

Wheatland County Community Wildfire Protection Plan



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INCORPORATED
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The Wheatland County Community Wildfire Protection Plan has been prepared by, reviewed and/or approved by the following signatories:

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Chair, Board of County Commissioners

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Lewis & Clark National Forest

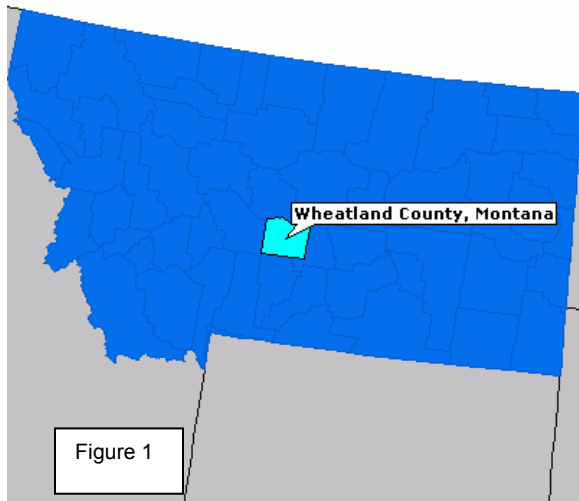
Northeastern Land Office, MT Dept. of Natural
Resources & Conservation

WHEATLAND COUNTY COMMUNITY WILDFIRE PROTECTION PLAN

1. Executive Summary

1.1. Problem Overview

Wheatland County is located at the southern base of the Little Belt Mountains in the south central part of Montana, see Figure 1. Wheatland County is relatively small by Montana standards with only 1,423 square miles in the county. Wheatland County runs about 38 miles in a north-south direction and is about 43 miles across. Wheatland County is a sparsely settled county having approximately 2,037 (2005 estimate) people in the entire county. It has 2 incorporated towns Harlowton, the county seat, and Judith Gap. Harlowton is located along the Musselshell River, which runs west to east through the county.



State Highway 12 runs through the middle of the county and is a major transportation route in the county. Highway 191 runs north-south through the county from Judith Gap to the southern edge of the county. There are no other significant paved roads in the county but there is an extensive secondary road system, most of whom have an all weather surface. Under the current drought conditions, Wheatland County has a high degree of potential for extended fire seasons ranging from March through October or November.

Wheatland County Fire Department, under the leadership of Dean Thompson, County Fire Warden, is responsible for wildland fire protection and structure fire protection on state and private lands throughout the county. The department is also responsible for taking action on those fires on federal lands that threaten state or private land. Chief Thompson has strategically located engines based on fire potential and historical fire occurrence throughout the county. There are a few Montana Department of Natural Resources and Conservation apparatus positioned in Wheatland County under the county coop program. Wheatland County frequently interacts with the United States Forest Service, Lewis and Clark National Forest and the Bureau of Land Management (BLM) since many of their lands are either intermingled or adjacent to county protection responsibilities. This provides a certain level of interagency complexity in dealing with wildland fires in the county. As with many counties in Montana, there is an increasing development of wildland-urban interface areas with potential access problems and a general lack of understanding by homeowners of the need for an asset protection zone to protect their homes and property. As a matter of general occurrence, Wheatland County Fire Department has to deal with multiple ignitions throughout the county from lightning storms.

1.2. Process Overview

The Wheatland County Community Wildfire Protection Plan, hereafter known as "CWPP," has been developed to assist Wheatland County, Wheatland County Fire Department and the federal and state wildland agencies in the identification of private and public lands at risk of severe wildland fires and to explore strategies for the prevention and suppression of such fires. The CWPP is intended to outline the

Wheatland County Fire Department's plans and activities targeted at reducing the risk of a catastrophic wildland and/or wildland-urban interface (WUI) fire event in Wheatland County. The intent of this planning document will ensure that the health, safety and welfare of Wheatland County's citizens remain secure from the threats of structural and wildland fires in the county.

1.3. Overall Goals

The CWPP will improve planning and fire suppression tools for county and the county fire department alike, which will result in Wheatland County providing its citizens with tools to live more safely in a fire prone ecosystem. The CWPP fosters the preservation of the economy of Wheatland County by maintaining and improving the fire protection capability of the County.

1.4. Methodology

Fire Logistics uses a Geographic Information System (GIS) based analysis approach to development of the fire hazard assessment for Wheatland County. This approach enables personnel from Fire Logistics to look at specific areas of high risk in the county such as wildland urban interface and focus on items that would be included in the mitigation plan as recommended projects.

1.5. Mitigation Strategy – The Action Plan

This is a summary of the specific actions, which are developed in the *mitigation plan* of Chapter 7 to include mitigation goals such as evaluate upgrade and maintain emergency wildfire protection responsibilities, decrease fuels, etc. The assumptions for planning priorities of the community fire plan are: protect human health and life, protect critical community infrastructure, protect private property, and protect natural resources. The existing mitigation efforts are described, which include asset protection zones (defensible space), neighborhood preparedness and fire protection response, and the coordination of prevention protection projects and response plans. Several recommended projects and programs are included as part of the mitigation effort for Wheatland County.

2. Introduction

2.1. Background and History

Snowy Mountain Development Corporation retained Fire Logistics, Inc. on behalf of Wheatland County in January of 2006 to:

- Develop a comprehensive Community Wildfire Protection Plan that meets FEMA standards, Healthy Forest Restoration Act and the National Fire Plan for each of the two counties of Golden Valley and Wheatland Counties.
- Facilitate communication with local fire district personnel for planning and assessments.
- Coordinate meetings with local committees, fire district personnel, local governments, state and federal agencies and keep them informed of programs or activities of the grant and countywide fire mitigation planning process.
- Analyze and review the information collected and develop strategies to address fire in the region.
- Establish and maintain effective working relationships with federal, state, local governments, local fire districts and councils, corporate and private landowners that will assist in the planning project.
- Prepare materials and make presentations, both orally and in writing, to individuals or groups about the fire mitigation plans.
- Prepare news releases, articles and public services announcements for use by media to enhance public relations, inform the public of the fire mitigation plans.
- Meet and deal effectively with individuals, groups, organizations, and various agency personnel about complex and conflicting issues relating to fire prevention planning.
- Provide quarterly reports detailing the planning, assessment, educational activities and accomplishments as well as dollars spent in the current period and to date.

2.2. Mission

The mission of the Wheatland County Fire Department is:

“To safely protect the lives of our fire fighters and to protect the lives and property of the residents of Wheatland County to the best of our ability and in the most efficient manner possible.”

2.3. Current Relevant Fire Policies

A brief discussion of the relevant fire policies is provided to educate the leaders and residents of Wheatland County.

2.3.1. Federal Policies “Homeland Security is Fire Safety”

We will briefly describe the relevant policies at the national level, which affect fire planning on the local level.

2.3.1.1. National Fire Plan

“The National Fire Plan (NFP) is a long-term investment that will help protect communities and natural resources, and most importantly, the lives of firefighters and the public. It is a long term commitment based on cooperation and communication among federal agencies, states, local governments, tribes and

interested publics.” It mandates community participation in its implementation.¹

2.3.1.2 Disaster Mitigation Act 2000

Disaster Mitigation Act 2000 (DMA 2000) sets policies for “disaster mitigation plans”—plans designed to avoid disasters such as fires and floods. DMA 2000 requires 4 elements in these plans:

- A planning process.
- An assessment of risks.
- A mitigation strategy (action plan) and,
- A maintenance plan and updating process.

2.3.1.3. Western Governor’s Association, 10-Year Comprehensive Strategy for Reducing Wildland Fire Risks² and A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment—Implementation Plan

The goals of the 10-Year Comprehensive Strategy are to:

- Improve Prevention and Suppression
- Reduce Hazardous Fuels
- Restore Fire Adapted Ecosystems
- Promote Community Assistance.

This is done through a “Framework for Collaboration... Local Level—Successful implementation will include stakeholder groups with broad representation including Federal, State, and local agencies, tribes and the public, collaborating with local line officers on decision making to establish priorities, cooperation on activities, and increase public awareness and participation to reduce the risks to communities and environments.”³

2.3.1.4. Local Implementation of Federal Fire Policies

Fire protection objectives on the state and private lands in Wheatland County are addressed indirectly in the Cooperative Fire Management Agreement between USDI’s Bureau of Land Management, National Park Service – Intermountain Region, Bureau of Indian Affairs – Portland and Billings Area, US Fish and Wildlife Service – Rocky Mountain Region; USDA’s Forest Service – Northern Region; and the State of Montana – Department of Natural Resources and Conservation. This agreement requires that the parties to the agreement develop and approve Annual Operating Plans by May 1 of each year specifying how the terms of the agreement will be carried out between the cooperating agencies and the state. Cooperation with local county governments is encouraged and additional agreements may be made with counties through the State of Montana. These agreements are to validate the arrangements desired between the county and a federal agency or the state in respect to assistance with their fire management programs. The procedures for obtaining state and federal assistance for large wildland fire, should the circumstance occur, needs to be clarified in any agreements prepared at the local level. They should include an articulation of the suppression standards that need to be employed by federal or state agencies working on a fire on state and private land. The reverse is also true for county resources working on federal or state lands. In the former case the objective will most likely be to suppress the fire at the smallest size possible utilizing the full range of suppression resource available. In the latter case, however, certain land management objectives may preclude this approach, i.e., mechanical equipment in sensitive areas.

A potential conflict of interests could develop should the USFS or BLM decide to implement a wildland fire use program whereby certain natural ignitions would be allowed to burn to accomplish resource management benefits. Neither of these agencies have large enough contiguous areas that would provide

¹ See www.fireplan.gov.

² www.westgov.org/wqa/initiatives/fire/final_fire_rpt.pdf

³ www.westgov.org/wqa/initiatives/fire/implem_plan.pdf

a reasonable assurance that the fires would not leave the respective agencies jurisdiction at some point, particularly considering the duration of the event and its eventual exposure to some type of major wind event. At the point the fire left federal lands the county would become the recipient and would have to suppress it, probably at considerable cost and risk.

There may be circumstances where a fire is human caused and assistance in an investigation is needed. The skill to be a fire investigator can either be developed within the county or it can be brought in from another agency on an as needed basis. Whichever route is chosen, there should be no delay in utilizing a fire investigator when the situation is warranted.

2.3.2. State Policies

The Montana Legislature adopted the following state fire policy during the 2007 legislature. 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 is critical to improving public safety and for reducing risk and loss.

Currently there are no State policies that require a rural fire district or county fire organization to develop a community wildfire protection plan; however, it certainly is encouraged by the State Fire Policy. Indirectly, it is a requirement to access federal funds for fuel reduction.

It is the policy of the State to complete pre-disaster mitigation plans in compliance with the Federal direction noted above..

2.3.3. Local Policies

A land use document that affects fire service delivery by the Wheatland County Fire Department is the Subdivision Regulations of Wheatland County (See Subdivision Regulations in Resources Section). Those subdivision regulations were adopted in September of 1997.

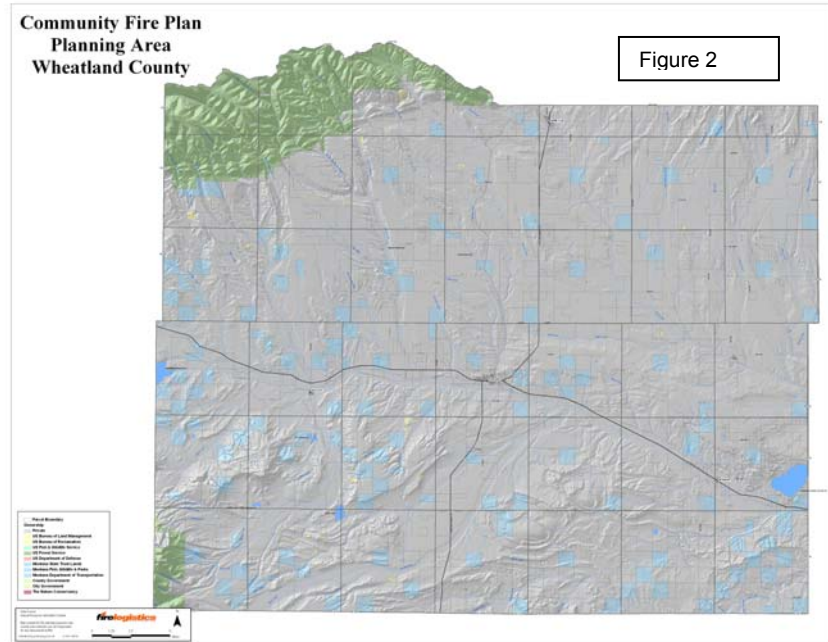
The purposes of the Wheatland County Subdivision Regulations are to promote public health, safety and general welfare by regulating the subdivision of land, providing ingress and egress, and etc. They also support the purposes of 76-3-102 MCA. The subdivision regulations are intended to promote the coordination of roads within subdivided lands with other roads, both existing and planned, the avoidance of danger or injury by reason of natural hazard or the lack of water, drainage, access, transportation or other public services, and the avoidance of excessive expenditure of public funds for the supply of public services. The Wheatland County Subdivision regulations should be up-dated with better fire protection language in light of the fact that the county will continue to see increasing development pressure.

There is an existing county disaster plan which was completed in 1988 and needs up-dating, which has a

fire and wildland fire annex; the pre-disaster mitigation plan is in development and will be adopted by Wheatland County in the near future.

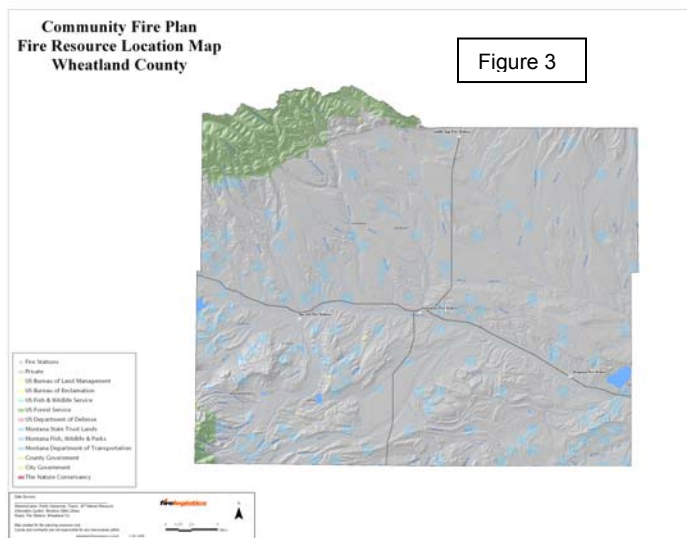
2.4. Planning Area Boundaries

The Wheatland County CWPP covers Wheatland County in its entirety. The county has been further subdivided into sub-planning areas by the 5th Code Watershed. The purpose of the 5th Code Watershed is to provide a uniquely identified and uniformed method of subdividing large drainage areas. These smaller, 5th Code Watershed units are approximately 40,000 acres to 250,000 acres and are useful for fire planning purposes as well as other programs by the Natural Resources and Conservation Service and other agencies in Figure 2 (See Planning Area Map in Map Section 10.5).



2.5. Community Legal Structure, Jurisdictional Boundaries

There is a mixture of fire protection organizations providing fire services to Wheatland County. These include Harlowton and Judith Gap Fire Departments (MCA 7-33-4101-4133), Wheatland County Fire Department, Two Dot Fire Department, Shawmut Fire Department (MCA 7-33-2201-2211), MT Department of Natural Resources and Conservation – County Cooperative Program, United States Forest Service – Lewis and Clark NF, and Bureau of Land Management (See Figure 3 and Fire Resources Map in Map Section 10.5).



Harlowton and Judith Gap Fire Departments provides structural and wildland fire services to the residents of the Harlowton and Judith Gap and mutual aid to Wheatland County Fire Department. There is no written mutual aid agreement.

Wheatland County, Shawmut, and Two Dot Fire Departments provide wildland fire protection and very limited structure fire services throughout the county.

The Bureau of Land Management is the responsible land management agency for BLM lands and assists the local agencies as needed. The United States Forest

Service – Lewis & Clark NF (USFS) is the responsible land management agency for Forest Service lands and assists the local agencies as needed.

The Department of Natural Resources and Conservation – County Cooperative Program provides fire support to counties when the county’s capability has been exceeded and assistance is requested.

2.6. Acknowledgements

Fire Logistics, Inc. would like to thank the Wheatland County Fire Department, especially Chief Dean Thompson and Assistant Chief Paul Painter; Snowy Mountain Development Corporation; Bureau of Land Management, especially Dena Sprandel-Lang; USFS – Lewis & Clark NF, especially Mike Widdicombe; and Wheatland County Board of County Commissioners for their contributions to this plan.

3. Planning Process

3.1. Current Process and Plan Development

In the winter of 2006, the Snowy Mountain Development Corporation awarded a contract to Fire Logistics, Inc. to complete a comprehensive risk assessment of Wheatland County and to develop a mitigation plan which provides recommendations for improvements to the county's fire protection system, mitigation measures for treating the fuels and providing protection to structures. The Wheatland County Community Wildfire Protection Plan (CWPP) is the result of that effort.

3.1.1. Avenues of Community and Public Input

Fire Logistics, Inc. attended public meetings with Tetra Tech on May 16 in Harlowton and Judith Gap in which wildland fire was identified as a major hazard in the county. Additional public meetings were held in June of 2007 to identify projects to mitigate the wildland fire hazards identified in the draft plan.

The draft Wheatland County CWPP was submitted for review and comment in July of 2007.

Comments were incorporated into the final draft of the Wheatland County CWPP.

3.2. Review of Existing Plans, Studies, Reports, Technical Documents

The following documents have been analyzed for materials, which may need to be referenced and incorporated in the Wheatland County CWPP:

- Portions of the Draft Pre-Disaster Mitigation Plan, January 2007
- Subdivision Regulations, Wheatland County, January 1997
- Emergency Operations Plan, Wheatland County, June 1988
- Cooperative Fire Plan AOP, 2007

3.3. Local Jurisdictional Involvement, Approval, Adoption

Once the Wheatland County CWPP is reviewed and approved by the Board of County Commissioners, it should be adopted as the fire component of the County's Pre-Disaster Mitigation Plan.

