard rating to one half the slope rating. Increasing slope can have a chimney effect that increases the overall fire intensity and spread rate within a forest stand.

6.2 Structure Densities and Evacuation Routes

Information on structure densities per square mile for the Fire Plan area was combined with information on primary evacuation routes to produce a weighting prioritizing the vulnerability of the communities to wildfire risk. Evacuation routes were based on a 1.5 mile buffer delineated on either side of Highway 83 and Highway 200. The primary highways were given weightings of 5 within 0.5 mile, 4 within 1.0 mile, and 3 within 1.5 miles. The structure densities per square mile were given weightings based on the following classes: 0=0, >0-1=1, >1-2=2, >2-5=3, >5-10=4, >10-25=5, >25-50=6, >50-100=7, >100-150=8, >150-200=9, >200=10.

6.2.1 Wildland-Urban Interface

The wildland-urban interface is frequently defined as "the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuel." For the 2004 and 2008 versions of the Seeley-Swan Fire Plan, the WUI boundary was determined by the 1.5 mile buffer on the major highways and where structural densities were greater than >1 per square mile. In 2011, Montana state law (MCA 76-13-145) mandated a shift to a parcel based WUI designation for all Community Wildfire Protection Plans. Designations of these parcels were based on the same criteria used in the 2004/2008 version of the Fire Plan where it could be applied. The shift to parcel based designation did result in an increase of WUI acres mostly due to the size of the affected parcels within the fire plan area. Figure 13 identifies the change in the WUI in 2013 as compared to the boundary used in 2004 and 2008. The 2013 WUI represents 259,639 acres or 40.2% of the Fire Plan area. This is a gain of 47,918 acres over the 2004/2008 WUI that represented 211,721 acres or 32.8% of the Fire Plan area.

6.3 Cumulative Effects – Final Risk Assessment

The fuel hazards/slope information was combined with the structure densities/evacuation route information to produce a map of each stand's cumulative risk to human life or property. This map used the overall fuel hazard rating for each location that ranged from 1-15 based on the amount and type of fuels present as well as the slope. It then combined the fuel hazard with a structure density/evacuation route rating that ranged from 1-15, with 15 being the highest priority areas for human safety and evacuation areas and 1 being wildlands not in proximity to populated locations or evacuation routes. The fuel hazard rating and population/evacuation rating were combined using an 80%/20% split. This means 80% of the final score came from the fuels hazard/slope information and 20% of the final score came from the structure densities/evacuation route information. The resulting map (Figure 14) identifies the combined ratings and identifies forest stands that present the greatest risk to human life or property under their existing conditions. The stands with high ratings can be listed by ownership and prioritized for preventive actions, either by agency management or for possible funding support for fuel thinning on private lands.

7.0 Preparedness: Plan and Practice

7.1 Be Prepared- it's your responsibility to protect your home from wildfire!

7.1.1 Defensible Space

Defensible space is often defined as an area around your home or outbuildings, where the flammable vegetation is modified and maintained to slow the rate and intensity of an advancing wildfire. This area would also provide room for firefighters to work to protect your structure from advancing wildfire as well as protect the forest from a structure fire. In practice, "defensible space" is defined as an area a minimum of 30 feet around a structure that is cleared of flammable brush or vegetation. There is considerable information available to help homeowners reduce the vulnerability of their homes and property to wildfire. Firewise (www.firewise.org) and Keep Montana Green (http://www.keepgreen.org/) are just a few of the many organizations offering information and resources to homeowners in the wildland/urban interface.

7.1.2 Burn Permits

As required in MCA 76-13-121; it is a landowner's responsibility to obtain a burn permit from the appropriate local firefighting agency. Burn permits can be obtained online at https://app.mt.gov/burnpermit/. Burn permits are required from March 1 to November 30, each year. Burning is not allowed from December 1 to February 28 due to the frequency of associated air quality problems at this time of year. Burn permits may be temporarily suspended during high fire risk conditions. Before lighting your fire, you must activate your burn permit by going back on-line to enter the required information. A burn permit is not valid when air quality or fire hazard restrictions are in effect. No fire may be ignited before 9:00 AM or be allowed to burn after 4:00 PM unless an extension is authorized by the fire agency. In the case of logging slash piles that will continue to burn after 4:00 PM, the fire must be attended until it is out or until it no longer poses a threat. On many days afternoon winds are likely, use extra caution and watch wind conditions while burning. No fire may be ignited when wind or other weather conditions make it hazardous to burn. Before lighting your fire, you must take all measures necessary to prevent the fire from spreading and must have sufficient help and equipment at the site to prevent the fire from getting out of control (MCA 50-63-103). You may not burn any man-made materials, trade wastes, or other prohibited materials. Under Montana Law (MCA 76-13-122), the landowner or individual starting a fire is liable for all fire suppression costs and damages resulting from an escaped or uncontrolled fire. A permit must be in the possession of the permittee or his/her representative at the site of the fire at all times. Fire, health and law enforcement officials may access the site of the outdoor burning to ensure compliance with the outdoor burning regulations and permit conditions.

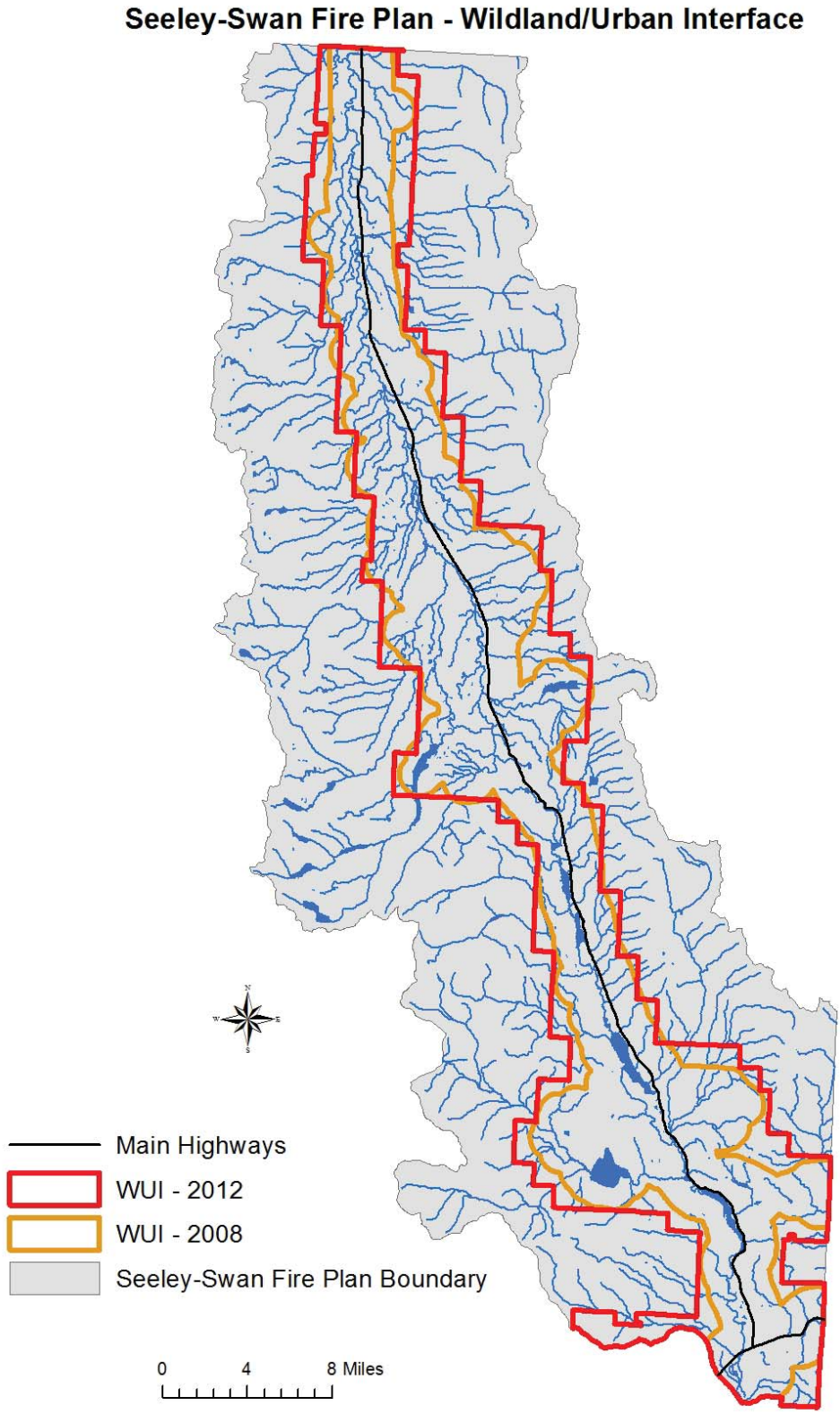


Figure 13. Change in Wildland-Urban Interface (WUI) boundary from 2004/2008 to 2013.

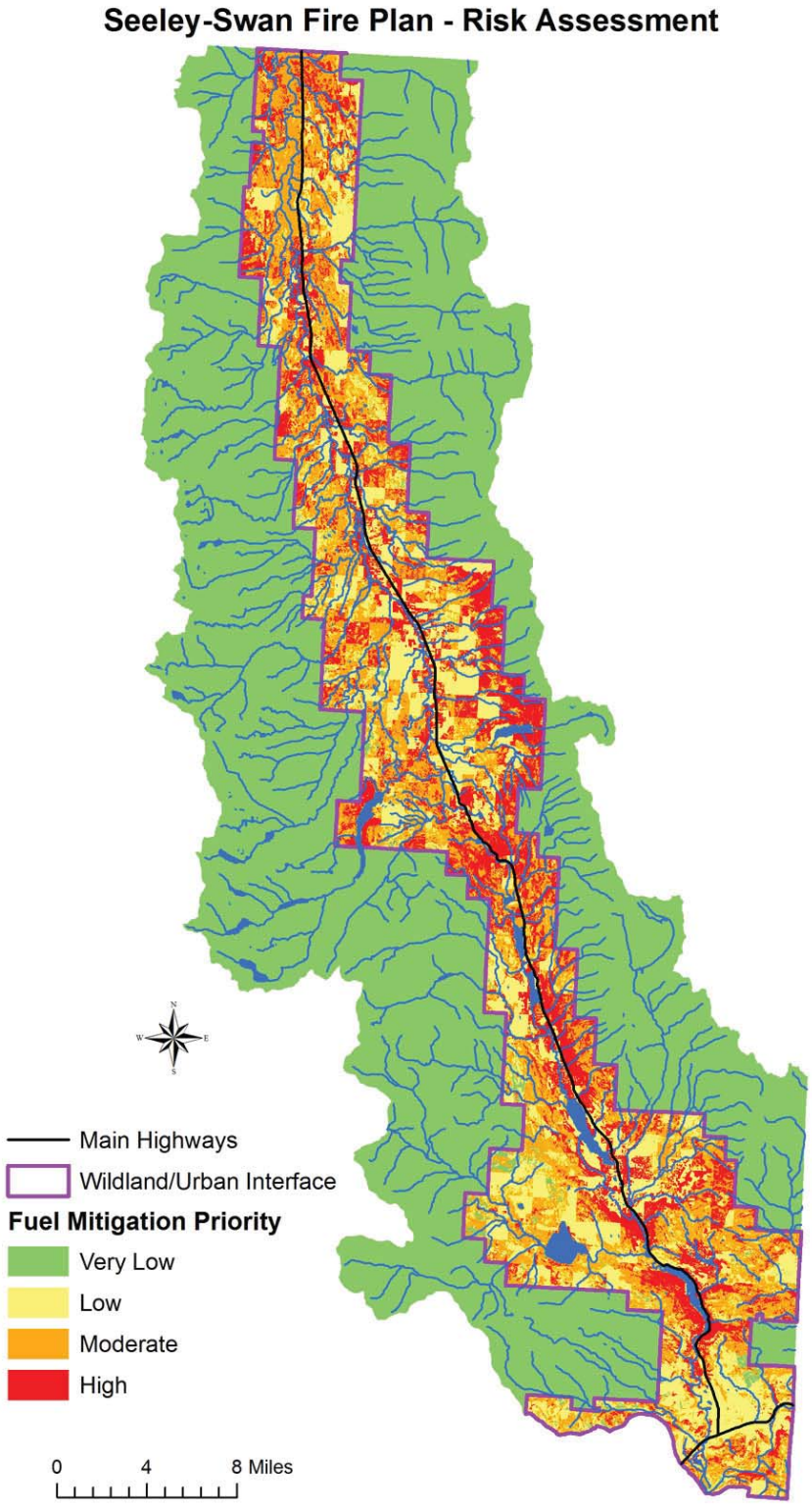


Figure 14. Results of the risk assessment identifying four priority levels for risk in the wildland/urban interface of the Seeley-Swan Fire Plan region.

