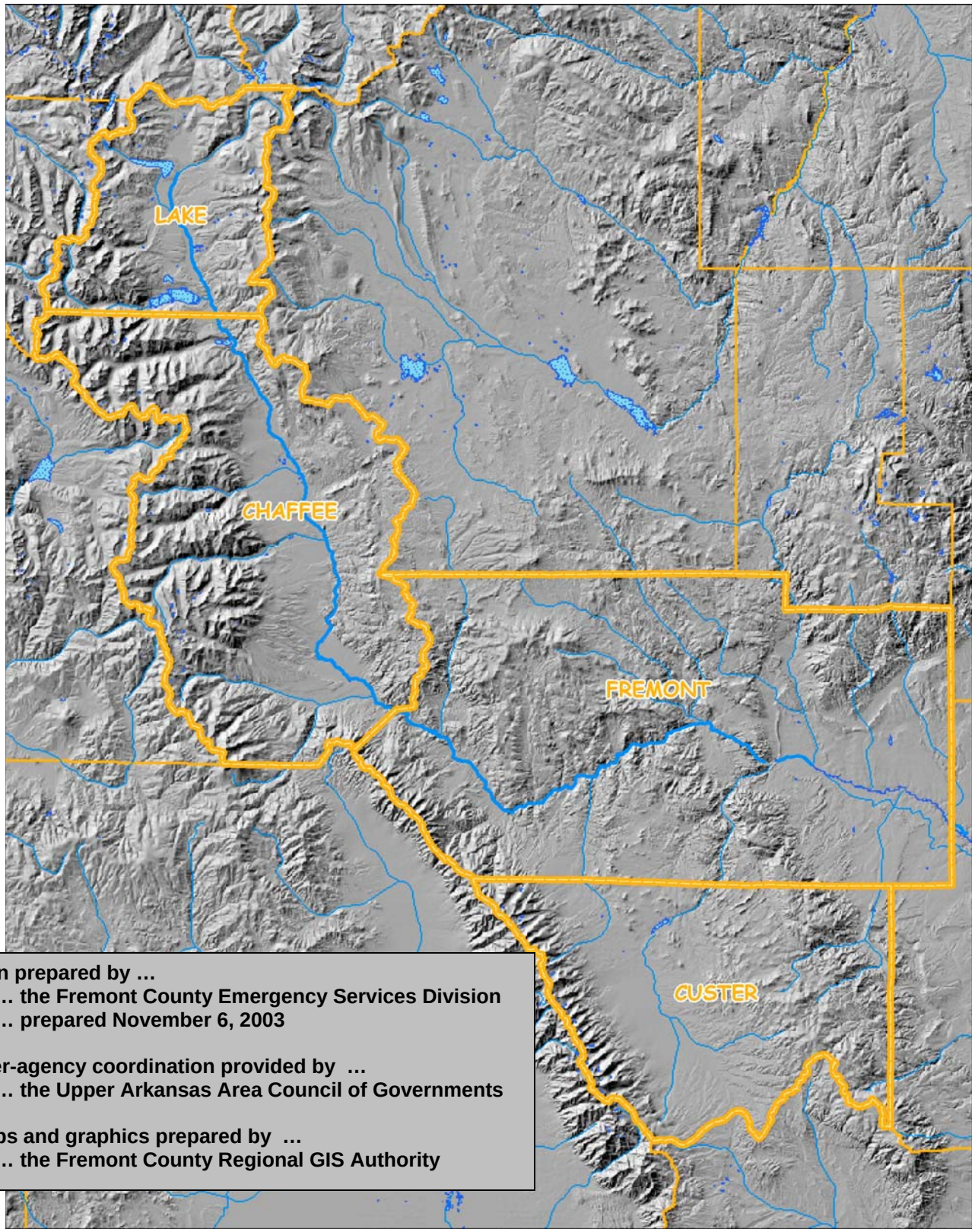
Natural Hazard Risk Analysis
&
Pre-Disaster Mitigation Plan
For
UPPER ARKANSAS AREA



Plan prepared by …
… the Fremont County Emergency Services Division
… prepared November 6, 2003

Inter-agency coordination provided by …
… the Upper Arkansas Area Council of Governments

Maps and graphics prepared by …
… the Fremont County Regional GIS Authority

TABLE OF CONTENTS

PREFACE

INTRODUCTION

With the passage of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, enacted as the Disaster Mitigation Act of 2000 (P.L. 106-390), the Federal government has placed renewed emphasis on **pre-disaster mitigation** of potential natural hazards from among the spectrum of alternative Emergency Management strategies.

Among other incentives for State and Local governments to prepare Pre-Disaster Mitigation **(PDM)** plans, Section 32 of the Act continues an existing requirement for a State PDM Plan **as a condition for disaster assistance**, and establishes a **similar requirement for local governments.** The act requires that local governments have PDM plans prepared, endorsed by their governing bodies, submitted to, and approved by the Federal Emergency Management Agency (FEMA) by November 1, 2003.

With coordination by the Upper Arkansas Area Council of Governments (UAACOG) and guidance from the Colorado State Office of Emergency Management, Emergency Management officials for Chaffee, Custer, Fremont, and Lake Counties have endeavored to prepare a common PDM Plan for their four-county region, designated the **Upper Arkansas Area**.

PURPOSE

The output of the PDM Plan is a set of recommended **pre-disaster mitigation actions** that, in an effective and meaningful manner, minimize the potential impacts of the identified hazards.

The intent of the PDM plan is to re-direct a portion of available emergency management resources to **preventing** potential losses as opposed to recovering from actual losses. Engaging local officials and citizenry in the PDM Planning Process focuses their attention on and increases their awareness of preventative measures.

METHOD

FEMA recommends a **3-step process** for formulating the local PDM Plan:

1.) **Identify and Profile Potential Hazards.**
2.) Assess the **vulnerability of community assets** to those hazards.
3.) Recommend **Pre-Disaster Mitigation Measures**.

To govern the application of the PDM process to the Headwaters Region, an ad hoc committee led by the Emergency Officers for Chaffee, Custer, Fremont, and Lake Counties was assembled. Meetings of the committee were held in Salida, Colorado at monthly intervals for 6 months. In addition to the Emergency Officers, the meetings included variously County Commissioners, City Managers, Fire Chiefs, and GIS Managers. Representatives from state and federal agencies including the Colorado Department of Local Affairs, the Colorado State Forest Service, the United States Forest Service, and the Bureau of Land Management also attended one or more of

these meetings. The Fremont County Emergency Services Division was designated to drive the planning process. The Fremont County Regional GIS Authority was engaged to assist in preparation of the Plan document.

A series of public meetings were publicized and held at the County Seats of each County to solicit input from the local community. Public perception of the relative risk posed by the various hazards was polled by circulating a survey (see appendix for copy of survey and results). Drafts of the Plan were made available for inspection as they became available.

The Public meetings culminated with Public Hearings before the boards of commissioners for each of the four participating counties.

COMMUNITY ASSETS AT RISK

Several citizens commented that the first draft of the document focused its risk analysis on structures and other quantifiable assets. They emphasized that the potential impact of hazard events to the local **economy** were of greater concern than the loss of personal or community property. Others expressed that losses to human life and health should be factored in.

Similarly, members of the first-response community voiced concerns that for certain emergency events, the greatest impact was to emergency response resources already stretched thin. They cited mountain aircraft accidents and avalanches as emergency events that consume large portions of the local first-response resource, but otherwise don't impact the local community.

In response to these inputs, vulnerability is assessed for each of five categories of community assets:

1.) Life and Health.
2.) Property.
3.) Economic Assets.
4.) Critical Facilities and Infrastructure.
5.) First-Response Resources.

FORMAT

AUDIENCE. While it is necessary that the PDM Plan meet the stated FEMA requirements, it is also recognized that many who read the document will not be familiar with the terminology and practices favored by FEMA.

READABILITY. Upon public review of early drafts of the document, observations were made that to access all the information regarding a single hazard, the reader had to "hop" from section to section. In response, the hazard profile, risk analysis, and mitigation measures **for each hazard** are presented together. Colorado Department of Local Affairs (DOLA) and FEMA reviewers therefore, will not find separate sections for hazard identification, risk analysis, and mitigation measures. A section covering

Implementation of Mitigation Measures allows proposed mitigation measures for all the hazards to be compared with one another and prioritized.

All required and relevant information is presented for **each hazard** in the following format:

Hazard Profile
1.) Narrative Description
2.) Frequency and Severity
3.) Sample Events

Assets at Risk to the Hazard
1.) Narrative Description
2.) Quantitative information
3.) Critical Facilities

Mitigation Measures
Mitigation Strategy
Mitigation Goals
Mitigation Actions

Trends

Jurisdictional Differences

LIMITATIONS *[added October, 2003]*
By any measure the four Counties comprising the Upper Arkansas Area are small and unsophisticated. A realistic plan for establishing the Emergency Planning methodology favored by FEMA and The Colorado State Office of Emergency Management must take into account the limited means available for these purposes.

EMERGENCY MANAGEMENT RESOURCES. A proud tradition for handling emergency situations in these four mountainous counties has existed for decades. Without benefit of sophisticated emergency planning tools, sheriff's deputies, volunteer firemen, and search and rescue teams have cooperated to meet the challenges presented by fires, floods, winter storms, avalanches, and other emergency events.

Recent years have seen initial efforts to formalize the Emergency Management function in the Upper Arkansas Area. Due to limited funding, accomplished emergency responders are often pressed into service as part-time, novice emergency planners. The substantial administrative load imposed by the recommended Emergency Planning process is often diverted to non-emergency offices that possess the requisite technology and expertise.

and Emergency First efforts to apply the elaborate emergency planning process promoted by FEMA and the Colorado State OEM can seem burdensome and extravagant, diverting resources

Just as the funding available for accomplishing mitigation actions are finite, so too are the resources available the Emergency Planning function. To ensure continuing public, political, and financial support for the Emergency Management concept, it is essential that the available resource, however meager, be applied in a demonstrably effective way. to those hazards that pose the greatest threat to 4 County the area.

HISTORIC DATA. Tabulations of emergency events through time have not been maintained on an on-going basis in any of the four counties.

For the purposes of this document, participants from each County researched libraries, newspaper archives, and historical societies to compile a chronological listing of Emergencies.

Accounts of sample events are typically anecdotal and are lacking in factual content.

VALUATION OF THREATENED ASSETS
The property-specific data required for the quantification and analysis of threatened assets suggested by FEMA is not currently available in the four counties of the Upper Arkansas Area.

Dollar values for community assets threatened by each hazard therefore cannot be provided.

To varying degrees, each of the four counties has established a Geographic Information System (GIS). When GIS layers representing land-ownership parcels and the areas threatened by the hazards become available, the sort of analysis recommended by FEMA may be possible.

SCOPE MANAGEMENT *[added October, 2003]*
PRIORITIES. Just as the funding available for accomplishing mitigation actions are finite, so too are the resources available for the Emergency Planning function.

To ensure continuing public, political, and financial support for the Emergency Management concept, it is essential that the available resource, however meager, be applied in a demonstrably effective way.

Matching the limited availability of those contributing to the PDM process against the comprehensive requirements set by FEMA makes clear that objectives for the planning process must be clarified and priorities established.

PRIMARY OBJECTIVE. The primary functional objective for the first year of the Pre-Disaster Mitigation program for the Upper Arkansas Area is stated as follows.

> To demonstrate the viability of the Pre-Disaster Mitigation process as set forth by FEMA and as applied by the Emergency Management officials in the Upper Arkansas Area.

Owing to the limited Emergency Management resource available in the four-county the means by which this objective is to be achieved is constrained to the following:

> The viability of the Pre-Disaster Mitigation process shall be demonstrated by successfully completing one full cycle of the PDM process for a single mitigation objective.

MATCHING SCOPE TO AVAILABLE RESOURCES
The following measures shall be applied conserve the resource available for preparing the Pre-Disaster Mitigation

1.) Man-made hazards will not be profiled nor mitigation actions proposed.
2.) Mitigation plans will be presented for only the top 4 natural hazards:
    a.) Wildland Fire
    b.) Flash Flooding
    c.) Drought
    d.) Elevations

I. BACKGROUND INFORMATION

1.1 The Project

The objective of this report is to provide the Upper Arkansas Area Council of Governments (UAACOG) with hazard identification, risk analysis, and pre-disaster mitigation recommendations for its region and to help bring the member local governments into compliance with the Disaster Mitigation Act of 2000, Section 322. Under the Disaster Mitigation Act of 2000, local communities must become involved in creating and implementing long-term strategies to mitigate known hazards. The central purpose of this report is to identify all relevant hazards within the Upper Arkansas Area ; research the history of past events and damages; recognize the population and property at risk; **identify the potential projects for mitigating the hazards; prioritize these mitigation projects;** prepare documentation to present to the regional planner which will cite sources used, and provide cost versus benefit information for hazard mitigation projects.

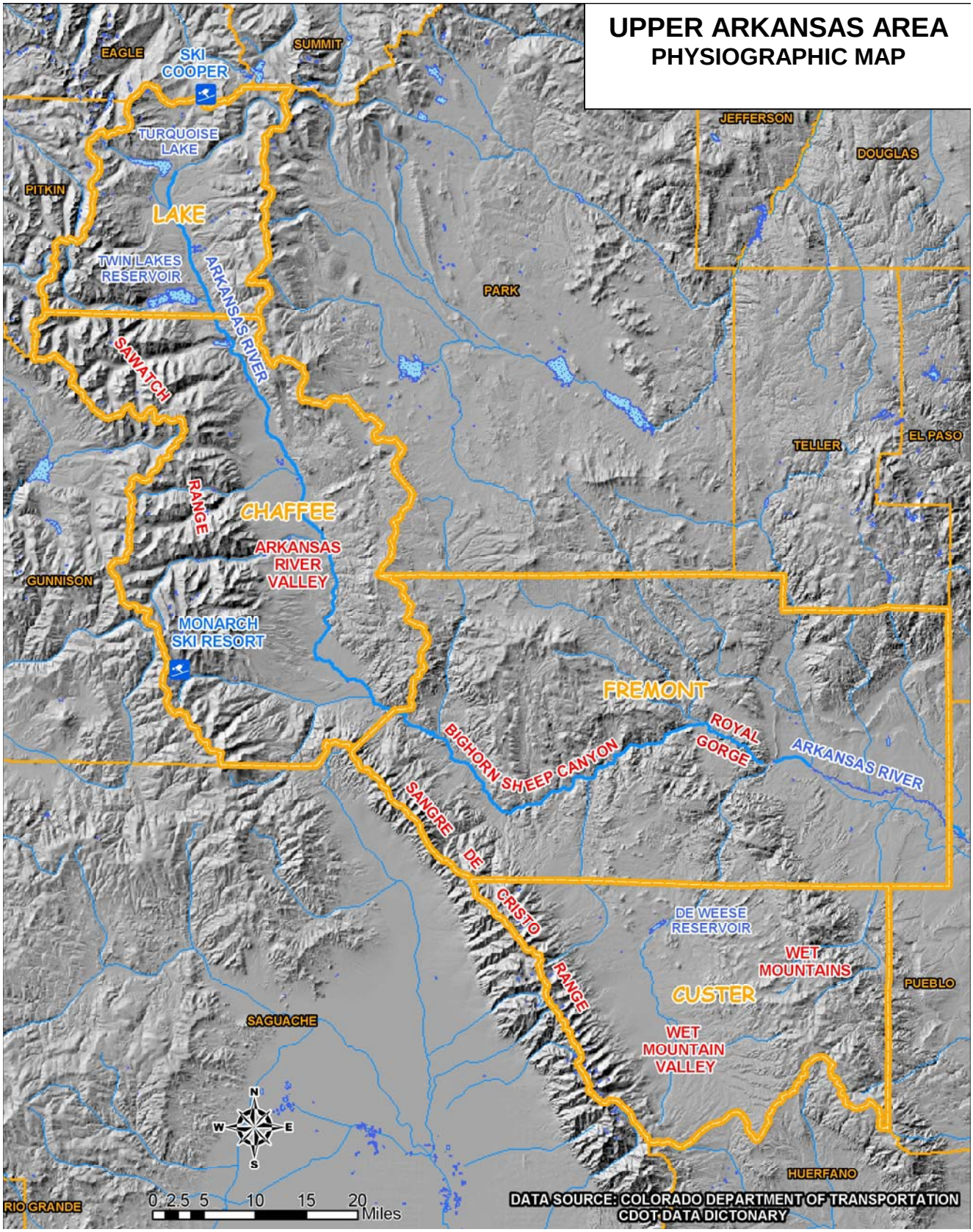
Using the "State and Local Mitigation Planning How-to Guide Version 1.0" the UAACOG and its communities have examined the history of hazards within the region and have compiled and prioritized a table of *Identified Hazards*. This report provides an analysis and recommendations for each *Identified Hazard.*

1.2 The Upper Arkansas Area Council of Governments (UAACOG)

The UAACOG serves the four rural counties of Lake, Chaffee, Fremont and Custer Counties. For the purposes of this document, the four counties will be referred to collectively as the **Upper Arkansas Area.** The planning area for the PDM corresponds to the 4-county area served by the Upper Arkansas Council of Governments (UAACOG) as well as Colorado Planning and Management Region 13. UAACOG is a non-profit agency established for the purpose of uniting local governments in mutually beneficial activities that better serve communities on a regional basis than on an individual basis. UAACOG provides technical assistance to counties, cities, and special districts in meeting the growing demands placed on them by area growth and declining energy markets. It offers assistance in grant preparation, project development, administration, community development, and assistance on financial packaging of projects and programs.

1.3 The Upper Arkansas Area – Physiographic Description

These four counties comprising the Upper Arkansas Area are located in Central Colorado and occupy an area of 3,670 square miles. The region is extremely diverse with mountain peaks rising above 14,000 feet to the valley floor dropping to 5,000 feet. At the heart of the region is the Arkansas River, which meanders through Lake, Chaffee and Fremont Counties. The extreme geography of the region provides opportunities for sightseeing and recreation, but also challenges for emergency responders.


UPPER ARKANSAS AREA
PHYSIOGRAPHIC MAP
EAGLE
SKI COOPER
SUMMIT
JEFFERSON
DOUGLAS
TURQUOISE LAKE
PITKIN
LAKE
TWIN LAKES RESERVOIR
ARKANSAS RIVER
PARK
SAWATCH
TELLER
EL PASO
RANGE
CHAFFEE
ARKANSAS RIVER VALLEY
GUNNISON
MONARCH SKI RESORT
FREMONT
ROYAL GORGE
BIGHORN SHEEP CANYON
ARKANSAS RIVER
SANGRE DE CRISTO
RANGE
DE WEESE RESERVOIR
WET MOUNTAINS
PUEBLO
CUSTER
SAGUACHE
WET MOUNTAIN VALLEY
HUERFANO
RIO GRANDE
N
W
E
S
0 2.5 5 10 15 20
Miles
DATA SOURCE: COLORADO DEPARTMENT OF TRANSPORTATION
CDOT DATA DICTONARY

1.4 The Upper Arkansas Area – Political Divisions

Lake County is the northernmost county in the Upper Arkansas Area. It contains 384 square miles and is home to 7,812 full time residents. The headwaters of the Arkansas River begin in and around the mountains of Lake County. The county seat is the city of Leadville, which is the highest incorporated town in the United States at 10,152 feet above sea level. It is also a designated National Historic Landmark District. Lake County and the town of Leadville have a city/county fire department, 2 volunteer fire departments, a hospital district which provides emergency medical services including ambulance service to the majority of the county, cit police and county sheriff offices, and a search and rescue organization. These entities are responsible for the initial emergency response in the area.