4. Community Description

4.1. General Environmental Conditions

Wheatland County is located in south central Montana just south of the Little Belt Mountains. It covers about 1,423 square miles and has a population of around 2,037 people (2005 estimate). The current population continues to decline from a population in the 1920's of 5,619. There are many miles of county roads in Wheatland County. Most lands in the county are used for some type of agriculture. The county is relatively compact in size with less productive soils to the north as the Little Belt Mountains are approached. Pine and juniper are found in abundance as one approaches the mountains and the lands are used primarily for grazing. The central and southern portions of the county are bench country and more suited to hay, wheat and other crop production. The Musselshell River flows from the west to the east through the county. The south western edge of the county is the beginning of the Crazy Mountain and is more broken with pine covered ridges and draws. The southern portion of the county averages 10-14 inches of rainfall per year while the northern edge of the county is in the 14-18 inch range.

The greatest portion of the lands in Wheatland County is covered by grasses and shrubs. There are pine and juniper forests as well as some hardwoods stands, especially along the Musselshell River bottom. The tree stands are in the general proximity of the breaks along either the Musselshell or along the coulees throughout the county. The ponderosa pine type is usually denser on north and east aspects where the soils can retain moisture somewhat longer than they can on south and west aspects.

Overall, the adapted ecosystems of the county contain vegetative types and quantities commensurate with soil productivity and available moisture. The tillable lands that can be irrigated are used for hay or grain while the remaining lands are left in a more natural state. They are either grazed by domestic stock or they remain unused except by wildlife.

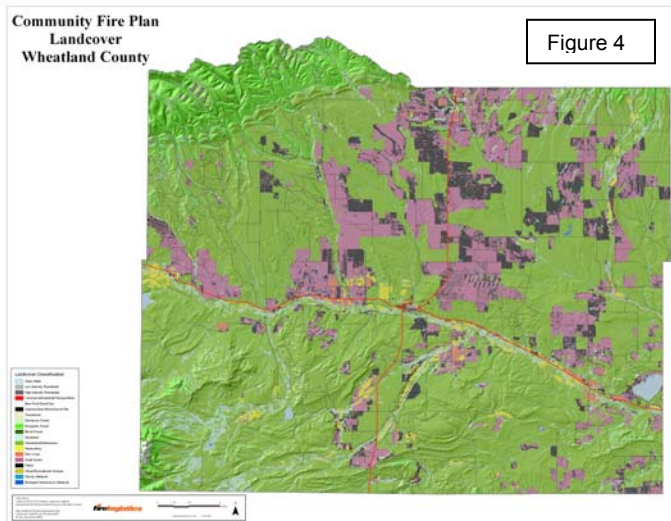


Figure 4

Lightning is common across the entire county but is more likely to result in ignitions in the tree covered areas. Within these forested areas, northern and eastern aspects and drainage bottoms support a greater amount of plant life than southern or western aspects resulting in heavier fuel loadings.

The vegetative types of Wheatland County are displayed in the Landcover Map, see Figure 4 and Landcover Map in Map Section, 10.5.

4.1.1. Topography, Slope, Aspect, Elevation

There is one major drainage in Wheatland County, the Musselshell River which flows from the west to the east through the county. Minor drainages enter the Musselshell River from the north and south. All the lands in Wheatland County drain into the Musselshell River. The edge of the Little Belt Mountain enters the county on the northern fringe of the county and the Crazy Mountains begin in Wheatland County and continue into Meagher, Park and Sweet Grass counties. Elevations within the county vary from 3,733 feet in the eastern part of the county where the Musselshell River exits the county to 8,686 feet near Cinnamon Peak in the southwestern corner of the county in the Crazy Mountains. Predominately the topography is relatively flat.

The dominant vegetative cover in Wheatland County is rangeland. The area along the northern edge and southwester corner of the county can best described as moderately timbered. The vegetation cover changes to a mostly grass type with timbered ridges and coulees as you head west. To the north rangeland transitions into timber types as you proceed toward and into the slopes of the Little Belt Mountains and Crazy Mountains. There are also significant areas of sage mixed in. Agricultural crops are also found in the more productive and more tillable lands of the vast majority of the county.

Aspect is the direction toward which a slope faces. Because of the topographic nature of Wheatland County, the areas along the Musselshell River have a high incidence of south facing aspect and the areas just south of the Musselshell River have a high incidence of north facing aspect. The area of the county associated with the Little Belt Mountains has all aspects represented at one location or another to varying degrees. The southwestern corner of the county along the Crazy Mountains has all aspect represented. The remainder of the county is relatively level resulting in all aspects being more or less equally represented.

4.1.2. Meteorology, Climate, Precipitation and Fire Weather

Weather directly affects fire behavior, with wind and low humidity values being the major influencing factors due to their ability to quickly dry fuels and allow fires to grow rapidly. Severe weather can ruin crops or fast moving fires can spoil a year's effort in the field or a lifetime of memories when a wildfire destroys a family dwelling. Generally, steering winds at the surface and aloft over central Montana in the spring and summer prevail out of the south to west and are moderate to strong across open areas with lighter winds over rougher hilly or mountain areas. Surface winds vary depending on the method used for developing the winds, elevation, aspect and openness of the local terrain. Southwest and west facing slopes are more exposed to the prevailing winds and have drier fuels, which relates to increased fire behavior activity. Fires generally spread from southwest to northeast.

Wind speeds are of great concern for fire fighters and strongly influence all fire activity. Winds are generally caused by one of four methods. The first method is pressure gradient winds. These winds are caused by winds trying to equalize pressure between high and low pressure systems. An example of this is a cold frontal passage accompanied by gusty winds. These winds are typical of open grassy areas found across large portions of Wheatland County. A second method for generating winds is by diurnal heating and cooling of the land. These winds are typically found in mountain or hilly areas where daytime upslope and nighttime down slope winds occur. These winds are usually lighter than pressure gradient winds but can be over-ridden by strong pressure gradient winds. The third method of producing wind is by outflow from thunderstorm activity. These winds can be very erratic as well as very gusty and can challenge all wildland fire suppression efforts and lead to fire fighter safety concerns as well as the potential for large wildland fire growth. The fourth method is primarily a winter phenomena with strong to very strong lee slope winds.

Climate

Seasonal changes can influence fire behavior. Winter months of December through February are generally non-fire months, but snow pack accumulations can be a key factor in potential fire activity for any given fire season. In the last half of the 20th century, spring seasons (April through June) were generally moist months with low fire frequencies due to higher fuel moisture values. The ignitions that did occur resulted in mostly low intensity grass type fires. Since the late 1980's, the weather patterns have been changing to a warmer and dryer cycle resulting in extended fire seasons; spring months no longer can be counted on as a low fire period of the year. Long-term drought conditions have increased the fire complexity in central Montana and Wheatland County with drier fuels and it is not unusual for significant pre green-up fires to occur in early spring.

Bug killed trees have been an increasing problem across the western United States and in Montana. Large stands of these bug killed trees pose a very serious threat for fires as they burn much hotter than normal and they also burn very quickly. Add gusty winds to any fire in bug killed trees and you have the potential for rapid and potentially large loss of property.

Weather

The normal summer weather pattern for central Montana can best be understood by looking at the larger weather pattern for the entire western United States. The Bermuda High located in the Caribbean and Gulf of Mexico makes its way across Texas and New Mexico by July and cuts off a supply of low-level moisture from the Gulf of Mexico to the plains of North America. This allows general thunderstorm activity to decrease across central Montana as the low level moisture diminishes. This allows the lower atmosphere to dry with a corresponding lowering of humidity values. This is timed with the development of a high-pressure system that sets up across Montana with subsidence within the high-pressure system that dries the atmosphere. This subsidence does two things; it brings very warm temperatures (95-110) to the area and it significantly lowers the relative humidity values. During this time overnight humidity recovery becomes poor allowing the drying of fuels of all size classes (1 hour, 10 hour, 100 hour, and 1000 hour plus time lag fuels). The 1-100 hours time lag fuels will show evidence of drying within 3-5 days. The 1000 hours fuels will take significantly longer to dry, usually in the 3-5 weeks range.

The typical fire season in central Montana is from early spring into the fall or early winter or from March through November. Spring, before green-up, can be a time of large fire growth as dry residual winter cured fuels combined with gusty winds pose a threat of large fires. Moisture in the spring provides for fuel growth and is a time for prescribed fire activity. As the season turns to summer, the amount of moisture from thunderstorms taper off while grasses and shrubs begin to lose their live fuel moisture, down fuels begin to dry, and fire conditions normally peak by late August. As autumn approaches, conditions generally begin to cool and killing frost begins to affect fuels. Dry cold frontal passages become common and can promote conditions of extreme fire behavior especially when accompanied by very strong winds. Late fall conditions in late October and November mark the transition into winter, but again, dry cold frontal passages at this time of year and the lack of snow pack can lead to conditions of rapid fire growth and high intensity fire behavior during wind events.

The Seasons

Spring typically begins by early to mid March and lasts until mid to late June. Thunderstorms are the dominant severe weather threat during this period especially May and June. These storms typically bring heavy rains, strong outflow winds (sometimes called micro burst winds) and large hail. Occasionally tornados do occur with strong thunderstorms, but are rare in the Northern Rockies with usually less than a dozen tornados or less across all of Montana. Heavy rains combined with melting snow pack in the mountains can produce low land flooding that can last for weeks with Urban and small stream flooding lasting a few days to around a week. Monthly rainfall totals are the highest of the year during this period with 1.5" to 3.5" common. Wet years can see 3" to 6" per month during April and May. Temperatures warm into the 70s and 80s with occasional 90s in May and June. Recent drought that began around 2000 brought below normal moisture and above normal temperatures. Moisture deficits have been averaging around 20% per year since the drought began.

Summer begins by mid to late June and lasts until early to mid September. This time frame marks the period when spring rains taper off while high pressure begins to dominate the western United States. This marks the time when temperatures are warmest and humidity values are lowest. It is also the time when vegetation begins to cure with fuel moistures at their lowest values. While severe thunderstorms continue to be a problem, the dominant severe weather threat during this period is from fires with lightning the primary fire producer and human caused fires in second place.

Fires are weather and fuel dependent. Some factors to consider that produce large fires are fuel type, fuel moisture content, wind speed, elevation, aspect, temperature, humidity values, and probability of wetting moisture in the near term to name a few. Moisture during the summer diminishes markedly with dry thunderstorms becoming more pronounced. These dry thunderstorms produce little if any moisture but can produce numerous lightning strikes as well as strong outflow winds. Monthly precipitation totals average less than a half-inch during the Summer months while temperatures peak for the year in July and August with upper 80s to low 100's common.

Recent drought impacts include short growth of grasses and crops, except where irrigated, with early onset of natural drying. This has impacted all classes of fuels from the fine grasses to the large fuels such as standing timber in forested areas. These larger fuels show a cumulative effect of the prolonged

drought such that the low fuel moisture is carried over from year to year often with devastating effects. One impact of serious import is that stands of trees that have been stressed from prolonged moisture deficit or from effects of widespread bug kill. These areas are susceptible to very rapid fire growth with potentially devastating impacts on structures within their path and can sterilize the ground to very high burning temperatures. This affects fire fighters such that they are diverted from fighting fires to providing structure protection.

Fall usually begins by mid September with foliage continuing to dry, frost beginning, temperatures cooling and moisture amounts increasing. Winds become the dominant severe weather threat during this period with speeds of 30 to 50 mph and gusts over 70 mph common. A rain event or two usually occurs in September that is followed by a mild weather period in late September and October while a killing frost helps cure fuels.

The warm dry and mild weather combined with dry fuels sets up a good potential for late season fires as strong westerly Chinook winds develop along the East Slopes of the Rockies. This combination has the potential for large devastating fires that can rapidly grow to over 100,000 acres in just a few hours time. Precipitation during the fall can range from a half inch to an inch and a half per month. Temperatures continue to cool with 60's and 70's in September and 30's and 40's by the end of October.

Winds

Wind speeds are of great concern for fire fighters and strongly influence all fire activity. Winds are generally caused by one of four methods. These methods are:

1. Pressure gradient winds. These winds are caused by winds trying to equalize pressure between high and low pressure systems. An example of this is a cold frontal passage accompanied by gusty winds. These winds are typical of open grassy areas found across large portions of northern Wheatland County.
2. Diurnal heating and cooling of the land. These winds are typically found in mountain or hilly areas where daytime upslope and nighttime down slope winds occur. These winds are usually lighter than pressure gradient winds, but can easily be over-ridden by strong pressure gradient winds.
3. Outflow from thunderstorms. These winds can be very erratic as well as very gusty and can challenge all wildland fire suppression efforts and lead to fire fighter safety concerns as well as the potential for large wildland fire growth.
4. Lee side winds. These winds are primarily a winter phenomena, sometimes called Chinook Winds, with strong to very winds and are usually accompanied by warming temperatures.

Precipitation

Moisture regimes in the spring and summer can be defined in terms of storm tracks, which typically move across the county from southwest to east. The storm track affecting the analysis area starts along the western or southern edges of Wheatland County and tracks northeastward across the county before moving out onto the eastern plains of Montana. Significant moisture associated with these storm tracks will be higher in April and May and will trend downward in June with mainly dry thunderstorms expected in July and August. Thunderstorm activity is possible in September and early October but at a much-reduced rate compared to early spring.

Winters have been mild for the past few years with a pronounced drought that affected large portions of the Northern Rockies. Winter and spring snow events have been fewer with less snow accumulating over the mountains with streams and rivers flowing at or near record low levels. In addition, subsurface moisture continued to be short helping to stress vegetation of all types. Bug kill has spread across large portions of the Northern Rockies and forested areas of Wheatland County over the past few drought years providing standing dead fuels for potential large fires. The winter of 2006-2007 continued this trend with warmer than normal conditions along with drier than normal moisture. While spring moisture helps the agriculture community and help to replenish surface and subsurface moisture with near normal streams and reservoirs, the long-term drought continues to pose potential large fire problems in the larger fuel types.

The higher elevations of the mountain in southern portions of the county provide the orographic lifting that results in more moisture to this forested area with a corresponding increase in thunderstorm activity. Heavy lightning activity associated with these storms contributes to a significant number of fire starts along the storm's path especially in late July and August. Dry lightning events increase during this period with these thunderstorms often producing strong down draft winds with little if any rain. These storms can be several miles wide at their bases with lightning expected anywhere within a 40-50 mile radius of the storms.

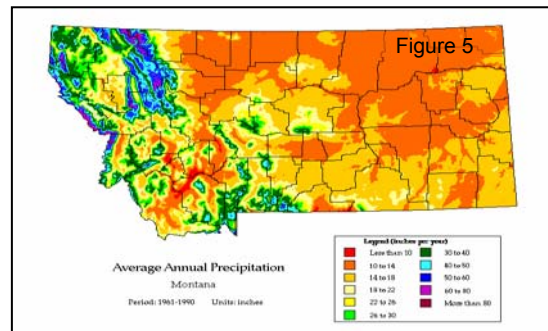
A review of the fire history for Wheatland County for the years 1980-2005 showed the following:

1. Average maximum temperature warmest in July and August.
2. Average wind speed was strongest in winter, early spring and late fall. During the summer winds are moderate with the higher winds over open ground and from a westerly direction. Wind gusts during the summer were strongest from thunderstorm outflow winds.
3. August is consistently the driest month with weather records showing poor nighttime relative humidity recovery. During the day light hours the relative humidity begins to drop substantially beginning at 0900 and remains low until 2100. These lows bottom at the lower teens around 1700-1800. In reviewing the weather history, there are also days in August where relative humidity values remained low for multiple twenty-four hour periods.
4. Moisture events did occur in August, but were limited in location, content and duration. The remnants of these events kept the maximum relative humidity high in that particular area for a period of seven days after initiation. Lowest moisture values occurred since the latest drought period began in 2000.
5. Continued drought conditions have begun to modify but have stressed large fuels.
6. Drought and bug kill have stressed conifer stands and contributed to large fire spread, where high fire intensities did not allow for aggressive initial attack or fire suppression with ground forces due to safety concerns.
7. Lightning occurrence usually begins in April with the heaviest occurrence in May and June. Dry Lightning is most prevalent July and August.

There is a lack of data recording devices within Wheatland County for accurate ground truth for this report. The values used in the table below are "best guess" values based of information from surrounding counties that do have recording devices. The data below should be used with caution as the time period used below for averaging values is short, only around five years or so for the spring months of March through May and the fall months of September through November. The summer months of June, July, and August cover a time period of twenty-five years and the data is considered reliable and accurate.

Wheatland County	1980-2005								
	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Temp (F)									
Avg high	41	50.5	59.7	66	75.7	76.4	70.8	57	46
Mean	19.5	30.6	41.4	50.3	62.8	62.1	54.3	36.8	30.1
Avg Low	6.5	7.5	35.2	40.6	45.2	41.4	36.3	22.8	13.3
RH (%)									
Avg high	97	100	80.5	78.5	90.4	92.4	87.4	88.7	99
Mean	83.4	76	65.2	62	46.9	45.6	50.4	65.2	67.9
Avg Low	42.5	27.5	33.3	33.1	24	18.2	21.5	26.3	33
Pcpn (In.)									
Max	2.72	3.15	5.15	6.55	9.07	5.66	2.07	2.70	0.87
Mean	2.72	2.61	3.24	4.49	2.54	2.38	1.21	1.63	0.87
Min	2.72	2.08	2.01	3.03	0.23	0.30	0.35	0.91	0.87
Wind (MPH)									
Avg high	23.5	24.5	15.2	18.3	17.5	20.2	19.8	22.7	24.3
Mean	14.8	11.9	10.9	11.1	9.8	9.9	11.1	13.3	13.6
Avg Low	14.3	10.2	5	6.4	5.4	6.6	7.1	8	12.5

Figure 5 depicts the average annual precipitation for Wheatland County during the years of 1961 through 1990.



