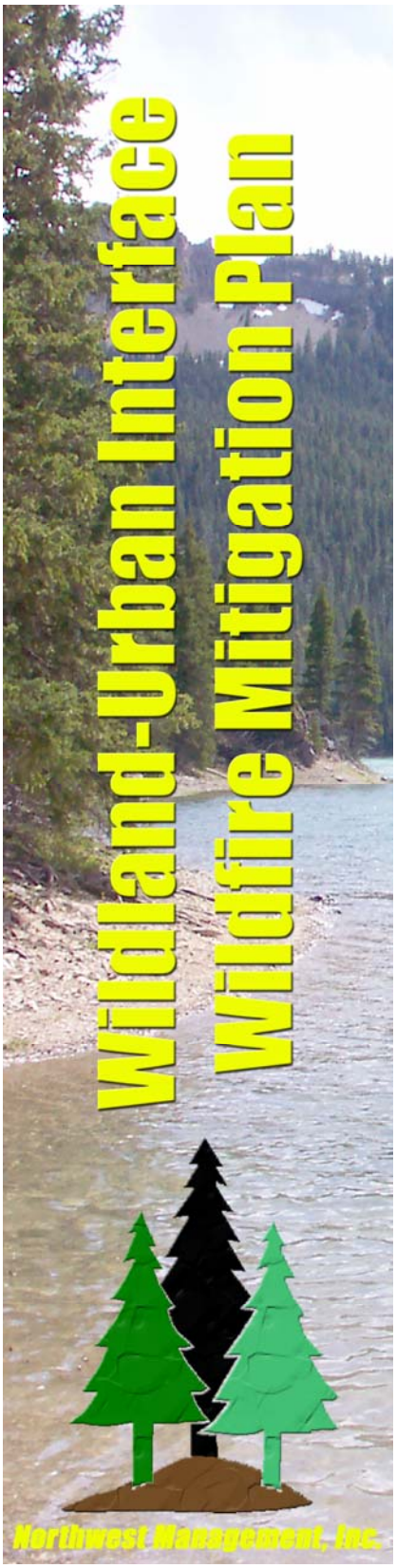

Fergus County, Montana, Wildland-Urban Interface Wildfire Mitigation Plan

Main Document

September 15, 2004

Vision: *Institutionalize and promote a countywide wildfire hazard mitigation ethic through leadership, professionalism, and excellence, leading the way to a safe, sustainable Fergus County.*

This plan was developed by the Fergus County Wildland-Urban Interface Wildfire Mitigation Plan Committee in cooperation with Northwest Management, Inc., P.O. Box 565, Helena, MT 59624, Phone: (406) 442-7555, Fax: (406) 495-9605, www.Consulting-Foresters.com

Acknowledgments

This Wildland-Urban Interface Wildfire Mitigation Plan represents the efforts and cooperation of a number of organizations and agencies, through the commitment of people working together to improve the preparedness for wildfire events while reducing factors of risk.

Fergus County Commissioners,
the employees of Fergus County,
Fire Districts of Fergus County,
Local Businesses and
Citizens of Fergus County

Snowy Mountain Development Corporation

USDI Bureau of Land Management

USDA Forest Service

Montana Disaster and Emergency Services

Fergus County Disaster and Emergency Services

Federal Emergency Management Agency

Montana Department of Natural Resources and Conservation

Northwest Management, Inc.

To obtain copies of this plan contact:

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Courthouse
712 W Main St.
Lewistown, Montana 59457-2562
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Chapter I: Overview of this Plan and its Development

1 Introduction

This Wildland-Urban Interface Wildland Fire Mitigation Plan for Fergus County, Montana, is the result of analyses, professional cooperation and collaboration, assessments of wildfire risks and other factors considered with the intent to reduce the potential for wildfires to threaten people, structures, infrastructure, and unique ecosystems in Fergus County, Montana. The planning team responsible for implementing this project was led by the Fergus County Commissioners. Agencies and organizations that participated in the planning process included:

- Snowy Mountain Development Corporation
- USDI Bureau of Land Management
- USDA Forest Service
- USDI Fish and Wildlife Service
- Montana Department of Natural Resources and Conservation
- Central Montana Resource Conservation and Development
- District VI Disaster and Emergency Services
- Fergus County Commissioners and Fergus County Departments
- Cheadle Volunteer Fire Department
- Coffee Creek Volunteer Fire Department
- Cottonwood-Beaver Creek Volunteer Fire Department
- Denton Volunteer Fire Department
- Grass Range Volunteer Fire Department
- Grass Range Rural Volunteer Fire Department
- Heath Volunteer Fire Department
- Hilger Volunteer Fire Department
- Lewistown City Fire Department
- Lewistown Rural Fire Department
- Moore Volunteer Fire Department
- Moore Rural Fire District
- North Fork Flatwillow Volunteer Fire Department
- Roy Volunteer Fire Department
- Surenuff Volunteer Fire Department
- Winifred Volunteer Fire Department
- Northwest Management, Inc.

The Fergus County Commissioners, working cooperatively with the Snowy Mountain Development Corporation, solicited competitive bids from companies to provide the service of leading the assessment and the writing of the **Fergus County Wildland-Urban Interface Wildland Fire Mitigation Plan**. The Commissioners selected Northwest Management, Inc., to provide this service. Northwest Management, Inc., is a professional natural resources consulting firm located in Helena, Montana. Established in 1984, in Moscow, Idaho, NMI provides natural resource management services across the USA. The Project Manager from Northwest Management, Inc. was Dr. William E. Schlosser, a professional forester and regional planner.

1.1 Goals and Guiding Principles

1.1.1 Federal Emergency Management Agency Philosophy

Effective November 1, 2004, a Local Hazard Mitigation Plan approved by the Federal Emergency Management Agency (FEMA) is required for Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation Program (PDM) eligibility. The HMGP and PDM program provide funding, through state emergency management agencies, to support local mitigation planning and projects to reduce potential disaster damages.

The new local hazard mitigation plan requirements for HMGP and PDM eligibility is based on the Disaster Mitigation Act of 2000, which amended the Stafford Disaster Relief Act to promote an integrated, cost effective approach to mitigation. Local hazard mitigation plans must meet the minimum requirements of the Stafford Act-Section 322, as outlined in the criteria contained in 44 CFR Part 201. The plan criteria covers the planning process, risk assessment, mitigation strategy, plan maintenance, and adoption requirements.

FEMA will only review a local hazard mitigation plan submitted through the appropriate State Hazard Mitigation Officer (SHMO). Draft versions of local hazard mitigation plans will not be reviewed by FEMA. FEMA will review the final version of a plan prior to local adoption to determine if the plan meets the criteria, but FEMA will be unable to approve it prior to adoption. In Montana the SHMO is:

Montana Disaster and Emergency Services
P.O. Box 4789 - 1900 Williams Street
Helena, Montana 59604-4789
Dan McGowen, 841-3911 - FAX: 841-3965

A FEMA designed plan will be evaluated on its adherence to a variety of criteria.

- Adoption by the Local Governing Body
- Multi-jurisdictional Plan Adoption
- Multi-jurisdictional Planning Participation
- Documentation of Planning Process
- Identifying Hazards
- Profiling Hazard Events
- Assessing Vulnerability: Identifying Assets
- Assessing Vulnerability: Estimating Potential Losses
- Assessing Vulnerability: Analyzing Development Trends
- Multi-Jurisdictional Risk Assessment
- Local Hazard Mitigation Goals
- Identification and Analysis of Mitigation Measures
- Implementation of Mitigation Measures
- Multi-Jurisdictional Mitigation Strategy

- Monitoring, Evaluating, and Updating the Plan
- Implementation Through Existing Programs
- Continued Public Involvement

1.1.2 Additional State and Federal Guidelines Adopted

The Wildland-Urban Interface Wildfire Mitigation Plan component of this All Hazards Mitigation Plan will include compatibility with FEMA requirements while also adhering to the guidelines proposed in the National Fire Plan and the Healthy Forests Restoration Act (2004). This Wildland-Urban Interface Wildland Fire Mitigation Plan has been prepared in compliance with:

- The National Fire Plan; A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-Year Comprehensive Strategy Implementation Plan–May 2002.
- Northern Rockies Coordinating Group
- Healthy Forests Restoration Act (2004)
- The Federal Emergency Management Agency's Region 10 guidelines for a Local Hazard Mitigation Plan as defined in 44 CFR parts 201 and 206, and as related to a fire mitigation plan chapter of a Natural Hazards Mitigation Plan.

> ***"When implemented, the 10-Year Comprehensive Strategy will contribute to reducing the risks of wildfire to communities and the environment by building collaboration at all levels of government."***
> **- The NFP 10-Year Comprehensive Strategy August 2001**

The objective of combining these four complimentary guidelines is to facilitate an integrated wildland fire risk assessment, identify pre-hazard mitigation activities, and prioritize activities and efforts to achieve the protection of people, structures, the environment, and significant infrastructure in Fergus County while facilitating new opportunities for pre-disaster mitigation funding and cooperation.

1.1.2.1 National Fire Plan

The goals of this Wildland-Urban Interface Fire Mitigation Plan include:

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

Its three guiding principles are:

1. Priority setting that emphasizes the protection of communities and other high-priority watersheds at-risk.
2. Collaboration among governments and broadly representative stakeholders
3. Accountability through performance measures and monitoring for results.

This Wildland-Urban Interface Fire Mitigation Plan fulfills the National Fire Plan's 10-Year Comprehensive Strategy. The projects and activities recommended under this plan are in

addition to other Federal, state, and private / corporate forest and rangeland management activities. The implementation plan does not alter, diminish, or expand the existing jurisdiction, statutory and regulatory responsibilities and authorities or budget processes of participating Federal, State, and tribal agencies.

By endorsing this implementation plan, all signed parties agree that reducing the threat of wildland fire to people, communities, and ecosystems will require:

- Firefighter and public safety continuing as the highest priority.
- A sustained, long-term and cost-effective investment of resources by all public and private parties, recognizing overall budget parameters affecting Federal, State, Tribal, and local governments.
- A unified effort to implement the collaborative framework called for in the Strategy in a manner that ensures timely decisions at each level.
- Accountability for measuring and monitoring performance and outcomes, and a commitment to factoring findings into future decision making activities.
- The achievement of national goals through action at the local level with particular attention on the unique needs of cross-boundary efforts and the importance of funding on-the-ground activities.
- Communities and individuals in the wildland-urban interface to initiate personal stewardship and volunteer actions that will reduce wildland fire risks.
- Management activities, both in the wildland-urban interface and in at-risk areas across the broader landscape.
- Active forestland and rangeland management, including thinning that produces commercial or pre-commercial products, biomass removal and utilization, prescribed fire and other fuels reduction tools to simultaneously meet long-term ecological, economic, and community objectives.

The National Fire Plan identifies a three-tiered organization structure including 1) the local level, 2) state/regional and tribal level, and 3) the national level. This plan adheres to the collaboration and outcomes consistent with a local level plan. Local level collaboration involves participants with direct responsibility for management decisions affecting public and/or private land and resources, fire protection responsibilities, or good working knowledge and interest in local resources. Participants in this planning process include Tribal representatives, local representatives from Federal and State agencies, local governments, landowners and other stakeholders, and community-based groups with a demonstrated commitment to achieving the strategy's four goals. Existing resource advisory committees, watershed councils, or other collaborative entities may serve to achieve coordination at this level. Local involvement, expected to be broadly representative, is a primary source of planning, project prioritization, and resource allocation and coordination at the local level. The role of the private citizen is not to be underestimated, as their input and contribution to all phases of risk assessments, mitigation activities, and project implementation is greatly facilitated by their involvement.

1.1.2.1.1 Montana's Endorsement of the National Fire Plan

In May 2002 Governor Martz, as a member of the Western Governors' Association, helped developed the *10-Year Comprehensive Strategy* and an implementation plan, titled *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment*.

With the Western Governors' Associations endorsement of the Implementation plan, Montana adopted the national implementation plan as its own.

NFP funding to the states occurs under the community assistance point and is made available through the USFS state and private forestry programs. DNRC has responsibility for delivery of these programs on state-owned and private lands in Montana.

The DNRC NFP Program is implemented primarily within the Forestry Division's Fire and Aviation Management Bureau (FAMB) and Service Forestry Bureau (SFB). The National Fire Plan is delivered, wherever appropriate, through existing state and private forestry programs. These programs are:

- County Cooperative Fire Program (FAMB)
- State Fire Assistance Program (FAMB)
- Private Forestry Assistance Program (SFB)
- Stewardship Program (SFB)

The Volunteer and Rural Fire Assistance (VFA/RFA) Program provides assistance to county fire agencies for equipment, training, and fire prevention materials. Adding National Fire Plan funding resulted in a grant program with more money than ever before. Again in 2003, the Department of the Interior agencies (BLM, FWS & BIA) contributed their budgeted Rural Fire Assistance Program dollars to be combined with the Volunteer Fire Assistance funds granted by the USDA Forest Service. The total assistance available in Montana exceeded $1.1 million in 2003. DNRC and its partners were recognized with the Ben Franklin Award, given by the Forest Service annually to one state for excellence in delivering these programs.

1.1.2.2 Northern Rockies Coordinating Group

The Northern Rockies Coordination Group (NRCG) was established to provide an interagency approach to wildland fire management and all-risk support on all land ownerships within the States of Montana, North Dakota, northern Idaho, and a small portion of South Dakota and Wyoming. NRCG is made up of representatives from the Montana Firewarden's Association, Montana Disaster and Emergency Services Division, Montana Department of Natural Resources and Conservation, Idaho Department of Lands, North Dakota Forest Service, Bureau of Land Management, National Park Service, Bureau of Indian Affairs, Fish and Wildlife Service, Forest Service, Montana Fire Chief's Association, and Montana Sheriff's and Peace Officer's Association. The purpose of NRCG is to further interagency cooperation, communications, coordination, and to provide interagency fire management direction and all-risk support for the Northern Rockies Geographic Area.

1.1.2.2.1 County Wildland Fire Interagency Group

Each County within the state has been requested to write a Wildland Fire Mitigation Plan. These plans should contain at least the following five elements:

1) Documentation of the process used to develop the mitigation plan. How the plan was developed, who was involved and how the public was involved.
2) A risk assessment to identify vulnerabilities to wildfire in the wildland-urban interface (WUI).
3) A prioritized mitigation strategy that addresses each of the risks. Examples of these strategies could be: training for fire departments, public education, hazardous fuel

treatments, equipment, communications, additional planning, new facilities, infrastructure improvements, code and/or ordinance revision, volunteer efforts, evacuation plans, etc.

4) A process for maintenance of the plan which will include monitoring and evaluation of mitigation activities
5) Documentation that the plan has been formally adopted by the involved agencies. Basically a signature page of all involved officials.

This five-element plan is an abbreviated version of the FEMA mitigation plan and will begin to meet the requirements for that plan. To develop these plans each county should bring together the following individuals, as appropriate for each county, to make up the County Wildland Fire Interagency Group. It is important that this group has representation from agencies with wildland fire suppression responsibilities:

- County Commissioners (Lead)
- Local Fire Chiefs
- Montana Department of Natural Resources and Conservation representative
- USDA Forest Service representative
- USDI Bureau of Land Management representative
- US Fish and Wildlife Service (Charles M. Russell Wildlife Refuge) representative
- Bureau of Indian Affairs
- Local Tribal leaders
- Bureau of Disaster and Emergency Services
- LEPC Chairperson
- Resource Conservation and Development representative
- State Fish and Game representative
- Interested citizens and community leaders as appropriate
- Other officials as appropriate

If requested by the County Commissioners, the local Resource Conservation and Development Councils may be available to assist the County Commissioners in evaluating each County within their council area to determine if there is a wildland fire mitigation plan in place, or if a plan is currently in the development phase. If no plan is in place, the RC&D's, if requested, could be available to assist the Commissioners with the formation of the County Wildland Fire Interagency Group and/or to facilitate the development of a wildland fire mitigation plan.

If a plan has been previously completed, the Commissioners will determine if the recommended five elements have been addressed. The Counties will provide a copy of the completed mitigation plan to the Montana Department of Natural Resources and Conservation Fire Plan Coordinator, which will include a contact list of individuals that developed the plan.

1.1.2.3 National Association of State Foresters

1.1.2.3.1 Identifying and Prioritizing Communities at Risk

This plan is written with the intent to provide the information necessary for decision makers (elected officials) to make informed decisions in order to prioritize projects across the entire county. These decisions may be made from within the council of Commissioners, or through the recommendations of ad hoc groups tasked with making prioritized lists of projects. It is not necessary to rank projects numerically, although that is one approach, rather it may be possible to rank them categorically (high priority set, medium priority set, and so forth) and still accomplish the goals and objectives set forth in this planning document.

The following was prepared by the National Association of State Foresters (NASF), June 27, 2003, and is included here as a reference for the identification of prioritizing treatments between communities.

Purpose: To provide national, uniform guidance for implementing the provisions of the "Collaborative Fuels Treatment" MOU, and to satisfy the requirements of Task e, Goal 4 of the Implementation Plan for the 10-Year Comprehensive Strategy.

Intent: The intent is to establish broad, nationally compatible standards for identifying and prioritizing communities at risk, while allowing for maximum flexibility at the state and regional level. Three basic premises are:

- Include all lands and all ownerships.
- Use a collaborative process that is consistent with the complexity of land ownership patterns, resource management issues, and the number of interested stakeholders.
- Set priorities by evaluating projects, not by ranking communities.

The National Association of State Foresters (NASF) set forth the following guidelines in the Final Draft Concept Paper; Communities at Risk, December 2, 2002.

Task: Develop a definition for "communities at risk" and a process for prioritizing them, per the Implementation Plan for the 10-Year Comprehensive Strategy (Goal 4.e.). In addition, this definition will form the foundation for the NASF commitment to annually identify priority fuels reduction and ecosystem restoration projects in the proposed MOU with the federal agencies (section C.2 (b)).

1.1.2.3.2 Conceptual Approach

1. NASF fully supports the definition of the Wildland Urban Interface (WUI) previously published in the Federal Register. Further, proximity to federal lands should not be a consideration. The WUI is a set of conditions that exists on, or near, areas of wildland fuels nation-wide, regardless of land ownership.
2. Communities at risk (or, alternately, landscapes of similar risk) should be identified on a state-by-state basis with the involvement of all agencies with wildland fire protection responsibilities: state, local, tribal, and federal.
3. It is neither reasonable nor feasible to attempt to prioritize communities on a rank order basis. Rather, communities (or landscapes) should be sorted into three, broad categories or zones of risk: high, medium, and low. Each state, in collaboration with its local partners, will develop the specific criteria it will use to sort communities or landscapes into the three categories. NASF recommends using the publication

"Wildland/Urban Interface Fire Hazard Assessment Methodology" developed by the National Wildland/Urban Interface Fire Protection Program (circa 1998) as a reference guide. (This program, which has since evolved into the Firewise Program, is under the oversight of the National Wildfire Coordinating Group (NWCG)). At minimum, states should consider the following factors when assessing the relative degree of exposure each community (landscape) faces.

- **Risk:** Using historic fire occurrence records and other factors, assess the anticipated probability of a wildfire ignition.
- **Hazard:** Assess the fuel conditions surrounding the community using a methodology such as fire condition class, or [other] process.
- **Values Protected:** Evaluate the human values associated with the community or landscape, such as homes, businesses, and community infrastructure (e.g. water systems, utilities, transportation systems, critical care facilities, schools, manufacturing and industrial sites, and high value commercial timber lands).
- **Protection Capabilities:** Assess the wildland fire protection capabilities of the agencies and local fire departments with jurisdiction.

4. Prioritize by project not by community. Annually prioritize projects within each state using the collaborative process defined in the national, interagency MOU "For the Development of a Collaborative Fuels Treatment Program". Assign the highest priorities to projects that will provide the greatest benefits either on the landscape or to communities. Attempt to properly sequence treatments on the landscape by working first around and within communities, and then moving further out into the surrounding landscape. This will require:
   - First, focus on the zone of highest overall risk but consider projects in all zones. Identify a set of projects that will effectively reduce the level of risk to communities within the zone.
   - Second, determining the community's willingness and readiness to actively participate in an identified project.
   - Third, determining the willingness and ability of the owner of the surrounding land to undertake, and maintain, a complementary project.
   - Last, set priorities by looking for projects that best meet the three criteria above. It is important to note that projects with the greatest potential to reduce risk to communities and the landscape may not be those in the highest risk zone, particularly if either the community or the surrounding landowner is not willing or able to actively participate.
5. It is important, and necessary, that we be able to demonstrate a level of accomplishment that justifies to Congress the value of continuing the current level of appropriations for the National Fire Plan. Although appealing to appropriators and others, it is not likely that many communities (if any) will ever be removed from the list of communities at risk. Even after treatment, all communities will remain at some, albeit reduced, level of risk. However, by using a science-based system for measuring relative risk, we can likely show that, after treatment (or a series of treatments), communities are at "*reduced risk*".

Similarly, scattered, individual homes that complete projects to create defensible space could be "counted" as "households at reduced risk". This would be a way to report progress in reducing risk to scattered homes in areas of low priority for large-scale fuels treatment projects.

Using the concept described above, the NASF believes it is possible to accurately assess the relative risk that communities face from wildland fire. Recognizing that the condition of the vegetation (fuel) on the landscape is dynamic, assessments and re-assessments must be done on a state-by-state basis, using a process that allows for the integration of local knowledge, conditions, and circumstances, with science-based national guidelines. We must remember that it is not only important to lower the risk to communities, but once the risk has been reduced, to maintain those communities at a reduced risk.

Further, it is essential that both the assessment process and the prioritization of projects be done collaboratively, with all local agencies with fire protection jurisdiction – federal, state, local, and tribal – taking an active role.

1.1.2.4 Healthy Forests Restoration Act

On December 3, 2003, President Bush signed into law the Healthy Forests Restoration Act of 2003 to reduce the threat of destructive wildfires while upholding environmental standards and encouraging early public input during review and planning processes. The legislation is based on sound science and helps further the President's Healthy Forests Initiative pledge to care for America's forests and rangelands, reduce the risk of catastrophic fire to communities, help save the lives of firefighters and citizens, and protect threatened and endangered species.

Among other things the Healthy Forests Restoration Act (HFRA):

- Strengthens public participation in developing high priority projects;
- Reduces the complexity of environmental analysis allowing federal land agencies to use the best science available to actively manage land under their protection;
- Creates a pre-decisional objections process encouraging early public participation in project planning; and
- Issues clear guidance for court action challenging HFRA projects.

The Fergus County Wildland-Urban Interface Wildfire Mitigation Plan is developed to adhere to the principles of the HFRA while providing recommendations consistent with the policy document which should assist the federal land management agencies (US Forest Service, Bureau of Land Management, and US Fish and Wildlife Service) with implementing wildfire mitigation projects in Fergus County that incorporate public involvement and the input from a wide spectrum of fire and emergency services providers in the region.

1.1.3 Local Guidelines and Integration with Other Efforts

1.1.3.1 Fergus County Fire Mitigation Planning Effort and Philosophy

The goals of this planning process include the integration of the National Fire Plan, the Western Governors Association Implementation Strategy, the Healthy Forests Restoration Act, and the requirements of FEMA for a county-wide Fire Mitigation Plan; a component of the County's All Hazards Mitigation Plan. This effort will utilize the best and most appropriate science from all partners, the integration of local and regional knowledge about wildfire risks and fire behavior, while meeting the needs of local citizens, the regional economy, the significance of this region to the rest of Montana and the Inland West.

1.1.3.1.1 Mission Statement

To make Fergus County residents, communities, state agencies, local governments, and businesses less vulnerable to the negative effects of wildland fires through the effective administration of wildfire hazard mitigation grant programs, hazard risk assessments, wise and efficient fuels treatments, and a coordinated approach to mitigation policy through federal, state, regional, and local planning efforts. Our combined prioritization will be the protection of people, structures, infrastructure, and unique ecosystems that contribute to our way of life and the sustainability of the local and regional economy.

1.1.3.1.2 Vision Statement

Institutionalize and promote a countywide wildfire hazard mitigation ethic through leadership, professionalism, and excellence, leading the way to a safe, sustainable Fergus County.

1.1.3.1.3 Goals

- To reduce the area of WUI land burned and losses experienced because of wildfires where these fires threaten communities in the wildland-urban interface
- Prioritize the protection of people, structures, infrastructure, and unique ecosystems that contribute to our way of life and the sustainability of the local and regional economy
- Educate communities about the unique challenges of wildfire in the wildland-urban interface (WUI)
- Establish mitigation priorities and develop mitigation strategies in Fergus County
- Strategically locate and plan fuel reduction projects
- Provide recommendations for alternative treatment methods, such as modifying forest stand density, herbicide treatments, fuel reduction techniques, and disposal or removal of treated slash
- Meet or exceed the requirements of the National Fire Plan and FEMA for a County level Fire Mitigation Plan

Chapter 2: Planning Process

2 Documenting the Planning Process

Documentation of the planning process, including public involvement, is required to meet FEMA's DMA 2000 (44CFR§201.4(c)(1) and §201.6(c)(1)). This section includes a description of the planning process used to develop this plan, including how it was prepared, who was involved in the process, and how all of the involved agencies participated.

2.1.1 Description of the Planning Process

The Fergus County Wildland-Urban Interface Wildfire Mitigation Plan was developed through a collaborative process involving all of the organizations and agencies detailed in Section 1.0 of this document. The County's local coordinator contacted these organizations directly to invite their participation and schedule meetings of the planning committee. The planning process included 5 distinct phases which were in some cases sequential (step 1 then step 2) and in some cases intermixed (step 4 completed though out the process):

1. **Collection of Data** about the extent and periodicity of wildfires in and around Fergus County. This included an area encompassing Petroleum and Judith Basin Counties to insure a robust dataset for making inferences about fires in Fergus County specifically; this included a wildfire extent and ignition profile.
2. **Field Observations and Estimations** about wildfire risks including fuels assessments, juxtaposition of structures and infrastructure to wildland fuels, access, and potential treatments by trained wildfire specialists.
3. **Mapping** of data relevant to wildfire control and treatments, structures, resource values, infrastructure, fire prone landscapes, and related data.
4. **Facilitation of Public Involvement** from the formation of the planning committee, to a public mail survey, news releases, public meetings, public review of draft documents, and acceptance of the final plan by the signatory representatives.
5. **Analysis and Drafting of the Report** to integrate the results of the planning process, providing ample review and integration of committee and public input, followed by acceptance of the final document.

Planning efforts were led by the Project Director, Dr. William E. Schlosser, of Northwest Management, Inc. Dr. Schlosser holds 4 degrees in natural resource management (A.S. geology; B.S. forest and range management; M.S. natural resource economic & finance; Ph.D. environmental science and regional planning). Mr. Gary Ellingson, holds a degree in forest resource management, and manages the Montana Office of Northwest Management, Inc. Together, they led a team of resource professionals that included fire mitigation specialists, wildfire control specialists, resource management professionals, and hazard mitigation experts.

They were the point-people for team members to share data and information with during the plan's development. They and the planning team met with many residents of the county during the inspections of communities, infrastructure, and hazard abatement assessments. This methodology, when coupled with the other approaches in this process, worked effectively to integrate a wide spectrum of observations and interpretations about the project.

The planning philosophy employed in this project included the open and free sharing of information with interested parties. Information from federal and state agencies was integrated

into the database of knowledge used in this project. Meetings with the committee were held throughout the planning process to facilitate a sharing of information between cooperators.

When the public meetings were held, many of the committee members were in attendance and shared their support and experiences with the planning process and their interpretations of the results.

2.2 Public Involvement

Public involvement in this plan was made a priority from the inception of the project. There were a number of ways that public involvement was sought and facilitated. In some cases this led to members of the public providing information and seeking an active role in protecting their own homes and businesses, while in other cases it led to the public becoming more aware of the process without becoming directly involved in the planning process.

2.2.1 News Releases

Under the auspices of the Fergus County Wildland-Urban Interface Wildfire Mitigation Planning Committee, news releases were submitted to area newspapers and radio.

2.2.1.1 Radio Messages

A short news release was aired over the KXLO and KLCM radio station the week prior to the public meetings announcing the goals of the planning committee, the purpose of the mitigation plan, the date and times of public meetings, and contact information.

2.2.1.2 Newspaper Articles

Committee and public meeting announcements were published in the local newspapers ahead of each meeting. The following is an announcement that ran in the local newspaper.

Hot Topic: Fergus County Plans to Mitigate Wildfire Risk

Lewistown, MT --- The Fergus County Commissioners, working with the Snowy Mountain Development Corporation, have created a Wildfire Mitigation Plan Committee to complete a Wildfire Mitigation Plan for Fergus County as part of the National Fire Plan authorized by Congress and the Whitehouse. The Fergus County Wildfire Mitigation Plan will include risk analysis at the community level with predictive models for where fires are likely to ignite and where they are likely to spread rapidly once ignited. Northwest Management, Inc. has been retained by Fergus County to provide wildfire risk assessments, mapping, field inspections, and interviews, and to collaborate with the committee to prepare the plan. The coordination for this effort is being provided by Kathie Bailey of Snowy Mountain Development Corp. The committee includes rural and wildland fire districts, land managers, elected officials, agency representatives, and others. Northwest Management specialists are conducting analyses of fire prone landscapes and making recommendations for potential treatments. Specific activities for homes, structures, infrastructure, and resource capabilities will be proposed as part of the analysis.

One of the most important steps in gathering information about fire risk in Fergus County is to conduct a homeowner's survey. Northwest Management, Inc., in cooperation with local fire officials, have mailed a brief survey to randomly selected homeowners in the county seeking details about home construction materials, proximity to water sources, and other risk factors surrounding homes. This survey is very important to the success of the plan. Those homes that receive a survey are asked to please take the time to complete it, thereby benefiting the

community overall.

The planning team will be conducting Public Meetings to discuss preliminary findings and to seek public involvement in the planning process in June. For more information on the Fire Mitigation Plan project in Fergus County contact your County Commissioner, Northwest Management, Inc. project director Dr. William Schlosser (208) 883-4488, Gary Ellingson of Northwest Management, Inc. (406) 442-7555 or Kathie Bailey at 406-350-0198.

Public Information Meeting 1: June 22nd at the school in Grass Range at 7:00PM

Public Information Meeting 2: June 23rd at the Lewistown Fish, Wildlife, & Parks meeting room at the airport at 7:00PM

Public Information Meeting 3: June 24th at Denton at 7:00PM

2.2.2 Public Mail Survey

In order to collect a broad base of perceptions about wildland fire and individual risk factors of homeowners in Fergus County, a mail survey was conducted. Using a state and county database of landowners in Fergus County, homeowners from the Wildland-Urban Interface surrounding each community were identified. In order to be included in the database, individuals were selected that own property and have a dwelling in Fergus County, as well as a mailing address in Fergus County. This database created a list of names to which a random number was affixed that contributed to the probability of being selected for the public mail survey. A total of 235 landowners meeting the above criteria were selected.

The public mail survey developed for this project has been used in the past by Northwest Management, Inc., during the execution of other WUI Wildfire Mitigation Plans. The survey used The Total Design Method (Dillman 1978) as a model to schedule the timing and content of letters sent to the selected recipients. Copies of each cover letter, mail survey, and communication are included in Appendix III.

The first in the series of mailing was sent May 27, 2004, and included a cover letter, a survey, and an offer of receiving a custom GIS map of the area of their selection in Fergus County if they would complete and return the survey. The free map incentive was tied into assisting their community and helping their interests by participating in this process. Each letter also informed residents about the planning process. A return self-addressed enveloped was included in each packet. A postcard reminder was sent to the non-respondents on June 4, 2004, encouraging their response. A final mailing, with a revised cover letter pleading with them to participate, was sent to non-respondents on June 30, 2004.

Surveys were returned during the months of June, July, and August 2004. A total of 106 residents responded to the survey. No surveys were returned as undeliverable. The effective response rate for this survey was 45%. Statistically, this response rate allows the interpretation of all of the response variables significantly at the 99% confidence level.

2.2.2.1 Survey Results

A summary of the survey's results will be presented here and then referred back to during the ensuing discussions on the need for various treatments, education, and other information.

All of the respondents have a home in Fergus County, and 98% consider this their primary residence. Table 1.1 summarizes where respondents consider their community of residence.

Table 2.1. Response rate to public mail survey, summarized by community of residence.

Community	Percent of Total Responses
Lewistown	41%
Roy	9%
Grass Range	9%
Winifred	6%
Hilger	6%
Forest Grove	6%
Moore	4%
Cheadle	4%
Heath	3%
Garneill	3%
Coffee Creek	2%
Buffalo	2%
Glengary	2%
Judith Gap	1%
Hobson	1%
Maiden	1%
Danvers	1%
Denton	1%

All of the respondents correctly identified that they have emergency telephone 911 services in their area. Most respondents also were able to correctly identify if they are covered by a rural fire district. Respondents were asked to identify if their home is protected by a rural or city fire district. Many of the county's residents have rural or city fire protection, with the exception of the homes in the areas of Maiden, Buffalo, and Garneill. Of the respondents, 97% correctly identified they live in an area protected by a rural or city fire district. Approximately 2% responded they do not have a fire district covering their home, when in fact they do. The additional 1% of the respondents indicated they believe they are in a protection district, but in fact, they are not protected. The only significant category of responses that would merit additional attention based on these answers would be the 1% of respondents that are currently not covered by a rural fire district, but are unaware of that vulnerability. This is a very small proportion of the total county.

Respondents were asked to indicate the type of roofing material covering the main structure of their home. Approximately 41% of respondents indicated their homes were covered with a composite material (asphalt shingles). About 40% indicated their home were covered with a metal (eg., aluminum, tin) roofing material. Roughly 4% of the respondents indicated they have a wooden roofing material such as shakes or shingles. The additional 15% of respondents had a variety of combustible and non-combustible materials indicated.

Residents were asked to evaluate the proximity of trees within certain distances of their homes. Often, the density of trees around a home is an indicator of increased fire risk. The results are presented in Table 2.2.

Table 2.2 Survey responses indicating the proximity of trees to homes.

Number of Trees	Within 250 feet of your home	Within 75 feet of your home
None	10%	13%
Less than 10	31%	44%
Between 10 and 25	25%	29%
More than 25	35%	14%

Approximately 95% of those returning the survey indicated they have a lawn surrounding their home. Of these individual home sites, 93% indicated they keep this lawn green through the fire season.

The average driveway length of the respondents was approximately 2,076 feet long, from their main road to their parking area. Roughly 37% of the respondents had a driveway over ¼ mile long. Of these homes with lengthy driveways, roughly 71% have turnouts allowing two vehicles to pass each other in the case of an emergency. Approximately 90% of all homeowners indicated they have an alternative escape route, with the remaining 10% indicating only one-way-in and one-way-out.

Nearly all respondents (95%) indicated they have some type of tool to use against a wildfire that threatens their home. Table 2.3 summarizes these responses.

Table 2.3. Percent of homes with indicated fire fighting tools in Fergus County.

95% – Hand tools (shovel, Pulaski, etc.)
49% – Portable water tank
26% – Stationery water tank
55% – Pond, lake, or stream water supply close
43% – Water pump and fire hose
40% – Equipment suitable for creating fire breaks (bulldozer, cat, skidder, etc.)

Roughly 38% of the respondents in Fergus County indicated they have someone in their household trained in wildland fire fighting. Approximately 13% indicated someone in the household had been trained in structural fire fighting. However, it is important to note that these questions did not specify a standard nor did it refer to how long ago the training was received.

A couple of questions in the survey related to on-going fire mitigation efforts households may be implementing. Respondents were asked if they conduct a periodic fuels reduction program near their home sites, such as grass or brush burning. Approximately 52% answered affirmative to this question, while 69% responded that livestock (cattle, horses, sheep) graze the grasses and forbs around their home sites.

Respondents were asked to complete a fuel hazard rating worksheet to assess their home's fire risk rating. An additional column titled "results" has been added to the table, showing the percent of respondents circling each rating (Table 2.4).

Circle the ratings in each category that best describes your home.

Table 2.4. Fuel Hazard Rating Worksheet		Rating	Results
Fuel Hazard	Small, light fuels (grasses, forbs, weeds, shrubs)	1	74%
	Medium size fuels (brush, large shrubs, small trees)	2	41%
	Heavy, large fuels (woodlands, timber, heavy brush)	3	15%
Slope Hazard	Mild slopes (0-5%)	1	89%
	Moderate slope (6-20%)	2	28%
	Steep Slopes (21-40%)	3	10%
	Extreme slopes (41% and greater)	4	4%
Structure Hazard	Noncombustible roof and noncombustible siding materials	1	35%
	Noncombustible roof and combustible siding material	3	52%
	Combustible roof and noncombustible siding material	7	17%
	Combustible roof and combustible siding materials	10	26%
Additional Factors	Rough topography that contains several steep canyons or ridges	+2	Average -1.21 pts
	Areas having history of higher than average fire occurrence	+3	
	Areas exposed to severe fire weather and strong winds	+4	
	Areas with existing fuel modifications or usable fire breaks	-3	
	Areas with local facilities (water systems, rural fire districts, dozers)	-3	

Calculating your risk

Values below are the average response value to each question.

Fuel hazard __1.73___ x Slope Hazard ____1.45___ = ____2.51___
Structural hazard + ____4.31__
Additional factors (+ or -) ___-1.21__
Total Hazard Points = ____5.61_

Table 2.5. Percent of respondents in each risk category as determined by the survey respondents.
00% – Extreme Risk = 26 + points
06% – High Risk = 16–25 points
34% – Moderate Risk = 6–15 points
60% – Low Risk = 6 or less points

Maximum household rating form score was 19 points, as assessed by the homeowners. These numbers were compared to observations made by field crews trained in wildland fire fighting. These results indicate that for the most part, these indications are only slightly lower than the risk rating assigned by the “professionals”. Anecdotal evidence would indicate that Fergus

County landowners involved in this survey have a more realistic view of wildfire risk than the landowners in other western state counties where these questions have been asked.

Finally, respondents were asked “if offered in your area, would members of your household attend a free, or low cost, one-day training seminar designed to teach homeowners in the wildland–urban interface how to improve the defensible space surrounding your home and adjacent outbuildings?” A majority of the respondents, 57% indicated a desire to participate in this type of training.

Homeowners were also asked, if they would be “interested in participating in a cost share program that would pay a portion of the costs of implementing fire risk projects on your property?” 34% of respondents indicated interest in this type of program.

2.2.3 Committee Meetings

The following list of people who participated in the planning committee meetings, volunteered time, or responded to elements of the Fergus County Wildland-Urban Interface Wildfire Mitigation Plan’s preparation.

- Kathie Bailey .....Snowy Mountain Development Corporation
- Toby Brown .....Northwest Management, Inc
- Tim Crosmer .....Department of Natural Resources & Conservation
- Gary Ellingson.....Northwest Management, Inc
- Dick Hassler .....Hilger Rural Volunteer Fire Department
- Shannon Iverson .....Bureau of Land Management
- Tom Killham .....Fergus County Sheriff & Firewarden
- Gary Kirpach .....USDA Forest Service
- Karen Marks.....Disaster and Emergency Services
- Elton Owens.....Heath Fire District & Fergus County Fire Council
- Bill Rash .....Lewistown Fire Department
- Ken Ronish.....County Commissioner
- Clive Rooney.....Department of Natural Resources & Conservation
- William E. Schlosser .....Northwest Management, Inc
- Jerry Simpson .....Moore Rural Volunteer Fire Department
- Steve Walter.....Moore Rural Volunteer Fire Department
- Ron Brinkmax.....Coffee Creek Fire District
- Jay Filson .....North Fork Flatwillow Fire District
- Jerry Buhre.....Department of Natural Resources & Conservation
- Mike Granger .....US Fish and Wildlife Service
- Ron Wiseman.....US Forest Service, JRD
- Vern Petersen .....Fergus County Commissioner

- Don Pyrah .....Fergus County Coordinator
- John Erixson .....Northwest Management, Inc.
- Vincent Corrao .....Northwest Management, Inc.

Committee Meetings were scheduled and held on the following dates:

April 15, 2004

Attendance list was signed by all present and collected by Bill Schlosser

Bill Schlosser, of Northwest Management Inc., made introductions and stated that the purpose for the initial meeting is to describe the fuel mitigation planning process and explain the role committee members will have in developing the plan for their county. Committee members can anticipate 3-4 meetings over the next several months. Future meetings will be focused on completing portions of the plan document and involve hands on planning and input from committee members. Bill emphasized that the plan will be submitted to county commissioners for their signature and that their sustained involvement in the process is especially important. All committee members and their respective organizations will be asked to sign off on the completed plan.

Bill reviewed standards that will apply to the planning document. Pertinent standards are contained within FEMA All Hazards Mitigation Plan requirements, National Fire Plan, Healthy Forests Restoration Act, and DNRC's Statewide Implementation Strategies.

Bill outlined possible funding opportunities that may be come available if the mitigation plan meets requirements of various funding sources. The fuels mitigation plan will be designed and written to enable the community to seek assistance from USFS, BLM, FEMA, DNRC and other sources that may become available in the future.

Questions and comments from committee members:

It was stated that there is no DNRC statewide plan. Planning is conducted independently by each of the 6 area offices. The Lewistown office would have responsibility for Fergus, Petroleum, and Judith Basin counties.

South side of Snowy Mountains has no fire protection district.

No communities use surface water for drinking supply.

Lewistown drinking water is taken from capped spring on Big Spring Creek. There is a watershed group that works on issues associated with Big Spring Creek.

Ignition data may be scarce

A countywide growth development plan is in development over the next two years.

BLM has primary fire protection

State will loan fire suppression equipment to county until outside resources are required on a large fire.

Infra structure data is available from Linda in the county planning departments as well as rural fire district boundaries.

Sue Elings is the county assessor.

Some concerns were expressed about what data attributes will be made available to the public. NMI will provide all data to county commissioners and forward data request to them.

Question was asked about formalizing the committee membership. It was stated that participation from NRCS, BLM, and local fire chiefs was going to be very important. Especially important that the fire chiefs attend the next meeting.

Local newspaper is the Argus News

Bill spoke about the strategy for planning and described what data will be collected and used in development of the plan utilizing GIS. He also provided definitions of Wildland Urban Interface and reviewed the public comment process.

Bill distributed the draft Fergus County Community Assessment and requested that all committee members review it and provide written response prior to the next meeting. Bill will try to summarize all comments and bring a 2nd draft to the next meeting.

Bill also distributed an example public mail survey and requested comments. A survey of Resource and Capabilities for fire districts was distributed for completion by local fire chiefs, BLM and DNRC.

Questions and comments from committee members:

Fergus county Fire Council meets the 4th Thursday of every month. NMI will attend the next mtg.

The next meeting date was set for May 13th. Kathy will mail meeting notices.

May 13, 2004

Attendance list was signed by all present and collected by Bill Schlosser

Bill Schlosser, of Northwest Management Inc. (NMI), made introductions and reviewed where the group is in the planning process. The mail survey was distributed to those who had not seen it. No changes were deemed necessary and the survey was approved for mailing.

A couple comments were made about the importance of evaluating the Maiden Canyon area. BLM has some forestry data for the area. Other areas in need of special attention are Kendall Boy Scout Camp, Crystal Lake and Camp Lewtana (S of Lewistown on Mill Creek Rd).

The committee reviewed the fire district map and made changes to boundaries where appropriate.

Need locations for BLM repeaters.

Comments were made that Denton and Winifred have greater structure densities than Roy yet the map does not seem to depict this accurately. The Hilger area may also need to be reviewed for accuracy.

It appeared the structure data was incomplete. Everything in the 538 exchange has been mapped to the front of the house. NMI will contact Dorothy Grenaux for structure data and missile site data.

Moore is just getting rural addressing and names and mileages are not yet posted.

The committee identified primary and secondary routes on the county map.

Jerry Simpson said Moore Rural is working on their resource and capability data and will mail it in.

In terms of the needs assessment, satellite phones would be useful and locating a repeater at the airport may be a possibility. County operations continue to update with project 25 compatible radios.

There are natural gas wells on the north and southeast portions of the county. The Montana Department of Environmental Quality may be able to provide data.

Denton has a spring that provides community water. The spring location may need to be GPS'd.

Denton and Winifred have community airports. Montana aeronautical maps are available from the sheriff or BLM aviation.

Public meetings will be held at the following locations.

June 22	Grass Range School	7pm
June 23	Lewistown	7pm
June 24	Denton Fire Hall	7pm

Other Meeting Announcements:

June 24	Fire Chiefs	Denton Fire Hall	6pm
June 24	Committee Meeting	Denton Fire Hall	2pm

NMI will advertise the public meetings in local newspapers.

June 24, 2004

Bill Rash will provide fire district boundaries

Res. Capability (form) to BLM (Bob Bahr) so they can supply info needs

Fire district enhancements (structure vs. wildland fire)

- Equipment
- Training
- Protection Boundaries
- Station locations

- Wildfire location and extent
- Record keeping

- Emergency services
- Report tones
- Mutual Aid Agreements

- Need for structural protection
- But how? Shortage of volunteers, training, etc.

Needs Assessment

Possible Structure Protection Needed (Communities)

- Moore
- Denton- Coffee Creek
- Grassrange
- Winifred
- Roy
- N.F. Flatwillow
- Beaver Creek
- Heath

- Hilger

Stations (esp. heated) needed (county-wide)

Training programs similar to Winifred (Les to provide info)

Replicate across the County

Disclosure of what is provided fire protection wise.

Public education needs

Fire reporting- All organizations give info to one clearing house

Possibility of coordinated “overhead”

Across County fire districts. Rural Fire Coordinator

CH. S. Mitigation measures

Draft of plan at next meeting

Comm. Meeting- July 15 Hand out draft plan at Sheriff’s office 2 PM

Meeting August 12th at 2 PM at Sheriff’s office

July 15, 2004

An attendance list was signed and collected by John Erixson. Attendees were: Karen Marks, Kathie Bailey, Jerry Buhre, Jay Filson, Ron Brinkmax, Bill Rash, Ken Romish, Thomas Kilham, Vincent Corrao.

