# Roosevelt County, Montana


# Pre-Disaster Mitigation Plan

September 2003


MAXIM TECHNOLOGIES INC®
A TETRA TECH COMPANY
ENGINEERING & ENVIRONMENTAL CONSULTANTS

# ROOSEVELT COUNTY MONTANA
# PRE-DISASTER MITIGATION PLAN

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| | |
|---|---|
| COE | U.S. Army Corps of Engineers |
| CRP | Conservation Reserve Program |
| DES | Montana Disaster and Emergency Services |
| DOI | U.S. Department of Interior |
| DMA | Disaster Mitigation Act |
| DNRC | Montana Department of Natural Resources and Conservation |
| FAA | Federal Aviation Administration |
| FEMA | Federal Emergency Management Agency |
| GIS | Geographic Information Systems |
| HUD | U.S. Department of Housing and Urban Development |
| LEPC | Local Emergency Planning Committee |
| NFIP | National Flood Insurance Program |
| NOAA | National Oceanic and Atmospheric Administration |
| NRCS | Natural Resource Conservation Service |
| NWS | National Weather Service |
| PDM | Pre-Disaster Mitigation Plan |
| USFS | U. S. Forest Service |
| USGS | U. S. Geological Survey |
| WAPA | Western Area Power Administration |

# 1.0 INTRODUCTION

The effects from natural and man-made hazards directly impact the safety and well being of Roosevelt County residents. Historically, county residents have dealt with floods, high winds, severe summer storms with damaging thunderstorms, hail, and tornadoes, harsh winter storms with extreme cold and blizzards, wildfires, drought, and hazardous material spills. While most hazards cannot be eliminated, the effects from them can be mitigated. Roosevelt County, working in conjunction with Montana DES and Maxim Technologies, Inc. (Maxim), prepared this Pre-Disaster Mitigation (PDM) Plan (the Plan) to help guide and focus hazard mitigation activities. The Roosevelt County Pre-Disaster Mitigation Plan profiles significant hazards to the community and identifies mitigation projects that can reduce their impacts. The purpose of the Plan is to promote sound public policy designed to protect citizens, critical facilities, infrastructure, private property, and the environment from natural and man-made hazards. The Roosevelt County Pre-Disaster Mitigation Plan includes resources and information to assist county residents, organizations, local government, and others interested in participating in planning for natural and man-made hazards. The mitigation plan provides a list of mitigation projects that will assist Roosevelt County in reducing risk and preventing loss from future hazard events.

## 1.1 AUTHORITY

The Disaster Mitigation Act (DMA) of 2000 amends the Robert T. Stafford Disaster relief and emergency assistance act by adding a new section, 322 – Mitigation Planning. It requires all local governments to have an approved Pre-Disaster Mitigation Plan in place by November 1, 2003 to be eligible to receive Hazard Mitigation Grant Program project funding.

Roosevelt County and the incorporated towns of Wolf Point, Poplar, Bainville, Brockton, Culbertson and Froid have adopted this Pre-Disaster Mitigation Plan. These governing bodies have the authority to promote sound public policy regarding natural and man-made hazards. Copies of the signed Resolutions from these jurisdictions are included as ***Appendix A*** to this plan. The Plan was adopted at the regularly scheduled meetings of the Wolf Point, Poplar, Bainville, Brockton, Culbertson, and Froid city councils, and at the meeting of the Roosevelt County commissioners, all of which were open to the public and advertised through the communities' typical process for publicizing public meetings.

The Roosevelt County Disaster and Emergency Services (DES) Coordinator will be responsible for submitting the adopted Plan to the State Hazard Mitigation Office in Helena, Montana. The State Hazard Mitigation Officer will then submit the Plan to the Federal Emergency Management Agency (FEMA) for review. This review will address the federal criteria outlined in FEMA Interim Final Rule 44 CFR Part 201. Upon acceptance by FEMA, Roosevelt County and the other Plan signatories will gain eligibility for local mitigation project grants and post-disaster hazard mitigation grant projects (HMGP).

## 1.2 ACKNOWLEDGEMENTS

Many groups and individuals have contributed to development of the Roosevelt County Pre-Disaster Mitigation Plan. The local DES Coordinator, District DES Representative, and the Montana State Hazard Mitigation Officer provided significant guidance and support to all aspects of plan development. The National Weather Service provided historic newspaper accounts of severe weather events and other weather data. Numerous elected officials, city and county personnel, and the local communities participated in the planning process and contributed significantly to the Plan's development.

## 1.3 PROJECT AREA LOCATION

Roosevelt County is located in northeast Montana, and has a land area of about 1,526,400 acres or 2,385 square miles (USDA et al., 1985). Roosevelt County is bounded by Daniels and Sheridan Counties on the north, McCone and Richland Counties on the south, and North Dakota on the east. Wolf Point is the county seat and incorporated towns include Bainville, Brockton, Culbertson, Froid, Poplar and Wolf Point. The Missouri River forms the southern boundary of Roosevelt County. ***Map 1-1*** presents a location map of the Plan area. The Fort Peck Reservation occupies area within the southwestern portion of Roosevelt County. A separate Pre-Disaster Mitigation Plan has been developed for the Fort Peck Tribes.

Elevation in Roosevelt County ranges from about 1,875 feet above mean sea level (amsl) along the Missouri River to about 2,900 feet in the northwestern part of the county. Most of the County consists of upland glaciated plains. The plains are nearly level to steeply sloping. In places the landscape is dissected by steep drainages and rough ridges of weathered shale, siltstone, and sandstone.

According to the 2000 census, the population of Roosevelt County is 10,620. This represents a 3.4% decline in population in the 10 years since the last census. The median age in Roosevelt County is 32.3 years old (U.S. Bureau of the Census, 2001 in DO1, 2002).

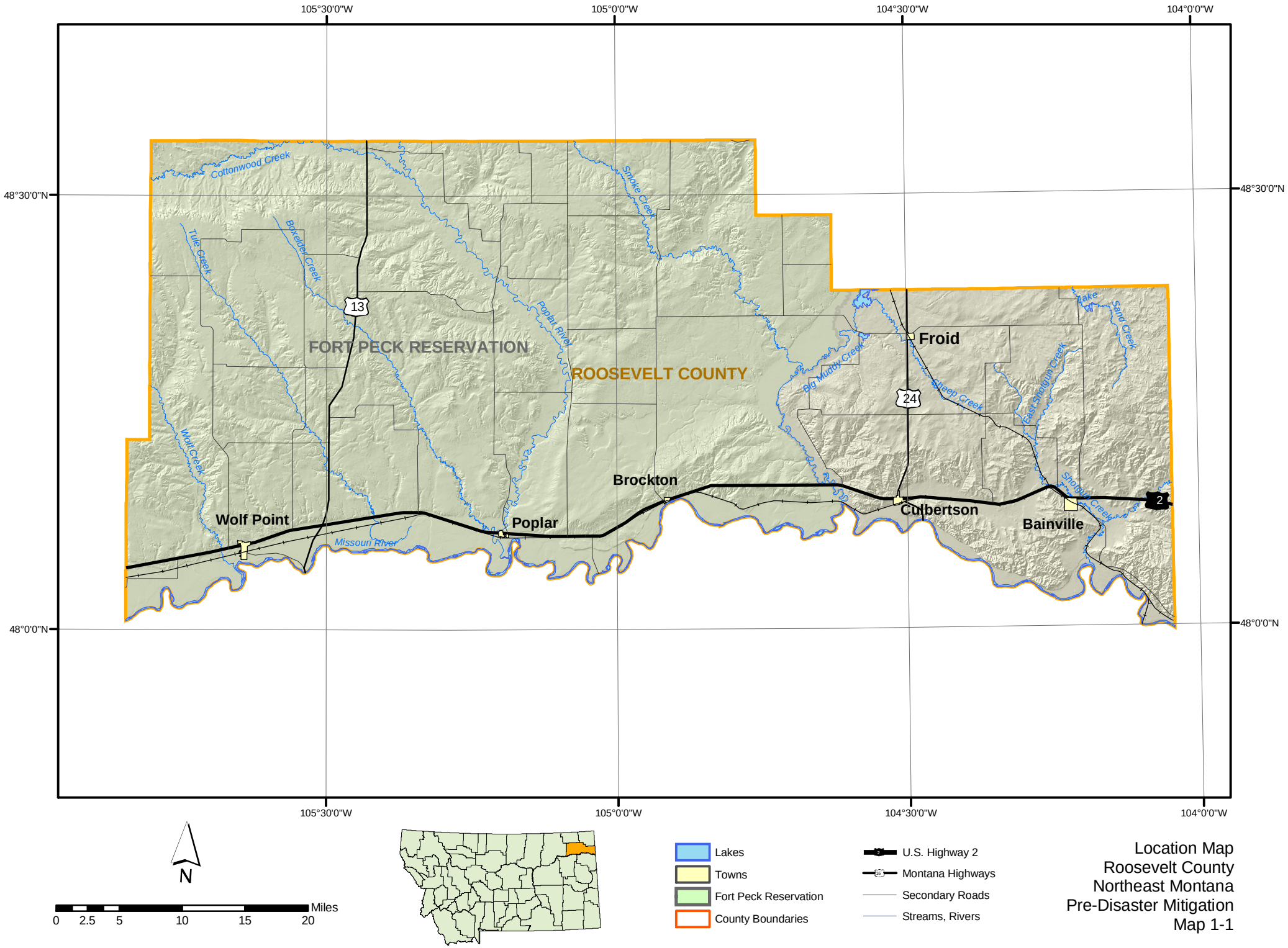
## 1.4 CLIMATE AND WEATHER

Roosevelt County, Montana is located within the region generally classified as dry continental or Steppe with four well-defined seasons. The weather can be quite changeable with large day to day temperature variations, particularly from fall to spring. Days with severe winter cold and summer heat are typical.

Average high temperatures in January are 15 to 22 F with average lows 5 below to 5 F above, with the coldest averages over the northern part of the county. In winter in particular, temperatures often vary significantly from the averages. Temperatures below -50 F have been recorded at a few locations, while typical extreme winter minimum temperatures are between -25 and -35 F. Often the coldest temperatures occur at sheltered valley locations when winds are light, but extreme wind chill situations occur almost every winter when windy conditions coincide with very low temperatures. Rapid warmups during the winter and early spring can lead to significant snow melt and flooding of small streams and rivers and/or ice jam flood problems.

Average high temperatures in July are in the 80s with average lows 55 to 60, with the warmest averages along the Missouri River valley. Brief spells with temperatures above 100 F can occur but are often short lived. Temperatures above 110 F have been reported on rare occasion. Extended periods with temperatures above 90 F occur every few years. Freezing temperatures can occur, but are rare in June and August, particularly at sheltered valley locations in the northern part of the county.

Annual average precipitation is 11 to 15 inches, with over 70% of the precipitation falling from May through September. Precipitation can vary significantly from year to year, and location to location within a given year. November through March, are on average quite dry with average monthly precipitation of 0.50" or less. Average annual precipitation increases slowly from west to east across the county. The heaviest most intense precipitation often occurs with localized downpours associated with thunderstorms in June through August. Significant flash flooding can result from these downpours with over 4 inches of precipitation reported in a few events. Widespread heavy precipitation events of 1 to 2 inches can occur every few years and is most common from April through June and September through early November.


105°30'0"W
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Cottonwood Creek
Smoke Creek
Boxelder Creek
Tule Creek
Poplar River
Wolf Creek
Big Muddy Creek
Sheep Creek
East Shotgun Creek
Sand Creek
Shotgun Creek
FORT PECK RESERVATION
ROOSEVELT COUNTY
13
24
2
Froid
Brockton
Wolf Point
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N
Miles
0 2.5 5 10 15 20
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Average winter snowfall ranges from 25 to 38 inches, with the highest averages over the higher elevations over the northern part of the county. The heaviest snowstorms often occur from late March through May or mid October to mid November. These storms can produce more than 12 inches of snow and are often made more severe as temperatures are warmer, and therefore the snow is heavier and more difficult to travel in and remove. These storms are often accompanied by high winds resulting in blizzard conditions. In spring these storms can coincide with the calving season resulting in livestock loss. Mid winter snowstorms in general produce less then 6 inches of snow, but heavier amounts to 10 inches or more have occurred. Despite the generally lighter amounts and drier snow, high winds can result in blizzard conditions. Even without falling snow, in the colder conditions of mid winter, high winds can pick up loose snow, resulting in local ground blizzards.

Severe thunderstorms are common from June into early September. Typically the greatest hazards associated with these thunderstorms are very highs winds and large hail. Damage to structures and crops occur every summer from these storms. Tornadoes have been reported, but are relatively rare.

An important element of the climate in Roosevelt County is the often windy conditions. Average wind speeds range from 10 to 15 mph, depending on the exposure of the location. The average and peak sustained winds in the Missouri River valleys tend to be somewhat less then the winds the higher more exposed terrain in the northern portion of the county. The highest wind gusts often occur with thunderstorms during the summer, with gusts over 60 mph occurring every year. The highest sustained winds tend to occur in the spring and fall, with sustained winds over 40 mph occurring every year.

***Table 1-1*** details the top weather events recorded at the Wolf Point weather station. Temperature, precipitation, and snowfall tables from Wolf Point are representative for the western part of the county in the Missouri River valley. ***Appendix G*** contains top weather event tables for other Roosevelt County communities. The weather tables for Poplar and Culbertson are representative of the central and eastern part of the county in the Missouri river valley, respectively. The weather table for Bredette is representative of the somewhat higher elevations in the northwest part of the county.

***TABLE 1-1***
***TOP WEATHER EVENTS IN WOLF POINT, ROOSEVELT COUNTY***

| **Hottest Days** | | **Coldest Days** | | **Wettest Days** | |
|---|---|---|---|---|---|
| 112° | 6/26/1988 | -57° | 1/26/1950 | 4.16 inches | 8/17/2001 |
| 110° | 8/7/1949 | -52° | 1/20/1954 | 3.00 inches | 6/25/1972 |
| 110° | 8/6/1949 | -52° | 1/18/1950 | 2.84 inches | 6/21/1984 |
| 109° | 8/7/1995 | -48° | 1/30/1950 | 2.66 inches | 7/21/1987 |
| 109° | 7/19/1960 | -47° | 2/28/1962 | 2.53 inches | 9/13/1978 |
| **Wettest Years** | | **Driest Years** | | **Longest Dry Spells** | |
| 19.62 inches | 1962 | 7.62 inches | 1988 | 110 days | 11/1986 |
| 18.32 inches | 1953 | 8.31 inches | 1949 | 103 days | 9/1987 |
| 17.66 inches | 1965 | 9.29 inches | 1971 | 93 days | 12/1980 |
| 17.49 inches | 1970 | 9.99 inches | 1961 | 70 days | 2/1984 |
| 17.38 inches | 1963 | 10.34 inches | 1952 | 64 days | 1/1985 |

Notes: Data from National Weather Service

Wind data from the Poplar weather station is representative for the lower elevations along the Missouri River Valley. Data from Williston, ND is representative for lower elevations in the eastern part of the county. As mentioned above, average and sustained winds are likely higher in the higher more exposed elevations north of the Missouri Valley.

For the purposes of this hazard assessment and mitigation plan, weather is of interest when it threatens property or life and thus becomes a hazard. The NWS provides short-term forecasts of hazardous weather to the public. In addition to issuing tornado and severe thunderstorm watches the NWS also produces regularly-scheduled severe weather outlooks and updates on various forms of hazardous weather including heavy rain and winter storms. NWS's Warning and Advisory Criteria for severe weather is presented in ***Table 1-2***. Descriptions of historic weather related hazard events and documentation of the frequency, severity, and impact of hazardous weather is presented in ***Plan Section 3***.

***TABLE 1-2***
***WARNING AND ADVISORY CRITERIA FOR SEVERE WEATHER***

| **Summer Weather Event** | **Criteria** | |
|---|---|---|
| Severe Thunderstorm Warning | Any thunderstorm wind gust equal to or greater than 58 mph; any hail size ¾ inch or larger. | |
| Tornado Warning | A violently, rotating column of air extending from the base of a thunderstorm to the ground. | |
| Flash Flood Warning | Flooding is imminent, water levels rise rapidly with inundation occurring in less than 6 hours. | |
| Flood Warning | Flooding is expected to occur more than 6 hours after the causative event. | |
| **Winter Weather Event** | **Winter Weather Advisory** | **Winter Storm/Blizzard Warning** |
| Snow | 2-5 inches of snow in 12 hours | 6 inches or more in 12 hours, or 8 inches in 24 hours |
| Blizzard | (see blowing snow) | Sustained winds or frequent gusts to 35 mph with visibility below a ¼ mile fro three hours or more |
| Blowing Snow | Visibility at or less than a ½ mile. | Visibility at or less than a ½ mile in combination with snowfall at or greater than 6 inches and/or freezing precipitation |
| Ice/Sleet | (see freezing rain/drizzle) | Accumulations of ¼ inch or more of ice. |
| Freezing Rain/Drizzle | Light precipitation and ice not forming on exposed surfaces. | None |
| Wind Chill | Wind chills of 20 to 39 below zero with a 10 mph wind in combination with precipitation. | Wind chills of 40 below zero or colder with a 10 mph wind in combination with precipitation. |
| **Summer Weather Event** | **Non-Precipitation Advisory** | **Non-Precipitation Warning** |
| High Wind | None | Sustained winds of 40 mph for an hour or any gust to 58 mph (non-convective winds). |
| Lake Wind | Sustained wind speeds of 25 mph or more for three or more hours. | None. |
| Heat | Heat index of 105 or more for at least three days. | High temperature of 105. Low of 80 or more for 3 days or more. |

## 1.5 REGIONAL ECONOMY

The major source of income in Roosevelt and Valley counties is government, whereas the major industry in Sheridan and Daniels counties is agriculture. Average annual unemployment rates in 2000 in the four-county area ranged from a low of 3.0 percent in Daniels County to a high of 9.5 percent in Roosevelt County. Unemployment rates in Valley and Sheridan counties were 4.1 percent and 4.4 percent, respectively (Montana Department of Labor and Industry, 2001 in DOI, 2002).