4.2. Population, Demographics

Population and demographics information was derived from the 2000 Census. The population for Wheatland County was 2,037 (2005 estimate) people. The area in square miles was given as 1,423. The Census showed 853 households with a density of <1 housing units per square mile and a population density of 1 per square mile. The median age of county residents was 41. The median family income was \$32,500 with 11.1 % of families below the poverty line.

Harlowton and Judith Gap are the only towns listed in Wheatland County and with populations of 977 (2003) and 153 (2003) respectively.

4.3. Infrastructure: Roads, Driveways, Utilities, Communication, Water Supply, Schools, and Hospitals

US Highway 12, running east and west through the county, and Highway 191 runs north-south through the county from Judith Gap to the southern edge of the county are the only major roadways that serve Wheatland County. The BNSF has a railroad track through the county crossing through the northeast corner of Wheatland County. The Musselshell River is runs west to east through the county and roughly parallels US Highway 12 throughout the county.

Many private ranches and developments are provided access utilizing graveled roads. Some of the graveled roads are difficult to travel in wet weather and may become impassable. Utilities are provided via overhead transmission and distribution lines. This power is distributed in Wheatland County by Fergus Electric Cooperative and Northwestern Energy.

The county has one airport, the Wheatland County Airport and a landing strip south of Harlowton, the Baxter Landing Strip.

Telephone service is provided by Mid-Rivers Telephone Cooperative, Triangle Telephone Cooperative and CMC. Verizon and Alltel provide cellular phone service and depending on one's specific location, coverage can be achieved throughout the county.

Municipal water service is provided by the Town of Harlowton and Judith Gap, Shawmut and Two Dot have no municipal fire protection water system, otherwise water is provided by wells in the rest of the county.

Propane and diesel fuel tanks are located throughout Wheatland County at ranch and home sites.

There are four pipelines transporting flammable and combustible liquids across the county, these pipelines could potentially affect fire suppression strategies and could be involved in a wildland fire if they are not adequately protected with asset protection zones.

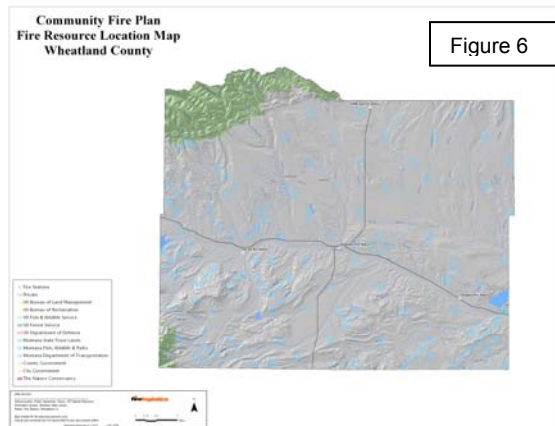
4.4. Emergency Services

Emergency services within Wheatland County include fire protection, emergency medical services including ambulance transportation, law enforcement, and emergency preparedness.

4.4.1. Fire Protection

Structure fire protection is provided to the Town of Harlowton, by the Harlowton Fire Department and to the Town of Judith Gap by the Judith Gap Fire Department. Harlowton and Judith Gap Fire Departments provide mutual aid resources to Wheatland County Fire Department. Shawmut and Two Dot Fire Departments provide limited structural fire protection. There is no formal written mutual aid agreement between the Harlowton and Judith Gap Fire Departments and Wheatland County Fire Department.

Wildland fire protection is provided by the Wheatland County Fire Department under the direction of the County Fire Warden with various fire suppression resources located throughout the County under the Wheatland County Coop Fire Plan (See Figure 6 and Fire Resource Locations in Map Section 10.5). In addition, many ranches in Wheatland County have their own wildland fire engines that they use to assist Wheatland County Fire Department.



Wheatland County is within the Northeastern Land Office of the Montana DNRC's geographic area and is a "coop" county. This provides additional resources such as air tankers from Billings and Helena, a helicopter from Lewistown, single engine air tankers from Lewistown and Billings and crews and overhead through the Northeastern Land Office. Single engine air tankers (SEATs) can load retardant at the Billings and Lewistown Airport SEAT Bases. The airport in Harlowton has the capability to be used as a temporary reload site for SEATs. During the fire season these resources may be committed to other incidents and may not be available to Wheatland

County during a wildland fire.

Another complexity to the fire protection system in Wheatland County is that the Billings Field Office is responsible for the fire protection for BLM lands in Wheatland County, however, the BLM fire suppression resources come from the Lewistown Field Office.

Wheatland County Disaster Emergency Services has agreements with surrounding counties.

4.4.1.1. Fire Engine Pump/Draft Source Sites

Water supply sources for wildland fire protection and structural fire protection throughout Wheatland County are relatively scarce. They include stock ponds, holes in creeks, the Musselshell River and Deadman's Reservoir. Due to the long-term drought in Wheatland County, most ranchers are concerned about the drawdown of their stock ponds for fire protection. In most cases water needs to be brought to the fire, through fire apparatus such as water tenders.

4.4.1.2. Training, Certification, and Qualification

All incidents require different skill levels of incident management personnel. To assist in assigning appropriate incident commanders to wildland fire incidents, an incident analysis can be used as a guide to identify and mitigate certain complexity and safety issues by selecting a different strategy, tactic, or requiring higher qualifications of incident command personnel. Certain assumptions are made in this analysis:

- As an incident becomes more complex, the need for an incident management team or organization increases.
- To facilitate assembling an efficient and effective organization, key managers should be involved during the early stages of the complexity analysis; this should include federal, state, and local officials.
- The analysis is not a cure-all for the decision process; local fire history, current fire conditions, and management experience must be considered.

All wildland fires, regardless of size, should have an assigned Incident Commander (IC). The training, certification and qualifications of the Incident Commander (IC) vary by the type of fire. General guidance is:

Type 5 Incident

- Resources required typically vary from two to six firefighters
- The incident is generally contained within the first burning period and often within a few hours after resources arrive on scene.

Type 4 Incident

- Command staff and general staff functions are not activated.
- Resources vary from a single resource to several resources.
- The incident is usually limited to one operational period in the control phase.
- No written incident action plan (IAP) is required. However a documented operational briefing will be completed for all incoming resources (See Briefing Checklist in Resources Section).

Type 3 Incident

- In-briefings and out-briefings are more formal.
- Some or all of the command and general staff positions may be activated, usually at the division/group supervisor and/or unit leader level.
- Type 3 organizations manage initial attack fires with a significant number of resources, an extended attack fire until containment/control is achieved, or an escaped fire until a Type 1 or Type 2 team assumes command.
- Resources vary from several resources to several task forces or strike teams.
- The incident may be divided into divisions.

- The incident may involve multiple operational periods prior to control, which may require a written IAP.
- A documented operational briefing will be completed for all incoming resources and before each operational period (See Briefing Checklist in Resources Section).
- Staging areas or an incident base may be used.

By completing an Incident Complexity Analysis, the County Fire Chief can assess the hazards and complexities of an incident and determine the specific positions needed (See Incident Complexity Analysis in Resources Section).

Required training, experience and prerequisites for various wildland fire management positions are contained in PMS 310-1 (Wildland and Prescribed Fire Qualification System Guide). PMS 310-1 has been adopted by the Northern Rockies Coordinating Group (NRCG) and, consequently, applies to all wildland fire fighting personnel in the state of Montana, including Wheatland County, for mobilization outside of the county. Within the County, local standards would apply.

Experience gained in mobilizing to wildland fires within the county and throughout south central Montana and the Northern Rockies has allowed Wheatland County personnel to acquire increased training and fire qualifications. Those experiences have allowed Wheatland County fire personnel to more efficiently perform and manage fire operations within the county.

4.4.2. Law Enforcement

Law enforcement and evacuation services are provided by the Wheatland County Sheriff's Office.

4.4.3. Emergency Medical Services

The Wheatland County Volunteer Ambulance, with ambulances located in Harlowton and Judith Gap, provides Wheatland County residents ambulance transport services.

4.4.4. Emergency Management

Overall County emergency preparedness and planning comes under direction of the office of the Wheatland County Disaster and Emergency Services.

4.5. Insurance Ratings

The insurance premiums that residential and commercial customers pay are based on a rating system established by the Insurance Services Office (ISO). In its evaluation of a community, ISO considers the water system and the fire protection provided by the fire department. The relative weights of the components are:

Water Supply	-	50
Fire Department	-	40
Fire Dispatch	-	10

The rating system produces ten different Public Protection Classifications, with Class 1 receiving the most insurance rate recognition and Class 10 receiving no recognition.⁴ It is important to note that some insurance companies will not insure structures that are outside of the 5 road miles from a fire station.

The Harlowton Fire Department has an ISO rating of Class 6 and the Judith Gap Fire Department has an ISO Rating of Class 6. Wheatland County, not having a structural fire department, has an ISO Rating of Class 10.

⁴ *Fire Protection Handbook*, NFPA 1997

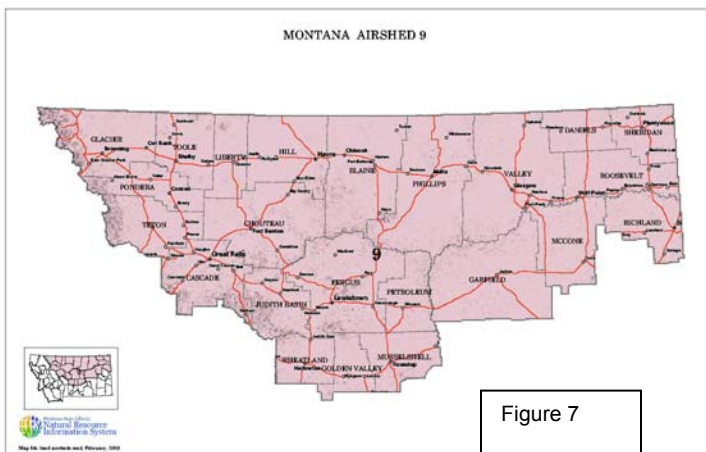
Improvements to the water delivery system, dispatch and to the fire departments could improve the ISO rating, which would result in some annual insurance premium savings to the city and county's customers.

4.6. Land Use/Development Trends

The majority of lands in Wheatland County are dedicated to ranching and agriculture. There has been little demand for land to subdivide within the county. The county is likely to experience increasing demands for subdivisions within the county in the foreseeable future.

4.7. Air Quality

The State of Montana's air quality is managed by the Montana State Airshed Group through the Department of Environmental Quality. Wheatland County is located in Airshed 9 (See Figure 7). Generally, open burning is permitted year around in the eastern Montana opening burning zone (Airshed 9 and 10), during December, January, and February the DEQ needs to be notified by telephone of agricultural or prescribed wildland open burning. In most cases this approval can be obtained for any proposed open burning in the eastern Montana zone because of good smoke dispersal and the lack of significant air quality issues such as the valley inversions experienced in western Montana.



4.8 Summary

The impacts that the elements of the community have on the wildland fire

program and the delivery of wildland fire fighting services in Wheatland County are summarized in Table 4.8.1.

Table 4.8.1

Element	Summary of Impact on Wheatland County's Wildland Fire Program
Topography, Slope, Aspect, Elevation	Accessibility Increased rates of spread
Meteorology, Climate, Precipitation and Fire Weather	Accessibility of water Increased number of high fire danger days Increased flammability of fuels Increased severity of wildland fires
Population, Demographics	Potential reduction in the availability of volunteers Potential reduction in the skill and experience of volunteers Need for increased recruitment and training Need for fire protection planning
Infrastructure	Reduced accessibility
Fire Protection	Lack of structure fire protection capability in the county New RFD's or FSA's need to be formed along with any new subdivisions Implementation of local government fire protection services Increased damage from structure fires High cost wildland urban interface fires Risk transfer to Wheatland County Fire
Fire Engine Pump/Draft Source Sites	access and accessibility to reliable water sources
Training, Certification, and Qualification	Availability of personnel Financial Constraints Mitigate potential liability
Law Enforcement	Capacity to deliver evacuation services, security Operational Cooperation
Insurance Ratings	Predictor of service capability Increase or decrease in insurance premiums paid
Land Use/Development Trends	Changing fire protection risk profiles Risk transfer to Wheatland County Fire
Air Quality	Ability to conduct prescribed burns

5. Current Fire Environment

The following describe the current fire environment in Wheatland County. These perspectives are a result of an on the ground tour conducted by Wheatland County fire authorities and Fire Logistics personnel in May of 2006.

5.1. Wildfire Problem Definition

As stated in Chapter 4, Wheatland County has limited areas of forested land scattered throughout the county with the concentrations located in the extreme northern and south western edges of the county. Almost all of these are the ponderosa pine ecosystems typical of south central Montana with some cottonwood and mixed hardwood types in the river and creek bottoms. A minor component of Douglas fir and lodgepole pine exists where the gradient of the county rises into the Crazy Mountains and the Big Belts. Large shares of these two conifer groups are located on National Forest ownership, but some stands exist within private ownership.

As will be discussed in the next section, this ponderosa pine ecosystem is prone to having a frequent wildland fire interval. The impacts of those frequent fires can be quite variable depending on the values at risk. The emergence of subdivisions within the large open blocks of land presents the probability of material losses to man made improvements as well as possible threats to the occupants of those new developments.

Currently, Wheatland County Fire Department has fire protection responsibilities for state and private wildlands within the county. Technically, BLM and USFS have protection responsibilities for their respective lands within the county. In reality, the county is often the first on the scene in both of these federal areas because the county fire engines located in the rural areas of the county. Improved communications between the county fire fighters and the federal agencies can improve the response and response time to wildland fires throughout the county. The county fire department is also the structure protection organization for the county. There are at least five major challenges facing the county fire protection organization in the performance of their duties:

Water Supply – Wheatland County is a very arid county with little natural water aside from the Musselshell River.

Subdivision Development – Wheatland County has adopted subdivision regulations for a developer to meet when establishing a subdivision, however, they are out of date and need to incorporate adequate requirements for development in the wildland urban interface. There will be pressure in the future to subdivide large land blocks within Wheatland County for a public eager to own a piece of Montana. Development in the wildland urban interface will create many problems for the county fire department in the future, most notably protecting those people in a large wildland urban interface fire event.

Personnel – Wheatland County is a very sparsely populated county and as a result the staffing of the fire departments is very limited. Having adequate personnel to staff a large wildland fire or structure fires is problematic.

Multiple Ignitions – Lightning is the main ignition source for wildland fires with the county and thunderstorms normally start multiple fires per episode. Multiple fire starts challenge the capability of any fire department.

Future Recruitment – While the county currently has an outstanding leader managing the fire program this situation will not last forever. In a county with a diminishing population it will be increasingly difficult to find available, motivated and physically capable individuals to fill the leadership and subordinate positions in the fire organization.

No written agreements have been developed between Wheatland County and the two federal agencies with which they work.

5.2. Wildland/Urban Interface

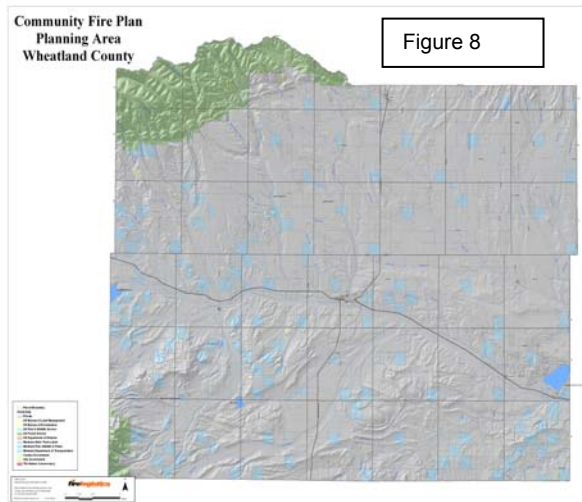
The wildland/urban interface is defined as the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.⁵ Similar terms are wildland/residential interface and wildland/urban intermix.

During the past several fire seasons of 2000, 2003 and 2006, it has become evident that wildland/urban interface fire losses have increased throughout the Western United States. The expectation under the Federal Fire Policy is “that losses will increase in the future.”⁶ According to research conducted by Volker C. Radeloff, assistant professor at the University of Wisconsin at Madison, of the 13 million homes constructed in the 1990’s, 69% or 9 million homes were constructed in the wildland urban interface.⁷

From a fire fighter’s perspective there are nine Wildland Urban Interface "Watchout" Situations that are significant to the safety of wildland fire fighters:

- Wooden construction and wood shake roofs
- Poor access and narrow congested one-way roads
- Inadequate water supply
- Natural fuels closer than 30 feet to structures
- Extreme fire behavior
- Strong winds
- Need to evacuate the public
- Structures located in chimneys, box or narrow canyons, or on steep slopes in flashy fuels
- Inadequate bridge load limits

Judith Gap is the only community in Wheatland County listed in the Federal Register as “Communities at Risk” from wildland fire. There are several additional areas of wildland -urban interface within the county,



which have been identified during this planning process, Figure 8 (See Planning Area Map in [Map Section 10.5](#)).

