Southeast Colorado Regional
Hazard Mitigation Plan

May 2012

Prowers County plan updated from original version approved October 2003

Developed by the Southeast Colorado Emergency Managers Association
with professional planning assistance from
AMEC Earth and Environmental, Denver, CO
Hazard Mitigation and Emergency Management Programs

TABLE OF CONTENTS

Chapters

County Planning Element Annexes

Baca County Planning Element

Bent County Planning Element

Crowley County Planning Element

Kiowa County Planning Element

Otero County Planning Element

Prowers County Planning Element

Appendixes

Appendix A – References

Appendix B - Plan Participants and Process Documentation

Appendix C – Records of Adoption

EXECUTIVE SUMMARY

This plan is the product of a planning process undertaken by the Southeast Colorado Emergency Management Association, a consortium of six southeast Colorado counties. The purpose is to meet the requirements of the Disaster Mitigation Act of 2000 (PL 106-390) and thereby maintain continued eligibility for certain Hazard Mitigation – or disaster loss reduction – programs from FEMA, the Federal Emergency Management Agency.

The HMPC followed a planning process prescribed by FEMA, which began with the formation of a hazard mitigation planning committee (HMPC) comprised of key region representatives, and other regional stakeholders. The HMPC conducted a risk assessment that identified and profiled hazards that pose a risk to the planning area, assessed the region's vulnerability to these hazards, and examined the capabilities in place to mitigate them. The planning area is vulnerable to several hazards that are identified, profiled, and analyzed in this plan.

Based on the risk assessment, the HMPC identified goals, objectives, and policies for reducing the region's vulnerability to hazards. It was decided 5 goals would be used. The goals of this multi-hazard mitigation plan are:

1. MAINTAIN FEMA ELIGIBILITY/POSITION COMMUNITIES FOR FEDERAL MITIGATION FUNDING

1.1. Develop and Adopt this DMA Plan

1.1.1. Attend the County Subcommittee Meetings
1.1.2. Provide Data Regarding Hazards, Losses, and Existing Capabilities
1.1.3. Review and Comment Upon the Drafts
1.1.4. Stimulate and Participate in the Public Input Process
1.1.5. Advise and Schedule Plan Adoption with Appropriate Authority

2. IMPROVE COUNTY CAPABILITY TO REDUCE DISASTER LOSSES

2.1. Have Each County Certified as "Storm Ready" by NWS

2.1.1. Coordinate with National Weather Service (NWS)
2.1.2. Seek NOAA Weather Radio Repeaters
2.1.3. Identify Other Program Requirement Needs
2.1.3.1. Communications Equipment

2.2. Improve Local Flood Protection Programs (where appropriate)

2.2.1. Promote National Flood Insurance Program (NFIP) Participation
2.2.2. Promote Public Awareness of Flood Hazard Areas & Potential Losses
2.2.3. Promote Flood Insurance
2.2.4. Seek Improved Floodplain Mapping

2.3. Coordinate Planning Requirements and Community Plans

2.3.1. Disaster Plans

2.3.1.1. Local Emergency Operations Plans

2.3.1.2. Homeland Security Plans

2.3.1.2.1. Bioterrorism/Health Department Plans

2.3.1.2.2. WMD/Terrorism Plans

2.3.2. Hazardous Materials and LEPC Plans

2.3.2.1. Materials Transported through the County

2.3.2.2. Materials Stored in the County

2.3.2.3. Materials Manufactured in the County

2.3.3. Regional Transportation Plans

2.3.3.1. CDOT

2.3.4. County Comprehensive Plans

2.4. Reduce Damage to and Maintain Functionality of Critical Facilities and Infrastructure.*

3. REDUCE LOSS OF LIFE, PROPERTY DAMAGES, AND ECONOMIC IMPACTS FROM HAZARDS

3.1. Reduce Losses from Drought

3.1.1. Improve Water Supply

3.1.2. Seek Grazing on CRP Land

3.1.3. Use Low-Water Crops

3.2. Reduce Losses from Flood

3.2.1. Promote Flood Insurance

3.2.2. Sponsor Cost-Effective Site-Specific Projects

3.3. Reduce Losses from Tornadoes/Wind storms

3.3.1. Improve Warning

3.3.2. Promote "Safe-Rooms" and Other Shelters

3.3.3. Promote Erosion Mitigation Techniques

3.4. Reduce Agricultural Losses Hazards

3.4.1. Promote Crop Insurance

3.5. Reduce Losses from Wildfires*

3.6. Reduce Losses from Winter Storms*

3.7. Reduce Losses from Other Hazards Identified in This Plan, Where Practical and Feasible*

4. INCREASE PUBLIC AWARENESS OF POTENTIAL HAZARD LOSSES

4.1. Sponsor an Annual Public Education Project

4.1.1. Have an “Awareness” Week

4.1.1.1. Show Hazard Maps, List Past Losses, Explain Insurance Availability/Cost

4.1.1.2. Use Billing “Stuffers,” County Fair, Websites, Newsletters, Radio, Newspapers, 4-H Clubs

4.1.2. Target Specific Areas (floodplains)

To meet this identified goal, the plan recommends 72 mitigation actions, which are summarized in the table that follows. This plan has been formally adopted by the City and will be updated every five years at a minimum.

Mitigation Action Plan Table

Mitigation Action Title	Priority	Cost Estimate	Schedule	Responsible Party	Addresses Current Development	Addresses Future Development	Continued Compliance with NFIP
Regional Mitigation Actions							
Coordinate with Edison Power to Identify Strategies to Improve Power System Redundancies (or resilience), including Undergrounding Vulnerable Lines in Adjacent Counties.	H	$1,003,200	Within 5 years	Southeast Colorado Power Association	X	X	
Baca County							
Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program	H	Staff time, printing costs	Ongoing	Baca County Emergency Management	X	X	
Community Wildfire Protection Plans	M	TBD	Determined in the CWPP	Baca County Office of Emergency Management	X	X	
CWPP Projects as identified by the County's CWPP	M	TBD	Determined in the CWPP	Baca County Office of Emergency Management	X	X	
Firewise Outreach Message to appropriate audiences within the County CWPP Plan	M	TBD	Determined in the CWPP	Baca County Office of Emergency Management	X	X	
Develop ordinances to address burn permitting and restrictions	H	$8,500	July 2013 if funded in 2012	Baca County Office of Emergency Management	X	X	
Countywide fire district establishment	M	$20,000	Nov. 2013 if worked on heavily	Baca County Office of Emergency Management	X	X	
Install outdoor warning sirens in unincorporated towns in the county (Stonington, North Walsh)	H	$43,000	October 2013 if funded in early 2012	Baca County Office of Emergency Management	X	X	
Educate residences on the importance of fire mitigation efforts around their houses /structures	H	$5,000	Next five years	Baca County Office of Emergency Management	X	X	

Mitigation Action Title	Priority	Cost Estimate	Schedule	Responsible Party	Addresses Current Development	Addresses Future Development	Continued Compliance with NFIP
Educate the public on current fire conditions by public outreach and roadside signs.	H	$7,500	July 2013 if funded in 2012	Baca County Office of Emergency Management	X	X	
Street Identification Signs	H	$220,000	January 2013 if funded in 2012	Baca County Office of Emergency Management	X	X	
Address/House number identification	H	$30,000	January 2013 if funded in 2012	Baca County Office of Emergency Management	X	X	
NFPA 704 enforcement and education to Tier II facilities and others to identify locations of hazardous materials	H	$7,500	July 2013 if funded in 2012	Baca County Office of Emergency Management	X	X	
Public awareness of flooding potential, Ag infestation, Drought, Heat, Cold	H	$6,000	January 2013 if funded in 2012	Baca County Office of Emergency Management	X	X	X
Install River Gauges	M	$48,000	January 2013 if worked on heavily	Baca County Office of Emergency Management	X	X	
Weather radio placement in public places	H	$3,800	July 2013 if funded in 2012	Baca County Office of Emergency Management	X	X	
Tornado Shelter Designation and Education	H	$12,000	January 2013 if funds available in early 2012.	Baca County Office of Emergency Management	X	X	
Town of Pritchett							
Address/House number identification	H	$3,000	July 2013 if funded in 2012	Mayor's Office	X	X	
Street Identification Signs	M	$5,000	July 2013 if funded in 2012	Mayor's Office	X	X	
Tornado Shelter Designation and Education	H	$4,000	July 2013 if funded in 2012	Mayor's Office	X	X	
Town of Springfield							
Street Identification Signs	M	TBD	July 2013 if funded in 2012	Mayor's Office	X	X	
Tornado Shelter Designation and Education	H	$1,200	July 2013 if funded in 2012	City Manager	X	X	

Mitigation Action Title	Priority	Cost Estimate	Schedule	Responsible Party	Addresses Current Development	Addresses Future Development	Continued Compliance with NFIP
Build outdoor warning system to include the south Hwy 287 area	H	$18,000	October 2013 if funded in early 2012	Mayor’s Office	X	X	
Town of Walsh							
Address/House number identification	H	$3,000	July 2013 if funded in 2012	Mayor’s Office	X	X	
Street Identification Signs	M	$11,000	January 2013 if funded in 2012	Mayor’s Office	X	X	
Public awareness of flooding potential, Ag infestation, Drought, Heat, Cold	H	$1,000	January 2013 if funded in 2012	Mayor’s Office	X	X	
Tornado Shelter Designation and Education	H	$2,000	January 2013 if funded in 2012	Mayor’s Office	X	X	
Bent County							
Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program	H	Staff time, printing costs	Ongoing	Bent County Emergency Management	X	X	X
CWPP Projects as identified by the County’s CWPP	M	TBD	Determined in the CWPP	Bent County Office of Emergency Management	X	X	
Continue to Implement Sound Floodplain Management Practices through Participation in the National Flood Insurance Program (NFIP) and Updated Statewide Floodplain Rules	M	Staff time	Within 1 year	Bent County Office of Emergency Management	X	X	X
Maintain Ditches, Culverts, and Drainages in County Right-of-ways	M	Varies	Ongoing	Bent County County Commissioners’ Office	X	X	
Firewise Outreach Message to appropriate audiences within the County CWPP Plan	M	TBD	Determined in the CWPP	Bent County Office of Emergency Management	X	X	
Community Wildfire Protection Plans	M	TBD	Determined in the CWPP	Bent County Office of Emergency Management	X	X	

Mitigation Action Title	Priority	Cost Estimate	Schedule	Responsible Party	Addresses Current Development	Addresses Future Development	Continued Compliance with NFIP
Arkansas River Conservancy District							
Armoring levy	M	TBD	Dependent on funding	Board of Directors, Arkansas River Conservancy District	X	X	
Amassing of Rip Rap	H	$50,000	Ongoing	Board of Directors, Arkansas River Conservancy District	X	X	
Removal of woody invasive species within levy narrow area.	M	TBD	Within 5 years	Board of Directors, Arkansas River Conservancy District	X	X	
Crowley County							
Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program	H	Staff time, printing costs	Ongoing	Crowley County Emergency Management	X	X	
Lane 27 drainage project	M	$1,441,800	Within 5 years	Crowley County Road & Bridge	X	X	
CWPP Projects as identified by the County's CWPP	M	TBD	Determined in the CWPP	Crowley County Emergency Management	X	X	
Firewise Outreach Message to appropriate audiences within the County CWPP Plan	M	TBD	Determined in the CWPP	Crowley County Emergency Management	X	X	
Community Wildfire Protection Plans	M	TBD	Determined in the CWPP	Crowley County Emergency Management	X	X	
Town of Ordway							
Ordway drainage project	M	$6,581	Within five years	Ordway Public Works Department	X	X	X
Kiowa County							
Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program	H	Staff time, printing costs	Ongoing	Kiowa County Emergency Management	X	X	
CWPP Projects as identified by the County's CWPP	M	TBD	Determined in the CWPP	Kiowa County Fire Department	X		

Mitigation Action Title	Priority	Cost Estimate	Schedule	Responsible Party	Addresses Current Development	Addresses Future Development	Continued Compliance with NFIP
Firewise Outreach Message to appropriate audiences within the County CWPP Plan	M	TBD	Determined in the CWPP	Kiowa County Fire Department	X	X	
Community Wildfire Protection Plans	M	TBD	Determined in the CWPP	Kiowa County Fire Department	X	X	
Eads/Kiowa County Fire Protection District	M	TBD	Within two years	Eads/Kiowa County Fire Department	X	X	
Eads Maine Street Drainage Improvements	M	$300,000	Within 5 years	Town of Eads	X	X	
Otero County							
Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program	H	Staff time, printing costs	Ongoing	Otero County Emergency Management	X	X	X
CWPP Projects as identified by the County's CWPP	M	TBD	Determined in the CWPP	Otero County Emergency Management	X	X	
Firewise Outreach Message to appropriate audiences within the County CWPP Plan	M	TBD	Determined in the CWPP	Otero County Emergency Management	X	X	
Community Wildfire Protection Plans	M	TBD	Determined in the CWPP	Otero County Emergency Management	X	X	
City of La Junta							
Flooding – Southwest La Junta Drainage and Roadway Improvements	H	$3,103,713.86	Dependent on funding.	City of La Junta Department of Engineering	X	X	X
Storm Drain Backflow Prevention	M	$150,000	Currently the project is not scheduled. If funding was available it would take approximately 120 days to complete once the funding was secured.	City Engineer's Office	X	X	X

Mitigation Action Title	Priority	Cost Estimate	Schedule	Responsible Party	Addresses Current Development	Addresses Future Development	Continued Compliance with NFIP
Continue to implement sound floodplain management practices	H	Staff Time	Dependent on funding.	City Engineer's Office	X	X	X
North La Junta Conservancy District							
Removal of tamarisk, Russian olive, and debris for better water river flow.	H	TBD	Ongoing	North La Junta Conservancy District	X	X	
Prowers County							
Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program	H	Staff time, printing costs	Ongoing	Prowers County Emergency Management	X	X	
Continue to Implement Sound Floodplain Management Practices through Participation in the National Flood Insurance Program (NFIP) and Updated Statewide Floodplain Rules	M	Staff time	Within 1 year	Prowers County Land Use	X	X	X
Community Wildfire Protection Plans	M	TBD	Determined in the CWPP	Prowers County Rural Fire Department	X	X	
CWPP Projects as identified by the County's CWPP	M	TBD	Determined in the CWPP	Prowers County Rural Fire Department	X	X	
Firewise Outreach Message to appropriate audiences within the County CWPP Plan	M	TBD	Determined in the CWPP	Prowers County Rural Fire Department	X	X	
Prowers County Stream Notification System	M	$70,000	When funding is available	Prowers County Office of Emergency Management	X	X	
Critical Facilities Relocation Fire	H	$445,000	1 year after funding is obtained	Prowers County Rural Fire Department	X	X	
Prowers Fire District Establishment	H	$25,000	2 year after funding is obtained	Prowers County Rural Fire Department	X	X	
Prowers Fire All-Hazard Response Apparatus	H	$200,000	When funding is available	Prowers County Rural Fire Department	X	X	

Mitigation Action Title	Priority	Cost Estimate	Schedule	Responsible Party	Addresses Current Development	Addresses Future Development	Continued Compliance with NFIP
Wiley CR 196 Bridge Project	H	$500,000	1st year update past engineering, 2 year project construction	Prowers County Office of Emergency Management	X	X	
Tornado Shelter	H	$2,500,000	1st year update past engineering, 2 year project construction	Prowers County Office of Emergency Management	X	X	
CR 196 Flood Project	M	$200,000	1st year update past engineering, 2 year project construction	Prowers County Office of Emergency Management	X	X	
Bristol Drainage Project	H	$350,000	1st year update past engineering, 2 year project construction	Prowers County Office of Emergency Management	X	X	
Town of Hartman							
Evaluate the Benefits of Joining the National Flood Insurance Program (NFIP)	H	Minimal	Within 1-2 years	Community planning/zoning/public works department	X	X	X
Town of Holly							
Holly Flood Control Dike	H	$250,000	1st year Prioritization of repairs, bid process for repairs, contracting for repairs. 2nd year contracting repairs completed	Holly Flood Control, Drainage, and Sanitation District and Prowers County OEM	X	X	X
City of Lamar							
Willow Creek Dike Project	H	$450,000	1st year update past engineering, 2 year project construction	City of Lamar Water and Waste	X	X	X
Parmenter East Storm Drainage Project	H	$1,323,600	1 year after funding is obtained.	City of Lamar Water and Waste	X	X	X
Lamar School District							
Lightning Detection/Warning Systems	H	$60,000	As soon as funding is obtained	Lamar School District Maintenance	X	X	

CHAPTER 1 INTRODUCTION

1.1 Purpose

The Southeast Colorado Emergency Managers Association prepared this regional hazard mitigation plan update to guide hazard mitigation planning and to better protect the people and property of the planning area from the effects of natural hazard events. This plan demonstrates the region's commitment to reducing risks from hazards, and serves as a tool to help decision makers direct mitigation activities and resources. This plan ensures the planning area's eligibility for certain federal disaster assistance, specifically, the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation program.

1.2 Background and Scope

Each year in the United States, disasters take the lives of hundreds of people and injure thousands more. Nationwide, taxpayers pay billions of dollars annually to help communities, organizations, businesses, and individuals recover from disasters. These monies only partially reflect the true cost of disasters, because additional expenses to insurance companies and nongovernmental organizations are not reimbursed by tax dollars. Many disasters are predictable, and much of the damage caused by these events can be alleviated or even eliminated.

Hazard mitigation is defined by FEMA as "any sustained action taken to reduce or eliminate long-term risk to human life and property from a hazard event." The results of a three-year, congressionally mandated independent study to assess future savings from mitigation activities provides evidence that mitigation activities are highly cost-effective. On average, each dollar spent on mitigation saves society an average of $4 in avoided future losses in addition to saving lives and preventing injuries (National Institute of Building Science Multi-Hazard Mitigation Council 2005).

Hazard mitigation planning is the process through which hazards that threaten communities are identified, likely impacts of those hazards are determined, mitigation goals are set, and appropriate strategies to lessen impacts are determined, prioritized, and implemented. This plan documents the planning region's hazard mitigation planning process, identifies relevant hazards and risks, and identifies the strategies that each participating County and jurisdiction will use to decrease vulnerability and increase resiliency and sustainability.

This plan was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 (Public Law 106-390) and the implementing regulations set forth by the Interim Final Rule published in the *Federal Register* on February 26, 2002 (44 CFR §201.6) and finalized on

October 31, 2007. (Hereafter, these requirements and regulations will be referred to collectively as the Disaster Mitigation Act (DMA).) While the act emphasized the need for mitigation plans and more coordinated mitigation planning and implementation efforts, the regulations established the requirements that local hazard mitigation plans must meet in order for a local jurisdiction to be eligible for certain federal disaster assistance and hazard mitigation funding under the Robert T. Stafford Disaster Relief and Emergency Act (Public Law 93-288). Because the planning area is subject to many kinds of hazards, access to these programs is vital.

Information in this plan will be used to help guide and coordinate mitigation activities and decisions for local land use policy in the future. Proactive mitigation planning will help reduce the cost of disaster response and recovery to the community and its property owners by protecting critical community facilities, reducing liability exposure, and minimizing overall community impacts and disruption. The planning area has been affected by hazards in the past and is thus committed to reducing future disaster impacts and maintaining eligibility for federal funding.

1.3 Plan Organization

The Southeast Colorado Regional Hazard Mitigation Plan is organized in alignment with the DMA planning requirements and the FEMA plan review crosswalk as follows:

- Chapter 1: Introduction
- Chapter 2: Community Profile
- Chapter 3: Planning Process
- Chapter 4: Risk Assessment
- Chapter 5: Mitigation Strategy
- Chapter 6: Plan Adoption, Implementation, and Maintenance
- Chapter 7: Introduction to the County Planning Elements
- County Planning Element Annexes
- Appendices

1.4 Multi-Jurisdictional Planning

This plan was prepared as a regional, multi-jurisdictional plan. The planning region is comprised of the 6 counties of the Southeast Colorado All-Hazards Planning Region established by the Colorado Division of Emergency Management (CDEM). These counties include Baca, Bent, Crowley, Kiowa, Otero, and Prowers Counties. All local units of government in the County were invited to participate in the planning process. The decision whether or not to participate in this process was a local decision, based on local community needs. Communities have the options to not prepare a plan, to prepare a stand-alone plan for their jurisdiction, or to participate in a multi-jurisdiction or county-wide plan. The following table lists counties and their local governments that have opted to participate in this effort and are seeking FEMA approval of this plan. Additional detail about participation can be referenced in Chapter 3, the County Planning Element Annexes, and Appendix B.

Table 1.1 Multi-Jurisdictional Participation

Jurisdiction
Baca County
County
Town of Pritchett
Town of Springfield
Town of Walsh
Bent County
County
Arkansas River Conservancy District
Crowley County
County
Town of Ordway
Kiowa County
County
Otero County
County
City of La Junta
North La Junta Conservancy District
Prowers County
County
Town of Hartman
Town of Holly
City of Lamar
Lamar School District

2 REGIONAL PROFILE

This section provides a brief overview of the geography of the planning area. Additional geographic profiles of the participating Counties are provided in the County Planning Elements.

2.1 Geography and Climate

The planning region is comprised of 6 counties of the Southeast All-Hazards Planning Region established by the Colorado Division of Emergency Management (CDEM). These Counties include Baca, Bent, Crowley, Kiowa, Otero, and Prowers Counties. This region of the State is generally characterized by the Great Plains. As shown in Table 2.1, the region covers some 9,598 square miles of land and 65 square miles of water, and elevations range between 3,000 and 6,000 feet, which increases from east to west.

Table 2.1 County Area Statistics

	Baca	Bent	Crowley	Kiowa	Otero	Prowers
Land (sq. mi)	2,557	1,541	800	1,786	1,270	1,644
Water (sq mi)	1	27	11	15	7	4
Total	2,558	1,568	811	1,801	1,277	1,648

Source: US Census Bureau

As shown in Table 2.2, the majority of the land mass is devoted to agriculture, with an estimated 8,201 square miles devoted to farmland (85% of the planning area).[1]

Table 2.2 Agricultural Statistics

	Baca	Bent	Crowley	Kiowa	Otero	Prowers
Farms	777	311	268	425	569	636
Land in Farms (sq. mi)	2032.6	1370.5	705.0	1,496.8	975.2	1620.8
Land in Farms (acres)	1,300,876	877,142	451,225	957,937	624,123	1,037,336
Average Size of Farm (acres)	1,674	2,820	1,684	2,254	1,097	1,631

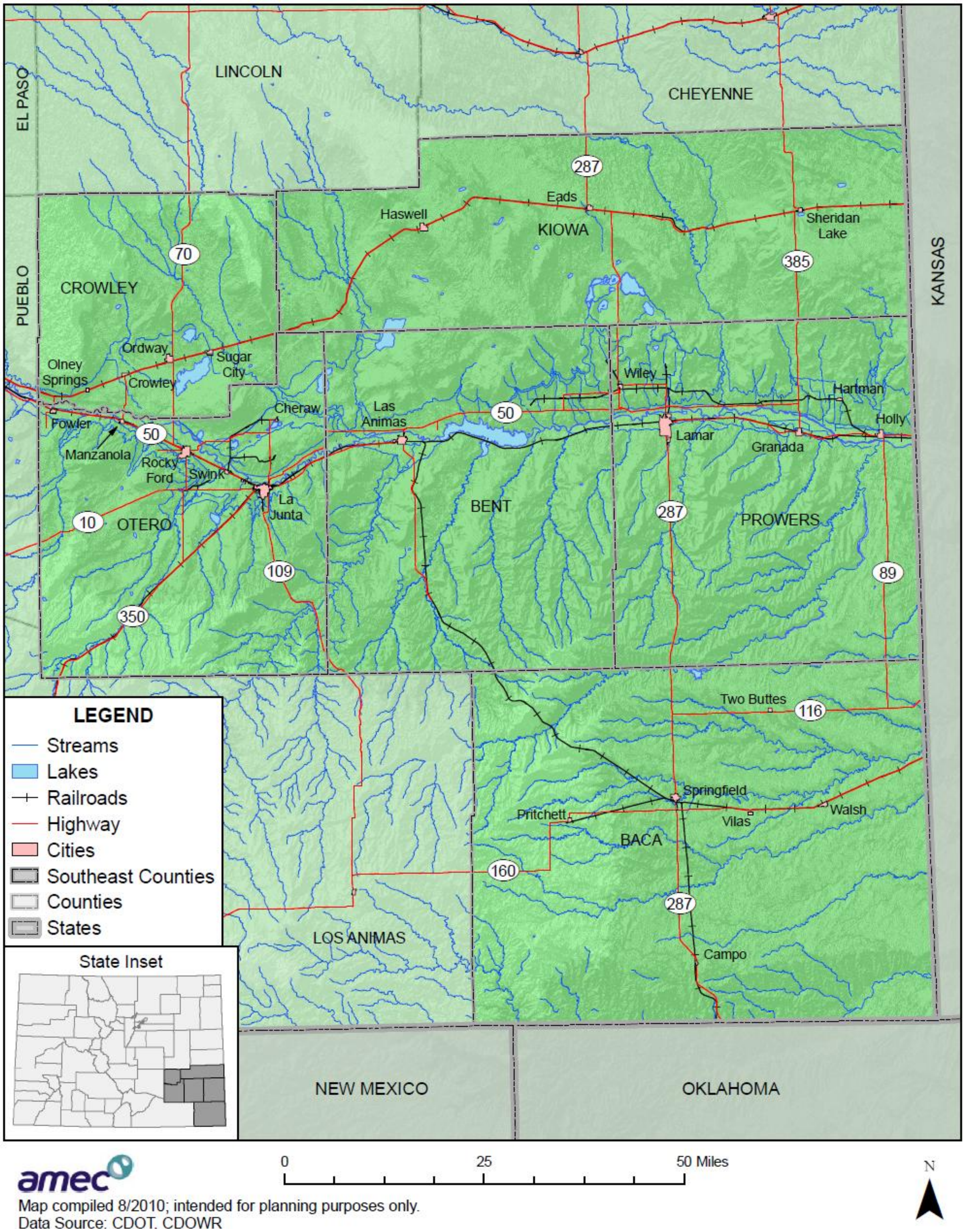
Source: USDA Census of Agriculture: http://www.agcensus.usda.gov/

The major rivers in the region include the Arkansas River, Big Sandy Creek, the Purgatoire River, and Two Butte Creek. Major roadways include US 50, US 385, US 287, US 350, State Highway 96, State Highway 71, and State Highway 10. A base map of the planning region is illustrated in Figure 2.1.

[1] USDA, 2007 Census of Agriculture.

The climate of the Great Plains is characterized by dry winters with occasional wind-blown snow and alternating periods of very cold temperatures followed by very warm days. Springs are windy and highly variable, including the occasional blizzard, rapid and drastic temperature changes, and high levels of precipitation in the form of both snow and rain. Summers offer low humidity with hot days and cools nights. Large thunderstorms are common and some of the most ferocious hail storms in the entire continent occur here. The fall is cool and dry. Overall, the area is considered semi-arid.

Figure 2.1 Southeast Colorado Planning Region



2.2 Population

Table 2.3 describes the population and projected population rates for the planning region. Specific population counts for 2008 are located in the County chapters of the plan. The State Demographics Office (SDO) predicts that the overall region would grow at a relatively slow rate from 2000 through 2035. Crowley County was predicted to grow the fastest, and Baca County was predicted to grow the slowest. The 2010 estimated population for the entire planning region, according to the Colorado State Demographics office is 50,657, which is a net decrease in growth of 3.5% in 10 years.

Table 2.3 Planning Region Projected Population

	2000 Census	SDO Proj.	SDO Proj.	SDO Proj.	SDO Proj.	SDO Proj.	SDO Proj.	SDO Proj.
COUNTIES	**July, 2000**	**July, 2005**	**July, 2010**	**July, 2015**	**July, 2020**	**July, 2025**	**July, 2030**	**July, 2035**
COLORADO	4,338,789	4,718,562	5,207,801	5,729,168	6,285,135	6,816,932	7,321,292	7,807,391
REGION	4,338,789	4,718,562	5,207,801	5,729,168	6,285,135	6,816,932	7,321,292	7,807,391
Region % Change	-	-3.1%	-0.4%	3.3%	3.7%	4.8%	.5%	1.7%
Baca	4,517	4,241	4,120	4,122	4,164	4,195	4,227	4,262
	-	-0.6%	0.0%	0.2%	0.1%	0.2%	0.2%	-0.6%
Bent	5,998	6,345	6,265	6,481	6,681	6,841	6,897	6,865
	-	-0.3%	0.7%	0.6%	0.5%	0.2%	-0.1%	-0.3%
Crowley	5,518	5,321	6,344	6,684	7,084	8,495	7,920	8,306
	-	3.6%	1.0%	1.2%	1.1%	1.1%	1.0%	3.6%
Kiowa	1,622	1,529	1,473	1,511	1,558	1,629	1,681	1,725
	-	-0.7%	0.5%	0.6%	0.9%	0.6%	0.5%	-1.1%
Otero	20,311	19,488	19,014	19,716	20,518	20,979	21,269	21,495
	-	-0.5%	0.7%	0.8%	0.4%	0.3%	0.2%	-0.7%
Prowers	14,483	13,905	13,441	13,811	14,243	14,704	15,119	15,445
	-	-0.7%	0.5%	0.6%	0.6%	0.6%	0.4%	-0.7%

Source: State Demographics Office.

Select Census 2000 demographic and social characteristics for the planning area are shown in Table 2.4. Characteristics for planning region are listed by County.

Table 2.4 Demographic and Social Characteristics

Characteristic	Baca	Bent	Crowley	Kiowa	Otero	Prowers
Total Population	4,517	5,998	5,518	1,622	20,311	14,483
Age						
Under 5 Years (%)	5.9	5.8	4.4	6.0	6.5	7.9
65 Years and Over (%)	22.4	15.9	10.8	17.6	16.5	12.6
Median Age	42.9	37.3	36.6	39.7	37.7	35.3
Special Considerations						
Disability Status (%)	21.6	25.1	26.3	21.3	24.8	20.3
Speak Language other than English (%)	5.8	16.8	14.7	3.5	21.9	24.4
Families Below Poverty Level (%)	12.9	16.6	15.2	9.6	14.2	14.5
Individuals Below Poverty Level (%)	16.9	19.5	18.5	12.2	18.8	19.5
Other						
Total Housing Units	2,364	2,366	1,542	817	8,813	5,977
Average Family Size	2.90	2.97	3.12	2.97	3.04	3.21
Average Household Size	2.33	2.53	2.59	2.40	2.49	2.67
High School Graduate or Higher (%)	78.5	77.2	77.5	86.3	75.7	72.0
Bachelors Degree or Higher (%)	14	11.5	11.9	16.1	15.4	11.9

Source: U.S. Census Bureau, 2000, www.census.gov/

2.3 Economy

Select economic characteristics for the planning region from the 2000 Census and the Bureau of Labor Statistics (2009) are shown in Table 2.5. Characteristics are represented by County.

Table 2.5 Planning Area Economic Characteristics

Characteristic	Baca	Bent	Crowley	Kiowa	Otero	Prowers
Median Home Value (1999 $)	47,300	57,200	57,200	46,100	66,300	67,900
Median Household Income (1999 $)*	34,018	28,125	26,803	30,494	29,738	19,935
Per Capita Income ($)	15,068	13,567	12,836	16,382	15,113	14,150
Population in Labor Force (%)*	57.6	48.6	31.9	60.6	58.4	65.4
Unemployment (%)**	4.1	7.6	9.5	6.1	7.9	7.0

Source: U.S. Census Bureau (2000), www.census.gov/; Bureau of Labor Statistics, www.bls.gov/

* Above age 16

**February 2009-March 2010, Bureau of Labor Statistics http://www.bls.gov/lau/#tables

CHAPTER 3 THE PLANNING PROCESS

Requirements §201.6(b) and §201.6(c)(1): An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

1) **An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;**
2) **An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and nonprofit interests to be involved in the planning process; and**
3) **Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.**

[The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

3.1 Mitigation Planning in the Region

Prior to initiating the development of this regional multi-jurisdictional Hazard Mitigation Plan in 2010, two critical activities took place that established the foundation for the entire planning process. First, a substantial coordination effort took place to ensure the participation of all 6 counties within the Southeast Colorado All Hazards Region (SCAHR). Second, a professional hazard mitigation planning consultant was hired.

In Colorado, the Colorado Office of Emergency Management (CDEM) utilizes a regional support structure to assist the counties with all aspects of emergency management, including planning. Each region has a “Regional Coordinator.” The Regional Coordinator contacted the County Board of Commissioners in each of the 6 counties and explained the DMA planning requirement and the leadership and coordination role that each of the 6 county emergency managers would be required to undertake, and that the Board of Commissioners would be expected to formally adopt the plan upon its completion. The county emergency managers, in turn, then contacted each of the incorporated communities and other FEMA “eligible applicants” within their own counties, offering them the opportunity to participate in the development of the SCEM plan versus having to develop their own individual plans.

The 2010-2012 planning process was initiated in the fall of 2009 with the submission of a Pre-Disaster Mitigation (PDM) planning grant to update the plan. The grant award was made in 2010 and AMEC Earth and Environmental was selected to facilitate the update. AMEC’s role was to:

- Establish a planning organization for the entire planning area and all of the participants;

- Meet all of the DMA requirements as established by federal regulations, following FEMA's planning guidance;
- Facilitate the entire planning process;
- Identify the data requirements that the participating counties, communities, and other FEMA "eligible applicants" could provide, and conduct the research and documentation necessary to augment that data;
- Develop and facilitate the public input process;
- Produce the draft and final plan documents; and
- Guarantee acceptance of the final Plan by FEMA Region VIII.

The majority of funding for the planning assistance contract was provided to the Southeast Colorado All Hazards Region (SECAHR) member counties by FEMA through CDEM. The required local match was provided as an "in-kind" or "soft" match, through the many, many hours spent on this effort by each of the planning team participants, as well as the use of their facilities for meetings and actual cash disbursements for copying and public notices, where necessary.

Initial discussions on the process were held at an October 2009 SECAHR meeting, but the process formally began with a kick-off meeting in May 2010. The following narrative of the 10-step planning process explains the process of this plan's development.

3.2 The 10-Step Planning Process

The process for this planning effort utilized the DMA planning requirements, and FEMA's associated guidance. This guidance is structured around a generalized 4-phase process:

1) Organize Resources
2) Assess Risks
3) Develop the Mitigation Plan
4) Implement the Plan and Monitor Progress

Into this four-phase process, AMEC integrated a more detailed 10-step planning process used for FEMA's Community Rating System (CRS) and Flood Mitigation Assistance programs. Thus, the modified 10-step process used for this plan meets the requirements of six major programs: FEMA's Hazard Mitigation Grant Program, Pre-Disaster Mitigation program, CRS, Flood Mitigation Assistance Program, Severe Repetitive Loss program, and new flood control projects authorized by the U.S. Army Corps of Engineers.

Table 3.1 shows how the modified 10-step process fits into FEMA's four-phase process.

Table 3.1. Four Phase/Ten Step Process

FEMA's 4-Phase DMA Process	Modified 10-Step CRS Process
1) Organize Resources	
201.6(c)(1)	1) Organize the Planning Effort
201.6(b)(1)	2) Involve the Public
201.6(b)(2) and (3)	3) Coordinate with Other Departments and Agencies
2) Assess Risks	
201.6(c)(2)(i)	4) Identify the Hazards
201.6(c)(2)(ii)	5) Assess the Risks
3) Develop the Mitigation Plan	
201.6(c)(3)(i)	6) Set Goals
201.6(c)(3)(ii)	7) Review Possible Activities
201.6(c)(3)(iii)	8) Draft an Action Plan
4) Implement the Plan and Monitor Progress	
201.6(c)(5)	9) Adopt the Plan
201.6(c)(4)	10) Implement, Evaluate, and Revise the Plan

For Prowers County, which had submitted a Hazard Mitigation Plan to CDEM and FEMA in 2003, this process involved a comprehensive review and update of each section of the 2003 plan and includes an assessment of the success of the participating communities in evaluating, monitoring and implementing the mitigation strategy outlined in the initial plan. The process followed to update the plan is detailed in the above table and the sections that follow and is the same process that was used to prepare the 2003 plan. As part of this plan update, all sections of the plan were reviewed and updated to reflect new data, processes, participating jurisdictions, and resulting mitigation strategies. In fact, based in part on the issuance of the new 2008 FEMA Plan Preparation Guidance, the 2003 plan has been reorganized, updated and rewritten in its entirety. Only the information and data still valid from the 2003 plan was carried forward as applicable into this LHMP update.

3.2.1 Phase 1: Organize Resources

Step 1: Get Organized - Building the Planning Team

With the County Board of Commissioners approval of participation in the DMA Plan development, and the commitment to participate by the incorporated communities and invited other "eligible applicants," AMEC next established a framework and organization for the development of this plan.

The six counties in the Southeast Colorado Emergency Management Region that participated in this plan in 2010 include:

- Baca County
- Bent County
- Crowley County
- Kiowa County
- Otero County
- Prowers County

Entities that participated within each county can be referenced in each County Planning Element.

During the planning process the Hazard Mitigation Planning Committee (HMPC) convened with a series of kick-off meetings. A HMPC kickoff meeting was held in May to explain the scope and schedule of the process. The kickoff meeting discussed the benefits of developing a hazard mitigation plan, the project schedule, and the hazards that affect the region and each county. The invitation letter went to various county departments, incorporated communities, other eligible applicants such as fire districts, and other stakeholders. Lists of who participated are provided at the beginning of each County Planning Elements (CPE).

The DMA planning regulations and guidance stress that each local government seeking FEMA approval of its mitigation plan must participate in the planning effort in the following ways:

- Participate in the planning process,
- Detail areas within the planning area where the risk differs from that facing the entire area,
- Identify specific projects to be eligible for funding, and
- Have the governing board formally adopt the plan.

For the Southeast Colorado Regional Hazard Mitigation Plan, “participation” meant:

- Attending and participating in the Hazard Mitigation Planning Committee (HMPC) meetings, or individual meetings with the County Emergency Manager
- Providing available data requested of the HMPC,
- Reviewing and providing comments on the plan drafts,
- Advertising, coordinating, and participating in the public input process, and
- Coordinating the formal adoption of the plan by the governing boards.

Southeastern Colorado has a number of small, rural jurisdictions with limited resources. In some counties, the county emergency managers are empowered to participate in planning efforts on the behalf of these small communities. This “authorized representation” model is a suggested method in FEMA’s multi-jurisdictional planning guidance, and was utilized for certain counties and jurisdictions in this plan. These specific instances are noted in the respective CPE. If this model was used by a jurisdiction, a proxy form was filled out authorizing representation. These forms can be found in Appendix B.

During the planning process, the HMPC communicated with a combination of face-to-face meetings, phone interviews, and email correspondence. An ftp site was utilized to allow members of the HMPC, the public, and other stakeholders in the Hazard Mitigation Plan to access information about the planning process, share data and reports, and review and comment on plan drafts. Two planning tools were developed by AMEC to facilitate information gathering for the update. This included two data collection tools: the first designed to gather information on hazard events, critical facilities, and inventory data based on assessor's data; and the second designed to collected information on mitigation capabilities and progress on implementation of actions recommended in 2003(for Prowers County only). In addition, revised drafts of the CPEs were distributed electronically to each county for review and comment, with areas needing particular attention highlighted within the document. This plan is a result of planning team input provided through these combinations of data collection tools, comments on draft planning elements, and information gathered during planning meetings.

Thirteen planning meetings with the HMPC were held during the plan's development between May 2010 and March 2011 (shown in Table 3.2). The meeting schedule and topics are listed in the following table. Agendas and sign in sheets from these minutes are included in Appendix B.

Table 3.2. 2010 Hazard Mitigation Planning Meetings

Meeting	Date(s)	Purpose
HMPC #1	May 25 – Bent and Kiowa County May 26 – Otero and Crowley County May 27 – Baca County May 28 – Prowers County	Regional Planning Kickoff Meetings
HMPC #2	August 31 – Bent and Kiowa County August 30 – Baca and Crowley County Sept. 1 – Prowers County Sept. 2– Otero County	Risk assessment overview and work sessions
HMPC #3	December 15 – Meeting in La Junta for Bent, Otero, and Crowley Counties December 16 – Meeting in Lamar for Baca, Kiowa, and Prowers Counties	Development of mitigation goals and objectives
HMPC #4		
HMPC #5		

HMPC meeting dates, agendas, and attendance logs are on file with the CDEM Regional Planner and in Appendix B.

Step 2: Plan for Public Involvement – Engaging the Public

At the kick-off meeting, the HMPC discussed additional options for public involvement and agreed to an approach using established public information mechanisms and resources within the community. Public outreach was initiated during the plan development process with an informational press release to inform the public of the purpose of DMA and the hazard mitigation planning process for the planning area. Public involvement activities included press releases, website postings, public meetings, and the collection of public comments on the draft plan. Mediums used to advertise the public meetings are listed below.

- Insert mediums used to advertise public participation.

Figure 3.1. Example of Public Outreach

INSERT

Step 3: Coordinate with other Departments and Agencies

Early on in the planning process, the HMPC determined that data collection and plan approval would be greatly enhanced by inviting other state and federal agencies to participate in the planning process. The following entities were invited to participate in the planning process on the HMPCs.

- CDEM (a division within the Department of Local Affairs [DOLA])
- Colorado Division of Wildlife
- Colorado State University Agricultural Extension (CSU)
- Colorado State Forest Service
- Colorado Water Conservation Board (Colorado Department of Natural Resources [DNR])
- FEMA
- US Army Corp of Engineers (John Martin Dam)
- National Weather Service (NWS)
- Southeast Colorado All Hazards Region
- Northern Colorado American Red Cross
- Colorado Department of Corrections

In addition, AMEC, and/or the county emergency managers utilized the resources of the following agencies in the development of this plan:

- The U.S. Geological Survey (USGS)
- The U.S. Department of Agriculture (USDA), and its subsidiary organizations:
    - The Farm Service Agency (FSA);
    - The Natural Resource Conservation Service (NRCS) and it's predecessor, the Soil Conservation Service (SCS); and
    - The National Crop Insurance Service (NCIS)
- The U.S. Department of Homeland Security (DHS)
- The Colorado Department of Public Health and Environment (CDPHE)
- The Colorado Department of Natural Resources, Office of the State Engineer
- The Colorado Department of Water Resources, Dam Safety Division

- The Colorado Geological Survey (CGS)
- Colorado State University (CSU), and
- The Office of Archaeology and Historic Preservation, Colorado Historical Society
- Other Community Planning Efforts and Hazard Mitigation Activities

Other documents were reviewed and considered, as appropriate, during the collection of data to support Planning Steps 4 and 5, which include the hazard identification, vulnerability assessment, and capability assessment.

Coordination with other community planning efforts is also paramount to the success of this plan. Hazard mitigation planning involves identifying existing policies, tools, and actions that will reduce a community's risk and vulnerability from natural hazards. The region uses a variety of mechanisms, such as comprehensive plans and ordinances, to guide growth and development. Integrating existing planning efforts and mitigation policies and action strategies into this plan establishes a credible and comprehensive plan that ties into and supports other community programs.

During the creation of this plan, emphasis was placed on wildfire hazard mitigation, driven in part by new legislation requiring county level Community Wildfire Protection Plans. Integrating these two efforts has already begun in some counties and will continue in the region. This is described in more detail in Chapter 5.

3.2.2 Phase 2: Assess Risks

Steps 4 and 5: Identify the Hazards and Assess the Risks

AMEC led the HMPC in an exhaustive research effort to identify and document all the hazards that have, or could, impact the planning area. Data collection worksheets were used in this effort to aid in determining hazards and vulnerabilities, and where risk varies across the planning area. Geographic information systems (GIS) were used to display, analyze, and quantify hazards and vulnerabilities. The HMPC also conducted a capability assessment to review and document the planning area's current capabilities to mitigate risk and vulnerability from natural hazards. By collecting information about existing government programs, policies, regulations, ordinances, and emergency plans, the HMPC can assess those activities and measures already in place that contribute to mitigating some of the risks and vulnerabilities identified. A more detailed description of the risk assessment process and the results are included in Chapter 4 Risk Assessment.

3.2.3 Phase 3: Develop the Mitigation Plan

Steps 6 and 7: Set Goals and Review Possible Activities

AMEC facilitated brainstorming and discussion sessions with the HMPC that described the purpose and the process of developing updated planning goals and objectives, a comprehensive range of mitigation alternatives, and a method of selecting and defending recommended mitigation actions using a series of selection criteria. The results of this collaborative process, and a more detailed description of the process followed, are captured in Chapter 5 Mitigation Strategy. Each CPE provided the recommended action item details, including a description of the action, the agency or department that is responsible for implementing it, and a timeframe for completion.

As part of the update process, Prowers County was provided a planning tool to track the progress of implementation. Progress on each objective is noted in the Prowers County CPE. Where progress has been made and a project completed, these have been preserved in the plan as record of progress.

Step 8: Draft an Action Plan

Based on input from the HMPC regarding the draft risk assessment and the goals and activities identified in Planning Steps 6 and 7, AMEC produced a complete first draft of the plan. This complete draft was distributed for review and comment. Other agencies were invited to comment on this draft as well. The HMPC and agency comments were integrated into the second draft, which was advertised and distributed to collect public input and comments. AMEC integrated comments and issues from the public, as appropriate, along with additional internal review comments and produced a final draft for the Colorado Division of Emergency Management and FEMA Region VIII to review and approve, contingent upon final adoption by the governing boards of each participating jurisdiction.

3.2.4 Phase 4: Implement the Plan and Monitor Progress

Step 9: Adopt the Plan

In order to secure buy-in and officially implement the plan, the plan was adopted by the governing boards of each participating jurisdiction on the dates included in the adoption resolutions in Appendix C Plan Adoption. Following conditional approval by FEMA Region VIII of the 2012 plan the participating jurisdictions will again re-adopt this plan.

Step 10: Implement, Evaluate, and Revise the Plan

The true worth of any mitigation plan is in the effectiveness of its implementation. Up to this point in the planning process, all of the planning efforts have been directed at researching data, coordinating input from participating entities, and developing appropriate mitigation actions. Each recommended action includes key descriptors, such as a lead manager and possible funding sources, to help initiate implementation. An overall implementation strategy is described in Chapter 6 Plan Adoption, Implementation, and Maintenance.

Finally, there are numerous organizations within the region whose goals and interests interface with hazard mitigation. Coordination with these other planning efforts, as addressed in Planning

Step 3, is paramount to the ongoing success of this plan and mitigation in the region and is addressed further in Chapter 6. A plan update and maintenance schedule and a strategy for continued public involvement are also included in Chapter 6.

4 RISK ASSESSMENT

***44 CFR Requirement 201.6(c)(2): [The plan shall include] a risk assessment that provides the factual basis for activities proposed in the strategy to reduce the losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.**

As defined by the Federal Emergency Management Agency (FEMA), risk is a combination of hazard, vulnerability, and exposure. "It is the impact that a hazard would have on people, services, facilities, and structures in a community and refers to the likelihood of a hazard event resulting in an adverse condition that causes injury or damage."

The risk assessment process identifies and profiles relevant hazards and assesses the exposure of lives, property, and infrastructure to these hazards. The process allows for a better understanding of a jurisdiction's potential risk to natural hazards and provides a framework for developing and prioritizing mitigation actions to reduce risk from future hazard events.

This risk assessment followed the methodology described in the FEMA publication *Understanding Your Risks—Identifying Hazards and Estimating Losses* (2002), which breaks the assessment down to a four-step process:

1) Identify Hazards
2) Profile Hazard Events
3) Inventory Assets
4) Estimate Losses

Data collected through this process has been incorporated into the following sections of this chapter:

- **Section 4.1 Hazard Identification** identifies the hazards that threaten the planning area and describes why some hazards have been omitted from further consideration.
- **Section 4.2 Hazard Profiles** discusses the nature of each hazard, describes previous occurrences of hazard events and the likelihood of future occurrences, and past and potential impacts to the planning area.
- **Section 4.3 Vulnerability Assessment** provides an overview of the region's total exposure to natural hazards, considering assets at risk. This section includes an overview of methodologies for estimating potential losses for the hazards, and how future development trends may increase or decrease vulnerability.

This risk assessment covers the entire geographical extent of Baca, Bent, Crowley, Kiowa, Otero, and Prowers County.

4.1 Hazard Identification

Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the type…of all natural hazards that can affect the jurisdiction.

The Southeast Colorado Hazard Mitigation Planning Committee (HMPC) conducted a hazard identification study to determine what hazards potentially threaten the planning area. Prowers County began the process by considering all of the hazards that were included in the 2003 mitigation plan. More information on the hazards added and eliminated can be found in the Prowers County Planning Element.

4.1.1 Methodology and Results

Using existing natural hazards data and input gained through planning meetings, the HMPC agreed upon a list of natural hazards that could affect the planning area. Hazards data from the Colorado Division of Emergency Management (CDEM), FEMA, the National Oceanic and Atmospheric Administration (NOAA), and many other sources were examined to assess the significance of these hazards to the planning area. Significance was measured in general terms and focused on key criteria such as frequency and resulting damage, which includes deaths, injuries, and property and economic damage. The natural hazards evaluated as part of this plan include those that occurred in the past or have the potential to cause significant human and/or monetary losses in the future.

The following hazards, listed alphabetically, were identified and investigated for the 2010 Southeast Colorado Regional Hazard Mitigation Plan:

Natural Hazards

- Agriculture Infestation
- Dam/Levee Failure
- Drought
- Earthquake
- Extreme Temperatures: Heat
- Extreme Temperatures: Cold
- Flood: 100/500-Year
- Flood: Stormwater/Localized Flooding
- Severe Weather: Thunderstorms/Lightning/Hail
- Stream Bank Erosion/Stability
- Subsidence
- Tornadoes
- Wildfire
- Wind Storms
- Winter Storms

Man-Made Hazards

- Civil Unrest
- Cyber Hazards
- Hazardous Materials
- Pandemic

The worksheet below was completed by the HMPC, based in part on the risk assessment, to identify, profile, and rate the significance of identified hazards. The worksheet reflects the regional level assessments. Individual county assessments are located in each county planning element, and may reflect higher or lower assessments, based on the particular exposures, geography, and vulnerabilities of the area. Only the more significant hazards (high or medium) have a more detailed hazard profile and are analyzed further in Section 4.3 Vulnerability Assessment (to the extent possible).

Table 4.1. Southeast Colorado All-Hazards Region Hazards Identification Worksheet

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/Severity	Significance
Agriculture Infestation	Significant	Highly Likely	Catastrophic	High
Dam/Levee Failure	Significant	Occasional	Critical	Medium
Drought	Extensive	Likely	Catastrophic	High
Earthquake	Significant	Occasional	Critical	Low
Extreme Temperatures: Heat	Extensive	Highly Likely	Critical	Low
Extreme Temperatures: Cold	Extensive	Highly Likely	Critical	Medium
Flood: 100/500 –Year	Significant	Occasional	Critical	Medium
Flood: Stormwater/Localized Flooding	Significant	Likely	Limited	Medium
Severe Weather: Thunderstorms/Lightning/Hail	Extensive	Highly Likely	Catastrophic	High
Stream Bank Erosion/ Stability	Limited	Occasional	Limited	Low
Subsidence	Limited	Occasional	Limited	Low
Tornadoes	Significant	Highly Likely	Catastrophic	High
Wildfire	Limited	Highly Likely	Limited	Medium
Wind Storms	Extensive	Highly Likely	Critical	Medium
Winter Storms	Extensive	Highly Likely	Catastrophic	High
Civil Unrest	Limited	Occasional	Limited	Low
Cyber Hazards	Limited	Occasional	Negligible	Low
Hazardous Materials	Limited	Likely	Catastrophic	Medium
Pandemic	Significant	Likely	Limited	Medium

Geographic Extent
Limited: Less than 10% of planning area
Significant: 10-50% of planning area
Extensive: 50-100% of planning area

Probability of Future Occurrences
Highly Likely: Near 100% chance of occurrence in next year, or happens every year.
Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less.
Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Magnitude/Severity
Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths
Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability
Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability
Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid

Significance
Low: minimal potential impact
Medium: moderate potential impact
High: widespread potential impact

4.1.2 Disaster Declaration History

One method the HMPC used to identify hazards was the researching of past events that triggered federal and/or state emergency or disaster declarations in the planning area. Federal and/or state disaster declaration histories help document past occurrences of hazards within the planning area. Disaster declarations are granted when the magnitude and severity impact of the event surpasses the ability of the local government to respond and recover. Disaster assistance is supplemental and sequential. When the local government's response capacity is surpassed, a state disaster declaration may be issued, allowing for the provision of state assistance. Should the severity of the disaster event surpass both the local and state government response capacity, a federal emergency or disaster declaration may be issued, allowing for the provision of federal disaster assistance. Generally, the federal government issues disaster declarations through FEMA. However, federal assistance may also come from the U.S. Department of Agriculture and the Small Business Association (SBA), and other government agencies such as the Fire Management Assistance Grant Program. FEMA also issues emergency declarations, which are more limited in scope and without the long-term federal recovery programs of major disaster declarations. The quantity and types of damage are the determining factors.

A USDA declaration will result in the implementation of the Emergency Loan Program through the Farm Services Agency. This program enables eligible farmers and ranchers in the affected county as well as contiguous counties to apply for low interest loans. A USDA declaration will automatically follow a major disaster declaration for counties designated major disaster areas and those that are contiguous to declared counties, including those that are across state lines. As part of an agreement with the USDA, the SBA offers low interest loans for eligible businesses that suffer economic losses in declared and contiguous counties that have been declared by the USDA. These loans are referred to as Economic Injury Disaster Loans.

The Fire Management Assistance Grant Program provides funding "for the mitigation, management, and control of fires on publicly or privately owned forests or grasslands, which threaten such destruction as would constitute a major disaster." The quantity and types of damages, as well as the type of event, determine the source of federal aid.

Figure 4.1, from the FEMA website, displays the number of Presidential (FEMA) Disaster Declarations from 1964 to 2010 by FEMA Region. Colorado is located in Region VII. This map indicates that:

- Crowley and Kiowa Counties received between 11 and 15 Presidential Disaster Declarations
- Baca, Bent, Otero, and Prowers Counties each received between 6 and 10 Presidential Disaster Declarations

Figure 4.1. Presidential Disaster Declarations, December 24, 1964 – January 1, 2010

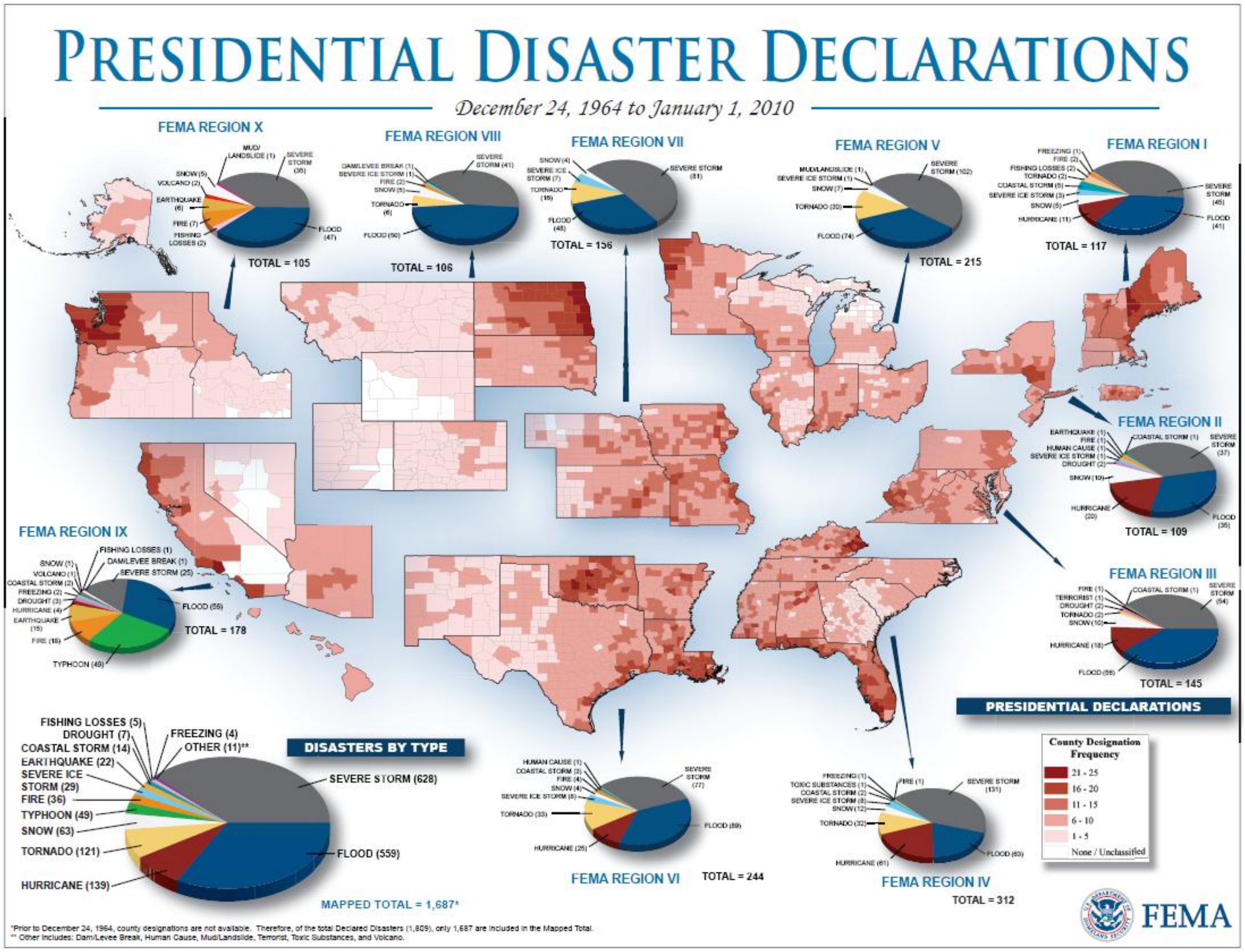


Table 4.2 provides information on federal emergencies and disasters declared in the Southeast Colorado All-Hazards Region between 1955 and 2010. The FEMA website also offers a list of Fire Management Assistance Declarations, with county-specific information available for the majority of the declarations declared. In addition, the 2008 Colorado Hazard Mitigation plan lists disasters declared by the Governor in the State. USDA Secretarial Designations are also included in the table due to the agrarian nature of many of the counties in Southeast Colorado. For USDA Secretarial Designations, only primary counties are included, while contiguous counties are not.

Table 4.2. Southeast Colorado All-Hazards Region Disaster and Emergency Declarations, 1955-2010

Year	Declaring Jurisdiction	Counties Affected	Disaster Type
2009	State of Colorado*	Baca, Bent, Crowley, Kiowa, Otero, Prowers	Severe Blizzard
2009	State of Colorado*	Baca, Bent, Crowley, Kiowa, Otero, Prowers	Severe Spring Snowstorm
2008	USDA – Secretarial Designation (S2750)	Baca, Bent, Crowley, Kiowa, Otero, Prowers	Drought
2008	Federal – Fire Management Assistance Declaration (FM-2760)	Crowley	Wildfire
2008	State of Colorado	Crowley	Wildfire
2007	Federal – Emergency (3271-EM, 3270-EM)	Baca, Bent, Crowley, Kiowa, Otero, Prowers	Snow
2007	State of Colorado	Prowers	Tornado
2006	State of Colorado	Baca, Bent, Crowley, Kiowa, Otero, Prowers	Snow
2006	USDA – Secretarial Designation (S2351)	Otero	Heat, high winds, drought
2006	USDA – Secretarial Designation (S2329)	Bent, Kiowa	Heat, high winds, insect pests, late freeze, drought
2005-2006	USDA – Secretarial Designation (S2327)	Baca, Prowers	Drought, Fire, High Winds, Heat
2005-2006	USDA – Secretarial Designation (S2287)	Kiowa	Drought, Crop Diseases, Insect Infestation
2005	Federal – Emergency (3224-EM)	Baca, Bent, Crowley, Kiowa, Otero, Prowers	Hurricane Katrina Evacuation
2005	USDA – Secretarial Designation (S2188)	Crowley, Otero	Drought, Wind, Heavy Rain, Hail
2004	USDA – Secretarial Designation (S1947)	Baca, Kiowa, Prowers	Drought, Freeze, Hail
2003	USDA – Secretarial Designation (S1843)	Crowley, Otero	Drought, Insects
2003	USDA – Secretarial Designation (S1797)	Baca, Bent, Kiowa, Prowers	Drought
2002	State of Colorado*	Baca, Bent, Crowley, Kiowa, Otero, Prowers	Snow Emergency
2002	State of Colorado*	Baca, Bent, Crowley, Kiowa, Otero, Prowers	Drought
2002	State of Colorado*	Baca, Bent, Crowley, Kiowa, Otero, Prowers	WIldfires
2002	USDA – Secretarial Designation (S1643)	Baca, Bent , Crowley, Kiowa, Otero, Prowers	Drought
2001	Federal – Major Disaster (1374-DR)	Baca, Bent, Crowley, Kiowa, Otero, Prowers	Severe Winter Storms

Year	Declaring Jurisdiction	Counties Affected	Disaster Type
2001	USDA – Secretarial Designation (S1514)	Crowley, Otero, Prowers	Drought
2000	USDA – Secretarial Designation (S1498)	Baca, Bent	Drought, High Winds, Lightning
2000	USDA – Secretarial Designation (S1451)	Kiowa	Drought, Freezing Temperatures
1999	Federal – Major Disaster (1276-DR)	Bent, Crowley, Kiowa, Otero, Prowers	Flooding
1999	State of Colorado	Bent, Crowley, Kiowa, Otero	Flooding, Landslides, Mudslides
1997	Federal – Emergency	Baca, Crowley, Kiowa, Otero, Prowers	Heavy Flash Flooding
1997	State of Colorado	Baca, Crowley, Kiowa, Otero Prowers	Flooding
1995-1996	USDA – Secretarial Designation (S999)	Baca, Bent, Kiowa	Drought
1994	USDA – Secretarial Designation (S767)	Kiowa	Freezing Temperatures
1977	Federal – Major Disaster	Baca, Bent, Crowley, Kiowa, Otero, Prowers	Drought
1965	Federal – Major Disaster (200-DR)	Baca, Bent, Crowley, Kiowa, Otero, Prowers	Tornadoes, Severe Storms, and Flooding
1955	Federal – Major Disaster (33-DR)	Otero	Flood and Tornado

Source: Colorado State Hazard Mitigation Plan; Colorado Governor's Office website, Federal Emergency Management Agency, PERI Presidential Disaster Declaration Site; U.S. Department of Agriculture.

*All counties in the state were proclaimed disaster areas by the Governor.

4.1.3 Hazards Not Included

Other hazards were discussed by the planning team but ultimately not included in this plan. Certain hazards were excluded because they do not occur in the planning region and include avalanche, coastal erosion, coastal storms, hurricanes, landslides, tsunamis, and volcanoes. Additionally, other potential man-made or technological hazards such as terrorism are not profiled in this plan.

4.2 Hazard Profiles

Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the…location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

The hazards identified in Section 4.1 Hazard Identification: Natural Hazards are profiled individually in this section. In general, information provided by planning team members is integrated into this section with information from other data sources, such as those mentioned in Section 4.1. These profiles set the stage for Section 4.3 Vulnerability Assessment, where the vulnerability is quantified, where possible, for each of the priority hazards. Specific risk and vulnerability of each county in the planning region can be found in the County Planning Elements.

4.2.1 Profile Methodology

Each hazard is profiled in a similar format that is described below:

Hazard/Problem Description

This section gives a description of the hazard and associated issues followed by details on the hazard specific to the planning area. Where known, this includes information on the hazard extent, seasonal patterns, speed of onset/duration, and magnitude and/or secondary effects.

Past Occurrences

This section contains information on historical incidents, including impacts where known. The extent or location of the hazard within or near the planning area is also included here. Historical incident worksheets and other data sources were used to capture information on past occurrences.

Three national databases were used to assist in documenting past occurrences:

- The National Oceanic and Atmospheric Administration's National Climatic Data Center (NCDC) has been tracking severe weather since 1950. Their Storm Events Database tracks severe weather events on a county basis and contains data on the following: all weather events from 1993 to current (except from 6/1993-7/1993); and additional data from the Storm Prediction Center, which includes tornadoes (1950-1992), thunderstorm winds (1955-1992), and hail (1955-1992). This database contains severe weather events that occurred in the planning area between January 1, 1950, and April 31, 2010.

- NCDC data was supplemented with data from SHELDUS (Spatial Hazard Events and Losses Database for the United States). SHELDUS is a county-level data set for the United States that tracks 18 types of natural hazard events along with associated property and crop losses, injuries, and fatalities for the period 1960-2005. Produced by the Hazards Research Lab at the University of South Carolina, this database combines information from several sources (including the NCDC). From 1960 to 1995, only those events that generated more than $50,000 in damage were included in SHELDUS. For events that covered multiple counties, the dollar losses, deaths, and injuries were equally divided among the affected counties (e.g., if four counties were affected, then a quarter of the dollar losses, injuries, and deaths were attributed to each county). From 1995 to 2005, all events that were reported by the NCDC with a specific dollar amount are included in SHELDUS. SHELDUS contains information on severe weather events that occurred in the planning area between 1960 and 2009.

- Wildfire data was supplied by the National Fire Incident Reporting System's (NFIRS) database. The NFIRS is an information system initiated and supported by the US Fire Administration. The USFA developed NFIRS as a means of assessing the nature and scope of the fire problem in the US. The system first began reporting in 1976. Local fire departments fill out NFIRS forms, which are submitted to state agencies responsible for NFIRS data. The state agency reports the NFIRS data to the USFA Because NFIRS is voluntary, not all states or fire departments participate. However, all wildfires that have occurred on federal land are contained in the NFIRS database.

Tables showing county-specific information from the NCDC and SHELDUS databases may be found in each County Planning Element. Maps and tables showing NFIRS data can be found in each County Planning Element as well. In addition to these national databases, data was gathered from the Colorado Water Conservation Board, the Colorado Geological Survey, the US Army Corps of Engineers, and data from local sources.

Likelihood of Future Occurrence

The frequency of past events is used in this section to gauge the likelihood of future occurrences. Where possible, frequency was calculated based on existing data. It was determined by dividing the number of events observed by the number of years on record and multiplying by 100. This gives the percent chance of an event happening in any given year (e.g., three droughts over a 30-year period equates to a 10 percent chance of a drought in any given year). The likelihood of future occurrences is categorized into one of the following classifications:

- **Highly Likely**—Near 100 percent chance of occurrence in next year or happens every year.
- **Likely**—Between 10 and 100 percent chance of occurrence in next year or has a recurrence interval of 10 years or less.
- **Occasional**—Between 1 and 10 percent chance of occurrence in the next year or has a recurrence interval of 11 to 100 years.
- **Unlikely**—Less than 1 percent chance of occurrence in next 100 years or has a recurrence interval of greater than every 100 years.

Section 4.2.20 Natural Hazards Summary provides an initial assessment of the profiles and assigns a level of significance to each hazard. Those hazards determined to be of high significance were characterized as priority hazards that required further evaluation in Section 4.3 Vulnerability Assessment. Those hazards that occur infrequently or have little or no impact on the planning area were determined to be of low significance. Significance was determined based on the hazard profile, focusing on key criteria such as frequency and resulting damage, including deaths/injuries and property, and economic damage. This assessment was used by the HMPC to prioritize those hazards of greatest significance to the planning area; thus enabling each county to focus resources where they are most needed.

The following sections provide profiles of the natural and man-made hazards that the HMPC identified in Section 4.1. Natural hazards are profiled alphabetically. Man-made hazards follow natural hazards, and are profiled alphabetically as well.

4.2.2 Agricultural Infestation

Hazard/Problem Description

Agricultural infestation encompasses a wide range of potential hazards, including pestilence (rodents and insect infestations) and noxious weeds. Pestilence hazards impact crops and the economic revenues derived from them, as well as causing secondary impacts on livestock (by damaging food sources) and on property and materials by spreading disease, polluting water sources, or sometimes damaging machinery and infrastructure. Some diseases, when documented in a livestock population, require the destruction of the entire herd of population to prevent transmission to humans. This has an enormous financial impact on the ranching and livestock industries. Additionally, populations impacted by disease are unable to work for periods of time, which has a secondary fiscal impact on the area. Noxious weed hazards impact crops and the economic revenues derived from them, as well as causing secondary impacts on livestock (by damaging food sources) and on property by consuming water sources or sometimes damaging machinery. Noxious weeds have well developed and specialized mechanisms to survive and can spread at alarming rates.

- Leafy spurge seeds are expelled from their seed capsule and can fly up to 30 feet. Leafy spurge contains a sap that may cause blisters in the mouth of cattle and wildlife. The animals will eat desirable vegetation but will leave the Leafy spurge
- Houndstongue seeds have tiny hooks that attach to fur and clothing.
- Diffuse knapweed breaks off at the base and acts as tumbleweed. It is often found lodged in the underside of vehicles that have driven over the dried plants.
- Eurasian watermilfoil can easily be transported on fishing equipment.
- Purple loosestrife can produce 2-3 million seeds per plant every year
- Orange hawkweed has developed hairy leaves that most animals will not eat
- 75% of a Canada thistle plant is underground

Pestilence and noxious weeds are profiled in greater detail in the sections below.

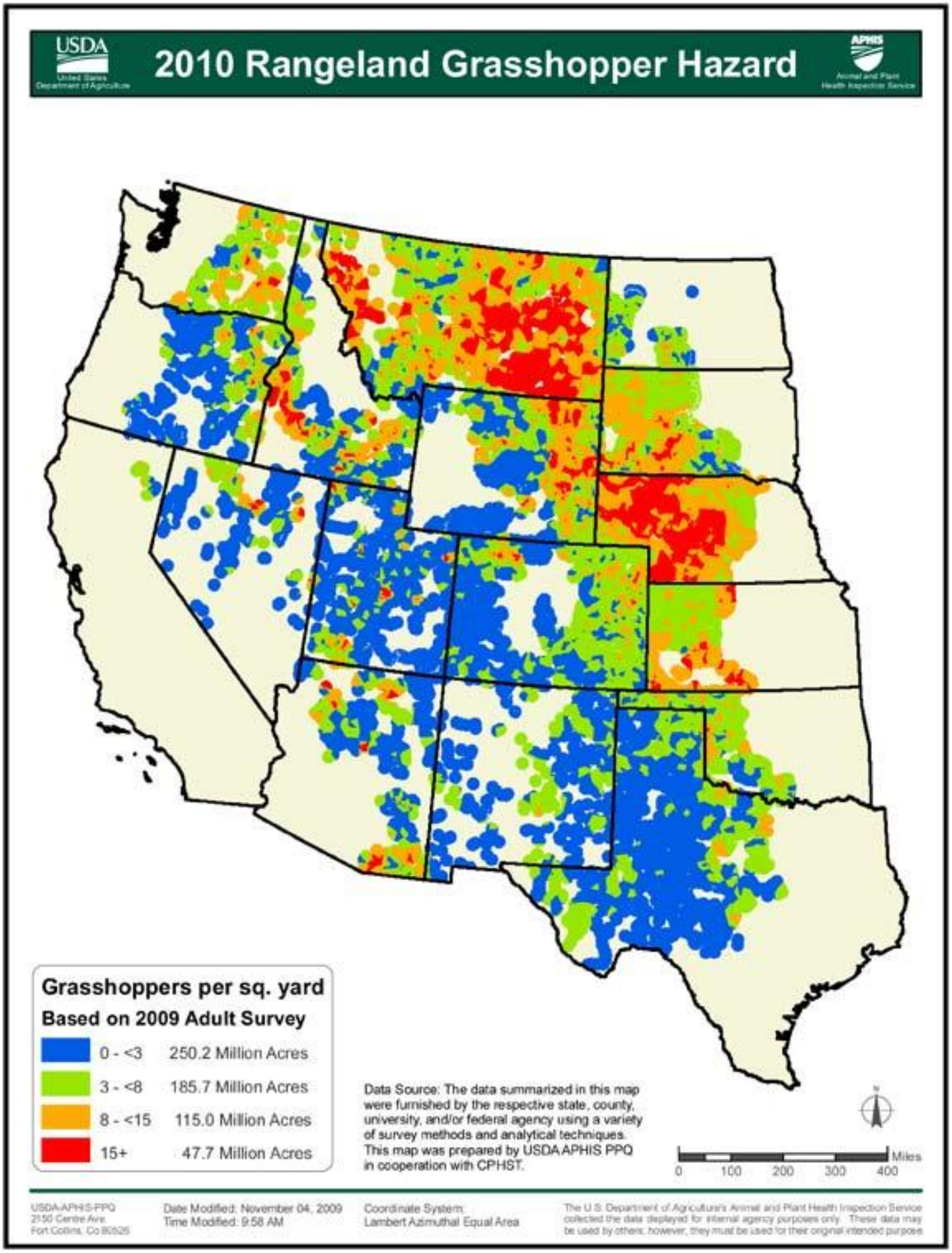
Pestilence

Rodent and insect infestations threaten crops, which is one of the primary industries in the planning region. Rodents, such as mice and rabbits, damage crops in all stages of the production process. Young plants are vulnerable to the rodents, who feed on them. Harvested and stored crops may be contaminated by rodents burrowing into storage units, either to feed on the materials or create nests during winter months. The nature of the infestations makes tracking statistical data nearly impossible. Variables include the geographic distribution of the rodents and the crops, the number of rodents in the area, and the reproduction rates relative to the amount of natural food resources available. The presence of predators, such as foxes, snakes, and hawks, also impacts the potential numbers of rodents. As such, historical recollection provides the majority of the hazard profile's content.

Insect plagues also cause significant damage to crops in the region. Most losses occur in the fall because of freezing temperatures. Grasshoppers move from the range into the crop. The last major grasshopper infestation in the United States occurred in the 1930s. Following this disaster, it was decided that local control of grasshopper outbreaks were insufficient and that regional coordination was required. The 1934 Congress charged the U.S. Department of Agriculture (USDA) with controlling grasshoppers on federal rangeland. Later, in 1987, the Animal and Plant Health Inspection Service (APHIS), which is part of the USDA, created the Grasshopper Integrated Pest Management (GHIPM) Project to develop new technologies for managing grasshopper populations. Subsequent grasshopper infestations in the 1950s, 1980s, and predicted infestations for the early 2000s further underscore the importance of mitigating this insect-driven hazard. In 2009, the planning area experienced the highest grasshopper infestation since 2002-2003. Similar insect hazards include locusts, aphids, and bark beetle plagues.

Rodents such as mice, rats, and rabbits, are found across the entire planning region, as are insects. The presence of the rodents and insects is a consistent feature, with normal population density flows following the seasonal patterns. However, when density of these populations exceeds the capacity of the ecosystem, agricultural industries such as crops and the health of livestock are threatened. The ability to model these trends is difficult and inconsistent. Figure 4.2 depicts a recent grasshopper density map at a point in time for the western United States, including Colorado, which demonstrates how varying densities pose different threats.

Figure 4.2. Grasshopper Density Map



Source: USDA APHIS

Noxious Weeds

According to the Colorado Noxious Weed Management Program, noxious weeds are a hazard across the entire State of Colorado, and particularly in the agricultural region included in the planning area. The Colorado Noxious Weed Act defines noxious weeds as "plant species that are not indigenous (native) to the state of Colorado and meet at least one of several criteria regarding their negative impacts upon crops, native plant communities, livestock, and the management of natural or agricultural systems. This definition applies to species listed by both state and local governing bodies." Native plants are also defined in the Act as "species that are indigenous to Colorado, may not be designated as noxious weeds by either state or local governments. Furthermore, the law does not permit distinctions to be made regarding the historical range or habitats of native species. Therefore, according to the Colorado Environmental Pesticide Education Program, even a native species that expands its range within Colorado due to human influences and otherwise meets the descriptive criteria as a noxious weed may not be listed as such."

Noxious weeds are aggressive and highly competitive, stealing moisture, nutrients and sunlight from native, desirable plants. Established noxious weeds compete with both the production of agricultural crops and natural grasses, plants, and groundcover. Often, noxious weeds can out-compete native plants entirely, which impacts the entire ecology of the area.

Noxious weeds are divided into three categories. Weeds listed in the "AW" category are considered A-list weeds, and are those species which are designated for eradication by the State Agricultural Commissioner. List B species (those listed in the "BW" category) are those in which the Commissioner develops and implements state noxious weed management plans designed to stop the continued spread of the species. This category is assigned based on consultation with the state noxious weed advisory committee, local governments, and other interested parties. List C weeds (those categorized as "CW") are those species which the Commissioner will develop and implement state noxious weed management plans designed to support the efforts of local governing bodies to facilitate more effective integrated weed management on private and public lands. The goal of such plans will not be to stop the continued spread of these species but to provide additional education, research, and biological control resources to jurisdictions that choose to require management of List C species, as defined by the Colorado Department of Agriculture. Some of the more common are profiled below.

- Salt Cedar or Tamarisk (scientific name: *Tamarix ramosissima*) is a small evergreen shrub or tree that grows between 5 and 20 feet in height. Mature plants can produce up to 600,000 seeds per year. The plant was introduced from central Asia, northern Africa, and southern Europe for ornamentation and stream bank stabilization. Salt Cedar can aggravate drought conditions by sucking up large volumes of water from riverbeds, increase the salinity of surface soil (which renders the soil inhospitable to native plants) and aggravate flooding by becoming a barrier within the watercourse channels.
- Other noxious weeds such as Spotted Knapweed (*Centaurea maculosa),* Diffuse Knapweed

(*Centaurea diffusa),* and Russian Knapweed (*Centaurea repens)* readily establish on any disturbed soil. The plants produce as many as 40,000 seeds per plant. The plants thrive in both wet and dry conditions, and out-compete livestock and wildlife forage plant species. Their early spring growth makes them competitive for soil moisture and nutrients and there is some evidence that they release chemical substances that inhibit surrounding vegetation.

- Field Bindweed (*Convolvulus arvensis)* is difficult to eradicate because of a root system that can penetrate the soil to a depth of 20 feet and which gives rise to numerous lateral roots. The plant seeds may remain viable in the ground for up to 40 years. It can adapt to different environmental conditions and can be found at altitudes as high as 10,000 feet. The plant is extremely competitive, and continual stress on the plant is necessary to ensure eradication.

The State Noxious Weed Act requires that local governing bodies of counties and municipalities uphold a number of duties, responsibilities, and powers regarding the management of noxious weeds. A 2007 legislative update requires all local governing bodies to have a noxious weed management plan. The state also has a management plan, which outlines regional and general control concepts. Funding for addressing noxious weeds is available through the Colorado Noxious Weed Management Program, including assistance for implementation of preventative strategies and public education.

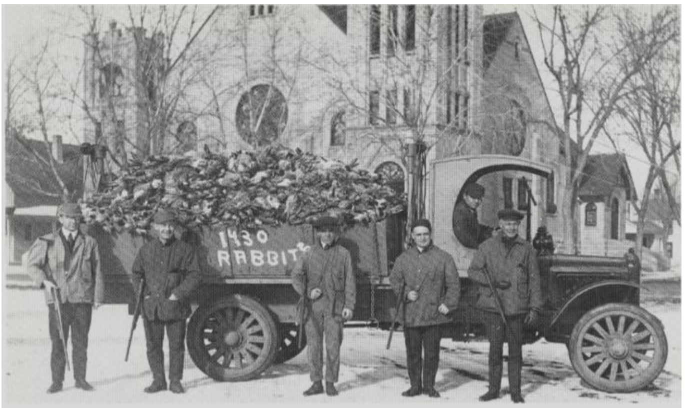
Distribution maps of noxious weeds can be found on the Colorado Department of Agriculture website (www.colorado.gov/cs/Satellite/Agriculture-Main/CDAG/1178305815770).

Previous Occurrences

Pestilence

On December 29, 1924, the Colorado Governor declared a “Hunt Day” targeting the rabbits that were causing devastating damage to crops across the planning area. In one day, 125,000 rabbits were killed in a six-county area (and 4,000 were shipped to Denver to feed the needy). Photos of pick-up trucks piled high with the bounty still adorn the walls of local historic societies, barbershops, and drug stores. There is some documentation of similar hunts in earlier years (around 1900) that were organized to rid the fields of roving bands of coyotes.

Figure 4.3. Historical Photograph of a Rabbit Hunt's Yield



Circa 1920

"Are rabbits feet really lucky?"

Source: Unknown.

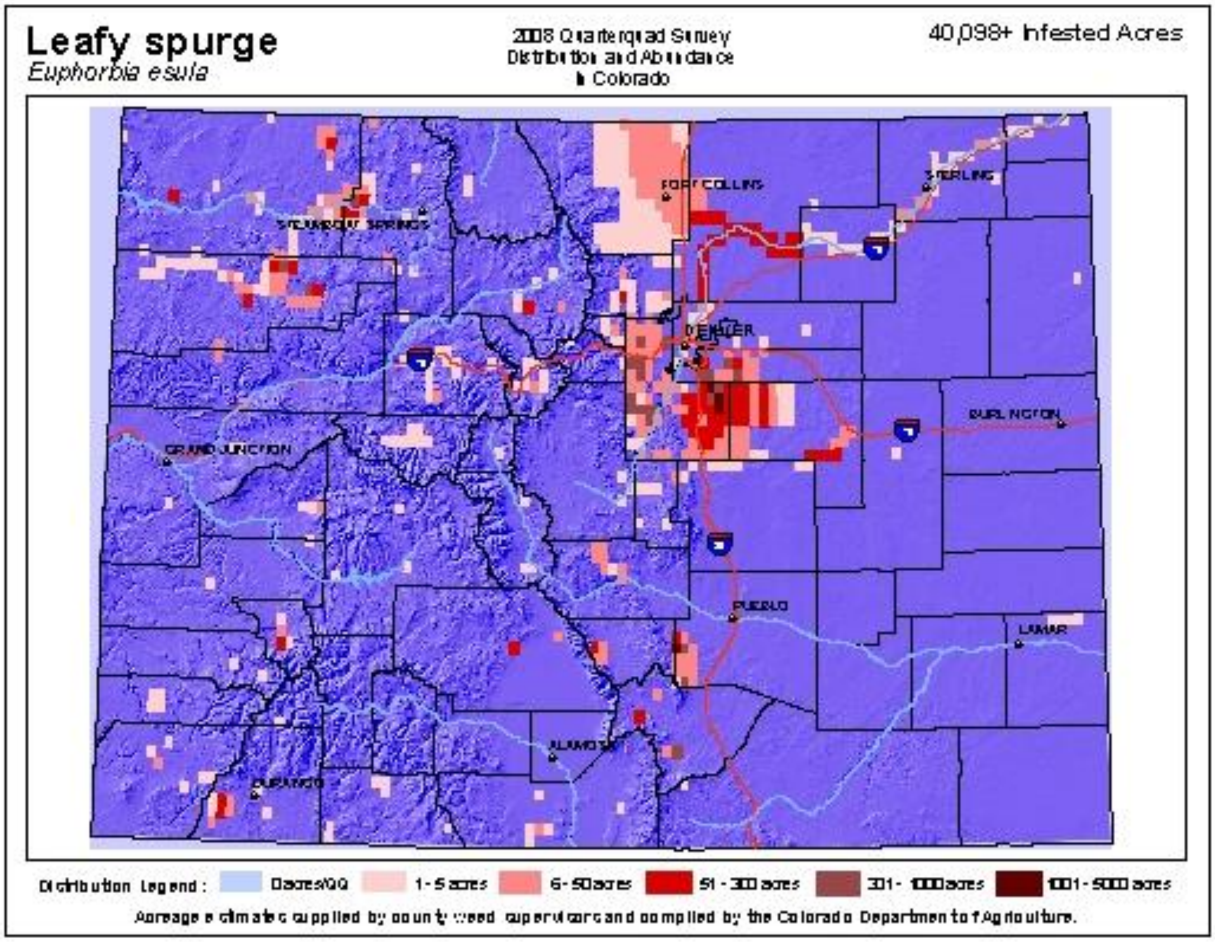
Two state disaster declarations were made for grasshopper plagues and the impact on agriculture in 1980 and 1981.

Noxious Weeds

Weeds are not tracked as other hazards are and so documentation is difficult to compile. The Planning Team was unable to find any documentation on the weed hazard, in that there are no direct links between weeds and verifiable damages. In common discussion, weeds are an annual problem that affects all residents to some degree within the planning area.

County Weed Supervisors submit annual reports to the Colorado Department of Agriculture which indicate the infested acreage estimates per 9,000 acre QuarterQuad. A QuarterQuad is one quarter of a standard 1:24,000 USGS 7.5min topographic quadrangle. This data is compiled by the Colorado DOA and posted as maps on the website indicated above. These maps provide the only datasets for weed hazards currently available. An example map is provided as Figure 4.4.

Figure 4.4. Colorado Department of Agriculture Leafy Spurge Infestation Map



Source: http://www.colorado.gov/cs/Satellite?c=Page&cid=1178305507391&pagename=Agriculture-Main%2FCDAGLayout

Probability of Future Occurrences

While the population of rodents and insects in the region is a yearly occurrence, this alone cannot describe the probability of future occurrences. These populations are part of the natural ecosystem of the region and are expected in certain quantities each year. The presence of such populations only becomes a hazard when the population number reaches a number greater than the surrounding ecosystem can support, driving the rodents and/or insects to severely damage crops and/or livestock. Weed infestations exist annually, with some years worse than others, and the hazard is expected to continue, though the state weed mitigation programs may reflect an impact on the hazards in the future. It is difficult to quantify when this may become an issue, as the data for tracking such events is not always available. Based on the information collected in this plan, there probability is **highly likely.**

4.2.3 Dam and Levee Failures

Hazard/Problem Description

Dams

A dam is a barrier constructed across a watercourse that stores, controls, or diverts water. Dams are usually constructed of earth, rock, concrete, or mine tailings. The water impounded behind a dam is referred to as the reservoir and is measured in acre-feet, with one acre-foot being the volume of water that covers one acre of land to a depth of one foot. Due to topography, even a small dam may have a reservoir containing many acre-feet of water. Dams serve many purposes, including agricultural uses; providing recreation areas; electrical power generation; and erosion, water level, and flood control.

A dam failure is the collapse, breach, or other failure of a dam that causes downstream flooding. Dam failures may result from natural events, human-caused events, or a combination thereof. Due to the lack of advance warning, failures resulting from natural events, such as hurricanes, earthquakes, or landslides, may be particularly severe. Prolonged rainfall that produces flooding is the most common cause of dam failure.

Dam failures usually occur when the spillway capacity is inadequate and water overtops the dam or when internal erosion through the dam foundation occurs (also known as piping). If internal erosion or overtopping cause a full structural breach, a high-velocity, debris-laden wall of water is released and rushes downstream, damaging or destroying whatever is in its path. Overtopping is the primary cause of earthen dam failure in the United States.

Dam failures can also result from any one or a combination of the following causes:

- Prolonged periods of rainfall and flooding, which cause most failures;
- Inadequate spillway capacity, resulting in excess overtopping flows;
- Internal erosion caused by embankment or foundation leakage or piping;
- Improper maintenance, including *failure to* remove trees, repair internal seepage problems, replace lost material from the cross-section of the dam and abutments, or maintain gates, valves, and other operational components;
- Improper design, including the use of improper construction materials and construction practices;
- Negligent operation, including the failure to remove or open gates or valves during high flow periods; and
- Failure of upstream dams on the same waterway.

High winds can cause significant wave action and result in substantial erosion around dams and spillways. Water released by a failed dam generates tremendous energy and can cause a flood that is catastrophic to life and property. A catastrophic dam failure could challenge local response capabilities and require evacuations to save lives. Impacts to life safety will depend on the warning time and the resources available to notify and evacuate the public. Major loss of life could result as well as potentially catastrophic effects to roads, bridges, and homes. Associated water quality and health concerns could also be issues. Factors that influence the potential severity of a full or partial dam failure are the amount of water impounded; the density, type, and value of development and infrastructure located downstream; and the speed of failure.

In general, there are three types of dams: concrete arch or hydraulic fill, earth-rockfill, and concrete gravity. Each type of dam has different failure characteristics. A concrete arch or hydraulic fill dam can fail almost instantaneously: the flood wave builds up rapidly to a peak then gradually declines. An earth-rockfill dam fails gradually due to erosion of the breach: a flood wave will build gradually to a peak and then decline until the reservoir is empty. And, a concrete gravity dam can fail instantaneously or gradually with a corresponding buildup and decline of the flood wave.

The Colorado Division of Water Resources Dam Safety Branch assigns hazard ratings to large dams within the State. Two factors are considered when assigning hazard ratings: existing land use and land use controls (zoning) downstream of the dam. Dams are classified in three categories that identify the potential hazard to life and property:

- High hazard indicates that a failure would most probably result in the loss of life
- Significant hazard indicates a failure could result in appreciable property damage
- Low hazard exists where failure would result in only minimal property damage and loss of life is unlikely.

Privately owned high and significant hazard dams are required by Colorado regulations to have Emergency Action Plans (EAPs) in place. Federally-owned high hazard dams are also required to have EAPs by federal regulations. According to the 2008 State Hazard Mitigation Plan, all high-hazard dams in Colorado have EAPs in place, which provide for the emergency response procedures in the event of a dam emergency event. According to the National Performance of Dams Program (NPDP) database, housed in the Department of Civil and Environmental Engineering at Stanford University, there are 319 high hazard dams in Colorado. According to HAZUS, and data from the National Inventory of Dams (NID) and NPDP, there are dams in each county that pose a risk to people or property should the dam fail (see Table 4.3). Figure 4.5 displays the location of high and significant hazard dams within the planning area.

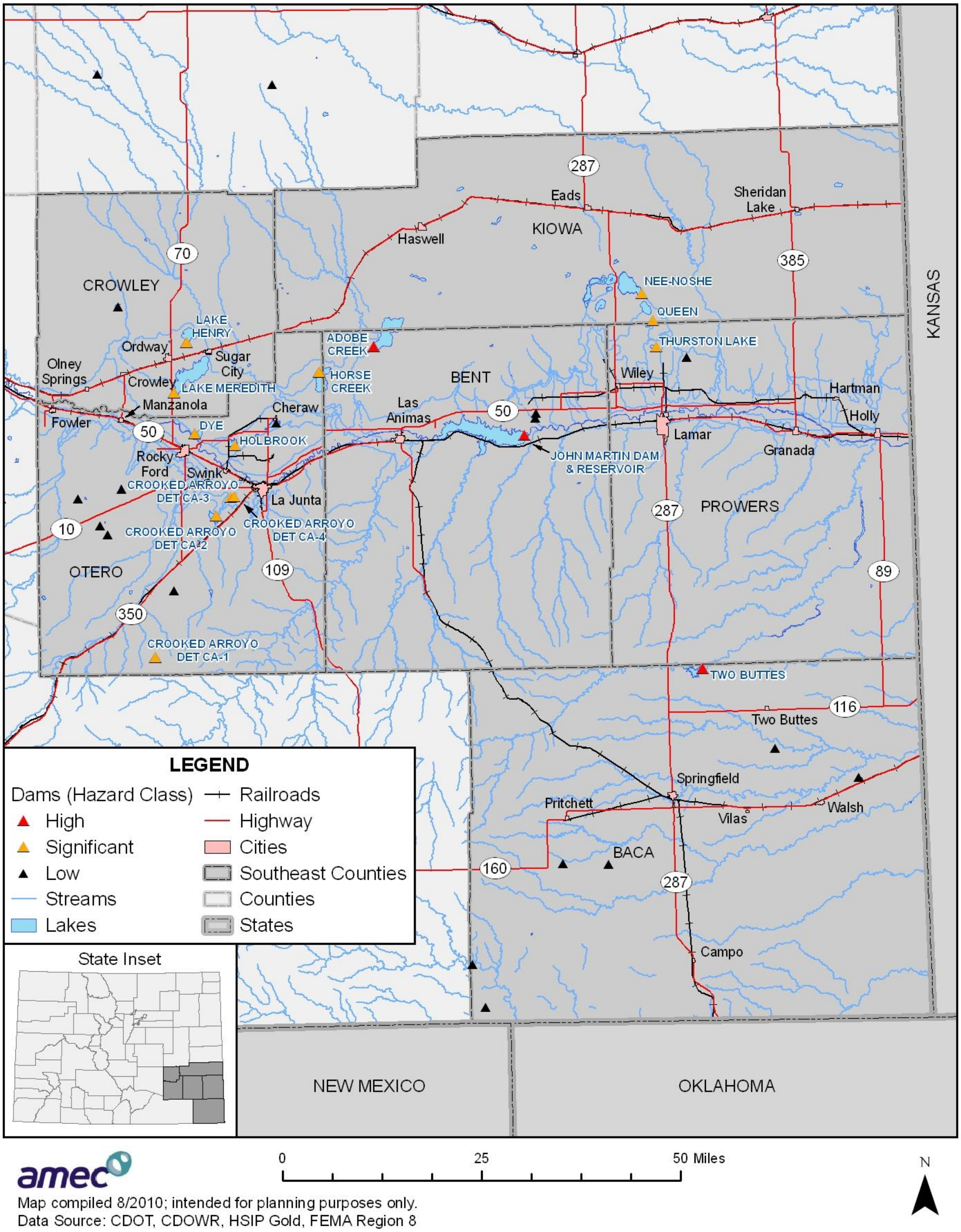
Table 4.3. Dams with Potential to Cause Damaging Floods in Southeast Colorado

Dam	EAP	Owner	Stream	Hazard Rating	Dam Height	Type	Capacity (Acre-feet)*
Baca County							
Two Buttes CO00759	Y	Colorado Division of Wildlife	Two Butte Creek	High	89	Earth	52,182

Dam	EAP	Owner	Stream	Hazard Rating	Dam Height	Type	Capacity (Acre-feet)*
Bent County							
John Martin Dam and Reservoir CO01283	Y	Cespa	Arkansas River	High	118	Gravity Earth	608,245
Adobe Creek CO00515	Y	Fort Lyon Canal Co.	Adobe Creek	High	35	Earthen	85,000
Crowley County							
Lake Henry CO01116	Y	Lake Henry Reservoir Co.	Horse Creek	Significant	24	Earth	14,914
Lake Meredith CO01836	Y	Private	Bob Creek	Significant	30	Earth	41,413
Kiowa County							
Nee-Noshe CO02024	Y	Amity Mutual Irrigation Co	Arkansas River	Significant	25	Earth	60,618
Queen CO02026	Y	Amity Mutual Irrigation Co	Arkansas River	Significant	25	Earth	32,690
Otero County							
Crooked Arroyo Det Ca-1 CO00519	Y	Otero County	Crooked Arroyo	Significant	61	Earth	4,916
Crooked Arroyo Det Ca-2 CO01837	Y	Otero County	Crooked Arroyo	Significant	40	Earth	17,714
Crooked Arroyo Det Ca-3 CO00520	Y	Otero County	Crooked Arroyo	Significant	56	Earth	701
Crooked Arroyo Det Ca-4 CO00521	Y	Otero County	Crooked Arroyo	Significant	40	Earth	545
Dye CO01847	Y	Holbrook Mutual Irrigation Co	Arkansas River	Significant	40	Earth	8,390
Horse Creek CO01046	Y	Fort Lyon Canal Co	Horse Creek	Significant	23	Earth	43,125
Holbrook CO01835	Y	Holbrook Mutual Irrigation Co	Arkansas River	Significant	23	Earth	7,975
Prowers County							
Thurston Lake CO01851	Y	Fort Lyon Canal Co	Arkansas River	Significant	20	Earth	4,550

Source: National Performance of Dams Program
*One acre-foot=326,000 gallons

Figure 4.5. High and Significant Hazard Dams in Southeast Colorado

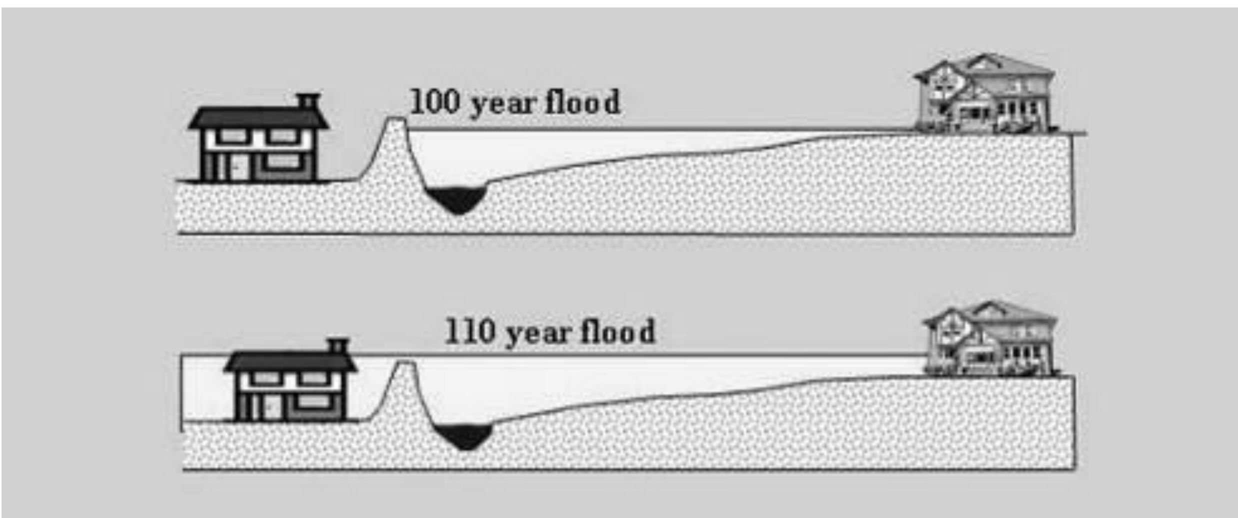


Levees

A levee is a type of dam that runs along the banks of a river or canal. Levees reinforce the banks and help prevent flooding. By confining the flow, levees can also increase the speed of the water. Levees can be natural or man-made. A natural levee is formed when sediment settles on the river bank, raising the level of the land around the river. To construct a man-made levee, workers pile dirt or concrete along the river banks, creating an embankment. This embankment is flat at the top, and slopes at an angle down to the water. For added strength, sandbags are sometimes placed over dirt embankments.

Levees provide strong flood protection, but they are not failsafe. Levees are designed to protect against a specific flood level and could be overtopped during severe weather events. Levees only reduce the risk to individuals and structure behind them, they do not eliminate risk.

Figure 4.6. Flooding from Levee Overtopping



Source: Levees In History: The Levee Challenge. Dr. Gerald E. Galloway, Jr., P.E., Ph.D., Water Policy Collaborative, University of Maryland, Visiting Scholar, USACE, IWR.
http://www.floods.org/ace-files/leveesafety/lss_levee_history_galloway.ppt

Unfortunately, in the rare occurrence when a levee system fails or is overtopped as in Figure 4.7, severe flooding can occur due to increased elevation differences associated with levees (see Figure 4.6) and the increased water velocity that is created. It's also important to remember that no levee provides protection from events for which it was not designed, and proper operation and maintenance are necessary to reduce the probability of failure.

Figure 4.7. Levee Failure

Source: River Partners, www.riverpartners.org

There are ten levees in the planning area based on levees that are mapped on Flood Insurance Rate Maps and four that are not. These levees are described in Table 4.4. This levee inventory is not complete, as portions of the planning region have not been mapped by the NFIP, and many of the existing maps are over 20 years old. Smaller levees or embankments that do not provide 100-year flood protection would not be captured in this inventory.

Table 4.4. Levees in the Planning Area

County	Levee Name	Flooding Source	Owner	FEMA Levee Certified	Date Built	FIRM Panel(s)	Level of Protection	In USACE Database?
Bent	Las Animas North	Arkansas River	Arkansas River Conservancy District	No	1970	0802710004B	50-99 year	Yes
Bent	Las Animas South	Arkansas River	Arkansas River Conservancy District	No	1970	0802710004B	50-99 year	Yes
Otero	-	Arkansas River	North La Junta Conservancy District	N/A	N/A	None	N/A	No
Otero	-	Arkansas River	BNSF Railroad	N/A	N/A	None	N/A	No
Otero	-	Arkansas River	BNSF Railroad	N/A	N/A	None	N/A	No
Otero	-	King Arroyo	Colorado Department of Transportation	N/A	N/A	None	N/A	No
Prowers	Granada Main South	Wolf Creek Channel	City of Granada	Yes	1970	0801440001A, 0802720007A	100-year	Yes
Prowers	Granada Ditch Levee	South Granada Ditch	City of Granada	Yes	1970	0801440001A, 0802720007A	100-year	Yes
Prowers	Granada Main North	Wolf Creek Channel	City of Granada	Yes	1970	0801440001A, 0802720007A	100-year	Yes
Prowers	Town of Holly and Wild Cr East	Arkansas River	Town of Holly	Yes	1980	0802720008A	50-99 year	Yes
Prowers	Town of Holly and Wild Cr West	Wild Horse Creek	Town of Holly	Yes	1980	0802720008A	50-99 year	Yes
Prowers	Town of Holly and Wildlife Area	Wild Horse Creek	Town of Holly	Yes	1980	0802720008A	50-99 year	Yes
Prowers	Town of Lamar & Willow Creek North	Willow Creek	Water Department	No	N/A	0802720006A, 0801460002B	N/A	No
Prowers	Town of Lamar & Willow Creek South	Willow Creek	Water Department	No	N/A	0802720006A	N/A	No

Source: USACE, FEMA Region VIII

Past Occurrences

There are no reports of significant dam failures in the planning area. However, the NPDP tracks dam incidents (events that affect the structural and functional integrity of dams, though not necessarily causing failure and not including ordinary maintenance and repair, vandalism, acts of war, recreational accidents, and sabotage), some of which have affected the planning area. These incidents are shown in Table 4.5.

Table 4.5. Dam Incidents in Planning Area

Dam ID	Name	Date of Incident	Description of Incident	Nearest Town	County	Class	Waterway	Failure?
CO00760	GW Verhodff	6/13/1995	Seepage: Piping	Lamar	Bent	Low	Arkansas	No
CO01116	Lake Henry	6/9/1995	Seepage	Ordway	Crowley	Low	Horse Creek	No
CO01116	Lake Henry	4/20/2001	Embankment Slide	Ordway	Crowley	Low	Horse Creek	No
CO01116	Lake Henry	6/14/2001	Embankment Slide	Ordway	Crowley	Low	Horse Creek	No
CO01836	Lake Meredith	4/7/1999	Embankment Slide	Rocky Ford	Otero	Significant	Horse Creek	No
CO01046	Horse Creek	2/25/1999	Seepage	Las Animas	Otero	Significant	Horse Creek	No

Source: National Performance of Dams Programs Dam Incident Query.

According to members on the planning team, while there have been issues related to levee erosion (discussed in the Streambank Erosion profile in Section 4.2.10) there have been no reported occurrences of levee failure in the planning area.

Likelihood of Future Occurrences

Occasional—The planning area remains at risk to dam failures from the high and significant hazard dams that protect the planning area. Given the varying density of population, the area that would be affected by flooding, and the varying ages and conditions of these dams, the potential exists for future dam failures which could result in property damage and possible loss of life. Nonetheless, it should be noted that there have not been any major failures of dams or levees in the planning area.

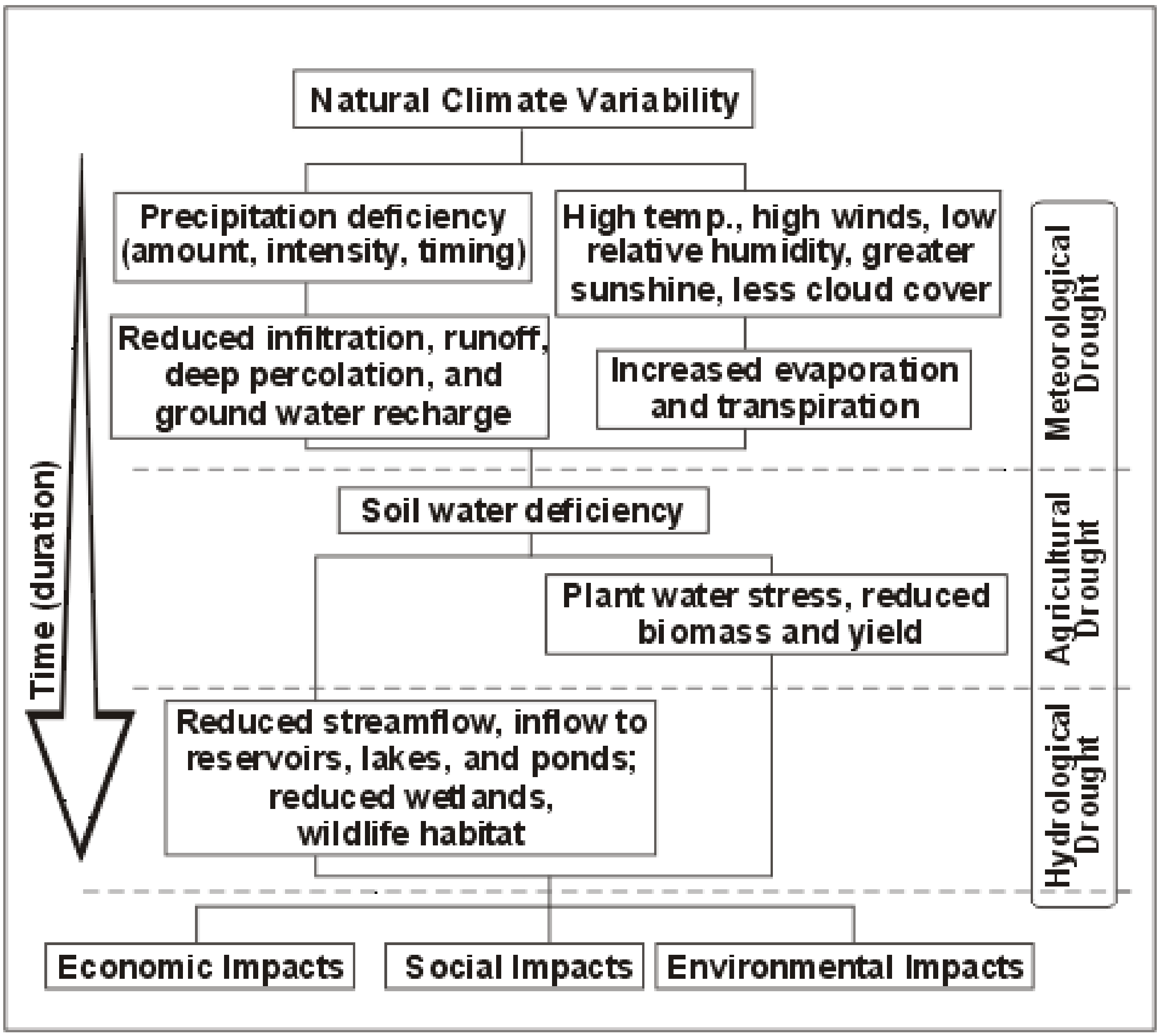
4.2.4 Drought

Hazard/Problem Description

Drought is a complex issue (see Figure 4.8) involving many factors—it occurs when a normal amount of moisture is not available to satisfy an area's usual water-consuming activities. Although droughts are sometimes characterized as emergencies, they differ from typical emergency events. Most natural disasters, such as floods or forest fires, occur relatively rapidly and afford little time for preparing for disaster response. Droughts occur slowly, over a multi-year period, and it is often not obvious or easy to quantify when a drought begins and ends. Drought can often be defined regionally based on its effects:

- **Meteorological** drought is usually defined by a period of below average water supply.
- **Agricultural** drought occurs when there is an inadequate water supply to meet the needs of the state's crops and other agricultural operations such as livestock.
- **Hydrological** drought is defined as deficiencies in surface and subsurface water supplies. It is generally measured as streamflow, snowpack, and as lake, reservoir, and groundwater levels.
- **Socioeconomic** drought occurs when a drought impacts health, well-being, and quality of life, or when a drought starts to have an adverse economic impact on a region.

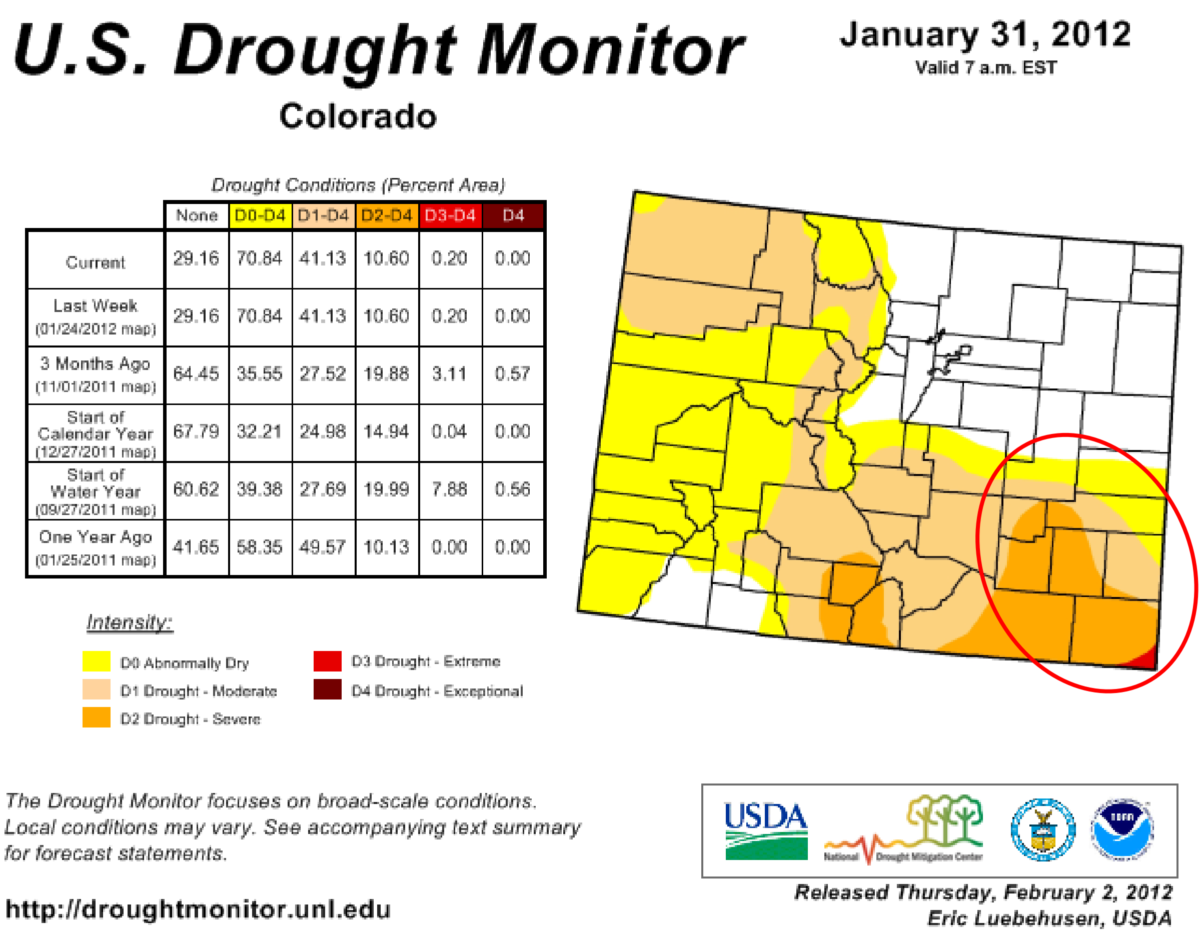
Figure 4.8. Causes and Impacts of Drought



Source: National Drought Mitigation Center

Drought in the United States is monitored by the National Integrated Drought Information System (NIDIS). A major component of this portal is the U.S. Drought Monitor. The Drought Monitor concept was developed jointly by the NOAA's Climate Prediction Center, the NDMC, and the USDA's Joint Agricultural Weather Facility in the late 1990s as a process that synthesizes multiple indices, outlooks and local impacts, into an assessment that best represents current drought conditions. T he final outcome of each Drought Monitor is a consensus of federal, state, and academic scientists who are intimately familiar with the conditions in their respective regions. A snapshot of the drought conditions in Colorado and the planning area can be found in Figure 4.9.

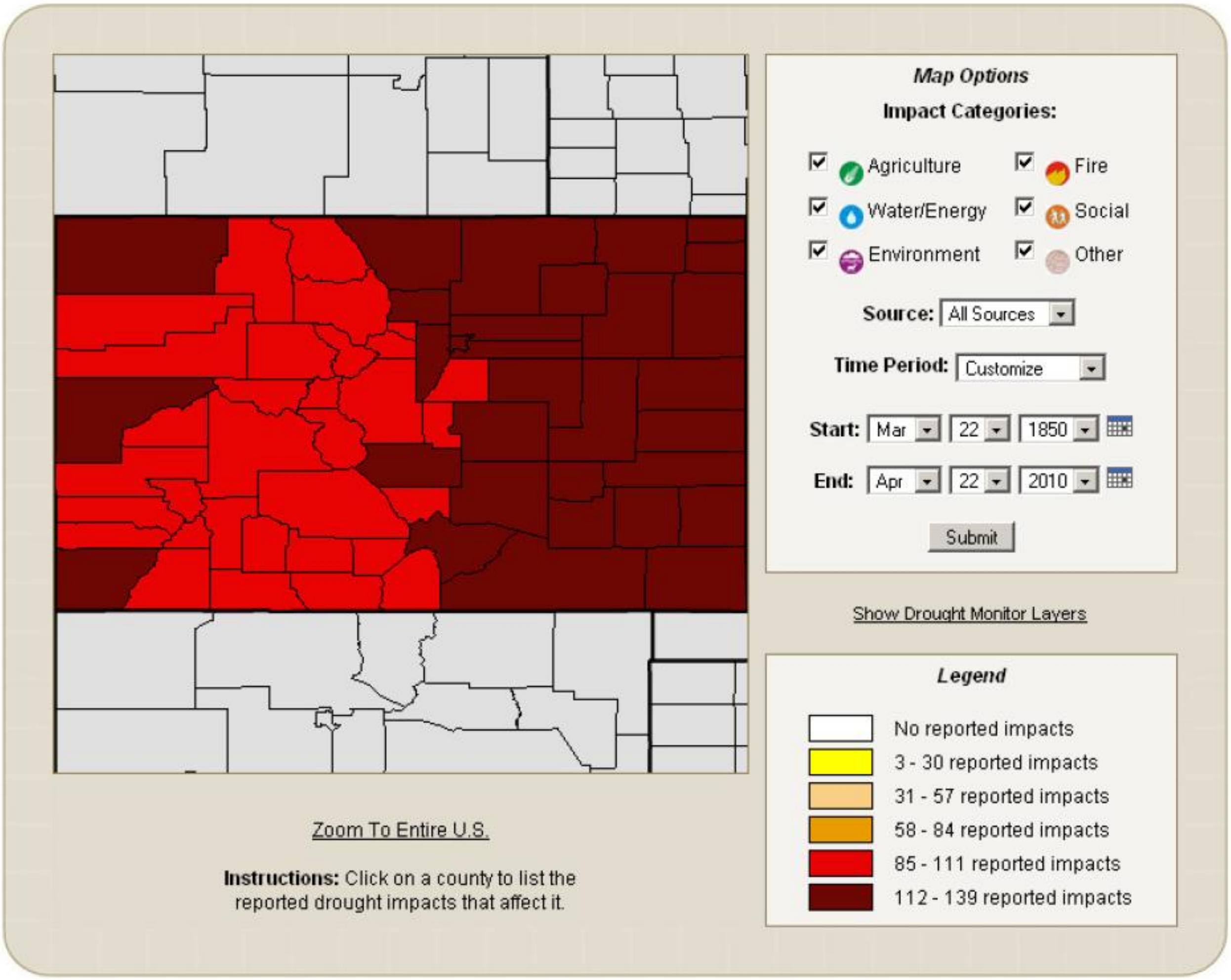
Figure 4.9. Current Drought Status in Colorado and the Planning Area



Source: US Drought Monitor

Drought impacts are wide-reaching and may be economic, environmental, and/or societal. Tracking drought impacts can be difficult. The Drought Impact Reporter from the NDMC is a useful reference tool that compiles reported drought impacts nationwide. Figure 4.10 and Table 4.6 show drought impacts for all Colorado counties, including the planning area, from 1850 to April 2010. Based on reports to the NDMC, all counties recorded some impact from drought, and the counties in the planning area all recorded major amounts of impacts The data represented is skewed, with the majority of these impacts from records within the past ten years.

Figure 4.10. Drought Impact Reporter for Colorado (1850-April 2010)



Source: National Drought Mitigation Center

Table 4.6. Drought Impacts by County

County	Ag	Fire	Water/ Energy	Environment	Social	Other	Total
Baca	31	15	3	7	16	45	117
Bent	33	14	4	7	17	46	121
Crowley	32	15	3	8	16	45	119
Kiowa	33	14	4	8	17	47	123
Otero	35	15	3	8	17	44	122
Prowers	31	16	4	7	16	47	121
Total	**195**	**89**	**21**	**45**	**99**	**274**	**723**

Source: National Drought Mitigation Center

The most significant impacts associated with drought in the planning area are those related to water intensive activities such as agriculture, wildfire protection, municipal usage, commerce, tourism, recreation, and wildlife preservation. Voluntary conservation measures are typically implemented during extended droughts. A reduction of electric power generation and water quality deterioration are also potential problems. Drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding.

Past Occurrences

Several times since the late 1800's, Colorado has experienced conditions of drought. The most dramatic occurred in the 1930s and 1950s when many states, Colorado included, were affected for several years at a time. Table 4.7, drawn from a study done by McKee, Pielke, and Doesken, shows six multi-year droughts experienced in Colorado since 1893. The 2002 drought occurred after the study was published, but the table has been modified to reflect Colorado's most recent and intense drought from 2002 to 2006.

Table 4.7. Historical Dry and Wet Periods in Colorado

Date	Dry	Wet	Duration (years)
1893-1905	X		12
1905-1931		X	26
1931-1941	X		10
1941-1951		X	10
1951-1957	X		6
1957-1959		X	2
1963-1965	X		2
1965-1975		X	10
1975-1978	X		3
1979-1999*		X	20
2000-2006*	X		6

Source: McKee, et al. *modified for the Colorado State Drought Plan in 2010 based on input from the Colorado Climate Center

The following is a summary of information on major droughts that have affected Colorado.

The 1930's Drought – The Dust Bowl drought severely affected much of the United States during the 1930s. Figure 4.11 illustrates the extent of the Dust Bowl as defined by the Soil Conservation Service.

Figure 4.11. Extent of the Dust Bowl

Source: Public Broadcasting System American Experience "Surviving the Dust Bowl" www.pbs.org/wgbh/amex/dustbowl/maps/index.html

The drought came in three waves, 1934, 1936, and 1939-40, but some regions of the High Plains experienced drought conditions for as many as eight consecutive years. The soil, depleted of moisture, was lifted by the wind into great clouds of dust and sand which were so thick they concealed the sun for several days at a time. They were referred to as "black blizzards." The period itself is known as the dust bowl. The "black blizzards" were caused by sustained drought conditions compounded by years of land management practices that left topsoil susceptible to the forces of the wind.

The agricultural and economic damage devastated residents of the Great Plains. The Dust Bowl drought worsened the already severe economic crises that many Great Plains farmers faced. In the early 1930s, many farmers were trying to recover from economic losses suffered during the Great Depression. To compensate for these losses, they began to increase their crop yields. High production drove prices down, forcing farmers to keep increasing their production to pay for both their equipment and their land. When the drought hit, farmers could no longer produce enough crops to pay off loans or even pay for essential needs. Even with federal emergency aid, many Great Plains farmers could not withstand the economic impacts of the drought. The agricultural and economic damage devastated residents of the Great Plains.

Many factors contributed to the severe impact of this drought and in its aftermath a better understanding of the interactions between the natural elements (climate, plants, and soil) and human-related elements (agricultural practices, economics, and social conditions) of the Great Plains developed. As a result, farmers adopted new cultivation methods to help control soil erosion in dry land ecosystems; consequently, subsequent droughts in the region have not had the same impact.

The 1950s Drought – During the 1950s, the Great Plains and the southwestern U.S. withstood a five-year drought, and in three of these years, drought conditions stretched coast to coast. The 1950s drought was characterized by both decreased rainfall and excessively high temperatures. The first effects of the drought were felt in the southwestern U.S. in 1950 and by 1953 conditions had spread to Oklahoma, Kansas and Nebraska. By 1954, the drought encompassed a ten-state area reaching from the mid-west to the Great Plains, and southward into New Mexico. The area from the Texas panhandle to central and eastern Colorado, western Kansas and central Nebraska experienced severe drought conditions. The drought maintained a stronghold in the Great Plains, reaching a peak in 1956. The drought devastated the region's agriculture, with crop yields in some areas decreased as much as 50%. Excessive temperatures and minimal rainfall scorched grasslands typically used for grazing. With grass scarce, hay prices rose, forcing some ranchers to feed their cattle a mixture of prickly pear cactus and molasses. By the time the drought subsided in 1957, many counties across the region were declared federal drought disaster areas.

The 1977 Drought – During 1976 and 1977, the State experienced record-low stream flows at two-thirds of the major stream gages, records that held until the 2002 drought. Agriculture producers had to incur higher crop production costs due to short water supplies; and numerous municipalities were forced to impose water use restrictions on their customers. The state's agriculture producers and municipalities received over $110 million in federal drought aid as a result of the 1976-1977 drought.

1994 Drought – On August 1st, in response to extremely arid conditions, the Governor activated, by memorandum, several Task Forces to assess impacts. Significant impacts reported included an increase in wildfires statewide, loss to the winter wheat crops, difficulties with livestock feeding, and impacts to the State's fisheries.

1996 Drought – July 29th, the Governor issued an Executive Order (D000996) proclaiming a Drought Disaster Emergency Declaration. Baca, Bent, and Kiowa County qualified for USDA Secretarial Disaster Declaration S999.

2002 Drought – According to the 2010 Colorado Drought Mitigation Plan, in 2002 Colorado experienced the worst drought in the State's history. These conditions were rated 'exceptional' by the US Drought Monitor and were the most severe drought experienced in the region since the Dust Bowl. Indeed, based on studies of tree rings and archaeological evidence from aboriginal cultures, the Colorado drought was arguably the worst in the recorded history of the State.

The drought of 2002 had its roots in the autumn of 1999. After a very wet spring and a soggy August, precipitation patterns reversed and the fall of 1999 was very dry across most of Colorado. The winter of 1999-2000 followed with below average snow fall and above average temperatures, dryness continued into spring and early summer over northeast Colorado and the South Platte watershed and drought conditions quickly emerged. A persistently hot summer with evapotranspiration rates higher than average deteriorated conditions. The 2001 water year, although less extreme continued to trend on the dry side.

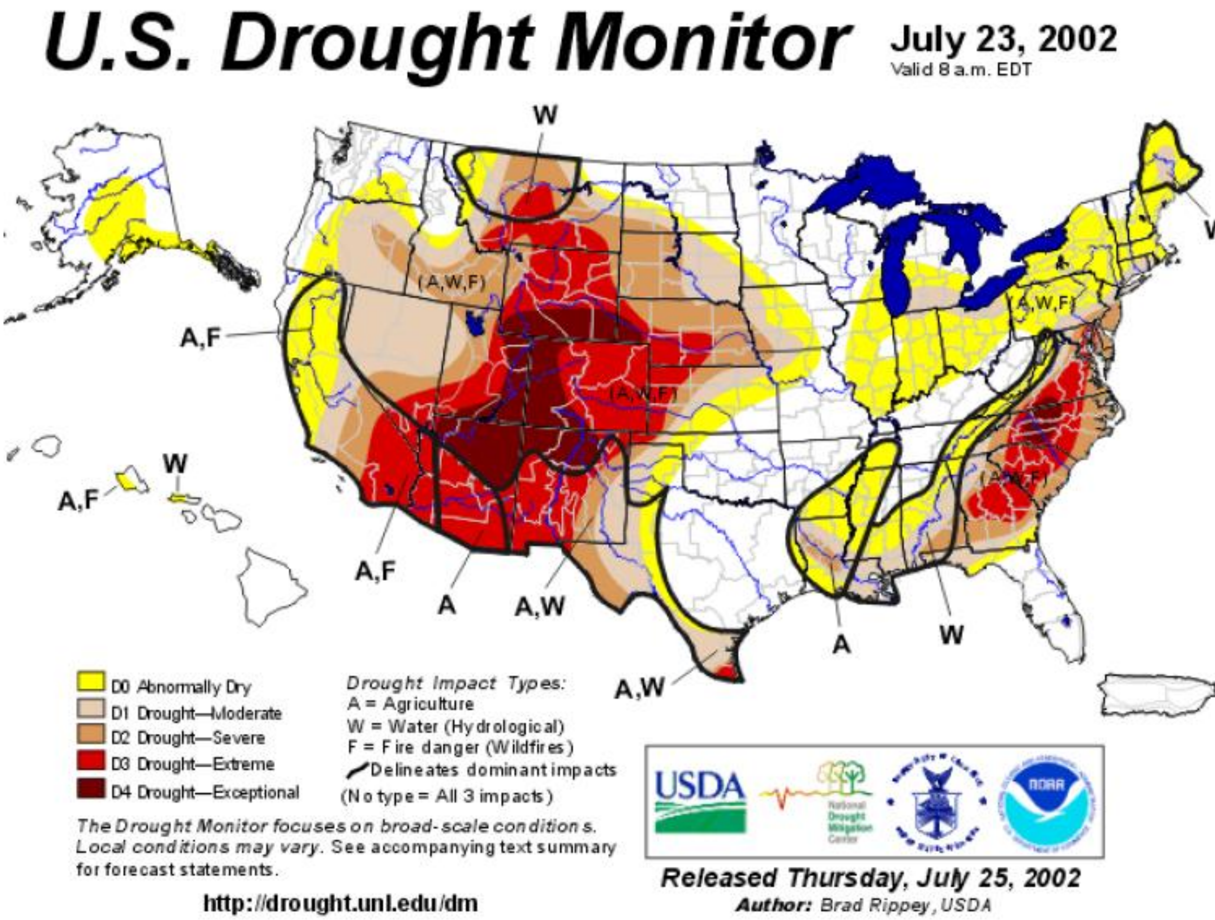
October 2001 weather patterns appeared more favorable as a variety of storm systems crossed the region. However the storms resulted in little moisture and when the month was over precipitation totaled again less than 50% of average over the majority of the State. November and December brought some snow accumulation but snow water content remained below average; and January's above average snowfall came down in the Front Range urban corridor and the southeastern plains, contributing very little to overall water supplies. February and March, despite cooler temperatures and numerous storm systems, did not see the copious wet snows that Colorado spring snowstorms typically produce. By the end of March 2002, the statewide snow water equivalent was a mere 52% of average and portions of Colorado's mountains were even further below average.

The spring storms that sometimes dump heavy and widespread precipitation were nonexistent in April and temperatures soared to record highs. In the mountains snow melted or evaporated at an alarming rate. Relative humidity on several afternoons fell to below 10%. Fire danger, which typically stays low to moderate through early June, was already high by mid April. May was even drier. At a time of year when Colorado's rivers and streams are normally churning with snowmelt runoff, there were only mere glimpses of snowmelt flows. Irrigation water demand was high, and it was soon obvious that supplies would not last through the growing season. Municipalities began to face the possibility that available water supplies might not be sufficient to meet typical summertime demand. Many areas implemented strict water conservation restrictions. Other forest fires erupted and each new blaze seemed to spread faster than the one before.

June arrived accompanied by relentless summer heat, temperatures routinely climbed above 90 degrees Fahrenheit at lower elevations east and west of the mountains. Vegetation that normally grows lush and tall with spring moisture barely greened up. Relative humidity often dropped to less than 10%, and bans on outside burning were enforced statewide. Little or no precipitation fell for the entire month over western Colorado. Winter wheat crop conditions continued rapid deterioration, and ranchers quickly sold or relocated their herds in response to the poor range conditions and high cost of feed. The most severe fires of the season erupted in June, including the Hayman fire southwest of Denver which quickly grew to be the largest documented forest fire in Colorado (217 mi^2) on record .

July brought a few changes. Below average precipitation persisted statewide and temperatures were above average for the fourth consecutive month. By late July, the entire state of Colorado was in a serious drought. (see Figure 4.12)

Figure 4.12. 2002 Drought – Drought Monitor from July 23, 2002



Source: National Drought Monitor

The first several days of August brought some hope for a respite but the monsoon moisture surge was brief. By mid-August, 100°F+ temperatures led media reports to liken conditions to the great Dust Bowl of the 1930's. As the month neared its end, a subtle change in weather patterns brought a round of spring-like thunderstorms loaded with hail and high winds to portions of eastern Colorado. Humid and stormy weather continued into September and for the first time since August 2001, the majority of Colorado received above average rainfall.

Likelihood of Future Occurrences

Likely—Historical drought data for the planning area indicates there have been 6 significant droughts in the last 60 years (1950-2010). This equates to a drought every 10 years on average or a 10 percent chance of a drought in any given year. Based on this data, droughts will likely affect the planning area.

4.2.5 Earthquake

Hazard/Problem Description

An earthquake is caused by a sudden slip on a fault. Stresses in the earth's outer layer push the sides of the fault together. Stress builds up and the rocks slip suddenly, releasing energy in waves that travel through the earth's crust and cause the shaking that is felt during an earthquake. The amount of energy released during an earthquake is usually expressed as a Richter magnitude and is measured directly from the earthquake as recorded on seismographs. Richter magnitude is summarize in Table 4.8.

Table 4.8. Richter Scale Magnitudes

Richter magnitudes	Description	Earthquake effects	Frequency of occurrence
Less than 2.0	Micro	Microearthquakes, not felt.	About 8,000 per day
2.0-2.9	Minor	Generally not felt, but recorded	About 1,000 per day
3.0-3.9		Often felt, but rarely causes damage.	49,000 per year (est.)
4.0-4.9	Light	Noticeable shaking of indoor items, rattling noises. Significant damage unlikely.	6,200 per year (est.)
5.0-5.9	Moderate	Can cause major damage to poorly constructed buildings over small regions. At most slight damage to well-designed buildings.	800 per year
6.0-6.9	Strong	Can be destructive in areas up to about 160 kilometres (100 mi) across in populated areas.	120 per year
7.0-7.9	Major	Can cause serious damage over larger areas.	18 per year
8.0-8.9	Great	Can cause serious damage in areas several hundred miles across.	1 per year
9.0-9.9		Devastating in areas several thousand miles across.	1 per 20 years

Source: US Geological Survey Earthquake Hazards Program FAQ - http://earthquake.usgs.gov/learn/faq/?categoryID=2

Another measure of earthquake severity is intensity. Intensity is an expression of the amount of shaking at any given location on the ground surface as felt by humans and defined in the Modified Mercalli scale (see Table 4.9).