The purpose of this meeting is to present the Draft document for discussion and receive comments. Discussions and comments were as follows:

DES has logo. Corrections to document can be made by e-mailing or faxing them to NMI. Elton is chair & will sign for chiefs.

Denton Creek, Poppy Creek joined because of Mutual aid. There was a discussion on county verses region.

WUI—west,private lands within unit by monument; east, CM Russell has structures & cabins.

A discussion followed concerning communities in the county.

NF Flatwillow Fire District assessment, major concern, high risk.

Cottonwood, Beaver Creek evaluations.

Shettle Area evaluation.

Giltshedge—no longer by fire district, leave in plan

There was discussion on training needs.

Write rotation system for equipment into plan.

Communications—25 radios for each area

Trudy will send updated district point of contact and equipment ASAP.

Also update signature page.

August 12, 2004

Attendance was as follows: Dick Hassler, Ken Ronish, Gary Kirpach, Ron Wiseman, Kathie Bailey, Vern Petersen, Mike Granger, Jerry Buhre, Karen Marks, Don Pyrah, John Erixson, Gary Ellingson.

John Erixson introduced himself and Gary. Comments received from past meetings were incorporated into the latest version of the Plan. The Appendix portion of the document was described.

Nothing planned for future mitigation projects for CMR has been provided; CMR will provide input by Monday; Final feedback requested by August 27.

Draft Plans will be available at the Library, BLM, courthouse. Public notice (press release) will be in paper this week. Changes made to plan were reviewed.

Final meeting, have all on signature page attend . Sept 15, 4:00 PM Sheriffs complex.

Final Plan to go out for signatures before meeting.

Send 2 copies to Kathie, 1 to CMR, 1 to BLM, 1 to USFS. Kathie to distribute

Fire chiefs that miss the 15th meeting will have opportunity to sign at the end of the month at council meeting.

2.2.3.1 Public Meetings

Public meetings were held as an integral component to the planning process. It was the desire of the planning committee, and the Fergus County Commissioners to integrate the public's input to the development of the fire mitigation plan.

The formal public meetings were scheduled on June 22, 2004, in Grass Range, Montana; June 23, 2004, in Lewistown, Montana; and June 24, 2004, in Denton, Montana. The purpose of the meetings was to share information on the planning process with a broadly representative cross section of Fergus County landowners. Wall maps were posted in the meeting rooms with many of the analysis results summarized specifically for the risk assessments, location of structures, fire protection, and related information. The formal portion of the presentations included a PowerPoint presentation made by Project Manager, Dr. William E. Schlosser. During his presentation, comments from committee members, fire chiefs, and others were encouraged in an effort to engage the audience in a discussion.

It was made clear to all in attendance that their input was welcome and encouraged, as specific treatments had not yet been decided, nor had the risk assessment been completed. Attendees were told that they could provide oral comment during these meetings, they could provide written comment to the meetings, or they could request more information in person to discuss the plan. In addition, attendees were told they would have an opportunity to review the draft plan prior to its completion to further facilitate their comments and input.

The formal presentations lasted approximately 1 hour and included many questions and comments from the audience. Following the meetings, many discussions continued with the committee members and the general public discussing specific areas, potential treatments, the risk analysis, and other topics.

Attendance at the public meetings included 2 individuals at Grassrange, 8 individuals at Lewistown, and 11 at Denton. The following are comments, questions or suggestions from the meetings:

2.2.3.1.1 Grassrange Public Meeting

June 22, 2004 - Grassrange School – 7 pm

The public meeting in Grass Range was attended by 2 local citizens. The attendees opted for an informal discussion about the fire mitigation plan. The needs for increasing local volunteers, enhancing equipment for rural fire districts, and fuels treatments were discussed.

2.2.3.1.2 Lewistown Public Meeting

June 23, 2004 - Lewistown Fish, Wildlife, & Parks meeting room at the airport - 7:00PM

BLM & USFS

- CRP lands- how to protect- highest risk- much concern about lands- check acreage
- Ted Hawn- director
- Petroleum Co has PDM plan

Linda

- Flooding issue in Fergus Co is high
- Judith River

BLM

- Prepare for stand replacing fire
- Problem north end of County
- High areas of homes and other structures
- No entity that retains fire info on yearly basis
- No reporting- maps-records
- Rural fire district need to report to state
- State Fire Marshall- no money- keep copies of fires- need to show all fires- keep accounting at County level- put course of fire- GPS

- Extend Crystal Lake- to primary secondary route
- Legally formed fire district- responsible for all fires- but not equipped or trained

Rural fire protection and Wildland fire protection

- Need definition for house protection
- Structure protection map-

Wildland

- Fire Districts- capability

-Recommendation:

- Between Snowys and town- volunteer- money available
- Put together all Fed-private work

FS

- Road access- Crystal Lake area is a concern

Fire Districts

- SW corner- not in district
- County would ask for protection- for wildland only- no structures
- No district excluded from federal land for protection
- Red card- non red card

Shannon Bonney- Fire Office
Bob Bahr- FMO

2.2.3.1.3 Denton Public Meeting

June 24, 2004 – Denton Fire Hall - 7:00 pm

Fire prone map is okay- chiefs agree

Issues:
-No access to break lands- roads are almost non-existent (Logging helps access)
-Can FS do work in study area?- will do on fringe area
-Locate Natural gas line (also need to put on map)-

New pumping station-west of Denton
Contact Info:
Terasen Pipelines
1-800-700-8666- Main office Casper, WY
Northern District Office- Powell, WY 307-754-7940

Cenex Pipeline Co.
Mike Stahly
Box 909
Laurel, MT 59044
(406) 628-5209

-Most districts don't have structure capability
-Coordinate- rural fire reports-training-funding
-Agree a full–time position would be a good idea (County Rural Fire Coordinator)
-No building codes in county
-Need to educate the public

County Commissioners need to hear this- set standards on sub-division they must make the decision and implement-codes & laws

Recommendations section:
Committee agrees with recommendations that have been made - process is okay

2.2.3.1.4 Meeting Notices

Public notices of the public meetings were printed in the Lewistown News-Argus and the Roundup Record-Tribune & Winnett Times the week of June 7th-11th, 2004 and June 14th-17th, 2004. The following is a public notice that aired on the KXLO and KLCM radio stations.

The Fergus County Commissioners, working with the Snowy Mountain Development Corp. have created a Wildfire Mitigation Plan Committee to complete a Wildfire Mitigation Plan for

Fergus County. This plan is part of the National Fire Plan authorized by Congress. The Plan will include risk analysis with models for where fires are likely to ignite and spread. A sample of Fergus County residents have already received a homeowner's survey concerning fire risk. We (Northwest Management, Inc.) will be having public information meetings about the Wildfire Mitigation Plan process on:

- June 22nd at the school in Grass Range 7:00 PM
- June 23rd at the Lewistown Fish Wildlife & Parks meeting room at the airport 7:00 PM
- June 24th at Denton at 7:00 PM

2.3 Review of the WUI Wildfire Mitigation Plan

Review of sections of this document was conducted by the planning committee during the planning process as maps, summaries, and written assessments were completed. These individuals included fire mitigation specialists, fire fighters, planners, elected officials, and others involved in the coordination process. Preliminary findings were discussed at the public meetings, where comments were collected and facilitated.

The results of these formal and informal reviews were integrated into a DRAFT Wildland-Urban Interface Wildfire Mitigation Plan. This plan was given to members of the planning committee (including the Fergus County Commissioners and the Snowy Mountain Development Corporation) on July 15, 2004.

Committee review of the DRAFT plan was completed on August 12, 2004. Comments, suggestions, and clarifications were integrated into a revised DRAFT plan which was released for public review on August 12, 2004. This DRAFT document was distributed at local libraries, the Snowy Mountain Development Corporation, and the County Commissioners Office. Comments were collected and integrated into the final plan which was accepted by the Fergus County Commissioners and other signatories on September 15, 2004.

Chapter 3: County Characteristics & Risk Assessment

3 Background and Area Description

3.1 Demographics

Fergus County reported a 4.7% decline in total population from 1990 to 1996 with approximately 5,558 housing units. Fergus County has five incorporated communities; Grass Range (pop. 576), Winifred (pop. 391), Denton (pop. 648), Roy (pop. 385), and Lewistown (pop. 9,100). Nearly 77% of the total county population resides in Lewistown.

Table 3.1 summarizes some relevant demographic statistics for Fergus County.

Table 3.1 Selected demographic statistics for Fergus County, Montana, from Census 2000.

Subject	Number	Percent
Total population	11,893	100.0
SEX AND AGE		
Male	5,754	48.4
Female	6,139	51.6
Under 5 years	614	5.2
5 to 9 years	782	6.6
10 to 14 years	871	7.3
15 to 19 years	898	7.6
20 to 24 years	438	3.7
25 to 34 years	1,048	8.8
35 to 44 years	1,768	14.9
45 to 54 years	1,806	15.2
55 to 59 years	695	5.8
60 to 64 years	603	5.1
65 to 74 years	1,117	9.4
75 to 84 years	911	7.7
85 years and over	342	2.9
Median age (years)	42.3	(X)
18 years and over	8,980	75.5
Male	4,326	36.4
Female	4,654	39.1
21 years and over	8,657	72.8
62 years and over	2,759	23.2
65 years and over	2,370	19.9
Male	972	8.2
Female	1,398	11.8

Table 3.1 Selected demographic statistics for Fergus County, Montana, from Census 2000.

Subject	Number	Percent
RELATIONSHIP		
Population	11,893	100.0
In households	11,335	95.3
Householder	4,860	40.9
Spouse	2,731	23.0
Child	3,093	26.0
Own child under 18 years	2,631	22.1
Other relatives	249	2.1
Under 18 years	101	0.8
Nonrelatives	402	3.4
Unmarried partner	180	1.5
In group quarters	558	4.7
Institutionalized population	322	2.7
Noninstitutionalized population	236	2.0
HOUSEHOLDS BY TYPE		
Households	4,860	100.0
Family households (families)	3,205	65.9
With own children under 18 years	1,406	28.9
Married-couple family	2,721	56.0
With own children under 18 years	1,122	23.1
Female householder, no husband present	342	7.0
With own children under 18 years	198	4.1
Nonfamily households	1,655	34.1
Householder living alone	1,472	30.3
Householder 65 years and over	687	14.1
Households with individuals under 18 years	1,512	31.1
Households with individuals 65 years and over	2,060	42.4
Average household size	2.33	(X)
Average family size	2.89	(X)
HOUSING TENURE		
Occupied housing units	4,860	100.0
Owner-occupied housing units	3,582	73.7
Renter-occupied housing units	1,278	26.3
Average household size of owner-occupied unit	2.36	(X)
Average household size of renter-occupied unit	2.24	(X)

(X) Not applicable
[1] Other Asian alone, or two or more Asian categories.
[2] Other Pacific Islander alone, or two or more Native Hawaiian and Other Pacific Islander categories.
[3] In combination with one or more other races listed. The six numbers may add to more than the total population and the six percentages may add to more than 100 percent because individuals may report more than one race.

Source: U.S. Census Bureau, Census 2000 Summary File 1, Matrices P1, P3, P4, P8, P9, P12, P13, P,17, P18, P19, P20, P23, P27, P28, P33, PCT5, PCT8, PCT11, PCT15, H1, H3, H4, H5, H11, and H12.

3.2 Socioeconomics

Fergus County had a total of 5,580 housing units (4,860 occupied) and a population density of 2.7 persons per square mile reported in the 2000 Census. Ethnicity in Fergus County is distributed: white 97.1%, black 0.1, American Indian or Alaskan Native 1.2%, Asian 0.2, Hispanic or Latino 0.8%, some other race 0.3, and two or more races 1.2%.

Specific economic data for individual communities is collected by the US Census; in Fergus County this includes Grass Range, Denton, Roy, Winifred, and Lewistown. Grass Range households earn a median income of $26,875 annually, Denton households average $30,144 annually, Roy earns $27,188 annually, Winifred earns $26,875 annually, and Lewistown households average $30,808 annually, which compares to the Fergus County median income during the same period of $30,409. Table 3.2 shows the dispersal of households in various income categories in Fergus County.

Table 3.2 Income in 1999	**Fergus County**	
	Number	**Percent**
Households	**4,860**	**100.0**
Less than $10,000	632	13.0
$10,000 to $14,999	451	9.3
$15,000 to $24,999	898	18.5
$25,000 to $34,999	842	17.3
$35,000 to $49,999	860	17.7
$50,000 to $74,999	697	14.3
$75,000 to $99,999	275	5.7
$100,000 to $149,999	149	3.1
$150,000 to $199,999	14	0.3
$200,000 or more	42	0.9
Median household income (dollars)	30,409	(X)

(Census 2000)

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*, directs federal agencies to identify and address any disproportionately high adverse human health or environmental effects of its projects on minority or low-income populations. In Fergus County, a significant number, 10.6%, of families are at or below the poverty level (Table 3.3).

Table 3.3 Poverty Status in 1999 (below poverty level)	**Fergus County**	
	Number	**Percent**
Families	**339**	**(X)**
Percent below poverty level	(X)	10.6
With related children under 18 years	235	(X)
Percent below poverty level	(X)	15.8
With related children under 5 years	63	(X)
Percent below poverty level	(X)	13.7

Table 3.3 Poverty Status in 1999 (below poverty level)	Fergus County	
	Number	Percent
Families with female householder, no husband present	**108**	**(X)**
Percent below poverty level	(X)	31.6
With related children under 18 years	98	(X)
Percent below poverty level	(X)	43.6
With related children under 5 years	30	(X)
Percent below poverty level	(X)	63.8
Individuals	**1,767**	**(X)**
Percent below poverty level	(X)	15.4
18 years and over	1,192	(X)
Percent below poverty level	(X)	13.8
65 years and over	257	(X)
Percent below poverty level	(X)	12.2
Related children under 18 years	529	(X)
Percent below poverty level	(X)	19.4
Related children 5 to 17 years	425	(X)
Percent below poverty level	(X)	19.8
Unrelated individuals 15 years and over	623	(X)
Percent below poverty level	(X)	28.8

(Census 2000)

The unemployment rate was 3.3% in Fergus County in 1999, compared to 4.4% nationally during the same period. Approximately 17% of the Fergus County employed population worked in natural resources, with much of the indirect employment relying on the employment created through these natural resource occupations; Table 3.4 (Census 2000).

Table 3.4 Employment and Industry	Fergus County	
	Number	Percent
Employed civilian population 16 years and over	5,589	100.0
OCCUPATION		
Management, professional, and related occupations	2,070	37.0
Service occupations	1,012	18.1
Sales and office occupations	1,132	20.3
Farming, fishing, and forestry occupations	198	3.5
Construction, extraction, and maintenance occupations	618	11.1
Production, transportation, and material moving occupations	559	10.0
INDUSTRY		
Agriculture, forestry, fishing and hunting, and mining	943	16.9
Construction	543	9.7
Manufacturing	278	5.0
Wholesale trade	142	2.5
Retail trade	625	11.2

Table 3.4 Employment and Industry	Fergus County	
	Number	Percent
Transportation and warehousing, and utilities	232	4.2
Information	106	1.9
Finance, insurance, real estate, and rental and leasing	220	3.9
Professional, scientific, management, administrative, and waste management services	164	2.9
Educational, health and social services	1,238	22.2
Arts, entertainment, recreation, accommodation and food services	469	8.4
Other services (except public administration)	339	6.1
Public administration	290	5.2

Approximately 58% of Fergus County's employed persons are private wage and salary workers, while around 19% are government workers (Table 3.5).

Table 3.5 Class of Worker	Fergus County	
	Number	Percent
Private wage and salary workers	3,250	58.1
Government workers	1,064	19.0
Self-employed workers in own not incorporated business	1,143	20.5
Unpaid family workers	132	2.4

(Census 2000)

3.2.1 European Settlement of Fergus County

Summarized from the Fergus County, Montana soil survey.

Fergus County was established by an act of the Fourteenth Legislative Assembly, Montana Territory, in spring of 1885. The original area of Fergus County was subsequently divided to form all or part of Musselshell, Petroleum, Judith Basin, Wheatland, and Golden Valley Counties and the present Fergus County.

The area that is now Fergus County once was largely the hunting grounds of such Indian tribes as the Gros Ventre, Crow, and Sioux. Trapping and trading with the Indians were the chief occupations up the time that gold was discovered in the area.

Gold was discovered in the Judith Mountains around the 1880's, which led to the establishment of several "boom" towns including Giltedge and Maiden. Most of these towns have since been abandoned, but other communities sprung up throughout the county with the construction of the Central Montana and Burlington Northern Railways. Due to the availability of vast expanses of rangelands, the cattle and sheep industries began to thrive in the early 1900's and continue to flourish today. Lewistown, named for Major William H. Lewis, began as a small trading post in 1874 and is currently the county seat.

In 1878 Mr. and Mrs. Janeaux filed the first homestead claim in the area that was to become Fergus County. In about 1880 stockmen began using the rangeland areas, but few crops were grown until about 1906. By 1917 most of the better farmland had been homesteaded. The number of farms has been decreasing steadily since 1930, when 2,073 farms were in the county. In 1974 the number of farms was only 802. As the number of farms has decreased, the average size of farms has increased from 609 acres in 1920 to 2,729 acres in 1974. In 1974 the

county was about 62 percent rangeland, 25 percent cropland, 9 percent woodland, 2.5 percent pastureland, and about 1.5 percent other types.

3.3 Description of Fergus County

Fergus County lies in the heart of Montana, encompassing the geographic center of the state. This area is characterized by gently rolling mixed grass rangeland with many small drainages and shallow coulees. Much of the region is used for livestock grazing or the production of crops such as hay, wheat, and barley. Fergus County receives an average of 18 inches of precipitation annually. The Judith Mountain Range is a relatively small island of steep timbered slopes rising near the center of the county just north of Lewistown. Additionally, the Big Snowy Mountains and the Little Snowy Mountains are located along the southern boundary of Fergus County. These larger ranges are part of the Jefferson Division of the Lewis and Clark National Forest. Recreational sites have been established in various locations throughout these publicly owned lands. The Missouri River, which defines the northern border of the county, also provides many recreational opportunities and historically significant sites as part of the Lewis and Clark Expedition trail. The greater Fergus County area was historically a common hunting ground for the Gros Ventre, Blackfeet, Crow, Nez Perce, and Sioux Indian tribes.

Near the northeastern border of Fergus County lays part of the 1.1 million acre Charles M. Russell National Wildlife Refuge extending from the Missouri River. Much of the Refuge remains relatively unchanged from the historic voyage of Lewis and Clark. The Refuge contains examples of most landforms and vegetative communities found throughout the county, including spectacular examples of native prairie, forested coulees, river bottoms, and "breaks" badlands. Elk, mule deer, white-tailed deer, pronghorn, bighorn sheep, sage and sharp-tailed grouse, and bald eagles make the Refuge home.

The Judith River, which travels about 10 miles west of Winifred, drains several small creeks and coulees before emptying into the Missouri River to the north. The flood plain along the river supports extensive riparian vegetation that serves as home to a variety of wildlife species. The bottomlands also provide more fertile soils for agricultural production in areas.

Land ownership throughout the County is a mix of private, state, BLM, U.S. Forest Service and U.S. Fish and Wildlife Service. Much of the land in Fergus County is managed in support of the ranching and agricultural economy of the area. Domestic livestock and wildlife graze many of the areas that are not actively cultivated for hay or cash crops.

3.3.1 Highways

The most populated community, Lewistown, acts as a central hub for the transportation network for the County. U.S. Highway 87 is the main east-west arterial through Fergus County. This two-lane route connects Lewistown with other urban centers including Roundup and Great Falls. U.S. Highway 191 dissects the county from north to south connecting many of the more rural communities to Lewistown. This route also travels to Harlowton to the south and Malta to the north. There are several State Highways crisscrossing the county, most of which connect Lewistown to small rural towns in outlying areas. These are typically paved, two-lane routes adequate for emergency travel.

3.3.2 Rivers

The Judith River flows between the western county border and the community of Winifred. Although not a large drainage, a multitude of small creeks and coulees drain into this tributary of the Missouri River. The Missouri River defines the northern border of Fergus County. During the

historic times and still today, these waterways served as a large financial entity in Fergus County providing many recreational and economic resources. Other important bodies of water in the county are Crystal Lake, Valentine Reservoir, Coffee Creek, Arrow Creek, McDonald Creek, Flatwillow Creek, Big Spring Creek, and a plethora of other streams that make ranching and agricultural production possible.

3.3.3 Climate

Fergus County is usually warm in summer and is characterized by frequent hot days. In winter, periods of very cold weather are a caused by arctic air moving in from the north or northeast. Cold periods alternate with milder periods that often occur when westerly winds are warmed as they move downslope. Most precipitation falls as rain during the warmer part of the year and is usually heaviest late in spring and early in summer. Winter snowfalls are frequent, but the snow cover usually disappears during mild periods. In some winters a heavy blizzard with high winds and drifting snow strikes the area, and snow remains on the ground for many weeks. In some years summer hailstorms cause severe local damage to crops in the area.

In winter the average temperature is 23 degrees Fahrenheit. The average daily minimum temperature is about 10 degrees Fahrenheit. The lowest temperature occurred at Denton on December 29, 1968, and is -46 degrees. In summer the average temperature is 64 degrees Fahrenheit. The average daily maximum temperature is about 80. The highest recorded temperature, which occurred at Grass Range on August 5, 1961, and at Winifred on August 24, 1969, is 105 degrees. The total annual precipitation for the County is 10 to 30 inches. Of the total precipitation, 75% usually falls April through September, which includes the growing season for most crops. Thunderstorms occur on about 30 days each year, most during the summer. The average seasonal snowfall is about 55 inches. The average relative humidity in midafternoon is about 50%. Humidity is higher at night, and the average at dawn is about 70%. The percentage of possible sunshine is 75 in summer and 50 in winter. The prevailing wind is from the southwest. Average wind speed is highest, 12 miles per hour, in spring.

3.3.4 Recreation

Fergus County is rich in recreational resources. Sportsmen enjoy the hunting and fishing opportunities. White-tailed deer, mule deer, Rocky Mountain elk, prong-horned antelope, and black beer are hunted. Bird hunters find ring-necked pheasant, sage grouse, sharp-tailed grouse, ruffed grouse, blue grouse, gray partridge, and Merriam's turkey. A portion of the Charles M. Russell Wildlife Refuge is located along the Missouri River in the northeastern corner of the County. This area is open to the public for hunting, camping, boating, and many other recreational activities

Numerous ponds, lakes, and streams offer a variety of fishing. Big Spring Creek, which flows through Lewistown, is an excellent fishing stream.

The potential for wintertime recreation is also good. The terrain in the county is ideal for snowmobiling and cross-country skiing.

The economic impacts of these activities to the local economy and the economy of Montana have not been enumerated.

3.3.4.1 Charles M. Russell Wildlife Refuge

Extending 125 miles up the Missouri River from the Fort Peck Dam in north-central Montana, the Charles M. Russell National Wildlife Refuge (NWR) is approximately 1,100,000 acres in size and includes the 245,000-acre Fort Peck Reservoir. Given the size and remoteness of the

Refuge, the area has changed very little from the historic voyage of the Lewis and Clark expedition, through the era of outlaws and homesteaders, to the present time.

Visitors will find spectacular examples of native prairie, forested coulees, river bottoms, and "breaks" badlands. Elk, mule deer, pronghorn, bighorn sheep, sage and sharp-tailed grouse, and bald eagles make the Refuge home. The Refuge's namesake famously portrayed the rich diversity of native wildlife and habitats of the area in many of his paintings.

UL Bend NWR, a "refuge-within-a-refuge," lies within Charles M. Russell NWR and contains 20,000 acres of designated wilderness. The Refuge complex also contains Hailstone, Halfbreed, Lake Mason, and War Horse NWRs. These small satellite refuges are scattered throughout central Montana and were established primarily to protect wetlands for migratory birds and waterfowl. Several waterfowl production areas are also managed as part of the Refuge complex.

Hunting and fishing opportunities abound on Charles M. Russell NWR, its satellite refuges, and the waterfowl production areas. Boating is popular on the Missouri River and Fort Peck Reservoir. Several state parks and recreational areas have been developed within the Refuge. Each fall, hundreds of elk congregate in the Slippery Ann Wildlife Viewing Area, creating a spectacle not to be missed. Camping is permitted anywhere on the Refuge. The entire Refuge is open to hiking and horseback riding although no formal trails exist. Excellent wildlife viewing and photography opportunities are found throughout the Refuge.

3.3.4.2 Missouri River Breaks National Back Country Byway

The Missouri Breaks National Back Country Byway traverses one of the most geologically unique and historically significant areas in Montana. Nature worked overtime here to fashion a ruggedly spectacular landscape that was first described by Lewis and Clark as ‘the Deserts of America.’ Fur traders would later refer to this section of the Missouri River as Mauvaises Terres, the ‘Bad Lands.’

The Byway leads the visitor to scenes overlooking the Upper Missouri National Wild & Scenic River. It was designated in 1976 to preserve the very values that are so abundant along the Byway. The Wild & Scenic River from Fort Benton down river to the James Kipp Recreation area is the foremost component of the Lewis & Clark National Historic Trail. The Byway northeast from Winifred to Deweese Ridge closely follows the Nez Perce National Historic Trail.

3.3.4.3 Fishing and Hunting

Fishing and hunting is very important to Fergus County both from a recreational standpoint and as an economic resource. Anglers often take catfish, walleye, northern pike, sauger, perch, bullhead, paddlefish, and lake trout from the waters of Fort Peck Lake and the Missouri River. Big Sand Creek and Crystal Lake are also popular fishing holes.

For those people who prefer a gun or bow to a rod, Fergus County offers a bounty of hunting experiences. Wild birds and game, like deer, antelope, elk, mountain lion, coyote, pheasant, quail, partridge, chukar, grouse, wild duck, geese, and doves are found in abundance.

3.3.4.4 Camping

Camping is another popular activity enjoyed by the residents of Fergus County. The James Kipp Recreation Area offers 19 single units and 15 multi/group camp sites, potable water, public telephone, a floaters tent camp site, boat ramp, fish cleaning table, 5 restroom sites, and an RV

dump station. There is a host on site during the summer season. Visitors enjoy the wooded river bottom setting in a historic and scenic area of the river. The roads are graveled and there are trailer pads. Camp sites are on a first come first serve basis. Remember to pack out what you pack in, no trash receptacles are available.

Crystal Lake Campground in the Lewis and Clark National Forest south of Lewistown is another popular camping and fishing spot in the summer time. The campground is pack it in, pack it out and located on Crystal Lake in the shadow of Mt. Harlow in a thick stand of spruce. Sites are large, secluded and widely spaced. The campground is attractive with several hiking trails and a picturesque lake, well suited for canoeing. Bring a tube, raft or canoe. This is an excellent family campground not only because of the lake, but also the large network of trails. Additionally, this area is well-known for its snowmobiling and cross-country skiing trails.

3.3.4.5 Bureau of Land Management Public Lands

There are several BLM administered areas in Fergus County that are open to the public for a variety of recreational purposes; however, few developed sites are available. BLM Special Recreation Management Areas include the Judith Mountains SRMA, the Judith River SRMA, and the Snowy Mountains SRMA. The BLM lands extending from south of the Missouri River to the Snowy and Belt Mountains (Judith) are classified as an Extensive Recreation Management Area.

3.3.5 Resource Dependency

Over the past century, employment through agricultural farming and livestock ranching has been significant in the region. Livestock ranching has been and continues to be an important component of the economy in Fergus County. Livestock grazing in Fergus and surrounding Counties has provided stable employment while serving to keep rangelands and forestlands alike maintained at a lower wildfire risk than if they had not been present and managed.

The role of natural resources in the local economies of Montana can be summarized by looking at the share of each community's economic base. Basic industries, or export industries, consist of firms that sell their products outside the local area or that are otherwise affected by events outside the local area.

Basic industries are responsible for injecting new funds into a region's economy, which in turn create additional jobs and incomes as these dollars are spent and re-spent locally. The incomes earned by workers in basic industries are spent at local grocery stores, car dealerships, and healthcare facilities such as hospitals and doctors and dentist offices (sometimes denoted as derivative or secondary industries). The relationship between basic and derivative industries is often summarized in terms of a "multiplier," which reflects the amount of additional income (or jobs) created in derivative industries for each dollar (or job) increase in the basic industries (Polzin 1998).

Table 3.6. Gross state product in basic industries, 1994.

Industry	Millions of 2004$
Ag and Ag Service	$1,242
Mining	$1,128
Primary Manufacturing	$731
Subtotal of Natural Resources	$3,101
Natural resources / Basic	41.8%
Other Basic Industries	$4,317

Table 3.6. Gross state product in basic industries, 1994.	
Industry	**Millions of 2004$**
Total Basic	$7,417
Source: (Polzin 1998)	

Montana's economy is a natural resource dependent economy (Table 3.6), which in turn is affected by natural and man caused disasters, including wildland fire. Efforts to mitigate hazards will have a positive impact on both rural economies, but also on the state's economy.

3.4 Emergency Services & Planning and Zoning

The Fergus County Commissioners have adopted the official Road Name List. Road signs have been installed throughout the County, including names and mileage to homes. These serve emergency response efforts well.

Currently, the County does not have Enhanced 911. The Fergus County Sheriff's office operates the 911 Dispatch Center for Fergus County. In addition to handling law enforcement and emergency medical calls, the center also provides dispatch services to all of the rural fire districts and city fire departments in Fergus and Judith Basin Counties, and the fire company in Petroleum County. The dispatch center, operational 24 hours a day, is located in the Sheriff's office at 121 8th Avenue South in Lewistown, Montana.

With regard to wildfires, the 911 dispatch center is primarily responsible for receiving reports of fires and notifying the appropriate fire district and/or agency according to protocol sheets provided by the districts or agencies. The center will provide some support to incidents, but generally does not function as an expanded dispatch office. For large-scale incidents, the County Emergency Operations Center in the basement of the Sheriff Complex is activated. The county DES Coordinator will be involved in establishing and operating the EOC.

3.5 Cultural Resources

Cultural resource impacts were qualitatively assessed through a presence/absence determination of significant cultural resources and mitigation measures to be employed during potential fire mitigation activities such as thinning and prescribed fire.

The United States has a unique legal relationship with Indian tribal governments defined in history, the U.S. Constitution, treaties, statutes, Executive Orders, and court decisions. Since the formation of the union, the United States has recognized Indian tribes as domestic dependant nations under its protection. The Federal Government has enacted numerous regulations that establish and define a trust relationship with Indian tribes.

The relationship between Federal agencies and sovereign tribes is defined by several laws and regulations addressing the requirement of Federal agencies to notify or consult with Native American groups or otherwise consider their interests when planning and implementing Federal undertakings, among these are:

- **EO 13175, November 6, 2000**, Consultation and Coordination with Indian Tribal Governments.
- **Presidential Memorandum, April, 1994**. Government-Government Relations with Tribal Governments (Supplements EO 13175). Agencies must consult with federally recognized tribes in the development of Federal Policies that have tribal implications.

- **EO 13007, Sacred sites, May 24, 1996**. Requires that in managing Federal lands, agencies must accommodate access and ceremonial use of sacred sites and must avoid adversely affecting the physical integrity of these sites.
- **EO 12875, Enhancing Intergovernmental Partnerships, October 26, 1993**. Mainly concerned with unfunded mandates caused by agency regulations. Also states the intention of establishing "regular and meaningful consultation and collaboration with state, local and tribal governments on matters that significantly or uniquely affect their communities."
- **Native American Graves Protection and Repatriation Act (NAGPRA) of 1989**. Specifies that an agency must take reasonable steps to determine whether a planned activity may result in the excavation of human remains, funerary objects, sacred objects and items of cultural patrimony from Federal lands. NAGPRA also has specified requirements for notifying and consulting tribes.
- **Archaeological Resources Protection Act (ARPA), 1979**. Requires that Federal permits be obtained before cultural resource investigations begin on Federal land. It also requires that investigators consult with the appropriate Native American tribe prior to initiating archaeological studies on sites of Native American origin.
- **American Indian Religious Freedom Act (AIRFA), 1978**. Sets the policy of the US to protect and preserve for Native Americans their inherent rights of freedom to believe, express, and exercise the traditional religions of the American Indian . . . including, but not limited to access to sacred sites, use and possession of sacred objects, and the freedom to worship through ceremonies and traditional rites.
- **National Environmental Policy Act (NEPA), 1969**. Lead agency shall invite participation of affected Federal, State, and local agencies and any affected Indian Tribe(s).
- **National Historic Preservation Act (NHPA), 1966**. Requires agencies to consult with Native American tribes if a proposed Federal action may affect properties to which they attach religious and cultural significance. (Bulletin 38 of the act, identification of TCPs, this can only be done by tribes.)
- Treaties (supreme law of the land) in which tribes were reserved certain rights for hunting, fishing and gathering and other stipulations of the treaty.
- Unsettled aboriginal title to the land, un-extinguished rights of tribes.

3.5.1 National Register of Historic Places

The National Park Service maintains the National Register of Historical Places as a repository of information on significant cultural locale. These may be buildings, roads or trails, places where historical events took place, or other noteworthy sites. The NPS has recorded sites in its database. These sites are summarized in Table 3.7.

Table 3.7. National Register of Historic Places in Fergus County, Montana.

Item Number	Resource Name	Address	City	Listed	Architect, Builder, orEngineer
1	Anderson House	1015 W. Watson	Lewistown	1993	Anderson,Harry F
2	Ayers House	316 Eighth Ave. S	Lewistown	1986	Folis & Coulter, Wasmansdorff & Eastman

Table 3.7. National Register of Historic Places in Fergus County, Montana.					
Item Number	**Resource Name**	**Address**	**City**	**Listed**	**Architect, Builder, orEngineer**
3	Big Springs Stone Quarry Historic District	Along MT 238, Upper Spring Cr.	Lewistown	1993	Ligatich,George, Tus,Peter
4	Bright House	707 W. Boulevard	Lewistown	1993	Tus,Peter
5	Clark-Cardwell House	523 W. Watson	Lewistown	1986	Unknown
6	Culver Studio	212 5th Ave	Lewistown	1980	
7	Fergus County High School	412 6th Ave	Lewistown	1985	Multiple
8	Fergus County Improvement Corporation Dormitory	216 7th St., S	Lewistown	1980	Wasmansdorff & Eastman
9	First Presbyterian	215 Fifth Ave	Lewistown	1986	Wasmansdorff & Eastman
10	Hopkins Brothers Grocery Warehouse	612--616 Fourth Ave.	Lewistown	1993	Unknown
11	House at 301 Eighth Avenue	301 Eighth Ave. S	Lewistown	1986	Unknown
12	House at 324 W. Corcoran	324 W. Corcoran	Lewistown	1993	Unknown
13	House at 618 West Janeaux	618 W. Janeaux	Lewistown	1986	Unknown
14	House at 805 W. Watson	805 W. Watson	Lewistown	1993	Unknown
15	House at 809 W. Watson	809 W. Watson	Lewistown	1993	Unknown
16	House at 813 W. Watson	813 W. Watson	Lewistown	1993	Unknown
17	Huntoon Residence	722 W. Water	Lewistown	1985	Link and Haire
18	Judith Place Historic District	Main St. the alley between Hawthorne and Ridgelawn Sts., Washington St.. and Oullette St.	Lewistown	1988	Et al., Devine,William S.
19	Kendall Townsite	Kendall Rd	Hilger	1991	
20	Lewis House	702 W. Boulevard	Lewistown	1993	Tus,Peter A.
21	Lewistown Airport Hangar	1.5 mi. W of Lewistown off US 87	Lewistown	1993	Civilian Works Administration
22	Lewistown Carnegie Library	701 W. Main St	Lewistown	1980	Tubb,George, Tubb,T.J.
23	Lewistown Central Business Historic	Washington St., 1st Ave.,	Lewistown	1985	Multiple

Table 3.7. National Register of Historic Places in Fergus County, Montana.					
Item Number	Resource Name	Address	City	Listed	Architect, Builder, orEngineer
	District	Janeaux St., and 8th Ave			
24	Lewistown Merchantile Company	220 E. Main	Lewistown	1986	Wasmansdorff & Eastman
25	Lewistown Satellite Airfield Historic District	US 87	Lewistown	2000	
26	Lewistown Silk Stocking District	2nd Ave., Boulevard and Washington Sts. and 3rd Ave	Lewistown	1985	Multiple
27	Masonic Temple	322 W. Broadway	Lewistown	1979	Tuss,Peter, Wasmansdorf & Eastman
28	Mill House	MT 466 4.5 mi. SE of Lewistown, along Spring Cr	Lewistown	1993	Unknown
29	N-Bar Ranch	15 mi. SW of Grass Range	Grass Range	1991	
30	Rocky Point	30 mi. S of Landusky	Charles M. Russell National Wildlife Refuge	1975	
31	Schroeder Hospital	502 Fifth Ave. S	Lewistown	1993	Heldahl,Thomas
32	St. James Episcopal Church and Parish House	502 W. Montana St	Lewistown	1978	Wamsdorff & Eastman, Sutcliffe,John
33	St. Joseph's Hospital	U.S. 87	Lewistown	1978	Multiple
34	St. Leo's Catholic Church	124 W. Broadwa	Lewistown	1982	Stanton & Smith, Linke & Haire
35	US Post Office and Federal Building	204 Third Ave. N	Lewistown	1986	McGough Bros., Wetmore, James A

(NRHP 2003)

Fire mitigation activities in and around these sites has the potential to affect historic places. In all cases, the fire mitigation work will be intended to reduce the potential of damaging the site due to wildfire. Areas where ground disturbance will occur will need to be inventoried depending on the location. Such actions may include, but are not limited to, constructed firelines (handline, mechanical line, etc.), new roads to creeks to fill water tankers, mechanical treatments, etc. Only those burn acres that may impact cultural resources that are sensitive to burning (i.e., buildings, peeled bark trees, etc.) would be examined. Burns over lithic sites are not expected to have an impact on those sites, as long as the fire is of low intensity and short duration. Some areas with heavy vegetation may need to be examined after the burn to locate and record any cultural resources although this is expected to be minimal. Traditional Cultural Properties

(TCPs) will also need to be identified. Potential impact to TCPs will depend on what values make the property important and will be assessed on an individual basis.

3.6 Transportation

Primary access to and from Fergus County is provided by U.S. Highways 87 and 191, both of which are two-lane highways traveling east-west and north-south, respectively. These main arterials connect Lewistown and all of Fergus County to the urban centers of Roundup, Great Falls, Malta, and Harlowton. State Highways 200, 238, 466, 3, 426, 81, 236, and 19 provide access to most outlying communities. These roads are generally paved, two lane access routes.

Secondary, gravel roads maintained by the County or private entities provide access to the adjoining areas within the county, including rural communities, oil rigs, recreation areas, and rural homes. A variety of trails and closed roads are to be found throughout the region. Many of these roads were originally built to facilitate logging, agricultural, or ranching activities. In most cases, these roads are adequate to facilitate firefighting equipment as they adhere to County Building Codes. County building codes for new developments should be adhered to closely to insure this tendency continues.

3.7 Vegetation & Climate

Vegetation in Fergus County is a mix of grasslands, rangelands, and forested ecosystems. An evaluation of satellite imagery of the region provides some insight to the composition of the forest vegetation of the area. The full extent of the county was evaluated for cover type as determined from Landsat 7 ETM+ imagery in tabular format, Table 3.8.

The most represented vegetated cover type is a Low/Moderate Cover Grasslands type at approximately 23% of the County's total area. The next most common vegetation cover type represented is a Moderate/High Cover Grasslands type Association at 14% of the total area. Dryland Agricultural represents only 7% of Fergus County, while irrigated lands represent almost 8% of the county's land area (Table 3.8).

Table 3.8. Cover Types in Fergus County

	Acres	Percent of County's Total Area
Low/Moderate Cover Grasslands	647,172	23.3%
Moderate/High Cover Grasslands	401,764	14.4%
Agricultural Lands: Dry	285,410	10.3%
Agricultural Lands: Irrigated	217,129	7.8%
Ponderosa Pine	171,937	6.2%
Xeric Shrub-Grassland Associati	153,937	5.5%
Very Low Cover Grasslands	103,472	3.7%
Mixed Xeric Shrubs	92,596	3.3%
Other Grasslands	78,197	2.8%
Sagebrush	74,946	2.7%
Graminoid and Forb Riparian	72,857	2.6%
Lodgepole Pine	58,595	2.1%
Mixed Xeric Forest	53,572	1.9%
Douglas-fir	48,680	1.8%
Mixed Broadleaf Forest	47,995	1.7%
Shrub Riparian	36,222	1.3%

Table 3.8. Cover Types in Fergus County	Acres	Percent of County's Total Area
Altered Herbaceous	28,178	1.0%
Badlands	23,264	0.8%
Missouri Breaks	22,984	0.8%
Mixed Subalpine Forest	22,327	0.8%
Low Density Xeric Forest	21,467	0.8%
Rocky Mountain Juniper	14,824	0.5%
Silver Sage	12,049	0.4%
Mesic Shrub-Grassland Associati	11,717	0.4%
Broadleaf Riparian	11,373	0.4%
Mixed Broadleaf and Conifer For	10,642	0.4%
Conifer Riparian	9,886	0.4%
Water	7,083	0.3%
Douglas-fir/Lodgepole Pine	7,039	0.3%
Rock	6,623	0.2%
Montane Parklands and Subalpine	5,408	0.2%
Mixed Mesic Forest	4,271	0.2%
Mixed Whitebark Pine Forest	3,837	0.1%
Mixed Riparian	3,371	0.1%
Mixed Barren Sites	3,371	0.1%
Urban or Developed Lands	2,158	0.1%
Limber Pine	1,968	0.1%
Mixed Broadleaf and Conifer Rip	1,531	0.1%
Mines, Quarries, Gravel Pits	598	0.0%
Salt-Desert Shrub/Dry Salt Flat	510	0.0%
Standing Burnt Forest	182	0.0%

Vegetative communities within the county follow the strong moisture and temperature gradient related to the major river drainages. Scarce precipitation and soil conditions result in a relatively arid environment. As moisture availability increases, so does the abundance of hardwood and conifer species.