Areas of wildland-urban interface in Wheatland County include:

- Basin Properties at Deadman’s Reservoir
- Fish Creek Hills Areas
- Judith Gap
- Harlowton, portions along the river corridor
- Shawmut
- Two Dot
- Musselshell River Corridor
- All of Wheatland County can be considered wildland urban interface due to extended drought

⁵ *Ibid.*

⁶ *Federal Fire Policy, 2001*

⁷ *Pomfret, John; As Houses Rise in the Wild, So Do Fire Concerns; Washington Post; 2006*

The development of portions of Wheatland County into residential lots of varying sizes will significantly contribute to the development of wildland/urban interface fire problem for the fire protection agencies in Wheatland County. This leads to several complex problems, which need to be addressed in the CWPP:

- Access
- Asset Protection Zones
- Water Supply
- Building Construction Requirements
- Fuel Reduction On All Ownerships
- Kinds And Types Of Fire Apparatus Required For Fire Protection
- Structural Fire Protection For Structures Outside Organized Fire Protection Jurisdictions

In addition to the fire losses increasing from wildland urban interface fires, the costs of fire suppression have continued to increase as well. Fire costs are passed along to the community, through all levels of government and eventually to the general population. Local government has a legislative responsibility to develop and enforce public policy that mitigates or eliminates the problems of the wildland urban interface or modifies the behavior of those who elect to build a home in wildland urban interface areas just as they do for flooding or other potential hazardous natural events.⁸

5.3. Structure Fire Problem Definition

The best way to quantify the structure fire problem in the Wheatland County is to conduct an occupancy risk assessment, which evaluates the severity of a specific structure in relation to the fire districts ability to handle the types and severity of emergencies with that structure.⁹ Risk categories used in the Self-Assessment Manual developed by the International Commission on Fire Accreditation are:¹⁰

Category	Description
Maximum/Worst Risk	Occupancies classified as maximum risk will be of substantial size and contain a concentration of properties, which present a very high risk of life loss, loss of economic value to the community or large loss damage to property in the event of a fire. These risks impact the need for the fire department to have multiple alarm capability and have an adequate assessment of their ability to concentrate resources.
High Hazard/Key Risk	Built-up areas of substantial size with a concentration of property presenting a substantial risk of life loss, severe financial impact on the community or unusual potential damage to property in the event of fire.
Moderate/Typical Risk	Built up areas of average size, where the risk of life loss or damage to the property in the event of a fire in a single occupancy is usually limited to the occupants. In certain areas, such as small apartment complexes, the risk of death or injury may be relatively high. The moderate/typical risks are often the greatest factor in determining fire station locations and staffing due to the frequency of emergencies in this category. To assure an equitable response and to provide adequate initial attack/rescue capability to the majority of incidents, the typical risk is often used in determining needed resources.

⁸ Gilbert, Gary; *Focusing Local Government; American Perspectives on the Wildland/Urban Interface*, 2005

⁹ *Fire and Emergency Service Self-Assessment Manual, Commission on Fire Accreditation International, 6th Ed.*

¹⁰ *ibid.*

Wheatland County has buildings and occupancies in all three categories with the majority being in the moderate/typical risk category, i.e., homes and small businesses.



The Commission on Fire Accreditation International, *Fire and Emergency Service Self-Assessment Manual* outlines the needed staffing levels for incidents occurring in the different types of risk occupancies, which are detailed in the following table.¹¹

¹¹ *ibid.*

Staffing Resources for Risk Type Occupancies				
Task	Maximum/ Worst Risk	High Risk	Moderate Risk	Low Risk
Attack Line	4 (16-18*)	4	2	2
Search and Rescue	4	2	2	
Ventilation	4	2	2	
Back-up-Line	2	3	3	
Pump Operator	1	1	1	1
Water Supply	1	1	1	
Utilities Support	1	1	1	
Command/Safety	2	2	1	1#
Forcible Entry	*			
Accountability	1			
Salvage	*			
Overhaul	*			
Communication	1*			
Chief's Aid	1	1		
Operations Officer	1			
Administration	1			
Logistics	*			
Planning		1*		
Staging		1*		
Rehabilitation	1			
Sector Officers	1-4*			
High-Rise Evacuation	10-30*			
Stairwell Support	10*			
Relief	*			
Investigation	*			
TOTALS	25-65*	17	13	3-4

Can often be handled by the first due officer.

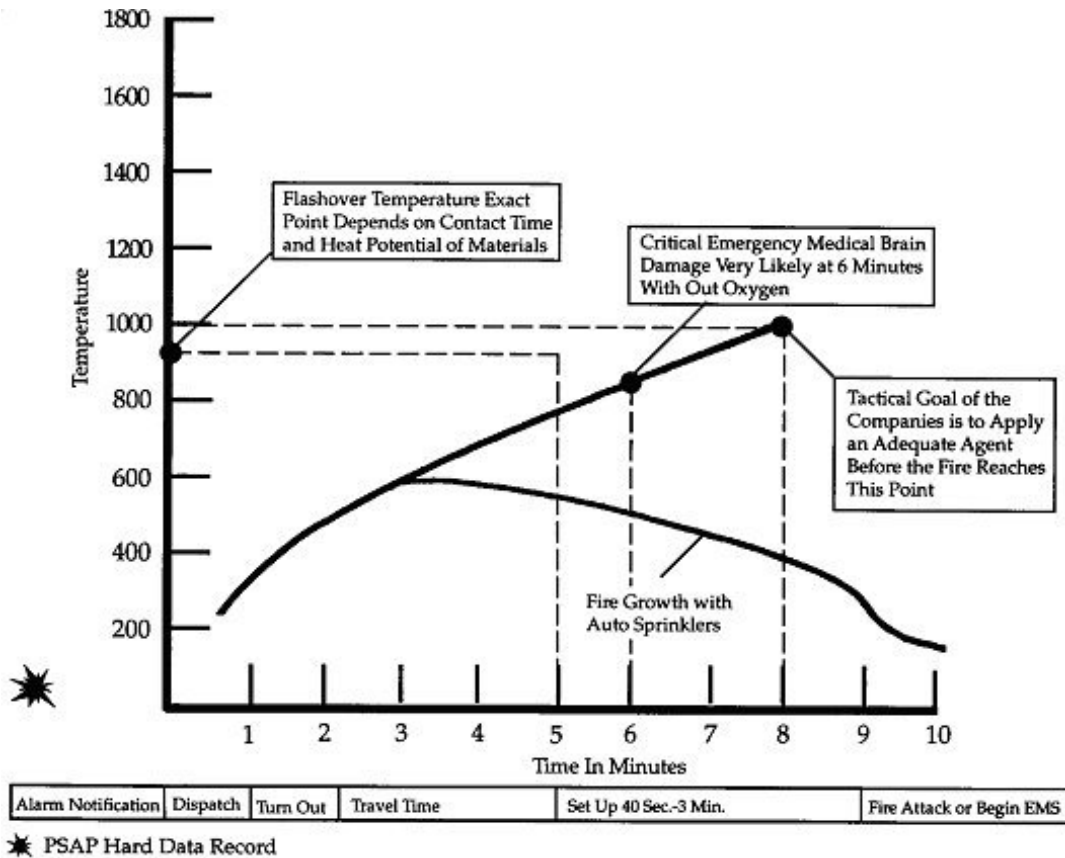
* At maximum and high-risk fires, additional fire fighting personnel are needed

Structural fire suppression whether in a rural environment or in one of our cities requires the accomplishment of the above listed tasks, many of which must occur almost simultaneously to ensure effective and safe operations at the incident scene. To ensure an effective fire fighting force on the scene of significant fires in these kinds of risks, current staffing levels need to be augmented with paid-call fire fighters, volunteers and mutual aid from other fire departments.

A principal difference between rural fire departments and their municipal counterparts is that the rural departments must typically solve the water supply issues in addition to fighting the fire. Typical rural departments incorporate water tenders, portable tanks, draft points, accessible water supplies, and etc. into their fire protection strategies for rural areas of Wheatland County. To complicate matter further, in Wheatland County due to the lack of adequate fire stations, water tenders are drained and stored outside during the winter.

To be minimally effective in controlling a structure fire, the initial responding apparatus should reach the scene of the fire before “flashover” occurs.¹² The time from ignition to flashover varies based on the materials involved in the fire, but generally occurs somewhere between 4 and 10 minutes. The following chart illustrates the relationship between the response time or reflex time and flashover and/or critical brain damage in an EMS incident.

¹² Evaluation & Planning of Public Fire Protection, John Granito



Significance of Flashover

Pre-Flashover

- Limited to one room
- Requires smaller attack streams
- Search & Rescue is easier
- Initial assignment can handle

Post-Flashover

- May spread beyond the room of origin
- Requires more larger attack lines
- Search and Rescue is difficult
- Requires additional fire companies

For municipal departments in small and medium sized cities, all of the first alarm apparatus will not arrive at the fire scene simultaneously. In a department like Ryegate Fire, Lavina Fire or Wheatland Fire, the volunteer fire fighters are paged, respond to the fire station, don personnel protective equipment, and respond to the incident.

Policy makers in the city and the county need to be concerned with what level of service is provided to the community, i.e., the number of personnel and apparatus that can arrive at the fire scene within a stipulated time frame and a percent of time that it will occur. A sample performance statement for a maximum risk structure fire might be:

The first unit shall arrive within 6 minutes total reflex time, for 90% of all requests for emergency service. The second-due engine and first-due truck company shall arrive within 10 minutes total reflex time, for 90% of all requests for emergency service. Remaining units, including battalion chiefs, shall arrive within 13 minutes total reflex time, for 90% of all requests for emergency service. The rescue company shall arrive within 15 minutes total reflex time, for 90% of all requests for emergency service.

A low risk structure fire performance measure might be:

The first engine shall arrive within 6 minutes total reflex time, for 90% of all requests for emergency service. The second-due engine shall arrive within 10 minutes total reflex time, for 90% of all requests for emergency service. Remaining units, including battalion chiefs, shall arrive within 15 minutes total reflex time, for 90% of all requests for emergency service.

Clearly levels of service need to be established by the community for each of the services provided by the typical fire department to include:

- Structure fires
- Wildland fires
- Hazardous Materials
- Emergency Medical Services
- Special Operations, including confined space and trench rescue
- Auto Extrication

The fire departments will then be able to measure how successful they are in delivering quality services to their customers. Other tools that can be used to measure the effectiveness of fire service organizations are:

- NFPA 1720 - Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments
- Insurance Services Office – Fire Suppression Rating Schedule

None of the fire service organizations in Wheatland County have NFPA 1720 plans.

There is no formal structure fire protection through a rural fire district or fire service area outside the city limits of the incorporated cities and towns in Wheatland County. If a structure fire were to occur and Wheatland County Fire requests mutual aid from one of the incorporated towns to fight the structure fire while Wheatland County's Fire Department's responsibility is to keep the fire from spreading to the wildlands. The issue of no entity providing structural fire service to Wheatland County places the Wheatland County Fire Department in a very tenuous position of responding to a structure fire with what looks like a fire truck, but not being able to fight the fire due to pump capacity, training, equipment, etc. The issue of structure fire protection in Wheatland County should be addressed by the Wheatland County Commission.

5.4. Local Fire Ecology

Wheatland County has a mix of grass, brush and timber types that comprise the overall natural fire ecology.

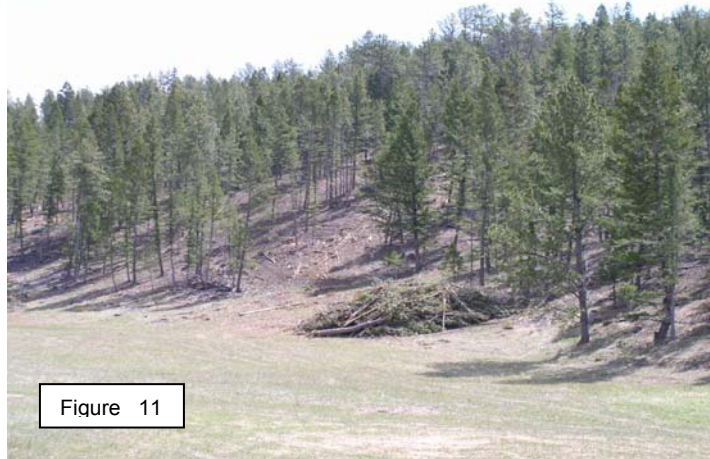
Native grasslands on non tilled soils comprise the largest share of these types. Under natural conditions, these grass types would burn on an average of three to five years. European settlement through the Homestead Act changed this in the late ninth century and remains that way today. Grazing has replaced the changing force of wildland fire. Agricultural practices on the more productive sites have had a significant change from the native grasslands. The rest rotation system employed by many producers has provided a new annual fuel type by planting small grains, which when harvested provide a replacement for the grass fuel type.

The native brush species remain prevalent in the coulees, draws and harsher sites. In many cases these areas have missed a number of natural fire cycles. These areas would have burned on an average of ten to twenty years. As with the grass fuel type, grazing has modified the available fine fuels and reduced that normal fire frequency.

Three timber fire groups represent Wheatland County: Dry ponderosa pine, Cool Dry Douglas fir and cool habitats dominated by lodge pole pine. The following will describe the fire ecology of each type and how fire plays a role.

Ponderosa Pine

The most prevalent timber type in Wheatland County is ponderosa pine. This type is a fire adapted tree species that has developed natural mechanisms to cope with frequent fire. It has a thick corky bark that insulates the tree's cambium from heat generated by wildland fires. The cambium is the living layer of cells between the bark and the woody portion of the tree stem and is responsible for the growth of both new wood and new bark. Ponderosa pine can be found on hot dry sites such as those found in Wheatland County. Because of the frequency of lightning storms in the county, it is estimated that fire burned in and under most of the natural pine stands at a 10-20 year interval and less than that in some areas. Because of this frequency fuel loadings were traditionally low in the stands as dead branch wood and needle litter were consumed during these fire events. The fires also tended to thin out patches of heavy regeneration that resulted from good cone crop years and favorable moisture conditions. The fires kept the density of trees lower by selectively killing some of the thinly barked seedlings and smaller individual trees. The trees that did survive had a greater supply of nutrients and water to nourish them and were stronger and healthier. In the absence of the heavy fuel loadings, periodic low intensity fires would have had no significant impacts on the older trees that remained (Figure 11).



Douglas fir

This group exists on dry sites that are generally too dry for lodgepole pine and too cold for ponderosa pine. Rocky Mountain Juniper, limber pine and subalpine fir can be found as minor species within these stands (Figure 12).

Downed dead fuel loads for this group average about 10 tons/acre. While downed, dead woody fuel loading can, at times, be significant, live fuels are less of a problem, due to the harsh site conditions. This factor plus the usual open nature of these stands results in a low probability of a crown fire. Individual trees will often have branches close to the ground and if sufficient ground fuels are available, torching can occur.



The role of fire in this fire group is not well defined. Fire probably occurred less frequently than in the warmer Douglas fir habitat types. The relatively light fuel load, sparse undergrowth, and generally open nature of the stands would appear to favor a long fire-free interval. However, fire history studies have estimated a fire interval of 35 to 40 years (Arno and Gruell, 1983).

Fire plays an important role in favoring ponderosa pine within this group. Without fire, Douglas fir would slowly replace ponderosa pine. Fire's role in seedbed preparation on most of these fire group sites is confounded by the difficulty of regeneration beyond the seedling stage on these droughty sites because of undergrowth and overstory competition. Where dense regeneration does occur, fire probably played the role as a thinning agent in sapling and pole-sized stands. Ground fire probably maintains many mature stands in an open, park like condition. Many pre-settlement stands were actually scattered groves. Modern fire suppression has allowed these groves to become forest stands.

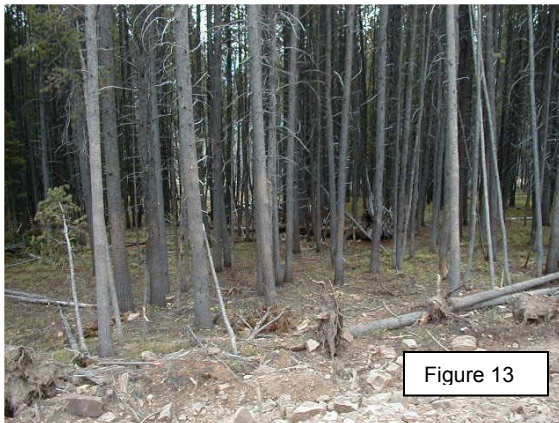
Opportunities for fire use may be limited in some stands in this group, due to the normally sparse fuels. Where sufficient surface fuels exist, prescribed fire can be used to accomplish timber, range and wildlife management objectives.

Fire can be used following timber harvest activities to prepare the seedbed and to reduce wildland fire hazards from the harvest related slash. Care needs to be taken in controlling the fire intensity when prescribed burning in partial-cut stands. The hazard reduction objective in these situations should be only to remove the fine fuels. Burning under moist conditions is recommended.

The absence of a dense understory results in a reduced fire hazard. However, the density of overstory trees and the presence of dead branches near ground level, create ladder fuels leading to crown fire potential under severe burning conditions.

Lodgepole pine

The role of fire in the lodgepole pine forest is almost exclusively as the agent that perpetuates or renews lodgepole pine. Without periodic disturbance, the shade-tolerant species replaces the lodgepole pine because it does not regenerate well on duff or under shaded conditions. Fire interrupts the course of succession and increases the proportion of lodgepole with each burn. Within 50 to 100 years following a severe fire, a lodgepole pine forest will exist even though shrubs and herbaceous cover may become dominant immediately following the burn (Figure 13).



Large stand replacement fires play a definite role in the ecology of lodgepole pine forests. The natural range of fire in seral lodgepole pine stands range from less than 100 years to about 500 years. The interval between any two fires in one area might be only a few years. Recurring cool fires may thin a stand or otherwise rejuvenate it without doing serious damage. Stands greater than 60 to 80 years old, however, become increasingly flammable due to overcrowding. Eventually an ignition sets off a major conflagration. In certain areas such a stand replacement fire can cover thousands of acres. Vast tracts of lodgepole can develop in this way as the serotinous cones open and shower the burn with seeds.

The exclusive dominance of lodgepole pine in the lodgepole community types is attributed in a large part to fire for the following reasons:

1. Historic repeated wildfires over large areas may eliminate seed sources of potential shade-tolerant competitors.
2. Light ground fires may remove invading shade-tolerant competitors from the understory.
3. Dense stands may prevent regeneration of all conifers for up to 200 years in the absence of disturbance or stand deterioration.
4. Sites may be unfavorable for the establishment of other conifers.

The primary fire management consideration in this group's habitat types is protection from unwanted fire during extended periods of drought and during severe fire weather conditions. Stand replacement fires at such times often crown and become holocausts that result in complete stand mortality.

