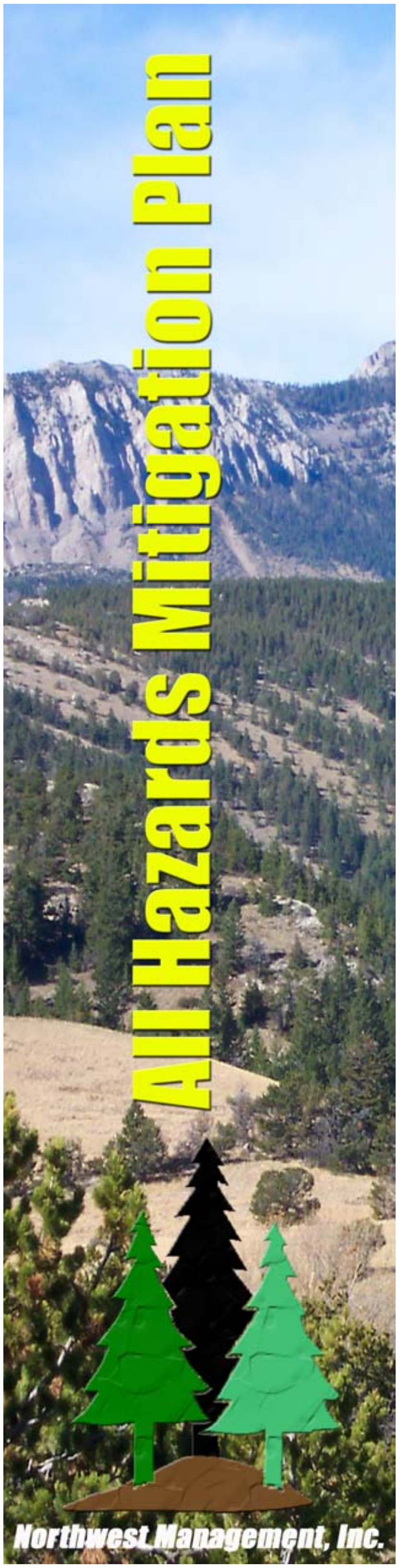


Teton County, Montana, All Hazard Mitigation Plan

Volume I

Flood Mitigation Plan

Landslide Mitigation Plan

Severe Weather Mitigation Plan

Earthquake Mitigation Plan

June 9, 2005

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

Teton County, Montana

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

Acknowledgments

This All Hazards Mitigation Plan represents the efforts and cooperation of a number of organizations and agencies, through the commitment of people working together to improve the preparedness for hazard events while reducing factors of risk.

Teton County Commissioners
and the employees of Teton County

USDI Bureau of Land Management

USDA Forest Service

Montana Disaster and Emergency Services

Federal Emergency Management Agency

Montana Fish, Wildlife & Parks

Montana Department of Natural Resources
and Conservation

NRCS
Natural Resources
Conservation Service

Teton County Sheriff Department
Choteau Fire Company
Fairfield Fire Company
Dutton Fire Company
Power Fire Company
Pendroy Fire Company
&
Local Businesses and Citizens of Teton County

To obtain copies of this plan contact:

Teton County Commissioner's Office
Teton County Courthouse
PO Box 610
Choteau, Montana 59422

Table of Contents

CHAPTER I: OVERVIEW OF THIS PLAN AND ITS DEVELOPMENT 1

1 INTRODUCTION 1

1.1 PHASE I HAZARD ASSESSMENT FOR TETON COUNTY 1
1.2 GOALS AND GUIDING PRINCIPLES 3
1.2.1 Federal Emergency Management Agency Philosophy 3
1.2.2 Additional State and Federal Guidelines Adopted 4
1.3 LOCAL GUIDELINES AND INTEGRATION WITH OTHER EFFORTS 5
1.3.1 Teton County Planning Effort and Philosophy 5
1.3.1.1 Mission Statement 5
1.3.1.2 Vision Statement 5
1.3.1.3 Goals 5
1.3.2 Coordination with Other County Plans 6
1.3.2.1 Teton County Growth Policy Plan 6

CHAPTER 2: DOCUMENTING THE PLANNING PROCESS 7

2 INITIATION 7

2.1 DESCRIPTION OF THE PLANNING PROCESS 7
2.2 THE PLANNING TEAM 7
2.3 PUBLIC INVOLVEMENT 8
2.3.1 News Releases 8
2.3.2 Newspaper Articles 9
2.3.3 Public Mail Survey 9
2.3.3.1 Survey Results 10
2.3.4 Committee Meetings 14
2.3.4.1 Committee Meeting Notes 15
2.3.4.1.1 September 15th, 2004 15
2.3.4.1.2 November 16th, 2004 16
2.3.4.1.3 December 14, 2005 17
2.3.4.1.4 February 22, 2005 19
2.3.4.1.5 March 30, 2005 21
2.3.4.1.6 April 19, 2005 22
2.3.5 Public Meetings 24
2.3.5.1 February 22nd, 2005 – Power 24
2.3.5.2 February 23, 2005 - Choteau 24
2.3.5.3 February 23rd, 2005 – Choteau 25
2.3.5.4 February 24, 2005 - Pendroy 25
2.3.5.5 February 24, 2005 - Fairfield 25
2.3.6 Documented Review Process 32
2.3.7 Continued Public Involvement 32

CHAPTER 3: COUNTY CHARACTERISTICS 33

3 BACKGROUND AND AREA DESCRIPTION 33

3.1 LOCATION AND LAND FORMS 33
3.2 DEMOGRAPHICS 37
3.3 SOCIOECONOMICS 39
3.4 DESCRIPTION OF TETON COUNTY 42
3.4.1 Teton County History 42
3.4.2 Recreation 43
3.4.2.1 Lewis and Clark National Forest 43
3.4.2.2 Wildlife Management Areas 44
3.4.2.3 BLM Public Lands 44
3.4.2.4 National Recreation Trails 44
3.4.2.5 Reservoirs 45
3.4.2.6 Camping 45
3.4.2.7 Winter Sports 45

3.4.2.8 Fishing and Hunting ... 45
3.4.3 Resource Dependency ... 45
3.4.4 Development Trends ... 46
3.4.5 Land Use ... 47
3.4.5.1 Agricultural Land Use ... 47
3.4.6 Wildland-Urban Interface ... 49
3.5 CULTURAL RESOURCES ... 52
3.6 TRANSPORTATION ... 54
3.7 VEGETATION & CLIMATE ... 54
3.7.1 Monthly Climate Summaries in Teton County ... 56
3.7.1.1 Pendroy, Montana ... 56
3.7.1.2 Choteau, Montana ... 56
3.7.1.3 Gibson Dam, Montana ... 56
3.7.1.4 Fairfield, Montana ... 57
3.7.2 Infrastructure ... 57
3.8 SOILS ... 61
3.9 HYDROLOGY ... 61
3.10 AIR QUALITY ... 62
3.11 FIRE FIGHTING RESOURCES AND CAPABILITIES ... 63
3.11.1 Wildland Fire ... 63
3.11.1.1 Fire Warden Summary of Resources and capabilities: ... 63
3.11.2 Rural Fire Departments ... 68
3.11.2.1 Choteau Volunteer Fire ... 68
3.11.2.2 Fairfield Rural Volunteer Fire Company ... 70
3.11.2.2.1 Grant Narrative ... 70
3.11.2.3 Dutton Rural Volunteer Fire Company ... 71
3.11.2.3.1 Grant Narrative ... 71
3.12 CRITICAL INFRASTRUCTURE ... 73
3.13 HAZARD PREPAREDNESS ... 76
3.13.1 Teton County Emergency Operations Plan ... 76
3.13.2 Rocky Mountain Ranger District Emergency Plan ... 77
3.14 HAZARD PROFILE OF TETON COUNTY ... 79

CHAPTER 4: FLOODS ... 84

4 FLOOD CHARACTERISTICS ... 84

4.1 HISTORY ... 84
4.2 WEATHER ... 85
4.3 TOPOGRAPHY ... 85
4.4 DEVELOPMENT ... 86
4.5 TETON COUNTY FLOOD PROFILE ... 86
4.5.1 Critical Infrastructure ... 96
4.5.2 Past Flood Events in Teton County ... 97
4.5.2.1 1964 Flood ... 97
4.5.3 County Wide Potential Mitigation Activities ... 97
4.5.3.1 Mitigation ... 98
4.5.3.2 Readiness/Education ... 98
4.5.3.3 Building Codes ... 98
4.5.3.4 Floodwater Diversion Dam on Teton River ... 101
4.6 COMMUNITIES ASSESSMENTS ... 103
4.6.1 Choteau ... 103
4.6.1.1 Flood Potential ... 103
4.6.1.2 Ingress-Egress ... 105
4.6.1.3 Infrastructure ... 106
4.6.1.4 Flood Protection ... 106
4.6.1.5 Community Risk Assessment ... 106
4.6.1.6 Mitigation Activities ... 107

CHAPTER 5: EARTHQUAKES ... 108

5 EARTHQUAKE CHARACTERISTICS ... 108

5.1 MEASURING AN EARTHQUAKE 109
5.2 EARTHQUAKE PROFILE IN MONTANA 109
5.2.1 Teton County Earthquake Profile 112
5.2.2 Teton County Geology 113
5.3 SEISMIC SHAKING HAZARDS 114
5.4 FAULT LINE GEOLOGY 115
5.5 COUNTY WIDE POTENTIAL MITIGATION ACTIVITIES 115

CHAPTER 6: LANDSLIDES 118

6 TETON COUNTY CONDITIONS 118

6.1 LANDSLIDE HAZARD PROFILE 118
6.2 LANDSLIDE PRONE LANDSCAPES 122
6.3 TETON COUNTY ASSESSMENT 122
6.4 GENERAL LANDSLIDE HAZARDS MITIGATION STRATEGIES 122
6.4.1 Establish a Countywide landslide hazard identification program 123
6.4.2 Restricting development in Landslide Prone Landscapes 123
6.4.3 Standardizing codes for excavation, construction, and grading 123
6.4.4 Protecting existing development 123
6.4.5 Post warnings of potentially hazardous areas and educate the public about areas to avoid 123
6.4.6 Utilizing monitoring and warning systems 123
6.4.7 Public Education 124
6.5 FIRE RELATED DEBRIS FLOWS 124
6.5.1 Conditions for fire-related debris-flow occurrences 125
6.6 GENERAL MITIGATION ACTIVITIES 125

CHAPTER 7: SEVERE WEATHER 127

7 SEVERE WEATHER CHARACTERISTICS 127

7.1 SEVERE WEATHER EVENT PROFILE 127
7.1.1 Winter Storms 128
7.1.2 Thunderstorms 129
7.1.3 Drought 129
7.1.4 Tornadoes and Windstorms 134
7.2 CLIMATE PROFILE FOR MONTANA 135
7.2.1 Topography 135
7.2.2 Temperature 136
7.2.3 Precipitation 137
7.3 TETON COUNTY CONDITIONS 137
7.3.1 County-Wide Potential Mitigation Activities 138
7.3.1.1 Mitigation 138
7.3.1.2 Readiness/Education 139
7.3.1.3 Building Codes 139

CHAPTER 8: POTENTIAL MITIGATION ACTIVITIES 140

8 ADMINISTRATION & IMPLEMENTATION STRATEGY 140

8.1 PRIORITIZATION OF MITIGATION ACTIVITIES 140
8.1.1 Prioritization Scheme 141
8.1.1.1 Benefit / Cost 142
8.1.1.2 Population Benefit 142
8.1.1.3 Property Benefit 142
8.1.1.4 Economic Benefit 143
8.1.1.5 Vulnerability of the Community 143
8.1.1.6 Project Feasibility (Environmentally, Politically & Socially) 143
8.1.1.7 Hazard Magnitude/Frequency 143
8.1.1.8 Potential for repetitive loss reduction 143
8.1.1.9 Potential project effectiveness and sustainability 144
8.1.1.10 Final ranking 144
8.2 RECOMMENDED HAZARD MITIGATION ACTIVITIES 144

8.2.1 Safety & Policy ... *144*
8.2.1.1 Overall Goals ... 144
8.2.1.2 Proposed Activities ... 145
8.2.2 People and Structures ... *146*
8.2.2.1 Overall Goals ... 146
8.2.2.2 Proposed Activities ... 147
8.2.3 Infrastructure ... *147*
8.2.3.1 Overall Goals ... 147
8.2.3.2 Proposed Activities ... 148
8.2.4 Resource and Capability Enhancements ... *150*
8.2.4.1 Overall Goals ... 150
8.2.4.2 Proposed Activities ... 150

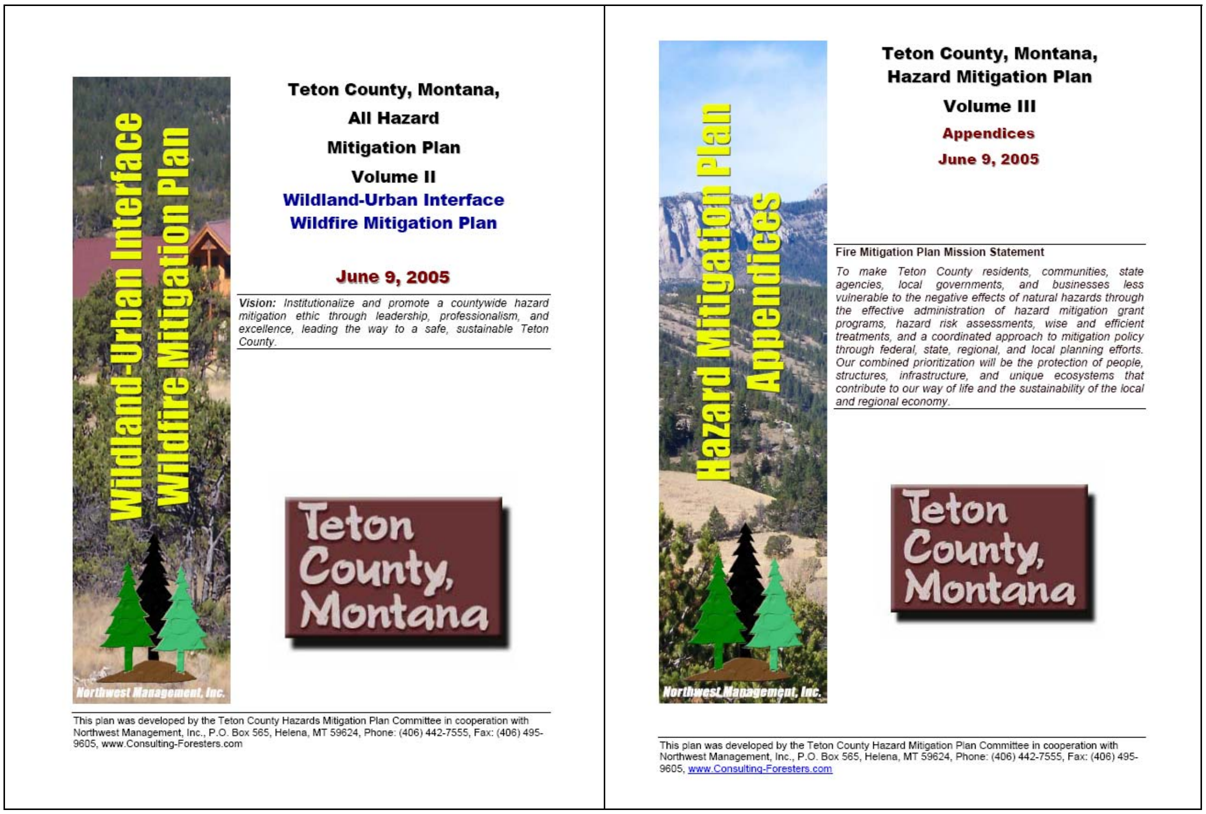
CHAPTER 9: SUPPORTING INFORMATION ... 152

9 SUPPORTING INFORMATION ... 152

9.1 LIST OF TABLES ... 152
9.2 LIST OF FIGURES ... 153
9.3 LIST OF PREPARERS ... 154
9.4 SIGNATURE PAGES ... 155
9.4.1.1 Representatives of Teton County Government ... 155
9.4.1.2 Representatives of City Government in Teton County ... 156
9.4.1.3 Representatives of Community Organizations, Federal, and State Agencies ... 156
9.4.1.4 Resolution of Adoption by Teton County Commissioners ... 157
9.4.1.5 Resolution of Adoption by Choteau City Council ... 158
9.4.1.6 Resolution of Adoption by Fairfield City Council ... 160
9.4.1.7 Resolution of Adoption Dutton City Council ... 161
9.5 LITERATURE CITED ... 162

Foreword

The **Teton County All Hazards Mitigation Plan** was developed during 2004-2005 by the Teton County Hazard Mitigation Planning Committee in cooperation with Northwest Management, Inc., of Helena, Montana. The Teton County Wildland-Urban Interface Wildfire Mitigation Plan (Volume II) is part of the Teton County All Hazards Mitigation Plan (Volume I). Although it is being published as a separate document, it should be considered one “chapter” of this All Hazards Mitigation Plan and is hereby incorporated into this plan’s contents. The All Hazards Mitigation Plan Appendices, Volume III, includes many maps and related information for both Volumes I and II.



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Chapter I: Overview of this Plan and its Development

1 Introduction

This All Hazards Mitigation Plan for Teton County, Montana, is the result of analyses, professional cooperation and collaboration, assessments of natural and man-caused risks and other factors considered with the intent to reduce the potential for disasters to threaten people, structures, infrastructure, and unique ecosystems in Teton County, Montana. The planning team responsible for implementing this project was led by the Teton County Commissioners. Agencies and organizations that participated in the planning process included:

- Teton County Commissioners and County Departments
- Teton County Fire Warden
- Teton 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 Reclamation
- USDA Natural Resources Conservation Service
- Choteau Fire Company
- Fairfield Fire Company
- Power Fire Company
- Dutton Fire Company
- Pendroy Fire Company
- Montana Disaster and Emergency Services
- Northwest Management, Inc.

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

1.1 Phase I Hazard Assessment for Teton County

The All Hazards Mitigation Plan is developed in accordance with the Federal Emergency Management Agency's (FEMA) guidelines for a County level pre-disaster mitigation plan and the State of Montana Disaster and Emergency Services.

`

A Phase I Assessment for Teton County was conducted for the following hazards: Flood, Wildland Fire, Severe Weather, Earthquake, Landslide and Civil Unrest / Terrorism. The purpose of the Phase I Assessment is to determine the relative likelihood of a hazard's occurrence and the potential damage to people, property, infrastructure, and the economy. This is a basic assessment in order to generalize the overall risk and impact on the county.

The methodology used for this assessment provides each of the criteria with a low, medium, or high ranking dependent on a set threshold.

The two criteria used to determine the relative ranking of each hazard are the Probability of Occurrence and the Potential to Impact People, Structures, Infrastructure and the Economy. The thresholds established for this analysis are:

Probability of Occurrence:

0-1 major occurrences in the past 100 years ……… Low

2-3 major occurrences in the past 100 years ……… Medium

4 or more major occurrences in the past 100 years ..High

Potential to Impact People, Structures, Infrastructure and the Economy:

Less than 1 % casualties/damage……………………Low

1% to 5% casualties/damage…………………………Medium

5% to 10% casualties/damage………………………..High

Data utilized to determine the Probability of Occurrence and Potential Impact included reviewing records of the historical impact of the hazard. Examining past historic occurrences of a hazard can be a predictor of future likelihood of the hazard reoccurring and its impact on the local population.

One informational source utilized in this process involved examining the past historical records for the county included in the State of Montana Multi-Hazard Mitigation Plan and Statewide Hazard Assessment.

Another source of historical records examined was the SHELDUS database (http://www.sheldus.org). SHELDUS is a county-level hazard data set for the U.S. for 18 different natural hazard events types such as thunderstorms, hurricanes, floods, wildfires, and tornados. The database covers the period from 1960-2000. For each event, the database includes the beginning date, location (county and state), property losses, crop losses, injuries, and fatalities that affected each county.

The data were derived from several existing national data sources such as National Climatic Data Center's monthly Storm Data publications and NGDC's Tsunami Event Database. Only those events that generated more than $50,000 in damages were included in SHELDUS. Since 1995, SHELDUS additionally includes all events that are reported in NCDC's Storm Data with a specific dollar amount. The database was supported by grants from the National Science Foundation and the University of South Carolina's Office of the Vice President for Research.

The final data source utilized was the Public Mail Survey conducted for Teton County by NMI as part of the public input for this plan. The survey includes several questions regarding the impact of past hazards on the citizens of Teton County. The results are summarized in detail in chapter 2, with a brief description of the sections relevant to the Phase I Assessment below. A copy of the entire survey is located in the appendix.

`

All of this data was empirically reviewed and the results are summarized in Table 1.1

Table 1.1. Phase I Hazard Assessment of Teton County.

Probability of Occurrence	**High**		**Flood**	**Wildland Fire**
	Medium			**Severe Weather**
	Low	**Civil Unrest / Terrorism** **Landslide**	**Earthquake**	
		Low	**Medium**	**High**
		Potential to Impact People, Structures, Infrastructure, and the Economy		

This All Hazards Mitigation Plan will include assessment of a variety of hazards including:

- Wildland-Urban Interface Wildfire Mitigation Plan
- Flood Mitigation Plan
- Landslide Mitigation Plan
- Severe Weather (Wind Storm & Winter Storm) Mitigation Plan
- Earthquake Mitigation Plan

Information gathered during the analysis and hazard profiling for Teton County indicates that many of the homeowners (45%) in Teton County have experienced threats from wind storms and that wind storms have caused impacts on approximately 19% of those homes and 6% of their property. Further, the average damage to homes caused by wind storms was estimated at over $2,000 for each event and landowner during the past 10 years. Wildfire has impacted 8% of the county's residents, causing damage to 1% of their homes and 2% of their property. The average damage to home and property was estimated at just over $2,500 per wildfire occurrence, per landowner. Winter storms and tornadoes have impacted approximately 37% of the county's residents causing over $2,400 per incident, per landowner. Floods have impacted just less than 3% of county residents impacting property in and near the flood zone. Just 1% of impacted residents, reported damage to property, however, the average damage per occurrence was reported at $2,000 per occurrence, per landowner. Earthquakes were reported to have impacted only 1% of the surveyed residents, causing minimal damage. Landslides, civil unrest and terrorism were reported to have impacted 1% of surveyed residents in Teton County with no reported financial damage. These results are summarized from the public mail survey conducted during the implementation of this plan with specific responses detailed in Chapter 2 of this document.

1.2 Goals and Guiding Principles

1.2.1 Federal Emergency Management Agency Philosophy

Effective November 1, 2004, a local Hazards 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.

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

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

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

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

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

1.2.2 Additional State and Federal Guidelines Adopted

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

- The National Fire Plan; A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-Year Comprehensive Strategy Implementation Plan–May 2002.
- Northern Rockies Coordinating Group Healthy Forests Restoration Act (2004)
- The Federal Emergency Management Agency's 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.

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> ***"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 Teton County while facilitating new opportunities for pre-disaster mitigation funding and cooperation. Additional information on the Wildland-Urban Interface Wildfire Mitigation Plan is found in Chapter 1 of that document.

1.3 Local Guidelines and Integration with Other Efforts

1.3.1 Teton County Planning Effort and Philosophy

The goals of this planning process include the integration of guidelines for a county (local) level pre-disaster mitigation plan from the Federal Emergency Management Agency, the Montana Disaster and Emergency Services, and where appropriate, the National Fire Plan and the Healthy Forest Restoration Act. This effort will utilize the best and most appropriate science from all partners, integrating local and regional knowledge about hazard risks, while meeting the needs of local citizens, the regional economy and make known the significance of this region to the rest of Montana and the Inland West.

1.3.1.1 Mission Statement

To make Teton County residents, communities, state agencies, local governments, and businesses less vulnerable to the negative effects of natural and man-caused hazards through the effective administration of pre-disaster mitigation grant programs, hazard risk assessments, wise and efficient mitigation efforts, 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, the economy, and unique ecosystems that contribute to our way of life and the sustainability of the local and regional economy.

1.3.1.2 Vision Statement

Institutionalize and promote a county-wide hazard mitigation ethic through leadership, professionalism, and excellence, leading the way to a safe, sustainable Teton County.

1.3.1.3 Goals

- To reduce the area of land damaged and losses experienced because of hazards where these risks threaten communities in the county.
- Prioritize the protection of people, structures, infrastructure, economic base, and unique ecosystems that contribute to the way of life and the sustainability of the local and regional economy.
- Educate communities about the unique challenges of pre-disaster hazard mitigation and post-disaster response.

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- Establish mitigation priorities and develop mitigation strategies.
- Strategically locate, plan, and implement hazard reduction projects.
- Provide recommendations for alternative treatment methods that can impact the exposure to multiple hazards at one time.
- Meet or exceed the requirements of FEMA for a county level All Hazards Mitigation Plan.

1.3.2 Coordination with Other County Plans

Throughout the planning process, existing Teton County planning documents were referenced and incorporated into the goals and objectives of the All Hazards Mitigation Plan. The Teton County Commissioners are dedicated to improving public safety by incorporating the information, guidelines, and recommendations defined in the All Hazards Mitigation Plan into future planning projects. Where appropriate, the Teton County All Hazards Mitigation Plan will provide the basis for all future planning activities.

1.3.2.1 Teton County 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: Documenting the Planning Process

2 Initiation

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 Teton County All Hazards Mitigation Plan was developed through a collaborative process involving all of the organizations and agencies detailed in Section 1.0 of this document. The County Commissioner's office contacted these organizations directly to invite their participation and scheduled 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 throughout the process):

1. **Collection of Data** about the extent and periodicity of hazards in and around Teton County. This included an area encompassing Lewis and Clark, Pondera, Flathead, Chouteau counties to ensure a robust dataset for making inferences about hazards in Teton County specifically.
2. **Field Observations and Estimations** about risks, juxtaposition of structures and infrastructure to risk areas, access, and potential treatments.
3. **Mapping** of data relevant to pre-disaster mitigation control and treatments, structures, resource values, infrastructure, risk assessments, 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 acknowledgement 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 signature of the final document.

2.2 The Planning Team

Planning efforts were led by the Project Co-Directors, Dr. William E. Schlosser, of Northwest Management, Inc. and Mr. Gary Ellingson, B.S. 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). Mr. Ellingson holds a bachelor's degree in Forest Resource Management.

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

The planning team met with many residents of the county during the inspections of communities, infrastructure, and hazard abatement assessments. This methodology, when

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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 as well as their interpretations of the results.

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 project without becoming directly involved in the planning process.

2.3.1 News Releases

Under the auspices of the Teton County All Hazards Mitigation Planning Committee, news releases were submitted to the local area newspapers: the *Choteau Acantha,* the *Fairfield Sun Times,* and the *Great Falls Tribune.*

Hot Topic: Teton County Plans to Mitigate Natural Hazard Risks

Choteau, MT – The Teton County Commissioners have created a Hazards Mitigation Plan committee to complete a Natural Hazards Mitigation Plan for Teton County as part of the Federal Emergency Management Agency requirements and the National Fire Plan authorized by Congress and the White House. The Teton County Natural Hazards Mitigation Plan will include risk analysis at the community level with predictive models for where fires, floods, landslides, and other hazards are likely to occur. Northwest Management, Inc. has been retained by Teton County to provide risk assessments, mapping, field inspections, interviews, and to collaborate with the committee to prepare the plan. The coordination for this effort is being provided by Richard Van Auken, Teton County Fire Warden. The committee includes rural and wildland fire districts, the Montana Department of Natural Resources and Conservation, USDA Forest Service, Bureau of Land Management, Teton County Department of Emergency Services, the Local Emergency Planning Committee, elected officials, business people, and others. Specialists o the committee are conducting hazard profiles 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 hazards in Teton County is to conduct a homeowner’s survey. Northwest Management, Inc. in cooperation with local fire officials, have mailed a brief survey to randomly selected homeowners in the county seeking details about home construction materials, proximity to water sources, and other risk factors surrounding homes. This survey is very important to the success of the plan. Those homes that receive a survey are asked to please take the time to complete it thereby benefiting the community overall.

The planning team will be conducting Public Meetings to discuss preliminary findings and to seek public involvement in the planning process in February. A notice on the date and location of these meetings will be posted in local newspapers. For more information on the Fire Mitigation Plan project in Teton County contact your County Commissioners, Northwest Management, Inc. project director Dr. William Schlosser (208) 883-4488, or Richard Van Auken, the Teton County Fire Warden at 406-466-5561.

2.3.2 Newspaper Articles

Committee and public meeting announcements were published in the local newspaper ahead of each meeting. The following is an example of one of the newspaper announcements that ran in the Great Falls Tribune.

Teton County All Hazards Mitigation Plan Committee to hold pubic meetings

The Teton County Commissioners have created an All Hazards Mitigation Plan Committee to complete an All Hazards Mitigation Plan for Teton County. The Teton County All Hazards Mitigation Plan will include risk analysis at the community level for wildfires, floods, severe weather, and landslides. Northwest Management, Inc., has been retained by Teton County to provide risk assessments, mapping, field inspections, 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. The committee's specialists are developing risk profiles and proposing mitigation strategies. Specific mitigation activities for homes, structures, infrastructure, and resource capabilities will be proposed as part of the analysis.

The planning team will be conducting five public meetings to discuss preliminary findings and to seek public involvement in the planning process from February 22-24, 2005. For more information on Hazard Mitigation Plan projects in Teton County, contact your County Commissioners, or Dick Van Auken, Teton County Fire Warden at 406-466-5561. Everyone interested in these meetings is encouraged to attend and join in the discussions!

Public Information Meetings:

Power; February 22 - American Legion Hall, 7 PM

Choteau; February 23 Teton Medical Center Conference Room, 1 PM - focus on floods

Choteau; February 23 - Choteau Country Club, 7 PM

Pendroy; February 24 - Pendroy Fire Hall, 1 PM

Fairfield, February 24 - Community Hall, 7 PM

Planning a

2.3.3 Public Mail Survey

In order to collect a broad base of perceptions about wildland fire, individual risk factors of homeowners, and natural hazards affecting homeowners in Teton County, a mail survey was conducted. The survey was completed during 2004. Using the cadastral database of landowners in Teton County, homeowners from the county were identified. Approximately 235 residents of Teton County were randomly selected to receive mail surveys.

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

The first in the series of mailings was sent November 8, 2004, and included a cover letter, a survey, and an offer of receiving a custom GIS map of the area of their selection in Teton 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 November 12, 2004, encouraging their response. A final mailing, with a revised cover letter pleading with them to participate, was sent to non-respondents on November 23, 2004.

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Surveys were returned during the months of November, December, and January. A total of 109 residents responded to the survey as of January 12, 2005. The effective response rate for this survey was 46%. Statistically, this response rate allows the interpretation of all of the response variables significantly at the 95% 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 109 respondents to the survey, approximately 45% were from the Fairfield area, 37% from Choteau, 9% from Power, 6% from Dutton, and 2% were from both Bynum and Agawam.

All of the respondents (100%) correctly identified that they have emergency telephone 911 services in their area. Structure fire protection in Teton County is limited to those living within the rural fire districts. 100% of the respondents to the survey indicated they have rural structural fire protection. Analysis of this data indicates that all of the respondents correctly identified that they do, indeed, have structural fire protection.

Respondents were asked to indicate the type of roofing material covering the main structure of their home. Approximately 77% of respondents living in a rural area indicated their homes were covered with a composite material (asphalt shingles). About 15% of these residents indicated their homes were covered with a metal (eg., aluminum, tin) roofing material. Roughly 3% of the rural respondents indicated they have a wooden roofing material such as shakes or shingles.

The average driveway length of rural respondents to the survey was 523 feet long (0.1 miles). The longest reported was 5,808 feet (1.1 miles). Of those respondents (5%) with a driveway over ½ mile long, approximately 45% do not have turnouts allowing two vehicles to pass. Approximately 76% of all respondents indicated an alternate escape route was available in an emergency which cuts off their primary driveway access. Additionally, 42% indicated that their driveways were kept plowed during the winter and 5% indicated that 4-wheel drive may be needed during slippery or icy conditions due to a steeper road grade.

Respondents were asked if they had alternative communications available in the event the telephone service was down. Of the 66% respondents that said "yes", 96% indicated that they had cellular phone service and 10% said they had access to two-way radios. Also, 30% of respondents indicated they had an alternative electrical power source.

Survey recipients were asked to report emergency services training received by members of the household. Their responses are summarized in Table 2.1.

Table 2.1. Emergency Services Training received by household.

Type of Training	Percent of Households
Wildland Fire Fighting	15%
City or Rural Fire Fighting	4%
EMT (Emergency Medical Technician)	13%
Basic FirstAid/ CPR	58%
Search and Rescue	10%

Residents were asked to indicate which, if any, of the disasters listed in Table 2.2 have affected their home, property or business within Teton County during the past 10 years.

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Table 2.2. Disasters affecting homes in Teton County.

↓Hazard↓	Percent of respondents reporting hazard occurrence during the period 1993-2003, near their home.	If YES, Complete these questions…	Percent of respondents experiencing damage to their home or property.	Approximate average damage caused by each hazard (during the period 1993-2003)
Wildfire	8%	→	3%	$2,525
Flood	3%	→	1%	$2,000
Earthquake	1%	→	--	$--
Landslide	1%	→	--	$--
Wind Storm	45%	→	25%	$2,210
Tornado	37%	→	3%	$2,429
Civil Unrest / Terrorism	1%	→	--	$--

Respondents were asked to complete a fuel hazard rating worksheet to assess their home's fire risk rating. An additional column titled "results" has been added to the table, showing the percent of respondents circling each rating (Table 2.3).

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

Table 2.3. Fuel Hazard Rating Worksheet		**Rating**	**Results**
Fuel Hazard	Small, light fuels (grasses, forbs, weeds, shrubs)	1	59%
	Medium size fuels (brush, large shrubs, small trees)	2	34%
	Heavy, large fuels (woodlands, timber, heavy brush)	3	7%
Slope Hazard	Mild slopes (0-5%)	1	93%
	Moderate slope (6-20%)	2	7%
	Steep Slopes (21-40%)	3	0%
	Extreme slopes (41% and greater)	4	0%
Structure Hazard	Noncombustible roof and noncombustible siding materials	1	28%
	Noncombustible roof and combustible siding material	3	29%
	Combustible roof and noncombustible siding material	7	22%
	Combustible roof and combustible siding materials	10	21%
Additional Factors	Rough topography that contains several steep canyons or ridges	+2	Average -1.9 pts
	Areas having history of higher than average fire occurrence	+3	
	Areas exposed to severe fire weather and strong winds	+4	
	Areas with existing fuel modifications or usable fire breaks	-3	
	Areas with local facilities (water systems, rural fire districts, dozers)	-3	

Calculating Your Risk:

Values below are the average response value to each question for those living in both rural and urban areas.

Fuel Hazard 1.4	x Slope Hazard	1.1	=	1.5
Structural Hazard	+	5.2		
Additional Factors	(+ or -)	-1.9		
Total Hazard Points	=	4.8 .		

Table 2.4. Percent of respondents in each risk category as determined by the survey respondents.

00% – Extreme Risk = 26 + points
01% – High Risk = 16–25 points
26% – Moderate Risk = 7–15 points
37% – Low Risk = 6 or less points

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Values below are the average response value to each question for those living in **rural areas only**.

Fuel hazard 1.5 x Slope Hazard 1.1	=	1.7
Structural hazard	+	5.2
Additional factors	(+ or -)	-1.8
Total Hazard Points	=	5.1 .

Table 2.5. Percent of respondents in each risk category as determined by the survey respondents.

00% – Extreme Risk = 26 + points
02% – High Risk = 16–25 points
40% – Moderate Risk = 7–15 points
58% – Low Risk = 6 or less points

Values below are the average response value to each question for those living in **urban areas only**.

Fuel hazard 1.2 x Slope Hazard 1.1	=	1.3
Structural hazard	+	5.3
Additional factors	(+ or -)	-2.1
Total Hazard Points	=	4.5 .

Table 2.6. Percent of respondents in each risk category as determined by the survey respondents.

00% – Extreme Risk = 26 + points
02% – High Risk = 16–25 points
33% – Moderate Risk = 7–15 points
64% – Low Risk = 6 or less points

Many Teton County residents have been affected by at least one of the hazards covered by the All Hazards Mitigation Plan (wildfire, flood, landslide, earthquake, and severe storm). The survey included a series of questions asking respondents if they thought their home or business was located in an area that places it at risk to any of the hazards specified in Table 2.7.

Table 2.7 Respondents opinion of risk occurrence.

Type of Hazard	Percent of “yes” answers
Wildfire	30%
Flood	31%
Earthquake	6%
Landslide	1%
Wind Storm	69%
Severe Weather	74%
Civil Unrest/Terrorism	4%

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?” 46% 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 2.8.

Table 2.8. Public Opinion of Hazard Mitigation Funding Preferences.

	100% Public Funding	Cost-Share (Public & Private)	Privately Funded (Owner or Company)
Home Defensibility Projects →	23%	38%	38%
Community Defensibility Projects →	45%	39%	16%
Infrastructure Projects Roads, Bridges, Power Lines, Etc. →	60%	24%	16%

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

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2.3.4 Committee Meetings

The following is a list of people who participated in the planning committee meetings, volunteered time, or responded to elements of the Teton County All Hazard Mitigation Plan's preparation.

NAME	ORGANIZATION
• Arnie Gettel	Teton County Commissioner
• Ben Rhodes	Teton County Fire Council / Fairfield Fire Chief
• Byron Grassman	Teton County Fire Council / Power Volunteer Fire Company
• Craig Zwerneman	Teton County Fire Council / Choteau Fire Chief
• Dale Hanson	Pendroy Volunteer Fire Company
• Dick Van Auken	Teton County Fire Warden
• Dick Brownell	Teton County Fire Fee Board / Pendroy Volunteer Fire Company
• Erik Eneboe	Montana Dept. of Natural Resources and Conservation
• Eric Somerfield	Teton County Fire Council / Power Volunteer Fire Company
• Gary Ellingson	Northwest Management, Inc.
• Jim Spinder	Teton County Fire Council/Choteau Rural Fire Chief
• Joe Widhalm	Power resident
• Joe Dellwo	Teton County Commissioner
• John Erixson	Northwest Management, Inc.
• Justin Grohs	Teton County EMS
• Lanny Christman	Teton County Fire Fee Board
• Lee Clark	USDA Forest Service
• Lyle Weist	Teton County Fire Fee Board
• Mark Schlepp	Fish, Wildlife, and Parks
• Mike Leys	Teton County Fire Council / Choteau Volunteer Fire Company
• Nick Dale	Teton County Fire Council / Fairfield Volunteer Fire Company
• Pat Field	Teton County Fire Council / Pendroy Volunteer Fire Company
• Rick Stott	Teton County Fire Council / Pendroy Volunteer Fire Company
• Roger Gettel	Teton County Fire Fee Board
• Ross Fitzgerald	Power Volunteer Fire Company / Montana Fire Services Training School
• Sam Carlson	Teton County Commissioner
• Shannon Downey	Bureau of Land Management
• Shawn Dutton	Teton County Fire Council/Dutton Fire Chief
• Sherwin K. Smith	USDA FSA/Teton County Fire Council
• Steve Ostberg	Fairfield Volunteer Fire Company

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- Sue Banis .... Teton County Disaster and Emergency Services
- Tim Horn .... USDA Forest Service
- Vicki Baker .... Teton Coop Reservoir Company
- William E. Schlosser .... Northwest Management, Inc.

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 September 15th, 2004

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

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

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

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

Questions and comments from committee members:

Department of Justice receives most fire calls.

The group agreed to the meeting dates suggested by John. Agreed upon meeting time is 1pm. Meetings will be held at USFS conference room in Choteau. Meeting dates are Nov. 16th, Dec. 14th, and Jan. 4th. There may be an additional meeting on the evening of Dec. 14th with fire chiefs.

Good locations for public meetings are Choteau, Fairfield, and Dutton.

Two local weekly newspapers are: Choteau Acantha acantha@3rivers.net

Fairfield Sun Times suntimes@3rivers.net

It might be helpful to have a map of occupied residences vs. just structures for emergency response.

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There are 155,000 acres of CRP in the county (25% of cropland area). Fine fuel loading is often in the 3-ton/acre range on CRP. County map of CRP may be available from FSA in a few months. Contact is Sherwin Smith.

Possible issue with wildfire protection on isolated federal ground.

John distributed the draft Media Release and requested that all committee members review it and provide written response prior to the next meeting. Verbal comments were noted and will be incorporated into the document.

Shannon Downey volunteered to redraft portions of the medial release and submit a draft to NMI.

The committee agreed to describe themselves as "state, federal, and local agencies along with concerned local citizens". They also felt FEMA should be spelled out.

The committee felt it was important to invite the Greenfield Irrigation District, Nature Conservancy, and Bureau of Reclamation to upcoming committee meetings. Input is especially significant regarding flood hazard.

John distributed an example public mail survey and requested comments.

The group agreed that the survey be sent to landowners owning greater than 5 acres. Dick Van Auken will work with the county to obtain a mailing list of property owners. Several committee members felt it important that the sample mailing list include the Arrowleaf subdivision and Mortimer Gulch area. The group felt that the front page of the survey emphasizes fire mitigation vs. all hazard mitigation. The form may need to be reviewed further to see if additional information about hazards other than fire can be collected.

A survey of Resource and Capabilities for fire departments was distributed for completion by local fire chiefs, BLM, and DNRC.

Dick Van Auken will work with the fire chiefs to complete the Resource and Capability forms.

Tim Horn, USFS, would like a PDF file of the Fergus County Fire Mitigation Plan for reference.

Lee Clark mentioned that Val Demer has a fire history layer for the Lewis and Clark NF.

2.3.4.1.2 November 16th, 2004

William (Bill) Schossler, of Northwest Management Inc. (NMI), made introductions distributed the meeting agenda.

Bill noted that the public survey was mailed to 236 households on 11/5/04. A reminder post card was mailed 11/15/04. 25 responses have been received to date.

Bill reviewed the procedure used by FEMA to review Pre Disaster Mitigation Plans (PDMs). FEMA will 1st provide conditional approval followed by a final approval of the completed plan. NMI will prepare a fire plan as a separate "stand alone" document.

Bill reviewed the chapter headings for the PDM and explained that the goal is to prepare a document that garners an "outstanding" acceptance review from FEMA.

The committee completed a Phase 1 Hazard Assessment Profile for the county. Hazards identified for the county were ranked as follows:

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Hazard	Probability of Occurrence	Potential of Impact
Earthquake	Moderate	Low
Landslide	Low	Low
Terrorism	Low	Low
Flood	High	Moderate
Wildfire	High	High
Severe Weather	Moderate	High

The Phase II Hazard Assessment will be included in the PDM document.

Bill distributed drafts of the Flood Hazard chapter, Severe Weather chapter, and Wildlfire Mitigation Community Assessment chapters for editing and review by committee members. He asked that edits and comments be provided prior to the next meeting on December 14th so changes can be incorporated for review at that time.

Bill explained that the last chapter of the plan will include recommendations regarding; Safety and Policy, People and Structures, Infrastructure, Resource and Capability Enhancements, and Regional Land Management Recommendations.

Supporting information is presented on various maps prepared by NMI's Geographic Information Systems (GIS) lab. A variety of risk assessments have been completed and mapped. The committee reviewed each of the maps prepared following Bill's introduction to the particular map its intended use. Assessment maps presented included Flood Zones, Land slides, Historic Fire Regime, Current Fire Severity Estimate, Fire prone Landscapes, and the Wildland Urban Interface. Copies of each map were left with Dick Van Auken.

In following discussion Dick Van Auken agreed to conduct a review of recent fire history (since 1980) on flatlands located east of the Rocky Mountain front. Data required includes ignition point, cause, acres and perimeter. Shannon Downey (BLM) will coordinate with Dick as she seeks sources of funding to support collection of the data. Bill Schossler will post the current data he has available to NMI's FTP site.

The committee identified primary and secondary travel routes on the map and recommended changes to be incorporated.

The next meeting was schedule for December 14th at 1 pm at the hospital. Dick Van Auken agreed to send out meeting announcements.

2.3.4.1.3 December 14, 2005

Attendance list was signed by all present and collected by Gary Ellingson.

William (Bill) Schlosser, of Northwest Management Inc. (NMI), distributed the meeting agenda. Bill reminded committee members to submit any edits on the draft chapters (flood, severe weather, and wildfire mitigation community assessments) distributed at the last mtg. Extra copies of these chapters are available. Comments can be submitted by e-mail to Bill or handed to Dick Van Auken.

Mapping Issues

Bill displayed the draft vegetation layers map and asked for a discussion regarding FSA's policy on distributing data on the location and extent of CRP lands in the county. Sherwin Smith, of FSA, stated that the agency cannot make the data available to the public due to privacy

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concerns. He may be able to obtain approval from the Washington, DC office. He suggested a request for the data be routed through either FEMA or Homeland Security. The data could be provided to the USFS because it is in the Department of Agriculture. BLM cannot be provided the date because it is in the Dept of Interior. Sherwin estimated that CRP data layers would not be completed for another 3-4 months.

Shannon Downey asked if the privacy issue could be addressed by classifying the CRP land as "high hazard herbaceous fuel" in combination with other lands that receive a similar classification. The committee agreed that Sherwin Smith and Dick Van Auken could prepare a vegetation map showing the approximate extent of CRP lands and provide a scanned copy to Bill. There are approximately 150,000 acres of CRP land in Teton County.

Fire Occurrence and Extent Data

Bill opened a discussion regarding the status of fire occurrence data. The currently available fire data describes only fires that occurred on federal lands since 1980. Dick Van Auken is leading the effort to compile data on ignition points and fire extents for fires that occurred on other lands in the county. Dick has advertised a temporary position in order to provide a person to compile the data. He hopes the ignition data work could be completed by mid-January. Estimates of fire perimeters may take a bit longer. Bill explained that additional data will improve fire prone landscape predictions and help to make the case regarding historical fire related problems within the county. The committee agreed to postpone the public meetings until the mapping and analysis with new data have been completed. Public meetings will be scheduled February 22-24th, 2005.

Hazard Event Data

Bill distributed a Hazard profile report for the years 1960-2000. The report was generated by FEMA utilizing the SHELDUS 2.1 program, which was obtained for free. Shannon Downey had notified Bill regarding the availability of this data. Bill will distribute the link to the program to committee members by email. Bill noted that the program generally did not provide good reporting on wildfires but did well providing data associated with weather related events. The report is a good starting point for developing a hazard profile for the county. Committee members noted that the report did not include data regarding the 1964 flood and floods that occurred in 1975 and 86. Bill will cross check the flood data he has with the report. Northwest Management, Inc. (NMI) will update the hazard profile based on committee input and Bill's review of flood data and submit updates to the SHELDUS program. Bill asked committee members to submit anecdotal information regarding past hazard events that have occurred within the county. Dick will locate and submit information of the 1964 flood. It was suggested that Bud Olsen former water commissioner be contacted as ask to write something up. Vicki Baker will do some additional research as well.

Public Mail Survey

95 surveys have been returned for a response rate of 40%. Dick said he had received several comments from local citizens regarding the survey. The fire risk section confused some people who weren't sure it applied to them if they lived in town. People who owned more than 1 home (1 in town and 1 out of town) weren't sure which home to evaluate. There was a perception that the survey was all about fire risk and did not address the other hazards. Bill noted that info was collected regarding other hazards in the survey.

Mitigation Activities

Bill facilitated a discussion regarding potential mitigation activities that should be considered within the county. The committee created a list of potential activities under the headings of fire,

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flood, and severe weather. Bill noted that fire chiefs would have the opportunity to complete resource and capability guides that will ID enhancements and resource needs. The guides will be distributed at the fire chiefs meeting scheduled that evening.

Potential Mitigation Activities, Concerns, Topics, Needs

Fire Hazard

- Airstrips and heliports (Dick will provide data)
- CRP lands, river bottoms, Rocky Mountain Front, Mortimer Gulch and Arrowleaf subdivision.
- Access
- Water Supplies (drafting stations, dry wells)
- Equipment Storage
- Portable repeater
- Satellite phones
- Trained personnel
- Hydrants
- Dutton-auxiliary power supply

Flood Hazard

- Bynum-diversion dam
- Bynum – canal upgrade and reinforcement
- Access and Roads – ice jamming, culverts, bridges. Hwy 89 north of town on Kimmet place, secondary and primary road crossings.
- Early warning systems

Severe Weather

- County road crew has funding issues, highway crew is very good
- Windbreaks/snow fences
- Back up power supplies needed – Fairfield and Dutton municipal water supply, Choteau courthouse.

The next committee meeting was scheduled for Tuesday, February 22nd, 1 pm at the hospital. Public meeting will be scheduled for that evening and the next couple days. Dick will check on various venues. During the public meetings the planning process will be described. Public input will be incorporated into the draft plan that will be made available to the public at a later date.

Several committee members attended the Teton County Fire Chiefs meeting later that evening. Attendance at the meeting was 21 consisting primary of rural fire chiefs, volunteer fire personnel and the fire fee board. Committee members in attendance included: Bill Schlosser and Gary Ellingson (NMI), Shannon Downing (BLM), Dick Van Auken (Teton Co Fire Warden), Sherwin Smith (FSA), Jim Spindon (CVFD rural chief). Dick Van Auken will forward an attendance roster.

2.3.4.1.4 February 22, 2005

Attendance list was signed by all present and collected by Gary Ellingson.

Bill Schlosser, of Northwest Management, Inc. (NMI) led the meeting. Bill distributed copies of the public meeting notice. Five meetings have been scheduled in the county during the current week at five separate locations.

Bill provided an overview of the current status of the planning process. He highlighted significant changes that have occurred since the last December meeting. These changes are a direct response to new information that was collected and compiled by committee members.

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Dick Van Auken completed his effort to map fire boundaries based upon 25 years of fire reports from 5 fire departments. Over 2,600 incidents involving 1,400 wildfires were reviewed. The extent of fires over 10 acres in size were plotted on maps. Sherwin Smith completed a map of CRP lands in the county. This data was incorporated into shape files. NMI used both sets of data to revaluate fire prone landscape areas. The result was a significant increase in the abundance of high risk areas in lowlands located in the eastern ½ of the county.

Bill referenced the Hazard profile data distributed at the last meeting and received no additional comments.

The committee discussed possible infrastructure improvements needed within the county. The group identified two locations on the map where repeaters are needed to improve emergency communications.

The group suggested that there may be issues associated with the diversion dam used to divert water from the Teton River into Bynum Reservoir. During the large flood in 1975 debris blocked gates and gates could not be opened manually. There may be a need for standby power and remote gate opening capability. An evaluation of the diversion canal may be needed to access its capacity to handle large volumes of water. Another possible issue may be the functionality of the diversion structure in the stream. The stream has a tendency to meander and carry significant bed load. The group raised the concern of possible water rights issues associated with diverting flood water. A local contact for more information is Bob Larson, in Havre, Montana, Regional Manager for DNRC, Water Rights Bureau (ph 265-5516). The group felt that county commissioners would have decision making authority regarding flood water diversion under the Declaration of Emergency Act.

The group noted that the South Fork Bridge near the Arrowleaf subdivision has a remote electronic monitor that records real time stream data. USGS monitors stream flow at the Dutton bridge on I-15.

The committee next discussed road infrastructure in the county. A few issues were identified. The bridge on Spring Ck in Choteau is prone to ice jamming. The bridge at Collins below the train trestle can have its approaches washed out but the structure stays in place and alternative routes are available.

The ditch and pipeline system associated with Freezout Lake was discussed. The pipeline from Priest Lake to Teton River is critical infrastructure to protect highway and homes in the area from flooding. A water management plan was prepared by the Montana Department of Fish, Wildlife and Park (FWP) in 1996. Mark Schlepp will provide a copy of the plan to Dick Van Auken. The plan includes an inventory of 35 diversion structures and 27 primary water sources.

The group shifted the discussion toward fire mitigation activities. Erik Enebon reminded the group that CRP contracts will be coming up for renewal over the next few years. The situation with CRP lands could change drastically depending on federal funding levels.

Fire mitigation strategies for CRP lands were discussed at length. Mowing is not a firebreak but provides a potential "burnout area" that can be utilized during suppression efforts. There are wind erosion problems associated with tilling. 250-300' wide firebreaks could be effective especially if located near existing corridors associated with RR's, highways, and power lines. NRCS prescription of CRP for fuel break is 60' plow – 300' mow – 30' plow. NRCS permits fuel break installation near farmsteads and buildings. No mowing is permitted May15-July 15 to protect nesting wildlife. Many producers are reluctant to burn. Prescribed burning services are limited in the local area. Costs average about $8 per acre. Haying is permitted every 5 years and grazing every 3 years on CRP lands. Contract mowers are available locally. A 10' strip

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plowed can provide an control line near mowed fuel breaks. Three entries are typically required to maintain plowed strips. Herbicide treatments are an alternative.

Fuel reduction is needed in the river bottom but is difficult to accomplish and maintain. Treatment in town may still be feasible. Structures located in or near the river bottom are a priority for defensible space projects.

Potential fuel mitigation projects in the Arrowleaf and Mortimer Gulch areas were discussed. Potential to conduct additional DSP and roadside treatments remains but may be limited by landowner attitudes. Several residents implemented DSP projects over the past year. Residents in the area are 50% permanent and 50% seasonal. The vast majority are retired. Mechanical treatments are necessary on adjoining federal lands. A summary of proposed treatment is needed from the USFS. The Peoples Road is a good candidate for a roadside fuel reduction project.

Water storage and access issues within the county were discussed next. Five sites where water improvements are needed were identified.

1. Install a 10,000-20,000 gallon cistern near the fire station in Pendroy.
2. Install a dry hydrant in Big Coulee Creek south of Fairfield.
3. Install a dry hydrant on Fifth Road.
4. Install a pressured hydrant on Tri-County water system.
5. Install a dry hydrant near the South Fork bridge close to Arrowleaf subdivision.

The group suggested that fire chiefs map known locations of all existing hydrants.

Next committee meeting was scheduled for Wednesday, March 9th at 1 pm. The draft plan will be reviewed at the meeting.

2.3.4.1.5 March 30, 2005

Attendance list was signed by all present and collected by Gary Ellingson.

Bill Schlosser, of Northwest Management, Inc. (NMI) led the meeting. Bill distributed Committee Draft copies of the All Hazards Mitigation Plan (Volume 1), Wildland Urban Interface Wildfire Mitigation Plan (Volume II), and Hazard Mitigation Plan Appendices. Bill would like committee comments on the drafts to be submitted prior to April 19, 2005..

Volume I includes the Flood, Landslide, Severe Weather and Earthquake Mitigation plans. Volume II is the Wildfire Mitigation plan. The two volumes combined are the counties PDM Plan. Bill asked the committee to pay special attention to the recommendations chapters as these are newest chapters and are subject to the most change. Bill noted a typo on the appendices Table of Contents …there is no title for Appendix III. Committee members noted the Idaho Forestry Assistance program needs to be deleted as a potential funding source on page 37. NRCS needs to be added to the acknowledgments page on Vols I and II.

Bill reviewed the organization of the documents and explained that FEMA standards primarily guided format of the plan document. Other format items were incorporated to dovetail with National Fire Plan standards.

During the course of discussion Bill asked if there might be additional information available regarding zoning and regulations under the county growth plan. Dick Van Auken volunteered to check it out and get back to Bill. It was noted that committee-meeting notes for December and February were missing from section 2.3.3.3. Gary Ellingson will forward the minutes to Bill by email. Shannon Downey had a question on pg 59 regarding the extent of the region mentioned. Bill replied the data set included the Central Zone of the BLM.

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Bill noted that there was still some information missing in Section 4.5 regarding Resource and Capability Guides. Dick Van Auken will check his files to look for the guides which were completed by the local fire company chiefs.

Tim Horn (USFS) has been asked to provide a summary of the Evacuation Plan prepared for the Mortimer Gulch area. The summary would be inserted into section 4.7 of the plan. Some discussion occurred regarding $75,000 in mitigation monies that had been provided to the local RC&D.

Bill reviewed Chapter 5 and noted that some material in the section was prepared specifically for county commissioners. Bill agreed to send Dick Van Auken a CD that had a format for calculating cost –benefit analysis for FEMA grants. During review of section 5.1 it was mentioned that Lewis and Clark county has developed approved fire mitigation standards for subdivisions. A page formatting problem (footer) was noted on pages 134 and 137.

The committee agreed that section 5.2c of Table 5.2 should be modified from $850 to $1200 for home defensible space treatment. Costs in section 5.2d should be modified from $750 to $1,200. Roadside treatment areas in section 5.2h should be modified to 150' below the road and 100' feet above and cost per mile of road treated to $30,000.

Dick Van Auken will try to put together some costs for section 5.3b in Table 5.3 regarding cost to improve communications.

Section 5.4f in Table 5.4 will need to be completed by Dick Van Auken.

Bill will update table 5.4 to include specific locations where resources such as on-site water, repeaters, and back up power are required.

The committee had several comments regarding the signature pages on pages 145 and 146 of the plan. Power, Bynum and Pendroy do not have a mayor. Choteau is the only "city" in Teton County. Other locations such as Fairfield and Dutton are "towns". The mayor of Choteau is Dan Clark, Fairfield-Lillian Alfson, Dutton- Robert Goodell. Sue Banis's title should read "Teton County DES Coordinator".

Dick Van Auken is the County Fire Warden representing all "Fire Companies".

Signatures on page 148 are: BLM – June Bailey, NRCS-Sherwin Smith, L&C National Forest – Leslie W. Thompson, DNRC Gary Williams Central Land Office Area Manager.

Bill will have the final plan completed by May 9th. Dick Van Auken will obtain resolution numbers for the cities and town that will sign the plan and forward them to Bill. Bill will send Dick a "resolution template". The Teton County commissioners will meet on May 12th and can sign the plan at that time.

2.3.4.1.6 April 19, 2005

The meeting took place at the Teton Medical Center in Choteau, Montana. Sue Banis - Teton County DES, Ross H. Fitzgerald – Power Volunteer Fire Co., Mike Leys – Choteau Volunteer Fire Dept., Dick Van Auken – Teton County Fire Warden, Sam Carlson – Teton County Commissioner, Bill Schlosser – Northwest Management, Inc., Sherwin K. Smith – USDA/FSA, Vicki Baker – Teton Coop. Reservoir Co were in attendance.

Bill Schlosser, Northwest Management, Inc.

- Recap of the purpose of the meeting – to make the final changes to the All Hazard Mitigation Plan for Teton County.

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- Bill indicated that he had the missing meeting notes from two prior PDM meetings available if anyone wanted to read them.

Regarding the inclusion of additional &/or changed information for the PDM plan:

- Forest Service (Tim Horn) has provided the Emergency "E" Plan for the Rocky Mountain Front.
- The Mortimer Hazard & Fuel Reduction will be added to the appendix.
- WUI Boundary will be added to the appendix.
- Dick's changes from the November meeting will be added.
- Dick also has some Forest Service changes that will be added.
- Sue's changes to the Public Meeting minutes will be added.
- All faxed changes that were received will be added.
- There were 15 pages via email that will be added.
- The Bureau of Land Management changes are forthcoming.
- Vick Baker, Teton Coop Reservoir Co., has requested specifics on Diversion from Brent Eckland, who is from the Bureau of Reclamation in Billings. The plans are meant to identify projects and get the details if possible. She also mentioned for inclusion in the Action Plan to put in a railings system and maybe a 30% grate or a grate up and off to the side to aid in debris disbursement. Vicki hoped that she could email her information to Bill by the end of next week. Bill hoped the end of this week. She said she'd try, but it all depended on Brent getting her the information she needed. She said she would also include information on the process used to determine who controls the floodgate.

Draft Changes

The committee proceeded to go through both Volumes I and II, and the Appendices of the PDM Plan, indicating changes as necessary. Bill and several committee members recorded the changes directly on their drafts. Bill will make the changes / additions / deletions / corrections and redistribute the draft via email to the committee when completed, tentatively by May 2nd.

At this point there was another meeting scheduled for the TMC Conference Room, so we agreed to move and continue our meeting at the Choteau Country Club. We concluded the editing of Volumes I, II and the Appendices.

The new schedule for the Plan is as follows:

May 2, 2005 – New draft of the plan emailed to the committee

May 2-23, 2005 – Copies of "The Draft" available for public viewing to be located at:

- City Halls – Choteau, Fairfield, & Dutton
- City Libraries – Choteau, Fairfield, & Dutton
- Post Offices – Bynum, Power, & Pendroy
- Courthouse – Choteau

Bill handed out copies of a media release, regarding the Public Review Draft, to be distributed to the local newspapers. He will change the "available for review" dates and also update Dick's new telephone number to 406-466-3406.

May 26 (or June 2) – approval of the "All Hazard Mitigation Plan" draft by the Commissioners at their weekly Commissioners' Meeting. Then the approved draft will be sent to Montana State DES Office, and to FEMA Region 8 for their approval; then back to Teton County for a formal adoption of the plan.

The meeting was adjourned at 5:50 p.m.

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2.3.5 Public Meetings

Public meetings were scheduled in a variety of communities in Teton 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 Project Manager Bill Schlosser on the following dates and locations:

2.3.5.1 February 22nd, 2005 – Power

Present:

Ross Fitzgerald
Erik Somerfeld
Roger Gettel
Arnie Gettel County Commissioner
Byron Grassman

Additional Recommendations for mitigation:

Flood:

Hold flood waters in Bynum Reservoir for fire protection

Allow County Commissioners to control head gates in event of high water

Fire:

Use of fire resistant building materials in high fire risk areas

Built equipment (CRP eater) which can respond to scene quickly using existing roads and plow line. I.e. use of military 6X6 with offset plow attached with mechanical lift to raise and lower plow.

Additional water supplies East of I 15

Use of defensible space near CRP

Portable repeater

Severe weather:

Put transfer switches on critical infrastructure. I.e. fire hall, ambulance barn, shelters etc

2.3.5.2 February 23, 2005 - Choteau

FOCUSED ON FLOODS

One quarter of the County’s structures (right around Choteau) are in the flood zone.
The big floods in Teton County / Choteau area were in 1953, 1964, and 1975.
Teton County only has 100-year records. (100-year floods happen every 11ish years.)

QUESTION: What do we need to do to make the Diversion gate better?

`

1. Increase the holding capacities of the canal
2. Divert the water into other areas
    a. another reservoir
    b. into the fields
    c. it takes 30 days to fill Bynum to capacity

QUESTION: What do we do for Choteau?

1. Divert the water to Bynum
2. Watch out for debris – need to premitigate
3. Need to meet the needs of both flood and irrigation
4. Need back-up power to run gates at the Bynum diversion

Alan Rollo to give assessments to Dick to put into the PDM plan.

Spring Creek and Teton River – bridge by Park and one up above were replaced by the CORP with culverts after the 1964 flood.

2.3.5.3 February 23rd, 2005 – Choteau

Those who attended this meeting had been to previous meetings, so there was no reason to go through the entire presentation. Bill Schlosser, Northwest Management, Inc., presented an abbreviated version of the PowerPoint slides. There was a brief discussion regarding the general processes to complete the final plan from this point.

2.3.5.4 February 24, 2005 - Pendroy

The WUI model seems to fit our needs.

Significant infrastructure weaknesses.

CRP – a lot of risk regarding fire.

Nearly every acre will burn. We need to decide what is important to us. What hazards and places do we mitigate?

QUESTION: What do we need in Pendroy?

1. Repeaters
2. Cell phone coverage (almost non-exsistant)
3. Dry hydrants
    a. Paul Wick (Weed Supervisor for Teton County) could utilize & keep the water recycled.
    b. Pendroy has put in a dry hydrant by Kister's
    c. Hydrant in reservoir if we could get to them
    d. Spring by Ora Knowlton's
4. Cisterns
5. Portable Repeaters
6. New 3,000 gallon tanker
7. Additional storage

Bill requested that Pendroy put together a list of needs for a 5-year plan.

2.3.5.5 February 24, 2005 - Fairfield

The WUI model fits us.

`

CRP – a lot of risk regarding fire.

What hazards and places do we mitigate?

QUESTION: What do we need?

1. Tenders
2. Dry hydrant
3. Water sources
4. Repeaters
5. Water storage

Fire Hall needs 2 more truck bays

Figure 2.1. Public meeting slideshow overview.

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

Table 2.9. Public meeting slide show.

Slide 1

Slide 2

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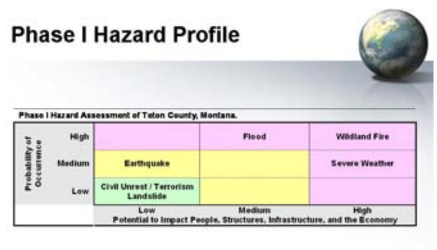
Table 2.9. Public meeting slide show.

Slide 3

Slide 4

Slide 5



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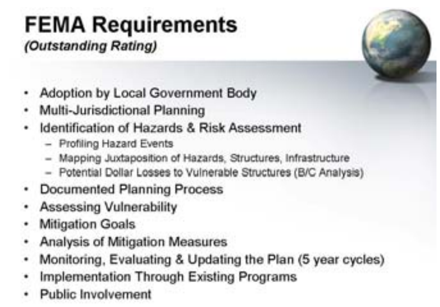

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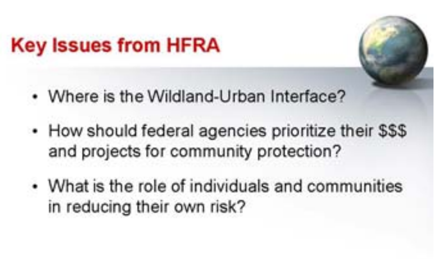
Slide 9



Slide 10

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Table 2.9. Public meeting slide show.

Slide 11

Slide 12

Slide 13

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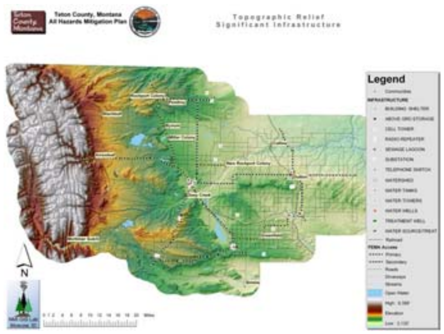
Table 2.9. Public meeting slide show.

Slide 19

Slide 20

Slide 21



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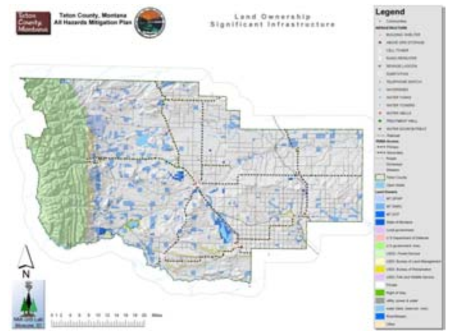

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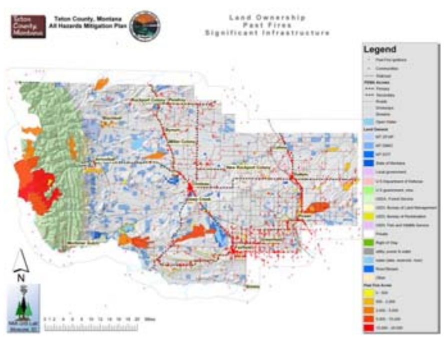

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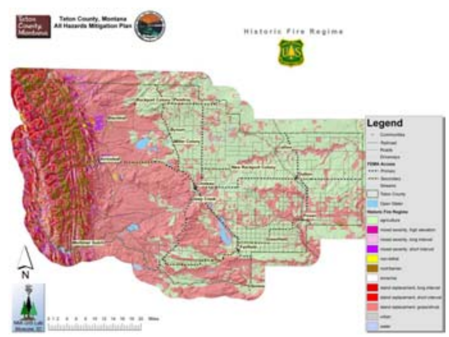

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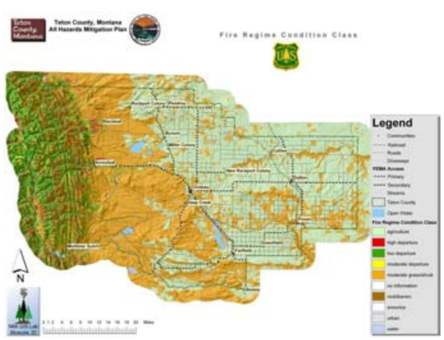

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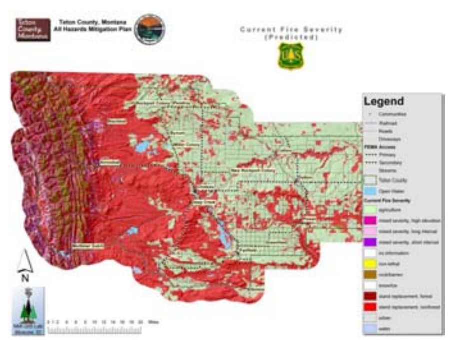
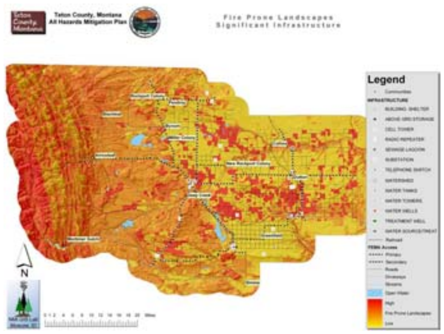


Table 2.9. Public meeting slide show.

Slide 27



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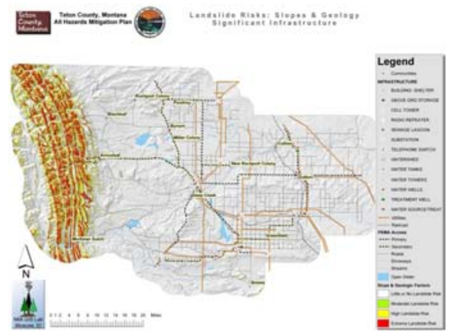

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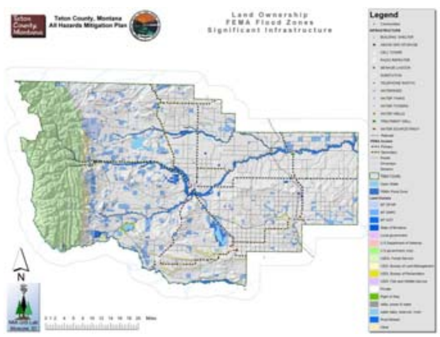

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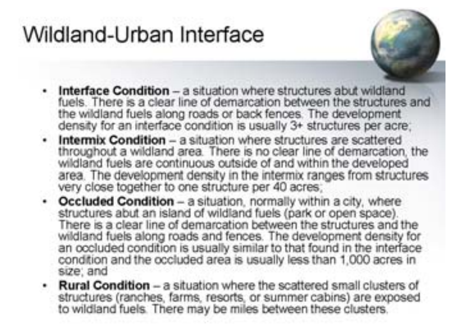

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Slide 32

Slide 33

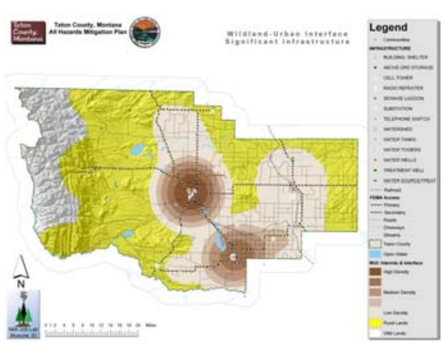

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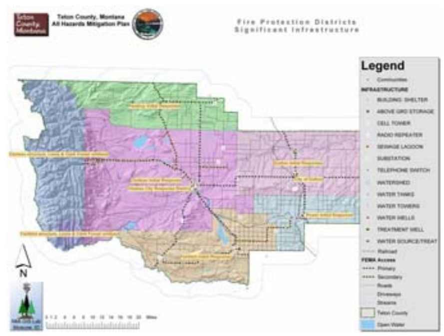
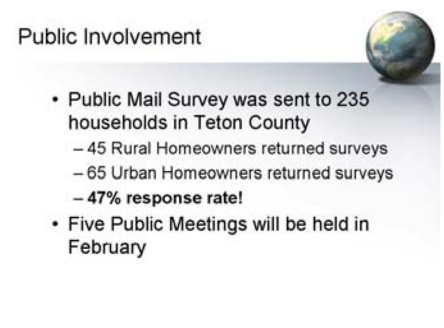
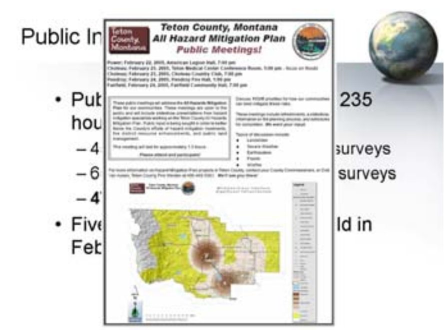
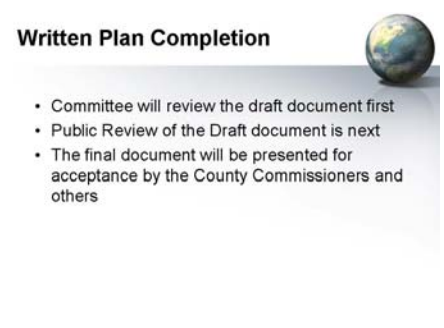
Table 2.9. Public meeting slide show.

Slide 35	 	Slide 36	
Slide 37	 	Slide 38	
Slide 39	 	Slide 40	
Slide 41	 		

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2.3.6 Documented Review Process

The review process begins with the planning committee. As previously discussed, the Teton County Wildland Urban Interface Wildfire Mitigation Plan is one chapter of the Teton County All Hazards Mitigation Plan, but will be bound as a stand alone document. The Teton County All Hazards Mitigation Plan will detail, in subsequent chapters, the additional hazards listed below.

- Flood Mitigation Plan
- Severe Weather (Winter Storm, Wind Storm, Tornado) Mitigation Plan
- Landslide & Earthquake Mitigation Plan

Chapters 1, 2, and 3 of this document are provided as “Overview” chapters, to set the stage for the planning process, the public involvement, and an assessment of the county’s characteristics which influence all of the individual hazard assessments and mitigation efforts.

The results of these formal and informal reviews were integrated into a DRAFT Hazards Mitigation Plan. This plan was given to members of the planning committee on March 30, 2005 with comments provided by April 30, 2005. Public review of the revised DRAFT document was made from May 1 until May 31, 2005. All comments were integrated into the final version of the mitigation plan.

The final plans were prepared on June 9, 2005. Adoption of the All Hazards Mitigation Plan and the Wildland-Urban Interface Wildfire Mitigation Plan was completed by the listed municipalities on the dates indicated in section 9.4 (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

Teton County is dedicated to involving the public directly in review and updates of the All Hazard Mitigation Plan and Wildland-Urban Interface Wildfire Mitigation Plan. The Teton County Commissioners, through the Hazard Mitigation Committee are responsible for the annual review and update of the plan as recommended in the “Recommendations” section 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 plans 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 plans also include 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 Hazard Mitigation Committee. The meetings will provide the public a forum for which they can express its concerns, opinions, or ideas about the plans. The County Clerk 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

3 Background and Area Description

3.1 Location and Land Forms

Teton County is located along the eastern Rocky Mountain Front of western Montana with the Teton River cutting through its heartland. Elevations range from 3,300 feet above sea level on the eastern side to 9,392 feet on top of Rocky Mountain in the Lewis and Clark National Forest on the western edge of the county. Ownership is mixed between Federal (mainly US Forest Service and Bureau of Land Management), state and private owners.

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Figure 3.1. Topographic relief of Teton County, Montana.

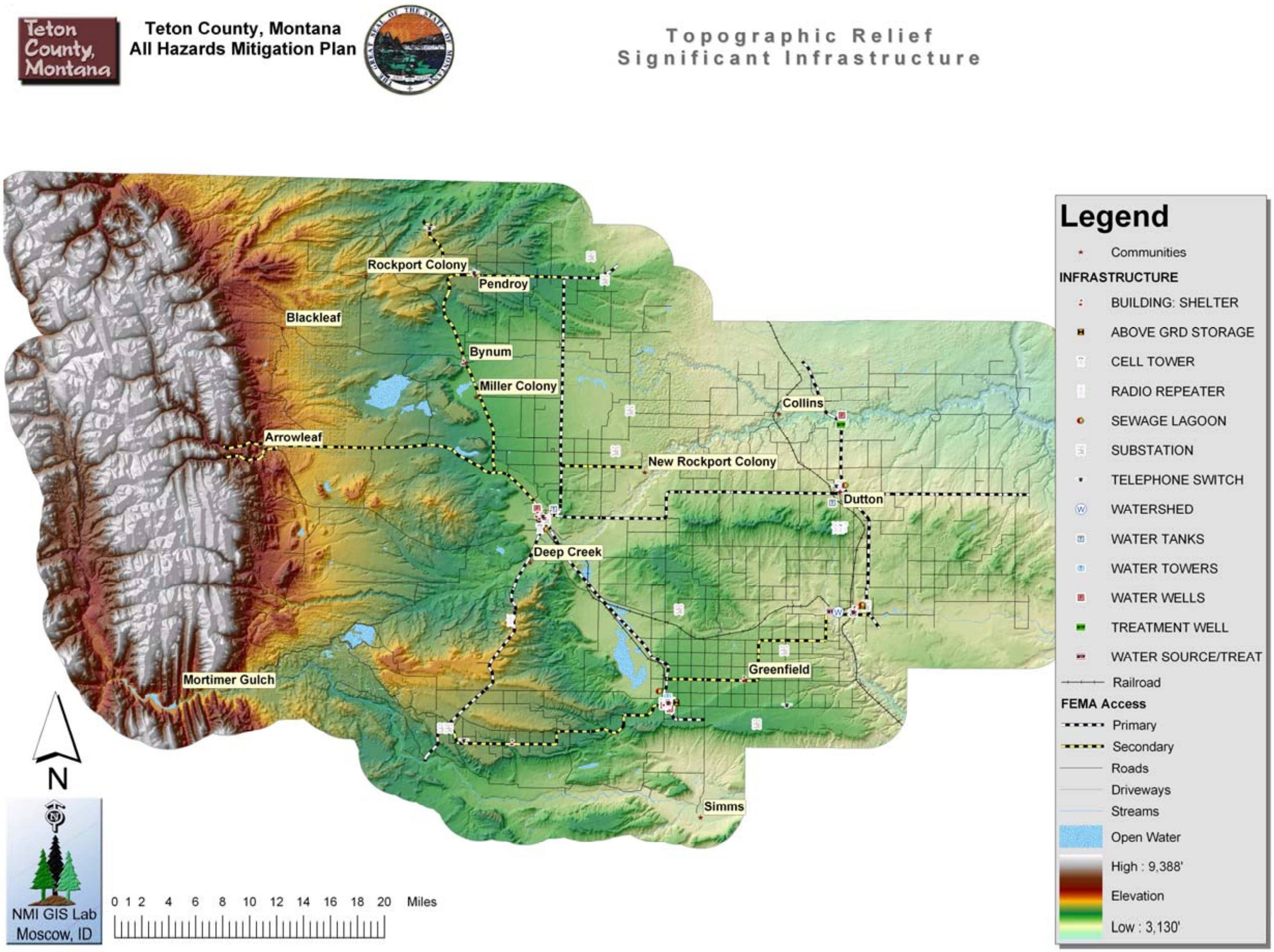

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Figure 3.2. Land Ownership in Teton County.

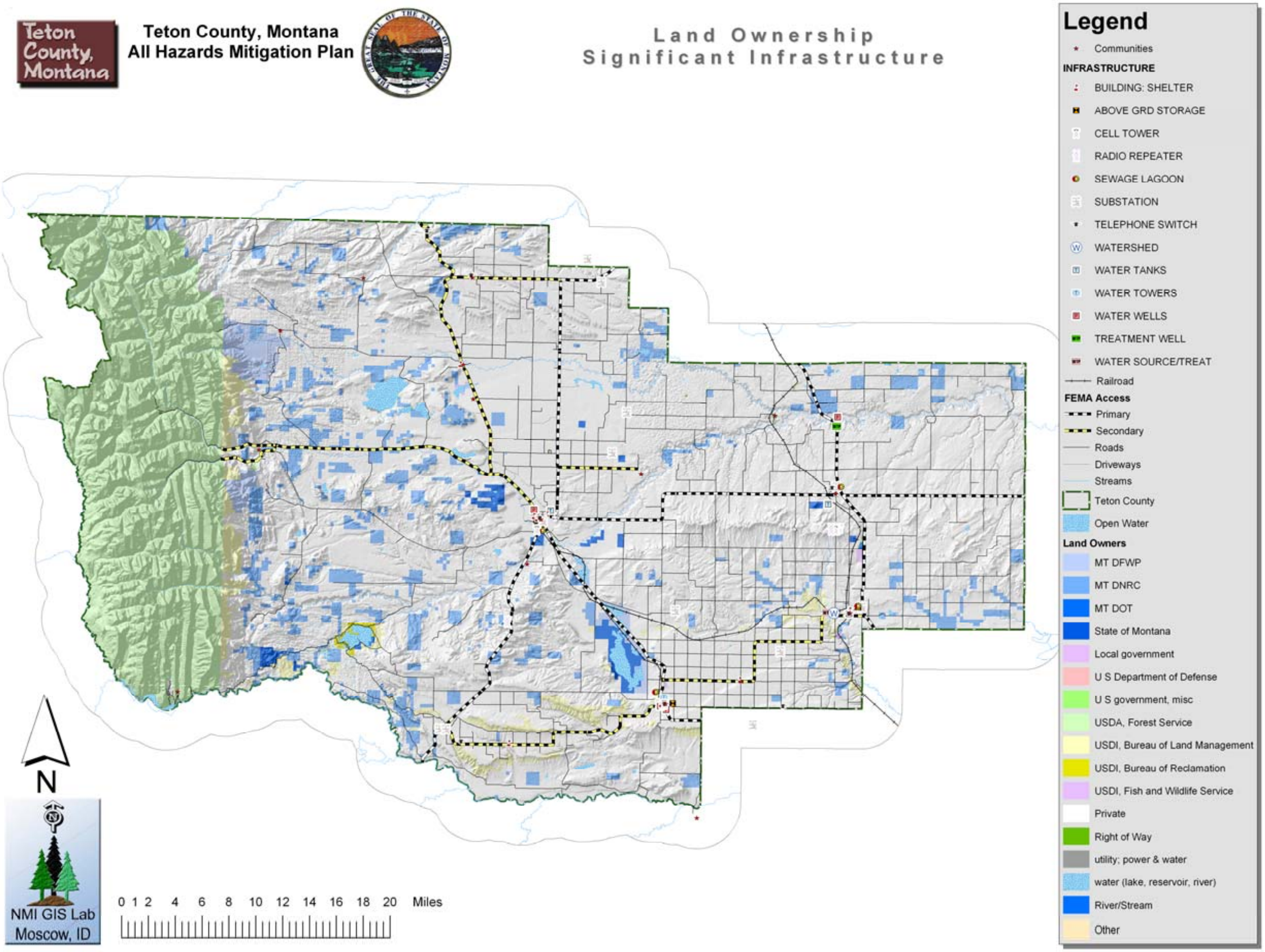

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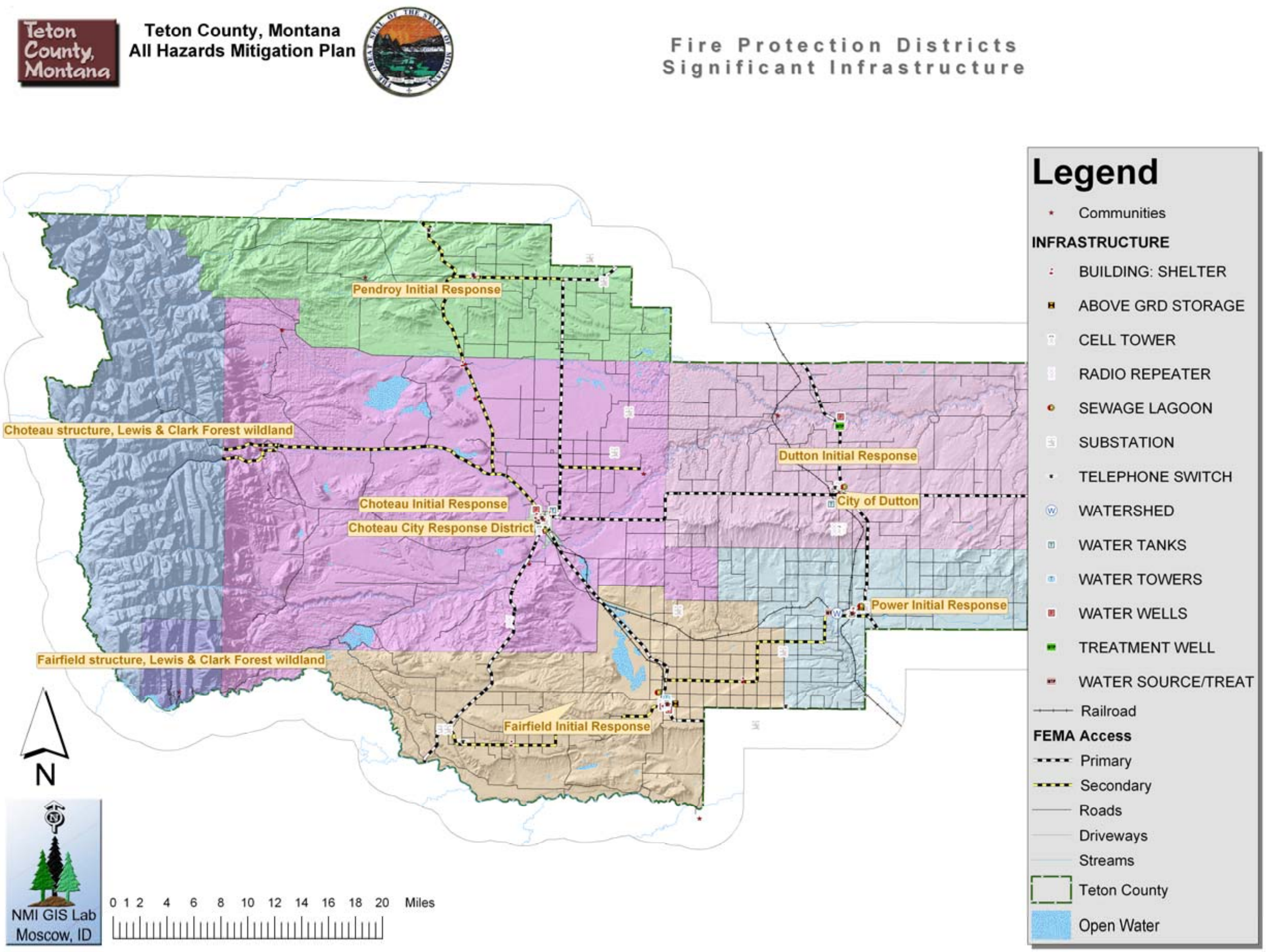
Figure 3.3. Rural and City Fire Protection Districts in Teton County.



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3.2 Demographics

The number of persons residing in Teton County has remained remarkably steady over the past 80 years, rising by less than 10 percent between 1920 and 2000. Teton County's population was 6,445 in 2000, and 5,870 in 1920. Teton County has two incorporated communities, Choteau (pop. 1,801) and Fairfield (pop. 655). The total land area of the county is roughly 2,293 square miles (1,467,251.2 acres).

Table 3.1 summarizes some relevant demographic statistics for Teton County.

Table 3.1. Summary of selected demographic statistics for Teton County, Montana.

Subject	Number	Percent
Total population	**6,445**	**100.0**
SEX AND AGE		
Male	3,167	49.1
Female	3,278	50.9
Under 5 years	388	6.0
5 to 9 years	447	6.9
10 to 14 years	562	8.7
15 to 19 years	528	8.2
20 to 24 years	225	3.5
25 to 34 years	607	9.4
35 to 44 years	993	15.4
45 to 54 years	910	14.1
55 to 59 years	316	4.9
60 to 64 years	382	5.9
65 to 74 years	506	7.9
75 to 84 years	433	6.7
85 years and over	148	2.3
Median age (years)	39.9	(X)
18 years and over	4,687	72.7
Male	2,284	35.4
Female	2,403	37.3
21 years and over	4,477	69.5
62 years and over	1,322	20.5
65 years and over	1,087	16.9
Male	485	7.5
Female	602	9.3
RELATIONSHIP		
Population	**6,445**	**100.0**
In households	6,378	99.0
Householder	2,518	39.1
Spouse	1,571	24.4

`

Table 3.1. Summary of selected demographic statistics for Teton County, Montana.

Subject	Number	Percent
Child	2,020	31.3
Own child under 18 years	1,706	26.5
Other relatives	102	1.6
Under 18 years	30	0.5
Nonrelatives	167	2.6
Unmarried partner	69	1.1
In group quarters	67	1.0
Institutionalized population	60	0.9
Noninstitutionalized population	7	0.1
HOUSEHOLDS BY TYPE		
Households	**2,518**	**100.0**
Family households (families)	1,743	69.2
With own children under 18 years	788	31.3
Married-couple family	1,523	60.5
With own children under 18 years	647	25.7
Female householder, no husband present	158	6.3
With own children under 18 years	96	3.8
Nonfamily households	775	30.8
Householder living alone	691	27.4
Householder 65 years and over	364	14.5
Households with individuals under 18 years	828	32.9
Households with individuals 65 years and over	1,035	41.1
Average household size	2.53	(X)
Average family size	3.12	(X)
HOUSING TENURE		
Occupied housing units	**2,538**	**100.0**
Owner-occupied housing units	1,920	75.7
Renter-occupied housing units	618	24.3
Average household size of owner-occupied unit	2.56	(X)
Average household size of renter-occupied unit	2.38	(X)

(Census 2000)

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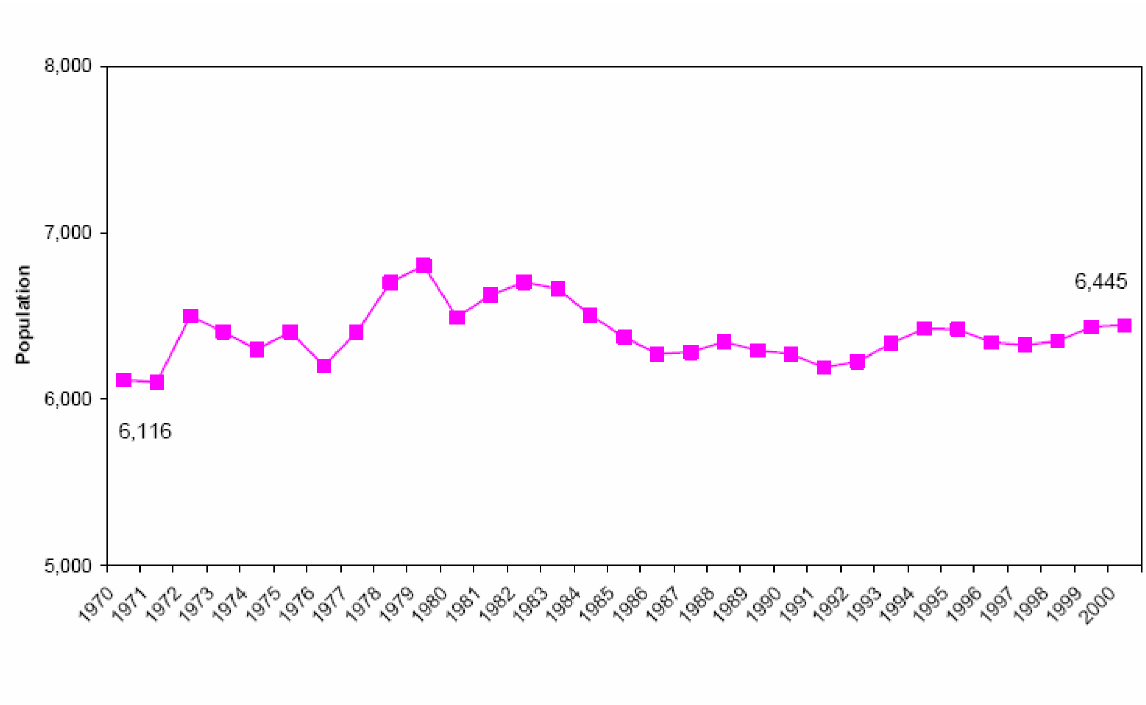
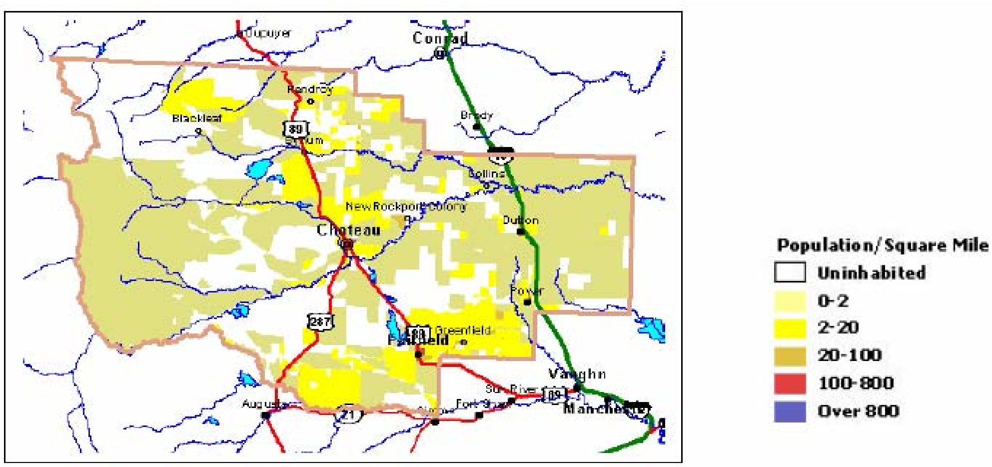
Figure 3.4. Teton County Population Trends from 1970 – 2000.



Sources: U. S. Bureau of the Census. Decennial Censuses of Population and Intercensal Estimates.

Figure 3.5. Population per square mile in Teton County.



Source: Montana Natural Resource Information System (NRIS) Geographic Information System (GIS), Based on US Bureau of the Census, "Census of the Population – 2000"

3.3 Socioeconomics

Teton County had a total of 2,538 occupied housing units and a population density of 2.8 persons per square mile reported in the 2000 Census (Table 3.1). Ethnicity in Teton County is distributed: white 96.3%, black or African American 0.2%, American Indian or Alaskan Native 1.5%, other race 1.5%, and Hispanic or Latino 1.1%.

Specific economic data for individual communities is collected by the US Census; in Teton County this includes Choteau and Fairfield. Choteau households earn a median income of

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$25,708 annually and Fairfield households earn $29,018. Both are below the Teton County median income for the same period ($30,197). Table 3.2 shows the dispersal of households in various income categories in both communities.

Table 3.2. Income in 1999	**Choteau**		**Fairfield**		**Teton County**	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Households						
Less than $10,000	123	15.3	28	9.8	306	12.2
$10,000 to $14,999	102	12.7	15	5.2	213	8.5
$15,000 to $24,999	168	20.9	70	24.4	500	19.9
$25,000 to $34,999	106	13.2	62	21.6	421	16.7
$35,000 to $49,999	147	18.3	47	16.4	470	18.7
$50,000 to $74,999	115	14.3	41	14.3	390	15.5
$75,000 to $99,999	28	3.5	22	7.7	135	5.4
$100,000 to $149,999	11	1.4	2	0.7	56	2.2
$150,000 to $199,999	2	0.2	0	0	16	0.6
$200,000 or more	1	0.1	0	0	11	0.4
Median household income (dollars)	$25,708		$29,018		$30,197	

(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 Teton County, a significant number of families are at or below the poverty level. Approximately 12.2% of Teton County families are below poverty level (Table 3.3).

Table 3.3 Poverty Status in 1999 (below poverty level).	**Teton County**	
	Number	**Percent**
Families	212	(X)
Percent below poverty level	(X)	12.2
With related children under 18 years	166	(X)
Percent below poverty level	(X)	20.4
With related children under 5 years	93	(X)
Percent below poverty level	(X)	33.0
Families with female householder, no husband present	52	(X)
Percent below poverty level	(X)	32.9
With related children under 18 years	48	(X)
Percent below poverty level	(X)	47.1
With related children under 5 years	15	(X)
Percent below poverty level	(X)	57.7
Individuals	1,056	(X)
Percent below poverty level	(X)	16.6
18 years and over	608	(X)

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Table 3.3 Poverty Status in 1999 (below poverty level).	Teton County Number	Teton County Percent
Percent below poverty level	(X)	13.1
65 years and over	88	(X)
Percent below poverty level	(X)	8.4
Related children under 18 years	445	(X)
Percent below poverty level	(X)	25.6
Related children 5 to 17 years	294	(X)
Percent below poverty level	(X)	21.7
Unrelated individuals 15 years and over	210	(X)
Percent below poverty level	(X)	22.5

(Census 2000)

The unemployment rate was 2.1% in Teton County in 1999, compared to 4.4% nationally during the same period. Approximately 20.6% of the Teton 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 & Industry	Teton County Number	Teton County Percent
OCCUPATION		
Management, professional, and related occupations	1,070	39.4
Service occupations	423	15.6
Sales and office occupations	548	20.2
Farming, fishing, and forestry occupations	148	5.4
Construction, extraction, and maintenance occupations	266	9.8
Production, transportation, and material moving occupations	264	9.7
INDUSTRY		
Agriculture, forestry, fishing and hunting, and mining	561	20.6
Construction	139	5.1
Manufacturing	78	2.9
Wholesale trade	95	3.5
Retail trade	258	9.5
Transportation and warehousing, and utilities	165	6.1
Information	148	5.4
Finance, insurance, real estate, and rental and leasing	122	4.5
Professional, scientific, management, administrative, and waste management services	106	3.9
Educational, health and social services	635	23.4
Arts, entertainment, recreation, accommodation and food services	165	6.1
Other services (except public administration)	136	5.0
Public administration	111	4.1

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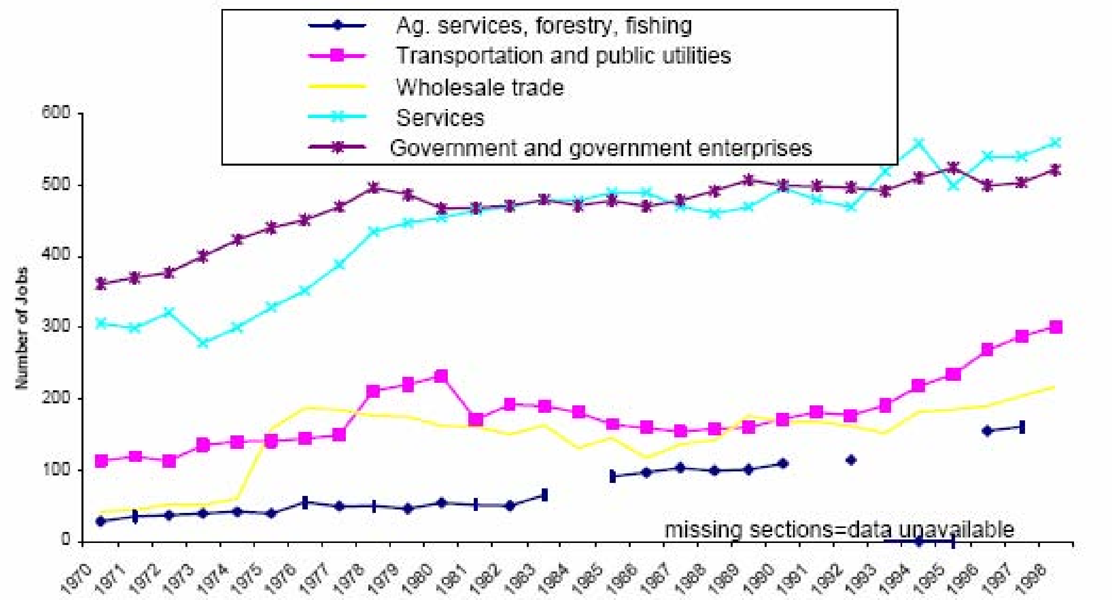
Figure 3.6. Employment in Largest Growing Sectors.