Table 4.9. Modified Mercalli Intensity (MMI) Scale

MMI	Felt Intensity
I	Not felt except by a very few people under special conditions. Detected mostly by instruments.
II	Felt by a few people, especially those on upper floors of buildings. Suspended objects may swing.

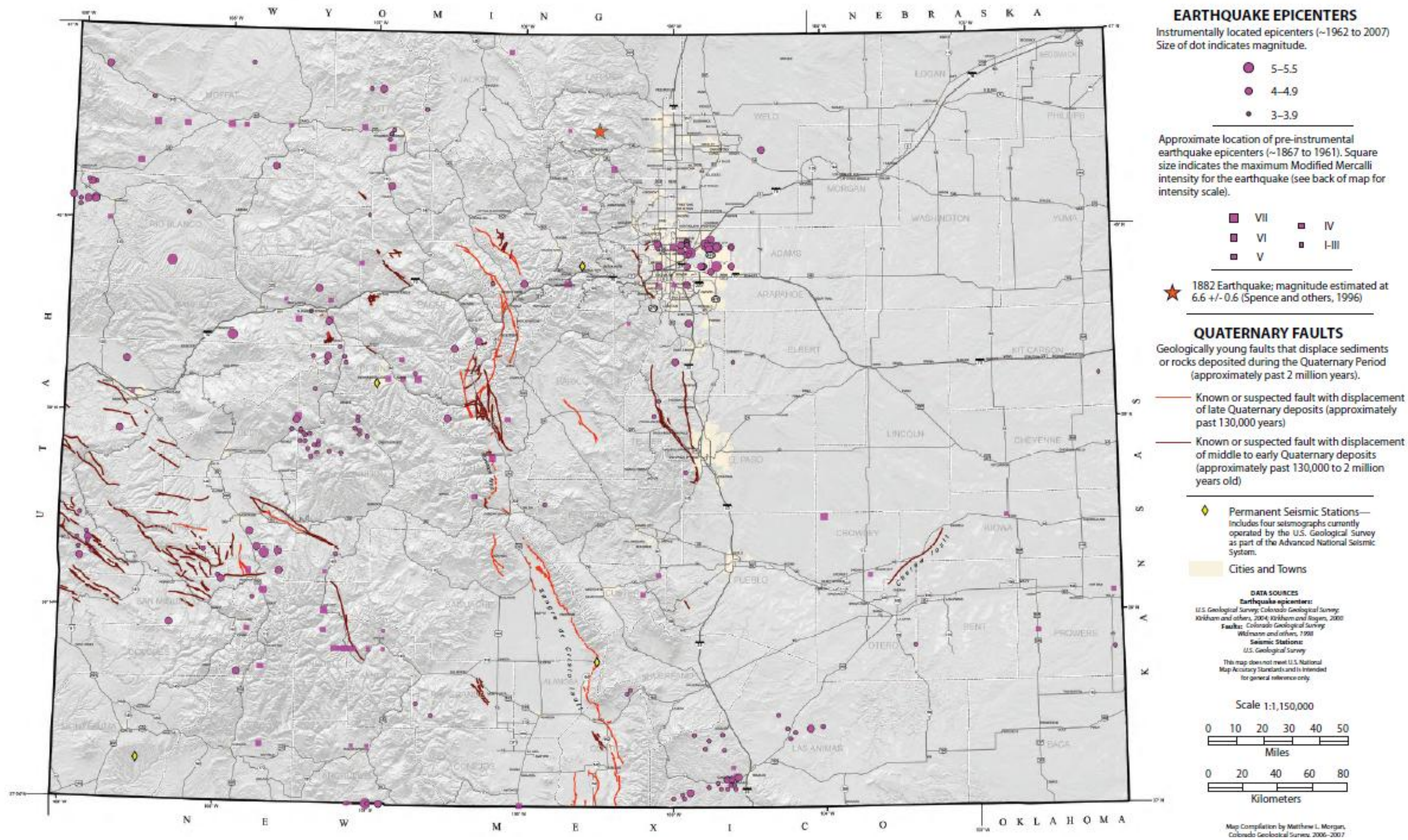
MMI	Felt Intensity
III	Felt noticeably indoors. Standing automobiles may rock slightly.
IV	Felt by many people indoors, by a few outdoors. At night, some people are awakened. Dishes, windows, and doors rattle.
V	Felt by nearly everyone. Many people are awakened. Some dishes and windows are broken. Unstable objects are overturned.
VI	Felt by everyone. Many people become frightened and run outdoors. Some heavy furniture is moved. Some plaster falls.
VII	Most people are alarmed and run outside. Damage is negligible in buildings of good construction, considerable in buildings of poor construction.
VIII	Damage is slight in specially designed structures, considerable in ordinary buildings, great in poorly built structures. Heavy furniture is overturned.
IX	Damage is considerable in specially designed buildings. Buildings shift from their foundations and partly collapse. Underground pipes are broken.
X	Some well-built wooden structures are destroyed. Most masonry structures are destroyed. The ground is badly cracked. Considerable landslides occur on steep slopes.
XI	Few, if any, masonry structures remain standing. Rails are bent. Broad fissures appear in the ground.
XII	Virtually total destruction. Waves are seen on the ground surface. Objects are thrown in the air.

Source: Federal Emergency Management Agency

Earthquakes can cause structural damage, injury, and loss of life, as well as damage to infrastructure networks, such as water, power, communication, and transportation lines. Other damage-causing effects of earthquakes include surface rupture, fissuring, settlement, and permanent horizontal and vertical shifting of the ground. Secondary impacts can include landslides, seiches, liquefaction, fires, and dam failure. Seismic shaking is typically the greatest cause of losses to structures during earthquakes.

Colorado is considered a region of minor earthquake activity. Geologic studies indicate there are about 90 potentially active faults in Colorado with documented movement within the last 1.6 million years. Potentially active faults, which represent the highest earthquake hazard, are those that have ruptured to the ground surface during the Holocene period (about the last 15,000 years). Faults with evidence of movement during the past 130,000 years are often considered active faults. These faults are shown in red on Figure 4.13. Faults that last moved between 130,000 and 2 million years ago may be considered potentially active. Locations of these faults are depicted on the map by the dark red-brown lines. Thousands of other faults exist in Colorado, but few have been studied in sufficient detail to determine their activity during the recent geologic past. Some of these faults also may be a potential concern. Figure 4.13 shows the location of faults and earthquake epicenters in Colorado.

Figure 4.13. Colorado's Earthquake and Fault Map



In the 2008 State Hazard Mitigation Plan, extensive discussion about earthquake hazards indicates that the historical assumption about earthquake vulnerability in the state (namely, that said vulnerability is low) may be false. The "Earthquake Evaluation Report" issued by the Colorado Geological Survey (CGS) is included as an Annex in the 2008 State Plan. This report extensively reviews the history of earthquake analysis in the State, and indicates that significant funding and time investments are required to determine a more realistic evaluation of the earthquake threat to the State. As part of the report, the CGS ran HAZUS (FEMA's HAZards United States software) to perform several different loss prediction analyses. One of these is presented in a county summary format. Table 4.10 summarizes this information.

Table 4.10. Colorado Fault Lines by County

County	Fault	Magnitude	Default Attenuation Function	Estimated Fatalities	Estimated Total Damages	Loss Ratio of Total Building Stock	Previous Events
Baca	Cheraw	M7.0	CEUS	0	$5.74 million	-0.9%	
Bent	Cheraw	M7.0	CEUS	1	$35.5 million	-3.2%	
Crowley	Cheraw	M7.0 M5.5	CEUS	3 0	$60.5 million $4 million	-8.9% -0.6%	Dec 4 1870 – Pueblo-Ft. Reynolds November 28,1955 – Fowler-Sugar City
Kiowa	Cheraw	M7.0 M5.5	CEUS	0 0	$5.1 million $0.5 million	-.45% -.04%	Oct. 15, 1921 – Eads Jan. 10, 2003 - Lamar
Otero	Cheraw	M7.0 M5.5	CEUS	20 0	$556 million $24.3 million	-18.4% -0.8%	
Prowers	Cheraw	M7.0	CEUS	0	$27.6 million	-1.2%	Sept 29, 1928 – Holly January 14, 1956 – Lamar Apr. 21, 1968 – S of Holly Jan. 10, 2003 - Lamar

WUS: Western U.S. Attenuation Function
CEUS: Central U.S. Attenuation Function
Loss Ratio of Total Building Stock: This refers to the percentage of total building stock value damaged. The higher the ratio, the more difficult it is to restore a community to viability.

Source: Colorado Geological Society Earthquake Evaluation Report

Two other analyses ran by the CGS show data by fault instead of by county. This information reflects the total economic losses, fatalities, and loss ratios for the entire impacted area, not just the specific planning area covered in this document. This information helps place the magnitude of such an event into perspective. Table 4.11 shows the fault analysis scenarios for the Cheraw Fault that could affect the planning area.

Table 4.11. Fault Scenarios for Counties within 150 km of Fault

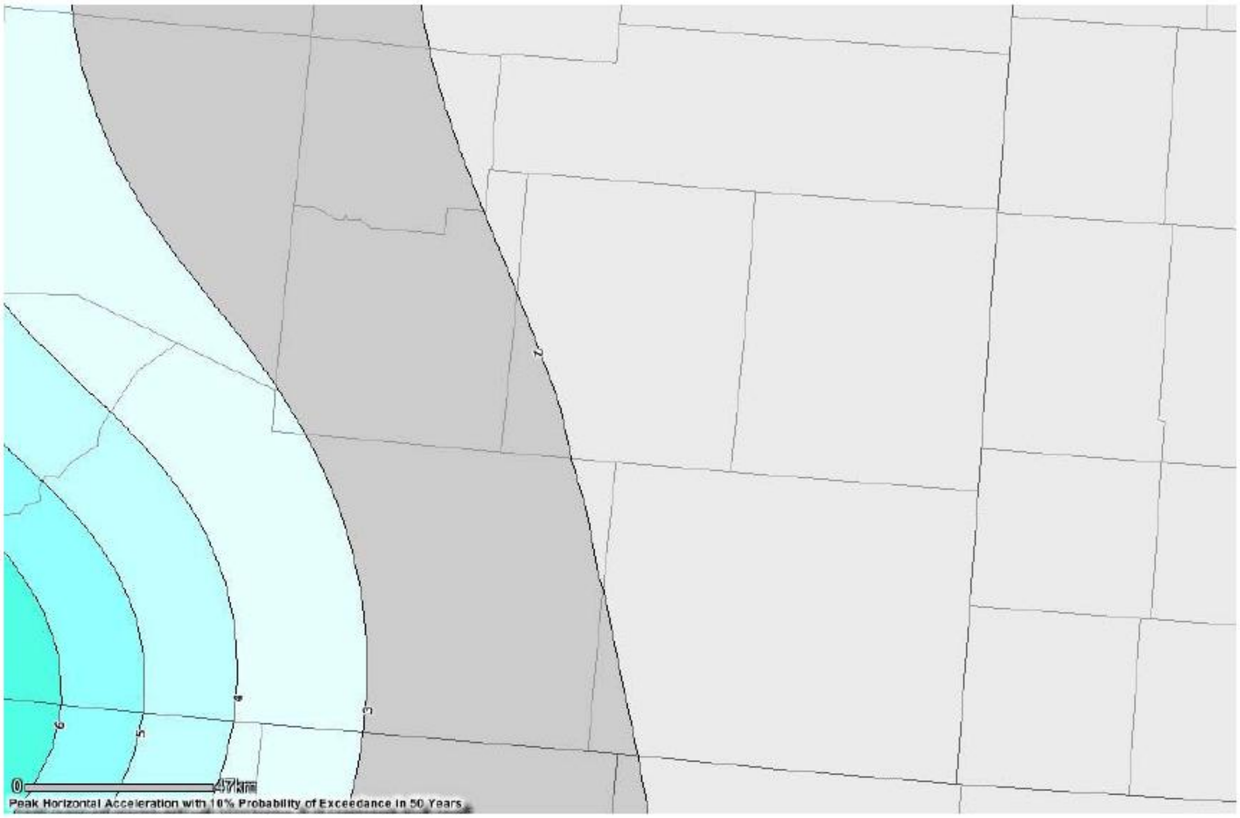
Fault Scenario	Magnitude	Total Economic Loss	Fatalities	Loss Ratio
Cheraw Fault CEUS	7.0	$1,353 Million	27	1.0%
Cheraw Fault CEUS	6.0	$148 Million	1	0.1%
Cheraw Fault CEUS	5.5	$44.3 Million	0	0.03%
CEUS: Central U.S. Attenuation Function				

Source: Colorado Geological Society Earthquake Evaluation Report

The HAZUS runs were divided into "Top Five" lists for integration into the 2008 State plan. The first 'Top Five' listed the most damaging faults in the state. The second 'Top Five' list depicted total direct economic loss scenarios. However, no portion of the planning area falls within the Highest Loss Ratio categories or the counties at greatest risk. The complete report is available in the 2008 State Hazard Mitigation Plan.

The U.S. Geological Survey (USGS) issues National Seismic Hazard Maps as reports every few years. These maps provide various acceleration and probabilities for time periods. Figure 4.14 depicts the peak horizontal acceleration (%g) with 10% probability of exceedance in 50 years for the planning region. The figure demonstrates that almost the entire region falls in the 1%g area (represented by the lightest shade). Most of Otero and Crowley County fall into the 2%g area (represented by the gray). This data indicates that the expected severity of earthquakes in the region is fairly limited, as damage from earthquakes typically occurs at peak accelerations of 30%g or greater. However, as demonstrated by the HAZUS modeling documented earlier, the potential, though remote, does exist for damaging earthquakes. This relatively higher risk applies primarily to Bent, Crowley, Kiowa, Otero Counties, due to their proximity to the Cheraw fault.

Figure 4.14. 2008 Southeast Colorado Seismic Hazard Map



Source: USGS National Seismic Hazard Maps – 2008 Interactive Tool. Available online at http://gldims.cr.usgs.gov/nshmp2008/viewer.htm

Based on the history of previous occurrences, as documented below, there is also indication that counties without known, active faults are at risk for earthquakes. No geographically extensive earthquakes have occurred in the planning region, but the potential remains.

Previous Occurrences

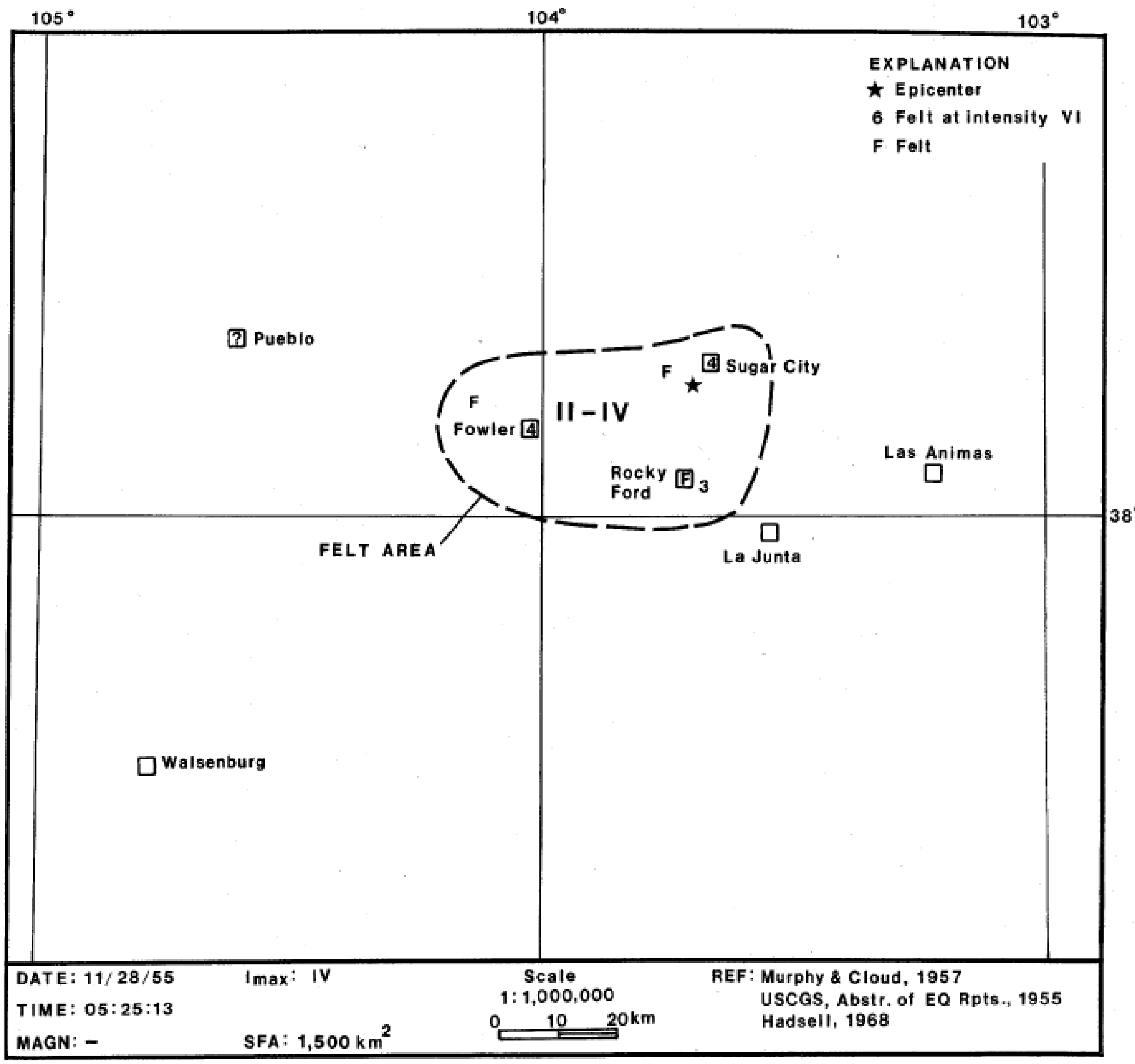
Past occurrences in the planning area were reported in the Earthquake Evaluation Report released by the CGS. The CGS also released a publication, titled "Colorado Earthquake Information 1867-1996," that provides details on past earthquakes. Based on that report, information of specific occurrences that affected the planning area are as follows:

Dec 4 1870 – F.A. Hadsell, writing in the *Colorado School of Mines Quarterly* (vol. 63, No. 1, Jan. 1968), reports the first known reference to an earthquake in Colorado occurred on December 7, 1870. The *Colorado Transcript* states, "A careful observer at Fort Reynolds, 20 miles east of Pueblo, noted that bottles standing 1 inch apart were knocked together violently."

Oct. 15, 1921 – The Colorado Geological Survey Humphreys (1921) and Wollard (1968) reported that an earthquake lasting for 2 to 3 seconds was felt by several in Eads. It was rated at intensity III.

Sept 29, 1928 – An earthquake shook Holly and other parts of Prowers County. Heck and Bodle (1930) described the earthquake as a rocking motion generally felt in Holly and indicated that many people were awakened and alarmed throughout the county. Stover, Reagor, and Algermissen (1984) rated this event at intensity IV. A map of the affected area is provided in Figure 4.15.

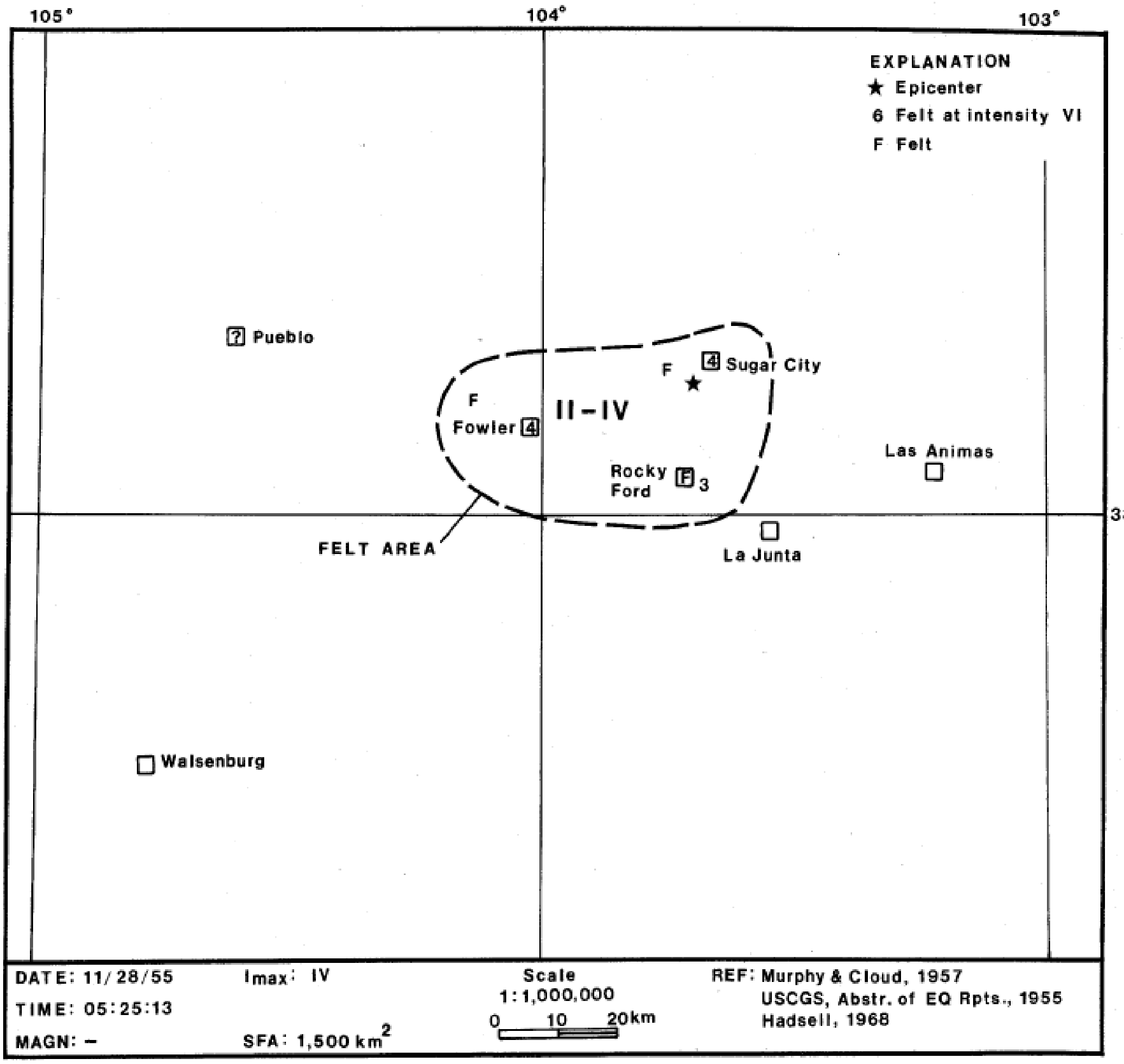
Figure 4.15. September 29, 1928 Earthquake



Source: Colorado Earthquake Information 1867-1996

November 28, 1955 – During the late evening on November 27, 1955 (local time) a light earthquake shook a limited area in southeastern Colorado. Murphy and Cloud (1957) stated that intensity IV was reported at Fowler and Sugar City. The CGS rated the report for the Colorado Experiment Station at III. The earthquake was also felt at Nepesta, Ordway, and Rocky Ford. Figure 4.16 is an intensity map for this event. According to the USGS quarterly series "Abstracts of Earthquake Reports", Pueblo experienced intensity IV effects. Based on the intensity map, the felt area for this event is around 1,500 km^2. Hadsell (1968) reported it at 1,000 km^2.

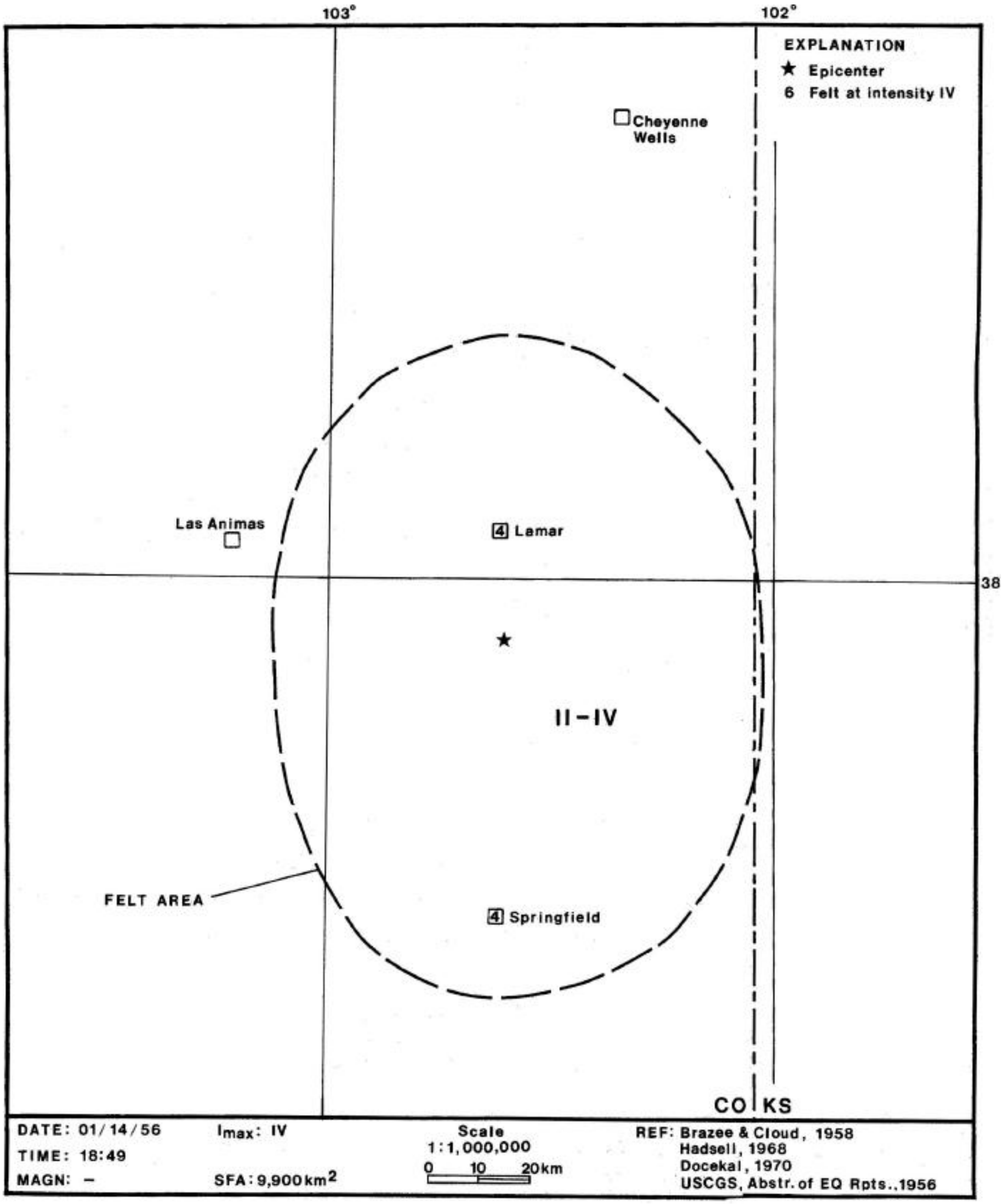
Figure 4.16. November 28, 1955 Earthquake



Source: Colorado Earthquake Information 1867-1996

January 14, 1956 – A small earthquake on January 14, 1956 was felt in the Lamar area. Brazee and Cloud (1958) indicated it was felt by many at Lamar, causing considerable excitement and some alarm. A number of residents of Springfield also felt the quake, and a few reported creaking of buildings and rattling of loose objects. Figure 4.17 illustrates an intensity map for this earthquake based on the two felt reports. The felt area could be outlined in several ways, but based on our map the felt area is 9,900 km^2. Hadsell (1968) suggested the felt area was about 41,000 km^2, while Docekal (1970) reported it at 21,000 km^2.

Figure 4.17. January 14, 1956 Earthquake



Source: Colorado Earthquake Information 1867-1996

Apr. 21, 1968 – A magnitude 3.8 struck the area south of Holly in Prowers County.

Jan. 10, 2003 – A magnitude 2.9 earthquake struck the area of Lamar in Prowers County.

August 16, 2009 - An earthquake hit Colorado's plains, setting off tremors across the southeastern part of the state and into western Kansas, but causing no reported damage. The National Earthquake Information Center in Golden confirmed that a magnitude 3.9 earthquake occurred at 6:22 p.m. in southeastern Colorado, about 180 miles southeast of Denver.

Likelihood of Future Occurrences

Occasional - Because the occurrence of earthquakes is relatively infrequent in Colorado and the historical earthquake record is short (only about 130 years), it is not possible to accurately estimate the timing or location of future dangerous earthquakes in Colorado. Seismologists predict that Colorado will again experience a magnitude 6.5 earthquake at some unknown point in the future. The major factor preventing the precise identification of the time or location of the next damaging earthquake is the limited knowledge of potentially active faults.

4.2.6 Extreme Temperatures: Extreme Cold

Hazard/Problem Description

Temperature extremes - both cold and hot - cause more deaths every year than any other disaster, including hurricanes. Both extreme cold and extreme heat are hazards present in the planning area.

Extreme cold often accompanies a winter storm or is left in its wake. It is most likely to occur in the winter months of December, January, and February. Prolonged exposure to the cold can cause frostbite or hypothermia and can become life-threatening. Infants and the elderly are most susceptible. Pipes may freeze and burst in homes or buildings that are poorly insulated or without heat. Extreme cold can disrupt or impair communications facilities.

In 2001, the NWS implemented an updated Wind Chill Temperature index, which is reproduced in Figure 4.18. This index was developed to describe the relative discomfort/danger resulting from the combination of wind and temperature. Wind chill is based on the rate of heat loss from exposed skin caused by wind and cold. As the wind increases, it draws heat from the body, driving down skin temperature and eventually the internal body temperature.

Figure 4.18. Wind Chill Temperature Chart

Temperature (°F)

Wind (mph) / Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: 30 minutes / 10 minutes / 5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph) *Effective 11/01/01*

Source: National Weather Service

Previous Occurrences

In a region known for extremely cold weather, exacerbated by high winds, temperature extremes and particularly severe cold present a danger to the inhabitants of the planning area. Surprisingly, the NCDC database reflects no extreme cold and extreme wind-chill events in the planning region between 1996 and 2010. The 2010 State Hazard Mitigation Plan does record the following events that affected the planning area.

January 17-18, 1996 – In southeast Colorado, cold temperatures combined with high winds resulted in extreme wind chill. Wind chills of -30°F to -50°F were recorded.

February 1-4, 1996 - In southeast Colorado, cold temperatures combined with high winds resulted in extreme wind chill. Wind chills of -25°F to -50°F were recorded.

March 24-25, 1996 – In southeast Colorado, cold temperatures combined with high winds resulted in extreme wind chill. Wind chills of -25°F to -40°F were recorded.

December 25-26, 1996 – In southeast Colorado, cold temperatures combined with high winds resulted in extreme wind chill. Wind chills of -2°F to -35°F were recorded.

January 11-16, 1997 – In southeast Colorado, cold temperatures combined with high winds resulted in extreme wind chill. Wind chills of -25°F to -50°F were recorded.

The Colorado Department of Public Health & Environment tracks the number of hospitalizations due to extreme cold on the Colorado Health Information Dataset. In Otero County, 7 people were hospitalized due to extreme cold (at a rate of 2.5 per 100,000 people) from 1995 to 2008. In the planning area, there were 12 reported cases (at a rate of 1.7 per 100,000 people). These rates are considered lower than the rate for the state. Statewide statistics indicate that 1,415 people were hospitalized for extreme cold injuries during this time period, with an occurrence rate of 2.0 per 100.000. The region with the highest rate is the San Luis Valley (3.14 per 100,000), while the Foothills region is the lowest occurrence rate areas, with rates of 1.1 per 100.000.

The 2008 State Plan includes information that shows the extreme temperatures in ºFahrenheit between 1961 and 1990, which is replicated for the planning area below:

Table 4.12. Temperature Extremes by County, 1961-1990

Counties	Extreme Low (ºF)
Baca	-26
Bent	-29
Crowley	N/A
Kiowa	-27
Otero	-28
Prowers	-28

Source: 2010 Colorado State Hazard Mitigation Plan

Probability of Future Occurrences

Temperature variations are expected in the planning region. While extremes are usually statistical outliers, they still present a useful picture of potential ranges. These events are expected to occur yearly, in general, and are considered **highly likely**.

4.2.7 Extreme Temperatures: Extreme Heat

Hazard/Problem Description

Temperature extremes - both cold and hot - cause more deaths every year than any other disaster, including hurricanes. Both extreme cold and extreme heat are hazards present in the planning area.

According to information provided by FEMA, extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks. Heat kills by taxing the human body beyond its abilities. In a normal year, about 175 Americans succumb to the demands of summer heat. According to the National Weather Service (NWS), among natural hazards, only the cold of winter—not lightning, hurricanes, tornados, floods, or earthquakes—takes a greater toll. In the 40-year period from 1936 through 1975, nearly 20,000 people were killed in the United States by the effects of heat and solar radiation. In the heat wave of 1980, more than 1,250 people died.

Heat disorders generally have to do with a reduction or collapse of the body's ability to shed heat by circulatory changes and sweating or a chemical (salt) imbalance caused by too much sweating. When heat gain exceeds the level the body can remove, or when the body cannot compensate for fluids and salt lost through perspiration, the temperature of the body's inner core begins to rise and heat-related illness may develop. Elderly persons, small children, chronic invalids, those on certain medications or drugs, and persons with weight and alcohol problems are particularly susceptible to heat reactions, especially during heat waves in areas where moderate climate usually prevails. Figure 4.19 illustrates the relationship of temperature and humidity to heat disorders.

Figure 4.19. Heat Index

Temperature (°F)

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	118	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	126	130					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Streuous Activity

Caution   Extreme Caution   Danger   Extreme Danger

Source: National Weather Service

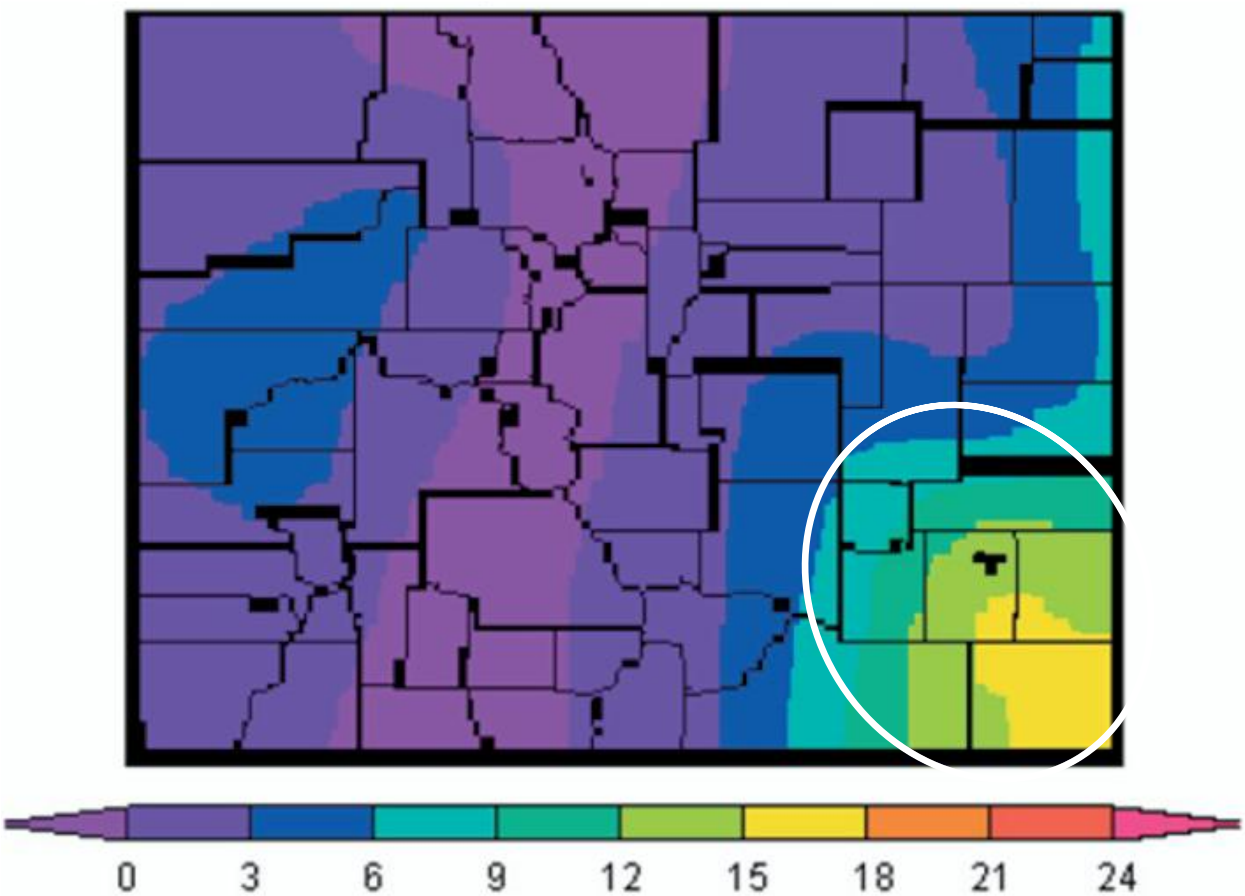
Note: Since HI values were devised for shady, light wind conditions, exposure to full sunshine can increase HI values by up to 15°F. Also, strong winds, particularly with very hot, dry air, can be extremely hazardous.

The NWS has in place a system to initiate alert procedures (advisories or warnings) when the Heat Index is expected to have a significant impact on public safety. The expected severity of the heat determines whether advisories or warnings are issued. A common guideline for the issuance of excessive heat alerts is when the maximum daytime high is expected to equal or exceed 105°F and a nighttime minimum high of 80°F or above is expected for two or more consecutive days.

Previous Occurrences

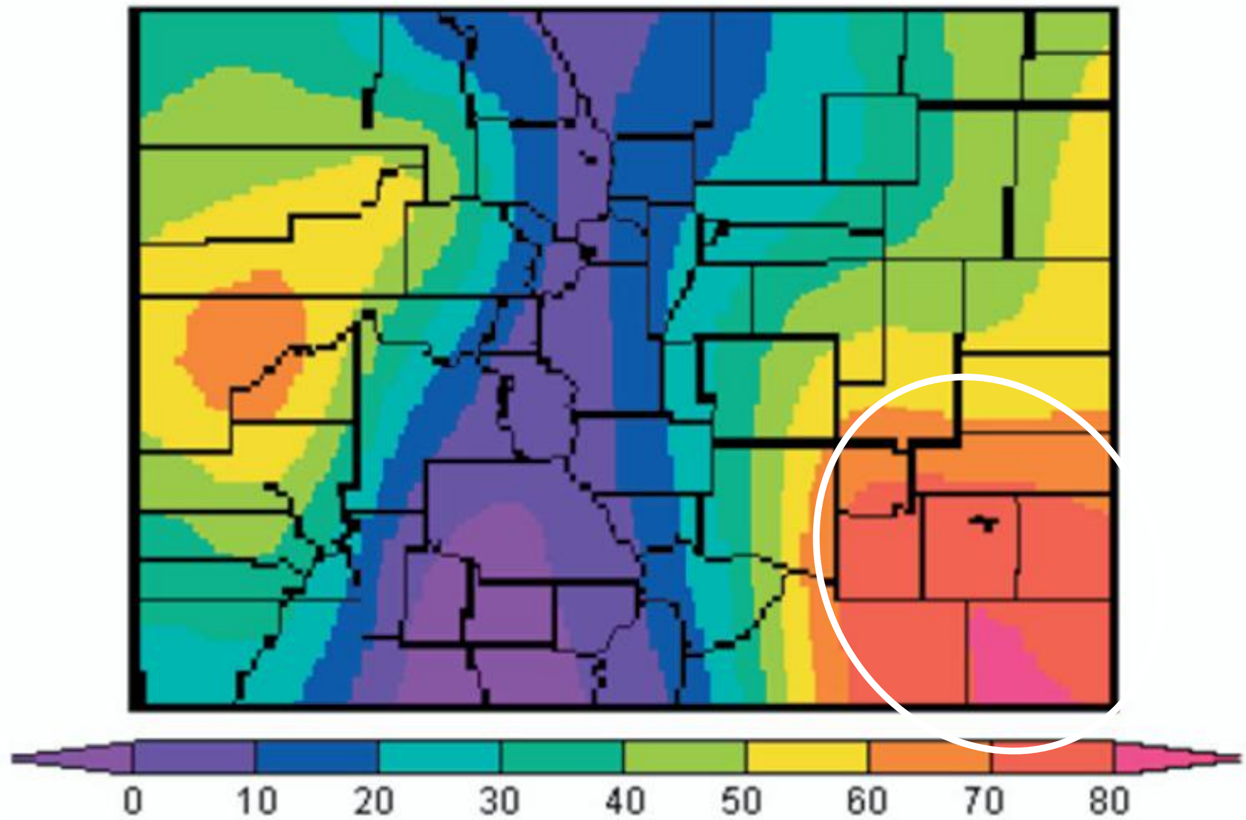
In a region known for extreme weather, extreme heat presents a danger to the inhabitants of the planning area. Surprisingly, the NCDC database reflects no extreme heat in the planning region between 1996 and 2010. The 2008 State Hazard Mitigation Plan does contain two maps, shown here as Figure 4.20 and Figure 4.21, that show average numbers of days per year exceeding 90° and 100°F. According to these maps, Baca County has the highest average summer temperatures in the State of Colorado. Portions of Baca County may have 80 or more days of 90°F or greater temperatures a year. Most of the county may experience fifteen to eighteen days of 100°F or greater. All of the counties in the planning area have higher average temperatures than most counties in the State.

Figure 4.20. Number of Days with Temperatures Exceeding 100°F in the Planning Area



Source: 2010 Colorado State Hazard Mitigation Plan, data adapted from http://hpccsun.unl.edu/coop/atlas/temps100.gif

Figure 4.21. Number of Days with Temperatures Exceeding 90°F in the Planning Area



Source: 2010 Colorado State Hazard Mitigation Plan, data adapted from http://hpccsun.unl.edu/coop/atlas/temps90.gif

Unfortunately, the health department does not track heat-related injury or mortality statistics in the State of Colorado by county. The NCDC database does not reflect any extreme heat incidents, outside of those captured as drought, for the region either. However, some extrapolation for the severity of extreme heat in the region can be drawn based on the national weather service heat index illustrated above. The Colorado Climate Center notes that the humidity of the eastern plains is very low, but that the highest temperatures in the state occur in this region. This indicates that while many hot days in the planning area fall in the 'danger' or 'extreme danger' area of the heat index, the low humidity may make the heat feel less uncomfortable on the population. It is possible; therefore, that the population may not notice the effects of extreme heat on themselves until serious injury occurs.

The 2010 State Plan includes information that shows the extreme temperatures in ºFahrenheit between 1961 and 1990, which is replicated for the planning area in Table 4.13.

Table 4.13. Extreme Heat by County, 1961-1990

Counties	Extreme High (ºF)
Baca	111°
Bent	112°
Crowley	N/A
Kiowa	110°
Otero	110°
Prowers	109°

Source: 2010 Colorado State Hazard Mitigation Plan

Probability of Future Occurrences

Temperature variations are expected in the planning region. While extremes are usually statistical outliers, they still present a useful picture of potential ranges. These events are expected to occur yearly as shown in Figure 4.20 and Figure 4.21, and are considered **highly likely**.

4.2.8 Flooding

Description

Floods are among the most frequent and costly natural disasters in terms of human hardship and economic loss and are usually caused by weather events. Floods can cause substantial damage to structures, landscapes, and utilities as well as life safety issues. Certain health hazards are also common to flood events. Standing water and wet materials in structures can become breeding grounds for microorganisms such as bacteria, mold, and viruses (see Section 4.2.19 Pandemic). This can cause disease, trigger allergic reactions, and damage materials long after the flood. When floodwaters contain sewage or decaying animal carcasses, infectious disease becomes a concern. Direct impacts, such as drowning, can be limited with adequate warning and public education about what to do during floods. Where flooding occurs in populated areas, warning and evacuation will be of critical importance to reduce life and safety impacts.

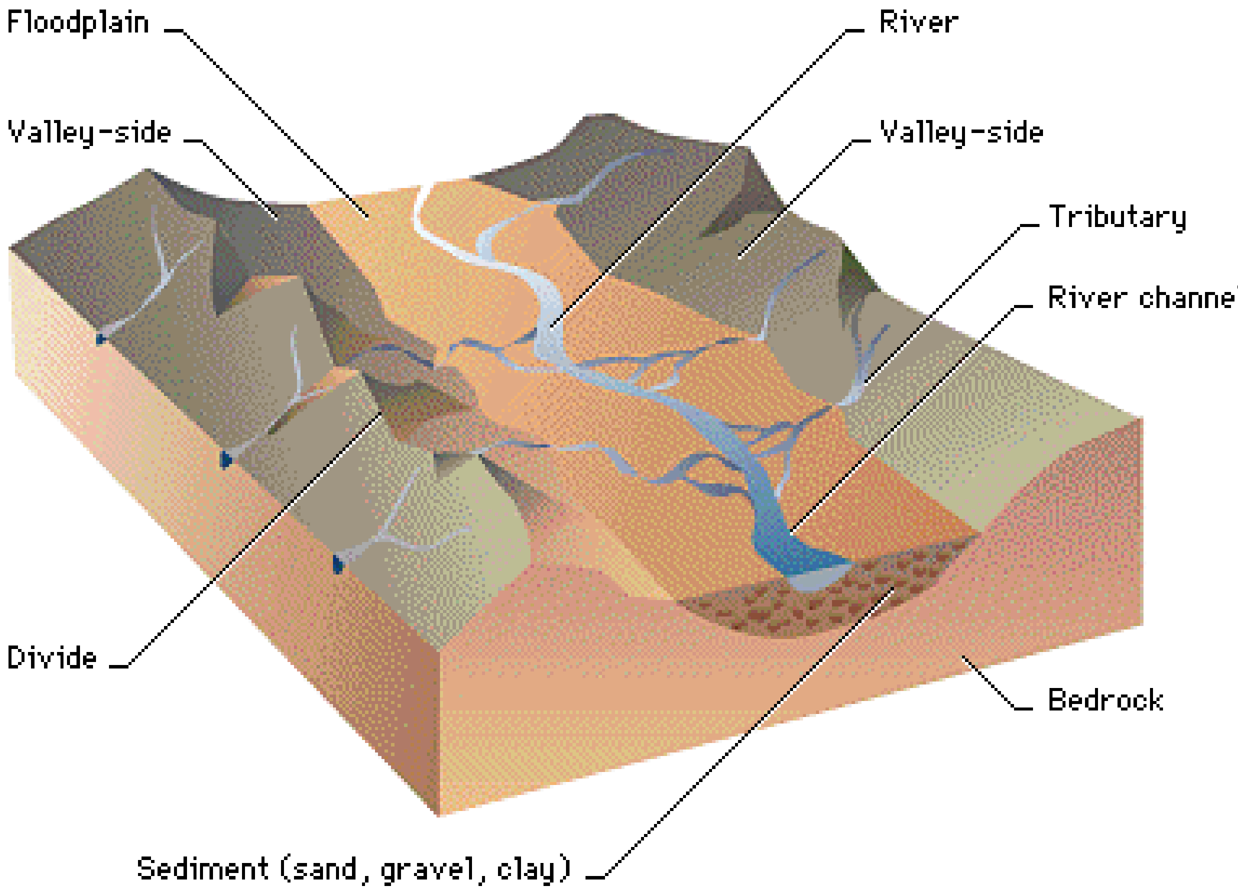
The planning area is susceptible to various types of flood events as described below.

- **Riverine flooding**—Riverine flooding, defined as when a watercourse exceeds its "bank-full" capacity, generally occurs as a result of prolonged rainfall, or rainfall that is combined with already saturated soils from previous rain events. This type of flood occurs in river systems whose tributaries may drain large geographic areas and include one or more independent river basins. The onset and duration of riverine floods may vary from a few hours to many days. Factors that directly affect the amount of flood runoff include precipitation amount, intensity and distribution, the amount of soil moisture, seasonal variation in vegetation, snow depth, and water-resistance of the surface due to urbanization. In the planning area, riverine flooding is largely caused by heavy and continued rains, increased outflows from upstream dams, and heavy flow from tributary streams. These intense storms can overwhelm the local waterways as well as the integrity of any flood control structures. The warning time associated with slow rise floods assists in life and property protection.

- **Flash Flooding**—Flash flooding describes localized floods of great volume and short duration. This type of flood usually results from a heavy rainfall on a relatively small drainage area. Precipitation of this sort usually occurs in the winter and spring. Flash floods often require immediate evacuation.
- **Localized flooding**—Localized flooding problems are often caused by flash flooding, severe weather, or an unusual amount of rainfall. Flooding from these intense weather events usually occurs in areas experiencing an increase in runoff from impervious surfaces associated with development and urbanization as well as inadequate storm drainage systems.
- **Dam failure flooding**—Flooding from failure of one or more upstream dams is also a concern to the planning area. A catastrophic dam failure could easily overwhelm local response capabilities and require mass evacuations to save lives. Impacts to life safety will depend on the warning time and the resources available to notify and evacuate the public. Major loss of life could result, and there could be associated health concerns as well as problems with the identification and burial of the deceased. Dam failure is further addressed in Section 4.2.3 Dam and Levee Failure.

The area adjacent to a channel is the floodplain, as shown in Figure 4.22. In its common usage, the floodplain most often refers to that area that is inundated by the 100-year flood, the flood that has a 1% chance in any given year of being equaled or exceeded. A floodplain is flat or nearly flat land adjacent to a stream or river that experiences occasional or periodic flooding. It includes the floodway, which consists of the stream channel and adjacent areas that carry flood flows, and the flood fringe, which are areas covered by the flood, but which do not experience a strong current. Floodplains are made when floodwaters exceed the capacity of the main channel or escape the channel by eroding its banks. When this occurs, sediments (including rocks and debris) are deposited that gradually build up over time to create the floor of the floodplain. Floodplains generally contain unconsolidated sediments, often extending below the bed of the stream.

Figure 4.22. Floodplain Topography



Source: FEMA

Regulated floodplains are illustrated on inundation maps called Flood Insurance Rate Maps (FIRM). FIRM maps are currently being replaced with Digital Flood Insurance Rate Maps (DFIRM) as part of FEMA's map modernization project. It is the official map of a community on which the Federal Emergency Management Agency (FEMA) has delineated both the special flood hazard areas and the risk premium zones applicable to the community. Private citizens and insurance agents use FIRM's to determine whether or not specific properties are located within flood hazard areas. Community officials use FIRM's to administer floodplain management regulations and to mitigate flood damage. Lending institutions and federal agencies use FIRM's to locate properties and buildings in relation to mapped flood hazards, and to determine whether flood insurance is required when making loans or providing grants following a disaster for the purchase or construction of a building.

The 100-year flood, which is the minimum standard used by most federal and state agencies, is used by the National Flood Insurance Program (NFIP) as the standard for floodplain management and to determine the need for flood insurance. Most of the flood prone counties and incorporated communities within the planning area participate in the NFIP. Participation in the NFIP requires adoption of a local floodplain management ordinance and its enforcement within a mapped Special Flood Hazard Area. A jurisdiction's eligibility to participate is premised on their adoption and enforcement of state and community floodplain management regulations intended to prevent unsafe development in the floodplain, thereby reducing future flood damages. Thus, participation in the NFIP is based on an agreement between communities and the federal government. If a community adopts and enforces a floodplain management ordinance to reduce future flood risk to new construction in floodplains, the federal government will make flood insurance available within the community as a financial protection against flood losses. Since floods have an annual probability of occurrence, have a known magnitude, depth and velocity for each event, and in most cases, have a map indicating where they will occur, they are in many ways often the most predictable and manageable hazard.

Localized Flooding

Each county in the planning area contains areas of unique, nuisance, localized flooding. This type of flooding can be found in both incorporated and unincorporated areas of the County. It may be a result of low lying roads, intersections, or areas where drainage problems exist. In cities, there may be areas where stormwater flooding persists. These areas will be discussed in further detail in each CPE.

Watershed Systems and Major Sources of Flooding in the Planning Area

The planning area contains 15 separate and distinct watersheds. Each watershed, or drainage basin, contains a river or creek. Watersheds drain and move water through the planning area and are often sources of flooding. These watersheds are shown on Table 4.14 and described in Figure 4.23.

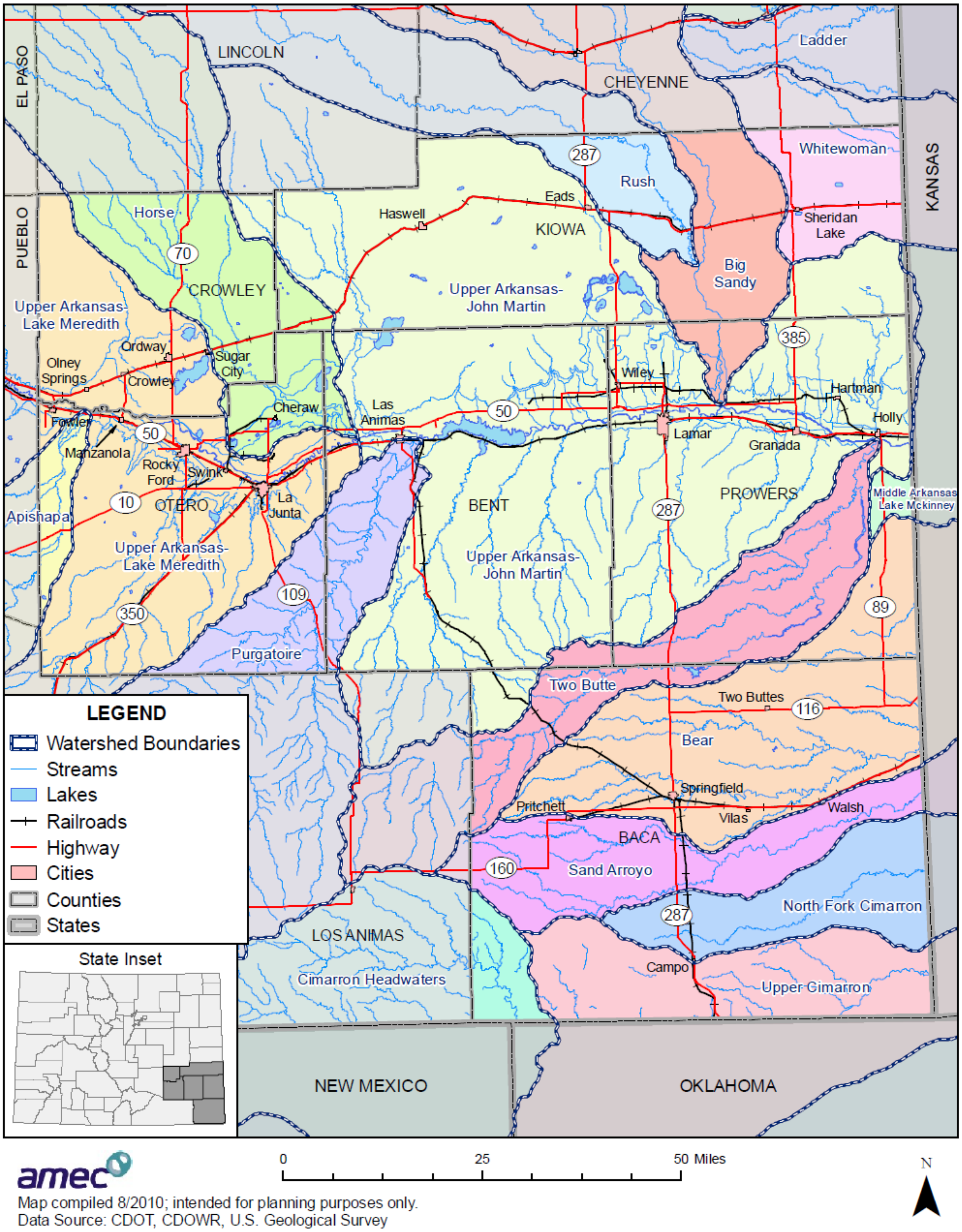
Table 4.14. Watersheds in the Planning Area

Watershed Name	River in Watershed	Counties and Acreage Contained in Watershed	
Apishapa	Apishapa River	Otero	59,617
Horse	Horse Creek	Bent Crowley Kiowa Otero	18,326 237,432 25,715 86,062
Purgatoire	Purgatoire River	Bent Otero	129,926 127,383
Upper Arkansas – Lake Merideth	Arkansas River	Bent Crowley Otero	17,373 253,187 538,746
Upper Arkansas – John Martin	Arkansas River	Baca Bent Crowley Kiowa Prowers	35,538 805,749 21,444 620,410 659,351

Watershed Name	River in Watershed	Counties and Acreage Contained in Watershed	
Rush	Rush Creek	Kiowa	130,958
Big Sandy	Big Sandy Creek	Kiowa Prowers	195,086 40,460
White Woman	White Woman Creek	Kiowa	160,887
Two Butte	Two Butte Creek	Baca Bent Prowers	127,126 986,170 1,052,815
Bear	Bear Creek	Baca Prowers	523,788 107,498
Middle Arkansas - Lake McKinney	Arkansas River	Prowers	9,537
Sand Arroyo	Sand Arroyo Creek	Baca	295,518
Cimmaron Headwaters	Cimmaron River	Baca	348,238
North Fork Cimmaron	Cimmaron River	Baca	262,969
Upper Cimmaron	Cimmaron River	Baca	324,265

Source: National Resource Conservation Service Rapid Assessments. http://www.co.nrcs.usda.gov/technical/WaterRes/WaterResources.html

Figure 4.23. Watersheds in the Planning Area



Previous Occurrences

Flooding has occurred frequently within the planning area. Table 4.15 documents floods which have struck the planning area as well. Major floods that have affected the planning area are detailed below the table. Flash flooding that has affected individual counties is profiled in each CPE.

Table 4.15. Flood Occurrences per County, 1950-2010

County	Occurrences
Baca	8
Bent	8
Crowley	4
Kiowa	7
Otero	9
Prowers	15
6 County Total	**51**

Source: National Climatic Data Center

Historical Floods

Historical records reference many floods in the Arkansas River Valley. The Colorado Water Conservation Board (CWCB) maintains a record of historical documents for the planning area. A 1998 Otero County Local Pre-Disaster Flood Hazard Mitigation Plan contained an excellent history of flooding in the area. It forms much of the disaster history, supplemented by individual members of the HMPC and the AMEC Data Collection Guide.

The earliest known floods in the area occurred in 1826. The next notable flood was in 1844. Other reported floods: floods in the 1800's occurred in 1859, 1864, 1869, and 1894. These floods were generally confined between Pueblo and the present John Martin Dam. Major floods were experienced at various localities in the subbasin in 1921, 1935, 1942, 1955, and 1965. The flood of 1921 was the greatest flood of record on the Arkansas River at La Junta. In addition to flooding from the Arkansas River, King and Anderson Arroyos have flooded La Junta, with flooding reported to have occurred in 1886, 1965, 1969 and 1972. Major floods that have occurred in the planning area, both above and below the John Martin Dam are described below.

July 1886 - A large flood occurred in the valley below the confluence of the Purgatoire River during the period of July 20-25, 1886. This flood was produced by rainfall with heavy amounts occurring in the vicinity of Las Animas and La Junta. At Las Animas there were 3.36 inches of rainfall on July 24 and 25. At La Junta water reportedly came down the King Arroyo in a 12-foot wave. In Anderson, Arroyo water was at least 20 feet deep and overtopped the AT&SF Railway Bridge.

June 1921 - Two areas of intense rainfall were observed above Pueblo. One of these was mostly north of the towns of Florence and Canon City. The other was fairly well distributed on both banks of the Arkansas River between Portland and Pueblo. Precipitation in this latter area is reported to have been as much as 11 inches in six hours while in the other area it was reported to have been as much as nine inches in six hours. The rainfall in the upper area was reported to have occurred first so that runoff combined with that below to produce the largest flood of record at Pueblo. The peak discharge of 103,000 cubic feet per second (cfs) occurred at midnight on June 3. Above La Junta the effect of Va11ey storage on peak attrition was obscured by the inflow from tributary streams and the peak discharge at La Junta was 200,000 cubic feet per second. North La Junta was flooded; water was four to six feet deep on Second Street and reached the Otero County Jail. It was reported that 13 persons were drowned although some of the bodies were not found until June 9. Areas in the Huerfano and Purgatoire Rivers and in Timpas, Adobe, and Horse Creek were flooded. Heavy rains occurred on the main stem of the Arkansas River from La Junta to Lamar. Below La Junta tributary inflow was small.

May 1955 - During the period of May 17-20, heavy precipitation occurred over the lower mountains and plains of eastern Colorado, northeastern New Mexico and western Kansas. The storm began on the afternoon of May 17 over the entire area and continued through the 19th in New Mexico and Kansas. Major flooding occurred in the Arkansas River watershed from Pueblo to the John Martin Reservoir. The Arkansas River at Pueblo peaked at 11,100 cfs and produced very little flooding. As the flood progressed downstream, the peak increased to 50,000 cfs at La Junta and caused major flood damage to North La Junta. There were 236 residents, five businesses, one school, and one church in the flooded area of North La Junta. Streets and public utilities were heavily damaged as well as individual water supply and sewage disposal systems. A low levee to protect against minor overflows on the Arkansas River was lost and two bridges were damaged. National Guard assisted in the evacuation of 500 to 1,000 people in North La Junta. About 300 residences were flooded in La Junta, eight to 10 blocks on the south side of town flooded. Damages were estimated at $400,000 ($3.3 million in 2010 dollars). A county bridge west of La Junta washed out. The Arkansas River crest at La Junta was 14.2 feet (about 54,000 cfs) at 1:30 p.m on May 20.

June 1965 - Along the Arkansas River and its tributaries between Pueblo and the John Martin Dam, near the Colorado/Kansas state line, approximately 45,000 acres were flooded. Agricultural losses, as well as damage to transportation and urban facilities, were substantial and amounted to about $15 million. Below Pueblo, north La Junta was severely damaged by floodwaters during June 17-19. Although all water from the upstream area was stored in the John Martin Reservoir, serious flooding began less than three miles downstream. The flood below the dam was much more severe than the flood between Pueblo and the John Martin Dam; illustrating the limitations of a single flood-control structure. Over 220,000 acres of rural, urban, waste, and woodland lands were flooded between the John Martin Dam and Great Bend, Kansas. Outstanding floods occurred on June 17 on the south-bank tributaries of the Arkansas. Wolf Creek flooded the town of Granada. Triggered by rains of over nine inches at Two Buttes and 11 inches near Holly on June 17, the floodwaters of Two Butte Creek reached a peak discharge of

82,600 cfs above Two Buttes Reservoir and increased to 182,000 cfs at the mouth, overtopping the reservoir. Floods devastated the towns of Holly and Granada, and both locales were evacuated as floodwaters inundated the valuable farmlands surrounding the two towns. The floodwaters that hit the town of Holly caused flooding that extended to Great Bend, Kansas.

May 1969 - Flood flows from Anderson Arroyo damaged about 35 residences and businesses in La Junta. This flood also damaged a sanitary sewer line, city streets, farmsteads, croplands and fences. A few head of livestock were lost and some hay was damaged or washed away. The total estimated damages for this flood amounted to $144,000 ($857,000 in 2010 dollars). Some minor damage occurred to the Otero Canal. This canal crosses Anderson Arroyo about five miles upstream from the mouth.

May 1999 - The Arkansas River began to flood on April 30, 1999. Flooding problems became quite serious in Otero and Crowley Counties during the day of May 1, 1999. During the evening of May 1, 1999 through the day of May 2,1999, the flooding reached major proportions from Rocky Ford to La Junta. By the morning of May 2, up to eight feet of water flooded the north La Junta area as the Arkansas River swelled with runoff from the storm in the Pikes Peak region. Rocky Ford experienced flooding and sewer water back up problems, but the area known as North La Junta was most severely affected. In North La Junta, about 300 homes were flooded with water two thirds of the way up doorways and flowing through businesses. Rescues were performed to save the lives of those who refused to leave during evacuations. Many homes and businesses located on the south bank portion of La Junta were also flooded. These areas in south La Junta were primarily affected by storm sewer back up. Flood waters also spread east into Bent County on May 1, 1999. Although water levels climbed several feet above flood stage in Bent County, flood damage was confined mainly to roads and agricultural land. The Arkansas River channel was significantly altered in several sections and numerous roads and bridges were washed out or destroyed, mostly between Rocky Ford and La Junta. The local flood protection levee at Las Animas held back floodwaters and spared the city from severe flooding. This flooding resulted in a federal disaster declaration (1276-DR) for all counties in the planning area except Baca County.

Localized Flooding History

Due to the high number of flash floods that have occurred in the planning area, flash flooding previous occurrences will be detailed in each County Planning Element.

Individual county profiles provide more accurate insights into the flooding risk by jurisdiction, which helps account for the variability of the hazard across the planning region. To estimate the magnitude of flood impacts by jurisdiction flood losses were modeled using FEMA's HAZUS-MH loss estimation software. The results of this modeling are captured in map and tabular form in each County Planning Element. The methodology is discussed in Section 4.3 Vulnerability Assessment.

Probability of Future Occurrences

Based on the information above, the planning area experiences an average of 2.7 floods per year. Most of these floods were less than the 100-year flood. The probability for future occurrence of a 100-year flood event in the planning region is **occasional** while the probability for flash flooding is **likely**.

4.2.9 Severe Weather: Thunderstorms/Lightning/Hail

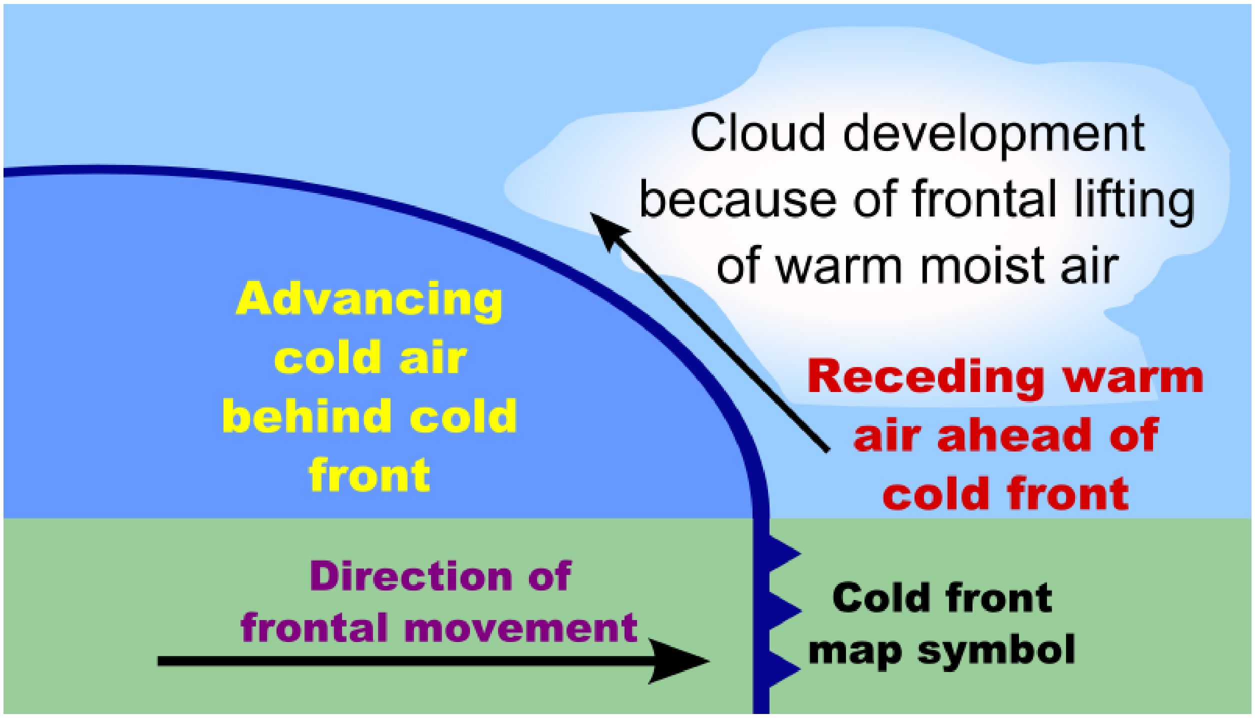
Hazard/Problem Description

Thunderstorms

Storms in the planning area are generally characterized by heavy rain often accompanied by strong winds and sometimes lightning and hail. Approximately 10 percent of the thunderstorms that occur each year in the United States are classified as severe. A thunderstorm is classified as severe when it contains one or more of the following phenomena: hail that is 1 inch or greater, winds in excess of 50 knots (57.5 mph), or a tornado (profiled in Section 4.2.12).

Thunderstorms result from the rapid upward movement of warm, moist air (see Figure 4.24). They can occur inside warm, moist air masses and at fronts. As the warm, moist air moves upward, its cools, condenses, and forms cumulonimbus clouds that can reach heights of greater than 35,000 ft. As the rising air reaches its dew point, water droplets and ice form and begin falling the long distance through the clouds towards earth's surface. As the droplets fall, they collide with other droplets and become larger. The falling droplets create a downdraft of air that spreads out at Earth's surface and causes strong winds associated with thunderstorms.

Figure 4.24. Formation of a Thunderstorm



Source: NASA. http://rst.gsfc.nasa.gov/Sect14/Sect14_1c.html

There are four ways in which thunderstorms can organize: single cell, multicell cluster, multicell lines (squall lines), and supercells. Even though supercell thunderstorms are most frequently associated with severe weather phenomena, thunderstorms most frequently organize into clusters or lines. Warm, humid conditions are favorable for the development of thunderstorms. The average single cell thunderstorm is approximately 15 miles in diameter and lasts less than 30 minutes at a single location. However, thunderstorms, especially when organized into clusters or lines, can travel intact for distances exceeding 600 miles.

Thunderstorms are responsible for the development and formation of many severe weather phenomena, posing great hazards to the population and landscape. Damage that results from thunderstorms is mainly inflicted by downburst winds, large hailstones, and flash flooding caused by heavy precipitation. Stronger thunderstorms are capable of producing tornadoes and waterspouts.

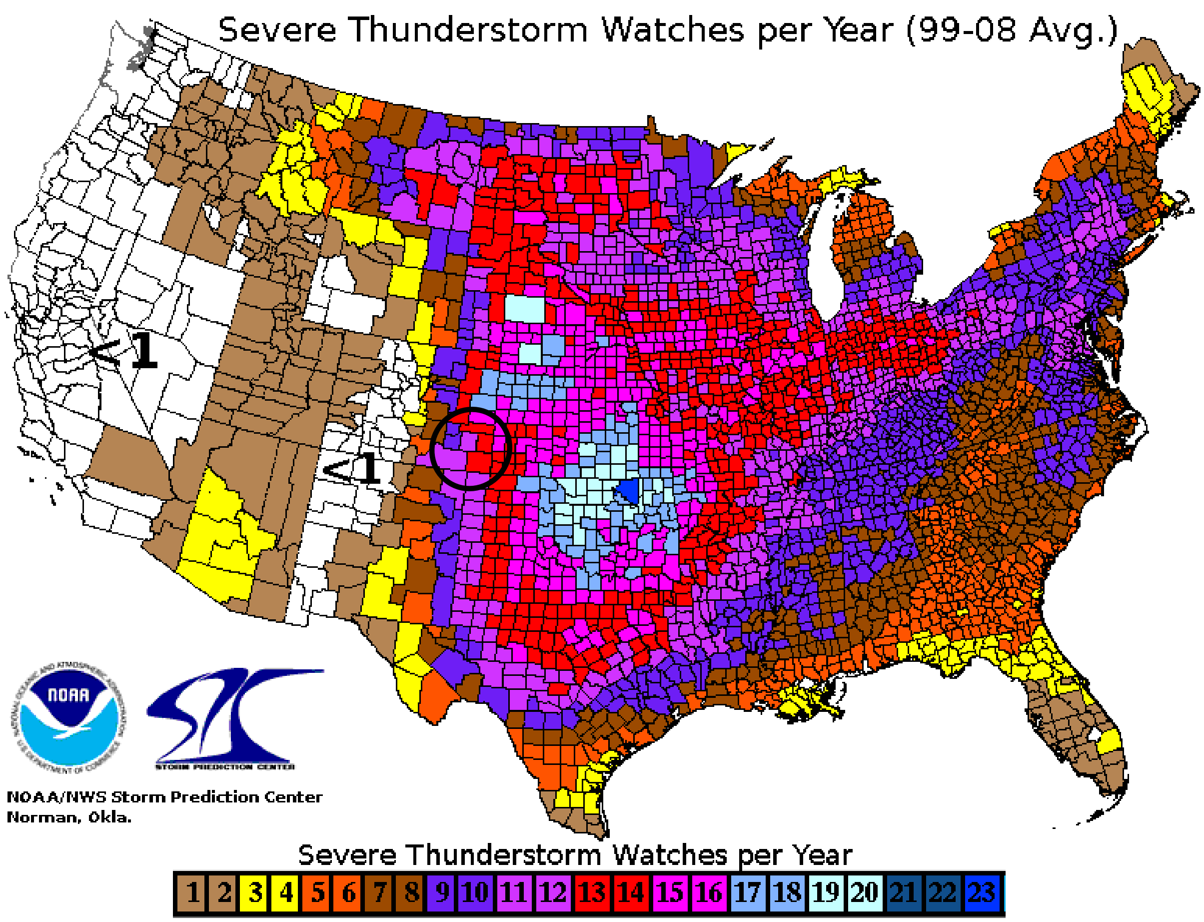
The National Weather Service issues two types of alerts for severe thunderstorms:

- A Severe Thunderstorm Watch indicates when and where severe thunderstorms are likely to occur. Citizens are urged to watch the sky and stay tuned to NOAA Weather Radio, commercial radio, or television for information. Severe Thunderstorm Watches are issued by the Storm Prediction Center in Norman, OK.
- A Severe Thunderstorm Warning is issued when severe weather has been reported by spotters or indicated by radar. Warnings indicate imminent danger to life and property to

those in the path of the storm. Severe Thunderstorm Warnings are issued by the National Weather Service in Pueblo.

The planning area sees 9-14 severe thunderstorm watches per year. This can be seen in Figure 4.25.

Figure 4.25. Severe Thunderstorm Watches per Year in the Planning Area



Source: NOAA/NWS Storm Prediction Center

Lightning

Lightning is an electrical discharge between positive and negative regions of a thunderstorm. A lightning flash is composed of a series of strokes with an average of about four. The length and duration of each lightning stroke vary, but typically average about 30 microseconds.

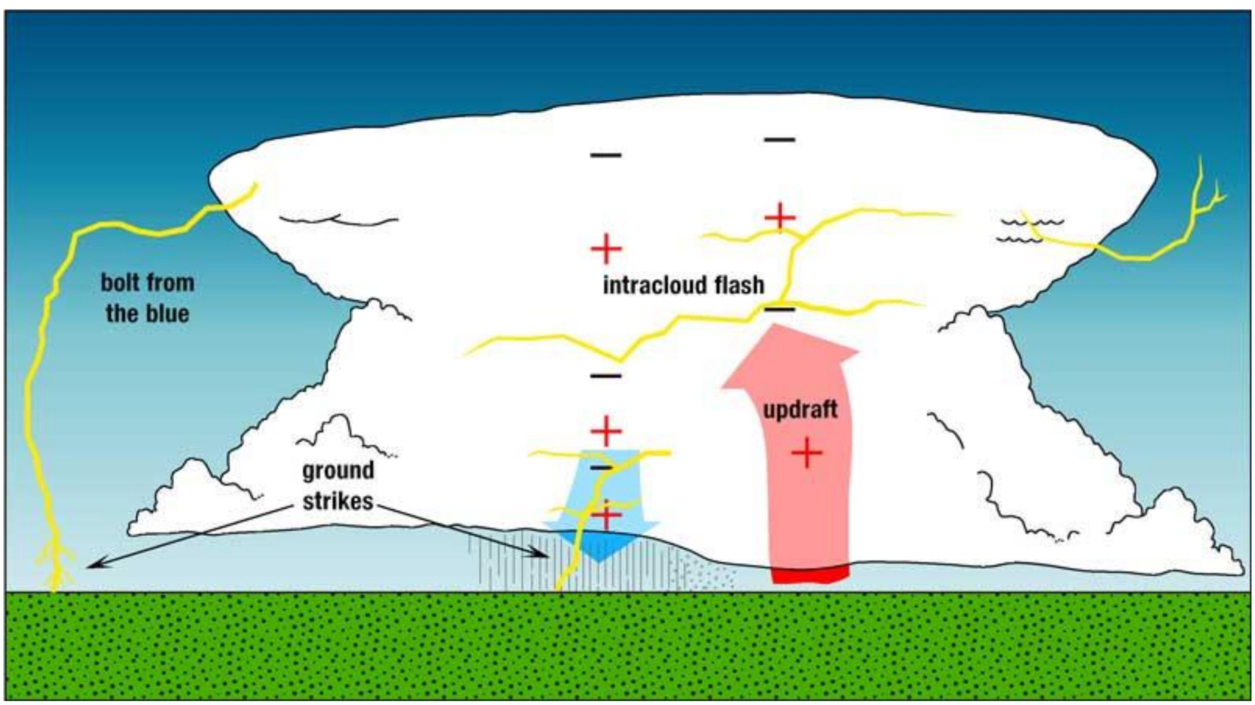
Lightning is one of the more dangerous weather hazards in the United States and in Colorado. Each year, lightning is responsible for deaths, injuries, and millions of dollars in property damage, including damage to buildings, communications systems, power lines, and electrical systems. Lightning also causes forest and brush fires, and deaths and injuries to livestock and other animals. According to the National Lightning Safety Institute, lightning causes more than

26,000 fires in the United States each year. The institute estimates property damage, increased operating costs, production delays, and lost revenue from lightning and secondary effects to be in excess of $6 billion per year. Impacts can be direct or indirect. People or objects can be directly struck, or damage can occur indirectly when the current passes through or near it.

Intra-cloud lightning is the most common type of discharge. This occurs between oppositely charged centers within the same cloud. Usually it takes place inside the cloud and looks from the outside of the cloud like a diffuse brightening that flickers. However, the flash may exit the boundary of the cloud, and a bright channel, similar to a cloud-to-ground flash, can be visible for many miles.

Cloud-to-ground lightning is the most damaging and dangerous type of lightning, though it is also less common. Most flashes originate near the lower-negative charge center and deliver negative charge to earth. However, a large minority of flashes carry positive charge to earth. These positive flashes often occur during the dissipating stage of a thunderstorm's life. Positive flashes are also more common as a percentage of total ground strikes during the winter months. This type of lightning is particularly dangerous for several reasons. It frequently strikes away from the rain core, either ahead or behind the thunderstorm It can strike as far as 5 or 10 miles from the storm in areas that most people do not consider to be a threat (see Figure 4.26). Positive lightning also has a longer duration, so fires are more easily ignited. And, when positive lightning strikes, it usually carries a high peak electrical current, potentially resulting in greater damage.

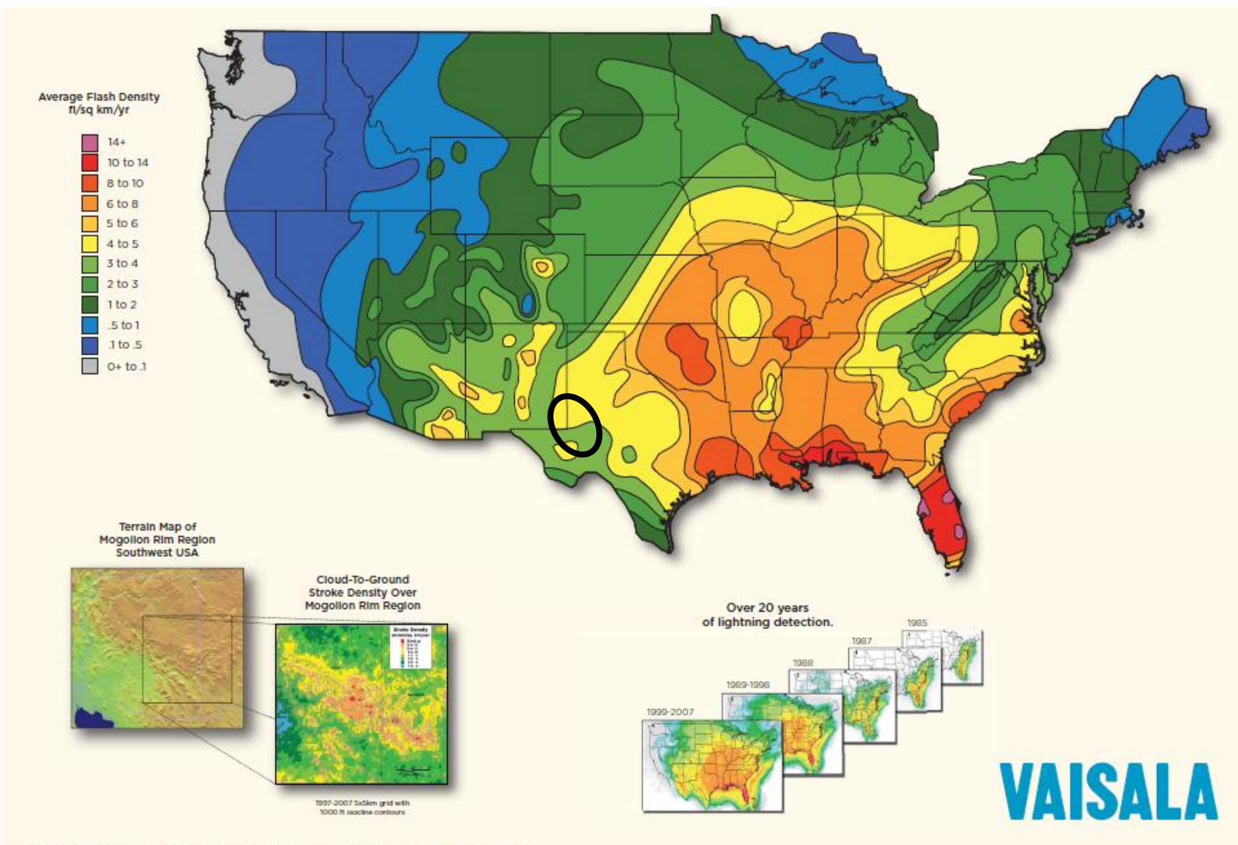
Figure 4.26. Cloud to Ground Lightning



Source: National Weather Service Pueblo Office

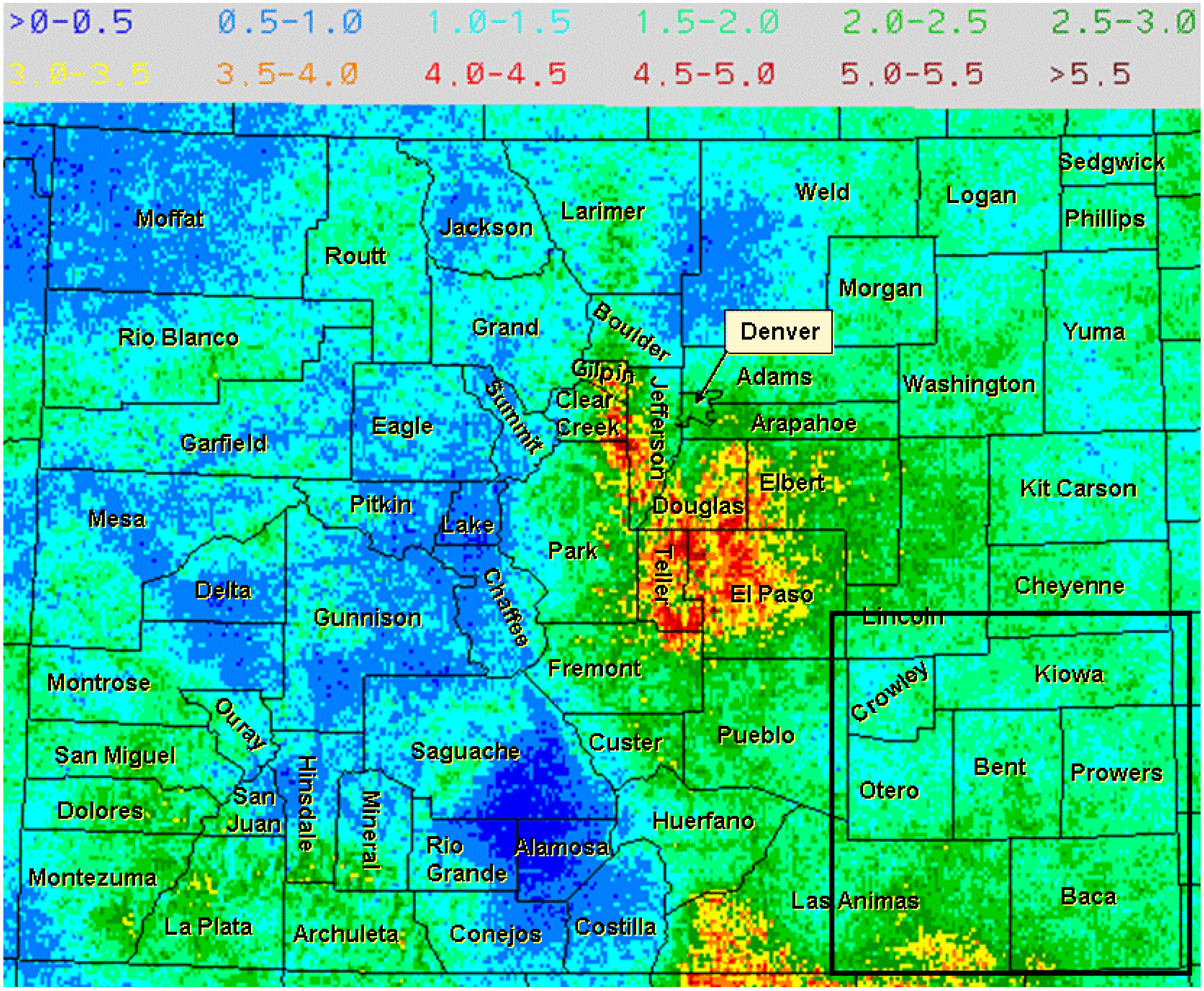
The ratio of cloud-to-ground and intra-cloud lightning can vary significantly from storm to storm. Depending upon cloud height above ground and changes in electric field strength between cloud and earth, the discharge stays within the cloud or makes direct contact with the earth. If the field strength is highest in the lower regions of the cloud, a downward flash may occur from cloud to earth. Using a network of lightning detection systems, the United States monitors an average of 25 million strokes of lightning from the cloud-to-ground every year. Figure 4.27 depicts cloud to ground lightning in the United States and the planning area (circled in black). Figure 4.28, from the National Weather Service in Pueblo, depicts a more detailed lightning flash density map for the State of Colorado and the planning area (boxed in black).

Figure 4.27. Lightning Flash Density Map 1997-2007



Source: Vaisala's US National Lightning Detection Network

Figure 4.28. Colorado Lightning Flash Map 1989-2005



Source: National Weather Service Pueblo Office. http://www.crh.noaa.gov/pub/?n=/ltg/flash_density_maps_index.php

Hail

Hail is associated with thunderstorms that can also bring high winds and tornados. I t forms when updrafts carry raindrops into extremely cold areas of the atmosphere where they freeze into ice. Hail falls when it becomes heavy enough to overcome the strength of the updraft and is pulled by gravity towards the earth. Hailstorms occur throughout the spring, summer, and fall in the region, but are more frequent in late spring and early summer. Hailstones are usually less than two inches in diameter and can fall at speeds of 120 mph. Hail causes nearly $1 billion in damage to crops and property each year in the United States. Hail is also one of the requirements which the National Weather Service uses to classify thunderstorms as 'severe.' If hail more than ¾ of an inch is produced in a thunderstorm, it qualifies as severe.

The National Weather Service classifies hail by diameter size, and corresponding everyday objects to help relay scope and severity to the population. Table 4.16 indicates the hailstone measurements utilized by the National Weather Service.

Table 4.16. Hailstone Measurements

Average Diameter	Corresponding Household Object
.25 inch	Pea
.5 inch	Marble/Mothball
.75 inch	Dime/Penny
.875 inch	Nickel
1.0 inch	Quarter
1.5 inch	Ping-pong ball
1.75 inch	Golf-Ball
2.0 inch	Hen Egg
2.5 inch	Tennis Ball
2.75 inch	Baseball
3.00 inch	Teacup
4.00 inch	Grapefruit
4.5 inch	Softball

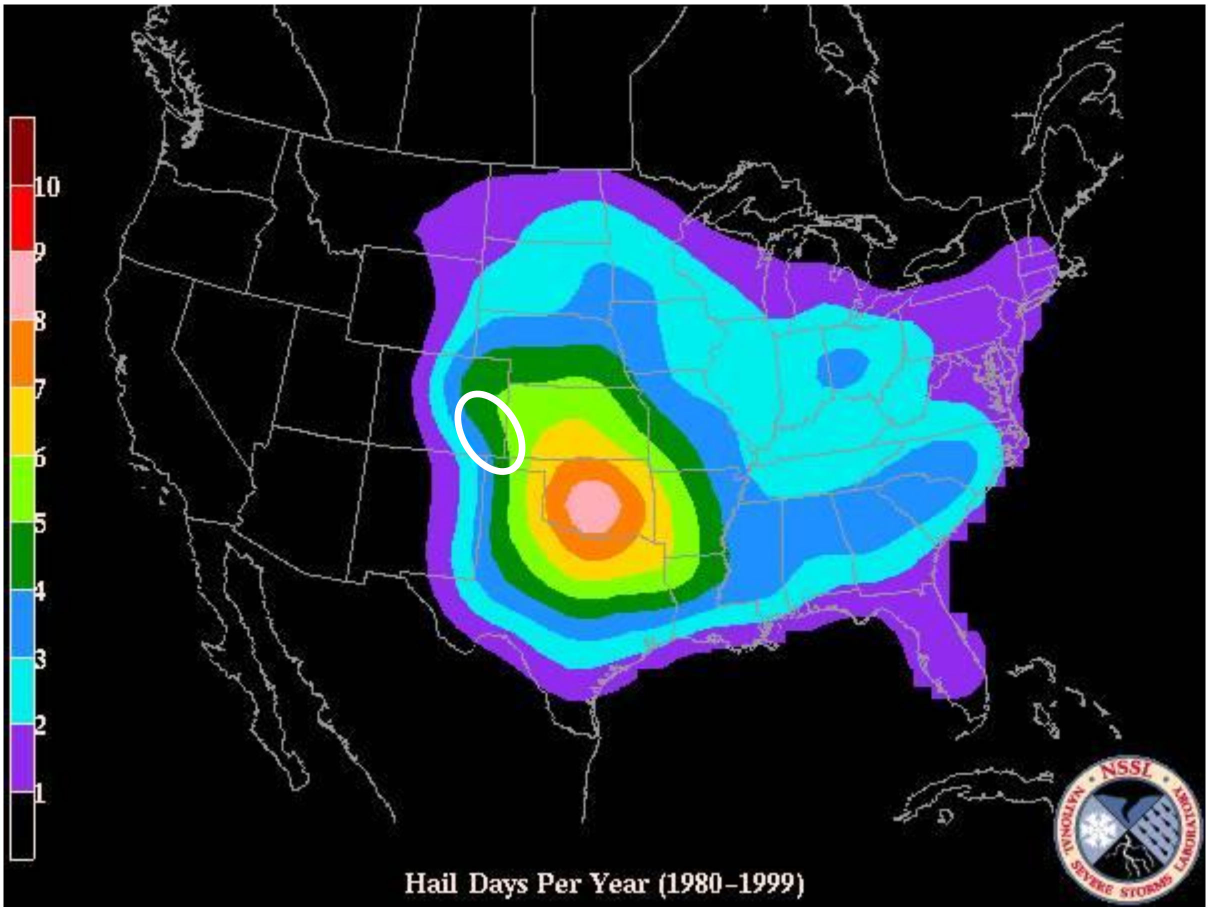
Source: National Weather Service

There is no clear distinction between storms that do and do not produce hailstones. Nearly all severe thunderstorms probably produce hail aloft, though it may melt before reaching the ground. Multi-cell thunderstorms produce many hailstones, but not usually the largest hailstones. In the life cycle of the multi-cell thunderstorm, the mature stage is relatively short so there is not much time for growth of the hailstone. Supercell thunderstorms have sustained updrafts that support large hail formation by repeatedly lifting the hailstones into the very cold air at the top of the thunderstorm cloud. In general, hail 2 inches (5 cm) or larger in diameter is associated with supercells (a little larger than golf ball size which the NWS considers to be 1.75 inch.). Non-supercell storms are capable of producing golf ball size hail.

In all cases, the hail falls when the thunderstorm's updraft can no longer support the weight of the ice. The stronger the updraft the larger the hailstone can grow. Nebraska, Colorado, and Wyoming usually have the most hail storms in the United States. The area where these three states meet – "hail alley," averages seven to nine hail days per year. The reason why this area gets so much hail is that the freezing levels (the area of the atmosphere at 32 degrees or less) in the high plains are much closer to the ground than they are at sea level, where hail has plenty of time to melt before reaching the ground.

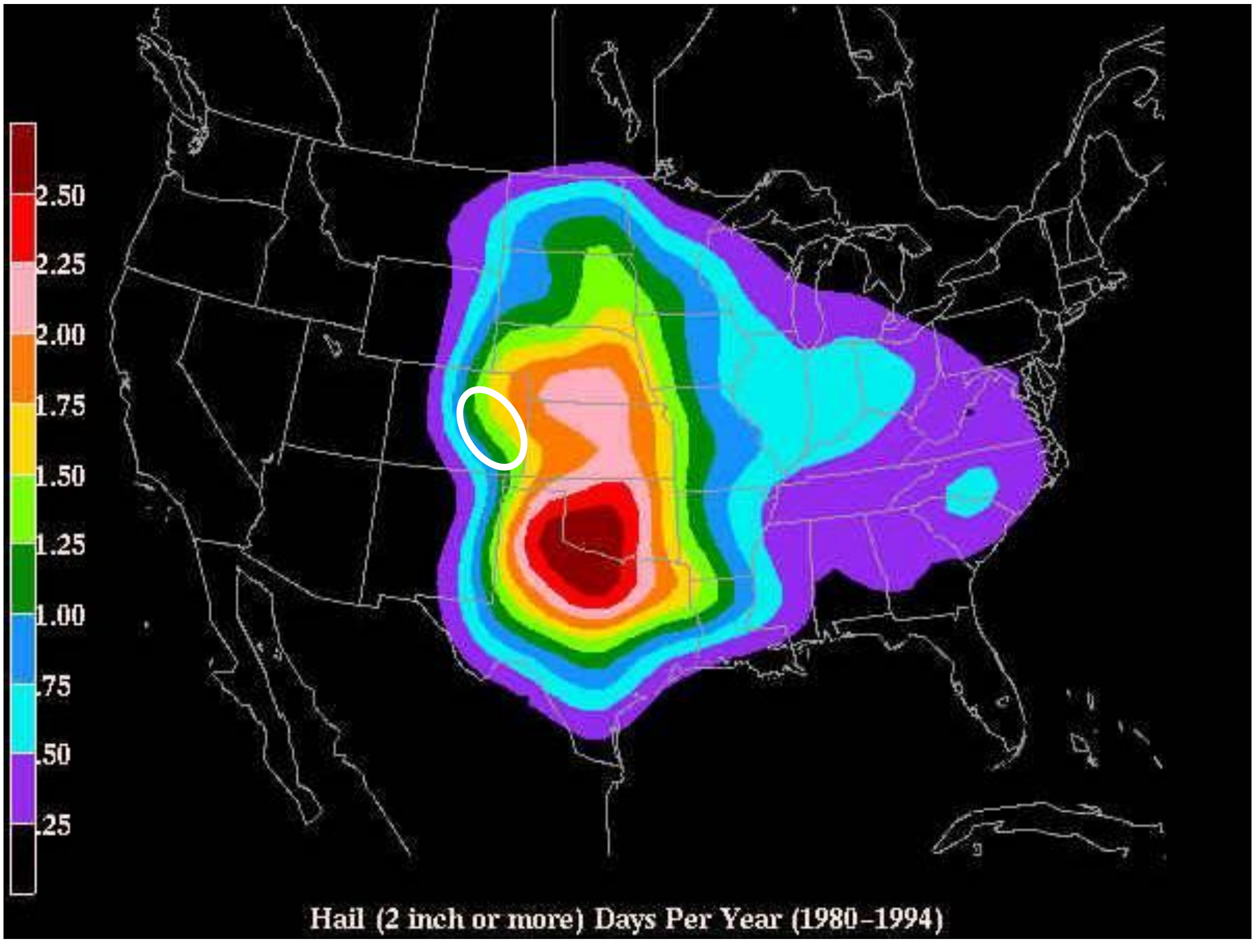
When viewed from the air, it is evident that hail falls in paths known as hail swaths. They can range in size from a few acres to an area 10 miles wide and 100 miles long. Piles of hail in hail swaths have been so deep, a snow plow was required to remove them, and occasionally, hail drifts have been reported. Figure 4.29 shows the average number of days of hail per year in the United States, with the planning area outlined in a white oval. Figure 4.30 shows the average number of days of severe hail (over two inches in diameter) per year in the United States, with the planning area outlined in a white oval.

Figure 4.29. Average Number of Days of Hail per Year



Source: NOAA National Severe Weather Laboratory

Figure 4.30. Average Days of Large Hail in the Planning Area



Source: NOAA National Severe Weather Laboratory

Previous Occurrences

Thunderstorms

Heavy rains and severe storms occur in the planning area mainly between May and August. Major events are summarized in Table 4.17.

Table 4.17. Severe Thunderstorm Events in the Planning Area

County	Number
Baca	38
Bent	31
Crowley	15
Kiowa	28
Otero	79
Prowers	64

County	Number
Total	**255**

Source: NCDC

Lightning

Tracking lightning events is not simple. The NCDC database reports only 480 events for the entire State in the last 60 years, indicating that these events are vastly underreported. The following table, drawn from the National Weather Service in Pueblo, depicts the average number of cloud-to-ground lightning strikes, per year, for each county in the planning area. The NWS in Pueblo reports that Colorado ranks 18th for most lightning strikes overall, and 3rd for the most lightning-related deaths. The most recent numbers for lightning-related deaths by county are collected by NCDC. These numbers are reflected in the far right column of the table below.

Table 4.18. Average Cloud-to-Ground Lightning Strikes (in thousands) Per Year

County	Strikes (in thousands)*	Reported Injures/Deaths 1950-2005**
Baca	8.5	0/0
Bent	6.7	0/0
Crowley	3.5	0/0
Kiowa	7.3	0/0
Otero	5.9	2/0
Prowers	7.2	1/3
6 County Total	**39.1**	**3/3**

Source: *National Weather Service Pueblo **National Climatic Data Center

July 16, 1994 - Lightning struck a roof antenna of a home in La Junta in Otero County, which started a fire and caused extensive damage. $50,000 in damage was attributed to this lightning strike.

September 25, 1996 – A man was struck and killed by lightning while working in an onion field southwest of the Town of Swink in Otero County.

September 23, 1998 – A 32-year old man died and three others were injured while working at a hog farm near Lamar in Prowers County when lightning struck. The man was carrying a metal object when the lightning struck and died at the scene. The other three men were airlifted to a Denver area hospital for burns and residual tingling sensation.

September 8, 2005 - A 36-year old man was struck and killed by lightning while working outside on a farm near Rocky Ford in Otero County.

August 16, 2007 - Lightning strikes causes small fires in a few buildings in La Junta in Otero County. The fires were contained quickly, but caused $10,000 in damages.

Hail

Table 4.19 reflects the number of reported hail occurrences for each county in the planning area, as recorded in the NCDC database. Because hailstorms are so frequent, and the majority of hailstorms cause negligible damage, the search parameters were limited to hail events producing hailstones at least 2 inches in diameter. Results of these limited search parameters are found in Table 4.20.

Table 4.19. All Hail Occurrences per County: 1950-2010

County	Occurrences	Property Damage	Crop Damage
Baca	271	400,000	0
Bent	105	6,201,000	3,100,000
Crowley	59	0	0
Kiowa	213	0	500,000
Otero	138	70,000	0
Prowers	219	5,310,000	500,000
6 County Total	**1,005**	**11,981,000**	**4,100,000**

Source: National Climatic Data Center

Table 4.20. Hail (≥ 2") Occurrences per County: 1950-2010

County	Occurrences
Baca	26
Bent	13
Crowley	2
Kiowa	14
Otero	13
Prowers	32
6 County Total	**100**

Source: National Climatic Data Center

Specific incidents of hail have caused large amounts of damage in the planning area. Only those incidents with reported damage of more than $50,000 are reported below.

June 6, 1994 - Hail up to 3 inches in diameter destroyed up to one half of a wheat field south southwest of Towner in Kiowa County. Over $500,000 in damages were attributed to this storm.

May 16, 1995 – Hail 2.75 inches in diameter fell in the area of Lamar in Prowers Count. Over $500,000 in damages were attributed to this storm.

October 11, 1997 – 4.5 inch hail fell 3 miles northwest of Las Animas in Bent County. Hail of 2.75 inches fell in the La Junta area in Otero County. Over $100,000 in damages were attributed to this storm.

June 7, 2001 - A slow moving very severe thunderstorm brought very heavy rain, causing flooding, and hail around baseball size to the Ft. Lyon area in Bent County for nearly an hour. Highway 50 was under water for over an hour near Ft. Lyon. Many residences experienced basement flooding. The large hail broke out windows and destroyed roofs on houses. Many vehicles also sustained major damage. The VA Medical Center's tile roof was completely destroyed, along with many windows. The grounds also sustained major damage. In addition, crops were totally destroyed in the area. This storm also caused hail 3 inches in diameter to fall in Lamar in Prowers County. Over $14 million in damage was attributed to this storm.

September 24, 2004 - Hail occurred for nearly an hour, ranging from one inch to 1.75 inches in diameter near Springfield in Baca County. Over $100,000 in damages were attributed to this storm.

June 16, 2006 - A few damaging supercells moved through Las Animas, Bent, Prowers, and Baca Counties. One broke out 75 windows with 2-inch diameter, wind-driven hail at the Colorado Interstate Gas Facility in southeast Bent County. Large hail damaged a house in southwest Prowers County. Another passed through Campo, in southern Baca County, producing damaging, wind driven 2-inch diameter hail. Windows were broken out, roofs were partially ripped off modular homes, and outbuildings and vehicles were damaged or destroyed. Over $200,000 in damages were attributed to this storm.

June 11, 2009 - A long-lasting supercell tracked across southeast Colorado, producing large hail, high winds, and two short-lived tornadoes. Many vehicles damaged on Highway 287. Damages of $50,000 were attributed to this storm.

May 23, 2010 - Severe thunderstorms generated hail up to around baseball size and damaging thunderstorm winds over portions of Kiowa, Prowers, and Baca Counties. A tornado occurred northwest of Springfield. Damaging large hail occurred in Springfield and north-northwest of town over a half hour time frame. Over $500,000 in damages

Probability of Future Occurrences

Thunderstorm

Thunderstorms are considered a yearly event in the planning area and it is expected to remain so. The total number of deaths and injuries (2) averaged across the collected data timeframe of 60 years indicate that the region experiences and injury or death related to thunderstorms every 30 years. The probability of a thunderstorm in the planning area is **highly likely**.

Lightning

Lightning is considered a yearly event in the planning area and is expected to remain so. The total number of injuries and deaths (6) averaged across the collected data timeframe of 60 years indicates that, overall, the region experiences an injury or death related to lightning every 10 years. The probability of any lightning strike in the region is 100% and **highly likely**. Injuries and deaths are more substantive variables to analyze. The risk that an individual will be injured or killed by lightning somewhere in the planning region in any given year is 10%, and the rating is **likely**.

Hail

Hailstorms occur in every county in the planning region. Based on the information above, the planning area has experienced an average of 16.75 hailstorms per year, which equates to a 100% probability of future occurrence. This corresponds to an occurrence rating of **highly likely**.

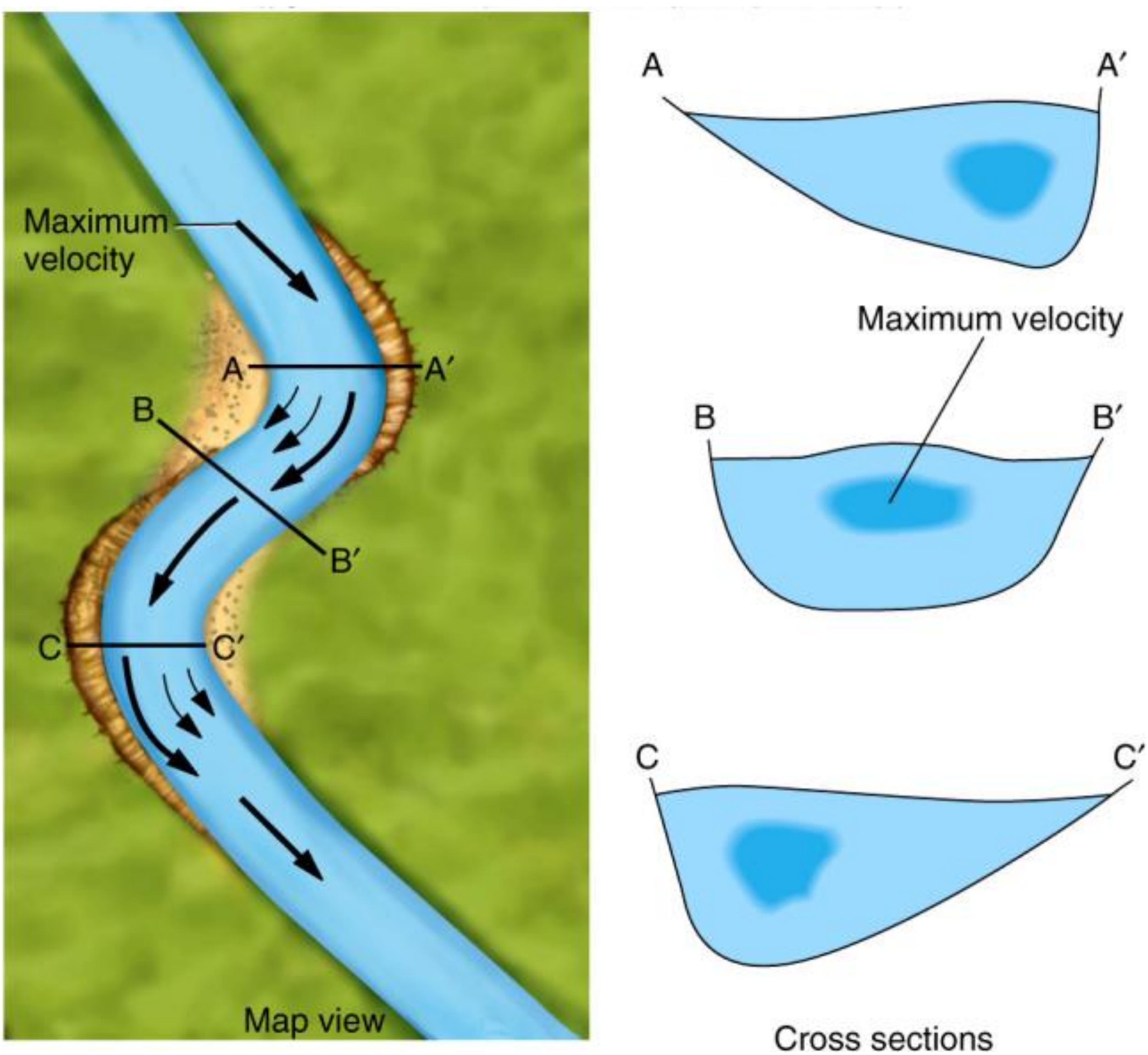
4.2.10 Stream Bank Erosion/Stability

Hazard/Problem Description

Any flowing body of water (brook, creek, stream, river) is a stream. Stream flow is expressed as volume per unit time, usually cubic meters per second, cubic feet per second, sometimes cubic kilometers per second, or acre-feet per second or day. Stream flow varies tremendously with time. Short term controls include rainfall, snowmelt, and evaporation conditions. Long term controls include land use, soil, groundwater state, and rock type.

Streams erode by a combination of direct stream processes, like down cutting and lateral erosion, and indirect processes, like mass-wasting accompanied by transportation. Water tends to move downstream in slugs that extend all the way across a channel. When the channel bends, water on the outside of the bend (the cut-bank) flows faster and water on the inside of the bend (the point) flows slower. This distribution of velocity results in erosion occurring on the outside of the bend (cut) and deposition occurring on the inside of the bend.

Figure 4.31. Meanders and Stream flows



Stream bank erosion is a natural process, but acceleration of this natural process leads to a disproportionate sediment supply, stream channel instability, land loss, habitat loss and other adverse effects. Stream bank erosion processes, although complex, are driven by two major components: stream bank characteristics (erodibility) and hydraulic/gravitational forces. Many land use activities can affect both of these components and lead to accelerated bank erosion. The vegetation rooting characteristics can protect banks from fluvial entrainment and collapse, and also provide internal bank strength. When riparian vegetation is changed from woody species to annual grasses and/or forbs, the internal strength is weakened, causing acceleration of mass wasting processes. Stream bank aggradation or degradation is often a response to stream channel instability (see Figure 4.32). Since bank erosion is often a symptom of a larger, more complex problem, the long-term solutions often involve much more than just bank stabilization. Numerous studies have demonstrated that stream bank erosion contributes a large portion of the annual sediment yield.

Figure 4.32. Remnant "River Pedestals" Indicating High Rates of Lateral Erosion

Source: Watershed Assessment of River Stability & Sediment Supply (WARSSS)

Determining the cause of accelerated streambank erosion is the first step in solving the problem. When a stream is straightened or widened, streambank erosion increases. Accelerated streambank erosion is part of the process as the stream seeks to re-establish a stable size and pattern. Damaging or removing streamside vegetation to the point where it no longer provides for bank stability can cause a dramatic increase in bank erosion. A degrading streambed results in higher and often unstable, eroding banks. When land use changes occur in a watershed, such as clearing land for agriculture or development, runoff increases. With this increase in runoff the stream channel will adjust to accommodate the additional flow, increasing streambank erosion. Addressing the problem of streambank erosion requires an understanding of both stream dynamics and the management of streamside vegetation.

Erosion and deposition are occurring continually at varying rates over the planning area. Swiftly moving floodwaters cause rapid local erosion as the water carries away earth materials. Severe erosion removes the earth from beneath bridges, roads and foundations of structures adjacent to streams. By undercutting it can lead to increased rockfall and landslide hazard. The deposition of material can block culverts, aggravate flooding, destroy crops and lawns by burying them, and reduce the capacity of water reservoirs as the deposited materials displace water.

Streambank erosion increases the sediment that a stream must carry, results in the loss of fertile bottomland and causes a decline in the quality of habitat on land and in the stream.

Past Occurrences

The Arkansas River has eroded sufficiently to reach the toe of the south bank levee at the west end of the project several times since construction. The Arkansas River Levee District has successfully repaired the damage and restored the levee toe. This problem reoccurred during June 1994 when the river eroded into the toe of the levee approximately 1/2 mile from the beginning of the levee west of Las Animas. Some of the jacks installed for levee protection were washed out. The District is fighting this streambank erosion and has restored the levee toe but another section downstream is being threatened. A large scale, vigorous program of streambank stabilization and levee toe protection will be necessary to maintain the integrity of the levee at the critically important west end. A separate erosion problem developed at the west end of the project where the Consolidated Canal river return outlet channel has eroded into the toe of the levee. This problem should also be addressed in a vigorous manner to maintain the integrity of the levee.

During the 1999 flooding, after a field inspection of the reservoir on May 6, 1999, John Martin Project Office personnel discovered a slide on the Burlington Northern - Santa Fe (BNSF) railway embankment adjacent to the reservoir. The BNSF railway was notified of this problem on May 6, 1999. An inspection of the reservoir on May 11, 1999 indicated that problem was getting worse. Railroad personnel visited the site on the afternoon of May 11, 1999. Subsequently, the railroad placed a speed limit on all trains in the area and took action to make the necessary repairs. The railroad dumped at least 69 train cars of riprap at this site to stabilize the slide. With the slope stabilized, the railroad began placing riprap in specific areas that required protection.

The levee in Las Animas experienced erosion of at one location, but provided protection during the entire 10-year to 25-year flood event. HMPC members were not able to give specific dates for this occurrence.

Likelihood of Future Occurrence

Streambank erosion is a natural process, and will continue to occur in the future. Problematic occurrences were rated as **occasional** by the planning team.

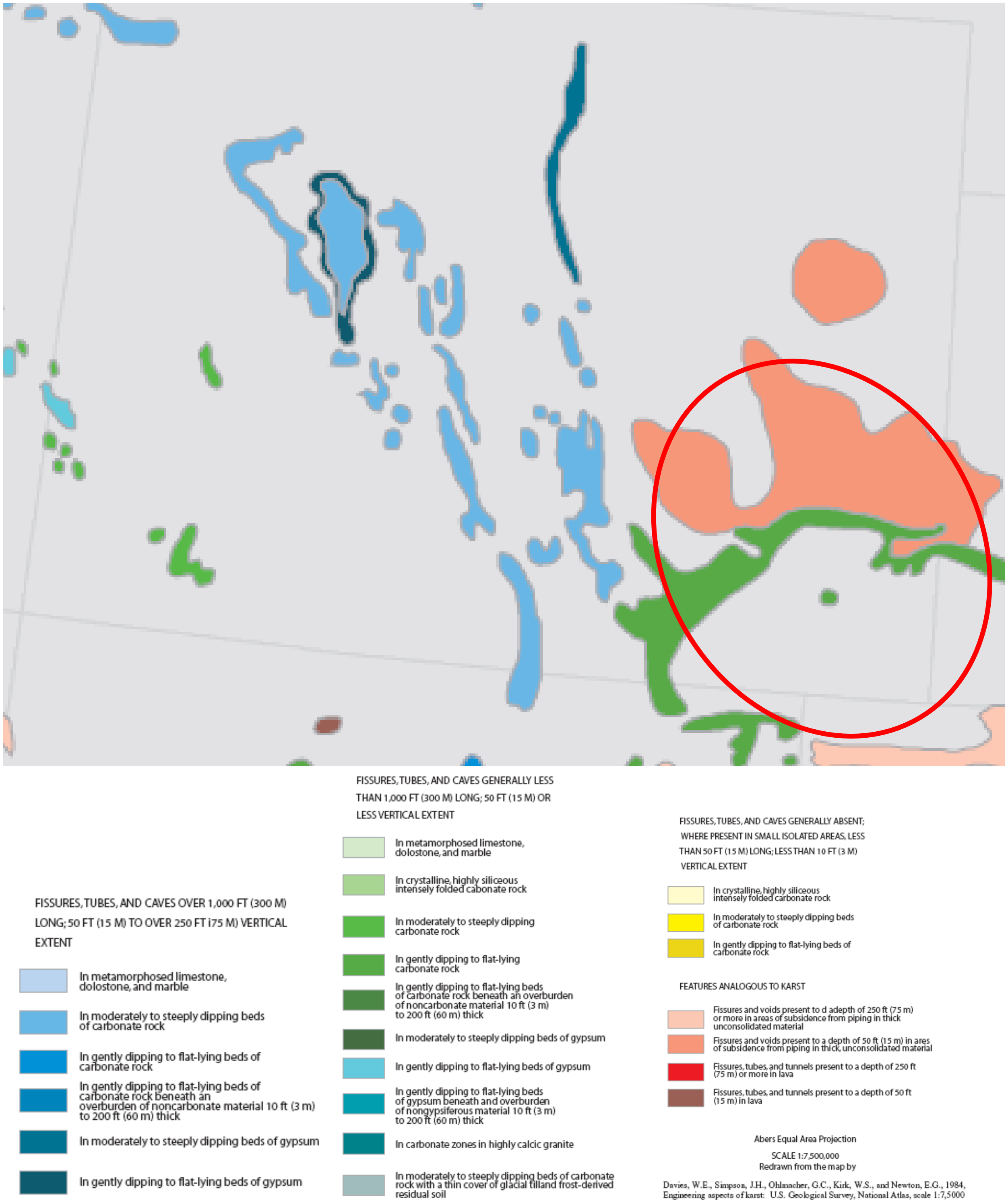
4.2.11 Subsidence

Hazard/Problem Description

The Colorado Geological Survey defines land subsidence as the sinking of the land over manmade or natural underground voids. Subsidence can result in serious structural damage to buildings, roads, irrigation ditches, underground utilities, and pipelines. It can disrupt and alter the flow of surface or underground water. Weight, including surface developments such as roads, reservoirs, and buildings and manmade vibrations from such activities as blasting or heavy truck or train traffic can accelerate the natural processes of subsidence. Fluctuations in the level of underground water caused by pumping or by injecting fluids into the earth can initiate sinking to fill the empty space previously occupied by water or soluble minerals. The consequences of improper use of land subject to ground subsidence can be excessive economic losses, including the high costs of repair and maintenance for buildings, irrigation works, highways, utilities, and other structures. This results in direct economic losses to citizens as well as indirect economic losses through increased taxes and decreased property values.

In Colorado, land subsidence often occurs in areas where development takes place above or near abandoned coal mines. According to maps in the 2008 State of Colorado Hazard Mitigation Plan, there are no abandoned mines in the planning area. While the area is not at risk to this type of subsidence, it is at risk to subsidence from karst. Distinctive surficial and subterranean features developed by solution of carbonate and other rocks and characterized by closed depressions, sinking streams, and cavern openings are commonly referred to as karst. Originally the term defined surface features derived by solution of carbonate rocks, but subsequent use has broadened the definition to include sulfates, halides, and other soluble rocks. The term has been expanded also to cover interrelated forms derived by solution on the surface in the subsurface. Most of the problems created by karst pertain to subterranean karst and pseudokarst features that affect foundations, tunnels, reservoir tightness, and diversion of surface drainage. A map of karst in the planning area is provided in Figure 4.33.

Figure 4.33. Colorado Karst Map



Source: National Karst Map. Davies, W.E., Simpson, J.H., Ohlmacher, G.C., Kirk, W.S., and Newton, E.G., 1984.

Previous Occurrences

Records of previous subsidence occurrences are difficult to track, as there are no coordinating or monitoring agencies for this hazard. No previous occurrences were recorded by members of the planning team.

Probability of Future Occurrences

Calculating the probability of future occurrence of subsidence is difficult given the limited information regarding past events. The planning area does not contain abandoned coal mines, but does contain areas affected by karst. It is usually very difficult to accurately predict the exact location or time of any future subsidence from this cause because of the many variables. Given this, the probability of future occurrence is **occasional**.

4.2.12 Tornadoes

Hazard/Problem Description

According to the 2008 Colorado Hazard Mitigation plan, a tornado is a localized, violently destructive windstorm occurring over land, especially in the Midwestern U.S., characterized by a long, funnel-shaped cloud composed of condensation and containing debris that extends to the ground and marks a path of great destruction. The National Weather Service Glossary provides further technical definition, stating that a tornado is "A violently rotating column of air, usually pendant to a cumulonimbus, with circulation reaching the ground. It nearly always starts as a funnel cloud and may be accompanied by a loud roaring noise. On a local scale, it is the most destructive of all atmospheric phenomena."

Prior to February 1, 2007, tornado intensity was measured by the Fujita (F) scale. This scale was revised and is now the Enhanced Fujita scale. Both scales are sets of wind estimates (not measurements) based on damage. The new scale provides more damage indicators (28) and associated degrees of damage, allowing for more detailed analysis, better correlation between damage and wind speed. It is also more precise because it takes into account the materials affected and the construction of structures damaged by a tornado. Table 4.21 shows the wind speeds associated with the original Fujita scale ratings and the damage that could result at different levels of intensity. Table 4.22 shows the wind speeds associated with the Enhanced Fujita Scale ratings. Figure 4.34 displays reported tornado touchdowns and paths across the planning area.

Table 4.21. Traditional Fujita (F) Scale

Fujita (F) Scale	Fujita Scale Wind Estimate (mph)	Typical Damage
F0	< 73	Light damage. Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
F1	73-112	Moderate damage. Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
F2	113-157	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
F3	158-206	Severe damage. Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown.
F4	207-260	Devastating damage. Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated.
F5	261-318	Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yards); trees debarked; incredible phenomena will occur.

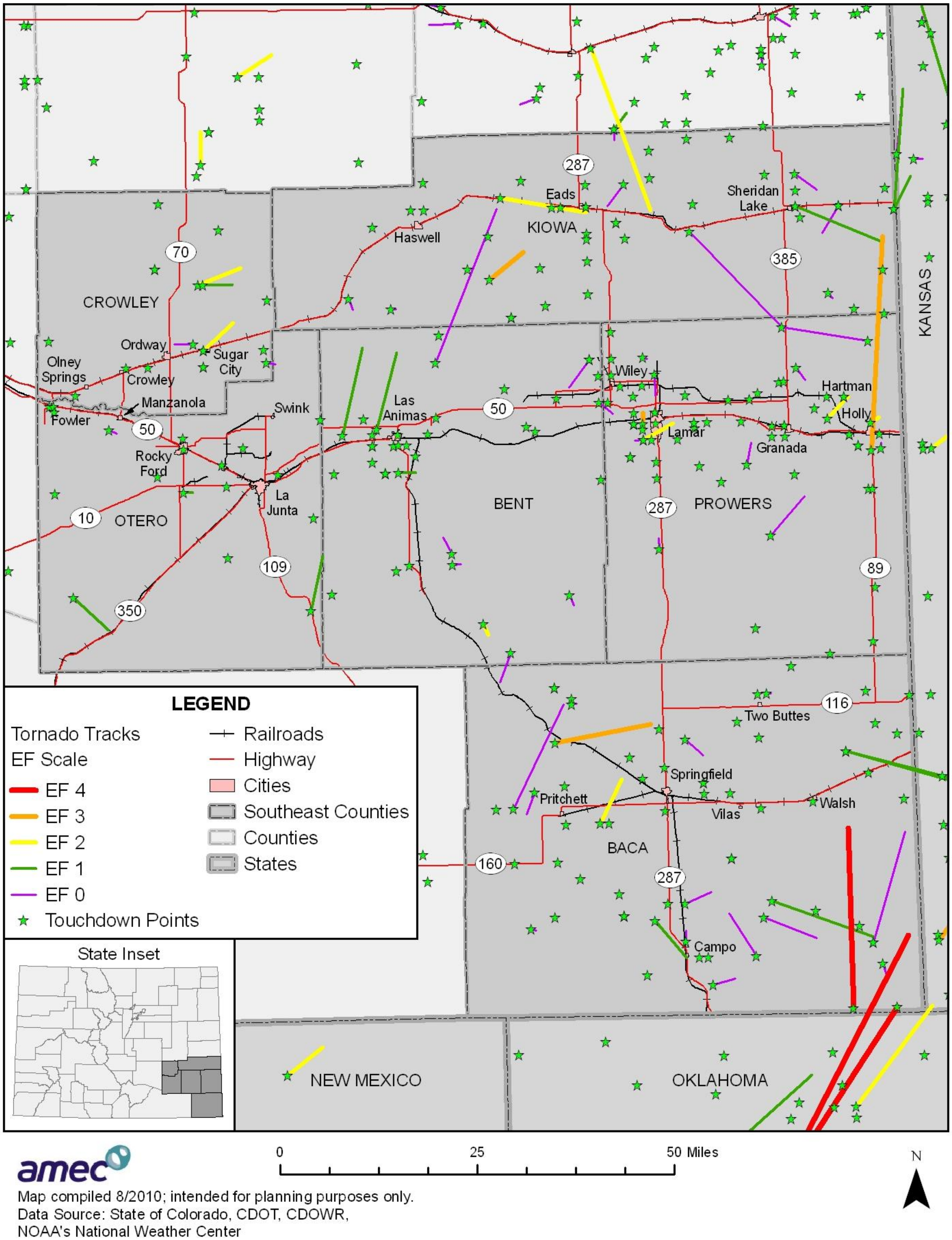
Source: National Oceanic and Atmospheric Administration Storm Prediction Center

Table 4.22. Enhanced Fujita (EF) Scale

Enhanced Fujita (EF) Scale	Enhanced Fujita Scale Wind Estimate (mph)
EF0	65-85
EF1	86-110
EF2	111-135
EF3	136-165
EF4	166-200
EF5	Over 200

Source: National Oceanic and Atmospheric Administration Storm Prediction Center

Figure 4.34. Map of Tornado Paths in Planning Region



The map only shows a representative sample of the tornados that have occurred within the planning area. Tornado analysis indicates that nearly half of the tornadoes in the 1950-2005 archived NCDC database were either brief touchdowns or do not have a recorded tornado end point. Therefore, tornado track studies have inherent limitations to determining geographical distributions of tornado path length and associated tornado incidence. Tornados have occurred across the planning area frequently and are possible in all areas of the region.

Previous Occurrences

Table 4.23 indicates that 286 tornadoes occurred in the planning area between 1950 and May 31, 2010. The data indicates a wide range of occurrences on a per county basis. The Planning Team believes the data is more indicative of tornadoes being *reported versus actual occurrences.* The counties with the higher number of occurrences are also those counties with either higher population, greater damages experienced, or where official "Spotter Training" has been provided.

Table 4.23. Tornado Occurrences by County, 1950-2010

County	Occurrences
Baca	71
Bent	40
Crowley	16
Kiowa	69
Otero	19
Prowers	71
6 County Total	**286**

Source: NCDC

The vast majority of tornados affecting the planning area are rated between F0 and F2, according to the data collected by the National Climactic Data Center. The table below presents all F3 or greater events in the planning area. According to available data, only one event greater than F3 has been documented in the planning area. The Holly tornado, an F3, resulted in a State Disaster Declaration, two fatalities, 9 injuries, and over $4 million in property damage. More detail on past tornados and their specific impacts are referenced in the County Planning Elements.

Table 4.24. Tornados of F3 Magnitude or Greater

Scale	Date	County	Community	Injured	Killed	Damages	Damages Adjusted*
EF3	3/28/2007	Prowers	Holly	9	2	4,000,000	4,210,000
F3	5/29/2001	Prowers	Lamar	0	0	150,000	184,650
F4	5/18/1977	Baca	Baca	0	0	2,500,000	8,993,900
F3	10/17/1971	Kiowa	Kiowa	0	0	250,000	1,345,750

Source: National Climatic Data Center
* Damages adjusted to 2010 dollars using Consumer Price Index

Tornadoes have been costly in the planning area. Tornadoes causing over a million dollars in damage (in 2010 dollars) are listed below.

On **June 10, 1967**, an F2 tornado struck Baca County, touched down and stayed on the ground for approximately 14 miles. The tornado was 100 yards wide, and caused $250,000 in damages, equivalent to $1.6 million in 2010. No one was killed, but 4 people were injured by the tornado.

On **October 17, 1971**, and F3 tornado touched down in Kiowa County. The tornado stayed on the ground for 5.6 miles and was 500 yards wide. The tornado caused $250,000 in damages, equivalent to $1,347,600 in 2010. No deaths or injuries were reported

On **May 18, 1977**, and F2 tornado struck in Kiowa County. The tornado touched down and stayed on the ground for 11.1 miles. The tornado was 440 yards wide, and caused $250,000 million dollars in damage, equivalent to $1,014,460 million dollars in 2010. No deaths or injuries were reported.

On **May 18, 1977**, and F4 tornado struck in Baca County. The tornado touched down and stayed on the ground for 9.3 miles. The tornado was 440 yards wide, and caused 2.5 million dollars in damage, equivalent to $9 million in 2010. No deaths or injuries were attributed to this tornado.

On **June 20, 2004**, and F1 tornado struck 5 miles south of Las Animas in Bent County. The tornado touched down and stayed on the ground for 1 mile. The tornado was 100 yards wide, and caused $1 million in damage, equivalent to $1.16 million in 2010. No one was killed, but 4 people were injured by the tornado. The tornado caused severe damage to at least seven buildings at Mountain Prairie Hog Farms. Seven farrowing barns (380 feet x 60 feet) were destroyed. One pig was killed. A fire started in one of the structures when a gas line broke. Debris was scattered a few miles east southeast of the Farms.

On **March 28, 2007**, and EF3 tornado struck the Town of Holly in Prowers County. A few severe thunderstorms occurred over extreme southeast Colorado producing damaging winds and large hail. One supercell generated large hail, damaging winds, and two tornadoes. The tornado which struck Holly in rural northeast Prowers County and rural southeast Kiowa County had a maximum rating of EF3. The path width reached a maximum of around 900 yards in extreme northeast Prowers County. Prior to this, as the tornado moved through Holly, the path width was around 600 feet. Over 200 residences and other buildings were affected or destroyed. Two people were killed and nine others were injured. The damage path was around 28 miles long, extending into Kiowa County. The last substantial damage with the tornado was 12 miles north of Holly, in northeast Prowers County, where a ranch sustained high end EF3 damage. As the supercell cycled through, another tornado occurred east of Towner and moved into Kansas. The tornado caused $4 million in damage, equivalent to $4.2 million in 2010.

Figure 4.35. 2007 Holly Tornado

Source: Denver Channel 9

Other tornadoes have caused multiple injuries.

On **October 11, 1997** an F1 tornado struck 12 miles northwest of Las Animas. The same supercell thunderstorm that brought large hail and a brief tornado to eastern Otero County produced a long track tornado through northwestern Bent and central Kiowa counties. The tornado began about 7 miles west of Las Animas. Eleven people were in the direct path of the tornado as it hit a ranch house and adjacent outbuildings. Five men were caught outside, trying to move their vehicles from harm's way. Four were thrown about by the tornado and received minor injuries. The tornado moved northeast and blew a vehicle off Highway 194. The occupant received minor injuries. It destroyed a stream level monitor on the other side of the highway, then ripped through a line of trees before moving into barren country. Eyewitnesses said the tornado remained intact for most of the 35 mile track northeast to just south of Highway 96 in Kiowa County. Owing to the nearly uninhabited, barren landscape, little if any damage occurred beyond Highway 194 in Bent County. Total damages from the storm were $200,000 (272,000 when adjusted to 2010 dollars). In total 6 people were injured, but no deaths occurred.

Probability of Future Occurrences

Based on the information above, the planning area has experienced an average of 4.8 tornados per year, or an occurrence rating of 100%. This leads to a probability of future occurrence rating of **highly likely**.