Opportunities for use of prescribed fire are limited in natural stands because of the low heat resistance of lodgepole pine, spruce and subalpine fir. The other problem is that burning during conditions that would allow for low fire intensities, make it difficult to sustain a prescribed fire in these stands.

Wildland fire is an essential, natural process that has helped shape our wildland areas for thousands of years and is important to the survival of many plants and animals. With the advent of fire protection, and changes occurring in other cultural practices such as grazing and farming, however, the situation has changed considerably. The natural litter occurring from the trees in these stands has accumulated for decades. In most areas there are many more trees per acre than there would have been historically. There are also more situations where continuous fuel exists from the ground to the crowns of mature trees (ladder fuels). This results when too many seedlings survive and, because of intense competition for water and nutrients, form overcrowded pockets of spindly trees. These trees will survive to intermediate heights with many of them bent or broken by snow loads, see Figure 14.



Along with the forested lands, there is an increasing threat to firefighters, the public and the improvements on private land from rangeland fires. These lands are typified by light flashy fuels which are capable of producing tremendous rates of spread, especially under windy conditions. The annual accumulation of grasses and forbs contributes to this phenomenon and the results, at best, will be the loss of fences, winter forage and possibly livestock.

Today, when a wildland fire occurs it is much more likely to have greater negative consequence. The higher fire intensity caused by a greater amount of fuel, results in an increased amount of heat. This increased heat can have adverse

effects on the soil and, subsequently, the productivity of the site. Higher intensity fires are also more difficult to keep away from improvements that landowners and firefighters wish to protect. Most importantly, they increase the risk to firefighters.

Another phenomenon that has become evident the past few years is that the cumulative drought has changed the effects of fire in the pine stands. They have gone from one of a "non-lethal" nature to one of vast areas of "lethal" or stand replacement fire. Fires are killing the majority of the mature trees under these conditions whereas in the past only a small percentage would have succumbed as a result of the fire.

5.5. Hazardous Fuels

As displayed in the Land Cover Map, the continuity of heavy fuels, i.e. ponderosa pine, is relatively consolidated in Wheatland County. In the north and east portions of the county there are areas of continuous pine type covering several thousand acres in size. These are the areas that have the greatest potential for supporting large intense fires. Fires may be terrain driven, (plume dominated) or wind driven in this fuel type. This is also the ecosystem type most attractive to developers for the placement of subdivisions.

Areas of sage and brush species also have potential for large intense fires but they are less likely except under wind driven conditions. Many of these are located on broken topography and draws, which support this type of cover vegetation. From a fire risk standpoint, many of these areas have missed several fire cycles, due to their isolation and to agricultural practices throughout the county. When they do become involved in a fire they burn with high intensity.

The most common fuel type in Wheatland County is grassland which includes a significant amount of CRP. Some of the CRP land has been enrolled in the program for approximately 20 years. Fires, in the grassland type will exhibit significant fire behavior which includes high intensity fire behavior, that are not easily controlled.

5.5.1. Fire Regime Condition Class

Fire has always been a part of the wildland environment, changing and shaping the structure and composition of vegetation in the area. The five natural (historical) fire regimes are classified based on average number of years between fires (fire frequency) combined with the severity (amount of replacement) of the fire on the dominant overstory vegetation. These five regimes include:

I – 0-35 year frequency and low (surface fires most common) to mixed severity (less than 75% of the dominant overstory vegetation replaced);

II – 0-35 year frequency and high (stand replacement) severity (greater than 75% of the dominant overstory vegetation replaced);

III – 35-100+ year frequency and mixed severity (less than 75% of the dominant overstory vegetation replaced);

IV – 35-100+ year frequency and high (stand replacement) severity (greater than 75% of the dominant overstory vegetation replaced);

V – 200+ year frequency and high (stand replacement) severity.

In the eastern and northern parts of Wheatland County the predominant tree species of ponderosa pine, a fire dependent tree species, was maintained by fire. Low intensity surface fires burned relatively frequently, keeping ground vegetation and prolific pine regeneration from becoming established and producing ladder fuels. As grazing and farming practices, as well as increased fire suppression, modified the natural fire cycles, fire became less of a factor in maintaining the vegetation in these areas and the fuel structure changed. As a result, there are more ladder and ground fuels (litter mat and down woody material) that contribute to higher intensity crown fires than what would have occurred historically. This has increased the threat of fire to people and human resource values within the wildlands and wildland-urban interface.

Current “Condition Class” is defined in realms of departure from the historic fire regime, as determined by the number of missed fire return intervals. There are three “Condition Classes” that have been developed to categorize the current condition with respect to each of the historic fire regime groups.

The following table describes each Condition Class:

Fire Regime Condition Class	Description	Potential Risks
Condition Class 1	Within the natural (historical) range of variability of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances	<p>Fire behavior, effects, and other associated disturbances are similar to those that occurred prior to fire exclusion (suppression) and other types of management that do not mimic the natural fire regime and associated vegetation and fuel characteristics.</p> <p>Composition and structure of vegetation and fuels are similar to the natural (historical) regime.</p> <p>Risk of loss of key ecosystem components (e.g. native species, large trees, and soil) are low</p>
Condition Class 2	Moderate departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances	<p>Fire behavior, effects, and other associated disturbances are moderately departed (more or less severe).</p> <p>Composition and structure of vegetation and fuel are moderately altered.</p> <p>Uncharacteristic conditions range from low to moderate;</p> <p>Risk of loss of key ecosystem components are moderate</p>
Condition Class 3	High departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances	<p>Fire behavior, effects, and other associated disturbances are highly departed (more or less severe).</p> <p>Composition and structure of vegetation and fuel are highly altered.</p> <p>Uncharacteristic conditions range from moderate to high.</p> <p>Risk of loss of key ecosystem components are high</p>

5.5.2. Fire Breaks

Since Wheatland County is primarily an agricultural based county there are many land use activities that break up the continuity of the fuel types, particularly in the sage and grassland types. Cropland, grazed land, county roads and state highways all contribute to interrupting continuous fuel beds thus giving fire fighters an opportunity to safely take effective action on wildland fires under less than severe conditions.

The Musselshell River also provides natural fuel barrier within the county.

There are also areas of open rock and clay bluffs that can prove to be effective barriers to the spread of wildland fire.

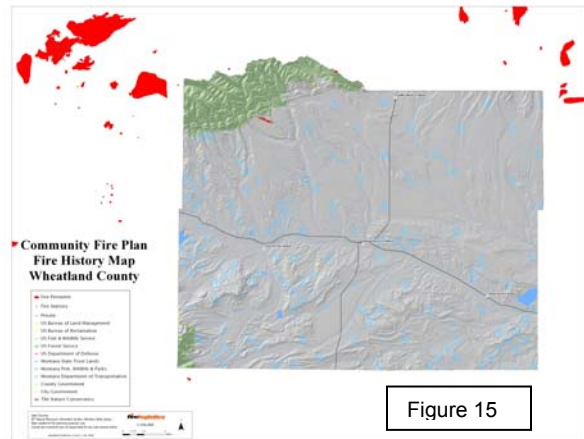
5.6. Fire History

Almost all fires experienced in Wheatland County are the result of lightning fires resulting from thunderstorms. These starts usually occur in the forested areas and are relatively fast spreading in the grass and needle cast understory. They are also relatively easy to control unless the area is experiencing the cumulative effects of drought and/or when high winds move the fire rapidly through the prevalent fuel type. Even under more normal climatic conditions, fire can be expected to be a problem when located in

an area where the topographic or fuel conditions are conducive to the fire getting into the crowns of the trees and/or when access is limited.

The current long-term drought has made control more difficult in recent years. In an average year there are approximately 30 fire starts, which burn a total area of approximately 3,000 acres. Significant fires in the past include the fire east of Shawmut that burned through Basin Properties subdivision. This fire occurred on the types of days described in Section 4.1.2. Unfortunately no GIS data was available from Wheatland County Fire, so we have only displayed fires that we obtained from other sources (See Figure 15 and Fire History Map in Map Section 10.5).

The current performance of wildland fire protection personnel in Wheatland County is excellent considering the size of the county and the travel times required to respond to incidents, the access limitations, the frequency of wildland fires and the challenges of keeping local firefighters motivated and qualified in a county with such a small population. In addition, the overall lack of a water supply in many areas within the county significantly adds to the difficulty of conducting an effective fire suppression effort on wildland fires.



On a severe burning day with extreme fire danger and multiple new ignitions it is probable that the supervisory capability and the county resource availability will be exceeded. Mutual assistance agreements with the State of Montana, BLM and the USFS and adjacent counties are imperative at a time like this to insure losses are kept to a minimum. Unfortunately, it is likely that local cooperators will have fire problems of their own under these conditions and rapid mobilization and deployment of resources from outside the area will be needed.

5.7. Expected Fire Behavior

Fire behavior describes the way fires ignite and spread. Topography, fuel conditions, and weather all influence fire behavior and how wildland fires burn in Wheatland County. Fuel is the only factor influencing fire behavior that people have the ability to manage. The following fire behavior assessment shows fire intensities and fire spread rates in different fuel types/models that are found in Wheatland County. It is important to understand this information to determine what areas contribute to the fire problem in the county.

The following fuel types/models were used for analyzing potential fire behavior:

Fuel Type/Model 1: Grass that dominated by short grass where very little shrubs or timber is present over less than $\frac{1}{3}$ rd of the area. The fine, porous, and continuous fuels that have cured or are nearly cured govern fire spread.

Fuel Model 2: Grass with open timber overstory that cover $\frac{1}{3}$ rd to $\frac{2}{3}$ rd of the area. This model represents the open grass and ponderosa pine and harvested areas where an overstory of timber remains. Fire spread is primarily by a surface fire through the curing or dead grasses with the litter and dead down wood from the open shrub or timber overstory contributing to fire intensity. This fuel model also includes scattered sagebrush within grasslands without ponderosa pine overstory.

Fuel Model 6: Shrubs are older and require moderate winds for fire spread, but can be extremely flammable. Fire will fall to ground at low wind speeds. This fuel model includes sage and pinion juniper shrub lands. Under drought conditions, live fuel moisture is less than normal, causing shrubs to be more flammable.

Fuel Model 9: Long-needle ponderosa pine stands with forest floor litter fall into this model. Fires in this fuel model run through the surface litter faster than in FM 8 and have longer flame lengths. Concentrations of dead-down woody material will contribute to possible torching out of trees, spotting, and crowning.

Fuel Model 10: This model is represented by the older mature timber stands that have large fuel loads of dead material on the forest floor. This would include areas that are insect and disease ridden, wind-thrown stands, and over mature stands with deadfall or heavy accumulations of debris. Ladder fuels are usually present. Fire burns in the surface and ground fuels with greater intensity than the other timber types. Crowning, spotting, and torching of individual trees are more frequent in this fuel type.

Fire behavior calculations for these fuel models were made using the fuels, weather, and topographic conditions prevalent for Wheatland County. One is for normal August fire season conditions, called Average, and one for extreme August fire season conditions, called Extreme. The extreme case also takes into consideration severe drought conditions. These conditions could be present in July, August and September when all the vegetation has cured and dried.

<u>Weather</u>	<u>Average</u>	<u>Extreme</u>
High Temperature	80 degrees	90 degrees
Low Relative Humidity	31%	14%
Mid Flame Wind Speed	8 mph	20 mph

	<u>Fuel Moistures</u>	
	<u>Average</u>	<u>Extreme</u>
Fine Fuels, 0-¼ in.	6%	3%
Small Fuels, ¼ - 1 in.	9%	4%
Medium Fuels, 1-3 in.	10%	5%
Large Fuels, >3in.	14%	8%
Shrubs, Live Fuel Moisture	80%	50%
Trees, Live Crown Moisture	100%	60%

The following table is the fire behavior interpretations that should be used for the fire behavior outputs.

Fire Suppression Interpretations from Flame Length

<u>Flame Length</u>	<u>Fireline Intensity</u>	<u>Interpretations</u>
< 4 feet	< 100 BTU/ft/sec	Fires can generally be attacked at the head or flanks by fire fighters using hand tools. Handline should hold fire.
4 – 8 feet	100 – 500 BTU/ft/sec	Fires are too intense for direct attack on the head with hand tools. Handline cannot be relied upon to hold the fire. Bulldozers, engines, and retardant drops can be effective.
8 – 11 feet	500 – 1000 BTU/ft/sec	Fires may present serious control problems: torching crowning, and spotting. Control efforts at the head will probably be ineffective.
> 11 feet	> 1000 BTU/ft/sec	Crowning, spotting and major fire runs are probable. Control efforts at the head of the fire are ineffective.

Fires are classified according to the fuels they are burning in; ground fires, surface fires, and crown fires. Each burns with different intensities and spread rates depending on fuel, wind, and topography. The following fuel types/models were used for analyzing potential fire behavior:

**Fire Behavior Outputs
Average and Extreme**

Fuel Type/Model	Rate of Spread (Chains/hour)		Flame Length (Feet)		Fire Size after 1 hour (Acres)	
	<u>Average</u>	<u>Extreme</u>	<u>Average</u>	<u>Extreme</u>	<u>Average</u>	<u>Extreme</u>
1	101	446	5	11	400	4,812
2	131	182	12	20	61	2,333
6	85	116	9	18	57	752
9	3	29	2	6	3	50
10	23	68	6	15	4	77

Due to the ever present wind in Wheatland County, wildland fires can quickly spread through the grass/shrubs fuel models and into the more heavily forested areas.

The transition from a fire burning in the surface fuels on the forest floor to a fire that burns in the crowns of the trees is determined by the amount of available fuel, the fire intensity or flame length, the presence of ladder fuels to carry the fire into the standing trees, and the wind. A fire may start out torching a single tree or small group of trees. When a fire becomes established in the tree crowns, the wind will usually carry the fire in the crowns creating fire intensities that cannot be dealt with by fire suppression forces.

Crown fires are normally driven by the wind but the dryness of the fuels and tree crowns can cause what is known as a plume dominated crown fire. Crown fires of this type occur because of dry, explosive, and cumulative drought conditions present in the forest. A plume dominated crown fire does not necessarily need wind to keep it sustained. Because of successful fire suppression efforts for the last 100 years, the increased fuel complex in many areas increases the potential for a plume dominated wildland fire.

Spot fires are caused by burning embers carried aloft by the wind and smoke column and dropped ahead of the main fire front. Spot fires need a dry fuel bed to ignite and it is not uncommon for these fires to start

¼ to ¾ of a mile ahead of the main fire front. These spot fires create serious problems for fire suppression forces trying to protect lives and property well ahead of an advancing fire front.

As spot fires start and gain intensity, they can become as active as the main fire front. This was experienced in neighboring Sweet Grass County in 2006. Some fires travel so quickly through a combination of crowning and spotting that there is absolutely no way for fire suppression forces to gain control and not put fire fighters in unsafe situations.

Some of the timber stands in the Wheatland County are susceptible to crown fires because of the presence of ladder fuels, heavy, down woody debris on the forest floor and mature or over-mature age classes of the timber stands. This is an incentive for private landowners, county, state and federal agencies in the county to implement a hazardous fuels treatment program on a landscape scale.

5.8. Fire Behavior Modeling

The following hypothetical fire will describe the potential fire threat that exists annually in Wheatland County. The fire was simulated using the topography on site, typical fuel models present, and the most probable weather under these severe burning conditions. The values predicted are only approximations, but never the less provide a valuable estimate of fire behavior under comparable conditions. The calculated fire size at 1 hour assumes a continuous fuel bed with constant conditions.

This exercise makes the following assumptions:

- Wheatland County climate and fuel moisture conditions are within those normally found in the County by early August.
- The weather event that ignited the fire is followed by a strong high pressure system.
- The fire is multi-jurisdiction and crosses agency boundaries.
- Structures will be threatened

The Deadman's Basin Reservoir Fire

This Deadman's Basin Reservoir Fire was started by a vehicle accident along Highway 12 on August 11th. A semi truck and trailer went off the road and overturned in the right of way while trying to avoid a small group of cattle that had strayed on to the highway.

As the truck overturns fuel from the tractor ignites and begins burning in the grassy ditch. A portion of the truck remains on the highway blocking traffic in both directions.

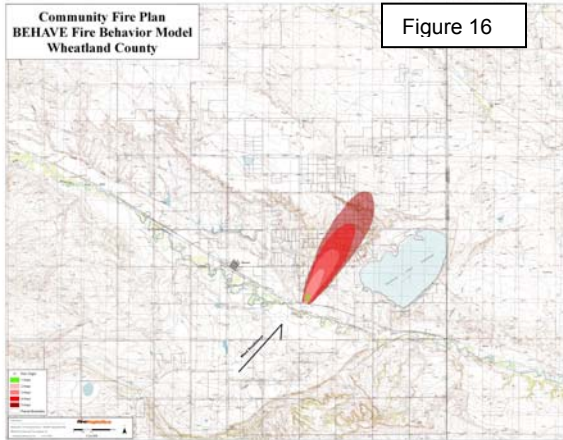
The driver unhurt by the accident calls 911 and EMS begins responding out of Harlowton. The time is 1400 MDT.

The weather pattern is in the normal very warm dry system of August. An extended weather forecast from the Billings Weather Service for Wheatland County from August 12th through August 15th indicates an extremely warm air mass forming over the area with relative humidities in the single digits.

At approximately 1500 hours, the relative humidity dropped below 20%, the Deadman's Basin Reservoir Fire begins to become active within the right of way of the highway. The winds are out of the southwest, blowing 10 to 20 mph. This wind moves the fire from the road ditch onto a grazed pasture, whose fuels are cured and although sparse, burn readily.

By 1500 hours, the temperature has now reached 80 degrees and the relative humidity continues to drop. The initial fire spread is on level ground, spreading through a sparse grassy pasture and at one hour is approximately 20 acres. Due to the vehicular accident and resultant traffic stoppage on Highway 12, wildland fire engines and crews are delayed in reaching the fire perimeter. Once the fire has moved across the pasture, it reaches a sage brush field which is located on a slope of 20% and gets established

on a southwesterly aspect. The fire spread continues to northeast toward the subdivision. At the end of two hours the fire has reached a size of over 100 acres (See Figure 16 and Behave Fire Modeling Map in Section 10.5).