The estimated percent of people of all ages in poverty in the state was 15.7 percent in 1998. Roosevelt County had the highest percent of people in poverty of the four-county area with 31.7 percent, followed by Valley County (18.7 percent), Daniels County (15.6 percent), and Sheridan County (13.7 percent) (U.S. Bureau of the Census, 2001b in DOI 2002).

## 1.6 SCOPE AND PLAN ORGANIZATION

The scope of the Roosevelt County Pre-Disaster Mitigation Plan includes the following:

- Identify and prioritize disaster events that are most probable and destructive,
- Identify critical facilities,
- Identify areas within the community that are most vulnerable,
- Develop goals for reducing the effects of a disaster event,
- Develop specific projects to be implemented for each goal,
- Develop procedures for monitoring progress and updating the Plan, and
- Officially adopt the Plan.

The Plan is organized into sections that describe the planning process (Section 2), risk assessment (Section 3), mitigation strategies (Section 4), and plan maintenance (Section 5). Appendices containing supporting information are included at the end of the Plan.

# 2.0 PLANNING PROCESS

The Roosevelt County Pre-Disaster Mitigation (PDM) Plan is the result of a collaborative effort between Roosevelt County citizens, public agencies, local utility companies, and regional, state, and federal organizations. Public participation played a key role in development of goals and mitigation projects. Interviews were conducted with the Roosevelt County DES Coordinator, mayors, and elected officials, and three public meetings were held to include the input of Roosevelt County residents.

## 2.1 CONTACT LIST

The PDM planning process was initiated by preparing a contact list of individuals whose input was needed to help develop the Plan. On the County level, these persons included elected officials (County Commissioners), the DES Coordinator, and County Road Superintendent. Councilpersons from the incorporated towns were listed (Wolf Point, Poplar, Culbertson, Bainville, Brockton, and Froid), as well as the mayors, fire chiefs and public works directors. Federal and State agencies on the contact list included the National Weather Service, Army Corps of Engineers, Western Area Power, and Montana Department of Natural Resources and Conservation. Private utilities included Nemont Telephone and Sagebrush Cellular. ***Appendix B*** presents the Roosevelt County contact list. Persons and entities on the contact list received a variety of information during the planning process, including project maps and documents for review, meeting notifications, and mitigation strategy documents.

## 2.2 STAKEHOLDER INTERVIEWS AND MEETINGS

Interviews were conducted with individuals and specialists from organizations interested in hazard mitigation planning. The interviews identified common concerns related to natural and man-made hazards and identified key long- and short-term activities to reduce risk. Stakeholders interviewed for the plan included representatives from local government, water providers, fire departments, and utility providers. A list of meetings and interviews with Roosevelt County stakeholders is presented in ***Appendix B***.

## 2.3 FORMAL PUBLIC MEETINGS

Three public meetings were conducted in Roosevelt County during initial plan development. The meetings were held in Wolf Point on February 25, 2003, Poplar on February 26, 2003, and in Culbertson on February 27, 2003. The purpose of the meetings was to gather information on historic disasters, update the list of critical facilities, and gather ideas from citizens about mitigation planning and priorities for mitigation goals. The sign-in sheet from the Roosevelt County public meetings and meeting summaries are presented in ***Appendix B***.

In advance of the public meeting, a press release was distributed to local and regional newspapers including the Wolf Point Herald News, Culbertson Searchlight, Wotanin Wowapi, Great Falls Tribune, and Billings Gazette. Local radio stations who received copies of the press release as public service announcements included KVCK radio Wolf Point, KEYZ radio Williston, North Dakota, and Northern Ag Radio. Notices of the public meetings were sent in advance to all jurisdictions participating in the planning process including Wolf Point, Poplar, Culbertson, Froid, Bainville, Brockton, and Roosevelt County. Notices were sent to all federal, state, and local officials on the project contact list (***Appendix B***). A copy of the press release and media distribution list is included in ***Appendix B***. ***Appendix B*** also contains copies of the press release as it appeared in several local newspapers. Reporters were in

attendance at several of the public meetings and follow-up articles on Plan development appeared in local newspapers.

The City Council and County Commission meetings at which the resolutions adopting the plan were passed provided the public with the opportunity to review the final version of the plan.

## 2.4 OTHER PROJECT MEETINGS

Over the course of the project numerous meetings were held with, and briefings given to, local officials and other stakeholders. At the project's inception the Montana DES District Representative and the Project Manager for Maxim Technologies Inc., toured the project area and met with commissioners from each county, mayors for most of the incorporated towns, Tribal staff, Bureau of Indian Affairs staff, representatives from local utilities, Local Emergency Planning Committee (LEPC) members, National Weather Service (NWS) staff, US Corps of Engineers (COE) staff, county health officials, and others. The overall project objectives were presented at these meetings and initial concerns and potential mitigation projects were discussed.

On February 19, 2003, a breakfast was held at Maxim's Helena, Montana office to update elected officials on the status of Plan development. The breakfast was scheduled to coincide with the Governor's conference, since many of the Roosevelt County stakeholders were in Helena for that purpose. Representatives from the National Weather Service, Glasgow office attended the breakfast, as did DES Coordinators on the state, regional and local levels. An overview of the PDM program was presented and the schedule for the Roosevelt County public meetings was unveiled.

## 2.5 PLAN REVIEW

Review copies of the draft Plan were provided to the DES Coordinator for distribution in hard copy. Plan reviewers included county commissioners, mayors of the various jurisdictions, representatives of the local utility companies, the National Weather Service, and other federal, state, and local officials. The DES Coordinator provided review copies of the Plan to all jurisdictions involved in the planning process including Wolf Point, Poplar, Culbertson, Froid, Bainville, Brockton, and Roosevelt County. Public comments were submitted to the DES Coordinator after a 30-day review period. The DES Coordinator reviewed the comments and submitted a consolidated list of them to Maxim.

A review of the Plan for completeness was conducted after the initial comments were addressed. Plan copies were submitted to the Montana DES Hazard Mitigation Officer and the Montana FEMA representative for review. The review period lasted 30-days. Upon receipt of comments, the Plan was finalized and taken to the County commissioners and jurisdictions for adoption.

Future comments on this Plan should be addressed to:

Roosevelt County Disaster and Emergency Services Coordinator
416 ½ Second Avenue South
Wolf Point, Montana 59201
(406) 653-6224

# 3.0 HAZARD EVALUATION AND RISK ASSESSMENT

A risk assessment was conducted to address requirements of the Disaster and Mitigation Act of 2000 (DMA 2000) for evaluating the risk to the community from the highest priority hazards. DMA 2000 requires measuring potential losses to critical facilities and property resulting from natural hazards by assessing the vulnerability of buildings and critical infrastructure to natural hazards. In addition to the requirements of DMA 2000, the risk assessment approach taken in this study will evaluate risks to vulnerable populations and also examine the risk presented by man-made hazards. The goal of the risk assessment process is to determine which hazards present the greatest risk and what areas are cumulatively the most vulnerable to hazards.

The hazard risk assessment requires information about what hazards have historically impacted the community and what hazards may present risks in the future. Identifying historical and possible future hazards was primarily accomplished in two phases. The first phase entailed interviewing local government officials and staff, local emergency planning and response staff, and the general public. ***Plan Section 2*** describes the interview/public input process in detail. The second phase entailed researching government records and news publications for records of previous hazard events. The results of the initial hazard evaluation were used to focus further risk assessment on hazards that historically had caused the most problems and those judged to be of most future concern.

The risk assessment approach used for the Roosevelt County Pre-Disaster Mitigation Plan entailed using Geographic Information System (GIS) software and data to develop vulnerability models for people, structures, and critical facilities and evaluating those vulnerabilities in relation to hazard profiles that model where hazards exist. This type of approach to risk assessment is very dependent on the detail and accuracy of the data used during the analysis. Additionally, some types of hazards are extremely difficult to model. The schedule and resources available for conducting this risk assessment dictated that existing data be used to perform the assessment. The existing information available is extensive but also has many limitations. Results of risk assessment allow hazards to be compared and relative comparisons to be made of areas within the jurisdiction.

## 3.1 HISTORICAL HAZARDS

Roosevelt County may be affected by many types of natural, technological, and human caused hazards. Examples of natural hazards that have impacted the region include earthquakes, flooding, wildfire, severe winter storms, tornadoes, and drought, among others. Technological hazards are caused by human processes. Technological hazards that exist in the region include explosions, urban fires, uncontrolled chemical or hazardous material release (either at a fixed location or in transit), power outage, and dam failure, among others. Human-caused hazards are the result of direct (purposeful) actions of humans. Possible human-caused hazards include civil unrest/riots, and terrorism.

Available documentation of historic hazards is directly related to their occurrence near populated areas. An exhaustive search was conducted for hazard data on Roosevelt County but due to the rural nature of the county, very little historic hazard information exists. The lack of data does not mean there is a lack of hazards or risk from hazards in Roosevelt County. To illustrate this point, regional hazard information is used in the Roosevelt County PDM Plan to supplement the data specific to the county that was found.

The hazards most likely to affect Roosevelt County were derived from a number of sources. Hazard information was compiled by examining data from DES, FEMA, the U.S. Coast Guard, and the NWS, reviewing historical newspaper articles, and interviewing local experts. Most importantly, the residents

of Roosevelt County voiced their opinions on what hazards had affected their lives and their communities during the public meetings. ***Table 3-1*** lists the State and Federal declared disasters that have occurred in Roosevelt County.

***TABLE 3-1***
***DECLARED DISASTERS IN ROOSEVELT COUNTY***

| Date of Declaration | Event | Area Affected | State Disaster Declaration | Federal Disaster Declaration |
|---|---|---|---|---|
| March 2003 | Flooding | County-wide | Yes | No |
| November 14, 2000 | Winter Storms | County-wide | Yes | Yes |
| July 26, 1999 | Wildland Fires | County-wide | Yes | Yes |
| July 8, 1998 | Flooding | Culbertson | Yes | No |
| September 5, 1997 | Windstorm | Wolf Point | Yes | No |
| March 12, 1997 | Flooding | County-wide | Yes | Yes |
| September 9, 1994 | Wildland Fires | County-wide | Yes | No |
| June, 1986 | Grasshopper Infestation | County-wide | Yes | No |

### *3.1.1 Floods*

A flood is a natural event for rivers and streams. Excess water from snowmelt and rainfall accumulates and overflows onto the banks and adjacent floodplains. Floodplains are lowlands, adjacent to rivers and lakes that are subject to recurring floods. A flash flood generally results from a torrential (short duration) rain or cloudburst on a relatively small drainage area. Flash floods are discussed in ***Plan Section 3.1.4***. Chinook winds, warm dry winds that can gust to 100 mph and that are typical to the area, often lead to the rapid melting of snow and cause flooding.

Hundreds of floods occur each year, making it one of the most common hazards in all 50 states. Floods kill an average of 150 people a year nationwide. Most injuries and deaths occur when people are swept away by flood currents and most property damage results from inundation by sediment-laden water. Faster moving floodwater can wash buildings off their foundations and sweep vehicles downstream. Pipelines, bridges, and other infrastructure can be damaged when high water combines with flood debris. Basement flooding can cause extensive damage.

#### 3.1.1.1 Location and Extent of Previous Flood Events

The Missouri River forms the southern boundary of Roosevelt County. The major tributaries feeding into the Missouri River from Roosevelt County are Big Muddy Creek and Poplar River. Wolf Creek, Little Wolf Creek, Tule Creek, and Chelsea Creek are the major drainage ways in the western part of the county. The southeastern part of the county is drained by Little Muddy Creek and its main tributary, Shotgun Creek. The extreme northeastern part of the county is drained by Sand Creek, which flows northward into the Medicine Lake area of Sheridan County. Many of these areas are subject to flooding.

The municipality of Culbertson is located partially in the alluvial floodplain of East Divide Creek. The town has constructed flood protection that provides partial protection from overflow but the existing works have not been adequate to provide complete protection against the probable maximum flood. Heavy losses often occur during or following periods of excessive rainfall or snowmelt.

***Table 3-2*** presents the flood listings in Roosevelt County from the NWS Storm Events Database (***Appendix G***). Storm type definitions are presented in ***Table 1-2***.

***TABLE 3-2***
***NWS STORM EVENTS DATABASE***
***FLOOD LISTINGS IN ROOSEVELT COUNTY***

| Location | Date | Type | Comments |
|---|---|---|---|
| Roosevelt County | 3/26/1997 | Flood | |
| Roosevelt County | 3/15,17/1999 | 3 reports of floods | $95K property damage |

Roosevelt County received two disaster declarations for flooding; one March 12, 1997, and the other July 8, 1998 in Culbertson. A description of some historic flooding events in Roosevelt County is presented below.

***April 1916 –*** A man lost his life when his buggy overturned in the floodwaters of Cottonwood Creek, 25 miles east of Froid. (*Farmer Drowned*, Glasgow Courier, April 21, 1916.)

***April 1925*** – The body of a 10 year old girl drowned in the flood waters of Houley Creek, 25 miles north of Wolf Point. As she crossed the ice on the swollen stream, she broke through and was thrown into the rushing waters. (*Girl is Flood Victim; Body is Found in Creek*, Glasgow Courier, April 3, 1925.)

***July 1976*** – Torrential rains caused flash flooding in the eastern Roosevelt County town of Froid. Significant damage occurred to municipal property, especially the public water and sewer system. Repair, reconstruction and rehabilitation of the damaged property far exceeded the ability of the town to bear; therefore, a state disaster was declared. (Governor Thomas Judge papers, Montana Historical Society archives.)

***July 29, 1987*** – Heavy rain and flooding in the Tule Creek area was reported to have been the 100-year flood event. Farms in the area experienced extensive losses including erosion of two to six inches of topsoil, downed fences, and crop damage. County roads were also damaged with 24 washouts from high floodwaters. Most of the road damage occurred at low water crossings and culverts but approaches to three bridges on Highway 13 were also washed out. Some areas reported 10 inches of rain over two days. (*Flood Damage Effects Could be Far-Reaching*, Wolf Point Herald, August 6, 1987.)

***July 22, 1993*** – Torrential rains moved through Roosevelt County dumping as much as eight inches of rain north of Wolf Point in a short period of time. The Powder River Road was severely damaged including a major bridge washout. Other highway problems included severe damage to the Tule Creek bridge on Highway 13 and guardrails and washed out road surfaces. The biggest disaster occurred in the Airport Addition east of Wolf Point where many people were flooded from their homes. (*Flooding Cause of Major Problems Over Weekend*, Wolf Point Herald, August 26, 1993.)

***March 2003*** – From March 16 through 19, 2003, heavy rain fell onto existing heavy snowpack and frozen ground, causing the rapid rise of water in the Sheep Creek, Little Muddy, and Shotgun Creek, which led to the widespread flooding of lowland areas of Roosevelt County. The floodwaters caused damage to an estimated 80 sites on the County road system, including 15 to 20 sites with major damage

to culverts, low water crossings and bridges. A state disaster was declared in Roosevelt County on March 31, 2003. (Executive Order No. 5-03.)

#### 3.1.1.2 Floodplain and Floodway Management Ordinance

All of Roosevelt County is in the National Flood Insurance Program (NFIP) except for the incorporated communities of Wolf Point, Poplar, Brockton, Bainville, and Froid. Culbertson is the only incorporated community that has entered into the NFIP. Many of the flood prone areas in Roosevelt County are covered by flood plain maps developed by the County. These maps show areas of shallow flooding on topographic maps and are preliminary in nature. Several federal agencies have completed studies on Poplar River flooding including the U.S. Army Corps of Engineers and U.S. Geological Survey.

Roosevelt County passed a Floodplain and Floodway Management Ordinance to comply with the Montana Floodplain and Floodway Management Act and to ensure compliance with requirements for continued participation in the National Flood Insurance program. A copy of this document is contained in ***Appendix C***. The floodplain ordinance identifies land use regulations to be applied to all identified 100-year floodplains within local jurisdictions. Identification of 100-year floodplains is based on a study on flood boundaries for the Poplar River and Porcupine Creek (Omang, 1990; Omang, 1993), a flood hazard report on the Missouri River (COE,1986), the Box Elder Creek watershed project (SCS,1987), flood hazard boundary maps of unincorporated areas in Roosevelt County (HUD,1979), and Roosevelt County potential flood hazard boundary maps (1994).

### *3.1.2 Winter Storms*

Winter storms and blizzards follow a seasonal pattern that begins in late fall and lasts until early spring. These storms have the potential to destroy property, and kill livestock and people. Winter storms may be categorized as sleet, ice storms or freezing rain, heavy snowfall or blizzards, and low temperatures. Blizzards are most commonly connected with blowing snow and low visibility.

A severe winter storm is generally a prolonged event involving snow or ice and extreme cold. The characteristics of severe winter storms are determined by the amount and extent of snow or ice, air temperature, wind speed, and event duration. Severe winter storms create conditions that disrupt essential regional systems such as public utilities, telecommunications, and transportation routes. Ice storms accompanied by high winds can have destructive impacts, especially to trees, power lines, and utility services.

Winter storms are frequently the precursors to spring flooding; the more snow, the better the chances of floods if a quick warm-up occurs. Any snowfall over 4 inches is likely to have an effect on both property and lives in Roosevelt County as snow frequently combines with winds in northeast Montana to produce blizzards. The NWS reports that at least three lives have been lost due to extreme cold in northeast Montana.

#### 3.1.2.1 Location and Extent of Previous Winter Storm Events

Numerous severe winter storm events have affected northeastern Montana and impacted Roosevelt County residents. ***Table 3-3*** presents the winter weather listings from the NWS Storm Events Database (***Appendix G***). Storm type definitions are presented in ***Table 1-2***.

***TABLE 3-3***
***NWS STORM EVENTS DATABASE***
***WINTER WEATHER LISTINGS IN ROOSEVELT COUNTY***

| Date | Type | Comments |
|---|---|---|
| 11/18/1996 | Heavy Snow | |
| 12/16/1996 | Blizzard | |
| 12/29/1996 | Winter Storm | |
| 1/8/1997 | Extreme Windchill | 1 death |
| 1/21,22,28/1997 | 3 Winter Storm Reports | |
| 3/12/1997 | Blizzard | |
| 2/25/1998 | Blizzard | 1 death |
| 3/23/1998 | Heavy Snow | |
| 12/4/1998 | Heavy Snow | |
| 5/11/1999 | Heavy Snow | |
| 11/1,5/2000 | 2 Winter Storm Reports | $3.3M in property damage |
| 12/15/2000 | Blizzard | |
| 12/27/2000 | Ice Storm | |
| 4/1/2001 | Winter Storm | |
| 5/7/2002 | Winter Storm | |

A brief synopsis of major winter storms, as chronicled by local newspapers, is presented below.