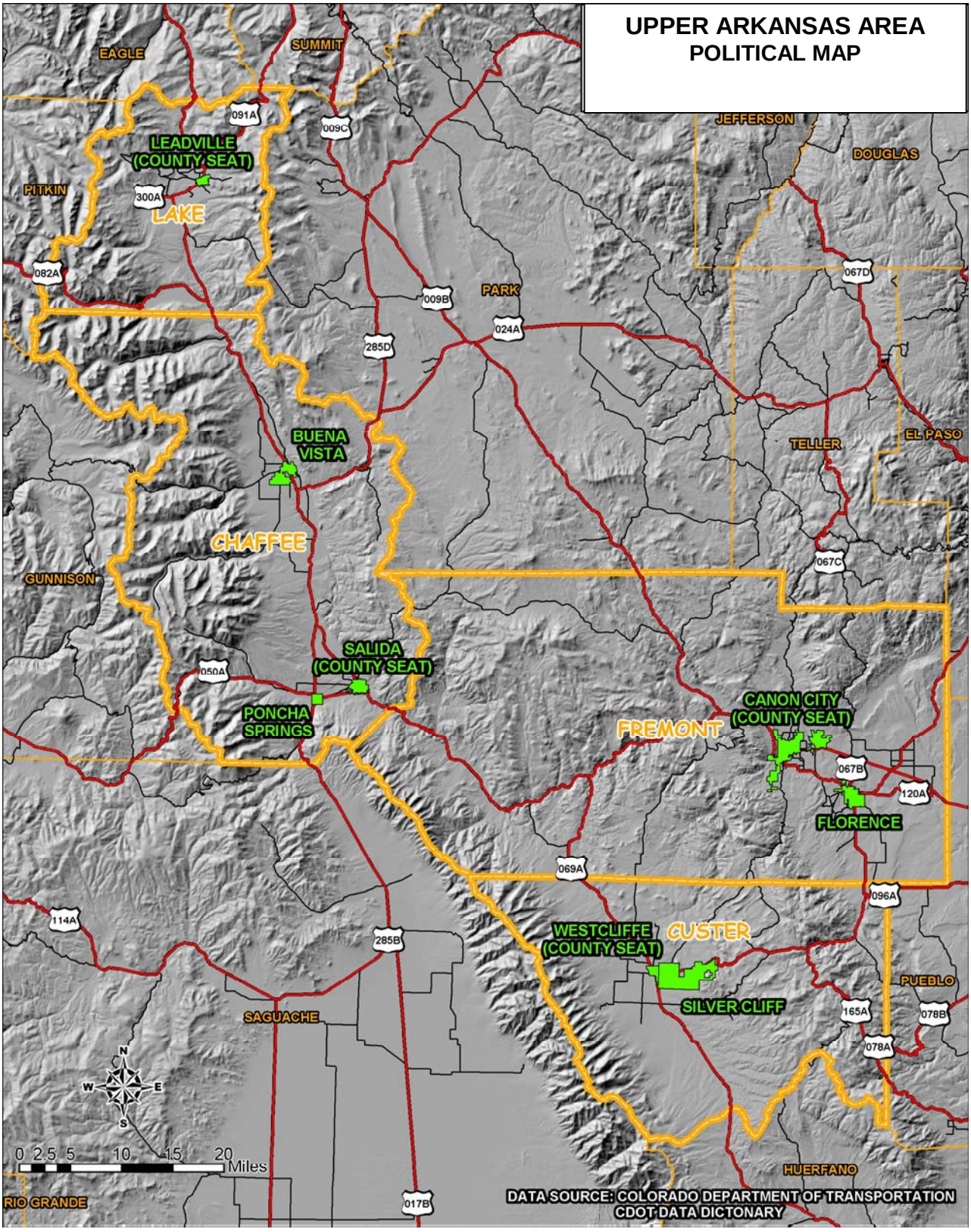
Chaffee County shares borders with both Lake and Fremont Counties. It has a population of 16,242 full-time residents and an area of 1,014 square miles. The county seat is the city of Salida. Buena Vista and Poncha Springs are two smaller incorporated towns in the county. The central districts of these cities are located in the Arkansas River Valley, but an increase in population has created a sprawl into the foothills and mountainous areas surrounding these towns. Chaffee County and its incorporated towns have a city and a county fire department, four volunteer fire departments, a hospital district which provides emergency medical services including ambulance service to the majority of the county, city police and county sheriff offices, and a search and rescue organization. These entities are responsible for the initial emergency response in the area.

Fremont County is the largest and most geographically diverse of the four county region. It contains 1,533 square miles and has a population of 46,145 full-time residents. Canon City is the largest city in the county and is the county seat. Florence is an incorporated town located 10 miles southeast of Canon City and these two cities have the largest concentration of the population in the Upper Arkansas Area. Fremont County is also home to 13 State and Federal prisons which, together, employ the most people of any industry or business in the region. Fremont County and its incorporated cities have city police and county fire departments, five volunteer fire departments, a hospital district which provides emergency medical services including ambulance service to the majority of the county, city police and county sheriff offices, and a search and rescue organization. These entities are responsible for the initial emergency response in the area.

Fremont, Chaffee, and Lake Counties are also dotted with smaller unincorporated communities in and around the Arkansas River Valley. These communities range from 50 people to as many as 1000. The larger communities have volunteer organizations that provide emergency services to the citizens. The lack of training and funding limit the response and outcomes in emergency situations from these various volunteer organizations.

Custer County is the only county in the Upper Arkansas Area through which the Arkansas River does not flow. It has an area of 739 square miles and 3,503 full-time residents. The central population of Custer County is located in and around the two incorporated towns of Westcliffe and Silver Cliff. Westcliffe is the county seat of Custer County. In addition, Custer County has two smaller unincorporated communities: Wetmore and San Isabel. The County has two volunteer fire departments, a hospital district which provides emergency medical services including ambulance service to the majority of the county, a county sheriff's office,

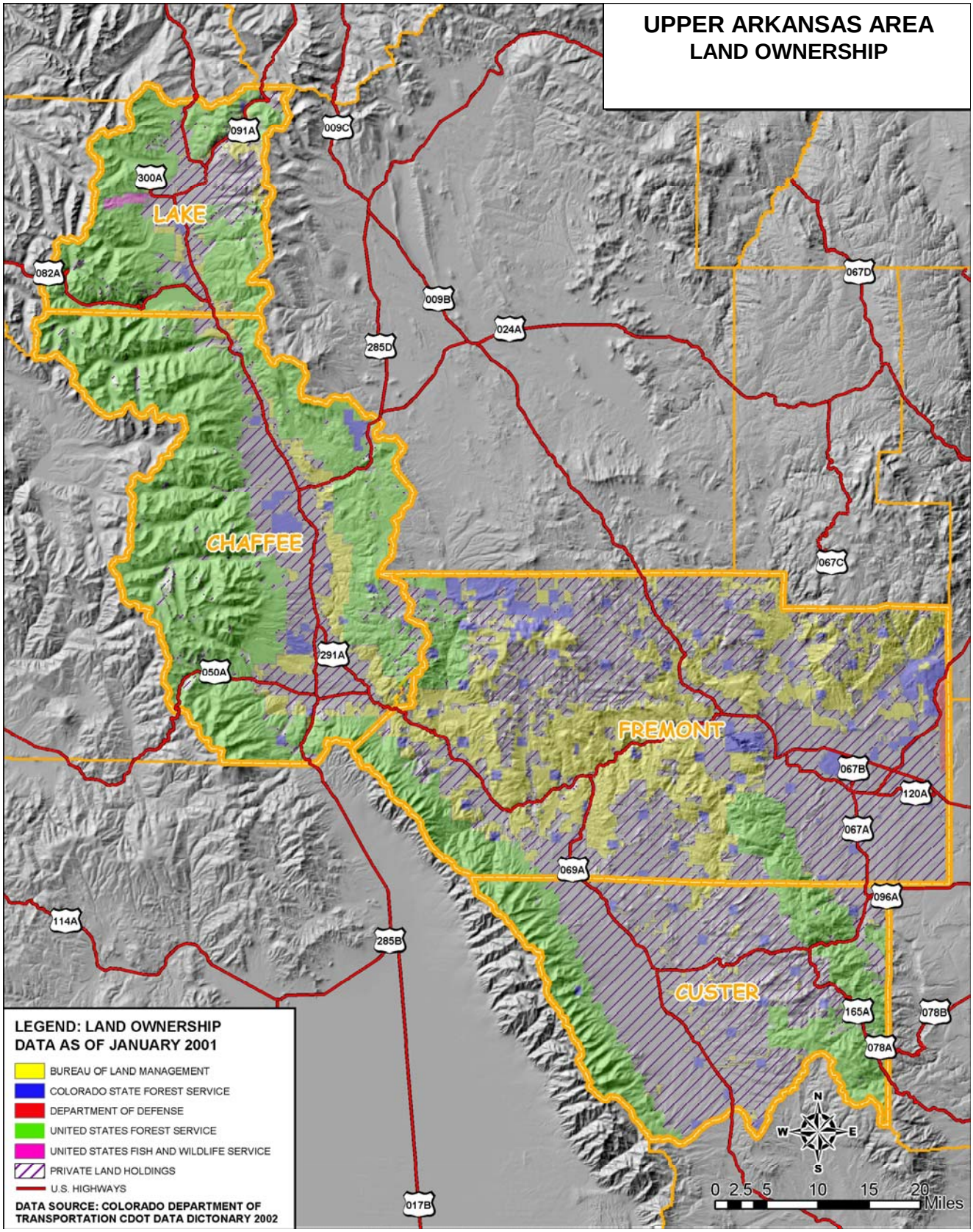
and a search and rescue organization. These entities are responsible for initial emergency response.



1.5 STEWARDSHIP OF PUBLIC LANDS

Each county in the Upper Arkansas Area also has large land areas maintained and operated by State and Federal agencies. In total these lands encompass an area of nearly 60% of the region. Many of the *Identified Hazards* in this report can, and will, occur in these government land areas. The danger to the population within the counties can be directly impacted by the hazard events within these government land areas. In turn, some of the *Identified Hazards* can be caused by human error and may affect the value of these government lands. These issues will be covered in greater detail within the *Identified Hazards* risk assessments.

The largest of the governmental lands are owned and managed by the United States Forest Service. This agency manages approximately 1346 square miles, which is almost 37% of the region. The Bureau of Land Management owns the second largest government land area in the region at 662 square miles or 18% of the region. The third largest governmental land area is owned by the State of Colorado. The State manages 4.6% of the region with 169 square miles. These State land areas consist of “school sections”, State Forest Lands, Division of Wildlife tracts, and State Correctional Facilities. The United Stated Department of Defense and the United States Fish and Wildlife Service maintain the balance of government lands in the region. These land-holdings comprise a total 14 square miles, which is less than 1 % of the region.


UPPER ARKANSAS AREA
LAND OWNERSHIP
LAKE
CHAFFEE
FREMONT
CUSTER
091A
009C
300A
082A
009B
024A
285D
067D
067C
291A
050A
067B
120A
067A
069A
096A
114A
285B
165A
078B
078A
017B
LEGEND: LAND OWNERSHIP
DATA AS OF JANUARY 2001
BUREAU OF LAND MANAGEMENT
COLORADO STATE FOREST SERVICE
DEPARTMENT OF DEFENSE
UNITED STATES FOREST SERVICE
UNITED STATES FISH AND WILDLIFE SERVICE
PRIVATE LAND HOLDINGS
U.S. HIGHWAYS
DATA SOURCE: COLORADO DEPARTMENT OF TRANSPORTATION CDOT DATA DICTONARY 2002
N
W
E
S
0 2.5 5 10 15 20
Miles

1.6 The Upper Arkansas Area – Demographic Description

The four county region has 73,702 full time residents. The majority of the population is located along the Arkansas River Corridor in Lake, Chaffee and Fremont Counties. In addition to the full time residents, many part-time residents frequent the region for extended periods of time during the summer months. Many of the part-time residents own or rent summer homes and spend a fair amount of time in the area. In addition, many visitors come to the area looking for seasonal work at ski resorts and in the summer Arkansas River activities.

In the last 20 years, the population of the four county region has grown considerably. In addition to the population growth in the urban interface, development has occurred in mountainous areas as large ranches, and large tracts of land were sold and subdivided into smaller parcels. Custer County showed more growth per capita in 1999 than any other county in the U.S., other than Douglas County, Colorado. From 1990 to 2000, Custer County's population grew by 81.9 %. This sprawl of the population has increased the potential magnitude of some of the *Identified Hazards* in the region. Not only has the chance for monetary loss increased, but also the risk to emergency personnel. The extreme geography of the region creates a very dangerous environment for recovery and rescue efforts.

1.7 The Upper Arkansas Area – Economic Description

The economic well-being of the Upper Arkansas Area rests on the twin pillars of the Corrections and Recreation industries.

Colorado Department of Corrections has been a stable source of employment for the Fremont County economy since 1871 when the first Colorado Territorial Prison was established in Canon City. Today over 1800 staff-persons are employed at the 8 State correctional facilities operated in Fremont County. An additional 400 persons work at the Buena Vista Correctional Facility, the largest single employer in Chaffee County. In 1994, the United States Bureau of Prisons (BOP) opened a three-facility complex in Florence that provides work for over 1,000 employees.

The vagaries of the tourism and recreation industry often determine whether lean or prosperous times prevail in the Upper Arkansas area. During the summer, activity centers on trout fishing and whitewater rafting on the Arkansas River, as well as hiking and camping in the adjacent mountain ranges. Fall brings an influx of elk and deer hunters an sightseers intent on viewing the aspen trees. Winter opportunities include snow-boarding and skiing at the Monarch ski area west of Salida and Ski Cooper Mountain northwest of Leadville. Outdoor recreationists enjoy Leadville as for mountain-biking in the Summer and cross-country skiing in the Winter. The world's "highest suspension bridge" across the Royal Gorge is west of Canon City. Sightseers are attracted to the scenery provided by the Sangre de Cristo and Collegiate mountain ranges and outdoor recreation enthusiasts enjoy the whitewaters of the Arkansas River, the snow-pack of the Monarch ski area, and the mountain trails.

Environmental disturbances in the past have discouraged would-be visitors from recreating in the Upper Arkansas Area. Drought, Wildland Fire, mine discharges, and whirling disease have created a perception that the pristine nature of the area has been tainted and resorts, outfitters, motels, restaurants, experienced declines in their revenues, as a result.

When assessing the impact of natural and man-made hazards on the Upper Arkansas Area, the vulnerability of the area's economic assets must be considered. Mitigation measures to preserve such "soft" assets as view-sheds and water-quality merit consideration just as measures to preserve "hard" assets like residential structures and critical facilities.

The beautiful landscape, small town atmosphere and generally pleasant weather bring visitors from all over. The holidays and summer months bring the largest number of people to the area, together with fall hunting seasons and spring fishing on the Arkansas River. The downtown areas of Salida, Buena Vista, Leadville, Florence and Westcliffe are lined with gift shops, art galleries, antique stores, and tourist stops. People come from all over to participate in the recreational activities, stroll the downtown streets and enjoy the beautiful scenery of the region.

The recreational activities on the Arkansas River attract the most people to the area. It is reputed as one of the most popular whitewater destinations in the country. There are 60 commercial whitewater rafting companies on the river as well as numerous shuttle companies and whitewater photography companies. These companies are located all over the region from Leadville to Canon City 120 miles away. Some of these rafting companies employ as many as 100 personnel during the summer months. The whitewater rafting season lasts from the middle of May to the end of August. In just under a 4-month period the gross receipts for commercial rafting trips alone generated $10.5 million dollars in 2001.

The ski industry is the main attraction to the region in the winter months. Chaffee County is home to Monarch Ski Resort, which attracts individuals and large groups to Salida and Buena Vista. Ski Cooper lies just outside the Lake County border and draws visitors to Leadville. These relatively small ski resorts do not have the restaurants, shops and condominiums that many large ski resorts in Colorado have. Therefore tourists spend their dollars in the cities and downtown districts in the Upper Arkansas Area. In particular, Monarch Ski Resort averages approximately 148,000 ticket sales a year and without having

the amenities of a large resort. Salida and Buena Vista are highly dependent on these skiers to support their lodging and service industry.

The Royal Gorge is a very popular “natural wonder” located in Fremont County just 8 miles west of Canon City. It is home to the highest suspension bridge in the world at 1053 feet above the Arkansas River. It can be driven across but many visitors choose to walk the bridge, ride the scenic train and enjoy the amusement park. It has become one of the regions most popular tourist attractions. Since 1998 it has averaged 422,783 visitors a year, with the peak visitation being the summer months. Overall the revenue since 1998 computes to an average of $9,905,285.00 annually.

Without tourism dollars these four rural counties would suffer significantly. The lack of commercial industry and manufacturing in the region creates a vulnerable economy, which can easily be affected by many of the *Identified Hazards* discussed further in the report. The mitigation efforts that will be discussed within this report will focus on preserving the tourism and natural beauty, which fuels the economies of the Upper Arkansas Area.

II. TABULATION OF IDENTIFIED HAZARDS

TABLE A: ALL HAZARDS - RATED BY PUBLIC SURVEY

HAZARDS RATED BY SURVEY OF PUBLIC

10 - Most Threatening
1 - Least Threatening

ALL HAZARDS	***RATING***
Wildland Fire	8.6
Drought	7.9
Hazmat - Transported	7.0
Seasonal Flooding	6.8
High Winds	6.7
Prison Escape	6.7
HazMat - Fixed Site	6.6
Lightning and Thunder	6.4
Flash Flood	6.3
Winter Storm	6.0
Multi-Car Pile-up	5.2
Urban Fire	5.1
Civil Disturbance	5.0
Airplane Crash	4.8
Terrorist Attack	4.5
Military Accident	4.0
Landslide	3.3
Tornado	3.3
Avalanche	2.8
Earthquake	2.2
Asteroid or Comet Impact	1.6
Volcano Eruption	1.3

TABLE B: ALL HAZARDS - RANKED BY EMERGENCY RESPONDERS

HAZARDS RANKED

BY

EMERGENCY RESPONDERS

ALL HAZARDS	***RANK***
Wildland Fire	1
Flash Flood	2
Hazmat - Transported	3
Drought	4
Winter Storm	5
HazMat - Fixed Site	6
Seasonal Flooding	7
High Winds	8
Multi-Car Pile-up	9
Airplane Crash	10
Prison Escape	11
Urban Fire	12
Military Accident	13
Avalanche	14
Civil Disturbance	15
Landslide	16
Lightning and Thunder	17
Earthquake	18
Tornado	19
Terrorist Attack	20
Volcanic Activity	21
Asteroid or Comet Impact	22

TABLE C: NATURAL HAZARDS - RANKED BY EMERGENCY RESPONDERS

NATURAL HAZARDS RANKED

BY

EMERGENCY RESPONDERS

ALL HAZARDS	***RANK***	***PROFILED***	***ACTIONS***
Wildland Fire	1	X	X
Flash Flood	2	X	X
Drought	3	X	X
Winter Storm	4	X	X
Seasonal Flooding	5	X	
High Winds	6	X	
Avalanche	7	X	
Landslide	8	X	
Lightning and Thunder	9	X	
Earthquake	10	X	
Tornado	11	X	
Volcanic Activity	12	X	
Asteroid or Comet Impact	13	X	

III. NATURAL HAZARDS

3.1 WILDLAND FIRE

The 2002 Wildland Fire season was the worst in United States history, with 2.3 million acres burned, 2.1 million more than in 2000. There were 4,612 Wildland Fires in Colorado during 2002 that burned over 619,000 acres.. There were approximately $152 million in Wildland Fire suppression costs, 81,435 people were evacuated and approximately 1,000 structures burned. Unfortunately, there were also nine lives lost. Based on a ten-year average, Colorado typically experiences 3,119 Wildland Fires with a loss of 70,000 acres per year

History shows that most of the Wildland Fires in Colorado are caused by lighting strikes. Thunderstorms pass through the Upper Arkansas Area on a regular basis during the summer months. Unfortunately, many of the storms do not produce rain and the lightening strikes can create hotspots, which have the potential to grow out of control. The hotspots can spread over a large area and are very challenging for fire crews to locate and control. These fires are taxing on fire suppression equipment and supplies. Many times these “hotspots” are deep within the forest and can go unnoticed until a full-strength fire erupts.