3.7.1 Monthly Climate Summaries In or Near Fergus County

3.7.1.1 Denton, Montana (242347)

Period of Record Monthly Climate Summary

Period of Record : 7/ 1/1948 to 3/31/2004

Table 3.9 Climate records for Denton, Montana (Fergus County)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	33.1	39.0	46.0	57.2	65.8	74.4	83.0	82.9	71.7	60.6	45.0	36.2	57.9
Average Min. Temperature (F)	6.5	11.7	18.3	27.7	36.3	44.0	47.3	46.2	36.9	28.3	16.9	9.2	27.4
Average Total	0.59	0.44	0.69	1.15	2.74	2.89	1.77	1.56	1.29	0.85	0.55	0.58	15.11

Table 3.9 Climate records for Denton, Montana (Fergus County)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Precipitation (in.)													
Average Total SnowFall (in.)	10.8	6.6	7.7	3.5	1.3	0.1	0.0	0.0	0.4	1.6	4.4	7.2	43.6
Average Snow Depth (in.)	4	3	1	0	0	0	0	0	0	0	1	2	1

Percent of possible observations for period of record. Max. Temp.: 69.6% Min. Temp.: 69.2% Precipitation: 97.2% Snowfall: 89% Snow Depth: 78.6%

3.7.1.2 Lewistown FAA AP, Montana (244985)

Period of Record Monthly Climate Summary

Period of Record : 1/ 8/1896 to 3/31/2004

Table 3.10 Climate records for Lewistown FAA AP, Montana (Fergus County)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	32.5	35.6	42.5	54.4	63.7	71.9	81.4	80.6	69.3	58.7	44.3	35.8	55.9
Average Min. Temperature (F)	10.0	12.3	19.4	28.6	37.0	44.6	49.5	48.1	39.5	31.3	20.4	13.2	29.5
Average Total Precipitation (in.)	0.78	0.70	1.06	1.35	2.89	3.58	1.98	1.66	1.56	1.16	0.80	0.81	18.32
Average Total SnowFall (in.)	12.5	8.8	12.7	10.6	4.9	0.3	0.0	0.0	1.4	4.8	9.0	12.8	77.9
Average Snow Depth (in.)	4	4	3	1	0	0	0	0	0	0	1	3	1

Percent of possible observations for period of record. Max. Temp.: 87.4% Min. Temp.: 87.4% Precipitation: 96.3% Snowfall: 56.2% Snow Depth: 57.1%

3.7.1.3 Lewistown, Montana (244978)

Period of Record Monthly Climate Summary

Period of Record : 5/ 1/1949 to 3/31/2004

Table 3.11 Climate records for Lewistown, Montana (Fergus County)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	25.7	35.4	36.2	50.4	62.2	69.3	80.9	79.3	68.4	57.5	44.3	36.5	53.8
Average Min. Temperature (F)	4.4	14.0	14.6	26.5	37.0	43.4	49.9	48.9	40.5	31.7	22.0	15.0	29.0
Average Total Precipitation (in.)	1.03	0.78	1.34	1.91	3.48	3.83	2.31	2.16	2.01	1.42	0.96	1.07	22.31
Average Total SnowFall (in.)	18.8	14.1	22.3	15.2	4.9	0.2	0.0	0.0	1.5	6.8	11.7	19.3	114.9
Average Snow Depth (in.)	4	4	4	1	0	0	0	0	0	0	1	2	1

Percent of possible observations for period of record. Max. Temp.: 16.8% Min. Temp.: 16.8% Precipitation: 99.4% Snowfall: 91.9% Snow Depth: 63.6%

3.7.1.4 Winifred, Montana (249033)

Period of Record Monthly Climate Summary

Period of Record : 7/ 1/1948 to 3/31/2004

Table 3.12 Climate records for Winifred, Montana (Fergus County)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	29.4	36.2	43.8	56.3	66.6	74.9	84.1	83.8	71.8	60.1	43.7	34.1	57.1
Average Min. Temperature (F)	6.0	12.4	19.7	29.6	39.2	46.9	51.6	49.8	40.2	30.7	19.2	10.5	29.6
Average Total Precipitation (in.)	0.70	0.45	0.69	1.20	2.62	2.84	1.69	1.51	1.18	0.84	0.59	0.65	14.95
Average Total SnowFall (in.)	5.5	3.9	3.3	2.5	0.1	0.0	0.0	0.0	0.1	0.7	2.7	5.3	24.2
Average Snow Depth (in.)	4	3	1	0	0	0	0	0	0	0	0	2	1

Percent of possible observations for period of record. Max. Temp.: 98.6% Min. Temp.: 98.6% Precipitation: 98.5% Snowfall: 60.9% Snow Depth: 57.6%

3.7.1.5 Grass Range, Montana (243727)

Period of Record Monthly Climate Summary

Period of Record : 7/ 1/1948 to 3/31/2004

Table 3.13 Climate records for Grass Range, Montana (Fergus County)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	35.3	41.1	46.9	57.9	67.9	76.3	84.9	84.4	73.1	62.7	47.4	39.1	59.8
Average Min. Temperature (F)	9.1	14.6	20.3	29.4	38.6	46.2	51.1	49.8	40.8	32.1	21.0	13.3	30.5
Average Total Precipitation (in.)	0.74	0.41	0.88	1.47	3.00	3.04	1.89	1.53	1.28	0.87	0.62	0.61	16.32
Average Total SnowFall (in.)	11.2	6.7	10.2	6.5	1.1	0.1	0.0	0.0	0.4	3.2	6.5	8.4	54.2
Average Snow Depth (in.)	2	2	1	0	0	0	0	0	0	0	1	1	1

Percent of possible observations for period of record. Max. Temp.: 96.9% Min. Temp.: 97.2% Precipitation: 98% Snowfall: 94.4% Snow Depth: 76.5%

3.7.1.6 Roy, Montana (247228)

Period of Record Monthly Climate Summary

Period of Record : 7/ 1/1948 to 3/31/2004

Table 3.14 Climate records for Roy, Montana (Fergus County)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	30.2	36.8	44.4	56.8	67.3	76.1	85.2	84.9	72.9	61.3	44.8	34.8	58.0
Average Min. Temperature (F)	6.2	12.5	19.8	30.3	40.2	48.2	53.4	52.0	42.0	32.3	20.0	10.9	30.6
Average Total Precipitation (in.)	0.49	0.37	0.65	1.17	2.64	2.55	1.82	1.38	1.13	0.73	0.44	0.47	13.84
Average Total SnowFall (in.)	8.8	6.1	7.3	5.7	1.0	0.1	0.0	0.0	0.2	2.2	5.1	7.8	44.3
Average Snow Depth (in.)	6	5	3	1	0	0	0	0	0	0	1	3	2

Percent of possible observations for period of record. Max. Temp.: 99.9% Min. Temp.: 99.8% Precipitation: 100% Snowfall: 100% Snow Depth: 99.9%

3.7.1.7 Valentine, Montana (248498)

Period of Record Monthly Climate Summary

Period of Record : 10/1/1984 to 3/31/2004

Table 3.15 Climate records for Valentine, Montana (Fergus County)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	33.4	37.6	47.4	58.7	68.6	77.5	85.5	84.9	73.2	60.5	44.2	36.1	59.0
Average Min. Temperature (F)	6.3	10.9	20.5	30.0	39.7	48.5	52.8	51.2	40.9	29.3	16.9	8.5	29.6
Average Total Precipitation (in.)	0.52	0.33	0.70	1.18	2.45	2.12	2.15	1.38	1.12	0.71	0.50	0.53	13.71
Average Total SnowFall (in.)	8.2	4.4	5.0	1.8	0.5	0.0	0.0	0.0	0.0	1.6	4.5	7.1	33.0
Average Snow Depth (in.)	3	2	1	0	0	0	0	0	0	0	1	2	1

Percent of possible observations for period of record. Max. Temp.: 100% Min. Temp.: 100% Precipitation: 99.9% Snowfall: 97.6% Snow Depth: 97.4%

3.8 Wildfire Hazard Profiles

3.8.1 Wildfire Ignition Profile

Fire was once an integral function of the majority of ecosystems in Montana. The seasonal cycling of fire across the landscape was as regular as the July, August and September lightning storms plying across the canyons and mountains. Depending on the plant community composition, structural configuration, and buildup of plant biomass, fire resulted from ignitions with varying intensities and extent across the landscape. Shorter return intervals between fire

events often resulted in less dramatic changes in plant composition (Johnson 1998). The fires burned from 1 to 47 years apart, with most at 5- to 20-year intervals (Barrett 1979). With infrequent return intervals, plant communities tended to burn more severely and be replaced by vegetation different in composition, structure, and age (Johnson *et al.* 1994). Native plant communities in this region developed under the influence of fire, and adaptations to fire are evident at the species, community, and ecosystem levels. Fire history data (from fire scars and charcoal deposits) suggest fire has played an important role in shaping the vegetation in the Columbia Basin for thousands of years (Steele *et al.* 1986, Agee 1993).

Detailed records of fire ignition and extent have been compiled by the USDA Forest Service, and the USDI Bureau of Land Management. Using this data on past fire extents and fire ignition data, the occurrence of wildland fires in the region of Fergus County has been evaluated.

Many fires have burned in the region of Fergus County (Table 3.16 & 3.17). Figure 3.1 summarizes fire ignitions and acres burned annually (1980-2003). There were approximately 400 fire ignitions during this 24 year period, with the highest number of total ignitions peaking in 1988 and 1994, recent years have witnessed a decrease in the number of ignitions and the total acres burned (Figure 3.1).

The average number of acres burned each year since 1980 has been approximately 1,555 acres, with the average fire burning just over 90 acres after ignition.

Table 3.16. Past fire ignitions in Fergus County, Montana: 1980-2003.

Name	LATITUDE	LONGITUDE	Cause[1]	Acres	Year
FS 1	46.767	-109.133	0	0.0	1980
SOUTH SOUR	47.517	-109.133	1	0.0	1980
FA 12	47.200	-109.167	0	0.0	1980
FA 2	47.150	-109.250	0	0.0	1980
FA 1	47.367	-109.283	0	0.0	1980
MUSSEL	47.467	-108.367	1	0.0	1980
CARROL COU	47.583	-108.500	1	0.0	1980
FA 13	47.267	-109.500	0	0.0	1980
TWO CALF	47.617	-108.833	1	0.0	1980
SAND CRK 2	47.517	-108.667	1	0.1	1980
LITTLE SAG	47.650	-109.683	1	0.2	1980
KELLY HILL	47.450	-109.750	1	0.2	1980
SPOT HORSE	47.200	-109.200	9	0.5	1980
WOODHAWK	47.733	-109.017	1	1.0	1980
CHEADDE	47.000	-109.133	1	1.0	1980
HORSE CAMP	47.467	-108.350	1	1.0	1980
SAND CREEK	47.533	-108.667	1	1.0	1980
REPPE-BUTE	47.700	-108.967	1	1.0	1980
ARMELLS	47.467	-108.933	1	2.0	1980
POWERPLANT	47.717	-108.950	1	2.0	1980
HALF MOON	46.833	-109.167	4	3.0	1980
OSBURNSEN	47.600	-109.417	6	3.0	1980
BAUEWATER	47.468	-108.730	1	3.0	1980
SAGE HEN	47.133	-108.900	1	3.0	1980
ERVINRIDGE	47.783	-109.067	1	4.0	1980

Table 3.16. Past fire ignitions in Fergus County, Montana: 1980-2003.

Name	LATITUDE	LONGITUDE	Cause[1]	Acres	Year
N MOCCASIN	47.267	-109.500	1	4.0	1980
RIM	47.062	-108.834	1	10.0	1980
SILVER TIP	47.620	-108.838	1	30.0	1980
SAGE CREEK	47.552	-108.516	1	80.0	1980
FA 5	47.117	-109.283	0	0.0	1981
FA 3	47.133	-109.283	0	0.0	1981
TIMTAR	46.833	-109.500	0	0.0	1981
FA 7	47.633	-109.550	0	0.0	1981
FA 2	47.417	-108.583	0	0.0	1981
MAIDEN	47.133	-109.250	4	0.2	1981
MIDDLE BNC	46.833	-109.000	1	0.5	1981
FARGO COUL	47.533	-109.033	1	0.5	1981
ARMELS	47.500	-109.067	1	0.5	1981
ROSS 2	47.217	-109.083	1	0.5	1981
MAIDEN PK	47.183	-109.217	1	0.5	1981
WHISKEY	47.467	-109.717	1	0.5	1981
PORPHYRY	47.200	-109.183	1	1.0	1981
BALDY MTN	47.200	-109.267	1	1.0	1981
LIME KILN	47.167	-109.333	9	1.0	1981
DOG CRK 2	47.650	-109.500	1	1.0	1981
DOG CREEK	47.667	-109.500	1	1.0	1981
EIKE	47.017	-108.983	1	1.0	1981
S MOCCASIN	47.167	-109.550	1	3.0	1981
JANICH	47.755	-108.921	1	3.0	1981
ROSS PASS	47.217	-109.083	1	5.0	1981
NEW YEAR	47.167	-109.200	4	22.0	1981
SAND CREEK	47.600	-108.667	0	0.0	1982
ARMELLS	47.200	-108.950	1	0.2	1982
BIRCHES	46.800	-109.600	1	0.5	1982
LIMEKILN	47.133	-109.317	1	1.0	1982
FIVE PINE	47.550	-108.667	1	1.0	1982
KIPP	47.600	-108.750	1	1.0	1982
S ARMELLS	47.467	-108.950	1	2.0	1982
FA 5	47.217	-109.167	0	0.0	1983
FA 4	47.217	-109.200	0	0.0	1983
DEVILS	46.767	-109.450	0	0.0	1983
HILLCOULEE	47.617	-108.667	0	0.0	1983
FAWN FIRE	46.833	-109.000	4	0.3	1983
WOODHAWK	47.733	-109.150	1	0.3	1983
WILLOW CK	46.767	-109.017	1	1.0	1983
E S CABIN	47.200	-109.233	4	1.0	1983
LYONCANYON	46.817	-109.367	1	1.3	1983
EICHOFF	46.933	-108.933	1	2.0	1983
LEE	46.733	-109.483	1	3.0	1983

Table 3.16. Past fire ignitions in Fergus County, Montana: 1980-2003.

Name	LATITUDE	LONGITUDE	Cause[1]	Acres	Year
LITTLE SAG	47.683	-109.717	1	5.0	1983
DEAD MANS	47.717	-109.667	1	10.0	1983
SOURDOUGH	47.583	-109.083	1	20.0	1983
CAROL TR	47.517	-108.333	1	20.0	1983
JURDIE	46.933	-108.633	1	600.0	1983
NORTH FORK	46.783	-109.050	0	0.0	1984
FA 3	46.817	-109.200	0	0.0	1984
FA 6	46.933	-109.283	0	0.0	1984
FERGUS	47.400	-108.400	0	0.0	1984
FA 5	47.283	-109.483	0	0.0	1984
MEADOW CRK	46.783	-109.617	0	0.0	1984
OLD GUMBO	47.733	-109.550	1	0.5	1984
MALE BENCH	46.783	-109.183	1	1.0	1984
MCCOLLUM	47.550	-108.700	1	1.0	1984
TAFFY CK	47.667	-109.383	1	2.0	1984
PUP	47.667	-109.500	1	2.0	1984
PN	47.667	-109.533	1	2.0	1984
MAIDEN	47.167	-109.333	4	5.0	1984
DOG CREEK	47.633	-109.450	1	15.0	1984
GUMBO	47.733	-109.550	1	25.0	1984
BUFFALO WA	47.483	-108.383	1	50.0	1984
PRIVATE	47.133	-109.117	6	300.0	1984
BOX ELDER	47.300	-109.133	4	550.0	1984
Fergus County			0	2318.0	1984
FALSE ALM1	46.783	-109.233	0	0.0	1985
FA 2	47.517	-108.767	0	0.0	1985
BLACK RDG	46.767	-109.367	1	0.1	1985
LONE TREE	47.767	-108.950	1	0.1	1985
JUDITH	47.117	-109.383	1	0.2	1985
DRY POLE	46.817	-109.500	1	0.2	1985
TWO CALF	47.633	-108.817	0	0.2	1985
TWO CALF	47.650	-108.780	1	0.3	1985
BEAVER CRK	46.850	-109.417	1	0.5	1985
KNOX RIDGE	47.617	-109.833	1	0.5	1985
FARGO COUL	47.617	-108.783	1	2.0	1985
WERKS	47.650	-109.017	1	2.5	1985
ARMELLS	47.567	-108.833	1	3.0	1985
SNOW BANK	47.000	-108.833	4	14.2	1985
SOURDOUGH	47.567	-108.850	1	25.0	1985
WEST GULCH	46.817	-109.617	1	1200.0	1985
LIMEKILN	47.150	-109.333	1	0.1	1986
LONE TREE	47.733	-109.633	1	0.1	1986
WILDER	47.550	-108.417	1	0.3	1986
ALKALI	47.383	-108.750	1	0.3	1986

Table 3.16. Past fire ignitions in Fergus County, Montana: 1980-2003.

Name	LATITUDE	LONGITUDE	Cause[1]	Acres	Year
BULL	47.500	-108.833	0	0.5	1986
SOUTH FORK	47.633	-109.050	1	1.0	1986
DYGERT	46.967	-109.283	2	1.0	1986
79 FIRE	47.617	-109.617	1	2.0	1986
CRYSTAL PK	47.183	-109.183	1	3.0	1986
FA 1	47.150	-109.300	0	0.0	1987
FA 4	46.717	-109.433	0	0.0	1987
FA 5	46.767	-109.483	0	0.0	1987
FA 3	46.850	-109.500	0	0.0	1987
FA 7	47.700	-109.667	0	0.0	1987
BLACKBUTTE	47.233	-108.967	1	0.5	1987
ELK PEAK	47.200	-109.100	1	1.0	1987
EVERS COUL	47.683	-109.650	1	1.0	1987
SUNDANCE	47.433	-108.617	1	1.5	1987
FA 11	47.183	-109.250	0	0.0	1988
FA 6	46.717	-109.483	0	0.0	1988
HALFMOON	46.833	-109.333	1	0.1	1988
ICE CAVES2	46.933	-109.617	1	0.1	1988
LONE TREE	47.610	-108.660	1	0.1	1988
ALPINE	47.133	-109.283	1	0.2	1988
HARTMAN	47.300	-109.500	1	0.2	1988
SPTDHORSE	47.133	-109.200	1	0.3	1988
YOMO	47.117	-109.333	1	0.3	1988
DOG CREEK	47.717	-109.417	1	0.3	1988
LIL BLACK	47.183	-109.533	1	0.3	1988
BAKERS MON	47.567	-108.983	1	0.3	1988
ARMELLS	47.610	-108.660	6	0.3	1988
MALDEN	47.167	-109.217	1	0.5	1988
ASHSPRINGS	46.917	-109.283	1	0.5	1988
HAY CANYON	46.967	-109.467	1	0.5	1988
CUTOFF	47.183	-109.517	1	0.5	1988
BECKETT	47.017	-108.883	1	0.5	1988
RIDGE	47.530	-108.700	1	0.5	1988
VAURNET	46.817	-109.083	1	1.0	1988
RUBY GULCH	47.117	-109.283	1	1.0	1988
MAULAND	47.600	-108.510	1	1.5	1988
FLATWILLOW	46.817	-109.000	1	2.0	1988
MIDDLEBNCH	46.800	-109.017	1	2.0	1988
ICE CAVES	46.933	-109.617	1	2.0	1988
PRONGHORN	46.786	-109.084	1	2.0	1988
KIPP PARK	47.610	-108.660	1	5.0	1988
TWO CALF	47.617	-108.800	1	6.0	1988
TWO CALF	47.610	-108.800	1	6.0	1988
BEARSPRING	47.550	-109.617	1	8.0	1988

Table 3.16. Past fire ignitions in Fergus County, Montana: 1980-2003.

Name	LATITUDE	LONGITUDE	Cause[1]	Acres	Year
IRON CITY	47.733	-109.517	1	45.0	1988
KENDALL	47.610	-108.780	1	83.0	1988
SOURDOUGH	47.617	-109.067	1	100.0	1988
SUNSHINE	47.750	-109.167	1	100.0	1988
KENDALL CO	47.617	-108.783	9	100.0	1988
SOURDOUGH	47.610	-109.060	1	100.0	1988
MAYNARD	46.783	-109.300	1	180.0	1988
WOLF CREEK	47.600	-109.633	1	200.0	1988
WHOOPUP	46.833	-108.917	1	200.0	1988
ARROW CRK	47.683	-109.783	1	450.0	1988
WOODHAWK	47.733	-109.000	1	1000.0	1988
DUVAL COUL	47.617	-108.633	1	1000.0	1988
DUVAL COUL	47.610	-108.630	1	1000.0	1988
FA 1	47.117	-109.233	0	0.0	1989
FA 4	47.000	-108.667	0	0.0	1989
ZENOBIACRK	47.500	-109.933	1	0.1	1989
DEAD CALF	46.883	-109.617	1	0.1	1989
SALT LICK	46.757	-109.063	1	0.1	1989
PINE	47.600	-108.700	1	0.1	1989
MERKEL DUR	47.117	-109.367	1	0.3	1989
H B	47.500	-108.967	1	0.3	1989
SNAG	47.600	-108.700	1	0.3	1989
KNOX RIDGE	47.600	-108.800	1	1.0	1989
SOUTH FORK	47.617	-108.950	1	1.3	1989
HUTTON BOT	47.550	-108.367	1	1.5	1989
	47.000	-108.833	1	1.5	1989
SKYLINE	47.550	-108.360	1	1.5	1989
CLFHANGER	47.750	-109.100	1	2.0	1989
WHISKYFAIR	47.683	-109.433	1	2.0	1989
BROWN COUL	47.583	-109.533	1	2.0	1989
LITTLE SAG	47.667	-109.717	1	2.0	1989
TWO CALF	47.617	-108.950	1	2.0	1989
KNOXRIDGE	47.583	-108.967	1	2.0	1989
BIG COULEE	47.600	-108.610	1	3.0	1989
ROCK CREEK	47.610	-108.460	1	4.0	1989
BLACKTAIL	46.917	-108.917	1	7.0	1989
BLACK MAGI	46.867	-109.050	1	10.0	1989
WHITE BOT.	47.610	-108.530	0	15.0	1989
SAND CREEK	47.580	-108.660	1	306.0	1989
SAND CREEK	47.583	-108.667	1	343.0	1989
FA 8	47.517	-109.033	0	0.0	1990
FA 7	47.667	-109.233	0	0.0	1990
BATMAN	47.333	-108.417	1	0.1	1990
	46.757	-109.568	9	0.2	1990

Table 3.16. Past fire ignitions in Fergus County, Montana: 1980-2003.

Name	LATITUDE	LONGITUDE	Cause[1]	Acres	Year
RAIN-OUT	47.383	-108.367	0	2.0	1990
NEW YEAR S	47.167	-109.317	1	25.0	1990
DOG CREEK	47.667	-109.617	6	200.0	1990
SUNSHINE	47.783	-109.017	1	230.0	1990
CARELESS	46.771	-109.421	1	0.0	1991
POT LICKER	46.817	-109.517	1	0.1	1991
PORPHYRY	47.200	-109.250	1	0.2	1991
CRYSTL CAS	46.783	-109.483	1	0.2	1991
MIDDLEXING	47.617	-108.833	1	0.2	1991
	47.530	-108.680	1	0.2	1991
SMURF	46.800	-109.183	1	0.3	1991
	47.610	-108.750	1	0.3	1991
RADIOTOWER	47.167	-109.550	1	1.0	1991
DOG CREEK	47.650	-109.383	1	2.5	1991
LOOKOUT	47.233	-109.000	1	5.0	1991
	47.610	-108.560	0	5.0	1991
	47.650	-109.330	1	5.0	1991
	47.610	-108.610	4	48.0	1991
VALENTINE	47.350	-108.383	1	50.0	1991
ARROWCLIFF	47.483	-109.917	6	50.0	1991
	47.610	-108.610	0	80.0	1991
	47.610	-108.550	0	110.0	1991
	47.330	-109.330	1	800.0	1991
	47.150	-109.310	4	2520.0	1991
BURNETTEPK	47.150	-109.317	4	6300.0	1991
FA 1	47.133	-109.350	0	0.0	1992
FA 2	46.783	-109.483	0	0.0	1992
T-2	47.667	-109.017	1	0.2	1992
FIRST DAY	47.233	-109.217	1	0.3	1992
KNOLL PEAK	46.817	-109.333	1	0.5	1992
TWO CALF	47.617	-108.850	1	5.0	1992
	47.600	-108.600	0	8.0	1992
	47.600	-108.560	0	30.0	1992
	47.600	-108.510	0	30.0	1992
	47.600	-108.460	0	50.0	1992
COYOTE	47.550	-109.683	1	120.0	1992
BRADLEY	47.634	-108.860	1	800.0	1992
FA 2	47.283	-109.467	0	0.0	1993
	46.757	-109.020	2	0.1	1993
FA-10	47.133	-109.367	0	0.0	1994
FA-5	47.417	-108.950	0	0.0	1994
MAYBERRY	47.217	-109.267	1	0.1	1994
JAKES RES	47.533	-108.583	1	0.1	1994
BECKET	46.933	-108.967	1	0.2	1994

Table 3.16. Past fire ignitions in Fergus County, Montana: 1980-2003.

Name	LATITUDE	LONGITUDE	Cause[1]	Acres	Year
PACKER	46.783	-109.350	2	0.3	1994
SECTION	47.600	-108.700	1	1.0	1994
ANDERSONBR	47.550	-109.583	1	1.5	1994
REEDCOULEE	47.683	-109.017	1	5.0	1994
FARGO	47.517	-108.817	1	25.0	1994
BEARSPRING	47.383	-109.667	1	40.0	1994
MAULAND	47.580	-108.550	1	75.0	1994
SAND CREEK	47.567	-108.567	1	83.5	1994
WINDYPOINT	46.800	-109.447	9	4217.0	1994
FA 3	46.786	-109.483	0	0.0	1995
FA 10	47.178	-109.534	0	0.0	1995
FA 7	47.692	-109.462	0	0.0	1995
BIRDWELL	47.512	-108.836	1	0.1	1995
C AND M	47.322	-108.326	1	0.3	1995
LONG WALK	47.548	-108.927	1	0.3	1995
REEDCOULEE	47.678	-108.838	1	0.5	1995
ARMELLS	47.600	-108.660	1	0.5	1995
ASSIST #2	47.660	-108.830	1	0.5	1995
ELK	47.548	-108.905	1	1.0	1995
REBURN	47.512	-108.836	1	3.0	1995
NO SHOW	47.428	-108.381	0	3.0	1995
LIMEKILN	47.122	-109.350	4	4.0	1995
DRAG RIDGE	47.439	-109.000	1	10.0	1995
ROSSPASS	47.240	-109.081	1	15.0	1995
FA4	47.019	-108.643	0	0.0	1996
FA3	47.077	-109.428	0	0.0	1996
LITTLESTRK	47.217	-109.133	1	0.1	1996
ROCK FIRE	47.217	-109.133	1	0.1	1996
RUB FIRE	47.217	-109.133	1	0.1	1996
JUDITH PK	47.219	-109.242	1	0.1	1996
MAGINNISMT	47.219	-109.178	1	0.2	1996
DRY POLE	46.785	-109.568	1	0.2	1996
S. FORK	46.767	-109.067	1	1.0	1996
YEAGERS	47.383	-109.150	1	1.0	1996
WILLOWCRK	46.786	-109.020	1	1.0	1996
SOUTH FORK	46.785	-109.063	1	1.0	1996
SNOWY PK	46.771	-109.484	1	1.5	1996
SNOWY PEAK	46.800	-109.505	1	1.5	1996
BURNETTE#2	47.134	-109.491	1	2.0	1996
Fergus County			0	2.0	1996
MOCCASIN	47.250	-109.483	1	5.0	1996
RIVER FIRE	47.700	-108.833	1	5.0	1996
RIVER FIRE	47.700	-108.833	1	5.0	1996
UPPERCALF	47.678	-109.035	1	5.0	1996

Table 3.16. Past fire ignitions in Fergus County, Montana: 1980-2003.

Name	LATITUDE	LONGITUDE	Cause[1]	Acres	Year
BEAR SPR.	47.583	-109.617	1	7.0	1996
SOUTH FORK	46.771	-109.147	1	12.0	1996
CON FIRE	47.217	-109.133	1	15.0	1996
FINK	47.562	-108.860	1	40.0	1996
FINKBEINER	46.950	-108.867	1	80.0	1996
WEAVER	47.395	-108.326	1	125.0	1996
MAN	47.294	-109.504	1	150.0	1996
FA 7	47.033	-109.133	1	200.0	1996
BOATMAN	47.700	-109.750	8	300.0	1996
Fergus County			0	350.0	1996
FA6	47.649	-109.739	0	0.0	1997
REESER	47.605	-108.838	1	0.1	1997
ICE CAVE	46.753	-109.522	1	0.2	1997
FERRY FIRE	47.707	-109.590	1	1.0	1997
HAWG	47.707	-109.441	1	1.0	1997
ICE CAVES	46.757	-109.526	1	1.0	1997
Fergus County	0.000	0.000	0	1.0	1997
SAND CREEK	47.527	-108.344	1	10.0	1997
KILLHAM	47.652	-109.447	1	20.0	1997
GALEN FIRE	46.917	-108.622	1	60.0	1997
COLBURNBUT	47.550	-108.367	3	0.1	1998
N.O. #6	46.800	-109.633	1	0.1	1998
SHRIMP	47.498	-109.434	1	0.1	1998
MOSQUITO	47.651	-109.455	1	0.1	1998
FITZNER	47.552	-108.516	1	0.1	1998
BLACKTAIL	46.903	-108.968	1	0.5	1998
PALLAS	46.758	-109.056	1	0.5	1998
PALLAS	46.755	-109.053	1	0.5	1998
N MOCCASIN	47.315	-109.515	1	0.6	1998
N O #2	47.366	-108.879	1	1.0	1998
N O #5	47.292	-108.964	1	1.0	1998
N O #3	47.351	-108.815	1	1.0	1998
N O #4	47.351	-108.815	1	1.0	1998
STUMP	47.234	-109.199	1	1.0	1998
STYLER	47.366	-108.495	1	5.0	1998
JUDITH RIV	47.693	-109.611	1	15.0	1998
SALT CR	47.483	-109.562	1	15.0	1998
VALENTINE	47.312	-108.358	1	29.0	1998
TEIGEN	47.033	-108.686	1	600.0	1998
Bullsham	47.625	-108.838	1	0.0	1999
VFD 11	46.907	-109.208	1	0.0	1999
NO 1	47.483	-109.583	1	0.1	1999
NO 9	47.161	-109.240	1	0.1	1999
Horse	46.771	-109.252	1	0.2	1999

Table 3.16. Past fire ignitions in Fergus County, Montana: 1980-2003.

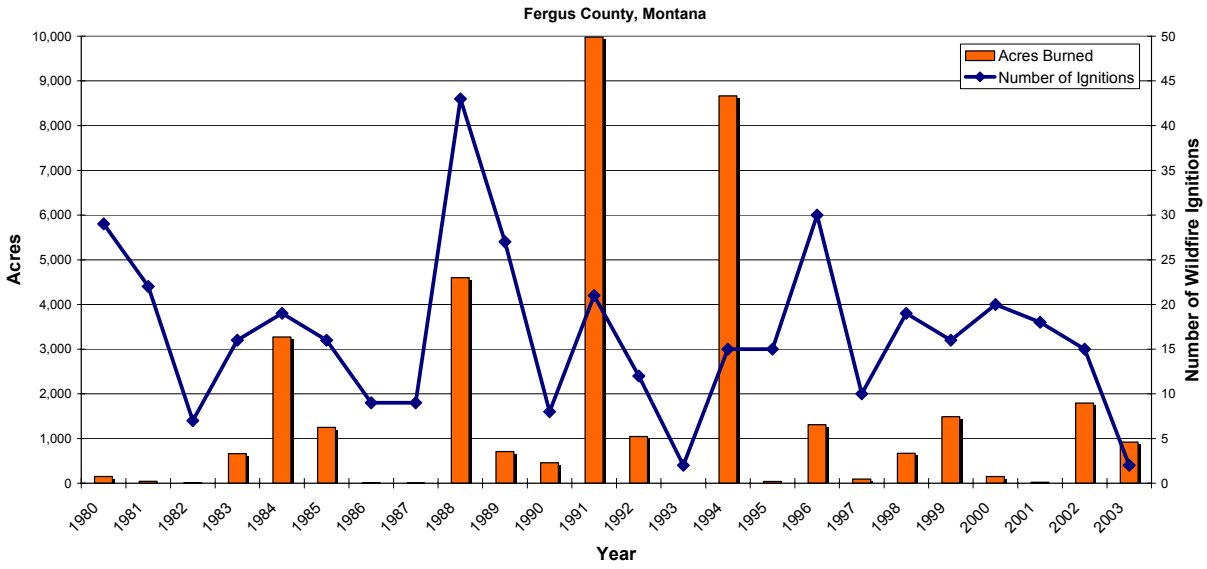
Name	LATITUDE	LONGITUDE	Cause[1]	Acres	Year
Limekiln	47.126	-109.365	1	0.2	1999
HORSE	46.775	-109.250	1	0.2	1999
Baldy	46.917	-108.622	1	3.0	1999
Whiskey	47.678	-109.483	1	5.0	1999
Knox	47.605	-108.905	1	15.0	1999
KNOX	47.600	-108.850	1	20.0	1999
Lonesome L	47.750	-109.056	9	24.0	1999
LAKEMASON	46.750	-108.760	1	100.0	1999
Babys Brea	47.750	-109.056	1	120.0	1999
ASSITT 3	47.780	-109.250	1	200.0	1999
Willow 1	46.785	-108.851	1	1000.0	1999
USFS 5	46.767	-109.017	0	0.0	2000
USFS 1	46.801	-109.484	0	0.0	2000
USFS 3	46.798	-109.260	0	0.0	2000
USFS 4	46.744	-109.446	0	0.0	2000
VFD 4	46.791	-108.999	0	0.0	2000
Fisherman	47.012	-108.724	1	0.1	2000
Careless	46.714	-109.479	1	0.1	2000
Kickmee	47.140	-109.366	1	0.1	2000
Kendalmine	47.293	-109.500	1	0.2	2000
Limekiln	47.165	-109.322	1	0.2	2000
Maiden	47.277	-109.241	1	0.3	2000
Bomber	46.795	-109.172	1	0.8	2000
New Year	47.151	-109.319	1	1.0	2000
Flatwillow	46.804	-109.033	1	1.0	2000
PETERSON	47.728	-109.008	1	3.0	2000
BearSpring	47.527	-109.655	1	5.0	2000
Whiskey	47.717	-109.350	1	7.0	2000
MAYNARD	46.798	-109.260	1	17.0	2000
Blindbread	47.133	-109.350	1	40.0	2000
Piles	47.208	-109.125	0	73.0	2000
WINDY POINT	46.771	-109.441	1	0.1	2001
POSEY SPRING	46.771	-109.063	1	0.1	2001
	47.610	-108.560	1	0.1	2001
	47.610	-108.560	6	0.1	2001
Kelly Hlll	47.100	-109.250	1	0.3	2001
Durfee	46.767	-108.883	1	0.3	2001
BlackButte	47.255	-109.027	1	0.3	2001
BROWNS GULCH	46.786	-109.568	1	0.3	2001
Blakeslee	47.191	-108.800	1	0.5	2001
DRY POLE	46.814	-109.526	1	0.6	2001
South Fork	46.789	-108.994	1	0.8	2001
POSEY	46.771	-109.020	1	1.0	2001
Anderson	47.562	-109.552	1	2.0	2001

Table 3.16. Past fire ignitions in Fergus County, Montana: 1980-2003.

Name	LATITUDE	LONGITUDE	Cause[1]	Acres	Year
Cone Butte	47.249	-109.028	1	2.0	2001
	47.530	-108.450	0	2.0	2001
Carroll Co	47.533	-108.450	1	3.0	2001
Steep Fire	47.449	-109.996	1	3.0	2001
Deadman Co	46.856	-108.679	9	5.0	2001
LWT FD AST	47.101	-109.267	1	0.1	2002
Fargo Coul	47.487	-108.837	1	0.1	2002
Sure Nuf	46.880	-109.057	1	0.1	2002
Cheadle	47.023	-109.177	1	0.1	2002
Marks Asst	47.323	-108.963	1	0.1	2002
Moon Asst	46.802	-109.191	1	0.3	2002
Pinman	47.015	-108.743	1	0.3	2002
SquawCreek	47.483	-108.767	1	1.0	2002
Pegg	47.039	-109.257	9	2.0	2002
Peck Hill	47.548	-109.053	1	5.0	2002
Blacktail	46.961	-108.876	0	30.0	2002
EGrassRang	47.019	-108.728	0	120.0	2002
FergusHP	47.378	-109.072	0	184.0	2002
LowerArmel	47.527	-108.900	0	671.0	2002
FergusTria	47.378	-109.072	0	778.0	2002
REED			0	226.0	2003
ARMELLS H498			0	691.0	2003

[1] See table 3.17 for cause codes.

Figure 3.1. Fergus County Wildfire Ignition and Extent Profile.



Since 1980, it would appear that roughly 73% of all fires in the County have been ignited by nature, while the remaining 27%, on average have been human caused (including

miscellaneous causes, Table 3.17). In comparison with the rest of Montana and the Western United States, this statistic would indicate that the rate of human caused ignitions is slightly lower than average with the standard experienced elsewhere, where human caused ignitions often climb above 25% and even 35%. There may be many factors contributing to this statistic, but the agrarian economy and wildfire educated residents are all positive factors.

Table 3.17. Wildfire Ignitions by Cause in Fergus County.

Cause	Cause Reference	1980-2003 Occurrence	1980-2003 Percent
Lightning	1	293	73.3%
Campfire	2	3	0.8%
Smoking	3	1	0.3%
Debris Burning	4	12	3.0%
Arson	5	0	0.0%
Equipment Use	6	6	1.5%
Railroad	7	0	0.0%
Children	8	1	0.3%
Miscellaneous	9	84	21.0%
Total		**174**	

[1] Data provided by the Bureau of Land Management.

3.8.2 Regional Wildfire Extent Profile

Across the North Central Montana Region, many fires have ignited and burned causing a loss of property and life. Data indicates that in this region, approximately 5,000 fires have burned an estimated 1.0 million acres (average 200 acres each, maximum 182,000 acres – Hill County Fire). Figure 3.2 demonstrates the periodicity of wildland fires in the region, while Table 3.15 documents the degree of nature caused versus human caused wildfires. It is important to understand that the percent of lightning caused fires is calculated based on the total number of fires in the region. Thus, if only a small number of human caused fires are totaled with a large number of nature caused fires, then the percent of lightning caused fires will be high. Conversely, if human caused wildfires are abundant, then the percent of wildfires caused by lightning will be low. Therefore, the observed 36% of total fires caused by lightning, and the 64% of human caused ignitions in the region demonstrates a very high number of human caused ignitions. In fact, the ratio between these two figures should be reversed, with human caused ignitions averaging only 30%, with lightning representing 70%.

Figure 3.2. Regional Wildfire Ignition and Extent Profile.

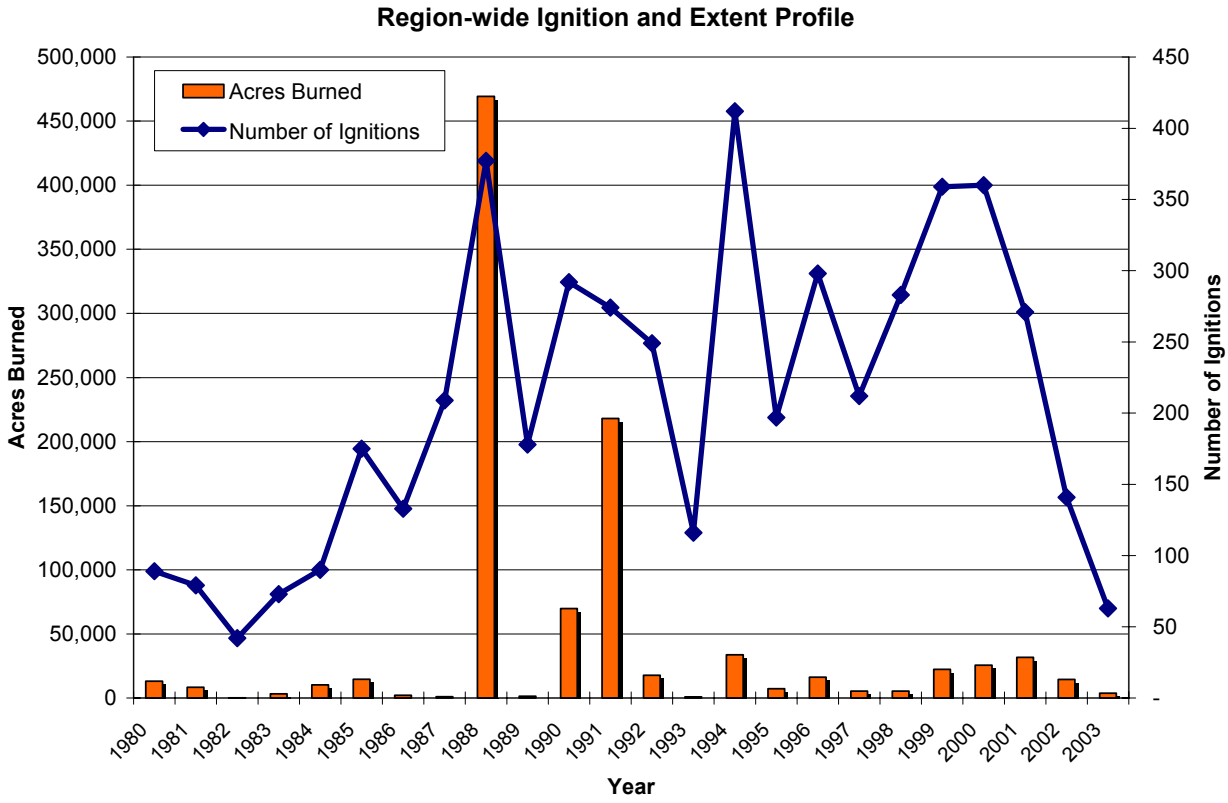


Table 3.18. Regional Summary of Wildfire Ignitions by Cause, regionally.

Cause	Cause Reference	1980-2003 Occurrence	1980-2003 Percent
Lightning	1	1,814	36.3%
Campfire	2	271	5.4%
Smoking	3	241	4.8%
Debris Burning	4	742	14.9%
Arson	5	197	3.9%
Equipment Use	6	230	4.6%
Railroad	7	82	1.6%
Children	8	490	9.8%
Miscellaneous	9	929	18.6%
Total		**4,996**	

Across the west, wildfires have been increasing in extent and cost of control. The National Interagency Fire Center (2003) reports nearly 88,500 wildfires in 2002 burned a total of nearly 7 million acres and cost $1.6 billion (Table 3.19). By most informed accounts, the 2003 totals will be significantly higher in terms of acres burned and cost.

Table 3.19. National Fire Season 2002 Summary	
Number of Fires (2002 final)	88,458
10-year Average (1992-2001)	103,112
Acres Burned (2002 final)	*** 6,937,584**
10-year Average (1992-2001)	4,215,089
Structures Burned (835 primary residences, 46 Commercial buildings, 1500 outbuildings)	2,381
Estimated Cost of Fire Suppression (Federal agencies only)	$ 1.6 billion

- *This figure differs from the 7,184,712 acres burned estimate provided by the National Interagency Coordination Center (NICC). The NICC estimate is based on information contained in geographic area and incident situation reports prepared at the time fires occurred. The 6,937,584 estimate is based on agency end-of-year reports.*

The National Interagency Fire Center, located in Boise, Idaho, maintains records of fire costs, extent, and related data for the entire nation. Tables 3.20 and 3.21 summarize some of the relevant wildland fire data for the nation, and some trends that are likely to continue into the future unless targeted fire mitigation efforts are implemented and maintained in areas like Fergus County.

Table 3.20. Total Fires and Acres 1960 - 2002 Nationally

These figures are based on end-of-year reports compiled by all wildland fire agencies after each fire season, and are updated by March of each year. The agencies include: Bureau of Land Management, Bureau of Indian Affairs, National Park Service, US Fish and Wildlife Service, USDA Forest Service and all State Lands.

Year	Fires	Acres	Year	Fires	Acres
2002	88,458	* **6,937,584**	1980	234,892	5,260,825
2001	84,079	3,555,138	1979	163,196	2,986,826
2000	122,827	8,422,237	1978	218,842	3,910,913
1999	93,702	5,661,976	1977	173,998	3,152,644
1998	81,043	2,329,709	1976	241,699	5,109,926
1997	89,517	3,672,616	1975	134,872	1,791,327
1996	115,025	6,701,390	1974	145,868	2,879,095
1995	130,019	2,315,730	1973	117,957	1,915,273
1994	114,049	4,724,014	1972	124,554	2,641,166
1993	97,031	2,310,420	1971	108,398	4,278,472
1992	103,830	2,457,665	1970	121,736	3,278,565
1991	116,953	2,237,714	1969	113,351	6,689,081
1990	122,763	5,452,874	1968	125,371	4,231,996
1989	121,714	3,261,732	1967	125,025	4,658,586
1988	154,573	7,398,889	1966	122,500	4,574,389
1987	143,877	4,152,575	1965	113,684	2,652,112
1986	139,980	3,308,133	1964	116,358	4,197,309
1985	133,840	4,434,748	1963	164,183	7,120,768
1984	118,636	2,266,134	1962	115,345	4,078,894
1983	161,649	5,080,553	1961	98,517	3,036,219
1982	174,755	2,382,036	1960	103,387	4,478,188
1981	249,370	4,814,206			

(National Interagency Fire Center 2003)

Table 3.21. Suppression Costs for Federal Agencies Nationally

Year	Bureau of Land Management	Bureau of Indian Affairs	Fish and Wildlife Service	National Park Service	USDA Forest Service	Totals
1994	$98,417,000	$49,202,000	$3,281,000	$16,362,000	$678,000,000	**$845,262,000**
1995	$56,600,000	$36,219,000	$1,675,000	$21,256,000	$224,300,000	**$340,050,000**
1996	$96,854,000	$40,779,000	$2,600	$19,832,000	$521,700,000	**$679,167,600**
1997	$62,470,000	$30,916,000	$2,000	$6,844,000	$155,768,000	**$256,000,000**
1998	$63,177,000	$27,366,000	$3,800,000	$19,183,000	$215,000,000	**$328,526,000**
1999	$85,724,000	$42,183,000	$4,500,000	$30,061,000	$361,000,000	**$523,468,000**
2000	$180,567,000	$93,042,000	$9,417,000	$53,341,000	$1,026,000,000	**$1,362,367,000**
2001	$192,115,00	$63,200,000	$7,160,000	$48,092,000	$607,233,000	**$917,800,000**
2002	$204,666,000	$109,035,000	$15,245,000	$66,094,000	$1,266,274,000	**$1,661,314,000**

(National Interagency Fire Center 2003)

Although many very large fires, growing to over 250,000 acres have burned in Montana actual fires in this county have usually been controlled at much smaller extents. This is not to imply that wildfires are not a concern in this county, but to point to the aggressive and professional manner to which the wildland and rural fire districts cooperate in controlling these blazes. The Rural Fire Districts in Fergus County provide primary wildfire protection in Fergus County in cooperation with the Bureau of Land Management with the DNRC assisting for wildfires that escape initial attack.

3.9 Analysis Tools and Techniques to Assess Fire Risk

Fergus County and the adjacent counties of Petroleum and Judith Basin, were analyzed using a variety of techniques, managed on a GIS system (ArcGIS 8.2). Physical features of the region were represented by data layers including roads, streams, soils, elevation, and remotely sensed images from the Landsat 7 ETM+ satellite. Field visits were conducted by specialists from Northwest Management, Inc., and others. Discussions with area residents and fire control specialists augmented field visits and provided insights to forest health issues and treatment options.

This information was analyzed and combined to develop an assessment of wildland fire risk in the region.

3.9.1 Fire Prone Landscapes

Schlosser *et al.* 2002, developed a methodology to assess the location of fire prone landscapes on forested and non-forested ecosystems in the western US. Working under an agreement with the Clearwater Resource Conservation and Development Council, Inc., (RC&D), Northwest Management, Inc., a natural resources consulting firm, completed a similar assessment for five counties in the north central Idaho area including Clearwater County, Idaho County, Latah County, Lewis County, and Nez Perce County. In a separate project, also funded by the Bureau

of Land Management working in cooperation with Adams, Gem, Payette, Washington, and Valley Counties, through the West Central Highlands RC&D Area, Northwest Management, Inc., completed a Fire Prone Landscapes assessments on those listed areas. Additional assessments of Fire Prone Landscapes were completed simultaneously for Ada, Boise, Canyon, and Elmore Counties, working in cooperation with the Southwestern Idaho RC&D located in Meridian, Idaho.

The goal of developing the Fire Prone Landscapes analysis is to make inferences about the relative risk factors across large geographical regions (multiple counties) for wildfire spread. This analysis uses the extent and occurrence of past fires as an indicator of characteristics for a specific area and their propensity to burn in the future. Concisely, if a certain combination of vegetation cover type, canopy closure, aspect, slope, stream and road density have burned with a high occurrence and frequently in the past, then it is reasonable to extrapolate that they will have the same tendency in the future, unless mitigation activities are conducted to reduce this potential.

The analysis for determining those landscapes prone to wildfire utilized a variety of sources.

Digital Elevation: Digital elevation models (DEM) for the project used USGS 30 meter DEM data provided at quarter-quadrangle extents. These were merged together to create a continuous elevation model of the analysis area.

The merged DEM file was used to create two derivative data layers; aspect and slope. Both were created using the spatial analyst extension in ArcGIS 8.2. Aspect data values retained one decimal point accuracy representing the cardinal direction of direct solar radiation, represented in degrees. Slope was recorded in percent and also retained one decimal point accuracy.