***January 1942*** – High wind and snow in northeast Montana resulted in one of the most severe blizzards in years. Temperatures plunged to sub-zero recordings and the raging blizzard disrupted traffic and paralyzing transportation in the territory. (*Blizzard, Cold Wave Hits Area over Week End*, Culbertson Searchlight, January 21, 1942.)

***January 1969*** – Cold temperatures, estimated to be as low as 51 degrees below zero, coupled with heavy snowfall crippled the Wolf Point area. Merchants reported economic hardship as few persons were willing to drive to the city to shop or conduct business. Highway travel was extremely hazardous due to limited visibility from blowing snow. (*51 Below Zero Cold Plagues Wolf Point Area*, Wolf Point Herald, January 30, 1969.)

***February 1998*** – A severe winter storm hit the North Dakota border communities February 25, 1998. Wind gusts up to 40 mph with heavy snow created snowdrifts as tall as housetops in some areas. A Plentywood man died from the storm when he tried to walk home through the blizzard. (*First Blizzard of 1998*, Culbertson Searchlight, March 5, 1998.)

***November 2000*** – Roosevelt County was hard hit by a severe winter storm that occurred during November 2000 and received a federal disaster declaration. A summary of the letter sent to President Clinton by Governor Racicot is presented below:

"On October 31, 2000 a rainstorm hit northeast Montana. The storm started as a drizzle, however, by the early morning hours of November 1, 2000 it had turned into snow and sleet. The storm produced wind gusts of 30 to 40 mph, temperatures reaching 35 degrees below zero and snow drifts up to 3 and 4 feet deep. The initial storm was followed by additional and intermittent storms across eastern Montana. These combined storms represent the earliest and heaviest snows ever-recorded in portions of northeastern Montana."

"A winter weather event of this magnitude has a substantial impact on the commercial, municipal, residential, and agricultural arenas. The biggest impact commercially was on the electrical co-ops, which serve the rural areas. Freezing temperatures followed the rainstorm, causing ice to accumulate on power lines. The weight of the ice was so tremendous that it snapped power lines and broke poles. Overall, electrical co-ops lost upwards of 895 power poles, which affected over 6,500 customers. The power outages ranged between 12 hours up to 3 weeks in some areas."

"Vital water pumps were among the losses caused by the power outages. Therefore, municipalities suffered the loss of fire suppression along with a depletion of town emergency water supplies, causing local government to restrict citizens to an 'Emergency Only' water ration. State snowplows had to work 20 hours a day for snow removal in 'Emergency Only' travel conditions."

"Residents lost electricity, which negated their personal wells and threatened their major heat source. The amount of snow and ice was so immense that the weight collapsed roofs causing major structural damage."

### *3.1.3 Wildfire*

A wildfire is an unplanned fire, a term which includes grass fires, forest fires and scrub fires be it man caused or natural in origin. Severe wildfire conditions have historically represented a threat of potential destruction within Montana. Negative impacts of wildfire include loss of life, property and resource damage or destruction, severe emotional crisis, widespread economic impact, disrupted and fiscally impacted government services, and environmental degradation.

Wildland/urban interface is defined as the zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuel. In northeast Montana, the wildland/urban interface typically is where the edge of local communities adjoin agricultural fields, many of which are in CRP.

U.S. Forest Service (USFS) data for 1990 indicate that 25.7 percent of reported wildfires were caused by arson. Other ignition sources were debris burns (24 percent); lightning (13.3 percent); and other (16.7 percent). Lightning can present particularly difficult problems when dry thunderstorms move across an area suffering from seasonal drought. In northeast Montana, the railroad is a relatively common ignition source of wildfires.

Multiple fires can be started simultaneously, as is often the case in northeast Montana. In dry fuel areas, these fires can cause massive damage before containment. Dry grass, associated with farmland in CRP, is the primary fuel for northeast Montana wildfires. The rate of spread of a fire varies directly with wind speed. Numerous wildfires have impacted residents in northeast Montana. The generally windy

conditions typical to the region, as noted in ***Plan Section 1.4***, cause wildfires to spread rapidly as happened with the Halloween Fires of 1999, described below.

3.1.3.1 Location and Extent of Previous Wildfire Events

Wildfires in 1994 and 1999 were declared State and/or Federal disasters. A description of some wildland fires that have occurred in northeast Montana is presented below.

***Oswego Fire - September 11, 1971 –*** A raging prairie fire consumed 15,000 acres and burned the town of Oswego, in Roosevelt County. Thirteen occupied homes were completely destroyed, along with several other vacant buildings, one of the town's two grain elevators, and a highway bridge. The local utility company suffered losses when many of their poles burned and downed electrical wire. The grass fire burned over 2.8 miles of railroad ties on Burlington Northern's tracks. The source of the fire started at the town's garbage dump where near hurricane force winds blew sparks into a haystack. The fire in Oswego was not the first that town had suffered. Twice in its history prairie fires decimated the town of Oswego, the last large one was about 1922. At the same time as the Oswego fire, a grass fire in the Wolf Creek area burned thousands of acres. The fire was set by dry lightning. (*Flames Gut Oswego; Aid Coming*, The Herald News, September 16, 1971.)

***Bainville Fire - June 1988*** – A range fire south and east of Bainville, in Roosevelt County, started along the Burlington Northern railroad tracks, destroyed two homes, a County bridge and burned an area 2½ miles wide and eight miles long. (*Range Fire Destroys Farms*, Wolf Point Herald, June 16, 1988.)

***The Pines Fire - August 1, 1998 –*** A fire pushed by 40 mph wind threatened cabins in the Pines recreation area on Fort peck Reservoir, in southwestern Valley County. The fire was human-caused and began near the Pines Youth Camp facility. It burned approximately 1,250 acres in a heavily timbered area *(Weekend Blaze in the Pines Recreation Area,* Wolf Point Herald News, August 6, 1998.)

***Murray Fire – August 6, 1999 –*** Firemen from Reserve, Medicine Lake and Plentywood battled a 100-acre wheat field fire about six miles northwest of Reserve, in Sheridan County. Combining was in progress and equipment malfunction caused heat or sparks that ignited the field of ripe grain. (*Fire Consumes 100 Acres; Burning Ban is Approved*, Sheridan County News, September 1, 1999.)

***Culbertson Fire – October 24, 1999*** – North of Culbertson, a pickup truck started a grass fire that was then spread by 20 mph winds. Approximately, 720 acres were charred in a 4-mile long by 1½-mile wide area. (*October 24 Prairie Fire Burns 720 Acres North of Culbertson,* Culbertson Searchlight, October 28, 1999.)

***Outlook Fire - October 31, 1999*** – A massive, wind-fueled wildfire swept across the prairie and about 20 buildings, including 3 inhabited homes, the post office, and gas station, and three grain elevators burned to the ground. At times, the blaze spread as fast as 40 mph. When the fire was finally contained it had burned a swath a mile wide and 15 miles long. The fire began about eight miles west of Outlook along the Soo Line railroad tracks, in Sheridan County. Officials said sparks from a passing locomotive set fire to the grassy right-of-way and wind gusts up to 60 mph blew it out of control. Damage to the railroad was $750,000, including a destroyed locomotive, damaged railcars, charred railroad ties, and two obliterated wooden rail bridges. (*Families Return to Burned Homes*, Great Falls Tribune November 2, 1999.) Farmers and ranchers lost livestock, forage, fences, equipment and other real property. The NWS reported 18,000 acres burned and $4 million in damages. (*Halloween 1999 Firestorms*, NWS Power Point Presentation.)

***Wolf Point Fire - October 31, 1999*** – A grass fire started three miles east of Wolf Point and burned east toward Poplar, cutting a four-mile wide swath. It jumped the Missouri River and into McCone County. Firefighters were battling wind ranging from 40 to 60 mph. Rural structures were burned including six homes southeast of Wolf Point and the local UPS building where a two-building complex and six trucks were destroyed. Damage was estimated between $4 and $5 million. (*Wolf Point Families Homeless*, Great Falls Tribune, November 2, 1999.) The NWS reported that 8,000 acres burned (*Halloween 1999 Firestorms*, NWS Power Point Presentation.)

***Antelope Fire - October 31, 1999 –*** The ferocious wind that spread the Outlook fire also sent a power line to the ground southwest of Antelope, in Sheridan County. The blaze grew in rough coulees and spread rapidly in high wind. Firemen battled to save structures in the Antelope area but one occupied residence was lost. The fire burned an area 7-miles by 2-miles wide. *(Fires Ravage County*, Sheridan County News, November 3, 1999.)

### *3.1.4 Severe Thunderstorms*

The NWS estimates that over 100,000 thunderstorms occur each year in the U.S. Approximately 10 percent are classified as severe. Thunderstorms can produce deadly and damaging tornadoes, hailstorms, intense downburst and microburst wind, lightning, and flash floods. Thunderstorms spawn as many as 1,000 tornadoes each year. Since 1975, severe thunderstorms were involved in 327 Federal disaster declarations.

Hailstorms develop from severe thunderstorms. Although they occur in every state, hailstorms occur primarily in the mid-west and are frequent during the summer months in northeast Montana. NWS data indicates that over 70 hail events affected Roosevelt County between 1955 and 2001. Nationally, hailstorms cause nearly $1 billion in property and crop damage annually, as peak activity coincides with peak agricultural seasons. Severe hailstorms also cause considerable damage to buildings and automobiles, but rarely result in loss of life. The largest hailstones reported in Roosevelt County were 3 inches in diameter and fell on June 30, 1965 (NWS data).

A windstorm is generally a short duration event involving straight-line wind and/or gusts in excess of 50 mph. Windstorms affect areas with significant tree stands, as well as areas with exposed property, major infrastructure, and aboveground utility lines.

Tornados are the most concentrated and violent storms produced by the earth's atmosphere. They are created by a vortex of rotating wind and strong vertical motion, which possess remarkable strength and can cause widespread damage. The most violent tornadoes are capable of tremendous destruction with wind speeds of 250 mph or more. Tornadoes are most common in the Midwest, and are more infrequent and generally small west of the Rockies.

Northeast Montana has experienced tornadoes, many of which have produced significant damage and occasionally injury or death. Over the 52 year period of record from the NWS, 16 tornadoes have been confirmed in Roosevelt County.

#### 3.1.4.1 Location and Extent of Previous Severe Thunderstorm Events

Numerous severe thunderstorm events have affected northeastern Montana and impacted Roosevelt County residents. ***Table 3-4*** presents the severe summer storm listings from the NWS Storm Events Database (***Appendix G***). Storm type definitions are presented in ***Table 1-2***.

***TABLE 3-4***
***NWS STORM EVENTS DATABASE***
***SEVERE SUMMER WEATHER LISTINGS IN ROOSEVELT COUNTY***

| Location | Date | Type | Comments |
|---|---|---|---|
| Roosevelt County | 7/30/1953 | Tornado | |
| Roosevelt County | 7/14/1957 | Thunderstorm Wind | 60 kts. |
| Roosevelt County | 6/10, 26/1959 | Hail, Tornado & Thunderstorm wind reports | 2-inch diameter hail; $3K property damage from tornado |
| Roosevelt County | 7/11 & 8/4 1960 | 2 Hail reports | 1 to 1.5-inch diameter hail |
| Roosevelt County | 7/27 & 9/7/1961 | 2 Hail reports | 1 to 1.25-inch diameter hail |
| Roosevelt County | 7/30/1962 | Hail | 0.75-inch diameter hail |
| Roosevelt County | 6/28/1963 | Thunderstorm Wind | |
| Roosevelt County | 8/1/1964 | Tornado | |
| Roosevelt County | 6/30/1965 | Hail | 3-inch diameter hail |
| Roosevelt County | 7/2/1966 | Hail | 2-inch diameter hail |
| Roosevelt County | 7/16/1968 | Hail & Thunderstorm Wind reports | 1-inch diameter hail |
| Roosevelt County | 9/21/1969 | Tornado | $25K property damage |
| Roosevelt County | 6/14/1978 | Thunderstorm Wind | |
| Roosevelt County | 7/13/1980 | Tornado | $250K property damage |
| Roosevelt County | 7/4/1982 | Hail | 1.75-inch diameter hail |
| Roosevelt County | 7/20/1983 | Thunderstorm Wind | |
| Roosevelt County | 7/15/1987 | Thunderstorm Wind | 69 kts. |
| Roosevelt County | 9/2/1989 | 2 Hail reports | 1 to 1.75-inch diameter hail |
| Roosevelt County | 6/26,28 & 7/10 1990 | 2 Hail & Thunderstorm Wind reports | 1.25-inch diameter hail; winds 57 kts. |
| Roosevelt County | 5/25 & 7/4,17 1991 | Hail, Thunderstorm Wind & Tornado reports | 2.75-inch diameter hail |
| Roosevelt County | 7/7 & 8/6 1992 | 2 Hail & Tornado reports | 1.5-inch diameter hail |
| Poplar | 8/13/1993 | Flash Flood | $50K property damage |
| Wolf Point | 6/4 & 7/2 1994 | 2 Hail reports | 0.75- to 1-inch diameter hail |
| Bainville | 8/7 & 9/5 1995 | Hail & Tornado reports | |
| Volt, Wolf Point, Bainville, Brockton | 6/14,24 & 7/27 & 9/4 1996 | 3 Hail & Thunderstorm Wind reports | 0.75-inch diameter hail; winds 52 kts. |
| Bainville, Poplar | 6/29 & 7/17 1997 | Hail & Thunderstorm Wind reports | 1-inch diameter hail; wind 52 kts. |
| Wolf Point, Froid, Poplar, Bainville | 8/27,29/1997 | 3 Hail, 2 Flash Flood & 7 Thunderstorm Wind reports | 0.75- to 1-inch diameter hail; winds 52 to 65 kts.; $2K property damage Poplar (wind); $10K property damage Wolf Point (wind) |
| Brockton | 6/23/1998 | Flash flood | $50K property damage; $25K crop damage |

***TABLE 3-4***
***NWS STORM EVENTS DATABASE***
***SEVERE SUMMER WEATHER LISTINGS IN ROOSEVELT COUNTY***

| Location | Date | Type | Comments |
|---|---|---|---|
| Wolf Point, Poplar, Brockton, Bainville, Volt, Culbertson | 7/4,5,8/1998 | Tornado & 6 Flash Flood reports | $12K property & $30K crop damage Wolf Point; $100K property & $50K crop damage Poplar; $1M property & $300K crop damage Culbertson; $10K property damage Brockton |
| Wolf Point, Culbertson, Froid, Bainville, Poplar, Brockton | 7/4-18 & 8/1-23 1998 | 26 Hail & 4 Thunderstorm Wind reports | 0.75- to 1.75-inch diameter hail; winds 52 to 73 kts. |
| Poplar, Wolf Point, Froid | 6/19-21/1999 | 4 Hail, 1 Flash Flood & 2 Thunderstorm Wind reports | $25K property damage in Poplar from flash flood; 0.75- to 1.75-inch diameter hail; winds 60 to 65 kts. |
| Poplar, Wolf Point, Brockton, Bainville | 7/12,19-21/1999 | 10 Hail, 2 Funnel Clouds & 2 Thunderstorm wind reports | 0.75- to 2-inch diameter hail; winds 56 kts; $20K property damage Bainville (tornado); $10K property damage Wolf Point (wind) |
| Wolf Point, Culbertson, Poplar, Brockton | 6/7-9 & 7/2-10 & 8/4 2000 | 8 Hail, 1 Flash Flood & 6 Thunderstorm Wind reports | 0.75- to 1-inch diameter hail; winds 52 to 61 kts. |
| Wolf Point, Poplar | 6/15,17/2001 | Thunderstorm Wind & 2 Hail reports | Winds 52 kts.; 0.75-inch diameter hail |
| Brockton, Froid, Culbertson, Bainville, Poplar, Wolf Point | 7/5,17-21 & 8/12 2001 | 2 Hail, 2 Flash Flood & 14 Thunderstorm Wind reports | 0.75 to 0.88-inch diameter hail; winds 52 to 88 kts.; $26K property damage Froid; $30K property damage from flash floods |
| Poplar, Culbertson, Wolf Point | 6/8,21-29/2002 | 2 Hail & 5 Thunderstorm Wind reports | 0.75- to 1-inch diameter hail; winds 50 to 66 kts.; $20K property damage Wolf Point (wind) |
| Bredette, Wolf Point, Poplar, Brockton, Culbertson, Bainville | 7/4,8,14-24/2002 | 4 Hail & 11 Thunderstorm Wind reports | 0.88- to 1-inch hail; winds 52 to 65 kts.; $200K property damage Bainville (wind) |
| Wolf Point, Bredette, Poplar, | 8/7,16/2002 | Flash flood & 5 Thunderstorm Wind reports | $100K property & $50K crop damage Wolf Point flash flood; 52 to 60 kts. winds |

A brief synopsis of some of the severe thunderstorm, hail, and tornado events in northeast Montana, as chronicled by local newspapers, is presented below.

***July 1904*** – Rain fell in torrents filling Culbertson's streets with water. A whirlwind blew down lumber sheds and outbuildings at a local business. Railroad tracks in front of the station were covered with water. Water flowed down Diamond and Stafford coulees several feet deep. The storm produced 1.67 inches of rainfall in one hour. (*Bad Storm at Culbertson*, Valley County News, July 15, 1904.)

***July 9, 1946*** – The communities of Scobey, Flaxville, and Whitetail witnessed 6.09 inches of rainfall in six hours. All over town basements took on water in varying degrees. The communities became isolated as roads washed out, which was complicated when power, light, and telephones went out. Five washouts occurred on the highway between Scobey and Wolf Point, and a serious washout occurred between Flaxville and Whitetail. Rail service was interrupted along the branch line for many days. Hailstorms seriously damaged crops in the Silver Star and Four Buttes communities. Rain washed out miles of fences. A twister took out a grandstand, granaries and some houses. The greatest single disaster occurred when the Carrol dam west of Plentywood washed out. The wall of water released

moved down the valley destroying homes and farm buildings. (*6-Inch Rain in 6 Hours*, Daniels County Leader, July 11, 1946.)