3.1.1 WILDLAND FIRE – Hazard Profile

The potential for Wildland Fire is fairly uniform across the 4 counties comprising the Upper Arkansas Area. Residential and commercial properties are concentrated on broad inter-mountain valley floors. The flanks of each valley are covered with dense coniferous forest and are increasingly popular locations for mountain homes.

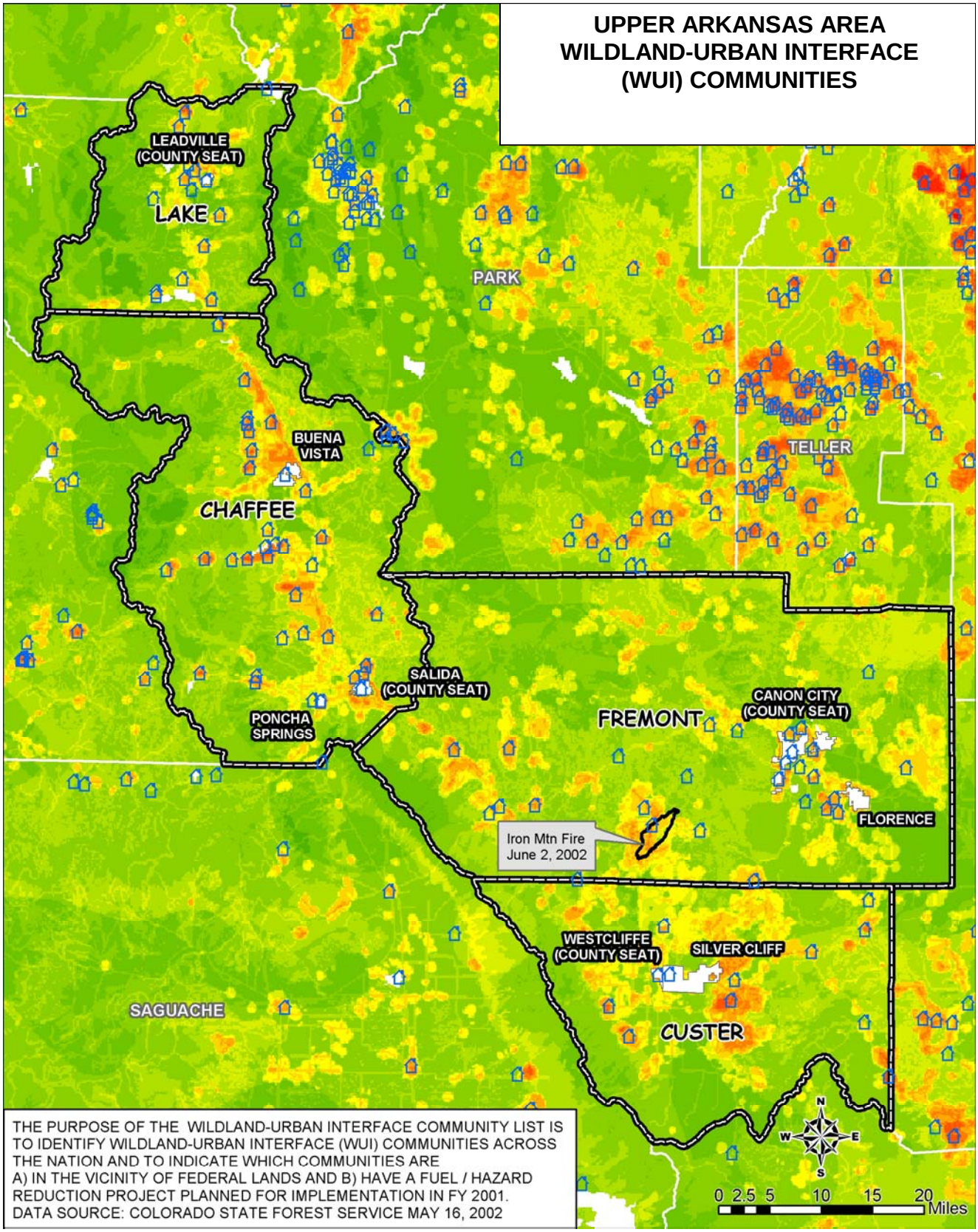
The Colorado State Forest Service compiled a Wildland Urban Interface (WUI) Hazard Assessment in 2001 and 2002 to map the residential areas in Colorado that are in Wildland Fire Hazard Areas. It analyzed numerous sources of data such as housing density, fuel load, and proximity to government lands in a GIS model to identify the residential areas that are at risk. The Colorado Wildland Urban Interface Hazard Assessment was intended to be used as a tool to compare fire hazard in various areas in Colorado and within counties. The data was not meant to be used to determine fire hazard at the subdivision or parcel level scale. The assessment data and process steps were provided to allow counties or subdivisions to substitute better, higher resolution data for comparing portions of small areas of counties, subdivisions, or individual parcels.

Examination of the following map illustrates clearly where the WUI communities within the Upper Arkansas Area intersect with areas showing a high potential for Wildland Fire.

3.1.1.1 WILDLAND FIRE – Frequency and Severity

Frequency: High – an estimated 10 events in 10 years

Severity: High – for each event, the potential for loss of life or property is high without appropriate mitigating actions.


UPPER ARKANSAS AREA
WILDLAND-URBAN INTERFACE
(WUI) COMMUNITIES
LEADVILLE
(COUNTY SEAT)
LAKE
PARK
BUENA
VISTA
CHAFFEE
TELLER
SALIDA
(COUNTY SEAT)
PONCHA
SPRINGS
FREMONT
CANON CITY
(COUNTY SEAT)
FLORENCE
Iron Mtn Fire
June 2, 2002
WESTCLIFFE
(COUNTY SEAT)
SILVER CLIFF
SAGUACHE
CUSTER
THE PURPOSE OF THE WILDLAND-URBAN INTERFACE COMMUNITY LIST IS TO IDENTIFY WILDLAND-URBAN INTERFACE (WUI) COMMUNITIES ACROSS THE NATION AND TO INDICATE WHICH COMMUNITIES ARE
A) IN THE VICINITY OF FEDERAL LANDS AND B) HAVE A FUEL / HAZARD REDUCTION PROJECT PLANNED FOR IMPLEMENTATION IN FY 2001.
DATA SOURCE: COLORADO STATE FOREST SERVICE MAY 16, 2002
N
W
E
S
0 2.5 5 10 15 20
Miles

3.1.1.2 WILDLAND FIRE – Sample Event #1

IRON MOUNTAIN FIRE – Fremont County

The Iron Mountain Fire was one of the first high profile fires of the 2002 fire season in Colorado. It attracted national attention due to the number of structures that were destroyed and the speed with which the fire spread. It began at 1:30 pm. on June 2, 2002, at a private residence in southern Fremont County. Due to the southwest winds it quickly grew out of control and spread through the Colorado Acres and Deer Mountain subdivisions located 12 miles west of Canon City. It advanced six miles to the northwest by evening and dropped ash on Canon City and other communities to the east. Many agencies responded including USFS, BLM, Fremont and Custer County Fire Departments, Deer Mountain Fire Department, and Red Cross. Overall there were 270 incident personnel involved with the fire fighting and relief efforts, 6 engines, 5 dozers, 8 hand crews and assorted air resources. The fire was declared to be contained 4 days after it started.

The Iron Mountain Fire was soon overshadowed by the Hayman Fire, the largest Wildland Fire in Colorado History, but the aftermath of the Iron Mountain Fire could not be ignored. It burned approximately 4,436 acres of private and BLM land. Around 200 structures were destroyed of which about 100 were homes. Numerous horses and other ranch animals were also lost and unaccounted for. Fremont County Sheriff Jim Beicker reported to The Denver Post that the final damage estimate was $20 million with $7.5 million covered by insurance. Many of the residents of the area were not adequately insured and were unable to get full compensation for their losses. The Canon City Daily Record reported that the state and local cost for fire suppression was $931,477 of which FEMA has committed to pay 75%, or $698,608.

3.1.1.3 WILDLAND FIRE – Sample Event #2

CUERNO VERDE FIRE – Custer County

On April 30, 2002, the fire season in Custer County began in earnest with the Cuerno Verde Fire. In burned for 5 days and was 100% contained on May 3, 2002. The final report stated that the fire covered 388 acres. The fire destroyed four structures including 2 homes. There were no serious injuries or fatalities.

3.1.2 WILDLAND FIRE – Risk Analysis

Impacts to Life and Health.

The rapid rate, 6 miles in 8 hours, with which the Iron Mountain Fire advanced to the northeast underscores the risk a Wildland Fire poses to residents in the Wildland-Urban Interface. Many of the mountain subdivisions in the Upper Arkansas Area were created before standards for emergency ingress and egress were established and may not provide adequate roadways for evacuation or access to burning structures.

The probable impacts to the life and health of inhabitants and first responders by Wildland Fire are characterized as **major**.

Impacts to Property.

In May of 1972, a revision to the Colorado Revised Statutes exempted properties divided into parcels of 35 acres or more from the statutory definition of a subdivision. Tracts of 35-acre lots developed since that time have not been subject to state or local subdivision regulations. The difficulty for County planning departments to apply fire-safety regulations to these developments, coupled with the increasing popularity of homes in the WUI has exacerbated the Wildland Fire risk to these properties.

The migration of area residents to mountainside lots has outpaced the evolution of policies to effectively manage the Wildland Fire risk. Homeowners, their personal property, and the first responders expected to defend these homes will be exposed to elevated levels of risk until adequate regulatory controls are in place.

The probability of significant impacts to the homes and other personal property of these inhabitants by Wildland Fire is characterized as **extreme**.

Impacts to Economic Assets

Early public comment on the draft PDM Plan questioned why the economic impacts of the listed hazards were not considered.

Long-time residents in the Upper Arkansas Area understand that the economic well-being of the region is dependent upon steady flows of tourists and recreationists to the area. Each decade the contributions from the agriculture and mining sectors of the regional economy diminish, and these losses must be filled by corrections and tourism dollars.

With the mountains as a key attraction to the area, a major Wildland Fire could destroy one of the most important aspects of the region. The scenic beauty of the mountains in combination with the recreation opportunities, make the Upper Arkansas Area very unique. A Wildland Fire could destroy valuable view -sheds as well as trails, roads, campgrounds and destinations like the Monarch Ski Resort. Monarch employs about 350 people; the second largest employer in Chaffee County. The whole economy of the region could be literally changed overnight if a Wildland Fire ran through the area. People could be unemployed, tourism could significantly decrease and the property values and the general livelihood for the regions population could be altered for many years.

Comprehensive figures are not available across the 4-county area. but the information presented in the Economic Description for the region illustrate that the local economy relies heavily on preserving the pristine condition of the mountains and rivers that dominate the region.

Even the perception that Wildland Fire threatens the safety of tourists and recreationists or the quality of their outdoor experiences can have devastating impacts to the economy. A single Wildland Fire of limited extent can impact the the economic health of the entire region in several ways:

1.) Reduction in spending with local businesses.
2.) Reduction in sales tax revenues.
3.) Losses in residential and commercial property values.

The probability of significant impacts by Wildland Fire to the economic assets of the Upper Arkansas Area is characterized as **major**.

Impacts to Infrastructure and Critical Facilities

Except for overhead power and telephone lines, important infrastructure elements are generally not impacted by Wildland Fire events.

Very few critical facilities are situated in locations subject to Wildland Fires. Members of the public pointed out that “adventure camps” for large groups of children may be situated in areas subject to danger Wildland Fire. It was agreed that these facilities should be identified and defensible spaces established at these sites as soon as practicable.

The probability of significant impacts to the infrastructure and critical facilities by wild-fire is characterized as **moderate.**

Impacts to First Responders

Emergency events caused by wild-fires demand a wide range of services from the local emergency response community including evacuation, fire-suppression, security, and relief. .

Historically, Wildland Fires of limited extent have been controlled by the various professional and volunteer fire departments in the region. As many Wildland Fires impact the widespread state and federal land areas in the four county area, fire-fighting teams from the District offices of the State Forest Service, USFS and BLM contribute to the over-all fire suppression capabilities.

The combined abilities of the various Wildland Fire-suppression agencies are substantial, but the impact to local fire-fighting units of a major blaze can be overwhelming. For example, by the time the recent Iron Mountain Fire at been contained, all of the fire-trucks owned and maintained by the Deer Mountain Fire Station had been rendered inoperable.

The probability of significant impacts by Wildland Fire to the first-response assets of the Upper Arkansas Area is characterized as **extreme**.

3.1.3 WILDLAND FIRE - Mitigation Strategy

The risk-analysis method prescribed by FEMA suggests that pre-disaster approach strategies will fall into two general categories:

1.) Actions to reduce the frequency and/or severity of hazard events.
2.) Actions that reduce the vulnerability of community assets.

3.1.4 WILDLAND FIRE – Mitigation Goals, Objectives, And Actions

3.1.4.1 GOAL #1: REDUCE THE FREQUENCY AND/OR SEVERITY OF WILDLAND FIRE IN THE UPPER ARKANSAS AREA

Objective #1: Reduce the Frequency of Man-Caused Wildland Fires.

- Action #1: Strengthen Public Education Programs
- Action #2: Strengthen ability to identify and prosecute fire-starters
- Action #3: Strengthen partnership between code-enforcing fire-fighters, planners, and law enforcement authorities.

Objective #2: Reduce the Fuel Load at Strategic Locations in the WUI.

- Action #1: Develop parcel-specific model for Wildland Fire risk analysis.
- Action #2: Work with federal agencies identify high-risk properties at the WUI.
- Action #3: Develop partnerships to fund and execute the fuel-mitigation projects.

Objective #3: Improve the Over-All Health of Publicly-Owned Forests .

- Action #1: Participate in state and federal programs to improve the condition of forested lands.

3.1.4.2 GOAL #2: REDUCE THE VULNERABILITY OF LOCAL ASSETS TO IMPACTS BY WILDLAND FIRE IN THE UPPER ARKANSAS AREA

Objective #1: Improve the Defensibility of Residential and Commercial Properties Against Wildland Fire.

- Action #1: Institute voluntary programs for homeowners and businesses in WUI.
- Action #2: Add provisions to existing zoning and building codes and regulations for roofing and siding, defensible areas, evacuation routes, access for fire-suppression, etc.
- Action #3: Support statewide initiatives to restore all land divisions to the definition for a subdivision, thereby making 35 acre and larger parcels subject to local subdivision regulations.

Objective #2: Reduce the Vulnerability of Key View-Sheds to Wildland Fire.

- Action #1: Create partnership with federal agencies to perform a view-shed value analysis for the four-county area.
- Action #2: Work with USFS and BLM to review fire-fighting protocols for high-value view-sheds.

3.2.1 WILDLAND FIRE - Trends

HAZARD. Both the natural and man-made conditions that contribute to the Wildland Fire hazard are tending to exacerbate through time.

Conservative forestry management practices have resulted in congested forests prone to fire and disease.

The continued migration of inhabitants to remote areas of increases the probability of man-caused ignitions from vehicles, grills, campfires, and electrical devices.

The penetration by SUV and all-terrain vehicles to ever more remote areas extends the risk of man-caused ignitions to pristine forests.

VULNERABILITY OF ASSETS. The vulnerability of community assets to Flash Floods is tending to increase through time as the migration of inhabitants to the forested slopes expands.

MITIGATION.
Lacking catastrophic examples, recommendations to perform actions mitigating Wildland Fire vulnerability were largely ignored until the Summer of 2002.

For over a century communities in the Upper Arkansas Area have cooperated to complete a wide range of actions to mitigate the Flash Flood hazard. Corresponding efforts to reduce Wildland Fire risks have not been the norm.

After witnessing the Iron Mountain and Hayman fires during the Summer of 2002, citizens and public officials alike are just beginning to formulate and implement plans to address the Wildland Fire hazard.

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3.2.2 WILDLAND FIRE - Jurisdictional Differences

Issues related to Wildland Fire are uniform across the Upper Arkansas Area.

3.2 FLASH FLOODS

Flooding as a natural hazard has been a recognized problem throughout history. Some flooding can be predicted by weather reports, but many times smaller flash floods are a result of a microburst system, which can drop a significant amount of rain in a short amount of time. The high runoff produced by excessive rainfall and rugged topography can cause natural and man-made drainage systems to fail. This failure can cause excessive damage to cities, industry and farms in the floodplain areas. Emergency Services, transportation, power, water and wastewater services, business and Hazardous materials Storage may be disrupted and can affect the population located in and around the flooded area.

In August of 2003 the Board of Commissioners for Custer County passed a resolution to participate in the FEMA-sponsored National Flood Insurance Program (NFIP). With this commitment by Custer County, all jurisdictions with Planning and Zoning responsibilities in four-county upper Arkansas Area are committed to participate in NFIP.

As a condition to participating in the NFIP, each agency has committed to constrain the building of structures in the flood-hazard areas delineated in the by FEMA FIRM (Flood-Insurance-Rate Map) panels. This limits the vulnerability to flooding to structures built in the Flood Hazard Areas prior the respective NFIP commitments for each governing body.

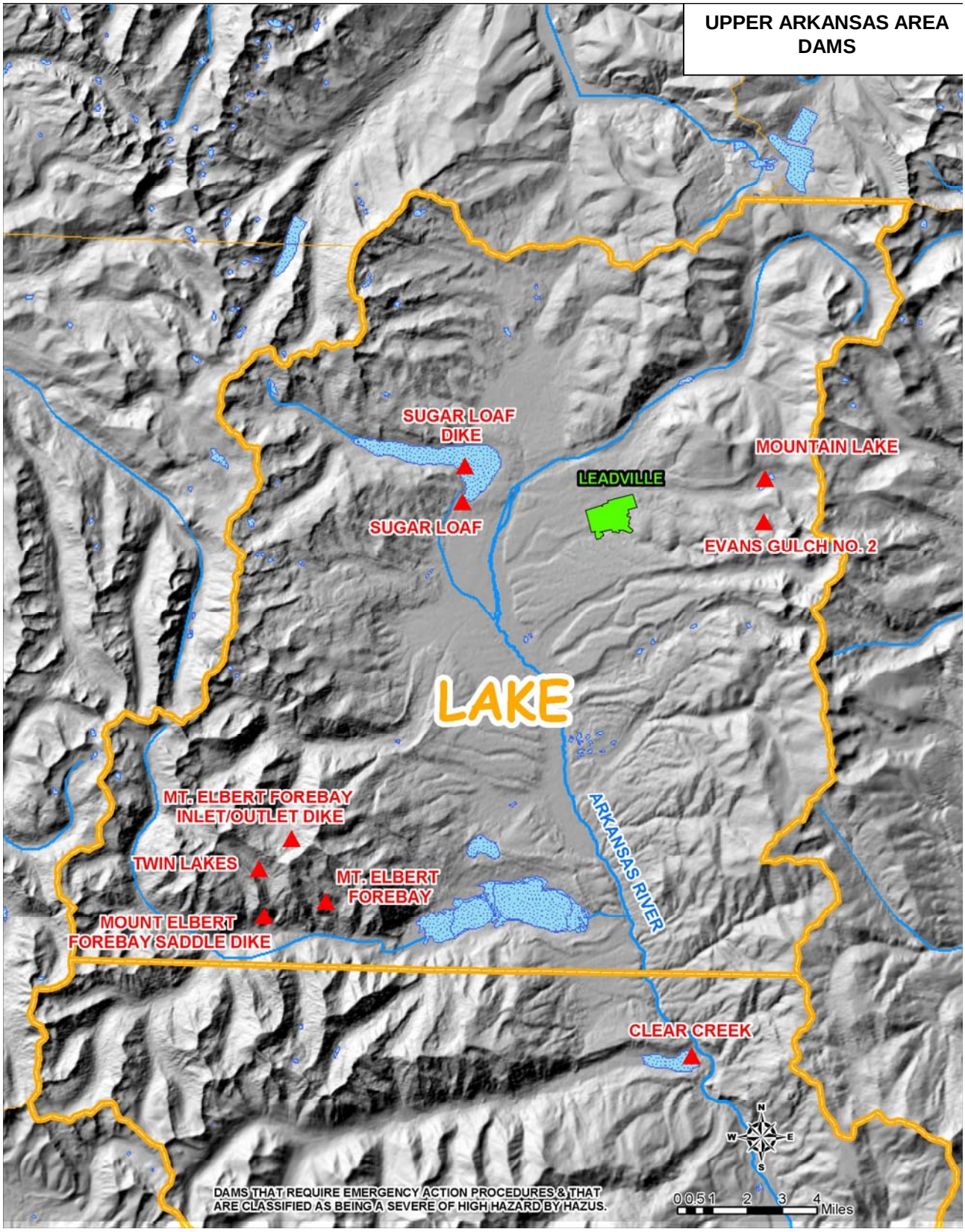
3.2.1 FLASH FLOODS – Hazard Profile

The extreme geography in the Upper Arkansas Area has the potential for severe flash flooding. Unlike a winter storm where the magnitude can usually be estimated before the storm arrives, many of the events that cause the flooding in our region are a result of a microburst and are unable to be predicted. There are many campgrounds and fee stations along the drainages and Arkansas River. Flash floods threaten the structures and people that are located within these drainage systems. If these structures were to be destroyed the services that they provide to tourists and visitors would be limited. In turn the tourists upon which the Upper Arkansas Area depends could choose to vacation elsewhere.