7.1.3 Evacuation Routes/Safety Zones

Families should identify in advance, normal and alternate escape routes out of the Fire Plan area. In addition, they should also identify the locations of and routes to large areas with little or no vegetation or other fuels where they can ride out the fire if it's too late to evacuate. A rule of thumb for choosing a safety zone is the center of the zone should be more than 4 times the expected flame height from the edge of the forest.

7.1.4 Pets and Livestock - Evacuation

Seeley Lake and Condon are rural communities with a high number of associated pets and livestock. In addition, both communities have a large number of dog sled racing teams, each with a considerable number of dogs in their kennels. It is the pet and livestock owners' responsibility to be prepared for evacuation well in advance of a wildfire. If you must evacuate your home or property, it is the owner's responsibility to not leave pets and livestock behind. In addition to fighting a wildfire, firefighters should not be additionally burdened with trying to protect or evacuate abandoned pets or livestock.

For public health reasons, many emergency shelters cannot accept pets. Develop a plan in advance and have the necessary phone numbers, pet supplies, and medical records (many boarding facilities require evidence of vaccinations) on hand to take with you on short notice. Arrangements for evacuation of livestock, including routes and host sites, should also be made in advance. Alternate routes should be mapped out in case the planned route is inaccessible. All animals should have some form of identification that will help facilitate their return.

7.1.5 Personal Tools, Equipment, Fire Protection Clothing

A homeowner should NEVER attempt to fight a wildfire to protect their home or property. However, in the event that you have time to prepare your house for a wildfire prior to evacuation, or there is simply no time to evacuate, there are several tools, equipment and clothing you can have on hand to help protect your family and your house from wildfire.

- Hoses and sprinklers can be used to reduce the risk of sparks and embers igniting surrounding vegetation or the roof of the house. If power is lost, however, a gas powered pump (fueled and ready) can be used to extract water from a nearby pond or stream. Pre-connect the hoses to the faucets or pumps.
- Have a ladder, shovels, rakes, chain-saws, and pick-ax on hand to help you reduce the vulnerability of your home to wildfire. However, it is important to note that developing defensible space around your home should be done long before a wildfire is threatening your home.
- Have one or more 5-pound multipurpose type fire extinguishers readily available.
- Protective clothing should be on hand for while you are working to prepare the house for a wildfire or for anyone who is unable to evacuate before the fire arrives. This includes a cotton long-sleeved shirt or jacket and trousers, a handkerchief to provide minimum protection for the lungs (avoid inhaling smoke or hot gases), leather boots, gloves, a helmet or other head

covering, and goggles. Cotton clothing is important as synthetic fabrics can melt onto your skin and cause serious burns.

7.2 The Communities: Fire Preparation

7.2.1 Evacuation Plans

An evacuation plan is in place for Missoula County. Local law enforcement agencies will be in charge of implementing the evacuation plan in the event of a wildfire that jeopardizes human safety. In general, the evacuation plan consists of six stages:

1) Pre-evacuation contacts and briefings – contact teams go door-to-door (if possible) to provide information about the emergency and determine any special needs of those contacted.
2) Evacuation warning – Residents notified of the high probability of the need to evacuate. Persons with special need will be evacuated at this time.
3) Evacuation request – residents of the affected area are asked to leave within a specified time frame by a pre-designated route (dependent on the emergency) and report to the evacuation center.
4) Evacuation order – emergency conditions present a clear threat to human safety and residents are ordered to leave.
5) Roadblocks – perimeter roadblocks are maintained and the evacuated area(s) are patrolled around the clock. Regular incident status briefings are provided for evacuees.
6) Evacuees are allowed to return according to conditions identified by the controlling agency.

7.2.2 Fire Protection Response

7.2.2.1 IGNITION WORKLOAD ANALYSIS

The following table (table 6) represents the number of wildfires within the Fire Plan area that were responded to by firefighting agencies over the past five fire seasons. Data were obtained from Lolo National Forest, Flathead National Forest, and Montana DNRC.

The ratio of successful fire suppression in the Fire Plan area to the total fire workload during the last five-year period is 95%. The average number of fire responses in this five-year period increased 9% over the previous five-year period.

7.2.2.2 STRATEGIC FUEL BREAKS

There are several existing fuel breaks within the Fire Plan area that can serve as strategic fuel breaks for wildfire suppression including the Double Arrow Golf Course and the many large lakes and rivers that occur throughout the Fire Plan region. In addition, there are several large meadows, both wet and agricultural, that occur along Highway 83 that could also be used strategically to help suppress a wildfire.

Table 6. The number of wildfires within the Fire Plan area responded to by firefighting agencies that were suppressed or escaped initial attack, for the last 5 fire seasons.

FIRE SEASON	SUPPRESSED	ESCAPED INITIAL ATTACK	TOTAL FIRES
2012	70	7	77
2011	56	4	60
2010	42	1	43
2009	61	3	64
2008	80	1	81

Primary lines of defense (PLOD) have been designated within the plan area. PLODs describe a predetermined boundary around a particular area of high values at risk such as residential, recreational or commercial structures. PLOD boundaries are determined by local fire suppression experts with consideration of tactical efficacy, accessibility, ease of identification from the ground or from the air and potential fire fighter safety. PLODs designated by MT DNRC and USFS in the Swan Valley and by the Seeley Lake Fuels Mitigation Task Force in the Clearwater Valley are shown in Figures 10 and 11.

7.2.2.3 COMMUNITY SAFETY ZONES

Where necessary, a community safety zone will be identified by fire managers relative to the specifics of each wildfire's behavior and location in the landscape. Fire managers will ensure the designated location of each safety zone is publicized as appropriate.

7.2.2.4 FIRE ENGINE PUMP/DRAFT SOURCE SITES

The Seeley/Swan Valley has a large number of natural lakes and streams as well as the water system in the Town of Seeley Lake. These provide a number of good sources of water for firefighting. The location and types of equipment that can be served at each draft site is maintained in a GIS and available to firefighting agencies.

7.3 Emergency Communication

The Seeley Lake RFD has established a website for dissemination of important information (www.seeleyfire.org). The Swan Ecosystem Center (754-3137) also provides emergency communication services to Condon area residents for the Swan Valley Emergency Alert System (SEAS). The Lolo (www.fs.fed.us/r1/lolo/fire) and Flathead National Forests (www.fs.fed.us/r1/flathead) maintain websites that also provide information on fires, and have links to national fire information centers. All of these can provide sources for emergency wildfire information.

Since the 2008 Plan update both Missoula and Lake County of developed reverse 911 capabilities to communicate emergency information to the public.

The establishment of "phone trees", a pre-established system for networking (telephone, e-mail, or other) between neighbors or within homeowners associations, is encouraged for emergency communication and evacuation purposes. The DNRC Swan Unit, working with community members has identified 10 neighborhoods in Lake County and 19 neighborhoods in Missoula County. Typically, these neighborhoods are characterized by similar access and egress routes for evacuation and phone trees provide an effective mechanism to ensure all residents are contacted in the event of an emergency. Pre-evacuation plans will be available for all homes within a neighborhood and maintained at the Swan Ecosystem Center. All neighborhoods incorporate an emergency contact form that can be filled out online on the Swan Ecosystem Center website (http://www.swanecosystemcenter.org/swanemergencyalertsystem.html). Figure 15 shows the neighborhoods in the Swan Valley and Figure 16 provides an overview of Clearwater Valley. Within the Seeley Lake area, a phone tree is currently being developed for the Placid Lake Homeowners Association. Phone trees are particularly important for the elderly, small children or handicapped when planning an evacuation.

In the event phone lines are down and cellular service to the area is jammed, the Seeley Lake RFD, Swan Valley FSA, U.S. Forest Service and DNRC all have radio capability to communicate effectively throughout a wildfire emergency. These same agencies will then coordinate their efforts to ensure the general public is also kept informed of important or emergency information.

7.4 Agency Fire Plans

The DNRC Clearwater and Swan Units utilize Land Office Mobilization Plans to provide the necessary guidance to insure that state fire resources are in an appropriate state of readiness to deal with actual fire suppression situations and to guide the mobilization of additional resources to accomplish this task. The Mobilization Plan contains information on communications, fire mobilization, aircraft, manpower and equipment.

Seeley Lake and Condon support a number of companies that conduct work in logging and excavating. Each year the DNRC seeks contractors that would like to sign-up their equipment to be used in fire suppression efforts. This sign-up period is usually done in May before fire season. Once an Emergency Equipment Rental Agreement (EERA) is signed by a certified contracting officer, the copy of the EERA and the type of equipment is kept at the various dispatch centers in a Resource Ordering and Supply (ROSS) database so dispatch can mobilize equipment to the fire line when requested.

DNRC has the ability to utilize any resource necessary to aid in the suppression/rehabilitation of any fire on lands protected by the State of Montana. This includes, but is not limited to use of any resource from

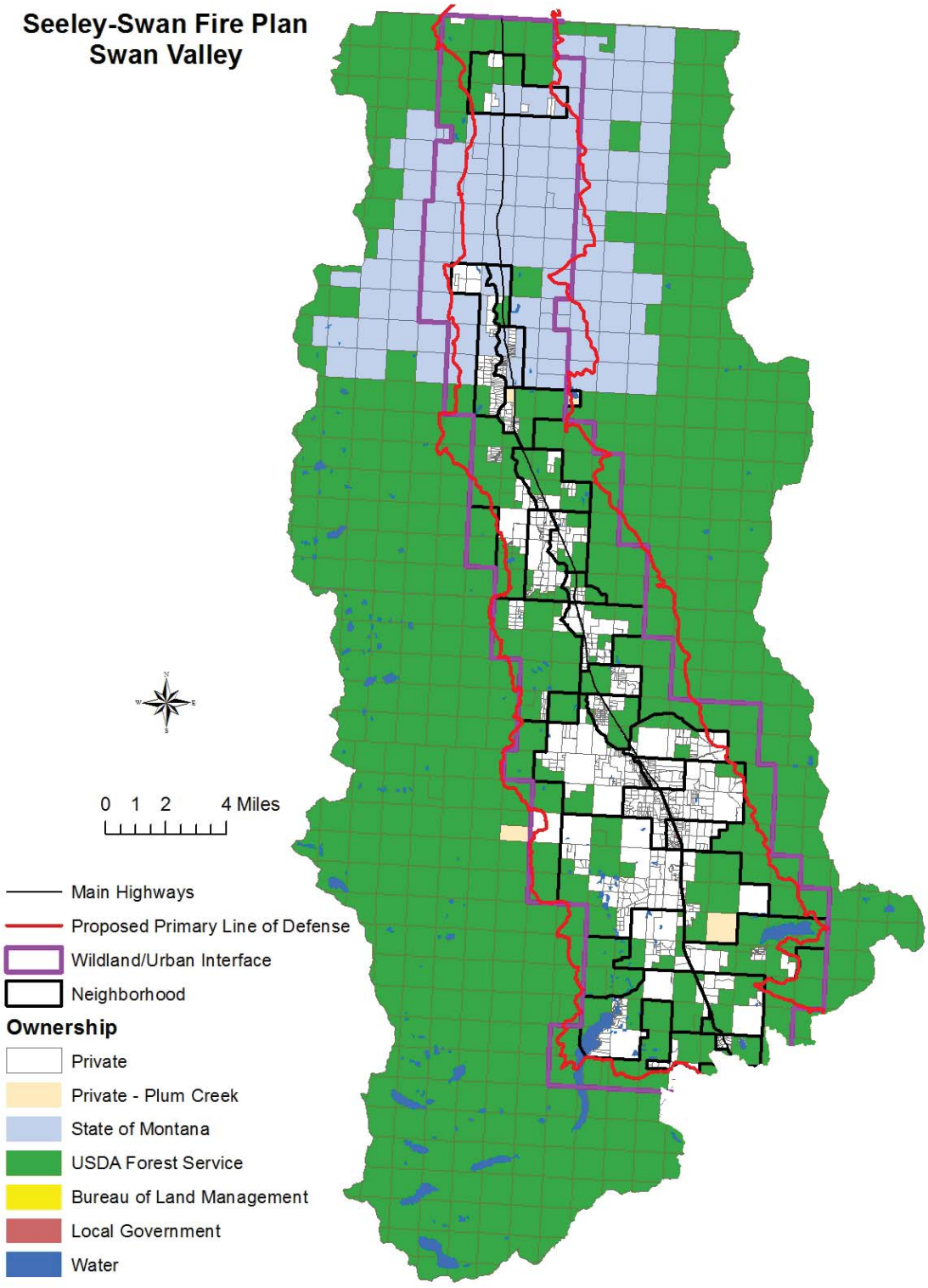


Figure 6. Overview of the Swan Valley with neighborhood boundaries.