***May 1966*** – A heavy rainstorm created flash flood conditions in the Wolf Point area when close to 2 inches of rain fell in a few hours. Over six feet of water caused city officials to close the underpass and reroute traffic. The highway east of Wolf point was also flooded from Tule Creek, as was a ¼ -mile of County road north and east of Wolf Creek. Basements of many homes were flooded. (*N.E. Areas Escape Heavy Storm Damages*, Wolf Point Herald, June 2, 1966.)

***July 9, 1983 –*** A storm that hit the Wolf Point area demolished houses, uprooted trees and downed dozens of power lines. The storm killed one person and injured another when their truck was lifted by a tornado and thrown one-eighth of a mile into a wheat field. Other storm damage included the complete destruction of a house, garage and quonset. (*Violent Storm Causes Death, Destroys Farm*, Wolf Point Herald, July 14, 1983.)

***June 1994*** – Driving winds, pelting rain, and one or more funnel clouds hit the Culbertson area June 4, 1994. The storm lasted only 15 minutes but left destruction in its wake. Fences were torn down, trees came down on houses, and many buildings were destroyed. (*Damage is Heavy After Tornado Hits Culbertson*, Culbertson Searchlight, June 9, 1994.)

***July 1996*** – A 45 minute storm in Medicine Lake dumped 3 ¾ inches of rain and hail pile up like snow banks. The storm started around Redstone then headed southeast hitting the communities of Reserve, Medicine Lake, and Froid. Farmers reported 100 percent damage to crops and gardens. Residents in Culbertson and Bainville reported broken windows from the hail and damage to vehicles. (*Mother Nature Cuts Loose During Storm*, Culbertson Searchlight, August 1, 1996.)

***August 1997*** – A windstorm in the Wolf Point area, reported as one of the worst windstorms to hit the Roosevelt and Valley County areas, produced straight-line winds measuring 77 mph. The storm blew many roofs off buildings, broke windows in cars and homes and uprooted many trees. Tri-County Implement in Wolf Point reported damages in excess of $20,000. The highest winds were clocked in the Lustre area at 93 mph and 85 mph on the north side of Glasgow. (*Getting Blown Away*, Wolf Point Herald, August 4, 1997.)

### *3.1.5 Human-Caused and Technological Hazards*

Human-caused hazards are technological hazards (accidental events) and terrorism (intentional acts). These are distinct from natural hazards primarily in that they originate from human activity.

The term "technological hazards" refers to the origins of incidents that can arise from human activities such as the manufacture, transportation, storage, and use of hazardous materials. Technological emergencies are accidental and their consequences are unintended. Examples of technological hazards are industrial accidents at either fixed facilities or transportation, and failure of a critical infrastructure component.

The term "terrorism" refers to intentional, criminal, malicious acts. Terrorism hazards include the use of Weapons of Mass Destruction, such as biological, chemical, nuclear, and radiological weapons; arson, incendiary, explosive, and armed attacks; industrial sabotage and intentional chemical releases; and "cyber terrorism".

Whether intentional or accidental, human-caused disasters involve the application of one or more modes of harmful force to the built environment. These modes are defined as contamination (chemical, biological, radiological, or nuclear hazards), energy (explosives, arson, and electromagnetic waves), or failure or denial of service (sabotage, infrastructure breakdown, and transportation service disruption). The greatest human-caused hazard risk to northeast Montana communities is the large quantities of propane, anhydrous ammonia, and petroleum stored in various locations, and the lack of security at these bulk storage facilities. Transportation of hazardous materials on highways and by railroad also poses a significant risk to the area.

3.1.5.1 Location and Extent of Previous Technological Hazard Events

Technological hazards in northeast Montana do not occur with great frequency. However, a bomb scare on the Amtrak train in Wolf Point indicates the region is not immune to terror-related hazards.

***February 1996*** – Amtrak offices in Philadelphia received notification by phone from a person claiming to have knowledge of a bomb placed on a train headed for western Montana. At that time, the train was 10 minutes out of Wolf Point. The decision was made to evacuate passengers from the train and to allow a search to take place. Once the train was evacuated, it was moved to the east end of town, where it was anticipated than an explosion would cause less property damage. Teams were sent from Great Falls, including a canine search team from Malmstrom and the Explosives Ordinance Disposal team from the Montana Air National Guard. No sign of explosives were found and the train was cleared to continue its journey. (Bomb Scare, Wolf Point Herald News, February 26, 1996.)

Records of human-caused disasters in Roosevelt County, available from the U.S. Coast Guard's National Response Center database, and the Montana DES Hazardous Material Response database are summarized in ***Tables 3-5*** and ***Table 3-6***, respectively.

***TABLE 3-5***
***HUMAN CAUSED HAZARD INCIDENTS***
***COAST GUARD NATIONAL RESPONSE CENTER DATABASE***

| Incident Date | City | Suspected Responsible Company | Type of Incident | Medium Affected | Material Name |
|---|---|---|---|---|---|
| 11/19/1990 | Wolf Point | Rempel Trail Transport. | Fixed | Land | Oil: Diesel |
| 07/28/1991 | Poplar | | Railroad | Rail Report | |
| 08/29/1993 | Wolf Point | Montana-Dakota Utility | Pipeline | Air | Natural Gas |
| 01/21/1994 | Culbertson | True Oil | Pipeline | Air | Hydrogen Sulfide |
| 04/02/1994 | Wolf Point | | Railroad | Rail Report | |
| 04/20/1994 | Wolf Point | Gramm Royalty Limited | Fixed | Land | Oil: Crude |
| 05/12/1995 | Poplar | Sheridan Electric | Fixed | Land | Polychlorinated Biphenyls 32ppm |
| 01/04/1996 | Culbertson | True Oil | Fixed | Air | Hydrogen Sulfide |
| 06/13/1996 | Wolf Point | Williston Basin Pipeline | Pipeline | Air | Natural Gas |
| 06/03/1997 | Bainville | Transmontaigne Pipeline Co | Fixed | Land | Sodium Nitrite Solution |
| 09/04/1997 | Brockton | | Railroad | Rail Report | |

***TABLE 3-5***
***HUMAN CAUSED HAZARD INCIDENTS***
***COAST GUARD NATIONAL RESPONSE CENTER DATABASE***

| Incident Date | City | Suspected Responsible Company | Type of Incident | Medium Affected | Material Name |
|---|---|---|---|---|---|
| 08/22/1999 | Poplar | Murphy Exploration & Prod | Fixed | Land | Oil: Crude |
| 05/03/2001 | Brockton | Cenex Harvest States | Storage Tank | Air | Ammonia, Anhydrous |
| 09/14/2002 | Wolf Point | | Fixed | Water | Waste Oil |
| 05/04/2003 | Bainville | BNSF Railroad | Railroad | Ballast | Oil: Diesel |

***TABLE 3-6***
***HUMAN CAUSED HAZARD INCIDENTS***
***MONTANA DES HAZARDOUS MATERIAL RESPONSE DATABASE***

| Incident Date | Geographic Location | Incident Specific Information | HazMat Name | Amount |
|---|---|---|---|---|
| 03/31/1997 | Zimmerman-Sletbold Wells | Oil storage tank ran over top. Release flowed down borrow pit 1/2 mile and may be heading toward stock pond. | Crude Oil | Unknown |
| 06/13/1997 | Near Bainville (rural) | Pipeline released natural gas, condensate into soil and atmosphere. Repaired already, soil absorbed majority and is being turned. | Natural Gas, Condensate | 20-30 barrels |
| 12/31/1997 | 3 mi. N. of Bainville | Overfill of tanker truck - at the Crush Oil Lease Co. owned by JN Exploration. | Crude Oil | 10 to 15 gallons |
| 07/10/1998 | Not listed | While loading, crude truck did not have valve closed properly causing crude to spill onto ground. Clean up occurred with product removed. | Crude Oil | 2 barrels |
| 08/12/1998 | Cenex fertilizer plant in Wolf Point | By-pass hose broke on transport vehicle spilling anhydrous ammonia | Anhydrous ammonia | less than 20 gallons |
| 09/01/1998 | Wolf Point Airport | 75 gals of avgas lost from tank petcock. Went in sump area. Pump shut off. Plane moved. | Avgas | 75 gals |
| 08/23/1999 | Murphy Exploration Production Company | A report of 25 barrels of crude oil spilled from a transfer line. The majority of the product was recovered. | Crude Oil | 25 barrels |
| 11/17/1999 | Highway 2 fill site near Wolf Point | Human error at fill site, Section 07 Township 27N Range 52E | Crude Oil | 15 Barrels |
| 01/05/2000 | 3 miles N of Bainville | Tanker released crude oil over a 30-mile area. Caused by faulty valve. | Crude Oil | 30 - 60 gallons |
| 03/27/2000 | 8 mile E of Culbertson on US 2 | Truck rollover with potash, potassium chloride KCL, cleaned up by responsible party, DEQ notified | Potassium chloride | 200 lbs |
| 04/17/2000 | 2 to 3 mi east of Poplar | Over-fill to above ground storage tanks | Crude Oil | 20 barrels |
| 06/09/2000 | 8 Miles East of Froid | Lightning struck a 4400 gallons crude oil storage tank. VFD let it burn. | Crude Oil | 4400 gallons |
| 07/31/2000 | 10 mi E of Wolf Point | 28 - 50 gallon drums fell off truck during a rollover. Twenty gallons was spilled. | 10-W40 Motor oil | 20 gallons |
| 03/22/2001 | Poplar | Broken containers of herbicide/pesticide discovered in dumpster in Poplar. Dumpster owned and operated by Tribe. DEQ coordinated with Tribe to get Olympus Environmental to clean up spilled materials. | Dieldrin, LD%' Roundup | Unknown |

***TABLE 3-6***
***HUMAN CAUSED HAZARD INCIDENTS***
***MONTANA DES HAZARDOUS MATERIAL RESPONSE DATABASE***

| Incident Date | Geographic Location | Incident Specific Information | HazMat Name | Amount |
|---|---|---|---|---|
| 05/03/2001 | N of Brockton on Rye road | Harvest States (formerly Cenex) called to report anhydrous ammonia release. Farmer was filling tank and failed to turn off valve. Consequently he was burned and between 100-200 pounds of product was released. | Anhydrous Ammonia | 100-200 pounds |
| 08/07/2001 | Tribal Bear Tank Battery 14-5 Palomino Field | | Crude Oil | 30 barrels |
| 12/29/2001 | Tribal Express in Poplar | 20 gallons of diesel fuel were released. | Diesel | 20 gallons |
| 02/09/2002 | East of Poplar | Highway 2 Truck Unloading Facility had bulk tanks leaking into containment area. Unknown cause of leak. | Crude Oil | 400 bbls |
| 05/17/2002 | Private residence 10 miles NNE of Bainville | | Meth Lab Waste | Unknown |
| 09/03/2002 | Palomino Field | SWNE SEC 7 T29N R49E | Produced water (saltwater) | 400 barrels |
| 10/18/2002 | Whiting Oil Field | Equipment malfunction allowed 30 barrels of Produced Water onto the soil. Contractors diluting salt-water mixture with fresh water. | Produced Water | 30 barrels |
| 11/07/2002 | South of Poplar | Found evidence of release from an unused pipeline during normal maintenance. | Crude Oil | 25 barrels (1050 gal) |
| 12/10/2002 | Roosevelt County Roads | Someone dumping well salt water on county & reservation roads. Incident reported to sheriff's office and DEQ DO | Well salt water | Unknown |
| 01/27/2003 | Culbertson | Thermometer broke spilling mercury. Wanted assistance with information on how to dispose. | Mercury | Unknown |

### *3.1.6 Dam Failure*

According to the Montana DNRC, over 300 dams exist in northeast Montana. These dams are used for flood control, fire protection, irrigation, and stock watering. There are no high hazard (Category I) dams in Roosevelt County. Dam failure usually occurs as a secondary effect of storms or earthquakes.

#### 3.1.6.1 Location and Extent of Previous Dam Failure Events

It is not known how many dams have failed in Montana. The following is a summary of several dam failures in northeast Montana, followed by a description of some of the Class I dams in the area. In addition to those listed below, a dam failure and flood impacted the Culbertson area sometime during the early to mid-1900s.

***Frenchman Creek Dam Failure*** – Frenchman Creek Dam is located in Phillips County, 20 miles north of Saco. On April 17, 1952, the dam failed as a result of floodwater and exacerbated flooding in the Milk River Valley. The dam was completed in 1951 and had a storage capacity of about 7,000 acre-feet. The dam's main section was 926 feet long and about 40 feet high with a lower dike section at each side of the mid-valley main section. The west dike was purposely built a foot below the crest level of the spillway so that water could escape over it, in case of flooding. About the time the lower dike was

overtopped, a breach was detected in the main section near the spillway. This was very small, but apparently widened as water ate through the dam. Three other irrigation dams are located on Frenchman Creek upstream across the international boundary near Val Marie, Saskatchewan. *($150,000 Loss in Frenchman Dam Failure*, Glasgow Courier, April 17, 1952.)

***Midway Dam Failure*** – The Midway dam, 40 miles northwest of Nashua, breached during the March 1939 Porcupine Creek flood when the spillway was undermined by huge floating ice cakes. The dam was built by the Indian Reclamation Service as an irrigation structure. The dam was earth fill, faced with concrete slabs with the spillway in the middle. When the dam failed, a four-foot liquid wall swept down the valley causing extensive damage. (*Nashua Hit Twice From High Water*, Glasgow Courier, March 30, 1939.)

***Carrol Dam Failure*** – The Carrol Dam, located eight miles northwest of Plentywood, was a WPA project. The Carrol Dam failed in July 1946 following several inches of rain in a short timeframe. There were no fatalities attributable to the dam failure but destruction was evident throughout the 15 mile valley which took the brunt of the flood. Several homes and farm buildings were destroyed. (*Two Flash Floods Hit Sheridan County*, Plentywood Herald, July 11, 1946.)

3.1.6.2 Existing Dams in the Area

Following is a description of some of the Class I dams in the area.

***Fort Peck Dam –*** in Valley County is one of six multipurpose mainstem projects on the upper Missouri River. Construction began in 1933 and the dam was completed in 1940. It is the largest hydraulically filled dam in the United States. The dam measures 21,026 feet in length with a maximum height of 250.5 feet. In addition to power generation, the water is managed for flood damage reduction, downstream navigation, fish and wildlife, recreation, irrigation, public water supply, and improved water quality. The total storage capacity of the reservoir is approximately 18.7 million acre-feet.

***Box Elder Creek Dam*** is owned and operated by the City of Plentywood. The dam was constructed in 1963 to provide flood protection to the city of Plentywood. The 60-foot high earth dam impounds approximately 6,620 acre-feet of water when filled. According to the 1998 inspection report prepared by the Natural Resources Conservation Service (NRCS, 1998), the dam is in excellent condition and is inspected annually. The intent of the report was to improve project safety while preserving flood protection. The 1980 inspection report (CH2M Hill, 1980) recommends that a downstream warning system be developed and activated. DNRC has indicated that due to its concrete outlet, the life expectancy of the Box Elder Creek Dam is about 100 years. The dam is currently in full compliance; its "Operations Permit" is due for renewal in September 2003 which will involve a more comprehensive 5-year inspection.

***Canadian Power Plant Dam***, owned by the Province of Saskatchewan operates a 1,200-million watt coal-fired electric power complex in southern Saskatchewan near the international border with Montana. A strip mine, dam and reservoir for cooling water and four 300-million watt-generating stations were built in the headwaters drainage of the East Fort Poplar River, upstream of Scobey. Failure of the cooling dam structure would impact the Scobey area.

### *3.1.7 Drought*

A drought is an extended period of unusually dry weather. Drought is a special type of disaster because its occurrence does not require evacuation of an area nor does it constitute an immediate threat to life or property. People are not suddenly rendered homeless or without food and clothing. The basic effect of a drought is economic hardship, but it does, in the end, resemble other types of disasters in that victims can be deprived of their livelihoods and communities can suffer economic decline.

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, range fires can destroy the economic potential of the livestock industry, 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.

#### 3.1.7.1 Description of Previous Drought Events

The history of drought in Montana, as presented in the State of Montana Natural Hazards Mitigation Plan (DES, 2001) is summarized below.

***1930's*** - The 1930's Dust Bowl remains the most highly publicized of past droughts in Montana, but may not necessarily be the worst.

***1950's*** - 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 1956, a total of 20 Montana counties had applied for federal drought assistance.

***1960's*** - Montana saw another drought episode in 1961. By the end of June, 17 counties had requested federal disaster designation 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 1930s. In 1966, the entire state experienced another episode of drought.

***1980's*** - Another well-established drought episode occurred in eastern Montana in 1980. Glasgow received only 4.74 inches in the period from June of 1979 to May of 1980. 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. Drought-related economic losses in Montana in 1980 were estimated to be $380 million.

The drought of 1980 continued into the following year. March snowpacks were at 50-60 percent of normal, initiating forecasts of critical water shortages later in the season. Wolf Point received only six inches of precipitation in the 12-month period ending June 1979. The northeast corner of the state, where forty percent of Montana's wheat crop is produced, remained the driest area of the state.

Inadequate moisture supplies were a problem again in 1984. 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 range fires burning out of control.

Drought continued to plague the state in 1985 and all 56 counties received disaster declarations. April estimates by the Montana Crop and Livestock Reporting Service put northeast Montana's pasture and range at 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 that 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 2,500 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. The extended effects of this drought included the loss of thousands of off-farm jobs, the closing of many implement dealerships and Production Credit Associations.

***1990's*** – Unusual weather conditions in northeast Montana during 1996 wreaked havoc on agricultural producers. Spring arrived late, flooding drowned alfalfa fields, and the summer was dry with rain not coming until it was too late to produce a crop. Severe winter conditions had a negative impact on the local economy, especially livestock producers. Record-setting cold temperatures occurred with snowfall in early November. Livestock feeding began two months early and required increased amounts of hay and supplemental feed. Depletion of hay supplies required that cattle be sold. The Governor requested that haying of CRP land be allowed. (Gov. Marc Racicot papers, January 15, 1997, Montana Historical Society archives).