4.2.13 Wildfire

Description

The Colorado State Forest Service defines wildfires as "an open fire which spreads unconstrained through the environment. If not quickly controlled, the result can be a firestorm, often termed a 'conflagration,' which destroys large amounts of property and threatens lives."

Wildfires occur everywhere in Colorado. In the planning area, the most common kinds of wildfires are grassland fires, which occur along railroad tracks, in fields, and in the prairie land. Wildfires occur naturally (often through lightning strikes) and also from human causes, both intentional and accidental. Examples of human-driven causes of wildfire include campfires, sparks from railroad cars or engines, discarded cigarette butts, and grills. Droughts may increase the number of wildfire incidents by drying out fuel sources. Insect epidemics and forest parasites may also increase the number and severity of wildfires.

Wildfires are most likely to occur during the fire season, which extends from mid-spring to late fall, and is most prominent during the driest summer months of July and August. However, the fire season's duration is impacted by local fire conditions. Fire conditions are impacted by hot weather, vegetation growth, and low moisture content in air and fuel. These conditions, especially when combined with high winds and years of drought, increase the potential for wildfire to occur. The wildfire risk is predominantly associated with the wildland-urban interface (WUI). The WUI is made of up of areas where development is interspersed or adjacent to landscapes that support wildland fire. While traditionally associated with forested mountain areas, WUI areas are also present in grasslands, prairies, valleys, or in any area where a sustained wildfire may occur and impact developed areas. Fires in the WUI may result in major losses of property and structures, threaten greater numbers of human lives, and incur larger financial costs. In addition, WUI fires may be more dangerous than wildfires that do not threaten developed areas, as firefighters may continue to work on more dangerous conditions in order to protect structures such as businesses and homes. As the development of WUI areas increases, the likelihood of a severe wildfire also increases.

Generally, there are three major factors that sustain wildfires and predict a given area's potential to burn. These factors are fuel, topography, and weather.

Fuel - Fuel is the material that feeds a fire and is a key factor in wildfire behavior. Fuel is generally classified by type and by volume. Fuel sources are diverse and include everything from dead tree needles and leaves, twigs, and branches to dead standing trees, live trees, brush, and cured grasses. Manmade structures, such as homes and associated combustibles, are also potential fuel sources. The type of prevalent fuel directly influences the behavior of wildfire. Light fuels such as grasses burn quickly and serve as a catalyst for fire spread. "Ladder fuels" are fuels low to the ground that can spread a surface fire upward through brush and into tree tops. These fires, known as crown fires, burn in the upper canopy of forests and are nearly impossible to control. The volume of available fuel is described in terms of fuel loading. Many areas in the planning area are extremely vulnerable to wildfires as a result of dense vegetation combined with urban interface living.

Topography - An area's terrain and land slopes affect its susceptibility to wildfire spread. Both the fire intensity and the rate of spread increase as slope increases due to the tendency of heat from a fire to rise via convection. The arrangement and types of vegetation throughout a hillside can also contribute to increased fire activity on slopes. In addition, topography impacts the ability of firefighters to combat the blaze by hampering access for equipment, supplies, materials and personnel.

Weather – Weather components such as temperature, relative humidity, wind, and lightning also affect the potential for wildfires. High temperatures and low relative humidity dry out the fuels that feed the wildfire, increasing the odds that fuel will more readily ignite and burn more intensely. Wind is the most treacherous weather factor. The greater the wind, the faster a fire will spread, and the more intense it will be. In addition to wind speed, wind shifts can occur suddenly due to temperature changes or the interaction of wind with topographical features such as slopes or steep hillsides. Lightning also ignites wildfires, which are often in terrain that is difficult for firefighters to reach. Drought conditions contribute to concerns about wildfire vulnerability. During periods of drought, the threat of wildfire increases. There are no known effective measures for human mitigation of weather conditions. Careful monitoring of weather conditions that drive the activation and enforcement of fire-safety measures and programs, such as bans on open fires, are ongoing weather-related mitigation activities.

In 2009 the Colorado State Legislature adopted Senate Bill 09-001, an act which amends Title 23, Article 31, Part 3, Section 1. This law now requires CWPPs for all unincorporated portions of a county where a fire hazard exists. The status of CWPPs in the planning area are listed in Table 4.25. More information regarding these CWPP's can be found in the Capability Assessment in each CPE.

Table 4.25. CWPP Status in the Planning Area

County	Status
Baca	In process
Bent	In process
Crowley	In process
Kiowa	Completed 1997
Otero	In process
Prowers	In process

Source: CSFS

Previous Occurrences

The map in Figure 4.36 shows reported federal wildfire history for the planning area from 1980 to 2009. The fire occurrence data for this map is a collection of fire records from the following five federal agencies within the United States Department of Interior (DOI) and the United States Department of Agriculture (USDA):

- Bureau of Land Management (BLM)
- Bureau of Indian Affairs (BIA)
- U.S. Fish and Wildlife Service (FWS)

- National Park Service (NPS)
- U.S. Forest Service (USFS)

These fires occurred on federal public lands. Specific occurrences are described in Table 4.26. The data that follows only includes those incidents reported to databases. Other fires also have occurred in the planning area, but are not included in this database.

Table 4.26. Federal Fire Occurrences in the Planning Area from 1980 to 2009

Fire Name	Total Acres Burned	Cause	County	Year
Unnamed	17	Natural	Baca	1986
Unnamed	118	Natural	Baca	1986
Unnamed	6	Human	Baca	1987
Unnamed	5	Human	Baca	1987
Unnamed	213	Natural	Baca	1987
Unnamed	160	Human	Baca	1988
Unnamed	220	Human	Baca	1988
Unnamed	1	Natural	Baca	1988
Unnamed	25	Human	Baca	1988
Unnamed	29	Human	Baca	1988
Unnamed	28	Natural	Baca	1988
Unnamed	28	Natural	Baca	1988
Unnamed	1,216	Natural	Baca	1988
Unnamed	17	Natural	Baca	1988
Unnamed	0	Natural	Baca	1990
Unnamed	0	Human	Baca	1990
Unnamed	0	Natural	Baca	1990
Unnamed	9	Natural	Baca	1990
Unnamed	22	Natural	Baca	1990
Unnamed	320	Natural	Baca	1990
Unnamed	18	Human	Baca	1990
Unnamed	3	Human	Baca	1990
Unnamed	0	Natural	Baca	1990
Unnamed	2	Human	Baca	1990
Unnamed	0	Natural	Baca	1990
Unnamed	0	Human	Baca	1990
Unnamed	73	Natural	Baca	1990
Unnamed	32	Human	Baca	1991
Unnamed	150	Human	Baca	1991
Unnamed	2	Human	Baca	1991
Unnamed	0	Natural	Baca	1992

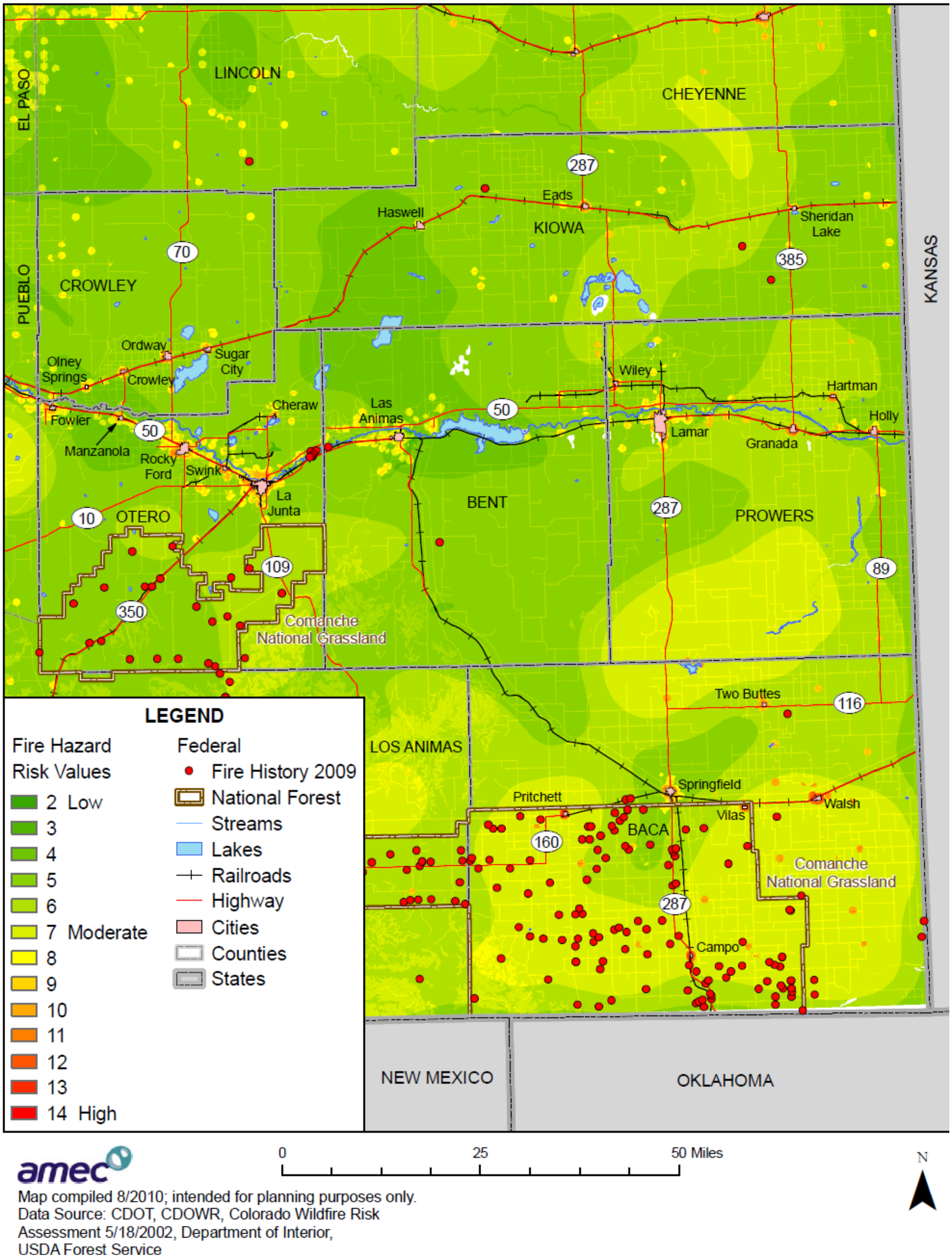
Fire Name	Total Acres Burned	Cause	County	Year
Unnamed	0	Human	Baca	1992
Unnamed	6	Natural	Baca	1992
Unnamed	100	Human	Baca	1992
Unnamed	400	Natural	Baca	1992
Unnamed	0	Human	Baca	1992
Unnamed	1	Natural	Baca	1992
Unnamed	0	Natural	Baca	1993
Unnamed	0	Natural	Baca	1993
Unnamed	3	Natural	Baca	1993
Unnamed	5	Natural	Baca	1993
Unnamed	8	Natural	Baca	1993
Unnamed	40	Natural	Baca	1993
Unnamed	40	Human	Baca	1994
Unnamed	80	Natural	Baca	1994
Murrey Draw	160	Natural	Baca	1994
Pasture IAE	270	Natural	Baca	1994
Unnamed	25	Human	Baca	1994
Unnamed	20	Human	Baca	1994
Pasture 16C	400	Natural	Baca	1994
Unnamed	12	Human	Baca	1994
Unnamed	50	Natural	Baca	1994
Unnamed	80	Natural	Baca	1994
Unnamed	27	Natural	Baca	1994
Unnamed	1	Natural	Baca	1994
Unnamed	0	Natural	Baca	1994
Wintergreen	1	Natural	Baca	1995
Smoke Chaser	5	Natural	Baca	1995
Hallmark	80	Natural	Baca	1995
Unnamed	4	Human	Baca	1995
Furball	20	Natural	Baca	1995
Sanders	16	Natural	Baca	1995
Unnamed	700	Natural	Baca	1995
Sparky (Pasture 4-H)	2	Natural	Baca	1995
Unnamed	175	Natural	Baca	1995
Bridge	40	Natural	Baca	1995
Big Cholla	0	Natural	Baca	1996
Jack Back	40	Natural	Baca	1996
Goodby Jerry	4	Natural	Baca	1997
Furnish Canyon	30	Natural	Baca	1997

Fire Name	Total Acres Burned	Cause	County	Year
Snake Pond	73	Human	Baca	1997
Screaming Hawk	60	Natural	Baca	1997
Combine	80	Human	Baca	1998
2 Days Later	110	Natural	Baca	1998
Grinder	260	Human	Baca	1999
Aubrey	4	Natural	Baca	2000
Kirkwell	1	Natural	Baca	2000
Reader Lake	15	Natural	Baca	2000
Vfd	540	Human	Baca	2000
Utleyville	1,000	Human	Baca	2000
Portal West	1	Human	Baca	2000
Portal	40	Human	Baca	2000
Haney	420	Human	Baca	2001
Royal Crwon	40	Human	Baca	2002
Edler	90	Natural	Baca	2002
Kirkwell	1,350	Natural	Baca	2002
Lone Rock Draw	36	Natural	Baca	2002
Tiefault	5	Natural	Baca	2002
Aubrey	14	Human	Baca	2003
Sunflower	13	Natural	Baca	2003
Mount Carmel	23	Natural	Baca	2003
Brushy Canyon	150	Natural	Baca	2003
South Fork	150	Human	Baca	2003
Experiment Station	200	Natural	Baca	2003
South	152	Natural	Baca	2004
Murray Draw	30	Natural	Baca	2004
North	12	Natural	Baca	2004
Moore Draw ("M")	200	Natural	Baca	2004
TP	2	Natural	Baca	2004
Little Washington	23	Human	Baca	2004
Burrows Draw	411	Natural	Baca	2005
Charlie	206	Natural	Baca	2005
Alpha	2	Natural	Baca	2005
Liberty	12	Natural	Baca	2005
8GN	80	Natural	Baca	2005
Moore Draw	595	Human	Baca	2005
Mount Carmel	4,000	Human	Baca	2006
East Sand Canyon	18	Human	Baca	2006
Richardson	121	Human	Baca	2006

Fire Name	Total Acres Burned	Cause	County	Year
Sand Hill	9	Natural	Baca	2006
Shooting Range	350	Natural	Baca	2006
AA AND 28	5	Human	Baca	2006
Radio Tower	350	Human	Baca	2006
Dry Creek	900	Human	Baca	2006
Antelope	40	Natural	Baca	2006
Edler	423	Natural	Baca	2007
Sandsage	0	Natural	Baca	2008
Campo	0	Human	Baca	2008
Little Washington	1	Natural	Baca	2008
Lone Rock	62	Natural	Baca	2008
Sand Canyon	7	Natural	Baca	2009
Picture Canyon	1	Natural	Baca	2009
Athens	3	Natural	Baca	2009
3-AWN	76	Human	Baca	2009
Unnamed	2	Natural	Bent	1992
Unnamed	0	Human	Bent	1992
Unnamed	0	Natural	Kiowa	1980
Unnamed	0	Natural	Kiowa	1992
Chivington	142	Human	Kiowa	1993
Unnamed	5	Human	Otero	1986
Unnamed	200	Human	Otero	1987
Unnamed	20	Natural	Otero	1988
Unnamed	145	Natural	Otero	1989
Unnamed	20	Human	Otero	1992
Unnamed	30	Human	Otero	1992
Unnamed	10	Natural	Otero	1994
Unnamed	2	Natural	Otero	1994
Cattails	70	Human	Otero	1995
Sheep Canyon	400	Natural	Otero	1996
Higbee	0	Natural	Otero	1996
Sante Fe Trail	0	Natural	Otero	1996
Car	0	Human	Otero	1996
Microwave	0	Natural	Otero	1996
Santa Fe Trail #1	0	Human	Otero	1997
Prairieres	33	Human	Otero	1997
Flashpiles	40	Human	Otero	1998
Tamariskrd	0	Human	Otero	1999
Tamariskre	4	Human	Otero	1999

Fire Name	Total Acres Burned	Cause	County	Year
Tamariskrt	15	Human	Otero	1999
Tamflddbri	10	Human	Otero	1999
Withers Canyon	1	Natural	Otero	2000
Bloom	190	Natural	Otero	2000
May Water	2	Natural	Otero	2000
Timpas	12	Natural	Otero	2000
Ordway	3	Human	Otero	2000
Slashpiles	4	Human	Otero	2000
Packer South	10	Natural	Otero	2001
Packer North	40	Natural	Otero	2001
Ox Bow	3	Human	Otero	2001
Santa Fe	1725	Human	Otero	2002
Owl Piles	15	Human	Otero	2004
Jacks Point	245	Natural	Otero	2005
Tamarisk	25	Human	Otero	2005
Minnie Canyon 1	0	Natural	Otero	2008
Snakeweed	1,227	Human	Otero	2008

Figure 4.36. Federal Fire Occurrences in the Planning Area from 1980 to 2009



The National Fire Data Center in the United States Fire Administration (USFA) gathers and analyzes information on the magnitude of the Nation's fire problem, as well as its detailed characteristics and trends. The National Fire Data Center has established the National Fire Incident Reporting System (NFIRS). Data contained within NFIRS for the planning area is listed in Table 4.27. Only those fires considered to be major (greater than 50 acres) are included in the table. It should be noted, however, that any ignition in the planning area could possibly lead to a major fire. In the 2000 to 2009 timeframe, there were 1,377 ignitions that were listed in the NFIRS database. In general, this database captures fires do not occur on federal lands, in contrast to Table 4.26.

Table 4.27. NFIRS Fires in the Planning Area from 2000-2009

FD_Name	DATE	Location	City	County	Acres Burned
Prowers County Rural Fire	04/15/08	Highway 96	Ordway	Crowley	8,900
Ordway FD (Crowley CTY FPD)	05/31/02	Lane 7 Road D	Crowley County	Crowley	3,000
Fowler Rural FPD	03/09/09	Hwy 96	Fowler	Otero	700
Fowler Rural FPD	03/09/09	Hwy 96	Fowler	Otero	700
Springfield FD	09/17/07	CR RR & CR 16	SPRINGFIELD	Baca	600
Rocky Ford FD	08/11/07	20549 CC RD	Rocky Ford	Otero	510
Ordway FD (Crowley CTY FPD)	12/01/07	N. Road G RD	Ordway	Crowley	500
Campo FD	02/13/08	US Hwy 287 & Rd M	Campo	Baca	500
Walsh FD	03/08/06	County Rd HH	Walsh	Baca	500
Walsh FD	03/08/06	County Rd HH	Walsh	Baca	500
Hasty-Mcclave FD & Ambulance SVC	03/06/09		Las Animas	Bent	320
Springfield FD	09/15/07	CR Q & CR 23	SPRINGFIELD	Baca	300
Walsh FD	06/04/04	County Road G	Campo	Baca	215
Springfield FD	01/17/09	CR FF	SPRINGFIELD	Baca	200
Walsh FD	03/08/06	County Rd 42	Walsh	Baca	200
Hasty-Mcclave FD & Ambulance SVC	02/17/09	CR 20&FT Lyon Canal	Las Animas	Bent	160
Hasty-Mcclave FD & Ambulance SVC	03/14/04	CR 32 & CR JJ	Bent County	Bent	150
Hasty-Mcclave FD & Ambulance SVC	03/15/04	CR 24 & CR LL	McClave	Bent	125
Walsh FD	03/24/04	89 HWY	Holly	Prowers	125
Hasty-Mcclave FD & Ambulance SVC	03/17/09		Hasty	Bent	100
Ordway FD (Crowley CTY FPD)	05/31/02	Lane 8	Olney Spings	Crowley	100
Springfield FD	01/19/09	CR Y & CR 23.3	SPRINGFIELD	Baca	100

FD_Name	DATE	Location	City	County	Acres Burned
Fowler Rural FPD	04/24/09	Hwy 50	Fowler	Otero	80
Fowler Rural FPD	04/24/09	Hwy 50	Fowler	Otero	80
Rocky Ford FD	01/03/09	County Road DD and County Road 22 RDS	Rocky Ford	Otero	80
Walsh FD	03/08/06	County Rd 37	Walsh	Baca	80
Fowler Rural FPD	03/12/08	Nepesta Hills RD	Fowler	Otero	50
Walsh FD	06/04/04	County Road 39	Campo	Baca	50

The NCDC database tracks wildfire as well. Historically significant wildfires are listed below. More detail may be found in each County Planning Element.

June 15, 2006 - Strong winds caused 19 fires to consume 15,000 acres of grassland across northeastern Prowers County near Holly. At times, flames reached 40 feet in length. Fortunately only two structures were destroyed, an abandoned house and a garage.

December 1, 2007 - a wildfire near Hasty burned several hundred acres and three empty mobile homes. A truck driver drove off the road due to thick smoke. The truck was consumed by the wildfire. Two other semi-trailers ran off the road as well, and some power lines were burned. The highest winds across the southeast plains occurred around La Junta, where winds gusted to around 60 mph. Wildfires broke out in Pueblo County, Crowley County, and Bent County.

April 15 and 16, 2008 - the Ordway Fire, which resulted in Fire Management Assistance Declaration FM-2760, was caused by an unpermitted prescribed burn south of the City of Ordway. Strong winds spread the blaze rapidly east northeastward. Highways 96 and 71 were shut down, as 8,900 acres of grassland was consumed. Firefighters from 35 agencies battled the blaze. Twenty-four structures were destroyed west and north of Ordway. Over 150 power poles were destroyed. The entire Town of Ordway was evacuated. Tragically, two firefighters perished when the truck they were in plummeted into a culvert, where a bridge had burned out. Over $5 million of property damage were attributed to this fire. In addition to the damages to property, there were other economic damages. According to members of the HMPC, the location of the fires near large herds of cattle caused stress in herds. Many cattle lost three to five percent of their body weight, resulting in millions of dollars of lost income for area ranchers.

Figure 4.37. Ordway Fire

Source: 7News website. http://www.thedenverchannel.com/image/15899119/detail.html

April 1, 2010 - A wind-driven grass fire forced the evacuation of residents. The fire started around 3 p.m. along the Arkansas River near CR21 and Highway 266. The fire burned nearly 1,000 acres. An irrigation pump house was destroyed, along with some irrigation pipe.

Probability of Future Occurrences

The location of a fire is almost impossible to predict, as the factors which contribute to a fire are hugely variable, including current weather conditions, associative climate, and the interactions of humans on the environment. Other triggers may include lightning, a particularly dry (or wet) growing season, and the exposure of the event to the population. Between 2000 and 2009, 1377 ignitions were reported in the planning area. It is reasonable then to assume that wildland and grassland fires are a yearly occurrence in the region, even if they are not always documented and reported. The likelihood of a future occurrence, then, is predicted at 100%, or **highly likely**.

4.2.14 Windstorm

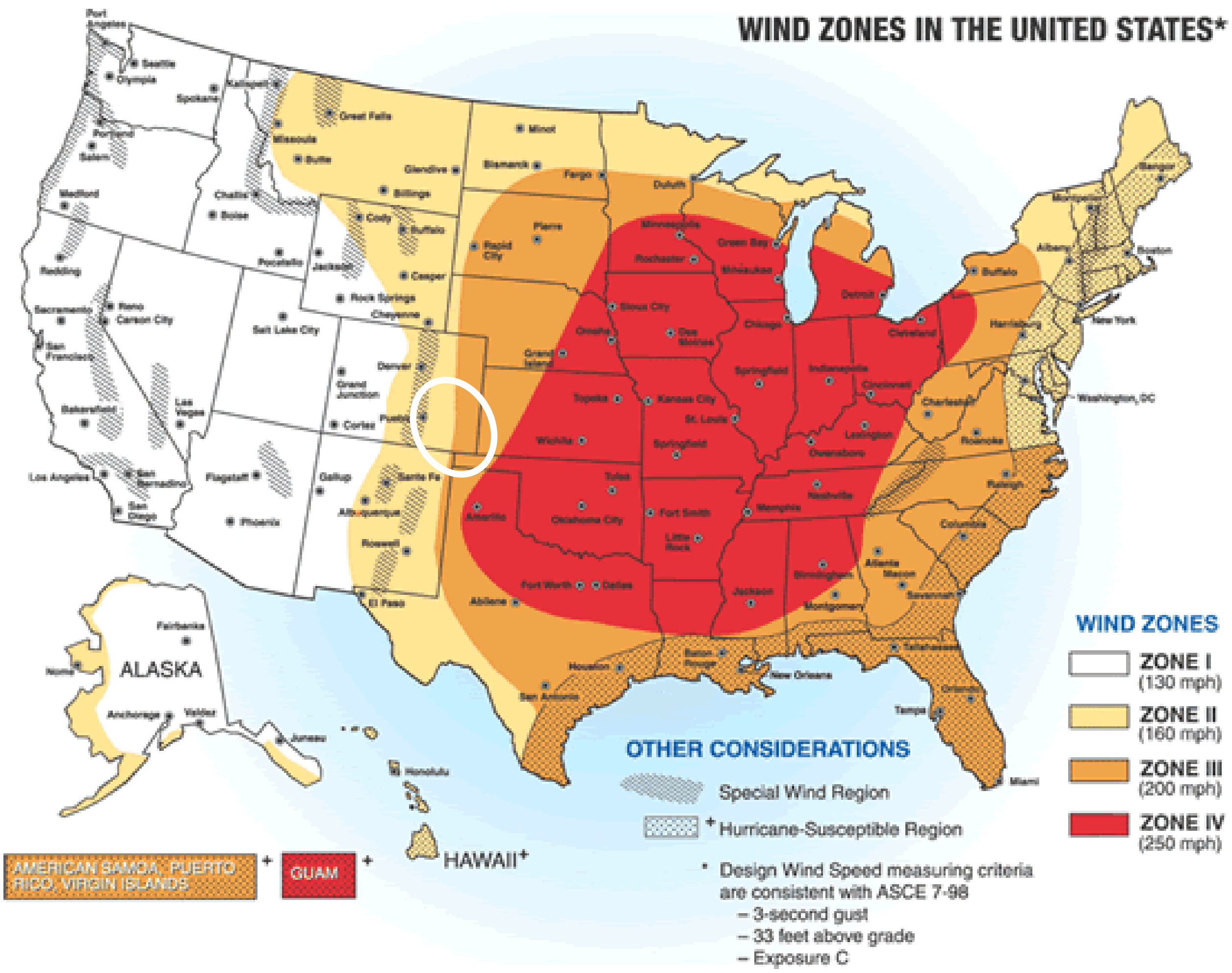
Hazard/Problem Description

The planning area is subject to significant, non-tornadic (straight-line), winds. High winds, as defined by the NWS glossary, are sustained wind speeds of 40 mph or greater lasting for 1 hour or longer, or winds of 58 mph or greater for any duration." These winds may occur as part of a seasonal climate pattern or in relation to other severe weather events such as thunderstorms. Straight-line winds may also exacerbate existing weather conditions, as in blizzards, by increasing the affect on temperature and decreasing visibility due to the movement of particulate matters through the air, as in dust and snow storms. The winds may also exacerbate fire conditions by drying out the ground cover, propelling fuel, such as tumbleweeds, around the region, and increasing the ferocity of exiting fires. These winds may damage crops, push automobiles off roads, damage roofs and structures, and cause secondary damage due to flying debris.

A corollary hazard of high wind events is blowing dust and sedimentation. A study published in part by Jason Neff at the University of Colorado indicates that the amount of dust in the Western region of the United States, in which the planning area is entirely contained, has increased significantly since the 1800s. According to an article by Richard Harris on the NPR website, increased levels of dust in the atmosphere have been linked to increased rates of snowmelt, which may cause flooding and exacerbate drought conditions, or prolong the recovery periods from drought. Blowing dust also damages homes, vehicles, property, and livestock, and causes erosion and reduces visibility, which may increase the danger to motorists and travelers.

Figure 4.38 depicts wind zones for the United States. The map denotes that the majority of the planning area falls into Zone II, which is characterized by high winds of up to 160 mph. The far eastern edges of Crowley and Otero Counties fall into Zone III, characterized by high winds of up to 200 mph.

Figure 4.38. Wind Zones in the United States



Source: Federal Emergency Management Agency

Previous Occurrences

The table below depicts the total number of high wind events reported and recorded by the NCDC in the planning region. A total of 320 events have been recorded since 1950, for an average occurrence rate of 5.3 events per year.

Table 4.28. Straight-Line Wind Events by County, 1950-2008

County	Occurrences
Baca	48
Bent	40
Crowley	25
Kiowa	39
Otero	93

County	Occurrences
Prowers	75
6 County Total	**320**

Source: National Climatic Data Center using High Winds and Thunderstorm Winds categories

On **June 22, 1996**, a storm ripped through Lamar, producing periods of heavy rain that reduced visibilities to near zero, 1/2 diameter hail, and damaging straight-line winds. Numerous 6 inch or larger diameter trees were uprooted, and numerous 6 inch or larger diameter limbs were broken off. Fences and signs were blown over, while 3 power poles and 2 transformers were lost. Many roofs were ripped off, including 60% of the roof of radio station KLMR. A number of funnel clouds were reportedly seen around the damaging downburst. Wind speeds of 84 mph were recorded. No injuries of deaths were reported.

On **August 3, 1996**, strong thunderstorm winds blew down numerous trees and power lines, and also destroyed a car wash and the four vehicles inside in Bent County. Wind speeds reached 62 mph. Local street flooding was caused by 1.2 inches of rain. Over $75,000 in damage was attributed for this storm. No injuries of deaths were reported.

On **August 31, 1997**, a damaging microburst wind, estimated to be at least 115 mph in strength struck a mobile home in McClave in Bent County, rolling it a few hundred yards. The intense damage was 50 to 75 yards across. Twin brothers were in the mobile home. One was thrown from the mobile home and sustained a broken eye socket. The other was rolled inside the mobile home, sustaining numerous injuries to his body, neck, and head. He died six days later.

On **May 24, 1998**, damaging straight-line winds moved through mainly northern La Junta in Otero County. Hardest hit was the Fair View Cemetery, on the northwest side of town, where about 25 large trees were damaged or uprooted. Spotty roof and sign damage occurred on the north side of La Junta. Wind speeds of 82 mph were recorded. $25,000 in damages were attributed to the windstorm. No injuries of deaths were reported.

On **July 31, 2001**, damaging thunderstorm winds downed 1 1/2 miles of power poles along Highway 101 around 7 miles south of Las Animas in Bent County. It took around 2 to 3 weeks to replace the poles. Over $100,000 in damage was attributed to this storm. No injuries of deaths were reported. No injuries of deaths were reported.

On **May 15, 2003**, an intense rear flank downdraft caused heavy damage to several ranch buildings outside the Town of Lamar in Prowers County. Part of the wall, and the roof of a large building were destroyed. Smaller, less substantial structures were a total loss. Wind speeds of 90 mph were recorded. $50,000 in damages were attributed to this storm. No injuries of deaths were reported.

On **August 4, 2003**, a microburst damaged roofs and took down trees and 15 utility poles south of Rocky Ford in Otero County. Wind speeds of 69 mph were recorded. $50,000 in damages were attributed to this windstorm. No injuries of deaths were reported.

On **June 16, 2004**, strong rear flank downdraft winds caused damage to horse barns and knocked down around 40 power poles along Highway 101. Wind speeds reached 80 mph. This rear flank downdraft later tightening a circulation which caused a tornado at a ranch in extreme south central Bent County. Over $50,000 in damage was attributed to this storm. No injuries of deaths were reported.

On **June 15, 2006**, very strong gradient air flow, coupled with showers and fairly dry air in the lower layer of the atmosphere, combined to produced damaging microburst and macroburst winds across southeast Colorado. Wind speeds reached 82 mph. A particularly damaging microburst started just south of La Junta, causing power failures, downed trees and limbs, and peeled off a section of a store roof. There were also power outages from Rocky Ford to Swink in Otero County. A few semi-trailers were blown over in La Junta in Otero County. At Cheraw, several outbuildings were damaged, and power poles were damaged as well. Through the rest of southeast Colorado, there was only minor damage to outbuildings. In total, over $100,000 in damage was caused by the windstorm. No injuries of deaths were reported.

On **June 26, 2007**, numerous severe thunderstorms occurred from the I-25 corridor to the far southeast plains, producing hail up to the size of baseballs, thunderstorm wind gusts over 70 mph, a tornado, and flash flooding. An intense thunderstorm wind gust occurred on County Road R in Otero County, hitting a ranch. Major damage occurred to a 50-foot long shed, which damaged a truck inside. Debris from the shed was thrown several hundred feet to the east. Other farm equipment sustained damage as well. Several corrals were destroyed. In all, $80,000 in damages were attributed to this windstorm. No injuries of deaths were reported.

On **August 12, 2008**, severe thunderstorms produced hail up to the size of golf balls and wind gusts from 60 to nearly 100 mph from Kiowa to Baca Counties. Several airport hangars were destroyed and a few planes were damaged at the Springfield Airport due to a powerful microburst. No injuries of deaths were reported.

On **June 13, 2009**, long-lasting supercells produced large hail, high winds, and a short-lived tornado. Wind speeds reached 80 miles per hour. Five power poles were snapped off at the bases along Highway 287 and around 20 power poles were taken down on County Road 35 in Baca County. The storm caused $30,000 in damages. No injuries of deaths were reported.

There is not a well documented history of windblown dust hazards in the planning area from the NCDC or SHELDUS databases. HMPC members were not able to give specific incidents of windblown hazards.

Probability of Future Occurrences

There have been 320 reported straight-line events in the last 60 years in the planning region, which equates to a 100% chance of occurrence in the next year. The probability of a future occurrence is **highly likely**.

4.2.15 Winter Storms

Hazard/Problem Description

Heavy snow, ice, severe winter storms, and blizzards are common occurrences in Colorado. The size of such events varies and may range in size from isolated (impacting only a portion of a county) to statewide. Generally, severe winter storm events are considered to be a regional occurrence, impacting multiple counties simultaneously and for extended time periods.

The National Weather Service Glossary defines common winter storm characteristics as follows:

- **Blizzard:** A blizzard means that the following conditions are expected to prevail for a period of 3 hours or longer:
  - Sustained wind or frequent gusts to 35 miles an hour or greater; and
  - Considerable falling and/or blowing snow (i.e., reducing visibility frequently to less than ¼ mile).
- **Heavy Snow**: This generally means:
  - snowfall accumulating to 4" or more in depth in 12 hours or less; or
  - snowfall accumulating to 6" or more in depth in 24 hours or less.
  - In forecasts, snowfall amounts are expressed as a range of values, e.g., "8 to 12 inches." However, in heavy snow situations where there is considerable uncertainty concerning the range of values, more appropriate phrases are used, such as "up to 12 inches" or alternatively "8 inches or more"
- **Ice Storm**: An ice storm is used to describe occasions when damaging accumulations of ice are expected during freezing rain situations. Significant accumulations of ice pull down trees and utility lines resulting in loss of power and communication. These accumulations of ice make walking and driving extremely dangerous. Significant ice accumulations are usually accumulations of ¼" or greater.

Heavy snow can immobilize a region, stranding commuters, stopping the flow of supplies, and disrupting emergency and medical services. Accumulations of snow can collapse roofs and knock down trees and power lines. In rural areas, homes and farms may be isolated for days, and unprotected livestock may be lost. The cost of snow removal, damage repair, and business losses can have a tremendous impact on cities and towns. Heavy accumulations of ice can bring down trees, electrical wires, telephone poles and lines, and communication towers. Communications and power can be disrupted for days until damages are repaired. Even small accumulations of ice may cause extreme hazards to motorists.

Some winter storms are accompanied by strong winds, creating blizzard conditions with blinding wind-driven snow, severe drifting, and dangerous wind chills. Strong winds with these intense storms and cold fronts can knock down trees, utility poles, and power lines. Blowing snow can reduce visibilities to only a few feet in areas where there are no trees or buildings. Serious vehicle accidents can result with injuries and deaths.

Heavy snowfall during winter can also lead to flooding or landslides during the spring if the area snowpack melts too quickly.

Previous Occurrences

Table 4.29 depicts the number of snow and ice storm events in each of the participating counties between 1993 and April 30, 2010 as captured in the NCDC database. The numbers are not a perfect representation of events, as the storms are often regional and impact several counties simultaneously. This margin of error should be considered when calculating the probability of future occurrence.

Table 4.29. Snow and Ice Storm Occurrences per County, 1993-2010

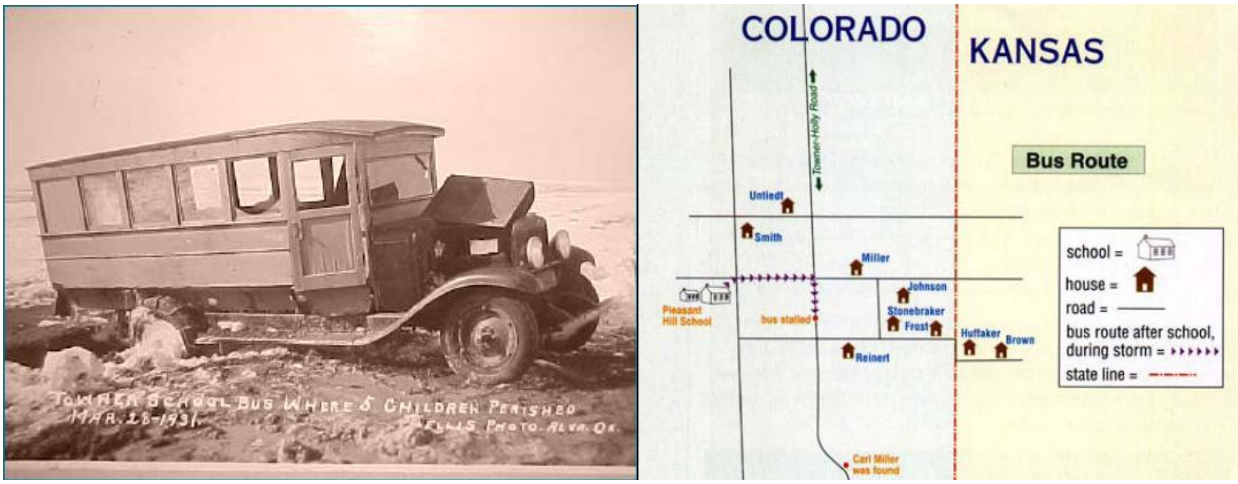
County	Occurrences
Baca	12
Bent	5
Crowley	5
Kiowa	7
Otero	7
Prowers	6
6 County Total	**42**

Source: National Climatic Data Center

Some specific incidents have also been recorded here. As with the margin of error established above, not all of these storms impacted the entire region uniformly. However, examples for this section were selected because of their impact on a majority of the region. Specific storms which may have had an unusually high impact on a single county are located in the County Planning Elements. The incidents captured here are mostly derived from the National Climactic Data Center, with augmentation from other sources as noted.

March 1931 – A blizzard near Eads caused a school bus to become stuck. Tragically, 6 people died as a result. 5 were school children, and the bus driver died as well.

Figure 4.39.   Pictures from the 1938 Blizzard near Eads



Source: "Colorado Classics – Our Legendary Storms" Colorado Climate Center presentation by Nolan Doesken, November 9, 2005.

October 1946 – A lengthy snowstorm clobbered eastern Colorado with 20- 50 inches of snow and high winds. At least 13 people died. The storm began on Halloween. It rained that evening, then turned into snow the following day. The snow fell steadily for three days, ending up 3-5 feet deep in areas. The storm knocked out phone service. It was a slow process to open roads, taking two weeks to open up from La Junta – school kids out of Arlington couldn't get in for about two weeks as well. Arlington had an extensive feed yard system, still partly in operation in 1946. Following the storm, ranchers brought their cattle to town. 10-15% of herds died in storm, most of the rest brought to Arlington to be trucked out.

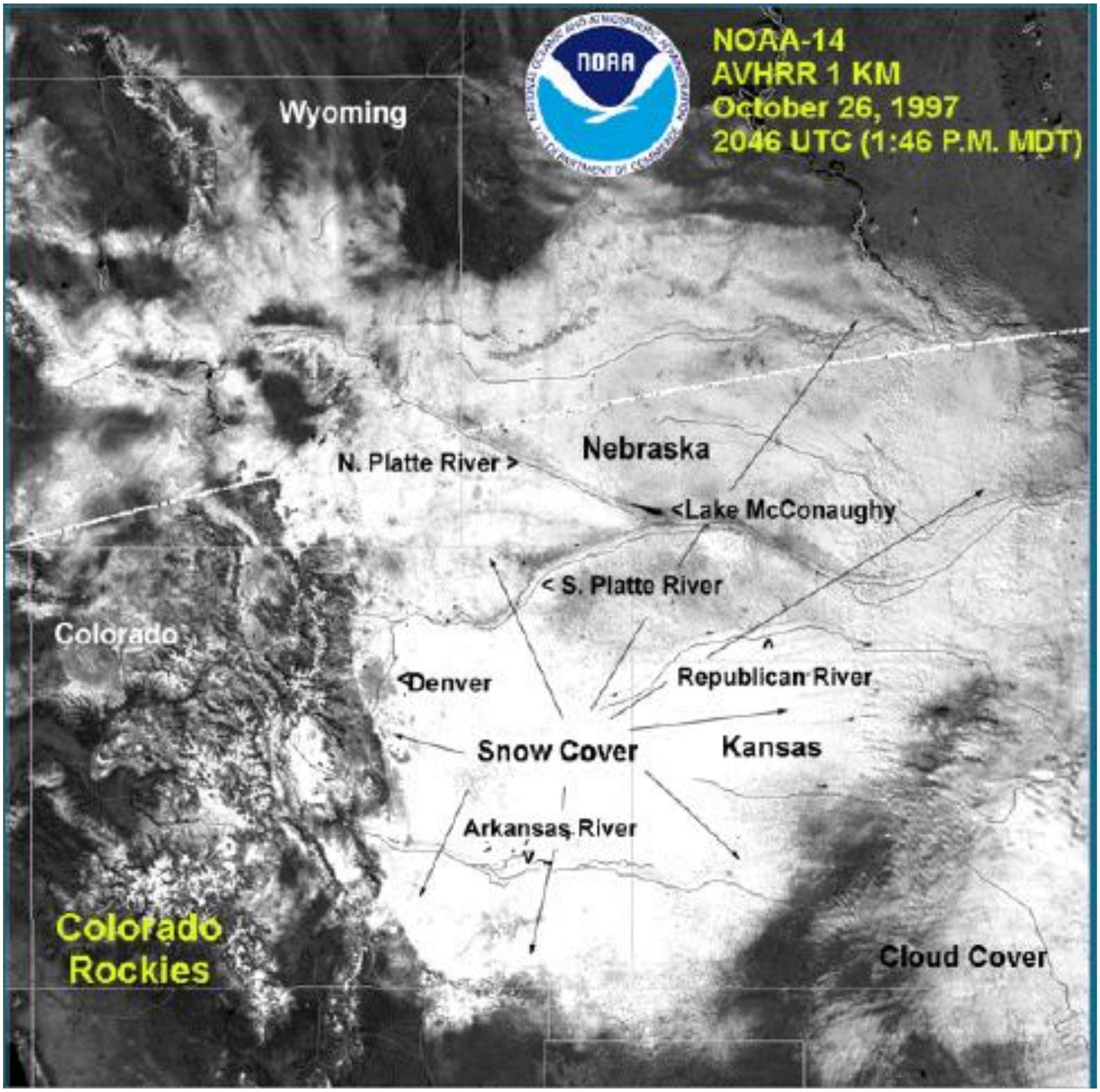
Figure 4.40. 1946 Blizzard

Source: Colorado Historical Society, Call Number X-12159

March 1977 – A blizzard on the plains of Colorado killed nine people.

October 1997 – deep snow cover over parts of the central Rockies and across the high plains of Nebraska, Kansas, and portions of western South Dakota and the panhandles of Oklahoma and Texas. Over 2 feet of snow fell in the planning area due to the storm.

Figure 4.41. October 1997 Blizzard Snow Cover



Source: NOAA

March of 2005 went out like a lion over many sections of southern Colorado as an intense storm system produced heavy wet snow and high winds over the region, causing some downed power lines as well as numerous isolated power outages. The greatest snow amounts occurred in southern Bent and Otero Counties. The higher snow totals with this storm system ranged from 8 to 20 inches. 5 to 10 inches fell 20 miles northwest of Springfield in Baca County. 12 to 14 inches of snow was noted 17 miles southeast of La Junta in Bent County.

On **December 20, 2006** heavy snow and blizzard conditions occurred over the western southeast plains of southern Colorado. 10 to 15 inches blanketed all six counties in the planning region.

On **December 29, 2006**, following on the heels of the December 20-22 blizzard, Colorado was subjected to a more severe blizzard starting on December 28th. Heavy snow and blizzard conditions impacted the southeast plains of southern Colorado. Wind gusts exceeded 55 mph, and snow amounts reached up to 48 inches. This caused snow drifts noted as high as 18 feet. The heaviest concentration of snow occurred within the Southeast region of the state (Baca, Bent, Crowley, Kiowa, Las Animas, Otero, and Prowers). The area is home to 345,000 head of cattle and calves, 23,500 head of producing sows and 112,000 head of sheep and lambs, all with an estimated value of $500 million. Snow and transportation difficulties kept ranchers from feeding their cattle. Hay was delivered via air (using Colorado National Guard UH-60 Blackhawk helicopters and a Wyoming National Guard C-130 aircraft) and ground assets. The State of Colorado purchased $12,000 dollars of hay for this effort. Despite these efforts, over 35,000 head of cattle perished during and after the blizzard. Estimated losses were over $3 million. The Colorado Department of Transportation was a critical participant in the southeast region response operations by clearing the road networks. Preliminary estimates for their snow blowing/plowing activities were $7.1 million. Due to the nature of the storm, mass feeding also became a major operation. An example of this was the Salvation Army in Baca County, where they provided 1,155 meals over five and one-half days. They were able to transport food from Denver to the region.

Figure 4.42. Christmas Blizzard 2006

Source: Colorado Department of Emergency Management After Action Report: Southeast Colorado Blizzard Response (Blizzard II) December 2006.

During early **February 2008**, a winter storm produced bands of six to ten inches of snow along eastern Colorado and into Kansas and Nebraska. Many severe winter storms were reported across eastern Colorado throughout the early part of 2008. While snow accumulation generally remained below six inches, the snow was often accompanied by freezing rain and drizzle or foggy conditions. This band affected Crowley and Otero Counties This emphasizes that even smaller-scale storms have a significant impact on the planning region.

On **March 24, 2010**, a winter storm produced localized snow drifts up to 4 feet as well as heavy snow over a large portion of southern Colorado. Between 6 and 14 inches of snow covered the six counties in the planning area.

Likelihood of Future Occurrences

Within the planning area there have been 42 snow and ice storms reported between 1993 and 2010, a 17-year period. This equates to an average of 2.47 severe winter storm events each year and a probability of future occurrence rating of **highly likely**.

4.2.16 Civil Unrest

Hazard/Problem Description

Civil unrest refers to a situation where groups intentionally choose not to observe the law. Civil unrest may also be defined as random acts of violence by three or more persons with the potential to injure people or damage property, but that does not meet the definition of a terrorist act. Civil unrest can take the form of small gatherings or large groups that block or impede access to a building, or disrupt normal activities by generating noise and intimidating people. Other examples range from peaceful sit-ins to a full-scale riot in which a group destroys property and disregards or retaliates against law enforcement response. Civil disorder varies widely in size and scope, and its overall impact is generally low.

There are two types of large gatherings typically associated with civil disorders: crowds and mobs. A crowd can be defined as a casual, temporary collection of people without a strong, cohesive relationship. Crowds can be classified into four categories:

1) **Casual Crowd** – A casual crowd is merely a group of people who happen to be in the same place at the same time. The likelihood of violent conduct is non-existent.
2) **Cohesive Crowd** – A cohesive crowd consists of people who are involved in some type of unified behavior, such as worshiping, dancing, or watching a sporting event. Although they may have intense internal discipline, they require substantial provocation to arouse to action.
3) **Expressive Crowd** – An expressive crowd is one held together by a common commitment or purpose. Although they may not be formally organized, they are assembled as an expression of common sentiment or frustration. Members wish to be seen as a formidable influence. One of the best examples of this type is a group assembled in general or specific protest.
4) **Aggressive Crowd** – An aggressive crowd is comprised of individuals who have assembled for a specific purpose. This crowd often has leaders who attempt to arouse the members or motivate them to action. Aggressive crowd members are noisy, threatening, and often taunt authorities. They tend to be impulsive, highly emotional, and require only minimal provocation to arouse them to violence. Examples of this type of crowd include demonstrations and strikers.

A mob can be defined as a large, disorderly crowd or throng. Mobs are usually emotional, loud, tumultuous, violent, and lawless. Like crowds, mobs have different levels of commitment and can be classified into four categories:

1) **Aggressive Mob** – An aggressive mob is one that attacks, riots, and terrorizes. The object of violence may be a person, property, or both. An aggressive mob is distinguished from an aggressive crowd only by lawless activity. Examples of this type are inmate mobs in prisons and jails, those that act out their frustrations after political defeat, or violent ones at political protests or rallies.
2) **Escape Mob** – An escape mob attempts to flee from something such as a fire, bomb, flood, or other catastrophe. Members of escape mobs have lost their capacity to reason and are generally impossible to control. They are characterized by unreasonable terror.
3) **Acquisitive Mob** – An acquisitive mob is one motivated by a desire to acquire something. Riots caused by other factors often turn into looting sprees. This mob exploits a lack of control by authorities in safeguarding property. Examples of acquisitive mobs would include the looting in south central Los Angeles in 1992 or, more recently, those in New Orleans during Hurricane Katrina in 2005.
4) **Expressive Mob** – An expressive mob is one that expresses fervor or revelry following some sporting event, religious activity, or celebration. Members experience a release of pent-up emotions in highly charged situations. Examples of this type of mob include the June 1994 riots in Canada, following the Stanley Cup professional hockey championship, European soccer riots, and those occurring after other sporting events worldwide.

In the planning area, civil unrest is profiled due to the number of private and public prisons located in the planning area. These prisons are detailed in Table 4.30

Table 4.30. Correctional Facilities in the Planning Area

Name	County	Owner	Security	Capacity	Closest City
Arkansas Valley Correctional Facility	Crowley	Colorado Department of Corrections	Medium	1,007	City of Crowley
Bent County Correctional Facility	Bent	Corrections Corporation of America	Medium	1,446	City of Las Animas
Crowley County Correctional Facility	Crowley	Corrections Corporation of America	Medium	1,630	City of Olney Springs
Fort Lyon Correctional Facility	Bent	Colorado Department of Corrections	Medium	500	City of Fort Lyon

Source: Colorado Department of Corrections

Past Occurrences

Occurrences in the planning area have been related to the relatively high number of private and state prisons located in the planning area.

March 1999 – At the Crowley County Correctional Facility, inmates who had just been transferred from the State of Washington rioted when they refused to "lock down." Inmates flooded floors, smashed doors and windows and tried to set fires, and prison staff responded with gas and rubber bullets. About 400 prisoners at the prison were involved in an uprising that left one inmate and one staff member with minor injuries.

July 2004 - Several hundred prisoners rioted at a privately run prison in southern Colorado, setting fires and leaving more than a dozen people injured before the violence was quelled. No guards were hurt, but more than a dozen inmates were hurt, including one prisoner with multiple stab wounds. Another inmate was shot in the foot by guards using rubberized bullets to quell the five-hour riot at the medium-security Crowley County Correctional Facility. The riot started in the recreation yard and grew to include several hundred prisoners. Four of the prison's five living units for inmates were uninhabitable because of broken windows, fire, smoke and water damage, and a vocational greenhouse burned to the ground.

Figure 4.43. 2004 Crowley County Correctional Facility Riot Fires

Source: msnbc.msn.com/id/547927

Likelihood of Future Occurrence

Based on assessment of previous occurrences (or lack of) and frequency of contributing factors of civil disorder events, probability of future occurrence is considered **occasional.**

4.2.17 Cyber Hazards

Hazard/Problem Description

A computer virus is a computer program that can copy itself and infect a computer. The term "virus" is also commonly but erroneously used to refer to other types of malware, including but not limited to adware and spyware programs that do not have the reproductive ability. A true virus can spread from one computer to another (in some form of executable code) when its host is taken to the target computer; for instance, because a user sent it over a network or the internet, or carried it on a removable medium such as a floppy disk, CD, DVD, or USB drive. Viruses can increase their chances of spreading to other computers by infecting files on a network file system or a file system that is accessed by another computer.

As stated above, the term "computer virus" is sometimes used as a catch-all phrase to include all types of malware, even those that do not have the reproductive ability. Malware includes computer viruses, computer worms, Trojan horses, most rootkits, spyware, dishonest adware, and other malicious and unwanted software, including true viruses. Viruses are sometimes confused with worms and Trojan horses, which are technically different. A worm can exploit security vulnerabilities to spread itself automatically to other computers through networks, while a Trojan horse is a program that appears harmless but hides malicious functions. Worms and Trojan horses, like viruses, may harm a computer system's data or performance. Some viruses and other malware have symptoms noticeable to the computer user, but many are surreptitious or simply do nothing to call attention to themselves. Some viruses do nothing beyond reproducing themselves.

Viruses affect the world in a very costly way. An example would be the ILoveYou virus that hit the government, corporations, and private sectors in May of 2000. It erased large amounts of data and also did the following four things: it made its way into the user's address book and sent itself to all of the addresses; it made its way to the software that supports chat rooms so that everyone in the chat room would receive it; it searched for audio so that it could replace itself; and finally it incorporated a password-stealing program in Internet Explorer. This virus spread worldwide in a few hours and the damage was estimated at a minimum of $15 billion.

Past Occurences

The HMPC was unable to find any damaging occurrences of cyber hazards.

Likelihood of Future Occurence

Viruses occur to some extent annually. Due to the lack of past occurrences, it is difficult to predict a likelihood of future occurrence. Anti-virus, anti-malware, and anti-spyware programs are in place in each county, rendering the likelihood of future occurrence **occasional**.

4.2.18 Hazardous Materials

Hazard/Problem Description

A hazardous material is any item or agent (biological, chemical, physical) which has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors. Hazardous materials can be present in any form; gas, solid, or liquid. Environmental or atmospheric conditions can influence hazardous materials if they are uncontained.

The U.S. Occupational Safety and Health Administration's (OSHA) definition of hazardous material includes any substance or chemical which is a "health hazard" or "physical hazard," including: chemicals which are carcinogens, toxic agents, irritants, corrosives, sensitizers; agents which act on the hematopoietic system; agents which damage the lungs, skin, eyes, or mucous membranes; chemicals which are combustible, explosive, flammable, oxidizers, pyrophorics, unstable-reactive or water-reactive; and chemicals which in the course of normal handling, use, or storage may produce or release dusts, gases, fumes, vapors, mists or smoke which may have any of the previously mentioned characteristics.

The Environmental Protection Agency (EPA), through various regulations such as the Resource Conservancy and Recovery Act, CERCLA, and others, provide a series of definitions depending on the applicable regulation. A release or spill of bulk hazardous materials could result in fire, explosion, toxic cloud, or direct contamination of people and property. The effects may involve a local site or many square miles. Health problems may be immediate, such as corrosive effects on skin and lungs, or be gradual, such as the development of cancer from a carcinogen. Damage to property could range from immediate destruction by explosion to permanent contamination by a persistent hazardous material.

Accidents involving the transportation of hazardous materials could be just as catastrophic as accidents involving stored chemicals, possibly more so, since the location of a transportation accident is not predictable. The U.S. Department of Transportation divides hazardous materials into nine major hazard classes. A hazard class is a group of materials that share a common major hazardous property, i.e., radioactivity, flammability, etc. These hazard classes include:

- Class 1 – Explosives
- Class 2 – Compressed Gases
- Class 3 – Flammable Liquids
- Class 4 – Flammable Solids; Spontaneously Combustible Materials; Dangerous When Wet

Materials/Water-Reactive Substances
- Class 5 – Oxidizing Substances and Organic Peroxides
- Class 6 – Toxic Substances and Infectious Substances
- Class 7 – Radioactive Materials
- Class 8 – Corrosives
- Class 9 – Miscellaneous Hazardous Materials/Products, Substances, or Organisms

Hazardous materials are everywhere, and spills or releases occur in the U.S. on a daily basis. According to FEMA, the impact to life and property from any given release depends on a number of factors:

- Application Mode describes the human act(s) or unintended event(s) necessary to cause the hazard to occur.
- Duration is the length of time the hazard is present on the target.
- The dynamic/static characteristic of a hazard describes its tendency, or that of its effects, to either expand, contract, or remain confined in time, magnitude, and space.
- Mitigating conditions are characteristics of the target and its physical environment that can reduce the effects of a hazard.
- Exacerbating conditions are characteristics that can enhance or magnify the effects of a hazard.

These factors are summarized here in regard to hazardous materials releases from a fixed facility or transportation incident:

- Solid, liquid, and/or gaseous hazardous materials can be released from fixed or mobile containers either accidentally or on purpose (see Table 4.31).
- The resulting release can last for hours or for days.
- The substances released may be corrosive or otherwise damaging over time, and they may cause an explosion and/or fire.
- Contamination may be carried out of the incident area by people, vehicles, water, and/or wind.
- Weather conditions will directly affect how the hazard develops.
- The micrometeorological effects of buildings and terrain can alter travel and duration of agents.
- Shielding in the form of sheltering in place can protect people and property from harmful effects.
- Noncompliance with fire and building codes as well as failure to maintain existing fire protection and containment features can substantially increase the damage from a hazardous materials release.

Table 4.31. Potential Human-Caused Actions Resulting in Hazardous Materials Events

Industrial (Fixed Facility)	Industrial (Transportation Accidents)	Supervisory Control and Data Acquisition
Failure to adhere to procedures	Tanker truck spills	Failure of automated systems
Leaks	Truck accidents	
Failure of equipment	Railway accidents	
Failure of safety systems		

Source: Integrating Manmade Hazards into Mitigation Planning, FEMA 386-7, 2003

Potential for contact with hazardous materials is present throughout the planning areas of due to:

- the location of fixed hazardous materials facilities;
- the transport of hazardous materials via motor transportation and rail (transportation); and
- the transport of hazardous materials via pipeline (pipeline).

Fixed Facility

Industrial accidents occur due to inadequate human oversight or the failure of systems used to move or store materials, such as pipes and storage tanks. Numerous facilities in the planning area have been identified as sites that store hazardous materials as part of their daily operations. The threat that these sites pose to the region depends on the type of material present and the proximity of these facilities to populations and whether or not these materials are transported.

In order to identify those facilities with the greatest potential for a hazardous materials release that could adversely impact communities within the Southeast Colorado planning area, the Environmental Protection Agency Geospatial Data Access Project layer was used. The EPA collects information monthly on facilities and sites that are required to comply with environmental regulations to improve the environment and public health. There are 10 listing agencies that report to the EPA with different lists of facilities and sites however only 7 were used in this analysis since they were determined to have the greatest potential for material release and the others were not. This is not a complete picture of HAZMAT facilities within the Southeast Region since there could be other state and federal facilities not listed or mapped by these EPA database. The following listing agencies' descriptions that were utilized in this analysis are from the EPA.

Corrective Action

Facilities that house hazardous wastes can release pollutants into soil, groundwater, surface water, and air. To combat those effects, the Resource Conservation and Recovery Act (RCRA) Corrective Action Program, run by EPA and 43 authorized states and territories, works with responsible facilities to investigate and clean up hazardous releases.

Large Quantity Generators (LQG)

LQG's generate 1,000 kilograms per month or more of hazardous waste, or more than 1 kilogram per month of acutely hazardous waste.

Risk Management Plan (RMP)

Under the authority of section 112(r) of the Clean Air Act, the Chemical Accident Prevention Provisions require facilities that produce, handle, process, distribute, or store certain chemicals to develop a Risk Management Program, prepare a Risk Management Plan (RMP), and submit the RMP to EPA. Covered facilities were initially required to comply with the rule in 1999, and the rule has been amended on several occasions since then, most recently in 2004.

Section Seven Tracking System (SSTS)

SSTS is one of the major system that supports the Pesticide Program at EPA. SSTS is the only automated system that EPA uses to track pesticide producing establishments and the amount of pesticides they produce. SSTS records the registration of new establishments and records pesticide production at each establishment. It is a repository for information on the establishments that produce pesticides.

Superfund National Priorities List (NPL)

NPL is the list of national priorities among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States and its territories. The NPL is intended primarily to guide the EPA in determining which sites warrant further investigation.

Toxic Release Inventory System (TRIS)

The Toxics Release Inventory Program compiles the TRI data on toxic chemical releases and waste management activities reported annually by certain industries as well as federal facilities and makes it available through data files and database tools. The goal of the Toxics Release Inventory program is to provide communities with information about toxic chemical releases and waste management activities and to support informed decision making at all levels by industry, government, non-governmental organizations, and the public.

Treatment, Storage & Disposal (TSD)

Through the Resource Conservation and Recovery Act (RCRA), Congress directed EPA to regulate all aspects of hazardous waste. As a result, EPA developed strict regulations for the treatment, storage, and disposal of hazardous waste. States may implement stricter requirements than the Federal regulations as needed.

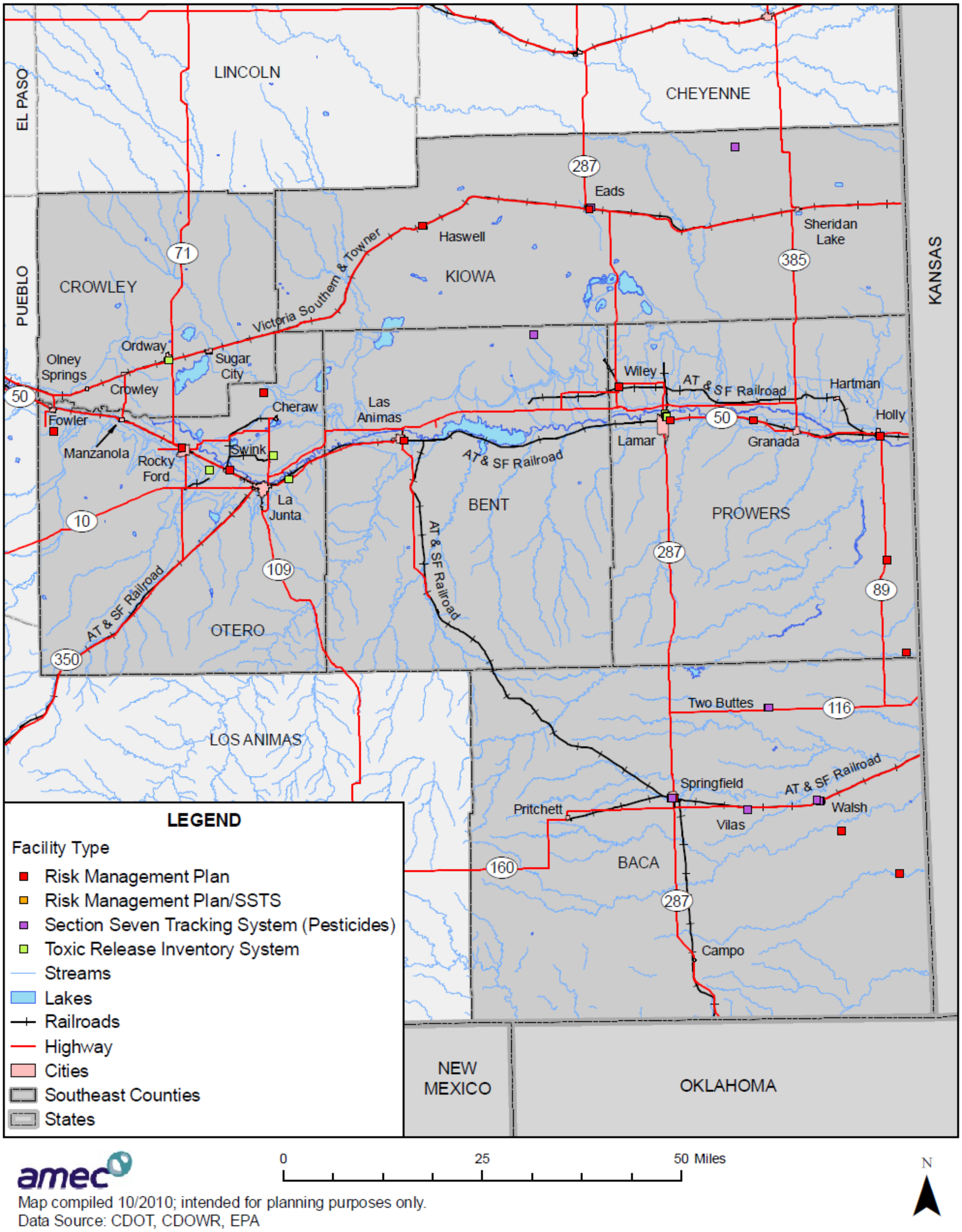
This inventory included a database table of 37 sites that produce, transport, store, and/or use hazardous materials; sites that generate hazardous wastes; and contaminated sites that have been cleaned up and closed or are still under active cleanup.

Table 4.32. Number of Fixed-Facilities with the Greatest Potential of a Hazardous Materials Release in the Planning Area by Facility Type

Facility Type	City	Unincorporated	Total County
Corrective Action	-	-	-
Large Quantity Generators (LQG)	-	-	-
Risk Management Plan (RMP)	10	9	18
Section Seven Tracking System (SSTS)	6	4	10
Superfund National Priorities List (NPL)	-	-	-
Toxic Release Inventory System (TRIS)	5	3	8
Treatment, Storage & Disposal (TSD)	-	-	-
Total	21	16	36

Source: EPA

Figure 4.44. Hazardous Materials Release – Fixed Facilities in the Planning Area



A fixed facility outside the planning area with the potential to affect the planning area is the U.S. Army Pueblo Chemical Depot (PCD). The PCD, located approximately 20 miles west of Crowley County, is one of six Army installations in the United States that currently store chemical weapons. The depot houses 2,611 tons (2,369 metric tons) of mustard agent in approximately 780,000 munitions, equivalent to about seven percent of the original chemical material stockpile of the United States. Full-scale destruction operations are expected to begin in 2014 and to be complete by 2017. The plant will operate until all the chemical weapons have been destroyed. Closure activities (shut-down, dismantling, and restoration of site) are slated to be wrapped up by 2020. The plant will use neutralization with a hot caustic solution followed by bacterial bio-treatment to destroy mustard agent. The location of the PCD is on the inset of Figure 4.45.

Transportation of Hazardous Materials

Transportation incidents can occur during the transportation of hazardous materials to and from storage facilities. The most likely routes for the transportation of hazardous materials are major roadways and railroads. Four major highways within the planning area have been designated as Hazardous Materials Routes by CDOT's Department of Safety. These highways are identified as State Highways 10 and 71 and U.S. Highways 287 and 50. These State and U.S. Highways run throughout the planning region where most of the Counties' industrial and residential activities are positioned. As of the writing of this plan, legislation was pending that would make Highway 160, which runs east and west through Baca County, a hazardous material route.

Two major railways run throughout the six county planning region; AT&SF Railroad and Victoria Southern & Towner Railroad. The major transportation corridors and rail lines are listed in Table 4.33 and shown in Figure 4.45. Mapped oil and gas pipelines are also shown.

Table 4.33. Major Southeast Colorado Regional Transportation Corridors

Major Roadways	Locations
State Highway 10	Otero County
State Highway 71	Crowley and Otero County
U.S. Highway 287	Baca, Prowers, and Kiowa County
U.S. Highway 50	Bent, Prowers, and Otero County
Rail Lines/Operations	
AT & SF Railroad	Baca, Bent, Prowers, Otero County
Victoria Southern & Towner Railroad	Crowley and Kiowa County

Source: CDOT Department of Safety 2007

Table 4.34, from the U.S. Department of Transportation's Office of Pipeline Safety, shows the breakdown of gas transmission line and hazardous liquid line mileage by county. All mileages are for 2008 and are approximate as some data sources may not have contained a complete record of state pipeline mileage.

Table 4.34. Gas Transmission Line and Hazardous Liquid Line Mileage By County

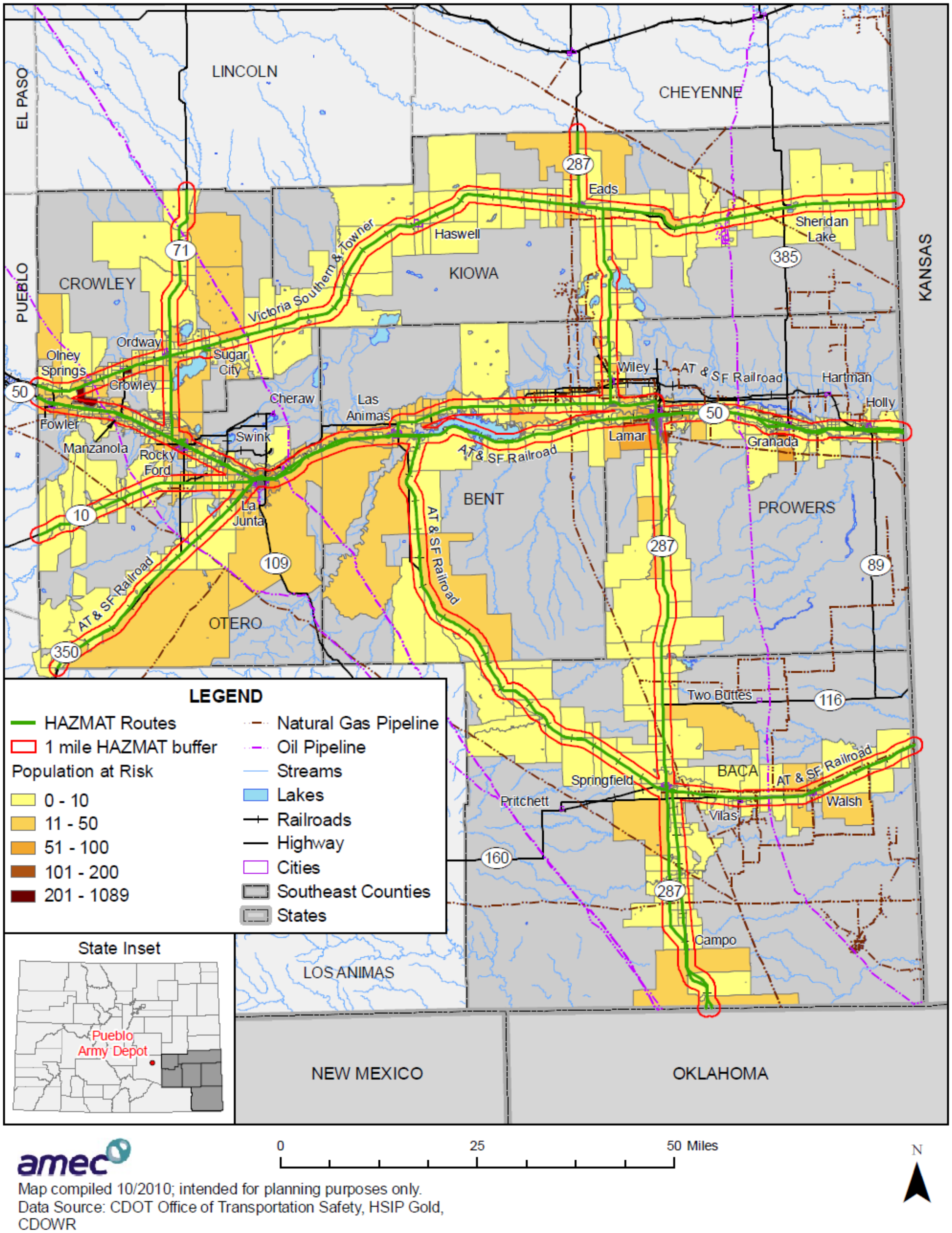
County	Gas Miles	Liquid Miles	Percentage of State Total
Baca	310	131	4.0%
Bent	58	63	1.1%
Crowley	0	70	0.6%
Kiowa	90	0	0.8%
Otero	60	88	1.3%
Prowers	98	0	0.9%
Total	**616**	**352**	**8.70%**

Source: PHMSA. http://primis.phmsa.dot.gov/comm/reports/safety/CO_detail1.html?nocache=7850#_OuterPanel_tab_2

Failure of Supervisory Control and Data Acquisition

These systems control the automated switching of various utility and environmental systems from remote locations, such as electrical power distribution grids, environmental control systems, traffic signals, water management systems, and mass transit systems. Failure of these systems can result in a variety of human-caused hazards.

Figure 4.45. Hazardous Material Routes in Southeast Colorado



Past Occurrences

The US Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) tracks hazardous materials spills and occurrences. A list of incidents can be found in Table 4.35.

Table 4.35. Hazardous Material Incidents in the Planning Area

Incident City	Incident County	Incident Route	Mode of Transportation	Failure Cause Description	Total Amount of Damages
Walsh	Baca	County Road M 16 MI. South &	Highway	Rollover Accident; Rollover Accident	$51,391
Springfield	Baca	Highway 287	Highway	Rollover Accident; Vehicular Crash or Accident Damage	$65
Campo	Baca	Colorado 287 MP #17	Highway	Rollover Accident; Vehicular Crash or Accident Damage	$147,345
Eads	Kiowa	US HWY 287 & Colorado 96	Highway	Rollover Accident	$50,734
La Junta	Otero	CO SR 50 MM 376	Highway	Rollover Accident	$57,500
Rocky Ford	Otero	Main Track MP 566.5, Pueblo	Rail	Derailment; Rollover Accident	$7,700
La Junta	Otero	1 West First Street	Rail		$232
Lamar	Prowers		Highway		$206,441
Lamar	Prowers	CO State Road 287	Highway	Defective Component or Device	$10
Lamar	Prowers	HWY 287 10 Miles Outside of Lamar	Highway	Rollover Accident; Vehicular Crash or Accident Damage	$55,500
Bristol	Prowers	18750 C. RD. SS	Highway	Rollover Accident; Vehicular Crash or Accident Damage	$1,900
Lamar	Prowers	I-287 Road 7	Highway	Overfilled	$8,000
Lamar	Prowers	USSO @MP 433	Highway	Loose Closure Component or Device;	$10

Source: PHMSA Incident Reports Database

Likelihood of Future Occurrence

There is a low number of fixed hazardous material facilities in the planning area. However, due to the amount of past occurrences and the number of hazardous materials routes that cross the planning area, the likelihood of future occurrence is **likely**.

4.2.19 Pandemic and Zoonotic Diseases

Hazard/Problem Description

According to the World Health Organization (WHO), a disease epidemic occurs when there are more cases of that disease than normal. A pandemic is a worldwide epidemic of a disease. A pandemic may occur when a new virus appears against which the human population has no immunity. Colorado state law requires the Colorado Department of Public Health and Environment (CDPHE) to monitor, investigate and control the causes of epidemic and communicable diseases affecting the public health in Colorado.

In the predominately agricultural region that makes up the planning region, zoonotic diseases are also a significant hazard to the population and livestock of the area. Zoonotic diseases are those which can be transmitted from animals and humans. The CDHPE indicates that the most common of these diseases in Colorado are hantavirus, plague, rabies, tularemia, West Nile Virus (WNV) (and other mosquito-borne diseases) and various tick-borne diseases.

It is important to realize that this plan does not examine pandemic contingency plans, but instead focuses on examining the risk of a normal hazard occurrence.

Pandemic

Pandemic Flu

A pandemic flu occurs when a new influenza virus emerges for which people have little or no immunity, and for which there is no vaccine. This disease spreads easily person-to-person, causes serious illness, and can sweep across the country and around the world in a very short time. The U.S. Centers for Disease Control and Prevention has been working closely with other countries and the World Health Organization to strengthen systems to detect outbreaks of influenza that might cause a pandemic and to assist with pandemic planning and preparation. An especially severe influenza pandemic could lead to high levels of illness, death, social disruption, and economic loss. Impacts could range from school and business closings to the interruption of basic services such as public transportation, health care, and the delivery of food and essential medicines. An outbreak at one of the public or private prisons in the area could be deadly due to the fact that inmates are in mandatory custody and options are limited for isolation and removal of ill persons from the environment. In addition, many inmates and workforce may have medical conditions that increase their risk of influenza-related complications.

Zoonotic Diseases

Hantavirus

Hantavirus Pulmonary Syndrome (HPS) is an infectious respiratory disease endemic to North and South America. It is caused by a virus generally known as the hantavirus. Hantavirus is spread through the saliva, urine, and feces of the deer mouse and is caused by the Sin Nombre virus. Contamination is only possible when humans come into direct contact with the rodents or dust and feces contaminated by the mice. Hantavirus was initially identified in the Four Corners region of the United States in 1985. The CDPHE reports that mitigation of the disease includes adequate sanitation and use of respiratory and eye protection when working in areas where exposure may occur, including barns, hay lots, basements, and attics.

Plague

Plague is a severe and potentially deadly bacterial infection. Plague is a rodent disease transmitted to humans by flea bites, and is widespread in the western United States. Plague may also infect felines. The disease has epidemic histories, most famously as the "Black Death" plagues of the Middle Ages. The disease is easily mitigated through improved sanitation and rat control; and when detected early, the plague can be treated. However, the disease may still prove fatal if not treated quickly enough.

Rabies

Rabies is a preventable viral disease of mammals most often transmitted through the bite of a rabid animal. The vast majority of rabies cases reported to the Centers for Disease Control and Prevention (CDC) each year occur in wild animals like raccoons, skunks, bats, and foxes. Domestic animals account for less than 10% of the reported rabies cases, with cats, cattle, and dogs most often reported rabid.

Rabies virus infects the central nervous system, causing encephalopathy and ultimately death. Symptoms of rabies in humans are initially nonspecific, consisting of fever, headache, and general malaise. As the disease progresses, neurological symptoms appear and may include insomnia, anxiety, confusion, slight or partial paralysis, excitation, hallucinations, agitation, hypersalivation, difficulty swallowing, and hydrophobia (fear of water). Death usually occurs within days of the onset of symptoms. There is no treatment for rabies after symptoms of the disease appear. However, an extremely effective rabies vaccine can provide immunity to rabies when administered after an exposure (postexposure prophylaxis) or for protection before an exposure occurs (preexposure prophylaxis).

In Colorado, the primary reservoirs for rabies are bats and skunks. Starting in 2008, rabies in skunks began to spread from eastern Colorado towards the Front Range. Instances of rabies among other wild and domestic animals are rare. According to the CDPHE, a few cases have recently been documented in foxes in Colorado, due to infection with rabies from skunks. Rodents and lagomorphs are rarely positive anywhere in the country.

Tularemia

Tularemia is an illness caused by a bacterium. It results in fever , rash, and greatly enlarged lymph nodes. Tularemia is commonly called "rabbit fever," though it occurs in over a hundred species of wild animals, birds, and insects. Transmission is most common when ticks bite infected animals, particularly rabbits and rodents, and then transfer the disease via human bites. The bacteria may also be inhaled or ingested via the consumption of infected meat or food and water contaminated with the urine from infected animals. Tularemia is not currently transmissible via human-to-human contact, but the disease is easily aerosolized. For this reason, the disease is considered a potential bioterrorism agent and falls under national pharmaceutical stockpile regulations. In addition, as reported by the CDPHE, corpses who have not been treated or were treated for less than 48 hours should be considered contagious and appropriate caution and equipment should be utilized in disposing of remains, both human and animal. The CDPHE reports that tularemia is easily mitigated through appropriate hygiene, limitation of contact between human and rodent populations, and appropriate sanitation of water and food supplies, particularly local garden produce.

West Nile Virus

West Nile Virus (WNV), which is spread through mosquito bites, can be contracted by birds, humans, horses, cattle, and other livestock. Symptoms may include headaches, fever, malaise, encephalitis, and death, although not all infected individuals exhibit symptoms. The CDPHE reports that there is no treatment for the virus except supportive care. The Colorado Mosquito-Borne Virus Surveillance Program, local health departments, and the Colorado Department of Public Health and Environment have conducted WNV surveillance since 2001. Many resources exist for local communities to mitigate the risk of WNV. Online resources include the "Fight the Bite" website (www.fightthebitecolorado.com), which provides tips and tools for local homeowners to mitigate mosquito populations on private property. Other mitigation efforts include spraying, use of personal pesticide sprays, avoiding outdoor activities during dawn and dusk, and draining bodies of water that have little or no circulation.

Each of the zoonotic diseases discussed in this profile have a global incidence history. Diseases are difficult to categorize based on geographic extent alone. The entire planning area is at risk to an occurrence of any of the diseases, alone or in concurrence with other outbreaks.

Past Occurrences

Usually, disease does not directly cause property damages or losses. Some zoonotic diseases may impact livestock, which may have a significant impact on the economics of the planning area. Other diseases impact the human population, which may have secondary impacts on the production of materials, goods, and services while the population is ill. The most common method of evaluating the magnitude and severity of a disease, however, is to examine how many people are likely to fall ill, and of those, how many are likely to die.

Hantavirus

Between January 1985 (when the disease was first documented) and December 2009, only two cases of hantavirus have been reported in the planning area (one in Kiowa County, and one in Prowers County). Both cases were fatal. Statewide, there have been 67 total cases, 25 of which were fatal.

Plague

Bubonic plague records are only available on a state-wide basis. The CDPHE reported that between 1957 and 2005, 54 cases of plague have been documented in Colorado and nine cases were fatal.

Rabies

The last reported cases of rabies occurred in Colorado in the following domestic animals: dog (2003 - imported from Texas), cat (2010 & 2008). The last case of dog rabies acquired in Colorado occurred in 1974. The last reported case of rabies in a human occurred in 1931.

Tularemia

Statistics for tularemia cases are only available on a state-wide basis. Between 1975 and 2006, 204 cases were reported and fatality rates were not available.

West Nile Virus

In 2003, Colorado had the most confirmed cases of WNV in the United States, with 2,134 confirmed diagnoses and 151 within the 6 county planning area studied in the original plan. As the disease continued to spread west, the rate of infection also followed into previously-unexposed populations. In 2008, California reported the most human cases (440), Arizona reported the second highest counts (114), and Colorado reported the third highest counts at 71. According to the CDC, as of 2010, there have been 2 human deaths in the 6 county planning area from WNV.

Table 4.36. Human West Nile Virus Cases from 2003-2008 (Illnesses/Deaths)

County	2003	2004	2005	2006	2007	2008	2009
Baca	5/0	1/0	0/0	0/0	1/0	0/0	0/0
Bent	6/0	0/0	4/0	3/0	4/0	0/0	0/0
Crowley	4/0	0/0	0/0	2/0	1/0	0/0	0/0
Kiowa	1/0	0/0	0/0	0/0	0/0	1/0	0/0
Otero	28/2	0/0	1/0	3/0	10/0	1/0	7/0

County	2003	2004	2005	2006	2007	2008	2009
Prowers	43/0	3/0	4/0	5/0	7/0	1/0	5/0
6 County Total	**87/2**	**4/0**	**9/0**	**13/0**	**23/0**	**3/0**	**12/0**

Source: Colorado Department of Public Health and Environment

Pandemic Flu

The most recent pandemic flu and the only pandemic flu to occur in the 21st century, the 2009 H1N1 flu virus, created cause for concern. 2009 H1N1 (sometimes called "swine flu") is a new influenza virus causing illness in people. This new virus was first detected in people in the United States in April 2009. This virus is spreading from person-to-person worldwide, probably in much the same way that regular seasonal influenza viruses spread. This virus was originally referred to as "swine flu" because laboratory testing showed that many of the genes in this new virus were very similar to influenza viruses that normally occur in pigs (swine) in North America. But further study has shown that this new virus is very different from what normally circulates in North American pigs. It has two genes from flu viruses that normally circulate in pigs in Europe and Asia and bird (avian) genes and human genes. Scientists call this a "quadruple reassortant" virus. On June 11, 2009, the World Health Organization (WHO) signaled that a pandemic of 2009 H1N1 flu was underway. In Colorado, swine flu cases are tracked by the CDPHE. Table 4.37 shows the affect of H1N1 on the planning area.

Table 4.37. Reported Cases of H1N1 in the Planning Area

County	2009 H1N1 Occurrences
Baca	1
Bent	0
Crowley	0
Kiowa	0
Otero	3
Prowers	2
Total	**6**

Source: CDPHE

The 20th century saw three outbreaks of pandemic flu.

- The **1918-1919** Influenza Pandemic is the catastrophe against which all modern pandemics are measured. It is estimated that approximately 20 to 40 percent of the worldwide population became ill and that over 50 million people died. Approximately 675,000 deaths from the flu occurred in the U.S. alone.
- In **February 1957**, an influenza pandemic was first identified in the Far East. Immunity to this strain was rare in people less than 65 years of age, and a pandemic was predicted. In preparation, vaccine production began in late May 1957, and health officials increased surveillance for flu outbreaks. Unlike the virus that caused the 1918 pandemic, the 1957

pandemic virus was quickly identified, due to advances in scientific technology. Vaccine was available in limited supply by August 1957. The virus came to the U.S. quietly, with a series of small outbreaks over the summer of 1957. When U.S. children went back to school in the fall, they spread the disease in classrooms and brought it home to their families. Infection rates were highest among school children, young adults, and pregnant women in October 1957. Most influenza-and pneumonia-related deaths occurred between September 1957 and March 1958. The elderly had the highest rates of death. By December 1957, the worst seemed to be over. However, during January and February 1958, there was another wave of illness among the elderly. This is an example of the potential "second wave" of infections that can develop during a pandemic. The disease infects one group of people first, infections appear to decrease and then infections increase in a different part of the population. Although the Asian flu pandemic was not as devastating as the 1918-1919 flu, about 69,800 people in the U.S. died.

- In early **1968**, an influenza pandemic was first detected in Hong Kong. The first cases in the U.S. were detected as early as September of that year, but illness did not become widespread in the U.S. until December. Deaths from this virus peaked in December 1968 and January 1969. Those over the age of 65 were most likely to die. The same virus returned in 1970 and 1972. The number of deaths between September 1968 and March 1969 for this pandemic was 33,800, making it the mildest pandemic in the 20th century.

To date, the 21st century has seen one acknowledged pandemic.

- **2009 Swine Flu (H1N1)**—This strain caused more than 14,700 deaths worldwide to date, according to the WHO. It was first detected in the United States in early 2009 and spread to the world later that year. About 70 percent of people who have been hospitalized with this 2009 H1N1 virus have had one or more medical conditions previously recognized as placing people at "high risk" of serious seasonal flu-related complications. This included pregnancy, diabetes, heart disease, asthma, and kidney disease. Young children were also at high risk of serious complications from 2009 H1N1, just as they are from seasonal flu. And while people 65 and older were the least likely to be infected with 2009 H1N1 flu, if they got sick, they were also at "high risk" of developing serious complications from their illness.

Likelihood of Future Occurrence

Similar to infestations, the calculation for future occurrence of the diseases profiled here must first be considered in light of circumstances. The diseases are naturally occurring in the populations of animals which always reside in the region. In addition, this plan is not examining the pandemic potential of these diseases, but instead examines when these diseases manifest in severe injury or fatalities among humans. Given these assumptions, the likelihood of future occurrence is **likely**.

4.2.20 Natural Hazards Summary

Table 4.38 summarizes the results of the hazard identification and hazard profile for the planning area based on the hazard identification data and input from the HMPC. For each hazard profiled in Section 4.2, this table includes the likelihood of future occurrence and whether the hazard is initially considered a priority hazard for the planning area.

Table 4.38. Hazard Identification/Profile Summary and Determination of Priority Hazard

Hazard	Likelihood of Future Occurrence	Significance
Agriculture Infestation	Likely	High
Dam/Levee Failure	Occasional	Medium
Drought	Likely	High
Earthquake	Occasional	Low
Extreme Temperatures: Heat	Highly Likely	Low
Extreme Temperatures: Cold	Highly Likely	Medium
Flood: 100/500 –Year	Occasional	Medium
Flood: Stormwater/ Flash Flooding	Likely	Medium
Severe Weather: Thunderstorms/Lightning/Wind/Hail	Highly Likely	High
Stream Bank Erosion/Stability	Occasional	Low
Subsidence	Occasional	Low
Tornadoes	Highly Likely	High
Wildfire	Highly Likely	Medium
Wind Storms	Highly Likely	Medium
Winter Storms	Highly Likely	High
Civil Unrest	Occasional	Low
Cyber Hazards	Occasional	Low
Hazardous Materials	Likely	Medium
Pandemic	Likely	Medium

Source: HMPC, 2009

The HMPC determined that dam failure, drought, seismic and geologic hazards (earthquake, landslide, liquefaction), flood, heavy rain/thunderstorm/hail/lightning, and wildfire are the most significant hazards in the planning area. The assets at risk and estimated potential losses associated with these hazards are discussed in Section 4.3 Vulnerability Assessment. Only those hazards determined to be priority hazards are discussed further in this plan.

4.3 Vulnerability Assessment

Requirement §201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.

Requirement §201.6(c)(2)(ii)(A): The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas.

Requirement §201.6(c)(2)(ii)(B): [The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate.

Requirement §201.6(c)(2)(ii)(C): [The plan should describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

4.3.1 Methodology

The Southeast Colorado Hazard Mitigation Planning Committee (HMPC) conducted a Vulnerability Assessment to describe the impact that each hazard identified in the preceding section would have upon the planning area. This portion of the plan evaluates those risks where they are similar across the entire planning area, and where they vary from the risks facing the entire planning area. The vulnerability assessment quantifies, to the extent feasible, assets at risk to natural hazards and estimates potential losses.

This section is a prelude to more detailed vulnerability and loss information captured in each County Planning Element (CPE). In the County Planning Elements that follow Chapter 6 there is a county-by-county accounting of historic hazard impacts. Actual impacts and associated losses of past occurrences are included for each county. These "histories" confirm that the hazard poses some risk to that county, and describes, where data is available, how it has impacted the county.

The county-by-county assessments also detail what is vulnerable to *all* hazards by describing the populations, the rate of population growth, and a general description of land-uses and development trends. Each county assessment also presents a listing of the total values (actual and/or assessed) of property at risk. Each CPE includes an estimate of losses to flood, and a qualitative analysis of risk to other high significance hazards. The risk to these hazards as it varies within each county and incorporated community is also detailed in each CPE. Agriculture is a critical economic asset of all counties in the region, and often accounts for the highest disaster losses. Each CPE contains an analysis of potential losses to agriculture from floods using HAZUS, and multiple hazards based on an analysis of federal crop insurance records.

Each CPE contains a County Hazard Summary table. The table is based on Table 4.1 in this document, that reflects the regional assessment which identifies and rates the significance of a variety of possible hazards. Significance was measured in general terms, focusing on key criteria such as the likelihood of the event, past occurrences, spatial extent, and damage and casualty potential. The worksheet reflects the regional assessments. Individual county assessments are located in each county planning element, and may reflect higher or lower assessments, based on the particular exposures, geography, and vulnerabilities of the area. Only the more significant hazards (high or medium) have a more detailed hazard profile and are analyzed further in this Vulnerability Assessment (to the extent possible) and in each CPE. Low vulnerability hazards are given a brief explanation in this Section of the plan, but vulnerability of these hazards is not discussed in the CPEs.

The medium or high significance hazards assessed are:

- Agricultural Infestation
- Dam/Levee Failure
- Drought
- Extreme Temperatures: Cold
- Flood: 100- and 500-year
- Flood: Localized/Stormwater Flooding
- Severe Weather: Thunderstorms/Lightning/Hail
- Tornadoes
- Wildfire
- Wind Storms
- Winter Storms
- Hazardous Materials
- Pandemic

The low significance hazards include:

- Earthquake
- Extreme Temperatures: Heat
- Stream Bank Erosion/Stability
- Subsidence
- Civil Unrest
- Cyber Hazards

The remainder of this section includes methodologies for estimating potential losses, and a discussion of regional trends, where possible.

4.3.2 Assets at Risk

Total Exposure of Population and Structures

Table 4.39 displays the estimated total population, housing units, and building value for each county in the region. Structure counts and values in this plan are based on building inventories from FEMA's HAZUS-MH. HAZUS-MH (which is based on 2000 building inventory data by Census blocks and inflated to 2006 values) estimates the value of the building stock in the region to be approximately $3 billion. HAZUS may not as accurately represent the replacement value of the real estate in each county as some of the assessed valuations do, but it does present a standard baseline dataset for all the counties in the region. More detail on the HAZUS inventories can be referenced in each CPE.

Table 4.39. Regional Population and Building Inventory Summary

County	Population	Building Count	Total Building Exposure	Building Content	Total Exposure
Baca	4,517	4,094	$277,735,000	$187,841,000	$465,576,000
Bent	5,998	3,566	$306,702,000	$189,588,000	$496,290,000
Crowley	5,518	2,143	$212,008,000	$125,060,000	$337,068,000
Kiowa	1,622	1,474	$104,998,000	$70,650,000	$175,648,000
Otero	20,311	12,103	$1,283,942,000	$870,526,000	$2,154,468,000
Prowers	14,483	7,933	$837,687,000	$564,841,000	$1,402,528,000
Total	**52,449**	**31,313**	$**3,023,072,000**	$**2,008,506,000**	$**5,031,578,000**

Source: HAZUS-MH MR4

Critical Facilities, Infrastructure, and Other Important Community Assets

A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. HSIP Gold, like FEMA's HAZUS-MH loss estimation software, uses the following three categories of critical assets. Essential facilities are those that if damaged would have devastating impacts on disaster response and/or recovery. High potential loss facilities are those that would have a high loss or impact on the community. Transportation and lifeline facilities are a third category of critical assets. Examples of each are provided below.

Table 4.40. Critical Facilities, Definitions and Examples

HSIP Gold Data: Essential Facilities	HSIP Gold Data: High Potential Loss Facilities	HSIP Gold Data: Transportation and Lifelines	State Assets Data: State Facilities	Local County Level Data: Additional Facilities of Critical Importance*
Hospitals and other medical facilities	Power plants	Highways, bridges, and tunnels	Corrections	

HSIP Gold Data: Essential Facilities	HSIP Gold Data: High Potential Loss Facilities	HSIP Gold Data: Transportation and Lifelines	State Assets Data: State Facilities	Local County Level Data: Additional Facilities of Critical Importance*
Police stations	Dams	Railroads and facilities	Higher Education	
Fire stations	Schools	Airports	Human Services	
Emergency operations centers	Hazardous material sites	Water treatment facilities	Labor Employment	
		Natural gas, facilities and pipelines	Military Affairs	
		Communications facilities	Natural Resources	
			Government Offices	
			Public health	
			Public Safety	
			Revenue	
			Transportation	

*Critical facility data provided by the Counties and other participating jurisdictions will be added to the list of critical facilities for that community. However, due to data limitations only the facilities included in the HSIP Gold data and State Assets data will be mapped. Local data will be used to supplement the other data sources and included in the plan.

HMPC members were asked to identify the assets in their respective jurisdictions that they considered to be critical facilities or of particular importance/value. Assets for each county are identified in their respective CPE.

Available critical facility inventories and GIS databases of critical facilities and infrastructure were limited in most of the counties. An effort was made to develop comprehensive inventories of critical facilities in each county. The best available data on a regional basis was from statewide GIS inventories. The best available data for critical facilities came from multiple sources: HSIP Gold 2008 (Homeland Security Infrastructure Program) was obtained through FEMA Region VIII. Within this dataset FEMA Region VIII updated emergency operations, fire stations, hospitals, natural gas facilities, oil facilities, police stations, power plants, and schools. Other layers within the HSIP Gold 2008 dataset has a source of HAZUS-MH MR4 and HSIP Gold 2007, which include airports, bridges, communications, dams, health facilities, HAZMAT facilities, waste water facilities, and water facilities. State assets were obtained from CDEM (Colorado Division of Emergency Management). State assets are symbolized with one symbol on the maps but are comprised of the following assets: animal science, containment structures, Dept of Corrections, education, fish hatcheries, garages, monitoring stations, museums, national monuments, offices, power plants, recreation facilities, residence/housing, restrooms, sheds, shops, State Patrol, storage, utilities and workforce centers. Even this data has some limitations including lack of complete or comprehensive data and values such as replacement costs. The data sources are noted in Table 4.41 below.

Table 4.41. Summary of Critical Facilities in GIS

Facility Type	Count	Source
Airport	3	HAZUS-MH MR4
Bridge	526	HAZUS-MH MR4
Communications	6	HAZUS-MH MR4
Dams	26	HAZUS-MH MR4
Emergency Operations	6	HSIP Gold 2008
Fire Stations	29	HSIP Gold 2008
HAZMAT	3	HAZUS-MH MR4
Health Facility	2	HAZUS-MH MR4
Hospital	2	HSIP Gold 2008
Natural Gas Facility	4	HSIP Gold 2008
Oil Facility	1	HSIP Gold 2008
Police	19	HSIP Gold 2008
Power Plant	48	HSIP Gold 2008
Schools	64	HSIP Gold 2008
Scour Critical Bridge	42	HAZUS-MH MR4
State Assets	360	CDEM
Waste Water Facility	5	HAZUS-MH MR4
Water Facility	1	HAZUS-MH MR4
Total	**1,147**	

Scour Critical Bridges

Included with HAZUS-MH is a database of bridges called the National Bridge Inventory (NBI) developed by the Federal Highway Administration. One of the database items is a "scour index", which is used to quantify the vulnerability of a bridge to scour during a flood. Bridges with scour index between 1 and 3 are considered "scour critical", or a bridge with a foundation element determined to be unstable for the observed or evaluated scour condition. The date of the database, 2001, thus it may not reflect current conditions, but is the best available data.

Natural and Historical Assets

Natural Assets

Each CPE provides an inventory of threatened and endangered species on the US Fish and Wildlife Service and Colorado Division of Wildlife. Natural resources are important to include in benefit-cost analyses for future projects and may be used to leverage additional funding for mitigation projects that also contribute to community goals for protecting sensitive natural resources. Awareness of natural assets can lead to opportunities for meeting multiple objectives.

For instance, protecting wetlands areas protects sensitive habitat as well as stores and reduces the force of floodwaters.

Historic Sites

Each CPE provides a listing of the sites registered on either the federal or state Register of Historic Places. This is included because it is important for communities to have an awareness of cultural resources that could be impacted by natural hazards, and because if they are, the rules for repairing and rebuilding historic structures differ from others. Not having an inventory of historic resources available when disaster strikes can prolong a community's recovery and aggravate economic recovery.

4.3.3 Growth and Development Trends

Table 2.3 in the Community Profile shows the estimated total population and population growth projects for each County in the region. The State Demographics Office (SDO) predicted that the overall region would grow at a relatively slow rate from 2000 through 2035. Crowley County was predicted to grow the fastest, and Baca County was predicted to grow the slowest. The 2010 estimated population for the entire planning region, according to the SDO, is 50,657, which is an decrease in growth of 3.5% since 2000.

Concerns about specific hazards and future development are addressed by hazard in the following section.

4.3.4 Estimating Potential Losses by Hazard

Each of the following hazards was discussed in Section 4.2. Here, the hazards are described in terms of their potential for future losses in the planning area to both existing development, and potential future development, in quantitative terms where possible. For those hazards with a high or medium significance, this section provides the following information for each hazard: vulnerability overview, potential losses to existing development, and potential losses to future development. A summary vulnerability overview is provided for those hazards with low planning significance. These planning significance levels take into account the entire planning area.

Natural Hazards

Agricultural Infestation

Planning Significance: High.

Existing Development

The impact that insects and noxious weeds can have upon the planning area is substantial. The fact that there have been three USDA Secretarial Designation to combat the impact of insect infestations is indicative of the potential for future loss. A widespread infestation of agricultural products could seriously impact the economic base of the planning area. Agriculture is an important aspect of the region's economy, and often the majority of hazard losses are to crops and livestock. Federal Crop Insurance data represents losses from multiple hazards that could include: biological (insect and disease) hazards, flooding, drought, hailstorms, noxious weeds, temperature extremes, tornados, wildfires and straight-line winds. An overview of these losses is presented in Table 4.42 and Table 4.43, but further detail on the loss by particular hazard was not available.

Table 4.42. Federal Crop Insurance Coverage and Losses 1980-2009

County	Liability (amount of coverage)	Total Premium	Federal Premium Subsidy	Farmer Paid Premium	Amount Paid in Claims	Average Annual Amount Paid in Claims
Baca	$540,363,143	$111,940,904	$62,869,754	$49,071,150	$133,586,474	$4,452,882
Bent	$64,771,402	$11,111,045	$6,215,913	$4,895,132	$19,786,587	$659,553
Crowley	$9,358,829	$2,006,242	$1,147,953	$858,289	$2,793,361	$93,112
Kiowa	$284,514,150	$79,399,935	$46,350,357	$33,049,578	$84,983,782	$2,832,793
Otero	$73,454,513	$10,589,052	$6,138,768	$4,450,284	$13,180,861	$439,362
Prowers	$312,116,556	$63,039,198	$35,882,399	$27,156,799	$73,253,077	$2,441,769
Totals	**1,284,578,593**	**278,086,376**	**158,605,144**	**119,481,232**	**327,584,142**	**10,919,471**

Source: USDA Risk Management Agency

Table 4.43. 2010 Provisional Data (Claim Data Unavailable as 2010 Claims are not Fully Reported)

County	Liability (Amount of Coverage)	Total Premium	Federal Premium Subsidy	Farmer-paid Premium
Baca	$45,906,951	$12,905,593	$7,687,705	$5,217,888
Bent	$6,897,081	$1,283,757	$794,926	$488,831
Crowley	$983,389	$222,574	$127,061	$95,513
Kiowa	$21,789,082	$7,381,824	$4,813,819	$2,568,005
Otero	$8,816,421	$1,559,516	$924,997	$634,519
Prowers	$28,218,360	$6,704,553	$4,119,420	$2,585,133
Total	**112,611,284**	**30,057,817**	**18,467,928**	**11,589,889**

Source: USDA Risk Management Agency

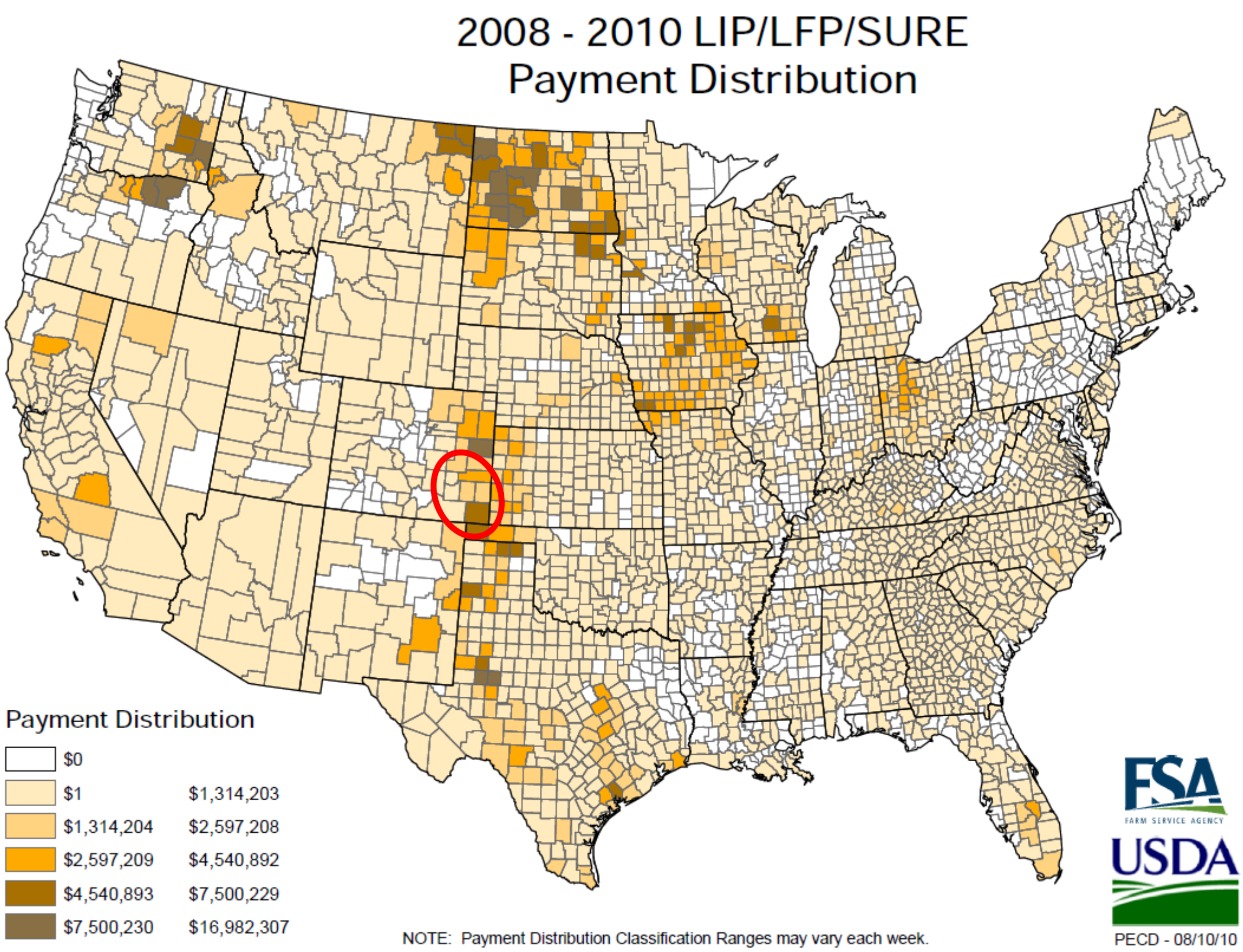
The Food, Conservation, and Energy Act of 2008 authorized the Livestock Indemnity Program (LIP) to provide benefits to livestock producers for livestock deaths in excess of normal mortality caused by adverse weather that occurred on or after Jan. 1, 2008, and before Oct. 1, 2011, including losses because of hurricanes, floods, blizzards, disease, wildfires, extreme heat and extreme cold.

The 2008 Farm Bill authorized the Livestock Forage Disaster Program (LFP) to provide compensation to eligible livestock producers that have suffered grazing losses for covered livestock on land that is native or improved pastureland with permanent vegetative cover or is planted specifically for grazing. The grazing losses must be due to a qualifying drought condition during the normal grazing period for the county. LFP also provides compensation to eligible livestock producers that have suffered grazing losses on rangeland managed by a Federal agency if the eligible livestock producer is prohibited by the Federal agency from grazing the normal permitted livestock on the managed rangeland due to a qualifying fire.

The Supplemental Revenue Assistance Payments Program (SURE) provides benefits for 2008 through 2011 crop year farm revenue losses due to natural disasters. It is the 2008 Farm Bill's successor to prior ad hoc crop disaster programs. For producers to be eligible for SURE, they must have obtained a policy or plan of insurance for all crops through either the Federal Crop Insurance Act or FSA's Noninsured Crop Disaster Assistance Program (NAP).

Figure 4.46 gives a county by county accounting of payments from LIP, LFP, and SURE from 2008-2010. Baca County is in the highest payment category for these payments, while Kiowa County is in the second highest payment category for these payments. The planning area is shown in a red circle.

Figure 4.46. RMA Payment Distribution



Source: USDA

Potential Losses to Existing Development

Buildings, infrastructure, and critical facilities are not vulnerable to this hazard. It impacts products of agriculture and impacts are primarily economic in nature, rather than structural impacts. Rough estimates of potential direct losses from agricultural infestation fall in a range of 1 to 50 percent of annual crop receipts for a County and/or 1 to 75 percent of livestock receipts. However, additional data is not available regarding historical uninsured or unclaimed losses or general reductions in crop and livestock yields. In addition, secondary impacts to the economic streams from agriculture affect local businesses and government tax rolls.

In 2009 much of the grasshopper infestation concerns were mitigated with a combination of aggressive aerial spraying program sponsored by the FSA in conjunction with timely rains that drowned grasshopper larvae.

Future Development

Future development is not expected to be significantly impacted by this hazard.

Dam and Levee Failure

Planning Significance: Medium.

Existing Development

Based on the information in the hazard profile in Section 4.2.3, the impacts to existing development from a dam failure in the region could be catastrophic. The impacts to certain counties in the region from a dam failure will be similar in some cases to those associated with flood events (see the flood hazard vulnerability analysis and discussion). The biggest difference is that a catastrophic dam failure has the potential to result in a much greater loss of life and destruction to property and infrastructure due to the potential speed of onset and greater depth, extent, and velocity of flooding.

Colorado law requires that Class 1 dams have Emergency Action Plans (EAP), and that failure inundation maps be prepared as part of the those plans. The Planning Team did confirm the existence of EAPs for the High Hazard dams. The emergency call-down notification lists for downstream property-owners serves as the initial vulnerability assessment for dam failure. An analysis of the communities exposed to the dam failure hazard, and the relative downstream impacts, are captured in each CPE that have dam failure risk. These CPE's include a table that indicates how dam failure risk varies among communities in the county, based on a visual interpretation of the dam location, the drainage or stream that would be affected, and the proximity of the downstream community to the floodplain of the impacted stream. The locations of these dams are shown in maps. The table indicates the first downstream community impacted by a dam upstream of it. In some cases additional communities downstream would be impacted as well. Dam inundation maps prepared by dam owners are on file with the counties, and for national security purposes, can only be accessed by the Emergency Manager for each county.

Losses from a dam failure will vary based on the dam involved, warning time, and time of day, but the potential exists for property losses into the billions and multiple deaths and injuries. Impacts to critical facilities would be similar to those identified in the flood vulnerability analysis.

Based on the information collected in Section 4.2.3, known levees in the region exist in Bent, Otero, and Prowers counties. The most at-risk community is suspected to be the City of Las Animas, most of which is protected by a levee. The HAZUS model does not account for levee protection, thus the HAZUS flood modeling results displayed in each CPE and on the associated maps is representative of a levee failure or overtopping scenario. This is discussed in more detail in each CPE.

Future Development

It is important that communities in the region keep the dam failure hazard in mind when permitting new development, particularly downstream of the high and significant hazard dams present in each county. There are numerous low hazard dams in the planning area. These could become significant or high hazard dams if development occurs below or downstream of them.

It is also important that communities in the region keep the levee failure hazard in mind when permitting new development. There are numerous levees in the planning area that could affect future populations and buildings in the planning area.

Drought

Planning Significance: High.

Existing Development

Based on the planning area's recent multi-year droughts and Colorado's drought history, it is evident that the entire region is vulnerable to drought. Similar to blizzards and severe winter storms, drought impacts such a vast area that the planning committee considers the risk of drought to be the same across the entire planning area. The risk of occurrence does not vary from county to county, but the impacts will vary based on the specific jurisdiction's water supply needs. With the majority land area of the region used for agricultural purposes, the planning area has significant exposure to this hazard. In addition to economic and public water supply impacts, soil erosion, dust, and wildfire hazard are also exacerbated by drought conditions.

The agricultural industry of the region will experience hardships, including agricultural losses, and livestock feeding expenses and deaths. Water supply issues for municipal, industrial, and domestic needs will be a concern for the entire region during droughts. Most of the region's water resources come from ground water, surface water reservoir storage, and the Arkansas River. Vulnerability to low flows on the Arkansas River, which drains from the Rocky Mountains to the west of the region, increases with consecutive winters of below-average snow pack.

While widespread, the losses associated with drought are often the most difficult to track or quantify. While FEMA requires the potential losses to structures to be analyzed, drought does not normally have a structural impact. Drought can indirectly lead to property losses as a result of it contributing to extreme wildfire conditions (see discussion on wildfire vulnerability). This, combined with the potential for significant impacts to water intensive activities such as agriculture, wildfire suppression, municipal usage, commerce, tourism, and wildlife preservation, can lead to widespread economic ramifications. The ramifications from the 2002 drought included:

- Impacted the cattle industry by forcing ranchers to sell off their herds because they could not provide enough feed due to the drought impact upon feed-crops. Drought has further impacted the herds because ranchers take their cattle to feed lots earlier in order to reduce the amount of feed they need, and to use less electricity to power the irrigation pumps used to grow the feed.

- Created an increase in the rates for hydroelectric power.
- Affected the population and distribution of wildlife. This, in turn, has affected the economy due to a lower than normal number of hunters and fishermen.
- Affected wildfire by providing a greater fuel source (dried out vegetation) and diminished fire-fighting capacity (the closing off of wells has left less water to fight fires).
- Increased the volume of noxious weeds, because they are now growing in areas that no longer can support crops.

While the crop insurance loss data covers a variety of perils, it is indicative of the types of agricultural impacts that drought can have upon the planning area. Available crop insurance data indicates over $327 million has been paid to the region's agricultural landowners in insurance claims between 1980 and 2009. It is reasonable to assume that a significant amount of this is due to drought-related losses. If one were to assume at least 50% of the losses are drought-related, an average annual loss estimate can be calculated. For the region this is calculated by ($327,000,000/2)/29years, which equates to $5.64 million in average annual agricultural losses for the region.

Future Development

Drought vulnerability will increase with future development as there will be increased demands for limited water resources. Given that population growth and associated new development is limited in scale, future development is unlikely to exacerbate drought conditions in the short term.

Extreme Temperatures: Extreme Cold

Planning Significance: Medium.

Existing Development

Limited data on temperature extreme impacts per County was available during the development of this hazard's profile. Extreme cold normally does not impact structures, but is a life safety issue. Areas prone to excessively cold temperatures are identified normally on a nation-wide assessment scale, which doesn't allow detailed results on specific structures. Secondary impacts of extreme cold can affect the supporting mechanisms or systems of a community's infrastructure. For example, when extreme cold is coupled with high winds or ice storms, power lines may be downed, resulting in an interruption in the transmission of that power shutting down electric furnaces, which may lead to frozen pipes in homes and businesses.

The elderly population in the planning area is most vulnerable to temperature extremes. Table 2.4 in Chapter 2 shows that the percentage of elderly people (age 65 or over) in the planning area is well above the national average, which is 6%. Most counties have population percentages in the 12-18% range. Baca County is as high as 22%, with Crowley County the lowest at 10.8%. However many residents of southeast Colorado are self sufficient and accustomed to rural living and the climate extremes that are part of the territory. The residents of nursing homes and elder care facilities are especially vulnerable to extreme temperature events. It is encouraged that such facilities have emergency plans or backup power to address power failure during times of extreme cold.

Future Development

Vulnerability to extreme cold will increase as the average age of the population in each county shifts. Greater numbers of future senior citizens will result from the large number of baby boomers in the planning area. As identified in the existing development discussion above, many of the residents of southeast Colorado are self sufficient and accustomed to rural living.

Flood: 100/500-year

Planning Significance: Medium.

Existing Development

Flooding and floodplain management are significant issues in the region, including certain incorporated areas. The planning committee used HAZUS-MH to quantify the potential flood losses to the county and cities in the region. An approximate 1% chance flood was generated for major rivers and creeks in each county in the region (those with a 10 square mile minimum drainage area). A USGS 30 meter resolution digital elevation model (DEM) was used as the terrain base in the model. HAZUS-MH produces a flood polygon and flood-depth grid that represents the base flood. While not generally as accurate as official flood maps, these floodplain boundaries are suitable for use in GIS-based loss estimation models. Flood insurance maps were not used as much of the region remains unmapped.

Potential losses to the county were analyzed with HAZUS-MH, based on census block-based buildings, and population inventory and flood hazard data. HAZUS-MH provides reports on the number of buildings impacted, estimates of the building repair costs, and the associated loss of building contents and business inventory. Building damage can cause additional losses to a community as a whole by restricting the building's ability to function properly. Income loss data accounts for business interruption and rental income losses as well as the resources associated with damage repair and job and housing losses. These losses are calculated by HAZUS-MH using a methodology based on the building damage estimates. Building damage is estimated by Census Block based on the average depth of flooding within a given Census Block. Flood damage is directly related to the depth of flooding. HAZUS-MH uses depth-damage functions to model the losses. For example, a two-foot flood generally results in about 20 percent damage to the structure (which translates to 20 percent of the structure's replacement value). The results of the loss estimation are summarized in the following table. Each CPE includes more detail on the losses, including maps and tables that detail how the losses vary by jurisdiction.

When combining the county-by-county HAZUS runs on a regional level there is a potential for $179 million in losses. Otero and Prowers Counties have the highest potential for flood losses due to the flood potential and higher populations and building numbers in these counties.

Table 4.44. HAZUS-MH Flood Loss Estimation by County

County	Cost Building Damage ($)	Cost Contents Damage ($)	Inventory Loss ($)	Relocation Loss ($)	Capital Related Loss ($)	Rental Income Loss ($)	Wage Loss ($)	Total Loss ($)	Percent of Regional Loss
Baca	1,111,000	1,146,000	93,000	-	1,000	-	16,000	2,367,000	1.3%
Bent	2,831,000	2,526,000	127,000	5,000	3,000	1,000	10,000	5,503,000	3.0%
Crowley	5,892,000	9,639,000	127,000	19,000	25,000	8,000	138,000	15,848,000	8.8%
Kiowa	1,176,000	1,115,000	65,000	-	3,000	-	6,000	2,365,000	1.3%
Otero	17,758,000	21,929,000	658,000	47,000	70,000	16,000	278,000	40,756,000	22.7%
Prowers	45,131,000	63,218,000	2,685,000	197,000	260,000	79,000	1,268,000	112,838,000	62.8%
Total	**73,899,000**	**99,573,000**	**3,755,000**	**244,000**	**362,000**	**95,000**	**1,716,000**	**179,677,000**	**100%**

Source: HAZUS-MH –MR4

Limitations

Default HAZUS-MH data was used to develop the loss estimates. Thus, the potential losses derived from HAZUS-MH, the best available data, may contain some inaccuracies. The building valuations used in HAZUS-MH MR4 are updated to R.S. Means 2006 and commercial data is updated to Dunn & Bradstreet 2006. There could also be errors and inadequacies associated with the hydrologic and hydraulic modeling of the HAZUS-MH model. The damaged building counts generated by HAZUS-MH are further susceptible to rounding errors and are likely the weakest output of the model due to the use of census blocks for analysis.

NFIP Statistics

Another method of examining the magnitude and severity of flooding in the region is to examine the damage losses and payments from the National Flood Insurance Program. This information is not comprehensive, because it only reflects the communities which participate in the NFIP, but it is a useful overview of flood damages in the region. Table 4.45 represents the composite of unincorporated and community-specific policies, claims and payments. Individual community information is found in the corresponding community-specific planning element.

Table 4.45. NFIP Damages and Payments 1978-2010

County	Policies	Claims	Payments
Baca*	0	0	$0
Bent	2	2	$2,689
Crowley*	0	0	$0

County	Policies	Claims	Payments
Kiowa*	0	0	$0
Otero	85	71	$1,194,841
Prowers	7	2	$2,783
6 County Total	**94**	**75**	**$1,200,313.00**

Source: Community Information System 2010
*The County does not participate in the NFIP program.

Agricultural Losses

Agricultural losses were included in the HAZUS-MH analysis. The HAZUS-MH model assumes a short duration and slow rise flood when estimating losses and does not account for high velocity flash floods. Loss estimates are based on United States Army Corp of Engineers (USACE) damage modifiers. The HAZUS-MH impact analysis predicts a loss estimate value by crop for flow time intervals. The first is a loss estimate for the day of the fixed event; the remaining three are for 3, 7, and 14 days following the event. The results of these analyses are presented in each CPE.

Critical Facilities

To estimate the potential impact of floods on critical facilities a GIS overlay was performed of the flood hazard layer on existing critical facilities point locations. The results are shown in each CPE in map and tabular form. A regional summary of facilities potentially located in floodplains is provided in Table 4.46. Note that the majority of the facilities are bridges, but the analysis does not determine if these bridges will be overtopped by flooding.

Table 4.46. Potentially Flood Prone Critical Facilities within the Region

Facility Type	No. of Facilities
Airport	3
Bridge	526
Communications	6
Dams	26
Emergency Operations	6
Fire Stations	29
HAZMAT	3
Health Facility	2
Hospital	2
Natural Gas Facility	4
Oil Facility	1
Police	19
Power Plant	48
Schools	64

Facility Type	No. of Facilities
Scour Critical Bridge	42
State Assets	360
Waste Water Facility	5
Water Facility	1
Total	**1147**

Future Development

Due to population shifts and trends in the planning area, future development is discussed in more detail in each specific CPE. The risk of flooding to future development in the region would be minimized by the developing, enhancing, and enforcing floodplain management programs. Additional risk reduction measures to new development could be further enhanced by encouraging additional participation with the NFIP, and promoting flood insurance, which have been a topic of discussion during this mitigation process and is reflected in the actions identified later in the plan and respective CPEs.

Flood: Stormwater/Localized Flooding

Planning Significance: Medium.

Existing Development

Historically, the planning area has been at risk to flooding primarily during the spring months when river systems in each County swell with heavy rainfall. Localized flooding also occurs throughout the planning area at various times throughout the year with several areas of primary concern unique to each County. These areas are discussed in the Flood Vulnerability Assessment (100/500-year and Localized) in each CPE.

Future Development

Due to population shifts and trends in the planning area, future development is discussed in more detail in each specific CPE. The risk of stormwater/localized flooding to future development can be minimized by accurate recordkeeping of repetitive localized storm activity. Mitigating the root causes of the localized stormwater or choosing not to develop in areas that often are subject to localized flooding will reduce future risks of losses due to stormwater/localized flooding.

Severe Weather: Thunderstorm/Lightning/Hail

Planning Significance: High.

Existing Development

Thunderstorms producing winds, hail, and heavy rains are common occurrences throughout the planning area between early spring and late fall. Given the lightning statistics for Colorado and the region, the entire region remains at risk and is vulnerable to the effects of lightning. Persons recreating or working outdoors during the months of April through September will be most at risk to lightning strikes. In addition, hailstones are frequently thrown out miles in front of the storm producing them. Due to the frequency and widespread distribution of hail-producing thunderstorms, the planning team considers the risk of severe thunderstorms to be the same across the entire planning area. The risk does not vary from county to county.

Thunderstorms can produce locally heavy rain and high winds, which may result in crop damage and localized flooding. Hail primarily causes crop damage in the planning area. However, hailstorms in populated areas can cause significant damage to roofs, automobiles, trees and windows. Critical facilities and infrastructure will have the greatest consequences if significantly damaged by a lightning strike or severe hail. The greatest losses from lightning could result from secondary hazards, such as wildfire.

Future Development

Future development is discussed in more detail in each specific County Planning Element. New critical facilities such as communications towers and tornado sirens should be built to withstand hail damage, lightning, and thunderstorm winds. While deaths have occurred in the planning area in the past due to lightning, it is difficult to quantify future deaths and injuries due to lightning. With limited development occurring in the region future losses to new development should be minimal.

Tornadoes

Planning Significance: High.

Existing Development

Tornadoes are the most violent hazard affecting the planning area. Tornadoes can have an atmospheric pressure differential of 2 inches from the outer edge of the funnel to its center, creating winds in excess of 300 mph across an area as small as 300 yards. For the sake of comparison, a hurricane can have the same pressure differential across an area of 300 miles.

When the randomness of tornado location and the vast open space within the planning area are considered, the planning team does not consider any one area at a greater risk to tornadoes than any other. Thus, the risk of tornadoes is the same across the entire planning area. The risk does not vary from county to county. This is because tornadoes are just as likely to hit one location as another within the planning area. The exposure to tornados does vary from county to county, as indicated by the building and population differences in each county. The area that tornadoes strike is random, depending upon the location of the weather system spawning them. The impact of tornadoes is also random across the planning area because of the tremendous amounts of open space between communities and farms and ranches. The planning area frequently experiences tornadoes that strike little or nothing.

On the other hand, tornadoes need to be given serious consideration in this assessment, because if and when they do strike populated areas, the impact can be devastating. Tornadoes can impact communities by destroying buildings and infrastructure within seconds. Tornadoes can cause numerous human injuries or fatalities. They can annihilate power distribution systems, commercial businesses, residential neighborhoods, automobiles and crops. They can create tremendous debris removal problems, overwhelm building departments, and psychologically scar residents.

Little can be done to reduce the damages caused by tornadoes – though recently, significant strides have been made to improve life safety during these events – most notably through improved warning systems and the installation of "safe-rooms."

Future Development

As building and population numbers continue to increase in the planning area, more persons and buildings will be exposed to the tornado hazard.

Wildfires

Planning Significance: Medium.

Existing Development

Based on wildfire captured in this hazard's profile, wildfires in the region have the potential to be both a public safety issue and contribute to property losses. According to the HMPC, the areas that are most vulnerable to wildfire are agricultural areas where Conservation Reserve Program (CRP) or grassland is burned, rural areas where trash and debris are burned, and the wildland-urban interface areas. Homes built in rural areas are more vulnerable since they are in closer proximity to CRP land that is burned and homeowners are more likely to burn trash and debris in rural locations. The vulnerability of structures in rural areas is exacerbated due to the lack of hydrants in these areas for firefighting and the distance required for firefighting vehicles and personnel to travel to respond. In addition, structures along the wildland urban interface where wild fuel loads are in close proximity to structures are at increased risk.

Wildland/grassland fires seem to increase with drought and with the increase of no-till farming – simply because there is less moisture available – in the air, in the ground, and in the plants. This can be attributed to both drought and the absence of irrigation. There also is an apparent increase in fires in areas where the CRP has prohibited grazing on lands enrolled in the program. In this instance, there is little else to stunt the growth of weeds, which in turn, provide fuel for fires.

The county-by-county assessments in each CPE include fire losses, and makes available fire fighting costs where that information was available. In many cases data on wildfires is not consistently recorded, or specific impacts information is limited.

The map below shows the results of a GIS based Wildland Urban Interface Wildfire Hazard Assessment performed by the Colorado State Forest Service (CSFS) in 2002. The assessment used three main layers to determine fire danger, risk of fire occurrence, hazard, and values. The following lists the data used to create the three layers.

1. Risk – Probability of Ignition
    a. Lightning strike density
    b. Road buffer – 100 meter buffer of roads and railroads
2. Hazard – vegetative and topological features affecting intensity and rate of spread
    a. Slope
    b. Aspect
    c. Fuels – interpreted from CO Division of Wildlife GAP vegetation information
3. Values – Natural or man-made components of the ecosystem on which a value can be placed.
    a. Housing Density – Life and Property
4. Non–flammable Areas Mask – a mask was created to aid in the analysis for areas that are not flammable, such as rock and water areas. Urban areas were included in these non-flammable areas if there was not a significant source of vegetation to carry the fire. These areas show a zero value for fire hazard in the final assessment.

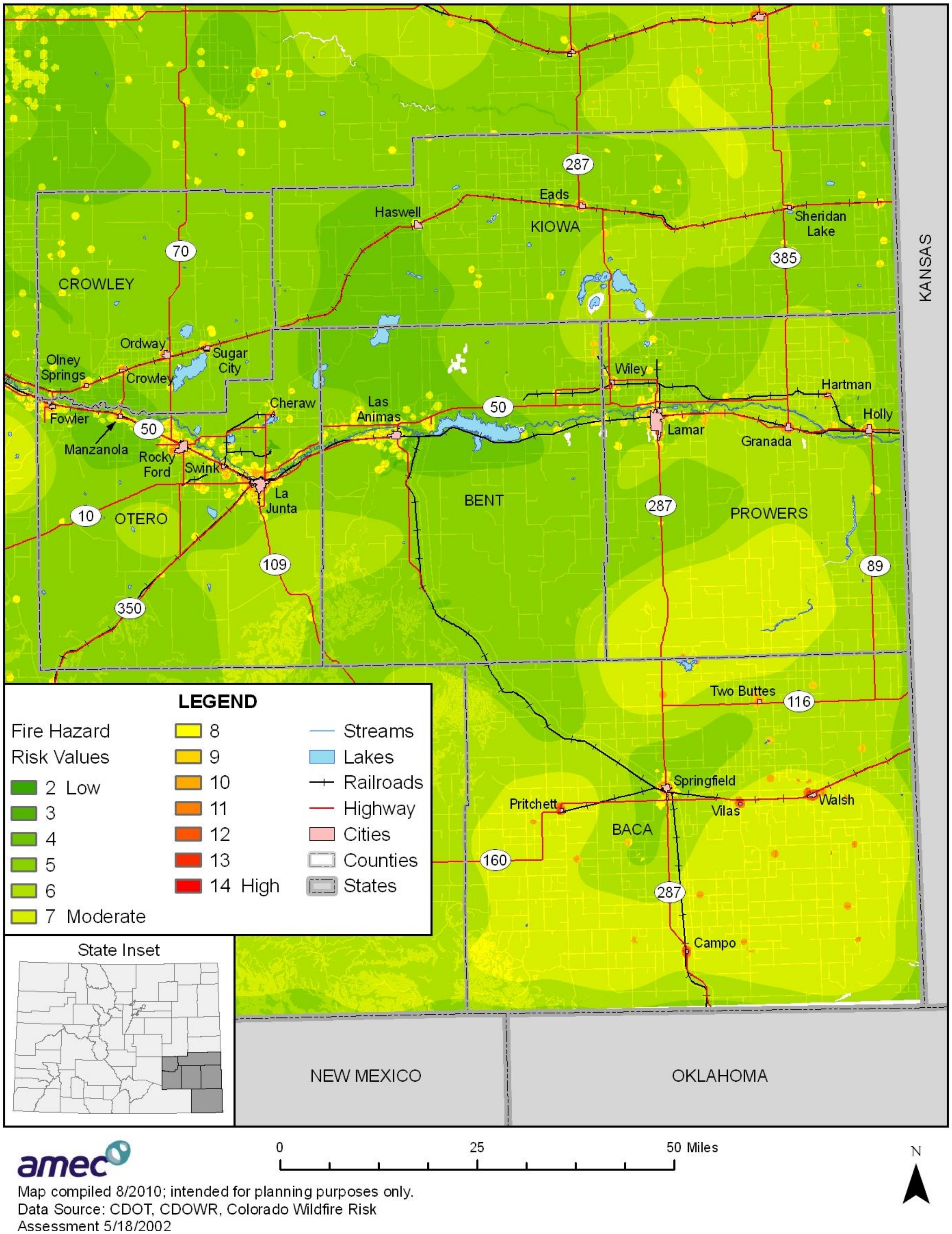
The Colorado Wildland Urban Interface Hazard Assessment is meant to be used as a tool to compare fire hazard in various areas in Colorado and within counties. The data is not meant to be used to determine fire hazard at the subdivision or parcel level scale.

A regional map is shown in Figure 4.47. County maps are provided in each CPE. The CSFS indicated that the methodology and mapping needs updated, but it currently is the best available wildfire hazard data available for the eastern plains of Colorado. The data does not lend itself to calculating loss estimates, but interpretation of the maps does allow a qualitative assessment of fire risk as it varies across the planning area. A discussion of the risk to incorporated communities and critical facilities as it varies within each county accompanies the maps in each CPE.