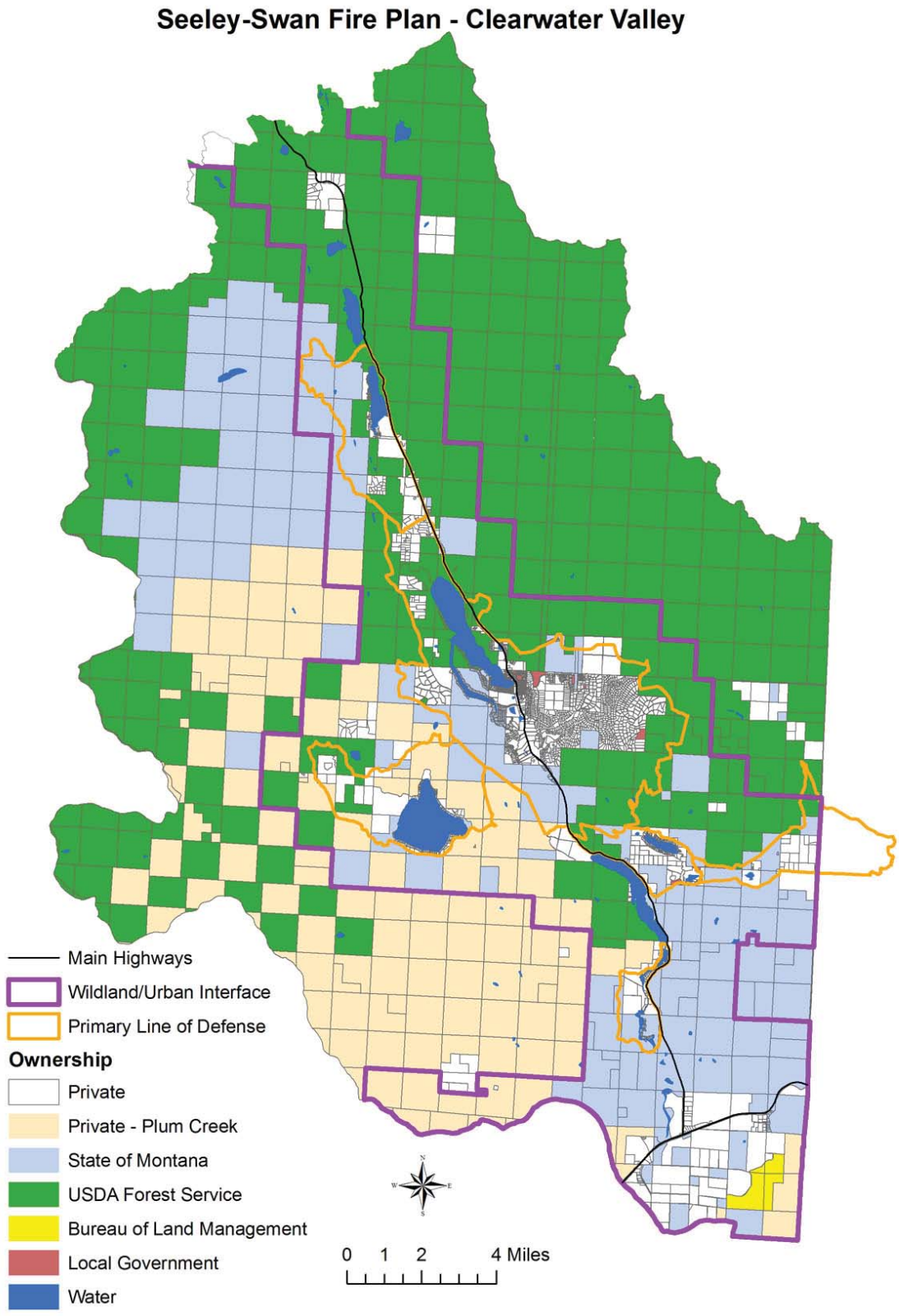


Figure 16. Overview of the Clearwater Valley.

the following sources: DNRC, other States and Federal agencies, local government fire forces, and private contract resources (including Competed Solicitation Resources and local EERAs). DNRC will order and utilize resources from the best, closest and most appropriate source as determined on the basis of urgency (date & time needed), availability, delivery time, reasonable cost, and operational impact on the agency & incident. This allows DNRC to select resources that will allow the fastest, most effective suppression of fires occurring under DNRC jurisdiction.

Each of the Lolo and Flathead National Forests prepare an annual Fire Management Plan that outlines programs to provide flexible wildfire preparedness, suppression, prevention and fire use options that meet interdisciplinary goals, objectives and move towards the desired conditions.

The Seeley Lake Fuels Mitigation Task Force was established in 2004 to implement the Seeley/Swan Fire Plan. The Task Force has acquired fuels mitigation funding for private landowners, and has hired a fuel mitigation coordinator through a cooperative arrangement with Bitter Root RC&D. The Task Force maintains a list of companies in the area that are available to assist landowners with fuel mitigation work.

8.0 Regulatory Compliance

8.1 Administrative Barriers to Wildfire Mitigation

8.1.1 Legal Mandates

Potential legal barriers to implementing various aspects of wildfire mitigation plans on National Forest lands include National Environmental Protection Act (NEPA) and Endangered Species Act (ESA) regulations and compliance issues, as well as potential citizen or organizational intervention (legal challenges) to proposed mitigation actions. Also, agency priorities for ongoing projects and potential agency funding restrictions for new projects have the potential to act as barriers to implementing mitigation actions identified and deemed necessary by the community.

At the federal level, NEPA concerns address threatened and endangered species and potential impacts that mitigation efforts will have on these. In the Seeley/Swan community Fire Plan area, existing threatened and endangered species include the grizzly bear, Canada lynx, and bull trout. All three species are listed as threatened under the ESA. Both state and federal land management is influenced by ESA.

It is recommended that policies and guidelines concerning considerations for threatened and endangered species and other species of concern be developed for fuel thinning projects occurring on Federal and State lands within the WUI. In particular, where such lands occur along the primary or secondary evacuation routes, with no structures close by, the level of fuel mitigation needed in proximity to the route could have some flexibility. Determining these policies and guidelines through a coordinated process prior to project implementation should produce better and more consistent

implementation of fuel thinning for public lands, and be better understood and more defensible to the public.

Potential citizen intervention in the form of legal challenges to mitigation efforts, while always a potential, are unlikely to come from the communities affected by this Fire Plan. Recent large wildfire events in the valley have resulted in heightened wildfire hazard awareness among community members. As a result of this, there is overwhelming consensus among community members that mitigation action to reduce the threat of catastrophic losses due to wildfires is an urgent priority.

The Healthy Forest Restoration Act (HFRA) alleviates some potential barriers in the short term. Specifically, the HFRA has its own abbreviated appeal process and allows agencies to propose one alternative action treatment, as opposed to multiple alternatives. In the event of legal challenges to proposed actions, the HFRA also gives the courts direction as far as considering the effects and potential catastrophic outcomes of no action being taken.

In addition to the ESA, potential legal barriers to implementing various aspects of wildfire mitigation plans on state lands include the Federal Enabling Act of 1889 and the Montana Environmental Policy Act (MEPA). The Enabling Act granted sections 16 and 36 to the State of Montana and provided that proceeds from the sale and permanent disposition of any of the trust lands, or part thereof, shall constitute permanent funds for the support and maintenance of the public schools and the various state institutions for which the lands had been granted. The Montana Constitution provides that these permanent funds shall forever remain inviolate, guaranteed by the State of Montana against loss or diversion. The Trust Land Management Division of the Montana Department of Natural Resources and Conservation (DNRC) is responsible for the management of these state trust lands. DNRC's responsibility is to obtain the greatest benefit for the school trusts. The greatest monetary return must be weighed against the long-term productivity of the land to ensure continued future returns to the trusts. In 1996, the State Land Board approved the Record of Decision (ROD) for the State Forest Land Management Plan (SFLMP). The SFLMP provides philosophical basis, consistent policy, technical rationale, and guidance for the management of forested state trust lands. The SFLMP is based on the philosophy that the best way to produce long-term income for the trust is to manage intensively for healthy and biologically diverse forests.

In 2003, the State Land Board approved DNRC's adoption of the Administrative Rules for Forest Management (Forest Management Rules; ARM 36.11.401 through 456). The Forest Management Rules are the specific legal resource management standards and measures under which DNRC implements the SFLMP and subsequently its forest management program. The Forest Management Rules establish guidelines on managing for biodiversity within forested stands, minimizing roads, retaining certain habitat attributes important to terrestrial and aquatic species (including threatened, endangered, and sensitive species), and minimizing impacts to watershed and soil resources.

In December 2011, the Land Board approved the Record of Decision (ROD) for the Montana Forested State Trust Lands Habitat Conservation Plan (HCP). Approval of the ROD was followed by the issuance of

an Incidental Take Permit (Permit) by the U.S. Fish and Wildlife Service (USFWS). The HCP is a required component of an application for a Permit which may be issued by the U.S. Fish and Wildlife Service to state agencies or private citizens in situations where otherwise lawful activities might result in the incidental take of threatened or endangered species listed under the ESA. The HCP is the plan under which DNRC conducts forest management activities on select forested state trust lands while implementing specific mitigation requirements for managing the habitats of grizzly bear, Canada lynx, and three fish species: bull trout, westslope cutthroat trout, and Columbia redband trout. For lands covered by the Permit, the DNRC is responsible for implementing the commitments in the HCP in addition to those set forth in the Forest Management Rules.

The second legal mandate influencing fuels mitigation on state lands consists of the Montana Environmental Policy Act (MEPA). MEPA was enacted by the 1971 Legislature and provides a public process that assures Montana's citizens that before state government makes a decision that could have significant impacts on the human environment; a deliberate effort is made to identify those impacts. The concept is that the decision maker and the public should be well informed of the environmental impacts of the decision before the decision is made. In order to learn the most about what the environmental impacts of a significant state action might be, agencies are directed to obtain the input of others. This is important because state government often makes decisions that can impact the environment or affect personal property rights or quality of life, and no one decision maker has all the answers.

There are two basic types of state government activities that most commonly require a MEPA review of possible impacts on the human environment. The first type of activity is an agency-sponsored proposal to implement a program or project or to undertake an activity on its own or in concert with other agencies. This may include local projects if they are funded by the state. Examples include timber sales on state lands or the construction of a road or a state recreation area. The second type of activity includes a decision by the state to grant to an applicant a license, permit, lease, or other state authorization to act. Examples of this type of action include permits for mines, air or water quality discharges, surface or ground water use, mineral leasing, and many others.

MEPA requires agencies to prepare a written environmental review that is available to the public. This review may be a simple checklist environmental assessment (EA), a more comprehensive EA, or a more detailed environmental impact statement (EIS). MEPA requires that the level of analysis and the degree of public involvement increase, depending on the significance of the potential or identified environmental impacts.

The following are laws applicable to forest harvest activities on private lands within the state of Montana:

1. Control of Timber Slash and Debris – a.k.a., “Slash Law” (76-13-401 to 76-13-415) MCA. Requires that a Hazard Reduction Agreement (HRA) be obtained and prescribes a treatment method that reduces the fire hazard, created by the slash from logging operation, to an acceptable state standard. The HRA is a legal contract and the person responsible for compliance with the slash

law is the signatory on the Hazard Reduction Agreement. This may be the logger, landowner, sawmill, private consultant, or other third party. A performance bond is created as wood products are hauled to the mill, at the rate of $6.00 per thousand board feet or equivalent measure for other products; a fee of $0.75 is also collected for administrative costs. After DNRC certifies that state slash standards have been met, the performance bond is refunded to the person holding the HRA. The slash treatment prescribed in the HRA is intended to reduce the fire hazard to an acceptable level, but does not require total slash removal.