Source: U.S. Bureau of Economic Analysis. Regional Economic Information System. Table CA 25. Released June 2000.

Approximately 61.1% of Teton County's employed persons are private wage and salary workers, while around 18% are government workers (Table 3.5).

Table 3.5. Class of Worker	**Teton County**	
	Number	**Percent**
Private wage and salary workers	1,661	61.1
Government workers	490	18.0
Self-employed workers in own not incorporated business	525	19.3
Unpaid family workers	43	1.6

(Census 2000)

3.4 Description of Teton County

3.4.1 Teton County History

Summarized from Teton County website http://www.tetoncomt.org/history.aspx

Teton County is located on the Rocky Mountain Front, which forms the seam between the wild lands and wilderness of the Lewis and Clark National Forest and the foothills and plains domesticated by area ranchers and farmers.

Sparsely populated, Teton County is made up of small communities, linked by miles of country roads and highways, that are dedicated to maintaining the special quality of life that makes living here so worthwhile. Teton County is a slice out of America's heartland and, in some ways, is a slice out of this country's past. Crime rates are low out here and violent crime is almost non-existent. We don't have gangs in our schools or on our streets, and we still enjoy old-fashioned pleasures like community dances, family picnics and going for a drive in the country.

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Our culture and traditions are steeped in the fertile soil and in the wheat and barley and livestock we raise as our top marketable products. Seasons around here include calving, lambing, haying, seeding, harvesting and, in the fall, shipping. When you see cowboys moving their cattle along a roadway, you can bet they live on a ranch in the area and they probably learned to ride shortly after they learned to walk.

We value the wide open spaces (Teton County's population density, for example, is just 2.8 people per square mile), the pristine wildlife habitat, the clean air and bountiful water. We're accustomed to seeing deer in our gardens and hay fields, hearing the yip and howl of coyotes on moonlit nights and watching as hawks and eagles soar over the prairie.

We're proud of our communities and ready with open hospitality for visitors and travelers. Stop here awhile and you'll begin to realize why life in the country - far from the hustle and bustle of urban America - is such a valuable treasure.

Along the Rocky Mountain Front you can visit wildlife viewing sites that may give you a glimpse of mountain goats, bighorn sheep, elk or white tail and mule deer.

You can visit the Old Trail Museum in Choteau and learn about the vast inland sea that covered this area 80 million years ago and imagine the herds of herbivorous dinosaurs that roamed the shores of the sea, nested in colonies and reared their young.

You can hike along quiet mountain trails, listening to the sounds of the chattering squirrels and the whisper of the wind in aspen trees. Or, you can get out your fishing pole and go after some of the area's rainbow and brook trout in area streams or fish the reservoirs and lakes for walleye and pike.

3.4.2 Recreation

This region is a favorite destination for a variety of recreational opportunities. Gibson Reservoir is a favorite recreational opportunity in the County. Remote areas offer fishing, hiking and backpacking opportunities. Several areas throughout the Lewis and Clark National Forest in Teton County provide developed camping, fishing, snowmobiling, and backpacking sites, all of which receive extremely heavy use during all seasons.

Bird hunting and big game hunting for deer and elk is especially intense every fall. During the winter, snowmobiling has become a very popular sport, with a smaller amount of skiing and snowshoeing.

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 terms of wildfire mitigation efforts because of the combination of visitors traveling to rural and remote areas. These visitors are not necessarily familiar with rangeland and forestland fuel risk factors (eg., campfire protocols, use of fire, etc.), and often unfamiliar with access routes and other factors. Because of these reasons and others, the rural areas of Teton County will receive increased attention during mitigation treatments.

3.4.2.1 Lewis and Clark National Forest

Historically, the Lewis and Clark National Forest has been separated into two major divisions- the Rocky Mountain Division, west of Great Falls, contains the Rocky Mountain Ranger District; and the Jefferson Division, scattered mountain ranges to the east of Great Falls, containing the Judith, Belt Creek, Musselshell, and White Sulphur Springs Ranger Districts.

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The Jefferson Division is comprised of six distinct mountain ranges east and south east of Great Falls. Private or other agency lands surround each mountain range. The mountain ranges include the Crazy Mountains (south half administered by Gallatin National Forest), Little Belt Mountains, Castle Mountains, Highwood Mountains, Big Snowy and Little Snowy Mountains.

The Lewis and Clark National Forest contains more than 1,500 miles of forest roads. Surfaced roads feature many scenic drives, including Kings Hill National Scenic Byway (US Highway 89), a major route between Glacier and Yellowstone National Parks, which passes through the Little Belt Mountains.

The Lewis and Clark National Forest contains 29 developed recreation sites. Many of these sites are handicap accessible. There are five cabins on the forest that may be rented by the public on a first come, first served basis. Trails provide the only routes of travel to much of the forest. Approximately 2,200 miles of trails are managed by the Lewis and Clark National Forest.

The Lewis and Clark National Forest is home for large game animals, small animals and protected species. Forest visitors can hunt elk, mule and white tail deer, mountain goat, bighorn sheep, black bear, mountain lion and blue grouse. Protected wildlife living on or near the forest includes bald eagles, grizzly bears, peregrine falcon, lynx and gray wolf. The forest contains many popular viewing sites for migrating waterfowl.

The forest has 1,600 miles of permanent streams and several small, natural and man-made lakes where forest visitors may fish for cutthroat, brook and rainbow trout, and mountain whitefish.

3.4.2.2 Wildlife Management Areas

There are several wildlife management areas in Teton County; however, due the dramatically different landscapes between the National Forest, the Rocky Mountain Front, and the rangelands, the management goals of the Montana Fish, Wildlife, and Parks Service vary, and therefore, the public opportunities afforded by these areas also vary significantly. Archery and gun seasons for white-tailed deer, mule deer, elk, black bear and grouse are open to licensed hunters; however, permits are required for bighorn sheep hunting in these areas. Freezout Lake WMA offers abundant waterfowl and upland game bird hunting opportunities. All of the Wildlife Management Areas in Teton County are excellent wildlife viewing sites.

3.4.2.3 BLM Public Lands

Much of the eastern Rocky Mountain front along the Lewis and Clark National Forest boundary is administered by the Bureau of Land Management. These areas are open to the public year-round. Although there are no developed sites, residents of Teton County use these lands to hunt, four-wheel, mountain bike, and drive off-road vehicles among many other things.

3.4.2.4 National Recreation Trails

There is a plethora of hiking trails throughout the Lewis and Clark National Forest in Teton County including the Mortimer Gulch, Jones Creek, and South Fork Teton Blacktail National Recreation Trails, as well as the Mount Wright, Green Gulch, and Mill Falls Trails. Most of these public trails begin near the eastern border of the National Forest and wind their way west towards the Continental Divide. Not only to Teton County residents enjoy the remote mountain experience offered by these trails, but people come from all over the United States to hike over the Divide.

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3.4.2.5 Reservoirs

There are many reservoirs used to store water for summer irrigation scattered throughout Teton County. Gibson Reservoir on the Sun River provides fishing, boating, and nearby camping opportunities that are well-used by area residents. Many of the other relatively small reservoirs, including Bynum Reservoir, Arod Lake, Eureka Reservoir, and Priest Butte Lake, attract large numbers of migratory and game bird populations; however, there are few developed camping, rest room, boating, or fishing facilities due to the variability of the water levels. Freezout Lake Reservoir is encompassed by a designated wildlife management area.

3.4.2.6 Camping

Camping is a popular activity enjoyed by residents and visitors of Teton County. In addition to the developed KOA RV park in Choteau, there are also several campsites on the Lewis and Clark National Forest, most of which are easily accessible.

3.4.2.7 Winter Sports

For those people who enjoy winter sports, Teton County has a variety of activities to interest them. Cross-country skiers will be exhilarated by the challenging mountain trails, while downhill skiers can hit the slopes at the Rocky Mountain Hi ski area. Snowmobiling is also a popular winter sport that attracts many local and out of town thrill seekers.

3.4.2.8 Fishing and Hunting

Fishing and hunting is very important to Teton County both from a recreational standpoint and as an economic resource. A wide variety of fish can be caught in Teton County including trout, walleye, perch, and pike.

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

3.4.3 Resource Dependency

Economic conditions can affect county population, land use, population growth (or decline), and personal income and ability of community's to fund services and infrastructure. Teton County completed an Overall Economic Development Plan in March of 1998 that 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. The following analysis in this chapter examines longer term trends (over the past 30 years).

- In 1998, there were 3,300 full- or part-time jobs in Teton County; up 25 percent from 1970.
- Sixty percent of all jobs in Teton County in 1998 were wage and salary employment; the remaining 40 percent were proprietor employment. Similar employment statewide comprises 74 percent of all jobs.
- In 1998, farm employment comprised 23 percent of all jobs in Teton County, compared to 6 percent statewide.
- With the exception of farm proprietors, farm employment, and retail trade employment increased in every major category between 1970 and 1998.

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- The fastest growing sectors in Teton County over the last 20 years are services, transportation and public utilities, wholesale trade, agricultural services, and government.
- The number of new jobs created between 1970 and 1998 outpaced population growth by nearly 300 percent. Many Teton County residents may be holding more than one full or part-time job.
- In 1998, there were 190 establishments with a total of 1,083 employees, and 478 establishments with 0 employees. “Non-employer” establishments are typically self-employed individuals or partnerships.
- Receipts for the 478 self-employed individuals totaled $13.6 million in 1998. Payroll for the 190 business establishments totaled $19.6 million.
- Seventy percent of all businesses with employees had less than five employees in 1998.
- Total personal income from farms and ranches decreased from $48.1 million (adjusted for inflation) to 11.4 million between 1970 and 1998.
- Labor earnings from non-farm sources increased from $25 million in 1970 (adjusted for inflation) to 34.9 million in 1998.
- Income from dividends, interest and rent increased from $20.4 million (adjusted for inflation) in 1970 to 36.6 million in 1998.
- A total of 306 persons commuted to work outside of Teton County in 1990; 183 persons residing outside the county had jobs in Teton County.
- In 1973, average earnings per job (adjusted for inflation) were $43,250 in Teton County. In 1998, average earnings per job were $17,791. Statewide, average earnings per job in 1998 were $22,103.

3.4.4 Development Trends

Teton County has a tight housing market. Based on statistical information from the 2000 census and from the 1999 *Montana Housing Condition Study,* less than one percent of the total housing units in fair or better condition were available for new occupants. It is likely there are periods when it is extremely difficult for anyone to find even unsuitable housing in Teton County. Persons on limited incomes are especially hard-hit by the tight housing market. Although there are housing assistance programs available, it appears that the need is much greater than the supply in most cases. With the exception of Fairfield, there are waiting lists for all of the subsidized housing in the county. Out of a total of 995 persons in Teton County estimated to be living in poverty, only six were receiving HUD Section 8 Housing assistance in 2001.

Population projections indicate that the county’s total population is likely to increase by only five persons over the next ten years. Consequently, overall demand for housing may not be much greater than it is currently. The demographics of the population will change however, potentially creating new types of housing demand. The number of persons aged 25-34 is expected to increase by 80 persons over the next ten years, and the demand for starter homes is likely to increase. Projections indicate approximately 120 more persons over age 65 in the next ten years, potentially increasing demand for senior care housing.

The Community Needs Assessments in Dutton and Fairfield indicate a need for housing rehabilitation. The statistical data from the 2000 census and the *Montana Housing Condition Study* indicate a similar need county-wide. A total of 189 units were determined to be in unsound or poor condition in 1999, according to state data. Housing rehabilitation and other programs are available to local government through the Montana Department of Commerce include Community Development Block Grant funds and other programs. Currently, only Dutton has applied for and received such assistance.

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3.4.5 Land Use

The County is comprised of 72% privately owned land, 19% of land under various Federal agencies and 8% State owned land. Most of the Federal owned land is within the Lewis and Clark National Forest. In the southwest corner of the County there are some scattered, small privately owned in-holdings within the Forest boundaries. The Bureau of Land Management (BLM) holdings are primarily adjacent to the Lewis and Clark National Forest and include Special Recreation Management Areas (SMRA) and Outstanding Natural Areas (ONA).

The State of Montana Land is comprised of State Trust Lands and State Wildlife Management Areas. The trust lands are scattered throughout the County. The income derived from state trust land including rentals is available for the maintenance and support of schools and institutions. The Trust Land Management Division administers land for the other state agencies in addition to state trust land. The division is divided into four bureaus that represent the different types of land uses: Agriculture and Grazing Management, Forest Management, Minerals Management, and Special Use Management. In Teton County, trust land is primarily used for agriculture and grazing.

Agriculture and rangeland comprise 80% of the County's land area. Urbanized areas comprise the smallest category of land use, representing only 0.3% of the entire area in the County. The forested areas are located in the west portion of the County along the Rocky Mountain front in primarily the Lewis and Clark National Forest. Agriculture land is the dominant land use in the east half of the County while rangeland is located mostly adjacent to the national forest in the west half of the County.

Table 3.6. Land ownership in Teton County.

Owner	Acres	Sq. Miles	% of Total
Private	1,033,015	1,614.09	70.48%
U.S. Forest Service	230,259	359.78	15.71%
State Trust Land	102,718	160.50	7.01%
Other Federal	26,196	40.93	1.79%
Private Conservation	22,282	34.82	1.52%
Bureau of Land Management	17,650	27.58	1.20%
Other State Land	16,087	25.14	1.10%
Water	15,991	24.99	1.09%
US Fish and Wildlife Service	1,486	2.32	0.10%
TOTAL	**1,465,684**	**2,290.13**	

3.4.5.1 Agricultural Land Use

According to the 1997 Census of Agriculture, there were 557 farms in Teton County in 1997 and 556 farms in 1992. Unlike the state, where the number of farms decreased by 2% since 1992,

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the number of farms in Teton County remained constant. Nationwide, there is a trend toward consolidation of smaller family farms to larger units, resulting in an overall decrease in the number of farms. The average size of farms in Teton County in 1997 was 2,005 acres, a decrease of 5% from a 2,120 acre average size in 1992. Statewide, the average size of farms is 2,414 acres and is slightly higher than Teton County. The average size of farm in the State decreased by 8% from 1992 to 1997. The primary reason for the decrease in average size is land being taken out of production and converted to uses such as developed land.

In 1997, farms that were owned by an individual or family accounted for 76% of all farms while partnerships/corporations represented 24% of the total farms. The number of family farms actually increased by 2% from 1992 to 1997. Farming is the principal occupation for 73% of farm operators. The number of full-time farm operators decreased by 7% from 1992 to 1997. Statewide, the number of fulltime farms decreased by 2%. The average age of the operator increased slightly from 49.9 in 1992 to 51.3 years in 1997.

Depending on the source of the data, the amount of cropland in Teton County ranges from Census of Agriculture estimate of 581,422 acres to the Montana Natural Resource Information System (NRIS) estimate of 636,868 acres. The 1997 Census of Agriculture is based on data reported by farmers while the NRIS data is based on estimates from maps. The difference may be due to the date of the aerial photographs, rounding errors and interpretation of maps that would include acreage that was not reported by farms.

The United States Department of Agriculture 2000 data indicates that of the total cropland, 105,030 acres were irrigated. Major irrigated acres lie north and east of Choteau and consist of the Bynum Irrigation Project, Teton Co-op Canal Company, Farmers Co-op Canal Company and the Eldorado Canal Company, along with several private ditches. The Greenfield Irrigation project near Fairfield, operated and maintained by the Federal Bureau of Reclamation, is the largest project in the County. Hay and grains are the primary irrigated crops. The largest areas of dry cropland are in the eastern half of the County with winter wheat and barley being the principle crops.

There are approximately 544,470 acres of rangeland in Teton County. The majority of this rangeland lies west of U.S. Highway 89 and is primarily used for livestock grazing. The land is generally not suited to more intensive agricultural uses. Some creek and valley bottoms, however, are irrigated on an individual basis. Rangeland in the east half of the County generally consists of rough breaks and coulees following water courses. There is some rangeland scattered in areas of low agricultural productivity. These areas provide pasture and rangeland for dryland farmers who wish to augment their farming operations.

While some rangeland may be suited only for low intensity grazing, these lands are regarded as having high scenic, open space, and environmental value. In general, the high winds and dry conditions have not been conducive to residential development. Recent subdivisions in the area, however, indicate increased interest.

According to the 1997 Census of Agriculture, livestock and livestock production account for 36% of the total agricultural receipts in the County. Teton County ranks 21st among counties in the state for the number of all cattle. Other livestock includes sheep and hogs.

The Conservation Reserve Program (CRP) includes rental payments to farmers to take sensitive lands out of production. The purpose of the CRP is to reduce soil erosion, protect the Nation's ability to produce food and fiber, reduce sedimentation in streams and lakes, improve water quality, establish wildlife habitat, and enhance forest and wetland resources. The CRP is a voluntary program administered by the United States Department of Agriculture (USDA). Producers enroll land in the program and receive 10 to 15 year contracts that provide them with

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annual rental payments and cost-share assistance. It encourages farmers to convert highly erodible cropland or other environmentally sensitive acreage to vegetative cover, such as tame or native grasses, wildlife plantings, trees, filterstrips, or riparian buffers. Cost-sharing is provided to establish the vegetative cover practices. The program has been in operation since 1987.

In Teton County, there were 857 contracts since 1987 that covered 148,392 acres of cropland. Almost all of this acreage has been enrolled since 1996 and will be under contract for another 5 to 15 years. More than half of the acreage was enrolled in 1998 with the number of new contracts steadily declining over the last three years. In Montana, Hill County has the largest amount of acreage under CRP contracts with 293,932 acres enrolled in the program. Teton County ranks 11 among the 51 counties with CRP acreage.

There are also a number of other USDA programs that resulted from the 1996 Farm Bill to assist people with their conservation needs. These programs offer technical assistance or include cost-share funds to implement various conservation practices. All programs are voluntary.

3.4.6 Wildland-Urban Interface

A key component in meeting the underlying need is the protection and treatment against hazards in what has been called the wildland-urban interface. The wildland-urban interface (WUI) was developed to give land managers a reference for where people and structures are located in reference to wildland fire control. The WUI has a broader application for use in hazard mitigation applications as it refers to areas where concentrations of people and structures are located. It encompasses not only the interface (areas immediately adjacent to urban development), but also the continuous slopes and wildlands that lead directly to a risk to urban developments. Reducing the hazards 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). Although Secretary Norton was speaking on wildfire risks, her comments apply equally to other hazards.

Property owners share a responsibility to protect their residences and businesses and minimize danger by creating defensible areas around them and taking other measures to minimize the risks to their structures (USFS 2001). With treatment, a wildland-urban interface can provide firefighters a defensible area from which to suppress hazard risks or defend communities (Norton 2002).

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;

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- **Occluded Condition** – a situation, normally within a city, where structures abut an island of wildland fuels (park or open space). There is a clear line of demarcation between the structures and the wildland fuels along roads and fences. The development density for an occluded condition is usually similar to that found in the interface condition and the occluded area is usually less than 1,000 acres in size; and
- **Rural Condition** – a situation where the scattered small clusters of structures (ranches, farms, resorts, or summer cabins) are exposed to wildland fuels. There may be miles between these clusters.

The location of structures in Teton County have been mapped and are presented on a variety of maps in this analysis document. The location of all structures was determined by examining the Teton County 911 structure layer.

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.

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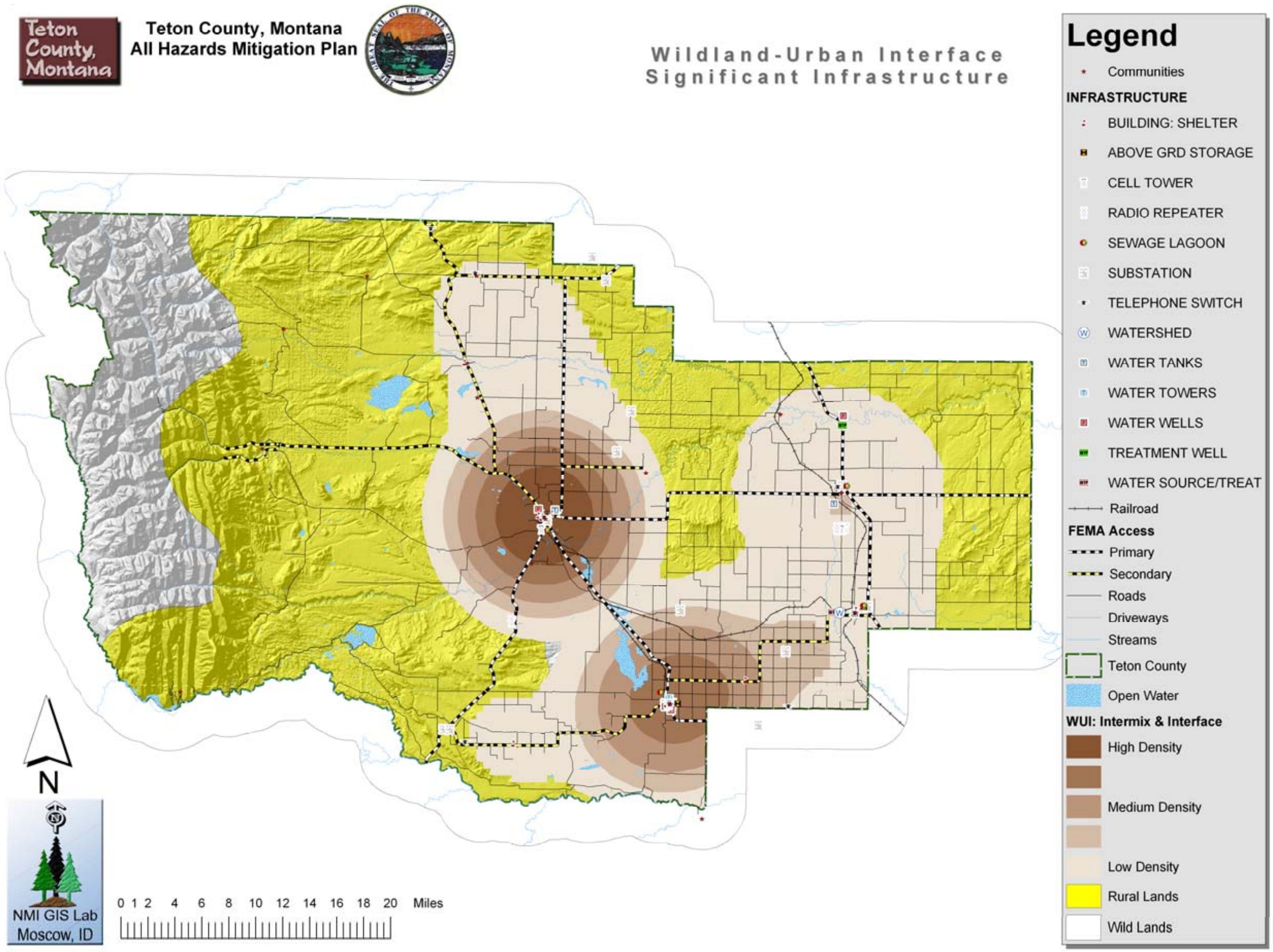
Figure 3.7. Wildland-Urban Interface of Teton County.



3.5 Cultural Resources

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

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.

Teton County was formed in 1893 from a portion of Chouteau County. The City of Choteau, incorporated in 1894, became the county seat. Teton County originally encompassed a much larger area until Toole, Glacier, and Pondera counties were formed. The first permanent residents in the County were squatters and cattlemen who settled near the military forts and trading posts at Fort Shaw, Choteau, and Dupuyer. With the introduction of irrigation such as the Sun River Irrigation Project and the Greenfield District, settlement increased, particularly in the Fairfield area. The railroad also played a major role in settlement with the Town of Dutton and other unincorporated areas being established along rail lines and spurs.

Evidence of pre-settlement and pioneer settlement history are found at various archaeological and historic sites throughout the County. Teton County has 12 archaeological sites and 26 cultural resources sites, with 20 of these sites being of prehistoric origin. A 1992 University of Montana study documented the discoveries at these sites including combinations of stone circles with rock cairns, isolated rock cairns, trail ruts and artifact scatters. Historic sites include historic cabins and foundations, cultural material scatters, a historic kiln, and a snare trap. Possible Indian burial grounds may also exist in the area, although no human remains have been reported.

The Montana State Historic Preservation Office maintains a “Cultural Resource Information Systems” database that catalogues each specific structure or artifact of historic significance in the County. The database includes over 300 listings. It includes buildings, historic trails, rail lines, bridges, farmstead buildings, irrigation systems, and pre-historic finds. The sites are located County wide on private, state, and Federal lands.

The historic “Old North Trail” passes through Teton County. The name refers to a Native American trail system which consisted of foot, dog, horse travois and Red River cart trails. The trail runs along the eastern front of the Rocky Mountains in north central Montana and follows the backbone of the Rockies from Alaska down into Mexico. The Metis Cultural Recovery, Inc.(MCRI) was formed in 1997 to preserve the history of the Trail.

Although there are no sites listed on the National Historic Register, a walking tour of buildings in Choteau list 20 notable sites. Several buildings date back prior to 1900. The Courthouse was built in 1906 with stone taken from Rattlesnake Butte south of town. The Courthouse underwent renovations in 2001.

Other notable sites include the Old Trail Museum in Choteau, the old Catholic Mission, and remains of the area’s first town: Old Agency. In addition to the historic areas, Teton County’s location along the Rocky Mountain front provides it with exceptional scenic resources. The Lewis and Clark National Forest-Teton Roadless area contains special features such as rugged limestone reefs that fringe the eastern border of the Blackleaf-Dupuyer area, and a waterfall framed by 1,000 foot high sheer cliffs in the Muddy Creek Canyon area. US Highway 89 that traverses the County is classified as a “Scenic Route”.

Hazard mitigation activities in and around these sites has the potential to affect historic places. In all cases, the mitigation work will be intended to reduce the potential of damaging the site.

3.6 Transportation

There are several main thoroughfares accessing Teton County. Interstate 15 passes through Power and Dutton on the eastern side of the county while U.S. Highway 89 accesses Bynum, Choteau, and Fairfield on the western side. U.S. Highway 287 connecting Choteau to Augusta in neighboring Lewis and Clark County is also a main route. Both U.S. 89 and I-15 from Great Falls run northward through Teton County to the Canadian border. State Routes 219, 220, 221, 379, 408, and 431 crisscross the County providing access to the smaller communities, rural home sites, and remote regions. Smaller access roads (mostly gravel) provide access to the adjoining areas within the county. A variety of trails and closed roads are to be found throughout the region.

Almost all of the roads in the county were originally built to facilitate logging, ranching, and farming activities. As such, all of these roads can support heavy equipment and emergency response equipment referenced in this document. However, many of the new roads have been built for home site access, especially for new subdivisions of homes. In most cases, these roads are adequate to facilitate large and heavy equipment.

Some of the most limiting points of access are found in the more rural areas of the county. In some locations, private roads were not built to the high standards adhered to on Federal and State lands. Some of these roads are narrow, have a dirt surface, and have limitations in the form of bridges and cattle guards that cannot guarantee weight standards. This situation is exacerbated by the fact that some of these limiting roads provide primary access to homes and recreation areas.

3.7 Vegetation & Climate

Vegetation in Teton County is a mix of forestland and rangeland 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 3.6.

The most represented vegetated cover type is Irrigated Agriculture at approximately 19% of the total area. The next most common vegetation cover type represented is Dryland Agricultural land at 19%. Low/Moderate Cover Grasslands is the third most common plant cover type at 16% along with Low Cover Grasslands at 13% (Table 3.7).

Table 3.7. Cover Types in Teton County.	Acres	Percent of County's Total Area
Irrigated Agriculture	364,884	19%
Dryland Agriculture	363,476	19%
Low/Moderate Cover Grasslands	315,854	16%
Low Cover Grasslands	258,883	13%
Mixed Mesic Shrubs	92,216	5%
Exposed Rock	56,941	3%
Mixed Subalpine	52,880	3%
Limber Pine	42,634	2%
Lodgepole Pine	40,694	2%
Subalpine Fir	31,977	2%
Douglas Fir	31,931	2%
Montane Parklands, Subalpine Meadows	29,893	2%
Mixed Whitebark Pine	21,343	1%
Mixed Barren Land	20,884	1%

Table 3.7. Cover Types in Teton County.	Acres	Percent of County's Total Area
Mixed Mesic Forest	20,530	1%
Mountain Big Sagebrush	20,330	1%
Standing Burnt or Dead Forest	20,267	1%
Douglas Fir-Lodgepole Forest	17,768	1%
Mixed Broadleaf Forest	16,727	1%
Moderate/High Cover Grasslands	16,625	1%
Water	16,166	1%
Ponderosa Pine	11,806	1%
Mixed Xeric Forest	11,486	1%
Creeping Juniper	11,072	1%
Alpine Grasslands	5,630	0%
Mixed Broadleaf Conifer Forest	5,296	0%
Graminoid and Forb Riparian	4,572	0%
Cold Mesic Shrubs	4,042	0%
Western Larch-Douglas Fir Forest	3,805	0%
High Cover Grasslands	3,573	0%
Engelmann Spruce	3,106	0%
Rocky Mountain Juniper	2,379	0%
Barren Alpine Tundra	2,283	0%
Shrub Dominated Riparian	2,253	0%
Altered Herbaceous	1,927	0%
Cloud	1,612	0%
CRP Lands	1,596	0%
Broadleaf Dominated Riparian	1,568	0%
Cloud Shadow	1,393	0%
Urban	1,215	0%
Very Low Cover Grasslands	1,007	0%
Willow Dominated Riparian	995	0%
Warm Mesic Shrubs	276	0%
Dry Salt-Flats	163	0%
Snowfields or Ice	141	0%
Tree Grassland Associations	24	0%
Conifer Dominated Riparian	4	0%
Mixed Forest Non-forest Riparian	3	0%
Aspen	3	0%

Vegetative communities within the county follow the strong moisture and temperature gradient related to the major river drainages. Limited precipitation and steep slopes result in a relatively arid environment in the southern portion of the county, limiting vegetation to drought-tolerant plant communities of grass and shrublands, with scattered clumps of ponderosa pine and Douglas-fir at the higher elevations in the north end of the county. As moisture availability increases, so does the abundance of conifer species, with subalpine forest communities present in the highest elevations where precipitation and elevation provide more available moisture during the growing season.

3.7.1 Monthly Climate Summaries in Teton County

3.7.1.1 Pendroy, Montana

Period of Record Monthly Climate Summary
Period of Record : 7/ 1/1948 to 1/31/1990

Table 3.8. Climate summaries for Pendroy, Teton County, Montana.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	Insufficient Data												
Average Min. Temperature (F)	Insufficient Data												
Average Total Precipitation (in.)	0.61	0.47	0.83	1.38	2.63	2.60	1.47	1.63	1.32	0.65	0.53	0.54	14.66
Average Total SnowFall (in.)	7.5	5.4	9.1	9.4	2.9	0.4	0.0	0.0	2.4	3.9	5.9	7.0	53.9
Average Snow Depth (in.)	2	2	2	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: 97.5% Snowfall: 76.3% Snow Depth: 54.5%

3.7.1.2 Choteau, Montana

Period of Record Monthly Climate Summary
Period of Record : 1/ 1/1893 to 9/30/2004

Table 3.9. Climate summaries for Choteau, Teton County, Montana.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	33.8	38.3	44.7	55.6	65.9	73.0	82.3	81.1	70.2	60.2	45.1	37.6	57.3
Average Min. Temperature (F)	10.3	13.7	20.0	29.3	38.2	45.6	50.2	48.1	40.4	32.6	21.7	15.4	30.5
Average Total Precipitation (in.)	0.34	0.32	0.49	0.81	1.99	2.78	1.42	1.17	1.07	0.53	0.39	0.32	11.62
Average Total SnowFall (in.)	7.8	5.6	6.7	4.4	1.1	0.1	0.0	0.1	1.3	2.1	5.3	5.6	40.1
Average Snow Depth (in.)	1	1	1	0	0	0	0	0	0	0	1	2	1

Percent of possible observations for period of record. Max. Temp.: 82.1% Min. Temp.: 81.9% Precipitation: 83% Snowfall: 80.9% Snow Depth: 63%

3.7.1.3 Gibson Dam, Montana

Period of Record Monthly Climate Summary
Period of Record : 7/ 1/1948 to 9/30/2004

Table 3.10. Climate summaries for Gibson Dam, Teton County, Montana.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	33.0	37.6	41.8	51.1	60.3	68.0	77.6	77.0	67.3	56.5	42.1	34.9	53.9
Average Min. Temperature (F)	12.4	16.4	19.9	27.9	35.3	41.9	46.0	44.8	38.0	31.8	22.9	16.4	29.5

Table 3.10. Climate summaries for Gibson Dam, Teton County, Montana.													
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**
Average Total Precipitation (in.)	0.96	0.76	0.97	1.57	2.86	3.23	1.51	1.62	1.41	1.01	0.98	0.86	17.75
Average Total SnowFall (in.)	13.6	10.6	13.2	11.1	2.7	0.1	0.0	0.1	0.9	4.9	9.7	10.6	77.5
Average Snow Depth (in.)	4	3	2	1	0	0	0	0	0	0	1	3	1

Percent of possible observations for period of record. Max. Temp.: 98.9% Min. Temp.: 99% Precipitation: 99.4% Snowfall: 96.6% Snow Depth: 94.1%

3.7.1.4 Fairfield, Montana

Period of Record Monthly Climate Summary
Period of Record : 7/ 1/1948 to 9/30/2004

Table 3.11. Climate summaries for Fairfield, Teton County, Montana.													
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**
Average Max. Temperature (F)	32.3	38.7	44.8	55.6	65.2	72.3	80.7	80.3	70.6	59.7	43.9	35.7	56.6
Average Min. Temperature (F)	11.5	17.0	21.3	30.5	39.4	46.6	51.4	50.5	42.4	34.3	23.7	16.2	32.1
Average Total Precipitation (in.)	0.42	0.35	0.62	1.10	2.21	2.45	1.45	1.37	1.05	0.57	0.39	0.32	12.28
Average Total SnowFall (in.)	7.2	5.7	8.8	5.9	1.2	0.1	0.0	0.0	1.3	1.9	5.4	5.9	43.5
Average Snow Depth (in.)	3	2	1	0	0	0	0	0	0	0	1	2	1

Percent of possible observations for period of record. Max. Temp.: 99.8% Min. Temp.: 99.8% Precipitation: 99.8% Snowfall: 94.4% Snow Depth: 91.8%

3.7.2 Infrastructure

Teton County has both significant infrastructure and unique ecosystems within its boundaries. Of note for this All Hazards Mitigation Plan is the existence of major highway routes (Interstate 15, Highways 89 and 287), and the presence of high tension power lines supplying surrounding counties. These resources will be considered in the protection of infrastructural resources for Teton County and the larger extent of this region as well as the rest of the State of Montana. Additional important infrastructure identified by the county is displayed in Table 3.12.

Table 3.12. Significant Infrastructure for Teton County, Montana.

OWNERSHIP	TYPE	ENTITY	COMMENTS
BREEN FUEL & TIRE	ABOVE GRD STORAGE	BULK FUEL STORAGE	LPG , GAS & DEISEL
KELLY'S	ABOVE GRD STORAGE	BULK FUEL STORAGE	FUEL GAS & DEISEL
MOUNTAINVIEW COOP	ABOVE GRD STORAGE	FUEL DIVISION	GAS & DIESEL
MOUNTAINVIEW COOP	ABOVE GRD STORAGE	FUEL DIVISION	GAS & DIESEL
MOUNTAINVIEW COOP	ABOVE GRD STORAGE	FUEL DIVISION	GAS & DIESEL
AMERICAN LEGION	BUILDING	NON PROFIT	SHELTER SITE
AMERICAN LEGION	BUILDING	NON PROFIT	SHELTER SITE
BYNUM SCHOOL DISTRICT	BUILDING	SCHOOL K-8	
CHOTEAU COUNTRY CLUB	BUILDING	GOLF COURSE	SHELTER SITE
CHOTEAU SCHOOL DIST.	BUILDING	SCHOOL K-12	
CITY OF CHOTEAU	BUILDING	PUBLIC WORKS	SHOP/ MACH & EQUIP
CITY OF CHOTEAU	BUILDING	WATER DEPARTMENT	WATER TREATMENT
CITY OF CHOTEAU	BUILDING	FIRE DEPARTMENT	FIRE HALL
DUTTON SCHOOL DISTRICT	BUILDING	SCHOOL K-12	
FAIRFIELD COMMUNITY HALL	BUILDING	NON PROFIT	SHELTER SITE/TOWN OFFICE
FAIRFIELD SCHOOL DIST	BUILDING	SCHOOL K-12	
GOLDEN RIDGE SCHOOL	BUILDING	SCHOOL K-5	
GREENFIELD SCHOOL DIST	BUILDING	SCHOOL K-8	
LDS CHURCH	BUILDING	CHURCH	SHELTER SITE
PENDROY SCHOOL DISTRICT	BUILDING	SCHOOL VACANT	
POWER SCHOOL DISTRICT	BUILDING	SCHOOL K-12	
TETON COUNTY	BUILDING	FIRE DEPARTMENT	FIRE HALL
TETON COUNTY	BUILDING	AMBULANCE	AMBULANCE BARN
TETON COUNTY	BUILDING	AMBULANCE	AMBULANCE BARN
TETON COUNTY	BUILDING	AMBULANCE	AMBULANCE BARN
TETON COUNTY	BUILDING	ROAD DEPARTMENT	MACH & EQUIP STORAGE
TETON COUNTY	BUILDING	FIRE DEPARTMENT	FIRE HALL
TETON COUNTY	BUILDING	HOSPITAL DISTRICT	HOSPITAL & NURSING HM
TETON COUNTY	BUILDING	ROAD DEPARTMENT	SHOP/ MACH & EQUIP

Table 3.12. Significant Infrastructure for Teton County, Montana.

OWNERSHIP	TYPE	ENTITY	COMMENTS
TETON COUNTY	BUILDING	ROAD DEPARTMENT	MACH & EQUIP STORAGE
TETON COUNTY	BUILDING	SHERIFF'S OFFICE	PSAP
TOWN OF DUTTON	BUILDING	FIRE DEPARTMENT	FIRE HALL/ TOWN OFFICE
TOWN OF FAIRFIELD	BUILDING	PUBLIC WORKS	SHOP/ MACH & EQUIP
TOWN OF FAIRFIELD	BUILDING	FIRE DEPARTMENT	FIRE HALL
US GOVERNMENT	BUILDING	POST OFFICE	
US GOVERNMENT	BUILDING	POST OFFICE	
US GOVERNMENT	BUILDING	POST OFFICE	
US GOVERNMENT	BUILDING	POSTOFFICE	
CELLULAR ONE	CELL TOWER	WIRELESS COMPANY	
THREE RIVERS COMMUN.	CELL TOWER	TELEPHONE COMPANY	
THREE RIVERS COMMUN.	CELL TOWER	TELEPHONE COMPANY	
THREE RIVERS COMMUN.	CELL TOWER	TELEPHONE COMPANY	
WAPA	CELL TOWER	ELECTRIC UTILITY	COMMUNICATION LINK
TETON COUNTY	RADIO REPEATER	PSAP	EMS,FIRE,WEED, WIRELESS COMPUTER
TETON COUNTY	RADIO REPEATER	PSAP	LAW,EMS,FIRE,ROAD, WEED,MHP,BLM,USFS
CITY OF CHOTEAU	SEWAGE LAGOON	PUBLIC WORKS	
POWER/TETON W&S DIST	SEWAGE LAGOON	DISTRICT	
TOWN OF DUTTON	SEWAGE LAGOON	PUBLIC WORKS	
TOWN OF FAIRFIELD	SEWAGE LAGOON	PUBLIC WORKS	
NORTHERN ENERGY	SUBSTATION	ELECTRIC UTILITY	DUTTON
NORTHWESTERN ENERGY	SUBSTATION	ELECTRIC UTILITY	AUGUSTA MPC
NORTHWESTERN ENERGY	SUBSTATION	ELECTRIC UTILITY	PONDERA OIL FIELD
NORTHWESTERN ENERGY	SUBSTATION	ELECTRIC UTILITY	CHALMERS
NORTHWESTERN ENERGY	SUBSTATION	ELECTRIC UTILITY	SUBSTATION & OFFICE
NORTHWESTERN ENERGY	SUBSTATION	ELECTRIC UTILITY	CHOTEAU
NORTHWESTERN ENERGY	SUBSTATION	ELECTRIC UTILITY	POWER
SUN RIVER ELECTRIC COOP	SUBSTATION	ELECTRIC UTILITY	ASHUELOT HILL
SUN RIVER ELECTRIC COOP	SUBSTATION	ELECTRIC UTILITY	MCDERMOTT JCT
SUN RIVER ELECTRIC COOP	SUBSTATION	ELECTRIC UTILITY	NORTH AUGUSTA
SUN RIVER ELECTRIC COOP	SUBSTATION	ELECTRIC UTILITY	AGAWAM

Table 3.12. Significant Infrastructure for Teton County, Montana.

OWNERSHIP	TYPE	ENTITY	COMMENTS
SUN RIVER ELECTRIC COOP	SUBSTATION	ELECTRIC UTILITY	PENDROY
WAPA	SUBSTATION	ELECTRIC UTILITY	BOLE
QWEST	TELEPHONE SWITCH	TELEPHONE COMPANY	476 EXCHANGE / FIBER OPTICS PT
THREE RIVERS COMMUN	TELEPHONE SWITCH	TELEPHONE COMPANY	463 EXCHANGE
THREE RIVERS COMMUN	TELEPHONE SWITCH	TELEPHONE COMPANY	MICROWAVE TOWER
THREE RIVERS COMMUN	TELEPHONE SWITCH	TELEPHONE COMPANY	MICROWAVE TOWER
THREE RIVERS COMMUN	TELEPHONE SWITCH	TELEPHONE COMPANY	REMOTE SWITCH
THREE RIVERS COMMUN.	TELEPHONE SWITCH	TELEPHONE COMPANY	CORP OFF PRIMARY SWITCH & 467 EXCH
THREE RIVERS COMMUN.	TELEPHONE SWITCH	TELEPHONE COMAPNY	466 EXCHANGE
THREE RIVERS COMMUN.	TELEPHONE SWITCH	TELEPHONE COMPANY	469 EXCHANGE
TOWN OF DUTTON	TREATMENT WELL	WATER DEPARTMENT	UNDER GRD TREATMENT
POWER/TETON W&S DIST	WATER SOURCE/TREAT	DISTRICT	MUDDY CREEK TREATMENT
POWER/TETON W&S DIST	WATER TANK	DISTRICT	
TOWN OF DUTTON	WATER TANK	WATER DEPARTMENT	METAL ON GRD LEVEL
CITY OF CHOTEAU	WATER TANKS	WATER DEPARTMENT	CEMENT ON GRD LEVEL
TOWN OF FAIRFIELD	WATER TOWER	WATER DEPARTMENT	
TOWN OF FAIRFIELD	WATER TOWER	WATER DEPARTMENT	
CITY OF CHOTEAU	WATER WELLS	WATER DEPARTMENT	SHALLOW WELLS
TOWN OF DUTTON	WATER WELLS	WATER DEPARTMENT	SHALLOW WELLS
TOWN OF FAIRFIELD	WATER WELLS	WATER DEPARTMENT	SHALLOW WELL #
TOWN OF FAIRFIELD	WATER WELLS	WATER DEPARTMENT	SHALLOW WELL #
TOWN OF FAIRFIELD	WATER WELLS	WATER DEPARTMENT	SHALLOW WELL #3
TOWN OF FAIRFIELD	WATER WELLS	WATER DEPARTMENT	4 SHALLOW WELLS

3.8 Soils

In western Teton County, a band following the eastern edge of the Lewis and Clark Forest that is approximately 2 – 5 miles wide is characterized by, “Gently sloping to very steep, shallow to deep well-drained soils of the foothills and mountains.” These soils have organic matter of duff on the surface one to two inches thick. Below this lies a thin layer of bleached material , followed by a block subsoil extending to a dept of one foot or more. The area was originally covered with conifer forest but a large portion has been logged or burned. The present cover consists of grass, pine, and an understory of brushy forbs and grass.

From the foothills to around Choteau, is a band of primarily, “Nearly level to steep, shallow to deep, well drained soils of the shale and sandstone uplands”. These soils are interspersed with the, “Nearly level to steep, deep, well-drained soils of the upland fans and terraces.” Generally, the shallow and gravelly soils are likely to be more subject to drought than the developed upland soils because they generally do not have the capacity to store much moisture.

East of Choteau, there is a band of “Dominantly nearly level to moderately sloping, deep, well drained soils of the glaciofluvial and glaciolacustrine fans and terraces.” These soils are generally developed under lower precipitation than the areas near the mountains and can be subject to drought unless irrigated.

The eastern half of the county is characterized by soils that are, “Dominantly nearly level to moderately steep, deep, well drained soils of the continental glacial till plains.” In the southeast corner of the county, several square miles of clayey, salty soils occur, much of which is poorly drained. Some areas in the eastern part of the County contain soils that are adversely affected by absorbed sodium, which causes a dense impervious layer a few inches below the surface.

Our soil resource is an extremely important resource for maintaining a healthy ecosystem.

3.9 Hydrology

The Montana Department of Natural Resources and Conservation Water Resources Division is charged with the development of the Montana Comprehensive State Water Plan. Included in the State Water Plan is the statewide water policy plan, and component basin and water body plans that cover specific geographic areas of the state (MTDEQ 2005). The Montana Department of Water Resources has prepared General Lithologies of the Major Ground Water Flow Systems in Montana.

The state may assign or designate beneficial uses for particular Montana water bodies to support. These beneficial uses are identified in sections 3.35 and 100.01 - .05 of the Montana Water Quality Standards (WQS). These uses include:

- **Aquatic Life Support:** cold water biota, seasonal cold water biota, warm water biota, and salmonid spawning;
- **Contact Recreation:** primary (swimming) and secondary (boating);
- **Water Supply:** domestic, agricultural, and industrial; and
- **Wildlife Habitat and Aesthetics**

While there may be competing beneficial uses in streams, federal law requires DEQ to protect the most sensitive of these beneficial uses (MTDEQ 2005).

The geology and soils of this region lead to rapid to moderate moisture infiltration. Slopes are moderate to steep, however, headwater characteristics of watersheds lead to a high degree of infiltration as opposed to a propensity for overland flow. Thus, sediment delivery efficiency of first and third order streams is fairly low. The bedrock is typically well-fractured and moderately soft. This fracturing allows excessive soil moisture to rapidly infiltrate into the rock, making surface runoff is rare. Natural mass stability hazards associated with slides are low. Natural sediment yields are low for these watersheds. However, disrupted vegetation patterns from logging (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 significant component of Teton County's infrastructure is the water sources that are maintained for use by communities. While the Water Resources Division does not monitor all drinking water supplies in the State, they are charged with maintaining standards on municipal drinking water supplies. These include community water sources, water used in businesses, and similar drinking water supplies in the County. Three categories of municipal water are recognized: groundwater, spring-groundwater, and surface water. The former two are generally considered resistant to surface disturbances such as fire, flood, landslide, and severe weather events. The latter is considered to be much more influenced by various hazards. Earthquakes can impact all collection types, while landslides can directly disrupt any of the sources, on an individual basis.

3.10 Air Quality

The primary means by which the protection and enhancement of air quality is accomplished is through the 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 three facilities in Teton County that are monitored for EPA emission standards. All are in compliance and well below allowable emission thresholds. These facilities include Ramaker-Swanson in Choteau and the Busch Agricultural Elevator and Seed Plant in Fairfield.

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.

Teton County is in Montana Airshed Unit 9: 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 that 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.

Class I airsheds in the immediate area include Glacier National Park, Bob Marshall Wilderness Area, Scapegoat Wilderness Area, and Gates of the Mountains Wilderness Area.

All of the communities within Teton 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).

3.11 Fire Fighting Resources and Capabilities

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

The county operates under a county Fire Services Annex (see Appendix), which provides guidance to the county on how its fire response services operate.

3.11.1 Wildland Fire

3.11.1.1 Fire Warden Summary of Resources and capabilities:

Teton County has been extremely fortunate in the funding arena as of late. After the Revenue Sharing went away Teton County was on status-quo for 20 + years. With the establishment of the Fee Service Area County wide and the VFA/RFA grant program our funding has gone from \$15000 per year to \$70000 per year from County Sources and another \$530000 from grants over the last three years. With this influx of money we have accomplished great things from replacing all the PPE& SCBA in all but one department and replacing several old and outdated fire vehicles. If we can maintain this funding for an additional five years I believe we can then be in a position to maintain and upgrade our vehicles and equipment within a standard rotation of some sort.

My opinion of the priority issues for each response area is as follows:

- **Choteau:** We have discussed the limber pine and WUI issues on the Front. We also have the River bottom issue near and around Choteau

- **Dutton:** Having the transmission lines and Railroad to start the fires and all the CRP, and continuous crops to carry the fire the potential for a large and disastrous fire is apparent.
- **Power** is the same as Dutton with the exception of they also cover part of the GID which even with burn permits and other education continues to have controlled burns escape.
- **Fairfield** is dealing with the majority of the GID which even with burn permits and other education continues to have controlled burns escape. In addition they are the responsible party for the Sun River Canyon area and the WUI in that area.
- **Pendroy** has CRP, forest and oil giving a diverse fire regime but relatively low population at risk.

Fire Chiefs in the County include:

Craig Zwerneman
Choteau Fire Department

Ben Rhodes
Fairfield Fire Department

Gene Walker
Power Fire Department

Shawn Dutton
Dutton Fire Department

John Stoltz
Pendroy Fire Department

Training of volunteers is a huge issue. With all our lives getting busier it is a real challenge to provide training and get those volunteers to give up their free time to attend.

Teton County is beginning a wellness program for firefighters which will give them a risk rating for possible hearts attack/stoke. We hope via this program to inform and help the firefighter be better prepared physically for the challenges of fire fighting. The idea is not to exclude members due to risks but to identify high risk individuals and assist them in being healthier. For the younger and middle age it is an opportunity to receive a free physical, lab work and fitness checkup. We hope this plan will help in recruitment and retention as well as save lives. We are searching for funding sources for this program.

We have mutual aid agreements with several surrounding communities. We also have a coop agreement with the State DNRC and an operating agreement with the USFS. We have just signed an initial attack agreement with the BLM out of Lewistown.

Our radio communications are adequate unless we have to switch to digital technology which would require an enormous amount of money and several additional repeater sites. A portable repeater for use on wildfires would be very helpful in certain areas of the county.

Table 3.13. County Fire Resources Teton County Rural Fire Truck Inventory (11/14/04).

NRGC	Yr	Model	INS#	Pump GPM	Gallon Tank	Foam	Type	Location	Vin #	Ownership	Purchase Date	
E-3	1963	Chevy	28		500		Wildland	Power	3C553J130452	Teton County	6/13/1963	out of service will be sold
T-2	1972	White	32	500	2800	N/A	Tender	Fairfield	W36679	Teton County	9/24/1976	
T-3	1973	IHC	75		1000	N/A	Tender	Pendroy	1066ZOH326494	Pendroy Fire Rescue	n/a	
T-2	1974	Ford 9000	29	350	3400	N/A	Tender	Power	U917VU05343	Power VD	n/a	
E-3	1975	Chevy C-60	31	100	500	Yes	Wildland	Fairfield	CCE615V156982	Teton County	8/24/1975	
E-1	1975	Piereville	66	1000	750		Structure	Power	I-652	Power VFD	n/a	
E-6	1977	GMC 2 Ton	33	250	500		Wildland	Choteau	TCE617V599735	Teton Cty/DNRC-tank	1977	out of service will be sold
E-6	1979	Ford F250 4x4	26	100	200	Yes	Wildland	Dutton/Collins	F26HRFC6828	Teton Cty/DNRC skid unit	6/24/1982	
E-6	1980	Chevy 4x4	59	100	200		Wildland	Pendroy	CKM23AJ138243	Pendroy VFD	n/a	
E-6	1980	GMC 1 Ton 4x4	30	250	200	Yes	Wildland	Power	TKM33AZ503813	Teton Cty/DNRC skid unit	10/10/1984	
T-3	1981	GMC C7000	dnrc		1500	N/A	Tender	Pendroy	N/A	DNRC	n/a	
E-1	1982	Ford	81	1000	500		Structure	Pendroy	1FDPF82K9CVA19577	Teton County FSA	3/4/1999	
E-6	1984	GMC 1Ton 4x4	58	100	250		Wildland	Choteau	1GBHK34M8EV135799	Choteau VFD	n/a	
	1984	Homemade Trailer (Cascade System)	73			N/A	Support		SNTR18363MT	Teton County	1984	
T-2	1987	Ford 9000	70		2600	N/A	Tender	Choteau	1FDYA90L4HVA65569	60% Choteau/ 40%Cnty FSA	12/23/1996	
T-2	1994	Kenworth	99	800	3500	no	Tender	Dutton	2XKNDE9XXRM638526	FSA $4000 FEMA GRANT 36000.00	10/30/2002	
E-1	1995	Ford/Central States	60	1250	500	Yes	Structure	Fairfield	1FDPF70J7SVA42567	Fairfield VFD	n/a	
E-6	1996	Dodge 1Ton 4x4	110	125	300	cafs	Wildland	Dutton	3B7MF33C4TM182519	Teton County FSA	9/16/2003	2003 cafs unit

Table 3.13. County Fire Resources Teton County Rural Fire Truck Inventory (11/14/04).

NRGC	Yr	Model	INS#	Pump GPM	Gallon Tank	Foam	Type	Location	Vin #	Ownership	Purchase Date	
E-6	1996	Ford f-350 4x4	96	150	250		Wildland	Pendroy	1FTJW36FXTEA19551	FSA10%/VFA90%/Skid pendroy	12/8/2001	skid unit not included in cost
E-1	2000	GMC Kodiak/Central States	93	1000	1000	Yes	Structure	Dutton	1GDL7H1B5YJ504231	50% Cnty FSA/ 50% Dutton	4/17/2001	County share
E-4	2000	Feightliner		250	750	yes	wildland	Choteau	1FV3GJAC7YHF03682	Teton County FSA	10/26/2004	
E-1	2002	Freightliner/E-1	city	1250	1000	Yes	Structure	Choteau	1FUABXBSX2HJ62104	37%Cnty FSA/ 63%Choteau	10/9/2001	County share
E-3	2003	Ford F-550	104	250	500		Wildland	Fairfield	1FDAX57S43EB56825	FEE 11885 VFA 9437 FVFD 8128	12/4/2002	CHASSIS 29450
E-3	2003	Ford F-550	103		500	cafs	wildland	Power	1FDAF57F83EB00649	Teton County FSA	10/24/2002	title III $6269
		City only Equipment										
E-1	1974	FORD/SUPERIOR		1000	500	no	Structure	Fairfield		Town of Fairfield	5/27/1905	
E-2	1967	HOWE		750	500	no	Structure	Dutton		Town of Dutton		
E-1	1980'S	FORD/SUPERIOR		1000	1000	no	Structure	Choteau		City of Choteau		
E-2	1965	HOWE (Reserve Pumper)	750	500	no	Structure	Choteau		City of Choteau			

Power has received a FEMA grant to purchase a used structure truck to replace the 1975 Piereville

This equipment is out of service and will be sold in the near future

highlighted indicates owned or leased by both City and County

Other County Fire Resources

- Choteau, Fairfield and Power have air compressors and Cascade systems for 4300PSI SCBAs
- Dutton has a 2300 PSI cascade system
- Pendroy houses the portable 2300PSI compressor & cascade system
- Choteau, Fairfield and Power have new high pressure SCBA's via the Fire Assistance Grants
- Choteau has a thermal imager via the Fire Assistance Grant
- Choteau, Fairfield and Power have all new turnout gear (structure & wildland) via the Fire Assistance Grant
- All departments have extrication equipment (ie jaws of life etc)
- All department have generators and emergency lighting
- Fairfield has high angle rescue equipment.

Teton County Fire Assessment and recommendations

Per Fire Council meeting 11/3/04

Maximum age of Trucks	25-30 years
<u>Apparatus per department:</u>	
Structure Trucks	1
Tender	1
Wildland Engine	2
Command vehicle	low priority at this time
Command vehicle Personal	Personal liability
All other	low priority or department funded

<u>Capital fund/priority requests:</u>

#1 Priorities:

Choteau: replace brush truck (1984 GMC 1Ton)

Dutton: replace PPE & SCBAs

Fairfield: replace Tender (1972 white)

Pendroy: fire hall addition (20x40)

Power: replace Tender (1974 Ford)

#2 Priorities:

Choteau: New Fire Hall (5 Bay new location)

Dutton: replace Collins Chassis (1979 Ford)

Fairfield: New Fire Hall (5 Bay new location)

Pendroy: Replace DNRC Tender (1981 GMC)

Power: Replace Brush Truck (1980 GMC (DNRC skid unit))

3.11.2 Rural Fire Departments

3.11.2.1 Choteau Volunteer Fire

38 1st Ave NW
Choteau, Mt 59422
Phone 406-466-3473

We have one fire station, it is located in downtown Choteau.

Description of Department:

The Choteau Volunteer Fire has a priority fire fighting response area of approximately 1157 square miles (787 sq. miles private + 400 sq. miles National Forest), 2600+ people, 1300 residences, 1500 outbuildings, 6 U.S. Air Force Minute Man II Missile Launch Sites, 1 U.S. Air Force Intercontinental Missile Control Center, 1 large natural gas transmission pipeline and 1 crude oil transmission pipeline.

Choteau is the only town within our district and has a population of 1750 people. Within the city limits of Choteau we have a hospital, 2 extended care facilities, nursing home, three-story retirement complex, 2 schools, County Courthouse, handicap group home and care facility, and a boys group home. The airport located at Choteau is designated as the emergency alternate landing strip for the Great Falls International Airport. The rest of our district consists of rural agricultural farmland, pastureland, and National Forest. Our department has mutual aid response agreements with the 4 other rural fire departments in our county plus our 4 adjoining counties, the State of Montana, U.S. Forest Service, U.S. Bureau of Land Management (BLM) and the U.S. Air Force. Our mutual aid response area is approximately 150 X 150 miles. We have had other departments respond to our needs from as far away as 110 miles.

Station description:

Our present hall, located in the middle of Choteau, consists of 4 stalls and a meeting room. We have to store our brush truck and extrication equipment trailer in a set of building (old State Highway Department shop) located on the north end of Choteau. The city of Choteau, using fire department funds, is paying off a note purchasing this facility. This site will some day be the new home of the Choteau Fire Department. This site consists of 3 building with 5 stalls situated on ¾'s of a city block.

Being a total volunteer department we do not staff our station.

Protection responsibilities:

See district description above. We are responsible for initial attack on all fires on private, BLM and state owned property, within our district. We are also responsible for structure fire protection and structure fire fighting on the federal forest located in our district.

Emergency Medical Treatment:

Our members assist EMS when we are dispatched to vehicle wrecks. Our department is responsible for fire control and the extrication of victims in vehicle wrecks.

Personnel:

We have 18 members in our department.

One half of the members of our department have received formal structure fire fighting training. Only 6 of our members are fire fighter one qualified.

Approximately one half of our members have received formal wildland fire fighting training. We have 6 members that are red carded.

Working relationship with other agencies, and mutual aid agreements:

We have a good working relationships with the other departments and agencies located in the county. Our department has mutual aid response agreements with the 4 other rural fire departments in our county plus our 4 adjoining counties, the State of Montana, U.S. Forest Service, U.S. Bureau of Land Management (BLM) and the U.S. Air Force. Our mutual aid response area is approximately 150 X 150 miles.

What are your top resource priorities to advance your department (example, more training, more equipment, etc.)?

The following are the highest resource priorities of our department.

1. Our department is in need of additional wildland and structure fire fighting and ICS training.
2. To remodel or construct a new fire hall at the old state highway department site.
3. To purchase a new or newer brush truck.
4. The purchase of additional vehicle extrication equipment (stabilizers, cribbing, lift bag system).

Resources most at risk of loss from wildland fire:

Homes, farmsteads located in the rural part of our district are most at risk of loss because of wildland fires. This is because of the distance and response time for our department. To reach the far northwestern part of our district will take approximately 1 hour and 15 minutes from page out to arriving on scene. Our rangeland and forestlands are at high risk from wildland fires.

Highest risk "problem areas":

The Rocky Mountain Front, Arrowleaf subdivision area, all of the CRP acreage, and the Teton, Blackleaf and Deep Creek river bottoms are the highest risk areas in our fire district.

Equipment Description:

Table 3.14. Choteau Volunteer Fire equipment.

Truck #	Assigned Station	Year	Make/ Model	Capacity (gallons)	Pump Capacity (GPM)	Structure, Wildland, Haz. Mat, Ambulance, Other
Engine 1	Choteau	2001	Type 1 Pumper Freightliner	1000	1250	Structure
Engine 2	Choteau	1984	Type 1 Pumper GMC	1000	1000	Structure
Water Tender	Choteau	1987	Kenworth	2700	500	Structure, wildland

Table 3.14. Choteau Volunteer Fire equipment.

Truck #	Assigned Station	Year	Make/ Model	Capacity (gallons)	Pump Capacity (GPM)	Structure, Wildland, Haz. Mat, Ambulance, Other
Rural Truck	Choteau	2000	Type 4 FL60	750	150	Wildland
Brush Truck	Choteau	1984	Type 6 3/4 ton GMC	250	150	Wildland
Extrication Trailer	Choteau	2002	Featherlite			Extrication/Hazmat

Operational challenges facing your district:

Our biggest challenge will be residential development along the Rocky Mountain front and the affect it will have on the number of fires and our ability to respond to fires. The Arrowleaf area is our worst interface area and is at least 45 minutes out. Our ability to fight a structure fire in this subdivision is further complicated by the narrow width of the private lanes leading into the houses.

Our department is also having problems keeping fire fighters on the roles. Because of the constant change over of fire fighters we are having difficulty in arranging and putting on adequate training sessions.

3.11.2.2 Fairfield Rural Volunteer Fire Company

3.11.2.2.1 Grant Narrative

Project Description

We intend to purchase a used cab and chassis. We anticipate this have a diesel engine with sufficient power to pull the load this truck will have. Seating limitations should allow for 2 firefighters to travel in this vehicle. We will look for a cab with automatic transmission. This will make the vehicle safer and easier for the majority of our volunteers to drive. Once the cab is found we will have a new tank fabricated to the chassis. We anticipate a tank of 2,800 to 3,000 gallons depending on weight limitations. Plumbing will include spray valves on the front, side, and rear. Dump valves will be placed on the rear and one side. A full safety light bar system will be used. Flood lights will be added for additional nighttime safety. We anticipate using a 250GPM pump for filling and transfer uses. We will also have a port a pit holder attached and use our existing pits.

Community/Department Benefits

Fairfield is a community of 659 people. WE also cover an area of 340 square miles with 1300 additional residents. We have seen strong growth. Our area includes 3 school systems of which 2 are in the rural area. We also cover 2 launch control facilities for Malmstrom Air Force Base and have 8 silo sites in our area. There are two electrical substations, a large telecommunications center and other businesses. Gibson Dam is in our response area. The dam provided irrigation water for nearly 80,000 acres. It the dam were breached there could be large loss of life downstream to Great Falls with a population of 65,000.

This grant will improve our response and decrease our dependence on mutual aid as we can have quicker, safer response time. A larger load can provide more water and the newer equipment will give us the ability to fill from some rural sources rather than driving back to our town. Sometimes now, our trip for water can be 30 miles round trip. The time issue becomes a safety issue.

Local Funding

Our county provides $3,000 per year for maintenance and upgrades. We also get a share of fee area money that goes towards vehicles and upgrades. Our turn averages between 10-15 years. It would generate about $60,000 but our turn is still 5-7 years away. The town provides $7500 per year but these funds cannot be used for a tender as they provide a hydrant system for in town. We have been successful with fundraising about $4-5,000 per year to help with minor equipment and training cost. These keep going up each year.

We should easily be able to fund the matching 5% and any additional costs that may occur such as delivery. This can come from our Fee Area money or fundraising. Getting this vehicle will allow us to be in very good shape as far as equipment. Last years grant allowed us to outfit all firefighters for wildland and structure gear. We also upgraded our SCBA's. This grant will allow us to have at least one newer, safe vehicle in each class that we use, Pumper, Tender, and brush. We do some type of mutual aid on nearly 50% of our fires and this will allow us to do so in a safer manner.

Summary

We appreciate the grants that we have received. We also appreciate the consideration that you will give to this request. Do to the extended drought in our area, water shuttle and water resources have become a large issue on our department. We are constantly looking for new sources. Our existing tender is very old. We had to put $4,000 into it in February just to keep it on the road. There are many safety issues like the transmission and brakes that are nearly failing. Also in February we had an electrical fire outside the cab as we drove back into the hall from a fire. This Vehicle needs to be replaced.

We received a grant in 2002 and 2004. The 2002 is now closed out and was for training. The 2004 was for personal protective gear including wildland and structure turnouts, SCBA, and boots. We also purchased a washer. All of the items have been purchased and are in use.

3.11.2.3 Dutton Rural Volunteer Fire Company

3.11.2.3.1 Grant Narrative

Project Description

We are requesting funds to upgrade our Personal Protective Equipment to NFPA standards including both wildland and structure bunker gear, SCBA's and Cascade system. In addition we would like to complete our Vehicle Extrication equipment by purchasing a cutter and a ram with hoses to go along with the spreader, power unit and generator we already have.

Our department operates on $13,400/yr in budget dollars which makes purchasing safety equipment a piecemeal proposition at best. Getting everyone completely up to standard now would allow us to stay current going forward. We have been fortunate to obtain FEMA grant funds in two previous years to supplement our funding, those funds were used to build a water tender and purchase a CAFS skid unit, and firefighter safety equipment has now reached the top of the priority list.

We protect a small rural town of 390 people that has a water system and hydrants and covers approximately 2 sq. miles. The remainder of our 780 sq. mile response area consists of scattered farms, 10 miles of Interstate 15, 10 miles of Burlington Northern Railroad main artery, and 24 minute man missile silo's operated by Malmstrom Air Force Base. We also provide mutual aide to 6 neighboring fire departments in 3 different counties.

At present we are using 30 minute SCBA's while all 6 of the mutual aide departments use 45 minute SCBA's. This causes us to haul our bottles back to the fire hall for refill. If we upgrade to 45 minute systems we can work with the mutual aide departments better and we can refill using the portable compressors they have.

Budget Detail

- 8 integrated alert SCBA's /$4500 each /$36,000 total
- 16 Structure Bunkers (helmet, boots, coat, pants,hood, gloves)/$1,800 each/ $28,800 total
- 16 Wildland coveralls /$300 each /$4,800 total
- 16 Wildland filter masks with replacement filter /$100 each /$1,600 total
- 1 Cascade system upgrade (new tanks) $4,200
- 1 Holmatro 10,500psi extrication cutter $4,300
- 1 Holmatro 10,500psi extrication telescopic ram $4,000
- 1 set of Holmatro connection hose $700

TOTAL EQUIPMENT PURCHASES $ 84,400

Community / Department Benefits

As an all volunteer department in a small rural community it is hard to recruit new members, train them and equip them on the small budgets the community can provide. Our $13,400/yr tax budget will barely cover the cost of operating our small department without any major incidents or major repairs. One large incident or repair can use up more than one years budget very easily. Safety of our members while they are volunteering their time to protect others is our number one concern. We must be able to train them, provide the right protective equipment, and be able to protect our customer in order to keep volunteers on the roster and keep them active. This will also keep insurance rates down so the community can afford to pay the taxes that fund our department.

We operate on a large number of mutual aide calls every year. If we can upgrade our equipment and SCBA's they will match the equipment of our mutual aide departments so we can operate in a more efficient manner. At present we must take our SCBA bottles back to our fire hall to fill. By upgrading we will be able to share bottles with the other dept's. on scene and also refill using their portable compressor. They have agreed also to allow us to use their compressor to refill our cascade system so we can save the cost of purchasing one.

We are located on the main north/south artery for Burlington Northern railroad and also Interstate 15 is the major north/south highway from Canada. As a result we have a number of Auto extrication runs and an occasional train derailment. We presently have a Holmatro 10500psi pump and spreader on our CAFS truck. By completing the purchase of the extrication equipment for a complete set we will be able to provide quicker extrication in vehicle accidents, and increase survivability.

Local Funding

We will fund our 5% match with a combination of community fund raiser, donations, and capital purchase funds from our budget. We presently have those funds available and will hold them for matching purposes until we are informed of approval or denial of this request.

Summary

We are a small department that covers a lot of area with not many resources. We have been very fortunate to obtain FEMA grants in two previous years that have greatly improved our firefighting capabilities. Our members volunteer their time from paying jobs to fight fire, volunteer their weekends to fund raising, training, equipment repair and maintenance, and we would now like to be able to provide them with the necessary safety equipment to do their jobs without risking their own lives. We all understand why our budgets are so tight as we are also taxpayers in a farm community that has been suffering through 6 years of drought, but we would also like to protect ourselves while protecting our community.

2002 AFG grant for a vehicle. $40,000 grant used to build a 3,200 gallon water tender on a 1994 Kenworth. 2003 AFG grant for equipment. $45,000 grant used to purchase a CAFS skid unit which was placed on a 1998 Dodge 1 ton. Also purchased a 10,500 psi Holmatro pump and spreader for the same truck.

3.12 Critical Infrastructure

The continuing function of city, county ,state and federal government services including emergency services, fire, ambulance, sheriff, police, sewer, water and road departments along with private or public communication systems, hospitals, and bulk fuel sites are considered part of the critical infrastructure of the county. The ability of these entities and sites to function during hazard events relates directly to the ability to protect and serve the people of Teton County. Table 3.15 lists the buildings and places of operations for critical infrastructure in the county. The location of these sites has been GPS and are displayed on many of the maps included in this plan.

Table 3.15. Teton County Critical Infrastructure.

OWNER	TYPE	ENTITY	COMMENTS
TETON COUNTY	BUILDING	SHERIFF'S OFFICE	PSAP
TETON COUNTY	BUILDING	ROAD DEPARTMENT	SHOP/ MACH & EQUIP
CITY OF CHOTEAU	BUILDING	PUBLIC WORKS	SHOP/ MACH & EQUIP
KELLY'S	ABOVE GRD STORAGE	BULK FUEL STORAGE	FUEL GAS & DEISEL
BREEN FUEL & TIRE	ABOVE GRD STORAGE	BULK FUEL STORAGE	LPG , GAS & DEISEL
CITY OF CHOTEAU	SEWAGE LAGOON	PUBLIC WORKS	
US GOVERNMENT	BUILDING	POST OFFICE	
CITY OF CHOTEAU	BUILDING	FIRE DEPARTMENT	FIRE HALL
CITY OF CHOTEAU	BUILDING	WATER DEPARTMENT	WATER TREATMENT
CITY OF CHOTEAU	WATER WELLS	WATER DEPARTMENT	SHALLOW WELLS
TETON COUNTY	BUILDING	HOSPITAL DISTRICT	HOSPITAL & NURSING HM
TETON COUNTY	BUILDING	AMBULANCE	AMBULANCE BARN
CHOTEAU SCHOOL DIST.	BUILDING	SCHOOL K-12	
CHOTEAU COUNTRY CLUB	BUILDING	GOLF COURSE	SHELTER SITE
CITY OF CHOTEAU	WATER TANKS	WATER DEPARTMENT	CEMENT ON GRD LEVEL
LDS CHURCH	BUILDING	CHURCH	SHELTER SITE
TOWN OF FAIRFIELD	SEWAGE LAGOON	PUBLIC WORKS	

Table 3.15. Teton County Critical Infrastructure.

OWNER	TYPE	ENTITY	COMMENTS
NORTHWESTERN ENERGY	SUBSTATION	ELECTRIC UTILITY	SUBSTATION & OFFICE
US GOVERNMENT	BUILDING	POSTOFFICE	
FAIRFIELD COMMUNITY HALL	BUILDING	NON PROFIT	SHELTER SITE/TOWN OFFICE
TOWN OF FAIRFIELD	WATER TOWER	WATER DEPARTMENT	
FAIRFIELD SCHOOL DIST	BUILDING	SCHOOL K-12	
TOWN OF FAIRFIELD	WATER TOWER	WATER DEPARTMENT	
TOWN OF FAIRFIELD	BUILDING	FIRE DEPARTMENT	FIRE HALL
TOWN OF FAIRFIELD	BUILDING	PUBLIC WORKS	SHOP/ MACH & EQUIP
TOWN OF FAIRFIELD	WATER WELLS	WATER DEPARTMENT	SHALLOW WELL #3
TOWN OF FAIRFIELD	WATER WELLS	WATER DEPARTMENT	4 SHALLOW WELLS
TOWN OF FAIRFIELD	WATER WELLS	WATER DEPARTMENT	SHALLOW WELL #
TOWN OF FAIRFIELD	WATER WELLS	WATER DEPARTMENT	SHALLOW WELL #
TETON COUNTY	BUILDING	AMBULANCE	AMBULANCE BARN
TETON COUNTY	BUILDING	ROAD DEPARTMENT	MACH & EQUIP STORAGE
NORTHWESTERN ENERGY	SUBSTATION	ELECTRIC UTILITY	CHOTEAU
TOWN OF DUTTON	BUILDING	FIRE DEPARTMENT	FIRE HALL/ TOWN OFFICE
US GOVERNMENT	BUILDING	POST OFFICE	
AMERICAN LEGION	BUILDING	NON PROFIT	SHELTER SITE
DUTTON SCHOOL DISTRICT	BUILDING	SCHOOL K-12	
TOWN OF DUTTON	WATER TANK	WATER DEPARTMENT	METAL ON GRD LEVEL
MOUNTAINVIEW COOP	ABOVE GRD STORAGE	FUEL DIVISION	GAS & DIESEL
NORTHERN ENERGY	SUBSTATION	ELECTRIC UTILITY	DUTTON
TOWN OF DUTTON	SEWAGE LAGOON	PUBLIC WORKS	
TOWN OF DUTTON	TREATMENT WELL	WATER DEPARTMENT	UNDER GRD TREATMENT
TOWN OF DUTTON	WATER WELLS	WATER DEPARTMENT	SHALLOW WELLS
NORTHWESTERN ENERGY	SUBSTATION	ELECTRIC UTILITY	POWER
MOUNTAINVIEW COOP	ABOVE GRD STORAGE	FUEL DIVISION	GAS & DIESEL
POWER/TETON W&S DIST	SEWAGE LAGOON	DISTRICT	
US GOVERNMENT	BUILDING	POST OFFICE	
TETON COUNTY	BUILDING	FIRE DEPARTMENT	FIRE HALL

Table 3.15. Teton County Critical Infrastructure.

OWNER	TYPE	ENTITY	COMMENTS
POWER SCHOOL DISTRICT	BUILDING	SCHOOL K-12	
POWER/TETON W&S DIST	WATER TANK	DISTRICT	
TETON COUNTY	BUILDING	AMBULANCE	AMBULANCE BARN
TETON COUNTY	BUILDING	ROAD DEPARTMENT	MACH & EQUIP STORAGE
AMERICAN LEGION	BUILDING	NON PROFIT	SHELTER SITE
POWER/TETON W&S DIST	WATER SOURCE/TREAT	DISTRICT	MUDDY CREEK TREATMENT
GREENFIELD SCHOOL DIST	BUILDING	SCHOOL K-8	
THREE RIVERS COMMUN.	CELL TOWER	TELEPHONE COMPANY	
SUN RIVER ELECTRIC COOP	SUBSTATION	ELECTRIC UTILITY	ASHUELOT HILL
SUN RIVER ELECTRIC COOP	SUBSTATION	ELECTRIC UTILITY	MCDERMOTT JCT
SUN RIVER ELECTRIC COOP	SUBSTATION	ELECTRIC UTILITY	NORTH AUGUSTA
NORTHWESTERN ENERGY	SUBSTATION	ELECTRIC UTILITY	AUGUSTA MPC
SUN RIVER ELECTRIC COOP	SUBSTATION	ELECTRIC UTILITY	AGAWAM
SUN RIVER ELECTRIC COOP	SUBSTATION	ELECTRIC UTILITY	PENDROY
NORTHWESTERN ENERGY	SUBSTATION	ELECTRIC UTILITY	PONDERA OIL FIELD
WAPA	SUBSTATION	ELECTRIC UTILITY	BOLE
NORTHWESTERN ENERGY	SUBSTATION	ELECTRIC UTILITY	CHALMERS
BYNUM SCHOOL DISTRICT	BUILDING	SCHOOL K-8	
PENDROY SCHOOL DISTRICT	BUILDING	SCHOOL VACANT	
GOLDEN RIDGE SCHOOL	BUILDING	SCHOOL K-5	
THREE RIVERS COMMUN.	CELL TOWER	TELEPHONE COMPANY	
WAPA	CELL TOWER	ELECTRIC UTILITY	COMMUNICATION LINK
CELLULAR ONE	CELL TOWER	WIRELESS COMPANY	
TETON COUNTY	RADIO REPEATER	PSAP	EMS,FIRE,WEED, WIRELESS COMPUTER
TETON COUNTY	RADIO REPEATER	PSAP	LAW,EMS,FIRE,ROAD, WEED,MHP,BLM,USFS
THREE RIVERS COMMUN.	CELL TOWER	TELEPHONE COMPANY	
THREE RIVERS COMMUN.	TELEPHONE SWITCH	TELEPHONE COMPANY	CORP OFF PRIMARY SWITCH & 467 EXCH

Table 3.15. Teton County Critical Infrastructure.

OWNER	TYPE	ENTITY	COMMENTS
THREE RIVERS COMMUN.	TELEPHONE SWITCH	TELEPHONE COMAPNY	466 EXCHANGE
TETON COUNTY	BUILDING	FIRE DEPARTMENT	FIRE HALL
THREE RIVERS COMMUN.	TELEPHONE SWITCH	TELEPHONE COMPANY	469 EXCHANGE
QWEST	TELEPHONE SWITCH	TELEPHONE COMPANY	476 EXCHANGE / FIBER OPTICS PT
THREE RIVERS COMMUN	TELEPHONE SWITCH	TELEPHONE COMPANY	463 EXCHANGE
THREE RIVERS COMMUN	TELEPHONE SWITCH	TELEPHONE COMPANY	MICROWAVE TOWER
THREE RIVERS COMMUN	TELEPHONE SWITCH	TELEPHONE COMPANY	MICROWAVE TOWER
THREE RIVERS COMMUN	TELEPHONE SWITCH	TELEPHONE COMPANY	REMOTE SWITCH
MOUNTAINVIEW COOP	ABOVE GRD STORAGE	FUEL DIVISION	GAS & DIESEL

3.13 Hazard Preparedness

The national emphasis on hazard preparedness intensified after the September 11 attacks on the World trade Center, the Pentagon, and other targets. The Federal emergency Management Agency was transferred to the newly formed Department of Homeland Security as part of a national reorganization focusing on homeland security.

States have responded with the development of statewide plans, and support for counties as they develop hazard mitigation plans at the county and community level. Although much has been accomplished over the past few years, still more remains to be done (see Figure 3.8). Teton County is facing this challenge with the development of this Hazard Mitigation Plan and its planned implementation.

3.13.1 Teton County Emergency Operations Plan

Teton County has also developed an Emergency Operations Plan that is designed to predetermine, to the extent possible, actions to be taken by the governments of Teton County and its municipalities, and by cooperating private organizations, to prevent disasters if possible, to reduce the vulnerability of county residents to any disasters that may strike, to establish capabilities for protecting citizens from the effects of disasters, to respond effectively to the actual occurrence of disasters, and to provide for recovery in the aftermath of any emergency involving extensive damage or other debilitating influence on the normal pattern of life within the community. The jurisdictions included in this plan are Teton County including the unincorporated towns of Power, Pendroy and Bynum, and the incorporated city/towns of Choteau, Dutton and Fairfield.

The following hazards are addressed in specific annexes: hazardous material; dam failure/flooding; earthquake; national emergency; forest/wild land/range fire; mass casualty incidents including, aircraft accidents, and transportation accidents; drought; tornadoes and volcanic ash. For emergencies not specifically addressed by an annex, the basic concepts of this plan and agency Standard Operating Procedures will be followed and responding entities will utilize the Incident Command System.

3.13.2 Rocky Mountain Ranger District Emergency Plan

The Rocky Mountain Ranger District (RMRD) on the Lewis and Clark National Forest (LCF) has coordinated to near completion an Emergency Plan (E-Plan) for the use in evacuation and structure protection during emergency incidents within the US Forest Service Boundary. The E-Plan includes the entire RMRD and approximately a 6 mile buffer extending east onto private lands along the entire National Forest boundary. The area covered by the E-Plan is designated into 10 zones on the Rocky Mountain Front.

Work on this plan is a cooperative effort between the USDA, Forest Service and those counties that comprise the RMRD of the LCF. These counties include; Lewis and Clark County, Teton County, Pondera County and Glacier County.

The E-Plan is intended to aid personnel involved in emergency situations and evacuations (including, but not limited to, those emergency incidents involving fire, flood, severe weather, and hazardous material).

The E-Plan will serve as a reference for multiple agency coordination and incident management teams to identify residences and businesses on private lands within the National Forest boundary such as, recreation residences, resorts and other structures on National Forest lands under special use permit as well as private, state, county, and federal facilities including administrative sites that exists within the 6 mile buffer east of the National Forest boundary.

This E-Plan will provide a comprehensive listing and site plans for private and public structures in each zone. However, any recent changes in ownership or new construction may not be immediately reflected in this document. In all situations, the information in the Emergency Plan should be used in conjunction with local knowledge and expertise.

The E-Plan will be maintained by the LCF, RMRD, and updated semi-annually in cooperation with the local agencies. Local agencies will receive CD’s of the initial maps and all annual revisions resulting from our cooperative efforts.

Figure 3.8. National Media Article About Hazard Preparedness.

THE WALL STREET JOURNAL.

D6 THURSDAY, FEBRUARY 24, 2005

Few States Are Prepared for Crisis

Associated Press

ATLANTA—More than three years after the Sept. 11 terrorist attacks, many state health departments aren't prepared for a crisis, a government official said.

Fewer than one in four states can respond 24 hours a day to alerts from hospitals about patients who may be suffering from biological or chemical attacks, said William Raub of the Department of Health and Human Services. Many states still haven't reviewed laws and rules for quarantine, he said.

Many states aren't able to immunize large groups of people from an emergency government supply of lifesaving vaccines, said Mr. Raub, the department's principal deputy assistant secretary for public-health emergency preparedness. He didn't specify which states lag behind.

"Preparing for catastrophic events almost guarantees readiness for lesser—and possibly more likely—challenges," said Mr. Raub, who spoke at a Centers for Disease Control and Prevention public-health conference. "Improving performance will be the key."

Since the Sept. 11 attacks, states have been expected to be prepared for a wide variety of crises, from natural disasters to attacks with biological weapons. More than 90% of states have met U.S. goals of having at least one epidemiologist in every metropolitan area of more than 500,000 people, Mr. Raub said.

Last month, the private Trust for America's Health released a report saying the nation is struggling to develop plans for public-health emergencies. The report said states that routinely deal with hurricanes and other natural disasters seem to be better prepared than others to handle bioterrorism.

Florida and North Carolina received the highest marks, while Alaska and Massachusetts had the lowest marks in the group's study.

3.14 *Hazard Profile of Teton County*

Table 3.16 lists many of the hazards experienced in Teton County between 1960 and 2000. This table is a useful reference when looking at the individual hazard sections.

Table 3.16. Hazard Profile of Floods in Teton County, 1960-2000 (SHELDUS 2004).

HAZARD BEGIN DATE	HAZARD END DATE	HAZARD TYPE	INJURIES	FATALITIES	PROPERTY DAMAGE	CROP DAMAGE	LOCATION	REMARKS
3/11/1996	3/13/1996	FLOODING	0	0	$166,667	$-		FLOODS
6/19/1991	6/23/1991	FLOODING	0	0	$10,000	$10		FLOOD
5/20/1991	5/21/1991	FLOODING	0	0	$25,000	$-		FLOOD
11/24/1990	11/24/1990	FLOODING	0	0	$877	$-		FLOOD
8/19/1990	8/19/1990	FLOODING	0	0	$877	$877,193		FLOOD
3/17/1969	3/31/1969	FLOODING	0	0	$877	$-	STATEWIDE	FLOODING
7/23/1992	7/23/1992	HAIL	0	0	$500	$50,000	COLLINS	HAIL
6/16/1977	6/16/1977	HAIL	0	0	$42	$4,167		HAIL
6/10/1976	6/10/1976	HAIL	0	0	$25,000	$25,000		HAIL
6/6/1976	6/6/1976	HAIL	0	0	$2,500	$250,000		HAIL
6/19/1974	6/20/1974	HAIL	0	0	$6,250	$6,250	HILL, BLAINE, PHILLIPS, CHOTEAU, TETON, CASCADE, JUDITH BASIN, FERGUS COUNTY	HAILSTORM
8/16/1972	8/16/1972	HAIL	0	0	$25	$25,000	PONDERA AND TETON COUNTIES	HAIL
7/8/1963	7/8/1963	HAIL	0	0	$2,500	$25,000	SOUTHERN PONDERA AND EASTERN TETON CO	HAIL
6/29/1982	6/29/1982	HAIL, LIGHTNING, SEVERE STORM /THUNDER STORM	0	0	$25,000	$25,000		HAIL/LIGHTNING/RAIN
7/2/1966	7/2/1966	HAIL, SEVERE STORM /THUNDER STORM	0	0	$1,667	$166,667	EASTERN TETON CO	THUNDERSTROMS AND HAIL

Table 3.16. Hazard Profile of Floods in Teton County, 1960-2000 (SHELDUS 2004).

HAZARD BEGIN DATE	HAZARD END DATE	HAZARD TYPE	INJURIES	FATALITIES	PROPERTY DAMAGE	CROP DAMAGE	LOCATION	REMARKS
6/12/1962	6/12/1962	HAIL, SEVERE STORM /THUNDER STORM	0	0	$5,000	$5,000	NORTH CENTRAL MONTANA	HAIL, THUNDERSTORMS, HEAVY RAIN
5/30/1961	5/30/1961	HAIL, SEVERE STORM /THUNDER STORM	0	0	$106	$1,064	SEVERAL PLACES EAST OF CONTINENTAL DIVIDE	THUNDER, HEAVY RAIN, AND HAIL STORMS
8/25/1963	8/25/1963	HAIL, SEVERE STORM /THUNDER STORM, WIND	0.07	0	$333	$33,333	NORTHERN MONTANA FROM FLATHEAD COUNTY EASTWARD	HAIL, THUNDERSTORMS, RAIN, WIND
6/28/1963	6/28/1963	HAIL, SEVERE STORM /THUNDER STORM, WIND	0	0	$3,333	$33,333	NORTHERN THIRD MONTANA, EAST OF CONTINENTAL DIVIDE	THUNDERSTORMS, HIGH WIND AND HAIL
7/1/1962	7/1/1962	HAIL, SEVERE STORM /THUNDER STORM, WIND	0	0	$500	$5,000	NORTH CENTRAL MONTANA	WIND, HAIL, THUNDERSTORMS
6/29/1961	6/29/1961	HAIL, SEVERE STORM /THUNDER STORM, WIND	0	0	$106	$1,064	NUMEROUS AREAS EAST OF CONTINENTAL DIVIDE	THUNDER, HIGH WIND, HAIL, HEAVY RAIN
6/1/1998	6/1/1998	HAIL, WIND	0	0	$1,000	$1,000,000		TSTM WIND/HAIL
7/11/1993	7/11/1993	HAIL, WIND	0	0	$500	$50,000		HAIL, THUNDERSTORM WINDS
8/2/1992	8/2/1992	HAIL, WIND	0	0	$50,000	$50,000	BYNUM	HAIL, THUNDERSTORM WIND
6/20/1985	6/20/1985	HAIL, WIND	0.02	0	$1,163	$1,163		HAIL/WIND
7/11/1981	7/11/1981	HAIL, WIND	0	0	$-	$166,667		HAIL, WINDS
8/22/1978	8/22/1978	HAIL, WIND	0	0	$12,500	$125,000		HAIL, WIND

Table 3.16. Hazard Profile of Floods in Teton County, 1960-2000 (SHELDUS 2004).

HAZARD BEGIN DATE	HAZARD END DATE	HAZARD TYPE	INJURIES	FATALITIES	PROPERTY DAMAGE	CROP DAMAGE	LOCATION	REMARKS
8/7/1975	8/7/1975	HAIL, WIND	0	0	$104	$1,042	EAST OF THE CONTINENTAL DIVIDE	HAIL AND WIND
7/1/1975	7/1/1975	HAIL, WIND	0	0	$4,167	$4,167	CENTRAL	WIND, HAIL
6/24/1975	6/24/1975	SEVERE STORM /THUNDER STORM	0	0	$56	$5,556	NORTH CENTRAL DIVISION	SEVERE THUNDERSTORMS
6/5/2000	6/5/2000	SEVERE STORM /THUNDER STORM, WIND	0	0	$1,000	$-	COLLINS	THUNDERSTORM WIND
8/28/1975	8/28/1975	SEVERE STORM /THUNDER STORM, WIND	0	0	$5,556	$5,556	NORTH CENTRAL	THUNDERSTORM, WIND
12/27/1990	12/27/1990	SEVERE STORM/ THUNDER STORM, WINTER WEATHER	0	0	$877	$-		SEVERE STORM-SNOW
12/18/1990	12/18/1990	SEVERE STORM /THUNDER STORM, WINTER WEATHER	0	0	$877	$-		SEVERE STORM-SNOW
4/27/1990	4/27/1990	SEVERE STORM /THUNDER STORM, WINTER WEATHER	0	0	$877	$-		SEVERE STORM-SNOW
1/29/1990	1/29/1990	SEVERE STORM /THUNDER STORM, WINTER WEATHER	0	0	$877	$-		SEVERE STORM-SNOW
9/17/1988	9/18/1988	SEVERE STORM/THUNDER STORM, WINTER WEATHER	0	0	$25,000	$-	MTZ 003,004,006	SEVERE STORM-SNOW
10/11/1981	10/12/1981	SEVERE STORM / THUNDER STORM, WINTER WEATHER	0.16	0.05	$2,632	$-		WET AND HEAVY SNOW
9/1/1994	9/25/1994	WILDFIRE	0	0	$8,772	$877	MONTANA	FOREST FIRES
8/1/1994	8/31/1994	WILDFIRE	0	0	$8,772	$-		WILDFIRE
12/15/1999	12/16/1999	WIND	0	0	$35,000	$-	COUNTYWIDE	HIGH WIND

Table 3.16. Hazard Profile of Floods in Teton County, 1960-2000 (SHELDUS 2004).

HAZARD BEGIN DATE	HAZARD END DATE	HAZARD TYPE	INJURIES	FATALITIES	PROPERTY DAMAGE	CROP DAMAGE	LOCATION	REMARKS
12/16/1999	12/16/1999	WIND	0	0	$4,000	$-	COUNTYWIDE	HIGH WIND
10/31/1999	10/31/1999	WIND	0	0	$125,000	$-	COUNTYWIDE	HIGH WIND
10/3/1999	10/3/1999	WIND	0	0	$12,500	$-	COUNTYWIDE	HIGH WIND
6/26/1994	6/26/1994	WIND	0	0	$4,167	$-	CENTRAL MT	HIGH WINDS
6/6/1994	6/6/1994	WIND	0	0	$500,000	$50,000	W TETON COUNTY	THUNDERSTORM WINDS
12/23/1992	12/24/1992	WIND	0	0	$4,545	$-		HIGH WINDS
1/15/1992	1/15/1992	WIND	0	0	$10,000	$-		WIND
10/16/1991	10/16/1991	WIND	0	0	$102,041	$-		WIND
11/29/1990	11/29/1990	WIND	0	0	$8,772	$-		WIND
11/28/1990	11/28/1990	WIND	0	0	$8,772	$-		WIND
11/23/1990	11/23/1990	WIND	0	0	$877	$877		WIND
11/23/1990	11/23/1990	WIND	0	0	$877	$-		WIND
11/22/1990	11/22/1990	WIND	0	0.02	$8,772	$-		WIND
2/11/1990	2/11/1990	WIND	0	0	$88	$877		WIND
1/28/1990	1/28/1990	WIND	0	0	$877	$-		WIND
1/25/1990	1/25/1990	WIND	0	0	$877	$877		WIND
1/8/1990	1/8/1990	WIND	0	0	$877	$-		WIND
1/30/1989	1/30/1989	WIND	0	0	$100,000	$1,000	TETON CO	WIND
1/18/1983	1/18/1983	WIND	0.33	0	$16,667	$167	DUPUYER TO AUGUSTA	WIND
12/13/1979	12/14/1979	WIND	0	0	$5,556	$-		WIND
12/4/1979	12/4/1979	WIND	0	0	$5,556	$-		WIND
1/29/1974	1/30/1974	WIND	0	0	$893	$-	MOST OF STATE	WIND
1/16/1972	1/16/1972	WIND	0	0	$1,667	$-	WESTERN HALF OF STATE	STRONG WINDS
1/9/1972	1/11/1972	WIND	0	0	$877	$-	STATEWIDE	STRONG WINDS
1/15/1967	1/15/1967	WIND	0.02	0	$877	$-	TETON	HIGH WIND
11/19/1962	11/20/1962	WIND	0.07	0	$877	$-	ENTIRE STATE	HIGH WINDS
1/5/1962	1/6/1962	WIND	0.13	0	$6,250	$-	TETON	HIGH GUSTY WIND

Table 3.16. Hazard Profile of Floods in Teton County, 1960-2000 (SHELDUS 2004).

HAZARD BEGIN DATE	HAZARD END DATE	HAZARD TYPE	INJURIES	FATALITIES	PROPERTY DAMAGE	CROP DAMAGE	LOCATION	REMARKS
1/15/1961	1/16/1961	WIND	0	0	$12,500	$-	GLACIER, PONDERA, TETON, AND TOOLE COUNTIES	HIGH WIND
2/28/1991	2/28/1991	WIND, WINTER WEATHER	0	0	$3,125	$-		BLIZZARD, WIND, SNOW
9/19/1968	9/21/1968	WIND, WINTER WEATHER	0	0	$357	$3,571	ALONG BOTH SLOPES OF THE CONTINENTAL DIVIDE	HEAVY SNOW, WIND
2/23/1994	2/24/1994	WINTER WEATHER	0	0	$8,772	$-		WINTER STORM
8/25/1992	8/25/1992	WINTER WEATHER	0	0	$-	$877		FROST/FREEZE
8/22/1992	8/23/1992	WINTER WEATHER	0	0	$217	$21,739		WINTER STORM
4/27/1991	4/28/1991	WINTER WEATHER	0	0	$3,125	$-		WINTER STORM, SNOW
4/11/1991	4/11/1991	WINTER WEATHER	0	0	$2,941	$-		WINTER STORM, SNOW
5/28/1989	5/28/1989	WINTER WEATHER	0	0	$2,000	$-	MUCH OF THE MOUNTAINS AND NORTHERN AND CENTRAL MONTANA (ZONES 3 THRU 6)	WINTER STORM
2/1/1989	2/1/1989	WINTER WEATHER	0	0	$87,719	$88	STATEWIDE	SEVERE COLD
1/31/1989	1/31/1989	WINTER WEATHER	0	0	$15,152	$152	TETON CO	BLIZZARD
4/7/1975	4/7/1975	WINTER WEATHER	0	0	$10,417	$-	EASTSIDE OF THE CONTINENTAL DIVIDE	WINTER STORM (SEVERE BLIZZARD)
4/18/1973	4/20/1973	WINTER WEATHER	0	0	$10,417	$-	E OF DIVIDE	BLIZZARD

Chapter 4: Floods

4 Flood Characteristics

Floods have been a serious and costly natural hazard affecting Montana. Floods damage roads, farmlands, and structures, often disrupting lives and businesses. Simply put, flooding occurs when water leaves the river channels, lakes, ponds, and other confinements where we expect it to stay. Flood-related disasters occur when human property and lives are impacted by that flooding water. An understanding of the role of weather, runoff, landscape, and human development in the floodplain is therefore the key to understanding and controlling flood-related disasters.

Natural flood events are grouped into three general categories:

Riverine Flooding: a rise in the volume of a stream until that stream exceeds its normal channel and spills onto adjacent lands.

Flash Flooding: results from high water velocity in a small area but may recede relatively quickly.

Ice/Debris Jam Flooding: floating debris or ice accumulates at a natural or man-made obstruction and restricts the flow of water.

The most commonly reported flood magnitude measure is the "base flood." This is the magnitude of a flood having a one-percent chance of being equaled or exceeded in any given year. Although unlikely, "base floods" can occur in any year, even successive ones. This magnitude is also referred to as the "100-year Flood" or "Regulatory Flood" by State government.

The areas adjacent to the channel that normally carry water are referred to as the floodplain. In practical terms, the floodplain is the area that is inundated by flood waters.

In regulatory terms, the floodplain is the area that is under the control of floodplain regulations and programs (such as the National Flood Insurance Program which publishes the FIRM maps). Montana State Code defines the floodplain as:

> *"That land that has been or may be covered by floodwaters, or is surrounded by floodwater and inaccessible, during the occurrence of the regulatory flood."*

4.1 History

Teton County has experienced a long history of high magnitude floods since first written records in the early 1900s, typically 50 and 100-year levels. The diverse landscape and weather patterns within Teton County are the triggers for those high magnitude floods. Rain on snow events and above normal seasonal temperatures are very typical throughout the county in the fall, winter and spring.

The largest flood in the recorded history of Teton County occurred in June of 1964. A combination of heavy rains along the Continental Divide and rapid snowmelt caused widespread flooding of many watersheds in Teton and neighboring counties. Fourteen inches of rain fell during a thirty-seven hour period. The water level in Gibson Reservoir rose three feet over the top of the dam spilling 60,000 cfs of floodwater into the Sun River drainage. The community of Choteau was submerged by floodwaters from the Teton River, Deep Creek, and Spring Creek. These waterways blew out several roads and bridges, leaving the community isolated for several days. Other major flood events of recent history occurred in 1953, 1956, 1975, 1986, and 2002.

4.2 Weather

Winter weather conditions are the main driving force in determining where and when base floods will occur. The type of precipitation that a winter storm produces is dependent on the vertical temperature profile of the atmosphere over a given area. Montana experiences riverine flooding from two distinct types of meteorological events:

- spring runoff and
- winter rain/snowmelt events

The major source of flood waters in Montana is normal spring snow melt. As spring melt is a “natural” condition, the stream channel is defined by the features established during the average spring high flow (bank-full width). Small flow peaks exceeding this level and the stream’s occupation of the floodplain are common events.

Unusually heavy snow packs or unusual spring temperature regimes (e.g., prolonged warmth) may result in the generation of runoff volumes significantly greater than can be conveyed by the confines of the stream and river channels. Such floods are often the ones that lead to widespread damage and disasters. Floods caused by spring snow melt tend to last for a period of several days to several weeks, longer than the floods caused by other meteorological sources.

Floods that result from rainfall on frozen ground in the winter, or rainfall associated with a warm, regional frontal system that rapidly melts snow at low and intermediate altitudes (rain-on-snow) can be the most severe. Both of these situations quickly introduce large quantities of water into the stream channel system, easily overloading its capacity.

On small drainages, the most severe floods are usually a result of rainfall on frozen ground but moderate quantities of warm rainfall on a snow pack, especially for one or more days, can also result in rapid runoff and flooding in streams and small rivers. Although meteorological conditions favorable for short-duration warm rainfall are common, conditions for long-duration warm rainfall are relatively rare. Occasionally, however, the polar front becomes situated along a line from Hawaii through Oregon, and warm, moist, unstable air moves into the region.

In general, the meteorological factors leading to flooding are well understood. They are also out of human control, so flood mitigation must address the other contributing factors.