Remotely Sensed Images: Landsat 7 Enhanced Thematic Mapper (ETM+) images were used to assess plant cover information and percent of canopy cover. The Landsat ETM+ instrument is an eight-band multi-spectral scanning radiometer capable of providing high-resolution image information of the Earth's surface. It detects spectrally-filtered radiation at visible, near-infrared, short-wave, and thermal infrared frequency bands from the sun-lit Earth. Nominal ground sample distances or "pixel" sizes are 15 meters in the panchromatic band; 30 meters in the 6 visible, near and short-wave infrared bands; and 60 meters in the thermal infrared band.

The satellite orbits the Earth at an altitude of approximately 705 kilometers with a sun-synchronous 98-degree inclination and a descending equatorial crossing time of 10 a.m. daily.

Image spectrometry has great application for monitoring vegetation and biophysical characteristics. Vegetation reflectance often contains information on the vegetation chlorophyll absorption bands in the visible region and the near infrared region. Plant water absorption is easily identified in the middle infrared bands. In addition, exposed soil, rock, and non-vegetative surfaces are easily separated from vegetation through standard hyper-spectral analysis procedures.

Landsat 7 ETM images were obtained to conduct hyper-spectral analysis for this project. The image was obtained in 1998. Hyper-spectral analysis procedures followed the conventions used by the Montana Vegetation and Land Cover Classification System, modified from Redmond (1997) and Homer (1998).

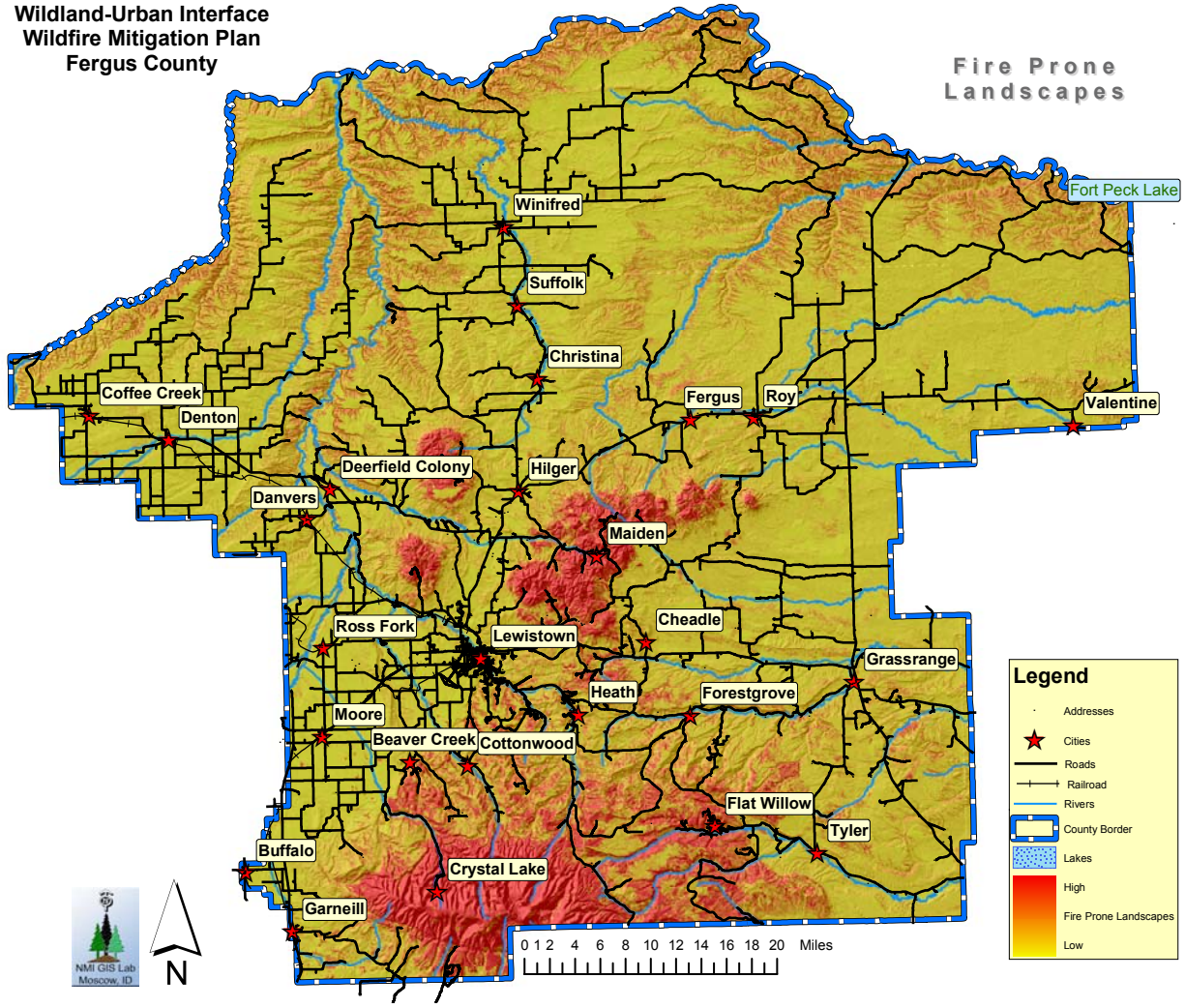
Riparian Zones: Riparian zones were derived from stream layers.

Wind Direction: Wind direction and speed data detailed by monthly averages was used in this project to better ascertain certain fire behavior characteristics common to large fire events. These data are spatially gridded Average Monthly Wind Directions in Montana.

Past Fires: Past fire extents represent those locations on the landscape that have previously burned during a wildfire. Past fire extent maps were obtained from a variety of sources for the central Montana area, including databases provided by the US Forest Service and the Bureau of Land Management.

Fire Prone Landscapes: Using the methodology developed by Schlosser *et al.* (2002), and refined for this project, the factors detailed above were used to assess the potential for the landscape to burn during the fire season in the case of fire ignition. Specifically, the entire region was evaluated at a resolution of 30 meters (meaning each pixel on the screen represented a 30 meter square on the ground) to determine the propensity for a particular area (pixel) to burn in the case of a wildfire. The analysis involved creating a linear regression analysis within the GIS program structure to assign a value to each significant variable, pixel-by-pixel. The analysis ranked factors from 0 (little to no risk) to 100 (extremely high risk) based on past fire occurrence. In fact, the maximum rating score for Fergus County was 100 with a low of 3.

Figure 3.3. Fire Prone Landscapes in Fergus County, Montana.



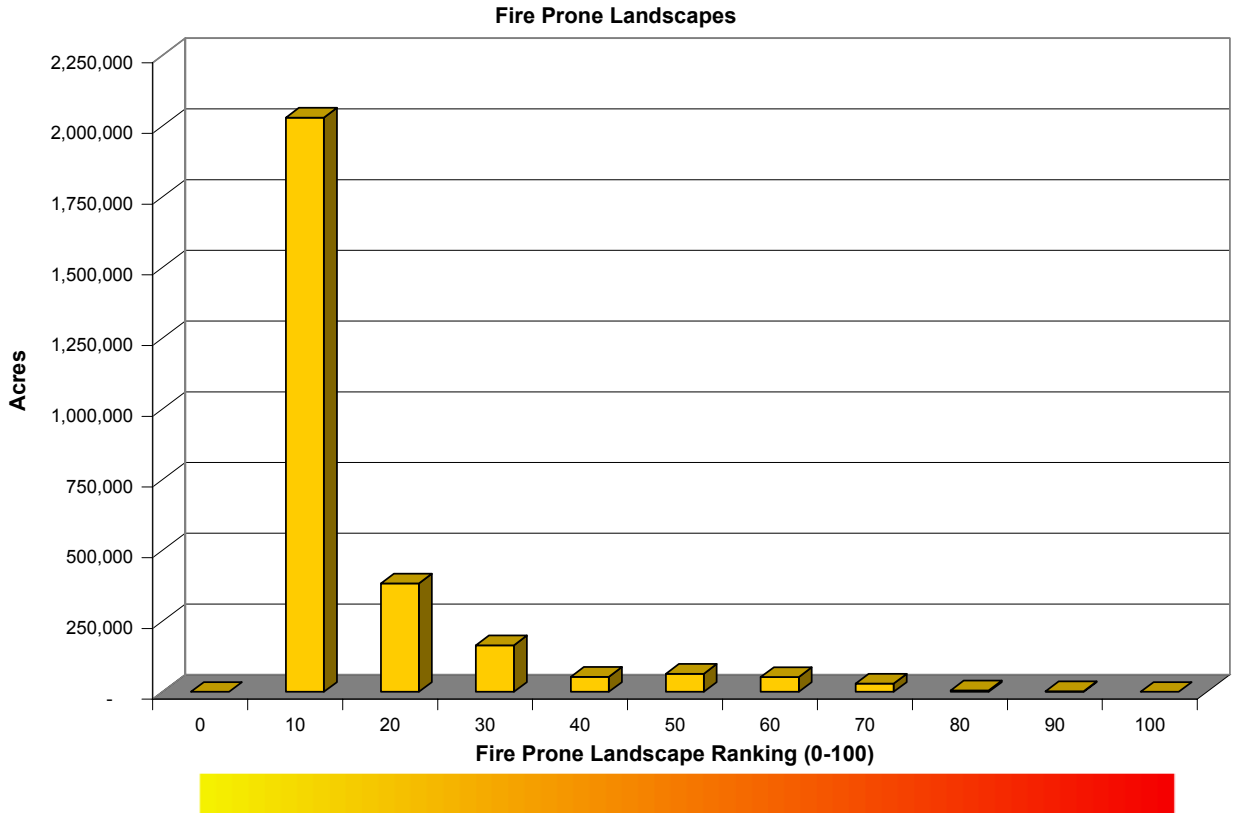
This map is presented for reference in this section of the plan. This map, and additional maps are detailed in Appendix I.

The maps depicting these risk categories display yellow as the lowest risk and red as the highest with values between a constant gradient from yellow to orange to red (Table 3.22). While large maps (16 square feet) have been provided as part of this analysis, smaller size maps are presented in Appendix I.

Table 3.22. Fire Prone Landscape rankings and associated acres in each category for Fergus County.

Color Code	Value	Total	Percent of Total Area
	0	-	0.0%
	10	2,030,029	73.0%
	20	382,849	13.8%
	30	164,091	5.9%
	40	53,196	1.9%
	50	63,753	2.3%
	60	52,207	1.9%
	70	29,087	1.0%
	80	4,775	0.2%
	90	1,678	0.1%
	100	4	0.0%

Figure 3.4: Distribution of area by Fire Prone Landscape Class.



The risk category values developed in this analysis should be considered **ordinal data**, that is, while the values presented have a meaningful ranking, they neither have a true zero point nor

scale between numbers. Rating in the “40” range is not necessarily twice as “risky” as rating in the “20” range. These category values also do not correspond to a rate of fire spread, a fuel loading indicator, or measurable potential fire intensity. Each of those scales is greatly influenced by weather, seasonal and daily variations in moisture (relative humidity), solar radiation, and other factors. The risk rating presented here serves to identify where certain constant variables are present, aiding in identifying where fires typically spread into the largest fires across the landscape.

3.9.2 Fire Regime Condition Class

The US Forest Service has provided their assessment of Fire Regime Condition Class for the forested areas of Fergus County to this WUI Fire Mitigation Plan analysis. These measures of forest conditions are the standard method of analysis for the USDA Forest Service.

A natural fire regime is a general classification of the role fire would play across a landscape in the absence of modern human mechanical intervention, but including the influence of aboriginal burning (Agee 1993, Brown 1995). Coarse scale definitions for natural (historical) fire regimes have been developed by Hardy *et al.* (2001) and Schmidt *et al.* (2002) and interpreted for fire and fuels management by Hann and Bunnell (2001). 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.

As scale of application becomes finer these five classes may be defined with more detail, or any one class may be split into finer classes, but the hierarchy to the coarse scale definitions should be retained.

A fire regime condition class (FRCC) is a classification of the amount of departure from the natural regime (Hann and Bunnell 2001). Coarse-scale FRCC classes have been defined and mapped by Hardy *et al.* (2001) and Schmidt *et al.* (2001) (FRCC). They include three condition classes for each fire regime. The classification is based on a relative measure describing the degree of departure from the historical natural fire regime. This departure results in changes to one (or more) of the following ecological components: vegetation characteristics (species composition, structural stages, stand age, canopy closure, and mosaic pattern); fuel composition; fire frequency, severity, and pattern; and other associated disturbances (e.g. insect and diseased mortality, grazing, and drought). There are no wildland vegetation and fuel conditions or wildland fire situations that do not fit within one of the three classes.

The three classes are based on low (FRCC 1), moderate (FRCC 2), and high (FRCC 3) departure from the central tendency of the natural (historical) regime (Hann and Bunnell 2001, Hardy *et al.* 2001, Schmidt *et al.* 2002). The central tendency is a composite estimate of vegetation characteristics (species composition, structural stages, stand age, canopy closure,

and mosaic pattern); fuel composition; fire frequency, severity, and pattern; and other associated natural disturbances. Low departure is considered to be within the natural (historical) range of variability, while moderate and high departures are outside.

Characteristic vegetation and fuel conditions are considered to be those that occurred within the natural (historical) fire regime. Uncharacteristic conditions are considered to be those that did not occur within the natural (historical) fire regime, such as invasive species (e.g. weeds, insects, and diseases), "high graded" forest composition and structure (e.g. large trees removed in a frequent surface fire regime), or repeated annual grazing that maintains grassy fuels across relatively large areas at levels that will not carry a surface fire. Determination of the amount of departure is based on comparison of a composite measure of fire regime attributes (vegetation characteristics; fuel composition; fire frequency, severity and pattern) to the central tendency of the natural (historical) fire regime. The amount of departure is then classified to determine the fire regime condition class. A simplified description of the fire regime condition classes and associated potential risks are presented in Table 3.23. Maps depicting Fire Regime and Condition Class are presented in Appendix I.

Table 3.23. Fire Regime Condition Class Definitions.

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.	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. Composition and structure of vegetation and fuels are similar to the natural (historical) regime. Risk of loss of key ecosystem components (e.g. native species, large trees, and soil) is low.
Condition Class 2	Moderate departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances.	Fire behavior, effects, and other associated disturbances are moderately departed (more or less severe). Composition and structure of vegetation and fuel are moderately altered. Uncharacteristic conditions range from low to moderate. Risk of loss of key ecosystem components is moderate.
Condition Class 3	High departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances.	Fire behavior, effects, and other associated disturbances are highly departed (more or less severe). Composition and structure of vegetation and fuel are highly altered. Uncharacteristic conditions range from moderate to high. Risk of loss of key ecosystem components is high.

This analysis of Fergus County was completed while completing other counties in western Montana. Unfortunately, approximately one-third of Fergus County was not evaluated. An analysis of Fire Regime Condition Class in Fergus County that was evaluated shows that only 6% of the County is in Condition Class 1 (low departure), almost 40% is in Condition Class 2 (moderate departure), with the remaining area (3%) in Condition Class 3 (Table 3.24).

Table 3.24. FRCC by area in Fergus County.

	Condition Class	Acres	Percent of Area
1	low departure	170,455	6.1%
2	moderate departure	46,159	1.7%
3	high departure	95,134	3.4%
4	moderate departure grass/shrub	1,055,599	37.9%
8	agriculture	428,970	15.4%
9	rock/barren	30,416	1.1%
10	urban	2,632	0.1%
11	water	3,950	0.1%
13	no information	949,873	34.1%

See Appendix I for maps of Fire Regime and Conditions Class.

3.9.3 Predicted Fire Severity

Current fire severity (CFS) is an estimate of the relative fire severity if a fire were to burn a site under its current state of vegetation. In other words, how much of the overstory would be removed if a fire were to burn today. The US Forest Service (Flathead National Forest) did not attempt to model absolute values of fire severity, as there are too many variables that influence fire effects at any given time (for example, temperature, humidity, fuel moisture, slope, wind speed, wind direction).

The characterization of likely fire severity was based upon historic fire regimes, potential natural vegetation, cover type, size class, and canopy cover with respect to slope and aspect. Each cover type was assigned a qualitative rating of fire tolerance based upon likely species composition and the relative resistance of each species to fire. The US Forest Service researchers defined 3 broad classes of fire tolerance: high tolerance (<20 percent post-fire mortality); moderate tolerance (20 to 80 percent mortality); and low tolerance (>80 percent mortality). We would expect that fires would be less severe within cover types comprised by species that have a high tolerance to fire (for example, western larch and ponderosa pine). Conversely, fires would likely burn more severely within cover types comprised by species having a low tolerance to fire (for example grand fir, subalpine fir). Data assignments were based upon our collective experience in the field, as well as stand structure characteristics reported in the fire-history literature. For example, if they estimated that a fire would remove less than 20 percent of the overstory, the current fire severity would be assigned to the non-lethal class (that is, NL). However, if they expected fire to remove more than 80 percent of the overstory, the current fire severity was assigned to a stand replacement class (that is, SR or SR3).

3.9.3.1 Purpose

Fire is a dominant disturbance process in the Northern Rockies. The likely effect of fire upon vegetation (i.e., current fire severity) is critical information for understanding the subsequent fire effects upon wildlife habitats, water quality, and the timing of runoff. There have been many

reports of how fire suppression and timber harvest has affected vegetation patterns, fuels, and fire behavior. The US Forest Service researchers from the Flathead National Forest, derived the current fire severity theme explicitly to compare with the historical fire regime theme to evaluate how fire severity has changed since Euro-American settlement (that is, to derive fire-regime condition class).

3.9.3.2 General Limitations

These data were designed to characterize broad scale patterns of estimated fire severity for use in regional and subregional assessments. Any decisions based on these data should be supported with field verification, especially at scales finer than 1:100,000. Although the resolution of the CFS theme is 90 meter cell size, the expected accuracy does not warrant their use for analyses of areas smaller than about 10,000 acres (for example, assessments that typically require 1:24,000 data).

Current fire severity rule-set was developed for an "average burn day" for the specific vegetation types in our area. Any user of these data should familiarize themselves with the rule sets to better understand our estimate of current fire severity. As with the Fire Regime Condition Class, this analysis was completed only for a portion of Fergus County.

Table 3.25. Predicted Fire Severity by area in Fergus County.

Predicted Fire Severity		Acres	Percent of Area
1	non-lethal	51,203	1.8%
2	mixed severity, short interval	65,514	2.4%
3	mixed severity, long interval	93,262	3.4%
4	Mixed Severity, high elevation	4,276	0.2%
5	stand replacement, forest	97,495	3.5%
7	stand replacement, nonforest	1,055,599	37.9%
8	agriculture	428,970	15.4%
9	rock/barren	30,416	1.1%
10	urban	2,632	0.1%
11	water	3,950	0.1%
13	no information	949,873	34.1%

See Appendix I for a map of Predicted Fire Severity.

3.9.4 On-Site Evaluations

Fire control and evaluation specialists as well as hazard mitigation consultants evaluated the communities of Fergus County to determine, first-hand, the extent of risk and characteristics of hazardous fuels in the Wildland-Urban Interface. The on-site evaluations have been summarized in written narratives and are accompanied by photographs taken during the site visits. These evaluations included the estimation of fuel models as established by Anderson (1982). These fuel models are described in the following section of this document.

In addition, field personnel completed FEMA's Fire Hazard Severity Forms and Fire Hazard Rating Criteria Worksheets. These worksheets and standardized rating criteria allow comparisons to be made between all of the counties in the country using the same benchmarks. The FEMA rating forms are summarized for each community in Appendix II.

3.9.5 Fuel Model Descriptions

Anderson (1982) developed a categorical guide for determining fuel models to facilitate the linkage between fuels and fire behavior. These 13 fuel models, grouped into 4 basic groups: grass, chaparral and shrub, timber, and slash, provide the basis for communicating fuel conditions and evaluating fire risk. There are a number of ways to estimate fuel models in forest and rangeland conditions. The field personnel from Northwest Management, Inc., that evaluated communities and other areas of Fergus County have all been intricately involved in wildland fire fighting and the incident command system. They made ocular estimates of fuel models they observed. In an intense evaluation, actual sampling would have been employed to determine fuel models and fuel loading. The estimations presented in this document (Chapter 3) are estimates based on observations to better understand the conditions observed.

Fuel Model 0- This type consists of non-flammable sites, such as exposed mineral soil and rock outcrops. Other lands are also identified in this type.

3.9.5.1 Grass Group

3.9.5.1.1 Fire Behavior Fuel Model 1

Fire spread is governed by the fine, very porous, and continuous herbaceous fuels that have cured or are nearly cured. Fires are surface fires that move rapidly through the cured grass and associated material. Very little shrub or timber is present, generally less than one-third of the area.

Grasslands and savanna are represented along with stubble, grass-tundra, and grass-shrub combinations that met the above area constraint. Annual and perennial grasses are included in this fuel model.

This fuel model correlates to 1978 NFDRS fuel models A, L, and S.

Fuel model values for estimating fire behavior

Total fuel load, < 3-inch dead and alive, tons/acre 0.74
Dead fuel load, ¼-inch, tons/acre 0.74
Live fuel load, foliage, tons/acre 0
Fuel bed depth, feet 1.0

3.9.5.1.2 Fire Behavior Fuel Model 2

Fire is spread primarily through the fine herbaceous fuels, either curing or dead. These are surface fires where the herbaceous material, in addition to litter and dead-down stemwood from the open shrub or timber overstory, contribute to the fire intensity. Open shrub lands and pine stands or scrub oak stands that cover one-third to two-thirds of the area may generally fit this model; such stands may include clumps of fuels that generate higher intensities that may produce firebrands. Some pinyon-juniper may be in this model.

This fuel model correlates to 1978 NFDRS fuel models C and T.

Fuel model values for estimating fire behavior

Total fuel load, < 3-inch dead and alive, tons/acre 4.0
Dead fuel load, ¼-inch, tons/acre 2.0
Live fuel load, foliage, tons/acre 0.5
Fuel bed depth, feet 1.0

3.9.5.1.3 Fire Behavior Fuel Model 3

Fires in this fuel are the most intense of the grass group and display high rates of spread under the influence of wind. Wind may drive fire into the upper heights of the grass and across standing water. Stands are tall, averaging about 3 feet (1 m), but considerable variation may occur. Approximately one-third or more of the stand is considered dead or cured and maintains the fire. Wild or cultivated grains that have not been harvested can be considered similar to tall prairie and marshland grasses.

This fuel correlates to 1978 NFDRS fuel model N.

Fuel model values for estimating fire behavior

Total fuel load, < 3-inch dead and live, tons/acre 3.0
Dead fuel load, ¼-inch, tons/acre 3.0
Live fuel load, foliage tons/acre 0
Fuel bed depth, feet 2.5

3.9.5.2 Shrub Group

3.9.5.2.1 Fire Behavior Fuel Model 4

Fire intensity and fast-spreading fires involve the foliage and live and dead fine woody material in the crowns of a nearly continuous secondary overstory. Stands of mature shrubs, 6 or more feet tall, such as California mixed chaparral, the high pocosin along the east coast, the pinebarrens of New Jersey, or the closed jack pine stands of the north-central States are typical candidates. Besides flammable foliage, dead woody material in the stands significantly contributes to the fire intensity. Height of stand qualifying for this model depends on local conditions. A deep litter layer may also hamper suppression efforts.

This fuel model represents 1978 NFDRS fuel models B and O; fire behavior estimates are more severe than obtained by Models B or O.

Fuel model values for estimating fire behavior

Total fuel load, <3-inch dead and live, tons/acre 13.0
Dead fuel load, ¼-inch, tons/acre 5.0
Live fuel load, foliage, tons/acre 5.0
Fuel bed depth, feet 6.0

3.9.5.2.2 Fire Behavior Fuel Model 5

Fire is generally carried in the surface fuels that are made up of litter cast by the shrubs and the grasses or forbs in the understory. The fires are generally not very intense because surface fuel loads are light, the shrubs are young with little dead material, and the foliage contains little volatile material. Usually shrubs are short and almost totally cover the area. Young, green stands with no dead wood would qualify: laurel, vine maple, alder, or even chaparral, manzanita, or chamise.

No 1978 NFDRS fuel model is represented, but model 5 can be considered as second choice for NFDRS model D or as third choice for NFDRS model T. Young green stands may be up to 6 feet (2m) high but have poor burning properties because of live vegetation.

Fuel model values for estimating fire behavior

Total fuel load, <3-inch dead and live, tons/acre 3.5
Dead fuel load, ¼-inch, tons/acre 1.0
Live fuel load, foliage, tons/acre 2.0
Fuel bed depth, feet 2.0

3.9.5.2.3 Fire Behavior Fuel Model 6

Fires carry through the shrub layer where the foliage is more flammable than fuel model 5, but this requires moderate winds, greater than 8 mi/h (13 km/h) at mid-flame height. Fire will drop to the ground at low wind speeds or at openings in the stand. The shrubs are older, but not as tall as shrub types of model 4, nor do they contain as much fuel as model 4. A broad range of shrub conditions is covered by this model. Fuel situations to be considered include intermediate stands of chamise, chaparral, oak brush, low pocosin, Alaskan spruce taiga, and shrub tundra. Even hardwood slash that has cured can be considered. Pinyon-juniper shrublands may be represented but may over-predict rate of spread except at high winds, like 20 mi/h (32 km/h) at the 20-foot level.

The 1978 NFDRS fuel models F and Q are represented by this fuel model. It can be considered a second choice for models T and D and a third choice for model S.

Fuel model values for estimating fire behavior

Total fuel load, <3-inch dead and live, tons/acres..... 6.0
Dead fuel load, 1/4 –inch, tons/acre 1.5
Live fuel load, foliage, tons/acre 0
Fuel bed depth, feet 2.5

3.9.5.2.4 Fire Behavior Fuel Model 7

Fires burn through the surface and shrub strata with equal ease and can occur at higher dead fuel moisture contents because of the flammability of live foliage and other live material. Stands of shrubs are generally between 2 and 6 feet (0.6 and 1.8 m) high. Palmetto-gallberry understory-pine overstory sites are typical and low pocosins may be represented. Black spruce-shrub combinations in Alaska may also be represented.

This fuel model correlates with 1978 NFDRS model D and can be a second choice for model Q.

Fuel model values for estimating fire behavior

Total fuel load, <3-inch dead and live, tons/acre 4.9
Dead fuel load, ¼-inch, tons/acre 1.1
Live fuel load, foliage, tons/acre 0.4
Fuel bed depth, feet 2.5

3.9.5.3 Timber Group

3.9.5.3.1 Fire Behavior Fuel Model 8

Slow-burning ground fires with low flame lengths are generally the case, although the fire may encounter an occasional “jackpot” or heavy fuel concentration that can flare up. Only under severe weather conditions involving high temperatures, low humilities, and high winds do the fuels pose fire hazards. Closed canopy stands of short-needle conifers or hardwoods that have

leafed out support fire in the compact litter layer. This layer is mainly needles, leaves, and occasionally twigs because little undergrowth is present in the stand. Representative conifer types are white pine, and lodgepole pine, spruce, fir and larch

This model can be used for 1978 NFDRS fuel models H and R.

Fuel model values for estimating fire behavior

Total fuel load, <3-inch, dead and live, tons/acre 5.0
Dead fuel load, ¼-inch, tons/acre 1.5
Live fuel load, foliage, tons/acre 0
Fuel bed depth, feet 0.2

3.9.5.3.2 Fire Behavior Fuel Model 9

Fires run through the surface litter faster than model 8 and have longer flame height. Both long-needle conifer stands and hardwood stands, especially the oak-hickory types, are typical. Fall fires in hardwoods are predictable, but high winds will actually cause higher rates of spread than predicted because of spotting caused by rolling and blowing leaves. Closed stands of long-needled pine like ponderosa, Jeffrey, and red pines, or southern pine plantations are grouped in this model. Concentrations of dead-down woody material will contribute to possible torching out of trees, spotting, and crowning.

NFDRS fuel models E, P, and U are represented by this model. It is also a second choice for models C and S.

Fuel model values for estimating fire behavior

Total fuel load, <3-inch dead and live, tons/acre 3.5
Dead fuel load, ¼-inch, tons/acre 2.9
Live fuel load, foliage, tons/acre 0
Fuel bed depth, feet 0.2

3.9.5.3.3 Fire Behavior Fuel Model 10

The fires burn in the surface and ground fuels with greater fire intensity than the other timber litter models. Dead-down fuels include greater quantities of 3-inch (7.6 cm) or larger limbwood, resulting from overmaturity or natural events that create a large load of dead material on the forest floor. Crowning out, spotting, and torching of individual trees are more frequent in this fuel situation, leading to potential fire control difficulties. Any forest type may be considered if heavy down material is present; examples are insect- or disease-ridden stands, wind-thrown stands, overmature situations with dead fall, and aged light thinning or partial-cut slash.

The 1978 NFDRS fuel model G is represented.

Fuel model values for estimating fire behavior

Total fuel load, < 3-inch dead and live, tons/acre 12.0
Dead fuel load, ¼-inch, tons/acre 3.0
Live fuel load, foliage, tons/acre 2.0
Fuel bed depth, feet 1.0

The fire intensities and spread rates of these timber litter fuel models are indicated by the following values when the dead fuel moisture content is 8 percent, live fuel moisture is 100 percent, and the effective wind speed at mid-flame height is 5 mi/h (8 km/h):

Table 3.26. Comparative Fire Intensities and Rates of Spread in Timber Fuel Models.

Fuel Model	Rate of Spread Chains/hour	Flame length Feet
8	1.6	1.0
9	7.5	2.6
10	7.9	4.8

Fires such as above in model 10 are at the upper limit of control by direct attack. More wind or drier conditions could lead to an escaped fire.

3.9.5.4 Logging Slash Group

3.9.5.4.1 Fire Behavior Fuel Model 11

Fires are fairly active in the slash and herbaceous material intermixed with the slash. The spacing of the rather light fuel load, shading from overstory, or the aging of the fine fuels can contribute to limiting the fire potential. Light partial cuts or thinning operations in mixed conifer stands, hardwood stands, and southern pine harvests are considered. Clearcut operations generally produce more slash than represented here. The less-than-3-inch (7.6-cm) material load is less than 12 tons per acre (5.4 t/ha). The greater-than-3-inch (7.6-cm) is represented by not more than 10 pieces, 4 inches (10.2 cm) in diameter, along a 50-foot (15 m) transect.

The 1978 NFDRS fuel model K is represented by this model.

Fuel model values for estimating fire behavior

Total fuel load, < 3-inch, dead and live, tons/acre 11.5
Dead fuel load, ¼-inch, tons/acre 1.5
Live fuel load, foliage, tons/acre 0
Fuel bed depth, feet 1.0

3.9.5.4.2 Fire Behavior Fuel Model 12

Rapidly spreading fires with high intensities capable of generating firebrands can occur. When fire starts, it is generally sustained until a fuel break or change in fuels is encountered. The visual impression is dominated by slash and much of it is less than 3 inches (7.6 cm) in diameter. The fuels total less than 35 tons per acres (15.6 t/ha) and seem well distributed. Heavily thinned conifer stands, clearcuts, and medium or heavy partial cuts are represented. The material larger than 3 inches (7.6 cm) is represented by encountering 11 pieces, 6 inches (15.3 cm) in diameter, along a 50-foot (15-m) transect.

This model depicts 1978 NFDRS model J and may overrate slash areas when the needles have dropped and the limbwood has settled. However, in areas where limbwood breakup and general weathering have started, the fire potential can increase.

Fuel model values fore estimating fire behavior

Total fuel load, < 3-inch, dead and live, tons/acre 34.6
Dead fuel load, ¼-inch, tons/acre 4.0
Live fuel load, foliage, tons/acre 0
Fuel bed depth, feet 2.3

3.9.5.4.3 Fire Behavior Fuel Model 13

Fire is generally carried across the area by a continuous layer of slash. Large quantities of material larger than 3 inches (7.6 cm) are present. Fires spread quickly through the fine fuels and intensity builds up more slowly as the large fuels start burning. Active flaming is sustained for long periods and a wide variety of firebrands can be generated. These contribute to spotting problems as the weather conditions become more severe. Clearcuts and heavy partial-cuts in mature and overmature stands are depicted where the slash load is dominated by the greater-than-3-inch (7.6 cm) diameter material. The total load may exceed 200 tons per acre (89.2 t/ha) but fuel less than 3 inches (7.6 cm) is generally only 10 percent of the total load. Situations where the slash still has "red' needles attached but the total load is lighter, more like model 12, can be represented because of the earlier high intensity and quicker area involvement.

The 1978 NFDRS fuel model I is represented. Areas most commonly fitting his model are old-growth stands west of the Cascade and Sierra Nevada Mountains. More efficient utilization standards are decreasing the amount of large material left in the field.

Fuel model values for estimating fire behavior

Total fuel load, < 3-inch dead and live, tons/acre 58.1
Dead fuel load, ¼-inch, tons/acre 7.0
Live fuel load, foliage, tons/acre 0
Fuel bed depth, feet 3.0

For other slash situations:

Hardwood slash .....Model 6
Heavy "red" slash.....Model 4
Overgrown slash .....Model 10
Southern pine clearcut slash.....Model 12

The comparative rates of spread and flame lengths for the slash models at 8 percent dead fuel moisture content and a 5 mi/h (8 km/h) mid-flame wind are presented in Table 3.27.

Table 3.27. Comparative Fire Intensities and Rates of Spread in Slash Fuel Models.

Fuel Model	Rate of Spread Chains/hour	Flame length Feet
11	6.0	3.5
12	13.0	8.0
13	13.5	10.5

3.10 Wildland-Urban Interface

3.10.1 People and Structures

A key component in meeting the underlying need is the protection and treatment of fire hazard in the wildland-urban interface. The wildland-urban interface refers to areas where wildland vegetation meets urban developments, or where forest fuels meet urban fuels (such as houses). These areas encompass not only the interface (areas immediately adjacent to urban development), but also the continuous slopes and fuels that lead directly to a risk to urban developments. Reducing the fire hazard in the wildland urban interface requires the efforts of

federal, state, local agencies, and private individuals (Norton 2002). “The role of [most] federal agencies in the wildland urban interface includes wildland fire fighting, hazard fuels reduction, cooperative prevention and education and technical experience. Structural fire protection [during a wildfire] in the wildland urban interface is [largely] the responsibility of Tribal, state, and local governments” (USFS 2001). Property owners share a responsibility to protect their residences and businesses and minimize fire danger by creating defensible areas around them and taking other measures to minimize the fire risks to their structures (USFS 2001). With treatment, a wildland-urban interface can provide firefighters a defensible area from which to suppress wildland fires or defend communities. In addition, a wildland urban interface that is properly thinned will be less likely to sustain a crown fire that enters or originates within it (Norton 2002).

By reducing hazardous fuel loads, ladder fuels, and tree densities, and creating new and reinforcing defensible space, landowners would protect the wildland-urban interface, the biological resources of the management area, and adjacent property owners by:

- minimizing the potential of high-severity ground or crown fires entering or leaving the area;
- reducing the potential for firebrands (embers carried by the wind in front of the wildfire) impacting the WUI. Research indicates that flying sparks and embers (firebrands) from a crown fire can ignite additional wildfires as far as 1¼ miles away during periods of extreme fire weather and fire behavior (McCoy *et al.* 2001 as cited in Norton 2002);
- improving defensible space in the immediate areas for suppression efforts in the event of wildland fire.

Four wildland/urban conditions have been identified for use in the wildland urban interface (Norton 2002). These include the Interface Condition, Intermix Condition, Occluded Condition, and Rural Condition. Descriptions of each are as follows:

- **Interface Condition** – a situation where structures abut wildland fuels. There is a clear line of demarcation between the structures and the wildland fuels along roads or back fences. The development density for an interface condition is usually 3+ structures per acre;
- **Intermix Condition** – a situation where structures are scattered throughout a wildland area. There is no clear line of demarcation, the wildland fuels are continuous outside of and within the developed area. The development density in the intermix ranges from structures very close together to one structure per 40 acres;
- **Occluded Condition** – a situation, normally within a city, where structures abut an island of wildland fuels (park or open space). There is a clear line of demarcation between the structures and the wildland fuels along roads and fences. The development density for an occluded condition is usually similar to that found in the interface condition and the occluded area is usually less than 1,000 acres in size; and
- **Rural Condition** – a situation where the scattered small clusters of structures (ranches, farms, resorts, or summer cabins) are exposed to wildland fuels. There may be miles between these clusters.

The location of structures in Fergus County have been mapped and are presented on a variety of maps in this analysis document; specifically in Appendix I. The location of all structures was mapped by using a database created by the Fergus County Planning Department showing the location of all addresses in the three counties of Fergus, Petroleum, and Judith Basin County. These were determined using remotely sensed images and GPS units. These records were

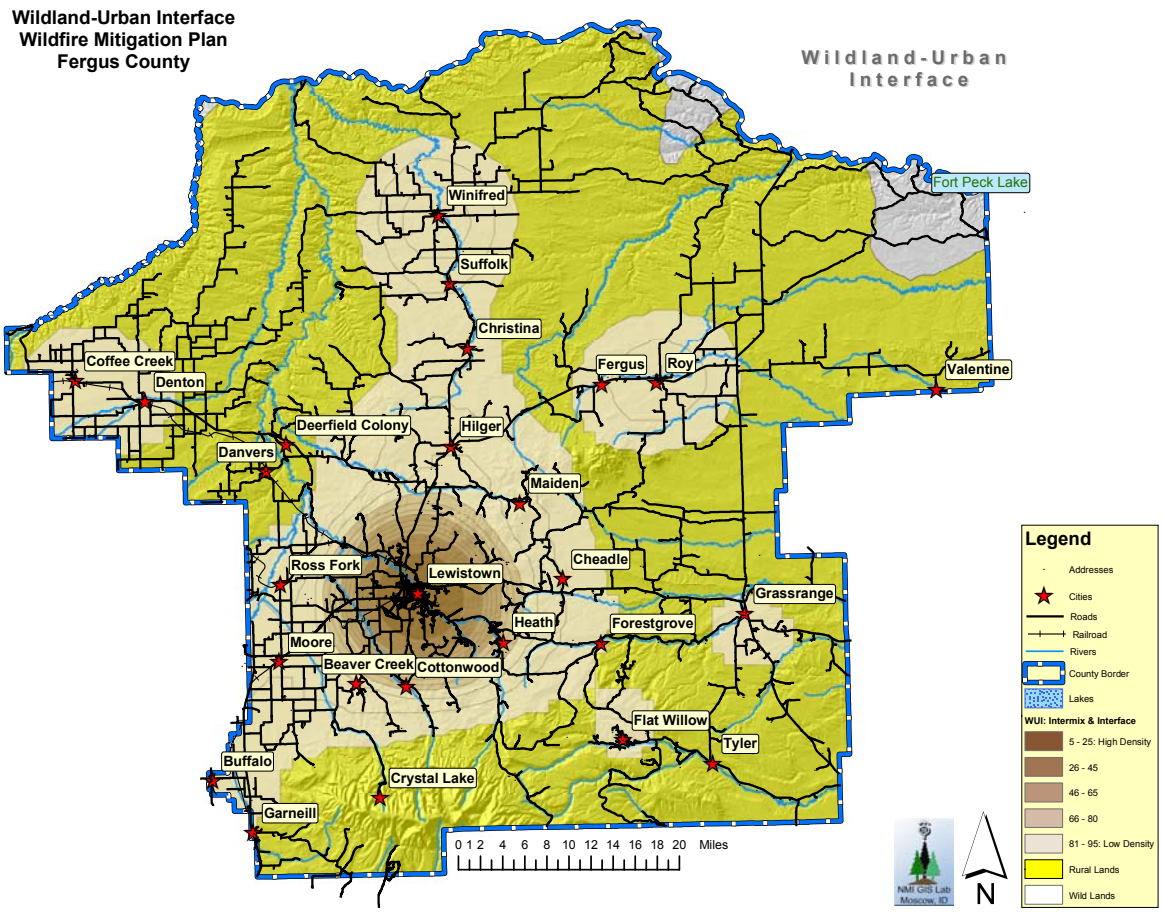
augmented with data collected on hand-held GPS receivers to record the location of structures, especially in areas where new housing developments were seen.

All addresses are represented by a “dot” on the map. The density of structures and their specific locations in this County are critical in defining where the potential exists for casualty loss in the event of a wildfire in the region.

By evaluating this structure density, we can define WUI areas on maps by using mathematical formulae and population density indexes to define the WUI based on where structures are located. The resulting population density indexes create concentric circles showing high density areas of Interface and Intermix WUI, as well as Rural WUI (as defined by Secretary Norton of the Department of Interior). This portion of the analysis allows us to “see” where the highest concentrations of structures are located in reference to high risk landscapes, limiting infrastructure, and other points of concern.

It is critical to understand that in the protection of people, structures, infrastructure, and unique ecosystems, this portion of the analysis only serves to identify structures and by some extension the people that inhabit them. It does not define the location of infrastructure and unique ecosystems. Other analysis tools will be used for those items. The WUI interface areas as defined here are presented in map form in Appendix I.

Figure 3.4. Wildland-Urban Interface of Fergus County, Montana.



This map is presented for reference in this section of the plan. This map, and additional maps are detailed in Appendix I.

3.10.2 Infrastructure

Fergus County has both significant infrastructure and unique ecosystems within its boundaries. Of note for this WUI Fire Mitigation Plan is the existence of highway routes (eg., U.S. Highways 87 and 191), oil rigs, railroads, and the presence of power and fiber optic lines supplying surrounding counties. These resources will be considered in the protection of infrastructural resources for Fergus County and to the larger extent of this region, and the rest of Montana.

Power Lines have been mapped and are presented in Appendix I. Protection of these lines from loss during a wildfire is paramount in as much as the electrical power they provide serves not only the communities of Fergus County but of surrounding counties. The protection of these lines allows for community sustainability, support of the economic viability of Fergus County, and the protection of people who rely on that power. Fuels mitigation under power lines has received considerable attention in forested ecosystems as timber is thinned and heavy accumulations of brush are managed. This practice should be mandated into the future. However, the importance of management of rangeland ecosystems under high tension power lines should not be overlooked. Brush intermixed with grasses and other species, during extreme fire weather events, coupled with steep slopes can produce considerable heat and particulate matter. When this occurs under power lines, the result can be arching between lines and even failure of the electrical media itself. Fuel mitigation treatments in high risk areas, especially where multiple lines are co-located, will be recommended for treatments.

3.10.3 Ecosystems

Fergus County is a diverse ecosystem with a complex array of vegetation, wildlife, and fisheries that have developed with, and adapted to fire as a natural disturbance process. A century of wildland fire suppression coupled with past land-use practices (primarily livestock grazing and logging) has altered plant community succession and has resulted in dramatic shifts in the fire regimes and species composition. As a result, forests and rangelands in Fergus County have become more susceptible to large-scale, high intensity fires posing a threat to life, property, and natural resources including wildlife and special status plant populations and habitats. High-intensity, stand-replacing fires have the potential to seriously damage soils and native vegetation. In addition, an increase in the number of large high intensity fires throughout the nation's forest and rangelands, has resulted in significant safety risks to firefighters and higher costs for fire suppression (House of Representatives, Committee on Agriculture, Washington, DC, 1997).

3.11 Soils

There are various soil types in the Fergus County area. Three major soil divisions are found:

1. Seventeen percent of the land area, mainly in the northeastern portions of the county, has a clay surface layer and clay underlying material and is mainly rangeland.
2. Fifteen percent of the land area, mostly in the deeply dissected areas along the Missouri River, Judith River, and Arrow Creek, has a clay surface layer and extremely shaly clay underlying material to a depth of about 18 inches.
3. Ten percent of the land area, mostly in the central and southern parts of the county, has a thin organic surface layer with cobbly silty clay loam underneath.

Our soil resource is an extremely important component for maintaining a healthy ecosystem and economy. Fire can play an intricate role in this process, if it occurs under normal conditions of light fuels associated with low intensity underburns. However, the buildup of fuels and

consequent high severity fires can cause soils to become water repellent (hydrophobic), and thus greatly increases the potential for overland flow during intense rains. Soil in degraded conditions does not function normally, and will not be able to sustain water quality, water yield, or plant communities that have normal structure, composition, and function. Fire is also strongly correlated with the carbon-nutrient cycles and the hydrologic cycle. Fire frequency, extent, and severity are controlled to a large degree by the availability of carbon, as well as the moisture regime (Quigley & Arbelbide 1997).

Soils were evaluated for their propensity to become hydrophobic during and after a fire as evidenced by the presence of clay and clay derivatives (e.g., clay loam, cobbly clay) in the upper soil layers. In addition, their permeability and tendency to allow runoff to infiltrate the soil rapidly was evaluated. In general, with notable exceptions, the majority of the area within Fergus County has high clay content in the surface horizons. The A and C horizons are predominately clay loam with underlying shaly clay. On average these soils are well drained with moderate permeability. Forested areas have somewhat more developed soils. These areas are characterized by a thin O horizon made up of decomposing forest litter underlain by cobbly silty clay loam.

Low to moderate intensity fires would not be expected to damage soil characteristics in the region, especially if the hotter fires in this range were limited to small extents associated with jackpots of cured fuels. Hot fires providing intense heat to the C horizon substrate depth have the potential to create hydrophobic characteristics in that layer. This can result in increased overland flow during heavy rains, following wildfire events, potentially leading to mass wasting. Rocky and gravelly characteristics in the A horizon layer would be expected to be displaced, while the silty and loamy fines in these soils may experience an erosion and displacement potential. These soils will experience the greatest potential impacts resulting from hot fires that burn for prolonged periods (especially on steep slopes).

The National Resource Conservation Service (NRCS) has mapped Fergus County in detail. A complete soil survey for Fergus County was distributed in June 1988. Please refer the Fergus County NRCS Soil Survey Report to view each soil unit in the County and the associated characteristics relating to the effects of wildland fire.