2. Streamside Management Zone Law (77-5-301 to 77-5-307 MCA). Also known as the "SMZ Law," this law established minimum standards for forest practices adjacent to streams, lakes and other bodies of water in Montana. The law prohibits seven forest practice activities within the SMZ. There is the potential for penalties to be assessed if the law is violated. The landowner is responsible for violations of the SMZ Law, and the associated penalties, unless the responsibility for compliance with the SMZ Law is transferred to another party through a written contract. The HRA Agreement does not transfer this responsibility for SMZ law compliance.

DNRC Service Foresters are available to explain applicable laws and rules to you, and provide sample contract language to transfer responsibility. Following completion of harvest activities, DNRC foresters may inspect the site to ensure that these state laws and standards have been met.

8.1.2 Fire and Building Codes

Missoula County adopted building codes that apply to the Fire Plan area. While the Seeley Lake Rural Fire District has not "officially" adopted the International Fire Code, it is used as a reference during new building construction. Any new subdivision that is built in the plan area must adhere to the Missoula County subdivision regulations in which the state of Montana guidelines must be followed for fuel mitigation of the new subdivision. At present, fire prone materials are sometimes used on the exterior of residences in the wildland/urban interface, making them more susceptible to ignition by wildfires. Some homeowners associations in the area have specified fire resistant materials for some exterior materials. Another hindrance to reducing wildfire risk is the inclusion of restrictions on cutting trees in the covenants of some homeowner association's deed restrictions. A number of these restrictions have been changed in recent years by some of the homeowner's associations.

8.1.3 Air Quality Regulations

Airshed Zones are geographic areas in which atmospheric and meteorological characteristics are similar. The Airshed Zones are used to issue restrictions on prescribed fires (if necessary) in each airshed based on air quality and atmospheric dispersion conditions. The Fire Plan region lies within 3 airshed boundaries that include 2, 3A, and 3B, as identified in Figure X.

Air Impact Zones are areas designated to be smoke sensitive and/or have an existing air quality problem. The Air Impact Zones are used to issue restrictions (if necessary) on prescribed fires in each Impact Zone based on air quality and atmospheric dispersion conditions. The Fire Plan region contains one Air Impact Zone for the Seeley Lake area, as identified in Figure 18.

Within the Fire Plan area, air quality regulations are administered by the Montana Department of Environmental Quality (MTDEQ) and the Missoula County Health Department (MCHD). The Missoula County Health Department maintains air quality monitors within the Seeley and Swan airsheds and regularly issues advisories and warnings based on current air pollution levels. For more information regarding air quality concerns please visit: http://www.co.missoula.mt.us/airquality/default.htm

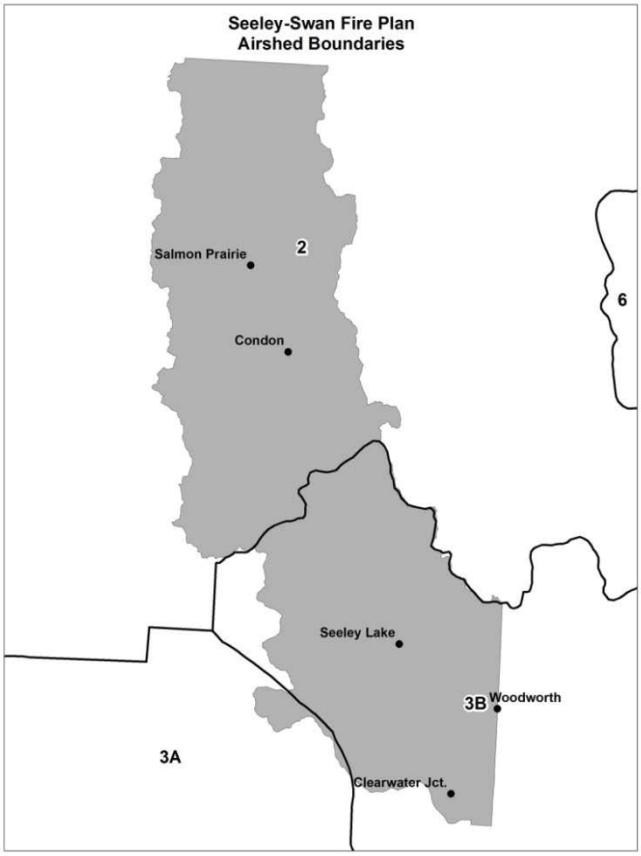


Figure 17. Airshed Zones in the Seeley-Swan Fire plan area.

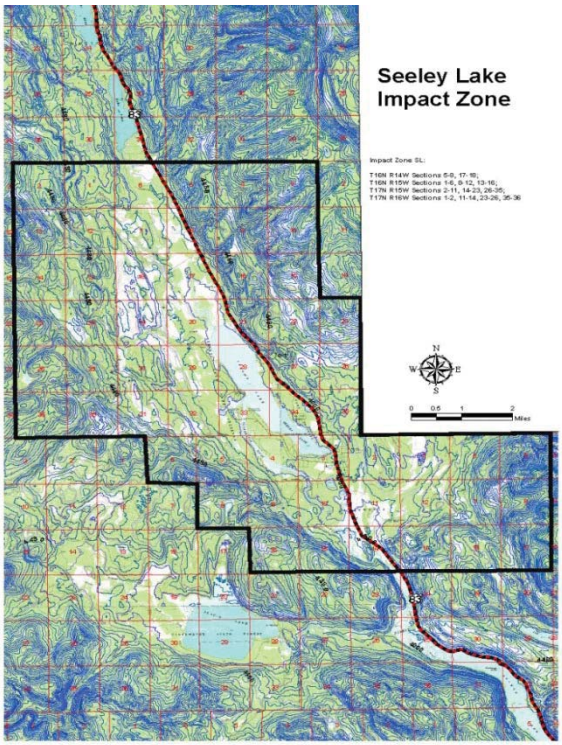


Figure 18. Seeley Lake designated Air Impact Zone.

Anyone conducting open burning is required to comply with Best Available Control Technology (BACT) during ignition and/or throughout the duration of burning by employing such techniques and methods that may include:

- Only burning natural, approved materials as found in ARM 17.8.604
- Scheduling of burning during periods and seasons of good ventilation;
- Applying dispersion forecasts;

- Utilizing predictive modeling results;
- Limiting the amount of burning to be performed during any one time;
- Using ignition and burning techniques which minimize smoke production;
- Selecting fuel preparation methods that will minimize dirt and moisture content;
- Promoting fuel configurations which create an adequate air to fuel ratio;
- Prioritizing burning as to air quality impact and assigning control techniques accordingly;
- Promoting alternative treatments and uses of materials to be burned; and
- Selecting sites that will minimize smoke impacts.

Open burning by the average home/individual is defined by MTDEQ and MCHDs rules as "minor open burning." In Montana, minor open burning may be conducted March 1 through November 30 of each year as allowed by local burning restrictions. The months of December, January and February are typically characterized by poor air dispersion and ventilation and, with very rare exceptions, minor open burning is prohibited during that time. Burners are responsible for obtaining the appropriate burn permit, determining when conditions are favorable and complying with local burning regulations.

The MTDEQ and MCHD issue special permits to burners who are classified as major open burners. A major open burner is any person, agency, institution, business, or industry conducting any open burning that will emit more than 500 tons per calendar year of carbon monoxide or 50 tons per calendar year of any other pollutant regulated, except hydrocarbons (Administrative Rules of Montana, Chapter 17.8, Subchapter 6, rule 17.8.610)

All major open burners are required to submit proposed burns to the Monitoring Unit of the Montana/Idaho Airshed group in accordance with the Smoke Management Unit's Operations guide and all burns must be approved through the airshed process prior to ignition. Members of the Airshed Management Group include state and federal air quality regulators as well as state, federal and private land management agencies. As members submit lists of proposed burns to the monitoring unit, health officials and meteorologist forecast how well the smoke will disperse each day and decides whether to restrict burning. Restrictions may be imposed by airshed, elevation, or special impact zones around populated areas such as Seeley Lake. All open burning is subject to superseding local authority Missoula, Powell and Lake Counties. It is recommended that anyone conducting open burning, confer with county authorities when performing burning in their respective jurisdictions.

For more information regarding Air Quality/Smoke Management:
http://www.deq.mt.gov/AirQuality/aqinfo.mcpx
http://www.co.missoula.mt.us/airquality/default.htm
http://www.smokemu.org/index.cfm
http://www.mcfpa.org/burn_permits.htm

8.2 Administrative Solutions

8.2.1 Interagency Collaboration

The Seeley Lake RFD, Swan Valley FSA, Lolo and Flathead National Forests, and DNRC Swan and Clearwater Units have worked together over the past 24 years to ensure interagency coordination and collaboration relative to wildfire prevention and suppression in the Fire Plan area. To aide in this regard, these agencies have developed agreements through the Montana Cooperative Fire Management and Stafford Act Response Agreement. They also revise operating plans with dispatch centers and county cooperative agreements on an annual basis. At the local level, the Missoula County Fire Protection Association, Blackfoot Fire Protection Association, and the Lake County Fire Association meet to discuss opportunities for improving coordination and collaboration. Interagency meetings will be scheduled for the spring (pre-season) and fall (post-season) to provide updates on new or on-going programs, introduce new personnel, discuss equipment needs and ways of obtaining new equipment, and discuss problems encountered during the previous fire season.

The ability to plan and implement mitigation treatments across jurisdictional boundaries will require close cooperation between the U.S. Forest Service, The Montana Department of Natural Resources and Conservation, and affected private landowners. The Seeley-Swan Fuels Mitigation Task Force was established to help provide this cooperation and coordination. Addressing areas of multi-ownership will be addressed initially through public meetings, and public education efforts to identify and make known those priority areas identified by the community and in the Community Fire Plan. Consequent efforts between the USFS and DNRC will require close interagency cooperation and coordination to implement mitigation project areas with joint boundaries. Both agencies are committed to work together to implement mitigation efforts identified by the community as priority areas.

8.2.2 Coordinated Resource Management Plans

The Clearwater Resource Council has prepared a Landscape Assessment of the Clearwater Valley. This assessment pulls together ecological information for the Valley including distributions of various listed species, species of concern or special interest, riparian and wetland areas, and other data. This assessment has provided information for use in land use planning discussions. It would also provide information of use in designing fuel mitigation projects. It can be viewed at http://www.crcmt.org.

The Swan Valley Landscape Analysis is a coordinated resource management plan developed for the upper Swan Valley region. This community-based assessment crosses all land ownerships for an ecosystem view of the landscape. The assessment's maps and documents were developed to help the federal and state land managers, the timber industry, and private landowners better manage the natural resources of the Swan Valley. The Swan Valley Landscape Assessment can be viewed at - http://www.swanecosystemcenter.com/. The Swan Valley Community Council has revised the Swan Comprehensive Growth Plan. See the following website for more details:
http://www.co.missoula.mt.us/rural/communitycouncils/SwanValleyPlanningCommittee.htm

9.0 Action Plan

9.1 Desired Future Conditions

The analyses conducted for this Fire Plan evaluates the fuel loadings within the wildland/urban interface and evacuation routes and identifies areas risk to wildfire. Areas with high fuel loadings occurring within this interface represent significant risk to human life and property. A first priority for desired future conditions is to reduce these fuel loadings to safer levels. This will be an on-going process, as the favorable forest productivity of the Seeley/Swan Valley means that additional fuels are added each year, and will accumulate to undesirable levels without continued fuel reduction programs. The following section identify the goals

9.2 Mitigation Goals

9.2.1 High and Moderate Risk Fuels

The results of the updated 2013 Seeley-Swan Fire Plan risk assessment identified a total of 168,479 acres in the category of high or moderate risk fuels for the area. For the 2013 update, the Fire Plan team recognized the need to further categorize the high and moderate risk fuels by the cost associated with potential treatment of these acres. Two treatment categories were identified: low and high. Low cost treatments were identified as those sites with < 35% slope or located outside the streamside buffer of 150'. High cost treatments were sites with >=35% or within the streamside buffer of 150'. High cost treatments would potentially require specialized logging practices or more detailed/intensive analysis of conditions to make treatment possible. To date most, if not all, of the acres treated were characterized by low cost treatment conditions. This trend is expected to continue with the fuels mitigation task force desire to treat as many of the priority acres as possible, with the least cost to the a available programs. Table 7 identifies the number of high and moderate risk acres, by treatment category and landowner category within the WUI. High risk acres in the low cost treatment category total 46,897 acres and moderate risk acres in the low treatment category total 89,152 acres. The number of high and moderate risk acres went up in the Fire Plan region due to two primary factors; 1) the size of the WUI was increased by 47,918 acres in 2013, and 2) recent updates to the LANDFIRE data increased the high and moderate fuel density categories on 26,000 acres in the area.

