Yellowstone County, Montana,

Community Wildfire Protection Plan

February 28, 2006

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

This plan was developed by the Yellowstone County Community Wildfire Protection 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

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Acknowledgments

This Community Wildfire Protection 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.

Yellowstone County Commissioners and the employees of Yellowstone County

State of Montana

USDI Bureau of Land Management

USDI Bureau of Indian Affairs

USDA Forest Service

Federal Emergency Management Agency

Montana Disaster and Emergency Services

USDI Bureau of Reclamation

Beartooth Resource Conservation & Development Council

Montana Fish, Wildlife, & Parks

Montana Department of Natural Resources and Conservation

City of Billings
City of Laurel
Town of Broadview
Yellowstone County Sheriff's Office
Yellowstone County Fire Departments
Yellowstone County Fire Districts
Yellowstone County Fire Service Areas
Deaconess Hospital
&
Local Businesses and Citizens of Yellowstone County

To obtain original copies of this plan contact:

Yellowstone County Commissioner's Office
Yellowstone County Courthouse
217 North 27th Street
Billings, Montana 59101

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Table of Contents

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Chapter I: Overview of this Plan and its Development

1 Introduction

This Community Wildfire Protection Plan for Yellowstone 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 Yellowstone County, Montana. This Community Wildfire Protection Plan is an amendment to the Yellowstone County Pre Disaster Mitigation Plan, which was approved by FEMA in January 2005. The Yellowstone County Commissioners led the planning team responsible for implementing this project. Agencies and organizations that participated in the planning process included:

- Yellowstone County Commissioners and County Departments
- Yellowstone County Fire Warden
- Yellowstone County Disaster and Emergency Services
- Montana Department of Natural Resources and Conservation
- USDI Bureau of Land Management (also providing funding through the National Fire Plan)
- USDA Forest Service
- USDI Bureau of Indian Affairs
- Yellowstone County Fire Departments
- Town of Broadview
- Big Sky Economic Development Authority
- Yellowstone County Fire Districts and Fire Service Areas
- City of Billings
- Deaconess Hospital
- USDI Bureau of Reclamation
- U.S. Department of Homeland Security
- Beartooth Resource Conservation and Development Council
- Montana Fish, Wildlife, & Parks
- City of Laurel
- USDA Natural Resources Conservation Service
- Montana Disaster and Emergency Services
- Northwest Management, Inc.

The Yellowstone County Commissioners solicited competitive bids from companies to provide the service of leading the assessment and the writing of the **Yellowstone County Community Wildfire Protection Plan**. The Commissioners selected Northwest Management, Inc., to provide this service. Northwest Management, Inc., is a professional natural resources consulting

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firm located in Helena, Montana. Established in 1984, 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 cover 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

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1.1.2 Additional State and Federal Guidelines Adopted

The Community Wildfire Protection 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 Community Wildfire Protection 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 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 Yellowstone County while facilitating new opportunities for pre-disaster mitigation funding and cooperation.

1.1.2.1 National Fire Plan

The goals of this Community Wildfire Protection 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 Community Wildfire Protection 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.

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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, Montana Governor Martz, as a member of the Western Governors' Association, helped develop 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' Association 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

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these programs on state-owned and private lands in Montana. NFP funding can also come directly from Department of Interior agencies.

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 (FWS, BIA, & BLM) 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 Fire Warden'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 Community Wildfire Protection 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.

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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 be an amendment to the Yellowstone County Pre Disaster Mitigation 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 representative
- Bureau of Indian Affairs
- Local Tribal leaders
- Division 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 community wildfire protection 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 community wildfire protection 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 Board 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.

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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.

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- **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, determine the community's willingness and readiness to actively participate in an identified project.
   - Third, determine 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.

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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 Yellowstone County Community Wildfire Protection 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 and Bureau of Land Management) with implementing wildfire mitigation projects in Yellowstone 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 Yellowstone 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 countywide Community Wildfire Protection Plan, a component of the County's All Hazards Pre-Disaster 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 Yellowstone 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 Yellowstone County.

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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 Yellowstone 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 Wildfire Protection Plan

1.1.3.2 Yellowstone County and City of Billings 2003 Growth Policy Plan

The Growth Policy Plan provides a vision for the County that indicates how it wants to develop and make public investments over the next 20 years. It analyzes land use, natural resources, public facilities, local services, population, economics, and housing to identify local issues and devise appropriate policies that will address those issues in a manner consistent with this vision. It provides the long-range focus to help decision-makers set priorities and evaluate whether development proposals are consistent with this vision. It is a tool to coordinate with other government agencies and to communicate to citizens and developers the vision of the community. The Plan provides the framework for regulatory updates, land use decisions, and public investments and will be an invaluable resource for the County as it enters the 21st Century.

The plan is a dynamic document that represents a continuous process of setting goals and establishing priorities on actions to achieve those goals. This plan provides for periodic updates and review of the plan. These updates will allow the County to reflect changing conditions and take advantage of new opportunities.

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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 Description of the Planning Process

The Yellowstone County Community Wildfire Protection 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 Yellowstone County. This included an area encompassing Big Horn, Treasure, Rosebud, Musselshell, Golden Valley, Stillwater, and Carbon Counties to insure a robust dataset for making inferences about fires in Yellowstone 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.

2.2 The Planning Team

Planning efforts were led by the Project Co-Directors, Dr. William E. Schlosser, Tera R. King, B.S., and Gary Ellingson, B.S., of Northwest Management, Inc. Dr. Schlosser's education includes 4 degrees in natural resource management (A.S. geology; B.S. forest and range management; M.S. natural resource economics & finance; Ph.D. environmental science and regional planning). Mrs. King and Mr. Ellingson both hold bachelor's degrees in Forest Resource Management.

They led a team of resource professionals, city and rural fire protection, law enforcement, State of Montana Disaster and Emergency Services, Montana Department of Natural Resources and Conservation, the Bureau of Land Management, and the Bureau of Indian Affairs; also included were fire mitigation specialists, resource management professionals, and hazard mitigation experts.

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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 adequately 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.

2.2.1 Multi-Jurisdictional Participation

CFR requirement §201.6(a)(3) calls for multi-jurisdictional planning in the development of community wildfire protection plans which impact multiple jurisdictions. This Community Wildfire Protection Plan is applicable to the following Jurisdictions:

- Yellowstone County, Montana
- City of Billings
- City of Laurel
- Town of Broadview

All of these jurisdictions were represented on the planning committee, in public meetings, and participated in the development of hazard profiles, risk assessments, and mitigation measures. The monthly planning committee meetings were the primary venue for authenticating the planning record. However, additional input was gathered from each jurisdiction in a combination of the following ways:

- Planning committee leadership visits to scheduled municipality public meeting (e.g., County Commission meetings, City Hall meetings) where planning updates were provided and information was exchanged.
- One-on-one visits between the planning committee leadership and the representatives of the municipality (e.g., meetings with County Commissioners, or City Councils in chambers).
- Special meetings at each jurisdiction by the planning committee leadership requested by the municipality involving elected officials (Mayor and County Commissioners, County Assessor, Sheriff), appointed officials (e.g. City Police, Disaster and Emergency Services Director), municipality employees, local volunteers (e.g., fire district volunteers), business community representatives, and local citizenry.
- Written correspondence was provided monthly between the planning committee leadership and each municipality updating the cooperators in the planning process, making requests for information, and facilitating feedback.

Planning committee leadership (referenced above) included: Jim Kraft, Yellowstone County Disaster and Emergency Services, Dr. William E. Schlosser and Tera King, of Northwest Management, Inc., Dianne Lehm from the Big Sky Economic Development Authority, and the Bureau of Land Management.

Like other rural areas of Montana and the USA, Yellowstone County's human resources have many demands put on them in terms of time and availability. Recognizing this, many of the

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jurisdictions decided to identify a representative from the jurisdiction to cooperate on the planning committee and then report back to the remainder of their organization on the process and serve as a conduit between the planning committee and the jurisdiction. This was the case with the Yellowstone County Commissioners where one of the Commissioners would attend the planning committee meetings as a regular attendee.

At the city level, the city mayors were represented in a variety of ways. The individual mayors commonly appointed a representative from the municipality to provide this representation on the committee meetings. For example, Jenny Johnson, Laurel City Councilperson represented the Mayor of the City of Laurel. The planning committee leadership provided communications and feedback with the municipality directly to insure the multi-jurisdictional planning necessitated by this process.

2.3 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.

2.3.1 News Releases

Under the auspices of the Yellowstone County Community Wildfire Protection Plan Committee, news releases were submitted to the local area newspapers, television stations, and radio broadcast networks. The following is an example of one of the press releases submitted during the planning process.

Yellowstone County Plans to Mitigate Wildfire Risk In and Out of Cities of Billings, Laurel and Broadview

Yellowstone County Commissioners have created a Wildland Fire Mitigation Plan Committee to complete a Wildfire Mitigation Plan for Yellowstone County as part of the National Fire Plan and Healthy Forests Restoration Act as authorized by Congress and the White House. The Wildfire Mitigation Plan, funded through a grant from the Bureau of Land Management (BLM), 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. (NWM) has been retained by Yellowstone County to provide wildfire risk assessments, mapping, field inspections, and interviews, and to collaborate with the committee to prepare the plan. The committee includes rural and wildland fire districts, land managers, elected officials, agency representatives, and others. NWM 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 Yellowstone County is to conduct a homeowner's survey. NWM, in cooperation with local fire officials, will mail a brief survey to randomly selected homeowners across the county seeking input 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 homeowners that receive a survey are asked to please take the time to complete it, thereby benefiting the community overall.

The planning team, along with commissioner participation, will be conducting public meetings to

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discuss preliminary findings and to seek public involvement in the planning process in early October. A notice on the date and location of these meetings will be posted in local newspapers.

For more information on the Fire Mitigation Plan for Yellowstone County contact Jim Kraft, Yellowstone County Disaster and Emergency Services Director at 406-256-2775 or Marv Jochems, Billings City Fire Chief at 406-657-8420.

2.3.2 Newspaper Articles

Committee and public meeting announcements were published in the local newspaper ahead of each meeting. The following are examples of newspaper announcements that ran in the *Billings Gazette*, the *Yellowstone County News,* and the *Laurel Outlook*.

Figure 2.1. *Billings Gazette* announcement published on September 28th, September 30th, and October 2nd, 2005.

Yellowstone County values your input!

Please join us to learn about the **Community Wildfire Protection Plan** and how you can protect yourself and your property from wildfire.

Yellowstone County Commissioners and the Wildfire Mitigation Committee are seeking public input and comment on the development of a Community Wildfire Protection Plan. Take this opportunity to review the preliminary findings, draft plan, provide input on historical data, and participate in discussions of at risk areas.

Laurel
Monday, October 3, 7 pm
Laurel Fire Hall

Billings
Tuesday, October 4, 9:30 am
Yellowstone County Courthouse
Room 403

Wednesday, October 5, 12:00 pm
Yellowstone County Courthouse
Room 105

Worden/Huntley/Shepherd
Tuesday, October 4, 7:00 pm
Worden VFW

Broadview
Wednesday, October 5, 7:00 pm
Broadview Community Center

Lockwood
Thursday, October 6, 7:00 pm
Lockwood School

For more information contact Jim Kraft, Yellowstone County Emergency and General Services Director and Fire Warden at 256-2775.

Community Wildfire Protection Plan is funded through a grant from the Bureau of Land Management

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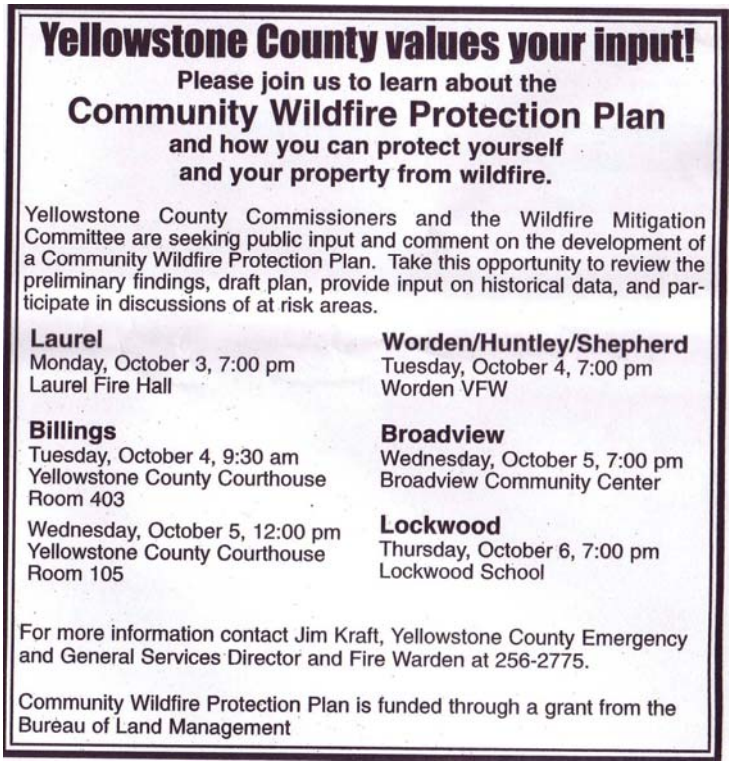
Figure 2.2. *Laurel Outlook* announcement published on September 28th, 2005.



Yellowstone County values your input!

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Community Wildfire Protection Plan

and how you can protect yourself and your property from wildfire.

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Lockwood School

For more information contact Jim Kraft, Yellowstone County Emergency and General Services Director and Fire Warden at 256-2775.

Community Wildfire Protection Plan is funded through a grant from the Bureau of Land Management

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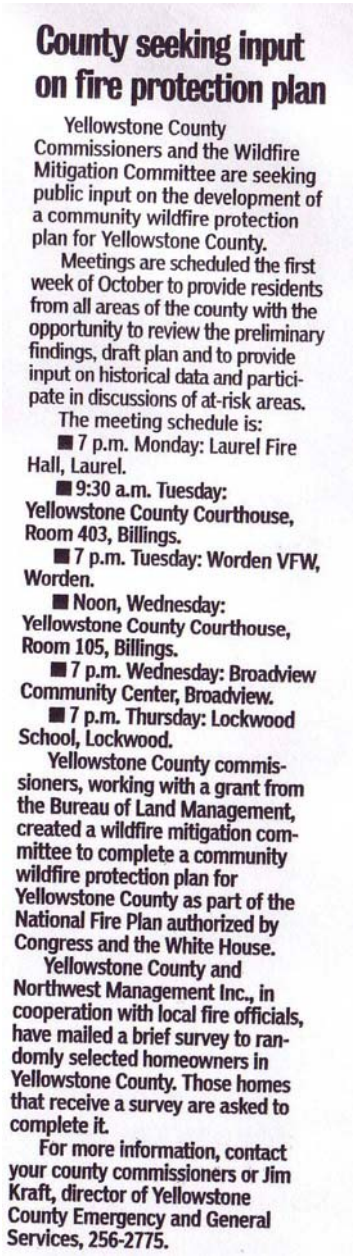
Figure 2.3. *Billings Gazette* article published on October 1st, 2005.



County seeking input on fire protection plan

Yellowstone County Commissioners and the Wildfire Mitigation Committee are seeking public input on the development of a community wildfire protection plan for Yellowstone County.

Meetings are scheduled the first week of October to provide residents from all areas of the county with the opportunity to review the preliminary findings, draft plan and to provide input on historical data and participate in discussions of at-risk areas.

The meeting schedule is:

- 7 p.m. Monday: Laurel Fire Hall, Laurel.
- 9:30 a.m. Tuesday: Yellowstone County Courthouse, Room 403, Billings.
- 7 p.m. Tuesday: Worden VFW, Worden.
- Noon, Wednesday: Yellowstone County Courthouse, Room 105, Billings.
- 7 p.m. Wednesday: Broadview Community Center, Broadview.
- 7 p.m. Thursday: Lockwood School, Lockwood.

Yellowstone County commissioners, working with a grant from the Bureau of Land Management, created a wildfire mitigation committee to complete a community wildfire protection plan for Yellowstone County as part of the National Fire Plan authorized by Congress and the White House.

Yellowstone County and Northwest Management Inc., in cooperation with local fire officials, have mailed a brief survey to randomly selected homeowners in Yellowstone County. Those homes that receive a survey are asked to complete it.

For more information, contact your county commissioners or Jim Kraft, director of Yellowstone County Emergency and General Services, 256-2775.

Figure 2.4. *Billings Gazette* article published on October 7th, 2005.

County drafting wildfire strategy

By BECKY SHAY
Of The Gazette Staff

Wildfire can be a formidable foe and the chance to fight it may be closer than you think.

To help residents and responders be prepared for the wildfires, Yellowstone County is working on a Community Wildfire Protection Plan.

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The document and projects will fit into the county's "all hazards plan" that was completed last year and covers potential problems as minor as hail and as devastating as terrorism, said to Tera King, who works for the county's consultant, Northwest Management Inc.

A committee of about 70 people has worked to develop the plan, which identifies areas that are at the most risk for fires that could damage private and public lands, buildings and infrastructure.

King said the committee hopes to hear from residents if they think there are areas that are not included or that should be made priorities.

Some of the projects areas identified so far include lands located in and around Buffalo Trail and Clapper Flats in the Laurel area, Echo Canyon toward Molt, Alkali Creek and Rehberg Ranch in the Billings area, areas in Blue Creek, Emerald Hills near Lockwood, High Trails in the Pryor Creek area, and Pleasant Hollow north of Shepherd.

King said work will include education and awareness efforts and thinning projects. The key to implementing the plan, she said, will be getting landowners to be proactive and take some responsibility to reduce risks, such as by thinning dying trees and removing brush around their buildings. Other objectives in the plan are to equip and train fire departments, she said.

"What we're trying to do is be prepared before we actually have a catastrophic fire," King said.

It is easier, and cheaper, to be prepared and mitigate fire hazards than to try to rehabilitate after a blaze, King said.

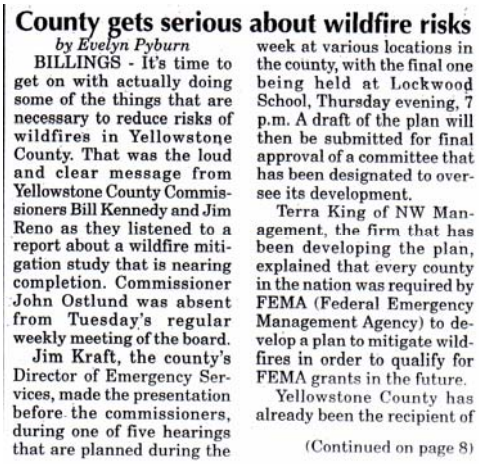
The plan is still being developed but should be reviewed by the committee at the end of this month. The draft plan will be made public in late November, and residents will have another chance to comment. King said she hopes the county commissioners and local city councils will be able to adopt the plan by early next year.

Several state and federal agencies that are partners in the plan will also sign off, she said. It will then become part of those agencies' fire planning documents.

Once local governments adopt the plan, the county will be eligible for more grant money, including funding from the Federal Emergency Management Agency, King said.

The county has already received $170,000 through the Bureau of Land Management. The grant is paying for the assessments and developing the draft plan. After paying the consultant, the county should have $100,000 to $110,000 to use for project work, said Jim Kraft, the county's director of emergency and general services, whose office is overseeing the plan.

Figure 2.5 *Yellowstone County News* article published on October 7th, 2005.



County gets serious about wildfire risks

by Evelyn Pyburn

BILLINGS - It's time to get on with actually doing some of the things that are necessary to reduce risks of wildfires in Yellowstone County. That was the loud and clear message from Yellowstone County Commissioners Bill Kennedy and Jim Reno as they listened to a report about a wildfire mitigation study that is nearing completion. Commissioner John Ostlund was absent from Tuesday's regular weekly meeting of the board.

Jim Kraft, the county's Director of Emergency Services, made the presentation before the commissioners, during one of five hearings that are planned during the week at various locations in the county, with the final one being held at Lockwood School, Thursday evening, 7 p.m. A draft of the plan will then be submitted for final approval of a committee that has been designated to oversee its development.

Terra King of NW Management, the firm that has been developing the plan, explained that every county in the nation was required by FEMA (Federal Emergency Management Agency) to develop a plan to mitigate wildfires in order to qualify for FEMA grants in the future.

Yellowstone County has already been the recipient of

(Continued on page 8)

Wildfire...

(Continued from page 1)

some pretty hefty grants that the commissioners want to direct to addressing the priorities that have been identified in the county as needed to reduce the potential of wildfire destruction.

In September 2003 the Bureau of Land Management awarded the county $43,000 for Hazardous Fuel Reduction projects and another $100,000 for planning efforts. Subsequently, $10,045 and another $17,170 in grants were awarded for a regional educational awareness campaign for total awards to the county of $170,215. Approximately $36,300 has been spent on the study.

"I would favor one less plan and have trees and brush gone," said Commissioner Reno.

"I would agree," said Commissioner Kennedy. "We need to prioritize."

Kennedy asked about the prospects of getting additional grants. Diane Lehm with the Big Sky Economic Development Authority, an agency which was contracted with to administer the grants, explained that there were more grants available. The size and terms of the grants are dependent upon the project for which they are applied, she said. A typical grant size might be $30,000 or $40,000, she suggested.

A top priority in the county which emerged from the study is the need for dry hydrants (dry hydrants are not the least bit dry, in that they are water storage units). Other needs included such things as tree removal, signage, equipment, training and education.

The county already has some dry hydrants, explained Kraft, some of which were built by the fire districts. Another 10 to 20 were identified as being needed in the study. Dry hydrants are often required, now, in the development of subdivisions.

Reno asked about the availability of grants to build the hydrants, and whether they required matching funds. Kraft said that grant money is available for that, and in some cases it's available with only a 10 percent required match, which could be beneficial to defray costs for subdivisions.

Lehm emphasized the importance of education and information "so the homeowners understand how to mitigate their risks." Areas in which property is particularly at risk to the threat of wildfires include Emerald Hills, Briarwood, Rehberg Estates, Buffalo Trail, Pleasant Hallow, Echo Canyon and Clapper Flats.

Meetings that have already been held regarding the wildfire plan have drawn strong interest from among homeowners in those areas, said commissioners.

Kraft said that they plan to make a lot of information available to the homeowners in such areas with "the idea to convince them to make their home defensible."

Kennedy noted that in several areas property owners indicated an interest in having the same kind of permanent fire ban that is imposed in Emerald Hills.

A citizen present at the meeting, Bob Fears, spoke in opposition to that idea, pointing out that controlled burning is one means of mitigating fire risks. He said that he is the Fire Committee Chairman for the Yellowstone Rifle Club on Molt Road. "We use fire as a mitigating tool," he said, noting that in 50 years they never had to worry much about the threat of fires. It's only been in the last three years, he said, that they have done controlled burns to reduce fuel levels. They also closed the club for 90 days, much to the consternation of their membership.

He said their biggest concern is neighbors who do not do anything to reduce the fire danger, and those neighbors include the City of Billings with Phipps Park and CRP land "where weeds are pocket high."

"We would like to see a requirement that CRP holders create fire breaks around their land," he said, adding, "We are ahead of the curve and would not like to get caught up in regulations that would not allow us to continue."

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Figure 2.6 *Yellowstone County News* article published on December 9th, 2005.

County seeks comments on proposed Community Wildfire Protection Plan

BILLINGS - The Yellowstone County Community Wildfire Protection Plan has been completed in draft and is available to the public for review and comment at locations throughout the county.

The plan includes risk analysis at the community level with predictive models for where fires are likely to ignite and where they are likely to spread once ignited. The coordination for this effort is being provided by Jim Kraft, Yellowstone County Disaster and Emergency Services (DES) Director with funding from a Bureau of Land Management grant. The committee includes rural and wildland fire districts, land managers, elected officials, agency representatives and others.

The draft plans will be available in the communities of Billings, Laurel, Broadview, Huntley, Shepherd, Lockwood, Molt, Custer and Worden, as well as on the Yellowstone County website at www.co.yellowstone.mt.us/.

For more information on the plan or if you have questions, contact Jim Kraft, Yellowstone County DES Director at 256-2775.

Draft Plans will be available at the following locations Dec. 2, 2005- Jan. 11, 2006:

Department of Disaster and Emergency Services
Yellowstone County Courthouse
217 North 27th, Room 312
Billings, MT 59101

Billings Library
City and County Planning Office
4th Floor
510 North Broadway
Billings, MT 59101

Huntley Post Office
155 Northern Avenue
Huntley, MT 59037

Shepherd Post Office
5450 Carey Avenue
Shepherd, MT 59079

Custer Post Office
413 2nd Avenue
Custer, MT 59024

Lockwood Fire District
3329 Driftwood Lane
Billings, MT 59101

Figure 2.7 *Billings Gazette* article published December 18th, 2005.

Yellowstone County wants your input!

The Yellowstone County Community Wildfire Protection Plan has been completed and is available for public review and comment at the listed locations:

Department of Disaster and Emergency Services
Yellowstone County Courthouse
217 N 27th St., Room 312
Billings, MT 59101

Custer Post Office
413 2nd Avenue
Custer, MT 59024-9759

Worden Post Office
2427 Main Street
Worden, MT 59088-2227

Broadview Community Center
Broadview, MT 59015

Prairie Wind Cafe
110 Wolfskill Avenue
Molt, MT 59057

Billings Library City and County Planning Office
4th Floor
510 N Broadway
Billings, MT 59101

Laurel City Hall
115 West 1st Street
Laurel, MT 59044

Shepherd Post Office
5450 Carey Avenue
Shepherd, MT 59079-9701

Lockwood Fire District
3329 Driftwood Lane
Billings, MT 59101

Huntley Post Office
155 Northern Avenue
Huntley, MT 59037-9701

web site: http://www.co.yellowstone.mt.us

For more information or to comment on the plan, contact Jim Kraft, Yellowstone County Disaster (DES) Director at (406) 256-2775.

Community Wildfire Protection Plan is funded through a grant from the Bureau of Land Management

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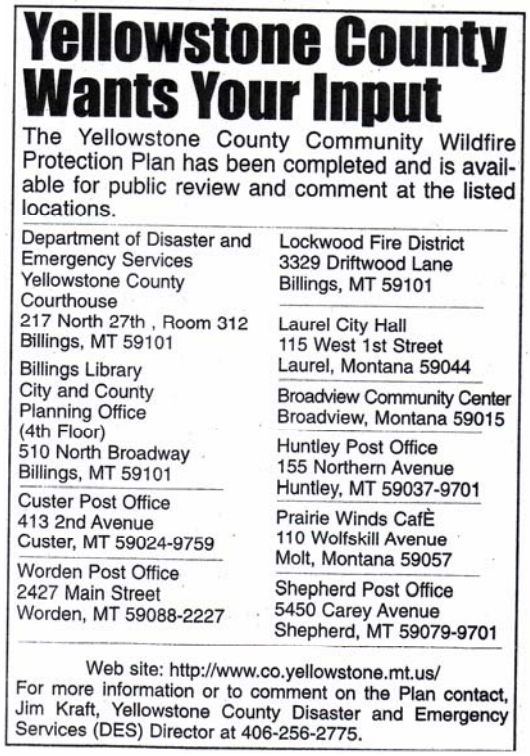
Figure 2.8 *Laurel Outlook* article published December 21st, 2005.



Yellowstone County Wants Your Input

The Yellowstone County Community Wildfire Protection Plan has been completed and is available for public review and comment at the listed locations.

Department of Disaster and Emergency Services
Yellowstone County Courthouse
217 North 27th , Room 312
Billings, MT 59101

Billings Library
City and County Planning Office
(4th Floor)
510 North Broadway
Billings, MT 59101

Custer Post Office
413 2nd Avenue
Custer, MT 59024-9759

Worden Post Office
2427 Main Street
Worden, MT 59088-2227

Lockwood Fire District
3329 Driftwood Lane
Billings, MT 59101

Laurel City Hall
115 West 1st Street
Laurel, Montana 59044

Broadview Community Center
Broadview, Montana 59015

Huntley Post Office
155 Northern Avenue
Huntley, MT 59037-9701

Prairie Winds CafÈ
110 Wolfskill Avenue
Molt, Montana 59057

Shepherd Post Office
5450 Carey Avenue
Shepherd, MT 59079-9701

Web site: http://www.co.yellowstone.mt.us/
For more information or to comment on the Plan contact, Jim Kraft, Yellowstone County Disaster and Emergency Services (DES) Director at 406-256-2775.

Figure 2.9 *Yellowstone County News* article published December 23rd, 2005.

Yellowstone County Wants Your Input

The Yellowstone County Community Wildfire Protection Plan has been completed and is available for public review and comment at the listed locations.

Department of Disaster and Emergency Services
Yellowstone County Courthouse
217 North 27th, Room 312
Billings, MT 59101

Billings Library
City and County Planning Office (4th floor)
510 North Broadway
Billings, MT 59101

Custer Post Office
413 2nd Avenue
Custer, MT 59024-9759

Worden Post Office
2427 Main Street
Worden, MT 59088-2227

Lockwood Fire District
3329 Driftwood Lane
Billings, MT 59101

Laurel City Hall
115 West 1st Street
Laurel, MT 59044

Broadview Community Center
Broadview, MT 59015

Huntley Post Office
155 Northern Avenue
Huntley, MT 59037-9701

Prairie Winds Cafe
110 Wolfskill Avenue
Molt, MT 59057

Shepherd Post Office
5450 Carey Avenue
Shepherd, MT 59079-9701

Web Site: http://www.co.yellowstone.mt.us/

For more information or to comment on the plan, contact Jim Kraft, Yellowstone County Disaster and Emergency Services (DES) Director, at 406-256-2775.

2.3.3 Public Mail Survey

In order to collect a broad base of perceptions about wildland fire and individual risk factors of homeowners in Yellowstone County a mail survey was conducted. The survey was completed during 2005. Using the cadastral database of landowners in Yellowstone County, homeowners from the county were identified. Approximately 250 residents of Yellowstone County were randomly selected to receive mail surveys.

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The public mail survey developed for this project has been used in the past by Northwest Management, Inc., during the execution of other Hazard Mitigation Plans. The survey used The Dillman 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 the Appendices.

The first in the series of mailings was sent September 21st, 2005, and included a cover letter, a survey, and an offer of receiving a custom GIS map of the area of their selection in Yellowstone 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 October 4th, 2005, encouraging their response. A final mailing, with a revised cover letter urging with them to participate, was sent to non-respondents on October 11th, 2005.

Surveys were returned during the months of September, October, November, and December. A total of 125 residents responded to the survey as of January 10th, 2006. The effective response rate for this survey was 50%. Statistically, this response rate allows the interpretation of all of the response variables significantly at the 99% confidence level.

2.3.3.1 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.

Of the 125 respondents in the survey, approximately 25% were from the Billings area, 16% from Huntley, 15% were from Shepherd, 14% from Laurel, 8% from Ballantine, 8% from Worden, with the remaining respondents from other areas in the county.

The vast majority of the respondents (98%) correctly identified that they have emergency telephone 911 services in their area. When asked if their home was protected by a local fire department 13% *incorrectly* responded that they did not. Of the 87% that said they were protected, 26% said that the average response time by a fire department to their home was less than 10 minutes, 48% thought the average response time was between 10 and 20 minutes, and 20% of respondents thought that a fire department would be there within 20 to 30 minutes.

Respondents were asked to indicate the type of roofing material covering the main structure of their home. Approximately 67% of respondents indicated their homes were covered with a composite material (asphalt shingles). About 19% indicated their homes were covered with a metal (e.g., aluminum, tin) roofing material and 10% of the respondents indicated they have a wooden roofing material such as shakes or shingles.

When asked how many trees were within 250 feet of their homes 6% said none, 38% indicated less than 10, 40% said between 10 and 25, and 15% indicated more than 25. When asked how many were within 75 feet, 59% responded less than 10, 27% said between 10 and 25, and only 6% said more than 25. 89% of respondents replied that they had a lawn and 89% of those that had a lawn keep it green year round.

The average driveway length of respondents to the survey was 441.5 feet long (0.08 miles). The longest reported was 10,560 feet (2.0). Of those respondents (6%) with a driveway over ½ mile long, about half, 53%, do not have turnouts allowing two vehicles to pass. 7% of those respondents with a driveway indicated having a dirt surface, while 68% had gravel or rock and 25% had a paved driveway. Approximately 73% of the respondents indicated an alternate escape route was available in an emergency which cuts off their primary driveway access.

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100% of respondents indicated they have some type of tools to use against a wildfire that threatens their home. Table 2.1 summarizes these responses.

Table 2.1. Percent of homes with indicated fire fighting tools in Yellowstone County.

97% – Hand tools (shovel, Pulaski, etc.)

23% – Portable water tank

14% – Stationery water tank

27% – Pond, lake, or stream water supply close

13% – Water pump and fire hose

82% - Well or cistern

19% – Equipment suitable for creating fire breaks (bulldozer, cat, skidder, etc.)

Respondents were asked to complete a fuel hazard rating worksheet to assess their home's fire risk rating. The following is an example of the worksheet and a summarization of responses (Table 2.2).

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

Table 2.2. Fuel Hazard Rating Worksheet		**Rating**
Fuel Hazard	Small, light fuels (grasses, forbs, weeds, shrubs)	1
	Medium size fuels (brush, large shrubs, small trees)	2
	Heavy, large fuels (woodlands, timber, heavy brush)	3
Slope Hazard	Mild slopes (0-5%)	1
	Moderate slope (6-20%)	2
	Steep Slopes (21-40%)	3
	Extreme slopes (41% and greater)	4
Structure Hazard	Noncombustible roof and noncombustible siding materials	1
	Noncombustible roof and combustible siding material	3
	Combustible roof and noncombustible siding material	7
	Combustible roof and combustible siding materials	10
Additional Factors	Rough topography that contains several steep canyons or ridges	+2
	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

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Table 2.3. Percent of respondents in each risk category as determined by the survey responses.
00% – Extreme Risk = 26 + points
02% – High Risk = 16–25 points
42% – Moderate Risk = 7–15 points
56% – Low Risk = 6 or less points

Respondents were asked a series of questions regarding mitigation activities they had recently done or currently do on their property. The first question asked if they conducted a periodic fuels reduction program near their home; about half; 49% said that they did. Respondents were also asked if livestock was grazed around their home and 40% indicated that there was.

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 share with homeowners how to reduce the potential for casualty loss surrounding your home?" A strong majority, 59% of respondents, indicated a desire to participate in this type of training.

Homeowners were also asked, "How Hazard Mitigation projects should be funded in the areas surrounding homes, communities, and infrastructure such as power lines and major roads?" Responses are summarized in Table 2.4.

Table 2.4. Public Opinion of Hazard Mitigation Funding Preferences.

	100% Public Funding	Cost-Share (Public & Private)	Privately Funded (Owner or Company)
Home Defensibility Projects →	22%	40%	38%
Community Defensibility Projects →	51%	43%	6%
Infrastructure Projects Roads, Bridges, Power Lines, Etc. →	69%	22%	9%

We wish to thank all Yellowstone County residents completing and returning these surveys.

2.3.4 Committee Meetings

The following list of people who participated in the planning committee meetings, volunteered time, or responded to elements of the Yellowstone County Community Wildfire Protection Plan's preparation.

NAME **ORGANIZATION**

- Alan Riley.....Lockwood Fire District #8
- Annette Cabrera .....Yellowstone County GIS
- Aura Lindstrand .....Yellowstone County/City Planning
- Bill Kennedy.....Yellowstone County Commissioner
- Bob Meidinger.....Bureau of Land Management
- Bob Fears .....Yellowstone Rifle Club
- Bryan Juhas.....Broadview City Council
- Daniel Krum .....Worden Fire District #4
- Darrell Kurk.....Department of Natural Resources and Conservation
- Dena Lang .....Bureau of Land Management

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- Dianne Lehm ..... Big Sky Economic Development Authority
- E. J. Jensen ..... Huntley Project Fire Service Area
- Eric Chapman ..... Bureau of Land Management
- Eric Gilsrud ..... City of Billings Forester
- Gary Colley ..... Laurel Volunteer Fire Department
- George Richards..... Shepherd Fire Department
- Greg Smith..... Molt Volunteer Fire Department
- Irv Leach ..... Bureau of Land Management
- Jack Welsh ..... Billings Urban Fire Service Area
- Jan Wheeler..... Department of Natural Resources and Conservation
- Jenny Johnson..... City of Laurel
- Jim Kraft..... Yellowstone County Disaster and Emergency Services
- Jim Roessler ..... Bureau of Indian Affairs
- Jim Ziegler ..... Laurel Volunteer Fire Department
- John Ostlund..... Yellowstone County Commissioner
- John Raisler ..... Department of Natural Resources and Conservation
- Jon Rutt ..... Laurel Fire District #5
- JT Smith..... Beartooth Resource Conservation and Development Council
- Keith Bauer ..... Blue Creek Fire Service Area
- Kenneth Kaufman ..... Shepherd Fire Service Area
- Larry Johnson ..... Broadview Fire District #3
- Lloyd Weber..... Laurel Fire District #7
- Marv Jochems ..... Billings Fire Department
- Michael Jansen..... Broadview Fire District #3
- Mike Dannenberg ..... Bureau of Land Management
- Mike Linder ..... Yellowstone County Sheriff's Office
- Mike Spini ..... Billings Fire Department
- Monte Dvorak ..... Worden Volunteer Fire Department
- Paul Aaby ..... Blue Creek Fire Service Area
- Rick Cortez III ..... Blue Creek Volunteer Fire Department
- Robby Badgett ..... Broadview Fire District #3
- Robert Guenther ..... Lockwood Fire District
- Roger Boss ..... Yellowstone County Park Board
- Sandy Brooks ..... Bureau of Land Management
- William Cummins ..... Lockwood Fire District #8

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- William Jones.....Broadview Fire District #3
- David McKinney.....Lockwood Fire District #8

2.3.4.1 Committee Meeting Notes

Committee Meetings were scheduled and held on the dates indicated with each entry. This information is useful to observe what topics were discussed, who participated, and the source of recommendations made in this planning process.

2.3.4.1.1 August 18th, 2005 – Yellowstone County Courthouse

Jim Kraft, Yellowstone County Department of Emergency Services, opened the meeting and explained that funds had been obtained from the Bureau of Land Management (BLM) to assist Yellowstone County with the development of a Wildfire Mitigation Plan. The purpose of the plan is to identify were wildfire hazards exist and to identify ways that existing hazards can be mitigated. Hopefully the plan will assist with the goal to develop "firewise subdivisions" within the county. Tera King and Gary Ellingson, staff members of Northwest Management, Inc (NMI) were introduced. NMI is a natural resource consulting firm and was selected to assist Yellowstone County with the development of its Wildfire Mitigation Plan.

Tera King asked audience members to introduce themselves to begin the meeting. An Attendance Roster, Meeting Agenda, and Timeline for Completion were distributed to attendees.

Tera presented a power point presentation (see attached) that provided an overview of the process involved with the development of a Wildfire Mitigation plan. Tera then distributed the draft Community Assessments and encouraged committee members to provide comments as their input is vital if the planning process is to be successful.

Several committee members offered comment during the presentation.

Comments included:

- It's important that the committee define the wildland urban interface boundary. The boundary determination will not be strictly based on a mathematical equation.
- The community name of Shepherd (check spelling!) is spelled incorrectly.
- Lockwood should have a community assessment completed.
- Blue Creek and Duck Creek should be treated as separate communities.
- Documents associated with the mitigation plan should be made available on the county website (community assessments, public survey, etc.).

Tera distributed the draft Yellowstone County Fire Mitigation Plan Survey that will be mailed to approximately 235 households (probably more to account for the large population of Billings) in Yellowstone County. Committee members were asked to review the document and submit their comments to Jim Kraft Yellowstone County Disaster and Emergency Services (DES) Director by Friday, August 26th. The survey will be mailed out the following week.

Comments regarding the survey included:

- The survey seems to focus on homeowners and "backyard type" wildfire hazards. It's important to consider completing risk assessments for outlying areas on other ownerships.

Tera distributed a draft Press Release for comment by the committee. Additional written comments should be provided to Jim Kraft by August 26, 2005.

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Comments regarding the press release included:

- The survey could be mentioned in the press release and should be made available on the county website so that volunteers could complete it.
- Yellowstone County can make arrangements for distribution of the press release.
- The press release should mention that project funding was provided by the BLM.
- The City of Billings should be mentioned so that city residents know that they are included in the process.

Tera went on to review the timeline for completion of the mitigation plan and proposed meeting dates.

Comments regarding the proposed timeline included:

- The proposed public meeting dates are Oct 4-6 or the week prior.
- Evening meetings are preferred.
- Suggested locations for public meetings are: Huntley-Worden, Lockwood, Billings, Broadview, Custer, Blue Creek/Duck Creek, Laurel, and Shepherd.
- The press release for public meetings should include a map that indicates the meeting locations and shows residents that if they live within that area indicated on the map that the meeting pertains to them.
- The county commissioners meet on Tuesday mornings at 9:30 am and this would be a good time to present information that is to be presented at the public meetings.

Tera distributed a draft vision statement. Comments or changes to the vision statement should be submitted to Jim Kraft by August 26th.

The meeting ended with a general discussion regarding the planning process of the Wildfire Mitigation Plan. The next committee meeting was slated for September 15th, 2005.

2.3.4.1.2 September 15th, 2005 – Deaconess Billings Clinic

Tera King of Northwest Management, Inc. began the meeting by making introductions and passing around a sign in sheet. There were several housekeeping items on the agenda before the committee broke into working groups. The public survey has been modified and will be mailed by September 20th. There has also been several edits to the community assessments, which have been incorporated to date. Comments and edits on the assessments can still be sent to Tera at Northwest Management, Inc. There has been some response by the fire departments on the Resources and Capabilities surveys, but Tera will begin calling departments who have not sent there's in next week.

Public meeting dates were proposed for the week of October 3rd – 6th with the following schedule.

Date	Target Community	Tentative Location	Time
October 3	Laurel	Laurel Fire Hall	7 pm
October 4	Billings	Commissioner's Office (televised)	9 am
October 4	Huntley/Worden/ Shepherd/Custer	Worden Elementary Cafeteria	7 pm

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October 5	Broadview	Broadview Community Center	7 pm
October 6	Lockwood/Blue Creek/Emerald Hills	Lockwood School	7 pm

The final item on the agenda was a short presentation by Bill Schlosser of NMI explaining the features of the newly developed wall maps. Maps covered were: ownership, past fire history, historic fire regime, fire regime condition class, current fire severity, fire prone landscapes, wildland-urban interface, fire service areas, and topographic relief. During the discussion, it was pointed out that the past fire history for the county was limited. Jim Kraft mentioned that it would be beneficial to take the map to the Rural Fire Council meeting next Tuesday. Bill will send the information to Annette Cabrera, County GIS Department, who will make maps for this purpose.

After this discussion and question period, the committee broke into four groups focused on different areas of Yellowstone County. The goal of the groups was to identify hazardous areas, outline projects, and discuss the components of the significant infrastructure throughout the County. One topic that came up frequently was the role of the County's fire departments and their needs. The following notes were compiled from the each group's notes.

Broadview Group –

- Communications – need a repeater closer to the Broadview community
- There is a need to require new subdivisions to install water resources for fire suppression, i.e. dry hydrants, storage tanks, etc.
- Minimum road width standards are believed to be adequate across the County
- Buffalo Trail Area – Main County road is adequate. Most private roads are inaccessible to anything larger than a 1-ton truck. There are 100+ homes and structures located in this area, which is characterized by steep canyon walls and wildland vegetation. There are only two ways into this entire subdivision. Clappers Flat Subdivision is in the same situation, which contains 63 homes.
- Need a minimum countywide standard on private roads for emergency access. There are numerous areas across the county that are accessed via one-way in, one-way out.
- CRP lands – need to be able to treat to help reduce fire potential
- Broadview FD #3 does not respond to structural fires. They need to establish structural capabilities; however, there are several limitations; including lack of manpower and volunteers, lack of equipment, no personal protective equipment, and they lack a facility in which to house additional equipment.
- LUFSA needs new Type 3 WUI pumper truck, but their communication system is in good condition due to past grant. Communications with State DNRC is good, but an annual meeting would be helpful.
- Rural addressing is in progress and going well.
- Future issues – water availability and access in outlying subdivisions
- Lockwood/Emerald Hills has poor access and water availability

Laurel Group –

- There is a new substation on northern part of Laurel off Airport Road and a new subdivision northwest of Laurel.
- The intersection of Duck Creek Road and River Road has a history of past fire ignitions. There are a lot of new homes within this area.

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- Clappers Flat – one way in and generally poor roads (inaccessible for standard pumper trucks). People in this area may be resistant to defensible space or other mitigation projects. This area also needs more water resources within the subdivision. Clapper Flats is approximately 7-8 miles from Laurel.
- Laurel FD needs 4x4 WUI pumper and a 1500-2000 gallon water tender.
- Duck Creek Road – there are a lot of new homes in the coulees
- Laurel VFD #8 protects the northern tip of Carbon County. There are two tanks in this area.
- Buffalo Trail – lots of expensive homes in the area. It takes over 20 minutes to get there from Laurel VFD. There are also address and signage issues in this area.
- City of Laurel needs an ambulance.
- There is a need for roadside fuel mitigation along many of the high risk roads.
- Education/Awareness – need training of the public of wildfire issues through the Fire Marshall office.

Huntley/Shepherd/Worden/Custer –

- Pryor Creek Subdivision south of Huntley – needs funding for dry hydrants and a 10,000 gallon storage tank.
- Need river access for dry hydrant near new bridge west of Pompey's Pillar.
- Need to install a buried 10,000 gallon tank at spring on W. Arrow Creek south of Ballantine.
- White Buffalo and Shadow Canyon RFD did home-to-home assessments
- Shadow Canyon could use fuel reduction project in brushy areas.
- Need a truck in the north end of district (Worden). DNRC Type 6 engine could sit at Clair Tempero's farm house.

Greater Billings Area –

- Lockwood maintains a wildland fire public education program
- County/City of Billings has revised their subdivision regulations
- Railroads tend to ignite several fires. The interstates also get a lot of ignitions.
- Most of the transmission lines throughout the County are on wooden poles; however, the high tension lines are metal.
- The BLM recreational pieces along the river may be a source of ignitions; however, this is rare. They would recommend that these areas are kept clean with developed camp sites and fire or barbeque pits.
- Billings FD has a regular inspection program for new construction homes that checks for access and wildland fuel issues.
- Lockwood FD has made a proposal to build an 8-10 bay facility.
- Several areas throughout the County have developed Neighborhood Plans, which helps make plans for future development.
- The Shepherd FD would like to construct a satellite station in the Hidden Lake subdivision. This would consist of a warm shed with a truck. The Shepherd FD already maintains 7 dry hydrants in the area.
- County/City of Billings can govern all subdivisions in the County, but they cannot govern use of private property. The committee would like to recommend Countywide Zoning (Annette has current zoning layer).
- Rehberg Project Area – defensible space, thinning of neighboring coulees, and education

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- Emerald Hills Project Area – address access issues, defensible space, community defensible space, and education
- Alkali Creek Project Area – (developing area) address access issues, defensible space, and education
- Pine Hills Project Area – education
- Briarwood Project Area – some defensible space projects and education
- Pleasant Hollow Project Area – defensible space, address access on private drives, and some defensible space
- Indian Cliffs Project Area – thinning and defensible space
- Echo Canyon Project Area – education
- Secret Valley Project Area – address access issues (too steep) and education
- Hill Estates Project Area – (developing 40 lots and 1 dry hydrant) education and some defensible space
- High Trails Project Area – address access issues (too steep), some defensible space, and education
- Subdivisions on Jellison Road need annexed into the Blue Creek Fire Service Area

The next committee meeting will be on Wednesday October 19th. Reminder letters and emails with more information will be sent out prior to the meeting.

2.3.4.1.3 October 19th, 2005 – Billings Deaconess Hospital, Fortin Conference Center

William E. Schlosser, Northwest Management, Inc., opened the meeting (sign-in sheet was passed around). Pizza and beverages were available.

The purpose of the meeting was to go through the DRAFT Committee Review of the Yellowstone CWPP. Dr. Schlosser explained that the plan is not ready for distribution to the general public, and that this draft is the first time everyone on the committee has seen all of the components of the plan in one document. The dates of the committee review were set for October 20 through November 15. The committee will meet again on November 17 to review the public review draft, which will be available to the general public (and all committee members) until December 12th.

Each section of the document was talked about with discussions focusing on risk assessments, hazard profiles, community assessments and treatment priorities. The actual prioritization of the projects was discussed at length and it was agreed that the scoring criteria detailed in the recommendations section would be completed for all listed projects.

Edits were discussed and Dr. Schlosser asked everyone to reference the section of the document as opposed to the page number when sending in comments. Comments can be sent either to NMI or to Jim Kraft. Everyone was asked to have comments sent before November 15.

Requests for additional data were made of the committee. Dr. Schlosser said NMI would complete missing data concerning fire ignitions and extents. The supply of additional fire ignition data from the rural fire districts has been terrific as the fire districts have provided a lot of additional fire ignition data. NMI is working on digitizing this information and summarizing it for the plan. It will be available in the next draft version for public review.

The next meeting was set for November 17, 6:00 PM in Billings to review the Public Review Draft of the plan.

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2.3.4.1.4 November 17th, 2005 – Emergency Operations Center in Billings

The meeting was called to order by Tera King of Northwest Management, Inc. at 6pm. The purpose of this committee meeting was to discuss the logistics of putting the Draft CWPP out for public review for the month of December. In order to accomplish this Tera asked for possible locations in each town for the document to be available for viewing by local citizens. The list decided on by the committee was as follows:

- Billings County Courthouse
- Yellowstone County Website
- Billings City Hall
- Laurel City Hall
- Broadview Community Center
- Shepherd High School Office
- Yellowstone County News in Huntley
- Custer School Library
- Worden School Central Office
- Lockwood Fire House
- Prairie Winds Café in Molt

The second item on the agenda was to go over significant changes to the Draft document since the last meeting including all of the comments and edits received from committee members. A brief summary of these changes includes: additional Resources and Capabilities sections from fire departments, additional wildfire extent and profile information, public survey results, prioritization and ranking of projects in Chapter 5, BIA information, updated lists of cooperators and logos, and the addition of the Molt community assessment. All of the maps and prioritization tables were also added to the Appendices document.

In further discussions the committee requested that an Executive Summary be written for the Commissioners before they sign the final plan. The committee would also like to have fuel mitigation along roads separated from the home defensibility project areas in the recommendations and prioritization. It would also be helpful if we listed in the wildfire profile how many ignitions each fire department was experiencing each year.

At the conclusion of the meeting, it was decided that the public review period should be left open until after the first of the year in order to accommodate the holiday season; thus, the next meeting date was not identified at this time.

2.3.5 Public Meetings

Public meetings were scheduled in a variety of communities in Yellowstone County during the hazard assessment phase of the planning process. Public meetings were scheduled to share information on the planning process, inform details of the hazard assessments, and discuss potential mitigation treatments. Attendees at the public meetings were asked to give their impressions of the accuracy of the information generated, and provide their opinions of potential treatments.

Wall maps detailing risk assessments, hazard profiles, and a slide show were presented at each meeting. Public meetings were conducted by Tera King on the following dates and locations:

2.3.5.1 October 3rd, 2005 – Laurel Fire Hall

Attendance:

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Bill Kennedy	Yellowstone County Commissioner
Tera King	Northwest Management, Inc.
Jim Ziegler	Laurel Volunteer Fire Department
Gary Colley	Laurel Volunteer Fire Department
Bill Linger	Molt Volunteer Fire Department
Mat Kegling	Molt Volunteer Fire Department
Dennis Deppmeier	Rimrock Vista Estates
Gordon and Abby Brown	Residents
Sandra Miller	Residents
Ron and Linda Kesler	Rimrock Vista Estates
P. J. Smith	Molt Volunteer Fire Department
Stewart Brown	Residents
Nichole Brown	Residents
Duane Torby	Residents
David Charles	Residents
Patty Nordlund	Big Sky EDA
Dianne Lehm	Big Sky EDA
Darrell L. McGillen	Laurel Volunteer Fire Department
Kurt Markegard	Residents
Rob Harris	Laurel Volunteer Fire Department
Lori York	Residents
Silver Zubaith	Laurel Volunteer Fire Department
Irv Leach	Bureau of Land Management
Sandy Brooks	Bureau of Land Management

Jim Ziegler of the Laurel Volunteer Fire Department began by welcoming everyone to the meeting and making introductions.

Tera King from Northwest Management, Inc. gave an overview presentation of the Yellowstone County Community Wildfire Protection Plan. Included in the presentation was a discussion of the planning process, key elements of the plan, a discussion of the wildland urban interface, proposed project areas, and several Yellowstone County maps. After the formal presentation, Tera opened it up for discussion and questions. Some of the key issues that came up were:

- The Clapper Flats subdivision already has land available to install an additional dry hydrant. There were many questions on how they should go about finding funding to complete this project. Tera King explained the benefits of having this project included in the County plan.
- One resident had questions regarding whether or not new homes in rural subdivisions were being GPS'd by the County and if this information was available to the public. Dianne Lehm from the Big Sky EDA said that the County was keeping up to date and gave her some contact names for more information.
- A resident from the Rimrock Vista Estates noted that subdivision covenants and codes generally restricted fuels reduction projects and could affect other types of on-the-ground fire mitigation projects.
- The Clapper Flats subdivision has several wildfire issues that could be potential mitigation projects including: excessive grass and other vegetation surrounding homes, access issues, and a lack of water resources.
- The Emerald Hills subdivision currently has a year round burn ban that seems to be helping reduce ignitions. Clapper Flats and Buffalo Trails subdivisions would also benefit from this type of no burning restriction. The Laurel Volunteer Fire Department

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noted that although they already had some burning restrictions throughout the County, enforcement of these laws was difficult. Commissioner Kennedy said that he would bring this up at the next Rural Fire Committee meeting. It is important that all fire departments as well as law enforcement personnel were on the same page regarding burn bans.

- The Laurel Volunteer Fire Department said that the cities had a tendency to tell people to take their fireworks out into the County to light them off. This puts considerable pressure on the rural fire departments as well as increases the risk of a wildland fire.
- One problem with fuels reduction projects will be disposing of the waste. There will have to be some type of agreement with the refuge board as well as the cities to help dispose of slash and other waste from thinning and fuels reduction projects.

The County is working on new restrictions and codes for developing subdivisions that will help reduce the wildfire risk. Currently, fire departments do as many assessments of new subdivision as their manpower allows. The problem is generally with older subdivisions that already have established access routes, hydrants, etc.

2.3.5.2 October 4th, 2005 – Yellowstone County Courthouse, Commissioners Meeting

Jim Kraft, Yellowstone County Disaster and Emergency Services Director; Dianne Lehm, Big Sky EDA; and Tera King, Northwest Management, Inc. gave a short presentation at the regular meeting of the Yellowstone County Commissioners. Tera King gave a brief background and the current status of the Community Wildfire Protection Plan and then answered questions by the Commissioners. Commissioner Kennedy then opened the floor for public comment or questions. Bob Fears from the Yellowstone Rifle Club commented that the rifle club conducted an annual prescribed burn on their lands to reduce the fire risk. He thought it would also be beneficial if the neighboring property owners were to do some type of fuels reduction project due to the excess grass and sagebrush fuels in the area. Mr. Fears also commented that restrictions on burning or mowing on neighboring CRP lands increases the risk of wildfire.

2.3.5.3 October 4th, 2005 – Worden VFW Hall

Attendance:

Joe Feist	Ballantine
Tera King	Northwest Management, Inc.
Dan Krum	Worden Fire District #4
Monte Dvorak	Worden Fire Department
Joy Eshleman	Worden Fire Department
John Eshleman	Worden Fire Department
Stuart Andersen	Shepherd Volunteer Fire Dept.
Jim Kraft	Yellowstone County DES
Annie Rowe	Worden
William Jo Rowe	Worden

Tera King from Northwest Management, Inc. began the meeting by welcoming those who braved the storm to attend the meeting and making introductions. Tera then began the formal PowerPoint presentation and asked attendees to ask questions as she went through it. The group also spent considerable time discussing the wall maps.

Comments that came out of the meeting included:

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- We need to add the Cedar Ridge subdivision on Highway 87 to the project areas map. This area is need of fuels reduction and home defensible space projects. This area also has some access issues with dead end roads and private driveways. Education and awareness projects would also be beneficial to the homeowners.
- The local fire departments want to do assessments of all the new subdivisions; however, they don't generally have the time or the money to get people out on the ground. It would be helpful to set up some type of program to help pay the firefighters for time spent doing this type of work.
- The Worden Volunteer Fire Department is in need of two 1000 gallon pumper trucks. One would be stationed in Huntley and the other in Pompey's Pillar. They are also in need of a heated two-bay equipment storage facility at Huntley and Worden needs to construct an addition to the Worden Fire Station.

2.3.5.4 October 5th, 2005 – Yellowstone County Courthouse

Attendance:

Tera King	Northwest Management, Inc.
Jack Welsh	Billings Urban FSA
Keith Kolstad	Blue Creek VFD
Mike Spini	Billings Fire Department
Rebecca Helvik	Big Sky EDA
Patty Nordlund	Big Sky EDA
Dianne Lehm	Big Sky EDA
Beth Woodson	Landowner

The noon meeting at the County Courthouse was not well attended due to power outages throughout the County including the Courthouse building. Tera King from Northwest Management, Inc. went through the PowerPoint presentation showing the group slides on the laptop computer and then led a discussion regarding how the funding opportunities through FEMA worked and how the County would go about applying for additional funding to carry out project implementation. Specific project areas and potential educational opportunities were also discussed.

2.3.5.5 October 5th, 2005 – Broadview Community Center

Attendance:

Tera King	Northwest Management, Inc.
Jim Kraft	Yellowstone County DES
Robby Badgett	Broadview Rural Fire Dept
Mike Linder	Yellowstone County Sheriffs Office
Bill Jones	Broadview Rural Fire Dept
Tim Jones	Broadview Rural Fire Dept
Ben Heiken	Broadview Rural Fire Dept
Unreadable	Broadview Rural Fire Dept
Unreadable	Broadview Rural Fire Dept
Larry Johnson	Broadview Rural Fire Dept
Byron ?	Broadview Councilman
Ralph Brewington	Broadview Councilman
Jr. Conover	Resident of Broadview

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Sandy Brooks	Bureau of Land Management
Irv Leach	Bureau of Land Management

Tera King of Northwest Management, Inc. began the meeting by welcoming everyone and making introductions. Tera then gave an overview presentation of the Yellowstone County Community Wildfire Protection Plan. Included in the presentation was a discussion of the planning process, key elements of the plan, a discussion of the wildland urban interface, proposed project areas, and several Yellowstone County maps. After the formal presentation, Tera opened it up for discussion and questions. Some of the key issues that came up were:

- Broadview has a very limited water supply. Presently, they only have 18,000 gallons available in the storage tank for the town. The pump on this system can only pump approximately 25 gallons per hour (i.e. it would take about 30 days to refill if emptied). They need to install a 100,000 gallon tank. Broadview received a $100,000 grant to work with the School of Mines to locate new, more efficient well sites. They are also working on a long term project with the communities of Rygate, Lavina, Utica, and Roundup to install a well for the use by all communities. However, the water gained from this well project would be for household use only.
- The Broadview Rural Fire Department has fairly good equipment.
- They need some type of communications infrastructure. Brett Conover has donated land for a good tower site. They are also having trouble with the new narrow band frequencies not being able to reach over longer distances.
- Broadview Rural Fire Department would like to add on to their fire hall in order to house their 4,000 gallon tender.
- Outside of town the water supply is not bad due to stock tanks and farmers having their own mobile water tanks.

This group was very interested in the wall maps, so following the formal part of the meeting, there were several in depth discussions of the various maps.

2.3.5.6 October 6th, 2005 – Lockwood School

Attendance:

Tera King	Northwest Management, Inc.
Rebecca Helvik	Big Sky EDA
Dianne Lehm	Big Sky EDA
Becky Shay	Billings Gazette
Alan Riley	Lockwood Fire Department
Sandy Brooks	Bureau of Land Management
Eric Chapman	Bureau of Land Management

Tera King of Northwest Management, Inc. began the meeting by thanking everyone for coming and introducing those who came from the committee. Tera then gave an overview presentation of the Yellowstone County Community Wildfire Protection Plan. Included in the presentation was a discussion of the planning process, key elements of the plan, a discussion of the wildland urban interface, proposed project areas, and several Yellowstone County maps. After the formal presentation, Tera opened it up for discussion and questions. Ms. Shay from the *Billings Gazette* asked for clarification on a few points stemming from the presentation, but otherwise there were no additional comments.

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Figure 2.10. Public meeting slideshow overview.

The public meeting slide show (title slide above) is outlined below.

Table 2.5. Public meeting slide show.

Slide 1	Slide 2
	

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Table 2.5. Public meeting slide show.

Slide 3

Slide 4

Slide 5

Slide 6

Slide 7

Slide 8

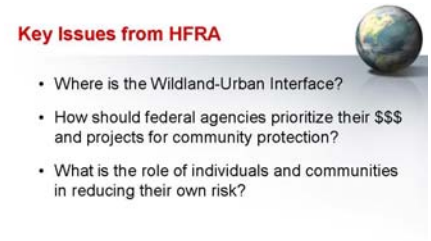

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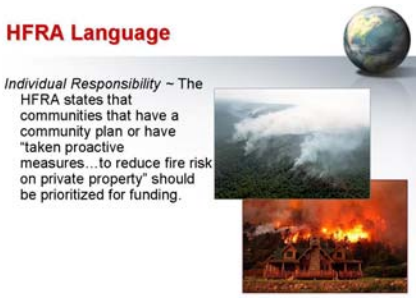
Table 2.5. Public meeting slide show.

Slide 9

Slide 10

Slide 11



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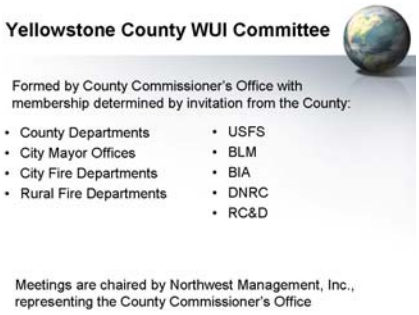

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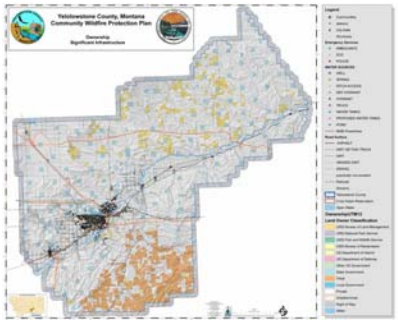
Table 2.5. Public meeting slide show.

Slide 15



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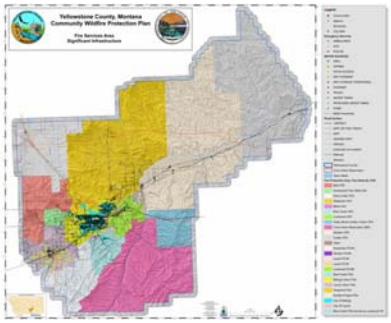

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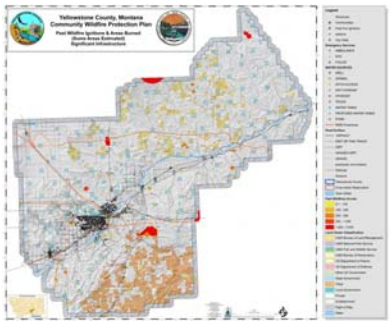

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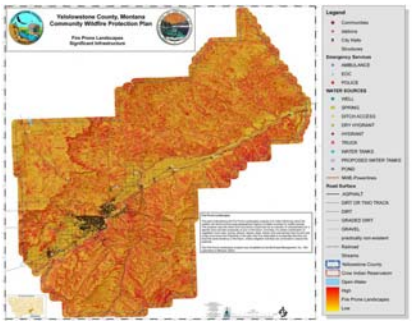

Slide 19

Wildland-Urban Interface

- **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.

Slide 20

Defining Yellowstone County's Wildland-Urban Interface

- Unique to each area & it changes over time
- Based on where structures are currently located
- Uses mathematical formulae and geospatial relationships to visually represent where the WUI exists
- *When you see it, you'll understand what we mean*

Slide 21

Slide 22

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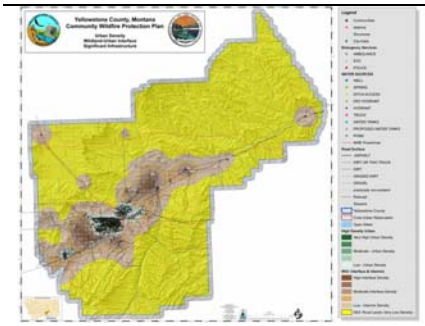
Table 2.5. Public meeting slide show.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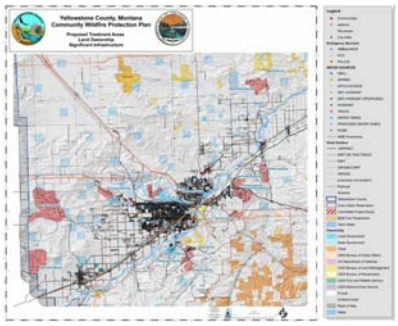	
Slide 27	Slide 28

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Table 2.5. Public meeting slide show.

Slide 29

2.3.6 Documented Review Process

Reviews of sections of this document were conducted by the committee during the planning process as maps, summaries, and written assessments were completed. These individuals included fire mitigation specialists, firefighters, 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 Community Wildfire Protection Plan. This plan was given to members of the planning committee on October 19th, 2005 with comments provided by November 16th, 2005. Public review of the revised DRAFT document was made from November 29th until January 11th, 2006. All comments were integrated into the final version of the mitigation plan.

The final plans were prepared on February 28th, 2006. Adoption of the Community Wildfire Protection Plan was completed by the listed municipalities on the dates indicated in section 6.4 (Signature Pages) as being formally adopted on those dates by the municipalities. Other agencies and organizations indicated their cooperation and collaboration in the planning process.

2.3.7 Continued Public Involvement

Yellowstone County is dedicated to involving the public directly in review and updates of the Wildfire Protection Plan. The Yellowstone County Commissioners, through the Wildfire

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Protection Plan Committee are responsible for the annual review and update of the plan as recommended in Chapter 5 of this document.

The public will have the opportunity to provide feedback about the Plan annually on the anniversary of the adoption of this plan, at the meeting of the County Commissioners. Copies of the Plan will be catalogued and kept at all of the appropriate agencies in the county. The existence and location of these copies will be publicized. The Plan also includes the address and phone number of the County Commissioners Office, responsible for keeping track of public comments on the Plan.

A public meeting will be held as part of each annual evaluation or when deemed necessary by the Wildfire Protection Plan Committee. The meetings will provide the public a forum for which they can express its concerns, opinions, or ideas about the plans. The County Commissioners will be responsible for using county resources to publicize the annual public meetings and maintain public involvement through the public access channel, webpage, and newspapers.

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Chapter 3: County Characteristics & Risk Assessment

3 Background and Area Description

3.1 Location and Land Forms

Yellowstone County is located in south central Montana with the Yellowstone River cutting through its heartland. Elevations range from 4,700 feet above sea level south of Billings to approximately 3,000 feet in some areas in the northeastern corner of the County. Ownership is mixed between federal, tribal, state, and private owners.

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Figure 3.1. Topographic relief of Yellowstone County, Montana.