The fire, now burning in the mixed fuel bed is beginning to spread rapidly to the northeast. Residents of the Basin Properties at Deadman's Basin are preparing their home sites for the fire and are considering their options for an evacuation route. Confusion is beginning to mount within the residents as the wind dominated smoke plume shrouds the entire area in smoke.

Short distance spotting propagates the fire spread as it moves into a number of heavy wooded draws, ridges and coulees surrounding the reservoir. A transition into a crown fire eliminated the opportunity for direct attack options, by the responding Wheatland County Fire suppression

resources.

A Type III organization is formed between the County. A DNRC Fire Advisor has been ordered. Additional air and ground resources have been ordered. The County Fire Warden has requested mutual aid assistance from adjacent counties for structure protection and county backup.

By 1600 hours, the fire has grown to 500 acres, is well established in the subdivision. Those structures in front of this fire would certainly be in jeopardy without an adequate asset protection zone (defensible space) and most likely could not be protected due to the size and scope of this event. At 1630 hours the Wheatland County Sheriff issues an evacuation order for the subdivision and several adjacent ranches.

A meeting is held between the Wheatland County Fire Warden, Wheatland County and Golden Valley Commissioners and Department of Natural Resources to assess the fire situation. Jointly they have come to a decision that due to the complexity of the fire and the potential loss of structures, that an Incident Management Team will be ordered. There is some discussion whether it needs to be a Type I or Type II team.

The complexity analysis for the decision is reviewed and a Type I Team is ordered. The request to order a Type I Team is passed through dispatch in Lewistown. Lewistown Dispatch informs the Wheatland County officials that the two Northern Rockies Teams are on assignment and the closest Type I Team would not be on site for 36 hours. With that information, a Type II Team is ordered and expected to be on the Deadman's Basin Fire for an in briefing at 2200 hours that evening.

By 1900 hours the fire has been actively burning for four hours and is now 1,150 acres. As the reaches the topographical change north of the subdivision and begin loses the energy from the sun, the fire behavior becomes subdued.

At 0600 the following morning, the fire has been burning for 16 hours. The Type II Team take command of the fire which in now over 1500-2,000 acres and has approximately four miles of open line.

This scenario is one that could be played out numerous times in Wheatland County. It depicts that complexity of the fire workload and the skill levels that are required to manage them. Due to the size of Wheatland County and it is not possible to detect and respond to all the ignitions that start within the county. Joint cooperation between the County, the Montana DNRC and adjacent counties is a very important part of successfully managing the wildland fire workload.

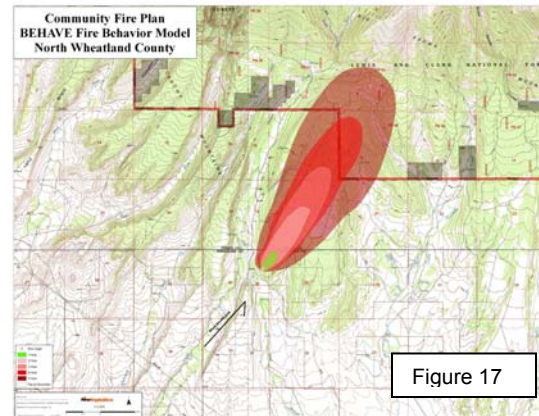
Church Camp Fire

This fire scenario has been run using the same climatic factors. The rates of spread have been adjusted to include the slopes. This scenario is being used, to describe the potential fire risk to the youth/family camp located along the border between Fergus and Golden Valley Counties. The potential risk to the camp is extremely high and could result in potential threat to life and property (See Figure 17 and BEHAVE North Map in Map Section 10.5).

5.9. Fire Effects Assessment

Wildland fires generally have three possible outcomes on forested areas. They can be lethal, non-lethal or mixed. These outcomes are alluded to in 5.1 Fire Regime Condition Class. A broad definition of each follows:

- Lethal – Fire is of high enough intensity and long enough duration to cause mortality in all or most of the trees and shrubs in the burned area. This result is likely in a hardwood ecosystem but the exception in a healthy ponderosa pine ecosystem. It can result, however, from severe burning conditions and/or unnaturally high fuel accumulations in the forest. When a lethal fire occurs it will be evident for decades that the area has been burned.
- Non-lethal – Fire is not of high enough intensity or long enough duration to kill the trees in the burned area. This is a more normal result in a healthy ponderosa pine ecosystem since the trees have adapted to fire by producing a thick bark. This bark protects the tree's cambium from heat. Within two years of a non-lethal burn almost all evidence of the fire has disappeared.
- Mixed – Fire will create significant areas of both lethal and non-lethal effects within the burned area.



Unless a lethal or mixed fire is experienced, such as in 2006, a wildland fire burning in Wheatland County has a much higher probability of negatively impacting human improvements, livestock and forage than it does creating any long term damage to natural resources. While wind driven, high intensity fire did occur in the county in 2006, most fires during more normal years are expected to be non-lethal or mixed. They may kill pockets of trees in places like draws and steep slopes but many trees will survive. A ponderosa pine can have over 60% of its crown scorched and it can still produce new needles the following year. The most significant natural resource loss from a non-lethal fire may be the short-term loss of forage for livestock.

Landowners can reduce the exposure of their buildings, structures and themselves to a spreading fire. Asset protection and fuel modification zones, which may include grazed areas, should be in place around sites needing protection. This is particularly effective on the south and west sides or down slope from such areas since most fires will progress to the north and east or upslope. Exceptions to this general rule can occur when a thunderstorm is in the vicinity of the fire and downdrafts from it cause the fire to spread erratically.

It is imperative that any new start be controlled as soon as possible. If a fire goes unattended it will continue to spread making eventual control more labor intensive and probably more difficult as it gets into new fuel sources. It also increases the chances of the fire being exposed to some type of severe weather event that can create a dangerous situation for life and property including those of the firefighters.

6. Risk Assessment

A fundamental part of any fire plan is identifying what you might lose in a wildland fire, known as assets or values at risk.

6.1. Values at Risk

The primary intent of fire protection is to protect the values at risk and maintain healthy forest and grassland ecosystems. The purpose of a successful fire management program is to reduce the risks associated with values that are important to the county, its citizens, and natural resources. Values at risk will be used to assist fire protection agencies in prioritizing mitigation projects.

Some of the values at risk in Wheatland County are:

- Health & Safety – Firefighters & Public
- Property, Improvements & Facilities – Private & Public
- Recreation/Community Impacts – Economic & Social
- Forest/Ecosystem Health
- Timber, Grazing, Hay and Grain Crops
- Aesthetics/Scenery

6.1.2. Health and Safety

Fire fighter safety should never be compromised

Wheatland County needs to maintain the safety of their firefighters. Thorough situational awareness on the part of the firefighter and strong incident management by the fire department leadership is critical to the safety of Wheatland County fire personnel. Wildland fires are capable of moving over significant distances in a short period of time. It is possible that firefighting resources could become trapped during one of these events if they do not maintain a constant situational awareness.

Wheatland County, under current drought conditions, has the potential to have multiple complex wildland fire situations that could conceivably extend for several months. Wheatland County Fire Department should work toward expanding its leadership capability so the county can simultaneously deal with complex multiple ignitions.

In 1997, the “TriData Study: Wildland Firefighter Safety Awareness Study” was commissioned to find ways to improve firefighter safety. Of the 114 recommendations, the #1 recommendation was to “Implement a large-scale, long-range fuel management program.” Fire protection agencies, county officials, and the public must insist on hazardous fuel reduction efforts on a landscape-basis if they are truly serious about improving safety of not only firefighters but the public in general.

6.1.3. Property, Improvements & Facilities

Few wildland fires burn where there is not some eventual threat to homes, ranch out buildings or other structures, fences, power lines, communication sites, missile silos, wind generation facilities, or some other type of infrastructure. Fuel treatments (asset protection zones, see in Resources Section 10.4) in the immediate area around structures, designed to reduce wildland fire intensity, can dramatically improve their probability of survival. However, restricting treatments to these areas does little to protect other values-at-risk, some of which may be equally or more important from a neighborhood and/or a community standpoint.

6.1.4. Recreation

Opportunities to enjoy outdoor recreation activities can also be severely hampered by wildland fire and fires can have an adverse effect on the economy of Wheatland County. Recreation areas could be closed to the public for extended periods of time during extreme fire danger. Often these closures and restrictions occur in early fall during upland and migratory bird and big game hunting seasons when many non-county residents have plans to travel to the area.

6.1.5. Forest/Ecosystem Health

See Section 5.4 Local Fire Ecology.

6.1.6. Timber, Grazing Hay and Grain Crops

Agriculture and grazing are two of the primary uses on the private lands in Wheatland County. Haying and hay storage, grain fields and croplands are at risk during large wildland fire.

The Bureau of Land Management, USFS and State of Montana has scattered land holdings within the county and are tasked with providing rangeland and recreation use on those lands.

There is some limited potential for timber harvest within the county with most harvests occurring on private ranches.

6.1.7. Aesthetics/Scenery

Picturesque long-distance vistas especially of the Little Belts and Crazy Mountains are a very important component of the landscape. Wildfires impact the aesthetics of an area, which can further impact the economy of the county by impacting tourism.

6.2. Risk Estimation

The purpose of our fire hazard assessment model is to develop a basic fire risk assessment and to prioritize areas within a county by 5th code watershed. The assessment consists of three sub-models: fuel hazard, values at risk, and risk and was designed with the following criteria in mind:

- The model is descriptive and not predictive.
- The assessment is used to prioritize area for further analysis.
- Each model is analyzed separately before being combined in an overall risk rating in order to avoid conflicts between values.

6.2.1. Fuel Hazard Sub-Model

The hazard parameter is defined as the physical or biological factors resulting in similar fire behavior characteristics and may result in an undesired wildland fire event. The model was developed using slope, aspect, elevation and land cover type. Each criteria was weighted with land cover type weighted X 10 the slope, aspect, and elevation. A low, moderate or high rating indicates the potential for extreme fire behavior.

6.2.2. Values at Risk Sub-Model

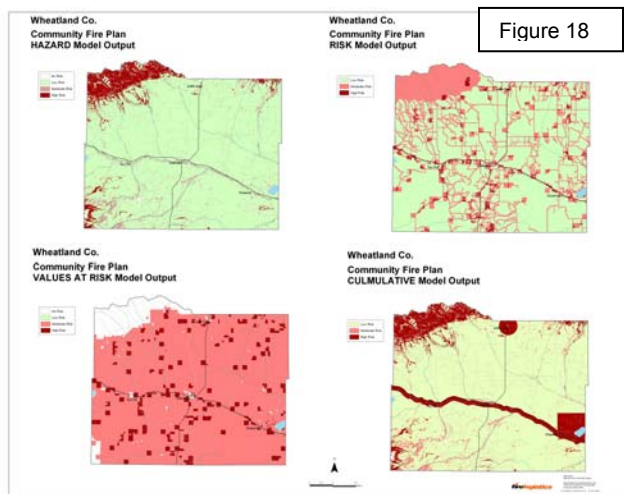
Values at Risk, or the human development data parameter, are defined as natural or developed features that can be affected by fire. Attributes for parcels with structures are extracted from the CAMA data and a point value is assigned for each parcel based on structure presence.

6.2.3. Risk Sub-Model

Risk is defined as potential risk to wildfire and is determined by the number of fire ignitions over a time period. Fire ignition points combined with the presence of railroads, roads, and residential parcels or structures are totaled and assigned a low, moderate, or high rating.

6.2.4. Final Fire Hazard Assessment

A grid or vector layer of accumulated point value will be created for each of the three models. The models will be represented separately and assigned a low, moderate or high risk for catastrophic fires. The final base map will consist of the fuel hazard model, in 30m raster format, assigned low, moderate, or high fire hazard. This hazard model will be overlaid with the values at risk (structures) and risk (historical fire occurrences and potential fire occurrence as represented by human activity near roads, railroads, and houses) models. A final rating fire hazard rating of low, moderate or high will be assigned each watershed and will identify areas in need of further assessment, Figure 18 (See Final Fire Hazard Assessment in Map Section 10.5).



In looking at the GIS generated maps of Wheatland County some areas of potential risk began to take form. When the fuel models are overlain with potential occurrence the areas most likely to experience a wildland fire can be identified. By adding the areas of human occupation or high value one can begin to assign priorities for protection. As with the federal agencies, the county's first priority is protection of human life and secondly, personal property.

6.2.5. Discussion of Risk

Most working ranches are located in open areas and have adequate clearing around them to hypothetically protect them from crown fire or a running surface fire. A problem can occur if there

is too much clutter or untended vegetation around their structures however, that would allow for a simple surface fire to ignite those structures.

Subdivision structures are inherently more vulnerable. People who own them often fail to recognize the relationship between the amount of vegetation around their structures and the threat to that structure from a wildfire. Some are even obstinate about that point refusing to remove any vegetation even though its continued presence reduces the probability that their home will survive a wildfire to almost zero. Firefighters must be very careful to look out for their own welfare first when asked to protect a structure where the owner has refused to do any work to enhance that structure's probability of surviving a wildland fire.

Areas of wildland-urban interface in Wheatland County include:

- Basin Properties at Deadman's Reservoir
- Fish Creek Hills Areas
- Judith Gap
- Harlowton, portions along the river corridor
- Shawmut
- Two Dot
- Musselshell River Corridor
- All of Wheatland County can be considered wildland urban interface due to extended drought

In looking at the GIS layered map of Wheatland County it is apparent why these priorities have been established. The subdivisions represent an aggregation of individual private investments. They are located a considerable distance from Harlowton and Judith Gap but the County Fire Warden has positioned wildland engines in close proximity, wherever possible. The structures vary in value considerably but each is important to its owner. The personal threat to the occupants in the event of a major fire is of paramount concern to Wheatland County. The limitations of the road system make evacuation uncertain and dependent on early notification. The potential for delays and/or accidents is considerable when the occupants are trying to egress and the fire protection resources are trying to ingress.

History has proven the possibility for large wildland fires in this part of the state when enough continuous fuels are available and when certain weather conditions are present. During one of these events, the actions that have been taken beforehand will generally prove to be as effective as any actions taken during the event. When conditions of extreme fire behavior exist little can be accomplished aside from evacuating people from harms way and keeping fire fighters in safe positions. Any fuel modification efforts that have been completed prior to the event will greatly enhance the fire fighter's efforts to protect property during the event.

7. Mitigation Strategy -- The Action Plan

This Chapter provides the steps that are being taken or should be taken in Wheatland County to reduce the wildland fire threats to public, fire fighters and other values at risk.

7.1. Mitigation Goals

An overarching principle of this Community Wildfire Protection Plan is that fire fighter and public safety is the highest priority!

The mitigation goals of this Community Wildfire Protection Plan are to:

- Evaluate, upgrade and maintain community wildland and structural fire preparation and response facilities, training and equipment to deal with multiple ignitions.
- Prevent threats to and destruction of property from wildland fire by adopting subdivision and zoning regulations, which include asset protection zones (defensible space), access, water supply, communications and fire stations.
- Decrease fuels to reduce wildfire intensity and impact in and around the improvements in the county.
- Help educate community members to prepare and respond to wildfire.
- Develop and implement a comprehensive emergency response plan.
- Improve training and qualifications of their personnel to more effectively interface with incoming Incident Management Teams deployed in the county and to manage multiple incidents.
- Coordinate fuels reduction opportunities between private landowners, the State of Montana, the Bureau of Land Management and the United States Forest Service.

Planning priorities of the CWPP in order of importance are:

- Protect human health and life
- Protect critical community infrastructure
- Protect private property
- Protect natural resources

7.2. Existing Mitigation Efforts

The following sections describe the existing mitigation measures that are being utilized in Wheatland County to decrease the risks from wildland or wildland-urban interface fire. Wheatland County and Wheatland County Fire Department should ensure that these efforts are supported and continued.

7.2.1. Asset Protection Zone (Defensible Space)

Generally when you look at a county in Eastern Montana, where the residents are native to Montana and have experience with the fire history in a county, you will see that some residents construct, on an annual basis, a fire break around their homes and ranch improvements (See Figure 19).

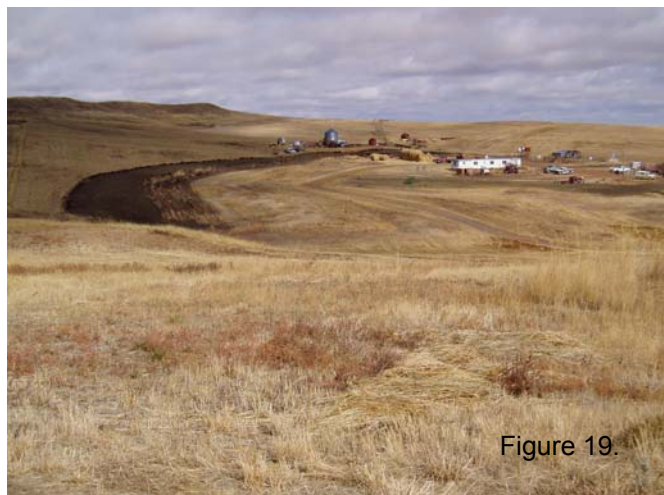


Figure 19.

The problem lies with either people inexperienced with the fire history in Wheatland County or people who build summer cabins who do not realize they need to protect themselves from wildland fires. As future development occurs within the county, the Board of County Commissioners should ensure that *Firewise* principles are adopted and that there are adequate development regulations to provide and maintain asset protection zones in these developments.