There is also potential for floods that may not be weather related but rather related to the failure of impoundment structures. By analyzing the HAZUS data there are 15 dams in the Upper Arkansas Area that require “Emergency Action Procedures” and are classified as having a ”High” or “Severe” Hazard rating. There are two concentrated areas in the Upper Arkansas Area where these dams are located. There are nine dams in and around Lake County, five dams are located around Canon City and one is near Westcliffe.

3.2.1.1 FLASH FLOODS – Frequency and Severity

Frequency: Moderate – an estimated 5 emergency events in 10 years
Severity: Moderate – for each event, the potential is for significant impacts to community assets rated high without mitigating actions.


UPPER ARKANSAS AREA DAMS
SUGAR LOAF DIKE
SUGAR LOAF
LEADVILLE
MOUNTAIN LAKE
EVANS GULCH NO. 2
LAKE
MT. ELBERT FOREBAY INLET/OUTLET DIKE
TWIN LAKES
MT. ELBERT FOREBAY
MOUNT ELBERT FOREBAY SADDLE DIKE
ARKANSAS RIVER
CLEAR CREEK
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DAMS THAT REQUIRE EMERGENCY ACTION PROCEDURES & THAT ARE CLASSIFIED AS BEING A SEVERE OF HIGH HAZARD BY HAZUS.
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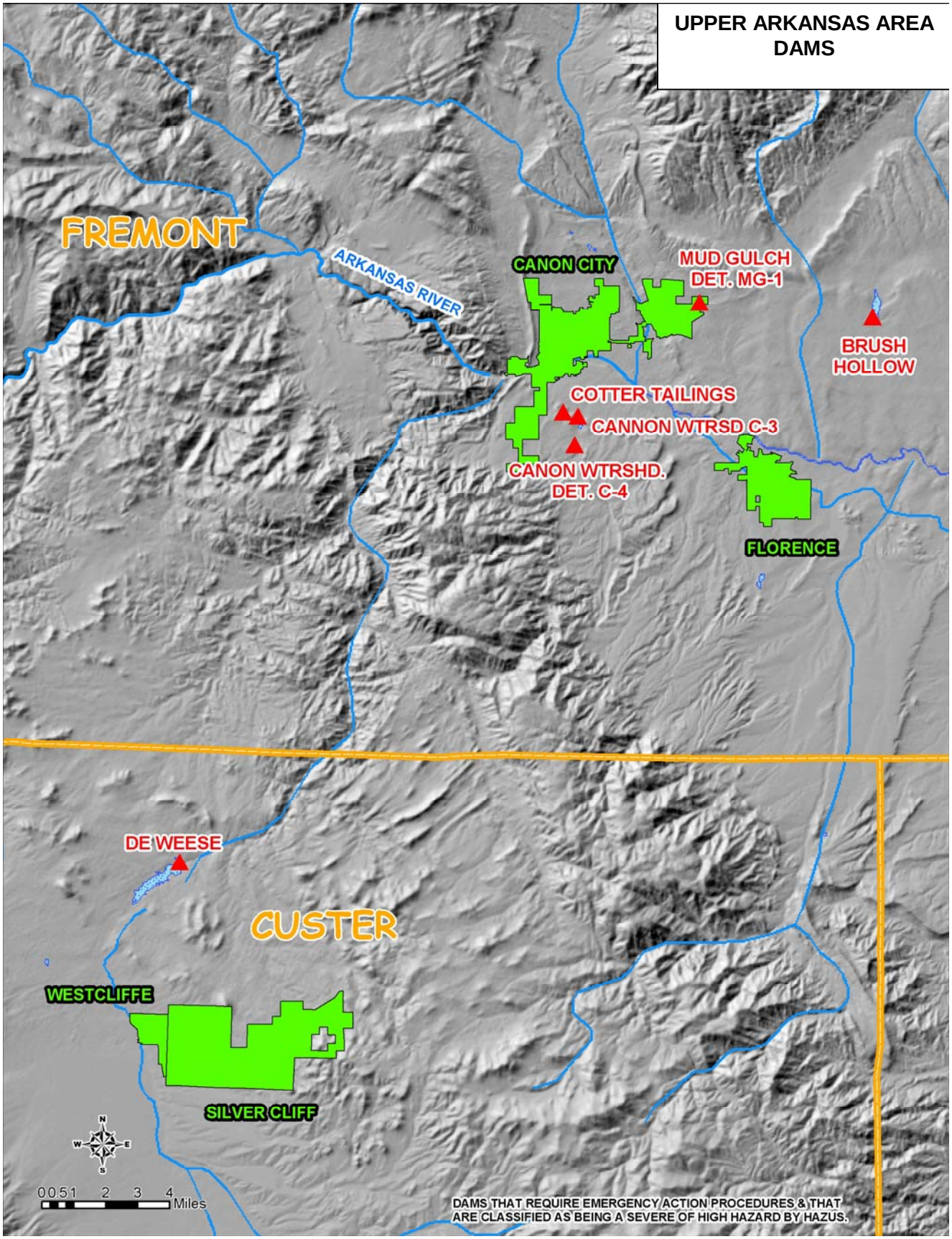

UPPER ARKANSAS AREA DAMS
FREMONT
ARKANSAS RIVER
CANON CITY
MUD GULCH DET. MG-1
BRUSH HOLLOW
COTTER TAILINGS
CANNON WTRSD C-3
CANON WTRSHD. DET. C-4
FLORENCE
DE WEESE
CUSTER
WESTCLIFFE
SILVER CLIFF
0 0.5 1 2 3 4 Miles
DAMS THAT REQUIRE EMERGENCY ACTION PROCEDURES & THAT ARE CLASSIFIED AS BEING A SEVERE OF HIGH HAZARD BY HAZUS.

3.2.2.1 FLASH FLOODS – Sample Event # 1
ORCHARD BASIN FLOOD – Canon City

Flash flooding has occurred many times throughout history in Canon City. Its semi-arid climate, sparse vegetation and potential for microbursts make it a vulnerable site for flash flooding. The Arkansas River is the largest water body in the city, but it does not present as much of a threat as the intermittent streams and tributary drainage basins in and around the city.

One of the most notable drainage basins in the city is the Orchard Avenue Drainage Basin. Flash flooding has occurred there several times throughout history, most notably in 1991, 1994 and 1996. These floods caused significant damage to homes, businesses, city and county facilities and disrupted the normal flow of activity in the Canon City.

On August 12, 1991 as much as 6 inches of rain was reported as falling within the city in a 45 minute period. Prior to the storm, the ground had been saturated from previous storms causing an ideal environment for flooding. No deaths or injuries were reported, but the damage to structures and facilities was calculated to be $554,202. The damage caused by the flood prompted the drafting of the “Flood Hazard Mitigation Plan, August 1993” by the City of Canon City, Colorado Department of Local Affairs, Division of Local Government and the Office of Emergency Management. This plan outlined the steps necessary to mitigate the potential losses in future flood events.

After the completion of the “Flood Hazard Mitigation Plan” the City of Canon City contracted with Graff, Anhalt, Schloemer & Associates to prepare the Orchard Avenue Drainage Basin Planning Study. The study was completed in November 1994 and gave recommendations on the size and location of three storm water detention facilities in the upper area of the Orchard Avenue Drainage Basin. Unfortunately, these storm water detention facilities were not instituted before the floods of 1994 and 1996. In particular the 1996 flood caused damage to 22 businesses and 162 homes with damages estimated to be approximately $500,000.

Shortly after the 1996 flood, the City of Canon City acquired the necessary tracts of land and was able to begin construction on the Orchard Avenue Detention Basin in 1997. This detention basin is designed to detain the volume of a 100-year storm event and it has a continuous, slow release outlet, which stabilizes the southward flow during and after heavy downpours.

The outcome of the Orchard Avenue Detention Basin has been very effective and since its completion in 1998, it has detained several rainfall events. The cost of the Orchard Avenue Detention Basin was $650,000 and was funded solely by the City of Canon City.

3.2.3 FLASH FLOODS - Risk Analysis

Impacts to Life and Health.

The suddenness with which flash-floods increases the risk of death and injury. Imprudent decisions by those seeking to evacuate or sidestep flooded areas can result in unnecessary injury or death. The probable impacts to the life and health of inhabitants and first responders by Wildland Fire is characterized as **moderate.**

Impacts to Property.

Flash-floods in the early 1900's were capable of washing out bridges, railroad beds, and roads, and buildings. The introduction of impoundments to the headwaters of the Arkansas River and its tributaries has reduced substantially the damages caused by the force of flooding waters.

Today, damage to private and public property by events such as the Orchard Basin flood are typically confined to damage due by water saturation and mud. This may include water-damaged foundations, dry-wall, carpets, and electronics that may require replacement.

The probable impacts to property by flash-floods is characterized as **moderate.**

Impacts to Economic Assets

Flash-floods in the Upper Arkansas Area typically to not inflict lasting damage to substantial economic assets such as business, amenities, or tourist attractions.

The probable impacts to economic assets by flash-floods is characterized as **low.**

Impacts to Infrastructure and Critical Facilities

Some road-beds and culverts in the County Road network remain vulnerable to wash-out.

Several sewage treatment plants and a power plant are located near the Arkansas River. With the flow of the Arkansas River controlled by upstream impoundments, the likelihood of a flash-flood event impacting these facilities is small.

The probable impacts to Infrastructure and Critical Facilities by flash-floods is characterized as **low.**

Impacts to First Responders

While most road-beds in the Upper Arkansas Area have been designed to withstand high-water events, it does not preclude the need by first-responders to perform white-water rescues. Victims may find their way into the white-water as a result of a car-accident, or a boating/fishing accident. Accomplishing such a rescue requires the availability of properly equipped and trained rescue personnel.

During flash-floods, first-responders are often called upon to assist with evacuations and rescues.

The probable impacts to first-responders by flash-floods are characterized as **high.**

3.2.4 FLASH FLOODS - Mitigation Strategy

The risk-analysis method prescribed by FEMA suggests that pre-disaster approaches strategies will fall into two general categories:

1.) Actions to reduce the frequency and/or severity of hazard events.
2.) Actions that reduce the vulnerability of community assets.

The greater Canon City area is currently in the process of organizing a Storm Water Management District that will collect fees to finance storm-water control projects. Projects may include the construction of detention ponds the installation of additional culverts and diversion structures.

3.2.5 FLASH FLOODS - Mitigation Goals, Objectives, and Actions

GOAL #1: REDUCE THE FREQUENCY AND/OR SEVERITY OF FLASH-FLOODS OF IN THE UPPER ARKANSAS AREA

Objective #1: Establish Storm Water Management Program.

- Action #1: Establish service area limits for Storm Water Management District by mapping drainage basin boundaries.
- Action #2: Analyze impervious areas to establish fee basis.
- Action #3: Pass resolution to form Storm-Water Management District.
- Action #4: Develop organization to administer the Storm-Water Management District.
- Action #5: Identify areas that are subject to damage from storm-water runoff.
- Action #6: Propose storm-water control projects to reduce the severity of flash flooding within the District Boundaries.
- Action #7: Find partners to finance storm-water control projects.
- Action #8: Execute storm-water control projects.

GOAL #2: REDUCE THE VULNERABILITY OF COMMUNITY ASSETS TO FLASH-FLOODS OF IN THE UPPER ARKANSAS AREA

Objective #1: Improve administration of FEMA Flood-Hazard Areas.

- Action #1: Incorporate FIRM maps into local GIS systems
- Action #2: Partner with FEMA to update and improve accuracy of Flood Hazard Area boundaries.

3.2.6 FLASH FLOODS - Trends

HAZARD. The natural conditions that contribute to the Flash Floods hazard tend to be static over time.

As the municipalities within the Upper Arkansas area grow, so too do the quantities of impervious surface that accelerate the run-off from summer storm events.

VULNERABILITY OF ASSETS. The vulnerability of community assets to Flash Floods is tending to decrease through time as mitigation measures, such as implementation of the NFIP program, show their effects.

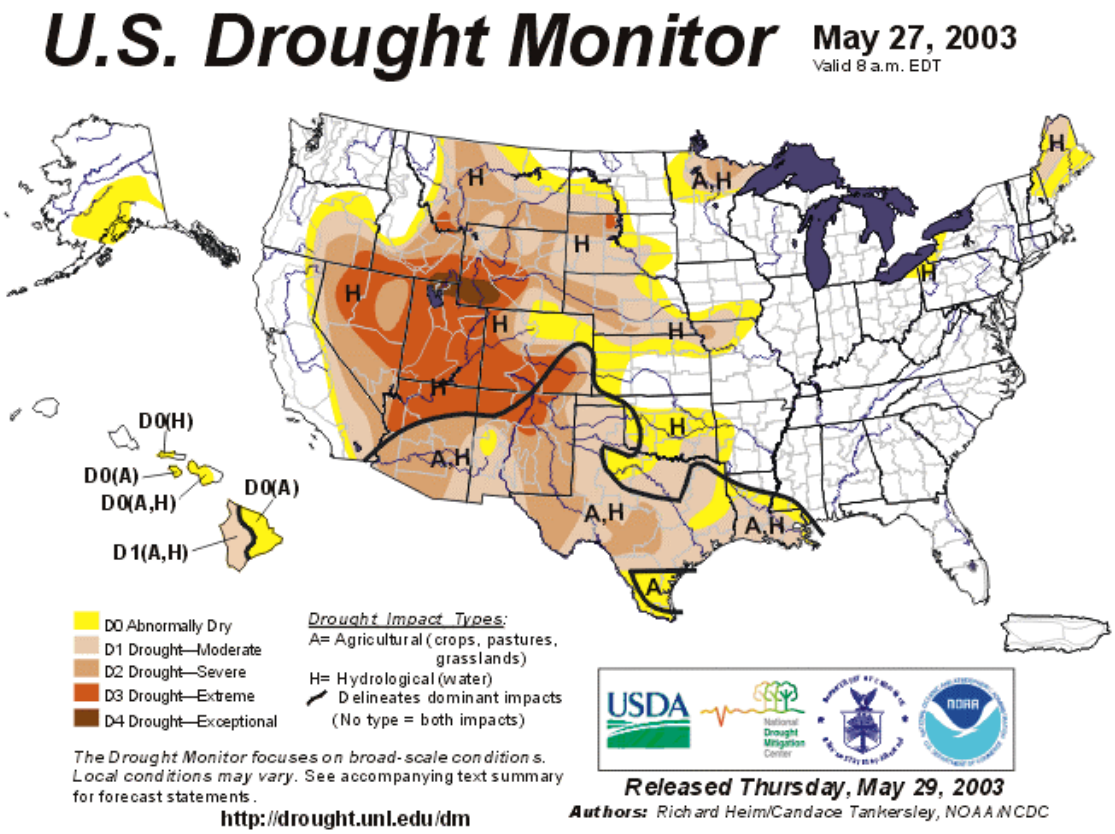
MITIGATION.
Local officials have been applying effective mitigation measures to Flash Flooding problems for over a century. Water-supply impoundments, storm-water detention and diversion structures, and NFIP participation all have helped to decrease vulnerability to Flash Floods.

New programs such as Phase II implementation of the EPA's NPDES (National Pollutant Discharge Elimination System) may have the side-benefit of helping to control storm run-off.

3.2.7 FLASH FLOODS - Jurisdictional Differences

Issues related to Flash Floods are uniform across the Upper Arkansas Area.

3.3 DROUGHT



Drought has been an all too familiar part of Colorado's history. It is one of the most destructive, but least understood of all natural hazards. Its onset is slow and silent and its effects can last for years. Geographically, drought can occur locally, regionally, or statewide. The impacts from drought are non-structural and generally affect the economy and environment of the host area. A drought event can be short-term or it can be a multi-year event much like the current drought affecting Colorado. From a historical perspective, scientific studies have shown that Colorado has experienced drought periods lasting ten years and longer. Research suggests that multi-year droughts typically have one peak year that is more dramatic and more devastating than all of the others. A look at recorded information suggested that 2002 was the peak year of the current drought event.

3.3.1 Hazard Profile

The risk of a drought is homogeneous across the Upper Arkansas Area. Annual precipitation is fairly consistent across the region with variations occurring as the topography changes from mountain to valley floors. Overall the population centers in Chaffee, Fremont, and Custer Counties receive an average of 11 to 15 inches of moisture a year. With such a small amount of annual precipitation, any decrease in moisture over a single year or for a multiyear period can greatly affect the livelihood in the region. The tourism and recreation economy, as well as individuals, can be disrupted by a drought at a parcel level. A large

portion of the Upper Arkansas Area relies on individual ground wells and man- made water retention structures for their water resources. Ground wells service a large portion of the population while local ranchers rely upon ponds and ditches for livestock and crops. Overall the four county-region has over 20,000 well permits as of July 1, 2003. The severe drought caused a number of these wells to dry up. Many people are now forced to have water hauled to their residence because their wells dried up or were not capable of sustaining a household. Unfortunately, there have been no totals calculated at this time on the exact numbers of wells that were disrupted in 2002.

Drought – Frequency and Severity

Frequency: Low – an estimated 1 event in 10 years

Severity: High – for each event, the potential is for severe economic impacts is high without appropriate mitigating actions.

3.3.1.1 DROUGHT - Sample Event #1

The Drought of 2002

The drought of 2002 began early in 2002 with the lack of snow in the state. By April 2002, statewide snow pack was 52% of average and general precipitation was well below the 70% average that is commonly used to define a severe drought. The previous 4 years in Colorado were also below normal precipitation amounts. The highly anticipated spring precipitation never occurred and warming temperatures caused the remaining snow pack to quickly diminish.

The extreme drought had a devastating effect on the state and local economies. The state economy suffered an estimated a 1.1 billion dollar impact on agriculture, tourism and recreation. For example, Southern Colorado ranchers sold 80% of their herds due to lack of water. Outfitters estimated visitation was down 40% and fishing licenses sales were down by 93,000 with an $1.8 million impact to the Division of Wildlife.

Within the Upper Arkansas Area the drought effects could be seen early. Snowfall in the high country was well below normal, which affected the local ski industry and tourism. Monarch Ski Resort had a decline of approximately 10,000 lift tickets and the general use by season tickets holders also declined. When summer arrived, the lack of snow pack caused the Upper Arkansas River to run well below normal water levels. The low water, in addition to the nationally publicized drought, caused many people to cancel pre-planned river trips and tourism to the region. Gross receipts for commercial rafting trips on the Arkansas River fell from 10.5 million dollars in 2001 to 5.72 million dollars in 2002.

Summertime also brings numerous visitors to the area for camping, hiking, fishing, and biking activities. Many of the visitors are not from out-of-state, but are residents of Colorado and they take advantage of the numerous campgrounds in the area for a weekend getaway. The drought caused the region to go into a full fire ban and many campgrounds and forest tracts were closed to the public. This deterred many in and out-of-state residents from visiting the region and they spent their tourist dollars elsewhere.