4.3 Topography

The nature and extent of a flood event is the result of the hydrologic response of the landscape. Factors that affect this hydrologic response include soil texture and permeability, land cover and vegetation, land use and land management practices. Precipitation and snow melt, known collectively as runoff, follow one of three paths, or a combination of these paths, from the point of origin to a stream or depression: overland flow, shallow subsurface flow, or deep subsurface (“ground water”) flow. Each of these paths delivers water in differing quantities and rates. The character of the landscape will influence the relative allocation of the runoff and will, accordingly, affect the hydrologic response.

Unlike precipitation and ice formation, steps can be taken to mitigate flooding through manipulation or maintenance of the floodplain. Insufficient natural water storage capacity and changes to the landscape can be offset through water storage and conveyance systems that run the gamut from highly engineered structures to constructed wetlands.

Careful planning of land use can build on the natural strengths of the hydrologic response. Re-vegetation of burned slopes diverts overland flow (fast and flood producing) to subsurface flow (slower and flood moderating). Details on rehabilitating burned areas to reduce flash floods, debris flows and landslides can be found in the Landslide chapter of this document.

4.4 Development

Floods generally come with warnings and flood waters rarely go where they are totally unexpected by experts. Those warnings are not always heeded, though, and despite the predictability, flood damage continues.

The failure to recognize or acknowledge the extent of the natural hydrologic forces in an area has led to development and occupation of areas that can clearly be expected to be flooded on a regular basis. Despite this, communities are often surprised when the stream leaves its channel to occupy its floodplain. A past reliance on structural means to control floodwaters and "reclaim" portions of the floodplain has also contributed to inappropriate development and continued flood-related damages.

Unlike the weather and the landscape, this flood-contributing factor can be controlled. Development and occupation of the floodplain places individuals and property at risk. Such use can also increase the probability and severity of flood events (and consequent damage) downstream by reducing the water storage capacity of the floodplain, or by pushing the water further from the channel or in larger quantities downstream.

4.5 Teton County Flood Profile

The principal streams are the Teton River, North Fork of the Sun River, Sun River, and Deep Creek. The Teton River, along with its tributaries drains most of Teton County. It flows easterly through the County. The North Fork of the Sun River above Gibson Dam drains most the mountainous western edge of the County. Sun River flows easterly along the southern boundary of Teton County. Spring Creek, a much smaller stream, flows southeasterly to its confluence with Teton River southeast of Choteau.

Precipitation over the plains, which falls mostly during the April-to-September growing season, averages 11.5 inches annually. At higher elevations this average amount increases to 60 inches. Snowfall accumulates and the snow melts that take place in late spring and early summer add appreciably to streamflows.

Several off-stream storage projects exist north of the Teton River upstream of Choteau. Bynum, Farmers, and Eureka Reservoirs all receive their water for irrigation from the Teton River and indirectly provide some flood control to downstream lands. On the Sun River, there are two U.S. Bureau of Reclamation projects. Gibson Reservoir, Pishkin Reservoir, and Willow Creek Reservoir (in Lewis and Clark County) are major suppliers of irrigation water and provide additional storage with some flood control.

All three types of flood events occur in Teton County. Riverine flooding occurs along the Teton River and its tributaries. The flat and mountainous terrain of Teton County creates a Flood Prone Environment. Rain-on-snow events can and do occur, particularly in the higher elevations. These events often contain enough moisture to cause flooding on the Teton River and most of its major tributaries in the county. In general these flood events can be predicted 24 to 72 hours in advance of the rising waters. Emergency plans that are in place can be executed, before flood waters overtop the river channel, minimizing loss of life and business disruption. Plans for reducing structural damage need to be put into place and executed long before the rain begins to fall and the snow begins to melt.

Within Teton County, summer thunderstorms can result in flash flooding of specific smaller drainages. Often, there is little time to react to the quickly rising waters; however, these small floods rarely cause severe damage. In extreme conditions, an undersized culvert may be damaged or overtopped causing water to run over the road surface.

Ice/debris flows usually occur as part of riverine and flash flooding, exacerbating the effects of those types of flood events. Flash flooding can result due to the limited amount of vegetation that usually intercepts some of the water's velocity flowing downhill. Details on reducing the effects of these types of debris flows can be found in the Landslide chapter.

Dam failure can result in immediate and unexpected flooding of downstream areas that may or may not be within the floodplain. In Teton County, there are several reservoirs used to store runoff water for irrigation purposes throughout the drier summer months. In the event that one of the larger dams is breached, the subsequent surge of water flow has the potential to inundate several communities as well as overtop levees and damage irrigation gates and canals. Dam failure is discussed as a separate chapter of the All Hazards Mitigation Plan, but will not be included in the Teton County All Hazard Mitigation Plan at this time.

The FEMA developed FIRM maps for Teton County were digitized for assessing how many acres in the county are within FEMA Flood Zones. FEMA has developed the Flood Zone A and Flood Zone B categories of flood zones in Teton County. The FEMA Flood Zone A (also call the 100-year flood zone) encompasses approximately 35,868 acres in Teton County. FEMA Flood Zone B (also called the 500-year flood zone) encompasses an additional 1,016 acres in Teton County.

Based on 2004 assessor data provide by the county there are 743 structures in the flood zones within the city limits of Choteau. The value of the private structures within the flood zones (government owned buildings do not have an assessed value) is $35,896,236 (Figure 4.1).

In addition to those properties in the city limits of Choteau, there are approximately 230 structures in the FEMA flood zones of the county. The value of the private structures is estimated at $16,352,559.

Many of these flood zones have received mitigation measures in the past such as levees and water diversion projects to mitigate potential flooding damages. However, the natural areas remain in the flood zones. Utilize the legend from figure 4.2 for the maps on figure 4.3-4.8.

Figure 4.1. Choteau Parcel Values in FEMA Flood Zones A&B

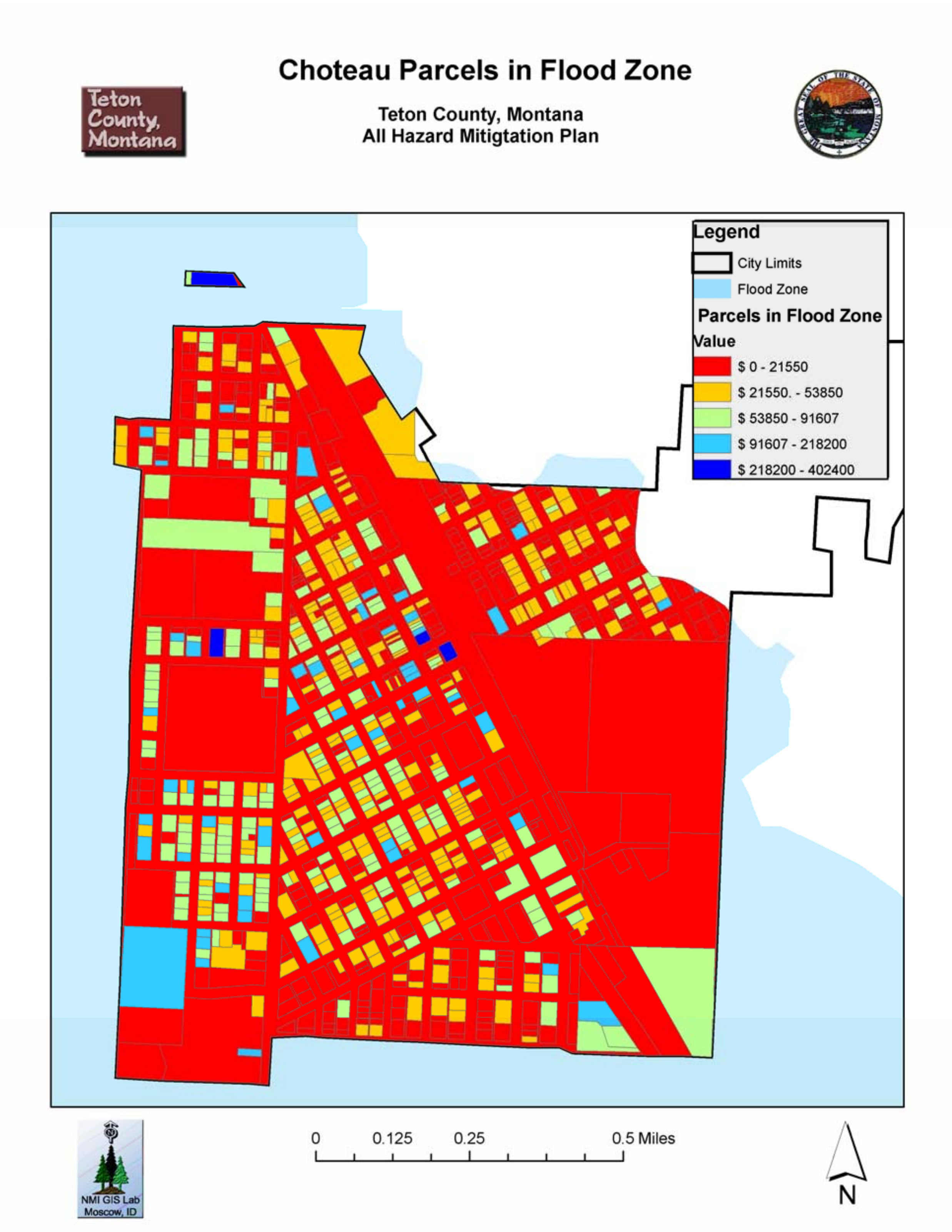


Figure 4.2. FEMA Flood Zones and Land Ownership in Teton County.

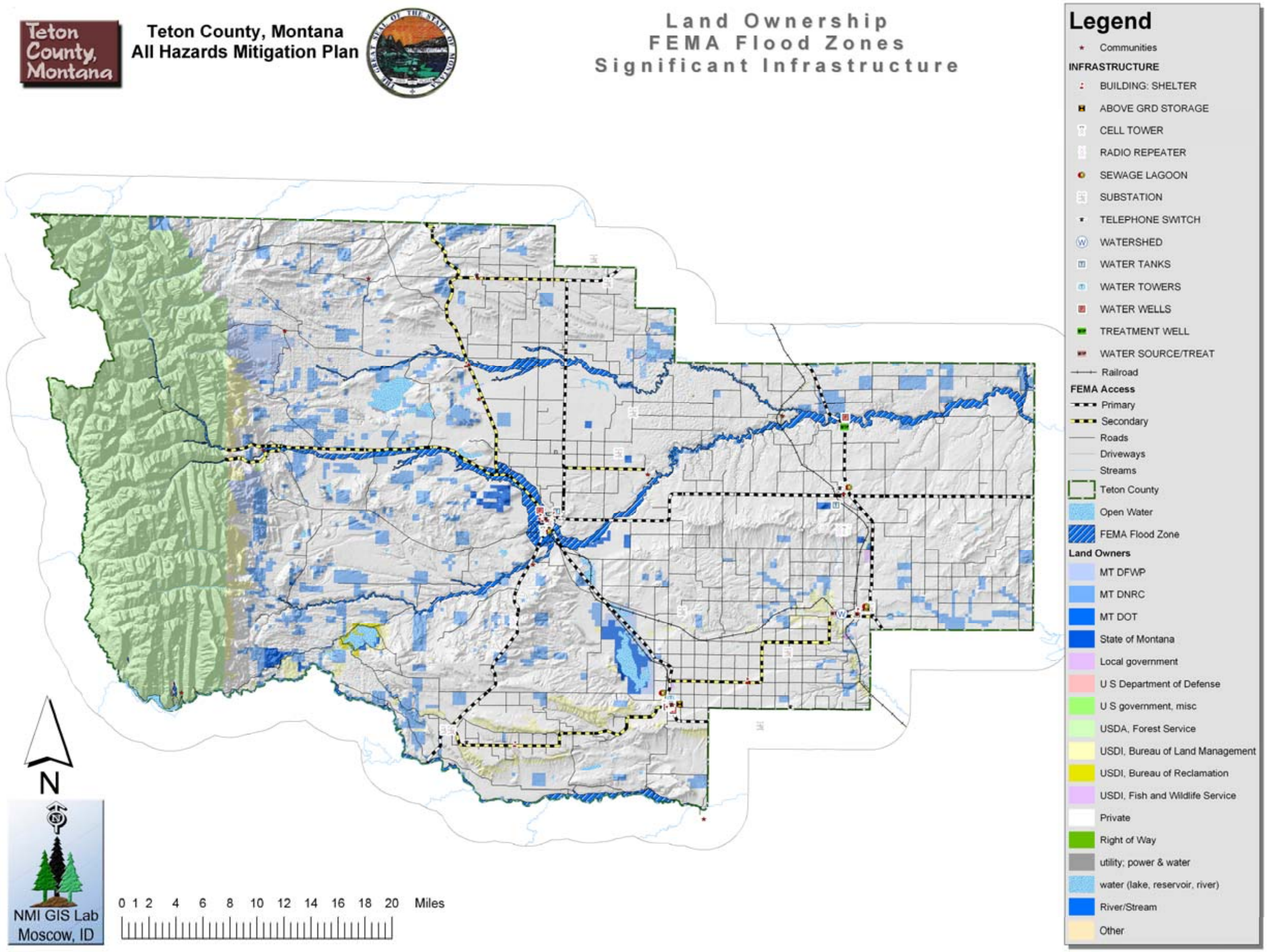


Figure 4.3. FEMA Flood Zones and Land Ownership Near Mortimer Gulch.

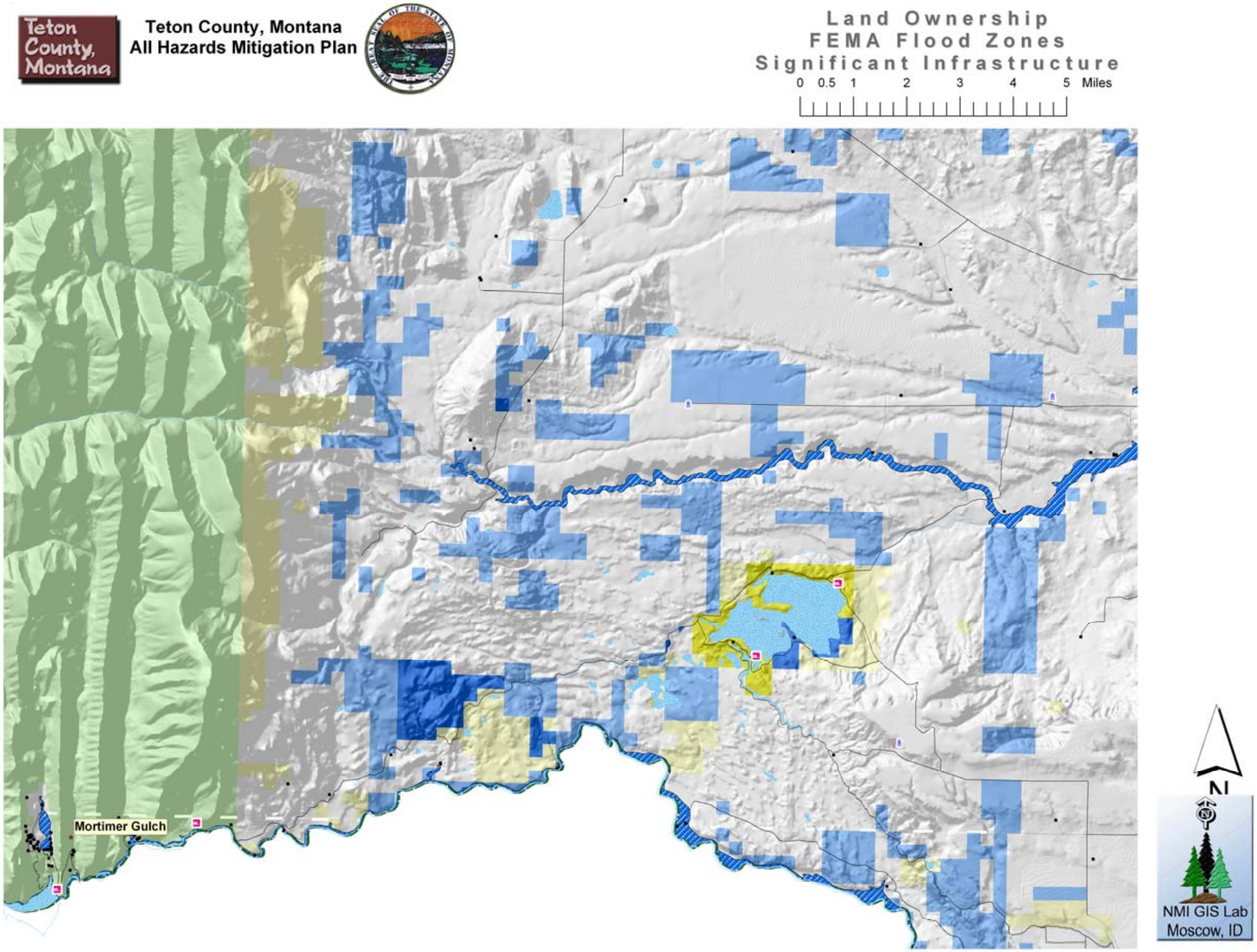


Figure 4.4. FEMA Flood Zones and Land Ownership Near Power and Greenfield.

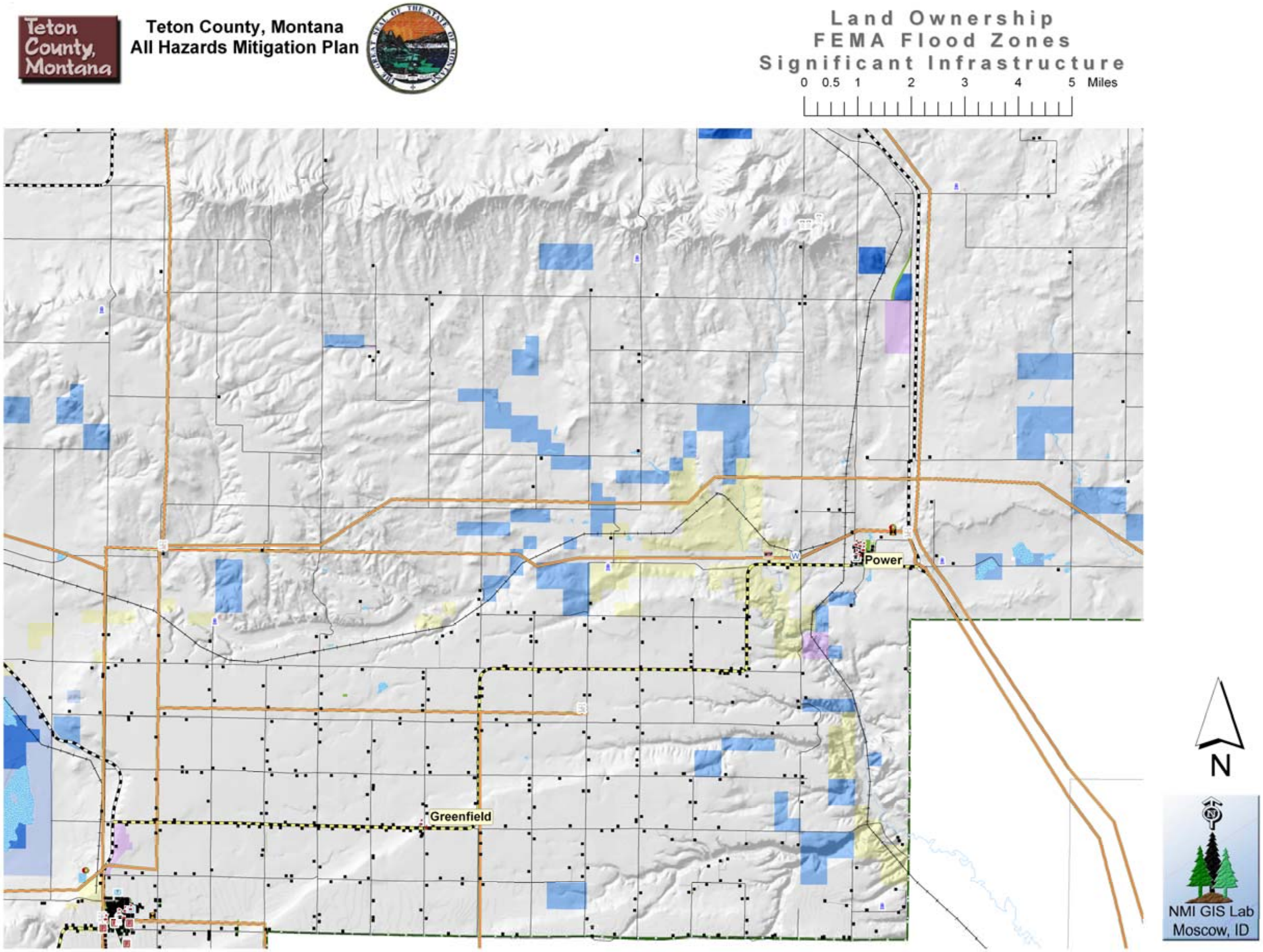


Figure 4.5. FEMA Flood Zones and Land Ownership Near Dutton.

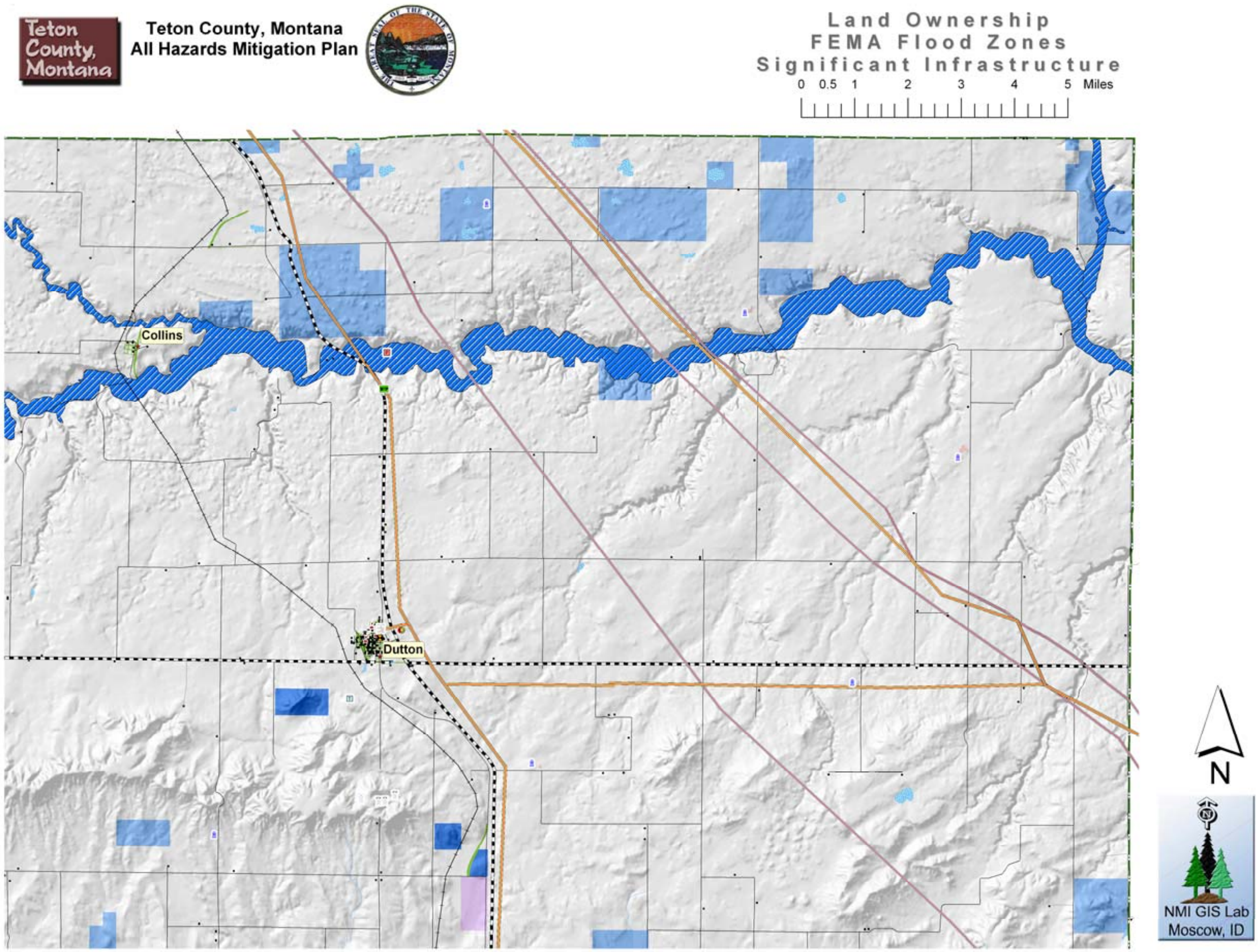


Figure 4.6. FEMA Flood Zones and Land Ownership Near Bynum.

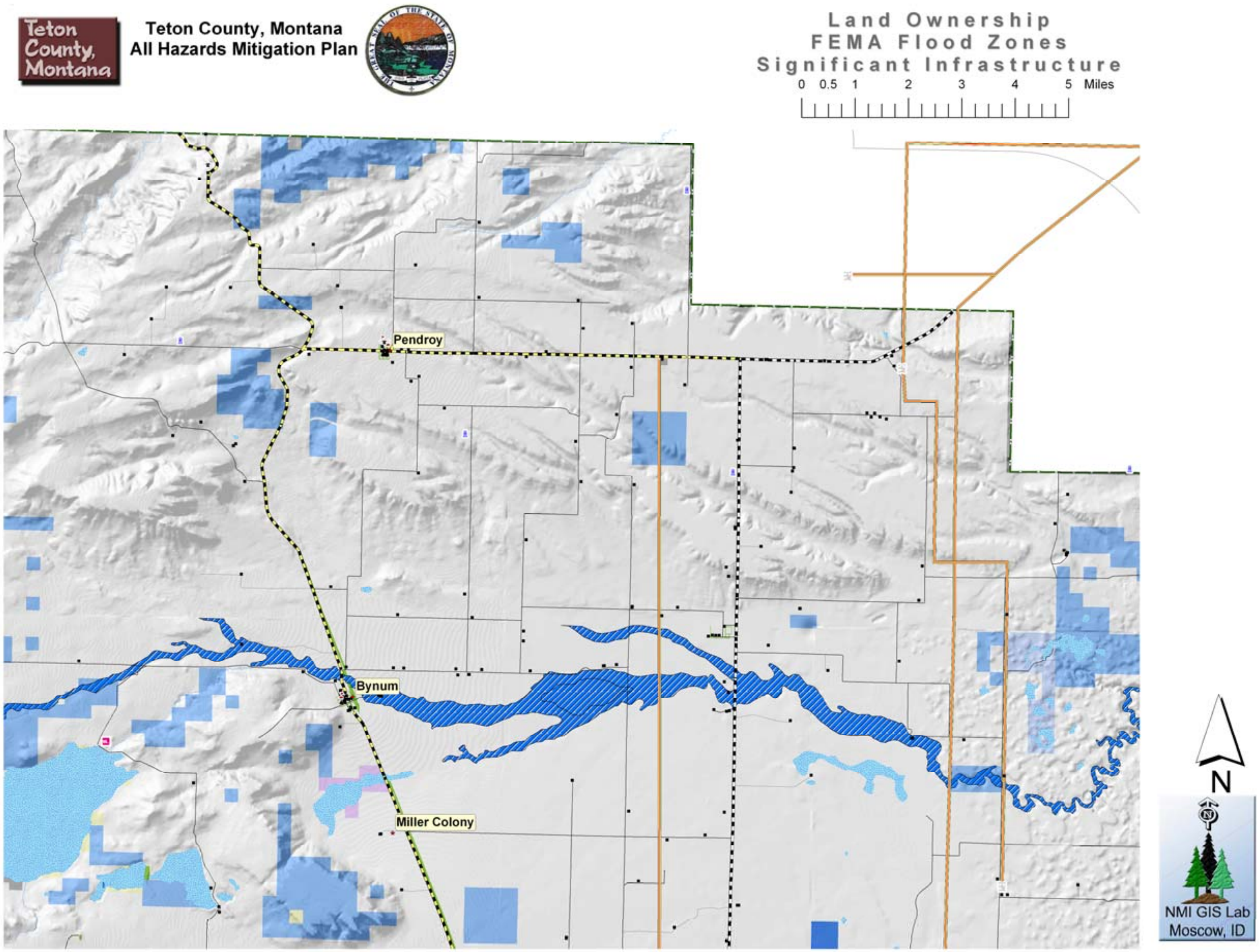


Figure 4.7. FEMA Flood Zones and Land Ownership Near Arrowleaf.

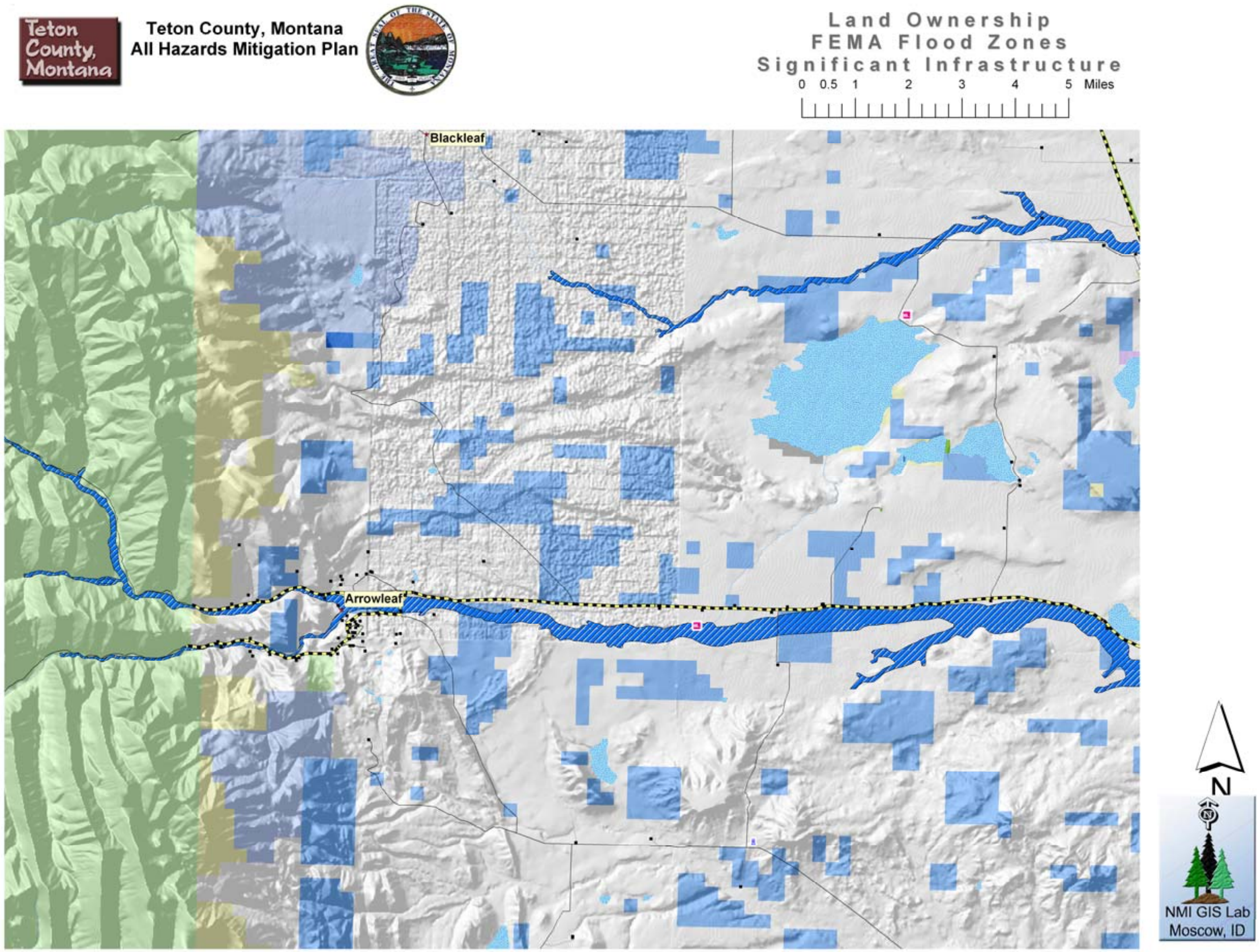
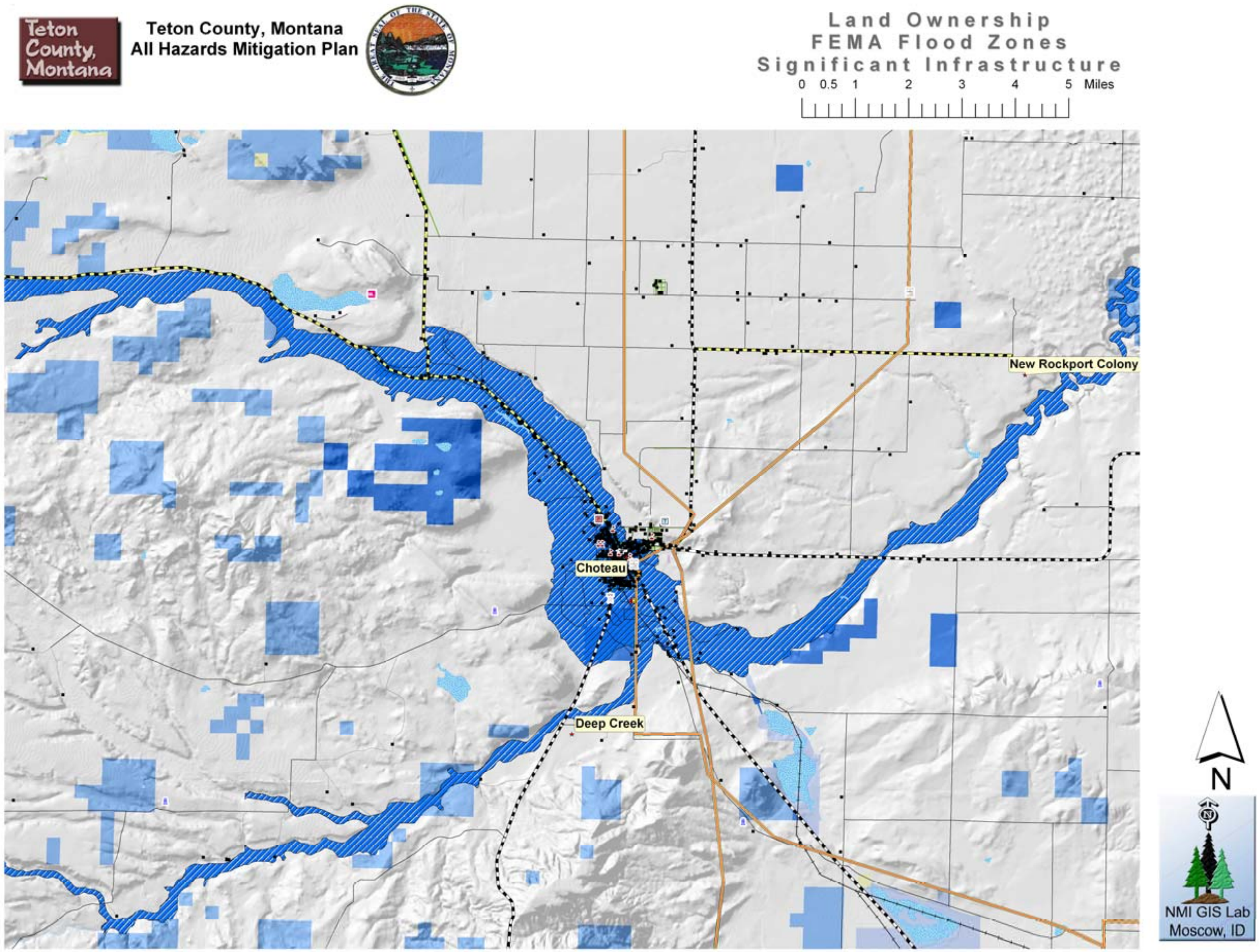


Figure 4.8. FEMA Flood Zones and Land Ownership Near Choteau.



4.5.1 Critical Infrastructure

Within Teton County, particularly within Choteau, a number of structures and critical infrastructure components are found in the FEMA Flood Zones (Table 4.1).

Table 4.1 Critical Infrastructure within FEMA Flood Zone, Teton County Montana.

OWNERSHIP	TYPE	ENTITY	COMMENTS
TETON COUNTY	BUILDING	SHERIFF'S OFFICE	PSAP
TETON COUNTY	BUILDING	ROAD DEPARTMENT	SHOP/ MACH & EQUIP
CITY OF CHOTEAU	BUILDING	PUBLIC WORKS	SHOP/ MACH & EQUIP
KELLY'S	ABOVE GRD STORAGE	BULK FUEL STORAGE	FUEL GAS & DEISEL
BREEN FUEL & TIRE	ABOVE GRD STORAGE	BULK FUEL STORAGE	LPG , GAS & DEISEL
CITY OF CHOTEAU	SEWAGE LAGOON	PUBLIC WORKS	
US GOVERNMENT	BUILDING	POST OFFICE	
CITY OF CHOTEAU	BUILDING	FIRE DEPARTMENT	FIRE HALL
CITY OF CHOTEAU	BUILDING	WATER DEPARTMENT	WATER TREATMENT
CITY OF CHOTEAU	WATER WELLS	WATER DEPARTMENT	SHALLOW WELLS
TETON COUNTY	BUILDING	HOSPITAL DISTRICT	HOSPITAL & NURSING HM
TETON COUNTY	BUILDING	AMBULANCE	AMBULANCE BARN
CHOTEAU SCHOOL DIST.	BUILDING	SCHOOL K-12	
NORTHWESTERN ENERGY	SUBSTATION	ELECTRIC UTILITY	CHOTEAU
TOWN OF DUTTON	WATER WELLS	WATER DEPARTMENT	SHALLOW WELLS
THREE RIVERS COMMUN.	CELL TOWER	TELEPHONE COMPANY	
THREE RIVERS COMMUN.	TELEPHONE SWITCH	TELEPHONE COMPANY	466 EXCHANGE

Additional infrastructure located within the flood zones of Teton County includes: almost 6 miles of utilities, electric and natural gas lines, over 1 mile of oil pipelines; 3.2 miles of railroad track; 4.2 miles of primary access roads and over 7.3 miles of secondary access roads, and 55 miles of other tertiary roads. Approximately 1,237 structures are located within the flood zones of Teton County.

Critical infrastructure located adjacent too but outside of the flood zone can be impacted during flood events. Often buildings and facilities located near the flood zones have restricted access during flood events. Also services required (phone, power, etc.) for the continuing operational functions the structure serves are more likely to be affected the closer to the flood zone the structure is located. Critical infrastructure located outside the flood zone, but within ¼ mile and between ¼ mile and ½ mile of the flood zone are shown in Table 4.2 and Table 4.3 respectively.

Table 4.2. Critical Infrastructure outside of Flood Zone but within ¼ mile of the flood zone.

OWNERSHIP	TYPE	ENTITY	COMMENTS
LDS CHURCH	BUILDING	CHURCH	SHELTER SITE
TOWN OF DUTTON	WATER WELLS	WATER DEPARTMENT	SHALLOW WELLS
LDS CHURCH	BUILDING	CHURCH	SHELTER SITE

Table 4.3. Critical Infrastructure outside of Flood Zone between ¼ mile and ½ mile of the flood zone.

OWNERSHIP	TYPE	ENTITY	COMMENTS
CHOTEAU COUNTRY CLUB	BUILDING	GOLF COURSE	SHELTER SITE
CITY OF CHOTEAU	WATER TANKS	WATER DEPARTMENT	CEMENT ON GRD LEVEL
BYNUM SCHOOL DISTRICT	BUILDING	SCHOOL K-8	

4.5.2 Past Flood Events in Teton County

4.5.2.1 1964 Flood

In the second week of June 1964, the worst natural disaster in Montana's recorded history descended on the state in the form of heavy rains that quickly turned once picturesque creeks into raging, mile-wide rivers. Dams, roads, and railroads washed out, homes and ranches were swept away, and thirty people died. The area affected by the flooding amounted to nearly thirty thousand square miles, or roughly 20 percent of the state. By Thursday, June 11, President Lyndon Johnson had declared nine counties in northwest and north-central Montana a federal disaster area. When mopping-up operations ended, damages stood at an estimated at $62 million.

In its official report, the United States Geological Survey (USGS) offered a comprehensive analysis of the meteorological and hydrological conditions that created the flooding. The first and most important factor was the inordinately heavy precipitation that preceded the storm. While precipitation levels were normal from January through March, and mountain snow pack was actually less than normal through March, heavy snowfall in April brought mountain snow cover to well above average by the end of the month. In early May, an unusually heavy snowstorm deposited record snowfall. Also contributing to the flooding were below-normal temperatures from March to May that delayed significant snowmelt. By the end of May, the nearly saturated soil in the mountains could absorb little additional moisture.

In practical terms, the storm's arrival meant that places ordinarily reporting modest rainfall logged seemingly apocalyptic amounts for the twenty-four-hour period between June 7 and 8: 8-plus inches in Browning, 10 inches at Lake McDonald in Glacier National Park, 13 inches southwest of Augusta, and 11 inches at Heart Butte. It also meant major flooding occurred, especially on the Flathead River on the west side of the mountains and the Sun and Marias Rivers and their tributaries on the east.

Without question, however, the worst of the damage occurred roughly one hundred miles northwest of Great Falls on the Blackfeet Indian Reservation, where raging rivers destroyed 265 homes, 20,000 acres of hay ground along the creeks, two large dams, irrigation facilities on which 37,000 acres of cropland depended, barns corrals, sheds, and livestock, all bridges and much of the Reservation road system.

4.5.3 County Wide Potential Mitigation Activities

There is no way to prevent floods. The weather forces and topography of Teton County will always dictate when and where floods occur. However, flood mitigation strategies should combine both structural and non-structural approaches to alleviating the hazard. Structural approaches include reservoir storage, channel modification, levees and flood walls, pumping stations and other engineering works designed to control floodwaters. Non-structural approaches include both preventive and corrective actions. Preventive actions involve comprehensive floodplain management techniques that prevent unwise and hazardous development of the floodplain. Corrective actions are directed at mitigating flood damages and losses which result from unwise development of flood hazard areas.

There are three areas where action can be taken to reduce the loss of life, property, infrastructure and business disruption to floods.

- Mitigation
- Readiness/Education
- Building codes

4.5.3.1 Mitigation

Some flood control measures currently taking place in Teton County include channel stabilization, bridge replacement, and preliminary surveys for structural flood control projects. Both the City of Choteau and Teton County have regulations that provide for flood plain management within their jurisdictional area.

4.5.3.2 Readiness/Education

Continued periodic public education measures should be undertaken. When extended periods of time pass between major flood events, both emergency response units and the public tend to forget to review plans and take necessary precautions. Some media and public communication ideas are:

- Publish a special section in your local newspaper with emergency information on floods and flash floods. Localize the information by printing the phone numbers of local emergency services offices, the American Red Cross chapter, and the nearest hospitals.
- Ask the local paper to interview local officials about land use management and building codes in flood plains.
- Periodically inform your community of local public warning systems. Explain the difference between flood watches and warnings. Let them know where to turn for emergency broadcast information should they hear a warning on their radio or television.
- Assist hospitals and other operations that are critically affected by power failure by arranging for auxiliary power supplies; this would include city water and sewer systems, emergency services (including electric dependent phone systems), police and fire.
- Publish emergency evacuation routes for areas prone to flooding.
- Have a ready source of sand, bags and shovels available, stored outside the flood plain.

Requiring building permits and compliance with building codes. Builders and future homeowners should be made aware of the potential risk of building in the flood plain. Periodic publication of the highlights of these building codes can help to keep up public awareness.

4.5.3.3 Building Codes

Participation in the National Flood Insurance Program (NFIP) and subsequent adoption of the Uniform Building Codes, or more stringent local building codes, provide basic guidelines to communities on how to regulate development. When a county participates in the NFIP it enables property owners in the county to insure against flood losses. By employing wise floodplain management, a participating county can protect its citizens against much of the devastating financial loss resulting from flood disasters. Careful local management of development in the floodplains results in construction practices that can reduce flood losses and the high costs associated with flood disasters to all levels of government.

Table 4.4 provides a list of the communities within Teton County that currently participate in the NFIP.

Table 4.4. Communities Participating in NFIP as of 11/8/04

CID#	Community	Date of Entry	Current Effective Map Date
300168	Teton County*	4/03/84	4/03/84
300097	Choteau, City of	7/18/83	7/18/83

* Unincorporated areas only (IDWR 2004)

Teton County has no communities with identified special flood hazard areas that are not participating in the NFIP. Teton County has no communities under suspension or revocation of participation in the NFIP (IDWR 2004).

An important part of being an NFIP community is the availability of low cost flood insurance for those homes and businesses within designated flood plains, or in areas that are subject to flooding, but that are not designated as Special Flood Hazard Areas.

Participation by individuals and business within each community for 2003 is shown in the Table 4.5.

Table 4.5. NFIP Policy Statistics As of 12/31/03 in Teton County

Community Name	Policies In-Force	Insurance In-Force whole $	Written Premium In-Force
Teton County*	17	1,323,100	6,773
Choteau, City of	9	1,002,100	4,355

*does not include policies in incorporated areas (FEMA 2004).

Overall participation by individuals and business in the NFIP appears to be low. Potential reasons are:

- A lack of knowledge about the existence of the availability of low cost flood insurance.
- Home and business owners unaware of their vulnerability to flood events.
- Current cost of insurance is prohibitive.

The first two reasons can be addressed through public education. The third could be addressed by all communities in the county taking advantage of the Community Rating System (CRS).

To encourage communities to go beyond the minimum requirements and further prevent and protect against flood damage, the NFIP established the Community Rating System (CRS). To qualify for CRS, communities can do things like make building codes more rigorous, maintain drainage systems, and inform residents of flood risk.

In exchange for becoming more flood-ready, the CRS community's residents are offered discounted premium rates. Based on your community's CRS ratings, you can qualify for up to a 45% discount of your annual flood insurance premium.

Of the Teton County communities that participate in the NFIP, no community has earned a discount on their flood insurance rates through the Community Rating System (CRS).

Participation is relatively simple, and with the planning work already in place within the county little to no additional work would have to be done to start receiving discounted insurance rates. For additional information go to http://www.floodsmart.gov/floodsmart/pages/crs_ratings.jsp

There are currently no building codes in Teton County; however, communities have adopted the Uniform Building Codes. Compliance to these codes is enforced by the State of Montana. Continued review and enforcement will ensure that Teton County remains in good standing with the NFIP and could enable additional discounts under CRS.

4.5.3.4 Floodwater Diversion Dam on Teton River

Figure 4.9. Photo of Teton River Diversion Canal to Bynum Reservoir.

A floodwater diversion gate built by the Corps of Engineers after the 1964 floods is located on the Teton River west of the community of Choteau. The original purpose of the gate was to divert water for irrigation from the river into Bynum Reservoir to the north via a 4 mile canal system which stores about a 2-year irrigation demand. The existing headworks is capable of diverting approximately 1,000 cubic feet per second into the canal. However, the physical construction of the grate-style gate promotes extreme gravel and debris blockage during high runoff events. Therefore, the gate becomes plugged along with a portion of the original channel. During past flood events, the diversion owners have attempted to keep the grates clear of debris; however, this manual effort is largely unsuccessful and potentially dangerous. Re-engineering the diversion gate to accommodate the debris flow and dump excess water into Bynum Reservoir would more effectively mitigate the flood potential for the community.

The Diversion Dam located on the Teton River is the most substantial opportunity the County has to mitigate flood damage to the town of Choteau. In addition, the water diverted to the large capacity of Bynum Reservoir means that this flood water can be delayed sufficiently in down-stream flow to mitigate flood damages in the Bynum River drainage. Other uses for the water once it is in the Bynum Reservoir include agricultural purposes such as irrigation. As part of the flood mitigation priorities for Teton County, the continued development and maintenance of the Diversion Dam on the Teton River is the highest in terms of low cost, and high benefit to the residents of the County.

Figure 4.10 Photo of Teton River Diversion Canal to Bynum Reservoir.

Figure 4.11 Bynum Reservoir Storage Levels from 1988 – 2004.

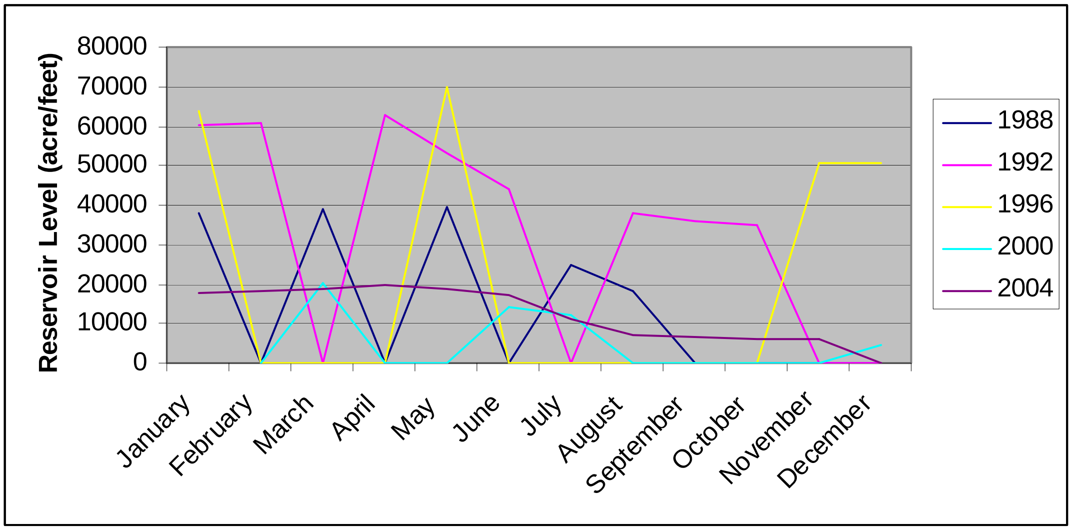


Figure 4.12. Photo of Teton River Diversion to Teton River.

Figure 4.13 Photo of Teton River Diversion Dam to Bynum Reservoir.

4.6 Communities Assessments

The community of Choteau is the only incorporated town within Teton County having a completed Flood Insurance Rate Map (FIRM).

4.6.1 Choteau

Choteau, the Teton County seat, is located in central Teton County at the junction of U.S. Highways 89 and 287. The Teton River and its tributaries, and several irrigation canals are the main source of flooding in Choteau. This river runs along the western edge of Choteau and drains agricultural fields, as well as the rangeland watersheds surrounding the community. Nearly all of the community's public buildings and emergency facilities, as well as many homes and businesses, are located within the floodplain of the river.

4.6.1.1 Flood Potential

The Teton River, which originates within the Bob Marshal Wilderness Area, and its tributaries drain much of the eastern side of the Continental Divide within Teton County and passes along the western edge of Choteau's city limits. This watershed drains 1,307 square miles. Spring Creek, a much smaller stream, flows southwesterly just east of Main Avenue through Choteau. The town is located in a shallow valley surrounded by agricultural fields and arid grasslands.

The vegetation is a mix of agriculturally produced and rangeland ecosystems. There is very little elevation change throughout town, so water has few restrictions in its flow.

Floods in the area are typically the result of rain-on-snow events. Rain-on-snow events that affect Choteau occur when significant snow pack exists within the hydrologic watershed surrounding Choteau. The boundaries of the watersheds are extremely large, draining the nearby agricultural fields and other watersheds on the Rocky Mountain Front. Warm rains falling on the snow pack result in a significantly increased rate of snowmelt. Often this melting occurs while the ground is frozen and the water cannot be absorbed into the soil, resulting in increased overland flows. Flood waters recede slowly as rain-on-snow weather events tend to last for several days.

Spring Creek has some issues with ice jams, particularly around bridge abutments. Too narrow bridge crossings or too small culverts can slow water flow enough to allow ice to form. These partially frozen ice chunks have a tendency to get jammed in riparian vegetation or downstream bridge abutments causing low level flooding. Usually damage is minimal; however, water over the road does create some transportation complications.

Thunderstorms are localized summer events that can also have an impact on the flooding potential of Choteau. Flooding can occur rapidly, overwhelming the carrying capacity of channels in a short time. The duration of subsequent flooding tends to be a matter of hours. Due to the lack of vegetation around the community, flash flooding can also occur. This type of event usually is associated with localized thunderstorms in which the ground cannot absorb moisture as quickly as it is coming down.

Choteau has a high potential for flooding due to dam failure. Although these events rarely occur, there are numerous dams upstream from the community center that could be breached causing severe damage. Dams at Eureka Reservoir and Pishkun Reservoir pose the greatest flooding risk to Choteau.

Choteau has an extensive irrigation canal system. There are several bridges that cross the canals, which could pose a problem if the main gates were damaged. This system is highly maintained, but the potential is something the community should be aware of.

Several streets and road shoulders erode under flood conditions within Choteau. Many secondary routes are not paved, which results in gravel washing down-slope potentially clogging storm drains. Sewer and storm drains are quickly filled, which consequently back-up these lines restricting the flow of water.

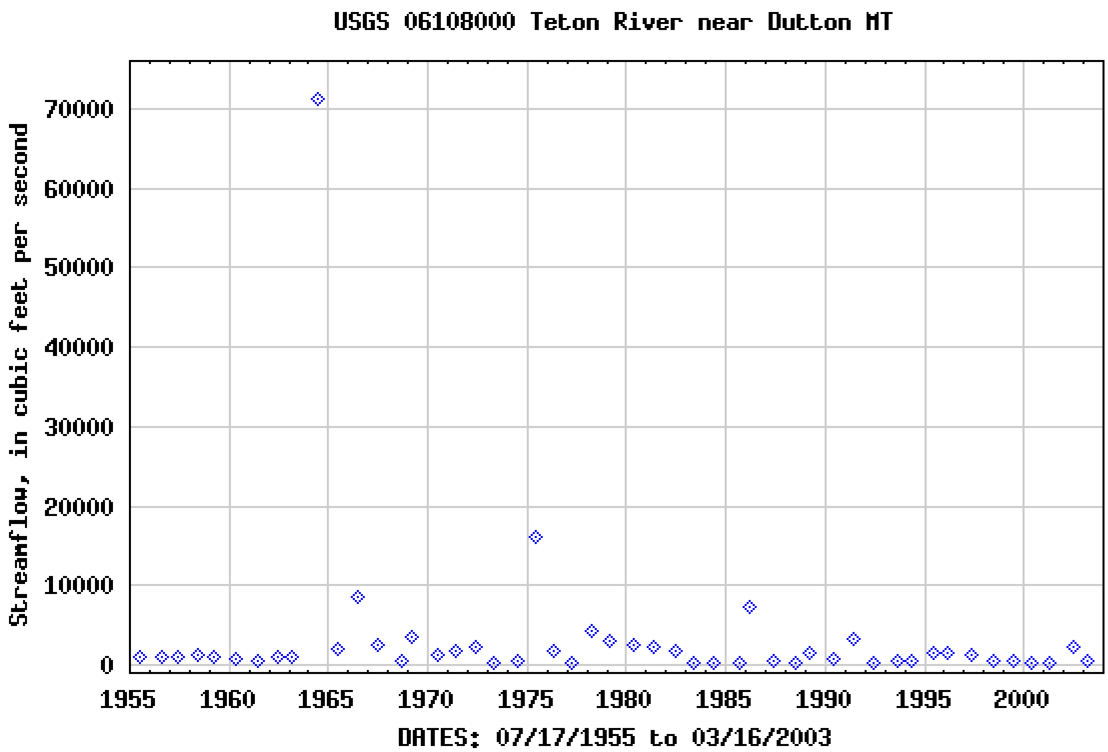
Nearly all of downtown Choteau lies within the Teton River floodplain, including many of the public service buildings, emergency response facilities, and community shelters. In the event of a flood, many businesses as well as several residential areas would be affected.

Much of the new construction occurring in Choteau is located on Airport Hill east of the city center. This area is well outside of the floodplain. The Arrowleaf Subdivision several miles west of Choteau is divided by the Teton River. Several homes have been built within the floodplain and are at high risk of flooding.

The Freezout Lake Wildlife Management area along U.S. Highway 89 between Choteau and Fairfield poses little flooding risk to either community; however, it does have the potential to overtop or cause damage to Highway 89 and other roads, bridges, and culverts in the area. This series of lakes, ponds, marshes, and grasslands stretch from nearly one mile northwest of Fairfield to the Teton River just south of Choteau with U.S. Highway 89 traveling approximately through the middle. In the event that the Wildlife Management Area flooded, excess water would most likely be distributed across neighboring agricultural fields affecting few homes. Currently, water discharge flows through a canal system from Freezout Lake to Priest Butte Lake (on the opposite side of the highway) and through a canal and pipeline system from Priest Butte Lake to the Teton River. Widespread flooding could occur if this drainage system became overrun or failed completely. Since Highway 89 is the primary linkage between Choteau and Fairfield, flood damage to this right-of-way could negatively impact these communities. Damage to canals, bridges, culverts, or pipelines could result in water overtopping the road or complete wash outs and failures of the road surface. The Montana Fish, Wildlife, and Parks manages the Freezout Lake Wildlife Management Area and has a Water Management Plan in place. This plan stresses the need for rehabilitation or replacement of water control structures.

The peak streamflow data for the Teton River effectively illustrates the recent flood events incurred by Teton County. The 500 year flood event that occurred in 1964 peaked at 71,300 cubic feet per second, which was high above the mean streamflow of approximately 1,300 cubic feet per second. This data depicts an 11-year cycle for major flood events on the Teton River; however, the time frame and limitations of the data do not allow us to conclude that a flood event will occur every 11 years.

Figure 4.14 Peak Streamflow data for Teton River near Dutton.



4.6.1.2 Ingress-Egress

The primary access into Choteau is either U.S. Highway 89 or 287. These are both two-lane, paved roads and are well-traveled by area commuters. U.S. 89 and 287 through Teton County are adjacent to relatively flat agricultural fields or native rangelands. Both of these escape routes would be at risk during a flood event due to their location within the floodplain. This situation is further exacerbated by bridges that could restrict water flow causing the roadway to become submerged by overtopping water. During the 1964 floods, the bridge crossing Deep Creek on U.S. 287, two bridges crossing the Teton River south of Choteau on U.S. 89, and the bridge crossing the Teton River on State Route 221 were either severely damaged or washed out causing the community to be completely isolated for several days. Although these bridge crossings have been reinforced, the potential for these escape routes to be cut off still remains.

4.6.1.3 Infrastructure

The primary infrastructural concern in Choteau is the location of many of the emergency services facilities and public buildings within the floodplain including the fire station, the courthouse, the hospital, or the sheriff's office. The majority of the town lies directly in the floodplain, yet few of the emergency-related structures have been moved to less flood prone areas. In the event of a major flood event, many of the emergency services may be rendered incapable. Future planning should take this issue into concern in order to make a flood a less disastrous situation.

Roads and bridges are another major infrastructural element that may be affected by flooding. Alternative routes to all parts of town are available during most floods. Nevertheless, this can add additional time to reach a desired destination or emergency location. Usually it is only a matter of a few minutes to circumvent flooded areas. Bridges and culverts have been repeatedly blown out by past flood events causing major long term damage to road systems. Paved road surfaces will normally require some cleaning of flood-carried debris, while local gravel roads need grading and some spot replacement of surface rock.

Most residents in Choteau are connected to the municipal water system or have drilled personal wells. The city water storage tanks are located out of the floodplain on Airport Hill to the east of the community; however, the well head is within the floodplain on the north end of town. The city's ability to provide clean drinking water during flood events should not be compromised. There is a 250,000 gallon tank built in 1912 and a 500,000 gallon tank built in 1949. The tanks have been regularly cleaned and sealed. Even though the tanks are both older than the 50-year design life, both are in good condition. The City does have alternative power generators located at the well sites, so power loss would not greatly affect the community.

The city's sewer lagoons are located within the 100-year flood plain; however, an elevated levee has been built around the ponds to protect them from flood waters.

4.6.1.4 Flood Protection

Although the area reservoirs were designed to provide water for irrigation purposes, the secondary advantage of flood control benefits Choteau and surrounding developments. Some additional flood protection is provided by the diversion gate on the Teton River. However, this gate was poorly engineered and is not capable of diverting the necessary amount of water to protect Choteau from flooding at this time.

At-risk or undersized bridges and culverts are slowly being replaced or reinforced in order to prevent them from damage due to flood waters.

4.6.1.5 Community Risk Assessment

The City of Choteau has a high risk of experiencing major flood damage and a potential long term disruption of business. Furthermore, the City has an increased risk of experiencing a flood caused by dam failure. Flooding could have major impacts due to the location of many of the emergency response structures and equipment within the floodplain. Communication components could also become threatened if phone lines or towers and repeaters are damaged. Many local businesses and residential areas will also be highly affected by a flood.

Overflow from the Teton River into Spring Creek causes added flood hazard to Choteau. During a 100-year flood, shallow flooding will occur along Spring Creek in Choteau. During the 500 year flood of 1964, water overtopped Gibson Dam on the North Fork of the Sun River. Water also overtopped Main Avenue throughout Choteau in 1964. Whether this event was a result of the Teton River or Spring Creek flooding is difficult to assess.

4.6.1.6 Mitigation Activities

Continued participation in NFIP and enforcement of building codes in the floodplain will help reduce the risk of the community incurring costly flood damage. Currently Choteau does not have a Flood Plain Ordinance, so adopting one would further reduce costly flood damage within the community.

Major weather events that cause floods can interrupt electrical service. Back up power systems for the city water supply, sheriff's office, fire warden's office, and the hospital are in place and help in emergency response situations. A mobile power supply would provide back up power to other emergency service facilities most in need such as senior citizen centers or the fire station.

Flooding on the Teton River drainage affecting the community of Choteau can be mitigated by re-engineering the diversion gate that would effectively channel excess flood waters into Bynum Reservoir. This would help keep the river within its banks as it passes the community. Flooding of Spring Creek due to ice jams can be mitigated by replacing too narrow bridge abutments and undersized culverts.

Emergency service facilities, public buildings, and other structures important to the operation of the community should consider moving out of the floodplain.

Chapter 5: Earthquakes

5 Earthquake characteristics

An earthquake is a trembling of the ground that results from the sudden shifting of rock beneath the earth's crust. Earthquakes may cause landslides and rupture dams. Severe earthquakes destroy power and telephone lines, gas, sewer, or water mains, which, in turn, may set off fires and/or hinder firefighting or rescue efforts. Earthquakes also may cause buildings and bridges to collapse.

By far, earthquakes pose the largest single event natural hazard faced by Montana. They may affect large areas, cause great damage to structures, cause injury, loss of life and alter the socioeconomic functioning of the communities involved. The hazard of earthquakes varies from place to place, dependent upon the regional and local geology. Western Montana contains a zone of high seismicity, the Intermountain Seismic Belt, which also covers parts of Nevada, Arizona, Utah, Wyoming and Idaho. In Montana, this seismic belt trends north from Yellowstone National Park to Helena, then heads northwest, terminating beyond Flathead Lake. Most of the earthquake activity in the state occurs within this zone.

Earthquakes occur along faults, which are fractures or fracture zones in the earth across which there may be relative motion. If the rocks across a fault are forced to slide past one another, they do so in a *stick-slip* fashion; that is, they accumulate strain energy for centuries or millennia, then release it almost instantaneously. The energy released radiates outward from the source, or focus, as a series of waves - an earthquake. The primary hazards of earthquakes are ground breaking, as the ricks slide past on another, and ground shaking, by seismic waves. Secondary earthquake hazards result from distortion of the surface materials such as water, soil, or structures.

Ground shaking may affect areas 65 miles or more from the epicenter (the point on the ground surface above the focus). As such, it is the greatest primary earthquake hazard. Ground shaking may cause seiche, the rhythmic sloshing of water in lakes or bays. It may also trigger the failure of snow (avalanche) or earth materials (landslide). Ground shaking can also change the mechanical properties of some fine grained, saturated soils, whereupon they *liquefy* and act as a fluid (liquefaction). The dramatic reduction in bearing strength of such soils can cause buried utilities to rupture and otherwise undamaged buildings to collapse.

The earth's crust breaks along uneven lines called faults. Geologists locate these faults and determine which are active and inactive. This helps identify where the greatest earthquake potential exists. Many faults mapped by geologists, are inactive and have little earthquake potential; others are active and have a higher earthquake potential.

When the crust moves abruptly, the sudden release of stored force in the crust sends waves of energy radiating outward from the fault. Internal waves quickly form surface waves, and these surface waves cause the ground to shake. Buildings may sway, tilt, or collapse as the surface waves pass.

Ground shaking from earthquakes can collapse buildings and bridges; disrupt gas, electric, and phone service; and sometimes trigger landslides, avalanches, flash floods, fires, and huge, destructive ocean waves (tsunamis). Buildings with foundations resting on unconsolidated landfill and other unstable soil, or trailers and homes not tied to their foundations are at risk because they can be shaken off their mountings during an earthquake. When an earthquake occurs in a populated area, it may cause deaths and injuries and extensive property damage.

Aftershocks are smaller earthquakes that follow the main shock and can cause further damage to weakened buildings. Aftershocks can occur in the first hours, days, weeks, or even months after the quake. Be aware that some earthquakes are actually foreshocks, and a larger earthquake might occur.

Ground movement during an earthquake is seldom the direct cause of death or injury. Most earthquake-related injuries result from collapsing walls, flying glass, and falling objects as a result of the ground shaking, or people trying to move more than a few feet during the shaking (FEMA 2004).

5.1 Measuring an Earthquake

Earthquakes are measured in two ways. One determines the power, the other describes the physical effects. Magnitude is calculated by seismologists from the relative size of seismograph tracings. This measurement has been named the Richter scale, a numerical gauge of earthquake energy ranging from 1.0 (very weak) to 9.0 (very strong). The Richter scale is most useful to scientists who compare the power in earthquakes. Magnitude is less useful to disaster planners and citizens, because power does not describe and classify the damage an earthquake can cause. The damage we see from earthquake shaking is due to several factors like distance from the epicenter and local rock types. Intensity defines a more useful measure of earthquake shaking for any one location. It is represented by the modified Mercalli scale. On the Mercalli scale, a value of I is the least intense motion and XII is the greatest ground shaking. Unlike magnitude, intensity can vary from place to place. In addition, intensity is not measured by machines. It is evaluated and categorized from people's reactions to events and the visible damage to man-made structures. Intensity is more useful to planners and communities because it can reasonably predict the effects of violent shaking for a local area.

Table 5.1. Modified Mercalli Earthquake Intensity Scale.

Intensity	Description
I.	Only instruments detect the earthquake
II.	A few people notice the shaking
III.	Many people indoors feel the shaking. Hanging objects swing.
IV.	People outdoors may feel ground shaking. Dishes, windows, and doors rattle.
V.	Sleeping people are awakened. Doors swing, objects fall from shelves.
VI.	People have trouble walking. Damage is slight in poorly-built buildings.
VII.	People have difficulty standing. Damage is considerable in poorly-built buildings.
VIII.	Drivers have trouble steering. Poorly-built structures suffer severe damage, chimneys may fall.
IX.	Well-built buildings suffer considerable damage. Some underground pipes are broken.
X.	Mast buildings are destroyed. Dams are seriously damaged. Large landslides occur.
XI.	Structures collapse. Underground utilities are destroyed.
XII.	Almost everything is destroyed. Objects are thrown into the air.

(IGS 2004)

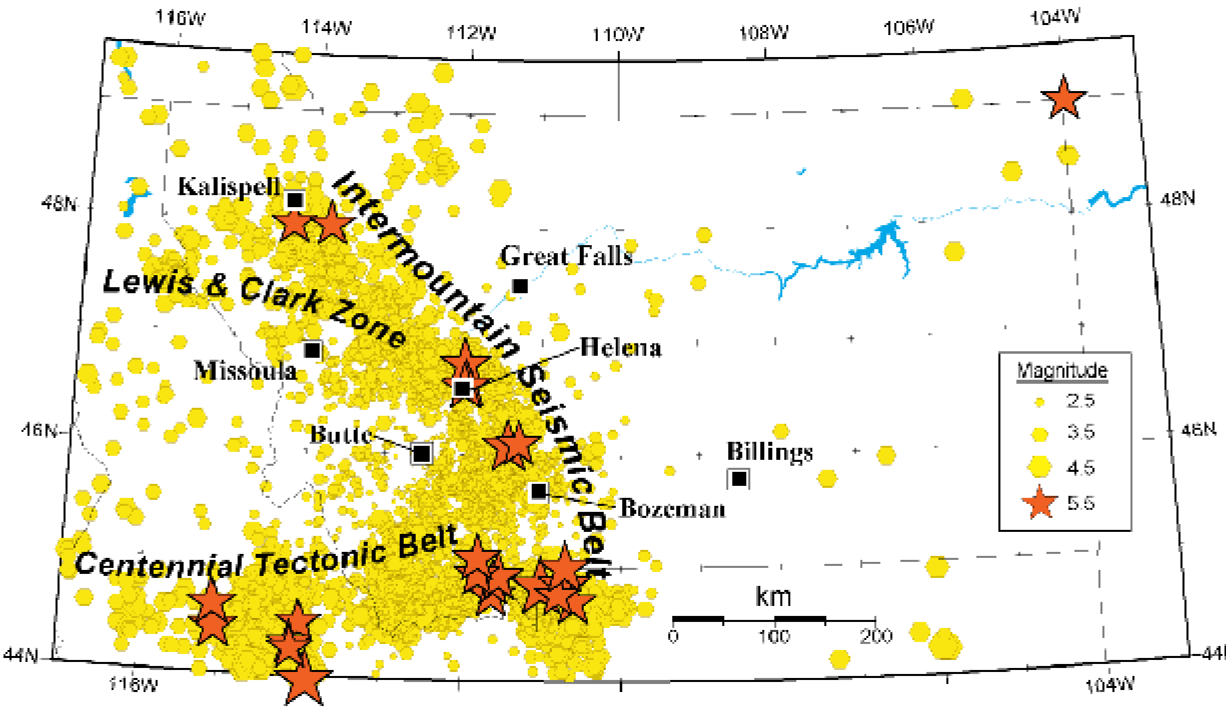
5.2 Earthquake Profile in Montana

Montana is one of the most seismically active States in the Union. Since 1925, the State has experienced five shocks that reached intensity VIII or greater (Modified Mercalli Scale). During the same interval, hundreds of less severe tremors were felt within the State.

A belt of seismicity known as the Intermountain Seismic Belt extends through western Montana, from the Flathead Lake region in the northwest corner of the state to the Yellowstone National

Park region where the borders of Montana, Idaho, and Wyoming meet. The Intermountain Seismic Belt continues southward through Yellowstone Park, along the Idaho-Wyoming border, through Utah, and into southern Nevada. In western Montana, the Intermountain Seismic Belt is up to 100 km wide. A branch of the Intermountain Seismic Belt extends west from the northwest corner of Yellowstone Park, through southwestern Montana, into central Idaho. This so called Centennial Tectonic Belt and includes at least eight major active faults and has been the site of the two largest historic earthquakes in the northern Rocky Mountains, the August 18, 1959 Hebgen Lake, Montana, earthquake (M 7.5), and the October 28, 1983 Borah Peak, Idaho, earthquake (M 7.3). Although it has been over four decades since the last destructive earthquake in Montana, small earthquakes are common in the region, occurring at an average rate of 7-10 earthquakes per day.

Figure 5.1 Intermountain Seismic Belt in Montana.

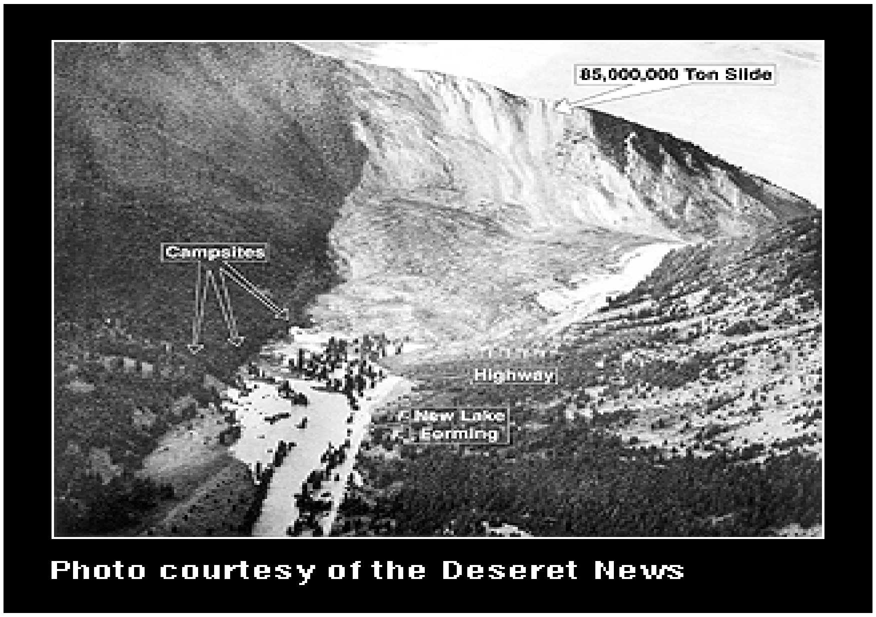


Although earthquakes are common in Montana, the early history of felt shocks is incomplete. Only four felt earthquakes that occurred before 1900 are on record. The first was a shock on May 22, 1869, that reached intensity VI at Helena. In 1872, Helena was shaken again, this time by two earthquakes, one on December 10 and the other on December 11, both intensity VI. The fourth pre-1900 earthquake was an intensity VI shock that struck Dillon November 4, 1897.

The largest earthquake in Montana's history was the magnitude 7.1 earthquake of August 17, 1959. At 11:37 p.m., Mountain Standard Time, the earth beneath Hebgen Lake suddenly warped and rotated, generating a seiche that continued for about 11 1/2 hours. The first few waves were over 1 meter in height, large enough to flow over Hebgen Dam, a concrete core earthfill structure that was completed in 1914. Although the dam's concrete corewall cracked in 16 places, only a minor amount of seepage occurred. The surface of the lake, which contained 324,000 acre-feet at the time of the earthquake, dropped more than 3 meters because of the violent geologic changes.

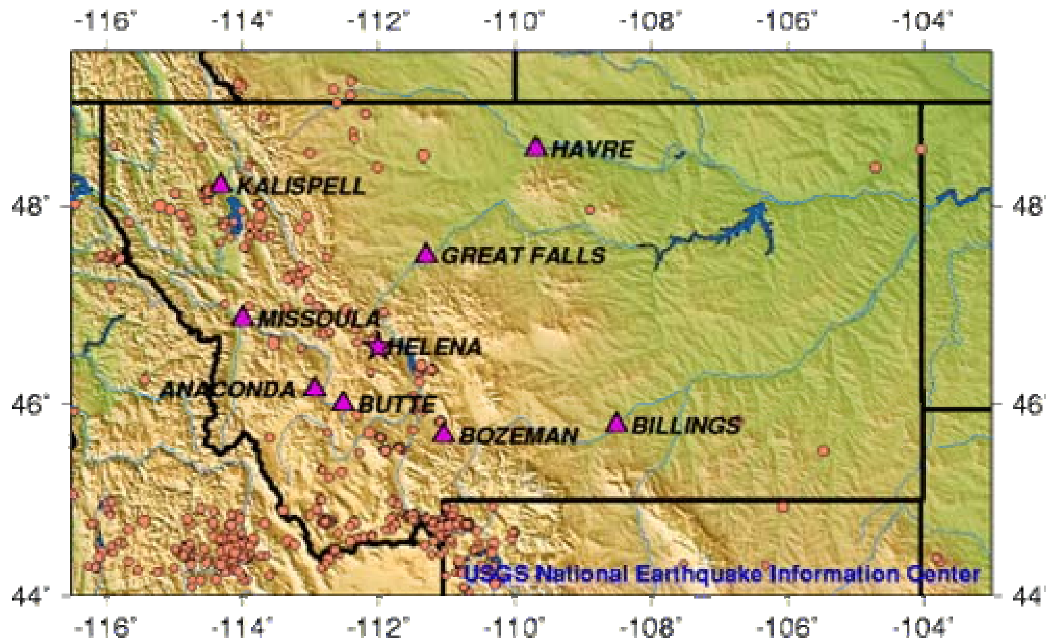
The main tremor triggered a major landslide in the Madison River Canyon, about 9 kilometers downstream from Hebgen Dam. An estimated 80 million tons of rock jarred loose by the earthquake slid down the south wall of the canyon. The slide's volume was estimated at 37 to 43 million cubic yards. Nearly 2 kilometers of the river and highway (Montana 287) were buried to depths as great as 120 meters. At least 26 people in the Rock Creek Campground were buried by the slide. Two other campers were killed by a rolling boulder at Cliff Lake, west of Madison Valley. The slide formed a natural dam in Madison Canyon which blocked the flow of the Madison River and created a new lake which within a few weeks was about 60 meters deep, and extended almost to Hebgen Dam. It has been appropriately named "Earthquake Lake."

Figure 5.2 Landslide caused by Hebgen Lake Earthquake in 1959.



The Forest Service of the U.S. Department of Agriculture later established the Madison River Canyon earthquake area to preserve the earthquake features and provide for public use and safety. A visitor center which includes a visible-recording seismograph is maintained by the Forest Service. Also, there is a memorial marker to those whose lives were lost during the earthquake. Although the scene of large-scale destruction and tragedy, the locality is of great scientific and general interest because it provides a dramatic example of mountain-building and earth-shaping processes.

Figure 5.3. Seismicity of Montana from 1990 - 2001.



5.2.1 Teton County Earthquake Profile

Geological and seismological studies show that earthquakes are likely to happen in any of several active zones in Montana and adjacent states.

The 1991 Uniform Building Code (UBC), a nationwide industry standard, sets construction standards for different seismic zones in the nation. UBC seismic zone rankings for Montana are among the highest in the nation. When buildings are built to these standards they have a better chance to withstand earthquakes. In 2002, the International Building Code (IBC) adopted the 1991 UBC earthquake standards. Teton County has no building codes; however, individual communities have adopted UBC standards.

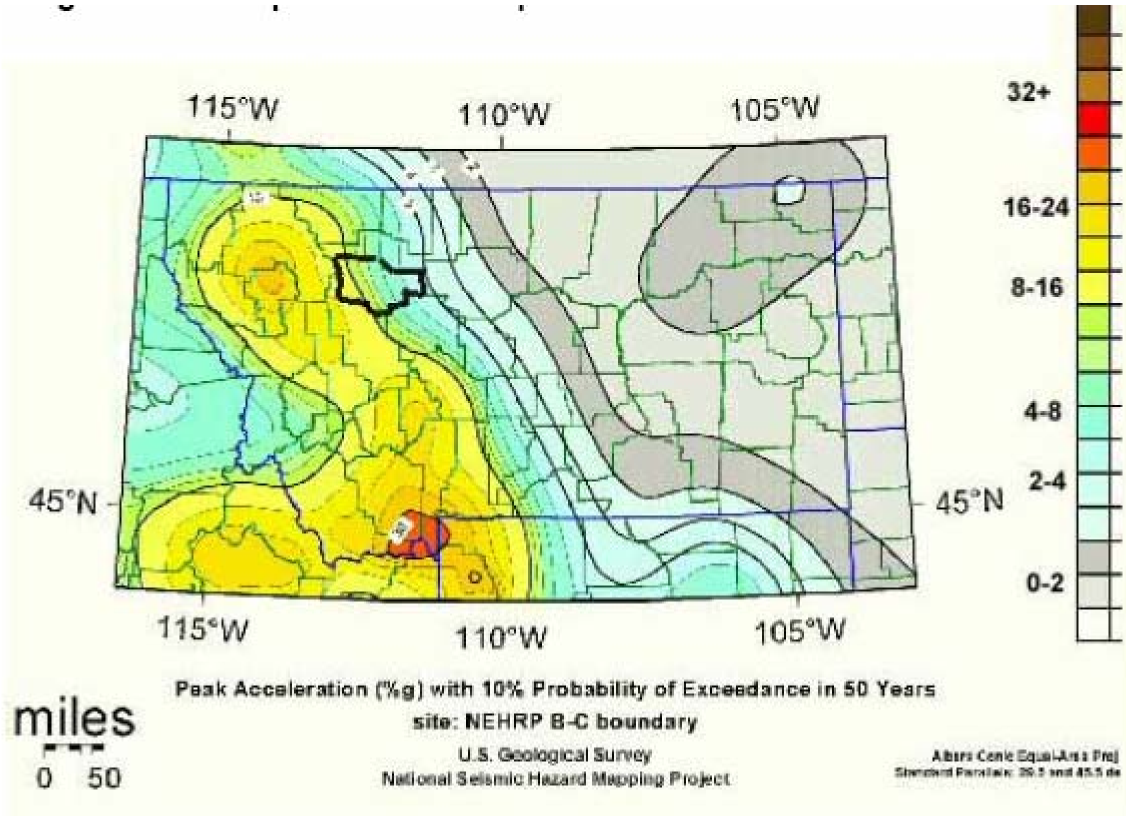
Studies of ground shaking in Montana during previous earthquakes have led to better interpretations of the seismic threat to buildings. In areas of severe seismic shaking hazard, older buildings are especially vulnerable to damage. Older buildings are at risk even if their foundations are on solid bedrock. Areas shown on the map with high seismic shaking hazard can experience earthquakes with intensity VII where weaker soils exist. Most populated areas in Montana are located on or near alluvial deposits which provide poorer building site conditions during earthquakes. Older buildings may suffer damage even in areas of moderate ground shaking hazards.

A belt of seismicity known as the Intermountain Seismic Belt extends through western Montana, from the Flathead Lake region in the northwest corner of the state to the Yellowstone National Park region. In western Montana, the Intermountain Seismic Belt is up to 100 km wide. The western part of Teton County is included in this area. Engineers use national maps of the earthquake shaking hazard in the United States to create the seismic-risk maps and seismic design provisions contained in building codes.

Local government agencies use building codes, such as the Uniform Building Code, to help establish the construction requirements necessary to preserve public health and safety in earthquakes.

The 1996 U.S. Geological Survey shaking-hazard maps for the United States are based on current information about the rate at which earthquakes occur in different areas and how far strong shaking extends from quake sources. Colors on the particular map show the levels of horizontal shaking that have a one in ten chance of being exceeded in a 50 year period. Figure 5.2 indicates the severity of earthquakes is likely to be higher in western Teton County. The County is generally rated in the low to mid range for earthquake hazards.

Figure 5.4. Earthquake Hazard Map for Teton County and the Rest of Montana.



5.2.2 Teton County Geology

The surface of Teton County is the result of geological activity that has continued for over four billion years. The oldest rocks in the County are more than 600 million years old and consist primarily of Precambrian Belt sedimentary rocks. Seas continuously flooded most of Montana during the Paleozoic Era that lasted from 600 to 225 million years ago, and also during the Mesozoic Era which lasted from 225 million years ago. This resulted in many more layers of sediment being deposited on top of the Precambrian sedimentary rocks.

The Rocky Mountains began forming approximately 135 million years ago. The region began breaking up into uplifted fault-blocks containing many combination rocks from previous eras. Teton County occupies a transitional zone between the Rocky Mountains and the Northern Great Plains. The mountains were formed after the Mesozoic era by a fault known as the "Northern Overthrust Belt". They rise 2,000 to 4,000 feet above the gravel capped plateaus and are eroded into sharp barren peaks and serrated ridges. The mountains comprise a strip along the western border of the County approximately 10 to 12 miles wide and consist primarily of rock or shallow and poorly developed soils along the steeper slopes, with some soils along the streams and level areas that can support grass and other vegetation.

The intense geological activity continued on through the Tertiary Period until about 3 million years ago. During this time the climate was relatively dry and the valleys were filled with large amounts of sediment because of insufficient water to carry it out onto the plains. Since that time, a series of ice ages and increased rainfall during the inter-glacial periods resulted in sediment being spread across what is now the high plains of northcentral Montana.

The eastern half of the County is characterized by these plains and consists primarily of Cretaceous sedimentary rock called Colorado Shale. This material was deposited 60 million years ago just prior to the draining of the last sea from Montana. As mentioned above, thick layers of gravel eroded from the mountains subsequently buried the Colorado shale. Since that time the landscape has been modified by continental glaciation and the continuing action of streams and rivers.

Currently geological activity includes the potential for the mass movement of earth and rock. Mass movement is the downslope movement of materials in response to gravity and can include rock fall, soil creep, earth flow, slumping, bedding plan failure, and debris slide or flow. Slumping or soil creep, the continuous slow downward movement of soil, is the most likely occurrence of mass movement in the County. Susceptible areas are along the transitional zone between benches and low lands and along streambanks where erosion on the outside curves of the creeks and rivers can gradually undercut the bank until it collapses. This is especially critical along Muddy Creek and portions of the Teton River. (Schiappa & Link 2002)

5.3 Seismic Shaking Hazards

Geological and seismological studies show that earthquakes are likely to happen in any of several active zones in Montana and adjacent states.

The 1991 Uniform Building Code (UBC), a nationwide industry standard, sets construction standards for different seismic zones in the nation. UBC seismic zone rankings for Montana are among the highest in the nation. When buildings are built to these standards they have a better chance to withstand earthquakes.

The U.S. Geological Survey has gathered data and produced maps of the nation, depicting earthquake shaking hazards. This information is essential for creating and updating seismic design provisions of building codes in the United States. The USGS Shaking Hazard maps for the United States are based on current information about the rate at which earthquakes occur in different areas and on how far strong shaking extends from quake sources. Colors on the maps show the levels of horizontal shaking that have a 1 in 10 chance of being exceeded in a 50-year period. Shaking is expressed as a percentage of “g” (g is the acceleration of a falling object due to gravity). This map is based on seismic activity and fault-slip rates and takes into account the frequency of occurrence of earthquakes of various magnitudes. Locally, this hazard may be greater than that shown, because site geology may amplify ground motions.

Studies of ground shaking in Montana during previous earthquakes has led to better interpretations of the seismic threat to buildings. In areas of severe seismic shaking hazard, older buildings are especially vulnerable to damage. Older buildings are at risk even if their foundations are on solid bedrock. Areas shown on the map with high seismic shaking hazard can experience earthquakes with high intensity where weaker soils exist. Most populated areas in Montana are located on or near alluvial deposits that provide poorer building site conditions during earthquakes. Older buildings may suffer damage even in areas of moderate ground shaking hazards (IGS 2004).

5.4 Fault Line Geology

We live on the thin crust of a layered Earth. The crust or surface of our planet is broken into large, irregularly shaped pieces called plates. The plates tend to pull apart or push together slowly, but with great force. Stresses build along edges of the plates until part of the crust suddenly gives way in a violent movement. This shaking of the crust is called an earthquake.

The crust breaks along uneven lines called faults. Geologists locate these faults and determine which are active and inactive. This helps identify where the greatest earthquake potential exists. Most faults mapped by geologists, however, are inactive and have no earthquake potential.

When the crust moves abruptly, the sudden release of stored force in the crust sends waves of energy radiating outward from the fault. Internal waves quickly form surface waves, and these surface waves cause the ground to shake. Buildings may sway, tilt, or collapse as the surface waves pass.

The constant interaction of crustal plates in western North America still creates severe earthquakes. Montana is situated in the Rocky Mountain geomorphic province. Most of Montana has undergone the effects of tremendous crustal stretching. Western Montana's high mountain ranges are striking evidence of these powerful earth movements over millions of years. The Borah Peak earthquake of 1983 was another event in the stretching that forms long deep valleys and tall, linear mountain ranges. Earthquakes from the crustal movements in the adjoining states of Idaho and Wyoming also cause severe ground shaking in Montana.

5.5 County Wide Potential Mitigation Activities

Many researchers have unsuccessfully tried to forecast earthquake occurrence. Even guessing that an event will occur within six months cannot be done with any degree of accuracy. Predicting the area where an earthquake will happen is an easier, more reliable task. Since earthquakes are usually associated with faulting, any region containing active faults is potentially dangerous. Unfortunately and inexplicable, earthquakes also strike within zones that do not contain faults, and, because the community is unaware of the potential hazard, extensive damage often occurs.

Instead of predicting when an earthquake will strike, an estimate of their likelihood of recurring within a given time frame is given. Some thoughts:

- In all of western Montana an event of magnitude greater than 5.0 can be expected every 1.5 years, a magnitude of 6.0 or greater should occur ever ten years, and a magnitude 7.0 or greater should occur every 77 years.
- The highest recurrence rate of large earthquakes in Montana occurs in the Hebgen Lake-Yellowstone Region, followed by Helena and Three Forks.
- In the Three Forks and Helena-Ovando regions the return time for a magnitude 6+ event is about 70 years, and that of a magnitude 7+ si 360 to 470 years.
- The number of large earthquakes in the Flathead Lake region is abnormally small compared to the number of small events. The recent discovery of an active fault system in that area identifies it as a potential location for a large magnitude (6.0 to 7.5) seismic event.

Although earthquake prediction is difficult at best, there are warning signs which can be interpreted to indicate both the place and the time of an impending event. Earthquakes most commonly occur in the same place as prior earthquakes, that is, along active faults. The term *active* is often interpreted by non-scientists as meaning *active during historical time (the last 100 years).* Active faults are most commonly indicated by micro-seismicity (earthquakes so small they can only be detected by instruments) and by the presence of scarps. Scarps are steep, linear slopes, up to 65 feet high, showing offset of the ground surface. They are commonly found along the base of mountain ranges.

As the stress builds, an impending earthquake may be signaled by precursors: Phenomena which occur in a characteristic way prior to an earthquake. Precursors include an increase in micro-seismicity, which has been credited with causing unusual animal behavior. Dogs have howled and cattle have left an area hours before an earthquake. Instruments, however, may be more reliable. The velocities of seismic waves through stressed rocks may decrease immediately prior to an event. Well water quality may change, as well as spring discharge. The ground surface may also be slightly deformed. *Earthquake lightning* has been observed just prior to an earthquake, and is believed to be due to the development of an electrical charge on stressed quartz grains.

Teton County comprehensive plan and strategy for preparing for earthquakes should include:

- Assessment of seismic hazards to quantify and understand the threat;
- Adoption and enforcement of seismic building code provisions;
- Implementation of land-use and development policy to reduce exposure to hazards;
- Implementation of retrofit, redevelopment, and abatement programs to strengthen existing structures;
- Support of ongoing public-education efforts to raise awareness and build constituent support; and
- Development and continuation of collaborative public/private partnerships to build a prepared and resilient community.

There are several earthquake-related mitigation activities outlined in the Montana State Hazard Mitigation Plan that pertain to Teton County including:

- Change purchasing specifications for non-structural items to include seismic safety (SHMP-HM13)
- Improve school safety by establishing a special fund for grants to schools to reduce non-structural seismic hazards (SHMP-HM14)

The media can raise awareness about earthquakes by providing important information to the community. Here are some suggestions:

- Publish a special section in your local newspaper with emergency information on earthquakes. Localize the information by printing the phone numbers of local emergency services offices, the American Red Cross, and hospitals.
- Conduct a week-long series on locating hazards in the home.
- Work with local emergency services and American Red Cross officials to prepare special reports for people with mobility impairments on what to do during an earthquake.
- Provide tips on conducting earthquake drills in the home, schools and public buildings.

- Interview representatives of the gas, electric, and water companies about shutting off utilities.
- Circulate “Earthquake Safety for People Who Work in Old Masonry Buildings” published by the Montana Bureau of Disaster Services to promote safety for communities with old unreinforced masonry buildings still in public or private use (FEMA 2004).

Chapter 6: Landslides

6 Teton County Conditions

Approximately 3 million years ago, the climate was relatively dry and the valleys were filled with large amounts of sediment because of insufficient water to carry it out onto the plains. Since that time, a series of ice ages and increased rainfall during the inter-glacial periods resulted in sediment being spread across what is now the high plains of north-central Montana.

The eastern half of Teton County is characterized by these plains and consists primarily of Cretaceous sedimentary rock called Colorado Shale. This material was deposited 60 million years ago just prior to the draining of the last sea from Montana. Thick layers of gravel eroded from the mountains subsequently burying the Colorado shale. Since that time the landscape has been modified by continental glaciations and the continuing action of streams and rivers.

Currently, geological activity includes the potential for the mass movement of earth and rock. Mass movement is the downslope movement of materials in response to gravity and can include rock fall, soil creep, earth flow, slumping, bedding plan failure, and debris slide or flow. Slumping or soil creep, the continuous slow downward movement of soil, is the most likely occurrence of mass movement in the County. Susceptible areas are along the transitional zone between benches and low lands and along streambanks where erosion on the outside curves of the creeks and rivers can gradually undercut the bank until it collapses. This is especially critical along Muddy Creek and portions of the Teton River.

6.1 Landslide Hazard Profile

Landslide is a general term for a wide variety of down slope movements of earth materials that result in the perceptible downward and outward movement of soil, rock, and vegetation under the influence of gravity. The materials may move by falling, toppling, sliding, spreading, or flowing. Some landslides are rapid, occurring in seconds, whereas others may take hours, weeks, or even longer to develop. Although landslides usually occur on steep slopes, they also can occur in areas of low relief. Landslides can occur as ground failure of river bluffs, cut and-fill failures that may accompany highway and building excavations, collapse of mine-waste piles, and slope failures associated with quarries and open-pit mines.

The primary factors that increase landslide risk are slope and certain soil characteristics. In general, the potential for landslide occurrence intensifies as slope increases on all soil types and across a wide range of geological formations.

Soil factors that increase the potential for landslide are soils developed from parent materials high in schist and granite, and soils that are less permeable containing a resistive or hardpan layer. These soils tend to exhibit higher landslide potential under saturated conditions than do well-drained soils. To identify the high-risk soils in Teton County, the NRCS State Soils Geographic Database (STATSGO) layer was used to identify the location and characteristics of all soils in the County. The specific characteristics of each major soil type within the County was reviewed. Soils with very low permeability that characteristically have developed a hardpan layer or have developed from schist and granite parent material were selected as soils with potentially high landslide risk potential. High-risk soils magnify the effect slope has on landslide potential. Soils identified as having high potential landslide risk are further identified only in areas with slopes between 14° and 30° (25-60%). It is these areas that traditionally exhibit the highest landslide risk due to soil characteristics within a given landscape.

To portray areas of probable landslide risk due to slope related factors, slope models were used to identify areas of low, moderate and high risk. This analysis identified the low risk areas as slopes in the range of 20°-25° (36-46%), moderate as 26°-30° (48-60%) and high risk as slopes in the range of 31°-60° (60-173%). Slopes that exceeded 60° (173%) were considered low risk due to the fact that sliding most likely had already occurred relieving the area of the potential energy needed for a landslide. From the coverage created by these two methods it is possible to depict areas of risk and their proximity to development and human activity. With additional field reconnaissance the areas of high risk were further defined by overlaying additional data points identifying actual slide locations, thus improving the resolution by specifically identifying the highest risk areas. This method of analysis is similar to a method developed by the Clearwater National Forest in north central Idaho (McClelland *et al.* 1997).

Landslide may occur on slopes steepened by man during construction, or on natural ground never disturbed. However, most slides occur in areas that have had sliding in the past. All landslides are initiated by factors such as weaknesses in the rock and soil, earthquake activity, the occurrence of heavy snow or rainfall, or construction activity that changes a critical factor involved with maintaining stability of the soil or geology of the area. A prime example of this includes previously stable slopes where home construction utilizing independent septic systems are added. The increased moisture in the ground, when coupled with an impermeable layer below the septic systems has led to surface soil movements and mass wasting.

Landslides can be triggered by natural changes in the environment or by human activities. Inherent weaknesses in the rock or soil often combine with one or more triggering events, such as heavy rain, snowmelt, or changes in ground water level. Late spring-early summer is slide season, particularly after days and weeks of greater than normal precipitation. Long-term climate change may result in an increase in precipitation and ground saturation and a rise in ground-water level, reducing the sheer strength and increasing the weight of the soil.

Stream and riverbank erosion, road building or other excavation can remove the toe or lateral slope and exacerbate landslides. Seismic or volcanic activity often triggers landslides as well. Urban and rural living with excavations, roads, drainage ways, landscape watering, logging, and agricultural irrigation may also disturb the solidity of landforms, triggering landslides. In general, any land use changes that affects drainage patterns or that increase erosion or change ground-water levels can augment the potential for landslide activity.

Landslides are a recurrent menace to waterways and highways and a threat to homes, schools, businesses, and other facilities. The unimpeded movement over roads—whether for commerce, public utilities, school, emergencies, police, recreation, or tourism—is essential for Teton County to function normally. The shallow walls of the Teton River drainage pose special problems to Highway 89 and Interstate 15, which are major interstate and intercommunity travel routes. The disruption and dislocation of these or any other routes caused by landslides can quickly jeopardize travel and vital services (Fragaszy 2002, USGS 2004).

Landslide risks in and around Teton County were evaluated and are presented in a number of Figures in this chapter. An analysis of this data reveals that approximately 4% of the area in and around Teton County is in the Extreme risk category, 3% is in the High risk category, 4% is in the Moderate risk category, with the remaining 89% at little or no risk to landslides from slope and geology factors (Table 6.1).

Table 6.1. Landslide Risk Due to Slopes and Geology in Teton County.		
Risk Due to Slopes and Geology	**Acres**	**Percent**
Little or No Landslide Risk	1,733,953	89%
Moderate Landslide Risk	70,871	4%
High Landslide Risk	5,1434	3%
Extreme Landslide Risk	79,876	4%

Figure 6.1. Landslide Risks in Teton County.