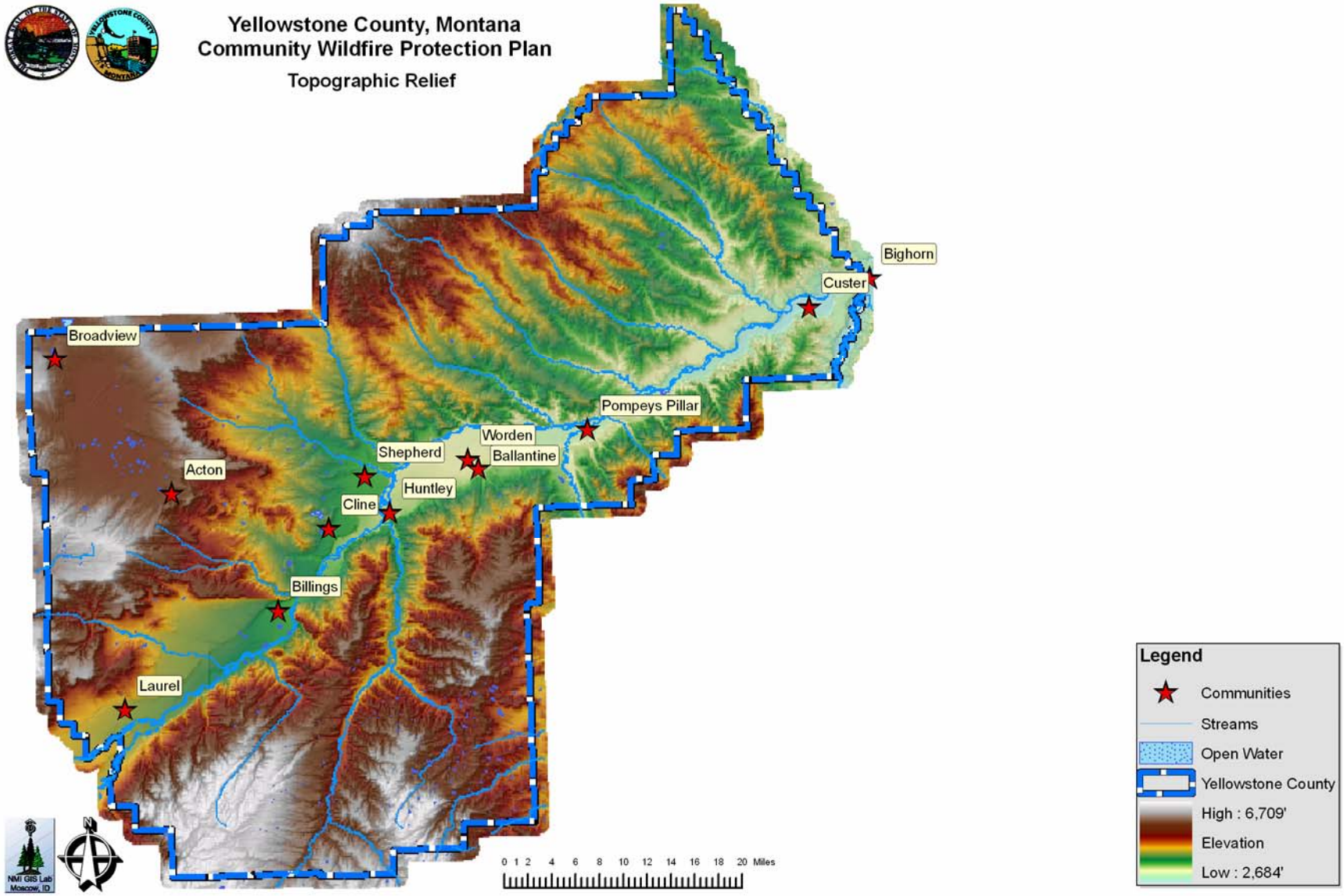

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Figure 3.2. Land Ownership in Yellowstone County.

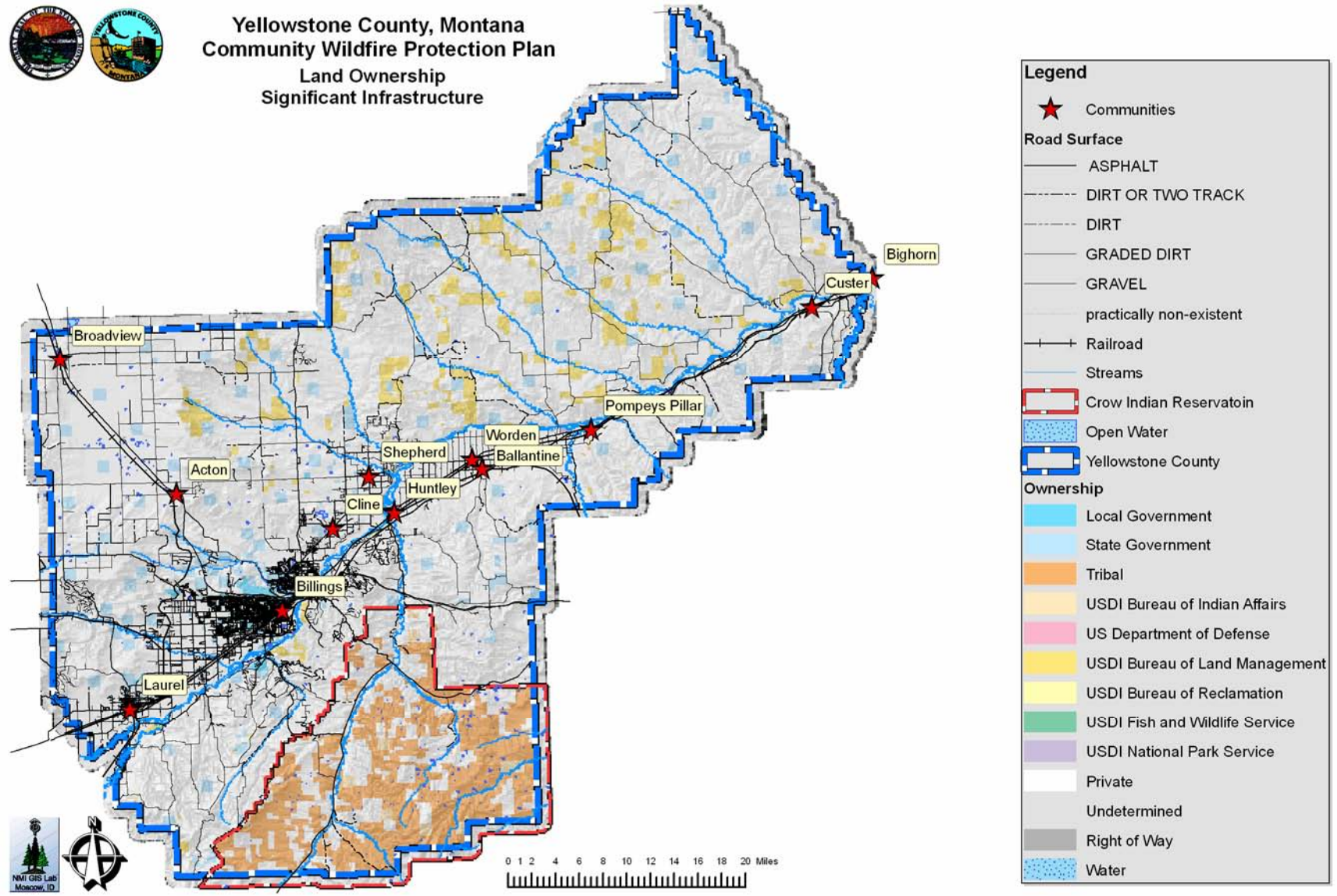

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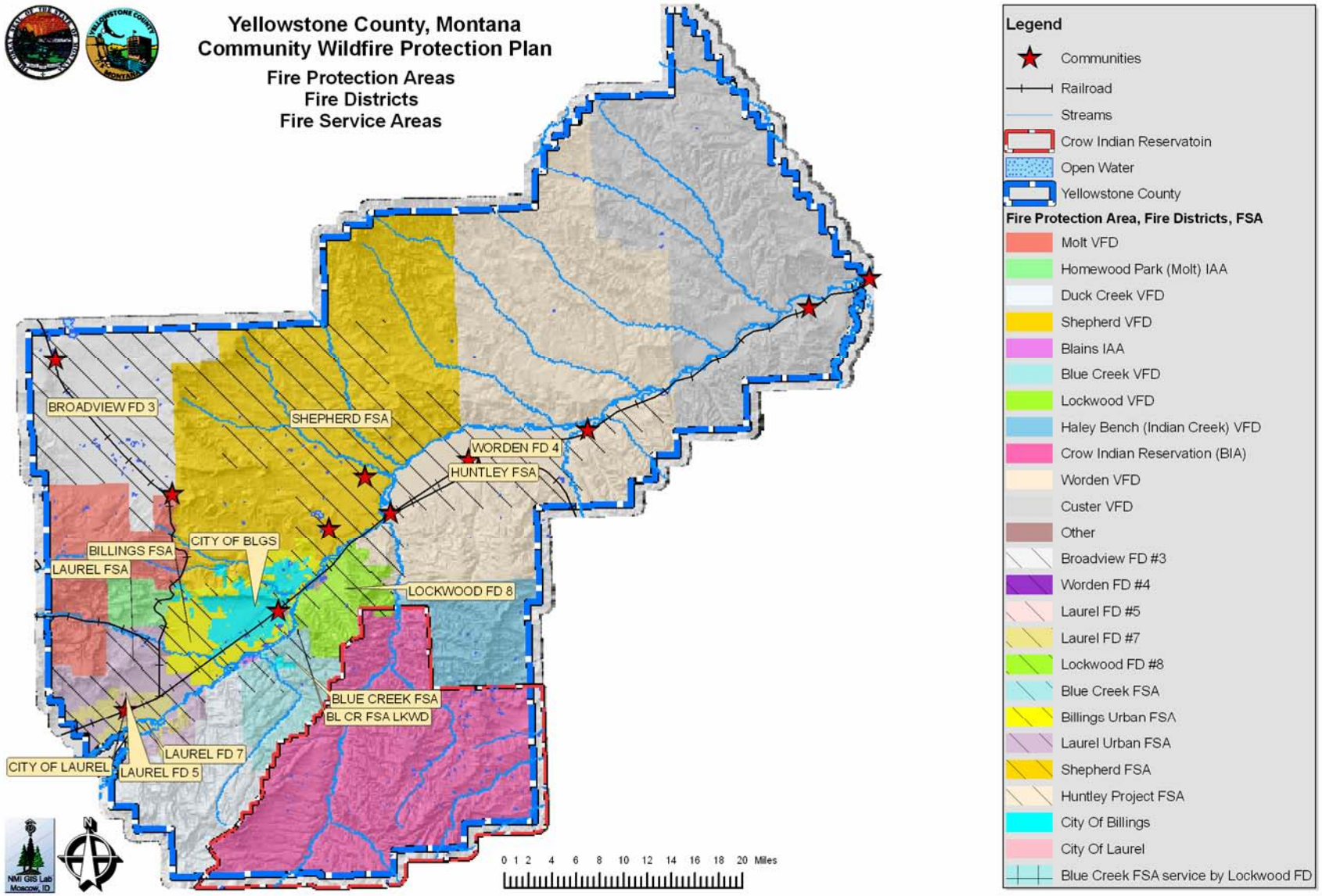
Figure 3.3. Rural and City Fire Protection in Yellowstone County.



3.2 Demographics

The number of persons residing in Yellowstone County has been growing steadily over the past few decades, rising by approximately 14 percent between 1990 and 2000. Yellowstone County remains the most populated county in Montana with a population of 129,352 in 2000. Yellowstone County has three incorporated communities, Billings (pop. 89,362), Laurel (pop. 6,142), and Broadview (pop. 184). Unincorporated communities recognized by the Census Bureau include Lockwood (pop. 4,282), Huntley (pop. 477), Worden (pop. 472), Shepherd (pop. 177), Ballantine (pop. 366), and Custer (pop. 145). The total land area of the county is roughly 2,649 square miles (1,695,392 acres).

Table 3.1 summarizes some relevant demographic statistics for Yellowstone County.

Table 3.1. Summary of selected demographic statistics for Yellowstone County, Montana (Census 2000).

Subject	Number	Percent
Total population	**129,352**	**100.0**
SEX AND AGE		
Male	63,045	48.7
Female	66,307	51.3
Under 5 years	8,440	6.5
5 to 9 years	9,463	7.3
10 to 14 years	9,517	7.4
15 to 19 years	9,180	7.1
20 to 24 years	8,519	6.6
25 to 34 years	16,087	12.4
35 to 44 years	21,172	16.4
45 to 54 years	18,426	14.2
55 to 59 years	6,249	4.8
60 to 64 years	5,076	3.9
65 to 74 years	8,636	6.7
75 to 84 years	6,475	5.0
85 years and over	2,112	1.6
Median age (years)	36.8	(X)
18 years and over	96,216	74.4
Male	45,785	35.4
Female	50,431	39.0
21 years and over	91,015	70.4
62 years and over	20,178	15.6
65 years and over	17,223	13.3
Male	7,121	5.5
Female	10,102	7.8
RELATIONSHIP		
Population	**129,352**	**100.0**
In households	126,413	97.7
Householder	52,113	40.3

Table 3.1. Summary of selected demographic statistics for Yellowstone County, Montana (Census 2000).

Subject	Number	Percent
Spouse	27,132	21.0
Child	37,421	28.9
Own child under 18 years	30,826	23.8
Other relatives	3,548	2.7
Under 18 years	1,450	1.1
Nonrelatives	6,199	4.8
Unmarried partner	2,941	2.3
In group quarters	2,939	2.3
Institutionalized population	1,652	1.3
Noninstitutionalized population	1,287	1.0
HOUSEHOLDS BY TYPE		
Households	**52,113**	**100.0**
Family households (families)	34,488	66.2
With own children under 18 years	16,668	32.0
Married-couple family	27,362	52.5
With own children under 18 years	11,901	22.8
Female householder, no husband present	5,050	9.7
With own children under 18 years	3,454	6.6
Nonfamily households	17,625	33.8
Householder living alone	14,548	27.9
Householder 65 years and over	5,632	10.8
Households with individuals under 18 years	17,700	34.0
Households with individuals 65 years and over	16,141	31.0
Average household size	2.43	(X)
Average family size	2.97	(X)
HOUSING TENURE		
Occupied housing units	**52,084**	**100.0**
Owner-occupied housing units	36,037	69.2
Renter-occupied housing units	16,047	30.8
Average household size of owner-occupied unit	2.59	(X)
Average household size of renter-occupied unit	2.06	(X)

(Census 2000)

Figure 3.4 Yellowstone County Population Trends from 1890 – 2000.

TABLE 1: Population Of Yellowstone County And Incorporated Areas
Percent Change By Decade 1890 – 2000

Decade	Yellowstone County	Percent Change	City of Billings	Percent Change	City of Laurel	Percent Change	Town of Broadview	Percent Change
1890	2065	*****	836	*****	No Data	*****	No Data	*****
1900	6212	66.76	3221	285.29	No Data	*****	No Data	*****
1910	22,944	22.49	10,031	50.53	806	*****	No Data	*****
1920	29,600	29.01	15,100	8.48	2239	177.80	191	*****
1930	30,785	4.00	16,380	42.00	2558	14.25	260	36.13
1940	41,182	33.77	23,261	36.85	2754	7.66	140	-120.00
1950	55,875	35.68	31,834	66.02	3663	33.00	164	17.14
1960	79,016	41.41	52,851	65.12	4601	.25.60	160	-2.44
1970	87,367	10.57	61,581	16.52	4454	-3.19	123	-23.13
1980	108,035	23.65	66,798	8.47	5481	23.06	120	-2.44
1990	113,419	4.98	81,151	21.49	5686	3.74	133	10.83
2000	129,352	14.04	89,847	10.72	6255	10.00	150	12.78

Yellowstone County and City of Billings 2003 Growth Policy Plan.

3.3 Socioeconomics

Yellowstone County had a total of 52,084 occupied housing units and a population density of 2.8 persons per square mile reported in the 2000 Census (Table 3.1). Ethnicity in Yellowstone County is distributed: white 92.8%, black or African American 0.4%, American Indian or Alaskan Native 3.1 %, other race 1.3%, and Hispanic or Latino 3.7%.

Specific economic data for individual communities is collected by the US Census; in Yellowstone County this includes Billings, Laurel, and Broadview. Billings's households earn a median income of $35,147 annually, Laurel households earn $32,679, and Broadview households earn $29,500, which are both below the Yellowstone County median income during the same period ($36,727). Table 3.2 shows the dispersal of households in various income categories in both communities.

Table 3.2. Income in 1999.	Billings		Laurel		Broadview		Yellowstone County	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Less than $10,000	3686	9.8	261	10.6	5	7.1	4773	9.2
$10,000 to $14,999	3642	9.9	252	10.3	7	10	4709	9.0
$15,000 to $24,999	5823	15.5	448	18.2	16	22.9	7928	15.2
$25,000 to $34,999	5512	14.7	338	13.8	14	20	7466	14.3
$35,000 to $49,999	6677	17.8	492	20	17	24.3	9508	18.2
$50,000 to $74,999	7029	18.8	390	15.9	7	10.0	9803	18.8
$75,000 to $99,999	2641	7	206	8.4	4	5.7	4128	7.9
$100,000 to $149,999	1518	4.1	40	1.6	0	0	2375	4.6
$150,000 to $199,999	437	1.2	7	0.3	0	0	667	1.3
$200,000 or more	505	1.3	21	0.9	0	0	756	1.5
Median household income (dollars)	35,147		32,679		29,500		36,727	

(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 Yellowstone County, a significant number of families are at or below the poverty level. Approximately 9.2% of Yellowstone County families are below poverty level (Table 3.3).

Table 3.3. Poverty Status in 1999 (below poverty level).	Yellowstone County	
	Number	Percent
Families	2,130	(X)
Percent below poverty level	(X)	9.2
With related children under 18 years	1,806	(X)
Percent below poverty level	(X)	15.6
With related children under 5 years	990	(X)
Percent below poverty level	(X)	21.7
Families with female householder, no husband present	1,220	(X)
Percent below poverty level	(X)	31.2
With related children under 18 years	1,125	(X)
Percent below poverty level	(X)	38.5
With related children under 5 years	683	(X)
Percent below poverty level	(X)	57.4

Table 3.3. Poverty Status in 1999 (below poverty level).	Yellowstone County	
	Number	Percent
Individuals	10,402	(X)
Percent below poverty level	(X)	12.0
18 years and over	6,851	(X)
Percent below poverty level	(X)	10.4
65 years and over	855	(X)
Percent below poverty level	(X)	7.0
Related children under 18 years	3,448	(X)
Percent below poverty level	(X)	16.5
Related children 5 to 17 years	2,168	(X)
Percent below poverty level	(X)	14.2
Unrelated individuals 15 years and over	3,860	(X)
Percent below poverty level	(X)	20.5

(Census 2000)

The unemployment rate was 2.1% in Yellowstone County in 1999, compared to 4.4% nationally during the same period. Approximately 20.6% of the Yellowstone 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.	Yellowstone County	
	Number	Percent
OCCUPATION		
Management, professional, and related occupations	14,505	31.8
Service occupations	7,834	17.2
Sales and office occupations	14,540	31.9
Farming, fishing, and forestry occupations	113	0.2
Construction, extraction, and maintenance occupations	3,662	8.0
Production, transportation, and material moving occupations	4,906	10.8
INDUSTRY		
Agriculture, forestry, fishing and hunting, and mining	812	1.8
Construction	2,630	5.8
Manufacturing	2,221	4.9
Wholesale trade	2,824	6.2
Retail trade	6,893	15.1
Transportation and warehousing, and utilities	2,685	5.9
Information	1,100	2.4
Finance, insurance, real estate, and rental and leasing	3,310	7.3
Professional, scientific, management, administrative, and waste management services	3,771	8.3
Educational, health and social services	9,743	21.4
Arts, entertainment, recreation, accommodation and food services	5,071	11.1
Other services (except public administration)	2,708	5.9
Public administration	1,792	3.9

Figure 3.5 Labor Force and Unemployment Rates from 1980 to 2000.

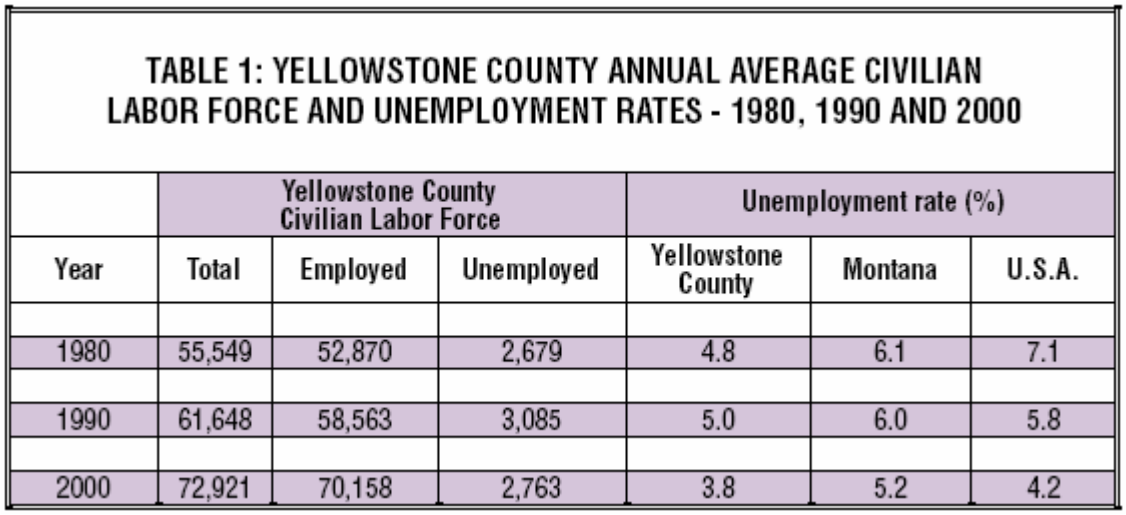


TABLE 1: YELLOWSTONE COUNTY ANNUAL AVERAGE CIVILIAN LABOR FORCE AND UNEMPLOYMENT RATES - 1980, 1990 AND 2000

	Yellowstone County Civilian Labor Force			Unemployment rate (%)		
Year	Total	Employed	Unemployed	Yellowstone County	Montana	U.S.A.
1980	55,549	52,870	2,679	4.8	6.1	7.1
1990	61,648	58,563	3,085	5.0	6.0	5.8
2000	72,921	70,158	2,763	3.8	5.2	4.2

Yellowstone County and City of Billings 2003 Growth Policy Plan

Approximately 80% of Yellowstone County's employed persons are private wage and salary workers, while around 12% are government workers (Table 3.5).

Table 3.5. Class of Worker	Yellowstone County	
	Number	Percent
Private wage and salary workers	36,439	80.0
Government workers	5,472	12.0
Self-employed workers in own not incorporated business	3,552	7.8
Unpaid family workers	97	0.2

(Census 2000)

3.4 Description of Yellowstone County

3.4.1 Recreation

This region is a favorite destination for a variety of recreational opportunities. Lake Elmo State Park is a favorite recreational opportunity for County residents offering swimming, hiking, fishing, and sail boating just outside of Billings. The Yellowstone River and the Clarks Fork of the Yellowstone River offer fishing, picnicking, and camping opportunities throughout the County as well. Pictograph Caves State Park and Pompeys Pillar draw tourists and residents alike for day use exploring, hiking, and picnicking. There are also several high-quality golf courses in the area.

Bird hunting and big game hunting for deer, elk, and antelope is especially intense every fall. During the winter, snowmobiling has become a very popular sport. Area residents can also travel to neighboring counties to take advantage of the skiing and snowshoeing opportunities.

The economic impacts of these activities to the local economy and the economy of Montana have not been enumerated. However, they are substantial given the many months of the year that activities take place and the staggering numbers of visitors that travel to this location. The large numbers of visitors to the region each year is noteworthy in light of wildfire mitigation efforts because of the combination of visitors traveling to rural and remote areas, visitors who are not necessarily familiar with rangeland and forestland fuel risk factors (e.g., campfire

protocols, use of fire, etc.), and their often unfamiliarity with access routes and other factors. Because of these reasons and others, the rural areas of Yellowstone County will receive increased attention during mitigation treatments.

3.4.1.1 BLM Public Lands

There are several scattered chunks of BLM administered lands in Yellowstone County. These areas are open to the public year round. Although there are no developed sites, residents of Yellowstone County use these lands to hunt, four-wheel, mountain bike, and drive off-road vehicles among many other things.

3.4.1.2 Camping

Camping is a popular activity enjoyed by residents and visitors of Yellowstone County. In addition to the developed RV parks along the freeway routes, there are also several undeveloped campsites along the Yellowstone River, most of which are easily accessed.

3.4.1.3 Fishing and Hunting

Fishing and hunting is very important to Yellowstone County both from a recreational standpoint and as an economic resource. A wide variety of fish can be caught in Yellowstone County including: trout, catfish, crappie, perch, and bass.

For those people who prefer a gun or bow to a fly rod, Yellowstone County offers a bounty of hunting experiences. Wild birds and game, like deer, elk, black bear, antelope, pheasant, partridge, grouse, wild duck, geese, and doves are found in abundance.

3.4.2 Resource Dependency

Economic conditions can affect county population, land use, population growth (or decline), and personal income and ability of communities to fund services and infrastructure. Yellowstone County completed the Yellowstone County and City of Billings 2003 Growth Policy Plan, which outlines an economic development strategy for the future. This document also provided descriptions and data on the county economy and other factors that can affect or be affected by the economy.

Resource industries and agriculture dominate the local economy. There are three oil refineries in the county, with two of those in Billings and the third in nearby Laurel. A Western Sugar refinery is located in Billings. About 350 Montana farmers supply sugar beets to the refinery, which has a direct impact of $50 million per year on the county's economy.

Billings is the medical and educational center for the region. The two hospitals employ over 3,200 people and have almost 600 beds. Several clinics also operate in Billings. Montana State University – Billings has 4,000 students while its College of Technology has approximately 500. Rocky Mountain College, a private, four-year university, has 800 students and is the oldest college in Montana.

The Billings and Yellowstone County economy can be summarized as follows:

- Employment grew by 1/3 between 1980 and 2000 and about 2/3 of those new workers were women.
- Employment growth in the mid to late 1990s was dominated by construction, retail sales and service jobs.

• Predicted Montana job growth through 2008 indicates that the most jobs will be produced in retail sales and services and the state growth rates for these jobs is predicted to be higher than for the U.S.

• The jobs that are predicted to grow most for the next few years have among the lowest job multipliers, thereby producing relatively low spin-off or secondary job opportunities.

• Supply of workers in Yellowstone County is predicted to equal or exceed the demand over the next several years.

• Per capita income has grown slowly over the past 30 years, but it has fallen when compared to the U.S., and has risen when compared to the state of Montana.

• When adjusted for inflation, average earnings per job have remained almost stagnant for the past 30 years and have fallen when compared to the U.S. average.

• The cost of living in Billings is slightly below the national average and is about the median among surveyed cities in Montana and the region.

• When the cost of living is compared to per capita income and earnings per job, Billings has a lower cost of living and higher income/earnings than most of the surveyed Montana cities. When compared to other surveyed cities in the region, Billings has about an equal cost of living and lower per capita income and job earnings.

• Yellowstone County and Billings aren't keeping pace with surrounding states and the nation in producing personal wealth, but appear to be doing better than the remainder of Montana.

3.4.3 Development Trends

Sixty-nine percent of the population in Yellowstone County lived in Billings in 2000. This is slightly less than the 71.5 percent of the population that lived in the City in 1990. These figures suggest a slight growth in population outside the City limits. This trend is supported by the increase in subdivision activity in the County. The growth trend has been to develop on the edges of Billings or in the County and not within the City. This trend is not because of the lack of developable parcels in the City. There are approximately 3,607 parcels classified by the Montana Department of Revenue as vacant residential land within the city limits. Of these, 3,529 parcels are two acres or less. The vacant parcels constitute 11 percent of all parcels in Billings. For the years of 2000 and 2001, there were more single family home building permits issued than there were lots created in the Billings Metro (building permit jurisdiction). There were 403 building permits issued for single family home construction in 2000, and 476 permits were issued in 2001. An estimated 298 lots were created in the Metro Area in 2000 and 312 in 2001. This trend indicates that, in addition to new construction occurring on newly created lots, lots created in previous years are being developed. Many of the older lots have remained vacant for a decade or more until being developed only recently. This is particularly true for subdivisions in the Heights, including several filings of the Lake Hills Subdivision.

According to the Billings Housing Needs Analysis, the need for low cost housing exceeds the supply. The study estimates a shortage of almost 2,200 low cost units that are affordable to households earning less than $15,000 per year. The estimates are based on the number of available units that would cost the homeowner no more than 30 percent of their income. There is also a shortage of housing for households earning more than $35,000 based on the same criteria. However, many people may choose to live in homes that are less expensive than they can afford and spend their money on other expenses.

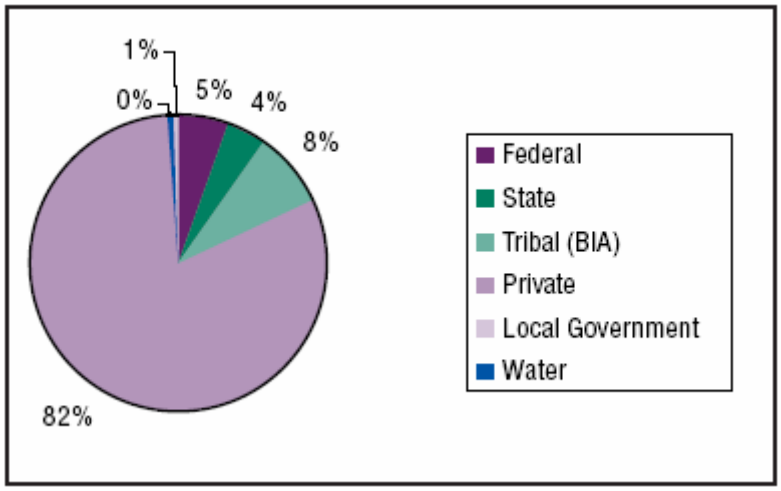
3.4.4 Land Use

Historically, Yellowstone County land use has been dominated by agriculture and related uses. Much of the early business in Billings developed to service the surrounding ranches and farms. Today, agriculture is still a dominant land use, but residential development and commercial uses have gained considerable ground.

The area of Yellowstone County is approximately 1,693,751 acres. Of the total, 1,374,730 acres, or 82 percent, is under private ownership. Tribal land administered by the U.S. Bureau of Indian Affairs comprises 139,983 acres (8 percent) and is located primarily in the southeast part of the County. Other Federal agencies, including the U.S. Bureau of Land Management, the U. S. Bureau of Reclamation, and U.S. Fish & Wildlife Service administer 88,581 acres (5 percent) and state agencies administer 73,414 acres (4 percent). State land management agencies include the Department of Natural Resources, responsible mainly for State Trust Land, and the Montana Department of Fish, Wildlife, and Parks, which oversees State Parks and fishing accesses.

Land owned by the City of Billings, City of Laurel and Yellowstone County comprise less than 1 percent of Yellowstone County. The ownership of land covered by water is also less than 1 percent where ownership is undetermined. In general terms, land use in Yellowstone County falls into five main categories: agricultural, residential, commercial, industrial and recreational. The majority of the County, over 1.3 million acres, is classified by the Montana Department of Revenue as agricultural. The primary residential and commercial centers are located in Billings, Laurel, and Lockwood and to a lesser extent, the communities of Custer, Shepherd, Huntley, Worden, Ballantine, Pompey's Pillar and Broadview. There is approximately 4,148 acres of commercially and industrially-classed property and 33,057 acres of residentially-classed property throughout the County. Industrial uses are mostly confined to Billings, Laurel and Lockwood. The remaining 350,000 acres includes land administered by the Bureau of Indian Affairs, or is not classified or is exempt.

Figure 3.6. Land ownership in Yellowstone County.



Yellowstone County and City of Billings 2003 Growth Policy Plan

3.4.4.1 Agricultural Land Use

The 1997 Census of Agriculture reported a 5 percent increase in the amount of land used for agricultural purposes between 1992 and 1997 in Yellowstone County. An estimated 1,526,007

acres or 90 percent of the total County land base is used for cropland and grazing. Most of the agricultural land, 1,144,617 acres, is used for livestock grazing while 381,390 acres are cultivated for crops. The amount of irrigated cropland increased from 73,261 acres in 1992 to 80,024 acres in 1997. This suggests that the loss of irrigated land to annexations and subdivisions was offset elsewhere in the County by an increase in irrigated land use. Within the County zoning jurisdiction, 69 percent or 100 square miles of land is zoned for agriculture.

Agricultural land is held in private, state and federal ownership. The Montana Department of Natural Resources manages 9,000 acres of land under agricultural production and 6,800 acres of grazing land. The Bureau of Land Management has approximately 76,900 acres allotted for grazing purposes.

3.5 Emergency Services

The City of Billings operates the 911 Dispatch Center for Yellowstone County and the City of Billings. In addition to handling law enforcement and emergency medical calls, the center also provides dispatch services to all of the fire departments in Yellowstone County except Laurel. The dispatch center, operational 24 hours a day, is located in Fire Station #1 in Billings.

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 at Fire Station #1 is activated. The County Fire Warden will be involved in establishing and operating the EOC.

The City of Laurel also operates a 911 Dispatch Center for the City of Laurel, the Laurel Volunteer Fire Department, Laurel Police Department, and the Laurel Volunteer Ambulance. This dispatch center handles law enforcement, emergency medical calls, and dispatches fire departments with jurisdiction in the Laurel area. For large scale incidents, and EOC is set up in the Laurel Safety Complex.

3.6 Cultural Resources

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.

3.6.1 Crow Indian Reservation

The Crow Reservation is in south central Montana, bordered by Wyoming to the south. The northwest boundary of the reservation is about ten miles from Billings in Yellowstone County. About 75 percent of the Crow tribe's, approximately 9,300, enrolled members live on or near the reservation. Many speak Crow as their first language.

For many years the vast coal deposits under the eastern portion of the reservation remained untapped. One mine is now in operation and is providing royalty income and employment to tribal members. The Crow use a portion of their land for irrigated and dryland farming and other portions for grazing land. They maintain a buffalo herd of 300 head. Crow Agency is home to Little Bighorn College. The college houses the Institute for MicroBusiness Development and offers degrees in eight fields.

Other points of interest on the reservation are:

- Bighorn Canyon National Recreation Area
- Little Bighorn National Monument/Reno-Benteen Battlefield
- Chief Plenty Coups State Park

- Yellowtail Dam and Reservoir

The Crow tribe call themselves "Apsaslooka", which means "children of the large-beaked bird." Other tribes called them "sharp people," meaning they were as crafty and alert as the raven. The Crow originally lived in the upper Midwest. The tribe began migrating west as early as the late 1300s. They migrated to North Dakota around 1600 and then continued their movement west. Finally, they settled along the Missouri and Yellowstone River bottoms in Montana.

Originally planters, as the Crow moved west, they came to rely on hunting, and they built a life around the buffalo. When the horse was first introduced in the 18th century, the Crow quickly became excellent horsemen and prospered.

William Clark met the Crow in 1806, and spent a month in Crow country. The expedition members, and later the fur traders, developed good relationships with the tribe. Nonetheless, the Crows, like so many other tribes, found themselves vulnerable to Euro-American diseases. Smallpox and other diseases reduced the tribe by over twenty percent.

At the same time, the buffalo were disappearing from the plains, and the tribe was forever changed. Despite their good relationship with the government, the tribe's lands dwindled and treaties were broken. Additionally, their traditional enemies, the Sioux and the Northern Cheyenne, invaded Crow land. The other tribes tried to get the Crow to work with them against the tide of white settlers, but the tribe did not have a hostile relationship with the government. George A. Custer had six Crow scouts at the Battle of The Little Bighorn. The reservation boundaries were finally fixed by 1904. The tribe has returned to an agricultural way of life, much like their ancestors 300 years before.

3.6.2 National Register of Historic Places

Section 106 of the National Historic Preservation Act requires federal agencies to consider the effects of their proposals on historic properties, and to provide state historic preservation officers, tribal historic preservation officers, and, as necessary, the Advisory Council on Historic Preservation a reasonable opportunity to review and comment on these actions.

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

Typical archeological sites include settlements, lithic scatters, village sites, rock art, and hunting blinds. The Crow had a network of trails throughout the area which included various trade routes, as well as gathering and hunting routes. Some of the same trails were later used by homesteaders and trappers. Traditional Cultural Properties (TCPs) are cultural resources defined as a significant place or setting, and does not necessarily have any associated material remains. For example, a TCP can be a mountain, river, or natural feature (i.e., rock formation, meadow, etc.). Some of these are present in Yellowstone County. The integrity of some cultural resources has been impacted in the past by logging activities, road building, mining, and grazing.

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 3.6.

Table 3.6. National Register of Historic Places in Payette County, Idaho.					
Item Number	**Resource Name**	**Address**	**City**	**Listed**	**Architect, Builder, or Engineer**
1	Antelope Stage Station	E of Broadview	Broadview	1983	
2	Billings Chamber of Commerce Building	303 N. 27th St.	Billings	1972	McAlister,G., Gagnon & Co.
3	Billings Historic District	Roughly bounded by N. 23rd and N. 25th Sts., 1st and Montana Aves.	Billings	1979	Crowe,J., Et al.
4	Billings West Side School	415 Broadwater Ave.	Billings	2002	Oehme, Curtis, et.al.
5	Boothill Cemetery	N of Billings	Billings	1979	
6	Electric Building	113-115 Broadway	Billings	2002	Link, John G.
7	Fire House No. 2	201 E. 30th St	Billings	1980	Ohme,Curtis E.
8	Hoskins Basin Archeological District		Billings	1974	
9	Masonic Temple	2806 Third Ave. N	Billings	1986	Link & Haire
10	Molt, Rudolph F. W., House	39 Yellowstone Ave	Billings	1987	Eames,V.W., Oehme,Curtis C.
11	Moss, Preston B., House		Billings	1982	Hardenbergh,R.J. , Gagnon,E.H.
12	North, Austin, House	622 N. 29th St.	Billings	1977	Link & Haire
13	O'Donnell, I. D., House	105 Clark Ave.	Billings	1977	Eams & Sawyer, Link & Haire
14	Parmly Billings Memorial Library	2822 Montana Ave	Billings	1972	Haire,Charles S.
15	Pictograph Cave	7 mi. SE of Billings in Indian Caves Park	Billings	1966	
16	Pompey's Pillar	W of Pompey	Pompey's Pillar	1966	
17	Prescott Commons	Rimrock Rd	Billings	1982	Comstock,Wallac e H.
18	US Post Office and Courthouse--Billings	2602 First Ave. N	Billings	1986	Wenderoth,Oscar , Et al
19	Yegen, Christian, House	208 S. 35th St	Billings	1979	
20	Yegen, Peter, House	209 S. 35th St	Billings	1980	Eames,Mr.

Hazard mitigation activities in and around these sites has the potential to affect historic places. In all cases, mitigation work will be intended to reduce the potential of damaging the site due to natural and man caused disasters. Areas where ground disturbance will occur will need to be inventoried depending on the location. Such actions may include, but are not be limited to, constructing firelines (handline, mechanical line, etc.), building 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, 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) may 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.

3.7 Transportation

The transportation system hierarchy in Yellowstone County begins with the Federal Highway System, which includes Interstates 90 and 94. U.S. Routes present in the County include U.S. Highway 87, 212 and 310. Numerous State highways and secondary roads traverse the County in addition to County roads and City streets. Maintaining the condition and efficiency of all these roadways is the responsibility of the Montana Department of Transportation, the County Public Works Department and the City Public Works Department. Much of the planning for these routes is accomplished through the Billings Metropolitan Planning Organization (MPO) under the jurisdiction of the County Planning Board.

Billings Logan International Airport is a growing regional air traffic hub with a market area encompassing central and eastern Montana and northern Wyoming. The airport is served by seven passenger airlines: Northwest, Delta/Skywest, Big Sky, United/Air Wisconsin, and Horizon, with 35 scheduled flights per day. Passenger emplanements have risen from 290,000 in 1989 to 354,722 emplanements in 2001.

The Billings Urban Area relies on two major rail companies and numerous trucking firms to move freight in, out, and through the region. The geographic location and the existing infrastructure generally restrict freight movement to east-west routes. Rail lines in particular are oriented toward transcontinental east-west flows, while freeway routes provide some, though less convenient, north-south flow. The two railroad operators in Billings are Burlington Northern Sante Fe and Montana Rail Link. Both move large volumes of coal and freight through the area and serve the downtown Billings intermodal facility. A total of 53 million tons of coal and freight was moved by rail through Billings in 1996. Freight originating in the region includes coal and coal products, petroleum, farm products, lumber and wood products, and stone, clay, glass and concrete products. Ninety percent of these commodities were shipped out of state. Existing rail facilities for Montana Rail Link and Burlington Northern Sante Fe are adequate and have sufficient capacity to accommodate current and anticipated freight movement demand.

3.8 Vegetation & Climate

Vegetation in Yellowstone 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 3.7.

The most represented vegetated cover types are Low Cover Grasslands at 28% and Xeric Shrubs and Dryland Agriculture at approximately 13% and 12%, respectively, of the County's total area. The next most common vegetation cover type represented is Low/Moderate Cover Grasslands at 6% of the total area. Big Sage Steppe represents 5% of Yellowstone County, while Very Low Cover Grasslands cover only 4%.

Table 3.7. Cover Types in Yellowstone County.	**Category**	**Acres**	**Percent of County's Total Area**
Low Cover Grasslands	Upland Grasslands	478,886	28%

Table 3.7. Cover Types in Yellowstone County.	Category	Acres	Percent of County's Total Area
Xeric Shrubs	Dry Shrubland	219,041	13%
Dryland Agriculture	Agricultural	211,025	12%
Low/Moderate Cover Grasslands	Upland Grasslands	102,049	6%
Big Sage Steppe	Dry Shrubland	83,050	5%
Very Low Cover Grasslands	Upland Grasslands	75,525	4%
Wyoming Big Sage Steppe	Dry Shrubland	72,703	4%
Irrigated Agriculture	Agricultural	66,999	4%
Xeric Shrub Grass	Dry Shrub/Grassland	52,629	3%
Ponderosa Pine	Conifer Forest	50,734	3%
Greasewood	Dry Shrubland	31,163	2%
Shrub Badlands	Badlands	27,719	2%
Urban	Urban	27,180	2%
Graminoid and Forb Riparian	Mixed Riparian	26,115	2%
Mixed Mesic Shrubs	Moist Shrubland	23,120	1%
Grass Badlands	Badlands	20,375	1%
Moderate/High Cover Grasslands	Upland Grasslands	19,078	1%
Water	Water	16,600	1%
Shrub Dominated Riparian	Mixed Riparian	15,326	1%
Mixed Broadleaf Forest	Mixed Deciduous	14,921	1%
Broadleaf Dominated Riparian	Mixed Riparian	10,590	1%
Xeric Mixed Shrub	Dry Shrubland	8,392	0%
Salt Desert Shrub	Dry Shrubland	7,703	0%
Mixed Forest Non-forest Riparian	Mixed Riparian	7,367	0%
Exposed Rock	Exposed Rock	6,994	0%
Badlands	Badlands	4,801	0%
Mountain Big Sagebrush	Dry Shrubland	3,532	0%
Mixed Barren Land	Barren Land	2,629	0%
Mixed Xeric Forest	Mixed Conifer Forest	2,295	0%
Tree Grassland Associations	Tree/Grassland	1,814	0%
Douglas Fir	Conifer Forest	1,210	0%
Mixed Tree Riparian	Mixed Riparian	1,164	0%
Silver Sage	Dry Shrubland	878	0%
Limber Pine	Tree/Grassland	572	0%
Mesic Shrub Grassland	Moist Shrub/Grassland	389	0%
Mixed Shrub Herbaceous Riparian	Mixed Riparian	358	0%
Mines Quarries Gravel Pits	Mines Quarries Gravel	261	0%
Forest Savannah	Tree/Grassland	250	0%
Mixed Broadleaf Conifer Forest	Mixed Deciduous-Conif	202	0%
Cattail Marshes	Mixed Riparian	125	0%
Very Low Cover Forest	Tree/Grassland	59	0%

Table 3.7. Cover Types in Yellowstone County.	Category	Acres	Percent of County's Total Area
Juniper Sage Grass	Dry Shrubland	5	0%
Total		**1,695,828**	

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 shrub and forest vegetation.

3.8.1 Monthly Climate Summaries in Yellowstone County

3.8.1.1 Billings

Period of Record Monthly Climate Summary

Period of Record: 7/ 1/1948 to 3/31/2005

Table 3.8. Monthly Climate Summaries for Billings, Yellowstone County, Montana.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	32.4	39.0	45.8	56.8	67.1	76.7	86.4	85.1	72.6	60.4	44.9	36.0	58.6
Average Min. Temperature (F)	13.9	19.5	24.9	33.9	43.4	51.6	58.2	56.8	46.9	37.3	25.9	18.2	35.9
Average Total Precipitation (in.)	0.76	0.62	1.03	1.76	2.26	2.12	1.10	0.86	1.26	1.11	0.71	0.65	14.25
Average Total Snowfall (in.)	10.0	7.0	9.7	8.8	1.7	0.0	0.0	0.0	1.1	3.8	6.5	8.4	57.0
Average Snow Depth (in.)	2	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: 100% Snowfall: 100% Snow Depth: 100%

3.8.1.2 Laurel

Period of Record Monthly Climate Summary

Period of Record: 8/28/1951 to 2/28/1994

Table 3.9. Monthly Climate Summaries for Laurel, Yellowstone County, Montana.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)					Insuff	icient	Data						
Average Min. Temperature (F)					Insuff	icient	Data						
Average Total Precipitation (in.)	0.67	0.51	0.94	1.76	2.58	2.10	1.03	1.06	1.51	1.09	0.69	0.66	14.61
Average Total Snowfall (in.)	8.3	5.5	6.4	4.1	0.7	0.0	0.0	0.0	0.5	1.6	4.9	7.6	39.4
Average Snow Depth (in.)	3	1	0	0	0	0	0	0	0	0	1	2	1

Percent of possible observations for period of record. Max. Temp.: 0% Min. Temp.: 0% Precipitation: 92% Snowfall: 81.5% Snow Depth: 77.9%

3.8.1.3 Huntley

Period of Record Monthly Climate Summary

Period of Record: 1/ 1/1911 to 3/31/2005

Table 3.10. Monthly Climate Summaries for Huntley, Yellowstone County, Montana.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	32.8	38.5	47.0	59.8	69.4	78.0	87.4	86.0	74.0	62.3	46.4	36.4	59.8
Average Min. Temperature (F)	7.9	12.7	20.8	31.1	40.5	48.6	53.7	51.3	41.6	31.5	20.4	11.5	31.0
Average Total Precipitation (in.)	0.56	0.45	0.79	1.33	2.07	2.39	1.12	0.94	1.31	1.03	0.63	0.60	13.22
Average Total Snowfall (in.)	8.1	5.7	6.9	3.3	0.5	0.0	0.0	0.0	0.4	1.1	5.4	7.5	39.0
Average Snow Depth (in.)	4	2	1	0	0	0	0	0	0	0	1	2	1

Percent of possible observations for period of record. Max. Temp.: 97.5% Min. Temp.: 97.5% Precipitation: 97.7% Snowfall: 47.5% Snow Depth: 46.9%

3.8.1.4 Custer

Period of Record Monthly Climate Summary

Period of Record: 7/ 1/1948 to 6/30/1975

Table 3.11. Monthly Climate Summaries for Custer, Yellowstone County, Montana.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	29.1	40.2	48.4	59.7	71.4	80.0	89.3	88.9	76.2	65.1	48.9	34.7	61.0
Average Min. Temperature (F)	4.1	13.2	20.8	31.2	41.4	50.0	55.5	53.8	43.4	32.6	22.6	10.1	31.6
Average Total Precipitation (in.)	0.76	0.42	0.61	1.84	1.84	2.81	0.97	1.14	0.88	0.97	0.43	0.55	13.21
Average Total Snowfall (in.)	10.7	5.5	7.2	6.4	0.6	0.0	0.0	0.0	0.3	1.5	2.8	8.6	43.7
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.: 53.3% Min. Temp.: 53.3% Precipitation: 54.9% Snowfall: 52.4% Snow Depth: 53.2%

3.8.1.5 Broadview, Montana

Period of Record Monthly Climate Summary

Period of Record: 9/15/1951 to 3/31/1991

Table 3.12. Monthly climate summaries for Broadview, Yellowstone County, Montana.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	34.0	40.2	46.9	57.0	67.2	77.0	86.0	84.5	72.2	62.1	45.5	37.5	59.2
Average Min. Temperature (F)	11.1	15.8	21.2	30.4	39.8	47.7	53.1	51.2	41.4	33.1	21.6	13.9	31.7
Average Total Precipitation (in.)	0.52	0.45	0.76	1.38	2.74	2.20	1.13	1.26	1.22	0.95	0.59	0.41	13.60
Average Total Snowfall (in.)	7.2	6.0	5.6	6.3	0.1	0.0	0.0	0.0	0.4	1.5	5.1	4.1	36.3
Average Snow Depth (in.)	2	1	1	0	0	0	0	0	0	0	1	1	1

Percent of possible observations for period of record. Max. Temp.: 88.7% Min. Temp.: 86.9% Precipitation: 97.3% Snowfall: 77.1% Snow Depth: 72.3%

3.9 Wildfire Hazard Profiles

3.9.1 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 seasonal 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 region for thousands of years (Steele *et al.* 1986, Agee 1993).

Detailed records of fire ignition and extent have been compiled by the Forest Service, Bureau of Indian Affairs, and the Bureau of Land Management. Using this data on past fire extents and fire ignition data, the occurrence of wildland fires in the region of Yellowstone County has been evaluated. Since it was a major fire that burned several hundred thousand acres, it should be noted that the Hawk Creek Fire of 1984 is not included in this dataset.

Many fires have burned in the region of Yellowstone County (Table 3.13). There were approximately 285 fire ignitions during this 25 year period, with the highest number of total ignitions peaking in 1996. Although there were fewer ignitions, more acres burned in 2000 in Yellowstone County

Table 3.13. Summary of Wildfire Ignitions and Acres Burned by Cause from 1980 – 2005.

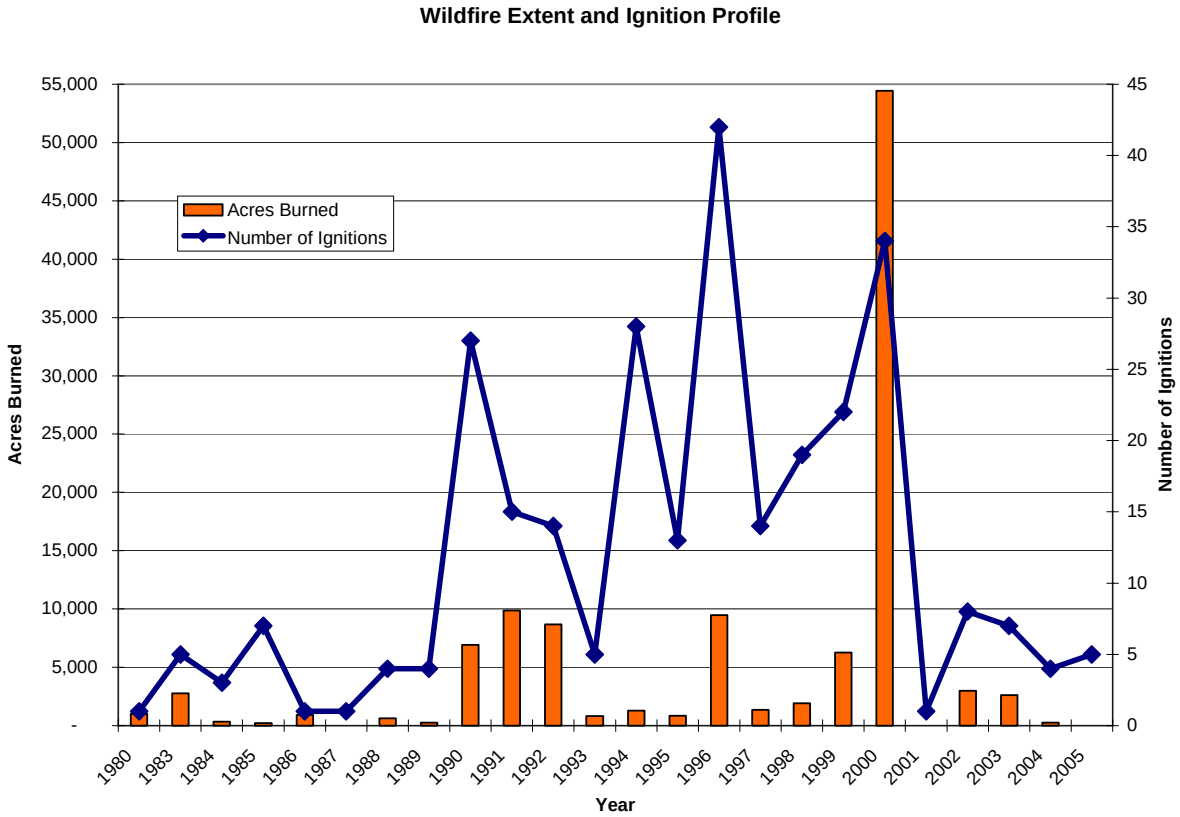
Cause	Acres Burned	Percent of Total	Number of Ignitions	Percent of Total
Campfire	1,000	1%	1	0%
Fireworks	-	0%	3	1%
Lightning	29,025	25%	81	28%
Machinery	2,000	2%	1	0%

Table 3.13. Summary of Wildfire Ignitions and Acres Burned by Cause from 1980 – 2005.

Cause	Acres Burned	Percent of Total	Number of Ignitions	Percent of Total
Mancaused	76,854	66%	120	42%
Unknown	739	1%	26	9%
Blank	6,290	5%	53	19%
Totals	**115908**		**285**	

Since 1980, it would appear that roughly 42% of all fires in Yellowstone County are human caused, while only 28% were naturally caused. There may be many factors contributing to this statistic, but the agrarian economy is likely mainly responsible. Mancaused fires have also contributed to the most acres burned throughout Yellowstone County. The large number of agriculture related wildfire ignitions has influenced this statistic greatly and it is important to note that the overwhelming majority of these fires have been contained at less than an acre.

Figure 3.7. Wildfire Extent and Ignition Profile for Yellowstone County.



During the course of the development of the Yellowstone County Community Wildfire Protection Plan all of the fire departments with jurisdiction in the County were asked to map fire ignitions by putting a dot or point on a map. This data was then merged and is summarized below in the "Past Fire Ignitions From All Departments" column of Table 3.14. In addition to the point data, the Billings Urban Fire Service Area also provided electronic data of their past fire ignitions including the cause and date of each fire. This information is summarized in Table 3.14 as well as in Section 3.9.1.2. The Shepherd Volunteer Fire Department also provided a written history of fires within their jurisdiction over the past 40 years. This information is included in the Table

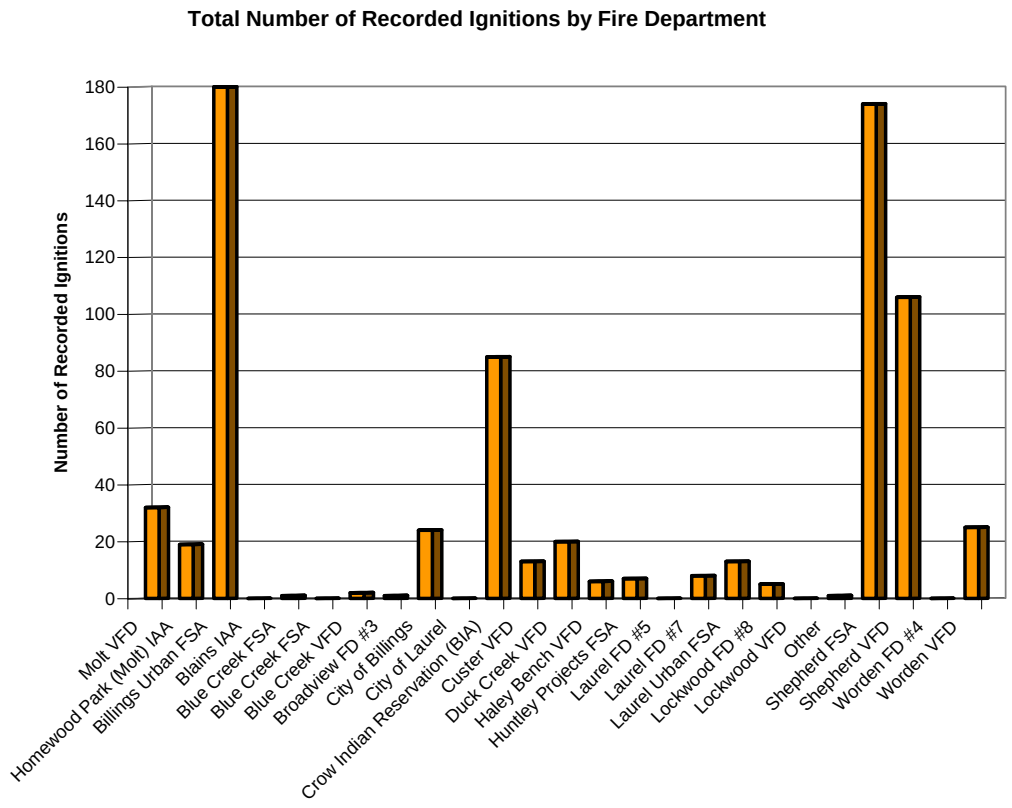
3.14 as well as in Section 3.9.1.1. This summarization allows local planners as well as fire departments to concentrate educational resources in areas with the highest frequency of recorded ignitions. This data does not; however, show dates of fires or the ultimate size of the fires. In many cases, ignitions were suppressed at less than an acre of burned area. Reference Appendix I for maps of wildfire ignition data throughout Yellowstone County.

Table 3.14. Summary of Yellowstone County Conditions by Fire Department From All Data Sources.

	Data Source			
District	**Past Fire Ignitions Data From All Departments**	**Billings Urban Fire Service Area Grass Fire Data**	**Shepherd Past Fires Data**	**Totals**
Billings Urban FSA	2	179	1	**182**
Blains IAA	0	0	0	**0**
Blue Creek FSA	0	1	0	**1**
Blue Creek FSA (provided by Lockwood FD)	0	0	0	**0**
Blue Creek VFD	2	0	0	**2**
Broadview FD #3	1	0	0	**1**
City of Billings	6	18	0	**24**
City of Laurel	0	0	0	**0**
Crow Indian Reservation	85	0	0	**85**
Custer VFD	9	0	4	**13**
Duck Creek VFD	14	0	6	**20**
Haley Bench VFD	6	0	0	**6**
Huntley Projects FSA	7	0	0	**7**
Laurel FD #5	0	0	0	**0**
Laurel FD #7	5	0	3	**8**
Laurel Urban FSA	5	2	6	**13**
Lockwood FD #8	3	2	0	**5**
Lockwood VFD	0	0	0	**0**
Other	0	1	0	**1**
Shepherd FSA	19	0	155	**174**
Shepherd VFD	14	0	92	**106**
Worden FD #4	0	0	0	**0**
Worden VFD	25	0	0	**25**
Totals	**254**	**203**	**267**	**724**

Figure 3.8 below shows the total number or recorded ignitions per fire department in Yellowstone County as summarized in Table 3.14. Some fire departments, such as the Billings Urban Fire Service Area, stand out as having a large number of ignitions. Part of the reason for this may be that they have a more complete record of ignitions or that they have been established for a longer period of time than many of the rural fire departments. It is important to remember that charting this information is a tool in order to better allocate resources to higher frequency areas; however, the data is not complete for every department and does not show the ultimate size of fires.

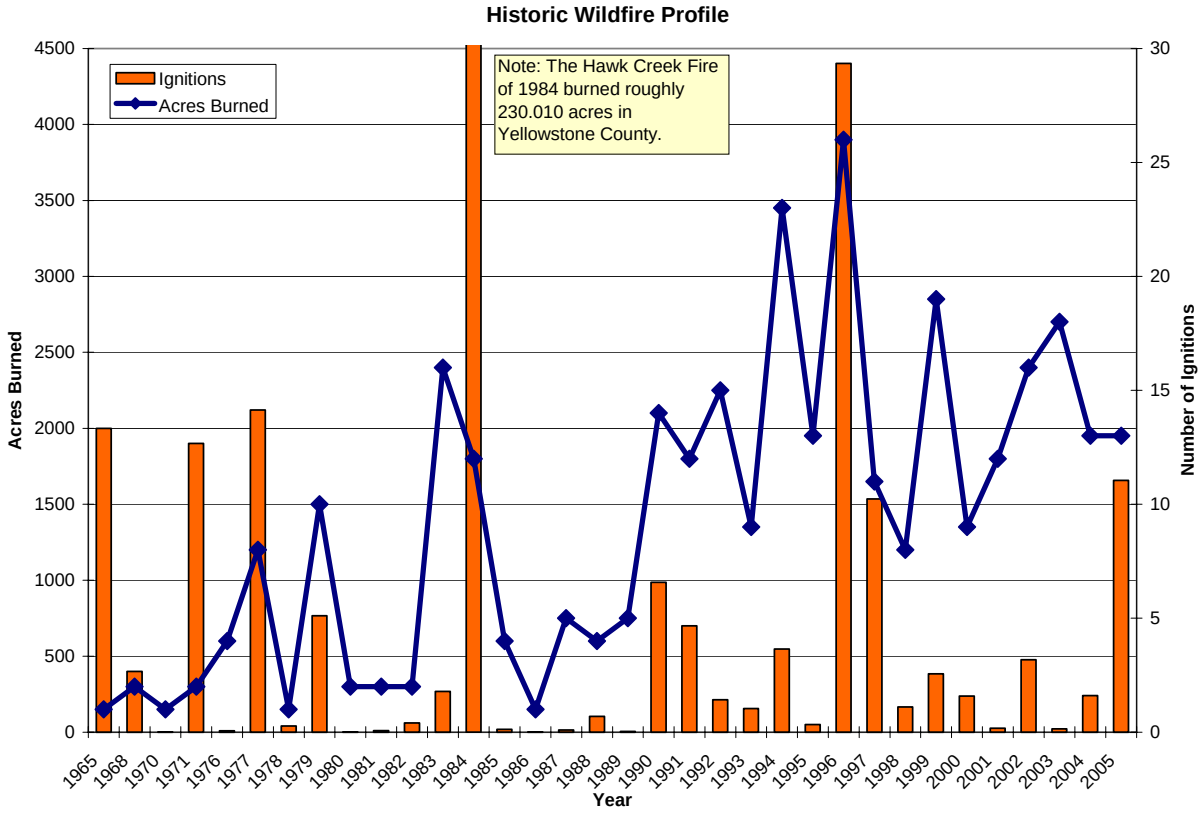
Figure 3.8. Total Number of Recorded Ignitions by Fire Department in Yellowstone County.



3.9.1.1 Shepherd Volunteer Fire Department Fire History

A long time member of the Shepherd Volunteer Fire Department has kept a personal journal of the fire history throughout the Shepherd Volunteer Fire Department's jurisdiction from 1965 through the present. While not complete, this data does provide some insight into the fire extent and frequency in the area. According to this record, there have been approximately 313 fire ignitions with 249,597 acres burned in the Shepherd area since 1965. Approximately 230,010 of those acres burned during the Hawk Creek Fire of 1984; however, the average annual acres burned is approximately 7,341. Consistent with the agency data presented in Table 3.13, the number of fire ignitions peaked in 1996 with 26 ignitions. The average annual number of fire starts in the Shepherd area is about 9.

Figure 3.9. Shepherd Volunteer Fire Department's Historic Wildfire Profile.

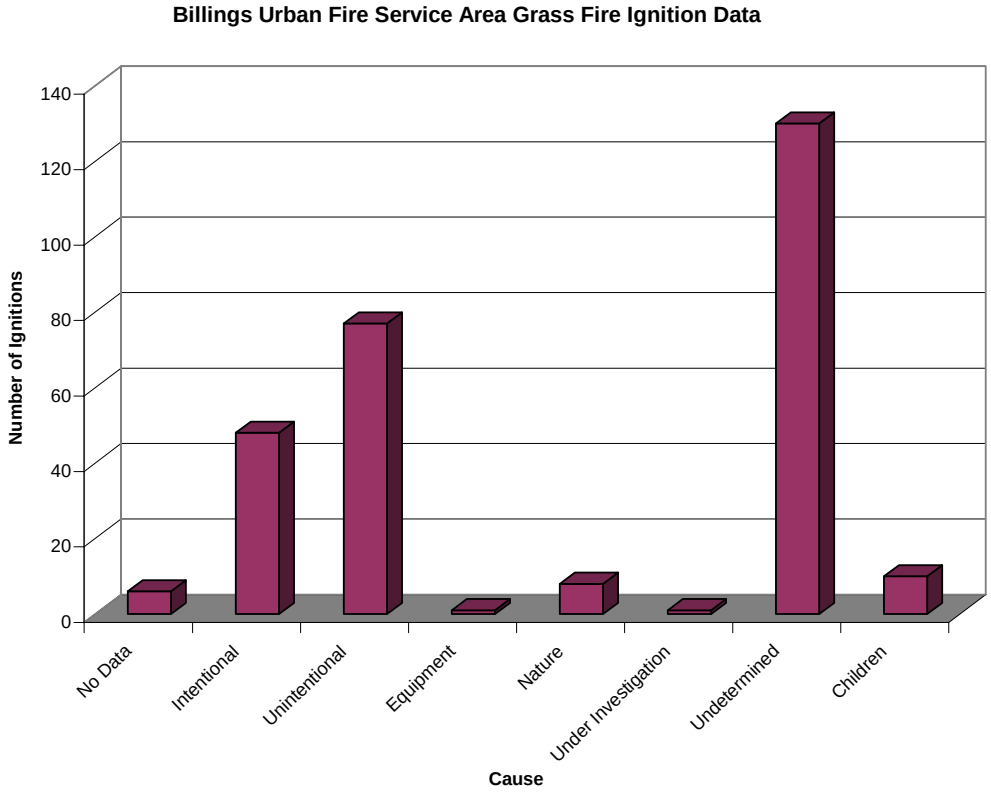


From Figure 3.8 it is clear that at least in the Shepherd area, the number of annual ignitions has been steadily increasing; however, the number of acres burned does not seem to support the same pattern.

3.9.1.2 Billings Urban Fire Service Area Statistics

The Billings Urban Fire Service Area has been recording the date and cause of grass fires within their jurisdiction since 1999. Figure 3.9 shows that only about 3% of grass fires are proven to be naturally caused.

Figure 3.10. Billings Urban Fire Service Area Grass Fire Ignition Data.



3.9.2 National Fire Statistics

Across the west, wildfires have been increasing in extent and cost of control. The National Interagency Fire Center (2005) reported over 77,500 wildfires in 2004 which burned a total of 6.7 million acres and cost $890 million in containment (Table 3.15). Data summaries for 2000 through 2004 are provided and demonstrate the variability of the frequency and extent of wildfires nationally (Table 3.15). It is important to note that the 10 year moving average number of acres burned reported each year has been increasing constantly since 2000.

Table 3.15. National Fire Season Summaries.