3.11.1 Fire Mitigation Practices to Maintain Soil Processes

Firelines constructed by hand or with the use of machinery will have varying impacts, depending upon construction techniques. If only the surface litter is removed in the fireline construction, minor increases to soil erosion may occur. If trenches are dug which channelize runoff down steep slopes, heavy rilling or gullying could occur depending upon rock content of surface layers exposed. Jackpot burning and, to a greater extent, pile burning would result in greater soil heating and localized impacts. Loss of soil carbon, nitrogen, sulphur, phosphorus, potassium, and soil organisms would be high in the soil surface layer. Soil physical structure could be altered thereby creating hydrophobic soils, especially where clay content is moderate or high.

Indirect effects of prescribed burning to slope stability are highly variable in the soil types found in Fergus County. Vegetation structure, including root strength after over burning, is maintained from three to fifteen years following low to moderate intensity burns and therefore soil saturation potential is not greatly altered. Re-vegetation of burned areas within this time frame will be a critical component to maintaining soil resources and pre-empting noxious weeds and invasive species from occupying the site. Locale experiencing high intensity burns will need to be evaluated immediately for mechanical erosion control followed by re-vegetation efforts. Holding soils in place will be a difficult challenge in many locations, especially on moderate to steep slopes.

Where heavy grazing has occurred in the past, there is also a possibility that soil productivity has been reduced. This is especially true in riparian areas where animal concentrations have historically been the greatest. These areas generally have easily compacted soils, and are where cattle tend to linger if not managed well. Mining also has significant effects on soil quality through soil compaction and mass displacement. Grazing across Fergus County was observed to be maintained in a sustainable manner without the overgrazing found in other areas of the region.

Severe fires in the past have consumed surface organics and volatilized nitrogen into the air. On some sites, however, these severe burns are a natural process, and therefore the inherent soil productivity may not be reduced. On other sites, however, where low intensity underburns typically occurred, high intensity wildland fires have consumed amounts of soil organics in excess of the historic patterns. Furthermore, excessive soil heating in these intense fires likely resulted in creation of water repellent soils, and therefore increased overland flow and soil erosion. In these cases, it can be assumed that wildland fires have reduced long-term soil productivity. Soil compaction damage typically is persistent in the area; several decades of rest from further compactive forces are needed until adequate soil recovery occurs. Loss of organics due to displacement and severe fire also requires decades to recuperate. This slow recovery from soil damage makes cumulative effects to soil productivity and soil hydrologic function a major concern.

To avoid potential impacts, wherever possible, firelines should be located outside of highly erosive areas, steep slopes, intermittent streams, and riparian and other sensitive areas. Following prescribed fire or fire suppression activities, firelines should be rehabilitated.

3.12 Hydrology

The Montana Department of Natural Resources and Conservation Water Resources Division is charged with the development of the Montana State Ground Water Plan. Included in the Plan is the statewide water policy plan along with detailed subsections regarding the protection, education, and remediation of Montana's ground water resources. The Montana DNRC Water Resources Division has prepared Surface Water Supply Index Maps for all of the surface water systems in Montana. This agency also addresses statewide floodplain management, streamflow conditions, and dams and canals, and water rights issues.

The geology and soils of this region lead to slow to moderate moisture infiltration. Soils that have a clay pan or clay layer near the surface inhibit downward water transmission; thus, have a high potential for overland flow. Clay soils also have a high shrink swell potential. Disrupted vegetation patterns from logging or agriculture (soil compaction) and wildland fire (especially hot fires that increase soil hydrophobic characteristics), can lead to increased surface runoff and debris flow to stream channels.

A correlation to mass wasting due to the removal of vegetation caused by high intensity wildland fire has been documented for the central Montana region. Burned vegetation can result in changes in soil moisture and loss of rooting strength that can result in slope instability, especially on slopes greater than 30%. The greatest watershed impacts from increased sediment will be in the lower gradient, depositional stream reaches.

3.12.1 Fire Mitigation Practices to Maintain Hydrologic Processes

The effects of wildland fire and prescribed burning on water quality are variable. The removal of the vegetative canopy will tend to reduce transpiration and increase water yield, especially during the growing season and immediately afterwards (MacDonald *et al.* 1991). Prescribed burning is used to maintain a healthy, dynamic ecosystem while meeting land management

objectives. Prescribed burning objectives include reduction of natural fuels, assuring current and future habitat conditions for native plants and animals, improvement of forest health, and enhancement, protection, and maintenance of old growth and riparian areas. The majority of the burned areas are expected to receive a low intensity ground fires with some areas of moderate intensity. This may include occasional torching of single trees or larger clumps or trees and consumption of some patches of regeneration. Impacts to soil and large woody debris are expected to be minimal, given project targets. In rangeland ecosystems, prescribed fire will have variable impacts dependant on burn intensity and proximity to streams. Stream buffering (low intensity to no burn around streams) has been shown to preserve most if not all normal sediment filtering functions.

A large, stand-replacing fire could have negative effects on watershed conditions, thus affecting both fish and habitat in streams. Treatment with low to moderate intensity fire would result in a mosaic pattern of burned and unburned areas of ground level vegetation species and ground level natural fuels. Some patches of shade-tolerant, fire intolerant species may also be consumed. Prescribed burning is not designed to consume all vegetation within project areas. Each treatment will leave a mosaic of burned and unburned areas. Once the target fuels and the risk of fire carrying from one tributary to another have been reduced, hand ignition may be considered on a site-specific basis.

The effects on sediment yield vary according to the intensity of fire; degree of soil disturbance; steepness of the slope and drainage network; the size of the area burned; and the extent to which the vegetation controls the movement and storage of sediment. Fire also increases surface erosion and sediment delivery rates by removing the litter layer and organic debris that traps sediment both on slopes and in the stream channel (MacDonald *et al.* 1991). The magnitude of these effects will depend on the geomorphic sensitivity of the landscape, which is largely a function of slope steepness and parent material (Swanson 1978).

Fire can greatly increase surface erosion by temporarily creating a hydrophobic soil layer. Soils within the project area are generally at moderate risk for hydrophobic conditions due to their fine-grained textures and clay content. In addition, the relatively low burn intensity of the prescribed fires will also help prevent the formation of hydrophobic soils.

The effects of wildland fire or prescribed fire are generally considered in terms of potential short-term, negative effects and long-term benefits of fuels reduction, which will result in a decreased risk of high intensity, stand-replacing fire. Potential short-term effects to streams and fish include increased risk of landslides, mass movement and debris torrents, increases in surface sediment erosion, possible reduction in streamside vegetation resulting in changes within management areas, and possible increases in water yield depending on the amount and severity of the vegetation burned. Long-term effects include increases in nutrient delivery, possible increases in woody debris in streams, and possible increases in stream temperature if shading is significantly reduced. The design criteria described above minimizes the risk that landslides, mass movement, significant increases in surface sediment yield, and significant changes in water yield will occur.

Reduction of vegetation will mostly be limited to creeping ground fires, which will reduce understory vegetation, but will not affect mature trees or result in significant mortality to the overstory. Spring burning often results in minimal riparian vegetation burned because streamside areas have higher humidity and live plant moisture. Fall burning will more likely result in understory vegetation removal, with a possibility of some tree and large shrub mortality, especially outside of riparian zones where live plant moisture is less.

Riparian buffer strips will be maintained, thereby preserving canopy cover for shading, sediment filtering, and streambank and floodplain stability (PACFISH guidelines). Areas not burned will

provide significant protection from adverse water quality impacts associated with wildland fire and prescribed burning. Therefore, effects to fish and habitat in these streams from increased water yield are unlikely. The area has been roaded from past management activities. Therefore, increased road densities from road construction are not expected to be of a magnitude to increase sedimentation to affected drainages, provided adequate planning for new road construction is implemented. Forest practices in the area will be conducted to meet the standards of the Montana Streamside Management Zone Law. These rules are designed to use best management practices that are adapted to and take account of the specific factors influencing water quality, water quality objectives, on-site conditions, and other factors applicable to the site where a forest practice occurs.

3.13 Air Quality

The primary means by which the protection and enhancement of air quality is accomplished is through implementation of National Ambient Air Quality Standards (NAAQS). These standards address six pollutants known to harm human health including ozone, carbon monoxide, particulate matter, sulfur dioxide, lead, and nitrogen oxides (USDA Forest Service 2000).

Smoke emissions from fires potentially affect an area and the airsheds that surround it. Climatic conditions affecting air quality in Central Montana are governed by a combination of factors. Large-scale influences include latitude, altitude, prevailing hemispheric wind patterns, and mountain barriers. At a smaller scale, topography and vegetation cover also affect air movement patterns. In Fergus County, winds are predominantly from the southwest but occasionally blow from the west to northwest. Air quality in the area and surrounding airshed is generally good to excellent. However, locally adverse conditions can result from occasional wildland fires in the summer and fall, and prescribed fire and agricultural burning in the spring and fall. All major river drainages are subject to temperature inversions which trap smoke and affect dispersion, causing local air quality problems.

Smoke management in Fergus County is managed by the Idaho/Montana Airshed Group. The entire county falls into Airshed Unit 9. An airshed is a geographical area which is characterized by similar topography and weather patterns (or in which atmospheric characteristics are similar, e.g., mixing height and transport winds). There are currently no impact zones near Fergus County. The USDA Forest Service, Bureau of Land Management, the Montana Department of Natural Resources and Conservation, and the US Fish and Wildlife Service are all members of the Montana/Idaho State Airshed Group, which is responsible for coordinating burning activities to minimize or prevent impacts from smoke emissions. Prescribed burning must be coordinated through the Missoula Monitoring Unit, which coordinates burn information, provides smoke forecasting, and establishes air quality restrictions for the Montana/Idaho Airshed Group. The Monitoring Unit issues daily decisions which may restrict burning when atmospheric conditions are not conducive to good smoke dispersion. Burning restrictions are issued for airsheds, impact zones, and specific projects. The monitoring unit is active March through November. Each Airshed Group member is also responsible for smoke management all year.

The Clean Air Act, passed in 1963 and amended in 1977, 1990 and 1999 is the primary legal authority governing air resource management. The act established a process for designation of Class I and Class II areas for air quality management. Class I areas receive the highest level of protection and numerical thresholds for pollutants. The U. L. Bend National Wildlife Refuge in Phillips County is the only Class 1 area in close proximity to Fergus County.

Residents and resources in Fergus County could be affected by smoke or regional haze from burning activities in the region. Montana Department of Environmental Quality maintains Air Pollution Monitoring Sites throughout Montana. The Air Pollution Monitoring program monitors

all of the six criteria pollutants. Measurements are taken to assess areas where there may be a problem, and to monitor areas that already have problems. The goal of this program is to control areas where problems exist and to try to keep other areas from becoming problem air pollution areas (Louks 2001).

The Clean Air Act provides the principal framework for national, state, and local efforts to protect air quality. Under the Clean Air Act, OAQPS (Organization for Air Quality Protection Standards) is responsible for setting standards, also known as national ambient air quality standards (NAAQS), for pollutants which are considered harmful to people and the environment. OAQPS is also responsible for ensuring these air quality standards are met, or attained (in cooperation with state, Tribal, and local governments) through national standards and strategies to control pollutant emissions from automobiles, factories, and other sources (Louks 2001).

3.13.1 Fire Mitigation Practices to Maintain Air Quality

Smoke consists of dispersed airborne solids and liquid particles, called particulates, which can remain suspended in the atmosphere for a few days to several months. Particulates can reduce visibility and contribute to respiratory problems. Very small particulates can travel great distances and add to regional haze problems. Regional haze can sometimes result from multiple burn days and/or multiple owners burning within an airshed over too short a period of time to allow for dispersion.

For prescribed fires, there are three principle strategies to manage smoke and reduce air quality effects. They include:

1. **Avoidance -** This strategy relies on monitoring meteorological conditions when scheduling prescribed fires to prevent smoke from drifting into sensitive receptors, or suspending burning until favorable weather (wind) conditions exist. Sensitive receptors can be human-related (e.g. campgrounds, schools, churches, and retirement homes) or wildlife-related (threatened and endangered species and their critical habitats);
2. **Dilution –** This strategy ensures proper smoke dispersion in smoke sensitive areas by controlling the rate of smoke emissions or scheduling prescribed fires when weather systems are unstable, not under conditions when a stable high-pressure area is forming with an associated subsidence inversion. An inversion would trap smoke near the ground; and
3. **Emission Reduction –** This strategy utilizes techniques to minimize the smoke output per unit area treated. Smoke emission is affected by the number of acres burned at one time, pre-burn fuel loadings, fuel consumption, and the emission factor. Reducing the number of acres burned at one time would reduce the amount of emissions generated by that burn. Reducing the fuel beforehand reduces the amount of fuel available. Prescribed burning when fuel moistures are high can reduce fuel consumption. Emission factors can be reduced by pile burning or by using certain firing techniques such as mass ignition.

If weather conditions changed unexpectedly during a prescribed burn, and there was a potential for violating air quality standards or for adverse smoke impacts on sensitive receptors (schools, churches, hospitals, retirement homes, campgrounds, wilderness areas, and species of threatened or endangered wildlife), the management organization may implement a contingency plan, including the option for immediate suppression. Considering 1) the proposed action would result in prescribed fire on a relatively small number of acres, 2) burning as part of this mitigation plan's implementation in the County will most likely occur over a 5-year or 10-year period at a minimum, and 3) the County will adhere to Montana/Idaho Airshed Group advisories

and management strategies to minimize smoke emissions, prescribed fire activities would not violate national or state emission standards and would cause very minor and temporary air quality impacts. The greatest threat to air quality would be smoke impacts on sensitive receptors; however, the relative scarcity of sensitive receptors within the County minimizes this potential air quality impact.

In studies conducted through the Interior Columbia Basin Management Project, smoke emissions were simulated across the Basin to assess relative differences among historical, current, and future management scenarios. In assessing the whole Upper Columbia Basin, there was a 43 percent reduction in smoke emissions between the historical and current periods (Quigley and Arbelbide 1997). The projected smoke emissions varied substantially with the vastly different management scenarios. The consumptive demand and passive management scenarios were projected to substantially increase smoke emissions above current levels. The active management scenarios were projected to result in a decrease of current levels.

Although prescribed fire smoke would occur more frequently than wildland fire smoke, since prescribed fires are scheduled during the year, the effects of wildland fire smoke on visibility are more acute. Prescribed fires produce less smoke than wildland fires for comparatively shorter periods, because they are conducted under weather conditions that provide for better smoke dispersion. In a study conducted by Holsapple and Snell (1996), wildland fire and prescribed fire scenarios for the Columbia Basin were modeled. In conclusion, the prescribed fire scenarios did not exceed the EPA particulate matter (PM 10) standard in a 24-hour period. Similar projections were observed for a PM 2.5 threshold. Conversely, all wildland fire scenarios exceeded air quality standards. Similar responses were reported by Huff *et al.* (1995) and Ottmar *et al.* (1996) when they compared the effects of wildland fire to prescribed fire on air quality. The impacts of wildland fire and management ignited prescribed fire on air quality vary because of the differences in distribution of acres burned, the amount of fuel consumed per acre (due to fuel moisture differences), and the weather conditions in which typical spring and fall prescribed burns occur. This analysis reveals wildland fire impacts on air quality may be significantly greater in magnitude than emissions from prescribed burns. This may be attributable, in part, to the fact that several states within the project area have smoke management plans requiring favorable weather conditions for smoke dispersion prior to igniting wildland fires (Quigley and Arbelbide 1997).

Chapter 4: Summaries of Risk and Preparedness

4 Overview

4.1 Wildland Fire Characteristics

An informed discussion of fire mitigation is not complete until basic concepts that govern fire behavior are understood. In the broadest sense, wildland fire behavior describes how fires burn; the manner in which fuels ignite, how flames develop and how fire spreads across the landscape. The three major physical components that determine fire behavior are the fuels supporting the fire, the topography in which the fire is burning, and the weather and atmospheric conditions during a fire event. At the landscape level, both topography and weather are beyond our control. We are powerless to control winds, temperature, relative humidity, atmospheric instability, slope, aspect, elevation, and landforms. It is beyond our control to alter these conditions, and thus impossible to alter fire behavior through their manipulation. When we attempt to alter how fires burn, we are left with manipulating the third component of the fire environment, the fuels which support the fire. By altering fuel loading and fuel continuity across the landscape, we have the best opportunity to determine how fires burn.

A brief description of each of the fire environment elements follows in order to illustrate their effect on fire behavior.

4.1.1 Weather

Weather conditions are ultimately responsible for determining fire behavior. Moisture, temperature, and relative humidity determine the rates at which fuels dry and vegetation cures, and whether fuel conditions become dry enough to sustain an ignition. Once conditions are capable of sustaining a fire, atmospheric stability and wind speed and direction can have a significant affect on fire behavior. Winds fan fires with oxygen, increasing the rate at which fire spreads across the landscape. Weather is the most unpredictable component governing fire behavior, constantly changing in time and across the landscape.

4.1.2 Topography

Fires burning in similar fuel conditions burn dramatically different under different topographic conditions. Topography alters heat transfer and localized weather conditions, which in turn influence vegetative growth and resulting fuels. Changes in slope and aspect can have significant influences on how fires burn. Generally speaking, north slopes tend to be cooler, wetter, more productive sites. This can lead to heavy fuel accumulations, with high fuel moistures, later curing of fuels, and lower rates of spread. The combination of light fuels and dry sites lead to fires that typically display the highest rates of spread. In contrast, south and west slopes tend to receive more direct sun, and thus have the highest temperatures, lowest soil and fuel moistures, and lightest fuels. These slopes also tend to be on the windward side of mountains. Thus these slopes tend to be “available to burn” a greater portion of the year.

Slope also plays a significant role in fire spread, by allowing preheating of fuels upslope of the burning fire. As slope increases, rate of spread and flame lengths tend to increase. Therefore, we can expect the fastest rates of spread on steep, warm south and west slopes with fuels that are exposed to the wind.

4.1.3 Fuels

Fuel is any material that can ignite and burn. Fuels describe any organic material, dead or alive, found in the fire environment. Grasses, brush, branches, logs, logging slash, forest floor litter, conifer needles, and home sites (the structures) are all examples. The physical properties and characteristics of fuels govern how fires burn. Fuel loading, size and shape, moisture content and continuity and arrangement all have an affect on fire behavior. Generally speaking, the smaller and finer the fuels, the faster the potential rate of fire spread. Small fuels such as grass, needle litter and other fuels less than a quarter inch in diameter are most responsible for fire spread. In fact, “fine” fuels, with high surface to volume ratios, are considered the primary carriers of surface fire. This is apparent to anyone who has ever witnessed the speed at which grass fires burn. As fuel size increases, the rate of spread tends to decrease, as surface to volume ratio decreases. Fires in large fuels generally burn at a slower rate, but release much more energy, and burn with much greater intensity. This increased energy release, or intensity, makes these fires more difficult to control. Thus, it is much easier to control a fire burning in grass than to control a fire burning in timber.

When burning under a forest canopy, the increased intensities can lead to torching (single trees becoming completely involved) and potentially development of crown fire. That is, they release much more energy. Fuels are found in combinations of types, amounts, sizes, shapes, and arrangements. It is the unique combination of these factors, along with the topography and weather, which determine how fires will burn.

The study of fire behavior recognizes the dramatic and often-unexpected affect small changes in any single component has on how fires burn. It is impossible to speak in specific terms when predicting how a fire will burn under any given set of conditions. However, through countless observations and repeated research, the some of the principles that govern fire behavior have been identified and are recognized.

4.2 Fergus County Conditions

Fergus County is characterized by cold winters and dry summers. Lewistown represents the greatest concentration of population in the County. The remainder of the county is quite rural, due in large part to the agricultural economy of the region. Farms and ranches tend to be widely spread throughout the County. Grazing activity on both public and private lands by livestock and wildlife tends to decrease the build up of fine fuel loads.

In addition to homes, other economic resources could be threatened by wildland fire. Although not rich in natural fuels, Fergus County sits atop valuable oil and gas reserves. Numerous active oil rigs dot the landscape, each rig being fed by electrical power lines. This creates a web of power lines throughout the dry rangelands. The number of power lines and oil rigs in the area somewhat increases the potential for electrical malfunctions and ignition sources.

Human activity is strongly correlated with fire frequency, with increasing numbers of fires as use increases. Discarded cigarettes, tire fires, and hot catalytic converters have increased the number of fires experienced along roadways. Careless and unsupervised use of fireworks and campfires also contributes their fair share to unwanted and unexpected wildland fires. Further contributing to ignition sources are the debris burners who use fire to rid ditches of weeds and other burnable materials.

4.2.1 County Wide Potential Mitigation Activities

There are four basic opportunities for reducing the loss of homes and lives to fires. There are many single actions that can be taken, but in general they can be lumped into one of the following categories:

- Prevention
- Education/ Mitigation
- Readiness
- Building Codes

4.2.1.1 Prevention

The safest, easiest, and most economical way to mitigate unwanted fires is to stop them before they start. Generally, prevention actions attempt to prevent human-caused fires. Campaigns designed to reduce the number and sources of ignitions can be quite effective. Prevention campaigns can take many forms. Traditional “Smokey Bear” type campaigns that spread the message passively through signage can be quite effective. Signs that remind folks of the dangers of careless use of fireworks, burning when windy, and leaving unattended campfires can be quite effective. It’s impossible to say just how effective such efforts actually are, however the low costs associated with posting of a few signs is inconsequential compared to the potential cost of fighting a fire.

Slightly more active prevention techniques may involve mass media, such as radio or the local newspaper. Fire districts in other counties have contributed the reduction in human-caused ignitions by running a weekly “run blotter,” similar to a police blotter, each week in the paper. The blotter briefly describes the runs of the week and is followed by a weekly “tip of the week” to reduce the threat from wildland and structure fires. The federal government has been a champion of prevention, and could provide ideas for such tips. When fire conditions become high, brief public service messages could warn of the hazards of misuse of fire or any other incendiary devise. Such a campaign would require coordination and cooperation with local media outlets. However, the effort is likely to be worth the efforts, costs and risks associated with fighting unwanted fires.

Fire Reporting: Fires cannot be suppressed until they are detected and reported. As the number and popularity of cellular phones has increased, expansion of the #FIRE program throughout Montana may provide an effective means for turning the passing motorist into a detection resource.

Burn Permits: The issues associated with debris burning during certain times of the year are difficult to negotiate and enforce. However, there are significant risks associated with the use of fire adjacent to expanses of flammable vegetation under certain scenarios. Burning permits are required by State law on all forested lands within the State during the official fire season of May 1 to September 30. The wildland fire agencies (DNRC, USFS, BLM, and US Fish and Wildlife Service) each have their own guidelines for issuing burn permits in their jurisdictions. Since local government fire agencies area also involved with burn permit regulation, close coordination between the two types of agencies is needed to ensure safe burning and to exchange information. Enforcement of burning permit requirements is the responsibility of the County Sheriff’s Department. Although this is a state-wide regulation, compliance and enforcement has been variable between fire districts. There is also considerable confusion on the part of the public as to when a permit is necessary and the procedure for which to obtain the permit. The best-intentioned citizen may unknowingly break this law for a lack of understanding. Clearly, there is a need to coordinate this process and educate the public.

Fire Resistant Oil Rig Sites: The occurrence of oil rig sites throughout central Montana is high. Although the fire risk associated with this machinery is low, the potential for an ignition due to mechanical failure or other reason exists. Maintaining fire resistant vegetation in the immediate vicinity of the rigs will decrease the likelihood of a stray spark igniting nearby fuels. A method for maintaining these sites with an awareness of the associated fire danger should be a priority of every county.

4.2.1.2 Education

Once a fire has started and is moving toward homes or other valued resources, the probability of that structure surviving is largely dependent on the structural and landscaping characteristics of the home. Also of vital importance is the accessibility of the home to emergency apparatus. If the home cannot be protected safely, firefighting resources will not jeopardize lives to protect a structure. Thus, the fate of the home will largely be determined by homeowner actions prior to the event.

The majority of the uncultivated vegetation in Fergus County is comprised of timberlands. These fuels tend to be very flammable and can support very fast moving and intense fires. In many cases, homes can easily be protected by following a few simple guidelines that reduce the ignitability of the home. There are multiple programs such as FIREWISE that detail precautions that should be taken in order to reduce the threat to homes, such as clearing timber or cured grass and weeds away from structures and establishing a green zone around the home.

However, knowledge is no good unless acted upon. Education needs to be followed up by action. Any education programs should include an implementation plan. Ideally, funds would be made available to financially assist the landowner making the necessary changes to the home. The survey of the public conducted during the preparation of this WUI Fire Mitigation Plan indicated that approximately 58% of the respondents are interested in participating in this type of an activity.

4.2.1.3 Readiness

Once a fire has started, how much and how large it burns is often dependent on the availability of suppression resources. In most cases, rural fire departments are the first to respond and have the best opportunity to halt the spread of a wildland fire. For many districts, the ability to reach these suppression objectives is largely dependent on the availability of functional resources and trained individuals. Increasing the capacity of departments through funding and equipment acquisition can improve response times and subsequently reduce the potential for resource loss.

In order to assure a quick and efficient response to an event, emergency responders need to know specifically where emergency services are needed. Continued improvement and updating of the rural addressing system is necessary to maximize the effectiveness of a response.

4.2.1.4 Building Codes

The most effective, albeit contentious, solution to some fire problems is the adoption of building codes in order to assure emergency vehicle access and home construction that does not “invite” a fast and intense house fire. Codes that establish minimum road construction standards and access standards for emergency vehicles are an effective means of assuring public and firefighter safety, as well as increasing the potential for home survivability. County building inspectors should look to the fire departments in order to assure adequate minimum standards. Fire districts may want to consider apparatus that may be available during mutual aid events in

order that the adopted standards meet the access requirements of the majority of suppression resources. In Fergus County, such standards may be drafted in consultation with the Fire Chiefs in order to assure accessibility is possible for all responding resources.

Coupled with this need is the potential to implement a set of requirements or recommendations to specify construction materials allowed for use in high risk areas of the county. The Fergus County Commissioners may want to consider a policy for dealing with this situation into the future as more and more homes are located in the wildland-urban interface.

4.3 Fergus County's Wildland-Urban Interface

Individual community assessments have been completed for all of the populated places in the county. The following summaries include these descriptions and observations. Local place names identified during this plan's development include:

Table 4.1. Fergus County Communities

Community Name	Planning Description	Vegetative Community	National Register Community At Risk?[1]
Chetal	Community	Forestland	No
Buffalo	Community	Rangeland	Yes
Coffee Creek	Community	Rangeland	No
Denton	Community	Rangeland	No
Forestgrove	Community	Forestland	Yes
Giltedge	Community	Forestland	Yes
Grass Range	Community	Rangeland	Yes
Hilger	Community	Rangeland	Yes
Lewistown	City	Rangeland	Yes
Moore	Community	Rangeland	No
Roy	Community	Rangeland	Yes
North Fork Flatwillow	Community	Rangeland	No
Winifred	Community	Rangeland	No
Beaver Creek, Cottonwood	Community	Forestland	No

[1]Those communities with a "Yes" in the National Register Community at Risk column are included in the Federal Register, Vol. 66, Number 160, Friday, August 17, 2001, as "Urban Wildland Interface Communities within the vicinity of Federal Lands that are at high risk from wildfires". All of these communities have been evaluated as part of this plan's assessment.

Site evaluations on these communities are included in subsequent sections. The results of FEMA Hazard Severity Forms for each community are presented in Appendix II.

4.3.1 Mitigation Activities Applicable to all Communities

4.3.1.1 Homesite Evaluations and Creation of Defensible Space

Individual home site evaluations can increase homeowners' awareness and improve the survivability of structures in the event of a wildfire. Maintaining a lean, clean, green zone within at least 100 feet of structures to reduce the potential loss of life and property is highly recommended. Assessing individual homes in the outlying areas can address the issue of escape routes and home defensibility characteristics. Educating the homeowners in techniques for protecting their homes is critical in these environments.

4.3.1.2 Travel Corridor Fire Breaks

Ignition points are likely to continue to be concentrated along the roads and railway lines that run through the county. These travel routes have historically served as the primary source of human-caused ignitions. In areas with high concentrations of resource values along these corridors, fire lines may be considered in order to provide a fire break in the event of a roadside ignition. Access route mitigation can provide an adequate control line under normal fire conditions. Alternatively, permanent fuel breaks can be established in order to reduce the potential for ignitions originating from the main travel roads to spread into the surrounding lands.

4.3.1.3 Power Line Corridor Fire Breaks

The treatment opportunities specified for travel corridor fire breaks apply equally for power line corridors. The obvious difference between the two is that the focus area is not an area parallel to and adjacent to the road, but instead focuses on the area immediately below the infrastructure element. Protection under the high tension power lines is strongly recommended. This may be an opportunity for intensive livestock grazing practices as a tool for reducing fine fuels around significant infrastructure.

4.4 Rangeland Communities in Fergus County

4.4.1 Overall Fuels Assessment

The land ownership pattern in Fergus County is a mixture of state, federal, and private. Most of the flatter rangeland regions are privately owned, while much of the Big Snowy and Little Snowy Mountain Ranges are encompassed in the Lewis and Clark National Forest. Additionally, a good portion of the timbered slopes comprising the Judith Mountains are administered by the Bureau of Land Management (BLM). The U.S. Fish and Wildlife Service manages a large section of acreage along the Missouri River as part of the Charles M. Russell National Wildlife Refuge, which extends across several counties. Approximately 2 sections per township throughout Fergus County are owned by the state of Montana, much of which is leased for grazing rights.

The native mixed grass and sage rangelands present throughout the majority of the county are fairly inconsistent. Farming, ranching, and housing development has broken the continuity of native fuels. Where native rangelands do exist, they are dominated by bluebunch wheatgrass, blue gramagrass, crested wheatgrass, needle and thread, western wheatgrass, Indian ricegrass, little bluestem, juniper, prairie sandreed, and several species of sage. Harsh winters, low precipitation, short growing season, and periodic droughts limit the establishment of trees in low elevation areas. The Charles M. Russell National Wildlife Refuge is one example of a large tract of native, continuous fuels. The refuge is located along the Missouri Breaks in the northeastern corner of Fergus County. The entire refuge covers 1,100,000 acres and extends for approximately 125 air miles, only a portion of which lies within Fergus County. Much of the refuge is covered by native prairie grasses, forested coulees, and pine savannahs. The combination of continuous fuels, varied topography, and windy environment would likely support a fast-moving wildfire, as demonstrated in the summer of 2003.

Much of the rangeland is actively grazed by livestock and large herds of mule deer, pronghorn antelope, and other ungulates. Grazing helps keep fine fuel loads low, reducing available fuel for rangeland fire. Fires in areas dominated by grasses and scattered sage tend to spread rapidly, but burn at relatively low intensities. The grass and sage fuels in many areas tend to be relatively sparse and short, with little continuity, limiting fire spread in the absence of wind. Agricultural fields can also serve to fuel a fire after curing, burning in much the same manner as

consistent grass fuel. Fires in grass and rangeland fuels tend to burn at relatively low intensities, with moderate flame lengths and only short-range spotting. Suppression resources are generally quite effective in such fuels. Homes and other improvements can be easily protected from direct flame contact and radiant heat through adoption of precautionary measures around the structure.

Although fires in these fuels may not present the same control problems as those associated with large, high intensity fires in timber fuel types, they can cause significant damage if precautionary measures have not taken place prior to a fire event. Wind driven fires in these shortgrass fuel types spread rapidly and can be difficult to control. During extreme drought and pushed by high winds, fires in these fuel types can exhibit extreme rates of spread, thwarting suppression efforts. The fires within the Missouri Breaks Complex of 2003 demonstrate the potential for fires in these fuels to grow to enormous size and demonstrate fire behavior atypical of these fuel complexes.

Where moisture becomes more available, ponderosa pine, juniper, and some Douglas-fir grow on lower ridges or in protected draws. Fires tend to be quite common in these habitat types, as open forest structure allows for the accumulation of light grass and surface fuels which dry quite rapidly. In the absence of heavy regeneration or downed wood fuels, these swift moving fires tend to burn at relatively low intensities. Historically, grassland understories were maintained in this type of open pine stand by periodic surface fires. Historic fire frequencies ranged from 5 to 25 years. These fires helped to reduce juniper encroachment and limit survival of pine regeneration, thus maintaining a relatively open understory. Only under extreme weather conditions would crowning and torching occur.

However, with the advent of fire suppression and the disruption of the natural fire disturbance regime, juniper establishment has increased, as have thickets of young ponderosa pine. In dry, fire maintained Douglas-fir habitats, ladder fuels and multi-storied forest conditions have developed as well. Dry surface fuels, overstocked, multi-layered stands and the abundance of ladder fuels has lead to the development of horizontal and vertical fuel continuity in many stands. These conditions, combined with an arid and often windy environment, can encourage the development of stand replacing fire, particularly on steep slopes. These fires present significant challenges for suppression resources due to large flame lengths, tremendous heat output, and frequency of spotting.

4.4.2 Overall Ignition Profile

The dry climate, xeric vegetation, and prevalence of hot and windy conditions in Fergus County create an environment that will sustain fire spread for many months of the year. This increases the probability that ignition sources from both natural (lightning) causes and human causes will find a receptive fuel bed. Natural ignitions are most likely to occur during summer storms over the high ridges and mountains of the Big and Little Snowy Mountains. Although not as common as over the mountains, lighting strikes do occur in the broad valley.

Human ignitions can stem from numerous activities, including debris burning, fireworks, cigarettes, welding, campfires, particularly in the Charles Russell NWR where recreation use is concentrated. Included in human ignition sources are fires sparked by vehicles or hot catalytic converters. Also included in an ignition profile are the fires sparked by downed power lines or malfunctioning transformers. All these potential ignition sources and the dry nature of vegetation in Fergus County increase the potential for fire occurrence.

4.4.3 Overall Community Risk Assessment

In general, most of the homes in Fergus County are at low to moderate risk from wildland fire events. Structures in the rangeland environment have a greater chance of surviving a fire event due to the relatively low intensities with which fires in these fuels burn, the gentle topography associated with most rangeland environments, the presence of adequate defensible space around the majority of structures in these fuel types, and the increased ability to control fires in these fuels. Homes located in narrow draws and along timbered slopes, particularly common in the southern region of the county, are at a much greater risk to wildland fire.

The Charles M. Russell National Wildlife Refuge (CMR NWR), managed by the U.S. Fish and Wildlife Service, is located along what is known as the Missouri Breaks in the northeastern corner of Fergus County. The entire refuge covers 1,100,000 acres and extends for approximately 125 air miles; however, only a portion of it lies within Fergus County borders. The easiest access into the refuge from Fergus County is provided by U.S. Route 191, which conveniently passes the Sand Creek Wildlife Station Administrative/Information site. Also accessible by this route is the James Kipp Recreation Area. Developed campsites, restroom facilities, boat launches, picnic areas, and a wildlife viewing area are maintained for public use along the southern bank of the Missouri River just off the main highway. Much of refuge is covered by native prairie grasses, forested coulees, creek bottoms, and barren badlands. The Fergus County portion is mostly native mixed grasses and sagebrush, although several patches of forest can be seen along various ridge tops. Stunted Douglas-fir, ponderosa pine, and low growing juniper are most common in these areas. The wide, shallow basin encompassing Armells Creek, which is dry throughout much of the year, enters the refuge from the southwest corner.

Fuels within the Charles M. Russell National Wildlife Refuge in combination with the varied topography would likely support a fast-moving wildfire. The abundance and continuity of wildland fuels could potentially sustain fire for many miles along either side of the river. Additionally, concentrated recreational activities throughout the refuge including campfires and motor vehicle use increase the likelihood of an ignition. Nevertheless, there are very few structures adjacent to or even nearby refuge lands in Fergus County. The nearest community, Roy, is about 22 miles away. A few scattered farms and ranch structures would be at moderate risk in the event of a wildfire escaping from the CMR NWR. This risk to these structures is minimized due to vegetation modifications typical around these agricultural areas. Many of these structures are surrounded by irrigated yards, crops, or actively grazed rangelands. Maintaining and enforcing strict regulations regarding the use of campfires, fireworks, and off-road vehicle use within the wildlife refuge can help to reduce human caused fire ignitions.

Power is provided to communities by above ground power lines, which could potentially spark and ignite dry surface fuels below. A profusion of oil rigs, generally powered by electric motors, have been inserted throughout all regions of Fergus County. The motors and associated power lines for these operations could potentially ignite nearby vegetation in case of an accident. Remoteness and lack of constant human inspection increases the likelihood of an ignition developing into a large fire. The potential hazard of an escaped fire caused by any of these sources presents the need for county residents to adopt practices to reduce the potential for resource loss in the event of a fire.

4.4.4 Individual Community Assessments

4.4.4.1 Buffalo

Buffalo is a small rural ranching community on the far southwestern edge of the county of Highway 191. The community is located on the Burlington Northern rail line, surrounded by agricultural land in all directions. The community center consists of a few occupied homes and a community church. Many of the buildings within Buffalo are now abandoned and are in varying states of disrepair. There are a number of large, scattered ranches in the outlying area.

4.4.4.1.1 Community Assessment

The gentle topography and predominant land use in the Buffalo area present little risk of wildland fire to the occupied homes within the community. Although cultivated and non-cultivated vegetation will support fire during the late summer and early fall, the potential for fire to threaten homes and other infrastructure is quite low. Most occupied residences in the area maintain an adequate radius of defensible space around the home and associated outbuildings. Furthermore, most occupied homes in the area have been constructed with fire resistant materials, further reducing the overall risk to structures.

There are a number of unoccupied, abandoned structures in the immediate Buffalo area that are at high risk to loss in the event of grass fire. Many of these structures are very old and of wooden construction, with grass and weeds growing in contact with the structures. The commercial value of these structures in obviously quite low, however they have some inherent historic value which may warrant taking some relatively simple precautions in order to protect them in the event of a grass fire. Creation of defensible space would be an easy and low cost means of protecting the Fergus County history.

The greatest risk to structures in the area is likely to come from accumulations of dry vegetation around the base of structure, serving to carry fire from the fields or range to the structure. This condition is most probable around remote outbuildings and barns associated with ranching activities.

House numbers throughout the community and surrounding areas are generally difficult to see. However, names of landowners and mileage to structures are usually posted at road intersections.

4.4.4.1.2 Mitigation Activities

The overall wildland fire threat to the community of Buffalo is considered to be low. However, there is a slight chance of structure loss due to a lack of defensible space surrounding the home. A few simple precautions on the part of the homeowner can reduce this potential. Individual home site evaluations can raise homeowner's awareness of hazardous conditions around the home and identify the precautions that can be taken to mitigate this risk. Creation of a green or non-combustible defensible space is the most effective means of reducing the potential of home loss from uncontrolled grass fires. Also, taking measures to further facilitate emergency response to homes can reduce response time and increase the probability of stopping fire spread before structures or other valuable resources become involved.

The risk to the historic buildings around Buffalo is much greater. As with the protection of homes, establishing a low or non-flammable buffer around these structures would help to protect them in the event of a fire.

4.4.4.2 Coffee Creek

The small agricultural community of Coffee Creek is located in Highway 81 west of Denton, in the northwest portion of Fergus County. Coffee Creek is surrounded by agricultural fields, with a clear line of demarcation between the community and the fields.

4.4.4.2.1 Community Assessment

The overall wildland fire risk to the community of Coffee Creek is low. This is due in large part to the rolling topography of the area, the lack of wildland fuels and isolation of structures from agricultural crops. The roads and residential nature of the community center reduces the potential for fire to move into or through the community. However, the potential does exist for fire to move through cured native and cultivated vegetation during dry periods of the year. Human sources of ignition such as debris burning, roadside ignitions, and farming operations increase the potential for human ignitions.

Most streets and homes within the community are named and numbered. There is a system of municipal fire hydrants within the community, providing an ample water supply in the event of a fire. The system of roads within the area provides adequate access for emergency vehicles in the event of an emergency.

The greatest risk to the area is associated with outbuildings and barns associated with ranches outside the community center that have allowed flammable vegetation to accumulate around the structure. Without a defensible space buffer, grass and range fires could potentially spread to the structure in the dried fuels.

4.4.4.2.2 Mitigation Activities

Taking some simple precautions to further protect structures and outbuildings in the outlying area can further reduce the present low risk status of Coffee Creek and the outlying area. Individual home site evaluations can increase homeowners' awareness and provide the impetus to reduce the ignition potential of structures in the event of a wildfire. Maintaining a lean, clean, green zone around structures is the most effective means of protection against a wildland fire in these fuel types. Reducing the response time for emergency resources allows fires to be controlled quickly, before they pose a threat to homes and resources. Measures that ease location of and access to an emerging fire further reduces the potential for loss.

4.4.4.3 Crystal Lake Recreation Area

Crystal Lake is Located in the Big Snowy Mountains in the Southwest corner of the county. It is an improved Forest Service campground that experiences heavy use in the summer months. It is located in a high mountain valley surrounded by steep cliffs. There are no homes in the area and the only permanent structure it the old ranger station that is now used as a summer station for the local campground hosts. The only access is via a narrow paved road.

4.4.4.3.1 Community Assessment

There is only one structure in the area that is at considerable risk to damage or loss in the event of a wildland fire. The biggest concern for this area is the high number of campers in the area in the summer time. Due to the presence of only one access road, this could pose a significant threat to the lives of the people camping in the area. Vegetation within the drainage bottom is a multi-layered stand of spruce and fir with moderate levels of dead and down and ladder fuels.

Contributing to the overall risk in the drainage is the concentration of human use in the lake area. There are multiple recreational opportunities in the area, including multiple trailheads adjacent to the lake and the Crystal Lake Campground. These attractions draw considerable numbers of recreational users in the summer months. Concentrated human use significantly increases the potential for human ignitions. Unattended campfires, discarded cigarettes, and fireworks all add to the potential for person-caused fires. The most serious ignitions would be those that start near the bottom of the drainage.

Natural ignitions from summer lightning storms also contribute to the overall ignition profile in the area. Although ignitions typically occur further upslope on ridges and mountainsides, natural ignitions can occur in the drainage bottom. During extreme weather events, fires upslope of Crystal Lake could be pushed down toward the recreation sites in the area. Although the probability of such events is quite low, it is possible.

The steep slopes, dry forest fuels and multi-layer stands increase the potential for development of high intensity, stand replacing fires. These fires present significant control problems due to large flame lengths, tremendous heat output, and the potential for long-range spotting. Such fires in this area would potentially pose significant threat to lives in the area.

Access to Crystal Lake and the trailheads is via the one-way-in, one-way-out, unimproved Crystal Lake Road. There is no other road access to the area. The road corridor runs in a narrow band along Big Rock Creek. In many place the road is overtopped by the adjacent forests. In many places the road crosses steep slopes. The road is a paved one lane road. Two pick-up trucks have trouble passing in most sections of the road. Due to the steep side slopes widening the road to provide additional turnouts would be difficult and expensive. A fire start in this area could potentially cut off the only available escape route for recreational users in the drainage.

4.4.4.3.2 Mitigation Activities

Effective risk mitigation strategies for this area are limited. Improving travel corridor access should also be emphasized along Crystal Lake Road. An understory treatment designed to remove ladder fuels and increase canopy base height can reduce the potential for fire to move from surface fuels to the overstory along the roadway. Hazardous fuels treatments should also be considered in the vicinity of the Crystal Lake Campground in order to reduce the potential for torching and spotting from fires originating in the campground. This could also provide a defensible zone if access were cut off and users were forced to take refuge in the campground.

Lastly, aggressive fire prevention campaigns should continue in the area to help reduce the risk of human-caused fires caused by ignorance or carelessness.

4.4.4.4 Denton

The community of Denton is located on Highway 81 in the northwestern portion of Fergus County. Denton provides services in support of the agricultural economy that dominates the landscape of the surrounding area. The community is completely surrounded by cropland, with

most homes and businesses situated in the urban center. There is a clear line of demarcation between the agricultural land and the community center.

4.4.4.4.1 Community Assessments

The overall wildfire risk to the community of Denton is low. The gentle topography and lack of wildland fuel in the area reduces the overall risk to the community. The roads and the urban nature of the community reduce the potential for fire to spread to the community. This provides adequate community defensible space, significantly reducing the threat to homes within the urban area.

The potential does exist for fire to move through cured native and cultivated vegetation during dry periods of the year. This potential is augmented by human use in the area. Roadside ignitions, debris burning and farming operations all contribute to the overall ignition profile of the area, increasing the probability of grass and range fires. It is critical that homes, barns or outbuildings situated in the midst of flammable vegetation take the necessary actions to protect structures, as there is little opportunity to protect a structure in the advance of a fast moving grass fire.

The greatest risk to the area is associated with outbuildings and barns associated with ranches outside the community center that have allowed for flammable vegetation to accumulate around the structure. Without a defensible space buffer, grass and range fires could potentially spread to the structure in the dried fuels.

Most roads in the area are signed, as are most homes, helping to reduce response times in the event of an emergency situation. Roads in the area are generally adequate for emergency traffic. The community of Denton is serviced by a municipal system of fire hydrants, providing adequate water supply within the community center. Emergency services are provided by the Denton Rural Fire Department located in the center of the community, helping to reduce response time in the area.

4.4.4.4.2 Mitigation Activities

Taking some simple precautions to further protect structures and outbuildings in the outlying area can further reduce the present low risk status of Denton and the outlying area. Individual home site evaluations can increase homeowners' awareness and provide the impetus to reduce the ignition potential of structures in the event of a wildfire. Maintaining a lean, clean, green zone around structures is the most effective means of protection against a wildland fire in these fuel types. Reducing the response time for emergency resources allows fires to be controlled quickly, before they pose a threat to homes and resources. Measures that ease location of and access to an emerging fire further reduces the potential for loss.

4.4.4.5 Forestgrove

Forestgrove is a small rural community located at the intersection of Forestgrove Road and Upper Flatwillow Road approximately 18 miles east of Lewistown. Although there is a cluster of homes near the city center, most structures are associated with large farming and ranching operations on the outer periphery of the community. The Forestgrove Road travels through the fairly wide valley created by the South Fork of McDonald Creek from Grass Range to Lewistown. Most homes are situated in the flatter drainage bottoms of McDonald Creek and the other small tributaries near Forestgrove.