Future Development

Limited development trends in the region should not greatly increase exposure or vulnerability to wildfires. However, increased development in the WUI areas may create a greater risk to wildfire. Adherence to sound construction standards and defensible space practices would limite vulnerability of new development to wildfire. If chosen as a mitigation measure, the planting of "living" wind breaks around existing or new homes and buildings should be set back far enough to limit wildfire vulnerability.

Figure 4.47. Wildland Urban Interface Hazard in the Planning Area



Windstorm

Planning Significance: Medium.

Existing Development

Beyond tornadoes, the planning area is subject to potentially destructive straight-line winds. High winds are common throughout the planning area, throughout the entire year. Straight line winds are primarily a public safety and economic concern. Windstorm can cause damage to structures and power lines which in turn can create hazardous conditions for people. Debris flying from high wind events can shatter windows in structures and vehicles and can harm people that are not adequately sheltered.

Future losses from straight line winds include:

- Erosion (soil loss)
- Dry land farming seed loss,
- Wind blown weeds, such as tumbleweed
- Power line impacts and economic losses from power outages
- Occasional building damage, primarily to roofs

While there has been some scattered record keeping describing the impacts of dust storms, there is little information to indicate that straight-line winds are little more than a nuisance. For example, while tumbleweeds can create an additional expense for farmers, they often cause little long term damage and there is little justification for allocating resources to combat them. In some areas, it should be noted though, that mitigation measures, such as "Living Snow Fences" (and traditional snow fences) have been established to protect roadways and/or farmsteads from wind-blown snow. Conversely, the frequent windmills that dot the landscape use the prevailing winds to capture the power of the wind to pump groundwater for livestock.

Campers, mobile homes, barns, and sheds and their occupants are particularly vulnerable as windstorm events in the region can be sufficient in magnitude to overturn these lighter structures. Livestock that may be contained in these structures may be injured or killed, causing economic harm to the rancher who owns both the structure and the livestock. Overhead power lines are vulnerable and account for the majority of historical damages. State highways can be vulnerable to high winds and dust storms, where high profile vehicles may be overturned by winds and lowered visibility can lead to multi-car accidents.

Future Development

Future development projects should consider windstorm hazards at the planning, engineering and architectural design stage with the goal of reducing vulnerability. Limited development trends in the region are not expected to increase vulnerability to the hazard.

Winter Storms

Planning Significance: High.

Existing Development

The threat to public safety is typically the greatest concern when it comes to impacts of winter storms. But these storms can also impact the local economy by disrupting transportation and commercial activities. Winter storms are occasionally severe enough to overwhelm snow removal efforts, transportation, livestock management, and business and commercial activities. The region can experience high winds and drifting snow during winter storms that can occasionally isolate individuals and entire communities and lead to serious damage to livestock populations and crops. Winter storms contribute directly to other hazards in this plan: extreme temperatures (cold) profiled in Section 4.2.6.

Travelers on highways in the planning area, particularly along remote stretches of road, can become stranded, requiring search and rescue assistance and shelter provisions.

Research presented in Section 4.2.14 Winter Storms yielded significant impacts from this hazard in the past. Structural losses to buildings are possible and structural damage from winter storms in Colorado have resulted from severe snow loads on rooftops. Older buildings are more at risk, as are buildings with large flat rooftops (often found in public buildings such as schools). The planning area's elderly population is a potentially vulnerable demographic during severe winter storms. Smaller communities prevalent in the region may become isolated during winter storm events, Persons that choose to live in these areas are generally self-sufficient, or should be, as government and emergency services may be limited during a severe winter storm.

Another common impact of blizzards and severe winter storms on the planning area is power loss. The weight of heavy continued snowfall and/or ice accumulating on power lines often brings them to the ground causing service disruptions for thousands of customers. This can cause a loss of community water and sewer services, as well as the supply of gasoline, as these services almost always require electrical pumps. In addition, prolonged power outages can mean loss of food to grocery stores, large facilities that provide feeding services (such as prisons, hospitals and nursing homes), and restaurants.

Winter storms can be particularly hard on herds of cattle in the planning area. Severe storms can strand herds in remote areas of the planning area. Lengthy blizzards or particularly deep snow can leave cattle without feed from ranchers. Snow cover removes grass and vegetation as a food source. Large blizzards can cause large losses of cattle, leaving ranchers monetarily impacted.

The CPEs identify specific impacts (the monetary impact and number of downed power poles) where the data was available. Estimating future dollar losses is difficult though because one never knows which counties, and which areas within those counties, will be impacted by any particular storm. What can be stated is that future severe winter storms will continue to occur, and most losses will be related to snow removal, roadway closures, and loss of electrical power.

Future Development

Future residential or commercial buildings built to code (for those areas with building codes) should be able to withstand snow loads from severe winter storms. As building and population trends continue to increase in the planning area, more persons will be exposed to the winter storm hazard, therefore increasing pressure on local government snow removal and emergency services. Areas without building codes should consider adopting and enforcing some type of building code.

Man-Made Hazards

Hazardous Materials

Planning Significance: Medium.

Existing Development

As previously stated, it is often quite difficult to quantify the potential losses from human-caused hazards. While the facilities themselves have a tangible dollar value, loss from a human-caused hazard often inflicts an even greater toll on a community, both economically and emotionally. The impact to identified assets will vary from event to event and depend on the type, location, and nature of a specific hazardous materials event. Given the difficulty in quantifying the losses associated with hazardous materials, this section focuses on analyzing key assets and populations relative to the hazardous materials sites and transportation corridors identified above.

Fixed Facility Incidents

As discussed above, there are 37 fixed facilities identified in the planning area with the potential to cause a hazardous materials release of sufficient type and magnitude to adversely impact surrounding areas. These sites are regulated and most have emergency action plans in place. Because of the number and dispersed nature of these fixed facilities, additional analysis on vulnerable assets and populations was not feasible. The impact to surrounding areas would depend on the nature and quantity of any release as well as the time of the event and prevailing weather conditions.

Transportation Incidents

To assess the vulnerability of the planning area to a hazardous materials release within a transportation corridor, a buffer zone was established around each of the major transportation routes previously identified in Figure 4.45. The buffer distance was based on guidelines in the U.S. Department of Transportation's Emergency Response Guidebook that suggest distances useful to protect people from vapors resulting from spills involving dangerous goods considered toxic if inhaled. The recommended buffer distance referred to in the guide as the "protective action distance" is the area surrounding the incident in which people are at risk of harmful exposure. For purposes of this plan, an average buffer distance of one mile was used on either side of the transportation corridor. Actual buffer distances will vary depending on the nature and quantity of the release, whether the release occurred during the night or daytime, and prevailing weather conditions.

Populations at Risk

To determine the populations at risk from a transportation-related hazardous materials release within identified transportation corridors, an analysis was performed using GIS. A one-mile buffer was applied to both sides of Highways 10, 50, 71, and 287, and the Atchison, Topeka, & Santa Fe (AT&SF) and the Victoria Southern & Towner Railroads, creating two-mile buffer zones around each corridor. US Census 2000 population data, aggregated by census block, was acquired from HAZUS-MH. An intersection was performed between the census data and the transportation buffers. If any part of the census block touched the transportation buffer zone, the entire block was included in the buffer zone. Table 4.47 shows populations within each transportation corridor that are at greatest risk to transportation-related hazardous materials releases. Figure 4.45 illustrate these corridors and their corresponding population densities. More information on county specific populations can be found in each CPE.

Table 4.47. Populations in Transportation Corridor

Transportation Corridor	Corridor Length (miles)	Cities	Population Unincorporated	County Totals
State Highway 10	29	1,967	1,176	3,143
State Highway 71	33	1,234	868	2,102
U.S. Highway 287	115	11,804	1,692	13,496
U.S. Highway 50	119	25,458	8,418	33,876
AT & SF Railroad	328	28,334	8,905	37,239

Source: US Census Bureau, AMEC

Critical Facilities at Risk

In order to identify those critical facilities at risk to a hazardous materials release within identified corridors, an analysis was performed using GIS software. The same buffer was applied to the population at risk. An intersect was performed between critical facilities and the transportation buffers. Table 4.48 summarizes the critical facilities located within a transportation corridor that are at risk to transportation related hazardous materials releases. More detailed information may be found in each CPE.

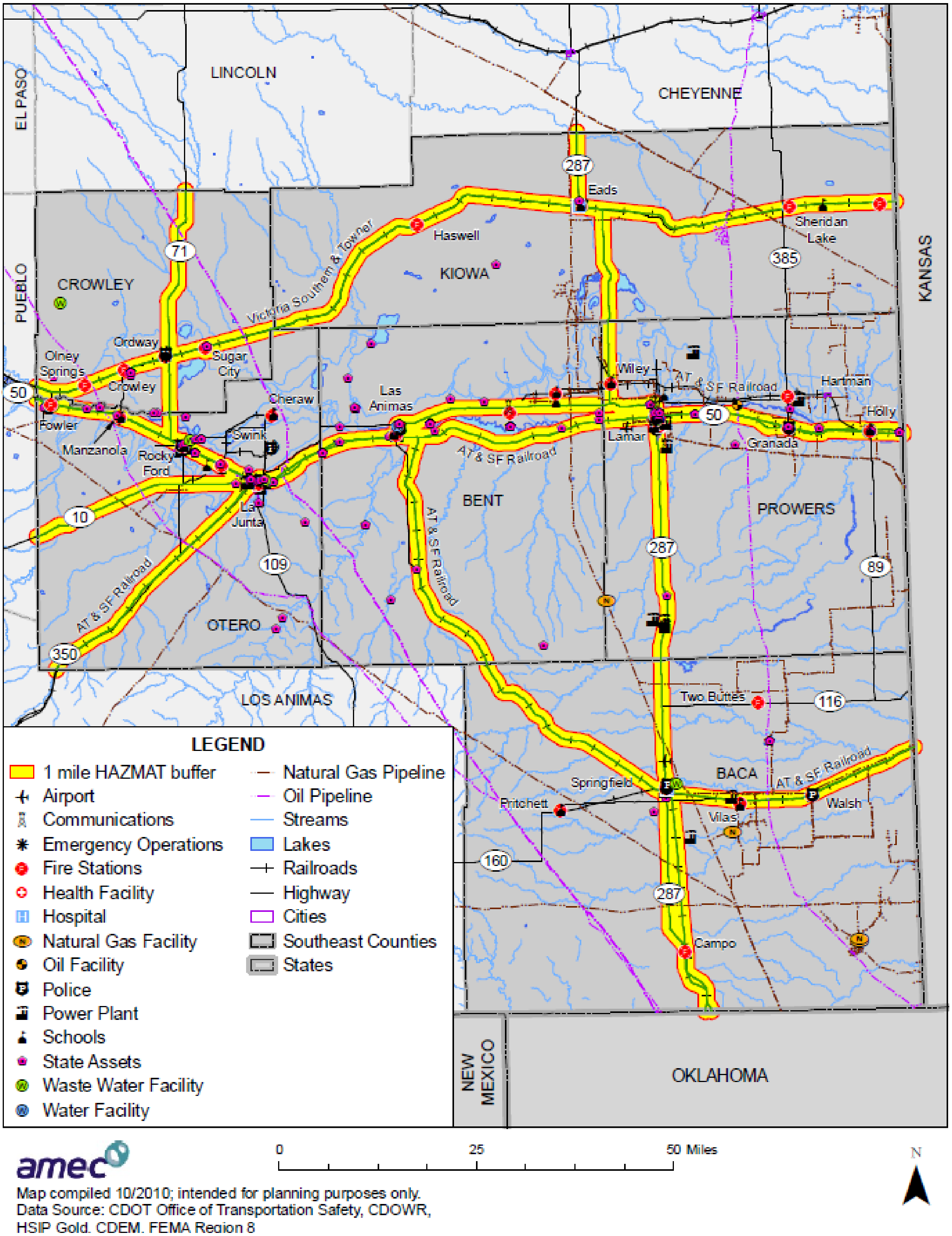
Table 4.48. Critical Facilities in Transportation Corridor

Facility Type	City	Unincorporated	Total County
State Highway 10			
Communications	-	3	3
Health Facility	1	-	1
Power Plant	-	9	9
School	1	-	1
State Assets	10	1	11
Total – Hwy 10	**12**	**13**	**25**
State Highway 71			
Emergency Operations	1	-	1
Fire Station	1	-	1
Police	1	-	1
Schools	3	-	3
State Assets	-	5	5
Waste Water Facility	-	1	1
Total – Hwy 71	**6**	**6**	**12**
U.S. Highway 287			
Airport	-	2	2
Communications	-	1	1
Emergency Operations	3	-	3
Fire Stations	6	-	6
HAZMAT	2	1	3
Health Facility	1	-	1
Hospitals	2	-	2
Police	7	-	7
Power Plants	13	7	20
Schools	17	-	17
State Assets	42	7	49
Waste Water Facility	1	-	1
Total – Hwy 287	**94**	**18**	**112**
U.S. Highway 50			
Communications	-	5	5
Emergency Operations	2	-	2
Fire Stations	10	1	11
HAZMAT	2	-	2
Health Facility	1	-	1
Oil Facility	-	1	1
Police	11	1	12

Facility Type	City	Unincorporated	Total County
Power Plants	20	10	30
Schools	30	2	32
State Assets	57	196	253
Waste Water Facility	2	1	3
Water Facility	-	1	1
Total – Hwy 50	**135**	**218**	**353**
AT & SF Railroad			
Airport	-	2	2
Communications	-	3	3
Emergency Operations	3	-	3
Fire Stations	14	-	14
HAZMAT	2	1	3
Health Facility	1	-	1
Hospital	1	-	1
Oil Facility	-	1	1
Police	14	2	16
Power Plants	25	12	37
Schools	41	1	42
State Assets	59	89	148
Waste Water Facility	2	1	3
Water Facility	-	1	1
Total –AT&SF	**162**	**113**	**275**
Victoria Southern & Towner Railroad			
Emergency Operations	2	-	2
Fire Stations	6	2	8
Hospitals	1	-	1
Police	2	-	2
Schools	6	2	8
State Assets	4	38	42
Waste Water Facility	-	1	1
Total – Victoria Southern	**21**	**43**	**64**

Source: FEMA Region VIII, HSIP Gold, CDEM

Figure 4.48. Critical Facilities along Transportation Corridors in the Planning Area



Future Development

Future development in the planning area will increase the number of people exposed to possible hazardous materials incidents. Continued training for emergency response personnel, as well as the implementation of reverse 911 systems, can greatly reduce risks to people in spill zones. Continued public education to the risks and amount of hazardous materials either fixed in or traveling through the planning area will also reduce risks to public safety.

Pandemic and Zoonotic Diseases

Existing Development

Planning Significance: Medium

Hantavirus, Rabies, Plague, and Tularemia are expected to have little to no impact on the planning area. West Nile Virus has and will continue to have impacts on human health in the region. As of April 2009, there have been 151 illnesses and 2 human deaths in the 6 county planning area since 2003. There are several strategies being utilized in combating West Nile virus; spraying areas where mosquitoes breed, inoculating horses and livestock in areas where the virus has been confirmed, general public education, and wearing clothing that minimizes exposure of the skin. Tracking expenses related to combating West Nile Virus is difficult, primarily because the cost of inoculations is borne by the owner of the livestock, and record keeping of the distribution and use of the vaccine is sketchy.

Pandemic flu has and will continue to have impacts on human health in the region. A flu pandemic occurs when a new influenza A virus emerges for which there is little or no immunity in the human population; the virus causes serious illness and spreads easily from person-to-person worldwide. There are several strategies that public health officials can use to combat pandemic flu. Constant surveillance regarding current pandemic flu, use of infection control techniques, and administration of vaccines once they become available. Citizens can help prevent spread of pandemic flu by staying home, or “self-quarantining,” if they suspect they are infected.

Future Development

Future development is not expected to be significantly impacted by this hazard, though population growth in each county could increase exposure to West Nile Virus and pandemic flu, and increase the ability of each disease to be transmitted among the population of the planning area. If the median age of County residents continues to increase, vulnerability to pandemic and zoonotic diseases may increase, due to the fact that these diseases are more deadly to senior citizens.

Chapter 5 MITIGATION STRATEGY

.Requirement §201.6(c)(3): [The plan shall include] a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.

This section describes the mitigation strategy process and mitigation action plan for the Southeast Colorado Multi-Hazard Mitigation Plan. This section describes how the Region accomplished Phase 3 of FEMA's 4-phase guidance—Develop the Mitigation Plan—and includes the following from the 10-step planning process:

- Planning Step 6: Set Goals
- Planning Step 7: Review Possible Activities
- Planning Step 8: Draft an Action Plan

5.1 Plan Goals

Requirement §201.6(c)(3)(i): [The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

Up to this point in the planning process, the Hazard Mitigation Planning Committee (HMPC) has organized resources, assessed hazards and risks, and documented mitigation capabilities. The resulting goals, objectives, and mitigation actions were developed based on these tasks. The HMPC held a series of meetings and exercises designed to achieve a collaborative mitigation strategy as described further throughout this section.

During the initial goal-setting meeting, AMEC reviewed the results of the hazard identification, vulnerability assessment, and capability assessment with the HMPC. This analysis of the risk assessment identified areas where improvements could be made and provided the framework for the HMPC to formulate planning goals and objectives and the ultimate mitigation strategy for the planning area.

Goals were defined for the purpose of this mitigation plan as broad-based public policy statements that:

- Represent basic desires of the community;
- Encompass all aspects of community, public and private;
- Are nonspecific, in that they refer to the quality (not the quantity) of the outcome;
- Are future-oriented, in that they are achievable in the future; and
- Are time-independent, in that they are not scheduled events.

Goals are stated without regard to implementation. Implementation cost, schedule, and means are not considered. Goals are defined before considering how to accomplish them so that they are not dependent on the means of achievement. Goal statements form the basis for objectives and actions that will be used as means to achieve the goals. Objectives (policies) define strategies to attain the goals and are more specific and measurable.

HMPC members were given a list of sample goals to consider. They were told that they could use, combine, or revise the statements provided or develop new ones, keeping the risk assessment in mind. Each member was each given three index cards and asked to write a goal statement on each card. Goal statements were collected and grouped into similar themes and pasted onto the wall of the meeting room. The goal statements were then grouped into similar topics. New goals from the HMPC were discussed until the team came to consensus. Some of the statements were determined to be better suited as objectives or actual mitigation actions and were set aside for later use. Next, the HMPC developed objectives that summarized strategies to achieve each goal.

Based on the risk assessment review and goal setting process, the HMPC identified the following goals, objectives, and policies, which provide the direction for reducing future hazard-related losses within the planning area.

5.1.1 Goals and Objectives

1. MAINTAIN FEMA ELIGIBILITY/POSITION COMMUNITIES FOR FEDERAL MITIGATION FUNDING

1.1. Develop and Adopt this DMA Plan

1.1.1. Attend the County Subcommittee Meetings
1.1.2. Provide Data Regarding Hazards, Losses, and Existing Capabilities
1.1.3. Review and Comment Upon the Drafts
1.1.4. Stimulate and Participate in the Public Input Process
1.1.5. Advise and Schedule Plan Adoption with Appropriate Authority

2. IMPROVE COUNTY CAPABILITY TO REDUCE DISASTER LOSSES

2.1. Have Each County Certified as “Storm Ready” by NWS

2.1.1. Coordinate with National Weather Service (NWS)
2.1.2. Seek NOAA Weather Radio Repeaters
2.1.3. Identify Other Program Requirement Needs
2.1.3.1. Communications Equipment

2.2. Improve Local Flood Protection Programs (where appropriate)

2.2.1. Promote National Flood Insurance Program (NFIP) Participation
2.2.2. Promote Public Awareness of Flood Hazard Areas & Potential Losses
2.2.3. Promote Flood Insurance

2.2.4. Seek Improved Floodplain Mapping

2.3. Coordinate Planning Requirements and Community Plans

2.3.1. Disaster Plans

2.3.1.1. Local Emergency Operations Plans

2.3.1.2. Homeland Security Plans

2.3.1.2.1. Bioterrorism/Health Department Plans

2.3.1.2.2. WMD/Terrorism Plans

2.3.2. Hazardous Materials and LEPC Plans

2.3.2.1. Materials Transported through the County

2.3.2.2. Materials Stored in the County

2.3.2.3. Materials Manufactured in the County

2.3.3. Regional Transportation Plans

2.3.3.1. CDOT

2.3.4. County Comprehensive Plans

2.4. Reduce Damage to and Maintain Functionality of Critical Facilities and Infrastructure.*

3. REDUCE LOSS OF LIFE, PROPERTY DAMAGES, AND ECONOMIC IMPACTS FROM HAZARDS

3.1. Reduce Losses from Drought

3.1.1. Improve Water Supply

3.1.2. Seek Grazing on CRP Land

3.1.3. Use Low-Water Crops

3.2. Reduce Losses from Flood

3.2.1. Promote Flood Insurance

3.2.2. Sponsor Cost-Effective Site-Specific Projects

3.3. Reduce Losses from Tornadoes/Wind storms

3.3.1. Improve Warning

3.3.2. Promote “Safe-Rooms” and Other Shelters

3.3.3. Promote Erosion Mitigation Techniques

3.4. Reduce Agricultural Losses Hazards

3.4.1. Promote Crop Insurance

3.5. Reduce Losses from Wildfires*

3.6. Reduce Losses from Winter Storms*

3.7. Reduce Losses from Other Hazards Identified in This Plan, Where Practical and Feasible*

4. INCREASE PUBLIC AWARENESS OF POTENTIAL HAZARD LOSSES

4.1. Sponsor an Annual Public Education Project

4.1.1. Have an "Awareness" Week

4.1.1.1. Show Hazard Maps, List Past Losses, Explain Insurance Availability/Cost

4.1.1.2. Use Billing "Stuffers," County Fair, Websites, Newsletters, Radio, Newspapers, 4-H Clubs

4.1.2. Target Specific Areas (floodplains)

5.2 Identification and Analysis of Mitigation Actions

Requirement §201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

In order to identify and select mitigation measures to support the mitigation goals, each hazard identified in Section 4.1 Identifying Hazards was evaluated. Only those hazards that pose a significant threat to the community were considered further in the development of hazard specific mitigation measures. The hazard and capabilities data collection supports the goals, objectives and recommended actions in these ways:

These priority hazards (in alphabetical order) are shown in each County Planning Element. Each County eliminated certain hazards from further consideration in the development of mitigation actions because the risk of a hazard event in the County is unlikely or nonexistent, the vulnerability of the County is low, or capabilities are already in place to mitigate negative impacts. The eliminated hazards are shown in each County Planning Element.

Once it was determined which hazards warranted the development of specific mitigation actions, the HMPC analyzed viable mitigation options that supported the identified goals and objectives. The HMPC was provided with the following list of categories of mitigation actions, which originate from the Community Rating System:

- Prevention
- Property protection
- Structural projects
- Natural resource protection
- Emergency services
- Public information

The HMPC was also provided with examples of potential mitigation action alternatives for each of the above categories. The HMPC was also instructed to consider both future and existing buildings in considering possible mitigation actions. A facilitated discussion then took place to examine and analyze the options. Also utilized in the review of possible mitigation measures is FEMA's publication on Mitigation Ideas, by hazard type. This was followed by a brainstorming session that generated a list of preferred mitigation actions by hazard.

Continued Compliance with the National Flood Insurance Program

The counties in the Region recognize the importance of the availability of flood insurance to citizens. Each NFIP participating county and municipality has and will continue to make every effort to remain in good standing with NFIP. This includes continuing to comply with the NFIP's standards for updating and adopting floodplain maps and maintaining the floodplain zoning ordinance. There are several action items identified in this plan in the County Planning Elements that address specifics related to NFIP continued compliance. Participants in the NFIP are shown in Table 5.1.

Table 5.1. NFIP Participants in SE Colorado

County	Jurisdiction*	Participates in NFIP	Date Joined NFIP	Date of FIRM map
Baca County	Unincorporated County	N	–	–
	Town of Springfield	N	–	–
	Town of Walsh	Y	6/30/1976	–
	Town of Pritchett	N	–	–
Bent County	Unincorporated County	Y	5/1/1989	5/1/1989
	City of Las Animas	Y	7/10/1985	–
Crowley County	Unincorporated County	N	–	–
	Town of Crowley	Y	12/11/1985	–
	Town of Ordway	Y	12/18/1985	12/18/1985
	Town of Olney Springs	N	–	–
	Town of Sugar City	N	–	–
Kiowa County	Unincorporated County	N	–	–
Otero County	Unincorporated County	Y	8/19/1985	8/19/1985
	City of La Junta	Y	12/1/1982	12/1/1982
Prowers County	Unincorporated County	Y	7/1/1986	7/1/1986
	City of Lamar	Y	11/17/1982	11/17/1982
	Town of Granada	Y	9/24/1984	8/24/1984
	Town of Hartman	N	–	–
	Town of Holly	Y	5/20/1983	–
	Town of Wiley	Y	10/6/2000	9/6/2000

Source: FEMA
*Only participating jurisdictions to this plan (as shown in each County Planning Element) are included in this table. There are no non-participating jurisdictions to this plan that participate in the NFIP.

5.3 Mitigation Action Plan

Requirement §201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

This section outlines the development of the final mitigation action plan. The action plan consists of the specific projects, or actions, designed to meet the plan's goals. Over time the implementation of these projects will be tracked as a measure of demonstrated progress on meeting the plan's goals.

5.3.1 Prioritization Process

Once the mitigation actions were identified, the HMPC members were provided with several sets of decision-making tools, including FEMA's recommended criteria, STAPLE/E (which considers social, technical, administrative, political, legal, economic, and environmental constraints and benefits).

- Social: Does the measure treat people fairly?
- Technical: Will it work? (Does it solve the problem? Is it feasible?)
- Administrative: Is there capacity to implement and manage the project?
- Political: Who are the stakeholders? Did they get to participate? Is there public support? Is political leadership willing to support the project?
- Legal: Does your organization have the authority to implement? Is it legal? Are there liability implications?
- Economic: Is it cost-beneficial? Is there funding? Does it contribute to the local economy or economic development? Does it reduce direct property losses or indirect economic losses?
- Environmental: Does it comply with environmental regulations or have adverse environmental impacts?

In accordance with the DMA requirements, an emphasis was placed on the importance of a benefit-cost analysis in determining project priority (the 'economic' factor of STAPLE/E).

In accordance with the DMA requirements, the HMPC was asked to place an emphasis on the importance of a benefit-cost analysis in determining project priority (the 'economic' factor of STAPLEE). The action identification and prioritization process is the first step in laying-out, in broad terms, what needs to be done to minimize the occurrence and impact of natural hazards in the County. Costs identified with each action in many cases are preliminary, or generalized, to give an indication if the action can be accomplished with in-house resources, such as staff time, or will need outside funding sources and partners to implement. In some cases the detailed engineering studies, implementation costs, and benefit-cost analysis of specific projects will come at future points in the process. Additional discussion on this topic is included with each action item identified in the County Planning Elements.

Other criteria used to recommend what actions might be more important, more effective, or more likely to be implemented than another included:

- Does the action protect lives?
- Does the action address hazards or areas with the highest risk?
- Does the action protect critical facilities, infrastructure or community assets?
- Does the action meet multiple objectives (Multiple Objective Management)?

With these criteria in mind, team members were given a set of ten green sticky-dots. The team was asked to use the dots to prioritize projects with the above criteria in mind, essentially voting on the projects. The projects with the most dots became the higher priority projects. This process provided both consensus and priority for the recommendations. A sponsor for each new project was assigned and provided a Mitigation Action Worksheet to fill out with details on the action description, responsible office, cost, benefits, schedule, and priority.

Each county used the results of the data collection efforts to develop goals and prioritize their actions. The priorities differ from county to county. From county to county, additional priorities were developed based on past damages, existing exposure to risk, other community goals, and weaknesses identified by the individual county capability assessments.

The results of the project identification and prioritization are captured in each County Planning Element (CPE) including more detail about the action, including a description of the activity, the entity responsible for implementation, any other alternatives considered, a cost estimate, and a schedule for implementation.

Community Wildfire Protection Plans

During the writing of this hazard mitigation plan, emphasis was placed on wildfire hazard mitigation, driven in part by new legislation requiring county level Community Wildfire Protection Plans (CWPP). Integrating these two efforts has already begun in some counties and will continue in the region. Each County, in their respective CPE, has included actions from the CWPP efforts. These actions can be found in each CPE and in Table 5.1.

5.4 Mitigation Action Plan

Requirement §201.6(c)(3)(iii): [The mitigation strategy section shall include] an action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

This action plan was developed to present the recommendations developed by the HMPC for how the planning area can reduce the vulnerability of people, property, infrastructure, and natural and cultural resources to future disaster losses. Emphasis was placed on both future and existing development. The action plan summarizes who is responsible for implementing each of the prioritized actions as well as when and how the actions will be implemented.

Specific actions summaries are located at the end of each CPE. Each action summary also includes a discussion of the benefit-cost review conducted to meet the regulatory requirements of the Disaster Mitigation Act. This can be found in the Benefits (losses avoided) section of each action summary in each CPE. Table 5.1 identifies the mitigation actions and lead department for each action. One mitigation action, which is actually occurring outside the region, but that will affect many citizens in the region, is an electric line burial action. This action is shown at the beginning of Table 5.1, and is detailed immediately after the table.

It is important to note that each county has numerous existing, detailed action descriptions, which include benefit-cost estimates, in other planning documents, such as their capital improvement budgets and reports. The planning area also realizes that new needs and priorities may arise as a result of a disaster or other circumstances and reserves the right to support new actions, as necessary, as long as they conform to the overall goals of this plan.

Table 5.2. Mitigation Action Plan Table

Mitigation Action Title	Priority	Cost Estimate	Schedule	Responsible Party	Addresses Current Development	Addresses Future Development	Continued Compliance with NFIP
Regional Mitigation Actions							
Coordinate with Edison Power to Identify Strategies to Improve Power System Redundancies (or resilience), including Undergrounding Vulnerable Lines in Adjacent Counties.	H	$1,003,200	Within 5 years	Southeast Colorado Power Association	X	X	
Baca County							
Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program	H	Staff time, printing costs	Ongoing	Baca County Emergency Management	X	X	
Community Wildfire Protection Plans	M	TBD	Determined in the CWPP	Baca County Office of Emergency Management	X	X	
CWPP Projects as identified by the County's CWPP	M	TBD	Determined in the CWPP	Baca County Office of Emergency Management	X	X	
Firewise Outreach Message to appropriate audiences within the County CWPP Plan	M	TBD	Determined in the CWPP	Baca County Office of Emergency Management	X	X	
Develop ordinances to address burn permitting and restrictions	H	$8,500	July 2013 if funded in 2012	Baca County Office of Emergency Management	X	X	
Countywide fire district establishment	M	$20,000	Nov. 2013 if worked on heavily	Baca County Office of Emergency Management	X	X	
Install outdoor warning sirens in unincorporated towns in the county (Stonington, North Walsh)	H	$43,000	October 2013 if funded in early 2012	Baca County Office of Emergency Management	X	X	

Mitigation Action Title	Priority	Cost Estimate	Schedule	Responsible Party	Addresses Current Development	Addresses Future Development	Continued Compliance with NFIP
Educate residences on the importance of fire mitigation efforts around their houses /structures	H	$5,000	Next five years	Baca County Office of Emergency Management	X	X	
Educate the public on current fire conditions by public outreach and roadside signs.	H	$7,500	July 2013 if funded in 2012	Baca County Office of Emergency Management	X	X	
Street Identification Signs	H	$220,000	January 2013 if funded in 2012	Baca County Office of Emergency Management	X	X	
Address/House number identification	H	$30,000	January 2013 if funded in 2012	Baca County Office of Emergency Management	X	X	
NFPA 704 enforcement and education to Tier II facilities and others to identify locations of hazardous materials	H	$7,500	July 2013 if funded in 2012	Baca County Office of Emergency Management	X	X	
Public awareness of flooding potential, Ag infestation, Drought, Heat, Cold	H	$6,000	January 2013 if funded in 2012	Baca County Office of Emergency Management	X	X	X
Install River Gauges	M	$48,000	January 2013 if worked on heavily	Baca County Office of Emergency Management	X	X	
Weather radio placement in public places	H	$3,800	July 2013 if funded in 2012	Baca County Office of Emergency Management	X	X	
Tornado Shelter Designation and Education	H	$12,000	January 2013 if funds available in early 2012.	Baca County Office of Emergency Management	X	X	
Town of Pritchett							
Address/House number identification	H	$3,000	July 2013 if funded in 2012	Mayor's Office	X	X	
Street Identification Signs	M	$5,000	July 2013 if funded in 2012	Mayor's Office	X	X	
Tornado Shelter Designation and Education	H	$4,000	July 2013 if funded in 2012	Mayor's Office	X	X	

Mitigation Action Title	Priority	Cost Estimate	Schedule	Responsible Party	Addresses Current Development	Addresses Future Development	Continued Compliance with NFIP
Town of Springfield							
Street Identification Signs	M	TBD	July 2013 if funded in 2012	Mayor's Office	X	X	
Tornado Shelter Designation and Education	H	$1,200	July 2013 if funded in 2012	City Manager	X	X	
Build outdoor warning system to include the south Hwy 287 area	H	$18,000	October 2013 if funded in early 2012	Mayor's Office	X	X	
Town of Walsh							
Address/House number identification	H	$3,000	July 2013 if funded in 2012	Mayor's Office	X	X	
Street Identification Signs	M	$11,000	January 2013 if funded in 2012	Mayor's Office	X	X	
Public awareness of flooding potential, Ag infestation, Drought, Heat, Cold	H	$1,000	January 2013 if funded in 2012	Mayor's Office	X	X	
Tornado Shelter Designation and Education	H	$2,000	January 2013 if funded in 2012	Mayor's Office	X	X	
Bent County							
Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program	H	Staff time, printing costs	Ongoing	Bent County Emergency Management	X	X	X
CWPP Projects as identified by the County's CWPP	M	TBD	Determined in the CWPP	Bent County Office of Emergency Management	X	X	
Continue to Implement Sound Floodplain Management Practices through Participation in the National Flood Insurance Program (NFIP) and Updated Statewide Floodplain Rules	M	Staff time	Within 1 year	Bent County Office of Emergency Management	X	X	X
Maintain Ditches, Culverts, and Drainages in County Right-of-ways	M	Varies	Ongoing	Bent County County Commissioners' Office	X	X	

Mitigation Action Title	Priority	Cost Estimate	Schedule	Responsible Party	Addresses Current Development	Addresses Future Development	Continued Compliance with NFIP
Firewise Outreach Message to appropriate audiences within the County CWPP Plan	M	TBD	Determined in the CWPP	Bent County Office of Emergency Management	X	X	
Community Wildfire Protection Plans	M	TBD	Determined in the CWPP	Bent County Office of Emergency Management	X	X	
Arkansas River Conservancy District							
Armoring levy	M	TBD	Dependent on funding	Board of Directors, Arkansas River Conservancy District	X	X	
Amassing of Rip Rap	H	$50,000	Ongoing	Board of Directors, Arkansas River Conservancy District	X	X	
Removal of woody invasive species within levy narrow area.	M	TBD	Within 5 years	Board of Directors, Arkansas River Conservancy District	X	X	
Crowley County							
Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program	H	Staff time, printing costs	Ongoing	Crowley County Emergency Management	X	X	
Lane 27 drainage project	M	$1,441,800	Within 5 years	Crowley County Road & Bridge	X	X	
CWPP Projects as identified by the County's CWPP	M	TBD	Determined in the CWPP	Crowley County Emergency Management	X	X	
Firewise Outreach Message to appropriate audiences within the County CWPP Plan	M	TBD	Determined in the CWPP	Crowley County Emergency Management	X	X	
Community Wildfire Protection Plans	M	TBD	Determined in the CWPP	Crowley County Emergency Management	X	X	
Town of Ordway							
Ordway drainage project	M	$6,581	Within five years	Ordway Public Works Department	X	X	X
Kiowa County							

Mitigation Action Title	Priority	Cost Estimate	Schedule	Responsible Party	Addresses Current Development	Addresses Future Development	Continued Compliance with NFIP
Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program	H	Staff time, printing costs	Ongoing	Kiowa County Emergency Management	X	X	
CWPP Projects as identified by the County's CWPP	M	TBD	Determined in the CWPP	Kiowa County Fire Department	X		
Firewise Outreach Message to appropriate audiences within the County CWPP Plan	M	TBD	Determined in the CWPP	Kiowa County Fire Department	X	X	
Community Wildfire Protection Plans	M	TBD	Determined in the CWPP	Kiowa County Fire Department	X	X	
Eads/Kiowa County Fire Protection District	M	TBD	Within two years	Eads/Kiowa County Fire Department	X	X	
Eads Maine Street Drainage Improvements	M	$300,000	Within 5 years	Town of Eads	X	X	
Otero County							
Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program	H	Staff time, printing costs	Ongoing	Otero County Emergency Management	X	X	X
CWPP Projects as identified by the County's CWPP	M	TBD	Determined in the CWPP	Otero County Emergency Management	X	X	
Firewise Outreach Message to appropriate audiences within the County CWPP Plan	M	TBD	Determined in the CWPP	Otero County Emergency Management	X	X	
Community Wildfire Protection Plans	M	TBD	Determined in the CWPP	Otero County Emergency Management	X	X	
City of La Junta							
Flooding – Southwest La Junta Drainage and Roadway Improvements	H	$3,103,713.86	Dependent on funding.	City of La Junta Department of Engineering	X	X	X

Mitigation Action Title	Priority	Cost Estimate	Schedule	Responsible Party	Addresses Current Development	Addresses Future Development	Continued Compliance with NFIP
Storm Drain Backflow Prevention	M	$150,000	Currently the project is not scheduled. If funding was available it would take approximately 120 days to complete once the funding was secured.	City Engineer's Office	X	X	X
Continue to implement sound floodplain management practices	H	Staff Time	Dependent on funding.	City Engineer's Office	X	X	X
North La Junta Conservancy District							
Removal of tamarisk, Russian olive, and debris for better water river flow.	H	TBD	Ongoing	North La Junta Conservancy District	X	X	
Prowers County							
Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program	H	Staff time, printing costs	Ongoing	Prowers County Emergency Management	X	X	
Continue to Implement Sound Floodplain Management Practices through Participation in the National Flood Insurance Program (NFIP) and Updated Statewide Floodplain Rules	M	Staff time	Within 1 year	Prowers County Land Use	X	X	X
Community Wildfire Protection Plans	M	TBD	Determined in the CWPP	Prowers County Rural Fire Department	X	X	
CWPP Projects as identified by the County's CWPP	M	TBD	Determined in the CWPP	Prowers County Rural Fire Department	X	X	
Firewise Outreach Message to appropriate audiences within the County CWPP Plan	M	TBD	Determined in the CWPP	Prowers County Rural Fire Department	X	X	
Prowers County Stream Notification System	M	$70,000	When funding is available	Prowers County Office of Emergency Management	X	X	

Mitigation Action Title	Priority	Cost Estimate	Schedule	Responsible Party	Addresses Current Development	Addresses Future Development	Continued Compliance with NFIP
Critical Facilities Relocation Fire	H	$445,000	1 year after funding is obtained	Prowers County Rural Fire Department	X	X	
Prowers Fire District Establishment	H	$25,000	2 year after funding is obtained	Prowers County Rural Fire Department	X	X	
Prowers Fire All-Hazard Response Apparatus	H	$200,000	When funding is available	Prowers County Rural Fire Department	X	X	
Wiley CR 196 Bridge Project	H	$500,000	1st year update past engineering, 2 year project construction	Prowers County Office of Emergency Management	X	X	
Tornado Shelter	H	$2,500,000	1st year update past engineering, 2 year project construction	Prowers County Office of Emergency Management	X	X	
CR 196 Flood Project	M	$200,000	1st year update past engineering, 2 year project construction	Prowers County Office of Emergency Management	X	X	
Bristol Drainage Project	H	$350,000	1st year update past engineering, 2 year project construction	Prowers County Office of Emergency Management	X	X	
Town of Hartman							
Evaluate the Benefits of Joining the National Flood Insurance Program (NFIP)	H	Minimal	Within 1-2 years	Community planning/zoning/public works department	X	X	X
Town of Holly							
Holly Flood Control Dike	H	$250,000	1st year Prioritization of repairs, bid process for repairs, contracting for repairs. 2nd year contracting repairs completed	Holly Flood Control, Drainage, and Sanitation District and Prowers County OEM	X	X	X
City of Lamar							
Willow Creek Dike Project	H	$450,000	1st year update past engineering, 2 year project construction	City of Lamar Water and Waste	X	X	X
Parmenter East Storm Drainage Project	H	$1,323,600	1 year after funding is obtained.	City of Lamar Water and Waste	X	X	X
Lamar School District							

Mitigation Action Title	Priority	Cost Estimate	Schedule	Responsible Party	Addresses Current Development	Addresses Future Development	Continued Compliance with NFIP
Lightning Detection/Warning Systems	H	$60,000	As soon as funding is obtained	Lamar School District Maintenance	X	X	

1. *Coordinate with Edison Power to Identify Strategies to Improve Power System Redundancies (or resilience), including Undergrounding Vulnerable Lines in Adjacent Counties.*

Hazards Addressed: Winter storms, tornadoes, wildfire, wind storms

Issue/Background: 10 miles of over head electrical line needs to undergrounded due to high incidences of ice loading and outages as a result of damage to overhead structures and conductor. The lines that would be going underground are Southeast Colorado Power Association lines and would affect the SECAHR if they were to be damaged.

Other Alternatives: None

Existing Planning Mechanism(s) through which project will be implemented:

Responsible Office: Southeast Colorado Power Association

Priority (High, Medium, Low): High

Cost Estimate: $1,003,200

Benefits (avoided Losses): Due to the fact that this sections of line servicers about 300 consumers in this area most of which are elderly farmers and ranchers also the Edison School. When these lines go down due to heavy icing conditions it could be up to two weeks before power is restored. These lines have been damaged and repaired three times in the last two years. The lines that would be going underground are Southeast Colorado Power Association lines and would affect the SECAHR if they were to be damaged.

Potential funding: To be determined.

Schedule: Within 5 years

6 PLAN ADOPTION, IMPLEMENTATION, AND MAINTENANCE

6.1 Formal Plan Adoption

Requirement §201.6(c)(5): [The local hazard mitigation plan shall include] documentation that the plan has been formally approved by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, county commissioner, Tribal Council).

The purpose of formally adopting this plan is to secure buy-in from the participating jurisdictions, raise awareness of the plan, and formalize the plan's implementation. The adoption of this plan completes Planning Step 9 of the 10-step planning process: Adopt the Plan. The governing board for each participating jurisdiction has adopted this local hazard mitigation plan by passing a resolution. Over 17 "local governments," as defined by the DMA regulations have participated in this planning process and formally adopted this plan by resolution of their governing board, be it elected or appointed. Copies of the adoption process are included in Appendix C Records of Adoption.

6.2 Implementation

Requirement §201.6(c)(4): [The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.

Implementation and maintenance of the plan is critical to the overall success of hazard mitigation planning. This is Planning Step 10 of the 10-step planning process, and phase 4 of FEMA's 4 phase process. This section outlines how this plan will be implemented and updated. The chapter also discusses incorporating the plan into existing planning mechanisms and how to address continued public involvement.

Upon adoption, the plan faces the truest test of its worth: implementation. While this plan puts forth many worthwhile and "High" priority recommendations, the decision of which action to undertake first will be the first issue that the SECAHR faces. Fortunately, there are two factors that will help make that decision. First, there are high priority items for each participating county, so each county can pursue an action simultaneously, and eleven recommendations will begin to be addressed. Second, funding is always an issue. Thus, pursuing low or no-cost high-priority recommendations will have the greatest likelihood for success.

An example would be pursuing the education efforts necessary for elected officials and the general public as they relate to participation in the NFIP. Some communities need to join the NFIP and others need to significantly increase the existing amount of flood insurance coverage.

6.2.1 Incorporation into Existing Planning Mechanisms

Mitigation is most successful when it is incorporated into the day-to-day functions and priorities of government and development. An important implementation mechanism that is highly effective and low-cost is incorporation of the hazard mitigation plan recommendations and their underlying principles into other plans and mechanisms, such as the general plans for each county. The counties in the region already implements policies and programs to reduce losses to life and property from hazards. This plan builds upon the momentum developed through previous and related planning efforts and mitigation programs and recommends implementing actions, where possible, through these other program mechanisms.

Implementation will be accomplished by adhering to the schedules identified for each action and through constant, pervasive, and energetic efforts to network and highlight the multi-objective, win-win benefits to each program and the planning area. This effort is achieved through the routine actions of monitoring agendas, attending meetings, and promoting a safe, sustainable community. Additional mitigation strategies could include consistent and ongoing enforcement of existing policies and vigilant review of programs for coordination and multi-objective opportunities.

Simultaneous to these efforts, it is important to maintain a constant monitoring of funding opportunities that can be leveraged to implement some of the more costly recommended actions. This will include creating and maintaining a bank of ideas on how to meet local match or participation requirements. When funding does become available, each county in the planning area will be in a position to capitalize on the opportunity. Funding opportunities to be monitored include special pre- and post-disaster funds, special district budgeted funds, state and federal earmarked funds, and other grant programs, including those that can serve or support multi-objective applications.

6.2.2 Role of the Hazard Mitigation Planning Committee (HMPC) in Implementation and Maintenance

With adoption of this plan, the HMPC will the lead on plan implementation and maintenance. The HMPC will act as an advisory body. Its primary duty is to see the plan successfully carried out and to report to the community governing boards and the public on the status of plan implementation and mitigation opportunities. The HMPC agrees to:

- Act as a forum for hazard mitigation issues;
- Disseminate hazard mitigation ideas and activities to all participants;
- Pursue the implementation of high-priority, low/no-cost recommended actions;
- Keep the concept of mitigation in the forefront of community decision making by identifying plan recommendations when other community goals, plans, and activities overlap, influence, or directly affect increased community vulnerability to disasters;

- Maintain a vigilant monitoring of multi-objective cost-sharing opportunities to help the community implement the plan's recommended actions for which no current funding exists;
- Monitor and assist in implementation and updates to this plan;
- Report on plan progress and recommended changes to the respective Boards of County Commissioners; and
- Inform and solicit input from the public.

Other duties include reviewing and promoting mitigation proposals, considering stakeholder concerns about hazard mitigation, passing concerns on to appropriate entities, and posting relevant information on the County website and in local newspapers.

6.3 Maintenance

Plan maintenance implies an ongoing effort to monitor and evaluate the implementation of the plan, and to update the plan as progress, roadblocks, or changing circumstances are recognized.

6.3.1 Maintenance/Monitoring Schedule

This monitoring and updating will take place through an annual review by each county HMPC. This plan will be updated, approved, and adopted within a five-year cycle as per Requirement §201.6(c)(4)(i) of the Disaster Mitigation Act of 2000 unless disaster or other circumstances (e.g., changing regulations) lead to a different time frame. With the approval of this plan on March 2nd, 2012, the plan will need to be updated, re-approved by the Colorado Division of Emergency Management (CDEM) and FEMA Region VIII no later than March of 2016. Each County will submit a Pre-Disaster Mitigation planning grant application to the Colorado Division of Emergency Management (CDEM)/FEMA for funds to assist with the update. This grant should be submitted in 2012, as there is a three year performance period to expend the funds, plus there is no guarantee that the grant will be awarded when initially submitted. This allows time to resubmit the grant in 2013 or 2014 if needed. Updates to this plan will follow the most current FEMA and CDEM planning guidance.

When each county HMPC reconvenes for the review, they will coordinate with each jurisdiction that participated in the planning process – or that has joined the HMPC since the inception of the planning process – to update and revise the plan. Public notice will be given and public participation will be invited, at a minimum, through available web-postings and press releases to local media outlets, primarily newspapers and AM radio stations.

6.3.2 Maintenance Evaluation Process

The evaluation of the progress can be achieved by monitoring changes in the vulnerability identified in the plan. Changes in vulnerability can be identified by noting:

- Lessened vulnerability as a result of implementing recommended actions;

- Increased vulnerability as a result of failed or ineffective mitigation actions, and/or;
- Increased vulnerability as a result of new development (and/or annexation).

The updating of the plan will be by written changes and submissions, as the HMPC/SECAHR deems appropriate and necessary.

Updates to this plan will:

- Consider changes in vulnerability due to project implementation;
- Document success stories where mitigation efforts have proven effective;
- Document areas where mitigation actions were not effective;
- Document any new hazards that may arise or were previously overlooked;
- Document hazard events and impacts that occurred within the five-year period;
- Incorporate new data or studies on hazards and risks;
- Incorporate new capabilities or changes in capabilities;
- Incorporate documentation of continued public involvement;
- Incorporate documentation to update the planning process that may include new or additional stakeholder involvement;
- Incorporate growth and development-related changes to building inventories;
- Incorporate new project recommendations or changes in project prioritization;
- Include a public involvement process to receive public comment on the updated plan prior to submitting the updated plan to CDEM/FEMA; and
- Include re-adoption by all participating entities following CDEM/FEMA approval.

6.3.3 Continued Public Involvement

Continued public involvement is imperative to the overall success of the plan's implementation. The update process provides an opportunity to solicit participation from new and existing stakeholders and to publicize success stores from the plan implementation and seek additional public comment. The plan maintenance and update process will include continued public and stakeholder involvement and input through attendance at designated committee meetings, web postings, press releases to local media, and through public hearings.

When the HMPC reconvenes for the update, they will coordinate with all stakeholders participating in the planning process—including those that joined the committee since the planning process began—to update and revise the plan. In reconvening, the HMPC plans to identify a public outreach subcommittee, which will be responsible for coordinating the activities necessary to involve the greater public. The subcommittee will develop a plan for public involvement and will be responsible for disseminating information through a variety of media channels detailing the plan update process. As part of this effort, a series of public meetings will be held and public comments will be solicited on the plan update draft.

7 INTRODUCTION TO THE COUNTY PLANNING ELEMENTS

7.1 Introduction

This plan contains separate County Planning Elements (CPE) that presents data specifically related to each county within the planning area. Each CPE is structured with the same format. The following is an explanation of the template and what each data set represents. The county specific vulnerability assessment and capability assessment are in each CPE. This formatting was developed to prevent the reader from having to go back and forth between risk assessment data found in Chapter 4 of the base plan and county specifics, and to provide each county with their own, separate, 'pull-out' section of the plan for easier and more functional use.

7.1.1 County Planning Committee

This section begins with a list of the entities that participated in the planning process. The list identifies the County, the incorporated municipalities, and the other "local governments" as defined in the DMA regulations, which are seeking FEMA approval by their having participated in the planning process. In some instances, the County Emergency Manager submitted data and information on behalf of a jurisdiction or special district located in the Emergency Manager's County. Proxy authorization forms authorizing the County Emergency Manager were filled out by any jurisdiction wanting to be represented by the County Emergency Manager. These completed Proxy Authorization Forms are shown in Appendix B.

7.1.2 County Profile

The general description paragraph details the number of square miles in the county, the 2000 population of the county, 2010 Colorado State Demographer's estimate (if available) the 2000 population density of the county -- per square mile, and the rate of population growth in the county between the 2000 census and 2010 population estimates. Other pertinent census demographic information such as housing density, median income, educational attainment, disability, and spoken languages was included as well. Due to the rural and agricultural nature of the counties in the planning area, farm census data was included as well. If other interesting information was provided describing the county it was included in this section.

7.1.3 Previous Planning Efforts (Prowers County only)

In 2003, Prowers County submitted, a hazard mitigation plan to CDEM and FEMA and received approval from both agencies. As part of that plan, mitigation actions were identified for inclusion in the plan. This section of the Prowers County Annex describes progress using the following language:

2011 Update: For actions identified in 2003, the statement here explains the status of progress made on the action, or an explanation on why little or no progress has been made.

7.1.4 Hazard Identification and Summary

Each County's planning team identified the hazards that affect the County and summarized their frequency of occurrence, special extent, potential magnitude, and significance specific to the County. This information is presented in Table 1 in each CPE. If participating jurisdictions denoted different risks from hazards than the county, their information follows Table 1 in each CPE.

Disaster Declaration and Hazard History

This section presents county specific federal, state, and USDA disaster declarations. A hazard summary from two national hazard databases, the National Climactic Data Center (NCDC) and the Spatial Hazards Events and Losses Database for the United States (SHELDUS), for each County is presented in respective tables detailing each hazard's frequency of occurrence during the 1950-2009 (NCDC) or 1960-2009 (SHELDUS) time frame.

7.1.5 County Vulnerability Assessment

The intent of this section is to assess each county's vulnerability separate from that of the planning area as a whole, which has already been assessed in Section 4.3 Vulnerability Assessment in the main plan. This vulnerability assessment analyzes the population, property, and other assets at risk to hazards ranked of medium or high significance that may vary from other parts of the planning area.

Assets at Risk

This section identifies a county's assets at risk, including values at risk, critical facilities and infrastructure, historic assets, economic assets, and growth and development trends. The data source used was the HAZUS-MR4 databases, developed by FEMA. The figures are included because many of the hazards present an equal risk across the entire county. It is unlikely, and unexpected, that a natural hazard would destroy the total value of property within a county. However, because the counties cannot determine where a hazard will strike in each county, and which property/infrastructure or what percent of property/infrastructure will be impacted, listing the total value of the property/infrastructure at risk was deemed the most reasonable approach of detailing "what is at risk." Floods are one of the sole hazards addressed in this plan where each county can determine where they will strike, what will be impacted, and a reasonable estimate of the value of the damage. This is why each NFIP participating community conducted a detailed floodplain inventory.

Critical Facilities Inventory

An inventory of critical facilities located each county are presented here. The best available data for critical facilities came from multiple sources. HSIP Gold 2008 (Homeland Security Infrastructure Program) was obtained through FEMA Region VIII. Within this dataset FEMA Region VIII updated emergency operations, fire stations, hospitals, natural gas facilities, oil facilities, police stations, power plants, and schools. Other layers within the HSIP Gold 2008 dataset has a source of HAZUS-MH MR4 and HSIP Gold 2007, which include airports, bridges, communications, dams, health facilities, HAZMAT facilities, waste water facilities, and water facilities. State Assets were obtained from CDEM (Colorado Division of Emergency Management).

In addition to the critical facilities mapped in GIS, each county, in their Data Collection Guide, identified assets important to the community. These assets include critical facilities and infrastructure; natural, cultural, and historical assets; and economic assets. These facilities are listed, but are not mapped.

Historic Assets in each County

This provides a listing of the sites registered on either the federal or state Register of Historic Places. This is included because it is important for communities to have an awareness of cultural resources that could be impacted by natural hazards, and because if they are, the rules for repairing and rebuilding historic structures differ from others. Not having an inventory of historic resources available when disaster strikes can prolong a community's recovery and aggravate economic recovery.

Natural Assets in each County

Information from the U.S. Fish and Wildlife Service and the Colorado Division of Wildlife, a program that inventories the status and locations of rare plants and animals in Colorado, was combined to create an inventory of special-status species for each county. Natural resources are important to include in benefit-cost analyses for future projects and may be used to leverage additional funding for mitigation projects that also contribute to community goals for protecting sensitive natural resources. Awareness of natural assets can lead to opportunities for meeting multiple objectives. For instance, protecting wetlands areas protects sensitive habitat as well as stores and reduces the force of floodwaters.

Development Trends in the County

Clearly, mitigation is most effective in protecting development that doesn't yet exist. Knowing a community's development trends, when juxtaposed with the hazard analysis, is a valuable information tool that can provide direction, incentive and alternatives to placing new development at risk from natural hazards. This section describes the development trends within each county, where discernable.

Individual Hazard Vulnerability Assessments

A county specific vulnerability assessment was performed for each county in the planning area.

7.1.6 County Capability Assessment

The purpose of this section of the planning process is to determine what policies, programs, regulations, and other mechanisms each County, and the incorporated communities, already have in place that either contribute to, or hinder the ability to mitigate the effects of natural hazards.

The Hazard Identification section identifies those hazards that have, or could, adversely affect the jurisdictions. The Vulnerability Assessment then estimates the impacts that those hazards could have. This section quantifies what protective measures and practices exist and lessen those impacts --- leaving a net vulnerability upon which the plan's goals and objectives are based. Additionally, the analysis of the existing capabilities also allows the identification of those practices which may actually increase the impacts of hazards upon the communities.

Each county, in their respective 2010 Data Collection Guides, identified three types of mitigation capabilities:

- Regulatory Mitigation Capabilities – lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in each county or participating jurisdiction.
- Administrative/Technical Mitigation Capabilities – identifies the County personnel responsible for activities related to mitigation and loss prevention in each county or participating jurisdiction.
- Fiscal Mitigation Capabilities – identifies financial tools or resources that could potentially use to help fund mitigation activities each county or participating jurisdiction..

The true value of a mitigation capability assessment is in its analysis. For this plan, each county presents a good first effort, as exemplified by the inventory they have completed. This is an ongoing process that will continue with the implementation and maintenance of this plan.

Additional Capabilities in the County

Each County HMPC filled out a 2010 Data Collection Guide which allowed each County to identify mitigation capabilities that existed in each county prior to the development of this regional hazard mitigation plan.

Additional Vulnerabilities in the County

Each County CPS filled out a 2010 Data Collection Guide. In it, the County's identified additional vulnerabilities or trends that may augment or exacerbate the hazards the County faces. These additional vulnerabilities are noted here, as applicable.

7.1.7 County Recommendations

The final section of each CPE puts forth the recommended actions of the County HMPC. Each recommendation is presented in a similar format:

Action Item: A brief statement of what is needed.

Issue/Background: An explanation of why the recommended action is important.

Other Alternatives: Identifies possible other solutions to the problem that the recommended action seeks to resolve.

Responsible Office: Identifies what person, position, department or agency has the initial lead responsibility for implementation. This could include a range of activities from identifying and applying for appropriate grants, to gathering the technical data needed for project development, or simply extending an invitation for technical assistance.

Priority: A general statement of relative degree of importance, usually from a range of high, medium and low. The assignment of priorities changes from action to action and could be based upon the potential impact if the action is not taken, pressing regulatory requirements, ease of implementation, potential availability of funding, or any combination of these factors.

Cost Estimate: Where costs are known, they are presented here.

Benefits (losses avoided): A statement of why the HMPC believes these recommended actions would be cost-effective to pursue. In most cases, this is a generic description, as it is fully expected that any project being seriously considered for implementation will need to detail project costs and benefits, and due to the scope of this plan, and the constant fluctuation in project costs and values that help determine benefits, a detailed analysis is not undertaken at this point in the planning process.

Potential Funding: Potential sources of funding and/or local matches are also identified when known or considered.

Schedule: An estimate of completion time for each action is given. This is the county's estimate of when the action item will be complete. Funding issues and future disaster may alter the schedule. The county provides a "best estimate" here.

BENT COUNTY PLANNING ELEMENT

1 Bent County Planning Committee

The following entities participated in the DMA planning process through the Bent County Planning committee. More details on the planning process followed and how the County, municipalities and stakeholders participated can be referenced in Chapter 3 of the base plan. Additional details on what local government departments participated and who represented them are listed in Appendix B.

- Bent County
- Arkansas River Conservancy District

2 Bent County Profile

Bent County is located in the southeastern region of the State in the high plains and is primarily agricultural. The land area of the County is 1,541 square miles, with 27 square miles of water. According to the 2000 U.S. Census, the population for the County was 5,998. The 2010 population estimate from the Department of Local Affairs is 6,265. The estimated average density for the County is 4.1 people per square mile. The County grew at a rate of 4.4% between 2000 and 2010. There are 2,366 housing units in the County. The median age in the County is 37.3 years. 5.8% of the population is under the age of 5 and 15.9% of the population is over the age of 65. The average household size is 2.53, and the average family size is 2.97. 77.2% of the population over the age of 25 holds at least a high school degree and 11.5% hold a bachelors level degree or higher. 25.1% of the population (over age 5) holds disability status, and 16.8% speak a language other than English in the home. 16.6% of all families live below the poverty level, and 19.5% of individuals live below poverty level. The County is a rural county located on the southeastern plains of Colorado. The largest city in the County is Las Animas, which also serves as the County Seat. The County is typical of the mid-western plains, with a rural orientation and solid agricultural basis. The Census of Agriculture reports 311 farms in the County with 877,142 total acres of farmland. The average farm size is 2,820 acres. A base map of the County can be referenced in Figure 2.

3 Hazard Identification and Summary

Bent County's planning team identified the hazards that affect the County and summarized their geographic extent, probability of future of occurrence, potential magnitude, and significance specific to the County. This information is presented in Table 1 and Table 2. A detailed description of each hazard can be found in Section 4.2 Hazard Profiles of the main plan.

Table 1 Bent County District Hazard Summary

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/Severity	Significance
Agriculture Infestation	Significant	Highly Likely	Catastrophic	High
Dam/Levee Failure	Extensive	Likely	Catastrophic	High
Drought	Extensive	Occasional	Critical	High
Earthquake	Limited	Unlikely	Limited	Low
Extreme Temperatures: Heat	Extensive	Highly Likely	Limited	Low
Extreme Temperatures: Cold	Extensive	Highly Likely	Limited	Low
Flood: 100/500 –Year	Extensive	Likely	Catastrophic	High
Flood: Stormwater/Flash Flooding	Significant	Highly Likely	Limited	Medium
Severe Weather: Thunderstorms/Lightning/Hail	Limited	Highly Likely	Critical	High
Stream Bank Erosion/ Stability	Limited	Highly Likely	Limited	Medium
Subsidence	Limited	Unlikely	Negligible	Low
Tornadoes	Extensive	Likely	Catastrophic	High
Wildfire	Limited	Occasional	Limited	Medium
Wind Storms	Extensive	Highly Likely	Limited	Medium
Winter Storms	Extensive	Highly Likely	Critical	High
Civil Unrest	Limited	Occasional	Limited	Medium
Cyber Hazards	Limited	Occasional	Negligible	Low
Hazardous Materials	Limited	Likely	Catastrophic	Medium
Pandemic	Significant	Occasional	Negligible	Low

Geographic Extent
Limited: Less than 10% of planning area
Significant: 10-50% of planning area
Extensive: 50-100% of planning area

Probability of Future Occurrences
Highly Likely: Near 100% chance of occurrence in next year, or happens every year.
Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less.
Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Magnitude/Severity
Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths
Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability
Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability
Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid

Significance
Low: minimal potential impact
Medium: moderate potential impact
High: widespread potential impact

Table 2 Arkansas River Conservancy District Hazard Summary

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/Severity	Significance
Agriculture Infestation	Extensive	Highly Likely	Catastrophic	Low
Dam/Levee Failure	Extensive	Likely	Catastrophic	High
Drought	Extensive	Occasional	Negligible	Low
Earthquake	Limited	Unlikely	Limited	Low
Extreme Temperatures: Heat	Extensive	Highly Likely	Negligible	Low
Extreme Temperatures: Cold	Extensive	Highly Likely	Negligible	Low
Flood: 100/500 –Year	Extensive	Likely	Catastrophic	High
Flood: Stormwater/Flash Flooding	Extensive	Likely	Catastrophic	High
Severe Weather: Thunderstorms/Lightning/Hail	Extensive	Highly Likely	Limited	Medium
Stream Bank Erosion/ Stability	Extensive	Highly Likely	Catastrophic	High
Subsidence	Limited	Unlikely	Catastrophic	High
Tornadoes	Extensive	Likely	Negligible	Low
Wildfire	Limited	Occasional	Limited	Medium
Wind Storms	Extensive	Likely	Negligible	Low
Winter Storms	Extensive	Likely	Negligible	Low
Civil Unrest	Limited	Occasional	Limited	Low
Cyber Hazards	Limited	Occasional	Negligible	Low
Hazardous Materials	Extensive	Likely	Negligible	Low
Pandemic	Significant	Occasional	Negligible	Low

Geographic Extent
Limited: Less than 10% of planning area
Significant: 10-50% of planning area
Extensive: 50-100% of planning area

Probability of Future Occurrences
Highly Likely: Near 100% chance of occurrence in next year, or happens every year.
Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less.
Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Magnitude/Severity
Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths
Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability
Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability
Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid

Significance
Low: minimal potential impact
Medium: moderate potential impact
High: widespread potential impact

3.1 Disaster Declaration History

One method the planning committee used to identify hazards was the researching of past events that triggered federal and/or state emergency or disaster declarations in the planning area. Federal and/or state disaster declarations may be granted when the severity and magnitude of an

event surpasses the ability of the local government to respond and recover. Disaster assistance is supplemental and sequential. When the local government's capacity has been surpassed, a state disaster declaration may be issued, allowing for the provision of state assistance. Should the disaster be so severe that both the local and state governments' capacities are exceeded, a federal emergency or disaster declaration may be issued allowing for the provision of federal assistance.

The federal government may issue a disaster declaration through FEMA, the U.S. Department of Agriculture (USDA), and/or the Small Business Administration (SBA). FEMA also issues emergency declarations, which are more limited in scope and without the long-term federal recovery programs of major disaster declarations. The quantity and types of damage are the determining factors. Federal, state, and USDA disaster declarations for the County are listed in Table 3.

Table 3 Bent County Disaster and Emergency Declarations, 1955-2010

Year	Declaring Jurisdiction	Disaster Type
2009	State of Colorado*	Severe Blizzard
2009	State of Colorado*	Severe Spring Snowstorm
2008	USDA – Secretarial Designation (S2750)	Drought
2007	Federal – Emergency (3271-EM, 3270-EM)	Snow
2006	State of Colorado	Snow
2006	USDA – Secretarial Designation (S2329)	Heat, high winds, insect pests, late freeze, drought
2005	Federal – Emergency (3224-EM)	Hurricane Katrina Evacuation
2003	USDA – Secretarial Designation (S1797)	Drought
2002	State of Colorado*	Snow Emergency
2002	State of Colorado*	Drought
2002	State of Colorado*	Wildfires
2002	USDA – Secretarial Designation (S1643)	Drought
2001	Federal – Major Disaster (1374-DR)	Severe Winter Storms
2000	USDA – Secretarial Designation (S1498)	Drought, High Winds, Lightning
1999	Federal – Major Disaster (1276-DR)	Flooding
1999	State of Colorado	Flooding, Landslides, Mudslides
1995-1996	USDA – Secretarial Designation (S999)	Drought
1977	Federal – Major Disaster	Drought
1965	Federal – Major Disaster (200-DR)	Tornadoes, Severe Storms, and Flooding

Source: Colorado State Hazard Mitigation Plan; Colorado Governor's Office website, Federal Emergency Management Agency, PERI Presidential Disaster Declaration Site; U.S. Department of Agriculture.
*All counties in the state were proclaimed disaster areas by the Governor.

3.2 National Severe Weather Databases

The National Oceanic and Atmospheric Administration's National Climatic Data Center (NCDC) has been tracking severe weather since 1950. Their Storm Events Database tracks severe weather events on a county basis and contains data on the following: all weather events from 1993 to current (except from 6/1993-7/1993); and additional data from the Storm Prediction Center, which includes tornadoes (1950-1992), thunderstorm winds (1955-1992), and hail (1955-1992). This database contains 197 severe weather events that occurred in Bent County between January 1, 1950, and April 31, 2010. Table 4 summarizes these events.

Table 4 NCDC Hazard Events Report for Bent County

Type	# of Events	Property Loss ($)	Crop Loss ($)	Deaths	Injuries
Blizzard	2	0	0	0	0
Flash Flood	8	0	0	0	0
Funnel Cloud	4	0	0	0	0
Hail	101	6,201,000	3,100,000	0	0
High Wind	9	100,000	0	0	0
Ice Storm	1	0	0	0	0
Microburst Winds	1	0	0	0	0
Thunderstorm Winds	31	315,000	0	0	0
Tornado	35	1,480,000	0	0	0
Wildfire/Forest Fire	2	60,000	0	0	0
Winter Storm	3	0	0	0	0
Totals	**197**	**8,156,000**	**3,100,000**	**0**	**0**

Source: NCDC

The HMPC supplemented NCDC data with data from SHELDUS (Spatial Hazard Events and Losses Database for the United States). SHELDUS is a county-level data set for the United States that tracks 18 types of natural hazard events along with associated property and crop losses, injuries, and fatalities for the period 1960-2005. Produced by the Hazards Research Lab at the University of South Carolina, this database combines information from several sources (including the NCDC). From 1960 to 1995, only those events that generated more than $50,000 in damage were included in SHELDUS. For events that covered multiple counties, the dollar losses, deaths, and injuries were equally divided among the affected counties (e.g., if four counties were affected, then a quarter of the dollar losses, injuries, and deaths were attributed to each county). From 1995 to 2005, all events that were reported by the NCDC with a specific dollar amount are included in SHELDUS.

SHELDUS contains information on 184 severe weather events that occurred in Bent County between 1960 and 2009. Table 5 summarizes these events.

Table 5 SHELDUS Hazard Events for Bent County,1960-2009

Hazard	Number	Injuries	Fatalities	Property Damage	Crop Damage
Drought	2	0	0	0	2,193,396
Flooding	1	0	0	381,818.20	327,272.70
Flooding –Severe Storm/Thunder Storm – Winter Weather	1	0	0	793.65	0
Fog – Winter Weather	1	0	0	22,727.27	0
Hail	14	0	0	6,332,094	3,246,190
Hail – Lightning	1	.08	0	41.67	4,166.70
Hail - Lightning - Severe Storm/Thunder Storm	1	0	0	416.67	4,166.67
Hail - Lightning - Wind	3	.17	0	2,395.84	23,958.34
Hail - Severe Storm/Thunder Storm	12	.08	0	102,464,60	479,227.90
Hail - Severe Storm/Thunder Storm - Tornado	1	0	0	333.33	333.33
Hail - Severe Storm/Thunder Storm – Wind	6	0	0	8,143.53	77,310.20
Hail - Severe Storm/Thunder Storm - Winter Weather	1	0	0	1,923.08	0
Hail - Wind	8	.25	0	17,079.56	132,045.50
Lightning	3	.1	0	550	0
Lightning - Severe Storm/Thunder Storm	1	.07	0	172.41	0
Lightning - Wind	2	0	0	176.58	4,166.67
Lightning - Winter Weather	1	0	0	416.67	0
Severe Storm/Thunder Storm	9	0	.08	535,414.90	959,166.70
Severe Storm/Thunder Storm - Wind	6	1	1	265,000	0
Severe Storm/Thunder Storm - Wind - Winter Weather	1	0	0	79.37	0
Tornado	10	8	0	1,387,425	0
Tornado – Wind	1	0	0	5,000	0
Wind	49	7.03	0	1,403,899	259,783.50
Wind - Winter Weather	20	.06	.18	266,870.8	185,112.80
Winter Weather	29	0.75	.27	1,200,131	2,597,848
Totals	**184**	**17.59**	**1.53**	**11,935,426.53**	**10,494,145.01**

Source: SHELDUS, Hazards Research Lab, University of South Carolina, www.sheldus.org/
Events may have occurred over multiple counties, so damage may represent only a fraction of the total event damage and may not be specific to Bent County.

The NCDC and SHELDUS tables above summarize severe weather events that occurred in Orange County. Only a few of the events actually resulted in state and federal disaster declarations. It is interesting to note that different data sources capture different events during the same time period, and often different information specific to the same events. While the HMPC recognizes these inconsistencies, it is the value this data provides in depicting the County's "big picture" hazard environment.

4 Bent County Vulnerability Assessment

The intent of this section is to assess the County's vulnerability separate from that of the planning area as a whole, which has already been assessed in Section 4.3 Vulnerability Assessment in the main plan. This vulnerability assessment analyzes the population, property, and other assets at risk to hazards ranked of medium or high significance that may vary from other parts of the planning area. For more information about how hazards affect the Region as a whole, see Chapter 4 Risk Assessment in the main plan.

4.1 Assets at Risk

This section identifies the County's assets at risk, including values at risk, critical facilities and infrastructure, historic assets, economic assets, and growth and development trends. The data source used was the HAZUS-MR4 databases. The HAZUS building exposure (includes building counts, value of building structure and contents) is shown in Table 6. A breakdown of the building count by type can be found in Table 7.

Table 6 Bent County Building Exposure

City	Population	Building Count	Building Exposure ($)	Building Content ($)	Total Exposure
Las Animas	2,753	1,832	159,311,000	101,640,000	260,951,000
Unincorporated	3,245	1,734	147,391,000	87,948,000	235,339,000
Total	**5,998**	**3,566**	**306,702,000**	**189,588,000**	**496,290,000**

Table 7 Bent County Building Exposure By Type

Occupancy Type	Building Count	Value ($)
Agriculture	47	5,326
Commercial	102	29,994
Education	6	5,979
Government	11	8,641
Industrial	17	8,393
Religion	16	9,301
Residential	3,367	121,954
Total	3,566	189,588

Critical Facilities and Infrastructure

The best available data for critical facilities came from multiple sources: HSIP Gold 2008 (Homeland Security Infrastructure Program) was obtained through FEMA Region VIII. Within this dataset FEMA Region VIII updated emergency operations, fire stations, hospitals, natural gas facilities, oil facilities, police stations, power plants, and schools. Other layers within the HSIP Gold 2008 dataset has a source of HAZUS-MH MR4 and HSIP Gold 2007, which include Airports, Bridges, Communications, Dams, Health Facilities, HAZMAT facilities, Waste Water Facilities, and Water Facilities. State Assets were obtained from CDEM (Colorado Division of Emergency Management). State Assets are symbolized with one symbol on the maps but are comprised of these flooded assets: Animal science, containment structures, dept of corrections, education, fish hatcheries, garages, monitoring stations, museums, national monuments, offices, power plants, recreation facilities, residence/housing, restrooms, sheds, shops, State Patrol, storage, utilities and workforce centers.

An inventory of critical facilities in Bent County is provided below in Table 8. The table includes data from available national and statewide GIS resources (locations are illustrated in Figure 2) supplemented with information from the County planning committee.

Table 8 Critical Facilities Inventory

Facility Type	Facility Count
Bridges	70
Bridges – Scour Critical	4
Communications Facilities	1
Dams	5
Emergency Operations Centers	1
Fire Stations	3
Police Stations	2
Power Plants	6
Schools	7
State Assets	169
Waste Water Facilities	1
Total	**269**

Source: HSIP Gold 2008, HAZUS MR4, CDEM

Locally Determined Facilities

In addition to the critical facilities mapped in GIS, Bent County and the Hasty-McClave Fire Protection District, in their Data Collection Guide, identified the following assets as important to the community. These assets include critical facilities and infrastructure; natural, cultural, and historical assets; and economic assets.

Table 9 Bent County Asset Inventory

Name of Asset	Type	Replacement Value	Occupancy/ Capacity #	Comments
Medical Clinic	Private	$350,000	30	
Police Department	Public	$250,000	15	
Jail/Sherriff's Office/ County EOC	Public	$6,000,000	75	
Power Plant	Public	$10,000,000	10	
Levy	Public	$10,000,000	N/A	
Schools	Public	$20,000,000	800	2 districts combined
Nursing Home/Day Care	Public	$15,000,000	100	
County Buildings	Public	$10,000,000	300	
City Building	Public	$5,000,000	300	
Water Treatment Plant	Public	$5,000,000	N/A	
Highways	Public	N/A	N/A	
Railroad	Private	N/A	N/A	
Gas Pipelines	Private	N/A	N/A	
Cell Towers	Private	N/A	N/A	
Propane/Anhydrous Tank Farms	Private	N/A	N/A	

Table 10 Hasty-McClave Fire Protection District Asset Inventory

Name of Asset	Type	Replacement Value	Occupancy/ Capacity #	Comments
Beef City	Private	N/A	8	
Reyher Enterprises	Private	N/A	5	
McClave Bank	Private	N/A	10	
McClave Post Officer	Public	N/A	5	
McClave School	Public	N/A	325	
Kasza Brothers Fuels	Public	N/A	4	
McClave Fire Station	Public	$500,000	30	
US Army Corps of Engineers	Public	N/A	8	
John Martin State Park	Public	N/A	1200	
Hasty Post Office	Public	N/A	4	
Hasty Fire Station	Public	$1,500,000	30	
Wind Farm	Private	$115,000,000	9	
Gas Pipelines	Private	N/A	N/A	

Name of Asset	Type	Replacement Value	Occupancy/ Capacity #	Comments
BNSF Railroad	Private	N/A	N/A	

The City of Springfield identified the following assets as important to the community. These assets include critical facilities and infrastructure; natural, cultural, and historical assets; and economic assets.

- Police and Fire Station
- Municipal Power Plant
- Municipal Government Building
- Airport
- Water Wells
- Wastewater Treatment Facility

Historic and Natural Assets

Assessing the vulnerability of the Bent County to disaster also involves inventorying the historic, cultural, and natural assets of the area. This step is important for the following reasons:

- The community may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.
- If these resources are impacted by a disaster, knowing so ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts are higher.
- The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.
- Natural resources can have beneficial functions that reduce the impacts of natural hazards, for example, wetlands and riparian habitat help absorb and attenuate floodwaters.

Historic Assets

The County has a stock of historically significant homes, public buildings, and landmarks. To inventory these resources, the planning committee collected information from a number of sources. The Colorado Historical Society's (CHS) Colorado State Register of Historic Properties was the primary source of information. The CHS is responsible for the administration of federally and state mandated historic preservation programs to further the identification, evaluation, registration, and protection of Colorado's irreplaceable archaeological and historical resources.

In addition, the National Register of Historic Places database was used. The National Register of Historic Places is the Nation's official list of cultural resources worthy of preservation. The National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect historic and archeological resources. Properties listed include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archeology, engineering, and culture. The National Register is administered by the National Park Service, which is part of the U.S. Department of the Interior.

Historical resources included in the programs above are identified in Table 11.

Table 11 Bent County Historic Properties

Property	Location	National Register	State Register
Bent County Courthouse & Jail	725 Carson, Las Animas	1/2/1976,	5BN.99
Boggsville	Colo. Hwy. 101, south of Las Animas	10/24/1986,	5BN.363
Fort Lyon	Junction of Bent County Rd. 15 and Fort Lyon Gate Rd., Las Animas vicinity	5/5/2004	5BN.117
Graham House	505 Locust Ave. Las Animas	-	5BN.453
I.O.O.F. Hall, Lodge No. 11	560 Bent Ave. Las Animas	-	5BN.466
KING Solomon's Lodge Masonic Temple	506 Carson Ave. Las Animas	-	5BN.452
Las Animas Christian Church	502 Locust Las Animas	-	5BN.449
Las Animas Post Office	513 6th St. Las Animas	1/16/2008	5BN.591
Las Animas Santa Fe Railroad Depot	333 8th St. Las Animas	-	5BN.415
Prowers Bridge	County Rd. 34 Prowers	National Register 2/4/1985,	5BN.374

Source: Colorado State Register of Historic Properties

Natural Assets

Natural resources are important to include in benefit-cost analyses for future projects and may be used to leverage additional funding for mitigation projects that also contribute to community goals for protecting sensitive natural resources. Awareness of natural assets can lead to opportunities for meeting multiple objectives. For instance, protecting wetlands areas protects sensitive habitat as well as stores and reduces the force of floodwaters.

Information from the U.S. Fish and Wildlife Service and the Colorado Division of Wildlife, a program that inventories the status and locations of rare plants and animals in Colorado, was combined to create an inventory of special-status species in Bent County. Table 12 lists national and state endangered, threatened, rare, and candidate species in the County by species type.

Table 12 Sensitive Plant and Animal Species in the Planning Area

Group	Name	Population	Status	Lead Office	Recovery Plan Name	Recovery Plan Stage
Birds	Arctic peregrine Falcon (Falco peregrinus tundrius)		Recovery			
Birds	Mountain plover (Charadrius montanus)		Proposed Threatened			
Birds	Piping Plover (Charadrius melodus)	except Great Lakes watershed	Threatened	Office Of The Regional Director	Piping Plover Atlantic Coast Population Revised Recovery Plan	Final Revision 1
Birds	Piping Plover (Charadrius melodus)	except Great Lakes watershed	Threatened	Office Of The Regional Director	Great Lakes & Northern Great Plains Piping Plover	Final
Birds	Least tern (Sterna antillarum)	interior pop.	Endangered	Columbia Ecological Services Field Office	Least Tern (Interior Pop.)	Final
Birds	Lesser prairie-chicken (Tympanuchus pallidicinctus)		Candidate	Oklahoma Ecological Services Field Office		

Source: US Fish and Wildlife Service, Colorado Division of Wildlife

Development Trends

Growth in the City of Las Animas is currently stagnant. No growth is expected in the unincorporated County.

4.2 Agricultural Infestation Vulnerability Assessment

Agriculture is an important aspect of the County's economy. The following discussion analyzes the potential losses from floods using HAZUS and multiple hazards from federal crop insurance records.

Crop Insurance Analysis

Federal Crop Insurance Data represents losses from multiple hazards that could include: agricultural infestation, flooding, drought, hailstorms, temperature extremes, tornados, wildfires and straight-line winds. Average annual claims payout amount to $659,553 in the County. More details are provided in Table 13 and 14.

Table 13 Bent County Premium and Crop Loss Data for Federal Crop Insurance 1980-2009

Liability (Amount of Coverage)	Total Premium	Federal Premium Subsidy	Farmer-paid Premium	Amount Paid in Claims	Average Amount Paid Annually in Claims
64,771,402	11,111,045	6,215,913	4,895,132	19,786,587	659,553

Source: Risk Management Agency

Table 14 Bent County Provisional Data (claim data unavailable as 2010 claims are not fully reported)

Liability (Amount of Coverage)	Total Premium	Federal Premium Subsidy	Farmer-paid Premium
6,897,081	1,283,757	794,926	488,831

Source: Risk Management Agency

Flood Analysis

HAZUS Methodology for Agricultural Economic Loss

The HAZUS Flood Model is determined by the relationships between the depth of flood and the annual chance of flood inundation to that depth. The primary elements that contribute to flood losses are depth, duration and velocity of the water in the floodplain. The other risks with flooding that assist with flood loss are channel erosion and migration, sediment deposition, bridge scour and the impact of flood-borne debris.

The agriculture component of the HAZUS Flood Model estimated a range of losses to barley, corn, corn silage, oats, and wheat. These crops were the only crops identified by the HAZUS model to have loss within the region of study. The model assumes a short duration and slow rise flood when estimating losses and does not account for high velocity flash floods. Loss estimates are based on United States Army Corp of Engineers (USACE) damage modifiers. The HAZUS-MH impact analysis predicts a loss estimate value by crop for flow time intervals. The first is a loss estimate for the day of the fixed event; the remaining three are for 3, 7 and 14 days following the event.

The agricultural products in Bent County that show economic loss are corn and wheat. Corn's total loss is $6,792,863 and wheat's total loss is $5,013,250. The total loss of these products is $11,806,113.

Table 15 Bent County Direct Economic Loss for Agricultural Products

Agricultural Product	Crop Loss Day 0 ($)	Crop Loss Day 3 ($)	Crop Loss Day 7 ($)	Crop Loss Day 14 ($)	Total Loss ($)
Corn	0	1,852,599	2,470,132	2,470,132	6,792,863
Wheat	0	1,367,250	1,823,000	1,823,000	5,013,250
Total	0	3,219,849	4,293,132	4,293,132	11,806,113

Source: HAZUS-MH MR4

4.3 Dam and Levee Failure Vulnerability Assessment

According to HAZUS MR4, there is 2 high and no significant hazard dams in the County. Table 16 indicates how dam failure risk varies among communities in the County. The locations of these dams are shown in Figure 1.

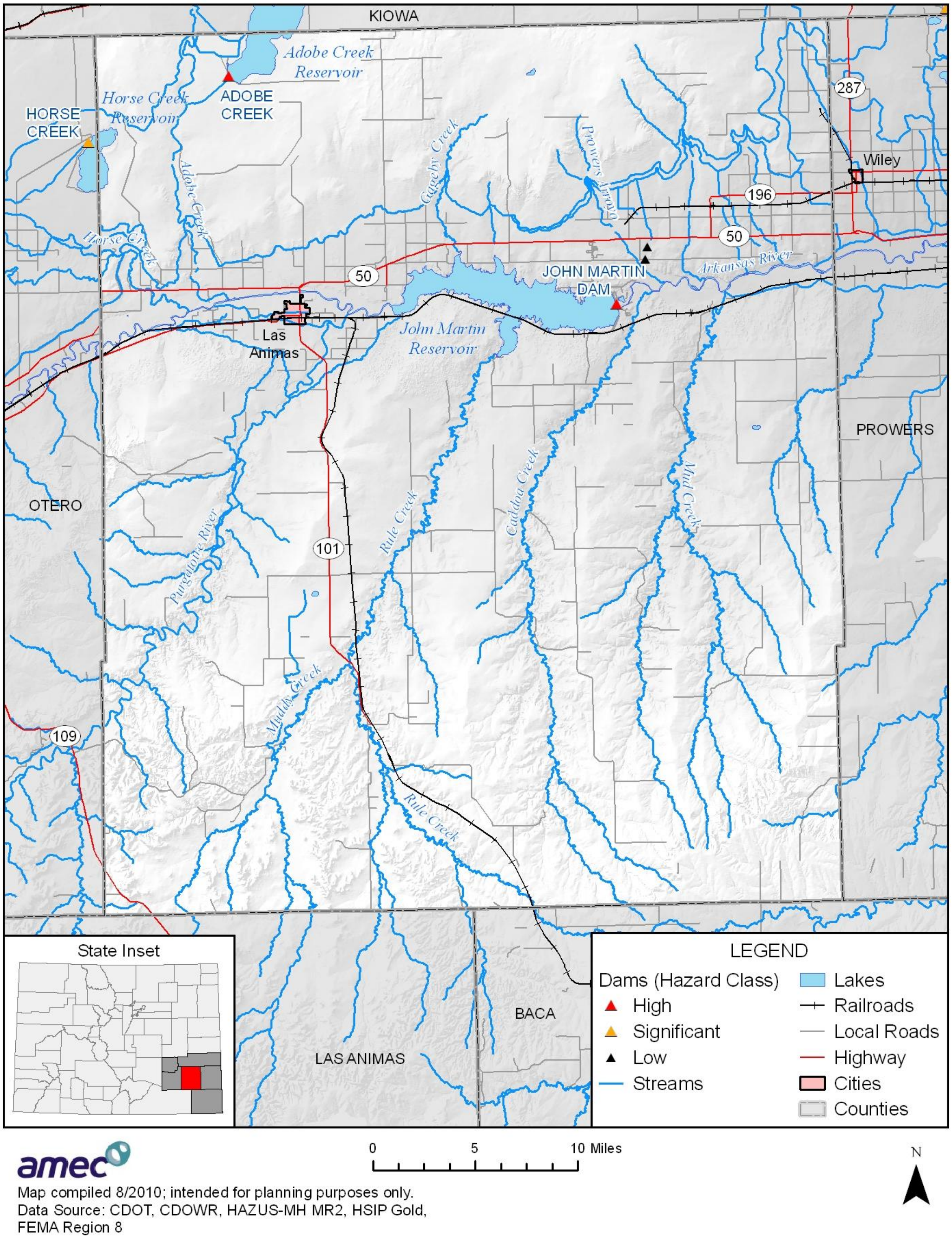
Table 16 Hazardous Dams in Bent County

Dam Name	Max Storage (acre ft)	Dam Hazard	Downstream Community	Miles to Community	Relative Downstream Impacts
John Martin Dam and Reservoir CO01283	608,245	High	Lamar	20	Catastrophic
Adobe Creek CO00515	85,000	High	Las Animas	15	Limited

Source: HAZUS MR4

The City of Las Animas is protected by levees. The HAZUS flood modeling does not take into account the existing levee protection, and thus the flood loss potential mentioned previously represents a levee failure event. The Las Animas levee protects the town from flooding on the Arkansas River.

Figure 1 Significant and High Hazard Dams in Bent County



4.4 Drought Vulnerability Assessment

Based on the County's recent multi-year droughts and Colorado's drought history, it is evident that the entire region is vulnerable to drought. With the majority land area in the County used for agricultural purposes, the County has significant exposure to this hazard. In addition to economic and public water supply impacts, soil erosion, dust, and wildfire hazard are also exacerbated by drought conditions. Bent County has been affected by the droughts in the years identified in Table 17.

Table 17 Drought Disaster and Emergency Declarations in Bent County

Year	Declaring Agency and Declaration Number
2008	USDA Secretarial Declaration S2750
2006	USDA Secretarial Declaration S2329
2003	USDA Secretarial Declaration S1797
2002	USDA Secretarial Declaration S1643 State of Colorado
2000	USDA Secretarial Declaration S1498
1995-1996	USDA Secretarial Declaration S999
1977	Federal – Major Disaster

Source: USDA, CDEM, FEMA

While the crop insurance loss data covers a variety of perils, it is indicative of the types of agricultural impacts that drought can have upon the planning area. Available crop insurance data indicates over $19 million has been paid to the County's agricultural landowners in insurance claims between 1980 and 2009. It is reasonable to assume that a significant amount of this is due to drought-related losses. While the crop insurance loss data covers a variety of perils, it is indicative of the types of agricultural impacts that drought can have upon the planning area. Assuming at least 50% of the losses are drought-related, an average annual loss estimate can be calculated. For the region this is calculated by ($19,786,000/2)/29years, which equates to over $340,000 in average annual agricultural losses for the County.

4.5 Flood Vulnerability Assessment (100/500-year and Localized)

The best available flood data for Bent County was generated by HAZUS-MH MR2, FEMA's software program for estimating potential losses from disasters. The 100-year floodplain was generated for major rivers and creeks in the county (those with a 10 square mile minimum drainage area). A USGS 30 meter resolution digital elevation model (DEM) was used as the terrain base in the model. HAZUS-MH produces a flood polygon and flood-depth grid that represents the base flood. While not as accurate as official flood maps, such as digital flood insurance rate maps, these floodplain boundaries are suitable for use in GIS-based loss estimation. Potential losses to the county were analyzed with HAZUS-MH, based on Census

Block-based buildings and population inventory and the flood hazard data. The following discussion, maps and tables presents the results of the loss estimation in more detail.

Figure 2 Bent County 100-year Floodplain and Critical Facilities Map

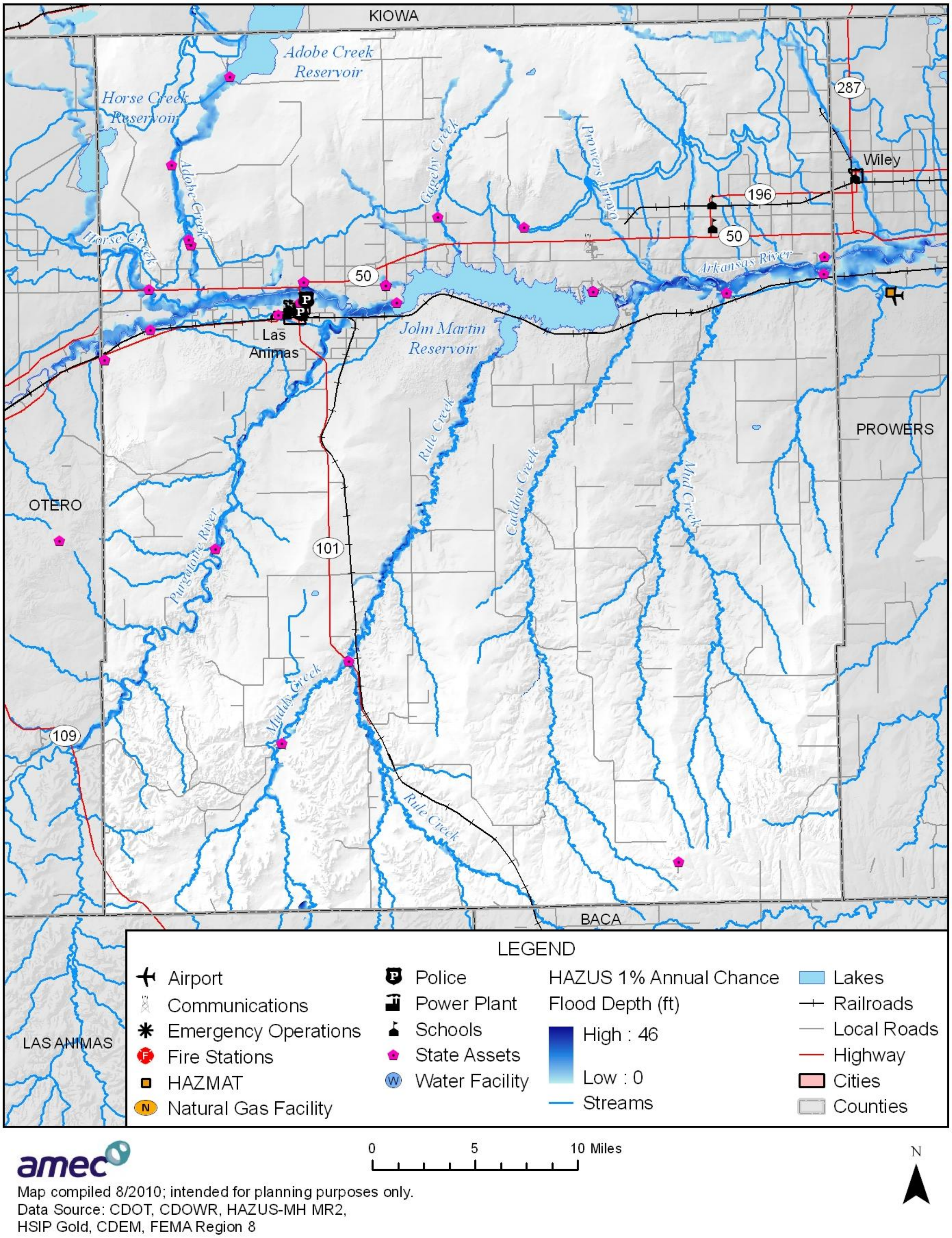
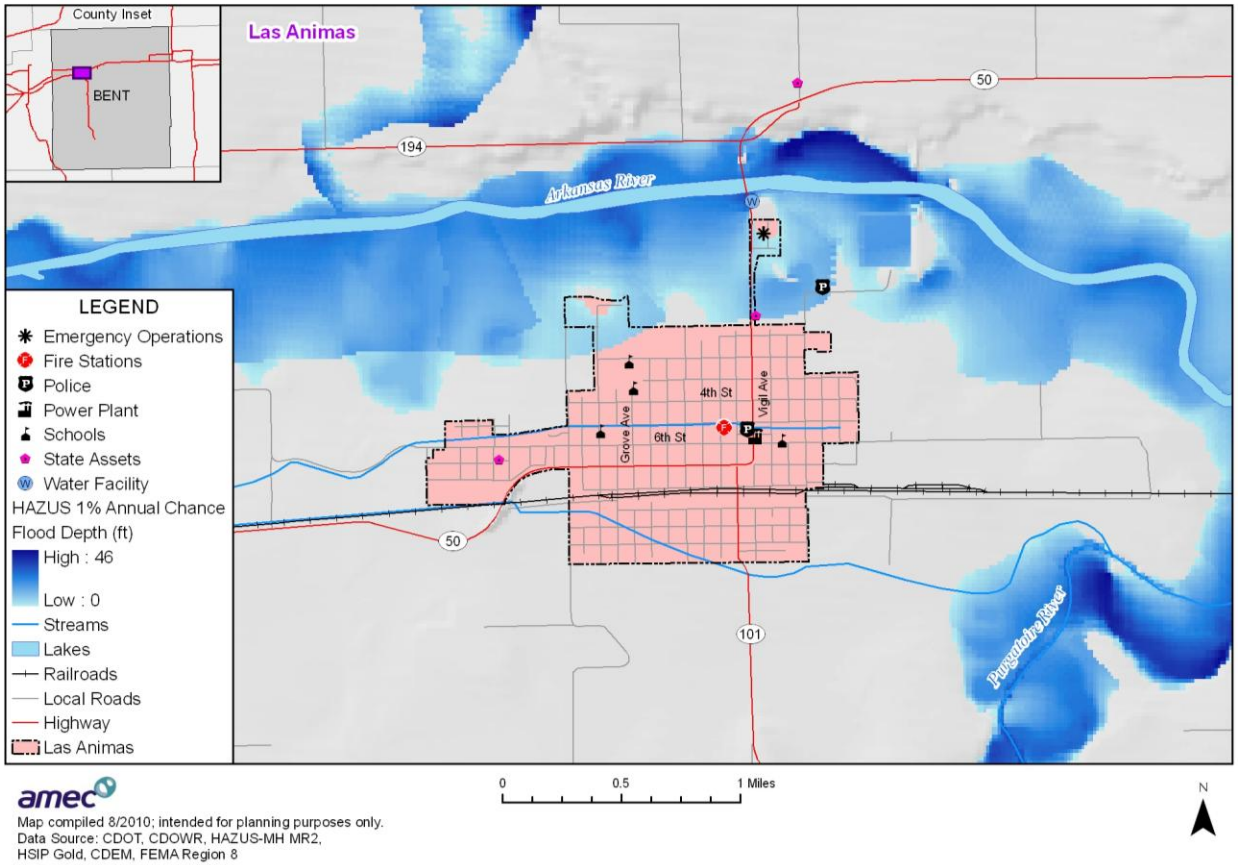


Figure 3 Bent County Cities 100-year Floodplain and Critical Facilities Map



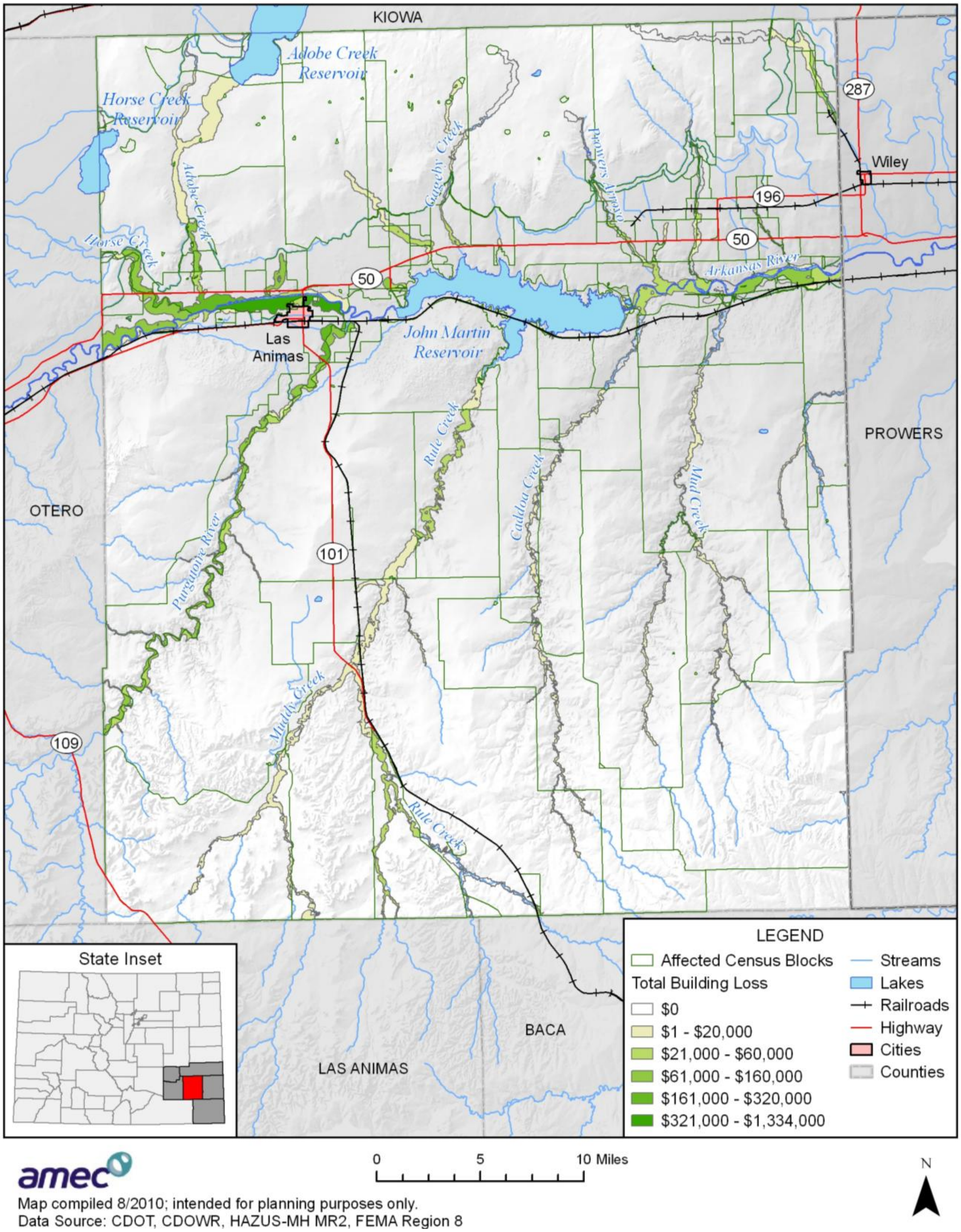
HAZUS-MH provides reports on the number of buildings impacted, estimates of the building repair costs, and the associated loss of building contents and business inventory. Building damage can cause additional losses to a community as a whole by restricting the building's ability to function properly. Income loss data accounts for business interruption and rental income losses as well as the resources associated with damage repair and job and housing losses. These losses are calculated by HAZUS-MH using a methodology based on the building damage estimates. Building damage is estimated by Census Block based on the average depth of flooding within a given Census Block. Flood damage is directly related to the depth of flooding. HAZUS-MH uses depth-damage functions to model the losses. For example, a two-foot flood generally results in about 20 percent damage to the structure (which translates to 20 percent of the structure's replacement value). To estimate the monetary loss for each city, the flooded Census Blocks were extracted, and the damage costs were totaled using GIS. This was done for each city and unincorporated area to illustrate how the risk varies across the planning area. The results of this analysis are shown in Table 18.

Table 18 Estimated Economic Losses from Flooding

Jurisdiction	Cost Building Damage	Cost Contents Damage	Inventory Loss	Relocation Loss	Capital Related Loss	Wage Loss	Total Loss	Percent of Total Loss	Loss Ratio
Las Animas	146,000	318,000	23,000	1,000	-	3,000	491,000	8.92%	0.19%
Unincorporated	2,685,000	2,208,000	104,000	4,000	3,000	7,000	5,012,000	91.08%	2.13%
Total	**2,831,000**	**2,526,000**	**127,000**	**5,000**	**3,000**	**10,000**	**5,503,000**	**100%**	**1.11%**

The building damage loss ratio shown in Table 18 is an indication of the community's ability to recover after an event. Building Damage Loss Ratio percent is calculated by taking the Building Structural Damage divided by Building Structural Value and then multiplying by 100. Loss ratio exceeding 10% are considered significant by FEMA. The area with the highest building damage loss ratio is the unincorporated County.

Figure 4 Bent County Building Loss in the 100-year Floodplain



According to HAZUS-MH, the City La Animas has the greatest flood risk and majority of the damage with $491,000. The map in Figure 4 displays the distribution of the flood loss by Census Block across the County. According to the map in Figure 3 the majority of potential flood impacts in the Unincorporated County is located on Arkansas River which is near the City of Las Animas to the north.

Floodplain Population Information

Should a 1% chance flood occur in the county, some residences would become uninhabitable during and after the flood. Table 19 shows the number of residents in Bent County who would be displaced or need shelter.

Table 19 Population Displaced by Flooding

Jurisdiction	Displaced Population	Population Needing Shelter
Las Animas	24	5
Unincorporated	274	64
Total	298	69

Critical Facilities

Critical facilities in the floodplain were determined using GIS, by selecting all critical facilities that fell within the floodplain. These are listed in Table 20 and shown on the maps in Figure 2 and Figure 3.

Table 20 Critical Facilities in the Floodplain

Location	Facility Type	Facility County
Unincorporated	Police	1
Unincorporated	State Assets	129
Total		**130**

Bent County Scour Critical Bridges

Included with HSIP Gold data is a database of bridges called the National Bridge Inventory developed by the Federal Highway Administration. Within the bridge layer one of the attribute items is a “scour index”, which is used to quantify the vulnerability of a bridge to scour during a flood. Bridges with scour index between 1 and 3 are considered “scour critical”, or a bridge with a foundation element determined to be unstable for the observed or evaluated scour condition.

There are 4 scour critical bridges in Bent County. They are all located on county, state and US highways that travel through Bent County. One scour critical bridge is located in the northeast of Bent County near Wiley on US 50 at the intersection of an unnamed creek. The other three scour critical bridges are located in the south of Las Animas. One is located on State Highway 101 at a Consolidated Ditch. The other two intersect Johnny Creek and Muddy Creek on county 10.

Table 21 Scour Critical Bridges

Name	Owner	Stream	Near City
County Road 10	County Highway Agency	Johnny Creek	Las Animas
County Road 10	County Highway Agency	Muddy Creek	Las Animas
State Highway 101	State Highway Agency	Consolidated Ditch	Las Animas
US 50	State Highway Agency	No Name	Wiley

NFIP Claims Analysis

Policies and Claims Information

Bent County joined the NFIP on May 1, 1989. The City of Las Animas joined the NFIP on July 10, 1985. As of July 31, 2010, there are currently 7 flood insurance policies in force in Bent County. The total amount of insurance in force is $938,500. There have been two flood claims in Bent County. The NFIP has paid out $2,689.25 to settle these claims. As of July 31, 2010, there are currently 2 flood insurance policies in force in the City of Las Animas. The total amount of insurance in force is $350,000. There have been no flood claims to date in the City of Las Animas.

Repetitive Loss Properties

There are no repetitive loss properties in Bent County.

Previous Occurrences

Previous occurrences of regional flooding can be found in Section 4.2.7 of the main plan. Flash flooding incidents affecting Bent County are reported below.

August 13, 1994 - 1.31 inches of rain fell in 30 minutes flooding a few basements in Las Animas.

July 29, 1997 - Heavy rains from thunderstorms produced flooding of roads and low spots around the town of Wiley in Prowers County and flooding of county roads around the town of Prowers in Bent County.

August 28, 2002 - Heavy rain from severe thunderstorms flooded areas from extreme northeast Bent County to Mud Creek and Caddoa Creek south of Highway 50.

August 5, 2004 - Very heavy rain from a slow moving thunderstorm resulted in water over 6 inches deep to flow over Highway 50 on the Bent-Otero County line.

August 18, 2004 - Slow moving thunderstorms caused heavy rain which brought flash flooding to Highway 194 just east of the Bent-Otero County line.

2009 – The planning team noted flash flooding/stormwater flooding at Highway 96 and County Road GG. This caused closure of sections of the roads due to areas being submerged by water.

4.6 Severe Weather: Thunderstorms/Lightning/Hail

Thunderstorms producing winds, hail, and are a common occurrence in the County between early spring and late fall. Given the lightning statistics for Colorado and the region, the County is at risk and is vulnerable to the effects of lightning. Persons recreating or working outdoors during the months of April through September will be most at risk to lightning strikes. Fortunately, there have been no incidents of death of injury associated with lightning in the County. In addition, hailstones are frequently thrown out miles in front of the storm producing them.

Thunderstorms can produce locally heavy rain and high winds, which may result in crop damage and localized flooding. Hail primarily causes crop damage. However, hailstorms in populated areas can cause significant damage to roofs, automobiles, trees and windows. Such was the case in Ft. Lyon on June 7, 2010 when baseball size hail damaged residences and the VA Medical Center. Critical facilities and infrastructure will have the greatest consequences if damaged by a lightning strike. The greatest losses from lightning could result from secondary hazards, such as wildfire.

Table 22 Thunderstorm/Lightning/Hail Occurrences in Bent County

	Thunderstorm	Lightning	Hail
Events	31	0	107
Deaths/Injuries	1/1	0/0	0/0
Damage	$315,000	0	$9,301,000

Source: NCDC

4.7 Stream Bank Erosion/Stability Vulnerability Assessment

Bent County has had events of stream bank erosion in the past. Stream bank erosion is a natural process, but acceleration of this natural process leads to a disproportionate sediment supply, stream channel instability, land loss, habitat loss and other adverse effects. Local interests have, with limited finances, sought for many years to provide protection from reoccurring floods on the Arkansas River. A major stumbling block in the quest for flood protection has been the aggradation of the streambed. Aggradation of the Arkansas River has been and continues to be a major problem from Pueblo to the Colorado-Kansas state line. In addition to aggradation, there is concern of an increasingly serious flood threat at Las Animas caused by heavy plant growth in the riverbed which retarded flows and resulted in deposition of silt and decreased channel capacity. Sedimentation in the Arkansas River has lead to changes in river depth, which has affected the toe of the levee that protects the City of Las Animas.

4.8 Tornado Vulnerability Assessment

Bent County has been struck by a number of tornadoes in the past 65 years. Some of these tornadoes have caused large amounts of damage. A history of tornadoes in Bent County is shown in Table 23 and Figure 5. One tornado in Bent County that occurred on June 20, 2004 caused in excess of $1 million in damages. Another tornado in Bent County that occurred on October 11, 1997 caused multiple injuries. These are profiled in greater detail in Section 4.2.11 of the main plan.

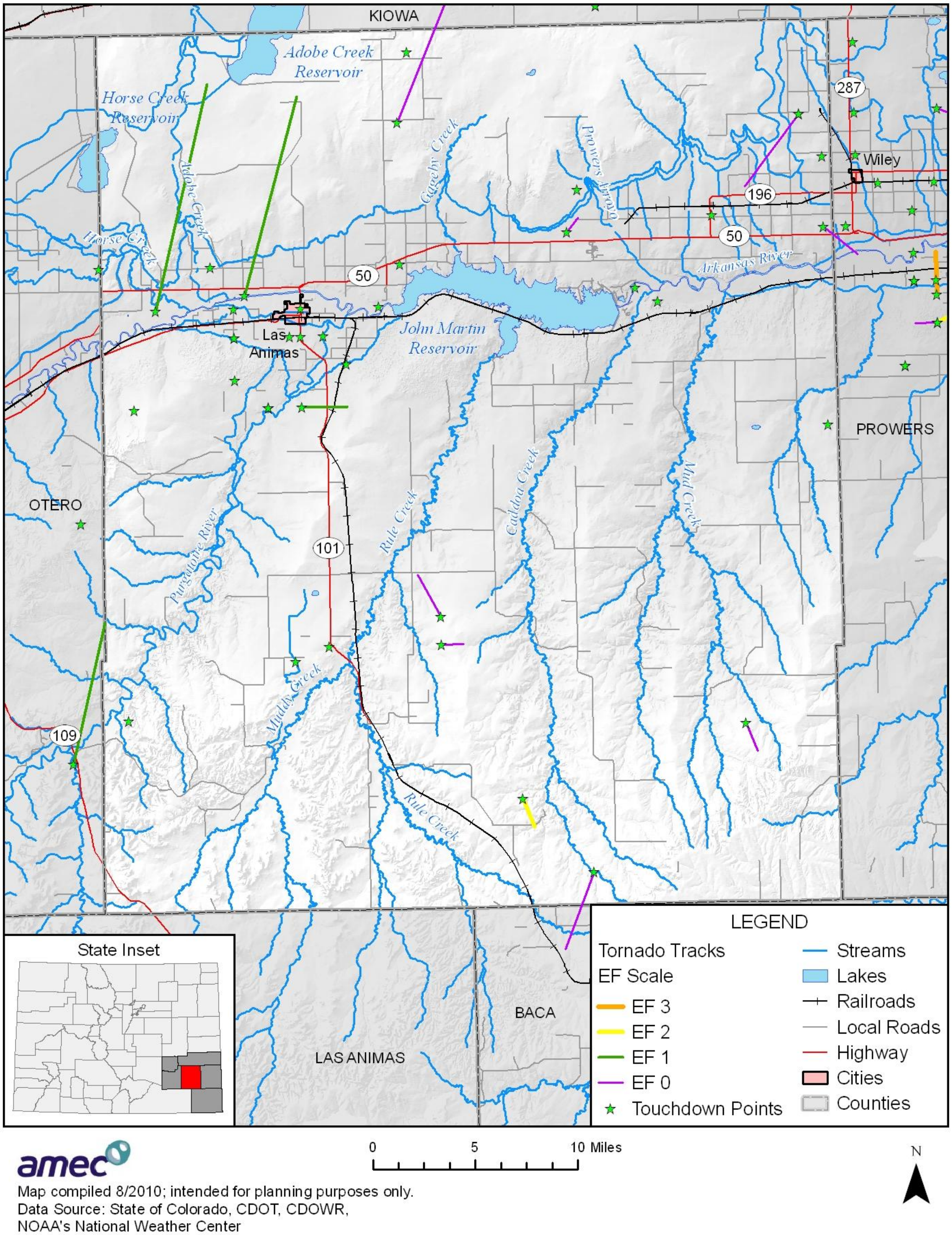
Table 23 Bent County Tornado History

Fujita Scale Ranking	Number of Tornadoes
F0	25
F1	8
F2	3
Unknown*	4
Total	**40**

Source: NCDC

*4 tornadoes struck Bent County in 1956 and 1957. The magnitude of these tornadoes is unknown.

Figure 5 Bent County Tornadoes and Touchdowns

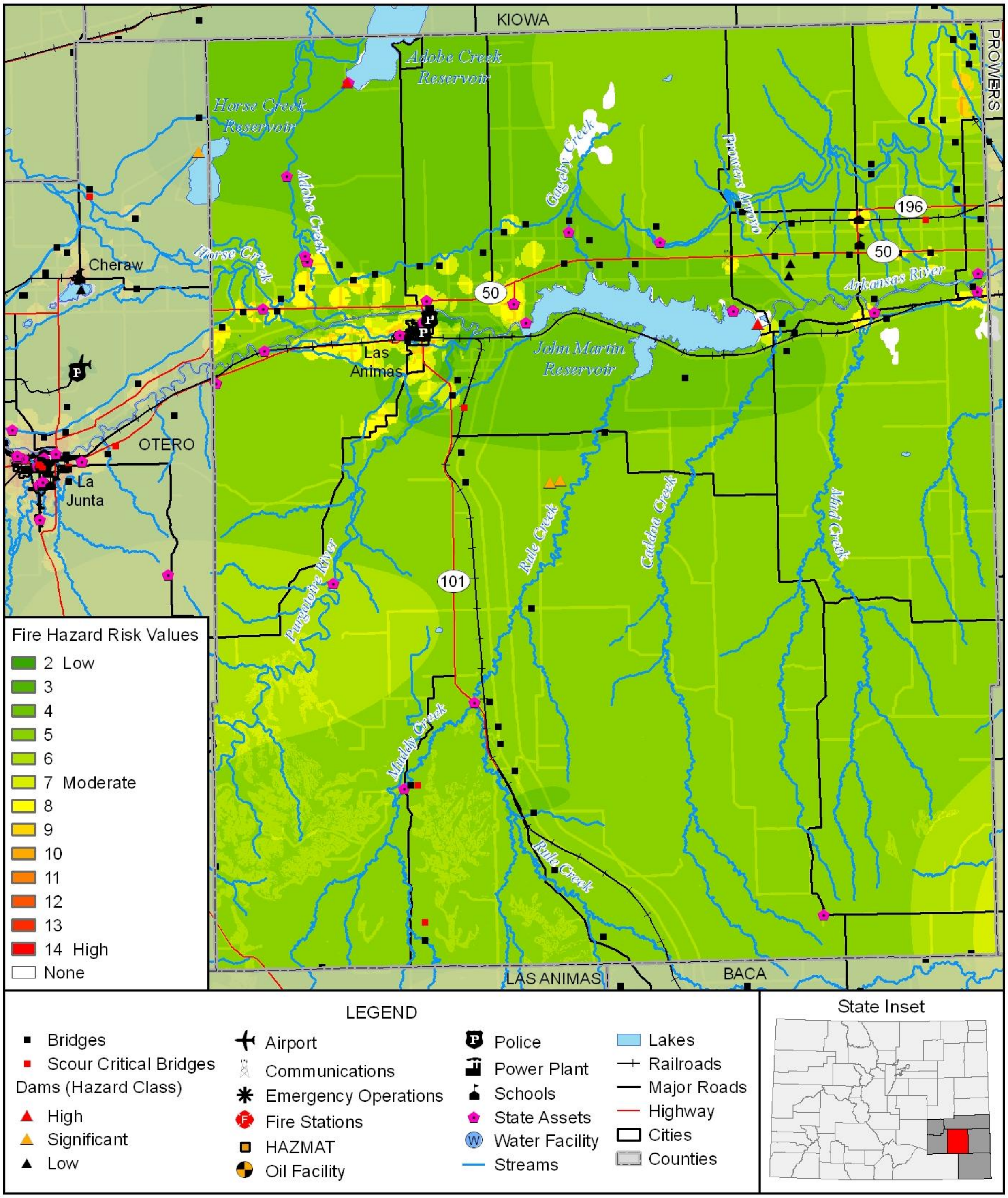


4.9 Wildfire Vulnerability Assessment

Bent County Wildland Urban Interface

The Wildland Urban Interface map for Bent County, shown in Figure 6, shows low to moderate fire hazard risk values throughout the county. The majority of the county has lower values with the higher values around the city of Las Animas which has risk values in the low to moderate range.

Figure 6 Bent County Wildland Urban Interface



amec

Map compiled 8/2010; intended for planning purposes only.
Data Source: CDOT, CDOWR, HSIP Gold, CDEM, Fema Region 8
Colorado Wildfire Risk Assessment 5/18/2002

Critical Facilities

Bent County has the highest number of facilities in a moderate to high fire hazard with 146 critical facilities. The town of Las Animas has three facilities: 1 bridge, 1 emergency operation center and one state asset. The unincorporated county has 143 critical facilities in a moderate to high fire hazard: 12 bridges, 2 fire stations, 1 police station, 1 school, 126 state assets, and 1 water facility.

Table 24 Critical Facilities in the Moderate to High Wildfire Hazard Areas

Facility Type	Facility Count
Bridge	13
Emergency Operations	1
Fire Stations	2
Police	1
Schools	1
State Assets	127
Water Facility	1
Total	**146**

Source: HSIP Gold 2008, HAZUS MR4, CDEM

4.10 Wind Storm Vulnerability Assessment

The County is subject to potentially destructive straight-line winds. High winds are common throughout the planning area, throughout the entire year. Straight line winds are primarily a public safety and economic concern. Windstorm can cause damage to structures and power lines which in turn can create hazardous conditions for people. Debris flying from high wind events can shatter windows in structures and vehicles and can harm people that are not adequately sheltered.

Future losses from straight line winds include:

- Erosion (soil loss)
- Dry land farming seed loss,
- Wind blown weeds, such as tumbleweed
- Power line impacts and economic losses from power outages
- Occasional building damage, primarily to roofs

Campers, mobile homes, barns, and sheds and their occupants are particularly vulnerable as windstorm events in the region can be sufficient in magnitude to overturn these lighter structures. Livestock that may be contained in these structures may be injured or killed, causing economic harm to the rancher who owns both the structure and the livestock. Overhead power lines are vulnerable and account for the majority of historical damages. State highways can be vulnerable to high winds and dust storms, where high profile vehicles may be overturned by winds and lowered visibility can lead to multi-car accidents.

4.11 Winter Storm Vulnerability Assessment

The threat to public safety is typically the greatest concern when it comes to impacts of winter storms. But these storms can also impact the local economy by disrupting transportation and commercial activities. Winter storms are occasionally severe enough to overwhelm snow removal efforts, transportation, livestock management, and business and commercial activities. The region can experience high winds and drifting snow during winter storms that can occasionally isolate individuals and entire communities and lead to serious damage to livestock populations and crops. Travelers on highways in the County, particularly along remote stretches of road, can become stranded, requiring search and rescue assistance and shelter provisions.

Structural losses to buildings are possible and structural damage from winter storms in Colorado has resulted from severe snow loads on rooftops. Older buildings are more at risk, as are buildings with large flat rooftops (often found in public buildings such as schools). The County's elderly population is a potentially vulnerable demographic during severe winter storms. Smaller communities prevalent in the County may become isolated during winter storm events, Persons that choose to live in these areas are generally self-sufficient, or should be, as government and emergency services may be limited during a severe winter storm.

Another common impact of blizzards and severe winter storms on the planning area is the loss of power. The weight of heavy continued snowfall and/or ice accumulating on power lines often brings them to the ground causing service disruptions for thousands of customers. This can cause a loss of community water and sewer services, as well as the supply of gasoline, as these services almost always require electrical pumps. In addition, prolonged power outages can mean loss of food to grocery stores, large facilities that provide feeding services (such as prisons, hospitals and nursing homes), and restaurants.

4.12 Hazardous Materials Vulnerability Assessment

It is often quite difficult to quantify the potential losses from human-caused hazards. While the facilities themselves have a tangible dollar value, loss from a human-caused hazard often inflicts an even greater toll on a community, both economically and emotionally. The impact to identified assets will vary from event to event and depend on the type, location, and nature of a specific technological hazard event. There are no fixed facilities in Bent County. There are multiple transportation routes that transect the County. Natural gas and oil pipelines also run through the County. Table 25 shows the breakdown of gas transmission line and hazardous liquid line mileage in the County

Table 25 Gas Transmission Line and Hazardous Liquid Line Mileage

County	Gas Miles	Liquid Miles	Percentage of State Total
Bent	58	63	1.1%

Source: PHMSA

The US Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) tracks hazardous materials spills and occurrences. No incidents were reported in the County.

Critical Facilities at Risk

In order to identify those critical facilities at risk to a hazardous materials release within identified corridors, an analysis was performed using GIS software. The same buffer was applied to the population at risk. An intersect was performed between critical facilities and the transportation buffers. Table 26 details the critical facilities located within a transportation corridor that are at risk to transportation related hazardous materials releases.

Table 26 Facilities within the 1 mile of HAZMAT Transportation Corridor by Jurisdiction

Jurisdiction	Facility Type	Facility Count
Las Animas	Bridge	1
Las Animas	Emergency Operations	1
Las Animas	Fire Stations	1
Las Animas	Police	1
Las Animas	Power Plant	6
Las Animas	Schools	5
Las Animas	State Assets	1
Unincorporated	Bridge	29
Unincorporated	Communications	1
Unincorporated	Dams	2
Unincorporated	Fire Stations	1
Unincorporated	Police	1
Unincorporated	Schools	1
Unincorporated	Scour Critical Bridge	1
Unincorporated	State Assets	127
Unincorporated	Water Facility	1
Total		**180**

Source: HSIP Gold, CDEM, CDOT

Populations at Risk

To determine the populations at risk from a transportation-related hazardous materials release within identified transportation corridors, an analysis was performed using GIS. A one-mile buffer was applied to both sides of Highways 10, 50, 71, and 287, and the Atchison, Topeka, & Santa Fe (AT&SF) and the Victoria Southern & Towner Railroads, creating two-mile buffer zones around each corridor. US Census 2000 population data, aggregated by census block, was acquired from HAZUS-MH. An intersection was performed between the census data and the transportation buffers. If any part of the census block touched the transportation buffer zone, the entire block was included in the buffer zone. Table 27 shows populations within each jurisdiction that are at greatest risk to transportation-related hazardous materials releases. There are a total of 5,421 citizens in the County at risk to hazardous material events.

Table 27 Populations in Haz-Mat Buffer Zone in Bent County

Jurisdiction	Population
Unincorporated County	2,650
Las Animas	2,771
Total	**5,421**

Source: CDEM, CDOT, US Census Bureau

Past Occurrences

Although not noted in national databases, in the Data Collection Guide, Bent County noted a 2008 hazardous materials release. A mix of poisons, corrosives, and explosives were released on the west edge of Las Animas at US Highway 50 and the airport. There were $15,000 in damages associated with the spill. All costs were paid by the trucking company involved.

5 Bent County Capability Assessment

Thus far, the planning process has identified the hazards posing a threat to Bent County and described, in general, the vulnerability of the County to these risks. The next step is to assess what loss prevention mechanisms are already in place. This part of the planning process is the mitigation capability assessment. Combining the risk assessment with the mitigation capability assessment results in the County's "net vulnerability" to disasters and more accurately focuses the goals, objectives, and proposed actions of this plan.

The planning committee used a two-step approach to conduct this assessment for the County. First, an inventory of common mitigation activities was made through the use of a matrix in the AMEC distributed Data Collection Guide. The purpose of this effort was to identify policies and programs that were either in place, needed improvement, or could be undertaken, if deemed appropriate. Second, the HMPC reviewed existing policies, regulations, plans, and programs to determine if they contributed to reducing hazard-related losses or if they inadvertently contributed to increasing such losses.

This section presents the County's mitigation capabilities: programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This assessment is divided into three sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, and fiscal mitigation capabilities.

5.1 Bent County's Regulatory Mitigation Capabilities

Table 28 lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the County, and in the cities of Springfield and Walsh.

Table 28 Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	County Y/N	City of Las Animas Y/N	Hasty-McClave Fire Protection District	Comments
General plan	N	Y	N	
Zoning ordinance	Y	Y	N	
Subdivision ordinance	Y	Y	N	
Growth management ordinance	N	Y	N	
Floodplain ordinance	N	N	N	
Other special purpose ordinance (stormwater, steep slope, wildfire)	Y	N	N	AWOP
Building code	Y	Y	N	Version:1997 UBC – City of Las Animas
BCEGS Rating	N	Y	N	
Fire department ISO rating	Y	Y	Y	Rating: 5 County 5/8B City of Las Animas 9 Hasty-McClave FPD
Erosion or sediment control program	N	N	N	There is a process for permits for gravel pits
Stormwater management program	N	Y	N	
Site plan review requirements	Y	Y	N	
Capital improvements plan	N	Y	N	
Economic development plan	Y	Y	N	
Local emergency operations plan	Y	Y	N	In process of converting to ESF format
Other special plans	N	Y	N	City of Las Animas Source Water Protection Plan
Flood insurance study or other engineering study for streams	Y	Y	N	FEMA Flood Hazard Maps – 1977.
Elevation certificates	N	N	N	
Other	N	N	N	

5.2 Bent County's Administrative/Technical Mitigation Capabilities

Table 29 identifies the County personnel responsible for activities related to mitigation and loss prevention in the County.

Table 29 Administrative/Technical Regulatory Tools

Personnel Resources	County Y/N	City of Las Animas Y/N	Hasty-McClave FPD Y/N	Department/Position	Comments
Planner/Engineer with knowledge of land development/land management practices	N	Y	N	County has Planning Commission City of Las Animas Public Works	Not Active
Engineer/Professional trained in construction practices related to buildings and/or infrastructure	N	Y	N	City of Las Animas Public Works	Would hire on contract basis if needed.
Planner/Engineer/Scientist with an understanding of natural hazards	N	Y	N	City of Las Animas Public Works	Would hire on contract basis if needed.
Personnel skilled in GIS	Y	N	N		Skill level unknown
Full time building official	N	Y	N	City of Las Animas Public Works Building Inspector	
Floodplain Manager	Y	Y	N	County Office of Emergency Management	Inactive and uninformed
Emergency Manager	Y	Y	Y		The City of Las Animas and Hasty-McClave FPD use Bent County for this position.
Grant writer	Y	Y	Y		Shared by several departments The City of Las Animas and Hasty-McClave FPD use Bent County for this position.
Other personnel	N	Y	N		The City of Las Animas uses Bent County for this position.
GIS Data – Hazard areas	Y	Y	N		The City of Las Animas uses Bent County for this position.

Personnel Resources	County Y/N	City of Las Animas Y/N	Hasty-McClave FPD Y/N	Department/Position	Comments
GIS Data - Critical facilities	Y	Y	N		The City of Las Animas uses Bent County for this position.
GIS Data – Building footprints	Y	Y	N		The City of Las Animas uses Bent County for this position.
GIS Data – Land use	Y	Y	N	NRCS	The City of Las Animas uses Bent County for this position.
GIS Data – Links to Assessor's data	Y	Y	N		The City of Las Animas uses Bent County for this position.
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	Y	Y	N		The City of Las Animas and Hasty-McClave FPD use Bent County for this position.
Other	N		N	Office of Emergency Management	

5.3 Bent County's Fiscal Mitigation Capabilities

Table 30 identifies financial tools or resources that the City could potentially use to help fund mitigation activities.

Table 30 Fiscal Regulatory Tools

Financial Resources	Accessible/Eligible to Use - County	Accessible/Eligible to Use – City of Las Animas	Accessible/Eligible to Use - Hasty-McClave FPD	Comments
Community Development Block Grants	Y	Y	N	
Capital improvements project funding	Y	Y	N	
Authority to levy taxes for specific purposes	Y	Y	Y	Hasty-McClave FPD can levy for FPD
Fees for water, sewer, gas, or electric services	Y	Y	N	
Impact fees for new development	N	Y	N	Only upon vote
Incur debt through general obligation bonds	N	Y	Y	Only upon vote

Financial Resources	Accessible/Eligible to Use - County	Accessible/Eligible to Use – City of Las Animas	Accessible/Eligible to Use - Hasty-McClave FPD	Comments
Incur debt through special tax bonds	N	Y	Y	Only upon vote
Incur debt through private activities	N	Y	Y	Only upon vote
Withhold spending in hazard prone areas	N	Y	N	Only upon vote
Other	N		N	

5.4 Additional Capabilities in Bent County

The Data Collection Guide indicated that Bent County is very close to StormReady status. Bent County is also currently developing a Community Wildfire Protection Plan to help mitigate against wildfire in the County.

The Public Health department has done mercury thermometer exchanges, and public education campaigns on:

- Radon
- H1N1 and pandemic flu
- West Nile Virus
- Rabies
- Emergency preparedness (24/7)

Additionally, the Public Health Department partnered with the Bent County Emergency Management office on a grant for a generator for emergency power at the Bent County Emergency Operations Center. In addition to the generator powering the EOC, a storage refrigerator was installed for Public Health vaccines to be stored during power outages.

All counties in the planning area make the 211 system available to citizens within each county. The system guides citizens to appropriate agencies and organizations, including disaster resources and assistance. The system ensures that citizens can access timely and accurate information about what is happening in their community.

5.5 Additional Vulnerabilities in Bent County

There is concern regarding whether there is significant resources to evacuate a high population of elderly citizens during a catastrophic event.

6 Bent County Mitigation Actions

After reviewing the goals of the Southeast Colorado Regional Hazard Mitigation Plan, Bent County has adopted the following mitigation actions to reduce their risk to the hazards identified above.

Action Item #1 Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program

Hazards Addressed: All

Issue/Background: The County and each jurisdiction are subject to several natural hazards. Each poses a different degree of risk and associated vulnerability. Some hazards have a combination of attributes, including a high likelihood of occurrence, a specific location that would likely be impacted, and proven approaches that could reduce the impact. For other hazards, where either the likelihood of occurrence is very low, the area of likely impact is not specifically known, or there is very little that can be done to reduce the impacts, the HMPC has determined that the best approach is public awareness. Citizens should have information describing historical events and losses, the likelihood of future occurrences, the range of possible impacts, appropriate actions to save lives and minimize property damage, and where additional information can be found. Any information provided through this effort should be accurate, specific, timely, and consistent with current and accepted local emergency management procedures as promoted by the Southeast Colorado All Hazards Region (SECAHR), Colorado Department of Emergency Management (CDEM) and the American Red Cross. Following a disaster event, there should be extra efforts to provide the public with information about disaster preparedness and mitigation measures. This public outreach effort will be conducted annually and will include:

- Using a variety of information outlets, including local news media;
- Creating and printing (where applicable) brochures, leaflets, water bill inserts, and public service announcements;
- Posting all information to the SECAHR website;
- Displaying current brochures and flyers in County office buildings, city halls, libraries, and other public places; and
- Developing public-private partnerships and incentives to support public education activities.