Statistical Highlights	2000	2001	2002	2003	2004
Number of Fires	122,827	84,079	88,458	85,943	77,534
10-year Average ending with indicated year	106,393	106,400	103,112	101,575	100,466
Acres Burned	**8,422,237**	**3,570,911**	**6,937,584**	**4,918,088**	**6,790,692**
10-year Average ending with indicated year	3,786,411	4,083,347	4,215,089	4,663,081	4,923,848
Structures Burned	861	731	2,381	5,781	1,095
Estimated Cost of Fire Suppression (Federal agencies only)	$1.3 billion	$542 million	$ 1.6 billion	$1.3 billion	$890 million

The National Interagency Fire Center, located in Boise, Idaho, maintains records of fire costs, extent, and related data for the entire nation. Tables 3.16 and 3.17 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.

These statistics (Table 3.16) 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.

Table 3.16. Total Fires and Acres 1960 - 2004 Nationally.

Year	Fires	Acres	Year	Fires	Acres
2004	77,534	* 6,790,692	1981	249,370	4,814,206
2003	85,943	4,918,088	1980	234,892	5,260,825
2002	88,458	6,937,584	1979	163,196	2,986,826
2001	84,079	3,555,138	1978	218,842	3,910,913
2000	122,827	8,422,237	1977	173,998	3,152,644
1999	93,702	5,661,976	1976	241,699	5,109,926
1998	81,043	2,329,709	1975	134,872	1,791,327
1997	89,517	3,672,616	1974	145,868	2,879,095
1996	115,025	6,701,390	1973	117,957	1,915,273
1995	130,019	2,315,730	1972	124,554	2,641,166
1994	114,049	4,724,014	1971	108,398	4,278,472
1993	97,031	2,310,420	1970	121,736	3,278,565
1992	103,830	2,457,665	1969	113,351	6,689,081
1991	116,953	2,237,714	1968	125,371	4,231,996
1990	122,763	5,452,874	1967	125,025	4,658,586
1989	121,714	3,261,732	1966	122,500	4,574,389
1988	154,573	7,398,889	1965	113,684	2,652,112
1987	143,877	4,152,575	1964	116,358	4,197,309
1986	139,980	3,308,133	1963	164,183	7,120,768
1985	133,840	4,434,748	1962	115,345	4,078,894
1984	118,636	2,266,134	1961	98,517	3,036,219
1983	161,649	5,080,553	1960	103,387	4,478,188
1982	174,755	2,382,036			

(National Interagency Fire Center 2004)

Table 3.17. 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
2004	$ 147,165,000	$ 63,452,000	$ 7,979,000	$ 34,052,000	$ 637,585,000	**$890,233,000**
2003	$151,894,000	$ 96,633,000	$ 9,554,000	$ 44,557,000	$ 1,023,500,000	**$1,326,138,000**
2002	$ 204,666,000	$ 109,035,000	$ 15,245,000	$ 66,094,000	$ 1,266,274,000	**$1,661,314,000**
2001	$ 192,115,00	$ 63,200,000	$ 7,160,000	$ 48,092,000	$ 607,233,000	**$917,800,000**
2000	$180,567,000	$ 93,042,000	$ 9,417,000	$ 53,341,000	$ 1,026,000,000	**$1,362,367,000**
1999	$ 85,724,000	$ 42,183,000	$ 4,500,000	$ 30,061,000	$ 361,000,000	**$523,468,000**
1998	$ 63,177,000	$ 27,366,000	$ 3,800,000	$ 19,183,000	$ 215,000,000	**$328,526,000**
1997	$ 62,470,000	$ 30,916,000	$ 2,000	$ 6,844,000	$ 155,768,000	**$256,000,000**
1996	$ 96,854,000	$ 40,779,000	$ 2,600	$ 19,832,000	$ 521,700,000	**$679,167,600**
1995	$ 56,600,000	$ 36,219,000	$ 1,675,000	$ 21,256,000	$ 224,300,000	**$340,050,000**

Table 3.17. 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**

(National Interagency Fire Center 2005)

Although many very large fires, growing to over 250,000 acres have burned in Montana, actual fires 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.

3.9.2.1 Prescribed Burning of Federal Acres

Prescribed fire has been effectively used as a mitigation tool, primarily on Federal and State lands across the US, and especially in the Western US. Federal Agencies report prescribed fire usage, with summaries provided by the National Interagency Fire Center, located in Boise, Idaho. National data is provided in Tables 3.18 and 3.19.

Table 3.18. Federal Wildland Fire Agency Prescribed Fire Acres Treated

Agency	1995 Acres	1996 Acres	1997 Acres	1998 Acres	1999 Acres	2000 Acres
USDA Forest Service	570,300	617,163	1,097,658	1,489,293	1,379,960	728,237
Bureau of Indian Affairs	21,000	16,000	37,000	48,287	83,875	3,353
Bureau of Land Management	56,000	50,000	72,500	200,223	308,000	125,600
National Park Service	62,000	52,000	70,000	86,126	135,441	19,072
U.S. Fish and Wildlife Service	209,000	180,000	324,000	285,758	300,508	201,052
Total	**918,300**	**915,163**	**1,601,158**	**1,889,564**	**2,240,105**	**1,077,314**

(National Interagency Fire Center 2005)

Table 3.19. Prescribed Fire Costs, Nationally.

Year	Bureau of Land Management	Bureau of Indian Affairs	Fish and Wildlife Service	National Park Service	USDA Forest Service	Totals
1995	$ 0	$ 840,000	$ 0	$ 3,200,000	$ 16,406,000	$ 20,446,000
1996	$ 1,200,000	$ 650,000	$ 0	$ 3,200,000	$ 24,500,000	$ 29,550,000
1997	$ 1,600,000	$ 800,000	$ 0	$ 4,600,000	$ 29,146,000	$ 36,146,000
1998	$ 6,700,000	$ 2,268,000	$ 4,825,000	$ 7,000,000	$ 50,000,000	$ 70,793,000
1999	$ 10,600,000	$ 6,300,000	$ 7,404,000	$ 9,800,000	$ 65,000,000	$ 99,104,000

3.9.2.2 Firefighter Accidents

The United States currently depends on approximately 1.2 million fire fighters (municipal and wildland) to protect its citizens and property from losses caused by fire. Of these fire fighters, approximately 210,000 are career/paid and approximately 1 million are volunteers. The National Fire Protection Association (NFPA) and the U.S. Fire Administration estimate that on average, 105 fire fighters die in the line of duty each year (NIFC 2005).

Due to the growing number of homes in the wildland/urban interface, it is almost inevitable that wildland and structural firefighters will find themselves in dangerous role reversals for which

they may not be adequately trained or equipped. For example, wildland fire fighters may be called on to protect threatened homes, and structural fire fighters may be called on to help battle the surrounding blazes in the wildlands.

In addition to the obvious difference of size, wildland fires and structure fires differ in that wildland fires require:

- more personnel, some of whom may have little or no fire fighting experience
- more resources spread out over a larger area.

Because of these factors, wildland fires present personal safety concerns to three areas:

- the firefighter
- the area immediately surrounding the firefighter
- the overall environment of the fire itself.

The most direct way to improve the safety of both structural and wildland fire fighters is cross-training of all fire fighters and improved equipment. While cross-training is being done in some regions throughout the country, it is still not standard practice everywhere. Until cross-training programs become universal, awareness may be the tool that saves lives.

Of the 1,046 firefighters who died while on duty from 1987 through 1996, 163 (15.6%) died while fighting wildland fires. The number of deaths was generally between 12 and 22 per year, with the exception of seven deaths in 1993 and 1996, and 33 deaths in 1994. Over the period, 23.6% of all fire ground deaths occurred at wildland fires (Firewise 2005).

This analysis includes members of municipal fire departments who responded to grass, brush and forest fires within their jurisdictions as well as career, seasonal and contract employees of state and federal wildland agencies who were involved in assigned firefighting activities at the time there were fatally injured (Firewise 2005). The federal wildland agencies include the U.S. Forest Service, the Bureau of Indian Affairs, the Bureau of Land Management, the Fish and Wildlife Service, the National Park Service and the military.

The 163 victims (1987-1996) ranged in age from 15 to 83, with a median age of 34. Fourteen of the victims were women. Approximately 70% of all wildland fire deaths (114) occurred during fire suppression activities. Another 49 deaths occurred when firefighters were responding to or returning from such fires.

3.9.2.2.1 Deaths on the Ground from Fire

The largest proportion of deaths during fire suppression activities resulted from being caught or trapped by fire progress. Twenty-five of these 38 firefighters died of smoke inhalation; the other 13 died as a result of burns. Fourteen of these 38 deaths occurred in a single incident in 1994.

Wildland fire deaths by nature of fatal injury, more commonly referred to as the medical cause of death, is important to understanding this issue. State and federal wildland officials believe that their rigorous fitness requirements lower the risk of heart attack death among firefighters under their jurisdiction. For this analysis, then, the fire ground deaths were broken down by type of department municipal (career or volunteer) or wildland agencies. A profile of the 114 fire ground victims shows that 50 were members of municipal fire departments (44 were volunteer firefighters and six were career firefighters). The other 64 firefighters were career, seasonal or contract employees of state and federal wildland agencies, or military personnel.

3.9.2.2.2 Municipal Fire Fighters

As shown in Table 3.20, heart attacks accounted for over half of the deaths of municipal firefighters during fire ground operations, while most of the deaths of state and federal employees were due to internal trauma, asphyxiation and burns.

Of the 17 municipal heart attack victims for whom medical documentation was available, nine had had prior heart attacks or bypass surgery, three had severe arteriosclerotic heart disease, three had hypertension and one was diabetic. The municipal volunteer firefighters who suffered fatal heart attacks ranged in age from 27 to 83, with a median age of 58. The one wildland agency firefighter who died of a heart attack was 38 years old and had severe arteriosclerotic heart disease.

The lower proportion of heart attacks among wildland agency firefighters may be a result of stricter fitness requirements, but it could also be a function of age. Older firefighters are more likely to suffer heart attacks and if the wildland agencies employ a significantly lower percentage of old firefighters, their experience would reflect this. Looking at all fire ground deaths, municipal vs. wildland agencies, the ages of wildland firefighters who died ranged from 18 to 64, with a median age of 32 years, while volunteer municipal firefighters ranged in age from 18 to 83, with a median age of 50. The six career municipal firefighters ranged in age from 20 to 49, with a median age of 29. Other factors besides age and fitness requirements that may impact the incidence of heart attack deaths at wildland fires include the equipment provided. In many of the incidents handled by municipal firefighters, those involved in fighting the fire did so in full protective clothing designed for structural firefighting, while wildland firefighters wear clothing, helmets and boots more appropriate to outdoor work (Firewise 2005).

Table 3.20. Wildland firefighter deaths on the fire ground by nature of Fatal Injury 1987-1996.

Fatality Cause	Federal and State Wildland Agencies	Municipal		Total
		Volunteer	Career	
Heart attack	1	27	0	28
Internal trauma	24	3	1	28
Asphyxiation	23	2	0	25
Burns	9	4	3	16
Crushing	4	4	0	8
Electric shock	1	2	0	3
Heat stroke	0	1	2	3
Stroke	2	0	0	2
Bleeding	0	1	0	1
Total	64	44	6	114

As far as the other types of injuries suffered on the fire ground are concerned, increased use of fire shelters could result in a reduction in fatal burns and smoke inhalation deaths and safer handling of aircraft could reduce the number of deaths due to aircraft crashes during suppression activities.

3.9.2.2.3 Deaths While Responding to or Return from Alarms

Of the 163 wildland-related deaths that occurred between 1987 and 1996, 49 occurred when firefighters were responding to or returning from such fires. Thirty four of the 49 deaths were the result of vehicle crashes, 12 were heart attacks, one firefighter was crushed when a tree fell on the crew area of a moving truck, one firefighter was crushed between two pieces of apparatus

while he attempted to start the rear-mounted pump in preparation for response to an incident and one firefighter drowned at a base camp after returning from the fire line.

The 34 deaths in crashes occurred in 25 separate incidents. Ten contractors and four federal employees were killed in six aircraft crashes. Eleven firefighters were killed in 10 crashes involving tankers, and five firefighters were killed when their personal vehicles crashed. The remaining four deaths resulted from crashes involving an engine, a brush unit, a supply vehicle and a military vehicle.

The 12 heart attack victims included eight municipal firefighters, three forestry employees and one contractor. Five of the 12 firefighters had had prior heart attacks or bypass surgery, one had severe arteriosclerotic heart disease and one was diabetic. No medical information was available for the other five heart attack victims.

3.9.2.2.4 Montana State Fatalities

Within Montana State, wildland fire injuries have been documented by the National Interagency Fire Center (2005) and are summarized in Table 3.21. From 1932-2003, there have been 38 fatalities during 16 incidents involving significant injuries. Burn over and entrapments are common themes in the listed fatalities. In order to reduce the risks to firefighters responding to wildland fire events, these issues must be addressed and eliminated.

Table 3.21. Wildfire accidents reported in Montana, 1910-2003.

Year	Place	Type of Accident	Organization	Fatalities
1933	Basin	Hypothermia	Federal	1
1934	Glacier NP	Snag	Federal	1
1934	Lincoln NF	Snag	Federal	1
1937	Missoula	Burnover	Federal	1
1949	Helena NF	Burnover	Federal	13
1967	Kootenai NF	Burnover	Federal	2
1984	Humansville	Burnover	Unknown	2
1988	Flathead NF	Snag	Federal	1
1988	Not Reported	Engine Rollover	Federal	1
1988	Not Reported	Snag	Other	1
1988	Not Reported	Vehicle	Federal	1
1991	Missoula	Fire Training	Federal	1
1991	Not Reported	Aircraft	Federal	2
1994	Missoula	Air tanker	Contractor/Federal	2
1996	Colstrip	Burnover	Private	2
1999	Pompeys Pillar	Dozer Burnover	Contractor	0
2001	Livingston	Helicopter	Contractor	3
2001	Not Reported	Snag	Federal	1
2002	Dillon	Work Capacity Test	State	1
2003	Missoula	Heart Attack	State	1

(National Interagency Fire Center 2005)

3.10 Analysis Tools and Techniques to Assess Fire Risk

Yellowstone County and the adjacent counties of Golden Valley, Musselshell, Rosebud, Treasure, Big Horn, Carbon, and Stillwater were analyzed using a variety of techniques, managed on a GIS system (ArcGIS 9). 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 wildfire risk in the region.

3.10.1 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. This analysis procedure has been completed on approximately 45 million acres across Montana, Wyoming, Idaho, Washington, and Nevada since 2002.

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 frequency 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 9. 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.

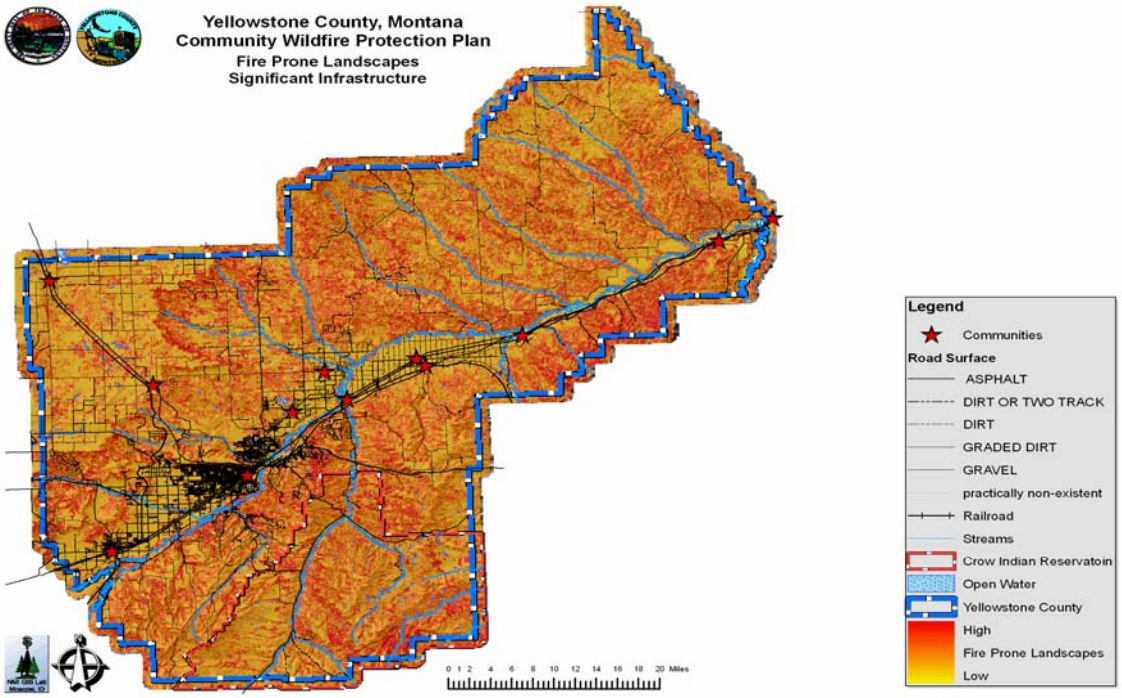
Landsat 7 ETM images were obtained to conduct hyper-spectral analysis for this project. The image was obtained in 1998. Hyper-spectral analysis procedures followed the conventions used by the Montana Vegetation and Land Cover Classification System, modified from Redmond (1997) and Homer (1998).

Riparian Zones: Riparian zones were derived from stream layers.

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 the U.S. Forest Service and the Montana Department of Natural Resources and Conservation. The Yellowstone County Fire Warden digitized fires reported by the Rural Fire Departments of Yellowstone County into a GIS system so that a full wildfire database was available to characterize wildfire occurrence in Yellowstone County. This data was used in the formation of the Fire Prone landscapes assessment.

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.

Figure 3.11. Fire Prone Landscapes in Yellowstone County.



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

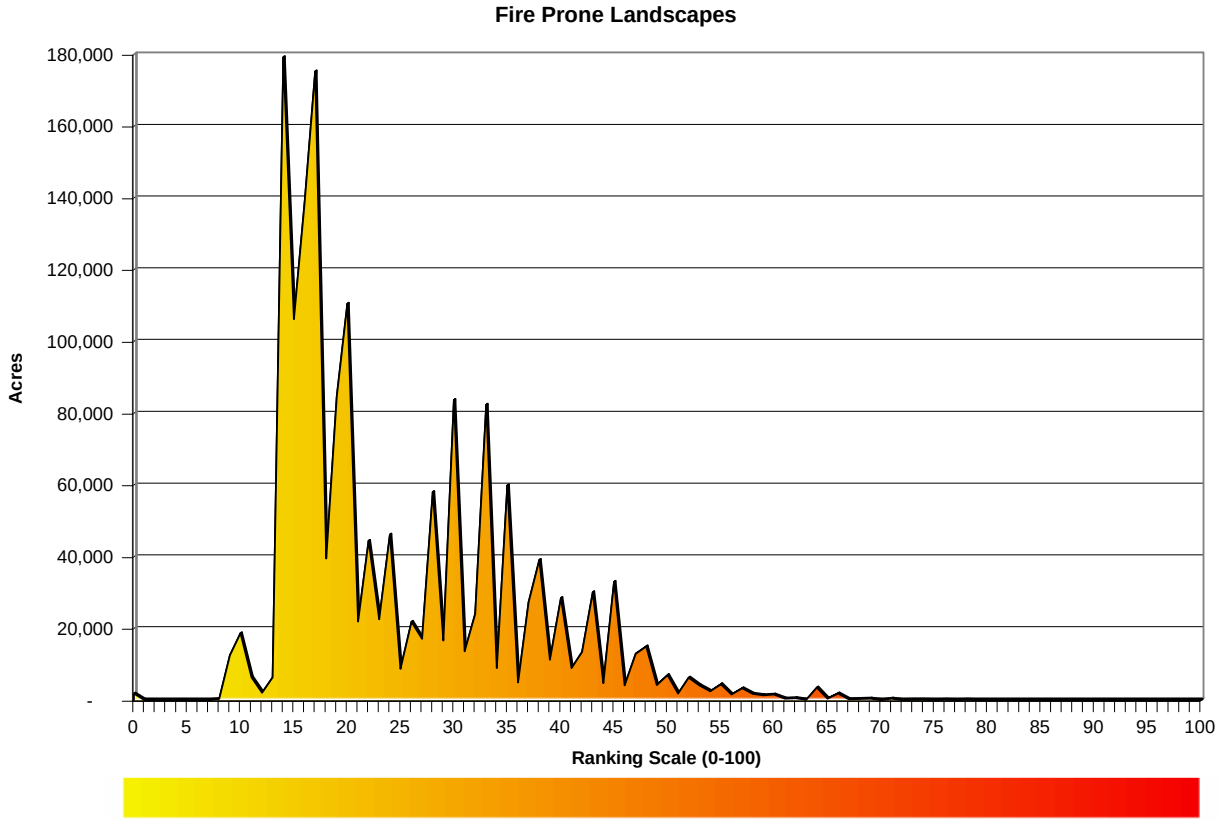
The maps depicting these risk categories display yellow as the lowest risk and red as the highest with values between a constant- gradient from yellow to orange to red (Table 3.22).

While large maps (16 square feet) have been provided as part of this analysis, smaller size maps are presented in the Appendices.

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

Color Code	Value	Total Acres	Percent of Total Area
	0	1,913	0%
	10	31,471	2%
	20	849,101	50%
	30	341,170	20%
	40	300,135	18%
	50	133,476	8%
	60	28,860	2%
	70	8,281	0%
	80	1,187	0%
	90	61	0%
	100	3	0%

Figure 3.12: 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.

3.10.2 Historic Fire Regime

The US Forest Service has provided their assessment of Historic Fire Regimes for western Montana. These measures of forest conditions are the standard method of analysis for the USDA Forest Service. The Historic Fire Regime map is presented in Appendix I.

In the fire-adapted ecosystems of Montana, fire is undoubtedly the dominant process in terrestrial systems that constrain vegetation patterns, habitats, and ultimately, species composition. Land managers need to understand historical fire regimes (that is, fire frequency and fire severity prior to settlement by Euro-Americans) to be able to define ecologically appropriate goals and objectives for an area. Moreover, managers need spatially explicit knowledge of how historical fire regimes vary across the landscape.

Many ecological assessments are enhanced by the characterization of the historical range of variability which helps managers understand: (1) how the driving ecosystem processes vary from site to site; (2) how these processes affected ecosystems in the past; and (3) how these processes might affect the ecosystems of today and the future. Obviously, historical fire regimes are a critical component for characterizing the historical range of variability in the fire adapted ecosystems of Montana. Furthermore, understanding ecosystem departures provides the necessary context for managing sustainable ecosystems. Land managers need to understand how ecosystem processes and functions have changed prior to developing strategies to maintain or restore sustainable systems. In addition, the concept of departure is a key factor for assessing risks to ecosystem components. For example, the departure from historical fire regimes may serve as a useful proxy for the potential of severe fire effects from an ecological perspective.

We used a database of fire history studies in the region to develop modeling rules for predicting historical fire regimes (HFRs). Tabular fire-history data was stratified into spatial data ecoregions, potential natural vegetation types (PNVs), slope classes, and aspect classes to derive rule sets which were then modeled spatially. Expert opinion was substituted for a stratum when empirical data was not available.

Fire is the dominant disturbance process that manipulates vegetation patterns in Montana. The HFR data were prepared to supplement other data necessary to assess integrated risks and opportunities at regional and subregional scales.

3.10.2.1 General Limitations

These data were derived using fire history data from a variety of different sources. These data were designed to characterize broad scale patterns of historical fire regimes for use in regional and subregional assessments. Any decisions based on these data should be supported with field verification, especially at scales finer than 1:50,000. Although the resolution of the HFR theme is 30 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).

Table 3.23. Historic Fire Regime by area in Yellowstone County.

Historic Fire Regime Description	Regime	Acres	Percent
Non-lethal Fires	I	46,259	3%
Mixed severity, short return interval	I	166	0%
Mixed severity, long return interval	III	43,783	3%
Mixed severity, high elevation	II	803,108	47%
Stand replacement, short return interval	III	26,854	2%
Stand replacement, long return interval	IV	329,623	19%
Stand replacement; grass/shrub type	V	109,676	6%
Agriculture	Agriculture	283,641	17%
Rock / barren	Urban	27,163	2%
Urban	Sparce Vegetation	9,543	1%
Water	Water	16,012	1%

3.10.3 Fire Regime Condition Class

The US Forest Service has provided their assessment of Fire Regime Condition Class for Yellowstone County to this Community Wildfire Protection 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 3.24. Maps depicting Fire Regime and Condition Class are presented in Appendix I.

Table 3.24. Fire Regime Condition Class Definitions.

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.

The analyses of Fire Regime Condition Class in Yellowstone County shows that approximately 10% of the County is in Condition Class 1 (low departure), just about 1% is in Condition Class 2 (moderate departure), with the remaining 2% of the area is in Condition Class 3 (Table 3.25).

Table 3.25. Fire Regime Condition Class by Area in Yellowstone County.

Condition Class	Acres	Percent
Low	86,568	5%
Moderate	1,268,666	75%
High	701	0%
Agriculture	286,136	17%
Sparse Vegetation	9,773	1%
Urban	27,259	2%
Water	16,012	1%
Burned Areas	713	0%

See the Appendix I for map of Fire Regime Condition Class.

3.10.4 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). Current Fire Severity maps are depicted in Appendix I.

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).

3.10.4.1 Purpose

Fire is a dominant disturbance process in Montana. 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).

3.10.4.2 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.

Table 3.26. Predicted Fire Severity by area in Yellowstone County.

Predicted Fire Severity	Regime	Acres	Percent of Area
Mixed Severity-Short Interval	I	1,947	0%
Mixed Severity-Long Interval	III	43,645	3%
Non-Lethal Fires	I	43,521	3%
Non-forest-Mixed Severity-Moderate Interval	III	26,592	2%
Non-forest-Stand Replacement-Short Interval	II	799,375	47%
Agriculture	Agriculture	283,641	17%
Urban	Urban	27,163	2%
Sparse Vegetation	Sparce Vegetation	9,925	1%
Water	Water	16,012	1%
Recently Burned Area	Recently Burned Area	6,887	0%
Non-forest-Stand Replacement-Moderate Interval	IV	328,105	19%
Non-forest-Stand Replacement-Long Interval	V	109,013	6%

3.10.5 On-Site Evaluations

Fire control and evaluation specialists as well as hazard mitigation consultants evaluated the communities of Yellowstone 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.

3.10.6 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 Yellowstone 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.

3.10.6.1 Grass Group

3.10.6.1.1 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

3.10.6.1.2 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 and 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

3.10.6.1.3 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

3.10.6.2 Shrub Group

3.10.6.2.1 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

3.10.6.2.2 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

3.10.6.2.3 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

3.10.6.2.4 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

3.10.6.3 Timber Group

3.10.6.3.1 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, fire 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

3.10.6.3.2 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

3.10.6.3.3 Fire Behavior Fuel Model 10

The fires burn in the surface and ground fuels with greater fire intensity than the other timber 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 3.27. 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.

3.10.6.4 Logging Slash Group

3.10.6.4.1 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

3.10.6.4.2 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

3.10.6.4.3 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-tayhn-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 3.28.

Table 3.28. 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

3.11 Wildland-Urban Interface

3.11.1 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.

Structure locations in Yellowstone County were first mapped by the Yellowstone County GIS Department for use in the 911 database. However, this dataset was missing a number of structures in the city of Billings, as well as in the rural regions of the county. To determine the location of these structures, aerial photography from 1998 and 2004 was used to manually locate missing structures and add them to the dataset. The result was a GIS data layer including most, if not all, of the structures in Yellowstone County.

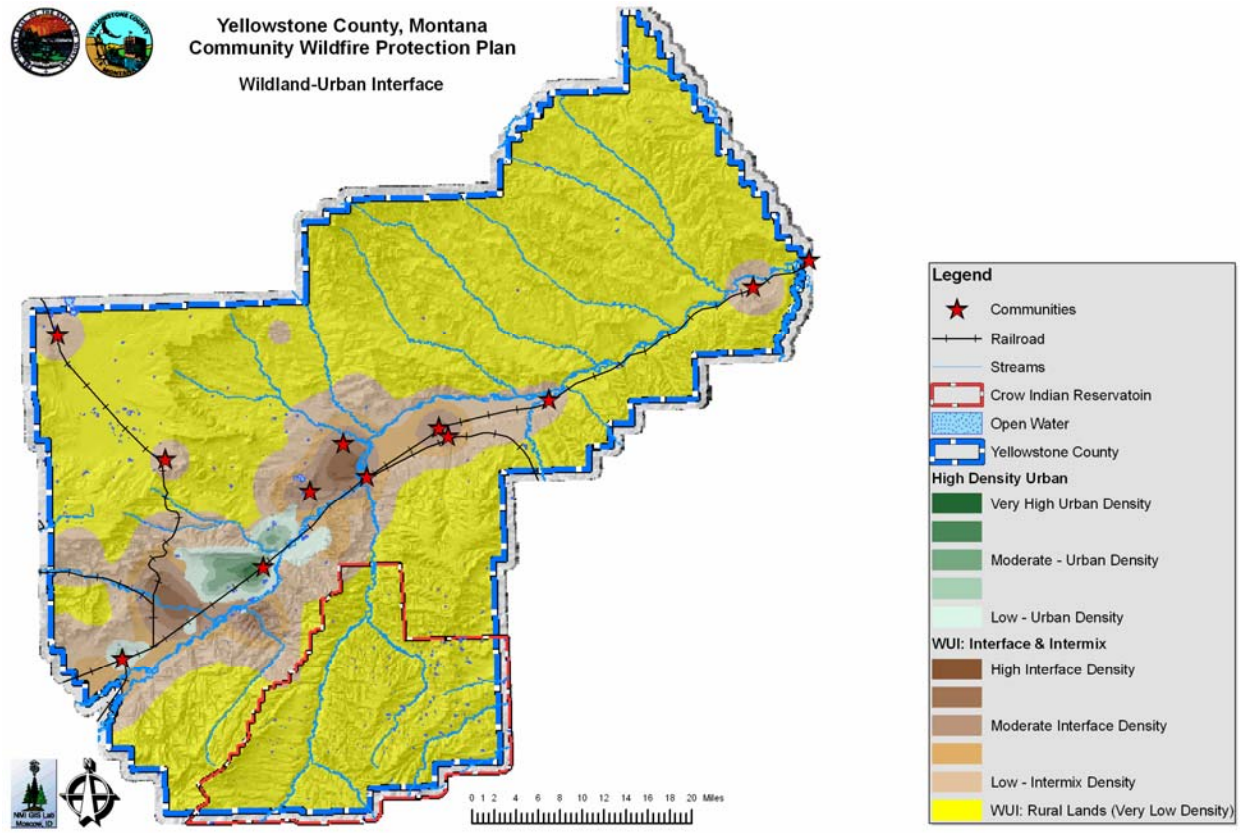
All structures are represented by a “dot” on the map. No differentiation is made between a garage and a home, or a business and a storage building. The density of structures and their specific locations in this management area are critical in defining where the potential exists for casualty loss in the 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 the Appendices.

Figure 3.13. Wildland-Urban Interface of Yellowstone County.



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

3.11.2 Infrastructure

Yellowstone County has both significant infrastructure and unique ecosystems within its boundaries. Of note for this Wildfire Protection Plan is the existence of highway routes (e.g., Interstates 90 and 94 and U.S. Routes 87, 212, and 312 and State Route 3), oil fields and refineries, and the presence of power lines supplying surrounding counties. These resources will be considered in the protection of infrastructural resources for Yellowstone County and to the larger extent of this region, and the rest of Montana.

High Tension Power Lines have been mapped and are presented in the Appendices. 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 Yellowstone County but of surrounding counties. The protection of these lines allows for community sustainability, support of the economic viability of Yellowstone 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

arcing 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.

3.11.3 Ecosystems

Yellowstone 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 farming) has altered plant community succession and has resulted in dramatic shifts in the fire regimes and species composition. As a result, woodlands and rangelands in Yellowstone 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).

3.12 Soils

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 was evaluated. Soils formed in place tend to contain high amounts of clay, silt and sand and low amounts of organic material in the surface horizons. These soils are located on the higher terraces and hills north and south of the Yellowstone River valley. The transported soils found in the Yellowstone River valley are more loam rich. On average, soils in Yellowstone County are well drained with moderate permeability.

Low to moderate intensity fires would be 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).

3.12.1 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, large scale pile burning would result in greater soil heating, but with 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. Loosely stacked hand piles resulting from typical defensible space projects in Yellowstone County would not be expected to have lasting affects on soil properties.

Indirect effects of prescribed burning to slope stability are highly variable in the soil types found in Yellowstone 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 Yellowstone 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.

3.13 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. Clayey 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.

3.13.1 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 low intensity ground fires with some areas of moderate intensity. This may include occasional torching of single trees or larger clumps of 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 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.

3.14 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). There are nine monitoring stations in Yellowstone County that are monitored for EPA emission standards. All locations are in compliance and well below allowable emission thresholds. These stations are positioned at Billings Logan International Airport, Pine Hills, Beartooth, Brickyard Lane, St. Lukes, Coburn Road, Lockwood Park, Johnson Lane, and Bernhardt Road in Laurel (Yellowstone City-County Health Department 2005).

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. 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. Air quality is also affected by winter inversions trapping emissions form internal combustion engines and wood burning stoves.

Yellowstone County is in the Montana Airshed Unit 10: Idaho/Montana Airshed Group Operating Guide (Levinson 2002). 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). The USDA Forest Service, Bureau of Land Management, and the Montana Department of Natural Resources and Conservation are all members of the Idaho/Montana 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 Idaho/Montana 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, 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 are most restrictive for this Class. The Gates of the Mountains Wilderness and the Anaconda-Pintler Wilderness Class 1 areas lie distantly to the northwest and west, respectively, of Yellowstone County.

All of the communities within Yellowstone 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).

3.14.1 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 roll 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, some of the principles that govern fire behavior have been identified and are recognized.

4.1.3.1 Conservation Reserve Program Lands

The Conservation Reserve Program is administered by the USDA Farm Services Agency. The Conservation Reserve Program (CRP) is a voluntary program for agricultural landowners. Through CRP, farmers can receive annual rental payments and cost-share assistance to establish long-term, resource conserving covers on eligible farmland. The Commodity Credit Corporation (CCC) makes annual rental payments based on the agriculture rental value of the land, and it provides cost-share assistance for up to 50 percent of the participant's costs in establishing approved conservation practices. Participants enroll in CRP contracts for 10 to 15 years.

The program is administered by the CCC through the Farm Service Agency (FSA), and program support is provided by Natural Resources Conservation Service, Cooperative State Research and Education Extension Service, state forestry agencies, and local Soil and Water Conservation Districts. Approximately 3.4 million acres of farm land in Montana have been enrolled in the CRP program through February 2005.

USDA Farm Service Agency's (FSA) Conservation Reserve Program (CRP) is a voluntary program available to agricultural producers to help them safeguard environmentally sensitive land. Producers enrolled in CRP plant long-term, resource-conserving covers to improve the quality of water, control soil erosion, and enhance wildlife habitat. In return, FSA provides participants with rental payments and cost-share assistance. Contract duration is between 10 and 15 years.

The Food Security Act of 1985, as amended, authorized CRP. The program is also governed by regulations published in 7 CFR, part 1410. The program is implemented by FSA on behalf of USDA's Commodity Credit Corporation.

CRP protects millions of acres of American topsoil from erosion and is designed to safeguard the Nation's natural resources. By reducing water runoff and sedimentation, CRP protects groundwater and helps improve the condition of lakes, rivers, ponds, and streams. Acreage enrolled in the CRP is planted to resource-conserving vegetative covers, making the program a major contributor to increased wildlife populations in many parts of the country.

Although there are many benefits to the County stemming from CRP land enrollment, the impact on wildfire control is problematic. When these lands, often near communities and homes, build up heavy fuel loading consistent with natural grasses and shrubs, the fuel loading increases dramatically above that found on farmlands. Fires in these fuels can move very rapidly when fanned by winds (common during the fire season). The FSA allows periodic fuels mitigation treatments on CRP lands. These fuel treatments are critical to the development of a successful wildfire mitigation program in Yellowstone County and are fully endorsed and encouraged by the Wildfire Protection Plan Committee.

4.2 Yellowstone County Conditions

Yellowstone County is characterized by cold winters and dry summers. The cities of Billings and Laurel make up a densely populated metropolitan center; however, much of the remaining area in the county is quite rural. Farms and ranches tend to be widely spread. Grazing activity on both public and private lands by livestock and wildlife tends to decrease the build up of fine fuel loads; however, this does not drastically reduce the fire potential.

The majority of the county is covered by native rangelands, while most of the Yellowstone River valley has been developed or converted to irrigated farm or pasture. Undeveloped rangelands are characterized by low growing grasses with scattered stands of sagebrush or juniper and occasionally ponderosa pine. Rangelands are typically either grazed, thereby keeping the fine fuel buildup to a minimum, or are in various stages of crop production. Agricultural fields are generally not considered to be at high risk of uncontrolled wildland fires; however, fires in this type of vegetation could burn very intensely with large flame lengths depending on the crop type. Annual burning of stubble after harvest occasionally leads to escaped grass fires. Usually, these fires are relatively easily controlled at road crossings or by using available farm implements to modify the vegetation in its path.

Since the induction of the Conservation Reserve Program by the federal government, many former crop producing fields have been allowed to return to native grasses. CRP fields are creating a new fire concern all over the West. As thick grasses are allowed to grow naturally year after year, dense mats of dead plant material begin to buildup. Due to the availability of a continuous fuel bed, fires in CRP fields tend to burn very intensely with large flame lengths that often times jump roads or other barriers, particularly under the influence of wind. Many landowners and fire personnel are researching allowable management techniques to deal with this increasing problem. Currently, according to the CRP Handbook, all management must be part of the landowner's Conservation Plan of Operations, which includes burning to reduce the fuel loading, and must be in the best interest of the CRP. Under certain circumstances, burning may be used as a process to enhance or renovate the existing vegetative cover for wildlife, especially if it is overgrown and stagnant. As noted in Montana CRP-542, burning can only be conducted under an approved burn plan by qualified personnel. The County must also issue a burn permit for any controlled burning on CRP fields.

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 also contributes to unwanted and unexpected wildland fires. Further contributing to ignition sources are the debris burners and the practice of ditch burning where fire is used 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 the 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 to 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 attempt 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 are 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 statewide regulation, compliance and enforcement has been variable between fire departments. 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 Yellowstone County is comprised of rangelands. 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 Community Wildfire Protection Plan indicated that approximately 61% 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 departments, 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 departments 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.

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 Yellowstone 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 Yellowstone 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. Yellowstone County Communities

Community Name	Planning Description	Vegetative Community	National Register Community At Risk?[1]
Billings	City	Rangeland	Yes
Laurel	City	Rangeland	Yes
Broadview	Town	Rangeland	No
Huntley Project	Community	Rangeland	No
Worden	Community	Rangeland	Yes
Lockwood	Community	Rangeland	No
Shepherd	Community	Rangeland	No
Custer	Community	Rangeland	No
Acton	Community	Rangeland	No
Ballantine	Community	Rangeland	No
Pompeys Pillar	Community	Rangeland	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.

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 around 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 Communities in Yellowstone County

4.4.1 Vegetative Associations and Overall Fuels Assessment

The land ownership pattern in Yellowstone County is a mixture of state, federal, and private. Additionally, a portion of the Crow Indian Reservation lies in the southeast corner of the county. Most of the Yellowstone River valley and the flatter rangeland regions are privately owned. Tillable or grazable ground is generally utilized for the production of agricultural products. The northeastern corner of the county is a mixture of rangeland and scattered forestlands. Ownership in this area is by and large private with scattered inholdings of Bureau of Land Management and State, 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.

Much of the rangeland is actively grazed by livestock, 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 short, grass fuel types spread very rapidly. 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 and juniper grow on 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. The current drought conditions in Yellowstone and surrounding counties is causing large scale mortality of many stands pockets of ponderosa pine. The needles left on these standing dead trees provide excellent fuel for an ignition and increase the probability of a crown fire.

4.4.2 Individual Community Assessments

4.4.2.1 Billings

(This assessment includes Hillcrest Subdivision, Blue Creek Area, Rehberg Ranch Estates, and Lone Eagle Subdivision).

Billings is the commercial center and population hub of Yellowstone County. The city spans the Yellowstone River valley just northeast of where the Clarks Fork of the Yellowstone River joins the main channel. Outside of the urban developments, the city is surrounded, for the most part, by agricultural development in the form of various crops and livestock grazing. North of the city, past the Rimrock, there are some agricultural crop fields; however, relatively flat rangelands extend for many miles broken only by a few shallow and usually sparsely forested coulees. On the south side of the Yellowstone River, there are several developing subdivisions. Wheat, hay, and other crop fields abut many of these housing projects; however, a few are intermingled with somewhat sparse stands of ponderosa pine and juniper.

Extensive development of subdivisions and rural communities has occurred throughout the foothills in almost every direction from the city. Included in this assessment are *Hillcrest, Blue Creek Area, Rehberg Ranch Estates, and Lone Eagle*.

The Hillcrest Subdivision is a newer development going in on the hilltop just south of the Yellowstone River and west of State Route 416 (Blue Creek Road). This has been subdivided out of former agricultural land; thus, there is little native fuels remaining.

The Blue Creek community is a compilation of several small clusters of homes and the Briarwood Estates Subdivision located along State Route 416, otherwise known as Blue Creek Road. The west side of the road is characterized by a gentle, grassy slope leading up to agricultural development along the top. Homes on the west side of the Blue Creek Road are generally at low risk due to lack of dense fuels. There are a few homes in the Basin Creek

drainage that may be at slightly higher risk due to accumulation sage and juniper in the creek bed. Many of the graveled roads accessing homes on the west side of road, namely Basin Creek Road and Vandaveer Road, are very rough due to potholes and washboards. During certain times of the year, emergency vehicles may need to travel very slowly to negotiate the bumpiness. Some of the homes along the east side of the road abut rangeland fuels with an increased sagebrush and juniper component. Homes in the Briarwood Estates Subdivision are generally well protected from fire by the well-manicured lawns that surround their homes. Nevertheless, structures along the perimeter of the development, particularly to the east and south, abut rangeland fuels consisting of medium length grasses, sagebrush, and juniper clumps. Additionally, there are a few occluded sections of wildland fuels within the subdivision that would be much more susceptible to an ignition.

The Rehberg Ranch Estates development sits north of Billings about one mile north of the Rimrock. Upon completion, this subdivision will contain 1,200 homes. Most of this area has previously been employed as a working ranch. This subdivision straddles a small coulee with several smaller drainages throughout. Although the coulee area is lightly timbered with ponderosa pine and juniper with a moderate grass understory, much of the trees are dead or dying. Insect infestation is evident by a significant number of trees with spiked tops and thinning foliage. This overstocked area contains high fuel densities, increasing ladder fuels, and dead and down fuels; which sets the stage for potential crown fires. The risk of a wildland fire occurring in this area is great. Fire history in the general area includes 6-9 fires in the past 15 years. The most recent fire occurred in 2002 on state land immediately to the west of the subdivision. Fire behavior has been characterized by high intensity crown fires and complete consumption of the timber overstory.

The Lone Eagle Subdivision lies a few miles northwest of Billings off of State Highway 3. Most of the homes in the Lone Eagle Subdivision sit on large lots (approximately 5-10 acre parcels) with horse pasture or rangeland surrounding manicured lawns. Many of the homes in this area are accessed via gated private driveways. There is a small rock ledge cutting through the middle of development that supports a few ponderosa pine and juniper; however, the surrounding area is predominantly rangeland.

4.4.2.1.1 Fire Potential

Fuels Assessment

The native rangeland ecosystem around the outskirts of the city and abutting several of the rural subdivisions consist of short to medium length grasses with scattered clumps of sagebrush and juniper. This type of fuel is typically very flashy. Fires spread quickly, particularly upslope, but tend to burn at lower intensities. In some areas, the lack of a consistent fuel bed may slow the spread of fire. The rangelands of eastern Montana, including Yellowstone County, historically burned at frequent intervals. 5 to 25 year return intervals helped maintain the grassland ecosystem by limiting the establishment of slower growing species.

Along the face of the Rimrock and in several coulees north of State Route 3 a mixed rangeland/forestland vegetation type abuts many homes and intermixes with the Rehberg Ranch Estates. The overstory consists of ponderosa pine and juniper with a light grass understory. Under normal conditions, a fire in these fuels would burn quickly along the surface with occasional flare ups, particularly in areas with juniper concentrations. Torching of individual trees, increased flame lengths, and high rates of spread would be expected under the influence of drought and/or wind.

The agricultural fields currently dominating the river bottom and regions of the surrounding foothills become very dry during the summer months. These cured grasses can be very flammable, especially under extreme weather conditions, such as drought or wind. In the event of an uncontrolled wildfire, these light fuels would tend to support very fast moving, yet lower intensity fires. Modification of the vegetation around structures can be done quickly with available farm equipment and is usually effective in controlling wildfire.

Ignition Profile

Both natural and human caused ignitions occur around the City of Billings. The community center is more prone to human caused ignitions than lightning strikes due to the flat topography and agricultural development; however, lightning strikes occur fairly frequently in the rangeland and forestlands throughout the county. Annual field burning, trains, debris fires, and vehicle use are common potential ignition sources. Stubble fires seldom escape landowner's boundaries; however, there are occasional incidents. These fires are generally easily suppressed by modifying the vegetation and homes are rarely threatened.

Vehicle use on- and off-road is also a significant source of ignitions. Not only do sparks from vehicles ignite fuels along roadways, but fires are also commonly started by vehicles driving through dry fields or on unimproved trails. Grain trucks, ATV's, and pick ups are used regularly in farming operations.

4.4.2.1.2 Ingress-Egress

There are several arterials traveling to and from Billings including Interstate 90, Interstate 94, U.S. Route 87, U.S. Route 212, U.S. Route 312, and State Route 3. All of these highways are bordered by rangeland fuels. Many of the rural subdivisions are accessed off secondary routes or gravel roads; however, most of these are also well maintained, two-way routes.

The Hillcrest community is accessed via the Hillcrest Road off of State Route 416 (Blue Creek Road). This is a gravel road with enough room for two vehicles to pass easily. State Route 416, known as the Blue Creek Road, accesses several subdivisions in the Blue Creek area including Briarwood Estates. Both the Hillcrest Road and Blue Creek Road are bordered by manicured yards, rangeland fuels, or agricultural fields.

The Rehberg Ranch Estates is accessed from the Rod and Gun Club Road off of State Route 3. Both routes are paved with agricultural fields abutting both sides. There is only one designated access point to the entire subdivision; however, an emergency only access road has been identified on the far northwest end. Currently, it is not maintained, but would likely serve its purpose in an emergency situation.

The Lone Eagle Subdivision is also located directly off of State Route 3 on Lone Eagle Road. Lone Eagle Road is a well maintained paved road that winds through the subdivision with several short spurs accessing homes. Neither Lone Eagle Road nor any of the spurs provide a thru access back to the highway, which not only decreases the safety of residents, but also inhibits the ability of emergency personnel to safely respond. Furthermore, a significant number of personal driveways are gated making access to structures by fire suppression equipment much more difficult and time consuming.

4.4.2.1.3 Infrastructure

The City of Billings is on a municipal water system; however, many of the outlying subdivisions rely on personal or multiple home well systems and water storage tanks.

There is a multitude of high tension transmission lines in the Billings area. Many of these power line corridors extend to other Yellowstone County communities traveling over expansive rangeland fuels. Sparks caused by downed lines, transformer malfunctions, or arcing could easily ignite the receptive rangeland fuel bed below.

There are two active refineries in Billings. The ConocoPhillips and the ExxonMobil, both of which maintain their own security and fire suppression capabilities specific to the needs of the company.

4.4.2.1.4 Fire Protection

The Billings Fire Department is responsible for structural and wildland protection in the City of Billings, the Billings Urban Fire Service Area (BUFSA), Briarwood Subdivision, and Rehberg Ranch Estates. The Blue Creek Volunteer Fire Department provides structural and wildland fire protection to the residents of the Blue Creek Area and the Hillcrest Subdivision. The Montana Department of Natural Resources and Conservation and the Bureau of Land Management will respond to wildland fires in Yellowstone County upon request.

4.4.2.1.5 Community Assessment

Residents within the urban community of Billings have a low risk of being directly affected by wildland fire. Homes located in the more rural subdivisions scattered around the outskirts of the city have an increased risk of fire, particularly those surrounded by or abutting timber type fuels. Developments such as Hillcrest and the west side of Blue Creek Road abut lower risk agricultural fields or rangeland. Nevertheless, landowners should still take precautions to safeguard their homes and families from fire. Creating a green defensible space around structures will help insure that a rapidly spreading grass fire will not threaten their property or lives.

Those subdivisions built near or within higher risk rangeland fuels or wooded areas have an increased risk of wildland fire. Homes located in the Lone Eagle, Rehberg Ranch Estates, and on the east side of Blue Creek Road are surrounded by fuels that have a moderate wildland fire risk due to the higher density of sagebrush, juniper, or timber. The Lone Eagle Subdivision has additional risk due to the lack of a thru access road and restricted driveways.

It is imperative that homeowners, particularly in higher risk areas, implement fire mitigation measures to protect their structures and families prior to a wildland fire event. As the city grows, more and more homes will be built in the wildland urban interface. It will become increasingly important to educate landowners of the potential fire risk. The receptive nature of the rangeland fuels in Yellowstone County and their natural tendency towards frequent burn intervals increases the likelihood of a fire start. Most homeowners maintain an adequate defensible space around structures by watering their yards or mowing grass and weeds; however, there is still a need to inform others of the potential danger.

4.4.2.1.6 Mitigation Activities

Effective mitigation strategies begin with public awareness campaigns designed to educate homeowners of the risks associated with living in a flammable environment. Residents of Yellowstone County must be made aware that home defensibility starts with the home. Once a fire has started and is moving toward a structure or other valued resources, the probability of that structure surviving is largely dependent on the structural and landscaping characteristics of the home. “Living with Fire, A Guide for the Homeowner” is an excellent tool for educating homeowners as to the steps to take in order to create an effective defensible space. Residents

of Billings and the surrounding area should be encouraged to work with local fire departments and fire management agencies within the county to complete individual home site evaluations. Home defensibility steps should be enacted based on the results of these evaluations.

Community defensible space projects can also help improve the safety of groups of homes. Rural subdivisions adjacent to wildland fuels can create fuel breaks along their perimeter that also increase the value of the homes in the community. Greenbelts or xeriscaped strips with a walking path not only provide a community defensible space, but they can potentially increase property values.

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. In many cases, homes' survivability can be greatly enhanced by following a few simple guidelines to increase accessibility such as widening or mowing driveways and creating a turnaround area for large vehicles. Roads and driveways accessing homes should be regularly maintained with the edges mowed to prevent an accidental ignition. Homeowners with structures located on dead end roads or driveways with no alternative escape route should construct loop roads where possible or establish gates in fencing to allow for an emergency evacuation if the primary escape route becomes impassable.

New developments in the wildland urban interface should be regulated by building codes that protect residents from the effects of wildfire. Insuring that there are adequate water resources available for emergency use and that new roads and driveways are accessible to emergency apparatus will become increasingly important as the community expands.

4.4.2.2 Laurel

The community of Laurel lies in the Yellowstone River valley southwest of Billings west of the junction of the Clarks Fork of the Yellowstone River and north of the main Yellowstone River channel. The community itself is surrounded primarily by agricultural development and is nearly connected to Billings by residential growth. Across the Yellowstone River to the south, much of the native rangelands have been converted to agricultural land, but to the north the agricultural development gives way to rangelands just a few miles past the city limits.

Several rural housing developments have become established in the rangelands north of Laurel. Included in this assessment is the *Buffalo Trail Subdivision, Clappers Flat, Canyon Creek Road area, and Duck Creek area.*

The Buffalo Trail area consists of several housing projects along State Route 401 (Buffalo Trail Road) near the Yellowstone-Stillwater County line. Buffalo Trail Road travels through a relatively wide coulee that is made up of rangeland grass with patches of sagebrush and juniper. Stunted ponderosa pine exists sporadically, but is somewhat denser near the upper slopes. The south side of highway is predominantly newer homes extending from the roadside up a gentle slope to a large plateau where 50 to 60 large lots have been established for construction. The north side of Buffalo Trail Road is a mixture of old and new homes. Structures near the road generally sit on fairly large, open lots, but as the steepness of the coulee wall increases, homes are more closely intermixed with the rangeland/forestland fuels.

The Canyon Creek Road area, which branches off the Buffalo Trail Road just south of the Buffalo Trail Subdivision. The Canyon Creek Road area follows the Canyon Creek drainage west towards the county line. There are several homes in the bottom of this little valley, most of which graze livestock and are relatively spread out.

The Clappers Flat area is a large plateau lying northwest of Laurel and is characterized by rangeland fuels with clumps of juniper and stunted ponderosa pine along the edges. Homes are typically built on large lots intermingled with the semi-wooded areas.

The Duck Creek Area refers to the scattered homes along Duck Creek Road south of the Yellowstone River about half way between Billings and Laurel. These are predominately large lots surrounded by agricultural fields, pasture, or rangeland. Many of the homes on the north end of this community are bordered by the riparian fuels associated with either the Yellowstone River or Duck Creek. The more remote homes towards the south end of Duck Creek Road are typically larger landowners surrounded by farm fields.

4.4.2.2.1 Fire Potential

Fuels Assessment

The native rangeland ecosystem around the outskirts of the community and abutting several of the rural subdivisions consist of short to medium length grasses with scattered clumps of sagebrush and juniper. This type of fuel is typically very flashy. Fires spread quickly, particularly upslope, but tend to burn at lower intensities. In some areas, the lack of a consistent fuel bed may slow the spread of fire. The rangelands of eastern Montana, including Yellowstone County, historically burned at frequent intervals. 5 to 25 year return intervals helped maintain the grassland ecosystem by limiting the establishment of slower growing species.

The partially timbered areas near Laurel are almost exclusively made up of ponderosa pine. Stringers and patches of trees typically exist in the coulees and canyons where moisture is more readily available. In most cases, fires in this type of timber will stay on the surface with only occasional torching of individual trees or clumps of trees, particularly where juniper offers a ladder fuel. Under extreme conditions, such as drought or high winds, fires will spread very rapidly with larger flame lengths.

The agricultural fields currently dominating the river bottom and regions of the surrounding foothills become very dry during the summer months. These cured grasses can be very flammable, especially under extreme weather conditions, such as drought or wind. In the event of an uncontrolled wildfire, these light fuels would tend to support very fast moving, yet lower intensity fires. Modification of the vegetation around structures can be done quickly with available farm equipment and is usually effective in controlling wildfire.

Ignition Profile

Both natural and human caused ignitions occur around the vicinity of Laurel. The community center is more prone to human caused ignitions than lightning strikes due to the flat topography and agricultural development; however, lightning strikes occur fairly frequently in the rangeland and forestlands throughout the county. Annual field burning, debris fires, and vehicle use are common potential ignition sources. Stubble fires seldom escape landowner's boundaries; however, there are a few incidences each year. These fires are generally easily suppressed by modifying the vegetation and homes are rarely threatened.

Vehicle use on- and off-road is also a significant source of ignitions. Not only do sparks from vehicles ignite fuels along roadways, but fires are also commonly started by vehicles driving through dry fields or on unimproved trails. Grain trucks, ATV's, and pick ups are used regularly in farming operations.

4.4.2.2.2 Ingress-Egress

The primary access into Laurel is via Interstate 90 from the east or west; however, there are several other main transportation routes coming into the area including U.S. Highway 310/212 and State Route 532. Most of the rural housing is accessed from gravel roads branching off of these primary routes.

Buffalo Trail Road provides the main access into the Buffalo Trail Subdivision. This two lane highway abuts rangeland fuels and provides an escape route out of both ends of the coulee. The Mountain View Road off of Buffalo Trail Road is primary access route for homes on the north side of the road. Mountain View is a graveled loop road; however, it becomes very narrow near the top and it is not well maintained. Potholes and severe washboards may hinder the speed of emergency response. There are several entrances to groups of homes on the south side of the road. These are typically graveled roads that loop through the subdivision. Roads in the Valley Canyon area start out as two-lane routes, but turn to one-lane further south. There are also numerous unmarked spur roads and long driveways extending off of these access routes making navigation through the area somewhat difficult. Better signing of the roads and house numbers at the end of driveways would help reduce confusion for emergency response personnel and for residents during an evacuation. The Medicine Man Road provides access to a large group of homes; however, this route dead ends at the last house. The lack of an alternate escape route significantly decreases the safety of residents in an emergency situation.

Homes in the Canyon Creek area are accessed via the Canyon Creek Road off of the Buffalo Trail Road. This is a two lane, graveled road that extends past the county line to the west. For the most part, this route is well maintained; however, there are a few rough spots that may slow emergency response.

Clapper Flats is reached by following Clapper Flats Road off of the Buffalo Trail/Laurel Road. This is also a two lane, graveled road that is kept in good condition. Most of the homes in this area are accessed by Red and King Gulch Road, which dead ends on the south side of the development. This road starts out as rough, but graveled two lane route; however, it tapers into a one lane dirt road towards the end. There are several dead end spur roads and driveways branching from the Red and King Gulch Road, none of which seem to have alternate escape routes. The safety of residents in the Clappers Flat area would be drastically improved with the development of a thru road.

The Duck Creek Area can be accessed from both Laurel and Billings. From Laurel, Theil Road, which turns into River Road along the south bank of the Yellowstone River provides the most direct access. From Billings, Duck Creek is reached by following Hillcrest Road out of the Blue Creek area. Thiel Road and River Road are both two-way paved routes while Hillcrest Road is mostly a well maintained gravel road. Duck Creek Road is also a well maintained graveled route that abuts mostly agricultural land with some isolated sections of rangeland. Near where Duck Creek Road connects to River Road, the actual Duck Creek parallels the roadway. The denser riparian fuels in the creek bed could potentially cause access problems from this end in the event of a fire in the area.

4.4.2.2.3 Infrastructure

The City of Laurel has a municipal water system for residents within the city limits. Rural subdivisions and individual homes rely on personal or multiple home well systems and storage tanks.

There are several high tension power lines crisscrossing the Laurel area, most of which travel over surrounding rangeland fuels. These fuels are highly receptive to sparks originating from the downed lines, arcing, or malfunctioning transformers.

A Cenex Harvest States oil refinery is located within the City of Laurel. This is a large facility that maintains its own security and fire suppression programs.

4.4.2.2.4 Fire Protection

The Laurel Volunteer Fire Department is responsible for structural protection for the community of Laurel, Fire District #5, Fire District #7, and the Laurel Urban Fire Service Area. Many of the more rural subdivisions north of Laurel including Buffalo Trails, Clappers Flat, and the Canyon Creek Road area receive structural protection from the Molt Volunteer Fire Department. The Montana Department of Natural Resources and Conservation and the Bureau of Land Management respond to wildland fires in the area as necessary.

4.4.2.2.5 Community Assessment

Commercial and residential development is expanding along U.S. Highway 310/212 to the south and along Thiel Road and River Road, which parallels the Yellowstone River. There are a few remaining patches of native rangelands; however, this area is primarily used for the production of agricultural products. The banks of both the Yellowstone River and the Clarks Fork of the Yellowstone River are lined with dense riparian vegetation that could support an intense fire. Homes directly adjacent to these fuels could be at high risk; however, the development of irrigated lawns and crop fields next to the channels will help keep the fire contained.

Residents within the urban community of Laurel have a low risk of being directly affected by wildland fire. Subdivisions built near or within higher risk rangeland fuels or wooded areas have an increased risk of wildland fire. Homes located in the Buffalo Trail area, Canyon Creek drainage, Duck Creek, and near Clappers Flat are surrounded by fuels that have a moderate to high wildland fire risk due to the higher density of sagebrush, juniper, and timber.

The Buffalo Trails Subdivision has moderate risk of wildfire. Many homes have created an adequate defensible space; however, there are several homes that have juniper and ponderosa pine directly abutting or overhanging structures. Furthermore, many of these homes are built along the upper slopes of the coulee. Fires originating near the road could spread upslope very rapidly giving residents little time to escape. Road and house number signage, as well as road widening and maintenance would significantly improve the safety of residents in the Buffalo Trails Subdivision.

Canyon Creek is a relatively large drainage with thick grasses in the valley bottom and ponderosa pine and juniper lining the rocky slopes. Dense riparian vegetation, including large black cottonwood trees, marks the path of the creek. Homes in this area have primarily been built in the valley bottom with small agricultural crops or livestock pasture surrounding home sites. For the most part, landowners have created defensible space around structures. Homes built closer to the timber may benefit from clearing brush and other ladder fuels from the understory and pruning trees within at least 50 to 100 feet.

Homes in the Clappers Flats area have a moderate to high risk of experiencing a wildfire. Not only are many of the houses intermixed with timber and rangeland fuels, but access into the area is very poor. Ponderosa pine, juniper, and sagebrush commonly abut homes with small or non-existent green yard space creating a continuous fuel bed with the surrounding rangelands. Additionally, not only does the main access route dead end, there are several unmarked spur roads that dead end at home sites. Homeowner education regarding the value of a defensible

space, especially in areas with hazardous fuels would help increase community awareness of the wildfire risk. The safety of residents and emergency response personnel would be improved by road and house number signing as well as construction of a thru road to provide an alternate escape route.

Most of the fuels in the Duck Creek area consist of developed croplands except for the denser riparian vegetation associated with the Yellowstone River and the Duck Creek drainage. Homes along these waterways should be especially aware of the potential for a wildland fire to be carried within the continuous fuel bed of the drainages. Insuring that fuels between the riparian fuels and structures are kept green and free of debris will help decrease the fire risk. Homes surrounded by agricultural fields have lower fire risk; however, the potential for an escaped stubble fire to threaten their structures exists.

It is imperative that homeowners, particularly in higher risk areas, implement fire mitigation measures to protect their structures and families prior to a wildland fire event. As the community grows, more and more homes will be built in the wildland urban interface. It will become increasingly important to educate landowners of the potential fire risk. The receptive nature of the rangeland fuels in Yellowstone County and their natural tendency towards frequent burn intervals increases the likelihood of a fire start. Most homeowners maintain an adequate defensible space around structures by watering their yards or mowing grass and weeds; however, there is still a need to inform others of the potential danger.

4.4.2.2.6 Mitigation Activities

Effective mitigation strategies begin with public awareness campaigns designed to educate homeowners of the risks associated with living in a flammable environment. Residents of Yellowstone County must be made aware that home defensibility starts with the home. Once a fire has started and is moving toward a structure or other valued resources, the probability of that structure surviving is largely dependent on the structural and landscaping characteristics of the home. “Living with Fire, A Guide for the Homeowner” is an excellent tool for educating homeowners as to the steps to take in order to create an effective defensible space. Residents of Laurel and the surrounding area should be encouraged to work with local fire departments and fire management agencies within the county to complete individual home site evaluations. Home defensibility steps should be enacted based on the results of these evaluations.

Community defensible space projects can also help improve the safety of groups of homes. Rural subdivisions adjacent to wildland fuels can create fuel breaks along their perimeter that also increase the value of the homes in the community. Greenbelts or xeriscaped strips with a walking path not only provide a community defensible space, but they can potentially increase property values.

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. In many cases, homes' survivability can be greatly enhanced by following a few simple guidelines to increase accessibility such as widening or mowing driveways and creating a turnaround area for large vehicles. Roads and driveways accessing homes should be regularly maintained with the edges mowed to prevent an accidental ignition. Homeowners with structures located on dead end roads or driveways with no alternative escape route should construct loop roads where possible or establish gates in fencing to allow for an emergency evacuation if the primary escape route becomes impassable.

New developments in the wildland urban interface should be regulated by building codes that protect residents from the effects of wildfire. Insuring that there are adequate water resources available for emergency use and that new roads and driveways are accessible to emergency apparatus will become increasingly important as the community expands.

4.4.2.3 Broadview and Acton

Broadview and Acton are small rural communities located along State Route 3. Broadview lies in the northwestern most corner of the county and Acton sits about 15 miles southeast of Broadview. Development in these communities has mostly occurred in tight clusters around the city centers. This part of Yellowstone County is almost entirely grass and sagebrush rangelands with the exception of a couple small coulees and a few sparse stringers of ponderosa pine on a low lying ridge east of Acton. Patches of farm and pasture ground intermittently break up the landscape, but due to the lack of water available, these fields are not extensive.

4.4.2.3.1 Fire Potential

Fuels Assessment

The native rangeland ecosystem surrounding these communities consists of short to medium length grasses with scattered clumps of sagebrush and juniper. This type of fuel is typically very flashy. Fires spread quickly, but tend to burn at lower intensities. In some areas, the lack of a consistent fuel bed may slow the spread of fire. The rangelands of eastern Montana, including Yellowstone County, historically burned at frequent intervals. 5 to 25 year return intervals helped maintain the grassland ecosystem by limiting the establishment of slower growing species.

There is a small sparse stand of ponderosa pine near some homes east of Acton. Under normal conditions, a fire in these fuels would tend to spread quickly along the surface with only occasional torching of individual trees or clumps of trees. Larger flame lengths and small crown fires could be expected under the influence of wind and severe drought.

The agricultural fields and pasture ground near Broadview and Acton become very dry during the summer months. These cured grasses can be very flammable, especially under extreme weather conditions, such as drought or wind. In the event of an uncontrolled wildfire, these light fuels would tend to support very fast moving, yet lower intensity fires. Modification of the vegetation around structures can be done quickly with available farm equipment and is usually effective in controlling wildfire.

Ignition Profile

Both natural and human caused ignitions occur around both Broadview and Acton. The community center is more prone to human caused ignitions than lightning strikes due to the flat topography and more abundant ignition sources; however, lightning strikes occur fairly frequently in the rangeland and forestlands throughout the county. Annual field burning, debris fires, and vehicle use are common potential ignition sources. Stubble fires seldom escape landowner's boundaries; however, there are a few incidences each year. These fires are generally easily suppressed by modifying the vegetation and homes are rarely threatened.

Vehicle use on- and off-road is also a significant source of ignitions. Not only do sparks from vehicles ignite fuels along roadways, but fires are also commonly started by vehicles driving through dry fields or on unimproved trails. Grain trucks, ATV's, and pick ups are used regularly in farming operations.

4.4.2.3.2 Ingress-Egress

Both Broadview and Acton are accessed by State Route 3. This is the only paved roadway in the area. The main secondary roads such as Buffalo Trail Road heading south along the county line and the Acton-Shepherd Road are typically two-lane graveled routes.

4.4.2.3.3 Infrastructure

There are several high tension power lines crisscrossing heading to and from a substation near Broadview. Sparks or downed lines could easily start a fire in dry, flashy rangeland fuels.

The town of Broadview has a municipal water system with a storage tank on the west side of the community. The surrounding area as well as the community of Acton relies on personal or multiple home well systems and storage tanks.

4.4.2.3.4 Fire Protection

The Broadview Volunteer Fire Department is responsible for wildland fire protection within Broadview Fire District #3. The Montana Department of Natural Resources and Conservation and the Bureau of Land Management respond to wildland fires in this area as necessary.

4.4.2.3.5 Community Assessment

The communities of Broadview and Acton are at low to moderate risk of experiencing a wildland fire. Fires in the rangeland fuels surrounding these areas are relatively common; however, under normal conditions they can be controlled by modifying the vegetation and creating a fuel break with the available farm implements. East of Acton there is a scattered group of homes along the Shepherd-Acton Road. Some of these structures abut a lightly timbered slope. This stand of timber is relatively isolated; however, homes with trees adjacent to or overhanging roofs may have an increased risk. Pruning nearby trees and removing any potential ladder fuels will help reduce the risk to the structure. Drought and/or high winds can lead to a very fast spreading fire with large flame lengths that can be much more difficult to control; therefore, it is imperative that homeowners implement fire mitigation measures to protect their structures and families prior to a wildland fire event.