4.4.4.5.1 Community Assessment

The topography north of Forestgrove is fairly gentle with only a few steeper pitches. Vegetative communities in the area are primarily grass and sage. There are several sparse patches of ponderosa pine occurring primarily in the moist draws. The area south of the community can be described as the foothills to the Little Snowy and Big Snowy Mountain Ranges. Many of the drainages in this area become much steeper near their headwaters to the south, which creates some highly variable topography and vegetation complexes. Isolated patches of ponderosa pine near the community begin to become more contiguous as the elevation increases, eventually transitioning to a Douglas-fir, Engelmann spruce, and lodgepole pine community on the upper slopes. Although fires in these denser forested areas are relatively infrequent, they can result in severe property damage and tree mortality when burning during severe fire weather conditions.

The community of Forestgrove and surrounding structures are at moderate risk to the detrimental effects of a wildland fire. Factors contributing to this risk include the steeper topography and increased fuel loading. Homes built along timbered slopes or on ridge tops are at significantly elevated fire risk. Upslope winds and convection amplify the ability of fires to spread rapidly up slopes leaving very little time to safeguard structures or escape.

Many of the structures located along the shallow valley bottoms maintain an adequate defensible space by pasturing and grazing livestock nearby. Additionally, these draws are commonly dominated by mixed grasses and riparian brush species making them less susceptible to higher intensity fires. The inconsistency of fuels in the immediate vicinity of Forestgrove also reduces the likelihood of an uncontrolled fire reaching the town site before being suppressed.

Debris burning, careless discarding of cigarettes, and other forms of human ignition introduce additional fire risks to the community. The xeric nature of the environment and abundance of dry windy weather greatly increases the possibility of an ignition source finding a receptive fuel bed and resulting in a large rangeland or forest fire. This risk depends largely on the season and status of fuels. Fire can travel through dry, cured grasses very rapidly, especially when driven by gusty winds, leaving very little time to prepare a home to withstand a wildfire event. Thus it is critical that all precautionary measures take place prior to the fire season.

The primary access into Forestgrove is by the Forestgrove Road from either Lewistown or Grass Range. This road has a moderate risk of fire primarily due to continuous fine fuels and patches of timber directly abutting the roadway. Upper Flatwillow Road offers an additional escape route for residents; however, this road travels through areas at much higher fire risk. Upper Flatwillow Road follows the Surenough, Potter, and Flatwillow Creek drainages before finally reaching U.S. Route 87 nearly 35 miles away. Steep slopes, increased timber concentrations, and narrow passageways make some areas along this route hazardous for evacuees. Fairview Road and an additional secondary road to Heath may serve as escape routes depending upon the size and location of a fire.

House numbers throughout the community and surrounding areas are generally difficult to see; however, names of landowners and mileage to structures are usually posted at road intersections. Many outlying homes have been built at the end of long, single-lane, dead end private driveways. One-way in, one-way out access roads are unsafe for both residents and firefighters due to the risk of becoming trapped and the inability of emergency vehicles to pass each other. Structures around the community of Forestgrove are generally all or partially constructed with building materials unfavorable for protection against wildfire.

4.4.4.5.2 Mitigation Activities

In general, risk can be mitigated by raising public awareness and by taking a few simple precautions. Educating the homeowners in techniques for protecting their homes is critical in these dry environments. Individual home site evaluations can increase homeowners' awareness and provide the impetus to reduce the ignition potential of structures in the event of a wildfire. Maintaining a lean, clean, green defensible zone around structures is the most effective means of protection against a wildland fire in these fuel types. In cases where cedar shakes or wood siding and decking have been used in home construction, there are no easy solutions to reducing the vulnerability to fire. In such cases, homeowners should consider re-roofing with fire resistant materials in the future. Finally, reducing the response time for emergency resources allows fires to be controlled quickly, before they pose a threat to homes and resources. Measures that ease location of and access to a developing fire further reduces the potential for loss. Pre-planning and identifying escape routes is imperative to the survival of a community in the event of a wildland or rangeland fire.

4.4.4.6 Garneill

Garneill is a small agricultural community in the southwest corner of Fergus County, between the Big Snowy and Little Belt Mountains, off Highway 191. Agricultural fields in all directions surround the community. The community center is dominated by the grain elevator on the Burlington Northern rail line, with only a few residential homes.

4.4.4.6.1 Community Assessment

The overall wildfire risk to the community is low. The gentle topography and lack of wildland fuel in the area reduce the overall risk to the community. The roads and agricultural activities in the area protect the few homes within the community center from encroachment by fire. The defensible space around the community and building material used in home construction result in a low risk to loss from a grass or range fire event. Most of the ranches in the surrounding area also have adequate defensible space surrounding most structures. However, there are some scattered outbuildings that lack adequate defensible space, increasing the potential for loss of the structure in the event of a grass or range fire.

The potential does exist for fire to move through cured native and cultivated vegetation that surround Garneill during dry periods of the year. This potential is augmented by human use in the area. Roadside ignitions, debris burning and farming operations all contribute to the overall ignition profile of the area, increasing the probability of grass and range fires. It is critical that homes, barns or outbuildings situated in the midst of flammable vegetation take the necessary actions to protect structures, as there is little opportunity to protect a structure in the advance of a fast moving grass fire.

The greatest risk to the area is associated with outbuildings and barns associated with ranches outside the community center that have allowed for flammable vegetation to accumulate around the structure. Without a defensible space buffer, grass and range fires could potentially spread to the structure in the dried fuels.

Most roads in the area are signed, as are most homes, helping to reduce response times in the event of an emergency situation. Roads in the area are generally adequate for emergency traffic.

4.4.4.6.2 Mitigation Activities

Taking some simple precautions to further protect structures and outbuildings in the outlying area can further reduce the present low risk status of Garneill and the outlying area. Individual home site evaluations can increase homeowners' awareness and provide the impetus to reduce the ignition potential of structures in the event of a wildfire. Maintaining a lean, clean, green zone around structures is the most effective means of protection against a wildland fire in these fuel types. Reducing the response time for emergency resources allows fires to be controlled quickly, before they pose a threat to homes and resources. Measures that ease location of and access to an emerging fire further reduces the potential for loss.

4.4.4.7 Giltedge

The remnant community of Giltedge is located near the base of the eastern slopes of the Judith Mountain Range approximately 11 miles northeast of Lewistown. This historic town was once a prosperous gold mining town; well known throughout the country as the first North American mine to use the cyanide leeching process to extract ore. Today only a few homes remain occupied. Ranchers currently graze large herds of livestock on the vast rangelands that extend to the east from the mountains. The timbered slopes of the Judith Mountains rise sharply along the western edge of the town site.

4.4.4.7.1 Community Assessment

The predominant slope of the Judith Mountains near Giltedge is a very steep east aspect. This isolated range has several small, steep peaks with deep draws and saddles. Although ponderosa pine is common along the lower slopes, a rapid transition to Douglas-fir and Engelmann spruce occurs as the elevation increases. Thin soils and a short growing season tend to limit growth to only the very hardy species on many slopes. Rock outcroppings and vertical cliffs are not uncommon. Quaking aspen, black cottonwood, and a variety of brush species are present in wetter draws. The rolling topography of the rangeland extending from the base of the Judith Mountains is dominated by mixed grasses and various crop fields.

The few residents remaining in the Giltedge area are generally larger landowners. A few homes are tucked into the timber on the lower slopes of the mountains, but most are ranch and farmhouses scattered throughout the nearby rangeland. Structures surrounded by open range are at low risk due to the low intensities with which these fuels burn. Most of this area has been actively grazed or otherwise developed for agricultural purposes, which tends to reduce the risk by controlling the growth of native vegetation.

Homes located on the timbered slopes or in one of the many narrow canyons of the Judith Mountains are at significantly higher risk. Some of these homes have very little defensible space with trees and other wildland fuels directly abutting or even overhanging structures. Steep slopes, continuous fuels and dry winds greatly increase fire-spread rates. Although large fires in these habitat types are infrequent, they tend to be quite intense and difficult to control, posing a significant threat to homes in the area.

Debris burning, careless discarding of cigarettes, and other forms of human ignition introduce additional fire risks to the community. The xeric nature of the environment and abundance of dry windy weather greatly increases the possibility of an ignition source finding a receptive fuel bed and resulting in a large rangeland or forest fire. This risk depends largely on the season and status of fuels. Fire can travel through dry, cured grasses very rapidly, especially when driven

by gusty winds leaving very little time to prepare a home to withstand a wildfire event. Thus, it is critical that all precautionary measures take place prior to the fire season.

The primary access into the Giltedge town site is by the Giltedge Road from State Highway 200. This section of road is at low risk of being threatened by fire due to the lack of hazardous fuels along the roadway. The Black Butte Road, which travels north to the community of Roy, also offers a low risk alternative escape route. The continuation of the Giltedge Road through the Judith Mountains to U.S. Highway 191 has much higher risk. This part of the road travels through the steep walled Maiden Canyon, which in a wildfire situation would likely act as a funnel for heat and fumes. Additionally, heavier fuels along this corridor further increase the risk. This section of Giltedge Road would not likely be a usable escape route for citizens of Giltedge; however, this is the only available path through the Judith Mountains suitable for the escape of recreators within.

House numbers throughout the greater Giltedge area are generally difficult to see; however, names of landowners and mileage to structures are usually posted at road intersections. Many outlying homes have been built at the end of long, single-lane, dead end private driveways. One-way in, one-way out access roads are unsafe for both residents and firefighters due to the risk of becoming trapped and the inability of emergency vehicles to pass each other. Structures around the community of Giltedge are generally all or partially constructed with building materials unfavorable for protection against wildfire.

4.4.4.7.2 Mitigation Activities

Many elements of wildland fire risk can be mitigated by raising public awareness of the dangers associated with living in a flammable environment and by taking a precautions to minimize home ignitability. Educating the homeowners in techniques for protecting their homes is critical in these dry environments. Individual home site evaluations can increase homeowners' awareness and provide the impetus to reduce the ignition potential of structures in the event of a wildfire. Maintaining a lean, clean, green defensible zone around structures surrounded by forest is the most effective means of protection against a wildland fire. In cases where cedar shakes or wood siding and decking have been used in home construction, creation of adequate defensible space is all the more critical. In such cases, homeowners should consider re-roofing with fire resistant materials in the future. Finally, reducing the response time for emergency resources allows fires to be controlled quickly, before they pose a threat to homes and resources. Measures that ease location of and access to a developing fire further reduces the potential for loss. Pre-planning and identifying escape routes also increases orderly egress in the event of a wildland or rangeland fire.

4.4.4.8 Grass Range

Grass Range is located approximately 32 miles east of Lewistown near the intersection of State Highway 200 and State Highway 19. This area is characterized by gently rolling rangeland dominated by mixed grass species and intermittent patches of sagebrush. Several residences are located within the small cluster of buildings near the city center; however, larger landowners are scattered along the highways and the secondary access routes. Except for a few state parcels, Grass Range is surrounded by several miles of privately owned land.

4.4.4.8.1 Community Assessment

Grass Range is at low risk of experiencing significant negative impacts from a wildland fire. Native vegetation complexes around the community are relatively isolated by agricultural

development and decades of livestock grazing. Sparse patches of sagebrush are more common along several of the shallow coulees. Although the dry nature of these fuels increases their availability to burn throughout the year, they would not present a significant threat to the community in the event of a fire.

Structures in outlying areas are typically surrounded by large expanses of rangeland. Structures around the community of Grass Range are generally all or partially constructed with building materials unfavorable for protection against wildfire. These areas are at reduced risk of experiencing an intense wildland fire due to the light and inconsistent fuels and the gentle topography in the area. Fires in grass and sage fuel types move rapidly, but burn at relatively low intensities and can generally be controlled effectively with suppression resources.

An island of sparse ponderosa pine is located about 1 mile southeast of the town site. Dead and down fuels and abundant regeneration in the understory is leading to a predisposition to development of intense wildland fire. Historically, surface fires would burn through these forest types maintaining an open, grassy understory. The accretion of fuels along the surface may lead to fires burning at increased intensities, possibly developing into crown fire under critical fire weather conditions. Currently there are only a few homes along the perimeter of this stand that may be directly impacted by fires within the forested area. However, the Whispering Pines Estates subdivision will be developing residential homes near the northern border of the timbered area, exposing more values to potential impact. The increase in human use will also increase the number of ignition sources in the area, further contributing to the probability of a fire event.

Debris burning, careless discarding of cigarettes, and other forms of human ignition introduce additional fire risks to the community. The xeric nature of the environment and abundance of dry windy weather greatly increases the possibility of an ignition source finding a receptive fuel bed and resulting in a large rangeland fire. This risk depends largely on the season and status of fuels. Fire can travel through dry, cured grasses very rapidly, especially when driven by gusty winds leaving very little time to prepare a home to withstand a wildfire event. Thus, it is critical that all precautionary measures take place prior to the fire season.

The primary access into Grass Range is provided by U.S. Highway 87 or State Highway 19. Both of these routes travel through areas considered to be at low fire risk. Secondary routes leading away from the community such as Forestgrove Road, Tyler Cutoff, or Elk Creek Road generally provide through access and are therefore adequate access and egress routes for residents and emergency services.

House numbers on rural homes throughout the area are generally difficult to see; however, names of landowners and mileage to structures are usually posted at road intersections. Many outlying homes have been built at the end of long, single-lane, dead end private driveways. One-way in, one-way out access roads are unsafe for both residents and firefighters due to the risk of becoming trapped and the inability of emergency vehicles to pass each other.

4.4.4.8.2 Mitigation Activities

Educating the homeowners in techniques for protecting their homes is critical in these dry environments. Individual home site evaluations can increase homeowners' awareness and provide the impetus to reduce the ignition potential of structures in the event of a wildfire. Maintaining a lean, clean, green zone around structures is the most effective means of protection against a wildland fire in these fuel types. In cases where cedar shakes or wood siding and decking have been used in home construction, there are no easy solutions to reducing the vulnerability to fire. In such cases, homeowners should consider re-roofing with fire

resistant materials in the future. Finally, reducing the response time for emergency resources allows fires to be controlled quickly, before they pose a threat to homes and resources. Measures that ease location of and access to an emerging fire further reduces the potential for loss. Pre-planning and identifying escape routes can help to facilitate evacuation in the event of a wildland or rangeland fire.

4.4.4.9 Hilger

The small community of Hilger is located approximately 15 miles north of Lewistown at the intersection of U.S. Route 191 and State Highway 236. This area is primarily gently rolling to flat rangeland vegetated predominantly by nonnative grass species, with small patches of native vegetation. The timbered slopes of the Judith Mountain Range begin to rise out of the rangeland about 5 miles southeast of the town site. Livestock grazing and crop production dominate the surrounding landscape.

4.4.4.9.1 Community Assessment

Hilger is considered to be at low risk of experiencing adverse impacts from a wildland fire. This area is relatively flat with very little native vegetation remaining due to agricultural development and livestock grazing. Many residents live near the town center, which is surrounded by several miles of developed agricultural land.

There are also many ranch and farm structures scattered throughout the area, most of which are also at low risk of fire. Fuel modification or removal and characteristically low burn intensities make the risks of an uncontrolled rangeland fire threatening structures fairly minimal. Structures farther away from the community near the forested mountain slopes have significantly higher risk. Typically, open ponderosa pine stands dominate the lower slopes of these steeper mountainous regions, while spruce and fir are more common as the elevation increases. Although these are isolated ranges, increased fuel concentrations, recreational use, and lightning events make these areas more prone to wildfire.

Debris burning, careless discarding of cigarettes, and other forms of human ignition introduce additional fire risks to the community. The xeric nature of the environment and abundance of dry windy weather greatly increases the possibility of an ignition source finding a receptive fuel bed and resulting in a large rangeland fire. This risk depends largely on the season and status of fuels. Fire can travel through dry, cured grasses very rapidly, especially when driven by gusty winds leaving very little time to prepare a home to withstand a wildfire event. Thus, it is critical that all precautionary measures take place prior to the fire season.

Primary access into Hilger is U.S. Highway 191, which travels directly adjacent to the town. State Highway 126 also provides access from the north. Both of these primary roads are in low fire risk areas; thus, are adequate for use as escape routes. There are also several secondary routes extending in all directions from the community that are suitable for emergency egress.

House numbers on rural homes throughout the area are generally difficult to see; however, names of landowners and mileage to structures are usually posted at road intersections. Many outlying homes have been built at the end of long, single-lane, dead end private driveways. One-way in, one-way out access roads are unsafe for both residents and firefighters due to the risk of becoming trapped and the inability of emergency vehicles to pass each other. Structures around the community of Hilger are generally all or partially constructed with building materials unfavorable for protection against wildfire.

4.4.4.9.2 Mitigation Activities

Educating the homeowners in techniques for protecting their homes is critical in these dry environments. Individual home site evaluations can increase homeowners' awareness and provide the impetus to reduce the ignition potential of structures in the event of a wildfire. Maintaining a lean, clean, green zone around structures is the most effective means of protection against a wildland fire in these fuel types. In cases where cedar shakes or wood siding and decking have been used in home construction, there are no easy solutions to reducing the vulnerability to fire. In such cases, homeowners should consider re-roofing with fire resistant materials in the future. Finally, reducing the response time for emergency resources allows fires to be controlled quickly, before they pose a threat to homes and resources. Measures that ease location of and access to an emerging fire further reduces the potential for loss. Pre-planning and identifying escape routes can help to facilitate evacuation in the event of a wildland or rangeland fire.

4.4.4.10 Lewis and Clark National Forest and Surrounding Foothills

A large portion of the Big Snowy Mountains and Little Snowy Mountains are encompassed by the Jefferson Division of the Lewis and Clark National Forest. Much of these two ranges are located in the southern most region of Fergus County; however, they extend into neighboring Golden Valley County and slightly into Wheatland and Musselshell Counties. The Judith Ranger District fire resources are located in Stanford (Judith Basin) and the Mussellshell Ranger District resources are in Harlowton (Wheatland County). Wildfire on land managed by the Forest Service would be actively suppressed; however, the habitat types and conditions throughout this part of the Lewis and Clark National Forest could potentially sustain significant damage in the event of a fire. BLM has responsibility for initial attack in the event of a wildfire in the Snowy and Little Snowy mountains on Lewis and Clark National Forest lands under a statewide agreement between the Forest Service and BLM. Fires have historically occurred infrequently in this area, but this may suggest that larger, more intense and destructive fires are a significant possibility.

4.4.4.10.1 Community Assessment

Much of the forestland leading up to the National Forest boundary is privately owned; therefore, there are many homes and other structures scattered along the multitude of secondary roads that access these foothills. Fuels vary from riparian grasses and shrubs to open, dry ponderosa pine to overstocked, multistoried, multi-species stands. Stands of timber are fairly patchy tending to be more common along ridges, but becoming more contiguous as the elevation increases. Specific outcomes are difficult to predict; however, due to the discontinuity of fuels, fire spread will likely be dependant on weather conditions. Dry, windy conditions could potentially push fires upslope through cured grasses into denser fuels and eventually into the more uninterrupted fuels present within the National Forest. Fires in the mixed native and non-native grasses common along many of the wide draws tend to have high rates of spread, but burn at relatively low intensities. Homes in these areas are at lower risk because fires are typically more easily controlled by vegetation modification and other suppression techniques. Homes closer to forest fuel types are at significantly higher risk due to generally increased fire intensities and potentially hazardous fuel accumulations in the understory, which may lead to more extreme fire behavior.

Many landowners have cleared an adequate defensible space around structures, yet many homes are either all or partially constructed with building materials unfavorable for fire protection. Human activity, recreational use, lightning events, debris burning, and numerous

other ignition sources are present throughout the foothills and extending into the mountain ranges, which further increases the potential risk of loss of life and property.

The Crystal Lake Recreational Area within Lewis and Clark National Forest located in the Big Snowy Mountain Range provides developed campsites and fishing and hiking access. This and many other recreation sites receive high concentrations of recreational use each year. Increased ignition sources and high usage in combination with hazardous fuels put these areas at significant risk of wildfire.

The Red Hill Road from Lewistown provides the main access through the foothills; however, there is a multitude of secondary roads, particularly along the drainages, that also travel through the majority of the foothills area. Many of these secondary roads dead end near the National Forest boundary making them unsatisfactory escape routes. Although Red Hill Road does continue over the mountain ranges to Golden Valley County, much of this corridor is adjacent to hazardous forest fuels. Crystal Lake Road, which accesses the Crystal Lake Recreational Area, also travels through sections of forest with denser fuel accumulations. Fuels along these routes have a high probability of becoming threatened in the event of a fire.

4.4.4.10.2 Mitigation Activities

Ignition sources in high-use recreational areas are significantly increased. Nevertheless, there are many preventative techniques that mitigate the fire risk associated with human activity in these areas. First, hazardous fuels such as brush, regeneration, cured grass, and dead or dying trees around camping areas or near parking areas, trails, or roads where motorized vehicles are likely to travel should be removed periodically. Next, install escape-proof fire rings and barbeque pits at picnic and camping sites. Finally, erect informative signs warning visitors of the risk of wildfire and precautions to take in order to prevent an accidental ignition such as the proper way to dispose of cigarettes and matches.

Educating homeowners in techniques for protecting their homes is also critical in these forested environments. Individual home site evaluations can increase homeowners' awareness and provide the impetus to reduce the ignition potential of structures in the event of a wildfire. Maintaining a lean, clean, green zone around structures is the most effective means of protection against a wildland fire in timber fuel types. In cases where cedar shakes or wood siding and decking have been used in home construction, there are no easy solutions to reducing the vulnerability to fire. In such cases, homeowners should consider re-roofing with fire resistant materials in the future. Finally, reducing the response time for emergency resources allows fires to be controlled quickly, before they pose a threat to homes and resources. Measures that ease location of and access to an emerging fire further reduces the potential for loss. Pre-planning and identifying escape routes is imperative to the survival of a community in the event of a wildland or rangeland fire.

Red Hill Road and Crystal Lake Road treatments should consider natural fuels reduction adjacent to the roads and throughout the road corridor to minimize the chances for crown fire establishment and spread. This will facilitate a safer escape route and will increase the chances of effective fire control operations from these access points.

4.4.4.11 Lewistown-Heath

Lewistown is the largest community in Fergus County and also marks the geographic center of the state of Montana. Although there is a buffer of rangelands surrounding the city center, Lewistown is situated between the South Moccasin and Judith Mountains ranges to the north and the foothills of the Big Snowy Mountains to the south. The remnant community of Heath is

located approximately 8 miles southeast of Lewistown along Big Spring Creek. All that remains near the town site is an old community hall and fire station and an industrial mill; however, there are numerous houses in the surrounding area.

4.4.4.11.1 Community Assessment

Most of the residents of Lewistown are at low risk of experiencing loss from a wildland fire. The city center and many of the more rural residents are surrounded by relatively flat land used for either grazing or developed for other agricultural purposes. Only a few small clumps of native rangeland fuels remain in this area. Although the potential for this type of altered rangeland to burn exists, most structures have fairly low risk due to the ability of homeowners to control and modify vegetation. Additionally, fires in these fuels typically burn at relatively low intensities. Structures built near the timbered slopes of the Judith Mountains or the South Moccasin Mountains are at significantly higher risk. These typically drier south and southwest aspect slopes are vegetated by ponderosa pine, grasses, and sage at lower elevations and a Douglas-fir and spruce habitat type in the higher elevations. Increased fuel accumulations and continuity, greater potential for intense fires, and human activity in the area require residents to be aware of the prospective ignition sources and associated fire danger.

The area known as Heath sits along the banks of Big Spring Creek. There are many homes situated within the shallow basin created by this drainage and along secondary roads such as Forestgrove Road that branch off of the main access route. Much of this area is vegetated by riparian grasses and brush species, which are not generally prone to fire. Nevertheless, the small ridge running along the east side of the valley has slightly more associated fire risk due to a steeper gradient and sparse stands of ponderosa pine growing intermittently along its face. Human caused fires ignited in the higher trafficked valley could easily run upslope through the needle duff and dead and down wood created by these stands. Although these fuels are not continuous, drought or windy weather conditions could easily sustain a fire along the ridge top and into more continuous fuels further south.

Brewery Flats, Carroll Trail, and Hruska are a few of the many fishing access points along Big Spring Creek in the vicinity of Lewistown and Heath. Restroom facilities, picnic areas, and parking areas are available at many of these sites. Big Spring Creek flows through a wide, shallow valley populated primarily by riparian grasses and brush species. Although this type of vegetation is not highly flammable under normal weather conditions, due to the high traffic and close proximity of many homes and businesses, these recreation areas are at significantly higher risk of providing an ignition source for a rangeland and/or structural fire.

Debris burning, careless discarding of cigarettes, and other forms of human ignition introduce additional fire risks to both communities. The xeric nature of the environment and abundance of dry windy weather greatly increases the possibility of an ignition source finding a receptive fuel bed and resulting in a large rangeland or forest fire. This risk depends largely on the season and status of fuels. Fire can travel through dry, cured grasses very rapidly, especially when driven by gusty winds, leaving very little time to prepare a home to withstand a wildfire event. Thus, it is critical that all precautionary measures take place prior to the fire season.

Access into Lewistown is provided by State Highway 200 from either the east or west and U.S. Highway 191 from the north. There are also numerous secondary routes traveling through low risk rangeland areas that offer additional escape routes. State Route 238, which becomes Red Hill Road is the only access route into Heath and the east side of the Jefferson Division of the Lewis and Clark National Forest. Although this is an adequate escape route to the north, increasing fuel accumulations make escape south to the mountains unsafe. Much of the potential fire risk for Heath is associated with the National Forest, so it is more likely that

residents will be attempting to evacuate northward towards Lewistown. Due to the amount of residents along Red Hill Road, precautions should be made to insure that this roadway will not be at risk in the event of a fire.

House numbers on rural homes throughout the area are generally difficult to see; however, names of landowners and mileage to structures are usually posted at road intersections. Many outlying homes have been built at the end of long, single-lane, dead end private driveways. One-way in, one-way out access roads are unsafe for both residents and firefighters due to the risk of becoming trapped and the inability of emergency vehicles to pass each other. Structures around the outskirts of Lewistown, including the community of Heath, are generally all or partially constructed with building materials unfavorable for protection against wildfire. Fire protection is provided by the Lewistown and Heath Fire Districts.

4.4.4.11.2 Mitigation Activities

Educating homeowners in techniques for protecting their homes is critical in these dry environments. Individual home site evaluations can increase homeowners' awareness and provide the impetus to reduce the ignition potential of structures in the event of a wildfire. Maintaining a lean, clean, green zone around structures is the most effective means of protection against a wildland fire in these fuel types. In cases where cedar shakes or wood siding and decking have been used in home construction, there are no easy solutions to reducing the vulnerability to fire. In such cases, homeowners should consider re-roofing with fire resistant materials in the future. Finally, reducing the response time for emergency resources allows fires to be controlled quickly, before they pose a threat to homes and resources. Measures that ease location of and access to an emerging fire further reduces the potential for loss. Pre-planning and identifying escape routes is imperative to the survival of a community in the event of a wildland or rangeland fire.

4.4.4.12 Maiden Canyon

Maiden Canyon is located at the base of the Judith Mountains on the Northwest side. Most of the homes in the area is are located along Warm Springs Creek. There are a few scattered homes and ranches in the upper portion of the drainage, and more development can be expected in this area.

4.4.4.12.1 Community Assessment

The homes and ranches in the Maiden Canyon area are considered to be at moderate risk to wildland fire. Mixed deciduous and coniferous forest vegetation is generally isolated in stringers along the bottom lands. These timbered stringers tend to be surrounded by open meadows. Forest type tends to shift increasingly toward coniferous species further up canyon and in the Judith Mountains. The coniferous forests have a high risk of fire. In the early 1990's a large fire burned in the Judith Mountains destroying several homes and threatening many others.

Most of the homes in the area are in grassy meadows along the base of the mountains, although many newer houses are being constructed closer to or in the more heavily timbered areas. The lack of consistency in forest vegetation along the bottom land reduces the potential for a high-intensity crown fire to threaten the structures. Such an event would require fire moving from the continuous timber on the mountains down slope, to the homes. Although improbable, such an event is possible, and has happened in the recent past, under high wind conditions. A greater threat is likely to come from fires originating in the vicinity of the structures, from human or natural causes, spreading through the grass toward the home. Although such

fires can move with rapid rates of spread, they generally do not pose the same control problems as high intensity crown fires. Fire intensity is considerably lower in grass fires and spotting distance is significantly less. Thus home and structure protection can be accomplished through the implementation of some simple precautionary measures. Fires started in the bottom land can burn into the adjacent timberland and threaten homes along the edge of the bottom land and forestland.

Most have adequate defensible space and have been built with materials that are fire resistant. However, there are some outbuildings and barns of wooden construction in both the bottom land and against the forest, with little to no defensible space. During the dry summer months, fires in these fuel types may develop into high intensity fires in areas where dead and down and ladder fuels have accumulated. The higher intensity with which these fires burn increases the potential for fire to transition from the wildland to the structure.

Access to most homes in the area is via a single lane, unimproved road. The road is adequate for most emergency traffic. It is unlikely that access would be compromised in the event of a fire, although there are some heavily stocked areas along the road that may compromise the road for a short period of time.

4.4.4.12.2 Mitigation Activities

Effective risk mitigation strategies begin with public awareness campaigns designed to educate individual homeowners about the risks associated with living in a flammable environment. *"Home protection starts at the home."* Educating the homeowner in techniques for protecting their homes is critical in areas surrounded by light, flashy fuels. Fires in these fuel types leave little time to react, as their rates of spread can be quite rapid. Thus, it is critical that mitigation activities take place prior to a fire event. Individual home site evaluations can increase homeowners' awareness and provide the impetus to reduce the ignition potential of structures in the event of a wildfire. Maintaining a lean, clean, green zone and adequate defensible space is the most effective means of protecting structures against wildland fire.

In cases where flammable materials have been used in home construction, there are no easy solutions to reducing the vulnerability to fire. Wooden roofing material is vulnerable to ignition for firebrands lofted from considerable distances. In such cases, homeowners should consider re-roofing with fire resistant materials in the future.

Vegetative treatments designed to reduce hazardous fuels along the roads in the area would help to assure access in the event of a wildfire, and reduce the potential for fire starts associated with roadside ignitions from developing into large wildland fires.

4.4.4.13 Moore

The community of Moore is located approximately 15 miles southwest of Lewistown along State Highway 200 near the western border of Fergus County. This area is characterized by relatively flat, privately owned farms and ranches. Many homes have been built near the community center; however, several larger landowners have established home sites throughout the surrounding area.

4.4.4.13.1 Community Assessment

The community of Moore is considered to have low risk of wildfire. Very few patches of native fuels remain due to the extensive agricultural development and livestock grazing in the area. Structures near the community center and many of the farm and ranch homes scattered

throughout the nearby rangelands are surrounded by flat crop land or actively grazed pastures. No till agricultural practices on croplands create widespread fine fuels (stubble) that cure during late summer and early fall. Fires can spread rapidly through these types of light fuels; however, they generally occur at lower intensities and can therefore be more easily controlled by vegetation modification. Most residents also lessen their home's fire risk by maintaining irrigated yards around their homes.

Debris burning, careless discarding of cigarettes, and other forms of human ignition introduce additional fire risks to the community. The xeric nature of the environment and abundance of dry windy weather greatly increases the possibility of an ignition source finding a receptive fuel bed and resulting in a large rangeland fire. This risk depends largely on the season and status of fuels. Fire can travel through dry, cured grasses very rapidly, especially when driven by gusty winds leaving very little time to prepare a home to withstand a wildfire event. Thus, it is critical that all precautionary measures take place prior to the fire season.

Primary access into Moore is provided by State Highway 200, which passes just north of the city center. Several other secondary roads extending from the community in all directions offer residents safe escape routes through areas with low fire risk due to the lack of hazardous fuels.

House numbers on rural homes throughout the area are generally difficult to see. Many outlying homes have been built at the end of long, single-lane, dead end private driveways. One-way in, one-way out access roads are unsafe for both residents and firefighters due to the risk of becoming trapped and the inability of emergency vehicles to pass each other. Structures around the community of Moore are generally all or partially constructed with building materials unfavorable for protection against wildfire. Fire protection is provided by the Moore Fire District.

4.4.4.13.2 Mitigation Activities

Educating the homeowners in techniques for protecting their homes is critical in these dry environments. Individual home site evaluations can increase homeowners' awareness and provide the impetus to reduce the ignition potential of structures in the event of a wildfire. Maintaining a lean, clean, green zone around structures is the most effective means of protection against a wildland fire in these fuel types. In cases where cedar shakes or wood siding and decking have been used in home construction, there are no easy solutions to reducing the vulnerability to fire. In such cases, homeowners should consider re-roofing with fire resistant materials in the future. Finally, reducing the response time for emergency resources allows fires to be controlled quickly, before they pose a threat to homes and resources. Measures that ease location of and access to an emerging fire further reduces the potential for loss. Pre-planning and identifying escape routes is imperative to the survival of a community in the event of a wildland or rangeland fire.

4.4.4.14 Roy

Roy is located along U.S. Highway 191 approximately 7 miles west of the intersection of U.S. Highway 191 and State Highway 19. Gently rolling rangeland and agricultural crops surround this small rural community. Except for a few parcels owned by the state of Montana, this area is entirely privately owned with farms and ranches spread out in all directions. The most northern slopes of the Judith Mountains lie distantly (approximately 6 miles) to the south.

4.4.4.14.1 Community Assessment

The community of Roy is considered to have a low risk of wildland fire. The landscape to the north, west, and east is relatively flat with mostly non-native grasses due to extensive

agricultural development and livestock grazing in the area. Various riparian brush species adorn the shallow basin accommodating the flow of Box Elder Creek, which passes just north of the city center. The gradient of the topography south of Roy begins to increase making a slow climb to the base of the Judith Mountains. Although not steep, portions of this area are vegetated by native grasses and sparse clumps of sage. Structures built along these foothills, particularly those directly adjacent to native fuels, are at somewhat higher risk of fire. Fires in these fuel types can move very quickly, but they generally burn at fairly low to moderate intensities. Homes farther away from the community, near the timbered slopes of the Judith Mountains, are at significantly higher risk. Forest stands in this area tend to be made up of open ponderosa pine on the lower slopes that rapidly transition to a spruce-fir habitat as the elevation increases. Even though this is an isolated range, increased fuel accumulations, recreational use, and lightning events make this area more susceptible to wildfire.

Debris burning, careless discarding of cigarettes, and other forms of human ignition introduce additional fire risks to the community. The xeric nature of the environment and abundance of dry windy weather greatly increases the possibility of an ignition source finding a receptive fuel bed and resulting in a large rangeland fire. This risk depends largely on the season and status of fuels. Fire can travel through dry, cured grasses very rapidly, especially when driven by gusty winds leaving very little time to prepare a home to withstand a wildfire event. Thus, it is critical that all precautionary measures take place prior to the fire season.

U.S. Highway 191, traveling just north of the community, provides the primary access into Roy. This highway corridor is considered to be at low risk of fire due to the surrounding rangeland along most of its path through Fergus County. Black Butte Road and a few other secondary roads also provide safe escape routes through low risk areas.

House numbers on rural homes throughout the area are generally difficult to see; however, names of landowners and mileage to structures are usually posted at road intersections. Many outlying homes have been built at the end of long, single-lane, dead end private driveways. One-way in, one-way out access roads are unsafe for both residents and firefighters due to the risk of becoming trapped and the inability of emergency vehicles to pass each other. Structures around the community of Roy are generally all or partially constructed with building materials unfavorable for protection against wildfire. Fire protection is provided by the Roy Fire District.

4.4.4.14.2 Mitigation Activities

Educating the homeowners in techniques for protecting their homes is critical in these dry environments. Individual home site evaluations can increase homeowners' awareness and provide the impetus to reduce the ignition potential of structures in the event of a wildfire. Maintaining a lean, clean, green zone around structures is the most effective means of protection against a wildland fire in these fuel types. In cases where cedar shakes or wood siding and decking have been used in home construction, there are no easy solutions to reducing the vulnerability to fire. In such cases, homeowners should consider re-roofing with fire resistant materials in the future. Finally, reducing the response time for emergency resources allows fires to be controlled quickly, before they pose a threat to homes and resources. Measures that ease location of and access to an emerging fire further reduces the potential for loss. Pre-planning and identifying escape routes is imperative to the survival of a community in the event of a wildland or rangeland fire.

4.4.4.15 Winifred-Suffolk

The small communities of Winifred and Suffolk are located approximately 6 miles apart along State Highway 236 in the most northern region of Fergus County. Both communities were originally established as stations along a railway that has since been abandoned. Winifred still survives as rural farming and ranching town, but there are very few buildings remaining near the original Suffolk town site. The landscape surrounding these two communities is characterized by gentle rolling rangeland or developed agricultural fields. Except for a few state parcels, this area is entirely privately owned with homes scattered in all directions. The Bureau of Land Management administers land along the Judith and Missouri Rivers, which are located approximately 10 miles to the east and north, respectively. The river basins are generally fairly steep walled with increased occurrences of rock outcroppings and patchy sagebrush, rabbitbrush, and many other xeric climate forbs.

4.4.4.15.1 Community Assessment

The communities of Winifred and Suffolk are considered to have low risk of wildland fire. The landscape surrounding these small farm and ranch towns is relatively flat rangelands with very little native vegetation remaining due to the agricultural development and livestock grazing. There are many structures scattered throughout the area that are generally also at low risk of experiencing a fire due to irrigated yards and non-native vegetation modification.

Lands administered by the Bureau of Land Management along the Judith and Missouri rivers to the distant east and north are at somewhat higher risk of fire. These drainages typically introduce increased topographical gradients and more continuous native fuels. Homes and other structures near these waterways may have an elevated fire risk.

Debris burning, careless discarding of cigarettes, and other forms of human ignition introduce additional fire risks to these communities. The xeric nature of the environment and abundance of dry windy weather greatly increases the possibility of an ignition source finding a receptive fuel bed and resulting in a large rangeland fire. This risk depends largely on the season and status of fuels. Fire can travel through dry, cured grasses very rapidly, especially when driven by gusty winds leaving very little time to prepare a home to withstand a wildfire event. Thus, it is critical that all precautionary measures take place prior to the fire season.

Primary access into Winifred and Suffolk is provided by State Highway 236, which travels directly through both communities. This and a multitude of secondary roads traveling in all directions provide safe, low risk escape routes for residents.

House numbers on rural homes throughout the area are generally difficult to see; however, names of landowners and mileage to structures are usually posted at road intersections. Many outlying homes have been built at the end of long, single-lane, dead end private driveways. One-way in, one-way out access roads are unsafe for both residents and firefighters due to the risk of becoming trapped and the inability of emergency vehicles to pass each other. Structures around Winifred and Suffolk are generally all or partially constructed with building materials unfavorable for protection against wildfire. Fire protection is provided by the Winifred Fire District.

4.4.4.15.2 Mitigation Activities

Educating the homeowners in techniques for protecting their homes is critical in these dry environments. Individual home site evaluations can increase homeowners' awareness and provide the impetus to reduce the ignition potential of structures in the event of a wildfire.

Maintaining a lean, clean, green zone around structures is the most effective means of protection against a wildland fire in these fuel types. In cases where cedar shakes or wood siding and decking have been used in home construction, there are no easy solutions to reducing the vulnerability to fire. In such cases, homeowners should consider re-roofing with fire resistant materials in the future. Finally, reducing the response time for emergency resources allows fires to be controlled quickly, before they pose a threat to homes and resources. Measures that ease location of and access to an emerging fire further reduces the potential for loss. Pre-planning and identifying escape routes is imperative to the survival of a community in the event of a wildland or rangeland fire.

4.5 Fire Fighting Resources and Capabilities

Fire Council Mailing List for Fire Fighting Districts and Departments in Fergus County, Montana.

Table 4.2. Key fire fighting personnel contact information in Fergus County.

Name:	Address:	Location:	E-Mail	Phone #:
Tom Killham	PO Box 180	Lewistown, MT 59457	fcso@tein.net	538-3415
Ken Ronish		Lewistown, MT 59457	commissioners@co.fergus.mt.us	538-5119
Jerry Buhre - DNRC	613 -NE Main	Lewistown, MT 59457	jbuhre@state.mt.us	538-7789
Karen Marks	PO Box 180	Lewistown, MT 59457	des@co.fergus.mt.us	538-8118
Ron Martin - acting Chief	just sent to moore he will get it	Moore, MT 59464		855-2050 cell
Will Estes	102 Highland Av.	Moore, MT 59464		374-2224(h) 374-2526 (w)
Steve Walter	Rt. #2 Box 2238	Lewistown, MT 59457	Spring Creek Colony	538-6737
Dave Kalina	174 Valentine Road	Roy, MT 59471		464-2331
Tom Byrne Chief	307 4th Ave.	Roy, MT 59471	byrne6211@hotmail.com	464-2161
Les Slivka Chief	4126 PN Bridge Road	Winifred, MT 59489	lpslivka@ttc-cmc.net	462-5347
Don Obie	20624 DY Train	Winifred, MT 59489	obranch@ttc-cmc.net	462-5529
Trevis Butcher	800 Butcher Rd	Winifred, MT 59489	butcher@ttc-cmc.net	462-8000
Bill Crabtree	1649 Crabtree Road	Denton, MT 59430	bheltcr@ttc.cmc.net	567-2314
Steve Krieger Chief	1252 Bench Land Road	Denton, MT 59430		567-2518(h) 2228 (w)
Charles Lee	Box 305	Denton, MT 59430		567-2557
Kevan Comes	1197 Toboggan Slide Ln- Box 5496	Lewistown, MT 59457		538-9016
Elton Owen Chief	5228 Souty McDonald Creek RD	Lewistown, MT 59457	strbean@midrivers.com	538-9812
Paul Tesarek Chief	309 Gill Street	Coffee Creek, MT 59424		567-2479
Ron Brinkman	3055 MT Highway 81	Coffee Creek, MT 59424		567-2385
Jerry Moline	309-A Street	Lewistown, MT 59457		538-8624/350-3264
Bill Rash	305 W. Watson Street	Lewistown, MT 59457	brash@ci.lewistown.mt.us	538-3412
Tom Dolan - Chief	3276 Tyler Cutoff - Box 2002	Grass Range, MT 59032	ccf@midrivers.com	428-2475
Ron Ahlgren	106 W. Second Street	Grass Range, MT 59032		428-2395
Mayor George Dengel	308 Charters Ave.	Grass Range, MT 59032	ranchers@midrivers.com	428-2245
Cecil Roane	115 Park Ave.	Lewistown, MT 59457	CECR@midrivers.com	538-4945

Table 4.2. Key fire fighting personnel contact information in Fergus County.

Name:	Address:	Location:	E-Mail	Phone #:
Ted Allison - Chief	375 Dome Ln	Forest Grove, MT 59441	tallison7@juno.com	428-2287
Shirley Betts	458 Stratford Ln	Forest Grove, MT 59441		428-2505
Dick Hassler - Chief	2857 - N Kendell RD	Hilger, MT 59451		538-8648
Fred Hassler	130 -Winifred RD	Hilger, MT 59451		538-3559
Bill Stahl - Chief	106009 US Highway 87	Grass Range, MT 59032	cheadlechief@hotmail.com	428-2362
Dee Boyce	95162 US Highway 87	Lewistown, MT 59457	dboyce@lewistown.net	538-2748
Darrell Abbott Chief	13160 Surenuff Road	Forest Grove, MT 59441		428-2467
Randy Barta	14102 Cottonwood Creek RD	Lewistown, MT 59457	rbarta@midrivers.com	538-7319
MSU Fire Training School	750 6th Street SW Suite 205 Great Falls, MT 59404-3297	Great Falls, MT 59405	acxws@montana.edu	761-7885
Bob Bahr	BLM - 303 E. Aztez Dr.	Lewistown, MT 59457	rbahr@mt.blm.gov	538-7461(w)
Jerry Simpson	559 Wichman Rd	Moore, MT 59464	jksimps@ttc-cmc.net	374-2280
Bob Olsen - Chief	12490 Beaver Creek RD - Box 19	Moore, MT 59464		538-5543/5382610
Mitch Maycox	BLM - 303 E. Aztez Dr.	Lewistown, MT 59457	mmaycox@mt.blm.gov	538-1986
Steve Clark	10562 Beaver Creek Rd	Lewistown, MT 59457	sacranch@tein.net	428-2241
Jason Manley	305 W. Watson Street	Lewistown, MT 59457	jmanley@ci.lewistown.mt.us	538-3412
John Stanley	13068 Forest Grove Rd	Grass Range 59032	stanley@tein.net	538-2993
Don Pyrah Fire Training Coordinator	305 W. Watson St.	Lewistown, MT 59457	fergusfire@midrivers.com	366-2220 (C) 538-9327 H 538-3412 (O)
Mike Granger	CMR PO Box 110	Lewistown, MT 59457	Mike_granger@fws.gov	538-8706

The Fire Fighting Resources and Capabilities information provided in this section is a summary of information provided by the Fergus County Cooperative Fire Management Plan and the Rural Fire Chiefs or Representatives of the Wildland Fire Fighting Agencies listed. Their answers to a variety of questions are summarized here. ***In an effort to correctly portray their observations, little editing to their responses has occurred.*** These summaries indicate their perceptions and information summaries.

4.5.1 State and Federal Fire Protection

4.5.1.1 Montana Department of Natural Resources and Conservation

Lewistown Northeastern Land Office
406-538-7789

Available Resources:

Aircraft:

- Recon flights available with a County Fire Advisor if warranted and weather conditions permit
- Retardant aircraft available if warranted and weather conditions permit

Ground Resources:

- 15 programmable King portable radios
- 50-person mobile fire cache
- Mobile command trailer
- DSL-376 4x4 1-ton flatbed
- DSL-353 ½ ton 4x4 pickup
- DSL-838 ½ ton 4x4 pickup
- DSL-842 ½ ton 4x4 pickup
- DSL-919 ½ ton 4x4 pickup (IC for CAT team)
- DSL-257 ½ ton 4x4 pickup (IOFR for CAT team)

4.5.1.2 Bureau of Land Management

The Central Zone's fire suppression/operations resources are based in Lewistown at the Central Zone Fire Complex located at the Lewistown Airport, and the Little Rockies Fire Station located just north of Zortman, Montana.