Agricultural producers in northeast Montana faced severe adverse impacts again in 1998, due to an open winter and very little fall and spring rainfall. Both crop and rangelands were affected, but the most immediate concern was the pasture and range condition. Livestock operations had very limited feed supplies available. In many areas, native range did not green that spring, and many pastures were dormant due to the lack of rainfall and earlier high temperatures. The areas normally hayed for winter feed supplies, were also severely affected. Most areas could not be hayed at all. (Gov. Marc Racicot papers, June 8, 1998, Montana Historical Society archives).

***2000's*** – The U.S. Department of Agriculture issued Natural Disaster Determinations 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.

### *3.1.8 Insect Infestations*

The agricultural industry in northeast Montana was particularly hard hit between 1869 and 1875 when grasshoppers completely destroyed crops. One of the most notable grasshopper invasions occurred in 1938 when "clouds of migrant hoppers came riding the wind from the southeast. They boosted populations of between 40 and 500 hoppers per square yard". Losses in the 17 counties affected by the 1938 grasshopper migration were estimated at $6,500,000 (Montana Magazine of Western History, 1985).

3.1.8.1 Description of Previous Insect Infestations

Insect infestations in Roosevelt County resulted in State disaster declarations in 1986. A description of previous insect infestations in the region is presented below:

***July 22, 1975*** - Roosevelt County applied for State disaster assistance for abatement of mosquitoes. Assistance was requested to alleviate the infestation in livestock and recreation areas, and because of the health hazard to humans. (Letter to Governor Thomas Judge, Montana Historical Society archives).

***July 26, 1975*** - Valley County requested aid due to an outbreak of grasshoppers. Grasshoppers had stripped leaves from growing crops and heads from winter wheat, and had devastated gardens. The Opheim/Glentana area reported 60-70 hoppers per square yard in wheat, and the Richland/Larslan area reported 110/120 hoppers per square yard in cut hay fields. Over 40,000 acres were sprayed at a cost of over $129,000. Valley County was declared an emergency due to the plaque of grasshoppers. (Letter to Governor Thomas Judge, Montana Historical Society archives.)

### *3.1.9 Earthquakes*

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.

Earthquakes occur along faults, which are fractures or fracture zones in the earth across which there may be relative motion. In northeast Montana, several earthquakes have been centered on the Froid-Brockton fault that runs through eastern-Roosevelt and southern-Sheridan County. Seismic risk zones are numbered 0 to 4, with a 4 representing the highest likelihood of a serious earthquake. Northeastern Montana is rated as a 0 on the Seismic Risk Zone scale.

Three quakes of magnitude 3.5 to 4.0 have been recorded in the northeastern Montana area since 1982 and one with a magnitude of 5.0 to 6.0 occurred in 1909. A magnitude 4.0 earthquake, centered about 30 miles north of Brockton, shook eastern Roosevelt County on July 28, 1998. Some residents felt the quake but no damage was reported. (*Mild Earthquake Hits NE Montana*, Daniels County Leader, August 6, 1998; *Earthquake Rocks Eastern Roosevelt County*, Wolf Point Herald, August 6, 1998.)

### *3.1.10 Civil Unrest*

Civil unrest in not a common hazard affecting Montana; however, Garfield County made national news during the Montana Freemen crisis. In the early spring of 1996, hundreds of FBI agents surrounded the Ralph Clark ranch complex near Jordan, Montana for a total siege of 81 days. The government claimed that the nearly thirty people inside were of a radical anti-government and racist religious sect who had written bad checks and threatened judges, among other things.

### *3.1.11 Aircraft Accidents*

The Federal Aviation Administration (FAA) has maintained a database of aircraft accidents since 1978. Database listings for northeast Montana are presented in ***Table 3-7***. No database listings for northeast Montana airports resulted in fatalities.

***TABLE 3-7***
***NORTHEAST MONTANA AIRCRAFT ACCIDENTS FROM FAA DATABASE***

| Event Date | Airport Name | Aircraft Damage | Aircraft Make | Operator | Primary Flight Type | Fatalities | Injuries |
|---|---|---|---|---|---|---|---|
| 11/27/02 | L M Clayton/Wolf Pt | None | Fairchild | Big Sky | Commercial | 0 | 0 |
| 09/14/00 | L M Clayton/Wolf Pt | Minor | Cessna | Private | Personal | 0 | 0 |
| 02/18/96 | Wokal Field/Glasgow | Minor | Cessna | Private | Personal | 0 | 0 |
| 10/05/95 | Wokal Field/Glasgow | Minor | Swrngn | Big Sky | Air Taxi | 0 | 0 |
| 12/29/94 | Wokal Field/Glasgow | None | Swrngn | Big Sky | Air Taxi | 0 | 0 |
| 09/18/94 | Wokal Field/Glasgow | None | Swrngn | Big Sky | Air Taxi | 0 | 0 |
| 08/20/91 | Wokal Field/Glasgow | Minor | Beech | Private | Business | 0 | 0 |
| 07/23/90 | Wokal Field/Glasgow | Minor | Swrngn | Big Sky | Air Taxi | 0 | 0 |
| 02/02/89 | Wokal Field/Glasgow | None | Cessna | Big Sky | Air Taxi | 0 | 0 |
| 04/03/88 | Wokal Field/Glasgow | None | Cessna | Big Sky | Air Taxi | 0 | 0 |
| 02/09/88 | L M Clayton/Wolf Pt | None | Cessna | Big Sky | Air Taxi | 0 | 0 |
| 10/31/83 | L M Clayton/Wolf Pt | Minor | Beech | Private | Air Taxi | 0 | 0 |
| 10/11/81 | Wokal Field/Glasgow | Minor | Piper | Private | Personal | 0 | 0 |

An aircraft accident involving four Plentywood residents occurred in 1962, as summarized below.

***April 8, 1962*** - Four Plentywood men were killed when the light plane in which they were flying crashed into a farm field about 6½ miles east of Circle Montana. According to FAA officials from Billings, a violent spring blizzard was blamed as the apparent cause of the tragedy. Authorities said the plain struck the earth at an extreme nose-low altitude with tremendous force and was completely demolished except for a potion of the tail assembly. (*Four Killed In Plane Crash*, Plentywood Herald, April 12, 1962).

### *3.1.12 Energy Shortage*

Energy shortage is a hazard that threatens northeast Montana, as well as the entire U.S. The Arab oil embargo in 1973 and the California energy shortage of 2000 are two examples. These events are summarized below.

On October 17, 1973 OPEC imposed an oil embargo on the U.S. The embargo came at a time when 85% of American workers drove to their places of employment each day. President Nixon set the nation on a course of voluntary rationing. He called upon homeowners to turn down their thermostats and for companies to trim work hours. Gas stations were asked to hold their sales to a max of ten gallons per customer. In the month of November 1973, Nixon proposed an extension of Daylight Savings Time and a total ban on the sale of gasoline on Sunday's. A severe recession hit U.S., and gasoline lines snaked their way around city blocks (the price at the pump had risen from 30 cents a gallon to about $1.20 at the height of the crisis).

In early December 2000, the state of California was faced with the threat of rolling blackouts for several weeks because of skyrocketing electricity prices and a shortage of power supplies from out of state. The State's move to deregulate its electricity industry and the state's failure to construct new power plants was blamed for the electricity shortage.

## 3.2 HAZARD PRIORITIZATION

Between 1986 and the present, eight federal and/or state disasters have been declared in Roosevelt County. Declared disasters have included two floods, two wildfires, one severe winter storm, and one grasshopper infestation. Further information on these disaster events is presented in subsequent sections of this Plan.

Public meetings were held in the Roosevelt County communities of Wolf Point, Poplar, and Culbertson. Additionally, meetings and interviews were held with public officials numerous times during development of the plan. Generally, Roosevelt County residents identified winter storms, flooding, wildfire, and windstorms are their primary hazards. Hazards discussed and evaluated during the interviews and public meetings are presented in ***Table 3-8.***

***TABLE 3-8***
***HAZARDS EVALUATION DURING PDM PLAN DEVELOPMENT***

| **Natural Hazards** | **Geologic Hazards** | **Hydrologic Hazards** |
|---|---|---|
| Thunderstorms & Lightning | Landslides | Floods |
| Tornadoes | Land Subsidence | Flashfloods |
| Windstorms | Earthquakes | Erosion |
| Hailstorms | Volcanic Eruption | |
| Severe Winter Storms | Expansive Soils | **Technological Hazards** |
| Avalanches | | Dam Failure |
| Extreme Heat and Cold | **People-Specific Hazards** | Power Failure |
| Wildfire | Bomb Threats | Energy Shortage |
| Insect Infestation | Terrorism | Nuclear Accidents |
| | Hostage Situation | Nuclear Attacks |
| **Biological Hazards** | School/Business Violence | Fixed Site (drug labs, pipelines, refineries, USTs, etc.) |
| West Nile Virus | Cyber-terrorism | |
| Hanta Virus | Civil Disturbance | Transportation (railway, roadway, waterway, airway) |
| | Airplane accident | |

Hazard prioritization was accomplished by determining which hazards had caused prior fatalities; resulted in property damage; had the potential to cause the most economic hardship within the County; and, had the potential to affect Roosevelt County residents in the future. Based on review of the historical record and local knowledge, Roosevelt County identified four major hazards that consistently affect this geographic area – flooding, wildfires, severe winter storms and extreme cold, and, severe thunderstorms including high winds, hail and tornadoes. The threat of hazardous material incidents is a technological hazard present in Roosevelt County due to transportation corridors (e.g. highway, railroad) through the area. Security of infrastructure from terrorism was also identified as a technological hazard of concern.

## 3.3 ASSESSING VULNERABILITY: IDENTIFYING ASSETS & VULNERABLE POPULATIONS

Assessing vulnerability requires understanding the location and importance of those things that the community values. For purposes of this risk assessment, building structural values, buildings that house critical services to the community, and people, were identified as valued community resources. To assess the vulnerability of these community assets, a model of their locations and characteristic was developed to be used in conjunction with hazard profiles for performing the risk assessment.

### *3.3.1 Building Values*

Analysis of building stock values is based on the building stock data available from the FEMA HAZUS software. The documentation for this data is provided in ***Appendix E***. Building stock data available in HAZUS was compiled at the census track level. Due to the largely rural nature of this project area, census tracks do not provide a high enough resolution to differentiate one area from another for hazard assessment. To allow analysis of building stock values at the census block level the building stock structure values were assigned to census blocks in the same proportion that a given block represents the percentage of population in the track. ***Map 3-1*** shows building stock values by census block.

### *3.3.2 Critical Facilities and Infrastructure*

Critical facilities are of particular concern because they provide, or are used to provide, essential products and services that are necessary to preserve the welfare and quality of life and fulfill important public safety, emergency response, and/or disaster recovery functions.

Critical facilities are defined as facilities critical to government response and recovery activities (i.e., life safety and property and environmental protection). Critical facilities include: 911 emergency call centers, emergency operations centers, police and fire stations, public works facilities, sewer and water facilities, hospitals, bridges and roads, and shelters; and facilities that, if damaged, could cause serious secondary impacts (i.e., hazardous material facility). Critical facilities also include those facilities that are vital to the continued delivery of community services or have large vulnerable populations. These facilities may include: buildings such as the jail, law enforcement center, public services buildings, community corrections center, the courthouse, and juvenile services building and other public facilities such as hospitals, nursing homes and schools. ***Appendix C*** lists critical facilities in Roosevelt County.

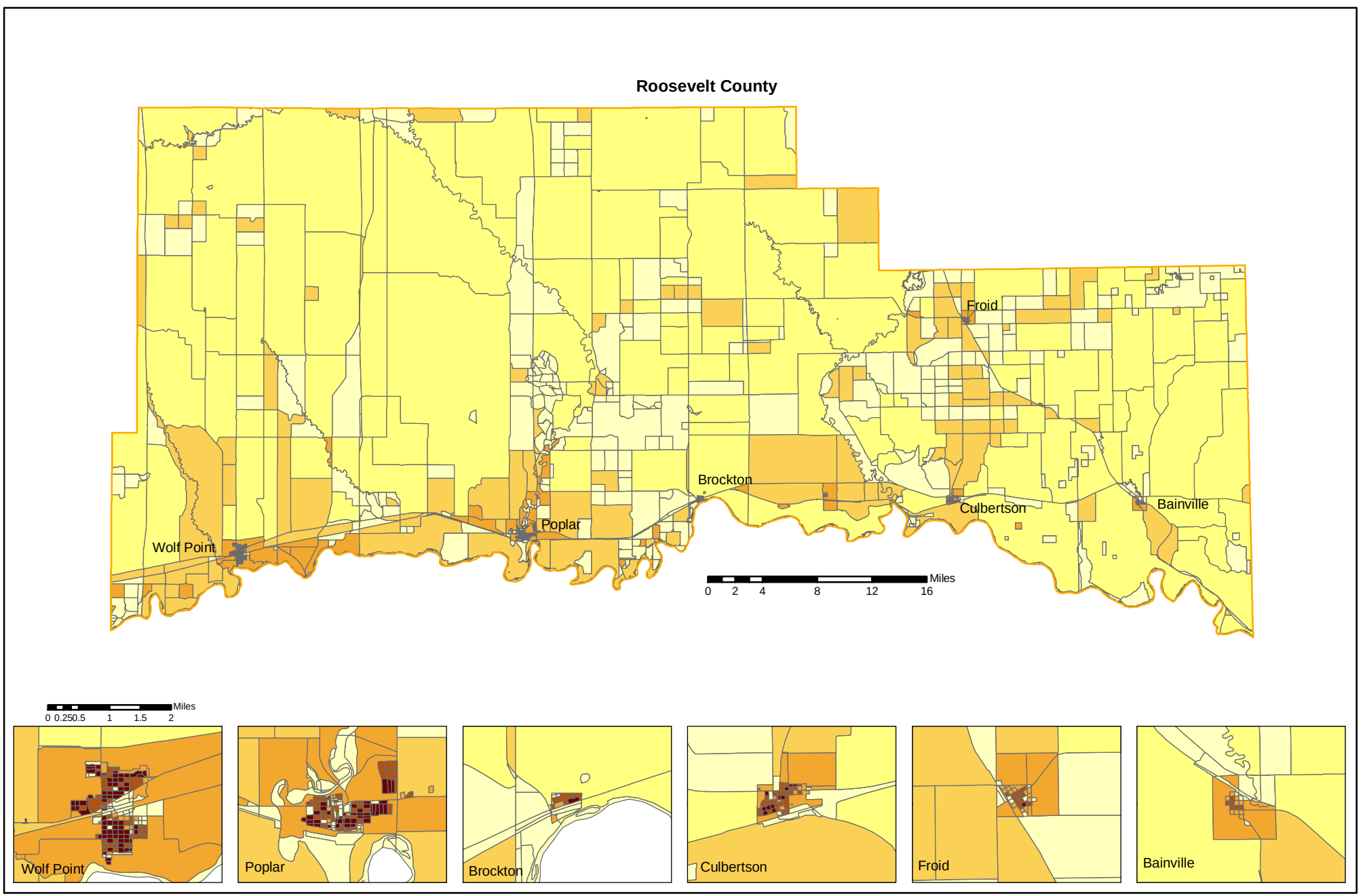
Critical facilities data were obtained by mapping the FEMA HAZUS critical facilities data and then having the maps reviewed, corrected, and enhanced during public meetings. Accurate location information was not available for many of the critical facilities listed in ***Appendix C***. Only those facilities that could be located accurately were included in the analysis. To provide a uniform analysis, critical facilities were assigned to the appropriate census block and the block was given a score based on the number of critical facilities it contains.

### *3.3.3 Future Growth and Land Use Trends*

The population of Roosevelt County has remained relatively stable since 1920. The Roosevelt County Planner suggests that due to the increase in enrolled tribal members residing on the Fort Peck Reservation, population trend in Roosevelt County is likely to remain stable or slightly increase.

Agriculture plays a major role in the economy of Roosevelt County and this trend is also not expected to change in the future. A Local Development Corporation exists to promote the growth of industry in the County and to provide assistance to entrepreneurs and small businesses. An economic development project taking place on the Fort Peck Indian Reservation that will provide positive impacts to portions of Roosevelt County is described below.

***Dry Prairie and Fort Peck Tribal Rural Water Systems***, municipal, rural, and industrial projects that will provide an adequate supply of good—quality water for domestic and industrial use and for livestock water in the Fort Peck Reservation and Dry Prairie service areas. The projects will consist of a water withdrawal intake and treatment plant near the community of Poplar, and pumping stations, pipelines,




Building Stock Values by Census Block
Roosevelt County
Northeast Montana
Pre-disaster Mitigation
Map 3-1

storage tanks, power lines, and other ancillary facilities that will serve a future population of about 30,000 people with water from the Missouri River.

Future Roosevelt County development projects include:

- A & S Tribal Industries Expansion
- West Electronics Expansion
- Wolf Point Senior Center Development
- Tribal Housing Expansion
- Cowboy Hall of Fame Development

Although local officials have indicated that there are no future buildings, infrastructure or critical facilities proposed that would be located in identified hazard areas, mitigation options will be considered in future land use decisions. Roosevelt County officials have indicated that flood mapping and floodplain regulations are most urgently needed in the incorporated communities.