The receptive nature of the rangeland fuels in Yellowstone County and their natural tendency towards frequent burn intervals increases the likelihood of a fire start. Most homeowners maintain an adequate defensible space around structures by watering their yards or mowing grass and weeds; however, there is still a need to inform others of the potential danger.

4.4.2.3.6 Mitigation Activities

Effective mitigation strategies begin with public awareness campaigns designed to educate homeowners of the risks associated with living in a flammable environment. Residents of Yellowstone County must be made aware that home defensibility starts with the home. Once a fire has started and is moving toward a structure or other valued resources, the probability of that structure surviving is largely dependent on the structural and landscaping characteristics of the home. “Living with Fire, A Guide for the Homeowner” is an excellent tool for educating homeowners as to the steps to take in order to create an effective defensible space. Residents of Broadview, Acton, and the surrounding area should be encouraged to work with local fire departments and fire management agencies within the county to complete individual home site

evaluations. Home defensibility steps should be enacted based on the results of these evaluations.

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. In many cases, homes' survivability can be greatly enhanced by following a few simple guidelines to increase accessibility such as widening or mowing driveways and creating a turnaround area for large vehicles.

4.4.2.4 Custer

The small rural community of Custer is located along Interstate 94 near the Yellowstone-Treasure County line. Most of the structures associated with the community lie on the south side of the highway; however, there is several farming and ranching enterprises scattered around the area. There is a low-lying ridge south of town that is partially timbered, but the agricultural development on both the bottom and top side keep the fire danger relatively low. Grass and sagebrush rangelands extend past the crop fields to the north.

4.4.2.4.1 Fire Potential

Fuels Assessment

The native rangeland ecosystem surrounding Custer consists of short to medium length grasses with scattered clumps of sagebrush and juniper. This type of fuel is typically very flashy. Fires spread quickly, but tend to burn at lower intensities. In some areas, the lack of a consistent fuel bed may slow the spread of fire. The rangelands of eastern Montana, including Yellowstone County, historically burned at frequent intervals. 5 to 25 year return intervals helped maintain the grassland ecosystem by limiting the establishment of slower growing species.

There is a small stand of ponderosa pine on a ridge bordering the south side of the community. This stand is completely surrounded by agricultural crops; thus, the fire danger associated with the increased fuels is minimal. Under normal conditions, a fire in this type of open timber would tend to spread quickly along the surface with only occasional torching of individual trees or clumps of trees. Larger flame lengths and small crown fires could be expected under the influence of wind and severe drought.

The agricultural fields and pasture ground near Custer becomes very dry during the summer months. These cured grasses can be very flammable, especially under extreme weather conditions, such as drought or wind. In the event of an uncontrolled wildfire, these light fuels would tend to support very fast moving, yet lower intensity fires. Modification of the vegetation around structures can be done quickly with available farm equipment and is usually effective in controlling wildfire.

Ignition Profile

Both natural and human caused ignitions occur in the Custer area. The community center is more prone to human caused ignitions than lightning strikes due to the flat topography and abundant ignition sources; however, lightning strikes occur fairly frequently in the rangeland and forestlands throughout the county. Annual field burning, debris fires, and vehicle use are common potential ignition sources. Stubble fires seldom escape landowner's boundaries; however, there are a few incidences each year. These fires are generally easily suppressed by modifying the vegetation and homes are rarely threatened.

Vehicle use on- and off-road is also a significant source of ignitions. Not only do sparks from vehicles ignite fuels along roadways, but fires are also commonly started by vehicles driving through dry fields or on unimproved trails. Grain trucks, ATV's, and pick ups are used regularly in farming operations.

4.4.2.4.2 Ingress-Egress

The primary access into Custer is from Interstate 94 from either the east or the west. State Route 47 is also a paved access route coming from Hardin to the south. Both of these major travel corridors are bordered by rangeland or agricultural type fuels. State Route 310 and the Custer-Pine View Road are graveled routes that could provide additional escape routes. Both of these roadways travel north through the vastly unpopulated rangelands of the northeastern region of Yellowstone County.

4.4.2.4.3 Infrastructure

The community of Custer relies on personal or multiple home well systems.

4.4.2.4.4 Fire Protection

The Custer Volunteer Fire Department is responsible for structural and wildland fire protection in Custer and the surrounding area. The Montana Department of Natural Resources and Conservation provide wildland fire protection throughout the County as necessary.

4.4.2.4.5 Community Assessment

The community of Custer is at low to moderate risk of experiencing a wildland fire. Fires in the rangeland fuels surrounding these areas are relatively common; however, under normal conditions they can be controlled by modifying the vegetation and creating a fuel break with the available farm implements. Drought and/or high winds can lead to a very fast spreading fire with large flame lengths that can be much more difficult to control; therefore, it is imperative that homeowners implement fire mitigation measures to protect their structures and families prior to a wildland fire event.

The receptive nature of the rangeland fuels in Yellowstone County and their natural tendency towards frequent burn intervals increases the likelihood of a fire start. Most homeowners maintain an adequate defensible space around structures by watering their yards or mowing grass and weeds; however, there is still a need to inform others of the potential danger.

4.4.2.4.6 Mitigation Activities

Effective mitigation strategies begin with public awareness campaigns designed to educate homeowners of the risks associated with living in a flammable environment. Residents of Yellowstone County must be made aware that home defensibility starts with the home. Once a fire has started and is moving toward a structure or other valued resources, the probability of that structure surviving is largely dependent on the structural and landscaping characteristics of the home. “Living with Fire, A Guide for the Homeowner” is an excellent tool for educating homeowners as to the steps to take in order to create an effective defensible space. Residents of Custer and the surrounding area should be encouraged to work with local fire departments and fire management agencies within the county to complete individual home site evaluations. Home defensibility steps should be enacted based on the results of these evaluations.

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. In many cases, homes' survivability can be greatly enhanced by following a few simple guidelines to increase accessibility such as widening or mowing driveways and creating a turnaround area for large vehicles.

4.4.2.5 Huntley

Huntley is a small agricultural community that sits just off of Interstate 94 approximately 7 miles east of Billings. The city center and most of the residential housing is located within the Yellowstone River valley. The valley bottom has been developed for agricultural use, which is fairly continuous to the north towards Shepherd and east towards Worden.

There are also numerous homes and ranches in the Pryor Creek area, which is directly south of the Huntley city center. Pryor Creek is a small drainage that runs through a relatively wide valley with steep slopes rising on both sides. The Pryor Creek area consists of agricultural and residential development along the valley floor with native rangeland fuels dominating the steeper slopes.

4.4.2.5.1 Fire Potential

Fuels Assessment

The native rangeland ecosystem around the outskirts of the community and in the Pryor Creek area consist of short to medium length grasses with scattered clumps of sagebrush and juniper. This type of fuel is typically very flashy. Fires spread quickly, particularly upslope, but tend to burn at lower intensities. In some areas, the lack of a consistent fuel bed may slow the spread of fire. The rangelands of eastern Montana, including Yellowstone County, historically burned at frequent intervals. 5 to 25 year return intervals helped maintain the grassland ecosystem by limiting the establishment of slower growing species.

Riparian vegetation along the Yellowstone River and in some of the other major drainages, such as Pryor Creek, is relatively dense. Due to the availability of moisture, thick grasses as well as brush, weeds, and other forbs grow very well. Black cottonwoods and other trees are also common along the river and creek beds. During, the summer, these fuels become dry and very receptive to an ignition. The consistent fuel bed afforded by the thicker fuels in the riparian zone could easily carry an uncontrolled fire from an ignition point in the rangelands to populated areas. This type of fire is somewhat difficult to suppress due to the lack of access points and the density of the vegetation.

The agricultural fields and pasture ground currently dominating the river bottom and much of the valley floor in the Pryor Creek drainage become very dry during the summer months. These cured grasses can be very flammable, especially under extreme weather conditions, such as drought or wind. In the event of an uncontrolled wildfire, these light fuels would tend to support very fast moving, yet lower intensity fires. Modification of the vegetation around structures can be done quickly with available farm equipment and is usually effective in controlling wildfire.

Ignition Profile

Both natural and human caused ignitions occur around the community of Huntley. The community center is more prone to human caused ignitions than lightning strikes due to the flat topography and agricultural development; however, lightning strikes occur fairly frequently in the rangeland throughout the county. Annual field burning, debris fires, and vehicle use are

common potential ignition sources. Stubble fires seldom escape landowner's boundaries; however, there are a few incidences each year. These fires are generally easily suppressed by modifying the vegetation and homes are rarely threatened.

Vehicle use on- and off-road is also a significant source of ignitions. Not only do sparks from vehicles ignite fuels along roadways, but fires are also commonly started by vehicles driving through dry fields or on unimproved trails. Grain trucks, ATV's, and pick ups are used regularly in farming operations.

4.4.2.5.2 Ingress-Egress

The primary access into Huntley is provided by Interstate 94; however, State Routes 568 and 312 are also paved highways that offer good ingress and egress to the city center. These roads are predominantly bordered by agricultural development.

4.4.2.5.3 Infrastructure

The community of Huntley and the surrounding area relies on a municipal water system as well as personal or multiple home wells.

4.4.2.5.4 Fire Protection

The Worden Volunteer Fire Department responds to structural and wildland fires in the Huntley area and Huntley Project Fire Service Area. Wildland fire protection is provided by the Montana Department of Natural Resources and Conservation and the Bureau of Land Management as necessary.

4.4.2.5.5 Community Assessment

Homes located in the agriculturally-based community of Huntley have low to moderate risk of wildfire. Fires originating in the crop fields are usually suppressed quickly by creating fuel breaks with the available farming equipment. Fires in the rangeland fuels in the surrounding areas and particularly on the slopes of the Pryor Creek drainage are relatively common. Under normal conditions this type of fire can be controlled by relatively quickly. Drought and/or high winds can lead to very fast spreading fires with large flame lengths that can be much more difficult to control; therefore, it is imperative that homeowners implement fire mitigation measures to protect their structures and families prior to a wildland fire event. Homeowners adjacent to the riparian zones of the Yellowstone River, Pryor Creek, or other drainages should be aware of the possibility of a fire within the watershed. Keeping structures an adequate distance from these fuels and maintaining a clean and green yard will help insure the safety of their property.

It is imperative that homeowners, particularly in higher risk areas, implement fire mitigation measures to protect their structures and families prior to a wildland fire event. As the community grows, more and more homes will be built in the wildland urban interface. It will become increasingly important to educate landowners of the potential fire risk. The receptive nature of the rangeland fuels in Yellowstone County and their natural tendency towards frequent burn intervals increases the likelihood of a fire start. Most homeowners maintain an adequate defensible space around structures by watering their yards or mowing grass and weeds; however, there is still a need to inform others of the potential danger.

4.4.2.5.6 Mitigation Activities

Effective mitigation strategies begin with public awareness campaigns designed to educate homeowners of the risks associated with living in a flammable environment. Residents of Yellowstone County must be made aware that home defensibility starts with the home. Once a fire has started and is moving toward a structure or other valued resources, the probability of that structure surviving is largely dependent on the structural and landscaping characteristics of the home. “Living with Fire, A Guide for the Homeowner” is an excellent tool for educating homeowners as to the steps to take in order to create an effective defensible space. Residents of Huntley and the surrounding area should be encouraged to work with local fire departments and fire management agencies within the county to complete individual home site evaluations. Home defensibility steps should be enacted based on the results of these evaluations.

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. In many cases, homes' survivability can be greatly enhanced by following a few simple guidelines to increase accessibility such as widening or mowing driveways and creating a turnaround area for large vehicles.

New developments in the wildland urban interface should be regulated by building codes that protect residents from the effects of wildfire. Insuring that there are adequate water resources available for emergency use and that new roads and driveways are accessible to emergency apparatus will become increasingly important as the community expands.

4.4.2.6 Lockwood

Lockwood is a large unincorporated area on the southeast side of the city of Billings. The lower northern part of the area, near the Interstate, is comprised of residential subdivisions, commercial businesses, and large industry. This area has a municipal water system.

The upper area of the community has five notable wildland urban interface developments. These are *Yellowstone Trail, Pine Hills, Emerald Hills, High Trail, and Coburn Hills*. Each of these areas is characterized by a ponderosa pine overstory with juniper, sagebrush, and grasses in the understory. These urban interface areas have homes irregularly distributed on steep, narrow, winding roads. Many of the roads are unpaved. Driveways tend to be long and narrow without adequate turnarounds for large fire trucks. Water is extremely limited in these areas as well.

4.4.2.6.1 Fire Potential

Fuels Assessment

The native rangeland ecosystem around the outskirts of the city and abutting several of the rural subdivisions consist of short to medium length grasses with scattered clumps of sagebrush and juniper. This type of fuel is typically very flashy. Fires spread quickly, particularly upslope and tend to burn at higher intensities. In some areas, the lack of a consistent fuel bed may slow the spread of fire. The rangelands of eastern Montana, including Yellowstone County, historically burned at frequent intervals. 5 to 25 year return intervals helped maintain the grassland ecosystem by limiting the establishment of slower growing species.

Fires in the urban interface areas of Lockwood tend to spread quickly thru the light flashy fuels, which are generally continuous. Flame lengths can reach 15 feet or more in areas of high grass. Fires move rapidly, especially when pushed by upslope winds or in steep terrain. Fuels

have built up over the years as fires in these areas have been aggressively suppressed. Several years of drought have stressed the ponderosa pine stands and bark beetles have added to the mortality. Fires move easily from the ground to the trees due to the abundance of ladder fuels. Individual tree torching is common, which increases the potential for crown fires. There is also an increased likelihood of short and medium range spotting as a result of the excessive build up of flammable fuels.

Between Highway 87 East and Interstate 90 a mixed rangeland/forestland vegetation type abuts and intermixes with the Emerald Hills Subdivision. The overstory consists of ponderosa pine and juniper with a light grass understory. Under normal conditions, a fire in these fuels would burn quickly along the surface with occasional flare ups, particularly in areas with juniper concentrations. Torching of individual trees, increased flame lengths, and high rates of spread would be expected under the influence of drought and/or wind.

Ignition Profile

Both natural and human caused ignitions occur around the community of Lockwood. The community center and surrounding subdivisions are more prone to human caused ignitions than lightning strikes due to the flat topography and agricultural development; however, lightning strikes occur fairly frequently in the rangeland and forestlands throughout the county. Annual field burning, debris fires, and vehicle use are common potential ignition sources. Stubble fires seldom escape landowner's boundaries; however, there are a few incidences each year. These fires are generally easily suppressed by modifying the vegetation and homes are rarely threatened.

Vehicle use on- and off-road is also a significant source of ignitions. Not only do sparks from vehicles ignite fuels along roadways, but fires are also commonly started by vehicles driving through dry fields or on unimproved trails. Grain trucks, ATV's, and pick ups are used regularly in farming operations.

4.4.2.6.2 Ingress-Egress

Access to Yellowstone Trail and Pine Hills is from Old Hardin Road. The access route to High Trail Road and Coburn Hill Road is U.S. Highway 87 East. Roads in these areas are mainly gravel with the exception of Emerald Hills Drive and Coburn Road, which are paved. All roads are narrow two lane routes with steep, winding grades.

The most straight forward access into the Emerald Hills Subdivision is via the Old Hardin Road through the Lockwood area to Emerald Hills Road on the northeast side of the development. The main roadways through the subdivision are two-lane graveled routes; however, many of the secondary roads are one-lane dead ends. Dead end roads are typically signed; however, it would be helpful for emergency purposes if the thru roads were marked as potential escape routes. Additionally, there is no organized grid pattern to the road system; therefore, there are several winding corners, short grades, and Y-intersections. The road system makes for a hazardous situation under normal conditions, but would become particularly unsafe for emergency response vehicles and evacuees during a wildfire event. On the primary roads, escape routes are marked with (evacuation signs) provide by the Lockwood Fire District and Yellowstone County DES.

4.4.2.6.3 Infrastructure

High risk infrastructure in the wildland-urban interface area includes numerous cellular, radio, and television towers in all areas except Pine Hills. A large microwave tower is located off U.S.

Highway 87 East adjacent to the High Trail area. Overhead power lines are predominant in most of Yellowstone County.

The community of Lockwood and the surrounding rural subdivisions rely on a municipal water system as well as personal or multiple home wells and storage tanks.

Low risk infrastructure includes the ExxonMobil Refinery, several chemical plants, and other large industry on the north end of the community.

4.4.2.6.4 Fire Protection

Both structural fire protection and wildland fire protection is provided by the Lockwood Fire District. The Lockwood Fire District is manned 24/7 with career firefighters supplemented with volunteer firefighters.

4.4.2.6.5 Community Assessment

The Emerald Hills area of Lockwood has the highest risk of the five areas in the urban interface due to the higher density of homes. Many homes have trees and juniper shrubs next to or overhanging structures. A number of homeowners have built next to steep slopes with continuous fuels directly abutting their homes. So far, only a few homeowners in the Emerald Hills Subdivision have taken proactive steps, such as clearing a defensible space, to protect their homes from wildfire.

There is no fuel break around the perimeter of these higher risk communities; therefore, a fire could easily spread north out of the partially forested rangelands into the residential areas. Further exacerbating this situation is the poor road systems and narrow driveways that make access to homes by emergency response equipment much more difficult and potentially unsafe. Additionally, many homes were constructed with flammable siding or decking and have propane tanks sitting next to or very near structures. Other potential hazards for firefighters include narrow roads, long driveways, lack of available water, and overhead power lines.

It is imperative that homeowners implement fire mitigation measures to protect their structures and families prior to a wildland fire event. Lockwood is seeing continued growth in homes built in these interface areas. Education of homeowners to the potential fire risk will increase the likelihood that additional properties will have the defensible space needed to make their homes safe and provide for a safer environment for firefighters responding to these subdivisions.

4.4.2.6.6 Mitigation Activities

Effective mitigation strategies begin with public awareness campaigns designed to educate homeowners of the risks associated with living in a flammable environment. Residents of Yellowstone County must be made aware that home defensibility starts with the home. Once a fire has started and is moving toward a structure or other valued resources, the probability of that structure surviving is largely dependent on the structural and landscaping characteristics of the home. “Living with Fire, A Guide for the Homeowner” is an excellent tool for educating homeowners as to the steps to take in order to create an effective defensible space. Residents of Lockwood and the surrounding area should be encouraged to work with local fire departments and fire management agencies within the county to complete individual home site evaluations. Home defensibility steps should be enacted based on the results of these evaluations.

Community defensible space projects can also help improve the safety of groups of homes. Rural subdivisions adjacent to wildland fuels can create fuel breaks along their perimeter that

also increase the value of the homes in the community. Greenbelts or xeriscaped strips with a walking path not only provide a community defensible space, but they can potentially increase property values.

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. In many cases, homes' survivability can be greatly enhanced by following a few simple guidelines to increase accessibility such as widening or mowing driveways and creating a turnaround area for large vehicles. Roads and driveways accessing homes should be regularly maintained with the edges mowed to prevent an accidental ignition. Homeowners with structures located on dead end roads or driveways with no alternative escape route should construct loop roads where possible or establish gates in fencing to allow for an emergency evacuation if the primary escape route becomes impassable.

New developments in the wildland urban interface should be regulated by building codes that protect residents from the effects of wildfire. Insuring that there are adequate water resources available for emergency use and that new roads and driveways are accessible to emergency apparatus will become increasingly important as the community expands.

4.4.2.7 Shepherd

Shepherd is a small agricultural community located approximately four miles northwest of Huntley and about two miles west of the Yellowstone River. There is a small city center; however, most of the homes in the area are scattered throughout the area. There is also a relatively large subdivision, Pleasant Hollow, which sits on a plateau north of town. Homes in this area are spread out on large lots usually with horses or other livestock grazing in adjacent pastures. Undeveloped lots and the surrounding area are typically native rangeland fuels consisting of medium length grasses and scattered clumps of sagebrush and juniper. Stringers and small stands of ponderosa pine are also common on the plateau and extending in a northeasterly direction.

The Cedar Ridge subdivision is located about 11 miles northwest of Shepherd on U.S. Highway 87. Homes in this area are typically situated on big lots with private driveways. This area is very rural with native rangeland fuels and stringers of ponderosa pine between lots and completely surrounding the development.

4.4.2.7.1 Fire Potential

Fuels Assessment

The native rangeland ecosystem around the outskirts of the community and surrounding both subdivisions consist of short to medium length grasses with scattered clumps of sagebrush and juniper. This type of fuel is typically very flashy. Fires spread quickly, particularly upslope, but tend to burn at lower intensities. In some areas, the lack of a consistent fuel bed may slow the spread of fire. The rangelands of eastern Montana, including Yellowstone County, historically burned at frequent intervals. 5 to 25 year return intervals helped maintain the grassland ecosystem by limiting the establishment of slower growing species.

The scattered stands of ponderosa pine in the both the Pleasant Hollow and Cedar Ridge subdivisions present an increased risk of wildland fire. Under normal conditions; however, a fire in this type of open timber would tend to spread quickly along the surface with only occasional torching of individual trees or clumps of trees. Larger flame lengths and small crown fires could be expected under the influence of wind and severe drought.

The agricultural fields and pasture ground currently surrounding the community of Shepherd and dominating the river bottom to the east become very dry during the summer months. These cured grasses can be very flammable, especially under extreme weather conditions, such as drought or wind. In the event of an uncontrolled wildfire, these light fuels would tend to support very fast moving, yet lower intensity fires. Modification of the vegetation around structures can be done quickly with available farm equipment and is usually effective in controlling wildfire.

Riparian vegetation along the Yellowstone River is relatively dense. Due to the availability of moisture, thick grasses as well as brush, weeds, and other forbs grow very well. Black cottonwoods and other trees are also common along the river bed. During, the summer, these fuels become dry and very receptive to an ignition. The consistent fuel bed afforded by the thicker fuels in the riparian zone could easily carry an uncontrolled fire from an ignition point in the rangelands to populated areas. This type of fire is somewhat difficult to suppress due to the lack of access points and the density of the vegetation.

Ignition Profile

Both natural and human caused ignitions occur around the community of Shepherd. The community center is more prone to human caused ignitions than lightning strikes due to the flat topography and agricultural development; however, lightning strikes occur fairly frequently in the rangeland throughout the county. Both of the subdivisions near Shepherd may be at increased risk of lightning caused fires due to the slightly increased elevation and surrounding rangelands.

Annual field burning, debris fires, and vehicle use are common potential ignition sources. Stubble fires seldom escape landowner's boundaries; however, there are a few incidences each year. These fires are generally easily suppressed by modifying the vegetation and homes are rarely threatened. Vehicle use on- and off-road is also a significant source of ignitions. Not only do sparks from vehicles ignite fuels along roadways, but fires are also commonly started by vehicles driving through dry fields or on unimproved trails. Grain trucks, ATV's, and pick ups are used regularly in farming operations.

4.4.2.7.2 Ingress-Egress

Shepherd can be reached by taking the Shepherd-Acton Road east from U.S. Route 87 or via the Shepherd Road from Huntley. Shepherd Road is a paved two lane route with agricultural development adjacent to both sides. The Shepherd-Acton Road is a two lane gravel road abutting rangeland and agricultural fuels. There also numerous other secondary routes crisscrossing the area, most of which are well maintained graveled roads.

The Pleasant Hollow area can be reached by following West Tenny Road off of Shepherd Road. Roads through the housing development are two lane graveled routes abutted by pasture or rangeland fuels.

The Cedar Ridge subdivision is reached via Highway 87. P K Road is a loop road through the development; however, a section of it is not maintained as a drivable route. Stonehouse Road is another access point off of Highway 87, but this is also a dead end route with several dead end spurs leading to clusters of homes.

4.4.2.7.3 Infrastructure

The community of Shepherd and the surrounding area rely on personal or multiple home well systems.

4.4.2.7.4 Fire Protection

The Shepherd Volunteer Fire Department is responsible for structural and wildland fire protection in the town site of Shepherd and the Shepherd Fire Service Area. The Montana Department of Natural Resources and Conservation and the Bureau of Land Management provide wildland fire protection as necessary.

4.4.2.7.5 Community Assessment

Homes located in the agriculturally-based community of Shepherd have low to moderate risk of wildfire. Fires originating in the crop fields are usually suppressed quickly by creating fuel breaks with the available farming equipment. Fires in the rangeland fuels in the surrounding areas are relatively common. Under normal conditions this type of fire can be controlled relatively quickly. Drought and/or high winds can lead to very fast spreading fires with large flame lengths that can be much more difficult to control; therefore, it is imperative that homeowners implement fire mitigation measures to protect their structures and families prior to a wildland fire event. Homeowners adjacent to the riparian zone of the Yellowstone River or other drainages should be aware of the possibility of a fire within the watershed. Keeping structures an adequate distance from these fuels and maintaining a clean and green yard will help insure the safety of their property.

Structures in both the Pleasant Hollow and Cedar Ridge subdivisions have an increased risk of experiencing a wildfire. Homes in these areas usually have a maintained lawn or pasture ground that may serve as a defensible space in the event of a fire, but many do not. Fires in the surrounding rangeland and partially timber fuels could easily move through these communities. Additionally, many homes in these areas were built using wood siding and decking, which make them more susceptible to ignition. Roads and driveways accessing homes should be regularly maintained with the edges mowed to prevent an accidental ignition. Homeowners with structures located on dead end roads or driveways with no alternative escape route should construct loop roads where possible or establish gates in fencing to allow for an emergency evacuation if the primary escape route becomes impassable.

In Shepherd, as well as several other communities in Yellowstone County, availability of water is an issue for rural fire departments, particularly in drought years. Other than the river corridor and a few other minor drainages, there are very few easily accessed water resources available for drafting or pumping to refill fire suppression engines. The lack of water puts many of the more remote subdivisions and communities at greater risk. Some of this risk can be alleviated by establishing water storage tanks, developed drafting sites, or dry hydrants in closer proximity to developments.

It is imperative that homeowners, particularly in higher risk areas, implement fire mitigation measures to protect their structures and families prior to a wildland fire event. As the community grows, more and more homes will be built in the wildland urban interface. It will become increasingly important to educate landowners of the potential fire risk. The receptive nature of the rangeland fuels in Yellowstone County and their natural tendency towards frequent burn intervals increases the likelihood of a fire start. Most homeowners maintain an adequate defensible space around structures by watering their yards or mowing grass and weeds; however, there is still a need to inform others of the potential danger.

4.4.2.7.6 Mitigation Activities

Effective mitigation strategies begin with public awareness campaigns designed to educate homeowners of the risks associated with living in a flammable environment. Residents of Yellowstone County must be made aware that home defensibility starts with the home. Once a fire has started and is moving toward a structure or other valued resources, the probability of that structure surviving is largely dependent on the structural and landscaping characteristics of the home. “Living with Fire, A Guide for the Homeowner” is an excellent tool for educating homeowners as to the steps to take in order to create an effective defensible space. Residents of Shepherd and the surrounding area should be encouraged to work with local fire departments and fire management agencies within the county to complete individual home site evaluations. Home defensibility steps should be enacted based on the results of these evaluations.

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. In many cases, homes' survivability can be greatly enhanced by following a few simple guidelines to increase accessibility such as widening or mowing driveways and creating a turnaround area for large vehicles.

New developments in the wildland urban interface should be regulated by building codes that protect residents from the effects of wildfire. Insuring that there are adequate water resources available for emergency use and that new roads and driveways are accessible to emergency apparatus will become increasingly important as the community expands.

4.4.2.8 Worden, Ballantine, and Pompeys Pillar

Worden, Ballantine, and Pompeys Pillar are small agricultural communities lying in the Yellowstone River valley along Interstate 94. The Pompeys Pillar community lies along Interstate 94 just south of the Pompeys Pillar National Historical Landmark. The Worden and Ballantine community centers are only about one mile apart; however, the residential and agricultural development extends from the Interstate north to the river, west to Huntley, and east to Pompey’s Pillar. There are patches of native rangeland fuels remaining; however, this part of the valley has been almost entirely converted to agriculture.

4.4.2.8.1 Fire Potential

Fuels Assessment

The agricultural fields and pasture ground surrounding Worden, Ballantine, and Pompeys Pillar become very dry during the summer months. These cured grasses can be very flammable, especially under extreme weather conditions, such as drought or wind. In the event of an uncontrolled wildfire, these light fuels would tend to support very fast moving, yet lower intensity fires. Modification of the vegetation around structures can be done quickly with available farm equipment and is usually effective in controlling wildfire.

Riparian vegetation along the Yellowstone River is relatively dense. Due to the availability of moisture, thick grasses as well as brush, weeds, and other forbs grow very well. Black cottonwoods and other trees are also common along the river and creek beds. During, the summer, these fuels become dry and very receptive to an ignition. The consistent fuel bed afforded by the thicker fuels in the riparian zone could easily carry an uncontrolled fire from an ignition point in the rangelands to populated areas. This type of fire is somewhat difficult to suppress due to the lack of access points and the density of the vegetation.

The native rangeland ecosystem on the north side of the Yellowstone River and south of the Interstate consist of short to medium length grasses with scattered clumps of sagebrush and juniper. This type of fuel is typically very flashy. Fires spread quickly, but tend to burn at lower intensities. In some areas, the lack of a consistent fuel bed may slow the spread of fire. The rangelands of eastern Montana, including Yellowstone County, historically burned at frequent intervals. 5 to 25 year return intervals helped maintain the grassland ecosystem by limiting the establishment of slower growing species.

Ignition Profile

Both natural and human caused ignitions occur near Worden, Ballantine, and Pompeys Pillar. The community center is more prone to human caused ignitions than lightning strikes due to the flat topography and abundant ignition sources; however, lightning strikes occur fairly frequently in the rangeland and forestlands throughout the county.

Annual field burning, debris fires, and vehicle use are common potential ignition sources. Stubble fires seldom escape landowner's boundaries; however, there are a few incidences each year. These fires are generally easily suppressed by modifying the vegetation and homes are rarely threatened. Vehicle use on- and off-road is also a significant source of ignitions. Not only do sparks from vehicles ignite fuels along roadways, but fires are also commonly started by vehicles driving through dry fields or on unimproved trails. Grain trucks, ATV's, and pick ups are used regularly in farming operations.

4.4.2.8.2 Ingress-Egress

Interstate 94, U.S. Highway 212, and State 568 provide access to these communities. All are paved routes adjacent to agricultural development or rangeland fuels. There are also numerous secondary routes crisscrossing the area to provide access to farms and ranches.

4.4.2.8.3 Infrastructure

The communities of Worden and Ballantine rely on a municipal water system as well as personal or multiple home wells. The scattered homes near Pompeys Pillar typically rely on personal well systems. There are also a few springs providing surface water collection points at remote locations in the rangelands south of the Interstate.

There is a dry hydrant located at Fly Creek near Pompeys Pillar for use by the local fire protection departments and agencies.

4.4.2.8.4 Fire Protection

The Worden Volunteer Fire Department provides structural protection to the Worden, Worden Fire District, Huntley Project Fire Service Area, Ballantine, Pompeys Pillar, and Huntley and wildland protection to the surrounding area. Wildland fire protection is provided by the Montana Department of Natural Resources and Conservation and the Bureau of Land Management as necessary.

4.4.2.8.5 Community Assessment

The communities of Worden, Ballantine, and Pompeys Pillar are at low risk of experiencing a wildland fire. The Yellowstone River and Interstate 94 would, under normal circumstances, serve as effective fuel breaks from fires in the rangeland areas beyond. Fires ignited within the valley bottom could, however, move very quickly through curing agricultural fields; therefore, it is

imperative that homeowners implement fire mitigation measures to protect their structures and families prior to a wildland fire event.

4.4.2.8.6 Mitigation Activities

Effective mitigation strategies begin with public awareness campaigns designed to educate homeowners of the risks associated with living in a flammable environment. Residents of Yellowstone County must be made aware that home defensibility starts with the home. Once a fire has started and is moving toward a structure or other valued resources, the probability of that structure surviving is largely dependent on the structural and landscaping characteristics of the home. “Living with Fire, A Guide for the Homeowner” is an excellent tool for educating homeowners as to the steps to take in order to create an effective defensible space. Residents of Worden, Ballantine, Pompeys Pillar, and the surrounding area should be encouraged to work with local fire departments and fire management agencies within the county to complete individual home site evaluations. Home defensibility steps should be enacted based on the results of these evaluations.

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. In many cases, homes' survivability can be greatly enhanced by following a few simple guidelines to increase accessibility such as widening or mowing driveways and creating a turnaround area for large vehicles.

4.4.2.9 Molt

Molt is a farming community located in eastern Stillwater County, at the end of Molt Road, which originates in Yellowstone County as Rimrock Road. The majority of the Molt area consists of dryland grain farming and cattle ranching. Areas that are unusable for agricultural are coulees filled with sagebrush, juniper, and ponderosa pine.

Ten miles east of Molt are the McFarland and Echo Canyon subdivisions. Echo Canyon straddles Molt Road, which offers good access. Homes in Echo Canyon abut light rangeland fuels; however, many landowners graze horses or other livestock near their homes. The steep, rocky slope of a plateau rises behind the development to the east. Rangeland fuels tend to be somewhat inconsistent with patches of sagebrush and bare ground throughout.

Hidden Valley and Chief Joseph subdivisions are five miles southeast of Molt along Buffalo Trail Road. Some homes area accessible from Buffalo Trail, but many more are located off both sides of the highway on gravel loop roads that are not maintained. Vegetation consists of grasses, juniper, and ponderosa pine.

Canyon Creek and Clappers Flat Road are in the southern part of the Molt Fire District. Both roads are well maintained. Some homes are set in among trees and rimrocks.

4.4.2.9.1 Fire Potential

Fuels Assessment

The agricultural land in Molt consists of open grassland and strip farming for grain. Sagebrush is present in some of the pastures. The canyons south and east of Molt consist of grassland, juniper, and ponderosa pine. Most of these canyons consist of rimrocks with grassy areas on top and between them.

Ignition Profile

The vast majority of fires surrounding Molt are lightning caused. Field burning and slash fires are normally done with the consent of the fire department under favorable conditions. Occasionally, fires start from farming operations due to equipment malfunction.

4.4.2.9.2 Ingress-Egress

There are only two paved roads in the Molt Fire District, Molt Road and Buffalo Trail Road (from Laurel to Molt Road). Molt Road is the main highway leading to Molt from Billings. The pavement ends there and the graveled Molt-Rapelje Road begins. The Echo Canyon development has several entrances off of Molt Road. These roads are two-lane graveled routes traveling adjacent to developed lots, pasture ground, or low risk rangeland fuels.

Buffalo Trail crosses Molt Road two miles east of Molt. This is the main highway between Laurel and Broadview. North of Molt Road, it is gravel.

4.4.2.9.3 Infrastructure

Water sources in the Molt area consist of wells and cisterns. The fire department uses water from a storage tank and wells. Several gas and oil pipelines cross the Molt area. A natural gas compressor station is west of Molt. A power substation with high-voltage power lines is the eastern boundary of the Molt fire area.

4.4.2.9.4 Fire Protection

Molt Volunteer Fire Department is responsible for wildland and structural fire protection in the area. Mutual aid agreements in each county help with this protection.

4.4.2.9.5 Community Assessment

Homes and businesses in the community of Molt all have grassland or cropland adjoining their property. The risk of fire is relatively low.

The subdivisions along Molt Road and Buffalo Trail Road all include steep slopes with grassland, juniper, and ponderosa pine. Because of recent drought these areas are extremely dry. All homes in these areas need to have clean and clear areas around their homes.

4.4.2.9.6 Mitigation Activities

Education is the key to protecting rural subdivisions in the Molt area. Homeowners need to be shown techniques that can be used to make protection of their homes from fire much easier.

Roads in these rural subdivisions are privately owned, which is why upkeep on them is minimal. Homeowners need to keep these roads in the best shape possible so that emergency vehicles can enter and leave quickly and safely. Driveways should be built with enough room for emergency vehicles to turn around.

City and County planning boards should require developers to install water resources, such as cisterns and wells, in new subdivisions. Adequate water resources would make protection of these areas much easier.

4.4.2.10 Blue Creek

The community of Blue Creek lies south of the Yellowstone River between Billings and the Crow Indian Reservation. The community itself is surrounded by agricultural development. Several rural housing developments have become established in the rangelands south and southwest of the Yellowstone River. Included in this assessment is the Vista View Subdivision, Hillcrest Views, and the Hill Subdivision.

The Vista View area consists of several housing projects off of Basin Creek Road. Vista View Road travels to the top of the hill that is made up of rangeland grass with patches of sagebrush and juniper. The entire area is predominantly newer homes extending from the roadside up a gentle slope to a large plateau where 24 large lots have been established for construction. Structures near the road generally sit on fairly large open lots. These homes are more closely intermixed with the rangeland fuels.

The Hill Subdivision is just southwest of the Vista View Subdivision. There are several homes at the top of this hill that overlook most of the Blue Creek area.

The Hillcrest Views area is a large plateau lying southwest of Billings and is characterized by rangeland fuels with clumps of juniper and stunted ponderosa pine along the edges. Homes are typically built on large lots intermingled with the semi-wooded areas.

4.4.2.10.1 Fire Potential

Fuels Assessment

The native rangeland ecosystem around the outskirts of the community and abutting several of the rural subdivisions consists of short to medium length grasses with scattered clumps of sagebrush and juniper. This type of fuel is typically very flashy. Fires spread quickly, particularly upslope, but tend to burn at lower intensities. In some areas, the lack of a consistent fuel bed may slow the spread of fire. The rangelands of eastern Montana, including Yellowstone County, historically burned at frequent intervals. 5 to 25 year return intervals helped maintain the grassland ecosystem by limiting the establishment of slower growing species.

The partially timbered areas in Blue Creek are almost exclusively made up of ponderosa pine. Stringers and patches of trees typically exist in the coulees and canyons where moisture is more readily available. In most cases, fires in this type of timber will stay on the surface with only occasional torching of individual trees or clumps of trees, particularly where juniper offers a ladder fuel. Under extreme conditions, such as drought or high winds, fires will spread very rapidly with larger flame lengths.

The agricultural fields that currently dominate the surrounding foothills become very dry during the summer months. These cured grasses can be very flammable, especially under extreme weather conditions, such as drought or wind. In the event of an uncontrolled wildfire, these light fuels would tend to support very fast moving, yet lower intensity fires. Modification of the vegetation with available farm equipment is usually effective in controlling wildfire.

Ignition Profile

Both natural and human caused ignitions occur in Blue Creek. The community center is more prone to human caused ignitions than lightning strikes due to the flat topography and agricultural development; however, lightning strikes occur fairly frequently in the rangeland and forestlands throughout the county. Annual field burning, debris fires, and vehicle use are common potential ignition sources. Stubble fires seldom escape landowner's boundaries;

however, there are a few incidences each year. These fires are generally easily suppressed by modifying the vegetation and homes are rarely threatened.

Vehicle use on and off road is also a significant source of ignitions. Not only do sparks from vehicles ignite fuels along roadways, but fires are also commonly started by vehicles driving through dry fields or on unimproved trails. Grain trucks, ATV's, and pickups are used regularly in farming operations.

4.4.2.10.2 Ingress-Egress

The primary access into Blue Creek is via Blue Creek Road from the north or south; however, there is another transportation route coming into the area. This is Duck Creek Road to Keller Road. Most of the rural housing is accessed from gravel roads branching off of these primary routes.

Blue Creek Road provides the main access into the Vista View Subdivision. This two lane highway abuts rangeland fuels and provides an escape route out of this subdivision. Vista View Road is the primary access route for homes in this subdivision. Vista View is a loop road; however, it branches off near the top and it is fairly well maintained. Potholes and severe washboards may hinder the speed of emergency response. Better signing of the roads and house numbers at the end of driveways would help reduce confusion for emergency response personnel and for residents during an evacuation. The Vista Blue Road provides access to a couple of homes; however, this route dead ends at the last house. The lack of an alternate escape route significantly decreased the safety of residents in an emergency situation.

Homes in the Hill Subdivision area are accessed via the Vandeveer Road off of Blue Creek Road. This is a two lane, graveled road that extends past the fire service area to the west. For the most part, this route is well maintained; however, the further west you travel, it is for the most part, impassible.

Hillcrest Views is reached by following Hillcrest Road off of Blue Creek Road. This is also a two land paved road that is kept in good condition. Most of the homes in this area are accessed off of Hillcrest Road, which continues south to the Crow Indian Reservation. This road starts out as a paved two lane route; however, it tapers into a two lane gravel road towards the end. There are several dead end spur roads and driveways branching from the Hillcrest Road, none of which seem to have alternate escape routes. The safety of residents in the Hillcrest area would be drastically improved with the development of some thru roads.

4.4.2.10.3 Infrastructure

Blue Creek has a municipal water system for residents within the city limits. Rural subdivisionsx and individual homes rely on personal or multiple home well systems and storage tanks.

There are several high tension power lines crisscrossing the Blue Creek area, most of which travel over surrounding rangeland fuels. These fuels are highly receptive to sparks originating from the downed lines, arcing, or malfunctioning transformers.

4.4.2.10.4 Fire Protection

The Blue Creek Volunteer Fire Department is responsible for EMS, structural, and wildland protection for the community of Blue Creek and the immediately surrounding areas.

4.4.2.10.5 Community Assessment

Residential development is expanding along Blue Creek Road to the south. There are few remaining patches of native rangelands; however, this area is primarily used for the production of agricultural products. The banks of the Yellowstone River are lined with dense riparian vegetation that could support an intense fire. Homes directly adjacent to these fuels could be at high risk; however, the development of irrigated lawns and crop fields next to the channels will help keep the fire contained.

Subdivisions built near or within higher risk rangeland fuels or wooded areas have an increased risk of wildland fire. Homes located in the Vista View area, Hill subdivision, and near Hillcrest Views are surrounded by fuels that have a moderate to high wildland fire risk due to the higher density of sagebrush, juniper, and timber.

The Vista View Subdivision has a moderate risk of wildfire. Many homes have created an adequate defensible space; however, there are several homes that have juniper and ponderosa pine directly abutting structures. Furthermore, many of these homes are built along the upper slopes of that area. Fires originating near the road could spread upslope very rapidly giving residents little time to escape. Road and house number signage, as well as road widening and maintenance would significantly improve the safety of residents in the Vista View area.

Hillcrest View is a relatively large drainage with thick grasses in the valley bottom and ponderosa pine and juniper lining the upraising slopes. Homes in this area have been built in the valley bottom with small agricultural crops or livestock pasture surrounding home sites. For the most part, landowners have created defensible space around structures. Homes built closer to the timber may benefit from clearing brush and other ladder fuels from the understory and pruning trees within at least 50 to 100 feet.

Homes in the Hill Subdivision area have a moderate to high risk of experiencing a wildfire. Not only are many of the houses intermixed with heavy rangeland fuels, but access into the area is very poor. Ponderosa pine, juniper, and sagebrush commonly abut these homes. Additionally, not only does the main access route dead end, there are several unmarked spur roads that dead end at home sites. Homeowner education regarding the value of a defensible space, especially in areas with hazardous fuels would help increase community awareness of the wildfire risk. The safety of residents and emergency response personnel would be improved by road and house number signing as well as construction of a thru road to provide an alternate escape route.

It is imperative that homeowners, particularly in higher risk areas, implement fire mitigation measures to protect their structures and families prior to a wildland fire event. As the community grows, more and more homes will be built in the wildland urban interface. It will become increasingly important to educate landowners of the potential risk of fire. The receptive nature of the rangeland fuels in Yellowstone County and their natural tendency towards frequent burn intervals increases the likelihood of a fire start. Most homeowners maintain an adequate defensible space around structures by watering their yards or mowing grass and weeds; however, there is still a need to inform others of the potential danger.

4.4.2.10.6 Mitigation Activities

Effective mitigation strategies begin with public awareness campaigns designed to educate homeowners of the risks associated with living in a flammable environment. Residents of Yellowstone County must be made aware that home defensibility starts with the home. Once a fire has started and is moving toward a structure or other valued resources, the probability of

that structure surviving is largely dependent on the structural and landscaping characteristics of the home. "Living with Fire, A Guide for the Homeowner" is an excellent tool for educating the homeowners as to the steps to take in order to create an effective defensible space. Residents of Blue Creek and the surrounding area should be encouraged to work with the local fire departments and fire management agencies within the county to complete individual home site evaluations. Home defensibility steps should be enacted based on the results of these evaluations.

Community defensible space projects can also help improve the safety of groups of homes. Rural subdivisions adjacent to wildland fuels can create fuel breaks along their perimeter that also increase the value of the homes in the community.

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. In many cases, homes' survivability can be greatly enhanced by following a few simple guidelines to increase accessibility such as widening or mowing driveways and creating a turnaround area for large vehicles. Roads and driveways accessing homes should be regularly maintained with the edges mowed to prevent an accidental ignition. Homeowners with structures located on dead end roads or driveways with no alternate escape route should construct loop roads where possible or establish gates in fencing to allow for an emergency evacuation if the primary escape route becomes impassible.

New developments in the wildland urban interface should be regulated by building codes that protect residents from the effects of wildfire. Insuring that there are adequate water resources in the case of an emergency.

4.5 Firefighting Resources and Capabilities

The Fire Fighting Resources and Capabilities information provided in this section is a summary of information provided by Yellowstone County Fire Organizations and Representatives of the Wildland Fire Fighting Agencies listed. Their answers to a variety of questions are summarized here. These summaries indicate their perceptions and information summaries.

4.5.1 Rural and City Fire Protection

4.5.1.1 Billings Fire Department

Marv Jochems, Chief
(406) 657-8420 or (406) 657-8423
JochemsM@ci.billings.mt.us
2305 8th Avenue North, Billings, MT 59101

District Summary:

The Billings Fire Department provides services to the City of Billings and surrounding contracted areas in Yellowstone County commonly referred to as the Billings Urban Fire Service Area (BUFSA). The total response area is approximately eighty-four square miles. The fire department provides emergency services such as fire suppression, emergency medical response, hazardous materials response, high angle rescue, confined space rescue, vehicle accident extrication, and fire investigations. There are currently six fire stations within the city limits with plans for an additional station on the west end of Billings.

Personnel include a Fire Chief, an Assistant Fire Chief, A Sr. Administrative Coordinator, an Administrative Secretary, a Fire Marshal, an Assistant Fire Marshal, 3 Deputy Fire Marshals, a Training Officer, a Maintenance Officer, 4 Battalion Chiefs, 27 Captains, 27 Engineers, and 39 Firefighters.

Under the direction of the Billings Fire Department, the City/County 9-1-1 Center provides the critical link between the community and public safety resources. Twenty-seven (27) full-time employees and three (3) 9-1-1 supervisors receive, coordinate, and process emergency and non-emergency radio and telephone traffic twenty-four (24) hours a day. Additionally, the 9-1-1 Center oversees the maintenance and usage of the citywide 800 MHz radio system.

Priority Areas:

Residential Growth:

The Billings area is growing at a steady rate. Growth is not expected to slow, in part, due to the population exceeding 100,000 people. At this population level, planners anticipate the community to become 'self generating' and continue to grow at a steady and significant rate.

Communications:

Communications within the Billings City Fire, Police and EMS systems are relatively effective and efficient, all using an 800 MHz radio system with a central dispatch center. However, communications with organizations outside of the City, such as other fire departments, is challenging, as many of these organizations are still using VHF or other systems not compatible with the 800 MHz system.

Fire Fighting Vehicles:

With the steady expansion of City limit boundaries, the amount of wildland urban interface area in the jurisdiction is increasing. The City's wildfire fighting apparatus, such as brush trucks, may be inadequate to handle potentially large wildfire events which include interface with urban development, such as in Rehberg Ranch Subdivision. Additional wildland firefighting resources are needed.

Burn Permit Regulations:

The current burn permit regulations appear to be adequate. The Billings Fire Department administers and regulates burn permits within the city limits. The Yellowstone City-County Health Department administers and regulates burn permits in the county.

Effective Mitigation Strategies:

The Department is making great efforts to expand the number of stations, equipment and personnel to meet the increasing demands resulting from population growth. The Department actually employees fewer firefighting personnel in 2005 than it did 30 years ago. From 1974 to 2004, the fire service area has expanded from 18 to 84 square miles. During the same period, staffing has decreased from 112 to 104 personnel. While the demand for firefighting and prevention efforts has dramatically increased, staffing has decreased, resulting in longer response times on calls and an inability to maintain relative levels of service to the public. Staffing and equipment resources are at a critical level.

Education and Training:

The Billings Fire Department provides annual wildland firefighting training. This includes a pre-fire season firefighter safety and survival course of instruction. Also provided is training for pumper drafting, tender and water shuttle operations, collapsible tank deployment, and a

sawyer class. This takes place in the context of 12 hours minimum of training. Additional training takes place at individual stations at the discretion of station Captains. Many of the firefighters certify on their own to carry wildland firefighting certifications such as red cards, engine boss, and various other positions.

Cooperative Agreements:

Billings has formal and signed mutual aid agreements with ConocoPhillips, ExxonMobil, and Cenex refineries, the communities of Laurel and Lockwood, and the Billings Logan International Airport ARFF. Billings generally offers mutual aid to all requesting fire departments surrounding the Billings area, pursuant to MCA 1-3-209, the State Mutual Aid Law.

Current Resources:

Station #1 – 2305 8th Avenue North:

Table 4.2. Billings Fire Department Station #1 Equipment List.

Year	Make	Model	Tank Capacity	Pump Capacity
2003	HME	Pumper	750 Gallons	1500 GPM
1997	Sutphen	Aerial Ladder	750 Gallons	1500 GPM
1997	Freightliner	Water Tender	2500 Gallons	300 GPM
2004	Ford	4x4 Brush Truck	450 Gallons	100 GPM
1991	E-1	Reserve Pumper	750 Gallons	1500 GPM
1992	Dodge	Utility Pickup	N/a	N/a
2002	Chevrolet	Suburban (Battalion Chief)	N/a	N/a
1996	Chevrolet	Suburban (Training Officer)	N/a	N/a

Station #2 – 501 South 28th Street:

Table 4.3. Billings Fire Department Station #2 Equipment List.

Year	Make	Model	Tank Capacity	Pump Capacity
2001	Sutphen	Pumper	750 Gallons	1500 GPM
1998	Chevrolet	Rescue	N/a	N/a

Station #3 – 1928 17th Street West:

Table 4.4. Billings Fire Department Station #3 Equipment List.

Year	Make	Model	Tank Capacity	Pump Capacity
1993	3D MFG.	Pumper	750 Gallons	1500 GPM
1991	E-1	Reserve Pumper	750 Gallons	1500 GPM

Station #4 – 475 6th Street West:

Table 4.5. Billings Fire Department Station #4 Equipment List.

Year	Make	Model	Tank Capacity	Pump Capacity
2003	HME	Pumper	750 Gallons	1500 GPM
2004	Freightliner	Haz-Mat Van	N/a	N/a

Station #5 – 605 South 24th Street West:

Table 4.6. Billings Fire Department Station #5 Equipment List.

Year	Make	Model	Tank Capacity	Pump Capacity
2001	Sutphen	Pumper	750 Gallons	1500 GPM
2004	Freightliner	Water Tender	2600 Gallons	300 GPM
2002	Ford	4x4 Brush truck	450 Gallons	100 GPM
2005	Sutphen	Quint	500 Gallons	1500 GPM

Station #6 – 1601 St. Andrews Drive:

Table 4.7. Billings Fire Department Station #6 Equipment List.

Year	Make	Model	Tank Capacity	Pump Capacity
1993	3D MFG	Pumper	750 Gallons	1500 GPM
1992	Ford	4x4 Brush Truck	300 Gallons	100 GPM
1986	Chevrolet	Air (SCBA) Van	N/a	N/a

Future Considerations:

A 7th Fire Station is currently being planned and is tentatively scheduled to begin construction in early 2006.

There is a need for City and County regulations to require minimum levels of wildland fuel mitigation in urban interface areas to protect lives and property. Virtually no regulations currently exist in City and County Code. Some individuals may view these new regulations as unnecessarily restrictive, but these changes could reduce insurance rates and the loss of life and property within the community.

4.5.1.2 Broadview Rural Fire District #3

District Summary:

Broadview Rural Fire District #3 is based in Broadview, Montana. The Broadview Rural Fire District covers four counties, northwestern Yellowstone County, northeastern Stillwater County, southeastern Golden Valley County, and southwestern Musselshell County. The fire hall is located in Broadview, Montana. They have mutual aid agreements with the surrounding fire departments. At the present time, the Broadview Rural Fire District does not respond to structural fires within their district; they are solely a wildland fire response organization. As a recommendation for this plan, they believe it would be in the best interests of the community for the department to assume structural suppression responsibilities.

Broadview Rural Fire District #3 has a few interface areas in Yellowstone County. More are located in the surrounding counties where they have people moving into timbered areas.

Their needs at the present time are a repeater/pager tower in the Broadview area to help with communications, a Type 6 Wildland Fire Truck, a Pro-PAC foam kit, a floater pump, and any kind of PPE that they can get. They also need basic wildland fire training. For the future needs of the BRFD, they would like to get a Type 3 truck and the training necessary to use this truck.

Current Resources:

Table 4.8. Broadview Rural Fire District #3 Equipment List.

Year	Make	Model	Tank Capacity (gal)	Pump	Comments
1973	Ford	F-250	200 gal w/ Vanguard 9 hp motor	Davy pump	Midland radio, 100' of 1" hose with hand reel, 5 gal gas can and 5 gal foam can, 4 bladder packs, 20' log chain, First Aid kit, 1 flapper, 2 axes, 1 shovel, and 1 rake
1989	Chevrolet	1-ton	215 gal w/ 18 hp	Briggs & Stratton pump	Kenwood radio, 100' of 1" hose w/ electric reel, 8' suction hose, 2 ½ gal gas can, 2 ½ foam can, First Aid kit, 2 flappers, 2 Pulaski's, 1 brush rake, and 1 shovel
1976	GMC	25	200 gal slide in		100' hose and reel, 3 bladder packs, 4 Pulaski's, 1 brush rake, 2 shovels, 2 flappers, and 1 axe
		6x6 Military Truck	1000 gal w/ 5 hp engine	Centrifugal pump	100' of ¾" hose w/ hand reel and 50' of 1 ½" hose
1974	Peterbuilt	Tender	5000 gal	300 gpm (50 psi)	20' of 2" hose, 40' of 3" hose, and 1500 gallon drop tank
1967	International	1300	300 gal w/ Vanguard 9 hp motor	Davy pump	Regency radio, 100' of 1 ¼ " hose w/ hand reel, 2 Indian backpacks, 1 fire shelter, 2 ½ gal gas can, 5 gal foam can, 3 shovels, 1 brush rake, 1 Pulaski, 20' 3/8" log chain
1979	Ford	F-350	215 gal w/ 18 hp Twin Briggs engine	Davy pump	Midland radio, 12' suction hose, 150' of 1" hose w/ electric reel, 25' of 1 ½" hose, 5 gal gas can, 5 gal foam can, 3 bladder packs, 3 fire shelters, 4 tire chains, 1 oxygen kit, 1flare kit, 20' of 3/8" log chain, burn First Aid kit, 2 shovels, 3 flappers, 1 Pulaski, 1 brush rake, and 1 axe

Other items: 8 SCBA's, 3 sections of 50' of 1 ½" water hose, 6 cots, 11 hp Wisconsin engine with 2" pump, 50 gallons of foam, aluminum extension ladder, one bladder pack, 1000 gallon water tank, 1000 gallon propane tank, 500 gallon propane tank, 2 slide in 200 gallon tanks with engine, pump, hose, and reel, 1 state lands slide in tank, engine, pump, hose, and reel, 1 ½" socket set, various sizes and amounts of structural and brush turnouts, helmets, pants, and fire shirts (all are hand-me-downs), 2 Bendix King radios, 2 Kenwood Radios, 2 Johnson Radios, 3 Kenwood Radios, and 9 handheld radios.

4.5.1.3 Lockwood Fire Department

Alan Riley, Chief
(406) 855-0400
Officer1198@yahoo.com
3329 Driftwood Lane
Billings, MT 59101

District Summary:

Lockwood Fire District is responsible for structural and wildland fire protection, hazmat, rescue, and emergency medical service in the unincorporated area east of the city of Billings. Lockwood Fire District covers 80 square miles and has both Interstate 90 and Interstate 94 within its district boundaries.

Lockwood Fire District is a combination department with 14 career firefighters, 1 administrative aid, and 8 volunteer firefighters. All aspects of the district response are major concerns due to the limited manpower and equipment. Lockwood Fire District has mutual aid agreements with the city of Billings and surrounding volunteer fire departments. Additional resources are available from the Department of Natural Resources and Conservation and the Bureau of Land Management for larger wildland incidents.

Priority Areas:

Residential Growth:

The residential growth in the district has far exceeded the expected growth for the area. New subdivisions are being developed from the flat farm lands to the steep wooded Hills on the eastern edge of the district. The wildland urban interface area is a major "red flag" for the district with the placement of houses with high risk indefensible landscapes.

Communications:

The communications in the district are barely adequate to meet the needs. Topographical features within the district make radio communications difficult to impossible in some areas. Frequently, "dead spots" are found where communications are nonexistent. Furthermore, inadequate common frequencies make for dangerous situations during interface fires.

Fire Fighting Vehicles:

Due to limited funding, the age and capabilities of the firefighting vehicles in our District has been an on-going concern.

Effective Mitigation Strategies:

The Fire District has strived to keep pace with the growth in the district, but due to a drop in the district's taxable value, this has not been possible. Over the last ten years the Fire District has added one aerial truck and one front line pumper with the aid of state grants and low interest loans. The District has been unsuccessful in attempts to fund a quick response wildland urban interface truck to replace the 1985 truck currently in operation.

Future plans to build a new fire station are now being explored. The current location does not have adequate space to house the number of vehicles or firefighters the District has at this time and there is no room for further expansion.

Education and Training:

Our department provides continued training for all firefighters in the Fire District. Several of our members teach classes for the County through the Department of Resources and Conservation. The department has planned and participated in a number of countywide mutual aid drills. At this time our training room has been converted into an additional bay to house another vehicle.

The Fire District has provided public education through the schools as well as providing public informational meetings. The firefighters have gone door to door talking to the homeowners about defensible space and making their homes more defensible in the event of wildfire. A video was produced and distributed statewide on how the home owner can protect their homes. Firefighters in this district have made themselves available to do on-site evaluations of property

in this district. Efforts have been made to assist the homeowner in clearing brush from the property.

Cooperative Agreements:

The Lockwood Fire District has a mutual aid agreement with Yellowstone County, which covers all fire departments within the county including the City of Billings. In addition, the fire District has a mutual aid agreement with the Bureau of Indian Affairs through Yellowstone County. The County Fire Warden can provide additional help from the Department of Natural Resources and Conservation and from the Bureau of Land Management.

Current Resources:

Station #1 – 2305 8th Avenue North:

Table 4.9. Lockwood Fire District Equipment List

Name	Year	Make/Model	Tank Capacity	Pump Capacity
Engine 1	1997	Pierce Saber	750 gal	1250 gpm
Engine 2	1992	Pierce Arrow 65' Telesquirt	500 gal	1500 gpm
Engine 3	1985	GMC 1-ton	300 gal	200 gpm
Engine 4	1979	International 4x4	1400 gal	1000 gpm
Tender 1	1979	GMC General	3700 gal	PTO
Squad 1	1995	E-350 Type 3 Ambulance		
Squad 2	1993	Ford 4x4 Type 1 Ambulance		
Squad 3	1997	Suburban Multi-Use Vehicle		
Unit 20	2001	Dodge Intrepid (Chief's Car)		

Proposal for New Fire Station:

The Lockwood Fire District operates out of one station. Over the years, we have steadily been running out of room. When the Fire District was first formed in 1988, we had two trucks and operated out of a garage and a Boise Cascade house. Today, the department has multiple vehicles consisting of four trucks, one tender, and four utility vehicles. The department also operates an Advanced Life Support (ALS) service with two ambulances and three paramedics. The Lockwood Fire District has recently purchased five acres of land on Johnson Lane. This piece of property has direct access onto Johnson Lane both north and south. It was decided that no tax dollars would be used for the construction of a facility except for the purchase of the land. After several conceptual meetings, it was decided to consider a building that encompasses a fire station, clinic, pharmacy, and community hall. The firehouse would be approximately 11,728 square feet and the apparatus bay would be 14,760 square feet. The clinic/community hall would be 5,112 square feet. The total square footage of the whole area would be approximately 110,000 square feet. The construction of this facility would create at least sixteen new jobs.

Future Considerations:

Lockwood Fire District will continue to be proactive in protecting the community and the firefighters. New information and projects will be provided to the residents in the District to reduce fire hazards and make the community safe. Building the new fire station and training facility will allow the Fire District to keep pace with the needs of the District, the community, and

the firefighters. Additional and upgraded equipment will be necessary to protect the citizens in the District. The new fire station and equipment should reduce insurance costs to the homeowners and reduce the loss of life and property within the District.

4.5.1.4 Worden Volunteer Fire Department

Monte Dvorak, Chief
(406) 967-4946
P.O. Box 369
Worden, MT 59088

District Summary:

The Worden Fire Department is all volunteer. They have 32 members in all and provide structure, wildland, and EMS. The district covers over 550 square miles. Both Worden Fire District #4 and the Huntley Project Fire Service Area contract with the Worden Volunteer Fire Department to provide structural and wildland fire protection to their constituents. Worden VFD borders two other counties, which are Musselshell and Big Horn. This department has mutual aid agreements with all other surrounding departments, specifically the Billings, Blue Creek, Broadview, Custer, Duck Creek, Haley Bench, Homewood Park, Laurel, Lockwood, Molt, and Shepherd. Also, BLM helps whenever requested. They have three fire stations located in Worden (our main station), Huntley, and Pompeys Pillar. In all they have 6 small communities that make up the Huntley Project.

Priority Areas:

Residential Growth:

The greatest concern lies in the Huntley - Pryor Creek area. There are numerous subdivisions that have been built in that area without any water storage tanks with dry hydrants. Most of the subdivisions are built in dryland areas where water is not readily available. They are also getting a lot more subdivisions in the valley, but most are on irrigated ground.

The Worden VFD is asking that any subdivisions proposed to have five or more residential dwellings be required to put in a 10,000 gallon dry hydrant.

Communications:

Communications is always a concern. At this time all of their fire vehicles have radios and all personnel have handheld radios. Their concern is that when they go to narrow band some of their radios won't be compatible.

Fire Fighting Vehicles:

The Worden VFD has upgraded substantially in the last 10 years, but they still have two Type 6's that are very hard to order parts for. One is owned by the DNRC and definitely needs to be replaced. It would be in the DNRC's best interest if they could replace theirs with a newer model.

Burning Permit Regulations:

Burning permits have been an issue for years. The County now has stricter laws in effect, but they are not always enforced by law enforcement when they are called on. The Worden VFD gets hundreds of calls during the spring to fall period when people are wanting to burn ditches, limbs, and old grass. It keeps more than one person busy just taking these calls. The department would like these calls to be recorded and used for

future references if a fire gets away. This way the calls would not tie up our lines in case there is a real emergency.

Effective Mitigation Strategies:

The department has been upgrading their vehicles and buildings as is affordable. They have updated the Huntley Station from a cold storage station to a heated station after they got a fire service area formed in 1994-95. They also built a fire station at Pompeys Pillar and supplied it with structural and wildland vehicles. The department is also in the process of buying two more lots in Worden, so they can expand the station there. The department has upgraded much of their equipment from FEMA grants and VFA/RFA grants. They are in the process of getting a new tender through a FEMA grant. All of their wildland firefighting vehicles have been fitted for foaming capabilities and our main structure vehicles have foam as well. The department has tried to keep up with the times and changes, but it takes a lot of money. Even the department's Humvees that were bought almost new are now 10 years old.

Education and Training:

The Worden VFD has had an open house the last two years at which they explain to the people where they are at and where they are going. The department hands out information on how to make their dwellings safer. In 2004, the firefighters went from door to door in the Huntley-Pryor Creek area handing out information and explaining how to make their homes more firewise.

The department was unable to go back to that area this year, but plan to go there again in 2006. They also have the kindergarten and first graders come to the Worden Fire Station and the firefighters explain and demonstrate what they do. They also give the teachers and pupils some helpful hints on how to be firewise.

Training for the department is always an important factor. They train twice a month on fire and once on EMS. Every department is always looking for new training skills and classes that will make the department better and their personnel safer. They have been struggling with DNRC to get the classes they want. For the last several years, many classes have been held out of county so it makes it hard to attend and also very expensive. Some of these classes are 2-4 days long and it gets awful expensive and time consuming for the volunteers. Some people just can't afford to take off work and the added expense. There also seems to be many people that like to join the departments, but don't like to train regularly.

Cooperative Agreements:

The department has a good mutual aid agreement with all surrounding fire departments. BLM is also very helpful if resources are needed. It is not always easy to get help from the DNRC when there is more than one fire in the area.

Current Resources:

Station #1 –Worden:

Table 4.10. Worden Volunteer Fire Department Worden Station Equipment List.

Year	Make	Model	Tank Capacity	Pump Capacity
1975	Ford	F-750	750	750
1995	Freightliner	EEI	1000	1250
1995	HummVee	AmGeneral	250	350
1995	HummVee	AmGeneral	250	350
1968	Kaiser 6x6		1000	350
1969	White	9000	4200	350

Station #2 – Pompeys Pillar:

Table 4.11. Worden Volunteer Fire Department Pompeys Pillar Station Equipment List.

Year	Make	Model	Tank Capacity	Pump Capacity
1996	HummVee	AmGeneral	250	350
1969	Kaiser 6x6		1000	350
1969	Chevy	C70	750	750
1965	Jeep		250	350

Station #3 – Huntley:

Table 4.12. Worden Volunteer Fire Department Huntley Station Equipment List.

Year	Make	Model	Tank Capacity	Pump Capacity
1965	International		1000	1000
1968	Jeep		250	250

Future Considerations:

- All new subdivisions will have 10,000 gallon dry hydrants when 5 or more houses are to be built.
- Putting more dry hydrants and storage tanks in existing subdivisions like White Buffalo and Shadow Canyon.
- A storage tank and dry hydrant at Scouthern and Bundy and one on Arrow Creek Road.
- We have 3 250 gallon slide-in tanks with pumps that we lent out to ranches north and east of Pompeys Pillar.
- We would like to put a Type 6 out at Clair Tempro's.

4.5.1.5 Worden Fire District #4

Daniel Krum, President
406-967-3281
P.O. Box 213
Worden, MT 59088
danielk@be-quik.com

District Summary:

We have no assets. We have a taxing district, but contract fire suppression services from the Worden Volunteer Fire Department.

4.5.1.6 Custer Volunteer Fire Department

Milton Mothershed, Chief
(406) 856-4261
Milton@midrivers.com
P.O. Box 47
Custer, MT 59024

Current Resources:

Station #1

Table 4.13. Custer Volunteer Fire Department Station #1 Equipment List.

Year	Make	Model	Tank Capacity	Pump Capacity
1967	AMG	2 ½ ton 6x6 Tender	1800	150
1982	AMG	2 ½ ton 6x6 Tender	2100	150
1993	Ford	350 4x4 Type 6	400	150
1983	Ford (DNRC)	350 4x4 Type 6	250	150
1967	Ford 850	Structural	1000	750

Station #2

Table 4.14. Custer Volunteer Fire Department Station #2 Equipment List.