3.3.2 DROUGHT – Risk Analysis

Impacts to Life and Health.

As an isolated hazard, drought may not have a major effect on the life and health of the Upper Arkansas Area but it can be a catalyst to other hazards in the region. In particular, the Wildland Fire Hazard greatly increases as a drought prolongs.

The probability of significant impacts to the life and health of inhabitants and first responders by drought is characterized as **low**.

Impacts to property.

At the parcel level many families rely on individual ground wells for the water supplies while ponds and ditches are relied upon by local ranchers for their livestock and crops. Overall the four county region has over 20,000 well permits as of July 1, 2003. The severe drought in 2002 caused a number of these wells to dry up. Many residents are now forced to have water hauled to their residence because their wells dried up or were not capably of sustaining a household. Unfortunately, there have been no totals calculated at this time on the exact numbers of wells that were disrupted in 2002.

The probability of significant impacts to the property of inhabitants and first responders by drought is characterized as **moderate**.

Impacts to Economic Assets

The drought of 2002 exposed the vulnerability of the Upper Arkansas Area's economy. The decline of skiers and rafters in the region greatly affected the economy in the region. The steady flow of tourists and recreationists has become a very important asset to the well being of the economy.

The probability of significant impacts to the economic assets of the Upper Arkansas Area by drought is characterized as **extreme.**

Impacts to Infrastructure and Critical Facilities

There are few infrastructures and critical facilities that are directly affected by drought. As a drought prolongs the supplies for municipal water sources are diminished.

The probability of significant impacts to the infrastructure and critical facilities by drought is characterized as **moderate.**

Impacts to First Responders

Except for related emergency events like Wildland Fires, drought events generally do not contribute to the work-load experienced by the first responders.

The probability of significant impacts to first responders by drought is characterized as **low.**

3.3.3 DROUGHT - MITIGATION STRATEGY

The risk-analysis method prescribed by FEMA suggests that pre-disaster strategies will fall into two general categories:

1.) Actions to reduce the frequency and/or severity of hazard events.
2.) Actions that reduce the vulnerability of community assets.

3.3.4 DROUGHT – Mitigation Goals

3.3.4.1 GOAL #1: REDUCE THE FREQUENCY AND/OR SEVERITY OF DROUGHT EVENTS IN THE UPPER ARKANSAS AREA

Objective #1: No objectives identified

- Action #1: No Actions Identified.

3.3.4.2 GOAL #2: REDUCE THE VULNERABILITY OF ASSETS TO DROUGHT EVENTS IN THE UPPER ARKANSAS AREA

Objective #1: Reduce the vulnerability of municipal water supplies

- Action #1: Acquire more senior water rights.
- Action #2: Construction of more water storage facilities.
- Action #3: Establish "Water Banks" or similar mechanism to protect both the agricultural and municipal centers in the region.

Objective #2: Improve water conservation practices.

- Action #1 Implement and Promote "Waterwise" programs.
- Action #2: Implement water-use fee policies that promote conservation.

Objective #3: Ensure that Public Perception of Drought Impacts to Recreational Assets is not Exaggerated.

- Action #1: Prepare public relations campaign to accurately p
- Action #2: Publicize findings of expert panel.

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3.3.5 DROUGHT - Trends

HAZARD. The incidence and severity of the Drought hazard is cyclic but tends to be static over large periods time.

VULNERABILITY OF ASSETS. The vulnerability of community assets to Drought is tending to increase through time as the demand for the limited raw water resource goes up.

Economic assets such as the rafting and skiing industries prosper and suffer as precipitation rates fluctuate and competition for the raw water from Front Range interests increases.

MITIGATION.
Increased public awareness from the recent drought years has increased pressure on public officials to re-consider mitigation options deemed impracticable in the past. Novel water-

allocation arrangements like water banks may ensure water supplies for municipalities as well as cash-flow for agricultural interests during drought years.

3.3.6 DROUGHT - Jurisdictional Differences

Issues related to Drought are uniform across the Upper Arkansas Area.

3.4 WINTER STORM

Winter storms occur in many forms and can vary significantly in size, strength, intensity, duration, and impact. High winds create snowdrifts, which can block roads and can create dangerous wind chill factors. Storms or freezing temperatures are not needed for wind chill conditions to become dangerous. The National Weather Service issues a wind chill advisory when wind and temperature combine to produce wind chill values of 20 degrees below zero to 35 degrees below zero. Hypothermia and frostbite are two consequences of wind chill. Hypothermia is the most common winter weather killer in Colorado. Ice accumulation becomes a hazard by creating dangerous travel conditions. When ice accumulates on roadways, the risk of losing control of a vehicle becomes much greater.

3.4.1 WINTER STORM – Hazard Profile

The Upper Arkansas Area weather is typical of Colorado where sunshine and blue skies change quickly to plunging temperatures and significant snowfall. Forecasts for this area are limited. The weather sources available to the general public do not address this specific area. People generally rely on weather forecasts for the Pueblo and/or Colorado Springs areas, as they are the nearest cities with adequate coverage. However, the Upper Arkansas Area has significant altitude, geothermal, and jet stream differences from those areas.

Frequently, significant winds accompany these winter snowstorms. Winds can take a few inches of snow and turn them into road-blocking drifts. Commuters and supplies can easily be caught in quick moving storms and may be trapped and unreachable for hours or days. These stranded commuters can easily succumb to carbon monoxide poisoning and hypothermia. The varying topography in the Upper Arkansas Area also limits cell phone coverage and a trapped person may not be able to request emergency assistance.

There are a large number of people who visit the Upper Arkansas Area for wintertime recreation. Downhill and backcountry skiing, snowmobiling, snowshoeing are very popular winter activities in the region. Quickly changing weather can trap recreationists out in the elements without the necessary equipment and supplies. Unlike commuters who are trapped on or near a road, many of these winter activities draw people deep into the wilderness where they can be difficult to locate and rescue. Many of these rescue efforts can become very dangerous for emergency personnel involved and require extensive equipment and supplies.

Ice accumulation becomes a hazard by creating dangerous travel conditions. U.S. Highway 50, U.S. Highway 285, U.S. Highway 24, State Highway 115, and State Highway 69 are extremely important corridors to move people, supplies and equipment into the region and to reach medical facilities outside of the counties. Many portions of these roads are narrow and curved and an accident on these roads can cause a major disruption in the flow of goods and services to the area.

WINTER STORM – Frequency and Severity

Frequency: High – an estimated 20 emergency events in 10 years

Severity: Moderate – for each event, the potential for impacts to life and health, property, and emergency response resources is rated moderate without appropriate mitigating actions.

3.4.1.1 WINTER STORM – Sample Event # 1

THE BLIZZARD OF MARCH 18, 2003 (Region Wide)

On March 18, 2003, a severe winter storm positioned itself over much of Colorado and dropped a significant amount of heavy, wet snow on the state. As much as four to six feet of snow fell in the Upper Arkansas Area. Most of the local schools closed for two to three days. In addition, many offices and portions of the state highways were closed. Rescues were made all over the region to help stranded motorists and assist residents who lost power and services. Some isolated parties needed immediate medical attention while others had run out of propane and thus had no heat. Road crews worked long hours clearing highways and main roads and emergency services were used to handle emergencies in areas where roads were not cleared.

3.4.1.2 WINTER STORM – Sample Event # 2

THE BLIZZARD OF MAY 4, 2001 (Region Wide)

On May 4, 2001, a storm, lasting 48 hours dropped 50 inches of snow on the Salida area. It should be noted that this is the heaviest single snowstorm in the Salida area in recorded history. The snow had a severe effect on structures weakened by age, power lines and urban vegetation. The city hot springs pool in Salida suffered a roof collapse, which ultimately required replacement of a significant portion of the structure. Fortunately, the structure was insured but the hot springs pool was unavailable to guests and residents for a prolonged period of time.

3.4.2 WINTER STORMS - Risk Analysis

Impacts to Life and Health.

The high altitudes and rugged terrain typical of the Upper Arkansas Area exacerbate emergency situations caused by Winter Storm events. It is not un-common for residents in remote areas to be stranded without access to food or utilities.

The probability of significant impacts to the life and health of inhabitants and visitors by winter storms is characterized as **high**.

Impacts to property.

Structures in the Upper Arkansas Area are typically built to withstand harsh winter conditions. As seen with the recent roof collapse of the Salida Hot Springs Pool, older structures may be subject to damage.

The probability of significant impacts to the life and health of property by Winter Storms is characterized as **low**.

Impacts to Economic Assets

The heavy snows that disrupt travel and communications in the Upper Arkansas Area have a generally beneficial effect to the economy. The snows attract skiers, snowmobilers and other recreationists to the mountains. Spring run-off from the snows re-fill reservoirs and ensure plentiful water supplies for municipal, agricultural, and recreational uses.

The probability of significant impacts to the economic assets of the Upper Arkansas Area by Winter Storms is characterized as **low**

Impacts to Infrastructure and Critical Facilities

A storm with heavy snow or ice could destroy power lines, which could leave many people without power.

The probability of significant impacts to the economic assets of the Upper Arkansas Area by Winter Storms is characterized as **moderate.**

Impacts to First Responders

During Winter Storm Events Emergency Response agencies are asked to perform in many capacities – warning, evacuation, rescue, and relief.

The probability of significant impacts to the Emergency Response assets of the Upper Arkansas Area by Winter storms is characterized as **moderate.**

3.4.3 WINTER STORMS - Mitigation Strategy

The risk-analysis method prescribed by FEMA suggests that pre-disaster approaches strategies will fall into two general categories:

1.) Actions to reduce the frequency and/or severity of hazard events.
2.) Actions that reduce the vulnerability of community assets.

Some jurisdictions in the Upper Arkansas Area have plans to establish the StormReady program in their communities. StormReady is a voluntary program that helps provide America's communities with the communication and safety skills needed to save lives before and during a weather event. StormReady communities, which number over 400 in 42 states, must establish a 24-hour warning point and emergency operations center; have more than one method to of receiving severe weather forecasts and warnings and alerting the public, and promote the importance of public readiness through community seminars, among other criteria.

3.4.4 WINTER STORMS – Mitigation Goals, Objectives and Actions

3.4.4.1 GOAL #1: REDUCE THE VULNERABILITY OF UPPER ARKANSAS AREA ASSETS TO OF WINTER STORMS .

Objective #1: Improve early notification capabilities for Winter Storm events.

- Action #1: Establish Storm Ready Programs in Upper Arkansas Area communities.

Objective #2: Improve ability to identify and locate stranded victims.

- Action #1: Incorporate GIS layer for Land-Ownership Parcels into emergency-response procedures.

3.4.5 WINTER STORMS - Trends

HAZARD. The incidence and severity of the Winter Storm hazard tends to be static through time and is not subject to man-made alteration through time.

VULNERABILITY OF ASSETS. The vulnerability of community assets to Winter Storms is tending to increase through time. The continued migration of inhabitants from the Front Range of Colorado to ever more remote areas increases the probability that residents and travelers will be stranded by high snowfall events.

MITIGATION.
The ability of the jurisdictions responsible for mitigating and responding to Natural Hazard Emergencies is improving through time. The migration of inhabitants and businesses from the Front Range of Colorado provides the tax base and skill levels to apply modern Emergency Management techniques.

Subdivision, zoning, and building regulations are evolving as instruments to enforce mitigation measures. Uniform enforcement of these regulations is improving as jurisdictions increasingly able to recruit qualified enforcement officers.

High-profile emergencies such as the Hayman fire have increased public awareness and support for mitigation activities.

3.4.6 WINTER STORMS - Jurisdictional Differences

Issues related to Winter Storms are uniform across the Upper Arkansas Area.

3.5 SEASONAL FLOODING

In its pristine state, the Arkansas River was prone to seasonal flooding with each Spring runoff. There are several anecdotal accounts of the Arkansas River overflowing and destroying farms and structures along its banks. The incidence of seasonal flooding events has diminished as the number of multi-use reservoirs has increased in the headwaters of the Arkansas River. These reservoirs help control the amount of runoff that enters the Arkansas River and has greatly reduced the risk of a damaging seasonal flood.

3.5.1 SEASONAL FLOODING - Hazard Profile

Chaffee, and Fremont counties have been known to have significant seasonal floods along the Arkansas River in the past. The construction of the large reservoirs as water storage facilities for the urban centers along the Colorado Front Range have greatly reduced the risk of a devastating seasonal flood. These reservoirs are generally at their lowest levels in the spring, which coincides with the greatest potential for snowmelt and runoff. The increased runoff fills the depleted reservoirs and the amount of water that makes it into the Arkansas River is significantly decreased. Many of the streams and creeks in the region are also diverted into irrigation ditches, which moves the water to ranches and farms in the area. This also limits the amount of runoff that enters the Arkansas River and has helped reduce the risk of a damaging seasonal flood.

3.5.1.1 SEASONAL FLOODING – Frequency and Severity

Frequency: Moderate – an estimated 4 events in 10 years

Severity: Moderate – for each event, the potential for impacts to life and health, property, and emergency response resources is moderate without appropriate mitigating actions.

3.5.2 SEASONAL FLOODING - Risk Analysis

Impacts to Life and Health.

The probability of significant impacts to the life and health of inhabitants and visitors by Seasonal Flooding is characterized as **high**.

Impacts to property.

The probability of significant impacts to the life and health of property inhabitants of by Seasonal Flooding is characterized as **low**.

Impacts to Economic Assets

The probability of significant impacts to the economic assets of the Upper Arkansas Area by Seasonal Flooding is characterized as **low**

Impacts to Infrastructure and Critical Facilities

The probability of significant impacts to the economic assets of the Upper Arkansas Area by Seasonal Flooding is characterized as **low**

Impacts to First Responders

The probability of significant impacts to the Emergency Response assets of the Upper Arkansas Area by Seasonal Flooding is characterized as **low**

3.5.3 SEASONAL FLOODS - Mitigation Strategy

The risk-analysis method prescribed by FEMA suggests that pre-disaster approaches strategies will fall into two general categories:

1.) Actions to reduce the frequency and/or severity of hazard events.
2.) Actions that reduce the vulnerability of community assets.

Upstream water-supply impoundments such as the Arkansas/ Frying Pan Project and the construction of permanent damming structures on natural lakes have diminished the threat of devastating seasonal floods in the Upper Arkansas Area.

3.5.4 SEASONAL FLOODS – Mitigation Goals, Objectives and Actions

No cost effective mitigation measures have been identified.

3.5.5 SEASONAL FLOODS - Trends

HAZARD. As the value increases to Front Range interests for excess Spring run-off in the Arkansas basin, water flows on the river are managed more carefully. As a consequence the threat from Spring flooding on the Arkansas River is decreasing through time.

VULNERABILITY OF ASSETS. Participation in NFIP by local jurisdictions is reducing the vulnerability of community assets to seasonal flooding through time.

MITIGATION.
With water supply reservoirs decreasing the likelihood of Spring flooding on the Arkansaas River, further mitigation measures may yield diminishing returns.

3.5.6 SEASONAL FLOODS - Jurisdictional Differences

Issues related to Seasonal Floods are uniform across the Upper Arkansas Area.

3.6 HIGH WINDS

3.6.1 HIGH WINDS – Hazard Profile

The varying topography in the Upper Arkansas Area has the potential for continuous and sudden gusting of high winds. Although these high winds may not be life-threatening, they can disrupt daily activities, cause damage to building and structures and increase the potential of other hazards. Many locations in the region have minimal vegetative ground cover and the high winds can create a large dust storm which becomes a hazard for travelers and a disruption for local services. High winds in the winter can turn small amount of snow into a complete whiteout and create drifts in roadways. A Wildland Fire can be accelerated and rendered unpredictable by high winds, which makes a dangerous environment for firefighters.

Damage to structures does happen regularly due to high winds but the damage is usually minimal and goes unreported. Some effects of the high winds may be roof (shingle) damage, cracked windows, and damage to trees and landscaping.

3.6.1.1 High Winds – Frequency and Severity

Frequency: High – an estimated 10 events in 10 years

Severity: Low – for each event, the potential for impacts to life, health, and property is rated as low .

3.6.2 HIGH WINDS - Risk Analysis

Impacts to Life and Health.

The high altitudes and rugged terrain typical of the Upper Arkansas Area exacerbate emergency situations caused by Winter Storm events. It is not un-common for residents in remote areas to be stranded without access to food or utilities.

The probability of significant impacts to the life and health of inhabitants and visitors by High WInds is characterized as **high**.

Impacts to property.

Structures in the Upper Arkansas Area are typically built to withstand harsh winter conditions. As seen with the recent roof collapse of the Salida Hot Springs Pool, older structures may be subject to damage.

The probability of significant impacts to the life and health of property inhabitants of by High WInds is characterized as **low**.

Impacts to Economic Assets

The heavy snows that disrupt travel and communications in the Upper Arkansas Area have a have generally beneficial effect to the economy. The snows attract skiers, snowmobilers and

other recreationists to the mountains. Spring run-off from the snows re-fill reservoirs and ensure a good year for rafting companies.

The probability of significant impacts to the economic assets of the Upper Arkansas Area by High WInds is characterized as **low**

Impacts to Infrastructure and Critical Facilities

A storm with heavy snow or ice could destroy power lines, which could leave many people without power.

The probability of significant impacts to the economic assets of the Upper Arkansas Area by High WInds is characterized as **low**

Impacts to First Responders

Emergency response becomes very difficult because of the weather conditions and the vast area that a storm can cover

The probability of significant impacts to the First Responder assets of the Upper Arkansas Area by High WInds is characterized as **medium**

3.6.3 HIGH WINDS - Mitigation Strategy

The risk-analysis method prescribed by FEMA suggests that pre-disaster approaches strategies will fall into two general categories:

1.) Actions to reduce the frequency and/or severity of hazard events.
2.) Actions that reduce the vulnerability of community assets.

3.6.4 HIGH WINDS – Mitigation Goals, Objectives and Actions

Building codes and zoning rules and regulations have been established to reduce the vulnerability of community assets to high winds. Therefore, no cost effective mitigation measures have been identified.

3.6.5 HIGH WINDS - Trends

HAZARD. The incidence and severity of the High Winds hazard tends to be static through time and is not subject to man-made alteration through time.

VULNERABILITY OF ASSETS. The vulnerability of community assets to High Winds is tending to decrease through time. Stronger building codes and more uniform code enforcement is increasing the number of structures that can withstand High Wind events.

MITIGATION.

Advancing technology for siding and roofing, as well as better-trained and better-equipped code enforcement officers will continue to reduce the number of structures vulnerable to wind damage.

3.6.6 High Winds - Jurisdictional Differences

Issues related to High Wind events are uniform across the Upper Arkansas Area.

3.7 AVALANCHE

3.7.1 AVALANCHE – Hazard Profile

The Sawatch Range is a steep and rugged mountain range that flanks the western boundary of Lake and Chaffee Counties. It receives a considerable amount of snow in the winter months which draws a number of people to the area for backcountry skiing and snowmobiling. Many of these people head into the backcountry ill-equipped and without respect for the dangers that avalanches pose in the area. Many times in the recent past people have been caught in these avalanches and been hurt or have died. The rescue and recovery of these people is a laborious and dangerous task for the emergency personnel involved. In general, the amount of personnel in the rescue efforts can far exceed the number of people who are caught in the avalanche.