7.2.2 Fire Protection Response

Relatively long travel distances and slow travel times for fire suppression resources are the norm in Wheatland County. The County Fire Warden has located the Department of Natural Resource engines as strategically as he can throughout the county. Water tenders are also located at Judith Gap and Harlowton to support the County Fire Department with water. When a fire is reported the volunteers are notified and they respond on a closest forces concept. They also respond to new ignitions reported on USFS and BLM administered lands. In many cases, the actual land ownership cannot be accurately determined until the initial attack is in progress. When fires are located on lands other than USFS or BLM, the county fire fighters continue their actions until the fire is controlled. One of the most important decisions that must be made when a closest force resource arrives at the scene near one of the subdivisions is whether to spend their limited time on attempting suppression action or beginning evacuation of any threatened structures. It is a routine decision on low to high fire danger days but could become very critical on very high or extreme days.

When responding to a fire on federal lands that has already been initial attacked by county fire forces the federal Incident Commander (IC) will either release the county forces or continue using them depending on the situation.

If the fire is already contained the IC will most likely ask the county fire fighters if they wish to be released and, if so, continue the control and mop up with federal firefighters. When the fire is not contained or if the county forces are still needed, the IC should continue to use them. The Montana DNRC will pay the County fire fighters wages for their assistance on any fire on federal lands according to existing agreements.

7.3. Coordinated Prevention, Protection Projects, and Response Plan

Future efforts in planning and implementation of prevention, mitigation and response project should be closely coordinated between Wheatland County and their cooperating partners, i.e., BLM, USFS and the State of Montana. It is likely that some projects would be more effective if implemented on the lands of two or more jurisdictions rather than by a single entity. Cooperation and coordination will also result in avoiding duplicating efforts or overlooking opportunities to protect values at risk.

In an effort to reduce new fire starts during periods of very high or extreme fire danger, there is a statewide process for instituting fire restrictions and closures by zone in the Northern Rockies Geographic area. Wheatland County is in the Eastern Montana Zone, Figure 20. Wheatland County Fire Department and its cooperators need to be coordinated in this process to ensure close communications and common actions occur during critical periods of fire danger.

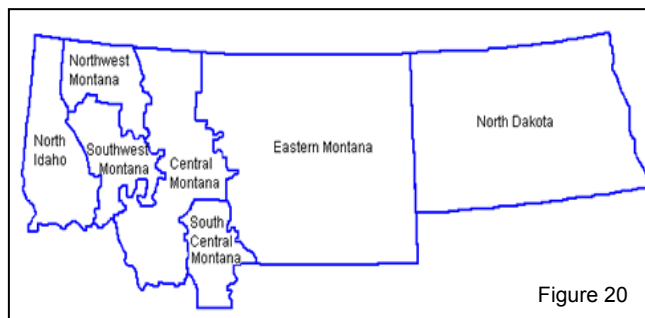


Figure 20

7.4. Prioritization Process

Recommended projects have been prioritized based on the risk estimation in Section 6.2 (See 7.6 Prioritized Actions).

7.5. Recommended Projects and Programs

This area describes recommended projects and actions that address the mitigation goals of the Chouteau County CWPP. The funding mechanism for both the State of Montana and BLM is directed toward projects that show collaboration between private, counties, tribes, state and federal partners.

7.5.1. Wildland Urban Interface Areas

Proposed Project 7.5.1.1 – The Wheatland County Board of County Commissioners should designate the following as wildland-urban interface areas in Wheatland County:

- Basin Properties at Deadman's Reservoir
- Fish Creek Hills Areas
- Judith Gap
- Harlowton, portions along the river corridor
- Shawmut
- Two Dot
- Musselshell River Corridor
- All of Wheatland County can be considered wildland urban interface due to extended drought

This will support decisions regarding fuel reduction efforts on adjacent Federal Lands.

Project Coordinator – Wheatland County Fire Warden

7.5.2. Fuel Modification Projects

This section addresses specific actions to reduce fuel loads, whether in forests, brush, or grasslands.

Proposed Project 7.5.2.1 – Form a collaborative planning group (Fire Safe Council) with the BLM and USFS, ranchers, Wheatland County Fire Department, Wheatland County Disaster & Emergency Services, Board of County Commissioners, power companies, other cooperators, and others to plan fuel reduction projects on a landscape basis.

Project Coordinator – Wheatland County Fire Warden

Proposed Project 7.5.2.2 – Annually on a collaborative basis prioritize fuels reduction projects on private and public lands.

Project Coordinator – Collaborative fire planning group

Proposed Projects 7.5.2.3 – Develop a plan to remove abandoned buildings and clean up hazardous lots in the communities in Wheatland County. These buildings and sites will contribute significantly to the fire protection problem if a fire burns into these communities.

Project Coordinators – Fire Departments, Health Department, County Attorney

7.5.2.1. Vegetation Management

Sivilcultural treatment of fuels is a technique used to eliminate a portion of the fuels in forested areas. Some of the smaller trees are cut and removed to create more growing space between the larger trees. This basic forestry practice of thinning will usually increase timber values for the landowner by concentrating annual growth in a few larger trees rather than many small trees. Limbing is another

technique accomplished by removing the lower branches of trees and like thinning it reduces the ladder fuels that allow a fire to climb from the ground up into the forest canopy. General litter cleanup is the removal of dead and downed woody debris on the forest floor that can contribute significantly to fire behavior, as these fuels tend to be very dry and readily combustible.

Recommended Project 7.5.2.1.1 – Identify strategic fuel break locations, throughout the county, along county roads that are either mail routes or school bus routes to break up the continuity of the CRP and/or wildland fuels. The fuel breaks should be constructed as wide as possible along both sides of the county road to provide an opportunity to anchor or suppress a fire.



Project Coordinator –Wheatland County Fire Warden, BLM and USFS

Proposed Project 7.5.2.1.2 – Reduce the vegetation in those areas within the subdivisions where the continued presence of the fuels represents a clear potential to generate high fire intensities. Wildland fires burning under high intensities will pose the greatest threat to structures, their inhabitants or firefighters. The county could start in those areas where fuel modification projects would have the most potential to positively impact the greatest number of people or structures. Normally, these areas would be on the western or southern edges of the subdivisions or down slope from improvements (See Figure 21). Changing crown density and interrupting the ladder fuel continuity should be highest priority. Fuel modification areas need to be a minimum of 50 feet wide and closer to 100 feet whenever possible. Look for areas of active tree or shrub encroachment where the absence of periodic natural fires has allowed vegetation, like juniper or heavy ponderosa pine regeneration, to survive. Eliminating these plants while they are young is relatively inexpensive and over time it will significantly reduce the resistance to control factor for firefighters when fighting a fire in that area. This is a treatment that can be especially effective upwind from subdivisions.

Project Coordinator – Wheatland County FD

Proposed Project 7.5.2.1.3 – Once the fuels in an area have been reduced to an acceptable level it is critical that they not be allowed to return to the condition they were in prior to treatment. Treated areas should be inspected at 5-10 year intervals to determine if they would still be effective during a wildland fire. Most likely they will need some type of follow up maintenance, at that point in time, but this work should require less effort and at a reduced cost from the original treatment. If it is not accomplished periodically the full treatment costs will be required again in 20-30 years.

Project Coordinator – Wheatland County FD

Proposed Project 7.5.2.1.4 – Plan and develop a fuel break around the western and southern edge of Harlowton. This will enable the fire agencies to more safely and efficiently protect the Town of Harlowton.

Project Coordinator – Wheatland County FD and Harlowton FD

Proposed Project 7.5.2.1.5 – Plan projects to develop water and reduce fuels in the areas of the county adjacent to the USFS and BLM with the involvement of the Rocky Mountain Elk Foundation.

Project Coordinator – Wheatland County FD, USFS and BLM

Recommended Project – 7.5.2.1.6 – Work with owners of cottonwood river bottoms where an early spring or late fall fire in the river bottoms will threaten Harlowton, Shawmut or Two Dot or other communities to

implement a fuel management prescription that would divide the cottonwood stands into 40 acre blocks separated by plowed lines that are at least 15 feet wide.

Project Coordinator – Wheatland County FD

Proposed Project 7.5.2.1.7 – Plan and develop a fuel break around Judith Gap, Shawmut and Two Dot. This will enable the fire agencies to more safely and efficiently protect the communities of Judith Gap, Shawmut and Two Dot.

Project Coordinator – Wheatland County FD, Judith Gap FD, Shawmut Fire, Two Dot Fire

7.5.2.2. Prescribed Burning

Prescribed burning—or controlled burning—is a relatively quick and inexpensive way to reduce fuel loads. However, in many situations, especially where there are structures nearby, preparatory work needs to be done to reduce the overall risk involved with conducting a prescribed burn.

The County Fire Department should continue to explore the opportunities for using prescribed fire on private lands within the County. There are some tangible benefits to local ranchers when they use low to moderate intensity prescribed fire to increase the quantity and palatability of grass on pastures, especially on those now occupied by sagebrush or other brushy hardwood species. It will also set back the encroachment of ponderosa pine into grasslands where this is a problem. Forage levels have been increased two to four times the pre-burn levels on many sites in Montana and sage has been reduced to about 10 percent of pre-burn levels. One drawback to prescribed fire is that the area to be burned should not be grazed for one season prior to burning and one season after burning. The reasons are to insure enough fine fuels are present on the site to adequately carry the fire during burning and to allow the new and/or rejuvenated grass plants adequate time to develop healthy root systems the following growing season. Another drawback is the potential for noxious weed species to invade a recently burned site. Several research publications completed by the Intermountain Research Station discuss the types of results that can be expected.

Areas that have been previously treated by prescribed fire make effective fuel breaks when attempting to control a wildland fire. The lighter nature of the grassy fuels reduces the resistance to control required of firefighters and if the lands have been grazed, may even cause the fire to burn itself out on its own.

One of the greatest benefits to prescribed burning is the training opportunity it provides for the volunteers. On a wildfire they are often forced to be reactive rather than to plan and execute actions in a more orderly fashion. When conducting a prescribed burn they will be able to observe fire behavior in a non-emergency setting. They will also learn how to effectively ignite the area to be burned and how to deploy the holding forces to make the best use of available skills and equipment. All of this can be accomplished while functioning in the serious but more controlled environment of a prescribed fire.

Proposed Project 7.5.2.2.1 – Opportunities may arise from planning efforts to jointly conduct prescribed fire projects. Wheatland County Fire Department should participate in these burns to improve their training, qualifications and experience in wildland fire management. Efforts such as these promote better interagency cooperation and working relationships.

Project Coordinator – Wheatland County FD/USFS/BLM

Proposed Project 7.5.2.2.2 – Work with the Wheatland County Weed Department to establish a wash requirement for contractors, other local and government apparatus that conduct prescribed burns within the county.

Project Coordinator – Wheatland County Weed and Fire Departments

7.5.2.3. Grazing

Wheatland County can expect some continued encroachment of fires off of timbered grounds, such as the USFS and BLM onto private ownership.

Proposed Project 7.5.2.3.1 - Landowners should be encouraged to sustain grass ecosystems through grazing and to control tree encroachment in those areas, particularly where they are adjacent to heavily timbered federal lands.

Project Coordinator – Wheatland County FD

7.5.2.4. Industrial Resource Management

Proposed Project 7.5.2.4.1 – Request that the companies operating the gas transmission lines in Wheatland County develop and maintain a facilities protection plan for wildfire and that they identify high value improvements and special hazards that would present a risk to County fire fighters responding to the area.

Project Coordinator – Wheatland County FD

7.5.2.5. Biomass Utilization

Proposed Project 7.5.2.5.1 – Explore any opportunities to dispose of biomass material on either a profit or break even basis. If there is no market for chips or hog fuel in the area and no possibility of utilization for posts or poles, look at designating a site or sites where material can be safely piled and burned during low fire danger periods. Continued use of some of the material for fire wood by community members is encouraged (See Figure 22).



Figure 22

Project Coordinator – Snowy Mountain Development Corporation

Proposed Project 7.5.2.5.2 – Explore involving the local RC&D or Snowy Mountain Development Corporation to work with existing or new businesses and try to utilize fuel reduction biomass to make marketable products.

Project Coordinator – Snowy Mountain Development Corporation

Proposed Project 7.5.2.5.3 – Explore the possibility of converting any existing boilers in Shawmut, Judith Gap, and Harlowton to multi-fuel systems to burn biomass generated by fuels reduction projects.

Project Coordinator – Snowy Mountain Development Corporation

7.5.3. Safety Zones

The establishment of safety zones within some of the subdivisions is probably the best approach to protecting human life during a fast moving fire, especially when residents are faced with the alternative of trying to navigate narrow roads under smoky conditions. Any required clearance work on these identified areas should be accomplished prior to fire season as labor and equipment become available. One

important point is to insure that the development of procedures, such as when to occupy them and what should and should not be taken into them, are clearly understood by anyone who may need to use them.

Proposed Project 7.5.3.1 – Review each subdivision and determine if safety zones may be necessary considering ingress and egress issues as well as the surrounding fuel type. Where they are appropriate, assist the subdivision residents in determining where to locate them, what maintenance work needs to be done and how and when they should be used.

Project Coordinator – Wheatland County FD and USFS

7.5.4. Infrastructure Improvements

Improvements to improve local infrastructure are discussed in this section.

7.5.4.1. Water Supply

Although water supply is not a direct function of the Wheatland County Fire Department, water supply unquestionably impacts the structure fire suppression performance of the department. Water supply, or lack of water supply, indirectly affects the whole community through the insurance rates they pay.

Proposed Project 7.5.4.1.1 – Document the strategic water source plan for the county, which shows the most efficient sources of water to support wildland firefighting efforts. GPS the locations of water supply points and develop a water supply map for Wheatland County.

Project Coordinator – Wheatland County FD

Proposed Project 7.5.4.1.2 – Continue to encourage homeowners associations, ranchers and individuals to develop water sources that can be used by fire protection personnel.

Project Coordinator – Wheatland County Fire

Proposed Project 7.5.4.1.3 – Coordinate with ranchers in the northern portion of the County on development of dry hydrants.

Project Coordinator – Wheatland County Fire Warden

7.5.4.2. Utilities

Proposed Project 7.5.4.2.1 – The Wheatland County FD should work with Fergus Electric and Northwestern Energy to ensure that the required clearances are maintained for all electrical transmission lines and facilities in the Wheatland County.

Project Coordinator – Wheatland County FD

Proposed Project 7.5.4.2.2 – The Fergus Electric Cooperative and/or Northwestern Energy should provide power line safety demonstrations to the Wheatland County Fire Department members.

Project Coordinator – Wheatland County FD and Power Company Managers

Proposed Project 7.5.4.2.3 – Work with the operators of the Judith Gap Wind Energy Center to develop a fire plan for the facility which incorporates fuel breaks along access routes and asset protection zones around important facilities in the Wind Energy Center.

Project Coordinator – Wheatland County Fire and Judith Gap Wind Energy Center.

7.5.4.3. Emergency Response

Emergency response to wildland, wildland-urban interface and structure fires includes the placement of stations, apparatus and personnel to meet the needs of the community.

Proposed Project 7.5.4.3.1 – Develop a capital improvement plan to up-grade fire apparatus, fire stations and equipment in Wheatland County Fire Department.

Project Coordinators – Wheatland County Fire Chief with assistance of the Wheatland County Board of County Commissioners.

Proposed Project 7.5.4.3.2 – Work with the county commissioners to develop a long-term plan to provide structural fire services to as many structures throughout the county as possible. One mechanism might be what is called an ISO Engine, which is basically a beefed-up brush engine with ladders, breathing apparatus and some minor equipment. To qualify for Class 9 Fire Protection, an apparatus needs to have a pump capable of delivering 50 gpm or more at 150 psi and a tank of at least 300 gallons. There should be training records, which indicate date and time, location of fires, number of members, meetings, training sessions, maintenance of apparatus, etc. A roster of fire department personnel should be kept up to date. Equipment is 250 foot lengths of ¾ inch or 1 inch booster hose, 1 ½ pre-connects or equivalent with a nozzle, 2 portable fire extinguishers. Minimum size should be 20 BC with 10 BC 2A rating, one 12 ft ladder with folding hooks, one 24 foot extension ladder, one pick head axe, 2 electric hand lights, one pike pole, one bolt cutter, one closet tool and one crow bar. These standards qualify an engine and meets ISO to get your rating from a 10 to a 9.

Project Coordinator – Wheatland County FD and Wheatland County Commissioners

Proposed Project 7.5.4.3.3 – Develop a cooperative fire response and fire prevention plan for the Assembly of God Church Camp (Ranger Mountain) in Timber Creek. The Assembly of God Church Camp is located in Fergus County; however the fire protection response is going to come from the USFS, Wheatland County Fire and Golden Valley Fire.

Project Coordinators – Wheatland, Golden Valley, and Fergus County Fire Wardens, Wheatland, Golden Valley, and Fergus DES Coordinators, USFS

7.5.4.3.1. Fire Stations

Proposed Project 7.5.4.3.1.1 – Establish a plan to upgrade the fire station facilities in Shawmut and Two Dot to provide more space for fire apparatus and equipment.

Project Coordinators – Wheatland County Fire Department and Board of County Commissioners

Proposed Project 7.5.4.3.1.2 – Design, fund and construct a new fire station for the Harlowton Fire Department that includes training facilities and meeting space.

Project Coordinators – Fire Chief Dean Thompson, Harlowton City Council, and Wheatland County Commissioners.

7.5.4.3.2. Fire Apparatus

Proposed Project 7.5.4.3.2.1 – Develop specifications for and purchase a water tender for Judith Gap Fire Department.

Project Coordinator – Fire Chief Mauws

Proposed Project 7.5.4.3.2.2 – Obtain a wildland engine for the Judith Gap Fire Department.

Project Coordinator – Fire Chief Mauws, County Fire Warden, & DNRC

7.5.4.3.3. Training, Certification, and Qualification

Proposed Project 7.5.4.3.3.1 – Continue to encourage County fire fighters to meet all training requirements, wear their personal protective equipment and to take the firefighter pack test each year.

Project Coordinator – Wheatland County Fire Chief

Proposed Project 7.5.4.3.3.2 – Develop ICS training needs for Wheatland County Fire personnel.