Year	Make	Model	Tank Capacity	Pump Capacity
1965	Jeep	Type 6	250	150

4.5.1.7 Molt Volunteer Fire Department

Greg Smith, Chief
(406) 669-3139
1438 Buffalo Trail
Molt, MT 59057-2101
buffalo@ttc-cmc.net

District Summary:

The Molt Volunteer Fire Department is responsible for wildland and structural fire protection in western Yellowstone County and eastern Stillwater County. The fire station is located in the town of Molt, which is in Stillwater County. One truck is kept at a member's home in the southern part of our area. Our main emphasis is wildland protection. We are not structure rated, but will do what we can at a structure fire. We have mutual aid agreements with each county.

Priority Areas:

Residential Growth:

The Buffalo Trail area has experienced a large increase in home building in recent years. Some homes have been built in areas where it will be hard to defend them from wildfires.

Communications:

We are constantly upgrading our radio and pager systems. All our members have pagers. We are working towards all members having radios.

Fire Fighting Vehicles:

With the exception of a new vehicle provided by the State of Montana, our vehicles are old and probably not capable of adequately protecting our wildland/urban interface.

Burning Permit Regulations:

The county government needs to come up with an enforceable burn permit system. Most of our residents do call and ask permission if they want to burn and have worked with us very well.

Effective Mitigation Strategies:

The county planning departments need to develop a process that will make sure homeowners and developers build homes that are well protected from fire. This could include sprinkler systems in homes, fire resistant construction materials, and landscaping designed to minimize exposure to a wildfire. Dry hydrants in developments would be assets. Roads and driveways need to be wide enough for safe access by fire trucks.

Our department needs to replace several old firefighting vehicles. Structure rated engines are much needed. Our low income has kept us from replacing vehicles as needed.

Education and Training:

Our volunteers attend training sessions sponsored by the State and sometimes attend training at neighboring departments. Our department also holds monthly training sessions.

Cooperative Agreements:

Molt Volunteer Fire Department has mutual aid agreements with Stillwater and Yellowstone Counties. The State of Montana and Bureau of Land Management are available for fires that exceed the resources of the local fire department.

Current Resources:

Station #1

Table 4.15. Molt Volunteer Fire Department Station #1 Equipment List.

Year	Make	Model	Tank Capacity	Pump Capacity
1992	Ford	Tender	2500 gal	350 gpm pto, 300 gpm portable
1987	Dodge 4x4	Type 6 engine	300 gal	120 gpm
1975	International 4x4	Mini-pumper	300 gal	350 gpm pto, 120 gpm portable
1976	Military 6x6	Type 6 engine	1000 gal	120 gpm
2005	Ford 4x4	Type 6 engine	300 gal	120 gpm
1968	Jeep 4x4	Type 6 engine	200 gal	120 gpm

Station #2

Table 4.16. Molt Volunteer Fire Department Station #2 Equipment List.

Year	Make	Model	Tank Capacity	Pump Capacity
1978	Military 6x6	Type 6 engine	1000 gal	120 gpm

4.5.1.8 Shepherd Volunteer Fire Department

Stuart Andersen, Chief
406-373-5802
Cell: 406-698-6339
P.O. Box 1
Shepherd, MT. 59079
Wildfire_engines@hotmail.com

District Summary:

Shepherd Volunteer Fire Department (SVFD) covers approximately 520 square miles. The District runs north to the Musselshell County line, south to the city of Billings north boundary, west to the railroad tracks to Acton and east to the Yellowstone River to Worden. There are two SVFD fire stations in the district and two satellite stations. There are 30 members, all volunteer. In most cases, out of the 30 members, 10 to 15 are active, depending on what time of day it is. The reason for this is that most of the members work in Billings, so at times during the work week, they have only two to five people available. The Bureau of Land Management (BLM), Billings Field Office has been a lifesaver the last couple of years in responding to some of their wildland fires near or adjacent to BLM lands. The department also uses Worden, Blue Creek, City of Billings, Custer, Haley Bench, Molt, Lockwood, Homewood Park, Laurel, Duck Creek and Broadview for mutual aid.

Shepherd VFD covers a wide variety of topography. There are more “leap frog” residential areas into urban interface type zones. Yellowstone County has done little in the way of regulations for road access, rural addressing, road design and water supply, etc. Individual fire departments have had to go it alone.

Priority Areas:

Residential Growth:

The entire Shepherd area has almost doubled in population in the last 8 to 10 years and the way it looks, it will double again in the next ten years.

We are getting people that don’t keep their yards or property up resulting in higher wildland fuel loadings in these areas. Some of the rural public burn any time they so desire. We need strict regulations. Possibly Yellowstone County needs to make better laws for people that are burning and letting weeds, grass and combustible fuels build up around their property. And when these laws are approved, enforce them.

Effective Mitigation Strategies:

1. Upgrade to newer equipment
2. We have had five dry hydrants installed and two more are on the way
3. We upgraded the Communication System with a new paging system
4. We built a new five bay fire station
5. Purchased a new 1250 gpm structure engine

Future Plans:

1. To replace station 2 with a fire department owned one in a better location.
2. Upgrade the 6 x 6's to newer Type 3 engines.
3. Purchase a new 3000 gal water tender.
4. Plan to develop more dry hydrants in the north half of the protection area.
5. Rural addressing system needs to be reviewed.
6. Fuels reduction around home sites and increase public awareness.

Education and Training:

The Shepherd VFD has experienced a lack of interest from our members for training and education. How can we resolve this issue? We have had a problem with getting training from DNRC in a timely manner.

Communications:

Due to topography, sometimes it is impossible without going through dispatch. It would be nice Shepherd had their own repeater system.

Fire Fighting Vehicles:

The Shepherd VFD needs one new structure engine, for station 2. All three 6 x 6's need to be replaced with Type 3 engines. They also need one new Type 2 water tender.

Current Resources:

Station #1 – Shepherd

Table 4.17. Shepherd Volunteer Fire Department Station #1 Equipment List.

Year	Make/Model	Type	Tank Capacity (gal)	Pump Capacity (gpm)
1970	American General 6x6 Brush Tender		1000	
1986	GMC Water Tender	Type 2	3000	
1995	Ford Engine	Type 6	220	
1983	Dodge Engine	Type 6	210	
2003	Almonte Structural Engine	Type 1	1000	1250
1975	Hendrickson Ladder Truck	Type 1	1000	1500
1996	Chevy Suburban (EMS only)			

Station #2

Table 4.18. Shepherd Volunteer Fire Department Station #2 Equipment List.

Year	Make/Model	Type	Tank Capacity (gal)	Pump Capacity (gpm)
1972	American General 6x6 Brush Tender		1500	
1975	Ford Darley Structural Engine	Type 2	1000	500

Station #3

Table 4.19. Shepherd Volunteer Fire Department Station #3 Equipment List.

Year	Make/Model	Type	Tank Capacity (gal)	Pump Capacity (gpm)
	Brush Truck, 1 ton (DNRC owned – assigned to Bar Diamond Initial Attack)			

Station #4

Table 4.20. Shepherd Volunteer Fire Department Station #4 Equipment List.

Year	Make/Model	Type	Tank Capacity (gal)	Pump Capacity (gpm)
1975	American General 6x6 Brush Tender		800	

4.5.1.9 Blue Creek Volunteer Fire Department

Rick Cortez III, Chief
406-208-0524

bcfyrstopper@msn.com
2144 Santiago Blvd
Billings, MT 59101

District Summary:

Blue Creek VFD is responsible for EMS, structure, and wildland fire protection for 54 square miles south of the Yellowstone River. The department is flanked on the west by Duck Creek IAA, on the east by Lockwood Fire District, and bordered to the south by the Crow Indian Reservation/BIA. There is one fire station in the service area. The station is located at the north end of our coverage area. We are an all-volunteer department with a total of 24 firefighters. Our primary areas of concern are structural fire protection and EMS, but due to the nature of our service area, the majority of our responses are wildland fires in wither grassland or timber environments. We are cabable of handling most Type 4 wildland incidents. Because of overlapping areas of responsibility, we have a mutual aid agreement with the Bureau of Indian Affairs.

Priority Areas:

Residential Growth:

The south and west ends of the fire service area have been experiencing significant residential growth over the last several years and indications are that this trend will continue into the foreseeable future.

The use of improper building materials, and/or construction practices for new construction in "high risk" wildland-urban interface areas and indefensible ground surrounding existing structures is a problem in some areas.

Communications:

Communications capabilities in our area are barely adequate. Topographical features within the area make radio communications with county dispatch and other agencies, difficult to impossible in some areas.

Firefighting Vehicles:

Due to limited funding, the age and capabilities of the firefighting vehicles in our department has been a concern.

Burn Permit Regulations:

The careless and unregulated use of fire to remove trash, weeds, and other burnable materials in addition to burning during stat burn ban periods needs to be addressed.

Effective Mitigation Strategies*:*

The department continues to keep pace with expansion in the area and has been successful in the upgrading of equipment and resources through the use of state and federal grants. The intent of the department is to continue to replace our aging equipment. Over the past six years, the fire service area has replaced two vehicles and is currently in the process of replacing two more.

Future plans include building a new fire station on the land the department owns in the area. Our current station is now located in a newly annexed area to the City of Billings. We are also looking to replace present vehicle and portable radio communications equipment.

County development of stricter building codes for designated "high risk" wildland-urban interface areas is needed. These codes should focus on the use of fire proof or fire retardant roofing,

siding materials, and roof ventilation systems that inhibit entry of airborne burning materials into roof and attic areas. Recommendations to persons building new homes to consider earthen terraces and patios constructed of non-flammable materials instead of highly flammable wooden decks should be developed. Additional considerations should also be made for the possible regulation of non-"Fire Wise" landscaping treatments and the mandatory inclusion of defensible space with green zones in these "high risk" areas.

Education and Training:

The department continues to emphasize the importance of continued training to our firefighters, and this issue could have just as easily been included in the "Priorities" section of the discussion. The department's members participate in training activities provided to us through our mutual aid agreement with surrounding departments and agencies in addition to local training activities conducted at our fire department drills. However, the department feels a countywide training program, if one were to be developed, would benefit us and the other departments by creating a more standardized level of training and familiarizing each agency to the other's equipment, personnel, and operating procedures.

The Blue Creek VFD participates in community education by hosting child fire safety education promotions in local schools. They familiarize the children to the appearance of firefighters in full turnout gear with SCBA and instruct them in safe evacuation techniques. Also, we do on-site evaluations of property to assist owners in making their homes more defensible in the event of a wildland fire.

Cooperative Agreements:

Blue Creek VFD has mutual aid agreements with Yellowstone County and the Bureau of Indian Affairs. The department believes they have very good working relationships with these agencies and enjoy the cooperative nature of this mutually beneficial association.

Current Resources:

Table 4.21. Blue Creek Volunteer Fire Department Equipment List.

Year	Make/Model	Tank Capacity (gal)	Pump Capacity (gpm)
1976	Ford Boardman	750	1000
1989	Ford Marion Mini-pumper	200	250
1986	Ford Type 6 ¾ ton 4x4	200	105
1991	Chevy Type 6 ¾ ton 4x4	200	100
1990	Chevy Type 6 1ton 4x4	200	105
1972	International Tender	3000	150 pto
1979	Ford F600 Heavy Type 6	300	100

The 1979 Ford F600 is on loan to Blue Creek VFD from the Department of Natural Resources through the Montana Department of State Lands. Though this truck is owned by the state government, the fire service area is responsible for the equipping and operating costs.

Future Considerations:

Blue Creek VFD will continue to be actively engaged in upgrading and modernizing existing vehicles and equipment assets. Protecting our community and our firefighters is our paramount objective. The building of a new fire station in the Blue Creek area is in the initial stages at this time (November 2005), with anticipated completion within the next three to five years. This station will provide the fire department with much needed space and training facilities to allow the department to keep pace with the needs of the firefighters and the community.

As previously stated, there is a need in the County for new regulations concerning new construction in "high risk" wildland-urban interface areas and stricter burn permit regulations. Some individuals may view these new regulations as unnecessarily restrictive, but these changes could reduce insurance rates and the loss of life and property within our communities.

4.5.1.10 Laurel Volunteer Fire Department

Current Resources:

Table 4.22. Laurel Volunteer Fire Department Equipment List.

Year	Make/Model	Name	Tank Capacity (gal)	Pump Capacity (gpm)
1996	Freightliner	Engine #1	750	1250
1990	Becker	Engine #4	750	1000
1976		Engine #3	750	1000
2002	Freightliner	Tender #1	4000	
1976	Kenworth	Tender #2	4000	
1978	Ford F-350	Brush #1	250	
1958	2 ½ ton Truck	Brush #2	750	
1992	Oheo 1 ton	Brush #3	250	
1960	Engine (converted)	Brush #4	750	
1974	Ford Truck (converted)	Support #1		
1993	Suburban	Support #2		

4.5.2 Wildland Fire Protection

4.5.2.1 Bureau of Land Management

Irv Leach, Fire Management Officer
(406) 896-2940 Office
Irv_Leach@blm.gov
1299 Rimtop Dr.
Billings, MT 59105

District Summary:

The Following information was excerpted from the Billings Field Office Fire Management Plan. For more detailed information please visit the web at: http://www.mt.blm.gov/fire/fireplans/index.html.

There are approximately 78,500 acres of BLM administered lands within Yellowstone County. An Interagency Fire Dispatch center is located within the City of Billings to assist wildland suppression forces under the direction of the Billings BLM Field Office (BIFO). This dispatch center directs the wildland fire response of two Type-6 engines and two 800 gallon Single Engine Air Tankers (SEATs), as well as numerous operational and administrative wildland fire support personnel. The Billings BLM Fire Program conducts all wildland fire management actions in compliance with the 1995 Federal Wildland Fire Policy and the 2001 Federal Wildland Fire Policy Update guiding principles. These principles are:

- Firefighter and public safety are the highest priority in every fire management activity.
- Provide an appropriate management response (AMR) on all wildland fires, with emphasis based on risks to firefighter and public safety, consistent with resource objectives weather and fuels conditions, threats and values to be protected, cost

efficiencies and standards and guidelines . AMR allows land managers to tailor preplanned wildland fire responses to meet objectives established in resource management plans and their associated implementation plans.

- Work with communities at risk to assess risk in terms of direct wildland fire impacts and implement programs to mitigate that risk through collaborative planning and projects.

- Establish partnerships with all interagency cooperators to facilitate coordinated fire management activities.

- Encourage close coordination and collaboration among specialists within the BIFO and among the BIFO and federal, interested organizations, private landowners, state, and local partners.

- Develop and use the best scientific information available to deliver technical and community assistance to support ecological, economic, biological, physical and sociological factors.

- Wildland fire use is not approved in the current land use plan so fire use objectives and goals will not be addressed in this plan.

Priority Areas:

The BLM has on-going hazard mitigation projects in WUI areas including the Shepherd Ah-Nei Recreation Area, the Pompeys Pillar National Monument, Acton area, South Hills area, Four Dances Natural area, and Sundance Lodge SRMA (maps of these areas are included in Appendix I). They are also dedicated to identifying other higher risk WUI areas within their ownership with the intention of implementing fuels mitigation projects for the safety of public users.

Education and Training:

All training and education is done in accordance with NWCG and Northern Rockies Coordination Group/ Northern Rockies Geographic Area Interagency Wildland Fire Training program standards. Any information pertaining to this process can be accessed through: http://nationalfiretraining.net/nr/

BLM is an active participant throughout the Billings protection zone working with county and local government, as well as private entities in education, prevention and mitigation activities. Community education presentations are frequent throughout the county to interested persons upon request, as well as local school presentations with a “prevention” theme covering various younger age groups.

One of the most facilitative projects within the county is the cooperative fire restrictions coordination between the various agencies. The BLM works extremely well with local governments when evaluating the need for fire restrictions and when processing requests for and implementing fire restrictions. This allows for uniform restrictions across the county.

Cooperative Agreements:

All cooperative agreements with county and state entities within the Billings Field Office fire protection boundary are currently under revision.

Current Resources:

Table 4.23. Bureau of Land Management Available Equipment List for Yellowstone County

ENGINES

Year	Make	Model	Tank Capacity	Pump Capacity
2001	Ford F-550	BLM Brush Model Type-6	300 gal	90 gpm
2005	GMC 5500	BLM Brush Model Type-6 (CAFs Unit)	400 gal	125 gpm

AIRCRAFT

Make/Model	Capacity	Availability
Air Tractor 802 Single Engine Air Tanker	800 gal	Available July 4th through Sept 1st
Air Tractor 802 Single Engine Air Tanker	800 gal	Available July 4th through Sept 1st

Bureau of Land Management Project Area Maps are included in Appendix I.

4.5.2.2 Bureau of Indian Affairs, Crow Agency Wildland Fire and Aviation Management Program

Ed Morgan, Forest Manager
Steve Collins, Fire Management Officer
BIA Crow Agency, Forestry
P.O. Box 69
Crow Agency, MT. 59022

District Summary:

There are approximately 139,983 acres of Tribal lands administered by the U.S. Bureau of Indian Affairs within the southeast part of Yellowstone County. These lands are within the exterior boundaries of the Crow Indian Reservation. Additionally, north of the reservation boundary lays an area known as the Crow Ceded area, in which approximately 41 tribal tracts exist, totaling roughly 2,000 acres and about 108 allotted tracts, totaling roughly 12,000 similar acres. Some of these lands are within Yellowstone County.

Wildland fire activities, including suppression within the Crow Reservation, are coordinated from the Crow Agency Forestry complex. This station has eight garage bays that house wildland fire suppression vehicles. A 100 person fire cache for equipping Type II MIF crews is available at the Crow Forestry Station. This cache is used for both agency and off-reservation fire dispatches.

The B.I.A. Crow Agency Wildland Fire and Aviation Management Program only fights wildland fires. Structure fires, vehicle fires, and dump fires are the responsibility of the local city, county, or tribal fire departments. Wildland fire management engines will not be used for structural firefighting.

Helicopter operations are housed at a separate helibase just down the street from the main forestry complex. There is one helipad with room for one additional helicopter on an emergency or temporary basis. In 2005, a new helibase operations building was built at Crow Agency to support the BIA Helitack Crew and contract helicopter. There is also a temporary helipad behind the Pryor Forestry Station, just south of the Yellowstone County line.

All personnel hired by or through B.I.A Crow Agency will meet minimum wildland fire qualification requirements which are equal to or exceed those recommended by the NWCG.

The BIA Crow Agency Wildland Fire and Aviation Management Program objectives include the following:

* Take aggressive and continued suppression action on wildland grass, brush, and timber fires that threaten human life, structures, or high value resources without compromising firefighter safety.

* Strive to prevent disastrous conflagrations that impact management objectives, have adverse environmental consequences, and affect the socioeconomic conditions of the area by conducting a fire prevention program that will reduce human caused wildfires.

* Provide guidelines for the implementation of an Appropriate Management Response (AMR) type fire management strategy, based on protection of human life, identified private property, high value resources, and fuel types, and burning conditions.

* Encourage good interagency relationships with adjacent federal, tribal, state, county and local fire fighting agencies in the spirit of mutual support and interagency cooperation.

Wildland Fire Organization - Initial Attack (IA) Resources/Equipment

Crow Agency:

3 - Type 6 Wildland Fire Engines, 4x4, 200 gallon, Model 52
1 - Type 4 Wildland Fire Engine, 4x2, 750 gallon, Model 52
1 - Type 3 Helicopter with bucket and helitack personnel (7/1 to 9/30)
1 - Helitack Crew Carrier with equipment
1 - Type 7 Slip-on Unit, 4x4 crew cab, 100 gallon
1 - Type 2 Water Tender, 6x4, 4000 gallon, 200 gpm (Branch of Roads)
1 - Road Grader (Branch of Roads)
1 - Type 2 Bulldozer, Cat D-6H & Transport (Branch of Roads)

Pryor:

2 - Type 6 Wildland Fire Engines, 4x4, 200 gallon, Model 52
1 - Road Grader (Branch of Roads)

4.6 Current Wildfire Mitigation Activities in Yellowstone County

4.6.1 Yellowstone County Coop Program

The County Coop Program is a formal written agreement between the Montana DNRC and all of the counties in eastern Montana. The plan is based on the following elements:

- The county is responsible for the suppression of all wildland fires on private and State land.
- If the suppression effort exceeds the counties capabilities, the county fire warden or commissioners call for assistance.
- The county must put the request in writing and submit to the DNRC Land Office (Southern-Billings, Eastern-Miles City, or Northeastern-Lewistown) within 48 hours of the request. Yellowstone County falls into the Southern Land Office area of responsibility.

- The DNRC/State of Montana pays the full cost for everything that is ordered on the fire.
- The county resources on the fire are in a non-pay status as far as the DNRC financial end of the incident is concerned. (The county road equipment costs are paid for by that particular county). The fire district(s) of the particular fire within the county maintain the Incident Command and use their own equipment to help with the extended attack. Once the fire is controlled and contained, the DNRC turns the incident back to the county, department, or district.

The other layer to the County Coop Program is that the DNRC also offers NWGG fire course training and fire equipment (Fed Excess Property or DNRC developed equipment) to the counties. Usually the county fire council and DNRC Rural Fire Coordinator decide which departments within the county get this particular equipment and what courses are needed.

4.6.2 Lockwood Fire District Education and Awareness Campaign

The Lockwood Fire District currently maintains a public education program for citizens within their district. This includes having firefighters go door-to-door with brochures and advice regarding home defensible space in the wildland-urban interface. Firefighters also explain to homeowners how maintaining a clean defensible space can help save their property and families during a wildfire event. As part of this program, other home defensibility issues are recognized and identified to interested homeowners such as access and water availability concerns.

4.7 Issues Facing Yellowstone County Fire Protection

4.7.1 Augmentation of Emergency Water Supplies

Residential growth will likely accelerate in the coming years in all areas of Yellowstone County. Growth will continue to stress rural and wildland fire suppression abilities into the future. It is prudent to address development practices before they become significant issues. Of primary concern to fire departments will be water availability and access. County zoning and planning officials need to address this issue in order to assure that new development is built following specifications that will result in a safe and prosperous community.

In many rural areas of Yellowstone County, there are no readily accessible, year-round water resources available for use by local fire departments. Thus, it is necessary for firefighters to keep large amounts of water loaded on trucks at all times. In the event of a large fire situation, additional water supplies must be transported to the site. The Yellowstone County fire departments feel that establishing permanent augmentations to emergency water supplies is necessary throughout the County. This includes establishment of pressurized water delivery systems in subdivisions as well as establishment of dry hydrants and drafting sites where immediate access to water is limited. Retrofitting dependable, year-round irrigation water sources with necessary fittings for use by emergency response equipment would also be highly beneficial. Once developed, these water sources need to be mapped and use agreements need to be made between landowners, local fire departments, the Crow Indian Reservation, the Montana Department of Natural Resources and Conservation, and the Bureau of Land Management.

4.7.2 Recruitment and Retention, Funding, Equipment Needs, Etc.

There are a number of pervasive issues that challenge volunteer districts within Yellowstone County. A short list of such issues include recruitment and retention of volunteers, lack of funding for equipment needs, keeping pace increases in training requirements, as well as numerous other factors that test district's abilities. The members of all fire protection districts should be recognized for the dedication they have shown and the excellent level of protection they provide for residents throughout the county. Volunteers take time out of their lives every day in order to assure the safety of the community.

The demands on volunteer departments are considerable. Keeping pace with ever-increasing training requirements can lead to burn-out of volunteers who are scantly compensated for their time and efforts. Keeping pace with the growing needs of the communities the districts serve is a constant challenge as well. Although there are many potential funding sources available for local districts to acquire equipment and other needs, grant writing and chasing of funding sources takes considerable time and effort. Recommendations that can help to reduce these challenges will be presented in Chapter 5.

4.7.3 Persistent Rapid Growth

Growth will continue to present the greatest challenge to fire management in the urban interface over the long term. The dramatic increase in demand for homes throughout Yellowstone County has resulted in significant changes in land use patterns. Many agricultural lands and private non-industrial rangelands have been sold and subdivided over the last few decades, pushing residential development further into the wildlands. This trend will continue into the future, as forestland and rangelands are sold for real estate development. This will have a dramatic effect on the ability of emergency resources to maintain current levels of fire protection without considerable increases in funding for equipment, personnel, and training. Indeed, many emergency response resources in Yellowstone County are already at a critical threshold. Further increases in protection responsibility will come at the expense of preparedness, as emergency resources are increasingly spread over an expanding protection area.

4.7.4 Accessibility

Fire chiefs throughout the County have identified home accessibility issues as a primary concern in some parts of Yellowstone County. It appears as though many homes and driveways have been constructed without regard to access requirements of large emergency vehicles. Lack of accessibility precludes engagement by suppression resources. Many homes within fire protection districts in Yellowstone County effectively have no fire protection simply because access is not possible or is potentially dangerous. Enforcement of the International Fire Code, regarding road and driveway construction standards for fire apparatus would prevent accessibility issues in new developments.

4.8 Proposed Home Defensible Space and Education Projects

The following are areas specifically identified by the committee as needing fuels treatments around homes. These projects would consist of individual home site assessments conducted by professionals to identify needed actions to help homeowners prepare for wildland fires. The assessments generally benefit the homeowner by providing specific wildfire information and preventative measures that they can do to improve the safety of their homes and families. If the homeowner agrees to these recommendations, the defensible space project would then be completed by a professional contractor. Individual home projects vary, but usually consist of

brush clearing, very selective tree removal, pruning, weed eradication, and slash removal. These projects along with estimated costs are included in Table 5.2.

Billings Area/Blue Creek Area

- Rehberg Ranch Estates
- Briarwood Subdivision
- Indian Cliffs
- Alkali Creek
- Hills Estates
- Secret Valley

Molt Area

- Echo Canyon

Laurel Area

- Clapper Flats
- Buffalo Trails

Shepherd/Huntley/Worden Area

- Pleasant Hollow
- Shadow Canyon
- Cedar Ridge
- White Buffalo

Lockwood Area

- Emerald Hills
- Pine Hills
- High Trails

Chapter 5: Treatment Recommendations

5 Administration & Implementation Strategy

Critical to the implementation of this Community Wildfire Protection 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 Yellowstone County and the region. Since there are many land management agencies and thousands of private landowners in Yellowstone 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.

Yellowstone County encourages the philosophy of instilling disaster resistance in normal day-to-day operations. By implementing plan activities through existing programs and resources, the cost of mitigation is often a small portion of the overall cost of a project's design or program.

The federal land management agencies in Yellowstone County, specifically Bureau of Land Management, are participants in this planning process and have contributed to its development. Where available, their schedule of land treatments have been considered in this planning process to better facilitate a correlation between their identified planning efforts and the efforts of Yellowstone County.

All risk assessments were made based on the conditions existing during 2005, thus, the recommendations in this section have been made in light of those conditions. However, the components of risk and the preparedness of the county's resources are not static. It will be necessary to fine-tune this plan's recommendations annually to adjust for changes in the components of risk, population density changes, infrastructure modifications, and other factors.

As part of the Policy of Yellowstone County in relation to this planning document, the Community Wildfire Protection Plan should be reviewed annually at a special meeting of the Yellowstone County Commissioners, open to the public and involving all municipalities/jurisdictions, where action items, priorities, budgets, and modifications can be made or confirmed. A written review of the plan should be prepared (or arranged) 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 (in accord with the Montana Open Public Meeting Laws). Amendments to the plan should be detailed at this meeting, documented, and attached to the formal plan as an amendment to the Community Wildfire Protection Plan. Total re-evaluation of this plan should be made on the 5th anniversary of its acceptance, and every 5-year period following.

5.1 Prioritization of Mitigation Activities

Prioritization of projects will occur at the County, City, agency, and private levels. Differing prioritization processes will occur, however, the county and cities will adopt the following prioritization process, as indicated through the adoption of this plan by each municipality.

The prioritization process will include a special emphasis on cost-benefit analysis review. The process will reflect that a key component in funding decision is a determination that the project will provide an equivalent or more in benefits over the life of the project when compared with the

costs. Projects will be administered by county and local jurisdictions with overall coordination provided by the County Disaster and Emergency Services Director.

County Commissioners and the elected officials of all jurisdictions will evaluate opportunities and establish their own unique priorities to accomplish mitigation activities where existing funds and resources are available and there is community interest in implementing mitigation measures. If no federal funding is used in these situations, the prioritization process may be less formal. Often the types of projects that the County can afford to do on their own are in relation to improved codes and standards, department planning and preparedness, and education. These types of projects may not meet the traditional project model, selection criteria, and benefit-cost model. The County will consider all pre-disaster mitigation proposals brought before the County Commissioners by department heads, city officials, fire districts and local civic groups.

When federal or state funding is available for hazard mitigation, there are usually requirements that establish a rigorous benefit-cost analysis as a guiding criterion in establishing project priorities. The county will understand the basic federal grant program criteria which will drive the identification, selection, and funding of the most competitive and worthy mitigation projects. FEMA's three grant programs (the post-disaster Hazard Mitigation Grant Program, the pre-disaster Flood Mitigation Assistance and Pre-Disaster Mitigation grant programs) that offer federal mitigation funding to state and local governments all include the benefit-cost and repetitive loss selection criteria.

The prioritization of projects will occur annually and be facilitated by the County Disaster and Emergency Services Director to include the County Commissioner's Office, City Mayors and Councils, Fire District Chiefs and Commissioners, agency representatives (USFS, BLM, WA DNR, BIA, etc.). The prioritization of projects will be based on the selection of projects which create a balanced approach to pre-disaster mitigation which recognizes the hierarchy of treating in order (highest first):

- People and Structures
- Infrastructure
- Local and Regional Economy
- Traditional Way of Life
- Ecosystems

5.1.1 Prioritization Scheme

A numerical scoring system is used to prioritize projects. This prioritization serves as a guide for the county when developing mitigation activities. This project prioritization scheme has been designed to rank projects on a case by case basis. In many cases, a very good project in a lower priority category could outrank a mediocre project in a higher priority. The county mitigation program does not want to restrict funding to only those projects that meet the high priorities because what may be a high priority for a specific community may not be a high priority at the county level. Regardless, the project may be just what the community needs to mitigate disaster. The flexibility to fund a variety of diverse projects based on varying reasons and criteria is a necessity for a functional mitigation program at the county and community level.

To implement this case by case concept, a more detailed process for evaluating and prioritizing projects has been developed. Any type of project, whether county or site specific, will be prioritized in this more formal manner.

To prioritize projects, a general scoring system has been developed. This prioritization scheme has been used in statewide all hazard mitigations plans. These factors range from cost-benefit ratios, to details on the hazard being mitigated, to environmental impacts.

Since planning projects are somewhat different than non-planning projects when it comes to reviewing them, different criteria will be considered, depending on the type of project.

The factors for the non-planning projects include:

- Benefit / Cost
- Population Benefit
- Property Benefit
- Economic Benefit
- Project Feasibility (environmentally, politically, socially)
- Hazard Magnitude/Frequency
- Potential for repetitive loss reduction
- Potential to mitigate hazards to future development
- Potential project effectiveness and sustainability

The factors for the planning projects include:

- Benefit / Cost
- Vulnerability of the community or communities
- Potential for repetitive loss reduction
- Potential to mitigate hazards to future development

Since some factors are considered more critical than others, two ranking scales have been developed. A scale of 1-10, 10 being the best, has been used for cost, population benefit, property benefit, economic benefit, and vulnerability of the community. Project feasibility, hazard magnitude/frequency, potential for repetitive loss reduction, potential to mitigate hazards to future development, and potential project effectiveness and sustainability are all rated on a 1-5 scale, with 5 being the best. The highest possible score for a non-planning project is 65 and for a planning project is 30.

The guidelines for each category are as follows:

5.1.1.1 Benefit / Cost

The analysis process will include summaries as appropriate for each project, but will include benefit / cost analysis results. Projects with a negative benefit / cost analysis result will be ranked as a 0. Projects with a positive Benefit / Cost analysis will receive a score equal to the projects Benefit / Cost Analysis results divided by 25. Therefore a project with a BC ratio of 125:1 would receive 5 points, a project with a BC ratio of 250:1 (or higher) would receive the maximum points of 10.

5.1.1.2 Population Benefit

Population Benefit relates to the ability of the project to prevent the loss of life or injuries. A ranking of 10 has the potential to impact 90% or more of the people in the municipality (county, city, or district). A ranking of 5 has the potential to impact 50% of the people, and a ranking of 1 will not impact the population. The calculated score will be the percent of the population impacted positively multiplied by 10. In some cases, a project may not directly provide population benefits, but may lead to actions that do, such as in the case of a study. Those

projects will not receive as high of a rating as one that directly effects the population, but should not be considered to have no population benefit.

5.1.1.3 Property Benefit

Property Benefit relates to the prevention of physical losses to structures, infrastructure, and personal property. These losses can be attributed to potential dollar losses. Similar to cost, a ranking of 10 has the potential to save $20,000,000 or more in losses. Property benefit of less than $20,000,000 will receive a score of the benefit divided by $20,000,000 (a ratio below $20 million). The calculated score will be the percent of the population impacted positively multiplied by 10. Therefore, a property benefit of $6,000,000 would receive a score of 3. In some cases, a project may not directly provide property benefits, but may lead to actions that do, such as in the case of a study. Those projects will not receive as high of a rating as one that directly effects property, but should not be considered to have no property benefit.

5.1.1.4 Economic Benefit

Economic Benefit is related to the savings from mitigation to the economy. This benefit includes reduction of losses in revenues, jobs, and facility shut downs. Since this benefit can be difficult to evaluate, a ranking of 10 would prevent a total economic collapse, a ranking of 5 could prevent losses to about half the economy, and a ranking of 1 would not prevent any economic losses. In some cases, a project may not directly provide economic benefits, but may lead to actions that do, such as in the case of a study. Those projects will not receive as high of a rating as one that directly affects the economy, but should not be considered to have no economic benefit.

5.1.1.5 Vulnerability of the Community

For planning projects, the vulnerability of the community is considered. A community that has a high vulnerability with respect to other jurisdictions to the hazard or hazards being studied or planned for will receive a higher score. To promote planning participation by the smaller or less vulnerable communities in the state, the score will be based on the other communities being considered for planning grants. A community that is the most vulnerable will receive a score of 10, and one that is the least, a score of 1.

5.1.1.6 Project Feasibility (Environmentally, Politically & Socially)

Project Feasibility relates to the likelihood that such a project could be completed. Projects with low feasibility would include projects with significant environmental concerns or public opposition. A project with high feasibility has public and political support without environmental concerns. Those projects with very high feasibility would receive a ranking of 5 and those with very low would receive a ranking of 1.

5.1.1.7 Hazard Magnitude/Frequency

The Hazard Magnitude/Frequency rating is a combination of the recurrence period and magnitude of a hazard. The severity of the hazard being mitigated and the frequency of that event must both be considered. For example, a project mitigating a 10-year event that causes significant damage would receive a higher rating than one that mitigates a 500-year event that causes minimal damage. For a ranking of 5, the project mitigates a high frequency, high

magnitude event. A 1 ranking is for a low frequency, low magnitude event. Note that only the damages being mitigated should be considered here, not the entire losses from that event.

5.1.1.8 Potential for repetitive loss reduction

Those projects that mitigate repetitive losses receive priority consideration here. Common sense dictates that losses that occur frequently will continue to do so until the hazard is mitigated. Projects that will reduce losses that have occurred more than three times receive a rating of 5. Those that do not address repetitive losses receive a rating of 1.

5.1.1.9 Potential to mitigate hazards to future development

Proposed actions that can have a direct impact on the vulnerability of future development are given additional consideration. If hazards can be mitigated on the onset of the development, the county will be less vulnerable in the future. Projects that will have a significant effect on all future development receive a rating of 5. Those that do not affect development should receive a rating of 1.

5.1.1.10 Potential project effectiveness and sustainability

Two important aspects of all projects are effectiveness and sustainability. For a project to be worthwhile, it needs to be effective and actually mitigate the hazard. A project that is questionable in its effectiveness will score lower in this category. Sustainability is the ability for the project to be maintained. Can the project sustain itself after grant funding is spent? Is maintenance required? If so, are or will the resources be in place to maintain the project. An action that is highly effective and sustainable will receive a ranking of 5. A project with effectiveness that is highly questionable and not easily sustained should receive a ranking of 1.

5.1.1.11 Final ranking

Upon ranking a project in each of these categories, a total score can be derived by adding together each of the scores. The project can then be ranking high, medium, or low based on the project thresholds of:

Project Ranking Priority Score Non-Planning Projects

- High 40-65
- Medium 25-39
- Low 9-24

Project Ranking Priority Score Planning Projects

- High 18-30
- Medium 12-17
- Low 1-11

5.2 Possible Fire Mitigation Activities

As part of the implementation of fire mitigation activities in Yellowstone 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 departments, merging existing departments)
- 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.

5.2.1 Existing Practices That Should Continue

Yellowstone 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 City of Billings currently operates the 911 Dispatch Center, which not only handles law enforcement and emergency medical calls, but also provides dispatch service to all of the County's fire companies. For large-scale incidents, the County Emergency Operations Center is activated.
- Automatic mutual aid is dispatched in extreme dry wildland conditions and stage 2 restrictions.
- Land management agencies within the county are conducting fuel reduction projects in response to increasing concerns of fire hazard in WUI areas.
- Several of the rural fire departments have begun implementing educational and awareness programs within their jurisdictions as their budgets allow. Many of these programs are geared towards schools; however, some have gone as far as door-to-door campaigns in high risk areas.

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

5.3.1 Overall Goals

Reduce Yellowstone County's wildfire risk by mitigating hazards affecting communities through improvement of County policies and enhancement of individual and public safety. Specific goals outlined by the County include:

- Educate the public regarding the existence of eminent hazards and how to respond during a wildfire event.
- Improve emergency response capabilities.
- Develop policies and standards concerning new building and housing projects that will reduce their exposure to fire risk factors.

5.3.2 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: Adoption and enforcement of International Building Codes and/or more stringent hazard--related building code provisions.	**Protection of people and structures** by improving the ability of emergency response personnel to respond to threatened homes in high-risk areas. Project Ranking Priority Score: **High** (24/30)	**Yellowstone County Commissioners**, Yellowstone County Building Department, City of Billings, City of Laurel, Town of Broadview, and the County Fire Warden.	**2006**: Annual review of IBC updates and relevance to hazards in the County.
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. Project Ranking Priority Score: **High** (30/30)	**County Commissioners Office** in cooperation with Billings Fire Department, Billings Urban FSA, Molt VFD, Homewood Park IAA, Duck Creek VFD, Shepherd VFD, Blains IAA, Blue Creek VFD, Lockwood VFD, Hailey Bench VFD, Crow Indian Reservation, Worden VFD, Custer VFD, Broadview FD #3, Worden FD #4, Laurel FD #5, Laurel FD #7, Lockwood FD #8, Blue Creek FSA, Laurel Urban FSA, Shepherd FSA, and Huntley Project FSA.	**2006**: 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 adjacent to heavy wildland fuels.
5.1.c: Develop County policy requiring the installation of dry hydrants in subdivisions with 5 or more dwellings.	**Protection of people and structures** by improving the ability of emergency response personnel to respond to threatened homes in high-risk areas. Project Ranking Priority Score: **High** (24/30)	**County Commissioners Office and City and County Planning Department** in cooperation with Billings Fire Department, Billings Urban FSA, Molt VFD, Homewood Park IAA, Duck Creek VFD, Shepherd VFD, Blains IAA, Blue Creek VFD, Lockwood VFD, Hailey Bench VFD, Crow Indian Reservation, Worden VFD, Custer VFD, Broadview FD #3, Worden FD #4, Laurel FD #5, Laurel FD #7, Lockwood FD #8, Blue Creek FSA, Laurel Urban FSA, Shepherd FSA, and Huntley Project FSA.	**2006**: Consider and develop policy to address the need for additional water resources for homes and businesses located in high wildfire risk areas. Specifically, a County policy requiring the installation of dry hydrants in subdivisions with 5 or more dwellings, especially where adjacent to heavy wildland fuels.

Table 5.1. WUI Action Items in Safety and Policy.

Action Item	Goals and Objectives	Responsible Organization	Action Items & Planning Horizon
5.1.d: Begin distributing "New Code of the West" pamphlets with sub-division permit requests.	**Protection of people and structures** by improving the ability of emergency response personnel to respond to threatened homes in high-risk areas. Project Ranking Priority Score: **High** (40/65)	**County Commissioners, City and County Planning Departments**, City of Billings, City of Laurel, and Town of Broadview.	• **2006**: Obtain copyrights to "New Code of the West" pamphlet. • **2006**: Distribute pamphlets.
5.1.e: Develop a policy to enforce "No Burning" restrictions in specified high risk subdivisions.	**Protection of people and structures** by reducing the fire ignition risk in high-risk areas. Project Ranking Priority Score: **High** (26/30)	**County Commissioners, City and County Planning Departments**, City of Billings, City of Laurel, Town of Broadview, and rural subdivision associations.	• **2006**: Consider and develop policy to address burning regulations for subdivisions and population clusters located in high wildfire risk areas. Specifically, a County policy concerning a "No Burning" restriction where subdivisions are juxtaposed near heavy wildland fuels
5.1.f: Review need to inspect and enforce access and water issues in new subdivisions and individual homes.	**Protection of people and structures** by improving the ability of emergency response personnel to respond to threatened homes in high-risk areas. Project Ranking Priority Score: **High** (27/30)	**County Commissioners**, City and County Planning Departments, County Fire Warden, City of Billings, City of Laurel, and Town of Broadview.	• **2006-07**: Study need for inspections and enforcement of access and water issues and other programmatic responses. • **2007**: Review need for inspector and potential duties.
5.1.g: Develop county policy concerning access in moderate to high-risk WUI areas where subdivisions 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. Project Ranking Priority Score: **High** (30/30)	**County Commissioners Office and Planning Board** in cooperation with Billings Fire Department, Billings Urban FSA, Molt VFD, Homewood Park IAA, Duck Creek VFD, Shepherd VFD, Blains IAA, Blue Creek VFD, Lockwood VFD, Hailey Bench VFD, Crow Indian Reservation, Worden VFD, Custer VFD, Broadview FD #3, Worden FD #4, Laurel FD #5, Laurel FD #7, Lockwood FD #8, Blue Creek FSA, Laurel Urban FSA, Shepherd FSA, and Huntley Project FSA.	**2006**: 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 access points.

Table 5.1. WUI Action Items in Safety and Policy.

Action Item	Goals and Objectives	Responsible Organization	Action Items & Planning Horizon
5.1.h: Develop a county policy to support grant applications for projects resulting from this plan.	**Protection of people and structures** by improving the ability of residents and organizations to implement sometimes costly projects. Project Ranking Priority Score: **High** (30/30)	**County Commissioners Office**	**Ongoing activity:** Support grant applications as requested in a manner consistent with applications from residents and organizations in Yellowstone County.

5.4 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 firefighter 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 Yellowstone 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, Yellowstone 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, giving specialists the opportunity to concentrate efforts on conveying methods of reducing risk instead of just learning how to identify 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.
- Discussions with the general public indicated an awareness of wildland fire risk, but they could not specifically identify risk factors.
- More than half (61%) of the respondents to the public mail survey indicated 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.

In addition to those items enumerated in Table 5.1, residents and policy makers of Yellowstone 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 Yellowstone 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 Yellowstone 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 Yellowstone 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** in Yellowstone County has been greatly impacted by the continuation of drought conditions over the last decade. Drought related stress on many of the forest stands has also let to a widespread beetle infestation, which is further increasing the rate of mortality, particularly in the ponderosa pine. Thinning operations focused on removing dead and dying trees would help reduce the wildfire hazard; however, there is little forest resource professionals or others can do to help prevent further mortality caused by the lack of water.
- **Agriculture** is a significant component of Yellowstone 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 Yellowstone County is integral to the continued management of wildfire risk in this region.

5.4.1 Overall Goals

Reduce Yellowstone County's wildfire risk by mitigating hazards affecting communities through direct improvement of personal and structure safety. Specific goals outlined by the County include:

- Improve the ability of communities to carry out necessary operations during emergency events.
- Educate the public regarding the existence of fire risk and how to respond during a wildfire event.
- Reduce the fire risk around homes and communities by maintaining a defensible space.
- Improve access and reduce the fire risk on major roads throughout the County.

5.4.2 Proposed Activities

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 and Professional Development Training.	**Protect people and structures** by increasing awareness of WUI risks, how to recognize risk factors, and how to modify those factors to reduce risk. Project Ranking Priority Score: **High** (30/30)	Cooperative effort including: • Montana State University Extension Service • Montana Department of Natural Resources and Conservation • Bureau of Land Management • Local School Districts • U.S. Forest Service • Bureau of Indian Affairs, Crow Agency • Yellowstone County Fire Departments, Fire Districts, and Fire Service Areas	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 assessments should be responsibility of Extension Service faculty and include the development of an integrated WUI educational series by year 3 (2008). 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.

Public Education Project Areas	Project Cost
Pine Hills Public Education Project Area Briarwood Public Education Project Area Secret Valley Public Education Project Area Echo Canyon Public Education Project Area	Public education targeted at specific communities or subdivisions is usually hosted and/or sponsored by the fire department, fire service area, or other related organization with jurisdiction in that area. Overall cost of educational classes is highly dependent on attendance and types of materials used; however, we can estimate that on average a class would cost $2,500. If other more time intensive or more individual citizen oriented methods are used the cost would likely increase due to the increase in manpower.

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.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. Project Ranking Priority Score: **Prioritized with 5.2.c.**	To be implemented by **County Commissioners Office** in cooperation with **Billings Fire Department, Billings Urban FSA, Molt VFD, Homewood Park IAA, Duck Creek VFD, Shepherd VFD, Blains IAA, Blue Creek VFD, Lockwood VFD, Hailey Bench VFD, Crow Indian Reservation, Worden VFD, Custer VFD, Broadview FD #3, Worden FD #4, Laurel FD #5, Laurel FD #7, Lockwood FD #8, Blue Creek FSA, Laurel Urban FSA, Shepherd FSA, Huntley Project FSA, City of Billings, City of Laurel, and Town of Broadview**. 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 7,740 housing units outside of the High Density Urban WUI designation in Yellowstone County, roughly 5,031 (65%) of these structures would benefit from a home site inspection and budget determination for a total cost estimate of $503,100. • **Action Item:** Secure funding and contract to complete the inspections during years 1 & 2 (2006-07) • Home site inspection reports and estimated budget for each home site's treatments will be a requirement to receive funding for treatments through grants.

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.c: Home Site WUI Treatments	**Protect people, structures, and increase firefighter safety** by reducing the risk factors surrounding homes in the WUI of Yellowstone County. Project Ranking Priority Score: **High** (42/65)	**County Commissioners** in cooperation with a Fire Mitigation Consulting company , Farm Service Agency, Billings Fire Department, Billings Urban FSA, Molt VFD, Homewood Park IAA, Duck Creek VFD, Shepherd VFD, Blains IAA, Blue Creek VFD, Lockwood VFD, Hailey Bench VFD, Crow Indian Reservation, Worden VFD, Custer VFD, Broadview FD #3, Worden FD #4, Laurel FD #5, Laurel FD #7, Lockwood FD #8, Blue Creek FSA, Laurel Urban FSA, Shepherd FSA, Huntley Project FSA, City of Billings, City of Laurel, Town of Broadview, and local subdivision and community associations. *Complete concurrently with 5.2.b.*	• Actual funding level will be based on the outcomes of the home site assessments and cost estimates • **Estimate** that treatments will cost approximately $900 per home site for a defensible space of roughly 150'. Approximately 3,483 (45%) home site treatments throughout the County would add up to an estimated cost of $3,134,700. • Home site treatments can begin after the securing of funding for the treatments and immediate implementation in 2006 and will continue from year 1 through 5 (2010). • Plan and implement an ongoing fuels reduction plan on Conservation Reserve Program lands surrounding home sites.

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.d: Community Defensible Zone WUI Treatments, specifically in the Clapper Flats, Buffalo Trails, Rehberg Ranch Estates, Alkali Creek, Hills Estates, Indian Cliffs, Pleasant Hollow, Shadow Canyon, Cedar Ridge, White Buffalo, High Trails, and Emerald Hills subdivisions.	**Protect people, structures, and increase firefighter safety** by reducing the risk factors surrounding high risk communities in the WUI of Yellowstone County. Project Ranking Priority Score: **High** (50/65)	**County Commissioners** in cooperation with a Fire Mitigation Consultant, Farm Service Agency, Billings Fire Department, Billings Urban FSA, Molt VFD, Homewood Park IAA, Duck Creek VFD, Shepherd VFD, Blains IAA, Blue Creek VFD, Lockwood VFD, Hailey Bench VFD, Crow Indian Reservation, Worden VFD, Custer VFD, Broadview FD #3, Worden FD #4, Laurel FD #5, Laurel FD #7, Lockwood FD #8, Blue Creek FSA, Laurel Urban FSA, Shepherd FSA, Huntley Project FSA, City of Billings, City of Laurel, Town of Broadview, and local subdivision and community associations.	• Actual funding level will be based on the outcomes of the home site assessments and cost estimates. • **Years 2-5 (2007-10):** 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 should focus on 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 $500 depending on extent of home defensibility site treatments, estimate 1077 (total number of structures in project areas) homes in need of this type of treatment for a cost estimate of $538,500. • Plan and implement an ongoing fuels reduction plan on Conservation Reserve Program lands surrounding communities.
5.2.e: Maintenance of Home Site WUI Treatments	**Protect people, structures, and increase firefighter safety** by reducing the risk factors surrounding homes in the WUI of Yellowstone County. Project Ranking Priority Score: **Prioritized with 5.2.f.**	**County Commissioners Office** in cooperation with Billings Fire Department, Billings Urban FSA, Molt VFD, Homewood Park IAA, Duck Creek VFD, Shepherd VFD, Blains IAA, Blue Creek VFD, Lockwood VFD, Hailey Bench VFD, Crow Indian Reservation, Worden VFD, Custer VFD, Broadview FD #3, Worden FD #4, Laurel FD #5, Laurel FD #7, Lockwood FD #8, Blue Creek FSA, Laurel Urban FSA, Shepherd FSA, Huntley Project FSA, 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 ($174,150) • Follow-up inspection reports with treatments as recommended years 5 through 10.

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.f: Re-entry of Home Site WUI Treatments	**Protect people, structures, and increase firefighter safety** by reducing risk factors around homes in the WUI of Yellowstone County. Project Ranking Priority Score: **High** (47/65)	**County Commissioners Office** in cooperation with Billings Fire Department, Billings Urban FSA, Molt VFD, Homewood Park IAA, Duck Creek VFD, Shepherd VFD, Blains IAA, Blue Creek VFD, Lockwood VFD, Hailey Bench VFD, Crow Indian Reservation, Worden VFD, Custer VFD, Broadview FD #3, Worden FD #4, Laurel FD #5, Laurel FD #7, Lockwood FD #8, Blue Creek FSA, Laurel Urban FSA, Shepherd FSA, Huntley Project FSA, 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.
5.2.g: Implement proposed home defensible space projects.	**Protect people, structures, and firefighter safety** by decreasing the fire risk around homes and communities.	**Rural Fire Departments, County Commissioners, area residents, and private contractor.**	• **Year 1 (2005):** Locate funding source and conduct home site evaluations for structures in mapped project areas. Write project plans for individual landowners. • **Year 2 (2006):** Continue to work with landowners to implement agreed upon project plans.

Defensible Space Project Areas	Acres	Project Cost	Priority Ranking
Rehberg Ranch Estates Defensible Space Treatment Area	1110.1	Approximately 92 structures at $900/per structure constitutes an estimated cost of $82,800.	**High** (40/65)
Clapper Flats Defensible Space Treatment Area	3463.0	Approximately 55 structures at $900/per structure constitutes an estimated cost of $49,500.	**Medium** (35/65)
Alkali Creek Defensible Space Treatment Area	448.6	Approximately 245 structures at $700/per structure constitutes an estimated cost of $171,500.	**High** (51/65)
Hills Estates Defensible Space Treatment Area	552.6	Approximately 13 structures at $500/per structure constitutes an estimated cost of $6,500.	**Medium** (38/65)
Buffalo Trails Defensible Space Treatment Area	7715.0	Approximately 138 structures at $900/per structure constitutes an estimated cost of $124,200.	**Medium** (38/65)
Indian Cliffs Defensible Space Treatment Area	228.0	Approximately 100 structures at $700/per structure constitutes an estimated cost of $70,000.	**High** (43/65)
Pleasant Hollow Defensible Space Treatment Area	2071.7	Approximately 86 structures at $900/per structure constitutes an estimated cost of $77,400.	**Medium** (36/65)

Table 5.2. WUI Action Items for People and Structures.

Action Item	Goals and Objectives	Responsible Organization	Action Items, Planning Horizon and Estimated Costs	
Cedar Ridge Defensible Space Treatment Area	2931.6		Approximately 47 structures at $700/per structure constitutes an estimated cost of $32,900.	**Medium** (35/65)
White Buffalo Defensible Space Treatment Area	319.3		Approximately 22 structures at $500/per structure constitutes an estimated cost of $11,000.	**Medium** (33/65)
High Trails Defensible Space Treatment Area	765.0		Approximately 25 structures at $500/per structure constitutes an estimated cost of $12,500.	**Medium** (39/65)
Emerald Hills Defensible Space Treatment Area	1710.0		Approximately 234 structures at $900/per structure constitutes an estimated cost of $210,600.	**High** (49/65)
Shadow Canyon Defensible Space Treatment Area	680.8		Approximately 20 structures at $500/per structure constitutes an estimated cost of $10,000.	**Medium** (33/65)

5.5 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 Yellowstone 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. Although site specific treatments will impact local networks directly, little needs to be done to insure the system's viability. To ensure good communications with the DNRC and the BLM resources a narrow band capability is needed and the radio's need to be able to be placed in "scan mode" to monitor cooperators frequencies.

Transportation Infrastructure (road and rail networks): This component of the WUI has some potential limitations in Yellowstone County. 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.

Energy Transport Supply Systems (gas and power lines): A number of power lines crisscross Yellowstone 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 Community Wildfire Protection 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 "fuel breaks" should be evaluated further, especially in light of the treatments enumerated in this plan (e.g., 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 Yellowstone County, water is supplied to many homes by municipal wells or single home and multiple home wells.

5.5.1 Overall Goals

Reduce Yellowstone County's fire risk by mitigating hazards affecting communities through enhancements of key infrastructure components. Specific goals outlined by the County include:

- Improve all components of the primary and secondary access routes.
- Educate the public regarding use of designated evacuation routes.
- Improve countywide communication systems.

5.5.2 Proposed Activities

Table 5.3. Infrastructure Enhancements.

Action Item	Goals and Objectives	Responsible Organization	Action Items & Planning Horizon
5.3.a: Post "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. Project Ranking Priority Score: **High** (51/65)	**County Commissioners** in cooperation with County Fire Warden, Billings Fire Department, Billings Urban FSA, Molt VFD, Homewood Park IAA, Duck Creek VFD, Shepherd VFD, Blains IAA, Blue Creek VFD, Lockwood VFD, Hailey Bench VFD, Crow Indian Reservation, Worden VFD, Custer VFD, Broadview FD #3, Worden FD #4, Laurel FD #5, Laurel FD #7, Lockwood FD #8, Blue Creek FSA, Laurel Urban FSA, Shepherd FSA, Huntley Project FSA, City of Billings, City of Laurel, and Town of Broadview.	• Purchase of signs (2006). • Posting roads and make information available to residents of the importance of Emergency Routes

Table 5.3. Infrastructure Enhancements.

Action Item	Goals and Objectives	Responsible Organization	Action Items & Planning Horizon
5.3.b: 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. Project Ranking Priority Score: **High** (48/65)	**County Road and Bridge Department** in cooperation with BLM, State of Montana (Dept of Transportation), BIA, and forestland or rangeland owners.	• **Year 1 (2006):** Update existing assessment of travel surfaces, bridges, and cattle guards in Yellowstone County as to location. Secure funding for implementation of this project (grants). • **Year 2 (2007):** Conduct engineering assessment of limiting weight restrictions for all surfaces (e.g., bridge weight load maximums). Estimate cost of $35,000 which might be shared between County, BLM, BIA, State, and private based on landownership associated with road locations. • **Year 2 (2007):** Post weight restriction signs on all crossings, copy information to rural fire departments and wildland fire protection agencies in affected areas. Estimate cost at roughly $10-$12,000 for signs and posting. • **Year 3 (2008):** 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.
5.3.c: Improve communications throughout the County by installing additional repeater towers and obtaining portable repeaters for emergency response personnel.	**Protection of people and structures** by providing improved communication resources. Project Ranking Priority Score: **High** (52/65)	**County Commissioners,** Billings Fire Department, Billings Urban FSA, Molt VFD, Homewood Park IAA, Duck Creek VFD, Shepherd VFD, Blains IAA, Blue Creek VFD, Lockwood VFD, Hailey Bench VFD, Crow Indian Reservation, Worden VFD, Custer VFD, Broadview FD #3, Worden FD #4, Laurel FD #5, Laurel FD #7, Lockwood FD #8, Blue Creek FSA, Laurel Urban FSA, Shepherd FSA, Huntley Project FSA, Montana DNRC, and BLM.	• **Year 1 (2006):** Summarize existing communication capabilities and limitations. Identify costs to add towers and obtain equipment and locate funding opportunities. • **Year 2 (2007):** Acquire and install equipment as needed.
5.3.d: Erect a repeater tower on the site donated by the Conover Ranch	**Protection of people and structures** by providing improved communication	**Broadview FD #3**, Montana DNRC, and BLM.	• **Year 1 (2006):** Summarize existing communication capabilities and limitations. Identify cost to install tower and obtain equipment and locate funding opportunities.

Table 5.3. Infrastructure Enhancements.

Action Item	Goals and Objectives	Responsible Organization	Action Items & Planning Horizon
near Broadview.	resources. Project Ranking Priority Score: **Medium** (36/65)		• **Year 2 (2007):** Acquire and install equipment as needed.
5.3.e: Fuel mitigation of the "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. Project Ranking Priority Score: **High** (42/65)	**County Commissioners** in cooperation with County and State Road Departments, Billings Urban FSA, Molt VFD, Homewood Park IAA, Duck Creek VFD, Shepherd VFD, Blains IAA, Blue Creek VFD, Lockwood VFD, Hailey Bench VFD, Crow Indian Reservation, Worden VFD, Custer VFD, Broadview FD #3, Worden FD #4, Laurel FD #5, Laurel FD #7, Lockwood FD #8, Blue Creek FSA, Laurel Urban FSA, Shepherd FSA, and Huntley Project FSA. .	• Full assessment of road defensibility and ownership participation (2005). • Implementation of projects (linked to item 5.3.b and 5.3.c).
5.3.f: Erect a repeater tower system to support the Shepherd Volunteer Fire Department and Shepherd community.	**Protection of people and structures** by providing improved communication resources. Project Ranking Priority Score: **High** (41/65)	**Shepherd Volunteer Fire Department** and community of Shepherd.	• **Year 1 (2006):** Summarize existing communication capabilities and limitations. Identify cost to install towers and obtain equipment and locate funding opportunities. • **Year 2 (2007):** Acquire and install equipment as needed.

Table 5.3. Infrastructure Enhancements.

Action Item	Goals and Objectives	Responsible Organization	Action Items & Planning Horizon
5.3.g: Access improvements through roadside fuels management.	**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 Road and Bridge Department** in cooperation with US Forest Service, BLM, BIA Crow Agency, State of Montana (Dept. of Transportation), and forestland or rangeland owners.	• **Year 1 (2006):** Update existing assessment of roads in Yellowstone County as to location. Secure funding for implementation of this project (grants). • **Year 2 (2007):** Specifically address access issues listed below, plus recreation areas, and others identified in assessment. Target 100' extending from each side of the roadway. Total estimated cost for mowing in mostly grass vegetation is $126,244 based on estimate of $95 per treated acre. (Mileage and acreage estimates are for all main thoroughfares within the project area plus the main ingress/egress routes accessing the project area from a main road (usually a paved County road). • **Year 3 (2008):** Secure funding and implement projects to treat road-side fuels.

Roadside Fuels Treatments for Project Areas	Miles	Acres	Project Cost	Priority Ranking
Rehberg Ranch Estates Project Area	3.44	83.4	Mowing mostly grass within 100 feet from each side of the roadway cost approximately $95 per acre totaling $7,923 for this project area.	**High** (44/65)
Clapper Flats Project Area	3.14	76.0	Mowing mostly grass within 100 feet from each side of the roadway cost approximately $95 per acre totaling $7,720 for this project area.	**High** (42/65)
Alkali Creek Project Area	3.84	93.2	Mowing mostly grass within 100 feet from each side of the roadway cost approximately $95 per acre totaling $8,854 for this project area.	**High** (52/65)
Hills Estates Project Area	1.66	40.2	Mowing mostly grass within 100 feet from each side of the roadway cost approximately $95 per acre totaling $3,819 for this project area.	**Medium** (37/65)
Buffalo Trails Project Area	11.55	280.0	Mowing mostly grass within 100 feet from each side of the roadway cost approximately $95 per acre totaling $26,600 for this project area.	**High** (42/65)
Indian Cliffs Project Area	2.46	59.8	Mowing mostly grass within 100 feet from each side of the roadway cost approximately $95 per acre totaling $5,681 for this project area.	**High** (42/65)
Pleasant Hollow Project Area	8.71	211.1	Mowing mostly grass within 100 feet from each side of the roadway cost approximately $95 per acre totaling $20,054 for this project area.	**High** (40/65)
Cedar Ridge Project Area	2.97	72.0	Mowing mostly grass within 100 feet from each side of the roadway cost approximately $95 per acre totaling $6,840 for this project area.	**Medium** (39/65)
White Buffalo Project Area	2.46	59.6	Mowing mostly grass within 100 feet from each side of the roadway cost approximately $95 per acre totaling $5,662 for this project area.	**Medium** (36/65)
High Trails Project Area	2.42	58.7	Mowing mostly grass within 100 feet from each side of the roadway cost approximately $95 per acre totaling $5,577 for this project area.	**Medium** (38/65)
Emerald Hills Project Area	7.3	176.9	Mowing mostly grass within 100 feet from each side of the roadway cost approximately $95 per acre totaling $16,806 for this project area.	**High** (52/65)
Shadow Canyon Project Area	4.86	117.8	Mowing mostly grass within 100 feet from each side of the roadway cost	**Medium** (32/65)

Table 5.3. Infrastructure Enhancements.

Action Item	Goals and Objectives	Responsible Organization	Action Items & Planning Horizon
			approximately $95 per acre totaling $11,191 for this project area.

5.6 Resource and Capability Enhancements

There are a number of resource and capability enhancements identified by the rural and wildland firefighting departments in Yellowstone County. All of the needs identified by the departments 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 dry hydrants 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
- Enhancement of equipment available for rural and city departments

Although additional, and specific, needs were enumerated by the departments in Yellowstone County, these items were identified by multiple departments and/or in the public meetings. The implementation of each issue will rely on either the isolated efforts of the rural fire departments or a concerted effort by the county to achieve equitable enhancements across all of the departments.

5.6.1 Overall Goals

Reduce Yellowstone County's fire risk by mitigating hazards affecting communities through direct enhancements of emergency response capabilities. Specific goals outlined by the County include:

- Obtain necessary equipment to effectively and safely prevent and respond to emergency situations.
- Enhance communications system throughout the County.
- Improve training of firefighters and all emergency personnel and provide incentives for trained firefighters and new recruits to stay with the force.

5.6.2 Proposed Activities

Table 5.4. WUI Action Items in Firefighting Resources and Capabilities.

Action Item	Goals and Objectives	Responsible Organization	Action Items & Planning Horizon
5.4.a: Enhance radio availability in each department, link into existing dispatch, improve range within the region, and conversion to consistent standard of radio types.	**Protection of people and structures** by direct capability enhancements. Project Ranking Priority Score: **High** (59/65)	**Montana Department of Natural Resources and Conservation** in cooperation with County Commissioners, Billings Urban FSA, Molt VFD, Homewood Park IAA, Duck Creek VFD, Shepherd VFD, Blains IAA, Blue Creek VFD, Lockwood VFD, Hailey Bench VFD, Crow Indian Reservation, Worden VFD, Custer VFD, Broadview FD #3, Worden FD #4, Laurel FD #5, Laurel FD #7, Lockwood FD #8, Blue Creek FSA, Laurel Urban FSA, Shepherd FSA, Huntley Project FSA, and BLM,.	• **Year 1 (2006):** Summarize existing two-way radio capabilities and limitations. Identify costs to upgrade existing equipment and locate funding opportunities. • **Year 2 (20076):** Acquire and install upgrades as needed. • **Year 2-3 (2007-08):** 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 firefighting capability enhancements. Project Ranking Priority Score: **High** (30/30)	**Rural and Wildland Fire Departments, Districts, and Fire Service Areas** 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 (2006):** Apply for S.A.F.E.R. grants. • **Year 1 (2006):** Develop incentives program and implement it.
5.4.c: Increased training and capabilities of firefighters.	**Protection of people and structures** by direct firefighting capability enhancements. Project Ranking Priority Score: **High** (30/30)	**Rural and Wildland Fire Departments, Districts, and Fire Service Areas** working with the **BLM and DNRC** for wildland training opportunities and with the **Fire Services Training School** for structural firefighting training.	• **Year 1 (2006):** 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 2 (2007)**: Begin implementing training opportunities for volunteers.

Table 5.4. WUI Action Items in Firefighting Resources and Capabilities.

Action Item	Goals and Objectives	Responsible Organization	Action Items & Planning Horizon

5.4.d: Obtain a Type 6 wildland fire truck, a ProPAC foam kit, a floater pump, and additional personal protective equipment for the Broadview Fire District #3.	**Protection of people and structures** by direct firefighting capability enhancements.
	
	Project Ranking Priority Score: **Medium** (27/65)
		Broadview Fire District #3.	• **Year 1 (2006):** Verify stated need still exists, develop budget, and locate funding or equipment (surplus and grant) sources.
			• **Year 1 or 2 (2006-07):** Acquire and deliver needed equipment based on prioritization by need and funding awards.
			  • **Estimated cost**
			  • **$80,000**

5.4.e: Support the construction of the new Fire Station/Clinic/Pharmacy/Community Center proposed in Lockwood.	**Protection of people and structures** by direct firefighting capability enhancements.
	
	Project Ranking Priority Score: **High** (30/30)
		Lockwood Fire District and community of Lockwood.	• **Year 1 (2006):** Verify stated need still exists, develop budget, locate funding and equipment (surplus) sources, and acquire required building plans and permits.
			• **Year 2 - 5 (2007-10):** Complete construction of new multiple-use facility.
			  • Estimated cost
			  • $5,200,000

5.4.f: Obtain a Type 6 engine, two 1,000 gallon pumper trucks, and a heated truck storage facility for the Worden Volunteer Fire Department.	**Protection of people and structures** by direct firefighting capability enhancements.
	
	Project Ranking Priority Score: **Medium** (39/65)
		Worden Volunteer Fire Department, Worden Fire District #4, and the Huntley Project FSA.	• **Year 1 (2006):** Verify stated need still exists, develop budget, and locate funding or equipment (surplus) sources.
			• **Year 1 or 2 (2006-07):** Acquire and deliver needed equipment based on prioritization by need and funding awards.
			  • Estimated cost
			  • $430,000

5.4.g: Obtain a 4x4 pumper truck and a 1,500-2,000 gallon water tender for the Laurel Fire Department.	**Protection of people and structures** by direct firefighting capability enhancements.
	