Table 7. Number of high and moderate risk fuels by treatment category and landowner type in the Seeley-Swan Fire Plan region.

LANDOWNER	HIGH		MODERATE	
	Low Cost Treatment	*High Cost Treatment*	*Low Cost Treatment*	*High Cost Treatment*
US Forest Service	27161	8722	46213	9465
Private	10103	1869	13791	2307
MT Dept. Natural Res. Conserv.	7548	2360	17053	3201
MT Fish, Wildlife, and Parks	1066	891	4374	938
Plum Creek	404	559	5941	1397
The Nature Conservancy	282	14	1310	181
Other Categories	229	42	192	38
Bureau of Land Management	61	244	221	189
Missoula County	43	4	45	9
MT Dept. of Transportation	1	0	13	0
Total	**46897**	**14705**	**89152**	**17724**

In an effort to maintain consistency between collaborative efforts, mitigation goals developed for the 2013 Seeley-Swan Fire Plan have been updated to apply the same goals developed for the SW Crown of the Continent Prioritization Framework (Haufler et al. 2012) but as applied to the Fire Plan area. The prioritization framework targets treatment of 80% of the high risk, treatable acres in a 10 year time frame. Table 8 summarizes this goal for the project area.

Table 8. The acres representing treatment of 80% of the high risk, treatable stands through 2023, by landowner. Note 2013 represents treatable acres only.

	2013	**2023 (80% goal acres treated)**
USFS	27161	21729
PRIVATE	10103	8083
MT DNRC	7548	6038
MT FWP	1066	853
PLUM CREEK	404	323
BLM	61	49
TNC	282	226
MISSOULA COUNTY	43	34
MT DOT	1	1
TOTAL	**46669**	**30731**

9.2.2 Ecological Restoration

In some instances it may be fully compatible with a landowner objectives and vegetation conditions on an ecological site, to encourage treatments that can achieve both ecological restoration and fuels mitigation objectives. The 2004 and 2008 Seeley-Swan Fire Plans identified as a goal to "develop policies and guidelines for ecological considerations within the WUI." The SW Crown Prioritization Framework (Haufler et al. 2012) helped provide information to incorporate ecological restoration objectives in fuels mitigation planning. The following is an excerpt from the assessment:

"The landscape assessment identified and quantified that the most significant changes to native ecosystem diversity have occurred in forest structures, species compositions, and patterns associated with the historically common non-lethal and mixed-severity fire regimes. In particular, the pre-fire suppression old growth condition characterized in the landscape assessment as the low severity fire late seral forest condition which were historically common native ecosystems in this landscape occur in greatly reduced amounts today. Further, where these residual late seral structures and species composition remain in the landscape, fire suppression activities have facilitated their in-growth by high densities of younger trees that now put the stand at risk of high severity fire and competition for water and nutrients which may continue to reduce opportunities for restoring these historically important native conditions in this landscape. In fact, recent wildfires have demonstrated that these residual structures continue to be at high risk from stand replacing fire and require immediate protection where they still occur. Restoring the historical fire regimes and forest conditions in these high risk native ecosystems should be a high priority for land managers and is highly compatible with many of the objectives identified for the SW Crown project. Specifically, objectives identified in the SW Crown proposal include:

- *Restore forest structure processes and resiliency, promote diversity, establish a mosaic pattern consistent with the mixed-severity fire regime that mimics historical and native landscape conditions, maximize retention of large trees, reintroduce low-severity and low-intensity fire on sites that historically burned in this manner to establish open stands consistent with historical conditions.*
- *Treatments outside of the WUI will be vegetative restoration projects intended to maximize retention of large trees while maintaining and restoring pre-fire suppression old growth conditions and a mosaic of size class distribution, and improving resiliency.*

To accomplish these stated restoration objectives while also addressing the findings of the landscape assessment, the SW Crown collaborative has identified a recommended initial goal of restoring 10% of the mean historical range of variability (HRV) for the non-lethal and mixed-severity A fire regimes, using the coarse-filter framework. This strategy emphasizes providing representation of sufficient amounts of functionally similar ecosystems relative to what occurred historically across the SW Crown landscape."

Table 8 was developed (Mehl et al. 2012) to assist in determining where fuel mitigation and ecological restoration goals may be integrated on appropriate ecological sites.

Table 9. Desired conditions for fuel mitigation and possible integration with ecological restoration objectives within the WUI depending on distance to values at risk and existing vegetation conditions. NL refers to the non-lethal fire regime and MSA refers to the mixed severity A fire regime (As adapted from Mehl et al. 2012, see text for a description of terms).

DISTANCE TO RESIDENCE/ ESCAPE ROUTE	PRIMARY OBJECTIVE	TREES >15" dbh*	ECOLOGICAL SITES	
			WARM DRY & WARM MOIST	COOL DRY & COOL MOIST
<120' (30 m)	**Fuel reduction to move a crown fire to ground while maintaining or developing large trees**	**Present**	Fuel mitigation priority with restoration sometimes compatible (NL)	Fuel mitigation priority with restoration sometimes compatible (MSA)
	Spacing of fuels a key consideration	**Absent**	Fuel mitigation priority	Fuel mitigation priority
>120' (30 m)	**Fuel reduction to reduce crown fires and limit large fire growth while maintaining or developing large trees**	**Present**	Restoration (NL) & fuel mitigation compatible	Fuel mitigation & restoration usually compatible Pattern very important
	Patterns key	**Absent**	Pattern important, including age class diversity and fuel loading patchiness.	Fuel mitigation & restoration sometimes compatible Special consideration for dead LP may apply.

* >15" DBH is the largest dbh category used in VMAP. VMAP was used in the landscape assessment to determine today's vegetation structure for much of the SW Crown project area.

9.3 Mitigation Grant Opportunities

For landowners within the Seeley-Swan Fire Plan area there are three local contacts for possible grants for fuel mitigation work around your home or forested ownership. All of these organizations work together to offer the best variety of possible grants, to meet a landowners individual needs. A professional forester will come and assess your property and values and help make recommendations to enhance the safety and health of your forest and home.

The Seeley Lake Fire Department has grant applications on their website:
www.seeleyfire.org/index_files/mitigation.htm

The Clearwater Resource Council also has grant applications available online through the Seeley Swan Fuel Mitigation task force: crcmt.org/fuelsmanagement.html

The Swan Ecosystem Center in the Swan Valley has a local fuel mitigation program that has been working for 11 years now. The program is geared through Forest Stewardship and landowner assistance. You can access grant applications on their website:
http://www.swanecosystemcenter.org/Landowner_Assistance.html

9.4 Fuel Mitigation Projects

The Seeley Lake Fuels Mitigation Task Force and the Swan Ecosystem Center continue to provide one-stop-shopping for landowners interested in funding support to conduct fuel mitigation on their property in the Fire Plan region. As of this report, approximately $660,000 in fuel mitigation funds, from a number of sources, are available in the next several years to assist private landowners in completing fuel mitigation projects on their lands. More grant dollars will be sought in future years to continue efforts to meet the objectives of this plan.

In addition to private land projects, federal and state agencies will continue to plan and implement fuel mitigation and ecological restoration projects on their lands as well. The following sections describe some of the projects planned for the next several years by agency.

9.4.1 US Forest Service

9.4.1.1 SWAN LAKE RANGER DISTRICT

Proposed projects – The Swan Lake Ranger District is currently implementing hazardous fuel reduction for the following project areas: Meadow Smith, Cooney McKay, Summit Salvage, Holland, and the Mission Upland burn. Projects range from timber sale related activities to prescribe burning throughout the project areas. Planned NEPA analyses within Glacier Loon, Cold Jim, Beaver Creek and Piper Creek will provide hazardous fuel reduction projects over the next several years. The primary focus for hazardous fuel reduction will occur within the WUI, but they will also treat vegetation outside the WUI

for hazardous fuel reduction, wildlife benefits and ecological restoration. A combination of mechanical treatments and prescribe fire are the primary tools used to accomplish the objectives for these projects.

Prescribed burning - The Swan Lake Ranger District will continue to use ecosystem burning to reach mitigation goals. The mid to upper mountain slopes in the lower Swan Range have historically experienced infrequent moderate-intensity natural fires, and forest ecosystems have adapted to that fire regime. However, modern-day fire suppression activities have prevented or minimized fires within these landscapes. For example, forests once dominated by fire-dependent open-grown stands of fire resistant species have now developed to forests dominated by dense, less fire resistant species. Fire suppression has caused a change in species composition as well as increased stress and disease levels, accumulations of woody material, and an increased risk of stand-replacing fires. Introduction of fire will improve forest health and reduce the likelihood of intense wildfire. Some of the decadent brush and understory conifers have been slashed to rearrange fuel components.

The objective of proposed prescribed burning on public lands is to re-introduce fire to stands which have experienced moderately frequent mid-to-high elevation fires. These projects are designed to reduce the density of the vegetation, change species composition to favor fire resistant trees, rejuvenate fire-dependent vegetation, and reduce long-term insect and disease risk.

9.4.1.2 SEELEY LAKE RANGER DISTRICT

Proposed projects – The Seeley Lake Ranger District has scheduled Redauggie project (222 acres) for 2013, Colt Summit project (2,038 acres) for 2014, and the Horseshoe West project (3,149 acres) for 2015.

9.4.2 Montana Department of Natural Resources and Conservation

Prescribed burning – DNRC does not currently have a prescribed burning program that targets restoration of natural fire regimes. Burning that occurs on DNRC land is generally "pile" burning. This burning includes landing piles, hand piles, and equipment piles within the treatment units. Due to major difference in personnel available, pile burning is easier to accomplish and can be done during times of the year that potential escape is minimized. On steeper slopes where cable yarding is utilized the Swan Unit has burned 2 Units in the last 5 years. There are plans for 5 more Units within the next 3 years. We utilize all personnel available and request assistance from the USFS in order to accomplish some of these larger burns. A 39 acre unit was burned in the fall of 2011 and portions of a 50 acre unit in 2011. In 2012 we were not able to burn any units, the fire prescription window went from too dry to too wet with one large storm.

9.4.2.1 CLEARWATER UNIT

Proposed projects - The Clearwater Unit is working in several different areas to mitigate fuel hazards on state land adjacent to private property. In Seeley Lake, the "Good Neighbor" grant projects are getting underway to reduce fuel on state lands, creating fuel breaks between dense stands of timber and residential areas. At this time, it appears there will be two larger timber sales that will be tasked with this. The Clearview and the Clear East Timber Sales have been approved for this area and preparation work will begin in the summer of 2013. As with other timber sale and timber permit projects, it will be

necessary to complete some type of environmental assessment document, provide information for the State Forest Land Management Plan, and also for the recently passed Habitat Conservation Plan. This would include timber harvest, travel planning, and potential pre-commercial thinning. There is also a pre-commercial thinning planned in the area of the Seeley Lake Airport for 367 acres and is expected to be done in 2013. Another larger thinning (400 acres or more) in this same area may be put to bid in later 2013.

9.4.2.2 SWAN UNIT

Proposed projects include:

Date		Volume (MMbf)	Acres
2013			
	Perry Squeezer Permit	0.2	32
	Scout Lake 5	1.5	149
	Scout Lake 6	0.5	94
2014			
	Scout Lake 7	5.0	390

9.5 Prioritization Process

Federal and state agencies will use the results of the risk assessment to give highest priority to projects within the treatable sites of the high and moderate risk categories. All projects implemented to meet the objectives of the Seeley-Swan Fire Plan will be identified in public announcements and scoping documents.

Federal and state grant programs to assist fuel reduction actions on private lands will also give highest priority to projects within the treatable sites of the high and moderate risk categories of the risk assessment. However, all landowners are encouraged to conduct fuel mitigation work around their homes and other structures. The Seeley Lake Fuels Mitigation Task Force is seeking funds on a continuing basis, and allocating these funds to landowners who meet the requirement for each source. Landowners only need to complete an application to be considered for fuel mitigation assistance from the Task Force. Applications are available from the Seeley Lake Rural Fire District, or at http://www.seeleyfire.org.

9.6 Possible Actions

9.6.1 Infrastructure Improvements

There are currently no immediate plans for infrastructure improvements in the fire plan region. The most recent infrastructure improvements include the construction of a new volunteer fire station in Salmon Prairie in 2008 and the purchase of the Plum Creek building located north of Seeley Lake in 2009 to serve as a second fire station for the Seeley Lake Rural Fire District.