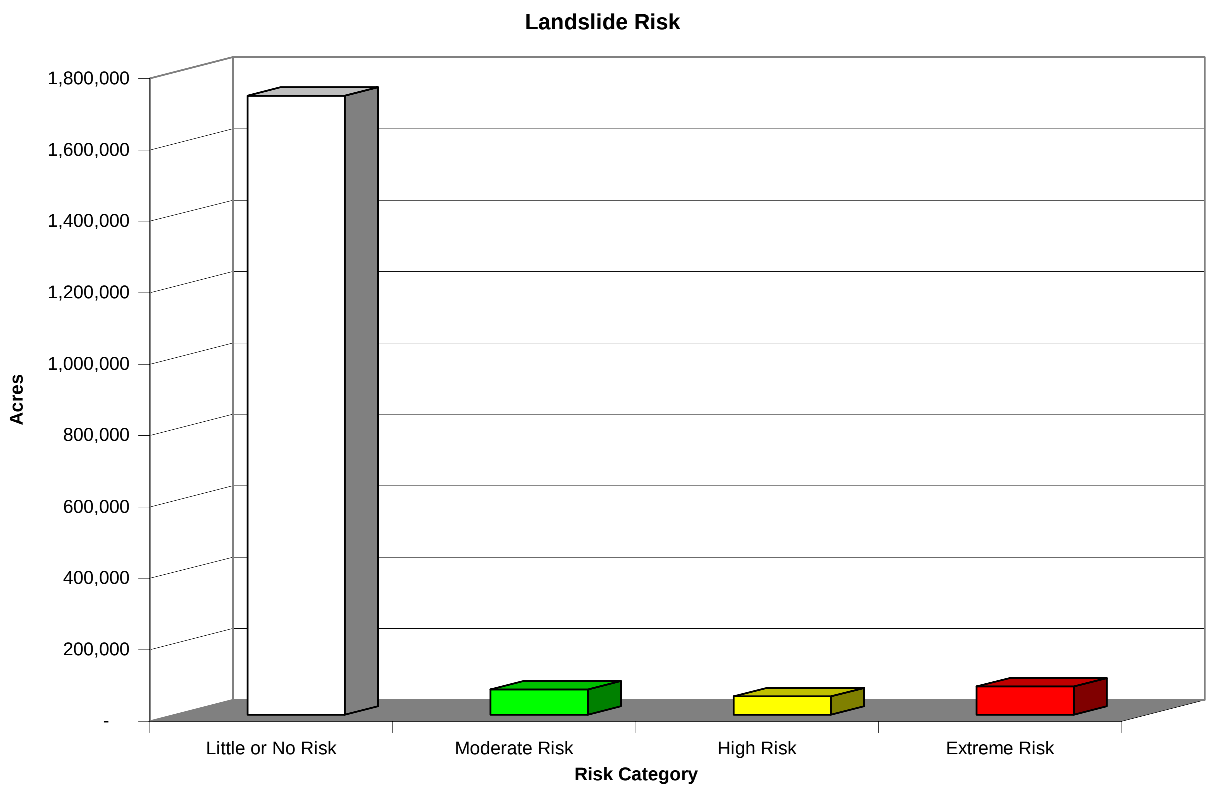
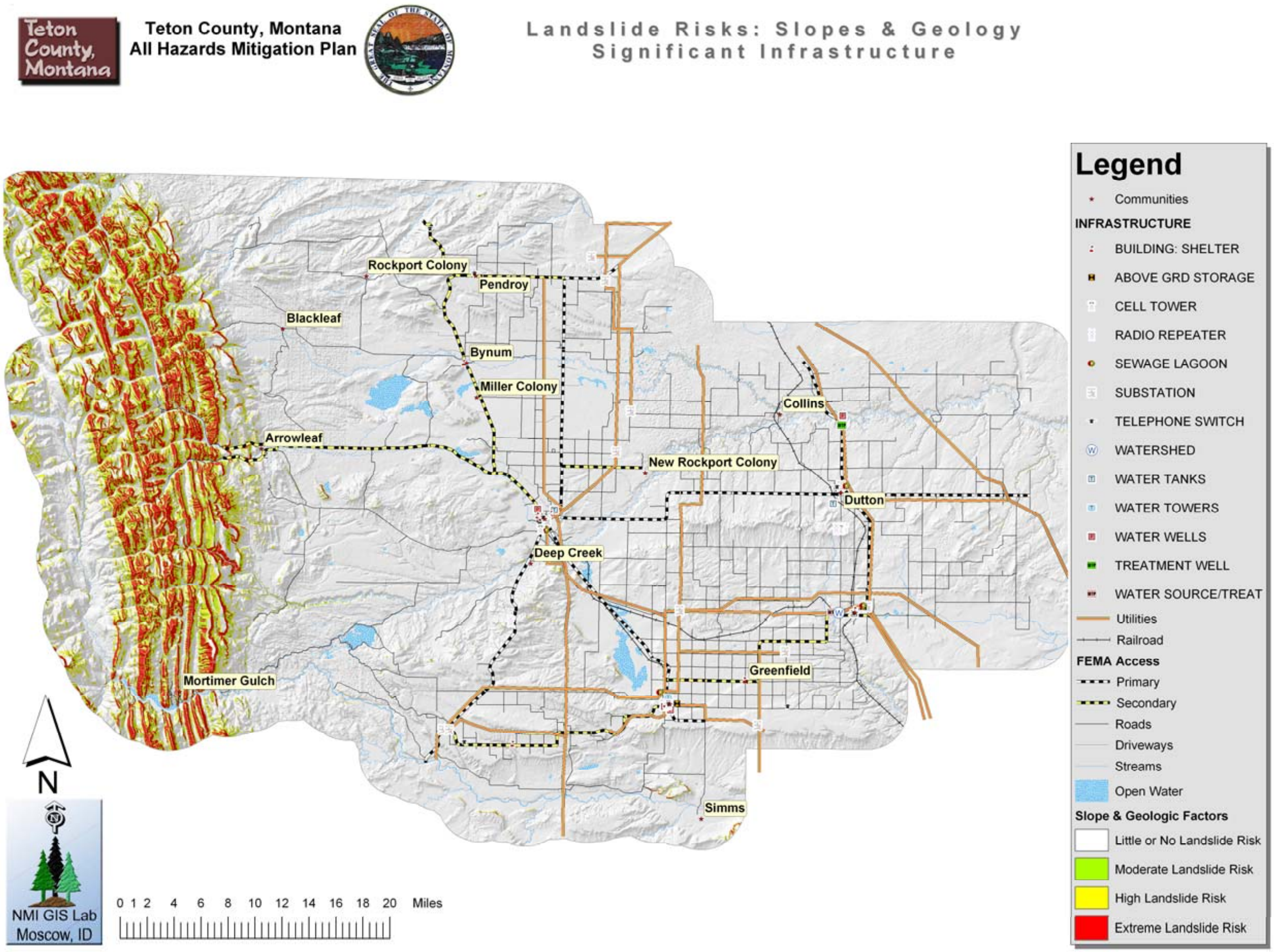


Figure 6.2. Landslide Prone Landscapes of Teton County.



6.2 Landslide Prone Landscapes

Many areas have specific landslide concerns. Areas that are generally prone to landslides are:

- On existing landslides, old or recent
- On or at the base or top of slopes
- In or at the base of minor drainage hollows
- At the base or top of an old fill slope
- At the base or top of a steep cut slope

There are many homes, roads and other resources at risk in Teton County because of their juxtaposition to one or more of these characteristics. Individual assessments of landslide-prone areas that would cause disruption in Teton County are detailed in subsequent sections of this plan.

6.3 Teton County Assessment

Communities in the transition zone between the steep slopes of the Rocky Mountains and the rangelands associated with the Rocky Mountain Front area have an elevated risk of experiencing large, destructive landslides. In part, this is due to the location of most structures at the base of slopes on ground that may have been deposited by a historic landslides. These areas are called alluvial fans. Soils on alluvial deposits are typically unstable. Research shows that areas that have experienced slides or rock falls in the past are at the most risk for the same occurrence.

Structures located in the transition zone are also at more risk of landslides due to their close proximity to faults from which the rugged mountains were originally created. Devastating slides, slumps, or rock falls could be triggered by seismic activity along the Intermountain Seismic Belt.

Smaller slides often occur on cut or fill slopes associated with road construction. Slumps, either onto or from under road right of ways, can cut off critical transportation or evacuation routes. Often times, this type of slide is a result of another natural hazard such as an earthquake or saturated soils due to flooding or heavy rainfall; thus, exacerbating an already hazardous situation.

Small slides or slumps are also common along waterways. In Teton County, communities near the Teton River, Muddy Creek, or other drainages (including earthen irrigation canals) may have an increased risk of incurring the secondary effects of a mudslide in the water channel. Slides or deterioration of the stream bank may result in blockage of the channel. Subsequent flooding of the surrounding area could occur as water spills over the banks and into the floodplain. Another potential flooding issue could occur as a result of the sudden release of the blockage causing a rush of flood waters downstream. Communities that could be affected by this type of landslide and subsequent flooding include: Choteau, Bynum, Fairfield, Dutton, Power, the Arrowleaf Subdivision, and many scattered homes throughout the County.

6.4 General Landslide Hazards Mitigation Strategies

A number of techniques and practices are available to reduce and cope with losses from landslide hazards. Careful land development can reduce losses by avoiding the hazards or by reducing the damage potential. A number of approaches used individually or in combination can reduce or eliminate losses and reduce landslide risk.

6.4.1 Establish a Countywide landslide hazard identification program

Document all landslides, bank failures, "washouts", and man-made embankment failures. Each failure should be located on a map with notations about time of failure, repair (if made), and descriptions of the damaged area. This could become a County directive to the road and bridge crews.

6.4.2 Restricting development in Landslide Prone Landscapes

Land-use planning is one of the most effective and economical ways to reduce landslide losses by avoiding the hazard and minimizing the risk. This is accomplished by removing or converting existing development or discouraging or regulating new development in unstable areas. Buildings should be located away from known landslides, debris flows, steep slopes, streams and rivers, intermittent-stream channels, and the mouths of mountain channels. In the State of Montana, restrictions on land use are generally imposed and enforced by local governments by land-use zoning districts and regulations.

6.4.3 Standardizing codes for excavation, construction, and grading

Excavation, construction, and grading codes have been developed for construction in landslide-prone areas; however, there is no nationwide standardization. Instead, State and local government agencies apply design and construction criteria that fit their specific needs. The Federal Government has developed codes for use on Federal projects. Federal standards for excavation and grading often are used by other organizations in both the public and private sectors.

6.4.4 Protecting existing development

Control of surface-water and ground water drainage is the most widely used and generally the most successful slope-stabilization method. Stability of a slope can be increased by removing all or part of a landslide mass or by adding earth buttresses placed at the toes of potential slope failures. Restraining walls, piles, caissons, or rock anchors are commonly used to prevent or control slope movement. In most cases, combinations of these measures are used.

6.4.5 Post warnings of potentially hazardous areas and educate the public about areas to avoid

Such areas may include (a) existing / old landslides, (b) on or at the base of a slope, (c) in or at the base of a minor drainage hollow, (d) at the base or top of an old fill or steep cut slope, and (e) on developed hillsides where leach field septic systems are used. In addition to identifying these at-risk landscapes, it will also serve to begin an educational dialog with landowners in Teton County, enlightening residents and visitors to the risks associated with landslides.

6.4.6 Utilizing monitoring and warning systems

Monitoring and warning systems are utilized to protect lives and property, not to prevent landslides. However, these systems often provide warning of slope movement in time to allow the construction of physical measures that will reduce the immediate or long-term hazard. Site-specific monitoring techniques include field observation and the use of various ground motion instruments, trip wires, radar, laser beams, and vibration meters. Data from these devices can be sent via telemetry for real-time warning. Development of regional real-time landslide warning systems is one of the more significant areas of landslide research (Fragaszy 2002, USGS 2004).

6.4.7 Public Education

Residents can increase their personal awareness by becoming familiar with the land around the home and community. People can learn whether landslides or debris flows have occurred in the area by contacting local officials, state geological surveys or departments of natural resources, USGS maps, and university departments of geology. Slopes where landslides or debris flows have occurred in the past are likely to experience them in the future.

Educate the public about telltale signs that a landslide is imminent so that personal safety measures may be taken. Some of these signs include:

- Springs, seeps, or saturated ground in areas that have not typically been wet before.
- New cracks or unusual bulges in the ground, street pavements or sidewalks.
- Soil moving away from foundations, and ancillary structures such as decks and patios tilting and/or moving relative to the house.
- Sticking doors and windows, and visible open spaces indicating jambs and frames out of plumb.
- Broken water lines and other underground utilities.
- Leaning telephone poles, trees, retaining walls or fences.
- Sunken or dropped-down roadbeds.
- Rapid increase in a stream or creek water levels, possibly accompanied by increased turbidity (soil content).
- Sudden decrease in creek water levels even though rain is still falling or just recently stopped.

Residents or county representatives who live and work in landslide prone areas should follow these recommendations prior to a storm event:

- Watch the patterns of storm-water drainage on slopes and note places where runoff water converges, increasing flow over soil-covered slopes. Watch the hillsides around your home and community for any signs of land movement, such as small landslides or debris flows or progressively tilting trees.
- Develop emergency response and evacuation plans for individual communities and for travel routes. Individual homeowners and business owners should be encouraged to develop their own evacuation plan.

(USGS 2004)

6.5 Fire Related Debris Flows

Wildland fires are inevitable in the western United States where burnable vegetation exists. Expansion of human development into forested areas has created a situation where wildfires can adversely affect lives and property, as can the flooding and landslides that potentially occur in the aftermath of the fires. Post-fire landslide hazards include fast-moving, highly destructive debris flows that can occur in the years immediately after wildfires in response to high intensity rainfall events, and those flows that are generated over longer time periods accompanied by root decay and loss of soil strength. Post-fire debris flows are particularly hazardous because they can occur with little warning, can exert great impulsive loads on objects in their paths, can strip vegetation, block drainage ways, damage structures, and endanger human life. Wildfires could potentially result in the destabilization of pre-existing deep-seated landslides over long time periods.

6.5.1 Conditions for fire-related debris-flow occurrences

In a recent study of the erosion response of recently burned basins in the Intermountain West, the USGS found that not all basins produce debris flows; most burned watersheds respond to even heavy rainfall events by flooding. However, those watersheds that do produce destructive debris flows can be readily identified by a combination of geologic, topographic, and rainfall characteristics. The factors that best determine the probability of debris-flow occurrence are:

- The percent of area burned in each basin at both high and moderate severities,
- The average storm rainfall intensity,
- The measure of sorting of the grain-size distribution of the burned soil,
- The percent of soil organic matter (by weight),
- The soil permeability,
- The soil drainage, and
- The percent of the basin with slopes greater than or equal to 30%.

The results from post-fire erosion rates show that the majority of post-fire erosion results from summer thunderstorms rather than frontal storms or snowmelt (MacDonald *et al.* 2004). Thunderstorm events producing 0.25 inches of precipitation an hour have been used as a threshold for flash flooding in severely burned areas of Western Montana.

6.6 General Mitigation Activities

There are a number of mitigation activities that can be implemented following large wildland fires in order to help rehabilitate the site. Rehabilitation efforts help speed the ecological recovery of the burned area while reducing the potential for rapid runoff, rilling, gullying, and development of destructive debris flows. These efforts also help reduce the loss of soil productivity and water quality, while reducing the threat to human life and property. In the event of large-scale fire events, a complete Burned Area Emergency Recovery (BAER) plan should be completed in order to address the unique features of the burn. The following is a partial list of components that would likely be included in a BAER plan.

- Directional tree felling, and contour log terracing along drainages and slopes with high burn severity in order to reduce overland and in stream channel flow. This can help reduce the amount of runoff and potential to initiate rilling and downstream mud and debris flows.
- Aerially seed moderate to high burn areas to provide short-and long-term vegetative cover to reduce water yield and sedimentation.
- Apply straw mulch to high severity burn areas where soils are well drained, occurring on gentle slopes and are protected from the wind. Mulch will slow runoff and help to prevent erosion. Topsoil will be protected and soil moisture will be maintained to promote biological activity in the soil.
- Install straw bale check dams in steep drainages in order to trap sediment.
- Place flood hazard warning signs in areas prone to flash-flooding.

- Install straw wattles in a checkerboard fashion along the contour of hillsides. The wattles serve as soil erosion and runoff control measure on steep slopes with a high degree of water repellency. Waddles can help stabilize the slope, minimize soil erosion and capture sediment.
- Clear, reinforce, and if need be replace undersized culverts and stream crossings within the burn area to prevent washout along roads. Since water yield will be dramatically higher in the post-burn condition, drainage systems need to be restructured in order to accommodate the increase in flow.

The Montana State Mitigation Plan suggests that they should provide funding, through appropriation or other means, for a grant program to assist counties in installing cost-effective debris retention or collection systems (SHMP-HM15).

Chapter 7: Severe Weather

7 Severe Weather Characteristics

Severe storms are a serious hazard that could affect Montana. Severe storms can affect the entire state with varying degrees due to the complex landscape and the influence of the Continental Divide. Although Montana's climate sees relatively few severe storms in comparison with the rest of the nation, it still poses a significant hazard to the state and local communities.

Damaging storms do occur, however, and casualties and extensive property damage result throughout the entire state. Two types of severe storms are of concern in Montana:

- Winter storms with accumulations of snow and ice, extreme cold and reduced visibility.
- Thunderstorms with hail, lightning, and high winds.

7.1 Severe Weather Event Profile

In Montana, most of the tornadoes occur in June, followed closely by the month of July. From 1950 to 1995, Montana had an annual average of 6 tornadoes. From 1950-2003, 95 of the 394 recorded tornado and funnel cloud events in Montana were considered F1 speeds or greater as recorded by the National Weather Service (2004). Montana had 5 deaths and at least 68 injuries from tornadoes from 1883 to 1993. The National Weather Service database indicates that from 1950 to 2004, severe summer weather has caused $59,552,000 in property damage and $8,345,000 in crop damage. Six deaths and 16 injuries were attributed to lightning strikes in Montana between 1950 and 2003. Based on historical storm data, hail and damaging winds are more likely to occur in Montana between 6:00 and 7:00 pm.

Montana has not had a significant number of severe storm-related Presidential Disaster Declarations during the past 30 years. The majority of the storms that affect Montana are on a lower scale that is not recognized as a "National Disaster" due to the number of less intense storms that occur every year. Montana, due to its complex landscape, will always have to deal with severe winter conditions. People and communities have learned to adapt to the winter storms and deal with them as they come. Table 7.1 lists the State Disaster declarations from 1974-2003:

Table 7.1. Montana Disaster Declarations from Thunderstorms, Hail, Wind and Tornadoes (1974-2003).

Date	Event	Damages
July 23, 1997	Windstorm (EO 14-97). Disaster declaration for the City of Libby.	State: $56,549 Local: $6,434
Sept. 5, 1997	Windstorm (EO 16-97). Disaster declaration for the City of Wolf Point.	State: $13,833 Local: $3,994
June 23, 1999	Windstorm/Tornado (EO 7-99). Disaster declaration for the Town of Opheim.	State: $10,366 Local: $296
August 14, 1999	Windstorm/Tornado (EO 11-99). Disaster declaration Fergus County and the City of Lewistown.	State: $298,609 Local: $11,544

(State Hazard Mitigation Plan 2004)

7.1.1 Winter Storms

Winter storms are a part of life in Montana. They vary in degree and intensity and can occur at anytime but are especially probable between September and May. These storms could be localized or could affect the entire state. They can last a matter of minutes or many days. Typically, winter storms are measured by the amounts of snow which accumulated during any given storm. Additionally, these storms could be measured by the accompanied wind or temperatures associated with each storm.

Table 7.2. State declared winter storm disasters and assistance in Montana.

Year	PA or EO No.	Applicant	Local Share	State Share	Comment
1978	ST-78-1	Blaine County	$23,714	$117,620	Winter Storm
1978	ST-78-2	Havre, City of	$18,200	$19,495	Winter Storm
1978	ST-78-3	Phillips county	$22,085	$121,075	Winter Storm
1978	ST-78-4	Carter County	$14,135	$76,008	Winter Storm
1978	ST-78-5	Valley County	$29,681	$22,349	Winter Storm
1978	ST-78-6	Dawson County	$27,508	$31,524	Winter Storm
1978	ST-78-7	Garfield County	$41,484	$114,937	Winter Storm
1978	ST-78-8	Wibaux County	$18,728	$47,990	Winter Storm
1978	ST-78-9	McCone County	$19,117	$14,944	Winter Storm
1978	ST-78-10	Wolf Point, City of	$5,040	$10,231	Winter Storm
1979	ST-79-1	Judith Basin County	$17,320	$201,825	Winter Storm
1979	ST-79-2	Sweet Grass County	$10,174	$34,145	Winter Storm
1979	ST-79-3	Teton County	$24,210	$247,818	Winter Storm
1979	ST-79-4	Golden Valley County	$7,746	$66,693	Winter Storm
1979	ST-79-5	Carter County	$13,370	$95,672	Winter Storm
1979	ST-79-6	Garfield County	$13,800	$88,387	Winter Storm
1979	ST-79-7	McCone County	$21,680	$15,790	Winter Storm
1979	ST-79-8	Wibaux County	$15,650	$39,559	Winter Storm
1979	ST-79-9	Dawson County	$20,949	$75,947	Winter Storm
1985	MT-85-1	Neihart, Town of	$243	$12,542	Winter Freeze
1990	MT-2-90	Browning, Town of	$806	$2,493	Winter Storm
1996	EO2-96	Teton County	$0	$2,288	Winter Storm
1996	EO29-96	Glacier County	$0	$35,521	Winter Storm
1996	EO30-96	Libby, City of	$0	$74,645	Winter Storm
2004	EO 8-04	Petroleum County	$2,936	$11,282	Winter Storm
2004	EO 8-04	Daniels County	$9,373	$22,504	Winter Storm
2004	EO 8-04	Garfield County	$0	$31,389	Winter Storm
2004	EO 8-04	Richland County	$22,294	$45,162	Winter Storm
2004	EO 8-04	Roosevelt County	$43,444	$46,392	Winter Storm
2004	EO 8-04	Sheridan County	$12,575	$26,239	Winter Storm
2004	EO 8-04	12 Cities & Towns	$19,619	$66,713	Winter Storm
TOTAL			$475,881	$1,819,179	

In any discussion about winter storms, terminology and the general characteristics of the causes and impacts of winter storms need to be defined. Natural winter storm events are grouped into the following categories:

Flurries – Light snow falling for short durations. No accumulation or light dusting is all that is expected.

Showers – Snow falling at varying intensities for brief periods of time. Some accumulation is possible.

Squalls – Brief, intense snow showers accompanied by strong, gusty winds. Accumulation may be significant. Snow squalls are best known in the Great Lakes Region.

Blowing Snow – Wind-driven snow that reduces visibility and causes significant drifting. Blowing snow may be snow that is falling and/or loose snow on the ground picked up by the wind.

Blizzard – A winter storm with winds over 35 mph and temperatures of 20 degrees F., Accompanied by blowing snow that reduces visibility to near zero.

Sleet – Rain drops that freeze into ice pellets before reaching the ground. Sleet usually bounces when hitting a surface and does not stick to objects. However, it can accumulate like snow and cause a hazard to motorists.

Freezing Rain – Rain that falls onto a surface with a temperature below freezing. This causes it to freeze to surfaces, such as trees, cars, and roads, forming a coat or glaze of ice. Even small accumulations of ice can cause a significant hazard.

Severe Winter Storm - defined as one that drops four or more inches of snow during a twelve hour period, or six or more inches during a twenty-four hour period.

Ice storm - occurs when cold rain freezes immediately on contact with the ground, structures, and vegetation.

7.1.2 Thunderstorms

Thunderstorms and lightning events are generated by atmospheric imbalance and turbulence due to the combination of unstable warm air rising rapidly into the atmosphere; sufficient moisture to form clouds and rain; and, upward lift of air currents caused by colliding weather fronts (cold and warm) or mountains. They are experienced in nearly every region of the mainland United States, including Montana. They can produce deadly and damaging tornadoes, hailstorms, intense downburst and microburst winds, lightening and flash floods. It is estimated by the National Weather Service that over 100,000 thunderstorms occur each year on the U.S. mainland, with approximately 10% classified as severe.

Hailstorms, which cause crop and property damage averaging about $5 million annually, are one of the most troublesome types of storms occurring in Montana. This is not unusually large for an area of 146,000 square miles, however, and their occurrence is limited mainly to July and August, infrequently in June and September.

Thunderstorms do occur within Montana affecting almost all counties, but usually are localized events. Their impacts are fairly limited and do not significantly affect the communities enough to declare a disaster. Thunderstorms are emphasized within the flood chapter of this All Hazards Mitigation Plan.

7.1.3 Drought

Drought must be defined not only in terms of below normal precipitation, but also in terms of duration. Occasional periods of below average precipitation will not seriously deplete moisture reserves, while prolonged shortages of moisture can be enough of a drain on moisture reserves to seriously affect crops, livestock, forest and range lands, as well as hydro-electric, irrigation, and urban water supplies.

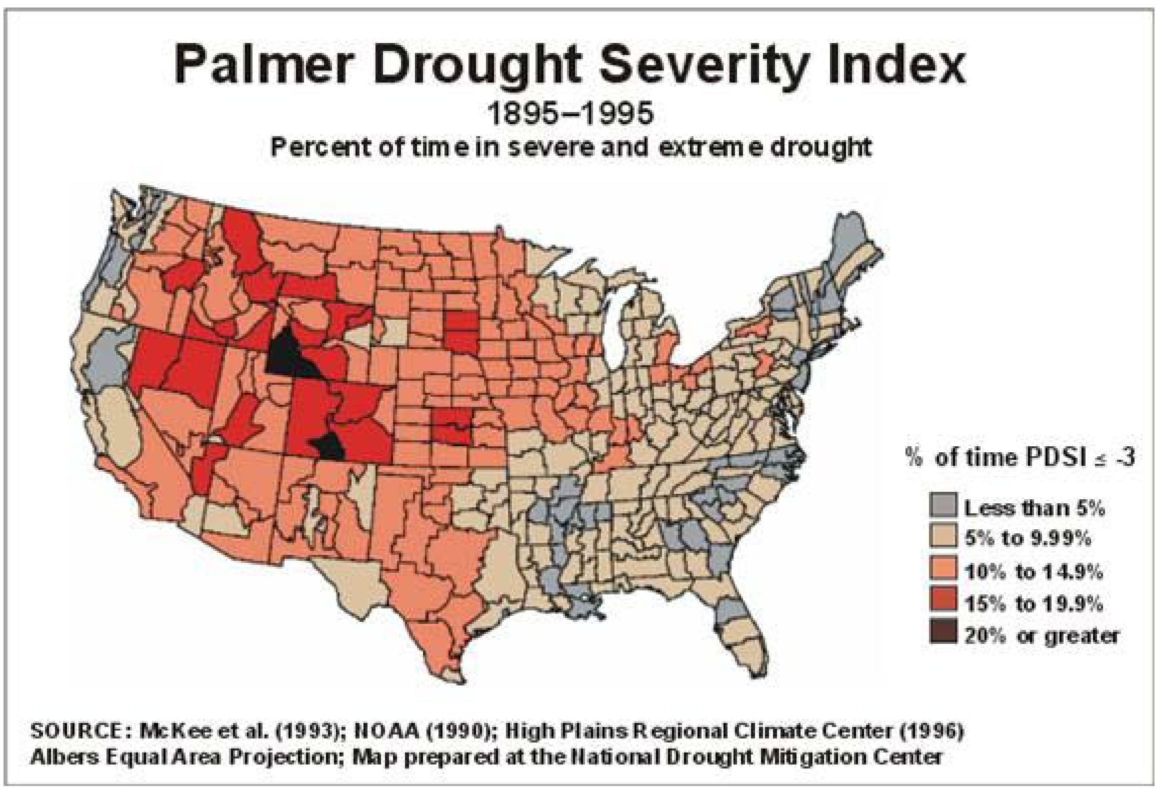
The effects of drought become apparent with a longer duration because more and more moisture-related activities are affected. Non-irrigated croplands are most susceptible to moisture shortages. Rangeland and irrigated agricultural lands do not feel the effects as quickly as the non-irrigated, cultivated acreage, but their yields can also be greatly reduced due to drought. Reductions in yields due to moisture shortages are often aggravated by wind induced soil erosion.

In periods of severe drought, forest and range fires can destroy the economic potential of the timber and livestock industries, and wildlife habitat in, and adjacent to, the fire areas. Under extreme drought conditions, lakes, reservoirs, and rivers can be subject to severe water shortages which greatly restrict the use of their water supplies. An additional hazard resulting from drought conditions is insect infestation.

In the last 100 years, the first experiences of drought impacts occurred shortly after homesteaders flooded the state. The homestead boom of 1906 through 1918 "busted" when severe drought swept the state from 1917 through 1923. The drought was compounded by plummeting market prices and banks demanding repayments. Already reeling from the 1919 drought and agricultural disaster, the Dust Bowl years further

impacted agricultural production and economies throughout the state. The period from 1928 through 1939 was the driest in the historic record. The Palmer Hydrologic Drought Index (PHDI) showed the entire state was in a hydrologic deficit for over 10 years. Other sustained dry periods include the middle 1950s, early 1960s, mid-1970s, and the 1980s. The most-recent drought from 2000-2004, suggests the dryness and hydrologic deficit mimics the Dust Bowl years in everything but duration.

Figure 7.1. Palmer Drought Severity Index.



The mid 1950's saw Montana with a period of reduced rainfall in eastern and central portions of the state. In July of 1956, four counties applied for federal disaster aid due to greatly reduced precipitation amounts since June of the previous year. By November of 1956, a total of 20 Montana counties had applied for federal drought assistance. Montana found itself in another drought episode in 1961. By the end of June, 17 counties had requested designation as federal disaster areas due to lack of moisture, higher than normal temperatures, and grasshopper infestation. Small grain crops died before maturing, and range grass and dryland hay crops were deteriorating rapidly. Livestock water supplies were at critical levels. In July of 1961, the State’s Crop and Livestock Reporting Service called it the worst drought since the 1930's. Better conservation practices such as strip cropping were helping to lessen the impacts of the worst water shortages since the 1934-36 years.

By August of 1961, 24 counties had applied for federal drought disaster aid. Five years later in 1966, the entire state was experiencing yet another episode of drought. Although water shortages were not as great as in 1961, a study of ten weather recording stations across Montana showed all had recorded below normal precipitation amounts for a ten month period. By August of 1966, the Bitterrott Valley was experiencing its worst drought in 25 years, and the state arranged to sell water to local irrigators.

Water supplies were so critical by June of 1977 that officials from Montana were working with others from Idaho, Washington, and Oregon on the Northwest Utility Coordination Committee in an attempt to moderate potential hydroelectricity shortages. On June 23, Governor Judge issued an energy supply alert and ordered a mandatory ten percent reduction in electricity use by state and local governments.

Eastern Montana found itself with another well-established drought episode in 1980. The southeast corner of the state had received less than four inches of precipitation since July of 1979. In the northeast corner of the state, Glasgow received only 4.74 inches in the period from June of 1979 to May of 1980, making it the first twelve month period on record since 1905. Grasshopper infestations were seen in isolated areas, little wheat was planted, and large numbers of livestock were being sold due to the hay and water shortages.

By October, estimates of 1980 federal disaster payments were five times those paid in 1979. In Richland County alone, 600 of the county’s 800 farmers had applied for federal payments. Total drought related economic losses from Montana in 1980 were estimated to be $380 million.

The drought that had started in 1979 continued into 1981. March snowpacks were at 50-60 percent of normal, initiating forecasts of critical water shortages later in the season. All areas east of a north-south line running from Havre through Billings had received less than their normal precipitation in the first three months of 1981. Wolf Point had received only six inches since June of 1979. Fortunately, large May storms brought moisture to much of the state, but then flooding started to occur in the formerly parched areas. The northeast corner of the state, where forty percent of Montana’s wheat crop is produced, remained the driest area of the state, despite the spring storms.

Inadequate moisture supplies were again the problem in 1984. By July, many of the Hi-Line cities were experiencing water shortages and rationing schedules were put into effect. Conrad businesses voluntarily closed to help curtail water use. The seven districts involved in the Milk River Irrigation Project were out of water, and crop losses were estimated at $12 - $15 million. August of 1984 saw Montana in flames with numerous forest and range fires burning out of control.

Drought continued to plague the state in 1985. All 56 counties received disaster declarations for drought during this year. April estimates by the Montana Crop and Livestock Reporting Service put the state’s pasture and range at 65 percent of normal, while conditions in the northeast corner of the state were down to 32 percent of normal. From 1982 through 1985 cattle herds were reduced by approximately one-third.

The continued lack of moisture in 1985 resulted in a wheat crop which was the smallest in 45 years. Grain farmers received more in Government deficiency payments and insurance money than they did for their crops. For a typical 2500 acre Montana farm/ranch, the operator lost more than $100,000 in equity over the course of that year. The state's agriculture industry lost nearly $3 billion in equity.

Drought conditions are currently affecting several counties within the State of Montana. Current warming trends and below normal precipitation levels in the past ten years is causing severe drought conditions. These droughts are causing severe water losses to the area aquifers as well as municipal water supplies. Furthermore, reduced growth to the areas vegetation due to the lack of moisture is increasing the risk of wildfires. The counties within Montana that have currently declared Drought Emergency Declarations are summarized in Table 7.3.

Table 7.3. Montana Drought and other Agricultural Disasters

Date	Event	Damages
1930-1938	Dust Bowl	
1938	Grasshopper Infestation affecting 17 counties with populations "between 40 and 500 hoppers per square yard".	$6,500,000
1956	20 counties applied for Federal disaster aid due to reduced precipitation	
1961	17 counties requested designation as federal disaster areas due to lack of moisture, higher than normal temperatures, and grasshopper infestation.	
August 1961	24 counties applied for federal drought disaster aid.	Federal: $420,000
1966	Below-normal precipitation for a 10-month period recorded in 10 weather stations across the state.	
August 1975	Grasshopper Infestation, Valley County. Up to 110-120 hoppers per square yard in hay fields. 40,000 acres sprayed.	State: $60,000 Local: $60,000
May 1977	Soil damaged by winds in western and southern part of state over a 7-month period.	250,000 acres of farmland damaged
June 1977	Hydroelectric water supplies critical; Governor Judge issued an energy supply alert and ordered 10% reduction in electricity use by state and local governments.	
1980	Record-low precipitation in eastern Montana since 1979. In Richland County alone, 600 of the county's 800 farmers had applied for federal payments for drought. Grasshopper infestations in isolated areas, little wheat planted, large numbers of livestock sold due to hay and water shortages.	Est. economic loss: $380,000,000
1981	Drought starting in 1979 continued. March snow pack 50-60% of normal	
1984	By July, many High-Line cities experiencing water shortages and rationing schedules put into effect. Numerous forest and range fires.	Est. crop losses: $12,000,000 to $15,000,0000
1985	All 56 counties received disaster declarations for drought during this year. From 1982 to 1985, cattle herds reduced by 1/3. Smallest wheat crop in 45 years. Extended effects of drought: loss of off-farm jobs, closing of implement dealerships and Production Credit Associations.	Est. economic loss: $3,000,000,000
June 1986	Grasshopper Infestation. Carter, Daniels, Golden Valley, Petroleum, Richland, Roosevelt, Sheridan, Treasure & Wibaux counties.	State: $350,000 Local: $350,000
June 1992	Drought Emergency (EO 13-92). All areas of the state, suspend certain regulatory authorities relating to the issuance of beneficial water use permits by DNRC because of drought.	
June 1992	Drought Disaster (EO 14-92). All areas of the state, continue the suspension of certain regulatory authorities relating to the issuance of beneficial water use permits by DNRC because of drought.	
October 1992	Terminating drought disaster (EO 20-92). Executive Order terminating the declaration of disaster ordered in EO 14-92.	
August 1994	Drought emergencies were declared in a number of Montana counties with 83% of the State reported under drought conditions at mid-month. Stress to stream fisheries (low water levels, high temp.); crop yields, wildfires.	
2000	Severe drought and persistent heat causing significant losses to agriculture and related industries	$4.2 billion in damage/costs and 140 deaths nationwide
2000-2002	The U.S. Department of Agriculture (USDA) issued Natural Disaster Determinations (NDD) for drought for the entire state of Montana for the years 2000, 2001, and 2002. This designation entitled counties to low interest loans for producers, small business administration loans, and an Internal Revenue Service provision deferring capital gains.	
2003	The USDA issued NDD for drought for 35 counties in Montana on December 3, 2003. This designation makes Montana farmers and ranchers eligible for USDA Farm Service Agency (FSA) emergency farm loans if they have losses caused by drought in the 2003 crop year.	$154,012,122 paid by FSA in Montana
2004	The USDA issued NDD for drought for 20 counties in Montana on April 23, 2004. This designation makes Montana farmers and ranchers eligible for USDA Farm Service Agency (FSA) emergency farm loans if they have losses caused by drought in the 2004 crop year.	

(Montana Hazard Assessment and Mitigation Plan 2004)

7.1.4 Tornadoes and Windstorms

Tornados are extremely violent localized windstorms. A tornado is characterized by a funnel cloud that reaches to the ground with wind velocities inside the funnel as high as 200 miles per hour. Tornados are formed by violent thunderstorms. They appear as a vertical funnel cloud reaching to the ground, and creating an incredibly loud roar. Tornados almost always travel from the southwest to the northeast. Tornados are usually part of a severe thunderstorm and may be accompanied by lightning, high winds, floods, and flash floods from extremely heavy rainfall.

Compared with other States, Montana ranks number 31 for frequency of Tornadoes, 36 for number of deaths, 42 for injuries and 37 for cost of damages.

Table 7.4. Recent tornado occurrences in Montana.

Year	Tornadoes	Deaths	Injuries	Cost Adjusted ($)
1950	0	0	0	-
1951	0	0	0	-
1952	2	1	2	1,193,311
1953	5	0	0	60,403
1954	4	0	0	65,244
1955	3	0	0	123,895
1956	0	0	0	-
1957	1	0	0	563
1958	4	0	3	5,477,125
1959	3	0	0	10,921
1960	3	0	0	5,876
1961	2	0	1	5,293,362
1962	10	0	0	592,141
1963	3	0	0	-
1964	6	0	1	515,145
1965	9	0	6	5,170,559
1966	2	0	0	488
1967	0	0	0	-
1968	1	0	0	454
1969	2	0	0	43,514
1970	1	0	0	408
1971	8	0	0	82,766
1972	4	0	0	7,944
1973	2	0	0	35,647
1974	0	0	0	-
1975	10	0	1	117,557
1976	2	0	0	2,806,582
1977	6	0	0	626,193
1978	13	0	0	970,022
1979	5	0	0	435,575
1980	7	0	0	767,542
1981	3	0	0	-
1982	3	0	0	165,503
1983	4	1	1	161,939

Table 7.4. Recent tornado occurrences in Montana.				
Year	**Tornadoes**	**Deaths**	**Injuries**	**Cost Adjusted ($)**
1984	5	0	0	167,397
1985	2	0	0	1,616
1986	4	0	0	2,885
1987	1	0	0	13,918
1988	20	0	2	164,663
1989	6	0	0	127,511
1990	6	0	0	1,210
1991	30	0	0	204,317
1992	9	0	0	125,093
1993	19	0	3	241,930
1994	8	0	0	225,115
1995	15	0	0	103,749
Total	**253**	**2**	**20**	**26,110,016**
Avg/year	**6**	**0**	**0**	**567,609**

7.2 Climate Profile for Montana

The nature and extent of severe weather conditions is a result of the topography of the state or local community and the location of the state within the Pacific Northwest. Information for this section (7.5) has been summarized from the Western Regional Climate Center (WRCC 2004).

7.2.1 Topography

Montana, with an area of 146,316 square miles, is the fourth largest State of the Union. Climatic variations are large. The half of the State southwest of a line from the southeastern corner to the Canadian Border north of Cut Bank in Glacier County is very mountainous, while the northeastern half is very much like Great Plains country, broken occasionally by wide valleys and isolated groups of hills. The extent of the climatic variations is indicated by the range in elevation of from 1,800 feet above sea level where the Kootenai river enters Idaho to 12,850 feet at Granite Peak near Yellowstone Park. Half the State lies over 4,000 feet above sea level.

The Continental Divide traverses the western half of the State in roughly a north-south direction. To the west of the Divide, Montana is drained by the Kootenai, Clark Fork, and Flathead Rivers into the Pacific Ocean through the Columbia River. Many of the tributary streams in this region have their origin in the high western slopes of the Rockies. Most streams traverse narrow canyons, at least through parts of their length, affording many valuable waterpower sites. A relatively small area located between the Hudson Bay Divide and the Rocky Mountains is drained by the St. Mary River, which finds its way to Hudson Bay through the Saskatchewan River. The remainder of the State is drained by the Missouri River, which is formed by the confluence of the Gallatin, Madison, and Jefferson Rivers at Three Forks, and travels northward through deep canyons in the Big Belt Mountains, and flows through the lower lying northeastern portion of the State. The Yellowstone River, the principal tributary of the Missouri in Montana and which has its source in Wyoming, drains the southeastern section of the State and has its confluence with the Missouri just east of the Montana-North Dakota line.

The Continental Divide exerts a marked influence on the climate of adjacent areas. West of the Divide the climate might be termed a modified north Pacific coast type, while to the east, climatic characteristics are decidedly continental. On the west of the mountain barrier winters are milder, precipitation is more evenly distributed throughout the year, summers are cooler in general, and winds are lighter than on the eastern side. There is more cloudiness in the west in all seasons, humidity runs a bit higher, and the growing season is shorter than in the eastern plains areas.

7.2.2 Temperature

Cold waves, which cover parts of Montana on the average of 6 to 12 times a winter, are confined mostly to the sections northeast of a Glacier Park – Miles City line. A few of these cold waves cover the entire area east of the Divide, and will cover the State all the way from the Dakotas to Idaho. These cold waves do not now hold the dangers they did years ago before transportation, roads, communications, and even heating plants developed to their present levels. However, with temperatures well below zero accompanied by strong winds with blowing snow, these cold waves can be very inconvenient and even dangerous to the careless or inexperienced. In small areas ideally situated for radiation cooling, low temperatures can fall to -50° F or lower. The coldest ever observed was -70° F at Rogers Pass, 40 miles northwest of Helena, on January 20, 1954. This is the coldest of record for the entire United States, exclusive of Alaska. In contrast, the low at Helena that morning was only -36°F.

During the summer months hot weather occurs fairly often in the eastern parts of the State. The highest ever observed was 117° at Glendive on July 20, 1893, and Medicine Lake on July 5, 1937. Temperatures of over 100° sometimes occur in the lower elevation areas west of the Divide during the summer, but hot spells are less frequent and of shorter duration than in the plains sections. Hot spells nowhere become oppressive, however, because summer nights almost invariably are cool and pleasant. In the areas with elevations above 4,000 feet, extremely hot weather is almost unknown. Summer days, however, are usually warm enough for light summer clothing.

Winters, while usually cold, have few extended cold spells. Between cold waves there are periods, sometimes longer than 10 days, of mild but often windy weather. These warm, windy winter periods occur almost entirely along the eastern slopes of the Divide and are popularly known as “chinook” weather. The so-called “chinook” belt extends from the Browning-Shelby area southeastward to the Yellowstone Valley above Billings. Through this belt, “chinook” winds frequently reach speeds of 25 to 50 mph or more and can persist, with little interruptions, for several days. In January, the coldest month, temperature averages range from 11° F for the Northeastern Division to 22° F for the South Central (upper Yellowstone Valley) Division. In some areas east of the Continental Divide, January or February can average zero or below, but such occurrences range from infrequent to about once in 10 to 15 years in the coldest spots. Most Montana lakes freeze over every winter, but Flathead Lake between Polson and Kalispell, freezes over completely only during the coldest winters, about 1 year in 10. All rivers carry floating ice during the late winter or early spring. Few streams freeze solid; water generally continues to flow beneath the ice. During the coldest winters “anchor” ice, which builds from the bottom of shallow streams, on rare occasions causes some flooding.

In July, the warmest month, temperature averages range from 74° for the Southeastern Division to 64° F for the Southwestern Division. This mid-summer warmth is fairly steady, very seldom severe, and is tempered by normal nighttime minimums in the 50’s and 60’s. Miles City, one of the State’s warmest places in July, has a July average minimum temperature of 60° and an average maximum of 90° F. Generally, adequate moisture permits rapid plant and crop development during most growing seasons.

7.2.3 Precipitation

Precipitation varies widely and depends largely upon topographic influences. Areas adjacent to mountain ranges in general are the wettest, although there are a few exceptions where the “rain shadow” effect appears. Generally, nearly half the annual long-term average total falls from May through July. This is perhaps the main reason why Montana in consistently one of the largest producers of dryland grain crops. The Western Division of the State is the wettest and the North Central the driest. There are a few valleys in the Western Division that are relatively dry, as reflected by Deer Lodge and Lonepine averages of 11.00 and 11.46 inches respectively. Probably the driest part of the State is along the Clark Fork of the Yellowstone River in Carbon County. In this area, 8 miles south-southwest of Belfry, the average precipitation for a 16-year period is 6.59 inches. The highest average in the State is 34.70 inches at Heron.

Annual snowfall varies from quite heavy, 300 inches, in some parts of the mountains in the western half of the State, to around 20 inches at some stations in the two northern Divisions east of the Continental Divide. Most of the larger cities have annual snowfall within the 30 to 50 inch range. Most snow falls during the November-March period, but heavy snowstorms can occur as early as mid-September or as late as May 1 in the higher southwestern half of the State. In eastern sections early or late season snows are not very common. Mountain snowpacks in the wetter areas often exceed 100 inches in depth as the annual snow season approaches its end around April 1 to 15.

The greatest volume of flow of Montana’s rivers occurs during the spring and early summer months with the melting of the winter snowpack. Heavy rains falling during the spring thaw constitute a serious flood threat. Ice jams, which occur during the spring breakup, usually in March, cause backwater flooding. Flash floods, although restricted in scope, are probably the most numerous and result from locally heavy rainstorms in the spring and summer. Damaging floods have occurred in 1952, 1953, and 1964.

7.3 Teton County Conditions

Past weather patterns show that severe weather conditions are likely to happen in any part of the county in any given year. The topographical features of the county contribute greatly to the various weather conditions that occur.

Winter storms in Teton County are generally short lived. After a snowfall, the warm Chinook winds off the mountains to the west either blow the snow away or melt what is left within a few days. Occasionally, a winter storm will drop several inches of snow in a short amount of time; however, local residents are familiar with this type of weather and are equipped to handle it without extreme hardship. Of more concern during the winter months, are the well below freezing temperatures.

Thunderstorms do not usually cause widespread damage across Teton County; however, the severe winds and hail that sometimes accompany these storms can reek havoc on crops, structures, and other valued property. Even brief thunderstorms bringing small amounts of precipitation to the arid landscape is usually welcome. Additionally, most residents take the winds for granted, as they occur regularly. However, hail damage to crops and other assets is a serious problem that is not easily mitigated.

Teton County is in the rain shadow of the Continental Divide; thus, limiting the amount of moisture falling on the rangelands. This causes the county to frequently experience moderate to severe drought conditions. Extensive irrigation systems have been developed to help spread water resources across the county. Drought has an almost immediate affect on Teton County. Many people rely on the water for farms or ranches that are their livelihood. Underground aquifers are typically tapped for drinking water and other potable water uses. These resources can also be affected by drought; however, these effects are usually delayed.

Tornadoes are not considered a frequent occurrence in Teton County, but they do happen with varying degrees of intensity. Severe damage can be caused by the high winds county-wide, but more localized affects are caused by funnel clouds. Property and agricultural damage is common during a tornado, but more extreme harm such as human injury or even death is possible.

7.3.1 County-Wide Potential Mitigation Activities

There is no way to prevent severe storms. The weather forces and topography of Teton County will always dictate when and where severe storms will occur.

There are three areas where action can be taken to reduce the loss of life, property, and infrastructure and business disruption to severe weather.

- Mitigation
- Readiness/Education
- Building Codes

7.3.1.1 Mitigation

Some of the mitigation efforts should require the following:

- Readiness of snow removal equipment and schedule within the community.
- The availability of traction sand.
- School bus schedule or delays.
- Communication centers.
- Back-up power supplies.
- Water availability.
- Abundance of emergency equipment or shelters to the public.

At the individual home level:

- Insulate walls and attic.
- Caulk and weather-strip doors and windows.
- Install storm windows or cover windows with plastic from the inside.
- Have emergency heating equipment available.
- Fireplace with ample supply of wood.
- Small, well-vented, wood, coal, or camp stove with fuel.
- Portable space heaters or kerosene heaters.
- Install smoke detectors.
- Keep pipes from freezing.
- Have disaster supplies on hand in case power goes out.
- Develop an emergency communication plan.
- Make sure that all family members know how to respond after or during a severe winter storm.
- Stay indoors and dress warmly.
- Conserve fuel.

7.3.1.2 Readiness/Education

Continued periodic public education measures should be undertaken. When extended periods of time pass between major weather events, both emergency response units and the public tend to forget to review plans and take necessary precautions. Some media and public communication ideas are:

- Publish a special section in your local newspaper with emergency information on severe weather patterns. Localize the information by printing the phone numbers of local emergency services offices, the American Red Cross chapter, and the nearest hospitals.
- Ask the local paper to interview local officials about land use management and building codes in the area.
- Periodically inform your community of local public warning systems. Explain differences between winter weather warnings and watches. Let them know where to turn for emergency broadcast information should they hear a warning on their radio or television.
- Assist hospitals and other operations that are critically affected by power failure by arranging for auxiliary power supplies, this would include city water and sewer systems, emergency services (including electric dependant phone systems), police and fire departments.
- Publish emergency evacuation routes for areas prone to severe weather.
- Have a ready source of shovels, candles, or other emergency equipment.
- Provide information at the local level on the weather patterns within the area to people new to the area.
- Provide information on traction devices for winter time travel.

Requiring building permits and compliance with building codes is a good educational tool. Builders and future homeowners are made aware of the potential risk of building in a severe weather area. Periodic publication of the highlights of these building codes can help to keep up public awareness.

7.3.1.3 Building Codes

The subsequent adoption of the International Building Codes, or more stringent local building codes, provides basic guidelines to communities on how to regulate development. Careful localized management of development in severe weather areas or rural areas results in construction practices that can reduce losses and the high costs associated with disasters to all levels of government.

Building codes should address the following:

- Snow load requirements for roofing materials.
- Localized wind storms or prevailing winds.
- Parking lot construction to handle snow removal or piling of snow.
- Width of driveways for snow removal equipment or piling of snow.
- Manufactured home tie downs and placement of blocking.
- Sign codes for billboards in high wind prone areas.

Chapter 8: Potential Mitigation Activities

8 Administration & Implementation Strategy

Critical to the implementation of this All Hazard Mitigation Plan will be the identification of, and implementation of, an integrated schedule of treatments targeted at achieving an elimination of the lives lost, and reduction in structures destroyed, infrastructure compromised, and unique ecosystems damaged that serve to sustain the way-of-life and economy of Teton County and the region. Since there are many management agencies and thousands of private landowners in Teton 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.

Teton 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 Teton County, specifically the USDA Forest Service and the 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 Teton County.

All risk assessments were made based on the conditions existing during 2004-05, 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 Teton County in relation to this planning document, this entire **All Hazard Mitigation Plan** should be reviewed annually at a special meeting of the Teton 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 Wildfire Mitigation Plan. Re-evaluation of this plan should be made on the 5th anniversary of its acceptance, and every 5-year period following.

8.1 Prioritization of Mitigation Activities

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 local jurisdictions with overall coordination provided by the County Fire Warden.

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 departments 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 Fire Warden to include the County Commissioner's Office, City Mayors and Councils, Fire Department Chiefs and Commissioners, agency representatives (USFS, State Lands, 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

8.1.1 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:

- Cost/Benefit
- 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:

- Cost/Benefit
- 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:

8.1.1.1 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 10. Therefore a project with a BC ratio of 50:1 would receive 5 points, a project with a BC ratio of 100:1 (or higher) would receive the maximum points of 10.

8.1.1.2 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 over 3,000 people. A ranking of 5 has the potential to impact 100 people, and a ranking of 1 will not impact the population. 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.

8.1.1.3 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 over $1,000,000 in losses, a ranking of 5 has the potential to save roughly $100,000 in losses, and a ranking of 1 only has the potential to save less than $100 in losses. 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.

8.1.1.4 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.

8.1.1.5 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.

8.1.1.6 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.

8.1.1.7 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.

8.1.1.8 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. 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.

8.1.1.9 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.

8.1.1.10 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 non-planning project thresholds of:

Project Ranking Priority Score

- High 40-65
- Medium 25-39
- Low 9-25

8.2 Recommended Hazard Mitigation Activities

As part of the implementation of hazard mitigation activities in Teton County, a variety of management tools may be used.

8.2.1 Safety & Policy

Hazard mitigation efforts must be supported by a set of policies and regulations at the county level that maintain a solid foundation for safety and consistency. The recommendations enumerated here serve that purpose. Because these items are regulatory in nature, they will not necessarily be accompanied by cost estimates. These recommendations are policy-related in nature and therefore are recommendations to the appropriate elected officials; debate and formulation of alternatives will serve to make these recommendations suitable and appropriate.

8.2.1.1 Overall Goals

Reduce Teton County's risk by mitigating hazards affecting communities through improvement of County and municipality 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 an event.
- Develop policies and standards concerning new building and housing projects that will reduce their exposure to risk factors.
- Improve emergency response capabilities.
- Create knowledgeable councils that will be able to advise the County during emergency situations.

8.2.1.2 Proposed Activities

Table 8.1. Action Items in Safety and Policy.

Action Item	Mitigated Hazard	Responsible Organization	Action Items & Planning Horizon
8.1.a. Public education programs.	Flood, Earthquake, Landslide, Winter Storm, Thunderstorm, Drought, and Windstorm/Tornado	Cooperative effort including Teton County, University of Montana Cooperative Extension, Montana Disaster and Emergency Services, federal and state agencies, area schools, local municipalities.	• 2005 Identify teaching partners in public education program • 2005 Locate and adopt training materials appropriate for local conditions • 2005 Develop budgets and acquire funding for desired programs • 2006 Begin implementation in schools and through adult education programs.
8.1.b: Create additional access points to rural subdivisions.	Flood, Earthquake, Landslide, Winter Storm, Thunderstorm, Drought, and Windstorm/Tornado	Teton County Commissioners, City of Choteau, Town of Fairfield, Town of Dutton, and Disaster & Emergency Services Coordinator.	• 2005: Assess existing access routes to rural subdivisions and develop an implementation plan. • 2005-07: Develop additional access routes in rural subdivisions as needed. • Annually review subdivisions to insure adequate access routes are installed and maintained, particularly in developing areas.
8.1.c: Implement land-use and development policy to reduce exposure to hazards.	Flood, Earthquake, Landslide, Winter Storm, Thunderstorm, Drought, and Windstorm/Tornado	Teton County Commissioners and Disaster & Emergency Services Coordinator.	• 2005: Review of hazard mapping in updating County/City comprehensive plan.
8.1.d: Standardize practices for excavation, construction, and grading of roads.	Flood and Severe Weather	County Commissioners, County Road Department, and County Planning Department	• 2005: Draft recommendations for road location and standards.
8.1.e: Review need to inspect and enforce access and water issues in new subdivisions and individual homes.	Flood, Earthquake, Landslide, Winter Storm, Thunderstorm, Drought, and Windstorm/Tornado	County Commissioners, County Planning Department, Disaster & Emergency Services, City of Choteau, Town of Fairfield, and Town of Dutton	• 2005-06: Study need for inspections and enforcement of access and water issues. and other programmatic responses. • 2006: Review need for inspector, and potential duties.

Action Item	Mitigated Hazard	Responsible Organization	Action Items & Planning Horizon
8.1.f: Address emergency dispatch policy.	Flood, Earthquake, Landslide, Winter Storm, Thunderstorm, Drought, and Windstorm/Tornado	County Sheriff's Office, County Commissioners, County Fire Warden, Hospitals, Disaster and Emergency Services, Choteau RVFC, Fairfield RVFC, Power RVFC, Dutton RVFC, Pendroy RVFC, USDA Forest Service, BLM, and Montana DNRC.	• 2005: Train dispatch personnel to use system effectively within the county's first responders. • 2005: Establish training for first responders. • 2006: Implement annual training for all involved.
8.1.g: Encourage participation in National Flood Insurance Program.	Flood	County Commissioners, County Planning Department, Disaster & Emergency Services Coordinator, and City of Choteau.	• On going: Continued participation in NFIP. • 2005 Participation in the Community Rating System to lower the costs of NFIP premiums.

8.1.h: Establish a county-wide Hazard Advisory Commission.	All Hazards	Teton County Commissioners, Disaster & Emergency Services, Local Emergency Planning Commission, City Choteau, Town of Dutton, Town of Fairfield, Choteau RVFC, Fairfield RVFC, Power RVFC, Dutton RVFC, and Pendroy RVFC.	• 2005 Form and appoint members to the commission. Initial tasks:
			  • Set commission policy
			  • Address priorities from this plan
			  • Advise County on implementation strategies

Table 8.1. Action Items in Safety and Policy.

8.2.2 People and Structures

The protection of people and structures will be tied together closely as the loss of life in the event of a hazard is generally linked to a person who could not, or did not, flee a structure threatened by a hazard. 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.

8.2.2.1 Overall Goals

Reduce Teton County's 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 property owners of the effects certain hazards may have on buildings and the community.

8.2.2.2 Proposed Activities

Table 8.2. Action Items for People and Structures.

Action Item	Mitigated Hazard	Responsible Organization	Action Items & Planning Horizon
8.2.a. Assess and hardwire emergency facilities for use with a portable generator. Install transfer switches to turn off main electrical line.	Flood, Earthquake, Landslide, Winter Storm, Thunderstorm, and Wind Storm/Tornado.	Teton County Commissioners, Sheriff's Office, City of Choteau, City of Fairfield, City of Dutton, and Disaster & Emergency Services Coordinator	• 2005: Assess which buildings in the county require alternative power during emergencies. • 2005: Cost benefit assessment of providing alternative power • 2005: Secure grant funding through PDM grants or others for the wiring of buildings • 2006: Secure funding for the purchase of generators, or other alternative power sources.
8.2.b. Educate owners of non-reinforced masonry buildings regarding earthquake stability.	Earthquake	County Commissioners, Disaster & Emergency Services, and County Safety Officer.	• 2005: Education campaign using "Earthquake Safety for People Who work in Old Masonry Buildings"

8.2.3 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 Teton County. Without supporting infrastructure, a community's structures may be protected, but the economy and way of life are lost. As such, a variety of components will be considered here in terms of management philosophy, potential policy recommendations, and on-the-ground activities.

8.2.3.1 Overall Goals

Reduce Teton County's risk by mitigating hazards affecting communities through enhancements of key infrastructure components. Specific goals outlined by the County include:

- Insure that community sewer systems are reasonably protected from hazards.
- Improve all components of the primary and secondary access routes.
- Educate the public regarding use of designated evacuation routes.
- Insure stability of irrigation systems under hazardous conditions.
- Improve county-wide communication systems.

8.2.3.2 Proposed Activities

Table 8.3. Action Items for Infrastructure Enhancements.

Action Item	Goals and Objectives	Responsible Organization	Action Items & Planning Horizon
8.3.a: Implement a study to determine the impacts of a breach in the protective levee surrounding sewer lagoons.	Flood, Earthquake, and Severe Weather	City of Choteau and Town of Fairfield	• 2005: Secure funding to do a detailed engineering study of the impacts of Flooding on the sewer systems.
8.3.b: Assess stability and upgrade irrigation canal head gates.	Flood and Thunderstorm	Teton County Commissioners, Irrigation Districts, Flood Hazard Advisory Commission.	• 2005: Locate and Map all head gates in the County • 2006 Establish minimum specifications for the construction and maintenance of head gates
8.3.c: Post FEMA "Emergency Evacuation Route" signs along the identified Primary and Secondary access routes in the county.	Flood, Earthquake, Landslide, Winter Storm, Thunderstorm, and Wind Storm/Tornado.	**County Commissioners** in cooperation with Roads Department, Choteau RVFC, Fairfield RVFC, Power RVFC, Dutton RVFC, and Pendroy RVFC.	• Purchase of signs based upon funding availability(2005). • 2005-06: Posting roads and make information available to residents of the importance of Emergency Routes
8.3.d: Conduct an inventory of all bridges and culverts in Teton County.	Flood, Landslide, and Thunderstorm	**County Commissioners** and County Roads Department.	• 2005: Secure funding to conduct inventory. • 2006: Acquire any equipment necessary, train personnel, and conduct inventory.
8.3.e: Reconstruct U.S. Highway 89 bridge crossing Muddy Creek near Bynum to accommodate two lane truck traffic.	Flood, Earthquake, Landslide, Winter Storm, Thunderstorm, and Wind Storm/Tornado.	**State of Montana Roads Department** in cooperation with County Commissioners.	• 2005: Work with the State of Montana Highway Department to inspect existing bridge and develop a plan for the new bridge. • Implement construction plan.
8.3.f: Assess current condition and reconstruct Spring Creek bridges and culverts on 1st Street, Rodeo Road, Airport Road, and 3rd Street in Choteau.	Flood	**State of Montana Roads Department, County Commissioners, County Roads Department, and City of Choteau.**	• 2005-06: Conduct assessment of current condition of existing bridges and culverts. • 2006: Secure funding for proposed projects. • 2006: Engineer replacement bridges and culverts. • 2007: Implement proposed projects.

Table 8.3. Action Items for Infrastructure Enhancements.

Action Item	Goals and Objectives	Responsible Organization	Action Items & Planning Horizon
8.3.g: Access Improvements of the FEMA "Emergency Evacuation Routes" in the county to insure these routes can be maintained in the case of an emergency. Signage on County Roads	Flood, Earthquake, Landslide, Winter Storm, Thunderstorm, and Wind Storm/Tornado.	**County Commissioners** in cooperation with Roads Department, Choteau RVFC, Fairfield RVFC, Power RVFC, Dutton RVFC, and Pendroy RVFC.	• 2006: Full assessment of road defensibility and ownership participation. • 2006-07: Implementation of projects
8.3.h: Develop effective County Interoperable Communication System.	Flood, Earthquake, Landslide, Winter Storm, Thunderstorm, and Wind Storm/Tornado.	County Commissioners, County Fire Warden, State Disaster and Emergency Services, County Disaster and Emergency Services, Choteau RVFC, Fairfield RVFC, Power RVFC, Dutton RVFC, Pendroy RVFC, USDA Forest Service, BLM, and Montana DNRC.	• 2005: Create a council and hold meetings to decide needed actions and develop a plan. • 2006-07: Acquire equipment funding (grants), and training needed to institute action items directed by the council.
8.3.i: Install back up power source to run Bynum Bypass head gates and diversion gates during power outages.	Flood	Bynum Irrigation, Corps of Engineers, and individual communities.	• 2005-06: Secure funding for additional equipment. • 2006-07: Install backup power source and test effectiveness.
8.3.j: Reconstruction of Teton River Diversion Gate to improve debris removal during flood events.	Flood	Teton County Commissioners, Corps of Engineers,and Teton Coop Reservoir Company.	• 2005 Redesign diversions gate to facilitate safe collection and removal of debris during high water events. • 2006 Secure funding for redesign construction estimated cost $35,000
8.3.k Design and construct a flood water by-pass around the Teton River Diversion Gate and located above bank full width	Flood	Teton County Commissioners, Corps of Engineers, and Teton Coop Reservoir Company.	• 2005 Design a flood water by pass around the diversion gate to accommodate 500 year flood events. • 2006 Secure funding for construction of flood water bypass, estimated cost $200,000
8.3. l Current Teton River by pass to Bynum reservoir needs increased flow capacity and hardening to accommodate high flows	Flood	Teton County Commissioners, Corps of Engineers, and Teton Coop Reservoir Company.	• 2005 design and engineer needed channeling widening and hardening to handle 500 yr flood events • 2006 Secure funding for widening and hardening of current channel. Estimated cost $ 75,000

8.2.4 Resource and Capability Enhancements

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

8.2.4.1 Overall Goals

Reduce Teton County's risk by mitigating hazards affecting communities through direct enhancements of emergency response capabilities. Specific goals include:

- Obtain necessary equipment to effectively and safely prevent and respond to emergency situations.
- Enhance communications system throughout the County.
- Improve County GIS and 911 services.

8.2.4.2 Proposed Activities

Table 8.4. Action Items for Resource and Capability Enhancements.

Action Item	Mitigated Hazard	Responsible Organization	Action Items & Planning Horizon
8.4.a: Obtain portable generators and trailers for use during power outages and other emergency situations.	Flood, Earthquake, Landslide, and Severe Weather.	Teton County Commissioners, Sheriff's Office, City of Choteau, Disaster Services Coordinator	• 2005: Coordinate with 8.2.a • 2006: Secure funding for generator and trailer purchase • 2006: Determine where generators will be stored and who will maintain
8.4.b: Maintain snow removal equipment and schedule for communities and primary transportation routes.	Winter Storm	County Road Department	• Annual review of equipment and community snow removal needs to determine if operable equipment is adequate.
8.4.c: Enhance radio availability in each department, link into existing dispatch, and improve range within the region.	Flood, Earthquake, Landslide, Winter Storm, Thunderstorm, and Wind Storm/Tornado.	**Montana Department of Natural Resources and Conservation** in cooperation with County Commissioners, Choteau RVFC, Fairfield RVFC, Dutton RVFC, Power RVFC, Pendroy RVFC, BLM, and USDA Forest Service.	• 2005 Summarize existing two-way radio capabilities and limitations. Identify costs to upgrade existing equipment and locate funding opportunities. • 2006: Acquire and install upgrades as needed. • 2006-7:Identify opportunities for radio repeater towers located in the region for multi-county benefits.

Table 8.4. Action Items for Resource and Capability Enhancements.

Action Item	Mitigated Hazard	Responsible Organization	Action Items & Planning Horizon
8.4.d: Obtain extrication equipment (stabilization, lift system, air bags, and jaws of life) for Choteau RVFC, Dutton RVFC, Fairfield RVFC, and Pendroy RVFC.	Flood, Earthquake, Landslide, Winter Storm, Thunderstorm, and Wind Storm/Tornado.	Choteau RVFC, Fairfield RVFC, Dutton RVFC, and Pendroy RVFC.	• 2005: Verify stated need still exists, develop budget, and locate funding or equipment (surplus) sources. • 2005-6:Acquire and deliver needed equipment based on prioritization by need and funding awards. Train personnel. • Estimated cost • $5,000 per set
8.4.e: Obtain high angle equipment and training for Choteau RVFC, Dutton RVFC, Fairfield RVFC, and Pendroy RVFC.	Flood, Earthquake, Landslide, Winter Storm, Thunderstorm, and Wind Storm/Tornado.	Choteau RVFC, Fairfield RVFC, Dutton RVFC, and Pendroy RVFC.	• 2005: Verify stated need still exists, develop budget, and locate funding or equipment (surplus or grants) sources. • 2005-6: Acquire and deliver needed equipment based on prioritization by need and funding awards. Train personnel. • Estimated cost $30,000 per set $4,000 per year for training $1,000 per year for equipment maintenance and/or replacement
8.4.f: Maintain and improve a centralized county-wide GIS data system, integrate with emergency 911 response system.	Flood, Earthquake, Landslide, Winter Storm, Thunderstorm, and Wind Storm/Tornado.	Teton County Commissioners, Assessors Office, DES, Fire Warden, Sheriff, and Farm Services.	• 2005-06: Secure both purchasing and operating funds (grants, general budget). • 2006-10: Increase GIS capabilities to include spatial analyst, ArcMap 9, and 911 database interface software. • 2005-06: Provide training in department to support software and hardware upgrades.
8.4.g: Provide funding for debris retention and collection systems.	Flood, Earthquake, Landslide, Winter Storm, Thunderstorm, and Wind Storm/Tornado.	City of Choteau Public Works, City of Fairfield, and County Road Department	• 2005-07: Establish and implement a plan for the periodic removal of debris in and around city and county culverts, bridges, and storm water drains.

Chapter 9: Supporting Information

9 Supporting Information

9.1 List of Tables

Table 1.1. Phase I Hazard Assessment of Teton County. 3

Table 2.1. Emergency Services Training received by household. 10

Table 2.2. Disasters affecting homes in Teton County. 11

Table 2.3. Fuel Hazard Rating Worksheet 12

Table 2.4. Percent of respondents in each risk category as determined by the survey respondents. 12

Table 2.5. Percent of respondents in each risk category as determined by the survey respondents. 13

Table 2.6. Percent of respondents in each risk category as determined by the survey respondents. 13

Table 2.7 Respondents opinion of risk occurrence. 13

Table 2.8. Public Opinion of Hazard Mitigation Funding Preferences. 13

Table 2.9. Public meeting slide show. 26

Table 3.1. Summary of selected demographic statistics for Teton County, Montana. 37

Table 3.2. Income in 1999 40

Table 3.3 Poverty Status in 1999 (below poverty level). 40

Table 3.4. Employment & Industry 41

Table 3.5. Class of Worker 42

Table 3.6. Land ownership in Teton County. 47

Table 3.7. Cover Types in Teton County. 54

Table 3.8. Climate summaries for Pendroy, Teton County, Montana. 56

Table 3.9. Climate summaries for Choteau, Teton County, Montana. 56

Table 3.10. Climate summaries for Gibson Dam, Teton County, Montana. 56

Table 3.11. Climate summaries for Fairfield, Teton County, Montana. 57

Table 3.12. Significant Infrastructure for Teton County, Montana. 58

Table 3.13. County Fire Resources Teton County Rural Fire Truck Inventory (11/14/04). 65

Table 3.14. Choteau Volunteer Fire equipment. 69

Table 3.15. Teton County Critical Infrastructure. 73

Table 3.16. Hazard Profile of Floods in Teton County, 1960-2000 (SHELDUS 2004). 79

Table 4.1 Critical Infrastructure within FEMA Flood Zone, Teton County Montana. 96

Table 4.2. Critical Infrastructure outside of Flood Zone but within ¼ mile of the flood zone......96
Table 4.3. Critical Infrastructure outside of Flood Zone between ¼ mile and ½ mile of the flood zone. 97
Table 4.4. Communities Participating in NFIP as of 11/8/04 99
Table 4.5. NFIP Policy Statistics As of 12/31/03 in Teton County 99
Table 5.1. Modified Mercalli Earthquake Intensity Scale. 109
Table 6.1. Landslide Risk Due to Slopes and Geology in Teton County. 120
Table 7.1. Montana Disaster Declarations from Thunderstorms, Hail, Wind and Tornadoes (1974-2003). 127
Table 7.2. State declared winter storm disasters and assistance in Montana. 128
Table 7.3. Montana Drought and other Agricultural Disasters 133
Table 7.4. Recent tornado occurrences in Montana. 134
Table 8.1. Action Items in Safety and Policy. 145
Table 8.2. Action Items for People and Structures. 147
Table 8.3. Action Items for Infrastructure Enhancements. 148
Table 8.4. Action Items for Resource and Capability Enhancements. 150
Table 9.1. List of Preparers. 154

9.2 List of Figures

Figure 2.1. Public meeting slideshow overview. 26
Figure 3.1. Topographic relief of Teton County, Montana. 34
Figure 3.2. Land Ownership in Teton County. 35
Figure 3.3. Rural and City Fire Protection Districts in Teton County. 36
Figure 3.4. Teton County Population Trends from 1970 – 2000. 39
Figure 3.5. Population per square mile in Teton County. 39
Figure 3.6. Employment in Largest Growing Sectors. 42
Figure 3.7. Wildland-Urban Interface of Teton County. 51
Figure 3.8. National Media Article About Hazard Preparedness. 78
Figure 4.1. Choteau Parcel Values in FEMA Flood Zones A&B 88
Figure 4.2. FEMA Flood Zones and Land Ownership in Teton County. 89
Figure 4.3. FEMA Flood Zones and Land Ownership Near Mortimer Gulch. 90
Figure 4.4. FEMA Flood Zones and Land Ownership Near Power and Greenfield. 91
Figure 4.5. FEMA Flood Zones and Land Ownership Near Dutton. 92
Figure 4.6. FEMA Flood Zones and Land Ownership Near Bynum. 93
Figure 4.7. FEMA Flood Zones and Land Ownership Near Arrowleaf. 94

Figure 4.8. FEMA Flood Zones and Land Ownership Near Choteau. 95
Figure 4.9. Photo of Teton River Diversion Canal to Bynum Reservoir. 101
Figure 4.10 Photo of Teton River Diversion Canal to Bynum Reservoir. 101
Figure 4.11 Bynum Reservoir Storage Levels from 1988 – 2004. 102
Figure 4.12. Photo of Teton River Diversion to Teton River. 102
Figure 4.13 Photo of Teton River Diversion Dam to Bynum Reservoir. 103
Figure 4.14 Peak Streamflow data for Teton River near Dutton. 105
Figure 5.1 Intermountain Seismic Belt in Montana. 110
Figure 5.2 Landslide caused by Hebgen Lake Earthquake in 1959. 111
Figure 5.3. Seismicity of Montana from 1990 - 2001. 112
Figure 5.4. Earthquake Hazard Map for Teton County and the Rest of Montana. 113
Figure 6.1. Landslide Risks in Teton County. 120
Figure 6.2. Landslide Prone Landscapes of Teton County. 121
Figure 7.1. Palmer Drought Severity Index. 130

9.3 List of Preparers

The following personnel participated in the formulation, compilation, editing, and analysis of alternatives for this assessment.

Table 9.1. 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
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Vincent P. Corrao, B.S.	Northwest Management, Inc.	Resource Management Specialist
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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
Dick VanAuken	Teton County Fire Warden	Teton County Fire
Entire Planning Committee		

9.4 Signature Pages

This **Teton County Hazards Mitigation Plan** has been developed in cooperation and collaboration with the representatives of the following organizations, agencies, and individuals.

9.4.1.1 Representatives of Teton County Government

This Hazard Mitigation Plan and all of its components identified herein were adopted formally through a resolution of the Board of County Commissioners as of June 16, 2005, resolution number 2005-15, recorded in the official record of the Teton County Commissioners.

Arnie Gettel — 7-13-05

By: Arnie Gettel, Chairman
Teton County Commissioner — Date

R F Sam Carlson — 7-13-05

By: R.F. "Sam" Carlson
Teton County Commissioner — Date

Joe Dellwo — 7/13/05

By: Joe Dellwo
Teton County Commissioner — Date

James J McDonald — 8-16-05

By: James J. McDonald - *Foreman*
Teton County Road Department — Date

7/12/05

By: Richard Van Auken
Teton County Fire Warden
Interim Coordinator, Teton County DES — Date

9.4.1.2 Representatives of City Government in Teton County

Daniel W. Clark 8/15/05 By: Dan Clark Date Mayor, City of Choteau	Adopted by Resolution of the City Resolution Number: 645 Adoption Date: 7/19/05
Lillian I. Alfson 8/16/05 By: Lillian Alfson Date Mayor, Town of Fairfield	Adopted by Resolution of the Town Resolution Number: 229 Adoption Date: 8/10/05
Paul C. Goodell 9/12/05 By: Bob Goodell Date Mayor, Town of Dutton	Adopted by Resolution of the Town Resolution Number: 03/05 Adoption Date: 9/12/05

9.4.1.3 Representatives of Community Organizations, Federal, and State Agencies

These agencies and organizations collaborated and cooperated in the development of this plan.

By: 9/14/05 Date
Montana Department of Natural Resources and Conservation

By: Lesley W. Thompson 9/19/05 Date
Lewis and Clark National Forest

By: June Bailey 9/20/05 Date
Bureau of Land Management

Mike Aderhold 9/14/05
By: Mike Aderhold Date
Montana Fish, Wildlife, and Parks

Sherwin K. Smith 8/15/05
By: Sherwin Smith Date
USDA Farm Services Agency

Wm. E. Schlosser 9 June 2005
By: William E. Schlosser, Ph.D. Date
Project Manager-Teton County Hazard Mitigation Plan, Lead Author, Northwest Management, Inc.

9.4.1.4 Resolution of Adoption by Teton County Commissioners

TETON COUNTY RESOLUTION
#2005-15

A resolution of the Commissioners of Teton County declaring County support and adoption of the Teton County All Hazards Mitigation Plan, which includes the Wildland-Urban Interface Wildfire Mitigation Plan.

Whereas, The Board of Teton County Commissioners supports the Teton County All Hazards Mitigation Plan and the Wildland-Urban Interface Wildfire Mitigation Plan, and

Whereas, The Teton County All Hazards Mitigation Plan and the Wildland-Urban Interface Wildfire Mitigation 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 Teton County Commissioners,

Therefore be it resolved, that the Teton County Commissioners do hereby adopt and support the Teton County All Hazards Mitigation Plan and the Wildland-Urban Interface Wildfire Mitigation Plan

Passed and approved this 16th Day of June 2005

Board of County Commissioners
Teton County, Montana

Arnold Gettel
Arnold Gettel Commission Chairman

R. F. Sam Carlson
R. F. Sam Carlson, Commissioner

Joe Dellwo
Joe Dellwo, Commissioner

Attested by: Paula J Jaconetty
Paula Jaconetty, Clerk & Recorder

9.4.1.5 Resolution of Adoption by Choteau City Council

RESOLUTION NO. 645

RESOLUTION DECLARING SUPPORT AND ADOPTION OF THE TETON COUNTY ALL HAZARDS MITIGATION PLAN, WHICH INCLUDES THE WILDLAND-URBAN INTERFACE WILDFIRE MITIGATION PLAN.

WHEREAS, the Choteau City Council supports the Teton County All Hazards Mitigation Plan and the Wildland-Urban Interface Wildfire Mitigation Plan; and

WHEREAS, the Teton County All Hazards Mitigation Plan and the Wildland-Urban Interface Wildfire Mitigation 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;

NOW, THEREFORE, BE IT RESOLVED that the Choteau City Council does hereby support and adopt the Teton County All Hazards Mitigation Plan and the Wildland-Urban Interface Wildfire Mitigation Plan.

PASSED AND APPROVED by the City Council of the City of Choteau, Montana, this 19th day of July, 2005.

Daniel W. Clark

DANIEL W. CLARK
Mayor of the City of Choteau

ATTESTATION:-

Leona C. Huidekoper

LEONA C. HUIDEKOPER
Finance Officer
City of Choteau

(SEAL)

Member Martin moved and Member Vandolah seconded the Motion and the following voted in favor thereof: Corlene Martin, Pete Rasmussen, Larry Renteria, Doug Vandolah

and the following voted against the same: None

Absent: None

STATE OF MONTANA)
: ss.
County of Teton)

LEONA C. HUIDEKOPER, Finance Officer of the City of Choteau, Montana hereby certifies that the foregoing Resolution No. 645 was read, passed and approved by the City Council of the City of Choteau, Montana, at a regular meeting thereof held on the 19th day of July, 2005.

Leona C. Huidekoper
LEONA C. HUIDEKOPER
Finance Officer
City of Choteau

(SEAL)

SUBSCRIBED AND SWORN TO before me this 19 day of July, 2005.

Linda O'Loughlin
Notary Public for the State of Montana
(Printed Name) Linda O'Loughlin
Residing in Choteau, Montana
My Commission expires 3-10-2006

(NOTARIAL SEAL)

9.4.1.6 Resolution of Adoption by Fairfield City Council

TOWN OF FAIRFIELD
ALL HAZARDS MITIGATION PLAN
RESOLUTION NO. 229

A resolution of the Town Council of Fairfield, Teton County, declaring Town support and adoption of the Teton County All Hazards Mitigation Plan, which includes the Wildland-Urban Interface Wildfire Mitigation Plan.

Whereas, The Town Council of Fairfield supports the Teton County All Hazards Mitigation Plan and the Wildland-Urban Interface Wildfire Mitigation Plan, and

Whereas, the Teton County All Hazards Mitigation Plan and the Wildland-Urban Interface Wildfire Mitigation 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 Teton County Commissioners,

Therefore be it resolved, that the Town of Fairfield does hereby adopt and support the Teton County All Hazards Mitigation Plan and the Wildland-Urban Interface Wildfire Mitigation Plan

Passed and approved this 10th day of August, 2005.

Ayes: 3 Nays: ______ 1 absent

Town of Fairfield

Lillian I. Alfson

Lillian I. Alfson, Mayor

(SEAL)

Attested by: Tia N. Taylor

Tia N. Taylor, Clerk-Treasurer

9.4.1.7 Resolution of Adoption Dutton City Council

TOWN OF DUTTON
ALL HAZARDS MITIGATION PLAN
RESOLUTION # 03/05

A resolution of the Town Council of Dutton declaring Town support and adoption of the Teton County All Hazards Mitigation Plan, which includes the Wildland-Urban Interface Wildfire Mitigation Plan.

Whereas, The Board Town Council of Dutton supports the Teton County All Hazards Mitigation Plan and the Wildland-Urban Interface Wildfire Mitigation Plan, and

Whereas, The Teton County All Hazards Mitigation Plan and the Wildland-Urban Interface Wildfire Mitigation 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 Teton County Commissioners,

Therefore be it resolved, that the Town of Dutton does hereby adopt and support the Teton County All Hazards Mitigation Plan and the Wildland-Urban Interface Wildfire Mitigation Plan

Passed and approved this 12th Day of September 2005

Town of Dutton

Robert C Goodell

Robert Goodell, Mayor

Attested by: Jean L Schoonover

JEAN L. SCHOONOVER, CLERK

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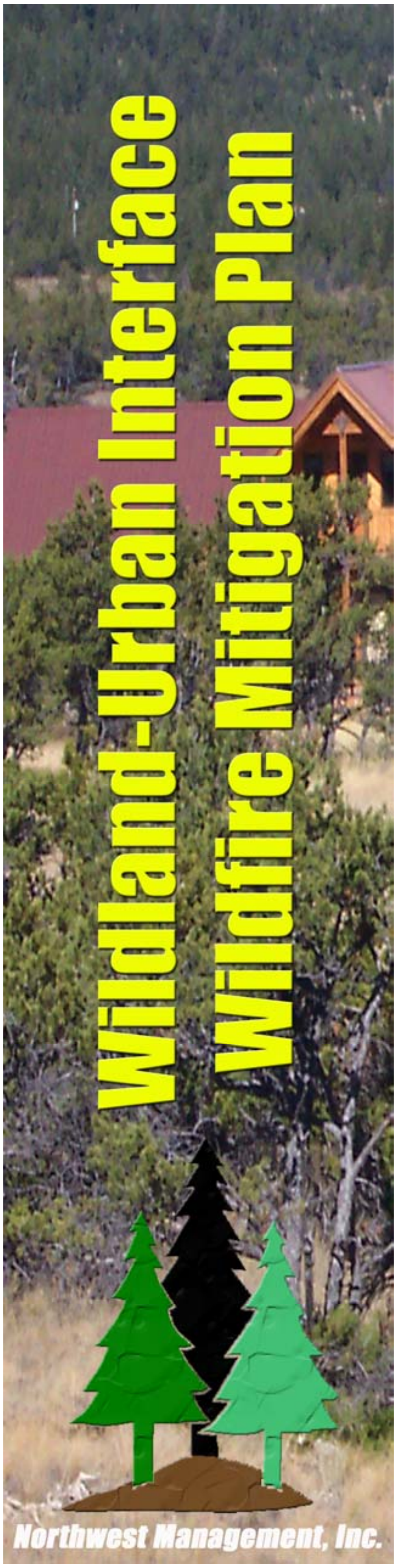

Teton County, Montana, All Hazard Mitigation Plan

Volume II

Wildland-Urban Interface Wildfire Mitigation Plan

June 9, 2005

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

Teton County, Montana

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

Acknowledgments

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

Teton County Commissioners
and the employees of Teton County

USDI Bureau of Land Management

USDA Forest Service

Montana Disaster and Emergency Services

Federal Emergency Management Agency

Montana Fish, Wildlife & Parks

Montana Department of Natural Resources
and Conservation

Natural Resources Conservation Service

Teton County Sheriff Department
Choteau Fire Company
Fairfield Fire Company
Dutton Fire Company
Power Fire Company
Pendroy Fire Company
&
Local Businesses and Citizens of Teton County

To obtain original copies of this plan contact:

Teton County Commissioner's Office
Teton County Courthouse
PO Box 610
Choteau, Montana 59422

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Table of Contents

CHAPTER I: OVERVIEW OF THIS PLAN AND ITS DEVELOPMENT 1

1 INTRODUCTION 1

1.1 GOALS AND GUIDING PRINCIPLES 1
1.1.1 Federal Emergency Management Agency Philosophy 1
1.1.2 Additional State and Federal Guidelines Adopted 2
1.1.2.1 National Fire Plan 3
1.1.2.1.1 Montana's Endorsement of the National Fire Plan 4
1.1.2.2 Northern Rockies Coordinating Group 5
1.1.2.2.1 County Wildland Fire Interagency Group 5
1.1.2.3 National Association of State Foresters 6
1.1.2.3.1 Identifying and Prioritizing Communities at Risk 6
1.1.2.3.2 Conceptual Approach 7
1.1.2.4 Healthy Forests Restoration Act 8
1.1.3 Local Guidelines and Integration with Other Efforts 9
1.1.3.1 Teton County Fire Mitigation Planning Effort and Philosophy 9
1.1.3.1.1 Mission Statement 9
1.1.3.1.2 Vision Statement 9
1.1.3.1.3 Goals 9
1.1.3.2 Teton County Growth Policy Plan 10
1.1.3.3 National Fire Management Analysis System – Montana Department of State Lands 10

CHAPTER 2: PLANNING PROCESS 12

2 DOCUMENTING THE PLANNING PROCESS 12

2.1 DESCRIPTION OF THE PLANNING PROCESS 12
2.2 THE PLANNING TEAM 12
2.3 PUBLIC INVOLVEMENT 13
2.3.1 News Releases 13
2.3.2 Newspaper Articles 14
2.3.3 Public Mail Survey 14
2.3.3.1 Survey Results 15
2.3.4 Committee Meetings 19
2.3.4.1 Committee Meeting Notes 20
2.3.4.1.1 September 15th, 2004 20
2.3.4.1.2 November 16th, 2004 22
2.3.4.1.3 December 14, 2005 23
2.3.4.1.4 February 22, 2005 25
2.3.4.1.5 March 30, 2005 26
2.3.4.1.6 April 19, 2005 28
2.3.5 Public Meetings 29
2.3.5.1 February 22nd, 2005 – Power 29
2.3.5.2 February 23, 2005 - Choteau 30
2.3.5.3 February 23rd, 2005 – Choteau 30
2.3.5.4 February 24, 2005 - Pendroy 30
2.3.5.5 February 24, 2005 - Fairfield 31
2.3.6 Documented Review Process 37
2.3.7 Continued Public Involvement 37

CHAPTER 3: COUNTY CHARACTERISTICS & RISK ASSESSMENT 38

3 BACKGROUND AND AREA DESCRIPTION 38

3.1 LOCATION AND LAND FORMS 38
3.2 DEMOGRAPHICS 42
3.3 SOCIOECONOMICS 44
3.4 DESCRIPTION OF TETON COUNTY 47
3.4.1 Teton County History 47

`

3.4.2 Recreation 48
3.4.2.1 Lewis and Clark National Forest 48
3.4.2.2 Wildlife Management Areas 49
3.4.2.3 BLM Public Lands 49
3.4.2.4 National Recreation Trails 49
3.4.2.5 Reservoirs 50
3.4.2.6 Camping 50
3.4.2.7 Winter Sports 50
3.4.2.8 Fishing and Hunting 50
3.4.3 Resource Dependency 50
3.4.4 Development Trends 51
3.4.5 Land Use 52
3.4.5.1 Agricultural Land Use 53
3.5 EMERGENCY SERVICES & PLANNING AND ZONING 54
3.6 CULTURAL RESOURCES 54
3.7 TRANSPORTATION 56
3.8 VEGETATION & CLIMATE 57
3.8.1 Monthly Climate Summaries in Teton County 58
3.8.1.1 Pendroy, Montana 58
3.8.1.2 Choteau, Montana 59
3.8.1.3 Gibson Dam, Montana 59
3.8.1.4 Fairfield, Montana 60
3.9 WILDFIRE HAZARD PROFILES 60
3.9.1 Wildfire Ignition Profile 60
3.9.2 Regional Wildfire Profile 66
3.9.2.1 Prescribed Burning of Federal Acres 68
3.9.2.2 Fire Fighter Accidents 69
3.9.2.2.1 Deaths on the Ground from Fire 70
3.9.2.2.2 Municipal Fire Fighters 70
3.9.2.2.3 Deaths While Responding to or Return from Alarms 71
3.9.2.2.4 Montana State Fatalities 71
3.10 ANALYSIS TOOLS AND TECHNIQUES TO ASSESS FIRE RISK 72
3.10.1 Fire Prone Landscapes 72
3.10.2 Historic Fire Regime 75
3.10.2.1 General Limitations 76
3.10.3 Fire Regime Condition Class 77
3.10.4 Predicted Fire Severity 79
3.10.4.1 Purpose 79
3.10.4.2 General Limitations 79
3.10.5 On-Site Evaluations 80
3.10.6 Fuel Model Descriptions 80
3.10.6.1 Grass Group 80
3.10.6.1.1 Fire Behavior Fuel Model 1 80
3.10.6.1.2 Fire Behavior Fuel Model 2 81
3.10.6.1.3 Fire Behavior Fuel Model 3 81
3.10.6.2 Shrub Group 81
3.10.6.2.1 Fire Behavior Fuel Model 4 81
3.10.6.2.2 Fire Behavior Fuel Model 5 82
3.10.6.2.3 Fire Behavior Fuel Model 6 82
3.10.6.2.4 Fire Behavior Fuel Model 7 83
3.10.6.3 Timber Group 83
3.10.6.3.1 Fire Behavior Fuel Model 8 83
3.10.6.3.2 Fire Behavior Fuel Model 9 83
3.10.6.3.3 Fire Behavior Fuel Model 10 84
3.10.6.4 Logging Slash Group 84
3.10.6.4.1 Fire Behavior Fuel Model 11 84
3.10.6.4.2 Fire Behavior Fuel Model 12 85
3.10.6.4.3 Fire Behavior Fuel Model 13 85
3.11 WILDLAND-URBAN INTERFACE 86
3.11.1 People and Structures 86

`

3.11.2 Infrastructure 88
3.11.3 Ecosystems 89
3.12 CRITICAL INFRASTRUCTURE 89
3.13 SOILS 92
3.13.1 Fire Mitigation Practices to Maintain Soil Processes 92
3.14 HYDROLOGY 93
3.14.1 Fire Mitigation Practices to Maintain Hydrologic Processes 94
3.15 AIR QUALITY 95
3.15.1 Fire Mitigation Practices to Maintain Air Quality 96

CHAPTER 4: SUMMARIES OF RISK AND PREPAREDNESS 98

4 OVERVIEW 98

4.1 WILDLAND FIRE CHARACTERISTICS 98
4.1.1 Weather 98
4.1.2 Topography 98
4.1.3 Fuels 99
4.1.3.1 Conservation Reserve Program Lands 99
4.2 TETON COUNTY CONDITIONS 100
4.2.1 County Wide Potential Mitigation Activities 101
4.2.1.1 Prevention 101
4.2.1.2 Education 102
4.2.1.3 Readiness 102
4.2.1.4 Building Codes 103
4.3 TETON COUNTY'S WILDLAND-URBAN INTERFACE 103
4.3.1 Mitigation Activities Applicable to all Communities 104
4.3.1.1 Homesite Evaluations and Creation of Defensible Space 104
4.3.1.2 Travel Corridor Fire Breaks 104
4.3.1.3 Power Line Corridor Fire Breaks 104
4.4 COMMUNITIES IN TETON COUNTY 104
4.4.1 Overall Fuels Assessment 104
4.4.2 Overall Ignition Profile 105
4.4.3 Individual Community Assessments 105
4.4.3.1 Agawam and Farmington 105
4.4.3.1.1 Fire Potential 106
4.4.3.1.2 Ingress-Egress 106
4.4.3.1.3 Infrastructure 106
4.4.3.1.4 Fire Protection 107
4.4.3.1.5 Community Risk Assessment 107
4.4.3.1.6 Mitigation Activities 107
4.4.3.2 Arrowleaf Subdivision 108
4.4.3.2.1 Fire Potential 108
4.4.3.2.2 Ingress-Egress 109
4.4.3.2.3 Infrastructure 109
4.4.3.2.4 Fire Protection 109
4.4.3.2.5 Community Risk Assessment 109
4.4.3.2.6 Mitigation Activities 110
4.4.3.3 Bynum 110
4.4.3.3.1 Fire Potential 110
4.4.3.3.2 Ingress-Egress 111
4.4.3.3.3 Infrastructure 111
4.4.3.3.4 Fire Protection 112
4.4.3.3.5 Community Risk Assessment 112
4.4.3.3.6 Mitigation Activities 112
4.4.3.4 Choteau 112
4.4.3.4.1 Fire Potential 113
4.4.3.4.2 Ingress-Egress 114
4.4.3.4.3 Infrastructure 114
4.4.3.4.4 Fire Protection 114
4.4.3.4.5 Community Risk Assessment 114

`

4.4.3.4.6 Mitigation Activities ... 115
4.4.3.5 Collins ... 115
4.4.3.5.1 Fire Potential ... 115
4.4.3.5.2 Ingress-Egress ... 116
4.4.3.5.3 Infrastructure ... 116
4.4.3.5.4 Fire Protection ... 116
4.4.3.5.5 Community Risk Assessment ... 117
4.4.3.5.6 Mitigation Activities ... 117
4.4.3.6 Dutton ... 117
4.4.3.6.1 Fire Potential ... 117
4.4.3.6.2 Ingress-Egress ... 118
4.4.3.6.3 Infrastructure ... 118
4.4.3.6.4 Fire Protection ... 119
4.4.3.6.5 Community Risk Assessment ... 119
4.4.3.6.6 Mitigation Activities ... 119
4.4.3.7 Fairfield and Greenfield ... 120
4.4.3.7.1 Fire Potential ... 120
4.4.3.7.2 Ingress-Egress ... 121
4.4.3.7.3 Infrastructure ... 121
4.4.3.7.4 Fire Protection ... 121
4.4.3.7.5 Community Risk Assessment ... 121
4.4.3.7.6 Mitigation Activities ... 122
4.4.3.8 Mortimer Gulch and Surrounding Area ... 122
4.4.3.8.1 Fire Potential ... 122
4.4.3.8.2 Ingress-Egress ... 123
4.4.3.8.3 Infrastructure ... 123
4.4.3.8.4 Fire Protection ... 123
4.4.3.8.5 Community Risk Assessment ... 123
4.4.3.8.6 Mitigation Activities ... 124
4.4.3.9 New Rockport Colony, Rockport Colony, and Miller Colony ... 124
4.4.3.9.1 Fire Potential ... 125
4.4.3.9.2 Ingress-Egress ... 125
4.4.3.9.3 Infrastructure ... 125
4.4.3.9.4 Fire Protection ... 126
4.4.3.9.5 Community Risk Assessment ... 126
4.4.3.9.6 Mitigation Activities ... 126
4.4.3.10 Pendroy ... 126
4.4.3.10.1 Fire Potential ... 126
4.4.3.10.2 Ingress-Egress ... 127
4.4.3.10.3 Infrastructure ... 127
4.4.3.10.4 Fire Protection ... 127
4.4.3.10.5 Community Risk Assessment ... 128
4.4.3.10.6 Mitigation Activities ... 128
4.4.3.11 Power ... 128
4.4.3.11.1 Fire Potential ... 128
4.4.3.11.2 Ingress-Egress ... 129
4.4.3.11.3 Infrastructure ... 129
4.4.3.11.4 Fire Protection ... 130
4.4.3.11.5 Community Risk Assessment ... 130
4.4.3.11.6 Mitigation Activities ... 130
4.5 FIRE FIGHTING RESOURCES AND CAPABILITIES ... 131
4.5.1 Wildland Fire Protection ... 131
4.5.1.1 Fire Warden Summary of Resources and Capabilities: ... 131
4.5.2 Rural Fire Protection ... 136
4.5.2.1 Choteau Volunteer Fire ... 136
4.5.2.2 Fairfield Rural Volunteer Fire Company ... 138
4.5.2.2.1 Grant Narrative ... 138
4.5.2.3 Dutton Rural Volunteer Fire Company ... 139
4.5.2.3.1 Grant Narrative ... 139
4.6 CRITICAL INFRASTRUCTURE IN THE FIRE PRONE LANDSCAPE ... 141
4.6.1 Methodology ... 141

`

4.7 ISSUES FACING TETON COUNTY FIRE PROTECTION 145
4.7.1 Fires in Conservation Reserve Program Fields 145
4.8 CURRENT WILDFIRE MITIGATION ACTIVITIES IN TETON COUNTY 146
4.8.1 Defensible Space Projects – 2001 National Fire Plan Grant 146
4.8.2 Mortimer Gulch Hazardous Fuel Reduction Project 147

CHAPTER 5: TREATMENT RECOMMENDATIONS 148

5 ADMINISTRATION & IMPLEMENTATION STRATEGY 148

5.1 PRIORITIZATION OF MITIGATION ACTIVITIES 148
5.1.1 Prioritization Scheme 149
5.1.1.1 Benefit / Cost 150
5.1.1.2 Population Benefit 150
5.1.1.3 Property Benefit 150
5.1.1.4 Economic Benefit 151
5.1.1.5 Vulnerability of the Community 151
5.1.1.6 Project Feasibility (Environmentally, Politically & Socially) 151
5.1.1.7 Hazard Magnitude/Frequency 151
5.1.1.8 Potential for repetitive loss reduction 151
5.1.1.9 Potential project effectiveness and sustainability 152
5.1.1.10 Final ranking 152
5.2 POSSIBLE FIRE MITIGATION ACTIVITIES 152
5.3 WUI SAFETY & POLICY 152
5.3.1 Existing Practices That Should Continue 153
5.3.2 Overall Goals 153
5.3.3 Proposed Activities 153
5.4 PEOPLE AND STRUCTURES 155
5.4.1 Overall Goals 156
5.4.2 Proposed Activities 157
5.5 INFRASTRUCTURE 160
5.5.1 Overall Goals 161
5.5.2 Proposed Activities 161
5.6 RESOURCE AND CAPABILITY ENHANCEMENTS 161
5.6.1 Overall Goals 162
5.6.2 Proposed Activities 163
5.7 REGIONAL LAND MANAGEMENT RECOMMENDATIONS 166
5.7.1 Federal and State Agency Projects 166
5.7.2 Initial Attack of Wildfires in the Lewis and Clark National Forest 166
5.7.3 Conservation Reserve Program 166

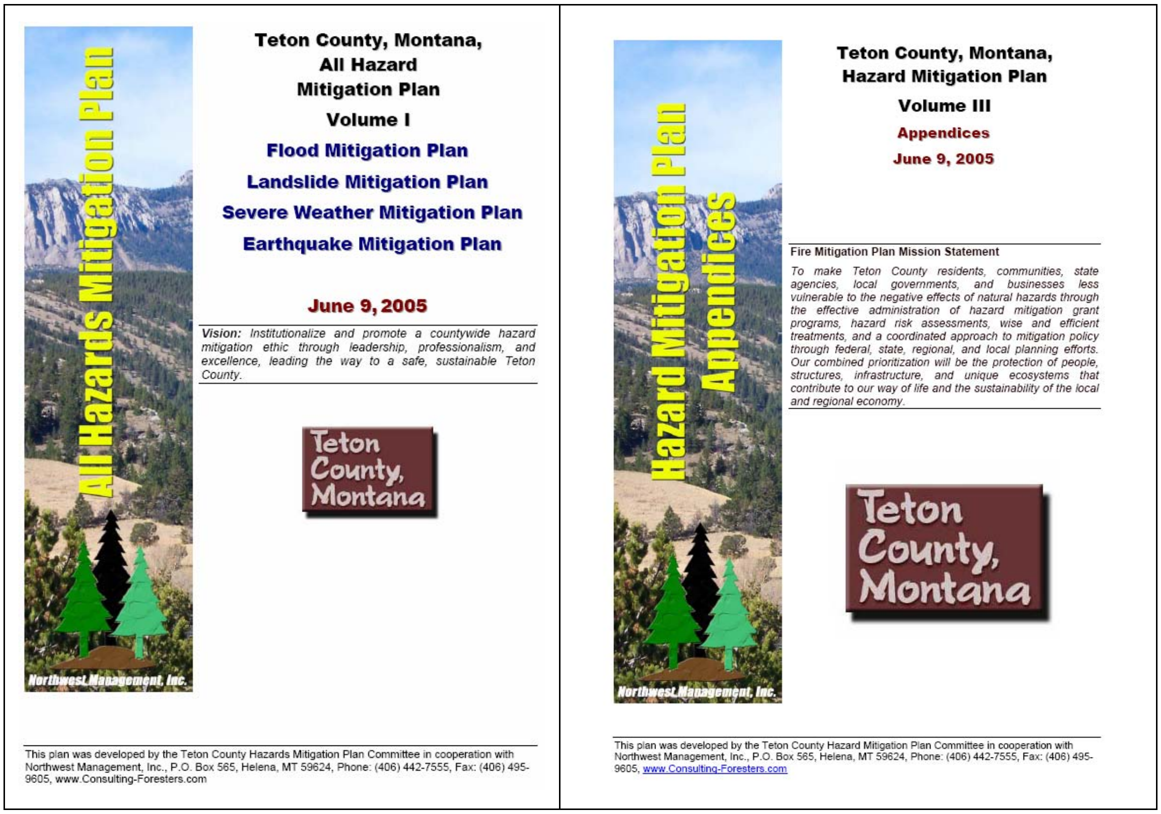
CHAPTER 6: SUPPORTING INFORMATION 168

6 168

6.1 LIST OF TABLES 168
6.2 TABLE OF FIGURES 169
6.3 LIST OF PREPARERS 170
6.4 SIGNATURE PAGES 171
6.4.1.1 Representatives of Teton County Government 171
6.4.1.2 Representatives of City Government in Teton County 172
6.4.1.3 Representatives of Community Organizations, Federal, and State Agencies 172
6.4.1.4 Resolution of Adoption by Teton County Commissioners 173
6.4.1.5 Resolution of Adoption by Choteau City Council 174
6.4.1.6 Resolution of Adoption by Fairfield City Council 176
6.4.1.7 Resolution of Adoption Dutton City Council 177
GLOSSARY OF TERMS 178
6.5 LITERATURE CITED 185

Foreword

The **Teton County All Hazards Mitigation Plan** was developed during 2004-2005 by the Teton County Hazard Mitigation Planning Committee in cooperation with Northwest Management, Inc., of Helena, Montana. The Teton County Wildland-Urban Interface Wildfire Mitigation Plan (Volume II) is part of the Teton County All Hazards Mitigation Plan (Volume I). Although it is being published as a separate document, it should be considered one “chapter” of this All Hazards Mitigation Plan and is hereby incorporated into this plan’s contents. The All Hazards Mitigation Plan Appendices; Volume III, includes many maps and related information for both Volumes I and II.