Other Alternatives: Continue public information activities currently in place.

Responsible Office: Bent County Emergency Management

Priority (High, Medium, Low): High

Cost Estimate: Staff time, printing costs for literature.

Benefits (avoided Losses): Life safety, reduction in property losses, relatively low cost

Potential Funding: State Hazard Mitigation Program grants, county and jurisdiction funds, other available grants

Schedule: Ongoing – part of seasonal multi-hazard public awareness campaign.

Action Item #2 Continue to Implement Sound Floodplain Management Practices through Participation in the National Flood Insurance Program (NFIP) and Updated Statewide Floodplain Rules

Issue/Background: The County participates in the National Flood Insurance Program. This project restates the commitment of Bent County to implement sound floodplain management practices, as stated in the flood damage prevention ordinance. This includes ongoing activities such as enforcing local floodplain development regulations, issuing permits for appropriate development in Special Flood Hazard Areas and ensuring that development is elevated above the base flood elevation. Floodplain managers will remain current on NFIP policies, and are encouraged to attend appropriate training and consider achieving Certified Floodplain Manager (CFM) status.

This project also includes periodic reviews of the floodplain ordinance to ensure that it is clear and up to date and adequately addresses the level of flood risk identified within the Hazard Mitigation Plan. As a result of the adoption of updated statewide floodplain rules and regulations (effective January 14, 2011) the CWCB will require local governments to revise their ordinance to comply with the new rules by January 2014.

Other activities that could be included in this effort are:

- Ensure that stop work orders and other means of compliance are being used as authorized by each ordinance;
- Suggest changes to improve enforcement of and compliance with regulations and programs;
- Identify unmapped areas and coordinate with the Colorado Water Conservation Board on identifying resources for mapping unmapped areas;
- Participate in Flood Insurance Rate Map updates by adopting new maps or amendments to maps;
- Utilize any recently completed Digital Flood Insurance Rate maps in conjunction with GIS to improve floodplain management, such as improved risk assessment and tracking of floodplain permits;
- Promote and disperse information on the benefits of flood insurance, with assistance from partners such as the City of Las Animas, and the Colorado Water Conservation Board;
- Evaluate joining the Community Rating System to further lower the cost of flood insurance for residents.

Other Alternatives: No Action; Continue to manage community floodplains under existing program

Existing Planning Mechanism(s) through which project will be implemented: General Plan, Existing Zoning and Floodplain Management Ordinances, Other

Responsible Office: Community planning/zoning/public works departments

Priority (High, Medium, Low): Medium

Cost Estimate: Minimal – existing staff time

Benefits (avoided Losses): Life safety and property protection. Enhancement of current floodplain management program.

Potential funding: Existing department budgets

Schedule: Within 1year

Action Item #3 Maintain Ditches, Culverts, and Drainages in County Right-of-ways

Issue/Background: In order to ensure minimal risk to flooding, the County maintains ditches, drainages, and culverts in County right-of-way locations. These drainages ensure that flood waters are able to drain quickly and effectively, thus reducing risk to property owners in the County

Other Alternatives: No action, which would increase flood risk.

Existing Planning Mechanism(s) through which project will be implemented:

Responsible Office: County Commissioner's Office

Priority (High, Medium, Low): Medium

Cost Estimate: Varies by year

Benefits (avoided Losses): Property protection. Enhancement of current floodplain management program.

Potential funding: Existing department budgets

Schedule: Ongoing

Action Item #4 Community Wildfire Protection Plans

Issue/Background: Wildfire is an issue in the County. The intent is to minimize risk and vulnerability from wildfire hazard.

- Complete CWPP's for Bent County

Other Alternatives: No action.

Existing Planning Mechanism(s) through which project will be implemented:

Basically three meetings per county –

- 1st Meeting – Wildfire Mitigation Assessment mapping exercise (circling areas for values, risks & fuels) to identify areas of concern).
- 2nd Meeting – Review mapping overlays; review FireWise mitigation potentials; start looking at overall goals for a five year plan.
- 3rd Meeting – Review/complete goals; review draft plan; determine annual workplan (identify persons responsible/ tasks/benchmark dates to complete assignments/projects.

Responsible Office: Office of Emergency Management

Priority (High, Medium, Low): High

Cost estimate: Low to high cost depending upon in-kind and actual expenses – mileage/per diem/in-kind hours/ administrative copying costs, etc/ CWPP plan copying costs.

Benefits (avoided Losses): Mitigating wildfire hazards within a county by identifying /prioritizing areas of concern, then mechanisms to implement mitigation.

Potential funding: Federal/State grant options

Schedule:

- Three meetings per county to create plan.
- Schedule according to each annual workplan for implementing projects.
- Update meetings according to each county's schedule

Action Item #5 CWPP Projects as identified by the County's CWPP

Issue/Background: Wildfire is an issue in the County. The intent is to minimize risk and vulnerability from wildfire hazard. Projects can include mitigating risk, access, water supply, structure construction design & materials, defensible space, trees & shrubs (landscapes), interior design, & 'What to do when… (evacuation needs) .

Other Alternatives: No action.

Existing Planning Mechanism(s) through which project will be implemented: The County's CWPP. Types of projects include:

- Risk (Landowner Awareness)
- Access (ingress/egress; widths/turnarounds/ culverts; signage (High/med/low fire danger; CR/street signages)
- Water supply
- Construction design & materials,(building codes, ordinances)
- Defensible space (Fuels mgmt, establishing living fuel breaks (grass) – riverbottom & community),
- Trees & shrubs,
- Interior safety
- What to do when
- Other
  - Hazards – Power lines/trees/brush breakage (Tree Line USA, NADF)
  - County Fire Bans & Controlled Burn Ordinances
  - Ag Hazards – wildfire
  - Drought – fire hazards

Responsible Office: Office of Emergency Management

Priority (High, Medium, Low): Medium

Cost estimate: Per project

Benefits (avoided Losses): Protect homes, homesteads, structures, values from potential wildfires until fire services can arrive. Protecting homes can be maximized when fire service arrives. Protect Firefighter safety during suppression operations.

Potential funding: Federal/State grant options?

Schedule: Schedule according to each CWPP annual workplan for implementing projects.

Action Item #6 Firewise Outreach Message to appropriate audiences within the County CWPP Plan

Issue/Background: Wildfire is an issue in the County. The intent is to minimize risk and vulnerability from wildfire hazard.

- Homeowners, landowners and other property owners need to have an awareness of vulnerability to wildfire hazards.

- Each property owner needs to take responsibility for mitigating potentials for catastrophic damage to their own properties – protect their own properties from wildfire.
- Support safety to firefighters during suppression by mitigation of fuels and implementing other FireWise suggestions.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which project will be implemented: Educating publics on risk, access, water supply, construction design & materials, defensible space, trees & shrubs, interior safety & 'What to do when…' – tools to mitigate.

Responsible Office:

- Educational outreach from local VFD's to assess homesites and give recommendations.
- Media news releases; Fair booths (w/other entities);
- Firewise prevention messages for schools.

Priority (High, Medium, Low): Medium

Cost estimate: To be determined

- Pamphlets/handout costs
- Firewise Educational material for schools
- Low to high cost depending upon in-kind and actual expenses – mileage/per diem/in-kind hours/ administrative copying costs, etc.

Benefits (avoided Losses): Protect homes, homesteads, structures, values from potential wildfires until fire services can arrive. Protecting homes can be maximized when fire service arrives. Protect Firefighter safety during suppression operations.

Potential funding: Federal/State grant options?

Schedule:

- Schedule according to each CWPP annual workplan for implementing projects.
- Update meetings according to each county's schedule.

Arkansas River Conservancy District

Action Item #7 Armoring levy

Issue/Background: Multiple locations of levy are susceptible to erosion during high water events. As river channel changes the areas of concern change.

Other Alternatives: Dredge river channel to alter river's course. Very expensive with short term results.

Existing Planning Mechanism(s) through which project will be implemented: When inspections reveal erosion the area is repaired then armored.

Responsible Office: Board of Directors, Arkansas River Conservancy District

Priority (High, Medium, Low): Medium

Cost Estimate: Dependant on size of area affected. One medium area could be as little as $20,000. Multiple large areas could be in excess of $1,000,000.

Benefits (avoided Losses): Avoid catastrophic levy failure the result which would be damage or loss of structures, critical infrastructure and loss of life in Las Animas.

Potential funding: DOLA, CWCB, FEMA

Schedule: Without additional funding no work is scheduled other than emergency repairs.

Action Item #8 Amassing of Rip Rap

Issue/Background: Rip Rap is clean broken concrete or stones and is used to repair breeches in the levee structure. It is necessary to have a large volume of this material on hand in the event of an emergency. It is also necessary to have multiple caches of this material stored along the 9 mile long structure. This will reduce transportation time and costs in the event of levee failure.

Other Alternatives: Pre-event armoring of the entire structure.

Existing Planning Mechanism(s) through which project will be implemented: Location identified for material storage. The need for rip rap is known to key individuals who on occasion make the material available.

Responsible Office: Board of Directors, Arkansas River Conservancy District.

Priority (High, Medium, Low): High

Cost Estimate: $50,000.00

Benefits (avoided Losses): Timely repair could stop levee failure and flooding of the city of Las Animas.

Potential funding: Colorado Water Conservation Board, FEMA, Colorado Department of Local Affairs

Schedule: Ongoing

Action Item #9 Removal of woody invasive species within levy narrow area.

Issue/Background: Channel capacity has been reduced because of woody invasive species such as tamarisk and Russian olive trees. As the levy passes Las Animas it narrows and that area in particular is over grown with tamarisk. A flow capacity

Other Alternatives: No action.

Existing Planning Mechanism(s) through which project will be implemented:

Responsible Office: Board of Directors, Arkansas River Conservancy District

Priority (High, Medium, Low): Medium.

Cost Estimate: To be determined.

Benefits (avoided Losses): Increased flow rates of river, reduced flood risk.

Potential funding: Colorado Water Conservation Board, FEMA, Colorado Department of Local Affairs

Schedule: Within 5 years

BACA COUNTY PLANNING ELEMENT

1 Baca County Planning Committee

The following entities participated in the DMA planning process through the Baca County Planning Committee. More details on the planning process followed and how the County, municipalities and stakeholders participated can be referenced in Chapter 3 of the base plan. Additional details on what local government departments participated and who represented them are listed in Appendix B.

- Baca County
- Town of Pritchett
- Town of Springfield
- Town of Walsh

2 Baca County Profile

Baca County is located in the southeastern region of the State in the high plains and is primarily agricultural. The land area of the County is 2,557 square miles, with 1 square mile of water. According to the 2000 U.S. Census, the population for the County was 4,517. The 2010 population estimate from the Department of Local Affairs is 4,120. The estimated average density for the County is 1.6 people per square mile. The County lost 9% of its population between 2000 and 2010. There are 2,364 housing units in the County. The median age in the County is 42.9 years. 5.9% of the population is under the age of 5 and 22.4% of the population is over the age of 65. The average household size is 2.33, and the average family size is 2.90. 78.5% of the population over the age of 25 holds at least a high school degree and 14% hold a bachelors level degree or higher. 21.6% of the population (over age 5) holds disability status, and 5.8% speak a language other than English in the home. 12.9% of all families live below the poverty level, and 16.9% of individuals live below poverty level. The County is a rural county located on the southeastern plains of Colorado. The largest town in the County is Springfield, which serves as the County Seat. The County is typical of the mid-western plains, with a rural orientation and solid agricultural basis. The Census of Agriculture reports 777 farms in the County with 1,300,876 total acres of farmland. The average farm size is 1,674 acres. A base map of the County can be referenced in Figure 1.

3 Hazard Identification and Summary

Baca County's planning team identified the hazards that affect the County and summarized their geographic extent, probability of future of occurrence, potential magnitude, and significance specific to the County. This information is presented in Table 1. A detailed description of each hazard can be found in Section 4.2 Hazard Profiles of the main plan.

Table 1 Baca County and the Towns of Springfield and Walsh Hazard Summary

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/Severity	Significance
Agriculture Infestation	Extensive	Occasional	Catastrophic	High
Dam/Levee Failure	Limited	Limited	Limited	Low
Drought	Extensive	Highly Likely	Catastrophic	High
Earthquake	Extensive	Limited	Catastrophic	Low
Extreme Temperatures: Heat	Extensive	Likely	Catastrophic	Medium
Extreme Temperatures: Cold	Extensive	Likely	Catastrophic	Medium
Flood: 100/500 –Year	Significant	Occasional	Critical	Medium
Flood: Stormwater/Flash Flooding	Limited	Occasional	Critical	Medium
Severe Weather: Thunderstorms/Lightning/Wind /Hail	Extensive	Highly Likely	Critical	High
Stream Bank Erosion/ Stability	Limited	Unlikely	Limited	Low
Subsidence	Limited	Unlikely	Limited	Low
Tornadoes	Extensive	Highly Likely	Catastrophic	High
Wildfire	Likely	Significant	Critical	High
Wind Storms	Extensive	Highly Likely	Catastrophic	High
Winter Storms	Extensive	Highly Likely	Catastrophic	High
Civil Unrest	Limited	Unlikely	Low	Low
Cyber Hazards	Significant	Likely	Catastrophic	Low
Hazardous Materials	Significant	Likely	Critical	High
Pandemic	Extensive	Likely	Medium	Low

Geographic Extent
Limited: Less than 10% of planning area
Significant: 10-50% of planning area
Extensive: 50-100% of planning area

Probability of Future Occurrences
Highly Likely: Near 100% chance of occurrence in next year, or happens every year.
Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less.
Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Magnitude/Severity
Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths
Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability
Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability
Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid

Significance
Low: minimal potential impact
Medium: moderate potential impact
High: widespread potential impact

Table 2 Town of Pritchett Hazard Summary

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/Severity	Significance
Agriculture Infestation	Limited	Unlikely	Negligible	Low
Dam/Levee Failure	Limited	Unlikely	Negligible	Low
Drought	Extensive	Occasional	Limited	Low
Earthquake	Limited	Unlikely	Negligible	Low
Extreme Temperatures: Heat	Limited	Unlikely	Negligible	Low
Extreme Temperatures: Cold	Limited	Unlikely	Negligible	Low
Flood: 100/500 –Year	Limited	Unlikely	Negligible	Low
Flood: Stormwater/Flash Flooding	Limited	Unlikely	Negligible	Low
Severe Weather: Thunderstorms/Lightning/Wind /Hail	Extensive	Occasional	Limited	Low
Stream Bank Erosion/ Stability	Limited	Unlikely	Negligible	Low
Subsidence	Limited	Unlikely	Negligible	Low
Tornadoes	Extensive	Occasional	Critical	Medium
Wildfire	Limited	Unlikely	Negligible	Low
Wind Storms	Extensive	Occasional	Limited	Low
Winter Storms	Extensive	Occasional	Limited	Low
Civil Unrest	Limited	Unlikely	Negligible	Low
Cyber Hazards	Limited	Unlikely	Negligible	Low
Hazardous Materials	Limited	Unlikely	Negligible	Low
Pandemic	Limited	Unlikely	Negligible	Low

Geographic Extent
Limited: Less than 10% of planning area
Significant: 10-50% of planning area
Extensive: 50-100% of planning area

Probability of Future Occurrences
Highly Likely: Near 100% chance of occurrence in next year, or happens every year.
Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less.
Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Magnitude/Severity
Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths
Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability
Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability
Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid

Significance
Low: minimal potential impact
Medium: moderate potential impact
High: widespread potential impact

3.1 Disaster Declaration History

One method the planning committee used to identify hazards was the researching of past events that triggered federal and/or state emergency or disaster declarations in the planning area.

Federal and/or state disaster declarations may be granted when the severity and magnitude of an event surpasses the ability of the local government to respond and recover. Disaster assistance is supplemental and sequential. When the local government's capacity has been surpassed, a state disaster declaration may be issued, allowing for the provision of state assistance. Should the disaster be so severe that both the local and state governments' capacities are exceeded, a federal emergency or disaster declaration may be issued allowing for the provision of federal assistance.

The federal government may issue a disaster declaration through FEMA, the U.S. Department of Agriculture (USDA), and/or the Small Business Administration (SBA). FEMA also issues emergency declarations, which are more limited in scope and without the long-term federal recovery programs of major disaster declarations. The quantity and types of damage are the determining factors. Federal, state, and USDA disaster declarations for the County are listed in Table 3.

Table 3 Baca County Disaster and Emergency Declarations, 1955-2010

Year	Declaring Jurisdiction	Disaster Type
2009	State of Colorado*	Severe Blizzard
2009	State of Colorado*	Severe Spring Snowstorm
2008	USDA – Secretarial Designation (S2750)	Drought
2007	Federal – Emergency (3271-EM, 3270-EM)	Snow
2006	State of Colorado	Snow
2005-2006	USDA – Secretarial Designation (S2327)	Drought, Fire, High Winds, Heat
2005	Federal – Emergency (3224-EM)	Hurricane Katrina Evacuation
2004	USDA – Secretarial Designation (S1947)	Drought, Freeze, Hail
2003	USDA – Secretarial Designation (S1797)	Drought
2002	State of Colorado*	Snow Emergency
2002	State of Colorado*	Drought
2002	State of Colorado*	WIldfires
2002	USDA – Secretarial Designation (S1643)	Drought
2001	Federal – Major Disaster (1374-DR)	Severe Winter Storms
2000	USDA – Secretarial Designation (S1498)	Drought, High Winds, Lightning
1997	Federal – Emergency	Heavy Flash Flooding
1997	State of Colorado	Flooding
1995-1996	USDA – Secretarial Designation (S999)	Drought
1977	Federal – Major Disaster	Drought
1965	Federal – Major Disaster (200-DR)	Tornadoes, Severe Storms, and Flooding

Source: Colorado State Hazard Mitigation Plan; Colorado Governor's Office website, Federal Emergency Management Agency, PERI Presidential Disaster Declaration Site; U.S. Department of Agriculture.
*All counties in the state were proclaimed disaster areas by the Governor.

3.2 National Severe Weather Databases

The National Oceanic and Atmospheric Administration's National Climatic Data Center (NCDC) has been tracking severe weather since 1950. Their Storm Events Database tracks severe weather events on a county basis and contains data on the following: all weather events from 1993 to current (except from 6/1993-7/1993); and additional data from the Storm Prediction Center, which includes tornadoes (1950-1992), thunderstorm winds (1955-1992), and hail (1955-1992). This database contains 390 severe weather events that occurred in Baca County between January 1, 1950, and April 31, 2010. Table 4 summarizes these events.

Table 4 NCDC Hazard Events Report for Baca County

Type	# of Events	Property Loss ($)	Crop Loss ($)	Deaths	Injuries
Blizzard	2	0	0	0	0
Flash Flood	5	0	0	0	0
Flood	1	0	0	0	0
Funnel Cloud	5	0	0	0	0
Hail	248	150,000	0	0	0
Heavy Snow	4	0	0	0	0
High Wind	10	100,000	0	0	0
Ice Storm	1	0	0	0	0
Small Stream/Urban Flooding	2	0	0	0	0
Thunderstorm Winds	38	85,000	0	0	0
Tornado	65	2,969,000	0	0	0
Wildfire/Forest Fire	3	0	0	0	0
Winter Storm	5	0	0	0	0
Winter Weather	1	0	0	0	0
Totals	**390**	**3,304,000**	**0**	**0**	**0**

Source: NCDC

The HMPC supplemented NCDC data with data from SHELDUS (Spatial Hazard Events and Losses Database for the United States). SHELDUS is a county-level data set for the United States that tracks 18 types of natural hazard events along with associated property and crop losses, injuries, and fatalities for the period 1960-2005. Produced by the Hazards Research Lab at the University of South Carolina, this database combines information from several sources (including the NCDC). From 1960 to 1995, only those events that generated more than $50,000 in damage were included in SHELDUS. For events that covered multiple counties, the dollar losses, deaths, and injuries were equally divided among the affected counties (e.g., if four counties were affected, then a quarter of the dollar losses, injuries, and deaths were attributed to each county). From 1995 to 2005, all events that were reported by the NCDC with a specific dollar amount are included in SHELDUS.

SHELDUS contains information on 173 severe weather events that occurred in Baca County between 1960 and 2009. Table 5 summarizes these events.

Table 5 SHELDUS Hazard Events for Baca County,1960-2009

Hazard	Number	Injuries	Fatalities	Property Damage	Crop Damage
Drought	2	0	0	0	2,193,396
Flooding	1	0	2.08	3,846,154	0
Flooding –Severe Storm/Thunder Storm – Winter Weather	1	0	0	793.65	0
Fog – Winter Weather	1	0	0	22,727.27	0
Hail	12	0	0	325,725	652,500
Hail – Lightning	1	.08	0	41.67	4,166.70
Hail - Lightning - Severe Storm/Thunder Storm	1	0	0	416.67	4,166.67
Hail - Lightning - Wind	3	.17	0	2,395.84	23,958.34
Hail - Severe Storm/Thunder Storm	12	.08	0	98,714.59	441,724.90
Hail - Severe Storm/Thunder Storm - Tornado	1	0	0	333.33	333.33
Hail - Severe Storm/Thunder Storm – Wind	6	0	0	1,923.08	0
Hail - Severe Storm/Thunder Storm - Winter Weather	1	0	0	1,923.08	0
Hail - Wind	8	.25	0	7,079.56	127,045.50
Lightning	3	1.1	0	50	0
Lightning - Severe Storm/Thunder Storm	1	.07	0	172.41	0
Lightning - Wind	2	0	0	176.58	4,166.67
Lightning - Winter Weather	1	0	0	416.67	0
Severe Storm/Thunder Storm	8	0	.08	485,414.9	459,166.7
Severe Storm/Thunder Storm - Wind	1	0	0	50,000	0
Severe Storm/Thunder Storm - Wind - Winter Weather	1	0	0	79.37	0
Tornado	11	0	0	717,474.8	0
Wind	46	7.03	0	1,288,899	249,783.50
Wind - Winter Weather	20	.06	.18	266,870.8	185,112.80
Winter Weather	29	0.75	3.27	1,200,131	2,597,848
Totals	**173**	**9.59**	**5.61**	**8,317,913.27**	**6,943,369.11**

Source: SHELDUS, Hazards Research Lab, University of South Carolina, www.sheldus.org/
Events may have occurred over multiple counties, so damage may represent only a fraction of the total event damage and may not be specific to Baca County.

The NCDC and SHELDUS tables above summarize severe weather events that occurred in Baca County. Only a few of the events actually resulted in state and federal disaster declarations. It is interesting to note that different data sources capture different events during the same time period, and often different information specific to the same events. While the HMPC recognizes these inconsistencies, it is the value this data provides in depicting the County's "big picture" hazard environment.

4 Baca County Vulnerability Assessment

The intent of this section is to assess the County's vulnerability separate from that of the planning area as a whole, which has already been assessed in Section 4.3 Vulnerability Assessment in the main plan. This vulnerability assessment analyzes the population, property, and other assets at risk to hazards ranked of medium or high significance that may vary from other parts of the planning area. For more information about how hazards affect the Region as a whole, see Chapter 4 Risk Assessment in the main plan.

4.1 Assets at Risk

This section identifies the County's assets at risk, including values at risk, critical facilities and infrastructure, historic assets, economic assets, and growth and development trends. The data source used was the HAZUS-MR4 databases. The HAZUS building exposure (includes building counts, value of building structure and contents) is shown in Table 6. A breakdown of the building count by type can be found in Table 7.

Table 6 Baca County Building Exposure

Town	Population	Building Count	Building Exposure ($)	Building Content ($)	Total Exposure
Campo	150	140	7,810,000	4,500,000	12,310,000
Pritchett	135	133	6,567,000	3,303,000	9,870,000
Springfield	1,569	1,315	101,735,000	73,517,000	175,252,000
Two Buttes	67	76	4,302,000	2,368,000	6,670,000
Vilas	110	59	4,932,000	2,908,000	7,840,000
Walsh	723	571	56,628,000	40,210,000	96,838,000
Unincorporated	1,763	1,800	95,761,000	61,035,000	156,796,000
Total	**4,517**	**4,094**	**277,735,000**	**187,841,000**	**465,576,000**

Source: HAZUS

Table 7 Baca County Building Exposure by Type

Occupancy Type	Building Count	Value ($)
Agriculture	108	14,528,000
Commercial	128	57,193,000

Occupancy Type	Building Count	Value ($)
Education	8	6,183,000
Government	10	1,783,000
Industrial	24	4,253,000
Religion	13	5,648,000
Residential	3,803	98,263,000
Total	4,094	187,851,000

Source: HAZUS

Critical Facilities and Infrastructure

The best available data for critical facilities came from multiple sources. HSIP Gold 2008 (Homeland Security Infrastructure Program) was obtained through FEMA Region VIII. Within this dataset FEMA Region VIII updated emergency operations, fire stations, hospitals, natural gas facilities, oil facilities, police stations, power plants, and schools. Other layers within the HSIP Gold 2008 dataset has a source of HAZUS-MH MR4 and HSIP Gold 2007, which include airports, bridges, communications, dams, health facilities, HAZMAT facilities, waste water facilities, and water facilities. State assets were obtained from CDEM (Colorado Division of Emergency Management). State Assets are symbolized with one symbol on the maps but are comprised of these flooded assets: Animal science, containment structures, Department of Corrections, education, fish hatcheries, garages, monitoring stations, museums, national monuments, offices, power plants, recreation facilities, residence/housing, restrooms, sheds, shops, State Patrol, storage, utilities and workforce centers.

An inventory of critical facilities in Baca County is provided below in Table 8. The table includes data from available national and statewide GIS resources (locations are illustrated in Figure 1) supplemented with information from the County planning committee.

Table 8 Critical Facilities Inventory

Facility Type	Facility Count
Airport	1
Bridges	103
Bridges – Scour Critical	4
Dams	7
Emergency Operations Centers	1
Fire Stations	6
Hospitals	1
Natural Gas Facilities	3
Police Stations	3
Power Plants	7
Schools	14
State Assets	10

Facility Type	Facility Count
Waste Water Facilities	1
Total	**161**

Source: HSIP Gold 2008, HAZUS MR4, CDEM

Locally Determined Facilities

In addition to the critical facilities mapped in GIS, Baca County, in their Data Collection Guide, has identified the following assets as important to the community. These assets include critical facilities and infrastructure; natural, cultural, and historical assets; and economic assets.

- USFS Fire Station on the south end of Springfield
- Southeast Colorado Hospital
- Campo Police Department
- Daycare in Walsh
- Daycare in Springfield,
- Special Care Facilities
  - Walsh Nursing Home
  - Walsh Assisted Living
  - Springfield Nursing Home
  - Springfield Alzheimers unit,
  - Walsh Holt Manor
  - Springfield Springfield West
- Campo Junction Gas Distribution Center
- Flank Natural Gas Storage Field
- Cell Phone Towers (Verizon, Cellular One, Viaero)
- Electrical Substations
- US Highway 287
- US Highway 160
- BNSF Boise City Railway Line
- Springfield Municipal Airport
- Elpaso – CIG Natural Gas Lines
- Nu Start Petroleum Based Pipelines
- Conoco Phillips Pipelines
- Public Safety Radio Communication Towers
- Pritchett Town Hall
- Pritchett Water Treatment Plant
- Baca County Dispatch Center

The Town of Springfield identified the following assets as important to the community. These assets include critical facilities and infrastructure; natural, cultural, and historical assets; and economic assets.

- Police and Fire Station
- Municipal Power Plant
- Municipal Government Building
- Airport
- Water Wells
- Wastewater Treatment Facility

Historic and Natural Assets

Assessing the vulnerability of Baca County to disaster also involves inventorying the historic, cultural, and natural assets of the area. This step is important for the following reasons:

- The community may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.
- If these resources are impacted by a disaster, knowing so ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts are higher.
- The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.
- Natural resources can have beneficial functions that reduce the impacts of natural hazards, for example, wetlands and riparian habitat help absorb and attenuate floodwaters.

Historic Assets

The County has a stock of historically significant homes, public buildings, and landmarks. To inventory these resources, the planning committee collected information from a number of sources. The Colorado Historical Society's (CHS) Colorado State Register of Historic Properties was the primary source of information. The CHS is responsible for the administration of federally and state mandated historic preservation programs to further the identification, evaluation, registration, and protection of Colorado's irreplaceable archaeological and historical resources.

In addition, the National Register of Historic Places database was used. The National Register of Historic Places is the Nation's official list of cultural resources worthy of preservation. The National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect historic and archeological resources. Properties listed include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archeology, engineering, and culture. The National Register is administered by the National Park Service, which is part of the U.S. Department of the Interior.

Historical resources included in the programs above are identified in Table 9.

Table 9 Baca County Historic Properties

Property	Location	National Register	State Register
Colorado Millennial Site/Hackberry/Bloody Springs	Ruxton vicinity	4/8/1980	5BA.31
Commercial Hotel (Stage Stop Hotel)	1033 Main St., Springfield	-	5BA.941
Springfield Schoolhouse/Springfield Masonic Temple	281 W. 7th Ave. Springfield	10/5/1977,	5BA.313
Two Buttes Dam	County Rd. 30, northeast of Springfield	-	5BA.39
Stonington Methodist Episcopal Church	48854 County Rd. X, Stonington	3/14/1996,	5BA.555

Source: Colorado State Register of Historic Properties

Natural Assets

Natural resources are important to include in benefit-cost analyses for future projects and may be used to leverage additional funding for mitigation projects that also contribute to community goals for protecting sensitive natural resources. Awareness of natural assets can lead to opportunities for meeting multiple objectives. For instance, protecting wetlands areas protects sensitive habitat as well as stores and reduces the force of floodwaters.

Information from the U.S. Fish and Wildlife Service and the Colorado Division of Wildlife, a program that inventories the status and locations of rare plants and animals in Colorado, was combined to create an inventory of special-status species in Baca County. Table 10 lists national and state endangered, threatened, rare, and candidate species in the County by species type.

Table 10 Sensitive Plant and Animal Species in the Planning Area

Group	Name	Population	Status	Lead Office	Recovery Plan Name	Recovery Plan Stage
Birds	Arctic peregrine Falcon (Falco peregrinus tundrius)		Recovery			
Birds	Mountain plover (Charadrius montanus)		Proposed Threatened			
Birds	Piping Plover (Charadrius melodus)	except Great Lakes watershed	Threatened	Office Of The Regional Director	Piping Plover Atlantic Coast Population Revised Recovery Plan	Final Revision 1
Birds	Piping Plover (Charadrius melodus)	except Great Lakes watershed	Threatened	Office Of The Regional Director	Great Lakes & Northern Great Plains Piping Plover	Final

Group	Name	Population	Status	Lead Office	Recovery Plan Name	Recovery Plan Stage
Birds	Least tern (Sterna antillarum)	interior pop.	Endangered	Columbia Ecological Services Field Office	Least Tern (Interior Pop.)	Final
Birds	Lesser prairie-chicken (Tympanuchus pallidicinctus)		Candidate	Oklahoma Ecological Services Field Office		

Source: US Fish and Wildlife Service, Colorado Division of Wildlife

Development Trends

Baca County, along the Cities of Pritchett, Springfield, and Walsh, noted that no significant growth is expected in the County or in each Town. This lack of growth should ensure that no development will occur in the floodplain.

4.2 Agricultural Infestation Assessment

Agriculture is an important aspect of the County's economy. The following discussion analyzes the potential losses from floods using HAZUS and multiple hazards from federal crop insurance records.

Crop Insurance Analysis

Federal Crop Insurance Data represents losses from multiple hazards that could include: agricultural infestation, flooding, drought, hailstorms, temperature extremes, tornados, wildfires and straight-line winds. Average annual claims payout amount to $4.45 million in the County. More details are provided in Table 11 and 12.

Table 11 Baca County Premium and Crop Loss Data for Federal Crop Insurance 1980-2009

Liability (Amount of Coverage)	Total Premium	Federal Premium Subsidy	Farmer-paid Premium	Amount Paid in Claims	Average Amount Paid Annually in Claims
540,363,143	111,940,904	62,869,754	49,071,150	133,586,474	4,452,882

Source: Risk Management Agency

Table 12 Baca County Provisional Data (claim data unavailable as 2010 claims are not fully reported)

Liability (Amount of Coverage)	Total Premium	Federal Premium Subsidy	Farmer-paid Premium
45,906,951	12,905,593	7,687,705	5,217,888

Source: Risk Management Agency

Flood Analysis

HAZUS Methodology for Agricultural Economic Loss

The HAZUS Flood Model is determined by the relationships between the depth of flood and the annual chance of flood inundation to that depth. The primary elements that contribute to flood losses are depth, duration and velocity of the water in the floodplain. The other risks with flooding that assist with flood loss are channel erosion and migration, sediment deposition, bridge scour and the impact of flood-borne debris.

The agriculture component of the HAZUS Flood Model estimated a range of losses to barley, corn, corn silage, oats, and wheat. These crops were the only crops identified by the HAZUS model to have loss within the region of study. The model assumes a short duration and slow rise flood when estimating losses and does not account for high velocity flash floods. Loss estimates are based on United States Army Corp of Engineers (USACE) damage modifiers. The HAZUS-MH impact analysis predicts a loss estimate value by crop for flow time intervals. The first is a loss estimate for the day of the fixed event; the remaining three are for 3, 7 and 14 days following the event.

As shown in Table 13, the agricultural products in Baca County that show economic loss are barley, corn, corn silage and wheat. Barley's total loss is $3,860,147, Corn's total loss is $22,352,547, Corn silage's total loss is $59,652,662 and Wheat's total loss is $13,914,287. The total loss of all of these products is $99,779,643.

Table 13 Baca County Direct Economic Loss for Agricultural Products

Agricultural Product	Crop Loss Day 0 ($)	Crop Loss Day 3 ($)	Crop Loss Day 7 ($)	Crop Loss Day 14 ($)	Total Loss ($)
Barley	0	1,052,767	1,403,690	1,403,690	3,860,147
Corn	0	6,096,149	8,128,199	8,128,199	22,352,547
Corn Silage	0	16,268,908	21,691,877	21,691,877	59,652,662
Wheat	0	3,794,805	5,059,741	5,059,741	13,914,287
Total	**0**	**27,212,629**	**36,283,507**	**36,283,507**	**99,779,643**

Source: HAZUS-MH MR4

4.3 Drought Vulnerability Assessment

Based on the County's recent multi-year droughts and Colorado's drought history, it is evident that the entire region is vulnerable to drought. With the majority land area in the County used for agricultural purposes, the County has significant exposure to this hazard. In addition to economic and public water supply impacts, soil erosion, dust, and wildfire hazard are also exacerbated by drought conditions. Baca County has been affected by the droughts in the years identified in Table 14.

Table 14 Drought Disaster and Emergency Declarations in Baca County

Year	Declaring Agency and Declaration Number
2008	USDA Secretarial Declaration S2750
2005-2006	USDA Secretarial Declaration S2327
2004	USDA Secretarial Declaration S1947
2003	USDA Secretarial Declaration S1797
2002	USDA Secretarial Declaration S1643 State of Colorado
2000	USDA Secretarial Declaration S1498
1995-1996	USDA Secretarial Declaration S999
1977	Federal – Major Disaster

Source: USDA, CDEM, FEMA

While the crop insurance loss data covers a variety of perils, it is indicative of the types of agricultural impacts that drought can have upon the planning area. Available crop insurance data indicates over $133 million has been paid to the County's agricultural landowners in insurance claims between 1980 and 2009. It is reasonable to assume that a significant amount of this is due to drought-related losses. While the crop insurance loss data covers a variety of perils, it is indicative of the types of agricultural impacts that drought can have upon the planning area. Assuming at least 50% of the losses are drought-related, an average annual loss estimate can be calculated. For the region this is calculated by ($133,000,000/2)/29years, which equates to $2.29 million in average annual agricultural losses for the County.

4.4 Extreme Temperatures: Extreme Heat Vulnerability Assessment

Limited data on temperature extreme impacts per County was available during the development of this hazard's profile. Extreme heat normally does not impact structures as there may be a limited number of days where the temperatures stay high which gives the structure periodic relief between hot and cool temperature cycles. Areas prone to excessively high temperatures are identified normally on a nation-wide assessment scale, which doesn't allow detailed results on specific structures. Secondary impacts of extreme heat can affect the supporting mechanisms or systems of a community's infrastructure. For example, when high amounts of utilization is imposed on the power system it can cause an interruption in the transmission of that power shutting down air conditioning capabilities or refrigeration that can lead to spoiled foods, etc.

The elderly population in the planning area is most vulnerable to temperature extremes. Table 2.4 in Chapter 2 shows that the percentage of elderly people (age 65 or over) in the planning area is well above the national average, which is 6%. 22% of Baca County's population is over 65. However many residents of southeast Colorado are self sufficient and accustomed to rural living and the climate extremes that are part of the territory. The residents of nursing homes and elder care facilities are especially vulnerable to extreme temperature events. It is encouraged that such facilities have emergency plans or backup power to address power failure during times of extreme heat.

4.5 Extreme Temperatures: Extreme Cold Vulnerability Assessment

Limited data on temperature extreme impacts per County was available during the development of this hazard's profile. Extreme cold normally does not impact structures, but is a life safety issue. Areas prone to excessively cold temperatures are identified normally on a nation-wide assessment scale, which doesn't allow detailed results on specific structures. Secondary impacts of extreme cold can affect the supporting mechanisms or systems of a community's infrastructure. For example, when extreme cold is coupled with high winds or ice storms, power lines may be downed, resulting in an interruption in the transmission of that power shutting down electric furnaces, which may lead to frozen pipes in homes and businesses.

The elderly population in the planning area is most vulnerable to temperature extremes. Table 2.4 in Chapter 2 shows that the percentage of elderly people (age 65 or over) in the planning area is well above the national average, which is 6%. 22% of Baca County's population is over 65. However many residents of southeast Colorado are self sufficient and accustomed to rural living and the climate extremes that are part of the territory. The residents of nursing homes and elder care facilities are especially vulnerable to extreme temperature events. It is encouraged that such facilities have emergency plans or backup power to address power failure during times of extreme cold.

4.6 Floodplain Vulnerability Assessment (100/500-year and Localized)

The best available flood data for Baca County was generated by HAZUS-MH MR4 by FEMA Region VIII, FEMA's software program for estimating potential losses from disasters. The 100-year floodplain was generated for major rivers and creeks in the county (those with a 10 square mile minimum drainage area). A USGS 30 meter resolution digital elevation model (DEM) was used as the terrain base in the model. HAZUS-MH produces a flood polygon and flood-depth grid that represents the base flood. While not as accurate as official flood maps, such as digital flood insurance rate maps, these floodplain boundaries are suitable for use in GIS-based loss estimation. Potential losses to the county were analyzed with HAZUS-MH, based on Census Block-based buildings and population inventory and the flood hazard data. The following discussion, maps and tables presents the results of the loss estimation in more detail.

Figure 1 Baca County 1% Chance Floodplain and Critical Facilities Map

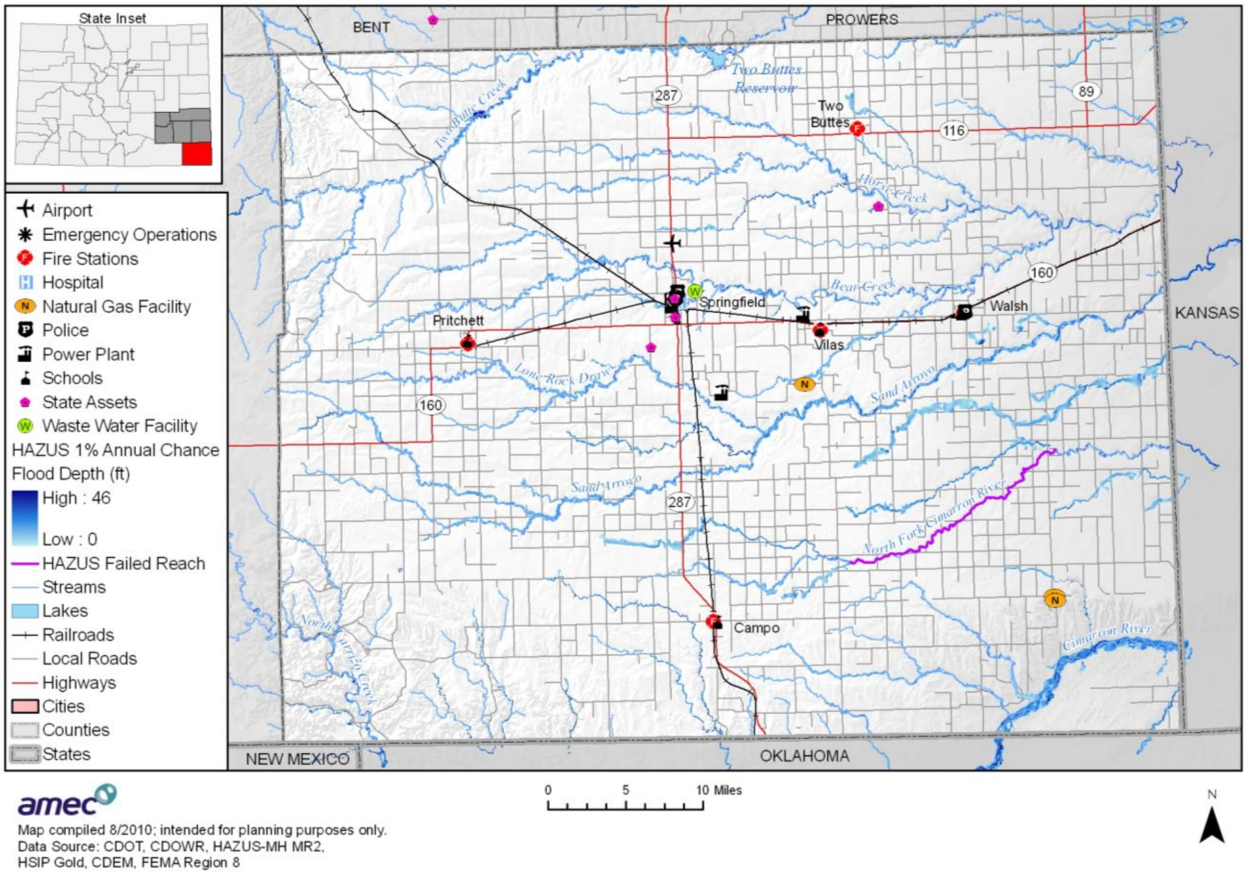
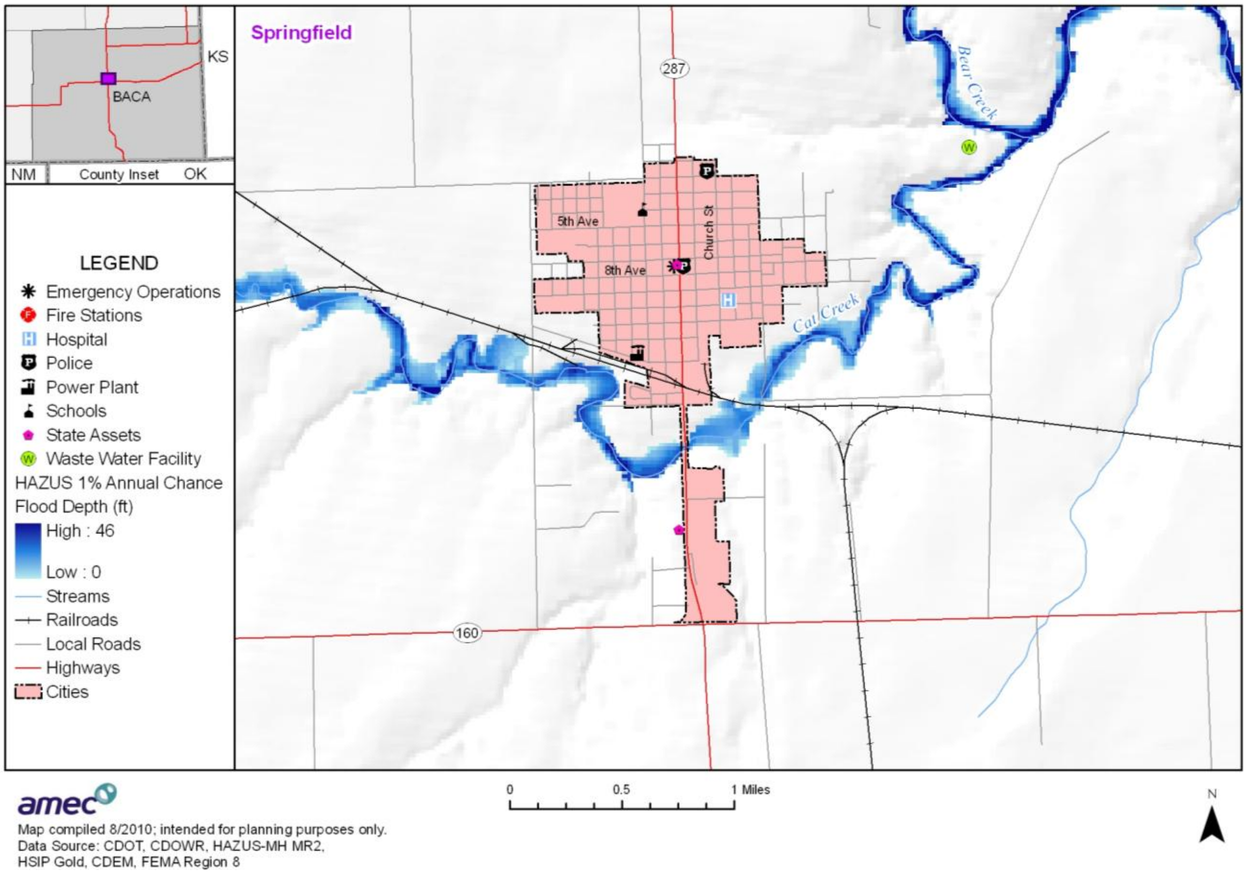


Figure 2 Baca County Cities 100-year Floodplain and Critical Facilities Map



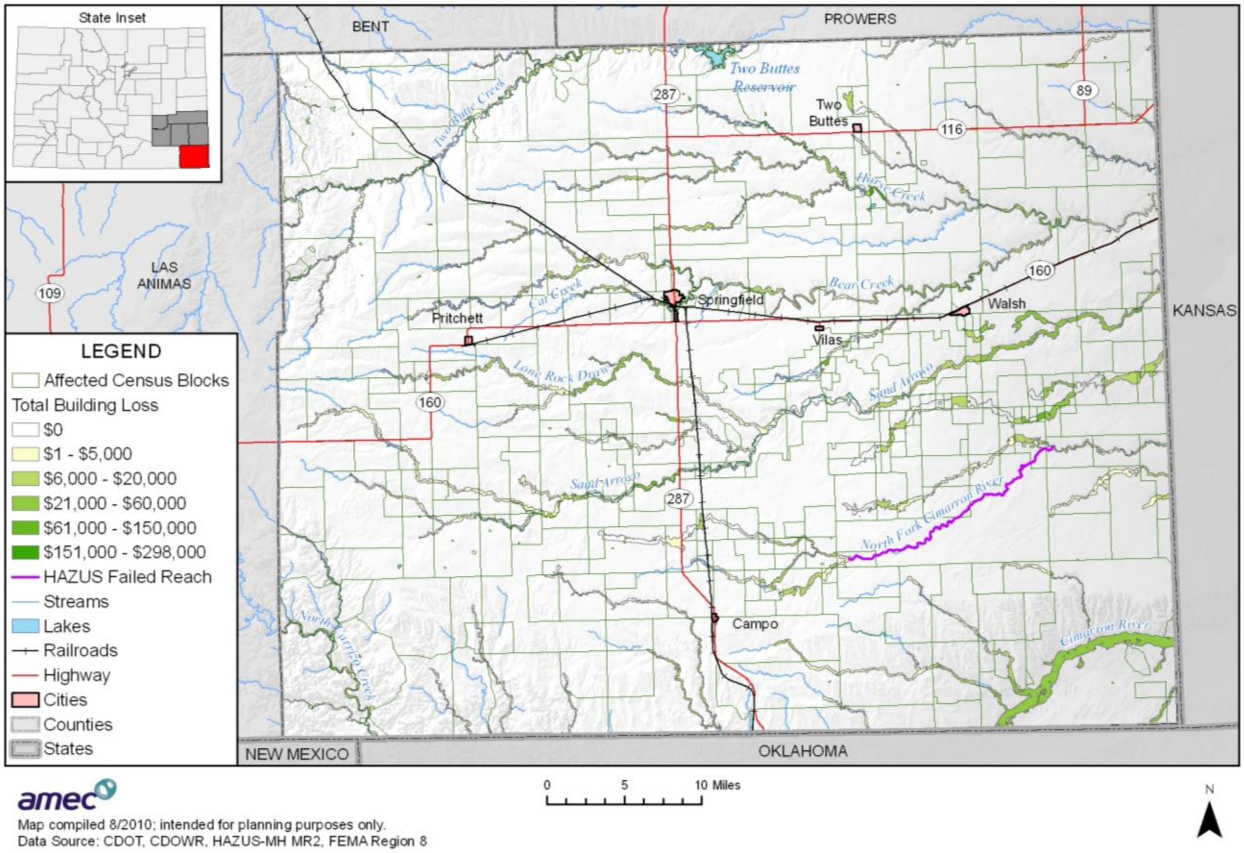
HAZUS-MH provides reports on the number of buildings impacted, estimates of the building repair costs, and the associated loss of building contents and business inventory. Building damage can cause additional losses to a community as a whole by restricting the building's ability to function properly. Income loss data accounts for business interruption and rental income losses as well as the resources associated with damage repair and job and housing losses. These losses are calculated by HAZUS-MH using a methodology based on the building damage estimates. Building damage is estimated by Census Block based on the average depth of flooding within a given Census Block. Flood damage is directly related to the depth of flooding. HAZUS-MH uses depth-damage functions to model the losses. For example, a two-foot flood generally results in about 20 percent damage to the structure (which translates to 20 percent of the structure's replacement value). To estimate the monetary loss for each town, the flooded Census Blocks were extracted, and the damage costs were totaled using GIS. This was done for each town and unincorporated area to illustrate how the risk varies across the planning area. The results of this are shown in Table 15.

Table 15 Estimated Economic Losses from Flooding

Jurisdiction	Cost Building Damage	Cost Contents Damage	Inventory Loss	Relocation Loss	Capital Related Loss	Wage Loss	Total Loss	Percent of Total Loss	Loss Ratio
Campo	-	-	-	-	-	-	-	-	-
Pritchett	-	-	-	-	-	-	-	-	-
Springfield	-	-	-	-	-	-	-	-	-
Two Buttes	-	-	-	-	-	-	-	-	-
Vilas	-	-	-	-	-	-	-	-	-
Walsh	-	-	-	-	-	-	-	-	-
Unincorporated	1,111,000	1,146,000	93,000	-	1,000	16,000	2,367,000	100%	1.5%
Total	**1,111,000**	**1,146,000**	**93,000**	**-**	**1,000**	**16,000**	**2,367,000**	**100%**	**0.5%**

The building damage loss ratio shown in Table 15 is an indication of the community's ability to recover after an event. Building Damage Loss Ratio percent is calculated by taking the Building Structural Damage divided by Building Structural Value and then multiplying by 100. Loss ratio exceeding 10% are considered significant by FEMA. The area with the highest building damage loss ratio is the unincorporated County.

Figure 3 Baca County Building Loss in the 100-year Floodplain



According to HAZUS-MH, the municipalities within Baca County are not affected by the 1% annual chance flood. The map in Figure 3 displays the distribution of the flood loss by Census Block across the County. According to the map in Figure 2 the majority of potential flood impacts in the unincorporated County are located around the Town of Springfield on the Bear and Cat Creeks.

Floodplain Population Information

Should a 1% chance flood occur in the county, some residences would become uninhabitable during and after the flood. Table 16 shows the number of residents in Baca County who would be displaced or need shelter.

Table 16 Population Displaced by Flooding

Jurisdiction	Displaced Population	Population Needing Shelter
Campo	-	-
Pritchett	-	-
Springfield	-	-

Jurisdiction	Displaced Population	Population Needing Shelter
Two Buttes	-	-
Vilas	-	-
Walsh	-	-
Unincorporated	72	-
Total	**72**	**-**

Critical Facilities

Critical facilities in the floodplain were determined using GIS, by selecting all critical facilities that fell within the floodplain. Baca County has no critical facilities in the floodplain.

Baca County Scour Critical Bridges

Included with HSIP Gold data is a database of bridges called the National Bridge Inventory developed by the Federal Highway Administration. Within the bridge layer one of the attribute items is a "scour index", which is used to quantify the vulnerability of a bridge to scour during a flood. Bridges with scour index between 1 and 3 are considered "scour critical", or a bridge with a foundation element determined to be unstable for the observed or evaluated scour condition.

There are 4 scour critical bridges in Baca County. They are all located on county roads that travel through Baca County. One scour critical bridge is located northeast of Walsh on County Road 45 at the intersection of Bear Creek. The other three scour critical bridges are located in the southwest portion of the County near Pritchett and Campo. One is located on County Road 8 at the intersection of South Fork Sand Arroyo. The other two intersect unnamed streams but they are on County Road J and M. The locations of these bridges are shown in Table 17.

Table 17 Scour Critical Bridges

Name	Owner	Stream	Near Town
County Road 45	Baca County Road & Bridge	Bear Creek	Walsh
County Road 8	Baca County Road & Bridge	South Fork Sand Arroyo	Pritchett
County Road J	Baca County Road & Bridge	No Name	Campo
County Road M	Baca County Road & Bridge	No Name	Pritchett

NFIP Claims Analysis

Policies and Claims Information

Baca County does not participate in the NFIP. The Town of Walsh is the only entity within the County that participates in the NFIP. There have been no claims, and no policies are currently in force in the Town of Walsh.

Repetitive Loss

There are no repetitive loss properties in the County.

Previous Occurrences

Previous occurrences of regional flooding can be found in Section 4.2.7 of the main plan. Flash flooding incidents affecting Baca County are reported below.

July 1, 1995 - 2.60 inches of rainfall in a 45 minute period resulted in street flooding and the flooding of an office building. Damage estimates were not given.

June 17, 1996 - Over 3 inches of rain fell near Bartlett, flooding Bear Creek and the adjacent roadways. The irrigation controls (watergates) on Bear Creek were damaged due to the flooding. Damage estimates were not given.

July 7, 1998 - Slow moving thunderstorms produced 2 to 6 inches of rainfall across Baca County, causing flooding of low-lying areas, ditches, and roads near the towns of Vilas and Walsh. Water 200 to 300 yards wide was moving across county roads near Vilas, and private homes, basements, and the high school in both Vilas and Walsh were flooded. Damage estimates were not given.

July 5, 2002 - Very heavy rainfall in excess of six inches caused some flooding of county roads and low areas in the Sand arroyo basin.

July 9, 2006 - Heavy rains from thunderstorms brought flooding to Baca County. A draw flowing into Sand Arroyo Creek, 3 miles south of Walsh, was filled with fast flowing water and debris 150 yards wide and four feet deep.

4.7 Severe Weather: Thunderstorms/Lightning/Hail Vulnerability Assessment

Thunderstorms producing winds, hail, and are a common occurrence in the County between early spring and late fall. Given the lightning statistics for Colorado and the region, the County is at risk and is vulnerable to the effects of lightning. Persons recreating or working outdoors during the months of April through September will be most at risk to lightning strikes. Fortunately, there have been no incidents of death of injury associated with lightning in the County. In addition, hailstones are frequently thrown out miles in front of the storm producing them.

Thunderstorms can produce locally heavy rain and high winds, which may result in crop damage and localized flooding. Hail primarily causes crop damage. However, hailstorms in populated areas can cause significant damage to roofs, automobiles, trees and windows. Critical facilities and infrastructure will have the greatest consequences if damaged by a lightning strike. The greatest losses from lightning could result from secondary hazards, such as wildfire.

Table 18 Thunderstorm/Lightning/Hail Occurrences in Baca County

	Thunderstorm	Lightning	Hail
Events	38	0	276
Deaths/Injuries	0/0	0/0	0/0
Damage	$85,000	0	$400,000

Source: NCDC

4.8 Tornado Vulnerability Assessment

Baca County has been struck by a number of tornadoes in the past 65 years. Some of these tornadoes have caused large amounts of damage. A history of tornadoes in Baca County is shown in Table 19 and Figure 4. Two tornadoes have struck Baca County that caused in excess of $1 million in damages. One occurred on June 10, 1967 and caused $1.6 million in damages in 2010 dollars. The other occurred on May 18, 1977 and caused $2.5 million in damages. These tornadoes are profiled in greater detail in Section 4.2.11 of the main plan.

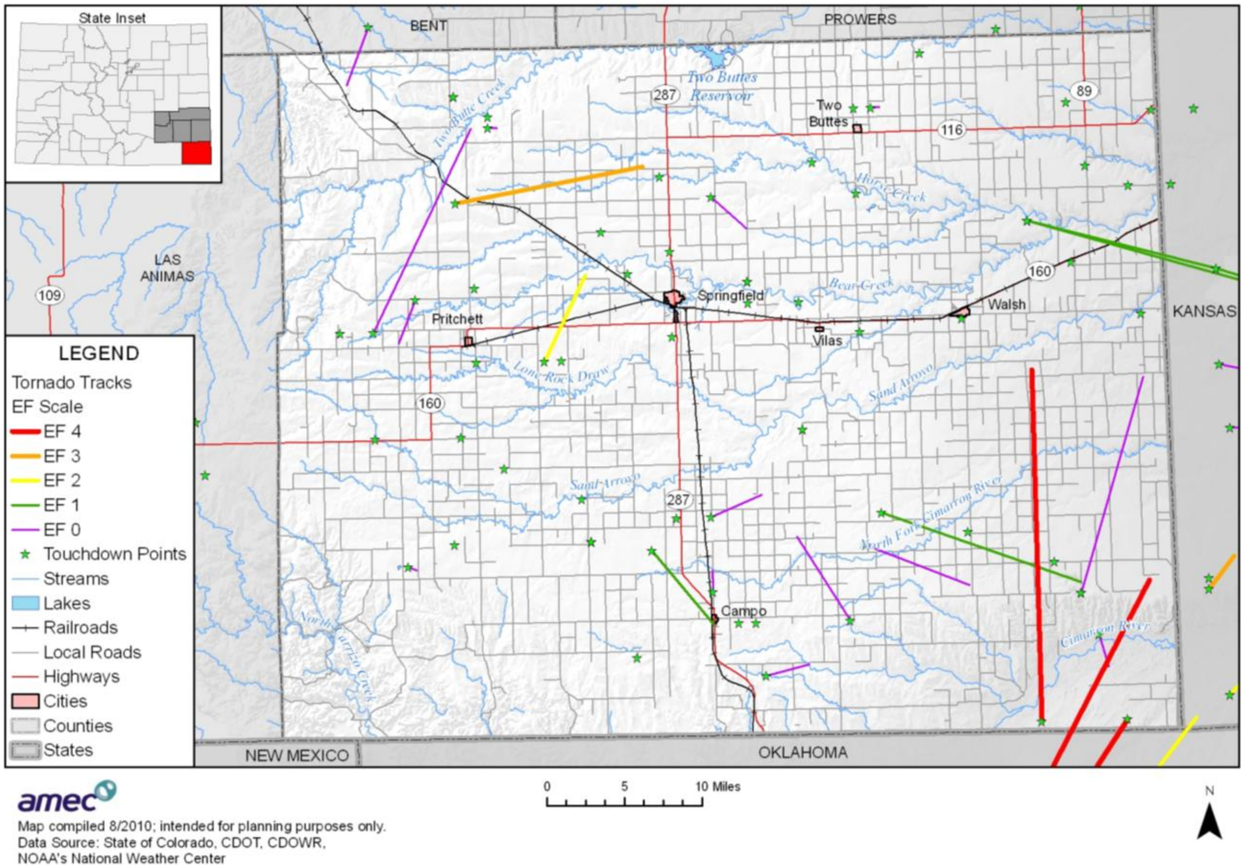
Table 19 Baca County Tornado History

Fujita Scale Ranking	Number of Tornadoes
F0	43
F1	18
F3	0
F4	1
Unknown*	3
Total	**65**

Source: NCDC

* Three tornadoes struck Baca County in 1955. The magnitude of them is unknown.

Figure 4 Baca County Tornadoes and Touchdowns

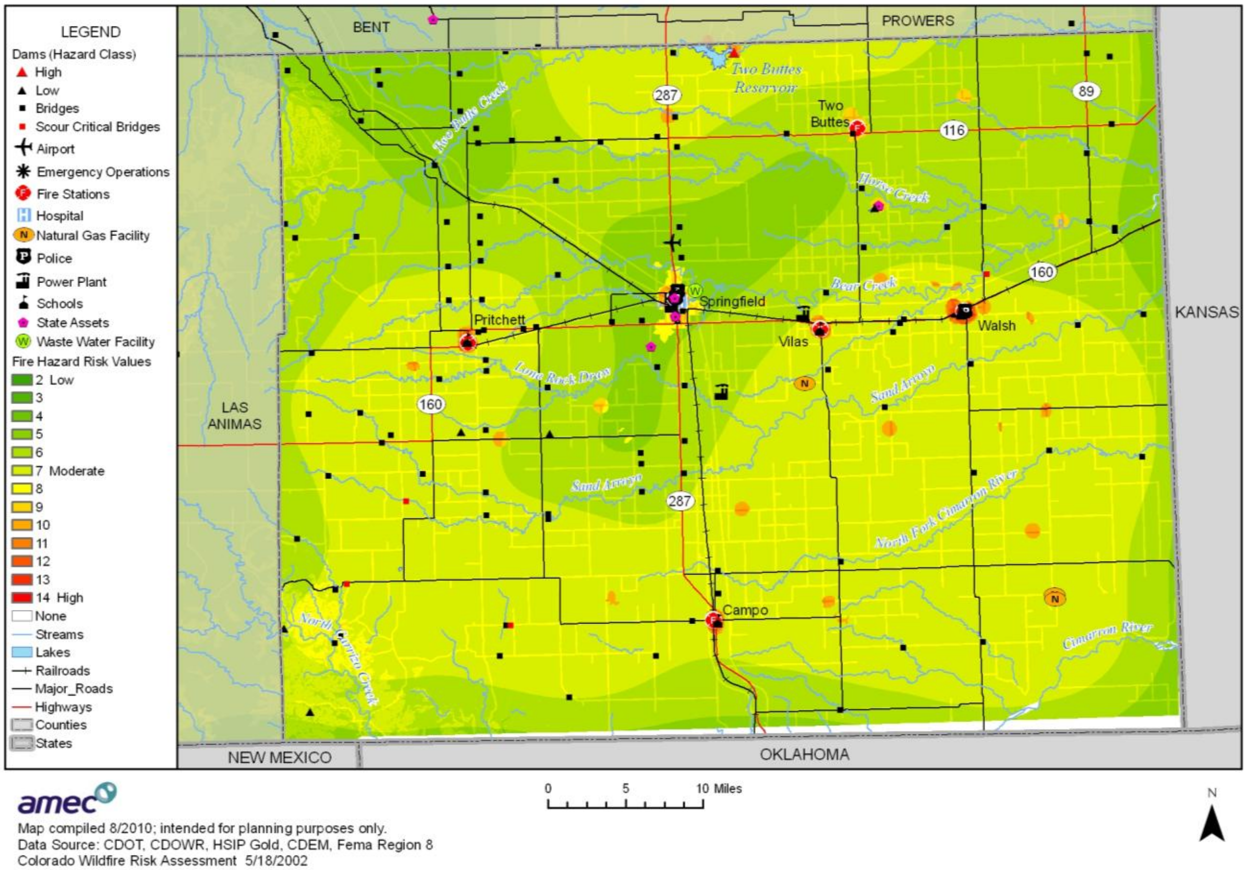


4.9 Wildfire Vulnerability Assessment

Baca County Wildland Urban Interface

The Wildland Urban Interface map for Baca County, shown in Figure 5, shows low to high fire hazard risk values throughout the County. The majority of the County has lower values with the higher values around the communities of Campo, Pritchett, Springfield, Two Buttes, Vilas and Walsh. Campo, Pritchett, Vilas and Walsh have the highest fire risk in the County with values between moderate and high. Springfield and Two Buttes' risk values are in the low to moderate range.

Figure 5 Baca County Wildland Urban Interface



Critical Facilities

There are one hundred critical facilities in a moderate to high fire hazard in Baca County. The Town of Campo has three facilities: one fire station and two schools. The Town of Pritchett has four facilities: one fire station and three schools. The Town of Springfield has six facilities: five power plant facilities and one police station. In addition, the HMPC noted that there is a hospital and Sherriff's Office in the Town as well. The Town of Two Buttes has one facility: one fire station. The Town of Vilas has five facilities: one fire station and four schools. The Town of Walsh has four facilities: one fire station, one police station, and two schools. The unincorporated county has 77 critical facilities in a moderate to high fire hazard: 57 bridges, four scour critical bridges, five dams, three natural gas facilities, and eight state assets.

Table 20 Critical Facilities in the Moderate to High Wildfire Hazard Areas

Facility Type	Facility Count
Bridge	57
Dams	5
Fire Stations	5

Facility Type	Facility Count
Natural Gas Facility	3
Police	2
Power Plant	5
Schools	11
Scour Critical Bridge	4
State Assets	8
Total	**100**

Source: HSIP Gold 2008, HAZUS MR4, CDEM

4.10 Wind Storm Vulnerability Assessment

The County is subject to potentially destructive straight-line winds. High winds are common throughout the planning area, throughout the entire year. Straight line winds are primarily a public safety and economic concern. Windstorm can cause damage to structures and power lines which in turn can create hazardous conditions for people. Debris flying from high wind events can shatter windows in structures and vehicles and can harm people that are not adequately sheltered.

Future losses from straight line winds include:

- Erosion (soil loss)
- Dry land farming seed loss,
- Wind blown weeds, such as tumbleweed
- Power line impacts and economic losses from power outages
- Occasional building damage, primarily to roofs

Campers, mobile homes, barns, and sheds and their occupants are particularly vulnerable as windstorm events in the region can be sufficient in magnitude to overturn these lighter structures. Livestock that may be contained in these structures may be injured or killed, causing economic harm to the rancher who owns both the structure and the livestock. Overhead power lines are vulnerable and account for the majority of historical damages. State highways can be vulnerable to high winds and dust storms, where high profile vehicles may be overturned by winds and lowered visibility can lead to multi-car accidents.

4.11 Winter Storm Vulnerability Assessment

The threat to public safety is typically the greatest concern when it comes to impacts of winter storms. But these storms can also impact the local economy by disrupting transportation and commercial activities. Winter storms are occasionally severe enough to overwhelm snow removal efforts, transportation, livestock management, and business and commercial activities. The region can experience high winds and drifting snow during winter storms that can occasionally isolate individuals and entire communities and lead to serious damage to livestock populations and crops. Travelers on highways in the County, particularly along remote stretches of road, can become stranded, requiring search and rescue assistance and shelter provisions.

Structural losses to buildings are possible and structural damage from winter storms in Colorado has resulted from severe snow loads on rooftops. Older buildings are more at risk, as are buildings with large flat rooftops (often found in public buildings such as schools). The County's elderly population is a potentially vulnerable demographic during severe winter storms. Smaller communities prevalent in the County may become isolated during winter storm events, Persons that choose to live in these areas are generally self-sufficient, or should be, as government and emergency services may be limited during a severe winter storm.

Another common impact of blizzards and severe winter storms on the planning area is the loss of power. The weight of heavy continued snowfall and/or ice accumulating on power lines often brings them to the ground causing service disruptions for thousands of customers. This can cause a loss of community water and sewer services, as well as the supply of gasoline, as these services almost always require electrical pumps. In addition, prolonged power outages can mean loss of food to grocery stores, large facilities that provide feeding services (such as prisons, hospitals and nursing homes), and restaurants.

4.12 Hazardous Materials Vulnerability Assessment

It is often quite difficult to quantify the potential losses from human-caused hazards. While the facilities themselves have a tangible dollar value, loss from a human-caused hazard often inflicts an even greater toll on a community, both economically and emotionally. The impact to identified assets will vary from event to event and depend on the type, location, and nature of a specific technological hazard event. There are no fixed facilities in Baca County. There are multiple transportation routes that transect the County. Natural gas and oil pipelines also run through the County. Table 21 shows the breakdown of gas transmission line and hazardous liquid line mileage in the County

Table 21 Gas Transmission Line and Hazardous Liquid Line Mileage By County

County	Gas Miles	Liquid Miles	Percentage of State Total
Baca	310	131	4.0%

Source: PHMSA

The US Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) tracks hazardous materials spills and occurrences. A list of incidents can be found in Table 22.

Table 22 Hazardous Materials Incidents in the County

Incident Town	Incident Route	Mode of Transportation	Failure Cause Description	Total Amount of Damages
Walsh	County Road M 16 MI. South &	Highway	Rollover Accident; Rollover Accident	$51,391
Springfield	Highway 287	Highway	Rollover Accident; Vehicular Crash or Accident Damage	$65
Campo	Colorado 287 MP #17	Highway	Rollover Accident; Vehicular Crash or Accident Damage	$147,345

Source: PHMSA Incident Reports Database

Critical Facilities at Risk

In order to identify those critical facilities at risk to a hazardous materials release within identified corridors, an analysis was performed using GIS software. The same buffer was applied to the population at risk. An intersect was performed between critical facilities and the transportation buffers. Table 23 details the critical facilities located within a transportation corridor that are at risk to transportation related hazardous materials releases.

Table 23 Facilities within the 1 mile of HAZMAT transportation Corridor by Jurisdiction

Location	Facility Type	Facility Count
Campo	Fire Stations	1
Campo	Schools	2
Pritchett	Fire Stations	1
Pritchett	Schools	3
Springfield	Emergency Operations	1
Springfield	Fire Stations	1
Springfield	Hospital	1
Springfield	Police	2
Springfield	Power Plant	5
Springfield	Schools	3
Springfield	State Assets	1
Unincorporated County	Airport	1
Unincorporated	Bridge	22
Unincorporated	Dams	1
Unincorporated County	Power Plant	1
Unincorporated County	State Assets	3
Vilas	Fire Stations	1
Vilas	Schools	4
Walsh	Fire Stations	1

Location	Facility Type	Facility Count
Walsh	Police	1
Walsh	Schools	2
Total		**58**

Source: HSIP Gold, CDEM, CDOT

Populations at Risk

To determine the populations at risk from a transportation-related hazardous materials release within identified transportation corridors, an analysis was performed using GIS. A one-mile buffer was applied to both sides of Highways 10, 50, 71, and 287, and the Atchison, Topeka, & Santa Fe (AT&SF) and the Victoria Southern & Towner Railroads, creating two-mile buffer zones around each corridor. US Census 2000 population data, aggregated by census block, was acquired from HAZUS-MH. An intersection was performed between the census data and the transportation buffers. If any part of the census block touched the transportation buffer zone, the entire block was included in the buffer zone. Table 24 shows populations within each jurisdiction that are at greatest risk to transportation-related hazardous materials releases. There are a total of 3,444 citizens in the County at risk to hazardous material events.

Table 24 Populations in Haz-Mat Buffer Zone in Baca County

Jurisdiction	Population
Unincorporated County	892
Campo	150
Springfield	1,569
Vilas	110
Walsh	723
Total	**3,444**

Source: CDEM, CDOT, US Census Bureau

5 Baca County Capability Assessment

Thus far, the planning process has identified the hazards posing a threat to Baca County and described, in general, the vulnerability of the County to these risks. The next step is to assess what loss prevention mechanisms are already in place. This part of the planning process is the mitigation capability assessment. Combining the risk assessment with the mitigation capability assessment results in the County's "net vulnerability" to disasters and more accurately focuses the goals, objectives, and proposed actions of this plan.

The planning committee used a two-step approach to conduct this assessment for the County. First, an inventory of common mitigation activities was made through the use of a matrix in the AMEC distributed Data Collection Guide. The purpose of this effort was to identify policies and programs that were either in place, needed improvement, or could be undertaken, if deemed appropriate. Second, the HMPC reviewed existing policies, regulations, plans, and programs to determine if they contributed to reducing hazard-related losses or if they inadvertently contributed to increasing such losses.

This section presents the County's mitigation capabilities: programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This assessment is divided into three sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, and fiscal mitigation capabilities.

5.1 Baca County's Regulatory Mitigation Capabilities

Table 25 lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the County, and in the cities of Springfield and Walsh.

Table 25 Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Baca County Y/N	Town of Springfield Y/N	Town of Walsh Y/N	Town of Pritchett Y/N	Comments
General plan	N	N	N	N	
Zoning ordinance	N	Y	N	N	
Subdivision ordinance	N	N	N	N	
Growth management ordinance	N	N	N	N	
Floodplain ordinance	N	N	N	N	
Other special purpose ordinance (stormwater, steep slope, wildfire)	N	N	N	N	
Building code	Y	Y	N	N	Version: UBC 97 for County, 2006 IBC for Springfield
BCEGS Rating	N	N	N	N	
Fire department ISO rating	N	N	Y	N	Rating: No county fire dept. Run by cities Town of Walsh: Rating Class 6 Town of Springfield: 6 Town of Pritchett: 9
Erosion or sediment control program	Y	N	N	N	Blowing Dirt
Stormwater management program	N	N	N	N	

Regulatory Tool (ordinances, codes, plans)	Baca County Y/N	Town of Springfield Y/N	Town of Walsh Y/N	Town of Pritchett Y/N	Comments
Site plan review requirements	N	N	N	N	
Capital improvements plan	N	N	N	N	
Economic development plan	N	N	N	N	
Local emergency operations plan	Y	Y	Y	N	
Other special plans	Y	N	N	N	Severe Weather Plan encompasses all towns and unincorporated county.
Flood insurance study or other engineering study for streams	N	N	N	N	
Elevation certificates	N	N	N	N	
Other		N	N	N	

5.2 Baca County's Administrative/Technical Mitigation Capabilities

Table 26 identifies the County personnel responsible for activities related to mitigation and loss prevention in the County.

Table 26 Administrative/Technical Regulatory Tools

Personnel Resources	Yes/No	Department/Position	Comments
Planner/Engineer with knowledge of land development/land management practices	Y	Land use administrator	
Engineer/Professional trained in construction practices related to buildings and/or infrastructure	N		
Planner/Engineer/Scientist with an understanding of natural hazards	N		
Personnel skilled in GIS	N		
Full time building official	N		
Floodplain Manager	N		
Emergency Manager	N		
Grant writer	Y	Division of Emergency Management Riley Frazee	
Other personnel	Y	Commissioners Office	
GIS Data – Hazard areas	N		
GIS Data - Critical facilities			

Personnel Resources	Yes/No	Department/Position	Comments
GIS Data – Building footprints	N		
GIS Data – Land use	N		
GIS Data – Links to Assessor's data	N		
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	Y		Outdoor warning sirens are located in all six communities within Baca County. CodeRED NOAA All-Hazards Weather Radios
Other	N		

5.3 Baca County's Fiscal Mitigation Capabilities

Table 27 identifies financial tools or resources that the County could potentially use to help fund mitigation activities.

Table 27 Fiscal Regulatory Tools

Financial Resources	Accessible/Eligible to Use	Comments
Community Development Block Grants	Y	Commissioners Office
Capital improvements project funding	Y	State Historical / DOLA
Authority to levy taxes for specific purposes	Y	Commissioners
Fees for water, sewer, gas, or electric services	N	
Impact fees for new development	Y	Commissioners
Incur debt through general obligation bonds	Y	Commissioners
Incur debt through special tax bonds	Y	Commissioners
Incur debt through private activities	Y	Commissioners
Withhold spending in hazard prone areas	Y	Commissioners
Other	N	

5.4 Additional Capabilities in Baca County

In the Data Collection Guide, Baca County indicated that the County was Storm Ready Certified. Each town in the County is Storm Ready as well. Baca County is in the process of writing a Communication Wildfire Protection Plan to mitigate against wildfire.

The Town of Springfield has an Emergency Warning Evacuation Plan that was written in 2003. The plan lays out what events, both natural and man-made, would necessitate an evacuation, and lays out routes should an evacuation occur. Shelter in place locations are also discussed. As part of the evacuation plan, shut-ins, the elderly, and those persons not having the availability of transportation will be provided with transportation to a staging area.

The County has 54 trained SKYWARN weather spotters.

All counties in the planning area make the 211 system available to citizens within each county. The system guides citizens to appropriate agencies and organizations, including disaster resources and assistance. The system ensures that citizens can access timely and accurate information about what is happening in their community.

6 Baca County Mitigation Actions

After reviewing the goals of the Southeast Colorado Regional Hazard Mitigation Plan, Baca County and its jurisdictions has adopted the following mitigation actions to reduce their risk to the hazards identified above.

County Actions

Action Item #1 Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program

Hazards Addressed: All

Issue/Background: The County and each jurisdiction are subject to several natural hazards. Each poses a different degree of risk and associated vulnerability. Some hazards have a combination of attributes, including a high likelihood of occurrence, a specific location that would likely be impacted, and proven approaches that could reduce the impact. For other hazards, where either the likelihood of occurrence is very low, the area of likely impact is not specifically known, or there is very little that can be done to reduce the impacts, the HMPC has determined that the best approach is public awareness. Citizens should have information describing historical events and losses, the likelihood of future occurrences, the range of possible impacts, appropriate actions to save lives and minimize property damage, and where additional information can be found. Any information provided through this effort should be accurate, specific, timely, and consistent with current and accepted local emergency management procedures as promoted by the Southeast Colorado All Hazards Region (SECAHR), Colorado Department of Emergency Management (CDEM) and the American Red Cross. Following a disaster event, there should be extra efforts to provide the public with information about disaster preparedness and mitigation measures. This public outreach effort will be conducted annually and will include:

- Using a variety of information outlets, including local news media;
- Creating and printing (where applicable) brochures, leaflets, water bill inserts, and public service announcements;
- Posting all information to the SECAHR website;
- Displaying current brochures and flyers in County office buildings, city halls, libraries, and other public places; and

- Developing public-private partnerships and incentives to support public education activities.

Other Alternatives: Continue public information activities currently in place.

Responsible Office: Baca County Emergency Management

Priority (High, Medium, Low): High

Cost Estimate: Staff time, printing costs for literature.

Benefits (avoided Losses): Life safety, reduction in property losses, relatively low cost

Potential Funding: State Hazard Mitigation Program grants, county and jurisdiction funds, other available grants

Schedule: Ongoing – part of seasonal multi-hazard public awareness campaign.

Action Item #2 Community Wildfire Protection Plans

Issue/Background: Wildfire is an issue in the County. The intent is to minimize risk and vulnerability from wildfire hazard.

- Complete CWPP's for Baca County.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which project will be implemented:

Basically three meetings per county –

- 1st Meeting – Wildfire Mitigation Assessment mapping exercise (circling areas for values, risks & fuels) to identify areas of concern).
- 2nd Meeting – Review mapping overlays; review FireWise mitigation potentials; start looking at overall goals for a five year plan.
- 3rd Meeting – Review/complete goals; review draft plan; determine annual workplan (identify persons responsible/ tasks/benchmark dates to complete assignments/projects.

Responsible Office: Office of Emergency Management

Priority (High, Medium, Low): High

Cost estimate: Low to high cost depending upon in-kind and actual expenses – mileage/per diem/in-kind hours/ administrative copying costs, etc/ CWPP plan copying costs.

Benefits (avoided Losses): Mitigating wildfire hazards within a county by identifying /prioritizing areas of concern, then mechanisms to implement mitigation.

Potential funding: Federal/State grant options?

Schedule:

- Three meetings per county to create plan.
- Schedule according to each annual workplan for implementing projects.
- Update meetings according to each county's schedule

Action Item #3 CWPP Projects as identified by the County's CWPP

Issue/Background: Wildfire is an issue in the County. The intent is to minimize risk and vulnerability from wildfire hazard. Projects can include mitigating risk, access, water supply, structure construction design & materials, defensible space, trees & shrubs (landscapes), interior design, & 'What to do when… (evacuation needs) .

Other Alternatives: No action.

Existing Planning Mechanism(s) through which project will be implemented: The County's CWPP. Types of projects include:

- Risk (Landowner Awareness)
- Access (ingress/egress; widths/turnarounds/ culverts; signage (High/med/low fire danger; CR/street signages)
- Water supply
- Construction design & materials,(building codes, ordinances)
- Defensible space (Fuels mgmt, establishing living fuel breaks (grass) – riverbottom & community),
- Trees & shrubs,
- Interior safety
- What to do when
- Other
  - Hazards – Power lines/trees/brush breakage (Tree Line USA, NADF)
  - County Fire Bans & Controlled Burn Ordinances
  - Ag Hazards – wildfire
  - Drought – fire hazards

Responsible Office: Office of Emergency Management

Priority (High, Medium, Low): Medium

Cost estimate: Per project

Benefits (avoided Losses): Protect homes, homesteads, structures, values from potential wildfires until fire services can arrive. Protecting homes can be maximized when fire service arrives. Protect Firefighter safety during suppression operations.

Potential funding: Federal/State grant options?

Schedule: Schedule according to each CWPP annual workplan for implementing projects.

Action Item #4 Firewise Outreach Message to appropriate audiences within the County CWPP Plan

Issue/Background: Wildfire is an issue in the County. The intent is to minimize risk and vulnerability from wildfire hazard.

- Homeowners, landowners and other property owners need to have an awareness of vulnerability to wildfire hazards.
- Each property owner needs to take responsibility for mitigating potentials for catastrophic damage to their own properties – protect their own properties from wildfire.
- Support safety to firefighters during suppression by mitigation of fuels and implementing other FireWise suggestions.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which project will be implemented: Educating publics on risk, access, water supply, construction design & materials, defensible space, trees & shrubs, interior safety & 'What to do when…' – tools to mitigate.

Responsible Office:

- Educational outreach from local VFD's to assess homesites and give recommendations.
- Media news releases; Fair booths (w/other entities);
- Firewise prevention messages for schools.

Priority (High, Medium, Low): Medium

Cost estimate: To be determined

- Pamphlets/handout costs
- Firewise Educational material for schools
- Low to high cost depending upon in-kind and actual expenses – mileage/per diem/in-kind hours/ administrative copying costs, etc.

Benefits (avoided Losses): Protect homes, homesteads, structures, values from potential wildfires until fire services can arrive. Protecting homes can be maximized when fire service arrives. Protect Firefighter safety during suppression operations.

Potential funding: Federal/State grant options?

Schedule:

- Schedule according to each CWPP annual workplan for implementing projects.
- Update meetings according to each county's schedule.

Action Item #5 Develop ordinances to address burn permitting and restrictions.

Hazards Addressed: uncontrolled burning during dangerous weather conditions.

Issue/Background: Having an agricultural based economy Baca County deals with large intentionally started fires. These fires pose little danger when done properly and during the right weather conditions. Too often these factors are not taken into consideration by those burning and losses occur.

Other Alternatives: We see none other than doing nothing. Restrictions with no ordinances backing them have little effect.

Existing Planning Mechanism(s) through which project will be implemented: Baca County commissioners, Office of Emergency Management.

Responsible Office: Baca County Office of Emergency Management

Priority (High, Medium, Low): High

Cost Estimate: $8,500.00

Benefits (avoided Losses): Losses from fires now started with no regard to weather and other dangers could be reduced and give those harmed because of illegal fires a better footing in court seeking reimbursement. This would also give the county a way of fining those that chose not to get permits.

Potential funding: FEMA PDM Grant, Homeland Security CCP.

Schedule: We anticipate we could have this completed by July 2013 if we had the funds in early 2012.

Action Item #6 County wide fire district establishment

Hazards Addressed: Wildland and Structural fire protection

Issue/Background: Fire departments within the county are not part of a Fire Protection District and receive funds from the towns and the County. Many departments are under funded and equipped.

Other Alternatives: Continue funding departments as they are now and keep same level of fire suppression services.

Existing Planning Mechanism(s) through which project will be implemented: Community Wildfire Protection Plan, Local Emergency Planning Committee.

Responsible Office: Baca County Office of Emergency Management

Priority (High, Medium, Low): Medium

Cost Estimate: $20,000.00

Benefits (avoided Losses): $500,000.00 – This summer we lost two houses and damaged 4 due to wildland fires and with the proper training/equipment and additional apparatus this could have been avoided.

Potential funding: Colorado State Forest Service – Volunteer Firefighter Assistance Grant Program, FEMA PDM Grant.

Schedule: We anticipate we could have this completed by Nov. 2013 if we worked on it heavily.

Action Item #7 Install outdoor warning sirens in unincorporated towns in the county (Stonington, North Walsh)

Hazards Addressed: Public safety during severe weather or man-made disasters.

Issue/Background: Baca County can expect severe weather anytime of the year. These include but not limited to tornados, flash flooding, wild fire, and blizzards.

Other Alternatives: The use of loud speakers in fire and patrol vehicles, though these vehicles are usually already tied up doing other things. This would slow the warning down considerably.

Existing Planning Mechanism(s) through which project will be implemented: The Local Emergency Planning Committee.

Responsible Office: Baca County Office of Emergency Management

Priority (High, Medium, Low): High

Cost Estimate: $43,000.00

Benefits (avoided Losses): The faster we can get people to the proper shelter the safer our public will be. Outdoor sirens have been shown to be the device the public will react to fastest and have the most confidence in. It will lessen the calls to dispatch asking for verification as well.

Potential funding: FEMA PDM Grant, Homeland Security CCP.

Schedule: We anticipate we could have this completed by October 2013 if we had the funds in early 2012.

Action Item #8 Educate residences on the importance of fire mitigation efforts around their houses /structures

Hazards Addressed: The danger of wild land fires encroaching onto homes and other structures. A repeat of Ordway.

Issue/Background: Ordway showed the danger of not having an active mitigation plan and project. Ordway is by no means the exception. Most homes within the county and at the town/county interface are in danger.

Other Alternatives: None.

Existing Planning Mechanism(s) through which project will be implemented: The Local Emergency Planning Committee.

Responsible Office: Baca County Office of Emergency Management

Priority (High, Medium, Low): High

Cost Estimate: $5,000.00

Benefits (avoided Losses): This project will help lessen the fire danger to homes and other structures. In doing so will help reduce the danger of loss of life due to structure fires for both home owners and emergency responders.

Potential funding: FEMA PDM Grant, Homeland Security CCP.

Schedule: This would be a long running project and could be started in late 2012. We would like to run the project over the next five years.

Action Item #9 Educate the public on current fire conditions by public outreach and roadside signs.

Hazards Addressed: Wild fires started by carelessness, sometimes resulting in the loss of homes and damage to ag businesses.

Issue/Background: Our volunteer fire departments are called to a large number of fires each year started by a cigarette flipped from a car window or a camp fire not extinguished properly.

Other Alternatives: Increase the number of fire stations and patrol officers.

Existing Planning Mechanism(s) through which project will be implemented: The Local Emergency Planning Committee. Baca county commissioners.

Responsible Office: Baca County Office of Emergency Management

Priority (High, Medium, Low): High

Cost Estimate: $7,000.00

Benefits (avoided Losses): Awareness would lessen the careless fires started. Helping to reduce the loss of grass for cattle operations, endanger fewer homes and keep our responders from having to risk their lives putting out the fires.

Potential funding: FEMA PDM Grant, Homeland Security CCP.

Schedule: We anticipate we could have this completed by July 2013 if we had the funds in early 2012.

Action Item #10 Street Identification Signs

Hazards Addressed: Prevent delayed responses by emergency personnel

Issue/Background: Baca County is a large county and it is easy for responders to wind up using the wrong road to get to an emergency or for people reporting an emergency to be unable to give good directions to where they are. Also lack of well marked roads contributes to traffic accidents.

Other Alternatives: Instillation of GPSs in every response vehicle. This would help with the responders but would do nothing to help with the reporting problems.

Existing Planning Mechanism(s) through which project will be implemented: The Local Emergency Planning Committee.

Responsible Office: Baca County Office of Emergency Management

Priority (High, Medium, Low): High

Cost Estimate: $220.000.00

Benefits (avoided Losses): The benefits will be reduced response time to emergencies, less chance responders becoming lost and endangered. According to CDOT this will also lower the number of accident at intersections.

Potential funding: FEMA PDM Grant, Homeland Security CCP.

Schedule: We anticipate we could have this completed by January 2013 if we had the funds in early 2012.

Action Item #11 Address/House number identification

Hazards Addressed: Prevent delayed responses by emergency responders. Make response safer by having easily seen signs.

Issue/Background: Baca County is a large county and it is easy for responders to have difficulty knowing if they have reached the right house. Most homes in the county are not identified with a house number.

Other Alternatives: Hope more people will respond to requests to number their home.

Existing Planning Mechanism(s) through which project will be implemented: The Local Emergency Planning Committee.

Responsible Office: Baca County Office of Emergency Management

Priority (High, Medium, Low): High

Cost Estimate: $30,000.00

Benefits (avoided Losses): The benefits will be reduced response time to emergencies, less chance responders becoming lost and endangered.

Potential funding: FEMA PDM Grant, Homeland Security CCP.

Schedule: We anticipate we could have this completed by January 2013 if we had the funds in early 2012.

Action Item #12 NFPA 704 enforcement and education to tier II facilities and others to identify locations of hazardous materials.

Hazards Addressed: Unknown hazardous material storage.

Issue/Background: Many users of hazardous materials are unaware of the regulations and signage needed while others choose to try and hide the use of such chemicals.

Other Alternatives: We could go with strictly legal action. However in a county where the economy is already hurt more than the national average, loss of a single industry would have a huge effect on the County. We feel education followed by enforcement is a better route.

Existing Planning Mechanism(s) through which project will be implemented: The Local Emergency Planning Committee.

Responsible Office: Baca County Office of Emergency Management

Priority (High, Medium, Low): High

Cost Estimate: $7500.00

Benefits (avoided Losses): The benefits will be getting business into compliance and making the community at whole safer. For those who chose not to comply the enforcement arm can fine or shut them down; once more making the community at whole safer. The 704 also is a big help to emergency responders in keeping themselves safer.

Potential funding: FEMA PDM Grant, Homeland Security CCP.

Schedule: We anticipate we could have this completed by July 2013 if we had the funds in early 2012.

Action Item #13 Public awareness of flooding potential, Ag infestation, Drought, Heat, Cold

Hazards Addressed: All weather related hazards found in Baca County

Issue/Background: Baca County is prone to extreme weather, weather conditions that can and has caused loss of life and endangerment.

Other Alternatives: Do nothing.

Existing Planning Mechanism(s) through which project will be implemented: Local Emergency Planning Committee, Severe Weather Plan

Responsible Office: Baca County Office of Emergency Management

Priority (High, Medium, Low): High

Cost Estimate: $6,000.00

Benefits (avoided Losses): The main focus of this project is helping prepare those in the county to be ready when severe weather events happen. The benefits are less loss of life and fewer times our volunteer responders have to be put in harm's way.

Potential funding: FEMA PDM Grant, Homeland Security CCP.

Schedule: We anticipate we could have this completed by January 2013 if we had the funds in early 2012.

Action Item #14 Install River Gauges

Hazards Addressed: Flash flooding, Flooding

Issue/Background: During large down pours in Baca County many of our drainages which do not have water flowing all the time can rise very rapidly. Many of these creeks and/or rivers are where people gather for outdoor recreational activities. In many situations the National Weather Service has called and requested deputies to check the camp areas because of the rising water.

Other Alternatives: None

Existing Planning Mechanism(s) through which project will be implemented: Local Emergency Planning Committee, Severe Weather Plan

Responsible Office: Baca County Office of Emergency Management

Priority (High, Medium, Low): Medium

Cost Estimate: 48,000.00

Benefits (avoided Losses): This is a life protection issue. Without proper warning the oncoming danger of rapidly rising waters cannot be passed on to the public. These small waterways are heavily used by the people of Baca County and surrounding areas.
Potential funding: Colorado State Forest Service – Volunteer Firefighter Assistance Grant Program, FEMA PDM Grant.

Schedule: We anticipate we could have this completed by January 2013 if we worked on it heavily.

Action Item #15 Weather radio placement in public places

Hazards Addressed: Warn those in public buildings of impending danger.

Issue/Background: Baca County can expect severe weather anytime of the year; tornados, flash flooding, wild fire, blizzards, and other extreme weather conditions.

Other Alternatives: Call the people in charge of the buildings and have them warn all the people in the building. Miss communication or the warning never being given to them is the problem using this method.

Existing Planning Mechanism(s) through which project will be implemented: The Local Emergency Planning Committee.

Responsible Office: Baca County Office of Emergency Management

Priority (High, Medium, Low): High

Cost Estimate: $3,800.00

Benefits (avoided Losses): The benefits will be reducing the time it takes to get people to proper shelter.

Potential funding: FEMA PDM Grant, Homeland Security CCP.

Schedule: We anticipate we could have this completed by July 2013 if we had the funds in early 2012.

Action Item #16 Tornado Shelter Designation and Education

Hazards Addressed: Tornado, Severe Thunderstorm, blizzards trapping people away from home or homes lost due to snow loads. Any emergency that would displace people or cause the need for shelter. These could also include man-made emergencies such as chemical spills or intentional releases. This is also tied to our people with special needs project as they often need sheltering in situations others would not, such as electrical outages.

Issue/Background: Baca County has several tornados, blizzards, wild fires and other natural and manmade occurrences each year that have the potential for forcing evacuations or causing the people to need shelter before and after an event. Many residents have no basement in which to seek shelter during a tornado watch/warning. We plan to work with local churches, businesses and government agencies that have locations that could be used for both short and long term sheltering. Once the agreements are in place we will educate the public on which shelters to use and when. What they need to bring with them and what to expect at the shelter. Most of the public education will be done with print media and meetings.

Other Alternatives: Do nothing.

Existing Planning Mechanism(s) through which project will be implemented: Local Emergency Planning Committee, Severe Weather Plan

Responsible Office: Baca County Office of Emergency Management

Priority (High, Medium, Low): High

Cost Estimate: $12,000.00

Benefits (avoided Losses): The main focus of this project is the protection of life during a storm or incident, and to ease the loss of homes caused by such events.

Potential funding: FEMA PDM Grant, Homeland Security CCP.

Schedule: We anticipate we could have this completed by January 2013 if we had the funds in early 2012.

City of Pritchett Actions

Action Item #17 Address/House number identification

Hazards Addressed: Prevent delayed responses by emergency responders. Make response safer by having easily seen signs.

Issue/Background: Most homes in the town are not identified with a house number making it difficult for emergency responders to find the homes quickly. Delaying response time and endangering the responders as they are concentrating on the houses not the road.

Other Alternatives: Hope more people will respond to requests to number their home.

Existing Planning Mechanism(s) through which project will be implemented: City council

Responsible Office: Mayor

Priority (High, Medium, Low): High

Cost Estimate: $3,000.00

Benefits (avoided Losses): The benefits will be reduced response time to emergencies, less chance responders becoming lost and endangered.

Potential funding: FEMA PDM Grant, Homeland Security CCP.

Schedule: We anticipate we could have this completed by January 2013 if we had the funds in early 2012.

Action Item #18 Street Identification Signs

Hazards Addressed: Prevent delayed responses by emergency personnel

Issue/Background: Emergency personnel winding up using the wrong road to get to an emergency or for people reporting an emergency to be unable to give good directions to where they are. Also lack of well marked roads contributes to traffic accidents.

Other Alternatives: Instillation of GPSs in every response vehicle. This would help with the responders but would do nothing to help with the reporting problems.

Existing Planning Mechanism(s) through which project will be implemented: City council

Responsible Office: Mayor

Priority (High, Medium, Low): Medium

Cost Estimate: $5,000.00

Benefits (avoided Losses): The benefits will be reduced response time to emergencies, less chance responders becoming lost and endangered. According to CDOT this will also lower the number of accident at intersections.

Potential funding: FEMA PDM Grant, Homeland Security CCP.

Schedule: We anticipate we could have this completed by January 2013 if we had the funds in early 2012.

Action Item #19 Tornado Shelter Designation and Education

Hazards Addressed: Tornado, Severe Thunderstorm, blizzards trapping people away from home or homes lost due to snow loads. Any emergency that would displace people or cause the need for shelter. These could also include man-made emergencies such as chemical spills or intentional releases. This is also tied to our people with special needs project as they often need sheltering in situations others would not, such as electrical outages.

Issue/Background: Pritchett has several tornados, blizzards, wild fires and other natural and manmade occurrences each year that have the potential for forcing evacuations or causing the people to need shelter before and after an event. Many residents have no basement in which to seek shelter during a tornado watch/warning. We plan to work with local churches, businesses and government agencies that have locations that could be used for both short and long term sheltering. Once the agreements are in place we will educate the public on which shelters to use and when. What they need to bring with them and what to expect at the shelter. Most of the public education will be done with print media and meetings.

Other Alternatives: Do nothing.

Existing Planning Mechanism(s) through which project will be implemented: City Council

Responsible Office: Mayor

Priority (High, Medium, Low): High

Cost Estimate: $4,000.00

Benefits (avoided Losses): The main focus of this project is the protection of life during a storm or incident, and to ease the loss of homes caused by such events.

Potential funding: FEMA PDM Grant, Homeland Security CCP.

Schedule: We anticipate we could have this completed by January 2013 if we had the funds in early 2012.

City of Springfield

Action Item #20 Street Identification Signs

Hazards Addressed: Prevent delayed responses by emergency personnel

Issue/Background: Emergency personal winding up using the wrong road to get to an emergency or for people reporting an emergency to be unable to give good directions to where they are. Also lack of well marked roads contributes to traffic accidents.

Other Alternatives: Instillation of GPSs in every response vehicle. This would help with the responders but would do nothing to help with the reporting problems.

Existing Planning Mechanism(s) through which project will be implemented: City council

Responsible Office: Mayor

Priority (High, Medium, Low): Medium

Cost Estimate: To be determined

Benefits (avoided Losses): The benefits will be reduced response time to emergencies, less chance responders becoming lost and endangered. According to CDOT this will also lower the number of accident at intersections.

Potential funding: FEMA PDM Grant, Homeland Security CCP.

Schedule: We anticipate we could have this completed by January 2013 if we had the funds in early 2012.

Action Item #21 Tornado Shelter Designation and Education

Hazards Addressed: Tornado, Severe Thunderstorm, blizzards trapping people away from home or homes lost due to snow loads. Any emergency that would displace people or cause the need for shelter. These could also include man-made emergencies such as chemical spills or intentional releases. This is also tied to our people with special needs project as they often need sheltering in situations others would not, such as electrical outages.

Issue/Background: The area has several tornados, blizzards, wild fires and other natural and manmade occurrences each year that have the potential for forcing evacuations or causing the people to need shelter before and after an event. Many residents have no basement in which to seek shelter during a tornado watch/warning. We plan to work with local churches, businesses and government agencies that have locations that could be used for both short and long term sheltering. Once the agreements are in place we will educate the public on which shelters to use and when. What they need to bring with them and what to expect at the shelter. Most of the public education will be done with print media and meetings.

Other Alternatives: Do nothing.

Existing Planning Mechanism(s) through which project will be implemented: City council

Responsible Office: City Manager

Priority (High, Medium, Low): High

Cost Estimate: $1,200.00

Benefits (avoided Losses): The main focus of this project is the protection of life during a storm or incident, and to ease the loss of homes caused by such events.

Potential funding: FEMA PDM Grant, Homeland Security CCP.

Schedule: We anticipate we could have this completed by January 2013 if we had the funds in early 2012.

Action Item #22 Build outdoor warning system to include the south Hwy 287 area.

Hazards Addressed: Public safety during severe weather or man-made disasters.

Issue/Background: Springfield can expect severe weather anytime of the year. These include but not limited to tornados, flash flooding, wild fire, and blizzards.

Other Alternatives: The use of loud speakers in fire and patrol vehicles, though these vehicles are usually already tied up doing other things. This would slow the warning down considerably.

Existing Planning Mechanism(s) through which project will be implemented: City Council

Responsible Office: Mayor

Priority (High, Medium, Low): High

Cost Estimate: $18,000.00

Benefits (avoided Losses): The faster we can get people to the proper shelter the safer our public will be. Outdoor sirens have been shown to be the device the public will react to fastest and have the most confidence in. It will lessen the calls to dispatch asking for verification as well.

Potential funding: FEMA PDM Grant, Homeland Security CCP.

Schedule: We anticipate we could have this completed by October 2013 if we had the funds in early 2012.

City of Walsh

Action Item #23 Address/House number identification

Hazards Addressed: Prevent delayed responses by emergency responders. Make response safer by having easily seen signs.

Issue/Background: Most homes in the town are not identified with a house number making it difficult for emergency responders to find the homes quickly. Delaying response time and endangering the responders as they are concentrating on the houses not the road.

Other Alternatives: Hope more people will respond to requests to number their home.

Existing Planning Mechanism(s) through which project will be implemented: City council

Responsible Office: Mayor

Priority (High, Medium, Low): High

Cost Estimate: $3,000.00

Benefits (avoided Losses): The benefits will be reduced response time to emergencies, less chance responders becoming lost and endangered.

Potential funding: FEMA PDM Grant, Homeland Security CCP.

Schedule: We anticipate we could have this completed by January 2013 if we had the funds in early 2012.

Action Item #24 Street Identification Signs

Hazards Addressed: Prevent delayed responses by emergency personnel

Issue/Background: Emergency personnel winding up using the wrong road to get to an emergency or for people reporting an emergency to be unable to give good directions to where they are. Also lack of well marked roads contributes to traffic accidents.

Other Alternatives: Instillation of GPSs in every response vehicle. This would help with the responders but would do nothing to help with the reporting problems.

Existing Planning Mechanism(s) through which project will be implemented: City council

Responsible Office: Mayor

Priority (High, Medium, Low): Medium

Cost Estimate: $11,000.00

Benefits (avoided Losses): The benefits will be reduced response time to emergencies, less chance responders becoming lost and endangered. According to CDOT this will also lower the number of accident at intersections.

Potential funding: FEMA PDM Grant, Homeland Security CCP.

Schedule: We anticipate we could have this completed by January 2013 if we had the funds in early 2012.

Action Item #25 Public awareness of flooding potential, Ag infestation, Drought, Heat, Cold

Hazards Addressed: All weather related hazards found in Walsh

Issue/Background: Walsh is prone to extreme weather, weather conditions that can and has caused loss of life and endangerment.

Other Alternatives: Do nothing.

Existing Planning Mechanism(s) through which project will be implemented: City Council

Responsible Office: Mayor

Priority (High, Medium, Low): High

Cost Estimate: $1,000.00

Benefits (avoided Losses): The main focus of this project is helping prepare those in the county to be ready when severe weather events happen. The benefits are less loss of life and fewer times our volunteer responders have to be put in harm's way.

Potential funding: FEMA PDM Grant, Homeland Security CCP.

Schedule: We anticipate we could have this completed by January 2013 if we had the funds in early 2012.

Action Item #26 Tornado Shelter Designation and Education

Hazards Addressed: Tornado, Severe Thunderstorm, blizzards trapping people away from home or homes lost due to snow loads. Any emergency that would displace people or cause the need for shelter. These could also include man-made emergencies such as chemical spills or intentional releases. This is also tied to our people with special needs project as they often need sheltering in situations others would not, such as electrical outages.

Issue/Background: Walsh has several tornados, blizzards, wild fires and other natural and manmade occurrences each year that have the potential for forcing evacuations or causing the people to need shelter before and after an event. Many residents have no basement in which to seek shelter during a tornado watch/warning. We plan to work with local churches, businesses and government agencies that have locations that could be used for both short and long term sheltering. Once the agreements are in place we will educate the public on which shelters to use and when. What they need to bring with them and what to expect at the shelter. Most of the public education will be done with print media and meetings.

Other Alternatives: Do nothing.

Existing Planning Mechanism(s) through which project will be implemented: City Council

Responsible Office: Mayor

Priority (High, Medium, Low): High

Cost Estimate: $2,000.00

Benefits (avoided Losses): The main focus of this project is the protection of life during a storm or incident, and to ease the loss of homes caused by such events.

Potential funding: FEMA PDM Grant, Homeland Security CCP.

Schedule: We anticipate we could have this completed by January 2013 if we had the funds in early 2012.

CROWLEY COUNTY PLANNING ELEMENT

1 Crowley County Planning Committee

The following entities participated in the DMA planning process through the Crowley County Planning committee. More details on the planning process followed and how the County, municipalities and stakeholders participated can be referenced in Chapter 3 of the base plan. Additional details on what local government departments participated and who represented them are listed in Appendix B.

- Crowley County
- Town of Ordway

2 Crowley County Profile

Crowley County is located in the southeastern region of the State in the high plains and is primarily agricultural. The land area of the County is 800 square miles, with 11 square miles of water. According to the 2000 U.S. Census, the population for the County was 5,518. The 2010 population estimate from the Department of Local Affairs is 6,344. The estimated average density for the County is 7.93 people per square mile. The County grew at a rate of 15% between 2000 and 2010. There are 1,542 housing units in the County. The median age in the County is 36.6 years. 4.4% of the population is under the age of 5 and 10.8% of the population is over the age of 65. The average household size is 2.59, and the average family size is 3.12. 77.5% of the population over the age of 25 holds at least a high school degree and 11.9% hold a bachelors level degree or higher. 26.3% of the population (over age 5) holds disability status, and 14.7% speak a language other than English in the home. 15.2% of all families live below the poverty level, and 18.5% of individuals live below poverty level. The County is a rural county located on the southeastern plains of Colorado. The largest city in the County is Ordway, which serves as the County Seat. The County is typical of the mid-western plains, with a rural orientation and solid agricultural basis. The Census of Agriculture reports 268 farms in the County with 451,225 total acres of farmland. The average farm size is 1,684 acres. A base map of the County can be referenced in Figure 2.

3 Hazard Identification and Summary

Crowley County's planning team identified the hazards that affect the County and summarized their geographic extent, probability of future of occurrence, potential magnitude, and significance specific to the County. This information is presented in Table 1. A detailed description of each hazard can be found in Section 4.2 Hazard Profiles of the main plan.

Table 1 Crowley County Hazard Summary

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/Severity	Significance
Agriculture Infestation	Significant	Likely	Critical	Medium
Dam/Levee Failure	Limited	Occasional	Limited	Medium
Earthquake	Limited	Unlikely	Limited	Low
Extreme Temperatures: Heat	Extensive	Highly Likely	Limited	Medium
Extreme Temperatures: Cold	Extensive	Highly Likely	Limited	Medium
Drought	Significant	Likely	Critical	High
Flood: 100/500 –Year	Limited	Likely	Limited	Medium
Flood: Stormwater/Flash Flooding	Limited	Likely	Limited	Medium
Severe Weather: Thunderstorms/Lightning/Hail	Limited	Highly Likely	Limited	Medium
Stream Bank Erosion/ Stability	Limited	Occasional	Limited	Medium
Subsidence	Limited	Occasional	Limited	Medium
Tornadoes	Limited	Highly Likely	Limited	High
Wildfire	Limited	Highly Likely	Limited	Low
Wind Storms	Extensive	Highly Likely	Critical	Medium
Winter Storms	Extensive	Highly Likely	Critical	High
Civil Unrest	Limited	Likely	Limited	Medium
Cyber Hazards	Limited	Occasional	Negligible	Low
Hazardous Materials	Limited	Occasional	Critical	Low
Pandemic	Significant	Occasional	Limited	Low

Geographic Extent
Limited: Less than 10% of planning area
Significant: 10-50% of planning area
Extensive: 50-100% of planning area

Probability of Future Occurrences
Highly Likely: Near 100% chance of occurrence in next year, or happens every year.
Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less.
Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Magnitude/Severity
Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths
Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability
Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability
Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid

Significance
Low: minimal potential impact
Medium: moderate potential impact
High: widespread potential impact

Table 2 Town of Ordway Hazard Identification

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/Severity	Significance
Agriculture Infestation	Occasional	Limited	Limited	Medium
Dam/Levee Failure	Occasional	Limited	Significant	High
Earthquake	Occasional	Limited	Significant	High
Extreme Temperatures: Heat	Occasional	Limited	Significant	Medium
Extreme Temperatures: Cold	Occasional	Limited	Significant	Medium
Drought	Occasional	Limited	Significant	Medium
Flood: 100/500 –Year	Occasional	Limited	Significant	High
Flood: Stormwater/Flash Flooding	Likely	Limited	Significant	Medium
Severe Weather: Thunderstorms/Lightning/Wind /Hail	Likely	Limited	Significant	High
Stream Bank Erosion/ Stability	Unlikely	Negligible	Limited	Low
Subsidence	Limited	Occasional	Limited	Medium
Tornadoes	Occasional	Limited	Extensive	Medium
Wildfire	Likely	Significant	Critical	Medium
Wind Storms	Likely	Significant	Critical	Medium
Winter Storms	Likely	Significant	Critical	Medium
Civil Unrest	Limited	Likely	Limited	Medium
Cyber Hazards	Limited	Occasional	Negligible	Low
Hazardous Materials	Occasional	Limited	Limited	Medium
Pandemic	Significant	Occasional	Limited	Low

Geographic Extent
Limited: Less than 10% of planning area
Significant: 10-50% of planning area
Extensive: 50-100% of planning area

Probability of Future Occurrences
Highly Likely: Near 100% chance of occurrence in next year, or happens every year.
Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less.
Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Magnitude/Severity
Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths
Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability
Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability
Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid

Significance
Low: minimal potential impact
Medium: moderate potential impact
High: widespread potential impact

3.1 Disaster Declaration History

One method the planning committee used to identify hazards was the researching of past events that triggered federal and/or state emergency or disaster declarations in the planning area.

Federal and/or state disaster declarations may be granted when the severity and magnitude of an event surpasses the ability of the local government to respond and recover. Disaster assistance is supplemental and sequential. When the local government's capacity has been surpassed, a state disaster declaration may be issued, allowing for the provision of state assistance. Should the disaster be so severe that both the local and state governments' capacities are exceeded, a federal emergency or disaster declaration may be issued allowing for the provision of federal assistance.

The federal government may issue a disaster declaration through FEMA, the U.S. Department of Agriculture (USDA), and/or the Small Business Administration (SBA). FEMA also issues emergency declarations, which are more limited in scope and without the long-term federal recovery programs of major disaster declarations. The quantity and types of damage are the determining factors. Federal, state and USDA disaster declarations for the County are listed in Table 3.

Table 3 Crowley County Disaster and Emergency Declarations, 1955-2010

Year	Declaring Jurisdiction	Disaster Type
2009	State of Colorado*	Severe Blizzard
2009	State of Colorado*	Severe Spring Snowstorm
2008	USDA – Secretarial Designation (S2750)	Drought
2008	Federal – Fire Management Assistance Declaration (FM-2760)	Wildfire
2008	State of Colorado	Wildfire
2007	Federal – Emergency (3271-EM, 3270-EM)	Snow
2006	State of Colorado	Snow
2005	Federal – Emergency (3224-EM)	Hurricane Katrina Evacuation
2005	USDA – Secretarial Designation (S2188)	Drought, Wind, Heavy Rain, Hail
2003	USDA – Secretarial Designation (S1843)	Drought, Insects
2002	State of Colorado*	Snow Emergency
2002	State of Colorado*	Drought
2002	State of Colorado*	WIldfires
2002	USDA – Secretarial Designation (S1643)	Drought
2001	Federal – Major Disaster (1374-DR)	Severe Winter Storms
2001	USDA – Secretarial Designation (S1514)	Drought
1999	Federal – Major Disaster (1276-DR)	Flooding
1999	State of Colorado	Flooding, Landslides, Mudslides
1997	Federal – Emergency	Heavy Flash Flooding
1997	State of Colorado	Flooding
1977	Federal – Major Disaster	Drought
1965	Federal – Major Disaster (200-DR)	Tornadoes, Severe Storms, and Flooding

Source: Colorado State Hazard Mitigation Plan; Colorado Governor's Office website, Federal Emergency Management Agency, PERI Presidential Disaster Declaration Site; U.S. Department of Agriculture.
*All counties in the state were proclaimed disaster areas by the Governor.

3.2 National Severe Weather Databases

The National Oceanic and Atmospheric Administration's National Climatic Data Center (NCDC) has been tracking severe weather since 1950. Their Storm Events Database tracks severe weather events on a county basis and contains data on the following: all weather events from 1993 to current (except from 6/1993-7/1993); and additional data from the Storm Prediction Center, which includes tornadoes (1950-1992), thunderstorm winds (1955-1992), and hail (1955-1992). This database contains 115 severe weather events that occurred in Crowley County between January 1, 1950, and April 31, 2010. Table 4 summarizes these events.

Table 4 NCDC Hazard Events Report for Crowley County

Type	# of Events	Property Loss ($)	Crop Loss ($)	Deaths	Injuries
Blizzard	3	$0	0	0	0
Dry Microburst	1	$10,000	0	0	5
Flash Flood	5	$30,000	0	0	0
Funnel Cloud	2	$0	0	0	0
Hail	56	$0	0	0	0
High Wind	9	$0	0	0	0
Ice Storm	1	$0	0	0	0
Lightning	1	$1,000	0	0	0
Thunderstorm Winds	15	$0	0	0	0
Tornado	16	$25,000	0	0	0
Wildfire/Forest Fire	2	$5,000,000	0	0	0
Winter Storm	4	$0	0	0	0
Totals	**115**	**5,066,000**	**0**	**0**	**5**

Source: NCDC

The HMPC supplemented NCDC data with data from SHELDUS (Spatial Hazard Events and Losses Database for the United States). SHELDUS is a county-level data set for the United States that tracks 18 types of natural hazard events along with associated property and crop losses, injuries, and fatalities for the period 1960-2005. Produced by the Hazards Research Lab at the University of South Carolina, this database combines information from several sources (including the NCDC). From 1960 to 1995, only those events that generated more than $50,000 in damage were included in SHELDUS. For events that covered multiple counties, the dollar losses, deaths, and injuries were equally divided among the affected counties (e.g., if four counties were affected, then a quarter of the dollar losses, injuries, and deaths were attributed to each county). From 1995 to 2005, all events that were reported by the NCDC with a specific dollar amount are included in SHELDUS.

SHELDUS contains information on 117 severe weather events that occurred in Crowley County between 1960 and 2009. Table 5 summarizes these events.

Table 5 SHELDUS Hazard Events for Crowley County,1960-2009

Hazard	Number	Injuries	Fatalities	Property Damage	Crop Damage
Drought	1	0	0	$0	$943,396.20
Flooding	2	0	0	$411,818.20	$327,272.70
Flooding - Hail - Lightning - Severe Storm/Thunder Storm	1	0	0	$250	$250,000
Flooding –Severe Storm/Thunder Storm – Winter Weather	1	0	0	$793.65	$0
Fog – Winter Weather	1	0	0	$22,727.27	$0
Hail	12	0	0	$57,700.01	$116,416.70
Hail - Lightning - Wind	1	0	0	$1,562.50	$15,625
Hail - Severe Storm/Thunder Storm	5	0	0	$12,843.36	$2,478.64
Hail - Severe Storm/Thunder Storm - Tornado	1	0	0	$333.33	$333.33
Hail - Severe Storm/Thunder Storm – Wind	4	0	0	$5,351.85	$31,268.52
Hail - Severe Storm/Thunder Storm - Winter Weather	1	0	0	$1,923.08	$0
Hail - Wind	1	0	0	$250	$25,000
Lightning	5	.6	0	$1,800	$0
Lightning - Severe Storm/Thunder Storm	1	.07	0	$172.41	$0
Lightning – Tornado	1	0	0	$25	$0
Lightning - Wind	1	0	0	$172.41	$0
Severe Storm/Thunder Storm	3	0	.08	$23,293.65	$166.67
Severe Storm/Thunder Storm - Wind - Winter Weather	1	0	0	$79.37	$0
Tornado	3	0	0	$6,924.80	$0
Wildfire	1	0	0	$1,666,667	$0
Wind	32	10.37	0	$1,217,601	$241,033.50
Wind - Winter Weather	10	.06	.18	$211,079.20	$184,696.10
Winter Weather	28	.5	.27	$1,075,854	$97,932.32
Totals	**117**	**11.6**	**0.53**	**4,719,222.09**	**2,235,619.68**

Source: SHELDUS, Hazards Research Lab, University of South Carolina, www.sheldus.org/
Events may have occurred over multiple counties, so damage may represent only a fraction of the total event damage and may not be specific to Crowley County.

The NCDC and SHELDUS tables above summarize severe weather events that occurred in Orange County. Only a few of the events actually resulted in state and federal disaster declarations. It is interesting to note that different data sources capture different events during the same time period, and often different information specific to the same events. While the HMPC recognizes these inconsistencies, it is the value this data provides in depicting the County's "big picture" hazard environment.

4 Crowley County Vulnerability Assessment

The intent of this section is to assess the County's vulnerability separate from that of the planning area as a whole, which has already been assessed in Section 4.3 Vulnerability Assessment in the main plan. This vulnerability assessment analyzes the population, property, and other assets at risk to hazards ranked of medium or high significance that may vary from other parts of the planning area. For more information about how hazards affect the Region as a whole, see Chapter 4 Risk Assessment in the main plan.

4.1 Assets at Risk

This section identifies the County's assets at risk, including values at risk, critical facilities and infrastructure, historic assets, economic assets, and growth and development trends. The data source used was the HAZUS-MR4 databases. The HAZUS building exposure (includes building counts, value of building structure and contents) is shown in Table 6. A breakdown of the building count by type can be found in Table 7.

Table 6 Crowley County Building Exposure

City	Population	Building Count	Building Exposure ($)	Building Content ($)	Total Exposure
Crowley	187	96	$10,316,000	$6,696,000	$17,012,000
Olney Springs	392	195	$16,381,000	$8,680,000	$25,061,000
Ordway	1,234	738	$74,225,000	$46,684,000	$120,909,000
Sugar City	279	204	$15,158,000	$8,137,000	$23,295,000
Unincorporated	3,426	910	$95,928,000	$54,863,000	$150,791,000
Total	5,518	2,143	$212,008,000	$125,060,000	$337,068,000

Table 7 Crowley County Building Exposure by Type

Occupancy Type	Building Count	Value ($)
Agriculture	24	$3,117,000
Commercial	72	$19,040,000
Education	3	$2,521,000
Government	11	$5,028,000
Industrial	14	$2,490,000
Religion	9	$4,938,000
Residential	2,010	$87,926,000
Total	**2,143**	$**125,060,000**

Critical Facilities and Infrastructure

An inventory of critical facilities in Crowley County is provided below in Table 8. The table includes data from available national and statewide GIS resources (locations are illustrated in Figure 2) supplemented with information from the County planning committee.

Table 8 Critical Facilities Inventory

Facility Type	Facility County
Bridges	22
Bridges – Scour Critical	4
Dams	4
Emergency Operations Centers	1
Fire Stations	4
Police	1
Schools	3
State Assets	41
Waste Water Facilities	1
Total	**81**

Locally Determined Facilities

In addition to the critical facilities mapped in GIS, Crowley County and the Towns of Crowley, Olney Springs, Ordway and Sugar City, in their Data Collection Guides, identified the following assets as important to the community. These assets include critical facilities and infrastructure; natural, cultural, and historical assets; and economic assets.

Table 9 Crowley County Asset Inventory

Name of Asset	Type	Replacement Value	Occupancy/ Capacity #	Comments
Court House	Public	$1,200,000	50/16	
Annex	Public	$600,000	111/30	
Justice Center	Public	$2,500,000	60/18	
Adult Education Building	Public	$84,000	12/50	
Fairground Building	Public	$250,000	0/150	
District #2 Shop Building	Public	$125,000	3/10	
Fire Hall	Public	$750,000	3/50	
Ordway Feed Lot	Private	$25,000,000	55/55	
District Shop #1	Public	$125,000	3/10	
District Shop #3	Public	$125,000	3/10	

Crowley County Water System	Public	$23,500,000	N/A	
State Prison	Public	$120,000,000	1167/1167	
Private Prison	Private	$100,000,000	1810/1810	
JR County Store	Private	$400,000	36/100	

Table 10 Town of Crowley Asset Inventory

Name of Asset	Type	Replacement Value	Occupancy/ Capacity #	Comments
Crowley Town Hall	Public	$2,000,000	N/A	
Fire Station	Public	$100,000	N/A	
U.S. Post Office	Public	$100,000	N/A	
Local Grocery Store	Private	$30,000	N/A	

Table 11 Town of Olney Springs Asset Inventory

Name of Asset	Type	Replacement Value	Occupancy/ Capacity #	Comments
Olney Springs Town Hall	Public	$1,000,000	N/A	
Fire Station	Public	$800,000	N/A	
Water Department	Public	N/A	N/A	

Table 12 Town of Ordway Asset Inventory

Name of Asset	Type	Replacement Value	Occupancy/ Capacity #	Comments
Ordway Town Hall	Public	$1,000,000	N/A	
Fire Station	Public	$800,000	N/A	
Ward Middle School	Public	$2,000,000	100/80	
Elementary School	Public	$2,000,000	200/80	
High School	Public	$5,000,000	200/60	
Water Department	Public	N/A	N/A	
Nursing Home	Private	$2,000,000	50/70	
Day Care Center	Private	$500,000	50/50	
Arkansas Valley Accumed	Private	$2,000,000	N/A	
Ordway Pharmacy	Private	$200,000	N/A	

Table 13 Town of Sugar City Asset Inventory

Name of Asset	Type	Replacement Value	Occupancy/ Capacity #	Comments
Sugar City Town Hall	Public	$1,000,000	N/A	
Fire Station	Public	$800,000	N/A	
Water Department	Public	N/A	N/A	
Sugar City Waste Disposal	Public	N/A	N/A	
Senior Citizens Center	Private	N/A	N/A	

Historic and Natural Assets

Assessing the vulnerability of Crowley County to disaster also involves inventorying the historic, cultural, and natural assets of the area. This step is important for the following reasons:

- The community may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.
- If these resources are impacted by a disaster, knowing so ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts are higher.
- The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.
- Natural resources can have beneficial functions that reduce the impacts of natural hazards, for example, wetlands and riparian habitat help absorb and attenuate floodwaters.

Historic Assets

The County has a stock of historically significant homes, public buildings, and landmarks. To inventory these resources, the planning committee collected information from a number of sources. The Colorado Historical Society's (CHS) Colorado State Register of Historic Properties was the primary source of information. The CHS is responsible for the administration of federally and state mandated historic preservation programs to further the identification, evaluation, registration, and protection of Colorado's irreplaceable archaeological and historical resources.

In addition, the National Register of Historic Places database was used. The National Register of Historic Places is the Nation's official list of cultural resources worthy of preservation. The National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect historic and archeological resources. Properties listed include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archeology, engineering, and culture. The National Register is administered by the National Park Service, which is part of the U.S. Department of the Interior.

Historical resources included in the programs above are identified in Table 14.

Table 14 Crowley County Historic Properties

Property	Location	National Register	State Register
Crowley Consolidated High School	200 Main St. Crowley	-	5CW.27
Crowley School	301 Main St. Crowley	7/28/1999	5CW.26

Source: Colorado State Register of Historic Properties

Natural Assets

Natural resources are important to include in benefit-cost analyses for future projects and may be used to leverage additional funding for mitigation projects that also contribute to community goals for protecting sensitive natural resources. Awareness of natural assets can lead to opportunities for meeting multiple objectives. For instance, protecting wetlands areas protects sensitive habitat as well as stores and reduces the force of floodwaters.

Information from the U.S. Fish and Wildlife Service and the Colorado Division of Wildlife, a program that inventories the status and locations of rare plants and animals in Colorado, was combined to create an inventory of special-status species in Crowley County. Table 15 lists national and state endangered, threatened, rare, and candidate species in the County by species type.

Table 15 Sensitive Plant and Animal Species in the Planning Area

Group	Name	Population	Status	Lead Office	Recovery Plan Name	Recovery Plan Stage
Birds	Arctic peregrine Falcon (Falco peregrinus tundrius)		Recovery			
Birds	Mountain plover (Charadrius montanus)		Proposed Threatened			
Birds	Piping Plover (Charadrius melodus)	except Great Lakes watershed	Threatened	Office Of The Regional Director	Piping Plover Atlantic Coast Population Revised Recovery Plan	Final Revision 1

Group	Name	Population	Status	Lead Office	Recovery Plan Name	Recovery Plan Stage
Birds	Piping Plover (Charadrius melodus)	except Great Lakes watershed	Threatened	Office Of The Regional Director	Great Lakes & Northern Great Plains Piping Plover	Final
Birds	Least tern (Sterna antillarum)	interior pop.	Endangered	Columbia Ecological Services Field Office	Least Tern (Interior Pop.)	Final
Birds	Lesser prairie-chicken (Tympanuchus pallidicinctus)		Candidate	Oklahoma Ecological Services Field Office		
Fishes	Arkansas darter (Etheostoma cragini)		Candidate	Kansas Ecological Services Field Office		

Source: US Fish and Wildlife Service, Colorado Division of Wildlife

Development Trends

There is limited development occurring in the County.

4.2 Agricultural Infestation Vulnerability Assessment

Agriculture is an important aspect of the County's economy. The following discussion analyzes the potential losses from floods using HAZUS and multiple hazards from federal crop insurance records.

Crop Insurance Analysis

Federal Crop Insurance Data represents losses from multiple hazards that could include: agricultural infestation, flooding, drought, hailstorms, temperature extremes, tornados, wildfires and straight-line winds. Average annual claims payout amount to $93,112 in the County. More details are provided in Table 16 and 17.

Table 16 Crowley County Premium and Crop Loss Data for Federal Crop Insurance 1980-2009

Liability (Amount of Coverage)	Total Premium	Federal Premium Subsidy	Farmer-paid Premium	Amount Paid in Claims	Average Amount Paid Annually in Claims
9,358,829	2,006,242	1,147,953	858,289	2,793,361	93,112

Source: Risk Management Agency

Table 17 Crowley County Provisional Data (claim data unavailable as 2010 claims are not fully reported)

Liability (Amount of Coverage)	Total Premium	Federal Premium Subsidy	Farmer-paid Premium
983,389	222,574	127,061	95,513

Source: Risk Management Agency

Flood Analysis

HAZUS Methodology for Agricultural Economic Loss

The HAZUS Flood Model is determined by the relationships between the depth of flood and the annual chance of flood inundation to that depth. The primary elements that contribute to flood losses are depth, duration and velocity of the water in the floodplain. The other risks with flooding that assist with flood loss are channel erosion and migration, sediment deposition, bridge scour and the impact of flood-borne debris.

The agriculture component of the HAZUS Flood Model estimated a range of losses to barley, corn, corn silage, oats, and wheat. These crops were the only crops identified by the HAZUS model to have loss within the region of study. The model assumes a short duration and slow rise flood when estimating losses and does not account for high velocity flash floods. Loss estimates are based on United States Army Corp of Engineers (USACE) damage modifiers. The HAZUS-MH impact analysis predicts a loss estimate value by crop for flow time intervals. The first is a loss estimate for the day of the fixed event; the remaining three are for 3, 7 and 14 days following the event.

The agricultural products in Crowley County that show economic loss are corn, corn silage and wheat. Corn's total loss is $3,547,217, Corn silage's total loss is $17,541,722 and wheat's total loss is $3,981,265. The total loss of all of these products is $25,070,204.

Table 18 Crowley County Direct Economic Loss for Agricultural Products

Agricultural Product	Crop Loss Day 0 ($)	Crop Loss Day 3 ($)	Crop Loss Day 7 ($)	Crop Loss Day 14 ($)	Total Loss ($)
Corn	0	967,423	1,289,897	1,289,897	3,547,217
Corn Silage	0	4,784,106	6,378,808	6,378,808	17,541,722
Wheat	0	1,085,799	1,447,733	1,447,733	3,981,265
Total	**0**	**6,837,328**	**9,116,438**	**9,116,438**	**25,070,204**

Source: HAZUS-MH MR4

4.3 Dam and Levee Failure Vulnerability Assessment

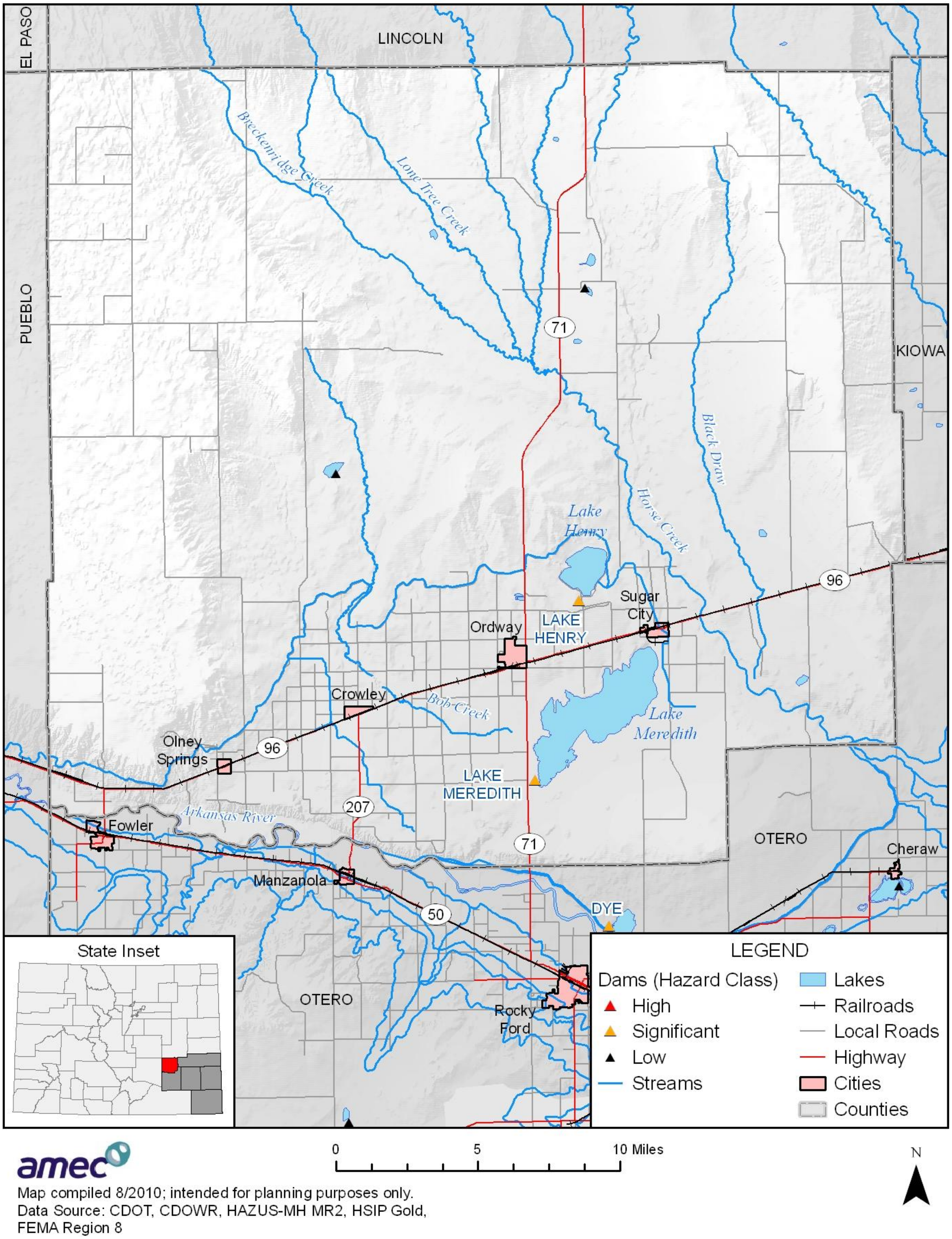
According to HAZUS MR4, there are no high and 2 significant hazard dams in the County. Table 19 indicates how dam failure risk varies among communities in the County. The locations of these dams are shown in Figure 1. There are no levees in Crowley County.