	Project Ranking Priority Score: **Low** (22/65)
		Laurel Fire Department.	• **Year 1 (2006):** Verify stated need still exists, develop budget, and locate funding or equipment (surplus) sources.
			• **Year 1 or 2 (2006-07):** Acquire and deliver needed equipment based on prioritization by need and funding awards.
			  • Estimated cost
			  • $280,000

Table 5.4. WUI Action Items in Firefighting Resources and Capabilities.

Action Item	Goals and Objectives	Responsible Organization	Action Items & Planning Horizon
5.4.h: Construction of a Shepherd Volunteer Fire Department satellite station in the Hidden Lake area.	**Protection of people and structures** by direct firefighting capability enhancements. Project Ranking Priority Score: **High** (41/65)	**Shepherd Volunteer Fire Department and Shepherd Fire Service Area**	• **Year 1 (2006):** Verify stated need still exists, develop budget, acquire land and equipment, and locate funding sources. • Estimated cost • $100,000
5.4.i: Additional heated equipment storage facility for the Broadview Fire Department #3.	**Protection of people and structures** by direct firefighting capability enhancements. Project Ranking Priority Score: **Medium** (26/65)	**Town of Broadview and Broadview Fire District #3.**	• **Year 1 (2006):** Verify stated need still exists, develop budget, acquire site, and locate funding sources. • Estimated cost • $80,000
5.4.j: Establish onsite water sources such as dry hydrants or underground storage tanks for rural housing developments.	**Protection of people and structures** by direct firefighting capability enhancements. Project Ranking Priority Score: **High** (46/65)	**County Commissioners, County Fire Warden,** Billings Urban FSA, Molt VFD, Homewood Park IAA, Duck Creek VFD, Shepherd VFD, Blains IAA, Blue Creek VFD, Lockwood VFD, Hailey Bench VFD, Crow Indian Reservation, Worden VFD, Custer VFD, Broadview FD #3, Worden FD #4, Laurel FD #5, Laurel FD #7, Lockwood FD #8, Blue Creek FSA, Laurel Urban FSA, Shepherd FSA, and Huntley Project FSA.	• **Year 2 -4 (2006-08):** Identify populated areas lacking sufficient water supplies and develop project plans to develop fill or helicopter dipping sites. • **Year 2 – 6 (2007-11):** Implement project plans.
5.4.k: Establish a site and install a higher capacity municipal well and pump and a 100,000 gallon storage tank for the town of Broadview.	**Protection of people and structures** by direct firefighting capability enhancements. Project Ranking Priority Score: **Medium** (28/65)	**Town of Broadview, Broadview Fire District #3, and the School of Mines.**	• **Year 1 – 3 (2006-08):** Identify populated areas lacking sufficient water supplies and develop project plans to develop fill or helicopter dipping sites. • **Year 2 – 6 (2007-11):** Implement project plans.

Table 5.4. WUI Action Items in Firefighting Resources and Capabilities.

Action Item	Goals and Objectives	Responsible Organization	Action Items & Planning Horizon
5.4.l: Establish a non-potable water well and storage system to supply fire hydrants, dry hydrants, and fire suppression systems in public buildings in the town of Broadview.	**Protection of people and structures** by direct firefighting capability enhancements**.** Project Ranking Priority Score: **Medium** (28/65)	**Town of Broadview, Broadview Fire District #3, and the School of Mines.**	• **Year 2 – 4 (2006-08):** Conduct feasibility study and identify non-potable water source. • **Year 3 – 4 (2007-08):** Establish well and storage system and install water lines throughout the community to handle non-potable water. • On-going: Update public facilities with fire suppression systems using the non-potable water source.
5.4.m: Obtain a Type 3 WUI pumper truck for the Laurel Urban Fire Service Area.	**Protection of people and structures** by direct fire fighting and emergency response capability enhancements. Project Ranking Priority Score: **High** (40/65)	**Laurel Urban Fire Service Area.**	• **Year 1 (2006):** Verify stated need still exists, develop budget, and locate funding or equipment (surplus) sources. • Estimate cost $150,000 • **Year 1 or 2 (2006-07):** Acquire and deliver needed equipment to district based on prioritization by need and funding awards.
5.4.n: Obtain funding to add structural fire responsibilities to Broadview Fire District #3, which would include personnel incentives, additional rolling stock equipped with structural firefighting capabilities, structural turnout gear, and a larger equipment storage facility.	**Protection of people and structures** by direct fire fighting and emergency response capability enhancements. Project Ranking Priority Score: Low (23/65)	**Town of Broadview and Broadview Fire District #3.**	• **Year 1 (2006):** Design plans for extension, identify grant funding opportunities, other funding as available. • **Year 2 (2007):** Begin and complete acquisition of funding and equipment, construction of a storage facility, and development of a mission statement and department policies. o Estimate cost $362,500
5.4.o: Obtain a Type 6 wildland engine and a wood chipper for Lockwood Fire District #8.	**Protection of people and structures** by direct fire fighting and emergency response capability enhancements. Project Ranking Priority Score: **Medium** (38/65)	**Community of Lockwood and Lockwood Fire District #8.**	• **Year 2 (2006):** Verify stated need still exists, develop budget, and locate funding or equipment (surplus) sources. • Estimate cost $72,000 • **Year 2 - 3 (2007-08):** Acquire and deliver needed equipment to district based on prioritization by need and funding awards.

Table 5.4. WUI Action Items in Firefighting Resources and Capabilities.

Action Item	Goals and Objectives	Responsible Organization	Action Items & Planning Horizon
5.4.p: Acquire sites and install dry hydrants on Pine Hills Road, High Trails Road, Coburn Hill Road, Yellowstone Trail Road, and Box Canyon Spring Road.	**Protection of people and structures** by direct fire fighting and emergency response capability enhancements. Project Ranking Priority Score: **High** (43/65)	**Community of Lockwood, Yellowstone County Fire Warden, and Lockwood Fire District #8.**	• **Year 2 -4 (2006-08):** Acquire land and develop project plans to develop dry hydrant sites. • **Year 2 – 10 (2007-17):** Implement project plans. o Estimate $17,000 per site.
5.4.q: Obtain one structural engine, 3 Type 3 engines (to replace old 6x6's), and one Type 2 water tender for the Shepherd Volunteer Fire Department.	**Protection of people and structures** by direct fire fighting and emergency response capability enhancements. Project Ranking Priority Score: **Medium** (37/65)	**Shepherd Volunteer Fire Department**	• **Year 1 (2006):** Verify stated need still exists, develop budget, and locate funding or equipment (surplus) sources. • Estimate cost $790,000 • **Year 1 or 2 (2006-07):** Acquire and deliver needed equipment to district based on prioritization by need and funding awards.
5.4.r: Secure funding for a full time Laurel Volunteer Fire Department Chief.	**Protection of people and structures** by direct fire fighting and emergency response capability enhancements. Project Ranking Priority Score: **Medium** (39/65)	**Laurel Volunteer Fire Department and City of Laurel.**	• **Year 1 (2006):** Research and locate funding resources and work into yearly budget. Estimate cost $65,000 • Advertise position and select qualified candidate.
5.4.s: Equip Laurel Emergency Operations Center with radios and phone lines.	**Protection of people and structures** by direct fire fighting and emergency response capability enhancements. Project Ranking Priority Score: **High** (49/65)	**Laurel Volunteer Fire Department and City of Laurel.**	• **Year 1 (2006):** Verify stated need still exists, develop budget, and locate funding. • Estimate cost $75,000 • **Year 1 or 2 (2006-07):** Acquire and deliver needed equipment to department based on prioritization by need and funding awards.

5.7 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. Yellowstone 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 Bureau of Land Management, the Montana Department of Natural Resources and Conservation, the Bureau of Indian Affairs, 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.

5.7.1 Federal and State Agency Projects

The guiding documents used to determine land use are the National Fire Plan (NFP), Healthy Forest Restoration Act (HFRA), and the goal statements of the individual agency to implement ecosystem restoration, protect communities from wildland fires, and to utilize prescribed fire as a tool in the restoration of the forest and to reduce the effects of wildfire leading to catastrophic loss. During the development of this project, acres managed by the USDA Forest Service, Bureau of Land Management, and the State of Montana that are in Fire Regime Condition Class II and III, as defined by the Forest Service and within the Wildland Urban Interface (WUI), were identified by the County as high priority areas to be treated under the NFP and HFRA. Federal or State managed lands adjacent to homes are particularly high priorities for these treatments. These projects may include, but are not limited to, mechanical treatments, prescribed fire, and creation of buffer zones and greenbelts.

5.7.1.1 Bureau of Land Management On-going Projects

5.7.1.1.1 Sundance Lodge Special Recreation Management Area

The Sundance Lodge Special Recreation Management Area (SRMA) is a small tract of land (379.9 acres) at the confluence of the Yellowstone and Clarks Fork of the Yellowstone River, south of the city of Laurel. This area includes habitat for whitetail deer, pheasants, waterfowl, and songbirds. (See Appendix I for map).

The Sundance Lodge is farm land intermixed with mature cottonwood and shrubs along the Clarks Fork River. It is characterized by Fuel models are 1, 2, 5 and 6. Fuel loads range from .74 to 6.0 ton/acre.

5.7.1.1.2 Four Dances Natural Area

The Four Dances Natural Area SRMA Area of Critical Concern (ACEC) (765 acres) is a tract of land with potential for heavy recreation use due to its location immediately east of downtown Billings. (See Appendix I for map).

The Four Dances area is native grasses including wheat and needle grasses, sagebrush, and pine along the rims above the Yellowstone River and cottonwood and brush along the river bottom. Fuel models are 1 and 5. Fuel loads range from .74 ton/acre to 3.0 ton/acre. Cultural values at the Four Dances Natural Area are, for the most part, not sensitive to damage from wildfire. The Native American religious values and similar values as a Traditional Cultural Properties are not at risk from wildfire. Suppression techniques should be modified to consider the fragile nature of the traditional and religious values.

5.7.1.1.3 South Hills Area

The South Hills area is directly south of Billings along the Yellowstone River. This tract of land lies between the river and a developed subdivision. (See Appendix I for map).

The South Hills area is native wheat grass and needle grasses, sagebrush, and a small amount of pine. This area fits fuel model 1. Fuel loads average .50 ton/acre.

5.7.1.1.4 Acton Area

The Acton area consists of six sections of public land north of Billings. Grazing and recreation are the primary uses of this area. (See Appendix I for map).

The Acton area is native wheat grass and needle grasses with mixed pine and big sagebrush, which fits fuel models 1 and 2. Fuel loads range from .74 tons/acre to 4.0 tons/acre.

5.7.1.1.5 Pompey's Pillar National Monument

Pompey's Pillar National Monument is located 30 miles east of Billings on the south side of the Yellowstone River. Within the Pompeys Pillar boundaries are the Pompeys Pillar National Landmark (approximately 8.23 acres) and a National Monument (approximately 51 acres). The combined acreage of the Landmark, the Monument, and the surrounding public lands, including the island in the Yellowstone River, is approximately 431 acres. The entire area is part of the Pompeys Pillar ACEC. This area includes a visitor center, associated outbuildings, and irrigated cropland. There is a 14 acre private inholding, owned by Robert Taylor, located within the eastern Pillar boundary along the south channel of the Yellowstone River. (See Appendix I for map).

Most of the land south and east of the pillar has been cultivated for the past 50-100 years. Some of this area near the pillar will be planted with native vegetation. The land north and east of the pillar has not been cultivated and is presently covered with dense cottonwood riparian woodland. The area is characterized by fuel loads that range from .74 to 6.0 ton/acre. Fuel models 1 and 5 fit the majority of this area with some fuel type 6.

South Pompey's Pillar represents an area of special consideration. The unit contains a National Landmark and National Monument. The entire unit is part of the Pompey's Pillar ACEC based on cultural values. Pictographs and petroglyphs, both historic and prehistoric, are the outstanding features of the monument, with the 1806 signature of William Clark as the centerpiece. Away from the pillar, visitor facilities, interpretive exhibits and historic structures and features require protection. Suppression objectives include:

- Protect native vegetative cover on all sites in and around the monument from catastrophic wildfire to prevent accelerated erosion and invasive species establishment on sites completely denuded of vegetative cover due to catastrophic wildfire.
- Protect riparian habitat, bald eagles and habitat, hairy woodpecker, spiny soft-shell turtles, Wood house's toad, hognose snake, and pale milk snake.
- Protect the presence of a national landmark, a national monument, an ACEC, and other archeological and historic resources.
- Protect structures that need fire protection including an interpretative center and farm structures.
- Protect the public with an estimated 130,000 visitors per year.

5.7.1.1.6 Shepherd Ah-Nei Recreation Area

The Shepherd Ah-Nei Recreation area is located north of the town of Shepherd. Heavy recreational use and urban interface combine to create safety concerns for firefighters and the general public on a 4,800 acre parcel of public land within this area.

The Shepherd Ah-Nei area is similar to the Acton area characterized by needle grasses with

mixed pine and big sagebrush which fits fuel models 1 and 2. Fuel loads range from .74 tons/acre to 4.0 tons/acre.

5.7.1.1.7 Other Projects

In general, almost all BLM lands within the Yellowstone County area contain a wide diversity of habitats and cultural sites. In general, identifiable site types are predominated by late prehistoric and protohistoric aboriginal sites and by historic period Euro-American homesteads. Typical prehistoric sites include tepee rings, brush and log habitation structures, open campsites, and resource procurement sites such as buffalo jumps.

5.7.2 Conservation Reserve Program

The fire hazard associated with the abundant Conservation Reserve Program (CRP) lands has become a prominent issue for all fire departments and emergency personnel in Yellowstone County. Due to the lack of management on CRP, a dense mat of highly flammable fuels build up as they sit in fallow year after year. Fires in these fuels burn at very high intensities with large flame lengths, particularly under the influence of the strong winds common in Yellowstone County. Once ignited, CRP fires can burn very rapidly, jumping roads and other barriers that would normally inhibit a natural range or grass fire. In the recent past, uncontrolled CRP fires have burned hundreds of acres and threatened countless homes and critical infrastructure such as main highways and power poles in Montana.

It is the recommendation of this plan that Yellowstone County enacts a policy defining an active management plan for fire hazard fuel reduction on Conservation Reserve Program lands. This plan should be based on a three year rotation where a certain number of acres are treated each year. Potential treatment options may include, but are not limited to, grazing, haying, prescribed fire, and/or tilling. Yellowstone County believes active management will reduce the fire risk associated with these fuels and cut down on the number of CRP fires responded to each year. This is especially critical on those acres adjacent to homes, businesses, and critical infrastructure.

Chapter 6: Supporting Information

6

6.1 List of Tables

6.2 Table of Figures

6.3 List of Preparers

The following personnel participated in the formulation, compilation, editing, and analysis of alternatives for this assessment.

Table 6.1. List of Preparers

Name	Affiliation	Role
William E. Schlosser, Ph.D.	Northwest Management, Inc.	**Lead Author,** Project Manager, GIS Analyst, Natural Resource Economist, Hazard Mitigation Specialist
Gary Ellingson, B.S.	Northwest Management, Inc.	Resource Management Specialist, Deputy Project Manager
Vincent P. Corrao, B.S.	Northwest Management, Inc.	Resource Management Specialist
Tera King, B.S.	Northwest Management, Inc.	Natural Resource Manager, Fire Control Technician
Toby Brown, B.S.	Northwest Management, Inc.	Natural Resource Manager, Fire Control Technician
John A. Erixson, M.S.	Northwest Management, Inc.	Range Management, Fire Specialist
Dennis S. Thomas	Northwest Management, Inc.	Fire & Fuels Specialist, Prescribed Burning Manager
Vaiden E. Bloch, M.S.	Northwest Management, Inc.	GIS Analyst
Greg Bassler, M.S.	Northwest Management, Inc.	Roads Engineer, Timber Sale Layout & Harvest Manager
Jim Kraft	Yellowstone County	Yellowstone County Fire Warden
Entire Planning Committee		

6.4 Signature Pages

This **Yellowstone County Community Wildfire Protection Plan** has been developed in cooperation and collaboration with the representatives of the following organizations, agencies, and individuals.

6.4.1 Yellowstone County Resolution

RESOLUTION NUMBER 06-22

Community Wildfire Protection Plan (CWPP)

This resolution declares County support and adoption of the Yellowstone County Community Wildfire Protection Plan as an amendment to the existing Yellowstone County Pre-Disaster Mitigation Plan.

Whereas, The Board of Yellowstone County Commissioners supports the Yellowstone County Community Wildfire Protection Plan, and

Whereas, The Yellowstone County Community Wildfire Protection Plan will be utilized as a guide for planning as related to FEMA Pre-Disaster Mitigation, The National Fire Plan, The Healthy Forest Restoration Act, and other purposes as deemed appropriate by the Yellowstone County Commissioners,

Therefore be it resolved, that the Yellowstone County Commissioners do hereby adopt, support, and will facilitate the Yellowstone County Community Wildfire Protection Plan implementation.

Passed and approved this 28th day of February, 2006

Board of County Commissioners
Yellowstone County, Montana

John Ostlund, Chairperson

Bill Kennedy, Member

James E. Reno, Member

(SEAL)

ATTEST:

Tony Nave, Clerk / Recorder

6.4.2 City of Billings Resolution

RESOLUTION NO. **06-18395**

A RESOLUTION OF THE CITY COUNCIL OF BILLINGS LOCATED IN YELLOWSTONE COUNTY, MONTANA DECLARING CITY SUPPORT AND ADOPTION OF THE YELLOWSTONE COUNTY COMMUNITY WILDFIRE PROTECTION PLAN AS AN AMENDMENT TO THE YELLOWSTONE COUNTY PRE-DISASTER MITIGATION PLAN.

WHEREAS, the City Council of Billings supports the Yellowstone County Community Wildfire Protection Plan; and

WHEREAS, The City Council of Billings has participated in the development of the Yellowstone County Community Wildfire Protection Plan, and

WHEREAS, The Yellowstone County Community Wildfire Protection Plan will be utilized as a guide for planning as related to FEMA Pre-Disaster Mitigation, The National Fire Plan, The Healthy Forest Restoration Act, and other purposes as deemed appropriate by the City Council of Billings,

NOW, THEREFORE, BE IT RESOLVED THAT THE CITY COUNCIL OF THE CITY OF BILLINGS, MONTANA, DOES HEREBY ADOPT, SUPPORT, AND WILL FACILITATE THE YELLOWSTONE COUNTY COMMUNITY WILDFIRE PROTECTION PLAN'S IMPLEMENTATION.

PASSED by the City Council and APPROVED this 27th day of February, 2006.

THE CITY OF BILLINGS:

BY: _____
Ron Tussing, MAYOR

CITY OF BILLINGS SEAL YELLOWSTONE COUNTY, MONTANA

ATTEST:

BY: Marita Herold
Marita Herold, CMC/AAE CITY CLERK

6.4.3 City of Laurel Resolution

RESOLUTION NO. R06-15

A RESOLUTION OF THE CITY COUNCIL OF LAUREL DECLARING ITS SUPPORT AND ADOPTION OF THE YELLOWSTONE COUNTY COMMUNITY WILDFIRE PROTECTION PLAN AS AN AMENDMENT TO THE YELLOWSTONE COUNTY PRE-DISASTER MITIGATION PLAN.

WHEREAS, the City Council of Laurel supports the Yellowstone County Community Wildfire Protection Plan; and

WHEREAS, the City Council of Laurel has participated in the development of the Yellowstone County Community Wildfire Protection Plan; and

WHEREAS, the Yellowstone County Community Wildfire Protection Plan will be utilized as a guide for planning as related to FEMA Pre-Disaster Mitigation, The National Fire Plan, The Healthy Forest Restoration Act, and other purposes as deemed appropriate by the City Council of Laurel.

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Laurel, Montana,

That the City Council of Laurel does hereby adopt, support and shall facilitate the Yellowstone County Wildfire Protection Plan's implementation.

Introduced at a regular meeting of the City Council on March 7, 2006, by Alderperson Poehls.

PASSED and APPROVED by the City Council of the City of Laurel, located in Yellowstone County, Montana, this 7th day of March, 2006.

APPROVED by the Mayor this 7th day of March, 2006.

CITY OF LAUREL

Kenneth E. Olson, Jr., Mayor

ATTEST:

Mary K. Embleton, Clerk-Treasurer

Approved as to form:

Sam Painter, Legal Counsel
Elk River Law Office, P.L.L.P.

R06-15 Community Wildfire Protection Plan

6.4.4 Town of Broadview Resolution

Resolution of the Town Council of Broadview
located in Yellowstone County, Montana
281

A resolution of the Town Council of Broadview declaring Town support and adoption of the Yellowstone County Community Wildfire Protection Plan as an amendment to the Yellowstone County Pre-Disaster Mitigation Plan.

Whereas, The Town Council of Broadview supports the Yellowstone County Community Wildfire Protection Plan, and

Whereas, The Town Council of Broadview has participated in the development of the Yellowstone County Community Wildfire Protection Plan, and

Whereas, The Yellowstone County Community Wildfire Protection Plan will be utilized as a guide for planning as related to FEMA Pre-Disaster Mitigation, The National Fire Plan, The Healthy Forest Restoration Act, and other purposes as deemed appropriate by the Town Council of Broadview,

Therefore be it resolved, that the Town Council of Broadview does hereby adopt, support, and will facilitate the Yellowstone County Wildfire Protection Plan's implementation.

Passed and approved this 21 Day of March 2006

Town Council of Broadview located in Yellowstone County, Montana

John Hougardy

Mayor, Town of Broadview

Carol Terpstra

Attested by:

, Town Clerk

6.4.5 Representatives of Fire Departments

Marvin L. Jochems — 2/22/06

By: Marv Jochems, Chief
Billings Fire Department — Date

2/28/06

By: Shadd Fritz, Chief
Duck Creek Volunteer Fire Department — Date

2-22-2006

By: Terry Ruff, Chief
Laurel Fire Department — Date

2-22-2006

By: Greg Smith, Chief
Molt Volunteer Fire Department — Date

2/22/06

By: Stuart Andersen, Chief
Shepherd Volunteer Fire Deparment — Date

2-22-06

By: Rick Cortez, Chief
Blue Creek Volunteer Fire Department — Date

2.22.06

By: Alan Riley, Chief
Lockwood Fire District #8 — Date

By: Bill Glaser, Chief
Haley Bench Volunteer Fire Department — Date

2/22/06

By: Milton Mothershead, Chief
Custer Volunteer Fire Department — Date

2/22/06

By: Robby Badgett, Chief
Broadview Volunteer Fire Department — Date

2/24/06

By: Monte Dvorak, Chief
Worden Volunteer Fire Department

2-22-06
Date

By: Gene Metzger, Chief
Homewood Park Fire Department

2/24/06
Date

6.4.6 Representatives of Community Organizations, Federal, and State Agencies

These agencies and organizations collaborated and cooperated in the development of this plan.

Sharon Moore — February 14, 2006
By: Sharon Moore
Montana Department of Natural Resources and Conservation

Dianne B. Lehm — 2.17.2006
By: Dianne Lehm
Big Sky Economic Development Authority

Sandy Brooks — 2/23/06
By: Sandy Brooks
Bureau of Land Management

Jim Roessler — 2/27/2006
By: Jim Roessler
Bureau of Indian Affairs

6.4.7 Yellowstone County Community Wildfire Protection Plan Coordinators

James T. Kraft — February 14, 2006
By: Jim Kraft
Yellowstone County Fire Warden
& Yellowstone County DES Director

William E. Schlosser — February 28, 2006
By: William E. Schlosser, Ph.D.
Project Manager-Yellowstone County Wildfire Protection Plan, Lead Author, Northwest Management, Inc.
Date

6.5 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.

Community Wildfire Protection Plan (CWPP) - 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 Tactic (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.

Xeriscape - a trademark for a method of landscaping that emphasizes water conservation in its use of drought-resistant plants

6.6 List of Acronyms

ACEC: Area of Critical Environmental Concern

AIRFA: American Indian Religious Freedom Act

ARPA: Archaeological Resources Protection Act

ATV: All Terrain Vehicle

B/C: Benefit/Cost

BIA: Bureau of Indian Affairs

BLM: Bureau of Land Management

BUFSA: Billings Urban Fire Service Area

CFS: Current Fire Severity

CRP: Conservation Reserve Program

CWPP: Community Wildfire Protection Plan

DES: Disaster and Emergency Services

DNRC: Department of Natural Resources and Conservation

ECA: Equivalent Clearcut Area

EDA: Economic Development Authority

EMS: Emergency Medical Services

EPA: Environmental Protection Agency

ETM: Enhanced Thematic Mapper

FAMB: Fire and Aviation Management Bureau

FD: Fire District

FEMA: Federal Emergency Management Agency

FMU: Fire Management Unit

FPL: Fire Prone Landscapes

FRCC: Fire Regime Condition Class

FSA: Fire Service Area

FWS: Fish and Wildlife Service

GAP: Gap Analysis Program

GIS: Geographic Information System

GPS: Global Positioning System

HFR: Historic Fire Regime

HFRA: Healthy Forests Restoration Act

HMGP: Hazard Mitigation Grant Program

ID: Idaho

LUFSA: Laurel Urban Fire Service Area

MIST: Minimum Impact Suppression Tactic

MOU: Memorandum of Understanding

MPO: Metropolitan Planning Organization

MT: Montana

NAAQS: National Ambient Air Quality Standards

NAGPRA: Native American Graves Protection and Repatriation Act

NASF: National Association of State Foresters

NEPA: National Environmental Policy Act

NFMAS: National Fire Management Analysis System

NFP: National Fire Plan

NFPA: National Fire Protection Association

NHPA: National Environmental Policy Act

NIFC: National Interagency Fire Center

NMI: Northwest Management, Inc.

NPS: National Park Service

NRCG: Northern Rockies Coordinating Group

NRCS: Natural Resources Conservation Service

NWCG: National Wildfire Coordinating Group

OAQPS: Organization for Air Quality Protection Standards

PDM: Pre Disaster Mitigation

RC&D: Resource Conservation and Development

RHCA: Riparian Habitat Conservation Area

RFA: Rural Fire Assistance

RFD: Rural Fire District

RMO: Riparian Management Objective

SFB: Service Forestry Bureau

SHMO: State Hazard Mitigation Officer

SRMA: Special Recreation Management Area

TCP: Traditional Cultural Property

USA: United States of America

USDA: United States Department of Agriculture

USDI: United States Department of Interior

USFS: United States Forest Service

VFA: Volunteer Fire Assistance

VFD: Volunteer Fire Department

WFIP: Wildland Fire Implementation Plan

WFSA: Wildland Fire Situation Analysis

WUFRB: Wildfire Use for Resource Benefit

WUI: Wildland Urban Interface

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Last Page of Document

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Yellowstone County, Montana,

Community Wildfire Protection Plan

Executive Summary

February 28th, 2006

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

This plan was developed by the Yellowstone County Community Wildfire Protection 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

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This Community Wildfire Protection 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.

Yellowstone County Commissioners and the employees of Yellowstone County

State of Montana

USDI Bureau of Land Management

USDI Bureau of Indian Affairs

USDA Forest Service

Federal Emergency Management Agency

Montana Disaster and Emergency Services

USDI Bureau of Reclamation

Beartooth Resource Conservation & Development Council

Montana Fish, Wildlife, & Parks

Montana Department of Natural Resources and Conservation

Natural Resources Conservation Service

USDA

City of Billings
City of Laurel
Town of Broadview
Yellowstone County Sheriff's Office
Yellowstone County Fire Departments
Yellowstone County Fire Districts
Yellowstone County Fire Service Areas
Deaconess Hospital
&
Local Businesses and Citizens of Yellowstone County

To obtain original copies of this plan contact:

Yellowstone County Commissioner's Office
Yellowstone County Courthouse
217 North 27th Street
Billings, Montana 59101

Table of Contents

Executive Summary

1 Introduction

This Community Wildfire Protection Plan for Yellowstone 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 Yellowstone County, Montana. This Community Wildfire Protection Plan is an amendment to the Yellowstone County Pre Disaster Mitigation Plan, which was approved by FEMA in January 2005. The Yellowstone County Commissioners led the planning team responsible for implementing this project. Agencies and organizations that participated in the planning process included:

- Yellowstone County Commissioners and County Departments
- Yellowstone County Fire Warden
- Yellowstone County Disaster and Emergency Services
- Montana Department of Natural Resources and Conservation
- USDI Bureau of Land Management (also providing funding through the National Fire Plan)
- USDA Forest Service
- USDI Bureau of Indian Affairs
- Yellowstone County Fire Departments
- Town of Broadview
- Big Sky Economic Development Authority
- Yellowstone County Fire Districts and Fire Service Areas
- City of Billings
- Deaconess Hospital
- USDI Bureau of Reclamation
- U.S. Department of Homeland Security
- Beartooth Resource Conservation and Development Council
- Montana Fish, Wildlife, & Parks
- City of Laurel
- USDA Natural Resources Conservation Service
- Montana Disaster and Emergency Services
- Northwest Management, Inc.

The Yellowstone County Commissioners solicited competitive bids from companies to provide the service of leading the assessment and the writing of the **Yellowstone County Community Wildfire Protection 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, 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.

1.1.2 Additional State and Federal Guidelines Adopted

The Community Wildfire Protection 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 Community Wildfire Protection 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 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.

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 Yellowstone County while facilitating new opportunities for pre-disaster mitigation funding and cooperation.

1.1.2.1.1 Montana's Endorsement of the National Fire Plan

In May 2002, Montana Governor Martz, as a member of the Western Governors' Association, helped develop 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' Association endorsement of the Implementation plan, Montana adopted the national implementation plan as its own.

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)

1.1.3 Local Guidelines and Integration with Other Efforts

1.1.3.1 Yellowstone 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 countywide Community Wildfire Protection Plan, a component of the County's All Hazards Pre-Disaster 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 Yellowstone 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 Yellowstone 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 Yellowstone 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 Wildfire Protection Plan

2 Administration & Implementation Strategy

Critical to the implementation of this Community Wildfire Protection 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 Yellowstone County and the region.

All risk assessments were made based on the conditions existing during 2005, thus, the recommendations have been made in light of those conditions. However, the components of risk and the preparedness of the county's resources are not static. It will be necessary to fine-tune this plan's recommendations annually to adjust for changes in the components of risk, population density changes, infrastructure modifications, and other factors.

As part of the Policy of Yellowstone County in relation to this planning document, the Community Wildfire Protection Plan should be reviewed annually at a special meeting of the Yellowstone County Commissioners, open to the public and involving all municipalities/jurisdictions, where action items, priorities, budgets, and modifications can be made or confirmed. A written review of the plan should be prepared (or arranged) 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 (in accord with the Montana Open Public Meeting Laws). Amendments to the plan should be detailed at this meeting, documented, and attached to the formal plan as an amendment to the Community Wildfire Protection Plan. Total re-evaluation of this plan should be made on the 5th anniversary of its acceptance, and every 5-year period following.

2.1 Recommendations

Throughout the course of the planning process members of the committee and the public came up with many mitigation activities that they felt would help reduce the risk of wildfire in Yellowstone County. Action items were categorized by their effectiveness in "Safety and Policy", "People and Structures", "Infrastructure", and "Firefighting Resources and Capabilities". All recommended mitigation activities are detailed in the recommendation tables in Chapter 5 of the Plan. The following is a summarized list of the recommendations made by the committee. A full record of the recommended activities is found in Chapter 5 of the Community Wildfire Protection Plan.

2.1.1 WUI Action Items in Safety & Policy

- Adoption and enforcement of International Building Codes and/or more stringent hazard--related building code provisions.
- Develop County policy concerning building materials used in high-risk WUI areas on existing structures and new construction.
- Develop County policy requiring the installation of dry hydrants in subdivisions with 5 or more dwellings.
- Begin distributing "New Code of the West" pamphlets with sub-division permit requests.
- Develop a policy to enforce "No Burning" restrictions in specified high risk subdivisions.
- Review need to inspect and enforce access and water issues in new subdivisions and individual homes.
- Develop county policy concerning access in moderate to high-risk WUI areas where subdivisions are built to insure adequate ingress and egress during wildfire emergencies.
- Develop a county policy to support grant applications for projects resulting from this plan.

2.1.2 WUI Action Items for People and Structures

- Youth and Adult Wildfire Educational Programs and Professional Development Training.
- Wildfire risk assessments of homes in identified communities.

- Home Site WUI Treatments
- Community Defensible Zone WUI Treatments, specifically in the Clapper Flats, Buffalo Trails, Rehberg Ranch Estates, Alkali Creek, Hills Estates, Indian Cliffs, Pleasant Hollow, Shadow Canyon, Cedar Ridge, White Buffalo, High Trails, and Emerald Hills subdivisions.
- Maintenance of Home Site WUI Treatments
- Re-entry of Home Site WUI Treatments
- Implement proposed home defensible space projects.

2.1.3 WUI Action Items for Infrastructure Enhancements

- Post "Emergency Evacuation Route" signs along the identified Primary and Secondary access routes in the County.
- Access improvements of bridges, cattle guards, and limiting road surfaces.
- Improve communications throughout the County by installing additional repeater towers and obtaining portable repeaters for emergency response personnel.
- Erect a repeater tower on the site donated by the Conover Ranch near Broadview.
- Fuel mitigation of the "Emergency Evacuation Routes" in the County to insure these routes can be maintained in the case of an emergency.
- Erect a repeater tower system to support the Shepherd Volunteer Fire Department and Shepherd community.
- Access improvements through roadside fuels management.

2.1.4 WUI Action Items in Firefighting Resources and Capabilities

- Enhance radio availability in each department, link into existing dispatch, improve range within the region, and conversion to consistent standard of radio types.
- Retention of Volunteer Fire Fighters.
- Increased training and capabilities of firefighters.
- Obtain a Type 6 wildland fire truck, a ProPAC foam kit, a floater pump, and additional personal protective equipment for the Broadview Fire District #3.
- Support the construction of the new Fire Station/Clinic/Pharmacy/Community Center proposed in Lockwood.
- Obtain a Type 6 engine, two 1,000 gallon pumper trucks, and a heated truck storage facility for the Worden Volunteer Fire Department.
- Obtain a 4x4 pumper truck and a 1,500-2,000 gallon water tender for the Laurel Fire Department.
- Construction of a Shepherd Volunteer Fire Department satellite station in the Hidden Lake area.
- Additional heated equipment storage facility for the Broadview Fire Department #3.
- Establish onsite water sources such as dry hydrants or underground storage tanks for rural housing developments.
- Establish a site and install a higher capacity municipal well and pump and a 100,000 gallon storage tank for the town of Broadview.
- Establish a non-potable water well and storage system to supply fire hydrants, dry hydrants, and fire suppression systems in public buildings in the town of Broadview.
- Obtain a Type 3 WUI pumper truck for the Laurel Urban Fire Service Area.
- Obtain funding to add structural fire responsibilities to Broadview Fire District #3, which would include personnel incentives, additional rolling stock equipped with structural firefighting capabilities, structural turnout gear, and a larger equipment storage facility.
- Obtain a Type 6 wildland engine and a wood chipper for Lockwood Fire District #8.
- Acquire sites and install dry hydrants on Pine Hills Road, High Trails Road, Coburn Hill Road, Yellowstone Trail Road, and Box Canyon Spring Road.
- Obtain one structural engine, 3 Type 3 engines (to replace old 6x6's), and one Type 2 water tender for the Shepherd Volunteer Fire Department.
- Secure funding for a full time Laurel Volunteer Fire Department Chief.
- Equip Laurel Emergency Operations Center with radios and phone lines.

2.2 Prioritization of Mitigation Activities

The Yellowstone County Community Wildfire Protection Plan committee has outlined a prioritization process for the mitigation activities recommended in the plan. The prioritization process includes a special emphasis on cost-benefit analysis review, but also incorporates factors such as population benefit, economic benefit, project feasibility, hazard magnitude, future development, and project effectiveness and sustainability. Each planning project or mitigation activity was analyzed and given a numerical score, which prioritized it into a "high", "medium", or "low" category. Priority rankings are listed with the specific action item in the recommendation tables in Chapter 5 of the Plan.

This plan was developed by Northwest Management, Inc., under contract with the Yellowstone County Commissioners, with funding provided by the USDI Bureau of Land Management and Yellowstone County.

Citation of this work:

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Schlosser, W. E. and T. R. King. *Lead Authors.* 2006. Yellowstone County, Montana, Community Wildfire Protection Plan – Executive Summary. Northwest Management, Inc., Helena, Montana. February 28, 2006. Pp. 10.

Schlosser, W. E. and T. R. King. *Lead Authors.* 2006. Yellowstone County, Montana, Community Wildfire Protection Plan Appendices. Northwest Management, Inc., Helena, Montana. February 28, 2006. Pp. 66.

Last Page of Document

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Yellowstone County, Montana

Community Wildfire Protection Plan

Appendices

February 28, 2006

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

This plan was developed by the Yellowstone County Community Wildfire Protection Plan Committee in cooperation with Northwest Management, Inc., P.O. Box 565, Helena, Montana 59624, Tel: 208-883-4488, www.Consulting-Foresters.com

Table of Contents

Appendix I: Maps

Map Legend

Northwest Management, Inc.
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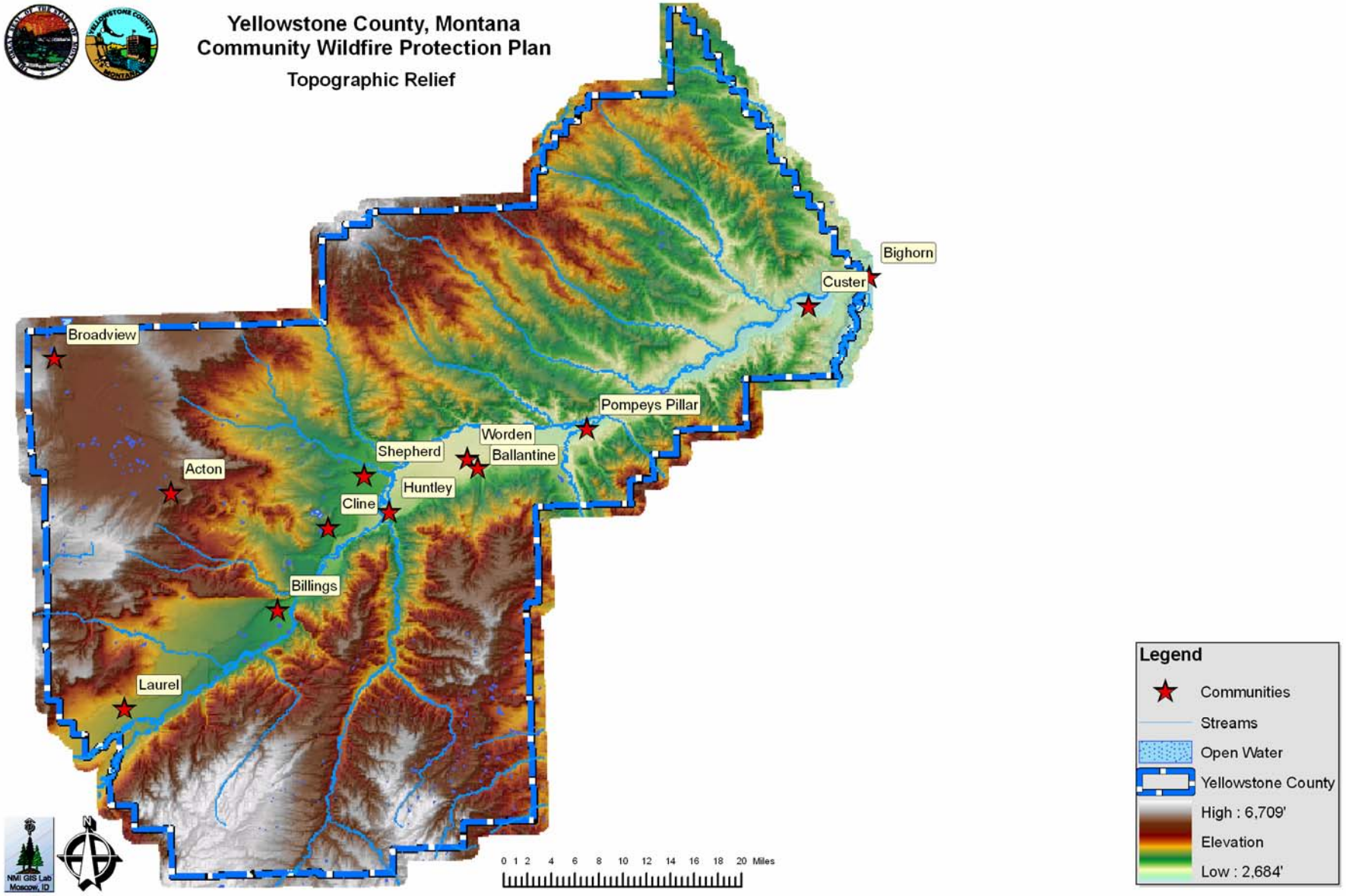
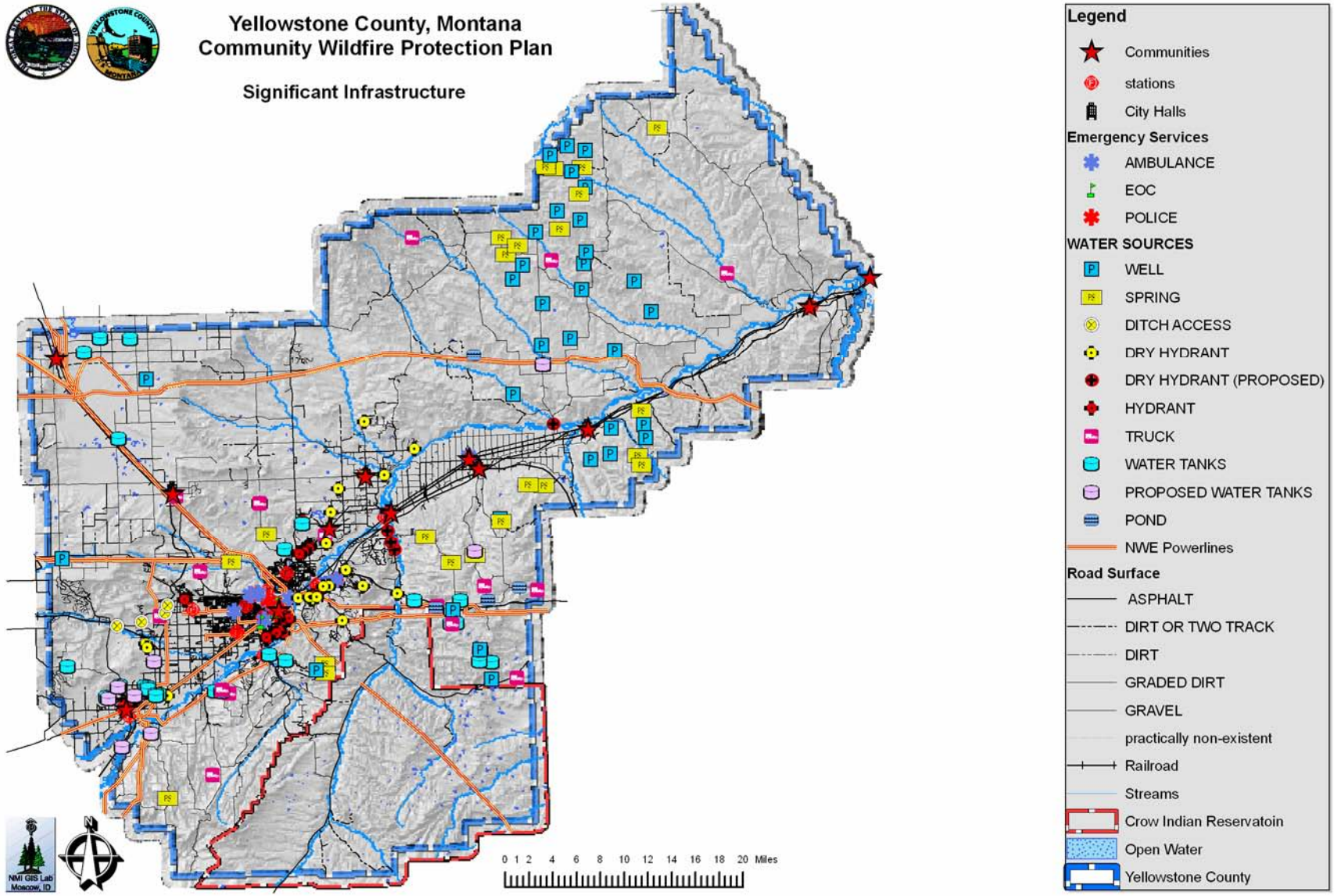
The information on the attached maps was derived from digital databases from NMI's GIS lab. Care was taken in the creation of these maps, but all maps are provided "as is" with no warranty or guarantees. Northwest Management, Inc., cannot accept any responsibility for any errors, omissions, or positional accuracy, and therefore, there are no warranties which accompany this product. Although information from Land Surveys may have been used in the creation of this product, in no way does this product represent or constitute a Land Survey. Users are cautioned to field verify information on this product before making any decisions.

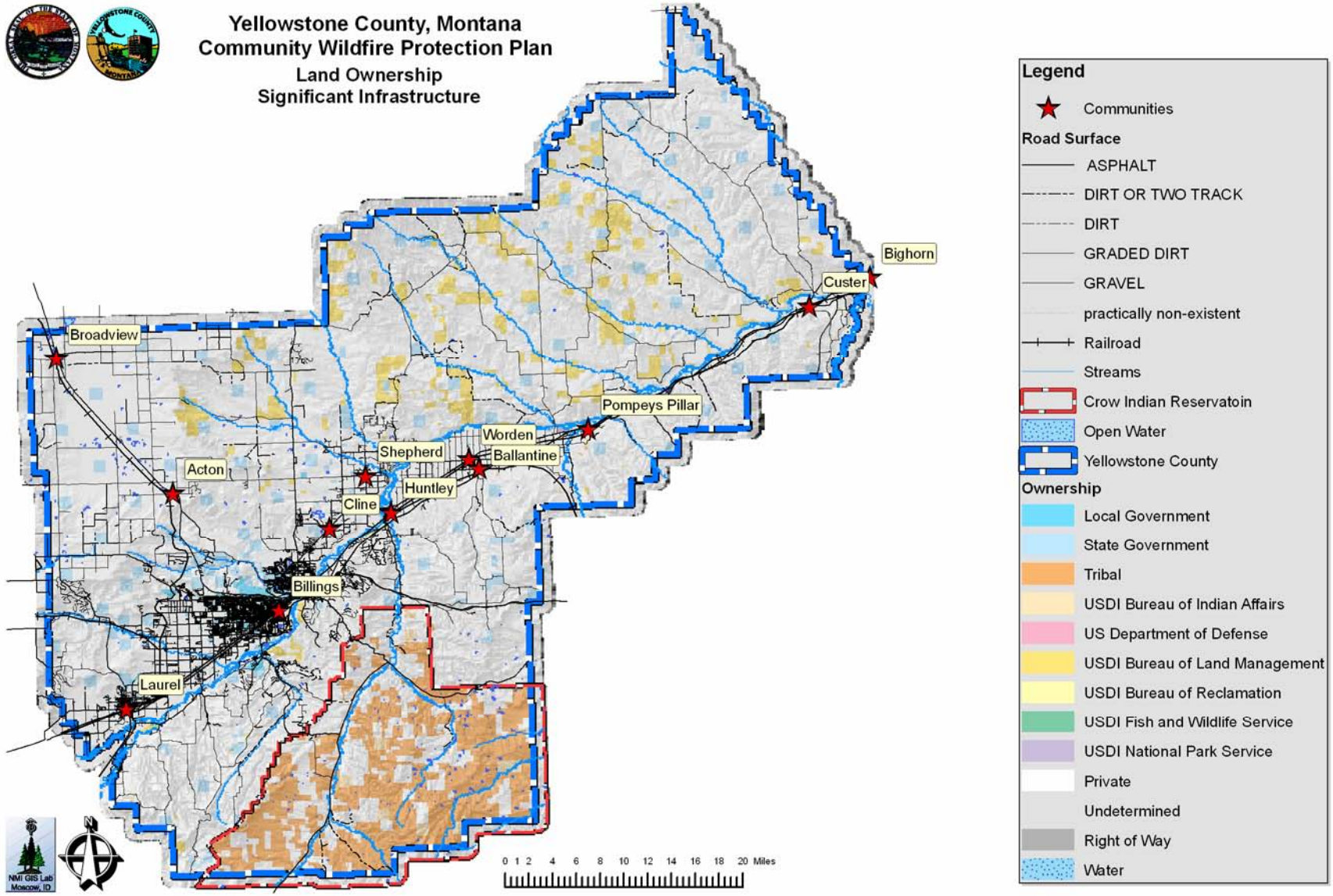
Shaded Elevation Relief of Yellowstone County



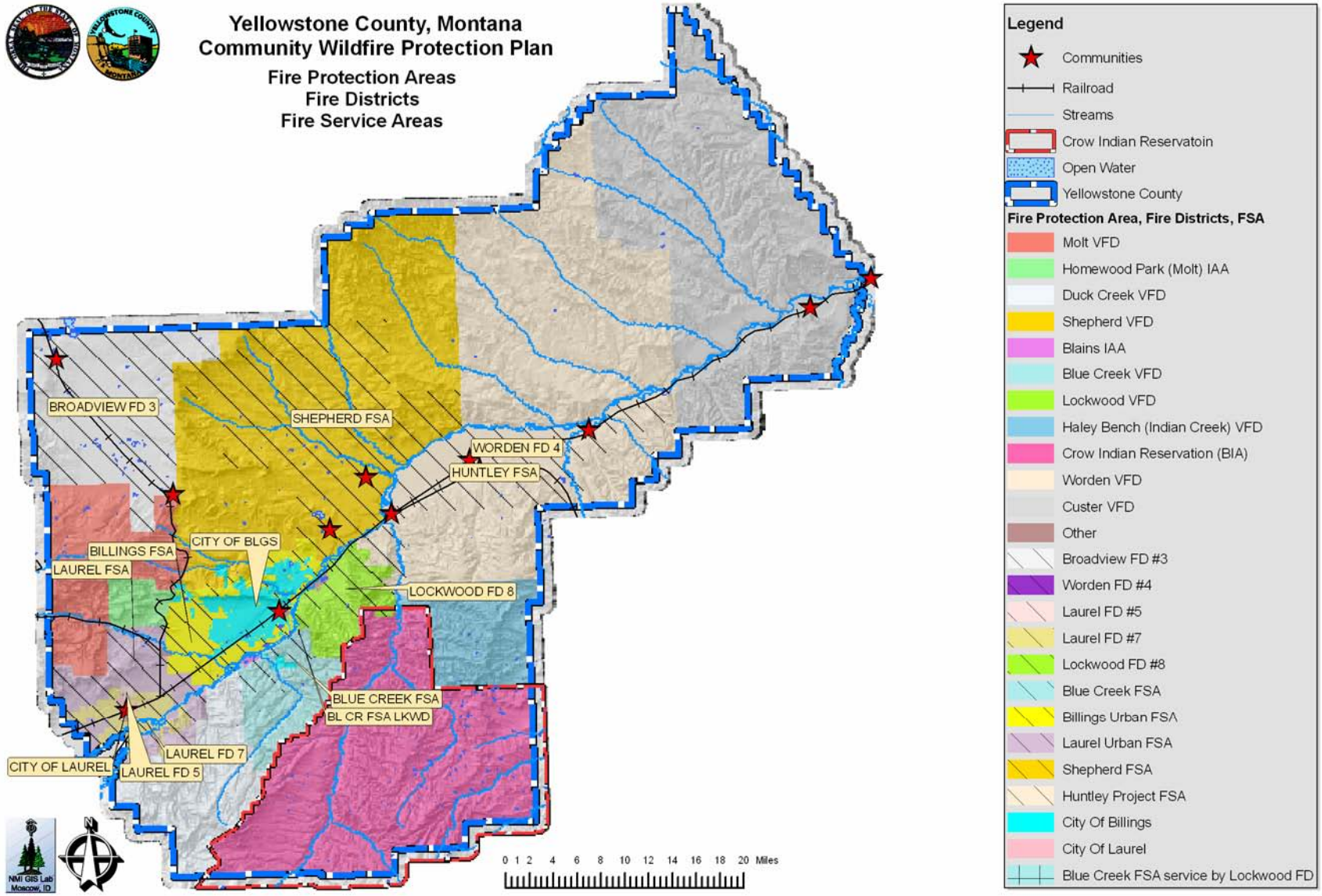
Significant Infrastructure in Yellowstone County



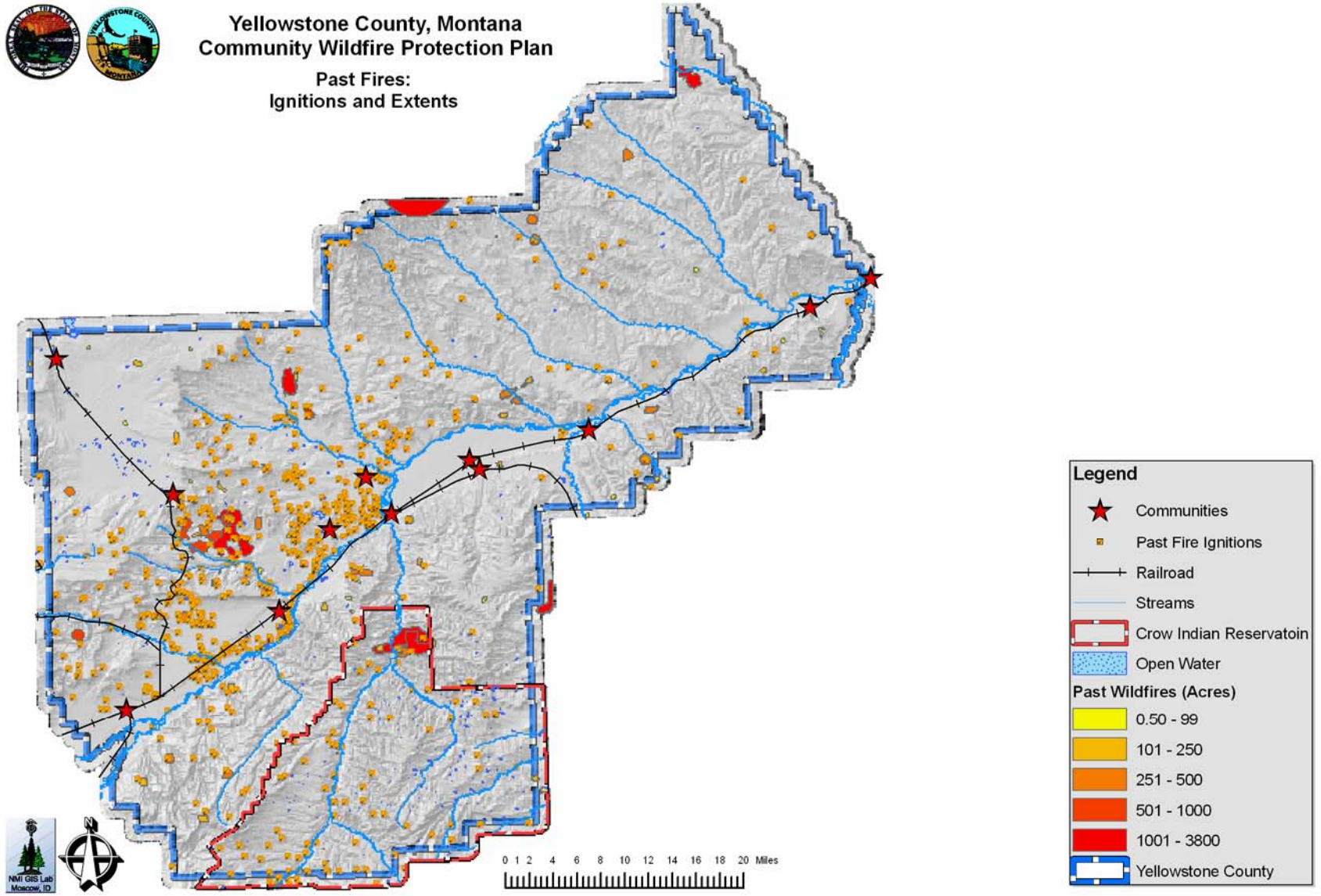
Yellowstone County Ownership Map



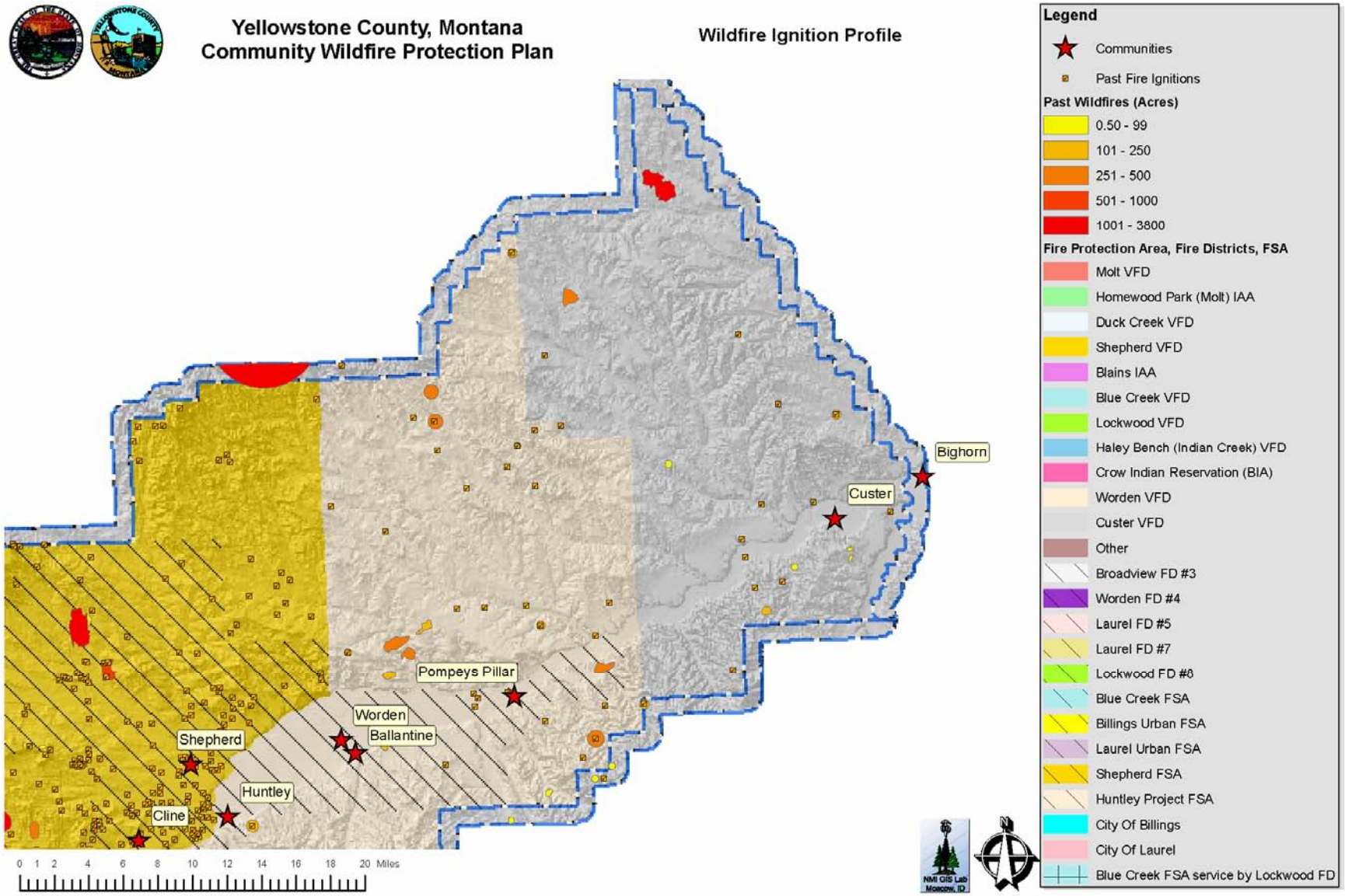
Fire Protection Districts



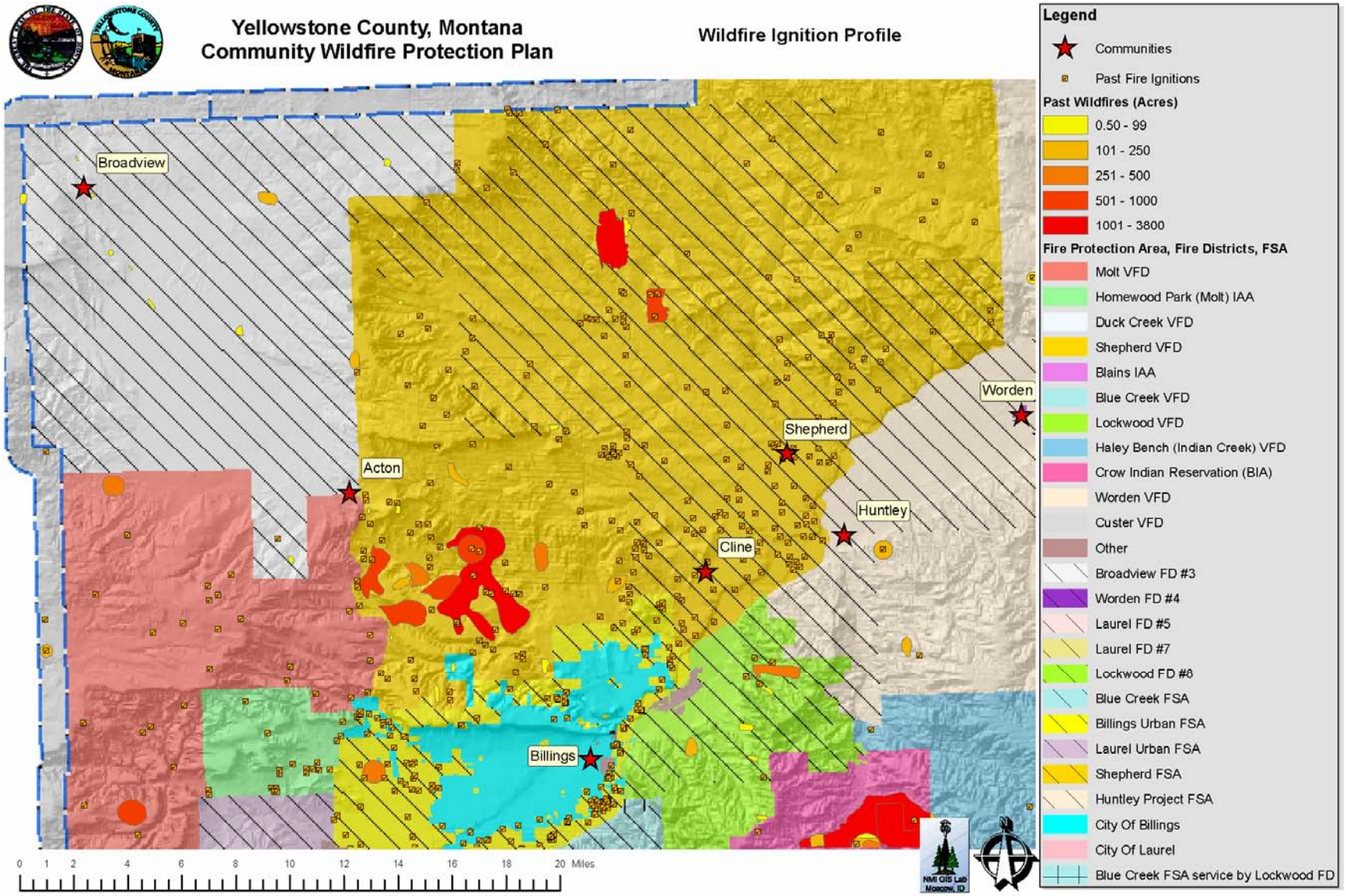
Past Wildfires in Yellowstone County



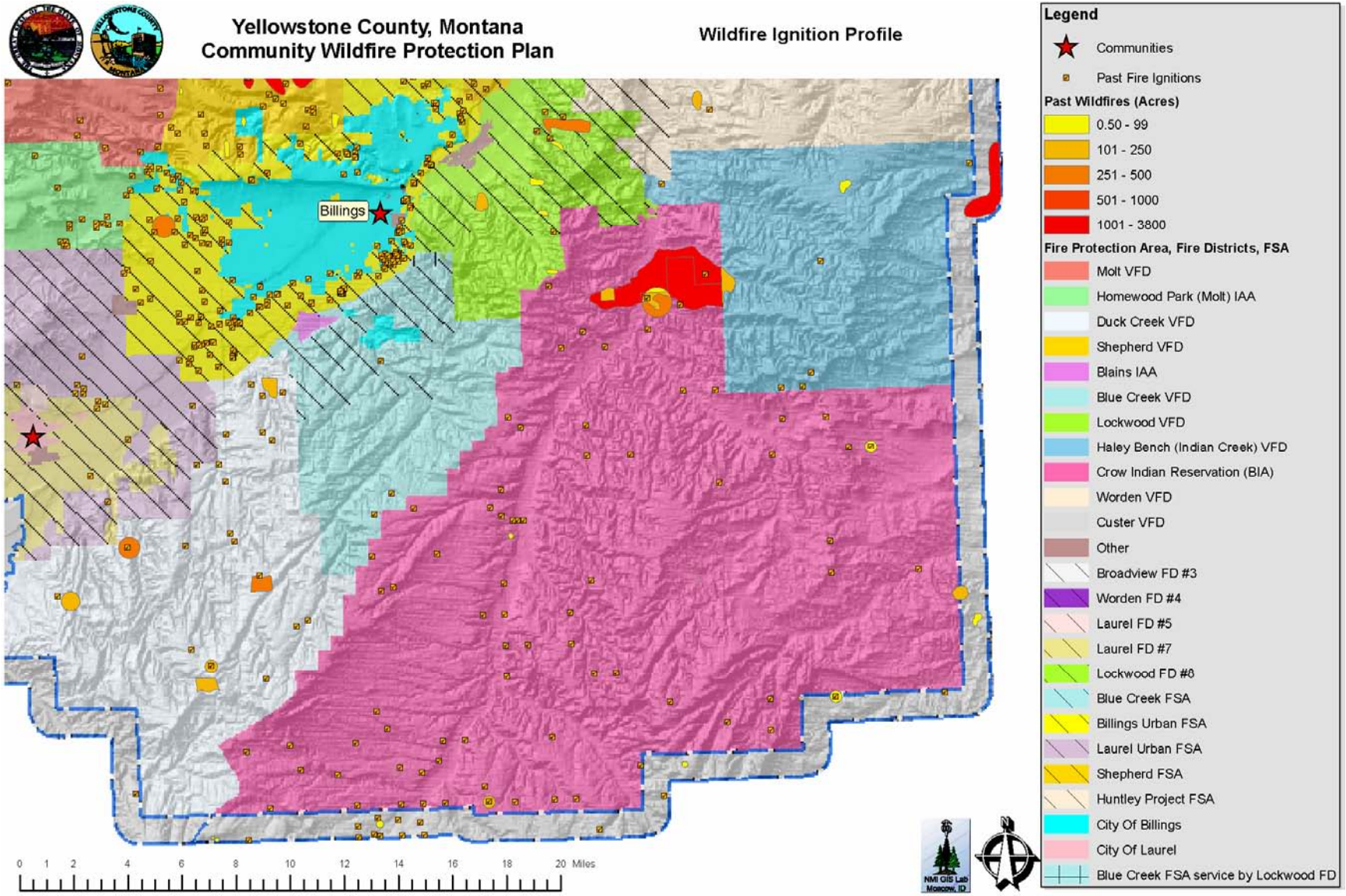
Wildfire Ignition Profile for Northeast Yellowstone County