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Chapter I: Overview of this Plan and its Development

1 Introduction

This Wildland-Urban Interface Wildland Fire Mitigation Plan for Teton 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 Teton County, Montana. The planning team responsible for implementing this project was led by the Teton County Commissioners. Agencies and organizations that participated in the planning process included:

- Teton County Commissioners and County Departments
- Teton County Fire Warden
- Teton 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 Reclamation
- USDA Natural Resources Conservation Service
- Choteau Fire Company
- Fairfield Fire Company
- Power Fire Company
- Dutton Fire Company
- Pendroy Fire Company
- Montana Disaster and Emergency Services
- Northwest Management, Inc.

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

1.1 Goals and Guiding Principles

1.1.1 Federal Emergency Management Agency Philosophy

Effective November 1, 2004, a Local Hazard Mitigation Plan approved by the Federal Emergency Management Agency (FEMA) is required for Hazard Mitigation Grant Program

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(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 and integrated, cost effective approach to mitigation. Local hazard mitigation plans must meet the minimum requirements of the Stafford Act-Section 322, as outlined in the criteria contained in 44 CFR Part 201. The plan criteria covers the planning process, risk assessment, mitigation strategy, plan maintenance, and adoption requirements.

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

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

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

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

1.1.2 Additional State and Federal Guidelines Adopted

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

- The National Fire Plan; A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-Year Comprehensive Strategy Implementation Plan–May 2002.

- Northern Rockies Coordinating Group

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- 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 Teton County while facilitating new opportunities for pre-disaster mitigation funding and cooperation.

1.1.2.1 National Fire Plan

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

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

Its three guiding principles are:

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

This Wildland-Urban Interface Fire Mitigation Plan fulfills the National Fire Plan's 10-Year Comprehensive Strategy. The projects and activities recommended under this plan are in addition to other Federal, state, and private / corporate forest and rangeland management activities. The implementation plan does not alter, diminish, or expand the existing jurisdiction, statutory and regulatory responsibilities and authorities or budget processes of participating Federal, State, and tribal agencies.

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

- Firefighter and public safety continuing as the highest priority.
- A sustained, long-term and cost-effective investment of resources by all public and private parties, recognizing overall budget parameters affecting Federal, State, Tribal, and local governments.
- A unified effort to implement the collaborative framework called for in the Strategy in a manner that ensures timely decisions at each level.

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- 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 under estimated, 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 developed the *10-Year Comprehensive Strategy* and an implementation plan, titled *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment*. With the Western Governors' 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 these programs on state-owned and private lands in Montana. NFP funding can also come directly form 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)

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- 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 & 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 Firewarden's Association, Montana Disaster and Emergency Services Division, Montana Department of Natural Resources and Conservation, Idaho Department of Lands, North Dakota Forest Service, Bureau of Land Management, National Park Service, Bureau of Indian Affairs, Fish and Wildlife Service, Forest Service, Montana Fire Chief's Association, and Montana Sheriff's and Peace Officer's Association. The purpose of NRCG is to further interagency cooperation, communications, coordination, and to provide interagency fire management direction and all-risk support for the Northern Rockies Geographic Area.

1.1.2.2.1 County Wildland Fire Interagency Group

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

1) Documentation of the process used to develop the mitigation plan. How the plan was developed, who was involved and how the public was involved.
2) A risk assessment to identify vulnerabilities to wildfire in the wildland-urban interface (WUI).
3) A prioritized mitigation strategy that addresses each of the risks. Examples of these strategies could be: training for fire departments, public education, hazardous fuel treatments, equipment, communications, additional planning, new facilities, infrastructure improvements, code and/or ordinance revision, volunteer efforts, evacuation plans, etc.
4) A process for maintenance of the plan which will include monitoring and evaluation of mitigation activities
5) Documentation that the plan has been formally adopted by the involved agencies. Basically a signature page of all involved officials.

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

- County Commissioners (Lead)
- Local Fire Chiefs

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- 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
- Bureau of Disaster and Emergency Services
- LEPC Chairperson
- Resource Conservation and Development representative
- State Fish and Game representative
- Interested citizens and community leaders as appropriate
- Other officials as appropriate

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

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

1.1.2.3 National Association of State Foresters

1.1.2.3.1 Identifying and Prioritizing Communities at Risk

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

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

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

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

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

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

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

1.1.2.3.2 Conceptual Approach

1. NASF fully supports the definition of the Wildland Urban Interface (WUI) previously published in the Federal Register. Further, proximity to federal lands should not be a consideration. The WUI is a set of conditions that exists on, or near, areas of wildland fuels nation-wide, regardless of land ownership.
2. Communities at risk (or, alternately, landscapes of similar risk) should be identified on a state-by-state basis with the involvement of all agencies with wildland fire protection responsibilities: state, local, tribal, and federal.
3. It is neither reasonable nor feasible to attempt to prioritize communities on a rank order basis. Rather, communities (or landscapes) should be sorted into three, broad categories or zones of risk: high, medium, and low. Each state, in collaboration with its local partners, will develop the specific criteria it will use to sort communities or landscapes into the three categories. NASF recommends using the publication "Wildland/Urban Interface Fire Hazard Assessment Methodology" developed by the National Wildland/Urban Interface Fire Protection Program (circa 1998) as a reference guide. (This program, which has since evolved into the Firewise Program, is under the oversight of the National Wildfire Coordinating Group (NWCG)). At minimum, states should consider the following factors when assessing the relative degree of exposure each community (landscape) faces.
    - **Risk:** Using historic fire occurrence records and other factors, assess the anticipated probability of a wildfire ignition.
    - **Hazard:** Assess the fuel conditions surrounding the community using a methodology such as fire condition class, or [other] process.
    - **Values Protected:** Evaluate the human values associated with the community or landscape, such as homes, businesses, and community infrastructure (e.g. water systems, utilities, transportation systems, critical care facilities, schools, manufacturing and industrial sites, and high value commercial timber lands).
    - **Protection Capabilities:** Assess the wildland fire protection capabilities of the agencies and local fire departments with jurisdiction.
4. Prioritize by project not by community. Annually prioritize projects within each state using the collaborative process defined in the national, interagency MOU "For the Development of a Collaborative Fuels Treatment Program". Assign the highest priorities to projects that will provide the greatest benefits either on the landscape or to communities. Attempt to properly sequence treatments on the landscape by working first around and within communities, and then moving further out into the surrounding landscape. This will require:

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- 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.

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;

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- Creates a pre-decisional objections process encouraging early public participation in project planning; and
- Issues clear guidance for court action challenging HFRA projects.

The Teton County Wildland-Urban Interface Wildfire Mitigation Plan is developed to adhere to the principles of the HFRA while providing recommendations consistent with the policy document which should assist the federal land management agencies (US Forest Service and Bureau of Land Management) with implementing wildfire mitigation projects in Teton 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 Teton County Fire Mitigation Planning Effort and Philosophy

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

1.1.3.1.1 Mission Statement

To make Teton 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 Teton 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 Teton County
- Strategically locate and plan fuel reduction projects

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- Provide recommendations for alternative treatment methods, such as modifying forest stand density, herbicide treatments, fuel reduction techniques, and disposal or removal of treated slash
- Meet or exceed the requirements of the National Fire Plan and FEMA for a County level Fire Mitigation Plan

1.1.3.2 Teton County 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.

1.1.3.3 National Fire Management Analysis System – Montana Department of State Lands

Original report dated March 8, 1982.

This is a report of the results of the National Fire Management Analysis System for Teton County, Montana. The Initial Action Assessment model was used as a basis for this analysis. Input data was gathered with the help of Sheriff Pete Howard.

The goal of this analysis was to identify an optimal wildfire budget by minimizing cost plus net value change (C+NVC). Cost was both pre-suppression (preparation) cost and suppression cost and net value change was the effect of fire on resources. It was assumed that there is an inverse relationship between the pre-suppression budget and both suppression expenses and net value change. Increases in what is spent on preparation will decrease acres burned, and thus decrease suppression costs and net value change.

The average fire load for Teton County can be characterized as moderate with estimates of an average of 45 fires per year with about 1,600 acres burned. Most of this acreage was burned during the hottest and driest part of the year in July and August. This was important in that grassland resource net value change (NVC) varies with soil moisture.

The resources that contribute the most to total net value change are forage and improvements. When soil moisture is low, long run forage production is set back by fire. Improvements include structures, machinery, fences, grain fields, and hay stacks, etc.

Teton County has a well organized fire organization that is equipped and trained to deal with both structure and wild fires. The fire organization consists of 5 volunteer fire departments with 5 all-purpose engines and about 80 volunteers. Teton County has a radio communication system for fire and dispatching that is handled through the Sheriff's Office. With the use of volunteers

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and reworked equipment, Teton County gets very good protection with a relatively small annual expenditure. The Teton County annual rural fire budget has ranged from $20,000 to $45,000 over the last 5 years. This is for structure and wildfire protection, and includes suppression and presuppression. Roughly 55% of all incidents handled by Teton County rural fire are wildfires. About half of an average budget of $30,000 was considered to be the wildfire presuppression budget.

It was felt that the eastern part of the county, in the areas near the 5 departments, were well covered. The plan for the additional equipment in this analysis was to add wildfire engines at strategic locations in the western part of the county. It was felt that this part of the county had on the average of about 40 minute attack times from Choteau and Pendroy. It was assumed that the addition of engines would decrease the attack times and put extra forces on larger fires. It was also assumed that there would be enough volunteers to operate the additional engines.

Generally, the results depend in part on assumptions regarding the expense of additional equipment and the value of volunteer labor. The model was run using the expense of both new and used engines. Also, volunteer labor was considered both as free and at a price. In this case the results were the same. The analysis indicates that an increase of three engines would minimize C+NVC.

Thus, the conclusion of the analysis is that Teton County would optimize its wildfire coverage by adding 3 strategically located wildfire engines to the west side of the county. The initial model indicated that with a third engine a fire that escaped initial attack was caught. If this were true, it should be considered to be due to better general coverage and not just one engine.

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

1. **Collection of Data** about the extent and periodicity of wildfires in and around Teton County. This included an area encompassing Chouteau, Flathead, and Lewis and Clark Counties to insure a robust dataset for making inferences about fires in Teton 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, of Northwest Management, Inc. and Mr. Gary Ellingson, B.S. 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). Mr. Ellingson holds a bachelor's degree 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 US Forest Service, the Bureau of Land Management; also included were fire mitigation specialists, resource management professionals, and hazard mitigation experts.

The planning team met with many residents of the county during the inspections of communities, infrastructure, and hazard abatement assessments. This methodology, when

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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.

2.3 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 Teton County All Hazards Mitigation Planning Committee, news releases were submitted to the local area newspapers the *Choteau Acantha* and the *Fairfield Sun Times.*

Hot Topic: Teton County Plans to Mitigate Natural Hazard Risks

Choteau, MT – The Teton County Commissioners have created a Hazards Mitigation Plan committee to complete a Natural Hazards Mitigation Plan for Teton County as part of the Federal Emergency Management Agency requirements and the National Fire Plan authorized by Congress and the White House. The Teton County Natural Hazards Mitigation Plan will include risk analysis at the community level with predictive models for where fires, floods, landslides, and other hazards are likely to occur. Northwest Management, Inc. has been retained by Teton County to provide risk assessments, mapping, field inspections, interviews, and to collaborate with the committee to prepare the plan. The coordination for this effort is being provided by Richard Van Auken, Teton County Fire Warden. The committee includes rural and wildland fire districts, the Montana Department of Natural Resources and Conservation, USDA Forest Service, Bureau of Land Management, Teton County Department of Emergency Services, the Local Emergency Planning Committee, elected officials, business people, and others. Specialists o the committee are conducting hazard profiles 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 hazards in Teton County is to conduct a homeowner's survey. Northwest Management, Inc. in cooperation with local fire officials, have mailed a brief survey to randomly selected homeowners in the county seeking details about home construction materials, proximity to water sources, and other risk factors surrounding homes. This survey is very important to the success of the plan. Those homes that receive a survey are asked to please take the time to complete it thereby benefiting the community overall.

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The planning team will be conducting Public Meetings to discuss preliminary findings and to seek public involvement in the planning process in February. A notice on the date and location of these meetings will be posted in local newspapers. For more information on the Fire Mitigation Plan project in Teton County contact your County Commissioners, Northwest Management, Inc. project director Dr. William Schlosser (208) 883-4488, or Richard Van Auken, the Teton County Fire Warden at 406-466-5561.

2.3.2 Newspaper Articles

Committee and public meeting announcements were published in the local newspaper ahead of each meeting. The following is an example of one of the newspaper announcements that ran in the Great Falls Tribune.

Figure 1.1. Newspaper article announcing planning process.

Teton County All Hazards Mitigation Plan Committee to hold pubic meetings

The Teton County Commissioners have created an All Hazards Mitigation Plan Committee to complete an All Hazards Mitigation Plan for Teton County. The Teton County All Hazards Mitigation Plan will include risk analysis at the community level for wildfires, floods, severe weather, and landslides. Northwest Management, Inc., has been retained by Teton County to provide risk assessments, mapping, field inspections, 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. The committee's specialists are developing risk profiles and proposing mitigation strategies. Specific mitigation activities for homes, structures, infrastructure, and resource capabilities will be proposed as part of the analysis.

The planning team will be conducting five public meetings to discuss preliminary findings and to seek public involvement in the planning process from February 22-24, 2005. For more information on Hazard Mitigation Plan projects in Teton County, contact your County Commissioners, or Dick Van Auken, Teton County Fire Warden at 406-466-5561. Everyone interested in these meetings is encouraged to attend and join in the discussions!

Public Information Meetings:

Power; February 22 - American Legion Hall, 7 PM

Choteau; February 23 Teton Medical Center Conference Room, 1 PM - focus on floods

Choteau; February 23 - Choteau Country Club, 7 PM

Pendroy; February 24 - Pendroy Fire Hall, 1 PM

Fairfield, February 24 - Community Hall, 7 PM

Planning a

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 Teton County a mail survey was conducted. The survey was completed during 2004. Using the cadastral database of landowners in Teton County, homeowners from the county were identified. Approximately 235 residents of Teton County were randomly selected to receive mail surveys.

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 Volume III Appendix.

The first in the series of mailings was sent November 8, 2004, and included a cover letter, a survey, and an offer of receiving a custom GIS map of the area of their selection in Teton 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 November

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12, 2004, encouraging their response. A final mailing, with a revised cover letter urging with them to participate, was sent to non-respondents on November 23, 2004.

Surveys were returned during the months of November, December, and January. A total of 109 residents responded to the survey as of March 20, 2005. The effective response rate for this survey was 46%. Statistically, this response rate allows the interpretation of all of the response variables significantly at the 95% 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 109 respondents in the survey, approximately 45% were from the Fairfield area, 37% from Choteau, 9% were from Power, 6% from Dutton, and 2% from both Bynum and Agawam.

All of the respondents (100%) correctly identified that they have emergency telephone 911 services in their area. Structure fire protection in Teton County is limited to those living within the rural fire departments. 100% of the respondents to the survey indicated they have rural structural fire protection. Analysis of this data indicates that all of the respondents correctly identified that they do, indeed, have structural fire protection as their homes were in rural fire protection districts..

Respondents were asked to indicate the type of roofing material covering the main structure of their home. Approximately 77% of respondents living in a rural area indicated their homes were covered with a composite material (asphalt shingles). About 15% of these residents indicated their homes were covered with a metal (eg., aluminum, tin) roofing material. Roughly 3% of the rural respondents indicated they have a wooden roofing material such as shakes or shingles.

The average driveway length of rural respondents to the survey was 523 feet long (0.1 miles). The longest reported was 5,808 feet (1.1 miles). Of those respondents (5%) with a driveway over ½ mile long, approximately 45% do not have turnouts allowing two vehicles to pass. Approximately 76% of all respondents indicated an alternate escape route was available in an emergency which cuts off their primary driveway access. Additionally, 42% indicated that their driveways were kept plowed during the winter and 5% indicated that 4-wheel drive may be needed during slippery or icy conditions due to a steeper road grade.

Respondents were asked if they had alternative communications available in the event the telephone service was down. Of the 66% respondents that said "yes", 96% indicated that they had cellular phone service and 10% said they had access to two-way radios. Also, 30% of respondents indicated they had an alternative electrical power source.

Survey recipients were asked to report emergency services training received by members of the household. Their responses are summarized in Table 2.1.

Table 2.1. Emergency Services Training received by household.

Type of Training	Percent of Households
Wildland Fire Fighting	15%
City or Rural Fire Fighting	4%
EMT (Emergency Medical Technician)	13%
Basic FirstAid/ CPR	58%
Search and Rescue	10%

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Residents were asked to indicate which, if any, of the disasters listed in Table 2.2 have affected their home, property or business within Teton County during the past 10 years.

Table 2.2. Disasters affecting homes in Teton County.

↓Hazard↓	Percent of respondents reporting hazard occurrence during the period 1993-2003, near their home.	If YES, Complete these questions…	Percent of respondents experiencing damage to their home or property.	Approximate average damage caused by each hazard (during the period 1993-2003)
Wildfire	8%	→	3%	$2,525
Flood	3%	→	1%	$2,000
Earthquake	1%	→	--	$--
Landslide	1%	→	--	$--
Wind Storm	45%	→	25%	$2,210
Tornado	37%	→	3%	$2,429
Civil Unrest / Terrorism	1%	→	--	$--

Respondents were asked to complete a fuel hazard rating worksheet to assess their home's fire risk rating. An additional column titled "results" has been added to the table, showing the percent of respondents circling each rating (Table 2.3).

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

Table 2.3. Fuel Hazard Rating Worksheet		Rating	Results
Fuel Hazard	Small, light fuels (grasses, forbs, weeds, shrubs)	1	59%
	Medium size fuels (brush, large shrubs, small trees)	2	34%
	Heavy, large fuels (woodlands, timber, heavy brush)	3	7%
Slope Hazard	Mild slopes (0-5%)	1	93%
	Moderate slope (6-20%)	2	7%
	Steep Slopes (21-40%)	3	0%
	Extreme slopes (41% and greater)	4	0%
Structure Hazard	Noncombustible roof and noncombustible siding materials	1	28%
	Noncombustible roof and combustible siding material	3	29%
	Combustible roof and noncombustible siding material	7	22%
	Combustible roof and combustible siding materials	10	21%
Additional Factors	Rough topography that contains several steep canyons or ridges	+2	Average -1.9 pts
	Areas having history of higher than average fire occurrence	+3	
	Areas exposed to severe fire weather and strong winds	+4	
	Areas with existing fuel modifications or usable fire breaks	-3	
	Areas with local facilities (water systems, rural fire departments, dozers)	-3	

Calculating your risk

Values below are the average response value to each question for those living in both rural and urban areas.

Fuel hazard 1.4	x Slope Hazard	1.1	=	1.5
Structural hazard	+	5.2		
Additional factors	(+ or -)	-1.9		
Total Hazard Points	=	4.8 .		

Table 2.4. Percent of respondents in each risk category as determined by the survey respondents.

00% – Extreme Risk = 26 + points
01% – High Risk = 16–25 points
26% – Moderate Risk = 7–15 points
37% – Low Risk = 6 or less points

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Values below are the average response value to each question for those living in **rural areas only**.

Fuel hazard 1.5 x Slope Hazard 1.1	=	1.7
Structural hazard	+	5.2
Additional factors	(+ or -)	-1.8
Total Hazard Points	=	5.1 .

Table 2.5. Percent of respondents in each risk category as determined by the survey respondents.

00% – Extreme Risk = 26 + points
02% – High Risk = 16–25 points
40% – Moderate Risk = 7–15 points
58% – Low Risk = 6 or less points

Values below are the average response value to each question for those living in **urban areas only**.

Fuel hazard 1.2 x Slope Hazard 1.1	=	1.3
Structural hazard	+	5.3
Additional factors	(+ or -)	-2.1
Total Hazard Points	=	4.5 .

Table 2.6. Percent of respondents in each risk category as determined by the survey respondents.

00% – Extreme Risk = 26 + points
02% – High Risk = 16–25 points
33% – Moderate Risk = 7–15 points
64% – Low Risk = 6 or less points

Many Teton County residents have been affected by at least one of the hazards covered by the All Hazards Mitigation Plan (wildfire, flood, landslide, earthquake, and severe storm). The survey included a series of questions asking respondents if they thought their home or business was located in an area that places it at risk to any of the hazards specified in Table 2.7.

Table 2.7 Respondents opinion of risk occurrence.

Type of Hazard	Percent of "yes" answers
Wildfire	30%
Flood	31%
Earthquake	6%
Landslide	1%
Wind Storm	69%
Severe Weather	74%
Civil Unrest/Terrorism	4%

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?" 46% of respondents indicated a desire to participate in this type of training.

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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 2.8.

Table 2.8. Public Opinion of Hazard Mitigation Funding Preferences.

	100% Public Funding	Cost-Share (Public & Private)	Privately Funded (Owner or Company)
Home Defensibility Projects →	23%	38%	38%
Community Defensibility Projects →	45%	39%	16%
Infrastructure Projects Roads, Bridges, Power Lines, Etc. →	60%	24%	16%

We wish to thank all Teton 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 Teton County Wildland-Urban Interface Wildfire Mitigation Plan’s preparation.

NAME **ORGANIZATION**

- Arnie Gettel....................................Teton County Commissioner
- Ben Rhodes....................................Teton County Fire Council / Fairfield Fire Chief
- Byron Grassman..............................Teton County Fire Council / Power Volunteer Fire Company
- Craig Zwerneman............................Teton County Fire Council / Choteau Fire Chief
- Dale Hanson....................................Pendroy Volunteer Fire Company
- Dick Van Auken...............................Teton County Fire Warden
- Dick Brownell...................................Teton County Fire Fee Board / Pendroy Volunteer Fire Company
- Erik Eneboe.....................................Montana Dept. of Natural Resources and Conservation
- Eric Somerfield................................Teton County Fire Council / Power Volunteer Fire Company
- Gary Ellingson.................................Northwest Management, Inc.
- Jim Spinder......................................Teton County Fire Council/Choteau Rural Fire Chief
- Joe Widhalm....................................Power resident
- Joe Dellwo.......................................Teton County Commissioner
- John Erixson....................................Northwest Management, Inc.
- Justin Grohs.....................................Teton County EMS
- Lanny Christman..............................Teton County Fire Fee Board
- Lee Clark...USDA Forest Service
- Lyle Weist..Teton County Fire Fee Board
- Mark Schlepp...................................Fish, Wildlife, and Parks
- Mike Leys...Teton County Fire Council / Choteau Volunteer Fire Company

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- Nick Dale .... Teton County Fire Council / Fairfield Volunteer Fire Company
- Pat Field... Teton County Fire Council / Pendroy Volunteer Fire Company
- Rick Stott .... Teton County Fire Council / Pendroy Volunteer Fire Company
- Roger Gettel .... Teton County Fire Fee Board
- Ross Fitzgerald................................ Power Volunteer Fire Company / Montana Fire Services Training School
- Sam Carlson .... Teton County Commissioner
- Shannon Downey .... Bureau of Land Management
- Shawn Dutton .... Teton County Fire Council/Dutton Fire Chief
- Sherwin K. Smith .... USDA FSA/Teton County Fire Council
- Steve Ostberg.................................. Fairfield Volunteer Fire Company
- Sue Banis .... Teton County Disaster and Emergency Services
- Tim Horn .... USDA Forest Service
- Vicki Baker....................................... Teton Coop Reservoir Company
- William E. Schlosser .... Northwest Management, Inc.

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 September 15th, 2004

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

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

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

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

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<u>Questions and comments from committee members:</u>

Department of Justice receives most fire calls.

The group agreed to the meeting dates suggested by John. Agreed upon meeting time is 1pm. Meetings will be held at USFS conference room in Choteau. Meeting dates are Nov. 16th, Dec. 14th, and Jan. 4th. There may be an additional meeting on the evening of Dec. 14th with fire chiefs.

Good locations for public meetings are Choteau, Fairfield, and Dutton.

Two local weekly newspapers are: Choteau Acantha acantha@3rivers.net

Fairfield Sun Times suntimes@3rivers.net

It might be helpful to have a map of occupied residences vs. just structures for emergency response.

There are 155,000 acres of CRP in the county (25% of cropland area). Fine fuel loading is often in the 3-ton/acre range on CRP. County map of CRP may be available from FSA in a few months. Contact is Sherwin Smith.

Possible issue with wildfire protection on isolated federal ground.

John distributed the draft Media Release and requested that all committee members review it and provide written response prior to the next meeting. Verbal comments were noted and will be incorporated into the document.

Shannon Downey volunteered to redraft portions of the media release and submit a draft to NMI.

The committee agreed to describe themselves as "state, federal, and local agencies along with concerned local citizens". They also felt FEMA should be spelled out.

The committee felt it was important to invite the Greenfield Irrigation District, Nature Conservancy, and Bureau of Reclamation to upcoming committee meetings. Input is especially significant regarding flood hazard.

John distributed an example public mail survey and requested comments.

The group agreed that the survey be sent to landowners owning greater than 5 acres. Dick Van Auken will work with the county to obtain a mailing list of property owners. Several committee members felt it important that the sample mailing list include the Arrowleaf subdivision and Mortimer Gulch area. The group felt that the front page of the survey emphasizes fire mitigation vs. all hazard mitigation. The form may need to be reviewed further to see if additional information about hazards other than fire can be collected.

A survey of Resource and Capabilities for fire departments was distributed for completion by local fire chiefs, BLM, and DNRC.

Dick Van Auken will work with the fire chiefs to complete the Resource and Capability forms.

Tim Horn, USFS, would like a PDF file of the Fergus County Fire Mitigation Plan for reference.

Lee Clark mentioned that Val Diemart/GIS specialist has a fire history layer for the Lewis and Clark NF.

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2.3.4.1.2 November 16th, 2004

William (Bill) Schlosser, of Northwest Management Inc. (NMI), made introductions distributed the meeting agenda.

Bill noted that the public survey was mailed to 236 households on 11/5/04. A reminder post card was mailed 11/15/04. 25 responses have been received to date.

Bill reviewed the procedure used by FEMA to review Pre Disaster Mitigation Plans (PDMs). FEMA will 1st provide conditional approval followed by a final approval of the completed plan. NMI will prepare a fire plan as a separate "stand alone" document.

Bill reviewed the chapter headings for the PDM and explained that the goal is to prepare a document that garners an "outstanding" acceptance review from FEMA.

The committee completed a Phase 1 Hazard Assessment Profile for the county. Hazards identified for the county were ranked as follows:

Hazard	Probability of Occurrence	Potential of Impact
Earthquake	Moderate	Low
Landslide	Low	Low
Terrorism	Low	Low
Flood	High	Moderate
Wildfire	High	High
Severe Weather	Moderate	High

The Phase II Hazard Assessment will be included in the PDM document.

Bill distributed drafts of the Flood Hazard chapter, Severe Weather chapter, and Wildlfire Mitigation Community Assessment chapters for editing and review by committee members. He asked that edits and comments be provided prior to the next meeting on December 14th so changes can be incorporated for review at that time.

Bill explained that the last chapter of the plan will include recommendations regarding; Safety and Policy, People and Structures, Infrastructure, Resource and Capability Enhancements, and Regional Land Management Recommendations.

Supporting information is presented on various maps prepared by NMI's Geographic Information Systems (GIS) lab. A variety of risk assessments have been completed and mapped. The committee reviewed each of the maps prepared following Bill's introduction to the particular map its intended use. Assessment maps presented included Flood Zones, Land slides, Historic Fire Regime, Current Fire Severity Estimate, Fire prone Landscapes, and the Wildland Urban Interface. Copies of each map were left with Dick Van Auken.

In following discussion Dick Van Auken agreed to conduct a review of recent fire history (since 1980) on flatlands located east of the Rocky Mountain front. Data required includes ignition point, cause, acres and perimeter. Shannon Downey (BLM) will coordinate with Dick as she seeks sources of funding to support collection of the data. Bill Schossler will post the current data he has available to NMI's FTP site.

The committee identified primary and secondary travel routes on the map and recommended changes to be incorporated.

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The next meeting was schedule for December 14th at 1 pm at the hospital. Dick Van Auken agreed to send out meeting announcements.

2.3.4.1.3 December 14, 2005

Attendance list was signed by all present and collected by Gary Ellingson.

William (Bill) Schlosser, of Northwest Management Inc. (NMI), distributed the meeting agenda. Bill reminded committee members to submit any edits on the draft chapters (flood, severe weather, and wildfire mitigation community assessments) distributed at the last mtg. Extra copies of these chapters are available. Comments can be submitted by e-mail to Bill or handed to Dick Van Auken.

Mapping Issues

Bill displayed the draft vegetation layers map and asked for a discussion regarding FSA's policy on distributing data on the location and extent of CRP lands in the county. Sherwin Smith, of FSA, stated that the agency cannot make the data available to the public due to privacy concerns. He may be able to obtain approval from the Washington, DC office. He suggested a request for the data be routed through either FEMA or Homeland Security. The data could be provided to the USFS because it is in the Department of Agriculture. BLM cannot be provided the date because it is in the Dept of Interior. Sherwin estimated that CRP data layers would not be completed for another 3-4 months.

Shannon Downey asked if the privacy issue could be addressed by classifying the CRP land as "high hazard herbaceous fuel" in combination with other lands that receive a similar classification. The committee agreed that Sherwin Smith and Dick Van Auken could prepare a vegetation map showing the approximate extent of CRP lands and provide a scanned copy to Bill. There are approximately 150,000 acres of CRP land in Teton County.

Fire Occurrence and Extent Data

Bill opened a discussion regarding the status of fire occurrence data. The currently available fire data describes only fires that occurred on federal lands since 1980. Dick Van Auken is leading the effort to compile data on ignition points and fire extents for fires that occurred on other lands in the county. Dick has advertised a temporary position in order to provide a person to compile the data. He hopes the ignition data work could be completed by mid-January. Estimates of fire perimeters may take a bit longer. Bill explained that additional data will improve fire prone landscape predictions and help to make the case regarding historical fire related problems within the county. The committee agreed to postpone the public meetings until the mapping and analysis with new data have been completed. Public meetings will be scheduled February 22-24th, 2005.

Hazard Event Data

Bill distributed a Hazard profile report for the years 1960-2000. The report was generated by FEMA utilizing the SHELDUS 2.1 program, which was obtained for free. Shannon Downey had notified Bill regarding the availability of this data. Bill will distribute the link to the program to committee members by email. Bill noted that the program generally did not provide good reporting on wildfires but did well providing data associated with weather related events. The report is a good starting point for developing a hazard profile for the county. Committee members noted that the report did not include data regarding the 1964 flood and floods that occurred in 1975 and 86. Bill will cross check the flood data he has with the report. Northwest Management, Inc. (NMI) will update the hazard profile based on committee input and Bill's review of flood data and submit updates to the SHELDUS program. Bill asked committee

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members to submit anecdotal information regarding past hazard events that have occurred within the county. Dick will locate and submit information of the 1964 flood. It was suggested that Bud Olsen former water commissioner be contacted as ask to write something up. Vicki Baker will do some additional research as well.

Public Mail Survey

95 surveys have been returned for a response rate of 40%. Dick said he had received several comments from local citizens regarding the survey. The fire risk section confused some people who weren't sure it applied to them if they lived in town. People who owned more than 1 home (1 in town and 1 out of town) weren't sure which home to evaluate. There was a perception that the survey was all about fire risk and did not address the other hazards. Bill noted that info was collected regarding other hazards in the survey.

Mitigation Activities

Bill facilitated a discussion regarding potential mitigation activities that should be considered within the county. The committee created a list of potential activities under the headings of fire, flood, and severe weather. Bill noted that fire chiefs would have the opportunity to complete resource and capability guides that will ID enhancements and resource needs. The guides will be distributed at the fire chiefs meeting scheduled that evening.

Potential Mitigation Activities, Concerns, Topics, Needs

Fire Hazard

- Airstrips and heliports (Dick will provide data)
- CRP lands, river bottoms, Rocky Mountain Front, Mortimer Gulch and Arrowleaf subdivision.
- Access
- Water Supplies (drafting stations, dry wells)
- Equipment Storage
- Portable repeater
- Satellite phones
- Trained personnel
- Hydrants
- Dutton-auxiliary power supply

Flood Hazard

- Bynum-diversion dam
- Bynum – canal upgrade and reinforcement
- Access and Roads – ice jamming, culverts, bridges. Hwy 89 north of town on Kimmet place, secondary and primary road crossings.
- Early warning systems

Severe Weather

- County road crew has funding issues, highway crew is very good
- Windbreaks/snow fences
- Back up power supplies needed – Fairfield and Dutton municipal water supply, Choteau courthouse.

The next committee meeting was scheduled for Tuesday, February 22nd, 1 pm at the hospital. Public meeting will be scheduled for that evening and the next couple days. Dick will check on various venues. During the public meetings the planning process will be described. Public input will be incorporated into the draft plan that will be made available to the public at a later date.

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Several committee members attended the Teton County Fire Chiefs meeting later that evening. Attendance at the meeting was 21 consisting primary of rural fire chiefs, volunteer fire personnel and the fire fee board. Committee members in attendance included: Bill Schlosser and Gary Ellingson (NMI), Shannon Downing (BLM), Dick Van Auken (Teton Co Fire Warden), Sherwin Smith (FSA), Jim Spindon (CVFD rural chief). Dick Van Auken will forward an attendance roster.

2.3.4.1.4 February 22, 2005

Attendance list was signed by all present and collected by Gary Ellingson.

Bill Schlosser, of Northwest Management, Inc. (NMI) led the meeting. Bill distributed copies of the public meeting notice. Five meetings have been scheduled in the county during the current week at five separate locations.

Bill provided an overview of the current status of the planning process. He highlighted significant changes that have occurred since the last December meeting. These changes are a direct response to new information that was collected and compiled by committee members.

Dick Van Auken completed his effort to map fire boundaries based upon 25 years of fire reports from 5 fire departments. Over 2,600 incidents involving 1,400 wildfires were reviewed. The extent of fires over 10 acres in size were plotted on maps. Sherwin Smith completed a map of CRP lands in the county. This data was incorporated into shape files. NMI used both sets of data to revaluate fire prone landscape areas. The result was a significant increase in the abundance of high risk areas in lowlands located in the eastern ½ of the county.

Bill referenced the Hazard profile data distributed at the last meeting and received no additional comments.

The committee discussed possible infrastructure improvements needed within the county. The group identified two locations on the map where repeaters are needed to improve emergency communications.

The group suggested that there may be issues associated with the diversion dam used to divert water from the Teton River into Bynum Reservoir. During the large flood in 1975 debris blocked gates and gates could not be opened manually. There may be a need for standby power and remote gate opening capability. An evaluation of the diversion canal may be needed to access its capacity to handle large volumes of water. Another possible issue may be the functionality of the diversion structure in the stream. The stream has a tendency to meander and carry significant bed load. The group raised the concern of possible water rights issues associated with diverting flood water. A local contact for more information is Bob Larson, in Havre, Montana, Regional Manager for DNRC, Water Rights Bureau (ph 265-5516). The group felt that county commissioners would have decision making authority regarding flood water diversion under the Declaration of Emergency Act.

The group noted that the South Fork Bridge near the Arrowleaf subdivision has a remote electronic monitor that records real time stream data. USGS monitors stream flow at the Dutton bridge on I-15.

The committee next discussed road infrastructure in the county. A few issues were identified. The bridge on Spring Ck in Choteau is prone to ice jamming. The bridge at Collins below the train trestle can have its approaches washed out but the structure stays in place and alternative routes are available.

The ditch and pipeline system associated with Freezout Lake was discussed. The pipeline from Priest Lake to Teton River is critical infrastructure to protect highway and homes in the area from flooding. A water management plan was prepared by the Montana Department of Fish,

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Wildlife and Park (FWP) in 1996. Mark Schlepp will provide a copy of the plan to Dick Van Auken. The plan includes an inventory of 35 diversion structures and 27 primary water sources.

The group shifted the discussion toward fire mitigation activities. Erik Enebon reminded the group that CRP contracts will be coming up for renewal over the next few years. The situation with CRP lands could change drastically depending on federal funding levels.

Fire mitigation strategies for CRP lands were discussed at length. Mowing is not a firebreak but provides a potential "burnout area" that can be utilized during suppression efforts. There are wind erosion problems associated with tilling. 250-300' wide firebreaks could be effective especially if located near existing corridors associated with RR's, highways, and power lines. NRCS prescription of CRP for fuel break is 60' plow – 300' mow – 30' plow. NRCS permits fuel break installation near farmsteads and buildings. No mowing is permitted May15-July 15 to protect nesting wildlife. Many producers are reluctant to burn. Prescribed burning services are limited in the local area. Costs average about $8 per acre. Haying is permitted every 5 years and grazing every 3 years on CRP lands. Contract mowers are available locally. A 10' strip plowed can provide an control line near mowed fuel breaks. Three entries are typically required to maintain plowed strips. Herbicide treatments are an alternative.

Fuel reduction is needed in the river bottom but is difficult to accomplish and maintain. Treatment in town may still be feasible. Structures located in or near the river bottom are a priority for defensible space projects.

Potential fuel mitigation projects in the Arrowleaf and Mortimer Gulch areas were discussed. Potential to conduct additional DSP and roadside treatments remains but may be limited by landowner attitudes. Several residents implemented DSP projects over the past year. Residents in the area are 50% permanent and 50% seasonal. The vast majority are retired. Mechanical treatments are necessary on adjoining federal lands. A summary of proposed treatment is needed from the USFS. The Peoples Road is a good candidate for a roadside fuel reduction project.

Water storage and access issues within the county were discussed next. Five sites where water improvements are needed were identified.

1. Install a 10,000-20,000 gallon cistern near the fire station in Pendroy.
2. Install a dry hydrant in Big Coulee Creek south of Fairfield.
3. Install a dry hydrant on Fifth Road.
4. Install a pressured hydrant on Tri-County water system.
5. Install a dry hydrant near the South Fork bridge close to Arrowleaf subdivision.

The group suggested that fire chiefs map known locations of all existing hydrants.

Next committee meeting was scheduled for Wednesday, March 9th at 1 pm. The draft plan will be reviewed at the meeting.

2.3.4.1.5 March 30, 2005

Attendance list was signed by all present and collected by Gary Ellingson.

Bill Schlosser, of Northwest Management, Inc. (NMI) led the meeting. Bill distributed Committee Draft copies of the All Hazards Mitigation Plan (Volume 1), Wildland Urban Interface Wildfire Mitigation Plan (Volume II), and Hazard Mitigation Plan Appendices. Bill would like committee comments on the drafts to be submitted prior to April 19, 2005..

Volume I includes the Flood, Landslide, Severe Weather and Earthquake Mitigation plans. Volume II is the Wildfire Mitigation plan. The two volumes combined are the counties PDM Plan.

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Bill asked the committee to pay special attention to the recommendations chapters as these are newest chapters and are subject to the most change. Bill noted a typo on the appendices Table of Contents …there is no title for Appendix III. Committee members noted the Idaho Forestry Assistance program needs to be deleted as a potential funding source on page 37. NRCS needs to be added to the acknowledgments page on Vols I and II.

Bill reviewed the organization of the documents and explained that FEMA standards primarily guided format of the plan document. Other format items were incorporated to dovetail with National Fire Plan standards.

During the course of discussion Bill asked if there might be additional information available regarding zoning and regulations under the county growth plan. Dick Van Auken volunteered to check it out and get back to Bill. It was noted that committee-meeting notes for December and February were missing from section 2.3.3.3. Gary Ellingson will forward the minutes to Bill by email. Shannon Downey had a question on pg 59 regarding the extent of the region mentioned. Bill replied the data set included the Central Zone of the BLM.

Bill noted that there was still some information missing in Section 4.5 regarding Resource and Capability Guides. Dick Van Auken will check his files to look for the guides which were completed by the local fire company chiefs.

Tim Horn (USFS) has been asked to provide a summary of the Evacuation Plan prepared for the Mortimer Gulch area. The summary would be inserted into section 4.7 of the plan. Some discussion occurred regarding $75,000 in mitigation monies that had been provided to the local RC&D.

Bill reviewed Chapter 5 and noted that some material in the section was prepared specifically for county commissioners. Bill agreed to send Dick Van Auken a CD that had a format for calculating cost –benefit analysis for FEMA grants. During review of section 5.1 it was mentioned that Lewis and Clark county has developed approved fire mitigation standards for subdivisions. A page formatting problem (footer) was noted on pages 134 and 137.

The committee agreed that section 5.2c of Table 5.2 should be modified from $850 to $1200 for home defensible space treatment. Costs in section 5.2d should be modified from $750 to $1,200. Roadside treatment areas in section 5.2h should be modified to 150’ below the road and 100’ feet above and cost per mile of road treated to $30,000.

Dick Van Auken will try to put together some costs for section 5.3b in Table 5.3 regarding cost to improve communications.

Section 5.4f in Table 5.4 will need to be completed by Dick Van Auken.

Bill will udate table 5.4 to include specific locations where resources such as on-site water, repeaters, and back up power are required.

The committee had several comments regarding the signature pages on pages 145 and 146 of the plan. Power, Bynum and Pendroy do not have a mayor. Choteau is the only “city” in Teton County. Other locations such as Fairfield and Dutton are “towns”. The mayor of Choteau is Dan Clark, Fairfield-Lillian Alfson, Dutton- Robert Goodell. Sue Banis’s title should read “Teton County DES Coordinator”.

Dick Van Auken is the County Fire Warden representing all “Fire Companies”.

Signatures on page 148 are: BLM – June Bailey, NRCS-Sherwin Smith, L&C National Forest – Leslie W. Thompson, DNRC Gary Williams Central Land Office Area Manager.

Bill will have the final plan completed by May 9th. Dick Van Auken will obtain resolution numbers for the cities and town that will sign the plan and forward them to Bill. Bill will send Dick a

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“resolution template”. The Teton County commissioners will meet on May 12th and can sign the plan at that time.

2.3.4.1.6 April 19, 2005

The meeting took place at the Teton Medical Center in Choteau, Montana. Sue Banis - Teton County DES, Ross H. Fitzgerald – Power Volunteer Fire Co., Mike Leys – Choteau Volunteer Fire Dept., Dick Van Auken – Teton County Fire Warden, Sam Carlson – Teton County Commissioner, Bill Schlosser – Northwest Management, Inc., Sherwin K. Smith – USDA/FSA, Vicki Baker – Teton Coop. Reservoir Co were in attendance.

Bill Schlosser, Northwest Management, Inc.

- Recap of the purpose of the meeting – to make the final changes to the All Hazard Mitigation Plan for Teton County.
- Bill indicated that he had the missing meeting notes from two prior PDM meetings available if anyone wanted to read them.

Regarding the inclusion of additional &/or changed information for the PDM plan:

- Forest Service (Tim Horn) has provided the Emergency “E” Plan for the Rocky Mountain Front.
- The Mortimer Hazard & Fuel Reduction will be added to the appendix.
- WUI Boundary will be added to the appendix.
- Dick’s changes from the November meeting will be added.
- Dick also has some Forest Service changes that will be added.
- Sue’s changes to the Public Meeting minutes will be added.
- All faxed changes that were received will be added.
- There were 15 pages via email that will be added.
- The Bureau of Land Management changes are forthcoming.
- Vick Baker, Teton Coop Reservoir Co., has requested specifics on Diversion from Brent Eckland, who is from the Bureau of Reclamation in Billings. The plans are meant to identify projects and get the details if possible. She also mentioned for inclusion in the Action Plan to put in a railings system and maybe a 30% grate or a grate up and off to the side to aid in debris disbursement. Vicki hoped that she could email her information to Bill by the end of next week. Bill hoped the end of this week. She said she’d try, but it all depended on Brent getting her the information she needed. She said she would also include information on the process used to determine who controls the floodgate.

Draft Changes

The committee proceeded to go through both Volumes I and II, and the Appendices of the PDM Plan, indicating changes as necessary. Bill and several committee members recorded the changes directly on their drafts. Bill will make the changes / additions / deletions / corrections and redistribute the draft via email to the committee when completed, tentatively by May 2nd.

At this point there was another meeting scheduled for the TMC Conference Room, so we agreed to move and continue our meeting at the Choteau Country Club. We concluded the editing of Volumes I, II and the Appendices.

The new schedule for the Plan is as follows:

May 2, 2005 – New draft of the plan emailed to the committee

May 2-23, 2005 – Copies of “The Draft” available for public viewing to be located at:

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- City Halls – Choteau, Fairfield, & Dutton
- City Libraries – Choteau, Fairfield, & Dutton
- Post Offices – Bynum, Power, & Pendroy
- Courthouse – Choteau

Bill handed out copies of a media release, regarding the Public Review Draft, to be distributed to the local newspapers. He will change the "available for review" dates and also update Dick's new telephone number to 406-466-3406.

May 26 (or June 2) – approval of the "All Hazard Mitigation Plan" draft by the Commissioners at their weekly Commissioners' Meeting. Then the approved draft will be sent to Montana State DES Office, and to FEMA Region 8 for their approval; then back to Teton County for a formal adoption of the plan.

The meeting was adjourned at 5:50 p.m.

2.3.5 Public Meetings

Public meetings were scheduled in a variety of communities in Teton 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 Project Manager Bill Schlosser on the following dates and locations:

2.3.5.1 February 22nd, 2005 – Power

Present:

Ross Fitzgerald
Erik Somerfeld
Roger Gettel
Arnie Gettel County Commissioner
Byron Grassman

<u>Additional Recommendations for mitigation:</u>

Flood:

Hold flood waters in Bynum Reservoir for fire protection

Allow County Commissioners to control head gates in event of high water

Fire:

Use of fire resistant building materials in high fire risk areas

Built equipment (CRP eater) which can respond to scene quickly using existing roads and plow line. Ie use of military 6X6 with offset plow attached with mechanical lift to raise and lower plow.

Additional water supplies East of I 15

Use of defensible space near CRP

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Portable repeater

Severe weather:

Put transfer switches on critical infrastructure. I.e. fire hall, ambulance barn, shelters etc

2.3.5.2 February 23, 2005 - Choteau

FOCUSED ON FLOODS

One quarter of the County's structures (right around Choteau) are in the flood zone.
The big floods in Teton County / Choteau area were in 1953, 1964, and 1975.
Teton County only has 100-year records. (100-year floods happen every 11ish years.)

QUESTION: What do we need to do to make the Diversion gate better?

1. Increase the holding capacities of the canal
2. Divert the water into other areas
   a. another reservoir
   b. into the fields
   c. it takes 30 days to fill Bynum to capacity

QUESTION: What do we do for Choteau?

1. Divert the water to Bynum
2. Watch out for debris – need to premitigate
3. Need to meet the needs of both flood and irrigation
4. Need back-up power to run gates at the Bynum diversion

Alan Rollo to give assessments to Dick to put into the PDM plan.

Spring Creek and Teton River – bridge by Park and one up above were replaced by the CORP with culverts after the 1964 flood.

2.3.5.3 February 23rd, 2005 – Choteau

Those who attended this meeting had been to previous meetings, so there was no reason to go through the entire presentation. Bill Schlosser, Northwest Management, Inc., presented an abbreviated version of the powerpoint slides. There was a brief discussion regarding the general processes to complete the final plan from this point.

2.3.5.4 February 24, 2005 - Pendroy

The WUI model seems to fit our needs.

Significant infrastructure weaknesses.

CRP – a lot of risk regarding fire.

Nearly every acre will burn. We need to decide what is important to us. What hazards and places do we mitigate?

QUESTION: What do we need in Pendroy?

1. Repeaters
2. Cell phone coverage (almost non-exsistant)
3. Dry hydrants
   a. Paul Wick (Weed Supervisor for Teton County) could utilize & keep the water recycled.

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   b. Pendroy has put in a dry hydrant by Kister's
   c. Hydrant in reservoir if we could get to them
   d. Spring by Ora Knowlton's
4. Cisterns
5. Portable Repeaters
6. New 3,000 gallon tanker
7. Additional storage

Bill requested that Pendroy put together a list of needs for a 5-year plan.

2.3.5.5 February 24, 2005 - Fairfield

The WUI model fits us.

CRP – a lot of risk regarding fire.

What hazards and places do we mitigate?

QUESTION: What do we need?

1. Tenders
2. Dry hydrant
3. Water sources
4. Repeaters
5. Water storage
6. Fire Hall needs 2 more truck bays

Figure 2.1. Public meeting slideshow overview.

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

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Table 2.9. Public meeting slide show.

Slide 1

Slide 2

Slide 3

Slide 4

Slide 5

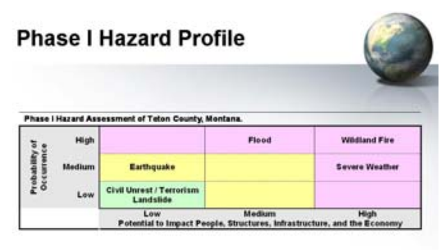

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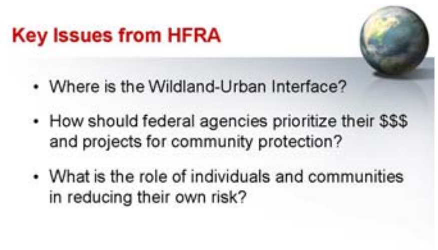
Table 2.9. Public meeting slide show.

Slide 9



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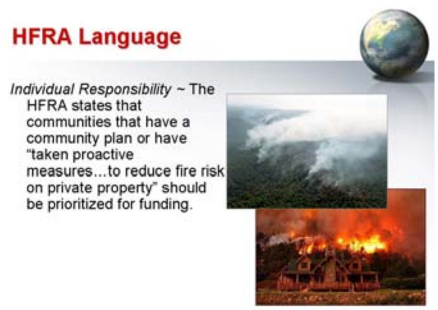

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Table 2.9. Public meeting slide show.

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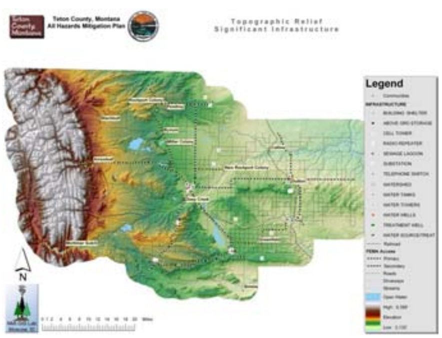
Slide 20

Slide 21



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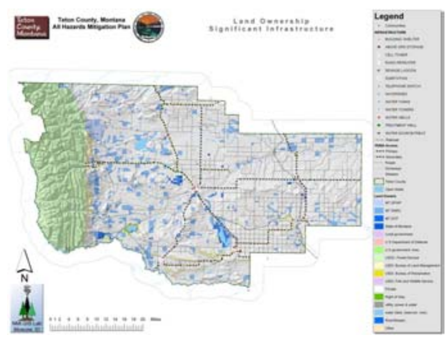

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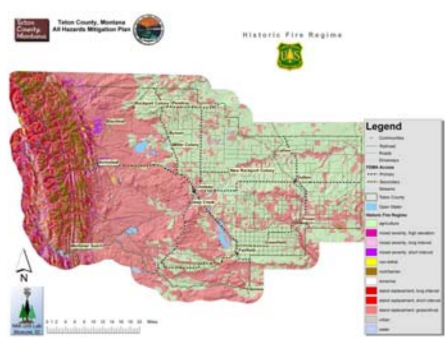

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Table 2.9. Public meeting slide show.

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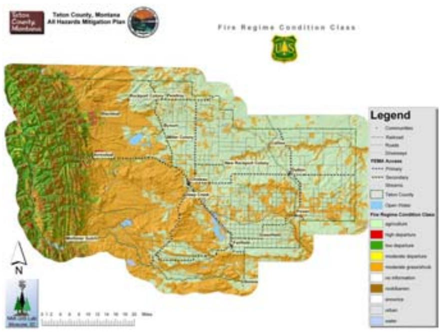

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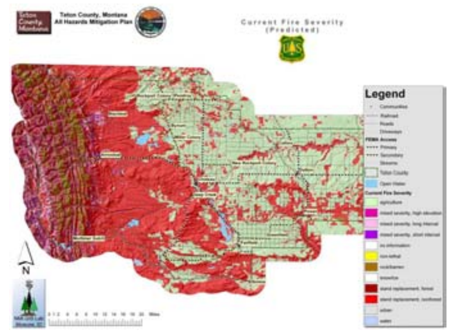

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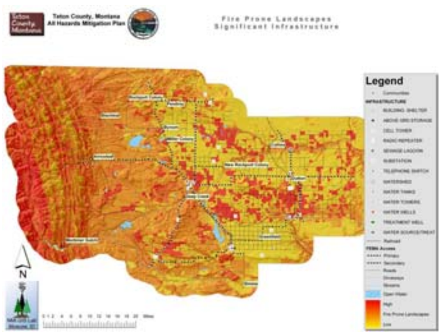

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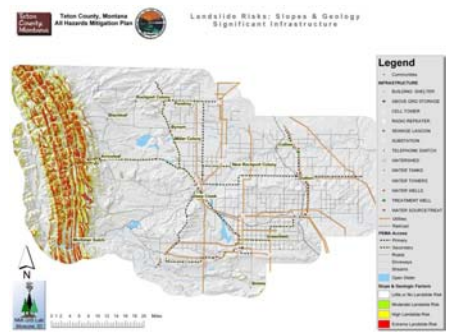

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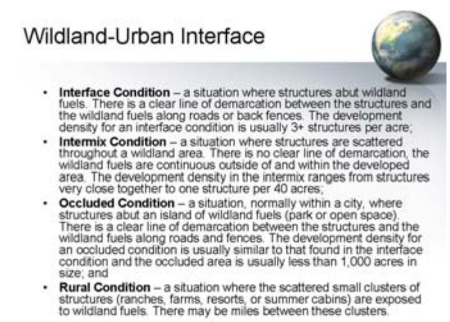

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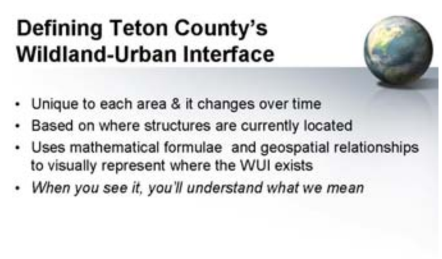

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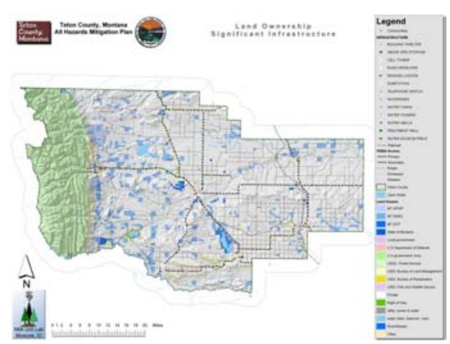

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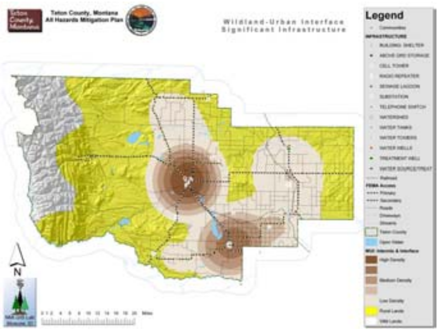
Table 2.9. Public meeting slide show.

Slide 33		Slide 34	
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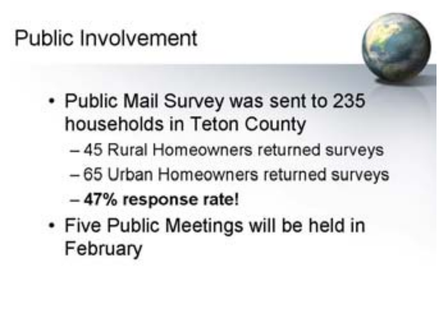
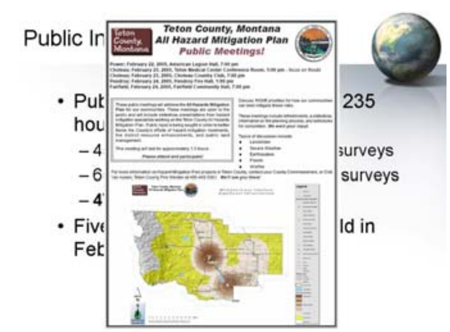
Slide 37		Slide 38	
Slide 39		Slide 40	

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Table 2.9. Public meeting slide show.

Slide 41			

2.3.6 Documented Review Process

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

The results of these formal and informal reviews were integrated into a DRAFT Wildland-Urban Interface Wildfire Mitigation Plan. This plan was given to members of the planning committee on March 30, 2005 with comments provided by April 30, 2005. Public review of the revised DRAFT document was made from May 1 until May 31, 2005. All comments were integrated into the final version of the mitigation plan.

The final plans were prepared on June 9, 2005. Adoption of the All Hazards Mitigation Plan and the Wildland-Urban Interface Wildfire Mitigation 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

Teton County is dedicated to involving the public directly in review and updates of the All Hazard Mitigation Plan and Wildland-Urban Interface Wildfire Mitigation Plan. The Teton County Commissioners, through the Hazard Mitigation Committee are responsible for the annual review and update of the plan as recommended in the “Recommendations” section 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 Hazard Mitigation Committee. The meetings will provide the public a forum for which they can express its concerns, opinions, or ideas about the plans. The County Clerk 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

Teton County is located along the eastern Rocky Mountain Front of Montana with the Teton River cutting through its heartland. Elevations range from 3,300 feet above sea level on the eastern side to 9,392 feet on top of Rocky Mountain in the Lewis and Clark National Forest on the western edge of the county. Ownership is mixed between Federal (mainly US Forest Service and Bureau of Land Management), state and private owners.

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Figure 3.1. Topographic relief of Teton County, Montana.

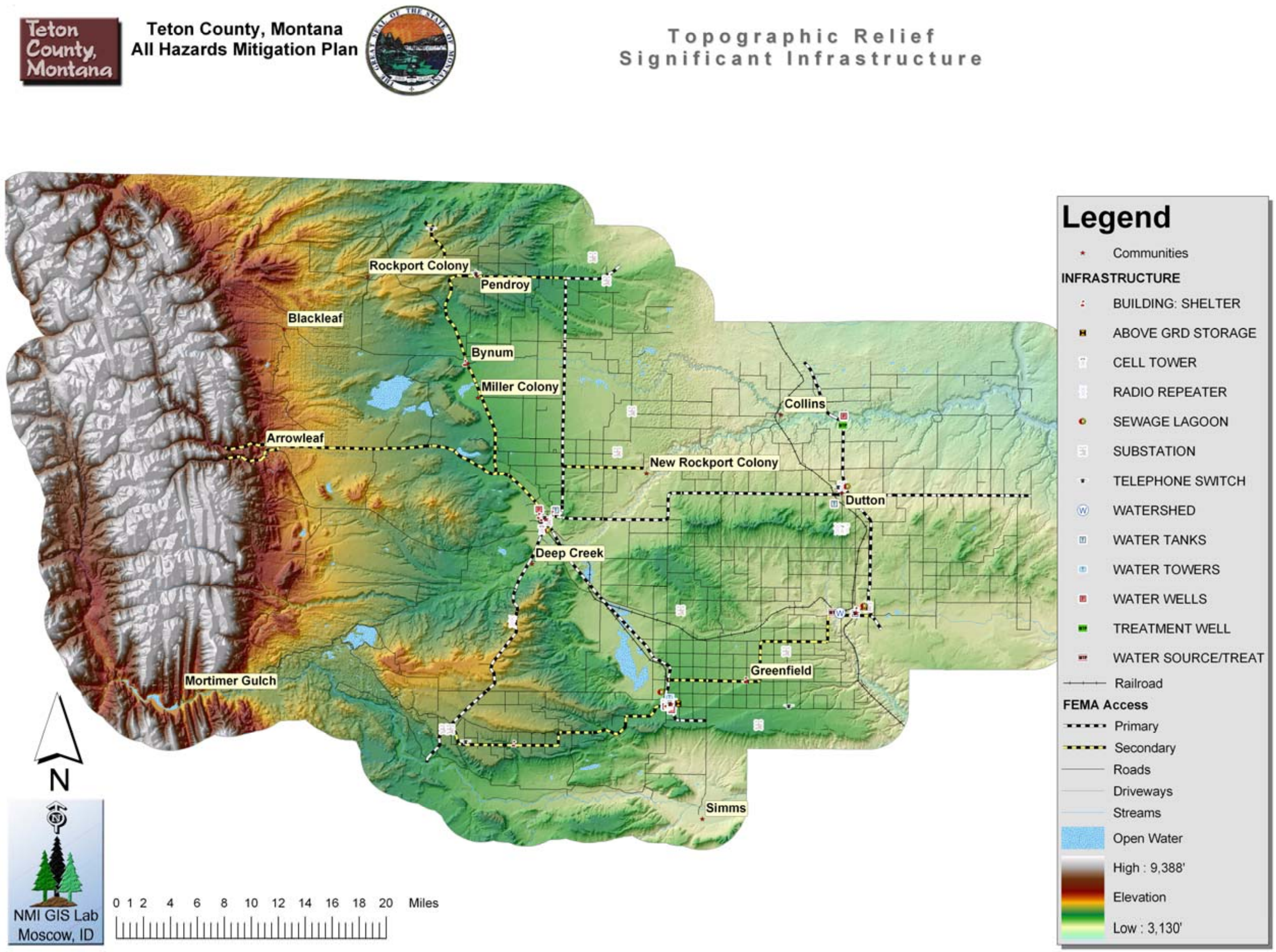

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Figure 3.2. Land Ownership in Teton County.

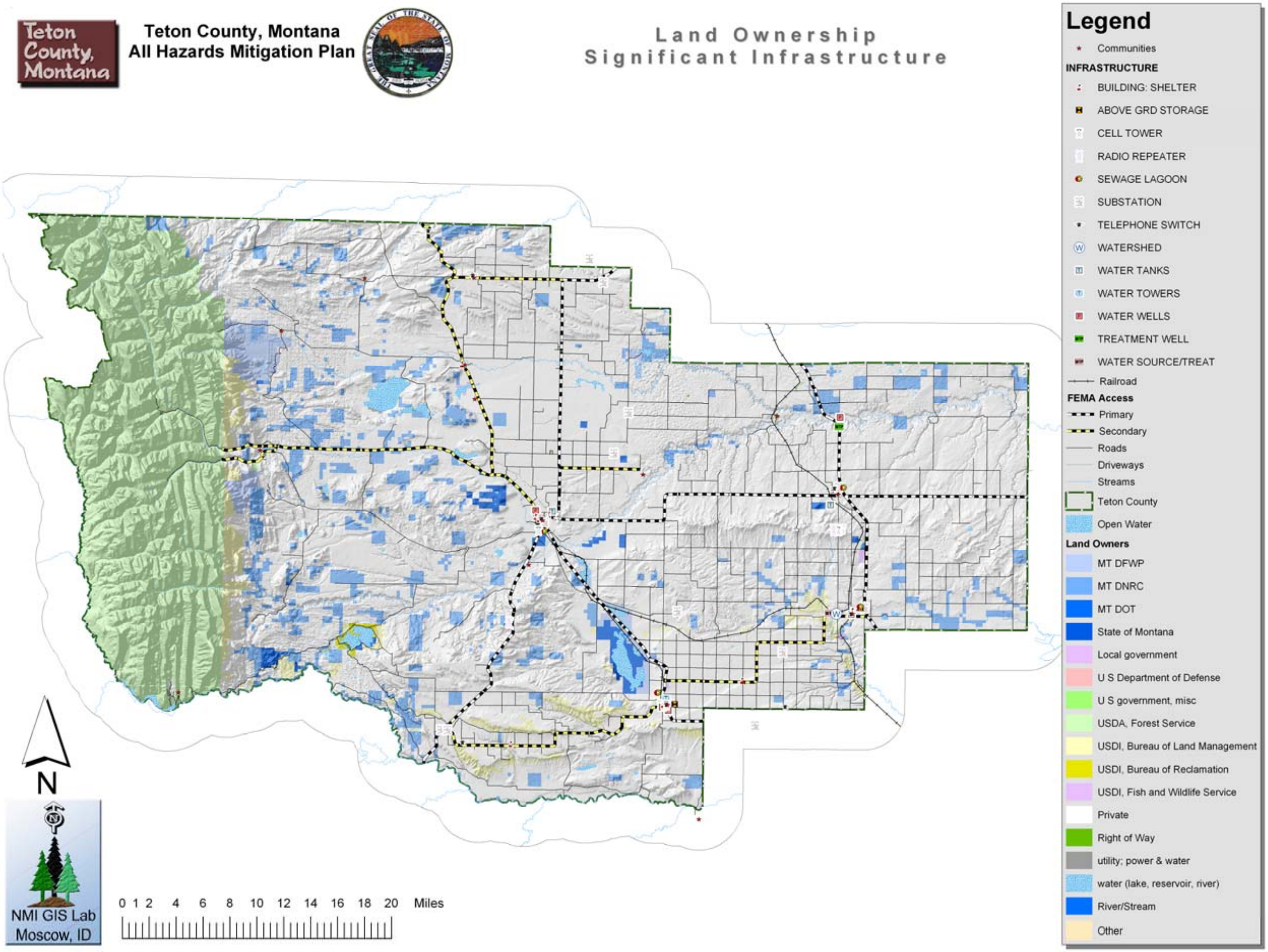

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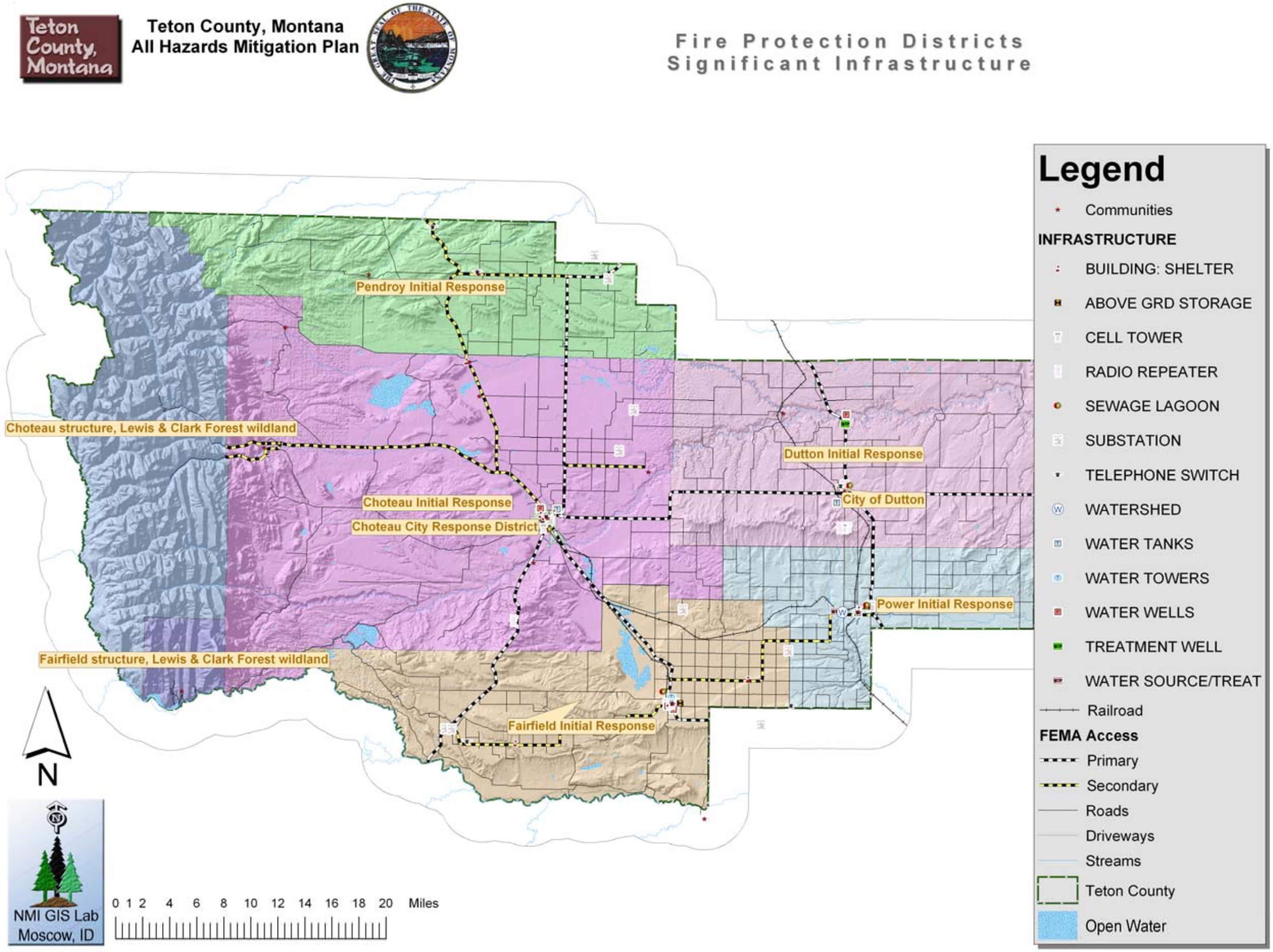
Figure 3.3. Rural and City Fire Protection in Teton County.



3.2 Demographics

The number of persons residing in Teton County has remained remarkably steady over the past 80 years, rising by less than 10 percent between 1920 and 2000. Teton County's population was 6,445 in 2000, and 5,870 in 1920. Teton County has two incorporated communities, Choteau (pop. 1,801) and Fairfield (pop. 655). The total land area of the county is roughly 2,293 square miles (1,467,251.2 acres).

Table 3.1 summarizes some relevant demographic statistics for Teton County.

Table 3.1. Summary of selected demographic statistics for Teton County, Montana.

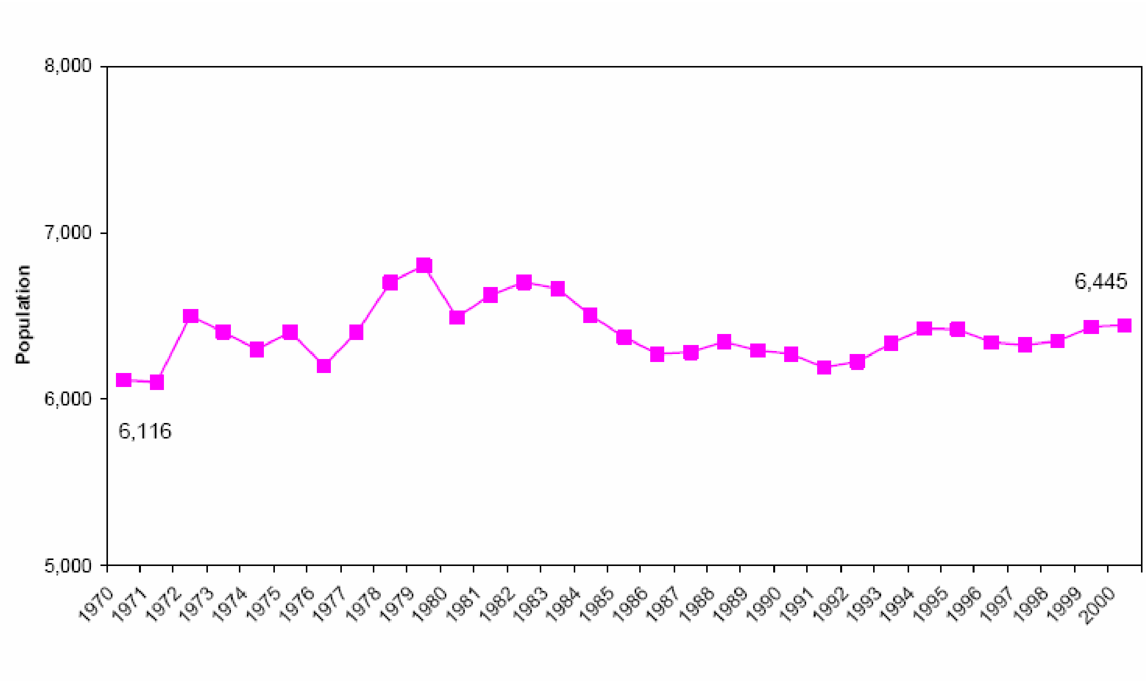
Subject	Number	Percent
Total population	**6,445**	**100.0**
SEX AND AGE		
Male	3,167	49.1
Female	3,278	50.9
Under 5 years	388	6.0
5 to 9 years	447	6.9
10 to 14 years	562	8.7
15 to 19 years	528	8.2
20 to 24 years	225	3.5
25 to 34 years	607	9.4
35 to 44 years	993	15.4
45 to 54 years	910	14.1
55 to 59 years	316	4.9
60 to 64 years	382	5.9
65 to 74 years	506	7.9
75 to 84 years	433	6.7
85 years and over	148	2.3
Median age (years)	39.9	(X)
18 years and over	4,687	72.7
Male	2,284	35.4
Female	2,403	37.3
21 years and over	4,477	69.5
62 years and over	1,322	20.5
65 years and over	1,087	16.9
Male	485	7.5
Female	602	9.3
RELATIONSHIP		
Population	**6,445**	**100.0**
In households	6,378	99.0
Householder	2,518	39.1
Spouse	1,571	24.4

Table 3.1. Summary of selected demographic statistics for Teton County, Montana.

Subject	Number	Percent
Child	2,020	31.3
Own child under 18 years	1,706	26.5
Other relatives	102	1.6
Under 18 years	30	0.5
Nonrelatives	167	2.6
Unmarried partner	69	1.1
In group quarters	67	1.0
Institutionalized population	60	0.9
Noninstitutionalized population	7	0.1
HOUSEHOLDS BY TYPE		
Households	**2,518**	**100.0**
Family households (families)	1,743	69.2
With own children under 18 years	788	31.3
Married-couple family	1,523	60.5
With own children under 18 years	647	25.7
Female householder, no husband present	158	6.3
With own children under 18 years	96	3.8
Nonfamily households	775	30.8
Householder living alone	691	27.4
Householder 65 years and over	364	14.5
Households with individuals under 18 years	828	32.9
Households with individuals 65 years and over	1,035	41.1
Average household size	2.53	(X)
Average family size	3.12	(X)
HOUSING TENURE		
Occupied housing units	**2,538**	**100.0**
Owner-occupied housing units	1,920	75.7
Renter-occupied housing units	618	24.3
Average household size of owner-occupied unit	2.56	(X)
Average household size of renter-occupied unit	2.38	(X)

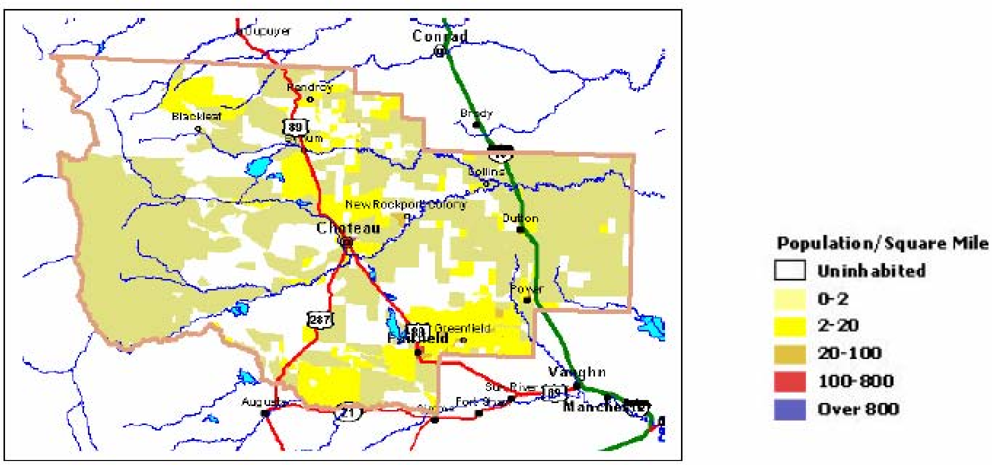
(Census 2000)

Figure 3.4 Teton County Population Trends from 1970 – 2000.



Sources: U. S. Bureau of the Census. Decennial Censuses of Population and Intercensal Estimates.

Figure 3.5 Population per square mile in Teton County.



Source: Montana Natural Resource Information System (NRIS) Geographic Information System (GIS), Based on US Bureau of the Census, "Census of the Population – 2000"

3.3 Socioeconomics

Teton County had a total of 2,538 occupied housing units and a population density of 2.8 persons per square mile reported in the 2000 Census (Table 3.1). Ethnicity in Teton County is distributed: white 96.3%, black or African American 0.2%, American Indian or Alaskan Native 1.5%, other race 1.5%, and Hispanic or Latino 1.1%.

Specific economic data for individual communities is collected by the US Census; in Teton County this includes Choteau and Fairfield. Choteau households earn a median income of

$25,708 annually and Fairfield households earn $29,018, which are both below the Teton County median income during the same period ($30,197). Table 3.2 shows the dispersal of households in various income categories in both communities.

Table 3.2. Income in 1999	Choteau		Fairfield		Teton County	
	Number	Percent	Number	Percent	Number	Percent
Households						
Less than $10,000	123	15.3	28	9.8	306	12.2
$10,000 to $14,999	102	12.7	15	5.2	213	8.5
$15,000 to $24,999	168	20.9	70	24.4	500	19.9
$25,000 to $34,999	106	13.2	62	21.6	421	16.7
$35,000 to $49,999	147	18.3	47	16.4	470	18.7
$50,000 to $74,999	115	14.3	41	14.3	390	15.5
$75,000 to $99,999	28	3.5	22	7.7	135	5.4
$100,000 to $149,999	11	1.4	2	0.7	56	2.2
$150,000 to $199,999	2	0.2	0	0	16	0.6
$200,000 or more	1	0.1	0	0	11	0.4
Median household income (dollars)	$25,708		$29,018		$30,197	

(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 Teton County, a significant number of families are at or below the poverty level. Approximately 12.2% of Teton County families are below poverty level (Table 3.3).

Table 3.3 Poverty Status in 1999 (below poverty level).	Teton County	
	Number	Percent
Families	212	(X)
Percent below poverty level	(X)	12.2
With related children under 18 years	166	(X)
Percent below poverty level	(X)	20.4
With related children under 5 years	93	(X)
Percent below poverty level	(X)	33.0
Families with female householder, no husband present	52	(X)
Percent below poverty level	(X)	32.9
With related children under 18 years	48	(X)
Percent below poverty level	(X)	47.1
With related children under 5 years	15	(X)
Percent below poverty level	(X)	57.7
Individuals	1,056	(X)
Percent below poverty level	(X)	16.6
18 years and over	608	(X)
Percent below poverty level	(X)	13.1

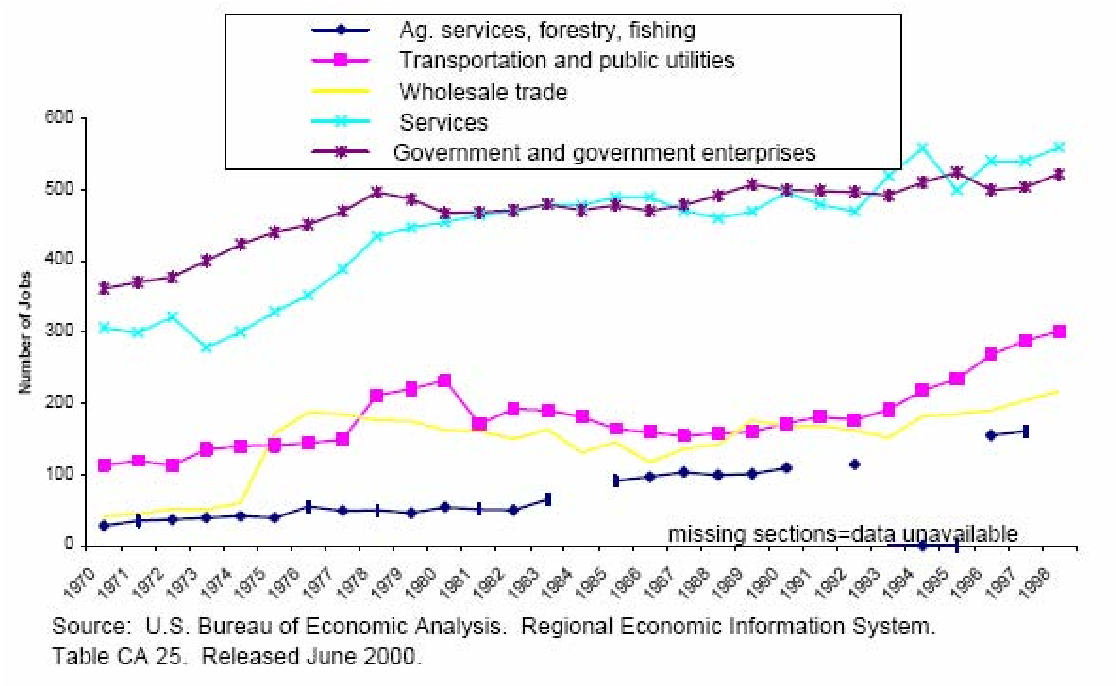
Table 3.3 Poverty Status in 1999 (below poverty level).	Teton County Number	Teton County Percent
65 years and over	88	(X)
Percent below poverty level	(X)	8.4
Related children under 18 years	445	(X)
Percent below poverty level	(X)	25.6
Related children 5 to 17 years	294	(X)
Percent below poverty level	(X)	21.7
Unrelated individuals 15 years and over	210	(X)
Percent below poverty level	(X)	22.5

(Census 2000)

The unemployment rate was 2.1% in Teton County in 1999, compared to 4.4% nationally during the same period. Approximately 20.6% of the Teton 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 & Industry	Teton County Number	Teton County Percent
OCCUPATION		
Management, professional, and related occupations	1,070	39.4
Service occupations	423	15.6
Sales and office occupations	548	20.2
Farming, fishing, and forestry occupations	148	5.4
Construction, extraction, and maintenance occupations	266	9.8
Production, transportation, and material moving occupations	264	9.7
INDUSTRY		
Agriculture, forestry, fishing and hunting, and mining	561	20.6
Construction	139	5.1
Manufacturing	78	2.9
Wholesale trade	95	3.5
Retail trade	258	9.5
Transportation and warehousing, and utilities	165	6.1
Information	148	5.4
Finance, insurance, real estate, and rental and leasing	122	4.5
Professional, scientific, management, administrative, and waste management services	106	3.9
Educational, health and social services	635	23.4
Arts, entertainment, recreation, accommodation and food services	165	6.1
Other services (except public administration)	136	5.0
Public administration	111	4.1

Figure 3.6 Employment in Largest Growing Sectors.



Approximately 61.1% of Teton County's employed persons are private wage and salary workers, while around 18% are government workers (Table 3.5).

Table 3.5. Class of Worker	Teton County	
	Number	Percent
Private wage and salary workers	1,661	61.1
Government workers	490	18.0
Self-employed workers in own not incorporated business	525	19.3
Unpaid family workers	43	1.6

(Census 2000)

3.4 Description of Teton County

3.4.1 Teton County History

Summarized from Teton County website http://www.tetoncomt.org/history.aspx

Teton County is located on the Rocky Mountain Front, which forms the seam between the wild lands and wilderness of the Lewis and Clark National Forest and the foothills and plains domesticated by area ranchers and farmers.

Sparsely populated, Teton County is made up of small communities, linked by miles of country roads and highways, that are dedicated to maintaining the special quality of life that makes living here so worthwhile. Teton County is a slice out of America's heartland and, in some ways, is a slice out of this country's past. Crime rates are low out here and violent crime is almost non-existent. We don't have gangs in our schools or on our streets, and we still enjoy old-fashioned pleasures like community dances, family picnics and going for a drive in the country.

Our culture and traditions are steeped in the fertile soil and in the wheat and barley and livestock we raise as our top marketable products. Seasons around here include calving, lambing, haying, seeding, harvesting and, in the fall, shipping. When you see cowboys moving their cattle along a roadway, you can bet they live on a ranch in the area and they probably learned to ride shortly after they learned to walk.

We value the wide open spaces (Teton County's population density, for example, is just 2.8 people per square mile), the pristine wildlife habitat, the clean air and bountiful water. We're accustomed to seeing deer in our gardens and hay fields, hearing the yip and howl of coyotes on moonlit nights and watching as hawks and eagles soar over the prairie.

We're proud of our communities and ready with open hospitality for visitors and travelers. Stop here awhile and you'll begin to realize why life in the country - far from the hustle and bustle of urban America - is such a valuable treasure.

Along the Rocky Mountain Front you can visit wildlife viewing sites that may give you a glimpse of mountain goats, bighorn sheep, elk or white tail and mule deer.

You can visit the Old Trail Museum in Choteau and learn about the vast inland sea that covered this area 80 million years ago and imagine the herds of herbivorous dinosaurs that roamed the shores of the sea, nested in colonies and reared their young.

You can hike along quiet mountain trails, listening to the sounds of the chattering squirrels and the whisper of the wind in aspen trees. Or, you can get out your fishing pole and go after some of the area's rainbow and brook trout in area streams or fish the reservoirs and lakes for walleye and pike.

3.4.2 Recreation

This region is a favorite destination for a variety of recreational opportunities. Gibson Reservoir is a favorite recreational opportunity in the County. Remote areas offer fishing, hiking and backpacking opportunities as well. Several areas throughout the Lewis and Clark National Forest in Teton County provide developed camping, fishing, snowmobiling, and backpacking sites, which receive extremely heavy use during all seasons.

Bird hunting and big game hunting for deer and elk is especially intense every fall. During the winter, snowmobiling has become a very popular sport, with a smaller amount of skiing and snowshoeing.

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 area, visitors who are not necessarily familiar with rangeland and forestland fuel risk factors (eg., 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 Teton County will receive increased attention during mitigation treatments.

3.4.2.1 Lewis and Clark National Forest

Historically, the Lewis and Clark National Forest has been separated into two major divisions- the Rocky Mountain Division, west of Great Falls, contains the Rocky Mountain Ranger District; and the Jefferson Division, scattered mountain ranges to the east of Great Falls, contains the Judith, Belt Creek, Musselshell, and White Sulphur Springs Ranger Districts.

The Jefferson Division is comprised of six distinct mountain ranges east and south east of Great Falls. Private or other agency lands surround each mountain range. The mountain ranges include the Crazy Mountains (south half administered by Gallatin National Forest), Little Belt Mountains, Castle Mountains, Highwood Mountains, Big Snowy and Little Snowy Mountains.

The Lewis and Clark National Forest contains more than 1,500 miles of forest roads. Surfaced roads feature many scenic drives, including Kings Hill National Scenic Byway (US Highway 89), a major route between Glacier and Yellowstone National Parks, which passes through the Little Belt Mountains.

The Lewis and Clark National Forest contains 29 developed recreation sites. Many of these sites are handicap accessible. There are five cabins on the forest that may be rented by the public on a first come, first served basis. Trails provide the only routes of travel to much of the forest. Approximately 2,200 miles of trails are managed by the Lewis and Clark National Forest.

The Lewis and Clark National Forest is home for large game animals, small animals and protected species. Forest visitors can hunt elk, mule and white tail deer, mountain goat, bighorn sheep, black bear, mountain lion, blue grouse and waterfowl. Protected wildlife living on or near the forest includes bald eagles, grizzly bears, peregrine falcon, lynx and gray wolf. The forest contains many popular viewing sites for migrating waterfowl.

The forest has 1,600 miles of permanent streams and several small, natural and man-made lakes where forest visitors may fish for cutthroat, brook and rainbow trout, and mountain whitefish.

3.4.2.2 Wildlife Management Areas

There are several wildlife management areas in Teton County; however, due the dramatically different landscapes between the National Forest, the Rocky Mountain Front, and the rangelands, the management goals of the Montana Fish, Wildlife, and Parks Service vary, and therefore, the public opportunities afforded by these areas also vary significantly. Archery and gun seasons for white-tailed deer, mule deer, elk, black bear and grouse are open to licensed hunters; however, permits are required for bighorn sheep hunting in these areas. Freezout Lake WMA offers abundant waterfowl and upland game bird hunting opportunities. All of the Wildlife Management Areas in Teton County are excellent wildlife viewing sites.

3.4.2.3 BLM Public Lands

Much of the eastern Rocky Mountain front along the Lewis and Clark National Forest boundary is administered by the Bureau of Land Management. These areas are open to the public year round. Although there are no developed sites, residents of Teton County use these lands to hunt, four-wheel, mountain bike, and drive off-road vehicles among many other things.

3.4.2.4 National Recreation Trails

There is a plethera of hiking trails throughout the Lewis and Clark National Forest in Teton County including the Mortimer Gulch, Jones Creek, and South Fork Teton Blacktail National Recreation Trails, as well as the Mount Wright, Green Gulch, and Mill Falls Trails. Most of these public trails begin near the eastern border of the National Forest and wind their way west towards the Continental Divide. Not only do Teton County residents enjoy the remote mountain experience offered by these trails, but people come from all over the United States to hike over the Divide.

3.4.2.5 Reservoirs

There are many reservoirs used to store water for summer irrigation scattered throughout Teton County. Gibson Reservoir on the Sun River provides fishing, boating, and nearby camping opportunities that are well used by area residents. Many of the other relatively small reservoirs, including Bynum Reservoir, Arod Lake, Eureka Reservoir, and Priest Butte Lake, attract large numbers of migratory and game bird populations; however, there are few developed camping, rest room, boating, or fishing facilities due to the variability of the water levels. Freezout Lake Reservoir is encompassed by a designated wildlife management area.

3.4.2.6 Camping

Camping is a popular activity enjoyed by residents and visitors of Teton County. In addition to the developed KOA RV park in Choteau, there are also several campsites on the Lewis and Clark National Forest, most of which are easily accessed.

3.4.2.7 Winter Sports

For those people who enjoy winter sports, Teton County has a variety of activities to interest them. Cross-country skiers will be exhilarated by the challenging mountain trails, while downhill skiers can hit the slopes at the Rocky Mountain Hi ski area. Snowmobiling is also a popular winter sport that attracts many local and out of town thrill seekers.

3.4.2.8 Fishing and Hunting

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

For those people who prefer a gun or bow to a fly rod, Teton 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.

3.4.3 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. Teton County completed an Overall Economic Development Plan in March of 1998 that 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. The following analysis in this chapter examines longer term trends (over the past 30 years).

- In 1998, there were 3,300 full- or part-time jobs in Teton County, up 25 percent from 1970.
- Sixty percent of all jobs in Teton County in 1998 were wage and salary employment; the remaining 40 percent were proprietor employment. Similar employment statewide comprises 74 percent of all jobs.
- In 1998, farm employment comprised 23 percent of all jobs in Teton County, compared to 6 percent statewide.
- With the exception of farm proprietors, farm employment, and retail trade employment increased in every major category between 1970 and 1998.

- Fastest growing sectors in Teton County in the last 20 years are services, transportation and public utilities, wholesale trade, agricultural services, and government.
- The number of new jobs created between 1970 and 1998 outpaced population growth by nearly 300 percent. Many Teton County residents may be holding more than one of full or part-time job.
- In 1998, there were 190 establishments with a total of 1,083 employees, and 478 establishments with 0 employees. “Non-employer” establishments are typically self-employed individuals or partnerships.
- Receipts for the 478 self-employed individuals totaled $13.6 million in 1998. Payroll for the 190 business establishments totaled $19.6 million.
- Seventy percent of all businesses with employees had less than five employees in 1998.
- Total personal income from farms and ranches decreased from $48.1 million (adjusted for inflation) to 11.4 million between 1970 and 1998.
- Labor earnings from non-farm sources increased from $25 million in 1970 (adjusted for inflation) to 34.9 million in 1998.
- Income from dividends, interest and rent increased from $20.4 million (adjusted for inflation) in 1970 to 36.6 million in 1998.
- A total of 306 persons commuted to work outside of Teton County in 1990; 183 persons residing outside the county had jobs in Teton County.
- In 1973, average earnings per job (adjusted for inflation) were $43,250 in Teton County. In 1998, average earnings per job were $17,791. Statewide, average earnings per job in 1998 were $22,103.

3.4.4 Development Trends

Teton County has a tight housing market. Based on statistical information from the 2000 census and from the 1999 *Montana Housing Condition Study,* less than one percent of the total housing units in fair or better condition were available for new occupants. It is likely there are periods when it is extremely difficult for anyone to find even unsuitable housing in Teton County. Persons on limited incomes are especially hard-hit by the tight housing market. Although there are housing assistance programs available, it appears that the need is much greater than the supply in most cases. With the exception of Fairfield, there are waiting lists for all of the subsidized housing in the county. Out of a total of 995 persons in Teton County estimated to be living in poverty, only six were receiving HUD Section 8 Housing assistance in 2001.

Population projections indicate that the county’s total population is likely to increase by only five persons over the next ten years. Consequently, overall demand for housing may not be much greater than it is currently. The demographics of the population will change however, potentially creating new types of housing demand. The number of persons aged 25-34 is expected to increase by 80 persons over the next ten years, and the demand for starter homes is likely to increase. Projections indicate approximately 120 more persons over age 65 in the next ten years, potentially increasing demand for senior care housing.

The Community Needs Assessments in Dutton and Fairfield indicate a need for housing rehabilitation. The statistical data from the 2000 census and the *Montana Housing Condition Study* indicate a similar need county-wide. A total of 189 units were determined to be in unsound or poor condition in 1999, according to state data. Housing rehabilitation and other programs are available to local government through the Montana Department of Commerce include Community Development Block Grant funds and other programs. Currently, only Dutton has applied for and received such assistance.

3.4.5 Land Use

The County is comprised of 72% privately owned land, 19% of land under various Federal agencies and 8% State owned land. Most of the Federal owned land is within the Lewis and Clark National Forest. In the southwest corner of the County there are some scattered, small privately owned in-holdings within the Forest boundaries. The Bureau of Land Management (BLM) holdings are primarily adjacent to the Lewis and Clark National Forest and include Special Recreation Management Areas (SMRA) and Outstanding Natural Areas (ONA).

The State of Montana Land is comprised of State Trust Lands and State Wildlife Management Areas. The trust lands are scattered throughout the County. The income derived from state trust land including rentals is available for the maintenance and support of schools and institutions. The Trust Land Management Division administers land for the other state agencies in addition to state trust land. The division is divided into four bureaus that represent the different types of land uses: Agriculture and Grazing Management, Forest Management, Minerals Management, and Special Use Management. In Teton County, trust land is primarily used for agriculture and grazing.

Agriculture and rangeland comprise 80% of the County's land area. Urbanized areas comprise the smallest category of land use representing only 0.3% of the entire area in the County. The forested areas are located in the west portion of the County along the Rocky Mountain front in primarily the Lewis and Clark National Forest. Agriculture land is the dominant land use in the east half of the County while rangeland is located mostly adjacent to the national forest in the west half of the County.

Table 3.6. Land ownership in Teton County.

Owner	Acres	Sq. Miles	% of Total
Private	1,033,015	1,614.09	70.48%
U.S. Forest Service	230,259	359.78	15.71%
State Trust Land	102,718	160.50	7.01%
Other Federal	26,196	40.93	1.79%
Private Conservation	22,282	34.82	1.52%
Bureau of Land Management	17,650	27.58	1.20%
Other State Land	16,087	25.14	1.10%
Water	15,991	24.99	1.09%
US Fish and Wildlife Service	1,486	2.32	0.10%
TOTAL	**1,465,684**	**2,290.13**	

3.4.5.1 Agricultural Land Use

According to the 1997 Census of Agriculture, there were 557 farms in Teton County in 1997 and 556 farms in 1992. Unlike the state, where the number of farms decreased by 2% since 1992, the number of farms in Teton County remained constant. Nationwide, there is a trend toward consolidation of smaller family farms to larger units which results in an overall decrease in the number of farms. The average size of farms in Teton County in 1997 was 2,005 acres and decreased by 5% from a 2,120 acre average size in 1992. Statewide, the average size of farms is 2,414 acres and is slightly higher than Teton County. The average size of farm in the State decreased by 8% from 1992 to 1997. The primary reason for the decrease in average size is land being taken out of production and converted to uses such as developed land.

In 1997, farms that were owned by an individual or family accounted for 76% of all farms while partnerships/corporations represented 24% of the total farms. The number of family farms actually increased by 2% from 1992 to 1997. Farming is the principal occupation for 73% of farm operators. The number of full-time farm operators decreased by 7% from 1992 to 1997. Statewide, the number of fulltime farms decreased by 2%. The average age of the operator increased slightly from 49.9 in 1992 to 51.3 years in 1997.

Depending on the source of the data, the amount of cropland in Teton County ranges from Census of Agriculture estimate of 581,422 acres to the Montana Natural Resource Information System (NRIS) estimate of 636,868 acres. The 1997 Census of Agriculture is based on data reported by farmers while the NRIS data is based on estimates from maps. The difference may be due to the date of the aerial photographs, rounding errors and interpretation of maps that would include acreage that was not reported by farms.

The United States Department of Agriculture 2000 data indicates that of the cropland, 105,030 acres were irrigated. Major irrigated acres lie north and east of Choteau and consist of the Bynum Irrigation Project, Teton Co-op Canal Company, Farmers Co-op Canal Company and the Eldorado Canal Company, along with several private ditches. The Greenfield Irrigation project near Fairfield, operated and maintained by the Federal Bureau of Reclamation, is the largest project in the County. Hay and grains are the primary irrigated crops. The largest areas of dry cropland are in the eastern half of the County with winter wheat and barley being the principle crops.

There are approximately 544,470 acres of rangeland in Teton County. The majority of this rangeland lies west of U.S. Highway 89 and is primarily used for livestock grazing. The land is generally not suited to more intensive agricultural uses. Some creek and valley bottoms however, are irrigated on an individual basis. Rangeland in the east half of the County generally consists of rough breaks and coulees following water courses. There is some rangeland scattered in areas of low agricultural productivity. These areas provide pasture and rangeland for dryland farmers who wish to augment their farming operation.

While some rangeland may be suited only for low intensity grazing, these lands are regarded as having high scenic, open space, and environmental value. In general the high winds and dry conditions have not been conducive to residential development. Recent subdivisions in the area have indicated more interest in the area.

According to the 1997 Census of Agriculture, livestock and livestock production account for 36% of the total agricultural receipts in the County. Teton County ranks 21st among Counties in the State for the number of all cattle. Other livestock includes sheep and hogs.

The Conservation Reserve Program (CRP) includes rental payments to farmers to take sensitive lands out of production. The purpose of the CRP is to reduce soil erosion, protect the

Nation's ability to produce food and fiber, reduce sedimentation in streams and lakes, improve water quality, establish wildlife habitat, and enhance forest and wetland resources. The CRP is a voluntary program administered by the United States Department of Agriculture (USDA). Producers enroll land in the program and receive 10 to 15 year contracts that provide them with annual rental payments and cost-share assistance. It encourages farmers to convert highly erodible cropland or other environmentally sensitive acreage to vegetative cover, such as tame or native grasses, wildlife plantings, trees, filterstrips, or riparian buffers. Cost-sharing is provided to establish the vegetative cover practices. The program has been in operation since 1987.

In Teton County, there were 857 contracts since 1987 that covered 148,392 acres of cropland. Almost all of this acreage has been enrolled since 1996 and will be under contract for another 5 to 15 years. More than half of the acreage was enrolled in 1998 with the number of new contracts steadily declining over the last three years. In Montana, Hill County has the largest amount of acreage under CRP contracts with 293,932 acres enrolled in the program. Teton County ranks 11 among the 51 counties with CRP acreage.

There are also a number of other USDA programs that resulted from the 1996 Farm Bill to assist people with their conservation needs. These programs offer technical assistance or include cost-share funds to implement various conservation practices. All programs are voluntary.