Project Coordinator – Wheatland County FD

Proposed Project 7.5.4.3.3.3 – Train Incident Commanders to request and understand a spot fire weather forecast.

Project Coordinator – Wheatland County FD

Proposed Project 7.5.4.3.3.4 – Develop a training program which encompasses the County Fire Chief, County Sheriff's office, Disaster and Emergency Service officials. and the County Commissioners as participants. The purpose would be to maintain their currency with the fire program and to review their roles and responsibilities as government officials. This training would provide the skill level to determine the appropriate level of Incident Management Team (IMT) and the ability to write a delegation to the IMT, which would include the management objectives of local government for the emergency incident.

Project Coordinator – Wheatland County FD

7.5.4.3.4. Operational Procedures & Programs

Proposed Project 7.5.4.3.4.1 – Wheatland County Fire Chief needs to continue keeping records on fire responses to all areas within the county to establish a fire history and occurrence map. This information will be invaluable in establishing mitigation activities and future funding requirements. The records should include a GPS location of each fire under 100 acres and the perimeters of those over 100 acres.

Project Coordinator – Wheatland County FD

Proposed Project 7.5.4.3.3.2 – Wheatland County Fire Department should order the County Assistance Team (CAT) as early as possible during an emerging incident to avoid experiencing key overhead shortages and overloading Wheatland County personnel.

Project Coordinator – Wheatland County FD

Proposed Project 7.5.4.3.3.3 – Include a requirement in the Wheatland County Weed Plan that fire suppression equipment from outside the county be washed down prior to fire suppression activities to eliminate weed seeds and other noxious species moving into Wheatland County. Selected sites throughout the county should be established, and a portable wash-down facility developed to accomplish this. Engage interagency partners in this effort.

Project Coordinator – Wheatland County Weed Department with support from the Wheatland County FD

Proposed Project 7.5.4.3.3.4 – Develop a plan that will alternately schedule a county Duty Officer or Relief Duty Officer to be on call daily during the critical fire season months. The intent of this

recommendation is to insure that key personnel are getting sufficient rest periodically and that they do not go through the entire season without a break.

Project Coordinator – Wheatland County Fire Chief

Proposed Project 7.5.4.3.3.5 – Develop a training program for Wheatland County ranchers to enable them to safely assist Wheatland County Fire on incident, while being incorporated into the Incident Command System used by Wheatland County.

Project Coordinator – Wheatland County Fire Chief

7.5.4.4. Access

It is important that Wheatland County Fire Department be able to find and defend homes throughout the county. If street signs and numbers are made from combustible materials, the street signs can ignite or melt, leaving the Fire Department or assisting agencies with no ability to locate roads or homes.

Proposed Project 7.5.4.4.1 – As road signs are replaced throughout the county, they should be non-combustible reflective road signs that would withstand a wildland fire.

Project Coordinator – Wheatland County Road Department and Wheatland County Commissioners

Recommended Project 7.5.4.4.2 – Install road name signs that are non-combustible and reflective on all roads that currently do not have signs.

Project Coordinator – Wheatland County Road Department

Recommended Project 7.5.4.4.3 – Include all wooden bridges on Wheatland County roads in a capital improvement fund to be replaced with non-combustible bridges.

Project Coordinator – Wheatland County Commissioners

7.5.5. Asset Protection Zone (Defensible Space)

One of the single most important mitigating factors to increase the chances for the home's survival during a wildland-urban interface fire is the creation and maintenance of an asset protection zone (defensible space). Defensible space refers to an area around the home where the native vegetation has been modified to reduce the wildland/urban interface fire threat to the home and provides a safe area for fire fighters to work effectively and safely, Figure 23 (See Asset Protection Zone Guideline Table in Resources Section 10.4).

Slope and fuels affect the size of the defensible space. Homes near steep slopes and in heavy fuels will need to clear additional vegetation to mitigate the effects of the radiant and convective heat currents and flame lengths. The slopes should be planted to native vegetation that is fire resistant.

Proposed Project 7.5.5.1 - The National Fire Plan suggests that local governments develop and adopt local land use plans and ordinances that provide for the maintenance of defensible

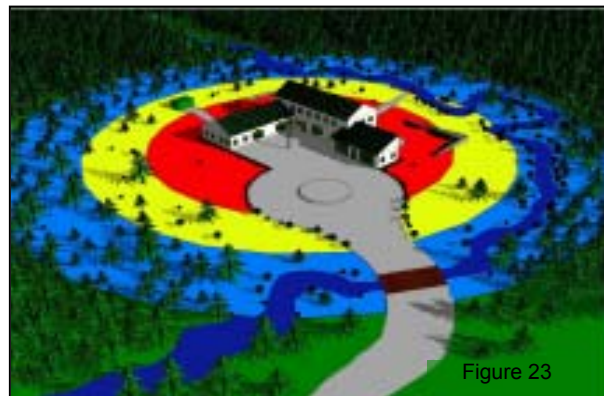


Figure 23

space and fuel management on municipal and private property.¹³ The Wheatland County Commissioners should develop land use plans and ordinances that provide for defensible space and fuel management.

Project Coordinator – Wheatland County FD

Proposed Project 7.5.5.2 – Encourage home and cabin owners in Wheatland County to develop and maintain an asset protection zone (defensible space) around their homes, cabins, ranch buildings and other important improvements.

Project Coordinator – Wheatland County Conservation District

7.5.6. Recommended Building Materials/Firewise Construction

A home may be vulnerable to a wildland/urban interface fire because of its design, construction and/or location. There are steps a homeowner or developer can take to reduce the chance of home catching fire, or resist further damage if it does catch fire. There are three ways that a wildland fire can cause homes and businesses to catch fire – through radiation, convection and/or fire brands. In all cases, the home's building materials and design play a significant role in establishing the level of exposure that can be tolerated before it ignites from radiation, convection, and/or fire brands.

Homes in a wildland urban interface area can be designed and maintained to increase the chances of surviving a wildland fire without the intervention of the fire department.

Proposed Project 7.5.6.1 – Encourage the use of Firewise Construction, Design and Materials¹⁴ and Firewise Construction Checklist¹⁵ to developers and homebuilders. Existing homeowners can use *Is Your Home Protected From Wildfire Disaster? A Homeowner's Guide to Wildfire Retrofit*¹⁶ (See in Resources Section 10.4).

Project Coordinator – Wheatland County FD

7.5.7. Fire-Resistant Landscaping

The landscaping plan of the homeowner is an integral component of the defensible space developed by the homeowner. Each lot should be thought of in terms of four zones, with each zone having a different purpose and emphasis in the overall defensible space concept for the property (See Figure 24).

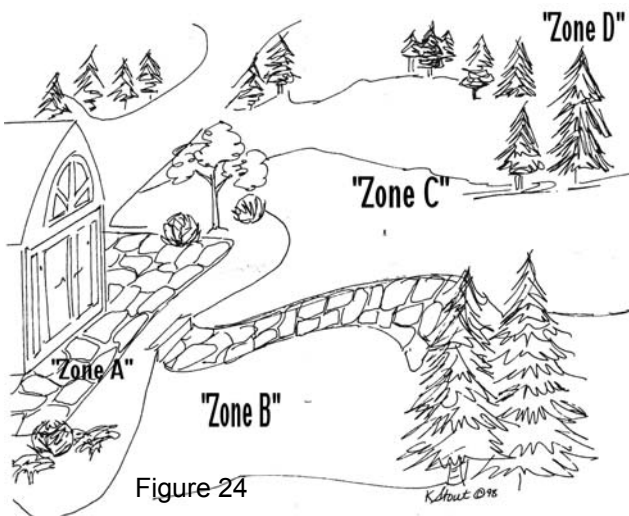


Figure 24

Zone A consists of the area from immediately next to the home to a distance of approximately five feet. The primary purpose of this zone is to have the least flammable type of landscaping immediately adjacent to the home to prevent ignition from firebrands and direct flame contact.

Zone B lies between five feet and at least 30 feet from the home. This zone provides the critical area where fire fighters can defend the home and where the fuels have been substantially reduced in height and volume.

¹³ See www.westgov.org/wqa/initiatives/fire/implem_plan.pdf

¹⁴ *Firewise Construction, Design and Materials*, Stack, Colorado Forest Service

¹⁵ www.firewise.org.

¹⁶ www.ibhs.org

Zone C represents the lot from 30 feet to approximately 60 feet from the structure. This area lies outside the formal landscape area and should be modified as described in the asset zone guidelines, which are attached.

Zone D is the property perimeter buffer which is 60 feet to the property line for lots 2 ½ acres or less or 60 feet to 200 feet around the perimeter of lots larger than 2.5 acres. This serves as a transition zone where you want to reduce the wildfire rate of spread and intensity, begin bringing the fire from a crown fire into a ground fire so that fire department resources can safely respond.

Provisions should be made as each phase is submitted for review to ensure the landscaping plans are reviewed for their appropriateness as a component of the defensible space requirement for the property. Provisions also need to be made by the developer to ensure long-term continuing maintenance for the defensible space surrounding the homes and businesses in the project. (See Asset Protection Zone Guidelines, Firewise Landscaping Checklist¹⁷, Fire and Your Landscape, Fire Scaping Resources for Montana Homeowners¹⁸ in Resources Section 10.4 of the CWPP).

Proposed Project 7.5.7.1 – Utilize the Firewise Landscaping Checklist and Fire and Your Landscape (See in Resources Section 10.4).

Project Coordinator – Wheatland County FD

7.5.8. Evacuation Plan

Getting people out of harms way in a fire is critical. This section addresses specific projects designed to move people quickly, safely, and effectively.

Proposed Project 7.5.8.1 – Develop a cooperative evacuation plan for the Basin Properties subdivision located near Deadman’s Reservoir.

Project Coordinator – Wheatland County Sheriff and DES Coordinator and Golden Valley County Sheriff/DES Coordinator.

7.5.9. Public Education

Educating residents about wildland fire issues is one of the most effective ways to reduce fire hazards, whether that be in K-12 schools, or programs designed for adults. Public education is one of the keys to the success of fire management programs whether they are local, state or federal. Fire is an important issue for the public and public understanding is key to the fire agencies ability to effectively manage wildland fire and wildland fire incidents.

Proposed Project 7.5.9.1 – Sponsor a annual Firewise Community Program locally within the county for the public. Integrate weeds and fire into any public education that is conducted during the Firewise Community Program.

Project Coordinator – Wheatland County FD

Proposed Project 7.5.9.2 – Develop public education kiosk’s in key locations throughout the county with *Firewise* information, fire danger information and public safety messages.

Project Coordinator – Wheatland County, USFS and BLM

Proposed Project 7.5.9.3 – Locate Fire Danger Rating Signs along primary roadways in the county.

¹⁷ www.firewise.org

¹⁸ *Montana Nursery & Landscape Assoc. 2003*

Project Coordinator – Wheatland County, USFS and BLM

Proposed Project 7.5.9.4 – Develop a specific Wheatland County *Firewise* brochure that details the Wheatland County Community Wildfire Protection Plan, asset protection zones (defensible space) guidelines, and fire apparatus ingress and egress requirements.

Project Coordinator – Wheatland County Conservation District

Proposed Project 7.5.9.5 – Utilize the Wheatland County Conservation District’s newsletter to deliver fire safety messages and information about how to prepare for a wildland fire.

Project Coordinator – Wheatland County Conservation District

7.5.10. Legal Requirements

7.5.10.1. Subdivision Regulations

History has shown past voluntary land use, planning, zoning, and construction methods have been largely lacking or inadequate in high-risk fire areas, and need to be implemented in the future. Local government governing bodies have a responsibility to provide the commitment and leadership for the coordination, collaboration, and communication necessary to develop and implement building standards, land use and zoning regulations, and defensible space requirements necessary to reduce the risks in the wildland urban interface.

Proposed Project 7.5.10.1.1 – Consider incorporating the concepts in the model fire protection standards into the County Subdivision Regulations in the Resources Section 10.4.

Project Coordinator – Wheatland County FD and Wheatland County Board of County Commissioners

Proposed Project 7.5.10.1.2 – The County Fire Chief needs to ensure that structural and wildland fire concerns are addressed in the subdivision review process for any future planned subdivision. The purpose for his input is to avoid creation or perpetuation of any untenable situations, from a fire protection standpoint. Issues such as road systems, water supply, building materials and covenants covering vegetation management are all of concern to the Fire Chief and they can directly affect his department’s ability to be effective in fire suppression and prevention.

Project Coordinator – Wheatland County FD

Proposed Project 7.5.10.1.3 – The USFS and the BLM both should review subdivisions adjacent to their protection to ensure adequate fire protection features are designed into the projects.

Project Coordinator – BLM and USFS, Wheatland County Planning Department

7.5.10.2. Agreements, MOU’s & Operating Plans

Proposed Project 7.5.10.2.1 – Review all verbal and written agreements and memorandums of understanding with cooperators. Follow up on those that have not yet been completed and insure annual operating plans are completed when specified. The following key points should be adequately covered within the agreements so that there are no unanswered questions:

- Clearly state who has jurisdiction for and will provide an IC for fires on BLM, USFS and county lands, respectively.

- When one agency responds first to another agency's fire, clarify what the rules of engagement, disengagement and expectations are for that agency when the responsible agency arrives at the scene.
- When a complexity analysis indicates a Type III, Type II or Type I Incident Management Team is needed, how is that request processed and who must approve it.
- Who will be the county liaison with that overhead team?
- Detail the process that the county needs to follow in order to obtain aviation resources such as air tankers and helicopters in a timely manner.
- Lay out reimbursement procedures.

Project Coordinator – Wheatland County Fire Chief, BLM and USFS

Proposed Project 7.5.10.2.2 – Either update or establish mutual aid agreements with neighboring counties and fire agencies to ensure the availability of adequate resources for wildland fire incidents.

Project Coordinator – Wheatland County Fire Chief, BLM and USFS

Proposed Project 7.5.10.2.3 – Develop materials and training programs to ensure that a delegation of authority is properly executed between the appropriate "Authority Having Jurisdiction" and the Type III, II, or I Incident Commanders.

Project Coordinator – Wheatland County Fire Warden

7.6. Prioritized Actions, Implementation Timeline

Proposed Project Table

Proposed Project	Short Term (< 1 Year)	Medium Term (1-3 Years)	Long Term (3+ Years)
7.5.1.1	X		
7.5.2.1	X		
7.5.2.2	X		
7.5.2.3		X	
7.5.2.1.1		X	
7.5.2.1.2			X
7.5.2.1.3			X
7.5.2.1.4		X	
7.5.2.1.5		X	
7.5.2.1.6		X	
7.5.2.1.7		X	
7.5.2.2.1	X		
7.5.2.2.2	X		
7.5.2.3.1	X		
7.5.2.1.4	X		
7.5.2.5.1	X		
7.5.2.5.2		X	
7.5.2.5.3		X	
7.5.3.1	X		
7.5.4.1.1		X	
7.5.4.1.2	X		
7.5.4.1.3		X	
7.5.4.2.1		X	
7.5.4.2.2		X	
7.5.4.2.3		X	
7.5.4.3.1		X	
7.5.4.3.2		X	
7.5.4.3.3	X		
7.5.4.3.1.1		X	

Proposed Project Table (continued)

Proposed Project	Short Term (< 1 Year)	Medium Term (1-3 Years)	Long Term (3+ Years)
7.5.4.3.1.2		X	
7.5.4.3.2.1		X	
7.5.4.3.2.2		X	
7.5.4.3.3.1	X		
7.5.4.3.3.2		X	
7.5.4.3.3.3		X	
7.5.4.3.3.4			X
7.5.4.3.4.1	X		
7.5.4.3.3.2	X		
7.5.4.3.3.3	X		
7.5.4.3.3.4	X		
7.5.4.3.3.5	X		
7.5.4.4.1	X		
7.5.4.4.2		X	
7.5.4.4.3		X	
7.5.5.1		X	
7.5.5.2	X		
7.5.6.1	X		
7.5.7.1	X		
7.5.8.1		X	
7.5.9.1	X		
7.5.9.2		X	
7.5.9.3		X	
7.5.9.4		X	
7.5.9.5	X		
7.5.10.1.1	X		
7.5.10.1.2		X	
7.5.10.1.3		X	
7.5.10.2.1	X		
7.5.10.2.2		X	
7.5.10.2.3		X	

8. Plan Monitoring and Review: How to Keep this Plan Active and Up-to-Date

8.1. Timeline

DMA 2000 requires that plans be updated every five years. This does not mean you have to rewrite it or redo this entire process. Rather, you are required to review your mitigation plan.

Proposed projects should be updated as the keeper of the plan becomes aware of new projects that might be implemented to mitigate a wildland fire problem. The prioritized project list should be revised every year based on new data and available dollars. The entire plan should be updated or reviewed on the same cycle as the pre-disaster mitigation plan.

8.2. Incorporation into Local Jurisdictional Plans

This plan should be adopted by local Wheatland County and the recommendations be incorporated into their other planning mechanisms, such as a County Growth Policy and Pre-Disaster Mitigation Plan.

9. Summary and Conclusions

9.1. Analysis and Findings

The complexity of the wildland fire program has significantly changed in Wheatland County over the last 15 years, due the development of wildland-urban interface, long term drought, and changes in the wildland ecosystems. The leadership and the level of fire preparedness within Wheatland County have been able to keep pace with this changing environment through the efforts of the County Fire Warden. The Wheatland County Board of Commissioners need to recognize this effort and also need to be supportive of future needs of the County's fire forces to further respond to a changing fire environment and the associated public safety risks.

In the recommended projects and programs section of this report, Section 7.5, significant changes are recommended. Funding for many of these suggested projects and programs can be obtained through the National Fire Plan and FEMA grant programs. The Wheatland County Board of Commissioners are strongly encouraged to utilize a grant writer to increase the wildland fire suppression, public education, training and qualifications capability of the Wheatland County and County Fire Department.

10. Appendices

10.1. Bibliography

10.2. Glossary

10.3. Public Education Materials

10.4. Resources

10.5. Maps