### *3.3.4 Vulnerable Populations*

A significant factor in the impact of any hazard is the effect it has on people. The severity of the impact is related to the intensity of the hazard, the population affected, and the population's ability to protect itself. To model the ability to self-protect and recover from hazards, we used age and indicators of economic well being. The population data used to develop the vulnerability model was derived from the 2000 Census. To model overall vulnerability the following equation was used:

- Score = (societal variable for block / total societal variable in jurisdiction) / maximum societal variable for any block in the jurisdiction)

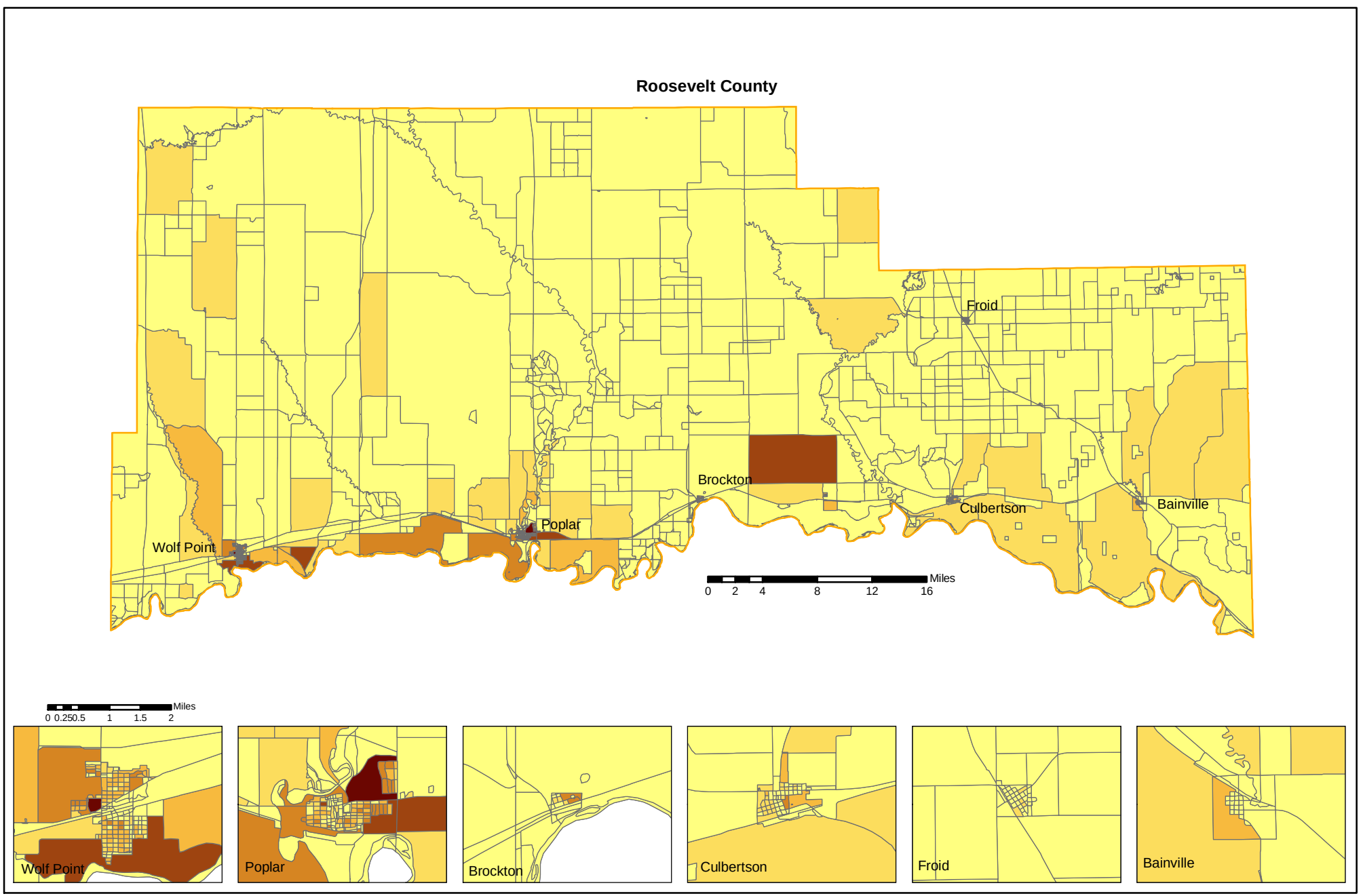
This formula creates a score for each variable that is based on the percentage of that variable in the jurisdiction and is normalized to a scale that is the same as the other variables. The societal variables that were used to determine the overall societal vulnerability per census block were:

- Population Density
- Age > 65
- Age < 18
- Income < Poverty Level
- No High School
- Population with Disabilities
- Population on Public Assistance

Each block was assigned a score for each societal vulnerability and an overall societal vulnerability by adding the individual societal vulnerability scores and dividing by seven, which is the total number of variables evaluated. ***Map 3-2*** depicts total societal vulnerability by census block.

## 3.4 HAZARD PROFILES

Hazard profiles define the frequency, location, and intensity of hazards that may impact a community. Profiles were developed for hazards that historically have had the most effect on the community and the ones that the community identified as being of most concern during public meetings.




Total Societal Vulnerability by Census Block
Roosevelt County
Northeast Montana
Pre-disaster Mitigation
Map 3-2

### *3.4.1 Hazard Frequency*

The frequency of past hazard events was calculated to determine the probability of future hazards occurring. Accurate and consistent records have not been kept for many hazards. Where records have been kept, they are often heavily biased towards only reflecting hazards that occurred in the more populated areas of the jurisdiction. This is especially problematic in areas like Roosevelt County that are largely rural.

Data from the NOAA National Climate Data Center Storm Events database and the Montana DES was used to compile frequencies of natural hazards. The complete listing of events from this database can be found in ***Appendix F***.

***TABLE 3-9***
***ROOSEVELT COUNTY HAZARD FREQUENCIES***

| Hazard | Number of Events | Period of Record In Years | Frequency In Years |
|---|---|---|---|
| Flooding | 21 | 9 | 2.3 |
| Winter Storms | 18 | 9 | 2.0 |
| *Wildfire | 724 | 8 | 90.5 |
| Tornadoes | 16 | 52 | .31 |
| Wind/Thunderstorms/Hail | 168 | 47 | 3.6 |
| **Technological | 37 | 13 | 2.8 |

Notes: *Compiled from data provided by DES and represents a regional frequency.
** Compiled from DES HAZMAT Response Coast Guard National Response Center Databases

### *3.4.2 Hazard Impact Areas*

Hazard impact areas describe the geographic extent a hazard can impact a jurisdiction and are uniquely defined on a hazard-by-hazard basis as discussed below. For purposes of conducting the risk analysis, all the hazard impact areas were defined as the percentage of area in each census block that would be affected.

#### 3.4.2.1 Flooding

Ideally flooding would be modeled by using floodplain maps. The types of floodplain maps required to model flooding in a Geographic Information System (GIS) are vector representations of the floodplain boundaries like the FEMA Q3 maps. Currently, there are no FEMA Q3 digital flood data for the project area. In order to conduct an analysis of flood impacts, a generalized model of potential flood areas was developed by reviewing the existing flood plain maps and modeling them using data that does exist. Potential flooding areas of impact were created by identifying all rivers and streams upstream of a major flood control dam, and buffering them using the following criteria:

- Rivers 2500 feet each side
- Streams 1750 feet each side
- Intermittent 750 feet each side

The buffered areas were then intersected with the census blocks in the GIS to define area of impact by block. ***Map 3-3*** depicts the area potentially impacted by flooding in Roosevelt County. The disadvantage to this method is that it is fairly general and doesn't adequately address known flood prone areas. The advantages of this method are that the floodplain models are at a comparable level of spatial resolution to the data that they are being used to analyze (census blocks) and that it is not biased to only account for flood areas that currently are impacting structures.

#### 3.4.2.2 Winter Storms

The entire project area is in a single climate region (BSk) according to the Köppen Climate Classification for the Conterminous United States developed by the Idaho State Climate Services Center at the University of Idaho. Characteristics of the BSk classification are:

- Semi-Arid, Steppe (Cool)
- Evaporation Exceeds Precipitation on Average
- Precipitation is More than Half but Less than Potential Evaporation
- Mean Average Temp is Below 18c/64.4f

Topographically there are no significant features that generate localized climate conditions that present significant changes in hazard risk in the project area. Therefore the hazard profile area for winter storms is the entire project area.

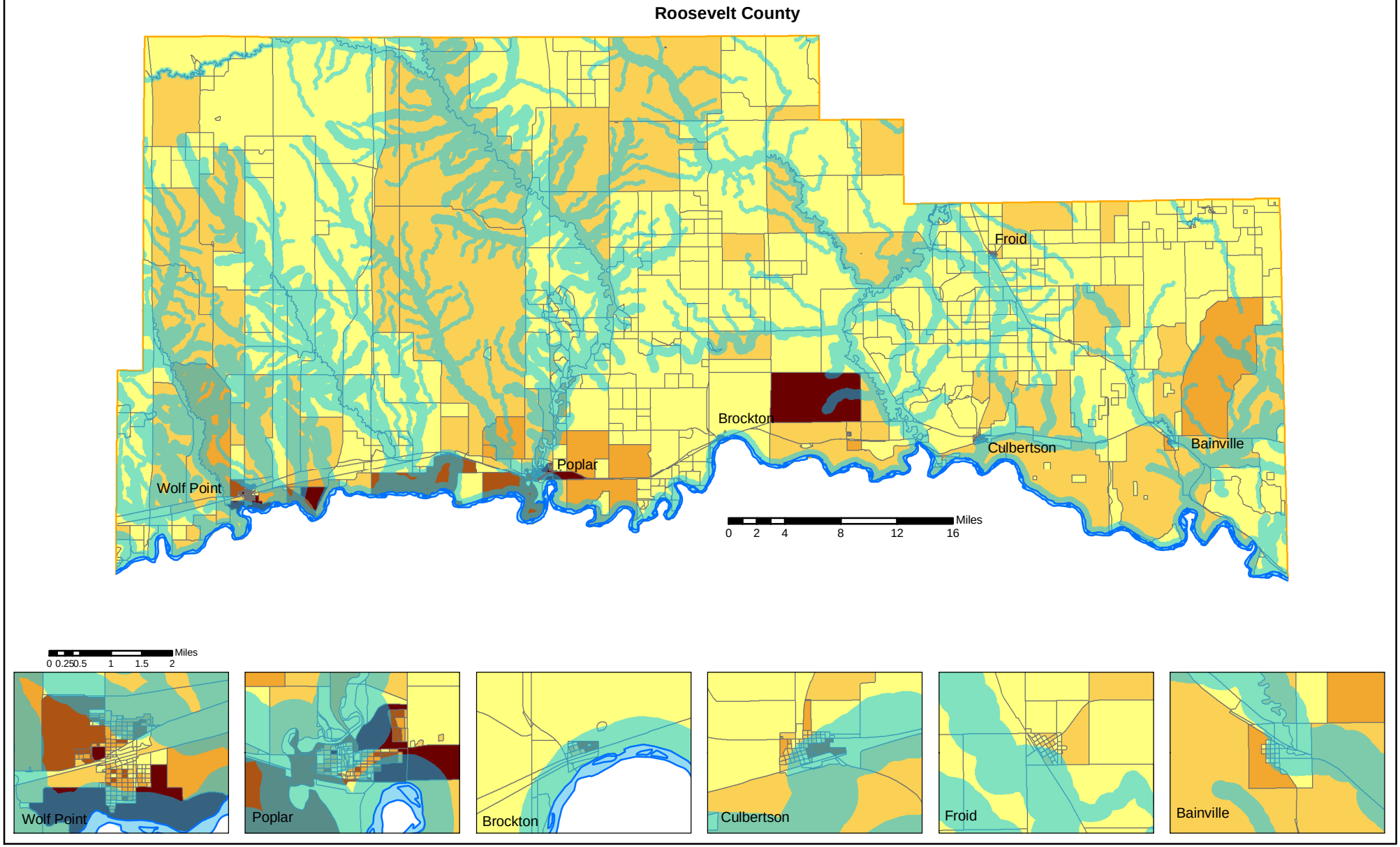
#### 3.4.2.3 Wildfire

Grass and brush fires represent the greatest wildland fire risk for the project area. According to the Urban Wildland Interface Code: 2000 published by the International Fire Code Institute (IFCI) a "Light Fuel" is vegetation consisting of herbaceous plants and round wood less than ¼ inch in diameter – Grassland would fall in this category. Grassland in the project area is mainly composed of grazing land and farmland that is currently in the NRCS Conservation Reserve Program (CRP land). Because there is a significant amount of land in the CRP program in the project area and land is consistently being added and retracted from the CRP, all agricultural land was classified as potential wildfire risk areas. A Medium Fuel according to the Urban Wildland Interface Code: 2000 is vegetation consisting of round wood 1/3 to 3 inches in diameter. Shrub and grassland in the project area fit into this category.

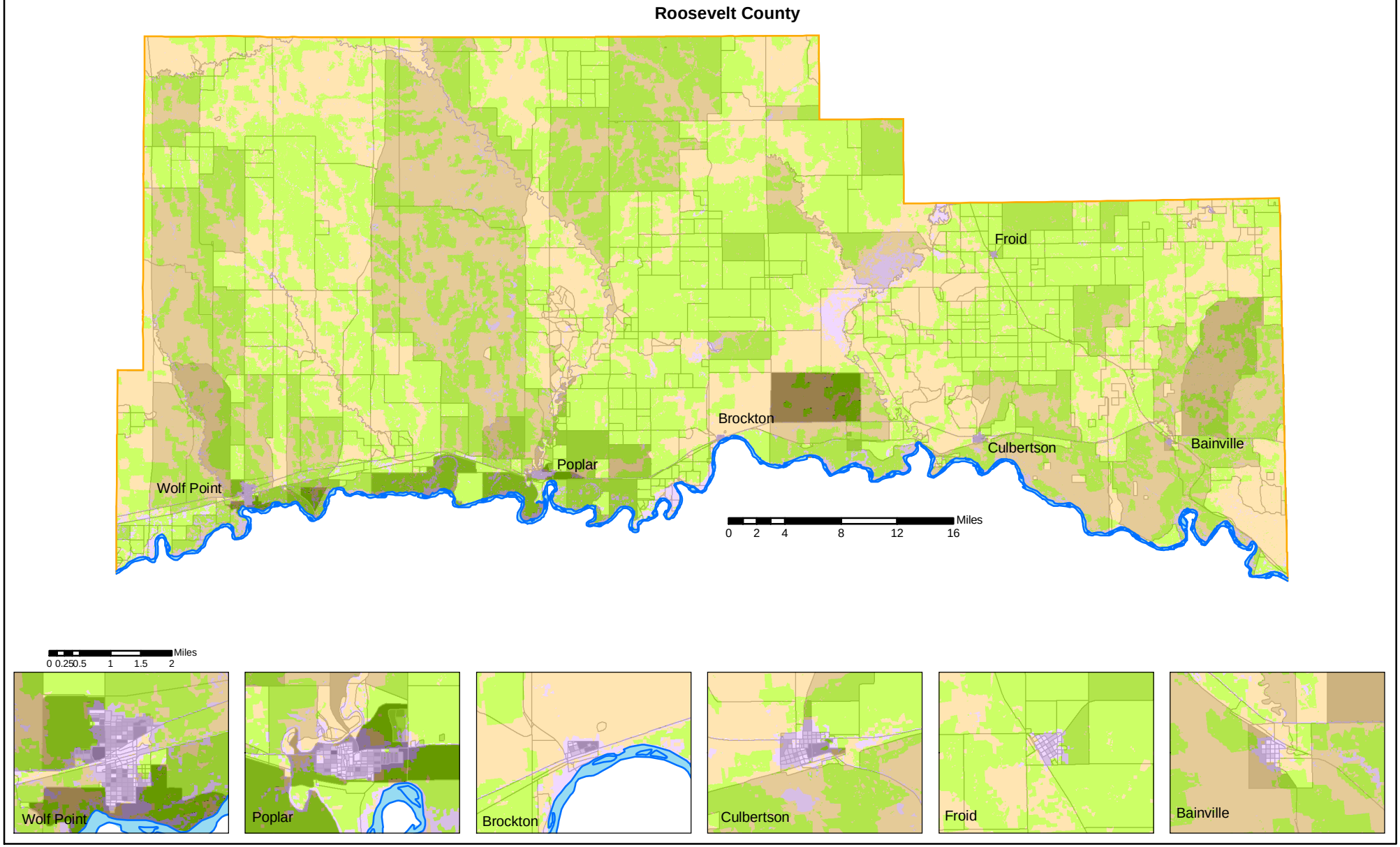
The National Land Cover Data from the US Geological Survey (USGS) was used to define agricultural, grass, and shrub land for the project area. ***Map 3-4*** depicts vegetation types that are fire risk areas. Data from the USFS Wildland Fire Assessment System were also evaluated for use in modeling fire risk but was determined to be too general for the project area.

#### 3.4.2.4 Severe Thunderstorms

According to FEMA's wind zone classifications the entire project area is in Zone II (160 MPH Design Wind Speeds). According to FEMA the project area also has a single classification for tornado frequency (<1 Per 1000 square miles). Based on review of weather data and the determinations made for tornadoes, windstorms and winter storms, the entire project area has been classified with a uniform risk for severe thunderstorms including tornadoes and hail.




Flooding Hazard by Areas
Roosevelt County
Northeast Montana
Pre-disaster Mitigation
Map 3-3




Fire Hazard by Census Areas
Roosevelt County
Northeast Montana
Pre-disaster Mitigation
Map 3-4

#### 3.4.2.5 Human-Caused and Technological Hazards

Based on review of historical accounts of human-caused and technological hazards, the DES Hazardous Material Response database, and input from the public meetings, it was determined that a significant component of risk in this category was related to transportation of hazardous materials and transportation infrastructure. To model the spatial distribution of this risk we developed a GIS data layer of major transportation arteries, which included highways and railroad lines, buffered them by 0.25 miles, and then calculated the impact area by census block. ***Map 3-5*** depicts Transportation Related Technological Risk Areas.

#### 3.4.2.6 Cumulative Hazard Areas

Cumulative hazards for the project area were calculated by summing the percent of each census block that contained flooding, fire, and transportation hazards. Other hazards where not included because they were determined to have uniform spatial distribution across the project area. ***Map 3-6*** depicts cumulative hazard areas by census block.

Estimating potential losses and calculating risk requires evaluating where hazard areas and vulnerabilities to them coincide, how frequently the hazards occur, and then estimating the magnitude of damage resulting from a hazard event.