3.5 Emergency Services & Planning and Zoning

The Teton County Sheriff's office operates the 911 Dispatch Center for Teton County. In addition to handling law enforcement and emergency medical calls, the center also provides dispatch services to all of the fire companies in Teton County. The dispatch center, operational 24 hours a day, is located in the Sheriff's office in Choteau.

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 is activated. The county Fire Warden will be involved in establishing and operating the EOC.

3.6 Cultural Resources

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

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.

Teton County was formed in 1893 from a portion of Chouteau County. The City of Choteau, incorporated in 1894, became the county seat. Teton County originally encompassed a much larger area until Toole, Glacier, and Pondera counties were formed. The first permanent residents in the County were squatters and cattlemen who settled near the military forts and trading posts at Fort Shaw, Choteau, and Dupuyer. With the introduction of irrigation such as the Sun River Irrigation Project and the Greenfield District, settlement increased, particularly in the Fairfield area. The railroad also played a major role in settlement with the Town of Dutton and other unincorporated areas being established along rail lines and spurs.

Evidence of pre-settlement and pioneer settlement history are found at various archaeological and historic sites throughout the County. Teton County has 12 archaeological sites and 26 cultural resources sites, with 20 of these sites being of prehistoric origin. A 1992 University of Montana study documented the discoveries at these sites including combinations of stone circles with rock cairns, isolated rock cairns, trail ruts and artifact scatters. Historic sites include historic cabins and foundations, cultural material scatters, a historic kiln, and a snare trap. Possible Indian burial grounds may also exist in the area, although no human remains have been reported.

The Montana State Historic Preservation Office maintains a “Cultural Resource Information Systems” database that catalogues each specific structure or artifact of historic significance in the County. The database includes over 300 listings. It includes buildings, historic trails, rail lines, bridges, farmstead buildings, irrigation systems, and pre-historic finds. The sites are located County wide on private, state, and Federal lands.

The historic “Old North Trail” passes through Teton County. The name refers to a Native American trail system which consisted of foot, dog, horse travois and Red River cart trails. The trail runs along the eastern front of the Rocky Mountains in north central Montana and follows the backbone of the Rockies from Alaska down into Mexico. The Metis Cultural Recovery, Inc.(MCRI) was formed in 1997 to preserve the history of the Trail.

Although there are no sites listed on the National Historic Register, a walking tour of buildings in Choteau list 20 notable sites. Several buildings date back prior to 1900. The Courthouse was built in 1906 with stone taken from Rattlesnake Butte south of town. The Courthouse underwent renovations in 2001.

Other notable sites include the Old Trail Museum in Choteau, the old Catholic Mission, and remains of the area’s first town, Old Agency. In addition to the historic areas, Teton County’s location along the Rocky Mountain front provides it with exceptional scenic resources. The Lewis and Clark National Forest-Teton Roadless area contains special features such as rugged limestone reefs that fringe the eastern border of the Blackleaf-Dupuyer area, and a waterfall framed by 1,000 foot high sheer cliffs in the Muddy Creek Canyon area. US Highway 89 that traverses the County is classified as a “Scenic Route”.

Hazard mitigation activities in and around these sites has the potential to affect historic places. In all cases, the mitigation work will be intended to reduce the potential of damaging the site.

3.7 Transportation

There are several main thoroughfares accessing Teton County. Interstate 15 passes through Power and Dutton on the eastern side of the county while U.S. Highway 89 accesses Bynum, Choteau, and Fairfield on the western side. U.S. Highway 287 connecting Choteau to Augusta in neighboring Lewis and Clark County is also a main route. Both U.S. 89 and I-15 from Great Falls run northward through Teton County to the Canadian border. State Routes 219, 220, 221, 379, 408, and 431 crisscross the County providing access to the smaller communities, rural home sites, and remote regions. Smaller access roads (mostly gravel) provide access to the adjoining areas within the county. A variety of trails and closed roads are to be found throughout the region.

Almost all of the roads in the county were originally built to facilitate logging, ranching, and farming activities. As such, all of these roads can support heavy equipment and emergency response equipment referenced in this document. However, many of the new roads have been built for home site access, especially for new subdivisions of homes. In most cases, these roads are adequate to facilitate large and heavy equipment.

Some of the most limiting points of access are found in the more rural areas of the county. In some locations, private roads were not built to the high standards adhered to on Federal and State lands. Some of these roads are narrow, have a dirt surface, and have limitations in the form of bridges and cattle guards that cannot guarantee weight standards. This situation is exacerbated by the fact that some of these limiting roads provide access to homes and recreation areas.

3.8 Vegetation & Climate

Vegetation in Teton 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 3.6.

The most represented vegetated cover types are Irrigated Agriculture and Dryland Agriculture at each at approximately 19% of the County's total area. The next most common vegetation cover type represented is Moderate/High Cover Grasslands at 16% of the total area. Low Cover Grasslands represent 13% of Teton County, while Mixed Mesic Shrubs cover only 5% (Table 3.6).

Table 3.7. Cover Types in Teton County.	Acres	Percent of County's Total Area
Irrigated Agriculture	364,884	19%
Dryland Agriculture	363,476	19%
Low/Moderate Cover Grasslands	315,854	16%
Low Cover Grasslands	258,883	13%
Mixed Mesic Shrubs	92,216	5%
Exposed Rock	56,941	3%
Mixed Subalpine	52,880	3%
Limber Pine	42,634	2%
Lodgepole Pine	40,694	2%
Subalpine Fir	31,977	2%
Douglas Fir	31,931	2%
Montane Parklands,Subalpine Meadows	29,893	2%
Mixed Whitebark Pine	21,343	1%
Mixed Barren Land	20,884	1%
Mixed Mesic Forest	20,530	1%
Mountain Big Sagebrush	20,330	1%
Standing Burnt or Dead Forest	20,267	1%
Douglas Fir-Lodgepole Forest	17,768	1%
Mixed Broadleaf Forest	16,727	1%
Moderate/High Cover Grasslands	16,625	1%
Water	16,166	1%
Ponderosa Pine	11,806	1%
Mixed Xeric Forest	11,486	1%
Creeping Juniper	11,072	1%
Alpine Grasslands	5,630	0%
Mixed Broadleaf Conifer Forest	5,296	0%
Graminoid and Forb Riparian	4,572	0%
Cold Mesic Shrubs	4,042	0%

Table 3.7. Cover Types in Teton County.	Acres	Percent of County's Total Area
Western Larch-Douglas Fir Forest	3,805	0%
High Cover Grasslands	3,573	0%
Engelmann Spruce	3,106	0%
Rocky Mountain Juniper	2,379	0%
Barren Alpine Tundra	2,283	0%
Shrub Dominated Riparian	2,253	0%
Altered Herbaceous	1,927	0%
Cloud	1,612	0%
CRP Lands	1,596	0%
Broadleaf Dominated Riparian	1,568	0%
Cloud Shadow	1,393	0%
Urban	1,215	0%
Very Low Cover Grasslands	1,007	0%
Willow Dominated Riparian	995	0%
Warm Mesic Shrubs	276	0%
Dry Salt-Flats	163	0%
Snowfields or Ice	141	0%
Tree Grassland Associations	24	0%
Conifer Dominated Riparian	4	0%
Mixed Forest Non-forest Riparian	3	0%
Aspen	3	0%

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

3.8.1 Monthly Climate Summaries in Teton County

3.8.1.1 Pendroy, Montana

Period of Record Monthly Climate Summary
Period of Record : 7/ 1/1948 to 1/31/1990

Table 3.8. Climate summaries for Pendroy, Teton County, Montana.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	Insufficient Data												
Average Min. Temperature (F)	Insufficient Data												
Average Total Precipitation (in.)	0.61	0.47	0.83	1.38	2.63	2.60	1.47	1.63	1.32	0.65	0.53	0.54	14.66
Average Total SnowFall (in.)	7.5	5.4	9.1	9.4	2.9	0.4	0.0	0.0	2.4	3.9	5.9	7.0	53.9
Average Snow Depth (in.)	2	2	2	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: 97.5% Snowfall: 76.3% Snow Depth: 54.5%

3.8.1.2 Choteau, Montana

Period of Record Monthly Climate Summary
Period of Record : 1/ 1/1893 to 9/30/2004

Table 3.9. Climate summaries for Choteau, Teton County, Montana.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	33.8	38.3	44.7	55.6	65.9	73.0	82.3	81.1	70.2	60.2	45.1	37.6	57.3
Average Min. Temperature (F)	10.3	13.7	20.0	29.3	38.2	45.6	50.2	48.1	40.4	32.6	21.7	15.4	30.5
Average Total Precipitation (in.)	0.34	0.32	0.49	0.81	1.99	2.78	1.42	1.17	1.07	0.53	0.39	0.32	11.62
Average Total SnowFall (in.)	7.8	5.6	6.7	4.4	1.1	0.1	0.0	0.1	1.3	2.1	5.3	5.6	40.1
Average Snow Depth (in.)	1	1	1	0	0	0	0	0	0	0	1	2	1

Percent of possible observations for period of record. Max. Temp.: 82.1% Min. Temp.: 81.9% Precipitation: 83% Snowfall: 80.9% Snow Depth: 63%

3.8.1.3 Gibson Dam, Montana

Period of Record Monthly Climate Summary
Period of Record : 7/ 1/1948 to 9/30/2004

Table 3.10. Climate summaries for Gibson Dam, Teton County, Montana.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	33.0	37.6	41.8	51.1	60.3	68.0	77.6	77.0	67.3	56.5	42.1	34.9	53.9
Average Min. Temperature (F)	12.4	16.4	19.9	27.9	35.3	41.9	46.0	44.8	38.0	31.8	22.9	16.4	29.5
Average Total Precipitation (in.)	0.96	0.76	0.97	1.57	2.86	3.23	1.51	1.62	1.41	1.01	0.98	0.86	17.75
Average Total SnowFall (in.)	13.6	10.6	13.2	11.1	2.7	0.1	0.0	0.1	0.9	4.9	9.7	10.6	77.5
Average Snow Depth (in.)	4	3	2	1	0	0	0	0	0	0	1	3	1

Percent of possible observations for period of record. Max. Temp.: 98.9% Min. Temp.: 99% Precipitation: 99.4% Snowfall: 96.6% Snow Depth: 94.1%

3.8.1.4 Fairfield, Montana

Period of Record Monthly Climate Summary
Period of Record : 7/ 1/1948 to 9/30/2004

Table 3.11. Climate summaries for Fairfield, Teton County, Montana.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	32.3	38.7	44.8	55.6	65.2	72.3	80.7	80.3	70.6	59.7	43.9	35.7	56.6
Average Min. Temperature (F)	11.5	17.0	21.3	30.5	39.4	46.6	51.4	50.5	42.4	34.3	23.7	16.2	32.1
Average Total Precipitation (in.)	0.42	0.35	0.62	1.10	2.21	2.45	1.45	1.37	1.05	0.57	0.39	0.32	12.28
Average Total SnowFall (in.)	7.2	5.7	8.8	5.9	1.2	0.1	0.0	0.0	1.3	1.9	5.4	5.9	43.5
Average Snow Depth (in.)	3	2	1	0	0	0	0	0	0	0	1	2	1

Percent of possible observations for period of record. Max. Temp.: 99.8% Min. Temp.: 99.8% Precipitation: 99.8% Snowfall: 94.4% Snow Depth: 91.8%

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 USDA Forest Service, and the USDI Bureau of Land Management. Using this data on past fire extents and fire ignition data, the occurrence of wildland fires in the region of Teton County has been evaluated. This data was augmented with detailed fire reports since 1980 compiled by the Teton County Fire Warden to include all fires reported to the County's fire departments.

Many fires have burned in the region of Teton County (Table 3.11). Table 3.12 indicates fires catalogued as "wildfire" that are greater than 2 acres in size. Figure 3.7 summarizes fire ignitions and acres burned annually (1980-2003). There were approximately 225 fire ignitions during this 24 year period, with the highest number of total ignitions peaking in 1990, recent years have witnessed a decrease in the number of ignitions and the total acres burned (Figure 3.7).

Table 3.12. Teton County Fire Ignition and Extent Profile.						
DEPARTMENT	**INCIDENT**	**YEAR**	**FIRE TYPE**	**ACRES**	**Ignition Factor**	**FUEL TYPE**
CHOTEAU	280011	1980	Wildfire	2.00	exhaust spark	crop
CHOTEAU	580012	1980	Wildfire	5.00	controlled burn	grass/ strawstack
FAIRFIELD	580005	1980	Wildfire	10.00	controlled burn	stubble
CHOTEAU	580006	1980	Wildfire	10.00	train	grass
CHOTEAU	280016	1980	Wildfire	20.00	lightning	stubble
CHOTEAU	280012	1980	Wildfire	40.00	exhaust spark	crop
POWER	281004	1981	Wildfire	5.00	controlled burn	stubble
CHOTEAU	381012	1981	Wildfire	8.00	controlled burn	stubble
FAIRFIELD	281010	1981	Wildfire	30.00	equipment failure	crop
FAIRFIELD	581010	1981	Wildfire	40.00	unknown	grass
FAIRFIELD	281005	1981	Wildfire	300.00	controlled burn	stubble/grass
DUTTON	282009	1982	Wildfire	5.00	controlled burn	grass
DUTTON	282015	1982	Wildfire	5.00	exhaust spark	stubble
POWER	582008	1982	Wildfire	8.00	controlled burn	stubble & hay bales
FAIRFIELD	382017	1982	Wildfire	15.00	controlled burn	hay field
POWER	582003	1982	Wildfire	20.00	controlled burn	grass/stubble
DUTTON	282005	1982	Wildfire	20.00	controlled burn	stubble
POWER	582005	1982	Wildfire	20.00	unknown	grass
DUTTON	282006	1982	Wildfire	1000.00	controlled burn	grass/ stubble
DUTTON	283011	1983	Wildfire	10.00	exhaust spark	crop
POWER	583009	1983	Wildfire	30.00	exhaust spark	crop
DUTTON	283014	1983	Wildfire	30.00	exhaust spark	crop
PENDROY	484003	1984	Wildfire	5.00	garbage burn	
POWER	584010	1984	Wildfire	10.00	garbage can	grass
DUTTON	284022	1984	Wildfire	10.00	exhaust spark	stubble
POWER	584013	1984	Wildfire	30.00	exhaust spark	crop & stubble
POWER	584022	1984	Wildfire	40.00	unknown	grass
DUTTON	284020	1984	Wildfire	100.00	exhaust spark	stubble
DUTTON	285009	1985	Wildfire	2.00	lightning	stubble
POWER	585005	1985	Wildfire	20.00	controlled burn	stubble
FAIRFIELD	386005	1986	Wildfire	10.00	81	grass
DUTTON	286007	1986	Wildfire	20.00	controlled burn	grass
FAIRFIELD	386016	1986	Wildfire	30.00	exhaust spark	vehicle/grass
FAIRFIELD	387006	1987	Wildfire	10.00	controlled burn	stubble
PENDROY	487004	1987	Wildfire	10.00	hot bearing	equip/stubble
PENDROY	487002	1987	Wildfire	15.00	controlled burn	stubble
POWER	587002	1987	Wildfire	20.00	controlled burn	grass/stubble
PENDROY	487005	1987	Wildfire	350.00	power line	grass/manure
FAIRFIELD	388023	1988	Wildfire	10.00	controlled burn	stubble
DUTTON	288015	1988	Wildfire	10.00	lightning	crop
PENDROY	488003	1988	Wildfire	12.00	controlled burn	stubble
PENDROY	488009	1988	Wildfire	35.00	harvest equipment	stubble
DUTTON	288005	1988	Wildfire	40.00	controlled burn	grass/ stubble
POWER	588008	1988	Wildfire	40.00	train	grass
POWER	588010	1988	Wildfire	40.00	controlled burn	grass/stubble

Table 3.12. Teton County Fire Ignition and Extent Profile.

DEPARTMENT	INCIDENT	YEAR	FIRE TYPE	ACRES	Ignition Factor	FUEL TYPE
POWER	588011	1988	Wildfire	40.00	controlled burn	grass/stubble
FAIRFIELD	388020	1988	Wildfire	80.00	unknown	unknown
POWER	588006	1988	Wildfire	80.00	controlled burn	straw
PENDROY	489006	1989	Wildfire	15.00	baler fire	equip/hay field
FAIRFIELD	389012	1989	Wildfire	20.00	power line	grass
DUTTON	289011	1989	Wildfire	40.00	lightning	stubble
PENDROY	489001	1989	Wildfire	300.00	Power line	grass
POWER	590002	1990	Wildfire	3.00	unknown	CRP
FAIRFIELD	390021	1990	Wildfire	3.00	swather	hay
FAIRFIELD	390002	1990	Wildfire	10.00	controlled burn	stubble
FAIRFIELD	390010	1990	Wildfire	10.00	controlled burn	grass
PENDROY	490014	1990	Wildfire	10.00	electrical/tranformer	grass
FAIRFIELD	390034	1990	Wildfire	10.00	exhaust spark	stubble
PENDROY	490015	1990	Wildfire	25.00	electrical	grass
DUTTON	290008	1990	Wildfire	30.00	lightning	grass
FAIRFIELD	390036	1990	Wildfire	40.00	unknown	CRP/grass
DUTTON	290012	1990	Wildfire	60.00	Combine	crop & hay
PENDROY	490019	1990	Wildfire	500.00	Power line	grass
DUTTON	291003	1991	Wildfire	2.00	controlled burn	stubble
DUTTON	291007	1991	Wildfire	5.00	controlled burn	grass
POWER	591013	1991	Wildfire	5.00	lightning	grass
PENDROY	491004	1991	Wildfire	6.00	Power Line	grass
DUTTON	291001	1991	Wildfire	10.00	train	train/grass
FAIRFIELD	391009	1991	Wildfire	10.00	controlled burn	stubble/trees
DUTTON	291010	1991	Wildfire	10.00	power pole	?
PENDROY	491013	1991	Wildfire	10.00	vehicle muffler	grass
PENDROY	491012	1991	Wildfire	15.00	mechanical	grass
FAIRFIELD	391023	1991	Wildfire	20.00	Combine fire	crop
PENDROY	491002	1991	Wildfire	25.00	Power Line	hayfield
PENDROY	491007	1991	Wildfire	30.00	unknown	hay meadow
PENDROY	491010	1991	Wildfire	60.00	mechanical	grass
DUTTON	291024	1991	Wildfire	800.00	Power line	CRP
POWER	591023	1991	Wildfire	6000.00	power line	CRP
DUTTON	292008	1992	Wildfire	3.00	cutting torch	grass
FAIRFIELD	392039	1992	Wildfire	3.00	controlled burn	grass
FAIRFIELD	392048	1992	Wildfire	3.00	unknown	grass
FAIRFIELD	392040	1992	Wildfire	5.00	unknown	crop
FAIRFIELD	392046	1992	Wildfire	5.00	baler fire	straw
PENDROY	492004	1992	Wildfire	10.00	grass	
PENDROY	492011	1992	Wildfire	10.00	lighting	crp
DUTTON	292005	1992	Wildfire	20.00	controlled burn	grass
FAIRFIELD	392028	1992	Wildfire	20.00	controlled burn	stubble
DUTTON	292006	1992	Wildfire	20.00	controlled burn	stubble
FAIRFIELD	392033	1992	Wildfire	20.00	controlled burn	stubble
POWER	592012	1992	Wildfire	20.00	controlled burn	grass

Table 3.12. Teton County Fire Ignition and Extent Profile.

DEPARTMENT	INCIDENT	YEAR	FIRE TYPE	ACRES	Ignition Factor	FUEL TYPE
FAIRFIELD	392024	1992	Wildfire	40.00	controlled burn	stubble
POWER	592014	1992	Wildfire	40.00	controlled burn	grass
PENDROY	492008	1992	Wildfire	100.00	grass	
POWER	592005	1992	Wildfire	1200.00	train	CRP +++
POWER	593014	1993	Wildfire	2.00	cutting torch	grass
FAIRFIELD	393006	1993	Wildfire	3.00	exhaust spark	crop
FAIRFIELD	393007	1993	Wildfire	3.00	exhaust spark	crop
PENDROY	493014	1993	Wildfire	10.00	equipment misuse	grass
FAIRFIELD	393011	1993	Wildfire	7750.00	power line	CRP
CHOTEAU	193010	1993	Wildfire	8-10000	power line	multiple things
DUTTON	294020	1994	Wildfire	3.00	controlled burn	grass
FAIRFIELD	394025	1994	Wildfire	3.00	unknown	grass
PENDROY	494006	1994	Wildfire	5.00	unknown	pasture
DUTTON	294009	1994	Wildfire	10.00	controlled burn	stubble
DUTTON	294031	1994	Wildfire	10.00	mechanical	stubble/combine
PENDROY	494009	1994	Wildfire	10.00	fireworks	pasture
PENDROY	494007	1994	Wildfire	15.00	vehicle fire	grass
FAIRFIELD	394004	1994	Wildfire	20.00	controlled burn	stubble
POWER	594012	1994	Wildfire	20.00	controlled burn	stubble
FAIRFIELD	394017	1994	Wildfire	20.00	lightning	grass
PENDROY	494008	1994	Wildfire	20.00	vehicle fire	grass
PENDROY	494002	1994	Wildfire	40.00		
FAIRFIELD	394022	1994	Wildfire	40.00	vehicle fire	stubble/ vehicle
DUTTON	294032	1994	Wildfire	70.00	Combine fire	stubble/ combine
FAIRFIELD	394018	1994	Wildfire	937.00	power line	crop
DUTTON	294024	1994	Wildfire	1546.00	unknown	CRP
DUTTON	295010	1995	Wildfire	5.00	Combine fire	grass/ stubble
POWER	595016	1995	Wildfire	5.00	unknown	grass
FAIRFIELD	395008	1995	Wildfire	10.00	controlled burn	shelter belt
PENDROY	495008	1995	Wildfire	15.00	mechanical	pasture
FAIRFIELD	395015	1995	Wildfire	20.00	suspicious	CRP
CHOTEAU	195012	1995	Wildfire	1500-2000	controlled	grass
PENDROY	496009	1996	Wildfire	10.00		
FAIRFIELD	396009	1996	Wildfire	10.00	controlled burn	grass
PENDROY	496012	1996	Wildfire	10.00	lighting	
DUTTON	296019	1996	Wildfire	10.00	Combine fire	stubble/ combine
FAIRFIELD	396015	1996	Wildfire	10.00	lightning	CRP
FAIRFIELD	396007	1996	Wildfire	15.00	baler fire	grass/hay
POWER	596018	1996	Wildfire	40.00	equipment failure	grass
POWER	596008	1996	Wildfire	60.00	controlled burn	stubble
DUTTON	296011	1996	Wildfire	200.00	lightning	CRP
DUTTON	296014	1996	Wildfire	200.00	lightning	CRP
POWER	597008	1997	Wildfire	5.00	controlled burn	grass
POWER	597017	1997	Wildfire	5.00	unknown	grass
DUTTON	297022	1997	Wildfire	10.00	controlled burn	grass

Table 3.12. Teton County Fire Ignition and Extent Profile.

DEPARTMENT	INCIDENT	YEAR	FIRE TYPE	ACRES	Ignition Factor	FUEL TYPE
DUTTON	297014	1997	Wildfire	15.00	equipment failure	grass
FAIRFIELD	397008	1997	Wildfire	20.00	Combine fire	crop
POWER	597007	1997	Wildfire	93.00	cutting torch	grass
PENDROY	497013	1997	Wildfire	100.00	Power line	haystack
CHOTEAU	197013	1997	Wildfire	300.00	equipment failure	grass
DUTTON	298008	1998	Wildfire	4.00	lightning	sod
POWER	598007	1998	Wildfire	10.00	rekindle	grass/debris
PENDROY	498009	1998	Wildfire	10.00	Combine fire	grain
POWER	598009	1998	Wildfire	13.00	transformer	grass
POWER	598010	1998	Wildfire	20.00	lightning	CRP
DUTTON	298013	1998	Wildfire	45.00	Combine fire	crop
CHOTEAU	198005	1998	Wildfire	50.00	controlled burn	grass / crop
DUTTON	298020	1998	Wildfire	60.00	welder	grass
FAIRFIELD	398019	1998	Wildfire	80.00	lightning	CRP
FAIRFIELD	398007	1998	Wildfire	100.00	controlled burn	grass
DUTTON	298006	1998	Wildfire	200.00	Power line	stubble
CHOTEAU	198019	1998	Wildfire	250.00	lightning	grass
FAIRFIELD	399004	1999	Wildfire	2.00	propane torch	grass/vehicle
FAIRFIELD	399008	1999	Wildfire	10.00	controlled burn	shelter belt
FAIRFIELD	399016	1999	Wildfire	15.00	exhaust spark	crop
FAIRFIELD	399005	1999	Wildfire	20.00	trash	grass
FAIRFIELD	300029	2000	Wildfire	2.00	baler fire	hay field
POWER	500014	2000	Wildfire	3.00	lightning	grass
FAIRFIELD	300007	2000	Wildfire	5.00	controlled burn	stubble
FAIRFIELD	300017	2000	Wildfire	5.00	tractor spark	crop
PENDROY	400013	2000	Wildfire	10.00		grass
PENDROY	400018	2000	Wildfire	10.00	Combine fire	grain
POWER	500009	2000	Wildfire	18.00	controlled burn	grass
FAIRFIELD	300031	2000	Wildfire	20.00	stacker	hay
PENDROY	400024	2000	Wildfire	20.00		crp
FAIRFIELD	300004	2000	Wildfire	40.00	electrical	grass/out bldg
PENDROY	400023	2000	Wildfire	40.00		stubble
PENDROY	400014	2000	Wildfire	60.00	grass	grass
CHOTEAU	100015	2000	Wildfire	1980.00	lightning	
DUTTON	201018	2001	wildfire	2.00	lightning	CRP
FAIRFIELD	301018	2001	Wildfire	3.00	baler fire	hay
POWER	501003	2001	Wildfire	4.00	exhaust spark	grass
DUTTON	201025	2001	wildfire	5.00	controlled burn	grass
DUTTON	201023	2001	wildfire	5.00	train	grass
DUTTON	201022	2001	wildfire	5.00	controlled burn	grass
FAIRFIELD	301016	2001	Wildfire	5.00	power line	grass
CHOTEAU	101020	2001	Wildfire	5.00	unknown	CRP ?
FAIRFIELD	301023	2001	Wildfire	5.00	garbage can	stubble
CHOTEAU	101010	2001	Wildfire	20.00	lightning	grass
POWER	501005	2001	Wildfire	30.00	rekindle	grass/fence

Table 3.12. Teton County Fire Ignition and Extent Profile.

DEPARTMENT	INCIDENT	YEAR	FIRE TYPE	ACRES	Ignition Factor	FUEL TYPE
CHOTEAU	101022	2001	Wildfire	30.00	unknown	CRP?
DUTTON	201016	2001	wildfire	40.00	equipment failure	grass
DUTTON	201011	2001	wildfire	120.00	swather	crop or grass
DUTTON	201004	2001	wildfire	160.00	ATV	CRP- 160 or 600
DUTTON	202011	2002	Wildfire	2.00	train	grass
FAIRFIELD	302020	2002	Wildfire	2.00	exhaust spark	stubble
FAIRFIELD	302026	2002	Wildfire	3.00	garbage can	grass
FAIRFIELD	302014	2002	Wildfire	10.00	power line	grass
DUTTON	202006	2002	Wildfire	100.00	equipment failure	CRP
FAIRFIELD	303005	2003	Wildfire	2.00	under investigation	grass
CHOTEAU	103011	2003	Wildfire	5.00	lightning	CRP
DUTTON	203015	2003	wildfire	10.00	controlled burn	grass
FAIRFIELD	303011	2003	Wildfire	10.00	lightning	grass
POWER	503013	2003	Wildfire	10.00	unknown	CRP & grain
FAIRFIELD	303022	2003	Wildfire	10.00	power line	grass
DUTTON	203007	2003	wildfire	15.00	Combine fire	crop
FAIRFIELD	303014	2003	Wildfire	15.00	Combine fire	grain
DUTTON	203005	2003	wildfire	40.00	lightning	CRP
DUTTON	203001	2003	wildfire	150.00	unknown	grass/trees
CHOTEAU	104009	2004	Wildfire	2.00	controlled burn	grass/stubble
FAIRFIELD	304029	2004	Wildfire	5.00	cigarette	pasture
FAIRFIELD	304006	2004	Wildfire	10.00	controlled burn	grass
DUTTON	204016	2004	Wildfire	15.00	Combine fire	crop
FAIRFIELD	304009	2004	Wildfire	25.00	controlled burn	stubble
FAIRFIELD	304013	2004	Wildfire	30.00	controlled burn	stubble
DUTTON	204009	2004	Wildfire	30.00	unknown	CRP
FAIRFIELD	304008	2004	Wildfire	40.00	controlled burn	grass
CHOTEAU	104018	2004	Wildfire	40.00	baler spark	CRP
CHOTEAU	104023	2004	Wildfire	40.00		
DUTTON	204018	2004	wildfire	40.00	transformer	grass
FAIRFIELD	304010	2004	Wildfire	100.00	controlled burn	stubble
FAIRFIELD	304028	2004	Wildfire	100.00	harvest equipment	crop
FAIRFIELD	304015	2004	Wildfire	150.00	controlled burn	stubble
FAIRFIELD	304017	2004	Wildfire	160.00	controlled burn	stubble
FAIRFIELD	304018	2004	Wildfire	30-40	controlled burn	grass

Since 1980, it would appear that roughly 51% of all fires in Teton County are human caused, while only 49% were naturally caused. In comparison with the rest of Montana and the Western United States, this statistic would indicate that the rate of human caused ignitions is high in comparison with the average experienced in the rest of the region. There may be many factors contributing to this statistic, but the low population of the county, coupled with the agrarian economy are contributing factors. 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.

3.9.2 Regional Wildfire Profile

Across the North Central Montana Region, many fires have ignited and burned causing a loss of property and life. Data indicates that in this region, approximately 4,323 fires have burned an estimated 770,000 acres (average 178 acres each, maximum 182,000 acres). Figure 3.7 demonstrates the periodicity of wildfires in the region, while Table 3.12 documents the degree of nature caused versus human caused wildfires in Teton County specifically. It is important to understand that the percent of lightning caused fires is calculated based on the total number of fires in the region. Thus, if only a small number of human caused fires are totaled with a large number of nature caused fires, then the percent of lightning caused fires will be high. Conversely, if human caused wildfires are abundant, then the percent of wildfires caused by lightning will be low. Therefore, the observed 51% of total fires caused by lightning, and the 49% of human caused ignitions in the region demonstrates a very high number of human caused ignitions. In fact, the ratio between these two figures is often skewed the other way, with human caused ignitions averaging only 30%, with lightning representing 70%.

Figure 3.7. Regional Wildfire Ignition and Extent Profile.

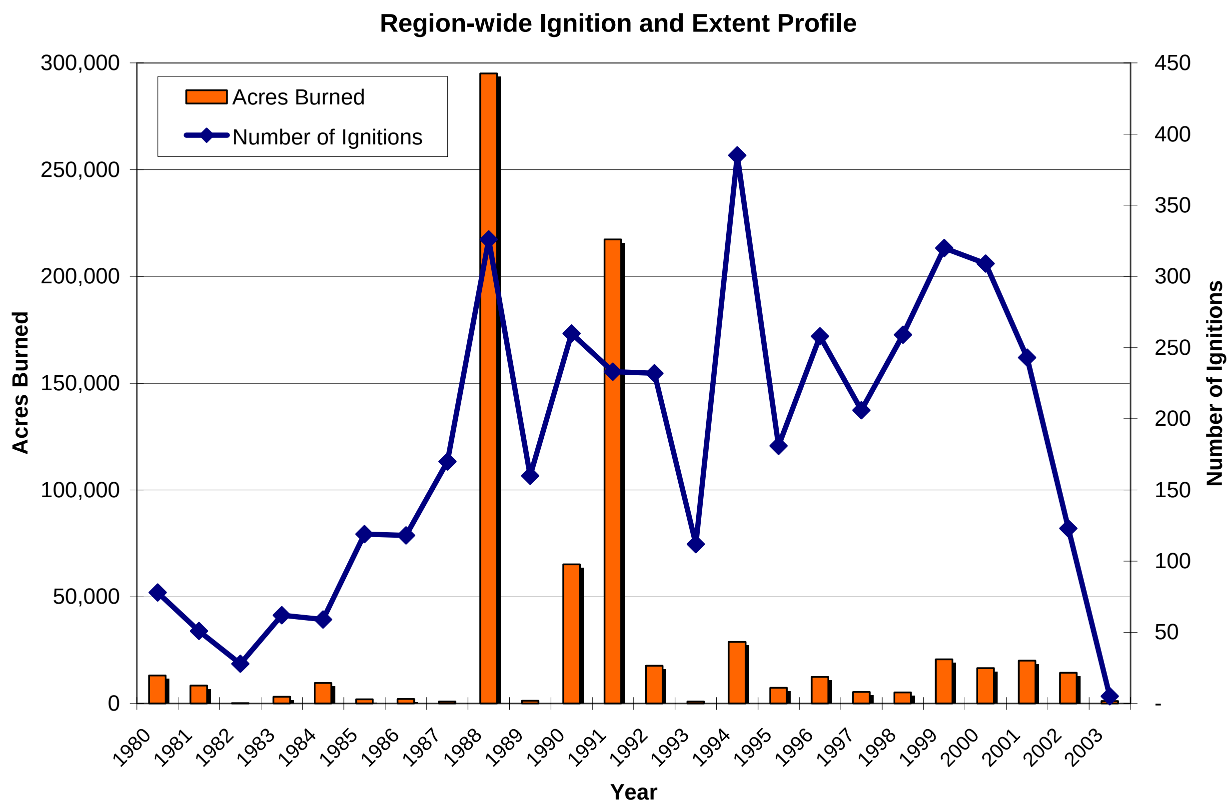


Table 3.13. Regional Summary of Wildfire Ignitions by Cause regionally.

Cause	Cause Reference	1980-2003 Occurrence	1980-2003 Percent
Lightning	1	1316	30.4%
Campfire	2	254	5.9%
Smoking	3	226	5.2%

Table 3.13. Regional Summary of Wildfire Ignitions by Cause regionally.			
		1980-2003	
Cause	**Cause Reference**	**Occurrence**	**Percent**
Debris Burning	4	648	15.0%
Arson	5	191	4.4%
Equipment Use	6	229	5.3%
Railroad	7	75	1.7%
Children	8	487	11.3%
Miscellaneous	9	897	20.7%
Total		**4,323**	

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 3.14). Data summaries for 200 through 2004 are provided and demonstrate the variability of the frequency and extent of wildfires nationally (Table 3.14). 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 3.14. 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 3.2 and 3.3 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 3.15) 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 3.15. 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

Table 3.15. Total Fires and Acres 1960 - 2004 Nationally.

Year	Fires	Acres	Year	Fires	Acres
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 3.16. 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**
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 3.17 and 3.18.

Table 3.17. 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 3.18. 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 Fire Fighter 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 fire fighter
- the area immediately surrounding the fire fighter
- 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 3.19, 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 3.19. Wildland fire fighter 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 3.20. 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 3.20. 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	Airtanker	Contractor/Federal	2
1996	Colsptrip	Burnover	Private	2
1999	Pompeys Pillar	Dozer Burnover	Volunteer	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

Teton County and the adjacent counties of Lewis and Clark, Flathead, Pondera, Chouteau, and Cascade 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.

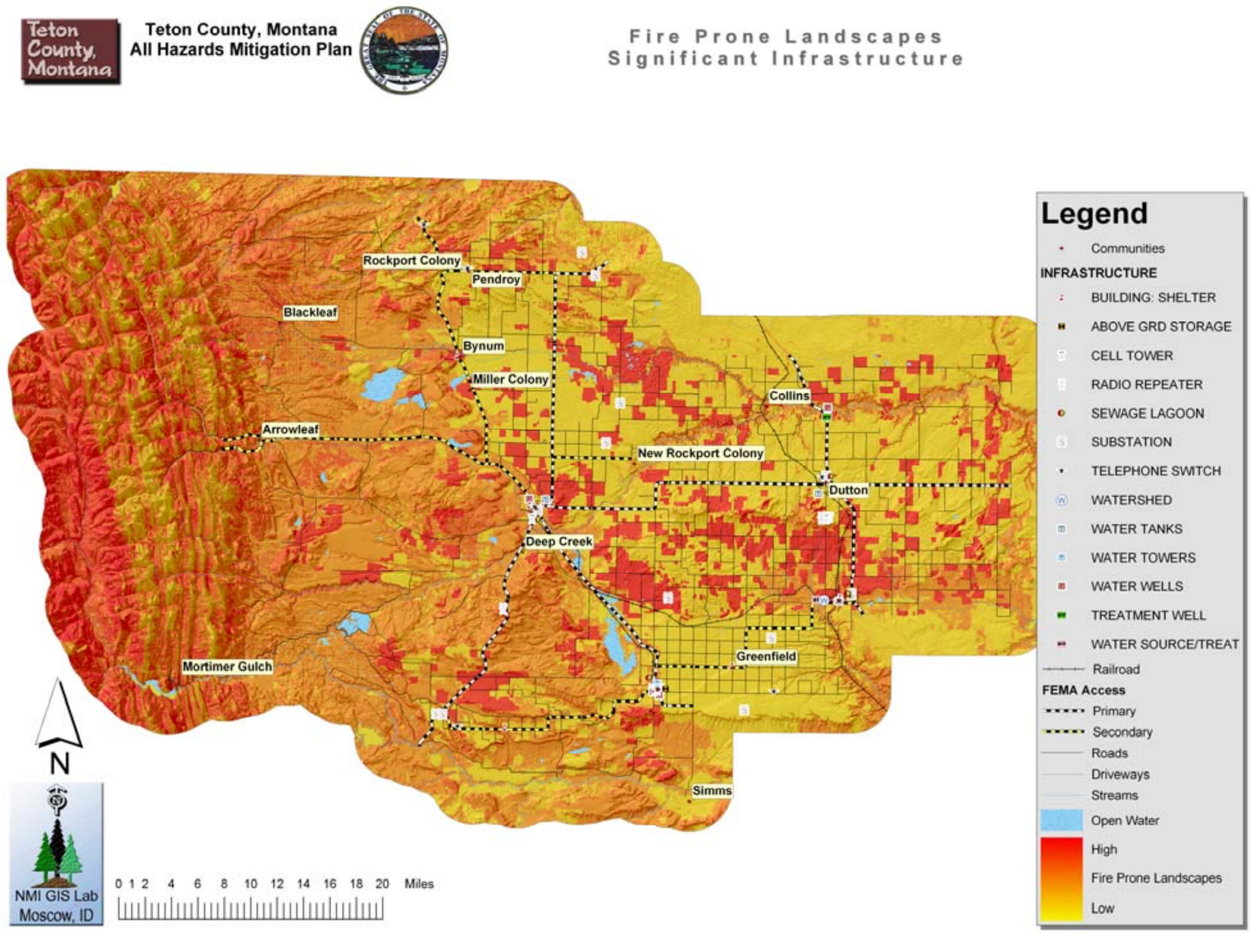
Landsat 7 ETM images were obtained to conduct hyper-spectral analysis for this project. The image was obtained in 1998. Hyper-spectral analysis procedures followed the conventions used by the Montana Vegetation and Land Cover Classification System, modified from Redmond (1997) and Homer (1998).

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 north central Montana area including the USFS Lewis and Clark National Forest and the Montana Department of Natural Resources and Conservation. The Teton County Fire Warden digitized fires reported by the Rural Fire Departments of Teton County into a GIS system so that a full wildfire database was available to characterize wildfire occurrence in Teton 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 3.8. Fire Prone Landscapes in Teton County.

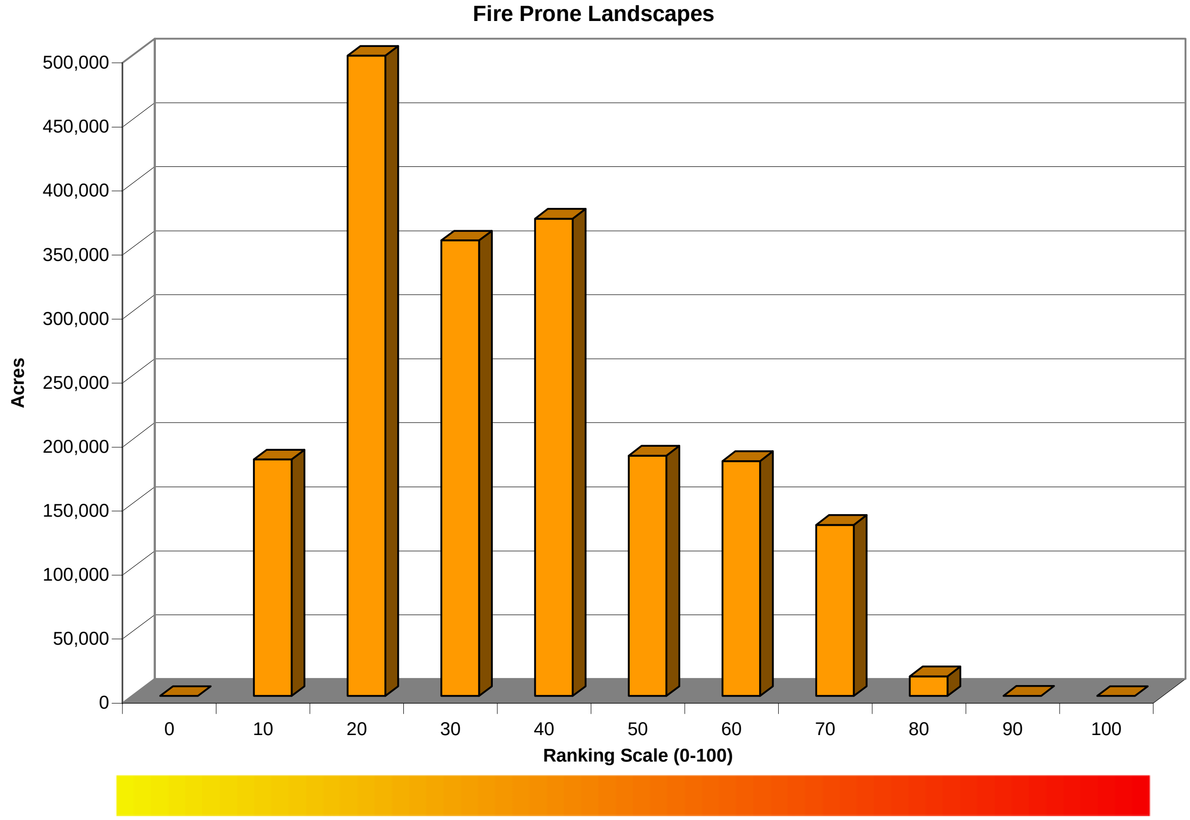


The maps depicting these risk categories display yellow as the lowest risk and red as the highest with values between a constant gradient from yellow to orange to red (Table 3.21). While large maps (16 square feet) have been provided as part of this analysis, smaller size maps are presented in Volume III Appendix .

Table 3.21. Fire Prone Landscape rankings and associated acres in each category for Teton County.

Color Code	Value	Total Acres	Percent of Total Area
	0	-	0%
	10	184,688	10%
	20	502,876	26%
	30	355,697	18%
	40	372,769	19%
	50	187,665	10%
	60	183,478	9%
	70	133,553	7%
	80	15,287	1%
	90	120	0%
	100	-	0%

Figure 3.9: 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.

In the fire-adapted ecosystems of Montana, fire is undoubtedly the dominant process in terrestrial systems that constrains 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 3.22. Historic Fire Regimes in Teton County.

Historic Fire Regime Description	Acres	Percent
Non-lethal Fires	22,800	1%
Mixed severity, short return interval	40,369	2%
Mixed severity, long return interval	50,970	3%
Mixed severity, high elevation	22,868	1%
Stand replacement, short return interval	120,233	6%
Stand replacement, long return interval	1,573	0%
Stand replacement; grass/shrub type	817,312	42%
Agriculture	734,460	38%
Rock / barren	106,044	5%
Urban	1,759	0%
Water	17,654	1%
Snow / ice	194	0%

3.10.3 Fire Regime Condition Class

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

A natural fire regime is a general classification of the role fire would play across a landscape in the absence of modern human mechanical intervention, but including the influence of aboriginal burning (Agee 1993, Brown 1995). Coarse scale definitions for natural (historical) fire regimes have been developed by Hardy *et al.* (2001) and Schmidt *et al.* (2002) and interpreted for fire and fuels management by Hann and Bunnell (2001). The five natural (historical) fire regimes are classified based on average number of years between fires (fire frequency) combined with the severity (amount of replacement) of the fire on the dominant overstory vegetation. These five regimes include:

> I – 0-35 year frequency and low (surface fires most common) to mixed severity (less than 75% of the dominant overstory vegetation replaced);
>
> II – 0-35 year frequency and high (stand replacement) severity (greater than 75% of the dominant overstory vegetation replaced);
>
> III – 35-100+ year frequency and mixed severity (less than 75% of the dominant overstory vegetation replaced);
>
> IV – 35-100+ year frequency and high (stand replacement) severity (greater than 75% of the dominant overstory vegetation replaced);
>
> V – 200+ year frequency and high (stand replacement) severity.

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

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

The three classes are based on low (FRCC 1), moderate (FRCC 2), and high (FRCC 3) departure from the central tendency of the natural (historical) regime (Hann and Bunnell 2001, Hardy *et al.* 2001, Schmidt *et al.* 2002). The central tendency is a composite estimate of vegetation characteristics (species composition, structural stages, stand age, canopy closure, and mosaic pattern); fuel composition; fire frequency, severity, and pattern; and other associated natural disturbances. Low departure is considered to be within the natural (historical) range of variability, while moderate and high departures are outside.

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

Table 3.23. 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 Teton 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 3.24).

Table 3.24. FRCC by area in Teton County.

	Condition Class	Acres	Percent of Area
1	Low departure	197,147	10%
2	Moderate departure	27,173	1%
3	High departure	34,491	2%
4	Moderate grass/shrub	817,312	42%
8	Agriculture	734,460	38%
9	Rock / barren	106,044	5%
10	Urban	1,759	0%
11	Water	17,654	1%
12	Snow / ice	194	0%
13	No information	2	0%

See Volume III Appendix for maps of Fire Regime Conditions 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).

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 the Northern Rockies. The likely effect of fire upon vegetation (i.e., current fire severity) is critical information for understanding the subsequent fire effects upon wildlife habitats, water quality, and the timing of runoff. There have been many reports of how fire suppression and timber harvest has affected vegetation patterns, fuels, and fire behavior. The US Forest Service researchers from the Flathead National Forest, derived the current fire severity theme explicitly to compare with the historical fire regime theme to evaluate how fire severity has changed since Euro-American settlement (that is, to derive fire-regime condition class).

3.10.4.2 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 3.25. Predicted Fire Severity by area in Teton County.			
Predicted Fire Severity		Acres	Percent of Area
1	Non-lethal	1,515	0%
2	Mixed severity, short interval	18,034	1%
3	Mixed severity, long interval	62,681	3%
4	Mixed severity, high elevation	22,738	1%
5	Stand replacement, forest	152,775	8%
7	Stand replacement, nonforest	817,589	42%
8	Agriculture	735,417	38%
9	Rock / barren	105,900	5%
10	Urban	1,749	0%
11	Water	17,646	1%
12	Snow / ice	192	0%
13	No information	2	0%

See Volume III Appendix for a map of Predicted Fire Severity.

3.10.5 On-Site Evaluations

Fire control and evaluation specialists as well as hazard mitigation consultants evaluated the communities of Teton 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 Teton 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 an 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 little 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 windspeed at mid-flame height is 5 mi/h (8 km/h):

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

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

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

3.10.6.4 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 3.27.

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

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

3.11 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.

The location of structures in Teton County have been mapped and are presented on a variety of maps in this analysis document. The location of all structures was determined by examining the Teton County 911 structure layer.

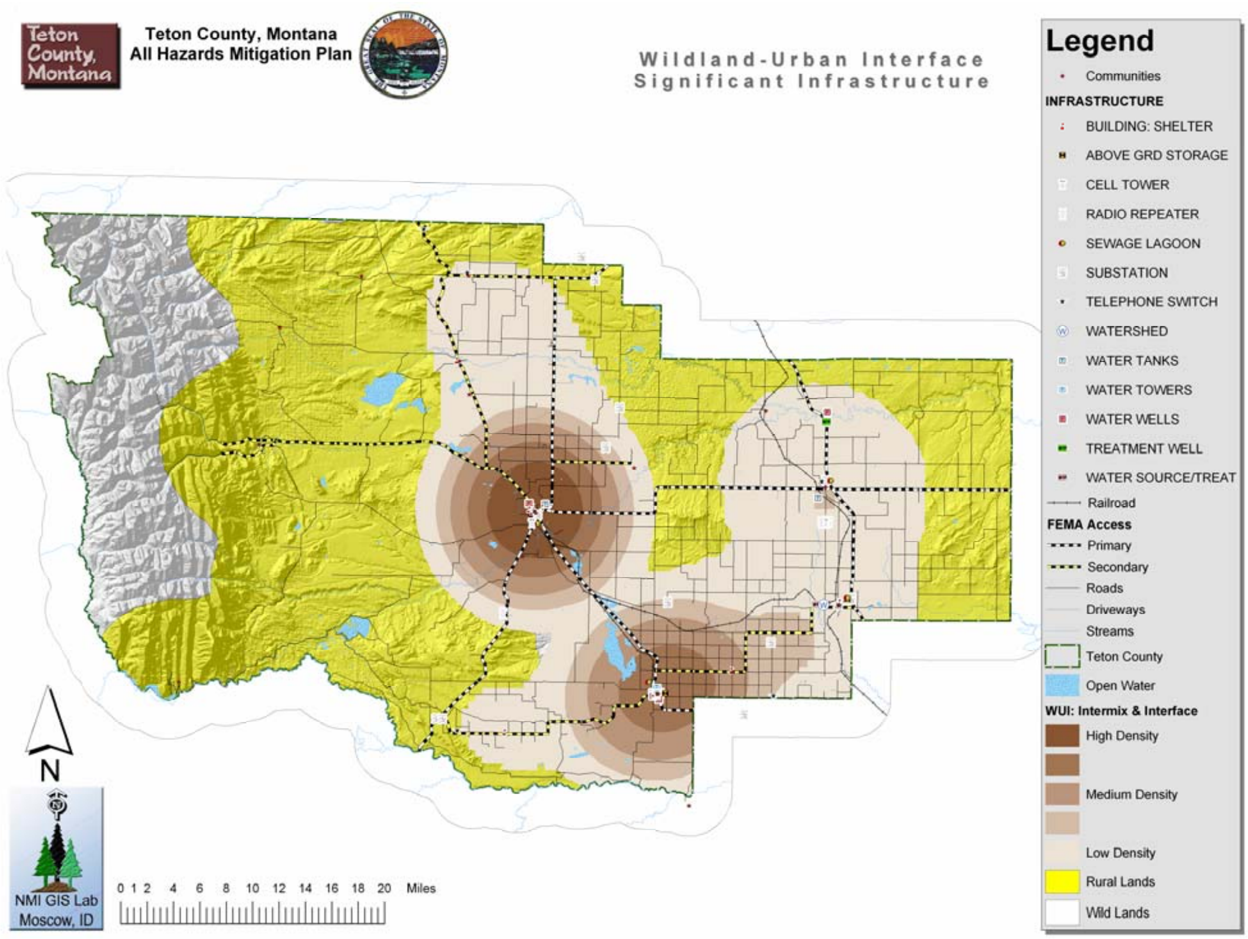
All structures are represented by a “dot” on the map. No differentiation is made between a garage and a home, or a business and a storage building. The density of structures and their specific locations in this management area are critical in defining where the potential exists for casualty loss in the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

Figure 3.9. Wildland-Urban Interface of Teton County.



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

3.11.2 Infrastructure

Teton County has both significant infrastructure and unique ecosystems within its boundaries. Of note for this WUI Fire Mitigation Plan is the existence of highway routes (eg., Interstate 15 and State Highways 287 and 89), oil fields, and the presence of power lines supplying surrounding counties. These resources will be considered in the protection of infrastructural resources for Teton 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 Volume III Appendix. 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 Teton County but of surrounding counties. The protection of these lines allows for community sustainability, support of the economic viability of Teton County, and the protection of people who rely on that power. Fuels mitigation under power lines has received considerable attention in forested ecosystems as timber is thinned and heavy accumulations of brush are managed. This practice should be mandated into the future. However, the importance of management of rangeland ecosystems under high tension power lines should not be overlooked. Brush intermixed with grasses and other species, during extreme fire weather events, coupled with steep slopes can produce considerable heat and particulate matter. When this occurs under power lines, the result can be arching between lines and even failure of the electrical media itself. Fuel mitigation treatments in high risk areas, especially where multiple lines are co-located, will be recommended for treatments.

3.11.3 Ecosystems

Teton 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, forests and rangelands in Teton 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 Critical Infrastructure

The continuing function of city, county, state and federal government services including emergency services, fire, ambulance, sheriff, police, sewer, water and road departments along with private or public communication systems, hospitals, and bulk fuel sites are considered part of the critical infrastructure of the county. The ability of these entities and sites to function during wildfire events relates directly to the ability to actively fight wildfire and to protect and serve the people of Teton County. Table 3.28 lists the buildings and places of operations for critical infrastructure in the county. The location of these sites has been GPS and are displayed on many of the maps included in this plan.

Table 3.28. Teton County Critical Infrastructure.

OWNER	TYPE	ENTITY	COMMENTS
TETON COUNTY	BUILDING	SHERIFF'S OFFICE	PSAP
TETON COUNTY	BUILDING	ROAD DEPARTMENT	SHOP/ MACH & EQUIP
CITY OF CHOTEAU	BUILDING	PUBLIC WORKS	SHOP/ MACH & EQUIP
KELLY'S	ABOVE GRD STORAGE	BULK FUEL STORAGE	FUEL GAS & DEISEL
BREEN FUEL & TIRE	ABOVE GRD STORAGE	BULK FUEL STORAGE	LPG , GAS & DEISEL
CITY OF CHOTEAU	SEWAGE LAGOON	PUBLIC WORKS	
US GOVERNMENT	BUILDING	POST OFFICE	
CITY OF CHOTEAU	BUILDING	FIRE DEPARTMENT	FIRE HALL
CITY OF CHOTEAU	BUILDING	WATER DEPARTMENT	WATER TREATMENT
CITY OF CHOTEAU	WATER WELLS	WATER DEPARTMENT	SHALLOW WELLS
TETON COUNTY	BUILDING	HOSPITAL DISTRICT	HOSPITAL & NURSING HM
TETON COUNTY	BUILDING	AMBULANCE	AMBULANCE BARN
CHOTEAU SCHOOL DIST.	BUILDING	SCHOOL K-12	
CHOTEAU COUNTRY CLUB	BUILDING	GOLF COURSE	SHELTER SITE
CITY OF CHOTEAU	WATER TANKS	WATER DEPARTMENT	CEMENT ON GRD LEVEL

Table 3.28. Teton County Critical Infrastructure.

OWNER	TYPE	ENTITY	COMMENTS
LDS CHURCH	BUILDING	CHURCH	SHELTER SITE
TOWN OF FAIRFIELD	SEWAGE LAGOON	PUBLIC WORKS	
NORTHWESTERN ENERGY	SUBSTATION	ELECTRIC UTILITY	SUBSTATION & OFFICE
US GOVERNMENT	BUILDING	POSTOFFICE	
FAIRFIELD COMMUNITY HALL	BUILDING	NON PROFIT	SHELTER SITE/TOWN OFFICE
TOWN OF FAIRFIELD	WATER TOWER	WATER DEPARTMENT	
FAIRFIELD SCHOOL DIST	BUILDING	SCHOOL K-12	
TOWN OF FAIRFIELD	WATER TOWER	WATER DEPARTMENT	
TOWN OF FAIRFIELD	BUILDING	FIRE DEPARTMENT	FIRE HALL
TOWN OF FAIRFIELD	BUILDING	PUBLIC WORKS	SHOP/ MACH & EQUIP
TOWN OF FAIRFIELD	WATER WELLS	WATER DEPARTMENT	SHALLOW WELL #3
TOWN OF FAIRFIELD	WATER WELLS	WATER DEPARTMENT	4 SHALLOW WELLS
TOWN OF FAIRFIELD	WATER WELLS	WATER DEPARTMENT	SHALLOW WELL #
TOWN OF FAIRFIELD	WATER WELLS	WATER DEPARTMENT	SHALLOW WELL #
TETON COUNTY	BUILDING	AMBULANCE	AMBULANCE BARN
TETON COUNTY	BUILDING	ROAD DEPARTMENT	MACH & EQUIP STORAGE
NORTHWESTERN ENERGY	SUBSTATION	ELECTRIC UTILITY	CHOTEAU
TOWN OF DUTTON	BUILDING	FIRE DEPARTMENT	FIRE HALL/ TOWN OFFICE
US GOVERNMENT	BUILDING	POST OFFICE	
AMERICAN LEGION	BUILDING	NON PROFIT	SHELTER SITE
DUTTON SCHOOL DISTRICT	BUILDING	SCHOOL K-12	
TOWN OF DUTTON	WATER TANK	WATER DEPARTMENT	METAL ON GRD LEVEL
MOUNTAINVIEW COOP	ABOVE GRD STORAGE	FUEL DIVISION	GAS & DIESEL
NORTHERN ENERGY	SUBSTATION	ELECTRIC UTILITY	DUTTON
TOWN OF DUTTON	SEWAGE LAGOON	PUBLIC WORKS	
TOWN OF DUTTON	TREATMENT WELL	WATER DEPARTMENT	UNDER GRD TREATMENT
TOWN OF DUTTON	WATER WELLS	WATER DEPARTMENT	SHALLOW WELLS
NORTHWESTERN ENERGY	SUBSTATION	ELECTRIC UTILITY	POWER
MOUNTAINVIEW COOP	ABOVE GRD STORAGE	FUEL DIVISION	GAS & DIESEL
POWER/TETON W&S DIST	SEWAGE LAGOON	DISTRICT	
US GOVERNMENT	BUILDING	POST OFFICE	
TETON COUNTY	BUILDING	FIRE DEPARTMENT	FIRE HALL
POWER SCHOOL DISTRICT	BUILDING	SCHOOL K-12	
POWER/TETON W&S DIST	WATER TANK	DISTRICT	
TETON COUNTY	BUILDING	AMBULANCE	AMBULANCE BARN

Table 3.28. Teton County Critical Infrastructure.			
OWNER	**TYPE**	**ENTITY**	**COMMENTS**
TETON COUNTY	BUILDING	ROAD DEPARTMENT	MACH & EQUIP STORAGE
AMERICAN LEGION	BUILDING	NON PROFIT	SHELTER SITE
POWER/TETON W&S DIST	WATER SOURCE/TREAT	DISTRICT	MUDDY CREEK TREATMENT
GREENFIELD SCHOOL DIST	BUILDING	SCHOOL K-8	
THREE RIVERS COMMUN.	CELL TOWER	TELEPHONE COMPANY	
SUN RIVER ELECTRIC COOP	SUBSTATION	ELECTRIC UTILITY	ASHUELOT HILL
SUN RIVER ELECTRIC COOP	SUBSTATION	ELECTRIC UTILITY	MCDERMOTT JCT
SUN RIVER ELECTRIC COOP	SUBSTATION	ELECTRIC UTILITY	NORTH AUGUSTA
NORTHWESTERN ENERGY	SUBSTATION	ELECTRIC UTILITY	AUGUSTA MPC
SUN RIVER ELECTRIC COOP	SUBSTATION	ELECTRIC UTILITY	AGAWAM
SUN RIVER ELECTRIC COOP	SUBSTATION	ELECTRIC UTILITY	PENDROY
NORTHWESTERN ENERGY	SUBSTATION	ELECTRIC UTILITY	PONDERA OIL FIELD
WAPA	SUBSTATION	ELECTRIC UTILITY	BOLE
NORTHWESTERN ENERGY	SUBSTATION	ELECTRIC UTILITY	CHALMERS
BYNUM SCHOOL DISTRICT	BUILDING	SCHOOL K-8	
PENDROY SCHOOL DISTRICT	BUILDING	SCHOOL VACANT	
GOLDEN RIDGE SCHOOL	BUILDING	SCHOOL K-5	
THREE RIVERS COMMUN.	CELL TOWER	TELEPHONE COMPANY	
WAPA	CELL TOWER	ELECTRIC UTILITY	COMMUNICATION LINK
CELLULAR ONE	CELL TOWER	WIRELESS COMPANY	
TETON COUNTY	RADIO REPEATER	PSAP	EMS,FIRE,WEED, WIRELESS COMPUTER
TETON COUNTY	RADIO REPEATER	PSAP	LAW,EMS,FIRE,ROAD, WEED,MHP,BLM,USFS
THREE RIVERS COMMUN.	CELL TOWER	TELEPHONE COMPANY	
THREE RIVERS COMMUN.	TELEPHONE SWITCH	TELEPHONE COMPANY	CORP OFF PRIMARY SWITCH & 467 EXCH
THREE RIVERS COMMUN.	TELEPHONE SWITCH	TELEPHONE COMAPNY	466 EXCHANGE
TETON COUNTY	BUILDING	FIRE DEPARTMENT	FIRE HALL
THREE RIVERS COMMUN.	TELEPHONE SWITCH	TELEPHONE COMPANY	469 EXCHANGE

Table 3.28. Teton County Critical Infrastructure.

OWNER	TYPE	ENTITY	COMMENTS
QWEST	TELEPHONE SWITCH	TELEPHONE COMPANY	476 EXCHANGE / FIBER OPTICS PT
THREE RIVERS COMMUN	TELEPHONE SWITCH	TELEPHONE COMPANY	463 EXCHANGE
THREE RIVERS COMMUN	TELEPHONE SWITCH	TELEPHONE COMPANY	MICROWAVE TOWER
THREE RIVERS COMMUN	TELEPHONE SWITCH	TELEPHONE COMPANY	MICROWAVE TOWER
THREE RIVERS COMMUN	TELEPHONE SWITCH	TELEPHONE COMPANY	REMOTE SWITCH
MOUNTAINVIEW COOP	ABOVE GRD STORAGE	FUEL DIVISION	GAS & DIESEL

3.13 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 rapidly was evaluated. In general, with notable exceptions, the majority of the area within Teton County has highly variable clay content in the surface horizons. On average these soils are well drained with moderate permeability. Forested areas have somewhat more developed soils. These areas are characterized by a thin O horizon made up of decomposing forest litter.

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).

3.13.1 Fire Mitigation Practices to Maintain Soil Processes

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

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

3.14 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.

3.14.1 Fire Mitigation Practices to Maintain Hydrologic Processes

The effects of wildland fire and prescribed burning on water quality are variable. The removal of the vegetative canopy will tend to reduce transpiration and increase water yield, especially during the growing season and immediately afterwards (MacDonald *et al.* 1991). Prescribed burning is used to maintain a healthy, dynamic ecosystem while meeting land management objectives. Prescribed burning objectives include reduction of natural fuels, assuring current and future habitat conditions for native plants and animals, improvement of forest health, and enhancement, protection, and maintenance of old growth and riparian areas. The majority of the burned areas are expected to receive a low intensity ground fires with some areas of moderate intensity. This may include occasional torching of single trees or larger clumps or trees and consumption of some patches of regeneration. Impacts to soil and large woody debris are expected to be minimal, given project targets. In rangeland ecosystems, prescribed fire will have variable impacts dependant on burn intensity and proximity to streams. Stream buffering (low intensity to no burn around streams) has been shown to preserve most if not all normal sediment filtering functions.

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

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

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

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

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

Riparian buffer strips will be maintained, thereby preserving canopy cover for shading, sediment filtering, and streambank and floodplain stability (PACFISH guidelines). Areas not burned will provide significant protection from adverse water quality impacts associated with wildland fire and prescribed burning. Therefore, effects to fish and habitat in these streams from increased water yield are unlikely. The area has been roaded from past management activities. Therefore, increased road densities from road construction are not expected to be of a magnitude to increase sedimentation to affected drainages, provided adequate planning for new road construction is implemented. Forest practices in the area will be conducted to meet the standards of the Montana Streamside Management 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.

3.15 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 three facilities in Teton County that are monitored for EPA emission standards. All are in compliance and well below allowable emission thresholds. These facilities include Ramaker-Swanson in Choteau and the Busch Agricultural Elevator and Seed Plant in Fairfield.

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.

Teton County is in the Montana Airshed Unit 9: 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.

Class I airsheds in the immediate area include Glacier National Park, Bob Marshall Wilderness Area, Scapegoat Wilderness Area, and Gates of the Mountains Wilderness Area.

All of the communities within Teton 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).

3.15.1 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 <u>fuels</u> 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, the 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 Teton County and are fully endorsed and encouraged by the Hazard Mitigation Plan Committee.

4.2 Teton County Conditions

Teton County is characterized by cold winters and dry summers. Although fairly large, Teton County is sparsely populated. Much of the county is quite rural, due in large part to the agricultural economy of the region. Farms and ranches tend to be widely spread. 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 Lewis and Clark National Forest on the west side of the county provides ample economic and recreational resources. Overcrowded forest conditions in some areas increases the potential for high intensity, possibly stand replacing fires.

The majority of the county is covered by rangelands, much of which has been converted to irrigated farm or pasture. Undeveloped rangelands are characterized by low growing grasses with occasional clumps of sagebrush or juniper. Developed rangelands are 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 does, inevitably, lead 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 Crop Reserve Program by the federal government, many formerly 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 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 effort is likely to be worth the efforts, costs and risks associated with fighting unwanted fires.

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

Burn Permits: The issues associated with debris burning during certain times of the year are difficult to negotiate and enforce. However, there are significant risks associated with the use of fire adjacent to expanses of flammable vegetation under certain scenarios. Burning permits are required by State law on all forested lands within the State during the official fire season of May 1 to September 30. The wildland fire agencies (DNRC, USFS, BLM, and US Fish and Wildlife

Service) each have their own guidelines for issuing burn permits in their jurisdictions. Since local government fire agencies area also involved with burn permit regulation, close coordination between the two types of agencies is needed to ensure safe burning and to exchange information. Enforcement of burning permit requirements is the responsibility of the County Sheriff's Department. Although this is a state-wide regulation, compliance and enforcement has been variable between fire 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 Teton 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 WUI Fire Mitigation Plan indicated that approximately 51% 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. In Teton County, such standards may be drafted in consultation with the Fire Chiefs in order to assure accessibility is possible for all responding resources.

Coupled with this need is the potential to implement a set of requirements or recommendations to specify construction materials allowed for use in high risk areas of the county. The Teton 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 Teton 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. Teton County Communities

Community Name	Planning Description	Vegetative Community	National Register Community At Risk?[1]
Choteau	Community	Rangeland	No
Fairfield	Community	Rangeland	No
Power	Community	Rangeland	No
Dutton	Community	Rangeland	No
Byron	Community	Rangeland	No
Pendroy	Community	Rangeland	No
New Rockport Colony	Community	Rangeland	No
Rockport Colony	Community	Rangeland	No
Miller Colony	Community	Rangeland	No
Agawam	Remnant	Rangeland	No
Farmington	Remnant	Rangeland	No
Collins	Remnant	Rangeland	No
Greenfield	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 within at least 100 feet of structures to reduce the potential loss of life and property is highly recommended. Assessing individual homes in the outlying areas can address the issue of escape routes and home defensibility characteristics. Educating the homeowners in techniques for protecting their homes is critical in these environments.

4.3.1.2 Travel Corridor Fire Breaks

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

4.3.1.3 Power Line Corridor Fire Breaks

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

4.4 Communities in Teton County

4.4.1 Overall Fuels Assessment

The suitability of the lands within Teton County to agricultural has led to a profusion of farming and ranching activity. Irrigated fields and pastures dominate the rolling hills and flat lands east of the Lewis and Clark National Forest. In areas unreachable by irrigation waters, which primarily occur in the northern reaches of the county, native grasslands stretch relatively unbroken for many miles. These low growing grasses are somewhat sparse; however, they would provide a consistent fuel bed for rapidly spreading rangeland fires. Agricultural or CRP fields can also serve to fuel a fire after curing; burning in much the same manner as consistent grass fuels. Fires in grass and rangeland fuel types 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 the 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 rapidly and can be difficult to control. During extreme drought and pushed by high winds, fires in these fuel types can exhibit extreme rates of spread, thwarting suppression efforts. The fires within the Missouri Breaks Complex of 2003 demonstrate the potential for fires in these fuels to reach enormous size and demonstrate fire behavior atypical of the fuels.

The combination of farming and livestock production has generally led to a landscape that is at low potential for wildland fire. Irrigated or cultivated fields surround nearly all community centers, with natural or man-made fire breaks such as roads separating the agricultural fields from structures. This reduces the potential for infringement by wildland fire. The overall threat to structures and communities in the agricultural portion of the County is quite low.

However, there are areas of notable exception within the County. Forested lands flank the western portion of the county along the Lewis and Clark National Forest. Many of these forest types are dry Douglas-fir and Engelmann spruce forests that have become heavily overstocked, resulting in multistoried conditions with abundant ladder fuels. Increased activities by pathogens will continue to increase levels of dead and down fuel, as host trees succumb to insect attack and stand level mortality increases. Overstocked, multi-layered stands and the abundance of ladder fuels lead to horizontal and vertical fuel continuity in many stands. These conditions, combined with an arid and often windy environment, can encourage the development of stand replacing fire. These fires can burn with very high intensities and generate large flame lengths and fire brands that can be lofted long distances. Such fires present significant control problems for suppression resources, often developing into large, destructive wildland fires.

Examples of large, stand replacing fires can be seen throughout the Rocky Mountains. These fire events threaten natural resource values as well as homes and other improvements important to Teton County residents.

4.4.2 Overall Ignition Profile

The dry climate, xeric vegetation, and prevalence of windy conditions in Teton County create an environment that will sustain fire spread for many months of the year. This increases the probability that ignition sources from both natural (lightning) causes and human causes will find a receptive fuel bed. Natural ignitions are most likely to occur during summer storms over the high ridges and mountains of the Lewis and Clark National Forest. Although not as common as over the mountains, lighting strikes do occur in the rangelands of the Rocky Mountain Front area. Human ignitions can stem from numerous activities, including debris burning, fireworks, cigarettes, welding, campfires, and so on. Included in human ignition sources are fires sparked by vehicles or hot catalytic converters. Also included in an ignition profile are the fires sparked by downed power lines or malfunctioning transformers. All of these potential ignition sources and the dry nature of vegetation in Teton County increase the potential for fire occurrence.

4.4.3 Individual Community Assessments

4.4.3.1 Agawam and Farmington

The small cluster of homes known as Farmington is located approximately five miles north of Choteau just west of State Route 220. Homeowners in this area are surrounded by irrigated farm fields. A small tributary of the Teton River flows through the townsite.

Agawam lies about seven miles north of Farmington, also alongside State Route 220. There are only a few homes still remaining in this remnant railroad town. Muddy Creek flows about one mile south of the townsite; however, this is not a sufficient water resource for irrigation purposes.

The topography in the Farmington and Agawam area is flat with only an occasional creek bed or ephemeral coulee to differentiate the landscape.

4.4.3.1.1 Fire Potential

Fuels Assessment

Fuels surrounding Farmington and Agawam consist primarily of sparse grasses, irrigated crop, or CRP fields. There are very few low growing shrubs and the only trees that exist are ornamentals planted in residents' yards. Agriculture and ranching activities dominate the landscape and the economy, particularly near Farmington, resulting in a discontinuous pattern of native fuels. A wind-driven fire in the dry native fuel complexes would produce a rapidly advancing, but variable intensity fire. Fires burning in some types of unharvested fields would be expected to burn more intensely with larger flame lengths due to the greater availability of fuels. Under extreme weather conditions, particularly high winds, there is a high potential for a rapidly advancing rangeland fire. Nevertheless, many homeowners maintain groomed yards or are surrounded by agricultural fields; thus, decreasing the risk of a wildland fire threatening structures. Grazing around homes and communities helps decrease build up of fine fuel loads. Livestock grazing can be an effective tool to reduce the primary fuel load component of the arid rangeland ecosystem.

Ignition Profile

Lightning events are particularly common in the mountainous regions on the west side of Teton County. Fires started by strikes in the higher elevations are commonly pushed eastward into the rangelands by the Chinook winds common in the Rocky Mountain Front. Human activities also have a high potential of causing an uncontrolled wildfire. Residential living and recreational use present innumerable ignition sources. Debris burning, discarded cigarettes, children playing with matches, fireworks, roadway fires, and camp fires are just a few of the countless potential human ignition sources in the area.

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 may also be started by vehicles driving through dry fields or on unimproved trails. Farm equipment, ATV's and pick ups are used regularly for farming purposes and recreational operations. Public transmission lines in the area also add to potential ignition sources. Sparks from downed lines or arcing during extreme weather conditions could easily ignite dry fuels below.

Stubble fires escape landowner's boundaries relatively regularly. These fires are generally easily suppressed by modifying the vegetation and homes are rarely threatened.

4.4.3.1.2 Ingress-Egress

The primary access into both Farmington and Agawam is State Route 220, a paved north-south highway connecting these more rural communities with the population center of Choteau. There are also numerous gravel roads crisscrossing the area. These travel corridors are typically bordered by arid, rangeland vegetation including primarily sparse grasses or agricultural fields. These access routes are not at significant risk of long-term closure due to wildland fire.

4.4.3.1.3 Infrastructure

Residents of Farmington and Agawam have drilled domestic wells either individually or for multiple home use in the same area. Supplementary wells have been established throughout the greater area to provide additional water for irrigation or livestock. These water resources could be affected by a rangeland fire if the power lines that serviced the pumps were compromised.

Public transmission lines strung to homes and businesses throughout the area are at fairly low risk of causing a wildfire due to the lack of heavy fuels within the corridor. Nevertheless, under severe wind conditions or in the event of a downed line, there is potential for ignition. Many of the power poles in Teton County are severely aging, which makes them more susceptible to fires. Power poles can, in some instances, add to the fuel complex of a wildfire. The loss of even one pole to fire causes a loss of electricity, which may inhibit the efficiency and effectiveness of emergency response and cause other infrastructure and service facilities to fail.

4.4.3.1.4 Fire Protection

Farmington and all of the surrounding area has structural fire protection provided by Choteau Rural Volunteer Fire Company. Agawam falls into the Pendroy Rural Volunteer Fire Company. All fifty-six Montana Counties are currently enrolled in the State/County Cooperative Fire program. According to agreements signed with the state, each county is obligated to fight wildland fire on all state and private ground not covered by an existing fire agency. The county is served by all volunteer fire companies. The State department, the Montana Department of Natural Resources and Conservation, in turn, assists counties when fires exceed their capability, provides training in wildland fire fighting, administrative support to county fire agencies through involvement in the County Rural Fire Councils and Fire Protective Associations, as well as the loan of Federal Excess Personal Property (FEPP) fire equipment.

4.4.3.1.5 Community Risk Assessment

Residents of Farmington and Agawam have low to moderate risk of experiencing a wildland fire due to the relatively flat topography and agricultural development. However, recreational and agricultural activities throughout the area increase the risk of a man-caused wildfire spreading to the communities. The receptive nature of fuels increases the likelihood of a fire start. In the event of wildfire, the dry, flashy fuels would likely support a very fast-moving rangeland fire. Therefore, it is important that homeowners implement fire mitigation measures to protect their structures and families prior to such an event. Most homeowners maintain an adequate defensible space around structures by watering their yards or mowing grass and weeds. Community defensible space is also maintained by livestock grazing. A planned, integrated grazing system around the communities could help enhance the fire reduction benefits derived from grazing.

4.4.3.1.6 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 Teton County must be made aware that home defensibility starts with the home. 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. “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.

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.

In more remote communities, such as Farmington and particularly Agawam, development of fuel breaks and creating access to water for firefighting would enhance the survivability of the community and the efficiency of emergency fire response.

4.4.3.2 Arrowleaf Subdivision

The Arrowleaf Subdivision is located near the end of Teton Canyon Road at the junction of the South Fork of the Teton River with the main Teton River channel. The subdivision sits at the base of the steep slopes of the Rocky Mountains and abuts the Lewis and Clark National Forest. Homes are scattered throughout the area, typically set back from the main road by private drives of variable length. Structures in this area, new and old, were typically built using wood siding and decking, which tends to heighten the fire risk. Many homeowners have established a yard or groomed area around structures; however, some homes directly abut forest fuels. The Pine Butte Guest Ranch, owned by the Nature Conservancy, lies on the western edge of the subdivision and has many associated cabins, barns, and other structures.

4.4.3.2.1 Fire Potential

Fuels Assessment

Many of the homes in the Arrowleaf Subdivision are surrounded by limber pine, which becomes somewhat denser on the western edge. Mature limber pine are naturally short to moderately tall trees that grow in well-spaced stands. The understory of this limber pine stand is generally made up of sparse grasses and a few low-growing shrubs. Fires in these fuels are typically infrequent, but burn at high intensities usually resulting in stand-replacement. The topography is relatively gentle in this area; thus, wind would likely be needed to push fire through the understory vegetation.

Homes closer to the National Forest boundary sit within the limber pine to Douglas-fir transition zone. Fuel loading in predominantly Douglas-fir stands is much higher than limber pine stands. Increased dead and down fuels, increased stand density, and increased understory vegetation results in a much hotter and more unpredictable wildfire. Crowning, spotting, and torching of individual trees also makes direct attack suppression efforts difficult and dangerous for firefighters. These fire behavior characteristics are significantly enhanced by steep, highly variable slopes and the potential for extreme weather conditions.

Homes located directly along the river frontage on the eastern end of the subdivision have slightly less fire risk. The floodplain area is mostly a series of river rock gravel bars deposited by past high water events. Riparian vegetation is somewhat sparse in this area. Denser riparian vegetation, which could potentially carry a fire, is found upriver near the National Forest boundary.

Ignition Profile

Lightning events are particularly common in the mountainous regions on the west side of Teton County. Fires started by strikes in the higher elevations are commonly pushed eastward into the rangelands by the Chinook winds common in the Rocky Mountain Front. Human activities also have a high potential of causing an uncontrolled wildfire. Residential living and intense recreational use present innumerable ignition sources. Debris burning, discarded cigarettes, children playing with matches, fireworks, roadway fires, and camp fires are just a few of the countless potential human ignition sources in the area.

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 may also be started by vehicles driving through dry fields or on unimproved trails. ATV's and pick ups are used regularly for recreational purposes in the mountains. Public transmission lines in the area also add to potential ignition sources. Sparks from downed lines or arcing during extreme weather conditions could easily ignite dry fuels below.

4.4.3.2.2 Ingress-Egress

The Arrowleaf Subdivision is about seventeen miles west of U.S. 89 via Teton Canyon Road, which is a paved two lane route. Belleview Road, a gravel secondary road, also accesses the area. There are two main roads through the subdivision, one traveling up the main Teton River drainage and another following the South Fork drainage. Where the South Fork road splits from the main Teton Canyon Road, a one lane bridge crosses the river. Accommodating only one lane of traffic may become a hinderance during an emergency evacuation; however, the Belleview Road provides an additional escape route for residents on the south side of the river. In the event of a wildfire, evacuees must travel east because both of the access routes for the Arrowleaf Subdivision end within a few miles of entering the Lewis and Clark National Forest.

4.4.3.2.3 Infrastructure

Residents in the Arrowleaf Subdivision rely on domestic single home or multiple home wells. These water resources could be affected by a wildland fire if the power lines that serviced the pumps were compromised.

Public transmission lines strung to homes and businesses throughout the area are at fairly low risk of causing a wildfire due to the lack of heavy fuels within the corridor. Nevertheless, under severe wind conditions or in the event of a downed line, there is potential for ignition. Many of the power poles in Teton County are severely aging, which makes them more susceptible to fires. Power poles can, in some instances, add to the fuel complex of a wildfire. The loss of even one pole to fire causes a loss of electricity, which may inhibit the efficiency and effectiveness of emergency response and cause other infrastructure and service components to fail.

4.4.3.2.4 Fire Protection

The Choteau Rural Volunteer Fire Company provides structural fire protection for residents in the Arrowleaf Subdivision and surrounding area. All fifty-six Montana Counties are currently enrolled in the State/County Cooperative Fire program. According to agreements signed with the state, each county is obligated to fight wildland fire on all state and private ground not covered by an existing fire agency. The Montana Department of Natural Resources and Conservation, in turn, assists counties when fires exceed their capability, provides training in wildland fire fighting, administrative support to county fire agencies through involvement in the County Rural Fire Councils and Fire Protective Associations, as well as the loan of Federal Excess Personal Property (FEPP) fire equipment.

4.4.3.2.5 Community Risk Assessment

Residents of the Arrowleaf Subdivision have a moderate to high risk of experiencing a wildland fire due to its proximity to forest fuels. Natural ignitions within the Lewis and Clark National Forest or in the Rocky Mountain Front area could easily move into this area. High intensity recreational traffic throughout the area also increases the risk of a man-caused wildfire threatening the community. Additionally, many of the homes in this area are at higher risk due to factors such as non fire-resistant siding and poor fire-conscious landscaping techniques. Recently, a defensible space awareness and creation project was implemented in some areas of the subdivision. This project was intended to remove or prune hazardous limber pine and underbrush within a set distance from qualifying structures. Homes that participated in the project have a much lessened risk of loss to wildfire.

The Arrowleaf Subdivision is a remote community without access to immediate fire protection. Response time for Choteau Initial Response may be delayed due to the sheer distance to the community. In the event of wildfire, the forest fuels would likely support a higher intensity and potentially very fast-moving wildland fire. It is imperative that homeowners in this area implement fire mitigation measures to protect their structures and families prior to a wildfire event

4.4.3.2.6 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 Teton County must be made aware that home defensibility starts with the home. 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. "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.

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 pruning driveways and creating a turnaround area for large vehicles.

Maintaining developed drafting sites and mapping alternative water resources such as underground tanks near the community will increase the effectiveness and efficiency of emergency response in a wildfire situation. It is also important for alternative escape routes to be well signed and maintained for emergency use.

4.4.3.3 Bynum

The community of Bynum is a U.S. Highway 89 roadside town lying approximately thirteen miles north of Choteau and about four miles northeast of Bynum Reservoir. The Bynum area is typical of a Rocky Mountain Front community. The immediate area is relatively flat, broken only by a few shallow creek beds and ephemeral coulees. However, the steep slopes of the Rocky Mountains and the Lewis and Clark National Forest rise ominously about 17 miles due west. The main fork of Muddy Creek passes along the north side of the community. Bynum Reservoir was created for irrigation purposes, supplying water to area farmers throughout the dry summers; however, the area is also used for recreational purposes including fishing and waterfowl hunting.

4.4.3.3.1 Fire Potential

Fuels Assessment

The rangeland fuels surrounding Bynum are predominantly made up of sparse native grasses and agricultural fields. There are very few shrubs and the only notable trees are those planted in residents' yards. Agriculture and ranching activities are scattered throughout the area resulting in a discontinuous pattern of native fuels. A wind-driven fire in the dry native fuel complexes would produce a rapidly advancing, but variable intensity fire. Fires burning in some types of unharvested fields would be expected to burn more intensely with larger flame lengths due to the greater availability of fuels. Under extreme weather conditions, particularly high winds, there is a high potential for a rapidly advancing rangeland fire. Nevertheless, many homeowners maintain groomed yards or are surrounded by agricultural fields; thus, decreasing the risk of a wildland fire threatening structures. Grazing around homes and communities helps decrease build up of fine fuel loads. Livestock grazing can be an effective tool to reduce the primary fuel load component of the arid rangeland ecosystem.

Ignition Profile

Lightning events are particularly common in the mountainous regions on the west side of Teton County. Fires started by strikes in the higher elevations are commonly pushed eastward into the rangelands by the Chinook winds common in the Rocky Mountain Front. Human activities also have a high potential of causing an uncontrolled wildfire. Residential living and recreational use present innumerable ignition sources. Debris burning, discarded cigarettes, children playing with matches, fireworks, roadway fires, and camp fires are just a few of the countless potential human ignition sources in the area.

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 may also be started by vehicles driving through dry fields or on unimproved trails. Farm equipment, ATV's, and pick ups are used regularly for farming purposes and recreational operations. Public transmission lines in the area also add to potential ignition sources. Sparks from downed lines or arcing during extreme weather conditions could easily ignite dry fuels below.

Stubble fires seldom escape landowner's boundaries; however, there are a few incidents throughout the County each year. These fires are generally easily suppressed by modifying the vegetation and homes are rarely threatened.

4.4.3.3.2 Ingress-Egress

The primary access route to Bynum is U.S. Highway 89 either from Choteau to the south or from Browning to the north. This is a paved, two-lane route bordered by light grassland fuels and agricultural fields; thus, it is at low risk of long-term closure due to wildland fire. There are also several gravel roads in the area capable of supporting an emergency evacuation. Alternative potential escape routes should be signed and maintained during the fire season.

4.4.3.3.3 Infrastructure

Residents of Bynum rely on domestic single home or multiple home wells. Supplementary wells have also been established throughout the greater area to provide additional water for irrigation or livestock. These water resources could be affected by a rangeland fire if the power lines that serviced the pumps were compromised.

Public transmission lines strung to homes and businesses throughout the area are at fairly low risk of causing a wildfire due to the lack of heavy fuels within the corridor. Nevertheless, under severe wind conditions or in the event of a downed line, there is potential for ignition. Many of the power poles in Teton County are severely aging, which makes them more susceptible to fires. Power poles can, in some instances, add to the fuel complex of a wildfire. The loss of even one pole to fire causes a loss of electricity, which may inhibit the efficiency and effectiveness of emergency response and cause other infrastructure and service components to fail.

4.4.3.3.4 Fire Protection

The Choteau Rural Volunteer Fire Company provides structural fire protection for most residents of Bynum; however, the Pendroy Rural Volunteer Fire Company picks up a few more remote structures north of the community. All fifty-six Montana Counties are currently enrolled in the State/County Cooperative Fire program. According to agreements signed with the state, each county is obligated to fight wildland fire on all state and private ground not covered by an existing fire agency. The Montana Department of Natural Resources and Conservation, in turn, assists counties when fires exceed their capability, provides training in wildland fire fighting, administrative support to county fire agencies through involvement in the County Rural Fire Councils and Fire Protective Associations, as well as the loan of Federal Excess Personal Property (FEPP) fire equipment.

4.4.3.3.5 Community Risk Assessment

Residents of Bynum have a low to moderate risk of experiencing a wildland fire due to the relatively flat topography, sparse vegetation surrounding most structures, and their nearby access to water resources. However, recreational and agricultural activities throughout the area increase the risk of a man-caused wildfire spreading to the community. Additionally, wildfires pushed out of the mountains by strong Chinook winds could potentially threaten the community. In the event of wildfire, the dry, flashy fuels would likely support a very fast-moving rangeland fire. It is important that homeowners implement fire mitigation measures to protect their structures and families prior to a wildfire event. Most homeowners maintain an adequate defensible space around structures by watering their yards or mowing grass and weeds.

4.4.3.3.6 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 Teton County must be made aware that home defensibility starts with the home. 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. “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.

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.

Maintaining developed drafting sites and mapping alternative water resources such as underground tanks near the community will increase the effectiveness and efficiency of emergency response in a wildfire situation. It is also important for alternative escape routes to be well signed and maintained for emergency use in the event that Highway 89 becomes compromised.

4.4.3.4 Choteau

Choteau, the Teton County seat and largest community, is located in central Teton County at the junction of U.S. Highway 89 and U.S. Highway 287. The Teton River flows along the western edge of the community. Deep Creek, a major tributary of the Teton, drains into the main Teton channel just south of the Choteau city limits. Another small stream, Spring Creek, runs through town near the east side of U.S. 89; however, this creek remains dry throughout most of the year. While Fairfield is the agricultural hub of the county, Choteau is the commercial center. Most of the area's public buildings, service facilities, and privately-owned businesses reside in Choteau. Nonetheless, due to the available water supply, the landscape surrounding the community is dominated by irrigated crops and livestock pasture.

4.4.3.4.1 Fire Potential

Fuels Assessment

Fuels surrounding Choteau consist primarily of irrigated crop fields, CRP, and pasture with scattered remnants of native grasses. Agriculture and ranching activities dominate the landscape resulting in a discontinuous pattern of native fuels. A wind-driven fire in the dry native fuel complexes would produce a rapidly advancing, but variable intensity fire. Fires burning in some types of unharvested fields would be expected to burn more intensely with larger flame lengths due to the greater availability of fuels. Agricultural fields currently managed under the Crop Reserve Program (CRP) burn very intensely due to increased amount of fuels, particularly dead grasses from previous years. Larger flame lengths and intense heat make fires in CRP fields difficult to control. Under extreme weather conditions, particularly high winds, there is a high potential for a rapidly advancing rangeland fire. Nevertheless, many homeowners maintain groomed yards or are surrounded by agricultural fields; thus, decreasing the risk of a wildland fire threatening structures. Grazing around homes and communities helps decrease build up of fine fuel loads. Livestock grazing can be an effective tool to reduce the primary fuel load component of the arid rangeland ecosystem.

Build up of riparian vegetation in the creek and river bottoms creates a continuous fuel bed for wildfires to enter communities or housing developments. Fires that would otherwise be controlled as they near developments, could potentially be carried through communities by fuels in the riparian zones; thus, potentially threatening many structures. These fires could potentially burn very intensely with large flame lengths due to the higher production of vegetation in the riparian areas. Community clean-up projects targeting the creek and river bottoms could be beneficial from both fire safety and aesthetic standpoints.

Ignition Profile

Lightning events are particularly common in the mountainous regions on the west side of Teton County. Fires started by strikes in the higher elevations are commonly pushed eastward into the rangelands by the Chinook winds common in the Rocky Mountain Front. Human activities also have a high potential of causing an uncontrolled wildfire. Residential living and recreational use present innumerable ignition sources. Debris burning, discarded cigarettes, children playing with matches, fireworks, roadway fires, and camp fires are just a few of the countless potential human ignition sources in the area.

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 may also be started by vehicles driving through dry fields or on unimproved trails. Farm equipment, ATV's, and pick ups are used regularly for farming purposes and recreational operations. Public transmission lines in the area also add to potential ignition sources. Sparks from downed lines or arcing during extreme weather conditions could easily ignite dry fuels below.

Stubble fires escape landowner's boundaries relatively frequently in heavily developed agricultural areas. These fires are generally easily suppressed by modifying the surrounding vegetation with readily available farm equipment and homes are rarely threatened.

4.4.3.4.2 Ingress-Egress

The primary access routes into and out of Choteau are U.S. Highways 89 and 287, but there are also several paved State Routes radiating from the city center. These are all paved routes traveling through lower risk grassland fuels or agricultural fields. In addition to these roadways, there are several gravel secondary routes crisscrossing the area, most of which access more remote farms and ranches or recreation areas.

4.4.3.4.3 Infrastructure

Residents of Choteau are either connected to a municipal well or have drilled domestic wells. Supplementary wells have been established throughout the greater area to provide additional water for irrigation or livestock. These water resources could be affected by a rangeland fire if the power lines that serviced the pumps were compromised. City wells; however, do have back-up power.

Public transmission lines strung to homes and businesses throughout the area are at fairly low risk of causing a wildfire due to the lack of heavy fuels within the corridor. Nevertheless, under severe wind conditions or in the event of a downed line, there is potential for ignition. Many of the power poles in Teton County are severely aging, which makes them more susceptible to fires. Power poles can, in some instances, add to the fuel complex of a wildfire. The loss of even one pole to fire causes a loss of electricity, which may inhibit the efficiency and effectiveness of emergency response and cause other infrastructure and service components to fail.

4.4.3.4.4 Fire Protection

Choteau City Volunteer Fire Department provides structural fire protection for structures within the Choteau city limits. The Choteau Rural Volunteer Fire Company provides structural fire protection for the greater Choteau area including structures within the Lewis and Clark National Forest. All fifty-six Montana Counties are currently enrolled in the State/County Cooperative Fire program. According to agreements signed with the state, each county is obligated to fight wildland fire on all state and private ground not covered by an existing fire agency. The Montana Department of Natural Resources and Conservation, in turn, assists counties when fires exceed their capability, provides training in wildland fire fighting, administrative support to county fire agencies through involvement in the County Rural Fire Councils and Fire Protective Associations, as well as the loan of Federal Excess Personal Property (FEPP) fire equipment.

4.4.3.4.5 Community Risk Assessment

Residents of Choteau have a low to moderate risk of experiencing a wildland fire due to the extensive agricultural development and nearby water supply. However, recreational activities throughout the area increase the risk of a man-caused wildfire spreading to the community. Recently, a project was implemented that reduced the fuel buildup along Spring Creek within the Choteau city limits. Much of the dead and down or dying vegetation was removed from the riparian zone. This project reduced the fire by creating discontinuity within the burnable fuels complex around the community.

Under extreme weather conditions, escaped agricultural fires could potentially threaten individual homes or the townsite; however, this type of fire is usually quickly controlled. The Choteau area experiences frequent high winds, which generally increase the rate of fire spread and intensity of rangeland fires. It is imperative that homeowners implement fire mitigation measures to protect their structures and families prior to a wildfire event. Most homeowners maintain an adequate defensible space around structures by watering their yards or mowing grass and weeds.

4.4.3.4.6 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 Teton County must be made aware that home defensibility starts with the home. 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. "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.

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.

Designing a plan to help firefighters control CRP fires would significantly lessen the fire danger to the community. Pre-mitigation associated with this type of fire might include plowing a fire resistant buffer zone around fields and along pre-designed areas to tie into existing natural or manmade barriers or implementing a prescribed burning regimen during less risky seasons of the year.

Maintaining developed drafting sites and mapping alternative water resources such as underground tanks near the community will increase the effectiveness and efficiency of emergency response in a wildfire situation.

4.4.3.5 Collins

There are very few residents remaining in the immediate Collins area. Although there is an identified community center, most residents are larger landowners. Collins is located along the Burlington Northern railroad corridor on Collins Road about seven miles northwest of Dutton. The junction of Muddy Creek with the Teton River occurs about one mile east of the townsite, effectively sandwiching the community between the two drainages. Farming and ranching operations sustain the economy in this somewhat remote area.

4.4.3.5.1 Fire Potential

Fuels Assessment

Fuels surrounding Collins consist primarily of sparse grasses, dryland CRP, or irrigated agricultural fields. There are very few low growing shrubs and the only trees that exist are ornamentals planted in residents' yards. Agriculture and ranching activities dominate the landscape, resulting in a discontinuous pattern of native fuels. A wind-driven fire in the dry native fuel complexes would produce a rapidly advancing, but variable intensity fire. Fires burning in some types of unharvested fields would be expected to burn more intensely with larger flame lengths due to the greater availability of fuels. Under extreme weather conditions, particularly high winds, there is a high potential for a rapidly advancing rangeland fire. Grazing around homes and communities helps decrease build up of fine fuel loads. Livestock grazing can be an effective tool to reduce the primary fuel load component of the arid rangeland ecosystem.

Ignition Profile

Lightning events are particularly common in the mountainous regions on the west side of Teton County. Fires started by strikes in the higher elevations are commonly pushed eastward into the rangelands by the Chinook winds common in the Rocky Mountain Front. Human activities also have a high potential of causing an uncontrolled wildfire. Residential living and recreational use present innumerable ignition sources. Debris burning, discarded cigarettes, children playing with matches, fireworks, roadway fires, railroad use, and camp fires are just a few of the countless potential human ignition sources in the area.

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 may also be started by vehicles driving through dry fields or on unimproved trails. Farm equipment, ATV's, and pick ups are used regularly for farming purposes and recreational operations. Public transmission lines in the area also add to potential ignition sources. Sparks from downed lines or arcing during extreme weather conditions could easily ignite dry fuels below.

Stubble fires escape landowner's boundaries relatively frequently; however, these fires are generally easily suppressed by modifying the vegetation and homes are rarely threatened.

4.4.3.5.2 Ingress-Egress

The primary access into Collins is via Collins Road off Interstate 15. This is a well-maintained gravel road that makes a loop from the Interstate through the townsite. There are also numerous gravel secondary routes crisscrossing the area, most of which provide access to remote farms and ranches. All of these travel routes are bordered by either native grassland fuels, CRP, or agriculture fields; thus, they are at low risk of becoming threatened by wildfire for an extended period of time.

4.4.3.5.3 Infrastructure

Residents of Collins haul water from nearby well on the Teton River. This water resource could be affected by a rangeland fire if the power lines that serviced the pump were compromised.

Public transmission lines strung to homes and businesses throughout the area are at fairly low risk of causing a wildfire due to the lack of heavy fuels within the corridor. Nevertheless, under severe wind conditions or in the event of a downed line, there is potential for ignition. Many of the power poles in Teton County are severely aging, which makes them more susceptible to fires. Power poles can, in some instances, add to the fuel complex of a wildfire. The loss of even one pole to fire causes a loss of electricity, which may inhibit the efficiency and effectiveness of emergency response and cause other infrastructure and service components to fail.

4.4.3.5.4 Fire Protection

Dutton Rural Volunteer Fire Company provides structural fire protection for residents in the Collins area. They maintain a satellite station containing a brush truck in the immediate Collins facility in order to better serve Collins residents. All fifty-six Montana Counties are currently enrolled in the State/County Cooperative Fire program. According to agreements signed with the state, each county is obligated to fight wildland fire on all state and private ground not covered by an existing fire agency. The Montana Department of Natural Resources and Conservation, in turn, assists counties when fires exceed their capability, provides training in wildland fire fighting, administrative support to county fire agencies through involvement in the County Rural Fire Councils and Fire Protective Associations, as well as the loan of Federal Excess Personal Property (FEPP) fire equipment.

During large fire events, local resident's often use their personal equipment to create fire breaks in addition to equipment provided by the Roads Department. This does create some liability issues; however, this is often a necessary fire control mechanism.

4.4.3.5.5 Community Risk Assessment

Residents of Collins have a moderate risk of experiencing a wildland fire due to the relatively flat topography, sparse vegetation surrounding most structures, and the nearby access to water resources. However, agricultural activities throughout the area increase the risk of a man-caused wildfire spreading to the community. It is important that homeowners implement fire mitigation measures to protect their structures and families prior to a wildfire event. Most homeowners maintain an adequate defensible space around structures by watering their yards or mowing grass and weeds.

4.4.3.5.6 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 Teton County must be made aware that home defensibility starts with the home. 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. “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.

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.

Maintaining developed drafting sites and mapping alternative water resources such as underground tanks near the community will increase the effectiveness and efficiency of emergency response in a wildfire situation.

4.4.3.6 Dutton

The community of Dutton is located on Interstate 15 and the Burlington Northern railroad between Power and Brady. This area is mostly flat; however, Bosseler Ridge gains about 300 feet in elevation just south of town. Other than a few ephemeral coulees, there are no major water bodies within several miles of Dutton.

4.4.3.6.1 Fire Potential

Fuels Assessment

Fuels surrounding Dutton consist primarily of dryland crops and CRP fields. There are very few low growing shrubs and the only trees that exist are ornamentals planted in residents' yards. Farming activities dominate the landscape, resulting in a discontinuous pattern of native fuels. A wind-driven fire in the dry native fuel complexes would produce a rapidly advancing, but variable intensity fire. Agricultural fields currently managed under the Crop Reserve Program (CRP) and fields set in fallow burn very intensely due to increased amount of fuels, particularly dead grasses from previous years. Larger flame lengths and intense heat make fires in CRP fields difficult to control. Under extreme weather conditions, particularly high winds, there is a high potential for a rapidly advancing rangeland fire. Nevertheless, many homeowners maintain groomed yards or are surrounded by grazed fields; thus, decreasing the risk of a wildland fire threatening structures. Grazing around homes and communities helps decrease build up of fine fuel loads. Livestock grazing can be an effective tool to reduce the primary fuel load component of the arid rangeland ecosystem.