9.6.2 Defensible Space

The following guidelines were adapted from the 1993 publication "Fire protection guidelines for wildland residential interface development" (MT Department of State Lands and MT Department of Justice). These guidelines apply to all development within the wildland/urban interface including residential, commercial, and recreational structures on private, State, and Federal lands. These guidelines should be used in conjunction with local fire authorities to safeguard homes and developments in a specific locale. These guidelines were also adopted by Missoula County in their new subdivision regulations.

9.6.2.1 BUILDING MATERIALS/FIRE WISE CONSTRUCTION

1) Roofs should be constructed with only Class A or B fire-rated roofing materials and where practical, build all roofs with the minimum of a 4 in 12 pitch.
2) Protect the exposed underside of all eaves, balconies, and unenclosed roofs, decks, and floors with one-hour fire-resistant materials.
3) Protect all supporting beams and posts, in stilt or cantilevered construction, with one-hour fire-resistant materials.
4) Attic openings, soffit vents, foundation louvers, or other direct openings in outside walls, overhangs, or roofs should be no larger than 144 square inches.
5) Cover all openings in outside walls, overhangs, or roofs with a ¼-inch non-combustible, corrosion-resistant metal mesh.
6) Install only an approved spark arrester around the mouth of the chimney, stovepipe, or vent of any heater, stove, or fireplace.
7) Clean spark arrester regularly to remove deposits.
8) Build exterior walls out of one-hour fire-resistant materials. Do not use shingles, shakes, or rough-cut wood siding to sheath outside walls.
9) Close off the spaces between outside rafters, wall plates, and the underside of the roof sheathing with wood at least two inches thick or equivalent solid blocking.
10) Wildfire can radiate through windows, heating the interior of houses to combustion temperature. It can heat, crack, and break the windows, letting in burning particles.
    a. Keep window surface area to a minimum. In particular, since fire usually travels uphill, minimize window surface area on downhill-facing walls.
    b. Build several small windows instead of one large window, as large windows are more vulnerable to fire damage.
    c. Screen all windows.

9.6.2.2 ROADS AND DRIVEWAYS

In an emergency, all road systems should provide for unobstructed traffic circulation for residents, firefighters, and fire equipment. This requires wide, well-constructed roads with sufficient turnarounds to prevent getting stuck off the road, and to allow simultaneous access by emergency vehicles and escape by local residents. Turns must be designed and hill grades established with truck traffic in mind. Fire trucks must be able to drive close to residences. Narrow, private roads, while picturesque and inexpensive to build, reduce access and limit the ability of emergency vehicles to respond quickly or in some instances, at all.

Driveways should be constructed with a minimum unobstructed driving surface of 12 feet and a vertical clearance of 15 feet for driveways less than 300 feet and a 16 foot driving surface for any driveway over 300 feet. Maintain a minimum of a 4-foot wide zone of reduced vegetation on each side of the driveway surface. A turnaround space should be provided at all building or structure sites on driveways over 300 feet in length. A 90-foot diameter area is required as a turnaround for emergency vehicles. Driveways should not exceed grades of steeper than 10%.

9.6.2.3 FIRE RESISTANT LANDSCAPING

Trees, brush, and dense undergrowth are primary fire hazards. This vegetation can ignite readily, burn with intense heat, and promote rapid spread of fire. Vegetation must be managed so as to reduce exposure of structures to flames and radiant heat during a wildfire. The reduction of flammable vegetation and other hazards around buildings provides a "defensible space" for firefighters and residents. As a minimum, landowners should:

1) Determine the slope of the building sites and use the following diagrams and guidelines to reduce and remove vegetation around each building according to the appropriate slope. Single ornamental trees need not be removed as long as all vegetation near them is reduced according to the guidelines. Ornamental trees and shrubs should not touch any buildings.
2) When planting, select trees, shrubs, and other vegetation that limit or retard fire spread.
3) Montana Fire Hazard Reduction Law requires that any person who creates a slash fire hazard as a result of logging or thinning must reduce or manage the hazard.

Vegetation Reduction Guidelines - 0% to 10% Slope

A = 3 foot buffer

- Maintain area of non-combustible material – flowers, plants, concrete, gravel, mineral soil, etc.

B = 10 foot buffer

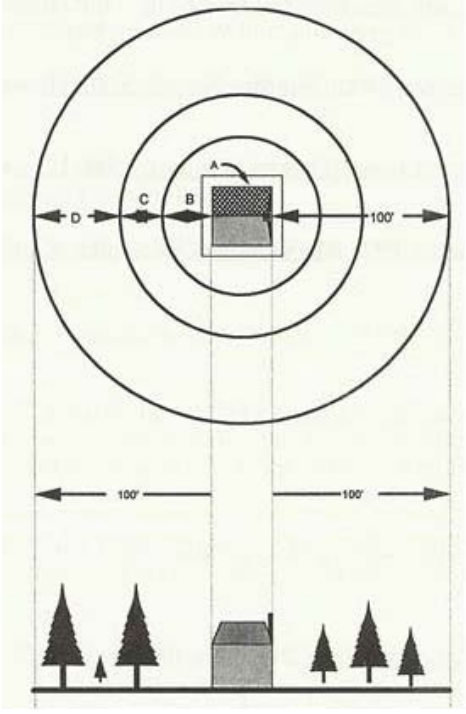
- Remove all trees and downed woody fuels

C = 20 foot buffer

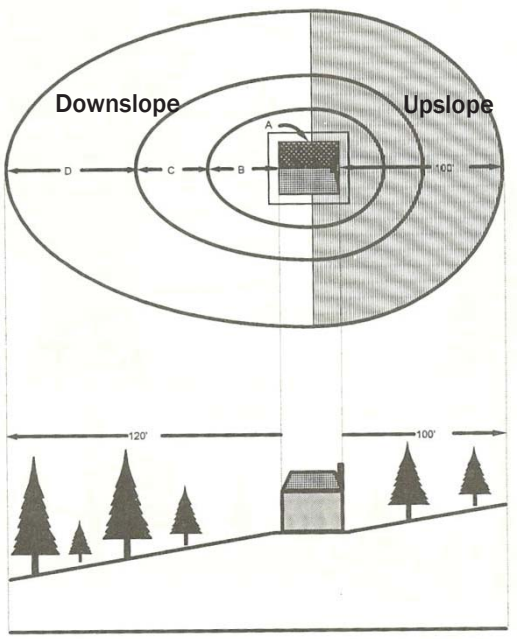
- Thin trees to 10 feet between crowns.
- Prune limbs of all remaining trees to 15 feet or one-third the total live crown height, whichever is less.
- Maintain surface vegetation at 3 inches or less.
- Remove all downed woody fuels.

D = 70 foot buffer

- Thin trees to 10 feet between crowns.
- Prune limbs of all remaining trees to 15 feet or one-third the total live crown height, whichever is less.
- Remove all downed woody fuels more than 3 inches in diameter.



Vegetation Reduction Guidelines – 10% to 20% Slope



A = 3 foot buffer

- Maintain area of non-combustible material – flowers, plants, concrete, gravel, mineral soil, etc.

B = 15 foot buffer

- Remove all trees and downed woody fuels

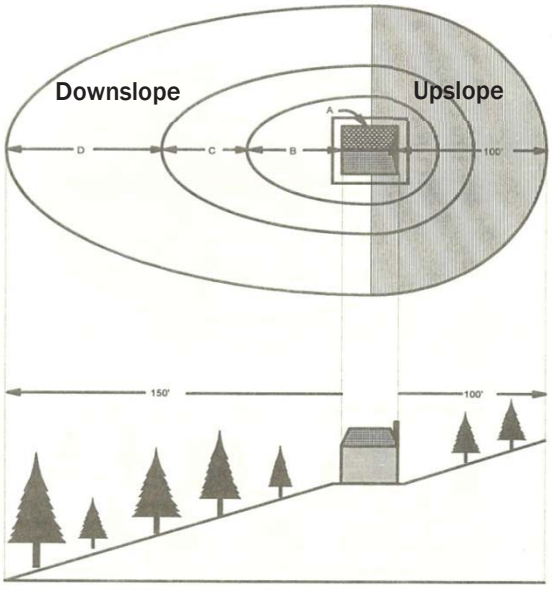
C = 25 foot buffer

- Thin trees to 10 feet between crowns.
- Prune limbs of all remaining trees to 15 feet or one-third the total live crown height, whichever is less.
- Maintain surface vegetation at 3 inches or less.
- Remove all downed woody fuels.

D = 80 foot buffer

- Thin trees to 10 feet between crowns.
- Prune limbs of all remaining trees to 15 feet or one-third the total live crown height, whichever is less.
- Remove all downed woody fuels more than 3 inches in diameter.

Vegetation Reduction Guidelines – 20% to 30% Slope



A = 3 foot buffer

- Maintain area of non-combustible material – flowers, plants, concrete, gravel, mineral soil, etc.

B = 20 foot buffer

- Remove all trees and downed woody fuels

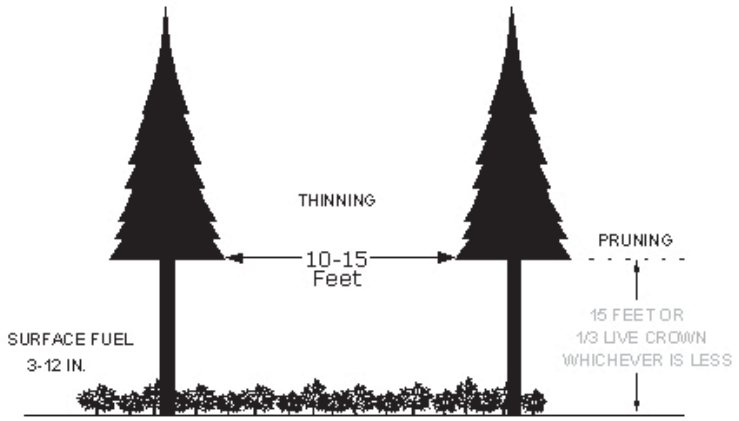
C = 30 foot buffer

- Thin trees to 10 feet between crowns.
- Prune limbs of all remaining trees to 15 feet or one-third the total live crown height, whichever is less.
- Maintain surface vegetation at 3 inches or less.
- Remove all downed woody fuels.

D = 100 foot buffer

- Thin trees to 10 feet between crowns.
- Prune limbs of all remaining trees to 15 feet or one-third the total live crown height, whichever is less.
- Remove all downed woody fuels more than 3 inches in diameter.

Tree Crown Thinning and Pruning



- Thin trees to 10-15 feet between crowns.
- Prune limbs on all remaining trees to 15 feet or 1/3 of total crown height, whichever is less.
- Maintain surface vegetation at 3 to 12 inches.

9.6.2.4 RELOCATION OF FLAMMABLE MATERIALS

- Dispose of all slash and debris left from thinning by chipping, hauling away or piling and burning.
- Stack firewood uphill or on a contour and at least 15 feet from your home.
- Clean roof and gutters of pine needles and leaves to eliminate an ignition source for firebrands, especially during the hot, dry weather of the fire season.
- Locate propane tanks a minimum of 15 feet from buildings or any flammable materials.

9.6.3 Education

The Seeley Lake RFD has produced a video using funds provided by a grant from Montana Department of Commerce that discusses the importance of reducing wildfire threats on property owned by absentee landowners.

Public education regarding wildfire risk is a high priority for all firefighting agencies within the Fire Plan region. Agency personnel provide presentations to local organizations and audiences when provided the opportunity and additional educational material and programs will be developed as resources become available.

9.6.4 Senior/Disabled Assistance

People with limited physical abilities, such as senior citizens and disabled persons, will need special attention and support when it comes to wildfire prevention and emergency response. They often will need assistance in creating defensible space around their homes and evacuating in the event of a wildfire. To help in that regard, Missoula Aging Services initiated a project in 2003 called Neighbor to Neighbor. Volunteers will locate and collect information from senior citizens and disabled persons that will be used by area emergency responders to help those in need. More information regarding this

program can be obtained by contacting Missoula Aging Services at 1-406-728-7682 or visiting their website at http://www.missoulaagingservices.org/.

9.7 Prioritized Actions, Implementation Timeline

9.7.1 Short Term (<1 year), Planning

Over the next year, the Seeley Lake Fuels Mitigation Task Force will develop policies and guidelines for ecological considerations within the WUI. The purpose of this is to identify where within the WUI considerations for lynx habitat, grizzly bear habitat, bull trout habitat, linkage zones, and other such considerations should be factored into fuel mitigation plans, especially for state and Federal lands. These recommendations should allow future fuel mitigation planning and implementation to include these ecological considerations in an efficient and effective manner without potentially slowing up future fuel mitigation projects. Considering these needs up front, from a watershed perspective will reduce and improve the planning conducted at the project level.