## 3.5 ASSESSING VULNERABILITY: ESTIMATING POTENTIAL LOSSES

### *3.5.1 Hazard Magnitudes*

The percentage of structures or people exposed to a hazard who are negatively impacted is related to the nature of the hazard and intensity of the event and is expressed as the hazard magnitude. The hazard magnitude is required to develop estimates of structures and people impacted by the hazard. For this risk assessment, hazard magnitude estimates were developed by researching historical disaster records and other relevant data related to hazard intensity. Hazard magnitudes are expressed as a percent of structures or people impacted.

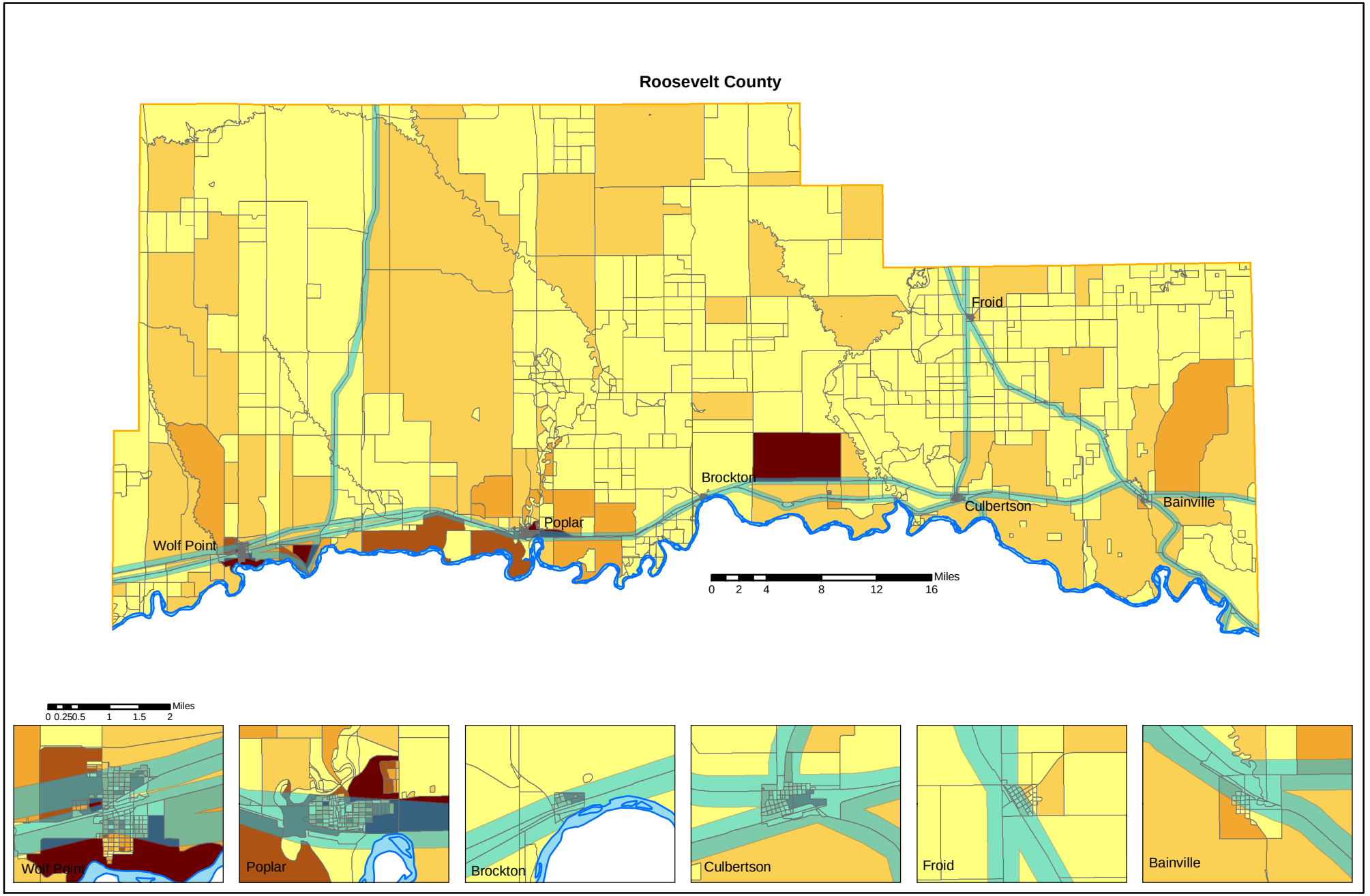
### *3.5.2 Risk Calculations*

Risk calculations present a quantitative assessment of the vulnerability of structures, people, and critical facilities to individual hazards and cumulatively to all hazards. The equation used to develop the overall risk values is:

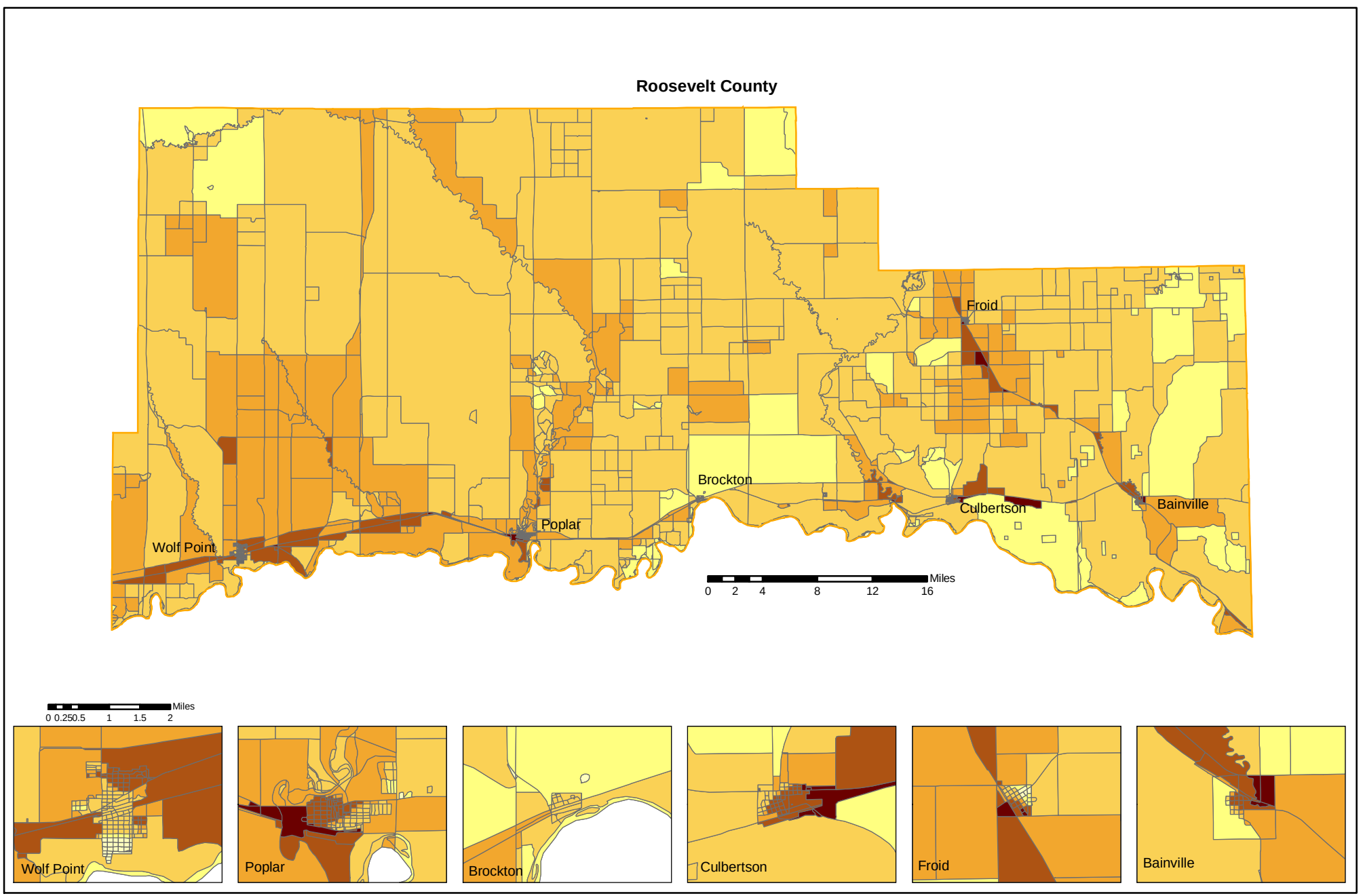
- Exposure x Frequency x Hazard Loss Magnitude

Where :

- Exposure = structures, vulnerable population, or critical facilities at risk as determined in ***Plan Section 3.4.2***
- Frequency = annual number of events determined by calculating the (number of hazard events / period of record) as described in ***Plan Section 3.4.1***
- Magnitude = percent of damage expected as described in ***Plan Section 3.5.1*** and presented in ***Table 3-10***




Transportation Hazards by Areas
Roosevelt County
Northeast Montana
Pre-disaster Mitigation
Map 3-5




Cumulative Hazard Area by Census Block
Roosevelt County
Northeast Montana
Pre-disaster Mitigation
Map 3-6

***Table 3-10*** presents the results of the risk calculations. While the results are presented as dollar values for Building $ Risk, numbers of people effected for Societal Risk, and numbers of facilities effected, they should not be interpreted literally as estimates of actual values. Due to data and modeling limitations the values presented are more appropriately used to evaluate the relative risk posed by the different hazard types. **Tables 3-11 through 3-16** contain the risk calculations for the incorporated towns in Roosevelt County.

***TABLE 3-10***
***ROOSEVELT COUNTY HAZARD VULNERABILITY ASSESSMENTS***

| Hazard | Frequency | Magnitude | Building $ Exposure | Societal Exposure | Critical Facilities Exposure | Building $ Risk | Societal Risk | Critical Facilities Risk |
|---|---|---|---|---|---|---|---|---|
| Flooding | 2.3 | 20.00% | $170,059,356 | 4326 | 32.32 | $78,227,304 | 1990.18 | 14.87 |
| Winter Storms | 2 | 2.00% | $479,169,000 | 12578 | 73.00 | $19,166,760 | 503.12 | 2.92 |
| Wildfire | 90.5 | 0.15% | $165,125,491 | 4089 | 3.98 | $22,415,785 | 555.21 | 0.54 |
| Tornadoes | 0.31 | 0.50% | $479,169,000 | 12578 | 73.00 | $742,712 | 19.50 | 0.11 |
| Wind/Hail Thunderstorms | 3.6 | 0.10% | $479,169,000 | 12578 | 73.00 | $1,725,008 | 45.28 | 0.26 |
| Technological | 2.8 | 0.10% | $292,402,136 | 7,895 | 69.46 | $818,726 | 22.11 | 0.19 |
| Cumulative | | | $2,065,093,983 | 54,045 | 324.76 | $123,096,295 | 3,135.40 | 18.90 |

***TABLE 3-11***
***BAINVILLE HAZARD VULNERABILITY ASSESSMENTS***

| Hazard | Frequency | Magnitude | Building $ Exposure | Societal Exposure | Critical Facilities Exposure | Building $ Risk | Societal Risk | Critical Facilities Risk |
|---|---|---|---|---|---|---|---|---|
| Flooding | 2.3 | 20.00% | $4,878,227 | 101.62 | 1.04 | $2,243,984 | 46.75 | 0.48 |
| Winter Storms | 2 | 2.00% | $9,655,571 | 201.14 | 3.00 | $386,223 | 8.05 | 0.12 |
| Wildfire | 90.5 | 0.15% | $5,320,545 | 110.84 | 0.82 | $722,264 | 15.05 | 0.11 |
| Tornadoes | 0.31 | 0.50% | $9,655,571 | 201.14 | 3.00 | $14,966 | 0.31 | 0.00 |
| Wind/Hail Thunderstorms | 3.6 | 0.10% | $9,655,571 | 201.14 | 3.00 | $34,760 | 0.72 | 0.01 |
| Technological | 2.8 | 0.10% | $3,588,208 | 74.75 | 2.17 | $10,047 | 0.21 | 0.01 |
| Cumulative | | | $42,753,694 | 890.63 | 13.04 | $3,412,244 | 71.08 | 0.73 |

***TABLE 3-12***
***BROCKTON HAZARD VULNERABILITY ASSESSMENTS***

| Hazard | Frequency | Magnitude | Building $ Exposure | Societal Exposure | Critical Facilities Exposure | Building $ Risk | Societal Risk | Critical Facilities Risk |
|---|---|---|---|---|---|---|---|---|
| Flooding | 2.3 | 20.00% | $3,689 | 0.10 | 0.00 | $657 | 0.02 | 0.00 |
| Winter Storms | 2 | 2.00% | $11,505,470 | 303.09 | 0.00 | $437,208 | 11.52 | 0.00 |
| Wildfire | 90.5 | 0.15% | $457,716 | 12.06 | 0.00 | $62,135 | 1.64 | 0.00 |
| Tornadoes | 0.31 | 0.50% | $11,505,470 | 303.09 | 0.00 | $12,081 | 0.32 | 0.00 |
| Wind/Hail Thunderstorms | 3.6 | 0.10% | $11,505,470 | 303.09 | 0.00 | $19,559 | 0.52 | 0.00 |
| Technological | 2.8 | 0.10% | $11,104,732 | 292.53 | 0.00 | $4,442 | 0.12 | 0.00 |
| Cumulative | | | $46,082,548 | 1213.96 | 0.00 | $536,081 | 14.12 | 0.00 |

***TABLE 3-13***
***CULBERTSON HAZARD VULNERABILITY ASSESSMENTS***

| Hazard | Frequency | Magnitude | Building $ Exposure | Societal Exposure | Critical Facilities Exposure | Building $ Risk | Societal Risk | Critical Facilities Risk |
|---|---|---|---|---|---|---|---|---|
| Flooding | 2.3 | 20.00% | $20,470,360 | 426.92 | 21.17 | $9,416,366 | 196.38 | 9.74 |
| Winter Storms | 2 | 2.00% | $34,561,531 | 716.54 | 29.00 | $1,382,461 | 28.66 | 1.16 |
| Wildfire | 90.5 | 0.15% | $4,658,766 | 95.99 | 2.91 | $632,428 | 13.03 | 0.40 |
| Tornadoes | 0.31 | 0.50% | $34,561,531 | 716.54 | 29.00 | $53,570 | 1.11 | 0.04 |
| Wind/Hail Thunderstorms | 3.6 | 0.10% | $34,561,531 | 716.54 | 29.00 | $124,422 | 2.58 | 0.10 |
| Technological | 2.8 | 0.10% | $32,938,413 | 682.83 | 29.00 | $92,228 | 1.91 | 0.08 |
| Cumulative | | | $161,752,131 | 3355.36 | 140.08 | $11,701,474 | 243.68 | 11.53 |

***TABLE 3-14***
***FROID HAZARD VULNERABILITY ASSESSMENTS***

| Hazard | Frequency | Magnitude | Building $ Exposure | Societal Exposure | Critical Facilities Exposure | Building $ Risk | Societal Risk | Critical Facilities Risk |
|---|---|---|---|---|---|---|---|---|
| Flooding | 2.3 | 20.00% | $3,858,616 | 77.18 | 0.00 | $1,774,964 | 35.50 | 0.00 |
| Winter Storms | 2 | 2.00% | $9,971,408 | 199.45 | 2.00 | $398,856 | 7.98 | 0.08 |
| Wildfire | 90.5 | 0.15% | $1,956,042 | 39.12 | 0 | $265,533 | 5.31 | 0.00 |
| Tornadoes | 0.31 | 0.50% | $9,971,408 | 199.45 | 2.00 | $15,456 | 0.31 | 0.00 |
| Wind/Hail Thunderstorms | 3.6 | 0.10% | $9,971,408 | 199.45 | 2.00 | $35,897 | 0.72 | 0.01 |
| Technological | 2.8 | 0.10% | $5,686,403 | 113.74 | 1.00 | $15,922 | 0.32 | 0.00 |
| Cumulative | | | $41,415,284 | 828.39 | 7.00 | $2,506,627 | 50.14 | 0.09 |

***TABLE 3-15***
***POPLAR HAZARD VULNERABILITY ASSESSMENTS***

| Hazard | Frequency | Magnitude | Building $ Exposure | Societal Exposure | Critical Facilities Exposure | Building $ Risk | Societal Risk | Critical Facilities Risk |
|---|---|---|---|---|---|---|---|---|
| Flooding | 2.3 | 20.00% | $44,807,713 | 1269.36 | 6.00 | $20,611,548 | 583.90 | 2.76 |
| Winter Storms | 2 | 2.00% | $58,790,697 | 1733.79 | 6.00 | $2,351,628 | 69.35 | 0.24 |
| Wildfire | 90.5 | 0.15% | $6,214,768 | 174.57 | 0.14 | $843,655 | 23.70 | 0.02 |
| Tornadoes | 0.31 | 0.50% | $58,790,697 | 1733.79 | 6.00 | $91,126 | 2.69 | 0.01 |
| Wind/Hail Thunderstorms | 3.6 | 0.10% | $58,790,697 | 1733.79 | 6.00 | $211,647 | 6.24 | 0.02 |
| Technological | 2.8 | 0.10% | $57,387,908 | 1694.42 | 6.00 | $160,686 | 4.74 | 0.02 |
| Cumulative | | | $284,782,482 | 8339.72 | 30.14 | $24,270,289 | 690.63 | 3.07 |

***TABLE 3-16***
***WOLF POINT HAZARD VULNERABILITY ASSESSMENTS***

| Hazard | Frequency | Magnitude | Building $ Exposure | Societal Exposure | Critical Facilities Exposure | Building $ Risk | Societal Risk | Critical Facilities Risk |
|---|---|---|---|---|---|---|---|---|
| Flooding | 2.3 | 20.00% | $44,464,921 | 1199.93 | 2.10 | $20,453,864 | 551.97 | 0.97 |
| Winter Storms | 2 | 2.00% | $138,516,839 | 3529.08 | 31.00 | $5,540,674 | 141.16 | 1.24 |
| Wildfire | 90.5 | 0.15% | $10,132,008 | 269.28 | 0 | $1,375,420 | 36.55 | 0.00 |
| Tornadoes | 0.31 | 0.50% | $138,516,839 | 3529.08 | 31.00 | $214,701 | 5.47 | 0.05 |
| Wind/Hail Thunderstorms | 3.6 | 0.10% | $138,516,839 | 3529.08 | 31.00 | $498,661 | 12.70 | 0.11 |
| Technological | 2.8 | 0.10% | $93,492,177 | 2338.85 | 29.93 | $261,778 | 6.55 | 0.08 |
| Cumulative | | | $563,639,622 | 14395.29 | 125.03 | $28,345,097 | 754.41 | 2.45 |

# 4.0 MITIGATION STRATEGY

Specific mitigation goals and projects were developed for Roosevelt County in conjunction with public meetings held in three communities and stakeholder interviews. A matrix developed for project ranking emphasizing cost-benefit and input from local officials was used to determine project prioritization. Following is a description of goals and objectives used to mitigate natural and technological hazards that builds on the community's existing capabilities. Project implementation and legal framework are discussed at the conclusion of this section.