Ignition Profile

Lightning events are particularly common in the mountainous regions on the west side of Teton County. Fires started by strikes in the higher elevations are commonly pushed eastward into the rangelands by the Chinook winds common in the Rocky Mountain Front. Human activities also have a high potential of causing an uncontrolled wildfire. Residential living and recreational use present innumerable ignition sources. Debris burning, discarded cigarettes, children playing with matches, fireworks, roadway fires, railroad use, and camp fires are just a few of the countless potential human ignition sources in the area.

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 may also be started by vehicles driving through dry fields or on unimproved trails. Farm equipment, ATV's, and pickups are used regularly for ranching purposes and recreational operations. Public transmission lines in the area also add to potential ignition sources. Sparks from downed lines or arcing during extreme weather conditions could easily ignite dry fuels below.

4.4.3.6.2 Ingress-Egress

The primary access into Dutton is Interstate 15; however, State Routes 221 from the west and 379 from the east also provide paved ingress to the community center. In addition, there are also several gravel secondary roads throughout the area that are capable of supporting an evacuation as well as large truck travel. All of these roadways travel through grassland, CRP vegetation, or developed pasture ground, which has a low risk of long-term closure due to wildfire.

4.4.3.6.3 Infrastructure

Residents of Dutton are connected to a municipal well. This water resource could be affected by a rangeland fire if the power lines that serviced the pumps were compromised.

Public transmission lines strung to homes and businesses throughout the area are at fairly low risk of causing a wildfire due to the lack of heavy fuels within the corridor. Nevertheless, under severe wind conditions or in the event of a downed line, there is potential for ignition. Many of the power poles in Teton County are severely aging, which makes them more susceptible to fires. Power poles can, in some instances, add to the fuel complex of a wildfire. The loss of even one pole to fire causes a loss of electricity, which may inhibit the efficiency and effectiveness of emergency response and cause other infrastructure and service components to fail.

4.4.3.6.4 Fire Protection

Dutton City Volunteer Fire Department provides structural fire protection for structures within the Dutton city limits. The Dutton Rural Volunteer Fire Company provides structural fire protection for the greater Dutton area. All fifty-six Montana Counties are currently enrolled in the State/County Cooperative Fire program. According to agreements signed with the state, each county is obligated to fight wildland fire on all state and private ground not covered by an existing fire agency. The county consists of a combination of paid and volunteer staff from county government, rural fire departments, fire service areas, county rural fire departments, and volunteer fire companies. The Montana Department of Natural Resources and Conservation, in turn, assists counties when fires exceed their capability, provides training in wildland fire fighting, administrative support to county fire agencies through involvement in the County Rural Fire Councils and Fire Protective Associations, as well as the loan of Federal Excess Personal Property (FEPP) fire equipment.

4.4.3.6.5 Community Risk Assessment

Residents of Dutton have a low to moderate risk of experiencing a wildland fire due to the relatively flat topography and relatively sparse vegetation surrounding most structures. However, agricultural activities throughout the area and heavy traffic on the Interstate increase the risk of a man-caused wildfire spreading to the community. It is important that homeowners implement fire mitigation measures to protect their structures and families prior to a wildfire event. Most homeowners maintain an adequate defensible space around structures by watering their yards or mowing grass and weeds.

4.4.3.6.6 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 Teton County must be made aware that home defensibility starts with the home. 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. “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.

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.

Designing a plan to help firefighters control CRP fires would significantly lessen the fire danger to the community. Pre-mitigation associated with this type of fire might include disking a fire resistant buffer zone around fields or implementing a prescribed burning regimen during less risky seasons of the year.

Maintaining developed drafting sites and mapping alternative water resources such as underground tanks near the community will increase the effectiveness and efficiency of emergency response in a wildfire situation.

4.4.3.7 Fairfield and Greenfield

Fairfield and Greenfield are both located on what is known as “The Bench” in southeast Teton County. The Bench is actually a series of three flat benches (Greenfield Bench, Second Bench, and Third Bench) that have been extensively developed into heavily irrigated farm and pasture ground. A large percentage of Teton County’s population lives on the Bench.

Fairfield is the second largest community in Teton County and is located near the southwest corner of the Bench along U.S. Highway 89. Freezeout Lake and the Freezeout Lake Wildlife Management Area lie about one mile northwest of the community center. This area is well-known for its migratory bird populations. Greenfield is located about six miles northeast of Fairfield with the Greenfield Main Canal passing along its north side. Although there are still many residents in the Greenfield area, all that remains to designate the community center is a small school.

4.4.3.7.1 Fire Potential

Fuels Assessment

Fuels surrounding Fairfield and Greenfield consist primarily of irrigated crop fields and pasture with scattered remnants of native grasses. Agriculture and ranching activities dominate the landscape and the economy resulting in a discontinuous pattern of native fuels. A wind-driven fire in the dry native fuel complexes would produce a rapidly advancing, but variable intensity fire. Fires burning in some types of unharvested fields would be expected to burn more intensely with larger flame lengths due to the greater availability of fuels. Agricultural fields currently managed under the Crop Reserve Program (CRP) burn very intensely due to increased amount of fuels, particularly dead grasses from previous years. Larger flame lengths and intense heat make fires in CRP fields difficult to control. Under extreme weather conditions, particularly high winds, there is a high potential for a rapidly advancing rangeland fire. Nevertheless, many homeowners maintain groomed yards or are surrounded by agricultural fields; thus, decreasing the risk of a wildland fire threatening structures. Grazing around homes and communities helps decrease build up of fine fuel loads. Livestock grazing can be an effective tool to reduce the primary fuel load component of the arid rangeland ecosystem.

The expansive landscape west of Fairfield and continuing towards the mountains is native rangelands. Fires in these areas have the potential to move extremely rapidly, but would likely burn at variable intensities.

Ignition Profile

Lightning events are particularly common in the mountainous regions on the west side of Teton County. Fires started by strikes in the higher elevations are commonly pushed eastward into the rangelands by the Chinook winds common in the Rocky Mountain Front. Human activities also have a high potential of causing an uncontrolled wildfire. Residential living and recreational use present innumerable ignition sources. Debris burning, discarded cigarettes, children playing with matches, fireworks, roadway fires, and camp fires are just a few of the countless potential human ignition sources in the area.

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 may also be started by vehicles driving through dry fields or on unimproved trails. Farm equipment, ATV's, and pick ups are used regularly for farming purposes and recreational operations. Public transmission lines in the area also add to potential ignition sources. Sparks from downed lines or arcing during extreme weather conditions could easily ignite dry fuels below.

Stubble fires escape landowner's boundaries relatively frequently on the Bench. These fires are generally easily suppressed by modifying the surrounding vegetation with readily available farm equipment and homes are rarely threatened.

4.4.3.7.2 Ingress-Egress

The primary access into Fairfield is via U.S. Highway 89; however, there is also several state routes radiating from the city center. Greenfield can be reached by following State Route 431 from either Fairfield or Power. All of these travel routes are paved, two-lane highways bordered by low risk agricultural fields or rangeland fuels, which are not likely to be threatened by wildfire for an extended period of time. Due to its extensive development, roads throughout most of the Bench are spaced evenly at one mile intervals. Many of these are secondary gravel roads capable of supporting heavy truck traffic; thus, making suppression efforts more efficient and effective.

4.4.3.7.3 Infrastructure

Residents of Fairfield and Greenfield are either connected to a municipal well system or have drilled domestic wells. Supplementary wells have been established throughout the greater area to provide additional water for domestic irrigation or livestock. These water resources could be affected by a rangeland fire if the power lines that serviced the pumps were compromised.

Public transmission lines strung to homes and businesses throughout the area are at fairly low risk of causing a wildfire due to the lack of heavy fuels within the corridor. Nevertheless, under severe wind conditions or in the event of a downed line, there is potential for ignition. Many of the power poles in Teton County are severely aging, which makes them more susceptible to fires. Power poles can, in some instances, add to the fuel complex of a wildfire. The loss of even one pole to fire causes a loss of electricity, which may inhibit the efficiency and effectiveness of emergency response and cause other infrastructure and service components to fail.

4.4.3.7.4 Fire Protection

The Fairfield City Volunteer Fire Department provides structural fire protection for residents within the Fairfield city limits. The Fairfield Rural Volunteer Fire Company provides structural fire protection for the greater Fairfield area including Greenfield and the western half of the Bench. All fifty-six Montana Counties are currently enrolled in the State/County Cooperative Fire program. According to agreements signed with the state, each county is obligated to fight wildland fire on all state and private ground not covered by an existing fire agency. The Montana Department of Natural Resources and Conservation, in turn, assists counties when fires exceed their capability, provides training in wildland fire fighting, administrative support to county fire agencies through involvement in the County Rural Fire Councils and Fire Protective Associations, as well as the loan of Federal Excess Personal Property (FEPP) fire equipment.

4.4.3.7.5 Community Risk Assessment

Residents of Fairfield and Greenfield have a low risk of experiencing a wildland fire due to the extensive development of irrigated farming. However, there is a fairly high potential for escaped agricultural fires, which under extreme circumstances, may threaten structures. It is important that homeowners implement fire mitigation measures to protect their structures and families prior to a wildfire event. Most homeowners maintain an adequate defensible space around structures by watering their yards or mowing grass and weeds. Additionally, the road system allows for prompt and straightforward access to firefighters and emergency response equipment.

4.4.3.7.6 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 Teton County must be made aware that home defensibility starts with the home. 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. “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.

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.

Designing a plan to help firefighters control CRP fires would significantly lessen the fire danger to the community. Pre-mitigation associated with this type of fire might include disking a fire resistant buffer zone around fields or implementing a prescribed burning regimen during less risky seasons of the year.

Maintaining developed drafting sites and mapping alternative water resources such as underground tanks near the community will increase the effectiveness and efficiency of emergency response in a wildfire situation.

4.4.3.8 Mortimer Gulch and Surrounding Area

There are several leased Forest Service cabins and a few privately owned structures in the mountainous region near Gibson Reservoir on the Lewis and Clark National Forest. Most of these structures are located in Mortimer Gulch; however, there are also a few in Blacktail Gulch and Hannan Gulch on the north side of the Sun River. This area is characterized by sheer cliff walls rising nearly vertically from narrow valleys. The thin soils on the lower slopes support a primarily Douglas-fir forest type; however, many of the ridge tops are solid rock void of any vegetation.

4.4.3.8.1 Fire Potential

Fuels Assessment

Many of the structures in Mortimer Gulch and the surrounding area are bordered by a primarily Douglas-fir forest type. Many of these stands are unnaturally dense due to years of fire suppression. The understory consists of an assortment of brush species and regeneration at variable stages of development. Greater amounts of fuel in combination with steep and rugged topography can result in a high intensity and unpredictable wildfire. Crowning, spotting, and torching of individual trees also makes direct attack suppression efforts difficult and dangerous for firefighters. These fire behavior characteristics are significantly enhanced by steep, highly variable slopes and the potential for extreme weather conditions.

Ignition Profile

Lightning events are particularly common in the mountainous regions on the west side of Teton County. Human activities also have a high potential of causing an uncontrolled wildfire. Residential living and intense recreational use present innumerable ignition sources. Debris burning, discarded cigarettes, children playing with matches, fireworks, roadway fires, and camp fires are just a few of the countless potential human ignition sources in the area.

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 may also be started by vehicles driving through dry fields or on unimproved trails. ATV's and pick-ups are used regularly for recreational purposes in the mountains. Public transmission lines in the area also add to potential ignition sources. Sparks from downed lines or arcing during extreme weather conditions could easily ignite dry fuels below.

4.4.3.8.2 Ingress-Egress

The sole access into the Mortimer Gulch area is Forest Route 108 off the intersection of the Sun River Road from Augusta or the Pishkun Canal Road. Although paved, this road is narrow, steep, and bordered by precipitous slopes and forest type fuels. Ingress and egress from this area is made more difficult by several hairpin switchbacks. Many of the Mortimer Gulch structures are accessed by gated private drives. Hannan Gulch is accessed by a one-lane bridge across the Sun River and subsequent one-lane, dirt surface, unimproved road to cabins.

4.4.3.8.3 Infrastructure

Public transmission lines strung to homes throughout the area are at moderate risk of causing a wildfire due to heavy fuels near the corridor. Under severe wind conditions or in the event of a downed line, there is potential for ignition. Although the Sun River Road and the Beaver-Willow Road provide access into the general area, those homeowners with structures near Gibson Reservoir or in Mortimer Gulch, Blacktail Gulch, or Hannan Gulch have only one escape route. The lack of an additional access point and elevated risk of wildfire occurrence places these residents at very high risk.

4.4.3.8.4 Fire Protection

Teton County has an automatic mutual aid agreement set up with the Augusta Volunteer Fire Department in Lewis and Clark County to provide initial attack on structure fires in the Mortimer Gulch area. The Fairfield Rural Volunteer Fire Company also responds to structure fires. The USDA Forest Service provides wildland fire protection on the Lewis and Clark National Forest.

4.4.3.8.5 Community Risk Assessment

Mortimer Gulch and the surrounding area have a high risk of experiencing a wildland fire due to its proximity to forest fuels. Natural ignitions within the Lewis and Clark National Forest could easily move into this area. High intensity recreational traffic throughout the area also increases the risk of a man-caused wildfire threatening the community. Additionally, many of the structures in this area are at higher risk due to factors such as non fire-resistant siding and poor fire-conscious landscaping techniques.

Recently, a defensible space project was implemented in the Mortimer Gulch area. Widening roads and thinning and pruning trees and underbrush around participating homes and structures increases their survivability during a wildfire event. However, many of the Forest Service leased cabins were not included in this project due to the legal ramifications of thinning on Forest

Service property. Not only does this increase the risk to these structures, but it also increases the risk to neighboring structures that received treatment. In order to make this area less fire prone, all structures need to be assessed and appropriate defensible space treatments implemented.

Mortimer Gulch and the surrounding area is very remote and lacks access to immediate fire protection. Response time for Fairfield, Augusta, or the Forest Service may be delayed due to the sheer distance into the area. Also, the lack of alternative access routes, limits the ability of firefighters to control a fire. In the event of wildfire, the forest fuels would likely support a higher intensity and potentially very fast-moving wildland fire. It is imperative that homeowners in this area implement fire mitigation measures to protect their structures and families prior to a wildfire event

4.4.3.8.6 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 Teton County must be made aware that home defensibility starts with the home. 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. "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.

Also of vital importance is the accessibility 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 pruning driveways and creating a turnaround area for large vehicles. As the sole access road, Forest Route 108 should be made as fire resistant as possible. This may include thinning and pruning vegetation within a reasonable distance from both sides of the road. An alternate escape route out of the area should be considered as part of this fire plan.

Continuing the defensible space project in this area would also help reduce the fire danger. Creating a defensible space around all structures through education and thinning and pruning would drastically increase the survivability of the structures as well as increase firefighter safety. Thinning, pruning, and removal of underbrush in the area between structures and Gibson Reservoir would slow the approach of forest fires and give firefighters a place to tie their operations into and, therefore, more effectively control the blaze.

Providing more immediate response to emergencies could save structures and lives in the event of wildland fire. Having a fire truck or other equipment parked near the populated areas would allow initial attack procedures to begin before additional firefighting personnel could arrive. Trained personnel to operate the equipment is also imperative.

4.4.3.9 New Rockport Colony, Rockport Colony, and Miller Colony

New Rockport, Rockport Colony, and Miller Colony are Hutterite religious colonies. New Rockport is located approximately six miles east of Farmington on the northern bank of the Teton River. Rockport is a more remote community located in the northwest corner of the County east of Pendroy. Miller Colony lies just west of U.S. 89 between Bynum and Choteau. Hutterian communes typically rely on agriculture, livestock, and small manufacturing operations for their livelihood. The New Rockport, Rockport, and Miller Colonies manage vast expanses of farmland surrounding the community centers, which New Rockport and Miller Colony irrigate with water from the Teton River. Residents live in a group of large housing facilities; thus, limiting the amount of structures.

4.4.3.9.1 Fire Potential

Fuels Assessment

There are very little native fuels remaining near these colonies due to the efficient development of crop fields. Additionally, all structures, including housing, are surrounded by river rock, gravel, or groomed lawns making them well buffered from the effects of wildfire. During the spring and summer some unharvested fields may be at risk to loss by fire; however, very few, if any, structures would be threatened.

Ignition Profile

Although lightning events are common in Teton County, residents of the New Rockport, Rockport, and Miller Colony are more prone to man-caused ignitions than lightning strikes. Residential living, particularly the daily use of farm and manufacturing machinery, presents innumerable ignition sources. Debris burning and roadway fires are just a few of the countless potential human ignition sources in the area.

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 may also be started by vehicles driving through dry rangeland vegetation or farm fields.

4.4.3.9.2 Ingress-Egress

The primary route into New Rockport Colony from State Route 220 is a gravel road, which ends at New Rockport. This road is a well-maintained and bordered by agricultural fields. Miller Colony is accessed by two short driveways off Highway 89. The more remote Rockport Colony can be accessed most directly from West Pendroy Road off Highway 89; however, the Cut Across Road from the Blackleaf Road also provides good access. For the most part both of these routes are bordered by native rangeland fuels. There are a few secondary roads accessing the New Rockport and Rockport areas; however, many are dirt surfaces that may not be adequate for large truck travel.

4.4.3.9.3 Infrastructure

New Rockport Colony, Rockport Colony, and Miller Colony rely on a multiple structure domestic wells. These water resources could be affected by a rangeland fire if the power lines that serviced the pumps were compromised.

Public transmission lines throughout these areas are at fairly low risk of causing a wildfire due to the lack of heavy fuels within the corridor. Nevertheless, under severe wind conditions or in the event of a downed line, there is potential for ignition. Many of the power poles in Teton County are severely aging, which makes them more susceptible to fires. Power poles can, in some instances, add to the fuel complex of a wildfire. The loss of even one pole to fire causes a loss of electricity, which may inhibit the efficiency and effectiveness of emergency response and cause other infrastructure and service components to fail.

4.4.3.9.4 Fire Protection

Structural protection for the New Rockport Colony and the Miller Colony is provided by Choteau Rural Volunteer Fire Company, whom maintains a satellite at the New Rockport Colony. New Rockport has converted a truck to handle wildland fire suppression activities and several colonists are members of the Choteau Rural Volunteer Fire Company. Rockport Colony structures are protected by the Pendroy Rural Volunteer Fire Company.

All fifty-six Montana Counties are currently enrolled in the State/County Cooperative Fire program. According to agreements signed with the state, each county is obligated to fight wildland fire on all state and private ground not covered by an existing fire agency. The Montana Department of Natural Resources and Conservation, in turn, assists counties when fires exceed their capability, provides training in wildland fire fighting, administrative support to county fire agencies through involvement in the County Rural Fire Councils and Fire Protective Associations, as well as the loan of Federal Excess Personal Property (FEPP) fire equipment.

4.4.3.9.5 Community Risk Assessment

Residents of New Rockport, Rockport, and Miller Colonies have a low risk of wildland fire due to the sheer lack of vegetation around structures and the agricultural development of the surrounding landscape. Rockport Colony may have a slightly elevated risk due to the abundance of native rangeland fuels in the surrounding area and their closer proximity to timber type fuels on the Lewis and Clark National Forest. Since there is only one main access point to the New Rockport Colony, emergency evacuation and initial response may become difficult and potentially dangerous. The lack of a safe alternate escape route heightens the risk to residents in the event that a wildfire threatens the community.

4.4.3.9.6 Mitigation Activities

Wildfire within the Hutterite colonies has been effectively mitigated by limiting the number of at-risk structures and by inhibiting the growth of natural vegetation around community structures.

Maintaining developed drafting sites and mapping alternative water resources such as underground tanks near the community will increase the effectiveness and efficiency of emergency response in a wildfire situation. It is also important that an alternative escape routes be developed, maintained, and signed for emergency use.

4.4.3.10 Pendroy

Pendroy is a small community located in north central Teton County near the junction of U.S. Highway 89 and State Route 219. There are several homeowners residing within the town of Pendroy; however, many residents are larger landowners scattered throughout the nearby rangelands. Ranching is the economic base in this part of the county.

4.4.3.10.1 Fire Potential

Fuels Assessment

Fuels surrounding Pendroy consist primarily of sparse grasses or pasture. There are very few low growing shrubs and the only trees that exist are ornamentals planted in residents' yards. Ranching activities dominate the landscape, resulting in a discontinuous pattern of native fuels. A wind-driven fire in the dry native fuel complexes would produce a rapidly advancing, but variable intensity fire. Under extreme weather conditions, particularly high winds, there is a high potential for a rapidly advancing rangeland fire. Nevertheless, many homeowners maintain groomed yards or are surrounded by agricultural fields; thus, decreasing the risk of a wildland fire threatening structures. Grazing around homes and communities helps decrease build up of fine fuel loads. Livestock grazing can be an effective tool to reduce the primary fuel load component of the arid rangeland ecosystem.

Ignition Profile

Lightning events are particularly common in the mountainous regions on the west side of Teton County. Fires started by strikes in the higher elevations are commonly pushed eastward into the rangelands by the Chinook winds common in the Rocky Mountain Front. Human activities also have a high potential of causing an uncontrolled wildfire. Residential living and recreational use present innumerable ignition sources. Debris burning, discarded cigarettes, children playing with matches, fireworks, roadway fires, and camp fires are just a few of the countless potential human ignition sources in the area.

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 may also be started by vehicles driving through dry fields or on unimproved trails. Farm equipment, ATV's, and pick ups are used regularly for ranching purposes and recreational operations. Public transmission lines in the area also add to potential ignition sources. Sparks from downed lines or arcing during extreme weather conditions could easily ignite dry fuels below.

4.4.3.10.2 Ingress-Egress

State Route 219 is the primary access into Pendroy. This is a paved, two-lane highway connecting Pendroy to U.S. 89 to the west and Conrad to the east. There are also several other secondary gravel roads in the area that could function as potential escape routes; however, these roadways should be signed and maintain as an evacuation route during the fire season.

4.4.3.10.3 Infrastructure

Residents of Pendroy have drilled domestic wells. Supplementary wells have also been established throughout the greater area to provide additional water for livestock. These water resources could be affected by a rangeland fire if the power lines that serviced the pumps were compromised.

Public transmission lines throughout the area are at fairly low risk of causing a wildfire due to the lack of heavy fuels within the corridor. Nevertheless, under severe wind conditions or in the event of a downed line, there is potential for ignition. Many of the power poles in Teton County are severely aging, which makes them more susceptible to fires. Power poles can, in some instances, add to the fuel complex of a wildfire. The loss of even one pole to fire causes a loss of electricity, which may inhibit the efficiency and effectiveness of emergency response and cause other infrastructure and service components to fail.

4.4.3.10.4 Fire Protection

Residents of Pendroy and the surrounding area are protected by the Pendroy Rural Volunteer Fire Company. All fifty-six Montana Counties are currently enrolled in the State/County Cooperative Fire program. According to agreements signed with the state, each county is obligated to fight wildland fire on all state and private ground not covered by an existing fire agency. The Montana Department of Natural Resources and Conservation, in turn, assists counties when fires exceed their capability, provides training in wildland fire fighting, administrative support to county fire agencies through involvement in the County Rural Fire Councils and Fire Protective Associations, as well as the loan of Federal Excess Personal Property (FEPP) fire equipment.

4.4.3.10.5 Community Risk Assessment

Residents of Pendroy have a low risk of experiencing a wildland fire due to the lack of vegetation surrounding most structures. Nevertheless, this area experiences frequent high winds, which generally increases the rate of fire spread and intensity of rangeland fires. Most homeowners maintain an adequate defensible space around structures. The lack of a readily available water source during the summer fire season may reduce the ability of fire suppression services to effectively fight a wildland fire.

4.4.3.10.6 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 Teton County must be made aware that home defensibility starts with the home. 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. “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.

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.

Maintaining developed drafting sites and mapping alternative water resources such as underground tanks near the community will increase the effectiveness and efficiency of emergency response in a wildfire situation.

4.4.3.11 Power

The small community of Power is located just off the west side of Interstate 15 between Dutton and Vaughn. The Muddy Creek drainage flows about one mile west of the townsite. The immediate area surrounding Power is relatively flat with only a few shallow creek beds and coulees. Power is not as extensively irrigated as the Bench; however, agriculture and ranching activities dominate much of the landscape.

4.4.3.11.1 Fire Potential

Fuels Assessment

Fuels surrounding Power consist primarily of native grasslands mixed with dryland crop fields, CRP, and pasture. Agriculture and ranching activities are scattered throughout the area resulting in a discontinuous pattern of native fuels. A wind-driven fire in the dry native fuel complexes would produce a rapidly advancing, but variable intensity fire. Fires burning in some types of unharvested fields would be expected to burn more intensely with larger flame lengths due to the greater availability of fuels. Agricultural fields currently managed under the Crop Reserve Program (CRP) burn very intensely due to increased amount of fuels, particularly dead grasses from previous years. Larger flame lengths and intense heat make fires in CRP fields difficult to control. Under extreme weather conditions, particularly high winds, there is a high potential for a rapidly advancing rangeland fire. Nevertheless, many homeowners maintain groomed yards or are surrounded by agricultural fields; thus, decreasing the risk of a wildland fire threatening structures. Grazing around homes and communities helps decrease build up of fine fuel loads. Livestock grazing can be an effective tool to reduce the primary fuel load component of the arid rangeland ecosystem.

Ignition Profile

Lightning events are particularly common in the mountainous regions on the west side of Teton County. Fires started by strikes in the higher elevations are commonly pushed eastward into the rangelands by the Chinook winds common in the Rocky Mountain Front. Human activities also have a high potential of causing an uncontrolled wildfire. Residential living and recreational use present innumerable ignition sources. Debris burning, discarded cigarettes, children playing with matches, fireworks, roadway fires, railroad use, and camp fires are just a few of the countless potential human ignition sources in the area.

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 may also be started by vehicles driving through dry fields or on unimproved trails. Farm equipment, ATV's, and pick ups are used regularly for farming purposes and recreational operations. Public transmission lines in the area also add to potential ignition sources. Sparks from downed lines or arcing during extreme weather conditions could easily ignite dry fuels below.

Stubble fires escape landowner's boundaries relatively frequently in heavily developed agricultural areas. These fires are generally easily suppressed by modifying the surrounding vegetation with readily available farm equipment and homes are rarely threatened. An abundance of CRP around Power has not only increased the fire risk, but it has also made escaped fires more difficult to control.

4.4.3.11.2 Ingress-Egress

The primary access into Power is Interstate 15; however, State Route 431 from Fairfield is also a paved access route. In addition, there is also several gravel secondary routes crisscrossing the area. These roadways all travel through areas considered to be at low risk of long-term closure caused by wildfire due to the lack of heavy fuels abutting the roadway.

4.4.3.11.3 Infrastructure

Power’s municipal water supply is obtained from Muddy Creek located to the west of the town. Some residents are connected to the Tri-County water system or haul water from Fairfield Bench. Tri-County water is pumped from the well site to a tower on Teton Ridge from which it is gravity fed to farmsteads in Eastern Teton, Chouteau, and Pondera Counties. Each farm receives 1,500 gallons per day, which is stored in underground tanks and pumped to various locations for domestic and livestock use. These water resources could be affected by a rangeland fire if the power lines that serviced the pumps were compromised.

Public transmission lines throughout the area are at fairly low risk of causing a wildfire due to the lack of heavy fuels within the corridor. Nevertheless, under severe wind conditions or in the event of a downed line, there is potential for ignition. Many of the power poles in Teton County are severely aging, which makes them more susceptible to fires. Power poles can, in some instances, add to the fuel complex of a wildfire. The loss of even one pole to fire causes a loss of electricity, which may inhibit the efficiency and effectiveness of emergency response and cause other infrastructure and service components to fail.

4.4.3.11.4 Fire Protection

Residents of Power and the surrounding area are protected by the Power Rural Volunteer Fire Company. All fifty-six Montana Counties are currently enrolled in the State/County Cooperative Fire program. According to agreements signed with the state, each county is obligated to fight wildland fire on all state and private ground not covered by an existing fire agency. The Montana Department of Natural Resources and Conservation, in turn, assists counties when fires exceed their capability, provides training in wildland fire fighting, administrative support to county fire agencies through involvement in the County Rural Fire Councils and Fire Protective Associations, as well as the loan of Federal Excess Personal Property (FEPP) fire equipment.

4.4.3.11.5 Community Risk Assessment

Residents of Power have a moderate risk of experiencing a wildland fire due to the relatively flat topography, agricultural development, and relatively sparse vegetation surrounding most structures. However, agricultural activities throughout the area and heavy traffic on the Interstate increase the risk of a man-caused wildfire spreading to the community. Uncontrolled wildfires in fields currently enrolled in the Crop Reserve Program (CRP) have repeatedly threatened Power. These fires burn very intensely with large flame lengths due to increased availability of fuels. Under the influence of high winds, these fires move very quickly and are difficult to control. It is important that homeowners implement fire mitigation measures to protect their structures and families prior to a wildfire event. Most homeowners maintain an adequate defensible space around structures by mowing grass and weeds; however, due to the lack of water, yards are usually dry throughout the late summer months.

4.4.3.11.6 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 Teton County must be made aware that home defensibility starts with the home. 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. “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.

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.

Designing a plan to help firefighters control CRP fires would significantly lessen the fire danger to the community. Pre-mitigation associated with this type of fire might include plowing a fire resistant buffer zone around fields or implementing a prescribed burning regimen during less risky seasons of the year.

Creating drafting sites or an alternative water source such as underground tanks near the community, will increase the effectiveness and efficiency of emergency response in a wildfire situation.

4.5 Fire Fighting Resources and Capabilities

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

The county operates under a county Fire Services Annex (see Appendix), which provides guidance to the county on how its fire response services operate.

4.5.1 Wildland Fire Protection

4.5.1.1 Fire Warden Summary of Resources and Capabilities:

Teton County has been extremely fortunate in the funding arena as of late. After the Revenue Sharing went away Teton County was on status-quo for 20 + years. With the establishment of the Fee Service Area County wide and the VFA/RFA grant program our funding has gone from $15000 per year to $70000 per year from County Sources and another $530000 from grants over the last three years. With this influx of money we have accomplished great things from replacing all the PPE& SCBA in all but one department and replacing several old and outdated fire vehicles. If we can maintain this funding for an additional five years I believe we can then be in a position to maintain and upgrade our vehicles and equipment within a standard rotation of some sort.

My opinion of the priority issues for each response area is as follows:

- **Choteau:** We have discussed the limber pine and WUI issues on the Front. We also have the River bottom issue near and around Choteau
- **Dutton:** Having the transmission lines and Railroad to start the fires and all the CRP, and continuous crops to carry the fire the potential for a large and disastrous fire is apparent.
- **Power** is the same as Dutton with the exception of they also cover part of the GID which even with burn permits and other education continues to have controlled burns escape.
- **Fairfield** is dealing with the majority of the GID which even with burn permits and other education continues to have controlled burns escape. In addition they are the responsible party for the Sun River Canyon area and the WUI in that area.
- **Pendroy** has CRP, forest and oil giving a diverse fire regime but relatively low population at risk.

Fire Chiefs in the County include:

Craig Zwerneman
Choteau Fire Department

Ben Rhodes
Fairfield Fire Department

Gene Walker
Power Fire Department

Shawn Dutton
Dutton Fire Department

John Stoltz
Pendroy Fire Department

Training of volunteers is a huge issue. With all our lives getting busier it is a real challenge to provide training and get those volunteers to give up their free time to attend.

Teton County is beginning a wellness program for firefighters which will give them a risk rating for possible hearts attack/stoke. We hope via this program to inform and help the firefighter be better prepared physically for the challenges of fire fighting. The idea is not to exclude members due to risks but to identify high risk individuals and assist them in being healthier. For the younger and middle age it is an opportunity to receive a free physical, lab work and fitness checkup. We hope this plan will help in recruitment and retention as well as save lives. We are searching for funding sources for this program.

We have mutual aid agreements with several surrounding communities. We also have a coop agreement with the State and operating agreement with the USFS. We have just signed an initial attack agreement with the BLM out of Lewistown.

Our radio communications are adequate unless we have to switch to digital technology which would require an enormous amount of money and several additional repeater sites. A portable repeater for use on wildfires would be very helpful in certain areas of the county.

Table 4.2. County Fire Resources Teton County Rural Fire Truck Inventory (11/14/04).

NRGC	Yrr	Model	INS#	Pump GPM	Gallon Tank	Foam	Type	Location	Vin #	Ownership	Purchase Date	
E-1	1955	Freightliner unk		1250	750	Yes	Structure	Power	1FV6JLCB4SL578310	Teton County	2/18/05	FSA
E-3	1963	Chevy	28		500		Wildland	Power	3C553J130452	Teton County	6/13/1963	out of service will be sold
T-2	1972	White	32	500	2800	N/A	Tender	Fairfield	W36679	Teton County	9/24/1976	
T-3	1973	IHC	75		1000	N/A	Tender	Pendroy	1066ZOH326494	Pendroy Fire Rescue	n/a	
T-2	1974	Ford 9000	29	350	3400	N/A	Tender	Power	U917VU05343	Power VD	n/a	
E-3	1975	Chevy C-60	31	100	500	Yes	Wildland	Fairfield	CCE615V156982	Teton County	8/24/1975	
E-6	1979	Ford F250 4x4	26	100	200	Yes	Wildland	Dutton/Collins	F26HRFC6828	Teton Cty/DNRC skid unit	6/24/1982	
E-6	1980	Chevy 4x4	59	100	200		Wildland	Pendroy	CKM23AJ138243	Pendroy VFD	n/a	
E-6	1980	GMC 1 Ton 4x4	30	250	200	Yes	Wildland	Power	TKM33AZ503813	Teton Cty/DNRC skid unit	10/10/1984	
T-3	1981	GMC C7000	dnrc		1500	N/A	Tender	Pendroy	N/A	DNRC	n/a	
E-1	1982	Ford	81	1000	500		Structure	Pendroy	1FDPF82K9CVA19577	Teton County FSA	3/4/1999	
E-6	1984	GMC 1Ton 4x4	58	100	250		Wildland	Choteau	1GBHK34M8EV135799	Choteau VFD	n/a	
	1984	Homemade Trailer (Cascade System)	73			N/A	Support		SNTR18363MT	Teton County	1984	
T-2	1987	Ford 9000	70		2600	N/A	Tender	Choteau	1FDYA90L4HVA65569	60% Choteau/ 40%Cnty FSA	12/23/1996	
T-2	1994	Kenworth	99	800	3500	no	Tender	Dutton	2XKNDE9XXRM638526	FSA $4000 FEMA GRANT 36000.00	10/30/2002	
E-1	1995	Ford/Central States	60	1250	500	Yes	Structure	Fairfield	1FDPF70J7SVA42567	Fairfield VFD	n/a	
E-6	1996	Dodge 1Ton 4x4	110	125	300	cafs	Wildland	Dutton	3B7MF33C4TM182519	Teton County FSA	9/16/2003	2003 cafs unit
E-6	1996	Ford f-350 4x4	96	150	250		Wildland	Pendroy	1FTJW36FXTEA19551	FSA10%/VFA90%/Skid pendroy	12/8/2001	skid unit not included in cost
E-1	2000	GMC Kodiak/Central States	93	1000	1000	Yes	Structure	Dutton	1GDL7H1B5YJ504231	50% Cnty FSA/ 50% Dutton	4/17/2001	County share

Table 4.2. County Fire Resources Teton County Rural Fire Truck Inventory (11/14/04).

NRGC	Yrr	Model	INS#	Pump GPM	Gallon Tank	Foam	Type	Location	Vin #	Ownership	Purchase Date	
E-4	2000	Feightliner		250	750	yes	wildland	Choteau	1FV3GJAC7YHF03682	Teton County FSA	10/26/2004	
E-1	2002	Freightliner/E-1	city	1250	1000	Yes	Structure	Choteau	1FUABXBSX2HJ62104	37%Cnty FSA/ 63%Choteau	10/9/2001	County share
E-3	2003	Ford F-550	104	250	500		Wildland	Fairfield	1FDAX57S43EB56825	FEE 11885 VFA 9437 FVFD 8128	12/4/2002	CHASSIS 29450
E-3	2003	Ford F-550	103		500	cafs	wildland	Power	1FDAF57F83EB00649	Teton County FSA	10/24/2002	title III $6269
		City only Equipment										
E-1	1974	FORD/SUPERIOR		1000	500	no	Structure	Fairfield		Town of Fairfield	5/27/1905	
E-2	1967	HOWE		750	500	no	Structure	Dutton		Town of Dutton		
E-1	1980'S	FORD/SUPERIOR		1000	1000	no	Structure	Choteau		City of Choteau		
Power has received a FEMA grant to purchase a used structure truck to replace the 1975 Piereville												
This equipment is out of service and will be sold in the near future												
highlighted indicates owned or leased by both City and County												

Other County Fire Resources

- Choteau, Fairfield, Pendroy, and Power have air compressors and Cascade systems for 4300PSI SCBAs
- Dutton has a 2300 PSI cascade system
- Dutton houses the portable 2300PSI compressor & cascade system
- Choteau, Fairfield, Pendroy, and Power have new high pressure SCBA's via the Fire Assistance Grants
- Choteau has a thermal imager via the Fire Assistance Grant
- Choteau, Fairfield, Pendroy, and Power have all new turnout gear (structure & wildland) via the Fire Assistance Grant
- All departments have extrication equipment (ie jaws of life etc)
- All department have generators and emergency lighting
- Fairfield has high angle rescue equipment.

Teton County Fire Assessment and recommendations

Per Fire Council meeting 11/3/04

Maximum age of Trucks	25-30 years
Apparatus per department:	
Structure Trucks	1
Tender	1
Wildland Engine	2
Command vehicle	low priority at this time
Command vehicle Personal	Personal liability
All other	low priority or department funded

Capital fund/priority requests:

#1 Priorities:

Choteau: replace brush truck (1984 GMC 1Ton)

Dutton: replace PPE & SCBAs

Fairfield: replace Tender (1972 white)

Pendroy: fire hall addition (20x40)

Power: replace Tender (1974 Ford)

#2 Priorities:

Choteau: New Fire Hall (5 Bay new location)

Dutton: replace Collins Chassis (1979 Ford)

Fairfield: New Fire Hall (5 Bay new location)

Pendroy: Replace DNRC Tender (1981 GMC)

Power: Replace Brush Truck (1980 GMC (DNRC skid unit))

4.5.2 Rural Fire Protection

4.5.2.1 Choteau Volunteer Fire

38 1st Ave NW
Choteau, Mt 59422
Phone 406-466-3473

We have one fire station, it is located in downtown Choteau.

Description:

The Choteau Volunteer Fire Department has a priority fire fighting response area of approximately 1157 square miles (787 sq. miles private + 400 sq. miles National Forest), 2600+ people, 1300 residences, 1500 outbuildings, 6 U.S. Air Force Minute Man II Missile Launch Sites, 1 U.S. Air Force Intercontinental Missile Control Center, 1 large natural gas transmission pipeline and 1 crude oil transmission pipeline.

Choteau is the only town within our district and has a population of 1750 people. Within the city limits of Choteau we have a hospital, 2 extended care facilities, nursing home, three-story retirement complex, 2 schools, County Courthouse, handicap group home and care facility, and a boys group home. The airport located at Choteau is designated as the emergency alternate landing strip for the Great Falls International Airport. The rest of our district consists of rural agricultural farmland, pastureland, and National Forest. Our department has mutual aid response agreements with the 4 other rural fire departments in our county plus our 4 adjoining counties, the State of Montana, U.S. Forest Service, U.S. Bureau of Land Management (BLM) and the U.S. Air Force. Our mutual aid response area is approximately 150 X 150 miles. We have had other departments respond to our needs from as far away as 110 miles.

Station description:

Our present hall, located in the middle of Choteau, consists of 4 stalls and a meeting room. We have to store our brush truck and extrication equipment trailer in a set of buildings (old State Highway Department shop) located on the north end of Choteau. The city of Choteau, using fire department funds, is paying off a note purchasing this facility. This site will some day be the new home of the Choteau Fire Department. This site consists of 3 buildings with 5 stalls situated on ¾'s of a city block.

Being a total volunteer department we do not staff our station.

Protection responsibilities:

See district description above. We are responsible for initial attack on all fires on private, BLM and state owned property, within our district. We are also responsible for structure fire protection and structure fire fighting on the federal forest located in our district.

Emergency Medical Treatment:

Our members assist EMS when we are dispatched to vehicle wrecks. Our department is responsible for fire control and the extrication of victims in vehicle wrecks.

Personnel:

We have 18 members in our department.

One half of the members of our department have received formal structure fire fighting training. Only 6 of our members are fire fighter one qualified.

Approximately one half of our members have received formal wildland fire fighting training. We have 6 members that are red carded.

Working relationship with other agencies, and mutual aid agreements:

We have a good working relationships with the other departments and agencies located in the county. Our department has mutual aid response agreements with the 4 other rural fire departments in our county plus our 4 adjoining counties, the State of Montana, U.S. Forest Service, U.S. Bureau of Land Management (BLM) and the U.S. Air Force. Our mutual aid response area is approximately 150 X 150 miles.

What are your top resource priorities to advance your department (example, more training, more equipment, etc.)?

The following are the highest resource priorities of our department:

1. Our department is in need of additional wildland and structure fire fighting and ICS training.
2. To remodel or construct a new fire hall at the old State Highway Department site.
3. To purchase a new or newer brush truck.
4. The purchase of additional vehicle extrication equipment (stabilizers, cribbing, lift bag system).

Resources most at risk of loss from wildland fire:

Homes, farmsteads located in the rural part of our district are most at risk of loss because of wildland fires. This is because of the distance and response time for our department. To reach the far northwestern part of our district will take approximately 1 hour and 15 minutes from page out to arriving on scene. Our rangeland and forestlands are at high risk from wildland fires.

Highest risk "problem areas" in your district:

The Rocky Mountain Front, Arrowleaf subdivision area, all of the CRP acreage, and the Teton, Blackleaf and Deep Creek river bottoms are the highest risk areas in our fire district.

Equipment Description:

Table 4.3. Choteau Volunteer Fire equipment.

Truck #	Assigned Station	Year	Make/ Model	Capacity (gallons)	Pump Capacity (GPM)	Structure, Wildland, Haz. Mat, Ambulance, Other
Engine 1	Choteau	2001	Type 1 Pumper Freightliner	1000	1250	Structure
Engine 2	Choteau	1984	Type 1 Pumper GMC	1000	1000	Structure
Water Tender	Choteau	1987	Kenworth	2700	500	Structure, wildland

Truck #	Assigned Station	Year	Make/ Model	Capacity (gallons)	Pump Capacity (GPM)	Structure, Wildland, Haz. Mat, Ambulance, Other
Rural Truck	Choteau	2000	Type 4 FL60	750	150	Wildland
Brush Truck	Choteau	1984	Type 6 3/4 ton GMC	250	150	Wildland
Extrication Trailer	Choteau	2002	Featherlite			Extrication/Hazmat

Table 4.3. Choteau Volunteer Fire equipment.

Operational challenges:

Our biggest challenge will be residential development along the Rocky Mountain front and the affect it will have on the number of fires and our ability to respond to fires. The Arrowleaf area is our worst interface area and is at least 45 minutes out. Our ability to fight a structure fire in this subdivision is further complicated by the narrow width of the private lanes leading into the houses.

Our department is also having problems keeping fire fighters on the roles. Because of the constant change over of fire fighters we are having difficulty in arranging and putting on adequate training sessions.

4.5.2.2 Fairfield Rural Volunteer Fire Company

4.5.2.2.1 Grant Narrative

Project Description

We intend to purchase a used cab and chassis. We anticipate this have a diesel engine with sufficient power to pull the load this truck will have. Seating limitations should allow for 2 firefighters to travel in this vehicle. We will look for a cab with automatic transmission. This will make the vehicle safer and easier for the majority of our volunteers to drive. Once the cab is found we will have a new tank fabricated to the chassis. We anticipate a tank of 2,800 to 3,000 gallons depending on weight limitations. Plumbing will include spray valves on the front, side, and rear. Dump valves will be placed on the rear and one side. A full safety light bar system will be used. Flood lights will be added for additional nighttime safety. We anticipate using a 250GPM pump for filling and transfer uses. We will also have a port a pit holder attached and use our existing pits.

Community/Department Benefits

Fairfield is a community of 659 people. WE also cover an area of 340 square miles with 1300 additional residents. We have seen strong growth. Our area includes 3 school systems of which 2 are in the rural area. We also cover 2 launch control facilities for Malmstrom Air Force Base and have 8 silo sites in our area. There are two electrical substations, a large telecommunications center and other businesses. Gibson Dam is in our response area. The dam provided irrigation water for nearly 80,000 acres. It the dam were breached there could be large loss of life downstream to Great Falls with a population of 65,000.

This grant will improve our response and decrease our dependence on mutual aid as we can have quicker, safer response time. A larger load can provide more water and the newer equipment will give us the ability to fill from some rural sources rather than driving back to our town. Sometimes now, our trip for water can be 30 miles round trip. The time issue becomes a safety issue.

Local Funding

Our county provides $3,000 per year for maintenance and upgrades. We also get a share of fee area money that goes towards vehicles and upgrades. Our turn averages between 10-15 years. It would generate about $60,000 but our turn is still 5-7 years away. The town provides $7500 per year but these funds cannot be used for a tender as they provide a hydrant system for in town. We have been successful with fundraising about $4-5,000 per year to help with minor equipment and training cost. These keep going up each year.

We should easily be able to fund the matching 5% and any additional costs that may occur such as delivery. This can come from our Fee Area money or fundraising. Getting this vehicle will allow us to be in very good shape as far as equipment. Last years grant allowed us to outfit all firefighters for wildland and structure gear. We also upgraded our SCBA's. This grant will allow us to have at least one newer, safe vehicle in each class that we use, Pumper, Tender, and brush. We do some type of mutual aid on nearly 50% of our fires and this will allow us to do so in a safer manner.

Summary

We appreciate the grants that we have received. We also appreciate the consideration that you will give to this request. Do to the extended drought in our area, water shuttle and water resources have become a large issue on our department. We are constantly looking for new sources. Our existing tender is very old. We had to put $4,000 into it in February just to keep it on the road. There are many safety issues like the transmission and brakes that are nearly failing. Also in February we had an electrical fire outside the cab as we drove back into the hall from a fire. This Vehicle needs to be replaced.

We received a grant in 2002 and 2004. The 2002 is now closed out and was for training. The 2004 was for personal protective gear including wildland and structure turnouts, SCBA, and boots. We also purchased a washer. All of the items have been purchased and are in use.

4.5.2.3 Dutton Rural Volunteer Fire Company

4.5.2.3.1 Grant Narrative

Project Description

We are requesting funds to upgrade our Personal Protective Equipment to NFPA standards including both wildland and structure bunker gear, SCBA's and Cascade system. In addition we would like to complete our Vehicle Extrication equipment by purchasing a cutter and a ram with hoses to go along with the spreader, power unit and generator we already have.

Our department operates on $13,400/yr in budget dollars which makes purchasing safety equipment a piecemeal proposition at best. Getting everyone completely up to standard now would allow us to stay current going forward. We have been fortunate to obtain FEMA grant funds in two previous years to supplement our funding, those funds were used to build a water tender and purchase a CAFS skid unit, and firefighter safety equipment has now reached the top of the priority list.

We protect a small rural town of 390 people that has a water system and hydrants and covers approximately 2 sq. miles. The remainder of our 780 sq. mile response area consists of scattered farms, 10 miles of Interstate 15, 10 miles of Burlington Northern Railroad main artery, and 24 minute man missle silo's operated by Malmstrom Air Force Base. We also provide mutual aide to 6 neighboring fire departments in 3 different counties.

At present we are using 30 minute SCBA's while all 6 of the mutual aide departments use 45 minute SCBA's. This causes us to haul our bottles back to the fire hall for refill. If we upgrade to 45 minute systems we can work with the mutual aide departments better and we can refill using the portable compressors they have.

Budget Detail

- 8 integrated alert SCBA's /$4500 each /$36,000 total
- 16 Structure Bunkers (helmet, boots, coat, pants,hood, gloves)/$1,800 each/ $28,800 total
- 16 Wildland coveralls /$300 each /$4,800 total
- 16 Wildland filter masks with replacement filter /$100 each /$1,600 total
- 1 Cascade system upgrade (new tanks) $4,200
- 1 Holmatro 10,500psi extrication cutter $4,300
- 1 Holmatro 10,500psi extrication telescopic ram $4,000
- 1 set of Holmatro connection hose $700

TOTAL EQUIPMENT PURCHASES $ 84,400

Community / Department Benefits

As an all volunteer department in a small rural community it is hard to recruit new members, train them and equip them on the small budgets the community can provide. Our $13,400/yr tax budget will barely cover the cost of operating our small department without any major incidents or major repairs. One large incident or repair can use up more than one years budget very easily. Safety of our members while they are volunteering their time to protect others is our number one concern. We must be able to train them, provide the right protective equipment, and be able to protect our customer in order to keep volunteers on the roster and keep them active. This will also keep insurance rates down so the community can afford to pay the taxes that fund our department.

We operate on a large number of mutual aide calls every year. If we can upgrade our equipment and SCBA's they will match the equipment of our mutual aide departments so we can operate in a more efficient manner. At present we must take our SCBA bottles back to our fire hall to fill. By upgrading we will be able to share bottles with the other dept's. on scene and also refill using their portable compressor. They have agreed also to allow us to use their compressor to refill our cascade system so we can save the cost of purchasing one.

We are located on the main north/south artery for Burlington Northern railroad and also Interstate 15 is the major north/south highway from Canada. As a result we have a number of Auto extrication runs and an occaisional train derailment. We presently have a Holmatro 10500psi pump and spreader on our CAFS truck. By completeing the purchase of the extrication equipment for a complete set we will be able to provide quicker extrication in vehicle accidents, and increase survivability.

Local Funding

We will fund our 5% match with a combination of community fund raiser, donations, and capital purchase funds from our budget. We presently have those funds available and will hold them for matching purposes until we are informed of approval or denial of this request.

Summary

We are a small department that covers a lot of area with not many resources. We have been very fortunate to obtain FEMA grants in two previous years that have greatly improved our firefighting capabilities. Our members volunteer their time from paying jobs to fight fire, volunteer their weekends to fund raising, training, equipment repair and maintenence, and we would now like to be able to provide them with the necessary safety equipment to do their jobs without risking their own lives. We all understand why our budgets are so tight as we are also taxpayers in a farm community that has been suffering through 6 years of drought, but we would also like to protect ourselves while protecting our community.

2002 AFG grant for a vehicle. $40,000 grant used to build a 3,200 gallon water tender on a 1994 Kenworth. 2003 AFG grant for equipment. $45,000 grant used to purchase a CAFS skid unit which was placed on a 1998 Dodge 1 ton. Also purchased a 10,500 psi Holmatro pump and spreader for the same truck.

4.6 Critical Infrastructure in the Fire Prone Landscape

4.6.1 Methodology

Utilizing the Fire Prone Landscapes methodology developed by Schlosser *et al.* 2002, the individual critical infrastructures located in the county were evaluated for their exposure to wildfire risk. A 10 acre area around each structure (373 foot radius circle) was drawn around the center point of the GPS datum for that structure. Thirty meter pixel data was used when evaluating the fire prone landscapes data. Each 30 meter square pixel had been assigned a numerical ranking as part of the Fire Prone Landscape analysis described in section 3.10.1.

Table 4.4 shows the results of examining each critical infrastructure component and the propensity for a particular area (pixel) to burn within a 10 acre area around the structure. The minimum ranking and maximum ranking within each 10 acre area is listed along with the weighted average score.

The minimum ranking represents the lowest ranked "pixel" within the 10 acres surrounding the infrastructure point. The maximum ranking represents the highest ranked pixel. It is important to note that although a low overall average may exist for a given structure; a highly ranked fuels area may exist near the structure. These islands of fuel are capable of compromising the structure during a wildland fire. Therefore it is important to consider the maximum ranking as well as the average ranking for each structure.

Table 4.4. Wildfire risk rating surrounding individual critical infrastructure components in Teton County.

Fire Prone Landscape Ranking Scale

10 35 60 85

OWNERSHIP	TYPE	ENTITY	MIN	MAX	AVERAGE
TOWN OF FAIRFIELD	BUILDING	FIRE DEPARTMENT	17	19	17
FAIRFIELD COMMUNITY HALL	BUILDING	NON PROFIT	17	19	18
TOWN OF FAIRFIELD	BUILDING	PUBLIC WORKS	17	19	18
US GOVERNMENT	BUILDING	POSTOFFICE	17	19	18
TOWN OF FAIRFIELD	WATER TOWER	WATER DEPARTMENT	17	19	18
FAIRFIELD SCHOOL DIST	BUILDING	SCHOOL K-12	17	19	18

Table 4.4. Wildfire risk rating surrounding individual critical infrastructure components in Teton County.

Fire Prone Landscape Ranking Scale

			10	35	60	85
OWNERSHIP	**TYPE**	**ENTITY**	**MIN**	**MAX**		**AVERAGE**
TETON COUNTY	BUILDING	ROAD DEPARTMENT	17	19		18
TETON COUNTY	BUILDING	AMBULANCE	17	19		18
THREE RIVERS COMMUN.	TELEPHONE SWITCH	TELEPHONE COMPANY	17	23		18
THREE RIVERS COMMUN	TELEPHONE SWITCH	TELEPHONE COMPANY	18	19		18
DUTTON SCHOOL DISTRICT	BUILDING	SCHOOL K-12	17	19		18
SUN RIVER ELECTRIC COOP	SUBSTATION	ELECTRIC UTILITY	18	20		18
TOWN OF FAIRFIELD	WATER WELLS	WATER DEPARTMENT	17	23		19
NORTHWESTERN ENERGY	SUBSTATION	ELECTRIC UTILITY	17	20		19
THREE RIVERS COMMUN.	CELL TOWER	TELEPHONE COMPANY	17	23		19
TOWN OF FAIRFIELD	WATER WELLS	WATER DEPARTMENT	17	20		19
QWEST	TELEPHONE SWITCH	TELEPHONE COMPANY	18	19		19
TOWN OF FAIRFIELD	WATER WELLS	WATER DEPARTMENT	17	21		19
TOWN OF DUTTON	BUILDING	FIRE DEPARTMENT	18	19		19
MOUNTAINVIEW COOP	ABOVE GRD STORAGE	FUEL DIVISION	18	20		19
US GOVERNMENT	BUILDING	POST OFFICE	18	19		19
NORTHERN ENERGY	SUBSTATION	ELECTRIC UTILITY	18	19		19
MOUNTAINVIEW COOP	ABOVE GRD STORAGE	FUEL DIVISION	19	20		19
AMERICAN LEGION	BUILDING	NON PROFIT	19	20		19
CITY OF CHOTEAU	BUILDING	FIRE DEPARTMENT	17	20		19
PENDROY SCHOOL DISTRICT	BUILDING	SCHOOL VACANT	18	21		19
THREE RIVERS COMMUN.	TELEPHONE SWITCH	TELEPHONE COMPANY	18	20		19
TETON COUNTY	BUILDING	SHERIFF'S OFFICE	19	20		19
TETON COUNTY	BUILDING	ROAD DEPARTMENT	19	20		19

Table 4.4. Wildfire risk rating surrounding individual critical infrastructure components in Teton County.

Fire Prone Landscape Ranking Scale

10 35 60 85

OWNERSHIP	TYPE	ENTITY	MIN	MAX	AVERAGE
US GOVERNMENT	BUILDING	POST OFFICE	17	23	20
CITY OF CHOTEAU	BUILDING	PUBLIC WORKS	19	20	20
KELLY'S	ABOVE GRD STORAGE	BULK FUEL STORAGE	19	20	20
NORTHWESTERN ENERGY	SUBSTATION	ELECTRIC UTILITY	17	21	20
THREE RIVERS COMMUN.	TELEPHONE SWITCH	TELEPHONE COMAPNY	17	20	20
CITY OF CHOTEAU	BUILDING	WATER DEPARTMENT	19	23	20
CHOTEAU SCHOOL DIST.	BUILDING	SCHOOL K-12	17	25	20
SUN RIVER ELECTRIC COOP	SUBSTATION	ELECTRIC UTILITY	18	21	20
TETON COUNTY	BUILDING	FIRE DEPARTMENT	18	20	20
SUN RIVER ELECTRIC COOP	SUBSTATION	ELECTRIC UTILITY	18	24	20
TOWN OF DUTTON	SEWAGE LAGOON	PUBLIC WORKS	18	21	20
NORTHWESTERN ENERGY	SUBSTATION	ELECTRIC UTILITY	19	23	20
GREENFIELD SCHOOL DIST	BUILDING	SCHOOL K-8	18	21	20
TETON COUNTY	BUILDING	HOSPITAL DISTRICT	20	21	20
TETON COUNTY	BUILDING	AMBULANCE	20	24	21
BREEN FUEL & TIRE	ABOVE GRD STORAGE	BULK FUEL STORAGE	17	41	22
TOWN OF FAIRFIELD	WATER TOWER	WATER DEPARTMENT	17	39	23
TOWN OF FAIRFIELD	WATER WELLS	WATER DEPARTMENT	17	37	23
TOWN OF DUTTON	WATER TANK	WATER DEPARTMENT	18	34	24
THREE RIVERS COMMUN	TELEPHONE SWITCH	TELEPHONE COMPANY	18	48	24
THREE RIVERS COMMUN.	CELL TOWER	TELEPHONE COMPANY	18	39	25
NORTHWESTERN ENERGY	SUBSTATION	ELECTRIC UTILITY	18	39	26
TOWN OF FAIRFIELD	SEWAGE LAGOON	PUBLIC WORKS	22	58	26
CHOTEAU COUNTRY CLUB	BUILDING	GOLF COURSE	21	34	27

Table 4.4. Wildfire risk rating surrounding individual critical infrastructure components in Teton County.

Fire Prone Landscape Ranking Scale

10 35 60 85

OWNERSHIP	TYPE	ENTITY	MIN	MAX	AVERAGE
SUN RIVER ELECTRIC COOP	SUBSTATION	ELECTRIC UTILITY	18	40	28
THREE RIVERS COMMUN.	CELL TOWER	TELEPHONE COMPANY	17	44	29
CITY OF CHOTEAU	SEWAGE LAGOON	PUBLIC WORKS	17	43	29
CITY OF CHOTEAU	WATER TANKS	WATER DEPARTMENT	21	74	30
TETON COUNTY	BUILDING	FIRE DEPARTMENT	19	39	31
LDS CHURCH	BUILDING	CHURCH	21	52	31
TETON COUNTY	BUILDING	AMBULANCE	17	43	32
WAPA	CELL TOWER	ELECTRIC UTILITY	18	48	34
TETON COUNTY	BUILDING	ROAD DEPARTMENT	17	43	35
US GOVERNMENT	BUILDING	POST OFFICE	19	39	36
TOWN OF DUTTON	WATER WELLS	WATER DEPARTMENT	18	40	37
CELLULAR ONE	CELL TOWER	WIRELESS COMPANY	19	48	37
AMERICAN LEGION	BUILDING	NON PROFIT	17	72	38
NORTHWESTERN ENERGY	SUBSTATION	ELECTRIC UTILITY	37	39	39
THREE RIVERS COMMUN	TELEPHONE SWITCH	TELEPHONE COMPANY	17	45	39
THREE RIVERS COMMUN	TELEPHONE SWITCH	TELEPHONE COMPANY	37	44	39
POWER/TETON W&S DIST	WATER TANK	DISTRICT	17	45	40
TOWN OF DUTTON	TREATMENT WELL	WATER DEPARTMENT	18	72	40
POWER/TETON W&S DIST	WATER SOURCE/TREAT	DISTRICT	37	50	41
GOLDEN RIDGE SCHOOL	BUILDING	SCHOOL K-5	37	52	42
NORTHWESTERN ENERGY	SUBSTATION	ELECTRIC UTILITY	40	44	42
POWER/TETON W&S DIST	SEWAGE LAGOON	DISTRICT	42	44	44
SUN RIVER ELECTRIC COOP	SUBSTATION	ELECTRIC UTILITY	19	69	44
CITY OF CHOTEAU	WATER WELLS	WATER DEPARTMENT	37	49	44

Table 4.4. Wildfire risk rating surrounding individual critical infrastructure components in Teton County.			Fire Prone Landscape Ranking Scale 10 35 60 85		
OWNERSHIP	**TYPE**	**ENTITY**	**MIN**	**MAX**	**AVERAGE**
TETON COUNTY	RADIO REPEATER	PSAP	39	60	48
MOUNTAIN VIEW COOP	ABOVE GRD STORAGE	FUEL DIVISION	40	72	53
POWER SCHOOL DISTRICT	BUILDING	SCHOOL K-12	17	74	54
TETON COUNTY	RADIO REPEATER	PSAP	39	86	55
BYNUM SCHOOL DISTRICT	BUILDING	SCHOOL K-8	67	69	68
WAPA	SUBSTATION	ELECTRIC UTILITY	70	70	70

4.7 Issues Facing Teton County Fire Protection

4.7.1 Fires in Conservation Reserve Program Fields

Since the introduction of the Conservation Reserve Program by the federal government, many formerly crop producing fields have been allowed to return to native grasses. Conservation Reserve Program 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.

As seen in the attached memo the issues and acres involved are significant.

UNITED STATES	FARM	TETON COUNTY FSA OFFICE
DEPARTMENT	SERVICE	P.O. BOX 836
OF AGRICULTURE	AGENCY	CHOTEAU, MT
		Phone 406-466-5351 Ext. 2 FAX 406-466-5328

To: Dick Van Auken
Teton County Fire Warden

November 22, 2004

From: Sherwin K. Smith, CED
Teton County FSA Office

Subject: Data for Fire Plan

Crop/SF Acres

	2004	1972
SF	122,000 acres	179,000 acres estimate
CRP	150,000 acres	0 acres
Barley	96,409 acres	104,500 acres
Wheat	142,479 acres	134,500 acres

I would estimate that over 95% of the SF acres in 2004 are chemical fallowed. I don't believe we had any chemical fallow in 1972. The other big difference between 1972 and 2004 is the width of the strips. In 1972 the strips were 1 to 2 rods wide. This gave you a fire break every 100+ feet. Today the bulk of the fields are farmed in large blocks (80 acres to 640 acres). With 95+% of our SF having stubble we have very few cropland fire breaks.

I have a 1966 aerial photo flight that we could use to do a visual comparison.

If we need to look at photos just let me know.

4.8 Current Wildfire Mitigation Activities in Teton County

4.8.1 Defensible Space Projects – 2001 National Fire Plan Grant

Given the drought conditions and fire history in the area known as the Rocky Mountain Front, the wildland urban interface (WUI) in the Teton River canyon and Sun River canyon was considered for its potential fire impacts on subdivisions and recreational cabin holdings in the area. The lack of any defensible space work being done in the area, the need to inform the landowners of the potential risk of fire, and the present weather conditions made the Rocky Mountain Front in Teton County a prime choice for a defensible space project. The two areas of primary concern were the Arrowleaf subdivision area at the mouth of Teton River canyon and the Sun River canyon area west of the Lewis and Clark National Forest eastern boundary. The purpose of the projects was to identify and implement the defensible space projects in these areas. Upon completion of the defensible space work at the selected locations, these sites would be used as models for educational purposes for the other residents in the area.

Educating residents on the Rocky Mountain Front in methods of increasing chances of surviving a fire in the urban interface was paramount at a time when interest was heightened due to the

2000 fire season and the September fire along the Front. This project allowed the public to observe and learn the proper methods and benefits of developing a defensible space.

Teton County has seen not only a heightened awareness of the need for fuel mitigation and defensible space within the WUI, but action has also been taken on several fronts.

1. Teton County has completed over 20 defensible space projects plus the 5 demonstration projects.
2. The City of Choteau has begun a community wide assessment and did some fuel mitigation along Spring Creek.
3. Several individuals have cleared access roads and continued fuel reduction beyond the grant funding.
4. A county wide fire plan process has been started and will be completed by July 2005.
5. The Forest Service has developed and will complete in 2004 an evacuation plan for all public and private lands with 6 miles of the Lewis and Clark Forest boundary.
6. A wildfire urban interface education component is now included as part of the extension service within Teton County.

4.8.2 Mortimer Gulch Hazardous Fuel Reduction Project

The Rocky Mountain Ranger District, USDA, Forest Service is in the beginning stages of proposing a hazardous fuels reduction project in the Lower Mortimer Gulch Drainage. The project area encompasses the Mortimer Gulch Campground area.

This area is a main recreation access area for the Lewis and Clark National Forest. A private in-holding of approximately 400 acres (32 private residences) is located directly up drainage from the proposed project area. There are also 6 recreation residences and 1 guest ranch (12 structures) up drainage from the proposed project area. The private in-holding and recreation residences are in very close proximity to the proposed project area. This is a highly frequented campground (equipped with fire pits) that holds the potential for a destructive human caused wildfire start.

The primary objective of this project is to improve firefighter and public safety and to protect private property within the National Forest by reducing, to an acceptable level, hazardous fuels and the risk and consequences of a wildfire in the Lower Mortimer Gulch Drainage.

Chapter 5: Treatment Recommendations

5 Administration & Implementation Strategy

Critical to the implementation of this Wildfire Mitigation Plan will be the identification of, and implementation of, an integrated schedule of treatments targeted at achieving an elimination of the lives lost, and reduction in structures destroyed, infrastructure compromised, and unique ecosystems damaged that serve to sustain the way-of-life and economy of Teton County and the region. Since there are many land management agencies and thousands of private landowners in Teton 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.

Teton 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 Teton County, specifically the USDA Forest Service and 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 Teton County.

All risk assessments were made based on the conditions existing during 2004-05, 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 Teton County in relation to this planning document, this entire **Wildfire Mitigation Plan** should be reviewed annually at a special meeting of the Teton 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 Wildfire Mitigation Plan. 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

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 local jurisdictions with overall coordination provided by the Teton County Fire Warden.

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 two grant programs (the post-disaster Hazard Mitigation Grant Program, 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 Teton County Fire Warden to include the County Commissioner’s Office, City Mayors and Councils, Fire Department Chiefs and, agency representatives (USFS, BLM, State Lands, 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:

- Cost/Benefit
- 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:

- Cost/Benefit
- 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 10. Therefore a project with a BC ratio of 50:1 would receive 5 points, a project with a BC ratio of 100:1 (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 over 3,000 people. A ranking of 5 has the potential to impact 100 people, and a ranking of 1 will not impact the population. 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 over $1,000,000 in losses, a ranking of 5 has the potential to save roughly $100,000 in losses, and a ranking of 1 only has the potential to save less than $100 in losses. 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. 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.

5.1.1.9 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.

5.1.1.10 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 non-planning project thresholds of:

Project Ranking Priority Score

- High 40-65
- Medium 25-39
- Low 9-25

5.2 Possible Fire Mitigation Activities

As part of the implementation of fire mitigation activities in Teton 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.

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

5.3.1 Existing Practices That Should Continue

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

5.3.2 Overall Goals

Reduce Teton 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.
- Develop policies and standards concerning new building and housing projects that will reduce their exposure to fire risk factors.
- Improve emergency response capabilities.

5.3.3 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.	Teton County Commissioners, Teton County Building Department, City of Choteau, Town of Fairfield, Town of Dutton, and Disaster Services Coordinator	**Year 1 (2005)**: Annual review of IBC updates and relevance to hazards in 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.	**County Commissioners Office** in cooperation with Choteau RVFC, Fairfield RVFC, Dutton RVFC, Power RVFC, and Pendroy RVFC.	**Year 1 (2005) activity:** Consider and develop policy to address construction materials for homes and businesses located in high wildfire risk areas. Specifically, a County policy concerning wooden roofing materials and flammable siding, especially where juxtaposed near heavy wildland fuels.

Table 5.1. WUI Action Items in Safety and Policy.

Action Item	Goals and Objectives	Responsible Organization	Action Items & Planning Horizon
5.1.c: Begin distributing "New Code of the West" pamphlets with sub-division requests.	**Protection of people and structures** by improving the ability of emergency response personnel to respond to threatened homes in high-risk areas.	**County Commissioners, County Planning Department**, City of Choteau, Town of Fairfield, and Town of Dutton.	• 2005: Obtain copyrights to "New Code of the West" pamphlet. • 2005: Distribute pamphlets .
5.1.d: Review need to inspect and enforce access and water issues in new subdivisions and individual homes.	Flood, Earthquake, Landslide, Winter Storm, Thunderstorm, Drought, and Windstorm/Tornado	County Commissioners, County Planning Department, Disaster & Emergency Services, City of Choteau, Town of Fairfield, and Town of Dutton	• 2005-06: Study need for inspections and enforcement of access and water issues. and other programmatic responses. • 2006: Review need for inspector, and potential duties.
5.1.e: Address emergency dispatch policy.	Flood, Earthquake, Landslide, Winter Storm, Thunderstorm, Drought, and Windstorm/Tornado	County Sheriff's Office, County Commissioners, County Fire Warden, Hospitals, Disaster and Emergency Services, Choteau RVFC, Fairfield RVFC, Power RVFC, Dutton RVFC, Pendroy RVFC, USDA Forest Service, BLM, and Montana DNRC.	• 2005: Train dispatch personnel to use system effectively within the county's first responders. • 2005: Establish training for first responders. • 2006: Implement annual training for all involved.
5.1.f: Develop County policy concerning access in moderate to high-risk WUI areas where sub-divisions are built to insure adequate ingress and egress during wildfire emergencies.	**Protection of people and structures** by improving the ability of emergency response personnel to respond to threatened homes in high-risk areas.	**County Commissioners Office and Planning Board** in cooperation with Choteau RVFC, Fairfield RVFC, Dutton RVFC, Power RVFC, and Pendroy RVFC.	**Year 1 (2005) activity:** Consider and develop policy to address access language for homes and businesses located in moderate to high wildfire risk areas. Specifically, a County policy concerning road widths, turning radii, and number of multiple access points.
5.1.g: Develop a County Commissioner's Office 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.	**County Commissioners Office**	**Ongoing activity:** Support grant applications as requested in a manner consistent with applications from residents and organizations in Teton County.

5.1.h: Establish a county-wide Hazard Advisory Commission.	All Hazards	Teton County Commissioners, Disaster & Emergency Services, Local Emergency Planning Commission, City Choteau, Town of Dutton, Town of Fairfield, Choteau RVFC, Fairfield RVFC, Power RVFC, Dutton RVFC, and Pendroy RVFC.	• 2005: Form and appoint members to the commission. Initial tasks:
			  • Set commission policy
			  • Address priorities from this plan
			  • Advise County on implementation strategies

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 fire fighter who suffers the loss of life during the combating of a fire. Many of the recommendations in this section will define a set of criteria for implementation while others will be rather specific in extent and application.

Many of the recommendations in this section involve education to increase awareness and teach mitigation strategies to the residents of Teton 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, Teton 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 identifying it.

- Homeowners in the public mail survey ranked their home site wildfire risk factors very similar than 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.
- Nearly half of the respondents to the public mail survey indicated (46%) 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 Teton 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 Teton 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 Teton 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 Teton 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 Teton County has been affected greatly by the reduction of operating sawmills in the region. However, the active forest management program of the U.S. Forest Service, Montana Department of Natural Resources and Conservation, Bureau of Land Management, and many of the private and industrial forestland owners in the region has led to a significant reduction of wildland fuels where they are closest to

homes and infrastructure. In addition, forest resource professionals managing these lands, and the lands of the state and federal agencies are generally trained in wildfire protection and recognize risk factors when they occur. One of the reasons that Teton County forestlands have not been impacted by wildland fires to a greater degree historically, is the presence and activities related to active forest management.

- **Agriculture** is a significant component of Teton 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 Teton County is integral to the continued management of wildfire risk in this region.

5.4.1 Overall Goals

Reduce Teton 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	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 • Teton County Fire Departments	Evaluate effectiveness of currently funded County education programs. If possible, use existing educational program materials and staffing. These programs may need reformatted using FireWISE materials. Formal needs assessment should be responsibility of Extension Service faculty and include the development of an integrated WUI educational series by year 3 (2007). Costs initially to be funded through existing budgets for these activities to be followed with grant monies to continue the programs as identified in the formal needs assessment. Detailed information on home defensible space requirements is contained on the FireWise CD, which can be purchased and personalized by the County. The CD costs $2,500.
5.2.b: Wildfire risk assessments of homes in identified communities	**Protect people and structures** by increasing awareness of specific risk factors of individual home sites in the at-risk landscapes. Only after these are completed can home site treatments follow.	To be implemented by **County Commissioners Office** in cooperation with **Choteau RVFC, Fairfield RVFC, Dutton RVFC, Power RVFC, Pendroy RVFC, City of Choteau, Town of Fairfield, and Town of Dutton**. Actual work may be completed by Wildfire Mitigation Consultants or trained volunteers. U.S. Forest Service is willing to assist in home assessments	• **Cost:** Approximately $100 per home site for inspection, written report, and discussions with the homeowners. • There are approximately 2,518 housing units in Teton County, roughly 755 (30%) of these structures would benefit from a home site inspection and budget determination for a total cost estimate of $75,500. • **Action Item:** Secure funding and contract to complete the inspections during years 1 & 2 (2005-06) • 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 fire fighter safety** by reducing the risk factors surrounding homes in the WUI of Teton County	**County Commissioners** in cooperation with Fire Mitigation Consulting company , Farm Services, Choteau RVFC, Fairfield RVFC, Dutton RVFC, Power RVFC, Pendroy RVFC, City of Choteau, Town of Fairfield, and Town of Dutton. *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 $1200 per home site for a defensible space of roughly 150'. Approximately 755 homes in this category for an estimated cost of $ 906,000. • Home site treatments can begin after the securing of funding for the treatments and immediate implementation in 2005 and will continue from year 1 through 5 (2009). • Plan and implement an ongoing fuels reduction plan on Crop Reserve Program lands surrounding homesites.
5.2.d: Community Defensible Zone WUI Treatments	**Protect people, structures, and increase fire fighter safety** by reducing the risk factors surrounding high risk communities in the WUI of Teton County	**County Commissioners** in cooperation with Fire Mitigation Consultants, Farm Services, Choteau RVFC, Fairfield RVFC, Dutton RVFC, Power RVFC, Pendroy RVFC, City of Choteau, Town of Fairfield, Town of Dutton, and Arrowleaf Subdivision.	• Actual funding level will be based on the outcomes of the home site assessments and cost estimates. • **Years 2-5 (2005-09):** Treat high risk wildland fuels from home site defensible space treatments (5.4.c) to an area extending 400 feet to 750 feet beyond home defensible spaces, where steep slopes and high accumulations of risky fuels exist. Should link together home treatment areas. Treatments target high risk concentrations of fuels and not 100% of the area identified. To be completed only after or during the creation of home defensible spaces have been implemented. • Approximate average cost on a per structure basis is $1200 depending on extent of home defensibility site treatments, estimate 755 homes in need of this type of treatment for a cost estimate of $ 906,000. • Plan and implement an ongoing fuels reduction plan on Crop Reserve Program lands surrounding communities.
5.2.e: Maintenance of Home Site WUI Treatments	**Protect people, structures, and increase fire fighter safety** by reducing the risk factors surrounding homes in the WUI of Teton County	**County Commissioners Office** in cooperation with Choteau RVFC, Fairfield RVFC, Dutton RVFC, Power RVFC, Pendroy RVFC, 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 ($37,750) • 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 fire fighter safety** by reducing risk factors around homes in the WUI of Teton County	**County Commissioners Office** in cooperation with Choteau RVFC, Fairfield RVFC, Dutton RVFC, Power RVFC, and Pendroy RVFC 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: Access Improvements of bridges, cattle guards, and limiting road surfaces	**Protection of people, structures, infrastructure, and economy** by improving access for residents and fire fighting personnel in the event of a wildfire. Reduces the risk of a road failure that leads to the isolation of people or the limitation of emergency vehicle and personnel access during an emergency.	**County Roads and Bridges Department** in cooperation with US Forest Service, BLM, State of Montana (Dept of Transportation), and forestland or rangeland owners.	• **Year 1 (2005):** Update existing assessment of travel surfaces, bridges, and cattle guards in Teton County as to location. Secure funding for implementation of this project (grants) • **Year 2 (2006):** 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, USFS, BLM, State, and private based on landownership associated with road locations. • **Year 2 (2006):** 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 (2007):** Identify limiting road surfaces in need of improvements to support wildland fire fighting vehicles and other emergency equipment. Develop plan for improving limiting surfaces including budgets, timing, and resources to be protected for prioritization of projects (benefit/cost ratio analysis). Create budget based on full assessment.
5.2.h: Access Improvements through road-side fuels management, especially Forest Route 108 (Mortimer Gulch), Canyon Road, Forest Route 109, and Forest Route 144.	**Protection of people, structures, infrastructure, and economy** by improving access for residents and fire fighting personnel in the event of a wildfire. Allows for a road based defensible area that can be linked to a terrain based defensible areas.	**County Roads and Bridges Department** in cooperation with US Forest Service, BLM, State of Montana (Dept. of Transportation), and forestland or rangeland owners.	• **Year 1 (2005):** Update existing assessment of roads in Teton County as to location. Secure funding for implementation of this project (grants). • **Year 2 (2006):** Specifically address access issues listed in column one, plus recreation areas, and others identified in assessment. Target 150' on downhill side of roads and 100' on uphill side for estimated cost of $15,000 per mile of road treated. If 50 miles of roadway are prioritized for treatment (est.) the cost would amount to $ 750,000. • **Year 3 (2007):** Secure funding and implement projects to treat road-side fuels.

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

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

5.5.1 Overall Goals

Reduce Teton 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 county-wide 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 FEMA "Emergency Evacuation Route" signs along the identified Primary and Secondary access routes in the county.	**Protection of people and structures** by informing residents and visitors of **significant infrastructure** in the county that will be maintained in the case of an emergency.	**County Commissioners** in cooperation with County Fire Warden, Choteau RVFC, Fairfield RVFC, Dutton RVFC, Power RVFC, Pendroy RVFC, City of Choteau, Town of Fairfield, Town of Dutton, and Arrowleaf Subdivision.	• Purchase of signs (2005). • Posting roads and make information available to residents of the importance of Emergency Routes
5.3.b: Improve communications throughout the county by providing a portable repeater and satellite phones for emergency response personnel.	**Protection of people and structures** by providing improved communication resources.	**County Commissioners,** Choteau RVFC, Fairfield RVFC, Dutton RVFC, Power RVFC, Pendroy RVFC, Montana DNRC, and local cellular phone companies.	• **Year 1 (2005):** Summarize existing communication capabilities and limitations. Identify costs to add cellular towers and obtain equipment and locate funding opportunities. • **Year 2 (2006):** Acquire and install equipment as needed.
5.3.c: Fuels mitigation of the FEMA "Emergency Evacuation Routes" in the county to insure these routes can be maintained in the case of an emergency. Signage on County Roads	**Protection of people and structures** by providing residents and visitors with ingress and egress that can be maintained during an emergency.	**County Commissioners** in cooperation with Rural Fire Departments and Roads Department.	• Full assessment of road defensibility and ownership participation (2005). • Implementation of projects (linked to item 5.2.g and 5.2.h.

5.6 Resource and Capability Enhancements

There are a number of resource and capability enhancements identified by the rural and wildland fire fighting districts in Teton 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 drafting sites in rural locations
- Improved radio capabilities within each district and for mutual aid operations
- Retention and recruitment of volunteers
- Training and development of rural firefighters in structure and wildland fire
- Enhancement of available equipment available for rural and city departments
- Develop a system to report all fires in one data base with ignition, acres and location documented.

Although additional, and specific, needs were enumerated by the departments in Teton County, these items were identified by multiple departments and 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 Teton 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 fire fighters and all emergency personnel and provide incentives for trained fire fighters and new recruits to stay with the force.

5.6.2 Proposed Activities

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

Action Item	Goals and Objectives	Responsible Organization	Action Items & Planning Horizon
5.4.a: Enhance radio availability in each department, link into existing dispatch, and improve range within the region.	**Protection of people and structures** by direct capability enhancements.	**Montana Department of Natural Resources and Conservation** in cooperation with County Commissioners, Choteau RVFC, Fairfield RVFC, Dutton RVFC, Power RVFC, Pendroy RVFC, BLM, and USDA Forest Service.	• **Year 1 (2005):** Summarize existing two-way radio capabilities and limitations. Identify costs to upgrade existing equipment and locate funding opportunities. • **Year 2 (2006):** Acquire and install upgrades as needed. • **Year 2-3 (2006-07):** Identify opportunities for radio repeater towers located in the region for multi-county benefits.
5.4.b: Retention of Volunteer Fire Fighters	**Protection of people and structures** by direct fire fighting capability enhancements.	**Rural and Wildland Fire Districts** working with broad base of county citizenry to identify options, determine plan of action, and implement it.	• 5 Year Planning Horizon, extended planning time frame • Target an increased recruitment (+10%) and retention (+20% longevity) of volunteers. • **Year 1 (2005):** Apply for S.A.F.E.R. grants. • **Year 1 (2005):** Develop incentives program and implement it.
5.4.c: Increased training and capabilities of fire fighters	**Protection of people and structures** by direct fire fighting capability enhancements.	**Rural and Wildland Fire Districts** working with the **BLM, DNRC, and USFS** for wildland training opportunities and with the **Fire Services Training School** for structural fire fighting training.	• **Year 1 (2005):** 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 (2006): Begin implementing training opportunities for volunteers.

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

Action Item	Goals and Objectives	Responsible Organization	Action Items & Planning Horizon
5.4.d: Obtain 3,000 gallon water tenders.	**Protection of people and structures** by direct fire fighting capability enhancements	**Choteau RVFC, Fairfield RVFC, Pendroy RVFC, and Power RVFC.**	• **Year 1 (2005):** Verify stated need still exists, develop budget, and locate funding or equipment (surplus and grant) sources. • **Year 1 or 2 (2005-06):** Acquire and deliver needed equipment based on prioritization by need and funding awards. • Estimated cost • $60,000 each
5.4.e: Build new fire halls for Fairfield RVFC and Choteau RVFC.	**Protection of people and structures** by direct fire fighting capability enhancements.	**Pendroy RVFC and Choteau RVFC.**	• **Year 1 (2005):** Verify stated need still exists, develop budget, and locate funding or equipment (surplus) sources. • **Year 1 or 2 (2005-06):** Acquire and deliver needed equipment based on prioritization by need and funding awards. • Estimated cost • $45,000 each
5.4.f: Obtain Type 6 Engines for Power RVFC, Dutton RVFC, Fairfield RVFC, and Pendroy RVFC.	**Protection of people and structures** by direct fire fighting capability enhancements.	**Power RVFC, Dutton RVFC, Fairfield RVFC, and Pendroy RVFC.**	• **Year 1 (2005):** Verify stated need still exists, develop budget, and locate funding or equipment (surplus) sources. • **Year 1 or 2 (2005-06):** Acquire and deliver needed equipment based on prioritization by need and funding awards. • Estimated cost • $40,000 each

Action Item	Goals and Objectives	Responsible Organization	Action Items & Planning Horizon
5.4.g: Obtain additional personal protective equipment and SCBAs for Dutton RVFC.	**Protection of people and structures** by direct fire fighting capability enhancements.	**Dutton RVFC.**	• **Year 1 (2005):** Verify stated need still exists, develop budget, and locate funding or equipment (surplus) sources. • **Year 1 or 2 (2005-06):** Acquire and deliver needed equipment based on prioritization by need and funding awards. • Estimated cost • $90,000
5.4.h: Establish onsite water sources such as dry hydrants or underground storage tanks for rural housing developments.	**Protection of people and structures** by direct fire fighting capability enhancements.	**County Commissioners, Tri-County Water, Choteau RVFC, Fairfield RVFC, Pendroy RVFC, and Power RVFC**	• 2005-07: Identify populated areas lacking sufficient water supplies and develop project plans to develop fill or helicopter dipping sites. • 2006-10: Implement project plans.
5.4.i: Obtain a Type 4 minipumper compressed air foam system for Choteau RVFC for protection of Choteau Airport.	**Protection of people and structures** by direct fire fighting and emergency response capability enhancements.	**Choteau RVFC, County Commissioners, and Choteau Airport.**	• **Year 1 (2005):** Verify stated need still exists, develop budget, and locate funding or equipment (surplus) sources. • Estimate cost $100,000 • **Year 1 or 2 (2005-06):** Acquire and deliver needed equipment to district based on prioritization by need and funding awards.
5.4.j. Build an addition to existing fire hall for Pendroy RVFC and Power RVFC.	**Protection of people and structures** by direct fire fighting and emergency response capability enhancements.	**County Commissioners, Fire Warden, Pendroy RVFC and Power RVFC.**	• **Year 1 (2005):** Design plans for extension, identify grant funding opportunities, other funding as available. • **Year 2 (2006):** Begin and complete construction for occupancy. o Estimate cost $50,000

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

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. Teton County is dominated by wide expanses of rangelands intermixed with communities and rural houses.

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

5.7.1 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.

5.7.2 Initial Attack of Wildfires in the Lewis and Clark National Forest

Due to the high probability of downslope Chinook winds pushing wildfires out of the Lewis and Clark National Forest and into the rangelands along the Rocky Mountain Front in Teton County, it is imperative that the USDA Forest Service work closely with Teton County fire officials to prevent uncontrolled forest fires from threatening lives and property along the Front. Teton County would like to encourage the Forest Service to implement a policy regarding immediate and aggressive initial attack of all wildfires that could potentially progress into the Rocky Mountain Front.

5.7.3 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 Teton 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 Teton 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 Teton County.

It is the recommendation of this plan that Teton County enact 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. Teton 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.

The Teton County Fire Warden, working with the FSA and local farmers has been successful in prescribed burning CRP lands in the past. This practice has been one of the most important fuels mitigation practice in Teton County's high population density areas. This should be encouraged into the future as these areas are both high risk (see Fire Prone Landscapes assessment) and in the highest populated areas (see WUI assessment).

Chapter 6: Supporting Information

6

6.1 List of Tables

Table 2.1. Emergency Services Training received by household. 15
Table 2.2. Disasters affecting homes in Teton County. 16
Table 2.3. Fuel Hazard Rating Worksheet 17
Table 2.4. Percent of respondents in each risk category as determined by the survey respondents. 17
Table 2.5. Percent of respondents in each risk category as determined by the survey respondents. 18
Table 2.6. Percent of respondents in each risk category as determined by the survey respondents. 18
Table 2.7 Respondents opinion of risk occurrence. 18
Table 2.8. Public Opinion of Hazard Mitigation Funding Preferences. 19
Table 2.9. Public meeting slide show. 32
Table 3.1. Summary of selected demographic statistics for Teton County, Montana. 42
Table 3.2. Income in 1999 45
Table 3.3 Poverty Status in 1999 (below poverty level). 45
Table 3.4. Employment & Industry 46
Table 3.5. Class of Worker 47
Table 3.6. Land ownership in Teton County. 52
Table 3.7. Cover Types in Teton County. 57
Table 3.8. Climate summaries for Pendroy, Teton County, Montana. 58
Table 3.9. Climate summaries for Choteau, Teton County, Montana. 59
Table 3.10. Climate summaries for Gibson Dam, Teton County, Montana. 59
Table 3.11. Climate summaries for Fairfield, Teton County, Montana. 60
Table 3.12. Teton County Fire Ignition and Extent Profile. 61
Table 3.13. Regional Summary of Wildfire Ignitions by Cause regionally. 66
Table 3.14. National Fire Season Summaries. 67
Table 3.15. Total Fires and Acres 1960 - 2004 Nationally. 67
Table 3.16. Suppression Costs for Federal Agencies Nationally. 68
Table 3.17. Federal Wildland Fire Agency Prescribed Fire Acres Treated 69
Table 3.18. Prescribed Fire Costs, Nationally. 69
Table 3.19. Wildland fire fighter deaths on the fire ground by nature of Fatal Injury 1987-1996. 71

Table 3.20. Wildfire accidents reported in Montana, 1910-2003. 72
Table 3.21. Fire Prone Landscape rankings and associated acres in each category for Teton County. 74
Table 3.22. Historic Fire Regimes in Teton County. 76
Table 3.23. Fire Regime Condition Class Definitions. 78
Table 3.24. FRCC by area in Teton County. 78
Table 3.25. Predicted Fire Severity by area in Teton County. 80
Table 3.26. Comparative Fire Intensities and Rates of Spread in Timber Fuel Models. 84
Table 3.27. Comparative Fire Intensities and Rates of Spread in Slash Fuel Models. 86
Table 3.28. Teton County Critical Infrastructure. 89
Table 4.1. Teton County Communities 103
Table 4.2. County Fire Resources Teton County Rural Fire Truck Inventory (11/14/04). 133
Table 4.3. Choteau Volunteer Fire equipment. 137
Table 4.4. Wildfire risk rating surrounding individual critical infrastructure components in Teton County. 141
Table 5.1. WUI Action Items in Safety and Policy. 153
Table 5.2. WUI Action Items for People and Structures. 157
Table 5.3. Infrastructure Enhancements. 161
Table 5.4. WUI Action Items in Fire Fighting Resources and Capabilities. 163
Table 6.1. List of Preparers 170

6.2 Table of Figures

Figure 1.1. Newspaper article announcing planning process. 14
Figure 2.1. Public meeting slideshow overview. 31
Figure 3.1. Topographic relief of Teton County, Montana. 39
Figure 3.2. Land Ownership in Teton County. 40
Figure 3.3. Rural and City Fire Protection in Teton County. 41
Figure 3.4 Teton County Population Trends from 1970 – 2000. 44
Figure 3.5 Population per square mile in Teton County. 44
Figure 3.6 Employment in Largest Growing Sectors. 47
Figure 3.7. Regional Wildfire Ignition and Extent Profile. 66
Figure 3.8. Fire Prone Landscapes in Teton County. 74
Figure 3.9. Wildland-Urban Interface of Teton County. 88

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
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Greg Bassler, M.S.	Northwest Management, Inc.	Roads Engineer, Timber Sale Layout & Harvest Manager
Dick Van Auken	Teton County Fire Warden	Teton County Fire
Entire Planning Committee		

6.4 Signature Pages

This **Teton County Wildfire Mitigation Plan** was developed in conjuntion with the **Hazards Mitigation Plan** and has been developed in cooperation and collaboration with the representatives of the following organizations, agencies, and individuals.

6.4.1.1 Representatives of Teton County Government

This Hazard Mitigation Plan and all of its components identified herein were adopted formally through a resolution of the Board of County Commissioners as of June 16, 2005, resolution number 2005-15, recorded in the official record of the Teton County Commissioners.

By: Arnie Gettel, Chairman Teton County Commissioner	7-13-05 Date
By: R.F. "Sam" Carlson Teton County Commissioner	7-13-05 Date
By: Joe Dellwo Teton County Commissioner	7/13/05 Date
By: James J. McDonald - *Foreman* Teton County Road Department	8-16-05 Date
By: Richard Van Auken Teton County Fire Warden Interim Coordinator, Teton County DES	7/12/05 Date

6.4.1.2 Representatives of City Government in Teton County

By: Dan Clark — Date 8/15/05 Mayor, City of Choteau	Adopted by Resolution of the City Resolution Number: 645 Adoption Date: 7/19/05
By: Lillian Alfson — Date 8/16/05 Mayor, Town of Fairfield	Adopted by Resolution of the Town Resolution Number: 229 Adoption Date: 8/10/05
By: Bob Goodell — Date 9/12/05 Mayor, Town of Dutton	Adopted by Resolution of the Town Resolution Number: 03/05 Adoption Date: 9/12/05

6.4.1.3 Representatives of Community Organizations, Federal, and State Agencies

These agencies and organizations collaborated and cooperated in the development of this plan.

By: — Date 9/14/05
Montana Department of Natural Resources and Conservation

By: Lesley W. Thompson — Date 9/19/05
Lewis and Clark National Forest

By: June Bailey — Date 9/20/05
Bureau of Land Management

By: Mike Aderhold — Date 9/14/05
Montana Fish, Wildlife, and Parks

By: Sherwin Smith — Date 8/15/05
USDA Farm Services Agency

By: William E. Schlosser, Ph.D. — Date 9 June 2005
Project Manager-Teton County Hazard Mitigation Plan, Lead Author, Northwest Management, Inc.

6.4.1.4 Resolution of Adoption by Teton County Commissioners

TETON COUNTY RESOLUTION
#2005-15

A resolution of the Commissioners of Teton County declaring County support and adoption of the Teton County All Hazards Mitigation Plan, which includes the Wildland-Urban Interface Wildfire Mitigation Plan.

Whereas, The Board of Teton County Commissioners supports the Teton County All Hazards Mitigation Plan and the Wildland-Urban Interface Wildfire Mitigation Plan, and

Whereas, The Teton County All Hazards Mitigation Plan and the Wildland-Urban Interface Wildfire Mitigation 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 Teton County Commissioners,

Therefore be it resolved, that the Teton County Commissioners do hereby adopt and support the Teton County All Hazards Mitigation Plan and the Wildland-Urban Interface Wildfire Mitigation Plan

Passed and approved this 16th Day of June 2005

Board of County Commissioners
Teton County, Montana

Arnold Gettel

Arnold Gettel Commission Chairman

R. F. Sam Carlson

R. F. Sam Carlson, Commissioner

Joe Dellwo

Joe Dellwo, Commissioner

Attested by: Paula J. Jaconetty

Paula Jaconetty, Clerk & Recorder

6.4.1.5 Resolution of Adoption by Choteau City Council

RESOLUTION NO. 645

RESOLUTION DECLARING SUPPORT AND ADOPTION OF THE TETON COUNTY ALL HAZARDS MITIGATION PLAN, WHICH INCLUDES THE WILDLAND-URBAN INTERFACE WILDFIRE MITIGATION PLAN.

WHEREAS, the Choteau City Council supports the Teton County All Hazards Mitigation Plan and the Wildland-Urban Interface Wildfire Mitigation Plan; and

WHEREAS, the Teton County All Hazards Mitigation Plan and the Wildland-Urban Interface Wildfire Mitigation 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;

NOW, THEREFORE, BE IT RESOLVED that the Choteau City Council does hereby support and adopt the Teton County All Hazards Mitigation Plan and the Wildland-Urban Interface Wildfire Mitigation Plan.

PASSED AND APPROVED by the City Council of the City of Choteau, Montana, this 19th day of July, 2005.

Daniel W. Clark

DANIEL W. CLARK
Mayor of the City of Choteau

ATTESTATION:-

Leona C Huidekoper

LEONA C. HUIDEKOPER
Finance Officer
City of Choteau

(SEAL)

Member Martin moved and Member Vandolah seconded the Motion and the following voted in favor thereof: Corlene Martin, Pete Rasmussen, Larry Renteria, Doug Vandolah

and the following voted against the same: None

Absent: None

STATE OF MONTANA)
: ss.
County of Teton)

LEONA C. HUIDEKOPER, Finance Officer of the City of Choteau, Montana hereby certifies that the foregoing Resolution No. 645 was read, passed and approved by the City Council of the City of Choteau, Montana, at a regular meeting thereof held on the 19th day of July, 2005.

Leona C. Huidekoper
LEONA C. HUIDEKOPER
Finance Officer
City of Choteau

(SEAL)

SUBSCRIBED AND SWORN TO before me this 19 day of July, 2005.

Linda O'Loughlin
Notary Public for the State of Montana
(Printed Name) Linda O'Loughlin
Residing in Choteau, Montana
My Commission expires 3-10-2006

(NOTARIAL SEAL)

6.4.1.6 Resolution of Adoption by Fairfield City Council

TOWN OF FAIRFIELD
ALL HAZARDS MITIGATION PLAN
RESOLUTION NO. 229

A resolution of the Town Council of Fairfield, Teton County, declaring Town support and adoption of the Teton County All Hazards Mitigation Plan, which includes the Wildland-Urban Interface Wildfire Mitigation Plan.

Whereas, The Town Council of Fairfield supports the Teton County All Hazards Mitigation Plan and the Wildland-Urban Interface Wildfire Mitigation Plan, and

Whereas, the Teton County All Hazards Mitigation Plan and the Wildland-Urban Interface Wildfire Mitigation 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 Teton County Commissioners,

Therefore be it resolved, that the Town of Fairfield does hereby adopt and support the Teton County All Hazards Mitigation Plan and the Wildland-Urban Interface Wildfire Mitigation Plan

Passed and approved this 10th day of August, 2005.

Ayes: 3 Nays: ______ 1 absent

Town of Fairfield

Lillian I. Alfson

Lillian I. Alfson, Mayor

(SEAL)

Attested by: Tia N. Taylor

Tia N. Taylor, Clerk-Treasurer

6.4.1.7 Resolution of Adoption Dutton City Council

TOWN OF DUTTON
ALL HAZARDS MITIGATION PLAN
RESOLUTION # 03/05

A resolution of the Town Council of Dutton declaring Town support and adoption of the Teton County All Hazards Mitigation Plan, which includes the Wildland-Urban Interface Wildfire Mitigation Plan.

Whereas, The Board Town Council of Dutton supports the Teton County All Hazards Mitigation Plan and the Wildland-Urban Interface Wildfire Mitigation Plan, and

Whereas, The Teton County All Hazards Mitigation Plan and the Wildland-Urban Interface Wildfire Mitigation 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 Teton County Commissioners,

Therefore be it resolved, that the Town of Dutton does hereby adopt and support the Teton County All Hazards Mitigation Plan and the Wildland-Urban Interface Wildfire Mitigation Plan

Passed and approved this 12th Day of September 2005

Town of Dutton

Robert C Goodell

Robert Goodell, Mayor

Attested by: Jean L Schoonover

JEAN L. SCHOONOVER, CLERK

Glossary of Terms

Anadromous - Fish species that hatch in fresh water, migrate to the ocean, mature there, and return to fresh water to reproduce (Salmon & Steelhead).

Appropriate Management Response - Specific actions taken in response to a wildland fire to implement protection and fire use objectives.

Biological Assessment - Information document prepared by or under the direction of the Federal agency in compliance with U.S. Fish and Wildlife standards. The document analyzes potential effects of the proposed action on listed and proposed threatened and endangered species and proposed critical habitat that may be present in the action area.

Backfiring - When attack is indirect, intentionally setting fire to fuels inside the control line to contain a rapidly spreading fire. Backfiring provides a wide defense perimeter, and may be further employed to change the force of the convection column.

Blackline - Denotes a condition where the fireline has been established by removal of vegetation by burning.

Burning Out - When attack is direct, intentionally setting fire to fuels inside the control line to strengthen the line. Burning out is almost always done by the crew boss as a part of line construction; the control line is considered incomplete unless there is no fuel between the fire and the line.

Canyon Grassland - Ecological community in which the prevailing or characteristic plants are grasses and similar plants extending from the canyon rim to the rivers edge.

Confine - Confinement is the strategy employed in appropriate management responses where a fire perimeter is managed by a combination of direct and indirect actions and use of natural topographic features, fuel, and weather factors.

Contingency Plans: Provides for the timely recognition of approaching critical fire situations and for timely decisions establishing priorities to resolve those situations.

Control Line - An inclusive term for all constructed or natural fire barriers and treated fire edge used to control a fire.

Crew - An organized group of firefighters under the leadership of a crew boss or other designated official.

Crown Fire - A fire that advances from top to top of trees or shrubs more or less independently of the surface fire. Sometimes crown fires are classed as either running or dependent, to distinguish the degree of independence from the surface fire.

Disturbance - An event which affects the successional development of a plant community (examples: fire, insects, windthrow, timber harvest).

Disturbed Grassland - Grassland dominated by noxious weeds and other exotic species. Greater than 30% exotic cover.

Diversity - The relative distribution and abundance of different plant and animal communities and species within an area.

Drainage Order - Systematic ordering of the net work of stream branches, (e.g., each non-branching channel segment is designated a first order stream, streams which only receive first order segments are termed second order streams).

Duff - The partially decomposed organic material of the forest floor beneath the litter of freshly fallen twigs, needles, and leaves.

Ecosystem - An interacting system of interdependent organisms and the physical set of conditions upon which they are dependent and by which they are influenced.

Ecosystem Stability - The ability of the ecosystem to maintain or return to its steady state after an external interference.

Ecotone - The area influenced by the transition between plant communities or between successional stages or vegetative conditions within a plant community.