In addition to BLM lands, the Central Zone is also responsible by agreement for initial attack on USFS lands in the Big and Little Snowy Mountains (Musselshell & Judith Ranger Districts). We also provide initial attack on wildland fires, under offset agreements for parts of Blaine, Phillips and Valley Counties. Lewistown Interagency Dispatch (LID) will be responsible for all IA dispatching functions.

BUREAU OF LAND MANAGEMENT - LEWISTOWN FIELD OFFICE						
Airport Road, PO Box 1160		**Dispatch email address** - mtled@dms.nwcg.gov				
OFFICE:		PHONE #	FAX #	2nd PHONE #		
Main Office		538-7461	538-1904			
Dispatch Office		538-1972	538-8200			
Zortman Station		673-3337	673-3556	673-3389		
BLM LEWISTOWN FIRE OFFICE:						
303 E. Aztec Drive						
Centrall Moontana Fire Staff:				PHONE #	CELL #	FAX #
Mitch Maycox	Fire Management Officer			538-1986	350-0370	
Bob Bahr	Fire Operations Manager			538-1975	350-0371	
Steve Knox	Fuels Specialist			538-1976	350-0219	
Shannon Bonney	Center Manager			538-1973	350-0372	
Fonda Knox	IA/Aviation Dispatcher			538-1992	350-0373	
Jay McAllister	Lewisotwn Station Manager`			538-1984	350-2124	
Kyle Cowan	Zortman Station Manager			673-3337	366-9868	
Jonathan C Edwards	**District Ranger**			**538-1939**	**350-1045**	**538-1941**
U. S. Department of Interior Bureau of Land Management: Montana State Office						
William A (Bill) Duncan	State Ranger			896-5151	855-5097	896-5291
Lewisotwn Inter agency Dispatch Center (LIDC) Fire Reporting After Hours:						
Fie Season (June through September) hours for LIDC are 7 days a week 0700 - 1800 Off season (October through May hours are Monday throught Friday 0700 - 1700						
Main business line for LIDC				**538-1972**		
Fire Report Line				**538-9488**		
From June through September these lines are forwarded at night to the "On Call Dispatcher". These lines maybe forwarded during the off season if condition warrrant.						
If no contact at above numbers please contact a person below in order of listing:						
Shannon Bonney		Center Manger		350-0372cell		538-2540 (Home)
Fonda Knox		IA Dispatcher		350-0373 cell		538-9203 (Home)
Bob Bahr		AFMO		350-0371cell		538-7650 (Home)
Jay McAllister		LWT Station Mgr		350-2142 cell		538-2393 (Home)
Ken Schmid		Helitack Mgr.		350-2143 cell		538-6525 (Home)
Kyle Cowan		Zortman Station Mg.		366-9868 cell		654-4833 (Home)

The current list of resources includes:

- Zone FMO
- Zone AFMO
- Lewistown FOS
- Zone Warehouse Manager
- Helicopter Module (7 person)
- Single Engine Air tanker Manager
- 1 type 4 Engine w/ 7 person crew
- 3 type 6 Engines w/ 5 person crew

- 1 type 1 water tender w/ 2 person crew
- 1 exclusive use Air Attack platform w/collateral duty or detailed ATGS
- 1 CWN Single Engine Air tanker as needed
- 1 exclusive use Type III helicopter (mid July-September)
- Personnel – 36

Additional resources located in Zortman, Montana:

- Zortman FOS
- 1 type 4 Engine w/ 7 person crew
- 2 type 6 Engines w/ 5 person crew
- Personnel – 18

4.5.1.3 US Fish & Wildlife Service (Charles M. Russell NWR-Sand Creek Resources)

Item	Year Purchased	Number	GVW
Engine Type			
4x-heavy (500-1000 gal)	1997	1	25,000/32,000
6x-medium (200-400 gal)	1990, 2000	2	12,000/15,000
7x-light (50-150 gal)	2002	1	12,000/15,000
Slip-on units	N/A		
Water Tenders	N/A		
Portable Pumps			
Standard	1995-1999	2	
Float-a-pump	1997-1999	1	
Power Saws	Various	4	
Graders	2003	1	
ATVs—4 wheel	2004	2	
Radios			
Narrow band portable	1996-2000	20	
Narrow band mobile	1996-2000	15	

All engines are outfitted with the required minimum gear to support local fire operations. The Refuge has six Type 6 engines and one Type 4 engine. These engines are outfitted with a full accompaniment of equipment as outlined in the WNCG Fireline Handbook (PMS 410-1) and the Northern Rockies Coordination Group interagency standards for Type 4 & 6 engines in this geographic area.

The USFWS (CMR Sand Creek Resources) also has 6 seasonal Firefighters along with Paul Pallas, AFMO and Ben Pratt, Supervisory Range Tech at Sand Creek.

4.5.2 Rural Fire Districts

4.5.2.1 Cheadle Volunteer Fire Department

Available Equipment List:

- 1,000 gallon water tender
- 500 gallon tank w/ sprayer x2

- 600 gallon engine
- 200 gallon engine
- 300 gallon engine
- 400 gallon power wagon
- 300 gallon slip on x3
- 300 gallon trailer
- 200 gallon engine (State owned) – Located at Ayers Colony

4.5.2.2 Coffee Creek Volunteer Fire District

Available Equipment List:

- 400 gallon engine

4.5.2.3 Beaver Creek – Cottonwood Volunteer Fire Department

Available Equipment List:

- Type 6 engine

BEAVER CREEK / COTTONWOOD	
Larry Gatz	538-9895
Randy Barta	538-7319
Bob Olsen	538-5543
Pat Patterson	538-2698
	538-3112

4.5.2.4 Moore Rural Fire District (Consolidation)

Available Equipment List:

- 200 gallon slip on (DNRC) – Located at Spring Creek Colony

4.5.2.5 Denton Volunteer Fire District

Available Equipment List:

- 1250 GPM engine w/ deck gun & 300 gallon booster tank (City only)
- 200 gallon engine (State owned) – Located at Everson Bench
- 300 gallon engine
- 600 gallon engine
- 1,200 gallon water tender
- 1,800 gallon water tender w/ 1,500 gallon port-a-tank

4.5.2.6 Grass Range Volunteer Fire District

Available Equipment List:

- 300 gallon engine
- 750 gallon engine

4.5.2.7 Grass Range Rural Volunteer Fire District

Available Equipment List:

- 1,000 gallon tender 6x6
- 250 gallon engine – Located at N Bar Ranch
- 300 gallon BLM slip on unit – Located at Stanley's
- 200 gallon engine (State owned)

4.5.2.8 Heath Rural Fire District

Elton Owens, Chief
5228 S McDonald Creek Road
Lewistown, Montana 59457
406-538-9812

District Summary: We have a lot of different terrain within our district, the south side borders the national forest, with private forested land and grass. The north side has some subdivision and more residents. Two DNRC fire engines are stationed at the Heath Fire Hall. Two other units are placed within the district. All fire personnel are volunteer.

Priority Areas:

Residential Growth: Most growth within our district will be within the subdivisions with some new real estate sales adding more residents.

Communications: All fire vehicles have radios, terrain causes some communication problems.

Fire Fighting Vehicles: Aging equipment is a problem, vehicles should be upgraded.

Burn Permit Regulations: Permits are issued from the sheriffs office with the okay from the district chief.

Other: We are strictly wildfire capable, with exterior structure protection.

Effective Mitigation Strategies: We continue to struggle for funding of our needs to upgrade and keep pace. The district is subscription funded so money is tight.

Education and Training: New volunteers have received basic training and some have intermediate.

Cooperative Agreements: We have mutual aid agreements with districts inside Fergus County as well as adjoining Counties.

Available Equipment List:

- 1971 Ford F250 4x4 250 gallons, wajax 31 at 350 psi
- 1975 Dodge (DNRC) 500 4x2 250 gallons, wajax 31 at 350 psi
- 1984 Chevy (DNRC) 1 ton 4x4 250 gallons, wajax 31 at 350 psi
- Dodge ¾ ton 300 gallons, Honda

Future Considerations: As our district continues with slight growth we will struggle with funding. We hope to qualify for some grants in the future. Young volunteers are difficult to find for fire fighters.

Needs: Our immediate needs will be to replace one vehicle and for maintenance of some equipment. We also have need for pagers. Hopefully, some of the grant money regulations can be used for equipment because its difficult to come up with matching funds for the new.

HEATH RURAL FIRE DEPARTMENT

Elton Owens, Chief	**Pager 363**		**538-9812**
If no ans. at home or pager for a message relay call:			
Josie Lancaster:	**Cell Phones**	**350-1557/7545**	**538-5527**

Call Tree: For Initial Attack

Jen Collins	538-9525	Bobbie Rouns	538-3917	Josie Lancaster	538-7545
Bobbie Rouns(1st call	538-3917	Josie Lancaster:	538-7545	Jan Collins	538-9525
Josie Lancaster:	538-7545	Jan Collins(she calls	538-9525	Bobbie Rouns	538-3917
Jen Calls the following:		Bobbie Calls the Following:		Josie Calls following	
Elton Owens, Chief	538-9812	Kevan Comes	538-9016 @ 350-9016		
John Collins	538-9225	Sonny Comes	538-3508	Gary Lancaster	538-7545 - 350-1557
Joe/Barb Stolz	538-3985	Cathy Dvorak	538-3865 Ron 8361	Kim Ross	538-9062
Ray Feller	538-5538	Dean Barkhoff	538-2652	Paul Jensen	538-7173
Pat Weidhel	538-6079	Bill Smart	538-7262	Joel Barber	538-3518 W 538-2379

Other Fire Fighters:

Burleigh, Rick		538-7740
Bursheim, Wayne	538-3019	538-7885
Holst, Terry	538-5335	
Merkel, Jeff	538-8801	538-4356
Montgomery, Tom		538-8638
Pangburn, John		538-7509
Petersen, Vern		538-8612
Rouns, Harlie		538-3917
Smith, Butch		538-9321
Steele, Tom		538-7861
Westburg Alb.		538-2186
Williams, John		538-7342

EQUIPMENT:

Trucks:	Location:		
1971 Ford 4X4 250 gal. Wajax 31 pump	Elton Owens	538-9812	
1975 Dodge 2X4 500 Gal. Wajax 31 pump	Fire Hall	DNRC Truck	
1984 Chevy 4X4 250 gal. Wajax 31 pump	Fire Hall	DNRC Truck	
(No Date)Dodge 4x4 300 gal. Honda pump	Gary Lancaster	538-7545	Alaska Bench
(No Date) Chevy 4X4 300 gal. Slide-in Unit	Kevin Comes	538-9016 350-9016	

HEATH FIRE DPT. EQUIPMENT	**Location**	
D4 Cat	**Elton Owens**	**538-9812**
D7 Cat	**Gary Lancaster**	**538-7545**
John Deere Dozer 550 C	**Kevin Comes**	**538-9016 350-9016**
Water tender	**Mike Jensen**	**538-7013**

HEATH FIRE DISTRICT BOARD:

VERN PETERSEN		538-8612
KEVAN COMES		538-9016
HARLEY ROUNS		538-3917
GARY LANCASTER		538-7545
JILL OWENS		538-9812
ELTON OWENS	HC 87 BOX 5410 LEWISTOWN	538-9812

4.5.2.9 Hilger Rural Fire District

Dick Hassler, Chief
5857 N Kendall Road
Hilger, Montana 59451
406-538-8648

District Summary: Truck #1 stationed at the Kendall Min in N. Moccasin Mtns. Truck #2 stationed at the Deefield Colony. This is our western boundary. Trucks #3 and #4 are stationed at the fire hall in Hilger. Truck #5 stationed 2 miles north of Hilger.

Priority Areas:

Residential Growth **–** few residences in Judith Mountains
*Communication**s*** – 10 -15 regualr firefighters w/ pagers and handheld.
Fire Fighting Vehicles - All trucks have mobile radios. Also have 5th wheel trailer stationed on the north end of Moccasin Mountains on western boundary for water tender (Capacity of 1,000 gallons, 3.5 HP pacer high volume pump on board.

Education and Training: Attend basic intermediate wildland course when offered. Also attend 4 hour safety class every spring. Conducted 2 practice burns in Spring 2004.

Cooperative Agreements: Mutual aid with all other 12 districts in Fergus County.

Available Equipment List:

- 1952 Chevy 1 ½ ton Type 4 500 gallons, 250 gpm
- 1980 Chevy ¾ ton Type 6 200 gallons, 150 gpm
- 1980 Chevy 1 ton Type 6 350 gallons w/ foam, 125 gpm
- 1974 Chevy 1 ½ ton Type 6 1,000 gallons, 125 gpm
- 1979 Chevy ¾ ton Type 6 200 gallons, 125 gpm

Needs: More equipment, tender to be stationed at Hilger working on a plan to station a truck at Maiden, the highest risk area in our district.

HILGER FIRE UPDATED 8-4-04

Names in Purple are the first three contacts:

HILGER FIRE Dept. PAGER 414	*pager - ** radio	PHONE #	CELL #
**Chief Dick Hassler		538-8648	350-1746
** Ass. Chief DIRK HASSLER	400 GALLON TANK	538-4019	350-1451
FRED HASSLER (Sec)	300 GALLONS	538-3559	
	** GREG WICHMAN	538-5686	350-2676
** JOHN MCBURNEY		538-7582	

Truck #1 Chev.1952 500 gal - 150 booster hose reel - 200 1 1/2" hose
Truck #2 Chev. 1981 1 ton w/350 gal Type 6 w/radio - radio - foam - at Hilger
Truck #3 duel w/rad -w/foam
1980 1 ton Dulley Chev. 300 GALLONS 150' 1" boosterline 4star pump
Truck4 w/rad100' 1" boos line
1974 2 1/2 ton 1000 GALLONS
Truck5 Hassler's w/held rad 200 GALLONS 50' l1/2 " line 2" irrig. pump

RESPONDRS / EQUIPMENT BY AREA

HILGER:	EQUIPMENT	PHONE #	CELL #
* LEWIS HARRELL		538-2995	
* GERRY HINZ		538-7113	350-0805
* DON SIMMONS		538-3115	366-1791
JERY VAN HAUR	300 GAL TANK	538-9767	
ANDY VAN HAUR	DISK	538-9767	
GUY MABERRY	500 GAL TANK	538-3634	
BRYAN BAWDEN		538-2739	
STEVE GILPATRICK	200 GAL. TANK	538-8831	
DAN HARRELL		538-5679	
CHUCK/CHRIS YAEGER		538-8663	
MIKE MCREYNOLDS		538-7848	
MIKE SWEENEY		538-3547	
SCOTT SWEENEY		538-7218	
TIM GILSKEY		538-8602	
TERRY GILSKEY		538-3121	

CHRISTINA:	EQUIPMENT	PHONE #	CELL #
** GAYLE ARNTZEN		462-5553	350-1590
DOUG ARNTZEN	1000 GAL TANK	462-5553	350-5553
KEITH ARNTZEN	DISK	462-5557	350-5557
BILL BUTLER		462-5500	
TOM BUTLER		462-5551	
DAVID BUTLER		462-5689	
JIM GREEN	DISK	462-5630	
ALAN SHAMMEL		538-8686	
JERRY VAN HAUR		538-9767	
CURT ROYCE		462-5556	
JIM FORAN		462-5698	
DUSTY PHILP		462-5570	
WADE WARNEKE		462-5588	
TODD FORAN		462-5566	

BROOKS OR CHRISTINA AREAS SEE HILGER

Hilger Truck #2 will be at Deerfield Colony Dave Stahl - 538-7824

RESP & Eup by area	N. OF Hilger - Pg # 373(Winfred)		
Moulton, Christina, Plum Ck Area		PHONE #	CELL #
JOHN WICKENS		462-5618	
ROGER BERG		462-5643	
PAT FORDYCE		462-5611	
NOLAN BARRETT		462-5532	
BROOKS - JUDITH RIVER			
DEERFIELD COLONY	Truck2 w/rad 1981 Chev.	350 GAL.	
100' -I" booster line		538-7824	350-1058
LYLE GRINDHEIM		538-3548	
**BILLY K SNAPP		538-5926	350-5927
BRIAN SNAPP		538-2666	350-4040
DAVE SNAPP		538-3539	
JERRY VOGL	1000 Gal tank	538-9409	350-3098
FRED COLVER JR	Honey wagon	538-2153	
ELDON FOSTER	1500 Gal Tank	538-9894	
JIM PHILLIPS	Watertank	538-5557	
WES PHILLIPS		538-8377	
JOHN SRAMEK		538-8809	
DAVID VANEK		538-9825	
LEON VANEK		350-3513	350-0052

2000 gal water tank by Carters Pond by race track by Calver's

MAIDEN:			
DALE PLOYHUR		538-8285	
JERRY HANLEY		538-2420	
PETER MICKELSON		538-9731	
DON DANELL	300 Gal tank	538-5622	
ALAN FOLDA	Watertank	538-8619	350-3537
ROY KOCH		538-5216	
PHILLIP KOLAR		538-7370	
CURLY OLSON		538-5818	
RAY SEBEK		538-8355	
GREG MENGE		538-5800	366-3806
PAT HENRY		538-3430	

PLUM CREEK			
ON PLUM CREEK ROAD	1000 GAL TANK		
PAT BROWN	Cat/Blade-1000 gal on flat bed	462-5604	350-5604
CURT HARTMAN		538-7004	350-7004
DAN HARTMAN	Sprayer	538-7213	
JOE SRAMEK		538-9792	
DOUG MULLANS		538-2870	

OTHER RESOURCES			
BOLD FEEDLOT	2 Watertruck	462-5522/462-5523	
HARVEST STATES		538-7879/538-6780	
PORTABLE OUTHOUSES ON TRAILER AT HILGER			
KENDALL CHUCK	Tender Trailer Tank 300 Gal		538-7857
1500 GAL PORTABLE TANK		538/2501	
RUCKMAN	300 W/TANK PUMP 100 FT Hose		
Float pump ON TRUCK #3 AT HILGER			

Truck #2 Chev. 1981 1 ton w/350 gal Type 6 w/radio

4.5.2.10 Lewistown City Fire

Available Equipment List:

LEWISTOWN FIRE DEPARTMENT Resource List (Revised 7/21/04)	
UNIT-1: 2000 MERCURY Mountainer COMMAND VEHICLE	5 passenger, 4x4, auto-transmission, Motorola 16 channel radio, Code 3 siren
UNIT-2: 2000 Chevrolet Impala	Staff car equipped for emergency response w/ radio
ENGINE 2: 1995 PIERCE SABER, Type I Structure Engine	1250 GPM pump, 750 gallon water tank, 8.7 liter Detroit Diesel, 6 passenger enclosed cab, Motorola 16 channel radio, Federal siren system, 4 SCBA seats 28ft extension ladder, 16ft roof ladder, 8ft combo ladder walk-thru pump panel
ENGINE 3: 1976 PIERCE Type I Structure Engine	1000 GPM, 750 gallon water tank, Ford chassis, 210 Catipillar Diesel, Motorola 16 channel radio, Federal siren, 5 passenger cab, 24ft extension ladder 14ft roof ladder, 10ft attic ladder, 2 hose reels with 1" booster line
LADDER-4: 2001 SMEAL Structure Engine/Ladder	1500 GPM pump, 75ft ladder, Spartan chassis, Cummins Diesel, 6 passenger cab, Motorola 16 channel radio, Code 3 siren, 35ft extension ladder, 28ft extension ladder, 14ft extension ladder, 20ft roof ladder, 16ft roof ladder, 10ft attic ladder
COMMAND ONE 1992 WINNEBAGO	Command vehicle with radio / rehab capabilities

Future Considerations: The Lewistown Fire Department and the Lewistown Rural Fire District will continue to improve equipment, training, apparatus, and prevention.

Needs: The Lewistown Fire Department is in desperate need of additional full paid and part paid personnel, a training center and equipment upgrades and rotation as indicated before.

Table 4.3. LEWISTOWN FIRE/RESCUE Personnel Resources (Revised 7/21/04).

Primary Contacts:				
Fire Chief William Rash	538-3411	538-2415	366-1372	EMT-B
A Chief Dale Link	538-3411	538-8302	366-3001	EMT-B
Captain Jason Manley	538-3411	538-7008	366-7008	EMT-B
Lieutenant Keith Kucera	538-3411	538-7272	366-7272	EMT-B
Firefighters				
Wade Kurns	538-3411	538-2484		EMT-B
Joe Ward	538-3411	538-7219		EMT-B
Mike Davis	538-3411	538-6857		EMT-I
Anthony Moline	538-3411	538-5737		EMT-B
Bret Ophus	538-3411	538-7523		EMT-B
Jimmy Jensen	538-3411	538-2757		EMT-B
Nick Plavonic	538-3411	538-0179		EMT-B
Albert White	538-3411	538-5312		EMT-B
Claude White	538-3411	538-5923		EMT-B
Mike Dow	538-3411	366-6426		EMT-B
Brian Godbey	538-3411	538-2844		EMT-B

Table 4.3. LEWISTOWN FIRE/RESCUE Personnel Resources (Revised 7/21/04).			
Dom Olivo	538-3411	538-4773	FR
Jeff Howard	538-3411	538-9936	EMT-B
Don Pyrah	538-3411	538-9241	EMT-B
Angus Rindal	538-3411	538-7209	EMT-B
Luke Berg	538-3411	350-1117	

4.5.2.11 Lewistown Rural Fire District

William D. Rash, Jr, Chief
406-538-3411
brash@lewistown.mt.us
305 West Watson
Lewistown, MT 59457

District Summary: The Lewistown Fire Department consists of approximately 5 square miles of industrial, commercial, and residential structures. The Lewistown Fire Department has primary jurisdiction for fire, rescue, and hazmat responsibilities within the City of Lewistown. The Lewistown Municipal Airport and approximately 2100 acres of open wildland area are included within the City of Lewistown. The City of Lewistown has a population of approximately 6,000 people.

The Lewistown Rural Fire District contracts with the Lewistown Fire Department for fire, rescue, hazmat and associate administrated responsibilities. The resources of the Lewistown Fire Department and the Lewistown Rural District are combined to use for fire/rescue incidents that occur within the City and the District as well as for mutual assistance requests. The Lewistown Rural Fire District consists of approximately 156 square miles of land with a population of approximately 2500 people. For all practical purposes, the term Lewistown Fire Department shall include the resources of the Lewistown Fire Department and the Lewistown Rural Fire District.

The Lewistown Fire Department operates out of one fire station that is located in Lewistown. The Lewistown Fire Department is responsible for all wildland and structure firefighting as well as rescue and hazmat incidents that occur within the City and District. The Lewistown Fire Department has a staff of seven full-time firefighters and eighteen part-paid firefighters. The District borders several areas of BLM and DNRC land and is involved with a county mutual assistance agreement as well as agreements with BLM and DNRC.

The Lewistown Fire Department provides initial attack to all fire incidents with the City and District and would request the assistance of the BLM to handle larger and more complex wildland incidents after expending all other mutual assistance resources.

Priority Areas:

Residential Growth: The City is experiencing minimal growth. The District is experiencing moderate interface growth south of the City in the Spring Creek area as well a subdivision development northwest of the city.

The District currently does not have a fire prevention/awareness program, but will be implementing such during this next fiscal year.

Communications: Communication capabilities in our City and District are adequate. A recent grant will potentially correct this deficiency not only in our jurisdiction, but countywide.

Fire Fighting Vehicles: Firefighting apparatus for the City is adequate with the exception of a need for one type 6 engine to handle wildland fires within the City's open space around the airport. Firefighting apparatus for the District is adequate, but is aging and we are experiencing problems with the water tanks on the tenders. The District has submitted a fire act grant for a large pumper/tender to provide greater pump and tank capacity with less manpower. The District is also in need of a second type 6 engine as our interface problem continues to grow with construction of homes within the District.

Burn Permit Regulations: The City does not allow any burning within City limits. Fire permits are issued to residents within the District when proper conditions allow. It would be preferred if fire permits could be better controlled on a county-wide basis, but this is difficult due to the size and geographic features of Fergus County.

Effective Mitigation Strategies: The Lewistown Fire Department is working to keep up with ever increasing responsibilities. Based on the lack of resources, the Lewistown Fire Department does not have adequate resources to properly staff the department or to create a realistic capital improvement plan that would include the upgrade and rotation of equipment and foremost, a proper training facility. A capital improvement plan will be presented to the City and the District next fiscal year, but the reality of inadequate resources to fund these improvements must be considered.

It is vitally important that Fergus County implement a planning process that would include affected fire districts so that roads, fillsites, etc. can be addressed and "checked off" before approval of construction or subdivision approval. This has been successfully accomplished in many counties throughout Montana, but it appears that Fergus County is reluctant to include county fire districts in the process.

Education and Training: The Lewistown Fire Department continues to emphasize the importance of training as related to our duties. The Lewistown Fire Department has an open invitation for county fire departments to attend our training sessions and would like to see more mutual assistance training with all agencies. The Lewistown Fire Department has offered to assist in training other departments in structural firefighting, however, most county fire districts do not currently provide structure protection and to my knowledge, do not plan to.

The Lewistown Fire Department has a comprehensive fire education program and will be extending the program to District residents next fiscal year.

Cooperative Agreements: The Lewistown Fire Department is a participant of the Fergus County Mutual Assistance agreement which extends into the County Cooperative agreement with the DNRC. We feel that we have good working relationships with all participants, but we will be working to enhance these relationships.

Available Equipment List:

LEWISTOWN RURAL FIRE DISTRICT Resource List (Revised 7/21/04)	
Engine 5 1985 IH Pierce Pumper Type I Structure Engine	750 GPM pump, 300 GPM CPK pump, 500 gallon water tank, 466 International diesel motor, 2 passenger cab, Motorola 20 channel radio, Code 3 siren system, 24 ft extension ladder, 14 ft roof ladder, 16 ft Little Giant combo ladder, 10 ft attic ladder, 2-3/4" booster reels, 20 ft hard suction
Tender 6 1989 IH, Smeal Water Tender	475 GPM Pump, 1500 gallon water tank, 466 International diesel, 3 passenger, Motorola 16 channel radio, Code 3 siren system, 28 ft extension ladder, 18 ft roof ladder, 2100 gallon fold-a-tank ¾" booster line

LEWISTOWN RURAL FIRE DISTRICT Resource List (Revised 7/21/04)	
Rescue 7—2002 Ford, Rescue/Structure Engine	500 GPM pump, 300 gallon water tank, 2-20 gallon foam cells with foam inductor, Ford chassis, 3 passenger cab, 16 ft extension ladder, Motorola 20 channel radio, Extrication equipment
Tender 8—1979 IH Water Tender	300 GPM CPK Pump, 466 Detroit Diesel, 2000 gallon water tank, 2000 gallon porta-tank, 3 passenger cab, Motorola 16 channel radio, Federal siren system, 200 ft ¾" booster reel
Tender 9—1980 IH Water Tender	300 GPM CPK pump, 1200 gallon water tank, 466 Diesel, 2 passenger cab, Motorola 16 Channel radio, Federal siren system, 2100 gallon fold-a-tank, 200 ft ¾" booster reel
1991 Dodge 1 ton Type 6 Wildland Engine	3 Passenger cab, Bendix King Radio, Federal Siren System, Code 3 Light Bar, Fiberglass Utility Box. Slip in firefighting unit w/200 gallons of water
Haz-Mat Trailer	Wells Cargo single axel, Chlorine kit, complete line of absorbent pads and pillows, level B misc. Four haz mat technicians on staff currently.

4.5.2.12 Moore Volunteer Fire Department

Available Equipment List:

- 750 gpm structure engine

4.5.2.13 Moore Rural Fire District

Available Equipment List:

- 700 gallon 6x6 (State owned)
- 300 gallon Type 6 Brush Trucks x4
- 3,000 gallon water tender
- 20 channel handhelds x16

Moore Fire Engines and Equipment:

Truck #1 300 gal Type 6 Year 2004 at Moore
Truck #2 250 gal Type 5 Year 1973 at Moore DNRC
Truck #3 400 gal Type 6 Year 1988 King Col.
Truck #4 250 gal Type 6 Year 1986 Sprin Ck Col.
Truck #5 250 gal Type 6 Year 1976 Leo Majerus in Moore in the winter
Truck #6 250 gal Type 6 Year 1988 Jammie Gilbert in Moore in the winter
Truck #7 750 gal pumper Year 1975 in Moore

GARNEILL, AREA

BRADLEY, RUSS	374-2312	**ATTENTION:** Garneill is out of our Fire District and do not have coverage by
BRIGGS, RON	374-2257	Moore FD. They can call in their requestfor Fire Permit, but must notify their
PAGE, STEPHEN	374-2426	immediate neighbors that they are burning so someone has water/hose near by.

MOORE contacts: call in order	PHONE #	OFFICE	Updated: 8-11-02 by Jerry Simpson
MRFD - Box 81 Phone # 374-2482	First contacts in Purple		
FIRE CHIEF - RON MARTIN	855-2050	374-2481	NOT ALWAYS HERE
ASST. CHIEF- WILLIE ESTES	374-2224	374-2526(w)	DANVERS AREA
SIMPSON, JERRY (RF)	374-2280	374-2480	RAY LINHART 538-7853
	374-2330		* RUSS SLIVKA 538-3934
OFFICE BAR	374-2441		DAVID MORRIS 374-2488
CENEX- MOORE FARMER'S OIL:	374-2555	374-2555	BRUCE PESTER 538-3749
DEAN BERG (Leut.)	374-2447	374-2555(W)	* JERRY SIMPSON 374-2280
DICK BROTTEM (Captain)	374-2496	Best daytime	* - ** STEVE WALTER (Captain) 538-3575
STEVE MCNEE	374-2421	contact	* JOHN HOFER 538-9835
AGRIBASICS:	374-2528	Fire Fighters with training hours covered by Workmen Comp	
MANAGER RYAN HOLT(WATER SUPPLY)	538-7085	Moore	Dean Berg 374-2447
ASST MGR. - TERRY BARTELT	374-2385	Moore	Richard Brottem 374-2496
PEAVEY	374-2526	Moore	William Estes 374-2224
MOORE SCHOOLS: CALL FOR	374-2231	South Moore	Jamie Gilbert 374-2205
FIRE EXTINGUISHERS		South Moore	Steve Hertel 374-2430
MOORE CALL DOWN: ** RADIO & PAGER - * PAGER		King Col.	John Hofer 538-9835
BRICKER, CHUCK	374-2316	King Col.	Marvin Hofer 538-9835
HORAN, DAN	374-2514	King Col.	Samuel Hofer 538-9835
NELSON, GARY	374-2479	King Col.	Toby Hofer 538-9835
THOM, MIKE	374-2422	King Col.	Wesley Hofer 538-9835
CRYSTAL LAKE ROAD AREA:		South Moore	Dan Horan 374-2514
MORRIS, STEVE	538-3231	Denton	Raymond Linhart 538-7853
NORTH OF MOORE - ROSS FORK AREA		Denton	Ryan Linhart # 538-7853
BROTTOM KEN(RF)	374-2377	Denton	Leo Majerus 538-8849
SIMPSON, JERRY (RF)	374-2280	Moore	Ron Martin 855-2050
WEINHEIMER, K (N)	374-2322	Moore	Brandon Morris 374-2701
WICHMAN, ED (NF)	374-2468	Moore/Denton	David Morris 374-2488
SOUTH OF MOORE		Moore	Bruce Pester 538-3749
HERTEL , KARI	374-2339	South Moore	Tyler Seifert 374-2327
NELSON, MELVIN	374-2264	Moore	Jerry Simpson 374-2280
SOUTH WEST OF MOORE		Moore	Katrina Simpson # 374-2280
HICKEY'S RANCHES	374-2335	Denton	Russel Slivka 538-3934
WEST OF MOORE		Denton	Tom Tucek 538-8690
TYLER, MIKE	374-2458	South Moore	Todd Tyler 374-2225
TYLER, PAUL	374-2253	Spring Col	Eli Walter 538-2716
TYLER, TODD	374-2225	Spring Col	Ken Walter 538-6737
BUFFALO AREA		Spring Col	Steve Walter 538-6737
ASKINS, VIC	374-2379	Moore	Clarence Weinheimer 538-4832
MATTHEWS, FRED	374-2240	Moore	Keith Weinheimer 374-2322
PETERSEN, R. SR.	374-2297	NOTICE:	LPG: Bill Martin 538-5892 He has a water supply.
PETERSEN R. JR	374-2403	Peavey:Terry Bartett is the Peavey Manager, Bill Estes Peavey # 374-2224	
PHILPOTT, MERVIN	374-2213	Burn Permits	Have the people call the co-op at Moore 374-2555 to give info on
SWANSON LES	374-2218	the burn the coop will log the info there. any after hrs:DICK BROTTOM 374-2496	

No Bunker Gear all other are equip. w/ BG.

All names in blue have full Wildland Fire PPE.

4.5.2.14 North Fork Flatwillow Volunteer Fire Department

Chief: Ted Allison

HC 88 Forest Grove. MT 59441

406-428-2287

Available Equipment List:

- 1978 American 4x4, type 6, 250 gallon, 55 gpm @ 200 psi
- 1959 International 6x6, type 3, 1,000 gallon, 55 gpm @ 200 psi
- 1976 Chevrolet 4x4, type 6, 250 gallon, 55 gpm @ 200 psi

4.5.2.15 Roy Volunteer Fire Department

Available Equipment List:

- Ford diesel 250 gallon engine
- 200 gallon slip on (BLM loan)
- 1969 Ford 300 gallon engine
- 1984 GMC 300 gallon engine
- 500 gallon structure/brush engine (State owned)
- 2,000 gallon tender w/250 GPM pump
- Ford F-600 w/ 2 300 gallon tanks and pump

4.5.2.16 Surenuff Volunteer Fire Department

No equipment

4.5.2.17 Winifred Volunteer Fire Department

WINIFRED RURAL FIRE DEPARTMENT:			PAGER 373 Updated 8-10-04		
PAGE FIRE THEN CALL WINIFRED FAMERS OIL				462-5428	
# RADIO		TYPE ENGINE	LOCATED		
* PAGER					
** LES SIVKA	CHIEF				
** TREVIS BUTCHER	ASST. CHIEF				
UNIT 1 TYPE 6 - 300 Gal.	SLIVKA'S 5MI NW OF WINIFRED		Unit 6 Type 6 - 200 Gal Bold's 7mil SE of		
RESPONDERS FOR UNIT 1:	1990 Chev Dully 1 Ton		Winifred - 1969 Internat. 3/4 Ton		
*# LES SILIVKA	426-5347		*# TREVIS BUTCHER		462-8000
*# SHANE SLIVKA	462-5474		* CASEY PHILP		462-5302
# WESTON HINMAN	No Phone # given				
*# TJ STULC	462-5405		Unit 7 Type 6 - 300 Gal. PN Ranch 22		
* DARYL SMITH	462-5661		Mil NW of Winifred - Slide in owned by		
# MIKE SCHMITT	462-5489		Dept. on privately owned 3/4 Ton Truck		
*# MATT WICKENS	462-5612		*# Shawn Allen		462-5540
			Ron Hall		462-5508
UNIT 2 Type 6 - 200 Gal.	OBIE'S 15 MI NE OF WINIFRED				
RESPONDERS FOR UNIT 2	1977GMC Dully 1 Ton				
* # DON OBIE	462-5529				
* # STEVE KNOX	462-5525				
*# JON BERG	462-5606				
* DAVE BERGUM	462-5693				
UNIT 3 Type 6 - 200 Gal.	BERG'S 15 MI S OF WINIFRED				
RESPONDERS FOR UNIT 3	1975 Dodge 3/4 Ton				
*# ROGER BERG	462-5643				
* # JOHN WICKENS	462-5618				
ERIC WICKENS	462-5376				
JASON WICKENS	462-5618				
UNIT 4 Type 6 - 300 Gal.	IN WINIFRED				
RESPONDERS FOR UNIT 4	1985 GMC 1 TON				
*# TERRY ECONOM	462-5483				
# TRAVIS WILLSON	462-5637				
* JOE DeMARS	462-5335				
BOB KNOX	462-5488				
MATT KNOX	No Phone # given				
GAROLD JOHNSTON	462-5687				
DALE SMITH	462-5608				
CHRIS NORSKOG	462-5416				
UNIT 5 - Type 6 - 600 Gal.	at Barrett's 7mil S of Winifred				
Privately owned	1970 2 WD Dully 1 Ton				
Barrett's 7mi s. of Winifred					
* NOLAN BARRETT	462-5532				
PRIVATELY OWNED EQUIPMENT:					
GARALD JOHNSTON WATER TRUCK 3000 GAL 462-5687					
DARYL SMITH Water Truck 1000 gal - TD 18 dozer;Road Patrol					
462-5661					
LES SLIVKA water truck 1500 gal 462-5347					
BOB BOLD WATER TRUCK 1500 GAL-D6 cat & Grader 462-5522					
JOHN WICKENS: D6 Cat - 462-5618					
Dale Smith: Road Patrol 462-5608					

Available Equipment List:

- Type 6 300 gallon engine w/ Blizzard Wizard
- 200 gallon engine (State owned)
- 500 gallon structural engine, 500 gpm (City only)
- Type 6 300 gallon engine
- 200 gallon engine
- 1 ton 2wd, 700 gallon engine

4.5.2.18 Fergus County Support Equipment

Table 4.4. Fergus County Road Department Contact Information.

Name	Position	Home Telephone
Joe Foran	Superintendent	428-2156
John Anderson	Lewistown Dist Mng	538-7339
Dan Horacek	Supervisor - Roy Dist	464-7351
Ronald Nelson	Supervisor - Grassrange Dist	428-2365
Grover Roe	Supervisor- Denton Dist	567-2517
Bob Wherley	Supervisor - Winifred Dist	462-5482
Linda Bradley	Secretary	538-7183

Table 4.5. Fergus County Road Department Available Equipment.

Equipment Number	Type of Equipment	Channels	Year Purchased
333	Loader	2	Old
347	Loader	4	2003
357	Grader	2	Old
359	Grader	2	Old
365	Backhoe	4	2003
366	Grader	2	Old
367	Grader	2	Old
368	Grader	2	Old
369	Grader	2	Old
372	Grader	2	Old
373	Grader	2	Old
378	Tractor		
379	Tractor	4	2001
390	Tractor	4	2001
382	Loader	4	2001
8-030	Trucks	4	2002
8-035	Trucks	4	2002
8-106	Trucks	4	2002
8-131	Trucks	4	2002
8-140	Trucks	5	
8-190	Trucks	2	
8-201	Trucks	4	2003

Table 4.5. Fergus County Road Department Available Equipment.

Equipment Number	Type of Equipment	Channels	Year Purchased
8-202	Trucks	2	
8-212	Trucks	2	
8-224	Trucks	2	
8-243	Trucks	2	
8-253	Trucks	4	2002
8-254	Trucks	2	
8-267	Trucks	2	
8-294	Trucks	2	
8-314	Trucks	2	
8-316	Trucks	2	
8-400	Tractor	4	2002
8-418	Trucks	5	1998
8-435	Trucks	4	2002
8-436	Trucks	2	
8-454	Trucks	4	2002
8-477	Trucks	4	2002
8-515	Trucks	4	2002
8-524	Trucks	4	2002
8-525	Trucks	4	2002

NOTE: Purchase dates "OLD" were purchased prior to 1998.

- 1966 D-4 Dozer
- 1972 D-7 Dozer
- 1982 D6D Dozer
- 1978 Grader 16G
- 1995 Grader 163 H (Moore)
- 1995 Grader 163 H (Winifred)
- 1995 Grader 163 H (Lewistown)
- 1995 Grader 163 H (Roy)
- 1995 Grader 163 H (Denton)
- 1997 Grader 163 H (Lewistown)
- 1997 Grader 163 H (Grass Range)

4.6 Issues Facing Fergus County Fire Protection

4.7 Current Wildfire Mitigation Activities in Fergus County

4.7.1 Bureau of Land Management

Assistance activities potentially cover 14 counties within the Lewistown Field Office. Assistance to communities focuses on fire hazard assessment and mitigation planning, hazardous fuel reduction, natural resource-based economic development, fire education and Rural Fire Assistance.

Assistance agreements for assessments, planning, hazardous fuel reduction and landowner education have been signed with four county entities (Fergus, Chouteau, Lewis and Clark, and

Teton counties) and one economic development council that covers three counties (Judith Basin, Fergus and Petroleum counties) within the field office area.

Projects currently underway through the assistance agreements include hazardous fuel reduction in Fergus, Chouteau and Lewis and Clark counties; county-wide fire mitigation assessment and planning in Fergus, Judith Basin, Petroleum, Chouteau and Teton counties; individual community assessments in Lewis and Clark county; education and outreach to landowners in Judith Basin, Fergus and Petroleum counties.

The potential for biomass energy development is currently being pursued for school and medical facilities in Lewistown (Fergus County) and for schools in Judith Basin County. Such a project has the potential to result in energy savings for public buildings, create a market for natural resource small business, and tie in with hazardous fuel reduction plans on federal lands for both BLM and the U.S. Forest Service.

Chapter 5: Treatment Recommendations

5 Overview

Critical to the implementation of this Wildland-Urban Interface Wildfire Mitigation Plan will be the identification of, and implementation of, an integrated schedule of treatments targeted at achieving an elimination of the lives lost, and reduction in structures destroyed, infrastructure compromised, and unique ecosystems damaged that serve to sustain the way-of-life and economy of Fergus County and the region. Since there are many land management agencies and hundreds of private landowners in Fergus County, it is reasonable to expect that differing schedules of adoption will be made and varying degrees of compliance will be observed across all ownerships.

The Federal land management agencies in Fergus County, specifically the USDA Forest Service and the Bureau of Land Management, the USDI Fish and Wildlife Service, and the state land management agency, the Montana Department of Natural Resources and Conservation, are participants in this planning process and have contributed to its development. Where available, their schedule of WUI treatments has been summarized in this chapter to better facilitate a correlation between their identified planning efforts and the efforts of Fergus County.

5.1 Possible Fire Mitigation Activities

As part of the implementation of fire mitigation activities in Fergus County, a variety of management tools may be used. Management tools include but are not limited to the following:

- Homeowner and landowner education
- Building code changes for structures and infrastructure in the WUI
- Home site defensible zone through fuels modification
- Community defensible zone fuels alteration
- Access improvements
- Access creation
- Emergency response enhancements (training, equipment, locating new fire stations, new fire districts, merging existing districts)
- Regional land management recommendations for private, state, and federal landowners

Maintaining private property rights will continue to be one of the guiding principles of this plan's implementation. Sound risk management is a foundation for all fire management activities. Risks and uncertainties relating to fire management activities must be understood, analyzed, communicated, and managed as they relate to the cost of either doing or not doing an activity. Net gains to the public benefit will be an important component of decisions.

5.2 WUI Safety & Policy

Wildfire mitigation efforts must be supported by a set of policies and regulations at the county level that maintain a solid foundation for safety and consistency. The recommendations enumerated here serve that purpose. Because these items are regulatory in nature, they will not necessarily be accompanied by cost estimates. These recommendations are policy related in

nature and therefore are recommendations to the appropriate elected officials; debate and formulation of alternatives will serve to make these recommendations suitable and appropriate.

As part of the Policy of Fergus County in relation to this planning document, this entire **Wildland-Urban Interface Wildfire Mitigation Plan** should be reviewed annually at a special meeting of the Fergus County Commissioners, open to the public, where action items, priorities, budgets, and modifications can be made or confirmed. A written review of the plan should be approved by the Chairman of the County Commissioners, detailing plans for the year's activities, and made available to the general public ahead of the meeting. Amendments to the plan should be detailed at this meeting, documented, and attached to the formal plan as an amendment to the WUI Wildfire Mitigation Plan (signatures by the cooperators would be collected at the Chairman's discretion). Re-evaluation of this plan should be made on the 5th anniversary of its acceptance, and every 5-year period following.

Prioritization of activities recommended in this plan should be made by the Fergus County Commissioners consistent with the recommendations made in Chapter 1 of this document. During the annual review of this plan, reprioritization can be justified in response to changing conditions and funding opportunities.

5.2.1 Existing Practices That Should Continue

Fergus County currently is implementing many projects and activities that, in their absence, could lead to increased wildland fire loss potential. By enumerating some of them here, it is the desire of the authors to point out successful activities.

- Existing rural addressing efforts have aided emergency responses well.
- The 911 service in the county is an excellent resource that is currently dispatched out of Lewistown. Activities that build on the rural addressing and current emergency services to develop an Enhanced 911 service would serve the county well.
- Land management agencies within the county are conducting fuel reduction projects in response to increasing concerns of fire hazard in WUI areas.

5.2.2 Proposed Activities

Table 5.1. WUI Action Items in Safety and Policy.

Action Item	Goals and Objectives	Responsible Organization	Action Items & Planning Horizon
5.1.a: Amend existing building codes to apply equally to new single housing construction as it does to sub-divisions. Make sure existing policy is comprehensive to wildland fire risks.	**Protection of people and structures** by applying a standard of road widths, access, and building regulations suitable to insure new homes can be protected while minimizing risks to firefighters. (defensible space, roads and access management, water systems, building codes, signage, and maintenance of private forest and range lands)	**County Commissioners** in cooperation with Rural Fire Districts and Planning and Zoning.	• Year 1 debate and adoption of revised code (2004). • Review adequacy of changes annually, make changes as needed.
5.1.b: Develop County policy concerning building materials used in high-risk WUI areas on existing structures and new construction	**Protection of people and structures** by improving the ability of emergency response personnel to respond to threatened homes in high-risk areas.	**County Commissioners Office** in cooperation with Rural Fire Departments	**Year 1 (2004) activity:** Consider and develop policy to address construction materials for homes and businesses located in high wildfire risk areas. Specifically, a County policy concerning wooden roofing materials and flammable siding, especially where juxtaposed near heavy wildland fuels.
5.1.c: Develop County policy concerning access in moderate to high-risk WUI areas where sub-divisions are built to insure adequate ingress and egress during wildfire emergencies.	**Protection of people and structures** by improving the ability of emergency response personnel to respond to threatened homes in high-risk areas.	**County Commissioners Office** in cooperation with Rural Fire Departments	**Year 1 (2004) activity:** Consider and develop policy to address access language for homes and businesses located in moderate to high wildfire risk areas. Specifically, a County policy concerning road widths, turning radii, and number of multiple access points.
5.1.d: Develop a County Commissioner's Office policy to support the applications for grant monies for projects resulting from recommendations in this plan.	**Protection of people and structures** by improving the ability of residents and organizations to implement sometimes costly projects.	**County Commissioners Office**	**Ongoing activity:** Support grant applications as requested in a manner consistent with applications from residents and organizations in Fergus County.
5.1.e. Develop a formal Rural Fire Coordinator position within the County to manage overhead responsibilities across all county fire districts.	**Protection of people and structures** by improving the ability of emergency response personnel to respond to threatened homes.	**County Commissioners Office** in cooperation with Rural Fire Departments	• Year 1 identify funding possibilities through grants or as a County permanent position (2004). • Fill the position with existing staff member.