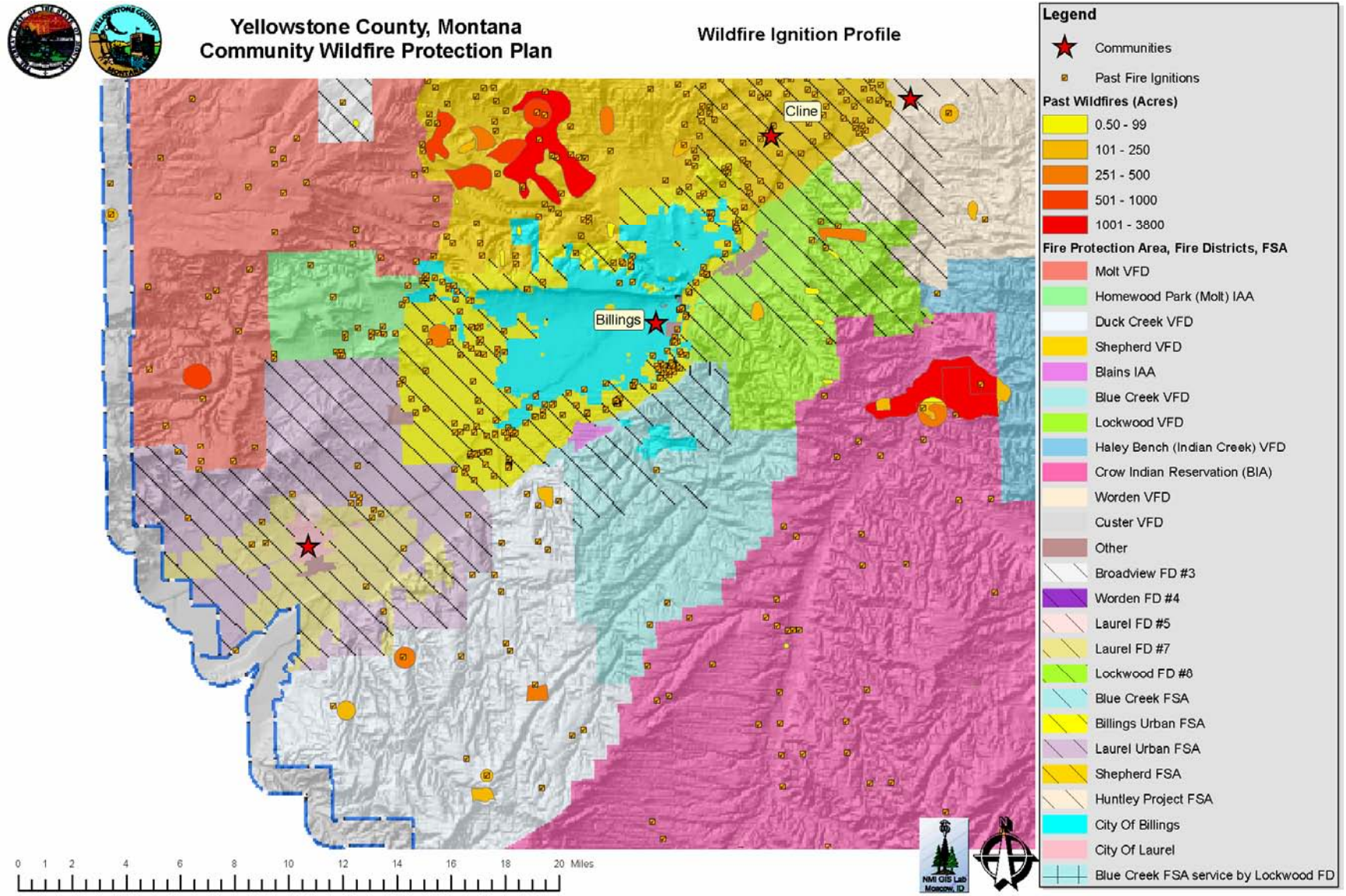
Wildfire Ignition Profile for Northwest Yellowstone County



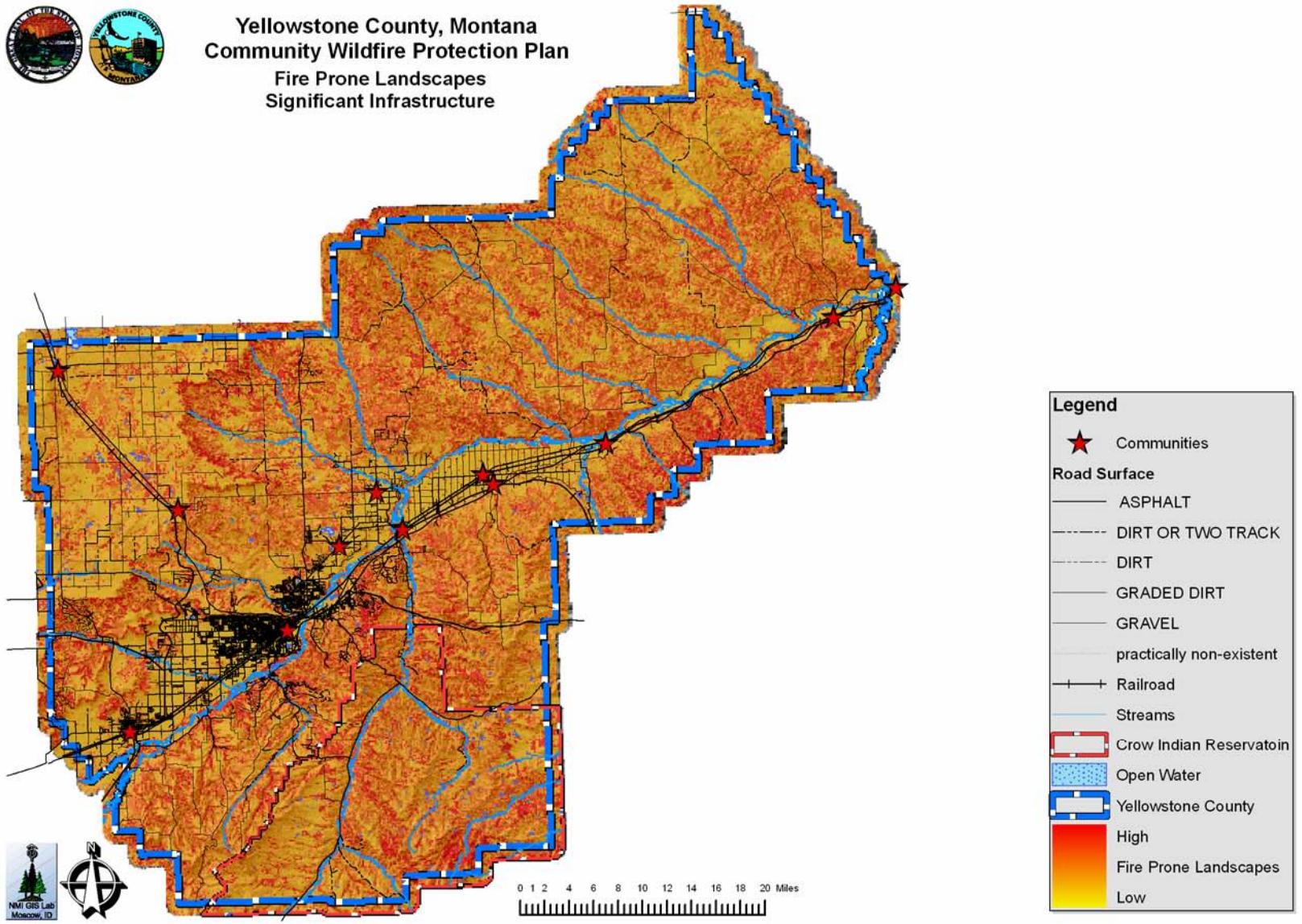
Wildfire Ignition Profile for Southeast Yellowstone County



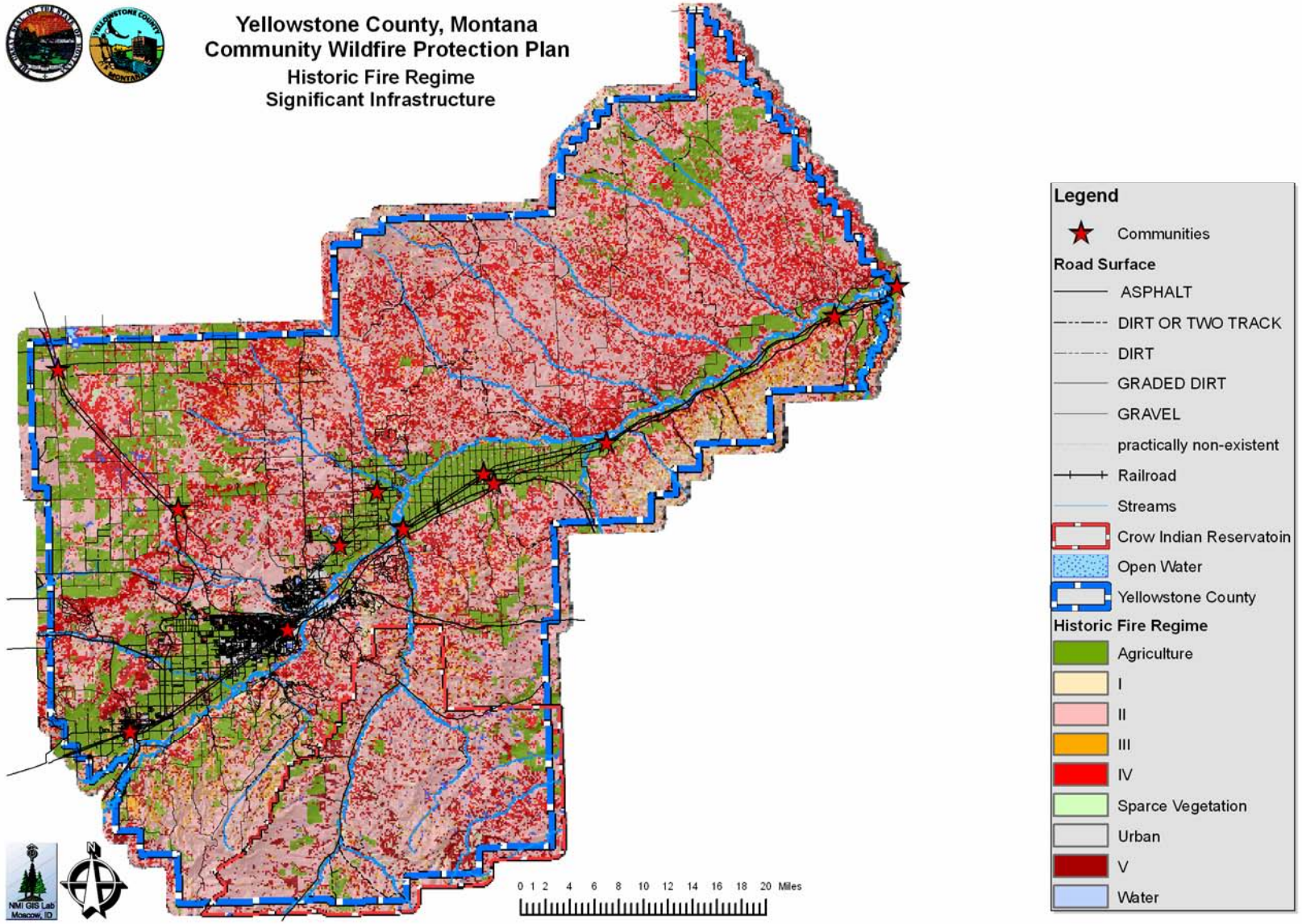
Wildfire Ignition Profile for Southwest Yellowstone County



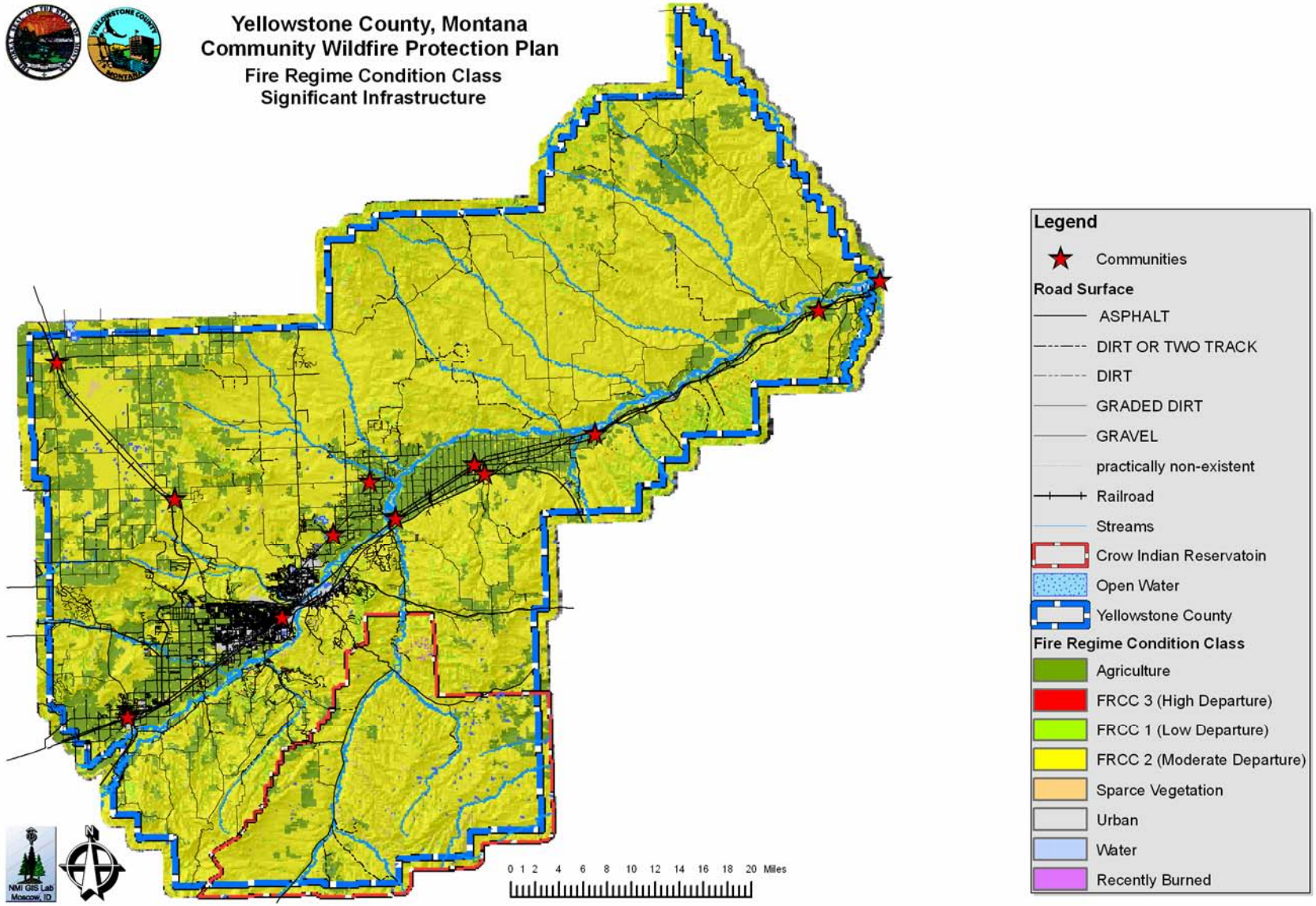
Fire Prone Landscapes in Yellowstone County



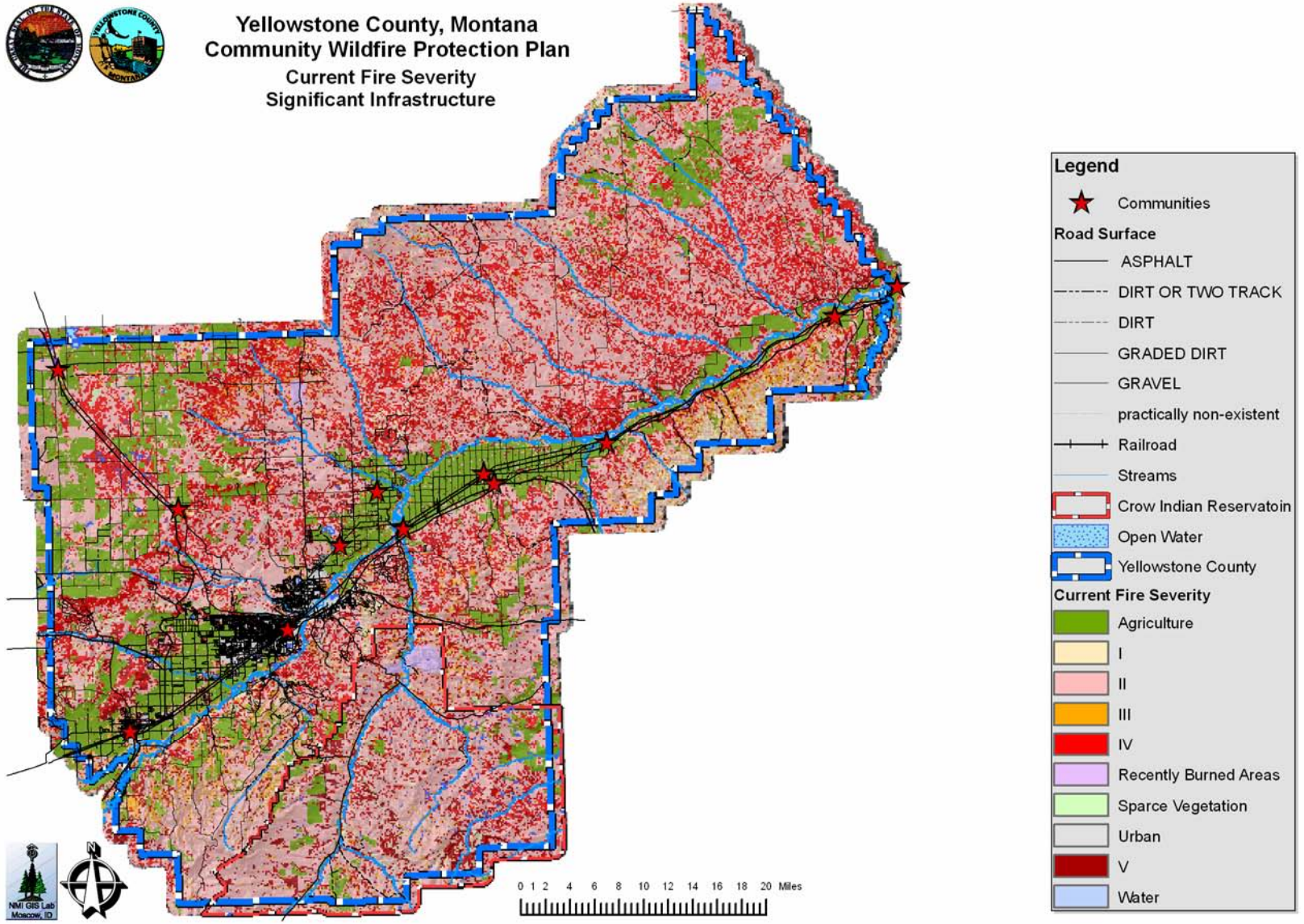
Historic Fire Regime in Yellowstone County



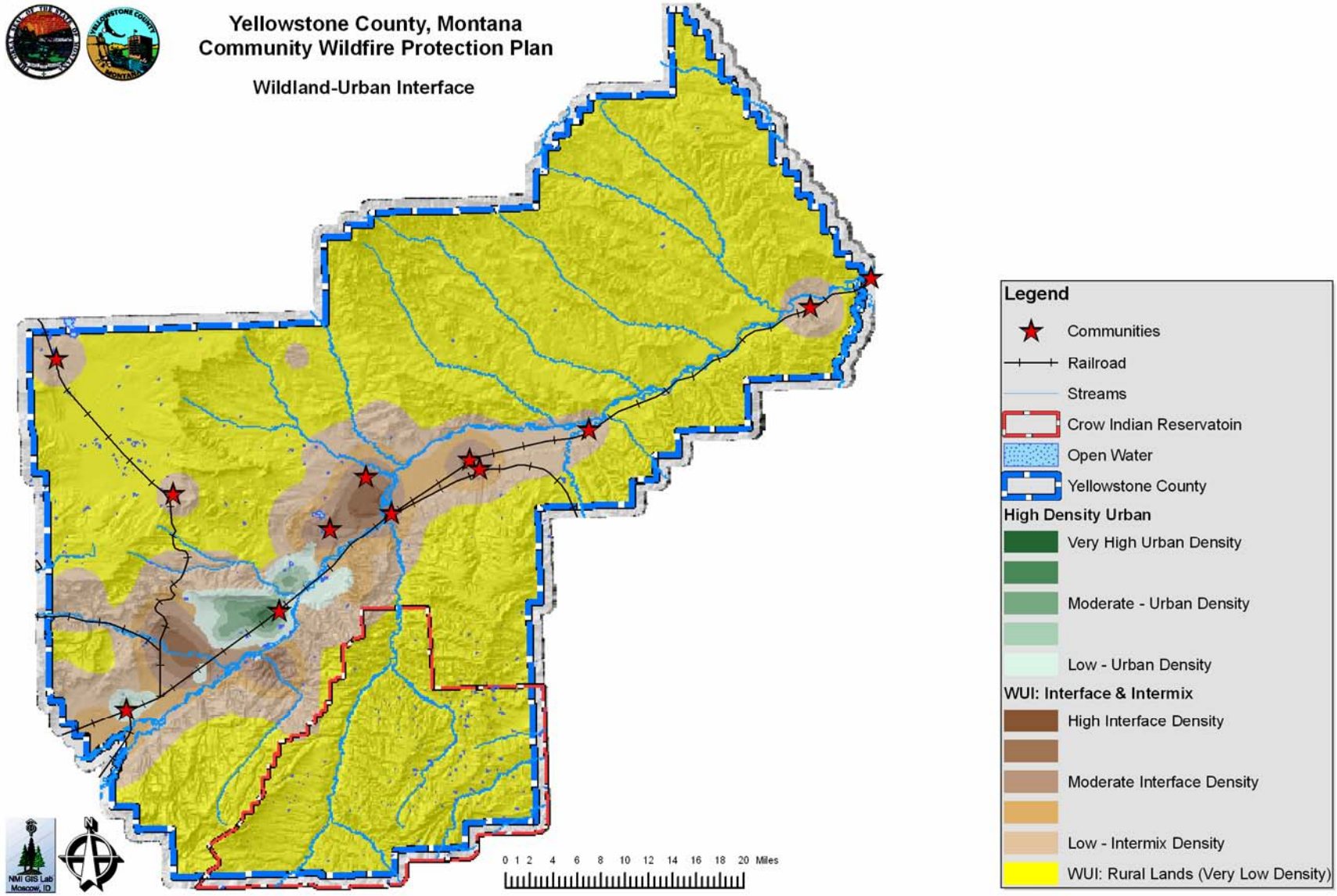
Fire Regime Condition Class in Yellowstone County



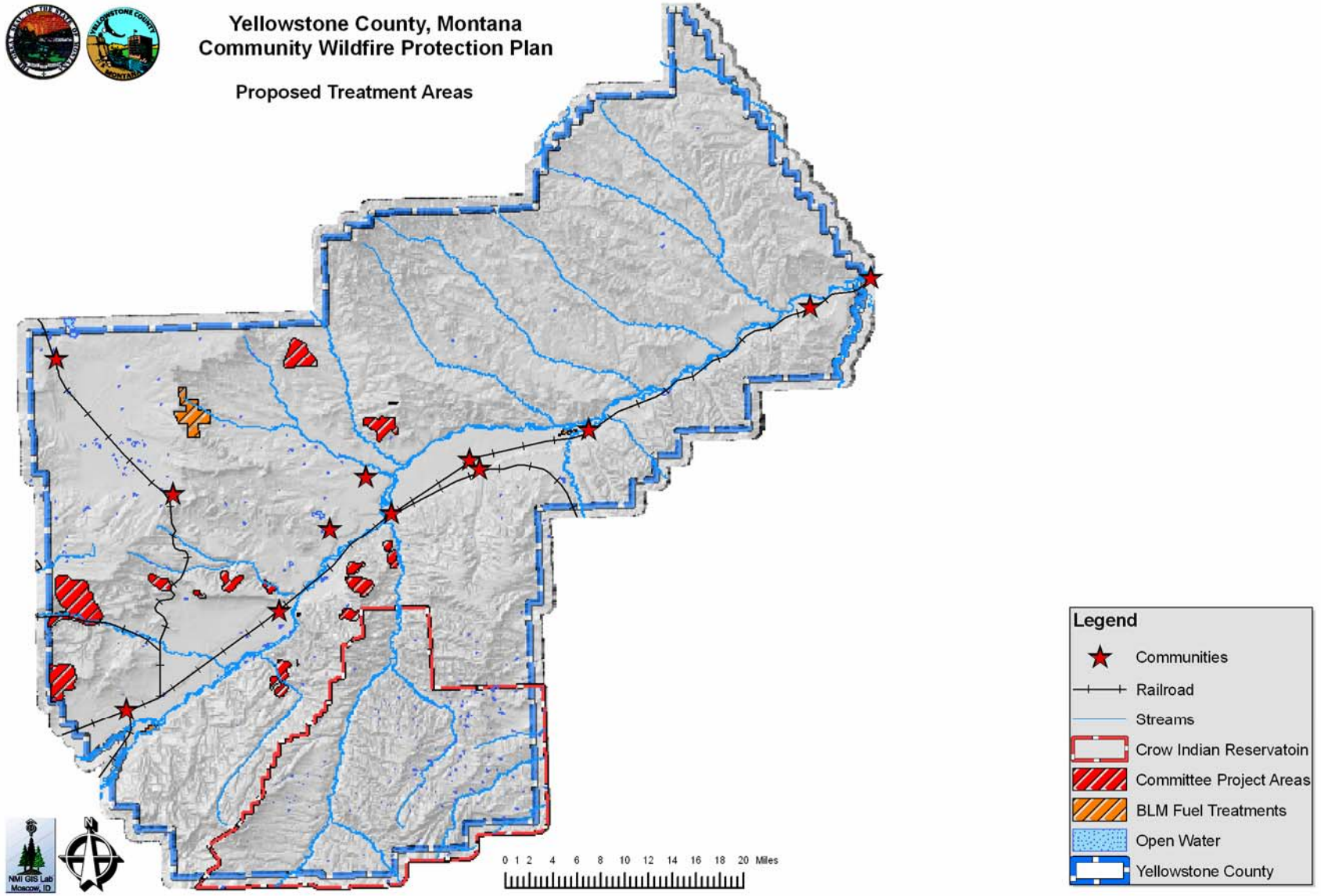
Current Fire Severity in Yellowstone County



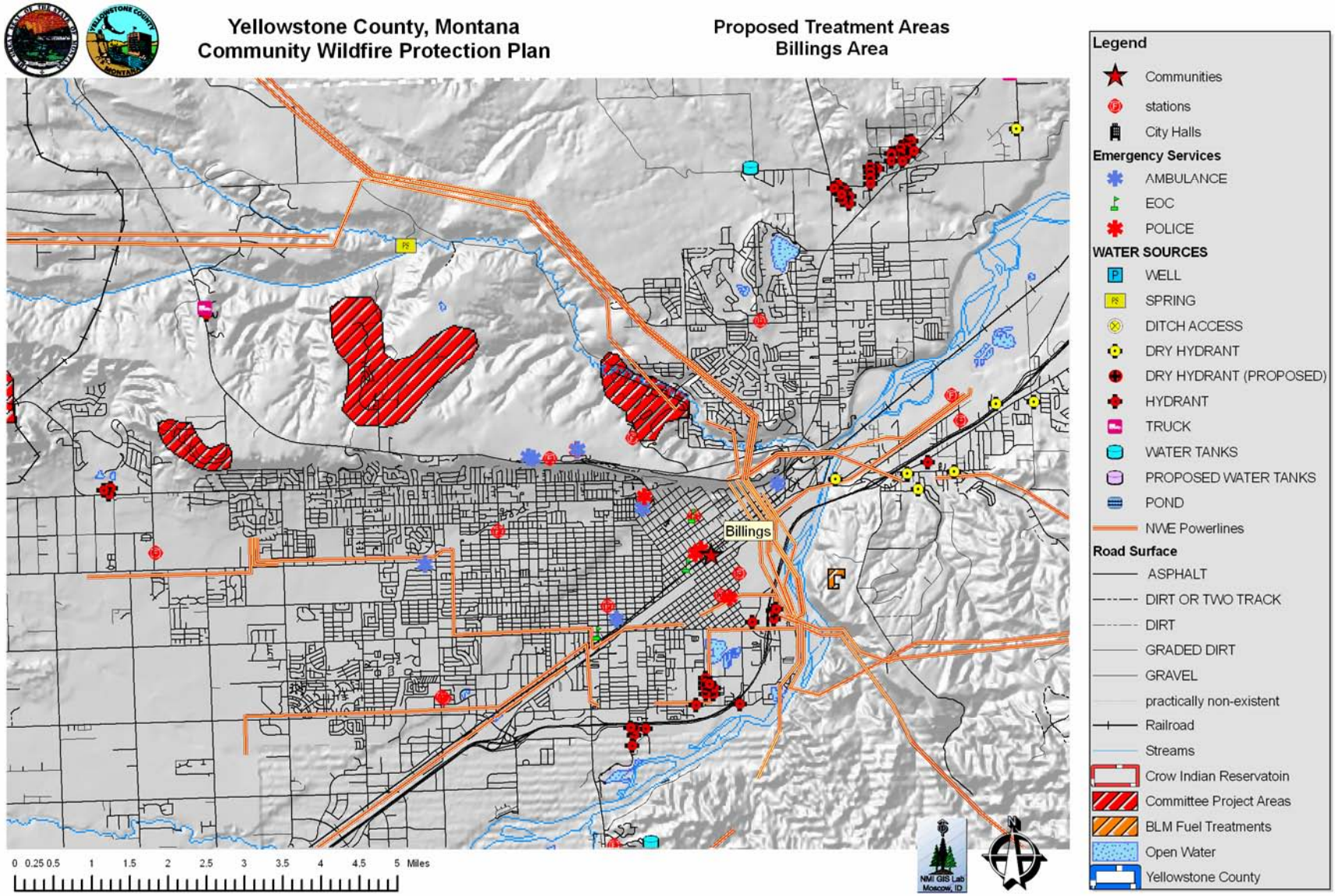
Wildland-Urban Interface and Significant Infrastructure



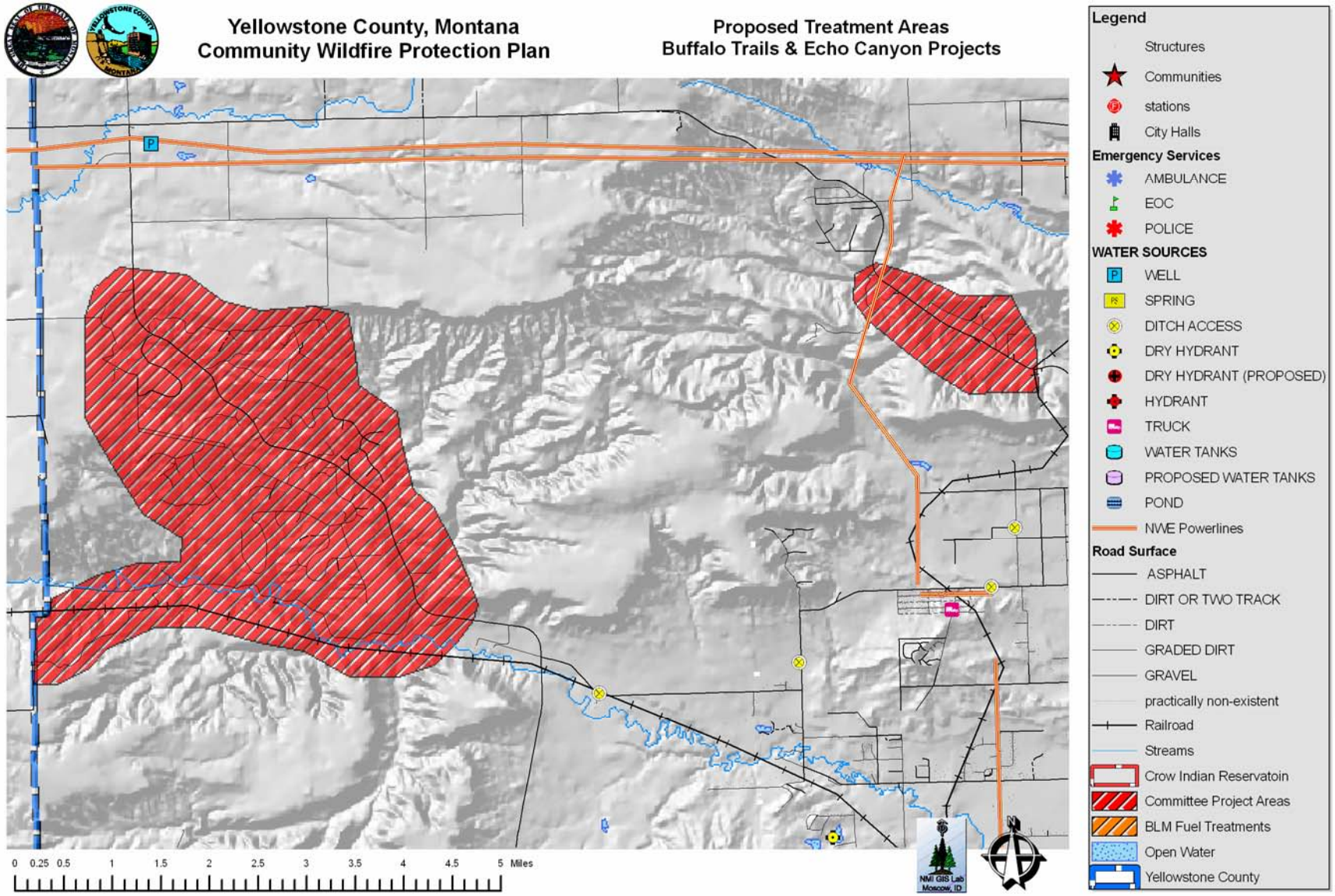
Proposed Treatment Areas: Overview



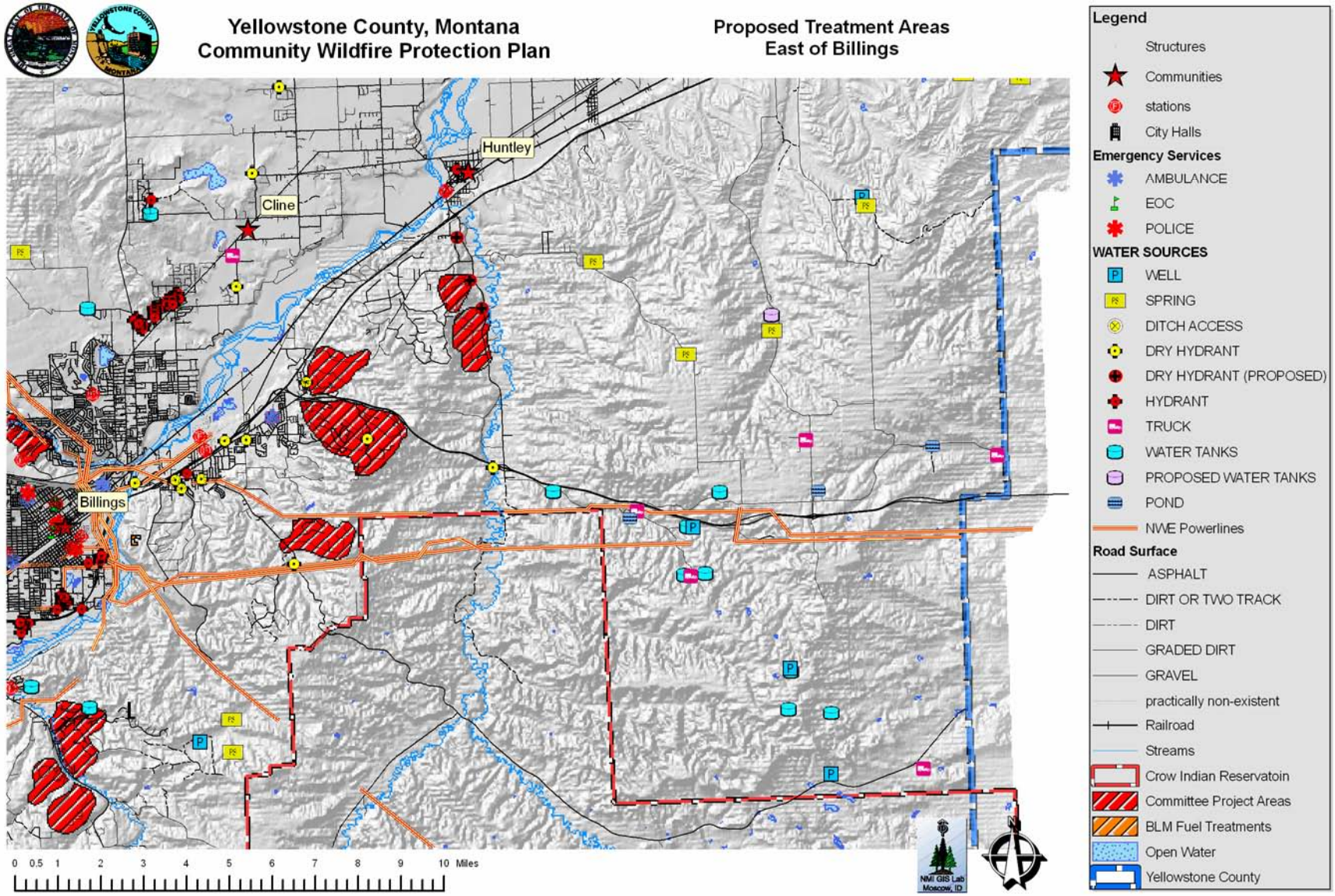
Proposed Treatment Areas in Billings Area, Yellowstone County.



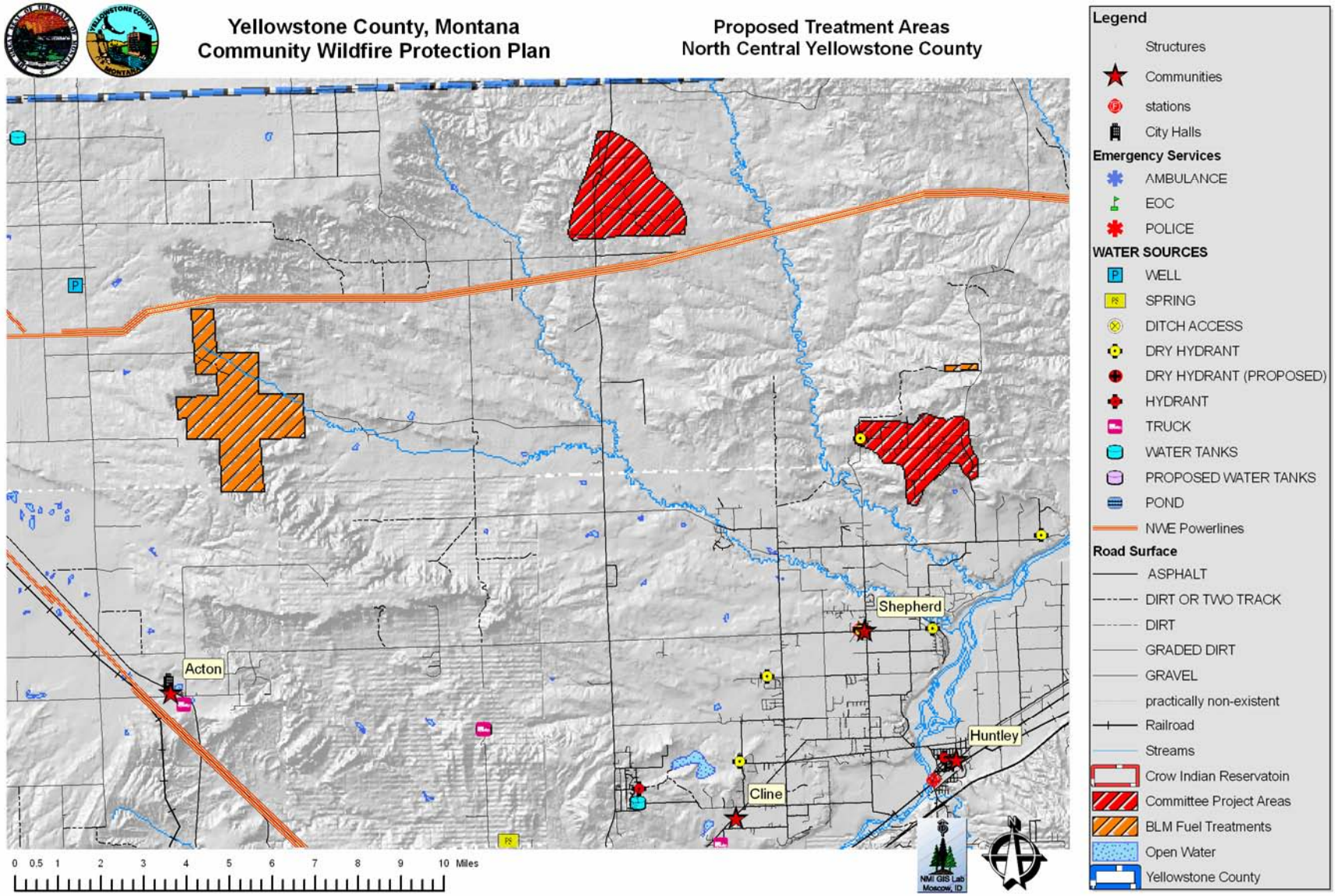
Buffalo Trails and Echo Canyon Proposed Treatment Areas



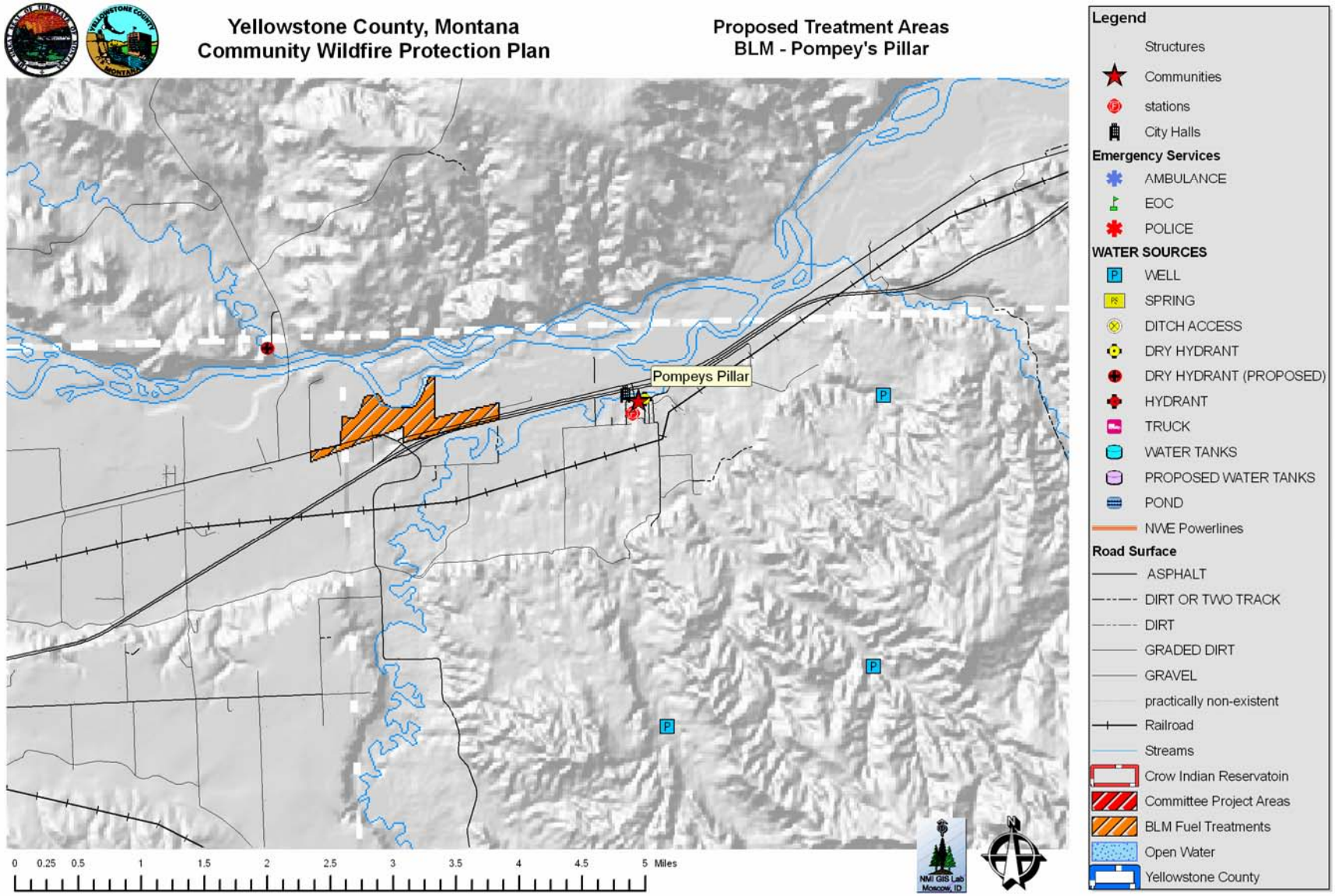
Proposed Treatment Areas East of Billings, Yellowstone County



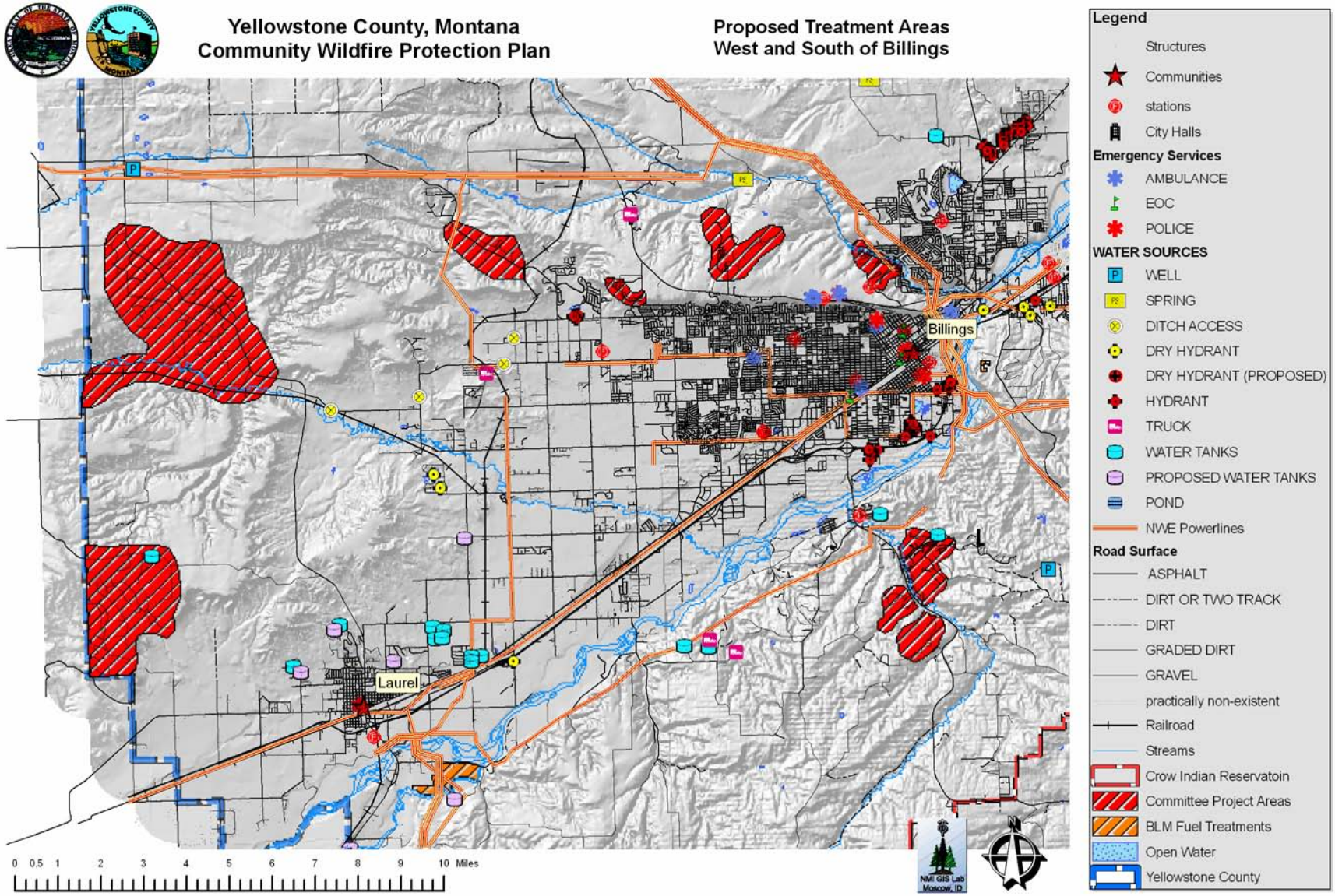
Proposed Treatment Areas in North Central Yellowstone County



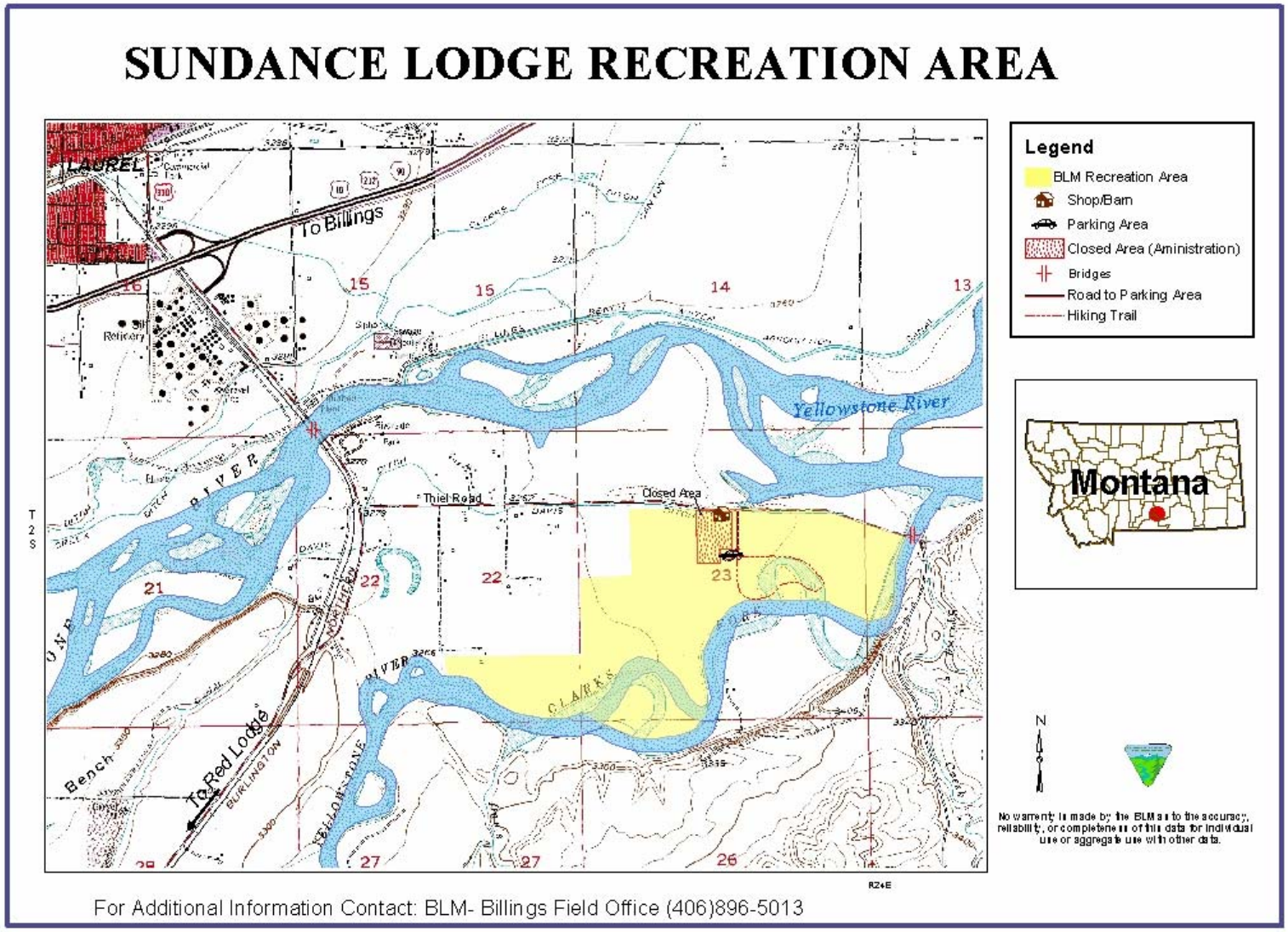
Proposed Treatment Areas near Pompeys Pillar, Yellowstone County



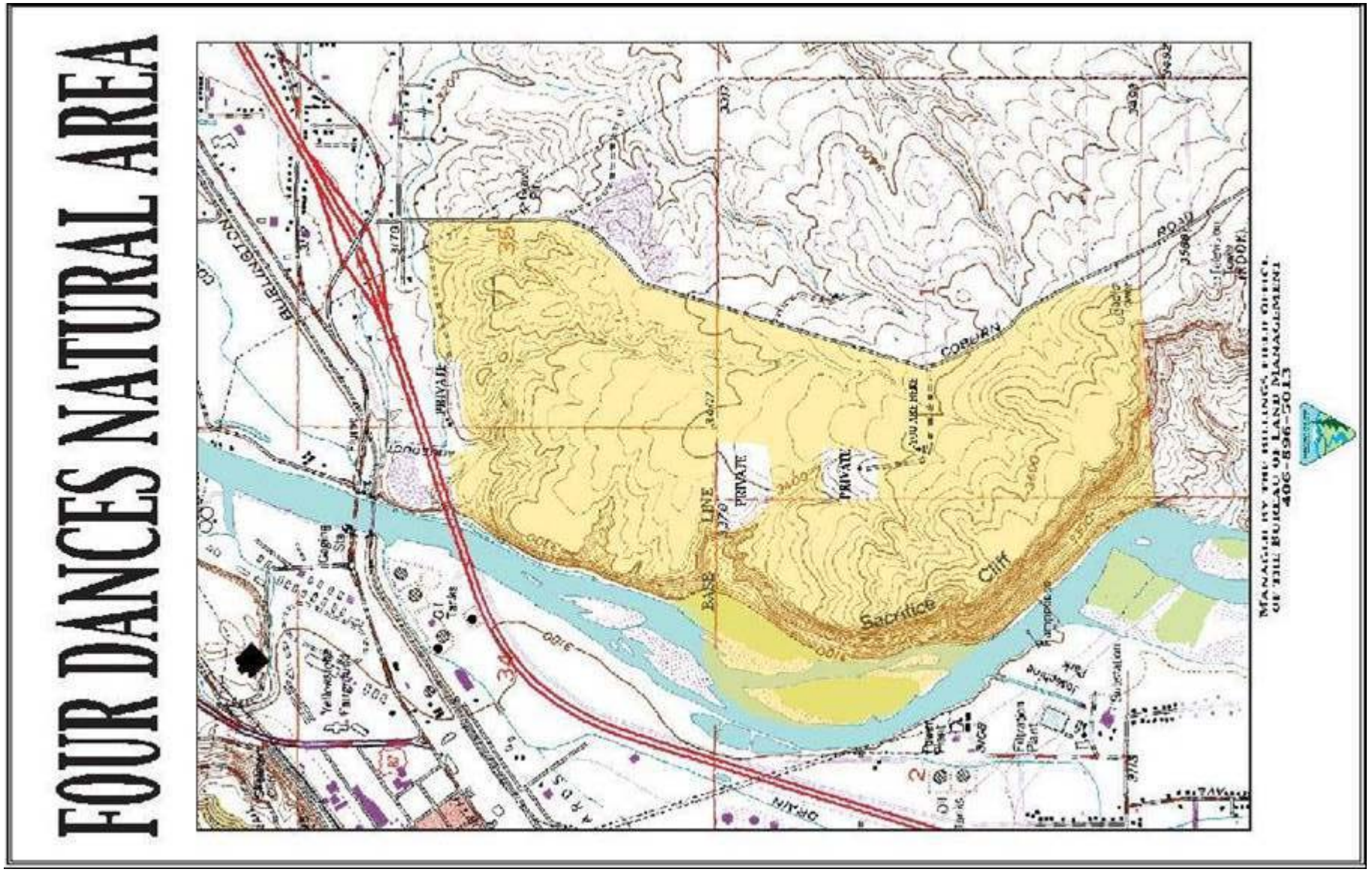
Proposed Treatment Areas West and South of Billings, Yellowstone County



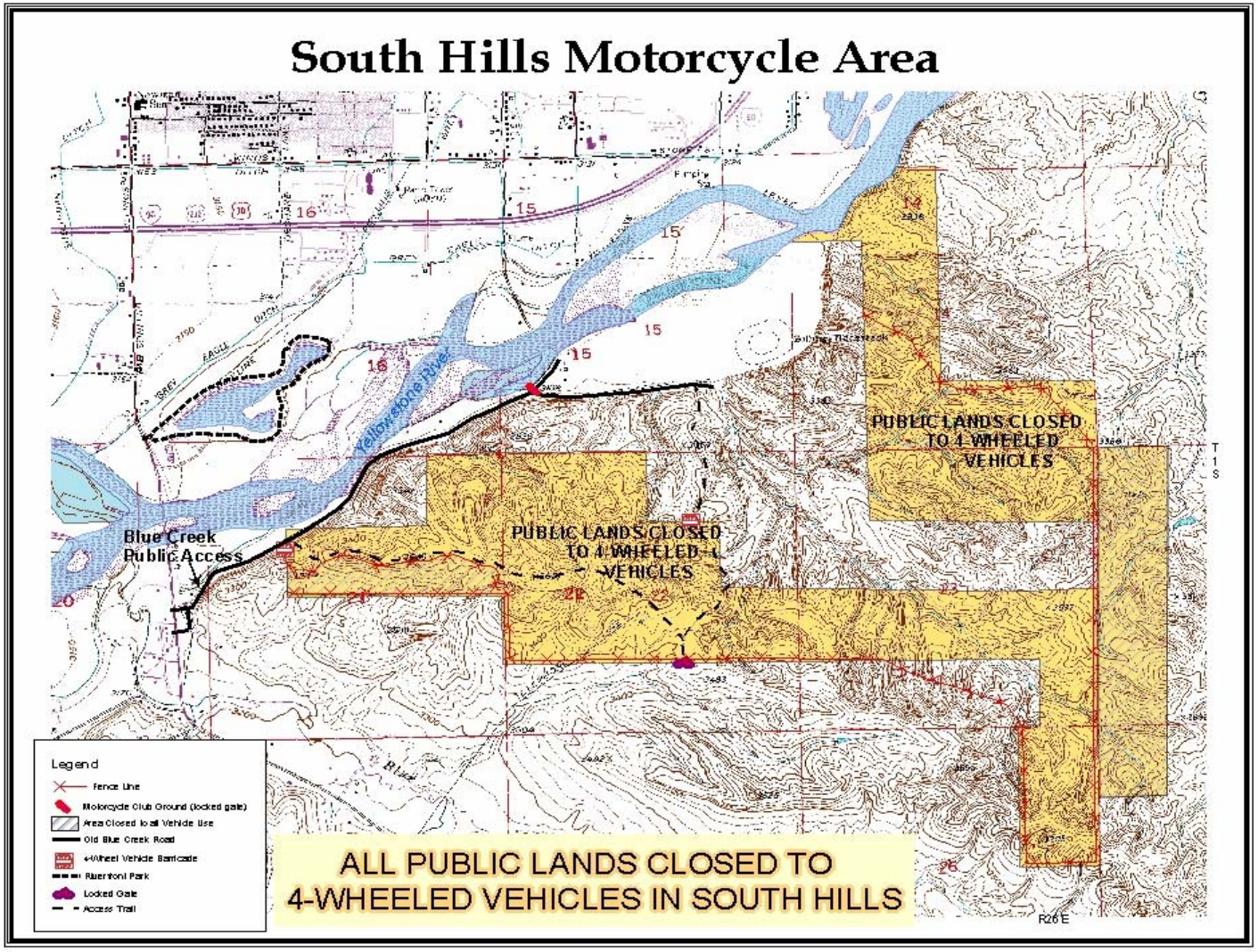
Bureau of Land Management Sundance Lodge Recreation Area Map



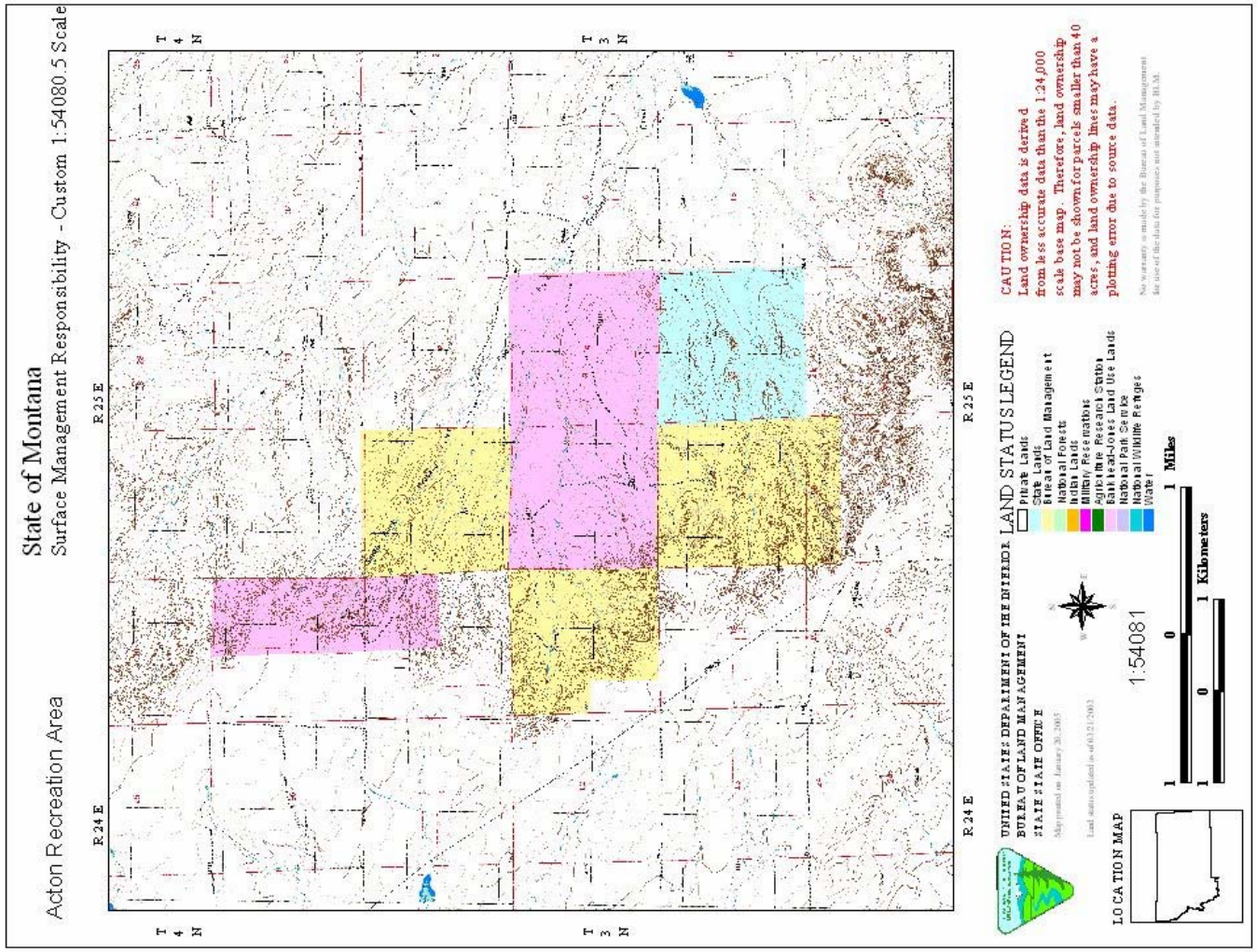
Bureau of Land Management Four Dances Natural Area Map



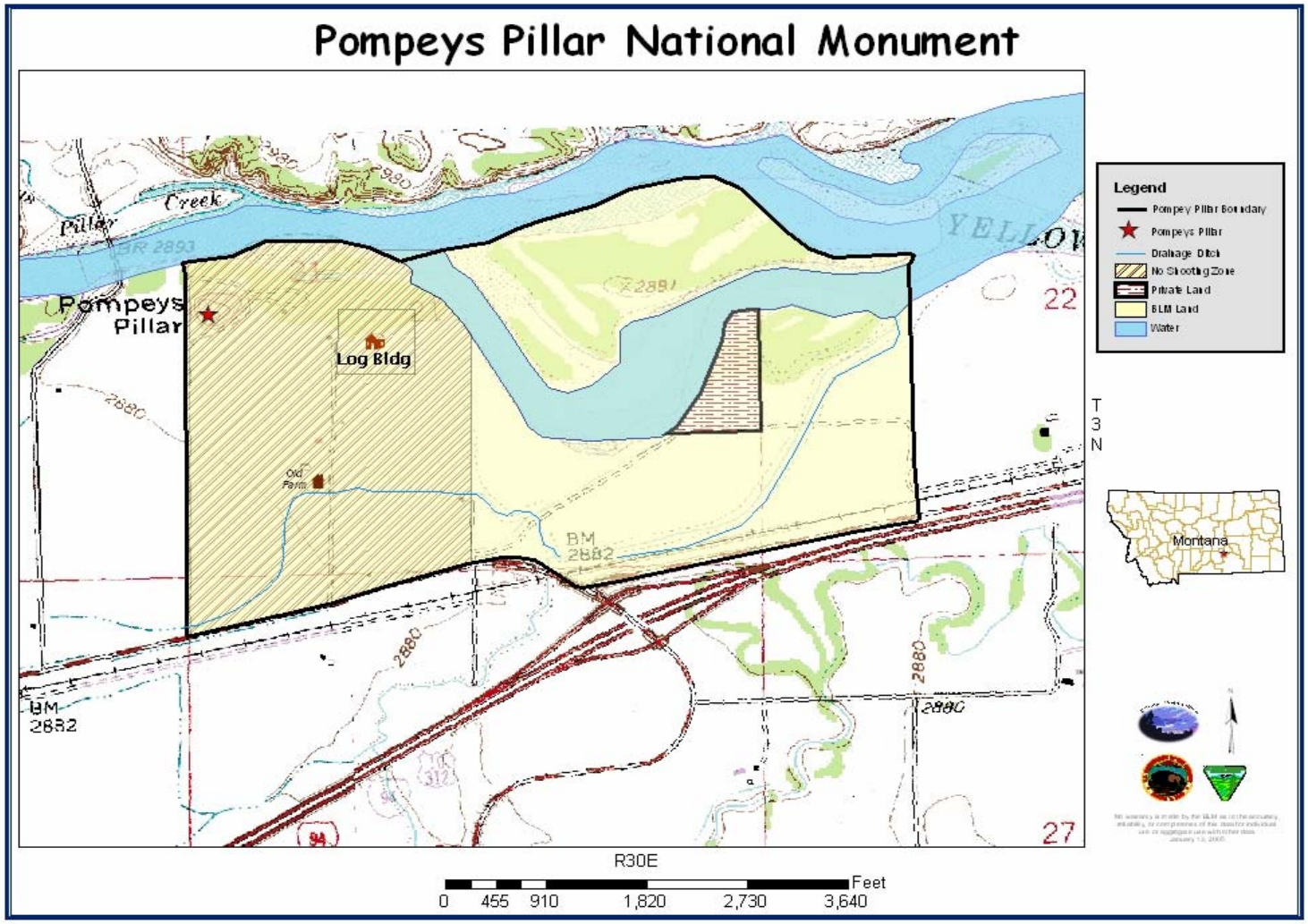
Bureau of Land Management South Hills Motorcycle Area Map



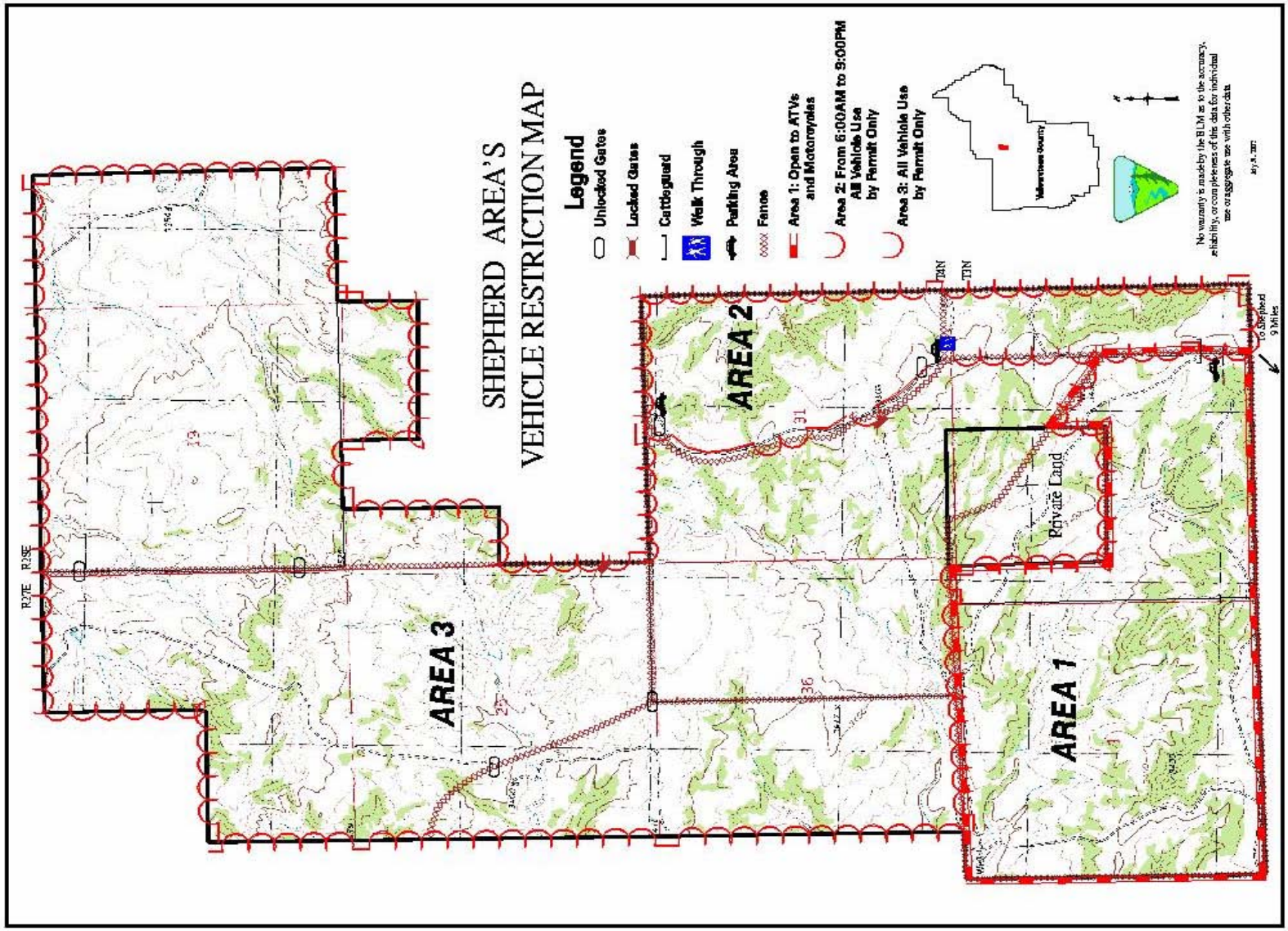
Bureau of Land Management Acton Recreation Area Map



Bureau of Land Management Pompeys Pillar National Monument Map



Bureau of Land Management Shepherd Area Vehicle Restriction Map



Appendix II

Project Prioritization

Planning Projects

Action Items for Safety and Policy

5.1.a. Adoption and enforcement of International Building Codes and/or more stringent hazard-related building code provisions.