9.7.2 Medium Term (1-10 years), Fuel Hazard Reduction Treatments

Fuel hazard reduction projects will be implemented over the next 10 years with the goal of reducing hazardous fuels by 80% in the treatable high-risk category, each year. Collectively, the goal is to treat at least 3000 acres per year. For many lands, especially private lands around dwellings, fuels reduction may cost over $1000 per acre. For private lands, the 80% goal would equate to roughly 800 acres per year at a cost of roughly $800,000 per year. Additional acres within the moderate risk category should also be treated where they intermingle with high risk acres, to improve cost efficiency of treatments. For this reason, the goal of acquiring $1 million per year for the next ten years for fuel treatments on private lands seems appropriate.

9.7.3 Long Term (10+ years), Treatment and Maintenance

Fuel hazard reduction will require a long-term commitment from landowners within the Seeley-Swan Fire Plan region. Those high and moderate risk forest stands that were not treated within the 10 year window will require emphasis in the next ten-year window. Forest stands that are currently categorized as low risk will be adding additional growth and fuels each year, and moving many low risk stands toward the moderate risk category and moderate risk stands that have not been treated toward the high risk category. The first 10 years of this process has also identified the need to differentiate between treatable and untreatable acres (see section 9.2.1) for planning and cost evaluation. Future plans will need to address how to bring the untreatable acres into the treatable category, both through new or recognized treatment options and how to obtain additional funds to off-set more expense treatment options.

10.0 Plan Monitoring and Progress Review

10.1 Process and Measures

This plan has several components that should be reviewed and monitored on an annual basis. Considerable data and mapping information was compiled to facilitate firefighting capabilities as well as to identify and prioritize fire hazard areas for treatments. These data and information should be examined and updated on an annual basis. New houses need to be added to the database and maps. Roads, water sources, helipads, and hazard areas need to be reviewed and updated annually. Available contractors and equipment, as indicated in the plan, should be listed annually. Potential new information on fuel loadings should be incorporated as it becomes available. Thus, this plan should be viewed as a working document and associated data and maps, and should be updated in a systematic manner to maintain its currency and utility to fire prevention and firefighting capability.

The plan should be monitored in several ways. The Seeley Lake Fuels Mitigation Task Force should compile data and maps of treated areas to document accomplishments. The Task Force should also update the data base relative to information needed for effective fire suppression activities. In addition, an annual report should be made to the community with each agency reporting on its annual accomplishments in the following:

- Equipment or infrastructure improvements acquired or completed,
- Funds or grants applied for/obtained for educational or home inspection activities,
- Funds or grants applied for/obtained for fuel thinning programs,
- Types and numbers of educational programs conducted,
- Treated acres for fuel reductions and their risk category,
- Improvements in agency coordination/cooperation,
- Public communication programs, and
- Fire response statistics.

This plan should be reviewed and updated no later than 5 years from this revision, or sooner if conditions or perceived needs indicate. This revision should involve revisiting and updating all aspects of the plan, including a critical look at the action steps and accomplishments.

10.2 Mitigation Treatments –Progress Review

The Seeley Lake Fuels Mitigation Task Force and Swan Ecosystem Center continue to provide professional advice and financial support to private landowners interested in conducting fuel mitigation and forest health improvement treatments on their property in the Fire Plan region. Through the end of 2012, over $3,488,000 in fuel mitigation funds have been obtained from various sources to reduce wildfire risk on private land (Appendix B). More than 2500 acres have been mitigated with support from

grant assistance since the plans inception in 2004. Additionally, 13,585 acres of private land has been treated by landowners. Many of these projects were paid for by timber sale proceeds and may have returned an income to the landowner. Table 10 identifies the number of acres of fuel treatments completed since 2004 by landowners in the Fire Plan region to date. The Plum Creek information displays harvested areas, that while not completed specifically as fuel mitigation, do result in a reduction in current fuel levels. Figure 19 identifies the location of previous mitigation projects in the Clearwater Valley (south-end project area) and figure 20 mitigation projects occurring in the Swan Valley (north-end project area).

Table 10. Number of fuel treatment acres by landowner conducted since 2004 in the Fire Plan region.

Landowner	Fuel Treatments	Wildland Fires
Private	16085	589
Plum Creek	13833	16126
MT DNRC-Swan Unit	8608	69
US Forest Service-Swan Lake RD	8551	18839
MT Fish, Wildlife, and Parks	6010	4137
US Forest Service-Seeley Lake RD	4210	12902
MT DNRC-Clearwater Unit	3641	2175
Other Landowners	92	4
Missoula County	63	0
TOTAL	**61093**	**54842**

Additional mitigation or other projects completed by local agencies since the last Fire Plan update, are summarized in the following sections.

10.2.1 US Forest Service

10.2.1.1 SWAN LAKE RANGER DISTRICT

The Swan Lake Ranger District has completed the following hazardous fuel reduction projects through its stewardship program including:

Holland Pierce – 2007-2012	2000 acres treated, 5.5 mmbf volume
Condon Fuels – 2007-2011	249 acres treated, 2 mmbf volume
Cooney McKay – 2008-2012	2742 acres treated, 3.2 mmbf volume
Hemlock Elk – 2008-2011	498 acres treated, 2.2 mmbf volume
Mid Swan Blow Down – 2009	605 acres treated, 0.004 mmbf volume
Summit Mountain – 2009-2012	1309 acres treated, 9.3 mmbf volume
Missin' Dog – 2010-2012	577 acres treated, 2.1 mmbf volume

Lion Creek – 2011-2012 250 acres treated

10.2.1.2 SEELEY LAKE RANGER DISTRICT

The Seeley Lake Ranger District has completed the following hazardous fuel reduction projects:

Double Arrow – 66 Acres

10.2.2 Montana Department of Natural Resources and Conservation

10.2.2.1 CLEARWATER UNIT

The Montana DNRC - Clearwater Unit is responsible for management of Trust Lands within the Clearwater Valley. The general goal of the DNRC timber program is to make money to support the various School Trust beneficiaries and promote the growth of the forest stands. While not specifically identified by the Trust Lands mandate, DNRC personnel have found ways to include fuel mitigation as well as improvements to ingress and egress routes for nearby residences, in their management objectives. In all cases, the created fuels are treated to protect long-term benefit. In most cases recently, the removal of "pulp" material has been included and has further reduced the stems that have been left onsite in the past.

Since 2007, DNRC – Clearwater Unit have sold and harvested 9.146 million board feet. These harvests generally keyed on removing stands infested with mountain pine beetle or salvaging fire damage on DNRC land. These sales and permits are described below:

2007		
Confusion Salvage	587 mbf.	100 acres
Hidden Bugs Salvage	633 mbf.	109 acres
Double Beaver	3.188 mmbf.	661 acres
Permits	329 mbf.	68 acres
2008		
Bugchuck Salvage	500 mbf.	209 acres
Buck Finley	2.144 mmbf.	425 acres
Permits	144 mbf.	23 acres
2009		
Permits	243 mbf.	44 acres
2010		
Permits	85 mbf.	58 acres
2011		
Elbow Lake	911 mbf.	97 acres
Permits	439 mbf.	397 acres

The DNRC also has a considerable forest improvement program. Since 2009, the Clearwater office has completed four pre-commercial thinning projects within the Clearwater Flats area that is west of Harper's Lake. As of the fall of 2012, 858 acres had been thinned. Much of this included hand piling adjacent to roads and along areas between thinning units. This provides the larger areas that we have had thinned and potential fuel breaks if there is a wildfire within the area.

10.2.2.2 SWAN UNIT

The Swan River State Forest Northwest Land Office or Swan Unit has completed one large timber package which included 3 different sale packages, known as the Goat Squeezer 1, 2 and 3. These timber sales were sold and cut from June of 2003 to the fall of 2007 and include 7.5 mmbf of timber harvested on 1920 acres. The Three Creeks project includes 4 timber sales all of which have been sold between March of 2007 and Sept. of 2008 for a total volume of 19.188 mmbf over 1788 acres. Although the timber has sold the harvest will continue on these sales until 2011. A few salvage and pre-commercial thinning operations have also occurred. The Goat Squeezer 3 sale thinned about 2 miles of highway 83 frontage in the high risk category.

Since 2009, DNRC – Swan River State Forest, or Swan Unit, has sold 28.7 million board feet (MMbf) over 2,664 acres. These sales have been completed or are in the process of being harvested. There is an additional 7.2 MMbf planned for sale and harvest in 2013 and 2014 over 665 acres. With the exception of 2 small permits, the majority of the volume is associated with 2 major timber sale projects – White Porcupine and Scout Lake. The sales list is as follows:

Completed Sales

Sale Date		Volume (MMbf)	Acres
2009			
	White Porcupine Sale 1	2.9	215
	White Porcupine Sale 2	4.3	319
	White Donut	0.2	13
2010			
	White Wood	2.0	216
	White Cliffs	4.5	248
2011			
	White Bird	0.2	19
	Lodgepole 612	0.2	26

Sales in Progress

Sale Date		Volume (MMbf)	Acres
2011			
	White Tailed	2.8	229
	White Cedar	3.3	253
2012			
	Scout Lake 1	1.2	328
	Scout Lake 2	2.6	373
2013			
	Scout Lake 3	2.7	216
	Scout Lake 4	1.8	209

In addition, since 2009, the Swan Unit has completed 3 precommercial thinning projects totaling 504 acres.

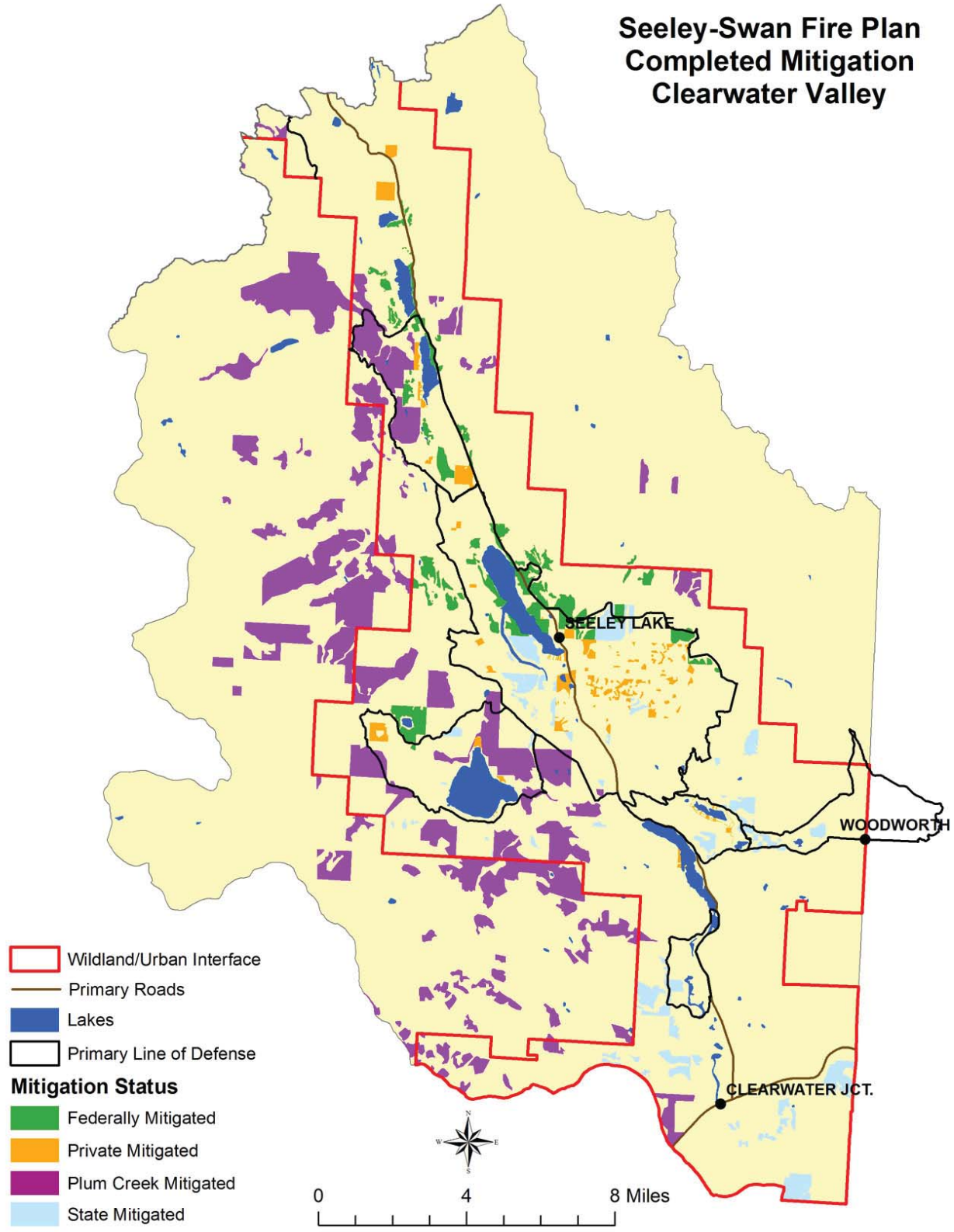


Figure 7. Fuel mitigation projects completed in the Clearwater Valley of the Seeley-Swan Fire Plan area from 2004 to 2012.