Energy Release Component - The Energy Release Component is defined as the potential available energy per square foot of flaming fire at the head of the fire and is expressed in units of BTUs per square foot.

Equivalent Clearcut Area (ECA) - An indicator of watershed condition, which is calculated from the total amount of crown removal that has occurred from harvesting, road building, and other activities based on the current state of vegetative recovery.

Exotic Plant Species - Plant species that are introduced and not native to the area.

Fire Adapted Ecosystem - An arrangement of populations that have made long-term genetic changes in response to the presence of fire in the environment.

Fire Behavior - The manner in which a fire reacts to the influences of fuel, weather, and topography.

Fire Behavior Forecast - Fire behavior predictions prepared for each shift by a fire behavior analysis to meet planning needs of fire overhead organization. The forecast interprets fire calculations made, describes expected fire behavior by areas of the fire, with special emphasis on personnel safety, and identifies hazards due to fire for ground and aircraft activities.

Fire Behavior Prediction Model - A set of mathematical equations that can be used to predict certain aspects of fire behavior when provided with an assessment of fuel and environmental conditions.

Fire Danger - A general term used to express an assessment of fixed and variable factors such as fire risk, fuels, weather, and topography which influence whether fires will start, spread, and do damage; also the degree of control difficulty to be expected.

Fire Ecology - The scientific study of fire's effects on the environment, the interrelationships of plants, and the animals that live in such habitats.

Fire Exclusion - The disruption of a characteristic pattern of fire intensity and occurrence (primarily through fire suppression).

Fire Intensity Level - The rate of heat release (BTU/second) per unit of fire front. Four foot flame lengths or less are generally associated with low intensity burns and four to six foot flame lengths generally correspond to "moderate" intensity fire effects. High intensity flame lengths are usually greater than eight feet and pose multiple control problems.

Fire Prone Landscapes – The expression of an area's propensity to burn in a wildfire based on common denominators such as plant cover type, canopy closure, aspect, slope, road density, stream density, wind patterns, position on the hillside, and other factors.

Fireline - A loose term for any cleared strip used in control of a fire. That portion of a control line from which flammable materials have been removed by scraping or digging down to the mineral soil.

Fire Management - The integration of fire protection, prescribed fire and fire ecology into land use planning, administration, decision making, and other land management activities.

Fire Management Plan (FMP) - A strategic plan that defines a program to manage wildland and prescribed fires and documents the fire management program in the approved land use plan. This plan is supplemented by operational procedures such as preparedness, preplanned dispatch, burn plans, and prevention. The fire implementation schedule that documents the fire management program in the approved forest plan alternative.

Fire Management Unit (FMU) - Any land management area definable by objectives, topographic features, access, values-to-be-protected, political boundaries, fuel types, or major fire regimes, etc., that set it apart from management characteristics of an adjacent unit. FMU's are delineated in FMP's. These units may have dominant management objectives and preselected strategies assigned to accomplish these objectives.

Fire Occurrence - The number of wildland fires started in a given area over a given period of time. (Usually expressed as number per million acres.)

Fire Prevention - An active program in conjunction with other agencies to protect human life, prevent modification, of the ecosystem by human-caused wildfires, and prevent damage to cultural resources or physical facilities. Activities directed at reducing fire occurrence, including public education, law enforcement, personal contact, and reduction of fire risks and hazards.

Fire Regime - The fire pattern across the landscape, characterized by occurrence interval and relative intensity. Fire regimes result from a unique combination of climate and vegetation. Fire regimes exist on a continuum from short-interval, low-intensity (stand maintenance) fires to long-interval, high-intensity (stand replacement) fires.

Fire Retardant - Any substance that by chemical or physical action reduces flareability of combustibles.

Fire Return Interval - The number of years between two successive fires documented in a designated area.

Fire Risk - The potential that a wildfire will start and spread rapidly as determined by the presence and activities of causative agents.

Fire Severity - The effects of fire on resources displayed in terms of benefit or loss.

Foothills Grassland - Grass and forb co-dominated dry meadows and ridges. Principle habitat type series: bluebunch wheatgrass and Idaho fescue.

Fuel - The materials which are burned in a fire; duff, litter, grass, dead branchwood, snags, logs, etc.

Fuel Break - A natural or manmade change in fuel characteristics which affects fire behavior so that fires burning into them can be more readily controlled.

Fuel Loading - Amount of dead fuel present on a particular site at a given time; the percentage of it available for combustion changes with the season.

Fuel Model - Characterization of the different types of wildland fuels (trees, brush, grass, etc.) and their arrangement, used to predict fire behavior.

Fuel Type - An identifiable association of fuel elements of distinctive species; form, size, arrangement, or other characteristics, that will cause a predictable rate of fire spread or difficulty of control, under specified weather conditions.

Fuels Management - Manipulation or reduction of fuels to meet protection and management objectives, while preserving and enhancing environmental quality.

Gap Analysis Program (GAP) - Regional assessments of the conservation status of native vertebrate species and natural land cover types and to facilitate the application of this information to land management activities. This is accomplished through the following five objectives:

1. Map the land cover of the United States
2. Map predicted distributions of vertebrate species for the U.S.
3. Document the representation of vertebrate species and land cover types in areas managed for the long-term maintenance of biodiversity
4. Provide this information to the public and those entities charged with land use research, policy, planning, and management
5. Build institutional cooperation in the application of this information to state and regional management activities

Habitat - A place that provides seasonal or year-round food, water, shelter, and other environmental conditions for an organism, community, or population of plants or animals.

Heavy Fuels - Fuels of a large diameter, such as snags, logs, and large limbwood, which ignite and are consumed more slowly than flash fuels.

Hydrologic Unit Code - A coding system developed by the U. S. Geological Service to identify geographic boundaries of watersheds of various sizes.

Hydrophobic - Resistance to wetting exhibited by some soils, also called water repellency. The phenomena may occur naturally or may be fire-induced. It may be determined by water drop penetration time, equilibrium liquid-contact angles, solid-air surface tension indices, or the characterization of dynamic wetting angles during infiltration.

Human-Caused Fires - Refers to fires ignited accidentally (from campfires or smoking) and by arsonists; does not include fires ignited intentionally by fire management personnel to fulfill approved, documented management objectives (prescribed fires).

Intensity - The rate of heat energy released during combustion per unit length of fire edge.

Inversion - Atmospheric condition in which temperature increases with altitude.

Ladder Fuels - Fuels which provide vertical continuity between strata, thereby allowing fire to carry from surface fuels into the crowns of trees or shrubs with relative ease. They help initiate and assure the continuation of crowning.

Landsat Imagery - Land remote sensing, the collection of data which can be processed into imagery of surface features of the Earth from an unclassified satellite or satellites.

Landscape - All the natural features such as grasslands, hills, forest, and water, which distinguish one part of the earth's surface from another part; usually that portion of land which the eye can comprehend in a single view, including all its natural characteristics.

Lethal - Relating to or causing death; extremely harmful.

Lethal Fires - A descriptor of fire response and effect in forested ecosystems of high-severity or severe fire that burns through the overstory and understory. These fires typically consume large woody surface fuels and may consume the entire duff layer, essentially destroying the stand.

Litter - The top layer of the forest floor composed of loose debris, including dead sticks, branches, twigs, and recently fallen leaves or needles, little altered in structure by decomposition.

Maximum Manageable Area - The boundary beyond which fire spread is completely unacceptable.

Metavolcanic - Volcanic rock that has undergone changes due to pressure and temperature.

Minimum Impact Suppression Strategy (MIST) - "Light on the Land." Use of minimum amount of forces necessary to effectively achieve the fire management protection objectives consistent with land and resource management objectives. It implies a greater sensitivity to the impacts of suppression tactics and their long-term effects when determining how to implement an appropriate suppression response.

Mitigation - Actions to avoid, minimize, reduce, eliminate, replace, or rectify the impact of a management practice.

Monitoring Team - Two or more individuals sent to a fire to observe, measure, and report its behavior, its effect on resources, and its adherence to or deviation from its prescription.

National Environmental Policy Act (NEPA) - This act declared a national policy to encourage productive and enjoyable harmony between humans and their environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and will stimulate the health and welfare of humankind; to enrich the understanding of important ecological systems and natural resources; and to establish a Council on Environmental Quality.

National Fire Management Analysis System (NFMAS) - The fire management analysis process, which provides input to forest planning and forest and regional fire program development and budgeting.

Native - Indigenous; living naturally within a given area.

Natural Ignition - A wildland fire ignited by a natural event such as lightning or volcanoes.

Noncommercial Thinning - Thinning by fire or mechanical methods of precommercial or commercial size timber, without recovering value, to meet MFP standards relating to the protection/enhancement of adjacent forest or other resource values.

Notice of Availability - A notice of Availability published in the Federal Register stating that an EIS has been prepared and is available for review and comment (for draft) and identifying where copies are available.

Notice of Intent - A notice of Intent published in the Federal Register stating that an EIS will be prepared and considered. This notice will describe the proposed action and possible alternatives, the proposed scoping process, and the name and address of whom to contact concerning questions about the proposed action and EIS.

Noxious Weeds - Rapidly spreading plants that have been designated "noxious" by law which can cause a variety of major ecological impacts to both agricultural and wild lands.

Planned Ignition - A wildland fire ignited by management actions to meet specific objectives.

Prescribed Fire - Any fire ignited by management actions to meet specific objectives. A written, approved prescribed fire plan must exist, and NEPA requirements must be met, prior to ignition.

Prescription - A set of measurable criteria that guides the selection of appropriate management strategies and actions. Prescription criteria may include safety, economic, public health, environmental, geographic, administrative, social, or legal considerations.

Programmatic Biological Assessment - Assesses the effects of the fire management programs on Federally listed species, not the individual projects that are implemented under these programs. A determination of effect on listed species is made for the programs, which is a valid assessment of the potential effects of the projects completed under these programs, if the projects are consistent with the design criteria and monitoring and reporting requirement contained in the project description and summaries.

Reburn - Subsequent burning of an area in which fire has previously burned but has left flareable light that ignites when burning conditions are more favorable.

Riparian Habitat Conservation Areas (RHCA) - Portions of watersheds where riparian-dependent resources receive primary emphasis, and management activities are subject to specific standards and guidelines. RHCAs include traditional riparian corridors, wetlands, intermittent headwater streams, and other areas where proper ecological functioning is crucial to maintenance of the stream's water, sediment, woody debris, and nutrient delivery systems.

Riparian Management Objectives (RMO) - Quantifiable measures of stream and streamside conditions that define good fish habitat and serve as indicators against which attainment or progress toward attainment of goals will be measured.

Road Density - The volume of roads in a given area (mile/square mile).

Scoping - Identifying at an early stage the significant environmental issues deserving of study and de-emphasizing insignificant issues, narrowing the scope of the environmental analysis accordingly.

Seral - Refers to the stages that plant communities go through during succession. Developmental stages have characteristic structure and plant species composition.

Serotinous - Storage of coniferous seeds in closed cones in the canopy of the tree. Serotinous cones of lodgepole pine do not open until subjected to temperatures of 113 to 122 degrees Fahrenheit causing the melting of the resin bond that seals the cone scales.

Stand Replacing Fire - A fire that kills most or all of a stand.

Sub-basin - A drainage area of approximately 800,000 to 1,000,000 acres, equivalent to a 4th -field Hydrologic Unit Code.

Surface Fire - Fire which moves through duff, litter, woody dead and down, and standing shrubs, as opposed to a crown fire.

Watershed - The region draining into a river, river system, or body of water.

Wetline - Denotes a condition where the fireline has been established by wetting down the vegetation.

Wildland Fire - Any nonstructure fire, other than prescribed fire, that occurs in the wildland.

Wildland Fire Implementation Plan (WFIP) - A progressively developed assessment and operational management plan that documents the analysis and selection of strategies and describes the appropriate management response for a wildland fire being managed for resource benefits. A full WFIP consists of three stages. Different levels of completion may occur for differing management strategies (i.e., fires managed for resource benefits will have two-three stages of the WFIP completed while some fires that receive a suppression response may only have a portion of Stage I completed).

Wildland Fire Situation Analysis (WFSA) - A decision making process that evaluates alternative management strategies against selected safety, environmental, social, economic, political, and resource management objectives.

Wildland Fire Use - The management of naturally ignited wildland fires to accomplish specific prestated resource management objectives in predefined geographic areas outlined in FMP's. Operational management is described in the WFIP. Wildland fire use is not to be confused with "fire use", which is a broader term encompassing more than just wildland fires.

Wildland Fire Use for Resource Benefit (WFURB) - A wildland fire ignited by a natural process (lightning), under specific conditions, relating to an acceptable range of fire behavior and managed to achieve specific resource objectives.

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Last Page of Document

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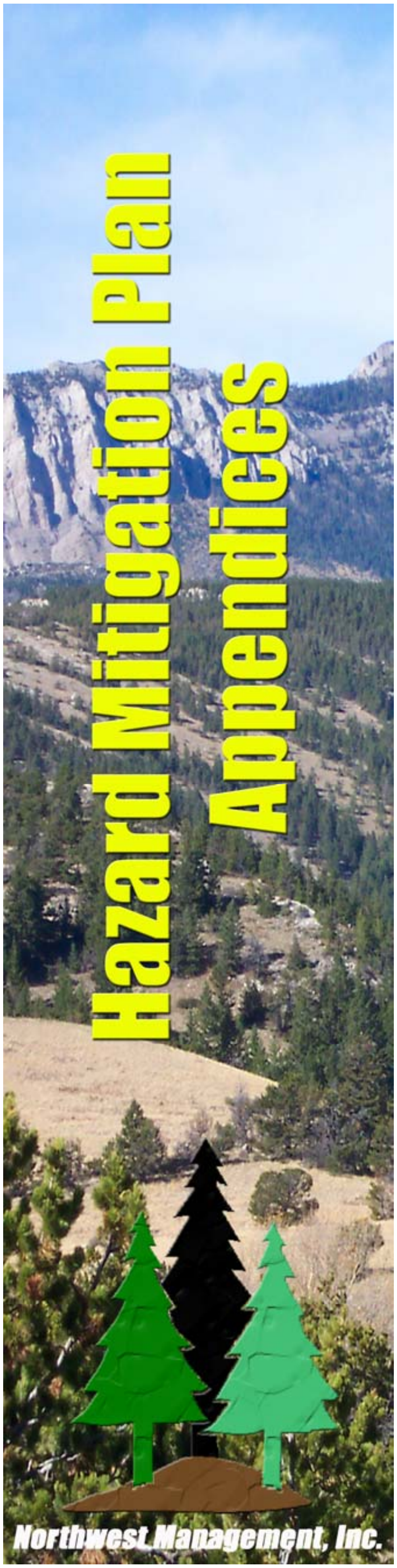


Teton County, Montana, Hazard Mitigation Plan

Volume III

Appendices

June 9, 2005

Fire Mitigation Plan Mission Statement

To make Teton County residents, communities, state agencies, local governments, and businesses less vulnerable to the negative effects of natural hazards through the effective administration of hazard mitigation grant programs, hazard risk assessments, wise and efficient 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.

Teton County, Montana

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

Table of Contents

Table of Contents i

APPENDIX I: MAPS 1

Map Legend 1
Shaded Elevation Relief of Teton County 2
Teton County Ownership Map 3
Fire Prone Landscapes in Teton County 4
Historic Fire Regime in Teton County 5
Fire Regime Condition Class in Teton County 6
Current (Predicted) Fire Severity in Teton County 7
Past Fires in Teton County 8
Fire Protection in Teton County 9
Wildland-Urban Interface as derived from structure density 10
Landslide Prone Landscapes in Teton County 11
FEMA Flood Zones in Teton County 12
FEMA Flood Zones near Arrowleaf 13
FEMA Flood Zones near Bynum 14
FEMA Flood Zones near Choteau 15
FEMA Flood Zones near Dutton & Collins 16
FEMA Flood Zones near Mortimer Gulch 17
FEMA Flood Zones near New Rockport Colony & Collins 18
Parcel Values within Choteau Flood Zone 19

APPENDIX II 20

Public Mail Survey 20

Public Letter #1 20
Public Letter #2 28
Public letter #3 29

APPENDIX III 31

TETON COUNTY FIRE SERVICES 31

APPENDIX IV 36

Potential Funding Sources 36

APPENDIX V 40

Training Programs 40

Research Programs 41

Private Foundations 41

APPENDIX VI 42

Forming a Not For Profit Fire Service Organization 42

Incorporation as a non-profit organization: 42

APPENDIX VII 43

Federal Fire Related Codes 43
Key Features of the 2001 Wildland Fire Policy: 43
Point 1 - Safety 43
Point 3 - Response to Wildland Fire 43
Point 6 - Protection Priorities 44
Point 7 – Wildland-Urban Interface 44
Point 14 - Interagency Cooperation 44
Organization 44

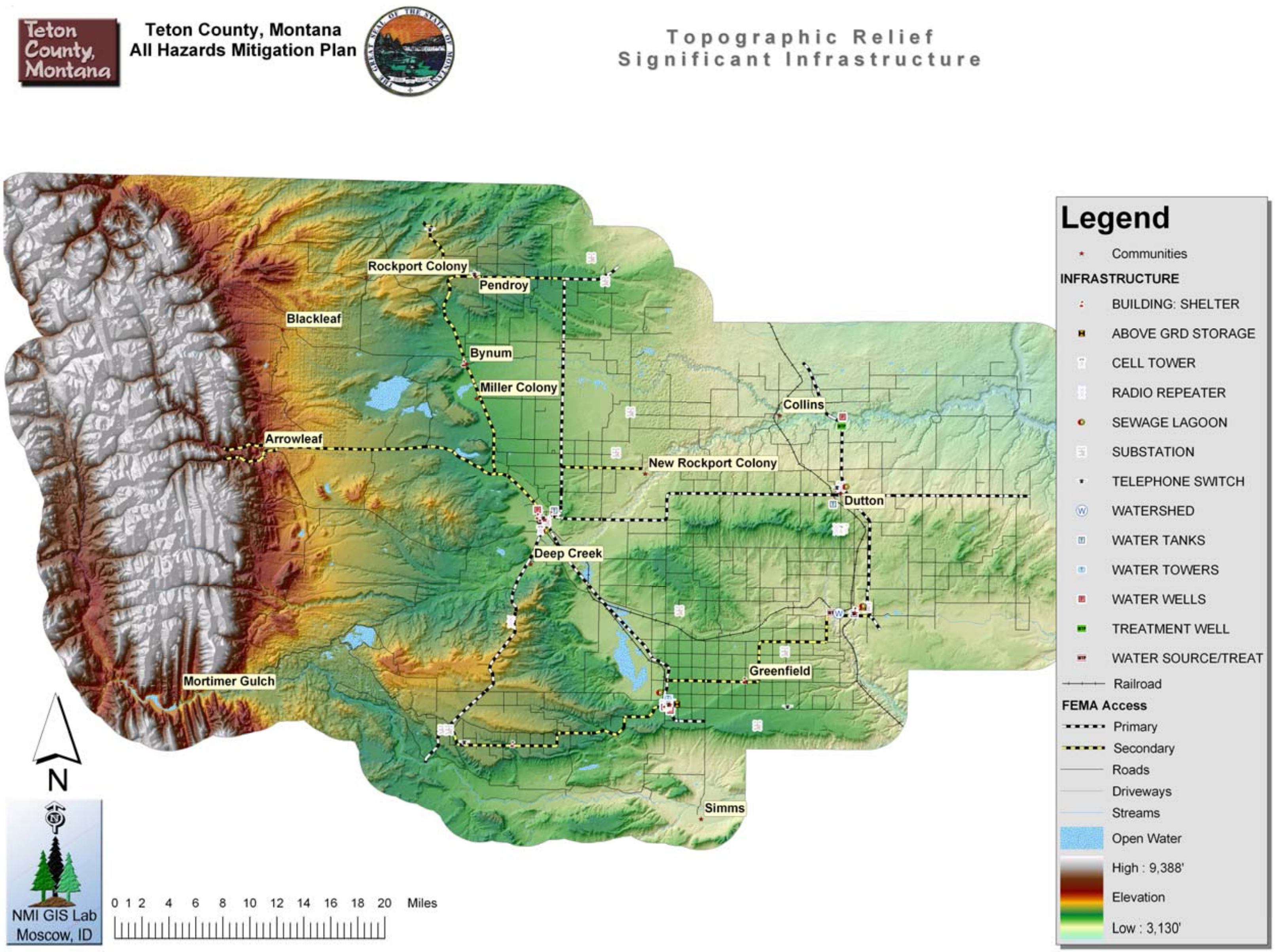
Appendix I: Maps

Map Legend

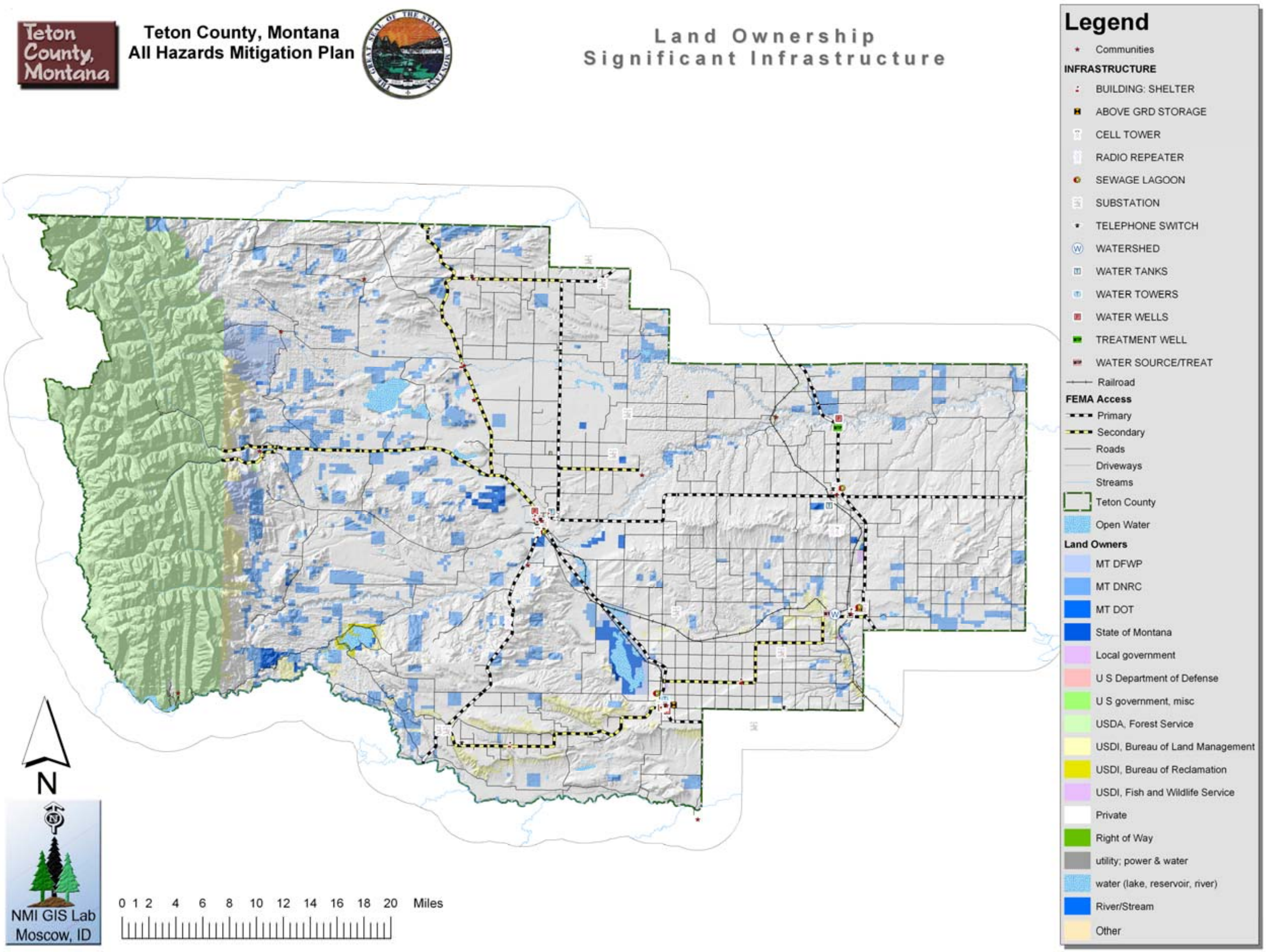
Northwest Management, Inc.
Geographical Information Systems Laboratory
233 East Palouse River Dr., P.O. Box 9748, Moscow, ID 83843 www.Consulting-Foresters.com

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.

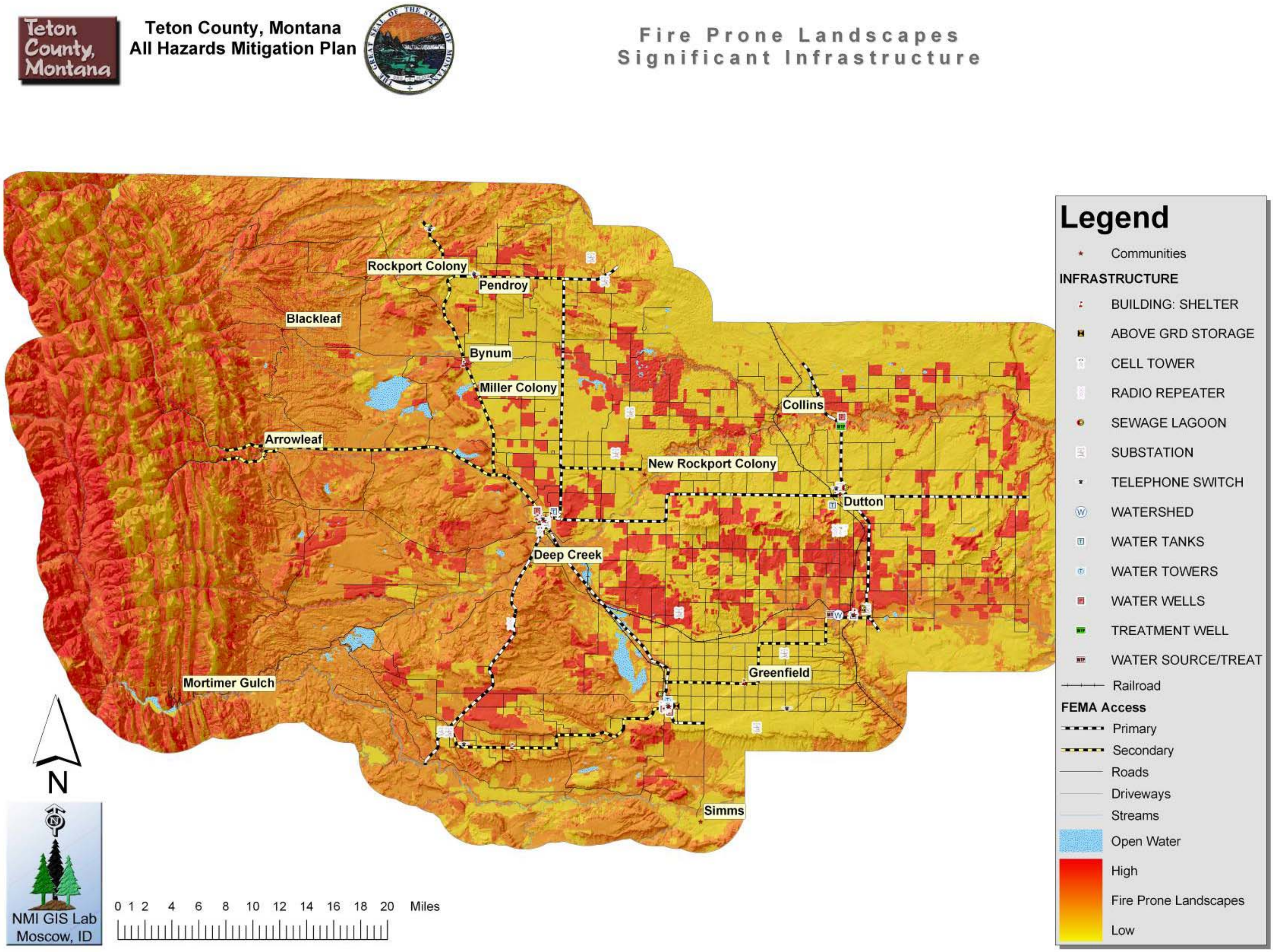
Shaded Elevation Relief of Teton County



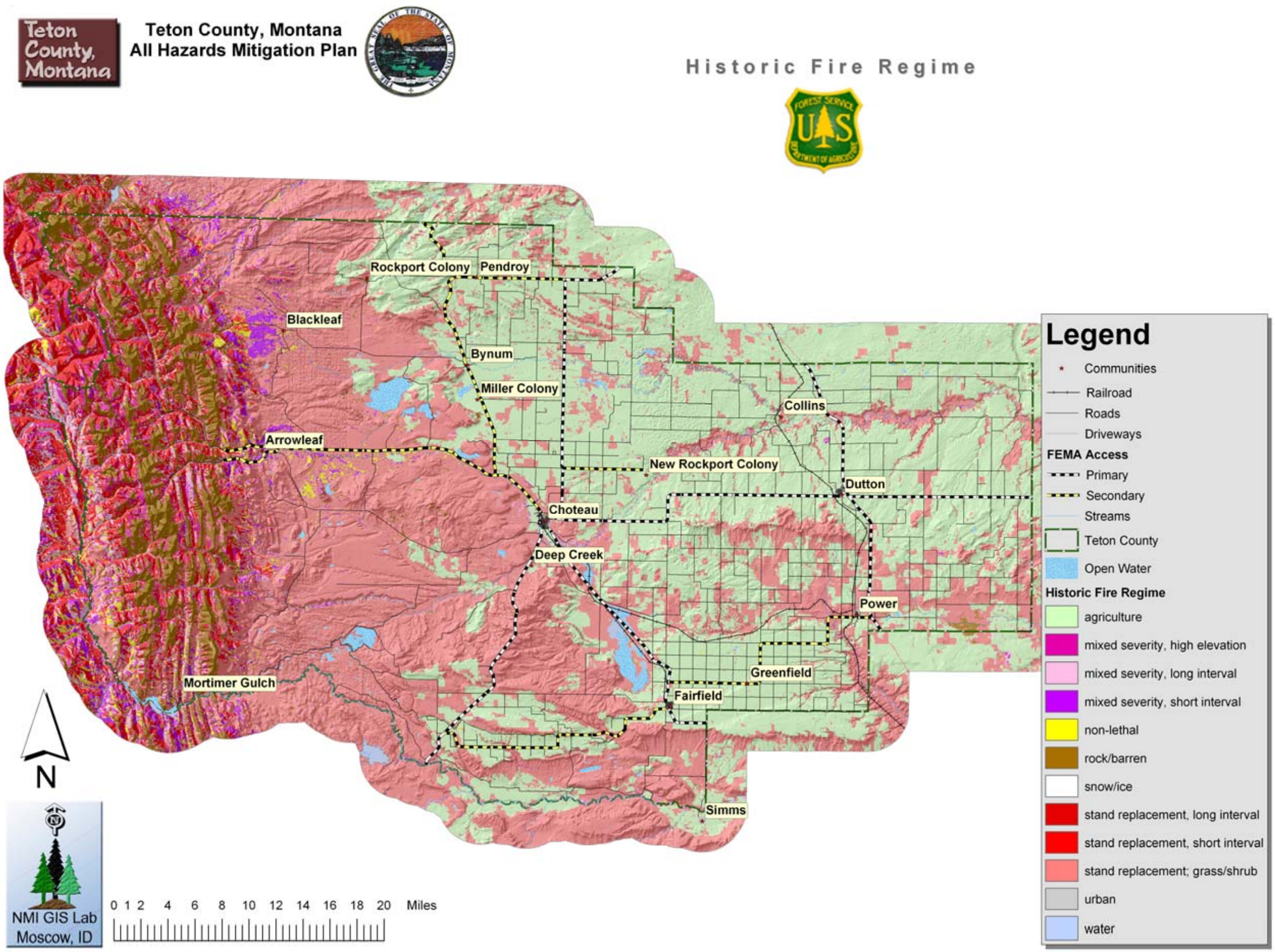
Teton County Ownership Map



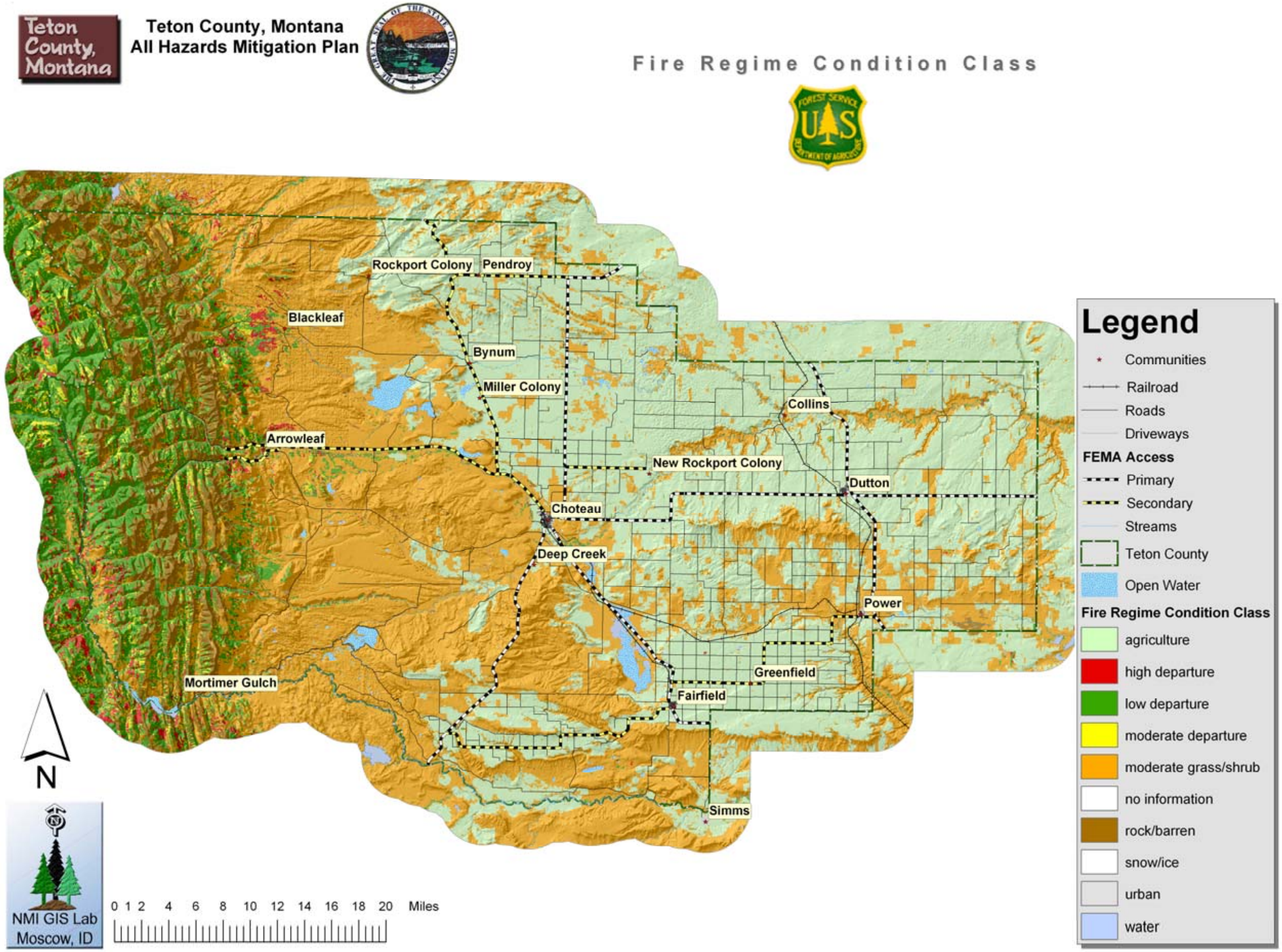
Fire Prone Landscapes in Teton County



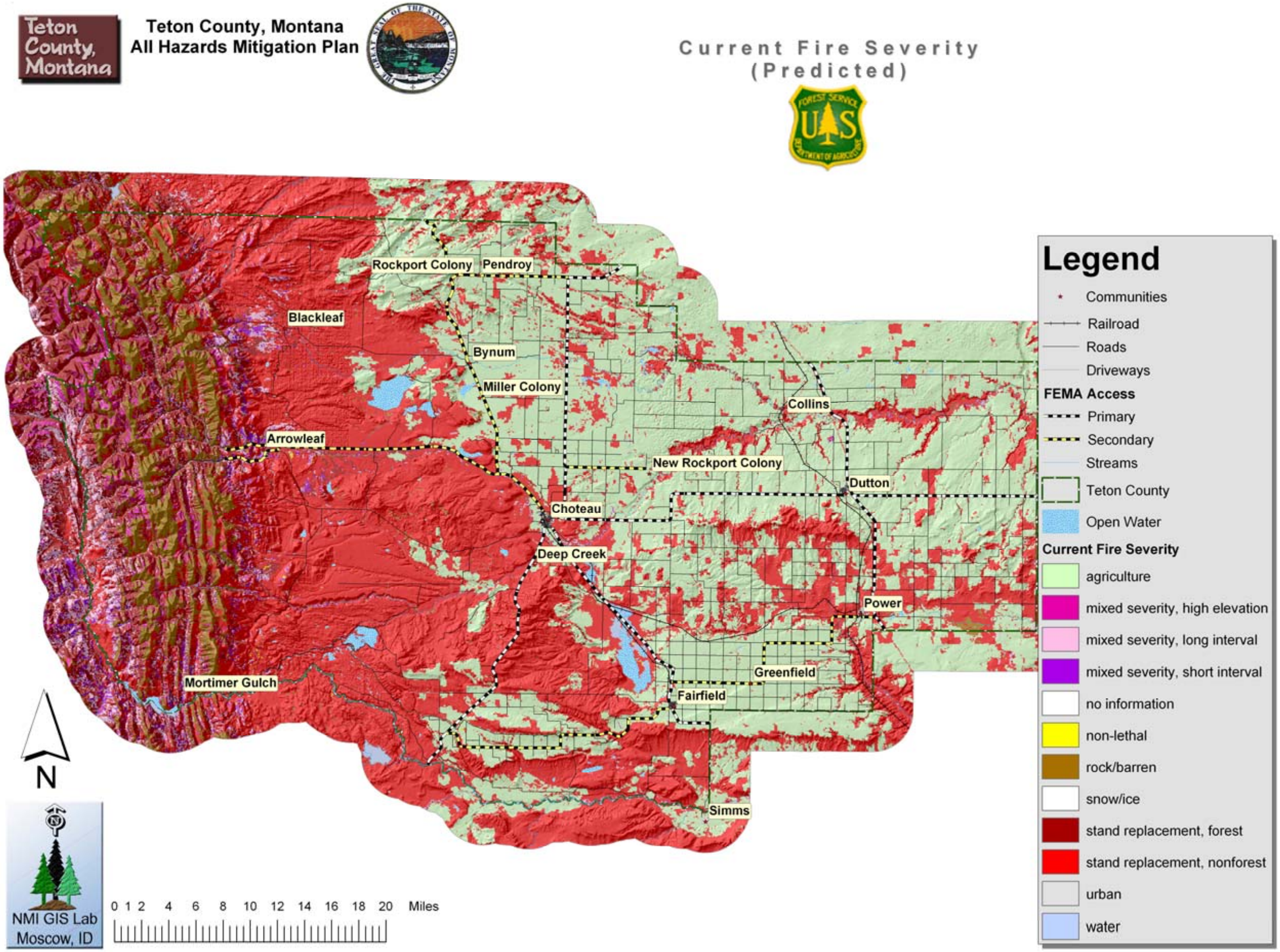
Historic Fire Regime in Teton County



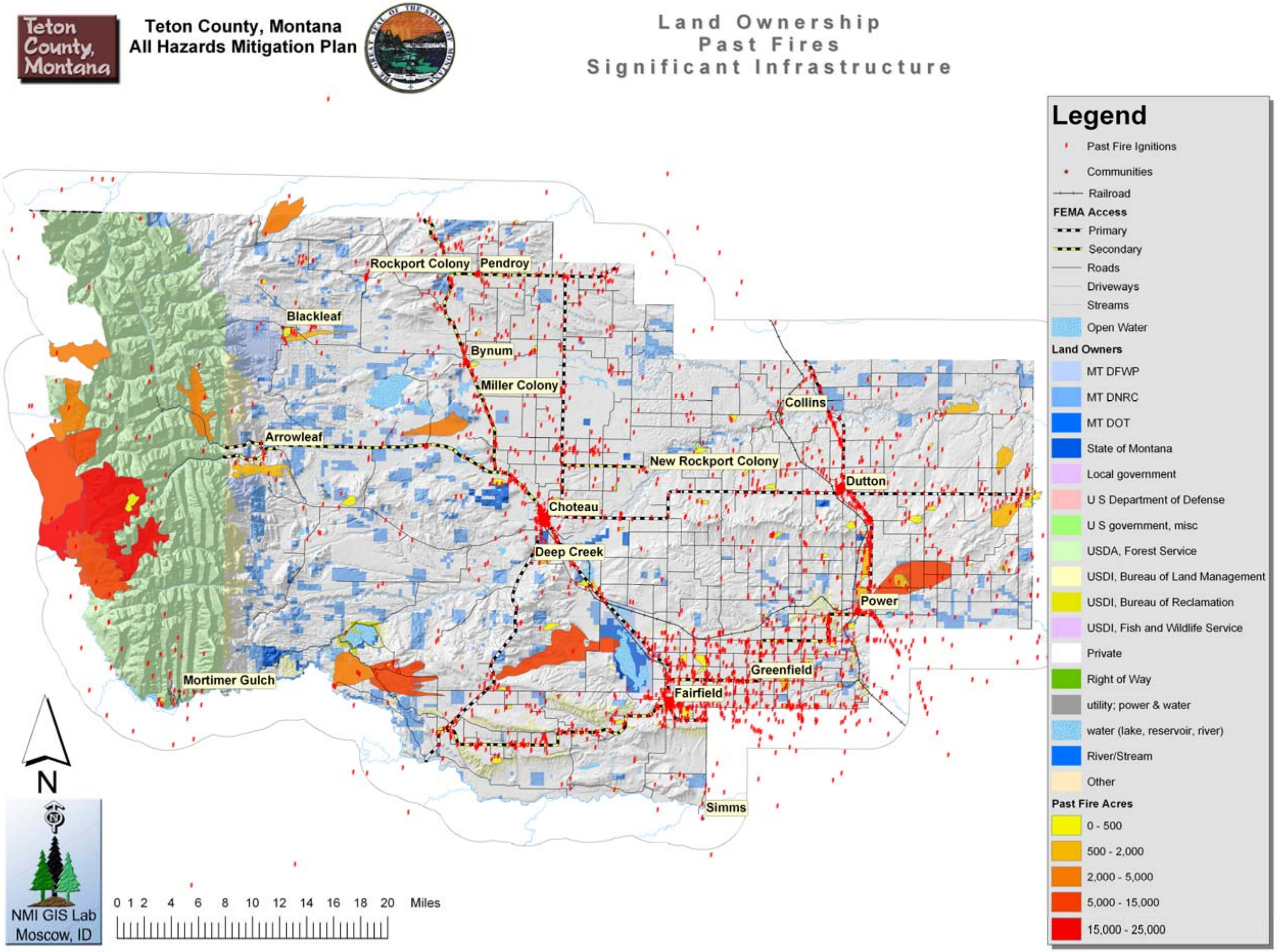
Fire Regime Condition Class in Teton County



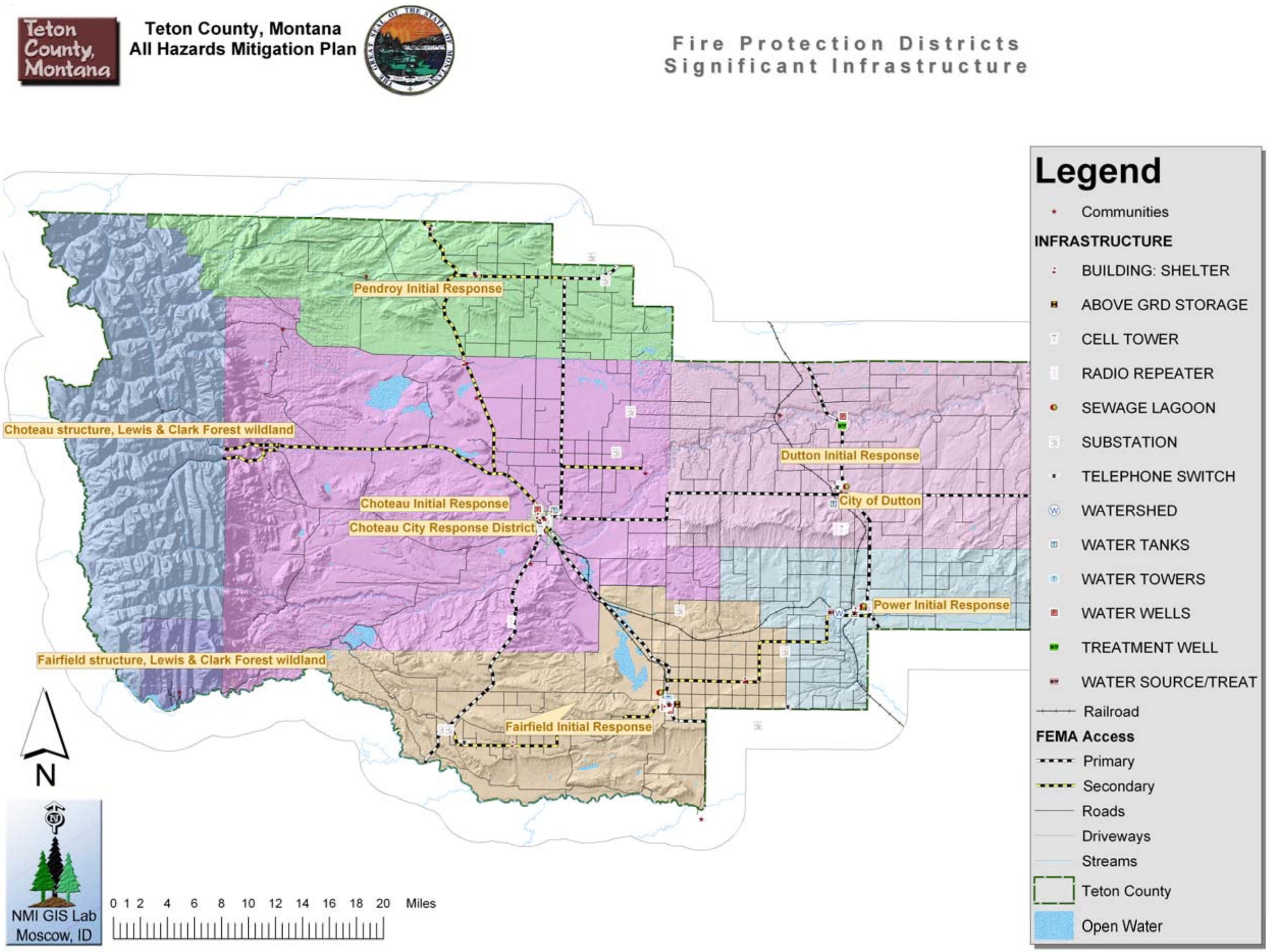
Current (Predicted) Fire Severity in Teton County



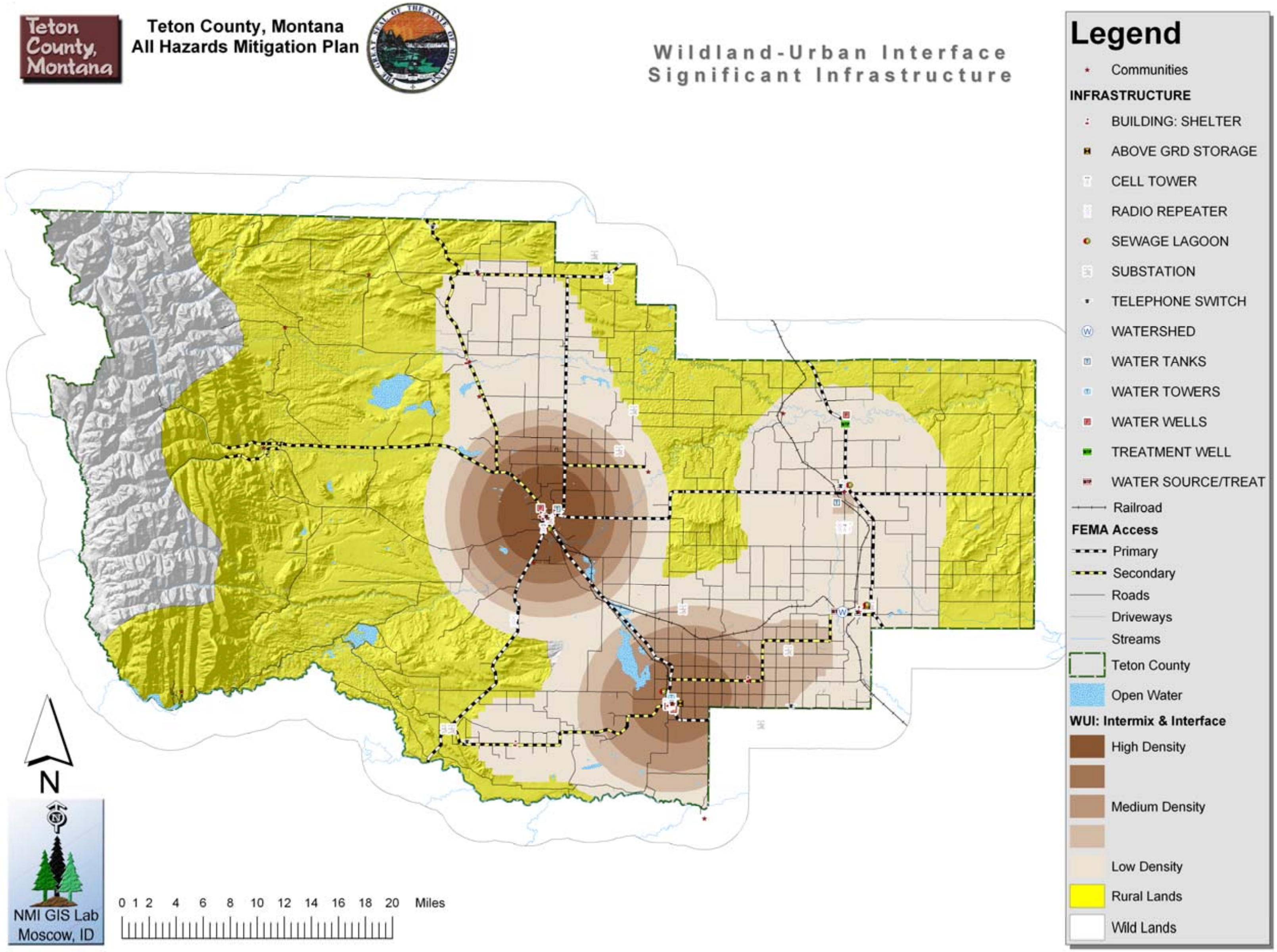
Past Fires in Teton County



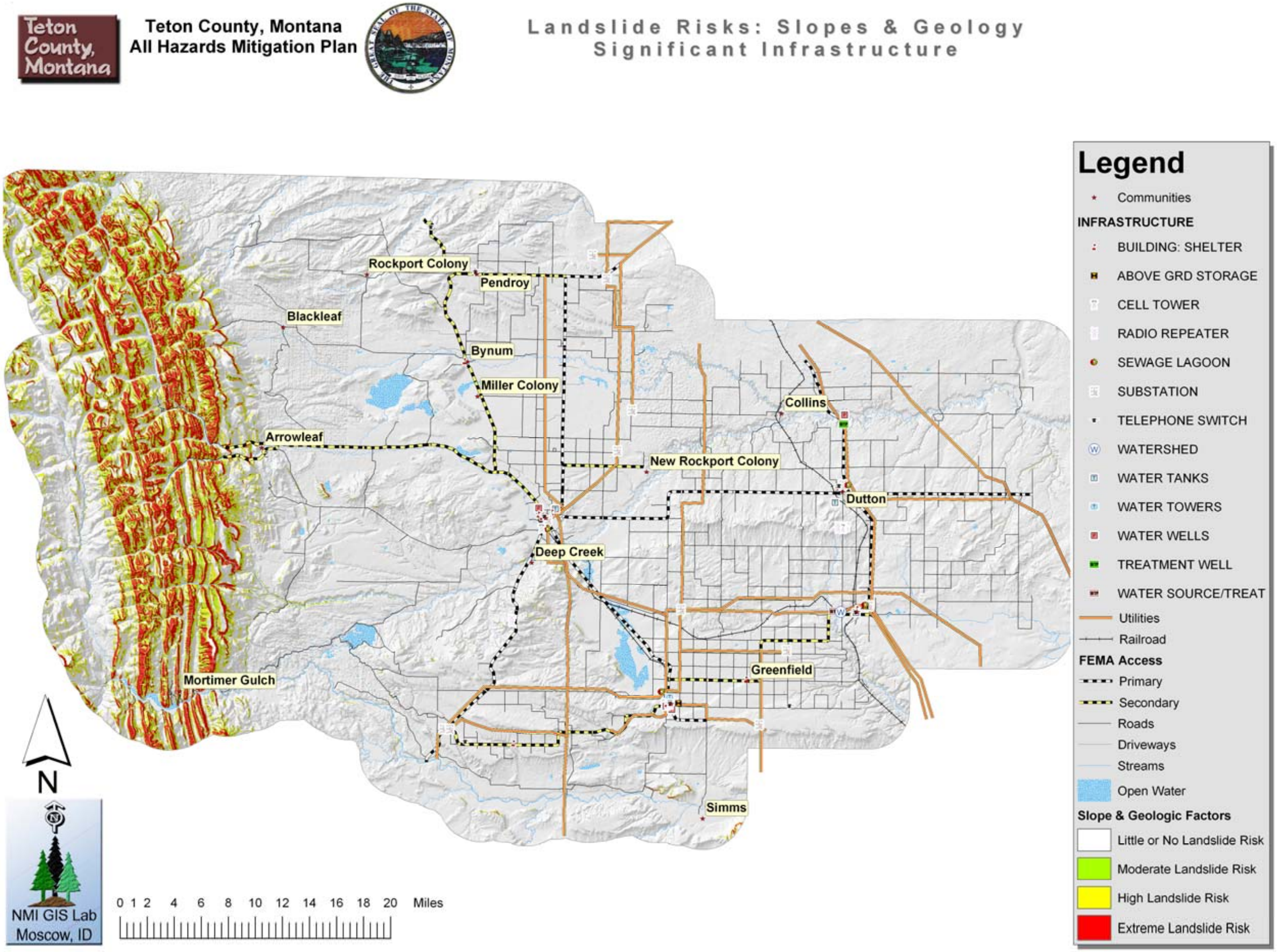
Fire Protection in Teton County



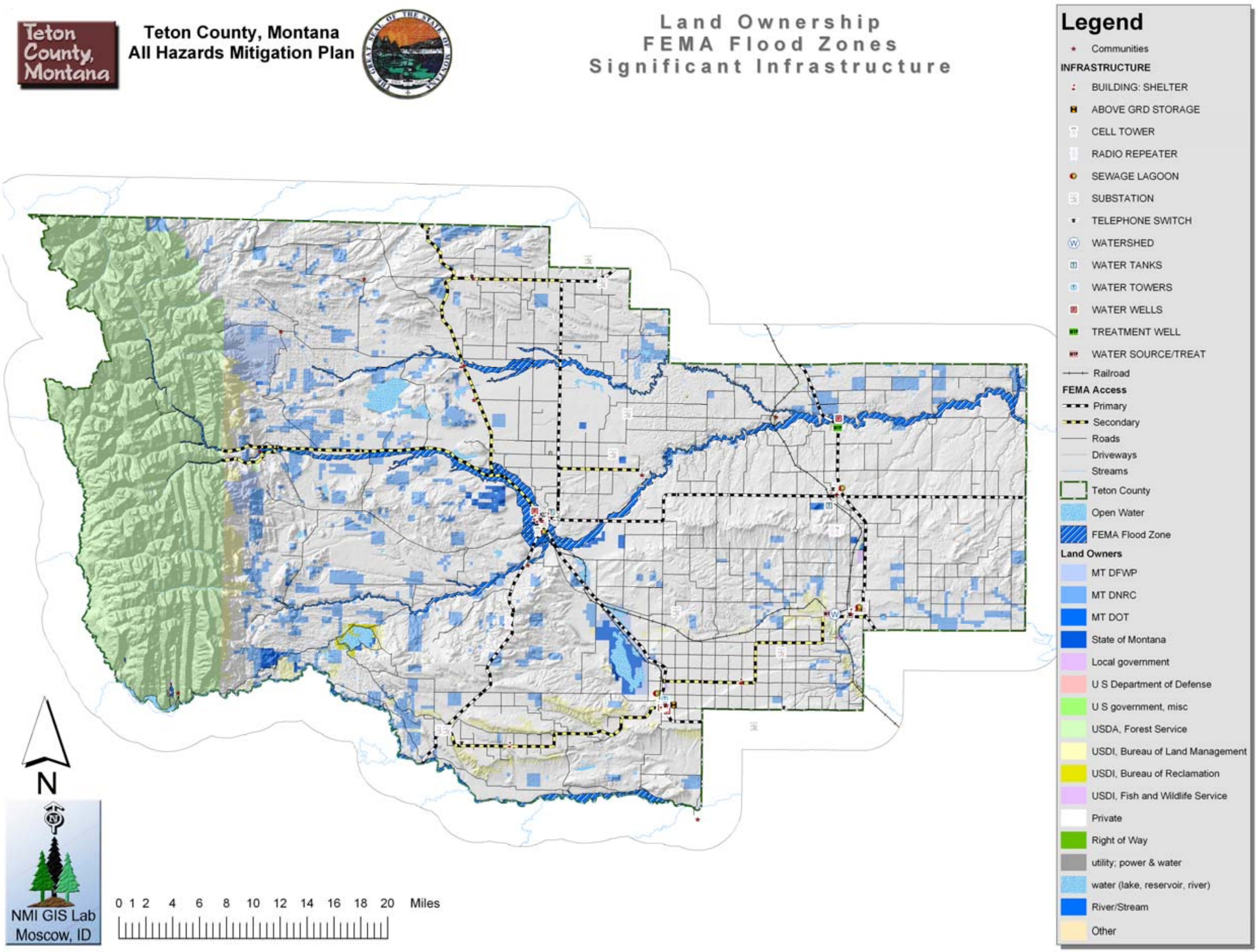
Wildland-Urban Interface as derived from structure density



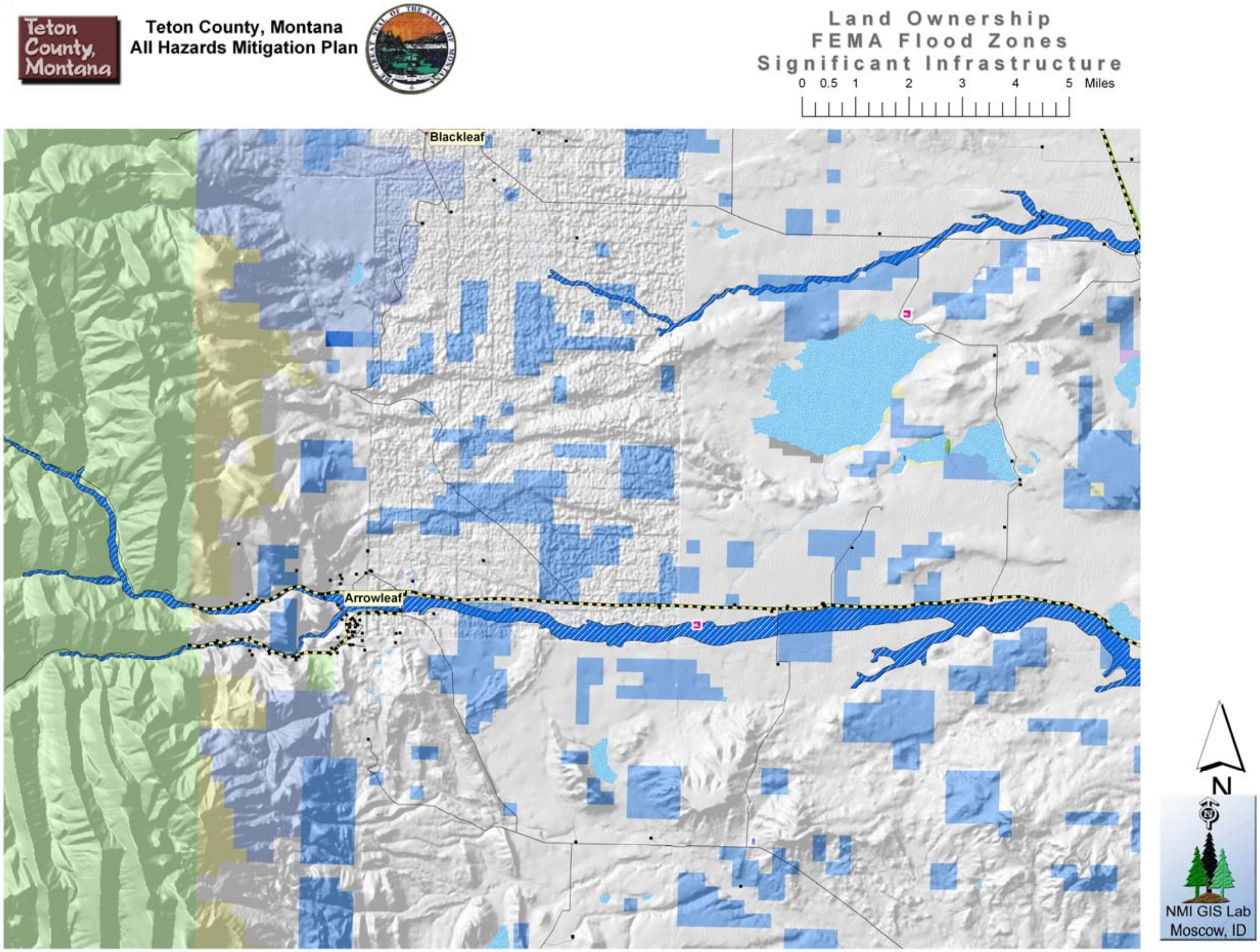
Landslide Prone Landscapes in Teton County



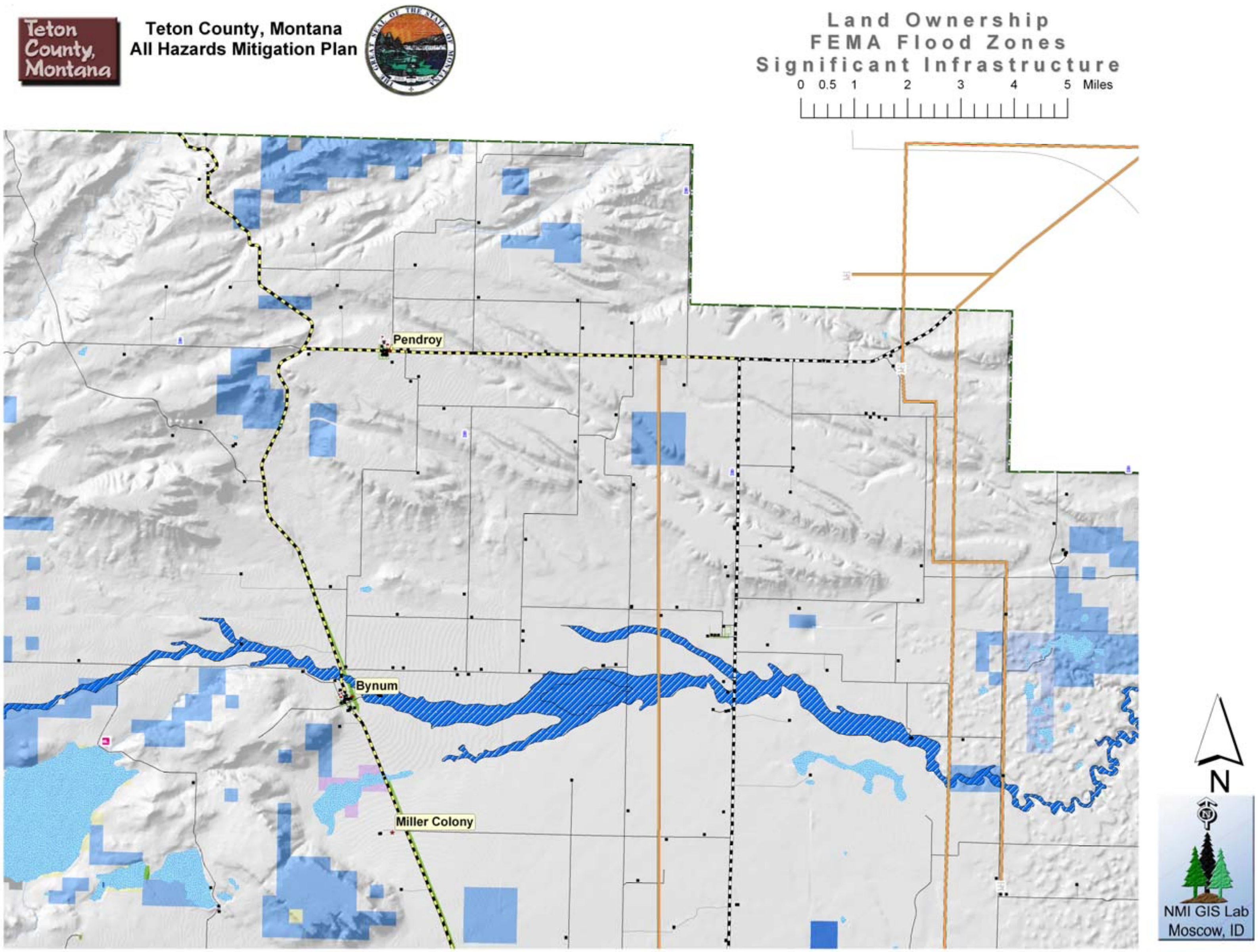
FEMA Flood Zones in Teton County



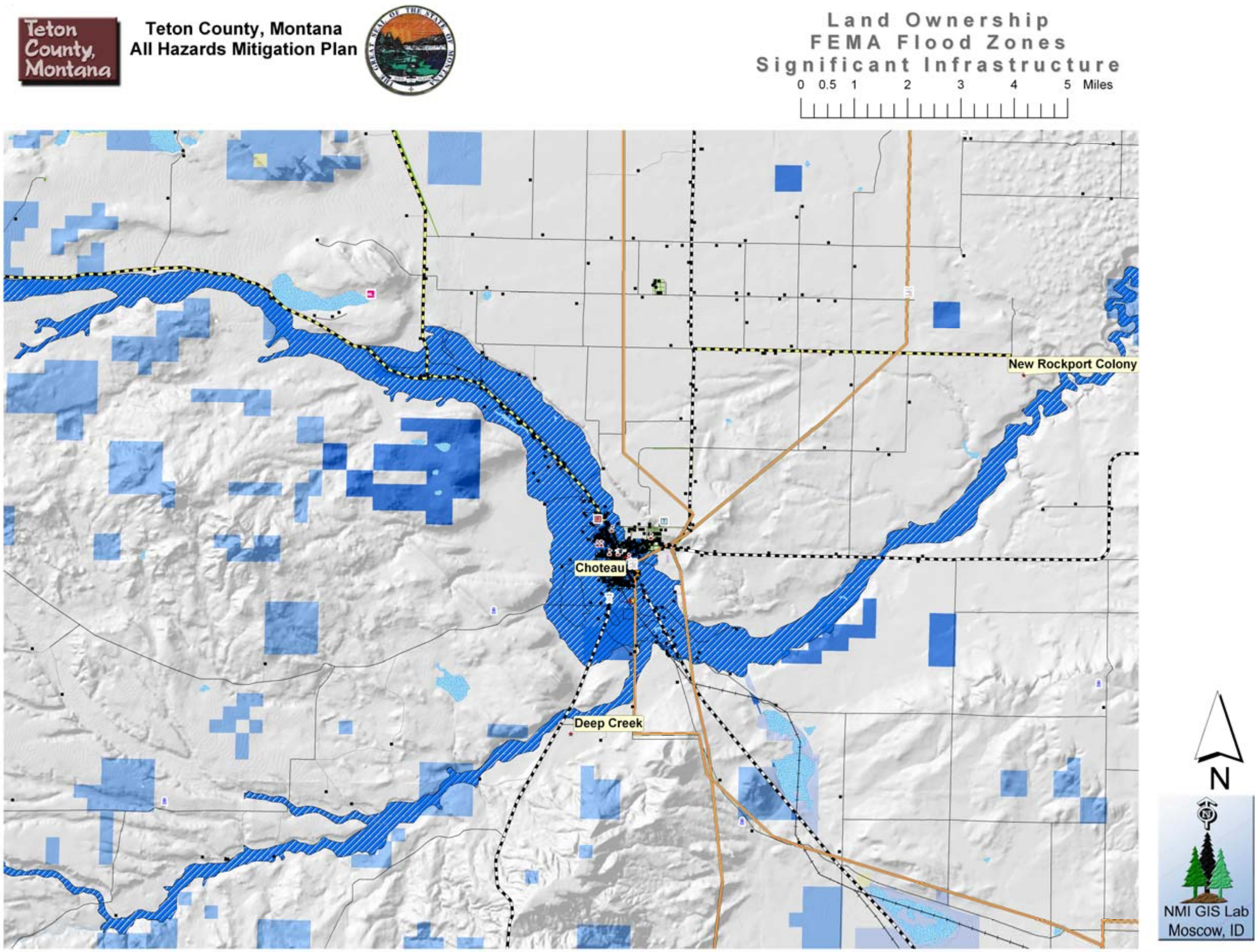
FEMA Flood Zones near Arrowleaf



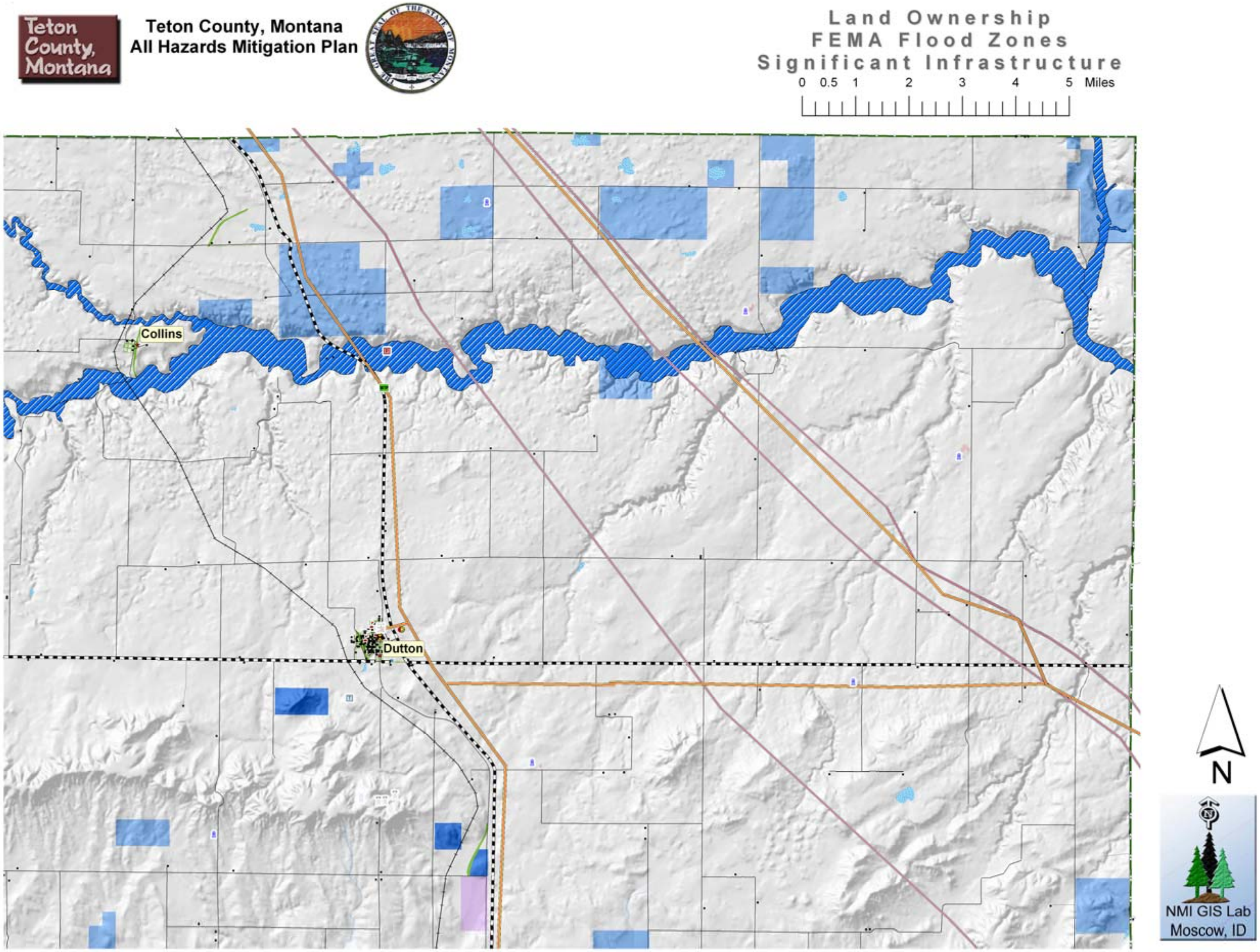
FEMA Flood Zones near Bynum



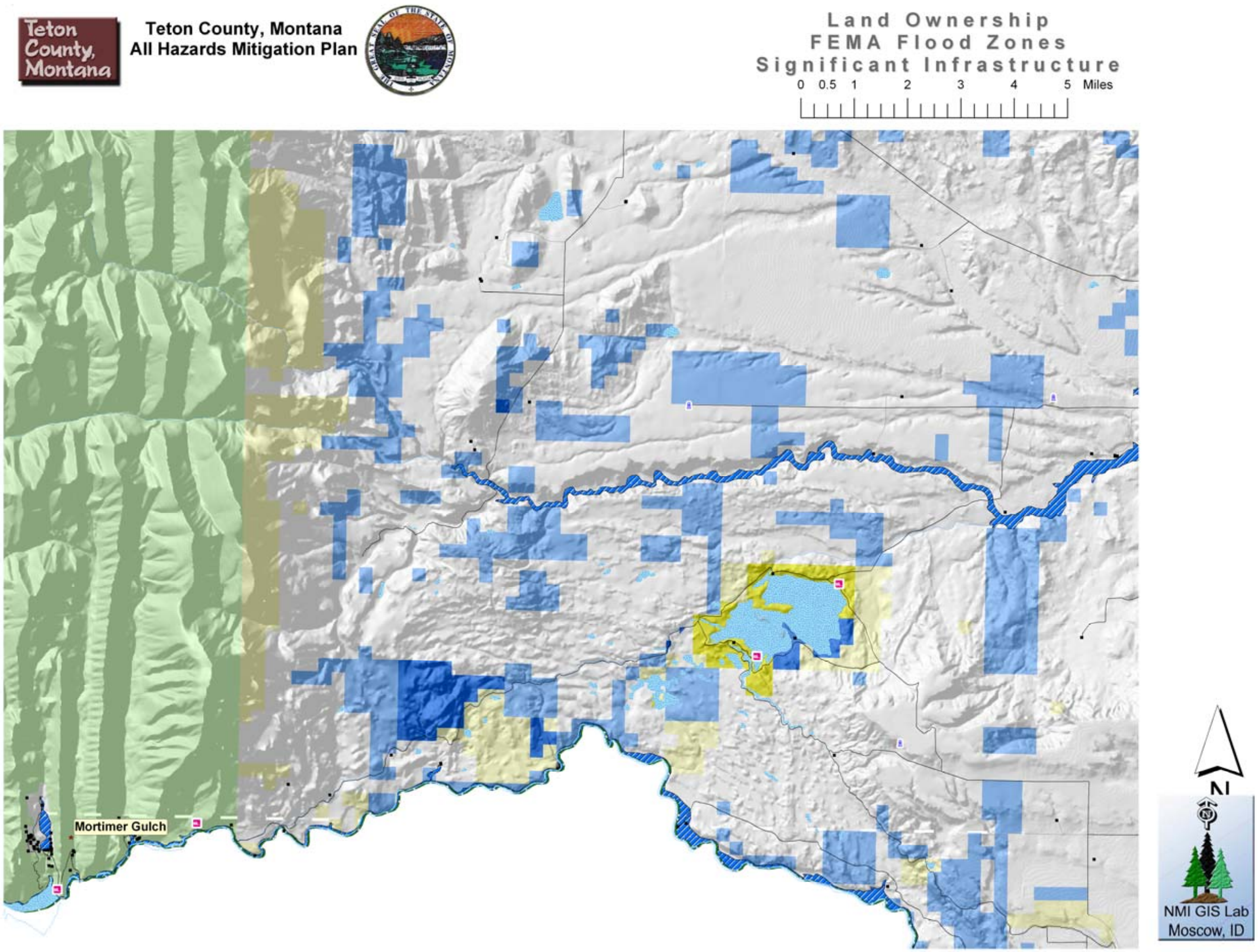
FEMA Flood Zones near Choteau



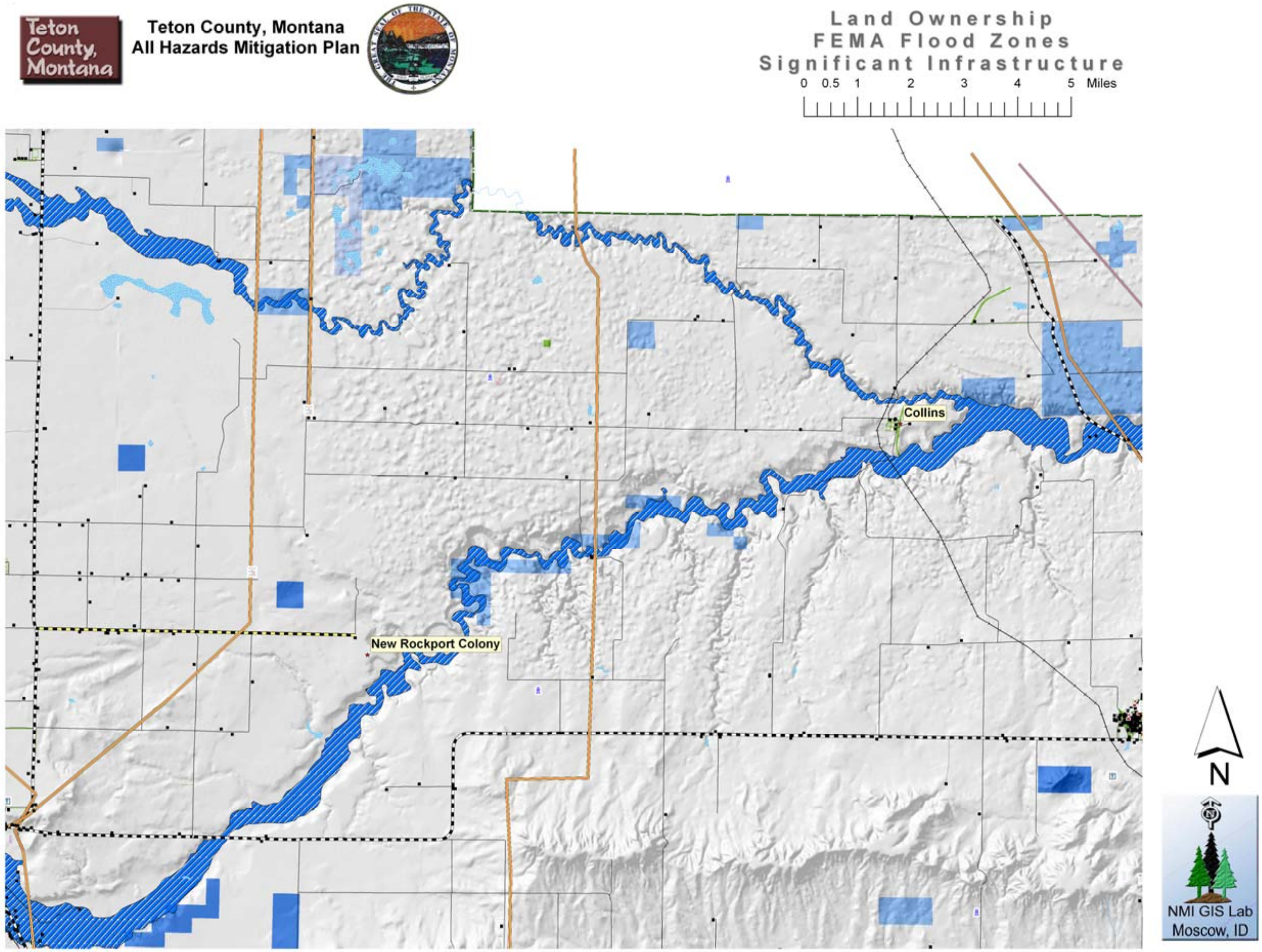
FEMA Flood Zones near Dutton & Collins



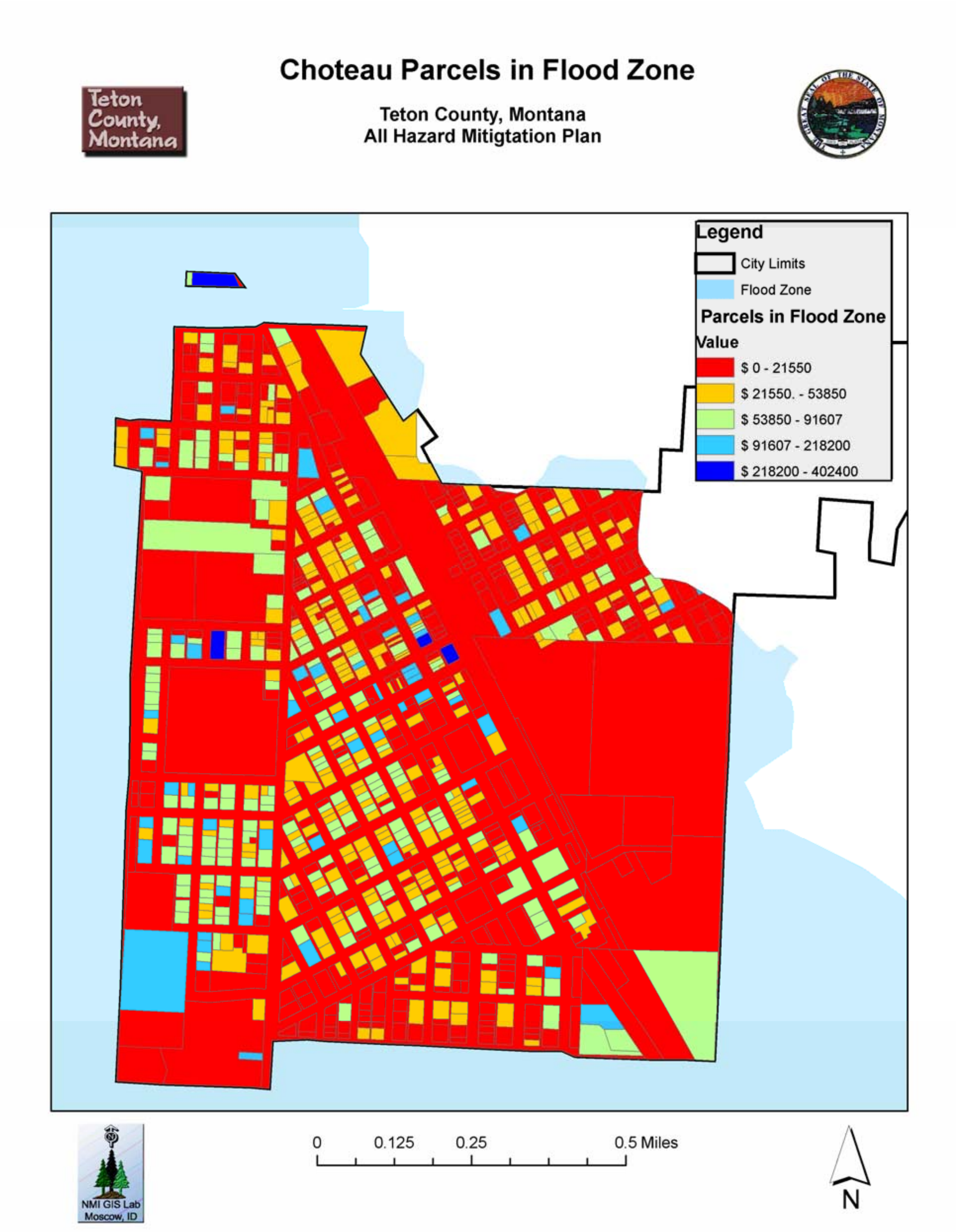
FEMA Flood Zones near Mortimer Gulch



FEMA Flood Zones near New Rockport Colony & Collins



Parcel Values within Choteau Flood Zone



Appendix II

Public Mail Survey

Public Letter #1

Northwest Management, Inc.

Natural Resources Management

P.O. Box 565
Helena, MT 59624
Phone: (406) 442-7555
www.Consulting-Foresters.com

Teton County Natural Hazards Mitigation Plan

November 5, 2004

Name

Address

City State Zip

Dear Teton County Landowner:

Thank you for taking some of your time to read and respond to this short inquiry. We are working with the Teton County Commissioners Office and a host of fire protection and disaster relief organizations in Teton County to develop a **Natural Hazards Mitigation Plan** in your area. As an individual who owns property in Teton 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. Floods, landslides, and severe weather have also taken a toll on Teton County's communities.

However, today we are doing more than watching for hazards, we are taking a proactive role in reducing casualty loss in our area. 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 natural hazard or human-caused hazard. 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 Teton 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 to us 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, we are completing some very advanced mapping of Teton County. We have created detailed maps showing roads, rivers, elevation, fire prone landscapes, landslide prone landscapes, 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, we 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 we 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 Dick Van Auken, the Teton County Fire Warden at 406-466-5561, or me at the Northwest Management, Inc. office in Moscow, Idaho, at 208-883-4488.

Sincerely,

William E. Schlosser, Ph.D.

Project Manager, Teton County Fire Mitigation Plan

Northwest Management, Inc.

Teton County Natural Hazards Mitigation Plan

Public Survey

1. Do you have a home in Teton County?

   - O Yes
   - O No

2. Is this your primary residence? (*if you have more than one home in Teton County, please fill this out for 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 city or rural fire department?

   - O Yes
   - O No

6. What type of roof does your home have (please mark one):

   - O Composite (asphalt shingles)
   - O Wooden (eg., wood shingles)
   - O Ceramic tiles
   - O Metal: aluminum, tin, or other
   - O Other (please indicate: ____________________)

7. 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

8. If your driveway is over ½ mile long, does it have turnouts that would allow two emergency services vehicles to pass each other?

   - O No
   - O Yes

9. Is your driveway plowed in the winter time?

- O Yes
- O No

If yes, to what width is it normally plowed, in feet? _______ft.

10. What is the lowest overhead obstruction in your drive way (i.e. Powerline, archway, tree branches, etc.) in feet? __________ ft.

11. Choose the most accurate description of the steepest grade of your driveway:

- O Flat: No grade.
- O Slight: Little grade, all vehicles can use it even in winter.
- O Moderate: Some grade, may have to use 4 wheel drive in slippery/icy conditions.
- O Steep: Difficult for 2 wheel drive vehicles to pass, 4 wheel drive a must in slippery/icy conditions.

12. If the primary access to your home were cut off because of a wildfire, landslide, or flood, would you have an alternative vehicle route to escape through?

- O No
- O Yes

13. Does your driveway cross a stream, river, or irrigation canal?

- O No
- O Yes

14. Is your address clearly visible from the nearest public road?

- O No
- O Yes

15. If your regular phone service (land line) was not functioning do you have alternative communication?

- O No
- O Yes

If yes, what alternatives are currently available to you?

- O Cell Phone (with working service at your home)
- O Satellite Phone
- O CB/Ham radio
- O Two-way radio (other)
- O Other (please specify)____________

16. Do you have an alternative power source for when the electrical service is interrupted for long periods?

- O No
- O Yes

17. Use this exercise below to assess your home's wildfire risk rating:
Circle the ratings in each category that best describe your home.

	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:

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

18. Please indicate emergency services training anyone in your household has received within the last 10 years.

Type of Training	No	Yes
Wildland Fire Fighting	O	O
City or Rural Fire Fighting	O	O
Paramedic or EMT (Emergency Medical Technician)	O	O
Basic First Aid	O	O
Search and Rescue	O	O

19. Please indicate on the following table which, if any, of the following disasters have affected you, your family, or your home during the past 10 years.

	During the period 1994-2003, did this hazard <u>occur</u> near your home, property or business?		If YES, Complete these questions…	Did this hazard <u>cause damage</u> to: *(mark all that apply)*			<u>Approximately</u> how much damage was caused to your home, property and business during the period 1994-2003?
↓Hazard↓	No	Yes		Home	Property	Business	
Wildfire	O	O	→	O	O	O	$
Flood	O	O	→	O	O	O	$
Earthquake	O	O	→	O	O	O	$
Landslide	O	O	→	O	O	O	$
Wind Storm / Tornado	O	O	→	O	O	O	$
Winter Storm	O	O	→	O	O	O	$
Civil Unrest / Terrorism	O	O	→	O	O	O	$

20. Using your best judgment, please indicate if your home or business is located in a place that places it at risk to any of the following hazards.

Type of Hazard	No	Yes
Wildfire	O	O
Flood	O	O
Earthquake	O	O
Landslide	O	O
Wind Storm / Tornado	O	O
Winter Storm	O	O
Civil Unrest / Terrorism	O	O

21. 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 ways to reduce the potential for casualty loss surrounding their homes?

O No

O Yes

22. How do you feel Natural Hazard Mitigation projects should be **funded** in the areas surrounding homes, communities, and infrastructure such as power lines and major roads?

	Mark the boxes which best indicates to your preferences		
	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 where hazards 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!

Order Your Teton 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 at a scale of approximately 1:12,000 showing 1 square mile at its center.

What is the legal land description of the property you want mapped (must be in Teton County).

____________________________________ T _____N, R _____ W.

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
- O Fire Prone Landscapes
- O Landslide Prone Landscapes
- O FEMA Flood Zones (includes ownership)
- O Imagery: Orthophoto or satellite imagery (not in color)

Maps may include:

- Roads
- Streams & rivers
- Community locations
- Building locations

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:

____

____

____

Please Note: *This map will be made and mailed to you during the winter of 2004-05.*

Public Letter #2

November 12, 2004

Dear Teton County Resident:

About a week ago, I mailed you a letter and a brief survey concerning the wildfire situation in your community. That survey is instrumental to the success of the Wildland Fire Mitigation Plan we are developing in conjunction with the Teton County Commissioners Office. 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 Dick Van Auken, the Teton County Fire Warden, at 406-466-5561 or me 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 the number below or write me requesting another survey.

Thank you for your time and your assistance with this project!

William E. Schlosser, Ph.D.

Northwest Management, Inc. Natural Resource Management
233 Palouse River Dr., P.O. Box 9748, Moscow ID 83843
Tel: 208-883-4488, Fax 208-883-1098, http://www.Consulting-Foresters.com/

Public letter #3

Northwest Management, Inc.

Natural Resources Management

P.O. Box 565
Helena, MT 59624
Phone: (406) 442-7555
www.Consulting-Foresters.com

Teton County Natural Hazards Mitigation Plan

November 23, 2004

Name
Address
City, State Zip

Dear Teton County Landowner:

Thank you for taking some of your time to read and respond to this short inquiry. About two weeks ago, I sent you a letter and package of materials much like this one. In it, I asked if you would please assist our efforts by reading, filling out, and returning a survey concerning a **Natural Hazards Mitigation Plan** we are preparing for Teton County. We are working on in cooperation with the Teton County Commissioners Office and a host of fire protection and disaster relief organizations in Teton 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 Teton 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. Floods, landslides, and severe weather have also taken a toll on Teton County's communities.

However, today we are doing more than watching for hazards; we are taking a proactive role in reducing casualty loss in our area. We are inviting you to take a proactive role as well.

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<u>We have sent this letter and survey to only a select number of people in Teton County</u>. 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 to us 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, we are completing some very advanced mapping of Teton County. We have created detailed maps showing roads, rivers, elevation, fire prone landscapes, landslide prone landscapes, 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, we 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 we 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 Dick Van Auken, the Teton County Fire Warden at 406-466-5561, or me at the Northwest Management, Inc. office in Moscow, Idaho, at 208-883-4488.

Sincerely,

William E. Schlosser, Ph.D.
Project Manager, Teton County Fire Mitigation Plan
Northwest Management, Inc.

Appendix III

TETON COUNTY FIRE SERVICES

I. INTRODUCTION

The purpose of this annex is to establish a sound, workable and effective fire plan to be utilized in emergency or disaster situation. The goal of this plan is to ensure a rapid, coordinated response to the emergency to save lives, reduce personnel injuries and damage to property.

II. LEGAL AUTHORITIES

A. MCA 7-33 - Parts 21, 22, 23, 24, 41; Title 50, Ch. 3 & 39

B. Teton County is a legal fire entity.

C. In February 2000, Teton County entered into a cooperative Fire Control Agreement with the Montana Department of Natural Resources and Conservation.

D. Teton County has Mutual Aid Fire Agreements with adjacent counties, adjacent Rural Fire Companies and Municipalities within Teton County. Current copies of these mutual aid agreements are kept on file with the County Commissioners, DES Coordinator and County Fire Warden.

III. SITUATION AND ASSUMPTIONS

A. SITUATION

Teton County fire protection is provided through both rural fire companies and municipal fire departments. Teton County has five fire companies in the county, which with assistance from a fire fee service area and county funding, provide fire protection to all the unincorporated areas in the county except wildfire protection on Federal Lands. These Companies are located in Choteau, Dutton, Fairfield, Pendroy and Power. The US Forest Service or BLM depending on jurisdiction protects federal lands. The incorporated city/towns of Choteau, Fairfield and Dutton have municipal fire departments. All the personnel on the municipal fire departments are also on the rural fire companies and mutual aid agreements are in place between county and all municipalities in the county (see appendix). The county also has two fire districts near the communities of Choteau and Dutton. These districts receive fire protection from the respective municipal fire departments. The county has a cooperative fire control agreement with the Montana DNRC and mutual aid agreements with several surrounding counties and Fire Companies (see appendix).

B. ASSUMPTIONS

1. Existing fire personnel and equipment will be able to handle most emergencies either on their own or through the use of mutual aid agreements.

2. Fire Departments in Teton County will respond to calls anywhere throughout the county. However, Choteau, Dutton and Fairfield have established Municipal Fire Departments and therefore have an obligation to maintain some fire suppression equipment within their incorporated boundary.

3. A Fire Council has been formed in Teton County with representation from each of the county departments.

IV. ORGANIZATIONS AND RESPONSIBILITIES

A. FIRE DEPARTMENT

1. GENERAL

   a. The responsibilities of a fire department in disaster situations are basically the same as those they perform daily. Their primary responsibility is to save lives followed by property and environment.

   b. The fire department provides fire protection on a continuous basis. It maintains equipment and personnel in a continuous state of readiness.

   c. In addition, selected fire personnel may be trained in specialized skills such as Emergency Medical Technicians, hazardous materials, and extrication procedures.

2. SPECIFIC

   a. MITIGATION PHASE

      1) Conduct a hazard awareness program.

      2) Review and update departmental SOP's.

      3) Conduct public fire safety information program.

      4) Establish mutual aid agreements for assistance with other communities.

   b. PREPAREDNESS PHASE

      1) Conduct fire prevention inspections of buildings and shelters.

      2) Train personnel in CPR, radio communications, hazardous materials, fire fighting, and rescue techniques.

      3) Test, maintain and repair equipment.

      4) Prepare hazardous material analysis and assist facilities in preparing facility profiles.

      5) Assist in writing, reviewing and updating Teton County EOP Fire Annex.

   c. RESPONSE PHASE

      1) Provide fire prevention/suppression.

2) Conduct rescue operations as capable.

3) Conduct hazardous material operations according to level of training and capabilities.

4) Assist with evacuation or extrication as requested.

d. RECOVERY PHASE

1) Fire inspections.

2) Decontamination.

3) Condemn unsafe buildings.

4) Identify new potential fire hazards.

5) Inventory equipment and replace losses.

B. LAW ENFORCEMENT

1. Provide traffic and crowd control in support of fire department operations.
2. Assist in search and rescue operations.
3. Provide warning notification to fire department.
4. Handle evacuation as needed.

C. EMERGENCY MEDICAL SERVICES

1. Report to Incident Command or Staging as directed.
2. Be prepared to provide patient care as necessary.
3. Monitor responder and victim health and welfare conditions.
4. Assist with rehab area, decontamination or other tasks as requested.

D. DISASTER AND EMERGENCY SERVICES (EOC):

1. Activate EOC if requested by the Incident Commander and County Commissioners.
2. Coordinate resources.
3. If incident is beyond county resources, inform state DES.
4. Maintain communications with the Incident Commander.

E. SEARCH & RESCUE

1. Report first to Incident Command or Staging as directed for instructions.
2. Set up mobile communications van to facilitate on-scene communications and dispatch.

E. CHIEF ELECTED OFFICIALS:

1. Cooperate with the Incident Commander to determine if EOC needs to be activated. If EOC is activated, report to the EOC.
2. Cooperate with the Incident Commander to expend county resources and comply with written agreements between Teton County, the Department of Natural Resources and Federal Agencies.
3. Coordinate with the Incident Commander to determine the activation of mutual aid agreements with neighboring counties.

F. **ROAD DEPARTMENT:**

1. Assist the Incident Commander as requested.
2. Manpower and equipment requests must be approved by Chief Executives.
3. Assist in recovery operations.

G. **PUBLIC INFORMATION OFFICER:**

1. Coordinate news media. See PIO Annex
2. Coordinate with Chief Executives, Incident Commander, DES Coordinator on news releases and information to the public.
3. Make periodic broadcasts or announcements to the public and press keeping them informed and advised of hazards and conditions and emergency information.

V. <u>OPERATIONAL CHECKLISTS</u>

A. INCIDENT COMMAND

1. Scenes will be managed according to the Incident Command System.
2. The Fire Chief of the department in who's area the incident occurs will serve as incident commander, unless he designates another.
3. Fire departments are predestinated as Incident Command for the following situations: fire and hazardous materials incidents.

B. MUTUAL AID

1. If a situation expands beyond the fire department's capabilities, the Incident Commander can request mutual aid by notifying the Sheriff's department dispatch. The dispatcher will then notify the requested fire department by pager or telephone.
2. The mutual aid responding fire department will respond to staging to receive assignment.
3. Each responding fire chief or designee will maintain control of his unit(s), but will function under the direction of the Incident Commander.

C. SPECIAL ASSISTANCE ROLES

1. <u>MOTOR VEHICLE ACCIDENTS</u>
   a. Provide fire protection and hazardous materials protection on scene as needed.
   b. Assist with extrication.
   c. Assist emergency medical responders as requested.
2. <u>MASS CASUALTY OR MULTIPLE VICTIM INCIDENTS</u>
   a. Assist in patient rescue and evacuation.
   b. Assist in moving or loading patients for transport.
   c. At times fire fighters may be requested to drive ambulances or buses to transport victims.

D. PROTOCOL FOR REQUESTING ASSISTANCE ON FIRES BEYOND COUNTY'S CAPABILITIES:

1. County Firewarden advises DNRC, Helena, of fire status and requests tactical advice or resources as necessary.
2. County Commissioners notified.
3. All available county forces dispatched to fire.
4, Mutual Aid Counties are contacted for assistance per agreements.
5. County Commissioners formally request assistance from the DNRC, Forestry Division

E. ADMINISTRATION & LOGISTICS

1. Lines of Succession for individual fire departments responding will be according to each department's established procedures.
2. Communications - See County Communications Plan

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

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

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

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

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

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

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

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.

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Last Page of Document

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