	Project Type: Planning Project	
Item	**Criteria**	**Score**
1	Benefit/Cost	8
2	Vulnerability of the community or communities	6
3	Potential for repetitive loss reduction	5
4	Potential to mitigate hazards to future development	5
	Total	**24**
	Project Ranking Priority Score	**High**

5.1.b: Develop county policy concerning building materials used in high-risk WUI areas on existing structures and new construction.

	Project Type: Planning Project	
Item	**Criteria**	**Score**
1	Benefit/Cost	10
2	Vulnerability of the community or communities	10
3	Potential for repetitive loss reduction	5
4	Potential to mitigate hazards to future development	5
	Total	**30**
	Project Ranking Priority Score	**High**

5.1.c: Develop county policy requiring the installation of dry hydrants in subdivisions with 5 or more dwellings.

	Project Type: Planning Project	
Item	**Criteria**	**Score**
1	Benefit/Cost	4
2	Vulnerability of the community or communities	10
3	Potential for repetitive loss reduction	5
4	Potential to mitigate hazards to future development	5
	Total	**24**
	Project Ranking Priority Score	**High**

5.1.e: Develop a policy to enforce "No Burning" restrictions in specified high-risk subdivisions.

Item	Project Type: Planning Project Criteria	Score
1	Benefit/Cost	6
2	Vulnerability of the community or communities	10
3	Potential for repetitive loss reduction	5
4	Potential to mitigate hazards to future development	5
	Total	**26**
	Project Ranking Priority Score	**High**

5.1.f: Review need to inspect and enforce access and water issues in subdivisions and individual homes.

Item	Project Type: Planning Project Criteria	Score
1	Benefit/Cost	10
2	Vulnerability of the community or communities	7
3	Potential for repetitive loss reduction	5
4	Potential to mitigate hazards to future development	5
	Total	**27**
	Project Ranking Priority Score	**High**

5.1.g: Develop county policy concerning access in moderate to high-risk WUI areas where subdivisions are built to insure adequate ingress and egress during wildfire emergencies.

Item	Project Type: Planning Project Criteria	Score
1	Benefit/Cost	10
2	Vulnerability of the community or communities	10
3	Potential for repetitive loss reduction	5
4	Potential to mitigate hazards to future development	5
	Total	**30**
	Project Ranking Priority Score	**High**

5.1.h: Develop a county policy to support grant applications for projects resulting from this plan.

Item	Project Type: Planning Project Criteria	Score
1	Benefit/Cost	10
2	Vulnerability of the community or communities	10
3	Potential for repetitive loss reduction	5
4	Potential to mitigate hazards to future development	5
	Total	**30**
	Project Ranking Priority Score	**High**

Action Items for People and Structures

5.2.a: Youth and Adult Wildfire Educational Programs and Professional Development Training.

	Project Type: Planning Project	
Item	Criteria	Score
1	Benefit/Cost	10
2	Vulnerability of the community or communities	10
3	Potential for repetitive loss reduction	5
4	Potential to mitigate hazards to future development	5
	Total	30
	Project Ranking Priority Score	High

Action Items for Resources and Capabilities

5.4.b: Retention of Volunteer Firefighters.

	Project Type: Planning Project	
Item	Criteria	Score
1	Benefit/Cost	10
2	Vulnerability of the community or communities	10
3	Potential for repetitive loss reduction	5
4	Potential to mitigate hazards to future development	5
	Total	30
	Project Ranking Priority Score	High

5.4.c: Increased training and capabilities of firefighters.

	Project Type: Planning Project	
Item	Criteria	Score
1	Benefit/Cost	10
2	Vulnerability of the community or communities	10
3	Potential for repetitive loss reduction	5
4	Potential to mitigate hazards to future development	5
	Total	30
	Project Ranking Priority Score	High

5.4.e: Support the construction of the new Fire Station/Clinic/Pharmacy/Community Center in Lockwood.

	Project Type: Planning Project	
Item	Criteria	Score
1	Benefit/Cost	10
2	Vulnerability of the community or communities	10
3	Potential for repetitive loss reduction	5
4	Potential to mitigate hazards to future development	5
	Total	30
	Project Ranking Priority Score	High

Non-Planning Projects

Action Items for Safety and Policy

5.1.d: Begin distributing "New Code of the West" pamphlets with subdivision permit requests.

Project Type: Implementation Project (Non-Planning)

Item	Criteria	Score
1	Benefit / Cost	1077:1
2	Population Benefit	3
3	Property Benefit	$ 140,874,831
4	Economic Benefit	2
5	Project Feasibility (environmentally, politically, socially)	5
6	Hazard Magnitude/Frequency	2
7	Potential for repetitive loss reduction	1
8	Potential to mitigate hazards to future development	4
9	Potential project effectiveness and sustainability	3
	Total	**40**
	Project Ranking Priority Score	**High**

Action Items for People and Structures

5.2.b: Wildfire risk assessments of homes in identified communities.

5.2.c: Home site WUI Treatments.

Project Type: Implementation Project (Non-Planning)

Item	Criteria	Score
1	Benefit / Cost	133:1
2	Population Benefit	5
3	Property Benefit	$ 416,051,316
4	Economic Benefit	4
5	Project Feasibility (environmentally, politically, socially)	5
6	Hazard Magnitude/Frequency	3
7	Potential for repetitive loss reduction	3
8	Potential to mitigate hazards to future development	2
9	Potential project effectiveness and sustainability	5
	Total	**42**
	Project Ranking Priority Score	**High**

5.2.d: Community Defensible Zone WUI Treatments (specifically, Clapper Flats, Buffalo Trails, Rehberg Ranch, Alkali Creek, Hills Estates, Cedar Ridge, Pleasant Hollow, Shadow Canyon, White Buffalo, High Trails, Indian Cliffs, and Emerald Hills).

	Project Type: Implementation Project (Non-Planning)	
Item	**Criteria**	**Score**
1	Benefit / Cost	262:1
2	Population Benefit	10
3	Property Benefit	$ 140,874,831
4	Economic Benefit	3
5	Project Feasibility (environmentally, politically, socially)	5
6	Hazard Magnitude/Frequency	3
7	Potential for repetitive loss reduction	3
8	Potential to mitigate hazards to future development	1
9	Potential project effectiveness and sustainability	5
	Total	**50**
	Project Ranking Priority Score	**High**

5.2.e: Maintenance of Home site WUI Treatments.

5.2.f: Re-entry of Home site WUI Treatments.

	Project Type: Implementation Project (Non-Planning)	
Item	**Criteria**	**Score**
1	Benefit / Cost	239:1
2	Population Benefit	5
3	Property Benefit	$ 416,051,316
4	Economic Benefit	4
5	Project Feasibility (environmentally, politically, socially)	5
6	Hazard Magnitude/Frequency	3
7	Potential for repetitive loss reduction	3
8	Potential to mitigate hazards to future development	2
9	Potential project effectiveness and sustainability	5
	Total	**47**
	Project Ranking Priority Score	**High**

5.2.g: Implement proposed home defensible space projects.

	Project Type: Implementation Project (Non-Planning	Scores		
Item	**Criteria**	**Rehberg Ranch**	**Clapper Flats**	**Alkali Creek**
1	Benefit / Cost	197:1	114:1	191:1
2	Population Benefit	10	10	10
3	Property Benefit	$ 16,347,652	$ 5,658,240	$ 32,807,504
4	Economic Benefit	5	4	7
5	Project Feasibility (environmentally, politically, socially)	5	5	5
6	Hazard Magnitude/Frequency	3	3	3
7	Potential for repetitive loss reduction	3	3	3
8	Potential to mitigate hazards to future development	0	0	0
9	Potential project effectiveness and sustainability	5	5	5
	Total	**40**	**35**	**51**
	Project Ranking Priority Scores	**High**	**Medium**	**High**

5.2.g: Implement proposed home defensible space projects.

	Project Type: Implementation Project (Non-Planning	Scores		
Item	Criteria	Hills Estates	Buffalo Trails	Indian Cliffs
1	Benefit / Cost	268:1	138:1	274:1
2	Population Benefit	10	10	10
3	Property Benefit	$ 1,742,546	$ 17,105,638	$ 19,202,149
4	Economic Benefit	2	6	6
5	Project Feasibility (environmentally, politically, socially)	5	5	5
6	Hazard Magnitude/Frequency	3	3	3
7	Potential for repetitive loss reduction	3	3	3
8	Potential to mitigate hazards to future development	0	0	0
9	Potential project effectiveness and sustainability	5	5	5
	Total	**38**	**38**	**43**
	Project Ranking Priority Scores	**Medium**	**Medium**	**High**

5.2.g: Implement proposed home defensible space projects.

	Project Type: Implementation Project (Non-Planning	Scores		
Item	Criteria	Pleasant Hollow	Cedar Ridge	White Buffalo
1	Benefit / Cost	122:1	119:1	96:1
2	Population Benefit	10	10	10
3	Property Benefit	$ 9,416,085	$ 3,921,391	$ 1,056,852
4	Economic Benefit	5	4	3
5	Project Feasibility (environmentally, politically, socially)	5	5	5
6	Hazard Magnitude/Frequency	3	3	3
7	Potential for repetitive loss reduction	3	3	3
8	Potential to mitigate hazards to future development	0	0	0
9	Potential project effectiveness and sustainability	5	5	5
	Total	**36**	**35**	**33**
	Project Ranking Priority Scores	**Medium**	**Medium**	**Medium**

5.2.g: Implement proposed home defensible space projects.

	Project Type: Implementation Project (Non-Planning	Scores		
Item	Criteria	Shadow Canyon	High Trails	Emerald Hills
1	Benefit / Cost	100:1	262:1	139:1
2	Population Benefit	10	10	10
3	Property Benefit	$ 996,257	$ 3,277,614	$ 29,342,713
4	Economic Benefit	3	3	7
5	Project Feasibility (environmentally, politically, socially)	5	5	5
6	Hazard Magnitude/Frequency	3	3	3
7	Potential for repetitive loss reduction	3	3	3
8	Potential to mitigate hazards to future development	0	0	0
9	Potential project effectiveness and sustainability	5	5	5
	Total	**33**	**39**	**49**
	Project Ranking Priority Scores	**Medium**	**Medium**	**High**

Action Items for Infrastructure Enhancement Projects

5.3.a: Post "Emergency Evacuation Route" signs along the identified primary and secondary access routes in the county.

	Project Type: Implementation Project (Non-Planning)	
Item	**Criteria**	**Score**
1	Benefit / Cost	123274:1
2	Population Benefit	10
3	Property Benefit	$ 9,245,585
4	Economic Benefit	6
5	Project Feasibility (environmentally, politically, socially)	5
6	Hazard Magnitude/Frequency	5
7	Potential for repetitive loss reduction	5
8	Potential to mitigate hazards to future development	5
9	Potential project effectiveness and sustainability	5
	Total	**51**
	Project Ranking Priority Score	**High**

5.3.b: Access improvements of bridges, cattle guards, and limiting road surfaces.

	Project Type: Implementation Project (Non-Planning)	
Item	**Criteria**	**Score**
1	Benefit / Cost	180:1
2	Population Benefit	2
3	Property Benefit	$ 184,911,696
4	Economic Benefit	8
5	Project Feasibility (environmentally, politically, socially)	5
6	Hazard Magnitude/Frequency	2
7	Potential for repetitive loss reduction	4
8	Potential to mitigate hazards to future development	5
9	Potential project effectiveness and sustainability	5
	Total	**48**
	Project Ranking Priority Score	**High**

5.3.c: Improve communications throughout the County by installing additional repeater towers and obtaining portable repeaters for emergency response personnel.

	Project Type: Implementation Project (Non-Planning)	
Item	**Criteria**	**Score**
1	Benefit / Cost	2845:1
2	Population Benefit	8
3	Property Benefit	$ 739,646,784
4	Economic Benefit	6
5	Project Feasibility (environmentally, politically, socially)	4
6	Hazard Magnitude/Frequency	3
7	Potential for repetitive loss reduction	3
8	Potential to mitigate hazards to future development	3
9	Potential project effectiveness and sustainability	5
	Total	**52**
	Project Ranking Priority Score	**High**

5.3.d: Erect a repeater tower on the site donated by the Conover Ranch near Broadview.

	Project Type: Implementation Project (Non-Planning)	
Item	**Criteria**	**Score**
1	Benefit / Cost	716:1
2	Population Benefit	3
3	Property Benefit	$ 14,327,461
4	Economic Benefit	3
5	Project Feasibility (environmentally, politically, socially)	5
6	Hazard Magnitude/Frequency	3
7	Potential for repetitive loss reduction	3
8	Potential to mitigate hazards to future development	3
9	Potential project effectiveness and sustainability	5
	Total	**36**
	Project Ranking Priority Score	**Medium**

5.3.e: Fuels mitigation of the "Emergency Evacuation Routes" in the County to insure these routes can be maintained in the case of an emergency.

	Project Type: Implementation Project (Non-Planning)	
Item	**Criteria**	**Score**
1	Benefit / Cost	92:1
2	Population Benefit	8
3	Property Benefit	$ 277,367,544
4	Economic Benefit	7
5	Project Feasibility (environmentally, politically, socially)	2
6	Hazard Magnitude/Frequency	3
7	Potential for repetitive loss reduction	3
8	Potential to mitigate hazards to future development	3
9	Potential project effectiveness and sustainability	2
	Total	**42**
	Project Ranking Priority Score	**High**

5.3.f: Erect a repeater tower system to support the Shepherd Volunteer Fire Department and Shepherd community.

	Project Type: Implementation Project (Non-Planning)	
Item	**Criteria**	**Score**
1	Benefit / Cost	2659:1
2	Population Benefit	2
3	Property Benefit	$ 159,554,607
4	Economic Benefit	2
5	Project Feasibility (environmentally, politically, socially)	3
6	Hazard Magnitude/Frequency	3
7	Potential for repetitive loss reduction	3
8	Potential to mitigate hazards to future development	4
9	Potential project effectiveness and sustainability	4
	Total	**41**
	Project Ranking Priority Score	**High**

5.3.g: Access improvements through roadside fuels management.

	Project Type: Implementation Project (Non-Planning	Scores		
Item	Criteria	Rehberg Ranch	Clapper Flats	Alkali Creek
1	Benefit / Cost	2063:1	783:1	3705:1
2	Population Benefit	10	10	10
3	Property Benefit	$ 16,347,652	$ 5,658,240	$ 32,807,504
4	Economic Benefit	5	4	7
5	Project Feasibility (environmentally, politically, socially)	4	4	4
6	Hazard Magnitude/Frequency	3	3	3
7	Potential for repetitive loss reduction	3	3	3
8	Potential to mitigate hazards to future development	3	3	0
9	Potential project effectiveness and sustainability	5	5	5
	Total	**44**	**42**	**52**
	Project Ranking Priority Scores	**High**	**High**	**High**

5.3.g: Access improvements through roadside fuels management.

	Project Type: Implementation Project (Non-Planning	Scores		
Item	Criteria	Hills Estates	Buffalo Trails	Indian Cliffs
1	Benefit / Cost	456:1	643:1	3383:1
2	Population Benefit	10	10	10
3	Property Benefit	$ 1,742,546	$ 17,105,638	$ 19,202,149
4	Economic Benefit	2	6	6
5	Project Feasibility (environmentally, politically, socially)	4	4	4
6	Hazard Magnitude/Frequency	3	3	3
7	Potential for repetitive loss reduction	3	3	3
8	Potential to mitigate hazards to future development	0	0	0
9	Potential project effectiveness and sustainability	5	5	5
	Total	**37**	**42**	**42**
	Project Ranking Priority Scores	**Medium**	**High**	**High**

5.3.g: Access improvements through roadside fuels management.

	Project Type: Implementation Project (Non-Planning	Scores		
Item	Criteria	Pleasant Hollow	Cedar Ridge	White Buffalo
1	Benefit / Cost	469:1	573:1	187:1
2	Population Benefit	10	10	10
3	Property Benefit	$ 9,416,085	$ 3,921,391	$ 1,056,852
4	Economic Benefit	5	4	3
5	Project Feasibility (environmentally, politically, socially)	4	4	4
6	Hazard Magnitude/Frequency	3	3	3
7	Potential for repetitive loss reduction	3	3	3
8	Potential to mitigate hazards to future development	0	0	0
9	Potential project effectiveness and sustainability	5	5	5
	Total	**40**	**39**	**36**
	Project Ranking Priority Scores	**High**	**Medium**	**Medium**

5.3.g: Access improvements through roadside fuels management.

	Project Type: Implementation Project (Non-Planning	Scores		
Item	Criteria	Shadow Canyon	High Trails	Emerald Hills
1	Benefit / Cost	89:1	588:1	1746:1
2	Population Benefit	10	10	10
3	Property Benefit	$ 996,257	$ 3,277,614	$ 29,342,713
4	Economic Benefit	3	3	7
5	Project Feasibility (environmentally, politically, socially)	4	4	4
6	Hazard Magnitude/Frequency	3	3	3
7	Potential for repetitive loss reduction	3	3	3
8	Potential to mitigate hazards to future development	0	0	0
9	Potential project effectiveness and sustainability	5	5	5
	Total	**32**	**38**	**52**
	Project Ranking Priority Scores	**Medium**	**Medium**	**High**

Action Items for Resources and Capabilities

5.4.a: Enhance radio availability in each department, link into existing dispatch, improve range within the region, and conversion to consistent standard of radio types.

	Project Type: Implementation Project (Non-Planning)	
Item	Criteria	Score
1	Benefit / Cost	370:1
2	Population Benefit	10
3	Property Benefit	$ 92,455,848
4	Economic Benefit	6
5	Project Feasibility (environmentally, politically, socially)	5
6	Hazard Magnitude/Frequency	3
7	Potential for repetitive loss reduction	5
8	Potential to mitigate hazards to future development	5
9	Potential project effectiveness and sustainability	5
	Total	**59**
	Project Ranking Priority Score	**High**

5.4.d: Obtain a Type 6 wildland fire truck, a ProPAC foam kit, a floater pump, and additional personal protective equipment for the Broadview Fire District #3.

	Project Type: Implementation Project (Non-Planning)	
Item	Criteria	Score
1	Benefit / Cost	179:1
2	Population Benefit	2
3	Property Benefit	$ 14,327,461
4	Economic Benefit	2
5	Project Feasibility (environmentally, politically, socially)	4
6	Hazard Magnitude/Frequency	3
7	Potential for repetitive loss reduction	3
8	Potential to mitigate hazards to future development	2
9	Potential project effectiveness and sustainability	3
	Total	**27**
	Project Ranking Priority Score	**Medium**

5.4.f: Obtain a Type 6 engine, two 1,000 gallon pumper trucks, and a heated truck storage facility for the Worden Volunteer Fire Department.

	Project Type: Implementation Project (Non-Planning)	
Item	**Criteria**	**Score**
1	Benefit / Cost	346:1
2	Population Benefit	2
3	Property Benefit	$ 148,815,924
4	Economic Benefit	2
5	Project Feasibility (environmentally, politically, socially)	4
6	Hazard Magnitude/Frequency	3
7	Potential for repetitive loss reduction	3
8	Potential to mitigate hazards to future development	2
9	Potential project effectiveness and sustainability	3
	Total	**39**
	Project Ranking Priority Score	**Medium**

5.4.g: Obtain a 4x4 pumper truck and a 1,500-2,000 gallon water tender for the Laurel Fire Department.

	Project Type: Implementation Project (Non-Planning)	
Item	**Criteria**	**Score**
1	Benefit / Cost	52:1
2	Population Benefit	2
3	Property Benefit	$ 14,500,006
4	Economic Benefit	2
5	Project Feasibility (environmentally, politically, socially)	4
6	Hazard Magnitude/Frequency	2
7	Potential for repetitive loss reduction	3
8	Potential to mitigate hazards to future development	3
9	Potential project effectiveness and sustainability	3
	Total	**22**
	Project Ranking Priority Score	**Low**

5.4.h: Construction of a Shepherd Volunteer Fire Department satellite station in the Hidden Lake area.

	Project Type: Implementation Project (Non-Planning)	
Item	**Criteria**	**Score**
1	Benefit / Cost	1596:1
2	Population Benefit	2
3	Property Benefit	$ 159,554,607
4	Economic Benefit	2
5	Project Feasibility (environmentally, politically, socially)	4
6	Hazard Magnitude/Frequency	3
7	Potential for repetitive loss reduction	3
8	Potential to mitigate hazards to future development	3
9	Potential project effectiveness and sustainability	4
	Total	**41**
	Project Ranking Priority Score	**High**

5.4.i: Additional heated equipment storage facility for the Broadview Fire Department #3.

	Project Type: Implementation Project (Non-Planning)	
Item	**Criteria**	**Score**
1	Benefit / Cost	179:1
2	Population Benefit	2
3	Property Benefit	$ 14,327,461
4	Economic Benefit	2
5	Project Feasibility (environmentally, politically, socially)	4
6	Hazard Magnitude/Frequency	3
7	Potential for repetitive loss reduction	2
8	Potential to mitigate hazards to future development	3
9	Potential project effectiveness and sustainability	2
	Total	**26**
	Project Ranking Priority Score	**Medium**

5.4.j: Establish onsite water sources such as dry hydrants or underground storage tanks for rural housing developments.

	Project Type: Implementation Project (Non-Planning)	
Item	**Criteria**	**Score**
1	Benefit / Cost	4623:1
2	Population Benefit	4
3	Property Benefit	$ 924,558,480
4	Economic Benefit	3
5	Project Feasibility (environmentally, politically, socially)	4
6	Hazard Magnitude/Frequency	2
7	Potential for repetitive loss reduction	3
8	Potential to mitigate hazards to future development	5
9	Potential project effectiveness and sustainability	5
	Total	**46**
	Project Ranking Priority Score	**High**

5.4.k: Establish a site and install a higher capacity municipal well and pump and a 100,000 gallon storage tank for the town of Broadview.

	Project Type: Implementation Project (Non-Planning)	
Item	**Criteria**	**Score**
1	Benefit / Cost	57:1
2	Population Benefit	3
3	Property Benefit	$ 14,327,461
4	Economic Benefit	3
5	Project Feasibility (environmentally, politically, socially)	3
6	Hazard Magnitude/Frequency	3
7	Potential for repetitive loss reduction	3
8	Potential to mitigate hazards to future development	5
9	Potential project effectiveness and sustainability	5
	Total	**28**
	Project Ranking Priority Score	**Medium**

5.4.l: Establish a non-potable water well and storage system to supply fire hydrants, dry hydrants, and fire suppression systems in public buildings in the town of Broadview.

	Project Type: Implementation Project (Non-Planning)	
Item	**Criteria**	**Score**
1	Benefit / Cost	72:1
2	Population Benefit	3
3	Property Benefit	$ 14,327,461
4	Economic Benefit	3
5	Project Feasibility (environmentally, politically, socially)	3
6	Hazard Magnitude/Frequency	3
7	Potential for repetitive loss reduction	3
8	Potential to mitigate hazards to future development	4
9	Potential project effectiveness and sustainability	5
	Total	**28**
	Project Ranking Priority Score	**Medium**

5.4.m: Obtain a Type 3 WUI pumper truck for the Laurel Urban Fire Service Area.

	Project Type: Implementation Project (Non-Planning)	
Item	**Criteria**	**Score**
1	Benefit / Cost	418:1
2	Population Benefit	2
3	Property Benefit	$ 62,739,255
4	Economic Benefit	2
5	Project Feasibility (environmentally, politically, socially)	5
6	Hazard Magnitude/Frequency	2
7	Potential for repetitive loss reduction	3
8	Potential to mitigate hazards to future development	3
9	Potential project effectiveness and sustainability	3
	Total	**40**
	Project Ranking Priority Score	**High**

5.4.n: Obtain funding to add structural fire responsibilities to Broadview Fire District #3, which would include personnel incentives, additional rolling stock equipped with structural firefighting capabilities, structural turnout gear, and a larger equipment storage facility.

	Project Type: Implementation Project (Non-Planning)	
Item	**Criteria**	**Score**
1	Benefit / Cost	40:1
2	Population Benefit	2
3	Property Benefit	$ 14,327,461
4	Economic Benefit	2
5	Project Feasibility (environmentally, politically, socially)	4
6	Hazard Magnitude/Frequency	3
7	Potential for repetitive loss reduction	3
8	Potential to mitigate hazards to future development	3
9	Potential project effectiveness and sustainability	4
	Total	**23**
	Project Ranking Priority Score	**Low**

5.4.o: Obtain a Type 6 structural engine and a wood chipper for Lockwood Fire District #8.

	Project Type: Implementation Project (Non-Planning)	
Item	**Criteria**	**Score**
1	Benefit / Cost	2839:1
2	Population Benefit	2
3	Property Benefit	$ 204,422,546
4	Economic Benefit	2
5	Project Feasibility (environmentally, politically, socially)	3
6	Hazard Magnitude/Frequency	2
7	Potential for repetitive loss reduction	3
8	Potential to mitigate hazards to future development	3
9	Potential project effectiveness and sustainability	3
	Total	**38**
	Project Ranking Priority Score	**Medium**

5.4.p: Acquire sites and install dry hydrants on Pine Hills Road, High Trails Road, Coburn Hill Road, Yellowstone Trail Road, and Box Canyon Spring Road.

	Project Type: Implementation Project (Non-Planning)	
Item	**Criteria**	**Score**
1	Benefit / Cost	2405:1
2	Population Benefit	2
3	Property Benefit	$ 204,422,546
4	Economic Benefit	2
5	Project Feasibility (environmentally, politically, socially)	4
6	Hazard Magnitude/Frequency	3
7	Potential for repetitive loss reduction	4
8	Potential to mitigate hazards to future development	4
9	Potential project effectiveness and sustainability	4
	Total	**43**
	Project Ranking Priority Score	**High**

5.4. q: Obtain one structural engine, 3 Type 3 engines (to replace old 6x6's), and one Type 2 water tender for the Shepherd Volunteer Fire Department.

	Project Type: Implementation Project (Non-Planning)	
Item	**Criteria**	**Score**
1	Benefit / Cost	202:1
2	Population Benefit	2
3	Property Benefit	$ 159,554,607
4	Economic Benefit	2
5	Project Feasibility (environmentally, politically, socially)	4
6	Hazard Magnitude/Frequency	2
7	Potential for repetitive loss reduction	3
8	Potential to mitigate hazards to future development	3
9	Potential project effectiveness and sustainability	3
	Total	**37**
	Project Ranking Priority Score	**Medium**

5.4.r: Secure funding for a full time Laurel Volunteer Fire Department Chief.

	Project Type: Implementation Project (Non-Planning)	
Item	**Criteria**	**Score**
1	Benefit / Cost	5327:1
2	Population Benefit	4
3	Property Benefit	$ 346,236,721
4	Economic Benefit	2
5	Project Feasibility (environmentally, politically, socially)	4
6	Hazard Magnitude/Frequency	2
7	Potential for repetitive loss reduction	2
8	Potential to mitigate hazards to future development	2
9	Potential project effectiveness and sustainability	3
	Total	**39**
	Project Ranking Priority Score	**Medium**

5.4.s: Equip Laurel Emergency Operations Center with radios and phone lines.

	Project Type: Implementation Project (Non-Planning)	
Item	**Criteria**	**Score**
1	Benefit / Cost	4616:1
2	Population Benefit	4
3	Property Benefit	$ 346,236,721
4	Economic Benefit	2
5	Project Feasibility (environmentally, politically, socially)	5
6	Hazard Magnitude/Frequency	5
7	Potential for repetitive loss reduction	3
8	Potential to mitigate hazards to future development	5
9	Potential project effectiveness and sustainability	5
	Total	**49**
	Project Ranking Priority Score	**High**

Data Tables Used to Calculate Prioritization

Average Structure Value and Cost To Inspect and Treat per Project Area

Treatment Area	Acres	Parcels with Structures	Total Structure Value	Average Structure Value	Cost To Inspect and Treat
Clapper Flats Project Area	3463	55	$5,658,240	$102,877	$49,500
Buffalo Trails Project Area	7715	138	$17,105,638	$123,954	$124,200
Indian Cliffs Project Area	228	100	$19,202,149	$192,021	$70,000
Rehberg Ranch Project Area	1110	92	$16,347,652	$177,692	$82,800
Alkali Creek Project Area	449	245	$32,807,504	$133,908	$171,500
Emerald Hills Project Area	1710	234	$29,342,713	$125,396	$210,600
High Trail Project Area	765	25	$3,277,614	$131,105	$12,500
Hill Estates Project Area	553	13	$1,742,546	$134,042	$6,500
Pleasant Hollow Project Area	2072	86	$9,416,085	$109,489	$77,400
Shadow Canyon Project Area	681	20	$996,257	$49,813	$10,000
White Buffalo Project Area	319	22	$1,056,852	$48,039	$11,000
Cedar Ridge Project Area	2932	47	$3,921,391	$83,434	$32,900
Treatment Area Summary	21996	1077	$140,874,641	$130,803	$969,300
Structures Outside High Density Urban Area	***	7740	$924,559,341	$119,452	$6,966,000

Average Value of Structures per Fire Department

Name	Number of Structures	Total Value	Average Value
Billings FSA	3189	$ 423,860,078	$ 132,913
Blue Ck FSA Lakewood	274	$ 33,021,122	$ 120,515
Broadview FD 3	194	$ 14,327,461	$ 73,853
City of Billings	32517	$4,501,259,310	$ 138,428
City of Laurel	2158	$ 169,621,596	$ 78,601
Huntley FSA	1364	$ 135,498,014	$ 99,339
Laurel FD 5	133	$ 14,511,116	$ 109,106
Laurel FD 7	848	$ 99,364,754	$ 117,175
Laurel FSA	528	$ 62,739,255	$ 118,824
Lockwood FD 8	2118	$ 204,422,546	$ 96,517
Shepherd FSA	1685	$ 159,554,607	$ 94,691
Worden FD 4	145	$ 13,317,910	$ 91,848
Wildland Protection	1306	$ 131,785,180	$ 100,907

Roadside Fuels Treatments Within or Near Project Areas

Roadside Fuels Treatment Area	Total Miles	Total Acres	Cost
Clapper Flats Project Area	3.14	76.0	$ 7,221.83
Buffalo Trails Project Area	11.55	280.0	$ 26,603.49
Indian Cliffs Project Area	2.46	59.8	$ 5,676.45
Rehberg Ranch Project Area	3.44	83.4	$ 7,923.21
Alkali Creek Project Area	3.84	93.2	$ 8,854.89
Emerald Hills Project Area	7.30	176.9	$ 16,808.20
High Trail Project Area	2.42	58.7	$ 5,577.87
Hill Estates Project Area	1.66	40.2	$ 3,823.12
Pleasant Hollow Project Area	8.71	211.1	$ 20,058.61
Shadow Canyon Project Area	4.86	117.8	$ 11,192.81
White Buffalo Project Area	2.46	59.6	$ 5,665.11
Cedar Ridge Project Area	2.97	72.0	$ 6,837.99
Total	**54.82**	**1328.9**	**$126,243.57**

Appendix III

Public Mail Survey

Public Letter #1

Sent on September 21, 2005 and included a survey and a return envelope.

Yellowstone County

COMMISSIONERS
(406) 256-2701
(406) 256-2777 (FAX)

P.O. Box 35000
Billings, MT 59107-5000
commission@co.yellowstone.mt.us

Yellowstone County Community Wildfire Protection Plan Survey

September 21, 2005

«Name»

«Address»

«City», ID «Zip»

Dear Yellowstone County Resident:

Thank you for taking fifteen minutes of your time to read and respond to this short inquiry. Yellowstone County has contracted with Northwest Management, Inc., through a Bureau of Land Management grant, to work with a host of fire protection and emergency service organizations in Yellowstone County to develop a **community wildfire protection plan** in your area. As an individual who lives in Yellowstone County, you know that the urban-rural interface is at very high risk to casualty loss due to wildland fires.

This year we are taking a proactive role in mitigating wildland fire-caused casualty losses in the County. We are inviting you to take a proactive role as well.

Northwest Management, Inc. is developing improved predictive models of where fires are likely to ignite, locating and identifying high risk landscape characteristics, advancing improved land management practices to reduce fire rate-of-spread on forestlands and rangelands, and working with rural landowners to create wildland fire

defensible zones around homes and buildings. It is with the last of these goals that your help is needed.

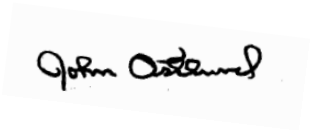
We would like you to complete the attached survey about your home's defensible space in the case of wildland fire. Your responses will be kept completely confidential and released only in aggregated form. This questionnaire will allow us to identify key criteria that may place your home and the homes of your neighbors at the greatest risk. We will use this information to develop mitigation activities that may lead to saving your home and the community you live in.

We have sent this letter and survey to only a select number of people living in Yellowstone County. Because of this, your response is very important to our efforts and the application of our findings to your home and to your community. Please take a few minutes to complete the enclosed survey and return it in the self addressed envelope.

We would like to thank you for your assistance on this project with a small token of appreciation. During the development of this project, Northwest Management, Inc. is completing some very advanced mapping of Yellowstone County. They have created detailed maps showing roads, rivers, elevation, fire prone landscapes, potential fire ignition locations, plant cover characteristics, and even orthophoto coverage (black and white images taken from high elevation) with features over them. These maps are printed at 8.5” x 11” sizes. If you give us a legal land description, they will make a high resolution map of this property and send it to you. The map might be the locale of your home, your property, or even your favorite recreation spot. When you complete your survey, please mark which map coverage you would like, and they will custom color print this map for you and send it at no charge. It is our way of thanking you for your input to this very important project.

Thank you for your assistance. If you have any questions about this project or this survey please contact Jim Kraft, Yellowstone County Fire Warden at 406-256-2775 or at jkraft@co.yellowstone.mt.us or Bill Schlosser at Northwest Management, Inc. in Moscow, Idaho, at 208-883-4488 or at schlosser@consulting-foresters.com.

Sincerely,



John Ostlund, Chairman

Board of County Commissioners

Yellowstone County, Montana

Yellowstone County Community Wildfire Protection Plan

Public Survey

1. Do you have a home in Yellowstone County?

    - O Yes
    - O No

2. Is this your primary residence?

    - O Yes
    - O No

3. Which community do you live closest to?

    _____

4. Does your area have 911 emergency telephone service?

    - O Yes
    - O No

5. Is your home protected by a rural fire department?

    - O No
    - O Yes, if yes what is the fire response time to your home?
        - O under 10 minutes
        - O 10 – 20 minutes
        - O 20 – 30 minutes
        - O 30 – 45 minutes
        - O more than 45 minutes

6. What type of roof does your home have (please mark one):

    - O Composite
    - O Wooden shake (shingles)
    - O Ceramic tiles
    - O Aluminum, tin, or other metal
    - O Other (please indicate: _____)

7. How many trees are within 250 feet of your home?

    - O None
    - O less than 10

- O Between 10 and 25
- O More than 25

8. How many trees are within 75 feet of your home?

   - O None
   - O less than 10
   - O Between 10 and 25
   - O More than 25

9. Do you have a lawn surrounding your home?

   - O No
   - O Yes, if yes is it kept green and trimmed all summer?
     - O No
     - O Yes

10. How long is your driveway, from the main road to your home parking area? Please indicate distance units in feet or miles.

    _____

    - O Feet
    - O Miles

11. If your driveway is over ½ mile long, does it have turnouts that would allow two trucks to pass each other?

    - O No
    - O Yes

12. What type of surfacing does your driveway have?

    - O Dirt
    - O Gravel/rock
    - O Paved

13. If the primary access to your home were cut off because of a wildfire, would you have an alternative route to escape through?

    - O No
    - O Yes

14. Please indicate which of the following items you have available at or near your home that could be used in fighting a wildland fire that threatens your home (mark all that apply)

    - O Hand tools (shovel, pulaski, etc.)
    - O Portable water tank

- Stationery water tank
- Pond, lake, or stream water supply close
- Water pump and fire hose
- Well or cistern
- Equipment suitable for creating fire breaks (bulldozer, cat, skidder, etc.)

15. Use this exercise below to assess your home's fire risk rating:
    Circle the ratings in each category that best describes your home.

16.

Fuel Hazard Rating Worksheet		Rating
Fuel Hazard (within 200 feet of structures)	Small, light fuels (grasses, forbs, weeds, shrubs)	1
	Medium size fuels (brush, large shrubs, small trees)	2
	Heavy, large fuels (woodlands, timber, heavy brush)	3
Slope Hazard (within 200 feet of structures)	Mild slopes (0-5%)	1
	Moderate slope (6-20%)	2
	Steep Slopes (21-40%)	3
	Extreme slopes (41% and greater)	4
Structure Hazard	Noncombustible roof and noncombustible siding materials	1
	Noncombustible roof and combustible siding material	3
	Combustible roof and noncombustible siding material	7
	Combustible roof and combustible siding materials	10
Additional Factors	Rough topography that contains several steep canyons or ridges	+2
	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

Fuel hazard _____ x Slope Hazard _____ = _____

Structural hazard + _____

Additional factors (+ or -) _____

Total Hazard Points = _____

Extreme Risk = 26 + points
High Risk = 16–25 points
Moderate Risk = 6–15 points
Low Risk = 6 or less points

17. Do you conduct a periodic fuels reduction program near your home site such as grass or brush burning?

    O No

    O Yes

18. Do livestock (cattle, horses, sheep) graze the grasses and forbs around your home?

    O No

    O Yes

19. If offered in your area, would members of your household attend a free, or low cost, half-day training seminar designed to teach homeowners in the rural–urban interface how to improve the defensible space surrounding your home and adjacent outbuildings?

    O No

    O Yes

20. How do you feel Fire Mitigation projects should be **<u>funded</u>** in the areas surrounding homes, communities, and infrastructure such as power lines and major roads?

	Mark the box that best applies to your preference		
	100% Public Funding	**Cost-Share (Public & Private)**	**Privately Funded (Owner or Company)**
Home Defensibility Projects	O	O	O
Community Defensibility Projects	O	O	O
Infrastructure Projects **Roads, Bridges, Power Lines, Etc.**	O	O	O

Thank you very much for completing this survey and sending it back to us. This information will be combined with other data to assess the greatest threats to defending homes and adjacent buildings in the rural–urban interface where Wildland fires are common.

Please place the completed survey and the Map Request Form in the self-addressed envelope and place it in the mail for return to us. Thank you!

Your name and address are printed here so we can remove you from our mailing list once we have received your completed survey.

Order Your Yellowstone County Area Map

FREE

As a token of appreciation for completing and returning this survey, we would like to send you a detailed map of your favorite area. Complete this form and return it to us with your survey and we will custom print a color map of your property and send it to you. Maps are produced by NMI during the winter months of December, January and February. Expect your maps to arrive in the mail during this time.

What is the legal land description of the property you want mapped (must be in Yellowstone County).

_____ T _____N, R _____ E.

or describe the area _____

_____

About how many acres is the parcel you want mapped? _____ acres

What would you like printed as the title of the map? (Five or less words, please print)

_____

Please select which coverage (only one per map) you would like as the primary theme:

- O Land Ownership Categories (over shaded relief map)
- O Ortho photo (limited availability)

All maps include:

- Roads
- Streams & rivers
- Community locations
- Building locations (where available)
- Township, Range, and Sections (property lines are not included)
- Hillshade relief placed in the background to provide representation of slope and elevation.

Please verify your name and full address here so we can send your map to you:

Our records indicate that your address is:	If this is incorrect please correct it here: _____ _____ _____

Public Letter #2

sent as a postcard on October 4, 2005

October 4, 2005

Dear Yellowstone County Resident:

About a week ago, we mailed you a letter and a brief survey concerning the wildfire situation in your community. That survey is instrumental to the success of the Community Wildfire Protection Plan we are developing in conjunction with Northwest Management, Inc. through a grant from the Bureau of Land Management. We have received responses from many families in the area and we wish to extend our thanks and appreciation to everyone who has participated. However, we still have not received completed surveys from many homes in the region. If you have not returned the completed survey to us yet, please take a few minutes to complete the survey and return it in the self-addressed envelope provided with the letter.

Your responses are very important to this effort which will recommend the location and type of fire mitigation projects to be implemented in the area of your home. If you have any questions about the survey, please contact Jim Kraft, the Yellowstone County Fire Warden, at 406-256-2775 or Bill Schlosser at the Northwest Management, Inc. office in Moscow, ID at 208-883-4488. If you did not receive my original letter, or if you misplaced your survey, you can request a new one at one of the numbers above.

Thank you for your time and your assistance with this project!

John Ostlund, Chairman

Yellowstone County Board of Commissioners

Public letter #3

Sent on October 11, 2005 and included a replacement survey and return envelope (not included here).

Yellowstone County

COMMISSIONERS
(406) 256-2701
(406) 256-2777 (FAX)

P.O. Box 35000
Billings, MT 59107-5000
commission@co.yellowstone.mt.us

Yellowstone County Community Wildfire Protection Plan

{{Date}}

«Name»

«Address»

«City», ID «Zip»

Dear Yellowstone County Landowner:

Thank you for taking some of your time to read and respond to this short inquiry. About two weeks ago, we sent you a letter and package of materials much like this one. In it, we asked if you would please assist our efforts by reading, filling out, and returning a survey concerning a **Community Wildfire Protection Plan** Yellowstone County is preparing through a grant from the Bureau of Land Management. We are working in cooperation with the natural resource consulting firm, Northwest Management, Inc., and a host of fire protection and emergency service organizations in Yellowstone County. While we have received excellent responses from many residents of the area, we have not received them from everyone**. If you have completed and returned your survey, please accept our sincere thanks!** If you have not returned the completed survey, please do so as soon as possible.

As an individual who owns property in Yellowstone County, you know that this area is at very high risk to casualty loss due to wildfires. We have all witnessed the images of fires over the past few years that ravaged the western states. However, today we are doing more than watching for wildland fires; we are taking a proactive role in reducing fire-caused casualty losses in Yellowstone County. We are inviting you to take a proactive role as well.

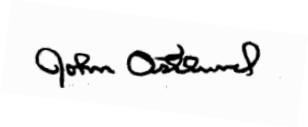
We would like you to complete the attached survey about your home's defensibility in the case of a wildland fire. Your responses will be kept completely confidential and released only in aggregated form. This questionnaire will allow us to identify key criteria that may place your home and the homes of your neighbors at the greatest risk. We will use this information to develop mitigation activities that may lead to saving your home and the community you live in.

We have sent this letter and survey to only a select number of people in Yellowstone County. Because of this, your response is very important to our efforts and the application of our findings to your home and to your community. Please take a few minutes to complete the enclosed survey and return it in the self-addressed envelope.

We would like to thank you for your assistance on this project with a small token of appreciation. During the development of this project, Northwest Management, Inc. is completing some very advanced mapping of Yellowstone County. They have created detailed maps showing roads, rivers, elevation, fire prone landscapes, potential fire ignition locations, plant cover characteristics, and even orthophoto coverage (black and white images taken from high elevation) with features over them. These maps are printed at 8.5" x 11" sizes. If you give us a legal land description, they will make a high resolution map of this property and send it to you. The map might be the locale of your home, your property, or even your favorite recreation spot. When you complete your survey, please mark which map coverage you would like, and they will custom color print this map for you and send it at no charge. It is our way of thanking you for your input to this very important project.

Thank you for your assistance. If you have any questions about this project or this survey please contact Jim Kraft, Yellowstone County Fire Warden at 406-256-2775 or at jkraft@co.yellowstone.mt.us or Bill Schlosser at Northwest Management, Inc. in Moscow, Idaho, at 208-883-4488 or at schlosser@consulting-foresters.com.

Sincerely,



John Ostlund, Chairman

Board of County Commissioners

Yellowstone County, Montana

Appendix IV

Potential Funding Sources

Program: **Rural Fire Assistance**

Source: Montana Department of Natural Resources and Conservation

Description: The Rural Fire Assistance Program is a Department of the Interior program to enhance firefighter safety and strengthen fire protection capabilities. Safe and effective fire suppression in the wildland urban interface demands close coordination among local, state, tribal, and federal firefighting resources. Funding will be used to provide technical assistance, training, supplies, equipment and public education support to rural fire departments.

More info: VFA/RFA Grant Program Coordinator Montana DNRC Forestry Division / Fire and Aviation Management Bureau 2705 Spurgin Road Missoula, Montana 59804-3199

Program: **Communities at Risk**

Source: USDA Forest Service

Description: Assistance to communities for hazardous fuels reduction projects in the wildland urban interface; includes funding for assessments and mitigation planning.

More info: Regional Forester Rick Cables 303-275-5350

Program: **State Fire Assistance**

Source: US Forest Service

Description: USFS grants to state foresters through state and private grants, under authority of Cooperative Forestry Assistance Act. Grant objectives are to maintain and improve protection efficiency and effectiveness on non-federal lands, training, equipment, preparedness, prevention and education.

More info: www.fireplan.gov

Program: **State Fire Assistance Hazard Mitigation Program**

Source: National Fire Plan

Description: These special state Fire Assistance funds are targeted at hazard fuels treatment in the wildland-urban interface. Recipients include state forestry organizations, local fire services, county emergency planning committees and private landowners.

More info: www.fireplan.gov and www.fs.fed.us/r4

Program: **Volunteer Fire Assistance**

Source: Montana Department of Natural Resources and Conservation

Description: VFA, Title IV, is a federal matching funds program with dollars provided through the USDA Forest Service. The program is administered by the Montana State Forester (State Department of Natural Resources and Conservation - DNRC). Title II/IV authorizes the Secretary of Agriculture to provide funds and technical assistance to the Montana DNRC to organize, train and equip local forces for preventing and suppressing wildfires.

More info: VFA/RFA Grant Program Coordinator Montana DNRC Forestry Division / Fire and Aviation Management Bureau 2705 Spurgin Road Missoula, Montana 59804-3199

Program: **Forest Land Enhancement Program**

Source: US Forest Service

Description: The 2002 Farm Bill repealed the Forestry Incentives Program (authorized in 1978) and Stewardship Incentive Program (1990) cost share programs and replaced it with a new Forest Land Enhancement Program (FLEP). FLEP purposes include 1) Enhance the productivity of timber, fish and wildlife habitat, soil and water quality, wetland, recreational resources, and aesthetic values of forest land through landowner cost share assistance, and 2) Establish a coordinated, cooperative federal, state and local sustainable forestry program to establish, manage, maintain, enhance and restore forests on non-industrial private forest land.

More info: www.usda.gov/farmbill

Program: **National Association of State Agencies for Surplus Property**

Source: Montana State Agency for Surplus Property

Description: Provides assistance to other state, county, and local governments by providing excess state property (equipment, supplies, tools) for wildland and rural community fire response.

More info: Mark Athearn, Program Manager Phone: 406-495-6016, Fax: 406-495-6001, Email: mathearn@state.mt.us

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Program: **Federal Excess Property**

Source: US Forest Service

Description: Provides assistance to state, county and local governments by providing excess federal property (equipment, supplies, tools) for wildland and rural community fire response.

More info: Mark Athearn, Program Manager Phone: 406-495-6016, Fax: 406-495-6001, Email: mathearn@state.mt.us

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Program: **Economic Action Program**

Source: US Forest Service

Description: A USFS, state and private program with involvement from local Forest Service offices to help identify projects. Addresses long-term economic and social health of rural areas; assists the development of enterprises through diversified uses of forest products, marketing assistance, and utilization of hazardous fuel byproducts.

More info: http://www.fs.fed.us/spf/coop/programs/eap/; Dave Atkins Phone: 406-329-3132 Fax:406-329-3132, email: datkins@fs.fes.us

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Program: **Forest Stewardship Program**

Source: US Forest Service

Description: Funding helps enable preparation of management plans on state, private and tribal lands to ensure effective and efficient hazardous fuel treatment.

More info: http://www.fs.fed.us/r1-r4/spf/stewardship.html, Dee Sessions (801) 625-5189, (801) 625-5127 FAX, dsessions@fs.fed.us

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Program: **Community Planning**

Source: US Forest Service

Description: USFS provides funds to recipients with involvement of local Forest Service offices for the development of community strategic action and fire risk management plans to increase community resiliency and capacity.

More info:

Program: **Firefighters Assistance**

Source: Federal Emergency Management Agency and US Fire Administration Program

Description: Financial assistance to help improve fire-fighting operations, services and provide equipment.

More info: www.usfa.fema.gov

Program: **Pre-Disaster Mitigation Program**

Source: Federal Emergency Management Agency

Description: Emergency management assistance to local governments to develop hazard mitigation plans.

More info: www.usfa.fema.gov; Larry Akers, Montana Disaster and Emergency Services, (406) 841-3960 e-mail: lakers@mt.gov

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Program: **Community Protection Fuels Mitigation Grants**

Source: USDA Forest Service

Description: The purpose of this grant program is to protect communities and subdivisions from fires that cross onto private property from adjacent federal property. By providing assistance to private landowners to reduce their fuel hazard, the threat to communities is reduced.

More info: Montana DNRC @ http://dnrc.mt.gov/forestry/Fire/Grants/cwpp.asp

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Program: **Community Facilities Loans and Grants**

Source: Rural Housing Service (RHS) U. S. Dept. of Agriculture

Description: Provides grants (and loans) to cities, counties, states and other public entities to improve community facilities for essential services to rural residents. Projects can include fire and rescue services; funds have been provided to purchase fire-fighting equipment for rural areas. No match is required.

More info: http://www.rurdev.usda.gov;/or local county Rural Development office.

Program: **Sale of Federal Surplus Personal Property**

Source: General Services Administration

Description: This program sells property no longer needed by the federal government. The program provides individuals, businesses and organizations the opportunity to enter competitive bids for purchase of a wide variety of personal property and equipment. Normally, there is no use restrictions on the property purchased.

More info: www.gsa.gov

Program: **Reimbursement for Firefighting on Federal Property**

Source: U. S. Fire Administration, Federal Emergency Management Agency

Description: Program provides reimbursement to fire service organizations that have engaged in firefighting operations on federal land. Payments can be for direct expenses and direct losses.

More info: www.fema.gov

Program: **Fire Management Assistance Grant Program**

Source: Readiness, Response and Recovery Directorate, FEMA

Description: Program provides grants to states, tribal governments and local governments for the mitigation, management and control of any fire burning on publicly (nonfederal) or privately owned forest or grassland that threatens such destruction as would constitute a major disaster. The grants are made in the form of cost sharing with the federal share being 75 percent of total eligible costs. Grant approvals are made within 1 to 72 hours from time of request.

More info: www.fema.gov

Program: **Hazard Mitigation Grant Program**

Source: Federal Insurance and Mitigation Administration, FEMA

Description: Provides states and local governments with financial assistant to implement measures to reduce of eliminate damage and losses from natural hazards. Funded projects have included vegetation management projects. It is each State's responsibility to identify and select hazard mitigation projects.

More info: www.fema.gov

Program: **Catalog of Selected Federal Grants and Assistance**

Source: National Association of Conservation Districts

Description: Provides several lists of potential federal funding sources supporting the National Fire Plan.

More info: http://www.forestry.nacdnet.org/biomass/Funding/SpecificSources.htm

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Program: **Building Better Rural Places**

Source: U.S. Department of Agriculture in collaboration with the Michael Fields Agricultural Institute

Description: This guide is written for anyone seeking help from federal programs to foster innovative enterprises in agriculture and forestry in the United States. Specifically, the guide addresses program resources in community development; sustainable land management; and value-added and diversified agriculture and forestry. Thus, it can help farmers, entrepreneurs, community developers, conservationists, and many other individuals, as well as private and public organizations, both for-profit and not-for-profit.

More info: http://attra.ncat.org/guide/index.html

Program: **Fuels for Schools and Beyond**

Source: Fuels for Schools Partnership

Description: To promote and encourage the use of wood as a renewable, natural resource to provide a clean, readily available energy source suitable for use in heating systems in public and private buildings. To facilitate the removal of hazardous fuels from our forests by assisting in the development of viable commercial uses of removed material.

More info: http://www.fuelsforschools.org/

Appendix V

Training Programs

Program: **National Fire Academy Educational Program**

Source: National Fire Academy, U. S. Fire Administration, FEMA

Description: Provides training to people responsible for fire prevention and control. Training is provided at the resident facility in Emmetsburg, Maryland, and travel stipends are available for attendees. The course is available to any individual who is a member of a fire department; attendees are selected based on need and benefit to be derived by their community.

More info: www.fema.gov

Program: **Emergency Management Institute (EMI), Independent Study Program**

Source: EMI Readiness, Response and Recovery Directorate, FEMA

Description: The program currently provides 32 courses in emergency management practices to assist fire department managers with response to emergencies and disasters. Several courses could apply to fires in rural interface areas.

More info: www.fema.gov

Program: **Northern Rockies Training Center**

Source: Various state and federal agencies

Description: This site enables access to the Northern Rockies Geographic Area Interagency Wildland Fire Training program. The Northern Rockies Training Center (NRTC) and the Northern Rockies Local Zones together, serve the Wildland Fire training needs of the Northern Rockies Area..

More info: http://www.nationalfiretraining.net/nr/schedule.htm

Program: **Fire Services Training School**

Source: Montana State University Extension Service

Description: This program offers a wide variety of fire rescue courses and hands-on training in various locations throughout Montana.

More info: http://www.montana.edu/~wwwfire/index.html or phone: 1-800-294-5272

Program: **National Interagency Fire Center**

Source: Various federal agencies

Description: The National Interagency Fire Center (NIFC) in Boise, Idaho is the nation's support center for wildland fire fighting offering various wildland fire training courses.

More info: www.nifc.gov or phone: 208-387-5512

Research Programs

Program: **Forestry Research** (Forest and Rangeland Renewable Resources Research Act)

Source: U S Forest Service

Description: Awards grants for research in a wide array of forest-related fields, including forest management and forest fire protection.

Contact: www.fs.fed.uslinksresearch.html

Private Foundations

Source: **The Allstate Foundation**

Description: Provides grants for community development, government/public administration, safety/disasters. Grants average $1,000 to $10,000.

Deadline: None

More info: Guidelines available by mail request only: 2775 Sanders Rd., Suite F3, Northbrook, IL 60062-6127; www.allstate.com/foundation/

Source: **Plum Creek Foundation**

Description: Provides grants for community projects in areas of company operations. In 2000, grants were awarded to a volunteer fire department and a county search & rescue unit. An application form is required. Grants average around $5,000.

Deadline: None

More info: Contact foundation at 999-3rd Ave, Suite 2300, Seattle, WA 98104; 206-467-3600; www.plumcreek.com/company/foundation.cfm; foundation@plumcreek.com

Source: **The Steele-Reese Foundation**

Description: Provides grants for rural development and projects that benefit rural areas; Montana is one of several areas in which the foundation funds projects. Have funded projects for emergency volunteers and fire protection districts in the past. Grant amounts fall within a wide range. The foundation requires three copies of the request letter; no application form is required.

Deadline: April 1

More info: 32 Washington Square West, New York, NY 10011. Info on programs:

406-722-4564

Appendix VI

Forming a Not For Profit Fire Service Organization

A non-profit organization is a group organized for purposes other than generating profit and in which no part of the organizations income is distributed to its members, directors, or officers. Some volunteer fire departments are organized as non-profit organizations.

Many -- but not all -- non-profit corporations, depending upon their purposes, can qualify for exemption from federal corporate income taxes. The U.S. Internal Revenue Code contains more than 25 different classifications of tax-exempt groups, including professional associations, charitable organizations, civic leagues, labor unions, fraternal organizations, and social clubs, to name just a few. Depending on the category of the exemption, such groups are entitled to certain privileges and subject to certain reporting and disclosure requirements and limitations on their activities. There are also a number of reporting requirements that must be adhered to after your organization is up and running.

Incorporation as a non-profit organization:

- Incorporation is a good idea if the group plans on being in existence for several years and has the need to raise money through grants and donations that require tax-exempt status.
- Incorporation and the process of seeking tax-exempt status can be costly and time-consuming.
- Liability of leaders and members of the corporation is limited (in other words, the individuals who control the corporation are not responsible, except in unusual situations, for the legal and financial obligations of the organization).
- There is a tax advantage for the financial donor if money is given to a tax-exempt corporation. (Tax-exempt status is defined in section 501 (c) (3) of the IRS Tax Code.) Money can, however, be legally given to any group or individual without tax-exempt status.
- Some foundations will simply not fund groups that do not have final approval from IRS of its tax-exempt application.
- Incorporation requires careful minutes of official organizational meetings and good financial record keeping.
- If the group's budget is more than $25,000 per year, a tax return needs to be filed.
- Incorporation takes between 6 and 18 months to complete.

Incorporation Process:

- Develop clear and detailed By-laws and Articles of Incorporation
- Incorporation as a not-for-profit corporation within the state (filing with the state includes names and addresses of the first board of directors, etc.)
- File for recognition as tax-exempt with IRS

Estimated Costs for Incorporation . $2,600

Attorney fees	$1,000
Accountant fees	$1,000
Incorporation fees (state)	$ 50
Nonprofit application (IRS)	$ 550

Appendix VII

Federal Fire Related Codes

The Bureau of Land Management, the National Park Service, the Bureau of Indian Affairs, Fish and Wildlife Service, and the US Forest Service are all members of the National Wildfire Coordinating Group (NWCG). This group provides a formalized system of agreement on substantive issues. Any agreed-on policies, standards or procedures are then implemented directly by each agency. In effect, the NWCG is a large umbrella that coordinates wildland fire matters between all members of the group.

The 2001 Federal Wildland Fire Management Policy is in Chapter 3 in a report entitled "Review and Update of the 1995 Federal Wildland Fire Management Policy." The 2001 Wildland Fire Management Policy and the recommended changes in policy were accepted by the US Secretaries of Interior and Agriculture in 2001, bringing policy changes to the local agency level.

The National Fire Policy sets the policy for support among federal agencies for fire management, and encourages coordination with the individual states, tribes, and municipalities. The National Fire Policy places high priority on several other important topics. This interagency policy highlights and reiterates firefighter and public safety as the number one priority; the policy calls for an assessment of the consequences on safety, property, and cultural resources in choosing the appropriate response to wildland fire.

The National Fire Policy explains the role of federal wildland firefighters (including equipment) as that of only wildland firefighting, and in the special case of the wildland-urban interface use of federal personnel will be limited to exterior structural fire suppression only. The national policy forbids use of wildland firefighters to enter a house (or other structure).

Key Features of the 2001 Wildland Fire Policy:

The 2001 Wildland Fire Policy is the guiding source for how the federal government deals with wildland fire. The document covers a wide variety of issues: safety, protection priorities, planning for possible ignitions, and the use of fire for land management purposes; and communication and education of public and agency personnel.

The 2001 Wildland Fire Policy provides a loose framework that allows agencies at all levels of government (federal to local) to work together. Below are some listed points from the 2001 Wildland Fire Policy that briefly summarize what the document is about, and summarize what applies to the homeowner.

Point 1 - Safety

"Firefighter and public safety is the first priority. All Fire Management Plans and activities must reflect this commitment."

Point 3 - Response to Wildland Fire

"Fire, as a critical natural process, will be integrated into land and resource management plans and activities on a landscape scale, and across agency boundaries. Response to wildland fire is based on ecological, social, and legal consequences of the fire. The circumstances, under which a fire occurs, and the likely consequences on firefighter and public safety and welfare, natural and cultural resources, and values to be protected, dictate the appropriate management response to the fire."

Point 6 - Protection Priorities

“The protection of human life is the single, overriding priority. Setting priorities among protecting human communities and community infrastructure, other property and improvements, and natural and cultural resources will be based on the values to be protected, human health and safety, and the costs of protection. Once people have been committed to an incident, these human resources become the highest value to be protected.”

Point 7 – Wildland-Urban Interface

“The operational roles of federal agencies as partners in the Wildland-Urban Interface are wildland firefighting, hazardous fuels reduction, cooperative prevention and education, and technical assistance. Structural fire suppression is the responsibility of tribal, State, or local governments. Federal agencies may assist with exterior structural protection activities under formal Fire Protection Agreements that specify the mutual responsibilities of the partners, including funding.”

Point 14 - Interagency Cooperation

“Fire management planning, preparedness, prevention, suppression, fire use, restoration, and rehabilitation, monitoring, research, and education will be conducted on an interagency basis with the involvement of cooperators and partners.”

Organization

In terms of a firefighting organization, the federal government has come to terms with the challenges of multiple agencies, multiple land ownerships, and multiple objectives. Although each agency views wildland fire differently, through the interagency approach, the federal agencies have managed to establish a strong fire management organization.

The interagency effort has come about because it is difficult for any one agency to fund enough resources to protect all of its lands. By pooling their resources and carefully coordinating their efforts, the agencies can deal with the many fires that burn every year.

On the operational end of the National Wildfire Coordinating Group (NWCG) is the National Interagency Fire Center (NIFC) in Boise, Idaho. NIFC is a complex that houses all of the agencies in one place. NIFC provides safe, effective, and efficient policies and guidance, as well as technical and logistical support to the wildland fire management community.

All of the resources available on the national level are available for fire wildland fire suppression. Through a system of allocation and prioritizing, crews and resources are frequently moved around the United States to provide fire suppression services on federal lands.

The fire teams and crews ultimately carry out the wildland fire policy. These teams have the responsibility of ordering resources, asking for assistance, and for providing the fire suppression. They also determine whose land a fire is on and if it is a threat to people, to homes, or to other property.

The personnel within that fire management organization are wildland fire trained. The rules, regulations, and legal authority of the federal government are for the preservation of federally administered lands. With the exception of government compounds that have firefighters trained to deal with fires inside of buildings and other structures, federal wildland firefighters are not trained to deal with structural fires.

This plan was developed by Northwest Management, Inc., under contract with the Yellowstone County Commissioners with funding provided by the Montana Department of Natural Resources and Yellowstone County.

Citation of this work:

Schlosser, W. E. and T. R. King. *Lead Authors.* 2006. Yellowstone County, Montana, Community Wildfire Protection Plan. Northwest Management, Inc., Helena, Montana. February 28, 2006. Pp. 216.

Schlosser, W. E. and T. R. King. *Lead Authors.* 2006. Yellowstone County, Montana, Community Wildfire Protection Plan – Executive Summary. Northwest Management, Inc., Helena, Montana. February 28, 2006. Pp. 10.

Schlosser, W. E. and T. R. King. *Lead Authors.* 2006. Yellowstone County, Montana, Community Wildfire Protection Plan Appendices. Northwest Management, Inc., Helena, Montana. February 28, 2006. Pp. 66.

Last Page of Document

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