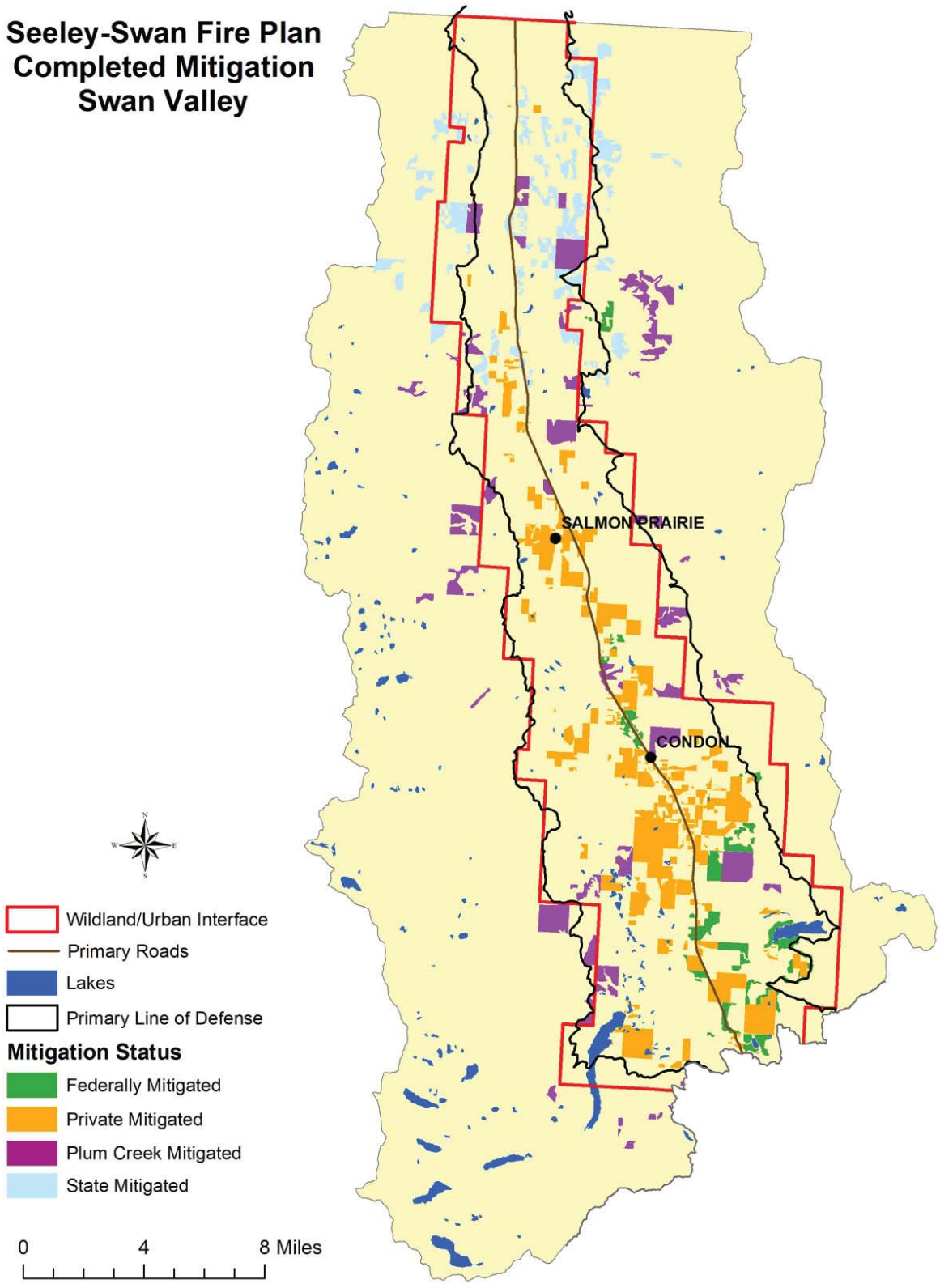


Figure 20. Fuel mitigation projects completed in the Swan Valley of the Seeley-Swan Fire Plan area from 2004 to 2012.

11.0 Additional Information Needs

As identified in this plan, three remaining information needs have been identified and should be addressed as soon as practical. These three information needs are:

- Determining the accuracy of the LANDFIRE fuels map for the Swan and Clearwater Valleys,
- Determining policies and guidelines for incorporating additional ecological considerations, particularly as they relate to threatened and endangered species or species of concern, for fuel thinning within the WUI.

The fuel layer developed for the 2008 Fire Plan was replaced by updated LANDFIRE information. LANDFIRE is a remotely sensed and classified region-wide (Region 1 US Forest Service) GIS layer. It is used by the USFS and other agencies, so these agencies are familiar with the data in this coverage. This is important in fire suppression efforts, particularly if support teams from outside this area are brought in during a fire incident. These teams will be familiar with the LANDFIRE classification and data layers. Also, use of these data will be recognized and supported by any funding sources in seeking fuel mitigation funding. However, unlike the fuels layer in the 2004 Plan, the accuracy of the LANDFIRE data for this area has not been ground-truthed. It is recommended that these data be checked, so that it confidence levels can be developed for the various fuel categories resulting from the LANDFIRE classification. As with all satellite imagery, understory fuels tend to be poorly assessed, so the extent of this problem for the LANDFIRE coverage for the plan area needs to be assessed.

As discussed previously, within the WUI, fuel mitigation treatments may overlap with ecosystem restoration goals in some areas, particularly in the low-severity, short fire-return interval areas of the plan area. In the mixed-severity and high-severity fire regimes, fuel mitigation may differ from historical stand conditions. In these areas, additional considerations may be required to provide for the habitat needs of various species of concern, in particular Canada lynx and grizzly bears. Policies and guidelines for fuel mitigation treatments in such areas should be developed. For example, policies might set distances from homes where fuel mitigation needs would override habitat concerns. But at some distance from existing residences, additional considerations for the habitat needs of species of concern could be applied. The specific guidelines as to what should be provided need to be determined, combining the input of fuel specialists, fire response personnel, and biologists. Setting up these criteria as a consistent set of policies and guidelines for the plan area could speed up the processing of individual projects by both the USFS and MT DNRC.

APPENDIX A. List of Fire Plan Participants

SEELEY-SWAN FIRE PLAN PARTICIPANTS - 2013 REVISION

Seeley Lake Rural Fire District

Frank Maradeo – Fire Chief, Fuels Task Force Member

Swan Valley Fire Service Area

Tony Quadros – President

Swan Ecosystem Center

Roger Marshall – Stewardship Forester, Fuels Task Force Chairman, Board Member CRC

Clearwater Resource Council (CRC)

Matt Arno – Private Land Fuel Mitigation Specialist

Montana Department of Natural Resources

Norm Fortunate – DNRC Clearwater Unit - Service Forester, Fuels Task Force Member

Allen Branine – DNRC Swan Unit - Fire Supervisor & Service Forester, Fuels Task Force Member

Cory Calnan - DNRC Clearwater Unit - Fire Supervisor, Fuels Task Force Member

Cindy Super – DNRC South West Land Office - Fire Prevention Specialist, Fuels Task Force Member

Dave Poukish – DNRC Clearwater Unit – Unit Manager

Dan Roberson – DNRC Swan Unit – Unit Manager

Seeley Lake Ranger District

Tim Love – District Ranger, Fuels Task Force Member

Phil Shelmerdine – Fire Management Officer, Fuels Task Force Member

Rebecca White – Assistant Fire Management Officer, Fuels Task Force Member

Swan Lake Ranger District

Richard Kehr – District Ranger, Fuels Task Force Member

Brad Gillespie – Fire Management Officer, Fuels Task Force Member

John Ingebretson – Assistant Fire Management Officer, Fuels Task Force Member

Andy Huntsberger – Assistant Fire Management Officer, Fuels Task Force Member

Ecosystem Management Research Institute

Jon Haufler – Executive Director, Fuels Task Force Member

Carolyn Mehl – Ecosystem and Wildlife Ecologist

Scott Yeats – GIS Analyst

Bitterroot RC&D

Colin Moon – Private Land Fuel Mitigation Specialist

Double Arrow Landowners Association

Jim Normark – Fire Safe Committee Chairman

SEELEY-SWAN FIRE PLAN PARTICIPANTS – 2008 UPDATE

Seeley Lake Rural Fire District

Frank Maradeo – Fire Chief, Fuels Task Force Member

Swan Valley Fire Service Area

Jim Daenzer – Fire Chief

Clearwater Resource Council (CRC)

Jon Haufler – President, Fuels Task Force Chairman

Stan Nicholson – Board Member

Swan Ecosystem Center

Kathy Koors – Private Land Fuel Mitigation Specialist

Montana Department of Natural Resources

Allen Branine – DNRC Swan Unit - Fire Supervisor & Service Forester, Fuels Task Force Member

Howie Kent - DNRC Clearwater Unit - Fire Supervisor, Fuels Task Force Member

Seeley Lake Ranger District

Tim Love – District Ranger, Fuels Task Force Member

Phil Shelmerdine – Fire Management Officer, Fuels Task Force Member

Rebecca White – Assistant Fire Management Officer, Fuels Task Force Member

Alison Kolbe – Fire Prevention Specialist, Fuels Task Force Member

Swan Lake Ranger District

John Ingebretson – Assistant Fire Management Officer, Fuels Task Force Member

Ecosystem Management Research Institute

Jon Haufler – Executive Director, Fuels Task Force Member

Scott Yeats – GIS Analyst

Bitterroot RC&D

Colin Moon – Private Land Fuel Mitigation Specialist

Plum Creek Timber Company

Roger Marshall – Forester, Fuels Task Force Member and Chairman

SEELEY-SWAN FIRE PLAN PARTICIPANTS – 2004

Seeley Lake Rural Fire District

Frank Maradeo – Fire Chief, Fuels Task Force Member

Jim White – firefighter

Tim Downey – firefighter

Swan Valley Fire Service Area

Jack Novosel – President

Clearwater Resource Council

Jon Haufler – President Fuels Task Force Member,

Stan Nicholson – Board Member, Fuels Task Force Member

Montana Department of Natural Resources

Colin Moon – DNRC Clearwater Unit - Service Forester, Fuels Task Force Member

Allen Branine – DNRC Swan Unit - Fire Supervisor & Service Forester, Fuels Task Force Member

Howie Kent - DNRC Clearwater Unit - Fire Supervisor, Fuels Task Force Member

Seeley Lake Ranger District

Tim Love – District Ranger, Fuels Task Force Member

Jon Agner – Fire Management Officer, Fuels Task Force Member

Swan Lake Ranger District

John Ingebretson – Assistant Fire Management Officer, Fuels Task Force Member

Ecosystem Management Research Institute

Jon Haufler – Executive Director, Fuels Task Force Member

Carolyn Mehl – Ecosystem Ecologist/GIS Analyst

Plum Creek Timber Company

Roger Marshall – Forester, Fuels Task Force Member

APPENDIX B. List of Grant Sources

American Reinvestment Recovery Act

Community Fire Protection (aka Stephens Funds)

Firewise Grant Program

Home Depot Foundation

Lake County Title III

Missoula County Title III

National Forest Foundation

State and Private Forestry Competitive Grants

Western States WIldland Urban Interface

Private landowner in-kind contributions and dollar match

APPENDIX C (provided separately on compact disc)

1. Data: GIS layers, tabular data, etc.
2. Maps

APPENDIX D. Characterizing wildfire risk and hazard in lodgepole pine stands killed by the Mountain Pine Beetle