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3.7.1.1 Avalanche – Frequency and Severity

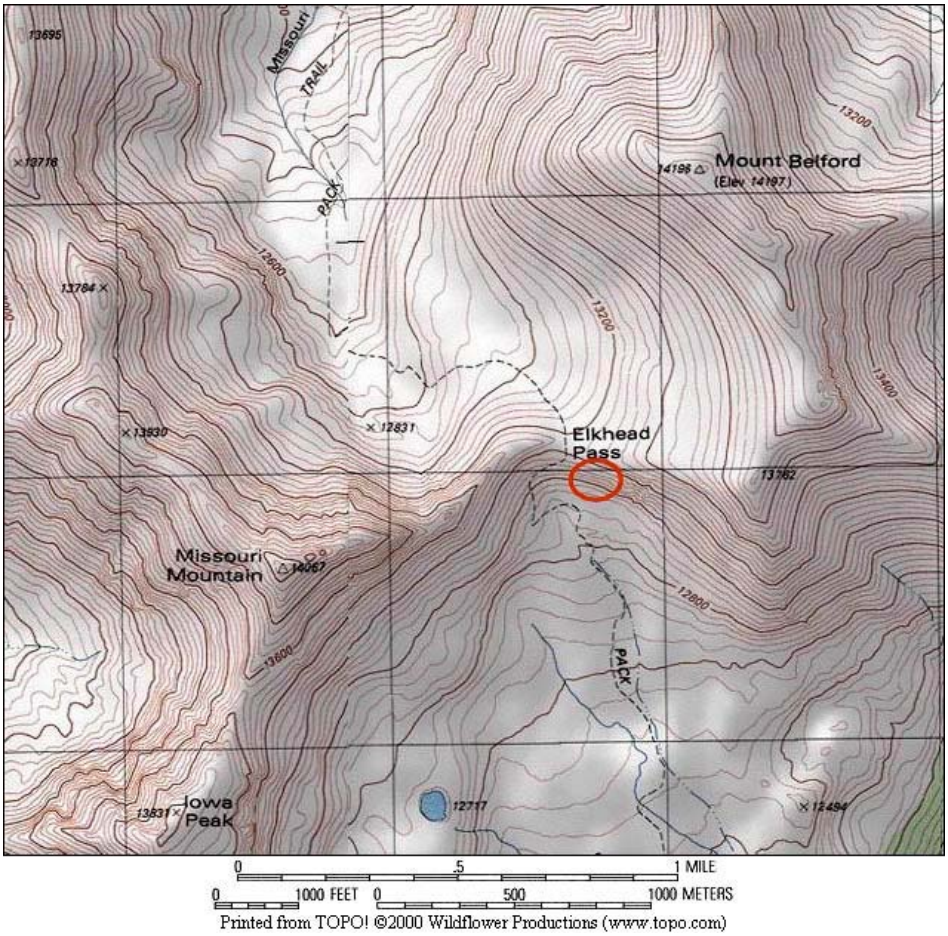
Frequency: High – an estimated 50 events in 10 years

Severity: Moderate – for each event, the potential for impacts to life, health, and emergency response resources is moderate without appropriate mitigating actions. The scope of individual events is usually limited to a small area and to a small number of potential victims.

3.7.1.2 Avalanche – Sample Event # 1

Elkhead Pass, Mount Belford, Sawatch Range

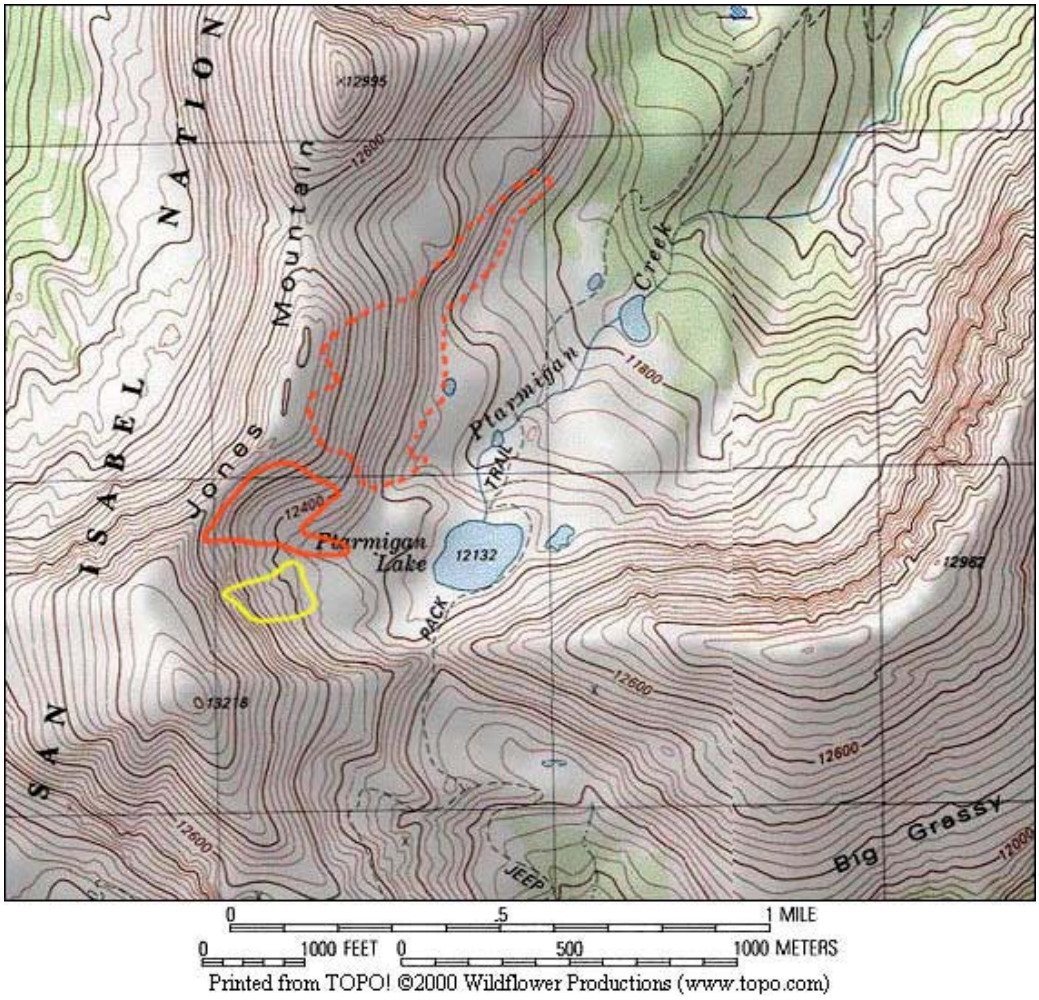
On Febuary 22, 2003, a 57-year-old Denver man was buried and killed in a slab avalanche below Elkhead Pass near Mount Belford (14,197 feet) in the Sawatch Range. The man accompanied by his son and a family friend was on a multi-day backcountry ski tour. Their plan was to ski south from Vicksburg, ascended Missouri Gulch, cross Elkhead Pass into Missouri Basin and follow Pine Creek out. They were very familiar with the area from summer climbing trips and had planned this trip for months. A very small avalanche caught all three men and swept them downslope. The son and family friend were partly buried to their waist. It took about 10 minutes for the son to dig himself free. He hurried 15 feet upslope to his father's backpack where his father was buried face down and not breathing. He started CPR and after several minutes got a pulse but had to continue to assist his father's breathing for sometime. His father did not regain consciousness.



3.7.1.3 Avalanche – Sample Event # 2

Ptarmigan Lake, Cottonwood Pass, Sawatch Range,

On March 9, 2003, a 42-year-old Manitou Springs man was buried and killed in a medium- to large-sized avalanche at "Upper" Ptarmigan Lake near Cottonwood Pass. The avalanche was triggered at about 10:00 Sunday morning. At 10:48 the Chaffee County Sheriff's Office received the report of the accident. The man and his wife were snowmobiling at the lake by themselves while many other riders were in the Cottonwood Pass area. Around 16:00 the victim was found dead under 6 feet of debris by an avalanche rescue dog.


SAN ISABEL NATION
Jones Mountain
12595
12600
Ptarmigan Creek
11800
Ptarmigan TRAIL
12400
Ptarmigan Lake
12132
12987
PACK
13218
12600
12600
12600
Big Grassy
JEEP
0 .5 1 MILE
0 1000 FEET 0 500 1000 METERS
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3.7.2 AVALANCHE - Risk Analysis

Impacts to Life and Health.

The probability of significant impacts to the life and health of inhabitants and visitors by Avalanche is characterized as **high**.

Impacts to property.

The probability of significant impacts to the life and health of property inhabitants of by Avalanche is characterized as **low**.

Impacts to Economic Assets

The probability of significant impacts to the economic assets of the Upper Arkansas Area by Avalanche is characterized as **low**

Impacts to Infrastructure and Critical Facilities

The probability of significant impacts to the economic assets of the Upper Arkansas Area by Avalanche is characterized as **moderate.**

Impacts to First Responders

The probability of significant impacts to the economic assets of the Upper Arkansas Area by Avalanche is characterized as **high.**

3.7.3 AVALANCHE - Mitigation Strategy

The risk-analysis method prescribed by FEMA suggests that pre-disaster approaches strategies will fall into two general categories:

3.) Actions to reduce the frequency and/or severity of hazard events.
4.) Actions that reduce the vulnerability of community assets.

3.7.4 AVALANCHE – Mitigation Goals, Objectives and Actions

No cost-effective mitigation measures have been identified.

3.7.5 AVALANCHE - Trends

HAZARD. The incidence and severity of the Avalanche hazard tends to be static through time and is not subject to man-made alteration through time.

VULNERABILITY OF ASSETS. The vulnerability of community assets to Avalanche is tending to increase through time. As larger numbers of recreationists travel to avalanche-prone areas, the potential for death and injury is increased.

MITIGATION.

More detailed and more readily available information about potential avalanches may enable recreationists to avoid potential avalanches.

3.7.6 AVALANCHE - Jurisdictional Differences

Fremont County lacks the high elevations and heavy snowpack that contribute to avalanche danger.

3.8 LANDSLIDE

Landslides as a natural hazards exist in almost every state in the U.S. They are a serious geologic hazard occurring on public and private lands. They can pose a threat to human life, but more often result in a disruption of everyday services. Landslides can block transportation routes, dam creeks and drainages and contaminate water supplies.

3.8.1 LANDSLIDES – Hazard Profile

There are many locations in the Arkansas River Area where the potential for a landslide is high. The Soil Conservation Service acknowledged the existence of debris fans in Chaffee County in the early to mid-1970's in their Flood Plain Studies. The south slope of Mt. Princeton and north of Chalk Creek and along County Road 162 from Mt. Princeton Hot Springs to the town site of Alpine is well-defined and slides almost annually. A rainstorm in the area precipitates the slide.

There are numerous residences in the area, two small settlements and many Forest Service camping areas above the slide area with no easily managed alternate route. Once it starts it may continue to flow for some time (depending on the charge rate of the rain). It usually blocks the road and has been known to dam Chalk Creek. Witnesses describe the mud (loaded with large and small stones) moving across the road and forming a substantial dam across the creek. The water drops out of the moving mud, which then becomes a semi-solid dam across the creek until enough water is backed up to overtop the structure.

3.8.1.1 Landslides – Frequency and Severity

Frequency: High – an estimated 20 events in 10 years

Severity: Low – for each event, the potential for impacts to life and health, property, transportation infrastructure and emergency response resources is moderate without appropriate mitigating actions. The scope of individual events is typically limited to a small area and a small number of potential victims.

3.8.1.2 LANDSLIDES – Sample Event # 1

COTTONWOOD CREEK – CHAFFEE COUNTY

In 2002 it was discovered that a similar situation to Chalk Creek exists on the North slope of Mt. Princeton. Heavy rains caused a debris (or mud) flow in an area where it hadn’t been identified before. The elderly people in this mini-van were almost swept into Cottonwood Creek by the moving muck. The trailer on the rear of the van is actually perched atop the guard rail.

The cost of removing the mud from the mile-and-a-half section of road was about $70,000. People who live along the road were isolated in their homes for a while and businesses along the road (County Road 306 - Cottonwood Pass) were impacted. Some damage to private property was sustained.

3.8.2 LANDSLIDES - Risk Analysis

Impacts to Life and Health.

The probability of significant impacts to the life and health of inhabitants and visitors by Landslides is characterized as **moderate**.

Impacts to property.

The probability of significant impacts to the life and health of property inhabitants of by Landslides is characterized as **low**.

Impacts to Economic Assets

The probability of significant impacts to the economic assets of the Upper Arkansas Area by Landslides is characterized as **low.**

Impacts to Infrastructure and Critical Facilities

The probability of significant impacts to the economic assets of the Upper Arkansas Area by Landslides is characterized as **moderate.**

Impacts to First Responders

The probability of significant impacts to the economic assets of the Upper Arkansas Area by Landslides is characterized as **low.**

3.8.3 LANDSLIDE - Mitigation Strategy

The risk-analysis method prescribed by FEMA suggests that pre-disaster approaches strategies will fall into two general categories:

1.) Actions to reduce the frequency and/or severity of hazard events.
2.) Actions that reduce the vulnerability of community assets.

3.8.4 LANDSLIDE – Mitigation Goals, Objectives and Actions

No cost effective mitigation measures have been identified.

3.8.5 LANDSLIDE - Trends

HAZARD. The incidence and severity of the Landslide hazard is tending to decrease as road-cuts through hillsides are re-constructed to modern specifications.

VULNERABILITY OF ASSETS. The vulnerability of community assets to Landslides is tending to increase through time as larger numbers of recreationists travel on back-country roads.

MITIGATION.
GIS analysis may enable emergency managers to maintain an inventory of landslide-prone locations.

3.8.6 LANDSLIDE - Jurisdictional Differences

Issues related to Landslides are uniform across the Upper Arkansas.

3.9 LIGHTNING AND THUNDER

In Colorado, thunderstorms can be a large problem. These usually occur in the spring and summer, impact a small area and last for a brief period of time. A thunderstorm watch is issued by the National Weather Service when conditions are favorable for thunderstorms are expected to produce wind gusts to 58 mph or stronger or hail to 3/4 inch or larger to develop. A thunderstorm warning is issued when a severe thunderstorm has been detected by radar, or by a trained spotter. Heavy rainfall, flash flooding, lightning, high winds, and hail are all examples of hazards from thunderstorms that may occur in the Upper Arkansas Area.

3.9.1 LIGHTNING AND THUNDER – Hazard Profile

Weather forecasts for the Upper Arkansas Area are limited. The weather sources available to the general public do not address this specific area. People generally rely on weather forecasts for the Pueblo and/or Colorado Springs areas, as they are the nearest cities with adequate coverage. However, there are significant altitude, geothermal, and jet stream differences from those areas. Therefore, residents are often left to simply watch the skies.

Lightning is the leading summer weather-related killer in Colorado. Hikers and climbers caught in lightning storms are in particular danger. While lightning usually accompanies thunderstorms, a thunderstorm is not necessary for lightning to occur. Lightning may strike as far away as 10 miles from any precipitation. Many of the tourists that travel to the region are not aware of how fast a thunderstorm can build in the mountains. They can easily be caught in a storm while high up in the mountains.

Late spring and summer thunderstorms can appear quickly and leave just as fast, leaving behind a trail of secondary effects. Heavy rain can cause flash flooding, washing out roads and disrupting transportation routes. Lightning often sparks isolated fires that leave firefighters scrambling, and taxing resources. Hailstorms can damage structures and property in the area.

3.9.1.1 Lightning and Thunder – Frequency and Severity

Frequency: High – an estimated 50 events in 10 years

Severity: Low – for each event, the potential for impacts to life and health, property, and emergency response resources is rated low.

3.9.2 LIGHTNING AND THUNDER - Risk Analysis

Impacts to Life and Health.

The probability of significant impacts to the life and health of inhabitants and visitors by Lightning and Thunder is characterized as **moderate**.

Impacts to property.

The probability of significant impacts to the life and health of property inhabitants of by Lightning and Thunder is characterized as **low**.

Impacts to Economic Assets

The probability of significant impacts to the economic assets of the Upper Arkansas Area by Lightning and Thunder is characterized as **low**

Impacts to Infrastructure and Critical Facilities

The probability of significant impacts to the economic assets of the Upper Arkansas Area by Lightning and Thunder is characterized as **low**

Impacts to First Responders

The probability of significant impacts to the economic assets of the Upper Arkansas Area by Lightning and Thunder is characterized as **low**

3.9.3 LIGHTNING & THUNDER - MITIGATION STRATEGY

The risk-analysis method prescribed by FEMA suggests that pre-disaster approaches strategies will fall into two general categories:

1.) Actions to reduce the frequency and/or severity of hazard events.
2.) Actions that reduce the vulnerability of community assets.

3.9.4 LIGHTNING & THUNDER–Mitigation Goals, Objectives and Actions

No cost effective mitigation goals have been identified.

3.9.5 LIGHTNING & THUNDER - Trends

HAZARD. The incidence and severity of the Lightning and Thunder hazard tends to be static through time and is not subject to man-made alteration through time.

VULNERABILITY OF ASSETS. The vulnerability of community assets to Lightning and Thunder is appears to be static.

MITIGATION.

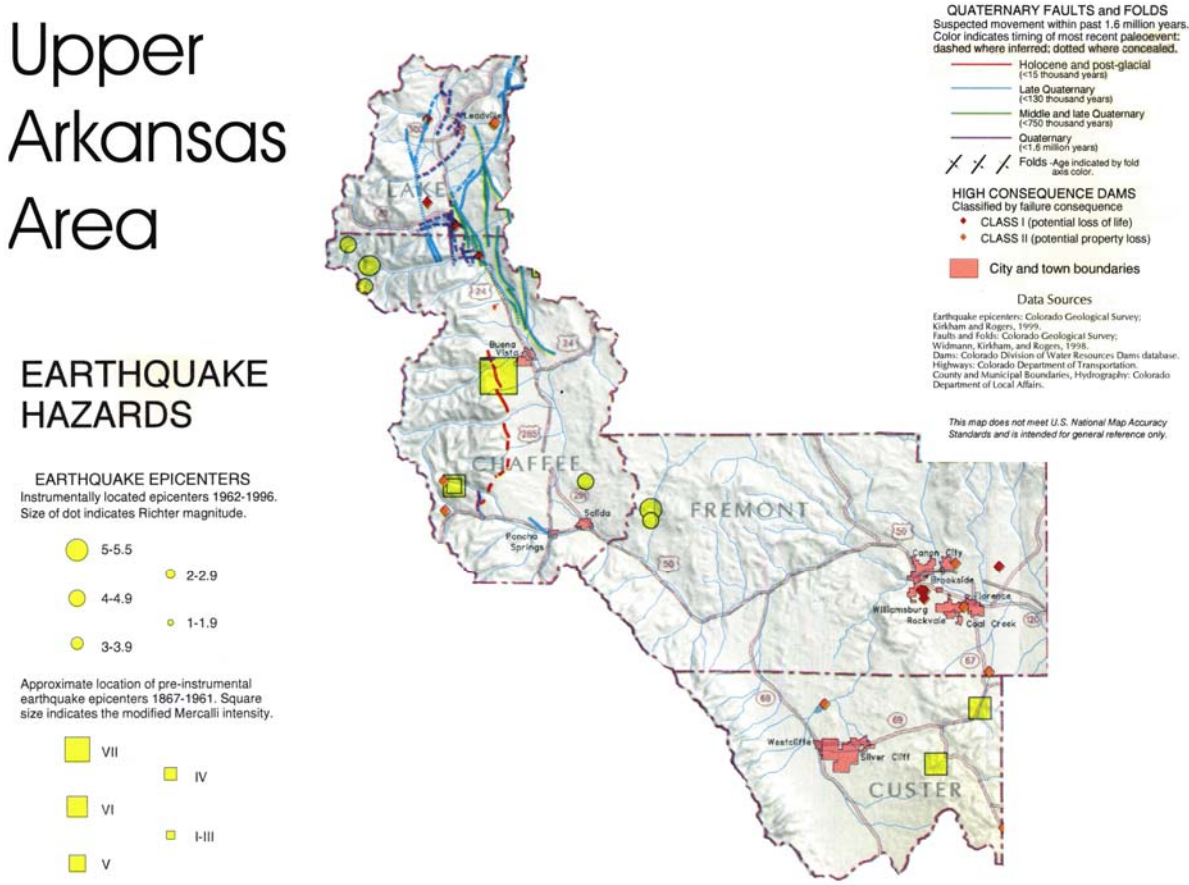
GIS analysis may enable emergency managers to maintain an identify of lightning-prone locations.

3.9.6 LIGHTNING * THUNDER - Jurisdictional Differences

Issues related to Lightning and Thunder are uniform across the Upper Arkansas Area.