Table 19 Hazardous Dams in Crowley County

Dam Name	Max Storage (acre ft)	Dam Hazard	Downstream Community	Miles to Community	Relative Downstream Impacts
Lake Henry CO01116	14,914	Significant	Ordway	3	Critical
Lake Meredith CO01836	41,413	Significant	Rocky Ford	7	Critical

Source: HAZUS MR4

Figure 1 Significant and High Hazard Dams in Crowley County



4.4 Drought Vulnerability Assessment

Based on the County's recent multi-year droughts and Colorado's drought history, it is evident that the entire region is vulnerable to drought. With the majority land area in the County used for agricultural purposes, the County has significant exposure to this hazard. In addition to economic and public water supply impacts, soil erosion, dust, and wildfire hazard are also exacerbated by drought conditions. Bent County has been affected by the droughts in the years identified in Table 20.

Table 20 Drought Disaster and Emergency Declarations in Bent County

Year	Declaring Agency and Declaration Number
2008	USDA Secretarial Declaration S2750
2006	USDA Secretarial Declaration S2188
2004	USDA Secretarial Declaration S1843
2003	USDA Secretarial Declaration S1797
2002	USDA Secretarial Declaration S1643 State of Colorado
2001	USDA Secretarial Declaration S1514
1977	Federal – Major Disaster

Source: USDA, CDEM, FEMA

While the crop insurance loss data covers a variety of perils, it is indicative of the types of agricultural impacts that drought can have upon the planning area. Available crop insurance data indicates over $2.7 million has been paid to the County's agricultural landowners in insurance claims between 1980 and 2009. It is reasonable to assume that a significant amount of this is due to drought-related losses. While the crop insurance loss data covers a variety of perils, it is indicative of the types of agricultural impacts that drought can have upon the planning area. Assuming at least 50% of the losses are drought-related, an average annual loss estimate can be calculated. For the region this is calculated by ($2,700,000/2)/29years, which equates to $46,550 in average annual agricultural losses for the County.

4.5 Extreme Temperatures: Extreme Heat Vulnerability Assessment

Limited data on temperature extreme impacts per County was available during the development of this hazard's profile. Extreme heat normally does not impact structures as there may be a limited number of days where the temperatures stay high which gives the structure periodic relief between hot and cool temperature cycles. Areas prone to excessively high temperatures are identified normally on a nation-wide assessment scale, which doesn't allow detailed results on specific structures. Secondary impacts of extreme heat can affect the supporting mechanisms or systems of a community's infrastructure. For example, when high amounts of utilization is imposed on the power system it can cause an interruption in the transmission of that power shutting down air conditioning capabilities or refrigeration that can lead to spoiled foods, etc.

The elderly population in the planning area is most vulnerable to temperature extremes. Table 2.4 in Chapter 2 shows that the percentage of elderly people (age 65 or over) in the planning area is well above the national average, which is 6%. 10.8% of Crowley County's population is over 65. However many residents of southeast Colorado are self sufficient and accustomed to rural living and the climate extremes that are part of the territory. The residents of nursing homes and elder care facilities are especially vulnerable to extreme temperature events. It is encouraged that such facilities have emergency plans or backup power to address power failure during times of extreme heat.

4.6 Extreme Temperatures: Extreme Cold Vulnerability Assessment

Limited data on temperature extreme impacts per County was available during the development of this hazard's profile. Extreme cold normally does not impact structures, but is a life safety issue. Areas prone to excessively cold temperatures are identified normally on a nation-wide assessment scale, which doesn't allow detailed results on specific structures. Secondary impacts of extreme cold can affect the supporting mechanisms or systems of a community's infrastructure. For example, when extreme cold is coupled with high winds or ice storms, power lines may be downed, resulting in an interruption in the transmission of that power shutting down electric furnaces, which may lead to frozen pipes in homes and businesses.

The elderly population in the planning area is most vulnerable to temperature extremes. Table 2.4 in Chapter 2 shows that the percentage of elderly people (age 65 or over) in the planning area is well above the national average, which is 6%. 10.8% of Crowley County's population is over 65. However many residents of northeast Colorado are self sufficient and accustomed to rural living and the climate extremes that are part of the territory. The residents of nursing homes and elder care facilities are especially vulnerable to extreme temperature events. It is encouraged that such facilities have emergency plans or backup power to address power failure during times of extreme cold.

4.7 Flood Vulnerability Assessment (100/500-year and Localized)

The best available flood data for Crowley County was generated by HAZUS-MH MR4 by FEMA Region VIII, FEMA's software program for estimating potential losses from disasters. The 100-year floodplain was generated for major rivers and creeks in the county (those with a 10 square mile minimum drainage area). A USGS 30 meter resolution digital elevation model (DEM) was used as the terrain base in the model. HAZUS-MH produces a flood polygon and flood-depth grid that represents the base flood. While not as accurate as official flood maps, such as digital flood insurance rate maps, these floodplain boundaries are suitable for use in GIS-based loss estimation. Potential losses to the county were analyzed with HAZUS-MH, based on Census Block-based buildings and population inventory and the flood hazard data. The following discussion, maps and tables presents the results of the loss estimation in more detail.

Figure 2 Crowley County 100-year Floodplain and Critical Facilities Map

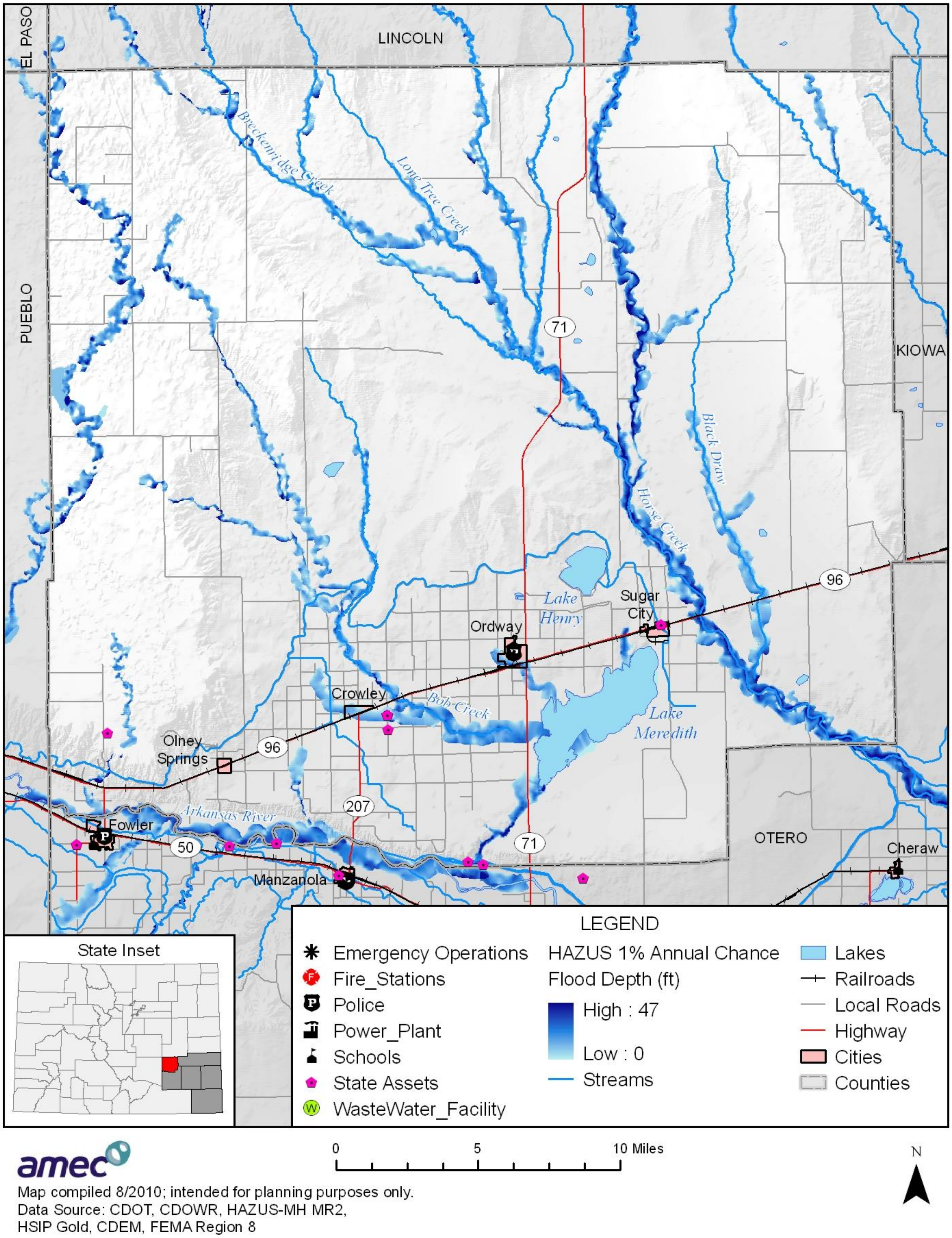
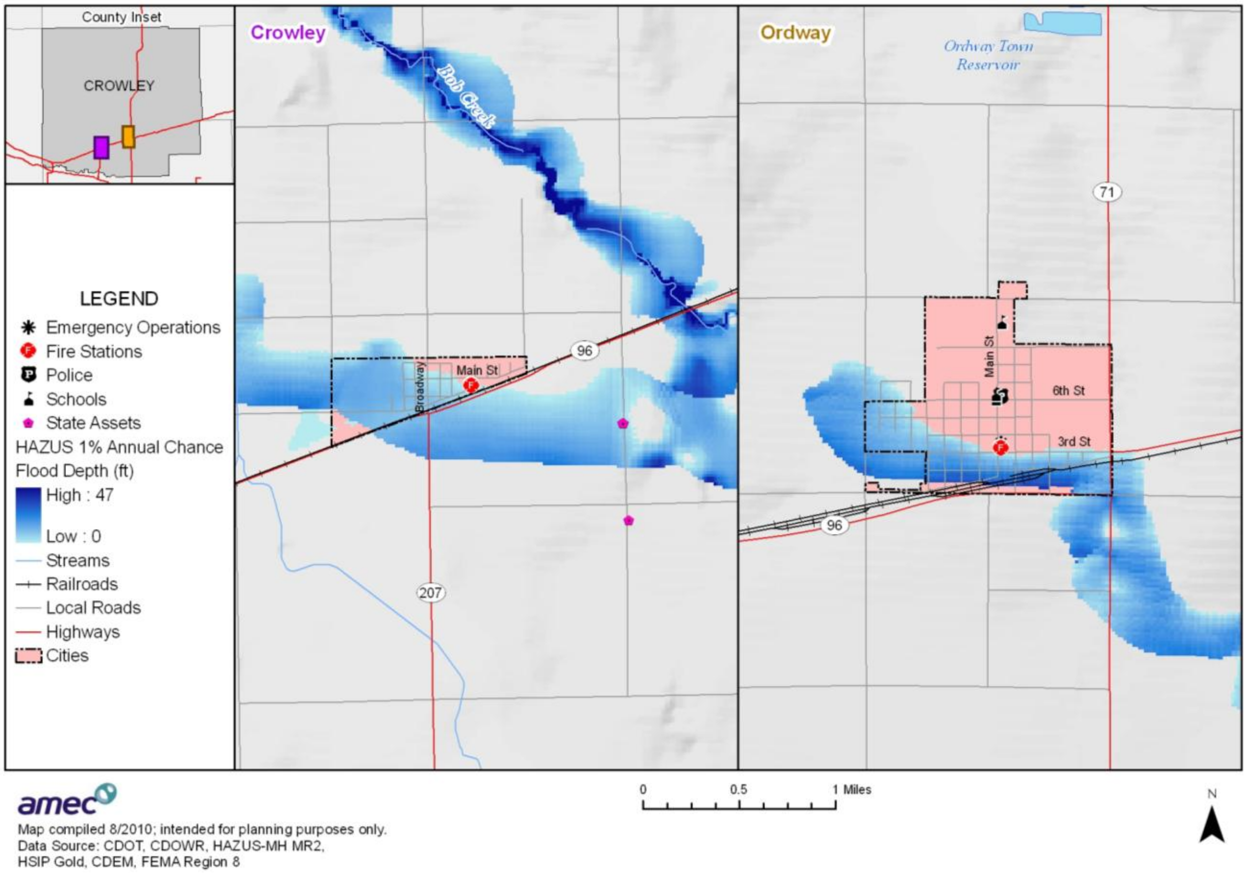


Figure 3 Crowley County Cities 100-year Floodplain and Critical Facilities Map



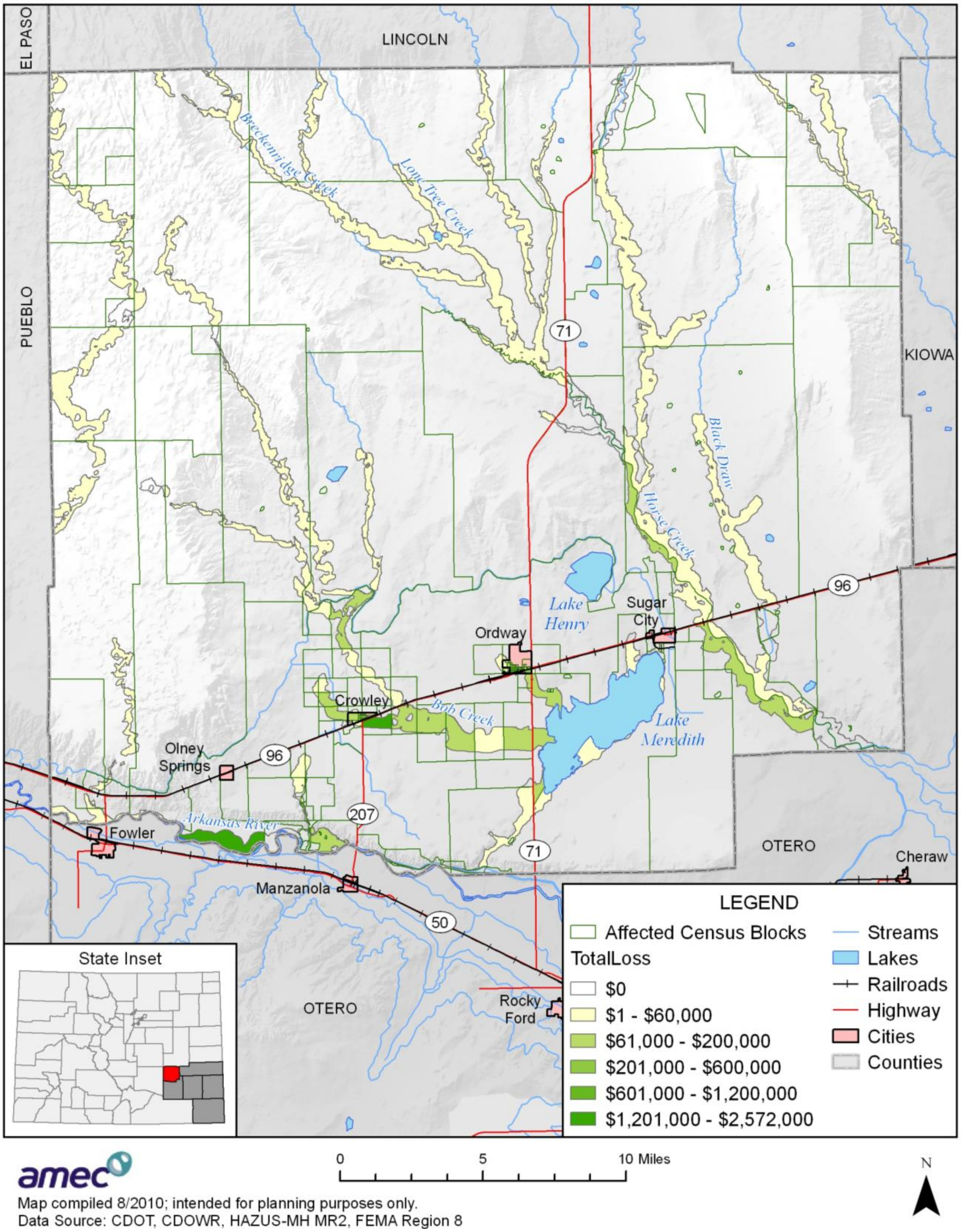
HAZUS-MH provides reports on the number of buildings impacted, estimates of the building repair costs, and the associated loss of building contents and business inventory. Building damage can cause additional losses to a community as a whole by restricting the building's ability to function properly. Income loss data accounts for business interruption and rental income losses as well as the resources associated with damage repair and job and housing losses. These losses are calculated by HAZUS-MH using a methodology based on the building damage estimates. Building damage is estimated by Census Block based on the average depth of flooding within a given Census Block. Flood damage is directly related to the depth of flooding. HAZUS-MH uses depth-damage functions to model the losses. For example, a two-foot flood generally results in about 20 percent damage to the structure (which translates to 20 percent of the structure's replacement value). To estimate the monetary loss for each city, the flooded Census Blocks were extracted, and the damage costs were totaled using GIS. This was done for each city and unincorporated area to illustrate how the risk varies across the planning area. The results of this are shown in Table 21.

Table 21 Estimated Economic Losses from Flooding

Jurisdiction	Cost Building Damage	Cost Contents Damage	Inventory Loss	Relocation Loss	Capital Related Loss	Wage Loss	Total Loss	Percent of Total Loss	Loss Ratio
Crowley	304,000	288,000	2,000	2,000	5,000	21,000	622,000	3.9%	3.7%
Olney Springs	-	-	-	-	-	-	-	-	-
Ordway	3,040,000	4,808,000	98,000	17,000	19,000	112,000	8,098,000	51%	6.7%
Sugar City	-	-	-	-	-	-	-	-	-
Unincorporated	2,548,000	4,543,000	27,000	-	1,000	5,000	7,128,000	45%	4.7%
Total	**5,892,000**	**9,639,000**	**127,000**	**19,000**	**25,000**	**138,000**	**15,848,000**	**100%**	**4.7%**

The building damage loss ratio shown in Table 21 is an indication of the community's ability to recover after an event. Building Damage Loss Ratio percent is calculated by taking the Building Structural Damage divided by Building Structural Value and then multiplying by 100. Loss ratio exceeding 10% are considered significant by FEMA. The area with the highest building damage loss ratio is in the City of Ordway.

Figure 4 Crowley County Building Loss in the 100-year Floodplain



According to HAZUS-MH, the City of Ordway has the greatest flood risk and majority of the damage with $3,040,000. The map in Figure 4 displays the distribution of the flood loss by Census Block across the County. According to the map in Figure 2 the majority of potential flood impacts in the unincorporated County is located on Arkansas River which is the southern boundary of Crowley County.

Floodplain Population Information

Should a 1% chance flood occur in the county, some residences would become uninhabitable during and after the flood. Table 22 shows the number of residents in Crowley County who would be displaced or need shelter.

Table 22 Population Displaced by Flooding

Jurisdiction	Displaced Population	Population Needing Shelter
Crowley	122	10
Olney Springs	-	-
Ordway	394	229
Sugar City	-	-
Unincorporated	1,009	843
Total	1,525	1,082
Crowley	122	10

Critical Facilities

Critical facilities in the floodplain were determined using GIS, by selecting all critical facilities that fell within the floodplain. These are listed in Table 23 and shown on the maps in Figure 2 and Figure 3. All of the critical facilities in the floodplain in Crowley County fall in the unincorporated portions of the County.

Table 23 Critical Facilities in the Floodplain

Location	Facility Type	Facility County
Unincorporated County	State Assets	35

Crowley County Scour Critical Bridges

Included with HSIP Gold data is a database of bridges called the National Bridge Inventory developed by the Federal Highway Administration. Within the bridge layer one of the attribute items is a “scour index”, which is used to quantify the vulnerability of a bridge to scour during a flood. Bridges with scour index between 1 and 3 are considered “scour critical”, or a bridge with a foundation element determined to be unstable for the observed or evaluated scour condition.

There are 4 scour critical bridges in Crowley County. They are all located on county and state roads that travel through Crowley County. One scour critical bridge is located east of Sugar City on State Highway 96 at the intersection of Horse Creek. The other three scour critical bridges are located between the cities of Crowley and Ordway. They are all located on Bob Creek at the intersections of County Roads 14, 17, and G. These are shown in Table 24.

Table 24 Scour Critical Bridges

Name	Owner	Stream	Near City
County Lane 14	County Highway Agency	Bob Creek	Crowley
County Lane 17	County Highway Agency	Bob Creek	Ordway
County Road G	County Highway Agency	Bob Creek	Crowley
SH 96	State Highway Agency	Horse Creek	Sugar City

Localized Flooding

Localized flooding also occurs throughout the County with several areas of primary concern. The County has determined a number of areas that incur repetitive local flooding. The Crowley County Emergency Manager maintains a map of locations of flooding. These areas are listed on

Table 25 Crowley County Localized Flood Problem Areas

Location
26483 Highway 96, Sugar City
Lane 21 North of Highway 96, where Pond Creek Crosses Lane 21
Low Water Crossing on Road U at Lane 22 (approximately)
Low Water Crossing on Road K where K is crossed by Horse Creek
Lane 27 between CC & DD, approximately 1 mile south of the Lincoln County line
Road K and Lane 10
Road F.5 and Lane 11
Road C and Lane 11
Road D and Lane 13
Road D between Lane 13 and 14

It was noted in the AMEC Data Collection Guide that there has been repetitive flash flooding in Sugar City. An event in April of 2000 washed out a 12″ culvert. This affected the wells owned by Sugar City. As long as there continues to be a low water crossing at this area, flooding will continue.

NFIP Claims Analysis

Policies and Claims Information

Crowley County does not participate in the NFIP. The City of Crowley joined the NFIP on December 11, 1985. There are currently no flood insurance policies in force in the City of Crowley. There have been no claims in the City of Crowley. The Town of Ordway joined the NFIP on December 18, 1985. There are two policies in force in the Town of Ordway. $575,000 of insurance is in force in Ordway. There have been no claims in the Town of Ordway.

Repetitive Loss Properties

There have been no repetitive loss properties in Crowley County.

Previous Occurrences

Previous occurrences of regional flooding can be found in Section 4.2.7 of the main plan. Flash flooding incidents affecting Crowley County are reported below.

June 6, 1997 - Prolonged and widespread thunderstorm activity produced flooding across many of the highways and roads in Crowley and Otero counties. Highway 50 near La Junta in Otero County was closed due to flooding. Several bridges were either washed out or sustained damage on county roads around La Junta. Highway 96 near Ordway in Crowley County was flooded.

August 4, 1999 - Heavy rain caused extensive flooding of low lying areas in central Crowley County. No significant property damage was reported.

August 19, 2004 - Slow moving thunderstorms caused very heavy rain which flooded and closed Highway 96 for a time. Several homes were evacuated just east of Sugar City. Residences had water in their basements, in some cases more than four feet deep, which damaged and destroyed personal effects.

4.8 Severe Weather: Thunderstorms/Lightning/Hail Vulnerability Assessment

Thunderstorms producing winds, hail, and are a common occurrence in the County between early spring and late fall. Given the lightning statistics for Colorado and the region, the County is at risk and is vulnerable to the effects of lightning. Persons recreating or working outdoors during the months of April through September will be most at risk to lightning strikes. Fortunately, there have been no incidents of death of injury associated with lightning in the County. In addition, hailstones are frequently thrown out miles in front of the storm producing them.

Thunderstorms can produce locally heavy rain and high winds, which may result in crop damage and localized flooding. Hail primarily causes crop damage. However, hailstorms in populated areas can cause significant damage to roofs, automobiles, trees and windows. Critical facilities and infrastructure will have the greatest consequences if damaged by a lightning strike. The greatest losses from lightning could result from secondary hazards, such as wildfire.

Table 26 Thunderstorm/Lightning/Hail Occurrences in Bent County

	Thunderstorm	Lightning	Hail
Events	15	1	63
Deaths/Injuries	0/0	0/0	0/0
Damage	$0	$1,000	$0

Source: NCDC

4.9 Tornado Vulnerability Assessment

Crowley County has been struck by a number of tornadoes in the past 65 years. Some of these tornadoes have caused large amounts of damage. A history of tornadoes in Crowley County is shown in Table 27 and Figure 5.

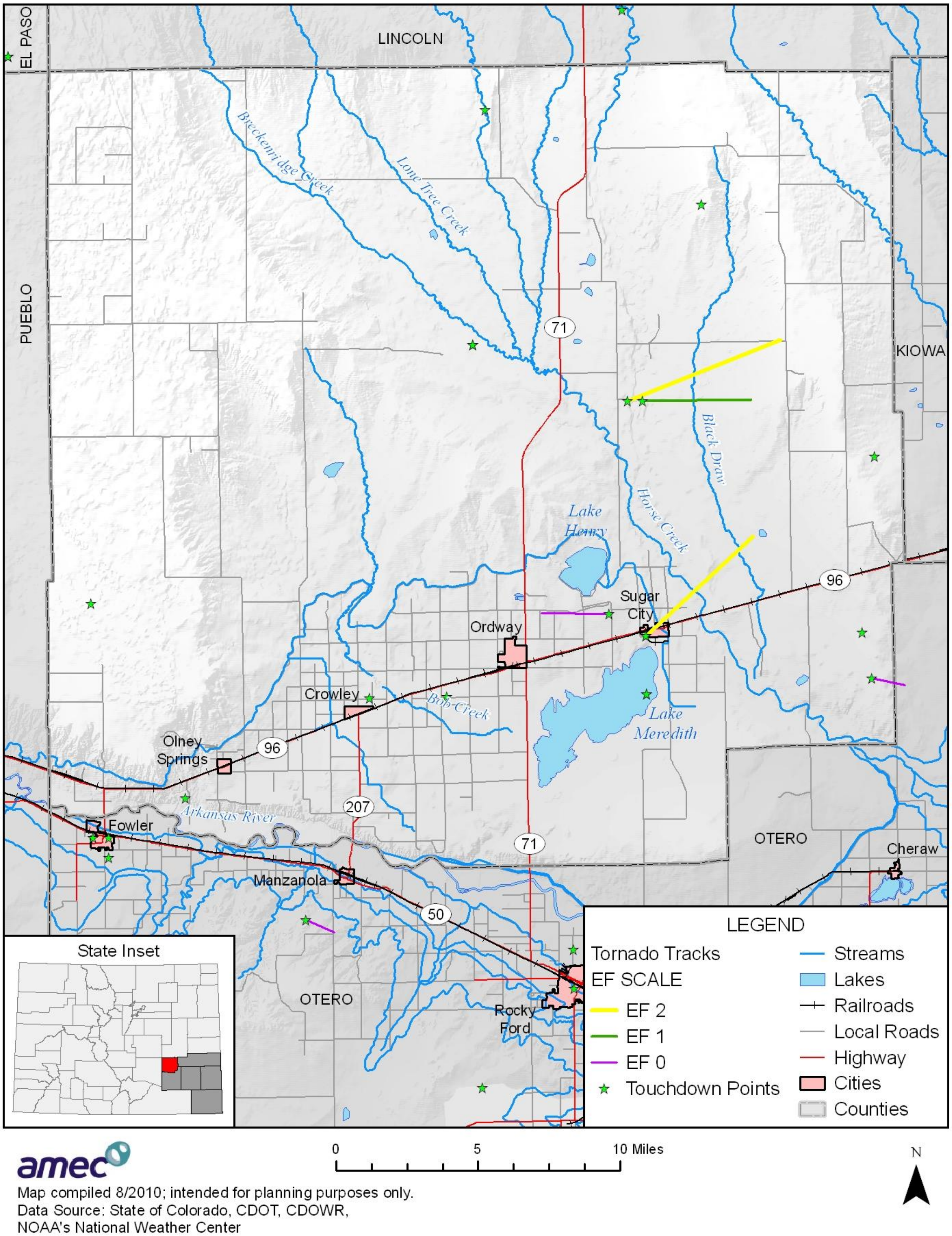
Table 27 Crowley County Tornado History

Fujita Scale Ranking	Number of Tornadoes
F0	9
F1	4
F2	2
Unknown*	1
Total	**16**

Source: NCDC

* One tornado struck Crowley County in 1951. The magnitude of it is unknown.

Figure 5 Crowley County Tornadoes and Touchdowns

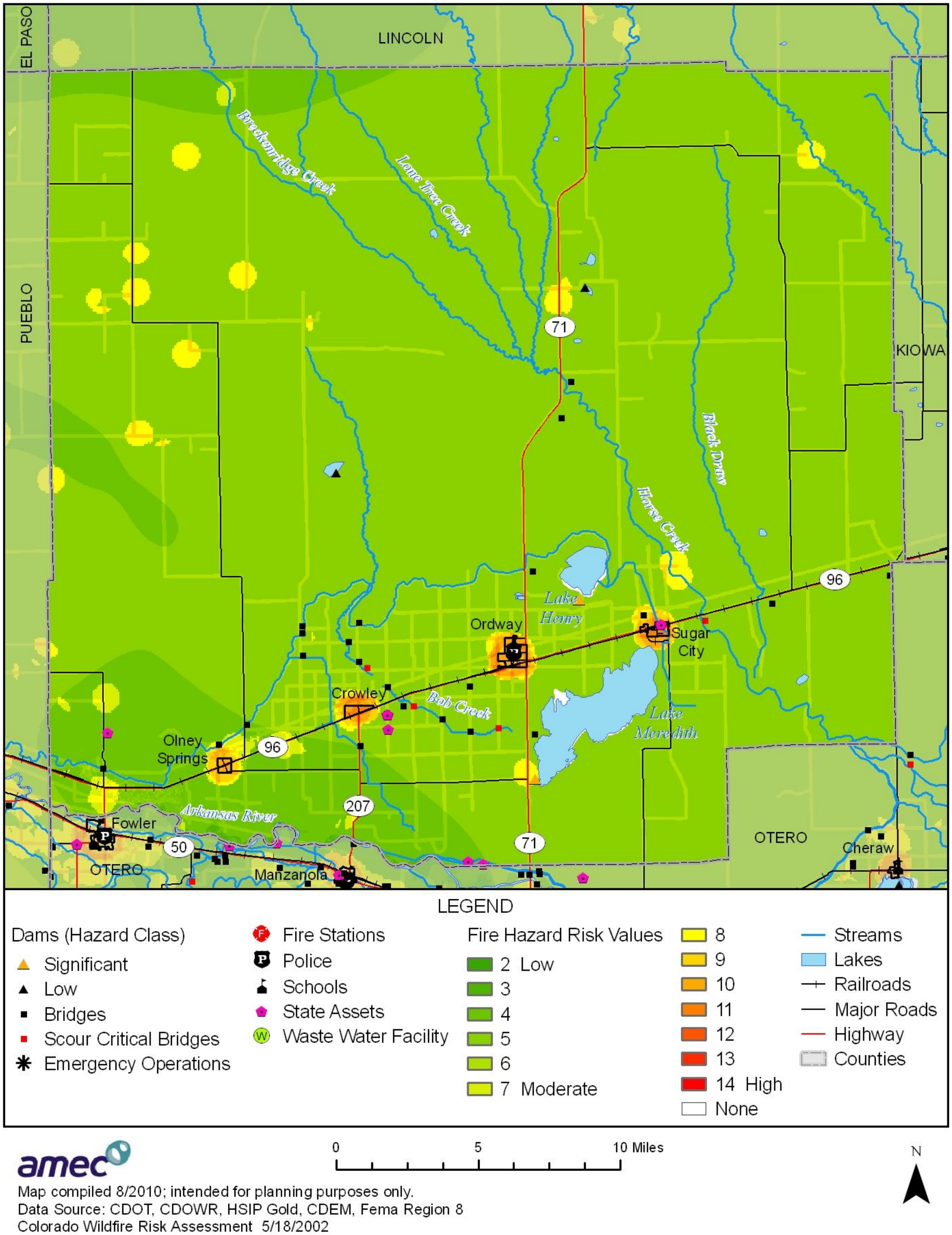


4.10 Wildfire Vulnerability Assessment

Crowley County Wildland Urban Interface

The Wildland Urban Interface map for Crowley County shows low to high fire hazard risk values throughout the county. The majority of the County has lower values with the higher values around the communities of Crowley, Olney Springs, Ordway, and Sugar City.

Figure 6 Crowley County Wildland Urban Interface



Critical Facilities

There are fifteen critical facilities in a moderate to high fire hazard in Crowley County. The Town of Olney Springs has one facility: one fire station. The Town of Ordway has six facilities: one emergency operations center, one fire station, one police station and three schools. The Town of Sugar City has four facilities: one fire station and three state assets. The unincorporated county has four critical facilities in a moderate to high fire hazard: two bridges, one dam, and one fire station.

Table 28 Critical Facilities in the Moderate to High Wildfire Hazard Areas

Facility Type	Facility Count
Bridge	2
Dams	1
Emergency Operations	1
Fire Stations	4
Police	1
Schools	3
State Assets	3
Total	**15**

4.11 Wind Storm Vulnerability Assessment

The County is subject to potentially destructive straight-line winds. High winds are common throughout the planning area, throughout the entire year. Straight line winds are primarily a public safety and economic concern. Windstorm can cause damage to structures and power lines which in turn can create hazardous conditions for people. Debris flying from high wind events can shatter windows in structures and vehicles and can harm people that are not adequately sheltered.

Future losses from straight line winds include:

- Erosion (soil loss)
- Dry land farming seed loss,
- Wind blown weeds, such as tumbleweed
- Power line impacts and economic losses from power outages
- Occasional building damage, primarily to roofs

Campers, mobile homes, barns, and sheds and their occupants are particularly vulnerable as windstorm events in the region can be sufficient in magnitude to overturn these lighter structures. Livestock that may be contained in these structures may be injured or killed, causing economic harm to the rancher who owns both the structure and the livestock. Overhead power lines are vulnerable and account for the majority of historical damages. State highways can be vulnerable to high winds and dust storms, where high profile vehicles may be overturned by winds and lowered visibility can lead to multi-car accidents.

4.12 Winter Storm Vulnerability Assessment

The threat to public safety of Crowley County citizens is typically the greatest concern when it comes to impacts of winter storms. But these storms can also impact the local economy by disrupting transportation and commercial activities. Winter storms are occasionally severe enough to overwhelm snow removal efforts, transportation, livestock management, and business and commercial activities. The region can experience high winds and drifting snow during winter storms that can occasionally isolate individuals and entire communities and lead to serious damage to livestock populations and crops. Travelers on highways in the County, particularly along remote stretches of road, can become stranded, requiring search and rescue assistance and shelter provisions.

Structural losses to buildings are possible and structural damage from winter storms in Colorado has resulted from severe snow loads on rooftops. Older buildings are more at risk, as are buildings with large flat rooftops (often found in public buildings such as schools). The County's elderly population is a potentially vulnerable demographic during severe winter storms. Smaller communities prevalent in the County may become isolated during winter storm events, Persons that choose to live in these areas are generally self-sufficient, or should be, as government and emergency services may be limited during a severe winter storm.

Another common impact of blizzards and severe winter storms on the planning area is the loss of power. The weight of heavy continued snowfall and/or ice accumulating on power lines often brings them to the ground causing service disruptions for thousands of customers. This can cause a loss of community water and sewer services, as well as the supply of gasoline, as these services almost always require electrical pumps. In addition, prolonged power outages can mean loss of food to grocery stores, large facilities that provide feeding services (such as prisons, hospitals and nursing homes), and restaurants.

5 Crowley County Capability Assessment

Thus far, the planning process has identified the hazards posing a threat to Crowley County and described, in general, the vulnerability of the County to these risks. The next step is to assess what loss prevention mechanisms are already in place. This part of the planning process is the mitigation capability assessment. Combining the risk assessment with the mitigation capability assessment results in the County's "net vulnerability" to disasters and more accurately focuses the goals, objectives, and proposed actions of this plan.

The planning committee used a two-step approach to conduct this assessment for the County. First, an inventory of common mitigation activities was made through the use of a matrix in the

AMEC distributed Data Collection Guide. The purpose of this effort was to identify policies and programs that were either in place, needed improvement, or could be undertaken, if deemed appropriate. Second, the HMPC reviewed existing policies, regulations, plans, and programs to determine if they contributed to reducing hazard-related losses or if they inadvertently contributed to increasing such losses.

This section presents the County's mitigation capabilities: programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This assessment is divided into three sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, and fiscal mitigation capabilities.

5.1 Crowley County's Regulatory Mitigation Capabilities

Table 29 lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the County, and the towns of Crowley, Olney Springs, Ordway, and Sugar City.

Table 29 Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	County Y/N	Town of Crowley Y/N	Ordway Y/N	Olney Springs Y/N	Sugar City Y/N	Comments
General plan	N	Y	Y	Y	Y	
Zoning ordinance	Y	Y	Y	Y	Y	County Planning & Zoning Manual for all
Subdivision ordinance	Y	N	N	N	N	
Growth management ordinance	N	N	N	N	N	
Floodplain ordinance	Y	N	Y	N	N	County Planning & Zoning Manual for all
Other special purpose ordinance (stormwater, steep slope, wildfire)	Y	N	Y	Y	Y	County: Fire only Olney Springs: Along with County's AWOP
Building code	Y	N	Y	N	N	County: 2009 IBC Ordway: 1999
BCEGS Rating	N	N	N	N	N	
Fire department ISO rating	Y	Y	Y	T	Y	Rating: 9 – County 7 - Crowley 6 – Olney Springs 6 - Ordway 7 – Sugar City
Erosion or sediment control program	N	N	N	N	N	

Regulatory Tool (ordinances, codes, plans)	County Y/N	Town of Crowley Y/N	Ordway Y/N	Olney Springs Y/N	Sugar City Y/N	Comments
Stormwater management program	N	N	N	N	N	
Site plan review requirements	Y	N	Y	N	Y	Planning & Zoning Manual
Capital improvements plan	N	N	Y	N	Y	
Economic development plan	N	Y	Y	N	Y	
Local emergency operations plan	Y	Y	Y	Y	Y	With County Emergency Management
Other special plans	N	N	N	N	N	
Flood insurance study or other engineering study for streams	N	N	N	N	N	
Elevation certificates	N	N	N	N	N	
Other	N	N	N		N	

5.2 Crowley County's Administrative/Technical Mitigation Capabilities

Table 30 identifies the County personnel responsible for activities related to mitigation and loss prevention in the County.

Table 30 Administrative/Technical Regulatory Tools

Personnel Resources	County Y/N	Crowley/Olney Springs/Ordway/ Sugar City Y/N	Department/Position	Comments
Planner/Engineer with knowledge of land development/land management practices	N	N		
Engineer/Professional trained in construction practices related to buildings and/or infrastructure	N	N		
Planner/Engineer/Scientist with an understanding of natural hazards	N	N		
Personnel skilled in GIS	N	N		
Full time building official	N	N		
Floodplain Manager	N	N		
Emergency Manager	Y	N	County	County
Grant writer	N	N		

Personnel Resources	County Y/N	Crowley/Olney Springs/Ordway/ Sugar City Y/N	Department/Position	Comments
Other personnel	N/A	N		
GIS Data – Hazard areas	N	N		
GIS Data - Critical facilities	N	N		
GIS Data – Building footprints	N	N		
GIS Data – Land use	N	N		
GIS Data – Links to Assessor's data	N	N		
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	Y	Y	County	All equipment is owned by the County
Other	N	N		

5.3 Crowley County's Fiscal Mitigation Capabilities

Table 31 identifies financial tools or resources that the City could potentially use to help fund mitigation activities.

Table 31 Fiscal Regulatory Tools

Financial Resources	County Accessible/ Eligible to Use	Town of Crowley	Town of Sugar City	Town of Olney Springs	Town of Ordway	Comments
Community Development Block Grants	Y	N	N	N	N	
Capital improvements project funding	N	Y	N	N	Y	Ordway and Crowley – Heritage Center Grant
Authority to levy taxes for specific purposes	Y	Y	N	N	Y	Voter approval
Fees for water, sewer, gas, or electric services	Y	Y	Y	Y	Y	Water
Impact fees for new development	Y	N	N	N	N	Assessed
Incur debt through general obligation bonds	Y	N	N	N	N	Voter approval
Incur debt through special tax bonds	Y	N	N	N	N	Voter approval

Financial Resources	County Accessible/ Eligible to Use	Town of Crowley	Town of Sugar City	Town of Olney Springs	Town of Ordway	Comments
Incur debt through private activities	Y	N	N	N	N	Approval of DOLA
Withhold spending in hazard prone areas	N	N	N	N	N	
Other	N	N	N	N	N	

5.4 Additional Capabilities in Crowley County

In the Data Collection Guide, Crowley County indicated that the County is in the process of writing a Communication Wildfire Protection Plan to mitigate against wildfire.

All counties in the planning area make the 211 system available to citizens within each county. The system guides citizens to appropriate agencies and organizations, including disaster resources and assistance. The system ensures that citizens can access timely and accurate information about what is happening in their community.

5.5 Additional Vulnerabilities in Crowley County

Due to the high population of elderly, should a disruption of natural gas, electricity, or water occur, there is limited or restricted transportation in severe weather conditions.

The town of Crowley is less than 1 mile away from the state of Colorado's Arkansas Valley correctional facility for adult males, which houses approximately 1,200 inmates and accommodates 200 staff members. The past events regarding civil unrest have happened at this facility.

There are 11 unreinforced masonry buildings in the County that may be at risk should an earthquake occur.

6 Crowley County Mitigation Actions

After reviewing the goals of the Southeast Colorado Regional Hazard Mitigation Plan, Crowley County has adopted the following mitigation actions to reduce their risk to the hazards identified above.

Action Item #1 Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program

Hazards Addressed: All

Issue/Background: The County and each jurisdiction are subject to several natural hazards. Each poses a different degree of risk and associated vulnerability. Some hazards have a combination of attributes, including a high likelihood of occurrence, a specific location that would likely be impacted, and proven approaches that could reduce the impact. For other hazards, where either the likelihood of occurrence is very low, the area of likely impact is not specifically known, or there is very little that can be done to reduce the impacts, the HMPC has determined that the best approach is public awareness. Citizens should have information describing historical events and losses, the likelihood of future occurrences, the range of possible impacts, appropriate actions to save lives and minimize property damage, and where additional information can be found. Any information provided through this effort should be accurate, specific, timely, and consistent with current and accepted local emergency management procedures as promoted by the Southeast Colorado All Hazards Region (SECAHR), Colorado Department of Emergency Management (CDEM) and the American Red Cross. Following a disaster event, there should be extra efforts to provide the public with information about disaster preparedness and mitigation measures. This public outreach effort will be conducted annually and will include:

- Using a variety of information outlets, including local news media;
- Creating and printing (where applicable) brochures, leaflets, water bill inserts, and public service announcements;
- Posting all information to the SECAHR website;
- Displaying current brochures and flyers in County office buildings, city halls, libraries, and other public places; and
- Developing public-private partnerships and incentives to support public education activities.

Other Alternatives: Continue public information activities currently in place.

Responsible Office: Crowley County Emergency Management

Priority (High, Medium, Low): High

Cost Estimate: Staff time, printing costs for literature.

Benefits (avoided Losses): Life safety, reduction in property losses, relatively low cost

Potential Funding: State Hazard Mitigation Program grants, county and jurisdiction funds, other available grants

Schedule: Ongoing – part of seasonal multi-hazard public awareness campaign.

Action Item #2 Lane 27 drainage project

Issue/Background: Approximately 10 miles of Lane 27, from Road P, to Road BB continually wash away during flash flooding and take out drainage culverts and a water line located on the east side of the road.

Project: Relocate the water line to the West side of the road; dig a drainage ditch on the East side. Raise the roadway approximately 2 feet and then gravel the roadway.

Other Alternatives: without funding opportunities the only thing we could do is the continuing maintenance.

Existing Planning Mechanism(s) through which project will be implemented:

Responsible Office: Crowley County Road and Bridge

Priority (High, Medium, Low): Medium

Cost Estimate: $1,441,800.00

Benefits (avoided Losses): Protects the waterline for the families relying on it, protects and maintains an established school bus route. Prevents continued land erosion from continuous flooding.

Potential funding: To be determined

Schedule: Within 5 years

Action Item #3 Community Wildfire Protection Plans

Issue/Background: Wildfire is an issue in the County. The intent is to minimize risk and vulnerability from wildfire hazard.

- Start/complete CWPP for Crowley County

Other Alternatives: No action.

Existing Planning Mechanism(s) through which project will be implemented:

Basically three meetings per county –

- 1st Meeting – Wildfire Mitigation Assessment mapping exercise (circling areas for values, risks & fuels) to identify areas of concern).
- 2nd Meeting – Review mapping overlays; review FireWise mitigation potentials; start looking at overall goals for a five year plan.

- 3rd Meeting – Review/complete goals; review draft plan; determine annual workplan (identify persons responsible/ tasks/benchmark dates to complete assignments/projects.

Responsible Office: Office of Emergency Management

Priority (High, Medium, Low): High

Cost estimate: Low to high cost depending upon in-kind and actual expenses – mileage/per diem/in-kind hours/ administrative copying costs, etc/ CWPP plan copying costs.

Benefits (avoided Losses): Mitigating wildfire hazards within a county by identifying /prioritizing areas of concern, then mechanisms to implement mitigation.

Potential funding: Federal/State grant options?

Schedule:

- Three meetings per county to create plan.
- Schedule according to each annual workplan for implementing projects.
- Update meetings according to each county's schedule

Action Item #4 CWPP Projects as identified by the County's CWPP

Issue/Background: Wildfire is an issue in the County. The intent is to minimize risk and vulnerability from wildfire hazard. Projects can include mitigating risk, access, water supply, structure construction design & materials, defensible space, trees & shrubs (landscapes), interior design, & 'What to do when… (evacuation needs) .

Other Alternatives: No action.

Existing Planning Mechanism(s) through which project will be implemented: The County's CWPP. Types of projects include:

- Risk (Landowner Awareness)
- Access (ingress/egress; widths/turnarounds/ culverts; signage (High/med/low fire danger; CR/street signages)
- Water supply
- Construction design & materials,(building codes, ordinances)
- Defensible space (Fuels mgmt, establishing living fuel breaks (grass) – riverbottom & community),
- Trees & shrubs,
- Interior safety
- What to do when
- Other

– Hazards – Power lines/trees/brush breakage (Tree Line USA, NADF)
– County Fire Bans & Controlled Burn Ordinances
– Ag Hazards – wildfire
– Drought – fire hazards

Responsible Office: Office of Emergency Management

Priority (High, Medium, Low): Medium

Cost estimate: Per project

Benefits (avoided Losses): Protect homes, homesteads, structures, values from potential wildfires until fire services can arrive. Protecting homes can be maximized when fire service arrives. Protect Firefighter safety during suppression operations.

Potential funding: Federal/State grant options

Schedule: Schedule according to each CWPP annual workplan for implementing projects.

Action Item #5 Firewise Outreach Message to appropriate audiences within the County CWPP Plan

Issue/Background: Wildfire is an issue in the County. The intent is to minimize risk and vulnerability from wildfire hazard.

- Homeowners, landowners and other property owners need to have an awareness of vulnerability to wildfire hazards.
- Each property owner needs to take responsibility for mitigating potentials for catastrophic damage to their own properties – protect their own properties from wildfire.
- Support safety to firefighters during suppression by mitigation of fuels and implementing other FireWise suggestions.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which project will be implemented: Educating publics on risk, access, water supply, construction design & materials, defensible space, trees & shrubs, interior safety & 'What to do when…' – tools to mitigate.

Responsible Office:

- Educational outreach from local VFD's to assess homesites and give recommendations.
- Media news releases; Fair booths (w/other entities);
- Firewise prevention messages for schools.

Priority (High, Medium, Low): Medium

Cost estimate: To be determined

- Pamphlets/handout costs
- Firewise Educational material for schools
- Low to high cost depending upon in-kind and actual expenses – mileage/per diem/in-kind hours/ administrative copying costs, etc.

Benefits (avoided Losses): Protect homes, homesteads, structures, values from potential wildfires until fire services can arrive. Protecting homes can be maximized when fire service arrives. Protect Firefighter safety during suppression operations.

Potential funding: Federal/State grant options

Schedule:

- Schedule according to each CWPP annual workplan for implementing projects.
- Update meetings according to each county's schedule.

Town of Ordway

Action Item #6 Ordway drainage project

Issue/Background: Repeated flooding at the corner of 1st Street and Colorado Avenue.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which project will be implemented:

Responsible Office: Town of Ordway public works department

Priority (High, Medium, Low): Medium

Cost Estimate: $6,581

Benefits (avoided Losses): Flooding to businesses located in the area, damage to road infrastructure.

Potential funding: To be determined.

Schedule: Within 5 years

KIOWA COUNTY PLANNING ELEMENT

1 Kiowa County Planning Committee

The following entities participated in the DMA planning process through the Kiowa County Planning committee. More details on the planning process followed and how the County, municipalities and stakeholders participated can be referenced in Chapter 3 of the base plan. Additional details on what local government departments participated and who represented them are listed in Appendix B.

- Kiowa County

2 Kiowa County Profile

Kiowa County is located in the southeastern region of the State in the high plains and is primarily agricultural. The land area of the County is 1,786 square miles, with 15 square miles of water. According to the 2000 U.S. Census, the population for the County was 1,622. The 2010 population estimate from the Department of Local Affairs is 1,473. The estimated average density for the County is .82 people per square mile. The County shrunk at a rate of 9.2% between 2000 and 2010. There are 817 housing units in the County. The median age in the County is 39.7 years. 5.9% of the population is under the age of 5 and 17.6% of the population is over the age of 65. The average household size is 2.40, and the average family size is 2.97. 86.3% of the population over the age of 25 holds at least a high school degree and 16.1% hold a bachelors level degree or higher. 21.3% of the population (over age 5) holds disability status, and 3.5% speak a language other than English in the home. 9.6% of all families live below the poverty level, and 12.2% of individuals live below poverty level. The County is a rural county located on the southeastern plains of Colorado. The largest city in the County is Eads. The County is typical of the mid-western plains, with a rural orientation and solid agricultural basis. The Census of Agriculture reports 425 farms in the County with 957,937 total acres of farmland. The average farm size is 2,254 acres. A base map of the County can be referenced in Figure 1.

3 Hazard Identification and Summary

Kiowa County's planning team identified the hazards that affect the County and summarized their geographic extent, probability of future of occurrence, potential magnitude, and significance specific to the County. This information is presented in Table 1. A detailed description of each hazard can be found in Section 4.2 Hazard Profiles of the main plan.

Table 1 Kiowa County Hazard Summary

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/Severity	Significance
Agriculture Infestation	Extensive	Occasional	Critical	High
Dam/Levee Failure	Limited	Unlikely	Negligible	Low
Drought	Extensive	Likely	Catastrophic	High
Earthquake	Limited	Occasional	Limited	Low
Extreme Temperatures: Cold	Extensive	Highly likely	Limited	Low
Extreme Temperatures: Heat	Extensive	Highly likely	Limited	Low
Flood: 100/500 –Year	Limited	Occasional	Limited	Medium
Flood: Stormwater/Flash Flooding	Limited	Likely	Negligible	Low
Severe Weather: Thunderstorms/Lightning/Hail	Significant	Highly Likely	Critical	Medium
Stream Bank Erosion/ Stability	Limited	Unlikely	Negligible	Low
Subsidence	Limited	Unlikely	Negligible	Low
Tornadoes	Limited	Highly Likely	Limited	Medium
Wildfire	Limited	Highly Likely	Negligible	Low
Wind Storms	Extensive	Highly Likely	Limited	Medium
Winter Storms	Extensive	Highly Likely	Critical	Medium
Civil Unrest	Limited	Occasional	Negligible	Low
Cyber Hazards	Limited	Occasional	Negligible	Low
Hazardous Materials	Limited	Occasional	Negligible	Medium
Pandemic	Significant	Occasional	Limited	Low

Geographic Extent
Limited: Less than 10% of planning area
Significant: 10-50% of planning area
Extensive: 50-100% of planning area

Probability of Future Occurrences
Highly Likely: Near 100% chance of occurrence in next year, or happens every year.
Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less.
Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Magnitude/Severity
Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths
Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability
Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability
Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid

Significance
Low: minimal potential impact
Medium: moderate potential impact
High: widespread potential impact

3.1 Disaster Declaration History

One method the planning committee used to identify hazards was the researching of past events that triggered federal and/or state emergency or disaster declarations in the planning area. Federal and/or state disaster declarations may be granted when the severity and magnitude of an event surpasses the ability of the local government to respond and recover. Disaster assistance is supplemental and sequential. When the local government's capacity has been surpassed, a state disaster declaration may be issued, allowing for the provision of state assistance. Should the disaster be so severe that both the local and state governments' capacities are exceeded, a federal emergency or disaster declaration may be issued allowing for the provision of federal assistance.

The federal government may issue a disaster declaration through FEMA, the U.S. Department of Agriculture (USDA), and/or the Small Business Administration (SBA). FEMA also issues emergency declarations, which are more limited in scope and without the long-term federal recovery programs of major disaster declarations. The quantity and types of damage are the determining factors. Federal, state, and USDA disaster declarations for the County are listed in Table 2.

Table 2 Kiowa County Disaster and Emergency Declarations, 1955-2010

Year	Declaring Jurisdiction	Disaster Type
2009	State of Colorado*	Severe Blizzard
2009	State of Colorado*	Severe Spring Snowstorm
2008	USDA – Secretarial Designation (S2750)	Drought
2007	Federal – Emergency (3271-EM, 3270-EM)	Snow
2006	State of Colorado	Snow
2006	USDA – Secretarial Designation (S2329)	Heat, high winds, insect pests, late freeze, drought
2005-2006	USDA – Secretarial Designation (S2287)	Drought, Crop Diseases, Insect Infestation
2005	Federal – Emergency (3224-EM)	Hurricane Katrina Evacuation
2004	USDA – Secretarial Designation (S1947)	Drought, Freeze, Hail
2003	USDA – Secretarial Designation (S1797)	Drought
2002	State of Colorado*	Snow Emergency
2002	State of Colorado*	Drought
2002	State of Colorado*	WIldfires
2002	USDA – Secretarial Designation (S1643)	Drought
2001	Federal – Major Disaster (1374-DR)	Severe Winter Storms
2000	USDA – Secretarial Designation (S1451)	Drought, Freezing Temperatures
1999	Federal – Major Disaster (1276-DR)	Flooding
1999	State of Colorado	Flooding, Landslides, Mudslides
1997	Federal – Emergency	Heavy Flash Flooding
1997	State of Colorado	Flooding
1995-1996	USDA – Secretarial Designation (S999)	Drought
1994	USDA – Secretarial Designation (S767)	Freezing Temperatures
1977	Federal – Major Disaster	Drought
1965	Federal – Major Disaster (200-DR)	Tornadoes, Severe Storms, and Flooding

Source: Colorado State Hazard Mitigation Plan; Colorado Governor's Office website, Federal Emergency Management Agency, PERI Presidential Disaster Declaration Site; U.S. Department of Agriculture.
*All counties in the state were proclaimed disaster areas by the Governor.

3.2 National Severe Weather Databases

The National Oceanic and Atmospheric Administration's National Climatic Data Center (NCDC) has been tracking severe weather since 1950. Their Storm Events Database tracks severe weather events on a county basis and contains data on the following: all weather events from 1993 to current (except from 6/1993-7/1993); and additional data from the Storm Prediction Center, which includes tornadoes (1950-1992), thunderstorm winds (1955-1992), and hail (1955-1992). This database contains 310 severe weather events that occurred in Kiowa County between January 1, 1950, and April 31, 2010. Table 3 summarizes these events.

Table 3 NCDC Hazard Events Report for Kiowa County

Type	# of Events	Property Loss ($)	Crop Loss ($)	Deaths	Injuries
Blizzard	3	0	0	0	0
Flash Flood	5	0	0	0	0
Flood	2	0	0	0	0
Funnel Cloud	8	0	0	0	0
Hail	199	0	500,000	0	0
High Wind	11	100,000	0	0	0
Ice Storm	1	0	0	0	0
Thunderstorm Winds	27	0	0	0	0
Tornado	47	656,000	0	0	0
Wildfire/Forest Fire	1	0	0	0	0
Winter Storm	5	0	0	0	0
Winter Weather	1	0	0	0	0
Totals	**310**	**756,000**	**500,000**	**0**	**0**

Source: NCDC

The HMPC supplemented NCDC data with data from SHELDUS (Spatial Hazard Events and Losses Database for the United States). SHELDUS is a county-level data set for the United States that tracks 18 types of natural hazard events along with associated property and crop losses, injuries, and fatalities for the period 1960-2005. Produced by the Hazards Research Lab at the University of South Carolina, this database combines information from several sources (including the NCDC). From 1960 to 1995, only those events that generated more than $50,000 in damage were included in SHELDUS. For events that covered multiple counties, the dollar losses, deaths, and injuries were equally divided among the affected counties (e.g., if four counties were affected, then a quarter of the dollar losses, injuries, and deaths were attributed to each county). From 1995 to 2005, all events that were reported by the NCDC with a specific dollar amount are included in SHELDUS.

SHELDUS contains information on 174 severe weather events that occurred in Kiowa County between 1960 and 2009. Table 4 summarizes these events.

Table 4 SHELDUS Hazard Events for Kiowa County,1960-2009

Hazard	Number	Injuries	Fatalities	Property Damage	Crop Damage
Drought	2	0	0	0	2,193,396
Flooding –Severe Storm/Thunder Storm – Winter Weather	1	0	0	793.65	0
Fog – Winter Weather	1	0	0	22,727.27	0
Hail	14	0	0	176,850	209,000
Hail - Lightning	1	.08	0	41.67	4,166.67
Hail - Lightning - Severe Storm/Thunder Storm	1	0	0	41.67	4,166.67
Hail - Lightning - Wind	3	.17	0	2,395	23,958.34
Hail - Severe Storm/Thunder Storm	14	.08	0	110,520.20	429,780.40
Hail - Severe Storm/Thunder Storm - Tornado	1	0	0	333.33	333.33
Hail - Severe Storm/Thunder Storm – Wind	5	0	0	6,893.53	64,810.20
Hail - Severe Storm/Thunder Storm - Winter Weather	1	.08	0	124,813	976,400.80
Hail - Wind	9	.25	0	17,329.56	132,295.50
Lightning	2	0	0	50	0
Lightning - Severe Storm/Thunder Storm	1	.07	0	172.41	0
Lightning - Wind	2	0	0	176.58	0
Lightning - Winter Weather	1	0	0	416.67	0
Severe Storm/Thunder Storm	8	0	.08	485,414.90	459,166.70
Severe Storm/Thunder Storm – Wind	1	0	0	10,000	0
Severe Storm/Thunder Storm - Wind - Winter Weather	1	0	0	79.37	0
Tornado	8	0	0	173,924.80	0
Tornado – Wind	1	0	0	25	0
Wind	48	7.03	0	440,470.60	272,283.50
Wind - Winter Weather	20	.06	.18	266,870.8	185,112.80
Winter Weather	28	.73	.27	1,199,068	2,597,848
Totals	**174**	**8.55**	**0.53**	**3,039,408.01**	**7,552,718.91**

Source: SHELDUS, Hazards Research Lab, University of South Carolina, www.sheldus.org/
Events may have occurred over multiple counties, so damage may represent only a fraction of the total event damage and may not be specific to Kiowa County.

The NCDC and SHELDUS tables above summarize severe weather events that occurred in Orange County. Only a few of the events actually resulted in state and federal disaster declarations. It is interesting to note that different data sources capture different events during the same time period, and often different information specific to the same events. While the HMPC recognizes these inconsistencies, it is the value this data provides in depicting the County's "big picture" hazard environment.

4 Kiowa County Vulnerability Assessment

The intent of this section is to assess the County's vulnerability separate from that of the planning area as a whole, which has already been assessed in Section 4.3 Vulnerability Assessment in the main plan. This vulnerability assessment analyzes the population, property, and other assets at risk to hazards ranked of medium or high significance that may vary from other parts of the planning area. For more information about how hazards affect the Region as a whole, see Chapter 4 Risk Assessment in the main plan.

4.1 Assets at Risk

This section identifies the County's assets at risk, including values at risk, critical facilities and infrastructure, historic assets, economic assets, and growth and development trends. The data source used was the HAZUS-MR4 databases. The HAZUS building exposure (includes building counts, value of building structure and contents) is shown in Table 5. A breakdown of the building count by type can be found in Table 6.

Table 5 Kiowa County Building Exposure

City	Population	Building Count	Building Exposure ($)	Building Content ($)	Total Exposure
Eads	737	646	53,290,000	37,105,000	90,395,000
Haswell	84	62	4,513,000	2,861,000	7,374,000
Sheridan Lake	66	65	3,733,000	1,911,000	5,644,000
Unincorporated	735	701	43,462,000	28,773,000	72,235,000
Total	**1,622**	**1,474**	**104,998,000**	**70,650,000**	**175,648,000**

Table 6 Kiowa County Building Exposure by Type

Occupancy Type	Building Count	Value ($)
Agriculture	48	6,577,000
Commercial	43	13,863,000
Education	5	4,841,000
Government	8	2,199,000
Industrial	12	2,553,000
Religion	5	2,232,000
Residential	1,353	38,385,000
Total	**1,474**	**70,650,000**

Critical Facilities and Infrastructure

An inventory of critical facilities in Kiowa County is provided below in Table 7. The table includes data from available national and statewide GIS resources (locations are illustrated in Figure 1) supplemented with information from the County planning committee.

Table 7 Critical Facilities Inventory

Facility Type	Facility County
Bridge	25
Bridge – Scour Critical	1
Emergency Operations Center	1
Fire Stateions	4
Hospital	1
Police	1
Schools	5
State Assets	4
Total	**42**

Historic and Natural Assets

Assessing the vulnerability of the Kiowa County to disaster also involves inventorying the historic, cultural, and natural assets of the area. This step is important for the following reasons:

- The community may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.
- If these resources are impacted by a disaster, knowing so ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts are higher.
- The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.
- Natural resources can have beneficial functions that reduce the impacts of natural hazards, for example, wetlands and riparian habitat help absorb and attenuate floodwaters.

Historic Assets

The County has a stock of historically significant homes, public buildings, and landmarks. To inventory these resources, the planning committee collected information from a number of sources. The Colorado Historical Society's (CHS) Colorado State Register of Historic Properties was the primary source of information. The CHS is responsible for the administration of federally and state mandated historic preservation programs to further the identification, evaluation, registration, and protection of Colorado's irreplaceable archaeological and historical resources.

In addition, the National Register of Historic Places database was used. The National Register of Historic Places is the Nation's official list of cultural resources worthy of preservation. The National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect historic and archeological resources. Properties listed include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archeology, engineering, and culture. The National Register is administered by the National Park Service, which is part of the U.S. Department of the Interior.

Historical resources included in the programs above are identified in Table 8.

Table 8 Kiowa County Historic Properties

Property	Location	National Register	State Register
American Legion Hall	Kiowa County Fairground, US Hwy. 287, Eads vicinity	12/11/2007	5KW.87
Nipps-Bransgrove Building	1307 Maine Eads	-	5KW.56
Sand Creek Massacre Site (Sand Creek Massacre National Historic Site)	Near junction of County. Rd. 54 and County Rd. W, Eads vicinity	9/28/2001	5KW.28
Haswell Jail	211 Main St. Haswell	-	5KW.50

Source: Colorado State Register of Historic Properties

Natural Assets

Natural resources are important to include in benefit-cost analyses for future projects and may be used to leverage additional funding for mitigation projects that also contribute to community goals for protecting sensitive natural resources. Awareness of natural assets can lead to opportunities for meeting multiple objectives. For instance, protecting wetlands areas protects sensitive habitat as well as stores and reduces the force of floodwaters.

Information from the U.S. Fish and Wildlife Service and the Colorado Division of Wildlife, a program that inventories the status and locations of rare plants and animals in Colorado, was combined to create an inventory of special-status species in Kiowa County. Table 9 lists national and state endangered, threatened, rare, and candidate species in the County by species type.

Table 9 Sensitive Plant and Animal Species in the Planning Area

Group	Name	Population	Status	Lead Office	Recovery Plan Name	Recovery Plan Stage
Birds	Arctic peregrine Falcon (Falco peregrinus tundrius)		Recovery			
Birds	Mountain plover (Charadrius montanus)		Proposed Threatened			
Birds	Piping Plover (Charadrius melodus)	except Great Lakes watershed	Threatened	Office Of The Regional Director	Piping Plover Atlantic Coast Population Revised Recovery Plan	Final Revision 1
Birds	Piping Plover (Charadrius melodus)	except Great Lakes watershed	Threatened	Office Of The Regional Director	Great Lakes & Northern Great Plains Piping Plover	Final
Birds	Least tern (Sterna antillarum)	interior pop.	Endangered	Columbia Ecological Services Field Office	Least Tern (Interior Pop.)	Final
Birds	Lesser prairie-chicken (Tympanuchus pallidicinctus)		Candidate	Oklahoma Ecological Services Field Office		
Fishes	Arkansas darter (Etheostoma cragini)		Candidate	Kansas Ecological Services Field Office		
Mammals	Black-footed ferret (Mustela nigripes)	U.S.A. (specific portions of AZ, CO, MT, SD, UT, and WY)	Experimental Population, Non-Essential	Office Of The Regional Director		

Source: US Fish and Wildlife Service, Colorado Division of Wildlife

Development Trends

There is limited development occurring in the County.

4.2 Agricultural Infestation Vulnerability Assessment

Agriculture is an important aspect of the County's economy. The following discussion analyzes the potential losses from floods using HAZUS and multiple hazards from federal crop insurance records.

Crop Insurance Analysis

Federal Crop Insurance Data represents losses from multiple hazards that could include: agricultural infestation, flooding, drought, hailstorms, temperature extremes, tornados, wildfires and straight-line winds. Average annual claims payout amount to $2.8 million in the County. More details are provided in Table 10 and 11.

Table 10 Kiowa County Premium and Crop Loss Data for Federal Crop Insurance 1980-2009

Liability (Amount of Coverage)	Total Premium	Federal Premium Subsidy	Farmer-paid Premium	Amount Paid in Claims	Average Amount Paid Annually in Claims
284,514,150	79,399,935	46,350,357	33,049,578	84,983,782	2,832,793

Source: Risk Management Agency

Table 11 Kiowa County Provisional Data (claim data unavailable as 2010 claims are not fully reported)

Liability (Amount of Coverage)	Total Premium	Federal Premium Subsidy	Farmer-paid Premium
21,789,082	7,381,824	4,813,819	2,568,005

Source: Risk Management Agency

Flood Analysis

HAZUS Methodology for Agricultural Economic Loss

The HAZUS Flood Model is determined by the relationships between the depth of flood and the annual chance of flood inundation to that depth. The primary elements that contribute to flood losses are depth, duration and velocity of the water in the floodplain. The other risks with flooding that assist with flood loss are channel erosion and migration, sediment deposition, bridge scour and the impact of flood-borne debris.

The agriculture component of the HAZUS Flood Model estimated a range of losses to barley, corn, corn silage, oats, and wheat. These crops were the only crops identified by the HAZUS model to have loss within the region of study. The model assumes a short duration and slow rise flood when estimating losses and does not account for high velocity flash floods. Loss estimates are based on United States Army Corp of Engineers (USACE) damage modifiers. The HAZUS-MH impact analysis predicts a loss estimate value by crop for flow time intervals. The first is a loss estimate for the day of the fixed event; the remaining three are for 3, 7 and 14 days following the event.

The agricultural product in Kiowa County that show economic loss is wheat. Wheat’s total loss is $21,331,062.

Table 12 Kiowa County Direct Economic Loss for Agricultural Products

Agricultural Product	Crop Loss Day 0 ($)	Crop Loss Day 3 ($)	Crop Loss Day 7 ($)	Crop Loss Day 14 ($)	Total Loss ($)
Wheat	0	5,817,562	7,756,750	7,756,750	21,331,062
Total	**0**	**5,817,562**	**7,756,750**	**7,756,750**	**21,331,062**

Source: HAZUS-MH MR4

4.3 Drought Vulnerability Assessment

Based on the County's recent multi-year droughts and Colorado's drought history, it is evident that the entire region is vulnerable to drought. With the majority land area in the County used for agricultural purposes, the County has significant exposure to this hazard. In addition to economic and public water supply impacts, soil erosion, dust, and wildfire hazard are also exacerbated by drought conditions. Kiowa County has been affected by the droughts in the years identified in Table 13.

Table 13 Drought Disaster and Emergency Declarations in Kiowa County

Year	Declaring Agency and Declaration Number
2008	USDA Secretarial Declaration S2750
2006	USDA Secretarial Declaration S2329
2005-2006	USDA Secretarial Declaration S2287
2004	USDA Secretarial Declaration S1947
2003	USDA Secretarial Declaration S1797
2002	USDA Secretarial Declaration S1643 State of Colorado
2000	USDA Secretarial Declaration S1451
1995-1996	USDA Secretarial Declaration S999
1977	Federal – Major Disaster

Source: USDA, CDEM, FEMA

While the crop insurance loss data covers a variety of perils, it is indicative of the types of agricultural impacts that drought can have upon the planning area. Available crop insurance data indicates over $84 million has been paid to the County's agricultural landowners in insurance claims between 1980 and 2009. It is reasonable to assume that a significant amount of this is due to drought-related losses. While the crop insurance loss data covers a variety of perils, it is indicative of the types of agricultural impacts that drought can have upon the planning area. Assuming at least 50% of the losses are drought-related, an average annual loss estimate can be calculated. For the region this is calculated by ($84,983,782/2)/29years, which equates to $1.47 million in average annual agricultural losses for the County.

4.4 Flood Vulnerability Assessment (100/500-year and Localized)

The best available flood data for Kiowa County was generated by HAZUS-MH MR4 by FEMA Region VIII, FEMA’s software program for estimating potential losses from disasters. The 100-year floodplain was generated for major rivers and creeks in the county (those with a 10 square mile minimum drainage area). A USGS 30 meter resolution digital elevation model (DEM) was used as the terrain base in the model. HAZUS-MH produces a flood polygon and flood-depth grid that represents the base flood. While not as accurate as official flood maps, such as digital flood insurance rate maps, these floodplain boundaries are suitable for use in GIS-based loss estimation. Potential losses to the county were analyzed with HAZUS-MH, based on Census Block-based buildings and population inventory and the flood hazard data. The following discussion, maps and tables presents the results of the loss estimation in more detail.

Figure 1 Kiowa County 100-year Floodplain and Critical Facilities Map

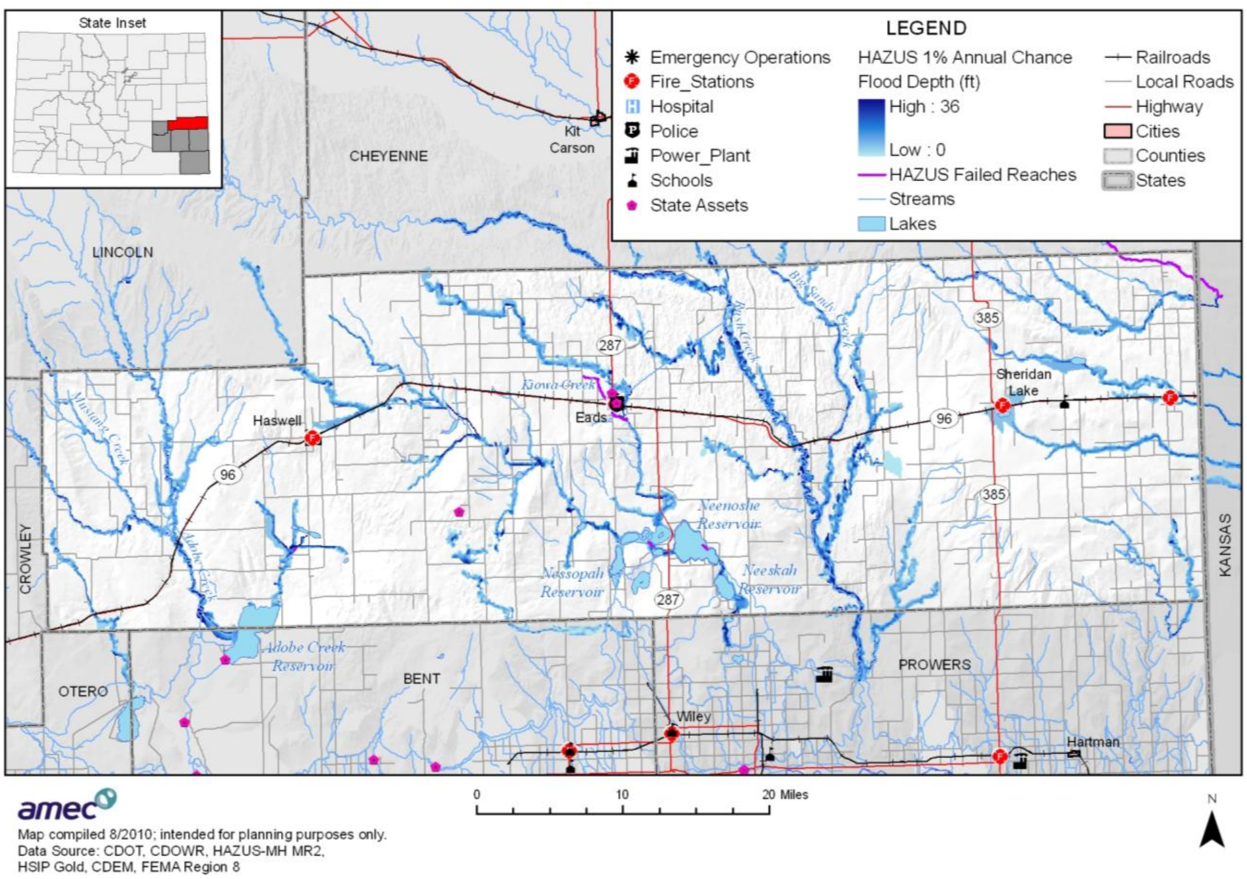
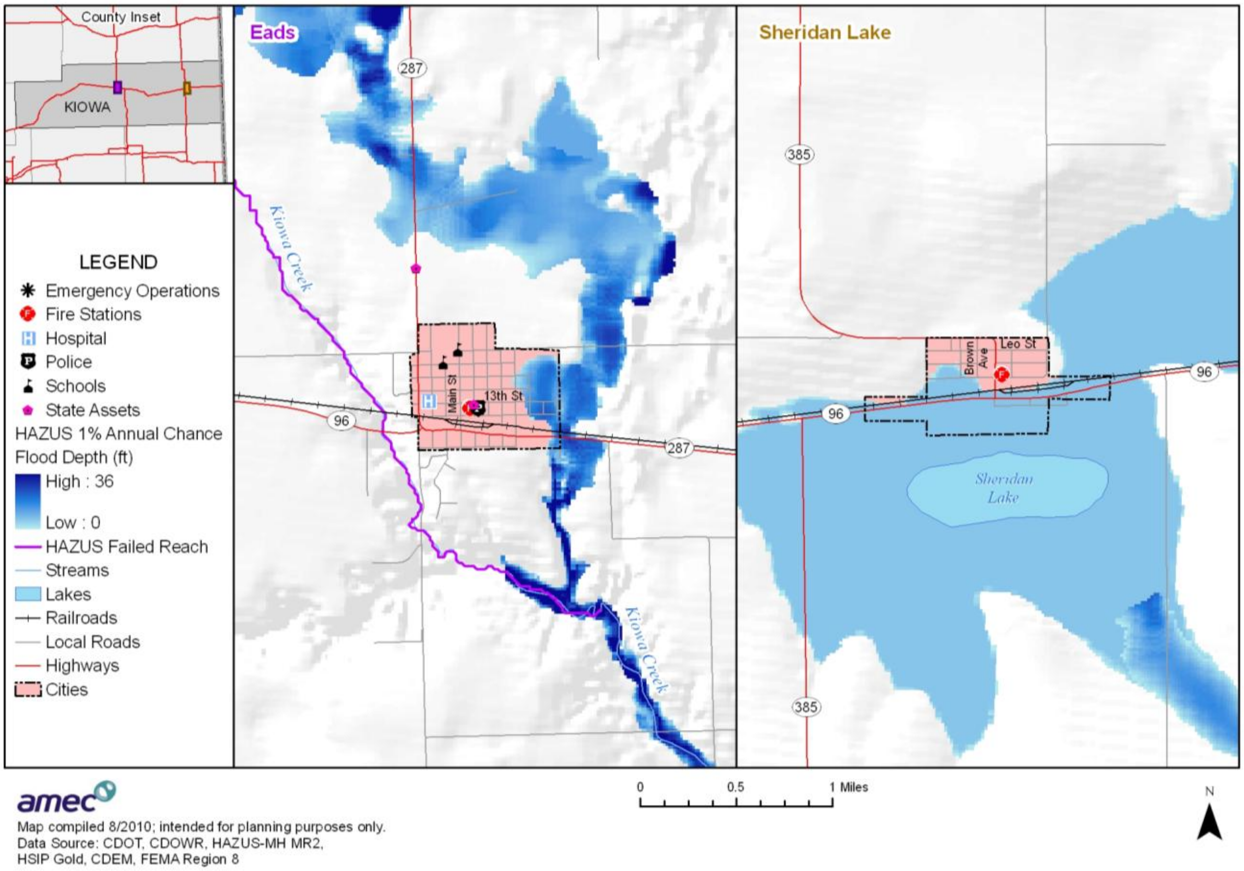


Figure 2 Kiowa County Cities 100-year Floodplain and Critical Facilities Map



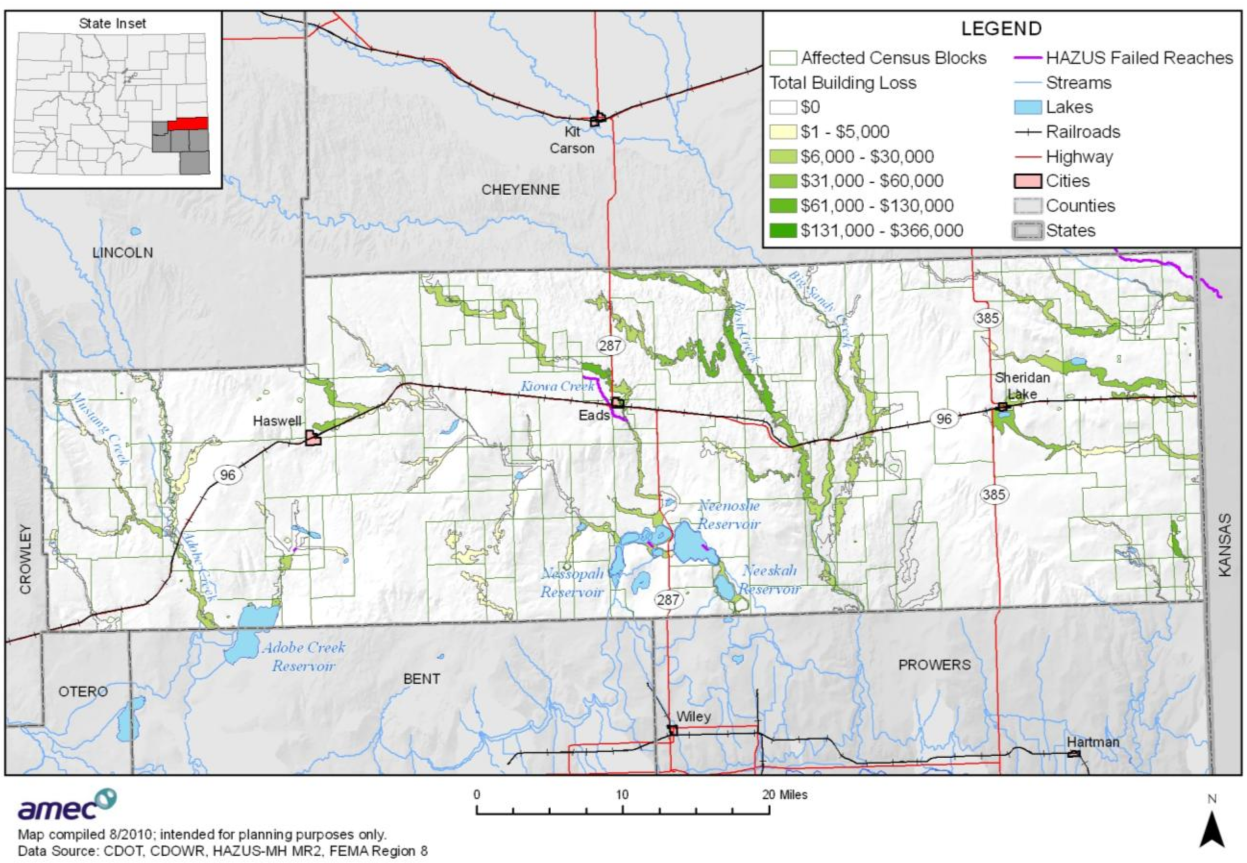
HAZUS-MH provides reports on the number of buildings impacted, estimates of the building repair costs, and the associated loss of building contents and business inventory. Building damage can cause additional losses to a community as a whole by restricting the building's ability to function properly. Income loss data accounts for business interruption and rental income losses as well as the resources associated with damage repair and job and housing losses. These losses are calculated by HAZUS-MH using a methodology based on the building damage estimates. Building damage is estimated by Census Block based on the average depth of flooding within a given Census Block. Flood damage is directly related to the depth of flooding. HAZUS-MH uses depth-damage functions to model the losses. For example, a two-foot flood generally results in about 20 percent damage to the structure (which translates to 20 percent of the structure's replacement value). To estimate the monetary loss for each city, the flooded Census Blocks were extracted, and the damage costs were totaled using GIS. This was done for each city and unincorporated area to illustrate how the risk varies across the planning area. The results of this are shown in Table 14.

Table 14 Estimated Economic Losses from Flooding

Jurisdiction	Cost Building Damage	Cost Contents Damage	Inventory Loss	Relocation Loss	Capital Related Loss	Wage Loss	Total Loss	Percent of Total Loss	Loss Ratio
Eads	538,000	414,000	20,000	-	2,000	2,000	976,000	41%	1.1%
Haswell	-	-	-	-	-	-	-	-	-
Sheridan Lake	95,000	54,000	-	-	-	-	149,000	6%	2.6%
Unincorporated	543,000	647,000	45,000	-	1,000	4,000	1,240,000	52%	1.7%
Total	**1,176,000**	**1,115,000**	**65,000**	**-**	**3,000**	**6,000**	**2,365,000**	**100%**	**1.3%**

The building damage loss ratio shown in Table 14 is an indication of the community's ability to recover after an event. Building Damage Loss Ratio percent is calculated by taking the Building Structural Damage divided by Building Structural Value and then multiplying by 100. Loss ratio exceeding 10% are considered significant by FEMA. The area with the highest building damage loss ratio is Sheridan Lake.

Figure 3 Kiowa County Building Loss in the 100-year Floodplain



According to HAZUS-MH, the Town of Eads has the greatest flood risk and majority of the damage with $976,000. The map in Figure 3 displays the distribution of the flood loss by Census Block across the County. According to the map in Figure 1 the majority of potential flood impacts in the unincorporated County is located on Rush Creek which is in the center of Kiowa County.

Floodplain Population Information

Should a 1% chance flood occur in the county, some residences would become uninhabitable during and after the flood. Table 15 shows the number of residents in Kiowa County who would be displaced or need shelter.

Table 15 Population Displaced by Flooding

Jurisdiction	Displaced Population	Population Needing Shelter
Eads	58	10
Haswell	-	-
Sheridan Lake	29	3
Unincorporated	43	-
Total	130	13

Critical Facilities

Critical facilities in the floodplain were determined using GIS, by selecting all critical facilities that fell within the floodplain. There are no critical facilities in the floodplain in Kiowa County.

Kiowa County Scour Critical Bridges

Included with HSIP Gold data is a database of bridges called the National Bridge Inventory developed by the Federal Highway Administration. Within the bridge layer one of the attribute items is a "scour index", which is used to quantify the vulnerability of a bridge to scour during a flood. Bridges with scour index between 1 and 3 are considered "scour critical", or a bridge with a foundation element determined to be unstable for the observed or evaluated scour condition.

There is 1 scour critical bridge in Kiowa County. It is located on US 287 at the intersection of Kiowa Creek just south of the City of Eads. This is shown on Table 16.

Table 16 Scour Critical Bridges

Name	Owner	Stream	Near City
US 287	State Highway Agency	Kiowa Creek	Eads

NFIP Claims Analysis

Policies and Claims Information

Kiowa County does not participate in the NFIP.

Repetitive Loss Properties

There are no repetitive loss properties in Kiowa County.

Previous Occurrences

Previous occurrences of regional flooding can be found in Section 4.2.7 of the main plan. Flash flooding incidents affecting Kiowa County are reported below.

July 2, 1994 - Thunderstorms produced flash flooding in Eads (25 miles north of La Junta). Water up to 4 feet deep flooded the underpass at Colorado Highways 96 and 27 in the town.

August 2, 1994 - 1.75 inches of rain fell in the town of Brandon with minor flooding of rural roads and along Highway 96 between the towns of Brandon and Sheridan Lake.

July 1, 1998 - 1.43 inches of rain fell in one hour, causing flooding of Highway 96 and several roads in the town of Haswell.

August 9, 1998 - Slow moving thunderstorms produced heavy rain and hail 1/2 inch diameter in the vicinity of the town of Eads. Doppler radar estimated rainfall rates of 2 inches per hour. Several streets in Eads were flooded, closing them for approximately 1 hour until the flood waters receded, and a viaduct was flooded with several feet of water.

August 5, 1999 - Heavy rain caused flooding of low lying areas in rural Kiowa County. The dry wash of Wildhorse Creek flooded, but no significant property damage was reported.

May 24, 2005 - Flash flooding caused 1 foot of fast flowing water over portions of County Road 95.

July 10, 2005 - Heavy thunderstorm rains caused roadways to be covered by 1 foot of water with some washouts noted on side roads.

4.5 Severe Weather: Thunderstorms/Lightning/Hail Vulnerability Assessment

Thunderstorms producing winds, hail, and are a common occurrence in the County between early spring and late fall. Given the lightning statistics for Colorado and the region, the County is at risk and is vulnerable to the effects of lightning. Persons recreating or working outdoors during the months of April through September will be most at risk to lightning strikes.

Fortunately, there have been no incidents of death of injury associated with lightning in the County. In addition, hailstones are frequently thrown out miles in front of the storm producing them.

Thunderstorms can produce locally heavy rain and high winds, which may result in crop damage and localized flooding. Hail primarily causes crop damage. However, hailstorms in populated areas can cause significant damage to roofs, automobiles, trees and windows. Critical facilities and infrastructure will have the greatest consequences if damaged by a lightning strike. The greatest losses from lightning could result from secondary hazards, such as wildfire.

Table 17 Thunderstorm/Lightning/Hail Occurrences in Kiowa County

	Thunderstorm	Lightning	Hail
Events	28	0	224
Deaths/Injuries	0/0	0/0	0/0
Damage	$0	0	$500,000

Source: NCDC

4.6 Tornado Vulnerability Assessment

Kiowa County has been struck by a number of tornadoes in the past 65 years. Some of these tornadoes have caused large amounts of damage. A history of tornadoes in Kiowa County is shown in Table 18 and Figure 4. Two tornadoes in Kiowa County have produced damages in excess of $1 million dollars. One struck on October 17, 1971 and the other struck on May 18, 1977. These are described in greater detail in Section 4.2.11 of the main plan.

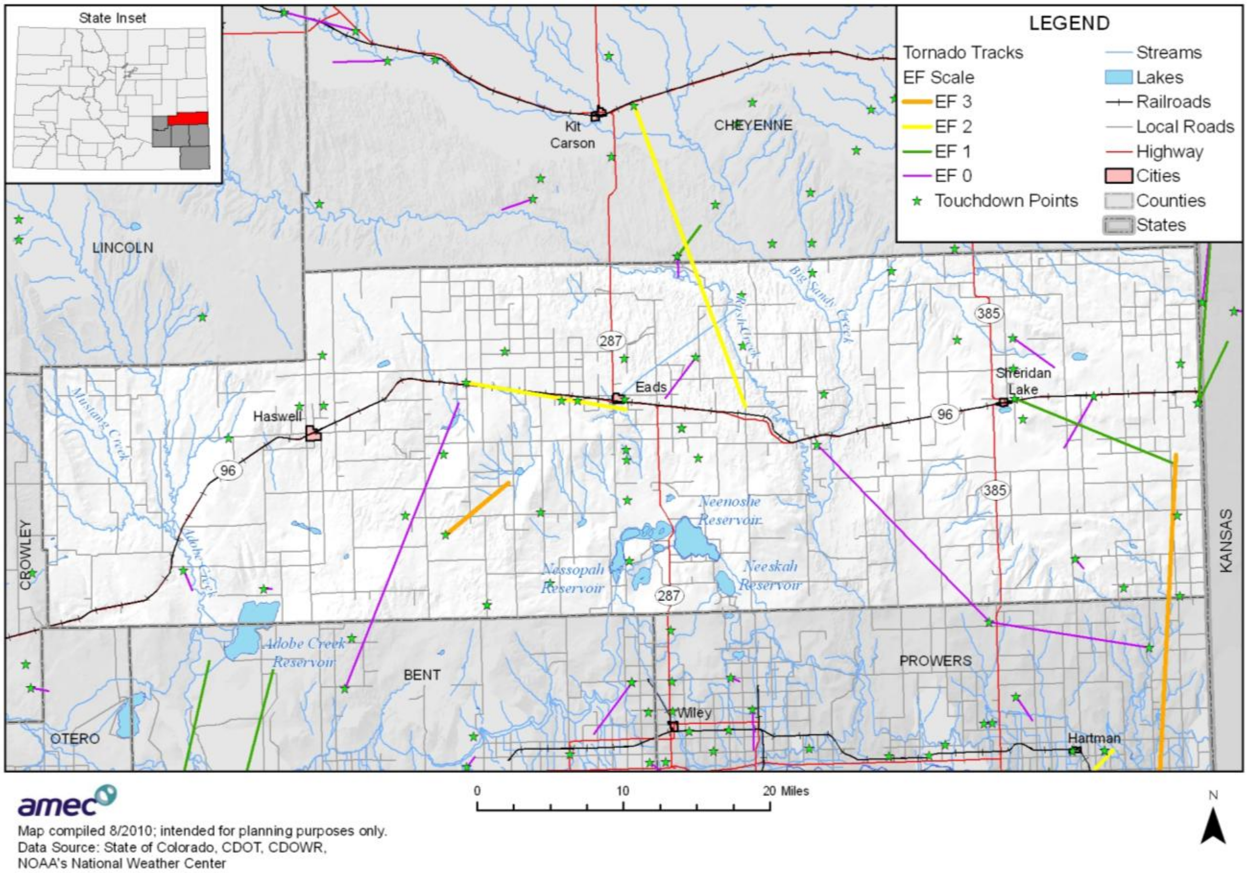
Table 18 Kiowa County Tornado History

Fujita Scale Ranking	Number of Tornadoes
F0	35
F1	15
F2	3
F3	1
Unknown*	1
Total	55

Source: NCDC

* A tornado struck Kiowa County in 1958. The magnitude of it is unknown.

**Figure 4	Kiowa County Tornadoes and Touchdowns**

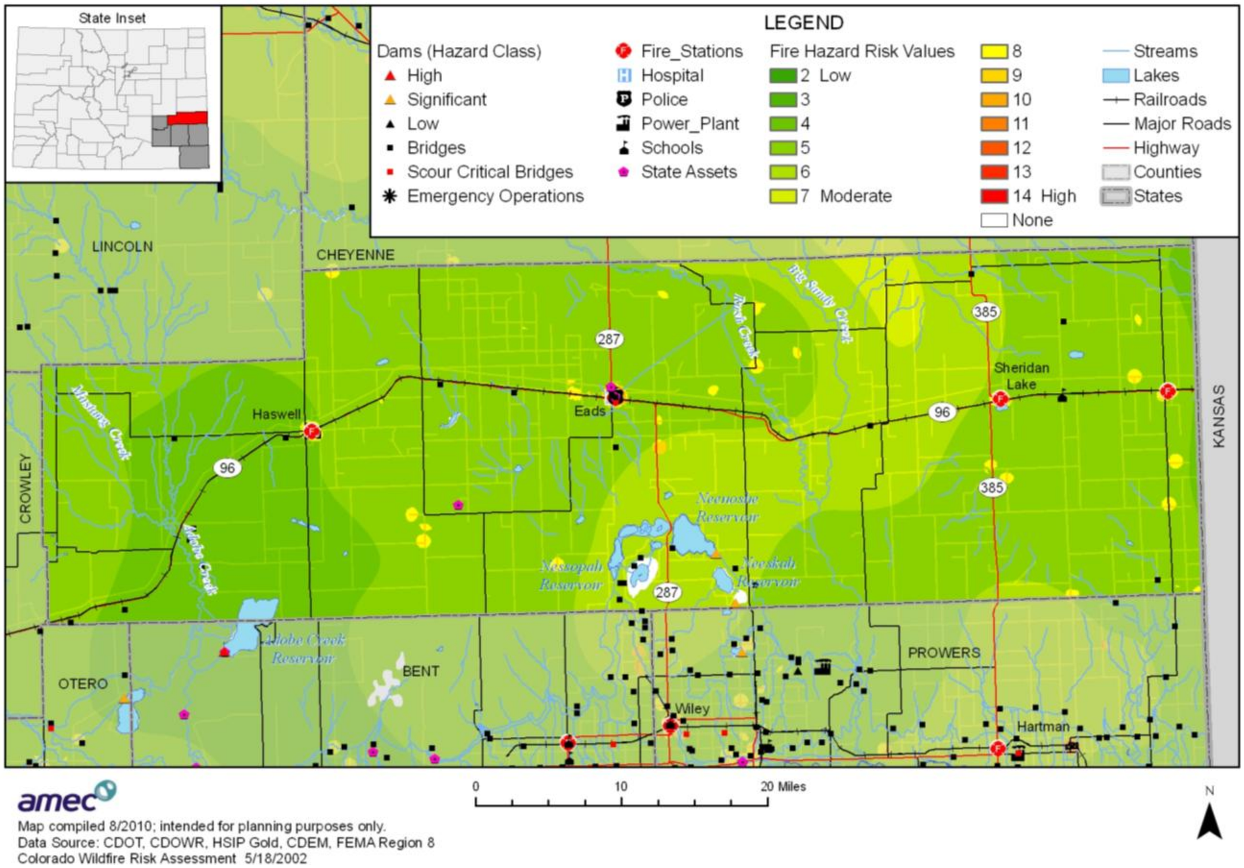


4.7 Wildfire Vulnerability Assessment

Kiowa County Wildland Urban Interface

The Wildland Urban Interface map for Kiowa County shows Low to High fire hazard risk values throughout the county. The majority of the county has lower values with the higher values around the communities of Eads, Haswell, and Sheridan Lake. Eads and Sheridan Lake have the highest fire risk in the county with values between moderate and high. Haswell's risk values are in the low to moderate range.

Figure 5 Kiowa County Wildland Urban Interface



Critical Facilities

There are 22 critical facilities in a moderate to high fire hazard in Kiowa County. The Town of Eads has 10 facilities: two bridges, one emergency operations center, one fire station, one hospital, one police station, three schools, and one state asset. The Town of Haswell has one facility: a fire station. The Town of Sheridan Lake has one facility: a fire station. The unincorporated county has 10 critical facilities in a moderate to high fire hazard: six bridges, one scour critical bridge, one fire station, and two state assets.

Table 19 Critical Facilities in the Moderate to High Wildfire Hazard Areas

Facility Type	Facility Count
Bridge	62
Communications	3
Fire Stations	4
Police	2
Power Plant	9
Schools	15

Facility Type	Facility Count
Scour Critical Bridge	2
State Assets	42
Waste Water Facility	2
Total	**141**

4.8 Wind Storm Vulnerability Assessment

The County is subject to potentially destructive straight-line winds. High winds are common throughout the planning area, throughout the entire year. Straight line winds are primarily a public safety and economic concern. Windstorm can cause damage to structures and power lines which in turn can create hazardous conditions for people. Debris flying from high wind events can shatter windows in structures and vehicles and can harm people that are not adequately sheltered.

Future losses from straight line winds include:

- Erosion (soil loss)
- Dry land farming seed loss,
- Wind blown weeds, such as tumbleweed
- Power line impacts and economic losses from power outages
- Occasional building damage, primarily to roofs

Campers, mobile homes, barns, and sheds and their occupants are particularly vulnerable as windstorm events in the region can be sufficient in magnitude to overturn these lighter structures. Livestock that may be contained in these structures may be injured or killed, causing economic harm to the rancher who owns both the structure and the livestock. Overhead power lines are vulnerable and account for the majority of historical damages. State highways can be vulnerable to high winds and dust storms, where high profile vehicles may be overturned by winds and lowered visibility can lead to multi-car accidents.

4.9 Winter Storm Vulnerability Assessment

The threat to public safety is typically the greatest concern when it comes to impacts of winter storms. But these storms can also impact the local economy by disrupting transportation and commercial activities. Winter storms are occasionally severe enough to overwhelm snow removal efforts, transportation, livestock management, and business and commercial activities. The region can experience high winds and drifting snow during winter storms that can occasionally isolate individuals and entire communities and lead to serious damage to livestock populations and crops. Travelers on highways in the County, particularly along remote stretches of road, can become stranded, requiring search and rescue assistance and shelter provisions.

Structural losses to buildings are possible and structural damage from winter storms in Colorado has resulted from severe snow loads on rooftops. Older buildings are more at risk, as are buildings with large flat rooftops (often found in public buildings such as schools). The County's elderly population is a potentially vulnerable demographic during severe winter storms. Smaller communities prevalent in the County may become isolated during winter storm events, Persons that choose to live in these areas are generally self-sufficient, or should be, as government and emergency services may be limited during a severe winter storm.

Another common impact of blizzards and severe winter storms on the planning area is the loss of power. The weight of heavy continued snowfall and/or ice accumulating on power lines often brings them to the ground causing service disruptions for thousands of customers. This can cause a loss of community water and sewer services, as well as the supply of gasoline, as these services almost always require electrical pumps. In addition, prolonged power outages can mean loss of food to grocery stores, large facilities that provide feeding services (such as prisons, hospitals and nursing homes), and restaurants.

4.10 Hazardous Materials Vulnerability Assessment

It is often quite difficult to quantify the potential losses from human-caused hazards. While the facilities themselves have a tangible dollar value, loss from a human-caused hazard often inflicts an even greater toll on a community, both economically and emotionally. The impact to identified assets will vary from event to event and depend on the type, location, and nature of a specific technological hazard event. There are no fixed facilities in Kiowa County. There are multiple transportation routes that transect the County. Natural gas and oil pipelines also run through the County. Table 20 shows the breakdown of gas transmission line and hazardous liquid line mileage in the County

Table 20 Gas Transmission Line and Hazardous Liquid Line Mileage

County	Gas Miles	Liquid Miles	Percentage of State Total
Kiowa	90	0	0.8%

Source: PHMSA

The US Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) tracks hazardous materials spills and occurrences. These incidents in the County are reported in Table 21.

Table 21 Hazardous Material Incidents in the Planning Area

Incident City	Incident County	Incident Route	Mode of Transportation	Failure Cause Description	Total Amount of Damages
Eads	Kiowa	US HWY 287 & Colorado 96	Highway	Rollover Accident	$50,734

Source: PHMSA Incident Reports Database

Critical Facilities at Risk

In order to identify those critical facilities at risk to a hazardous materials release within identified corridors, an analysis was performed using GIS software. The same buffer was applied to the population at risk. An intersect was performed between critical facilities and the transportation buffers. Table 22 details the critical facilities located within a transportation corridor that are at risk to transportation related hazardous materials releases.

Table 22 Facilities within the 1 mile of HAZMAT Transportation Corridor by Jurisdiction

Jurisdiction	Facility Type	Facility Count
Eads	Bridge	2
Eads	Emergency Operations	1
Eads	Fire Stations	1
Eads	Hospital	1
Eads	Police	1
Eads	Schools	3
Eads	State Assets	1
Haswell	Fire Stations	1
Sheridan Lake	Fire Stations	1
Unincorporated	Bridge	9
Unincorporated	Fire Stations	1
Unincorporated	Schools	2
Unincorporated	Scour Critical Bridge	1
Unincorporated	State Assets	2
Total		**27**

Source: HSIP Gold, CDEM, CDOT

Populations at Risk

To determine the populations at risk from a transportation-related hazardous materials release within identified transportation corridors, an analysis was performed using GIS. A one-mile buffer was applied to both sides of Highways 10, 50, 71, and 287, and the Atchison, Topeka, & Santa Fe (AT&SF) and the Victoria Southern & Towner Railroads, creating two-mile buffer zones around each corridor. US Census 2000 population data, aggregated by census block, was acquired from HAZUS-MH. An intersection was performed between the census data and the transportation buffers. If any part of the census block touched the transportation buffer zone, the entire block was included in the buffer zone. Table 23 shows populations within each jurisdiction that are at greatest risk to transportation-related hazardous materials releases. There are a total of 1,379 people in the County at risk to hazardous material incidents.

Table 23 Populations in Haz-Mat Buffer Zone in Kiowa County

Jurisdiction	Population
Unincorporated County	492
Eads	737
Haswell	84
Sheridan Lake	66
Total	**1,379**

Source: CDEM, CDOT, US Census Bureau

5 Kiowa County Capability Assessment

Thus far, the planning process has identified the hazards posing a threat to Kiowa County and described, in general, the vulnerability of the County to these risks. The next step is to assess what loss prevention mechanisms are already in place. This part of the planning process is the mitigation capability assessment. Combining the risk assessment with the mitigation capability assessment results in the County's "net vulnerability" to disasters and more accurately focuses the goals, objectives, and proposed actions of this plan.

The planning committee used a two-step approach to conduct this assessment for the County. First, an inventory of common mitigation activities was made through the use of a matrix in the AMEC distributed Data Collection Guide. The purpose of this effort was to identify policies and programs that were either in place, needed improvement, or could be undertaken, if deemed appropriate. Second, the HMPC reviewed existing policies, regulations, plans, and programs to determine if they contributed to reducing hazard-related losses or if they inadvertently contributed to increasing such losses.

This section presents the County's mitigation capabilities: programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This assessment is divided into three sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, and fiscal mitigation capabilities.

5.1 Kiowa County's Regulatory Mitigation Capabilities

Table 24 lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the County

Table 24 Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Y/N	Comments
General plan	No	

Regulatory Tool (ordinances, codes, plans)	Y/N	Comments
Zoning ordinance	Yes	Covers Kiowa County; Town of Eads does not have zoning
Subdivision ordinance	Unknown	
Growth management ordinance	No	
Floodplain ordinance	No	
Other special purpose ordinance (stormwater, steep slope, wildfire)	Fire Ban	Approved in 2009
Building code	No	Version:
BCEGS Rating	No	
Fire department ISO rating		Rating:
Erosion or sediment control program	No	
Stormwater management program	Limited	Limited, within the Town of Eads
Site plan review requirements	No	
Capital improvements plan	Unknown	
Economic development plan	Yes	County entities formed the Kiowa County Economic Development Foundation (approximately 2001)
Local emergency operations plan	Yes	In Annex format, currently being revised to ESF format
Other special plans	Unknown	
Flood insurance study or other engineering study for streams	No	
Elevation certificates	Unknown	
Other		

5.2 Kiowa County's Administrative/Technical Mitigation Capabilities

Table 25 identifies the County personnel responsible for activities related to mitigation and loss prevention in the County.

Table 25 Administrative/Technical Regulatory Tools

Personnel Resources	Yes/No	Department/Position	Comments
Planner/Engineer with knowledge of land development/land management practices	No		
Engineer/Professional trained in construction practices related to buildings and/or infrastructure	No		
Planner/Engineer/Scientist with an understanding of natural hazards	No		
Personnel skilled in GIS	No		

Personnel Resources	Yes/No	Department/Position	Comments
Full time building official	No		
Floodplain Manager	No		
Emergency Manager	Yes	KC Division of Emergency Mgmnt	Full-time position
Grant writer	Partial	Kiowa County Economic Development Foundation, Kiowa County Division of Emergency Mgmnt	Both positions have grant writing responsibilities, neither have professionally trained grant writers.
Other personnel	N/A		
GIS Data – Hazard areas	No		
GIS Data - Critical facilities	No		
GIS Data – Building footprints	No		
GIS Data – Land use	No		
GIS Data – Links to Assessor's data	No		Has been considered but no active plan or budget to accomplish
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	Yes		Outdoor sirens in Eads, Haswell and Sheridan Lake, Reverse telephone alert serving the entire county (includes text and email capability).
Other			

5.3 Kiowa County's Fiscal Mitigation Capabilities

Table 26 identifies financial tools or resources that the City could potentially use to help fund mitigation activities.

Table 26 Fiscal Regulatory Tools

Financial Resources	Accessible/Eligible to Use	Comments
Community Development Block Grants	N	
Capital improvements project funding	N	
Authority to levy taxes for specific purposes	Y	With voter approval
Fees for water, sewer, gas, or electric services	Y	Franchise fees paid within and to the Town of Eads
Impact fees for new development	N	
Incur debt through general obligation bonds	Y	
Incur debt through special tax bonds	Y	
Incur debt through private activities	N	

Financial Resources	Accessible/Eligible to Use	Comments
Withhold spending in hazard prone areas	Y	
Other		

5.4 Additional Capabilities in Kiowa County

Members of the planning team note that StormReady status for the County is pending – the plan is expected to be submitted for review by the end of June, 2010. Kiowa County Department of Emergency Management KCDEM has distributed citizen preparedness guides for the past two years covering severe weather, pandemics, earthquakes and fires. The material is also available on the KCDEM and regional web site, and elements are reviewed periodically in local media. The County completed a Community Wildfire Protection Plan (CWPP) in 2007 to mitigate wildfire in the County.

The Town of Eads has been working for the past 15 years to improve storm water drainage and reduce urban flooding.

All counties in the planning area make the 211 system available to citizens within each county. The system guides citizens to appropriate agencies and organizations, including disaster resources and assistance. The system ensures that citizens can access timely and accurate information about what is happening in their community.

6 Kiowa County Mitigation Actions

After reviewing the goals of the Southeast Colorado Regional Hazard Mitigation Plan, Kiowa County has adopted the following mitigation actions to reduce their risk to the hazards identified above.

Action Item #1 Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program

Hazards Addressed: All

Issue/Background: The County and each jurisdiction are subject to several natural hazards. Each poses a different degree of risk and associated vulnerability. Some hazards have a combination of attributes, including a high likelihood of occurrence, a specific location that would likely be impacted, and proven approaches that could reduce the impact. For other hazards, where either the likelihood of occurrence is very low, the area of likely impact is not specifically known, or there is very little that can be done to reduce the impacts, the HMPC has determined that the best approach is public awareness. Citizens should have information describing historical events and losses, the likelihood of future occurrences, the range of possible impacts, appropriate actions to save lives and minimize property damage, and where additional information can be found. Any information provided through this effort should be accurate, specific, timely, and consistent with current and accepted local emergency management procedures as promoted by the Southeast Colorado All Hazards Region (SECAHR), Colorado Department of Emergency Management (CDEM) and the American Red Cross. Following a disaster event, there should be extra efforts to provide the public with information about disaster preparedness and mitigation measures. This public outreach effort will be conducted annually and will include:

- Using a variety of information outlets, including local news media;
- Creating and printing (where applicable) brochures, leaflets, water bill inserts, and public service announcements;
- Posting all information to the SECAHR website;
- Displaying current brochures and flyers in County office buildings, city halls, libraries, and other public places; and
- Developing public-private partnerships and incentives to support public education activities.

Other Alternatives: Continue public information activities currently in place.

Responsible Office: Kiowa County Emergency Management

Priority (High, Medium, Low): High

Cost Estimate: Staff time, printing costs for literature.

Benefits (avoided Losses): Life safety, reduction in property losses, relatively low cost

Potential Funding: State Hazard Mitigation Program grants, county and jurisdiction funds, other available grants

Schedule: Ongoing – part of seasonal multi-hazard public awareness campaign.

Action Item #2 Community Wildfire Protection Plans

Issue/Background: Wildfire is an issue in the County. The intent is to minimize risk and vulnerability from wildfire hazard.

- Implement CWPP’s for Kiowa County.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which project will be implemented:

Basically three meetings per county –

- 1st Meeting – Wildfire Mitigation Assessment mapping exercise (circling areas for values, risks & fuels) to identify areas of concern).
- 2nd Meeting – Review mapping overlays; review FireWise mitigation potentials; start looking at overall goals for a five year plan.
- 3rd Meeting – Review/complete goals; review draft plan; determine annual workplan (identify persons responsible/ tasks/benchmark dates to complete assignments/projects.

Responsible Office: Kiowa County Fire Department

Priority (High, Medium, Low): High

Cost estimate: Low to high cost depending upon in-kind and actual expenses – mileage/per diem/in-kind hours/ administrative copying costs, etc/ CWPP plan copying costs.

Benefits (avoided Losses): Mitigating wildfire hazards within a county by identifying /prioritizing areas of concern, then mechanisms to implement mitigation.

Potential funding: Federal/State grant options?

Schedule:

- Three meetings per county to create plan.
- Schedule according to each annual workplan for implementing projects.
- Update meetings according to each county's schedule

Action Item #3 CWPP Projects as identified by the County's CWPP

Issue/Background: Wildfire is an issue in the County. The intent is to minimize risk and vulnerability from wildfire hazard. Projects can include mitigating risk, access, water supply, structure construction design & materials, defensible space, trees & shrubs (landscapes), interior design, & 'What to do when… (evacuation needs) .

Other Alternatives: No action.

Existing Planning Mechanism(s) through which project will be implemented: The County's CWPP. Types of projects include:

- Risk (Landowner Awareness)
- Access (ingress/egress; widths/turnarounds/ culverts; signage (High/med/low fire danger; CR/street signages)
- Water supply
- Construction design & materials,(building codes, ordinances)
- Defensible space (Fuels mgmt, establishing living fuel breaks (grass) – riverbottom & community),

- Trees & shrubs,
- Interior safety
- What to do when
- Other
  - Hazards – Power lines/trees/brush breakage (Tree Line USA, NADF)
  - County Fire Bans & Controlled Burn Ordinances
  - Ag Hazards – wildfire
  - Drought – fire hazards

Responsible Office: Kiowa County Fire Department

Priority (High, Medium, Low): Medium

Cost estimate: Per project

Benefits (avoided Losses): Protect homes, homesteads, structures, values from potential wildfires until fire services can arrive. Protecting homes can be maximized when fire service arrives. Protect Firefighter safety during suppression operations.

Potential funding: Federal/State grant options?

Schedule: Schedule according to each CWPP annual workplan for implementing projects.

Action Item #4 Firewise Outreach Message to appropriate audiences within the County CWPP Plan

Issue/Background: Wildfire is an issue in the County. The intent is to minimize risk and vulnerability from wildfire hazard.

- Homeowners, landowners and other property owners need to have an awareness of vulnerability to wildfire hazards.
- Each property owner needs to take responsibility for mitigating potentials for catastrophic damage to their own properties – protect their own properties from wildfire.
- Support safety to firefighters during suppression by mitigation of fuels and implementing other FireWise suggestions.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which project will be implemented: Educating publics on risk, access, water supply, construction design & materials, defensible space, trees & shrubs, interior safety & 'What to do when…' – tools to mitigate.

Responsible Office: Kiowa County Fire Department

- Educational outreach from local VFD's to assess homesites and give recommendations.
- Media news releases; Fair booths (w/other entities);
- Firewise prevention messages for schools.

Priority (High, Medium, Low): Medium

Cost estimate: To be determined

- Pamphlets/handout costs
- Firewise Educational material for schools
- Low to high cost depending upon in-kind and actual expenses – mileage/per diem/in-kind hours/ administrative copying costs, etc.

Benefits (avoided Losses): Protect homes, homesteads, structures, values from potential wildfires until fire services can arrive. Protecting homes can be maximized when fire service arrives. Protect Firefighter safety during suppression operations.

Potential funding: Federal/State grant options?

Schedule:

- Schedule according to each CWPP annual workplan for implementing projects.
- Update meetings according to each county's schedule.

Action Item #5 Eads/Kiowa County Fire Protection District

Issue/Background: Eads/Kiowa County Fire Department runs on very limited budget. With a fire protection district we would generate money from a tax increase to fund the fire department. This would help the county out because they would not have to have a budget line item for the fire department. I have seen other departments with modern firefighting equipment due to the fact they have become a protection district.

Other Alternatives: No action

Existing Planning Mechanism(s) through which project will be implemented: Chief Jay Haase and I would start by contacting other departments who have went through the process of switching to a fire district. We have spoke with our county commissioners and they are on-board with us about starting a district and said they would support us in doing so. The last step would be to make it public and try to get the proposal on a ballot for a vote of the people.

Responsible Office: Eads/Kiowa County Fire Department

Priority (High, Medium, Low): Medium

Cost Estimate: Unknown at this time

Benefits (avoided Losses): Would be better equipment, fire fighter PPE and fire trucks from the expanded budget that the district would have compared to the county budget we are using now.

Potential funding: A percentage of taxes from the Kiowa County residents.

Schedule: Within two years we would like to have the necessary paper work generated to present to whomever we choose to oversee this project. Next we would need another year or two depending on the election status to put this on a ballot.

Action Item #6 Eads Maine Street Drainage Improvements

Issue/Background: Addresses flooding of buildings on Maine Street.

Other Alternatives: No action

Existing Planning Mechanism(s) through which project will be implemented: In 2005, the Town had GMS Engineering do a preliminary engineering evaluation for Main Street Hardscape, Street and Drainage Improvements.

Responsible Office: Town of Eads

Priority (High, Medium, Low): Medium

Cost Estimate: $300,000

Benefits (avoided Losses): If drainage was improved, water damage to buildings would stop and street improvements could be started. As of now, it street improvements were made without drainage improvements, the flooding would spread to more buildings and homes.

Potential funding: A percentage of taxes from the Kiowa County residents.

Schedule: Within five years.

Otero County Planning Element

1 Otero County Planning Committee

The following entities participated in the DMA planning process through the Otero County Planning committee. More details on the planning process followed and how the County, municipalities and stakeholders participated can be referenced in Chapter 3 of the base plan. Additional details on what local government departments participated and who represented them are listed in Appendix B.

- Otero County
- City of La Junta
- North La Junta Conservancy District

2 Otero County Profile

Otero County is located in the southeastern region of the State in the high plains and is primarily agricultural. The land area of the County is 1,270 square miles, with 7 square miles of water. According to the 2000 U.S. Census, the population for the County was 20,311. The 2010 population estimate from the Department of Local Affairs is 19,014. The estimated average density for the County is 15 people per square mile. The County shrunk at a rate of 6.4% between 2000 and 2010. There are 8,813 housing units in the County. The median age in the County is 37.7 years. 6.5% of the population is under the age of 5 and 16.5% of the population is over the age of 65. The average household size is 2.49, and the average family size is 3.04. 75.7% of the population over the age of 25 holds at least a high school degree and 15.4% hold a bachelors level degree or higher. 24.8% of the population (over age 5) holds disability status, and 21.9% speak a language other than English in the home. 14.2% of all families live below the poverty level, and 18.8% of individuals live below poverty level. The County is a rural county located on the southeastern plains of Colorado. The largest city in the County is La Junta. The County is typical of the mid-western plains, with a rural orientation and solid agricultural basis. The Census of Agriculture reports 569 farms in the County with 624,123 total acres of farmland. The average farm size is 1,097 acres. A base map of the County can be referenced in Figure 2.

3 Hazard Identification and Summary

Otero County's planning team identified the hazards that affect the County and summarized their geographic extent, probability of future of occurrence, potential magnitude, and significance specific to the County. This information is presented in Table 1. A detailed description of each hazard can be found in Section 4.2 Hazard Profiles of the main plan.

Table 1 Otero County Hazard Summary

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/Severity	Significance
Agriculture Infestation	Significant	Likely	Critical	Medium
Dam/Levee Failure	Limited	Occasional	Limited	Medium
Drought	Extensive	Likely	Catastrophic	High
Earthquake	Limited	Unlikely	Negligible	Low
Extreme Temperatures: Heat	Extensive	Highly Likely	Catastrophic	High
Extreme Temperatures: Cold	Extensive	Highly Likely	Catastrophic	High
Flood: 100/500 –Year	Limited	Occasional	Catastrophic	Medium
Flood: Stormwater/Flash Flooding	Significant	Likely	Critical	High
Severe Weather: Thunderstorms/Lightning/Hail	Extensive	Highly Likely	Catastrophic	High
Stream Bank Erosion/ Stability	Limited	Likely	Significant	Medium
Subsidence	Limited	Unlikely	Negligible	Low
Tornadoes	Extensive	Likely	Catastrophic	High
Wildfire	Limited	Likely	Limited	Medium
Wind Storms	Extensive	Highly Likely	Critical	Medium
Winter Storms	Extensive	Highly Likely	Catastrophic	High
Civil Unrest	Limited	Likely	Catastrophic	High
Cyber Hazards	Limited	Occasional	Negligible	Low
Hazardous Materials	Significant	Likely	Critical	Medium
Pandemic	Significant	Occasional	Limited	Medium

Geographic Extent
Limited: Less than 10% of planning area
Significant: 10-50% of planning area
Extensive: 50-100% of planning area

Probability of Future Occurrences
Highly Likely: Near 100% chance of occurrence in next year, or happens every year.
Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less.
Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Magnitude/Severity
Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths
Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability
Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability
Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid

Significance
Low: minimal potential impact
Medium: moderate potential impact
High: widespread potential impact

Table 2 City of La Junta Hazard Summary

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/Severity	Significance
Agriculture Infestation	Limited	Occasional	Catastrophic	High
Dam/Levee Failure	Significant	Likely	Critical	Medium
Drought	Extensive	Likely	Catastrophic	Medium
Earthquake	Extensive	Unlikely	Catastrophic	High
Extreme Temperatures: Heat	Extensive	Highly Likely	Catastrophic	Medium
Extreme Temperatures: Cold	Extensive	Highly Likely	Catastrophic	Medium
Flood: 100/500 –Year	Significant	Occasional	Critical	Medium
Flood: Stormwater/Flash Flooding	Significant	Likely	Limited	Medium
Severe Weather: Thunderstorms/Lightning/Hail	Extensive	Highly Likely	Catastrophic	Medium
Stream Bank Erosion/ Stability	Significant	Occasional	Limited	Low
Subsidence	Limited	Unlikely	Negligible	Low
Tornadoes	Extensive	Likely	Critical	Medium
Wildfire	Significant	Likely	Critical	Medium
Wind Storms	Extensive	Likely	Critical	Medium
Winter Storms	Extensive	Likely	Critical	Medium
Civil Unrest	Limited	Occasional	Negligible	Low
Cyber Hazards	Extensive	Unlikely	Limited	Medium
Hazardous Materials	Significant	Highly Likely	Catastrophic	Low
Pandemic	Extensive	Occasional	Catastrophic	Low

Geographic Extent
Limited: Less than 10% of planning area
Significant: 10-50% of planning area
Extensive: 50-100% of planning area

Probability of Future Occurrences
Highly Likely: Near 100% chance of occurrence in next year, or happens every year.
Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less.
Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Magnitude/Severity
Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths
Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability
Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability
Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid

Significance
Low: minimal potential impact
Medium: moderate potential impact
High: widespread potential impact

3.1 Disaster Declaration History

One method the planning committee used to identify hazards was the researching of past events that triggered federal and/or state emergency or disaster declarations in the planning area. Federal and/or state disaster declarations may be granted when the severity and magnitude of an

event surpasses the ability of the local government to respond and recover. Disaster assistance is supplemental and sequential. When the local government's capacity has been surpassed, a state disaster declaration may be issued, allowing for the provision of state assistance. Should the disaster be so severe that both the local and state governments' capacities are exceeded, a federal emergency or disaster declaration may be issued allowing for the provision of federal assistance.

The federal government may issue a disaster declaration through FEMA, the U.S. Department of Agriculture (USDA), and/or the Small Business Administration (SBA). FEMA also issues emergency declarations, which are more limited in scope and without the long-term federal recovery programs of major disaster declarations. The quantity and types of damage are the determining factors. Federal, state, and USDA disaster declarations for the County are listed in Table 3.

Table 3 Otero County Disaster and Emergency Declarations, 1955-2010

Year	Declaring Jurisdiction	Disaster Type
2009	State of Colorado*	Severe Blizzard
2009	State of Colorado*	Severe Spring Snowstorm
2008	USDA – Secretarial Designation (S2750)	Drought
2007	Federal – Emergency (3271-EM, 3270-EM)	Snow
2006	State of Colorado	Snow
2006	USDA – Secretarial Designation (S2351)	Heat, high winds, drought
2005	Federal – Emergency (3224-EM)	Hurricane Katrina Evacuation
2005	USDA – Secretarial Designation (S2188)	Drought, Wind, Heavy Rain, Hail
2003	USDA – Secretarial Designation (S1843)	Drought, Insects
2002	State of Colorado*	Snow Emergency
2002	State of Colorado*	Drought
2002	State of Colorado*	WIldfires
2002	USDA – Secretarial Designation (S1643)	Drought
2001	Federal – Major Disaster (1374-DR)	Severe Winter Storms
2001	USDA – Secretarial Designation (S1514)	Drought
1999	Federal – Major Disaster (1276-DR)	Flooding
1999	State of Colorado	Flooding, Landslides, Mudslides
1997	Federal – Emergency	Heavy Flash Flooding
1997	State of Colorado	Flooding
1977	Federal – Major Disaster	Drought
1965	Federal – Major Disaster (200-DR)	Tornadoes, Severe Storms, and Flooding
1955	Federal – Major Disaster (33-DR)	Flood and Tornado

Source: Colorado State Hazard Mitigation Plan; Colorado Governor's Office website, Federal Emergency Management Agency, PERI Presidential Disaster Declaration Site; U.S. Department of Agriculture.
*All counties in the state were proclaimed disaster areas by the Governor.

3.2 National Severe Weather Databases

The National Oceanic and Atmospheric Administration's National Climatic Data Center (NCDC) has been tracking severe weather since 1950. Their Storm Events Database tracks severe weather events on a county basis and contains data on the following: all weather events from 1993 to current (except from 6/1993-7/1993); and additional data from the Storm Prediction Center, which includes tornadoes (1950-1992), thunderstorm winds (1955-1992), and hail (1955-1992). This database contains 275 severe weather events that occurred in Otero County between January 1, 1950, and April 31, 2010. Table 4 summarizes these events.

Table 4 NCDC Hazard Events Report for Otero County

Type	# of Events	Property Loss ($)	Crop Loss ($)	Deaths	Injuries
Blizzard	4	0	0	0	0
Flash Flood	8	50,000	0	0	0
Flood	1	0	0	0	0
Funnel Cloud	4	0	0	0	0
Hail	132	70,000	0	0	0
High Wind	13	100,000	0	0	0
Ice Storm	1	0	0	0	0
Lightning	6	67,000	0	2	0
Thunderstorm Winds	79	202,000	0	0	0
Tornado	19	162,000	0	0	0
Wildfire/Forest Fire	2	0	0	0	0
Windstorm	1	1,000	0	0	0
Winter Storm	5	0	0	0	0
Totals	**275**	**652,000**	**0**	**2**	**0**

Source: NCDC

The HMPC supplemented NCDC data with data from SHELDUS (Spatial Hazard Events and Losses Database for the United States). SHELDUS is a county-level data set for the United States that tracks 18 types of natural hazard events along with associated property and crop losses, injuries, and fatalities for the period 1960-2005. Produced by the Hazards Research Lab at the University of South Carolina, this database combines information from several sources (including the NCDC). From 1960 to 1995, only those events that generated more than $50,000 in damage were included in SHELDUS. For events that covered multiple counties, the dollar losses, deaths, and injuries were equally divided among the affected counties (e.g., if four counties were affected, then a quarter of the dollar losses, injuries, and deaths were attributed to each county). From 1995 to 2005, all events that were reported by the NCDC with a specific dollar amount are included in SHELDUS.

SHELDUS contains information on 143 severe weather events that occurred in Otero County between 1960 and 2009. Table 5 summarizes these events.

Table 5 SHELDUS Hazard Events for Otero County,1960-2009

Hazard	Number	Injuries	Fatalities	Property Damage	Crop Damage
Drought	1	0	0	0	943,396.20
Flooding	3	0	0	481,818.2	327,272.70
Flooding - Hail - Lightning - Severe Storm/Thunder Storm	1	0	0	250	250,000
Flooding - Severe Storm/Thunder Storm	1	0	0	5,000	0
Flooding –Severe Storm/Thunder Storm – Winter Weather	1	0	0	793.65	0
Fog – Winter Weather	1	0	0	22,727.27	0
Hail	15	0	0	634,600	5,161,667
Hail - Lightning - Wind	1	0	0	1,562.50	15,625
Hail - Severe Storm/Thunder Storm	6	0	0	2,504.47	13,589.75
Hail - Severe Storm/Thunder Storm - Tornado	2	0	0	62,833.33	62,833.33
Hail - Severe Storm/Thunder Storm – Wind	5	0	0	5,651.85	38,518.52
Hail - Severe Storm/Thunder Storm - Winter Weather	1	0	0	1,923.08	0
Hail - Wind	3	0	0	5,300	80,000
Lightning	7	1.1	2	17,050	0
Lightning - Severe Storm/Thunder Storm	1	.07	0	172.41	0
Lightning – Wind	1	0	0	172.41	0
Severe Storm/Thunder Storm	7	0	.08	84,960.32	50,166.67
Severe Storm/Thunder Storm – Wind	4	0	0	200,000	0
Severe Storm/Thunder Storm - Wind - Winter Weather	1	0	0	79.37	0
Tornado	7	0	0	127,974.80	0
Wind	35	5.37	0	1,266,648	241,033.50
Wind - Winter Weather	10	.06	.18	211,079.20	184,696.10
Winter Weather	29	.79	.98	1,2447,282	97,932.32
Totals	**143**	**7.39**	**3.24**	**15,580,382.86**	**7,466,731.09**

Source: SHELDUS, Hazards Research Lab, University of South Carolina, www.sheldus.org/
Events may have occurred over multiple counties, so damage may represent only a fraction of the total event damage and may not be specific to Otero County.

The NCDC and SHELDUS tables above summarize severe weather events that occurred in Orange County. Only a few of the events actually resulted in state and federal disaster declarations. It is interesting to note that different data sources capture different events during the same time period, and often different information specific to the same events. While the HMPC recognizes these inconsistencies, it is the value this data provides in depicting the County's "big picture" hazard environment.

4 Otero County Vulnerability Assessment

The intent of this section is to assess the County's vulnerability separate from that of the planning area as a whole, which has already been assessed in Section 4.3 Vulnerability Assessment in the main plan. This vulnerability assessment analyzes the population, property, and other assets at risk to hazards ranked of medium or high significance that may vary from other parts of the planning area. For more information about how hazards affect the region as a whole, see Chapter 4 Risk Assessment in the main plan.

4.1 Assets at Risk

This section identifies the County's assets at risk, including values at risk, critical facilities and infrastructure, historic assets, economic assets, and growth and development trends. The data source used was the HAZUS-MR4 databases. The HAZUS building exposure (includes building counts, value of building structure and contents) is shown in Table 6. A breakdown of the building count by type can be found in Table 7.

Table 6 Otero County Building Exposure

City	Population	Building Count	Building Exposure ($)	Building Content ($)	Total Exposure
Cheraw	207	153	12,962,000	8,260,000	21,222,000
Fowler	1,207	914	87,819,000	55,733,000	143,552,000
La Junta	7,567	3,877	527,244,000	391,642,000	918,886,000
Manzanola	539	347	33,915,000	23,489,000	57,404,000
Rocky Ford	4,283	2,488	219,403,000	134,458,000	353,861,000
Swink	696	399	37,346,000	22,787,000	60,133,000
Unincorporated	5,812	3,925	365,253,000	234,157,000	599,410,000
Total	**20,311**	**12,103**	**1,283,942,000**	**870,526,000**	**2,154,468,000**

Table 7 Otero County Building Exposure by Type

Occupancy Type	Building Count	Value ($)
Agriculture	48	6,577,000
Commercial	43	13,863,000
Education	5	4,841,000
Government	8	2,199,000
Industrial	12	2,553,000
Religion	5	2,232,000

Occupancy Type	Building Count	Value ($)
Residential	1,353	38,385,000
Total	**1,474**	**70,650,000**

Critical Facilities and Infrastructure

An inventory of critical facilities in Otero County is provided below in Table 8. The table includes data from available national and statewide GIS resources (locations are illustrated in Figure 2) supplemented with information from the County planning committee.

Table 8 Critical Facilities Inventory

Facility Type	Facility County
Airport	1
Bridges	183
Bridges – Scour Critical	16
Communications Facility	3
Dams	9
Emergency Operations Center	1
Fire Stations	6
Health Facility	1
Police	6
Power Plants	15
Schools	21
State Assets	72
Waste Water Facilities	2
Total	**336**

Locally Determined Facilities

In addition to the critical facilities mapped in GIS, the Bent Old Fort Historic District, in their Data Collection Guides, identified the following assets as important to the community. These assets include critical facilities and infrastructure; natural, cultural, and historical assets; and economic assets.