5.3 People and Structures

The protection of people and structures will be tied together closely as the loss of life in the event of a wildland fire is generally linked to a person who could not, or did not, flee a structure threatened by a wildfire. The other incident is a fire fighter who suffers the loss of life during the combating of a fire. Many of the recommendations in this section will define a set of criteria for implementation while others will be rather specific in extent and application.

Many of the recommendations in this section involve education to increase awareness and teach mitigation strategies to the residents of Fergus County. These recommendations stem from a variety of factors including items that became obvious during the analysis of the public surveys, discussions during public meetings, and observations about choices made by residents living in the Wildland-Urban Interface. Unlike many other counties across the west, Fergus County residents demonstrated a higher awareness of wildfire risk factors such as the responses to the homeowner survey questions concerning home risk factors. The results of that survey pointed to a recognition of risk very similar to what "fire professionals" estimated in the county. However, while the risk was recognized, it was still documented, specialists the opportunity to concentrate efforts on conveying methods of reducing risk instead of just learning how to identifying it.

- Homeowners in the public mail survey ranked their home site wildfire risk factors very similar to the results of a random sample of home rankings completed by fire mitigation specialists.
- Fire District personnel pointed to numerous examples of inadequate access to homes of people who believe they have adequate ingress.
- Over half of the respondents to the public mail survey indicated (58%) that they want to participate in educational opportunities focused on the WUI and what they can do to increase their home's chances of surviving a wildfire.
- 40% of respondents to the public mail survey indicated that they would be interested in participating in a cost share program that would pay a portion of the costs of implementing fire risk projects on their property.

In addition to those items enumerated in Table 5.1, residents and policy makers of Fergus County should recognize certain factors that exist today, that in their absence would lead to an increase in the risk factors associated with wildland fires in the WUI of Fergus County. These items listed below should be encouraged, acknowledged, and recognized for their contributions to the reduction of wildland fire risks:

- **Livestock Grazing** in and around the communities of Fergus County has led to a reduction of many of the fine fuels that would have been found in and around the communities and in the wildlands of Fergus County. Domestic livestock not only eat these grasses, forbs, and shrubs, but also trample certain fuels to the ground where decomposition rates may increase. Livestock ranchers tend their stock, placing resource professionals into the forests and rangelands of the area where they may observe ignitions, or potentially risky activities. There are ample opportunities throughout the county to increase grazing. This could contribute to the economic output of the county as well as reduce the fuel loading. Livestock grazing in this region should be encouraged into the future as a low cost, positive tool of wildfire mitigation in the Wildland-Urban Interface and in the wildlands.

- **Forest Health*:*** Much of the forested area within Fergus County is declining in health and at increased risk to large scale, high intensity wildland fire due to overcrowding. Current stand trajectory will lead to further decline in health, with continued accumulation of dead and downed woody fuels and further development of multistoried forest conditions and ladder fuels that can lead to intense wildland fire. Such fires can have severe and lasting impacts on water quality and slope stability due to loss of vegetative ground cover, as well as lead to loss of quality habitat for a variety of wildlife species.

  In order to reduce the potential for destructive wildland fire and to redirect stand trajectory, a hazardous fuel treatment program integrating commercial thinning, manual fuel treatments, and shaded fuel breaks are recommended. Such an effort would likely require collaboration between multiple landowners, including private individuals, the State of Montana, the BLM and the US Fish and Wildlife Service.

- **Agriculture** is a significant component of Fergus County's economy. The original conversion of these lands to agriculture from rangeland, was targeted at the most productive soils and juxtaposition to infrastructure. Many of these productive ecosystems were consequently also at some of the highest risk to wildland fires because biomass accumulations increased in these productive landscapes. The result today, is that much of the rangeland historically prone to frequent fires, has been converted to agriculture, which is at a much lower risk than prior to its conversion. The preservation of a viable agricultural economy in Fergus County is integral to the continued management of wildfire risk in this region.

Table 5.2. WUI Action Items for People and Structures.

Action Item	Goals and Objectives	Responsible Organization	Action Items, Planning Horizon and Estimated Costs
5.2.a: Youth and Adult Wildfire Educational Programs	**Protect people and structures** by increasing awareness of WUI risks, how to recognize risk factors, and how to modify those factors to reduce risk	Cooperative effort including: • Montana State University Extension Service • Montana Department of Natural Resources and Conservation • Charles M. Russell National Wildlife Refuge • Bureau of Land Management • Local School Districts • U.S. Forest Service	Evaluate effectiveness of currently funded County education programs. If possible, use existing educational program materials and staffing. These programs may need reformatted using FireWISE materials. Formal needs assessment should be responsibility of Extension Service faculty and include the development of an integrated WUI educational series by year 3 (2006). Costs initially to be funded through existing budgets for these activities to be followed with grant monies to continue the programs as identified in the formal needs assessment. Detailed information on home defensible space requirements is contained on the FireWise CD, which can be purchased and personalized by the County. The CD costs $2,500.
5.2.b: Wildfire risk assessments of homes in identified communities	**Protect people and structures** by increasing awareness of specific risk factors of individual home sites in the at-risk landscapes. Only after these are completed can home site treatments follow.	To be implemented by **County Commissioners Office** in cooperation with the **Rural Fire Departments**. Actual work may be completed by Wildfire Mitigation Consultants or trained volunteers.	• **Cost:** Approximately $100 per home site for inspection, written report, and discussions with the homeowners. • There are approximately 4,860 housing units in Fergus County, roughly 1,460 (30%) of these structures would benefit from a home site inspection and budget determination for a total cost estimate of $146,000. • **Action Item:** Secure funding and contract to complete the inspections during years 1 & 2 (2004-05) • Home site inspection reports and estimated budget for each home site's treatments will be a requirement to receive funding for treatments through grants.
5.2.c: Home Site WUI Treatments	**Protect people, structures, and increase fire fighter safety** by reducing the risk factors surrounding homes in the WUI of Fergus County	**County Commissioners** in cooperation with Fire Mitigation Consulting company and Rural Fire Districts *Complete concurrently with 5.4.b.*	• Actual funding level will be based on the outcomes of the home site assessments and cost estimates • **Estimate** that treatments will cost approximately $1,000 per home site for a defensible space of roughly 150'. Approximately 1,460 homes in this category for an estimated cost of $1,460,000. Total home and business (non-governmental) assessed value in County is roughly $ $368,328,677 (average $51,536 for 7,146 structures): **B/C Ratio of this treatment is approximately 252:1**, when considered across the entire county, and 51:1 on a per treated structure basis. Actual B/C ration will vary by community. • Home site treatments can begin after the securing of funding

Table 5.2. WUI Action Items for People and Structures.

Action Item	Goals and Objectives	Responsible Organization	Action Items, Planning Horizon and Estimated Costs
			for the treatments and immediate implementation in 2004 and will continue from year 1 through 5 (2008).
5.2.d: Community Defensible Zone WUI Treatments	**Protect people, structures, and increase fire fighter safety** by reducing the risk factors surrounding high risk communities in the WUI of Fergus County	**County Commissioners** in cooperation with Fire Mitigation Consultants and Rural Fire Districts	• Actual funding level will be based on the outcomes of the home site assessments and cost estimates. • **Years 2-5 (2004-08):** Treat high risk wildland fuels from home site defensible space treatments (5.4.c) to an area extending 400 feet to 750 feet beyond home defensible spaces, where steep slopes and high accumulations of risky fuels exist. Should link together home treatment areas. Treatments target high risk concentrations of fuels and not 100% of the area identified. To be completed only after or during the creation of home defensible spaces have been implemented. • Approximate average cost on a per structure basis is $750 depending on extent of home defensibility site treatments, estimate 300 homes in need of this type of treatment for a cost estimate of $225,000. Couple this cost with the home defensibility space costs of $1,460,000. The number of structures to benefit from these treatments include both homes and businesses (assessed value of $368,328,677). The **average B/C Ratio for these treatments combined in Fergus County is 218:1** when considered across the entire county (**44:1 B/C ratio per treated structure**). Actual B/C ration by community will be variable.
5.2.e: Maintenance of Home Site WUI Treatments	**Protect people, structures, and increase fire fighter safety** by reducing the risk factors surrounding homes in the WUI of Fergus County	**County Commissioners Office** in cooperation with Rural Fire Departments and local home owners	• Home site defensibility treatments must be maintained periodically to sustain benefits of the initial treatments. • Each site should be assessed 5 years following initial treatment • Estimated re-inspection cost will be $50 per home site on all sites initially treated or recommended for future inspections ($73,000) • Follow-up inspection reports with treatments as recommended years 5 through 10.
5.2.f: Re-entry of Home Site WUI Treatments	**Protect people, structures, and increase fire fighter safety** by reducing the risk factors surrounding homes in the WUI of Fergus County	**County Commissioners Office** in cooperation with Rural Fire Departments and local home owners	• Re-entry treatments will be needed periodically to maintain the benefits of the initial WUI home treatments. Each re-entry schedule should be based on the initial inspection report recommendations, observations, and changes in local conditions. Generally occurs every 5-10 years.

Table 5.2. WUI Action Items for People and Structures.

Action Item	Goals and Objectives	Responsible Organization	Action Items, Planning Horizon and Estimated Costs
5.2.g: Access Improvements of bridges, cattle guards, and limiting road surfaces	**Protection of people, structures, infrastructure, and economy** by improving access for residents and fire fighting personnel in the event of a wildfire. Reduces the risk of a road failure that leads to the isolation of people or the limitation of emergency vehicle and personnel access during an emergency.	**County Roads and Bridges Department** in cooperation with US Forest Service, BLM, State of Montana (Department of Transportation), and forestland or rangeland owners.	• **Year 1 (2004):** Update existing assessment of travel surfaces, bridges, and cattle guards in Fergus County as to location. Secure funding for implementation of this project (grants) • **Year 2 (2005):** Conduct engineering assessment of limiting weight restrictions for all surfaces (e.g., bridge weight load maximums). Estimate cost of $25,000 which might be shared between County, USFS, BLM, State, and private based on landownership associated with road locations. • **Year 2 (2005):** Post weight restriction signs on all crossings, copy information to rural fire districts and wildland fire protection agencies in affected areas. Estimate cost at roughly $25-$30,000 for signs and posting. • **Year 3 (2006):** Identify limiting road surfaces in need of improvements to support wildland fire fighting vehicles and other emergency equipment. Develop plan for improving limiting surfaces including budgets, timing, and resources to be protected for prioritization of projects (benefit/cost ratio analysis). Create budget based on full assessment.
5.2.h: Access Improvements through road-side fuels management: Crystal Lake and Maiden Canyon Areas specifically.	**Protection of people, structures, infrastructure, and economy** by improving access for residents and fire fighting personnel in the event of a wildfire. Allows for a road based defensible area that can be linked to a terrain based defensible areas.	**County Roads and Bridges Department** in cooperation with US Forest Service, BLM, State of Montana (Department of Transportation), and forestland or rangeland owners.	• **Year 1 (2004):** Update existing assessment of roads in Fergus County as to location. Secure funding for implementation of this project (grants). • **Year 2 (2005):** Specifically address access issues listed in column one, plus recreation areas, and others identified in assessment. Target 100’ on downhill side of roads and 75’ on uphill side for estimated cost of $15,000 per mile of road treated. If 350 miles of roadway are prioritized for treatment (est.) the cost would amount to $ 5,250,000. **B/C Ratio of 70:1 is achieved**, but is highly variable. Further, the total value of structures in the county is not “protected” by this type of treatment. • **Year 3 (2006):** Secure funding and implement projects to treat road-side fuels.

5.4 Infrastructure

Significant infrastructure refers to the communications, transportation (road and rail networks), energy transport supply systems (gas and power lines), and water supply that service a region or a surrounding area. All of these components are important to Fergus County. These networks are by definition a part of the Wildland-Urban Interface in the protection of people, structures, **infrastructure**, and unique ecosystems. Without supporting infrastructure a community's structures may be protected, but the economy and way of life lost. As such, a variety of components will be considered here in terms of management philosophy, potential policy recommendations, and on-the-ground activities.

Communication Infrastructure: This component of the WUI seems to be diversified across the county with multiple source and destination points, and a spread-out support network. To ensure good communication with the USFS, BLM and US Fish and Wildlife Service (CMR) resources, radios need to be narrow band and can be placed in "scan mode" to monitor cooperators frequencies. Although site specific treatments will impact local networks directly, little needs done to insure the system's viability.

Transportation Infrastructure (road and rail networks): This component if the WUI has some potential limitations in Fergus County. The hub of Fergus County's transportation network is located in Lewistown. Specific infrastructure components have been discussed in this plan.

Ignitions along highways are significant and should be addressed as part of the implementation of this plan. Various alternatives from herbicides to intensive livestock grazing coupled with mechanical treatments, have been suggested. These corridors should be further evaluated with alternatives implemented. A variety of approaches will be appropriate depending on the landowner, fuels present, and other factors. These ignitions are substantial and the potential risk of lives to residents in the area is significant.

Many roads in the county have limiting characteristics, such as narrow travel surfaces, sharp turning radii, low load limit bridges and cattle guards, and heavy accumulations of fuels adjacent to some roads. Some of these road surfaces access remote forestland and rangeland areas. While their improvements will facilitate access in the case of a wildfire, they are not necessarily the priority for treatments in the county.

Roads that have these inferior characteristics and access homes and businesses are the priority for improvements in the county. Specific recommendations for these roads are enumerated in Table 5.2. Insuring that access does not continue to be built in limiting and sub-standard ways is paramount to "staying ahead of the problem". New access providing ingress and egress to sub-divisions and other groupings of homes and businesses will insure that Fergus County does not have to repeat this planning process in 10 more years, identifying the same problems that exist today.

Energy Transport Supply Systems (gas and power lines): (Fergus County - Appendix I) A number of power lines crisscross Fergus County. Nearly all of these power lines cross over rangeland ecosystems. When fires ignite in these vegetation types, the fires tend to be fast moving and burn at relatively low intensities. However, there is a potential for high temperatures and low humidity with high winds to produce enough heat and smoke to threaten power line stability. Most power line corridors have been cleared of vegetation both near the wires and from the ground below. It is the recommendation of this Wildfire Mitigation Plan that this situation be evaluated annually and monitored but that treatments not be specifically targeted at this time. The use of these areas as "fire breaks" should be evaluated further, especially in light of the treatments enumerated in this plan (eg., intensive livestock grazing, mechanical treatments, and herbicide treatments).

Water Supply: In some of Montana's communities, water is derived from surface flow that is treated and piped to homes and businesses. When wildfires burn a region, they threaten these watersheds by the removal of vegetation, creation of ash and sediment. As such, watersheds should be afforded the highest level of protection from catastrophic wildfire impacts. In Fergus County, water is supplied to most homes by municipal wells or single home and multiple home wells.

5.4.1 Proposed Activities

Table 5.3. Infrastructure Enhancements.

Action Item	Goals and Objectives	Responsible Organization	Action Items & Planning Horizon
5.3.a: Post FEMA "Emergency Evacuation Route" signs along the identified Primary and Secondary access routes in the county.	**Protection of people and structures** by informing residents and visitors of **significant infrastructure** in the county that will be maintained in the case of an emergency.	**County Commissioners** in cooperation with Rural Fire Districts and Roads Department.	• Purchase of signs (2004). • Posting roads and make information available to residents of the importance of Emergency Routes
5.3.b: Fuels mitigation of the FEMA "Emergency Evacuation Routes" in the county to insure these routes can be maintained in the case of an emergency.	**Protection of people and structures** by providing residents and visitors with ingress and egress that can be maintained during an emergency.	**County Commissioners** in cooperation with Rural Fire Districts and Roads Department.	• Full assessment of road defensibility and ownership participation (2004). • Implementation of projects (linked to item 5.2.g and 5.2.h.
5.3.c: Roadside fuels treatments along Red Hill Road and Crystal Lake Road (see also 5.2.h above).	**Protection of people and structures** by providing residents and visitors with ingress and egress that can be maintained during an emergency.	**County Commissioners in cooperation with US Forest Service.**	• Implement a thinning, pruning, and brush reduction program along the roads to increase the defensibility of these access routes while increasing chances for escape.

5.5 Resource and Capability Enhancements

Rural fire districts in Fergus County are the primary entities responding to and fighting wildland fires on non-federal. The rural districts have primary responsibilities for wildfire response with mutual aid support from the BLM, Forest Service, and the Montana DNRC. Secondarily, some of these districts also respond to structure fires, although most do not have the personnel or equipment to enter burning homes. The exception to this is the Lewistown Fire Department, which has both the resources and capability to respond to structure fires. Through mutual aid agreements with neighboring districts, the Lewistown Fire Department responds to structure fires but response times are sometimes long due to the long distances they must traverse. Enhancement of the rural districts in Fergus County that concentrate on acquiring needed equipment, and recruiting and training volunteers is desperately needed. Item 5.1.e, detailed above, is in support of this philosophy, as a person who would coordinate and facilitate fire resources and capabilities in Fergus County. This position already exists in the County, although the funding for the position is only part time and currently grant funded.

There are a number of resource and capability enhancements identified by the rural and wildland fire fighting districts in Fergus County. All of the needs identified by the districts are in

line with increasing the ability to respond to emergencies in the WUI and are fully supported by the planning committee.

Specific reoccurring themes of needed resources and capabilities include:

- Development of drafting sites in rural locations
- Improved radio capabilities within each district and for mutual aid operations
- Retention and recruitment of volunteers
- Training and development of rural firefighters in structure and wildland fire
- Increasing the capability of the rural districts to fight wildland fires
- Developing and increasing the capability of the rural districts to respond to and fight structure fires

The implementation of each issue will rely on either the isolated efforts of the fire districts or a concerted effort by the county to achieve equitable enhancements across all of the districts. Given historic trends, individual departments competing against neighboring departments for grant monies and equipment will not necessarily achieve region wide equity. However, the Snowy Mountain Development Corporation (SMDC), and the coordinator identified in 5.1.e above, may be uniquely suited to work with all of the districts serving Fergus County and adjacent counties to assist in the prioritization of needs. Once prioritized, the SMDC is in a position to assist these districts with identifying, competing for, and obtaining grants and equipment to meet these needs.

Table 5.4. WUI Action Items in Fire Fighting Resources and Capabilities.

Action Item	Goals and Objectives	Responsible Organization	Action Items & Planning Horizon
5.4.a: Enhance radio availability in each district, link into existing dispatch, and improve range within the region, update to new digital, narrow band frequency adopted by feds and state. Communication needs to be expanded to unprotected areas. New buildings needed.	**Protection of people and structures** by direct fire fighting capability enhancements. Improve communications to unprotected areas.	**Rural and Wildland Fire Districts and County Commissioners in cooperation with Montana Department of Natural Resources and Conservation** in cooperation with rural and wildland fire districts and County Commissioners	• **Year 1 (2004):** Summarize existing two-way radio capabilities and limitations. Identify costs to upgrade existing equipment and locate funding opportunities. • **Year 2 (2005):** Acquire and install upgrades as needed. • **Year 2-3 (2005-06):** Identify opportunities for radio repeater towers located in the region for multi-county benefits.
5.4.b: Retention of Volunteer Fire Fighters	**Protection of people and structures** by direct fire fighting capability enhancements.	**Rural and Wildland Fire Districts** working with broad base of county citizenry to identify options, determine plan of action, and implement it.	• 5 Year Planning Horizon, extended planning time frame • Target an increased recruitment (+10%) and retention (+20% longevity) of volunteers • **Year 1 (2004):** Develop incentives program and implement it.

Table 5.4. WUI Action Items in Fire Fighting Resources and Capabilities.

Action Item	Goals and Objectives	Responsible Organization	Action Items & Planning Horizon
5.4.c: Increased training and capabilities of fire fighters. Improve recruitment of volunteer fire fighters. More fire fighters are needed.	**Protection of people and structures** by direct fire fighting capability enhancements.	**Rural and Wildland Fire Districts** working with the **BLM, DNRC, USFS, and USFWS** for wildland training opportunities and with the **State Fire Training School** for structural fire fighting training. Organized by County Fire Coordinator identified in 5.1.e.	• **Year 1 (2004):** Develop a multi-county training schedule that extends 2 or 3 years in advance (continuously). • Identify funding and resources needed to carry out training opportunities and sources to acquire. • Year 1 (2004): Begin implementing training opportunities for volunteers.
5.4.d. Construction of heated fire suppression equipment garages.	**Protection of people and structures** by direct fire fighting capability enhancements.	**Rural and Wildland Fire Districts** working with broad base of county citizenry, DNRC, BLM, USFS, and USFWS to identify options, determine plan of action, and implement it.	• Year 1 (2004): develop cost estimates and secure funding. • **2 Year Planning Horizon**
5.4.e. Acquisition of equipment needed for wildland and structure fire fighting. A rotation system is needed to upgrade equipment to meet NFMA standards.	**Protection of people and structures** by direct fire fighting capability enhancements. Implement equipment rotation system to meet NFMA standards.	**County Commissioners, Fergus County Fire Coordinator, Snowy Mountain Development Corporation, Rural and City Fire Districts.**	• Develop priority list of equipment and develop budgets • Create prioritization for acquisition • Seek grants or other funding sources and compete for them to acquire the needed equipment.

5.6 Regional Land Management Recommendations

In section 5.3 of this plan, reference was given to the role that forestry, grazing and agriculture have in promoting wildfire mitigation services through active management. Fergus County is dominated by wide expanses of rangelands intermixed with communities and rural houses.

Wildfires will continue to ignite and burn fuels and homes depending on the weather conditions and other factors enumerated earlier. However, active land management that modifies fuels, promotes healthy range and forestland conditions, and promotes the use of these natural resources (consumptive and non-consumptive) will insure that these lands have value to society and the local region. We encourage the US Forest Service, the Bureau of Land Management, the Montana Department of Natural Resources and Conservation, Industrial land owners, private land owners, and all other landowners in the region to actively administer their Wildland-Urban Interface lands in a manner consistent with the management of reducing fuels and risks in this zone.

5.6.1 Bureau of Land Management Planned and Potential Treatments

Lewistown Field Office out-year planning and budgeting for treatments is developed after identification and prioritization of treatment areas. Wildland urban interface communities on the Federal Register have received priority planning and treatment. Future projects will usually be identified in the Risk Assessment Mitigation Strategy (RAMS). Project planning and treatment objectives are in accordance with Resource Management Plans and area-specific planning documents.

The following proposed treatments have been provided by the Bureau of Land Management.

5.6.1.1 Proposed Prescribed Fire Projects in the Central Zone Region

Table 5.5 Bureau of Land Management Prescribed Fire Projects in Central Zone region.

Project Name	FMU	Acres*	Current * Condition Class (acres)	Projected * Condition Class 2(acres)	Projected * Condition Class 1 (acres)	Local Contractor
Armells Creek Watershed	Breaks, Monument	12,200	3-6,000 2-6,600	6,000	5,000	N/A
Arrow Creek	Breaks, Monument	5,795	3-2,030 2-3,769	1,500	1,000	N/A
Beaver Creek	Snowies	30	2-30		30	N/A
Becket	Island Ranges	400	3-400	40	350	N/A
BR-12	Prairie Pothole	150	2-150		75	N/A
Driftwood	Prairie Pothole	200	2-200		145	N/A
Gilmore	Big Open, Monument	1,100	2-950		700	N/A
Grass Range	Island Ranges	160	3-50 2-110	15	90	N/A
Havre Breaks	Breaks	30,000	3-5,000 2-20,000 1-5,000	3,000	2,000	N/A
Judith Mountains	Island Ranges	500	3-500	200		N/A
Lincoln Gulch	Island Ranges	30	3-30	20		N/A
Lion Coulee	Big Open, Monument	2,780	3-1,000 2-1,780	550	1,300	N/A
Lonesome Lake	Big Open	13,120	3-700 2-12,420	200	10,000	N/A
Musselshell Breaks	Breaks	5,000	3-2,000 2-3,000	1,000	1,500	N/A
North Moccasins	Island Ranges	300	3-300	200		N/A
North Peterson	Prairie Potholes	200	2-200		75	N/A
Rogers Pass	Front	250	3-250	120		N/A
Upper Missouri	Breaks	10,000	3-6,000 2-4,000	3,500	3,000	N/A

5.6.1.2 Proposed Non-Fire Fuels Treatments in the Central Zone Region

This table describes planning and implementation for non-fire treatments. It includes direction for; annual activities for implementation, equipment and seasonal use restrictions, effects monitoring requirements, and reporting, documentation, etc.

Table 5.6 Bureau of Land Management Non-Fire Fuels Treatments in Central Zone Region.

Project Name	FMU	WUI	Acres Treated	By-Product Utilization	Local Contractor	Condition Class 2 moved to 1 (acres)	Condition Class 3 moved to 2 or 1 (acres)	Current Condition Class (acres)
Maiden (JMLA)	Island Ranges	Yes	500	0	Not yet contracted	0	500	3 – 500
North Moccasins (JMLA)	Island Ranges	Yes	80	0	No	0	80	3 – 80
Dog Creek (Arrow Ck EA)	Breaks	No	300	0	No	300	0	2 – 300
Rogers Pass (Rogers Pass CMP and EA)	Front	Yes	250	0	Not yet contracted	130	120	3 – 250

5.6.2 US Forest Service Planned and Potential Treatments

Table 5.7. United States Forest Service Past and Planned Projects

Project	Summary	Location	Description
Velvet Spring (1980)	Treated 100 acres	NFS lands, Little Snowies, T12N, R21E, Sec 22&23	Reduce conifer encroachment and enhance forage.
Cameron Ridge (1981)	Treated 70 acres	NFS lands, Little Snowies, T12N, R21E, Sec 31	Reduce conifer encroachment and enhance forage.
North Fork Pole Creek T12N, R21E, Sec 34, 35; T11N, R21E, Sec 2,3, (1987)	Treated 260 acres	NFS lands, Little Snowies, T12N, R21E, Sec 34, 35; T11N, R21E, Sec 2,3	Reduce conifer encroachment, fuel loading and common juniper understory.
Little Snowies, EIS (1993-2004)	Treated-UB=620 acres; Mech=560 acres; Timber sale=300 acres (South Bench)	NFS lands, Little Snowies	Reduce conifer encroachment, fuel loading and common juniper understory, associated with fuelbreaks identified in EIS.
Ashbridge units 1/2/3/4/5	Treated-unit 4=40 acres (2003) 390 acres planned 2005	NFS lands, Little Snowies, T12N, R21E, Sec 29,30,31,32	Reduce multi-tiered fir understory and common juniper in previously harvested timber sale. Also to promote Aspen regeneration.
Junction 271/272	Treated—43 acres (1999)	NFS lands, Little Snowies, FS Road 271 and 272 junction	Fuel reduction of residual dead trees from earlier stand replacement fire.
Little Snowies Fuels	Planned NEPA—	NFS lands, Little	Ecosystem restoration

Table 5.7. United States Forest Service Past and Planned Projects

Project	Summary	Location	Description
Reduction	CE for FY05-06; 2700 to 3500 acres	Snowies	
Flat Pole Cat	Planned for 2005-2007	NFS lands Little Snowies, Flat Whiskey and Pole Cat timber sale units	Fuels reduction underburn in previously harvested timber sale units to reinforce fuel break effectiveness and insulate leave trees from high intensity fire.
Crystal Lake Cabin Defensible Space Project	Treat 3-4 acres	NFS lands	Remove excessive trees and ladder fuels from around US Forest Service structure. Hand pile resulting slash and burn when conditions are favorable. Project is completed, except for the disposal of the hand piles. Burning is planned for the fall of 2004.
Crystal Lake Road Corridor Fuels Project	Acres needed for treatment is unknown at this time.	NFS lands adjoining the Crystal Lake road	Eliminate some of the fuels along the roads. This would help facilitate ingress and egress (see treatment recommendations 5.3.c).
Population Protection Plan (Evac. Plan) for Crystal Lake Recreation Area			USFS (Stanford) will work in cooperation with BLM, Fergus County Sheriff's Office, Fergus County Fire Warden and Fergus County DES

Chapter 6: Supporting Information

6

6.1 List of Tables

6.2 List of Figures

6.3 List of Preparers

The following personnel participated in the formulation, compilation, editing, and analysis of alternatives for this assessment.

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Kathie Bailey	Snowy Mountain Development Corporation	Public Outreach and Committee Involvement

6.3 Signature Pages

This **Fergus County Wildland-Urban Interface Wildfire Mitigation Plan** has been developed in cooperation and collaboration with the representatives of the following organizations, agencies, and individuals.

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By: Carl Seilstad Fergus County Commissioner	Date
By: Kevin Myhre Lewistown City Manager	Date
By: Clive Rooney Montana Department of Natural Resources and Conservation	Date
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By: Bill Sthal Cheadle Volunteer Fire Department	Date
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By: Bob Olsen Cottonwood-Beaver Creek Volunteer Fire Department	Date
By: Steve Krieger (CITY/RURAL) Denton Volunteer Fire District	Date
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By: Dick Hassler Hilger Rural Fire Department	Date
By: William Rash Lewistown City Fire Department	Date

By: William Rash
Lewistown Rural Fire District

Date

By: Ron Martin
Moore Volunteer Fire Department

By: Ron Martin
Moore Rural Fire District

Date

By: Ted Allison
North Fork Flatwillow Volunteer Fire Department

Date

By: Tom Byrne
Roy Volunteer Fire Department

Date

By: Darrell Abbot
Surenuff Volunteer Fire Department

Date

By: Les Slivka
Winifred Volunteer Fire District

Date

By: Don Pyrah
Fergus County Fire Training Coordinator

Date

By: Sheriff Tom Killham
Fergus County Fire Warden

Date

By: Kathie Bailey Snowy Mountain Development Corporation	Date
By: Karen Marks Fergus Disaster and Emergency Services	Date
By: William E. Schlosser, Ph.D. Project Manager–Fergus County WUI Wildfire Mitigation Plan, Lead Author Forester–Northwest Management, Inc.	Date

6.4 Glossary of Terms

Anadromous - Fish species that hatch in fresh water, migrate to the ocean, mature there, and return to fresh water to reproduce (Salmon & Steelhead).

Appropriate Management Response - Specific actions taken in response to a wildland fire to implement protection and fire use objectives.

Biological Assessment - Information document prepared by or under the direction of the Federal agency in compliance with U.S. Fish and Wildlife standards. The document analyzes potential effects of the proposed action on listed and proposed threatened and endangered species and proposed critical habitat that may be present in the action area.

Backfiring - When attack is indirect, intentionally setting fire to fuels inside the control line to contain a rapidly spreading fire. Backfiring provides a wide defense perimeter, and may be further employed to change the force of the convection column.

Blackline - Denotes a condition where the fireline has been established by removal of vegetation by burning.

Burning Out - When attack is direct, intentionally setting fire to fuels inside the control line to strengthen the line. Burning out is almost always done by the crew boss as a part of line construction; the control line is considered incomplete unless there is no fuel between the fire and the line.

Canyon Grassland - Ecological community in which the prevailing or characteristic plants are grasses and similar plants extending from the canyon rim to the rivers edge.

Confine - Confinement is the strategy employed in appropriate management responses where a fire perimeter is managed by a combination of direct and indirect actions and use of natural topographic features, fuel, and weather factors.

Contingency Plans: Provides for the timely recognition of approaching critical fire situations and for timely decisions establishing priorities to resolve those situations.

Control Line - An inclusive term for all constructed or natural fire barriers and treated fire edge used to control a fire.

Crew - An organized group of firefighters under the leadership of a crew boss or other designated official.

Crown Fire - A fire that advances from top to top of trees or shrubs more or less independently of the surface fire. Sometimes crown fires are classed as either running or dependent, to distinguish the degree of independence from the surface fire.

Disturbance - An event which affects the successional development of a plant community (examples: fire, insects, windthrow, timber harvest).

Disturbed Grassland - Grassland dominated by noxious weeds and other exotic species. Greater than 30% exotic cover.

Diversity - The relative distribution and abundance of different plant and animal communities and species within an area.

Drainage Order - Systematic ordering of the net work of stream branches, (e.g., each non-branching channel segment is designated a first order stream, streams which only receive first order segments are termed second order streams).

Duff - The partially decomposed organic material of the forest floor beneath the litter of freshly fallen twigs, needles, and leaves.

Ecosystem - An interacting system of interdependent organisms and the physical set of conditions upon which they are dependent and by which they are influenced.

Ecosystem Stability - The ability of the ecosystem to maintain or return to its steady state after an external interference.

Ecotone - The area influenced by the transition between plant communities or between successional stages or vegetative conditions within a plant community.

Energy Release Component - The Energy Release Component is defined as the potential available energy per square foot of flaming fire at the head of the fire and is expressed in units of BTUs per square foot.

Equivalent Clearcut Area (ECA) - An indicator of watershed condition, which is calculated from the total amount of crown removal that has occurred from harvesting, road building, and other activities based on the current state of vegetative recovery.

Exotic Plant Species - Plant species that are introduced and not native to the area.

Fire Adapted Ecosystem - An arrangement of populations that have made long-term genetic changes in response to the presence of fire in the environment.

Fire Behavior - The manner in which a fire reacts to the influences of fuel, weather, and topography.

Fire Behavior Forecast - Fire behavior predictions prepared for each shift by a fire behavior analysis to meet planning needs of fire overhead organization. The forecast interprets fire calculations made, describes expected fire behavior by areas of the fire, with special emphasis on personnel safety, and identifies hazards due to fire for ground and aircraft activities.

Fire Behavior Prediction Model - A set of mathematical equations that can be used to predict certain aspects of fire behavior when provided with an assessment of fuel and environmental conditions.

Fire Danger - A general term used to express an assessment of fixed and variable factors such as fire risk, fuels, weather, and topography which influence whether fires will start, spread, and do damage; also the degree of control difficulty to be expected.

Fire Ecology - The scientific study of fire's effects on the environment, the interrelationships of plants, and the animals that live in such habitats.

Fire Exclusion - The disruption of a characteristic pattern of fire intensity and occurrence (primarily through fire suppression).

Fire Intensity Level - The rate of heat release (BTU/second) per unit of fire front. Four foot flame lengths or less are generally associated with low intensity burns and four to six foot flame lengths generally correspond to "moderate" intensity fire effects. High intensity flame lengths are usually greater than eight feet and pose multiple control problems.

Fire Prone Landscapes – The expression of an area's propensity to burn in a wildfire based on common denominators such as plant cover type, canopy closure, aspect, slope, road density, stream density, wind patterns, position on the hillside, and other factors.

Fireline - A loose term for any cleared strip used in control of a fire. That portion of a control line from which flammable materials have been removed by scraping or digging down to the mineral soil.

Fire Management - The integration of fire protection, prescribed fire and fire ecology into land use planning, administration, decision making, and other land management activities.

Fire Management Plan (FMP) - A strategic plan that defines a program to manage wildland and prescribed fires and documents the fire management program in the approved land use plan. This plan is supplemented by operational procedures such as preparedness, preplanned dispatch, burn plans, and prevention. The fire implementation schedule that documents the fire management program in the approved forest plan alternative.

Fire Management Unit (FMU) - Any land management area definable by objectives, topographic features, access, values-to-be-protected, political boundaries, fuel types, or major fire regimes, etc., that set it apart from management characteristics of an adjacent unit. FMU's are delineated in FMP's. These units may have dominant management objectives and preselected strategies assigned to accomplish these objectives.

Fire Occurrence - The number of wildland fires started in a given area over a given period of time. (Usually expressed as number per million acres.)

Fire Prevention - An active program in conjunction with other agencies to protect human life, prevent modification, of the ecosystem by human-caused wildfires, and prevent damage to cultural resources or physical facilities. Activities directed at reducing fire occurrence, including public education, law enforcement, personal contact, and reduction of fire risks and hazards.

Fire Regime - The fire pattern across the landscape, characterized by occurrence interval and relative intensity. Fire regimes result from a unique combination of climate and vegetation. Fire regimes exist on a continuum from short-interval, low-intensity (stand maintenance) fires to long-interval, high-intensity (stand replacement) fires.

Fire Retardant - Any substance that by chemical or physical action reduces flareability of combustibles.

Fire Return Interval - The number of years between two successive fires documented in a designated area.

Fire Risk - The potential that a wildfire will start and spread rapidly as determined by the presence and activities of causative agents.

Fire Severity - The effects of fire on resources displayed in terms of benefit or loss.

Foothills Grassland - Grass and forb co-dominated dry meadows and ridges. Principle habitat type series: bluebunch wheatgrass and Idaho fescue.

Fuel - The materials which are burned in a fire; duff, litter, grass, dead branchwood, snags, logs, etc.

Fuel Break - A natural or manmade change in fuel characteristics which affects fire behavior so that fires burning into them can be more readily controlled.

Fuel Loading - Amount of dead fuel present on a particular site at a given time; the percentage of it available for combustion changes with the season.

Fuel Model - Characterization of the different types of wildland fuels (trees, brush, grass, etc.) and their arrangement, used to predict fire behavior.

Fuel Type - An identifiable association of fuel elements of distinctive species; form, size, arrangement, or other characteristics, that will cause a predictable rate of fire spread or difficulty of control, under specified weather conditions.

Fuels Management - Manipulation or reduction of fuels to meet protection and management objectives, while preserving and enhancing environmental quality.

Gap Analysis Program (GAP) - Regional assessments of the conservation status of native vertebrate species and natural land cover types and to facilitate the application of this information to land management activities. This is accomplished through the following five objectives:

1. Map the land cover of the United States
2. Map predicted distributions of vertebrate species for the U.S.
3. Document the representation of vertebrate species and land cover types in areas managed for the long-term maintenance of biodiversity
4. Provide this information to the public and those entities charged with land use research, policy, planning, and management
5. Build institutional cooperation in the application of this information to state and regional management activities

Habitat - A place that provides seasonal or year-round food, water, shelter, and other environmental conditions for an organism, community, or population of plants or animals.

Heavy Fuels - Fuels of a large diameter, such as snags, logs, and large limbwood, which ignite and are consumed more slowly than flash fuels.

Hydrologic Unit Code - A coding system developed by the U. S. Geological Service to identify geographic boundaries of watersheds of various sizes.

Hydrophobic - Resistance to wetting exhibited by some soils, also called water repellency. The phenomena may occur naturally or may be fire-induced. It may be determined by water drop penetration time, equilibrium liquid-contact angles, solid-air surface tension indices, or the characterization of dynamic wetting angles during infiltration.

Human-Caused Fires - Refers to fires ignited accidentally (from campfires or smoking) and by arsonists; does not include fires ignited intentionally by fire management personnel to fulfill approved, documented management objectives (prescribed fires).

Intensity - The rate of heat energy released during combustion per unit length of fire edge.

Inversion - Atmospheric condition in which temperature increases with altitude.

Ladder Fuels - Fuels which provide vertical continuity between strata, thereby allowing fire to carry from surface fuels into the crowns of trees or shrubs with relative ease. They help initiate and assure the continuation of crowning.

Landsat Imagery - Land remote sensing, the collection of data which can be processed into imagery of surface features of the Earth from an unclassified satellite or satellites.

Landscape - All the natural features such as grasslands, hills, forest, and water, which distinguish one part of the earth's surface from another part; usually that portion of land which the eye can comprehend in a single view, including all its natural characteristics.

Lethal - Relating to or causing death; extremely harmful.

Lethal Fires - A descriptor of fire response and effect in forested ecosystems of high-severity or severe fire that burns through the overstory and understory. These fires typically consume large woody surface fuels and may consume the entire duff layer, essentially destroying the stand.

Litter - The top layer of the forest floor composed of loose debris, including dead sticks, branches, twigs, and recently fallen leaves or needles, little altered in structure by decomposition.

Maximum Manageable Area - The boundary beyond which fire spread is completely unacceptable.

Metavolcanic - Volcanic rock that has undergone changes due to pressure and temperature.

Minimum Impact Suppression Strategy (MIST) - "Light on the Land." Use of minimum amount of forces necessary to effectively achieve the fire management protection objectives consistent with land and resource management objectives. It implies a greater sensitivity to the impacts of suppression tactics and their long-term effects when determining how to implement an appropriate suppression response.

Mitigation - Actions to avoid, minimize, reduce, eliminate, replace, or rectify the impact of a management practice.

Monitoring Team - Two or more individuals sent to a fire to observe, measure, and report its behavior, its effect on resources, and its adherence to or deviation from its prescription.

National Environmental Policy Act (NEPA) - This act declared a national policy to encourage productive and enjoyable harmony between humans and their environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and will stimulate the health and welfare of humankind; to enrich the understanding of important ecological systems and natural resources; and to establish a Council on Environmental Quality.

National Fire Management Analysis System (NFMAS) - The fire management analysis process, which provides input to forest planning and forest and regional fire program development and budgeting.

Native - Indigenous; living naturally within a given area.

Natural Ignition - A wildland fire ignited by a natural event such as lightning or volcanoes.

Noncommercial Thinning - Thinning by fire or mechanical methods of precommercial or commercial size timber, without recovering value, to meet MFP standards relating to the protection/enhancement of adjacent forest or other resource values.

Notice of Availability - A notice of Availability published in the Federal Register stating that an EIS has been prepared and is available for review and comment (for draft) and identifying where copies are available.

Notice of Intent - A notice of Intent published in the Federal Register stating that an EIS will be prepared and considered. This notice will describe the proposed action and possible alternatives, the proposed scoping process, and the name and address of whom to contact concerning questions about the proposed action and EIS.

Noxious Weeds - Rapidly spreading plants that have been designated "noxious" by law which can cause a variety of major ecological impacts to both agricultural and wild lands.

Planned Ignition - A wildland fire ignited by management actions to meet specific objectives.

Prescribed Fire - Any fire ignited by management actions to meet specific objectives. A written, approved prescribed fire plan must exist, and NEPA requirements must be met, prior to ignition.

Prescription - A set of measurable criteria that guides the selection of appropriate management strategies and actions. Prescription criteria may include safety, economic, public health, environmental, geographic, administrative, social, or legal considerations.

Programmatic Biological Assessment - Assesses the effects of the fire management programs on Federally listed species, not the individual projects that are implemented under these programs. A determination of effect on listed species is made for the programs, which is a valid assessment of the potential effects of the projects completed under these programs, if the projects are consistent with the design criteria and monitoring and reporting requirement contained in the project description and summaries.

Reburn - Subsequent burning of an area in which fire has previously burned but has left flareable light that ignites when burning conditions are more favorable.

Riparian Habitat Conservation Areas (RHCA) - Portions of watersheds where riparian-dependent resources receive primary emphasis, and management activities are subject to specific standards and guidelines. RHCAs include traditional riparian corridors, wetlands, intermittent headwater streams, and other areas where proper ecological functioning is crucial to maintenance of the stream's water, sediment, woody debris, and nutrient delivery systems.

Riparian Management Objectives (RMO) - Quantifiable measures of stream and streamside conditions that define good fish habitat and serve as indicators against which attainment or progress toward attainment of goals will be measured.

Road Density - The volume of roads in a given area (mile/square mile).

Scoping - Identifying at an early stage the significant environmental issues deserving of study and de-emphasizing insignificant issues, narrowing the scope of the environmental analysis accordingly.

Seral - Refers to the stages that plant communities go through during succession. Developmental stages have characteristic structure and plant species composition.

Serotinous - Storage of coniferous seeds in closed cones in the canopy of the tree. Serotinous cones of lodgepole pine do not open until subjected to temperatures of 113 to 122 degrees Fahrenheit causing the melting of the resin bond that seals the cone scales.

Stand Replacing Fire - A fire that kills most or all of a stand.

Sub-basin - A drainage area of approximately 800,000 to 1,000,000 acres, equivalent to a 4th - field Hydrologic Unit Code.

Surface Fire - Fire which moves through duff, litter, woody dead and down, and standing shrubs, as opposed to a crown fire.

Watershed - The region draining into a river, river system, or body of water.

Wetline - Denotes a condition where the fireline has been established by wetting down the vegetation.

Wildland Fire - Any nonstructure fire, other than prescribed fire, that occurs in the wildland.

Wildland Fire Implementation Plan (WFIP) - A progressively developed assessment and operational management plan that documents the analysis and selection of strategies and describes the appropriate management response for a wildland fire being managed for resource benefits. A full WFIP consists of three stages. Different levels of completion may occur for differing management strategies (i.e., fires managed for resource benefits will have two-three stages of the WFIP completed while some fires that receive a suppression response may only have a portion of Stage I completed).

Wildland Fire Situation Analysis (WFSA) - A decision making process that evaluates alternative management strategies against selected safety, environmental, social, economic, political, and resource management objectives.

Wildland Fire Use - The management of naturally ignited wildland fires to accomplish specific prestated resource management objectives in predefined geographic areas outlined in FMP's. Operational management is described in the WFIP. Wildland fire use is not to be confused with "fire use", which is a broader term encompassing more than just wildland fires.

Wildland Fire Use for Resource Benefit (WFURB) - A wildland fire ignited by a natural process (lightning), under specific conditions, relating to an acceptable range of fire behavior and managed to achieve specific resource objectives.

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