3.10 EARTHQUAKE

Geologic Hazards are not uniformly spread through the region. Chaffee County has a significant history of small earthquakes and studies indicate a maximum credible quake level of between 6.3 and 7.2 Richter.



3.10.1 EARTHQUAKE – Hazard Profile

The age of many downtown buildings, infrastructure and many older homes would probably make damages in an earthquake above Richter level 5.5 devastating in terms of the economy and the structures of the area.

Quakes of a magnitude above 5.5 Richter might threaten dams in both Lake and Chaffee Counties, with severe results in communities downstream.

It would also cause some dislocation for front range communities through the loss of water (principal owners of the stored water).

The costs of engineering studies on each of the buildings in the area would probably overwhelm building owners who are beset by tightening economies and increasing costs.

Costs of retrofitting older businesses and homes with current technology solutions to make them more earthquake resistant appear to be prohibitive.

3.10.1.1 EARTHQUAKE – Frequency and Severity

Frequency: Low – an estimated 2 emergency events in 100 years
Severity: High – for each event, the potential for impacts to life and health, property, and emergency response resources is high without appropriate mitigating actions.

3.10.2 EARTHQUAKE - Risk Analysis

Impacts to Life and Health.
The probability of significant impacts to the life and health of inhabitants and visitors by Earthquake is characterized as **low**.

Impacts to property.
The probability of significant impacts to the life and health of property inhabitants of by Earthquake is characterized as **low**.

Impacts to Economic Assets
The probability of significant impacts to the economic assets of the Upper Arkansas Area by Earthquake is characterized as **low**

Impacts to Infrastructure and Critical Facilities
The probability of significant impacts to the economic assets of the Upper Arkansas Area by Earthquake is characterized as **low**

Impacts to First Responders
The probability of significant impacts to the economic assets of the Upper Arkansas Area by Earthquake is characterized as **low**

3.10.3 EARTHQUAKES - Mitigation Strategy

The risk-analysis method prescribed by FEMA suggests that pre-disaster approaches strategies will fall into two general categories:

3.) Actions to reduce the frequency and/or severity of hazard events.
4.) Actions that reduce the vulnerability of community assets.

3.10.4 EARTHQUAKES – Mitigation Goals, Objectives and Actions

No cost effective mitigation strategies have been identified.

3.10.5 EARTHQUAKES - Trends

HAZARD. The incidence and severity of the Earthquake hazard tends to be static through time and are not subject to man-made alteration.

VULNERABILITY OF ASSETS. The vulnerability of community assets to Earthquakes appears to be static.

MITIGATION.
Recent studies of the soundness of dams across the country may prompt dams to be strengthened to survive most-probable seismic events.

3.10.6 EARTHQUAKES - Jurisdictional Differences

Concern regarding earthquakes center on the large raw-water storage impoundments in Chaffee and Lake Counties.

3.11 TORNADO

3.11.1 TORNADO – Hazard Profile

The geography of the Upper Arkansas Area limits the occurrence of tornadoes in the region, but they have been known to occur. In a 45-year period from 1950 – 1995 there were 10 reported tornadoes in the Upper Arkansas Area. None of the events resulted in death or injury.

3.11.1.1 Tornado – Frequency and Severity

Frequency: Low – an estimated 1 event in 10 years

Severity: Low – for each event, the potential for impacts to life and health, property, and emergency response resources is rated low.

3.11.2 TORNADO - Risk Analysis

Impacts to Life and Health.

The probability of significant impacts to the life and health of inhabitants and visitors by Tornado is characterized as **low**.

Impacts to property.

The probability of significant impacts to the life and health of property inhabitants of by Tornado is characterized as **low**.

Impacts to Economic Assets

The probability of significant impacts to the economic assets of the Upper Arkansas Area by Tornado is characterized as **low**

Impacts to Infrastructure and Critical Facilities

The probability of significant impacts to the economic assets of the Upper Arkansas Area by Tornado is characterized as **low**

Impacts to First Responders

The probability of significant impacts to the economic assets of the Upper Arkansas Area by Tornado is characterized as **low**

3.11.3 TORNADO - Mitigation Strategy

The risk-analysis method prescribed by FEMA suggests that pre-disaster approaches strategies will fall into two general categories:

5.) Actions to reduce the frequency and/or severity of hazard events.
6.) Actions that reduce the vulnerability of community assets.

3.11.4 TORNADO – Mitigation Goals, Objectives and Actions

No cost effective mitigation strategies have been identified.

3.11.5 TORNADO - Trends

HAZARD. The incidence and severity of the Tornado hazard tends to be static through time and are not subject to man-made alteration.

VULNERABILITY OF ASSETS. The vulnerability of community assets to Tornados is increasing as subdivisions become more numerous in the lower elevations of Fremont County.

MITIGATION.
Technological advances have improved the ability to provide early warning of Tornado emergencies.

3.11.6 TORNADO - Jurisdictional Differences

Significant occurrence of tornados is restricted to the Eastern portions of Fremont County.

3.12 VOLCANIC ACTIVITY

3.12.1 VOLCANIC ACTIVITY – Hazard Profile

While the signs of ancient volcanism are common in Upper Arkansas Area, the probability of renewed volcanic activity in the foreseeable future is negligible.

Volcanic Activity – Frequency and Severity

Frequency: Never – an estimated 0 events in 100 years

Severity: Low – for each event, the potential for impacts to life and health, property, and emergency response resources is rated low without appropriate mitigating actions.

3.12.2 VOLCANIC ACTIVITY - Risk Analysis

Impacts to Life and Health.

The probability of significant impacts to the life and health of inhabitants and visitors by Volcanic Activity is characterized as **low**.

Impacts to property.

The probability of significant impacts to the life and health of inhabitants by Volcanic Activity is characterized as **low**.

Impacts to Economic Assets

The probability of significant impacts to the economic assets of the Upper Arkansas Area by Volcanic Activity is characterized as **low**

Impacts to Infrastructure and Critical Facilities

The probability of significant impacts to the economic assets of the Upper Arkansas Area by Volcanic Activity is characterized as **low**

Impacts to First Responders

The probability of significant impacts to the economic assets of the Upper Arkansas Area by Volcanic Activity is characterized as **low**

3.12.3 VOLCANIC ACTIVITY - Mitigation Strategy

The risk-analysis method prescribed by FEMA suggests that pre-disaster approaches strategies will fall into two general categories:

7.) Actions to reduce the frequency and/or severity of hazard events.
8.) Actions that reduce the vulnerability of community assets.

3.12.4 VOLCANIC ACTIVITY–Mitigation Goals, Objectives and Actions

No cost effective mitigation strategies have been identified.

3.12.5 VOLCANIC ACTIVITY - Trends

HAZARD. The absence of Volcanic Activity in the Upper Arkansas Area is expected to continue for the foreseeable future.

VULNERABILITY OF ASSETS. There is no active volcanic activity on the Upper Arkansas Area.

MITIGATION.
The minimal threat posed by Volcaninc activity does not warrant mitigation action.

3.12.6 VOLCANIC ACTIVITY - Jurisdictional Differences

Issues related to Volcanic Activity are uniform across the Upper Arkansas Area.

3.13 ASTEROID OR COMET IMPACT

3.13.1 ASTEROID OR COMET IMPACT – Hazard Profile

The open spaces of the Upper Arkansas Area provide residents and travelers alike unfettered views of the night sky. The absence of the light pollution encountered elsewhere along the Colorado Front Range makes the viewing of meteors a commonplace occurrence.

Several citizens attending the Public Input meeting for this document expressed concern that the area was prone to impacts from inter-terrestrial objects.

No historical evidence was found of damage or injury due to impacts from such objects. Neither were there credible forecasts of future impacts.

3.13.2 Asteroid or Comet Impact – Frequency and Severity

Frequency: Never – an estimated 0 events in 100 years

Severity: Low – for each event, the potential for impacts to life and health, property, and emergency response resources is rated low without appropriate mitigating actions.

3.13.2 ASTEROID OR COMET IMPACT - Risk Analysis

Impacts to Life and Health.

The probability of significant impacts to the life and health of inhabitants and visitors by Asteroid or Comet Impact is characterized as **low**.

Impacts to property.

The probability of significant impacts to the life and health of property inhabitants of by Asteroid or Comet Impact is characterized as **low**.

Impacts to Economic Assets

The probability of significant impacts to the economic assets of the Upper Arkansas Area by Asteroid or Comet Impact is characterized as **low**

Impacts to Infrastructure and Critical Facilities

The probability of significant impacts to the economic assets of the Upper Arkansas Area by Asteroid or Comet Impact is characterized as **low**

Impacts to First Responders

The probability of significant impacts to the economic assets of the Upper Arkansas Area by Asteroid or Comet Impact is characterized as **low**

3.13.3 ASTEROID or COMET IMPACT - Mitigation Strategy

The risk-analysis method prescribed by FEMA suggests that pre-disaster approaches strategies will fall into two general categories:

1.) Actions to reduce the frequency and/or severity of hazard events.
2.) Actions that reduce the vulnerability of community assets.

3.13.4 ASTEROID or COMET IMPACT - Mitigation Goals, Objectives and Actions

No cost effective mitigation goals have been identified.

3.13.5 ASTEROID or COMET IMPACT - Trends

HAZARD. The absence of Asteroid Or Comet Impact in the Upper Arkansas Area is expected to continue for the foreseeable future.

VULNERABILITY OF ASSETS. There is Asteroid or Comet Impact activity in the Upper Arkansas Area.

MITIGATION.
The minimal threat posed by Asteroid or Comet Impact activity does not warrant mitigation action.

3.13.6 ASTEROID or COMET IMPACT - Jurisdictional Differences

Issues related to Asteroid or Comet Impact are uniform across the Upper Arkansas Area.

IV PLAN IMPLEMENTATION

4.1 IMPLEMENTATION STRATEGY

Projects will be established to accomplish to each of the hazard-mitigation objectives set forth in Section III of this document. It is presumed that accomplishing each objective will require completion in sequence of each of the actions listed.

4.1.1 Area-wide coordination.

Program direction and area-wide coordination is provided by the Executive Director of the Upper Arkansas Area Council of Governments (UAACOG).

4.1.2 Prioritization of projects.

In order to select which of the hazard-mitigation objectives to pursue first, the objectives must be considered together for prioritization. The following criteria are considered as the objectives are prioritized:

- The level of risk posed by each hazard.
- The availability of cost-effective mitigation measures, determined by the cost/benefit ration presented by the undertaking.
- The opportunity to pursue the objective using existing regulatory mechanisms such as subdivision regulation, zoning restrictions, and building codes.
- Public and political support for the proposed mitigation measures.
- Availability of funding for the proposed mitigation measures.

The top 5 mitigation goals included in the November 5, 2003 iteration of the Hazard Mitigation Plan are prioritized, from top to bottom, as follows.

HAZARD	MITIGATION OBJECTIVE
Wildland Fire	Improve the Defensibility of Residential and Commercial Properties Against Wildland Fire.
Wildland Fire	Reduce the Fuel Load at Strategic Locations in the WUI.
Drought	Reduce the vulnerability of municipal water supplies.
Flash-Flooding	Establish a Stormwater Management Program.
Flash-Flooding	Improve administration of FEMA Flood-Hazard Areas.

4.1.3 Scope of projects.

Practical Scope. It is intended that the scope of each project is matched with a single mitigation objective. The project may be comprised sufficient multiple mitigation actions.

4.1.4 Area-wide projects.

For some hazard mitigation efforts, economies of scale may be achieved and duplication of effort minimized by pursuing the projects on an area—wide basis. In

those circumstances the UAACOG may serve as coordinating body.

4.2 PROJECT LEADERSHIP

4.2.1 Emergency Managers

Unless specific alternative arrangements are made, it is presumed that the designated emergency manager for each jurisdiction shall serve as project leader for his/her organization's hazard mitigation projects.

4.2.2 Project Leaders

Emergency Managers are presumed serve as project leaders for their jurisdictions. In the circumstance that someone other than the Emergency Manager will lead a project, a memorandum stating the fact must be presented to the Executive Director of the UAACOG.

4.3 PROJECT SCOPE

4.3.1 Goals, Objectives, and Actions.

For clarity, participants in the mitigation program are urged to use proper terminology when discussing mitigation goals, objectives, and actions.

4.3.2 Jurisdictional Scope

In general, each jurisdiction is responsible for completing its own mitigation projects. Where possible projects will be pursued in a coordinated manner, with the jurisdictions working through the prioritized objectives in unison.

4.4 PROJECT DESIGN

4.4.1 Purpose

When initiating a mitigation project, the project leaders may wish to review the reasons the project has been undertaken.

4.4.2 Outcome

Project leaders may wish to ponder what a successful outcome to the project will look like. This vision can serve as a standard against which to evaluate results.

4.4.3 Tasking

The project leader may wish to break the project down to a logical sequence of tasks. This list of tasks can be used to estimate needed resources and to allocate work assignments and once complete can serve as a work-plan.

4.4.4 Methods

When considering alternative means for accomplishing the mitigation objective, the project leader should give preference to methods that employ or modify existing mechanisms such as subdivision regulations, zoning restrictions, and building codes. Alternatives that require the new offices or statutory authority should be avoided.

4.4.5 Resources

Tasks can be matched with the capabilities of available personnel. Contract help may be used to supplement the contributions from employees and volunteers.

4.4.6 Funding

Project leaders are encouraged to seek out creative funding solutions. Cash contributions from one agency may serve as matching funds to grants from other agencies.

4.4.7 Assignments

Assignments are best communicated by document that shows the contributions of all participants. Be sure to include time estimates and deadlines.

4.4.8 Schedule

Projects with multiple tasks and multiple participants will benefit from a well-conceived schedule.

4.5 PROJECT IMPLEMENTATION

4.5.1 Approval of plan by governing bodies

Once a work-plan, budget, and schedule have been completed, the project can be presented to the appropriate governing board for approval. In many cases, formal approval is required before commitments are made by granting authorities or other cooperative funding arrangements.

4.5.2 Proposal for joint funding

For projects that require funding contributions from multiple sources, sufficient lead-time for the necessary approvals must be built into the schedule.

4.5.3 Project Startup.

When all elements for a project are in place, a meeting may be in order to introduce the participants to the work-plan and the schedule. This is a good time for participants to commit to their work assignments.

4.6 PROJECT MANAGEMENT

Project leaders are expected to provide ongoing project management for their undertakings. They should expect to be accountable to the ad-hoc Hazard Mitigation group and to their respective governing bodies.

4.6.1 Progress

Periodic reports regarding tasks completed and in progress are helpful to project participants.

4.6.2 Budget

Periodic reports comparing actual costs for completing tasks against budgeted costs helps to keep a project on course.

4.6.3 Schedule

Keeping tabs of completion dates for tasks may cue the project leader to make mid-course corrections to his work-plan.

4.6.4 Outcomes

As tasks are complete the project leader may wish to spot check the outcomes to ensure satisfactory results are being achieved.

V PLAN MAINTENANCE

5.1 Maintenance Strategy

Pursuing the mitigation objectives set forth in the PDM is an undertaking that may take a number of years to achieve. Continued funding for mitigation actions may require that progress against the plans goals be measured at regular intervals. Changing conditions and circumstances may require that the plan be altered or added to through time. Technological advancements such as GIS analysis or automated interpretation of satellite imagery may provide opportunities to model the natural hazards and vulnerable assets with more precision.

5.1.1 Maintenance Goals

1.) Monitor progress achieved against mitigations goals and objectives.
2.) Update plan to reflect new information and changing conditions.
3.) Secure continued funding by demonstrating tangible progress.

5.1.2 Maintenance Procedures

1.) Establish area-wide mitigation program.
2.) Establish regular meetings of program participants.
- Meet once every 3 months.

3.) Prepare progress report after every meeting.
3.) Update working copy of plan every 6 months.
4.) Present working copy for review every 12 months.
5.) Hold Meeting for Public Comment every 12 months.
6.) Prepare annual progress report every 12 months.

5.2 Plan Monitoring

5.2.1 Evaluating Progress

- Project leaders will report on their projects at each quarterly meeting.

5.2.2 Progress Reports

- Program leader will summarize progress against objectives each quarter.

5.3 Plan Modification

5.3.1 Plan Updates

- Each year, a program participant will be designated to maintain the plan.
- New data regarding hazards and vulnerabilities will be reviewed at each quarterly meeting.
- Updates reflecting changing conditions will be made each quarter**.**

5.3.2 Plan Improvements

- There's always room for improvement.

5.3.3 Plan Additions

- Participants may determine that new sections documenting policies or procedures are warranted.

APPENDIX A: CRITICAL INFRASTRUCTURE

FREMONT COUNTY

Sheriff's Dept.	100 Justice Center Road, Canon City	719 276-5555
Sheriff's Dept.(West End)	044 County Road 50, Cotopaxi	719 842-4299
Canon City Police Dept.	161 Justice Center Road, Canon City	719 276-5600
Florence Police Dept.	300 West Main, Florence	719 784-3411
Canon City Fire Station #1	1475 N. 15th. Canon City	719 275-8666
Canon City Fire Station #2	1349 Elm, Canon City	719 275-0601
Florence Fire Station	300 West Main, Florence	719 784-4848
Penrose Fire Station	Broadway, Penrose	719 784-4848
Deer Mountain Fire Station	6181 CR 28, Texas Creek	719 942-4444
Howard Fire Station	9856 Hwy 50, Howard	719 942-4833
Tallahassee Fire Station	662 Wapiti Trail, Tallahassee	719 275-7015
St. Thomas More Hospital	1338 Phay Ave., Canon City	719 269-2000
Water Treatment	103 Tunnel Drive, Canon City	719 269-9019
Water Treatment South Plant	500 CR 100, Coal Creek	719 784-0617
Water Treatment North Plant	312 Mica, Florence	
Water Treatment Plant	4218 CR 3A, Canon City	719 275-7507
Canon City Municipal Court	Justice Center Road, Canon City	719 276-5560
Fremont County Court	Justice Center Road, Canon City	719 269-0100
Airport	60298 Hwy 50, Penrose	719 784-3816
Electric Generating Station Commissioners	615 Macon, Canon City	

LAKE COUNTY

St. Vincent General Hospital	822 W. 4th St., Leadville	719 486-0230
Leadville Police Dept. (+ City Court)	800 Harrison Ave., Leadville	719 486-1365
Sheriffs Dept.	505 Harrison Ave., Leadville	719-486-1249
Fire Dept.	816 Harrison Ave., Leadville	719 486-2990
Water Treatment Plant	13867 Hwy 24, Leadville	719 486-2993
Water Treatment Plant (Evans Gulch)	551 CR 3, Leadville	719 486-1449
Lake County Court	505 Harrison Ave., Leadville	719 486-0993
County Commissioners	505 Harrison Ave., Leadville	719 486-0993

CHAFFEE COUNTY

Chaffee County Court	104 Crestone Ave., Salida	719 539-6031
Chaffee County Combined Courts	142 Crestone Ave., Salida	719 539-2561
Airport	9255 CR 140,	719 539-3720
Sheriff's Dept.	104 Crestone Ave., Salida	719 539-2596
Salida Police Dept.	125 E. 3rd., Salida	719 539-2596
Regional Medical Center	448 E. 1st St., Salida	719 539-6661
Buena Vista Public Safety Complex (Police, Sheriff, Fire, State Patrol)	123 Linderman Ave., Buena Vista	719 395-8654
Commissioners	104 Crestone Ave., Salida	719 539-2218
Water Treatment Plant	26200 CR 301, Buena Vista	719 395-8095
Water Treatment Plant	6608 CR 102, Salida	719 539-2448

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APPENDIX C: ACKNOWLEDGEMENTS

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Chaffee County Board of Commissioners
Custer County Board of Commissioners
Lake County Board of Commissioners
Tim Klco – Peak Designs
Steve Morrisey
Jerry Hurley
City of Canon City
Salida Chamber of Commerce
Arkansas Headwaters Recreation Area
Monarch Ski and Snowboard Area
Canon City Public Library
All local residents who participated in the Hazard Prioritization Survey

APPENDIX D: GLOSSARY OF TERMS

Acquisition of hazard-prone structures	Local governments can acquire lands in high hazard areas through conservation easements, purchase of development rights, or outright purchase of property.
Base Flood Elevation (BFE)	Elevation of the base flood in relation to a specified datum, such as the National Geodetic Vertical Datum of 1929. The Base Flood Elevation is used as a standard for the National Flood Insurance Program.
Benefit	Net project outcomes, usually defined in monetary terms. Benefits may include direct and indirect effects. For the purposes of conducting a benefit-cost analysis of proposed mitigation measures, benefits are limited to specific, measurable risk reduction factors, including a reduction in expected property losses (building, contents, and function) and protection of human life.
Benefit-Cost Analysis (BCA)	A systematic, quantitative method of comparing the projected benefits to projected costs of a project or policy. It is used as a measure of cost effectiveness.
Building	A structure that is walled and roofed, principally above ground and permanently affixed to a site. The term includes a manufactured home on a permanent foundation on which the wheel and axles carry no weight.
Capability assessment	An assessment that provides a description and analysis of a community or state's current capacity to address the threats associated with hazards. The capability assessment attempts to identify and evaluate existing policies, regulations, programs, and practices that positively or negatively affect the community or state's vulnerability to hazards or specific threats.
Coastal zone	The area along the shore where the ocean meets the land as the surface of the land rises above the ocean. This land/water interface includes barrier islands, estuaries, beaches, coastal wetlands, and land areas with direct drainage to the ocean.
Community Emergency Response Team (CERT)	CERT is the mechanism to establish, train and maintain a local cadre of residents to act as first responders in the event of an emergency. A CERT team is especially critical in the first three days following a disaster when conditions may prevent access by emergency response personnel.
Community Rating System (CRS)	CRS is a program that provides incentives for National Flood Insurance Program communities to complete activities that reduce flood hazard risk. When the community completes specified activities, the insurance premiums of these policyholders in communities are reduced.