Table 9 Bent's Old Fort Historic District Asset Inventory

Name of Asset	Type	Replacement Value	Occupancy/ Capacity #	Comments
BEOL	Public	N/A	N/A	
Reconstructed Fort	Public	$13,091,464.48	N/A	
Maintenance Facility	Public	$1,464,688.77	N/A	
Administration Building	Public	$1,274,783,52	N/A	
Bally/Lester Building	Public	$240,237.01	N/A	
Museum Collection	Public	$164,822.01	N/A	
Restroom/Parking Lot	Public	$288,711.36	N/A	
Hazmat Storage Building	Public	N/A	N/A	

Historic and Natural Assets

Assessing the vulnerability of Otero County to disaster also involves inventorying the historic, cultural, and natural assets of the area. This step is important for the following reasons:

- The community may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.
- If these resources are impacted by a disaster, knowing so ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts are higher.
- The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.
- Natural resources can have beneficial functions that reduce the impacts of natural hazards, for example, wetlands and riparian habitat help absorb and attenuate floodwaters.

Historic Assets

The County has a stock of historically significant homes, public buildings, and landmarks. To inventory these resources, the planning committee collected information from a number of sources. The Colorado Historical Society's (CHS) Colorado State Register of Historic Properties was the primary source of information. The CHS is responsible for the administration of federally and state mandated historic preservation programs to further the identification, evaluation, registration, and protection of Colorado's irreplaceable archaeological and historical resources.

In addition, the National Register of Historic Places database was used. The National Register of Historic Places is the Nation's official list of cultural resources worthy of preservation. The National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect historic and archeological resources. Properties listed include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archeology, engineering, and culture. The National Register is administered by the National Park Service, which is part of the U.S. Department of the Interior.

Historical resources included in the programs above are identified in Table 10.

Table 10 Otero County Historic Properties

Property	Location	National Register	State Register
Bent's Old Fort National Historic Site	Colo. Hwy. 194, northeast of La Junta	National Historic Landmark 12/19/1960, National Register 10/15/1966	5OT.149
Elks Lodge #701	119 Colorado Ave., La Junta	-	5OT.548
Dr. Frank Finney House	608 Belleview Ave., La Junta	5/17/1984	5OT.102
Wilson A. Hart House	802 Raton Ave., La Junta	5/31/1979	5OT.96
Kit Carson Hotel	123 Colorado Ave., La Junta	-	5OT.468
Koshare Kiva Museum	115 W. 18th St., La Junta	-	5OT.550
La Junta City Park	Colorado Ave. and 10th St., La Junta	4/24/2007	5OT.937
La Junta Post Office	4th & Colorado Ave., La Junta	7/12/1976	5OT.94
Lincoln School	300 block W. 3rd St., La Junta	9/13/1978	5OT.95
North La Junta School (North School)	Colo. Hwy. 109 & 194 (Main & Trail), La Junta	6/25/1992	5OT.276
Eugene Rourke House	619 Carson St., La Junta	5/9/1983	5OT.175
San Juan Avenue Historic District	501-521 & 522 San Juan Ave., La Junta	8/27/1980	5OT.97
Daniel Sciumbato Grocery Store	706 Second St., La Junta	5/17/1984	5OT.91
St. Patrick's Catholic Church	7th & Raton, La Junta	-	5OT.709
Vogel Canyon	Comanche National Grasslands	-	5OT.551
Santa Fe Railway Manzanola Depot	212 N. Grand Manzanola	28/2004	5OT.421

Property	Location	National Register	State Register
Adobe Stables, Arkansas Valley Fairgrounds	800 N. 9th St.	12/26/2007	5OT.478
Art Building	Arkansas Valley Fairgrounds	9/27/1996	5OT.457
Carnegie Public Library (Rocky Ford Historical Museum)	1005 Sycamore St. Rocky Ford	11/7/1995	5OT.193
Grand Theatre	405 S. Main St. Rocky Ford	-	- -5OT.577
Rocky Ford Post Office	401 N. 9th St. Rocky Ford	1/16/2008	5OT.935
Vroman School	14519 W. Hwy. 50, Rocky Ford vicinity	-	5OT.557

Source: Colorado State Register of Historic Properties

Natural Assets

Natural resources are important to include in benefit-cost analyses for future projects and may be used to leverage additional funding for mitigation projects that also contribute to community goals for protecting sensitive natural resources. Awareness of natural assets can lead to opportunities for meeting multiple objectives. For instance, protecting wetlands areas protects sensitive habitat as well as stores and reduces the force of floodwaters.

Information from the U.S. Fish and Wildlife Service and the Colorado Division of Wildlife, a program that inventories the status and locations of rare plants and animals in Colorado, was combined to create an inventory of special-status species in Otero County. Table 11 lists national and state endangered, threatened, rare, and candidate species in the County by species type.

Table 11 Sensitive Plant and Animal Species in the Planning Area

Group	Name	Population	Status	Lead Office	Recovery Plan Name	Recovery Plan Stage
Birds	Arctic peregrine Falcon (Falco peregrinus tundrius)		Recovery			
Birds	Mountain plover (Charadrius montanus)		Proposed Threatened			
Birds	Piping Plover (Charadrius melodus)	except Great Lakes watershed	Threatened	Office Of The Regional Director	Piping Plover Atlantic Coast Population Revised Recovery Plan	Final Revision 1

Group	Name	Population	Status	Lead Office	Recovery Plan Name	Recovery Plan Stage
Birds	Piping Plover (Charadrius melodus)	except Great Lakes watershed	Threatened	Office Of The Regional Director	Great Lakes & Northern Great Plains Piping Plover	Final
Birds	Least tern (Sterna antillarum)	interior pop.	Endangered	Columbia Ecological Services Field Office	Least Tern (Interior Pop.)	Final
Fishes	Arkansas darter (Etheostoma cragini)		Candidate	Kansas Ecological Services Field Office		
Mammals	Black-footed ferret (Mustela nigripes)	U.S.A. (specific portions of AZ, CO, MT, SD, UT, and WY)	Experimental Population, Non-Essential	Office Of The Regional Director		

Source: US Fish and Wildlife Service, Colorado Division of Wildlife

Development Trends

The County is experiencing limited development.

In South La Junta, the primary growth is with subdivision and primary hazards are a wildland fire interface with the subdivision and severe weather involving tornadoes. Hazmat creates an issue with the BNSF Railroad Yard adjacent to Hwy 50 and the business district. Flooding has always created issues with Hwy. 50 and the business district.

4.2 Agricultural Infestation Vulnerability Assessment

Agriculture is an important aspect of the County's economy. The following discussion analyzes the potential losses from floods using HAZUS and multiple hazards from federal crop insurance records.

Crop Insurance Analysis

Federal Crop Insurance Data represents losses from multiple hazards that could include: agricultural infestation, flooding, drought, hailstorms, temperature extremes, tornados, wildfires and straight-line winds. Average annual claims payout amount to $0.4 million in the County. More details are provided in Table 12 and 13.

Table 12 Otero County Premium and Crop Loss Data for Federal Crop Insurance 1980-2009

Liability (Amount of Coverage)	Total Premium	Federal Premium Subsidy	Farmer-paid Premium	Amount Paid in Claims	Average Amount Paid Annually in Claims
73,454,513	10,589,052	6,138,768	4,450,284	13,180,861	439,362

Source: Risk Management Agency

Table 13 Otero County Provisional Data (claim data unavailable as 2010 claims are not fully reported)

Liability (Amount of Coverage)	Total Premium	Federal Premium Subsidy	Farmer-paid Premium
8,816,421	1,559,516	924,997	634,519

Source: Risk Management Agency

Flood Analysis

HAZUS Methodology for Agricultural Economic Loss

The HAZUS Flood Model is determined by the relationships between the depth of flood and the annual chance of flood inundation to that depth. The primary elements that contribute to flood losses are depth, duration and velocity of the water in the floodplain. The other risks with flooding that assist with flood loss are channel erosion and migration, sediment deposition, bridge scour and the impact of flood-borne debris.

The agriculture component of the HAZUS Flood Model estimated a range of losses to barley, corn, corn silage, oats, and wheat. These crops were the only crops identified by the HAZUS model to have loss within the region of study. The model assumes a short duration and slow rise flood when estimating losses and does not account for high velocity flash floods. Loss estimates are based on United States Army Corp of Engineers (USACE) damage modifiers. The HAZUS-MH impact analysis predicts a loss estimate value by crop for flow time intervals. The first is a loss estimate for the day of the fixed event; the remaining three are for 3, 7 and 14 days following the event.

Otero County does not have any estimated range of losses within the HAZUS Flood Model.

4.3 Dam and Levee Failure Vulnerability Assessment

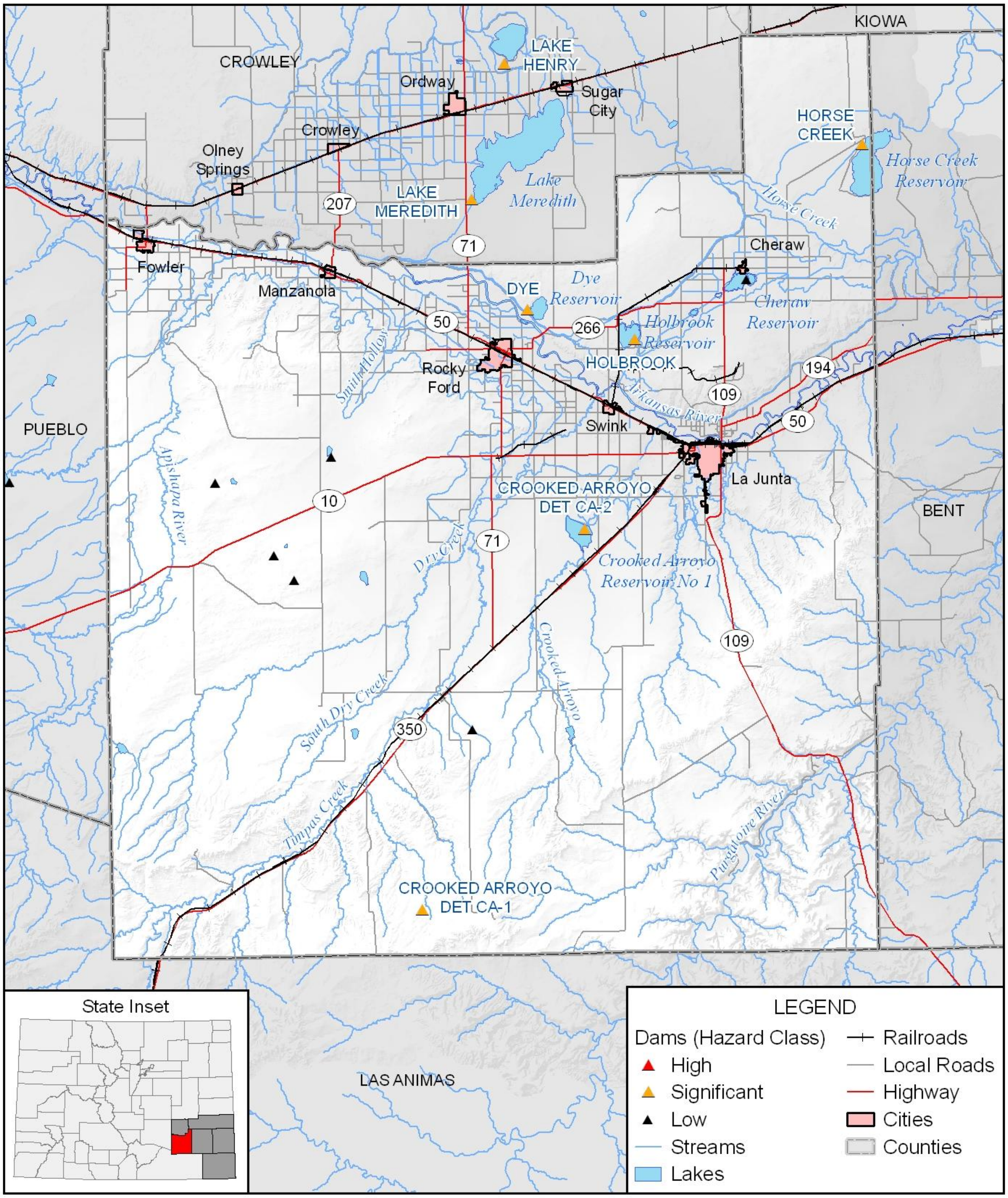
According to HAZUS MR4, there are no high and 7 significant hazard dams in the County. Table 14 indicates how dam failure risk varies among communities in the County. The locations of these dams are shown in Figure 1.

Table 14 Hazardous Dams in Otero County

Dam Name	Max Storage (acre ft)	Dam Hazard	Downstream Community	Miles to Community	Relative Downstream Impacts
Crooked Arroyo Det Ca-1 CO00519	4,916	Significant	La Junta	15	Limited
Crooked Arroyo Det Ca-2 CO01837	17,714	Significant	La Junta	6	Critical
Crooked Arroyo Det Ca-3 CO00520	701	Significant	La Junta	3	Limited
Crooked Arroyo Det Ca-4 CO00521	545	Significant	La Junta	3	Limited
Dye CO01847	8,390	Significant	Swink	5	
Holbrook CO01837	7,975	Significant	Cheraw	5	Significant
Horse Creek CO01847	43,125	Significant	Las Animas	12	Significant

Source: HAZUS MR4

Figure 1 Significant and High Hazard Dams in Otero County



0 5 10 Miles

N

Map compiled 8/2010; intended for planning purposes only.
Data Source: CDOT, CDOWR, HAZUS-MH MR2, HSIP Gold, FEMA Region 8

4.4 Drought Vulnerability Assessment

Based on the County's recent multi-year droughts and Colorado's drought history, it is evident that the entire region is vulnerable to drought. With the majority land area in the County used for agricultural purposes, the County has significant exposure to this hazard. In addition to economic and public water supply impacts, soil erosion, dust, and wildfire hazard are also exacerbated by drought conditions. Otero County has been affected by the droughts in the years identified in Table 15.

Table 15 Drought Disaster and Emergency Declarations in Otero County

Year	Declaring Agency and Declaration Number
2008	USDA Secretarial Declaration S2750
2006	USDA Secretarial Declaration S2351
2005	USDA Secretarial Declaration S2188
2003	USDA Secretarial Declaration S1843
2002	USDA Secretarial Declaration S1643 State of Colorado
2001	USDA Secretarial Declaration S1514
1977	Federal – Major Disaster

Source: USDA, CDEM, FEMA

While the crop insurance loss data covers a variety of perils, it is indicative of the types of agricultural impacts that drought can have upon the planning area. Available crop insurance data indicates over $13 million has been paid to the County's agricultural landowners in insurance claims between 1980 and 2009. It is reasonable to assume that a significant amount of this is due to drought-related losses. While the crop insurance loss data covers a variety of perils, it is indicative of the types of agricultural impacts that drought can have upon the planning area. Assuming at least 50% of the losses are drought-related, an average annual loss estimate can be calculated. For the region this is calculated by ($13,180,861/2)/29years, which equates to over $227,000 in average annual agricultural losses for the County.

4.5 Extreme Temperatures: Extreme Heat Vulnerability Assessment

Limited data on temperature extreme impacts per County was available during the development of this hazard's profile. Extreme heat normally does not impact structures as there may be a limited number of days where the temperatures stay high which gives the structure periodic relief between hot and cool temperature cycles. Areas prone to excessively high temperatures are identified normally on a nation-wide assessment scale, which doesn't allow detailed results on specific structures. Secondary impacts of extreme heat can affect the supporting mechanisms or systems of a community's infrastructure. For example, when high amounts of utilization is imposed on the power system it can cause an interruption in the transmission of that power shutting down air conditioning capabilities or refrigeration that can lead to spoiled foods, etc.

The elderly population in the planning area is most vulnerable to temperature extremes. Table 2.4 in Chapter 2 shows that the percentage of elderly people (age 65 or over) in the planning area is well above the national average, which is 6%. 16.5% of Otero County's population is over 65. However many residents of southeast Colorado are self sufficient and accustomed to rural living and the climate extremes that are part of the territory. The residents of nursing homes and elder care facilities are especially vulnerable to extreme temperature events. It is encouraged that such facilities have emergency plans or backup power to address power failure during times of extreme heat.

4.6 Extreme Temperatures: Extreme Cold Vulnerability Assessment

Limited data on temperature extreme impacts per County was available during the development of this hazard's profile. Extreme cold normally does not impact structures, but is a life safety issue. Areas prone to excessively cold temperatures are identified normally on a nation-wide assessment scale, which doesn't allow detailed results on specific structures. Secondary impacts of extreme cold can affect the supporting mechanisms or systems of a community's infrastructure. For example, when extreme cold is coupled with high winds or ice storms, power lines may be downed, resulting in an interruption in the transmission of that power shutting down electric furnaces, which may lead to frozen pipes in homes and businesses.

The elderly population in the planning area is most vulnerable to temperature extremes. Table 2.4 in Chapter 2 shows that the percentage of elderly people (age 65 or over) in the planning area is well above the national average, which is 6%. 16.5% of Otero County's population is over 65. However many residents of southeast Colorado are self sufficient and accustomed to rural living and the climate extremes that are part of the territory. The residents of nursing homes and elder care facilities are especially vulnerable to extreme temperature events. It is encouraged that such facilities have emergency plans or backup power to address power failure during times of extreme cold.

4.7 Flood Vulnerability Assessment (100/500-year and Localized)

The best available flood data for Otero County was generated by HAZUS-MH MR4 by FEMA Region VIII, FEMA's software program for estimating potential losses from disasters. The 100-year floodplain was generated for major rivers and creeks in the county (those with a 10 square mile minimum drainage area). A USGS 30 meter resolution digital elevation model (DEM) was used as the terrain base in the model. HAZUS-MH produces a flood polygon and flood-depth grid that represents the base flood. While not as accurate as official flood maps, such as digital flood insurance rate maps, these floodplain boundaries are suitable for use in GIS-based loss estimation. Potential losses to the county were analyzed with HAZUS-MH, based on Census Block-based buildings and population inventory and the flood hazard data. The following discussion, maps and tables presents the results of the loss estimation in more detail.

Figure 2 Otero County 100-year Floodplain and Critical Facilities Map

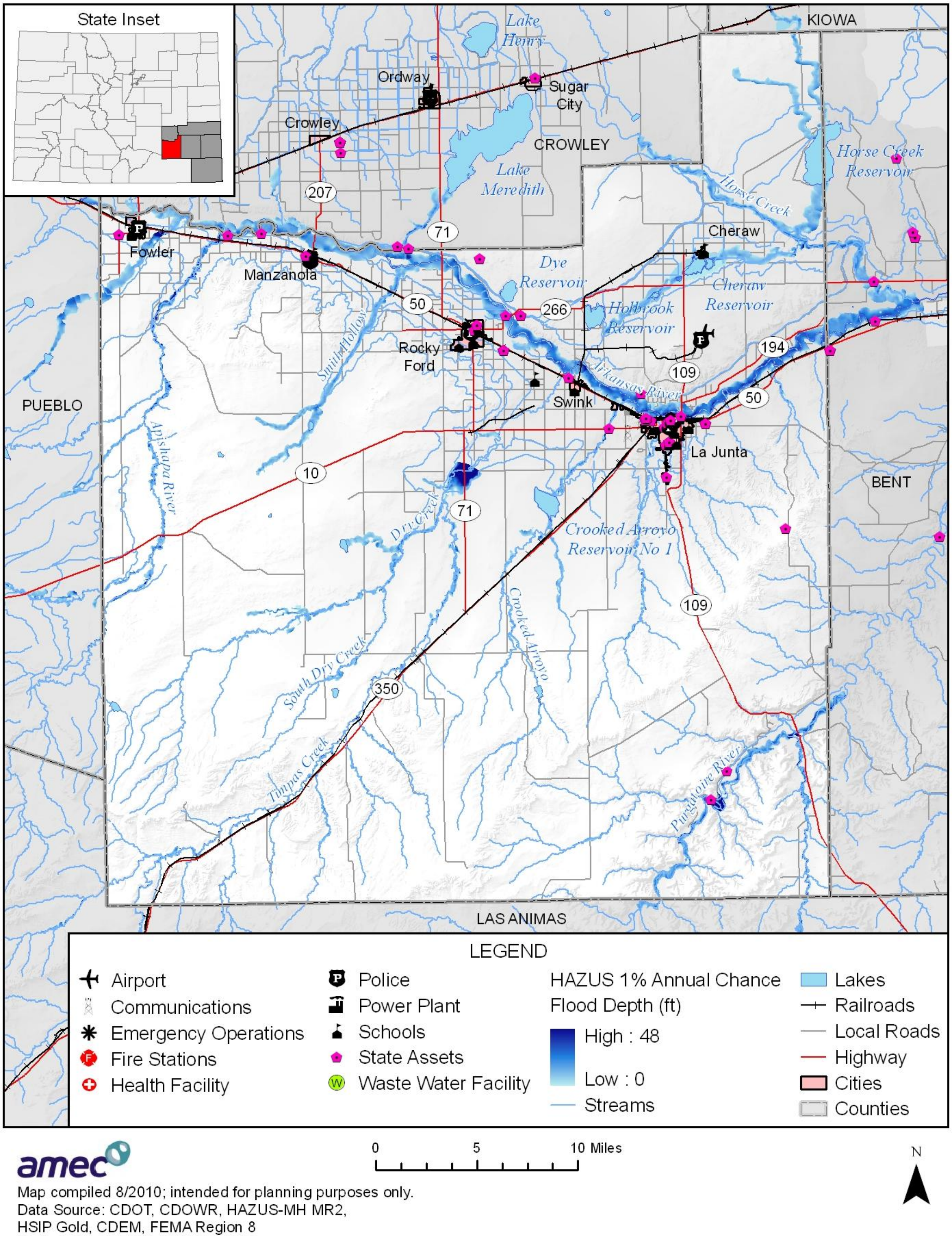
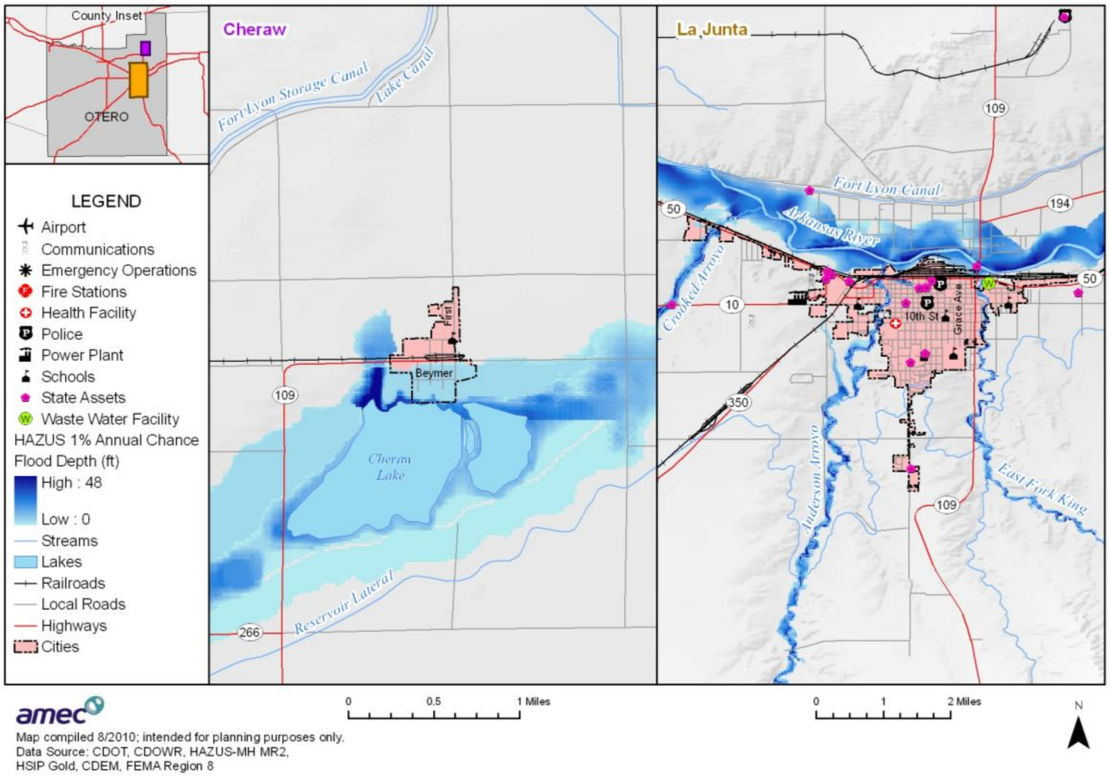


Figure 3 Otero County Cities 100-year Floodplain and Critical Facilities Map



HAZUS-MH provides reports on the number of buildings impacted, estimates of the building repair costs, and the associated loss of building contents and business inventory. Building damage can cause additional losses to a community as a whole by restricting the building's ability to function properly. Income loss data accounts for business interruption and rental income losses as well as the resources associated with damage repair and job and housing losses. These losses are calculated by HAZUS-MH using a methodology based on the building damage estimates. Building damage is estimated by Census Block based on the average depth of flooding within a given Census Block. Flood damage is directly related to the depth of flooding. HAZUS-MH uses depth-damage functions to model the losses. For example, a two-foot flood generally results in about 20 percent damage to the structure (which translates to 20 percent of the structure's replacement value). To estimate the monetary loss for each city, the flooded Census Blocks were extracted, and the damage costs were totaled using GIS. This was done for each city and unincorporated area to illustrate how the risk varies across the planning area.

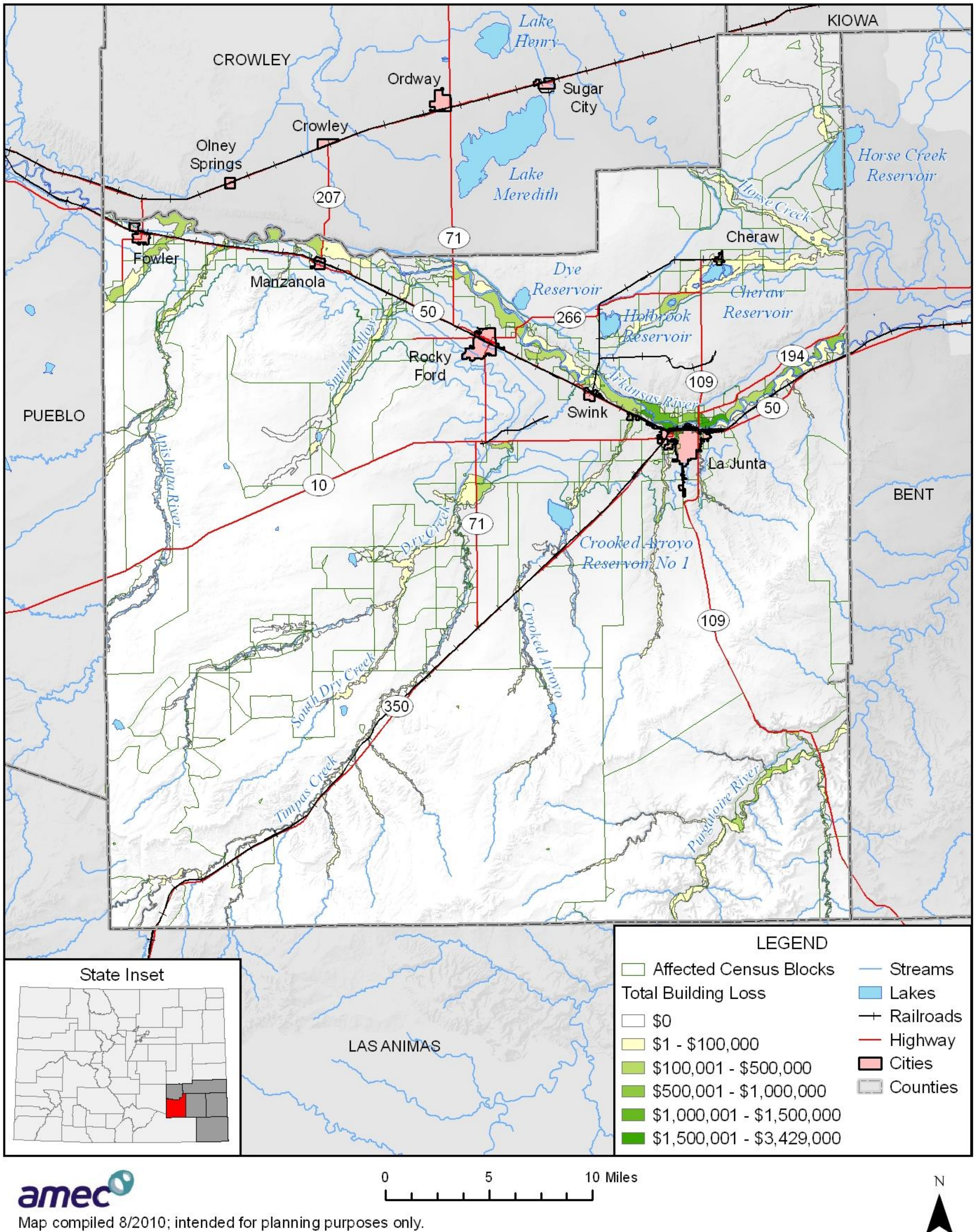
Table 16 Estimated Economic Losses from Flooding

Jurisdiction	Cost Building Damage	Cost Contents Damage	Inventory Loss	Relocation Loss	Capital Related Loss	Wage Loss	Total Loss	Percent of Total Loss	Loss Ratio
Cheraw	328,000	356,000	9,000	3,000	-	8,000	704,000	2%	3.3%
Fowler	-	-	-	-	-	-	-	-	-

Jurisdiction	Cost Building Damage	Cost Contents Damage	Inventory Loss	Relocation Loss	Capital Related Loss	Wage Loss	Total Loss	Percent of Total Loss	Loss Ratio
La Junta	4,537,000	9,572,000	212,000	16,000	49,000	113,000	14,507,000	36%	1.6%
Manzanola	-	-	-	-	-	-	-	-	-
Rocky Ford	-	-	-	-	-	-	-	-	-
Swink	-	-	-	-	-	-	-	-	-
Unincorporated	12,893,000	12,001,000	437,000	28,000	21,000	157,000	25,545,000	63%	4.3%
Total	**17,758,000**	**21,929,000**	**658,000**	**47,000**	**70,000**	**278,000**	**40,756,000**	**100%**	**1.9%**

The building damage loss ratio shown in Table 16 is an indication of the community's ability to recover after an event. Building Damage Loss Ratio percent is calculated by taking the Building Structural Damage divided by Building Structural Value and then multiplying by 100. Loss ratio exceeding 10% are considered significant by FEMA. The area with the highest building damage loss ratio is the unincorporated County.

Figure 4 Otero County Building Loss in the 100-year Floodplain



amec

Map compiled 8/2010; intended for planning purposes only.
Data Source: CDOT, CDOWR, HAZUS-MH MR2, FEMA Region 8

Floodplain Population Information

Should a 1% chance flood occur in the county, some residences would become uninhabitable during and after the flood. Table 17 shows the number of residents in Otero County who would be displaced or need shelter.

Table 17 Population Displaced by Flooding

Jurisdiction	Displaced Population	Population Needing Shelter
Eads	58	10
Haswell	-	-
Sheridan Lake	29	3
Unincorporated	43	-
Total	**130**	**13**

Critical Facilities

Critical facilities in the floodplain were determined using GIS, by selecting all critical facilities that fell within the floodplain. These are listed in Table 18 and shown on the maps in Figure 2 and Figure 3.

Table 18 Critical Facilities in the Floodplain

Location	Facility Type	Facility County
Otero	Unincorporated	State Assets

In addition, Bent's Old Fort Historic Site is located in the flood plain. According to them, the reconstructed fort is located on the 100-year flood plain terrace. During the last two significant flooding events in 1995 and 1998 the water rose to the top of that bank, dangerously close to the adobe structure. The 500-year flood plain map shows the line going right through the center of the fort plaza. Currently the park has plans in place to save the contents of the building, but nothing other than sand bagging to prevent damage to the fort structure. During significant flood events State Highway 194 has to be closed east of the fort where the Arkansas River oxbow flows north close to the road. In the late 1980's the Soil Conservation Service helped put jacks and rip rap along the outside bend of the oxbow to protect the road. This area continues to be a weak spot during floods events. It is estimated that this has happened 3- 4 times during the last 20 years.

Otero County Scour Critical Bridges

Included with HSIP Gold data is a database of bridges called the National Bridge Inventory developed by the Federal Highway Administration. Within the bridge layer one of the attribute items is a "scour index", which is used to quantify the vulnerability of a bridge to scour during a flood. Bridges with scour index between 1 and 3 are considered "scour critical", or a bridge with a foundation element determined to be unstable for the observed or evaluated scour condition.

There are 16 scour critical bridges in Otero County. They are all located on one US Highway and county roads that travel through Otero County. One scour critical bridge is located south of Fowler on County Road 2 at the intersection of Mustang Creek Apishapa River. One is located north of Cheraw on County Road 31 at the intersection of Horse Creek. Two are located between Fowler and Manzanola on the Apirshapa River at the intersections of County Road 6 and HH.5. One is located southeast of Manzanola on County Road 14 and the intersection of Catlin Canal. One is located southwest of Swink on County Road 22 and Timpas Creek. Three scour critical bridges are located within the city limits of La Junta; all three are located on unnamed creeks: one at Third Street, one at Fifth Street, and one at the intersection of US 50. Two are located east of La Junta on US 50 (east and west bound) at the intersection of Thompson Arroyo. Four are located southwest of La Junta on US 350 at the intersections of two unnamed creeks, Crooked Arroyo and Timpas Creek.

Limitation:

There is another scour critical bridge just outside of La Junta however it seems that is it is in the wrong location. The attributes cite that it is on Third Street and the bridge is located outside of the city limits. It is highlighted in red in the table below.

Table 19 Scour Critical Bridges

Name	Owner	Stream	Near City
County Road 14	County Highway Agency	Catlin Canal	Manzanola
County Road 2	County Highway Agency	Mustang Creek Apishapa River	Fowler
County Road 22	County Highway Agency	Timpas Creek	Swink
County Road 31	County Highway Agency	Horse Creek	Cheraw
County Road 6	County Highway Agency	Apishapa River	Fowler
County Road HH.5	County Highway Agency	Apishapa River	Fowler
Fifth St	County Highway Agency	No Name	La Junta
Third St	County Highway Agency	No Name	La Junta
Third St	County Highway Agency	No Name	La Junta
US 350	State Highway Agency	No Name	La Junta
US 350	State Highway Agency	Crooked Arroyo	La Junta
US 350	State Highway Agency	No Name	La Junta
US 350	State Highway Agency	Timpas Creek	Southwest Otero County
US 50	State Highway Agency	No Name	La Junta
US 50 East Bound	State Highway Agency	Thompson Arroyo	La Junta
US 50 West Bound	State Highway Agency	Thompson Arroyo	La Junta

NFIP Claims Analysis

Policies and Claims Information

Otero County joined the NFIP on August 15, 1985. As of July 31, 2000, there are currently 96 flood insurance policies in force. These policies insure $9,017,200 in property. There have been 85 flood insurance policy claims in Otero County totaling $1,194,841 in losses paid.

The City of La Junta joined the NFIP on December 1, 1982. As of July 31, 2000, there are currently 35 flood insurance policies in force. These policies insure $3,845,300 in property. There have been 28 flood insurance policy claims in La Junta totaling $457,711 in losses paid.

The City of Manzanola joined the NFIP on June 30, 1976. As of July 31, 2000, there are currently no flood insurance policies in force. No flood insurance policy claims have been made.

The City of Rocky Ford joined the NFIP on June 3, 1980. As of July 31, 2000, there are currently 5 flood insurance policies in force. These policies insure $325,100 in property. There have been 8 flood insurance policy claims in Rocky Ford totaling $25,803 in losses paid.

Repetitive Loss (RL) Properties

RL properties are those defined by the NFIP as a property that has 2 or more flood loss claims of over $1,000 in any ten year period since 1978. Table 20 shows the number of RL properties in Otero County.

Table 20 Repetitive Loss in Otero County

Property Type	Name of Community	No. of Flood Claims	Flood Insurance?	Value of Structure	Value of Flood Claim (s)	SFHA?
Non-Residential	La Junta	2	Yes	$903,054	$95,343.05 $18,549.28	Y
Non-Residential	La Junta	2	No	$975,525	$2,106.70 $2,332.88	Y
Single Family*	La Junta	2	Yes	$106,403	$15,678.90 $4,132.86	Y

Previous Occurrences

Previous occurrences of regional flooding can be found in Section 4.2.7 of the main plan. Flash flooding incidents affecting Otero County are reported below.

June 6, 1997 - Prolonged and widespread thunderstorm activity produced flooding across many of the highways and roads in Crowley and Otero counties. Highway 50 near La Junta in Otero

County was closed due to flooding. Several bridges were either washed out or sustained damage on county roads around La Junta. Highway 96 near Ordway in Crowley County was flooded.

July 17, 1999 - Very heavy rain fell in a few hours time from just south of Manzanola to about five miles northwest of Rocky Ford near U.S. Highway 50. The resulting flood closed Highway 50 for six hours Saturday morning. Widespread flooding occurred from County Roads 11 to 16. Many road washouts were reported and damage occurred to two irrigation canals. A residence was destroyed by two foot deep flood waters. The railroad just south of Highway 50 was undermined when the trestle abutments washed away. No firm damage amounts were available.

June 29, 2003 - Thunderstorms with very heavy rainfall produced some flash flooding in the vicinity of La Junta, especially in southern areas. Water reached the doorsteps of some resident's homes while the Arroyo's were running at and even occasionally over their banks.

August 5, 2004 - Very heavy rain from a slow moving thunderstorm resulted in water over 6 inches deep to flow over Highway 50 on the Bent-Otero County line.

August 18, 2004 - Slow moving thunderstorms produced very heavy rain and flash flooding on Highways 94 and 50. Flash flooding also occurred on Highway 194. According to the manager of the Bent Old Fort National Historic Site, surface water ran into the Fort Lyon Canal west and north of the park, and pushed water out of the Ft Lyon canal. This nearly caused the Ft Lyon to breach the bank. Neighbors said it sent a wall of water approximately 3 feet deep and 1,200 ft wide ran down across Hwy 194 across the park. During this time, the park was building the new administration building. It caved in most of the utility trenches, blew out the maintenance road, crossed the main entrance road of the park, leaving debris approximately 3 feet high on shrubs and two berms as it crossed into the park's wetland and into the river. The park asked for $10,000 of emergency funds to help repair the maintenance road and re-dig the utility trenches.

July 9, 2006 - Rainfall amounts of 2 to 3 inches in one hour's time fell on already saturated ground in Pueblo County as well as several other counties in southeast Colorado. Numerous creeks, arroyos and low water crossings flooded with fast flowing water and debris. The heavy rain also caused flooding of roads in Pueblo West and over portions of I-25, prompting numerous water rescues. As the heavy rains continued eastward, flooding problems then spread east across portions of Crowley, Otero and Bent Counties, leaving behind additional closed roads, including US Highway 50 in La Junta, Highway 194 near Las Animas and numerous county roads around Ordway.

May 24, 1997 - Heavy rain across southeast Colorado caused the Arkansas River to rise less than one foot above flood stage for nearly two days at La Junta. Agricultural flooding occurred and no structures were damaged.

June 26, 2007 - Numerous severe thunderstorms occurred from the I-25 corridor to the far southeast plains, producing hail up to the size of baseballs, thunderstorm wind gusts over 70 mph, a tornado, and flash flooding. A complex of strong to severe thunderstorms produced very heavy rain which flooded low areas and basements from Fowler to Rocky Ford.

4.8 Severe Weather: Thunderstorms/Lightning/Hail Vulnerability Assessment

Thunderstorms producing winds, hail, and are a common occurrence in the County between early spring and late fall. Given the lightning statistics for Colorado and the region, the County is at risk and is vulnerable to the effects of lightning. Persons recreating or working outdoors during the months of April through September will be most at risk to lightning strikes. Fortunately, there have been no incidents of death of injury associated with lightning in the County. In addition, hailstones are frequently thrown out miles in front of the storm producing them.

Thunderstorms can produce locally heavy rain and high winds, which may result in crop damage and localized flooding. Hail primarily causes crop damage. However, hailstorms in populated areas can cause significant damage to roofs, automobiles, trees and windows. Critical facilities and infrastructure will have the greatest consequences if damaged by a lightning strike. The greatest losses from lightning could result from secondary hazards, such as wildfire.

Table 21 Thunderstorm/Lightning/Hail Occurrences in Otero County

	Thunderstorm	Lightning	Hail
Events	83	6	156
Deaths/Injuries	0/0	2/0	0/0
Damage	$201,000	$67,000	$70,000

Source: NCDC

4.9 Stream Bank Erosion/Stability Vulnerability Assessment

Otero County has had events of stream bank erosion in the past. Stream bank erosion is a natural process, but acceleration of this natural process leads to a disproportionate sediment supply, stream channel instability, land loss, habitat loss and other adverse effects. Local interests have, with limited finances, sought for many years to provide protection from reoccurring floods on the Arkansas River. A major stumbling block in the quest for flood protection has been the aggradation of the streambed. Aggradation of the Arkansas River has been and continues to be a major problem from Pueblo to the Colorado-Kansas state line. In addition to aggradation, there is concern of an increasingly serious flood threat in the County caused by heavy plant growth in the riverbed which retards flows and results in deposition of silt and decreased channel capacity.

4.10 Tornado Vulnerability Assessment

Otero County has been struck by a number of tornadoes in the past 65 years. Some of these tornadoes have caused large amounts of damage. A history of tornadoes in Otero County is shown in Table 22 and Figure 5.

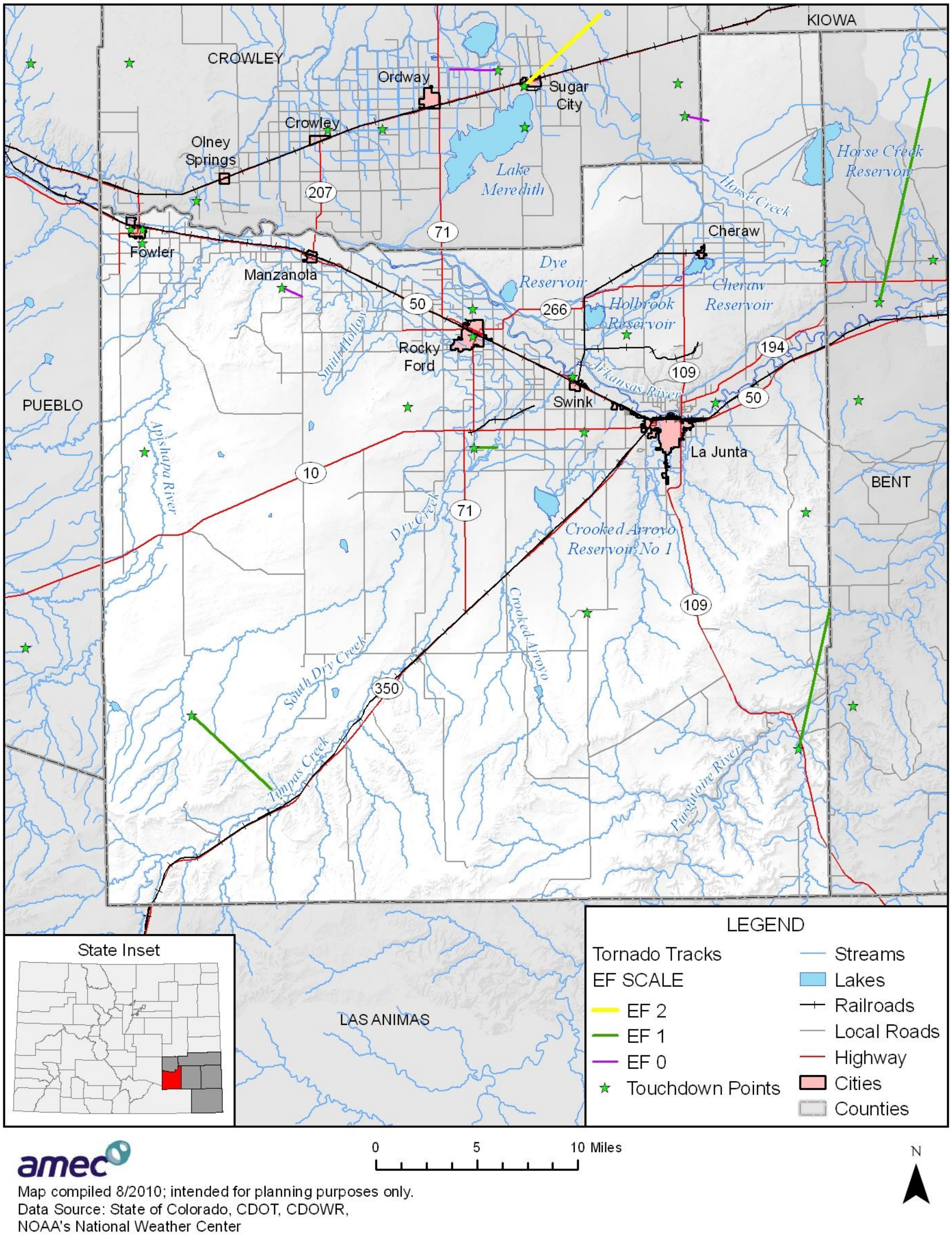
Table 22 Otero County Tornado History

Fujita Scale Ranking	Number of Tornadoes
F0	7
F1	8
F2	1
Unknown*	3
Total	**19**

Source: NCDC

* Two tornadoes struck Otero County in 1953 and one struck in 1957. The magnitude of them is unknown.

Figure 5 Otero County Tornadoes and Touchdowns

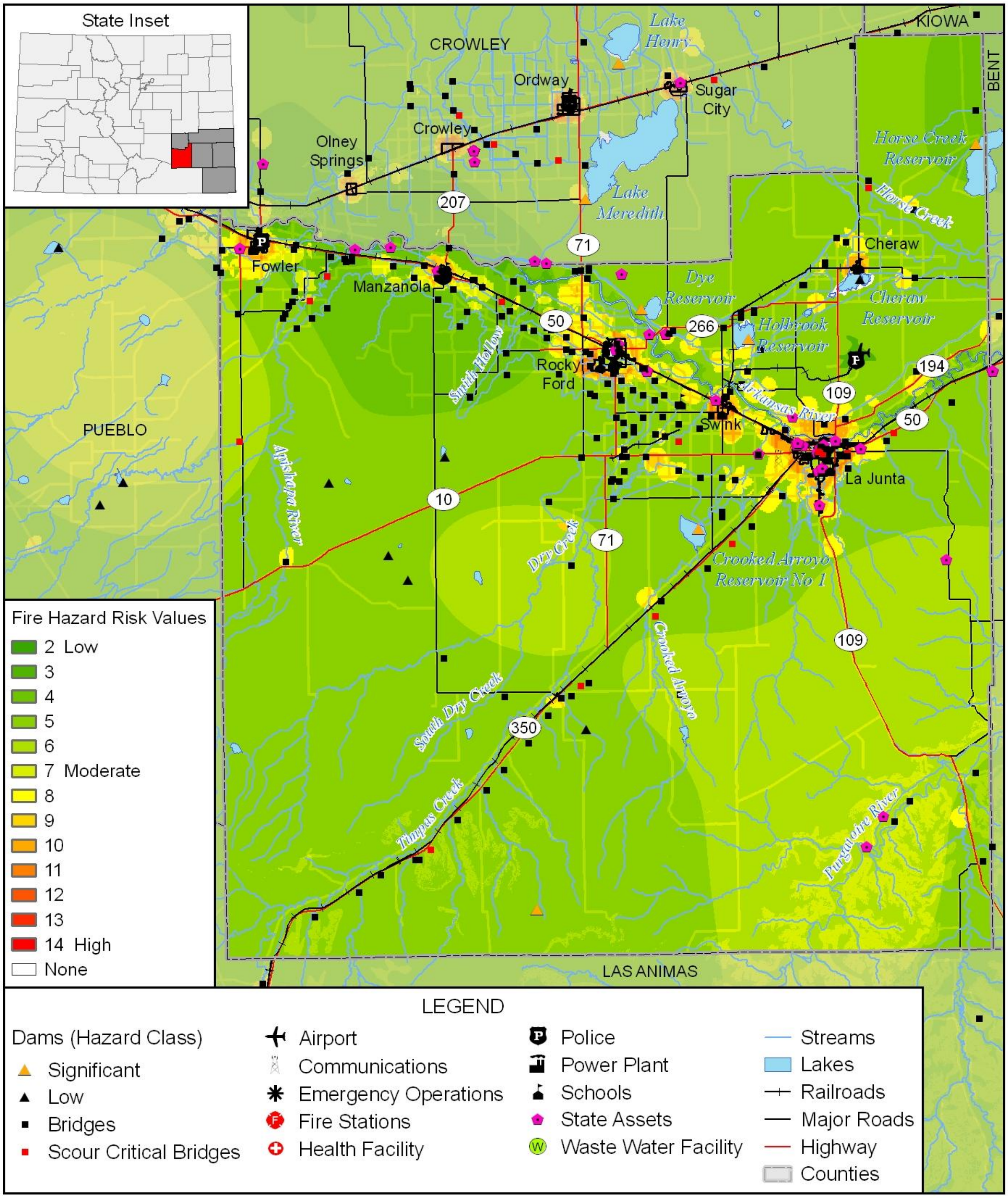


4.11 Wildfire Vulnerability Assessment

Otero County Wildland Urban Interface

The Wildland Urban Interface map for Otero County shows Low to High fire hazard risk values throughout the county. The majority of the county has lower values with the higher values around the communities of Cheraw, Fowler, La Junta, Manzanola, Rocky Ford, and Swink with values between moderate and high.

Figure 6 Otero County Wildland Urban Interface



Map compiled 8/2010; intended for planning purposes only.
Data Source: CDOT, CDOWR, HSIP Gold, CDEM, Fema Region 8
Colorado Wildfire Risk Assessment 5/18/2002

Critical Facilities

Otero County has the second highest number of facilities in a moderate to high fire hazard with 141 critical facilities. The Town of Cheraw has four facilities: one fire station and three schools. The Town of Fowler has five facilities: one fire station, one police station and three schools. The Town of La Junta has 16 facilities: four schools, eleven state assets, and one waste water facility. The Town of Manzanola has seven facilities: three bridges, one fire station, one police station, and two schools. The Town of Rocky Ford has two facilities: one bridge and one school. The Town of Swink has three facilities: one fire station, and two schools. The unincorporated County has 104 critical facilities in a moderate to high fire hazard: 58 bridges, two scour critical bridges, three communications, nine power plant facilities, 31 state assets, and one waste water facility.

Table 23 Critical Facilities in the Moderate to High Wildfire Hazard Areas

Facility Type	Facility Count
Bridge	38
Communications	1
Emergency Operations	1
Fire Stations	4
HAZMAT	2
Health Facility	1
Police	3
Power Plant	16
Schools	8
Scour Critical Bridge	8
State Assets	34
Total	**116**

4.12 Wind Storm Vulnerability Assessment

The County is subject to potentially destructive straight-line winds. High winds are common throughout the planning area, throughout the entire year. Straight line winds are primarily a public safety and economic concern. Windstorm can cause damage to structures and power lines which in turn can create hazardous conditions for people. Debris flying from high wind events can shatter windows in structures and vehicles and can harm people that are not adequately sheltered.

Future losses from straight line winds include:

- Erosion (soil loss)
- Dry land farming seed loss,

- Wind blown weeds, such as tumbleweed
- Power line impacts and economic losses from power outages
- Occasional building damage, primarily to roofs

Campers, mobile homes, barns, and sheds and their occupants are particularly vulnerable as windstorm events in the region can be sufficient in magnitude to overturn these lighter structures. Livestock that may be contained in these structures may be injured or killed, causing economic harm to the rancher who owns both the structure and the livestock. Overhead power lines are vulnerable and account for the majority of historical damages. State highways can be vulnerable to high winds and dust storms, where high profile vehicles may be overturned by winds and lowered visibility can lead to multi-car accidents.

4.13 Winter Storm Vulnerability Assessment

The threat to public safety is typically the greatest concern when it comes to impacts of winter storms. But these storms can also impact the local economy by disrupting transportation and commercial activities. Winter storms are occasionally severe enough to overwhelm snow removal efforts, transportation, livestock management, and business and commercial activities. The region can experience high winds and drifting snow during winter storms that can occasionally isolate individuals and entire communities and lead to serious damage to livestock populations and crops. Travelers on highways in the County, particularly along remote stretches of road, can become stranded, requiring search and rescue assistance and shelter provisions.

Structural losses to buildings are possible and structural damage from winter storms in Colorado has resulted from severe snow loads on rooftops. Older buildings are more at risk, as are buildings with large flat rooftops (often found in public buildings such as schools). The County's elderly population is a potentially vulnerable demographic during severe winter storms. Smaller communities prevalent in the County may become isolated during winter storm events, Persons that choose to live in these areas are generally self-sufficient, or should be, as government and emergency services may be limited during a severe winter storm.

Another common impact of blizzards and severe winter storms on the planning area is the loss of power. The weight of heavy continued snowfall and/or ice accumulating on power lines often brings them to the ground causing service disruptions for thousands of customers. This can cause a loss of community water and sewer services, as well as the supply of gasoline, as these services almost always require electrical pumps. In addition, prolonged power outages can mean loss of food to grocery stores, large facilities that provide feeding services (such as prisons, hospitals and nursing homes), and restaurants.

4.14 Hazardous Materials Vulnerability Assessment

It is often quite difficult to quantify the potential losses from human-caused hazards. While the facilities themselves have a tangible dollar value, loss from a human-caused hazard often inflicts an even greater toll on a community, both economically and emotionally. The impact to identified assets will vary from event to event and depend on the type, location, and nature of a specific technological hazard event. There are no fixed facilities in Otero County. There are multiple transportation routes that transect the County. Natural gas and oil pipelines also run through the County. Table 24 shows the breakdown of gas transmission line and hazardous liquid line mileage in the County

Table 24 Gas Transmission Line and Hazardous Liquid Line Mileage

County	Gas Miles	Liquid Miles	Percentage of State Total
Otero	60	88	1.3%

Source: PHMSA

The US Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) tracks hazardous materials spills and occurrences. A list of incidents can be found in Table 25.

Table 25 Hazardous Materials Incidents in the County

Incident City	Incident Route	Mode of Transportation	Failure Cause Description	Total Amount of Damages
La Junta	CO SR 50 MM 376	Highway	Rollover Accident	$57,500
Rocky Ford	Main Track MP 566.5, Pueblo	Rail	Derailment; Rollover Accident	$7,700
La Junta	1 West First Street	Rail		$232

Source: PHMSA Incident Reports Database

Critical Facilities at Risk

In order to identify those critical facilities at risk to a hazardous materials release within identified corridors, an analysis was performed using GIS software. The same buffer was applied to the population at risk. An intersect was performed between critical facilities and the transportation buffers. Table 26 details the critical facilities located within a transportation corridor that are at risk to transportation related hazardous materials releases.

Table 26 Facilities within the 1 mile of HAZMAT transportation Corridor by Jurisdiction

Jurisdiction	Facility Type	Facility Count
Fowler	Fire Stations	1
Fowler	Police	1
Fowler	Schools	3
La Junta	Bridge	2
La Junta	Emergency Operations	1
La Junta	Fire Stations	1
La Junta	Health Facility	1

Jurisdiction	Facility Type	Facility Count
La Junta	Police	2
La Junta	Schools	3
La Junta	Scour Critical Bridge	3
La Junta	State Assets	15
La Junta	Waste Water Facility	1
Manzanola	Bridge	3
Manzanola	Fire Stations	1
Manzanola	Police	1
Manzanola	Schools	2
Rocky Ford	Bridge	5
Rocky Ford	Fire Stations	1
Rocky Ford	Police	1
Rocky Ford	Power Plant	6
Rocky Ford	Schools	4
Rocky Ford	State Assets	2
Swink	Fire Stations	1
Swink	Schools	2
Unincorporated	Bridge	92
Unincorporated	Communications	3
Unincorporated	Power Plant	9
Unincorporated	Schools	1
Unincorporated	Scour Critical Bridge	9
Unincorporated	State Assets	26
Unincorporated	Waste Water Facility	1
Total		**204**

Source: HSIP Gold, CDEM, CDOT

Populations at Risk

To determine the populations at risk from a transportation-related hazardous materials release within identified transportation corridors, an analysis was performed using GIS. A one-mile buffer was applied to both sides of Highways 10, 50, 71, and 287, and the Atchison, Topeka, & Santa Fe (AT&SF) and the Victoria Southern & Towner Railroads, creating two-mile buffer zones around each corridor. US Census 2000 population data, aggregated by census block, was acquired from HAZUS-MH. An intersection was performed between the census data and the transportation buffers. If any part of the census block touched the transportation buffer zone, the entire block was included in the buffer zone. Table 27 shows populations within each jurisdiction that are at greatest risk to transportation-related hazardous materials releases. There are a total of 18,053 people in the County at risk to hazardous material incidents.

Table 27 Populations in the Haz-Mat Buffer Zone in Otero County

Jurisdiction	Population
Otero County	4,565
Fowler	1,209
La Junta	6,778
Manzanola	529
Rocky Ford	4,276
Swink	696
Total	**18,053**

Source: CDEM, CDOT, US Census Bureau

In addition, Bent's Old Fort Historic Site management consider the main threats to the Park from hazardous materials to be from spillage from the railroad which has a right of way on the south side of the Park, and from an accidental spill from Conoco Philips transfer station on the east side of La Junta. Currently there is no closer access to the river between La Junta and the National Park which means any accident that might occur from that plant wouldn't be stopped until it got to the Park's western boundary.

5 Otero County Capability Assessment

Thus far, the planning process has identified the hazards posing a threat to Otero County and described, in general, the vulnerability of the County to these risks. The next step is to assess what loss prevention mechanisms are already in place. This part of the planning process is the mitigation capability assessment. Combining the risk assessment with the mitigation capability assessment results in the County's "net vulnerability" to disasters and more accurately focuses the goals, objectives, and proposed actions of this plan.

The planning committee used a two-step approach to conduct this assessment for the County. First, an inventory of common mitigation activities was made through the use of a matrix in the AMEC distributed Data Collection Guide. The purpose of this effort was to identify policies and programs that were either in place, needed improvement, or could be undertaken, if deemed appropriate. Second, the HMPC reviewed existing policies, regulations, plans, and programs to determine if they contributed to reducing hazard-related losses or if they inadvertently contributed to increasing such losses.

This section presents the County's mitigation capabilities: programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This assessment is divided into three sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, and fiscal mitigation capabilities.

5.1 Otero County's Regulatory Mitigation Capabilities

Table 28 lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the County.

Table 28 Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	County Y/N	City of La Junta Y/N	Comments
General plan	Y	Yes	La Junta - Comprehensive Community Plan Phase 1, 2000
Zoning ordinance	Y	Yes	La Junta - Ordinance #: 1242 Muni Code Article 15-17
Subdivision ordinance	Y	Yes	La Junta - Ordinance # Article 15-16
Growth management ordinance	N	No	La Junta - N/A
Floodplain ordinance	Y	Yes	La Junta - Ordinance # Article 15-17
Other special purpose ordinance (stormwater, steep slope, wildfire)	N	No	La Junta - N/A
Building code	Y	Yes	La Junta - Version: 2006 IBC
BCEGS Rating	N	Yes	Rating of:
Fire department ISO rating	N	Yes	La Junta - Split Rating: City of LJ 5, Town of Swink 4, Rural with 5 mile distance 6
Erosion or sediment control program	N	No	La Junta - N/A
Stormwater management program	N	Yes	La Junta - City of La Junta public works manages this program
Site plan review requirements	N	Yes	La Junta - Zoning & Building Code/City Engineer
Capital improvements plan	N	Yes	La Junta - Comprehensive Plan/Finance Director
Economic development plan	Y	Yes	La Junta - Comprehensive Plan/Econ Director Ron Davis
Local emergency operations plan	Y	Yes	La Junta - Ordinance# 1357 Adopted Otero County EOP
Other special plans	N	Yes	La Junta - Industrial Park Master Plan/Airport Improv Plan
Flood insurance study or other engineering study for streams	Y	Yes	La Junta - FEMA Study 1982/City Engineer
Elevation certificates	N	No	N/A
Other			

5.2 Otero County's Administrative/Technical Mitigation Capabilities

Table 29 identifies the County personnel responsible for activities related to mitigation and loss prevention in the County.

Table 29 Administrative/Technical Regulatory Tools

Personnel Resources	County Y/N	City of La Junta Y/N	Department/Position	Comments
Planner/Engineer with knowledge of land development/land management practices		Yes	City Engineer	Dan Eveatt
Engineer/Professional trained in construction practices related to buildings and/or infrastructure		Yes	City Engineer	Dan Eveatt
Planner/Engineer/Scientist with an understanding of natural hazards		No	n/a	
Personnel skilled in GIS		Yes	City Engineer	Dan Eveatt
Full time building official		Yes	City Engineer	Dan Eveatt
Floodplain Manager		Yes	City Engineer	Dan Eveatt
Emergency Manager		No	n/a	
Grant writer		Yes	City Admin. Dept.	Dawn Block
Other personnel				
GIS Data – Hazard areas		No	n/a	
GIS Data - Critical facilities		Yes	Director Water City Engineer	Joe Kelly Dan Eveatt
GIS Data – Building footprints		Yes	City Engineer	Dan Eveatt
GIS Data – Land use		Yes	City Engineer	Dan Eveatt
GIS Data – Links to Assessor's data		No	n/a	
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)		Yes	Dispatch Com Center	Code Red & Warning Sirens
Other				

5.3 Otero County's Fiscal Mitigation Capabilities

Table 30 identifies financial tools or resources that the County could potentially use to help fund mitigation activities.

Table 30 Fiscal Regulatory Tools

Financial Resources	City of La Junta Accessible/Eligible to Use	City of La Junta Accessible/Eligible to Use	Comments
Community Development Block Grants		Y	Hospital Improvement,Business/ Economic Development
Capital improvements project funding		Y	Capital Reserve/CWPA/AARA
Authority to levy taxes for specific purposes		Y	Home Rule City
Fees for water, sewer, gas, or electric services		Y	City of La Junta Light and Power Company
Impact fees for new development		N	N/A
Incur debt through general obligation bonds		Y	Eligible
Incur debt through special tax bonds		Y	Can obtain by election
Incur debt through private activities		Y	Water/Sewer Enterprise Account
Withhold spending in hazard prone areas		N	
Other		Y	Line Development Fee, Facility Investment Fee/Board of Utilities

5.4 Additional Capabilities in Otero County

The City of La Junta is working on Firewise and StormReady certification. Public education programs include fire prevention, tornado preparedness through the library, and regional community preparedness guides.

All counties in the planning area make the 211 system available to citizens within each county. The system guides citizens to appropriate agencies and organizations, including disaster resources and assistance. The system ensures that citizens can access timely and accurate information about what is happening in their community.

5.5 Additional Vulnerabilities in Otero County

Severe Winter Weather creates impact with Dialysis patients to and from the hospital. Severe weather heat/cold created issues of elderly and disabled populations with the city limits. Flooding of the Arkansas River and flash flooding can create evacuation issues for the elderly and disabled populations especially of Maple Villa, La Junta Senior Center and La Junta Housing Authority all have evacuation concerns.

6 Otero County Mitigation Actions

After reviewing the goals of the Southeast Colorado Regional Hazard Mitigation Plan, Otero County has adopted the following mitigation actions to reduce their risk to the hazards identified above.

Otero County

Action Item #1 Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program

Hazards Addressed: All

Issue/Background: The County and each jurisdiction are subject to several natural hazards. Each poses a different degree of risk and associated vulnerability. Some hazards have a combination of attributes, including a high likelihood of occurrence, a specific location that would likely be impacted, and proven approaches that could reduce the impact. For other hazards, where either the likelihood of occurrence is very low, the area of likely impact is not specifically known, or there is very little that can be done to reduce the impacts, the HMPC has determined that the best approach is public awareness. Citizens should have information describing historical events and losses, the likelihood of future occurrences, the range of possible impacts, appropriate actions to save lives and minimize property damage, and where additional information can be found. Any information provided through this effort should be accurate, specific, timely, and consistent with current and accepted local emergency management procedures as promoted by the Southeast Colorado All Hazards Region (SECAHR), Colorado Department of Emergency Management (CDEM) and the American Red Cross. Following a disaster event, there should be extra efforts to provide the public with information about disaster preparedness and mitigation measures. This public outreach effort will be conducted annually and will include:

- Using a variety of information outlets, including local news media;
- Creating and printing (where applicable) brochures, leaflets, water bill inserts, and public service announcements;
- Posting all information to the SECAHR website;
- Displaying current brochures and flyers in County office buildings, city halls, libraries, and other public places; and
- Developing public-private partnerships and incentives to support public education activities.

Other Alternatives: Continue public information activities currently in place.

Responsible Office: Otero County Emergency Management

Priority (High, Medium, Low): High

Cost Estimate: Staff time, printing costs for literature.

Benefits (avoided Losses): Life safety, reduction in property losses, relatively low cost

Potential Funding: State Hazard Mitigation Program grants, county and jurisdiction funds, other available grants

Schedule: Ongoing – part of seasonal multi-hazard public awareness campaign.

Action Item #2 Community Wildfire Protection Plans

Issue/Background: Wildfire is an issue in the County. The intent is to minimize risk and vulnerability from wildfire hazard.

- Start/Complete CWPP's for Otero County.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which project will be implemented:

Basically three meetings per county –

- 1st Meeting – Wildfire Mitigation Assessment mapping exercise (circling areas for values, risks & fuels) to identify areas of concern).
- 2nd Meeting – Review mapping overlays; review FireWise mitigation potentials; start looking at overall goals for a five year plan.
- 3rd Meeting – Review/complete goals; review draft plan; determine annual workplan (identify persons responsible/ tasks/benchmark dates to complete assignments/projects.

Responsible Office: Office of Emergency Management

Priority (High, Medium, Low): High

Cost estimate: Low to high cost depending upon in-kind and actual expenses – mileage/per diem/in-kind hours/ administrative copying costs, etc/ CWPP plan copying costs.

Benefits (avoided Losses): Mitigating wildfire hazards within a county by identifying /prioritizing areas of concern, then mechanisms to implement mitigation.

Potential funding: Federal/State grant options?

Schedule:

- Three meetings per county to create plan.
- Schedule according to each annual workplan for implementing projects.

- Update meetings according to each county's schedule

Action Item #3 CWPP Projects as identified by the County's CWPP

Issue/Background: Wildfire is an issue in the County. The intent is to minimize risk and vulnerability from wildfire hazard. Projects can include mitigating risk, access, water supply, structure construction design & materials, defensible space, trees & shrubs (landscapes), interior design, & 'What to do when… (evacuation needs) .

Other Alternatives: No action.

Existing Planning Mechanism(s) through which project will be implemented: The County's CWPP. Types of projects include:

- Risk (Landowner Awareness)
- Access (ingress/egress; widths/turnarounds/ culverts; signage (High/med/low fire danger; CR/street signages)
- Water supply
- Construction design & materials,(building codes, ordinances)
- Defensible space (Fuels mgmt, establishing living fuel breaks (grass) – riverbottom & community),
- Trees & shrubs,
- Interior safety
- What to do when
- Other
  - Hazards – Power lines/trees/brush breakage (Tree Line USA, NADF)
  - County Fire Bans & Controlled Burn Ordinances
  - Ag Hazards – wildfire
  - Drought – fire hazards

Responsible Office: Office of Emergency Management

Priority (High, Medium, Low): Medium

Cost estimate: Per project

Benefits (avoided Losses): Protect homes, homesteads, structures, values from potential wildfires until fire services can arrive. Protecting homes can be maximized when fire service arrives. Protect Firefighter safety during suppression operations.

Potential funding: Federal/State grant options?

Schedule: Schedule according to each CWPP annual workplan for implementing projects.

Action Item #4 Firewise Outreach Message to appropriate audiences within the County CWPP Plan

Issue/Background: Wildfire is an issue in the County. The intent is to minimize risk and vulnerability from wildfire hazard.

- Homeowners, landowners and other property owners need to have an awareness of vulnerability to wildfire hazards.
- Each property owner needs to take responsibility for mitigating potentials for catastrophic damage to their own properties – protect their own properties from wildfire.
- Support safety to firefighters during suppression by mitigation of fuels and implementing other FireWise suggestions.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which project will be implemented: Educating publics on risk, access, water supply, construction design & materials, defensible space, trees & shrubs, interior safety & 'What to do when…' – tools to mitigate.

Responsible Office:

- Educational outreach from local VFD's to assess homesites and give recommendations.
- Media news releases; Fair booths (w/other entities);
- Firewise prevention messages for schools.

Priority (High, Medium, Low): Medium

Cost estimate: To be determined

- Pamphlets/handout costs
- Firewise Educational material for schools
- Low to high cost depending upon in-kind and actual expenses – mileage/per diem/in-kind hours/ administrative copying costs, etc.

Benefits (avoided Losses): Protect homes, homesteads, structures, values from potential wildfires until fire services can arrive. Protecting homes can be maximized when fire service arrives. Protect Firefighter safety during suppression operations.

Potential funding: Federal/State grant options?

Schedule:

- Schedule according to each CWPP annual workplan for implementing projects.
- Update meetings according to each county's schedule.

City of La Junta

Action Item #5 Flooding – Southwest La Junta Drainage and Roadway Improvements

Issue/Background: Due to storm drainage issues on a continual basis during major stomr events, the southwest portion of the City of La Junta experiences localized flooding of critical intersections and private property. These issues stem from new development and changes in the basin characteristics over the past 40 years.

Other Alternatives: Without full funding, project can be completed in multiple stages.

Responsible Office: City of La Junta Department of Engineering

Priority (High, Medium, Low): High

Cost Estimate: 3,103,713.86.

Benefits (avoided Losses): Reduction of the storm run-off inundation of the Casa del Sol retirement community. Construction of a new culvert that will be capable of passing the 10-year storm event.

Potential Funding: FEMA, City of La Junta General Capital Fund and Stormwater Fees.

Schedule: Dependent on funding.

Action Item #6 Storm Drain Backflow Prevention

Hazards Addressed: High water levels of the Arkansas River entering the storm drain system.

Issue/Background: Because of the degradation of the Arkansas River our storm water outfall structure is at the static water level of the river most of the time. When the river's water level starts to rise during runoff events, river water backs up into the storm drain system. This backflow reduces our available capacity and restricts or severely slows down the system. In addition, the river water inundates our sump well for the twelve inch pumps used to augment the system. This inundation causes the pumps to recycle river water rather than remove runoff from our local road system. This project would be to install a collapsible valve or "duck bill" valve at the outfall structure to prevent the backflow from the river.

Other Alternatives: Lower the static water level of the Arkansas River

Existing Planning Mechanism(s) through which project will be implemented: Floodplain Management and Street Department Capital Improvement.

Responsible Office: City Engineer's Office

Priority (High, Medium, Low): Medium

Cost Estimate: $150,000.00

Benefits (avoided Losses): The completion of this project would allow the existing storm water system to operate at full capacity. Full capacity equates to faster removal of runoff water, safer roadways, less water damage to surfaces and better service to our community.

Potential funding: Flood Mitigation grants or General Fund Capital Outlay Funds

Schedule: Currently the project is not scheduled. If funding was available it would take approximately 120 days to complete once the funding was secured.

Action Item #7 Continue to implement sound floodplain management practices

Hazards Addressed: Flood

Issue/Background: The City of La Junta participates in the National Flood Insurance Program. This project restates the commitment of the City of La Junta to implement sound floodplain management practices, as stated in the flood damage prevention ordinance. This includes ongoing activities such as enforcing local floodplain development regulations, including issuing permits for appropriate development in Special Flood Hazard Areas and ensuring that this development is elevated to or above the base flood elevation. This project also includes periodic reviews of the floodplain ordinance to ensure that it is clear and up to date. Floodplain managers will remain current on NFIP policies.

Other activities that could be included in this effort are:

- Ensure that stop work orders and other means of compliance are being used as authorized by each ordinance;
- Suggest changes to improve enforcement of and compliance with regulations and programs;
- Participate in Flood Insurance Rate Map updates by adopting new maps or amendments to maps;
- Develop Digital Flood Insurance Rate maps in conjunction with GIS to improve floodplain management, such as improved risk assessment and tracking of floodplain permits;
- Promote and disperse information on the benefits of flood insurance.

Other Alternatives: No action

Responsible Office: City of La Junta Department of Engineering. Dan Eveatt, Director of Engineering.

Priority (High, Medium, Low): High

Cost Estimate: Medium

Benefits (avoided Losses): Reduced property loss from floods, continued availability of flood insurance for residents.

Potential funding: FEMA, City of La Junta General Capital Fund and Storm Water Fees.

Schedule: Dependent upon funding

North La Junta Conservancy District

Action Item #8 Removal of tamarisk, Russian olive, and debris for better water river flow.

Issue/Background: The North La Junta Conservancy District is a non-profit volunteer group that works through the National Resource Conservation Service. The adviser is a member of the Corps of Engineers. The area is used by the community for recreational purposes.

Other Alternatives: Continue maintaining the work that has been done (a total of 102.1 acres has been cleared with this project).

Responsible Office: North La Junta Conservancy District

Priority (High, Medium, Low): High

Cost Estimate: unknown, as this is an ongoing project.

Benefits (avoided Losses): Protecting lives, homes, and property. Cleared land is being used for recreation. (fishing, boating, camping, walking, bike and horse back trails) The North La Junta community was devastated by the 1999 flood.

Potential Funding: Taxes from Otero County Treasurer's Office.

Schedule: Ongoing.

PROWERS COUNTY PLANNING ELEMENT

1 Prowers County Planning Committee

The following entities participated in the DMA planning process through the Prowers County Planning committee. More details on the planning process followed and how the County, municipalities and stakeholders participated can be referenced in Chapter 3 of the base plan. Additional details on what local government departments participated and who represented them are listed in Appendix B.

- Prowers County
- City of Lamar
- Town of Hartman
- Town of Holly
- Lamar School District

2 Prowers County Profile

Prowers County is located in the southeastern region of the State in the high plains and is primarily agricultural. The land area of the County is 1,644 square miles, with 4 square miles of water. According to the 2000 U.S. Census, the population for the County was 14,183. The 2010 population estimate from the Department of Local Affairs is 13,411. The estimated average density for the County is 8.2 people per square mile. The County shrunk at a rate of 6.5% between 2000 and 2010. There are 5,977 housing units in the County. The median age in the County is 35.3 years. 7.9% of the population is under the age of 5 and 12.6% of the population is over the age of 65. The average household size is 2.67, and the average family size is 3.21. 72% of the population over the age of 25 holds at least a high school degree and 11.9% hold a bachelors level degree or higher. 20.3% of the population (over age 5) holds disability status, and 24.4% speak a language other than English in the home. 14.5% of all families live below the poverty level, and 19.5% of individuals live below poverty level. The County is a rural county located on the southeastern plains of Colorado. The largest city in the County is Lamar, which also serves as the County seat. The County is typical of the mid-western plains, with a rural orientation and solid agricultural basis. The Census of Agriculture reports 636 farms in the County with 1,037,336 total acres of farmland. The average farm size is 1,631 acres. A base map of the County can be referenced in Figure 2.

3 Previous Planning Efforts

Requirements §201.6(d)(3): A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within 5 years in order to continue to be eligible for mitigation project grant funding.

Revision and Updating of Previous Plan

In 2003, Prowers County submitted, on October 20, 2003, a hazard mitigation plan to CDEM and FEMA and received approval from both agencies. This update involved a comprehensive review and update of each section of the 2003 plan and includes an assessment of the success of the participating communities in evaluating, monitoring and implementing the mitigation strategy outlined in the initial plan. In fact, based in part on the issuance of the 2008 FEMA Plan Preparation Guidance, the 2003 plan has been reorganized, updated, and rewritten in its entirety. Only the information and data still valid from the 2003 plan was carried forward as applicable into this LHMP update.

Past Mitigation Action Update

As part of the 2003 plan, mitigation actions were identified for inclusion in the plan. Each action was assigned a short or long term deadline. Short term and long term projects were defined as follows:

- Short-term projects are those, which could be accomplished within a two year time period.
- Long-term projects will take longer than two years and/or depend on other projects being accomplished first or substantial funding resources.

Below is an update to each of the actions that were included in the 2003 plan and the status of each action to date. The actions are followed by text identifying whether the actions are completed, deleted, ongoing, or deferred.

Action #1 - The current Flood Insurance Rate Maps are Very Outdated and Are in Need of Updating to Address the Following Items. (Short Term)

- 1977 maps need to be reevaluated with additional data.
- Base Elevations included in mapping
- Corrections may need to be made for areas where fill or naturally high ground is now shown as flood prone but may not be in jeopardy of flooding.
- Detailed floodplain study limits should be conducted for Willow Creek, Clay Creek , Wild Horse Creek and the Arkansas River
- U.S. Corps of Engineers needs to analyze new flood boundaries after 1,135 improvements projects are completed.

Progress to date: Nearly completed. In August of 2009 Prowers County, and the Cities of Lamar, Granada, Wiley and Holly entered into an agreement with Colorado Water Conservation Board, working in agreement with FEMA, for a map modernization project in Prowers County. The map modernization project is to include digital flood insurance rate maps-DFIRMS, new hydrologic and hydraulic analyses, field surveys and topographic data development. Total cost of the project is estimated to be $767,000. The project is on schedule with expected completion in 2012. 80% project funding from FEMA and 20% project funding from CWCB. Will not be included in 2012 update.

Action #2 - Improve Enforcement of Floodplain Regulations, Including Requiring Elevation Certifications for All Structures within the Floodplain. (Short Term)

Progress to date: Completed. On February 16, 2006, Prowers County adopted regulations requiring zoning permits for any construction or alteration of existing structures. This requirement has place a level of oversite for the requirement of Elevation Certifications when needed.

Action #3 - Incorporate Floodplain Areas and Regulations into the Comprehensive Plan. (Short Term)

Progress to date: Completed. On April 6, 2004 Prowers County adopted a new Master Plan which incorporated Floodplain Areas and Regulations.

Action #4 - Mitigate Damage to Roads, Drainage and Utilities by Requiring that Reconstruction be to a Higher Standard after a Storm. (Short Term)

Progress to date: No progress to date. Will not be included in 2012 update.

Action #5 - Adopt the Uniform Building Code within Prowers County. (Short Term)

Progress to date: No progress to date. Will not be included in 2012 update.

Action #6 - Publish a Brochure Containing Information on the Prowers County Flood Dangers to be Distributed to the Community. (Short Term)

Progress to date: When the New DFIRMS are complete, there will be a media campaign regarding the benefits and availability of the new maps. Regional Homeland Security Committee published a citizen emergency preparedness guide in 2008 and distributed to the citizens. Currently we are in the process of publishing the same guide but in a Spanish version. Will not be included in 2012 update.

Action #7 -Provide Local Realtors and Lending Institutions with GIS copies of FIRM. (Short Term)

Progress to date: When the New DFIRMS are complete, there will be a media campaign regarding the benefits and availability of the new maps. Will not be included in 2012 update.

Action #8 -Advanced Risk Analysis Projects, which Include GIS and Other Methodology. (Long Term)

Progress to date: No progress to date. Will not be included in 2012 update.

Action #9 -Research and Consider Instituting the "Storm Ready" Program. (Short Term)

Progress to date: Completed. Prowers County was Storm Ready April 11, 2006 with the City of Lamar to follow in 2007. Plans to make 3 other towns within the county Storm Ready are currently underway.

Action #10 -Conduct Special Statewide Outreach/Awareness Activities, such as Winter Weather Awareness Week, Flood Awareness Week, etc. (Short Term)

Progress to date: None, radio interviews have been conducted to promote preparedness activities dealing with winter weather, floods and tornados. Will not be included in 2012 update.

Action #11 -Expand Public Awareness about NOAA Weather Radio for Continuous Weather Broadcasts and Warning Tone Alert Capability. (Short Term)

Progress to date: Completed. Every government building and school/educational facility have a weather radio. Funding originally, until grant sources were made available for the purchase of the radios.

Action #12 - Encourage Weather Resistant Building Construction Materials and Practices. (Long Term)

Progress to date: No progress to date. Will not be included in 2012 update.

Action #13 - Complete and Revise as Necessary the Prowers County Emergency Operations Plan. (Long Term, Ongoing)

Progress to date: Ongoing. Annexes were converted to emergency support functions in 2003 and hazard specific annexes were updated also. 2005 NIMS adoption was included into the plan. 2010 the basic plan was updated to include lines of succession. Annual updates and alignment with other regional, state and federal plans. This is a living document and requires ongoing review and updates as required. Will not be included in 2012 update.

Action #14 - Identify Buildings or Locations Vital to the Emergency Response Effort and Buildings or Locations that, if Damaged, Would Create Secondary Disasters. (Short Term)

Progress to date: No progress to date. Will not be included in 2012 update.

Action #15 - Properties Should be Identified That Would be Appropriate for Protection Because of Flood Risks, and After Public Input, Acquisition, Conservation, or Flood Hazard protection Regulations by the Government Should be Pursued. (Long Term)

Progress to date: No progress to date. Will not be included in 2012 update.

Action #16 - Research and Consider a Countywide Emergency Warning System. (Short Term)

Progress to date: NOAA weather radio was installed around 2003 and continues with operation. Outdoor warning siren project began in 2010 with new siren installations in the Town of Granada and Community of Bristol. New siren installations in the Towns of Wiley and Hartman, Community of Kornman and City of Lamar are planned. Will not be included in 2012 update.

Action #17 - Research and Consider Construction of Tornado Safe Rooms in Public and Private Structures. (Long Term)

Progress to date: No progress to date. Will not be included in 2012 update.

Action #18 - Research Public Vulnerability and Consider Alternative Power Sources During Power Failure. (Short Term)

Progress to date: No progress to date. Will not be included in 2012 update.

In the October 2003 Prowers County PDM Plan, goals were attached to each hazard considered a significant risk to Prowers County. Goals for the 2003 plan were as follows:

Floods

- Goal 1: Protect individual properties from flooding.
- Goal 2: Guide development and use of the floodplain for flood protection.
- Goal 3: Enhance emergency services (emergency service activities).
- Goal 4: Increase public awareness.

Blizzards

- Goal 1: Mitigate the effects of extreme weather by instituting programs that provide early warning and preparation.
- Goal 2: Educate people about the dangers of extreme weather and how to prepare.

Drought

- Goal 1: Reduce the vulnerability of municipal water supplies.
- Goal 2: Improve water conservation practices.
- Goal 3: Protect senior water rights in the valley.

Tornadoes and Other Wind Hazards

- Goal 1: Improve life safety during these events by improved warning systems and the installation of "safe rooms". Little can be done to reduce the damages caused by tornadoes
- Goal 2: Protect individual properties from soil erosion.

Goal 3: Expand public awareness about NOAA Weather Radio for continuous weather broadcasts and warning tone alert capability.

Hail and Severe Summer Storms

- Goal 1: Expand public awareness about NOAA Weather Radio for continuous weather broadcasts and warning tone alert capability.

Urban Fires

Goal: 1: Adopt Uniform Building Codes.

Insects, Grasshoppers, and Mosquitoes

- Goal 1: Educating the Public about the danger of West Nile and providing information on the prevention.

Hazardous Materials Events

Goal 1: Route truck traffic away from populated areas.

Bio-Terrorism/Terrorism

- Goal 1: Training
- Goal 2: Planning
- Goal 3: Exercises
- Goal 4: Reassessment

Power Failure

- Goal 1. Assess generation needs at vital locations.

Dam Failure Flooding

- Goal 1: Warning System

Noxious Weeds

- Goal 1: Continue to seek funding for additional Tamarisk removal.
- Goal 2: Continue working with up river communities to complete a total removal of Tamarisk from the Arkansas River below the Pueblo Dam.

These goals were reviewed as part of the update process. The County decided to adopt the goals of the 2012 Southeast Colorado Regional Hazard Mitigation Plan.

4 Hazard Identification and Summary

Prowers County's planning team identified the hazards that affect the County and summarized their geographic extent, probability of future of occurrence, potential magnitude, and significance specific to the County. This information for the County, the towns of Bristol, Granada, Hartman, and Wiley, and the Lamar School District is presented in Table 1. The information for the Town of Holly is presented in Table 2. The information for the Town of Lamar is presented in Table 3. A detailed description of each hazard can be found in Section 4.2 Hazard Profiles of the main plan.

The 2003 Prowers County Pre-Disaster Mitigation Plan indicated the following hazards:

Natural Hazards

- Floods
- Blizzards and Severe Winter Storms
- Drought
- Tornadoes and Other Wind Hazards
- Hail and Severe Summer Storms
- Earthquake
- Landslide
- Wild Land/Grassland Fires
- Insects-Grasshoppers and Mosquitoes
- Noxious Weeds

Technical Hazards

- Hazardous Materials Events
- Terrorism/Bio-terrorism
- Cyber Viruses
- Power Failure
- Dam Failure Flooding
- Urban Fires

For this plan, landslides, terrorism/bio-terrorism, and power failure were not considered as hazards in the County. Insects – Grasshoppers and Noxious Weeds are considered in the Agricultural Infestation in this plan. The past hazard Insect – Mosquitoes is given consideration in the Pandemic hazard of this plan. The past hazard Urban Fires are considered along with Wildland/Grassland Fires in the Wildfire hazard in this plan.

Table 1 Prowers County, Town of Hartman, and Lamar School District Hazard Summary

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/Severity	Significance
Agriculture Infestation	Significant	Occasional	Critical	Medium
Dam/Levee Failure	Extensive	Unlikely	Catastrophic	High
Drought	Extensive	Likely	Catastrophic	Medium
Earthquake	Extensive	Unlikely	Catastrophic	Low
Extreme Temperatures: Heat	Extensive	Highly Likely	Catastrophic	Low
Extreme Temperatures: Cold	Extensive	Highly Likely	Catastrophic	Medium
Flood: 100/500 –Year	Significant	Unlikely	Critical	Low
Flood: Stormwater/Flash Flooding	Extensive	Likely	Limited	Medium
Severe Weather: Thunderstorms/Lightning/Hail	Extensive	Highly Likely	Catastrophic	High
Stream Bank Erosion/ Stability	Limited	Occasional	Limited	Low
Subsidence	Limited	Unlikely	Limited	Low
Tornadoes	Limited	Likely	Significant	High
Wildfire	Significant	Significant	Critical	High
Wind Storms	Extensive	Highly Likely	Catastrophic	High
Winter Storms	Extensive	Likely	Catastrophic	High
Civil Unrest	Limited	Unlikely	Negligible	Low
Cyber Hazards	Limited	Occasional	Negligible	Low
Hazardous Materials	Limited	Highly Likely	Catastrophic	Medium
Pandemic	Extensive	Likely	Catastrophic	High

Geographic Extent
Limited: Less than 10% of planning area
Significant: 10-50% of planning area
Extensive: 50-100% of planning area

Probability of Future Occurrences
Highly Likely: Near 100% chance of occurrence in next year, or happens every year.
Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less.
Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Magnitude/Severity
Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths
Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability
Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability
Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid

Significance
Low: minimal potential impact
Medium: moderate potential impact
High: widespread potential impact

Table 2 Town of Holly County Hazard Summary

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/Severity	Significance
Agriculture Infestation	Limited	Unlikely	Negligible	Low
Dam/Levee Failure	Extensive	Occasional	Catastrophic	Medium
Drought	Extensive	Likely	Catastrophic	Medium
Earthquake	Limited	Occasional	Limited	Low
Extreme Temperatures: Heat	Extensive	Occasional	Catastrophic	Medium
Extreme Temperatures: Cold	Extensive	Likely	Catastrophic	Medium
Flood: 100/500 –Year	Extensive	Likely	Catastrophic	Medium
Flood: Stormwater/Flash Flooding	Extensive	Likely	Catastrophic	Medium
Severe Weather: Thunderstorms/Lightning/Hail	Significant	Highly Likely	Catastrophic	Medium/High
Stream Bank Erosion/ Stability	Significant	Occasional	Critical	Medium (based upon eradication program)
Subsidence	Limited	Occasional	Limited	Low
Tornadoes	Significant	Likely	Catastrophic	Medium/High
Wildfire	Significant	Significant	Critical	Medium/High
Wind Storms	Extensive	Highly Likely	Catastrophic	Medium/High
Winter Storms	Significant	Likely	Catastrophic	Medium/High
Civil Unrest	Limited	Unlikely	Negligible	Low
Cyber Hazards	Limited	Occasional	Negligible	Low
Hazardous Materials	Significant	Occasional	Limited	Low
Pandemic	Extensive	Likely	Catastrophic	High

Geographic Extent
Limited: Less than 10% of planning area
Significant: 10-50% of planning area
Extensive: 50-100% of planning area

Probability of Future Occurrences
Highly Likely: Near 100% chance of occurrence in next year, or happens every year.
Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less.
Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Magnitude/Severity
Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths
Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability
Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability
Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid

Significance
Low: minimal potential impact
Medium: moderate potential impact
High: widespread potential impact

Table 3 City of Lamar County Hazard Summary

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/Severity	Significance
Agriculture Infestation	Limited	Occasional	Limited	Low
Dam/Levee Failure	Extensive	Unlikely	Catastrophic	Medium
Drought	Extensive	Likely	Catastrophic	Medium
Earthquake	Extensive	Unlikely	Catastrophic	Low
Extreme Temperatures: Heat	Extensive	Highly Likely	Catastrophic	High
Extreme Temperatures: Cold	Extensive	Occasional	Catastrophic	Medium
Flood: 100/500 –Year	Extensive	Unlikely	Critical	Low
Flood: Stormwater/Flash Flooding	Limited	Likely	Limited	Medium
Severe Weather: Thunderstorms/Lightning/Hail	Extensive	Extensive	Catastrophic	High
Stream Bank Erosion/ Stability	Limited	Limited	Limited	Low
Subsidence	Limited	Limited	Negligible	Low
Tornadoes	Limited	Limited	Limited	Medium
Wildfire	Significant	Significant	Critical	High
Wind Storms	Limited	Extensive	Catastrophic	High
Winter Storms	Limited	Extensive	Catastrophic	High
Civil Unrest	Limited	Unlikely	Negligible	Low
Cyber Hazards	Limited	Occasional	Negligible	Low
Hazardous Materials	Limited	Limited	Limited	Medium
Pandemic	Extensive	Likely	Catastrophic	High

Geographic Extent
Limited: Less than 10% of planning area
Significant: 10-50% of planning area
Extensive: 50-100% of planning area

Probability of Future Occurrences
Highly Likely: Near 100% chance of occurrence in next year, or happens every year.
Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less.
Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Magnitude/Severity
Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths
Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability
Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability
Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid

Significance
Low: minimal potential impact
Medium: moderate potential impact
High: widespread potential impact

4.1 Disaster Declaration History

One method the planning committee used to identify hazards was the researching of past events that triggered federal and/or state emergency or disaster declarations in the planning area. Federal and/or state disaster declarations may be granted when the severity and magnitude of an

event surpasses the ability of the local government to respond and recover. Disaster assistance is supplemental and sequential. When the local government's capacity has been surpassed, a state disaster declaration may be issued, allowing for the provision of state assistance. Should the disaster be so severe that both the local and state governments' capacities are exceeded, a federal emergency or disaster declaration may be issued allowing for the provision of federal assistance.

The federal government may issue a disaster declaration through FEMA, the U.S. Department of Agriculture (USDA), and/or the Small Business Administration (SBA). FEMA also issues emergency declarations, which are more limited in scope and without the long-term federal recovery programs of major disaster declarations. The quantity and types of damage are the determining factors. Federal, state, and USDA disaster declarations for the County are listed in Table 4.

Table 4 Prowers County Disaster and Emergency Declarations, 1965-2010

Year	Declaring Jurisdiction	Disaster Type
2009	State of Colorado*	Severe Blizzard
2009	State of Colorado*	Severe Spring Snowstorm
2008	USDA – Secretarial Designation (S2750)	Drought
2007	Federal – Emergency (3271-EM, 3270-EM)	Snow
2007	State of Colorado	Tornado
2006	State of Colorado	Snow
2005-2006	USDA – Secretarial Designation (S2327)	Drought, Fire, High Winds, Heat
2005	Federal – Emergency (3224-EM)	Hurricane Katrina Evacuation
2004	USDA – Secretarial Designation (S1947)	Drought, Freeze, Hail
2003	USDA – Secretarial Designation (S1797)	Drought
2002	State of Colorado*	Snow Emergency
2002	State of Colorado*	Drought
2002	State of Colorado*	WIldfires
2002	USDA – Secretarial Designation (S1643)	Drought
2001	Federal – Major Disaster (1374-DR)	Severe Winter Storms
2001	USDA – Secretarial Designation (S1514)	Drought
1999	Federal – Major Disaster (1276-DR)	Flooding
1997	Federal – Emergency	Heavy Flash Flooding
1997	State of Colorado	Flooding
1977	Federal – Major Disaster	Drought
1965	Federal – Major Disaster (200-DR)	Tornadoes, Severe Storms, and Flooding

Source: Colorado State Hazard Mitigation Plan; Colorado Governor's Office website, Federal Emergency Management Agency, PERI Presidential Disaster Declaration Site; U.S. Department of Agriculture.
*All counties in the state were proclaimed disaster areas by the Governor.

4.2 National Severe Weather Databases

The National Oceanic and Atmospheric Administration's National Climatic Data Center (NCDC) has been tracking severe weather since 1950. Their Storm Events Database tracks severe weather events on a county basis and contains data on the following: all weather events from 1993 to current (except from 6/1993-7/1993); and additional data from the Storm Prediction Center, which includes tornadoes (1950-1992), thunderstorm winds (1955-1992), and hail (1955-1992). This database contains 310 severe weather events that occurred in Prowers County between January 1, 1950, and April 31, 2010. Table 5 summarizes these events.

Table 5 NCDC Hazard Events Report for Prowers County

Type	# of Events	Property Loss ($)	Crop Loss ($)	Deaths	Injuries
Blizzard	2	0	0	0	0
Flash Flood	13	70,000	0	0	0
Funnel Cloud	9	0	0	0	0
Hail	216	5,060,000	500,000	0	0
Heavy Rain/Flood	1	0	0	0	0
Heavy Snow	1	0	0	0	0
High Wind	11	100,000	0	0	0
Ice Storm	1	0	0	0	0
Lightning	1	0	0	1	3
Microburst Winds	1	0	0	0	0
Thunderstorm Winds	64	66,000	0	0	0
Tornado	71	4,589,000	0	2	10
Urban/Small Stream Flood	1	0	0	0	0
Wildfire/Forest Fire	3	15,000	0	0	0
Winter Storm	2	0	0	0	0
Winter Weather	1	0	0	0	0
Totals	**398**	**9,900,000**	**500,000**	**3**	**13**

Source: NCDC

The HMPC supplemented NCDC data with data from SHELDUS (Spatial Hazard Events and Losses Database for the United States). SHELDUS is a county-level data set for the United States that tracks 18 types of natural hazard events along with associated property and crop losses, injuries, and fatalities for the period 1960-2005. Produced by the Hazards Research Lab at the University of South Carolina, this database combines information from several sources (including the NCDC). From 1960 to 1995, only those events that generated more than $50,000 in damage were included in SHELDUS. For events that covered multiple counties, the dollar losses, deaths, and injuries were equally divided among the affected counties (e.g., if four counties were affected, then a quarter of the dollar losses, injuries, and deaths were attributed to each county). From 1995 to 2005, all events that were reported by the NCDC with a specific dollar amount are included in SHELDUS.

SHELDUS contains information on 202 severe weather events that occurred in Prowers County between 1960 and 2009. Table 6 summarizes these events.

Table 6 SHELDUS Hazard Events for Prowers County,1960-2009

Hazard	Number	Injuries	Fatalities	Property Damage	Crop Damage
Drought	2	0	0	0	2,193,396
Flooding	4	0	1.08	7,297,972	327,272.70
Flooding –Severe Storm/Thunder Storm – Winter Weather	1	0	0	793.65	0
Fog – Winter Weather	1	0	0	22,727.27	0
Hail	16	0	0	5,151,442	1,700,167
Hail – Lightning	1	.08	0	41.67	4,166.67
Hail - Lightning - Severe Storm/Thunder Storm	1	0	0	416.67	4,166.67
Hail - Lightning - Wind	3	.17	0	2,395.84	23,958.34
Hail - Severe Storm/Thunder Storm	14	.08	0	103,214.60	441,724.90
Hail - Severe Storm/Thunder Storm - Tornado	2	0	0	62,833.33	62,833.33
Hail - Severe Storm/Thunder Storm – Wind	8	0	0	36,893.53	564,810.20
Hail - Severe Storm/Thunder Storm - Winter Weather	1	0	0	1,923.08	0
Hail – Tornado	1	0	0	5,150,000	0
Hail - Wind	11	1.25	0	67,079.56	137,045.50
Lightning	4	3.1	1	5,050	0
Lightning - Severe Storm/Thunder Storm	1	.07	0	172.41	0
Lightning - Wind	2	0	0	176.58	4,166.67
Lightning - Winter Weather	1	0	0	416.67	0
Severe Storm/Thunder Storm	9	0	.08	490,414.90	459,666.70
Severe Storm/Thunder Storm - Tornado – Wind	1	0	0	500	0
Severe Storm/Thunder Storm – Wind	4	0	0	75,250	2,500
Severe Storm/Thunder Storm - Wind - Winter Weather	1	0	0	79.37	0
Tornado	13	9	2	4,318,425	0
Tornado – Wind	1	0	0	25	0
Wildfire	1	0	0	15,000	0

Hazard	Number	Injuries	Fatalities	Property Damage	Crop Damage
Wind	50	8.03	0	1,349,399	254,783.50
Wind - Winter Weather	20	.06	.18	266,870.80	185,112.80
Winter Weather	28	.73	.27	1,199,068	2,597,848
Totals	**202**	**22.57**	**4.61**	**25,618,580.93**	**8,963,618.98**

Source: SHELDUS, Hazards Research Lab, University of South Carolina, www.sheldus.org/
Events may have occurred over multiple counties, so damage may represent only a fraction of the total event damage and may not be specific to Prowers County.

The NCDC and SHELDUS tables above summarize severe weather events that occurred in Orange County. Only a few of the events actually resulted in state and federal disaster declarations. It is interesting to note that different data sources capture different events during the same time period, and often different information specific to the same events. While the HMPC recognizes these inconsistencies, it is the value this data provides in depicting the County's "big picture" hazard environment.

5 Prowers County Vulnerability Assessment

The intent of this section is to assess the County's vulnerability separate from that of the planning area as a whole, which has already been assessed in Section 4.3 Vulnerability Assessment in the main plan. This vulnerability assessment analyzes the population, property, and other assets at risk to hazards ranked of medium or high significance that may vary from other parts of the planning area. For more information about how hazards affect the Region as a whole, see Chapter 4 Risk Assessment in the main plan.

5.1 Assets at Risk

This section identifies the County's assets at risk, including values at risk, critical facilities and infrastructure, historic assets, economic assets, and growth and development trends. The data source used was the HAZUS-MR4 databases. The HAZUS building exposure (includes building counts, value of building structure and contents) is shown in Table 7. A breakdown of the building count by type can be found in Table 8.

Table 7 Prowers County Building Exposure

City	Population	Building Count	Building Exposure ($)	Building Content ($)	Total Exposure
Granada	640	360	25,857,000	16,152,000	42,009,000
Hartman	111	67	6,377,000	4,051,000	10,428,000
Holly	1,027	605	62,418,000	40,771,000	103,189,000
Lamar	8,869	4,482	529,673,000	361,815,000	891,488,000
Wiley	483	260	23,530,000	15,246,000	38,776,000
Unincorporated	3,353	2,159	189,832,000	126,806,000	316,638,000
Total	**14,483**	**7,933**	**837,687,000**	**564,841,000**	**1,402,528,000**

Table 8 Prowers County Building Exposure by Type

Occupancy Type	Building Count	Value ($)
Agriculture	116	21,869,000
Commercial	358	151,225,000
Education	15	16,571,000
Government	20	13,115,000
Industrial	83	44,391,000
Religion	39	18,092,000
Residential	7,302	299,578,000
Total	**7,933**	**564,841,000**

Critical Facilities and Infrastructure

An inventory of critical facilities in Prowers County is provided below in Table 9. The table includes data from available national and statewide GIS resources (locations are illustrated in Figure 2) supplemented with information from the County planning committee.

Table 9 Critical Facilities Inventory

Facility Type	Facility County
Airport	1
Bridges	123
Bridges – Scour Critical	13
Communications Facilities	2
Dams	1
Emergency Operations Centers	1
Fire Stations	6
Hazardous Materials Facilities	3
Health Facilities	1
Natural Gas Facilities	1
Oil Facilities	1
Police	6
Power Plants	20
Schools	14
State Assets	64
Waste Water Facilities	1
Total	**258**

Locally Determined Facilities

In addition to the critical facilities mapped in GIS, Prowers County, in their Data Collection Guides, identified the following assets as important to the community. These assets include critical facilities and infrastructure; natural, cultural, and historical assets; and economic assets.

Table 10 Prowers County Asset Inventory

Name of Asset	Type	Replacement Value	Occupancy/ Capacity #	Comments
Prowers County Rural Fire	Public	$2,500,000	40	
PMC	Public	$5,000,000	45	
Prowers Road and Bridge	Public	$5,000,000	30	
Prowers County Courthouse	Public	$10,000,000	200	
Prowers County Annex	Public	$4,000,000	100	
Lamar Light and Power	Public	$190,000,000	10,000	
Southeast Colorado Power	Private	$100,000,000	4500	
Alta Vista School	Public	$1,500,000	120	
John Martin Dam	Public	$50,000,000	4000	
Prowers County Comm E911	Public	$3,000,000	14,583	
Prowers County Sheriff	Public	$5,000,000	125	
Water Assoc/Districts	Private	$2,500,000	2000	
Feed Lots	Private	$6,000,000	40	
Grocery Stores	Private	$5,000,000	14,583	
Atmos Energy	Private	$10,000,000	14,583	
UPS/USPS Shipping Companies	Private	$500,000	16,000	
Century link	Private	$500,000,000	14,583	
Prowers Sheriff	Public	$2,000,000	6,000	
Lamar Municipal Airport	Public	$8,000,000	3,000	
US Highways 50 and 287	Public	$500,000,000	50,000	
County Roadways and Bridges	Public	$75,000,000	4,500	
BNSF Railway and Amtrak	Private	$1,000,000,000	N/A	
Century Tel	Private	$50,000,000	N/A	

Name of Asset	Type	Replacement Value	Occupancy/ Capacity #	Comments
Underground Facility				
Arkansas River Bridges	Public	$4,000,000	20,000	
Waste Water Systems	Public	$10,000,000	5,000	
Radio Broadcast	Private	$5,000,000	20,000	
Financial Institutions	Private	N/A	14,583	
Prowers Area Transit and School Busing	Public	$3,000,000	10,000	

Historic and Natural Assets

Assessing the vulnerability of Prowers County to disaster also involves inventorying the historic, cultural, and natural assets of the area. This step is important for the following reasons:

- The community may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.
- If these resources are impacted by a disaster, knowing so ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts are higher.
- The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.
- Natural resources can have beneficial functions that reduce the impacts of natural hazards, for example, wetlands and riparian habitat help absorb and attenuate floodwaters.

Historic Assets

The County has a stock of historically significant homes, public buildings, and landmarks. To inventory these resources, the planning committee collected information from a number of sources. The Colorado Historical Society's (CHS) Colorado State Register of Historic Properties was the primary source of information. The CHS is responsible for the administration of federally and state mandated historic preservation programs to further the identification, evaluation, registration, and protection of Colorado's irreplaceable archaeological and historical resources.

In addition, the National Register of Historic Places database was used. The National Register of Historic Places is the Nation's official list of cultural resources worthy of preservation. The National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect historic and archeological resources. Properties listed include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archeology, engineering, and culture. The National Register is administered by the National Park Service, which is part of the U.S. Department of the Interior.

Historical resources included in the programs above are identified in Table 11.

Table 11 Prowers County Historic Properties

Property	Location	National Register	State Register
Douglas Crossing Bridge	County Rd. 28, Granada	2/4/1985	5PW.44
Granada Bridge	US Hwy. 385, Granada vicinity	10/15/2002	5PW.114
Granada Relocation Center/Camp Amache	Approximately 1 mile southwest of Granada	National Register 5/18/1994, National Historic Landmark, 1/16/2009	5PW.48
Hartman Gymnasium	School Ave. Hartman	-	5PW.74
Holly City Hall	119 E. Cheyenne St., Holly	10/11/2003	5PW.175
Holly Gymnasium	North Main Street, Holly	4/24/2007	5PW.268
Holly SS Ranch Barn	407 W. Vinson	2/25/2004	5PW.172
Holly Santa Fe Depot (Town Hall)	302 S. Main St.	7/28/1995	5PW.73
Alta Vista School	8785 Road LL, vicinity of Lamar	-	5PW.42
Davies Hotel/Payne Hotel	122 N. Main St. Lamar	10/19/1978	5PW.25
Lamar Post Office	300 S. Fifth St. Lamar	National Register 1/22/1986,	5PW.43
Paulsen Farm	39035 Rd. 7, Lamar vicinity	12/9/1999	5PW.98
Petticrew Stage Stop	Lamar vicinity	8/24/2000,	5PW.62
Prowers County Building/Prowers County Courthouse	301 S. Main St. Lamar	9/21/1981	5PW.27
Willow Creek Park	Memorial Drive, Parkview Ave. and Willow Valley Rd., Lamar	8/10/2007	5PW.56
Wiley Rock Schoolhouse	603 Main St. Wiley	2/20/2004	5PW.196

Source: Colorado State Register of Historic Properties

Natural Assets

Natural resources are important to include in benefit-cost analyses for future projects and may be used to leverage additional funding for mitigation projects that also contribute to community goals for protecting sensitive natural resources. Awareness of natural assets can lead to opportunities for meeting multiple objectives. For instance, protecting wetlands areas protects sensitive habitat as well as stores and reduces the force of floodwaters.

Information from the U.S. Fish and Wildlife Service and the Colorado Division of Wildlife, a program that inventories the status and locations of rare plants and animals in Colorado, was combined to create an inventory of special-status species in Prowers County. Table 12 lists national and state endangered, threatened, rare, and candidate species in the County by species type.

Table 12 Sensitive Plant and Animal Species in the Planning Area

Group	Name	Population	Status	Lead Office	Recovery Plan Name	Recovery Plan Stage
Birds	Arctic peregrine Falcon (Falco peregrinus tundrius)		Recovery			
Birds	Mountain plover (Charadrius montanus)		Proposed Threatened			
Birds	Piping Plover (Charadrius melodus)	except Great Lakes watershed	Threatened	Office Of The Regional Director	Piping Plover Atlantic Coast Population Revised Recovery Plan	Final Revision 1
Birds	Piping Plover (Charadrius melodus)	except Great Lakes watershed	Threatened	Office Of The Regional Director	Great Lakes & Northern Great Plains Piping Plover	Final
Birds	Least tern (Sterna antillarum)	interior pop.	Endangered	Columbia Ecological Services Field Office	Least Tern (Interior Pop.)	Final
Birds	Lesser prairie-chicken (Tympanuchus pallidicinctus)		Candidate	Oklahoma Ecological Services Field Office		
Fishes	Arkansas darter (Etheostoma cragini)		Candidate	Kansas Ecological Services Field Office		
Mammals	Black-footed ferret (Mustela nigripes)	U.S.A. (specific portions of AZ, CO, MT, SD, UT, and WY)	Experimental Population, Non-Essential	Office Of The Regional Director		

Source: US Fish and Wildlife Service, Colorado Division of Wildlife

Development Trends

Development increases and decreases at slow rates within the County not exceeding 15,000. A rise in the eastern portion of the county may be anticipated when construction begins on a multi year power plant project. The population in various cities and towns does see an increase during special events such as ball tournaments, rodeos, fairs and other attractions, some events may have not taken into consideration for emergency actions. It may be challenging to notify these visitors during a hazard event due their unfamiliarity of where to gain emergency information and where to go for shelter. A community north of Lamar, called Kornman, has shown some signs of growing currently with a population of approximately 100 citizens and 30 homes. There are no building codes in unincorporated Prowers County and some towns have been adopted possibly allowing ill advised building and construction practices.

Development and growth in the Town of Lamar appears to be headed predominantly in a southern direction. This minimizes exposure to possible floods, but this area could be subjected to a greater potential for tornadoes

Development of the Town of Wiley had moved eastward with the construction of various homes in the late 90s early 2000. Building has stabilized. The population does see a daily increase during special events such as ball tournaments, rodeos, fairs and other attractions, some events may have not taken into consideration for emergency actions. It may be challenging to notify these visitors during a hazard event due their unfamiliarity of where to gain emergency information and where to go for shelter. No building codes in Wiley exists possibly which may allow ill advised building and construction practices to take place.

5.2 Agricultural Infestation Vulnerability Assessment

Agriculture is an important aspect of the County's economy. The following discussion analyzes the potential losses from floods using HAZUS and multiple hazards from federal crop insurance records.

Crop Insurance Analysis

Federal Crop Insurance Data represents losses from multiple hazards that could include: agricultural infestation, flooding, drought, hailstorms, temperature extremes, tornados, wildfires and straight-line winds. Average annual claims payout amount to $2.4 million in the County. More details are provided in Table 13 and 14.

Table 13 Prowers County Premium and Crop Loss Data for Federal Crop Insurance 1980-2009

Liability (Amount of Coverage)	Total Premium	Federal Premium Subsidy	Farmer-paid Premium	Amount Paid in Claims	Average Amount Paid Annually in Claims
312,116,556	63,039,198	35,882,399	27,156,799	73,253,077	2,441,769

Source: Risk Management Agency

Table 14 Prowers County Provisional Data (claim data unavailable as 2010 claims are not fully reported)

Liability (Amount of Coverage)	Total Premium	Federal Premium Subsidy	Farmer-paid Premium
28,218,360	6,704,553	4,119,420	2,585,133

Source: Risk Management Agency

Flood Analysis

HAZUS Methodology for Agricultural Economic Loss

The HAZUS Flood Model is determined by the relationships between the depth of flood and the annual chance of flood inundation to that depth. The primary elements that contribute to flood losses are depth, duration and velocity of the water in the floodplain. The other risks with flooding that assist with flood loss are channel erosion and migration, sediment deposition, bridge scour and the impact of flood-borne debris.

The agriculture component of the HAZUS Flood Model estimated a range of losses to barley, corn, corn silage, oats, and wheat. These crops were the only crops identified by the HAZUS model to have loss within the region of study. The model assumes a short duration and slow rise flood when estimating losses and does not account for high velocity flash floods. Loss estimates are based on United States Army Corp of Engineers (USACE) damage modifiers. The HAZUS-MH impact analysis predicts a loss estimate value by crop for flow time intervals. The first is a loss estimate for the day of the fixed event; the remaining three are for 3, 7 and 14 days following the event.

Prowers County does not have any estimated range of losses within the HAZUS Flood Model.

5.3 Dam and Levee Failure Vulnerability Assessment

According to HAZUS MR4, there is no high and 1 significant hazard dam in the County. Table 15 indicates how dam failure risk varies among communities in the County. The locations of these dams are shown in Figure 1.

Table 15 Hazardous Dams in Prowers County

Dam Name	Max Storage (acre ft)	Dam Hazard	Downstream Community	Miles to Community	Relative Downstream Impacts
Thurston Lake CO01851	4,550	Significant	Lamar	10	Limited

Source: HAZUS MR4

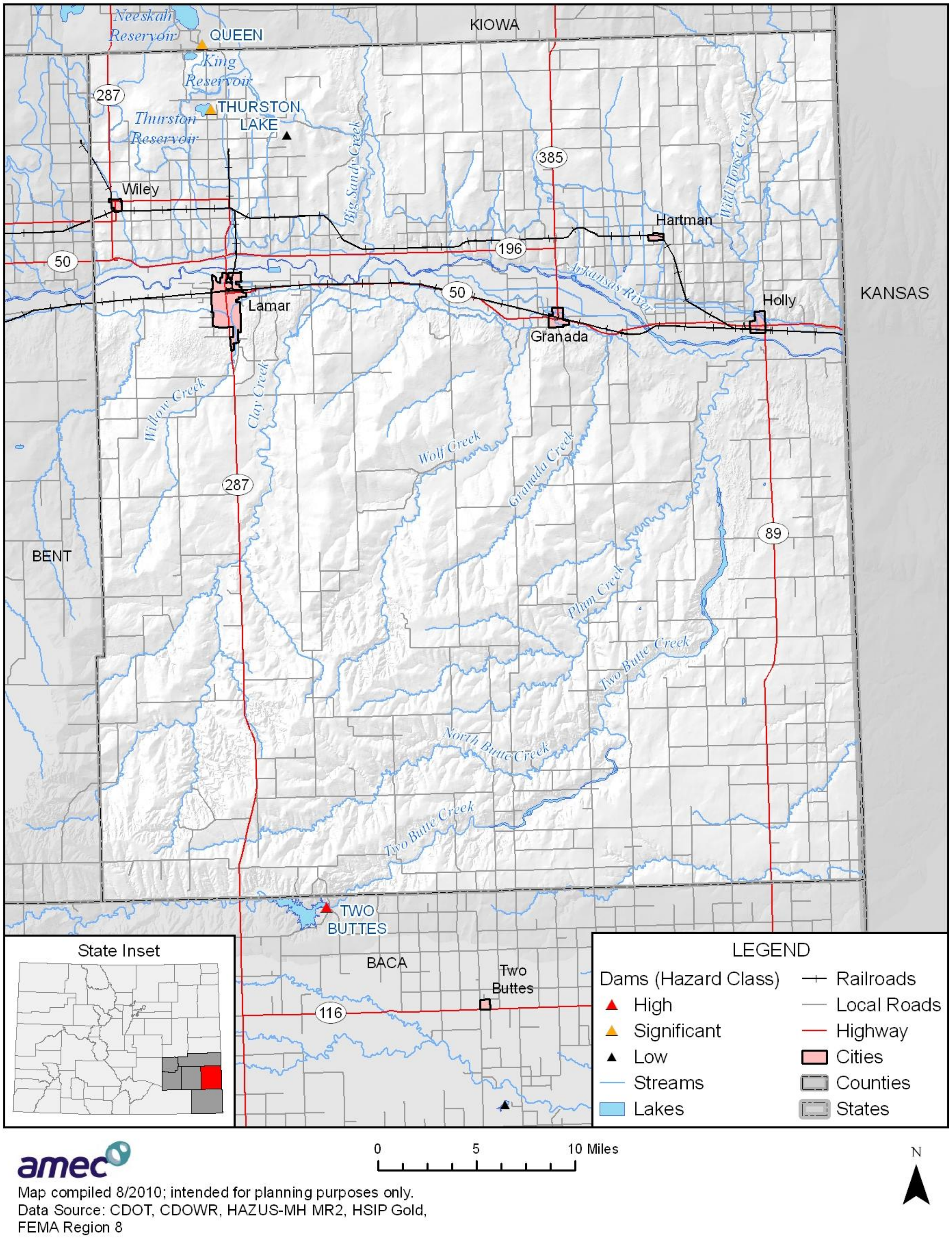
The City of Granada, the Town of Holly, and the Town of Lamar are protected by levees. The HAZUS flood modeling does not take into account the existing levee protection, and thus the flood loss potential mentioned previously represents a levee failure event.

The Wolf Creek Channel levee protects the Town of Granada from flooding on the Wolf Creek Channel. The South Granada Ditch levee protects the Town of Granada from flooding on the South Granada Ditch.

The Town of Holly & Wild Horse Creek East protects the Town of Holly from flooding on the Arkansas River. The Town of Holly & Wild Horse Creek West protects the Town of Holly from flooding on the Wild Horse Creek. The Town of Holly & Wildlife Area protects the Town of Holly from flooding on the Wild Horse Creek.

The Town of Lamar & Willow Creek North and South protect the City of Lamar from flooding on the Willow Creek.

Figure 1 Significant and High Hazard Dams in Prowers County



5.4 Drought Vulnerability Assessment

Based on the County's recent multi-year droughts and Colorado's drought history, it is evident that the entire region is vulnerable to drought. With the majority land area in the County used for agricultural purposes, the County has significant exposure to this hazard. In addition to economic and public water supply impacts, soil erosion, dust, and wildfire hazard are also exacerbated by drought conditions. Prowers County has been affected by the droughts in the years identified in Table 16.

Table 16 Drought Disaster and Emergency Declarations in Otero County

Year	Declaring Agency and Declaration Number
2008	USDA Secretarial Declaration S2750
2005 - 2006	USDA Secretarial Declaration S2327
2004	USDA Secretarial Declaration S1947
2003	USDA Secretarial Declaration S1797
2002	USDA Secretarial Declaration S1643 State of Colorado
2001	USDA Secretarial Declaration S1514
1977	Federal – Major Disaster

Source: USDA, CDEM, FEMA

While the crop insurance loss data covers a variety of perils, it is indicative of the types of agricultural impacts that drought can have upon the planning area. Available crop insurance data indicates over $73 million has been paid to the County's agricultural landowners in insurance claims between 1980 and 2009. It is reasonable to assume that a significant amount of this is due to drought-related losses. While the crop insurance loss data covers a variety of perils, it is indicative of the types of agricultural impacts that drought can have upon the planning area. Assuming at least 50% of the losses are drought-related, an average annual loss estimate can be calculated. For the region this is calculated by ($73,253,000/2)/29years, which equates to over $1,262,000 in average annual agricultural losses for the County.

5.5 Extreme Temperatures: Extreme Cold Vulnerability Assessment

Limited data on temperature extreme impacts per County was available during the development of this hazard's profile. Extreme cold normally does not impact structures, but is a life safety issue. Areas prone to excessively cold temperatures are identified normally on a nation-wide assessment scale, which doesn't allow detailed results on specific structures. Secondary impacts of extreme cold can affect the supporting mechanisms or systems of a community's infrastructure. For example, when extreme cold is coupled with high winds or ice storms, power lines may be downed, resulting in an interruption in the transmission of that power shutting down electric furnaces, which may lead to frozen pipes in homes and businesses.

The elderly population in the planning area is most vulnerable to temperature extremes. Table 2.4 in Chapter 2 shows that the percentage of elderly people (age 65 or over) in the planning area is well above the national average, which is 6%. 12.6% of Prowers County's population is over 65. However many residents of southeast Colorado are self sufficient and accustomed to rural living and the climate extremes that are part of the territory. The residents of nursing homes and elder care facilities are especially vulnerable to extreme temperature events. It is encouraged that such facilities have emergency plans or backup power to address power failure during times of extreme cold.

5.6 Flood Vulnerability Assessment (100/500-Year and Localized)

The best available flood data for Prowers County was generated by HAZUS-MH MR4 by FEMA Region VIII, FEMA's software program for estimating potential losses from disasters. The 100-year floodplain was generated for major rivers and creeks in the county (those with a 10 square mile minimum drainage area). A USGS 30 meter resolution digital elevation model (DEM) was used as the terrain base in the model. HAZUS-MH produces a flood polygon and flood-depth grid that represents the base flood. While not as accurate as official flood maps, such as digital flood insurance rate maps, these floodplain boundaries are suitable for use in GIS-based loss estimation. Potential losses to the county were analyzed with HAZUS-MH, based on Census Block-based buildings and population inventory and the flood hazard data. The following discussion, maps and tables presents the results of the loss estimation in more detail.

Figure 2 Prowers County 100-year Floodplain and Critical Facilities Map

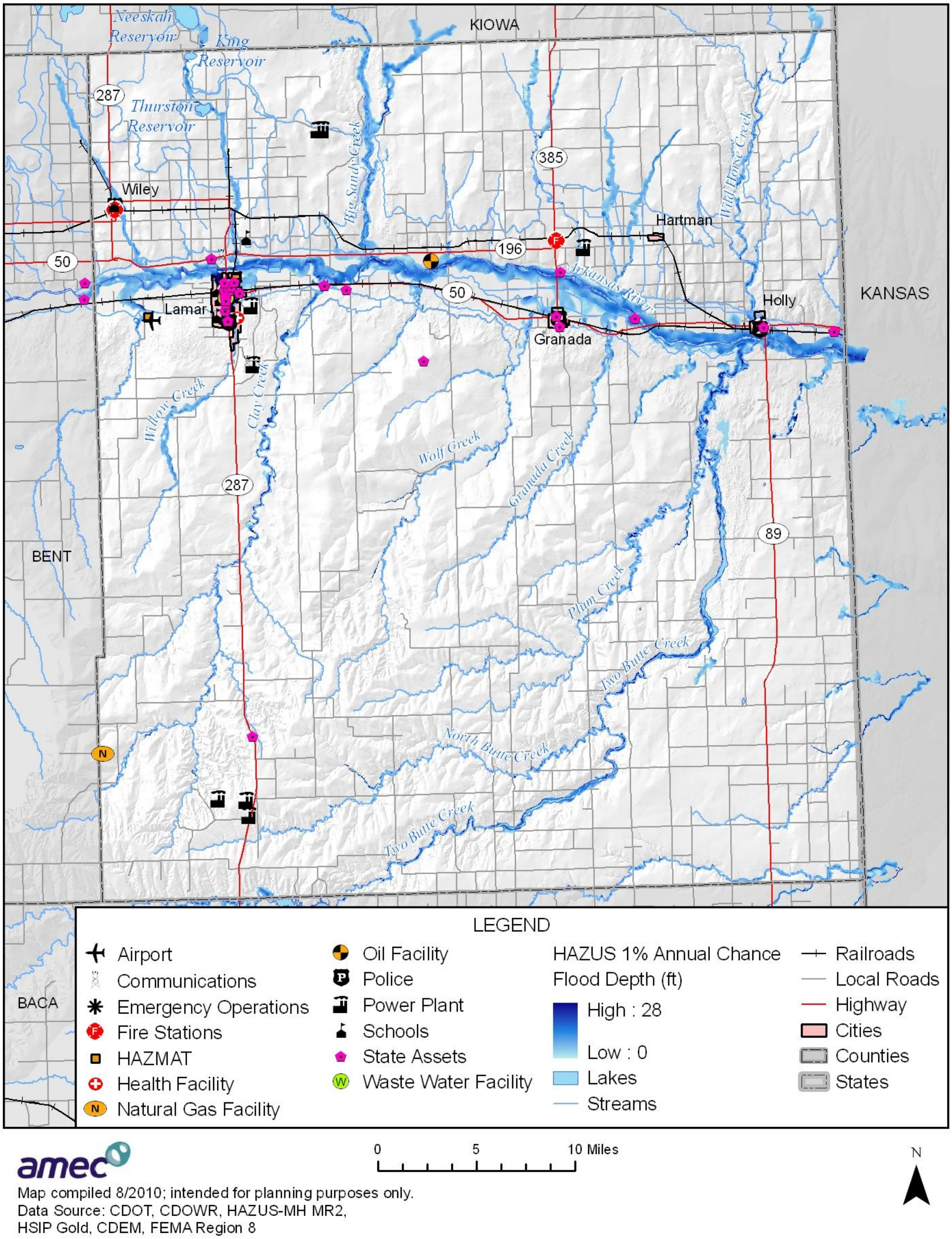
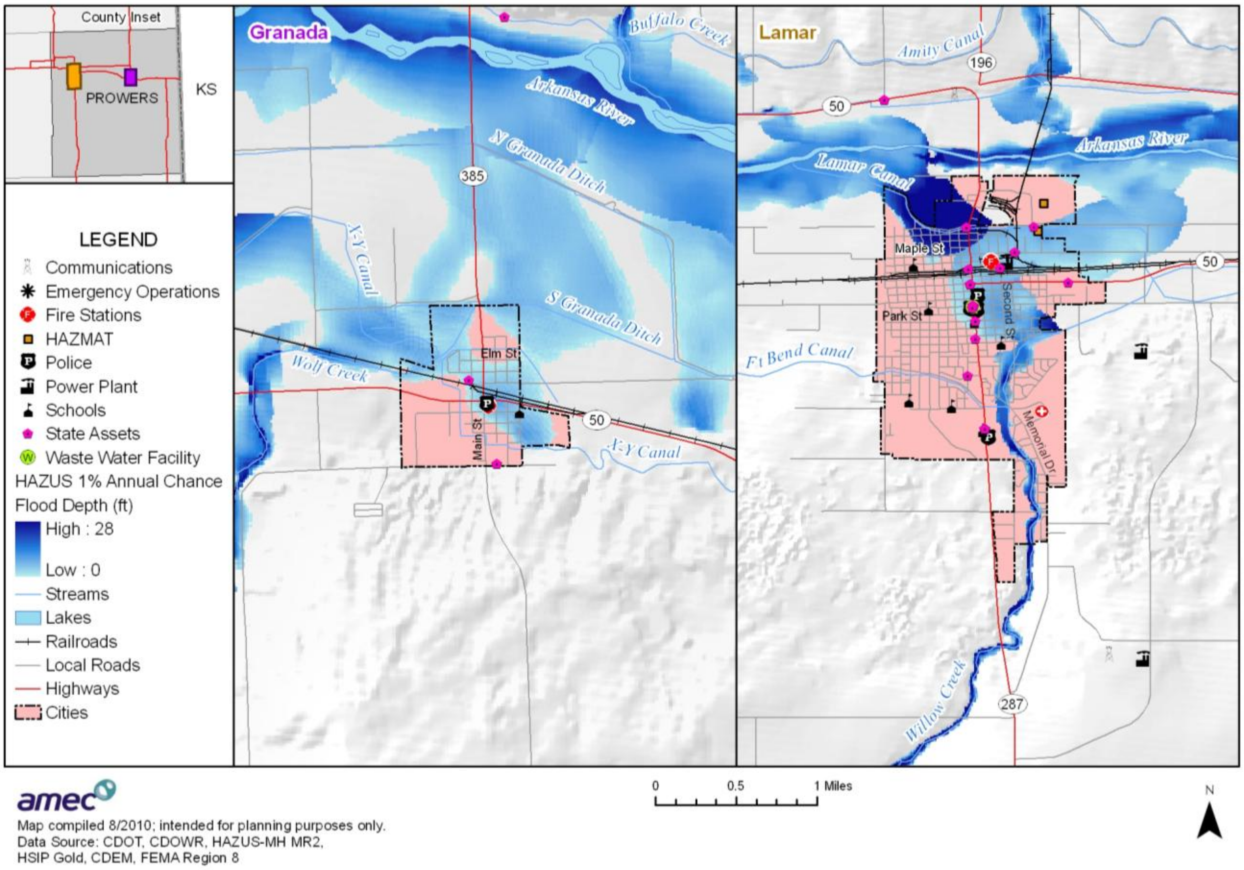


Figure 3 Prowers County Cities 100-year Floodplain and Critical Facilities Map



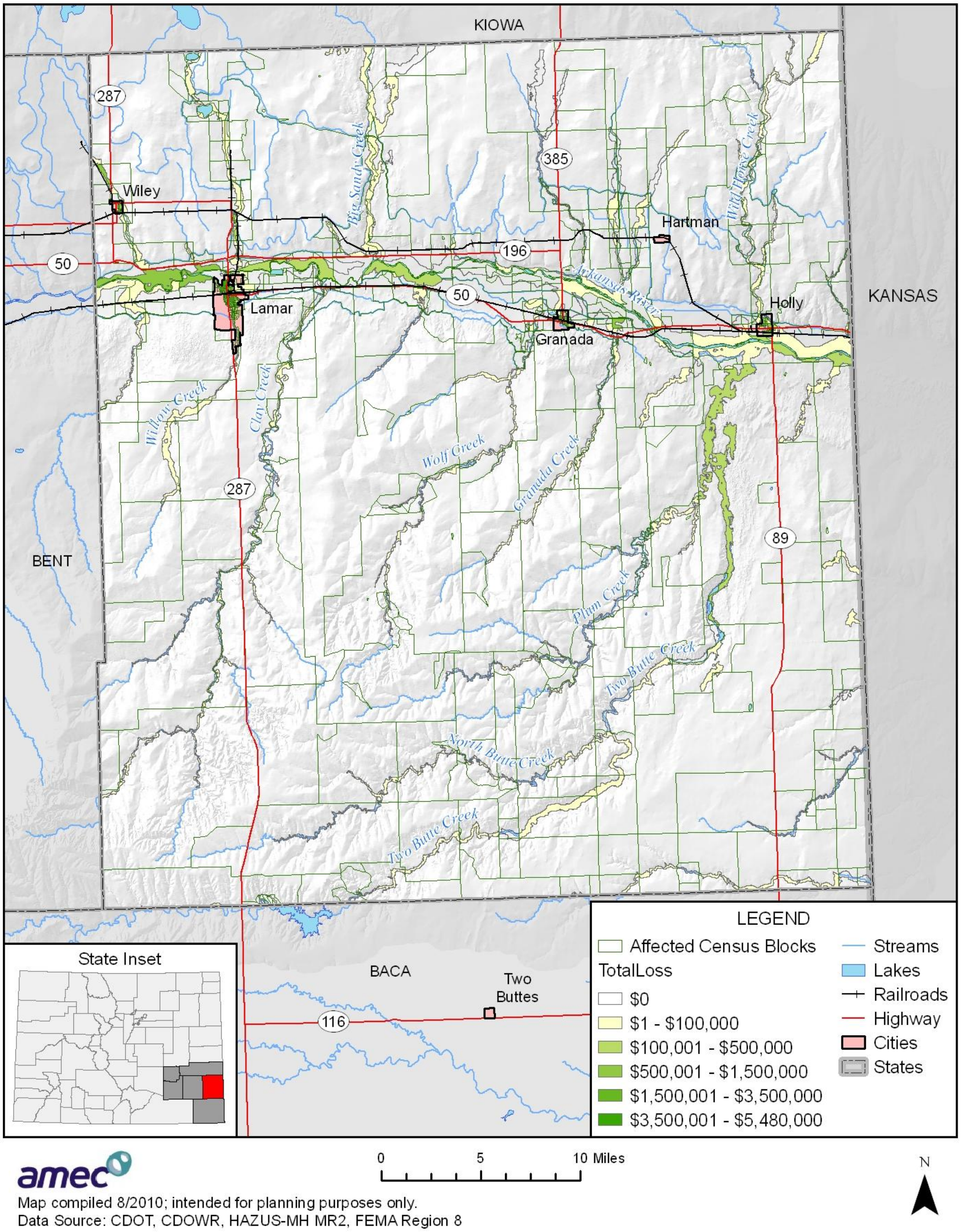
HAZUS-MH provides reports on the number of buildings impacted, estimates of the building repair costs, and the associated loss of building contents and business inventory. Building damage can cause additional losses to a community as a whole by restricting the building's ability to function properly. Income loss data accounts for business interruption and rental income losses as well as the resources associated with damage repair and job and housing losses. These losses are calculated by HAZUS-MH using a methodology based on the building damage estimates. Building damage is estimated by Census Block based on the average depth of flooding within a given Census Block. Flood damage is directly related to the depth of flooding. HAZUS-MH uses depth-damage functions to model the losses. For example, a two-foot flood generally results in about 20 percent damage to the structure (which translates to 20 percent of the structure's replacement value). To estimate the monetary loss for each city, the flooded Census Blocks were extracted, and the damage costs were totaled using GIS. This was done for each city and unincorporated area to illustrate how the risk varies across the planning area. The results of this are shown in Table 17.