## 4.1 LOCAL HAZARD MITIGATION GOALS

The Plan goals describe the overall direction that Roosevelt County agencies, organizations, and citizens can take to work toward mitigating risk from natural and technological hazards. Goals and objectives of the Plan were developed during interviews and meetings with public officials and at the public meetings held at three locations; Wolf Point, Poplar, and Culbertson. Roosevelt County hazard mitigation goals are identified below.

- Enhance Emergency Response System
- Reduce Impacts from Flooding
- Enhance Early Warning Capabilities
- Secure Integrity of Utilities and Infrastructure
- Minimize Risk of Wildfire at Urban Interface
- Minimize Economic Impact of Drought
- Reduce Risk of Hazardous Material Incidents

In addition to goals identified at the PDM public meetings, the City of Poplar provided goals and mitigation projects that were developed for their Growth Plan. A copy of this information is presented in ***Appendix D***.

## 4.2 MITIGATION OBJECTIVES AND ACTIONS

The broad range of potential mitigation activities presented in ***Appendix D*** were considered, and below is a list of mitigation objectives and the actions (projects) identified by the County. Projects marked with an asterisk are response-related actions identified as County priorities. Although these projects may not be eligible for FEMA funding, Counties may secure alternate funding sources to implement these projects in the future. Mitigation projects specific to individual jurisdictions are noted within the list.

***Enhance Emergency Response Systems***

- Install pigtails (electrical wiring) at shelters and critical facilities to accommodate mobile generators
- * Purchase mobile generators for emergency response activities
- Provide training for first responders
- * Purchase equipment for ambulance and fire department to prepare for chemical disasters (Culbertson)

***Reduce Impacts from Flooding***

- Enter into National Flood Insurance Program – Wolf Point, Bainville, Brockton, Froid, and Poplar
- Improve storm water system along Hwy 2 in Wolf Point and south side of town

- Maintain diversion and low-water crossing (Culbertson)
- Maintain waterways to keep free from debris (Culbertson)
- Install additional culvert in Hwy 16 north (MDT Plan) (Culbertson)
- Construct diversion in Saddle Club area to slow down water prior to culverts (Culbertson)
- Construct channel to handle outflow from culverts (Culbertson)
- Design storm sewers for town of Culbertson to handle surface water run off (Culbertson)
- Determine flood elevations for town of Culbertson and update floodplain maps (Culbertson)
- Construct diversion (Brockton)
- Install culverts (Froid)

***Enhance Early Warning Capabilities***

- Upgrade siren systems in all communities
- Implement local warning system (like channel 15) for local communities

***Secure Integrity of Utilities and Infrastructure***

- Install fencing and alarm system at water treatment plant and water supply wells

***Minimize Risk of Wildfire at Urban Interface***

- Institute weed control measures (mowing) along railroad
- Negotiate over haying of CRP land

***Minimize Economic Impact of Drought***

- Develop additional water supplies
- Construct Fort Peck Tribes Dry Prairie water line
- Negotiate for summer releases from Fort Peck Dam

***Reduce Risk of Hazardous Material Incidents***

- Relocate anhydrous ammonia tank currently adjacent to Wolf Point city limits.

## 4.3 PROJECT RANKING AND PRIORITIZATION

A cost-benefit matrix was developed to rank the mitigation projects using the following criteria. Each project was assigned a "high", "medium", or "low" rank for *Population Impacted, Property Impacted*, and *Cost*. For the *Population Impacted* category, a "high" rank represents greater than 50 percent of County residents; a "medium" rank represents 20 to 50 percent of County residents; and a "low" rank represents less than 20 percent of County residents. For the *Property Impacted* and *Project Cost* categories, a "high" rank represents greater than $500,000, a "medium" rank represents between $100,000 and $500,000, and a "low" rank is less than $100,000. The matrix was completed by assigning each rank a numeric value as follows:

***TABLE 4-1***
***COST-BENEFIT SCORING MATRIX***

| | **Population Impacted** | **Property Impacted** | **Cost** |
|---|---|---|---|
| High | 5 | 5 | 1 |
| Medium | 3 | 3 | 3 |
| Low | 1 | 1 | 5 |

The overall cost-benefit was then calculated by summing the total score for each project. ***Table 4-2*** presents the Hazard Mitigation Project Cost-Benefit Matrix for Roosevelt County.

The DES Coordinator also ranked each mitigation project as "high", "medium", and "low" based on community priorities. Projects identified by Roosevelt County as top priorities and their cost/benefit ranking are presented in ***Table 4-3.***

## 4.4 PROJECT IMPLEMENTATION AND LEGAL FRAMEWORK

Once the Roosevelt County PDM Plan is formally adopted, the County will use the cost-benefit analysis in the Plan to focus project prioritization. Mitigation projects will be considered for funding through federal and state grant programs, and when other funds are made available through the County. The LEPC, a consortium of local officials and disaster planning personnel, will be the coordinating agency for project implementation. The LEPC has the capacity to organize resources, prepare grant applications, and oversee project implementation, monitoring, and evaluation. Coordinating organizations may include local, county, or regional agencies that are capable of, or responsible for, implementing activities and programs. The DES Coordinator will be responsible for mitigation project administration.

A number of state and local regulations and policies form the legal framework available to implement Roosevelt County's hazard mitigation goals and projects. A list of these regulations and plans is presented below.

***State of Montana***

- Montana Subdivision and Platting Act
- Montana Building Codes
- Montana Sanitation in Subdivision

***Local***

- Roosevelt County Floodplain and Floodway Management Ordinance
- Comprehensive Growth Policy (under development)
- Roosevelt County Subdivision Regulations
- Septic Sewer permits

A summary of how the PDM Plan can be integrated into this legal framework is presented below.

- Use the PDM Plan to help the County's Comprehensive Growth Policy meet the goal of protecting public health and property from natural hazards.
- Initiate zoning ordinances in conjunction with flood mitigation projects to prevent development in flood-prone areas.
- Partner with other organizations and agencies with similar goals to promote building codes that are more disaster resistant on the State level.
- Develop incentives for local governments, citizens, and businesses to pursue hazard mitigation projects.
- Allocate county resources and assistance for mitigation projects.
- Partner with other organizations and agencies in northeast Montana to support hazard mitigation activities

***TABLE 4-2***

***ROOSEVELT COUNTY COST/BENEFIT RANKING OF HAZARD MITIGATION PROJECTS***

| *GOAL* | *HAZARD MITIGATION PROJECTS* | *HAZARDS MITIGATED* | *WOLF POINT JURISDICTION* | *POPLAR JURISDICTION* | *BAINVILLE JURISDICTION* | *BROCKTON JURISDICTION* | *CULBERTSON JURISDICTION* | *FROID JURISDICTION* | *ROOSEVELT CO. JURISDICTION* | *POPULATION IMPACTED* | *PROPERTY IMPACTED* | *COST* | *COST/BENEFIT RANKING* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reduce Impacts from Flooding | Enter into National Flood Insurance Program – Wolf Point, Poplar, Brockton, Froid, Bainville | Flooding | X | X | X | X | | X | | High | High | Low | High |
| Reduce Impacts from Flooding | Maintain diversion and low-water crossing (Culbertson) | Flooding | | | | | X | | | Medium | High | Low | High |
| Reduce Impacts from Flooding | Maintain waterways to keep free from debris (Culbertson) | Flooding | | | | | X | | | Medium | High | Low | High |
| Reduce Impacts from Flooding | Construct channel to handle outflow from culverts (Culbertson) | Flooding | | | | | X | | | Medium | High | Medium | High |
| Reduce Impacts from Flooding | Determine flood elevations for town of Culbertson and update floodplain maps | Flooding | | | | | X | | | Medium | High | Low | High |
| Enhance Early Warning Capabilities | Upgrade siren systems in all communities | Fire, Flooding, Tornadoes | X | X | X | X | X | X | X | High | High | Medium | High |
| Enhance Early Warning Capabilities | Implement local warning system (like channel 15) for local communities | Fire, Flooding, Winter Storms, Tornadoes | X | X | X | X | X | X | X | High | High | Low | High |
| Minimize Risk of Wildfire at Urban Interface | Institute weed control measures (mowing) along railroad | Fire | X | X | X | X | X | X | X | Medium | High | Low | High |
| Minimize Risk of Wildfire at Urban Interface | Negotiate haying of CRP land | Fire | | | | | | | X | Medium | High | Low | High |
| Enhance Emergency Response Systems | Purchase equipment for emergency response agencies to respond to chemical, biological & terrorist incidents | Technological | X | X | X | X | X | X | X | Medium | Medium | Medium | Medium |
| Enhance Emergency Response Systems | Purchase mobile generators to provide alternate power for critical facilities | Fire, Flooding, Winter Storms, Tornadoes | X | X | X | X | X | X | X | Medium | Medium | Low | High |
| Enhance Emergency Response Systems | Provide training for first responders | Fire, Flooding, Winter Storms, Tornadoes | X | X | X | X | X | X | X | Medium | Low | Low | Medium |
| Reduce Impacts from Flooding | Improve storm water system along Hwy 2 in Wolf Point and south side of town | Flooding | X | | | | | | | Medium | High | High | Medium |
| Reduce Impacts from Flooding | Construct flood diversion (Brockton) | Flooding | | | | X | | | | Medium | Medium | Medium | Medium |
| Reduce Impacts from Flooding | Install flood diversion and culverts (Froid) | Flooding | | | | | | X | | Medium | Medium | Medium | Medium |
| Reduce Impacts from Flooding | Install additional culvert in Hwy 16 north (MDT plan) (Culbertson) | Flooding | | | | X | | | | Low | High | High | Medium |

***TABLE 4-2***

***ROOSEVELT COUNTY COST/BENEFIT RANKING OF HAZARD MITIGATION PROJECTS***

| GOAL | HAZARD MITIGATION PROJECTS | HAZARDS MITIGATED | WOLF POINT JURISDICTION | POPLAR JURISDICTION | BAINVILLE JURISDICTION | BROCKTON JURISDICTION | CULBERTSON JURISDICTION | FROID JURISDICTION | ROOSEVELT CO. JURISDICTION | POPULATION IMPACTED | PROPERTY IMPACTED | COST | COST/BENEFIT RANKING |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reduce Impacts from Flooding | Construct diversion in Saddle Club area to slow down water prior to culverts (Culbertson) | Flooding | | | | X | | | | Low | High | High | Medium |
| Reduce Impacts from Flooding | Design storm sewers for town of Culbertson to handle surface water run off | Flooding | | | | X | | | | Medium | High | High | Medium |
| Secure Integrity of Utilities and Infrastructure | Install fencing and alarm system at water treatment plant and water supply wells | Technological | X | X | X | X | X | X | X | Medium | Low | Low | Medium |
| Minimize Economic Impact of Drought | Develop additional water supplies | Drought | X | X | X | X | X | X | X | Medium | Medium | High | Medium |
| Enhance Emergency Response Systems | Install pigtails (electrical wiring) at shelters and critical facilities to accommodate mobile generators | Fire, Flooding, Winter Storms, Tornadoes | X | X | X | X | X | X | X | Medium | Low | Low | Medium |
| Minimize Economic Impact of Drought | Construct Fort Peck Tribes Dry Prairie water line | Drought | X | X | X | X | X | X | X | Medium | Medium | Medium | Medium |
| Minimize Economic Impact of Drought | Negotiate for summer releases from Fort Peck Dam | Drought | X | X | X | X | X | X | X | Medium | Low | Low | Medium |
| Reduce Risk of Hazardous Material Incidents | Relocate hazardous materials storage facilities currently adjacent to city limits | Technological | X | | | | X | | | Medium | High | Low | High |

***POPULATION IMPACTED***

High = > 50% of County residents

Medium = 20 to 50% of County residents

Low = < 20% County residents

***PROPERTY IMPACTED & PROJECT COST***

High = > $500,000

Medium = $100,000 to $500,000

Low = < $100,000

***COST BENEFIT FORMULA***

High = "5" for Population Impacted & Property Impacted; "1" for Cost

Medium = "3" for Population Impacted & Property Impacted; "3" for Cost

Low = "1" for Population Impacted & Property Impacted; "5" for Cost

***COST/BENEFIT RANKING***

High = 11 to 15

Medium = 6 to 10

Low = 0 to 5

***TABLE 4-3***

***ROOSEVELT COUNTY PRIORITY HAZARD MITIGATION PROJECTS***

| *GOAL* | *HAZARD MITIGATION PROJECTS* | *HAZARDS MITIGATED* | *COUNTY PRIORITY* | *COST/BENEFIT RANKING* |
|---|---|---|---|---|
| Reduce Impacts from Flooding | Enter into National Flood Insurance Program – Wolf Point, Poplar, Brockton, Froid, Bainville | Flooding | High | High |
| Reduce Impacts from Flooding | Maintain diversion and low-water crossing (Culbertson) | Flooding | High | High |
| Enhance Emergency Response Systems | * Purchase mobile generators for emergency response activities | Fire, Flooding, Winter Storms, Tornadoes | High | Medium |
| Enhance Emergency Response Systems | Provide training for first responders | Fire, Flooding, Winter Storms, Tornadoes | High | Medium |
| Reduce Impacts from Flooding | Improve storm water system along Hwy 2 in Wolf Point and south side of town | Flooding | High | Medium |
| Enhance Emergency Response Systems | * Purchase equipment for ambulance and fire department to prepare for chemical disasters (Culbertson) | Technological | High | Low |

Notes: *indicates response-related project - funding source other than FEMA may be required

# 5.0 PLAN MAINTENANCE PROCEDURES

The Plan maintenance section of this document details the formal process that will ensure that the Roosevelt County Pre-Disaster Mitigation Plan remains an active and relevant document. The Plan maintenance process includes a schedule for monitoring and evaluating the Plan and producing a Plan revision every five years. This section describes how the county will integrate public participation throughout the Plan maintenance process. Also included in this section is an explanation of how Roosevelt County government intends to incorporate the mitigation strategies outlined in this Plan into existing planning mechanisms.

## 5.1 MONITORING, EVALUATING AND UPDATING THE PLAN

The Roosevelt County Pre-Disaster Mitigation Plan will be reviewed every two years, or as deemed necessary by knowledge of new hazards, vulnerabilities, or other pertinent reasons. The review will determine whether a Plan update is needed prior to the required five year update. The Plan review will identify new mitigation projects and evaluate the effectiveness of mitigation priorities and existing programs.

The DES Coordinator will be responsible for scheduling a meeting of the Roosevelt County board of Commissioners (Board) to review and update the Plan. The meeting will be open to the public and advertised in the local newspaper to solicit public input. The Board, assisted by the Local Emergency Planning Committee (LEPC) and the public will review the goals and mitigation projects to determine their relevance to changing situations in the county, as well as changes in state or federal policy, and to ensure they are addressing current and expected conditions. The Board and public will also review the risk assessment portion of the Plan to determine if this information should be updated or modified, given any new available data. The list of critical facilities will also be reviewed and enhanced with additional details. The DES Coordinator will give a status report detailing the success of various mitigation projects, difficulties encountered, success of coordination efforts, and which strategies should be revised. The status report will be published in the local newspaper to update local citizens.

The DES Coordinator will be responsible for the five year Plan update of the Plan, and will have six months to make appropriate changes to the Plan before submitting it to the Board and public for review and approval. Before the end of the five-year period, the updated Plan will be submitted to the State Hazard Mitigation Officer and the FEMA for acceptance. The DES Coordinator will notify all holders of the county Plan when changes have been made.

## 5.2 IMPLEMENTATION THROUGH EXISTING PROGRAMS

Roosevelt County is currently developing a Comprehensive Growth Policy to address statewide planning goals and legislative requirements. The Pre-Disaster Mitigation Plan provides a series of projects – many of which will be closely related to the goals and objectives of the County Growth Policy. Roosevelt County will have the opportunity to implement hazard mitigation projects through existing programs and procedures. Local officials will work with the County departments to ensure hazard mitigation projects are consistent with planning goals and integrate them, where appropriate.

The County Building Department is responsible for administering the building codes in local municipalities. After the adoption of the mitigation plan, they will work with the State Building Code Office to make sure that the County adopts, and is enforcing, the minimum standards established in the State Building Codes. In addition, the County Building Department will work with other agencies at the

state level to review, develop and ensure building codes that are adequate to mitigate or prevent damage by natural hazards. This is to ensure that life-safety criteria are met for new construction.

Within six months of formal adoption of the PDM plan, mitigation goals will be incorporated into the County Comprehensive Growth Policy. Meetings of the Board will provide an opportunity for local officials to report back on the progress made on the integration of mitigation planning elements into county planning documents and procedures.

## 5.3 CONTINUED PUBLIC INVOLVEMENT

Roosevelt County is dedicated to involving the public directly in review and updates of the Pre-Disaster Mitigation Plan. The public will have many opportunities to provide feedback about the Plan. Copies of the Plan will be catalogued and kept at all appropriate agencies in the County as well as at the Public Library. The existence and location of these copies will be publicized in the County newspaper. Section 2.0 of the Plan includes the address and the phone number of the DES Coordinator responsible for keeping track of public comments on the Plan.

A series of public meetings will also be held prior to each two year review and five year update, or at lesser intervals when deemed necessary by the Board. The meetings will provide the public a forum for which they can express its concerns, opinions, or ideas about the Plan. The DES Coordinator will be responsible for using county resources to publicize the annual public meetings and maintain public involvement through the newspapers and radio.

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