Comprehensive plan	A document, also known as a "general plan," covering the entire geographic area of a community and expressing community goals and objectives. The plan lays out the vision, policies, and strategies for the future of the community, including all of the physical elements that will determine the community's future development. This plan can discuss the community's desired physical development, desired rate and quantity of growth, community character, transportation services, location of growth, and siting of public facilities and transportation. In most states, the comprehensive plan has no authority in and of itself, but serves as a guide for community decision-making.
Cost-Effectiveness	Cost-effectiveness is a key evaluation criterion for federal grant programs. Cost- effectiveness has several possible definitions, although for grant-making purposes FEMA defines a cost-effective project as one whose long-term benefits exceed its costs. That is, a project should prevent more expected damages than it costs initially to fund the effort. This is done to ensure that limited public funds are used in the most efficient manner possible. Benefit-cost analysis is one way to illustrate that a project is cost-effective.
Critical facilities	Facilities vital to the health, safety, and welfare of the population and that are especially important following hazard events. Critical facilities include, but are not limited to, shelters, police and fire stations, and hospitals.
Debris	The scattered remains of assets broken or destroyed in a hazard event. Debris caused by a wind or water hazard event can cause additional damage to other assets.
Disaster Mitigation Act of 2000 (DMA 2000)	DMA 2000 (Public Law 106-390) is the latest legislation to improve the planning process. Signed into law on October 30, 2000, this new legislation reinforces the importance of mitigation planning and emphasizes planning for disasters before they occur.
Earthquake	A sudden motion or trembling caused by a release of strain accumulated within or along the edge of the earth's tectonic plates.
Elevation of structures	Raising structures above the base flood elevation to protect structures located in areas prone to flooding.
Emergency response services	The actions of first responders such as firefighters, police, and other emergency services personnel at the scene of a hazard event. The first responders take appropriate action to contain the hazard, protect property, conduct search and rescue operations, provide mass care, and ensure public safety.
Federal Emergency Management Agency (FEMA)	Agency created in 1979 to provide a single point of accountability for all federal activities related to disaster mitigation and emergency preparedness, response, and recovery. FEMA is now part of the Department of Homeland Security.
Flood Hazard Area	The area on a map shown to be inundated by a flood of a given magnitude.

Flood Insurance Rate Map (FIRM)	Map of a community, prepared by FEMA, which shows both the special flood hazard areas and the risk premium zones applicable to the community under the National Flood insurance Program.
Flood Mitigation Assistance (FMA) Program	A program created as part of the National Flood Insurance Reform Act of 1994. FMA provides funding to assist communities and states in implementing actions that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other NFIP insurable structures, with a focus on repetitive loss properties.
Floodplain	Any land area, including watercourse, susceptible to partial or complete inundation by water from any source.
Flood proofing	Actions that prevent or minimize future flood damage. Making the areas below the anticipated flood level watertight or intentionally allowing floodwaters to enter the interior to equalize flood pressures are examples of flood proofing.
Flood Zone	A geographical area shown on a Flood Insurance Rate Map (FIRM) that reflects the severity or type of flooding in the area.
Goals	General guidelines that explain what you want to achieve. They are usually broad policy-type statements, long term in nature, and represent global visions.
Hazard	A source of potential danger or adverse condition.
Hazard Event	A specific occurrence of a particular type of hazard.
Hazard Identification	The process of identifying hazards that threaten an area.
Hazard information center	Information booths, publication kiosks, exhibits, etc. that display information to educate the public about hazards that affect the jurisdiction and hazard mitigation activities people can undertake.
Hazard Mitigation	Sustained actions taken to reduce or eliminate long-term risk from hazards and their effects.
Hazard Mitigation Grant Program (HMGP)	Authorized under Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, HMGP is administered by FEMA and provides grants to states, tribes, and local governments to implement hazard mitigation actions after a major disaster declaration. The purpose of the program is to reduce the loss of life and property due to natural disasters and to enable mitigation activities to be implemented as a community recovers from a disaster.
Hazard profile	A description of the physical characteristics of hazards and a determination of various descriptors, including magnitude, duration, frequency, probability, and extent. In most cases, a community can most easily use these descriptors when they are recorded and displayed as maps.
HAZUS, HAZUS-MH	A GIS-based, nationally standardized, loss estimation tool developed by FEMA. HAZUS-MH is the new multi-hazard version that includes earthquake, wind, hurricane, and flood loss estimate components.

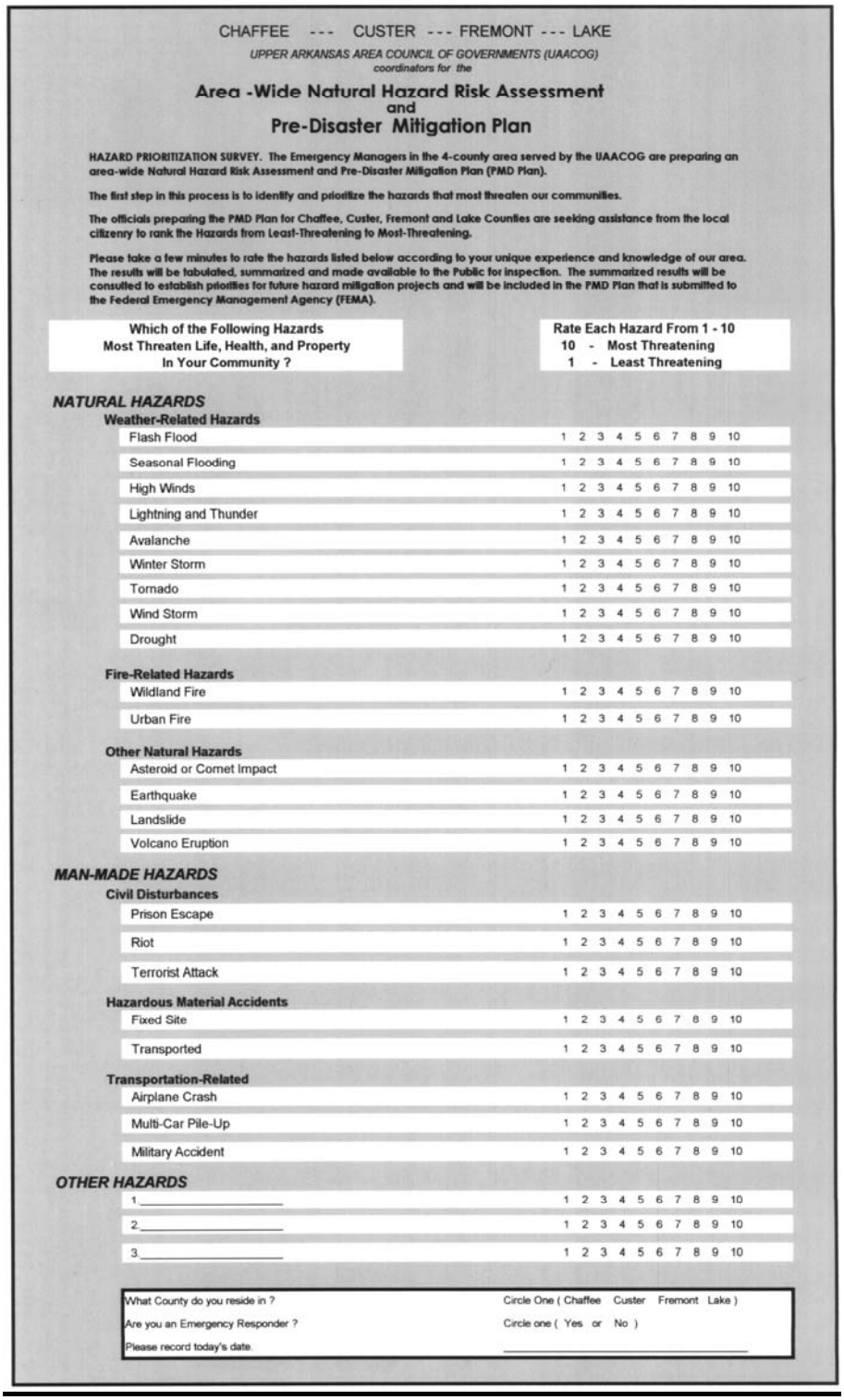
Hurricane	An intense tropical cyclone, formed in the atmosphere over warm ocean areas, in which wind speeds reach 74 miles per hour or more and blow in a large spiral around a relatively calm center or “eye”. Hurricanes develop over the north Atlantic Ocean, northeast Pacific Ocean, or the south Pacific Ocean east of 160ºE longitude. Hurricane circulation is counter-clockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere.
Infrastructure	Refers to the public services of a community that have a direct impact on the quality of life. Infrastructure includes communication technology, such as phone lines or Internet access; vital services, such as public water supplies and sewer treatment facilities; and an area's transportation system: airports, heliports, highways, bridges, tunnels, roadbeds, overpasses, railways, bridges, rail yards, depots; and waterways, canals, locks, seaports, ferries, harbors, drydocks, piers, and regional dams.
Landslide	Downward movement of a slope and materials under the force of gravity.
Loss estimation	Forecasts of human and economic impacts and property damage from future hazard events, based on current scientific and engineering knowledge.
Memorandum of Agreement (MOA)	A non-binding statement that defines the duties, responsibilities, and commitment of the different parties or individuals; provides a clear statement of values, principles, and goals; and establishes an organizational structure to assist in measuring and evaluating progress.
Mitigate	To cause something to become less harsh or hostile, to make less severe or painful.
Mitigation actions	Activities or projects that help achieve the goals and objectives of a mitigation plan.
Mitigation plan	The document that articulates results from the systematic process of identifying hazards and evaluating vulnerability, identifying goals, objectives and actions to reduce or eliminate the effects of identified hazards, and an implementation plan for carrying out the actions.
National Flood Insurance Program (NFIP)	Federal program created by Congress in 1968 that makes flood insurance available in communities that enact minimum floodplain management regulations in 44 CFR §60.3.
Objectives	Objectives define strategies or implementation steps to attain the identified goals. Unlike goals, objectives are specific and measurable.
Open space preservation	Preserving undeveloped areas from development through any number of methods, including low-density zoning, open space zoning, easements, or public or private acquisition. Open space preservation is a technique that can be used to prevent flood damage in flood-prone areas, land failures on steep slopes or liquefaction-prone soils, and can enhance the natural and beneficial functions of floodplains.

Ordinance	A term for a law or regulation adopted by a local government.
Planning	The act or process of making or carrying out plans; the establishment of goals, policies, and procedures for a social or economic unit.
Policy	A course of action or specific rule of conduct to be followed in achieving goals and objectives.
Post-disaster mitigation	Mitigation actions taken after a disaster has occurred, usually during recovery and reconstruction.
Post-disaster recovery ordinance	An ordinance authorizing certain governmental actions to be taken during the immediate aftermath of a hazard event to expedite implementation of recovery and reconstruction actions identified in a pre-event plan.
Post-disaster recovery planning	The process of planning those steps the jurisdiction will take to implement long-term reconstruction with a primary goal of mitigating its exposure to future hazards. The post-disaster recovery planning process can also involve coordination with other types of plans and agencies, but it is distinct from planning for emergency operations.
Preparedness	Actions that strengthen the capability of government, citizens, and communities to respond to disasters.
Probability	A statistical measure of the likelihood that a hazard event will occur.
Public education and outreach programs	Any campaign to make the public more aware of hazard mitigation and mitigation programs, including hazard information centers, mailings, public meetings, etc.
Recovery	The actions taken by an individual or community after a catastrophic event to restore order and lifelines in a community.
Regulation	Most states have granted local jurisdictions broad regulatory powers to enable the enactment and enforcement of ordinances that deal with public health, safety, and welfare. These include building codes, building inspections, zoning, floodplain and subdivision ordinances, and growth management initiatives.
Regulatory power	Local jurisdictions have the authority to regulate certain activities in their jurisdiction. With respect to mitigation planning, the focus is on such things as regulating land use development and construction through zoning, subdivision regulations, design standards, and floodplain regulations.
Relocation out of hazard areas	A mitigation technique that features the process of demolishing or moving a building to a new location outside the hazard area.
Resources	Resources include the people, materials, technologies, money, etc., required to implement strategies or processes. The costs of these resources are often included in a budget.
Response	The actions taken during an event to address immediate life and safety needs and to minimize further damage to properties.

Resolutions	Expressions of a governing body's opinion, will, or intention that can be executive or administrative in nature. Most planning documents must undergo a council resolution, which must be supported in an official vote by a majority of representatives to be adopted. Other methods of making a statement or announcement about a particular issue or topic include proclamations and declarations.
Risk	The estimated impact that a hazard would have on people, services, facilities, and structures in a community; the likelihood of a hazard event resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate, or low likelihood of sustaining damage above a particular threshold due to a specific type of hazard event. It also can be expressed in terms of potential monetary losses associated with the intensity of the hazard.
Stafford Act	The Robert T. Stafford Disaster Relief and Emergency Assistance Act, PL 100-107 was signed into law November 23, 1988 and amended the Disaster Relief Act of 1974, PL 93-288. The Stafford Act is the statutory authority for most federal disaster response activities, especially as they pertain to FEMA and its programs.
Stakeholder	Stakeholders are individuals or groups that will be affected in any way by an action or policy, including businesses, private organizations, and citizens.
State Hazard Mitigation Officer (SHMO)	The state government representative who is the primary point of contact with FEMA, other state and federal agencies, and local units of government in the planning and implementation of pre- and post-disaster mitigation activities.
Structural retrofitting	Modifying existing buildings and infrastructure to protect them from hazards.
Subdivision	The division of a tract of land into two or more lots for sale or development.
Subdivision and development regulations	Regulations and standards governing the division of land for development or sale. Subdivision regulations can control the configuration of parcels, set standards for developer-built infrastructure, and set standards for minimizing runoff, impervious surfaces, and sediment during development. They can be used to minimize exposure of buildings and infrastructure to hazards.
Tornado	A violently rotating column of air extending from a thunderstorm to the ground.
Vulnerability	Describes how exposed or susceptible an asset is to damage. Vulnerability depends on an asset's construction, contents, and the economic value of its functions. Like indirect damages, the vulnerability of one element of the community is often related to the vulnerability of another. For example, many businesses depend on uninterrupted electrical power—if an electric substation is flooded, it not only affects the substation but a number of businesses as well. Often, indirect effects can be much more widespread and damaging than direct ones.

Vulnerability assessment	The extent of injury and damage that may result from a hazard event of a given intensity in a given area. The vulnerability assessment should address the effects of hazard events on the existing and future built environment.
Wildfire	An uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming structures.
Zoning	The division of land within a local jurisdiction by local legislative regulation into zones of allowable types and intensities of land uses.
Zoning ordinance	Designation of allowable land use and intensities for a local jurisdiction. Zoning ordinances consist of two components: a zoning text and a zoning map.

APPENDIX E: PUBLIC SURVEY FORM



CHAFFEE --- CUSTER --- FREMONT --- LAKE

UPPER ARKANSAS AREA COUNCIL OF GOVERNMENTS (UAACOG)
coordinators for the

Area -Wide Natural Hazard Risk Assessment
and
Pre-Disaster Mitigation Plan

HAZARD PRIORITIZATION SURVEY. The Emergency Managers in the 4-county area served by the UAACOG are preparing an area-wide Natural Hazard Risk Assessment and Pre-Disaster Mitigation Plan (PMD Plan).

The first step in this process is to identify and prioritize the hazards that most threaten our communities.

The officials preparing the PMD Plan for Chaffee, Custer, Fremont and Lake Counties are seeking assistance from the local citizenry to rank the Hazards from Least-Threatening to Most-Threatening.

Please take a few minutes to rate the hazards listed below according to your unique experience and knowledge of our area. The results will be tabulated, summarized and made available to the Public for inspection. The summarized results will be consulted to establish priorities for future hazard mitigation projects and will be included in the PMD Plan that is submitted to the Federal Emergency Management Agency (FEMA).

Which of the Following Hazards Most Threaten Life, Health, and Property In Your Community ?	Rate Each Hazard From 1 - 10 10 - Most Threatening 1 - Least Threatening
NATURAL HAZARDS	
Weather-Related Hazards	
Flash Flood	1 2 3 4 5 6 7 8 9 10
Seasonal Flooding	1 2 3 4 5 6 7 8 9 10
High Winds	1 2 3 4 5 6 7 8 9 10
Lightning and Thunder	1 2 3 4 5 6 7 8 9 10
Avalanche	1 2 3 4 5 6 7 8 9 10
Winter Storm	1 2 3 4 5 6 7 8 9 10
Tornado	1 2 3 4 5 6 7 8 9 10
Wind Storm	1 2 3 4 5 6 7 8 9 10
Drought	1 2 3 4 5 6 7 8 9 10
Fire-Related Hazards	
Wildland Fire	1 2 3 4 5 6 7 8 9 10
Urban Fire	1 2 3 4 5 6 7 8 9 10
Other Natural Hazards	
Asteroid or Comet Impact	1 2 3 4 5 6 7 8 9 10
Earthquake	1 2 3 4 5 6 7 8 9 10
Landslide	1 2 3 4 5 6 7 8 9 10
Volcano Eruption	1 2 3 4 5 6 7 8 9 10
MAN-MADE HAZARDS	
Civil Disturbances	
Prison Escape	1 2 3 4 5 6 7 8 9 10
Riot	1 2 3 4 5 6 7 8 9 10
Terrorist Attack	1 2 3 4 5 6 7 8 9 10
Hazardous Material Accidents	
Fixed Site	1 2 3 4 5 6 7 8 9 10
Transported	1 2 3 4 5 6 7 8 9 10
Transportation-Related	
Airplane Crash	1 2 3 4 5 6 7 8 9 10
Multi-Car Pile-Up	1 2 3 4 5 6 7 8 9 10
Military Accident	1 2 3 4 5 6 7 8 9 10
OTHER HAZARDS	
1._____	1 2 3 4 5 6 7 8 9 10
2._____	1 2 3 4 5 6 7 8 9 10
3._____	1 2 3 4 5 6 7 8 9 10

What County do you reside in ?	Circle One (Chaffee Custer Fremont Lake)
Are you an Emergency Responder ?	Circle one (Yes or No)
Please record today's date.	_____

APPENDIX E: ADOPTIVE RESOLUTIONS

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