Table 17 Estimated Economic Losses from Flooding

Jurisdiction	Cost Building Damage	Cost Contents Damage	Inventory Loss	Relocation Loss	Capital Related Loss	Wage Loss	Total Loss	Percent of Total Loss	Loss Ratio
Granada	973,000	2,099,000	92,000	1,000	10,000	59,000	3,234,000	3%	8%
Hartman	-	-	-	-	-	-	-	-	-
Holly	6,032,000	9,100,000	504,000	16,000	28,000	153,000	15,839,000	14%	15%
Lamar	33,059,000	46,730,000	1,862,000	169,000	212,000	1,019,000	83,121,000	74%	9%
Wiley	1,073,000	731,000	16,000	4,000	-	1,000	1,825,000	2%	5%
Unincorporated	3,994,000	4,558,000	211,000	7,000	10,000	36,000	8,819,000	8%	3%
Total	**45,131,000**	**63,218,000**	**2,685,000**	**197,000**	**260,000**	**1,268,000**	**112,838,000**	**100%**	**8%**

The building damage loss ratio shown in Table 17 is an indication of the community's ability to recover after an event. Building Damage Loss Ratio percent is calculated by taking the Building Structural Damage divided by Building Structural Value and then multiplying by 100. Loss ratio exceeding 10% are considered significant by FEMA. The area with the highest building damage loss ratio is the City of Holly.

Figure 4 Prowers County Building Loss in the 100-year Floodplain



According to HAZUS-MH, the City Lamar has the greatest flood risk and majority of the damage with $83,121,000. Holly has the second highest flood risk with $15,839,000 in damages. The map in Figure 4 displays the distribution of the flood loss by Census Block across the County. According to the map in Figure 2 the majority of potential flood impacts in the unincorporated County is located on the Arkansas River which flows through the northern part of Otero County.

Floodplain Population Information

Should a 1% chance flood occur in the county, some residences would become uninhabitable during and after the flood. Table 18 shows the number of residents in Prowers County who would be displaced or need shelter.

Table 18 Population Displaced by Flooding

Jurisdiction	Displaced Population	Population Needing Shelter
Granada	331	73
Hartman	-	-
Holly	443	304
Lamar	2,904	2,218
Wiley	234	130
Unincorporated	374	72
Total	4,286	2,797

Critical Facilities

Critical facilities in the floodplain were determined using GIS, by selecting all critical facilities that fell within the floodplain. These are listed in Table 19 and shown on the maps in Figure 2 and Figure 3.

Table 19 Critical Facilities in the Floodplain

Location	Facility Type	Facility County
Granada	Fire Stations	1
Granada	Police	1
Granada	Schools	2
Granada	State Assets	1
Holly	Fire Stations	1
Holly	Police	1
Holly	Schools	1
Holly	State Assets	2
Lamar	Fire Stations	2

Location	Facility Type	Facility County
Lamar	HAZMAT	1
Lamar	Police	3
Lamar	Power Plant	8
Lamar	Schools	1
Lamar	State Assets	17
Lamar	Waste Water Facility	1
Unincorporated	State Assets	7
Total		**50**

Prowers County Scour Critical Bridges

Included with HSIP Gold data is a database of bridges called the National Bridge Inventory developed by the Federal Highway Administration. Within the bridge layer one of the attribute items is a "scour index", which is used to quantify the vulnerability of a bridge to scour during a flood. Bridges with scour index between 1 and 3 are considered "scour critical", or a bridge with a foundation element determined to be unstable for the observed or evaluated scour condition.

There are 13 scour critical bridges in Prowers County. They are all located on one US Highway and county roads that travel through Prowers County. Two scour critical bridges are located southeast of Wiley on County Road MM at the intersections of Pleasant Valley Drainage Ditch and Wiley Drain Ditch. One is located on US 50 just north of Lamar at the intersection of a unnamed creek. One scour critical bridge is located west of Hartman on County Road KK at the intersection of Buffalo Creek. One is located northeast of Holly at County Road HH and Cheyenne Creek. One is located south of Lamar on County Road 3 at the intersection of Cat Creek. Two scour critical bridges are located on County Road 16 in south Prowers County at the intersections of an unnamed creek and North Butte Creek. Five are located south of Granada, two on County Road 19 at the intersections of Granada Creek and Wolf Creek. One is on County Road X at the intersection of Granada Creek. One scour critical bridge is located on County Road 22 at North Plum Creek with another one on County Road 26 at the intersection of Plum Creek. The locations of these bridges are shown in Table 20.

Table 20 Scour Critical Bridges

Name	Owner	Stream	Near City
County Road 16	County Highway Agency	No Name	South Prowers County
County Road 16	County Highway Agency	North Butte Creek	South Prowers County
County Road 19	County Highway Agency	Granada Creek	Granada
County Road 19	County Highway Agency	Wolf Creek	Granada
County Road 22	County Highway Agency	North Plum Creek	Granada
County Road 26	County Highway Agency	Plum Creek	Granada
County Road 3	County Highway Agency	Cat Creek	Lamar

Name	Owner	Stream	Near City
County Road HH	County Highway Agency	Cheyenne Creek	Holly
County Road KK	County Highway Agency	Buffalo Creek	Hartman
County Road MM	County Highway Agency	Wiley Drain Ditch	Wiley
County Road MM	County Highway Agency	Pleasant Valley Drainage Ditch	Wiley
County Road X	County Highway Agency	Granada Creek	Granada
US 50	State Highway Agency	No Name	Lamar

NFIP Claims Analysis

Policies and Claims Information

Prowers County joined the NFIP on July 1, 1986. There are currently 17 policies in force in Prowers County. There is currently $2,021,500 of flood insurance in force in the County. There have been 7 flood insurance claims, totaling $2,782.59 in claims paid.

The City of Lamar joined the NFIP on November 17, 1982. There are currently 32 policies in force in the City. There is currently $4,922,900 of flood insurance in force in the City. There have been 12 flood insurance claims, totaling $ 6,746.63 in claims paid.

The Town of Granada joined the NFIP on September 24, 1984. There are currently 2 policies in force in the Town. There is currently $420,000 of flood insurance in force in the Town. There have been no flood insurance claims.

The Town of Holly joined the NFIP on May 20, 1983. There are currently 6 policies in force in the Town. There is currently $1,236,100 of flood insurance in force in the Town. There have been no flood insurance claims.

Repetitive Loss Properties

There are no repetitive loss properties in the County.

Previous Occurrences

Previous occurrences of regional flooding can be found in Section 4.2.7 of the main plan. Flash flooding incidents affecting Prowers County are reported below.

May 26, 1995 - Two to four inches of rainfall caused some high creek levels and minor lowland flooding.

May 25, 1996 - Strong thunderstorms moved across the northern portions of Prowers County the night of the 25th and into the early morning hours of the 26th. An 8 mile stretch of Highway 196 was water-covered, and normally dry washes were running full. Rainfall reports ranged from 2 1/4 inches in Lamar to 4 3/4 inches 20 miles south of the town of Holly.

July 30, 1996 - Nearly 3 inches of rain fell on an already saturated ground, creating widespread flooding of small streams in the vicinity of Lamar. Williams and Clay creeks went out of their banks, and lowland flooding was reported in downtown Lamar.

July 29, 1997 - Heavy rains from thunderstorms produced flooding of roads and low spots around the town of Wiley in Prowers County and flooding of county roads around the town of Prowers in Bent County.

August 13, 1997 - A thunderstorm brought very heavy rain on already saturated soil that flooded many county roads and city streets and low spots to depths of one to two feet.

July 24, 1998 - Scattered thunderstorms produced rainfall rates of 1 to 2 inches per hour over previously saturated ground. At least 6 inches of water was reported flowing across parts of Highway 196 northwest of Lamar.

July 5, 2002 - Very heavy rainfall in excess of six inches caused flash flooding of Wolf Creek, Granada Creek, and Plum Creek drainage basins in central Prowers County. A bridge over Wolf Creek just north of Granada was damaged. No dollar amount to fix the bridge was available at this time.

August 28, 2002 - Over four inches of rain, and large hail, caused flooding of roadways and a few houses.

June 9, 2004 - Water washed over County Road 8 and TT road

June 20, 2004 - Flash flooding occurred along highway 196 between Lamar and Bristol due to heavy thunderstorm rains.

July 28, 2004 - Two to 5 inches of rain in only a few hours caused several inches of water to flow over roadways as well numerous road washouts, mainly 3 to 10 miles south and southwest of Holly.

August 24, 2004 - Heavy thunderstorm rains caused flooding of Horse Creek and West Wildhorse Creek

June 26, 2007 - Numerous severe thunderstorms occurred from the I-25 corridor to the far southeast plains, producing hail up to the size of baseballs, thunderstorm wind gusts over 70 mph, a tornado, and flash flooding. An area of strong to severe thunderstorms produced very heavy rain in and around Lamar. Many streets were covered by at least 6 inches of water.

August 22, 2007 - Heavy rain produced flash flooding near Granada in Prowers County. Severe thunderstorms brought hail up to golfball size during the late afternoon and early evening hours in El Paso County. Heavy rain from nearly stationary thunderstorms brought ponding of water over six inches deep to the Granada area in Prowers County.

July 31, 2010 - Slow moving thunderstorms produced flash flooding around Bristol in north central Prowers County. Flowing water more than six inches deep occurred on Highway 196 between Bristol and County Road 19. The intersection of Highway 196 and Highway 385 was closed due to the flooding.

5.7 Severe Weather: Thunderstorms/Lightning/Hail Vulnerability Assessment

Thunderstorms producing winds, hail, and are a common occurrence in the County between early spring and late fall. Given the lightning statistics for Colorado and the region, the County is at risk and is vulnerable to the effects of lightning. Persons recreating or working outdoors during the months of April through September will be most at risk to lightning strikes. Fortunately, there have been no incidents of death of injury associated with lightning in the County. In addition, hailstones are frequently thrown out miles in front of the storm producing them.

Thunderstorms can produce locally heavy rain and high winds, which may result in crop damage and localized flooding. Hail primarily causes crop damage. However, hailstorms in populated areas can cause significant damage to roofs, automobiles, trees and windows. Critical facilities and infrastructure will have the greatest consequences if damaged by a lightning strike. The greatest losses from lightning could result from secondary hazards, such as wildfire.

Table 21 Thunderstorm/Lightning/Hail Occurrences in Prowers County

	Thunderstorm	Lightning	Hail
Events	69	1	223
Deaths/Injuries	0/0	1/3	0/0
Damage	$69,000	$0	$5,801,000

Source: NCDC

5.8 Tornado Vulnerability Assessment

Prowers County has been struck by a number of tornadoes in the past 65 years. Some of these tornadoes have caused large amounts of damage. A history of tornadoes in Prowers County is shown in Table 22 and Figure 5. The tornado that struck the Town of Holly on March 28, 2007 caused $4 million in damages. More detail on that tornado can be found in Section 4.2.11 of the main plan.

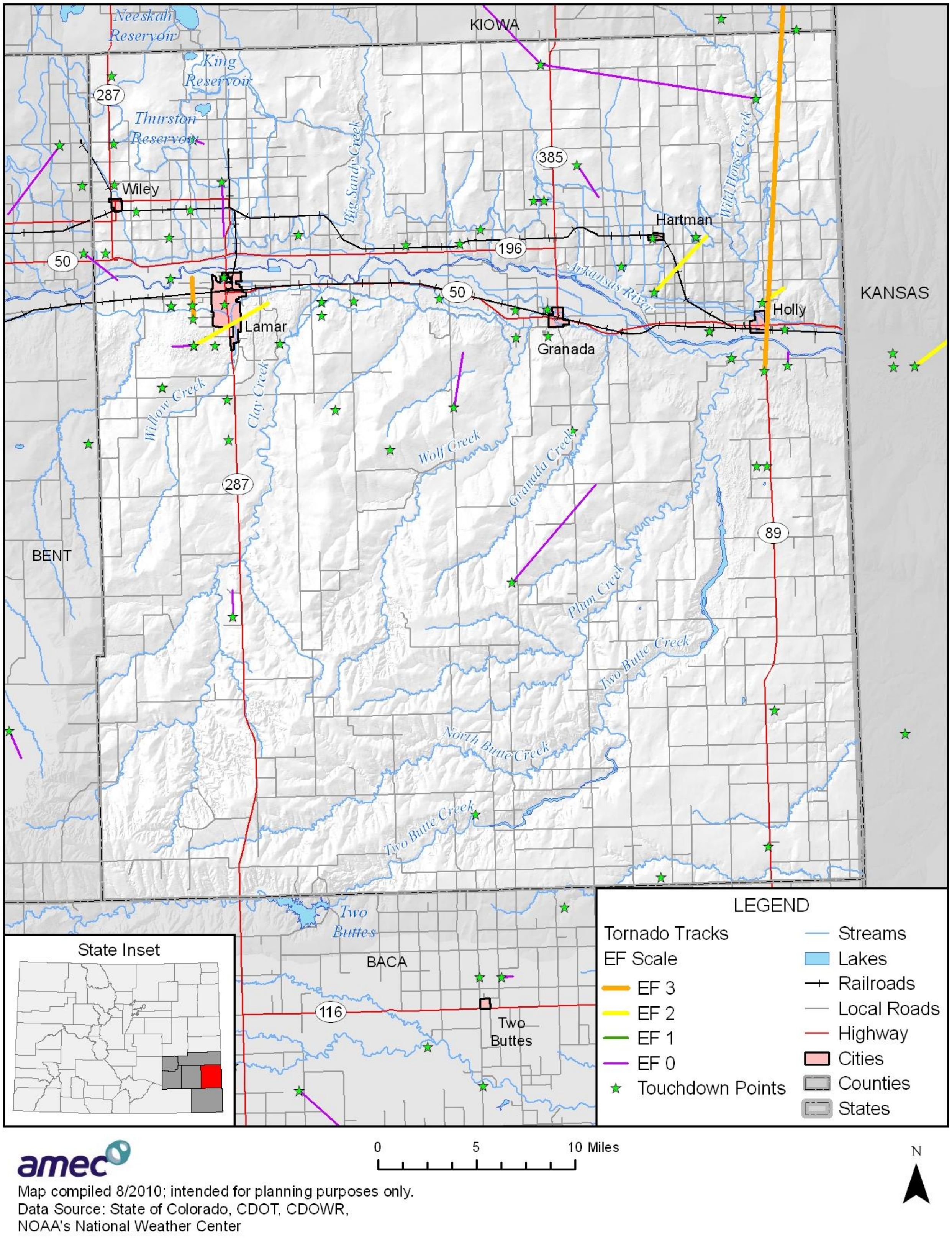
Table 22 Prowers County Tornado History

Fujita Scale Ranking	Number of Tornadoes
F0	50
F1	16
F2	2
F3	2
Unknown*	1
Total	**71**

Source: NCDC

* A tornado struck Prowers County in 1958. The magnitude of it is unknown.

Figure 5 Prowers County Tornadoes and Touchdowns

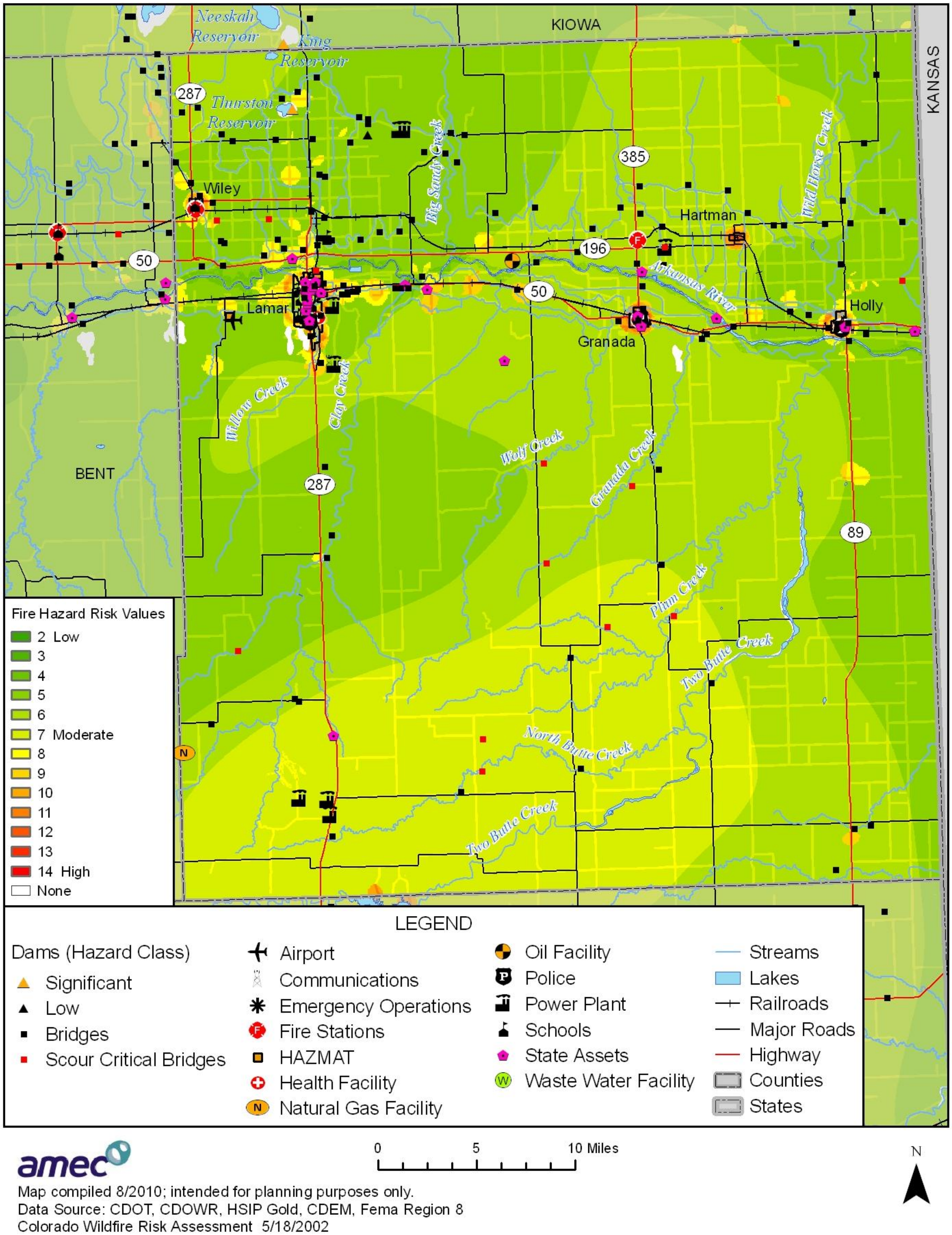


5.9 Wildfire Vulnerability Assessment

Prowers County Wildland Urban Interface

The Wildland Urban Interface map for Prowers County shows Low to High fire hazard risk values throughout the county. The majority of the county has lower values with the higher values around the communities of Granada, Hartman, Holly, Lamar, and Wiley with values between moderate and high.

Figure 6 Prowers County Wildland Urban Interface



Critical Facilities

Prowers County has the third highest number of facilities in a moderate to high fire hazard with 116 critical facilities. The Town of Granada has nine facilities: two bridges, one fire station, one police station, two schools, and three state assets. The Town of Holly has six facilities: one fire station, one police station, two schools and two state assets. The Town of Lamar has 41 facilities: two bridges, one emergency operations center, two HAZMAT facilities, one health facility, one police station, eight power plant facilities, two schools, and 24 state assets. The Town of Wiley has three facilities: one fire station and two schools. The unincorporated county has 57 critical facilities in a moderate to high fire hazard: 34 bridges, eight scour critical bridges, one communications, one fire station, eight power plant facilities, and five state assets.

Table 23 Critical Facilities in the Moderate to High Wildfire Hazard Areas

Facility Type	Facility Count
Bridge	38
Communications	1
Emergency Operations	1
Fire Stations	4
HAZMAT	2
Health Facility	1
Police	3
Power Plant	16
Schools	8
State Assets	34
Total	**108**

5.10 Wind Storm Vulnerability Assessment

The County is subject to potentially destructive straight-line winds. High winds are common throughout the planning area, throughout the entire year. Straight line winds are primarily a public safety and economic concern. Windstorm can cause damage to structures and power lines which in turn can create hazardous conditions for people. Debris flying from high wind events can shatter windows in structures and vehicles and can harm people that are not adequately sheltered.

Future losses from straight line winds include:

- Erosion (soil loss)
- Dry land farming seed loss,
- Wind blown weeds, such as tumbleweed
- Power line impacts and economic losses from power outages

- Occasional building damage, primarily to roofs

Campers, mobile homes, barns, and sheds and their occupants are particularly vulnerable as windstorm events in the region can be sufficient in magnitude to overturn these lighter structures. Livestock that may be contained in these structures may be injured or killed, causing economic harm to the rancher who owns both the structure and the livestock. Overhead power lines are vulnerable and account for the majority of historical damages. State highways can be vulnerable to high winds and dust storms, where high profile vehicles may be overturned by winds and lowered visibility can lead to multi-car accidents.

5.11 Winter Storm Vulnerability Assessment

The threat to public safety is typically the greatest concern when it comes to impacts of winter storms. But these storms can also impact the local economy by disrupting transportation and commercial activities. Winter storms are occasionally severe enough to overwhelm snow removal efforts, transportation, livestock management, and business and commercial activities. The region can experience high winds and drifting snow during winter storms that can occasionally isolate individuals and entire communities and lead to serious damage to livestock populations and crops. Travelers on highways in the County, particularly along remote stretches of road, can become stranded, requiring search and rescue assistance and shelter provisions.

Structural losses to buildings are possible and structural damage from winter storms in Colorado has resulted from severe snow loads on rooftops. Older buildings are more at risk, as are buildings with large flat rooftops (often found in public buildings such as schools). The County's elderly population is a potentially vulnerable demographic during severe winter storms. Smaller communities prevalent in the County may become isolated during winter storm events, Persons that choose to live in these areas are generally self-sufficient, or should be, as government and emergency services may be limited during a severe winter storm.

Another common impact of blizzards and severe winter storms on the planning area is the loss of power. The weight of heavy continued snowfall and/or ice accumulating on power lines often brings them to the ground causing service disruptions for thousands of customers. This can cause a loss of community water and sewer services, as well as the supply of gasoline, as these services almost always require electrical pumps. In addition, prolonged power outages can mean loss of food to grocery stores, large facilities that provide feeding services (such as prisons, hospitals and nursing homes), and restaurants.

5.12 Hazardous Materials Vulnerability Assessment

It is often quite difficult to quantify the potential losses from human-caused hazards. While the facilities themselves have a tangible dollar value, loss from a human-caused hazard often inflicts an even greater toll on a community, both economically and emotionally. The impact to identified assets will vary from event to event and depend on the type, location, and nature of a specific technological hazard event. There are no fixed facilities in Otero County. There are multiple transportation routes that transect the County. Natural gas and oil pipelines also run through the County. Table 24 shows the breakdown of gas transmission line and hazardous liquid line mileage in the County

Table 24 Gas Transmission Line and Hazardous Liquid Line Mileage

County	Gas Miles	Liquid Miles	Percentage of State Total
Prowers	98	0	0.9%

Source: PHMSA

The US Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) tracks hazardous materials spills and occurrences. A list of incidents can be found in Table 25.

Table 25 Hazardous Materials Incidents in the County

Incident City	Incident Route	Mode of Transportation	Failure Cause Description	Total Amount of Damages
Lamar		Highway		$206,441
Lamar	CO State Road 287	Highway	Defective Component or Device	$10
Lamar	HWY 287 10 Miles Outside of Lamar	Highway	Rollover Accident; Vehicular Crash or Accident Damage	$55,500
Bristol	18750 C. RD. SS	Highway	Rollover Accident; Vehicular Crash or Accident Damage	$1,900
Lamar	I-287 Road 7	Highway	Overfilled	$8,000
Lamar	USSO @MP 433	Highway	Loose Closure Component or Device;	$10

Source: PHMSA Incident Reports Database

Critical Facilities at Risk

In order to identify those critical facilities at risk to a hazardous materials release within identified corridors, an analysis was performed using GIS software. The same buffer was applied to the population at risk. An intersect was performed between critical facilities and the transportation buffers. Table 26 details the critical facilities located within a transportation corridor that are at risk to transportation related hazardous materials releases.

Table 26 Facilities within the 1 mile of HAZMAT transportation Corridor by Jurisdiction

Jurisdiction	Facility Type	Facility Count
Granada	Bridge	2

Jurisdiction	Facility Type	Facility Count
Granada	Fire Stations	1
Granada	Police	1
Granada	Schools	2
Granada	State Assets	3
Holly	Fire Stations	1
Holly	Police	1
Holly	Schools	2
Holly	State Assets	2
Lamar	Bridge	4
Lamar	Emergency Operations	1
Lamar	Fire Stations	2
Lamar	HAZMAT	2
Lamar	Health Facility	1
Lamar	Police	4
Lamar	Power Plant	8
Lamar	Schools	7
Lamar	State Assets	40
Lamar	Waste Water Facility	1
Wiley	Fire Stations	1
Wiley	Schools	2
Unincorporated	Bridge	44
Unincorporated	Communications	2
Unincorporated	HAZMAT	1
Unincorporated	Power Plant	4
Unincorporated	ScourCriticalBridge	1
Unincorporated	State Assets	17
Total		**157**

Source: HSIP Gold, CDEM, CDOT

Populations at Risk

To determine the populations at risk from a transportation-related hazardous materials release within identified transportation corridors, an analysis was performed using GIS. A one-mile buffer was applied to both sides of Highways 10, 50, 71, and 287, and the Atchison, Topeka, & Santa Fe (AT&SF) and the Victoria Southern & Towner Railroads, creating two-mile buffer zones around each corridor. US Census 2000 population data, aggregated by census block, was acquired from HAZUS-MH. An intersection was performed between the census data and the transportation buffers. If any part of the census block touched the transportation buffer zone, the entire block was included in the buffer zone. Table 27 shows populations within each jurisdiction that are at greatest risk to transportation-related hazardous materials releases. There are a total of 12,835 people in the County at risk to hazardous material incidents.

Table 27 Populations in Haz-Mat Buffer Zone in Prowers County

Jurisdiction	Population
Prowers County	1,820
Granada	640
Holly	1,027
Lamar	8,865
Wiley	483
Total	**12,835**

Source: CDEM, CDOT, US Census Bureau

5.13 Pandemic Vulnerability Assessment

Based on historical occurrences, pandemic of some description in Prowers County is likely.

- The likelihood of occurrence of hantavirus is low. Prowers County did have a case of hantavirus that was fatal, but one case since 1985 (when the disease was first documented) gives a 4% probability of occurrence (1 case/25 years). This equates to a low probability.
- The likelihood of plague, rabies, and tularemia are all considered to be unlikely.
- While the likelihood of occurrence of West Nile virus in the County planning area is likely, the County's vulnerability is low, based on the percentage of total population that actually comes down with the disease. Since the discovery of West Nile virus in Colorado in 2003, Prowers County has had 68 confirmed human cases.
- According to the Centers for Disease Control and Prevention, the risk from avian influenza is generally low to most people, because the viruses do not usually affect humans.
- According to the Centers for Disease Control and Prevention, the risk from H1N1 is currently low for most people, due to public information and vaccines currently available.

Although the potential for exposure does exist in Prowers County, the vulnerability should be considered in terms of adverse effects due to exposure. The County already has an active vector control program in place for mosquitoes, and protective measures to prevent exposure are relatively simple and cost-effective. Given the nature of protective measures, such as wearing long-sleeved clothing and using bug spray, the responsibility for protection can and should be an individual responsibility. Prowers County's current public education program should give the community the knowledge as well as access to resources to effectively counter the risk and impact from the virus.

6 Prowers County Capability Assessment

Thus far, the planning process has identified the hazards posing a threat to Prowers County and described, in general, the vulnerability of the County to these risks. The next step is to assess what loss prevention mechanisms are already in place. This part of the planning process is the mitigation capability assessment. Combining the risk assessment with the mitigation capability assessment results in the County's "net vulnerability" to disasters and more accurately focuses the goals, objectives, and proposed actions of this plan.

The planning committee used a two-step approach to conduct this assessment for the County. First, an inventory of common mitigation activities was made through the use of a matrix in the AMEC distributed Data Collection Guide. The purpose of this effort was to identify policies and programs that were either in place, needed improvement, or could be undertaken, if deemed appropriate. Second, the HMPC reviewed existing policies, regulations, plans, and programs to determine if they contributed to reducing hazard-related losses or if they inadvertently contributed to increasing such losses.

This section presents the County's mitigation capabilities: programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This assessment is divided into three sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, and fiscal mitigation capabilities.

6.1 Prowers County's Regulatory Mitigation Capabilities

Table 28 lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the County, and in the towns of Bristol, Granada, Hartman, Holly, Lamar, and Wiley

Table 28 Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	County Y/N	City of Lamar Y/N	Towns of Granada, Bristol, Hartman Y/N	Town of Holly Y/N	Town of Wiley Y/N	Lamar School District	Comments
General plan	N	Y	N	Y	N	Y	City of Lamar City Administration
Zoning ordinance	N	Y	N	N	N	Y	City of Lamar Building Codes Department
Subdivision ordinance	N	Y	N	Y	Y	Y	City of Lamar Building Codes Department
Growth management ordinance	N	N	N	N	N	N	
Floodplain ordinance	Y	N	N	Y	N	Y	
Other special purpose ordinance (stormwater, steep slope, wildfire)	Y	N	N	Y	N	N	Outdoor burning ordinance

Regulatory Tool (ordinances, codes, plans)	County Y/N	City of Lamar Y/N	Towns of Granada, Bristol, Hartman Y/N	Town of Holly Y/N	Town of Wiley Y/N	Lamar School District	Comments
Building code	N	Y	N	Y	N	Y	City of Lamar – 2006 IBC
BCEGS Rating	N	N	N	N	N	N	
Fire department ISO rating	Y	Y	Y	N	Y	Y	Rating: 7/9 City of Lamar - 5
Erosion or sediment control program	Y	N	Y	N	N	Y	Prowers County Land Use
Stormwater management program	N	Y	Y	Y	N	Y	Towns of Granada, Bristol, Hartman – Corp of Engineers, Flood Control Levees City of Lamar – Water Department
Site plan review requirements	N	N	N	Y	N	Y	Towns of Granada, Bristol, Hartman – Corp of Engineers School District – State of Colorado
Capital improvements plan	N	Y	N	Y	N	Y	City of Lamar – City Administration School District – Lamar School District Policies
Economic development plan	N	Y	N	N	N	N	City of Lamar – City Administration
Local emergency operations plan	N	Y	Y	Y	N	Y	City of Lamar – Lamar Fire Department School District – District, City of Lamar and Prowers County
Other special plans	N	Y	N	N	N	Y	Lamar School District – Asbestos Management, Chemical Safety Plan
Flood insurance study or other engineering study for streams	N	N	Y	Y	N		
Elevation certificates	N	N	N	N	N		
Other	N	N	N	N	N		

6.2 Prowers County's Administrative/Technical Mitigation Capabilities

Table 29 identifies the County personnel responsible for activities related to mitigation and loss prevention in the County.

Table 29 Administrative/Technical Regulatory Tools

Personnel Resources	County Yes/No	City of Lamar	Towns of Granada, Bristol, Hartman	Town of Holly	Town of Wiley	Lamar School District	Dept/ Position	Comments
Planner/Engineer with knowledge of land development/land management practices	Y	Y	Y	Y	Y	N	County Land Use	
Engineer/ Professional trained in construction practices related to buildings and/or infrastructure	N	Y	N	Y	N	N	City of Lamar Building Codes and Engineering	
Planner/Engineer/ Scientist with an understanding of natural hazards	Y	Y	N	Y	N	N	OEM/ Director City of Lamar Building Codes and Engineering	Since 1997
Personnel skilled in GIS	Y	N	Y	N	Y	N	County Land Use City of Lamar Engineering	
Full time building official	N	Y	N	Y	N	N	County Land Use City of Lamar Building Codes and Engineering	
Floodplain Manager	Y	Y	Y	Y	Y	N	County OEM/ Director City of Lamar Building Codes and Engineering	Since 1997
Emergency Manager	Y	Y	Y	Y	Y	Y	County OEM/ Director City of Lamar Fire Chief	
Grant writer	N	N	N	N	N	Y		
Other personnel	N	N	N	N	N	Y	Asbestos Manager	Since 2008

Personnel Resources	County Yes/No	City of Lamar	Towns of Granada, Bristol, Hartman	Town of Holly	Town of Wiley	Lamar School District	Dept/ Position	Comments
GIS Data – Hazard areas	N	N	N	N	N	N		
GIS Data - Critical facilities	N	N	N	N	N	N		
GIS Data – Building footprints	N	N	N	N	N	N		
GIS Data – Land use	Y	N	Y	N	Y	N	County Land Use	
GIS Data – Links to Assessor's data	N	N	N	N	N	N		
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	Y	Y	Y	Y	Y	Y	Prowers County E911 Lamar School District Principal	Sirens in all towns except Hartman – planned for 2011 Lamar School District IRIS mass communication system
Other	Y	Y	Y	N	Y	Y	National Weather Service	StormReady Prowers County

6.3 Prowers County's Fiscal Mitigation Capabilities

Table 30 identifies financial tools or resources that the City could potentially use to help fund mitigation activities.

Table 30 Fiscal Regulatory Tools

Financial Resources	Accessible/Eligible to Use Y/N						Comments
	County	City of Lamar	Towns of Granada, Bristol, Hartman	Town of Holly	Town of Wiley	Lamar School District	
Community Development Block Grants	Y	Y	Y	Y	Y	N	
Capital improvements project funding	N	Y	N	Y	N	Y	
Authority to levy taxes for specific purposes	Y	Y	Y	Y	Y	Y	
Fees for water, sewer, gas, or electric services	Y	Y	Y	Y	Y	Y	
Impact fees for new development	N	Y	N	Y	N	N	

Financial Resources	Accessible/Eligible to Use Y/N						Comments
	County	City of Lamar	Towns of Granada, Bristol, Hartman	Town of Holly	Town of Wiley	Lamar School District	
Incur debt through general obligation bonds	Y	Y	Y	N	Y	Y	
Incur debt through special tax bonds	Y	Y	Y	N	Y	Y	
Incur debt through private activities	Y	N	Y	N	Y	N	
Withhold spending in hazard prone areas	N	N	N	N	N	N	
Other	N	N	N	N	N	N	

6.4 Additional Capabilities in Prowers County

Prowers County is StormReady, has an Annual Wildfire Operations Plan, and is working on a CWPP with the Colorado State Forest Service.

All Schools are equipped with NOAA weather radios. Fire and tornado drills are performed regularly. Elementary schools participate in fire prevention activities. High school participates in annual health fair, and also has an onsite health clinic. The District employs 4 full time medical/health personnel. The District updated wiring and fire alarms systems in one elementary school in 2007 and updated the other 2 remaining elementary schools wiring and alarm system in 2008. In 2009 a new fire alarm system was installed in the high school with the addition of smoke detectors. One elementary school playground was totally secured with gates and fencing to prevent unauthorized persons entering school property, another is planned for the summer of 2010. An aggressive bus replacement program has been underway replacing 2 activity buses and 5 route buses. These buses may be used to evacuate special populations identified in Section 6.5.

There has been a Tamarisk removal project near Holly. Prowers County has 3 - 30,000 gallon water supplies established for fire protection at Hwy 89 and CR H, US 287 and CR F and CR NN and CR 19, one more tank will be placed in the future. There are also fire hydrants within the County at various locations where water districts have storage tanks. There is an ongoing training and equipment program for hazardous materials response with a program that began in 2007 training 4 Haz-mat techs. The Land Use department is in the process of updating the flood mapping within the county through grants.

All counties in the planning area make the 211 system available to citizens within each county. The system guides citizens to appropriate agencies and organizations, including disaster resources and assistance. The system ensures that citizens can access timely and accurate information about what is happening in their community.

6.5 Additional Vulnerabilities in Prowers County

Prowers County has elderly and special needs populations located throughout the county in its various cities and towns. Transportation issues may arise to assist with evacuation, especially with those needing ambulances for transport. Migrant farm workers are utilized at various times in the year and hazard communications may be compromised due to a language barrier.

There are 20 unreinforced masonry buildings in the County subject to damage from a possible earthquake.

The City of Lamar has elderly and special populations located throughout the community that may be at greater risk to certain hazards, and who made need transportation in the event of an evacuation.

The Lamar School District noted that special needs and young students may not comprehend the magnitude of situations taking place, delays in the appropriate actions to be taken may be delayed. Law enforcement intervention in some instances may be delayed to responder personal protection measures, building accessibility and not being familiar with facilities.

7 Prowers County Mitigation Actions

After reviewing the goals of the Southeast Colorado Regional Hazard Mitigation Plan, Prowers County has adopted the following mitigation actions to reduce their risk to the hazards identified above.

Prowers County

Action Item #1 **Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program**

Hazards Addressed: All

Issue/Background: The County and each jurisdiction are subject to several natural hazards. Each poses a different degree of risk and associated vulnerability. Some hazards have a combination of attributes, including a high likelihood of occurrence, a specific location that would likely be impacted, and proven approaches that could reduce the impact. For other hazards, where either the likelihood of occurrence is very low, the area of likely impact is not specifically known, or there is very little that can be done to reduce the impacts, the HMPC has determined that the best approach is public awareness. Citizens should have information describing historical events and losses, the likelihood of future occurrences, the range of possible impacts, appropriate actions to save lives and minimize property damage, and where additional information can be found. Any information provided through this effort should be accurate, specific, timely, and consistent with current and accepted local emergency management procedures as promoted by the Southeast Colorado All Hazards Region (SECAHR), Colorado

Department of Emergency Management (CDEM) and the American Red Cross. Following a disaster event, there should be extra efforts to provide the public with information about disaster preparedness and mitigation measures. This public outreach effort will be conducted annually and will include:

- Using a variety of information outlets, including local news media;
- Creating and printing (where applicable) brochures, leaflets, water bill inserts, and public service announcements;
- Posting all information to the SECAHR website;
- Displaying current brochures and flyers in County office buildings, city halls, libraries, and other public places; and
- Developing public-private partnerships and incentives to support public education activities.

Other Alternatives: Continue public information activities currently in place.

Responsible Office: Prowers County Emergency Management

Priority (High, Medium, Low): High

Cost Estimate: Staff time, printing costs for literature.

Benefits (avoided Losses): Life safety, reduction in property losses, relatively low cost

Potential Funding: State Hazard Mitigation Program grants, county and jurisdiction funds, other available grants

Schedule: Ongoing – part of seasonal multi-hazard public awareness campaign.

Action Item #2 **Continue to Implement Sound Floodplain Management Practices through Participation in the National Flood Insurance Program (NFIP) and Updated Statewide Floodplain Rules**

Issue/Background: The County participates in the National Flood Insurance Program. This project restates the commitment of Prowers County to implement sound floodplain management practices, as stated in the flood damage prevention ordinance. This includes ongoing activities such as enforcing local floodplain development regulations, issuing permits for appropriate development in Special Flood Hazard Areas and ensuring that development is elevated above the base flood elevation. Floodplain managers will remain current on NFIP policies, and are encouraged to attend appropriate training and consider achieving Certified Floodplain Manager (CFM) status.

This project also includes periodic reviews of the floodplain ordinance to ensure that it is clear and up to date and adequately addresses the level of flood risk identified within the Hazard Mitigation Plan. As a result of the adoption of updated statewide floodplain rules and regulations (effective January 14, 2011) the CWCB will require local governments to revise their ordinance to comply with the new rules by January 2014.

Other activities that could be included in this effort are:

- Ensure that stop work orders and other means of compliance are being used as authorized by each ordinance;
- Suggest changes to improve enforcement of and compliance with regulations and programs;
- Identify unmapped areas and coordinate with the Colorado Water Conservation Board on identifying resources for mapping unmapped areas;
- Participate in Flood Insurance Rate Map updates by adopting new maps or amendments to maps;
- Utilize any recently completed Digital Flood Insurance Rate maps in conjunction with GIS to improve floodplain management, such as improved risk assessment and tracking of floodplain permits;
- Promote and disperse information on the benefits of flood insurance, with assistance from partners such as City of Lamar, Town of Granada, Town of Holly, Town of Wiley, Town of Hartman, and the Colorado Water Conservation Board;
- Evaluate joining the Community Rating System to further lower the cost of flood insurance for residents.

Other Alternatives: No Action; Continue to manage community floodplains under existing program

Existing Planning Mechanism(s) through which project will be implemented: General Plan, Existing Zoning and Floodplain Management Ordinances

Responsible Office: Prowers County Land Use

Priority (High, Medium, Low): Medium

Cost Estimate: Minimal – existing staff time

Benefits (avoided Losses): Life safety and property protection. Enhancement of current floodplain management program.

Potential funding: Existing department budgets

Schedule: Within 1year

Action Item #3 Community Wildfire Protection Plans

Issue/Background: Wildfire is an issue in the County. The intent is to minimize risk and vulnerability from wildfire hazard.

- Complete CWPP's for Prowers County.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which project will be implemented:

Basically three meetings per county –

- 1st Meeting – Wildfire Mitigation Assessment mapping exercise (circling areas for values, risks & fuels) to identify areas of concern).
- 2nd Meeting – Review mapping overlays; review FireWise mitigation potentials; start looking at overall goals for a five year plan.
- 3rd Meeting – Review/complete goals; review draft plan; determine annual workplan (identify persons responsible/ tasks/benchmark dates to complete assignments/projects.

Responsible Office: Office of Emergency Management

Priority (High, Medium, Low): High

Cost estimate: Low to high cost depending upon in-kind and actual expenses – mileage/per diem/in-kind hours/ administrative copying costs, etc/ CWPP plan copying costs.

Benefits (avoided Losses): Mitigating wildfire hazards within a county by identifying /prioritizing areas of concern, then mechanisms to implement mitigation.

Potential funding: Federal/State grant options?

Schedule:

- Three meetings per county to create plan.
- Schedule according to each annual workplan for implementing projects.
- Update meetings according to each county's schedule

Action Item #4 CWPP Projects as identified by the County's CWPP

Issue/Background: Wildfire is an issue in the County. The intent is to minimize risk and vulnerability from wildfire hazard. Projects can include mitigating risk, access, water supply, structure construction design & materials, defensible space, trees & shrubs (landscapes), interior design, & 'What to do when… (evacuation needs) .

Other Alternatives: No action.

Existing Planning Mechanism(s) through which project will be implemented: The County's CWPP. Types of projects include:

- Risk (Landowner Awareness)
- Access (ingress/egress; widths/turnarounds/ culverts; signage (High/med/low fire danger; CR/street signages)
- Water supply
- Construction design & materials,(building codes, ordinances)
- Defensible space (Fuels mgmt, establishing living fuel breaks (grass) – riverbottom & community),
- Trees & shrubs,
- Interior safety
- What to do when
- Other
  - Hazards – Power lines/trees/brush breakage (Tree Line USA, NADF)
  - County Fire Bans & Controlled Burn Ordinances
  - Ag Hazards – wildfire
  - Drought – fire hazards

Responsible Office: Office of Emergency Management

Priority (High, Medium, Low): Medium

Cost estimate: Per project

Benefits (avoided Losses): Protect homes, homesteads, structures, values from potential wildfires until fire services can arrive. Protecting homes can be maximized when fire service arrives. Protect Firefighter safety during suppression operations.

Potential funding: Federal/State grant options?

Schedule: Schedule according to each CWPP annual workplan for implementing projects.

Action Item #5 Firewise Outreach Message to appropriate audiences within the County CWPP Plan

Issue/Background: Wildfire is an issue in the County. The intent is to minimize risk and vulnerability from wildfire hazard.

- Homeowners, landowners and other property owners need to have an awareness of vulnerability to wildfire hazards.
- Each property owner needs to take responsibility for mitigating potentials for catastrophic damage to their own properties – protect their own properties from wildfire.
- Support safety to firefighters during suppression by mitigation of fuels and implementing other FireWise suggestions.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which project will be implemented: Educating publics on risk, access, water supply, construction design & materials, defensible space, trees & shrubs, interior safety & 'What to do when…' – tools to mitigate.

Responsible Office:

- Educational outreach from local VFD's to assess homesites and give recommendations.
- Media news releases; Fair booths (w/other entities);
- Firewise prevention messages for schools.

Priority (High, Medium, Low): Medium

Cost estimate: To be determined

- Pamphlets/handout costs
- Firewise Educational material for schools
- Low to high cost depending upon in-kind and actual expenses – mileage/per diem/in-kind hours/ administrative copying costs, etc.

Benefits (avoided Losses): Protect homes, homesteads, structures, values from potential wildfires until fire services can arrive. Protecting homes can be maximized when fire service arrives. Protect Firefighter safety during suppression operations.

Potential funding: Federal/State grant options?

Schedule:

- Schedule according to each CWPP annual workplan for implementing projects.
- Update meetings according to each county's schedule.

Action Item #6 Prowers County Stream Notification System

Issue/Background: Numerous streams that have been identified can become very destructive and life endangering due to large rains up stream. The remoteness of area covered by these drainages seldom have witnessed events. This allows for a water event to encroach into Cities and Towns without warning.

Other Alternatives:

Existing Planning Mechanism(s) through which project will be implemented:

Responsible Office: Prowers County Office of Emergency Management

Priority (High, Medium, Low): Medium

Cost Estimate: $ 70,000

Benefits (avoided Losses): Loss of life and property.

Potential funding:

Schedule: As soon as funding is obtained.

**Action Item #7		Critical Facilities Relocation Fire**

Issue/Background: The main fire station for Prowers County was constructed as a combined use station between the City of Lamar and Prowers County, which is owned by the City of Lamar. At the time when the project was being planned the location of government land overweighed much thought for what type of all hazard events that may affect this facility. 3 of the largest impacts that this critical facility may face is flooding, a hazardous materials event or a malfunction at the coal fired power plant that could lead to large destruction. The location experiences water up to the bay doors and some into the bays when a heavy rain is experienced. Sand bags are placed at entrance doors to prevent water entering the office/training rooms. Hazardous materials are transported within 150' of this station via roadways and railroad on a daily basis. The coal fired power plant boiler and large ammonia storage tank are within 300' of the station.

Other Alternatives: Structure elevation is not feasible due the cost of such a project would only eliminate one of the hazards and also not be cost effective versus the cost of constructing a new facility. The only other alternative is relocation. County land is available and identified for the relocation of this station far out of the flood plain and away from such listed hazards. The only hazard the new facility may be subjected to is a tornado depending on what type of construction is utilized.

Existing Planning Mechanism(s) through which project will be implemented:

Responsible Office: Prowers County Rural Fire Department

Priority (High, Medium, Low): High

Cost Estimate: $445,000

Benefits (avoided Losses): Uninterrupted life saving emergency services during an all hazard event. By keeping this service intact it will largely impact the mortality of any other potential victims of an all hazard event. It will also prevent the destruction of valuable emergency response equipment utilized to mitigate all hazard events.

Potential funding: PDM Grant, DOLA Energy Impact Grants, County Capital Outlay and other grants that may accommodate such a project.

Schedule: 1 year after funding is obtained.

Action Item #8 Prowers Fire District Establishment

Issue/Background: The development of a fire district will provide for a tax funded department that is assured financing to continue its emergency services. With the current process of funding, the department does not have any statutes requiring that it be funded. If county revenues fall short there would be a situation where the department may not have any funding to operate. Prowers County established a county funded fire department to handle the un-incorporated areas within the county in 1992. This endeavor was done to provide better fire protection services to the county residents and provide mutual aid resources to area cities and towns within the county and adjoining counties. Department resources consist of one station in the community of Bristol and a non-owned shared station in Lamar. The department has 12 fire apparatus and 1 haz mat unit. The department provides hazardous materials response with 8 certified haz mat techs and handles approximately 140 calls per year with one paid chief and 15 volunteers.

Other Alternatives: Continue with funding from the county general funds, which pulls funding from other departments within the county.

Existing Planning Mechanism(s) through which project will be implemented: The project will require attorney assistance in developing legal boundaries, coordination with the State of Colorado Department of Local Affairs, wording for ballot measures and mil levy establishment and election support.

Responsible Office: Prowers County Rural Fire Department

Priority (High, Medium, Low): High

Cost Estimate: $25,000

Benefits (avoided Losses): Preservation of life. This will continue to provide needed life safety within the area of fire protection/prevention/rescue and hazardous materials response.

Potential funding: PDM Grant, DOLA Energy Impact Grants, County Capital Outlay, VFA Grant and other grants that may accommodate such a project.

Schedule: 2 years once funding is obtained.

Action Item #9 Prowers Fire All-Hazard Response Apparatus

Issue/Background:

Other Alternatives:

Existing Planning Mechanism(s) through which project will be implemented:

Responsible Office: Prowers County Rural Fire Department

Priority (High, Medium, Low): High

Cost Estimate: $200,000

Benefits (avoided Losses): Preservation of life. This will continue to provide needed life safety within the area of fire protection/prevention/rescue and hazardous materials response.

Potential funding: PDM Grant, DOLA Energy Impact Grants, County Capital Outlay, VFA Grant and other grants that may accommodate such a project.

Schedule: As soon as funding is obtained.

Action Item #10 Wiley CR 196 Bridge Project

Issue/Background: The Town of Wiley suffered flood damage in 1997 from heavy rains to the northwest of the town flowing into the Wiley Drainage. Approximately 12 homes were flooded from this event. Water inundation of homes created heavy damage. The water that came down the Wiley drainage caused the abutments of the then State Highway 196 to be washed out. Extensive engineering was done by the State of Colorado and then Prowers County Land and Environment. Another issue upstream from this bridge is the Thurston dam that could create a large impact to the community if the bridge isn't widened to allow for the appropriate flows.

Other Alternative: Some channel widening may assist but that will not alleviate the narrow bridge to allow for the water flows.

Existing Planning Mechanism(s) through which project will be implemented: This project may require some minor engineering. The State of Colorado and Prowers County land use should have the engineering studies that were completed in 1997.

Responsible Office: Prowers County Office of Emergency Management

Priority (High, Medium, Low): High

Cost Estimate: $500,000

Benefits (avoided Losses): This project would alleviate heavy flooding of the homes near the bridge and possibly alleviate flooding of the Town of Wiley. This roadway is a common route for transportation and an alternate for US Highway 287.

Potential funding: Prowers County Road and Bridge is willing to utilize heavy equipment and personnel to assist with the project. This would minimize the grant funding required. Other funding sources could be PDM Grant, Energy Impact Assistance Grant.

Schedule: 1st year update past engineering, 2 year project construction.

Action Item #11 Tornado Shelter

Issue/Background: Funds are requested to construct a tornado shelter for people that are attending outdoor events and the general public. The area in which the structure is required has several outdoor activities within the area those comprise the fairgrounds, 6 ball fields, a daycare center and a pre-school. Generally severe weather events occur during the outdoor events and a structure to provide adequate shelter is required.

Other Alternative: The alternative used is the local High School which is 3 blocks away and requires people to drive to the facility.

Existing Planning Mechanism(s) through which project will be implemented: This project will require engineering. Prowers County Social Services has done some planning and engineering for a facility to house only their staff and children. More engineering will be required to construct a much larger facility.

Responsible Office: Prowers County Office of Emergency Management

Priority (High, Medium, Low): High

Cost Estimate: $2,500,000

Benefits (avoided Losses): This project would alleviate deaths and injuries of those persons participating in the outdoor events in the area.

Potential funding: Prowers County Road and Bridge and other local government entities are willing to utilize heavy equipment and personnel to assist with the project. This would minimize the grant funding required. Other funding sources could be PDM Grant, Energy Impact Assistance Grant.

Schedule: 1st year update past engineering, 2nd year project construction.

Action Item #12 CR 196 Flood Project

Issue/Background: County Road 196 which was a Colorado Highway has always experienced flooding from heavy rains generated from the north. A 3 mile length of this roadway is in need of flood mitigation measures due to rain runoff attempting to flow toward the Arkansas River. Rains flood the roadway and make it impassable which generally causes the roadway to be closed at County Road 19 to US Highway 385. This roadway is an alternate route for US Highway 50 at times.

Other Alternative: Prowers County Road and Bridge has cleaned drainage tubes to assist with the runoff, but only has moderately helped the situation.

Existing Planning Mechanism(s) through which project will be implemented: This project will require some engineering and may have been done by the State of Colorado. We feel the replacement of current aged and collapsed drainage tubes under the roadway will be the largest cost of the project.

Responsible Office: Prowers County Office of Emergency Management

Priority (High, Medium, Low): Medium

Cost Estimate: $200,000

Benefits (avoided Losses): This project would alleviate heavy flooding of the roadway maintaining a heavily used access roadway.

Potential funding: Prowers County Road and Bridge is willing to utilize heavy equipment and personnel to assist with the project. This would minimize the grant funding required. Other funding sources could be PDM Grant, Energy Impact Assistance Grant.

Schedule: 1st year engineering process, 2 year project construction.

Action Item #13 Bristol Drainage Project

Issue/Background: The community of Bristol has an issue of flooding when a heavy rain is generated north of the community. The rain fall is directed along US Hwy 385 and directly into the town. This creates flooding of homes and local government infrastructure within the community.

Other Alternative: Prowers County Road and Bridge has constructed a holding pond on the east side of Bristol to curtail this issue. It has somewhat prevented some of the flooding.

Existing Planning Mechanism(s) through which project will be implemented: This project has had some minor engineering but will require more. The construction of an alternative channel around the community or another flood control pond is considered, additional drainage tubes has also been considered.

Responsible Office: Prowers County Office of Emergency Management

Priority (High, Medium, Low): High

Cost Estimate: $350,000

Benefits (avoided Losses): This project would alleviate heavy flooding of homes and local government critical facilities such as fire and the water treatment plant.

Potential funding: Prowers County Road and Bridge is willing to utilize heavy equipment and personnel to assist with the project. This would minimize the grant funding required. Other funding sources could be PDM Grant, Energy Impact Assistance Grant.

Schedule: 1st year engineering process, 2 year project construction.

City of Lamar

Action Item #14 Willow Creek Dike Project

Issue/Background: The Colorado Water Conservation Board, Colorado Department of Natural Resources, has conducted meetings with Prowers County Land Use Department and the City of Lamar staff concerning required flood plain and levy certification issues. Primary issues for certification of the existing levies are drainage channel capacity and road crossings. The City is currently unaware of what is necessary to bring existing levies to acceptable standards, total project costs, confirmed completion dates, and availability of grant funding for the project.

Other Alternatives: According to the engineering study in 1995 this is the best alternative to solve the flooding issues that are faced.

Existing Planning Mechanism(s) through which project will be implemented:

Responsible Office: City of Lamar Water and Waste Water

Priority (High, Medium, Low): High

Cost Estimate: $450,000

Benefits (avoided Losses): With the recent studies it has become apparent that there is a problem with the current dike system which can create flooding issues to numerous homes within the area and possibly affect 1 elementary school. Failure to certify the levies can also result in drastic changes to the Official Flood Plain Maps. Those changes would cause considerably more residential properties being required to have floodplain insurance than are now required to carry the policies.

Potential funding: The City has budgeted $100,000 in the 2012 Capital Improvement Budget, but it’s likely that completion of the project will cost considerably more, the City of Lamar could provide in kind services that it has available. Other possible funding sources may be the PDM Grant, Energy Impact Assistance Grant, Colorado Water Conservation Board and Colorado Department of Natural Resources.

Schedule:

- 1 year surveying and engineering.
- 2nd year project construction

Action Item #15 Parmenter East Storm Drainage Project

Issue/Background: Constructing a 66" RCP pipeline from the area of Fourth and Parmenter Streets eastward to an outlet structure at Willow Creek. The Parmenter Storm Sewer System serves the downtown area of Lamar, and therefore, problems in this system are more apparent due to the density of buildings and the increased traffic flow.

Other Alternatives: According to the engineering study in 1995 this is the best alternative to solve the flooding issues that are faced.

Existing Planning Mechanism(s) through which project will be implemented: The 1995 Master Drainage Plan has been engineered to some detail. There may be some additional engineering to provide actual construction documents.

Responsible Office: City of Lamar Water and Waste Water

Priority (High, Medium, Low): High

Cost Estimate: $1,323,600

Benefits (avoided Losses): This project would alleviate heavy flooding of downtown financial institutions, commercial properties, local government critical facilities and businesses which would curtail large financial losses. The area also has a high population of homes.

Potential funding: The City of Lamar has made large gains of various projects outlined within the master drainage project engineered and established in 1995. The remainder of the projects will require some type of financial assistance due to the down turns in tax funding which is more apparent than in the previous years. The City of Lamar could assist with matching funding and some in kind contributions. PDM Grant, Energy Impact Assistance Grant, City of Lamar Capital Outlay.

Schedule: 1 year after funding is obtained.

Lamar School District

Action Item #16 Lightning Detection/Warning Systems

Issue/Background: We have 7 school locations that have outdoor areas such as playgrounds and athletic fields which are open areas that are occupied by students at various times of the day. Lightning is one of the major weather hazards that could impact numerous students at any given time. If sufficient early warning is not given to the staff and students lives can be severely impacted. If such an event should happen it could develop into a large mass casualty event, taxing emergency resources. Due to the location of schools within the City this project will also provide the same warning for area residents within 3 blocks of each school this will in turn provide warning for approximately 75% of the City of Lamar residents.

Other Alternatives: The only other alternative is having someone to constantly monitor weather radar which is located in Pueblo. The distance of this radar from Lamar cannot provide accurate information on all possible thunderstorms that can produce lightning in the area.

Existing Planning Mechanism(s) through which project will be implemented: The district will provide for all labor and installation costs at each location which can represent a $2,800 in-kind contribution .

Responsible Office: Lamar School District Maintenance

Priority (High, Medium, Low): High

Cost Estimate: $60,000

Benefits (avoided Losses): Lives can be saved with providing such equipment by allowing an early warning to allow students ample time to move indoors.

Potential funding: PDM Grant, DOLA Energy Impact Grants, District Capital Reserve and other grants that may accommodate such a project.

Schedule: As soon as funding is obtained.

Town of Hartman

Action Item #17 Evaluate the benefits of joining the National Flood Insurance Program (NFIP)

Issue/Background: The NFIP is a Federal program enabling property owners in participating communities to purchase insurance as a protection against flood losses in exchange for State and community floodplain management regulations that reduce future flood damages. There are multiple benefits to communities that participate in this program. The County does not currently participate in the NFIP.

This project entails the evaluation of community participation in the NFIP, the education of community leaders, staff and the public on the program benefits, and the future participation in the NFIP by the community.

Steps:

1) Research program requirements and benefits
2) Develop community and public education program on the NFIP
3) Create ordinance for community participation in the NFIP
4) Join NFIP and promote flood insurance to the community

Other Alternatives: Continue to manage community floodplains without the benefits of participation in the NFIP.

Existing Planning Mechanism(s) through which project will be implemented: General Plan, Existing Zoning and Floodplain Management Ordinances

Responsible Office: Community planning/zoning/public works departments

Priority (High, Medium, Low): High

Cost Estimate: Minimal - staff research, staff created ordinance, public outreach/education costs, and costs associated with administering and enforcing the flood ordinance.

Benefits (avoided Losses): Life safety and property protection. Participation in the NFIP provides the community with a mechanism to guide development in floodplain areas in a manner that is consistent with both the need to convey flood waters and a community's existing and future land use needs. Participation also provides the availability of flood insurance for structures located in a Special Flood Hazard Area (SFHA) that are financed by federally-backed lending institutions.

Potential funding: Existing department budgets

Schedule: Within 1-2 years

Town of Holly

Action Item #18 Holly Flood Control Dike

Issue/Background: The Corps of Engineers conducted a Continuing Eligibility Inspection of the Holly Flood Control Dike on September 8, 2011. The inspection resulted in an overall minimally acceptable rating. The inspection documented vegetation growth problems, encroachments, erosion/bank caving, depressions, burrowing animal control, repair of burrows in dike system.

Other Alternatives: According to the engineering study in 2011 the included repair actions are the best alternative to solve the issues that are faced.

Existing Planning Mechanism(s) through which project will be implemented:

Responsible Office: Holly Flood Control, Drainage, and Sanitation District and Prowers County OEM

Priority (High, Medium, Low): High

Cost Estimate: $250,000

Benefits (avoided Losses): Problems with the current dike system which can create flooding issues to numerous homes within the area, schools, private businesses and government infrastructure. Failure to repair the levies can also result in drastic changes to the Official Flood Plain Maps. Those changes would cause considerably more residential properties being required to have floodplain insurance than are now required to carry the policies.

Potential funding: The District is strained with budget short falls and revenue due to the down turn in financial situations. The Town of Holly and District could provide in kind services that it has available. Other possible funding sources may be the PDM Grant, Energy Impact Assistance Grant, Colorado Water Conservation Board and Colorado Department of Natural Resources.

Schedule:

- 1st year Prioritization of repairs, bid process for repairs, contracting for repairs.
- 2nd year contracting repairs completed

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Appendix B Planning Process Documentation

This appendix contains the planning process documentation for the Southeast Colorado Regional Hazard Mitigation Plan. Meeting invitations, agenda, and sign in sheets, as well as the data collection guide and proxy representation form are contained below.

Southeast Colorado Region
All-Hazards Mitigation Plan

Serving Bent, Baca, Crowley, Kiowa, Otero and Prowers Counties

Directed through Bent County Office of Emergency Management

745 Bent Avenue • 11100 CR GG.5 • P.O. Box 1130 • Las Animas, CO 81054-8446 • 719-456-0795 Office • 719-456-0476 Fax

INVITATION
TO PARTICIPATE IN THE DEVELOPMENT OF THE
SE REGION ALL-HAZARDS MITIGATION PLAN KICK-OFF MEETING

TO: **Participants and Interested Stakeholders** of the Southeast Colorado Region

FROM: Regional Hazard Mitigation Planning Committee (RHMPC)

Randy Freed Email: randyf@bentcounty.net
Director - Bent County Office of Emergency Management
Office (719) 456-0796 cell (719) 469-3108
Date & Time: May 25th 9:00 to 11:00 am
Location: Bent County Sheriff's Office - Conference Room
11100 County Road GG.5
Las Animas, CO 81054

Chris Sorensen Email: chris@kiowaoem.com
Director - Kiowa County Office of Emergency Management
Office (719)438-2288 Cell (719)688-0506
Date & Time: May 25th 2:00 to 4:00 pm
Location: Kiowa County Courthouse, Community Room
1305 Goff Street, Eads, CO

Chris Johnson Email: cjohnson@oterogov.org
Director - Otero County Office of Emergency Management
Office (719) 384-5941 Cell (719) 469-6207
Date & Time: May 26th 1:00 to 3:00 pm
Location: City Council Chambers
601 Colorado, La Junta, CO

Larry Reeves Email: lreeves@crowleycounty.net
Director - Crowley County Office of Emergency Management
Office (719) 267-5555 cell (719) 980-0570
Date & Time: May 26th 6:00 to 8:00 pm
Location: Ordway Fire/EMS
611 E. 9th St., Ordway, Colorado 81063

Riley Frazee Email: riley.frazee@seregion.com
Director - Baca County Office of Emergency Management
Office (719) 523-6796 cell (719) 529-0300
Date & Time: May 27th 1:00 to 3:00 pm
Location: Springfield EMS Classroom
972 Kansas St. Springfield, CO 81073

Staffon Warn Email: staffon.warn@prowerscounty.net
Director - Prowers County Office of Emergency Management
Office (719) 336-2674 cell (719) 688-4701
Date & Time: May 28th 9:00 to 11:00
Location:

Chad Ray Email: chad.ray@state.co.us
Region Field Manager - Colorado Division of Emergency Management
Office (719) 544-6563 cell (719) 240-1531

RE: **County Mitigation Plan Kick-Off Meetings**

Good morning,

The Southeast Colorado Region is glad to announce that we will be developing an All-Hazard Mitigation Plan. As required by the Disaster Mitigation Act of 2000 and through funding from the Colorado Division of Emergency Management and the Flood Mitigation Assistance program, Bent County, as the representing County for the SE Region, has contracted with AMEC Earth & Environmental, Inc., who will assist us in facilitating the mitigation planning process. There will be a kick-off meeting in each county to inform participants and stakeholders of the mitigation planning process and how they will contribute to the plan from a local perspective.

We understand that your time is valuable and many of you serve in multiple positions. Your knowledge and experience within your respective areas is vital to the accurate development of this regional all-hazards mitigation plan, so we sincerely encourage you to join us in this process where your concerns can be heard and your input is valued.

The purpose of this plan: is to reduce or eliminate the threat and risk that comes with natural and man-made hazards.

The primary goal of this plan: is to better protect the people, animals, property, and environment of the Southeast Colorado Region.

The benefit of this plan: is by developing mitigation goals, objectives and actions, it will serve as a decision-making tool to build a more disaster resistant region. In addition to that, it also positions all participants for further mitigation grant funding opportunities we would not otherwise be able to receive.

Participants are those people, who work in the various departments of a city or county; or who represent a volunteer organization that serves the city, town or county; or who serves on the board or works for a special district; or any other person whose affiliation serves the citizens of the local, state or regional community.

Each County is recommended to have representatives at their scheduled meeting from the following departments or organizations. The list is not limited to these, but a suggestion of those who should be present.

County Road & Bridge Department
County Planning & Zoning Department
County Building Department
GIS Department
IT Department
Board of County Commissioners

County and City Law Enforcement
County Special Services
County Search and Rescue
Hazardous Materials Division
Fire Chief
EMS Director/Coordinator

Parks and Recreation
Open Space
Public Health and Environment
City or County Financial Officer
Libraries
American Red Cross or Salvation Army Representative
Mayors
City or Town Administrators
Public Works
City Health
School District Representative
Special Districts

As a participant, you will be a member of your the Local Hazard Mitigation Planning Committee (LHMPC). You will have the opportunity to contribute information about past natural hazard events, the impact these events had on the community, and how to reduce those impacts in the future. You will also get to review and provide comments on the draft Mitigation Plan as it is being developed. The requirements to be fully accredited as a participating jurisdiction are to:

- Attend planning team meetings (3-4 meetings for each LHMPC)
- Assist in identifying the unique risks that affect your jurisdiction
- Identify or update any mitigation actions for your jurisdiction
- Assist in public involvement efforts
- Distribute, review and comment on the draft plan
- Formally adopt the hazard mitigation plan

Your County Emergency Management will be taking the lead for your local planning efforts and providing the information to the Regional Hazard Mitigation Planning Committee (RHMPC) who will focus on mitigation planning goals from a regional perspective.

Interested Stakeholders are identified as representatives from state or federal government agencies *that may have significant interest* in Southeast Colorado Region, or that have information to support the planning process. Stakeholders also include representatives from key businesses, industry, non-profit organizations, colleges or higher education branch operations, the public at large, special districts, and neighboring states or jurisdictions.
Stakeholder representation examples include:

USDA
FEMA
Rancher's or Farmers' Associations
NRCS
Levee Boards
Chamber of Commerce
Junior Colleges
Special Districts

As a potential stakeholder you are also invited to participate in any or all of the kick-off planning meetings to contribute to this valuable mitigation process. Your input will be a vital component in each Local Hazard Mitigation Planning effort, which will build upon the resiliency for the entire region. As a stakeholder there are various ways to participate in the planning process, either by contributing input at the Local or Regional HMPC meetings, being aware of planning activities through an email group, providing information to support the effort, or reviewing and commenting on the draft plan. We also encourage your participation in this mitigation planning process.

Please all participants and stakeholders RSVP to your local Emergency Manager so we can get a count of how many to expect.

Thank you,

Regional Hazard Mitigation Planning Committee
and
Laura Nay
AMEC Earth & Environmental

AGENDA

SE Colorado

All-Hazards Mitigation Planning Project

Baca, Bent, Crowley, Kiowa, Otero and Prowers Counties

Meeting #2: Risk Assessment

May 25–May 27, 2010

1. Introductions
2. Mitigation, Mitigation Planning, & the Disaster Mitigation Act Requirements
3. Brief overview of the current Sacramento County Multi-Hazard Mitigation Plan & discussion of what has been done since plan adoption
4. Discussion of objectives for the plan update
5. The Role of the Hazard Mitigation Planning Committee (HMPC)
6. Planning for Public Input
7. Coordinating with other Agencies
8. Hazard Identification
9. Data Collection Needs (Handout)
10. Schedule Overview
11. Questions and Answers/Adjourn

Initial Kick off Mtg. 5/27/2010

SE Region - PDM Sign-In Sheet for RFP # SE-FMA-09-001

County: BACA -	Email Address	Address	City	Organization Affiliation
Name				
Chad Ray	Chad.ray@state.co.us	132 W. 8 St. Suite 260	Pueblo	CAEM Field Manager
Robin Trujillo	rtrujillo@bacacounty.net	700 Colorado	Springfield	Baca County Public Health
Riley Frazee	bacaeoc@aim.com	741 MAIN ST	Springfield	Baca COUNTY EM
Rick HARTLEY	rhartley@sechosp.org	972 Kansas st	Springfield	SECHosp EMS
Donna Walker	dwalker@sechosp.org	373 E 10th	Springfield	SECHD
Paul Sedillo	psedillo@semhs.org	711 Barnes	LA Junta	Southeast Mental Health Svs.
DONNA DAVIS	dodavis@lamar.colostate.edu	208 Santa Fe Ave #21	LaJunta	CSFS LaJunta District

DATE: 05/27/2010

Emergency Manager Signature

SE Region - PDM Sign-In Sheet for RFP # SE-FMA-09-001

County: BENT	Email Address	Address	City	Organization Affiliation
Name				
RANDY FREED	Freedrs@gmail.com	11100 CR GG.5	LAS ANIMAS	BENT COUNTY OEM
Ed Caley	ed.caley@doc.state.co.us	254 Garfield Ave	Las Animas	Dept of Corr FLCF
Kellie Wasko	kellie.wasko@doc.state.co.us	13841 Rd. H	Ordway	Dept of Corr. FLCF
LARRY BOURNE	bourne.larry@gmail.com	28087 CR 10.75	Las Animas	BCLR Cemetery
GERRY H. OYEN	bent.sheriff@bentcounty.net	11100 CR GG.5	LAS ANIMAS	Bent County SHERIFF
Curtis Sniff	curtis.sniff@yahoo.com	32555 Rd 30	McClave	Bent County Road & Bridge
SARA SERVAES	saraservaes@gmail.com	701 PARK AVE.	LAS ANIMAS	BENT COUNTY PUBLIC HEALTH
Clay Hasser	Chasser98@hotmail.com	32734 Rd 30	McClave	Hasty/McClave F.D.
LISA Trigilio	bcdf@bentcounty.org	332 Amb Thompson Bl	LAS Animas	BCDF
David R. Encinias	bent.undersheriff@bentcounty.net	11100 CR GG.5	LAS ANIMAS	BCSO SAR
KEITH SIEMSEN	ksiemsen@prowerscounty.net	1001 S. Main	LAMAR	SOUTHEAST ENVIRONMENTAL HEALTH
DONNA DAVIS	dodavis@lamar.colostate.edu	208 Santa Fe Av #21	LA JUNTA	CSFS LA JUNTA DISTRICT
CHAD RAY	Chad.ray@state.co.us	132 W. B St. Suite 260	Pueblo	CDEM -

DATE: 5-25-10

Emergency Manager Signature: Randy Freed

NAME:	email	PHONE	DIS
LARRY REEVES	larry@crowleycounty.net	719-267-5230	CCEM
TONIA Burnett	tburnett@crowleycounty.net	267-5248	CCDHS
Frank Grant	fgrant@crowleycounty.net	265-5555 x2	Crowley Cty.
Jim Trainor	jim.trainor@cck12.net	469-8106	SCHOOL Dist.
Gary Kidd		267-5221	Crowley County
George Kern	gLK Fire @ Yahoo.com	469-4945	Crowley Fire Dept.
Greg Karle	KarleBoy@msn.com	469-9063	Sugar City Fire
Jason Karle		248-7165	Sugar city fire
DONNA DAVIS	dodavis@lamar.colostate.edu	468-9499	CSFS LA JUNTA DISTRICT
David Rossdale	SNOOKY53 AT YAHOO	980-3248	Crowley Co Roadrunner
Jerry Scruggs	jerrys.crowleyco@yahoo.com	469-8733	CROWLEY-MAYOR
TOBE ALLUMBAUGH	tobe@crowleycounty.net	719-267-5555 EXT. 2	CROWLEY COUNTY COMMISSIONER
John Morgan	RMWizard2002@yahoo.com	719-225-3827	Ordway Fire Town of Ordway
Russell BENNETT	bennett-russ-81 yahoo.com	719-267-3253 719-980-4493	County R&B Olney Springs Fire
STEVE BECKER	UNDERSHERIFF@CROWLEYCOUNTY.NET	719-267-5263(w) 719-980-1344(c)	SHERIFF'S OFFICE
MILES CLAR	sheriff@crowleycounty.net	719 267-5555(w) 719-980 1343(c)	CCSO
Reed Chapman	COChapman53@Hotmail.com	719-267-5533 719-469-5094(c)	CCVFD
Mario Rodriguez	mario@crowleycounty.net	719-267-5206	C.C.Ambulance

2010-05-25

SE Region - PDM Sign-In Sheet for RFP # SE-FMA-09-001

County: Kiowa	Email Address	Address	City	Organization Affiliation
Name				
Chris Sorensen	chris@kiowaoem.com	1305 Goff St	Eads	KCDEM
CATHRYN ANDERSON	not connected to "FRAUDBOX"	P.O. Box 11	Arlington 81021	
Eunice M. Weber	kcas@plainsonline.net	P.O. 817	Eads	Kiowa County Ambulance
Durwood Miller	Durwood_Miller@nps.gov	910 Wansted PoBox 249	Eads	Sand Creek Massacre
[illegible]	none	44414 [illegible] Eads Co	Eads	Weisbrod Maintenance
Kevin Sietkas			Eads	Weisbrod Mem Hospital
Donna Davis	dedavis@lamar.colostate.edu	208 S Santa Fe Ave [illegible]	La Junta	CSFS - La Junta District
FORREST FRAZEE	ffrazee@kiowaso.net	1305 Goff St	Eads Co	Kiowa Sheriff
Warren Yule	warren.yule@[illegible]	P.O. Box 832	Eads	Weisbrod
Chad Kay	chad.ray@state.co.us	132 W. B St. Suite 260	Pueblo	CDEM Field MGR
Casey Sheridan	csheridan@kiowaso.net	1305 Goff St./box 427	Eads, CO	Kiowa County Sheriff
KEITH SIEMSEN	ksiemsen@prowerscounty.net	1001 S. Main	Lamar CO	Southeast Environmental Health

DATE: 2010-05-25

Emergency Manager Signature [signature]

SE Region - PDM Sign-In Sheet for RFP # SE-FMA-09-001

County: Otero

Name	Email Address	Address	City	Organization Affiliation
Chris Johnson	cjohnson@oterogov.org	222 E. 2nd st.	La Junta	Otero Sheriff/EM
Ken Kinsey	kkinsey@oterogov.org	222 E 2ND St.	LA Junta	Otero County S.O
Celestino Santistevan	Celestino.Santistevan	P.O Box 994	LA Junta	AAA -
Aaron Eveatt	aeveatt@ci.la-junta.co.us	P.O. BOX 1066	LA JUNTA	LJFD
Jean Hinkle	jhinkle@oterogov.org	Box 511	La Junta	Otero County
Larry Aragon	Larry_Aragon01@yahoo.com	1702 Smithland Ave	La Junta	City of Rocky Ford
Fran Pannebaker	Fran_Pannebaker@nps.gov	Bent's Old Fort/35110 Hwy 194	"	DOI, NPS
Chris Phillips	GPU@GPU.COM	408 N 1st ST. CHERAW	"	CHERAW VOL. FIRE DEPT
Dave Howard	dkhoward@wildblue.org	331 Heights Dr Cho	Cheraw	Town of Cheraw
Marlene Boettcher	marlene.boettcher@ojc.edu	1802 Colorado (?)	LJ	OJC
DAVID GASKILL	dgaskill@ci.LA-JUNTA.co.us	608 Colorado Ave	LA JUNTA	LJPD
Jim Sullivan	jsullivan@lajunta.k12.co.us	1802 Colo Ave	LJ.	EOSD
Norman Finkner	nfinkner@avrmc.org	1100 Carson Ave	LJ	AVRMC
Frank Gallegos	rfpd@ci.rocky-ford.co.us	203 S. 5th	RF	RFPD
Roy Fritch	rfritch@centurytel.net	601 DIXON	LJ	NLJ Conservancy Dist
Sheila Henry	rflib@rockyford.lib.co.us	400 S 10th	RF	RF Library
Gary Coe	gary@fineupdatemail.com	203 S. 9th St	R.F	Fire Dept.
Donna Davis	dodavis@lamar.colostate.edu	208 Santa Fe Ave #21	LJ.	CSFS
Rick Lovato Jr	rick.lovato.jr@cheraw.k12.co.us	110 Lakeview	Cheraw	Cheraw School District 31
Chad Ray	Chad.ray@state.co.us	132 W. B St. Suite 260	Pueblo	CDEM - Field Manager

DATE: 5/26/10

Emergency Manager Signature

SE Region - PDM Sign-In Sheet for RFP # SE-FMA-09-001

Name	Email Address	Address	City	Organization/Affiliation
J. Whitfisher	#jan@townofholly.com		Holly, Co	Town of Holly
Jim Faull	jfaull@prowerscounty.net		Lamar	PCSO
Jeremy Burkhart	jeremy.burkhart@ci.lamar.co.us	505 S. Main	LAMAR	LFD
Darron Glover	dglover@prowerscounty.net	4075 Cr 21.75	Lamar	Prowers Area Transit
Marshall Cook	marshall.cook@ci.lamar.co.us	505 S. Main	LAMAR	LAMAR FD/EMS
Pat Leonard	pat.leonard@ci.lamar.co.us	505 S Main	Lamar	Lamar FD/EMS.
Jackie Brown	jbrown@prowerscounty.net	1001 S. Main	Lamar	PCPH
Mary Root	mroot@prowerscounty.net	1001 S. Main #133	LAMAR	Land Use - County
Jo DORENKAMP	ctyadmin@prowerscounty.net	301 S. MAIN #215	LAMAR	PROWERS CO. ADMIN
Donna DAVIS	dadavis@lamar.colostate.edu	2608 Santa Fe Ave #21	LA JUNTA	CSFS

County: PROWERS

DATE: 28 May 2010

Emergency Manager Signature: Staffan Warn

Southeast Colorado Region
All-Hazards Mitigation Plan

Serving Bent, Baca, Crowley, Kiowa, Otero and Prowers Counties

Directed through Bent County Office of Emergency Management

745 Bent Avenue • 11100 CR GG.5 • P.O. Box 1130 • Las Animas, CO 81054-8446 • 719-456-0795 Office • 719-456-0476 Fax

INVITATION
TO PARTICIPATE IN THE DEVELOPMENT OF THE SE REGION ALL-HAZARDS MITIGATION PLAN
MEETING #2: RISK ASSESSMENT

TO: **Participants and Interested Stakeholders** of the Southeast Colorado Region

FROM: Regional Hazard Mitigation Planning Committee (RHMPC)

Randy Freed Email: randyf@bentcounty.net
Director - Bent County Office of Emergency Management
Office (719) 456-0796 cell (719) 469-3108
Date & Time: August 31st 9:00 am to 12:00 am
Location: Bent County Sheriff's Office - Conference Room
11100 County Road GG.5
Las Animas, CO 81054

Chris Sorensen Email: chris@kiowaoem.com
Director - Kiowa County Office of Emergency Management
Office (719)438-2288 Cell (719)688-0506
Date & Time: August 31st 2:00 to 5:00 pm
Location: Kiowa County Courthouse (Basement)
1305 Goff Street, Eads, CO 81036

Chris Johnson Email: cjohnson@oterogov.org
Director - Otero County Office of Emergency Management
Office (719) 384-5941 Cell (719) 469-6207
Date & Time: September 2nd 9:00 am to 12:00 pm
Location: City Council Chambers (tentative)
601 Colorado, La Junta, CO 81050

Larry Reeves Email: lreeves@crowleycounty.net
Director - Crowley County Office of Emergency Management
Office (719) 267-5555 cell (719) 980-0570
Date & Time: August 30th 2:00 to 5:00 pm
Location: Ordway Fire Hall
611 E. 9th St., Ordway, CO 81063

Riley Frazee Email: riley.frazee@seregion.com
Director - Baca County Office of Emergency Management
Office (719) 523-6796 cell (719) 529-0300
Date & Time: September 1st 2:00 to 5:00 pm

Location:	Springfield EMS Building 972 Kansas St. Springfield, CO 81073

Staffon Warn Email: staffon.warn@prowerscounty.net
Director - Prowers County Office of Emergency Management
Office (719) 336-2674 cell (719) 688-4701

Date & Time:	September 1st 9:00 to 12:00
Location:	1001 S. Main St. Mezzanine Room Lamar, CO 81052

Chad Ray Email: chad.ray@state.co.us
Region Field Manager - Colorado Division of Emergency Management
Office (719) 544-6563 cell (719) 240-1531

RE: County Mitigation Plan RHMPC #2: Risk Assessment Meeting

The Southeast Colorado Region is inviting all participating jurisdictions and interested stakeholders to the second meeting of the Regional Hazard Mitigation Planning Committee (RHMPC) as part of the SE Colorado All-Hazards Plan development process. This meeting will provide the results of the Risk Assessment portion of the plan and will detail additional data needs and plan requirements as we move forward towards development of a first draft of the plan.

Again, we understand that your time is valuable and many of you serve in multiple positions. However, your knowledge and experience within your respective areas is vital to the accurate development of this regional All-Hazards Mitigation Plan, so we sincerely encourage your continued participation in this process where your concerns can be heard and your input is valued.

This invitation is extended to both previous meeting attendees and to anyone who might be new to the process. By way of background, the following information is provided to inform and/or refresh all stakeholders as to the purpose and need for this plan as well as to detail key requirements of the planning process.

This SE Colorado All-Hazards Mitigation Plan: is being prepared pursuant to the requirements of the Disaster Mitigation Act of 2000.

The purpose of this plan: is to reduce or eliminate the threat and risk that comes with natural and man-made hazards.

The primary goal of this plan: is to better protect the people, animals, property, and environment of the Southeast Colorado Region.

The benefit of this plan: is by developing mitigation goals, objectives and actions, it will serve as a decision-making tool to build a more disaster resistant region. In addition to that, it also positions all participants for further mitigation grant funding opportunities we would not otherwise be able to receive.

Participants are those people, who work in the various departments of a city or county; or who represent a volunteer organization that serves the city, town or county; or who serves on the board or works for a special district; or any other person whose affiliation serves the citizens of the local, state or regional community.

Each County is recommended to have representatives at their scheduled meeting from the following departments or organizations. The list is not limited to these, but a suggestion of those who should be present.

County Road & Bridge Department	Open Space
County Planning & Zoning Department	Public Health and Environment
County Building Department	City or County Financial Officer
GIS Department	Libraries
IT Department	American Red Cross or Salvation Army
Board of County Commissioners	Representative
County and City Law Enforcement	Mayors
County Special Services	City or Town Administrators
County Search and Rescue	Public Works
Hazardous Materials Division	City Health
Fire Chief	School District Representative
EMS Director/Coordinator	Special Districts
Parks and Recreation	

As a participant, you will be a member of your the Local Hazard Mitigation Planning Committee (LHMPC). You will have the opportunity to contribute information about past natural hazard events, the impact these events had on the community, and how to reduce those impacts in the future. You will also get to review and provide comments on the draft Mitigation Plan as it is being developed. The requirements to be fully accredited as a participating jurisdiction are to:

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- Assist in identifying the unique risks that affect your jurisdiction
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- Assist in public involvement efforts
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- Formally adopt the hazard mitigation plan

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Interested Stakeholders are identified as representatives from state or federal government agencies that may have significant interest in the Southeast Colorado Region, or that have information to support the planning process. Stakeholders also include representatives from key businesses, industry, non-profit organizations, colleges or higher education branch operations, the public at large, special districts, and neighboring states or jurisdictions.

Stakeholder representation examples include:

USDA	Levee Boards
FEMA	Chamber of Commerce
Rancher's or Farmers' Associations	Junior Colleges
NRCS	Special Districts

As a potential stakeholder you are also invited to participate in any or all of the planning meetings to contribute to this valuable mitigation process. Your input will be a vital component in each Local Hazard Mitigation Planning effort, which will build upon the resiliency for the entire region. As a stakeholder there are various ways to participate in the planning process, either by contributing input at the Local or Regional HMPC meetings, being aware of planning activities through an email group, providing information to support the effort, or reviewing and commenting on the draft plan. We also encourage your participation in this mitigation planning process.

Please all participants and stakeholders RSVP to your local Emergency Manager so we can get a count of how many to expect.

Thank you,

Regional Hazard Mitigation Planning Committee
and
Jeanine Foster
AMEC Earth & Environmental

AGENDA
SE Colorado
All-Hazards Mitigation Planning Project
Baca, Bent, Crowley, Kiowa, Otero and Prowers Counties
Meeting #2: Risk Assessment

August 30–September 2, 2010

1. Introductions
2. LHMP Project Status
3. Risk Assessment Summary
4. Data Collection Needs
5. Next Steps

SIGN-IN SHEET
SE Colorado Region
ALL-HAZARDS MITIGATION PLANNING PROJECT
HMPC Meeting #2

Name	Email Address	Address	Phone	City/Organization/ Affiliation
RANDY FREED	Randy.freed@bentcounty.net	11100 CR GG.5	719-456-0796	BENT COUNTY OEM & LEVY DISTRICT
KEITH SIEMSEN	ksiemsen@prowerscounty.net	1001 S. MAIN 81052 LAMAR	719 336-8721	SOUTHEAST ENVIRONMENTAL HEALTH/ PROWERS COUNTY PUBLIC HEALTH
LARRY BOURNE	BOURNE.LARRY@gmail.com	28082 CR 10.75 Las Animas CO	456-0617	BENT County Cemetery District
LAWRENCE SENA	la.mayor@bentcounty.net	243 Carson Las Animas	456-0422	City of Las Animas
Donald Trujillo	lapd1@bentcounty.net	326 Prowers Ct Las Animas Co	456-1313	City of Las Animas
Chad Ray	Chad.ray@state.co.us	Pueblo, Co	719-240-1531	Colorado Division Emergency Management
Kaysie Schmidt	kschmidt@otrogov.org	701 Park Avenue Las Animas, CO 81054	(719) 456-0517	Bent County Public Health
LISA TRIGILIO	bcdf@bentcounty.org	332 AmbThompson Blvd LAS Animas CO 81054	(719) 456-0452	Bent County + BC Healthcare Development Foundation Center
David R. Encinias	bent.undersheriff@bentcounty.net	11100 CR GG.5 Las Animas, Co 81054	719-456-1363	Bent County Sheriffs Office

County: BENT

Date: 8/31/2010

Emergency Manager Signature: Freed

SIGN-IN SHEET
SE Colorado Region
ALL-HAZARDS MITIGATION PLANNING PROJECT
HMPC Meeting #2

Name	Email Address	Address	Phone	City/Organization/ Affiliation
Frank Grant	fgrant@crowleycounty.net	603 Main, Ste 2, Ordway CO 81063	719-267-5555 x2	Crowley County
TOBE ALLUMBAUGH	tobe@CrowleyCounty.net	- DO -	- DO -	- DO -
LARRY REEVES	larry@crowleycounty.net	611 E 5th St Ordway Co.	719-267-5230	
Chad Ray	Chad.ray@state.co.us	Pueblo, Co.	719-240-1531	COLORADO DIVISION EMERGENCY MANAGEMENT
DONNA DAVIS	dsdavis@lamar.colostate.edu	208 SANTA FE AVE #21, LJ 81050	719 384-9087	Colo State [illegible]

County: CROWLEY

Date: 8/30/2010

Emergency Manager Signature: [signature]

SIGN-IN SHEET
SE Colorado Region
ALL-HAZARDS MITIGATION PLANNING PROJECT
HMPC Meeting #2

Name	Email Address	Address	Phone	City/Organization/ Affiliation
Chad Ray	Chad.ray@state.co.us	Pueblo, CO	719-240-1531	Colorado Division Emergency Management
Chris Sorensen	chris@kiowaoem.com	Eads CO	719-688-0506	Kiowa County OEM
Keith Siemsen	ksiemsen@prowerscounty.net	1001 S Main Lamar CO 81052	719-336-8721	Southeast Environmental Health / Prowers County Public Health
Eunice M. Weber	Hcas@plainsonline.net	Eads, Colo	719-438-5900	Kiowa County Ambulance
Warren Yule	Warren.yule@yahoo.com	" "	719-438-5401	Kiowa County Hosp.
Forrest Frazee	FFrazee@kiowaso.net	Eads	719-438-5411	Kiowa Co Sheriff

County: Kiowa

Date: Aug 31, 2010

Emergency Manager Signature: [signature]

SIGN-IN SHEET
SE Colorado Region
ALL-HAZARDS MITIGATION PLANNING PROJECT
HMPC Meeting #2

Name	Email Address	Address	Phone	City/Organization/ Affiliation
TODD QUICK	tquick@ci.la-junta.co.us	601 COLO. AVE	719 384-2525	LJ PD
TIM KNABENSHUE	tim.knabenshue@cdps.state.co.us	617 RATON AVE LAJUNTA CO 81050	719-440-7541	COLO STATE PATROL HAZMAT
DAVID GASKILL	Dgaskill@ci.LA-JUNTA.co.us	601 Colorado Ave	719 384-2525	LJPD
Iain Hyde	iain.hyde@state.co.us	9195 E. Mineral ave. Centennial	720-852-6698	CDEM
VICTORIA SMITH	victoria.c.smith@state.co.us	9195 E. Mineral Ave Centennial	720-852-6699	CDEM
Paul Sedillo	psedillo@semhs.org	711 Barnes	719 384 5446	SEMHS
Joey Gacnik	jgacnik@ci.la-junta.co.us	601 Colorado Ave. LJ	719-384-2323	LJFD
DONNA DAVIS	Donna.Davis@Colostate.edu	1904 San Juan Ave La Junta, CO 81050	719-468-9499	CSFS
Chad Ray	Chad.Ray@state.co.us	Pueblo, Co	719-240-1531	COLORADO Division Emergency Management
Aaron Eveatt	aeveatt@ci.la-junta.co.us	601 Colorado Ave, LJ	719-384-2323	LJFD
Chris Johnson	cjohnson@oterogov.org	222E. 2nd L.J.	719-384-5941	Otero Sheriff

County: OTERO

Date: 9/2/2010

Emergency Manager Signature: CHAD RAY FOR CHRIS JOHNSON

SIGN-IN SHEET
SE Colorado Region
ALL-HAZARDS MITIGATION PLANNING PROJECT
HMPC Meeting #2

Name	Email Address	Address	Phone	City/Organization/ Affiliation
SHANE SCOVEL	Shane.Scovel@cdps.state.co.us	111 W. PARMENTER ST LAMAR, CO	719 336 7403	CSP
DONNA DAVIS	Donna.Davis@Colostate.Edu	208 S ANTAFE #21 LAJUNTA, CO 81050	719 384 9087	CO STATE Ext Service
KEITH SIEMSEN	ksiemsen@prowerscounty.net	1001 S. MAIN LAMAR 81052	719 336-8721	SOUTHEAST ENV. HEALTH / PROWERS COUNTY PUBLIC HEALTH
Jacqueline BROWN	jbrown@prowerscounty.net	PCPH 1001 S. main Lamar, Co. 81052	719-336-8721	PCPH.
Tim KNABENSHUE	tim.Knabenshue@cdps.state.co.us	CO 81050 GATEWAY AVE LAJUNTA	719-440-3841	COLO STATE PATROL HAZMAT
Staffon Warn	staffon.warn@prowerscounty.net	2506 S. Main Lamar, CO 81052	719-336-2674	Prowers County OEM / Fire
Chad Ray	Chad.ray@state.co.us	Pueblo, Co	719-240-1531	Colorado Division Emergency Management
J. White (Fisher)	jan@townofholly.com	P.O. Box 458 Holly, Co 81047	719.537-6610	Town of Holly

County: Prowers

Date: 9-1-10

Emergency Manager Signature: Staffon Warn

Southeast Colorado Region
All-Hazards Mitigation Plan

Serving Bent, Baca, Crowley, Kiowa, Otero and Prowers Counties

Directed through Bent County Office of Emergency Management

745 Bent Avenue • 11100 CR GG.5 • P.O. Box 1130 • Las Animas, CO 81054-8446 • 719-456-0795 Office • 719-456-0476 Fax

INVITATION
TO PARTICIPATE IN THE DEVELOPMENT OF THE
SE REGION ALL-HAZARDS MITIGATION PLAN
MEETING #3: Mitigation Strategy Development

TO: **Participants and Interested Stakeholders** of the Southeast Colorado Region

FROM: **Regional Hazard Mitigation Planning Committee (HMPC)**

Randy Freed Email: randyf@bentcounty.net
Director - Bent County Office of Emergency Management
Office (719) 456-0796 cell (719) 469-3108
Date & Time: December 15th 9:00 am to 3:00 pm
Location: La Junta Fire Training Center
14 E. 6th Street
La Junta, CO 81050

Chris Sorensen Email: chris@kiowaoem.com
Director - Kiowa County Office of Emergency Management
Office (719)438-2288 Cell (719)688-0506
Date & Time: December 16th 9:00 am to 3:00 pm
Location: Prowers County Public Health, Mezzanine Room
1001 S. Main St.
Lamar, CO 81052

Chris Johnson Email: cjohnson@oterogov.org
Director - Otero County Office of Emergency Management
Office (719) 384-5941 Cell (719) 469-6207
Date & Time: December 15th 9:00 am to 3:00 pm
Location: La Junta Fire Training Center
14 E. 6th Street
La Junta, CO 81050

Larry Reeves Email: lreeves@crowleycounty.net
Director - Crowley County Office of Emergency Management
Office (719) 267-5555 cell (719) 980-0570
Date & Time: December 15th 9:00 am to 3:00 pm
Location: La Junta Fire Training Center
14 E. 6th Street
La Junta, CO 81050

Riley Frazee Email: riley.frazee@seregion.com
Director - Baca County Office of Emergency Management
Office (719) 523-6796 cell (719) 529-0300
Date & Time: December 16th 9:00 am to 3:00 pm
Location: Prowers County Public Health, Mezzanine Room
1001 S. Main St.
Lamar, CO 81052

Staffon Warn Email: staffon.warn@prowerscounty.net
Director - Prowers County Office of Emergency Management
Office (719) 336-2674 cell (719) 688-4701
Date & Time: December 16th 9:00 am to 3:00 pm
Location: Prowers County Public Health ,Mezzanine Room
1001 S. Main St.
Lamar, CO 81052

Chad Ray Email: chad.ray@state.co.us
Region Field Manager - Colorado Division of Emergency Management
Office (719) 544-6563 cell (719) 240-1531

RE: County Mitigation Plan HMPC #3: Mitigation Strategy Meeting

The Southeast Colorado Region is inviting all participating jurisdictions and interested stakeholders to the third meeting of the Regional Hazard Mitigation Planning Committee (HMPC) as part of the SE Colorado All-Hazards Plan development process. This meeting is for the development of plan goals and objectives as well as to identify and prioritize mitigation action projects for participating jurisdictions.

Again, we understand that your time is valuable and many of you serve in multiple positions. However, your knowledge and experience within your respective areas is vital to the accurate development of this regional All-Hazards Mitigation Plan. This invitation is extended to both previous meeting attendees and to anyone who might be new to the process.

The Mitigation Strategy Development meeting is the most critical meeting of the plan development process. As such, it is extremely important that each participating jurisdiction is well represented at these meetings. Specifically, we recommend that each department (from each participating jurisdiction) that might have a mitigation action project for inclusion in the plan attend this very important meeting.

The following list identifies those departments that are typically critical to the development of the Mitigation Strategy.

- Road & Bridge Department
- Planning & Zoning Department
- Building Department
- Engineering Department
- Public Works Department
- Law Enforcement
- Hazardous Materials Division
- Fire Chief
- EMS Director/Coordinator
- Parks and Recreation
- Open Space
- Public Health and Environment
- Special Districts
- School Districts

Any other department, District and/or group that has a mitigation project for inclusion in the plan should come to these meetings. Keep in mind that FEMA will not approve a plan for any participating jurisdiction unless they have one or more project included in the plan.

By way of background, the following information is provided to inform and/or refresh all stakeholders as to the purpose and need for this plan as well as to detail key requirements of the planning process.

This SE Colorado All-Hazards Mitigation Plan: is being prepared pursuant to the requirements of the Disaster Mitigation Act of 2000.

The purpose of this plan: is to reduce or eliminate the threat and risk that comes with natural and man-made hazards.

The primary goal of this plan: is to better protect the people, animals, property, and environment of the Southeast Colorado Region.

The benefit of this plan: is by developing mitigation goals, objectives and actions, it will serve as a decision-making tool to build a more disaster resistant region. In addition to that, it also positions all participants for further mitigation grant funding opportunities we would not otherwise be able to receive.

Please all participants and stakeholders RSVP to your local Emergency Manager so we can get a count of how many to expect.

Thank you and see you at the meetings,

Hazard Mitigation Planning Committee
and
Jeanine Foster
AMEC Earth & Environmental

AGENDA
SE Colorado Region
All Hazards Mitigation Plan
Serving Baca, Bent, Crowley, Kiowa, Otero and Prowers Counties

Team Meetings #3 & 4
December 15 & 16, 2010

Morning

1) Introductions
2) Status of the DMA Planning Process
3) Review of Risk Assessment Summary
4) Develop Plan Goals and Objectives

Afternoon

1) Finalize Goals and Objectives
2) Review Mitigation Alternatives
3) Review Mitigation Selection Criteria
4) Identify Mitigation Projects
5) Prioritize Mitigation Projects
6) Review of Schedule/Data Needs

SE Region - PDM Sign-In Sheet for RFP # SE-FMA-09-001 - Mitigation Strategy Mtg. 12/14/2010 Otero, Bent & Crowley County

County:	Email Address	Address	City	Organization Affiliation
Otero County				
Name				
AARON EVEATT	aeveatt@ci.la-junta.co.us	601 Colorado Ave	La Junta	City of LJ EM / LJFD
Ray Davis	rdavis@arkvi.com	532 Carson	Las Animas	City of Las Animas / P.W.
Ken Wagner	lapw1@bentcounty.net	532 Carson	Las Animas	City of Las Animas P.W.
Lawrence Sena	la.mayor@bentcounty.net	532 Carson	Las Animas	City of Las Animas
SARA LEWIS	slewis@bcns.net	701 PARK AVE.	LAS ANIMAS	BENT COUNTY PUBLIC HEALTH
Kaysie Schmidt	kschmidt@bcns.net	701 Park Ave	Las Animas	Bent County Public Health
RANDY FREED	Randy.Freed@bentcounty.net	11100 CR GG.5	LAS ANIMAS	BENT COUNTY OEM
Donna Davis	Donna.Davis@ColoState.Edu	1904 San Juan Ave, La Junta	La Junta [illegible]	Colo State Forest Service
Joey Gacnik	jgacnik@ci.la-junta.co.us	601 Colorado Ave.	La Junta, Co	La Junta Fire Dept.
Chad Ray	Chad.ray@state.co.us	Pueblo, Co		CDEM
Larry Reeves	larry@crowleycounty.net	[illegible] Ordway [illegible]	Ordway, CO	CCOEM
KEITH SIEMSEN	ksiemsen@prowerscounty.net	1001 S Main, Lamar	Lamar, CO	Southeast Environmental Health

DATE: 14 DEC 2010

Emergency Manager Signature [signature]

Mitigation Strategy Development Kiowa, Baca Prowers

SE Region - PDM Sign-In Sheet for RFP # SE-FMA-09-001

County: Prowers County EOC.

Name	Email Address	Address	City	Organization
Chad Ray	chad.ray@state.co.us	Pueblo, CO	~~[illegible]~~	CDEM
Riley Frazee	bacaeoc@caim.com	741 Main St	Springfield	Baca DEM
Stafford Ward	stafford.ward@[illegible]	2506 S. Main	Lamar	Prowers OEM/Fire
Marshall Cook	marshall.cook@ci.lamar.co.us	505 S. Main Lamar	Lamar	Lamar Fire/Amb
Rick Hartley	rhartley@sechosp.org	972 Kansas	Springfield	SECHosp EMS
Chris Sorensen	chris@kiowaoem.com	PO Box 172	Eads	Kiowa OEM
Bruce Fickenscher	bruce.fickenscher@colostate.edu	PO Box 97	Eads	CSU Extension
J. White (Fisher)	jan@townofholly.com	P.O. Box 458	Holly	~~[illegible]~~
Mark Dorenkamp	mark.dorenkamp@[illegible]	[illegible], 209 E [illegible]	Lamar	Prowers [illegible]
Jarrell Brown	jbrown@prowerscounty.net	PCPH 1001 S Main	Lamar	Prowers County PH
Donna Davis	donna.davis@colostate.edu	1904 San Juan Ave	La Junta, Co	CSFS
Andrew Koehn	andrew.koehn@prowerscounty.net	1001 S Main,	Lamar	SE Environmental Health
Keith Siemsen	ksiemsen@prowerscounty.net	1001 S. Main	Lamar	" "
Marsha Willhite	marsha@townofholly.com	PO Box 458	Holly	Town of Holly

DATE: 15 DEC 2010

Emergency Manager Signature: [signature]

From: Chad Ray [mailto:Chad.Ray@state.co.us]
Sent: Monday, January 24, 2011 9:36 PM
To: Riley Frazee; Foster, Jeanine; Aaron Eveatt; Larry Reeves; Randy Freed; Chris Sorensen; Chris Johnson; Staffon Warren
Subject: SE Region PDM Plan Conference Call

Everyone,

I think it is time for a conference call to synch up the expectations of the grant and also deliverables to ensure the completion of the plan.

Jeanine with AMEC will be sending out an agenda for the conference call. So some pre-planning work for everyone..... do you have your updates to the draft county components and input for the mitigation projects. These are both the main parts of the plan.

Instructions for the conference to be held Jan. 27th @ 1030 Hrs.

1-866-877-3977

Room: *1563523*

Please use the * before and at the end.

I look forward to everyone on the call and making another step to this plan for the SE Region.

Chad

ALL INVITEES WERE PRESENT ON CONFERENCE CALL. AS EACH PARTICIPANT WAS CALLING FROM A DIFFERENT LOCATION, NO SIGN IN SHEET WAS KEPT.

From: Chad Ray [mailto:Chad.Ray@state.co.us]
Sent: Sunday, April 17, 2011 3:50 PM
To: Riley Frazee; Foster, Jeanine; Aaron Eveatt; Larry Reeves; Randy Freed; Chris Sorensen; Chris Johnson; Staffon Warren
Subject: SE Region PDM Conference Call

Everyone,

Since we have been very busy the last few weeks put out fires mostly, I would propose we have region PDM conference call on Tuesday at 1000 hrs. I only see this taking 30-45 minutes to complete. We are needing to finish up a few things to keep moving and finalizing the plan we are close in completion and need to finish it up.

Please use the following

1-866-877-3977
Conference Room *1563523*

Again Tuesday at 1000 hrs.

Chad Ray

ALL INVITEES WERE PRESENT ON CONFERENCE CALL. AS EACH PARTICIPANT WAS CALLING FROM A DIFFERENT LOCATION, NO SIGN IN SHEET WAS KEPT.

SOUTHEAST COLORADO REGION ALL-HAZARDS MITIGATION PLAN

(BACA, BENT, CROWLEY, KIOWA, OTERO AND PROWERS COUNTIES)

DATA COLLECTION WORKBOOK

LOCAL HAZARD MITIGATION PLANNING COMMITTEE (LHMPC)

Prepared by

AMEC Earth & Environmental, Inc.
Laura Nay

May 2010

Baca County Hazard Mitigation Plan

Clarification on Terminology

Emergency Management - the four phases
- Prevention - Mitigation
- Preparedness
- Response
- Recovery

Terms that will be used during this planning process will include:

Hazards
Natural
Man-made
EVENT OF RECORD
WORSE CASE SCENARIO

THREAT – Menace - is there a threat there? What is it? Based on previous experience tells us that there is a future threat.

VULNERABILITY – being prone or susceptible to damage or injury. The characteristics or a person, group, community that influence their capacity to anticipate, cope with, resist, and recover from the impact of a disaster(social, economic, physical) Root causes, dynamic pressures, unsafe conditions + the hazards cause the disaster

RISK – what makes you or your community "at risk?" Are you at risk for high cholesterol? Risk = the Hazard x the Vulnerability

BEST AVAILABLE DATA

CALCULATING LOSSES
Loss of life
Structure losses
Contents losses

CAPABILITIES
The capability to mitigate not Homeland Security capabilities
What is your capacity to mitigate the issues? In what way can you build resilience against these issues? Are they non-structural capabilities and/or structural capabilities?

MITIGATION – Moving toward a safer environment of becoming more disaster-resistant.
The heart or core of the mitigation message is CARDIAC
Communicate the understanding of vulnerability
Analyze vulnerability
Focus on reversing the pressures that makes a community vulnerable
Emphasize sustainable development
Improve livelihoods
Add recovery
Extend to culture

2

DOCUMENTING MATCH (WORKSHEET)

WHAT IS MITIGATION?

Mitigation is one of four basic phases of disaster management, the other three including preparedness, response, and recovery. Mitigation is predicated on the principles that many losses are preventable through better community design and that each event should teach us how to reduce losses in the next disaster.

Mitigation generally means reducing long-term risk from hazards to acceptable levels through predetermined measures accompanying physical development, for example: strengthening structures to withstand earthquakes; prohibiting or limiting development in flood-prone areas; clearing defensible space around residences in Wildfire Urban Interface (WUI) areas; or designing development away from areas of geological instability.

Mitigation is different from emergency preparedness. The latter concentrates on activities which make a person, place, or organization ready to respond to a disaster with emergency equipment, food, emergency shelter, and medicine.

OVERVIEW

The contents of this workbook have been designed to assist the City of Bossier City in collecting necessary background information to support the hazard mitigation planning process pursuant to the Federal Disaster Mitigation Act (DMA) of 2000. This includes a hazard identification and vulnerability assessment, an assessment of the City's current hazard mitigation capabilities, and an identification of potential mitigation projects that, if undertaken, could prevent or reduce future losses.

The essential information needed to support the planning process includes background information about the City of Bossier City; plans, technical studies, and data related to hazards and risks; current governing codes, ordinances, regulations, and procedures whose intent is to minimize future losses; and an assessment of the City's technical and organizational capabilities to perform hazard mitigation/loss prevention functions. It is important that the plan shows what the City of Bossier City is doing now to limit future disaster losses.

The planning process is heavily dependent on existing data to be supplied by each of the participants represented on the Hazard Mitigation Planning Committee (HMPC). The DMA plan development process does not require the development of new data, but requires *existing data only*.

The goal of this process is to produce a hazard mitigation plan that meets the City's needs, as well as the requirements of DMA 2000 and that contains a list of projects that may be eligible for streamlined federal mitigation funding pre or post disaster.

Baca County Hazard Mitigation Plan

PARTICIPATION

The DMA planning regulations and guidance stress that each entity seeking the required FEMA approval of their mitigation plan must:

- Participate in the process;
- Detail areas within the planning area where the risk differs from that facing the entire area;
- Identify specific projects to be eligible for funding; and
- Have the governing board formally adopt the plan.

For HMPC members, 'participation' means the planning committee representatives will:

- Attend and participate in HMPC meetings;
- Provide available data that is requested of the HMPC coordinator;
- Review and provide/coordinate comments on the draft plans;
- Advertise, coordinate and participate in the public input process; and
- Coordinate the formal adoption of the plan by the governing board.

DATA COLLECTION GUIDE

This guide contains an explanation of the types of hazard mitigation/loss prevention data that is needed for the hazard mitigation planning process. This guide identifies specific requirements for the Risk Assessment Process, which includes the Hazard Identification, Vulnerability, and Capability Assessments as well as defines requirements for development of the Mitigation Strategy.

The worksheets have been developed to assist with the data collection. These need to be completed by each person participating on the HMPC and will serve two purposes:

1) They will help facilitate the collection of the necessary information, and
2) They will function as evidence of "participation" in the planning process.

The Risk Assessment Process

The risk assessment process includes three components: 1) Hazard Identification, 2) Vulnerability Assessment, and 3) Capability Assessment. Data needs and worksheets for each of the risk assessment components are included in the following pages.

Baca County Hazard Mitigation Plan

WORKSHEET #1: HAZARD IDENTIFICATION

Name of Department/Jurisdiction:____

Use this worksheet to identify possible hazards that may impact your jurisdiction. Please rank according to the guidelines that follow the table. Use the Hazard Event Worksheet #2 to provide evidence to justify your conclusions.

Hazard	Frequency of Occurrence	Spatial Extent	Potential Magnitude	Significance	Hazard Map? (paper/GIS/ source)
Dam/Levee Failure					
Earthquake					
Extreme Temperatures : Heat					
Extreme Temperatures : Cold					
Drought					
Flood: 100/500 – Year					
Flood: Stormwater/ Flash Flooding					
Severe Weather: Thunderstorms/Lightning/Wind/Hail					
Stream Bank Erosion/ Stability					
Subsidence					
Tornadoes					
Tropical Storms/ Hurricanes					
Winter Storms (Icing)					

2

Guidelines

Frequency of Occurrence:
Highly Likely: Near 100% probability in next year.
Likely: Between 10 and 100% probability in next year or at least one chance in ten years.
Occasional: Between 1 and 10% probability in next year or at least one chance in next 100 years.
Unlikely: Less than 1% probability in next 100 years.

Potential Magnitude
Catastrophic: More than 50% of area affected
Critical: 25 to 50%
Limited: 10 to 25%
Negligible: Less than 10%

Spatial Extent
Limited: Less than 10% of planning area
Significant: 10-50% of planning area
Extensive: 50-100% of planning area

Significance (your subjective opinion)
Low, Medium, High

Prepared by:
Phone:
Email:

Baca County Hazard Mitigation Plan

WORKSHEET #2: HISTORIC HAZARD EVENT

Name of Department/Jurisdiction:______________________________________

Please fill out one sheet for each significant hazard event with as much detail as possible. Attach supporting documentation, photocopies of newspaper articles, or other original sources.

Type of event	
Nature and magnitude of event	
Location	
Date of event	
Injuries	
Deaths	
Property damage	
Infrastructure damage	
Crop damage	
Business/economic impacts	
Road/school/other closures	
Other damage	
Insured losses	
Federal/state disaster relief funding	
Opinion on likelihood of occurring again	
Source of information	
Comments	

Prepared by: ______________________________
Phone: ______________________________
Email: ______________________________
Date:______________________________

Please return worksheets by mail, email, or fax to:
AMEC Earth & Environmental
355 S. Teller St, Suite 300
Lakewood, CO 80226
fax: (303) 935-6575
email: shelby.hudson@amec.com

Baca County Hazard Mitigation Plan

WORKSHEET #3: VULNERABILITY ASSESSMENT

Name of Department/Jurisdiction:____

The purpose of this worksheet is to assess the vulnerable buildings, populations, critical facilities, infrastructure, and other important assets in your community by using the best available data to complete the table and questions that follow. Use the table on the next page to compile a detailed inventory of specific assets at risk including critical facilities and infrastructure; natural, cultural, and historical assets; and economic assets as defined below. These may include hospitals, fire stations, or historic buildings. Attach supporting documentation, such as photographs, reports, or plans if possible. In the hazard specific column of the asset inventory table, indicate if there is a specific hazard to which the asset is at risk.

Critical Facilities

FEMA generally defines four kinds of critical facilities:

- Structures or facilities that produce, use, or store highly volatile, flammable, explosive, toxic, and/or water-reactive materials
- Hospitals, nursing homes, and housing likely to have occupants who may not be sufficiently mobile to avoid injury or death during a hazard event
- Police stations, fire stations, vehicle and equipment storage facilities, and emergency operations centers that are needed for emergency response activities before, during, and after a hazard event
- Public and private utility facilities that are vital to maintaining or restoring normal services to hazard areas before, during, and after a hazard event

FEMA's HAZUS-MH loss estimation software uses the following three categories of critical assets. 'Essential facilities' are those that if damaged would have devastating impacts on disaster response and/or recovery. 'High potential loss facilities' are those that would have a high loss or impact on the community. Transportation and lifeline facilities are third category of critical assets; examples are provided below.

Essential Facilities	High Potential Loss Facilities	Transportation and Lifeline
▪ Hospitals and other medical facilities ▪ Police stations ▪ Fire station ▪ Emergency Operations Centers	▪ Power plants ▪ Dams/levees ▪ Military installations ▪ Hazardous material sites ▪ Schools ▪ Shelters ▪ Day care centers ▪ Nursing homes ▪ Main government buildings	▪ Highways, bridges, and tunnels ▪ Railroads and facilities ▪ Bus facilities ▪ Airports ▪ Water treatment facilities ▪ Natural gas facilities and pipelines ▪ Oil facilities and pipelines ▪ Communications facilities

5

Baca County Hazard Mitigation Plan

Natural, Cultural, and Historical Assets

Natural resource assets may include wetlands, threatened and endangered species, or other environmentally sensitive areas. Historical assets include state and federally listed historic sites.

Economic Assets

Economic assets at risk may include major employers or primary economic sectors, such as agriculture, whose losses or inoperability would have severe impacts on the community and its ability to recover from disaster.

6

Baca County Hazard Mitigation Plan

Asset Inventory

Name of Asset	Type	Replacement Value	Displacement Cost	Occupancy/ Capacity #	Hazard Specific Info

7

Baca County Hazard Mitigation Plan

Additional Vulnerability Questions

1. Number of flood insurance policies

2. Number of repetitive loss properties

3. Average depth of 100-year floodplain

4. Number of unreinforced masonry buildings

5. Hospitals built before 1973

6. Describe any hazard-related concerns or issues regarding the vulnerability of special needs populations, such as the elderly, disabled, low-income, or migrant farm workers.

7. Describe development trends and expected growth areas and how they relate to hazard areas and vulnerability concerns/issues.

Prepared by: ______________________________
Phone: ______________________________
Email: ______________________________
Date: ______________________________

Please return worksheets by mail, email, or fax to:
AMEC Earth & Environmental
355 S. Teller St, Suite 300
Lakewood, CO 80226
fax: (303) 935-6575
email: shelby.hudson@amec.com

8

Baca County Hazard Mitigation Plan

WORKSHEET #4: MITIGATION CAPABILITY ASSESSMENT

Name of Department/Jurisdiction:

____

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. Please complete this worksheet and provide supporting documentation if possible.

Regulatory

The following planning and land management tools are typically used by local jurisdictions to implement hazard mitigation activities. Please indicate which of the following your jurisdiction has in place. If your jurisdiction does not have this capability or authority, please indicate in the comments column if a higher level of government has the authority. Also use the comments column to indicate how we can obtain a copy of the plan or document (i.e. available on the web, will put on ftp, will email or mail).

Regulatory Tool (ordinances, codes, plans)	Y/N	Comments
General plan		
Zoning ordinance		
Subdivision ordinance		
Growth management ordinance		
Floodplain ordinance		
Other special purpose ordinance (stormwater, steep slope, wildfire)		
Building code		Version:
BCEGS Rating		
Fire department ISO rating		Rating:
Erosion or sediment control program		
Stormwater management program		
Site plan review requirements		
Capital improvements plan		
Economic development plan		
Local emergency operations plan		
Other special plans		
Flood insurance study or other engineering study for streams		
Elevation certificates		
Other		

9

Baca County Hazard Mitigation Plan

Administrative/Technical

Identify the technical and personnel resources responsible for activities related to hazard mitigation/loss prevention within your jurisdiction. For smaller jurisdictions without local staff resources, if there are public resources at the next higher level government that can provide technical assistance, please indicate so in the comments column.

Personnel Resources	Yes/No	Department/Position	Comments
Planner/Engineer with knowledge of land development/land management practices			
Engineer/Professional trained in construction practices related to buildings and/or infrastructure			
Planner/Engineer/Scientist with an understanding of natural hazards			
Personnel skilled in GIS			
Full time building official			
Floodplain Manager			
Emergency Manager			
Grant writer			
Other personnel			
GIS Data – Hazard areas			
GIS Data - Critical facilities			
GIS Data – Building footprints			
GIS Data – Land use			
GIS Data – Links to Assessor's data			
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)			
Other			

10

Baca County Hazard Mitigation Plan

Fiscal

Identify whether your jurisdiction has access to or is eligible to use the following financial resources for hazard mitigation

Financial Resources	Accessible/Eligible to Use (Y/N)	Comments
Community Development Block Grants		
Capital improvements project funding		
Authority to levy taxes for specific purposes		
Fees for water, sewer, gas, or electric services		
Impact fees for new development		
Incur debt through general obligation bonds		
Incur debt through special tax bonds		
Incur debt through private activities		
Withhold spending in hazard prone areas		
Other		

Additional Capabilities Questions

1. Does your community have any hazard-related certifications, such as Storm Ready certification or Firewise Communities certification?

2. List any past or ongoing public education or information programs, such as for responsible water use, earthquake or fire safety, household preparedness, or environmental education.

3. List any other past or ongoing projects or programs designed to reduce disaster losses. These may include projects to protect critical facilities.

Prepared by: ____________________
Phone: ____________________
Email: ____________________
Date: ____________________

Please return worksheets by mail, email, or fax to:
Shelby Hudson, AMEC Earth & Environmental
355 S. Teller St, Suite 300
Lakewood, CO 80226
fax: (303) 935-6575
email: shelby.hudson@amec.com

11

The Mitigation Strategy

One of the planning process' last activities will be for HMPC members to prepare brief descriptions of proposed mitigation projects that would effectively reduce future disaster losses. This section provides guidance on the categories of mitigation measures to be considered and a mitigation project outline with one example projects.

Categories of Mitigation Measures

PREVENTION: Preventive measures are designed to keep the problem from occurring or getting worse. Their objective is to ensure that future development is not exposed to damage and does not increase damage to other properties.

- ***Planning***
- ***Zoning***
- ***Open Space Preservation***
- ***Land Development Regulations***
  - ***Subdivision regulations***
  - ***Building Codes***
    - ***Fire-Wise Construction***
  - ***Floodplain development regulations***
  - ***Geologic Hazard Areas development regulations (for roads too!)***
- ***Storm Water Management***
- ***Fuels Management, Fire-Breaks***

EMERGENCY SERVICES measures protect people during and after a disaster. A good emergency services program addresses all hazards. Measures include:

- *Warning* (flooding, tornadoes, winter storms, geologic hazards, fire)
  - NOAA Weather Radio
  - Sirens
  - "Reverse 911" (Emergency Notification System)
- *Emergency Response*
  - *Evacuation & Sheltering*
  - *Communications*
  - *Emergency Planning*
    - Activating the EOC (emergency management)
    - Closing streets or bridges (police or public works)
    - Shutting off power to threatened areas (utility company)
    - Holding/releasing children at school (school district)
    - Passing out sand and sandbags (public works)
    - Ordering an evacuation (mayor)
    - Opening emergency shelters (Red Cross)
    - Monitoring water levels (engineering)
    - Security and other protection measures (police)
- ***Critical Facilities Protection (Buildings or locations vital to the response and recovery effort, such as police/fire stations, hospitals, sewage treatment plants/lift stations, power substations)***
  - Buildings or locations that, if damaged, would create secondary disasters, such as hazardous materials facilities and nursing homes
  - Lifeline Utilities Protection

- *Post-Disaster Mitigation*
  - Building Inspections
  - ID mitigation opportunities & funding before reconstruction

PROPERTY PROTECTION: Property protection measures are used to modify buildings subject to damage rather than to keep the hazard away. A community may find these to be inexpensive measures because often they are implemented by or cost-shared with property owners. Many of the measures do not affect the appearance or use of a building, which makes them particularly appropriate for historical sites and landmarks.

- *Retrofitting/disaster proofing*
  - *Floods*
    - Wet/Dry floodproofing (barriers, shields, backflow valves)
    - Relocation/Elevation
    - Acquisition
    - Retrofitting
  - *High Winds/Tornadoes*
    - Safe Rooms
    - Securing roofs and foundations with fasteners and tie-downs
    - Strengthening garage doors and other large openings
  - *Winter Storms*
    - Immediate snow/ice removal from roofs, tree limbs
    - "Living" snow fences
  - *Geologic Hazards (Landslides, earthquakes, sinkholes)*
    - Anchoring, bracing, shear walls
    - Dewatering sites, agricultural practices
    - Catch basins
  - *Drought*
    - Improve water supply (transport/storage/conservation)
    - Remove moisture competitive plants (Tamarisk/Salt Cedar)
    - Water Restrictions/Water Saver Sprinklers/Appliances
    - Grazing on CRP lands (no overgrazing-see Noxious Weeds)
    - Create incentives to consolidate/connect water services
    - Recycled wastewater on golf courses
  - *Wildfire, Grassfires*
    - Replacing building components with fireproof materials
      - Roofing, screening
    - Create "Defensible Space"
    - Installing spark arrestors
    - Fuels Modification
  - *Noxious Weeds/Insects*
    - Mowing
    - Spraying
    - Replacement planting
    - Stop overgrazing
    - Introduce natural predators

- *Insurance*

NATURAL RESOURCE PROTECTION: Natural resource protection activities are generally aimed at preserving (or in some cases restoring) natural areas. In so doing, these activities enable the naturally beneficial functions of floodplains and watersheds to be better realized. These natural and beneficial floodplain functions include the following:

- storage of floodwaters
- absorption of flood energy
- reduction in flood scour
- infiltration that absorbs overland flood flow
- groundwater recharge
- removal/filtering of excess nutrients, pollutants, and sediments from floodwaters
- habitat for flora and fauna
- recreational and aesthetic opportunities

Methods of protecting natural resources include:

- ***Wetlands Protection***
- ***Riparian Area/Habitat Protection/Threatened-Endangered Species***
- ***Erosion & Sediment Control***
- ***Best Management Practices***

  Best management practices ("BMPs") are measures that reduce nonpoint source pollutants that enter the waterways. Nonpoint source pollutants come from non-specific locations. Examples of nonpoint source pollutants are lawn fertilizers, pesticides, and other farm chemicals, animal wastes, oils from street surfaces and industrial areas and sediment from agriculture, construction, mining and forestry. These pollutants are washed off the ground's surface by stormwater and flushed into receiving storm sewers, ditches and streams. BMPs can be implemented during construction and as part of a project's design to permanently address nonpoint source pollutants. There are three general categories of BMPs:

1. Avoidance: setting construction projects back from the stream.

2. Reduction: Preventing runoff that conveys sediment and other water-borne pollutants, such as planting proper vegetation and conservation tillage.

3. Cleanse: Stopping pollutants after they are en route to a stream, such as using grass drainageways that filter the water and retention and detention basins that let pollutants settle to the bottom before they are drained

- ***Dumping Regulations***
- ***Set-back regulations/buffers***
- ***Fuels Management***
- ***Water Use Restrictions***
- ***Landscape Management***
- ***Weather Modification***

STRUCTURAL PROJECTS have traditionally been used by communities to control flows and water surface elevations. Structural projects keep flood waters away from an area. They are usually designed by engineers and managed or maintained by public works staff. These measures are popular with many because they "stop" flooding problems. However, structural projects have several important shortcomings that need to be kept in mind when considering them for flood hazard mitigation:

- They are expensive, sometimes requiring capital bond issues and/or cost sharing with Federal agencies, such as the U.S. Army Corps of Engineers or the Natural Resources Conservation Service.

- They disturb the land and disrupt natural water flows, often destroying habitats or requiring Environmental Assessments.

- They are built to a certain flood protection level that can be exceeded by a larger flood, causing extensive damage.

- They can create a false sense of security when people protected by a structure believe that no flood can ever reach them.

- They require regular maintenance to ensure that they continue to provide their design protection level.

Structural measures include:

- *Detention/Retention structures*
- *Erosion and Sediment Control*
- *Basins/Low-head Weirs*
- *Channel Modifications*
- *Culvert resizing/replacement/Maintenance*
- *Levees and Floodwalls*
- *Anchoring, grading, debris basins (for landslides)*
- *Fencing (for snow, sand, wind)*
- *Drainage System Maintenance*
- *Reservoirs(for flood control, water storage, recreation, agriculture)*
- *Diversions*
- *Storm Sewers*

PUBLIC INFORMATION: A successful hazard mitigation program involves both the public and private sectors. Public information activities advise property owners, renters, businesses, and local officials about hazards and ways to protect people and property from these hazards. These activities can motivate people to take protection

- *Hazard Maps and Data*
- *Outreach Projects* (mailings, media, web, speakers bureau, displays)
- *Library Resources*
- *Real Estate Disclosure*
- *Environmental Education*

Baca County Hazard Mitigation Plan

Mitigation Action Worksheet

Instructions: Use this guide to record potential mitigation projects (1 page per project) identified during the planning process. Provide as much detail as possible and use additional pages as necessary. These will be collected following HMPC meetings on mitigation goals and measures and included in the plan.

Jurisdiction:

Mitigation Project Title:

Hazards Addressed:

Issue/Background:

Existing Planning Mechanism(s) through which Action Will Be Implemented:

Responsible Office:

Cost Estimate:

Benefits (Losses Avoided):

Potential Funding:

Schedule:

Worksheet Completed by:
Name and Title:
Phone:

Baca County Hazard Mitigation Plan

Mitigation Action Worksheet - EXAMPLE

Action #12: Elevate Remaining 95 Homes in the Dry Creek Watershed

Issue/Background: Historically, flooding in the Dry Creek watershed has been a major concern. The February 1986 flood caused widespread damage in most of the Dry Creek watershed. Nearly all bridges and culverts were overtopped, with 30 sustaining embankment damages and one crossing washing out; two bridges over Dry Creek were damaged, street cave-ins occurred at a number of locations, and over 125 homes flooded. Of the 145 homes subject to historical flooding within the Watershed, 95 structures remain non-elevated. Of these 95 remaining homes, 25-30 declined initial grant money for elevation as did the three repetitive loss structures. Placer County is not only concerned with existing flooding problems, but with future problems resulting from increased growth and development in the area. According to the 1992 Dry Creek Watershed, Flood Control Plan, substantial flood damages will occur with the 100-year flood under existing conditions. Areas with the most extensive and frequent damages include areas in the location of the 95 homes. The report indicates that some of these areas are susceptible to flooding from storms as frequent as the 10-year storm. Elevating the remaining 95 homes will reduce future flood-related losses.

Other Alternatives: No Action

Responsible Office: Placer County Flood Control and Water Conservation District, in conjunction with its member agencies including the cities of Rocklin, Loomis, and Roseville.

Priority (H, M, L): Medium

Cost Estimate: The cost to elevate is estimated at $40 per square foot. Homes need to be elevated anywhere from one to six feet. Of the 95 homes where elevating is feasible, it is estimated to cost $6 million or $50 to $60 K per home.

Benefits (Losses Avoided): Life Safety; Reduction in Property Loss.

Potential Funding: HGMP, PDM, Dry Creek Trust Fund

Schedule: Within three years

17

Resolution Authorizing the Designated Representative to Act on Behalf of Local Jurisdiction

Name of Jurisdiction ____

Governing Body ____

Address ____

Name of Designated Representative: ______________________________

RESOLUTION

WHEREAS, Insert Jurisdiction has limited capability to undertake extensive participation in the preparation of a hazard mitigation plan; and

WHEREAS, Insert Representative is able to act on behalf of Insert Jurisdiction in the analysis and development of a hazard mitigation plan; and

WHEREAS, Insert Representative shall prepare a hazard mitigation plan in accordance with 44 FEMA requirements at 44 C.F.R. 201.6; and

WHEREAS, Insert Representative shall deliver a draft copy of the Plan for public comment as well as the governing body's comment during the planning process and prior to adoption.

NOW THEREFORE, Insert Jurisdiction's Governing Body authorizes Insert Representative on behalf of Insert Jurisdiction to prepare the Southeast Colorado Regional Hazard Mitigation Plan, which shall be reviewed and considered for adoption by Insert Jurisdiction's Governing Board upon completion.

ADOPTED this XX day of MONTH, 2010 at the meeting of the Insert Jurisdiction Governing Board.

____

Authorized Representative of Jurisdiction's Governing Board

SE Colorado
Regional Hazard Mitigation Plan

Appendix C Records of Adoption

Note to Reviewers: When this plan has been reviewed and approved pending adoption by FEMA Region VIII, the adoption resolutions will be signed by the participating jurisdictions and added to this appendix. A model resolution is provided below:

Resolution # ______

Adopting the Southeast Colorado Regional Hazard Mitigation Plan

Whereas, (Name of Government/District/Organization seeking FEMA approval of hazard mitigation plan) recognizes the threat that natural hazards pose to people and property within our community; and

Whereas, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

Whereas, the U.S. Congress passed the Disaster Mitigation Act of 2000 ("Disaster Mitigation Act") emphasizing the need for pre-disaster mitigation of potential hazards;

Whereas, the Disaster Mitigation Act made available hazard mitigation grants to state and local governments;

Whereas, an adopted Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

Whereas, (Name of Government/District/Organization) fully participated in the FEMA-prescribed mitigation planning process to prepare this local hazard mitigation plan; and

Whereas, the Colorado Department of Emergency Management and Federal Emergency Management Agency, Region VIII officials have reviewed the Southeast Colorado Regional Hazard Mitigation Plan and approved it contingent upon this official adoption of the participating governing body;

Whereas, the (Name of Government/District/Organization) desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Southeast Colorado Regional Hazard Mitigation Plan;

Whereas, adoption by the governing body for the (Name of Government/District/Organization), demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this Regional Hazard Mitigation Plan.

Whereas, adoption of this legitimacies the plan and authorizes responsible agencies to carry out their responsibilities under the plan.

Now, therefore, be it resolved, that the (Name of Government/District/Organization) adopts the Southeast Colorado Regional Hazard Mitigation Plan as an official plan; and

Be it further resolved, the Southeast Colorado All Hazards Region (SECAHR) Emergency Managers group will submit this adoption resolution to the Colorado Department of Emergency Services and FEMA Region VIII officials to enable the plan's final approval in accordance with the requirements of the Disaster Mitigation Act of 2000.

Passed:__________________
(date)

____
Certifying Official